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## Master Plan to Lower Your Landfill GCCS Infrastructure Investments

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There are no off-the-shelf landfill gas collection and control systems (GCCS). Rather these highly engineered components are configured precisely to tailor to each landfill's needs. With intricate designs, these flexible high-dollar infrastructure systems take operators into the future to adapt to changing regulations around emissions and the evolving waste streams that affect gas production.

Building the right system and effectively forecasting requires a master plan, aka a road map. Your master plan not only maps a path forward, keeping operators on a solid footing by informing them on exactly what gas collection and destruction equipment to buy, when to buy it, and how to size it; they can serve other useful purposes.



Stubout for a lateral header on the gas header in perimeter berm.

“Over time, it’s not unusual for landfill operators to see symptoms of problems surface, whether emission exceedances or odor complaints. When we analyze the situations, the problems are most often caused by gas collection and control system deficiencies. We can avoid these deficiencies by working toward a facility master plan from the beginning. Then with major expansions or over, say, five years, we update the plan. “So, suppose you do not currently have a master plan in place. In that case, we recommend preparing one to prevent what should be a planned event like flare installation from becoming more expensive problems,” says Vidhya Viswanathan, PE, an [SCS Engineers](#)

Engineer and colleague to Viswanathan, Maura Dougherty, PE, echoes: there are powerful cost savings in a master plan. "This is a tool to layout where the site's headed so that the equipment you are installing in the near term is relevant to what you will need down the road. Otherwise, you could end up installing then ripping out millions of dollars of infrastructure and having to start again."



Condensate sump with gas header connections in perimeter berm (lower portion of the sump not shown in the photo).

**Modeling: Where the Site Will Produce Gas and How Much it Will Produce**

Several metrics go into the model, which contributes to gas generation: waste tonnage per year and content of the stream, with close attention paid to changes in the waste stream, among others.

The beauty of your master plan is that it provides a framework to fall back on, with operators able to adjust the numbers to determine how they impact the model and, ultimately, if they need to adjust the GCCS. It is proving especially instrumental as landfill operators take in more types of wastes and ramp up for state regulations such as California's SB1383 that ban landfilling organic waste (the largest contributor to landfill methane production).



Gas header, Condensate force main, and compressed air lines in perimeter berm.

### **Master Plan Schedule: Plays a Critical Role as Operators Build Out Cells**

A master plan schedule helps prevent bottlenecks during the permitting process through cell launch. It can also serve as a financial planning tool. Viswanathan explains: "Equipment production can take

for exactly what is needed, when it is needed. Leverage your master plan to estimate design needs and costs based on how many standard cubic feet per minute of gas you expect. Figure out what you need in the way of length and size of pipe, number of wells, blowers, even flares, and how frequently components will need replacement.”

The data also serves as a budgeting tool beyond guiding field spending decisions. The information that informs the master plan also provides capital expense information to your financial modeling and economic analyses. The more information you have, the more accurately you can determine tipping fees to get a larger return on investments—useful when making a case to city councils for budget approval.



Gas header cleanouts, exposed condensate force main with isolation valve and air release valve, exposed compressed air lines with isolation valves and liquid removal valves.

### **It Takes a Team**

There was a lot of work to do; it was to be a large project. To start, she created a five-year plan, then set to work on a 25-year master plan to take her client further. First, Dougherty brought every professional into the room who might touch on the project.

"We had to consider what would be most effective from design, operational, and safety perspectives. And there were a lot of engineered pieces, so we had to make sure they would fit together and function well to accomplish this," she says.

The team worked from a spreadsheet that tracked each part and decision, and Dougherty had every player involved in the process check it whenever they were ready to take another step.



Stubouts for lateral header, condensate force main, and compressed air lines for future extension on landfill slope.

"It's how we can plan out to prevent potential problems. For example, we were discussing the blower design. We learned that one of the vendor's components would pressurize at a level, creating a potentially

dangerous situation in this scenario. We could proactively engineer around the potential problem.

By the time we were ready to begin construction, we had a thoroughly vetted plan and buy-in from the whole team on the final design. We were confident it was safe, efficient, and would meet site-specific needs for years to come," Dougherty says.



Construction of perimeter berm in vicinity of condensate sump.

Viswanathan, Dougherty, and their SCS colleagues often team for projects, as they have similar yet different perspectives working on multiple sites and bring that collective experience to the table. "What's exciting about working on landfill gas systems is that even though there are universal tenants of engineering designs, every site is unique," Dougherty says. "We've seen different scenarios month to month, year on year. So, collectively we've seen any number of conditions that may require more nimble engineering or responses on the ground. Teaming makes us stronger and better able to achieve."



Condensate sump in perimeter berm.

### **Keeping the Plan and Your Goals in Sight**

When operators have a master plan in place and do routine design and construction, keeping that plan in sight, the payoff is a system that serves them well and costs less. They can prepare early for capturing their gas, use the plan to install gas collection infrastructure on a timely basis, and help guide them through post-closure.

*For more information, visit [www.scsengineers.com](http://www.scsengineers.com).*