



Quarry Bellegarde in 2013

Project Details

COMPANY

LafargeHolcim France

COUNTRY

France

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Water Management and Flood Prevention in France

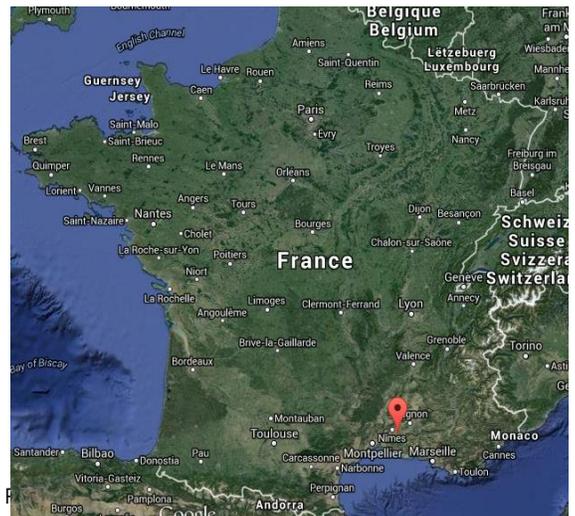
CONTEXT

LafargeHolcim (The Group), a world leader of building materials operates in 64 countries. Operations in France include more than 450 production sites and 5,200 employees. The Group's three primary activities are cement production, concrete production, and extraction of aggregates to supply the building and public works markets, which include housing, road, railways, and related infrastructure.

The Group places innovation at the heart of its strategy, with three main axes considered in their operations: 1) improve energy efficiency, 2) reduce the carbon footprint, and 3) reduce the environmental footprint. The Group accomplishes these goals by preferential use of sustainable fuels and raw materials. A registered sustainable builder, LafargeHolcim is highly involved in the protection of biodiversity. In France, the Ministry of Environment through the National Biodiversity Strategy has recognized LafargeHolcim since 2012 as a leader in its field.

In some parts of the world, annual flooding is commonplace. However, because of climate change and deforestation, flooding is increasingly occurring in areas not previously recorded. Hydrologic and hydrogeological studies of a river system provide flood risk information; and over the years, LafargeHolcim has gained experience managing changes in river flow dynamics by designing quarry rehabilitation and managing operations to mitigate flood risk. This is particularly important when trying to help prevent flooding in local communities, and for the protection of drinking water sources.

Quarries can be leveraged as water reserves during flood conditions, and the storage capacity in both restored areas and purposely-designed areas in active quarries reduces or prevents flooding risks. LafargeHolcim has found that developing quarry rehabilitation schemes with local authorities and community stakeholders results in a win-win-win: flood damage is averted, wetland areas rich in biodiversity are created, and community recreational areas are developed.



This project in Bellegarde in South of France (Figure 1) is an example of stormwater management and flood prevention through targeted quarry rehabilitation and management programs that provide stormwater catchments, and create beneficial wetland habitats. Local communities are the key stakeholders concerned with flood risk, due to the proximity of the river to homes.

OBJECTIVE AND PROJECT OVERVIEW

The overflow of Rieu exposes the municipality of Bellegarde (population of 6200 people) to the risk of flooding. The four water basins resulting from the rehabilitation of the quarry provide 2.5 million cubic meters of water storage capacity, and result in richly biodiverse wetland habitat.

THE BUSINESS CASE

This project was driven by regulatory requirements and community demand, and saw three main benefits:

1. Flood protection for the local communities—a potential savings of millions of euros in flood damage costs
2. The creation of wetland areas to increase biodiversity
3. The creation of a recreational area for the local community

DECISION MAKING PROCESS

This project required partnership with the local municipality and regulatory bodies to satisfy both security and environmental objectives that would result from control of flood risk, as well as the creation of wetland habitat rich in biodiversity.

The Land and Environment Department develops this type of natural infrastructure at a local level, which opens and manages the quarrying activities. The project of Bellegarde was organized in collaboration with the municipality that required flood controls.

The quarrying activities are subject to Environmental Impact Assessment, so the project was developed with the local authorities to prevent groundwater pollution; it was also performed in consultation with a variety of stakeholders (for example, NGOs, residents, and farmers).

The project was developed taking into account the following issues:

- Landscape
- Hydrogeology and hydrology
- Natural areas
- Transport of extracted materials

PROJECT DETAILS

The sand and gravel quarry of Bellegarde located in the South of France has been in operation since 1970. Over the last 15 years, LafargeHolcim has worked with the local municipality to expand the flood prevention infrastructure and created wetlands, which will be fully operational in 2015. The extracted quarry areas have been and/or will be converted into stormwater reservoirs with a capacity of 2.5 million cubic meters, reducing the risk of flooding to the local communities.

In addition to the constructed wetlands, the completed system will include automated flood

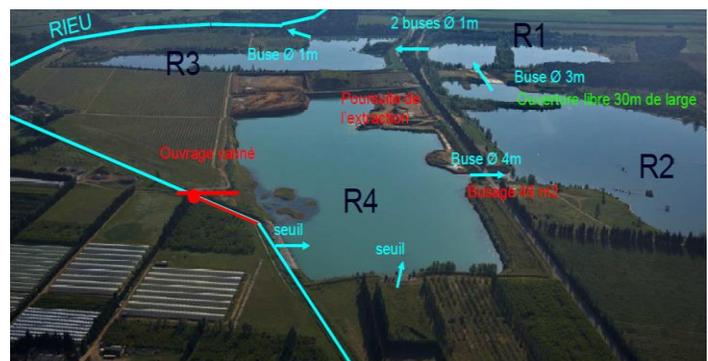


Figure 2. Reservoirs Developed at Bellegarde Quarry

control gates, piping, and channels. When the level of the waterway rises, the system will release water, in a controlled manner, from the river into the basins.

The rehabilitation included the creation of shoreline areas and gently sloped riverbanks with varied contours, which offer diverse natural habitats (for example, ponds, resting places, and small islands) that are favorable to many species.

The ecosystems created in the Bellegarde reservoirs are mostly wetlands that provide regulation services, such as water purification. The French National Museum of Natural History has studied the ecological potential of created wetlands from quarries in France. They have found these wetlands have become a habitat of 132 species of birds (more than 48 percent of the French avifauna), 17 percent of the flora (1,001 vascular plant species), and 63 percent of the dragonflies found in France. Quarries have also become important refuge areas for many protected species. Therefore, in addition to improving water quality, we can expect that the created wetlands will enhance biodiversity in the area.

Additionally, the Bellegarde reservoirs provide recreational benefits, such as bird watching, fishing, boating, and jet skiing.



Figure 3. Islands and Shallow Wading Areas Created for Bird Populations

Costs for this project are not yet available. However, a similar project that built systems to create flood retention reservoirs using a closed quarry, with a total capacity of 600,000 square meters, cost 450,000 euros. This price included hydraulic infrastructure such as embankments, channels, ditching, consolidation and waterproofing of banks, and riprap of the fragile areas.

At Bellegarde, the restoration of the site also included reforestation, which helps stabilize areas surrounding the reservoirs and reduces the risk of soil erosion, but will result in a higher cost.

LESSONS LEARNED

Converting a quarry into water retention basins is a relatively simple solution for flood control, and this system has proven to be very effective in preventing flooding.

The volume of the basins and the potential flood conditions are derived from simulation models of the hydrogeological study and these are only predictions. This can result in overestimations of the amount of water that can be captured, so data must be carefully reviewed.

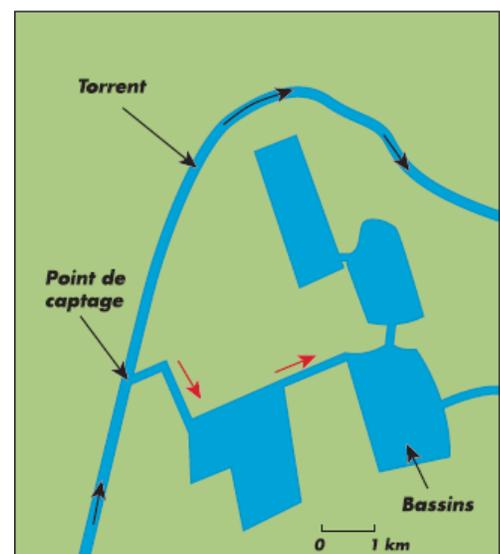


Figure 4. A Schematic Showing the Water Management Scheme

This case study is an applicable example for most quarries located near a river or water basin, if there is access to sufficient land and sufficient area for storage created through quarrying activities.

In designing these type of systems, it is important to determine the needs of the natural environment and local communities. The best solutions address several needs. For example, creating specific features such as reed beds, islands, and shallow areas can provide significant benefit to bird populations, while serving as fishing and recreational areas.

FUTURE IMPLEMENTATION AND NEXT STEPS

This project will be finalized in 2015 and it shows that through working in partnership with local authorities and community stakeholders it is possible to develop a quarry restoration that can not only benefit the local community in many ways but also nature.

ABOUT THE WORLD BUSINESS COUNCIL FOR SUSTAINABLE DEVELOPMENT (WBCSD)

The World Business Council for Sustainable Development (WBCSD), a CEO-led organization of some 200 forward-thinking global companies, is committed to galvanizing the global business community to create a sustainable future for business, society and the environment. Together with its members, the council applies its respected thought leadership and effective advocacy to generate constructive solutions and take shared action. Leveraging its strong relationships with stakeholders as the leading advocate for business, the council helps drive debate and policy change in favor of sustainable development solutions.

The WBCSD provides a forum for its member companies - who represent all business sectors, all continents and a combined revenue of more than \$8.5 trillion, 19 million employees - to share best practices on sustainable development issues and to develop innovative tools that change the status quo. The council also benefits from a network of 70 national and regional business councils and partner organizations, a majority of which are based in developing countries.

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