GENERAL INFORMATION

PETUS description of tool in use	
Name of the case	**"Porte des Alpes"- Storm water management**
Name of the tool	Combination of tools: - Environmental indicators - Charters to manage multi purpose facilities - Coordination cell
Country	France
City / region Total area (km2) Population Density (people/km2)	City: Lyon 1.2 million of inhabitants, 500 km² (25 km in length and 25 km in width), 8700 inhabitants/km² Greater Lyon: urban community constituted by 55 municipalities including Lyon and it is the second most important urban agglomeration in France. Region: Rhône-Alpes, ranked in second place through the 22 French regions for population and surface area criteria.
Tool user's profile a. Organisation name (municipality, NGO, national or regional department, company, etc.) b. Field of activity c. Detailed contact/feedback (project website, e-mail, address, tel., fax)	a. Water Department of the Greater Lyon b. In charge of studies, constructions and management of water infrastructures for the Greater Lyon. c. For further information Elisabeth Sibeud Head of the design section of the water department of the Greater Lyon Email : esibeud@grandlyon.org
Reviewer, date	INSA-Lyon, France, Last update Feb 2004

Short description of the case

The "Porte des Alpes" site is considered as a strategic site for the development of the city of Lyon. This urban extension project including a research park, green spaces, and a residential area, raises storm water management problems due to the saturation of downstream combined sewer network, the relatively low soil permeability over the most of the area and the conservation of groundwater, which is considered as the second resource supply for the city. The solution which has been adopted is to hold back the water and drain it towards areas where the permeability allows infiltration, favouring a short storm water cycle and to offer to water management facilities multipurpose objectives.

Different tools have been used to assess and manage the storm water infrastructures: environmental indicators, coordination cells and charters. Environmental indicators allow groundwater, lake ecology and lake purification monitoring. The implementation of an operating procedure and responsibilities definition has increased the relevance of the site management.

The case was chosen because it is a pilot site of a Concerted Development Zone (CDZ) and perceived as a

kind of showcase for other sites. The CDZ is a public procedure based on concerted objectives and dependent of an area. It allows public entities to carry out the land development in order to give it up at a later date to public or private users. It allows also operating on the different sectors that create the life in the area: housing, public spaces, roads, economic development etc. It is created, controlled and carried out by the urban community in partnership with the local private economic actors. This approach intends to ensure aconcerted management and global operation of the site.

This case study presents a sustainable water management and specially storm water management solutions on an urban extension site. The East part of Lyon and also the area where the project "Porte des Alpes" takes place is characterised by groundwater presence. The project could not have been carried out without introducing technical facilities to protect the aquifer. Indeed this environmental requirement (protection and conservation of groundwater) comes from the presence of groundwater in the area which is considered as the second resource supply for the Greater Lyon.

This case study is strongly related to the case study “Porte des Alpes Urban Development” which presents the whole urban project.

This case study can be linked to the following water sector key-problems:
- The water resource quality and availability
- Management and conception of urban water infrastructures

Sector	Waste	Energy	Water	Transport	Green/blue	Building & Land Use
			X			

Scale of project	Component	Building	Neighbourhood	City	Region
			X		

Status of project	Starting up	Ongoing	Finished	Start date	End date
			X	1996	2002

Key words **Storm water management, Neighbourhood, Concerted Zone Development, New urban development, monitoring, ‘Best Management Practices’, Protection of groundwater.**	
Project a. Object (building, city park, wind farm, etc.) b. Type of activity (regeneration, renovation, new development, etc.) c. Type of product (plan, scheme, design project, etc.)	a. Object: Concerted Zone Development b. Type of activity: New urban development c. Type of product: Infrastructure scheme
Tool a. Character (according to WP3final0704.doc) b. Benchmarks (qualitative or quantitative) c. Availability (paid/ free)	a. Character: Indicators and monitoring b. Benchmarks: yes, both qualitative and quantitative c. Availability: Free
Decision-making process a. Stage of the tool implementation (preliminary, midterm, etc.) b. Level (political, technical, etc.) c. Public participation	a. Stage of the tool implementation: Design b. Level: Technical and political c. Public participation: Consultation (public inquiries) and communication (coordination cells)
Other *(optional, if needed)*	Storm water management Urban extension Protection of groundwater

DETAILED INFORMATION

A. Detailed description of project and tool

1. Description of context

The main actors involved in this project are:

- Greater Lyon,
- Water Direction of Greater Lyon,
- University Lyon II.

2. Description of project

The "Porte des Alpes" site is considered as a strategic site for the development of the city of Lyon. It is a large site - 1400 ha - situated between 3 towns, including already several equipments as for example a business airport, an exhibition park, the University Lyon II and a commercial centre. It represents a link between the different urban areas of Lyon and the outlying cities, and it is supposed to give a positive economical and landscape-related image of eastern Lyon.

The development of this urban area urges to preserve and create natural greenspace (with a proportion of 50% of the area for greenspace and 50% for construction is required in the master plan).
In 1991, a 200 ha part of the site, bought by Greater Lyon, seems to present the basic criteria for the creation of a research park and a residential area, as a first step of the development of the site.

The 5 main urban elements developed in the first part of the project (~ 200 ha) are presented in the following table:

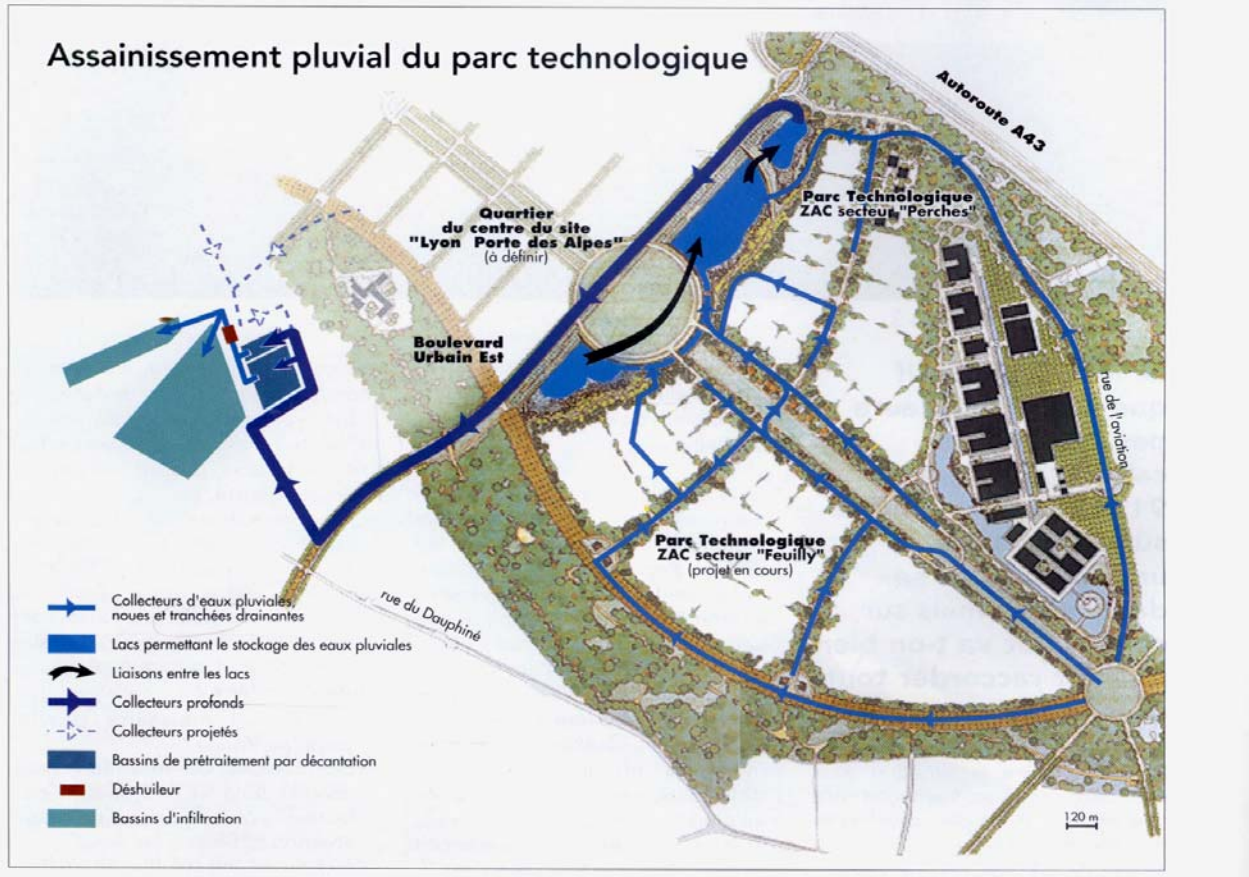
Research park		Composed of 2 ZACs (Concerted Development Zones)120 ha: ➢ 65 ha are to be sold to companies ➢ 55 ha are composed of greenspace or roads.
Greenspace	Forests	Around 30 ha of forest created (Forêt de Feuilly).
	Blue/green public spaces	More than 50 ha created, respecting the Master Plan's objectives: 50% greenspace, 50% constructions.
Tramway		Link between the Porte des Alpes site and Lyon.
Eastern beltway		Main access to the research park.
Residential area		9 ha with 175 townhouses.

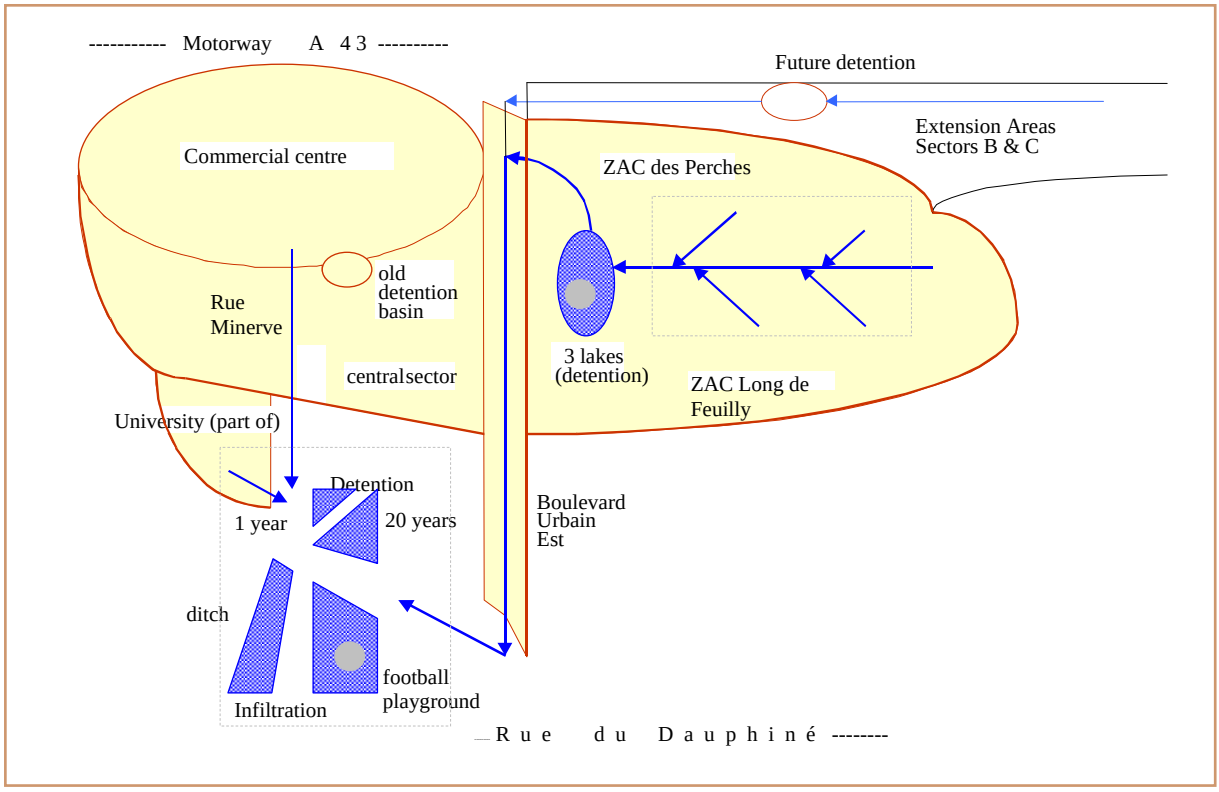
The major drainage questions concern (i) saturation of downstream combined sewer networks, and (ii) relatively low soil permeability over most of the area. Furthermore, there are environmental requirements regarding groundwater conservation, which is considered as a second resource supply for the Lyon conurbation.

The solution which has been adopted is to hold back the water and drain it towards areas where the

permeability allows infiltration, favouring a short storm water cycle. Infiltration is to make storm water percolate locally to the groundwater, in order to increase the ground water resources, and to avoid sewage treatment of storm water. The choice and design of the retention and infiltration systems was made at the beginning of the urban project. The decision was to make use of certain retention systems, such as lakes (3 for 4 hectares) as well as upstream drainage system including trenches and swales. The infiltration systems are composed of infiltration ditches, backed up, in case of heavy rainfall, by football fields. The lasting of the technical solutions and of their utilisations is ensured in various ways: pre-treatment of effluents from polluted areas (roads, car-parks, etc.), purification facilities upstream of the lakes, ecological monitoring of the lakes and minimal disturbance of other types of utilisation.

Beside an in-lake purification (decanting and by purification via plant and fauna life), the infiltrated water quality is attained by soil filtering.





Experiences from the project are presented below:

Environmental dimension

- On-site run-off water infiltration - i.e., without downstream network connection - does not increase combined sewer overflow and thus preserves the receiving water.
- It does not increase the amount of storm water directed to the treatment plant.
- This solution further ensures groundwater feed-in while minimising pollution risks via various treatment methods.
- This solution sets up an artificial ecosystem - the lakes - that allows enhancement of the landscape.

Social dimension

- Public involvement in the project design came only in the form of public inquiries. On the other hand, the extra uses of the drainage systems (with 90% open over 18 hectares) are intended for the general public (lakeside walkways, cycle track, football fields, etc.).
- Certain “users” will take part in maintenance (for example the University as far as the football fields are concerned).
- School visits from neighbouring communities are planned to raise consciousness regarding water and its management.
- An educative circuit about the water cycle is available for all-generation walkers.
- Public inquiries to the users of public spaces (people working in the area, visitors, associations, neighbouring cities…) are done to evaluate their satisfaction, in order to improve service offers,

Economic dimension

- Given the specificities of the area (topography and pre-existing network), the solution is low-cost compared to fully connected alternatives.
- System multi-functionality enabled outside financing to be sought.
- Landscaping enhances the site, making it more attractive to firms considering setting up there.

3. Description of tool

1/ Environmental indicators

Evaluation is carried out by means of scheduled observation. Their objectives are:

- following effluents nature and their effect on different bodies (lakes, soil, groundwater),
- defining corrective and preventive actions.

They concern:

- Groundwater monitoring, in accordance with water policy instructions: quarterly analysis of:
  - Effluent (downstream of the oil separator: BOD[1], COD[2], KN[3], and hydrocarbons): automatic sampling is planned to enable a regular analysis of the effluent,
  - Groundwater (downstream of the water table: conductivity, TOC[4], KN, nitrates, hydrocarbons, nitrate pesticides and heavy metals);

- Lake ecology monitoring: first evaluation, in 1999, examined water and sediment physical chemistry, aquatic biota (phytoplankton, algae, fish, etc.) and vegetation. Corrective action has been identified.

- Infiltration area soil monitoring by 50 cm sampling and analysis was planned (heavy metals, chloride solvents, hydrocarbons, pH and COT), but this monitoring is still not completed.

- Lake purification assessment with input and output measures for an ecological balance: an observatory should be set up in a near future for the upstream lake.

- All these operations are summed up in an operating procedure indicating the characteristics of the different elements (infiltration basin, networks …), as well as the description of the operations of sampling, monitoring, maintenance and the appliances used…

- A general document indicates defines therefore responsibilities of each stakeholder (maintenance, greenspace management, analysis, monitoring …).

- Finally, there is a working document called “crisis management”.

There are no national groundwater conservation norms, but a discharge consent decree from the water

[1] Biologic Oxygen Demand
[2] Chemical Oxygen Demand
[3] Kjeldahl Nitrogen
[4] Total Carbon Organic

policy (required by water law of 1992). The described indicators were created by the water policy for this specific site (lakes and groundwater).
The water sampling and analysis are done by the exploitation service of the water direction of the Greater Lyon, and the results are informative: the action process in case of a problem (emergency procedure), is not defined yet.
This tool requires a general metrology planning (sampling, measures…). All the results are kept in a specific file.

2/ Charters and coordination to manage multipurpose facilities

The water management facilities allow different utilisations and functions: lakes, swales enhance the landscape and lakes have a leisure function for the visitors; university students use the football fields, which served also as infiltration basins.

The tools used to take into account the multipurpose aspect of these facilities are:

- Coordination of the diverse technical teams working on the project: architects, water management engineers, green space team, etc…
- Agreements between services (water, green space, roads) defining their respective responsibilities in the follow-up of the project.
- There is also a charter between the water technical services of Greater Lyon and the university, which owns the football fields: their surface must be maintained by the university, whereas the subsurface (drainage) belongs to Greater Lyon.

Environmental indicators are defined within national regulation background (Water Law, 1992): it imposes an authorisation demand for any effluent discharge. The water policy watches over the application of this law.

B. Tool implementation

1. Argumentation for choosing the tool

The main arguments to choose the tools were:
- Request for the groundwater monitoring,
- Voluntary from the Water Direction of Greater Lyon.

The motivation for charters is to maintain wholly the different elements and works, and the compatibilities of the functions. Indeed, as it is mentioned before, this place is intended to all sorts of users: students, walkers, families, etc…

2. Barriers for the tool implementation

Here is discussed barriers that have been encountered during the project and the tool implementation

- Greenspace has been damaged by travelling people; thus, the authorities set up a permanent eviction order, in order to respect the integrity of the site. Special areas will be set aside and fitted out for them.
- The exploitation service has no decision power. For example, it does not work on greenspace of the site, which are managed by the Building Maintenance Direction. This sometimes implies a lack of coherence, but the project is still at a temporary stage.

The main fear about this project is the loss of information about the original intended use of the facilities: for example, the sewerage function of the lakes could be replaced by a leisure function because the whole memory and the principle aims of the project are not disseminated adequately among several actors, which is a problem for the project continuity. Therefore an information system is needed to handle the project's future and lastingness and to achieve long-term objectives.

C. Influence of the tool on the decision-making process

1. Description of the decision-making process/procedures

Before taking any decision, several studies were conducted to determine the best project: Steering the stream of storm water to the pre-existing network would have been too expensive. One alternative solution was available, and it was validated by water policy, to provide new drainage and retention facilities for storm water run-off.
The choice and design of the retention and infiltration systems was made at the very beginning of the urban project.
Throughout the project, there was strong coordination between the different services, and all the teams worked together. Contrary to traditional practices, it was not a sequential work.

2. Tool in decision-making process

Some quantitative goals or benchmarks have been defined:
A discharge procedure is defined according to national regulation background (Water Law, 1992) imposing an authorisation demand for any effluent discharge. The water policy watches over the application of this law.
There are no national groundwater conservation norms, but the discharge consent decree from water policy. These indicators were created by the water policy for this specific site (lakes and groundwater) to develop and monitor water management.

3. Transparency of decision-making process

The governance dimension of the project is illustrated by:
- Involvement of various specialists (technicians, planners, etc.) in the design,
- Single management cell co-ordinating pre-defined monitoring and maintenance partners,
- Public inquiries.

D. Expert assessment/analysis/comment of the tool effectiveness

1. Assessment by tool users

Transferability
- Drainage design at the beginning of urban project conception.
- "Cascade" management of flood risk: nearby structures to manage normal rainfall (swales and trenches upstream of lakes, settling tank downstream of industrial estate for annual rainfall) so as to better treat effluent and also minimise impact on multifunctional infrastructure (lakes, football fields, etc.).

- Single management cell (multiple use entails, multiple partners) integrating all those involved, with respective fields of competence pre-defined.

Lessons learned

- Importance of project holders.
- Durability of teams enables coherence within the project.
- Project duration (whole site conception) enables progressive information of the management and maintenance teams.
- There is a learning phenomenon through practicing, which implies a non-stop improvement of the methods. Thus, the actors have a better control of sustainability and its application on projects, which makes them more credible to developer contractors. Therefore, it arrives at a generalisation of the approach.

2. Reviewer's assessment

It is a quite recent project planning. Consequently, the feedback may not be exhaustive.
The project is site-specific, so that application elsewhere concerns only methods, undertakings and feedback.

For further development of the tool, some suggestion can be made:

- To develop a system to keep the memory of the project through the time,
- To improve the coordination between services.

E. Additional information on the case study available	
Websites	http://www.grandlyon.org
References *concerning the case but also the key words or problem* (papers, articles, reports, laws, etc.)	
Other sources (Interviews, conferences, discussions, etc.)	This project has been presented at different conferences on sustainability and water management (for example Novatech 2001). People in charge of the projects have been interviewed several times.
Contact details for further information	For further information, please contact: Elisabeth Sibeud Head of the design section of the water department of the Greater Lyon Email : esibeud@grandlyon.org