

When a Quarry Closes, Can Its Damage Be Undone?

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Aggregate mining in Texas yields billions of dollars but leaves behind a pockmarked landscape.



The Lime Creek Quarry in Cedar Park

Courtesy of City of Cedar Park

A hypnotic maze of subdivisions stretches along Anderson Mill Road as you drive north out of Austin. Then, just before you reach downtown Cedar Park, towering mounds of loose rock rise like ashes from a giant cigarette. Throughout the Texas Hill Country, this sort of pitted, alien topography is increasingly common. The massive craters result from the mining of what's known as aggregate—sand, gravel, crushed stone, and many other particulates that are used to make building materials such as glass, asphalt, and concrete.

Limestone quarries such as the one that straddles Anderson Mill, which is known as the Lime Creek Quarry, now cover tens of thousands of acres of Central Texas, accounting for 80 percent of all the limestone quarried statewide. The hunger for the stuff—in Texas, aggregate production has increased 30 percent since 2005—is driven in large part by Texas's population and housing boom. More people and more homes have created greater demand for aggregate. But that same

boom is about to lead to the closure of Lime Creek, thanks to the [explosive growth](#) of the suburbs of Austin and San Antonio. That growth led the city of Cedar Park to decide, in 2016, not to renew the mining lease that Austin-based Ranger Excavating has held on the site since 1996.

When Ranger's lease expires, in June 2023, it will mark the end of 173 years of mining at the site, where the area's distinctive Cordova Cream and Cordova Shell limestone has been extracted since [1850](#). What comes next, though, is uncertain. Corbin Van Arsdale, the mayor of Cedar Park, says the city's goal "was to get the land and do something positive with it, without knowing quite what that is."

Developers have some mixed uses in mind already, but before anything can be built on the quarry, Cedar Park must contend with the massive crater that decades of mining has left behind, along with the environmental and safety hazards that come with it. That [process](#) is known as "[reclamation](#)," and it's something many Central Texas cities may soon contend with as new homes replace old mines and as environmental concerns lead communities across the state to fill in mining craters.

But reclamation isn't easy. Fully rehabilitating mining sites requires replacing soil, preventing pollutants from inhibiting plant growth, correcting the flow of water into and out of a quarry, and reversing species loss caused by decades of mining—essentially, making a poisoned piece of land pristine once again.

Environmental groups aren't sure that process can repair all the damage done by mining, but, "If you do it right, you can get pretty close," says Milann Guckian, president of Preserve Our Hill Country Environment, which is part of Texans for Responsible Aggregate Mining, a coalition of landowners and environmental groups advocating for stiffer quarrying legislation. "Anything is better than leaving it a dangerous, toxic pit."

Explosions have rocked the Lime Creek Quarry site continually since two years after the end of the Mexican-American War. That's more than a nuisance to the residents of nearby subdivisions. It's literally changing the landscape. Bill Langer, a geologist and quarry reclamation consultant who worked for more than four decades with the U.S. Geological Survey, says years of blasting can fracture underground caverns, rerouting natural water systems and displacing local species. The soil and water in quarries are often left thick with iron, manganese, and phosphorus, making most former quarry sites hostile to vegetation.

Some of the damage beneath the surface at Lime Creek and elsewhere may well be beyond repair. In the Hill Country, many quarries sit atop the [Edwards Aquifer Recharge Zone](#), the principal water source for San Antonio, New Braunfels, and parts of Austin. Here, the limestone acts as a protective, filtering canopy of sorts for the water below. Once quarrying removes this layer, [contaminated](#) surface water can seep into the groundwater—fast. In January 2021, the Texas Legislature released an [interim study report](#) that found that if a pollutant enters the Edwards Aquifer, "the impact on nearby water supplies can occur in a matter of days."

Further complicating all of this is the fragility of the region's water system. Most of the Hill Country is a [karst](#) landscape, meaning that it is replete with fractures and cracks that serve as vital water conduits. Years of quarry blasting can reroute those paths and alter the discharge points of groundwater. "You start blowing things," Guckian says, "and there's tons of damage we can't see yet." As unseen, underground fractures widen from blasts, the velocity of the water flowing through them increases. Greater velocity, in turn, gives the limestone less time to absorb impurities—faster water, in other words, can mean [more polluted water](#). And unlike aggregate, water is an increasingly precious commodity in parched Central Texas. To meet spiking demand caused by the region's rapidly increasing population, the water authorities that draw from the Edwards Aquifer must [supplement](#) it with a variety of alternative sources.

That's not the only problem. Groundwater seeps through the limestone and adds to the rainwater that collects in abandoned quarry pits. This infusion of limestone increases the alkaline level in quarry lakes such as the Blue Lagoon, in Huntsville. Built in a reclaimed limestone quarry, that scuba diving facility is known for its Caribbean-like appearance. Its

high-alkaline water is a hit with divers in part because it is nearly fish- and vegetation-free. It's great for underwater selfies, but not so great for efforts to rebalance the ecosystem because the alkaline content can be high enough to kill off all flora and fauna.

Fixing all of those kinds of problems is easier if a reclamation plan is devised at the outset of mining operations at any given site. But most Texas quarries, including Lime Creek, didn't make such advance preparations. In fact, although Texas is the top aggregate-producing state in the country, it stands alone among the top ten aggregate states in not requiring aggregate miners to engage in *any* kind of reclamation. (There is no federal legislation requiring reclamation for mineral quarrying, unlike with [coal mining](#).)

[Texans for Responsible Aggregate Mining](#) has [pushed](#) several other proposed [bills](#) in the past three state legislative sessions, calling for administrative penalties and higher fees on what are known in legislative parlance as aggregate production operators. All three of those bills died in committee. And while the Texas Commission on Environmental Quality is charged with ensuring that APOs follow the limited guidelines that do exist, the agency has no authority to regulate APOs or require them to provide proof of environmental protections. Even so, the Texas Aggregates and Concrete Association, which [represents](#) 80 percent of the state's aggregate suppliers, calls the commission's permitting process "[robust](#)." Its members include companies such as [Rogers Group](#), the largest privately owned construction aggregate company in the United States, and [LafargeHolcim](#), a multinational APO with 350 sites across the country.

Texas's light hand with aggregate regulation could make rehabilitation much harder, but it doesn't make rehabilitation impossible. In the thirty years since its creation, the Quarry Golf Course in San Antonio has come to represent the platonic ideal of reclamation and rehabilitation—an example Lime Creek and others might benefit from. [From 1908 until the 1980s](#), this five-hundred-acre site was home to a quarry and cement plant. In 1992, the Alamo Cement Company began reclaiming the land after the quarry was exhausted. Above ground, Keith Foster, a golf course architect who led the project, got creative, turning one of the quarry's steep slopes into a forty-foot waterfall on the back nine that cascades into a ravine. He also says he replaced layers of native topsoil and subsoil that had been stripped away by mining.

But other challenges hid beneath the surface. In a typical golf course, you'll find ponds and bunkers, built out of deep recesses. Creating those recesses means cutting into the surface. When Foster began digging underground, he discovered that miners had created vaults filled with what's known as kiln dust, or the powdery, toxic detritus from cement production (it's a common practice in the industry). The vaults can't be punctured, because they'd release the dust, which is harmful to humans and can even lead to lung cancer. "Exactly half of the property was on top of these vaults," Foster says, "and you have to weave through it and create an environment that is at least appealing."

Since it opened in 1993, the golf course's operators have adopted a host of [practices](#) to restore the pre-quarry ecosystem. When first building the course, they planted native grasses like bluestem and Indian switchgrass. In 2006, they installed a water-conserving [irrigation system](#), and built a natural wildlife habitat and wetlands. Foster says the water quality has been monitored for years at the Quarry Golf Course with no negative effects discovered. Today, blue herons and snowy egrets roost in the marshy grasslands that meander through the fairway alongside limestone outcroppings.

Yet while it may appear safe for the Quarry Golf Course reclamation to declare victory, it's still too early to assess whether this ecosystem can ever fully recover from a century of life as a quarry. Regardless, it may still offer lessons for places such as Lime Creek.

In the coming years, Cedar Park officials hope to construct a mix of residential and commercial development on [142 acres](#) at Lime Creek. Early steps will include leveling the landscape's extreme slopes while avoiding the use of heavy equipment near caves and correcting cave openings that may have been obstructed during quarrying. "One of the primary goals of the reclamation plan is to maximize the area of land available for redevelopment," says Brenda Eivens, city manager of Cedar Park. To minimize future costs to the city, some reclamation work, such as filling in several pits, is

already underway, even as the quarry continues operating. For inspiration, Cedar Park can look to the limestone cliffs of what was once Beckmann Quarry, which now crown the perimeters of [Six Flags Fiesta Texas](#) and the La Cantera Resort and Spa, in San Antonio.

Cedar Park is still assessing the cost of reclamation for the Lime Creek site. But [Virginia](#), another of the top-ten crushed-stone-producing states, can serve as a baseline: there, the cost for reclamation is \$5,715.84 per acre. Based on that figure, the price tag for Lime Creek would come to about \$1.2 million. Some two hundred quarries are currently in operation across Texas, netting annual revenues approaching \$1 billion.

Some 282 million metric tons of aggregate material was produced in Texas in 2019, with a value of \$3.2 billion, [according](#) to the United States Geological Survey. The price of crushed limestone is mainly dependent on the [quantity available](#), which is unlikely to decrease anytime soon, thereby only increasing the hunger for more. Greater demand, in turn, means more quarries will soon reach exhaustion even as new ones are created, making the need for reclamation across the Hill Country more urgent in the coming years.

Meanwhile, reclamation remains an inexact science. Doing it right means harnessing geological science, engineering savvy, and a deep understanding of local ecosystems, not to mention a significant dose of architectural ingenuity. But giving it a chance to succeed as the current Texas development boom picks up the pace is vital. "With reclamation," Guckian says, "it may not be perfect but if you do it right, it's protective of the natural environment. And you only have one Texas Hill Country."