

Goodbye, Brownfield

Recreational campus rises out of the ashes of a brownfield.

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Orange, CA, is turning a contaminated brownfield into a recreational campus and park that will be cherished by generations to come. This task is being accomplished by creating partnerships and developing common sense solutions to the seemingly insurmountable brownfield problems that are facing municipalities everywhere.

The former 26-acre landfill and former asphalt plant site is located in Orange just north of the intersection of McPherson Road and Spring Street. The site is bounded by residential developments to the north and south, and by the completed first phase of Grijalva Park at Santiago Creek to the east. Santiago Creek bounds the property on the west.

The city has been forced to consider placing brownfield sites back into productive use due to the lack of available uncontaminated property in the area. The Grijalva site contains a closed landfill and a former asphalt plant located along the banks of Santiago Creek on the Orange County coastal plain. The city identified the site as a desirable location to construct a municipal recreational campus, given its central location to the city, good access to streets and public transit, and to the proposed bike path to be developed along Santiago Creek, which will link the park to other parks, schools, and retail centers.

The city acquired Grijalva in February 2001 after receiving a \$200,000 Brownfield Assessment Demonstration Pilot Grant from the EPA—Region IX, as part of EPA's Brownfield Economic Redevelopment Initiative. According to the EPA, "this initiative is designed to empower states, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields." The EPA defines a



Area location map

brownfield as "a site, or portion thereof, that has actual or perceived contamination and an active potential for redevelopment or reuse."

Site History

Prior to 2001, the Union Pacific Railroad Company owned the site. Before that, another company had been excavating sand and gravel from the banks of Santiago Creek. The railroad used the excavated area as a landfill, filling it with inert material to buttress the banks of Santiago Creek. The majority of the debris deposited there was rubble

consisting of concrete, brick, and other solid waste. The landfill was used between the early 1950s until the flood of 1969. The city also used the site for disposal of asphalt and curb and gutter sweepings.

Limited gas studies were conducted at the landfill site in 1985. Over a two-day period, subsurface methane gas concentrations and pressures were monitored by SCS Engineers (www.scsengineers.com) with a portable combustible gas indicator and Magnehelic pressure gauge (Dwyer Instruments, Inc., www.dwyer-inst.com). Gas samples

were collected at two locations for analysis in the laboratory using gas chromatography. No methane gas was detected.

Previously conducted soil assessment studies (Geomatrix 1998 and SECOR 2001) had shown that the site of the former asphalt plant had low levels of total petroleum hydrocarbon contamination. In the landfill portion of the site, however, lead was detected at two sampling locations near the surface, which were above allowable levels in California.

The grant from the EPA required that a Phase I and Phase II Environmental Assessment be performed. SCS Engineers was selected by the city to provide environmental consulting and assessment services for the Phase II portion of the project.

Interactive Meetings

After reviewing all available information for the site, SCS Engineers and the city invited representatives from the three regulatory agencies that would be overseeing the project to a meeting held at the city's offices. The purpose of the

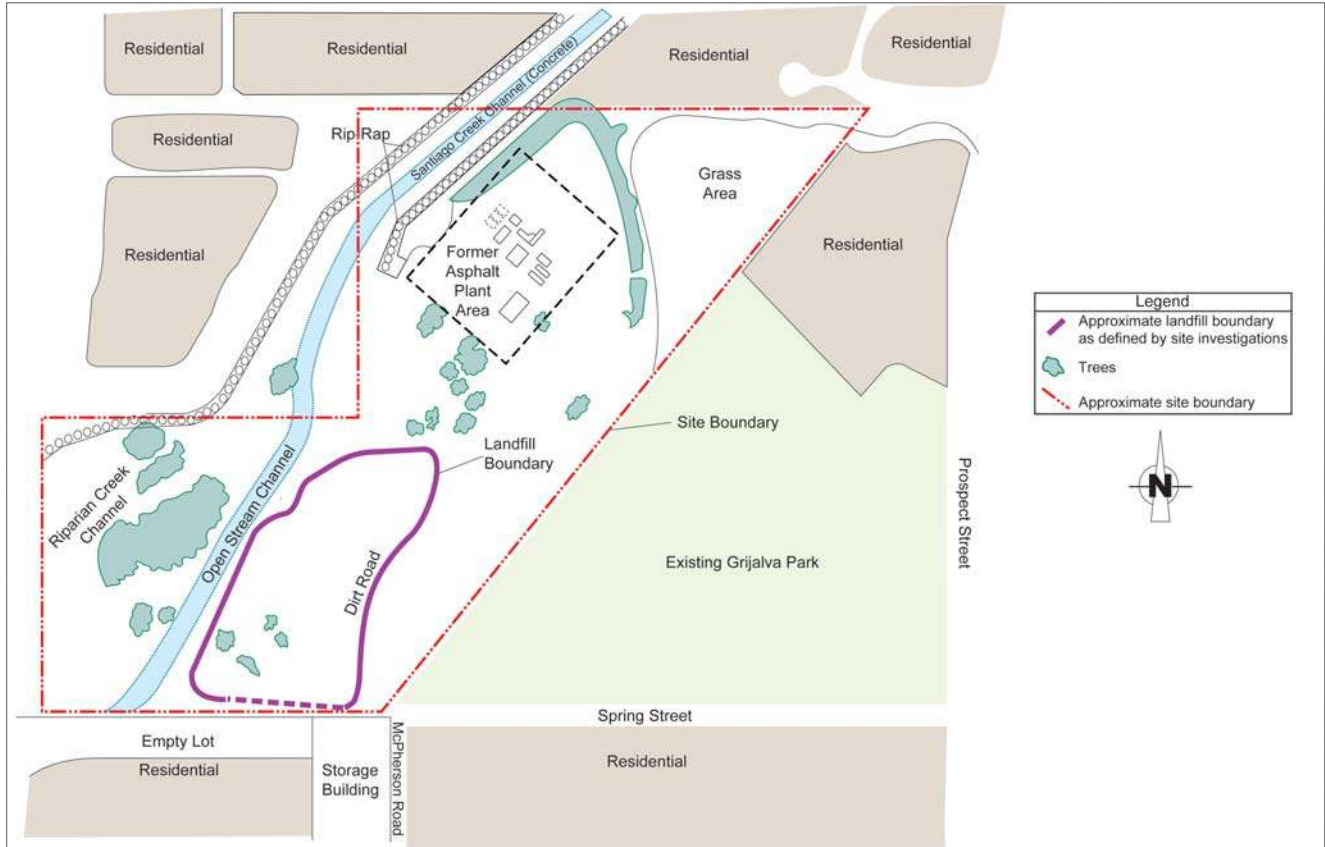
meeting was to forge partnerships to attain the goal of creating a public park, and to have the regulatory agencies participate in defining the scope of work for an expanded site assessment. The regulatory agencies included the following:

- The Orange County Health Care Agency—Environmental Health (OCHCA): The OCHCA is the Lead Enforcement Agency for the site, which has authority over all active and inactive landfills in Orange County.
- The California Regional Water Quality Control Board—Santa Ana Region (RWQCB): The RWQCB has jurisdiction over landfills in California if a real or potential threat to groundwater exists.
- EPA—Region IX: The federal agency that provided the Brownfield Assessment Demonstration Pilot Grant.

It was agreed by the three regulatory agencies that the lead which had already been detected was the primary area of concern. Additionally, the OCHCA felt

that past evaluations for methane gas generation had not been sufficient. The former asphalt plant was dropped from further consideration. In light of these considerations, the following program was proposed and agreed to by all the parties involved:

- Install a total of 15 soil borings in the refuse mass within the landfill and collect soil samples for lead analysis. Samples would be collected at six in. below ground surface and then every five ft thereafter, until the bottom of the landfill was reached. The analysis performed was to be for total lead, comparing results to the Total Threshold Limit Concentration (TTLC) for lead (1,000 mg/kg), and to the Soluble Threshold Limit Concentration (STLC) for lead (50 mg/kg), if required. If the STLC result exceeded 50 mg/kg, but were below 1,000 mg/kg, the sample was to be analyzed using the Waste Extraction Test (WET) method for the STLC, to determine whether hazardous levels of soluble lead were present.



Site Plan-Grijalva Study Area and Surrounding Land Use

- Soil samples were also to be collected in native soils beneath the landfill every five ft to a maximum depth of 40 ft below ground surface. The first sample collected in native soil would be analyzed for total lead. The same sampling regime as described above was to be applied to the native soil samples. If lead was not detected in a native sample, those samples collected from greater depths would not be analyzed.
- Install three soil gas probes and measure methane concentrations around the perimeter of the landfill. Monitoring was to occur monthly for six months. If methane gas was not detected within this period, monitoring would cease. If methane was detected, the percent methane by volume would be analyzed and the results discussed with the OCHCA to determine if further monitoring, or other activities, must be performed.

Convert two of the 15 soil borings, proposed to be drilled into the interior of the landfill, into soil gas probes. These probes were to be installed in the refuse mass and monitored over the same six-month period. The results of monitoring were to be used to evaluate whether or not gas was being generated within the landfill.

- Develop conclusions as to which, if any, remedial measures might be required prior to converting the landfill to a municipal park, with the data and information developed during the Phase II investigation and supplemented with data from the past studies. These measures could range from limited removal of lead contaminated "hot spot areas" of the landfill, to complete excavation, removal and disposal of the landfilled materials, to the design and implementation of a proper landfill cover to protect human health and the environment.

Assessment Results

After completing the Phase II field work and analyzing the results, the following conclusions were developed:

- After six months of gas monitoring had been completed in the perimeter and interior probes, no methane gas was detected.
- All but two of the soil borings drilled and sampled at the site had at least one soil sample that contained hazardous concentrations of lead (i.e., greater than 1,000 mg/kg by standard method 6010, or above five mg/L STLC by the WET method for 6010). The highest concentration of lead detected at the site during this investigation was 1,700 mg/kg.
- Samples containing hazardous concentrations of lead were detected only within the landfill soils, and did not extend into native soils beneath the fill area.

Based on the results of the Phase II assessment, it became clear that a remedial measure was needed to protect human health and welfare before the site could be converted to a public municipal recreational center.

After reviewing several remedial alternatives, including excavation, removal and disposal of the landfilled materials at a hazardous waste landfill, the city, SCS Engineers, and the three regulatory agencies agreed that a landfill cap would be the most cost-effective and safest way to close the landfill and protect the public. This method was considerably less expensive than some of the other possible solutions; would reduce the risk of unearthing, moving, and storing the hazardous debris; and would seal it in, removing it from human contact. Additionally, the city received a \$200,000 clean-up grant based on the landfill cap plan. With that agreement and funding concluded, the next step to be performed in the closure process was to develop a closure plan in accordance with the appropriate California Code of Regulations.

In December 2005, a "Closure Plan and Post Closure Monitoring and Maintenance Plan" was approved by the OCHCA and the RWQCB. The landfill was to be closed using a soil monocovert. The landfill cover would isolate the waste mass, preventing public exposure to the lead in the landfill. Moreover, the cover would serve to min-

imize, if not eliminate, the infiltration of water into the waste mass that may otherwise leach lead over the long-term into soils beneath the landfill. Included in the plan were a monitoring and maintenance schedule that the city agreed to observe to protect the integrity of the cover. The cover would be comprised from bottom to top as follows:

- A two-ft thick foundation layer (i.e., a compacted layer of soil that provides a stable base for overlying soil layers).
- Three ft of vegetative cover soil selected for its ability to support the desired plant growth. The landscaping plan would preclude use of deep-rooted bushes or trees to avoid creation of pathways for infiltration of surface water into the landfilled waste.

The cover was installed and completed in August 2006. The Notice of Completion was filed in October 2006.

The forging of partnerships did not stop on the brownfield issue. The city applied for and was granted \$2 million from California under the Urban Park Grant (Proposition 40), and the Community Foundation of Orange is continuing to raise private donations to turn this dream into a reality for the community.

An architectural firm selected by the city is nearing completion of the construction documents (architectural civil/structural) for the first phase of the campus, consisting of the Gymnasium and Sports Center, which will include a double-court gym, dance room, and medium class room. The project has been deemed a success by everyone involved, including the city staff members, the EPA, the regulatory agencies, and most importantly, the community. GE

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