

# The Daily Transcript<sup>®</sup>

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PERSPECTIVE

## The challenge in redeveloping landfills

By Pat Sullivan

As the real estate market in California continues to improve, interest in development of “brownfields” properties will increase. Closed landfills, one category of brownfields properties, tend to receive greater development interest in strong real estate markets. This includes both developments on and adjacent to landfills

There are numerous old landfills in San Diego County, as well as a handful of active sites, which could be candidates for redevelopment. Some of these sites have already been redeveloped, such as the one underlying portions of the Palomar Airport in Carlsbad. Many other landfills in the County could be considered for redevelopment, including those owned by the City of San Diego, the County, as well as by private parties. Development near large active landfills has also occurred in the County, such as developments near the Miramar and Otay Landfills



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in San Diego and Chula Vista. Throughout California, landfills have been redeveloped, creating golf courses, parks, mobile home parks, apartment buildings, shopping centers, and various commercial developments.

The challenges that must be addressed in building over landfill sites include building protection from combustible gas hazards, odor/air quality impacts from landfill gas (LFG), nuisance mitigation during fill excavation, landfill settlement, worker safety, and water quality protection. Site development could also trigger additional regulatory agency scrutiny, and potentially some upgrades to landfill environmental protection/monitoring systems that would not otherwise be required if the site were left undeveloped.

### Combustible Gas Hazards

Decomposition of the underlying refuse can create a potential for explosive gas conditions. LFG, the by-product of natural refuse decomposition processes, contains methane. Methane is combustible and can be explosive when allowed to accumulate in enclosed spaces. High concentrations of methane in the

soil atmosphere may not pose a threat by itself because an open flame will not propagate through soils. However, hazardous conditions can develop when LFG migrates into utility vaults, enclosed spaces or buildings and is exposed to an ignition source such as a pilot flame or electrical spark.

State and local regulations mandate that any structural improvements on or near landfill properties include provisions for combustible gas protection.

### Air Quality and Health Risk

LFG emissions from landfills can be subject to federal, state, and/or San Diego Air Pollution Control District (SDAPCD) regulations, depending on the size and age of the site. These rules are intended to minimize the release of non-methane organic gases (NMOCs) from landfills, which can contribute to photochemical smog and potentially create a health hazard. The rules generally require measures to reduce landfill emissions, including fill compaction, placement of additional cover soils, and/or installation of a gas collection and treatment (flaring) system.

These regulations are de-

signed to ensure that human health risk and odor impacts to properties off of the landfill site do not exceed allowable regulatory thresholds; however, they are not specifically designed to manage health and odor impacts for occupants on the landfill. As such, it is important to conduct additional health risk and odor impact evaluation for any residential or commercial receptors that will become part of a landfill redevelopment.

### Landfill Settlement

Normal refuse decomposition processes can result in both differential and uniform landfill settlements. For developments on landfill sites, settlement can be of concern for several reasons:

- Site grades and drainage patterns can change due to differential settlement. Ongoing maintenance is required.
- Slope stability may be compromised for soil fill/embankments placed over refuse.
- Any buildings located directly over refuse/shallow cover will require special provisions for building foundation stability.
- Underground utilities and connections to buildings may become damaged or compromised due to landfill settlement. This can be mitigated via use of supports and/or flexible utility connections at buildings.

### Water Quality Protection

Landfill hydrogeologic conditions will change with any site development on a landfill. Earth cut and fill operations will alter landfill drainage patterns. Fill soil surcharge could affect the



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integrity of the existing landfill cover, increase (or decrease) potential for surface water infiltration into the refuse mass, and increase hydrostatic pressure on the underlying fill. These factors could in turn affect leachate generation and underlying ground water quality. These potential impacts should be explored as part of project hydrology and water quality analyses. Mitigation measures successfully employed at other developments on landfill sites include:

- Upgrades to cover and drainage systems. Depending on grading requirements and existing cover conditions at the landfill, placement of earth fill over the landfill could be considered an improvement.

- Implementation of a water quality monitoring program (most commonly utilizing groundwater monitoring wells), subject to approval of the RWQCB.

- Irrigation/landscape design to

minimize water infiltration into the landfill.

### **Worker Health and Safety**

Trenching/excavation and grading work at landfill sites poses potential hazards not normally encountered in standard construction projects. There could be worker exposure to odors, combustible gas and trace LFG constituents, and contact with refuse, hazardous waste, leachate and contaminated water. These hazards can be managed via a site-specific worker health and safety (H&S) program.

The H&S plan should be prepared in accordance with landfill industry guidelines and known site conditions. It should include an assessment of potential hazards, provisions for air quality, combustible gas and dust monitoring, procedures for identifying and handling special wastes or liquids, requirements for protective clothing and equipment,

emergency response steps, and recordkeeping procedures.

### **Permit Requirements**

Special permits for development on landfill sites are typically not required. However, regulatory agency oversight of landfills will likely intensify as a result of a development project. In our experience, agency approvals for landfill redevelopment projects have included:

- Site characterization – landfill area, cover or waste investigation, gas monitoring, or water quality monitoring.

- Health risk assessment.

- Formal closure in accordance with current regulatory standards.

- Preparation or updates to landfill closure and post-closure monitoring and maintenance plans.

- Implementation of new or upgraded long-term groundwater and combustible gas monitoring programs.

### **Conclusion**

Redeveloping landfill sites can be challenging but it is feasible and has been successfully done in the past. Any project should begin by engaging the relevant agencies to negotiate the path forward for development. Specific conditions of approval should be negotiated based on prudent engineering practice and real, rather than perceived, public health and safety hazards. With the proper diligence and planning, redeveloped landfill properties can become a valuable community asset.

**Patrick Sullivan** is a Senior Vice President and Managing Director for SCS's Consulting and Engineering Operations in the Southwestern U.S. He is the Principal-in-Charge for air quality, greenhouse gas, and renewable energy projects for solid waste facilities.