baca

in, on, near and
under water

Our Vision

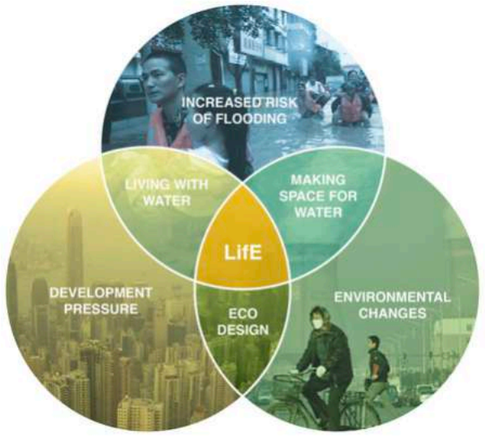
ON
IN
NEAR
& **UNDER**

water.

We are a practice based research company. We collaborate with academics, engineers and politicians to advance our understanding and affect change in the field of architecture and the built environment. The ranges across three core areas: enable, design and build, flood resilient homes and communities.

'We lobby Government for policy change.'

Our Planning strategies make space for water and our buildings offer flood resilience and future adaptability. The practice envisages large communities that are holistically planned to be better prepared for flooding and climate change. Dwellings will be low carbon and organized around multifunctional landscapes that will help control surface water flooding or act as a large flood storage area. New communities will be made up of streets of flood resilient dwellings located on the highest ground with amphibious homes adjacent to waterbodies subject to flooding. The long-term goal is to design communities that function as normal, preserving continuity of daily life during both droughts and floods. Our intention, through our research and built work is that we can demonstrate that the future is already here.

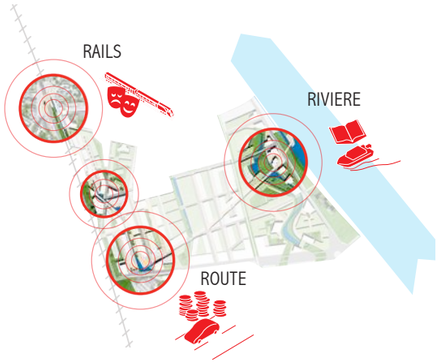


Introduction

The ZAC Seine Gare Vitry is one part of a major redevelopment along the banks of the River Seine in South East Paris. Despite over half the 37-hectare site being susceptible to flooding it was earmarked for over 6.5 million sq ft of development (including 4,500 new homes).

The plan illustrated adopts an integrated planning and design approach to tackle the complex site issues of flood-risk, land contamination, and phasing. The plan was to create a development that embraced water and nature at its heart and not to rely on flood defences. The proposal was to use the solution to managing flooding as the design catalyst to create a unique new neighbourhood at the same time as managing the threat from flooding. This shift in approach led to an innovative and highly integrated mixed-use, high density programme in a flood resilient neighbourhood. The three major public spaces that provide generous recreation areas act as buffers between the roads as well as flood attenuation areas during a flood event.

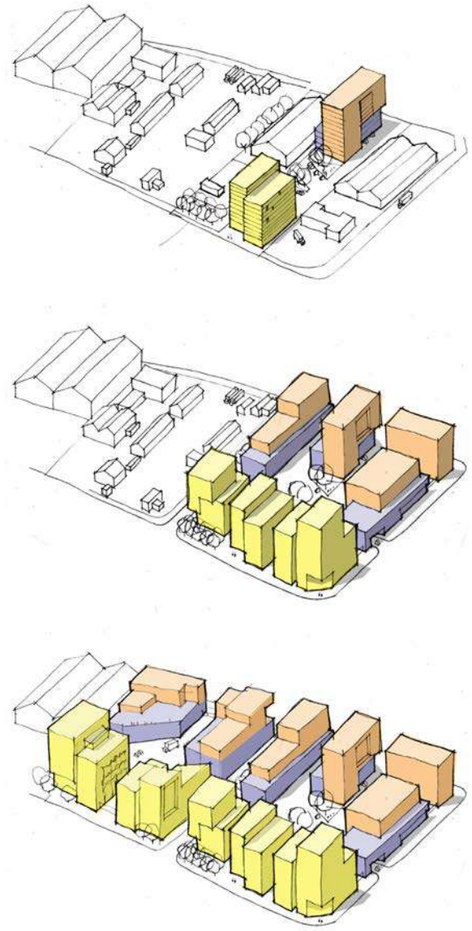
This plan indicates how use of different building types can help to create a resilient neighbourhood by organizing development in plan and section according to vulnerability of use.



Dynamic Regeneration

The rich industrial, railway, and riparian heritage of the site inspired new architecture and urban realm typologies, across the site and into the surrounding neighbourhoods. Three urban nodes are each organized around a major mode of transport: Rail, River, & Road, creating a dynamic neighbourhood with sustainable communal transport at its core, connecting trains, river buses, cycle routes, and dedicated bus routes. These nodes form “catalysts” within a flexible masterplan enhancing the surrounding area, around which more conventional and economic buildings grow. Each node is like a stone dropped in water, causing a ripple, around, before coalescing in smaller ripples. They form nuclei of redevelopment, to create revitalisation zones that bring a quick enhancement to the area.

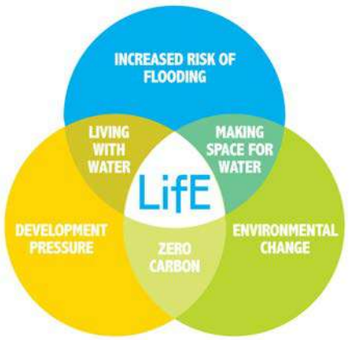
The site is part of a river regeneration corridor that leads right up through the centre of Paris. Due to the scale of the project different parts of the site will come available over time requiring dynamic and intelligent procedures that allow the requirements to evolve during the transition of the site from industrial to mixed-use. This transition is complicated by the variety of industrial uses present and forseen on the site, and their respective nuisances. Rather than designing a fixed and inflexible masterplan, a set of organisational principles categorise landuses, and indicate appropriate adjacencies, as well as design, remediation and management measures, to enable all landuses from industrial, through to educational and residential, to come forward simultaneously. This organic planning process allows the plan to flex and adjust depending on land availability, changing industries, and evolving local requirements. The illustrated masterplan is one of several bold and successful variants that could emerge.



incremental development based on land availability with buffers between uses

Key Concepts

An integrated planning and design approach was taken to identify solutions that would provide wider benefits and establish a clear strategy for redevelopment that would be safe, resilient and also create a unique sense of place. This is the 'LifE' approach (developed by Baca) for sustainable planning and with cost efficiency.



Vestiges de Vitry

The implementation strategy of the project is based on four fundamental elements of context:
1 - polarities keys.
2 - major urban axes
3 - The existing urban fabric
4 - The topography of the site

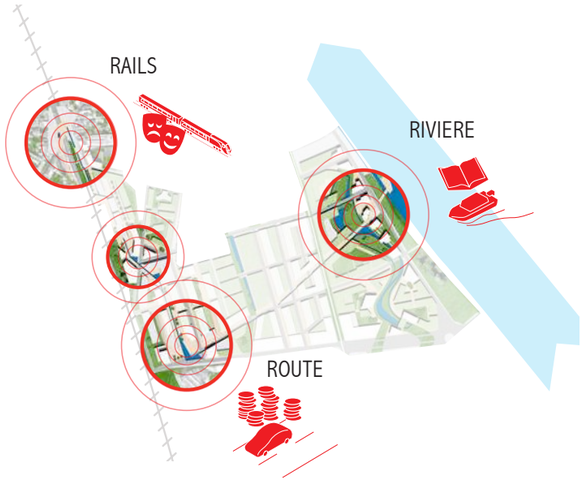
Catalysts & Conventional

Three urban polarities organizing events around a major mode of transport:

- RAIL northwest around the RER and including schools and businesses in the intersection;

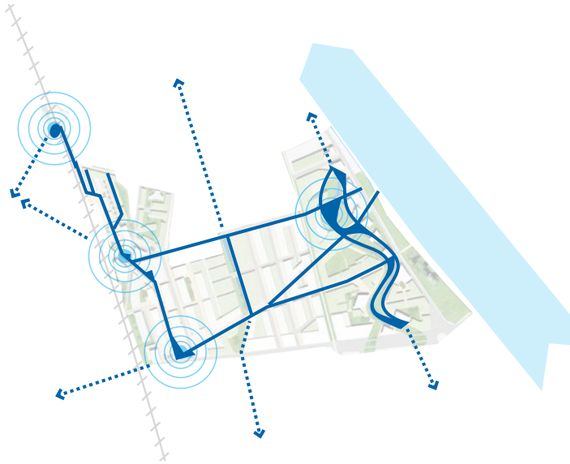
- RIVER west, around the river and including Voguéo terminus and a stop Tzen5;

- ROAD south, articulating and featuring distinct neighborhoods over the railway.



Theatre of Water

Water links each of the nodes, as a reminder of the riverside location and a guide to the next node. The water axis double as part of a sustainable drainage system, slowing the flow of rainfall and filtering run off before it enters the water course.



Ecological Spaces

A series of green corridors will run north to south through the site.

1 an extension to the existing riverside park to create a floodable urban park.

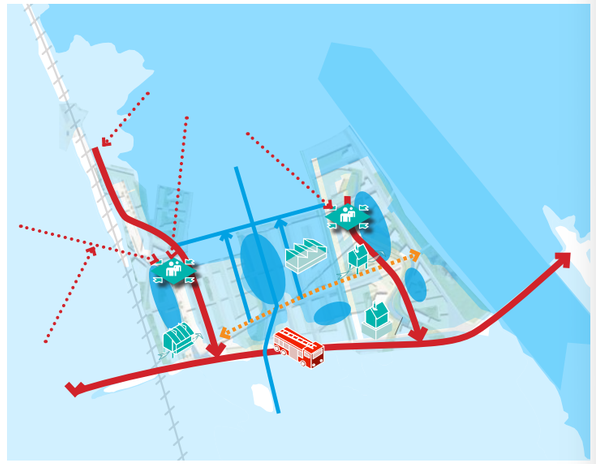
2. along the railway line will provide a visual and noise buffer to the railway as well as a habitat route.

3. in phase 2, a natural drainage flow path that extends south into the future redevelopment.

Technical Strategy

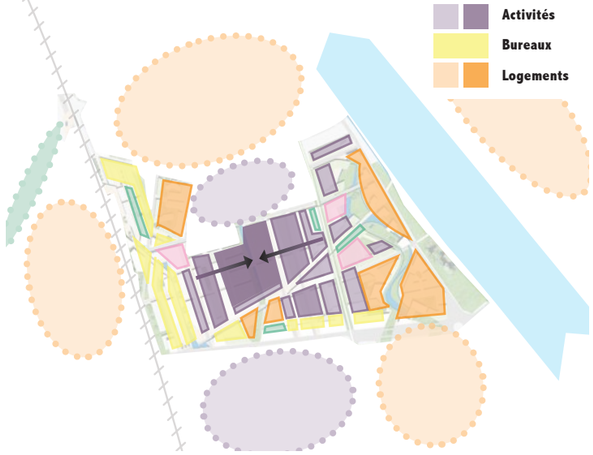
An integrated technical solution has been developed to tackle flood risk and contamination silmutaneously. A small volume of land which needs to be treated is reprofiled to create areas safe from flooding.

The flood risk strategy involves a logical and hierarchical approach to flooding: Locating the most vulnerable uses on the highest ground and above less vulnerable uses; and to provide with safe access routes, without costly bridges or defences.



Productive Programming & Dynamic Phasing

Les secteurs résidentiels seront donc placés au bord de la rivière et sur le pourtour du cœur industriel. Le tertiaire sera située entre la gare et la route principale ce qui lui permettra de bénéficier des services tout en constituant un écran acoustique pour le reste du développement. Le plan masse est flexible suivant la disponibilité foncière.

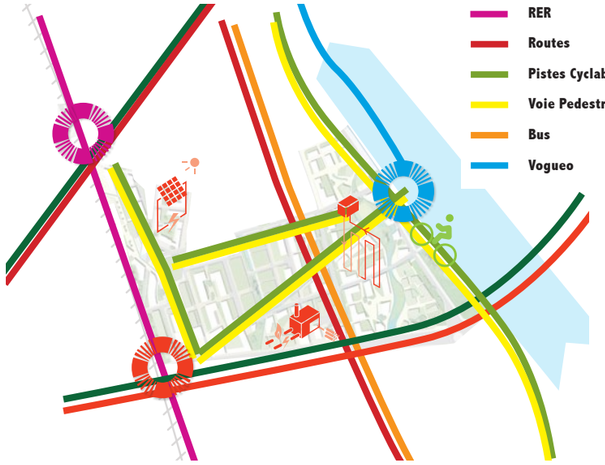


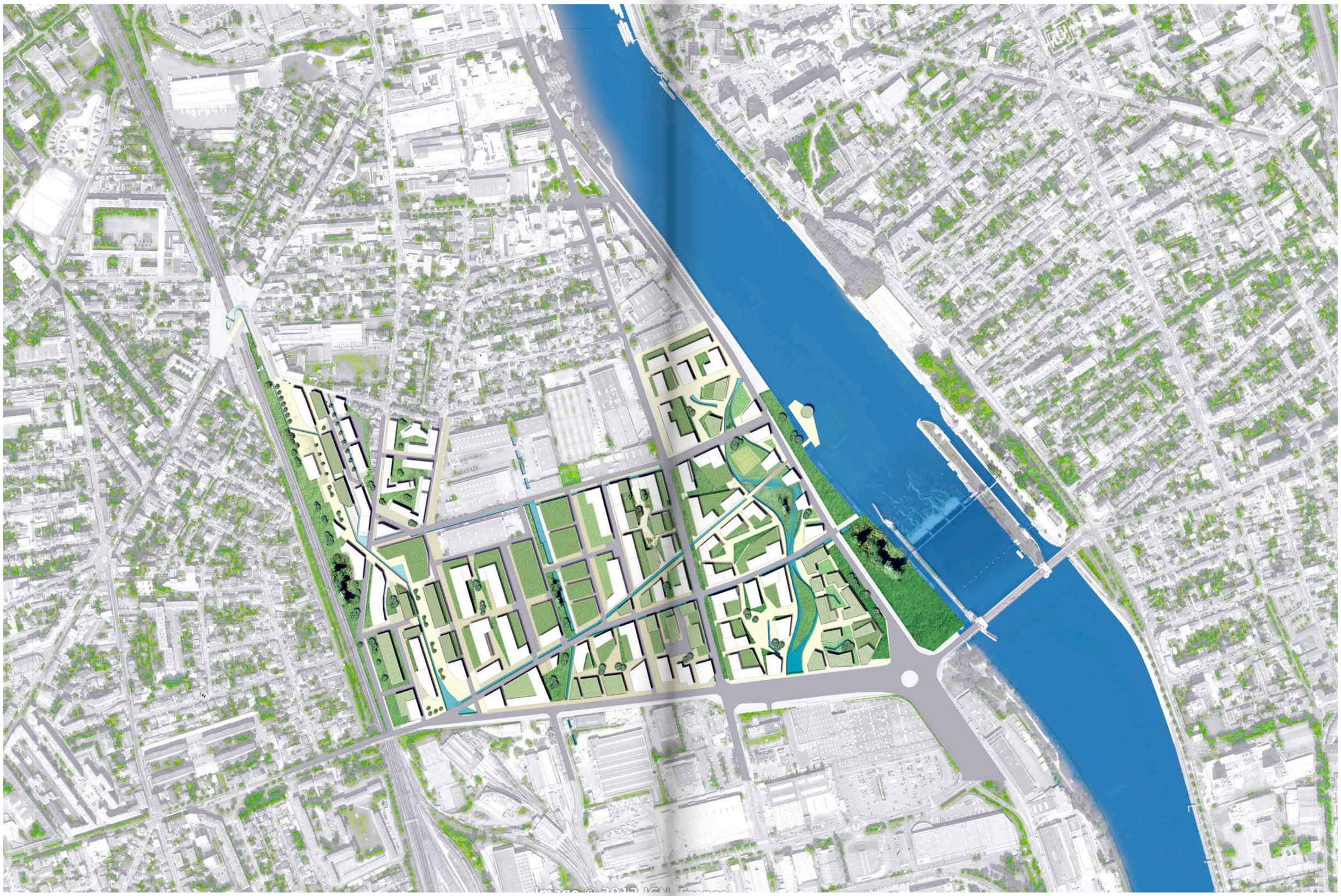
Transport & Sustainable Development

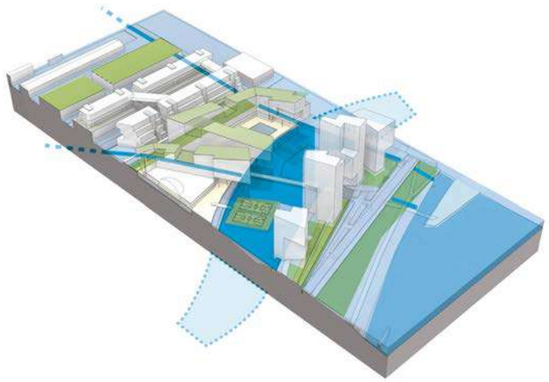
The proximity of the river and the forthcoming river bus service provide a fantastic opportunity to create an integrated access solution, based around the rail, the road and the river.

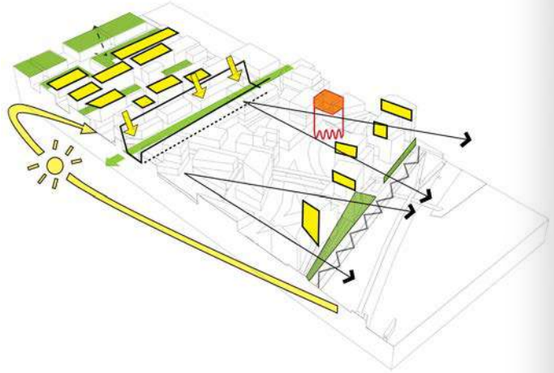
Pedestricanised routes run diagonally through the site and between the nodes, to provide convenient and safe routes for both walkers and cyclists and to discourage car use, particularly for short journeys.

Buildings are orientated to allow natural daylight, avoid overshadowing and provide space for renewable power.







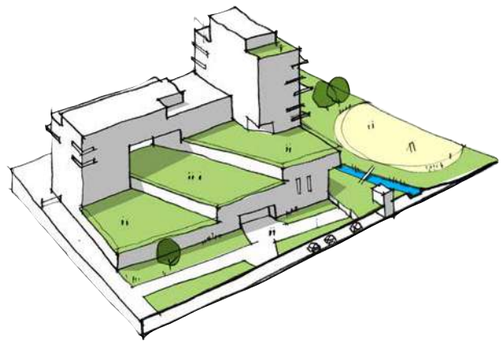


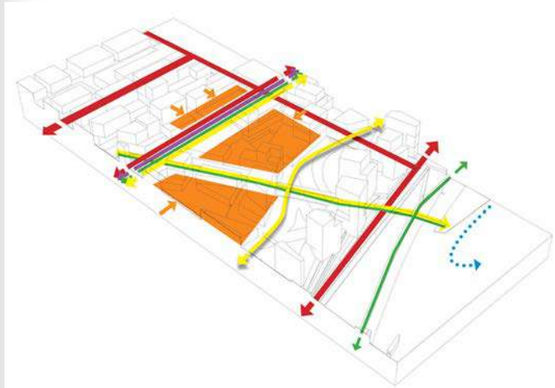
The River Node

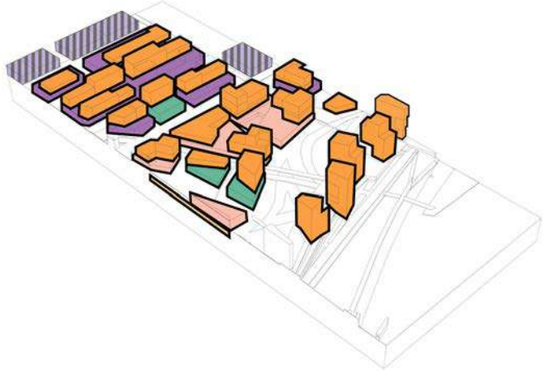
One of the three key nodes, the River node, forms a gateway to the site along the edge of the River Seine. The heart of the node is characterised by a generous floodpark, linking a new highspeed bus that runs down a green boulevard, a riverside cycle route and a new riverbus terminus. Sculptural towers are set along the river's edge, conceived as an extension of the existing urban fabric of tall riverside historic houses, forming a majestic urban skyline along the river's edge. These towers are organised to allow views of the river through them from buildings organised around open courtyards along the edge of the park.

A mix of educational establishments, libraries and high quality residential apartments are set around the blue/green park. This multifunctional shared park provides valuable amenity space for the schools and residents, allowing variety of leisure uses. Although visually continuous, the park is controlled through devices such as water fences enabling areas to be cordoned off at times, or open to the public. The surrounding buildings themselves form part of the active aquatic landscape, visibly discharging rainwater run off into the swales around the blue/green park. This symbiotic relationship between architecture and public space is key to the success of the scheme.

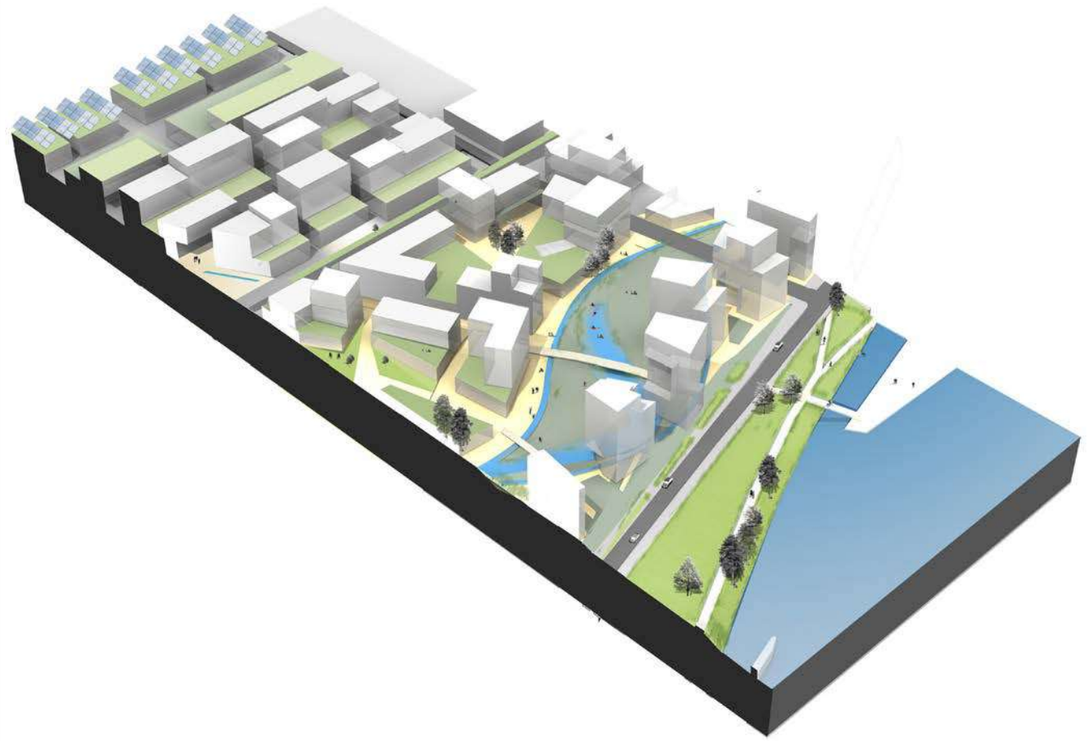
The park is located at a low point of the site that would otherwise require land-raising to be suitable for development. Localised excavations are made according to requirements for the removal of contaminated land, forming ponds within the park. The whole floodpark itself plays a key role in the flood risk strategy, designed as a large rainwater attenuation pond that will slow the flow of rainfall, to reduce the impact of the river flooding on the rest of the site.







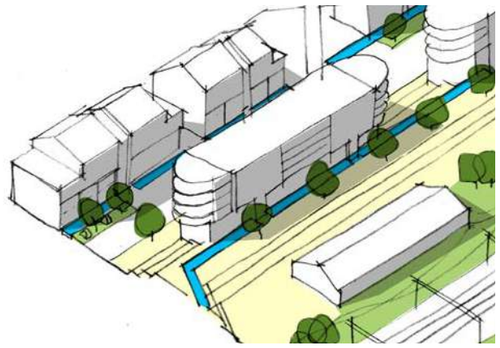
A new pedestrian and cycle street bisects the park, leading off towards the road node. A raised wide footpath along the edge of the park allows safe access and egress to the site, and doubles as which can emergency vehicles access. Pedestrianized zones also provide safe drop off and entrance points to schools.

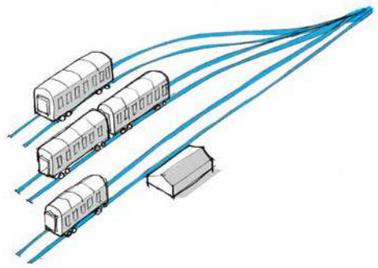


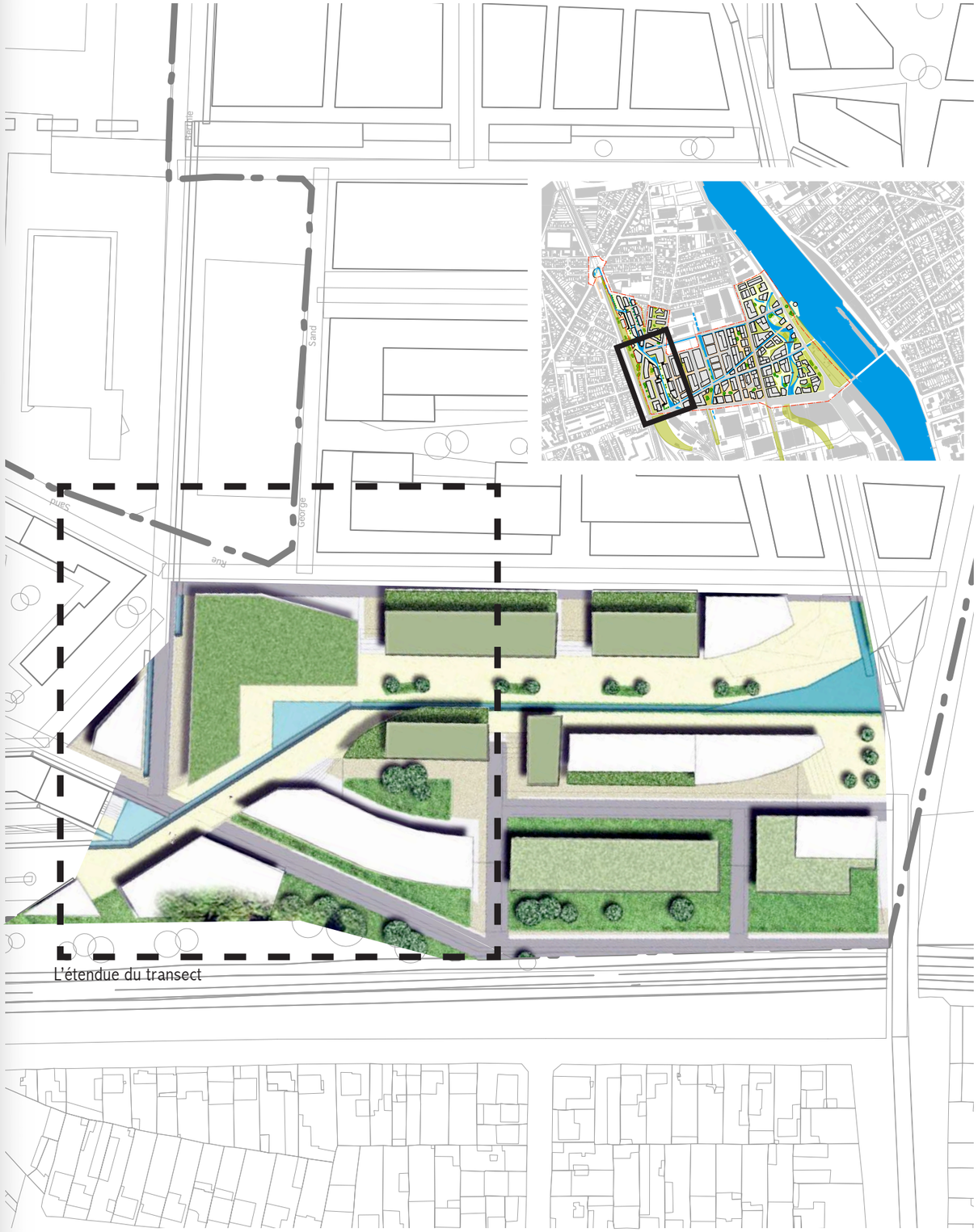
The Rail Node

The Rail node forms a major gateway to the site, connecting from the centre of Paris in 15 min. Rainwater is collected from the platform greenroof, and used to create a water gateway signalling the entry to the site. Water rills trace the railway lines of the past, serving both as urban drainage and guiding visitors towards a historic theatre. These rills are set within a new square that rises up from the existing theatre to form outdoor seating, a raised route providing safe access in times of flooding. New long buildings are set amongst the water rills, reminiscent of rail carriages, but also providing good natural ventilation and solar orientation. This cultural centre, embraces the site heritage, whilst adding a small number of cafe's and shops to create a local destination.

The water rills continue through the site towards the business district, organised around a triangular reflecting pool celebrating the intersection of several routes. Water cascades down steps to guide pedestrians towards the other key nodes.

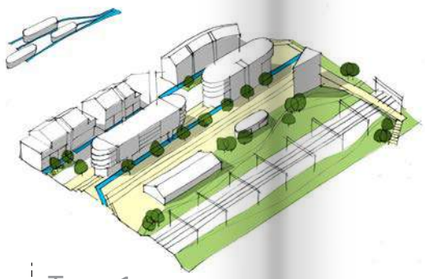




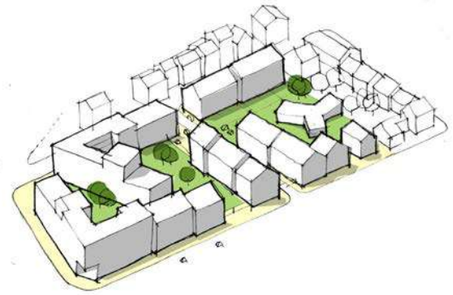


L'étendue du transect

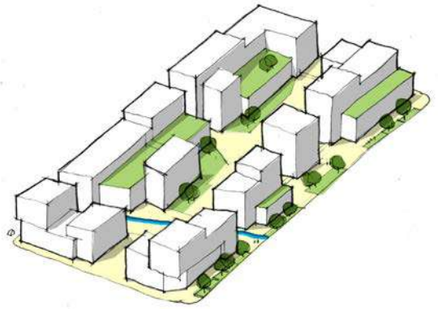
The phasing of this project has been developed to implement a series of development “nodes”, to act as local attractors, within which there will be “catalyst” exemplar buildings, enhancing the surrounding area. Surrounding buildings will be more conventional and economical. Overall it will create a high quality and sustainable community with moments of delight. A number of building types are proposed for different areas based on the mix of uses and to create variety and richness.



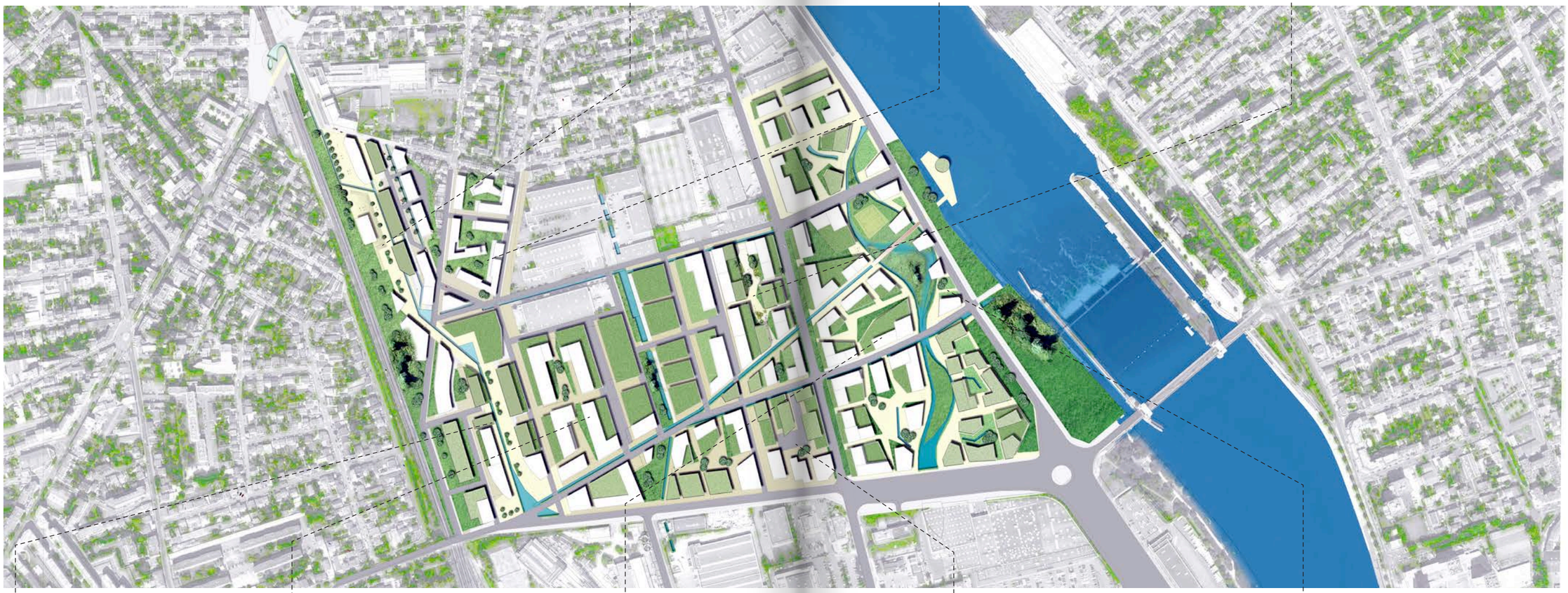
Type 1



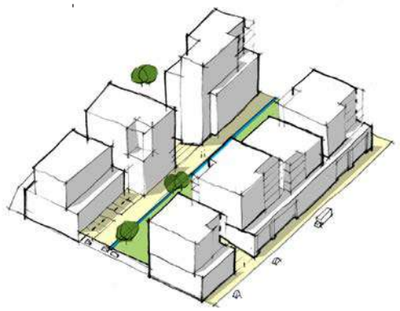
Type 2



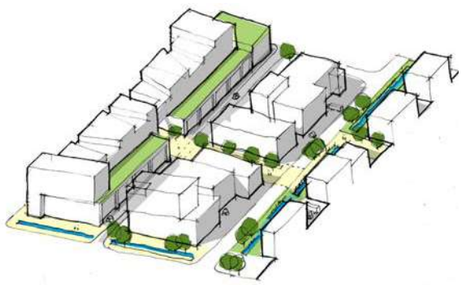
Type 3



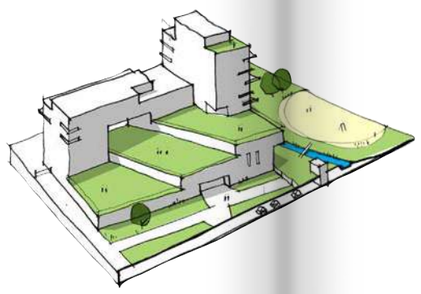
Type 4



Type 5

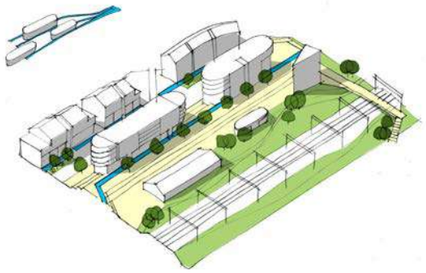


Type 6



Type 7

Type 8



Type 1

Terraces of offices and apartments

Housing above offices with duplexes on ground floor. Continuous balconies along street edge.

Mix of tree lined pedestrian streets and private areas.

Building heights range from 6 to 8 floors with taller buildings at key intersections.

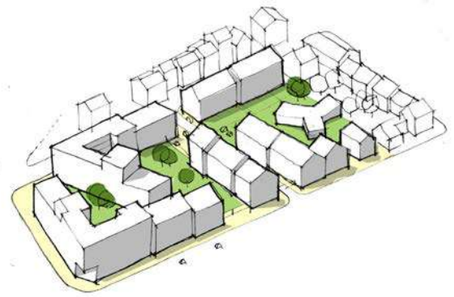
Type 2

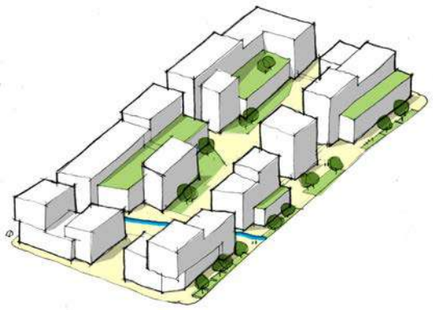
Townhouses and duplexes

Low rise, medium density housing

Duplexes, town houses and maisonettes arranged around private gardens set back from the street. Parking is arranged in garages and onto the street.

Building heights range from 3 to 5 floors.





Type 3

Open courtyards (mixed use)

Residential apartments are arranged above 3 storey industrial units, set back from the street and facing into private courtyards. Access as well as some duplex apartments is on the ground floor of the courtyard. Parking is provided in adjacent parking bays and streets.

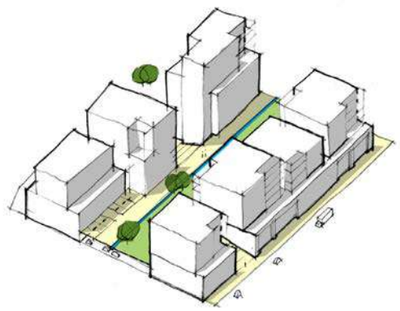
Building heights range from 3 to 6 floors.

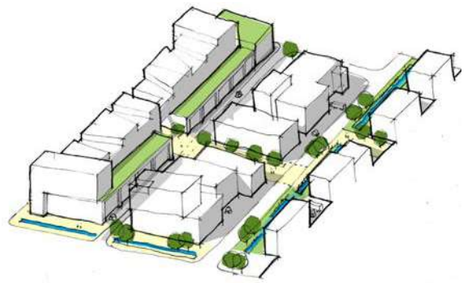
Type 4

Linear buildings are set along a pedestrian street with parking below a new ground level. Retail industry is located at the lower level and also onto the pedestrian street.

Appartments above the offices and industry are articulated with balconies and terraces.

Building heights range from 6 to 9 floors.





Type 5

Intensive industrial units

Noisier industrial units are located in a dense industrial centre. Buildings range in height to suit individual users with scope for lifts to higher floors.

The access corridors of adjacent residential units are set behind semi-glazed terraces to manage noise.

Building heights range from 2 to 4 floors with the capacity for further intensification.

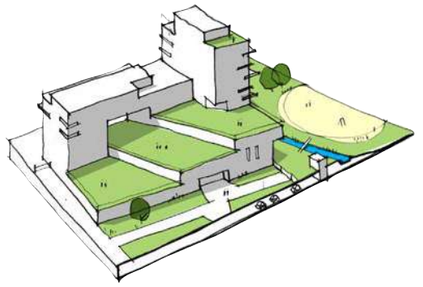
Type 6

Civic buildings with apartments above

Civic buildings are located at ground floor, onto the street and park. High-density residential blocks, with taller units on corners, are located above within private courtyards.

Set backs and balconies on upper floors to allow sunlight to ground level. Parking is located below a raised ground level.

Building heights range from 6 to 8 floors with taller buildings at key intersections.



Type 7

Taller buildings onto park.

Taller, slender apartment blocks are set within the park and overlooking the river. Cut backs and space between blocks allow views of river. Balconies provide private amenity space.

Parking is shared with the facilities in type 6.

Building heights range from 10 to 14 floors

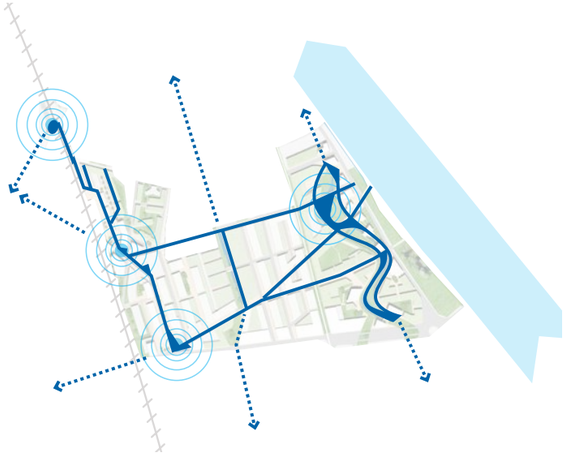
Type 8

Offices onto the boulevard

Taller office blocks and apartments face the street, with courtyards to the rear. Industrial units are located to the rear with apartments above.

Parking is located in the private courtyards.

Building heights range from 5 to 12 floors



‘Signaletique Aquatique’

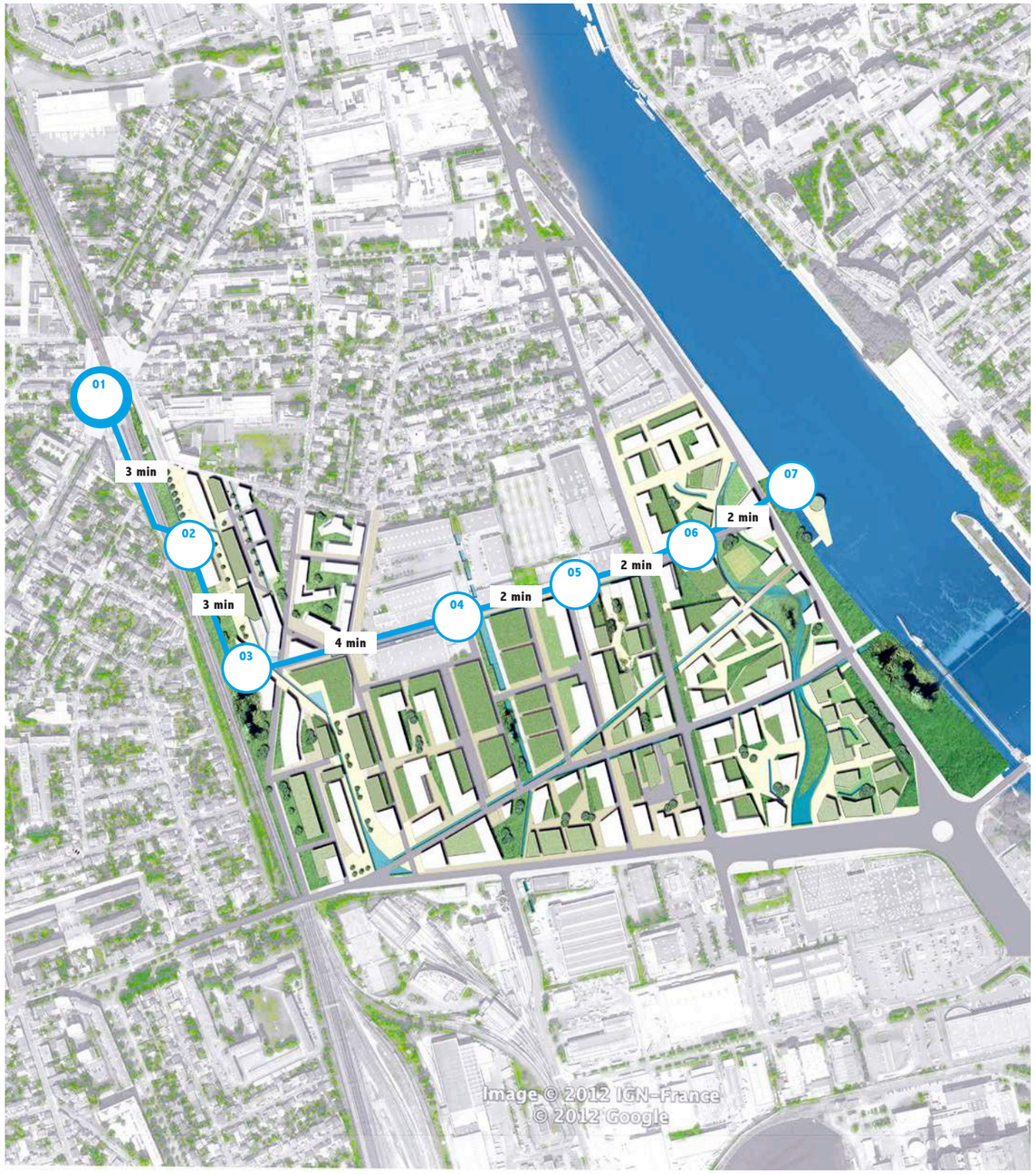
Waterways link each of the nodes, as a reminder of the riverside location and a guide to the next node. These rills, swales, paths and pools form a navigation and way finding mechanism, leading inhabitants and visitors alike across the site. This aquatic framework doubles as part of a sustainable drainage system, slowing the flow of rainfall and filtering run off before it enters the watercourse. The waterways converge at the nodes to form aquatic features (rain squares, fountains, mirror ponds, flood parks), bringing the riparian environment to the surface. These blue/green waterways cascade down to the new river bus terminus within the ‘blue avenue’ that is the legendary Seine. This Mise-en-‘Seine’ celebrates the historical and environmental context, whilst creating a safe place to live.

A series of public multifunctional green corridors run from north to south through the site, linking the development together and extending into surrounding areas. These act as visual and acoustic buffers between land uses, are part of the sustainable drainage strategy, assist urban cooling, and create new habitat space and routes. These ribbons respond to the natural topography of the site, creating low point collection spaces and flow paths for the floodwater.

In addition to the shared public spaces, private amenity has been designed to benefit the wider community. External spaces are designd to have an open atmosphere secured with gated entrances allowing view through and visual amenity whilst reducing pressures on the public purse.

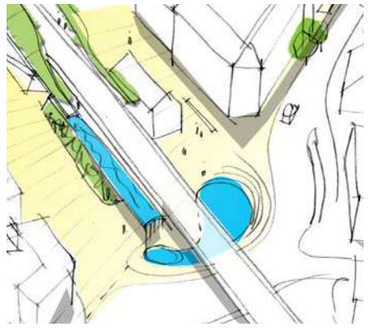
private space

public space



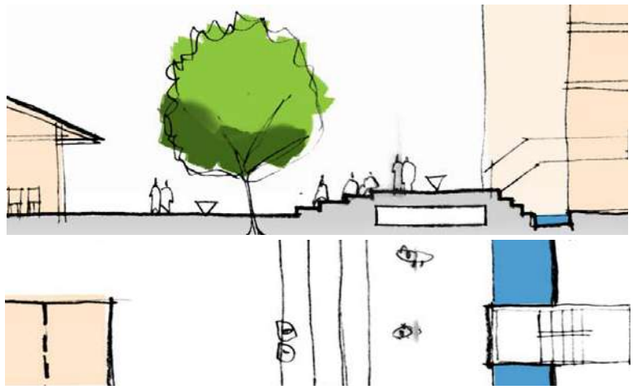
01

A new ‘green roof’ over the platform would collect rainwater and discharge it into a raised aquaduct along the railway, terminating in a waterfall and creating a water gateway.



02

The water way would run through to the theatre square, rising through outdoor seating blocks before ‘tracing’ the lines of the old railway tracks towards the triangle.

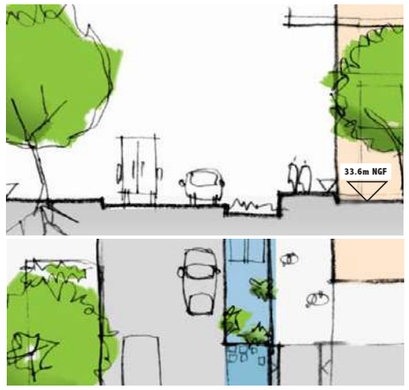


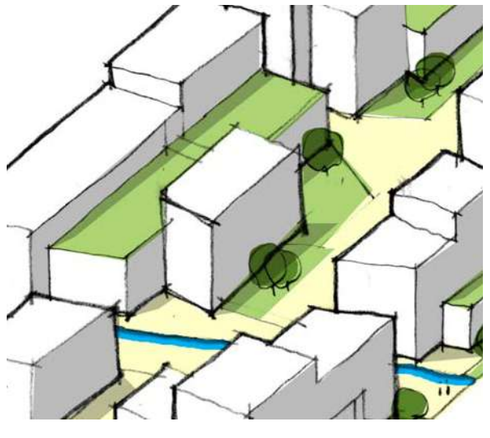
03

The triangle, is a reflecting pool, forming the intersection between different routes and part of a small plaza.

04

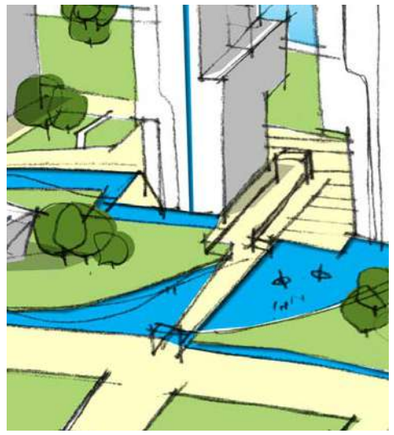
Along the edge of the Rue XXX the waterway becomes a rocky and planted swale, extending along the road all the way to the blue/green park and the River Seine.





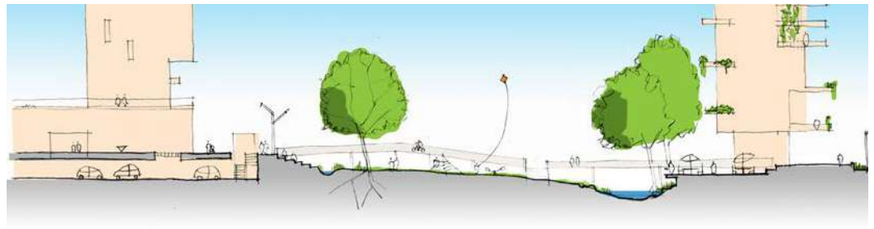
05

Many buildings are arranged around secure private courtyards that are still visually connected to the surroundings. This creates the appearance of public space but paid for and maintained by local residents. Rich garden areas are lined back to the waterways, by sustainable drainage paths.



06

The waterway arrives at the new blue/green park, overlooking the river, the weir and the bridge. The blue/green park provides additional outdoor space for the local schools. It is also designed to store rainwater in extreme and to keep surrounding areas dry. This public space is outlined by a water channel, to provide a wet fence for security and with a deck/bridge through for access across at night,



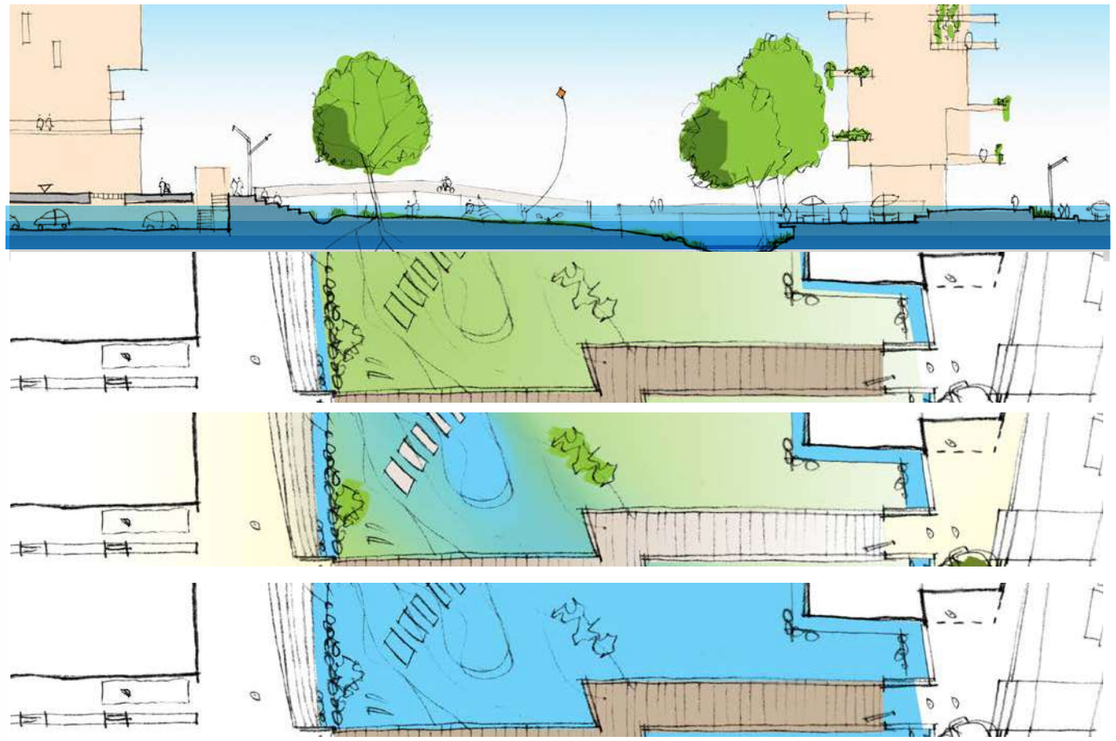
07

The path extends on to the new river bus terminus.

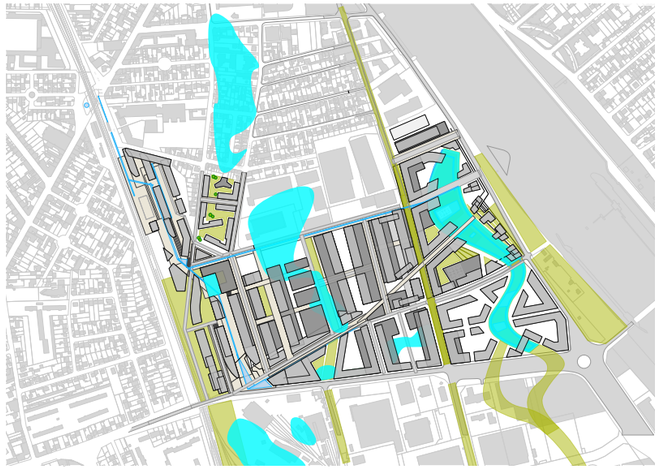
Flood risk management

Rather than relying on defences that are fallible, costly and increase floodrisk downstream, the masterplan developed by Baca makes space for water, both pluvial and fluvial. Water is accommodated on the site in a clearly managed and controlled way, which is safe, incremental and enables the continuity of daily life even in extreme floods. The whole site has been designed to allow water on and move around the site, but such that it creates a system of early warning mechanisms and hierarchal sacrificial spaces, where certain spaces are allowed to flood to reduce flooding elsewhere on the site. The site will function differently depending on the flood event (50yr, 100yr, etc) and the extent of the flooding.

However, this space for water is in competition with high-density development, amenity space, space for renewable power provision, and transport demands. This therefore called for creative integrated planning solutions. An integrated technical solution was developed to tackle a number of constraints, such as flood risk and contamination, simultaneously, limiting costs and remediation required. The strategy devised a logical and hierarchical approach to flooding: locating land uses in accordance to vulnerability and providing a system of safe havens and access routes (primary, secondary, tertiary), without requiring costly development and defence measures. Resilient routes are combined into the sustainable transport network where wide footpaths and cycle routes provide dry access and egress to users to maintain continuity of daily life, whilst also providing a access routes for emergency access during a flood. Subtle level changes allow safe passage through the site to avoid pedestrians being stranded by unexpected flood water, creating an ‘intuitive landscape’ that will lead pedestrians to safety. These are combined with compensatory measures, such as attenuation tanks, swales, etc, requiring little intervention and further reducing costs. These techniques to “let rain slow” and “let rivers go” also help to reduce flood-risk to surrounding neighbourhoods. The masterplan illustrates how flood-risk design can be used to create more successful spaces rather than cowering behind defences.



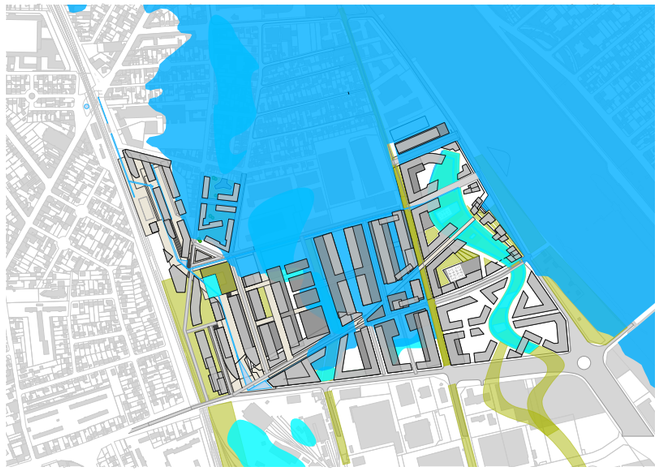
Non-defensive flood-risk management measures such as the flood park above, are designed to accommodate rainwater incrementally. Water is directed into chanels forming water fences, or retension ponds. From top: section showing flood event levels; park during normal conditions; park during 1 in 50 year storm; and park in a 1 in 100 year storm.



pluvial flooding

Pluvial Flooding

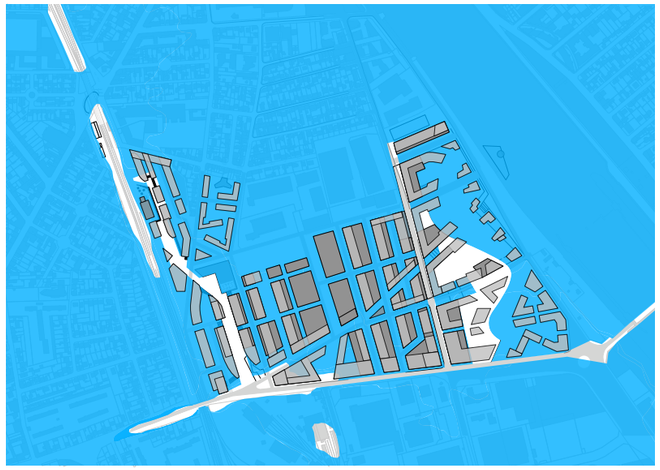
Rainwater attenuation areas have been incorporated to mitigate the impacts. These are located in the two high areas and in the low point at the centre of the site where water will naturally pond. These areas are connected with gravity planned sustainable drainage system, incorporated into the water ways.



1 in 50yr event

> 50 year fluvial event

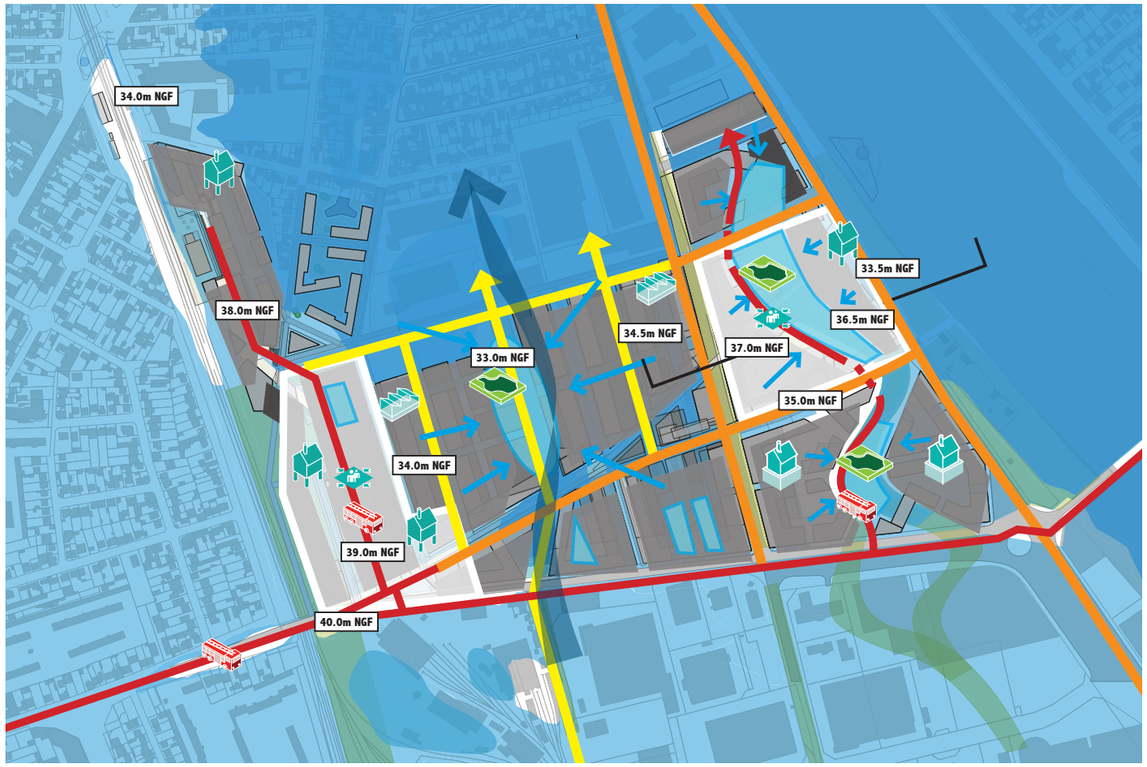
The low lying areas will be flooded first Footpaths along the tertiary streets are elevated to allow some passage through to avoid pedestrians being stranded by unexpected flood water.



1 in 100yr event + climate change

>100 year fluvial event + CC

If a very extreme 100 year flood occurs the majority of the site will be flooded and many of the ground floor units will be flooded. The two raised areas will remain dry, with safe access and egress to the rue de XXX to the south. These two wide pedestrianised areas will be usable by emergency vehicles to access .



Flood Risk Strategies

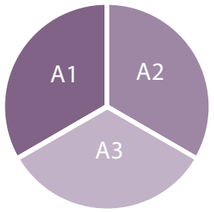
During an extreme flood the whole site would be inundated upto depths of 3m, which would be very dangerous to life and prevent access for emergency services. Increasing flood defences could increase risk to other areas. The flood-risk strategy is simple:

Locate most vulnerable uses (such as residential) in lowest risk areas and least vulnerable uses (such as playing fields and car parking) in highest risk area.
Create areas to attenuate rainfall above ground level and within public spaces.
Create SAFE HAVENS to help reduce flood-risk to surrounding neighbourhoods.
Introduce SWALES along paths, streets and as dividers between uses to absorb rainwater. Use flood-risk design to make better place making - make a FEATURE OF THE WATER.

An overall flood risk strategy has been designed that can be delivered in phases, whilst still reducing flood risk to the site. A hierarchy of roads and paths has been established to provide safe access and egress based on different flood events and importantly to provide access for emergency services. Two areas are elevated above the peak flood level to provide safe access to the surrounding development. In the business zone / road node, this is a pedestrian street that rises gently from the railway station to connect with the rue de xxx near the bridge over the railway line. Parking for the offices and apartments is located below the street, with industrial buildings fronting onto the adjacent roads.

In the leisure zone / river node the ground plane is elevated above the peak flood level with gentle steps back down to the surrounding land levels. The car parking is set below the buildings designed as if it were basement parking but at the previous (existing) ground level. The blue/green park is set within this new ground plane to provide a large rainwater attenuation pond. This strategy enables the new development to be delivered and made safe without needing to reprofile the existing roads through adjacent areas. The waterways aid quick recovery of the whole area after a flood.

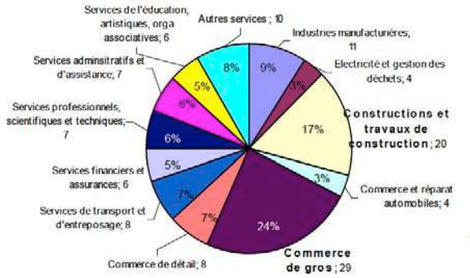
- Voie Primaire > 36m NGF
- Voie Secondaire > 35m NGF
- Voie Tertiare < 35m NGF
- Voie d'ecoulement
- Stockage des eaux des pluies
- Refuge



A1 - Fabrication / Construction

A2 - Commerce (Gros & Detail)

A3 - Services



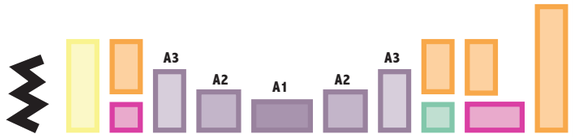


Diagramme conceptuel de la programmation transversale

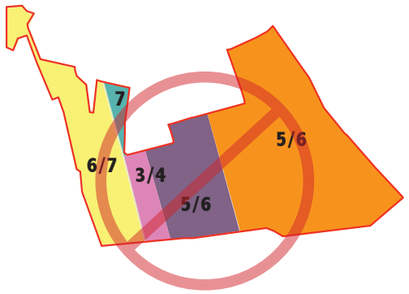
Productive Programming

To create a clear and logical planning framework the industrial sectors have been evenly divided into three land use categories based on the existing uses: services (A3 clean), wholesale (A2 “Manageable) and manufacturing/ construction (A1 “Dirty).

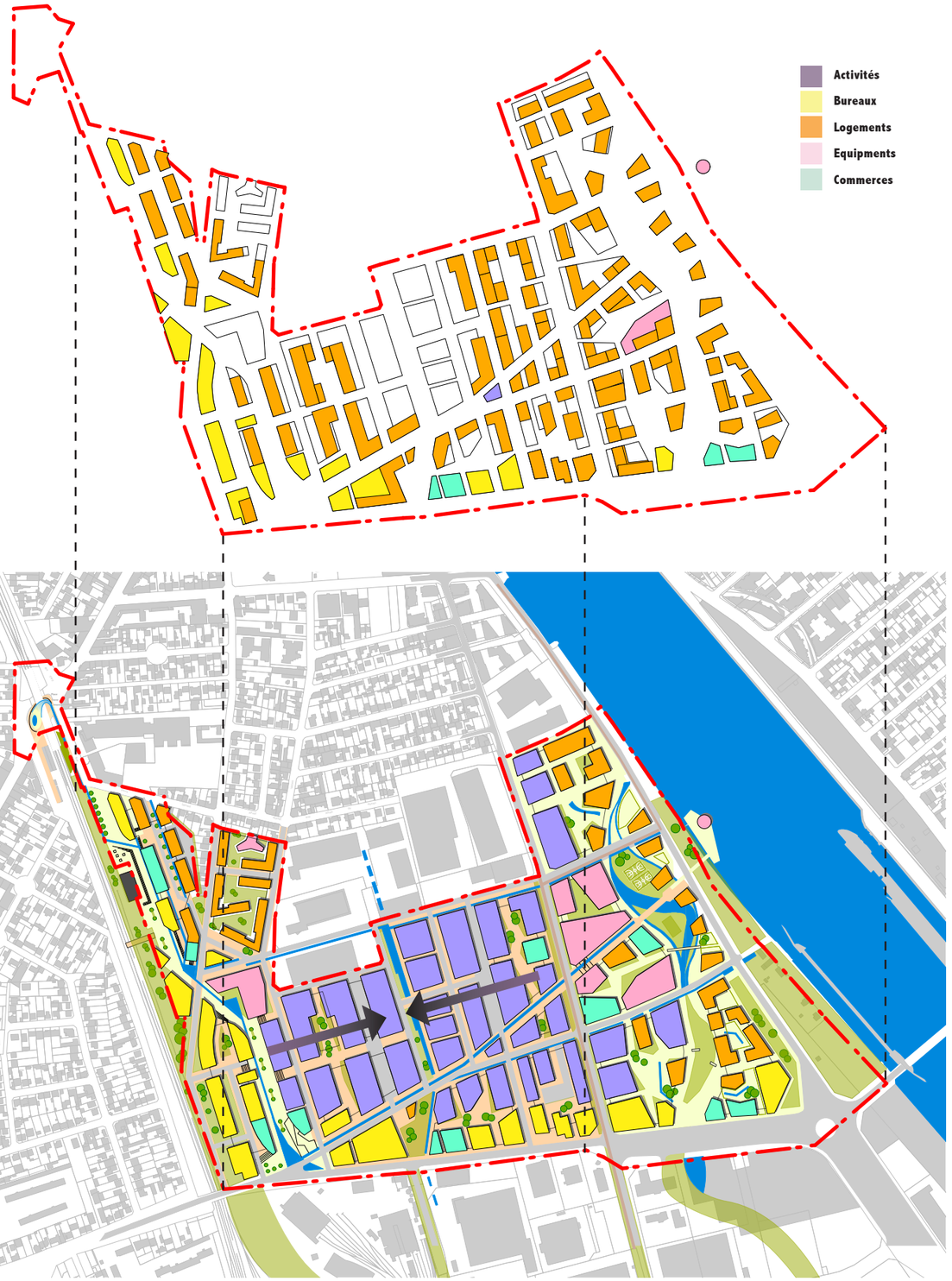
The following organisational principles have then been used to address noise, odour, fumes, vibrations, access, etc.

A1 should only be located next to other A1 or A2
A2 should only be located next to A1, A2 or A3, and may be located adjacent to offices with some buffer measures.
A3 can be located next to all other uses but some buffer measures may be needed for more sensitive uses.

Furthermore residences are more sensitive than offices which are more sensitive than any industry. Contamination has also influenced both horizontal and vertical planning with the aim to reduce the remediation requirements and therefore cost. Based on these principles the A1 industries are located at the centre of the site, intensifying A1 uses. Around these are located A2 and then A3 uses. Offices are located to the west of the site, providing a buffer to the railway, with residences located above office, retail or A3 industrial uses.



Logement au-dessus de l’activité. Logements en duplex ou accès à l’étage inférieur.



Sustainable Communities

The sustainable development plan incorporates play areas, space for renewable power provision, pedestrian friendly streets, accessible public transport, car clubs, waste management, green corridors and sustainable drainage. All of these elements require space that calls for more integrated multifunctional planning and buildings.

The combined energy strategy envisages a geothermal district heating system located in the floodpark that taps into the natural Lusitanian geothermic reservoir, benefitting from a high water table in the floodplain, in combination with rooftop solar photovoltaic electricity. Green roofs over industrial units reduce noise pollution whilst reducing rainwater flooding. Pedestrianized and cycle priority routes run diagonally through the site, to provide convenient and