ScanPlus
GPR Locating & Mapping

Remote Sensing Property Scan

March 29, 2018

Attn: Sam Miller and April Spackman

Re: Remote Sensing Property Scan at 2761 Murray Drive, Victoria, BC

ScanPlus completed a non-intrusive, subsurface remote sensing scan of the above described property, dated March 29, 2018 using a combination of ground penetrating radar, radio detection, and ferrous metal detection.

This Remote Sensing Property Scan was designed to target and locate potential underground heating oil storage tanks (UST), and/or a UST nest (the remnant hole where a UST was previously buried). A visual inspection for clues of potential UST's was completed prior to scanning. Some of the indicators the technician looked for include, existing fill and vent pipes, evidence of previous fill and vent pipes, current and/or previous boilers/furnaces, chimneys, existing above ground storage tanks, staining, depressions in the ground, and concrete/asphalt patches. It should be noted, Remote Sensing is not 100% effective in all situations, but ScanPlus provides the best non-intrusive means of subsurface detection available in the market today. See the attached, ***Understanding Concepts and Limitations***, for further details.

ScanPlus completed an onsite investigation to determine the potential for a UST to have been installed on the subject site. The District of Saanich Fire Department lists permit records for June 31,1956 furnace installed. January 14, 1964 250g tank installed.

It is the understanding of ScanPlus that the home, built in 1957, is currently heated by electric heat, an oil burning furnace and a wood burning fireplace.. ScanPlus has been made aware of, or noted the following changes that have been made to the house and or property:

- The siding on the house has been upgraded or painted at an unknown date.
- No other notable changes.

A visual inspection was completed of the ground floor of the subject home. An interior 250g above ground tank (AST) is present. A fill pipe and vent pipe can be seen existing the East exterior wall, and are visible from the outside. The copper fuel supply line is visible end to end, running from the AST to the furnace along the ceiling joists. The furnace is contained in a closet with limited access. ScanPlus did not note any subsurface fuel supply lines. There was no other evidence noted.

A visual inspection was completed of the exterior of the subject home. A fill pipe and vent pipe for the interior AST can be seen entering the house on the 2nd level, through the East exterior wall, directly south of the East entrance way. The subject home has a three-flue chimney that services the interior fireplace and oil burning furnace. Only 1 fireplace was noted on the 2nd floor. There was no other visible evidence.

Due to site specific limitations, such as a hot tub, a detached shed, landscaping, concrete walls, mature trees, shrubs, a pile of scrap lumber and garbage cans, some areas within the subject site boundaries were not accessible or feasible for GPR scanning. No other visual evidence of a UST was noted during the scan.

A GPR and Ferrous metal detect scan was completed with no evidence of a UST being found.

Following the subsurface remote sensing scan, we can certify as follows:

That ScanPlus has inspected the property, to the best of our ability, for the presence/absence of a UST. See the attached map for an overview.

That ScanPlus has no past, present, or contemplated interest in the property.

ScanPlus has taken into consideration, fire department records for the District of Saanich. See above comments.

ScanPlus **did not locate visual evidence or remote scanned evidence**, of a UST on the above mentioned subject site.

If there are any questions or concerns regarding the site scan please contact us at 778-352-4770.

Mike Cooper
Operations Manager
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Understanding Concepts and Limitations

GPR Concept

The Ground Penetrating Radar (GPR) uses high-frequency-pulsed EM waves (from 10 to 3000 MHz) to acquire subsurface information. Energy is propagated downward into the ground from a transmitting antenna and is reflected back to a receiving antenna from subsurface boundaries between media possessing different EM properties. The reflected signals are recorded to produce a scan or trace of radar data. Typically, scans obtained as the antenna(s) are moved over the ground surface are placed side by side to produce a radar profile. Objects within the earth reflect the EM wave at different rates thereby creating an image on the monitor which is then interpreted by the certified operator.

General Limitations Inherent to Geophysical Methods (GPR)

A fundamental limitation of all geophysical methods lies in the fact that a given set of data cannot always be associated with a unique set of subsurface conditions. In most situations, surface geophysical measurements alone cannot resolve all ambiguities, and some additional information is required. As a result of this inherent limitation in the geophysical methods, a GPR survey alone can not be considered a complete assessment of subsurface conditions. Properly integrated with other sources of knowledge or geophysical methods, GPR can be a highly effective, accurate, and cost-effective method of obtaining subsurface information. Soil types, groundwater/saturation of soils and limited area for completing two directional scans are a few of the typical limitations.

Increasing Accuracy During a Survey

ScanPlus engages two other electronic instruments in order to increase the volume of information collected. The first instrument engaged is a pin locator, or ferrous metal detector, that primarily detects magnetic fields such as iron pipes, tanks, etc. There are limitations when using ferrous metal detection that may lead to inconclusive results. These include, but are not limited to: rebar in concrete, metal fencing, metal mesh in stucco, vehicles in driveways, waste bins, scrap metal piles, naturally occurring metals in rocks and landscaping. Any of these may return a false positive or mask the location of a UST.

This is followed by a radio detection unit (EM), which can further define things like steel pipes, hydro/power lines and gas lines which were installed with a trace wire. Limitations also exist with the EM, poor ground connections may require a higher frequency in order to effectively locate a fuel line. The draw back of using a higher frequency is that the signal may "bleed off" into other buried utilities such as copper water lines, buried power or communication lines. Additionally, fuel supply lines that have been severed from the tank may result in an incomplete trace. All information gathered from these instruments assist in the GPR operator's investigation. The collaboration of these instruments and the resulting collection of information can increase the accuracy of locating underground utilities.

Site Limitations

The GPR unit requires a relatively flat surface to operate with adequate travel distance. Decks which are off the ground less than three feet are not accessible with the traditional GPR unit therefore the area would not be surveyed under a basic contract. If the area is of concern modifications can be made to the instrument to complete such surveys. A minimum of 18 inches is still required even with modifications. Soil type, both at surface and subsurface, seasonal changes that effect soil moisture content, surface contours and field obstructions (ex. Garden beds, shrubs, fencing or junk piles) can also be substantial limiting factors.

For further clarification or examples of limitations, please contact one of our technicians at 778-352-4770.

ScanPlus
Locating Ltd.

Office: 778-352-4770
Toll Free: 884-480-7226
Email: info@scanplus.ca

2761 Murray Drive, Victoria, BC
Ground Penetrating Radar Locate Map

Legend:

Area(s) Scanned w/GPR — Site Boundary — Area of Concern

Area(s) Not Scanned — Area(s) Scanned w/Metal Detection

Disclaimer: The location of the marked utility is approximate only. This locate is **valid for up to 10 business days so long as the markings are visible.** All ground disturbances in proximity to buried utilities must follow WorkSafe BC regulation 20.79 Excavations, Underground Utilities. ScanPlus Locating Ltd will not accept any liability for damages incurred as a result of this locate

You are responsible for any damages caused to the facility by your operations

Locate Technician:	Locate Date:
Mike Cooper	March 29, 2018
Client:	**Comments:**
Sam Miller and April Spackman	See attached report