Process Improvement Report: To Prevent the Transfer of Invasive Plants

Prepared for:

Envirogreen Technologies LTD.

Prepared by:

Invasive Species Council of BC

Date:

September 16th 2024

Executive Summary

This report evaluates Envirogreen Technologies LTD.'s (ETL) current soil handling and processing procedures to identify potential risks of spreading invasive species, specifically wild chervil, Canada thistle, shiny geranium, tansy ragwort and common tansy. These invasive species, present in the soil to be moved from Abbotsford to Princeton, pose a significant threat due to their ability to establish in various environments and aggressively outcompete native vegetation. Whether these specific species or other invasive species, it is critical to ensure responsible practices are in place to reduce the risk of moving and introducing invasive species into new areas.

Each stage of ETL's process was assessed, from soil loading and transport to thermal treatment and reclamation mix creation, identifying key areas where invasive species could survive or be introduced. Potential risks identified included escaping seeds or plant fragments during transport, survival in untreated feedstock, and contamination during post-treatment handling and reclamation- all of which could result in the spread of invasive species to new areas.

To mitigate these risks, recommendations include:

a. strengthen containment measures during transport

b. conduct regular monitoring of offloading and storage areas

c. use enclosed storage for untreated and treated material

d. Ensure organic matter used in reclamation is certified as invasive-free. Soil samples undergoing germination tests could assist in determining the presence of viable invasive seeds.

These improvements will minimize the risk of invasive species dispersal, protect the surrounding ecosystem, and support ETL's sustainable soil management practices.

Introduction

The objective of this report is to thoroughly evaluate each stage of the ETL's current process, from soil loading and transport to thermal treatment and final reclamation, to identify potential vulnerabilities where invasive species could survive or be introduced. This report provides recommendations for improving ETL's soil loading, transport, receiving**,** and processing procedures to prevent the movement and establishment of invasive species. Some specific species of recent concern are wild chervil, Canada thistle, tansy ragwort and common tansy, which are noxious listed species, while shiny geranium is a provincial containment species. Wild chervil, shiny geranium, and tansy ragwort are not known to exist in Princeton, west Similkameen region, the site of the ETL facility. These invasive plants are easily transported and can be established in a variety of soil and climate types. They are known for their aggressive spread and ability to outcompete native vegetation, and therefore, it is important to ensure they are not introduced into the Princeton and the Similkameen region.

The recommendations provided will focus on minimizing these risks, enhancing biosecurity, and ensuring that the movement and treatment of soil comply with best practices and regulatory standards for invasive species management. This report's recommendations will enhance ETL's soil handling practices so operations do not contribute to the spread of these or other invasive species, thereby protecting local ecosystems and supporting sustainable soil management practices.

Process Overview

The soil receiving and processing at ETL follows a structured, multi-stage process to ensure materials are handled efficiently and safely. The process begins at the source site, where soil material is loaded into sub-contracted trucks using either burrito wrap-style or a custom tarp system. These tarps are pulled over the edges of the truck box and securely fastened to prevent spillage during transport. After securing the load, the material is transported to ETL's facility, ensuring secure delivery over potentially long distances. Upon arrival, the trucks are scaled to record the weight of the incoming material to provide accurate tracking of the volume being processed.

Once scaled, the trucks enter through the facility's front gate, where they proceed to the offloading area. Here, the soil is offloaded into the designated feedstock area, and the material undergoes an initial screening process. This screening step is critical, as it removes larger items such as rootballs, plastic liners, and other oversized debris that may be present. Any materials deemed unsuitable, such as plant parts, nonorganic debris, and large rocks exceeding two inches in diameter, are set aside for secure landfill disposal at a hazardous waste landfill located in Alberta.

The screened material is then transferred to a rotating circular mesh drum (trommel) where it is blended with hazardous materials retrieved from tank bottom mixes from industrial waste reclamation, to create a less hazardous, uniform feedstock mixture for further processing. After blending, the material is moved into a sheltered storage area, where it remains temporarily before undergoing thermal treatment. This storage ensures that the feedstock is secure and protected from environmental factors while awaiting treatment. The feedstock is then fed into

the processing plant, where it is subjected to super-heated temperatures, from 400°C to 1500°C by a direct flame burner oven. This thermal treatment step is essential for neutralizing contaminants in the material and preparing it for safe post-treatment handling.

Following thermal treatment, the material is moved to transfer pads, where it remains until it has been confirmed ‘delisted’—indicating that it is no longer classified as hazardous. Once delisted, the material is blended with organic materials to create a reclamation mix. This final product is used primarily as bulk fill for slope stabilization and reclamation efforts, marking the conclusion of the process.

Figure 1 Map of ETL facility labelled with numbers demonstrating the sequencing of materials entering the facility, being treated, and stored.

Potential Risks & Recommendations

During the assessment of ETL’s soil handling and processing procedures, several key risks were identified at various stages of the process that could lead to the unintentional transfer and spread of invasive plants. All the following recommendations are specific to reducing the spread and establishment of invasive species including, wild chervil, Canada thistle, shiny geranium, tansy ragwort and common tansy.

Invasive plants can reproduce and spread through various mechanisms, including seed dispersal and vegetative reproduction via root or stem fragments. Seed-based reproduction allows these species to produce large quantities of seeds, which are easily spread by wind, water, or human activity, including soil handling operations. For example, tansy ragwort produces seeds with a parachute-like structure (pappus) that facilitates long-distance wind dispersal, significantly increasing the risk of spread, particularly in open environments such as transport and offloading areas[1].

Additionally, root fragments or rhizomes can generate new plants through cloning, making even small pieces of plant material highly viable for establishing new infestations. Canada thistle, for instance, can produce new plants from root fragments as small as 0.5 cm, meaning that even minor contamination of soil during transport or processing can lead to significant spread[2]. Both reproduction strategies—by seed and by vegetative fragments—pose a risk at multiple stages of ETL's operations, particularly during transport, offloading, and storage of untreated material. By recognizing that invasive species have diverse reproductive strategies, requires strong biosecurity measures at each stage of the process to limit the risk of establishment and spread.

Soil Loading and Transport: (1 + 2)

- **Risk:** The initial loading of soil material at the Abbotsford site, even with burrito wrap-style or custom tarps, may not fully prevent the escape of seeds, small fragments, or other viable parts of invasive species during transport. Additionally, material clinging to the exterior of trucks or spillage while securing tarps could inadvertently spread seeds or vegetative fragments along transport routes.
- **Recommendation:**

  1. Ensure vehicles are monitored during the loading and sealing of materials to ensure all materials are fully covered and sealed to prevent plant seeds or plant fragments from escaping during transportation. If any soil, or plant parts fall outside of the sealed area, ensure they are added to the sealed area or left on site.

  2. After the material is loaded, a thorough walk around the vehicle to ensure no loose soil material is attached to the vehicle and remove it prior to movement, if the soil is present anywhere outside of the sealed area clean it off with hot pressurized water, water and brush, or a broom in order of equipment availability[3].

Material Offloading and Screening: (3 + 4)

- **Risk:** Upon arrival at the Princeton facility, soil material offloaded into the feedstock area and screened may still contain viable seeds, root fragments, or

[1] Invasive Species Council of BC, Tansy ragwort factsheet, 2019, https://bcinvasives.ca/wp-content/uploads/2021/01/Tansy-Ragwort_Factsheet_09_04_2019.pdf

[2] Invasive Species Council of BC, Canada Thistle Factsheet, 2019, https://bcinvasives.ca/wp-content/uploads/2021/01/Canada-Thistle_Factsheet_26032019.pdf

[3] Metro Vancouver Regional District & Invasive Species Council of Metro Vancouver, Best Management Practices for Wild Chervil in the Metro Vancouver Region, 2021, https://metrovancouver.org/services/regional-planning/Documents/wild-chervil-best-management-practices.pdf

other propagative parts of invasive species, which could survive and establish in the feedstock area or surrounding site. The screening process to remove large debris (root balls, rocks, other non-fines) could have a high likelihood of plant seeds and small plant fragments could make their way into the mix, or potentially out onto the bare ground in this area of the facility.

» **Recommendation:**

3. After the material is offloaded, a detailed pressure wash of the truck box be done to ensure all soil, seeds, and plant particles are washed out of the vehicle box and will not move or be blown away to a different part of the facility. Alternatively, if pressure washing is not feasible, detailed brushing and inspection of the truck box should be done to prevent movement away from the offloading area. Preferably these materials would be funneled in a catch basin, or containment area that would be easy to clean out, preventing establishment in an offloading area[4].

4. Since there is a gap between offloading and treatment, a site survey of the storage and screening areas should be done at least once a week to determine if any growth has occurred and ensure all plant materials are managed before plant fragments or seeds can spread from the pile[3].

Trommel Blending and Storage: (5, 6, 7)

» **Risk:** The blending of soil with tank bottoms in the trommel and subsequent storage in the feedstock shelter may not effectively neutralize all invasive species seeds or fragments. Storage of untreated material poses a risk if not adequately secured from external environmental factors.

» **Recommendation:**

5. Store untreated material in a sealed, enclosed storage facility.

6. Routine cleaning and maintenance of the trommel and surrounding areas will reduce the risk of seed dispersal[1,4]

Thermal Treatment and Post-Treatment Storage: (8 + 9)

» **Risk:** While thermal treatment effectively neutralizes contaminants, if the process parameters (temperature and duration) are not consistently monitored, invasive species seeds or roots may survive. Additionally, improper storage of treated material before delisting could lead to recontamination.

» **Recommendation:**

7. Ensure heat levels are at or above the minimum requirements to manage the

[1] Invasive Species Council of BC, Tansy ragwort factsheet, 2019, https://bcinvasives.ca/wp-content/uploads/2021/01/Tansy-Ragwort_Factsheet_09_04_2019.pdf

[3] Metro Vancouver Regional District & Invasive Species Council of Metro Vancouver, Best Management Practices for Wild Chervil in the Metro Vancouver Region, 2021, https://metrovancouver.org/services/regional-planning/Documents/wild-chervil-best-management-practices.pdf

[4] Invasive Species Council of BC, Best Practices for Managing Invasive Plants on Roadsides, 2021, https://bcinvasives.ca/wp-content/uploads/2021/01/Weeds_Roads_BMP_Guide-2019-web.pdf

invasive species seeds.

8. After treatment, ensure materials are marked as processed and unprocessed to ensure cross-contamination does not occur. To eliminate the possibility of recontamination from wind-blown seeds or contact with untreated soil, store these two material types away from each other.

Reclamation Mix Creation:

- **Risk:** The blending of delisted (no longer toxic) material with organic matter for reclamation purposes could reintroduce invasive species if the decontamination process was not thorough and resulted in some viable invasive seeds or plant parts
- **Recommendation:**

  9. Source organic materials from certified suppliers to ensure they are free of invasive species. The reclamation mix blending should take place in a controlled, enclosed environment on impermeable surfaces to prevent accidental seeding on the property. Any excess or stockpiled reclamation mix should be stored in covered storage areas or away from untreated materials and vegetation[5]. Regular inspections of storage and application areas will further reduce the risk of contamination during reclamation activities on site.

Overarching Recommendations:

Wherever possible, it is best to treat and manage all invasive species on site to avoid spreading and contamination, Secondly, implement species-specific best management practices before the movement of materials happens[6]. Finally, providing ETL employees and contractors with invasive species training would be beneficial in developing an early detection system and increasing understanding of best practices to reduce the spread of invasive species through all phases of transport and treatment processes.

Conclusion

In conclusion, while ETL has established comprehensive soil receiving and processing procedures, there remain critical areas where invasive species, could potentially be moved. These risks span multiple stages, from soil loading and transport, through offloading, screening, and blending at the Princeton facility, to final reclamation mix creation.

Through this assessment, there are a few areas of risk that have been identified where invasive species could escape containment or be inadvertently introduced into new environments. Specific recommendations have been identified for specific improvements at each stage of the

[5] Invasive Species Council of BC, Best Practices for Managing Invasive Plants on Roadsides, 2021, https://bcinvasives.ca/wp-content/uploads/2021/01/Weeds_Roads_BMP_Guide-2019-web.pdf

[6] Capital Regional District, Shiny Geranium Invasive Species Alert Sheet, 2024, https://www.crd.bc.ca/docs/default-source/es-watersheds-pdf/invasive-species/shiny_geranium_weed_alert_mar2020.pdf?sfvrsn=a5674ecc_9

process, such as enhanced containment measures, routine monitoring, and the use of impermeable surfaces and sealed storage areas. By enhancing current practices, ETL can mitigate the risk of invasive species establishment, safeguard local ecosystems, and ensure compliance with best practices in biosecurity and invasive species management.