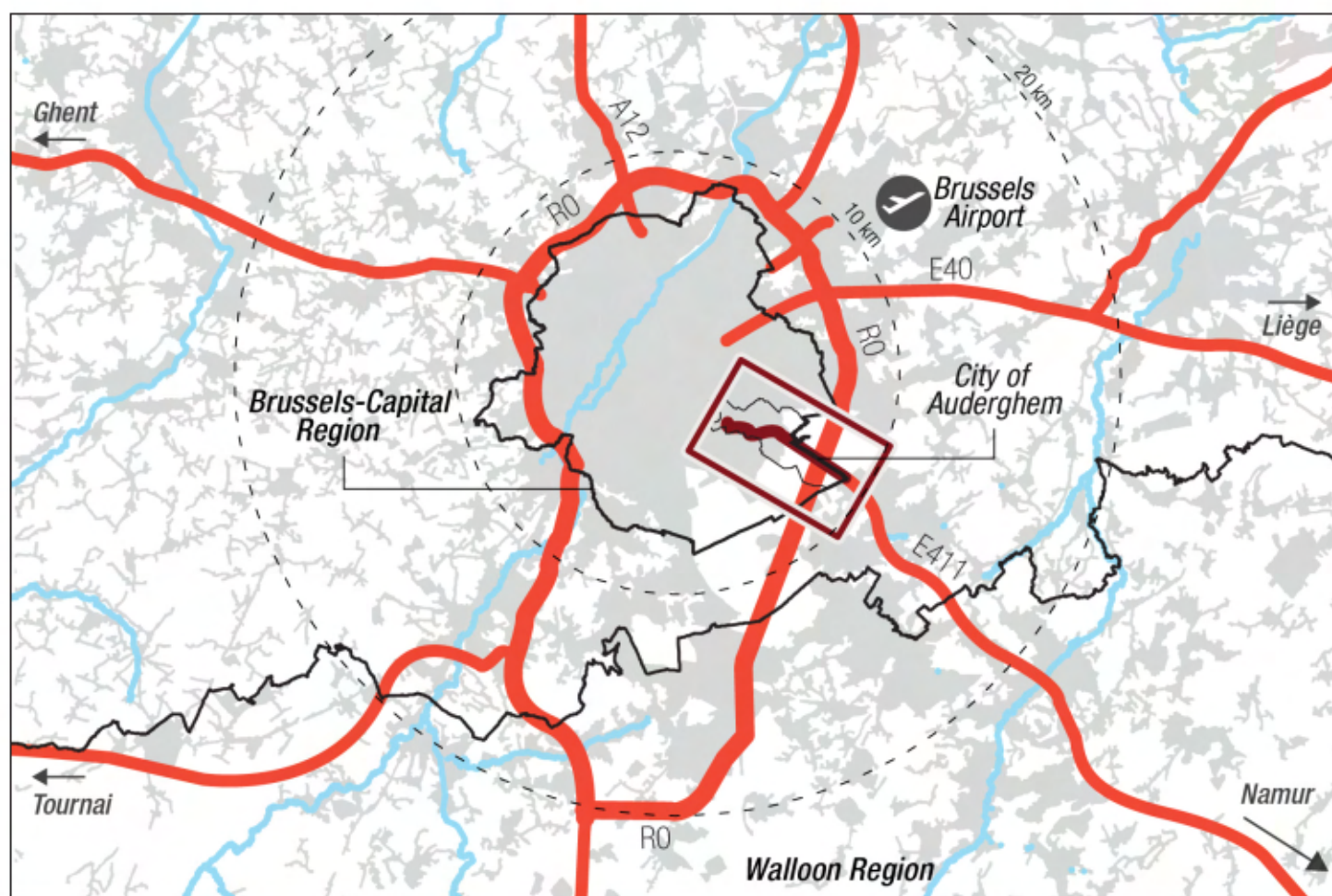


BRUSSELS. FROM EXPRESSWAYS TO AVENUES

THE DELTA/HERRMANN-DEBROUX PROJECT



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REGION

BRUSSELS

FROM EXPRESSWAYS TO AVENUES

THE DELTA/HERRMANN-DEBROUX PROJECT

Case Study Report for the METREX *From Roads to Streets* Expert Group
March 2022

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FOREWORD

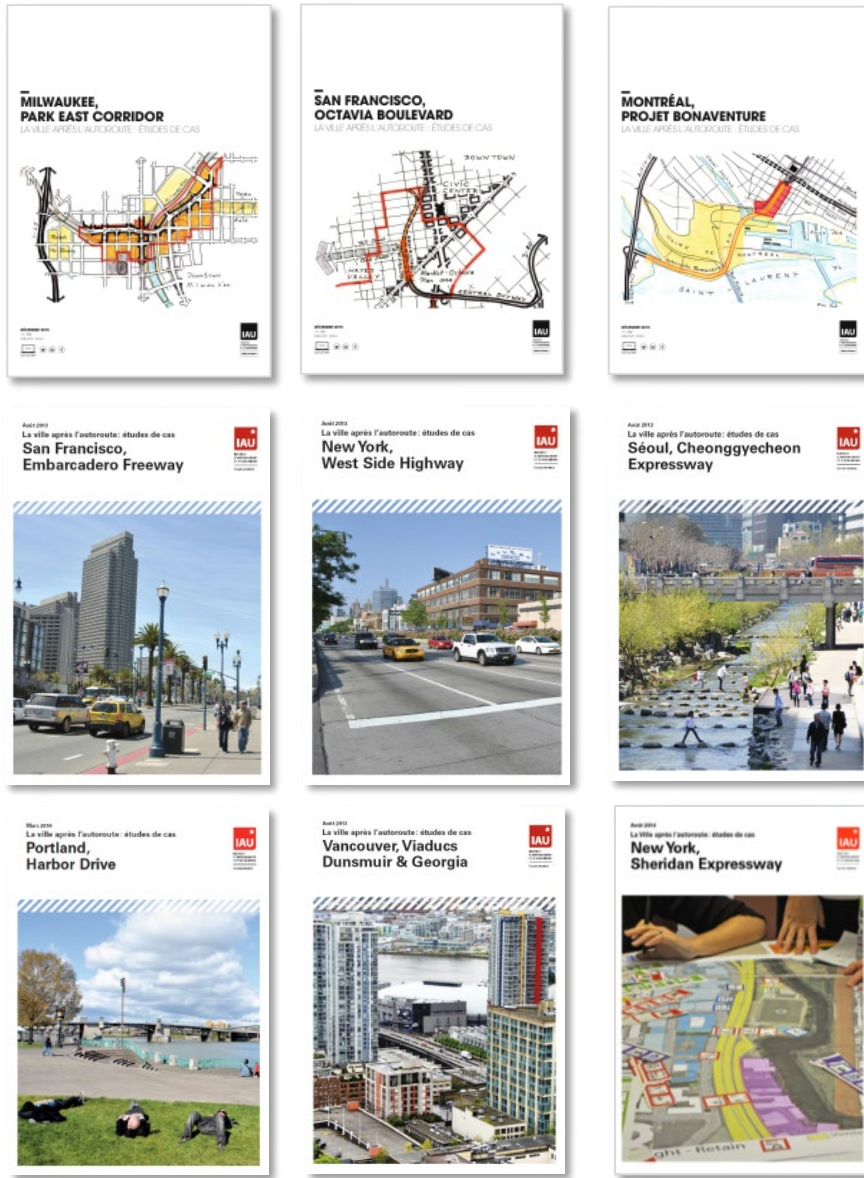
CONVERTING HIGHWAYS, RETHINKING CITIES

All over the world, cities and regions are confronted with the heritage of extensive networks of highways and their fragmented (sub) urban landscapes. As they are out there, they tend to be used: so these major road infrastructure systems play a role in moving people and goods within metropolitan areas, although if they may not be the most efficient way to do the job.

Segregated highways with interchanges create physical barriers within the cities and in their fringes; they limit pedestrian and bicycle movement and sever access to waterfronts and nature; they reinforce the social deprivation of roadside housing neighbourhoods and hinder regeneration efforts. The high volumes of traffic these highways promote generates noise, dust and air pollution, raising health and social justice issues. By providing seemingly easy access for cars and heavy-goods vehicles, extensive highways networks generally tend to encourage car-centric lifestyles, urban sprawl, mono-functional uses of space which in the end leads to more traffic and congestion.

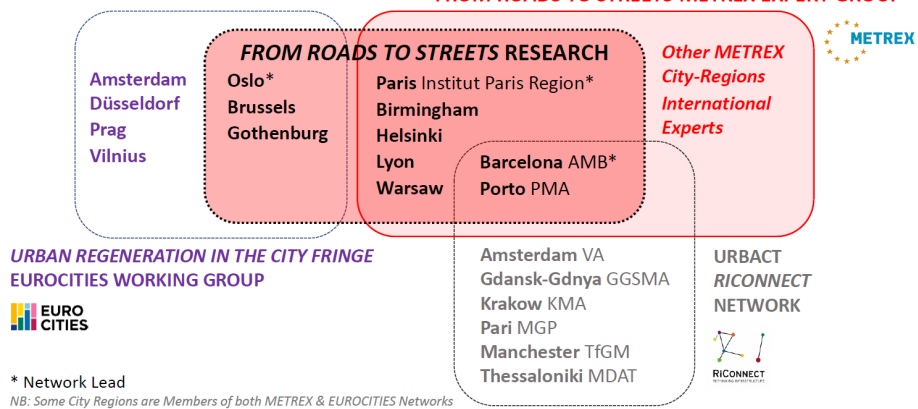
In the last decade, social and economic patterns have changed, resulting in growing aspirations for the vibrancy of city life and car-free living in denser, mix-use neighbourhoods served by more flexible, multi-use and greener public spaces, while keeping in close contact with nature. Cities and metropolitan regions respond to these trends by redeveloping former industrial areas and car-oriented urban fringe with more intensive land-uses, with the support of new metro, tramway or expressbus lines. These projects are increasingly becoming catalysts of green development strategies; sustainable urban mobility plans and climate-neutral policies.

The in-Covid and post-Covid contexts reflect a rapid and significant change in mobility, housing, working and leisure patterns, opening a new window of opportunity to reset our urban development and transport models. Highway transformation can help transitioning cities and regions towards more liveable, just and climate-neutral development patterns.



International case study reports on highway transformation
© L'Institut Paris Region

FROM ROADS TO STREETS METREX EXPERT GROUP



The METREX EUROCIITIES URBACT *From Roads to Streets* Learning Platform in March 2022
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Learning from international experience

Many cities –including Portland, New York, Seoul and, recently, Paris– have successfully removed or transformed stretches of urban highways, replacing them with multi-use boulevards lined with mixed-use new development or even new linear parks and promenades. Why are they doing that? What happens with the traffic? What are the benefits and costs? Do these projects get public support?

To find answers to these kind of questions and inform ongoing projects and reflections in the Paris region, I initiated in 2010 a long-term research programme on *Metropolitan Avenues*¹ at the *Institut Paris Region*, the urban planning and environmental agency for the Paris metropolitan region².

As part of the programme, over twenty highway-to-boulevard experiences on three continents (America, Asia and Europe) were examined. Of these, nine cases were studied in depth on-site, with their reports published in French:

- Seoul *Cheeonggyecheon Expressway* (2013)
- San Francisco *Embarcadero Freeway* (2013)
- Vancouver *Viaducts* (2013)
- New York *Westside Highway* (2013)
- Portland *Harbor Drive* (2014)
- New York *Sheridan Expressway* (2014)
- San Francisco *Octavia Boulevard* (2016)
- Milwaukee *Park East Corridor* (2016)
- Montréal *Projet Bonaventure* (2016)

The most significant result from this research is that these strategic metropolitan projects are complex and conflictual, but have long-term positive impacts on traffic and mobility, city regeneration and the quality of the urban environment, often far beyond the project boundaries. Some results in English can be found in a paper called *Reinventing Cities: From Urban Highway to Living Space*³ (2018) reproduced in the Appendix of this report.

This research has influenced projects in France, including the Paris Seine Banks pedestrianisation (2016) and the ongoing reflections on the future of the Paris Périphérique and the region's highways, with one of the first steps being the organisation of an International Competition on the *Future of Grand Paris's Highways* in 2018⁴.

The METREX-led *From Roads to Street* joint learning platform

In March 2020, METREX, the Network of European Metropolitan Regions and Areas, launched a “*From Roads to Streets*” expert group to serve as a platform for the exchange of knowledge and experience on the transformation of urban highways into city streets (places to move, to stay, to live and to work in), as “*a key measure to transform the urban fringes of metropolitan cities and regions*”⁵. The Institut Paris Region as lead partner.

The METREX *From Roads to Street* group works in close cooperation and support of the EURO CITIES *Urban Regeneration in the City Fringe*⁶ working group. This group was created in April 2020 with eight participating cities: Amsterdam, Brussels, Düsseldorf, Lyon, Prag, Vilnius, Göteborg and Oslo as the lead partner⁷. The purpose of this group is to exchange experiences on the conditions and methods for transforming urban fringes in three main directions: overcoming highway barriers, creating high quality public spaces, and managing radical land-use mix.

¹ *Avenues métropolitaines*. <https://en.institutparisregion.fr/know-how/international/rethinking-post-carbon-cities.html>

² Formerly Institut d'Aménagement et d'Urbanisme de la Région Île-de-France (IAU ÎdF). <https://en.institutparisregion.fr/>

³ Urban Design #147, Urban Design Group UK, Summer 2018

⁴ *Les Routes du futur du Grand Paris*, Forum Métropolitain du Grand Paris, Apur, Institut Paris Region, 2019.

⁵ Henk Bouwman, General Secretary of METREX. www.eurometrex.org

⁶ *Edge of Centre Transformation II, Urban Regeneration in the City Fringe*, EURO CITIES, April 2020.

⁷ Pernille Grimeland Røsvik, Project leader, with Jørn Roar Moe, Head of Planning and Peter Austin, Planning Advisor, City of Oslo.

The METREX *From Roads to Street* group aims specifically to further investigate the question of why and how converting traffic-oriented highways into streets could contribute to an environmentally friendly mobility, help design walkable, safe, socially balanced neighbourhoods, and be a driver for the revitalisation and intensification of fragmented, mono-functional, city fringes. The group draws upon the experience and expertise of its members in this field, and brings a regional, wide angle, perspective in the discussion.

Both METREX and EUROCITIES groups work in collaboration with a third network, the URBACT III '*RiConnect*' action planning network, which consists of eight metropolitan and transport authorities: Porto Metropolitan Area, Gdansk-Gdynia-Sopot Region, Krakow Metro Region, Thessaloniki Region, Amsterdam Regional Transport Authority, Grand Paris Metropole, Transport for Greater Manchester, with the Barcelona Metropolitan Area (AMB) as the lead partner⁸. *RiConnect* proposes rethinking the mobility infrastructure in combination with metropolitan and local planning, to reconnect people, neighbourhoods, cities, and natural spaces.

These three networks are joining forces to share knowledge, experience, and expertise on these complex issues, in order to strengthen strategic and creative planning capacities of cities and regions. The idea is for planners from different horizons both "*to learn through examples, discussions and presentation of projects*" and "*to learn by doing, through participation of group members in the local reflection and planning processes*"⁹.

The European Union's policies, together with national government strategies, plays a major role in the planning, programming, and financing of highway networks in our cities and regions. The joint reflection of the three networks aims at raising their awareness of the social and environmental impacts of these policies and the need to shift funding streams towards their environmental integration and urban transformation.

The networks' joint learning platform relies on a series of events, both online and on site, such as peer to peer cooperation workshops; multi-actor transnational seminars; site visits; hands-on studios; as well as *ad hoc* and partner conferences.

The common work programme of the networks will cover a period of three years, with a final international conference anticipated in 2023 and intermediate events planned in 2021 and 2022.

A case study-based learning process

The knowledge-based learning process is based on case studies of ongoing projects of highway transformation in different European partner cities. In-depth analysis and transverse comparisons are crucial to get a common understanding of local issues, strategies, planning approaches, reflections, and conflicts. Comparing scales, ambitions, framework policies, planning processes, and delivery instruments, can nurture the creative thinking of professionals from all networks to help find innovative and bold answers to the questions raised.

To trigger the process, the Institut Paris Region initiated a comprehensive research based on the voluntary participation from cities and regions as part in one of the three networks.

In 2020-2021, four case studies of urban and highway transformation projects have been analysed with the help of local colleagues (many thanks to all contributors!) with three research reports published in December 2020:

- Helsinki. *City Boulevards Strategy and Projects*
- Oslo. *Rethinking City Fringe Highways. Hovinbyen and Østre Aker Vei Projects*
- Lyon. *Regaining the Riverfront. Transforming M6/M7 Highway Corridor*

The current Brussels report, *From Expressways to Avenues. Delta / Herrmann-Debroux Project*, now available too (March 2022).

Reports are written, illustrated, and mapped in way that can help understanding the local conditions, comparing projects together and learning from them.

⁸ Joan Caba, Project Leader, Urban Planning Department, Barcelona Metropolitan Area.

⁹ *Urban Regeneration in the City Fringe Project Plan*, EUROCITIES-City of Oslo, March 2020. Revised Sept. 2020.

The reports share the same framework:

- Background: geo-historic context; current issues
- Strategies: urban regeneration and mobility; climate-neutrality
- Project: highway transformation planning and delivery
- Discussion: questions and suggestions about the strategy and project
- Takeaways: first learnings to fuel discussions of the working groups

On top of these four cases, L'Institut Paris Region has started to document and map highway transformation ongoing processes in eight other cities and regions in Europe:

- Barcelona. *C-245 Road Integration Project/Busway 8*
- Birmingham. *Breaking the Concrete Collar A38/Snowhill Master Plan*
- Gothenburg. *Dag-Hammarskjöld Boulevard/Frolunda Project*
- Porto, *N12 Ring Road Improvement Project*
- Warsaw, *John Paul II Avenue Project*
- Prag. *Chlumecka Highway Transformation*
- Nantes. *A831 Conversion/Busway 4 Boulevard*
- Paris. *A186 Removal/T1 Tram Boulevard Project*

Takeaways from these cases studies, from further research and from the hands-on workshops should fuel discussions and hopefully shape our work agenda for years to come.

The current report is about Brussels-Capital Region's strategy to convert expressways and heavy-traffic roads into urban avenues and boulevards as part of its sustainable long term development plan. It is in particular about the process of transforming the Delta/Hermann-Debroux E411 highway corridor into a pedestrian-friendly boulevard stimulating a change in land use, from a monofunctional, car-oriented, environment, to mix-use, intensive, diverse urban district.

I hope you will find food for thought and action in this report.

Paul Lecroart
Chair of the METREX *From Roads to Streets* Expert Group
March 2022



Urban Boulevards are the Backbone of Brussels Spatial Structure.
Brussels Capital Region Exhibition in 2012 © Photo Paul Lacroart Institut Paris Region

BRUSSELS

FROM EXPRESSWAYS TO AVENUES

THE DELTA/HERRMANN-DEBROUX PROJECT

With a population of 1.2 million, the Brussels-Capital Region is the European Union (EU) Capital and one of Europe's major metropolitan hubs; it lies at the heart of a metropolitan region of over 2.7 million residents living across the Capital Region and the two provinces of Flemish Brabant (Landers Region) and the Walloon Brabant (Wallon Region). The Capital Region is made up of 19 municipalities, the largest being the City of Brussels (180,000 residents).

This area's strategic location in the western part of the continent – at close distance from neighbouring countries such as France, the Netherlands and Germany – has facilitated the development of a significant highway network from the 1950s onwards, both inside and outside the Brussels Ring highway, which is still widely used today for both local and transit traffic purposes.

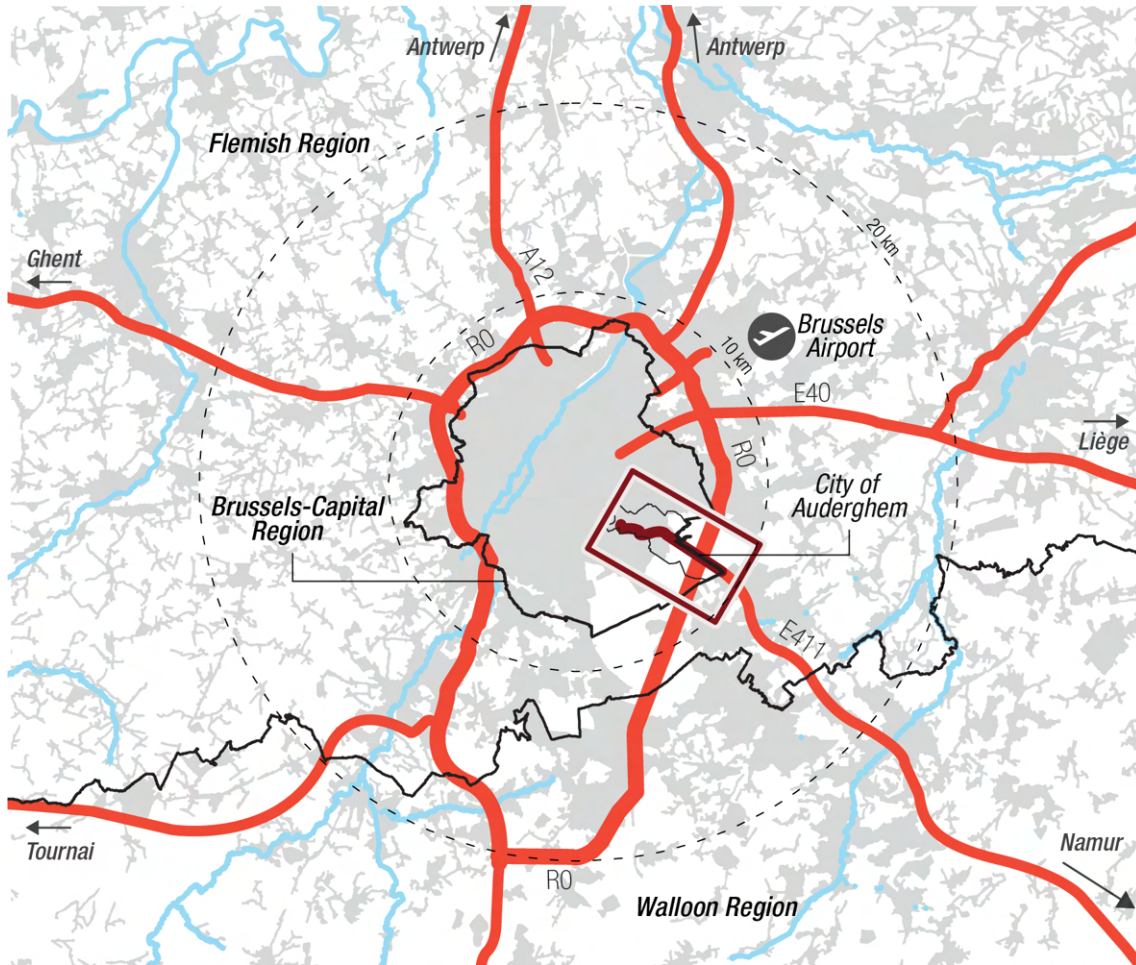
Recognising the significant social and environmental damages generated by car-based urban planning and mobility, Brussels-Capital's officials have recently vowed to transform the highways penetrating within the city-region's close periphery into urban boulevards. This effort is part of a wider urban development strategy, which seeks to concentrate future metropolitan growth in selected priority mix-use urban centres, including some areas on the urban fringe.

The Delta/Herrmann-Debroux highway corridor is one of such areas, located at the South-East of the Brussels' Region in the municipality of Auderghem (Ouderghen in Flemish) next to the boundary with the Flemish Brabant Region. Until today, the development the area has been largely shaped and partly undermined by the presence of a major segregated motorway known as the E411.

Brussels-Capital Region's plan for the sector, the Delta/Herrmann-Debroux Sustainable Development Plan (PAD), should be approved in 2022. It aims to transform the E411 highway into a multimodal boulevard as well as to reconvert the adjacent sites into a people-oriented vibrant urban area.



The E411 highway in Auderghem, snaking its way towards central Brussels.
© DR



Brussels' metropolitan region showing the motorway network and the E411 highway project area
 © L'Institut Paris Région



Key data for Brussels
 Sources: Perspective.Brussels, Environment.Brussels, Eurostat 2016

1. Background: Brussels, A Highway-City?

1.1. Post-war planning in Brussels

During the second half of the 20th Century, Brussels has developed and expanded as a car-oriented city. The rapid emergence of express roads after World War II coincided with the unprecedented democratisation of car use across the entire country over the period: between 1950 and 1960, car ownership rates increased by 175%¹⁰ in Belgium. As a result, post-war planning policies in Brussels largely sought to adapt the city's existing street network to the demands of a car-oriented lifestyle. Such policies have generated major impacts on the city's structure and design, with marks that are still visible today.

Brussels' current infrastructure network finds its roots in the so-called '*Modernisation programme for Belgium and Brussels' road network*' developed by Henri Hondermacq in 1949. Hondermacq, a prominent engineer working at the Ministry of Public Works and Reconstruction's Road Administration department, aimed to transform the Belgian capital into one of Europe's most important crossroads. To accommodate for the projected increase in vehicles transiting through and penetrating into Brussels, the programme advocated for an increase in the capacity of radial road arteries as well as for the construction of a new network of ring roads. Through such developments, it was argued, Brussels would be able to cement its strategic role as "*The Crossroads of Western Europe*".



"Brussels –A European Crossroads":

Poster produced by the Belgian Ministry of Public Works and Reconstruction in 1956.

Source : Hubert (2008)

Construction of Brussels' urban motorway network during the 1950s and 1960s was facilitated by Expo 1958, the first major International Exhibition to take place after the Second World War. Expo' 58 provided the political impetus and the financial means needed to "modernise" many existing streets and boulevards to the requirements of car-based mobility. A striking example of such construction works is the rapid transformation of the city centre boulevard ring, known as the "Pentagon": in just three years, the boulevards were stripped away from their tree line promenade and horse-ride lanes, replaced by a sort of urban expressway with underpasses or viaducts, now known as Ring 20 (R20).

¹⁰ HUBERT, Michel. (2008), p.3



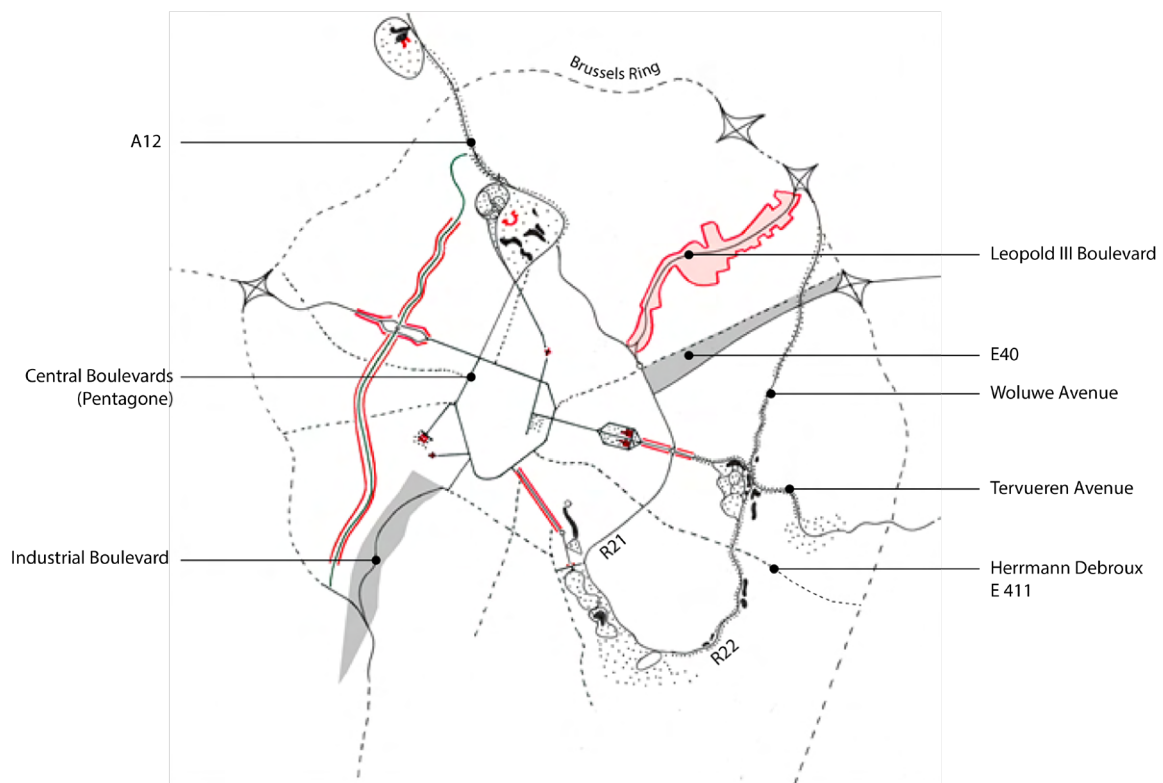
A urban boulevard axis transformed into an expressway in central Brussels for the 1958 Exhibition (Léopold Boulevard top, Anvers Boulevard bottom). The viaduct was replaced by a tunnel in the 1980s and refurbished in the 2020s.
 © Coll. CIVA Stichting - Sint-Lukasarchie

The construction of penetrating highways right into the city gave an opportunity to restructure the “roadscape”¹¹ with the brutal renovation of 19th century neighbourhoods -often replaced by modernist tower blocks surrounded by parking lots and green space. Road change and urban change went hand-in-hand, with the private sector playing a major part in this piecemeal transformation of the city-region.

Three main types of urban expressway development can be distinguished¹²: (1) the ‘modernisation’ of 19th and early 20th centuries boulevards and parkways such as A12 or the Avenue de Tervuren (hatched on map below), (2) city highways designed as modernist urban projects, such as the Boulevard Léopold III (pink area), (3) motorway axes built in places with little or no urbanisation in the 1970s such as E40, the Boulevard Industriel and Hermann-Debroux (E411).

At the end of the 1960 a first section of Brussels’ outer ring motorway, the Ring 0 (R0) was started, even though this infrastructure was only completed in 1978. The R0 was never really finalised due to opposition and looks more today like an oval than a ring. The south-eastern section cutting across the Soignes Forest is an existing road upgraded into an expressway and has sharp curbs, narrow hard shoulder and reduced speed limits. It totals 76 kilometres mostly outside the Brussels Region.

Until the federalization process of the Belgian state, the creation of the Brussels’ Agglomeration in 1971 and the Brussels-Capital Region in 1989, regional planning was mostly in the hands of the national government which according to some experts “promoted the rapid transformation of the city to the detriment of its traditional structure and largely against the wishes of the inhabitants”¹³. Car-oriented planning policies led to the brutal destruction of Brussel’s urban and architectural heritage and the development of functional urban car-based zoning plans, a process referred to in Europe as “bruxellisation”. The top-down brutalist planning prevailing in Brussels until the 1990s, combined with the urban sprawl and decentralisation of jobs occurring in Flemish and Walloon outer suburbs, encouraged a dominant reliance on car-use at the macro-regional level.



Brussels’ boulevards network was ‘modernised’ in the 1960s and 1970s.

© Karbon Architecture & Urbanisme, *Projet Parkway E40*, 2014

¹¹ Géry Leloutre et Claire Pelgrims, *Le roadscape bruxellois*, sd.

¹² Géry Leloutre (2020), *La transformation moderne de Bruxelles*, Thèse de doctorat, Faculté d’architecture de l’ULB, pp 327-335

¹³ Hein, 2006: p. 240.



The E411 in construction in the early 1970s brutally cutting across Auderghems' residential neighbourhoods. Above, the Demey-Beaulieu area along the railtracks. Bottom, the Beaulieu metro station built in the median of the highway with STIB Delta area in the background.

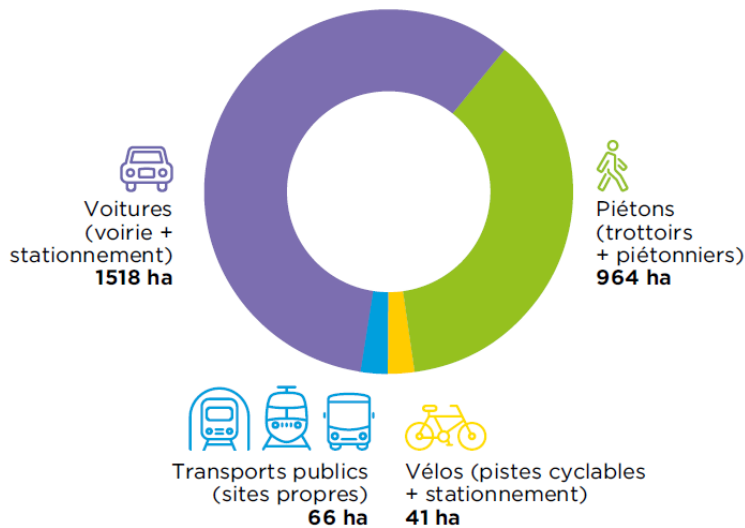
© Ministère des Travaux Publics, Bruxelles.

1.2. The Capital-Region Today: Mobility as a Strategic Issue

Today, the city-region's modal split is still dominated by private car (46%), while other modes of transportation are limited to 24% each for walking and public transport, and 6% for cycling.

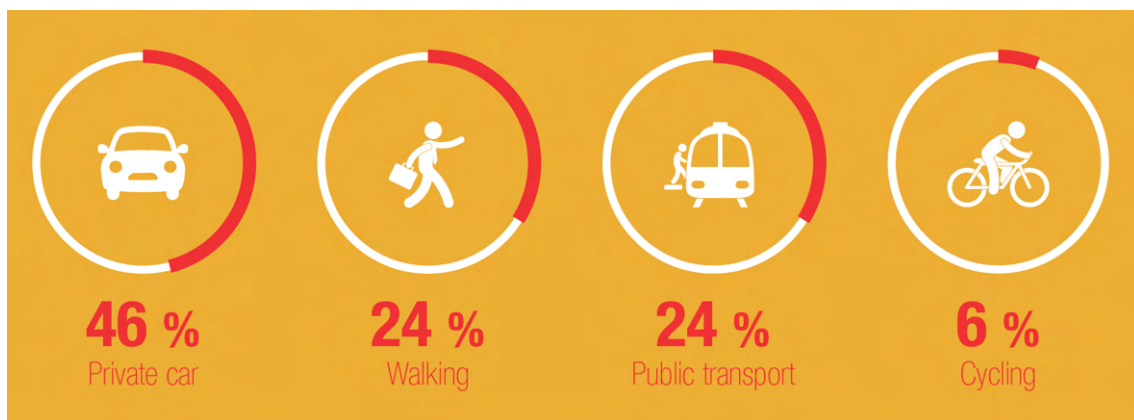
This predominance of car-based mobility exerts adverse environmental consequences at regional scale, with road transportation being the second source of pollution responsible for 27% of total greenhouse emissions, just second to residential¹⁴. Road-based transportation is in particular responsible for 69% of the region's NO₂ emissions in 2015, whose level is, since 2010, in infraction with European norms. Car-use is much higher at the scale of the functional macro-region. Cars occupy a large part of the Region's street space at the expense of other forms of mobility: 58% of street space is dedicated to motorised vehicles in 2014.

Reliance on alternative modes of transportation than car could probably be developed among Brussels-Capital's residents, with 45% of households owning a car, almost 40% owning a bicycle (compared to 75% in the periphery) and less than half of the population benefiting from a subscription for the STIB public transportation network¹⁵. However, 63% of all trips which have their origin or destination in Brussels-Capital rely on private cars, highlighting the pressure exerted on the region's street network by commuters living outside the regional boundaries.



Street space dedicated to each mobility form (in hectares) within the RBC, in 2014

Source : Cahier n°5 de l'Observatoire Bruxellois de la mobilité – Calculations by Thomas Emans USL-B CES (in Brussels' Goodmove Plan)



Modal split in the Brussels Capital-Region

© Environment.Brussels (2017; 2019)

¹⁴ Brussels-Capital Region (2020), *Plan Régional de Mobilité*.

¹⁵ Brussels-Capital Region (2018) *Plan Régional de Développement Durable*.

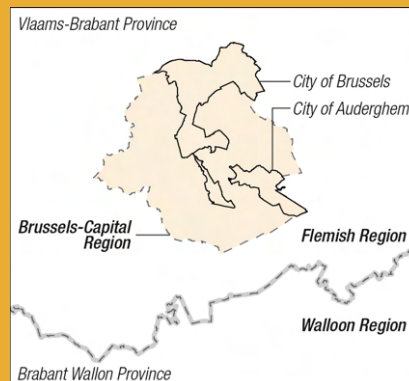
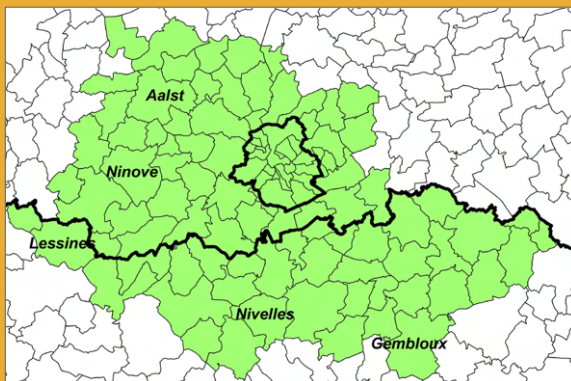
Planning and Governance in Brussels' Metropolitan Area

In the heart of a densely populated polycentric network of cities known as the Belgian Urban Network (RUB), Brussels is the capital of the European Union with EU and international institutions concentrated in the city, mainly in the Léopold Quarter. With only 33 square kilometres and about 180,000 inhabitants, the City of Brussels is a small municipality, in charge of basic infrastructure, social services and local planning.

Strategic and overall planning powers are in the hands of the Brussels-Capital Region which covers the central part of the urban area. One of Belgium's three autonomous federal regions, Brussels-Capital Region was initially established in 1989. It unites 19 municipalities and is in charge of the regional sustainable urban masterplan (*Plan Régional de Développement Durable*) as well housing policies, mobility strategies and transport policy, environment and energy policies.

With just over 161 km² and 1.2 million inhabitants, Brussels-Capital boundaries leave a large part of the functional metropolitan region outside its limits. Over 1.15 million people live in Flemish Brabant and over 400,000 in Walloon Brabant, and the total urban area is of over 3350 km². There is no formal metropolitan authority at this scale.

However since 2012 an Interregional Planning Information Forum serves as communication platform for the administrations of the three regions. Brussels-Capital Region also cooperates with the Walloon and the Flemish regions on strategic redevelopment sites (such as the former NATO site) and on transregional programmes such as the restructuring of the Brussels Ring Highway. The E411 project has its last stretch in the Brussels Region (municipality of Auderghem) but the highway crosses Flanders: there is no formal cooperation between the two regions on the project.

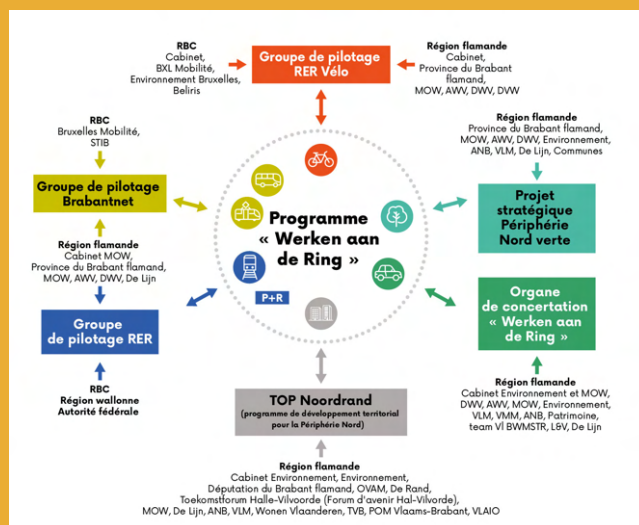


Left: Brussels' Functional Urban Region (Job basin definition) with regional and municipal boundaries

© Thomas I. & al. in *Belgeo*, 1-2, 2012

Right: Brussels Capital Region with municipalities of Brussels and Auderghem, home to the E411 highway

© Institut Paris Region



Complexity of the interregional cooperation framework for the Brussels Ring Project (see following page).

© *Werken an de Ring*/Flemish Region

The Brussels Ring R0 Highway Project



The Brussels Ring Highway project where three sections are planned with new bike and public transport connections © Werken an de Ring/Flemish Region

Running mostly outside the Capital-Region's boundaries, both in the Flanders and the Walloon regions, the Brussels Ring Highway (R0) is 65 years-old now and some unsafe and dysfunctional sections need to be partly restructured. The Ring is a barrier to pedestrian, bike and public transport movement, as well as for natural systems.

An ambitious umbrella-project called *Werken Aan de Ring* (Working on the Ring) was approved by the Flemish government in 2019 and is currently underway. The restructuring of the Ring aims at improving quality of life around the highway (noise, landscapes, eco-systems) and reinforcing the traffic flow capacity on the Ring and enhancing multimodal mobility, with new bike and public transport connections. These goals are gradually implemented through a series of 20-or so sub-projects. However, adding more capacity to the Ring may not align with the need to reduce car-traffic in the metropolitan region.

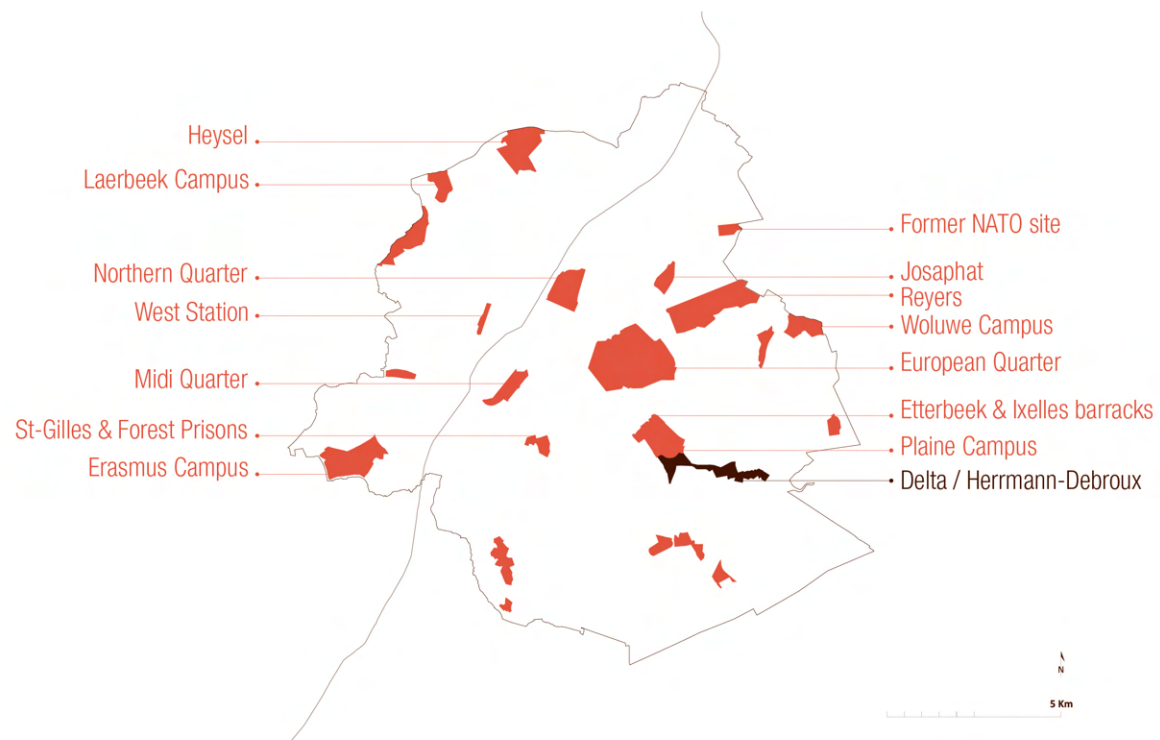
2. Highways in Brussels' Regional Strategies

2.1. The Region's Sustainable Development Plan (PRDD)

The Herrmann-Debroux E411 transformation project fits in the Brussels-Capital Region's strategy, which is defined in a key document known as the Regional Sustainable Development Plan (PRDD or *Plan Régional de Développement Durable*). Adopted in 2018, this strategic document to 2050, is structured around four main objectives:

- Structuring future territorial development and developing new districts,
- Fostering a sustainable, pleasant and attractive living environment,
- Promoting urban economic development,
- Encouraging multimodal forms of mobility.

The first goal identified by the PRDD identifies the key areas of the Brussels-Capital Region where future demographic growth and urban densification should concentrate. In order to encourage regional polycentricism, the region devises more precisely twelve "Priority Development Nodes", which are subject to a comprehensive development strategy aiming at creating new quality centres. New regeneration areas should be mixed-use, "offering housing, public facilities, activities, green spaces"¹⁶.



Delta/Herrmann-Debroux within the Priority Development Areas identified by the Brussels-Capital Region
© Perspective.Brussels (translated into English)

The priority development areas identified in the 2018 Regional Development Plan are not entirely new: First announced in the Brussels International Development Plan (PDI 2007), the Regional Policy Declaration of Brussels-Capital's Government (2014) had identified 10 strategic development areas, which roughly coincided with the 12 current priority areas. The Delta/Herrmann Debroux area, subject of this highway transformation case study, was then identified as the Pôle Delta-Souverain.

¹⁶ Brussels-Capital Region (2018) *Plan Régional de Développement Durable*.

2.2. Transforming Highway Spurs: A Strategic Objective

Since the 1990s, Brussels-Capital Region has tried to encourage a modal shift by planning for urban intensification, improving the regional public transport (including the regional express train network RER), and promoting traffic calming features in most neighbourhoods. Since the mid-2010s, Brussels has also largely extended its city-centre pedestrian zone and developed an extensive regional bike policy.

Transforming motorway-like roads into multimodal urban boulevards is now a key component of Brussels' regional mobility and urban re-development strategy. The Region is committed to transform the highway corridors within its boundaries into city boulevards.

Six penetrating highways or heavy-traffic roads inside the Ring R0 should gradually be converted by 2030 into high-capacity multimodal boulevards within urban intensification corridors -clockwise (see map p.22):

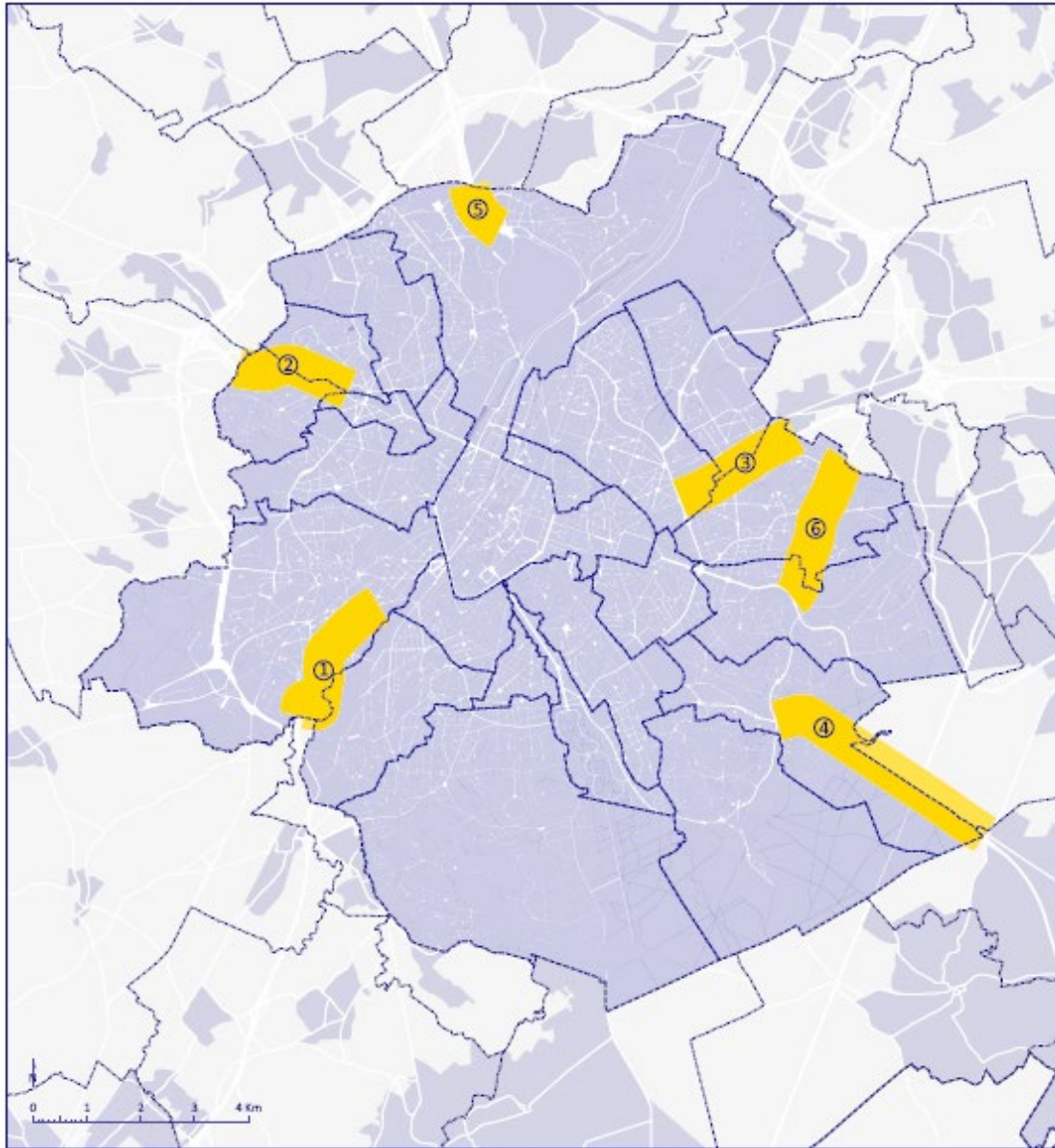
- The E19 (Mons highway) Industrial Boulevard,
- The western E40 (Gand highway) Charles Quint Avenue,
- The eastern E40 (Reyers) motorway conversion and Mediapark project (see Box),
- The A12 (Heysel Hub) motorway,
- The Woluwe Boulevard improvement,
- The E411 Delta/Hermann-Debroux transformation, subject of the current report.

Two highway sections within the Brussels Region, the E40 (see Box) and the A12, have already been decommissioned to this effect in 2019. For the A12, for example, it is planned to reduce the number of lanes from six to four lanes. This should include the creation of a transit parking area and a green space. All highway transformation projects will require reducing speed limits: in the case of A12, from 120 km/h before, to 50 km/h after.



The eastern E40 motorway penetrating Brussels, looking out towards Leuven (Louvain, Flanders) and the Ring 0 motorway. E40 is supposed to slowly evolve into an urban boulevard, but may keep its expressway features.

© Paul Lecroart, Institut Paris Region



Axes pénétrants 21 Invalswegen

Limite régionale		Gewestgrens	E411		E411
Limite communale		Gemeentegrens	A12		A12
Réseau viaire		Wegennet	Boulevard de la Woluwe		Woluwelaan
Axe pénétrant à transformer en boulevard urbain		Invalsweg om te vormen tot stadsboulevard			
E19 (Mons-Boulevard Industriel)		E19 (Bergen-Industrielaan)			
E40 (Gand-Charles Quint)		E40 (Gent-Kelzer Karellaan)			
E40 (Reyers)		E40 (Reyers)			

Highway Spurs (Axes Pénétrants) to be transformed into boulevards identified in the Sustainable Development Regional Plan (PRDD). The E411 Delta/Hermann-Debroux project is #4.

© Plan Régional de Développement Durable. Perspective.brussels

2.3. Mobility Strategy: the *Good Move Plan*

Brussels-Capital, with the support of its *Bruxelles Mobilité* Agency, has set up a movement strategy aimed at reducing the importance of car-based trips within its regional territory, but also at the interregional scale. Such a strategy is developed both in the Regional Master Plan (PRDD) and in the Regional Mobility Plan known as “*Good Move*” (*Plan Régional de Mobilité*, PRM), approved in March 2020, focuses on the target years 2020-2030. The main objective is to encourage the trend of reduction in car-use that has occurred since 1999. The goal for 2030 is for 25% of car-use within the Brussel Region.

In addition to the transformation of the six penetrating highways proposed in the regional spatial plan, these goals are to be achieved by the implementation following measures:

- Developing a strong public transportation network, including the finalisation of the S Regional Express Rail network (RER) that should be fully operational by 2025 (4 trains/hour in every Brussels station),
- Encouraging cycling, with the finalisation of a 400-km long Regional Express Bicycle Network (RER Vélo) by 2030,
- Discouraging solo car-use through the introduction of a Regional Low Emission Zone (LEZ),
- Developing a inter-regional network of Park and Ride facilities (35,000 P+R places) and reflecting on a new road-use fiscal instrument (not decided yet),
- Setting up a 30 km/h speed limit within the Brussels Capital-Region limits, with few exceptions (in operation since January 2020),
- Enlarging the pedestrian area in Brussels central areas and in local centres
- Attempting to deliver the *S.T.O.P.* principles, i.e. prioritizing pedestrians over bikes, bikes over busses, busses over cars.



A sign encouraging the shift towards alternatives to solo car-use during air pollution peaks (2012).

© Paul Lecroart, Institut Paris Region

Reyers Viaduct Deconstruction: Improving Scape, Reducing Congestion

Brussels has some experience in highway deconstruction: The Reyers viaduct, which was denounced for being unsafe, was dismantled in 2015-2016 and is being transformed into a landscaped boulevard. Interestingly, according to a research lead by the Free University of Brussels (VUL) on a 680 km-wide study area including the R0 Ring, congestion levels after deconstruction (2017) were lower than before (2014). This suggests that drivers changed their travel behaviour, resulting in an improvement of traffic flow speed.



The Reyers Viaduct on R21 Ring Road before (above in 2012) and after deconstruction with temporary street design (2021).

Photos © Paul Lecroart. Institut Paris Region

The E40 Parkway Project

Along with the E411 transformation, Brussels plans to transform the E40 (Reyers) motorway located in the north-east part of the Region into a boulevard. The Masterplan for the area, commissioned to a team led by TVK Urbanists in 2014, was adopted by the regional government in 2019: it plans to convert part of the E40 highway into a multi-use public space and break away the monofunctional character of the 75-hectare business area north of the road. The number of traffic lanes should be reduced from 12 to 8 in order to create a linear park along the A40. The new Masterplan (PAD) focusses on the development of the *Mediapark* with new workspaces, local facilities and some 1.600 new housing units.

As a first step, in July 2020, a temporary bike lane was created along E40 to encourage bike-use and relieve existing pressure on the public transport network in the COVID-19 context.



Above, the E-40 motorway has up to 12 traffic lanes. Below, a public-space long-term scenario for the northern carriageway (2030). © Above : Paul Lecroart, Institut Paris Region. Below : E-40 Parkway Masterplan / TVK

3. The Delta/Herrmann-Debroux E411 Project

3.1. A Fragmented Highway Corridor

Built in 1973 by the Belgian Ministry of Public Works without a planning permission, the E411 Brussels-Namur-Luxemburg is one of the most important gateways to the Brussels-Capital Region. Located in the municipality of Auderghem (35,000 inhabitants), on the south-eastern border of Brussels, the highway is shared with the surrounding Flemish Region.

The urbanisation of the area started around the 19th century, but saw its development accelerate during the thirty-year post-war period. While initially composed by rural and forest villages, it became a semi-industrial suburb and a residential destination in the late 1900s, with rapid connections to central Brussels. From 1945 onwards, construction work radically transformed the area into a distinctively urban periphery, without leading to the emergence of a single centrality. Instead, highly different types of buildings have tended to be juxtaposed to each other over time, creating a heterogeneous urban fabric with a patchwork of detached housing neighbourhoods, office strips, a shopping mall, carparks, railway tracks, and open space.

The spatial layout of the E411 highway, its large scale and geometry, have blurred the landscape and the character of the area, ignoring the topography and disconnecting the neighbourhoods from each other. The territory benefits however from structuring natural spaces, including the Forest of Soignes and the Woluwe and Roodkloosterbeek valleys. The corridor also includes a number of car-use generators such as shopping malls (Demey), academic and diplomatic institutions (EU Regio), a major hospital (Chirec) and a sport centre (ADEPS).

The overground metro line, the Beaulieu highway underpass and the E411 viaducts (Watermael, Herrmann-Debroux and Trois Fontaines), all contribute to the spatial fragmentation of the area, reinforcing the monofunctional character and inward logic of each part. The 950 m long Herrmann-Debroux Viaduct is particularly criticised for the visual barrier and the parking lots it offers under its arches. Uncomfortable pedestrian and bike connections across E411 and poor quality of public space under the viaducts don't encourage local residents and visitors to walk.

The typical roadway of the E411 expressway is:

- 2x3 lanes + 2x1 bus & taxi lanes east of Ring R0 (Flanders Region),
- 2x2 lanes + 2x1 bus & taxi lanes as it enters the urban agglomeration (Brussels Region),
- 2x2 lanes on the Hermann-Debroux viaduct + 2x1 bus & taxi lanes + 2x1 vehicle lane,
- 2x2 as it arrives into the urban core at Triangle.

Within the Delta/Herrmann-Debroux sector, the E411 functions as a highway backbone, and intersects with other main roads: the motorway Ring R0, the boulevard Souverain Ring R22, the boulevard de la Plaine.

The section of E411 located within the Brussels-Capital Region is five kilometres long and accounts for 9% of the automobile flows going in and out of the Region; It is used by 80,000 vehicles daily (around 40,000 vehicles in each direction) in 2017¹⁷. Over the same year, 3,600 cars entered the Region daily using the E411 between 8 am and 9 am alone.

However, despite high volumes of car traffic that have local negative impacts, the residents' enjoy a fair quality of life with lots of green space, including the Soignes Forest and the Brussels-Tervueren former railway pedestrian & bike link, and good transport connections west of the boulevard du Souverain/Ring 22 (metro line 5, tram 8). The eastern part of the corridor is served by the bus network. On average, the area's households are slightly larger, more affluent and more elderly than on average in Brussels.

¹⁷ *Projet de Plan d'Aménagement Directeur Herrmann-Debroux*, Brussels-Capital Region, Perspective Brussels, May 2019, p.31.



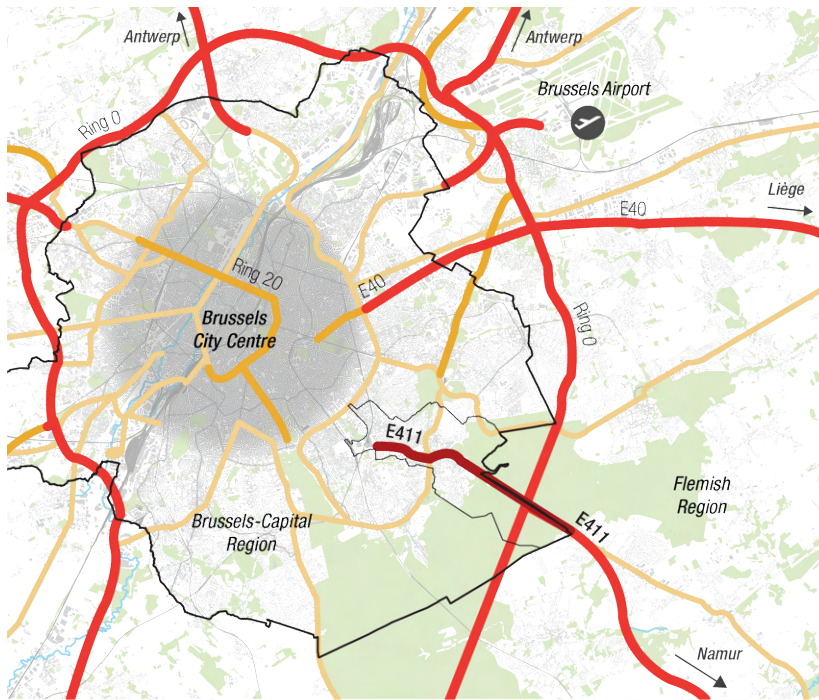
The E411 expressway trench at the Beaulieu metro station (left) is a major barrier between the municipalities of Auderghem and Watermael-Boitsfort. The Master Plan aims at filling in the trench to the right and reconnecting public space at ground level.

© Paul Lecroart, Institut Paris Region



The E411 motorway cuts through the Soignes Forest creating a major environmental scar. Here, the northern roadway going into the city is in the Flemish Region while the southern roadway is in Brussels-Capital Region. Cooperation between the two regions is a challenge for the transformation project.

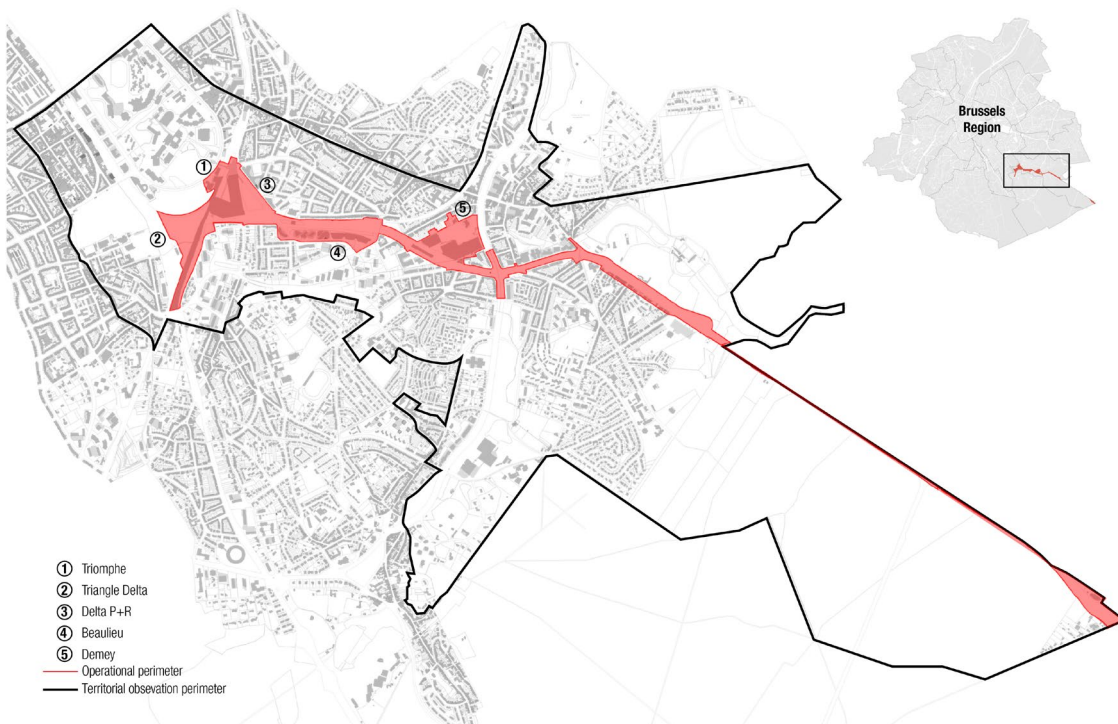
© Perspective.Brussels



- Motorways
- Boulevards with tunnels and underpasses
- Axis subject to transformation (E411)
- Municipal boundary (City of Auderghem)
- Metropolitan boundary (Brussels-Capital Region)
- City centre

© L'INSTITUT PARIS REGION 2020
 Sources : OpenStreetMap, ViaMichelin,
 Perspective.Brussels

Map of Brussel's road network with Delta/Hermann-Debroux E411 project colored in brown. Roads marked as expressways are major boulevards with roadway features such as underpasses or tunnels. © Institut Paris Region



- ① Triomphe
- ② Triangle Delta
- ③ Delta P+R
- ④ Beaulieu
- ⑤ Demey
- Operational perimeter
- Territorial observation perimeter

The Delta/Hermann-Debroux E411 project area with the five potential redevelopment sites (numbers). External black line is the study area (mostly within the municipality of Auberghem). Area colored in red is the operational area (E411 corridor). © Perspective.Brussels

3.2. The Project Design Process

Rethinking the Highway: First Steps

Cutting through the residential suburbs of Brussels in the early 1970s, the E411 highway has never been fully accepted by the residents of Auderghem who resent the presence of the massive, poorly designed, viaducts, associated with the high volumes of traffic and noise it generates. Ever since it was built without planning permit, voices have been calling for improvements or even for tearing-down the viaducts.

In 2003, a fire fragilizes the Trois Fontaines viaduct and the highway has to be closed to car-traffic for repair. The traffic chaos feared by the public authorities and the media fails to happen, as car-drivers change their travel patterns, using other routes or shifting to public transport.

In 2004, the Brussels NGO *Atelier de Recherche et d'Action Urbaine* (ARAU) calls for a removal of the viaducts and the transformation of the highway into an urban boulevard, combined with a development of transport alternatives¹⁸. With Inter-environnement Bruxelles (IEB, a federation of environmental NGOs), they push for reducing the speed limit on the highway.

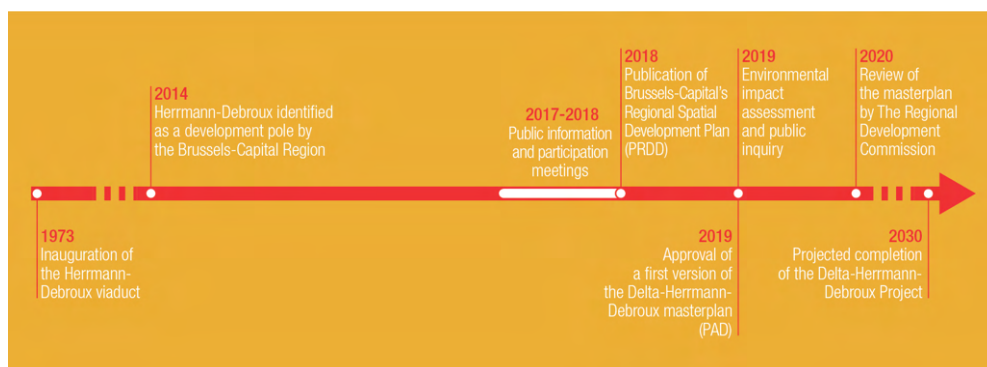
In 2007, *Bruxelles Environnement* and other regional agencies work on traffic mitigation measures, including the reduction of speed limits from 120 km/h first to 90 km/h and later to 70 km/h, the current speed limit. The mayor of Auderghem expresses the idea of initiating an urban redesign process to get rid of the highway in the long run.

In 2009, the Brussels Capital Region issues a Master Plan for the Delta-Triangle area, including part of the E411. The plan focuses on office redevelopment supported by large carparks and the potential expansion of the highway westwards to the boulevard ring R21. This plan is not approved due to local opposition, but the discussion helps the Regional Government to fully recognize the negative impacts generated by the E411 on its environment.

In September 2011, for the first time in Brussels, the city of Auderghem organizes a successful car-free day festival on top of the E411 Herrmann-Debroux viaduct, with the support of two reknown artists, François Schuiten and Alexandre Obolensky, helping to create a new imaginary of the infrastructure.

In 2014, Brussels' Regional Government officially identifies the Delta/Herrmann-Debroux area as a priority development area, within the framework of the new Regional Sustainable Development Plan, the PRDD, then to be elaborated.

In 2016, the Region initiates the regeneration process for the highway corridor and designates *Perspective Brussels*, the newly created regional planning agency, as the lead authority to steer the design of the mandatory Master Plan -the strategic and regulatory framework for the transformation-the *Plan d'Aménagement Directeur* (PAD).



Timeline of the Delta/Herrmann-Debroux E411 transformation project. The masterplan should finally be approved in 2022. © L'Institut Paris Region

¹⁸ 50 ans de Recherche et d'Actions Urbaines. 1969-2019, Atelier de Recherche et d'Action Urbaine (ARAU), Bruxelles 2019.

The Delta/Herrmann-Debroux Master Plan

Definition Study

The first phase in the design process is the preparation in 2016 by Perspective Brussels' Territorial Observation Department of the *Definition Study Herrmann Debroux* which is published in May 2017¹⁹. This research identifies two different spatial scales for the project:

- The Delta/Herrmann-Debroux operational corridor including the E411 viaducts and roadway fringes, with the addition of five potential redevelopment sites (Triomphe-Delta, Triangle, Beaulieu, Carrefour/Demey and ADEPS Sport Centre), approx. 43 hectares.
- A larger "territorial observation" area 9 km²-wide and 6 km-long which strongly interacts with the future transformations of the Delta/Herrmann-Debroux corridor.

Although, the Delta/Herrmann-Debroux Master Plan may have a direct impact on the Flemish municipalities of Tervuren (E411's westbound carriageway is in Tervueren) and Overijse, they are not part of the study area.

In line with the regional development strategy (PRDD), the *Definition Study* frames the transformation process of the highway and its environment as a major redevelopment corridor contributing to Brussels's future demographic and economic growth. The overall goals for the redevelopment are identified as a "*rethinking the role of highways in the City of the Future*", as well as reconnecting neighbourhoods, revealing landscape features and creating spaces for social interaction.

Design Process, Public Consultation and Master Plan Approval

This definition process leads to the launching of a public procurement competition for both the preparation of the Delta/Herrmann-Debroux Master Plan (*Projet d'Aménagement Directeur*, PAD) and the Environmental Impact Assessment Report (*Rapport sur les incidences environnementales*).

This results in 2017 in the designation of a consultant team led by ORG Urbanists, with D'ici Là (Landscape Architects, Paris), Sweco engineering consultants, Antea Group and Common Ground to support Perspective Brussels in the preparation of the *Plan d'Aménagement Directeur* (PAD), the local for the area, and in the public participation process. Brussels' regional public developer, the *Société d'Aménagement Urbain* (SAU), landowner of Triangle-Delta area, helps in the operational dimension of the redevelopment project.



The E411 highway corridor is located partly in the Brussels-Capital Region and partly in the Flemish region.

© Paul Lecroart - L'Institut Paris Region

¹⁹ Perspective Brussels, Etude de Définition Herrmann-Debroux. Synthèse, Mai 2017.

In order to manage the design process, around Perspective.Brussels, a Steering Committee is setup with SAU, Brussels' Master Architect (BMA), Brussels Environment and Brussels Mobility agencies, STIB transport operator and landowner of Delta area, municipalities of Auderghem and Watermael-Boisfort, and representatives of Ministries in charge of Planning, Economy and Mobility.

At this stage, different scenarios for each section of a future E411 boulevard are studied and discussed within a series of workshops, such as the removing or reconverting the viaducts, shifting traffic to the one side of the axis, creating a *Park & Ride* facility, etc.

Public or private landowners of potential redevelopment adjacent areas are approached to test their interest in site reconversion design options. Simultaneously, early in 2018 is launched a public consultation process involving a wide-range communication including opinion surveys, open workshops and public forums. Many questions and critics raised by citizens are specifically answered by the design team and Perspective Brussels.

A comprehensive 1780-page Environmental Impact Assessment report (*RIE*) is delivered in 2018 by a private consultant team led by Aries consultants on behalf of Perspective Brussels. The combination of the plan preparation, stakeholder consultation and impact assessment process finally leads to the definition of a draft design project for the corridor in Spring 2019. In May 2019, the strategic and regulatory framework for the highway transformation and area-based regeneration are made public as the draft *Plan d'Aménagement Directeur Delta/Herrmann-Debroux*.

Subject to a public inquiry in October-December 2019, then reviewed in 2020 by a public consultative organisation known as the Regional Development Commission, the modified version of the Delta/Herrmann-Debroux PAD is approved in second reading by the Government of the Brussels-Capital Region in July 2021, with alteration made for some aspects such as the reduction of some building heights. After a reading by Belgium's supreme administrative court, the Brussels-Capital Region's Government will approve the final statutory *Delta/Herrmann-Debroux Master Plan* (PAD) in 2022.

Master Plan Ambition and Goals

The Master Plan is a strategic and statutory planning framework, not an action-plan. It does not cover the financing, phasing and operational process of getting the project done. This 250-page plan combines in a single document:

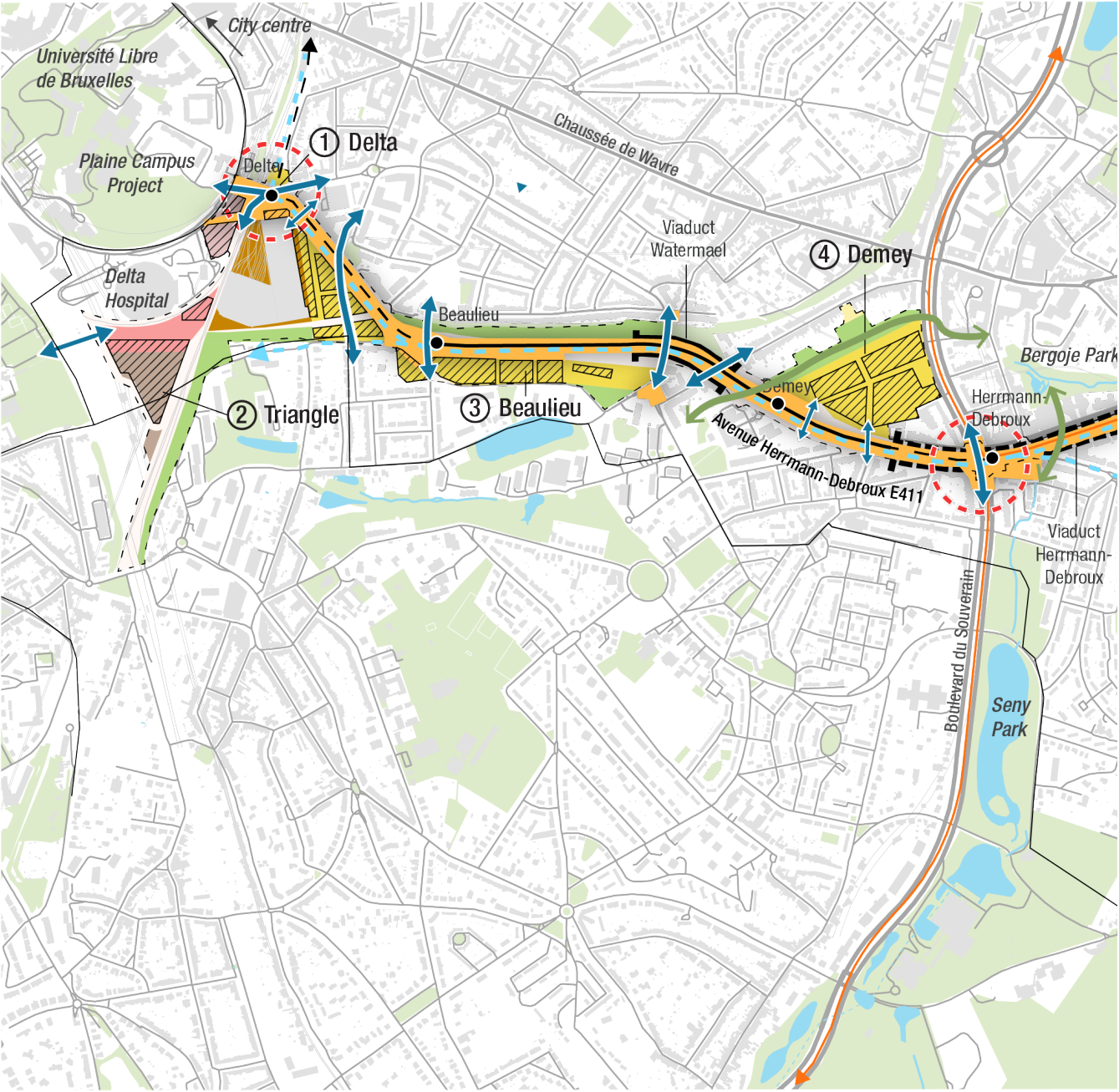
- (1) the rationale and strategic vision supporting the roadway transformation and the area-based strategic options, and
- (2) the planning regulations for the public and private redevelopment areas adjacent to the E411, including land-use regulation, building heights and densities.

The ambition of the project is to transform a car-oriented city fringe into a more people-oriented hub, better integrated in its environment. The main goals for the transformation are:

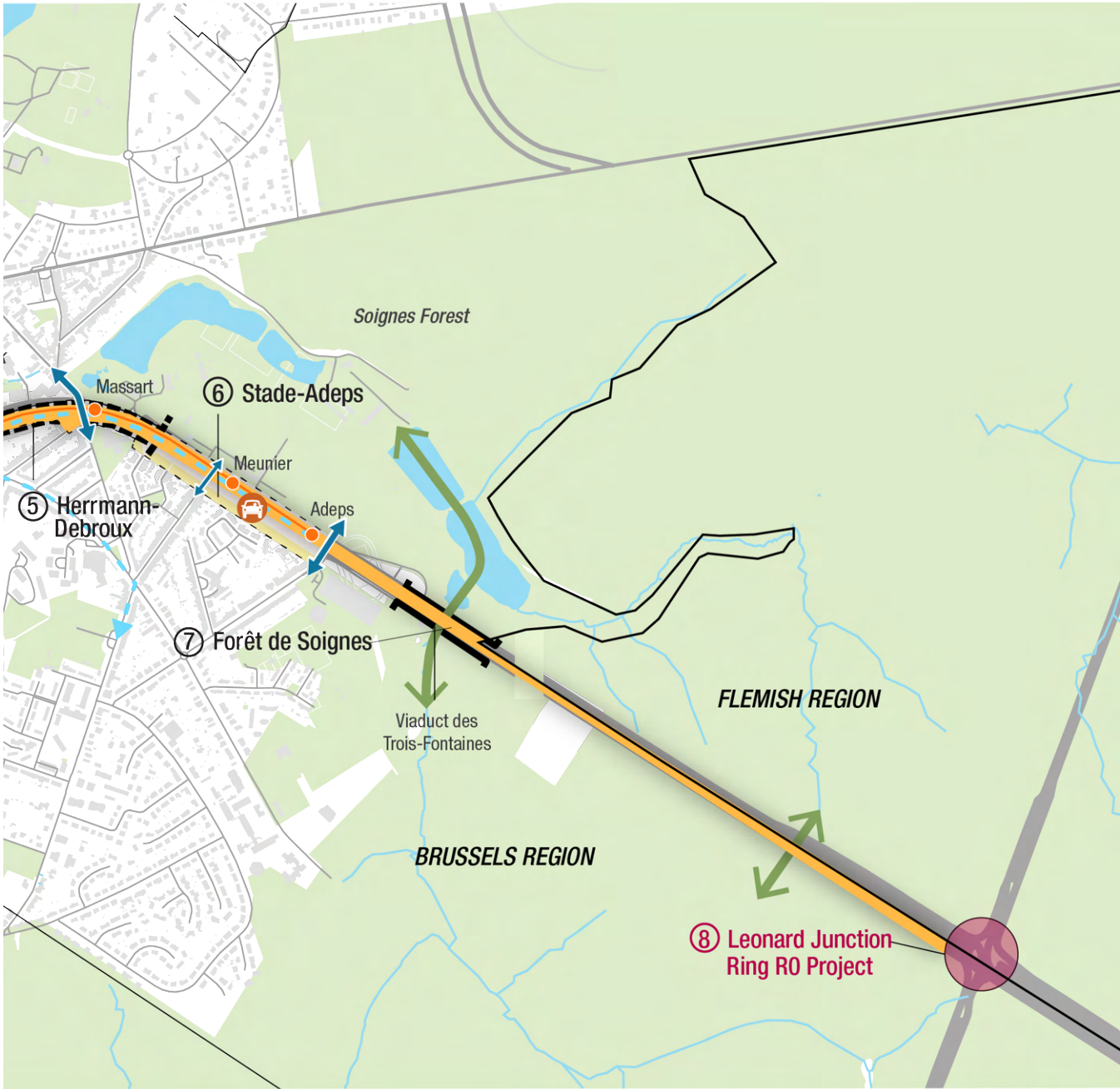
- Reconnecting the E411 to its urban and natural environment, and minimise the infrastructure's barrier impact by removing viaducts and reducing car-traffic,
- Creating new public spaces to strengthen the area's territorial cohesion, and to increase the attractiveness of sustainable mobility modes such as cycling or walking,
- Enhancing the area's urban qualities by transforming monofunctional sites into mix-use as well as the increasing porosity of building frontages,
- Giving more porosity to the urban environment, including restoring water ecosystems.

Seven key areas for transformation have been identified, including five urban mix-use redevelopment areas known as Delta, Triangle, Beaulieu, Demey and Herrmann-Debroux, and two transformation areas: Stade-ADEPS (Park & Ride project) and the Forêt de Soignes (landscape and bike lanes). Altogether, the urban redevelopment covers a 43.5 hectares-wide area requiring the involvement of public and private landowners, such as Redevco, the owner of the Carrefour retail mall site, or the EU Commission, who has already announced plans to leave its office building complex in Beaulieu.

The Delta-Herrmann-Debroux E411 Project in Brussels



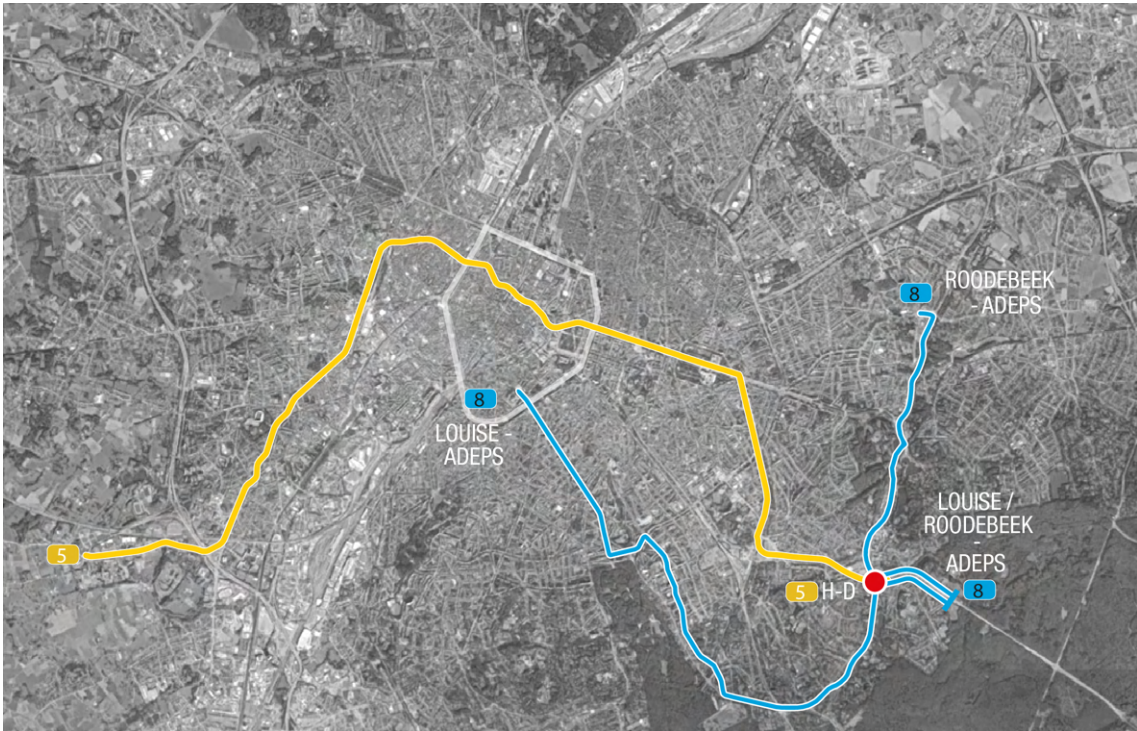
- Urban boulevard
- Metro Underground / Overground
- Tramway
- Bus
- Bicycle lane
- Park-and-ride
- Transport node
- New connection
- Ecological connection
- Project area
- Housing
- Workspace
- Industry
- Administration
- Public facility
- Mixed-use
- Green space
- Building area
- Ring R0 Project (Flemish Région)



N 0 0.3Km
 © L'INSTITUT PARIS REGION 2020
 Sources : OpenStreetMap, Perspective.Brussels
 L'INSTITUT PARIS REGION



The E411 near Beaulieu station in 2012. Metro line and motorway were initially designed together. The EU office complex to the right and the detached housing developments to the left turn their backs to the highway.
© DR



Public transport network serving the Herrmann-Debroux area, with metro line #5 and projected tramway line #8 projected branch towards a future Park & Ride facility in to be built in the Stade-Adeps area.
© Perspective.Brussels, 2018

3.3. New Boulevard Design and Mobility Options

The ambition of the project is embedded in the radical transformation of the E411 expressway infrastructure into an urban boulevard to make way for a new network of public spaces oriented towards active modes and public transportation.

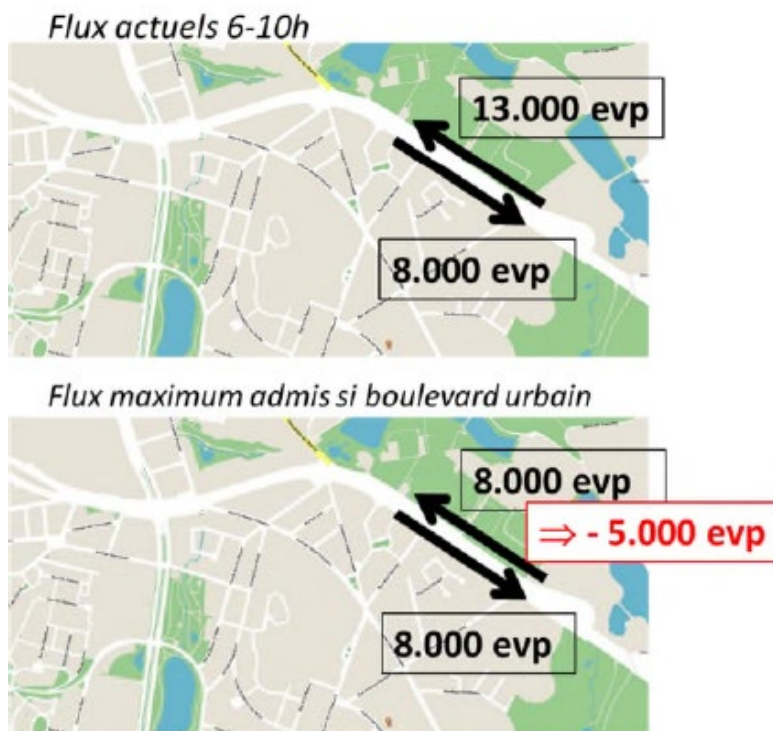
First, the E411 will be stripped off from some of its main traffic segregation features: the Beaulieu road underpasses, the Watermael viaduct (partly) and the Herrmann-Debroux viaduct. The deconstruction of Herrmann-Debroux viaduct will enable to reduce the number of lanes of the corridor: from 2x4 lanes lanes (4 above ground, 4 at grade) before to 2x2 lanes after, between Stade-ADEPS and Demey. The freeing up of traffic space will be used for active mobility, piazzas and linear green spaces along the new boulevard.

A stricter speed limit of 50 km/h should be introduced for the entire axis – compared to the existing 70 km/h – and new at-grade traffic-light crossroads will be designed to limit the intensity of traffic in the area. The newly introduced road design includes dedicated lanes for buses and tramway, and for bike lanes, as part of a wider mobility strategy.

Traffic Reduction

According to the Environmental Impact Assessment delivered by Aries consultants, the new road design envisioned by the Master Plan is likely to generate a significant decrease in motor vehicle traffic on the E411 road corridor.

During morning peak time from 6 to 10 am, it is estimated that traffic will drop from 21,000 vehicles today (8,000 from leaving Brussels and 13,000 entering Brussels) to 16,000 vehicles after the transformation (8,000 leaving and 8,000 entering)²⁰. This represents an almost 24% (5,000 peak time vehicles) traffic decrease, despite the induced mobility related to the densification of the area.



Projected evolution of traffic flows during morning peak hours
© Aries RIE, 2018, p. 32

²⁰ Aries Consultants (2019), *Projet de PAD Herrmann-Debroux : Rapport sur les incidences environnementales (RIE)*, p. 37.



Traffic jam on E411 at carrefour Léonard as it approaches Brussels in 2017 after closure for inspection of the Hermann-Debroux viaduct.
© Belga



Congestion along the Hermann-Debroux viaduct
© Pierre-Yves Thienpont. Le Soir

This ambition is supported by a series of key measures as part of the Master Plan's mobility strategy, including the extension of existing tramway line 8 eastwards to as a new branch line to Stade ADEPS, combined with a new 800 to 1500 parking places Park & Ride (see map). This P&R aims to replace the existing parking facilities currently located in the Delta sector as well as under the Herrmann-Debroux and Trois Fontaines viaduct. The idea of extending metro line 5 was not retained due to its significant costs. Reserved bus and taxi lanes will be managed along the new boulevard.

The creation of new, continuous bike and pedestrian infrastructure, along and across the Master Plan corridor, combined with the urban intensification of the surroundings comes in support of the mobility strategy for the area. As ambitious in the regional mobility policy, the plan proposes active building fronts along the different parts of the boulevard in its urban section with limited parking allowances to prevent the new developments from generating extra undesired car trips. The street network pattern is designed to encourage the creation of a pedestrian-scale urban environment.

All in all, it is estimated that the capacity of car infrastructure could be reduced by up to 40% in some sections, meeting that more movement capacity can be freed for new pedestrian plazas giving access to metro stations, esplanades and parks designed to reconnect the different neighbourhoods to the new boulevard.

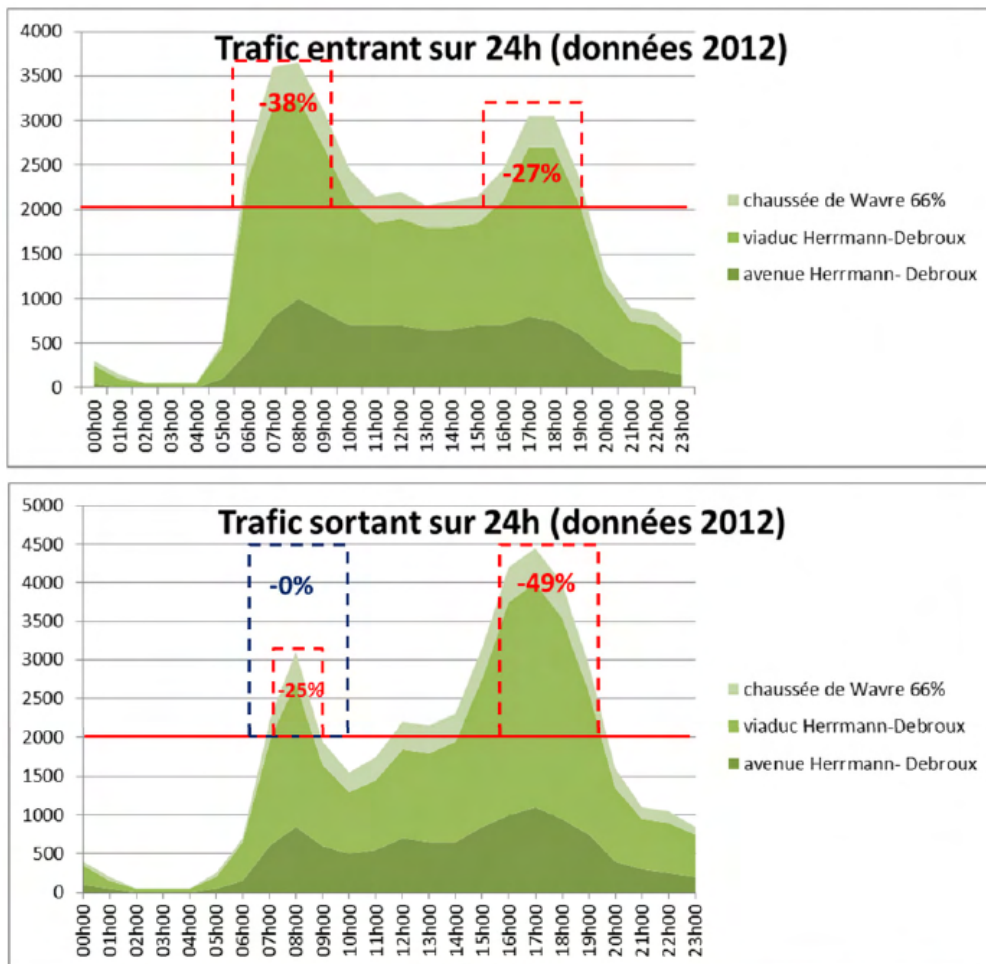
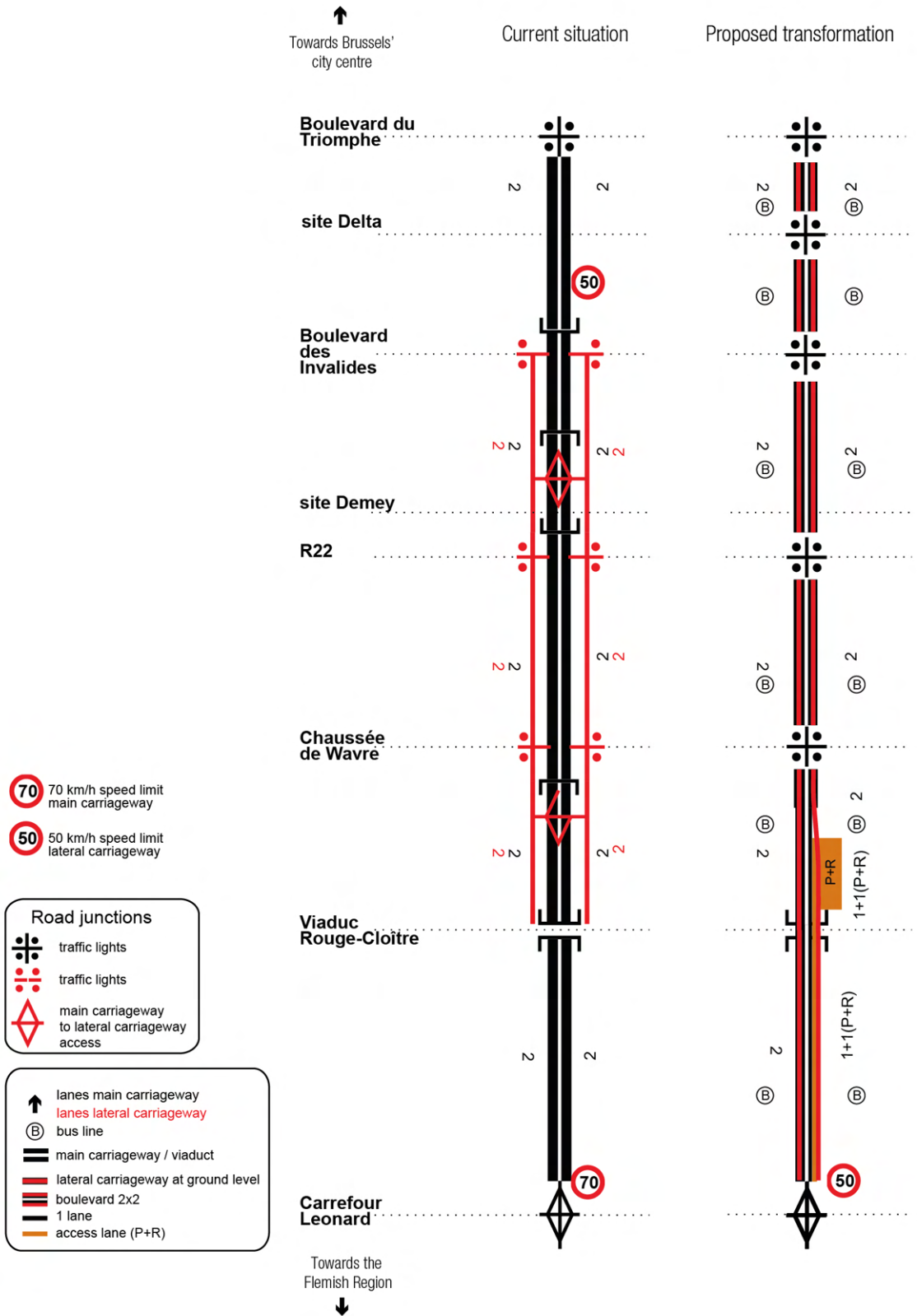


Figure 667 : Réduction de la capacité liée à l'aménagement du boulevard urbain (Bruxelles Mobilité, 2017)

Projected evolution of traffic flows during morning peak hours with a reduction of capacity related to new boulevard
 © Ariès RIE, 2018, p. 32

From Segregated Expressway to City Boulevard (with Traffic Lights)



Planned road design for the E411 axis
© Perspective.Brussels (adapted and translated)

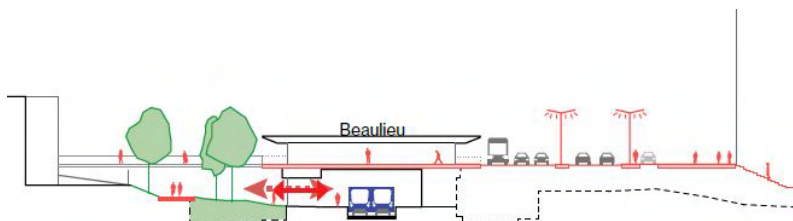
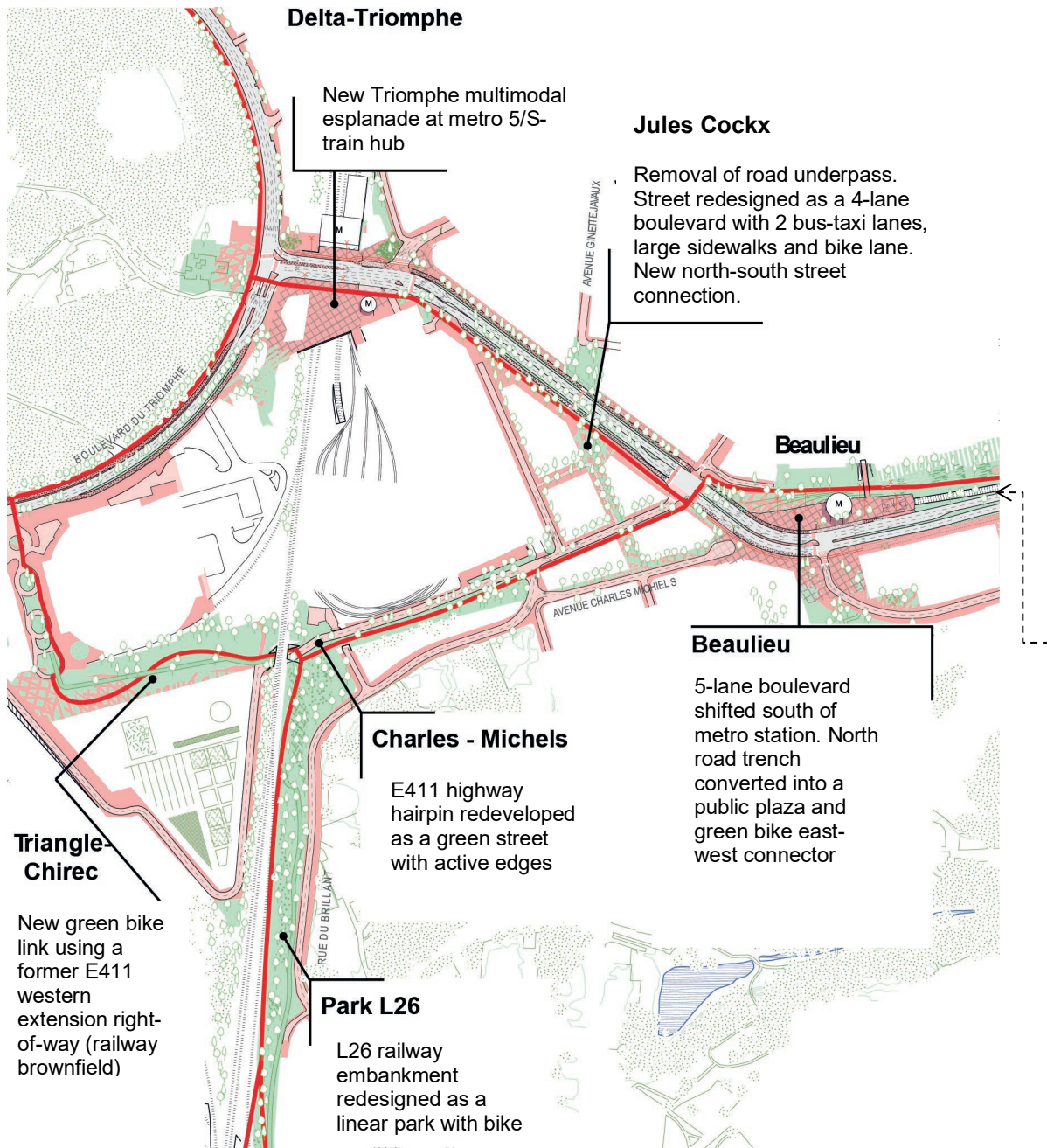


The Watermael Viaduct (in the background): a visual and partly physical barrier between neighbourhoods.
© Paul Lecroart - L'Institut Paris Region



The Herrmann-Debroux Viaduct
© Perspective.Brussels

New Public Space Design along Boulevard (1) Delta - Beaulieu Section



Beaulieu section with boulevard shifted to the southern side to the right (filled-in trench) and northern road trench converted into a pedestrian and bike connector

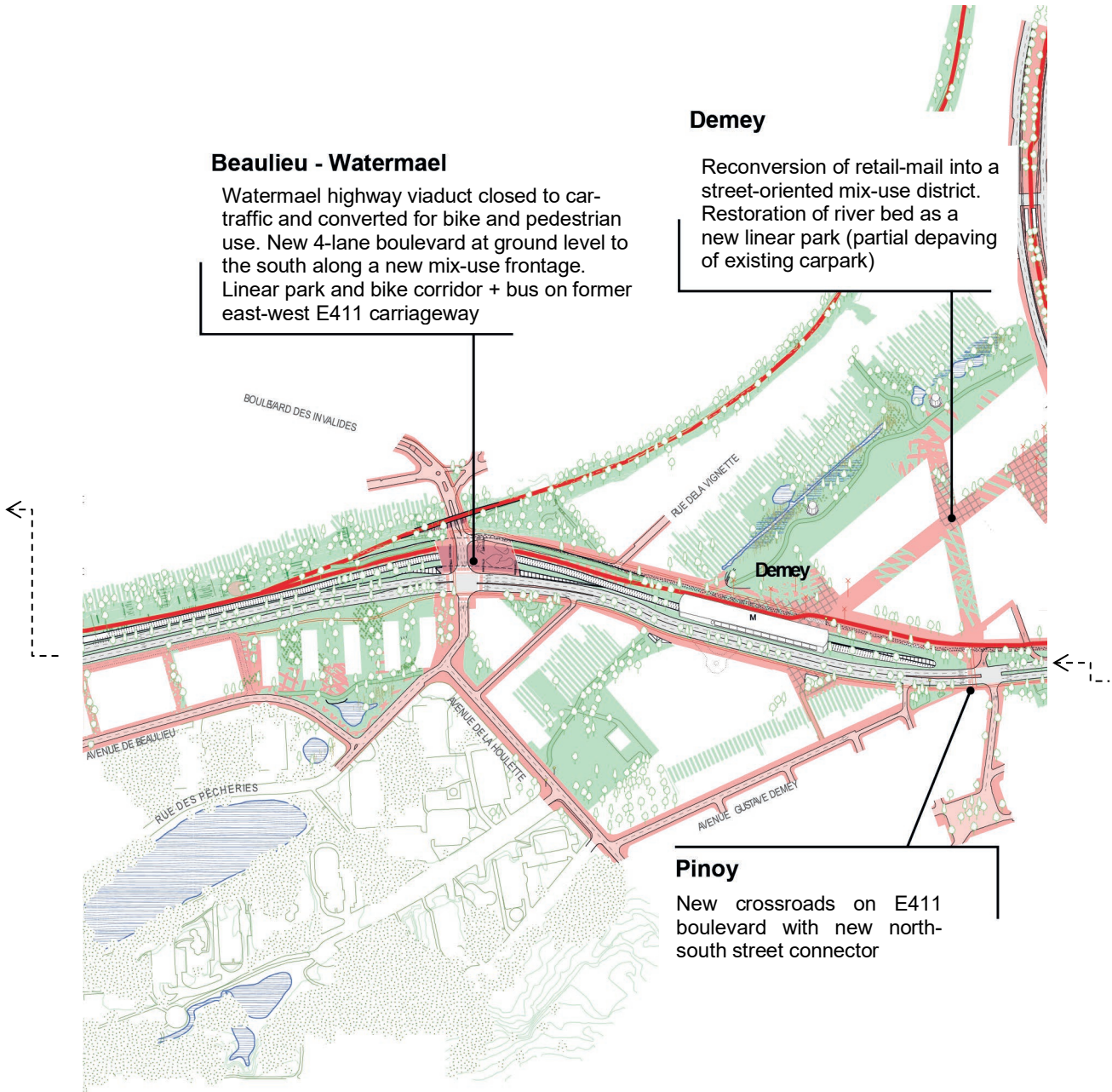
New Public Space Design along Boulevard (2) Beaulieu-Demey Section

Beaulieu - Watermael

Watermael highway viaduct closed to car-traffic and converted for bike and pedestrian use. New 4-lane boulevard at ground level to the south along a new mix-use frontage. Linear park and bike corridor + bus on former east-west E411 carriageway

Demey

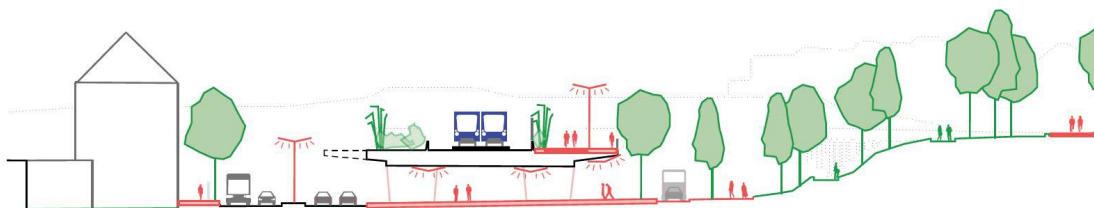
Reconversion of retail-mail into a street-oriented mix-use district. Restoration of river bed as a new linear park (partial depaving of existing carpark)



Pinoy

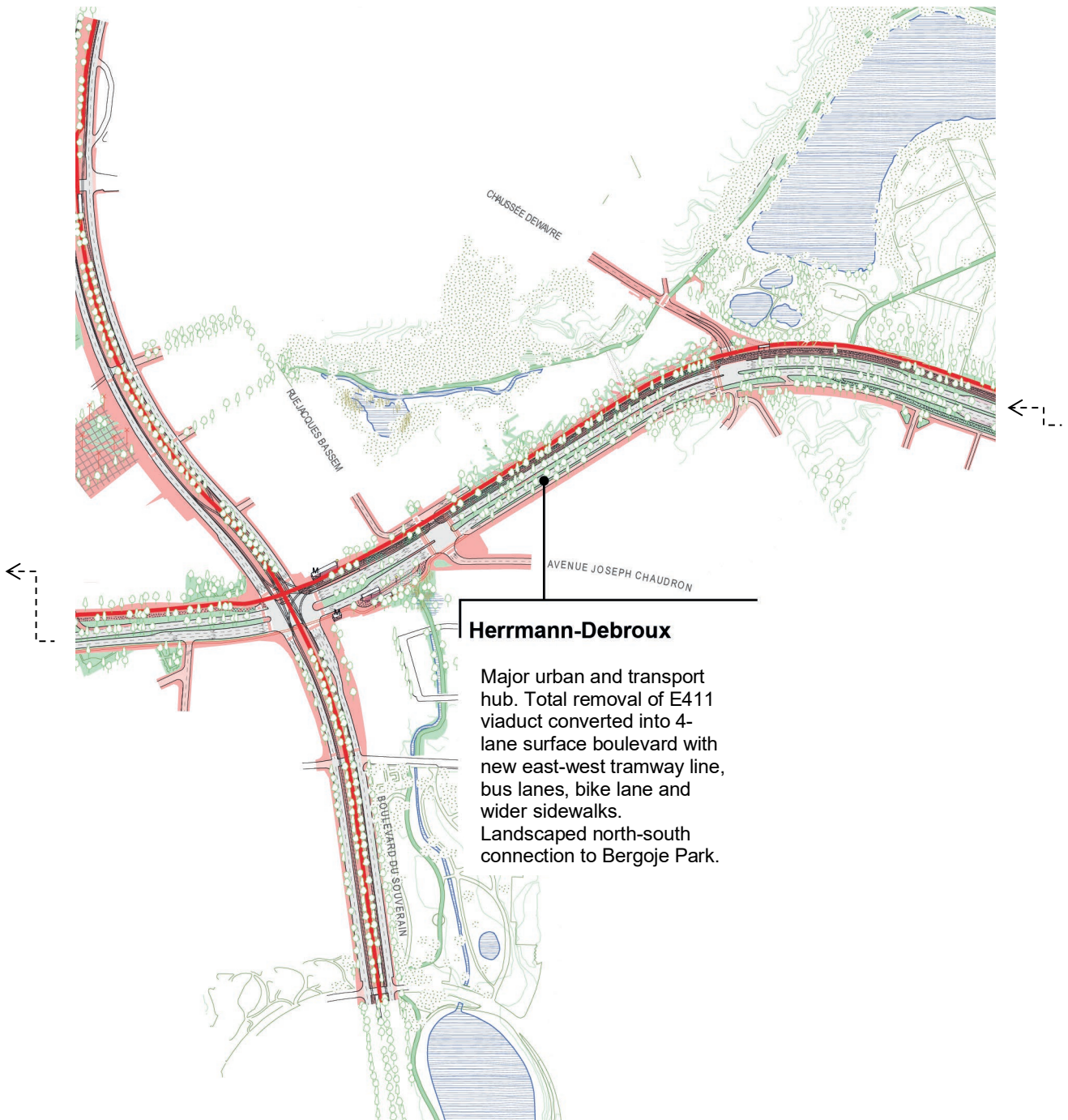
New crossroads on E411 boulevard with new north-south street connector

© Perspective.Brussels, ORG Urbanists



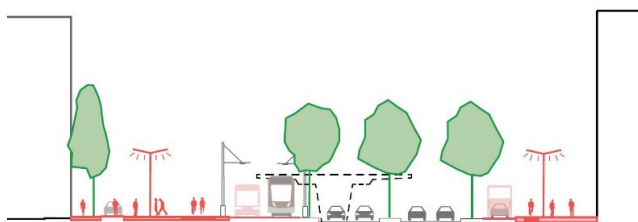
Section with boulevard replacing removed southern highway viaduct and northern viaduct converted into a pedestrian and bike link.

New Public Space Design along Boulevard (3) Demey Herrmann-Debroux Section



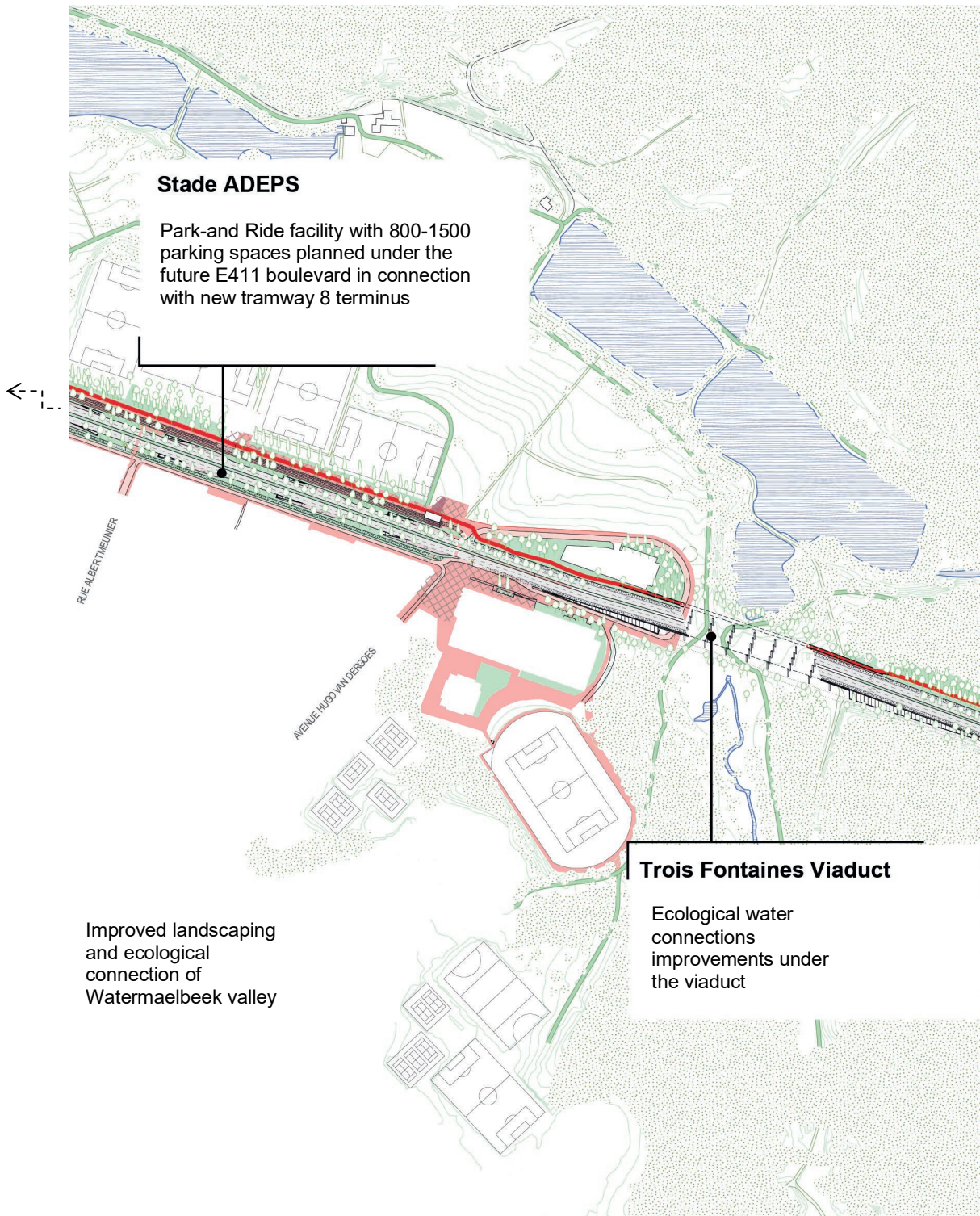
Herrmann-Debroux

Major urban and transport hub. Total removal of E411 viaduct converted into 4-lane surface boulevard with new east-west tramway line, bus lanes, bike lane and wider sidewalks. Landscaped north-south connection to Bergoje Park.



Herrmann-Debroux section with highway viaduct removed and new tramway boulevard

New Public Space Design along Boulevard (4) Stade - Trois Fontaines Section



© Perspective.Brussels, ORG Urbanists

3.4. Urban Intensification

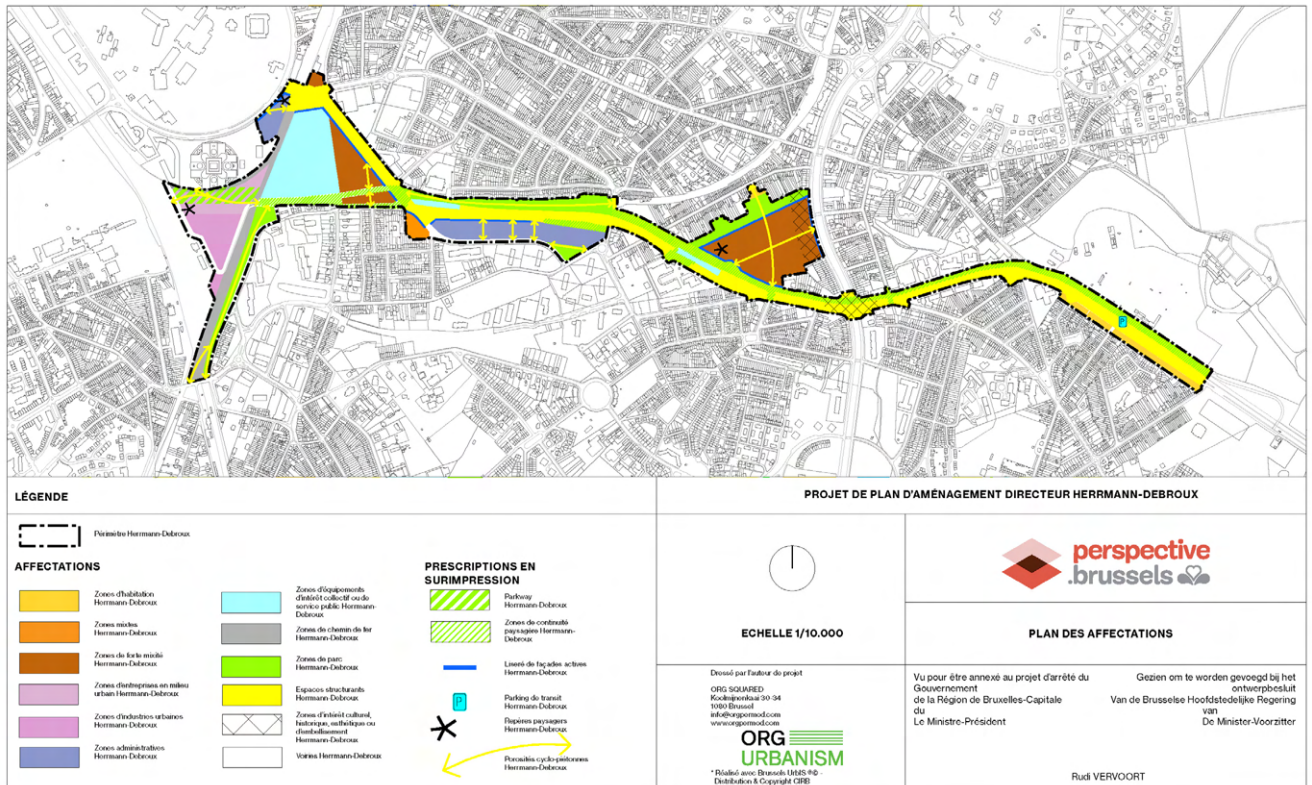
The Delta/Herrmann-Debroux regeneration Master Plan (PAD) aims to redevelop large monofunctional car-oriented areas surrounding the future boulevard into new mixed-use active neighbourhoods. It tries to make the best use of the existing metro accessibility and to reconnect the north of E411 to the south.

The design guidelines and overall programme of the seven transformation sites are framed by the Master Plan with distinctive features according to each situation. The land use plan below (*Plan des affectations*) provides the main uses of each sector. The regulatory chapter of the Plan fixes the future overall built form (block layout, street pattern, building heights, etc.) and max building volumes. A 3-D sketch illustrates the potential built form (following pages).

The five main urban intensification sites are from East to West: Triomphe (redevelopment of existing office buildings with potential tower-block), Delta (development of a parking lot as a mix-use housing-oriented district), Triangle (development of rail wasteland into a utility-based building complex, Beaulieu (redevelopment of long office block into free standing mix-use blocks), Demey (redevelopment of shopping mall and carpark into a mix-use housing district). To the west, the Stade ADEPS is earmarked for a future Park & Ride facility without any development.

Altogether, around 1570 new housing units, 135,400 square metres of commercial development (office, business, retail and hotel) and 11,700 square metres of public facilities are planned within the 43,5 hectares included in redevelopment areas. This fairly dense regeneration project should house over 4000 new residents and 6350 new -or relocated- jobs.

The area covered by the Delta/Herrmann-Debroux Master Plan is adjacent to two other potential urban development areas, known as Campus Plaine and Caserne d'Etterbeek et d'Ixelles to the West. The proposals for these areas involve the intensification of the university business & education campus and the conversion of former police headquarters into student facilities. The surface area of the combined potential project areas amounts to over 80 hectares.



Plan des affectations. Land-use regulations with public space (yellow), housing areas (orange), mix use areas (light red), high intensity mix-use areas (dark red), industry areas (light purple), office areas (dark purple) and landscaped areas (green).

© Perspective.Brussels, ORG Urbanists, 2018



Illustration of the urban transformation along Jules Cockx Street, after closure of Beaulieu underpass (Delta section).
 © Perspective.Brussels, ORG Urbanists, D'ici là, 2018

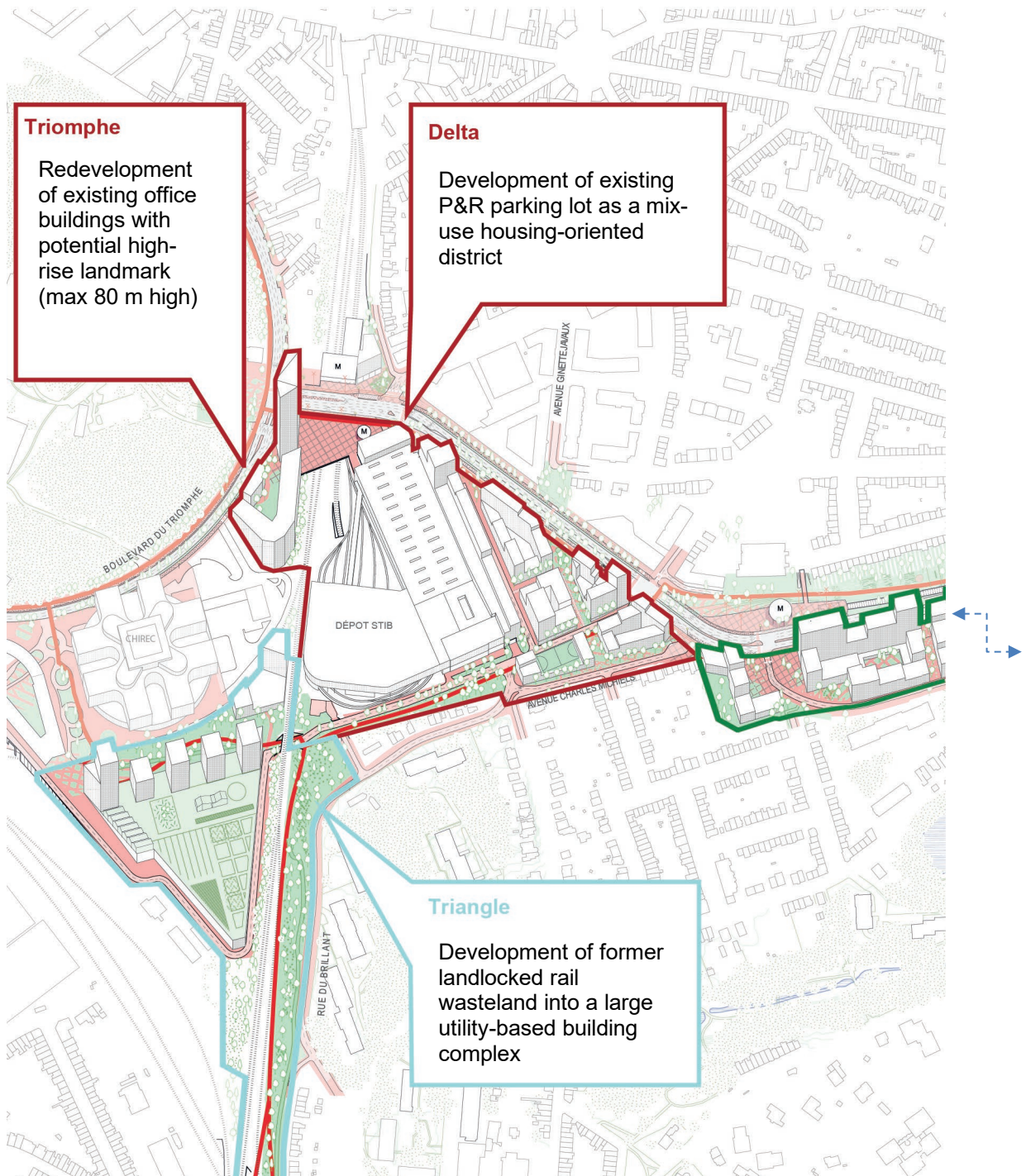


Illustration of the removal of the Herrmann-Debroux viaduct replaced by a tram-boulevard.
 © Perspective.Brussels, ORG Urbanists, D'ici là 2018

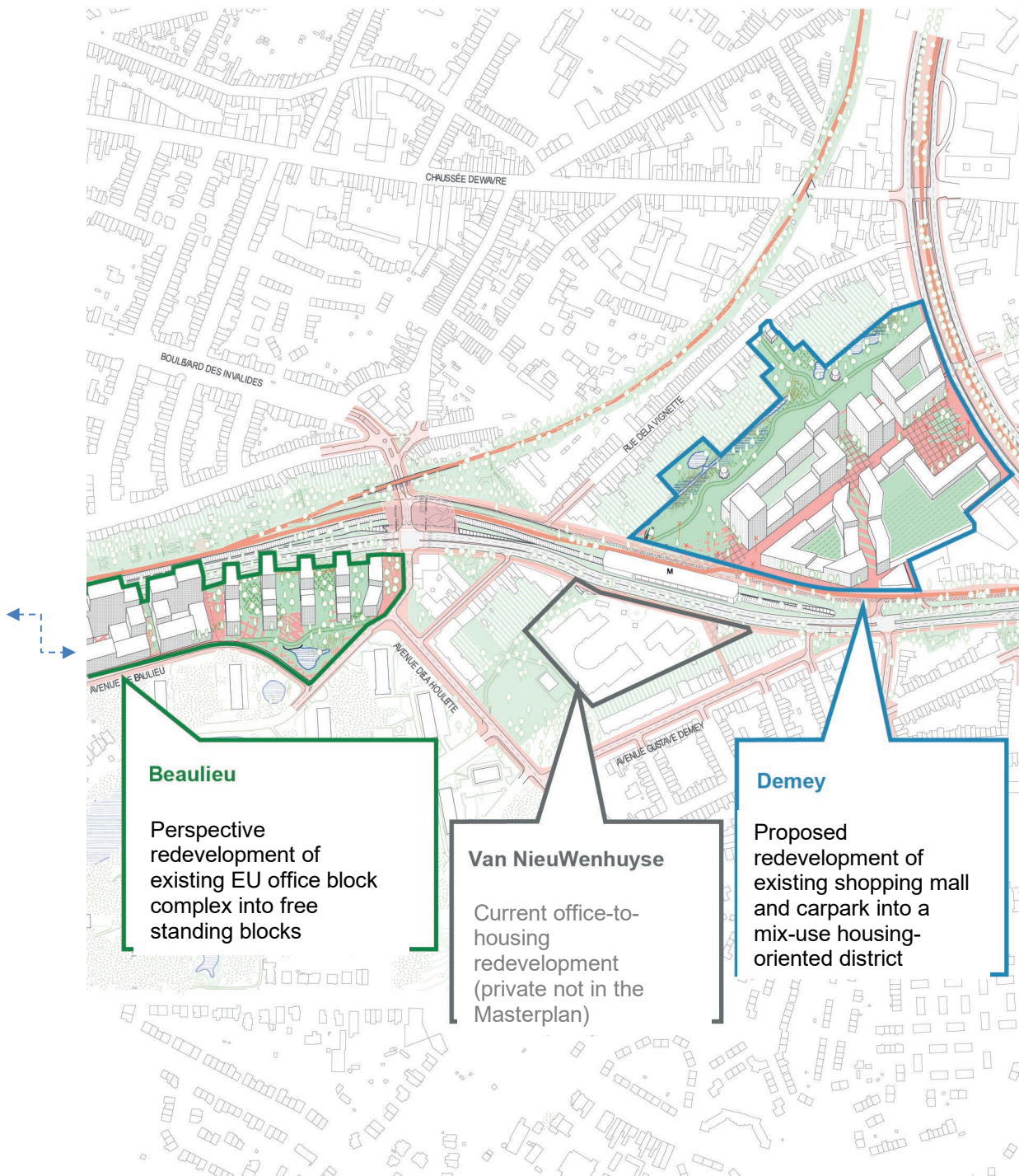


The Herrmann-Debroux viaduct after its temporary closure for inspection in 2017.
 © Le Soir

Urban Intensification Potential (A) Triomphe-Triangle-Delta Area



Urban Intensification Potential (B) Beaulieu-Demey Area



Beaulieu

Perspective redevelopment of existing EU office block complex into free standing blocks

Van NieuWenhuyse

Current office-to-housing redevelopment (private not in the Masterplan)

Demey

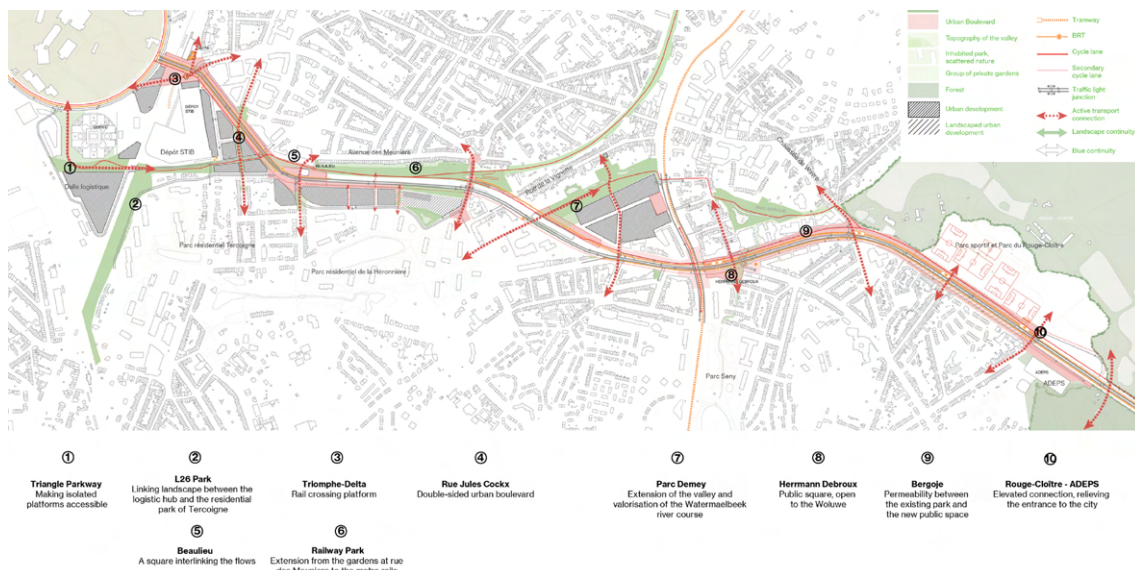
Proposed redevelopment of existing shopping mall and carpark into a mix-use housing-oriented district

© Perspective.Brussels, ORG Urbanists

Landscape and Greening

Redesigning the E411 infrastructure and transforming land-uses provides a unique opportunity to reconnect the corridor with its original geography and the living soil under the asphalt.

A new green structure for the corridor has been drafted, with a new blue connection between the Woluwe and the Roodkloosterbeek valleys, a new 2.4-hectare river park replacing part of the Demey-Carrefour parking lot and new green, pedestrian and bike connections along the metro line north of Beaulieu replacing the northern roadway and the Triangle section towards the Campus (*Triangle Parkway*). An ecological connection should also be restored in the Soignes forest. The green structure may need to be further increased to fit the needs of all new residents.



Green areas, public spaces and new links along the Delta/Hermann-Debroux
© Perspective.Brussels, ORG Urbanists 2018



Potential new bike lane and plantations along the E411 in the Soignes Forest © Perspective.Brussels, ORG Urbanists, D'Ici là 2018

4. Learning from Brussels

4.1. Planning as a Crucial Step for Change

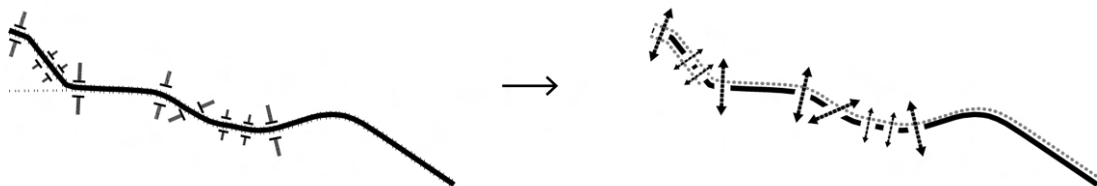
The Delta/Herrmann-Debroux transformation process is about to successfully pass the planning stage. After years of initiatives, research and debates, the Master Plan (Plan d'aménagement durable or PAD), is soon to be approved in third lecture by the regional authorities, in a consensus with the municipal level: there may still be a long way to go to deliver the promises of the PAD, but this must be viewed already as a major achievement for the Brussels Region.

At this stage, the project shows once again that urban highways are infrastructures of the past that they need to be radically redesigned to fit the needs of cities. And this is true both for the needs of today -converting expressways into boulevard contributes to a better local quality of living- and for the needs of tomorrow -it helps change travel behaviour and reduce the carbon footprint of urban development.

The Delta/Herrmann-Debroux PAD effectively combines different dimensions of the project in one single document:

- a strategic vision for the future of the highway corridor in line with the regional strategies
- a transformative highway-to-boulevard project expressing the potential of reducing traffic from about 80,000 vehicles per day in 2017 to less than 50,000 vehicles per day in 2030-40, without major traffic increases on alternative routes inside and outside Brussel Region,
- a integrated mobility plan for the area providing guidance for: a new tram extension; new pedestrian, bike and tramway links; metro, train and P & R hubs; and parking provision,
- a strategic public space plan for the area featuring a new organisation of space, including increased ground floor activity in buildings; new pedestrian links; green connections and people-friendly plazas,
- a draft landscape strategy showing the way rivers and natural features can be restored as part of the transformation process,
- a detailed urban design plan for each of the five adjacent areas that are to be converted from monofunctional, inward-looking, sites into intensive, mix-use, districts, that translates into local planning regulations.

The PAD shows that expressways such as the E411 can be (partly) deconstructed and (partly) reused to become the backbone of an active public space. A new boulevard can reconnect both sides of the former infrastructure and stimulate the transformation of fragmented roadside sites into pedestrian-friendly mix-use neighbourhoods. The Master Plan shows how an open urban form can interact with the new road design, despite the geometrical constraints of the viaducts, underpasses, trenches, median rail tracks and metro stations.



From road barrier to connected boulevard

© Perspective.Brussels, ORG Urbanists

4.2. An Informed and Iterative Scenario Building Process

One of the most interesting aspects of the preparation of the Delta/Herrmann-Debroux Master Plan (PAD) is the way the design of the project has interacted with the analysis of its potential environmental impacts all through the process.

In 2017, a public competition led to the designation of both a consultant design team led by ORG Urbanists to support Perspective Brussels in the preparation of the Master Plan (PAD) and a consultant engineering firm (Aries) in charge of the preparation of the Environmental impact assessment (RIE). Both teams were to work in an interactive, yet autonomous, way within the framework of the *Definition Study* prepared by Perspective.

While the ORG team built different transformation scenarios for the infrastructure (removal of viaducts or not, design options for the new crossroads, etc.), for transport alternatives (for example: metro line extension *versus* new tramway branch) and for the design of the five adjacent urban regeneration sites (various building volumes, densities and public space options), the Aries team would start analysing their potential impact on a range of topics such as traffic volumes, public transport, noise, air quality, shade, green space, water systems, biodiversity, urban structure, etc, as well as their possible combined impacts.

Step by step, the results of the research analysis would help choose preferred options which would then be combined to build a preferred design scenario. In turn this preferred scenario would be translated into urban design guidelines and submitted to discussion within the public consultation process. The environmental impact of the chosen scenario would then be refined by Aries along with solutions suggested to avoid, mitigate or compensate the negative impacts, and recommendations for the monitoring of the transformation process.

4.3. Project Debate and Acceptability

Building a Consensus

The draft Master Plan for the Delta/Herrmann-Debroux corridor has been quite well received by Brussels' stakeholders and public opinion. The local municipality of Auderghem, who has been pushing for such a plan for a long time, supports the project. The public consultation and participation (planning & design workshops) process did not result in any active opposition to the strategy. Private developers seem to support the project. Non-governmental environmental organisations, such as ARAU, also support the removal of the highway (with the exception of the Park & Ride project) have formulated positive statements regarding the project.

However, some local residents however still fear that removal of the Herrmann-Debroux viaduct and the reduction of traffic lanes from 8 lanes (2x2 on viaducts + 2x2 at street level) to 4 lanes (2x2 at level) may cause local and metropolitan traffic flows to merge, thereby increasing congestion. However, it seems that public opinion is changing as regard to the need to reduce car-use.

Car-drivers and commuters living outside the Brussels Region, in the Flemish Brabant or Walloon Brabant, may not align with the project, as well as some elected officials from these regions. These opinions need to be taken care of with specific alternatives.

Another key issue that has emerged is the fear of an excessive densification of the adjacent urban sites, with opposition to high-rise buildings. Some critics from the municipalities and citizens about the building heights permitted were heard by the Brussels Government officials. The draft Master Plan was altered in 2021 to reduce some maximum heights authorised from 11 floor-levels to 8.

The Park & Ride Debate

One of the sticky points remains the idea of building a new Park & Ride (P+R) facility to help cut by half the traffic volumes along the E411 corridor: there is no real consensus yet towards the principle, the size or the location of the new 800 to 1500 P+R car-park hub in the Stade-ADEPS sector. Located far into the urban core of the Brussels region, some fear the risk of further encouraging car use, despite its goal to promote multimodality. The hub (or hubs), it is argued, should ideally be located outside Brussels, well into the Flemish or Walloon regions and well connected to the regional train network.

As a first response, Perspective.Brussels argued that it is difficult for the Capital Region to develop P+R facilities outside its territory. And locating such a facility in Auderghem further away from the Stade-ADEPS would increase the costs of extending tram line 8.

Parking.Brussels, a public agency, is now launching an opportunity and feasibility study to help decide if a new P+R facility is needed, what size it should have (if needed) and how it should be financed and managed. This question is a theme of debate in many other metropolitan areas all over Europe.



Carrefour shopping mall and car-park today in Demey

© Paul Lecroart - L'Institut Paris Region



Visualisation of the pedestrian crossing to the future mix-use urban district and shopping centre.

© Perspective.Brussels, ORG Urbanists, D'ici là 2018

4.4. Taking Action: Operational Challenges and Tactics

The success of the project will rely on the alignment of many regional agencies, such as Perspective, SAU (Urban Development), Bxl Mobilité (Mobility), STIB (Transport), Bxl.Environnement (Environment), Bruxelles Logement (Housing), Bruxelles Urbanisme et Patrimoine (Heritage), BMA.Brussels (Master Architect) etc., the municipalities of Auderghem and Watermael-Boisfort, as well as private parties including landowners, investors and developers.

With the final approval by the Brussels Capital-Region Government of the Delta/Herrmann-Debroux Master Plan expected in 2022, the main question now is how to turn the plan into reality. This is a major issue as the Master Plan is a strategic and regulatory framework, not an operational framework.

What may be needed now is an Delivery Action Plan with would define a fine-tune phasing of the transformation showing how to coordinate in time and space the interaction between different components of the overall project: removal of the viaducts (or part of), extension of tramway #8, temporary relocation of functions to allow the redevelopment of sites, etc.

Detailed, yet flexible, phasing will need to be strongly articulated to the funding and financing possibilities of the different parts of the project by each public institution or agency, and each private stakeholder. To make sure real estate contributes well to the funding of the public infrastructure improvements, a specific value-capture mechanism may be interesting to look into.

Currently, a regional development agency, the *Société d'aménagement urbain* (SAU) has been commissioned to look into the public-sector side of the transformation. In the Brussels development ecosystem, private landowners of any one of the five development sites could technically start submitting building permits once the Master Plan is approved. But this piecemeal approach may jeopardize the success of the overall project.

A special delivery vehicle in charge of steering the whole transformation project may be something to think about. Supported by regional and local governments, it's board could represent a wide range of public agencies and enjoy a financial and technical autonomy.

Taking action also means using events and temporary uses to change to open up new possibilities. In the post-Covid context, provisional, cheap and quick moves to redesign public space known as tactical urbanism²¹ may be a powerful tool to mobilize citizens around the transformation of the Herrmann-Debroux and Watermael viaducts. *'Bruxelles en vacances'* experience could be an excellent reference.



A giant fresco by artist François Schuiten on the closed Herrmann-Debroux viaduct in 2011. © DR

²¹ Paul Lecroart, *Tactical Urbanism : Small-Scale Projects, Paradigm Shifts?* in *Cities Change the World*, Cahiers #176, Institut Paris Region, December 2019.

4.5. Highways to Boulevards: Building a Multi-Level Strategy

Brussels, A Pioneer Region

As a Region, Brussels may well be the first metropolitan authority in Europe to affirm and prioritize the transformation of penetrating highways into multimodal urban boulevards as a key measure of both its Regional Development Strategy (*PRDD*, 2018) and its Regional Mobility Strategy (*Good Move Plan*, 2020), and in line with the decarbonization objectives of its recent Climate and Energy Plan 2030.

Brussels' strategy is to redesign six penetrating road axes inside the Brussels Ring by 2030 into urban avenues. As part of the process, the goal is also to convert their low-density, car-oriented, fringes into greener, denser, mix-use, pedestrian-friendly and transit-oriented urban districts. The idea is clearly to improve the liveability along these axes by reconnecting neighbourhoods on both sides of these highways, reducing the speed and volumes of motorised traffic, and enlarging the bike & pedestrian realm.

Each of these penetrating highways has specific contexts, features, functions and technical complexity, so there is not one answer to the question of re-designing these axes. In the case of the Delta/Herrmann-Debroux corridor, the deconstruction of part of the E411 viaducts is crucial to unlock potential urban development sites around it. In the case of E40 motorway, traffic capacity should be incrementally reduced while the motorway would keep its expressway status. The A12 expressway transformation, currently known as *Parkway 21*, may give priority to the conversion of one of the carriageways into a green, bike and pedestrian corridor.

Inter-Regional Cooperation Needed

Most highway transformation projects are interdependent with what could happen outside the Brussels Region limits, calling for a closer inter-regional coordinated approach. It should involve the National Government, the Flemish and Walloon regions and provinces, transport authorities and operators, as well as the municipalities concerned inside and outside Brussels, in the building a common vision and action plan.

The E411 highway corridor extends beyond the boundaries of the Brussels-Capital Region in the Flemish Brabant province towards the city of Namur, but there has yet been little cooperation between the two authorities over the redevelopment of the highway. As it appears, the Flemish government is undertaking its own transformation project for the E411-section within its jurisdiction, though such a project seems less advanced than the one carried out by Brussels' Capital-Region.

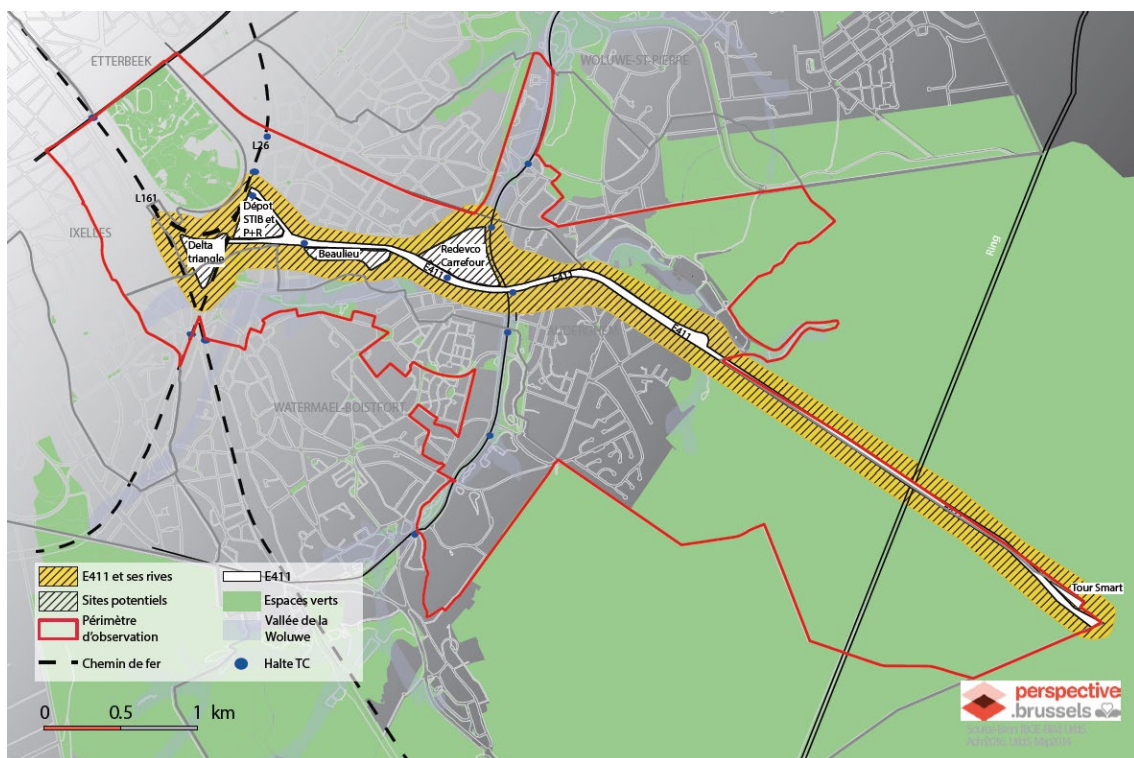
A weak cooperation may alter the plan's acceptability and efficiency, in particular regarding the Park & Ride strategy, the Léonard junction project on the Brussels Ring and the future of the E411 section located in the Soignes Forest where one carriageway lies in the Brussels Region, and the other in the Flemish Region. Currently, the Master Plan for the redevelopment of the Delta/Herrmann-Debroux area does not specify any statutory measures for the part of the E411 located in this sector, only broad strategic orientations.

APPENDIX

Key data

Key data: E411 highway – “Delta/Herrmann-Debroux” project				
Project status	Relevant authority	Highway section subject to transformation	Daily traffic prior to transformation	Surface area of the sector being redeveloped
Planning phase	Brussels-Capital Region (regional authority)	5 kilometres	80,000 vehicles per day	43.5 hectares

E411 Project Corridor and Study Area



The E411 project corridor in 2017 (in yellow) with potential redevelopment sites (in white). Red external contour is the territorial area (Auderghem). The green area to the right in the Forêt de Soignes, marks the limit of the urbanised area.

Source: Etude de définition -Synthèse, mai 2017 © perspective.brussels ORG Urbanists

Interviews

Interviews with Milène Deneubourg, Project Leader for Delta/Herrmann-Debroux at Perspective.Brussels, 15 July 2020 and 25 Sept. 2020. Site visit with M. Deneubourg: 30 June 2021.

Meetings: M. Deneubourg with Yannick Vanhaelen, Project Leader at ORG Urbanists 18 January 2022, with Géry Leloutre, Architect-Urbanist, Professor Free University Brussels, 7 February 2022.

Interview with Jean-Michel Bleus, Historian, Community Manager, Atelier de Recherche et d'Action Urbaine-ARAU, Brussels, 30 June 2021.

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International Reference

Reinventing Cities: From Urban Highway to Living Space

Paul Lecroart shows the many benefits of transforming urban highways into people-friendly boulevards



In 1974 Portland replaced its Harbor Drive with a waterfront park; in 1991 the Embarcadero Freeway in San Francisco was dismantled; in 2001 New York rebuilt the 12th Avenue where an elevated highway had stood; in 2005 the Cheonggyecheon Expressway in Seoul made way for the river hidden underneath; and between 2013 and 2017 Paris pedestrianised the Seine riverbank highway. Now Paris Metropolitan Region is launching an international design competition to rethink the *Périphérique* and the *Grand Paris* motorway network.

So will segregated highways become a thing of the past in the post-car and carbon city? Research by the Planning Agency for the Paris Region (IAU) suggests that converting stretches of highways into multi-use boulevards and public spaces may open up new avenues for rethinking our cities in terms of liveability, mobility and resilience.

HIGHWAY-TO-BOULEVARD CASE STUDIES

Functionalist thinking and post-war planning have left many large cities, including London and Paris, with extensive, yet unfinished networks of urban highways. As they were built they were used, and still have a role in moving people and goods

within metropolitan areas. However, these limited-access grade-separated roads create physical barriers, tend to devalue centres, neighbourhoods and waterfronts, and hinder regeneration. The high levels of traffic they support generate noise, dust and air pollution, raising health and social justice issues. By providing seemingly easy access for cars, extensive highways networks tend to encourage car-centric lifestyles, urban sprawl, and more traffic congestion.

In the last decades, many cities have successfully started tearing down obsolete urban highways and replacing them with multi-use boulevards lined with mixed use new development, or new linear parks. Why are they doing that? What happens with the traffic? What are the benefits and costs? Are these projects backed by public support?

1 Seoul: the Cheonggyecheon River, formerly a highway carrying 168,000 cars a day; removal of the viaduct and restoration of the river significantly reduced traffic. Image by Paul Lecroart IAU

To find answers to these questions and others, I have looked into over 20 highway-to-boulevard experiences either fully completed or planned in cities worldwide. Of these, nine cases were studied in depth on-site with reports published (in French): Seoul (Cheonggyecheon Expressway), Portland (Harbor Drive), San Francisco (Embarcadero, Octavia), New York (West Side, Sheridan), Milwaukee (Park East), Montreal (Bonaventure), and Vancouver (Northern False Creek Viaducts).

Most of these cases involve fairly central stretches of highways supporting heavy traffic volumes (in the range of 50,000 to 150,000+ vehicles per day), before being replaced by a boulevard and/or a linear park. This research is reference material to inform highway transformation strategies and projects in the Paris Region.

WHY DO CITIES GET RID OF URBAN HIGHWAYS?

Depending on the physical context and circumstances, city authorities decide to remove highway stretches for quite a pragmatic combination of reasons, including:

- **Aging infrastructure and rebuilding costs.** In San Francisco, Seoul, New York (West Side), or Toronto (East Gardiner), it appeared cheaper to dismantle crumbling elevated highways than to rebuild or bury them. Recycling viaducts into pedestrian connections can also give a new life to obsolete infrastructure cheaply, as in Seoul (Seoullo 7017) and Paris (La Défense Boulevard).

- **Revitalising blighted areas and unlocking redevelopment opportunities.** This is a main driver for change in Vancouver, Milwaukee, Montreal, Birmingham (Inner Ring Road), Lyons (A43 Mermoz), and Oakland (I-980).

- **Reclaiming the waterfront.** Transport engineers enjoyed building highways along river or seafronts, but these created barriers and therefore suppressed real estate values. Reconnecting cities with their historic setting and 'giving the waterfront back to the people', residents and visitors alike, often means converting the highways, such as in Portland, Seoul, New York and Paris.

- **Reducing through traffic and related nuisances.** This is central to the strategy supporting the Seoul, Paris, Lyons (A6/A7 Confluence), and Strasbourg (A35) reconstructions.

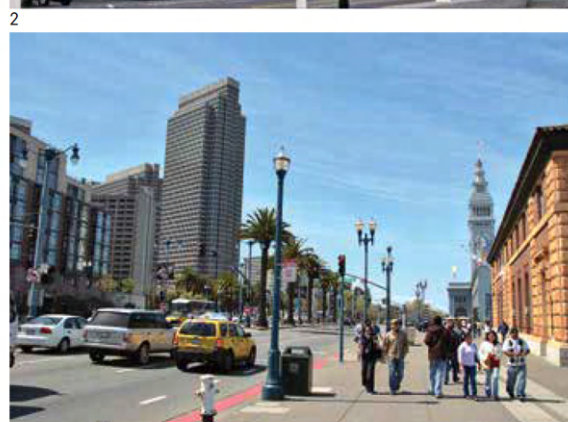
These context-specific goals are usually part of wider urban intensification policies, eco-friendly transport plans and economic strategies. However, many highway removal projects were accidental: both the Embarcadero and Central Freeway viaducts in San Francisco were closed after being damaged by the Loma Prieta earthquake in 1989, and New York's West Side elevated highway collapsed when a maintenance truck went through the viaduct in 1973!

DOES HIGHWAY TRANSFORMATION REALLY HELP REGENERATE CITIES?

Evidence from research shows that redesigning highway corridors can be a powerful driver for regenerating blighted or abandoned parts of cities, with a lasting positive impact on the city as a whole. Removing visual barriers, reconnecting streets, and improving the quality of the environment has changed the face of Portland, San Francisco, Seoul, Milwaukee and Birmingham. Replacing interchanges and ramps by straightforward crossroads unlocks vast pieces of land that can be reconverted into denser mixed use districts and parks.

WHERE DO THE CARS GO?

To many traffic engineers' surprise, closing highways does not usually create traffic chaos beyond initial adjustments. Where spare road capacity did exist in some of the cases studied (Seoul, San Francisco, New York), car traffic switched to local street networks. Traffic thus gets distributed more evenly on a larger number of streets. Congestion remained limited and less than forecast.



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Average daily traffic in the road corridor may decrease dramatically after removal – from 20 per cent in Portland to up to 82 per cent in Seoul. When accounting for trips diverted to alternative roads or to public transport, a significant share of earlier traffic appears to have simply evaporated, typically in the range of 10-25 per cent in the cases studied. Faced with a reduction of road capacity and speed, a proportion of motorists change their routes, time of travel, trip frequency or activity programme, while others switch to alternative modes. Changing conditions makes car drivers think twice, leading some to change destination or give up less essential trips.

INCREASED CONNECTIVITY FOR EVERYONE

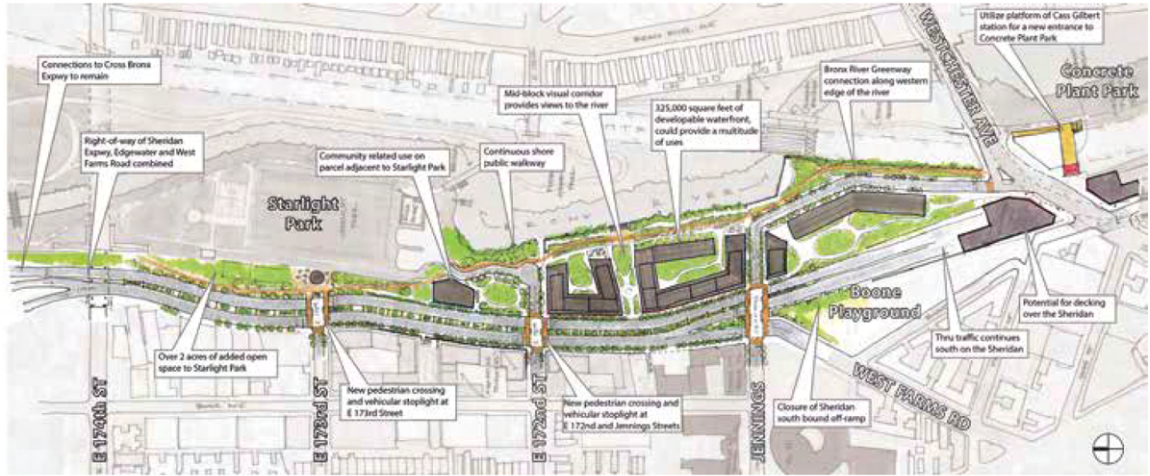
Some cities back up removal projects with specific alternative transport and travel management strategies. While reducing road supply on the Cheonggyecheon corridor, Seoul increased metro and express bus services, and discouraged solo car use through infrastructure tolls and parking policy. Local accessibility often improves with the removal of detours. A decrease of vehicular trips may mean increased accessibility for people as a whole.

Pedestrian and cycle mobility and static uses of public space for enjoyment increase sharply. However, more people on streets with still heavy car-traffic

2 San Francisco: Embarcadero Freeway in the 1960s, photo Tim Pharoah

3 The same area after the removal of the Freeway gave back the Bayfront to the people. Image by Paul Lecroart IAU

26 TOPIC



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levels (80,000 vehicles a day on New York's 12th Avenue today) may result in more car-pedestrian or car-cyclist collisions: the careful design of multi-lane boulevards is critical to their overall success. Ultimately, what we may see is a shift from a system providing off-peak fast travel for some (the motorists) to a 24/7 system of slower accessibility for all.

ENVIRONMENTAL EFFECTS

A reduction in the volume of motorised traffic and distances travelled tends to reduce fuel consumption, as well as CO₂ and fine particle emissions. Perceptions of noise levels decrease, even when actual levels remain high. Some highway-to-boulevard projects providing more greening may have a positive impact on the local climate: in Seoul, summer temperatures along the former highway corridor are now a welcome 5°C lower than on other arterial roads.

A FAVOURABLE COST-BENEFIT RATIO?

Transforming highways has a cost: in the cases studied, capital investment was in the range of €35-70 million (about £30-60 million) per kilometre. In view of the costs of maintaining or rebuilding infrastructure nearing the end of its life, transformation often proves cheaper. It may be a more affordable and longer-term solution than capping or tunnelling. Land freed for redevelopment can contribute to meet the costs.

COMPLEX PROCESSES, PUBLIC SUPPORT?

Redesigning a highway into a boulevard is always a lengthy, complex, and uncertain process in which open technical expertise,

4 New York: plan for the Sheridan Expressway in the South Bronx. Highway-to-boulevard projects can help deprived neighbourhoods while maintaining road capacity. Image by New York City Department of City Planning-ARR
5 New York: the boulevard replacing the Westside Freeway (2001): spectacular growth in bike and pedestrian traffic. Image by Paul Lecroart IAU

citizen participation, and political will play key roles. Convincing car-users and business interests requires lots of data, meetings and leadership. While controversial to begin with, these projects often win over the public during the process... or not, as in the case of Seattle (Alaskan Way). Just as in the 1970s, extensive highway plans were defeated by public opinion in San Francisco, London and other cities, many smart grass-roots coalitions are pressing governments today to remove existing highways and flyovers in cities including Paris, New York, Denver, Dallas and Sao Paulo.

SYMBOLIC ACTIONS OR PARADIGM SHIFTS?

Highway transformation projects have a strong symbolic impact because they affect objects traditionally connected with the idea of freedom and modernity. They bring us back to some of the fundamentals of city development, such as nature, heritage, parcels and streets, and into a more holistic way of thinking.

LEARNING FROM INTERNATIONAL EXPERIENCE

From an urban planner and designer's perspective, the main lessons can be summarised in four points:

- Transforming urban highways into boulevards encourages people to change their travel patterns: less essential car trips tend to disappear and eco-friendly transport modes tend to increase. This can free-up road capacity for other needs, such as higher added value car trips or goods distribution. Improving local accessibility is not detrimental to longer-distance metropolitan or regional trips.
- An integrated boulevard offers a comprehensive metropolitan level of services connecting people and activities, moving as many people, if not more, than a highway, but at a slower, smoother speed. Boulevards enable social and cultural interactions to take place, ultimately the



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raison d'être of cities and a key to their economic performance.

- Replacing a highway with a well-connected high-quality multi-use boulevard creates value and can unlock the mixed use regeneration of deprived urban spaces and improve the liveability of the city as a whole.

- As a tool in the sustainable planner's kit, highway conversion can be used pragmatically, for instance to leverage the revitalisation of a specific area. Successful tactical action on a short stretch where the highway is easy and cheap to change rapidly will help garner support for the transformation of longer stretches in the future. This is the strategy chosen by New York City for the Sheridan Expressway (by the Bronx River). In the United States, the country of the automobile *par excellence*, the success of removal projects stimulates many other cities to redesign obsolete highways. Seoul has removed 16 flyovers since 2005.

International successes in highway-to-boulevard transformation offer food for a wider rethinking of the functions, uses and status of urban highways in city regions. Profound changes are affecting the behaviour patterns of people and businesses, and the way that cities and regions are organised. Many developed cities worldwide, including Paris, New York, Los Angeles, Tokyo, London and Stockholm, have experienced an overall reduction in car use, traffic levels, and car ownership over the last decade.

Redesigning the existing urban highway network of large cities may be a smart way to address citizens' aspirations and metropolitan development challenges, including global warming related issues. It is not just about design: it is about rethinking the planning, movement, lifestyles, and wealth creation of cities and regions. This is a major trans-disciplinary task for the coming decades. ●

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Highway transformation projects have a strong symbolic impact because they affect objects traditionally connected with the idea of freedom and modernity.



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6-7 Montreal: the Buonaventure Highway, before and after the viaduct was demolished with a positive impact on the environment.

8 Paris: former Left Bank Expressway, now a pedestrian and cyclist promenade. Image by Paul Lecroart, IAU



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