# Kwantlen Polytechnic University

## Department of Sustainable Agriculture & Food Systems

ANNUAL REPORT

City of Richmond, Parks, Recreation and Cultural Services Committee
May 28, 2019

KPU

Where thought meets action

# Introduction

KPU is now in our second growing season on the Garden City Lands and we are excited to share the work that has occurred over the last year! We are extremely grateful for the ongoing support that we have received from the City of Richmond Council and take every opportunity to share our story. We are proud of what we have been able to accomplished through collaboration with the community and we look forward to our continued work with the City of Richmond and community partners to foster an innovative, sustainable food system future!

As we have been developing the site over the last year, we have had many opportunities to interact with community members that visit the site. We have been thrilled to discover that many people are finding the farm to be a place of inspiration, learning, reflection and, in several cases, the farm has brought back fond memories of growing up on a farm and providing a reconnection with agriculture. We are currently working with students from the KPU Wilson School of Design to develop a plan that will ensure the space is designed in a way that is inclusive and welcoming to the community while ensuring their safety on an active farm. The community fence was the first community project that we did and we are looking forward to the many ways this farm will become part of the daily lives of our community.

We are humbled by the privilege and responsibly of stewarding this land and are committed to developing a truly unique and innovative space that represents our community and a deep commitment to fostering a sustainable food system in our region.

This report highlights some of the major developments that have occurred on the Garden City Lands this past year including ongoing soil remediation, crop establishment and infrastructure development. We once again express our deep gratitude to The City or Richmond Council and staff and encourage you to come and visit the site.

Please do not hesitate to reach out to anyone on our team with any questions, concerns or ideas.

Sincerely,

Dr. Rebecca Harbut
Chair, Department of Sustainable Agriculture
& Food Systems
www.kpu.ca/agriculture

# Farm Map


Bog crops
(to be
capped with
peat soil)
North Fields
(To be capped when soil
available)
North Pad
3 High
Tunnels
Bulk Material Staging ...
HT 3-Space 1
MG7- Perrenial
Cover Crops
Dome
Market
Garden
Office
Gravel Area (appro

# Soil Management

**Site Preparation and Soil Management**

When KPU explored the possibility of establishing a Research and Teaching Farm on the Garden City Lands, we carried out soil testing in collaboration with the City of Richmond staff. The results of this analysis revealed that there were several locations on the site that had concentrations of metals that were above agricultural thresholds (Appendix A, B and C). This eliminated the possibility of growing crops directly in the soil. To address this issue, the City of Richmond proceeded to implement the recommendation put forward by consultants to cap the contaminated native soil with imported mineral soil. This was followed up with the addition of soil amendments to meet minimum standards for the imported soils that were defined by KPU.

This unconventional approach of capping the native soil with imported mineral soil was desirable to KPU for two reasons: 1) It provided adequate soil depth above the native soil to ensure that the crops do not interact with the native contaminated soil and 2) it presented an opportunity to sequester the carbon in the native peat soils while still allowing the production of food crops on the site.

The southern half of our lease area has been filled and we are looking forward to completing the north side of our fields when suitable imported soil is identified.

# Crop Production

## Organic Certification

The KPU farm has begun the three year process to attain organic certification. This certification process sets out requirements related to soil management, pest management, farm inputs as well as ecological consideration for the farm.

## *Cover Crops*

A critical component of sustainable crop production is the use of cover crops. The use of cover crops contributes to improving soil health, pest management, water quality and minimizing soil erosion. During the 2019 season, approximately 5 acres of our site have been planted to cover crops. These cover crops will be evaluated for different characteristics such as biomass production, root density, weed suppression and soil health.

## *Market Garden*

The south-western portion of the KPU Lease area where our greenhouse, high tunnels and market garden plots are located. The market garden is primarily dedicated to vegetable crop production which requires intensive management. All the plots are irrigated using drip irrigation to optimize efficiency.

# Infrastructure Development

## Geodesic Passive Solar Dome

During the fall of 2018 we began the construction of our geodesic passive solar dome. This is a prefabricated kit that provides greenhouse space that can facilitate year round production without the input of fossil fuel energy. This greenhouse does not require any supplemental energy input. It captures solar radiation and relies on the design to facilitate efficient year-round heating and cooling.

This dome has several features that allow it to function completely off the power grid:

- Geodesic shape optimizes interception of solar energy throughout the day
- A large water tank inside the dome facilitates the storage of heat energy during the day and releases it at night to moderate the temperature in the dome
- Air vents are opened and closed by wax-packed cylinders that respond to the temperature – as the wax heats up it expands and opens the vents and as the wax cools it contracts and closes the vents.
- Solar powered fans facilitate the movement of air throughout the structure to ensure even temperatures.
- The planting beds around the perimeter will have an air vent installed that will draw air from one end of the dome to the other to ensure even temperatures and provide insulation.

This energy-efficient house allows for solar-powered, year-round growing that will be used for early season seedling starts and mid-winter production

As there is a large water tank in the dome, there is a possibility to integrate fish production in the dome at a future date.

# Movable High Tunnels

High tunnels have three main components:

1. Steel hoops covered by greenhouse plastic
2. Roll-up sides to facilitate passive ventilation
3. Built directly over soil to allow for in-ground production

These high tunnels are passively heated structures that harness the energy of the sun to increase the length of the growing season by allowing growers to start production earlier in the spring and carry on later into the fall.

The high tunnels that are being built on the Garden City Lands are also moveable along a track which allows for sustainable soil management as tunnel can be moved to expose soil to natural processes such as precipitation, freezing temperatures and direct sunlight. It also allows growers to optimize the production cycle and ensure cropping rotations can be followed.

KPU is currently working with the permit department to ensure that permit requirements for these structures meet engineering requirements without placing onerous demands on farmers. There will be three 30'x 70' tunnels constructed on the farm.

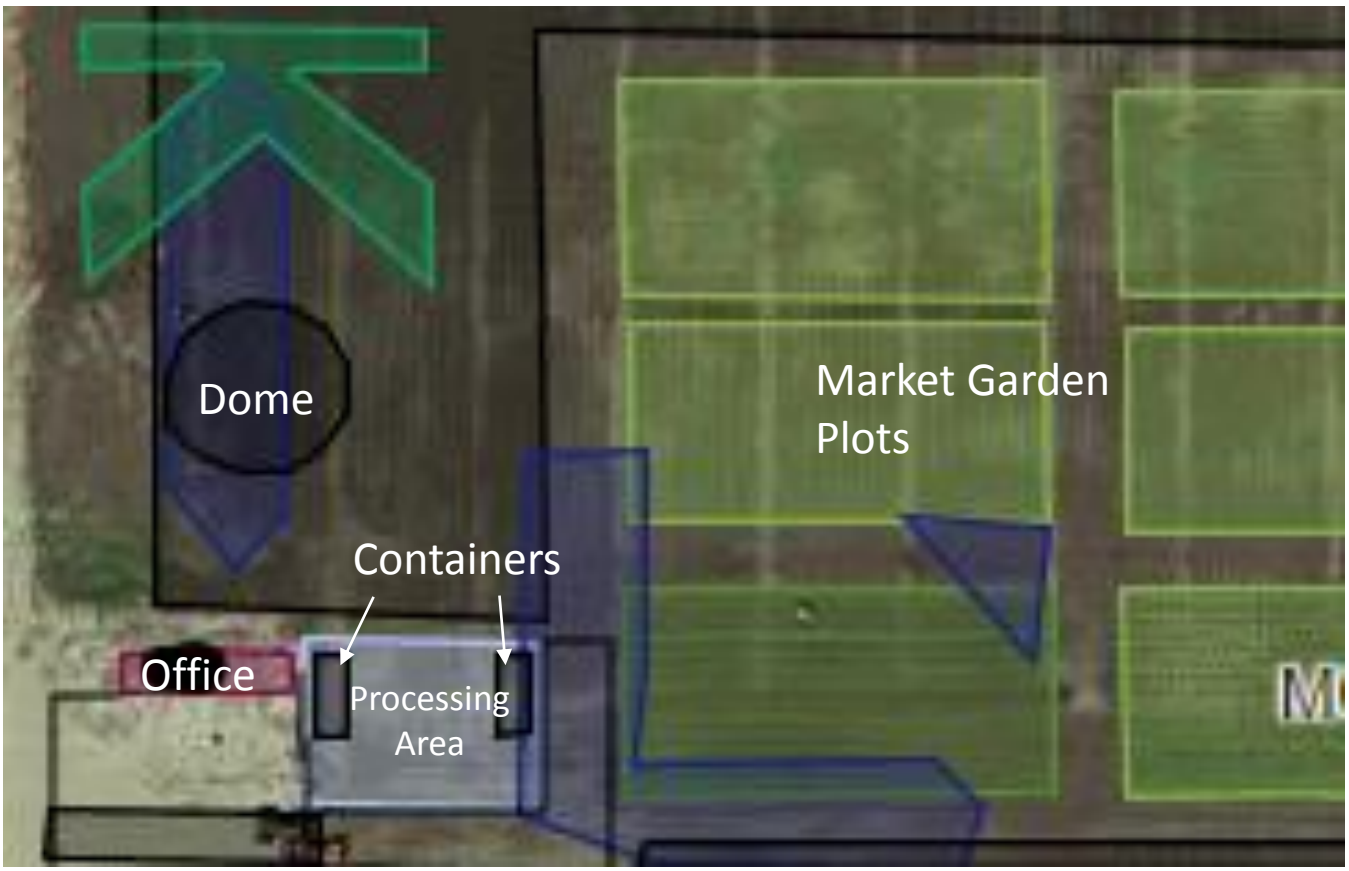
## Shipping Containers and Processing Area

Shipping containers provide a good option for storage of farm equipment such as our walk behind tractor and its implements as well as storage of hand tools.

In-between the containers, there will be a covered processing area with stainless steel sinks and counters for washing produce.

## Farm Office

KPU is currently in the process of procuring and securing permits for a mobile office to provide an office space for the farm. The office will be located on the main gravel pad. The office building is 10’ x 40’.



# Community Engagement

## *Farmers Market at Minoru Plaza*

Our program continues to sell our produce at the weekly Tuesday market (12-4pm). This market has been an important connection with community and has facilitated many learning opportunities for both our students and community members.

## *School Group Tours*

We have recently begun providing tours for school groups and have had a diversity of students visit the farm. We have had several schools that have expressed interest in bringing their classes to the farm and will be exploring the development of experiential learning opportunities for Richmond elementary and high school students.

## *Informal Conversations with Neighbours*

As the community is increasingly using the trails on the Garden City Lands, there have been many conversations with neighbours about what is happing on the farm. There is a great deal of interest in the activities on the farm.

## *Small Farm Sessions*

On March 2nd KPU cohosted a 'Small Farm Session' which was focused on policy and practices that are relevant to small farmers and provided all attendees with a tour of the farm.

## *Polytechnics Canada*

On May 16th KPU Richmond hosted the annual Polytechnics Canada Conference and the Sustainable Agriculture Degree program was highlighted as an outstanding example of the type of unique programing that a community-embedded, Polytechnic University can provide. It was a wonderful opportunity to share the story of the partnership with the City of Richmond.





# Community Engagement

## Upcoming Events:

***Twilight Tours***

From June – October, the community will be welcome to join one of the faculty on a twilight tour of the farm. These tours will be an opportunity for the community to learn about the different activities occurring on the farm as well as providing an opportunity for asking questions and having discussion about food production.

Tours will occur the second Tuesday of every month @ 7:00pm

***BC Seed Gathering***

November 8 and 9th we will be co-hosting the BC Seed Gathering and will be highlighting the seed lab and the farm.

***Farm Fest***

We are looking forward to contributing to another successful Farm Fest on Saturday, August 10, 2019.

## Let's Connect!

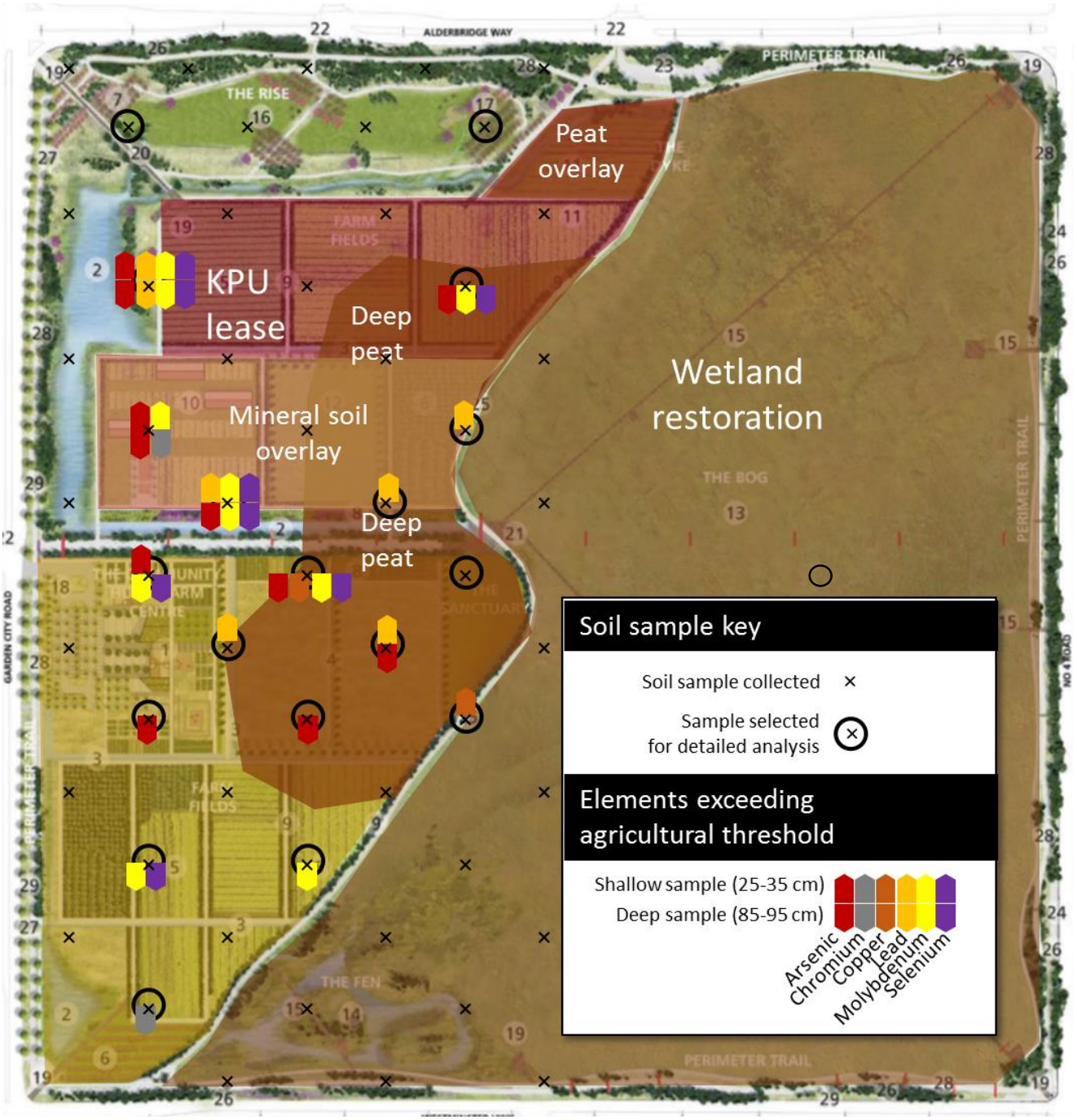
Follow us on social media to stay up to date about what is happening at the farm!

Instagram twitter

**@KPUAGRICULTURE**

# APPENDIX A

Map of the Garden City Lands with the KPU Lease area outlined in red. The x indicates a soil sample location and x indicates locations where detailed analysis for metals was carried out. Samples were collected at 25-35cm and 85-95cm. Coloured bars at sample locations indicate sample locations where elements were found to exceed agricultural thresholds.



# Appendix B: Soil Test Results for metal analysis on Garden City Lands.
# (Sample number refers to location on map in appendx B)

| Metal | Agr threshold | Detection limit | GCL 6 | GCL 9 | GCL 14 | GCL 16 | GCL 21 | GCL 23 | GCL 25 | GCL 26 | GCL 28 | GCL 29 | GCL 30 | GCL 32 | GCL 33 | GCL 35 | GCL 36 | GCL 37 | GCL 42-1 | GCL 43 | GCL 49 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Antimony | **20** | 0.025 | 0.2 | 0.1 | 13.6 | 0.86 | 0.4 | 0.58 | 1.1 | 0.74 | 0.59 | 1.2 | 0.75 | 0.5 | 1 | 0.3 | 0.51 | 0.51 | 0.65 | 0.5 | 0.4 |
| Arsenic | **12** | 0.05 | 8.7 | 3.8 | 19 | 27.5 | 12.8 | 1.7 | 12.6 | 7.78 | 13.5 | 33.7 | 1.7 | 11.4 | 12.8 | 13.3 | 14.5 | 11.6 | 9.59 | 9.6 | 11.8 |
| Barium | **750** | 0.05 | 49.1 | 63.6 | 88 | 59.2 | 83.7 | 12.7 | 82.5 | 67.3 | 80.3 | 51.8 | 19.3 | 67.7 | 69.3 | 62.1 | 76.9 | 79 | 67.7 | 91.7 | 72.7 |
| Beryllium | **4** | 0.05 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.05 | 0.4 | 0.5 | 0.4 | 0.3 | 0.08 | 0.4 | 0.2 | 0.3 | 0.4 | 0.4 | 0.3 | 0.5 | 0.52 |
| Cadmium | **1.4** | 0.005 | 0.0872 | 0.124 | 0.123 | 0.755 | 0.116 | 0.125 | 0.291 | 0.236 | 0.179 | 0.288 | 0.071 | 0.184 | 0.185 | 0.139 | 0.194 | 0.271 | 0.193 | 0.249 | 0.179 |
| Chromium | **64** | 0.05 | 46.6 | 17.7 | 59.3 | 34.7 | 67.2 | 1.6 | 51.3 | 47.4 | 60.9 | 38.1 | 8.1 | 60.6 | 41.8 | 56.9 | 55.2 | 48.2 | 40.9 | 53.3 | 64.1 |
| Cobalt | **40** | 0.05 | 5.83 | 8.09 | 7.64 | 17.8 | 10.1 | 0.7 | 9.49 | 7.5 | 9.08 | 5.83 | 0.76 | 10.1 | 7.56 | 9.24 | 8.95 | 9.26 | 5.82 | 8.24 | 21.7 |
| Copper | **63** | 0.1 | 26.1 | 17.7 | 48.1 | 61.5 | 41.1 | 6.28 | 51.8 | 37.9 | 47.8 | 71 | 7.69 | 44.3 | 28.7 | 44.2 | 40.3 | 48.5 | 47.1 | 48.2 | 42.6 |
| Lead | **70** | 0.01 | 7.99 | 14 | 803 | 13 | 10.8 | 32.1 | 34.2 | 28.6 | 15.7 | 20.8 | 23.7 | 17.6 | 25 | 9.77 | 11.2 | 12.6 | 15.3 | 11.2 | 10 |
| Lithium | **?** | 0.25 | 11.4 | 8.11 | 20.9 | 9.31 | 19.3 | 0.25 | 22.5 | 24.8 | 20.4 | 9.34 | 0.66 | 21.8 | 16.2 | 20.3 | 24.9 | 19.2 | 20.6 | 26.3 | 19.8 |
| Manganese | **?** | 0.5 | 173 | 481 | 194 | 88.7 | 224 | 16 | 192 | 197 | 220 | 78.4 | 11.9 | 237 | 166 | 229 | 226 | 174 | 136 | 192 | 233 |
| Mercury | **6.6** | 0.01 | 0.0427 | 0.0347 | 0.0425 | 0.0435 | 0.0559 | 0.0231 | 0.0412 | 0.0356 | 0.0478 | 0.0545 | 0.0221 | 0.0421 | 0.0352 | 0.0432 | 0.0413 | 0.0351 | 0.0376 | 0.0408 | 0.0457 |
| Molybdenum | **5** | 0.05 | 1.52 | 0.495 | 4.73 | 14.3 | 3.32 | 1.79 | 5.58 | 4.81 | 3.67 | 18.3 | 1.28 | 3.11 | 3.45 | 1.94 | 3.81 | 3.41 | 7.96 | 5.27 | 1.93 |
| Nickel | **45** | 0.1 | 21.8 | 14.1 | 28.9 | 40.9 | 33.6 | 2.7 | 33.1 | 29.4 | 34 | 27.1 | 3.4 | 34.9 | 25.4 | 31.6 | 31.5 | 32.5 | 24.4 | 32.4 | 58.9 |
| Selenium | **1** | 0.1 | 0.5 | 0.3 | 1.1 | 1.5 | 0.84 | 0.57 | 1.2 | 0.84 | 0.85 | 1.6 | 0.5 | 0.78 | 0.74 | 0.1 | 0.74 | 0.7 | 1.2 | 0.88 | 0.6 |
| Silver | **20** | 0.025 | 0.08 | 0.05 | 0.1 | 0.1 | 0.09 | 0.03 | 0.1 | 0.07 | 0.1 | 0.2 | 0.03 | 0.09 | 0.07 | 0.08 | 0.09 | 0.07 | 0.08 | 0.1 | 0.1 |
| Strontium | **?** | 0.05 | 36.4 | 22.9 | 29.8 | 20.8 | 36.8 | 38.6 | 29.9 | 36.6 | 31.4 | 22.9 | 24.3 | 35.9 | 28.8 | 36.7 | 31.5 | 33.7 | 23.9 | 41.7 | 48.2 |
| Thallium | **1** | 0.01 | 0.09 | 0.06 | 0.1 | 0.3 | 0.1 | 0.01 | 0.1 | 0.1 | 0.1 | 0.1 | 0.02 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Tin | **5** | 0.05 | 0.95 | 0.75 | 0.53 | 0.4 | 0.5 | 0.16 | 0.56 | 0.43 | 0.62 | 0.41 | 0.2 | 0.48 | 0.46 | 0.41 | 0.46 | 0.47 | 0.46 | 0.48 | 0.48 |
| Uranium | **23** | 0.01 | 0.81 | 0.4 | 4.3 | 5.22 | 3.5 | 0.2 | 4.6 | 3.8 | 3.8 | 4.2 | 0.3 | 3.2 | 2.1 | 2.9 | 2.6 | 2.5 | 4.1 | 4 | 1.8 |
| Vanadium | **130** | 0.05 | 68.5 | 48.8 | 75.6 | 60.9 | 95.3 | 2.5 | 67.5 | 55.6 | 77.1 | 74.3 | 7.48 | 71.3 | 46 | 80.4 | 63.5 | 56.9 | 51.8 | 67 | 84.2 |
| Zinc | **200** | 0.25 | 46.1 | 77.2 | 67.2 | 44.6 | 82 | 14 | 73.8 | 77.5 | 85.5 | 43.6 | 23.6 | 90 | 60.1 | 81.9 | 76.8 | 76.9 | 52.6 | 68.3 | 105 |
| | | | | | | | | | | | | | | | | | | | | | |
| pH | . | | 4.3 | 6.1 | 4.1 | 3.2 | 4.6 | 3.9 | 3.6 | 3.9 | 4.3 | 3.5 | 3.9 | 3.5 | 3.7 | 4.5 | 3.8 | 3.6 | 4.1 | 3.9 | 4.2 |

# Appendix C: Soil sample locations