# MEDIA KIT

Rehabilitation of the La Gabarre site

As part of a program included in a Departmental Plan designed to grant the Guadeloupe Region autonomy and self-sufficiency in the area of waste treatment, SICTOM, the Guadeloupean Inter-Communal Organization for the Treatment of Household Waste, launched a major project at the historic waste treatment facility of La Gabarre involving the gradual rehabilitation of the landfill.

A genuine ecological black spot, the site will be completely reorganized.

To ensure this project succeeds, Séché Environnement, a major industrial group specializing in environmental services, was selected to manage it.

Its expertise in the area of environmental risk, its know-how in terms of decontamination work as well as its commitment to sustainable development and the protection of biodiversity have enabled it to offer a "high end" project. Having already completed rehabilitation projects for former landfills, the Group is prepared to tackle all of the issues related to the treatment of effluents and to implement a program to redevelop the site and restore the surrounding environment.

The site, located in the Abymes commune at the juncture of the Basse-Terre and Grande-Terre islands, will be reintegrated into the landscape thanks notably to the rapid revegetation of storage cells.

The use of biogas and phytoremediation of landfill leachates will help to achieve environmental excellence through optimum management of environmental impacts.

This rehabilitation work will enable, among other things, restoration of the mangrove as well as the Salée River, which has been severely contaminated, and to revive the biodiversity specific to this natural environment.

This operation, ambitious in environmental terms, will take around 30 months to complete and is priced at nearly €25 million. It is supported by the French government and the European Union.

Séché Environnement intends to be the architect of territorial ecology and hopes that this project will be a real economic catalyst in the Caribbean. The businesses that carry out the work will be local ones and will require 30 workers throughout the project.
Services will be coordinated by Séché Environnement but 90% will be carried out by Guadeloupian businesses.

The goal is for the La Gabarre site to comply with regulations and to continue the rehabilitation work initiated by the Guadeloupe SICTOM in 2007, with a view to preparing for a multi-process environmental complex.

The site will be rehabilitated in successive stages, in view of its predetermined regulatory final closure, according to the Prefectural Order, on December 31, 2012.

After the final closure, 8 months will still be required to finalize the rehabilitation work, which will end on August 1, 2013.

At the same time, the construction of the new VALORGABAR multi-process treatment facility will take place.

Rehabilitation work will be carried out for the most part concurrently with the operation of the site, which will continue to be ensured by the SICTOM.

**Description of rehabilitation work, prescribed by Prefectural Orders:**

- Rehabilitation of plots and areas
- Installation of an impermeable cover on the dome and slopes
- Construction of dykes, ditches, and lagoons enabling stormwater management
- Construction of leachate collection and treatment systems
- Construction of biogas collection and treatment systems

Work will be carried out in 5 successive phases with two goals:

- Limit disturbances to site operation as much as possible;
- Ensure compliance of operation with Prefectural Orders

**Rehabilitation:**

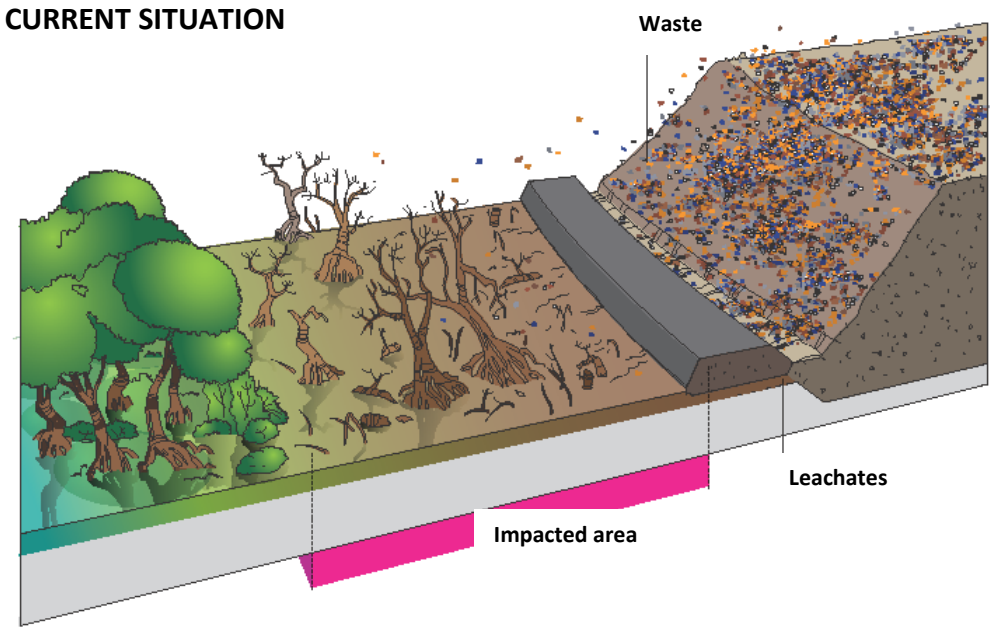
Rehabilitation of the waste mass will help to provide the site with slopes enabling the evacuation of stormwater and ensuring integration into the site's surroundings, while simultaneously preserving the stability of the mass, based on the prescriptions of Prefectural Order 2009-1618.

The rehabilitation operations will be monitored continuously in order to sort retrieved waste.

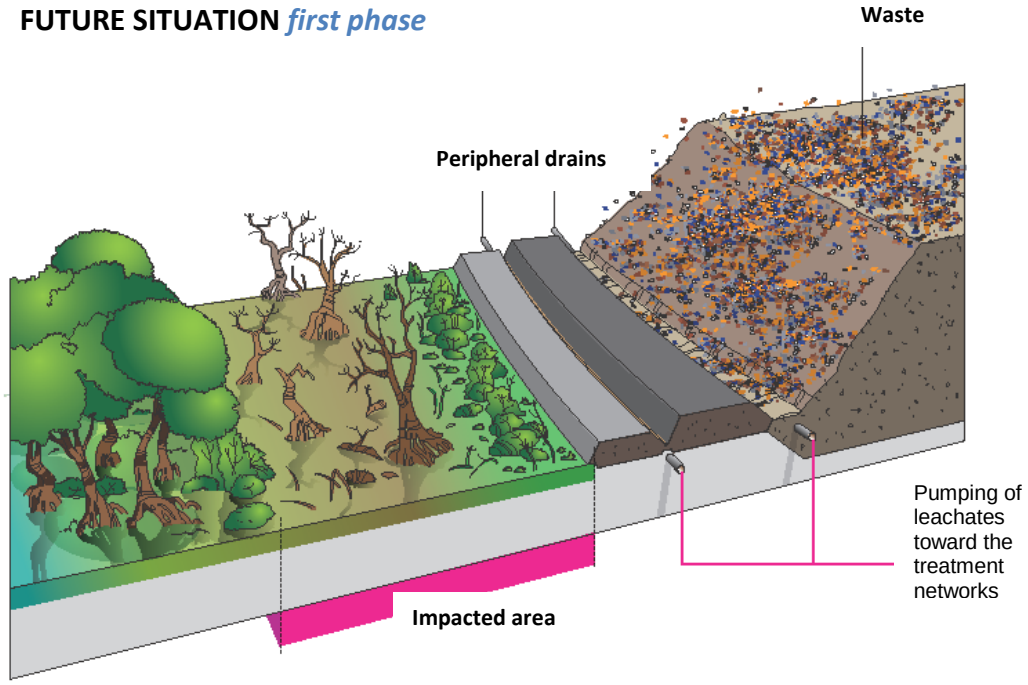
**Construction of peripheral dykes:**

One dyke already surrounds the site but does not collect leachates. The construction of a second dyke will reinforce the isolation of the waste storage zone from the surrounding area in order to protect the natural environment. The construction of peripheral ditches with drains to collect leachates will complete the system and enable:

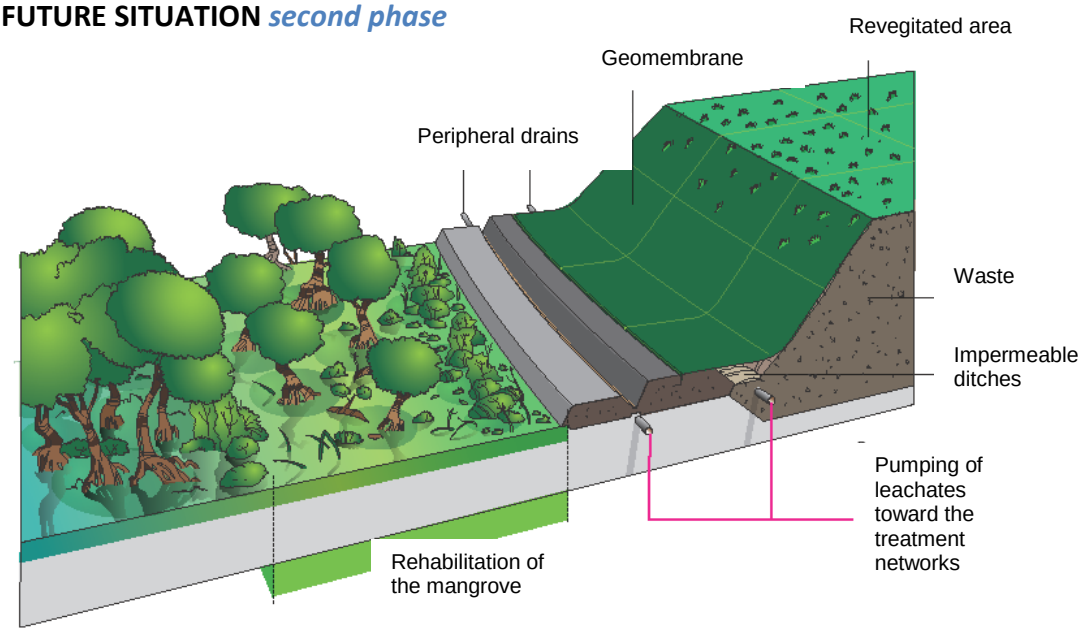
- Prevention of leachate leaks reaching the surrounding natural environment;
- The installation of physical protection for the waste mass in relation to fluctuations in water levels in the lacustrine and maritime setting.



## FUTURE SITUATION *first phase*




## FUTURE SITUATION *second phase*



**Collection and treatment of leachates:**

Reports have demonstrated that the seepage of untreated leachates during the operation of the site has affected the mangrove. In order to facilitate the mangrove's restoration, a collection and treatment system must be built. Drains installed at the foot of the slopes at the level of peripheral dykes will prevent leachates from leaking out of the storage mass.

Work in place will also enable the collection of leachates directly from the waste mass thanks to the drains placed at the bottom of storage cells and linked to a main collector. The leachates will be transported to treatment pools.

Séché Environnement plans to implement phytoremediation treatment. This type of treatment, however, requires several months of run-up time, until the vegetation takes root and grows. This type of treatment system, moreover, is particularly fragile at the start. Considering the time constraints, a transitional solution and treatment of leachates via a membrane bio-reactor (MBR) has been proposed. Simple to use, quickly installed and robust, it is based on biodegradadation of leachates via bacterial growth in several steps:

- Biodegradadation (COD, NH4)
- Ultrafiltration (suspended matter)
- Water purification
- Finishing treatment via phytoremediation before release

The selection of plant species for phytoremediation will be made in collaboration with the SEGE Biodiversité environmental research firm in order to choose the best-adapted local species. Indeed, the mangrove is a particularly fragile natural space and is deteriorating. The fragility of this location, as well as the proximity of the Grand Cul de Sac Marin wetland and the national park rule out the introduction of potentially invasive external plant species.

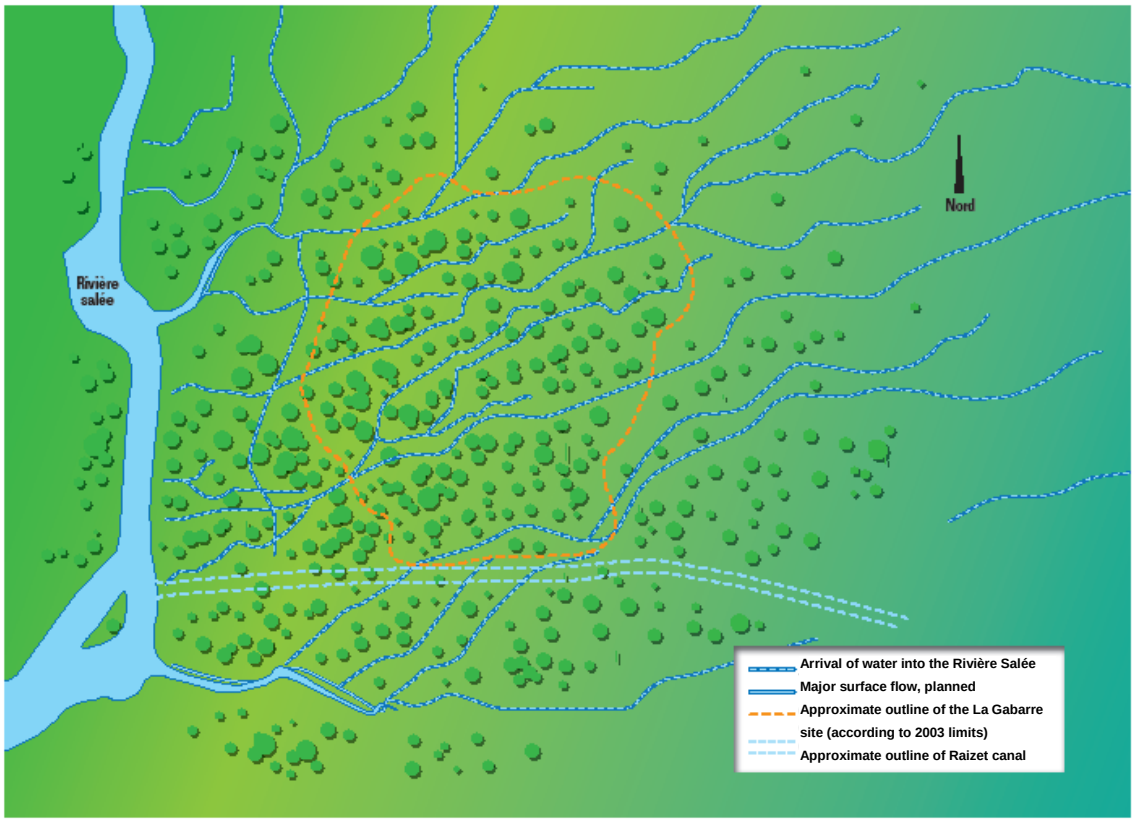
**Management of surface water:**

Surface water must be managed independently of and separately from leachates:

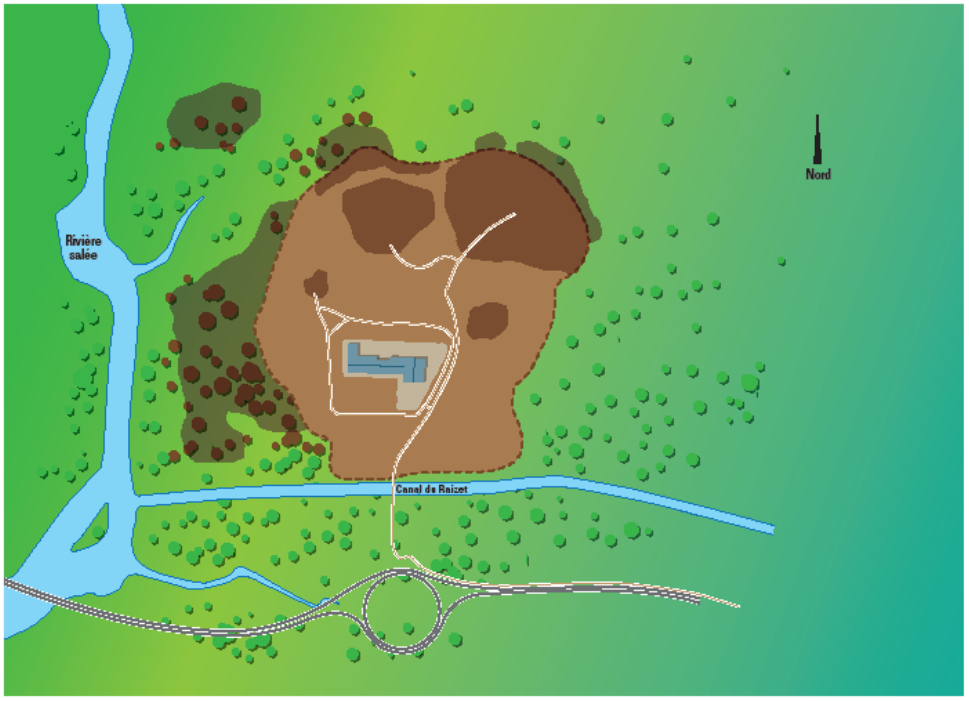
- Rainwater will be captured on the waste dome, on the slopes after they are covered as well as at the foot of the mass (dyke) and directed through a network of sloped ditches toward two stormwater drainage basins, then released into the surrounding environment.

- water in a natural outdoor environment (mangrove and swamp forest water). Today, this water is affected by the leaking of leachates which will end once a drainage network and treatment basins are built. Meanwhile, the natural flow of these waters from the mangrove was significantly disturbed by the building of the landfill (see the illustration below). Rehabilitation work will enable the re-establishment of some water flow from the natural areas (mangrove and swamp forest) to the Canal du Raizet, which is used as an outlet.

**THE SITE** ***in 1947***



**THE SITE** *in 2003*




**THE SITE** *after rehabilitation*

**Collection and treatment of biogas:**

In the areas where operation has ended, Séché Environnement will install biogas recovery systems. They will be installed on the surface of the waste mass:

- Drainage wells completed across the height of the waste mass
- Network of surface drainage ditches to ensure gas recovery
- Level of drainage materials under the cover
- Collection network for extracted biogas

In addition, a layer of drainage materials is planned for the cover, under the membrane.

For areas still to be exploited, biogas collection will be carried out in the same manner during the operation. In order to improve biogas capture, a level of drainage ditches, linked to extraction wells will be built mid-height of the waste mass while the storage cell is filled.
The wells will then be lifted as waste is used.

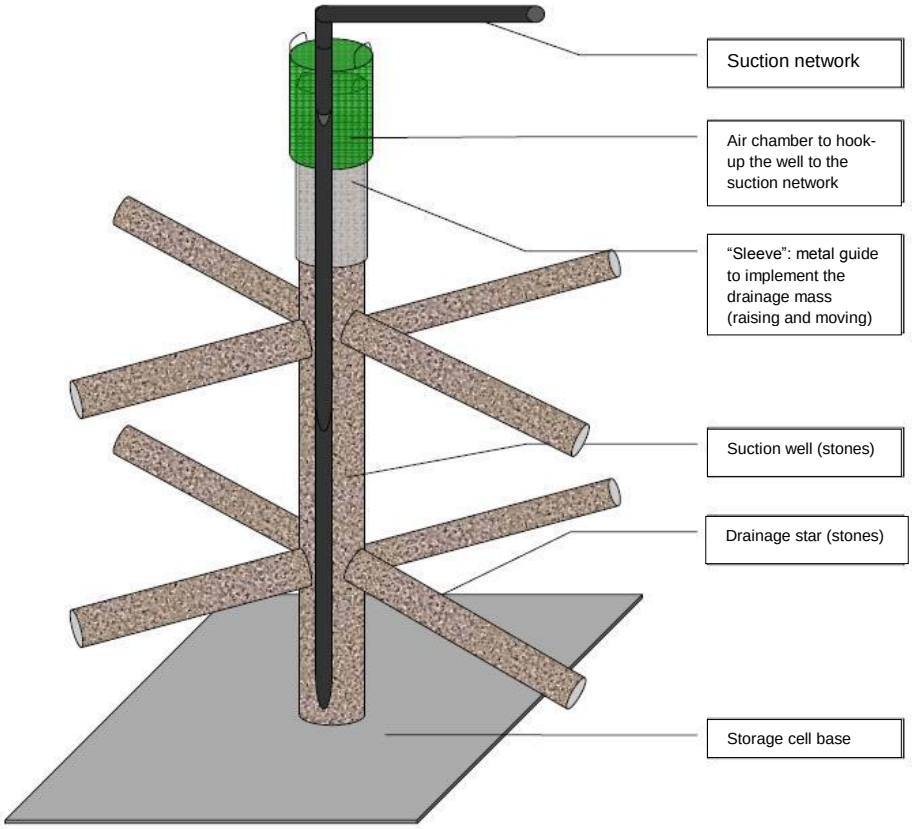



***Illustration of a biogas well with a "star" drainage network and vertical storage cell network***

Séché Environnement was chosen to develop a system for biogas treatment via destruction for the La Gabarre site. A specialist in energy recovery from biogas (all household waste storage sites are equipped with recovery tools), the Group estimates that energy recovery equipment will not be amortized in the case of the La Gabarre site. Indeed, the biogas production capacity and its quality are unknown, the site is at the end of its life and biogas production will rapidly decline.

The treatment system selected is one that destroys biogas by combustion. This unit includes a booster and a flame tower to ensure the proper treatment of the biogas.

The gas is collected continuously and destroyed at very high temperatures by the flame tower which guarantees controlled combustion with a hidden flame.

Finally, the biogas from the VALORGABAR complex will be collected through pipes installed from the edge of the plot to the biogas treatment unit.

**Final storage model:**

Many factors came into play in the final selection of the waste storage model. The following were the main choices:

- Optimization of storage capacity: The capacity of the mass had to enable storage of a preliminary operating volume until December 2012 as well as VALORGABAR excavation debris.
- Geographic constraints: work must respect the SICTOM's lot plan. Moreover, a limit to the height of the mass was set through a VFM audit. Optimization of storage volumes was achieved by slightly moving the rainwater basin.
- Landscape integration constraints: the chosen profile for the slopes was the weakest possible (3/1) in order to improve the site landscape's integration into its environment.
- Environmental constraints: Several improvements were made in the selection of materials in order to optimize the recovery of gas, leachates and rainwater and also to limit the risks of environmental impact.

In compliance with the prescriptions of the Prefectural Order 2009-1618, the project includes the installation of a cover for the entire waste mass.
This cover will be installed as operations end in each area.

**Landscape integration / revegetation:**

The project includes the landscape integration of all areas, including the "technical" areas reserved for treating leachates or biogas as well as roads, which will be subject to landscape rehabilitation.

The waste storage areas will be rehabilitated and revegetated after the installation of an impermeable cover. The vegetation on the site will be carried out gradually and pending the completion of the various project phases.

- Site analysis

The La Gabarre site drains into a mangrove area. The site is not visible by air as soil movements reach no higher than trees' crowns.

There is no access to the mangrove that enables a perspective from the mangrove; only the access route from the Grand Camp roundabout provides a view of the site, but this view is partly obstructed by ECODEC buildings and the future multi-process complex.

Conversely, at the landfill site, the view is quickly blocked by the vegetation of the mangrove, only the summits of Basse-Terre and high points such as La Gabarre's towers are visible.

However, in the framework of opening the site to new activities and especially a transparency and public awareness approach, revegetation is an important factor in the rehabilitation process.
Moreover, this revegetation holds the earth together and thus limits erosion

- Site revegetation

The project to revegetate the 23-hectare site includes a low plant cover which should enable easy, automated and regular maintenance to ensure the necessary safety and hygiene for a public space.
Meanwhile, for technical reasons, with the placing of a membrane over the entire landfill, it will not be possible to plant trees, whose roots could affect its waterproofness.

- Species selected

*On the dome and slopes*

The placing of topsoil over the whole surface with an average thickness of 20 cm will enable the vegetation to spread on its own. In addition, grass will be planted.
This natural vegetation will need to endure weather hazards due to dryness, because the membrane will not allow any natural soil capillarity nor will any underground water reserve ensure the regulation of humidity to protect the vegetation.

Additional planting will be reserved for access areas in the framework of educational visits. These areas will cover around 9,000 $m^2$. A smooth path will be framed and bordered by herbaceous graminae with: red fescues, green fescues, vetivers, arundo donax (giant reed), millet, thysanolaena maxima, pigmy bamboo, etc. These plants

will guide visitors to points of interest on the site.

*On the peripheral dyke*

The peripheral dyke, which functions mainly to contain effluents emanating from the dome, will be of limited size. The dyke will be directly connected to the surrounding mangrove. The plants should not colonize the natural environment.
The maintenance of the dyke and its desert path will need to be simple. Only the exterior wall on the mangrove side of the dyke will be able to accommodate bamboo planting which in time will function as a protective screen for the site.

- Re-establishing water flow in the mangrove

Rehabilitation work is aimed at stemming the impacts on the natural environment.

After the installation of leachate collection dykes, the re-establishment of water flow into the mangrove is planned.

To accomplish this, we anticipate the completion of a preliminary study on current flows and the implementation of a Rehabilitation plan. This study will be completed by the SEGE BIODIVERSITE environmental research firm.

Water flow re-establishment work will be carried out based on this study's conclusions, using engines equipped for working in the mangrove (marine caterpillars, floating engines) or after temporarily dewatering the mangrove.

**Interaction with the Valorgabar complex:**

Rehabilitation work will be completed in conjunction with the development of the VALORGABAR multi-process complex which will be done by URBASER, notably for:

- Managing waste from VALORGABAR landscaping;
- Managing leachates from VALORGABAR;
- Managing biogas from VALORGABAR.