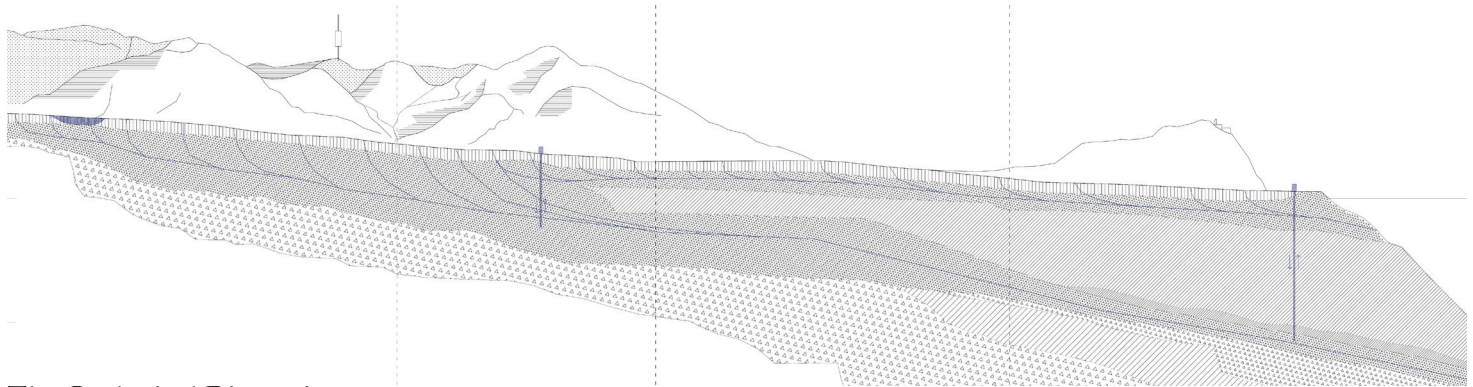


## El Prat de Llobregat



### A Fragile Balance

As it is located on a very delicate ecosystem, planning in El Prat de Llobregat involves understanding and reacquainting with the balances of a territory defined by water dynamics. It is located at the final stretch of the Llobregat River, which has a total length of 175 km and a water basin of 4.948 km<sup>2</sup>. The Llobregat is born in the Pyrenees, used to feed various textile colonies along its course, and makes a great entrance at the Metropolitan Area of Barcelona by creating the last remaining open-spaces for free-flowing waters and agricultural fields. The final stretch is defined by two hydrogeological units, the Vall Baixa and the Delta of the Llobregat. The presence of the river and the strength of the water granted the preservation of a great metropolitan void despite the urban pressure that Barcelona and its surroundings have experienced over the last century. This preservation is achieved through the Parc Agrari del Delta del Llobregat (Agricultural Park of the Llobregat Delta) and multiple deltaic ecosystems taking the lead. A complex network of canals, collectors, channels, and wells structures this unique landscape in Europe, granting its productive and reproductive capacity. Through this lens the Prat Nord project, an urban planning originated in a popular competition called in 2009 won by Claus en Kaan Architecten and Jaume Carné team under the morro “Central Prat”, is re-visited. Establishing that the winning competition planning is valid regarding the volumetric organization and main axes of the proposal (central park, street layout, etc.), a series of strategies are proposed to guarantee greater ecosystemic integration and compliance with the guidelines indicated in the UN’s 2030 Agenda and the EU’s 2050 horizon.



### The Geological Dimension

Due to its unique location in the centre of the Delta, El Prat is the only municipality not supplied with surface water. Instead, it extracts its water consumption from wells fed by the deep aquifer of the Delta. This fact reveals a new dimension of the territory that goes beyond the surface structure of the landscape and unveils the hidden water of the Llobregat River. From a historical perspective, the Llobregat Delta is a recent element, formed by sediments carried by the river along its course and deposited in the final stretch, forming various geological layers.

An example of this is that San Boi de Llobregat, currently located 8km from the coast, had a port during Roman times. Similarly, part of the current municipality of El Prat was an island called “lla de Banyols,” which was integrated into the coastal territory as the delta grew.

These river flows have defined a series of layers that make up the subsurface, some sandy and gravelly, and others composed of silts and clays. The first two, being more porous, became saturated with water from the river’s course, resulting in groundwater reserves, or aquifers. Historically, these aquifers have supplied the river populations of the delta, either through superficial wells or through deep artesian wells from 1895 onwards. It was precisely in this period that it was discovered that, beyond the superficial aquifer, where the water is contaminated by surface infiltrations, there is a second water reserve under a thick impermeable layer of clay, containing water of excellent quality, known as the deep aquifer. Throughout the first half of the 20th century, this reserve was the main source of supply for the Barcelona metropolis, until its overexploitation led to a drop in the water table and the intrusion of seawater into these underground reserves, revealing the danger of altering these hidden balances that affect the ecosystem dynamics of the environment. The construction of expensive infrastructures were needed to compensate this situation, such as the saltwater barrier at the port, formed by a battery of pumping wells. Precisely for this reason, beyond the surface design, the proper integration of the Prat Nord with its environment must be approached from the subsurface.

### A Leap in Scale

On the other hand, the construction of Prat Nord, while comprehensible at the metropolitan level as it provides an opportunity to develop open land in a scarce area, generates a strong impact at the local scale. The construction of 7,100 new homes and 1,639,042 m<sup>2</sup> of developed land represents a 26% demographic growth and an increase in the urban area of the municipality of 28% (excluding the airport). Therefore, the integration into its delta surroundings must be particularly careful from its socioecological dimension.

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## Ecosystemic principles

In order to guarantee the ecosystemic balance of the intervention, a series of premises are established:

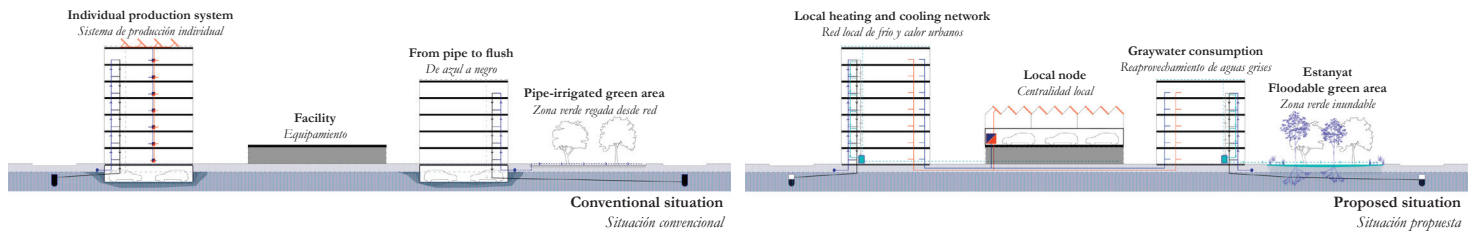
**01.** The water supply in El Prat de Llobregat will continue to come from the deep aquifer, highlighting the importance of maintaining municipal management of the resource in a context where a public-private company practically monopolizes water consumption in the region. The proposal will, therefore, seek to reduce this consumption wherever possible, seeking alternative sources under the “fit for purpose” principles.

**02.** In order to preserve the natural water cycle, permeable surfaces are maximized, ensuring water infiltration into the subsurface wherever possible.

**03.** Considering the amount of available land, the new urban development, regarding its context, should not affect the subsurface by constructing basements that alter water flows and soil dynamics. The original underground parking uses established are relocated in built-structures through collective management strategies.

**04.** Recognizing the role that associations and collectives have played throughout the history of El Prat, both in its agricultural origin and during its industrialization, the new development will seek to consolidate a collective dimension and integrate new growth within the original urban core.

These premises serve as guidelines for action, applicable at different scales, to respond to the complexity of the proposed transformation, which consists of a set of actions:



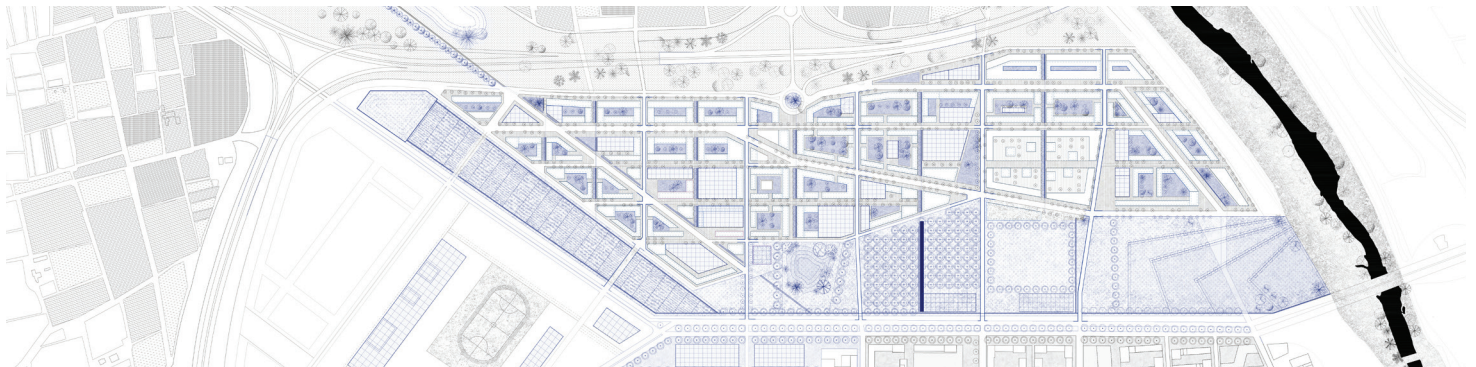
## Breaking the Barrier. Mobility strategy

The location is segregated from the urban core and its adjacent environment by various fast mobility infrastructures, the highways C-31, C-32, and the Ronda. The first proposed intervention to overcome these barriers and connect Prat Nord with the city centre and the landscape is to establish new hierarchies of road circulation.

Contrary to the redundancy of road infrastructures that prioritize private vehicles and segregate population centres, it is proposed to divert traffic outside the core, by simplifying the highway nodes that define the location. The C-31 is understood into an extension of the Gran Vía becoming a metropolitan avenue. The proposal is supported by recent studies derived from the competition organized by the Metropolitan Area of Barcelona on Nusos i Cruïlles, in which alternatives were studied to simplify or eliminate current road junctions to optimize the space allocated to the road network and allow for ecological and pedestrian continuity.

In contrast to the current proposal for burying the C-31, which involves costly interventions that alter subsurface dynamics, it is proposed to keep the road on the surface, with a pacified urban section.

Following this integration, the continuity of historical routes for soft mobility (bicycles and pedestrians) is granted through the recognition of the existing elevation difference between the B-20/C-32 (+9.50m) and the delta level (+6.00m), which allows the opening of two large crossings without modifying road access, turning the slope into a viaduct. These crossings also act as an ecological connectors that promote the mobility of different native species populating the deltaic ecosystem. This strategy is complemented by a re-hierarchization of the internal roads within the sector, especially concerning vertical axes that articulate the connection between El Prat - Prat Nord - Delta. Original urban blocks are grouped, generating a higher aggregation structure,



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delimited by five main vertical streets. The other vertical streets within this aggregation are pedestrianized, ensuring the continuity with the local urban layout and stretching it towards the deltaic paths.

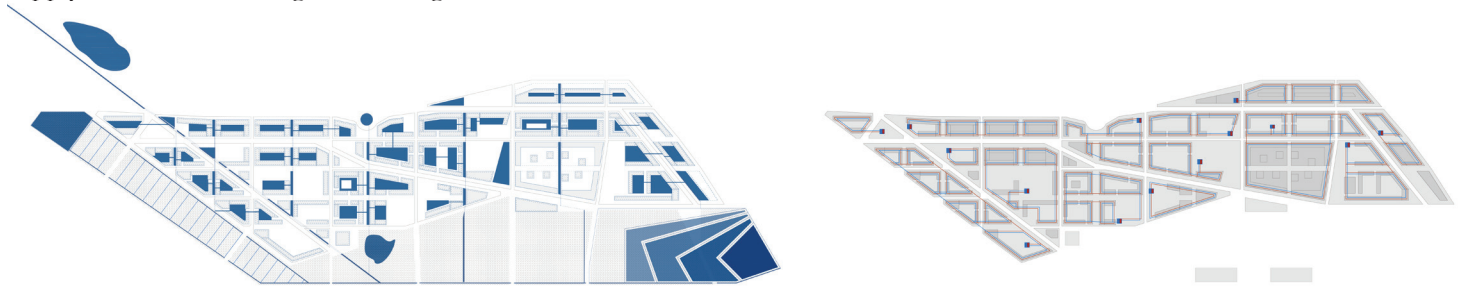
This strategy is further enhanced by the significant role that the arrival of the Metro to El Prat will play, where the combination of the intermodal station and the planned metro stations will lead to a significant reduction in the presence of private vehicles on the streets, promoting pedestrian mobility and neighbourhood-scale relationships.

### **Urban Superstructure.** *Energetic self-efficiency*

The resulting block aggregations are understood as autonomous units organized through vertical strips, following the movement of water. Each one integrates different uses (office, commercial, residential, facility, and public space).

In this scheme, the area designated for facilities becomes the core of each of these subzones. A new urban approach is proposed through the change of the urbanistic classification from 7a, 7b, and 7c to 7PN. This new urban figure keeps the use and building coefficient capacity, and includes extra additional construction coefficient prevision so it can absorb the parking use from the surrounding housing buildings (Classification 18). This strategy keeps the parking surface needed, avoiding impacts on the subsurface and promoting social and communitarian connections.

This urban classification is developed through the construction of modular wooden buildings, prefabricated with large spans, guaranteeing their reversibility in a horizon where private vehicles tend to disappear. The proposal also integrates the co-generative network of urban cooling and heating present in the current guidelines and strategies, adapting it to this new local structure. The roof of the communal facility buildings acts as a productive infrastructure, with the installation of photovoltaic pergolas that supply local urban cooling and heating networks.



### **L'Estanyat.** *Water cycle*

The management of the water cycle plays a fundamental role in the relationship between buildings and their environment. Understanding the importance of this aspect, local water sources are prioritized beyond the public water supply network. The first and most evident local source is rainwater, which, due to Mediterranean climate and climate change, tends to be less frequent over time but more intense in its flow. The other source considered is the use of graywater generated in homes. This water, considered as a waste, has a potential re-usage capacity in certain purposes. This practice is common in various European cities and some municipalities in the AMB, where water from tap and showers is stored for secondary use, such as in WC cisterns or outdoor spaces management. Considering that, according to metropolitan consumption indicators, the greywater generation (30% of total consumption) is higher than the blackwater (21% of total consumption), there is a surplus that can be redirected to the public space.

The pedestrian axes are proposed as vegetated corridors that laminate and filter graywater, bioretention strips with the plantation of native species that retain organic particles and ensure the water quality. This constitutes a continuous flow and independent of meteorological seasonality, that therefore is led to certain floodable green areas within the city blocks. This strategy is based on the “estanyat” practice, a typical agricultural technique of the Baix Llobregat used to combat soil salinization through the temporary flooding of soil. The freshwater on the surface pushes the salts that plants have absorbed back into the subsurface, providing a natural cleansing effect on the soil, acting as an insecticide, fungicide, and disinfectant. Additionally, creating shallow flooded areas benefits many species of waterfowl and other species to be preserved within the deltaic habitat. This technique, beyond ensuring soil maintenance, allows restoring the fragile balance of the Delta's subsurface.

### **Central Prat**

The surplus water is conducted to Parc Nord, which acts as a local receptor and meeting joint between the municipal and territorial scale. It is conceived as a 42ha public extension, a territorial hub between the delta, the river, and the metropolis. The park design acknowledges the five proposed vertical axes, and following Olmsted's Emerald Necklace project in Boston, it is understood as a linear succession of landscapes that accompany the course of the Sant Boi canal to the Llobregat River. Following the direction of the water (west-east), it is structured as follows:

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At the highest level of the park, a “Bassa” (reservoir) is located, accumulating water from the canal and conducting it along a set of municipal orchards through two canals, one for irrigation and one for collection. The presence of these orchards in this park has an important educational role for citizens, as despite being in the heart of the agricultural park, only 30 people in El Prat are engaged in agricultural activities.

The central stretch of the park acknowledges the existing reservoir, the Bassa del Prat, a refuge for biodiversity that plays a key role in the ecosystem balance of the area and cannot be replicated. The road structure initially proposed is slightly adapted to respect it, relocating the buildings in the neighbouring city blocks. Behind the Bassa, an “Arboretum” is proposed, a shaded space where various native species of riverside trees are planted in a grid. Opposite this shaded space, an open area is proposed, “la Clariana”, understood as a referential void that serves as a support for public activities and celebrations.

The last stretch of the park, close to the Llobregat River, is understood as a succession of floodable terraces. This gesture responds to the narrowing of the riverbed at the train bridge level, which is less than 100 meters wide and floodable in a 10-year return period. Given the existing risk, this area acts as a buffer for the river’s flow, ensuring the population’s safety.

A series of facilities are located along the Park, at the intersections with the main perpendicular roads, functioning as landmarks that ensure activity along the water course and connecting both riverbanks.

### Initial Investment and Long-Term

The economic dimension of the proposal is divided into two phases, the initial construction, and the long-term maintenance. In relation to construction costs, the proposed 7PN facility model is based on a hybrid management between public and private entities. A compensation mechanism is established regarding the prohibition of underground construction in private buildings (Classification 18), which results in an investment proportional to the available building capacity for the construction of collective facilities. In this way, the operation benefits both parties, reducing the construction ratio through collectively financed mechanization and prefabrication strategies, which reduce the price per m<sup>2</sup> of parking from €900/m<sup>2</sup> to €750/m<sup>2</sup>.

The long-term aspect is based on the reduction of water and energy consumption. The implementation of greywater management mechanisms and photovoltaic co-generation of urban cooling and heating entail higher investment at the time of construction, but considering the project densities, they are amortized within an average period of 8 to 10 years. At a time when European financial aid is set to mitigate this investment, a great opportunity ensures that the El Prat can achieve its decarbonization and self-efficiency objectives before 2030.

Finally, the most significant cost-saving in construction comes from not building at all, making it essential to reconsider preconceived actions such as the surface pedestrianization of the C-31 instead of its undergrounding. Recent experiences in Barcelona call into question whether tunnelling urban infrastructures are or not sustainable alternatives, from both economically and socially terms.

### Towards a Real Balance

In conclusion, the unique situation of Eixample Nord, frozen in time for over 10 years, offers the opportunity to reframe the implementation of a much-needed urban growth for a densely compressed metropolis like AMB in a delicate environment like the Delta del Llobregat. Beyond fulfilling the objectives set by the 2030 agenda and the 2050 roadmap, a meticulous study of the fragile deltaic ecosystem balance through the recovery of local techniques, is essential to ensure that construction in the Delta does not lead to its destruction.



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