

To:	Gerritt Lacey, Solid Waste Manager	Date:	February 20, 2024
c:		Memo No.:	
From:	Sarah Keith	File:	704-SWM.SWOP04801-01
Subject:	New Landfill Feasibility – Chetwynd Area Stage 1: Site Selection – Site Reconnaissance		

1.0 INTRODUCTION

Tetra Tech Canada Inc. (Tetra Tech) was retained by the Peace River Regional District (PRRD) to conduct a new landfill feasibility study (study) with the goal of siting a new landfill in the Chetwynd area.

The current Chetwynd Landfill (site or Landfill) received an operating permit in 1977. The 2021 Design, Operating, and Closure Plan (DOCP) indicates that the estimated closure date is 2030, while the 2022 Annual Report indicates an estimated closure date of 2029¹. Based on the most conservative closure date of 2029, a new landfill cell will be required to be approved and built by 2028.

The scope of work for the project as outlined in the Tetra Tech Proposal entitled “Request for Proposals #20-2023 New Landfill Feasibility Study” dated May 5, 2023, is divided into three stages:

- Stage 1:
 - Site Selection:
 - Desktop evaluation; and
 - Site Reconnaissance.
 - Feasibility Study:
 - Preliminary Technical Investigation.
- Stage 2:
 - Permitting; and
 - Detailed Design.
- Stage 3:
 - Construction; and
 - Commissioning.

It should be noted that the PRRD requested to move the site reconnaissance work from the feasibility phase to the site selection phase of Stage 1 which has been reflected as a change within this technical memo (memo).

The Site Selection – Desktop Evaluation phase of Stage 1 was previously completed to identify locations that, based on a desktop study, have technical characteristics that appear favourable for development of a Municipal Solid Waste (MSW) Landfill in accordance with the British Columbia Ministry of Environment and Climate Change Strategy (BCMECCS) Landfill Criteria for Municipal Solid Waste (the Criteria) (2016). This was detailed in the

¹ Tetra Tech Canada Inc. 2023. *2022 Annual Operations and Monitoring Report – Chetwynd Landfill*.

Tetra Tech Report entitled “New Landfill Feasibility – Site Selection - Landfill Siting Memo” dated November 3, 2023 (Tetra Tech 2023).

This memo undertakes Stage 1: Site Selection - Site Reconnaissance which is intended to build off the Landfill Siting Memo to complete a more detailed surface review of potential landfill development based on visual attributes associated with the environmental conditions as well as geotechnical and overall suitability for landfill operations.

Through the previous desktop evaluation task, four potential sites were identified for site reconnaissance. These are identified as Areas A, B, C2, and L. The location of each area in relation to Chetwynd can be seen on Figure 1. The site reconnaissance occurred on September 18 and 19, 2023. Tetra Tech visually assessed the areas from a stability and constructability standpoint, and to assess the overall site suitability for landfill operations. The site reconnaissance also assessed environmental conditions which may impact siting requirements such as wetland presence, desktop-delineated wetland and watercourse boundaries, and other observations of habitats of sensitive species that may impact the regulatory process.

2.0 REGULATORY CONSIDERATIONS

This section summarizes the relevant regulatory standards for siting a landfill in British Columbia (BC). Relevant regulatory requirements were considered during both the desktop evaluation and site reconnaissance phases of this project.

2.1 Provincial

2.1.1 British Columbia Environmental Management Act

The BC *Environmental Management Act* (EMA)² was enacted in July 2004, combining the previous Waste Management Act and Environment Management Act. The EMA governs solid waste and manages the introduction of waste into the environment by providing an authorization framework and environmental management tools to protect human health and environmental quality.

- Under the *Waste Discharge Regulations* of the EMA, certain industries, trades, businesses, and operations require authorization to discharge waste into the environment. However, even if an industry, trade, business, or operation does not require an authorization, waste discharge must not cause pollution (EMA Section 6 (4)).
- The *Spill Reporting Regulations* of the EMA establishes a protocol for reporting the unauthorized release of substances into the environment as well as a schedule detailing reportable amounts for certain substances.
- The *Hazardous Waste Regulations* of the EMA ensures that the generators, carriers and receivers of hazardous waste handle, store, transport, treat and dispose of hazardous waste in a safe manner. Hazardous wastes must be disposed of properly to ensure human health and environmental protection.

Under the EMA, regional districts are required to prepare and submit a solid waste management plan. The approved solid waste management plan authorizes regional districts to manage MSW in accordance with the plan. The BCMECCS released a guidance document in 2016: the Landfill Criteria for Municipal Solid Waste (herein referred to as “the Criteria”)³. This guidance document outlines best practices for landfill construction, operation, and

² *Environmental Management Act*, SBC 2003, c. 53.

³ BC Ministry of Environment. 2016. *Landfill Criteria for Municipal Solid Waste*. Second Edition.

monitoring. Although the Criteria are a guidance document once they are written into an Authorization or approved within a plan, they are considered to be a requirement.

2.1.2 Landfill Criteria for Municipal Solid Waste

The BCMECCS published the Criteria in 2016 to provide guidance for siting a landfill, among other things. The relevant sections of the Criteria are summarized below.

- Section 3.1 – Land Use
 - *The landfill footprint must not be located within 500 m of an existing or planned sensitive land use.*
- Section 3.2 – Heritage and Archaeological Sites
 - *The landfill footprint shall not be located within 100 m of a heritage or archaeological site.*
- Section 3.3 - Airports
 - *Transport Canada policies generally require that a landfill footprint be located no closer than 8 km from airports.*
- Section 3.4 – Buffer Zone
 - *The buffer zone between the landfill footprint and the landfill site boundary shall be a minimum of 50 m, of which the 30 m closest to the landfill site boundary shall be reserved for natural or landscaped screening (berms and/or vegetative screens). Only the 20 m buffer closest to the landfill footprint shall be used for access roads, surface water management works, leachate management, landfill gas management and monitoring works, firebeaks, and other ancillary works as required.*
- Section 3.5 – Water Supply Sources
 - *The landfill footprint shall be a minimum distance of 300 m from a water supply well or water supply intake and a minimum 500 m from municipal or other high capacity water supply wells.*
- Section 3.6 – Gullies and Depressions
 - *The landfill footprint shall not be located in a gully or depression that acts as a point of water collection during rainfall events unless acceptable diversion works are provided such as interception ditching or other diversion measures are undertaken. Diversion of water through culverts beneath the landfill footprint is not allowed.*
- Section 3.7 – Faults and Unstable Areas
 - *The landfill footprint shall not be located within 100 m of a geologically unstable area.*
- Section 3.8 – Environmentally Sensitive Areas
 - *The landfill footprint must not be located within 100 m of an environmentally sensitive area.*
- Section 3.9 – Surface Water
 - *A landfill footprint shall not be located within 100 m of surface water.*
- Section 3.10 – Floodplains
 - *A landfill footprint shall not be located in a floodplain.*
- Section 3.11 – Shorelines
 - *A landfill footprint shall not be located within 100 m of the sea level maximum high tide or seasonal high watermark of an inland lake shoreline.*

- Section 3.12 – Depth to Water Table
 - *The landfill base shall be a minimum 1.5 m above “groundwater” at all times.*

2.1.3 British Columbia Water Sustainability Act

The BC *Water Sustainability Act* (WSA) is the main provincial statute regulating water resources in BC⁴. The WSA is administered by the BC Ministry of Water, Land and Resource Stewardship (WLRS). Under the WSA, it is an offence to divert or use water, or alter a stream, without formal approval from the Province. The WSA defines “stream” as a natural watercourse or source of water supply, whether usually containing water or not, a lake, river, creek, wetland, spring, ravine, swamp, or gulch. “Stream” is used to describe any watercourse that is a fish habitat, including channelized streams, and ditches. Under the WSA, the Water Sustainability Regulation addresses the requirements to allocate both ground and surface water and identifies the requirements for using water or making changes to a stream.

Two types of approvals for in-stream works can be issued under Section 11 of the WSA. Change Approvals are written authorization required for complex works with substantial impacts. Change Approvals review timelines are influenced by project complexity, agency workload, and Indigenous review/engagement requirements, among other reasons. Notifications are typically used for low-risk works that do not include permanent water diversion, can be completed in a short period of time, and have minimal impacts. Notifications must meet the requirements of Section 39 of the *Water Sustainability Regulation* and comply with any additional conditions set out by a habitat officer. Notifications are issued following a 45-day review period.

2.1.4 BC Wildlife Act

The BC *Wildlife Act* protects most vertebrate animals from direct harm or harassment except as allowed by regulation (e.g., hunting or trapping)⁵. Section 34 of the *Wildlife Act* specifically protects the nests of Eagles, Peregrine Falcons, Gyrfalcons, Osprey, Herons, and Burrowing Owls year-round. This means that a tree or other structure containing such a nest must not be felled, even outside of the breeding season. Section 34 of the *Wildlife Act* also protects the nests of all species of birds when birds or eggs are present in the nest. If a heron or raptor nest, active wildlife den, or species at risk habitat is identified within the project footprint, mitigation and/or compensation plans will need to be developed under the direction of the BC Ministry of Forests.

Vegetated areas within the project footprint will provide habitat for breeding birds during the General Nesting Period, which extends from April 19 to August 24 for the region⁶. To avoid harm to birds and their nests, tree, and vegetation removal (including pruning activities) that may be required for the Project should be conducted outside of the General Nesting Period. If tree removal cannot be avoided during the General Nesting Period, it can only occur following a pre-clearing nest survey conducted by an Appropriately Qualified Professional (AQP). It should be noted that certain raptor species may begin nesting prior to the General Nesting Period, as early as January.

⁴ *Water Sustainability Act*, SBC 2014, c. 15.

⁵ *Wildlife Act*, RSBC 1996, c. 488.

⁶ Environment and Climate Change Canada. 2018. *General Nesting Periods of Migratory Birds*. Available: https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods.html#_03.

2.2 Federal

2.2.1 Fisheries Act

The *Fisheries Act* is the main federal legislation providing protection for all fish, fish habitat, and water quality⁷. The Act is administered federally by Fisheries and Oceans Canada (DFO) and Environment Canada. This Act provides protection against the ‘death of fish, other than by fishing’ and the ‘harmful alteration, disruption or destruction of fish habitat’ (HADD), unless authorized by DFO.

Fish habitat is defined as spawning grounds and nursery, rearing, food supply, and migration areas on which fish depend directly or indirectly to carry out their life processes. This definition indicates that a watercourse (which includes but is not limited to streams, ditches, ponds, and wetlands), which provides water, food, or nutrients to a fish-bearing stream (including marine waters), is considered fish habitat even if it does not contain fish and/or if it only has temporary or seasonal flows. The definition also indicates that not only the watercourse itself but also the vegetated stream side or riparian areas which provide nutrients and shade to the stream are considered fish habitat.

DFO encourages all project proponents to avoid and mitigate the impacts of projects to fish. As part of the professional reliance model, projects near water should be evaluated by an AQP and include documentation of common measures and best practices to avoid or minimize impacts to fish and fish habitat. If a project cannot fulfill DFO’s *Measures to Protect Fish and Fish Habitat* or the scope of the project is not entirely covered under DFO’s *Codes of Practice*, proponents are asked to submit a Request for Review and DFO will work with the proponent to find additional ways to reduce those impacts. If the project cannot be designed to avoid a HADD, a *Fisheries Act* authorization is required.

2.2.2 Migratory Birds Convention Act

Most bird species in Canada are protected under the *Federal Migratory Birds Convention Act* (MBCA)⁸. The MBCA prohibits the disturbance or destruction of (1) a migratory bird, (2) viable eggs of a migratory bird, (3) the occupied nests of any migratory bird, and (4) provides year-round protection to the unoccupied nests of additional bird species listed in Schedule 1 of the Migratory Birds Regulations, 2022.

The MBCA also prohibits the deposit of a substance harmful to migratory birds in waters, or in a place from which the substance may enter waters, frequented by birds. These prohibitions apply wherever a migratory bird or its nest is found (i.e., federal and non-federal lands).

Under the MBCA, most unoccupied nests may be removed without a permit, unless it is a nest of a species listed in Schedule 1 of the regulation, such as Pileated Woodpecker. To destroy or disturb a nest of a bird listed in Schedule 1, the nest needs to be submitted to the online Abandoned Nest Registry, and the nest must be monitored to ensure it remains unused throughout the designated wait time set out in Schedule 1 for that species (between one to three years).

⁷ *Fisheries Act*, R.S.C., 1985, c. F-14.

⁸ *Migratory Birds Convention Act*. 1994, c. 22.

2.2.3 Species At Risk Act

The federal *Species at Risk Act* (SARA) protects plant and wildlife species from becoming extinct or lost from the wild, provides for the recovery of species that are at risk (Extirpated, Endangered, Threatened), and promotes the management of Special Concern species to prevent further loss on federal lands (Government of Canada 2023)⁹¹⁰.

The SARA has a list of general prohibitions that apply to all wildlife species, and their critical habitat, that are listed on Schedule 1 as Extirpated, Endangered, or Threatened (i.e., listed species). These general prohibitions make it an offence to:

- Kill, harm, capture, or take an individual of a species listed in Schedule 1 of SARA as Endangered, Threatened, or Extirpated.
- Possess, collect, buy, sell, or trade an individual of a species listed in Schedule 1 of SARA as Endangered, Threatened, or Extirpated.
- Damage or destroy the residence (e.g., nest or den) or any part of the critical habitat of one or more individuals of a species listed in Schedule 1 of SARA as Endangered, Threatened, or Extirpated (if a recovery strategy has recommended the reintroduction of that Extirpated species into the wild in Canada).

3.0 AREA A

3.1 Background

As outlined in the previous Landfill Siting Memo report (Tetra Tech 2023), Area A was identified due to its transport links, lack of water supply permits, and water wells within the vicinity. Area A has watercourses present that likely preclude the possibility of siting a landfill to the west of Highway 29. However, the area east of Highway 29 has adequate space to potentially site a landfill between two of the watercourses present.

There are no water wells, known habitats of sensitive species, historical resources or parks and protected areas within Area A. The surficial geology present within the selected area is largely “streamlined till ridges” with an area of glaciolacustrine veneer running along Highway 29 in a north to south alignment for much of the central portion of the study area. An alluvial plain associated with a water feature is present to the northwest of the study area, however, it is approximately 4 km away.

Following discussion with the PRRD on the potential sites characteristics, it was determined Area A would be included in the preliminary field reconnaissance portion of the site selection. Figure 2 shows Area A along with points of interest that were identified during the site reconnaissance.

3.2 Visual Landfill Siting and Suitability Observations

The following observations were made for Area A from a landfill suitability standpoint during the site visit:

- Area A is located approximately 11 km north of Chetwynd along BC Highway 29.

⁹ *Species at Risk Act*, SC 2002, c 29.

¹⁰ Government of Canada. 2023. *Database of wildlife species assessed by Committee on the Status of Endangered Wildlife in Canada* [COSEWIC]. Retrieved from: <https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry.html>. Accessed November 31, 2023.

- The prospective site is approximately 390 Ha and was split by the highway resulting in an eastern half and a western half of the site.
- The eastern half is generally higher in elevation than the highway while the western half was generally lower in elevation than the highway.
- The site is mostly a densely forested area with localized overgrown cut blocks from previous logging.
- Tetra Tech traversed from the highway in the middle of the site towards the northeast corner.
 - The site gains elevation quickly from the highway heading east, then transitions to a more moderately sloped area gaining elevation towards the east across the majority of this eastern half. The site seems to plateau in the middle along the east boundary then gently slopes downwards to the north and south along the east boundary.
 - Tetra Tech crossed the mapped watercourse features as identified in the Landfill Siting Memo (Tetra Tech 2023) for Area A. The watercourse features, although minor, was observed and was noted as dry and mostly vegetated at the time of the reconnaissance (Photo 1 and Photo 2).



Photo 1: P15 – Small Dry Watercourse Feature



Photo 2: P15 – Small Dry Watercourse Feature

- From the northeast corner looking south, Tetra Tech observed the elevation increased towards the plateau noted previously. With the tree coverage it was difficult to determine the steepness of this elevation gain but based on visual observations from a distance, this may be a steep ridge. Obtaining surveyed topography (Lidar) of this site may be advantageous to better determine these slopes.
- Tetra Tech traversed from the south boundary at the highway in a northeast direction to assess the southeast quadrant of Area A.
 - This area was very densely forested.
 - The initial slope from the highway was quite steep.
 - Tetra Tech crossed an unmapped drainage feature in the southeast quadrant. This feature was situated east-west towards the highway and was very similar to the mapped drainage feature described earlier. Similarly, this feature was observed as dry at the time of the reconnaissance (Photo 3 and Photo 4).



Photo 3: P42 – Small dry unmapped drainage feature

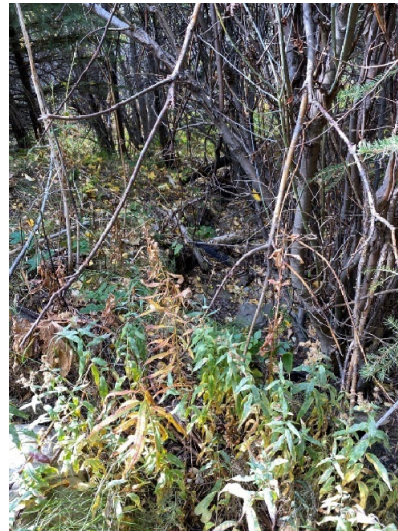


Photo 4: P42 – Small dry unmapped drainage feature

- An isolated grassy area or potential unmapped wetland was noted within this southeast quadrant (Photo 5 and Photo 6).



Photo 5: P45-48 – Potential Unmapped Wetland



Photo 6: P45-48 – Potential Unmapped Wetland

- Tetra Tech assessed the two mapped watercourses which run through the highway. In both cases, no obvious drainage course extending outwards from the highway was noted. The highway has created parallel ditch features which is to be expected. A culvert was found at the northern feature extending under the highway. In both cases, the highway ditches and culverts were dry at the time of the reconnaissance.
- Tetra Tech assessed the west half of the area with the use of an unmanned aerial vehicle (UAV).
 - The western half generally seemed to be a lower lying area with increased downed trees as compared to the eastern half. This may represent a typically softer and wetter surface. This area can be seen in Photo 7.
 - Deadman Creek is situated through the northwest quadrant flowing northward, and was ground truthed during the site reconnaissance. A small hut was noted along this watercourse near the north boundary of Site A. This watercourse can be seen in Photo 8.
 - The mapped watercourse which extended from the southwest quadrant was less obvious with the UAV, however, a small drainage feature was noted. This feature showed signs of surface water from the aerial view and can be seen in Photo 9.



Photo 7: Western Half of Area A



Photo 8: Watercourse in the Northwest Quadrant of Area A



Photo 9: Mapped Watercourse in the Southwest Quadrant of Area A

Overall, the potential suitability for a landfill based on the site reconnaissance is limited to the east half of Area A. The presences of watercourses in the west half of the site along with higher potential for low-lying wet areas and/or shallow groundwater would limit the available footprint due to necessary setbacks, constructability, and the ability to maintain a landfill with a minimum separation of 1.5 m above the seasonally high water table.

The majority of the east half of the site, after the initial elevation gain from the highway, seems to have a more gradual slope that would be suitable for landfill development. Along with no noted permanent watercourses, it is highly probable that a portion of the area would be considered suitable from a geotechnical stability and landfill suitability standpoint. As previously indicated, obtaining detailed ground surface topography would be advantageous for determining the actual slopes or the presence of a steep ridge.

3.3 Environmental Observations

The following observations were made for Area A from an environmental standpoint during the site visit:

- Vegetation observed during the site visit along the eastern half of the area was typical of the white spruce-aspen-step moss association within the Boreal White and Black Spruce moist warm (BWBSmw) biogeoclimatic zone (Photo 10). A detailed inventory of plant species observed was not conducted but forest stands on the eastern half of the area differed from the western half. The eastern half of the area consisted of dry mixed forest dominated by mature trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), and white spruce (*Picea glauca*), while the western half consisted of wet spruce forest dominated by white and black spruce (*Picea mariana*). Sections of forest within the eastern half of the area have been harvested and replanted with lodgepole pine (*Pinus contorta*).

- The forest stand consisted of numerous large (>40 cm diameter at breast height [DBH]) deciduous trees. There was suitable nesting habitat for Pileated Woodpecker (*Dryocopus pileatus*, [PIWO]) present.
 - An adult PIWO was observed in the northeast portion of the area.
 - There is a high risk of PIWO nest cavities being present within this area. Before clearing, a PIWO nest cavity survey should be conducted. Trees containing nest cavities (in use or abandoned) cannot be cleared until the nest is determined to be unoccupied for three years.
 - All tree and vegetation removal should be conducted outside of the General Nesting Period for breeding birds (April 19 to August 24).
- Though no nests from species listed in Section 34 were found, they may become established before clearing.
 - Before clearing, a stick nest survey should be conducted. Trees containing nests of species listed in Section 34 would require further permitting to be removed.
- Deadman Creek (watershed code 230-744800-51600) is mapped through the northwest corner of the area (Photo 8). Several small, mapped tributaries run from east to west across the area. Deadman Creek is the only watercourse in the site documented to be fish-bearing. A reference map of the watercourses noted during the site reconnaissance can be seen on Figure 2.
- Vegetation along the western half of the area changes from deciduous-dominated woodland to more dense spruce forest which indicates the presence of water. UAV imagery showed evidence of standing water through large sections of the site as seen above in Photo 9.
 - There is a higher likelihood of wetlands being present throughout the western half of the site. The encroachment of wetlands would constrain landfill location and could require permitting/compensation under the BC WSA.
 - The proximity of watercourses in the western half of the site to Deadman Creek increases the likelihood that they support fish and fish habitat under the *Fisheries Act*.
- The southeast tributary of Deadman Creek that is mapped through the east half of Area A consists of a small ephemeral channel, which was dry during the assessment (Photo 11). In addition, no culvert or signs of a watercourse were found where this tributary is mapped to cross the highway.
 - This portion of the channel is a 'stream' under the BC WSA and could indirectly support fish and fish habitat under the *Fisheries Act*.
- There were no obvious signs of a watercourse (distinguishable channel, suitable substrates, flowing water, etc.) at the mapped location of the northeast tributary of Deadman Creek. In addition, no culvert or signs of a watercourse were found where this tributary is mapped to cross the highway.
 - In the eastern half of the area, these features may not be considered 'streams' under the BC WSA and may not support fish and fish habitat as defined under the *Fisheries Act*.
- There were two unmapped ephemeral channels found north of the northeast tributary. These channels were dry at the time of observation and had poorly defined banks with minimal gravel substrate (Photo 12).
- Other mapped tributaries in the northeast corner of the site were not accessible for the assessment and based on the observations recorded at the other tributaries, these are likely ephemeral and poorly defined within the site boundaries.
- A more detailed watercourse assessment is recommended to identify suitable setback distances, if applicable.



Photo 10: Typical Tree Community Within Area A



Photo 11: P42 - Southeast Tributary of Deadman Creek



Photo 12: P30 - Ephemeral Channel Near the Northeast Tributary of Deadman Creek

From an environmental risk and permitting perspective, the eastern half of Site A appears to have fewer constraints than the western portion for a landfill based on the limited site reconnaissance. The eastern half has fewer aquatic areas and avoids Deadman Creek. The tributaries of Deadman Creek that run through the eastern half of the site were dry during the site reconnaissance and it's likely that only the southeast tributary would be subject to permitting and/or setback distances. A more detailed watercourse assessment is recommended but permitting under the BC WSA and Fisheries Act is expected to be minor. The biggest environmental challenge is the large, forested areas of the eastern half of the site that provide suitable habitat for PIWO nest cavities. While the western part of the site was not visited in detail, it is expected to also provide suitable habitat for PIWO nest cavities. As a result, there is a risk that one or more nest cavities could be found, creating permitting uncertainty. The presence of watercourses and other wet areas throughout the western half of the site would require more extensive permitting and necessary setbacks from the watercourses make this western half of the site a less desirable landfill location.

4.0 AREA B

4.1 Background

Area B is located directly north of the existing landfill. This Area was initially chosen as a landfill expansion may potentially be an easier path to approval.

There is a water feature that runs through the existing landfill and this area. There are also three water wells within private land to the west, east, and northeast of the area. However, the wells are at a distance greater than the Criteria siting requirement limits. There is also an agricultural land reserve approximately 250 m to the east of the area. There are no known habitats of sensitive species, historical resources, or parks and protected areas within Area B.

Surficial geology present in the area is largely streamlined till ridges with a glaciolacustrine plain to the east, and an alluvial fan to the east-northeast however, this alluvial fan is further than the required 100 m distance from the potential site.

The sites characteristics were discussed with the PRRD and it was determined Area B would be included in the initial site investigation. Figure 3 shows Area B along with points of interest that were identified during the site reconnaissance.

4.2 Visual Landfill Siting and Suitability Observations

The following observations were made for Area B from a landfill suitability standpoint during the site visit:

- Area B is located directly north of the existing Chetwynd Landfill approximately 5 km northeast of Chetwynd on the east side of BC Highway 29.
- The prospective site is approximately 10 Ha.
- The area is forested with moderate undergrowth and brush beneath the canopy.
- Area B is located east of the highway and is situated on a downward slope extending eastwards away from the highway.
- Tetra Tech accessed the area from the existing landfill and traversed from the southwest corner towards the middle of the area, then to the southeast corner.
 - The topography west of the area appeared to have a relatively steep slope down from the highway extending to inside the western boundary. The topography leveled out inside the western boundary and the majority of the site seemed to be a gently sloped undulating topography, and likely quite suitable for landfill development. Photo 15 shows an aerial photo (looking north) of the site providing a sense of the general topography and location compared to highway. Photo 16 is taken from the same location looking south towards the active landfill.
 - The topography drops off at some point to the east. Based on visual observations through the tree coverage, this seems to be beyond the eastern boundary (similar to the active Landfill), however, it was not obvious how far beyond the east boundary this occurs. As shown in Photo 16, the steeper drop off can be seen as a valley further east of the site. Similar to Area A, it would be advantageous to obtain detailed ground surface topography for the potential site and the immediate area around it to confirm no unobserved slopes would reduce the suitability for landfill construction.
 - No watercourses or water bodies were observed, nor were any mapped that needed to be ground truthed.

- The area within the active Landfill just north of the filling area has a mapped drainage feature. Although no obvious watercourse was observed, there were two discrete low-lying areas likely classified as wetlands (or similar), and a very deep cut drainage or erosion feature was noted east of one of the on-site retention ponds. Large pieces of excavated bedrock were noted to be placed in this drainage feature adjacent to the active landfill.
- Shallow bedrock is likely due to the presence of an outcropping bedrock layer noted along the western boundary of the active site.



Photo 15: Site B Looking North (Highway to the West)



Photo 16: Site B Looking South (Active Landfill in background)

Overall, this site seems to be a suitable choice for landfill development. From the site reconnaissance there were no discernable features that would limit the development and seemed to have a more suitable topography than the existing Chetwynd Landfill to the south.

The key benefits of this site include the ability to 'laterally expand' the existing landfill to optimize airspace, and likely would result in a more straightforward public consultation process. A few elements that should be considered or further investigated include:

- Review of the detailed ground surface topography to confirm no abrupt changes in the topography.
- Assuming similar geology to the existing Chetwynd landfill, there is a high probability of shallow bedrock which can limit the available overburden materials for use during construction activities.

4.3 Environmental Observations

The following observations were made for Area B from an environmental standpoint during the site visit:

- Area B consisted of an open deciduous forest typical of the white spruce-aspen-step moss association within the BWBSmw biogeoclimatic zone. Young trembling aspen (*Populus tremuloides*) was the dominant tree species and nootka rose (*Rosa nutkana*) was the dominant shrub species observed.
- The forest stand consists of young (<40 cm DBH) deciduous trees. Suitable nesting habitat for PIWO is limited. The typical forest stand within the area can be seen in Photo 17.
 - Before clearing, a PIWO nest cavity survey should be conducted. Trees containing nest cavities (used and abandoned) cannot be cleared until it is determined to be unoccupied for three years.
 - All tree and vegetation removal should be conducted outside of the General Nesting Period for breeding birds (April 19 to August 24).
- Though no nests of species listed in Section 34 were found, they may become established before clearing.
 - Before clearing, a stick nest survey needs to be conducted. Trees containing nests of species listed in Section 34 would require further permitting to be removed.

- No aquatic features were observed during the site reconnaissance within the site boundaries, but a wetland and watercourse were identified in the desktop search and are located immediately west of the site boundaries.
- A watercourse and adjacent marsh wetland (Photo 18) are found between Area B and the existing Chetwynd landfill. This area would likely be disturbed if Area B was chosen as a future landfill location.

From an environmental risk and permitting perspective, Area B appears to have few constraints for the development of a new landfill based on the limited site reconnaissance. There are no aquatic features (watercourses, wetlands, lakes, etc.) within the site boundaries, with only a small portion of the site overlaps with the 100 m buffer around the watercourse to the south of the site boundary. The forest within the area is too young to support PIWO nest cavities.



Photo 17: P33 - Typical Forest Stand Within Area B



Photo 18: Marsh Wetland South of Area B

5.0 AREA C2

5.1 Background

Area C2 is within an area (Area E) and was noted by the PRRD due to the presence of a closed landfill and industry in the area. It is approximately 10.6 km south of the existing landfill. The overall area was reduced to Area C2 as there were numerous limitations due to siting issues outside of the reduced area, including private landowners, Provincial Crown land, water features, and an alluvial fan.

Following the reduction of Area E to C2, it was determined there were no known habitats of sensitive species, historical resources, or parks and protected areas within Area C2. Surficial geology in the study area is largely till veneer. As previously mentioned, there is an alluvial fan, however, Area C2 is further than 100 m from it.

After discussion with PRRD, it was determined Area C2 would be included in the site reconnaissance if there was adequate time following the investigation of Areas A, B, and L. This site was included in the site reconnaissance field work. Figure 4 shows Area C2 along with points of interest that were identified during the site reconnaissance.

5.2 Visual Landfill Siting and Suitability Observations

The following observations were made for Area C2 from a landfill suitability standpoint during the site visit:

- Area C2 is located approximately 16 km southeast of Chetwynd along the Lone Prairie Road.
- The prospective site is approximately 400 ha.

- The area is split into a northern half and a southern half by the Lone Prairie Road.
- Access to the area is from the intersection of Lone Prairie Road and BC Highway 29. This road can be seen in Photo 19. The site is approximately 4 km east from this intersection along the Lone Prairie Road, which is a steep gravel road. Tetra Tech assessed the grade of this gravel road at three locations. The road grades were measured at approximately:
 - At kilometer 1 from Highway 29, 11%;
 - At kilometer 1.5 from Highway 29, 13%; and
 - At kilometer 2.3 from Highway 29, 12%.
- The prospective site is densely forested. An area in both the north and south half were noted as having been previously logged; however, were overgrown with brush and undergrowth at the time of the reconnaissance.
- Tetra Tech accessed the site from the Lone Prairie Road; however, due to the dense forest, access was limited.
- The north half of the area is dominated by a steep slope gaining elevation towards the northwest. This steep slope was visually assessed to not be suitable for landfill development. The grade was not determined; however, it is likely greater than 10% on average which is generally not recommended for landfill development due to higher risk of slope instability. The northern boundary of the site was noted to drop off at an even steeper grade towards Pine River situated approximately 1 km north and northwest of the site. These abrupt changes in elevation near the northern boundary created a narrow plateau at the high point of the site. This area can be seen in Photo 20 along with the drop off towards Pine River northwest of the site (Photo 21).

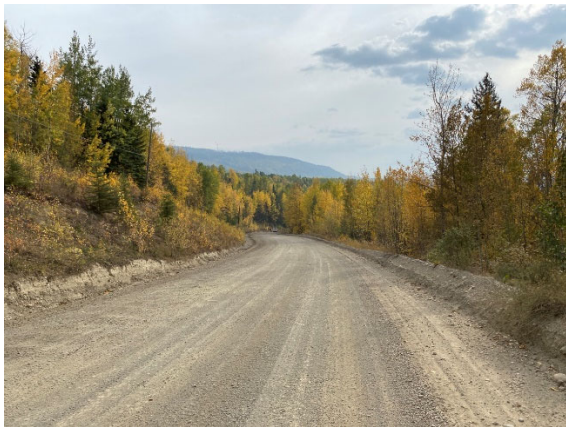


Photo 19: Lone Prairie Road to Access the Area



Photo 20: Steep Slopes in Area C2



Photo 21: Looking Northwest - Drop off to Pine River

- The south half of the area is dominated by a valley that paralleled the Lone Prairie Road approximately 150 m away from this road. An old logging road was noted along the opposite (southern) side of this valley. From this feature, the topography seemed to continue to gain in elevation towards the southern boundary of the site. Although the grade seems to be less steep than the grades north of the Lone Prairie Road, they are still considered steep for landfill development. The valley was well defined and looked to be the widest at the western boundary of the area, south of Lone Prairie Road.
- A mapped watercourse was ground truthed by Tetra Tech but was noted as dry at the time of the reconnaissance. Tetra Tech traversed across the valley and noted at the lowest point in the valley a fairly steep and well-defined drainage feature with a scoured bottom. It seems this mapped watercourse follows the valley feature described above.
- While traversing towards this mapped watercourse, a small wet area approximately 35 m south of Lone Prairie Road was noted, which contained standing water. The origin of this watercourse appeared to be from a groundwater spring further uphill near the adjacent road.

Overall, this site is not considered suitable for landfill development based on the steep slopes noted across the narrow plateau in the north half and the valley in the south half. The noted small watercourse also points to potential shallow groundwater.

5.3 Environmental Observations

The following observations were made for Area C2 from an environmental standpoint during the site visit:

- Area C2 is covered with a matrix of mixed boreal forest of various age classes (Photo 22). Large areas of the site have been logged, with the area naturally regenerating a mix of lodgepole pine, white spruce, and aspen. Large veteran trees remain sparsely scattered throughout harvested areas, and unharvested areas contain mature spruce and aspen forest.
- The southern half of the site contains several wildlife trees that were retained during previous logging. These wildlife trees are large (>40 cm DBH) deciduous trees in varying stages of decay that provide suitable PWIO nesting habitat.
 - A possible PIWO nest cavity was found in one of these trees as seen in Photo 23.
 - Before clearing a PIWO Nest Cavity survey must be conducted. Trees containing nest cavities (used and abandoned) cannot be cleared until it is determined to be unoccupied for three years.
 - All tree and vegetation removal should be conducted outside of the General Nesting Period for breeding birds (April 19 to August 24).
- Though no nests of species listed in Section 34 (raptors) were found, they may become established before clearing. The wildlife trees that are found throughout the southern half of the site would provide good nesting locations for Section 34 species.
 - Before clearing, a stick nest survey would need to be conducted. Trees containing nests of species listed in Section 34, would require further permitting to be removed.
- The only documented waterbody within the site is a mapped but unnamed watercourse (watershed code 234-440600-86600). This watercourse is mapped through the southern half of the site, draining from east to west. This unnamed watercourse is not documented as fish-bearing but is a tributary of the Pine River, which is fish-bearing.
- The unnamed watercourse contained isolated pockets of water during the site reconnaissance. It also had well-defined channel banks and contained cobble substrate, indicative of a stream.
 - This watercourse is a 'stream' under the BC WSA and at least indirectly supports fish and fish habitat as defined under the *Fisheries Act*.

- Portions of smaller mapped watercourses (and/or their 100m setbacks) overlap with the site boundary.
- Areas directly adjacent to the unnamed watercourse had the vegetative community change to support more hydrophilic species, indicating wetland presence (Photo 24). This vegetative community change was observed near an area of standing water approximately 35 m south of Lone Prairie Road.
 - To support a WSA permit application, a more detailed wetland assessment would be required.



Photo 22: Example of Trees Found in the Northern Half of Area C2



Photo 23: Potential PIWO Nest Cavity found in Area C2



Photo 24: View of Vegetative Change Indicating Wetland Presence in Area C2

From an environmental risk and permitting perspective, Area C2 is not a preferable location for construction of a new landfill. The southern half of the site has a well-defined watercourse and areas adjacent to the watercourse could be classified as wetland. In addition, the southern half of the site has several large wildlife trees that provide highly suitable habitat for PIWO nest cavities, with one potential nest cavity observed during the site reconnaissance visit. As a result, the risk that a suitable PIWO nest cavity is found within the site is high. These attributes present several regulatory challenges that will limit the area where a future landfill could be located. The northern half of the site would need to be investigated more sufficiently, but the older forest present provides suitable habitat for PWIO nest cavities which is a regulatory risk.

6.0 AREA L

6.1 Background

Area L was identified by PRRD as a potential site. It is located along Jackfish Lake Road. Air photo resolution is poor; however, the area appears to be flat with little grade. The Area is Crown Land but a 500 m residential buffer reduces potential developable area.

There is a relatively complex pattern of development constraints, such as private residences in the area and rail line running through the site, and there are no groundwater abstraction wells in proximity to this area. Surficial geology is predominantly Glaciofluvial Plain and Glaciofluvial Hummocky Terrain.

This Area was included in the Site Reconnaissance at the request of PRRD. Figure 5 shows Area L along with points of interest that were identified during the site reconnaissance.

6.2 Visual Landfill Siting and Suitability Observations

The following observations were made for Area L from a landfill suitability standpoint during the site visit:

- Area L is located approximately 20 km northeast of Chetwynd along Jackfish Lake Road. The majority of the area is located on the west side of the road. Only this section of the area would be suitable due to the presence of private property on the east side of the road.
- The prospective site is approximately 440 Ha including the area located on the east side of the road.
- A rail line is situated near the eastern boundary of the site that parallels the Jackfish Lake Road. The rail line is located on the west side of the road and can be seen in Photo 25.
- Tetra Tech accessed the site at a rail crossing where it was clear that this crossing is used for cattle access and grazing within the site. Photo 26 displays one of the many cattle trails throughout the site. A fenced area and gate were noted west of the rail line adjacent to the crossing.
- The area is mostly forested, however, has been used as a cattle pasture which has removed most of the undergrowth through much of the eastern half of the site. The western half is less disturbed and was noted to have moderate undergrowth.
- Tetra Tech traversed the area from the rail crossing and completed a loop that covered the majority of the potential site.
 - The area was generally flat with undulating topography with no discernible high point or low point. Based on Google mapping, the northeast corner is believed to be the low point and the southwest corner is believed to be the high point of the area. This is counterintuitive based on the presence of a large mapped wetland approximately 300 m northwest of the northwest corner, as well as Halfmoon Lake and Jackfish Lake located approximately 1.3 km southwest of the southwest corner.
 - The undulating topography was evident due to isolated low-lying wet areas most of which either contained water at the time of the reconnaissance or were marshy and muddy. It was clear that cattle use these areas as a water source. Based on visual observations, these areas did not seem to drain nor were they connected overland to one another. Some of these areas were mapped as wetlands while others were not.
 - A mapped watercourse orientated east to west was ground truthed as not present at various locations across the site. No discernable drainage feature or watercourse (either wet or dry) were noted through the site. This mapped feature included a small waterbody which was ground truthed as one of the mapped

wetlands. Photos 27, 28, and 30 show this mapped wetland and no observable watercourse associated with these features.



Photo 25: Rail Crossing in Area L



Photo 26: Overview of Area L and a Cattle Trail



Photo 27: Open Water Wetland

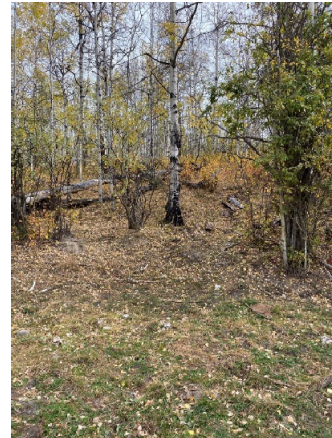


Photo 28: No Observable Mapped Location of Water Course

Overall, there is little concern regarding the suitability of this site for development of a landfill. There are no limitations because of slopes, permanent watercourses, and from a general geotechnical stability standpoint. A few key elements that should be considered or further investigated include:

- The proximity to private properties to the east.
- The current use of this property is for cattle pasture.

6.3 Environmental Observations

The following observations were made for Area L from an environmental standpoint during the site visit:

- The vegetation observed within Area L was typical of open rangeland in the BWBSmw zone. A detailed inventory of plant species observed was not conducted but the boreal forest stand was dominated by trembling aspen (Photo 29). Due to the heavily grazed nature of the site, shrubs were sparse.
- A Canada Warbler (*Cardellina canadensis*) occurrence was documented approximately 280 m north of the site boundary.

- Area L is not located on federal land but provides suitable nesting habitat. All tree and vegetation removal should be conducted outside of the General Nesting Period for breeding birds.
- The forest stand consisted of smaller deciduous trees that could provide nest habitat for various birds. Some deciduous trees are large enough to support suitable PIWO nesting habitat (>40 cm DBH).
 - There is a possibility of PIWO nest cavities being present within this area. Before clearing, a PIWO Nest Cavity survey must be conducted. Trees containing nest cavities (in use or abandoned) cannot be cleared until it is determined to be unoccupied for three years.
- Though no nests of species listed in Section 34 were found, they may become established before clearing.
 - All tree and vegetation removal should be conducted outside of the General Nesting Period for breeding birds (April 19 to August 24).
- Six wetlands were found within the site boundaries. There was no observed overland flow and we determined that the wetlands are not directly connected. The approximate locations of each wetland can be seen on Figure 5.
- The six wetlands observed with aerial imagery were ground truthed within the site boundaries. The desktop delineation of each wetland was confirmed to be accurate. Each of these wetlands were degraded by cattle grazing. An example of an open water wetland and marsh wetland found in the area can be seen in Photo 30 and Photo 31 respectively.
 - Encroachment and or loss of wetlands could require permitting and compensation under the BC WSA. A more detailed wetland assessment could be required.
- The advanced degradation made it challenging to identify the vegetation community surrounding the wetland. The eastern two wetlands are likely classified as marsh and the remaining four as shallow open-water wetland.
- The watercourse mapped from east to west along the centre of the site was not found. There were no signs of a watercourse (distinguishable channel, flowing water, etc.) at the mapped location.
 - No location constraints or permitting is expected for this mapped feature.



Photo 29: Typical Forest within Area L



Photo 30: Example of the Open Water Wetlands found in Area L



Photo 31: Example of the Marsh Wetlands found in Area L

From an environmental risk and permitting perspective, Area L provides a less favourable option for a landfill based on the limited site reconnaissance. The largest concern is the presence and distribution of wetlands throughout the site which restrict the area available for landfill placement. Further, a more detailed wetland assessment to support permitting and compensation under the BC WSA will be required if the landfill encroaches into the setbacks. The forested areas of the area are young, mainly consisting of smaller deciduous trees, which provide limited PIWO nesting habitat. Nonetheless, a few larger veteran trees were observed, therefore a PIWO nest cavity survey would be required, but the risk that a nest cavity is found within the site is low. The area is already disturbed by heavy cattle grazing throughout the site, so it provides less habitat value for surrounding wildlife.

7.0 RECOMMENDATIONS AND NEXT STEPS

Tetra Tech recommends the following for each of the Areas discussed:

- Area A – The western half of the area has multiple watercourses that would limit the development of a landfill and is therefore, not recommended. The eastern portion, however, has no apparent permanent watercourses, and appears suitable from a geotechnical stability standpoint. There is risk that one or more nest cavities are within the area which create permitting uncertainty. A detailed ground surface survey is recommended to evaluate the slopes within the eastern portion of the area to better evaluate the surface topography.
- Area B – This area has no apparent limitations for constructing a landfill and has the potential to allow a lateral expansion of the site which may simplify the approval and public consultation process. There is one portion of the area that would be within a 100 m buffer zone from the nearest watercourse, however, this would not significantly limit the available space for the landfill. A detailed ground surface survey is recommended to evaluate the slopes along the western boundary of the area.
- Area C2 – This area is likely not suitable for a landfill due to the steep slopes, potential shallow groundwater, well-defined watercourse running through the area, and the presence of large wildlife trees. No further action is recommended.
- Area L – From a landfill suitability perspective, this area is likely suitable for development. There are no limitations due to steep slopes and the geology appears favourable. However, the presence of wetlands on site would limit the area available for the landfill. If this area is further pursued, a ground surface survey and a detailed wetland assessment are recommended to determine where landfill development is possible.

7.1 Archeological Overview Assessment

It should be noted that given the site reconnaissance was moved to the site selection phase and based on the number of sites chosen for site reconnaissance the archeological overview assessments (AOA) were not completed at this stage. A desktop AOA should be conducted for each site chosen to advance to Site Feasibility.

7.2 Preliminary Technical Investigation

Tetra Tech recommends that once the memo has been reviewed and a decision made on which sites to advance to Site Feasibility, that a preliminary technical investigation be advanced. It is anticipated that the technical investigation would be undertaken in Spring 2024 and depending on the site and available information include:

- Advancement of up to eight (8) geotechnical boreholes with Standard Penetration Test (SPT) testing to a maximum depth of 10 m.
- Installation of three (3) groundwater piezometers to characterize depth to groundwater within the cell design or waste footprint area.
- Laboratory testing to determine the engineering properties of the site's soils. This allows a preliminary assessment to determine the required liner systems and identify conditions that may inhibit landfill construction.
- Interpretation of the data and preparation of a summary geotechnical report.

8.0 LIMITATIONS OF REPORT

This report and its contents are intended for the sole use of Peace River Regional District for the accuracy of any of the data, the analysis, or the recommendations contained or referenced in the report when the report is used or relied upon by any Party other than Peace River Regional District or for any Project other than the proposed development at the subject site. Any such unauthorized use of this report is at the sole risk of the user. Use of this document is subject to the Limitations on the Use of this Document attached in the Appendix or Contractual Terms and Conditions executed by both parties.

9.0 CLOSURE

We trust this technical memo meets your present requirements. If you have any questions or comments, please contact the undersigned.

Respectfully submitted,
Tetra Tech Canada Inc.

704-SWM.SWOP04801-01
704-SWM.SWOP04801-01
704-SWM.SWOP04801-01

Prepared by:
Taylor Szuba, E.I.T.
Project Engineer-in-Training
Solid Waste Management Practice
Direct Line: 306.850.6470
Taylor.Szuba@tetrattech.com

704-SWM.SWOP04801-01
704-SWM.SWOP04801-01
704-SWM.SWOP04801-01

Prepared by:
Eric Digel, B.Sc., BIT
Junior Biologist
Environment and Water Practice
Direct Line: 236.983.2943
Eric.Digel@tetrattech.com

704-SWM.SWOP04801-01
704-SWM.SWOP04801-01
704-SWM.SWOP04801-01

Reviewed by:
Sarah Keith, B.Sc.
Project Scientist & Regulatory Expert
Solid Waste Management Practice
Direct Line: 306.940.9967
Sarah.Keith@tetrattech.com

704-SWM.SWOP04801-01
704-SWM.SWOP04801-01
704-SWM.SWOP04801-01

Reviewed by:
Shawna Kjartanson, M.Sc., EP, P.Biol., R.P.Bio.
Senior Aquatic Biologist
Environment & Water Practice
Direct Line: 250.756.2256
Shawna.Kjartanson@tetrattech.com

704-SWM.SWOP04801-01
704-SWM.SWOP04801-01
704-SWM.SWOP04801-01

Reviewed by:
Spencer Smith, P.Eng.
Project Engineer – Team Lead
Solid Waste Management Practice
Direct Line: 403.723.6933
Spencer.Smith@tetrattech.com

PERMIT TO PRACTICE
TETRA TECH CANADA INC.
PERMIT NUMBER: 1001972

Enclosure: Limitations on the Use of this Document
 Figure 1 Site Overview & Species at Risk Occurrences
 Figure 2 Area A Site Reconnaissance
 Figure 3 Area B Site Reconnaissance
 Figure 4 Area C2 Site Reconnaissance
 Figure 5 Area L Site Reconnaissance

LIMITATIONS ON USE OF THIS DOCUMENT

GEOENVIRONMENTAL

1.1 USE OF DOCUMENT AND OWNERSHIP

This document pertains to a specific site, a specific development, and a specific scope of work. The document may include plans, drawings, profiles and other supporting documents that collectively constitute the document (the "Professional Document").

The Professional Document is intended for the sole use of TETRA TECH's Client (the "Client") as specifically identified in the TETRA TECH Services Agreement or other Contractual Agreement entered into with the Client (either of which is termed the "Contract" herein). TETRA TECH does not accept any responsibility for the accuracy of any of the data, analyses, recommendations or other contents of the Professional Document when it is used or relied upon by any party other than the Client, unless authorized in writing by TETRA TECH.

Any unauthorized use of the Professional Document is at the sole risk of the user. TETRA TECH accepts no responsibility whatsoever for any loss or damage where such loss or damage is alleged to be or, is in fact, caused by the unauthorized use of the Professional Document.

Where TETRA TECH has expressly authorized the use of the Professional Document by a third party (an "Authorized Party"), consideration for such authorization is the Authorized Party's acceptance of these Limitations on Use of this Document as well as any limitations on liability contained in the Contract with the Client (all of which is collectively termed the "Limitations on Liability"). The Authorized Party should carefully review both these Limitations on Use of this Document and the Contract prior to making any use of the Professional Document. Any use made of the Professional Document by an Authorized Party constitutes the Authorized Party's express acceptance of, and agreement to, the Limitations on Liability.

The Professional Document and any other form or type of data or documents generated by TETRA TECH during the performance of the work are TETRA TECH's professional work product and shall remain the copyright property of TETRA TECH.

The Professional Document is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of TETRA TECH. Additional copies of the Document, if required, may be obtained upon request.

1.2 ALTERNATIVE DOCUMENT FORMAT

Where TETRA TECH submits electronic file and/or hard copy versions of the Professional Document or any drawings or other project-related documents and deliverables (collectively termed TETRA TECH's "Instruments of Professional Service"), only the signed and/or sealed versions shall be considered final. The original signed and/or sealed electronic file and/or hard copy version archived by TETRA TECH shall be deemed to be the original. TETRA TECH will archive a protected digital copy of the original signed and/or sealed version for a period of 10 years.

Both electronic file and/or hard copy versions of TETRA TECH's Instruments of Professional Service shall not, under any circumstances, be altered by any party except TETRA TECH. TETRA TECH's Instruments of Professional Service will be used only and exactly as submitted by TETRA TECH.

Electronic files submitted by TETRA TECH have been prepared and submitted using specific software and hardware systems. TETRA TECH makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

1.3 STANDARD OF CARE

Services performed by TETRA TECH for the Professional Document have been conducted in accordance with the Contract, in a manner

consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Professional judgment has been applied in developing the conclusions and/or recommendations provided in this Professional Document. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of the Professional Document.

If any error or omission is detected by the Client or an Authorized Party, the error or omission must be immediately brought to the attention of TETRA TECH.

1.4 DISCLOSURE OF INFORMATION BY CLIENT

The Client acknowledges that it has fully cooperated with TETRA TECH with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information respecting the use of the site. The Client further acknowledges that in order for TETRA TECH to properly provide the services contracted for in the Contract, TETRA TECH has relied upon the Client with respect to both the full disclosure and accuracy of any such information.

1.5 INFORMATION PROVIDED TO TETRA TECH BY OTHERS

During the performance of the work and the preparation of this Professional Document, TETRA TECH may have relied on information provided by third parties other than the Client.

While TETRA TECH endeavours to verify the accuracy of such information, TETRA TECH accepts no responsibility for the accuracy or the reliability of such information even where inaccurate or unreliable information impacts any recommendations, design or other deliverables and causes the Client or an Authorized Party loss or damage.

1.6 GENERAL LIMITATIONS OF DOCUMENT

This Professional Document is based solely on the conditions presented and the data available to TETRA TECH at the time the data were collected in the field or gathered from available databases.

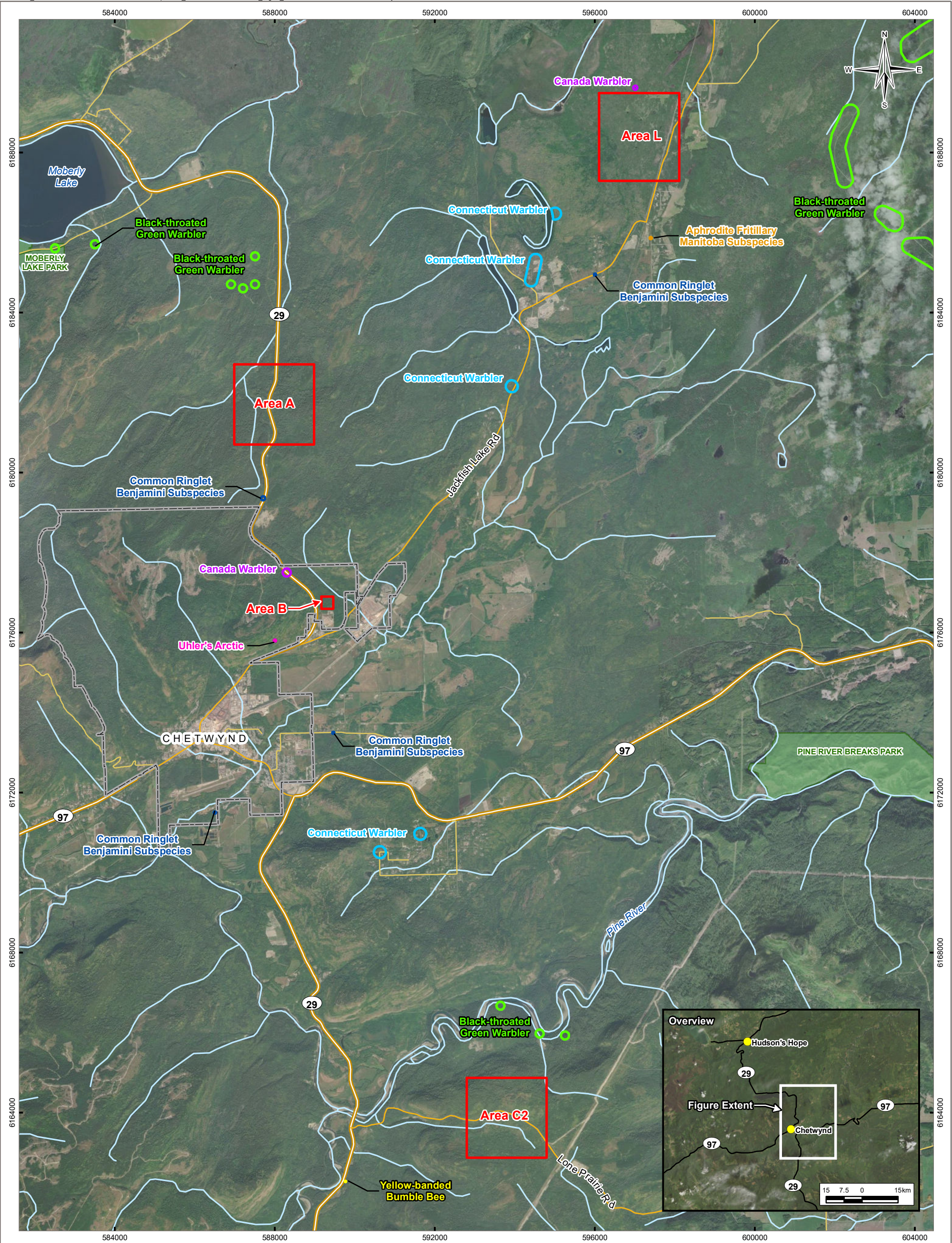
The Client, and any Authorized Party, acknowledges that the Professional Document is based on limited data and that the conclusions, opinions, and recommendations contained in the Professional Document are the result of the application of professional judgment to such limited data.

The Professional Document is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site conditions present, or variation in assumed conditions which might form the basis of design or recommendations as outlined in this report, at or on the development proposed as of the date of the Professional Document requires a supplementary exploration, investigation, and assessment.

TETRA TECH is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the Client.

1.7 NOTIFICATION OF AUTHORITIES

In certain instances, the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by TETRA TECH in its reasonably exercised discretion.



LEGEND

- Potential Landfill Site Area
- CDC Species at Risk Occurrences**

Aphrodite Fritillary - Manitoba Subspecies (Blue-listed)

Black-throated Green Warbler (Blue-listed)

Canada Warbler (Blue-listed)

Common Ringlet - Benjamini Subspecies (Blue-listed)

Connecticut Warbler (Blue-listed)

Uhler's Arctic (Blue-listed)

Yellow-banded Bumble Bee (Blue-listed)
- Base Data**

Highway

Main Road

Local Road

Watercourse/Waterbody

Provincial Park Boundary


District Of Chetwynd Municipal Boundary

NOTES
Base data source:
Imagery from ESRI; Maxar
Base data from CanVec; 1:250,000 (2019)
CDC data from DataBC (February 5, 2024)

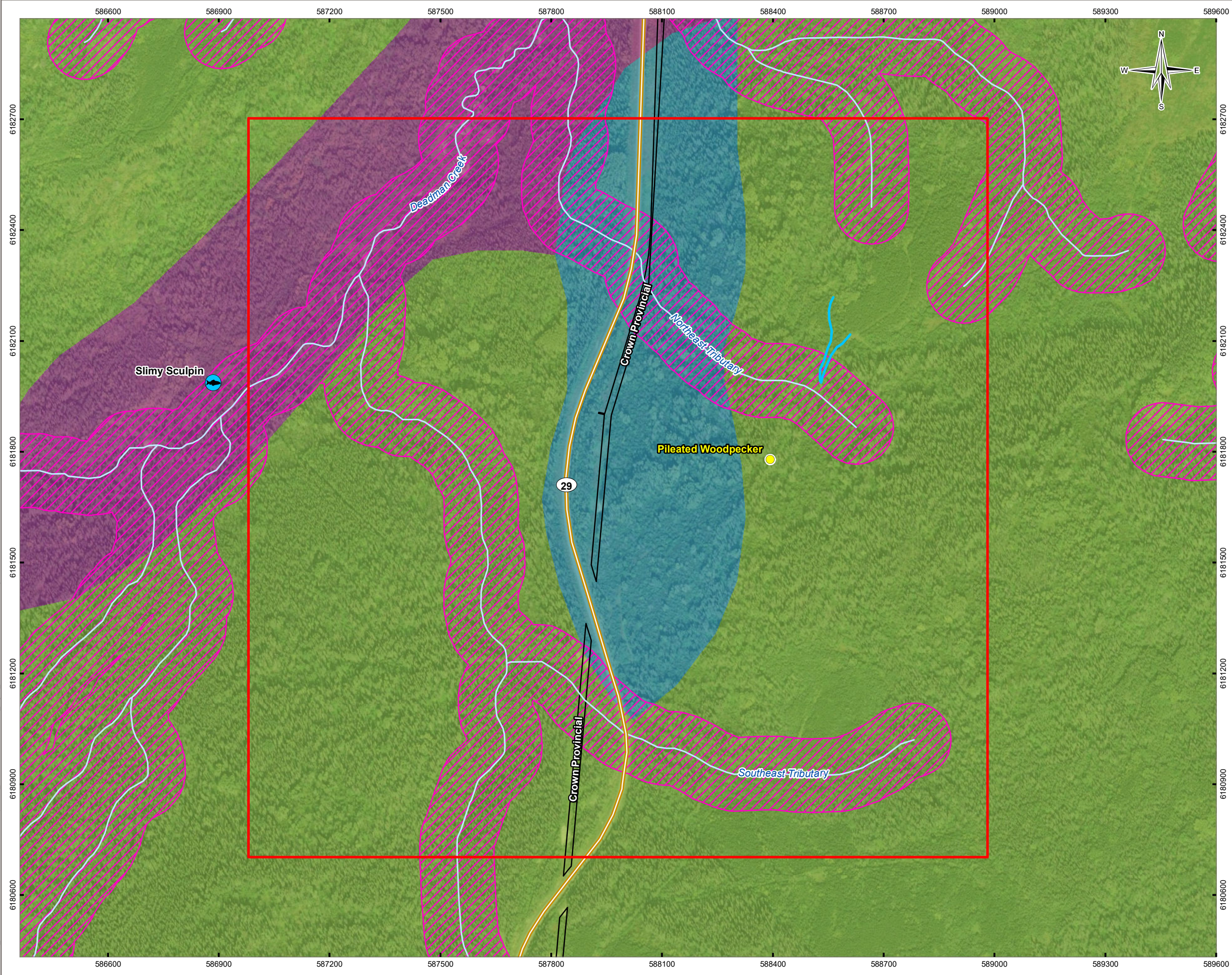
STATUS
ISSUED FOR USE

NEW LANDFILL FEASIBILITY
CHETWYND AREA STAGE 1
SITE SELECTION – SITE RECONNAISSANCE

Site Overview & Species at
Risk Occurrences

PROJECTION UTM Zone 10		DATUM NAD83		CLIENT Peace River Regional District	
<div>Scale: 1:90,000</div> <div>1.50.7501.5</div> <div></div> <div>Kilometres</div>					
FILE NO. SWOP04805-01_Fig01_Overview.mxd					
OFFICE Tl-VANC	DWN DS	CKD SL	APVD ED	REV 0	Figure 1
DATE February 8, 2024	PROJECT NO. SWM.SWOP04805-01				

G:\SOLID_WASTE\SWOP\SWOP04805-01\GIS\Map\Site_Recon\SWOP04805-01_Fig02_AreaA.mxd modified 2/8/2024 by DARREN SCHOULS



LEGEND

- Fish Occurrence
- Potential Landfill Site Area
- 100 m Water Feature Buffer
- Parcel Boundary
- Field Observations**
 - Pileated Woodpecker Observation
 - Approximate Unmapped Ephemeral Channel
- Surficial Geology**
 - Alluvial Plain
 - Glaciolacustine Veneer (thin, less than 2 m)
 - Streamlined Till Ridges
- Base Data**
 - Highway
 - Watercourse/Waterbody

Overview

NOTES

Base data source:
Water features from Fresh Water Atlas (2023)
Fish data from DataBC (February 5, 2024)
Parcels from DataBC (2023)
Surficial Geology from Geoscience BC, Energy Open File 2011-2 (2011)

STATUS

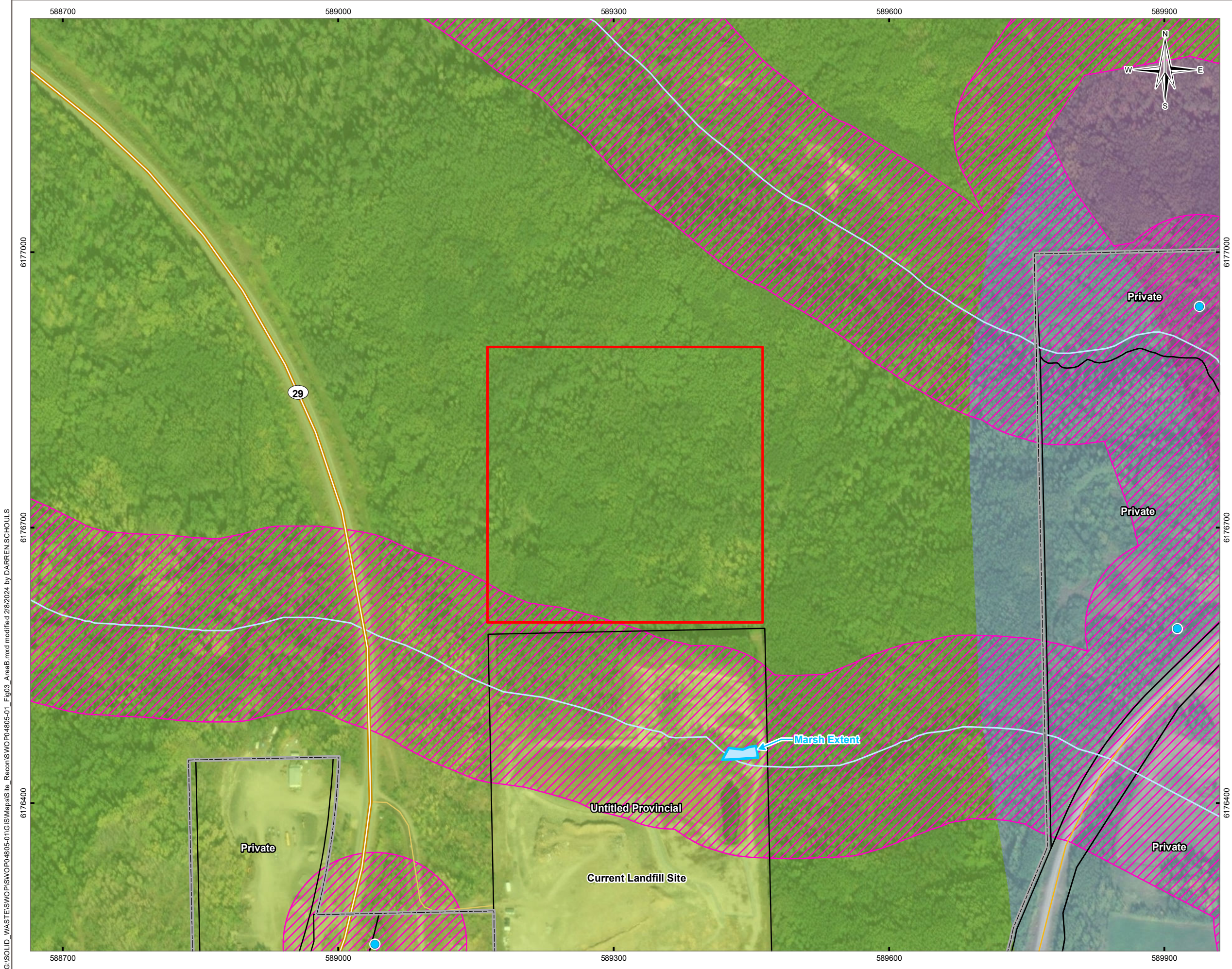
ISSUED FOR USE

**NEW LANDFILL FEASIBILITY
CHETWYND AREA STAGE 1
SITE SELECTION – SITE RECONNAISSANCE**

**Area A
Site Reconnaissance**

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Peace River Regional District
Scale: 1:10,000 200 100 0 200 Metres		
FILE NO. SWOP04805-01_Fig02_AreaA.mxd		
OFFICE TL-VANC	DWN DS	CKD SL
	APVD SB	REV 0
DATE February 8, 2024	PROJECT NO. SWM.SWOP04805-01	

Figure 2



LEGEND

- Groundwater Well
- Potential Landfill Site Area
- Alluvial Fan and Water Feature 100 m Buffer
- Parcel Boundary
- Field Observations**
 - Approximate Marsh Extent
- Surficial Geology**
 - Alluvial Fan
 - Glaciolacustine Plain
 - Streamlined Till Ridges
- Base Data**
 - Highway
 - Main Road
 - Local Road
 - Watercourse/Waterbody
 - District Of Chetwynd Municipal Boundary

Overview

NOTES

Base data source:
Water features from Fresh Water Atlas (2023)
Groundwater Wells from DataBC (February 5, 2024)
Parcels from DataBC (2023)
Surficial Geology from Geoscience BC, Energy Open File 2011-2 (2011)

STATUS

ISSUED FOR USE

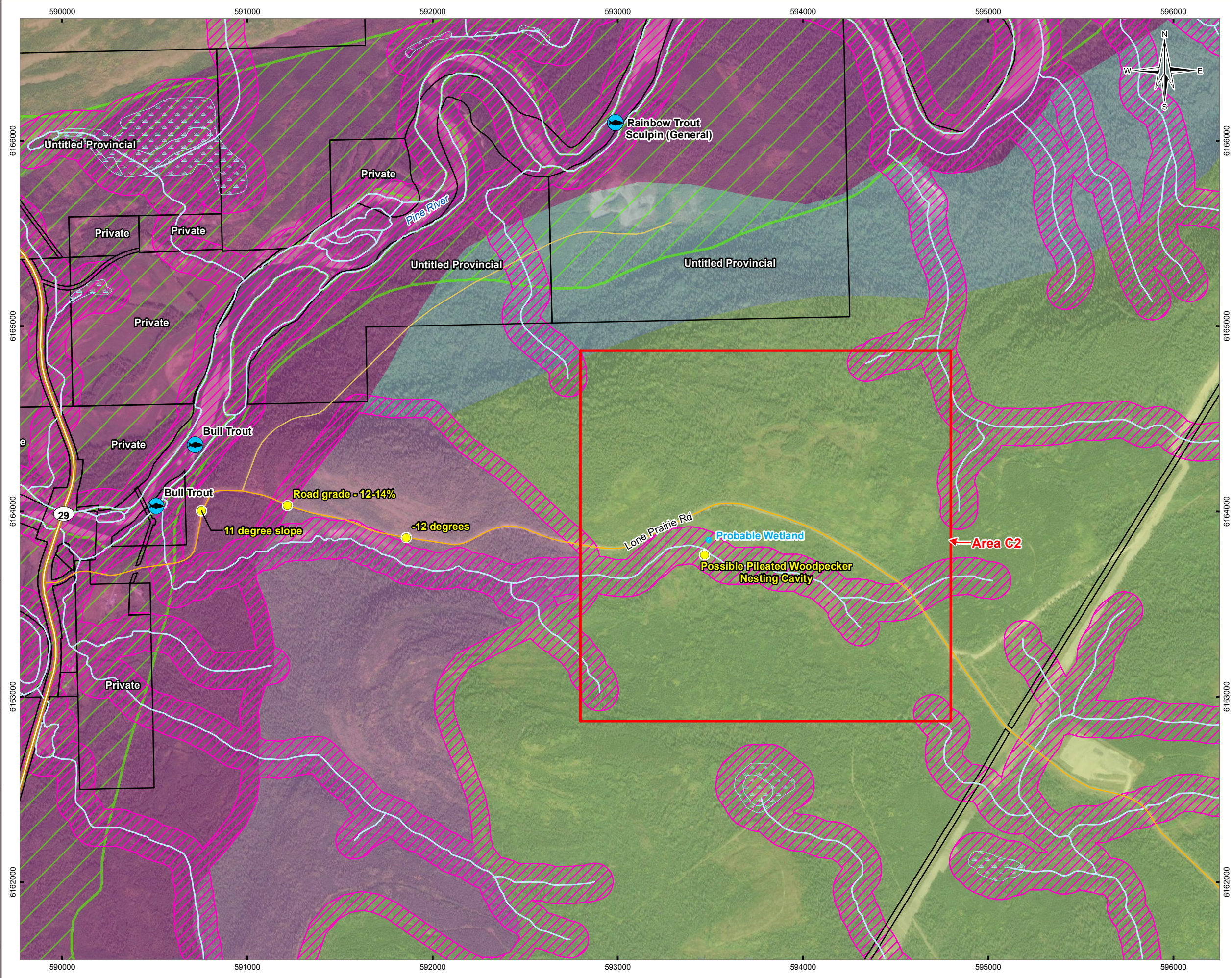
**NEW LANDFILL FEASIBILITY
CHETWYND AREA STAGE 1
SITE SELECTION – SITE RECONNAISSANCE**

**Area B
Site Reconnaissance**

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Peace River Regional District
Scale: 1:4,000 80 40 0 80 Metres		TETRA TECH
FILE NO. SWOP04805-01_Fig03_AreaB.mxd		
OFFICE TL-VANC	DWN DS	CKD SL
	APVD SB	REV 0
DATE February 8, 2024	PROJECT NO. SWM.SWOP04805-01	

Figure 3

G:\SOLID_WASTE\SWOP\SWOP04805-01\GIS\Maps\Site_Recon\SWOP04805-01_Fig04_AreaC2.mxd modified 2/8/2024 by DARREN SCHOULS



LEGEND

- Fish Occurrence
- Potential Landfill Site Area
- Alluvial Fan and Water Feature 100 m Buffer
- Agricultural Land Reserve
- Parcel Boundary

Field Observations

- Observation Location
- Probable Wetland

Surficial Geology

- Alluvial Fan
- Alluvial Plain
- Colluvial Veneer (thin, less than 2 m)
- Glaciolacustine Plain
- Till Veneer (thin, less than 2 m)

Base Data

- Highway
- Main Road
- Local Road
- Watercourse/Waterbody
- Wetland

Overview

NOTES

Base data source:
Water features from Fresh Water Atlas (2023)
Fish from DataBC (February 5, 2024)
ALR and Parcels from DataBC (2023)
Surficial Geology from Geoscience BC, Energy Open File 2011-2 (2011)

STATUS

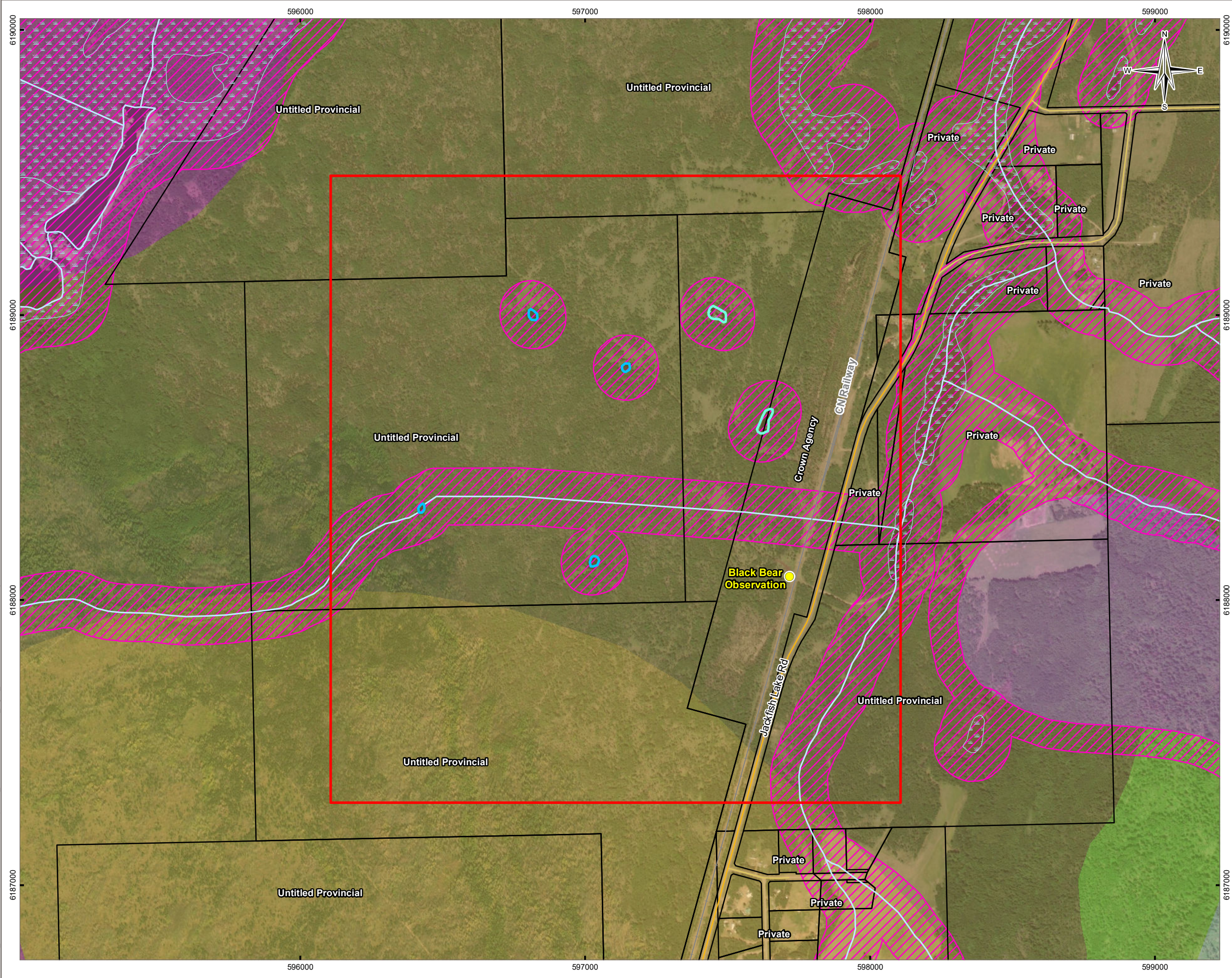
ISSUED FOR USE

**NEW LANDFILL FEASIBILITY
CHETWYND AREA STAGE 1
SITE SELECTION – SITE RECONNAISSANCE**

**Area C2
Site Reconnaissance**

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Peace River Regional District
Scale: 1:20,000 400 200 0 400 Metres		
FILE NO. SWOP04805-01_Fig04_AreaC2.mxd		
OFFICE TL-VANC	DWN DS	CKD SL
DATE February 8, 2024	APVD SB	REV 0
PROJECT NO. SWM.SWOP04805-01		Figure 4

G:\SOLID_WASTE\SWOP\SWOP04805-01\GIS\Maps\Site_Recon\SWOP04805-01_Fig05_AreaL.mxd modified 2/8/2024 by DARREN SCHOOLS



LEGEND

- Potential Landfill Site Area
- Alluvial Fan and Water Feature 100 m Buffer
- Parcel Boundary
- Field Observations**
 - Observation Location
 - Approximate Marsh Extent
 - Approximate Shallow Open Water Extent
- Surficial Geology**
 - Alluvial Fan
 - Alluvial Plain
 - Glaciofluvial Hummocky Terrain
 - Glaciofluvial Plain
 - Till Plain
 - Streamlined Till Ridges
- Base Data**
 - Main Road
 - Local Road
 - Railway
 - Watercourse/Waterbody
 - Wetland

Overview

NOTES

Base data source:
Water features from Fresh Water Atlas (2023)
Parcels from DataBC (2023)
Surficial Geology from Geoscience BC, Energy Open File 2011-2 (2011)

STATUS

ISSUED FOR USE

**NEW LANDFILL FEASIBILITY
CHETWYND AREA STAGE 1
SITE SELECTION – SITE RECONNAISSANCE**

**Area L
Site Reconnaissance**

PROJECTION UTM Zone 10	DATUM NAD83	CLIENT Peace River Regional District
Scale: 1:13,000 250 125 0 250 Metres		
FILE NO. SWOP04805-01_Fig05_AreaL.mxd		
OFFICE TL-VANC	DWN DS	CKD SL
DATE February 8, 2024	APVD SB	REV 0
PROJECT NO. SWM.SWOP04805-01		Figure 5