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Trail Area Soil Management Program 2019 Annual Report & 2020 SMP

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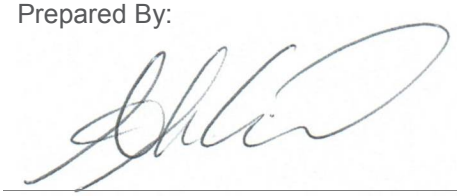

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Executive Summary

In 2019, soil assessment and remediation services provided through the Trail Area Health and Environment Program (THEP) were completed according to the Trail Area Residential Soil Assessment and Remediation – 2019 Work Plan submitted to the Ministry of Environment and Climate Change Strategy (ENV) on April 1, 2019. The 2019 Work Plan was referred to as the 2019 Soil Management Program (SMP), and encompassed all tasks related to managing risks from soil within the EMA such as outreach, communications, soil assessment and remediation (i.e., by means of soil replacement or risk management activities). The 2019 SMP sought to identify properties with children and complete soil assessment and ground cover evaluations, and complete remediation at the highest risk properties identified through implementation of a prioritization framework developed by SNC-Lavalin. Key activities completed through the 2019 SMP included:

- Identification of a total of 545 properties with children under the age of 12.
- Soil assessment, or testing, was completed at 244 residential properties and 105 of those properties were identified as having children present. A total of 1588 parcels within the Trail Environmental Management Area (EMA) have now been tested.
- Soil testing was completed on 18 Parks within the EMA.
- Ground cover evaluations (GCE), new to the program in 2019, were completed at 517 residential properties and 40 Parks. GCE are required to help identify top priority properties.
- Remediation work was completed on 204 properties in 2019.
  - 84 properties received full yard soil replacement (25 properties included vegetable garden remediation).
  - Seven properties received partial soil replacement.
  - Six vegetable garden remediations were completed.
  - 96 properties received lawn care to improve and maintain good ground cover.
  - 11 properties received other ground cover improvements.
- Parks generally have good quality ground cover that should be maintained. There are recommendations for ground cover improvements or remediation that will be discussed with the municipalities.
- The 2019 Garden Produce Sampling Program obtained updated garden produce Pb concentrations. The updated results show that there has been a statistically significant decrease in mean Pb in homegrown fruit and leafy greens since previous studies.

A challenge with the SMP is identification of properties with children to ensure soil assessment and GCEs are completed. Outreach will continue to be directed to areas frequented by families such as schools, daycares, library, arenas, etc. A mail out to the local elementary schools is planned for Spring 2020.

Based on a review of the accomplishments and challenges in implementation of the 2019 SMP, and a review of soil assessment and GCE data to identify highest priority properties, the 2020 SMP is anticipated to be similar in approach and workload. The focus for soil testing will continue to target families with children in key age groups. The prioritization strategy has no substantial changes. Remediation, through soil replacement or yard improvement activities, will be offered to highest priority properties.

The main objectives of the 2020 Workplan are to:

- Target soil testing on 300 residential properties, focused on properties with children in key age groups;
- Obtain updated GCE information on properties with children in key age groups;
- Provide soil remediation at all P1 Daycares and Residential properties; and
- Work with municipalities to implement the recommended ground cover improvements in Parks.

Acknowledgements

The work of the Home & Garden team has been carried out with the support of the Trail Area Health and Environment Committee (THEC). The collaboration of the THEC plays an important role in delivering the SMP. In particular, SNC-Lavalin would like to acknowledge Interior Health for their assistance in connecting the Home & Garden staff with families and promoting the SMP through their work. As well, SNC-Lavalin would like to thank the citizens of Trail for their support and willingness to participate in the SMP and other THEP services. These collaborative efforts are key to the program's success.

Definitions and Acronyms

This list includes definitions and acronyms that are commonly used in the Trail Area Health and Environment Program documents and within the database. As such, they are used in the text of the report and in the associated tables.

Term	Acronym (if available)	Definition
BC Property Identification Number	BC PID	A nine-digit parcel identifier that uniquely identifies a parcel in the BC land title register.
Caregiver		A person who takes care of children more than two days per week in the absence of their parents (e.g., grandparent, extended family, family friend, foster parent).
Community Properties	CP	Properties within the EMA that are not child occupied (e.g., there are no children less than 12 years old that reside or visit the property).
Contaminated Sites Regulation (CSR)	CSR	The regulation under the Environmental Management Act that governs contaminated sites and activities such as soil assessment and remediation.
Duplicate PID (DUP PID)	DUP PID	Identifies properties where more than one THEP PID is present in the data set. This occurs when more than one FID is associated with a THEP PID (e.g., multifamily dwellings and daycare facilities). These Dup PIDs need to be excluded to obtain an accurate summary of results.
THEP Database	Database	Purpose-built database system designed to store and provide access to information related to PIDs and FIDs that are part of the Home & Garden component of the THEP.
Daycare		A residential or commercial space that provides child-minding services to children who are younger than 12 years old.
Environmental Management Area	EMA	A term used in the CSR to identify an extensive geographic area comprised of many individual parcels that are contaminated from a known source or sources.
Family Identification Number	FID	A family identifier generated in the Database that uniquely identifies a parent, grandparent or caregiver who qualifies for Healthy Homes services and prioritization as per the SMP prioritization framework.
Frequent Visitor		A property that a child visits less than two days per week (e.g., seasonally or occasionally).
Ground Cover Evaluation	GCE	A visual assessment tool that collects ground cover information used to prioritize yards for remediation.
Ground Cover Improvement		Landscaping or lawn care activities that cover bare soils in the yard with grass or other materials.
Max Lead	Max Pb	A discrete sample with the highest Pb soil concentration in a soil assessment collection set from a given PID.
Not Prioritized (NP)	NP	A priority status assigned to a property indicating that it does not meet any of the priority status levels (e.g., there are no children present or there is no soil Pb concentration).

Term	Acronym (if available)	Definition
Park		Outdoor public spaces such as; play grounds, sport fields, walking trails, that are frequented by children of all ages.
Post Remediation Pb	PR	Pb concentration from a composite sample of the replaced backfill following the completion of remediation activities.
Primary Play Area		An area in a yard or park that is frequented by children under the age of 12 as indicated by, but not limited to, the presence of outdoor play equipment (e.g., sandboxes, swing set), toys, or other children's possessions, observations of play patterns (e.g., worn areas of the lawn), or information provided by parents, residents, care givers, or property owners.
Prioritization Strategy		Approach for prioritizing child-occupied properties for soil assessment and remediation which is based on age of the child, quality of ground cover and Pb concentration.
Priority Status		Priority assignment given to a property based on the prioritization strategy. P1, P2. P3 or NP.
Primary Residence		The main residence of the occupant (e.g., parent, grandparent, frequent visitor, etc.) within the EMA, typically a house or an apartment.
Property Association	ASSOCIATION	A description of how property relates to children or FIDs in the community (e.g., primary residence, daycare, park, etc.).
Property Identification Number	PID	A property identifier number assigned in the Database that uniquely identifies a parcel within the Environmental Management Area.
Property Type	TYPE	Identifies the type of parcel (residential, park, commercial).
Remediation	REM	A mechanism to manage contaminated soil on the property either through soil replacement or ground cover improvements.
Remediation Status		Classification of a property based on the latest remediation work completed on the property.
Remediation Extent		The extent of the remediation services completed on the property in a given year (part rem, full rem, yimp).
Secondary Residence		A child-occupied property that is associated to a child but is not their primary residence **and** the child visits more than two times per week.
Soil Assessment	SA	The process of collecting discrete and composite surface soil samples at a given PID. Results are used to calculate the 95% UCLM and Max Pb. Areas included in an assessment include general yard, vegetable garden, ornamental gardens, play areas, and drip zone.
Soil Management Program	SMP	A program that addresses soil within the Trail EMA.
95% Upper Confidence Limit of the Mean	95% UCLM	The upper limit of a confidence interval of the mean. In the THEP, the 95% UCLM represents lab Pb and xrf Pb samples that were used to calculate a "protective estimate" of mean Pb concentration on an individual property. This would indicate that if a property was sampled 20 times, 19 times out of 20 the mean Pb will be below the calculated UCLM.

Term	Acronym (if available)	Definition
Trail Area Health & Environment Committee	THEC	Provides governance for the THEP and is a partnership between the local community, Teck, Interior Health, and the BC Ministry of Environment and Climate Change Strategy.
Trail Area Health & Environment Program	THEP	A comprehensive community-led program that has evolved on a continuous effort since 1988 to improve the Trail area environment and promote and protect the health of the community related to smelter operations.
X-Ray Fluorescence	XRF	A specialized piece of equipment used to screen metals in soil and paint.
Year of Work	YEAR	Identifies the most recent year either a soil assessment, GCE or remediation was completed on the property.
Yard improvement	YIMP	Yard improvement services used to improve ground cover on the property.

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1 Introduction

On behalf of Teck Metals Ltd. (Teck), SNC-Lavalin Inc. (SNC-Lavalin) has prepared the following Annual Report for the 2019 Trail Area Residential Soil Assessment and Remediation – 2019 Work Plan[1]. The 2019 Work Plan was referred to as the 2019 Soil Management Program (2019 SMP) in all public communications and that name is reflected herein. The 2019 SMP was delivered by SNC-Lavalin under contract to Teck, through the Home & Garden (H&G) component of the Trail Area Health and Environment Program (THEP). This report summarizes the work completed in 2019 including the details requested by the Ministry of Environment and Climate Change Strategy (ENV) in letters to Teck dated December 7, 2018[2], March 5, 2019[3] and January 15, 2020[4].

This report also outlines the Trail Area Residential Soil Management Program 2020 Work Plan (the "2020 SMP").

1.1 Instructions to Readers

The 2019 SMP includes a status update for properties worked on in 2019, and also includes properties worked on in previous years including those where:

a. children are present or likely to be present;
b. soil assessment data was collected;
c. updated ground cover was collected; and
d. soil remediation was completed.

This report outlines the scope, approach and results of the 2019 SMP activities as well as an outline of the 2020 Work Plan. Additional details regarding program history and methodology are outlined in the 2019 Work Plan. Table 1 referenced herein compiles all relevant summary data resulting from SMP activities carried out during and before 2019. Using the filters in Table 1, the reader can obtain different summaries of the 2019 data. For example, filtering by YEAR for 2019, will provide a list of all properties that received services related to the SMP in 2019. By further filtering by neighbourhood, one can then obtain a list of all properties within a given neighbourhood that were worked on in 2019.

There are many terms used in this report and in Table 1 that have been developed by the THEP and are specific to the work carried out by the THEP and specifically the H&G. As such, a list of definitions and acronyms is provided on page iv.

[1] SNC-Lavalin and Teck, 2019. Trail Area Residential Property Soil Remediation – 2019 Workplan – Site ID: 3250 (Revision 1). April 1, 2019.
[2] ENV 2018. Remediation of Teck Metals Ltd. Trail Operations Facility Environmental Management Area in Trail, BC. Letter issued December 7, 2017.
[3] ENV 2019. Trail Area Residential Soil Assessment and Remediation – 2019 Work Plan. Letter issued March 5, 2019.
[4] ENV 2020. Site 3250 Trail Area Soil Assessment and Remediation – Request for 2020 Workplan Submission. Letter issued January 15, 2020.

2 Background

Due to the presence of metallurgical operations in Trail for over a century, there is a long history of environmental and health monitoring related to metals. Since 2001, soil assessment and remediation programs have been conducted through the H&G component of the THEP.

The 2019 SMP encompassed tasks related to managing risks from soil within the EMA such as outreach, communications, soil assessment and remediation (i.e., by means of soil replacement or risk management activities). In addition, a prioritization framework for residential properties was developed by SNC-Lavalin and presented in the 2019 Workplan. While soil assessment continued as it had in previous years, soil remediation work increased significantly. The goal of the ongoing SMP is to identify and offer soil testing to all properties with children under 12 years of age and prioritize and remediate the highest priority properties through soil replacement within 1-2 years after they are identified.

As properties are sampled and remediated each year, a workplan is prepared for the following year to address the next highest priority properties and to monitor conditions at properties that have been remediated through risk management.

2.1 Regulatory Context

The primary regulation that governs soil remediation at residential properties in Trail is the *Contaminated Sites Regulation*[5] (CSR), which was enacted under the Environmental Management Act[6] on April 1, 1997 and has since been amended several times to account for updates to scientific and policy information.

The CSR outlines requirements for site identification, assessment, and cleanup ("remediation") under the administration of the ENV Land Remediation Section.

Under the CSR, a site is contaminated if substances in the environment (soil, water, sediment, vapour) exceed the standards prescribed in the CSR. The CSR provides numerical and risk-based standards to determine when remediation is needed and satisfactorily completed. The legislation and regulation provide a framework for two remediation strategies. Contamination may be:

- Removed so that it no longer remains at a site – where the matrix and generic numerical standards contained in the regulation (or ENV approved background concentrations or interim Director's standards) apply; or
- Contained and managed on site – where risk-based standards apply.

Because of the large geographic area (as described in the following section), the THEP employs a risk-based approach for the purposes of identifying, prioritizing and remediating residential properties in the Trail area. However, risk-based remediation target concentrations acceptable to all stakeholders have not yet been determined, and development of such target concentrations is a complex science-based process that is proceeding concurrently with the implementation of the current SMP. Following the development of risk-based remediation targets, a Wide Area Remediation Plan (WARP) will be formalized for the Trail Environmental Management Area (EMA), and submitted to ENV.

[5] *Contaminated Sites Regulation* (CSR), B.C. Reg. 375/96, includes amendments up to B.C. Reg. 13/2019, January 24, 2019.
[6] *Environmental Management Act*, B.C. Reg. 13/2019 / effective January 24, 2019.

2.2 Environmental Management Area

Under the CSR, an Environmental Management Area[7] (EMA) is an extensive geographic area that comprises many individual sites or parcels contaminated by specific substances associated with a known source or sources that are attributable to one or more responsible parties. The EMA associated with Teck Trail Operations was established based on concentration limits determined for arsenic, cadmium, lead and zinc in surficial soils attributable to historical Trail smelter emissions (SNC-Lavalin 2018)[8]. The EMA boundary is shown below in Figure 2-1. Program efforts to date have been focussed within the THEP Areas 1, 2 and 3, which are show on the figure below.

[7] An EMA was previously referred to as wide area contamination as defined in ENV's Environmental Protection Division Procedure 8 – Definition of Acronyms for Contaminated Sites. November 1, 2017.

[8] SNC-Lavalin, 2018. Determination of Concentration Limits for Teck Trail WARP Boundary. July 23, 2018.

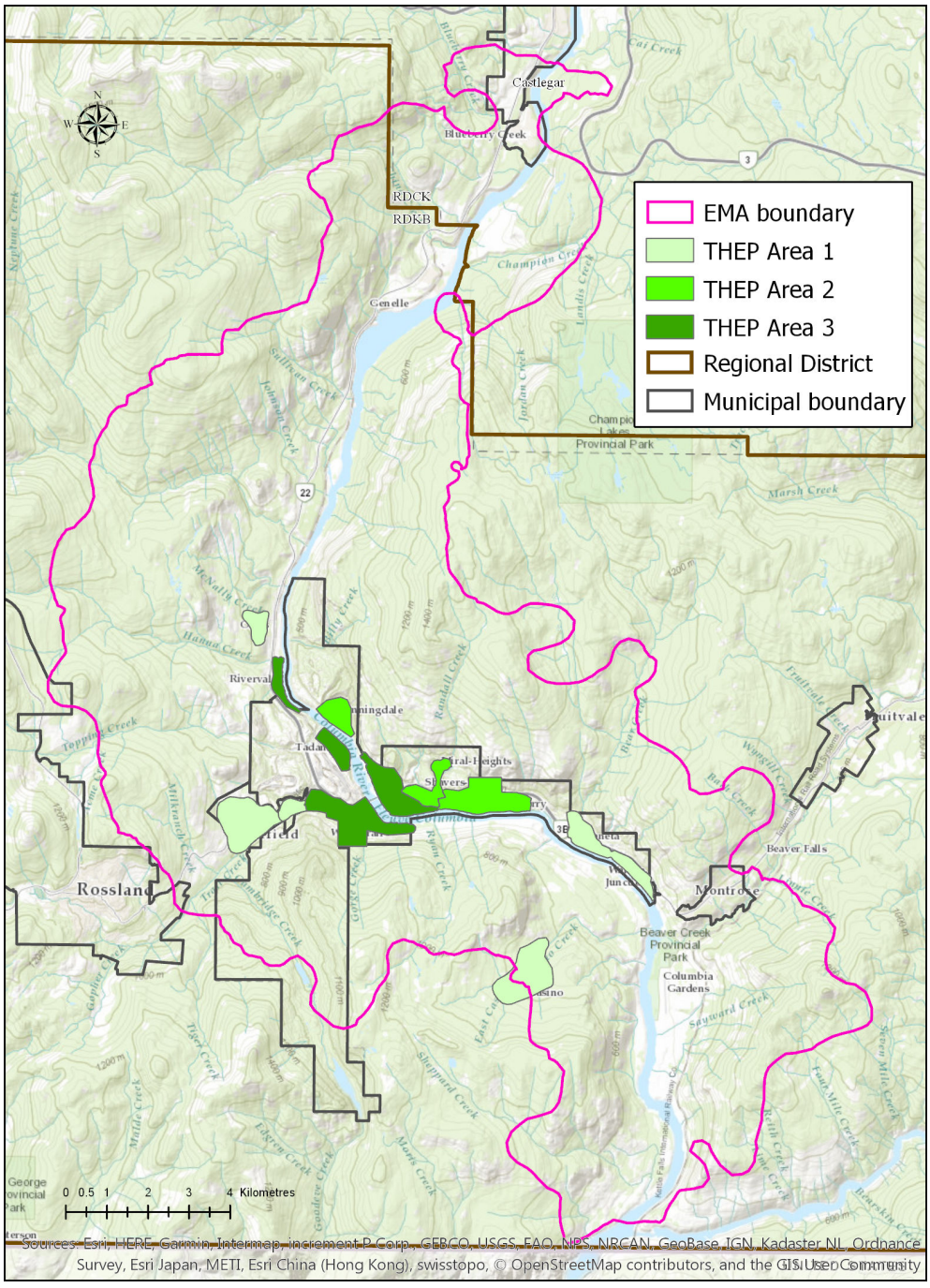


Figure 2-1: The Trail Environmental Management Area Boundary and THEP Areas

3 Risk Based Remedial Strategy

3.1 Prioritization of Residential Properties for Remediation

As part of the 2019 Workplan, SNC-Lavalin developed an approach to identify the highest risk residential properties for remediation prioritization. The objective of the prioritization strategy was to provide a scientifically-defensible approach that will identify and prioritize those properties for which remediation is most important, and therefore should occur soonest. The approach was based on the United States Department of Housing and Urban Development (US HUD) methods and focuses on three key attributes of a given property:

- Presence of children in target age groups: <6 years old (i.e., “young children”) and 6 to <12 years old (“older children”);
- Quality of ground cover (primarily grass but also gravel or mulch cover); and
- Soil Lead (Pb) concentration.

Based on the above criteria, properties are assigned a Priority using the Prioritization Screening Concentrations (PSC), below;

- P1 refers to properties with poor ground cover and soil concentrations above 400 ppm Pb where younger children (<6 years) reside and over 2,800 ppm Pb where older children (6 years to <12 years) reside[9].
- P2 refers to properties where ground cover is good and soil concentrations are above 1,200 ppm Pb where younger children reside and over 8,400 ppm Pb where older children reside.
- P3 refers to properties of lower priority based on ground cover and soil Pb concentration. These are classified into:
  - P3A – children <6 years, good ground cover, Pb <1,200 ppm;
  - P3B – children 6 to <12 years, good ground cover, Pb <8,400 ppm;
  - P3C - children <6 years, any cover quality, Pb <400 ppm; and
  - P3D – children 6 to <12 years, any cover quality, Pb <2,800 ppm.

It is important to stress that the above PSCs are not considered to represent risk-based remediation target concentrations and instead are intended to be used as part of the prioritization strategy.

3.2 Prioritization of Sites for Assessment

Prioritization of properties for assessment is necessary in the event that soil assessment requests exceed capacity, and aligns with the prioritization approach for remediation as outlined above. The approach used in Trail focuses on the three attributes outlined above, as follows:

1. Identify and assess all residential properties occupied by children in the target age groups (0 to <6 and 6 to <12 years old). This is a critical and ongoing data gap as babies are born, families move within the area and new families move to the area;

[9] Refer to the Prioritization Approach described in Appendix V of the 2019 Workplan (SNC-Lavalin, 2019).

2. Determine if the child-occupied property is situated in a neighbourhood where the average of the 95% UCLM Lead concentration for properties in that neighbourhood exceeds the most stringent PSC applicable to the age group of the children at the property (i.e., 400 pm for young-child occupied properties and 2,800 ppm for older-child occupied properties); and
3. Complete a ground cover evaluation at properties screened through Steps 1 and 2 (i.e., child occupied, and neighbourhood Pb concentration exceeds relevant PSC).

This methodology for assessment is generally consistent with the pre-2019 investigation approach with an additional focus on bare areas and primary play areas.

3.3 Review of the Risk Based Strategy

Having a clear and defensible prioritization strategy ensures a consistent approach for all residential properties in Trail so that the highest risk properties are addressed first. 2019 was the first year that the SMP used this risk-based prioritization strategy and it proved to be useful in identifying and remediating the highest risk properties. Amendments to the risk-based prioritization strategy are recommended to address post-remediation reclassification and to factor Daycares and Parks into the strategy, and these are described in the following sections.

3.3.1 Post-Remediation Reclassification

As noted above, the risk-based strategy addressed the initial prioritization of properties based on the age of children present, the quality of ground cover and the soil Pb concentration. However, the risk-based strategy does not specify how to re-prioritize properties post-remediation. To address this gap, we have adopted the following approach:

- Where remediation consists of soil removal and replacement, the priority level of the property will be reclassified on the basis of post-remediation soil Pb concentrations and ground cover condition. Typically, such properties would no longer have a P classification and would be recorded in the database as remediation complete (RC) along with the post remediation soil concentrations. For properties where soil concentrations exceeding CSR standards remain in the upper 30 cm (likely a result of partial remediation due to access constraints) and risk management activities are required, the property will be reclassified according to the prioritization framework and risk management (through annual monitoring) would be employed;
- Where remediation consists solely of risk management activities such as ground cover improvement without removal of shallow soil, the property will be reclassified and remain in the queue for soil removal and replacement. Remediation by soil replacement will occur at these properties once the issues causing delay have been addressed (e.g., homeowner consent, physical access, logistics, scheduling). These properties would receive annual ground cover monitoring and evaluation and be prioritized for soil replacement in accordance with the prioritization strategy.

It is important to note that in cases where a property is being risk managed, the child may age out of one priority level into a lower priority. Efforts will be made to communicate this to the property owners so they understand the prioritization framework and how remediation will be completed on properties in priority order.

Properties classified as P2, P3A or P3B inherently contain a risk management component in that their classification is reliant on good ground cover. These properties will be monitored annually by H&G staff. H&G staff will contact these property owners the following spring to confirm that the ground cover is in good condition (i.e., no bare spots, particularly in primary play areas) and to confirm the presence and age of children at the property. The results of this conversation will be recorded in the THEP Database (the Database) and the priority classification of the property will be indicated as confirmed or amended as appropriate for that year. If the owner is unsure or if they indicate that ground cover condition has changed, H&G staff will follow up promptly to complete an in-person ground cover evaluation (GCE) and will record the result in the Database. The next spring, H&G staff will again contact the property owner to inquire about the ground cover condition and presence/age of children, and will request permission to complete an in-person ground cover evaluation. If the ground cover remains in good condition the property owner will be given instructions to contact the H&G if anything changes and the property information is recorded in the Database.

3.3.2 Daycares and Parks

The risk-based strategy is intended to be applicable to non-residential recreational properties, such as Parks, playgrounds, schools and playing fields (collectively referred to as Parks) as well as Daycare facilities, in essentially the same way it is applied to residential properties. All Daycare properties in Trail and many Parks throughout the EMA were assessed prior to 2019. This information was reviewed in 2019 and additional assessment work was completed to align information with the needs of the risk-based strategy and to include additional properties as is further described in Section 4.4, below.

Daycares are typically similar to residential properties in terms of size and use. Therefore, Daycare properties are assessed and prioritized in the same way as residential properties.

Parks are divided into primary play areas and other areas, similar to how a residential yard is evaluated. Primary play areas in Parks are identified as areas where young children would return to play on a repeated basis and would have close contact with the soil (e.g., sandboxes, swing sets, play structures) and general park areas (e.g., green space and playing fields) are identified as areas where children would have less direct contact with soil and/or are not expected to return to the same location frequently. With this breakdown determined, the prioritization strategy can be applied to different areas of the park. This approach allows the risk-based strategy to target those areas where the highest risk is likely to exist (i.e., at primary play areas).

4 Summary of 2019 Workplan

The methodology for soil assessment and remediation activities carried out in 2019, including soil assessment, ground cover evaluation, soil replacement and ground cover improvement are described in the 2019 Workplan and/or the 2019 June Workplan Progress Update[10].

4.1 Determining Child Occupancy

The 2019 Workplan set out to identify and prioritize properties in the Trail Area for soil assessment (testing) and where necessary, remediation, under the SMP. As such, the first task was to develop a list of properties where children were likely or known to live from the information listed in the Database. SNC-Lavalin developed this list based on information recorded through the THEP's previous and ongoing work within the community since 2007, collaborating with Interior Health and through the 2019 communication activities described in the Communications Update below (Section 6).

In 2019, a total of 545 properties with children under the age of 12 were identified. This includes the child's primary residence and other properties where children visit (e.g., Daycares, grandparents, frequent visitors, etc.) and can be found in Table 1 by filtering out the blanks in the Family Identification Number (FID) column and removing the "true" under the Dupe column. This group of properties was the initial focus of the 2019 SMP as they were properties that would potentially be identified as top priority properties for soil remediation (e.g., P1s). In spring 2019, these properties were evaluated, and the following actions were carried out:

i. Confirmed the presence and ages of children on the property;
ii. Reviewed previous soil testing results and offered soil testing where no previous sampling had been completed,
iii. Completed a ground cover evaluation; and
iv. Assigned a priority to the property and offered remediation to P1 properties.

Following these actions, H&G were able to connect with 327 of these properties and these became the focus of the 2019 work. The other 218 properties had three common reasons why they did not become part of the 2019 work:

- 29 were previously remediated;
- 96 received a desktop review (DR) were assigned a P3C or P3D priority based on soil Pb concentration and not investigated further in 2019;
- 92 did not respond to our outreach (e.g. silent or no response) ; and
- 1 property declined services.

For the 92 properties where the owner did not respond and child occupancy was not confirmed, the H&G will continue to outreach to these property owners and/or tenants until the child occupancy is confirmed. The 327 properties that were connected with can be found in Table 1 by filtering FID and by "2019" under the YEAR column.

[10] SNC-Lavalin 2019. *Trail Area Residential Soil Assessment and Remediation - 2019 June Progress Update*. June 28, 2019.

4.2 Residential Soil Assessment

Soil assessment was carried out from March to November 2019. In total, 262 properties were assessed in 2019 in the following categories:

- 104 on child occupied residential properties (i.e., for families with children < 12 years);
- 140 on community properties (properties with no children present) (CP); and
- 18 Parks (summarized in Section 4.4).

Soil assessment was most frequently completed in West Trail with a total of 87 properties tested in 2019. A summary of results collected in each neighbourhood can be filtered through the table. First filter Assess Date to 2019 and then by NEIGHBOURHOOD.

By the end of 2019, a total of 1588 parcels in the EMA have been tested; comprising 1547 residential properties (single family, multi-family and Daycares) and 41 Parks. Soil assessment results including the 95% UCLM and the maximum Pb concentration are provided in Table 1 along with all previous years' soil assessment results.

A compilation of drawings is provided to visually present the distribution of properties sampled and Pb concentrations across neighbourhoods in the Trail Area. Map Book 1 presents information from Table 1 (all assessed properties) with the most up to date yard 95% UCLM soil Pb concentrations calculated using 10 or more discrete surface soil samples following soil assessment. Hatched properties indicate that the yard has been remediated and, in those cases, the soil Pb concentration of the backfill is shown on the drawings to show surface soil concentrations currently present on the property.

4.2.1 Ground Cover Evaluation

Properties that received soil assessment in 2019 received a ground cover evaluation (GCE) at the same time, even if the property was not child occupied. This was done to streamline field efforts and fulfil the objectives of the risk-based prioritization strategy. Since any property can become child occupied at some point in the future, the GCE at the time of soil assessment will provide baseline information about the property. Properties that were identified to be child occupied and had pre-2019 soil assessment were also offered a GCE. In total 517 GCEs were completed on residential properties. GCEs were also completed at 40 of the Parks within the EMA. 244 GCEs on residential properties were collected during soil assessment and 273 were independent of soil assessment work.

The key features of the GCE are as follows:

- Complete a thorough visual inspection of all areas of the property;
- Identify primary play areas within the property;
- Collect photographs and note ground cover information for each area of the property and relate to sample locations;
- Upload photos and GCE data into the Database;
- Review GCE information relative to soil concentration and use; and
- Assign a cover rating (POOR, AVERAGE, GOOD).

The result of the GCEs completed in 2019 is provided in Table 1. First filter by YEAR and then by GCE for an overview of the results.

4.2.2 Remediation Priority Assignments

Once the child occupancy, soil assessment and GCE information was collected, the property was assigned a remediation priority based on the risk-based strategy outlined in Section 3.1. Table A provides a summary of the results of the remediation priority assignment.

Table A: 2019 Summary of Remediation Priorities on Residential Properties

Number of GCE's	Number of Properties and Type	2019	
		Priority and Number of Properties	Remediation Type and Number of Properties
GCE's 517	327 families	P1 – 169 (141 by June)	75 – Full Soil Replacement
		P2 - 26	107 – Lawn Care/ Yard Improvements
		P3 - 128	
		Not Prioritized - 4	(2 missing soil assessment, 2 remediation complete)
	190 CP	Remediation Complete (RC) - 4	4 – Full Soil Replacement
		Not Prioritized (NP) - 186	6 – Risk Managed 2019

The goal was to complete remediation on all 141 P1 properties that were identified by the end of June 2019. An additional 28 properties were classified as P1 between July and November for a total of 169 P1 properties in 2019. As noted, remediation is completed by either soil replacement or ground cover improvements. 75 P1 properties received full soil replacement in 2019 and the others received ground cover improvements. Note that some properties that received full soil replacement also received lawn care while waiting for remediation to start.

4.3 Remediation and Risk Management

Based on the remediation priorities noted above, highest priority properties were identified in THEP Areas 2 and 3 and prioritized for soil remediation throughout the 2019 field season. Soil remediation was carried out between April 2, 2019 and November 7, 2019. Properties were remediated by soil replacement or risk management strategies (i.e., ground cover improvements). Of the 169 P1 properties identified, 75 received full soil replacement. Nine community properties were also remediated for a total of 84 full-yard remediations completed within the year. Note that seven of these properties had remediation work done in previous years and as such received a partial remediation in 2019 to complete soil remediation on the property.

In addition to the 84 properties noted above, remediation was also completed on:

- Seven properties received partial remediation,
- 11 properties received yard improvement,
- 96 properties were serviced with lawn care; and
- Six properties received vegetable garden remediation.

Note that vegetable gardens in Trail are remediated along with yards but are also prioritized separately. Along with the six vegetable gardens remediated independently, 25 other properties received only vegetable garden remediation. A summary of remediation can be found in Table 1 by filtering by the Rem Completion Date column for "2019" and the Property Status column to "Full Rem Completed".

4.3.1 Soil Remediation Methods

The detailed methodology for soil remediation was provided in the 2019 Workplan. In general, remediation by soil replacement is completed by removing a minimum of 30 cm of soil across the property, installing a demarcation fabric to identify the base of the excavation work, replacing excavated soil with clean backfill materials and re-landscaping the property to provide good quality ground cover. During the remediation process, H&G oversees the work being carried out by Teck's contractors. At the base of the excavation, soils are screened by H&G with the X-Ray Fluorescence (XRF) detector based on an approximate 5 m grid (plus additional areas of interest) and the depth of remediation is confirmed at various points across the yard. Following screening, the following decisions are made:

- If base soil < 1,000 ppm Pb by XRF screening, collect a minimum of 10 discrete samples across the base of the excavation.
- If base soil > 1,000 ppm Pb by XRF screening, instruct the contractor to remove an additional 15 cm of soil from the affected area(s) and re-screen the base of the excavation.
- Repeat the above steps until soil is < 1,000 ppm Pb, excavation cannot continue due to property constraints or the excavation depth reaches 1 m below grade.

Once the excavation depth and soil Pb concentrations at the base of the excavation are screened and discrete samples are collected by H&G, the contractor is instructed to install the geotextile demarcation fabric and given approval to backfill the property. Discrete samples from the base of the excavation are screened with the XRF at the office and a subset of samples are submitted for laboratory analysis. Samples of the replaced backfill material are also screened with the XRF and submitted for laboratory analysis.

4.3.2 Soil Remediation Details

A summary of 2019 soil results from the excavation base and the average remediation depth is provided in Table 3. These properties are also present in Table 1 and can be found by filtering the table by year within the Remediation Completion Date column but the remediation details are not provided in Table 1. These remediation details are intended to be added to Table 1 once the remediation base UCLM and average depth can be provided for all remedial excavations to date.

The results of the newly replaced backfill are also provided. There were 4 samples of replaced backfill with Pb concentrations greater than the CSR Residential Land Use (RL) standard. These concentrations are below the prioritization screening concentrations, but it is recommended these properties be re-sampled in the spring. If evidence of cross contamination is detected, the contractor will be responsible to remove and replace soil above CSR RL standard on the property. This can be found by filtering for "Year" and "PR Pb".

Map Book 2 presents the properties that have received remediation and the associated 95% UCLM soil Pb concentration from the excavation base. This information presents the soil Pb concentrations below the geotextile demarcation fabric, the backfill materials and the landscape features that is placed on the property following excavation.

The record of remediation for individual yards remediated as part of the SMP are also available in Notification of Independent Remediation (NOIR) and associated re-classification reports submitted to ENV. Remediation summary reports are also provided to property owners after remediation is carried out, and these can be provided to ENV on request.

4.4 Daycares and Parks

A summary status for Daycare facilities is provided in Table 1 (filter “PROPERTY TYPE” for “Daycare”). All registered Daycare facilities in Trail were sampled prior to 2019 and were updated in 2019 with new ground cover information if available, and assigned a priority level. One daycare declined the GCE and will be re-offered in 2020. Remediation by soil replacement or risk management will be offered to all P1 Daycares as outlined later in this report as part of the 2020 Workplan. As well, soil testing at Daycares has been focussed in Trail and will be offered more broadly within the EMA in 2020.

Parks within the EMA were reviewed in 2019. Soil sampling was carried out at parcels that had not been previously tested and all Parks received a GCE and these are included in Table 1. One park declined soil testing and will be re-offered in 2020. A summary of the all Parks in the EMA can be found in Table 2.

Parks were generally found to have good quality ground cover with well maintained grass in most areas and alternative cover applications (e.g., gravel or mulch) in primary play areas. The results of the 2019 Parks review are being communicated with applicable municipalities. Recommendations for soil remediation are limited to ground cover improvements and small areas of soil replacement in primary play areas. These recommendations are being provided to the property owners and a remediation plan will be developed.

It is important to note that remediation of Parks will require substantial coordination with agencies responsible for each property which will begin in 2020. As well, soil replacement at Parks will be limited to primary play areas to avoid putting constraints on materials and contractors completing soil replacement on residential properties.

4.5 Summary of Garden Produce

The 2019 Garden Produce Sampling Program was carried out to obtain an updated understanding of garden produce Pb concentrations. A detailed report of the findings will be provided under separate cover once complete. Produce samples were collected from 55 separate garden beds across 40 individual properties.

Table B, below provides summary statistics for the broad categories of produce samples collected before and after significant air quality improvements. A set of one-way analyses comparing mean Pb concentrations in each produce category before and after the implementation of the FDRP indicates that there has been a statistically significant reduction in mean Pb concentrations for fruit and leaf produce following the FDRP, but no statistically significant change for root produce. This may be a result of air quality improvements made by Teck through the Fugitive Dust Reduction Program that started in 2013.

Table B: 2019 Produce Pb Concentrations compared to 2007-2013 samples

Produce Type	Sample Size	Produce Pb Concentration (µg/g, wet weight)		
		Geometric Mean	Arithmetic Mean	95% UCLM
2007 – 2013 (before Fugitive Dust Reduction Program)				
Root	37	0.20	0.34	0.44
Fruit excluding berries	93	0.06	0.10	0.12
Berries only	6	0.51	0.60	0.98
Leaf	57	1.98	4.12	5.86
2019 (after Fugitive Dust Reduction Program)				
Root	30	0.15	0.33	0.49
Fruit excluding berries	70	0.02	0.03	0.05
Berries only	17	0.16	0.18	0.23
Leaf	39	0.27	0.39	0.52

The recommendations that the THEP has provided to gardeners in Trail previously remain relevant. These include, but are not limited to; washing all homegrown produce, peeling root crops, amending soil with nutrients, and washing hands after working in the garden. Further interpretation and recommended next steps with respect to the garden produce exposure pathway will be outlined in the report noted above.

5 2020 SMP Workplan

Based on the accomplishments and challenges in implementation of the 2019 Workplan and a review of the highest priority properties, the 2020 Workplan is anticipated to be similar in approach and workload. The focus for soil testing will continue to target families with children in key age groups. The prioritization strategy has no substantial changes and remediation through soil replacement and yard improvement activities, will be offered to highest priority properties.

The main objectives of the 2020 Workplan are to:

- Target soil testing at 300 residential properties;
- Obtain updated GCE information on properties with children in key age groups;
- Provide soil remediation at all P1 Daycares and residential properties (where feasible and where consent is obtained); and
- Work with municipalities/relevant authorities to implement the recommended ground cover improvements in Parks.

5.1 Soil Assessment & GCEs

As in previous years, the H&G are aiming to complete soil assessment on 300 properties in 2020. To find properties that qualify for soil remediation work, outreach for assessment will be focussed in locations frequented by families such as schools, Daycares, public spaces (arena, aquatic centre, library).

Other properties of interest will also be offered soil testing in 2020. Of highest importance will be Daycares within the EMA. H&G has compiled a list of Daycares in Table 1, and updated the property status, previous soil testing or ground cover information. All Daycares that have not been previously tested will be offered soil testing and a ground cover evaluation in Spring 2020.

Ground cover evaluations will be offered to all properties that did not respond in 2019 and a follow-up will be completed on all properties with previously good cover. H&G will also follow up with properties that had previous yard remediation work that were not evaluated in 2019. GCEs will continue to be completed on all newly tested properties.

5.2 Prioritization of Properties for Remediation

5.2.1 Residential Properties

There are currently 94 P1 properties in Table 1 that are the highest priority for remediation services in 2020. These and other priorities are also summarized in Map Book 3. These properties are primary residences for children in the two key age categories. 38 of these properties received yard improvement in 2019 and the priority will be re-evaluated in Spring 2020 according to the post remediation prioritization described in Section 3.3.1. Access constraints have been identified on 13 properties and ground cover improvements will be provided until a more permanent remediation solution can be achieved. Examples of access constraints include access to the property through adjacent properties, limited access for equipment via steep roadways and/or retaining walls, and stairs that are unsafe for employees to access the soil on the property. Another four properties have only one sample on the property with soil Pb above the CSR RL standard and as such, only part of the yard will be remediated. As such, 77 full soil replacement remediations are currently proposed to be completed on primary residences in 2019, which includes the 38 properties being re-evaluated in spring 2020.

In addition to the primary residences, there are two Daycares on the P1 list and remediation has been offered and planned at both properties. Consent to access the properties and remediation plans are being developed. Weather permitting, remediation activities are proposed to commence in early April 2020.

5.2.2 Daycares and Parks

As noted above, Daycares will be prioritized in 2020 along with the residential properties identified above. There are currently three Daycares within the City of Trail that will be offered soil remediation and updated GCE will be obtained from the other Daycares.

Following the 2019 evaluation of Parks, ground cover improvement work by the THEP is recommended on 7 properties. Soil replacement is recommended in an area of one Park. It is not proposed on any other Parks based on the prioritization framework. Soil replacement in Parks will be considered in primary play areas once capacity with remediation contractors, backfill materials and once top priority residential properties have been remediated.

5.3 Contingency Plan

Over the course of the year, families move or have reasons to decline soil remediation work. In these cases, the reasons for cancellation are noted in the Database and the property is flagged for follow up if applicable (e.g., with new owner/tenant, etc.). Assuming time allows and consent is confirmed, another property will be scheduled for remediation in order of priority.

5.4 Data Gaps

5.4.1 Critical Data Gaps

There were three critical data gaps identified in the 2019 Workplan.

1. Identification of Child Occupied Properties;
2. Ground Cover Evaluation; and
3. Garden Produce Pathway.

Through the 2019 SMP, these data gaps have been addressed as outlined below.

- As child occupancy changes, the THEP will continue reaching out to families with children in key age-groups. The partnership between H&G and IH is essential to collecting the most up to date information on families. Further outreach in schools is proposed for 2020 to continue to support this work, as this is an ongoing effort. As a secondary priority, the identification of rental properties for soil testing may be valuable as children may move in at any time.
- Ground cover evaluation is now a part of the ongoing SMP and is no longer considered a gap. Again, ground cover changes and requires monitoring.
- Updated Pb concentrations for garden produce are available following the 2019 SMP; further interpretation and recommended next steps with respect to the garden produce exposure pathway will be outlined in a report being completed under separate cover.

A new data gap identified is based on remediation logistics. Significant challenges with respect to property access for remediation of some properties were identified. Strategies are needed with the City of Trail, the remediation Contractors and adjacent property owners to improve access to such properties. This may include building temporary roads, extending alley ways, closing off streets and allowing exclusive temporary access. This gap will be explored in 2020.

5.4.2 Non-Critical Data Gaps

Non-critical data gaps identified in the 2019 Workplan included:

- Limited vertical delineation;
- Limited dataset for some neighbourhoods; and
- Limited groundwater assessment.

The vertical delineation of metals on properties is addressed during soil remediation activities. Vertical delineation of metals on residential properties has not been fully investigated throughout the EMA. During remedial excavation at each property, additional soil may be removed if metals are present at depth in order to remove high-risk conditions from the property in accordance with ENV Protocol 12[11]. Data for a additional neighbourhoods was obtained in 2019 and can be identified by filtering Table 1 by neighbourhood. Groundwater continues to be monitored by Teck in areas of potential environmental concern.

[11] Protocol 12; Protocol for Contaminated Sites – *Site Risk Classification, Reclassification and Reporting,* BC MoE, March 12, 2013.

6 Communication Plan

The THEP uses a continuum of communication strategies to engage and inform residents about the programs available. Typically it starts with broader community outreach such as newsletters, radio ads, posters and print materials provided in key locations. Once a family or property owner has connected with the H&G, direct communication continues as they move through the program. The majority of communication with families is carried out though the Healthy Homes program (a component of H&G) and this information is shared between Interior Health and H&G to ensure optimal services for families.

In 2019, over 1,400 people called or visited the THEP Community Program Office operated by the H&G staff in downtown Trail. This is more than twice the number of interactions recorded in 2018 and is likely a result of the increased work with respect to the SMP.

6.1 2019 SMP Community Surveys

In the fall of 2019, two surveys related to the SMP were conducted in the community by the THEP facilitator, a consultant on contract to the City of Trail. Summaries for both surveys are included in Appendix I.

The first survey was promoted throughout the community through the local newspaper and in the THEP newsletter with the goal of understanding community perceptions of the 2019 SMP. There were 108 respondents with 96% of respondents indicating they were supportive or very supportive of the increased soil remediation work. Based on the responses, there were very few concerns regarding noise, traffic and dust related to the soil remediation work. Respondents favourably noted communication efforts for the SMP and specifically the use of sandwich board signs on the sidewalk beside soil remediation projects that provided information on the work being carried out.

The second survey, also completed in Fall 2019, targeted recipients of soil remediation and was sent to 91 property owners that received remediation work. There were 50 responses with 90% of respondents indicating they were satisfied or very satisfied with the remediation work that was completed on their property. The remaining other 10% indicated they were unsatisfied with the work, typically because of communication issues between the owner, the remediation contractor and the consultant. In an effort to address these concerns during future remediation projects, we will conduct a root-cause investigation of each issue to determine what improvements can be adopted with respect to direct communications with property owners during remediation projects.

6.2 Summary of Communications with Property Owners

Table 1 provides a summary of communication steps specific to the SMP as described below:

1. Identifying child occupancy – these are indicated in Table 1 by the assignment of an FID through the HH program. Information obtained from each resident is documented in a “First Contact Questionnaire” and noted in the Database. For properties without children present, the first direct contact occurs when the owner/resident contacts H&G (i.e., H&G does not actively contact in these cases).

2. GCE and Soil Assessment – Once identified, these residents are offered a GCE and/or Soil Assessment. These communications are recorded in the Database and via signed consent forms where applicable. Entry of a date in the SA or GCE columns of Table 1, indicates the service was accepted and received by the resident. If a property has an FID assigned but no date recorded under SA or GCE, this indicates H&G needs to re-offer that service. H&G offers services three times before the property owner is recorded as "silent" if they do not respond. Following GCE and soil assessment, the property is prioritized, and a letter is sent to the property owner outlining next steps.
3. Remediation - For properties prioritized for remediation, the communication steps are to offer remediation and if remediation is accepted, a consent form is signed, and a remediation plan is developed in consultation with the property owner. The property is then scheduled for remediation work and once the work is accomplished, a completion form is signed and a summary report is prepared and submitted to the property owner.

A summary of the remediation workflow has been developed and is included in the attached SMP Brochure in Appendix II. These workflows and communication milestones are recorded in the Database by H&G staff. In Table 1, the "Action" column identifies the next step required on the property (e.g., "offer remediation", "complete GCE, etc.").

6.3 2020 Communications Activities

In 2020, we expect to carry out similar communications as in 2019 such as the THEP Spring Newsletter, radio ads, local community events (e.g., teddy bear's picnic), attending baby groups, and pre-natal classes.

We are planning additional outreach at schools and Daycares in Spring 2020. The primary method will be through a direct email sent to parents with children in the three elementary schools within the EMA. The email will inform families that soil testing is being offered within the area and will include a consent form to respond. Families can then email the consent directly back to the program office to sign up for soil testing.

In 2020, the H&G have arranged to attend the first Saturday farmers market, as well as two subsequent evening markets, to offer soil testing and provide information to vegetable gardeners.

7 Data Management & QA/QC

SNC-Lavalin Inc. (SNC-Lavalin) follows strict QA/QC protocols for all sampling and analysis and will ensure that all data is handled accordingly. As a minimum, the QA/QC program will include the following.

- Senior supervision of field staff.
- Use of in house trained personnel.
- Implementation of SNC-Lavalin preferred operating procedures (POPs).
- Written field instructions.
- Documentation of all field activities:
  - Samples will be collected in a manner appropriate for the prevention of cross-contamination and other field sampling errors. Samples will be collected using an appropriate contaminant-free utensil and placed in contaminant-free containers specifically designed for such use and appropriate to the subsequent analyses.
- Chain-of-custody documentation for sample submission:
  - Use of an appropriate coding system for submitting samples to the analytical laboratory to ensure that information concerning location or expected concentration is unavailable to the analyst(s). A chain-of-custody form will be established to trace the movement and handling of samples from the field to their final destination.
- Use of a Canadian Association of Laboratory Accreditation (CALA) accredited laboratory.
- Adherence to laboratory sampling and analysis protocols (e.g., hold times, sample containers, preservatives, detection limits, approved methodology).
- Procedures to confirmation accurate transcription of laboratory data into tables.
- Review of laboratory QC performance (standards, spike recoveries etc.) to confirm results are within acceptable limits.
- Analysis of samples in batches of no more than ten (10) samples for organic substances. Batch by batch review will be completed of the analytical data produced in concert with all internal QA data for that batch. Failure to achieve appropriate QA will require additional analysis to rectify the problem on a batch by batch basis.
- At least one analytical (lab) duplicate for each batch of analyses.
- Results of the laboratory's internal checks will be included in the analytical report.
- Decontamination of sampling (trowels, mixing bowls) between samples and boreholes.
- Submission of field QC samples at a rate of 10% of total samples. Implementation of corrective action plans (CAP) when acceptable limits are exceeded.1

7.1 XRF

The use of the XRF as a field screening tool is essential to the remediation workflow. Using the XRF at the base of the excavation allows property backfill in a timely fashion and reduces risks associated with leaving open excavations on residential properties.

As described in Section 4.3.1, during soil replacement, the base of the excavation is measured for depth and the base of the excavation is screened on an approximate 5 m grid or at visually unique locations. Following XRF base screening, a minimum of 10 discrete samples are collected from across the property and screened with the XRF in the H&G lab.

The proper servicing and operation of the XRF is an important part of the QAQC of the equipment. Only certified staff can operate the XRF and are issued an operating licence under Natural Resources Canada's Non-Destructive Testing Certification Body. Certificates are valid for three years. Field training staff is also an important part of the XRF QAQC. Samples must not be saturated with water and must be representative and homogeneous soil samples for accurate results.

Surface and excavation base samples collected under the SMP are screened with an XRF and at least 20% of samples are then verified with laboratory analysis. The XRF result is then compared to a laboratory results and a regression equation is developed for the XRF. The regression equation is then applied to the XRF samples collected on the property. Methods for the XRF use and calculating UCLMs were provided in the 2019 Workplan. The latest regression equation is provided in Appendix III.

7.2 Information Management

In coordination with Teck, SNC-Lavalin has developed the information management system for the H&G as outlined in the 2019 Workplan. In 2020, H&G will update the Database with new property owner information obtained through the Regional District Kootenay Boundary.

Note that all electronic laboratory documents, report letters, photos, videos, chains of custody, certificates of analysis, and maps are stored on the SNC-Lavalin server computer in Trail, and are linked to the associated property in the THEdb for quick reference and availability. Paper field documents, such as the various Consent forms, property condition checklists, soil logs, remediation plans, etc. are scanned, filed on the server and linked to the appropriate property in the THEdb.

The THEdb and all information within it, is owned by Teck. Data are summarized and presented to the THEC, or to Teck upon request. The Program Office provides information and data to property owners about their specific property on request (e.g., in the case of a new property purchase, soil information can be provided to the new owner). Data is also shared with IH and ENV as needed or requested. We expect data sharing with ENV to be a main component of the program moving forward.

8 Professional Statement

As required under Part 16, Section 63 of the *Contaminated Sites Regulation* (CSR), B.C. Reg. 375/96, including amendments up to B.C. Reg. 13/2019, January 24, 2019. SNC-Lavalin Inc. (SNC-Lavalin) acknowledges that the person(s) signing this report has(have) demonstrable experience and is(are) familiar in completing the work, as described, for the type of contamination at this property. The documentation provided has been prepared in accordance with the applicable regulations in the *Environmental Management Act*, B.C. Reg. 13/2019 / effective January 24, 2019.

9 Notice to Reader

This report has been prepared and the work referred to in this report have been undertaken by SNC-Lavalin Inc. (SNC-Lavalin) for the exclusive use of Ministry of Environment & Climate Change Strategy, who has been party to the development of the scope of work and understands its limitations. The methodology, findings, conclusions and recommendations in this report are based solely upon the scope of work and subject to the time and budgetary considerations described in the proposal and/or contract pursuant to which this report was issued. Any use, reliance on, or decision made by a third party based on this report is the sole responsibility of such third party. SNC-Lavalin accepts no liability or responsibility for any damages that may be suffered or incurred by any third party as a result of the use of, reliance on, or any decision made based on this report. Should this report be submitted to the BC Ministry of Environment & Climate Change Strategy (ENV) by Ministry of Environment & Climate Change Strategy, ENV is authorized to rely on the results in the report, subject to the limitations set out herein, for the sole purpose of determining whether Ministry of Environment & Climate Change Strategy has fulfilled its obligations with respect to meeting the regulatory requirements of ENV.

The findings, conclusions and recommendations in this report (i) have been developed in a manner consistent with the level of skill normally exercised by professionals currently practicing under similar conditions in the area, and (ii) reflect SNC-Lavalin's best judgment based on information available at the time of preparation of this report. No other warranties, either expressed or implied, are made as to the professional services provided under the terms of our original contract and included in this report. The findings and conclusions contained in this report are valid only as of the date of this report and may be based, in part, upon information provided by others. If any of the information is inaccurate, new information is discovered, site conditions change or standards are amended, modifications to this report may be necessary. The results of this assessment should in no way be construed as a warranty that the subject site is free from any and all environmental impact.

Any soil and rock descriptions in this report and associated logs have been made with the intent of providing general information on the subsurface conditions of the site. This information should not be used as geotechnical data for any purpose unless specifically addressed in the text of this report. Groundwater conditions described in this report refer only to those observed at the location and time of observation noted in the report.

This report must be read as a whole, as sections taken out of context may be misleading. If discrepancies occur between the preliminary (draft) and final version of this report, it is the final version that takes precedence. Nothing in this report is intended to constitute or provide a legal opinion.

The contents of this report are confidential and proprietary. Other than by Ministry of Environment & Climate Change Strategy, copying or distribution of this report or use of or reliance on the information contained herein, in whole or in part, is not permitted without the express written permission of Ministry of Environment & Climate Change Strategy and SNC-Lavalin.

Tables

Provided in Separate Excel File

1: 2019 THEP Record of Property Status
2: Summary Status of Parks in the Trail EMA
3: 2019 SMP Property Remediation Details

Drawings

Provided in Separate File

- Map Book 1 – THEP Surface Soil Status
- Map Book 2 – THEP Excavation Base Soil Status
- Map Book 3 – THEP Remediation Priority Status

Appendix I

SMP Surveys

2019 Community Survey Results Summary

Soil Remediation of Residential Yards in Trail

The Trail Area Health & Environment Program (THEP) undertook a survey of community members to understand their perceptions of the 2019 soil remediation program. The survey was online through Survey Monkey and open from September 16 to October 16, 2019. The survey was advertised in the Trail Times, City of Trail Facebook page, THEP website, THEP fall newsletter, at the September 2019 THEC meeting, and at Teck on their internal electronic newsletter. It was also shared with the community by the THEP Home & Garden staff by word of mouth and through mail drops at properties adjacent to remediation work. 108 people responded to the survey.

Respondents were overwhelmingly supportive of the yard remediation program. 96% of respondents said they were either very supportive or supportive of increased soil remediation of yards in Trail. The remaining less than 5% of respondents said they felt either neutral or did not know enough about the program to answer. Nobody was opposed to the program. General reasons for supporting the program included health (especially of children), aesthetics of landscaping, and potential for increased home values as a result of the work.

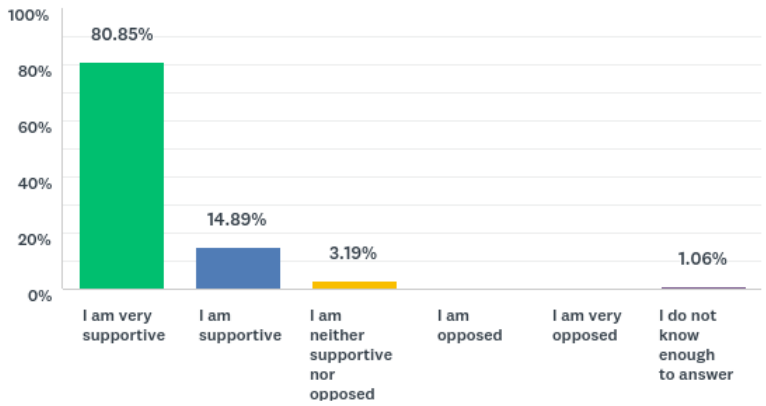


Figure 1: Respondents answers to "How supportive or opposed are you to increased soil remediation of yards in Trail?"

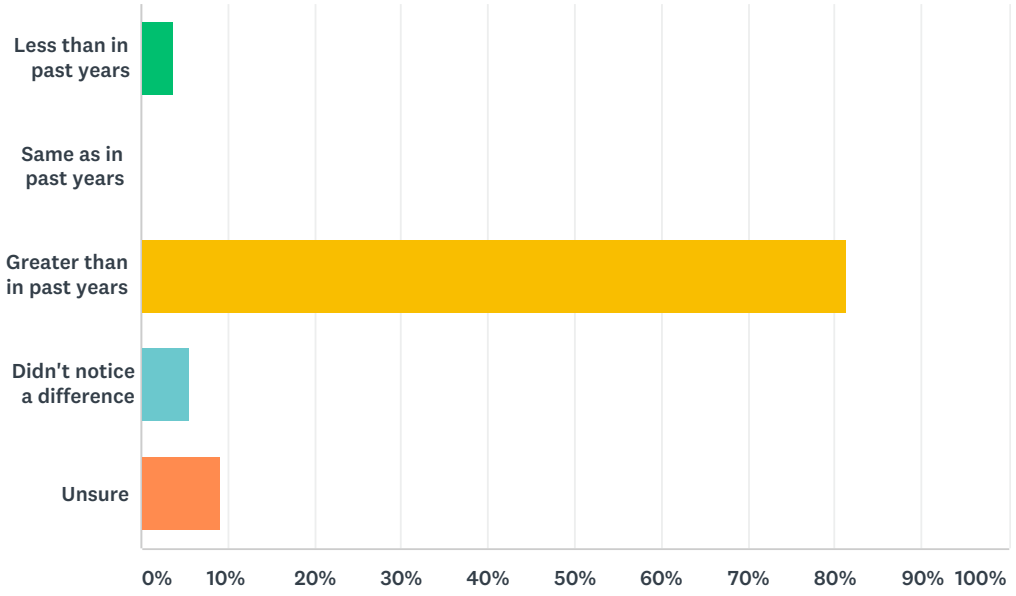
There were very few concerns around noise, dust, or traffic issues related to the program.

Most respondents said that they noticed safe practices of contractors and workers for the remediation program. 95% of respondents said that they never felt unsafe when passing properties undergoing yard remediation work.

While most comments and responses were positive with overwhelming support for increased soil remediation in Trail, a few people expressed frustration around how families with children were being prioritized over families without children. Suggestions for improvement included additional street sweeping and flaggers.

Q1 From my perspective, I noticed that soil remediation work in residential yards in Trail this year was:

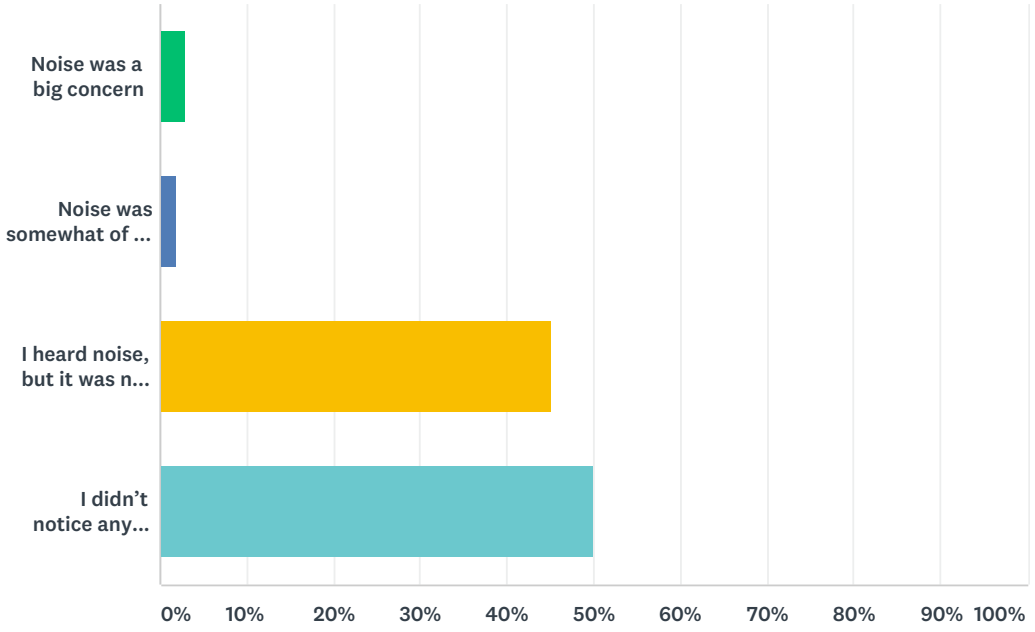
Answered: 108 Skipped: 0



ANSWER CHOICES	RESPONSES	
Less than in past years	3.70%	4
Same as in past years	0.00%	0
Greater than in past years	81.48%	88
Didn't notice a difference	5.56%	6
Unsure	9.26%	10
TOTAL		108

Q2 Related to noise from yard remediation, please check the answer that best applies.

Answered: 104 Skipped: 4



ANSWER CHOICES	RESPONSES	
Noise was a big concern	2.88%	3
Noise was somewhat of a concern	1.92%	2
I heard noise, but it was not a concern	45.19%	47
I didn't notice any noise related to soil remediation in yards	50.00%	52
TOTAL		104

Q3 In a few words, please tell us a bit more about the noise you noticed here:

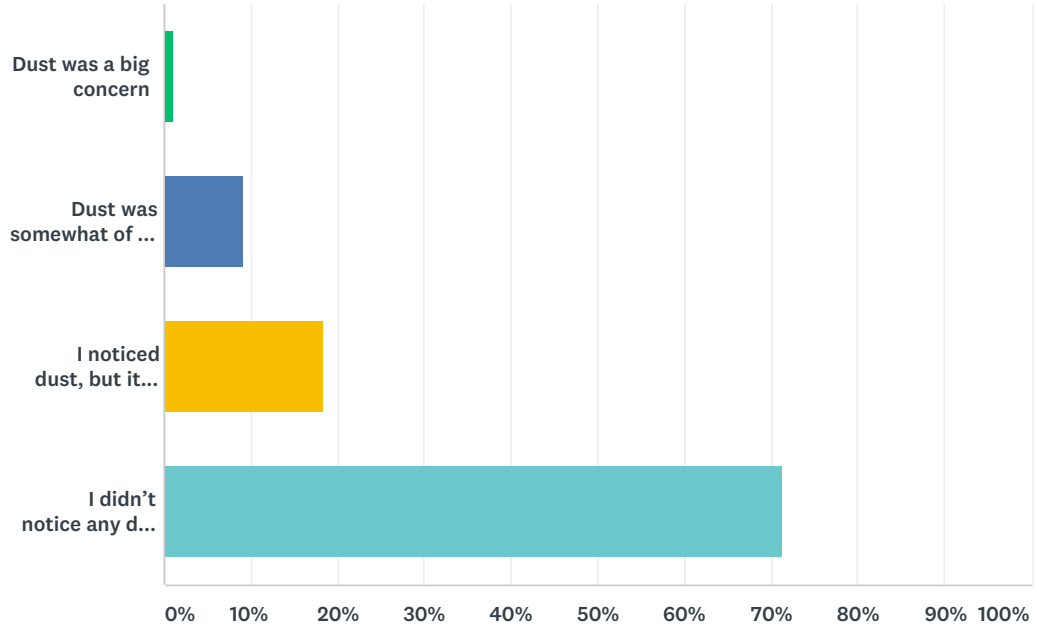
Answered: 43 Skipped: 65

#	RESPONSES	DATE
1	Noticed a little bit of backhoe noise but not annoyed by it	10/10/2019 2:11 PM
2	dummptrucks, other equipment driving by	10/10/2019 7:44 AM
3	The machinery at 7am was more noticeable for me as that is when I am home. The noise isn't heard in my house as there is a house away from me. I wouldn't say it was excessive at all or a bother.	10/9/2019 9:23 PM
4	Typical truck noises, only heard when I was outside somewhat close to the trucks	10/9/2019 2:19 PM
5	just trucks , backhoes, road noise. not disturbing	10/9/2019 1:04 PM
6	Noise of the machinery used but it was during the day and no more then to be expected	10/9/2019 5:14 AM
7	Trucks and diggers around but my son enjoyed seeing them	10/8/2019 2:55 PM
8	Mostly trucks just trucks, bringing the workers and rocks/soil	10/8/2019 1:34 PM
9	Machines operating	10/7/2019 11:45 PM
10	Just trucks and diggers mother out of the norm	10/7/2019 4:43 PM
11	equipment motors running	10/7/2019 8:32 AM
12	From the machinery moving the soils in and out.	10/7/2019 8:22 AM
13	Same as any other construction.	10/7/2019 7:46 AM
14	just general construction noise	10/7/2019 5:59 AM
15	just routine noise from equipment working	10/6/2019 5:57 PM
16	Machinery and HD truck traffic increased substantially in the area; expected with the increase in remediation.	10/6/2019 2:38 PM
17	Just the normal expected noise form larger equipment being operated in residential areas	10/6/2019 11:02 AM
18	Minimum noise from machinery.	10/5/2019 5:39 PM
19	Mostly back up beepers.	10/5/2019 12:19 AM
20	Dump trucks driving up and down the street...can't be avoided but we did notice.	10/4/2019 6:04 PM
21	Contractor equipment warming up in the mornings, as well as equipment going to operators homes for the night in other residential neighbourhoods disturbing more people	10/4/2019 3:20 PM
22	Small machinery but the work was done efficiently	10/4/2019 2:54 PM
23	I did not really pay attention to the noise. Dodge diesals are way louder than the small machinery used to clear the soil and dump it.	10/4/2019 2:52 PM
24	excavator running	10/4/2019 2:48 PM
25	Noise from equipment	10/4/2019 2:28 PM
26	4 or 5 yards were remediated in my neighborhood, heavy equipment and dump truck noise.	10/4/2019 1:46 PM
27	heavy machinery, gardening works	10/4/2019 1:23 PM
28	driving slowly by, window down, watching bobcat work	10/4/2019 1:23 PM
29	just general digging, machinery noise. Can't be helped	10/4/2019 1:22 PM
30	Equipment movement, etc.	10/4/2019 7:45 AM
31	Typical stuff - heavy machinery (loader, etc), compactor, some worker voices	10/3/2019 1:32 PM

32	Just some diggers working in a yard, nothing annoying.	9/28/2019 11:29 AM
33	Mainly noticed dump trucks driving by in residential areas where usually they are not	9/27/2019 12:49 PM
34	Equipment operation other than the city of trail or paving crews	9/25/2019 7:07 PM
35	Just your everyday sounds of trucks and equipment. We enjoy watching and interacting with the crews	9/25/2019 2:21 PM
36	Just normal trucks moving about but only last till 330 at the latest.	9/24/2019 6:53 PM
37	Trucks, machines	9/23/2019 9:21 AM
38	Visual first - backhoe or digger of sorts, than some noise associated with that earth mover.	9/20/2019 9:45 PM
39	Equipment noise, as per expected for the work being performed.	9/20/2019 4:02 PM
40	from machinery and trucks	9/20/2019 10:20 AM
41	Equipment working and vehicles in neighbouring yards and streets	9/19/2019 10:01 PM
42	Some trucks backing up and some Bobcats digging	9/19/2019 8:48 PM
43	just lots of activity. Trucks and workers for several weeks at a time.	9/16/2019 12:18 AM

Q4 Related to dust from yard remediation, please check the answer that best applies.

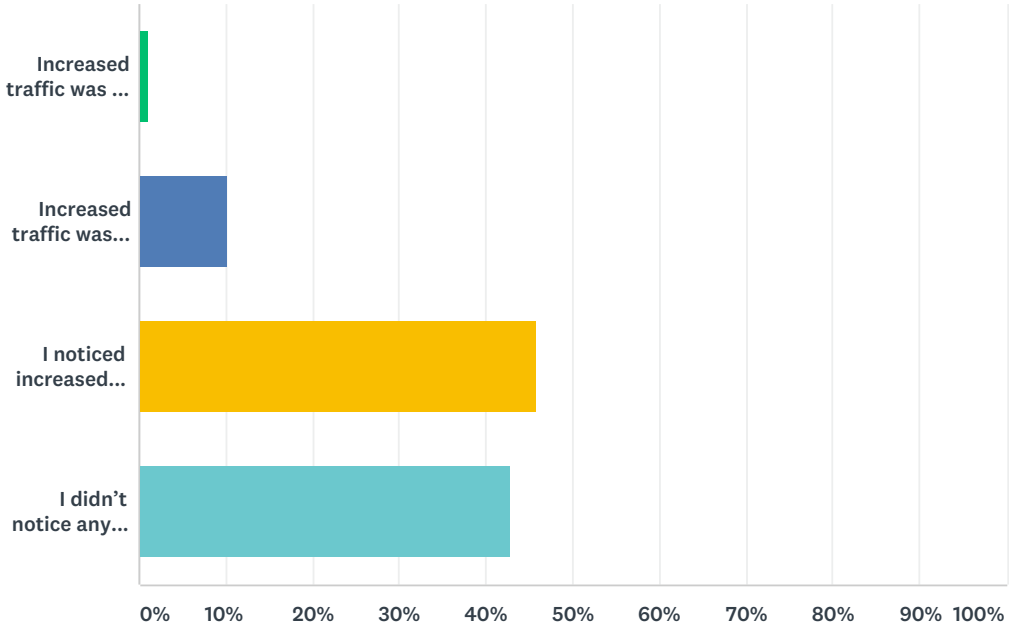
Answered: 98 Skipped: 10



ANSWER CHOICES	RESPONSES	
Dust was a big concern	1.02%	1
Dust was somewhat of a concern	9.18%	9
I noticed dust, but it was not a concern	18.37%	18
I didn't notice any dust related to soil remediation in yards	71.43%	70
TOTAL		98

Q5 Related to traffic from yard remediation, please check the answer that best applies.

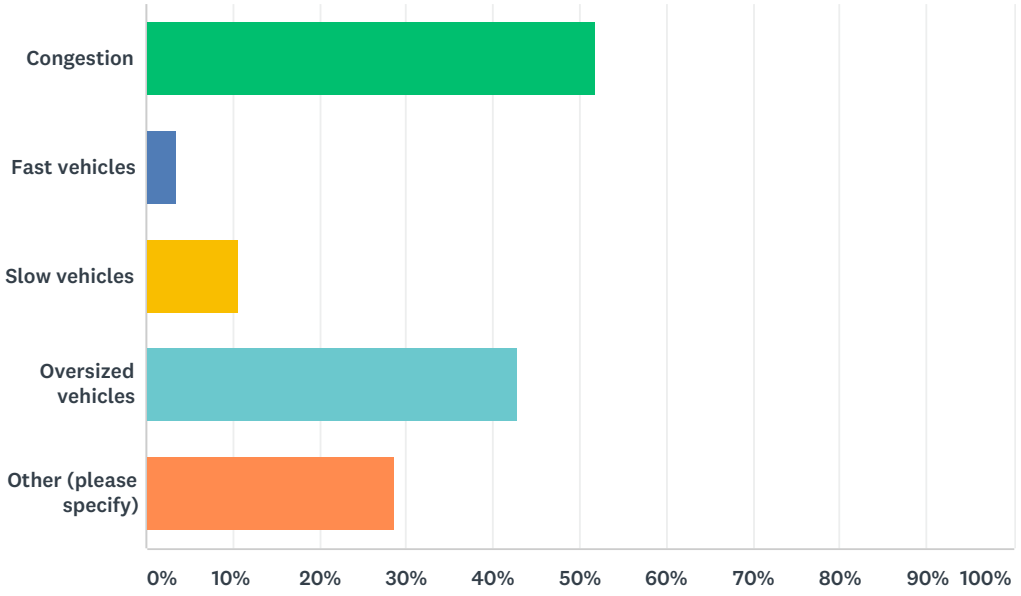
Answered: 98 Skipped: 10



ANSWER CHOICES	RESPONSES	
Increased traffic was a big concern	1.02%	1
Increased traffic was somewhat of a concern	10.20%	10
I noticed increased traffic, but it was not a concern	45.92%	45
I didn't notice any increased traffic related to soil remediation in yards	42.86%	42
TOTAL		98

Q6 What were some of the biggest issues related to traffic from yard remediation?

Answered: 56 Skipped: 52



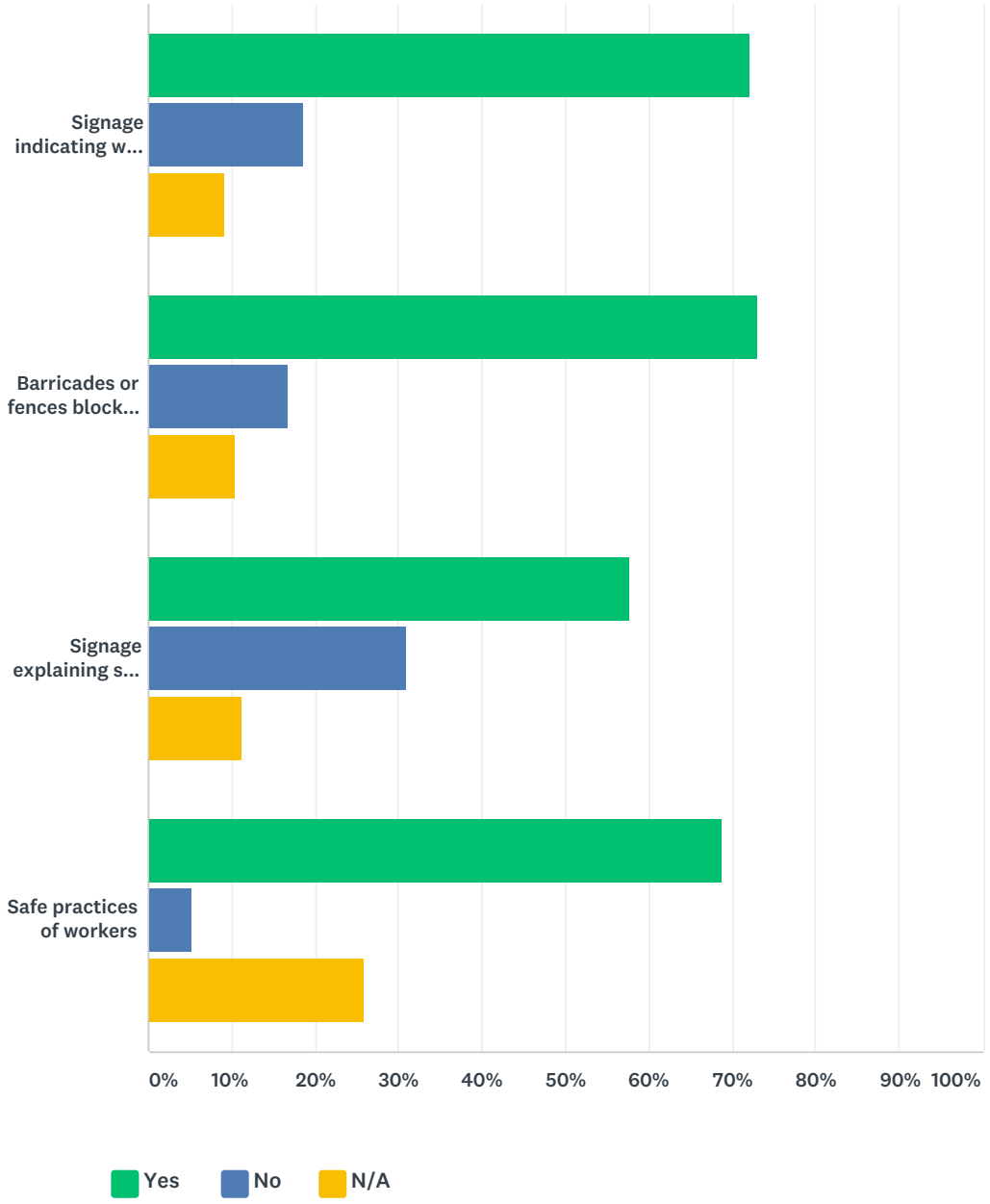
ANSWER CHOICES	RESPONSES	
Congestion	51.79%	29
Fast vehicles	3.57%	2
Slow vehicles	10.71%	6
Oversized vehicles	42.86%	24
Other (please specify)	28.57%	16
Total Respondents: 56		

#	OTHER (PLEASE SPECIFY)	DATE
1	Just noticed more heavy equipment vehicLes but they did not cause blockages to traffic flow in my residential area.	10/13/2019 2:35 PM
2	more vehicles taking up parking spots, short term	10/10/2019 2:12 PM
3	dirt/ dust being tracked thru neighbourhood	10/10/2019 7:45 AM
4	parking was the biggest problem.	10/9/2019 1:05 PM
5	Blocked sidewalks	10/9/2019 10:26 AM
6	Blocking sidewalks	10/9/2019 12:34 AM
7	Mostly Trucks unloading/taking dirt away	10/8/2019 1:35 PM
8	There were no big issues. More work around, but not an issue.	10/7/2019 8:23 AM
9	Many children playing in the area of the neighborhood, always a concern with HD vehicle traffic. The operators seemed to stay alert and vigilant regarding the kids though.	10/6/2019 2:40 PM
10	limited visibility	10/6/2019 11:03 AM

11	When they were working near Pople Park I advised the contractor that on soccer nights it becomes extremely congested for parking. They adjusted their schedules.	10/5/2019 12:21 AM
12	No noticeable impacts	10/4/2019 6:04 PM
13	Noise from dump trucks	10/4/2019 6:04 PM
14	transporting material out of site or into seemed equipment was on a mission going faster than should be	10/4/2019 3:23 PM
15	note: I found the contractors to be very considerate	10/3/2019 1:34 PM
16	Only issue I saw with traffic was the need for flangers when the skid steer would be delivering sod to area	9/27/2019 12:51 PM

Q7 When passing properties undergoing yard remediation, please indicate if you have noticed any of the following:

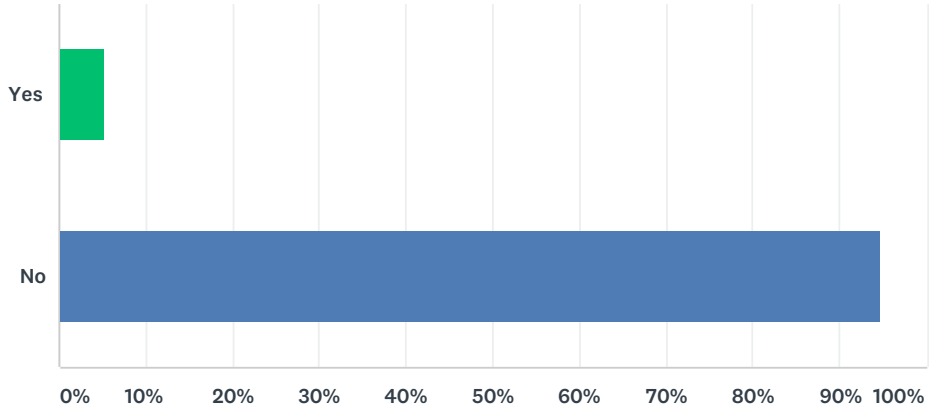
Answered: 97 Skipped: 11



	YES	NO	N/A	TOTAL	WEIGHTED AVERAGE
Signage indicating work site	72.16% 70	18.56% 18	9.28% 9	97	1.20
Barricades or fences blocking off work site	72.92% 70	16.67% 16	10.42% 10	96	1.19
Signage explaining soil remediation	57.73% 56	30.93% 30	11.34% 11	97	1.35
Safe practices of workers	68.75% 66	5.21% 5	26.04% 25	96	1.07

Q8 Have you ever felt unsafe when passing properties undergoing yard remediation work?

Answered: 97 Skipped: 11



ANSWER CHOICES	RESPONSES	
Yes	5.15%	5
No	94.85%	92
TOTAL		97

#	IF YOU ANSWERED YES, PLEASE EXPLAIN:	DATE
1	good work	10/9/2019 5:39 PM
2	Have had sidewalks blocked and have to go on the road (once was hwy) to get around, which is not safe especially with your child (and stroller)	10/9/2019 12:37 AM
3	some sites had multiple pieces of equipment operator and site lines not the best	10/4/2019 3:28 PM
4	Trucks pulling out in front of traffic, no eye contact with drivers.	10/4/2019 3:00 PM
5	When working near roads or alleys there wasn't any indication when heavy equipment would be moving into the roads and there wasn't any form of trafic control when they did	10/4/2019 1:24 PM
6	I am aware I need to be cautious - as I would near any construction zone. I do not feel these situations are any worse, unless the crew was not paying attention (which I may have noticed occasionally)	10/3/2019 1:53 PM

Q9 If you have any other feedback related to soil remediation of yards in Trail or THEP, please let us know here:

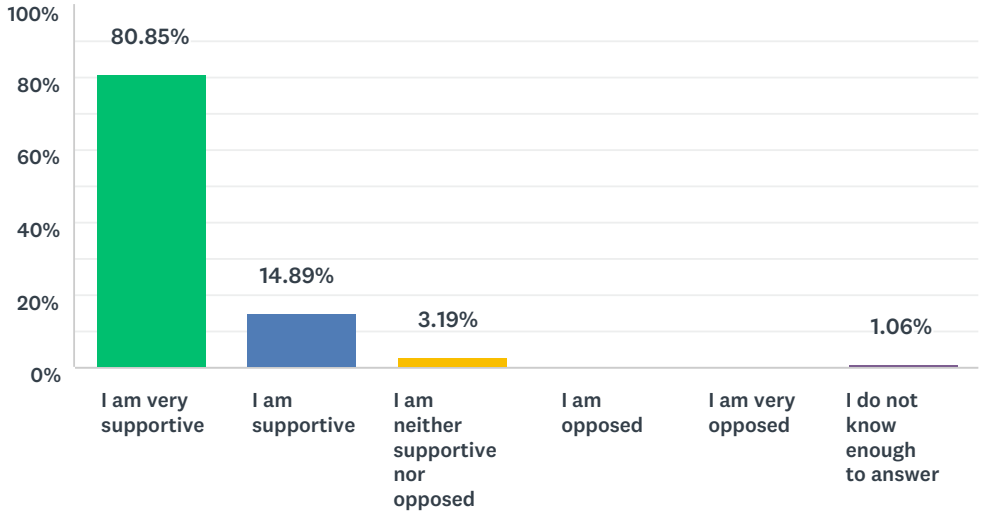
Answered: 30 Skipped: 78

#	RESPONSES	DATE
1	Keep up the good work!	10/15/2019 4:37 PM
2	Glad to see signage so that citizens are aware of the work being done and that it is remediation through the Program and not general maintenance and repair of yards.	10/13/2019 2:36 PM
3	workers were very courteous with as little disruption as possible.	10/10/2019 2:14 PM
4	the only thing I have noticed in recent years was the contractor leaving equiptment on private property for an extended period of time one bobcat was in the same location for about a month after the completion of the work	10/9/2019 5:39 PM
5	I think it is fantastic. Health and safety	10/9/2019 1:06 PM
6	Great program. Thank you.	10/9/2019 10:27 AM
7	I think it's fantastic and the work being done is very beneficial. The workers themselves all seemed professional and knowledgeable in what they were doing.	10/9/2019 5:16 AM
8	I feel someone needs to be on top of things more and communications with the people having their yard remediated.	10/9/2019 12:37 AM
9	We look forward to our yard being done in the spring	10/8/2019 2:56 PM
10	Wonderful work being done.	10/7/2019 7:03 PM
11	We had the program redo our yard about five years ago and had a very good experience.	10/7/2019 6:30 PM
12	There were at least 6 houses on our street that were remediated. I was dissapointed and a little confused that we were denied for the remediation	10/7/2019 5:51 PM
13	Great initiative and good to see so many yards being remediated.	10/7/2019 8:27 AM
14	The soil is being removed foe high levels of heavy metals (Lead) and yet there was little effort to curb the dusts blowing from the site, loading, or from transport. These dusts seem to be contaminating the neighborhood as they were blowing all over my home and property and many days I had to bring my children in and away from the work for concern of what the dusts may contain.	10/6/2019 2:43 PM
15	My answers are based on only one yard that was already done. This yard was the only yard I have ever seen done. I have lived in Trail for 23 years and I am not a shut-in.	10/5/2019 9:50 PM
16	Good job.	10/5/2019 5:40 PM
17	Great work , Keeps the kids safe.	10/4/2019 10:40 PM
18	i have heard that some sites have been done more than once, are we sure the soil/material being brought in is of the appropriate quality. when new soil material is placed are there maintenance parameters relayed to the property owners to ensure soil material enhances property and prolong any deterioration rate	10/4/2019 3:28 PM
19	I thought they did a great job this year on the yards.	10/4/2019 3:20 PM
20	I know houses with children are a priority, not sure if we are looking into a bigger picture of more in the future or if it is just on going to what we are doing currently and upon request day to day.	10/4/2019 3:09 PM
21	I had my soil tested and was not approved because it said that my soil was not contaminated enough YET my close neighbors have had theirs done. Does contamination only choose certain yards in the same immediate area? If it is because I do not have young children, that is a pretty lame excuse as I have neighborhood school children walking in my yard fairly regularly, laying down on hot days in the cool grass or just sit. I guess that does not count.	10/4/2019 3:00 PM

22	Thank you Teck and the THEP for all that you are doing for us in Trail and the surrounding area. Awesome work	10/4/2019 2:56 PM
23	If families have contaminated soil, its great Teck is remediating the yards. I am disappointed that families without children are discriminated against. Every family should have equal opportunity dependent on contamination levels.	10/4/2019 1:46 PM
24	In general I've found the workers to be friendly & mindful of neighbours. Occasionally they get distracted - but that can happen on any worksite. And I'm curious - why the rocks in some spaces rather than green groundcover?	10/3/2019 1:53 PM
25	Waiting for a response from thep as I filled out a form	10/2/2019 9:22 AM
26	Keep up the good work!	9/28/2019 11:31 AM
27	I'm satisfied to see signage but sometimes people park in front or behind these, impeding warning	9/25/2019 7:12 PM
28	The only thing ive noticed is the amount of dirt left on the road after a work day. Maybe having some deal with the city or teck to come and street sweep after would keep the dirt off the roads. Other then that great work!	9/25/2019 2:25 PM
29	A property on our street was being remediated and it seemed like some of the larger trucks were driving a bit fast for their size on a residential street. They could have been within the speed limit, but because of their size, volume, and possible reduce visibility for the driver, I would feel safer for my family and neighbors if they slowed down a bit.	9/24/2019 11:26 AM
30	We had our soil remediated, Lindsay and her partner were extremely helpful and informative. They were very thorough, I was very impressed.	9/19/2019 8:49 PM

Q10 How supportive or opposed are you to increased soil remediation of yards in Trail?

Answered: 94 Skipped: 14



Q11 Please share reasons for your answer:

Answered: 69 Skipped: 39

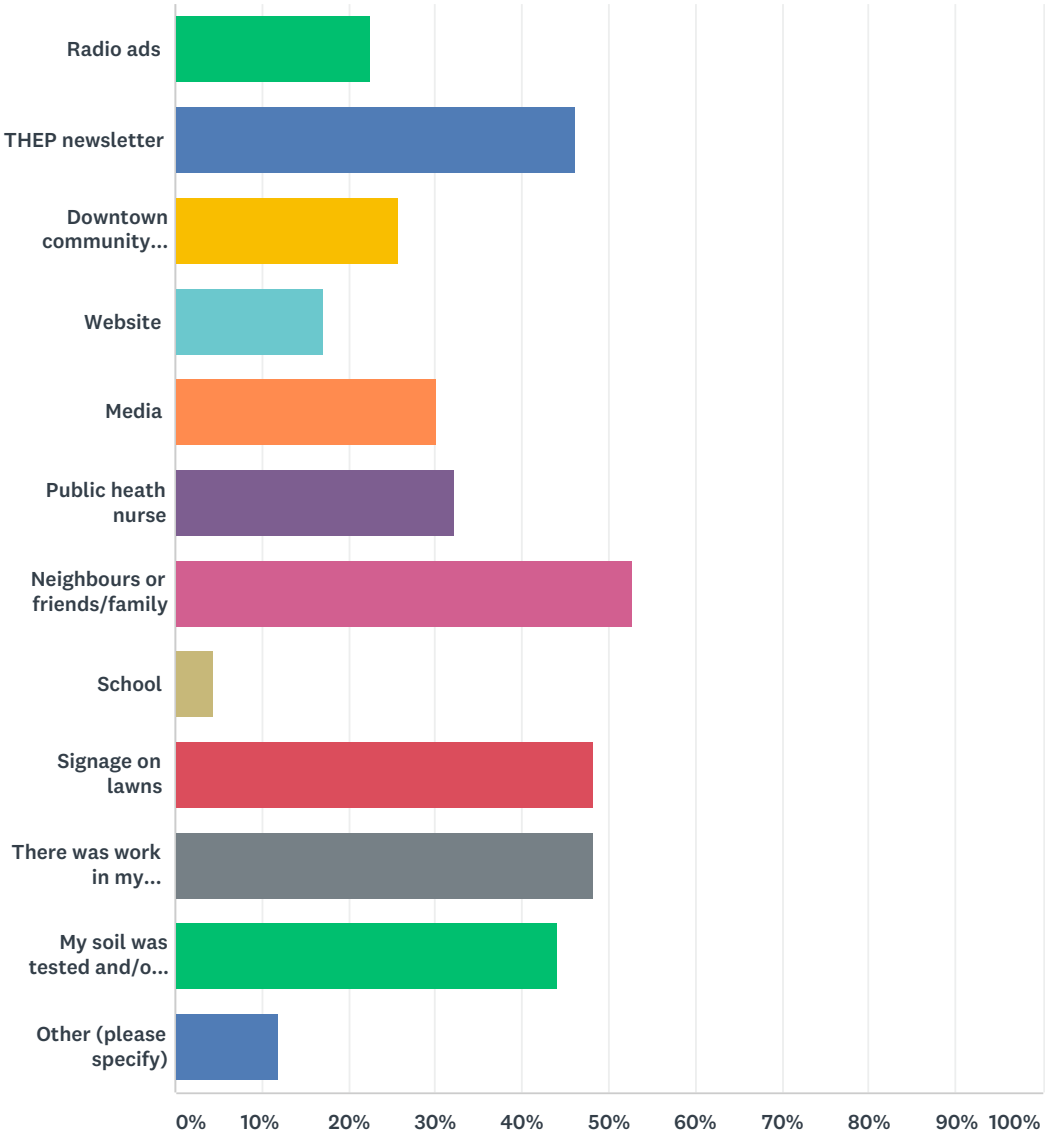
#	RESPONSES	DATE
1	Healthy environments for kids and pets	10/15/2019 4:39 PM
2	It’s progress. Esthetically the yards look better.	10/13/2019 2:38 PM
3	Safer and cleaner yards are good. The new yards also look nice	10/11/2019 12:57 AM
4	I feel it's a great program to promote healthy living.	10/11/2019 12:49 AM
5	Very important to keep our residents, families and children safe,	10/10/2019 11:05 PM
6	The heath of our kids and the community is more than worth it.	10/10/2019 11:02 PM
7	Soil remediation will make for a safer town	10/10/2019 2:15 PM
8	Increasing the value of our homes and providing a chemical free environment for kids	10/10/2019 7:48 AM
9	I believe that it is what is best for the community and with stricter standards I believe that it’s best for the families. I would like to see every yard being done to ensure the health and welfare of all the residents here in Trail.	10/9/2019 9:26 PM
10	It is very good thing for the heath of the community and the future generations of trail. However would be nice for more work to be done for the property owners in the west trail area given there is not good access to a lot of these the yards is difficult to attain with equipment	10/9/2019 5:44 PM
11	For lead reasons, and also aesthetic reasons	10/9/2019 2:22 PM
12	for the future safety of all who use the land and to lower contaminents.	10/9/2019 1:07 PM
13	Lead reduction is important to me as I have a new grandson. Glad to see that he will be raised in a safe and healthy environment.	10/9/2019 10:30 AM
14	It is so important for our children and families to have a clean and safe environment to play.	10/9/2019 5:17 AM
15	I think it’s a great thing thep is doing for families and the children however with the increase of properties being done I feel better planning and communication needs to be in place	10/9/2019 12:39 AM
16	It’s a great resource available in our community	10/8/2019 2:57 PM
17	Any yards that get remediated have the potential of having a family with young children owning the property at some time. An ounce of prevention is worth a pound of cure.	10/8/2019 2:52 PM
18	I think the yards look amazing!!!! The landscaping looks professional and clean. We are so luck to have this program in our community.	10/8/2019 1:39 PM
19	Healthier community and yards for people.	10/7/2019 11:47 PM
20	Removal of contaminated soil is important to the citizens.	10/7/2019 6:31 PM
21	I feel that the remediation within the community is very important as it give families peace of mind that their yards and gardens are safe	10/7/2019 5:54 PM
22	Beautifies the neighbor hoods and keeps lead levels down	10/7/2019 4:47 PM
23	I think its a way to protect children from historical pollution. Good community pride and Teck wanting to fix this.	10/7/2019 9:56 AM
24	I hear about the benefits at work	10/7/2019 8:51 AM
25	i would be cocerned if I was affected	10/7/2019 8:34 AM
26	Shows support from Teck to continue to improve lead levels in the community. Likely helps to make the area more attractive to new families looking at the area.	10/7/2019 8:29 AM
27	This is a good thing for community.	10/7/2019 7:48 AM
28	its great to see the well being of the community and its people being looked after so well	10/6/2019 5:59 PM

29	Shows great community stewardship on Teck's part to care enough to incur the cost of such an undertaking.	10/6/2019 2:44 PM
30	important part of Teck giving back to its community to take responsibility for its legacy of contaminated soil	10/6/2019 11:06 AM
31	I feel the program is a great idea to keep the community healthy and sustainable.	10/6/2019 6:35 AM
32	It is important for health reasons such as little kids and growing food.	10/5/2019 9:53 PM
33	Improves on unsightly properties.	10/5/2019 5:42 PM
34	great way to clean up community and make safer for children	10/5/2019 5:46 AM
35	It's the right thing to do and beautification of the neighbourhoods is nice.	10/5/2019 12:24 AM
36	Good for the health of our community.	10/4/2019 10:41 PM
37	The more remediation the better the community for everyone including our children and our future generations.	10/4/2019 10:17 PM
38	Keeping children's blood lead level down is very important	10/4/2019 4:25 PM
39	as stated previously are we sure the soil coming in is an improvement, i have heard of some risks with castlegar soil...uranium levels higher. rather than removing soil, can we enhance its cover or stablize it so will not be at risk to users	10/4/2019 3:31 PM
40	I think its great for the community and the kids growing up in the area	10/4/2019 3:21 PM
41	I think it is excellent to see this happening from previous operation and controls that have been dramatically improved on. I hope that it increases the positive look on Teck Trail from those outside of the area.	10/4/2019 3:10 PM
42	the soil is contaminated it should be replaced for the health and safety of the residents of Trail.	10/4/2019 3:02 PM
43	My neighbor had work done and it looks great.	10/4/2019 2:57 PM
44	It's a good thing that teck is doing their part to undo the years of lead contamination in the area.	10/4/2019 2:55 PM
45	The more clean soil the better for our community	10/4/2019 2:31 PM
46	I would like to have my yard done as well.	10/4/2019 1:49 PM
47	If families have contaminated soil, I feel its great Teck is remediating the yards.	10/4/2019 1:46 PM
48	Soil remediation of yards improves the health of residents and ensures that the community is thriving in an uncontaminated environment.	10/4/2019 1:37 PM
49	Is this work really impacting the health of people who live in homes being remediated?	10/4/2019 1:34 PM
50	Nice to see the yards are being made safe for the kids.	10/4/2019 1:30 PM
51	Betterment of the community and the future generation of Trail.	10/4/2019 1:27 PM
52	If tests reveal unhealthy levels of metals or other contaminants the soil should be remediate to right past wrongs.	10/4/2019 1:26 PM
53	solves some historic happenings	10/4/2019 1:26 PM
54	It is the right thing to do, also gives a better image of the town as so many yards have been cleaned up and may encourage more families and people in general to move to Trail.	10/4/2019 1:25 PM
55	It's great to see positive efforts being made in our community.	10/3/2019 1:55 PM
56	Apperntly my grandkids should not play in my yard..boohoo	10/2/2019 9:24 AM
57	It's kind of patchwork, but at least something is being done.	9/28/2019 11:32 AM
58	I think it’s very important to work towards decreasing lead levels in our area.	9/27/2019 12:52 PM
59	If it makes a safer environment, especially when children live there, I am happy to support that. Improves the look of many yards as well.	9/25/2019 7:41 PM
60	Let's get trail healthy!	9/25/2019 7:14 PM
61	Im glad to see teck cleaning up the mess left after all the years of pollution and taking our communities health seriously.	9/25/2019 2:28 PM

62	Love that yards are even safer for kids.	9/24/2019 6:55 PM
63	It's a great initiative for our community in making yards healthier for young kids.	9/24/2019 11:27 AM
64	It's great to see more properties around town being remediated	9/23/2019 9:23 AM
65	I think its a good thing for the "little people"...the neighbour kids, your kids or my grandkids!! The reason for remediation is clear & important! Keep up the good work :-)	9/20/2019 9:49 PM
66	I have a 4 month old daughter and wouldn't want her exposed to lead. The soil remediation program is making our yards a safer place for our children to play.	9/20/2019 4:04 PM
67	Anything we can do to improve the health of residents is a bonus	9/19/2019 10:04 PM
68	I appreciate the testing and results THEP provides	9/19/2019 8:51 PM
69	The work needs to get done and it's good to see the work being done.	9/16/2019 12:21 AM

Q12 Where have you seen or heard about the soils program of the Trail Area Health and Environment Program?

Answered: 93 Skipped: 15



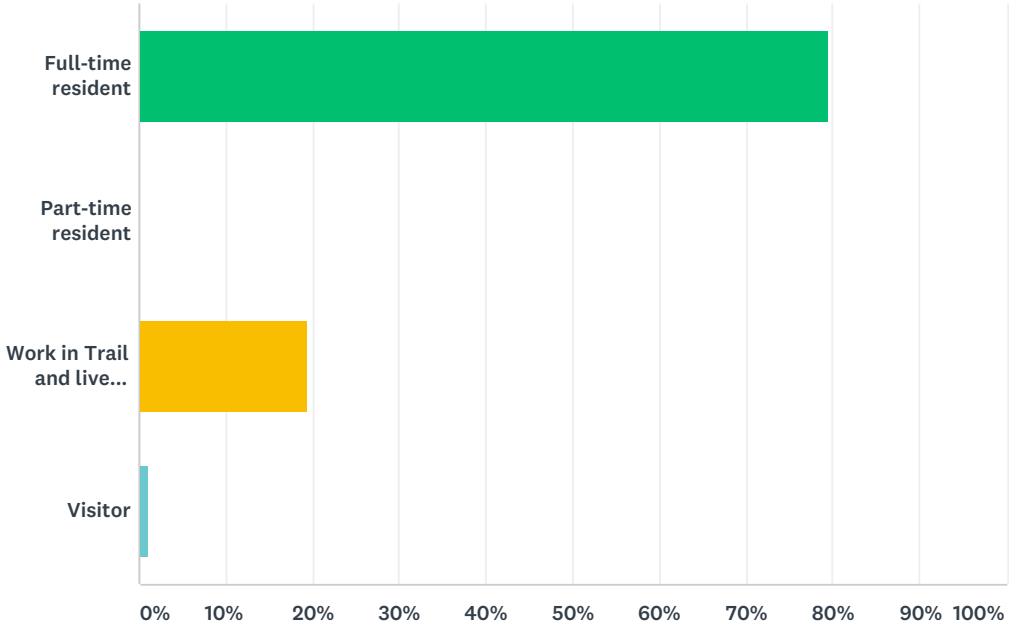
ANSWER CHOICES	RESPONSES	
Radio ads	22.58%	21
THEP newsletter	46.24%	43
Downtown community office	25.81%	24
Website	17.20%	16
Media	30.11%	28
Public heath nurse	32.26%	30
Neighbours or friends/family	52.69%	49

School	4.30%	4
Signage on lawns	48.39%	45
There was work in my neighbourhood	48.39%	45
My soil was tested and/or remediated	44.09%	41
Other (please specify)	11.83%	11
Total Respondents: 93		

#	OTHER (PLEASE SPECIFY)	DATE
1	Other parents	10/11/2019 12:57 AM
2	teck	10/9/2019 5:44 PM
3	Teck Operations	10/8/2019 2:52 PM
4	work - Teck	10/7/2019 8:51 AM
5	Workplace	10/6/2019 11:06 AM
6	My soil was tested but not remediated	10/4/2019 3:02 PM
7	I haven't heard anything	10/4/2019 1:42 PM
8	Friend's yard was remediated.	10/4/2019 1:37 PM
9	trail teck operations	10/4/2019 1:26 PM
10	Posters	10/3/2019 1:55 PM
11	At our prenatal class and at the theater	9/25/2019 2:28 PM

Q13 Which option most applies to you?

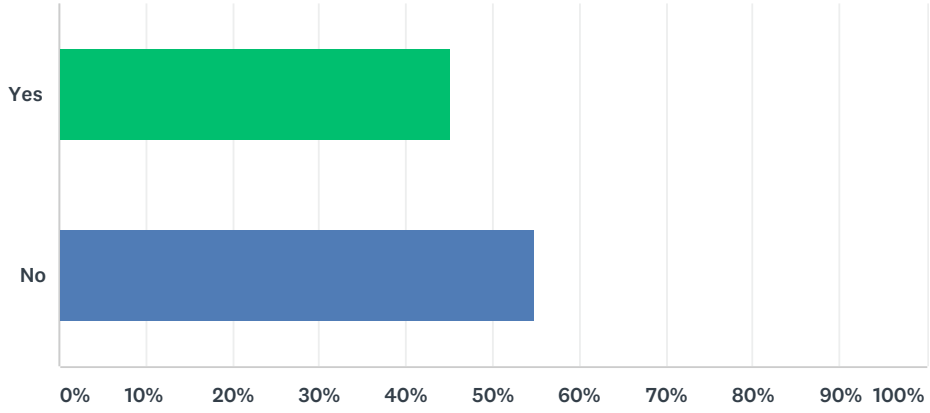
Answered: 93 Skipped: 15



ANSWER CHOICES	RESPONSES	
Full-time resident	79.57%	74
Part-time resident	0.00%	0
Work in Trail and live elsewhere	19.35%	18
Visitor	1.08%	1
TOTAL		93

Q14 Would you be willing to participate in a follow up interview?

Answered: 93 Skipped: 15



ANSWER CHOICES	RESPONSES	
Yes	45.16%	42
No	54.84%	51
TOTAL		93

Homeowner Feedback Form – Results Summary

Soil Remediation of Residential Yards in Trail

The Trail Area Health & Environment Program (THEP) undertook a survey of residents who participated in the residential yard remediation program. The survey was online through Survey Monkey and open from November 1 to November 27, 2019. The survey was emailed to 91 program participants and 50 people responded. 41% of respondents live in East Trail, 22% live in West Trail, 10% live in Sunningdale, 6% live in Tadanac, 4% live in Glenmerry, and the remainder live elsewhere. All but one respondent were homeowners.

The vast majority of respondents were satisfied with the yard remediation program. 90% of respondents said they were either very satisfied or satisfied while the remaining less than 10% of respondents said that they were unsatisfied or very unsatisfied. General reasons for supporting the program included health (especially of children), aesthetics of landscaping, and perceived increased home values.

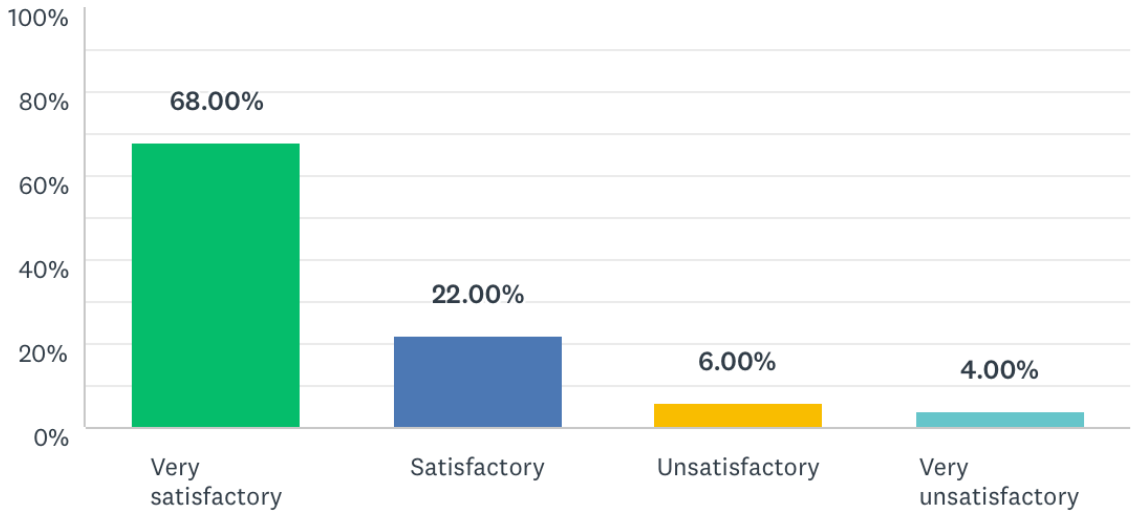


Figure 1: Respondents answers to "When telling friends and family about your experience with yard remediation, how would you rate your overall experience?"

Respondents were generally very positive about the soil remediation program. 94% of respondents said they were satisfied with the work plan they developed for their yards, 92% said they would recommend the program to friends and family, 90% thought the finished yard product was the same or better than before, 88% said that the Home & Garden team communicated well and in a timely manner, 88% said they were provided with information about health and safety considerations prior to work, 86% said that the team responded to questions in a reasonable timeframe, 86% said that their questions about the new yard and maintenance were addressed, and 82% had enough time to prepare for the remediation work.

A few respondents left comments about wanting garden boxes and a few mentioned that communication was confusing or lacking.

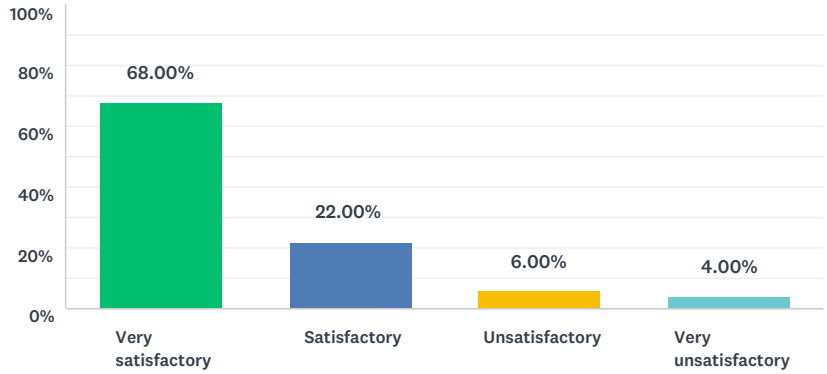
Most respondents were generally satisfied with the remediation contractor who worked on their yard. 62% of respondents worked with Alpine Contracting, 22% worked with Simms Excavating, and 16% didn't know which company worked on their yard. 96% of respondents said the contractors completed the work safely, 90% said the contractors contained soil and dust as it moved in and out of the yard, 88% of respondents said the contractors communicated well and in a timely manner, 88% said the contractors worked efficiently, 84% said the contractors helped prepare the yard for remediation, and 78% said the contractors provided valuable advice during planning and work. A few respondents noted that there were "too many cooks in the kitchen" often making points of contact disjointed and communication difficult.

69% of respondents participated in the Healthy Families Healthy Homes program.

A summary of the feedback results follows with comments removed to protect anonymity and maintain privacy. If you have questions, please contact the THEP community office: programs@thep.ca.

Q1 When telling friends and family about your experience with yard remediation, how would you rate your overall experience?

Answered: 50 Skipped: 0



Q2 The H&G team are the people who met with you to develop your yard plan, gain access consent, oversee the work and sign off on the work when it was complete. Please tell us how strongly you agree or disagree with the following statements with respect to the H&G team. For each row, please check one box.

Answered: 50 Skipped: 0

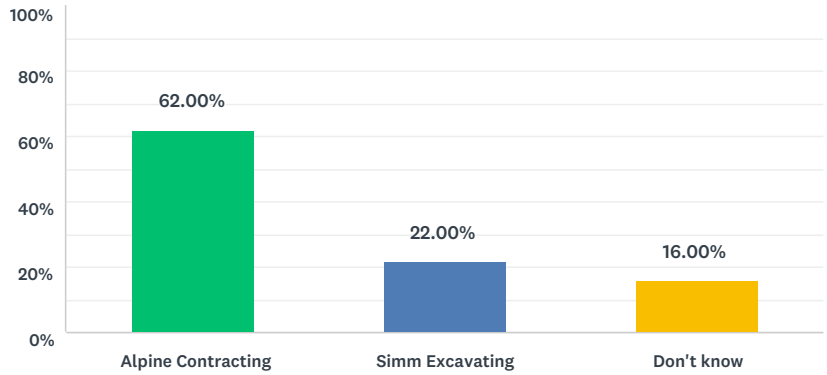
	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	UNSURE	TOTAL
The H&G team communicated well and in a timely manner	4.00% 2	8.00% 4	30.00% 15	58.00% 29	0.00% 0	50
I had enough time to prepare for the remediation work	2.00% 1	14.00% 7	38.00% 19	44.00% 22	2.00% 1	50
I was satisfied with the work plan we developed for my yard	2.04% 1	2.04% 1	30.61% 15	63.27% 31	2.04% 1	49
I was provided with information about health and safety considerations prior to work	2.00% 1	4.00% 2	34.00% 17	54.00% 27	6.00% 3	50
If I had questions during the work, the team responded in a reasonable timeframe	2.04% 1	10.20% 5	28.57% 14	57.14% 28	2.04% 1	49
The finished yard product is the same or better than before	2.00% 1	2.00% 1	18.00% 9	72.00% 36	6.00% 3	50
My questions about the new yard and maintenance were addressed	4.00% 2	6.00% 3	30.00% 15	56.00% 28	4.00% 2	50
I am likely to recommend that friends and family contact the community program office to have their soil tested	4.00% 2	4.00% 2	14.00% 7	78.00% 39	0.00% 0	50

#	PLEASE ADD ANY FURTHER COMMENTS YOU HAVE REGARDING THE H&G TEAM.	DATE
1	Would of liked veggie boxes you used to supply in past	11/24/2019 4:17 PM
2	Zero complaints everything was great!	11/23/2019 1:11 AM
3	Thank you, we love our new yard!	11/22/2019 11:35 PM
4	I really appreciated that any problems that cropped up were addressed immediately and we were offered several options as solutions.	11/22/2019 9:55 PM
5	Work on the in-ground sprinkler system was not managed well.	11/5/2019 4:33 PM
6	Everyone was amazing	11/4/2019 10:25 PM
7	Very slow response to questions that I had. There seemed to be very little if any communication between program and contractors	11/4/2019 9:33 PM

8	I would like to think that everyone involved was competent, but too may cooks in the kitchen can be frustrating and make for confusing communication.	11/2/2019 8:37 AM
9	We still don't have any communication about the plant credit we were supposed to get for the trees and flowers that we removed.	11/2/2019 3:47 AM
10	Always pleasant and responsive! Happy to work with them. Andrea is excellent.	11/2/2019 12:41 AM
11	Would of liked if you still did garden boxes	11/1/2019 11:53 PM

Q3 Which contracting company completed the remediation work at your property?

Answered: 50 Skipped: 0



Q4 Please tell us how strongly you agree or disagree with the following statements with respect to the Remediation Contractor.

Answered: 50 Skipped: 0

	STRONGLY DISAGREE	DISAGREE	AGREE	STRONGLY AGREE	UNSURE	TOTAL
Contractors communicated well and in a timely manner	2.00% 1	8.00% 4	40.00% 20	44.00% 22	6.00% 3	50
Contractors provided valuable advice during planning and during the work	2.00% 1	8.00% 4	40.00% 20	38.00% 19	12.00% 6	50
Contractors helped prepare the yard for remediation (e.g., moving large items, removing fences, etc.)	6.00% 3	8.00% 4	34.00% 17	50.00% 25	2.00% 1	50
Contractors worked efficiently	4.00% 2	6.00% 3	18.00% 9	70.00% 35	2.00% 1	50
Contractors contained soil and dust as it moved in and out of the yard	4.00% 2	0.00% 0	42.00% 21	48.00% 24	6.00% 3	50
Contractors completed the work safely	2.00% 1	0.00% 0	32.00% 16	64.00% 32	2.00% 1	50

#	PLEASE ADD ANY FURTHER COMMENTS YOU HAVE ABOUT THE REMEDIATION CONTRACTOR.	DATE
1	The contractor and crew went over and above great job.	11/23/2019 1:11 AM
2	They were awesome	11/22/2019 11:35 PM
3	The contractors were fantastic and were friendly and approachable.	11/22/2019 9:55 PM
4	They swept but not well it took us 2 hours to clean up the dirt from the drive way and sidewalks they needed to be washed down including the stairs to the house. With kids playing there was so much dirt left. All down our road as well. Cleanup was very poor the driveway and sidewalk should have been left how they found it.	11/6/2019 3:05 AM
5	Could have taken more care with sprinkler piping when doing removals	11/5/2019 4:33 PM
6	Once again too many cooks in the kitchen.	11/2/2019 8:37 AM

7	They had several areas that weren't completed, even though it was in the plan. Their landscaping didn't use the materials we had agreed on. I had to personally remove all fencing, trees, and brush at my own cost, which according to the survey above they were supposed to help with. The paths they laid out in the yard weren't symmetrical, and were barely covered in gravel so that the landscape fabric is already showing through just 3 months later. All in all it just felt rushed, shoddy, and that they didn't care to actually do a good job.	11/2/2019 3:47 AM
8	Work was done with tenants in residence, but any communication with us (landlords) was very clear and efficient.	11/2/2019 3:47 AM
9	Very pleased with sims as the contractor that worked on our yard this year. Alpine did some work last year and knocked out our water line and were dishonest with us and didn't contact a plumber and left us with three days with no water and a small baby at home.	11/2/2019 12:41 AM
10	Would definitely recommend that someone on the contractor team be aware of dismantling and reinstalling of chain link fencing in particular. As ours recieved some damage do to not being knowledgeable of this type of fencing. Once warped or kinked it's hard to reverse it. They came back and did their best to correct the situation which we greatly appreciate, but it would definitely be an asset for awareness or training, etc in regards to that type of fencing.	11/1/2019 11:52 PM

Q5 The H&G team is interested in ways to improve the following areas: - Communications and remediation planning- Health & safety - Minimizing disruptions to the neighbourhood If you have suggestions specific to these areas or other suggestions for the soil management program, please provide them below.

Answered: 6 Skipped: 44

#	RESPONSES	DATE
1	No was good	11/22/2019 11:04 PM
2	My only complaint was that there was such short notice for the work to begin in order prepare the yard. It was an advantageous time to replace utilities during the digging but necessitated quick action to arrange due to the limited time before project start. Suggest to include the possibility of utility replacement in project timeline planning.	11/17/2019 10:46 PM
3	Too many points of contact and uncertainty about what would be paid for made for some confusion at times. Make a point of more info on care for turf after being placed.	11/5/2019 4:33 PM
4	Communication could have been better. Explaining to homeowner the process; where work would begin etc, steps, stages of the project. Work started suddenly, was not able to save a few plants or put away lawn furniture etc.	11/5/2019 6:03 AM
5	Needs work towards all communication between all people working on the crews.	11/2/2019 8:37 AM
6	Other: We only had garden soil replaced in our yard and I found the soil it was replaced with is not good for growing fruits amd veggies. It is very dense and even with 2 yards of pure compost added I had poor soil quality. Hopefully over time with organic matter added it will improve - but I wonder if there are other topsoil/compost mixes available for food garden areas. Eg. I have previously purchased a nice mix from Korpac for a house we owned I Rossland.	11/2/2019 12:55 AM

Q6 I live in:

Answered: 49 Skipped: 1

ANSWER CHOICES	RESPONSES	
Tadanac	6.12%	3
Glenmerry	4.08%	2
East Trail	40.82%	20
West Trail	22.45%	11
Sunningdale	10.20%	5
Gulch	0.00%	0
Rivervale	0.00%	0
Other (please specify)	16.33%	8

TOTAL	49

#	OTHER (PLEASE SPECIFY)	DATE
1	Mcbride Street	11/22/2019 11:35 PM
2	Fruitvale	11/22/2019 10:59 PM
3	Shaversbench	11/22/2019 9:58 PM
4	Fruitvale	11/5/2019 4:19 PM
5	Shavers bench	11/2/2019 4:54 PM
6	fruitvale	11/2/2019 1:32 PM
7	Montrose	11/2/2019 3:47 AM
8	Shavers bench	11/2/2019 2:58 AM

Q7 I am a:

Answered: 49 Skipped: 1

ANSWER CHOICES	RESPONSES	
Homeowner	97.96%	48
Renter	2.04%	1
TOTAL		49

Q8 Have you participated in the Healthy Families Healthy Homes program?

Answered: 49 Skipped: 1

ANSWER CHOICES	RESPONSES	
Yes	69.39%	34
No	30.61%	15
TOTAL		49

Q9 Please share further suggestions or ways to improve outreach to families in the space below.

Answered: 7 Skipped: 43

#	RESPONSES	DATE
1	Unsure	11/22/2019 11:04 PM
2	Utilize social media-- instagram and facebook	11/22/2019 10:06 PM
3	The marketing was great. Having posters up in schools and the aquatic centre were really helpful and it was great getting feedback so quickly. We were really pleased with the entire experience.	11/22/2019 9:55 PM
4	Communication. Both verbal and the written plans. I am used to building blue prints Nd everyone being on the same page. This was not the case.	11/2/2019 8:37 AM
5	Work performed was at my previous residence, which I now rent out.	11/2/2019 3:47 AM
6	Job well done. Huge improvement to property.	11/2/2019 1:16 AM
7	If arn't already doing, Maybe including a brochure when families have there kids vaccinated, Speech, teeth, hearing, any of the children's support at the wellness center?	11/1/2019 11:55 PM

Appendix II

Updated SMP Communications Materials

TRAIL AREA
Health & Environment Program

Soil Management Program

Have you had your soil tested?

Take this important step to keep your yard healthy and safe.

We offer free soil testing and, in qualifying yards, replacement of soil or improvements to ground cover.

Following soil testing, we prioritize properties for soil management based on:

1. The age of children,
2. The quality of ground cover, such as grass, and
3. Lead levels in soil.

Our aim is to test all residential properties.
Contact us to learn more.

For more information

Visit our Office
1319 Bay Avenue

Call
250.368.3256

Email
programs@thep.ca

Website
thep.ca

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Contact us to learn more.

thep.ca

What's new?

Major improvements have been made to lower metal emissions from Teck Trail Operations, resulting in improved air quality. This means that Teck is not adding as many metals such as lead into the soil.

We can now focus more on addressing the historical impacts to soil from past emissions.

As would be expected, lead and other metals in soil are higher closer to the operation, and lower moving away from the operation. As such, properties further away may require no action.

Do you have a vegetable garden? Vegetable gardens are also prioritized.

For more information

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What does it mean to live with metals in soil? For most people, the risks are low. Bare soils may increase exposure to metals especially to children who are the most vulnerable to the effects of lead. Ways to minimize exposure are:

- **Cover bare soil areas in your yard** by improving lawn areas, mulching gardens or covering exposed areas with landscape fabric and rock;
- Follow good hygiene practices, including **washing hands** after playing outside and before eating;
- **Take shoes off at the door** and use floor mats at entryways;
- **Vacuum, wet dust and mop frequently**; and
- Hose off decks and patios and **wipe down outdoor play equipment** and furniture.

The Trail Area Health & Environment Program works together towards an overall goal to reduce exposure to lead and other smelter metals in the community on a continual improvement basis.

Our programs:

- Air Quality
- Family Health
- Home & Garden
- Parks & Wildlands
- Property Development

For more information

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Soil Management Program

Keeping your yard healthy and safe

WORKING TOGETHER
Creating a healthy environment

TRAIL AREA
Health & Environment Program

The community of Trail grew up around one of the world's largest lead and zinc smelters, operating for over a hundred years. The Trail Area Health & Environment Program focuses on preventing exposure to lead in the community through programs that improve: air quality, family health, homes & gardens and ecosystem health.

Soil management is one way to reduce exposure to metals in your home and yard environment.

How does the soil management program work?

Contact the THEP community program office to ask about soil testing in your yard.

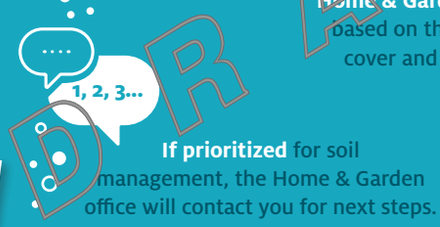
Priority is given to homes with **children.** Our aim is to test soil at all residential properties.

Home & Garden team receives **consent to access the property** for soil testing.

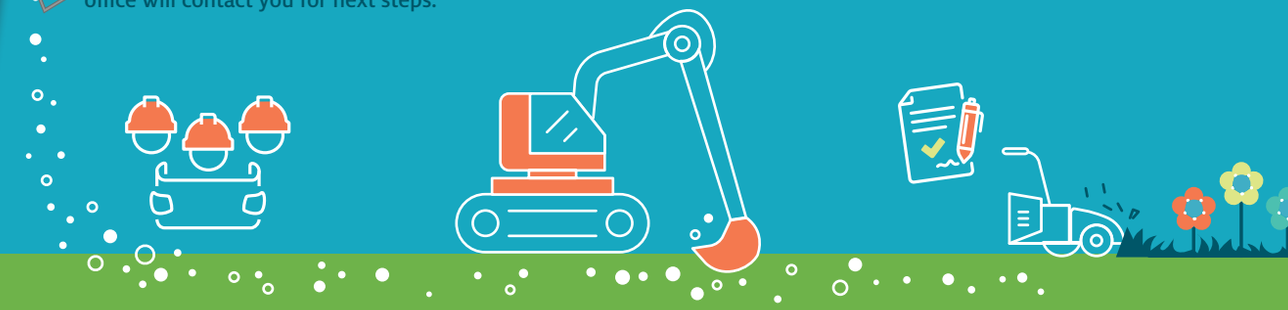
Collecting the samples takes half an hour.

Home & Garden reviews and prioritizes the property based on the age of children, the quality of ground cover and lead levels in soil. **Results are mailed.**

Once soil samples are collected they are analyzed and **a report is written.**



If prioritized for soil management, the Home & Garden office will contact you for next steps.



First, **a plan is developed** with the property owners, contractor and Home & Garden representative.

Next, the **work is scheduled.** It takes about 2 weeks to complete once it starts.

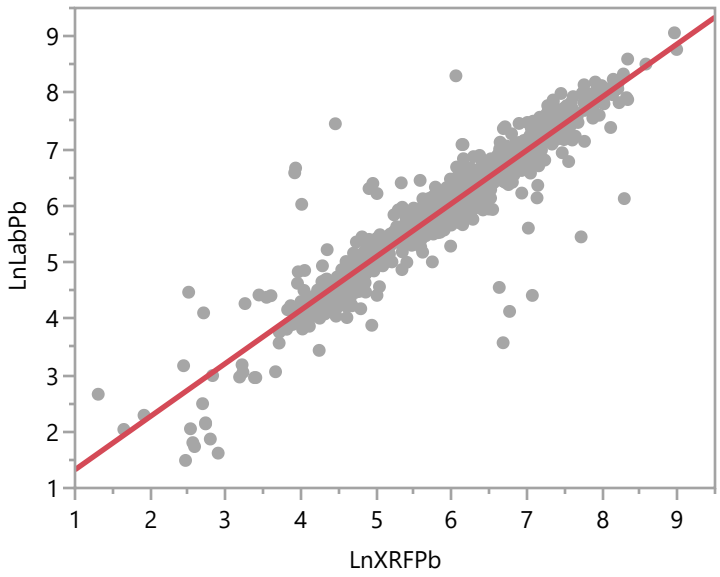
Lastly, a **completion** form is signed. Your yard is now ready to **enjoy and maintain.**

Do you have a vegetable garden? Vegetable gardens are also prioritized.

APPENDIX III

XRF Regression Equation

Bivariate Fit of LnLabPb By LnXRFPb



Linear Fit

Linear Fit

LnLabPb = 0.3804011 + 0.9427404*LnXRFPb

Summary of Fit

RSquare	0.892457
RSquare Adj	0.892331
Root Mean Square Error	0.40899
Mean of Response	5.935521
Observations (or Sum Wgts)	856

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	1	1185.4688	1185.47	7087.040
Error	854	142.8509	0.17	Prob > F
C. Total	855	1328.3198		<.0001*

Parameter Estimates

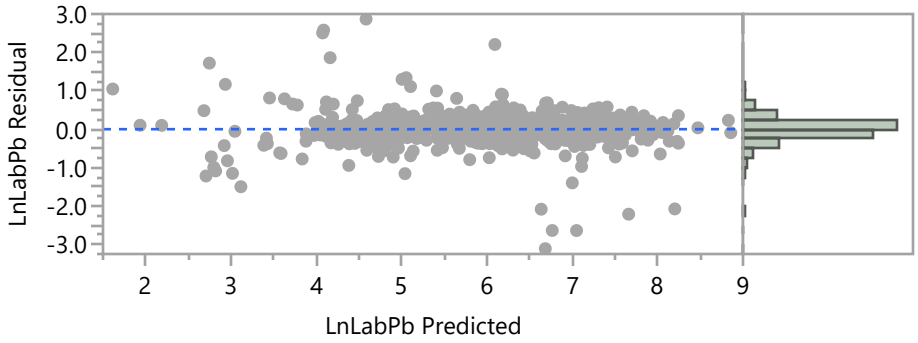
Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	0.3804011	0.067452	5.64	<.0001*
LnXRFPb	0.9427404	0.011198	84.18	<.0001*

Bivariate Fit of LnLabPb By LnXRFPb

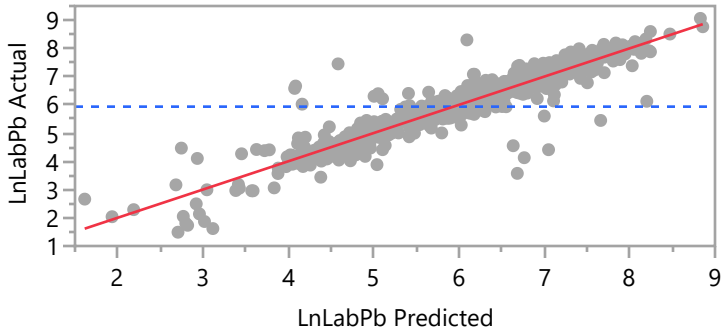
Linear Fit

Diagnostics Plots

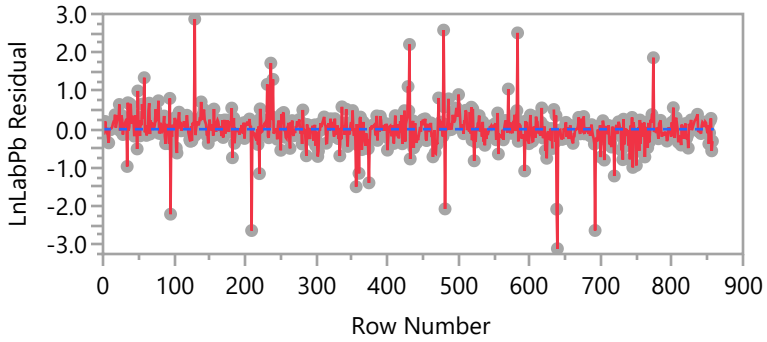
Residual by Predicted Plot



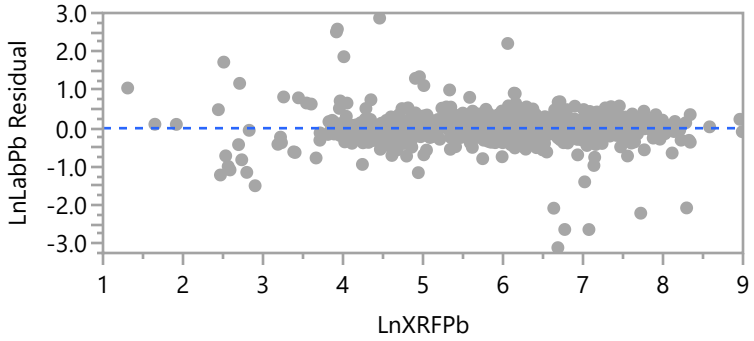
Actual by Predicted Plot



Residual by Row Plot



Residual by X Plot

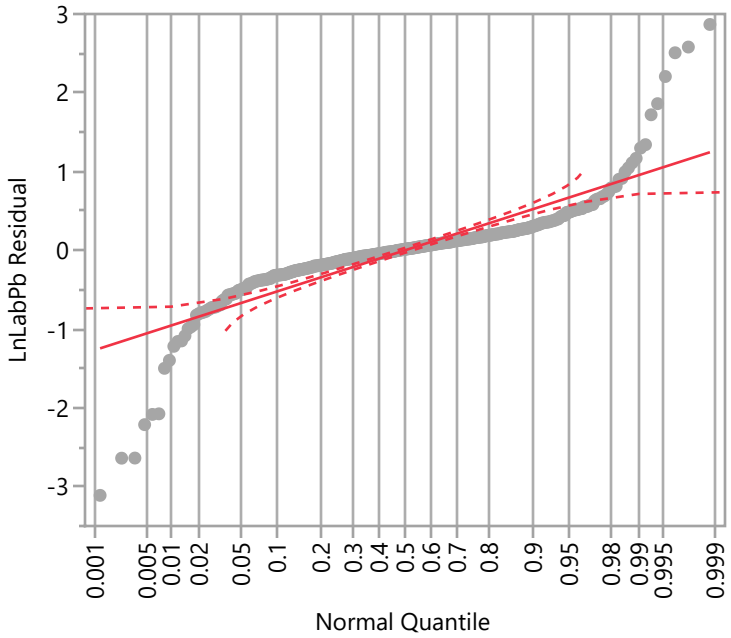


Bivariate Fit of LnLabPb By LnXRFPb

Linear Fit

Diagnostics Plots

Residual Normal Quantile Plot



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