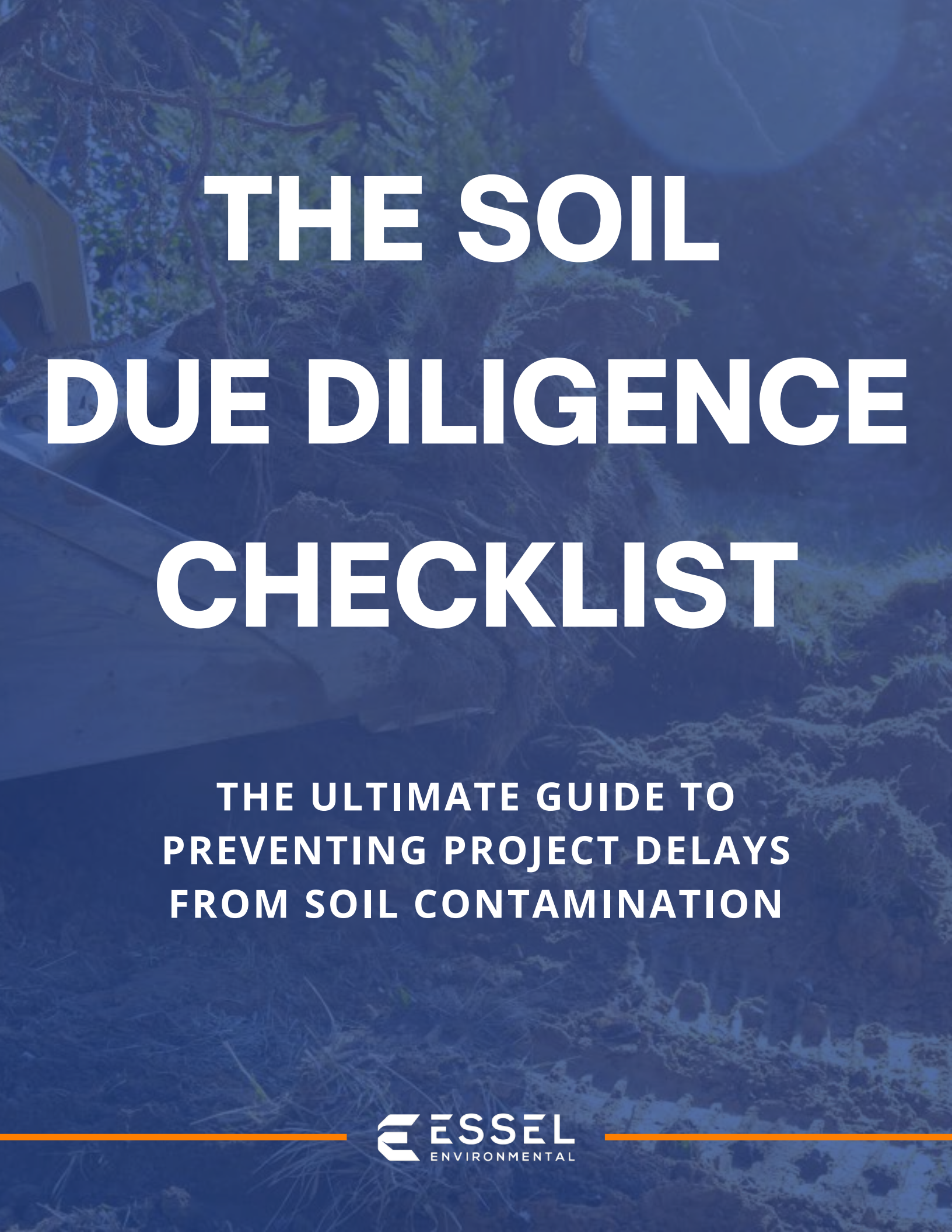

THE SOIL DUE DILIGENCE CHECKLIST

THE ULTIMATE GUIDE TO PREVENTING PROJECT DELAYS FROM SOIL CONTAMINATION

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THE ULTIMATE SOIL DUE DILIGENCE CHECKLIST

When we talk to developers about their biggest pain points, soil is always near the top of the list.

Soil contamination levels are difficult to predict, even after a Phase I Environmental Site Assessment. Excavation may reveal unexpected contaminants that set your project back weeks, months, or even years.

In order to reduce your liability and prevent project delays, a complete environmental due diligence plan must go beyond a Phase I ESA. Hiring a consultant to develop a **soil characterization program** can help you rest easy knowing there's a plan in place to properly dispose of your soil and rid your project of regulatory nightmares.

Essel Environmental developed this checklist and accompanying guide to give you the peace of mind you need. See our full soil due diligence checklist on the following page, and keep reading for a detailed explanation of each part of the process.

SOIL DUE DILIGENCE CHECKLIST

PREPARE

PREPARE FOR SOIL CHARACTERIZATION

- [ ] Complete a Phase I ESA
- [ ] Have your architectural/ development plans in place
- [ ] Prepare your proposed schedule
- [ ] Know your local guidelines
- [ ] Identify prospective sites for soil disposal

ORGANIZE

DEVELOP A SOIL CHARACTERIZATION PROGRAM

- [ ] Plan soil pre-characterization within 6 months to a year of breaking ground
- [ ] Hire an environmental consultant specializing in soil characterization
- [ ] Analyze samples based on site historical uses and disposal facility requirements
- [ ] Expect the unexpected and have a contingency plan
- [ ] Test for the following contaminants always:
  - [ ] Total petroleum hydrocarbons (TPHs)
  - [ ] Volatile organic compounds (VOCs)
  - [ ] The CAM 17 metals
- [ ] And these ones as needed:
  - [ ] Pesticides
  - [ ] Semi-volatile compounds
  - [ ] Polychlorinated biphenyls (PCBs)

EXECUTE

PREPARE FOR EXCAVATION

- [ ] Use test results to determine which areas of soil can go to which class of disposal facilities
- [ ] Mark areas for digging to distinguish soil disposal class, if needed
- [ ] Read your contingency plan —then read it again
- [ ] Contact your consultant and any necessary regulatory agencies if something comes up during excavation

PREPARE FOR SOIL CHARACTERIZATION

WHAT IS SOIL CHARACTERIZATION?

Soil characterization is an essential part of determining soil contamination levels at a development site. Environmental consultants use soil characterization to evaluate potential contamination at different depths throughout an excavation area.

This helps to eliminate surprises, allowing developers to address any major contamination concerns before excavation begins. Stakeholders can also rest easy knowing there is a plan to deal with soil contamination and dispose of soil properly according to regulatory guidelines and landfill requirements.

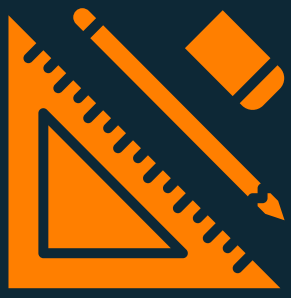
Before you begin working with an environmental consultant on your soil characterization program, you'll need to prepare several items. Here's what we recommend:

1. COMPLETE A PHASE I ESA

The first step in environmental due diligence is always a Phase I Environmental Site Assessment. Phase I ESAs give you and your environmental consultant a historical overview of the property as well as current land uses.

While it would be possible to conduct soil characterization without a Phase I, it is simply not an efficient way to do so. Historical data will provide your consultant with pertinent information such as whether a gas tank may have once existed on the property, guiding their sampling and testing program.

2. GATHER YOUR ARCHITECTURAL/ DEVELOPMENT PLANS



These plans will help your environmental consultant learn **exactly** where soil will need to be sampled and at what depths.

3. PREPARE YOUR PROPOSED SCHEDULE

Some landfills will only accept lab data that has been processed within the past 6 months to a year. Your environmental consultant will need to understand your schedule in order to put together a proposal and timeline for soil displacement that meets such requirements.

4. KNOW YOUR LOCAL GUIDELINES

San Francisco's Maher Ordinance requires that the San Francisco Department of Public Health oversees sampling and testing in many circumstances. Becoming familiar with these and other local guidelines will ensure you get the right parties involved early on and help you identify sites for soil displacement.

5. INDENTIFY SOIL DISPLACEMENT OPTIONS

Ideally, you should search for sites to dispose of contaminated soil *before* you start testing, so that you know what types of contaminants are allowable at which facilities. This will guide your consultant's sampling program, saving you time and money on testing for the wrong things.

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DEVELOPING YOUR SOIL CHARACTERIZATION PLAN

SEE OUR GUIDE TO SOIL CONTAMINANTS ON THE NEXT PAGE

Your soil characterization program should be customized to your site history and timeline. We always recommend **soil pre-characterization** rather than testing only during excavation. Pre-characterization (**6 months to a year** before breaking ground) will prevent you from getting stuck with piles of contaminated soil as you await lab results. This option saves you site space and—more importantly—time and money.

Hire an environmental consultant specializing in soil characterization—someone you can trust to write a clear report. The right consultant will put together a soil characterization program centered on analyzing samples based on their **chemical characteristics** (water solubility, for example), to save you money in the long run.

Although your consultant will be as thorough as possible, it's important to understand that unexpected contamination can still come up during excavation, as pre-characterization cannot test every inch of soil. A good soil characterization program should include a **thorough contingency plan.**

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COMMON SOIL CONTAMINANTS

Your consultant will most likely recommend testing for all of the following.

TPHs

From gas to diesel to jet fuel to heating oil, total petroleum hydrocarbons (TPHs) include mixtures of hundreds of chemicals of petroleum compounds that may be present in soil. Laboratories can distinguish which are present based on the size of the molecules, narrowing them down by class to guide soil displacement.

CAM 17 METALS

California requires sites to test for 17 metals called the CAM 17. Labs will test for what California calls "persistent, bioaccumulative, and toxic" substances. These include lead —which is well-known to create adverse health effects in children, including brain damage—as well as arsenic and mercury.

VOLATILE ORGANIC COMPOUNDS

VOCs, or volatile organic compounds, are toxic gases emitted from specific liquids. Usually, VOCs are emitted from common products, including paints, solvents, fuels, and cleaning products. Common VOCs found in soil are TCE and PCE, known commercial degreasing agents. TCE and PCE have been known to cause developmental effects in children, detailed in the Woburn, Massachusetts case that caused a leukemia cluster between 1969 and 1986.

ADDITIONAL CONTAMINATION CONCERNS

Indicators for further testing

Is your site on historical agricultural land?

Did your site once contain industrial equipment like transformers or light ballasts?

Does your prospective landfill require testing for certain compounds?

Does your local regulatory agency require further testing?

Has your site ever contained a sump, underground storage tank, or burn pit?

SEMIVOLATILE ORGANIC COMPOUNDS

SVOCs are often found in heavier oils like diesel fuel. Rarer semivolatile compounds such as naphthalene are a major concern with the State of California, but testing for SVOCs can be pricy. Your consultant will help your budget by testing only for those compounds that are most likely to occur based on site conditions (PNA or PAH tests). However, something like an industrial manufacturing facility will require more thorough tests.

PESTICIDES

A Phase I ESA may uncover historical agricultural land, indicating the need to test for pesticides.

POLYCHLORINATED BIPHENYLS (PCBs)

A presence or history of hydraulic oils may indicate the need to test for PCBs. Both pesticides and PCBs are not water-soluble, meaning you shouldn't have to test for them much further than 5 feet underground.

ALWAYS HAVE A CONTINGENCY PLAN

Any good soil characterization and remediation program includes a contingency plan. We've learned over the years to expect the unexpected.

At one site that had been a school since the 1880s, buried demolition materials were found to have soluble lead, requiring us to displace the soil to a Class 1 disposal site in Utah. We've also seen excavations reveal things like gas tanks that were never indicated in the Phase I.

It's simply not possible to test every square inch of soil throughout a site ahead of excavation. Familiarize yourself with your contingency plan (which should be included by your environmental consultant) and know what to do when the unexpected comes up.

Typically, you will have to halt excavation and contact your consultant for further testing, as well as any necessary regulating bodies. However, a good contingency plan can help minimize the time spent dealing with unexpected issues.

Hiring Checklist

The right environmental consultant will...

Help with everything you need for soil management:

- [ ] Developing a program
- [ ] Cooperating with labs for testing
- [ ] Completing all permits
- [ ] Arranging to dispose of soil at landfills

Stay informed about changing local regulations.

Develop a thorough contingency plan and remain available to consult throughout the excavation process.

Cooperate with regulators as needed, but...

Continue to advocate for what's best for your site based on current conditions and site history (saving you time and money).

Have a reputation for developing clear, technically-sound, and detailed reports.

HOW CAN ESSEL HELP WITH YOUR SOIL REMEDIATION PROCESS?

Unlike other environmental consulting firms, Essel can create and execute comprehensive soil management planning from start to finish.

INCLUDING:

Creating a soil management planning document

Completing all required permits

Conducting necessary testing.

Making contact with landfills and disposing of contaminated soil

TESTING CAPABILITIES

- PHASE I ESA
- PHASE II ESA
- GEOPHYSICAL SURVEYS
- SOIL TESTING

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