STRATEGIC SITE EVALUATION

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ABSTRACT

Many factors contribute to site evaluation and selection for onsite wastewater systems. Developing a strategy that begins with some research, a sanitary survey, landscape position and topography, and includes the owner's plans for the property is essential to finding a proper site for a dispersal area.
While soil evaluation is a crucial part of the process, the soils alone do not make or break system function so site evaluation strategy must include a multifactorial approach. Building on the scientific method helps create an efficient and effective process for site evaluation.

INTRODUCTION

"I need a "perc test" on this property I want to purchase." This statement is the beginning of many phone calls requesting a site and soil evaluation. Many clients believe that a site and soil evaluation means a water test. Others believe that the evaluator will be sending off soil samples to a lab of some kind. Some clients with a bit more understanding of the process believe that the evaluator will be checking every square foot of soil on the property and will then provide them with endless sewage disposal options so they can pick the option that best fits into their elaborate plans for the property and is super affordable.

For a land developer who has not yet decided how to use the property, an evaluator can approach the site evaluation as a soil mapping exercise and objectively describe the soil by landscape position. This type of evaluation is a feasibility study and provides some data useful for ultimately delineating and designing dispersal systems on a property. But soil maps alone are not specific enough to serve as the basis for a dispersal area design.

An understanding of the site and soil evaluator's role in a building project is important. The evaluator is primarily a consultant in these projects. Consulting's eight fundamental objectives are:

1. Providing information to a client.
2. Solving a client's problems.
3. Making a diagnosis, which may necessitate redefinition of the problem.
4. Making recommendations based on the diagnosis.
5. Assisting with implementation of recommended solutions.
6. Building consensus and commitment around a corrective action
7. Facilitating client learning - that is teaching clients how to resolve similar problems in the future.
8. Permanently improving organizational effectiveness.
   (Turner, 1982)

The last three points apply more when a builder or an engineering firm is the client and there's a continuing relationship. The author states, "Often information is all a client wants. But the

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information a client needs sometimes differs from what the consultant is asked to furnish." (Turner, 1982) These days there usually is an onsite sewage solution for each parcel, but it is important to remember that sometimes, the best information the evaluator can provide is that an onsite sewage solution is not possible for their project. In many projects, the client can then be released from their contract to purchase the lot to find a more suitable parcel. When the client already owns the land, this information will "differ from what the consultant was asked to furnish" but is still information that the client needs.

In the majority of cases the project will proceed. To design the dispersal system, a site-specific site and soil evaluation is required. A site and soil evaluation is a scientific process for collecting data objectively. This data is then used to determine the treatment level and the size and configuration of the dispersal area of the proposed onsite sewage system. While describing the soil profiles on the site is important, boring holes is not the best place to start the evaluation. For example, there is no need to place borings in unsuitable landscape positions or areas eliminated due to the inability to meet separation distance requirements.

The site evaluation part of the equation is often more critical than the soil evaluation part. Most property owners prefer a gravity-fed system that does not require the extra cost and maintenance of a pump system. But beyond that concern, the evaluator must consider how drainage will work with respect to the finished system. Does the site present obstacles to the installer, such as steep slopes, property lines or utility easements? A proposed site nestled into the very corner of the property may make it impossible for the installer to install the system without encroaching on the neighbor's property, which is usually problematic.

Determining other site parameters prior to digging holes can save the evaluator much time and effort in the process of evaluating the site. Where are the property lines? Discussing the proposed house location with the property owner, or even better, the builder, clarifies their requirements for the house, garage, pool, pasture, etc. Where do they plan to run the driveway? Will any outbuildings have plumbing that must connect into the onsite sewage system? What additional plans do they have for the property?

And of course, the evaluator must conduct a sanitary survey of the subject property and the adjoining properties. The evaluator must identify existing wells, septic systems, cemeteries, underground storage tanks, streams, lakes, sinkholes, etc., prior to beginning to dig holes. If the property is part of a subdivision, where are the preliminary locations for onsite sewage systems and wells on the neighboring properties? In Virginia, local governments require developers to show that each proposed building lot has a viable house, well, and dispersal area site prior to approving a subdivision. The sites can be changed later, but the preliminary dispersal areas established have been approved and carry setback requirements.

The sanitary survey must be conducted in the field primarily but having research materials such as GIS parcel and topo maps, Google Earth aerial photos, NRCS soil maps, and health department records is very valuable also. Routinely gathering these materials and any other research available prior to the field evaluation should be an essential part of the site and soil evaluation. The evaluator must organize all this information and develop a plan forward to conduct the evaluation.

Ultimately, the best approach to site and soil evaluation is to use the scientific method. The scientific method is an iterative approach designed to solve a problem (Khan Academy, n.d.). Drawing from numerous sources, here is a basic framework for the scientific method:

1. Define the problem.
2. Research the problem.
3. Form an hypothesis.
4. Test the hypothesis.
5. Iterate as necessary.
6. Form a conclusion.

The "problem" to solve with a site and soil evaluation is to identify and document a site for "X" bedrooms or for "XXX" gallons per day if it is non-residential site. By consolidating the research and the initial observations at the site, the evaluator can develop an hypothesis, i.e., identify a suitable landscape position large enough for a dispersal area for the project that would fit the owner's plan the best. At the same time, the evaluator is identifying areas that are definitely unsuitable due to topography and/or setback requirements. The remaining areas are sites to check if the initial hypothesis doesn't work out.

Applying a scientific method-based strategy for site and soil evaluation allows the evaluator to be efficient and accurate in the evaluation, enhances the objectivity of data collection, and facilitates writing reports about the evaluation.

EFFICIENCY AND ACCURACY

All site and soil evaluators can benefit from beginning the evaluation with a site sketch. Using the sketch, which could be based on a printout of the topo from county GIS or could be an original sketch of the property, is an efficient way to capture the research collected about the property and to show the field observations that lead to developing an hypothesis on where the dispersal system can be established. The sketch will show where the concave vs. convex landscape positions lie on the property. To begin, the evaluator can show the location and extent of the proposed house site, driveway, outbuildings, etc., on the sketch along with the areas eliminated due to topography or setback requirements. Not only is the sketch a valuable tool for the site evaluator, but it can also be a great way to help the property owner visualize his or her plans for the property.

Most property owners do not build dream houses every day and they have some trouble deciding where to place the house and the other elements they want. Highlighting the topographic features of the property with respect to the proposed house site shows where drainage will occur naturally and usually makes the first possible dispersal area site (the hypothesis) abundantly clear.

Working through this process with a homeowner that has chosen a poor location for the house is often the most efficient way to demonstrate that there is a much better house site. If the owner chooses to move forward with the less desirable house site, at least they are fully informed about their choice.

The evaluator can show their research from NRCS soil maps on the site sketch under development and discuss this information with the property owner. Since soil maps are not specific enough to use as the sole basis for dispersal site decisions, boring a hole in a convex area that would allow a gravity-fed drainfield is the best next step, even if the owner is not on site and the soil map indicates a much better site is available. As a consultant, part of the evaluator's role is to provide the owner with information about their property, not to make decisions for them. Is the remote site with better soil so far from the house that it will not be mowed routinely? Pump vs. gravity, conventional vs. alternative, all of these options must be considered when choosing the ultimate site for the dispersal system and the best solution for the client. Tank locations can be a factor as well, but are usually less controversial.

OBJECTIVITY

Designing an onsite sewage system requires a series of decisions: the treatment level, tank locations, the length, width, and number of absorption trenches or the dimensions of a pad or drip irrigation area, gravel, sand, or chambers, the depth of the dispersal area, time-dose or demand dose if a pump is needed, other components needed for the system, etc. These design decisions become part of the evaluator's role, often even when a separate engineer/designer is involved in the project. Local regulations or convention or even suppliers may influence some of the design. Evaluating the site provides the data to make these decisions.

There is no way to keep design decisions out of the site evaluation process entirely because many of these design decisions guide the evaluator in choosing where to bore the next hole. By consolidating the design decisions into an hypothesis, however, the evaluator is free to objectively evaluate the site and soil to solve the "problem": is this site suitable as a dispersal area for "XXX" gallons per day?

Discipline is essential at this stage to keep the soil evaluation objective. First the evaluator must determine the general suitability of the proposed dispersal site, and then determine the extent of the suitable soil. As the landscape position changes, the soil is likely to change as well, and the evaluator must document the soils to show that the extent of the site is sufficient to serve the proposed use.

The evaluator can usually determine the extent of the area based on estimated permeability rates. Often an estimated rate is sufficient for residential sites, but for non-residential projects, measured saturated hydraulic conductivity testing is necessary. Again, discipline is required to do proper testing and to let each test run through to a steady state.

If the soils are not suitable, the evaluator should be able to move readily to the next hypothetical site for evaluation.

While the problem is to determine if the hypothetical site is suitable for the proposed use, the consultant's ultimate role is to provide information that the owner needs to make their decisions, not to "find a site". With so many alternative treatment and dispersal technologies available today, most properties can have an onsite wastewater solution. There are still sites out there where there

is no suitable topography for a dispersal site, where shrink-swell soils make a site impossible, or the parcel is just too small for a house, dispersal area, and well.

WRITING REPORTS

An evaluator using the scientific method for site evaluation will readily be able to provide high-quality reports on the site by describing the process and the results as they developed. Most people recognize the scientific method, even if they do not remember the name of it.

Clients need their reports for various reasons. The report may be needed as part of a construction loan or mortgage application process. The client might need the report to present to investors or to the building committee of the church. Sometimes the project fizzles out and the report is the end product for the project for a while until someone re-activates it.

Accuracy and thoroughness are important, and it is also important to make limitations on the information or the site clear.

The site sketch showing the research from different sources, including soil maps can accompany the report, but the written report is important also. The report begins with the date and time of the evaluation and who was present for the evaluation. Next would be a description of the site and the purpose of the evaluation.

If the evaluator has followed the scientific method, the report can cover the process of developing the hypothesis, how the hypothesis was tested, including the equipment and methodologies, and then give the findings from the evaluation. Any glitches in the evaluation process should be noted as well.

Since the evaluator is also a consultant, the evaluator should provide the next steps for the client with respect to the drainfield project: hire a surveyor to locate the site, hire an engineer to design a system, file an application with the health department or natural resources agency – whatever the next step should be. If the proposed site requires special protection or clearing, the evaluator should clearly describe those conditions.

CONCLUSION

The public at large is not well informed about onsite sewage systems in general and rarely knows much about onsite sewage projects in detail. As a consultant who is also a technical expert, the site and soil evaluator faces extra challenges in providing information to clients who do not know much about onsite sewage systems. Developing a strategic approach to the site and soil evaluation has many benefits in fulfilling the role as both consultant and site and soil evaluator. The scientific method provides a great structure for the evaluator's role in the project.

The process should begin with solid research about the site to be developed. Geographic information systems, agency records, NRCS maps, and other resources such as Google Earth and specialty land use apps can provide a robust foundation for the evaluation.

This research could provide unexpected information about the site. For instance, the county GIS could indicate that the site is within 300' of public sewer and therefore must connect. Does the topo show odd shapes that must be man-made?

By collecting the research information on your site sketch, adding field-derived sanitary survey data about site influences, and then showing the client's plans on the sketch, the evaluator can develop an hypothesis of a site that would serve the client's needs, along with some backup sites should the first site considered not work out.

Following this process based on the scientific method helps the evaluator separate the design decisions from the data collection parts of the job in order to be most effective in both areas. Having a defined process also helps the evaluator provide a meaningful report to the client for whatever purpose they need it.

Works Cited

Khan Academy. (n.d.). *The scientific method*. Retrieved 08 26, 2022 from Khan Academy: https://www.khanacademy.org/science/biology/intro-to-biology/science-of-biology/a/the-science-of-biology

Turner, A. N. (1982, September). *Harvard Business Review.* From Consulting is more than giving advice: https://hbr.org/1982/09/consulting-is-more-than-giving-advice