



Cumberland Forest Ecological Assessment

for the Cumberland Community Forest Park and Surrounding Landscape

Phase One

Prepared by Fernhill Consulting
for the Cumberland Community Forest Society

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Front cover images: moss, western toad, and coho spawning in Perseverance Creek images provided by the CCFS. Wetland image from the Cumberland Wetland Working Group and cedar image from Jason Straka.

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Executive Summary

The Village of Cumberland is leading a collaborative Forest Land Strategy planning process for the Cumberland Community Forest Park and adjacent areas of interest. The Cumberland Community Forest Society (CCFS) developed and provided this ecological assessment as an input to the planning process. This ecological assessment also supports the CCFS's land stewardship planning efforts for both the Forest Land Strategy and a broader Landscape Study Area.

This report describes Phase One of the ecological assessment, which is primarily based on existing information. Phase Two of the ecological assessment will also be an input to Forest Land Strategy planning process, and will entail additional information gathering, in particular additional mapping and assessment efforts. Phase Two will also provide a prioritized list of proposed lands management and ecological restoration projects to steward the planning area and wider landscape.

The Forest Land Strategy project area was defined by the Village of Cumberland and includes the existing Community Forest Park and adjacent new or proposed land purchases by the Cumberland Community Forest Society (CCFS), for a total of 375 hectares. The CCFS defined a larger Landscape Study Area that surrounds the project area. This area is based on the Perseverance Creek watershed boundaries and key areas of interest within the Trent River watershed. Maps 1 and 2 in the appendix show these two areas.

Within both the Forest Land Strategy and Landscape Study project areas, the CCFS and Fernhill Consulting identified and mapped Environmentally Sensitive Areas to support greater understanding and management considerations of the ecological integrity and biodiversity of the project areas and surrounding landscape. The identified Environmentally Sensitive Areas (ESAs) are the following important habitats, sensitive ecosystems, and sensitive sites, shown in Maps 4 to 9:

- **ESA #1 Species-specific sensitive areas.** These are juvenile Western toad migratory zones, Little Brown bat foraging habitats, the wild Coho spawning reach of Perseverance Creek, and potential painted turtle habitats.
- **ESA #2 Biodiverse areas.** These are areas of high terrestrial habitat value that should be managed for their ecological integrity.
- **ESA #3 Wetlands.** Wetlands are areas of high biodiversity that also support healthy watershed functioning.
- **ESA #4 Riparian buffers.** Riparian buffers are areas of high biodiversity that protect and support aquatic habitats, including helping to maintain high water quality. Due to their typically linear nature they are often wildlife movement corridors. This ESA includes the floodplain of Perseverance Creek.
- **ESA #5 Mossy outcrops.** These areas are rare, fragile, have high biodiversity, and contain specialized habitats.
- **ESA #6 Coal Spoil.** Areas of coal mining waste (tailings) that should be protected from disturbance, to avoid contamination of soil ecosystems and ground and surface waters.

The following additional mapping data were collated or collected to inform the Forest Land Strategy and CCFS Landscape Study Area stewardship planning:

- **Climate Resilient / 7th Generation Landscapes:** These are the wetter parts of the landscape that contain plant species and plant communities important to the K'omoks First Nation: mature cedar groves, yew trees, and concentrations of devil's club, based on Terrestrial Ecosystem Mapping (Site Series 6 and 7). Also included in the Climate Resilient / 7th Generation mapping are wetlands and north facing slopes.

Together these areas are important for supporting climate resilience and some may require management attention or protection from human impacts. (*note: site series data is pre most recent harvesting is noted areas) These areas are shown in Map 10.

- **Forest Stand Age and Leading Tree Species:** based on the Provincial Vegetation Resources Inventory. These are shown in Map 11..
- **Landscape Connectivity Corridors:** Corridors of forested habitats that connect the wider landscape and that are important for maintaining biodiversity and wildlife migration. These are shown in Map 13.
- **Cumulative Human Impact:** Areas of cumulative human impact: areas of trampling, compaction and erosion, excluding trail-specific impacts. These are shown in Map 12.
- **Updated Roads and Trails:** Includes the recreational trail network as well as active and recently decommissioned resource roads. These are shown in Map 3.
- **Community Wildfire Resilience Plan Mapping:** showing risk ratings and treatment areas, as developed for the regional Community Wildfire Resilience Plan. These are provided in Map 14.

Recommended next steps are the following:

1. Use the information compiled in this assessment and future assessment phases to inform ongoing Forest Land Strategy planning.
2. Support the Village of Cumberland in their response to the January 30, 2026 flood event that re-routed Perseverance Creek
3. Initiate Phase Two of this Ecological Assessment, including improved and ground truthed mapping of ESAs, climate resilient / 7th Generation landscapes, cumulative human impacts, and legacy forestry impacts.
4. Compile and prioritize a list of lands management and ecological restoration projects within and outside the Forest Park, develop funding and partnerships, and collect further data as required.
5. Initiate new data collection projects for the study area as resources allow.
6. Work with the Comox Valley FireSmart Collaborative Table, Comox Valley Emergency Management, local fire protection and BC Wildfire to secure funding for forest management activities including developing and implementing wildfire risk reduction treatments for the Community Forest Park and CCFS owned lands.
7. Seek opportunities for collaboration, synergies, and resource sharing in the implementation of research and restoration projects on the landscape.
8. Continue to work collaboratively with adjacent land owners and rights holders, including K'omoks First Nation, to gain efficiencies and build relationships to benefit the ecological and hydrological health of the landscape.

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1 Introduction

This ecological assessment for the Cumberland Community Forest Park and adjacent areas is an input to a Village of Cumberland Forest Land Strategy planning process. It also supports wider Cumberland Community Forest Society (CCFS) landscape scale planning.

This document describes Phase One of the ecological assessment, and provides recommendations for further work. Phase One entailed collating existing reports and data, defining Environmentally Sensitive Areas (ESAs), mapping the ESAs, and identifying areas and topics that require further data collection. In addition, mapping data related to cumulative human impacts, forest stand age, wildfire treatment areas, landscape connectivity corridors, and climate-resilient landscapes were collected.

The CCFS is providing this report as outlined in a Memorandum of Understanding (MOU) with the Village of Cumberland, the United Riders of Cumberland, and the Comox Valley Land Trust. The MOU details how the parties are working together to develop a Cumberland Forest Land Strategy. Once complete, the Strategy will provide the information needed for park management until such time that an independent park management plan is prepared.

The 3,050-hectare Cumberland Forest Landscape Study Area (Map 1) surrounds the 375-hectare Village of Cumberland Forest Land Strategy Project Area (Map 2). The Landscape Study Area includes the entire Perseverance Creek watershed, the Cumberland Community Forest Park, and areas to the north and east of the Cumberland Community Forest Park. The Landscape Study Area extends into the Trent River watershed to Highway 19, and north to encompass the eastern shore of Comox Lake. For Phase One, the priority for data collection was within the Project Area, but mapping was extended to the broader landscape as information was available.

1.1 Land Management History and Roles

The Cumberland Community Forest Park (CCFP) is the result of land purchases made by the Cumberland Community Forest Society beginning in 2005. The CCFP is owned and managed by the Village of Cumberland. The CCFS has been instrumental in supporting the successful management of the Forest Park, including park improvement and restoration projects, streamkeeping activities, and securing resources to support educator and school outreach, research and assessments.

Coal Creek Historic Park is adjacent to the Project Area and is a secondary area of planning interest for the Village of Cumberland. The Park was acquired by the Village of Cumberland from Weldwood of Canada, the previous private forest land owner in the region. It is owned and managed by the Village of Cumberland.

The lands to the east and west of the CCFP are purchase areas in process, or planned purchases, from Manulife Resource Management by the Cumberland Community Forest Society. These lands are currently planned to remain in CCFS ownership, with access agreements to be extended to the United Riders of Cumberland.

The trail network located on private timber lands surrounding the CCFP is managed by the United Riders of Cumberland (UROC), who have a legal access agreement with the timber companies. UROC also has agreements with the Village of Cumberland and CCFS to participate in trail management and planning in the CCFP and in areas of overlapping interest, and provides contracted trail maintenance services to the Village through a community services agreement.

1.2 Covenants and other management directives

The CCFP and Coal Creek Historic Park properties are subject to conservation covenants that require they be preserved and maintained for their conservation values. In addition to specific reserved rights and restricted activities, the covenants require management plans to be developed and regularly updated. The eventual outputs of the Cumberland Forest Land Strategy planning process will meet these covenant requirements.

The Comox Valley Land Trust holds the conservation covenants on the current CCFP properties. This means that they provide formal approval for plans related to those lands. Consequently, the CVLT is a party to the MOU.

The CCFS is a co-covenant holder for the Space Nugget and Project Perseverance lands acquired in 2016 and 2020 and has management plan approval authority for these parcels. For all intents and purposes, the CCFS also acts as a co-covenant holder for the original park parcels acquired in 2005. The CCFS is also the owner and a co-covenant holder for the Lower Perseverance property acquired in 2023, which is outside of the Forest Lands Strategy project area but part of the larger Landscape Study Area.

Additional documents that provide management direction include the following:

1. The Village of Cumberland interim Trail Management Strategy (Village of Cumberland 2021). Pending the development of a park management plan, this interim strategy designates trails as either Nature Trails, Gravity Trails or Multi Use Trails, establishes trail etiquette and identifies trail management and maintenance actions.
2. Coal Creek Historic Park Master Plan. This plan (Village of Cumberland 2014a) includes a vision for habitat restoration and enhancement. This includes implementing a vegetation management strategy, habitat restoration and enhancement projects, developing an invasive species strategy (including bullfrogs), and a wildlife conservation strategy.
3. The Cumberland Community Forest and Coal Creek Historic Park Education and Outreach Strategy (CCFS 2023), which identifies actions to address the cumulative human impacts of trampling, erosion, outdoor education programs, and other human impacts.
4. Draft Conservation Plan for Lands at Comox Lake and Perseverance Creek. This plan (CVRD 2024) for three adjacent properties owned by the CVRD, Village of Cumberland and the CCFS was developed for the purposes of drinking water protection, ecological protection, hydrological function, and cultural values. The plan describes possible stewardship actions including stabilizing eroding areas, revegetation, invasive species management, managing people/access, and creating restoration plans including for the creek.

2 Methods

2.1 Background review

All available and relevant documents and data were reviewed. Each document was listed in a spreadsheet that also included its most pertinent information and a weblink where available.

2.2 Compiling ecological mapping data

The following ecological mapping data were compiled:

1. Terrestrial Ecosystem Mapping (TEM). The very dry eastern variant of the Coastal Western Hemlock zone was mapped at a 1:10,000 scale for the southern Comox Valley Regional District in 2022 (McEwen *et al.* 2022). The dataset describes forested and non-forested ecosystems. Forested ecosystems are described by stand structural

stage and Biogeoclimatic site series, and whether they are coniferous, broadleaf, or mixed. Non-forested ecosystems include wetlands and rocky outcrops, as well as areas converted to human uses such as roads and buildings.

2. Sensitive Ecosystems Inventory (SEI), 2014 update (Juniper Environmental Services 2014). This inventory describes seven intact and rare/fragile ecosystem types, plus two modified yet biologically important ecosystems: seasonally flooded agricultural fields and older second growth forests (60 - 100 years). In the study area the SEI polygons found are riparian, wetland and terrestrial herbaceous (rock/mossy outcrops). The SEI provides supplementary information to the TEM, as smaller-scale features such as rocky outcrops are delineated, whereas the TEM notes them as part of larger forest polygons.

3. Vegetation Resources Inventory (British Columbia Forest Analysis and Inventory Branch 2024). This dataset includes forest age and species. This information is supplementary to the TEM and provides useful detail for understanding the condition of the forest in the study area.

4. Waterway locations were compiled from two sources to most accurately depict the streams in the study area: stream locations from the Freshwater Atlas¹ were used with details added from TRIM water lines².

5. Biodiversity and Watershed Protection Zones (Ennis 2020). These zones are defined within the parcels known as Space Nugget and Project Perseverance, purchased in 2016 and 2020, with a conservation covenant put in place in 2020.

6. Perseverance Creek floodplain (Ballin *et al.* 2017), based on a digital elevation model.

2.3 Soliciting ecological information from knowledge holders

As the project area is heavily used for recreation and is valued by the community, an initial public information session was held on September 8th, 2025. The purpose of this session was to i) inform the public about the upcoming ecological values assessment, ii) solicit public and knowledge holder input on values to include, iii) advertise citizen science opportunities through iNaturalist observations, and iv) create a list of interested volunteers that can assist with future citizen science projects.

Other knowledge holders were contacted directly for their feedback. This included information gathering sessions with a total of 15 invitees on December 8th and 9th, a presence at an open house on December 11th, a public engagement session on February 3rd attended by 25 people, and a meeting with subject matter expert Jason Straka on August 26th, 2025. During these meetings, information was solicited regarding the type and locations of various ecological values as well as areas of cumulative human impact

Heather Thomson, Program Coordinator for the North Island Chapter of the BC Community Bat Program, and Program Coordinator for the CCFS provided data related to bat and western toad presence.

The Perseverance Creek Streamkeepers have been operating as a project of the CCFS since 2018. Long-time streamkeeper volunteer Heather Mather, with support from Carly Palmer from Current Environmental, provided fish and fish habitat data for inclusion in this project.

Coal spoil locations and associated coal mining infrastructure were provided by Dawn Copeman and the Cumberland Museum and Archives

¹ <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/topographic-data/freshwater#about>

² <https://www2.gov.bc.ca/gov/content/data/geographic-data-services/topographic-data/terrain>

2.4 Determining Environmentally Sensitive Areas

Mapped Environmentally Sensitive Areas (ESAs) are an important output of Phase One. The ESAs chosen for the study area are sensitive ecosystem types, important habitat for selected species, and sites that are sensitive to disturbance.

The sensitive ecosystem types are those previously identified in the Sensitive Ecosystems Inventory (SEI), including riparian areas, wetlands, and rocky/mossy outcrops. In addition to the riparian areas mapped in the SEI, which were determined based on their water-influenced vegetation, additional riparian buffers were identified along each mapped waterway based on distance from the waterway. Existing digital elevation mapping was also used to include floodplain areas in the riparian buffers for the lower reaches of Perseverance Creek.

Wetlands are another sensitive ecosystem type. Wetland mapping was improved by adjusting the wetland boundaries mapped in the SEI based on a review of wetland boundaries found in the TEM, boundaries visible on recent satellite imagery, and knowledge holder feedback.

Rock outcrops (mossy outcrops) are a category of the terrestrial herbaceous sensitive ecosystem type described in the SEI. The CCFS, knowledge holders, and members of the public are aware of numerous mossy outcrops that were not mapped in the SEI. Consequently, this ESA was chosen for ground truthing efforts during Phase One. This mapping is still incomplete, especially on private forest lands (current or recently owned), and requires analysis of aerial imagery as part of Phase Two.

The ESAs for important species-specific habitats were based on land management needs identified in the background review. These ESAs are for the purpose of habitat protection for these chosen species, and because these areas may require seasonal or general restrictions to minimize human impacts.

Areas of coal spoil were designated as ESAs as these are sensitive sites that should not be disturbed, in order to avoid water quality impacts and soil ecosystem impacts.

2.5 Ground truthing

Areas to ground truth for the presence, size and condition of mossy outcrops were based on a review of satellite imagery as well as knowledge holder feedback. In the field, contractors used Avenza software to define the boundaries or centers of mossy outcrops and to take notes and photographs. The data were later imported into QGIS and corrected to the satellite imagery based on the field notes.

3 Results of Background review

The most pertinent information for land stewardship planning is included here. A full annotated list of background documents is available from the CCFS.

3.1 Cultural values in the study area

Prior to the initiation of this project, the Village of Cumberland requested that the K'omoks First Nation (KFN) produce a cultural values report to inform the planning process. The purpose was to ensure that KFN values, concerns and objectives are considered in park planning. As described in the report (Morin 2025), some of the preliminary values of interest to the KFN within the park include:

- Preservation of mature trees;
- Preservation of existing stands of berry bushes, especially huckleberry and salmonberry;
- Preservation of any archaeological sites that may exist in the park area, while acknowledging that most if not all the study area has low archaeological potential;
- Preservation of wetlands;
- Creation of culturally relevant signage, including the use of Indigenous place names;
- Invasive species removal.

KFN members as well as employees of the Guardian Watchmen program were consulted about features of interest in the park during two site visits with the KFN's consulting archaeologist Jessie Morin. During one site visit the KFN noted a large patch of devil's club near the Hai Gai trail accessed from Coal Creek Historic Park. Devil's club was traditionally used by Indigenous people for medicinal purposes and for making black face paint (Turner 1998 in Morin 2025). Adjacent to the devil's club is a large stand of mature cedar trees that are probably appropriate for harvesting bark. Indigenous people traditionally harvested cedar bark for making cordage, hats, capes, clothing etc., and this practice has recently undergone a resurgence (Turner 1998 in Morin 2025).

Mature and young yew trees were observed along Mama Bear trail, Hai Gai Trail, and along the bank of Perseverance Creek. Yew is a very strong wood and has traditionally been used by Indigenous peoples for making bows, paddles, digging sticks and other implements (Turner 1998 in Morin 2025). As trees such as cedar and yew mature, they become of much more potential interest to the KFN for carving and canoe making. Lastly, the area of waterfalls and pools in Perseverance Creek known as China Bowls would be a good place for spiritual bathing if it were more private (Morin 2025).

3.2 Legacy Coal Mining Impacts

Map 9 in the appendix shows the historic coal mine sites and coal spoil sites. Coal spoil locations are noted as points until more detailed mapping is completed in future project phases.

3.3 Legacy Forestry Impacts and Forest Health

Aside from small areas of wetlands and bluffs, the study area is forested. All forested areas have been clear-cut logged. In addition to tree cutting, historic forestry activities included the creation of roads, landings, and burn piles. These sites typically have thin disturbed soils and support invasive plant species like Scotch broom.

The Vegetation Resources Inventory provides an estimate of the ages of forest stands in the study area - see Map 11. The CCFP has the oldest forest stands, ranging from 80 to 100 years old, with one area estimated to be 107 years old. The park also includes an area of younger (third-growth) clearcuts with forest stands ranging from approximately 17 to 27 years of age. Within the pending or desired acquisition areas of Middle Earth and Raven Ridge on either side of the CCFP, the average forest stands are younger and include a greater proportion of third-growth plantation forests.

The third-growth forest stands in the study area were replanted with crop trees rather than regenerating naturally. Silvicultural interventions would be helpful for many of these dense plantations to address their high wildfire risk, low biodiversity, and poor wildlife habitat. Some of these areas also have forest health issues and a tree species composition that is not resilient to climate change.

A more detailed assessment by the appropriate professional(s) is required to prioritize the protected forest locations that need silvicultural intervention for wildfire risk reduction and for biodiversity and forest health. From a biodiversity perspective, the plantations that are the highest short-term priority for silvicultural intervention are those currently in the process of losing their forest understory and non-crop tree species due to competition from the dense cover of crop trees. An initial reconnaissance indicates that an extensive plantation in the recent CCFS Middle Earth acquisition area meets these criteria.

The historic road network has altered the hydrology of parts of the study area. While this impact has been noted, it is not yet mapped or assessed.

3.4 Areas of Cumulative Human Impact

Map 12 shows locations in the study area identified as having high cumulative human impacts, including areas of Village infrastructure, access points to creeks and lakes, key intersections / crossings /staging areas, recreation target areas, and locations used by educational programs. Some of the areas shown in Map 12 are targets for rehabilitation, as noted in the CCFS 2023 Education and Outreach Plan. This phase of the assessment did not include an analysis of trail impacts.

3.5 Watershed Protection and Biodiversity Protection Zones

The 2020 conservation covenant for the land acquisitions made in 2016 (Space Nugget) and 2020 (Perseverance) designated significant portions of the properties as Watershed Protection Zones and Biodiversity Protection Zones.

Watershed Protection Zones were created to achieve hydrological and ecological integrity of the riparian area in support of water quality objectives for those areas draining into the Comox Lake drinking watershed. They encompass the waterways plus a 30-meter setback from the high-water mark.

The Biodiversity Protection Zones included areas outside of the Watershed Protection Zone with high ecological values, evidence of wildlife use, and without significant disturbance from biking/hiking trails, as determined by the Comox Valley Land Trust in consultation with their co-covenant holders.

Both zones informed the ESAs developed for this project.

3.6 Managing invasive plant species and bullfrogs

A Community Forest Management Plan was developed in 2012 for the two original (2005) parcels that established the Cumberland Community Forest Park. In addition to managing recreational impacts the plan recommends volunteer efforts to reduce bullfrog numbers and lists four invasive exotic plant species that should be managed: common tansy, bull thistle, common beggarticks and scotch broom.

3.7 Aquatic Habitat and Species

The entire Perseverance Creek watershed (a sub basin of the Comox Lake / Puntledge Watershed) is included in the Landscape Study Area, which also includes part of the Trent River watershed. The Project Area straddles the two watersheds.

Perseverance Creek Watershed

Construction of the dam at Comox Lake in 1913 eliminated all anadromous (ocean-going) fish from all tributaries to Comox Lake for at least 80 years until a fishway was constructed and functional (Ennis 2020). The species now found in Comox Lake and the mouth of Perseverance Creek are Kokanee and chum salmon, cutthroat and rainbow trout, Dolly Varden Char, and sculpin (CVRD 2024). E-DNA samples and observations by the Perseverance Creek streamkeepers confirm these known species and add three-spined stickleback and western brook lamprey to the list. A small population of wild, naturally returning Coho spawners has reappeared periodically in the past two decades (Ennis 2020). Anadromous fish access the Perseverance Creek mainstream up to the Hai Gai Cascade, which is approximately 1.5 kilometers downstream from Allen Lake, according to provincial records and confirmed by the Perseverance Creek Streamkeepers.

Extensive information is available regarding the aquatic habitat conditions in Perseverance Creek and adjacent wetlands (Ballin *et al* 2019, Ballin *et al* 2017, Guimond and Sheng 2006, Annschild 2020). The condition of Perseverance Creek is “functional at risk” (Ballin *et al* 2019) due to a downward trend in fish habitat quality. This is because of altered watershed hydrology causing high winter flows and low summer flows due to forestry land uses as well as a historic system of four reservoirs and associated diversions now used for the Village of Cumberland’s drinking water supply. High fall and winter flows degrade the channel morphology by eroding the stream banks and transporting bedload materials downstream, where they accumulate at great depths in the channel, and behind large log jams, leading to a more uniform morphology. Subsequently, low summer flows remain largely below the accumulated bedload, only surfacing in residual pools. Upstream fish migration is impeded by high flows and lack of refuge habitat in the fall and winter, and by lack of connected surface flows during low water in the summer. Overwintering and rearing habitat is also compromised, and low summer flows likely lead to the stranding and mortality of fish (CVRD 2024).

Detailed information about preferred spawning and rearing areas for coho salmon and rainbow trout is available from the CCFS and Perseverance Creek Streamkeepers, including the locations of important summer refuge pool habitat for coho salmon fry. Rescuing stranded coho fry is one of the main volunteer activities undertaken by the Streamkeepers, due to the aggraded nature of the lower channel. The streamkeepers also advocate for environmental flows to be prioritized in upstream infrastructure works to support the salmonid population in Perseverance Creek.

Various restoration activities are proposed to improve aquatic habitat conditions within the lower section of Perseverance Creek and in adjacent wetlands. The significant wetlands in Coal Creek Historic Park and between the Forest Park and the developed part of the Village have been assessed for possible restoration actions (Annschild 2020), which if implemented have the potential to significantly improve the health of the Perseverance Creek watershed. Funding permitting, instream, riparian and wetland restoration projects in the Perseverance Creek watershed will proceed in parallel with the Forest Land Strategy planning, under the guidance of the CCFS.

On January 30, 2026 a flood event created a partial blockage of Perseverance Creek in the Cumberland Community Forest Park. This blockage redirected flows into a channel that led the water through other channels/spillways, over land, across a developed piece of parkland within Coal Creek Historic Park, and into the wetland complex below. The flow diversion is upstream of a Village drinking water supply well, a culvert on Comox Lake Road, and the intake for the regional water supply system in Comox Lake. Thus the Village of Cumberland is currently overseeing a flood risk assessment that will inform next steps.

Trent River Watershed

The Trent River supports chum, pink and coho salmon, cutthroat, rainbow and steelhead trout, Pacific lamprey, sculpin, threespine stickleback, and non-native pumpkinseed fish (BC CDC 2026a). The Trent River mainstem has a waterfall approximately 500 meters east of Highway 19A that is noted as an obstruction to anadromous fish. However, a separate report for an upstream reach indicates that coho and cutthroat trout are found here (BC CDS 2026b). This upstream reach connects to the stream and wetland complex extending into the study area between Outfox and Roundout trails.

The wetlands in the low-lying area along the north-western edge of the CCFP are drained by a tributary to the Trent River, which connects with another un-named tributary running south from Maple Lake. Provincial records indicate that coho salmon and cutthroat and rainbow trout are found in this tributary (BC CDC 2026c). Within the wetlands, there is one confirmed observation of a three-spined stickleback (BC CDC 2026d).

Maple Lake has two verified observations of painted turtles, a red-listed (threatened) species (BC CDC 2014). The CCFS plans to survey for painted turtles in possibly connected areas of the Trent River watershed. An unverified sighting was reported to the CCFS in 2024 in the wetland complex between Outfox and Roundout trails. Possible areas of painted turtle habitat in the study area are included in a species-specific Environmentally Sensitive Area.

3.8 Wildfire Risk Management Recommendations

Community Wildfire Resiliency Plans (CWRPs) are the main wildfire risk reduction planning mechanism in British Columbia. A CWRP was developed for the Comox Valley Regional District in 2025 (CVRD 2025), in which the current extent of the Cumberland Community Forest Park was designated as a fuel treatment unit. The surrounding privately-owned lands are not included in the CWRP data but are likely at the same risk level as adjacent lands. Future park acquisitions are likely to be incorporated into future iterations of the CWRP.

As shown in Map 14 in the appendix, most of the current Forest Park and adjacent municipally owned lands have a wildfire threat rating of moderate, with small areas rated at threat levels high and low. The park was recommended to be further assessed to determine preferred wildfire reduction activities and target treatment areas, and to be submitted for future funding from the provincial Community Resilience Investment Program. It was also recommended as a training ground for the BC Wildfire Service, and as a demonstration forest for wildfire risk reduction. Additional mapping of drinking water reservoirs and data sharing with Wildfire BC would benefit community wildfire resiliency.

3.9 Village of Cumberland Watershed Lands Management Recommendations

The Village of Cumberland Forest Lands Management Direction statement (Village of Cumberland 2021) provides strategic direction for the Village Watershed Lands which include four reservoirs and connecting creeks that make up the Village's drinking water storage and conveyance system. These lands are adjacent and connected to the Village planning area and are within the CCFS study area. Recommendations for managing these lands are also supplemented by a consultant's report (Ennis 2019).

One recommended action is to investigate opportunities to design and implement forest fuel management programs (i.e. stand thinning) to reduce risk of landscape-level wildfire. Another is to monitor invasive species occurrences and follow best management practices and guidance of the Coastal Invasive Species Committee for monitoring, controlling and/or eradication activities.

The watershed lands and adjacent parts of the study area include many small rock outcrops. As noted in the recommendations for lands management (Ennis 2019), there is one plant community (Wallace's Selaginella / Reindeer lichens) specifically noted as present on the rock outcrops in the watershed lands. This plant community will also be present within the wider study area. It is blue-listed in BC because it is a highly vulnerable and ecologically sensitive community that is sparsely distributed on the landscape (BC Conservation Data Centre 2019 in Ennis 2019). The Conservation Status Assessment for this community suggests that the bryophyte cover is easily separated from the underlying bedrock surfaces and shallow veneer of humus through human disturbances. Reindeer lichens (*Cladina* spp.) once trampled require very long periods of time to recover and will not recover unless disturbances are discontinued (BC Conservation Data Centre 2019 in Ennis 2019). This information helps inform the ESA for mossy outcrops.

3.10 East Comox Lake Conservation Lands Baseline Inventory and Conservation Plan

The Comox Valley Regional District purchased a parcel of land on East Comox Lake in 2018, following recommendations of the Comox Lake Watershed Protection Plan (Aqua-Tex Scientific Consulting Ltd. 2016). In 2022, the CCFS purchased an adjacent property along lower Perseverance Creek to protect it from logging. The Village of Cumberland owns a right of way accessing both these properties, as part of its Colliery Trail.

All three properties are within the Landscape Study Area and are jointly referred to as the East Comox Lake Conservation Lands. The three land parcels together have one integrated conservation plan (CVRD 2024) and are to be included together in any future management plans.

A baseline inventory (Ballin *et al.* 2022) describes the ecological communities on the properties. As also described in the inventory for the Village of Cumberland watershed lands (Ennis 2019), nearly all forested ecological communities within the unique rain shadow climate that includes the study area are considered "ecosystems at risk" (blue or red-listed) by the BC Conservation Data Centre. This is because nearly all old forests have been logged or have been converted to urban or agricultural land uses. The mature second growth coniferous forests within the CCFS study area are consequently red-listed. The lands also support younger coniferous forest that will eventually become mature second growth and thus will become red-listed (Ballin *et al.* 2022).

The portion of the land owned by CCFS has few trails or recreation use and is therefore a quiet refugia for wildlife that may be easily disturbed by humans and their pets (CVRD 2024). It is thus a candidate for inclusion in a biodiverse environmentally sensitive area.

3.11 Knowledge Holder and Citizen Input

The following data were provided by the CCFS, knowledge holders and citizens. This information informed the ESAs as well as the mapping of cumulative human impacts.

- Fish and fish habitat data from the Perseverance Creek Streamkeepers
- Observation of bat presence from the CCFS Program Coordinator for the BC Community Bat program
- Four years of data regarding the migratory paths of juvenile western toads
- Additional citizen observations of western toad locations
- Locations of cumulative human impacts such as trampling and erosion

- Areas of small unmapped wetlands
- Locations of concentrations of devil's club
- Areas with mossy outcrops
- Area of high cultural value, community values
- Areas of high risk / danger
- Areas with concentrations of invasive scotch broom and other invasives
- Locations of sightings of beavers, bullfrogs, toads, bears, turkey vultures, and cougars
- Observations of climate change impacts

The above data, along with iNaturalist observations, additional citizen science data and heritage information, will be included in an upcoming community mapping project that will include additional community input sessions.

3.12 Observed Climate Change Impacts

British Columbia is experiencing ongoing impacts from increased drought and increased air temperatures, as well as more frequent extreme weather events (Gifford *et al.* 2022). Climate change impacts observed in the study area in recent years include dying cedar trees and a nearby fire in 2025. Heavy rainfall in late January 2026 caused high flows in Perseverance Creek which re-routed the creek to a location that may have been its original course, while a heat dome between June 25 and July 1, 2021 caused unusually high lake levels due to rapid snowmelt. Successive years of low snow pack are resulting in cumulative drought conditions across the landscape, and summer 2025 is likely to see extreme drought given climate forecasts and the current (June 11, 2026) provincial drought rating of level 4 for Vancouver Island.³

4. Environmentally Sensitive Areas

Based on the background review, ecological mapping data, and knowledge holder input, the following Environmentally Sensitive Areas (ESAs) were developed to support the lands management strategy and the CCFS's land stewardship planning. Maps of these ESAs are provided as Maps 4-9 in the appendix to this document.

- 1) **ESA #1 Species-specific sensitive areas.** These consist of juvenile western toad migratory zones, little brown bat foraging habitat, the coho salmon spawning reach of Perseverance Creek, and possible painted turtle habitat areas. These areas may require seasonal or general restrictions to recreational uses or other forms of management. Their extents are shown in Map 4.
- 2) **ESA #2 Biodiverse areas.** These are areas of high terrestrial habitat value that should be managed for their ecological integrity, including minimizing human disturbance. Future ground truthing may result in additions or refinements to their boundaries. Their current extents are shown in Map 5.
- 3) **ESA #3 Wetlands.** Wetlands are areas of high biodiversity that also support healthy watershed functioning. Wetlands are highly vulnerable to disturbance. An updated wetland map was created for this project - see Map 6. Wetland mapping will be refined in future project phases to include smaller known but unmapped wetlands and to adjust the boundaries of some of the larger wetlands.
- 4) **ESA #4 Riparian buffers + Wetlands.** Riparian buffers are areas of high biodiversity that protect and support aquatic habitats, including helping to maintain high water quality. Due to their linear nature, they are often wildlife movement corridors. Riparian buffers are shown in Map 7 and were created as follows: i) 50 meter riparian buffers along the anadromous reach of Perseverance Creek based on the rationale outlined in Ballin *et al.* 2017., ii) 30 meter riparian buffers surrounding all other waterways and wetlands in the study area,

³ <https://droughtportal.gov.bc.ca/pages/drought-map> viewed June 11, 2026

extending from the mapped centreline of the waterway, or from the mapped edge of the wetlands iii) riparian buffers extending beyond the 50 m buffer along the Perseverance Creek mainstem, where prior mapping using a digital elevation model (Ballin *et al.* 2017) identified an extensive floodplain area, and iv) additional previously established watershed protection zones (Ennis 2020) which include riparian buffers overlapping with those mapped using the methods above, as well as buffers surrounding smaller waterways not captured in current project mapping.

- 5) **ESA #5 Mossy outcrops.** These are the Terrestrial Herbaceous ecosystems defined in the SEI as “Terrestrial herbaceous ecosystems containing rocky outcrops”. For simplicity, the CCFS has chosen to call them Mossy Outcrops. These areas are rare, fragile, have high biodiversity, and contain specialized habitats. Due to their fragile nature they should be protected from recreational impacts, and those areas currently affected by recreational uses should be targeted for restoration efforts. The outcrops previously mapped in the SEI plus those ground-truthed during this project are shown in Map 8. There are additional unmapped Mocky outcrops which will be mapped in Phase Two.
- 6) **ESA #6 Coal spoils.** An enduring legacy of coal mining are areas of coal spoil, which is the waste rock discarded during coal mining. Disturbance of coal spoil can lead to potential contamination of soil ecosystems and ground and surface waters. The potential contaminants of concern from coal spoil include hydrocarbons (LEPH, HEPH, PAHs,) metals, chlorinated phenols and associated regulated soil vapour parameters (Tetra Tech 2016). Areas of coal spoil are shown in Map 9, with their precise boundaries to be mapped in Phase Two.

Active stewardship of the ESAs is important given the high and growing level of human use in the Cumberland Forest Park and surrounding landscape. The mapped ESAs give land managers insight into how to reduce or avoid human impacts to the biodiversity and ecological integrity of the project area and surrounding landscape. Some ESAs will need to be protected from additional human impacts, while others will need remediation or access redesign to address cumulative impacts such as trampling and erosion. Some ESAs or locations within ESAs will need restoration interventions to address the extensive legacy of logging, mining, and other historic land uses.

5. Climate Resilience and 7th Generation Landscapes

Given the K’omoks First Nation’s interest in stewarding and utilizing cedar trees, yew trees, and devil’s club, all of which are found in the wetter parts of the landscape, and given the need to steward wet or formerly wet areas to increase climate resilience, the CCFS mapped wet zones within the landscape study area to inform future management planning.

Map 10 shows the wettest forested site series (site series 6 and 7) where cedar, yew and devil’s club are typically found, together with wetlands and north facing slopes. These areas may provide habitat for species affected by drought in other parts of the landscape, as well as being resistant to wildfire. These areas may require stewardship to ensure water stays on or is restored to the landscape, for example by reversing drainage caused by ditching, or by thinning densely planted tree plantations.

Future project phases will more accurately map the species of interest to the K’omoks First Nation as well as assessing the need for any hydrological or silvicultural restoration activities to support the health of these parts of the landscape. Some of these areas may also need protection from human disturbance.

6. Discussion

6.1 Other Initiatives in the Project Area

Forest Lands Strategy Planning will interact with and be informed by other initiatives happening within the project area including the Perseverance Watershed Initiative, community mapping, and wetland and watercourse stewardship.

Perseverance Watershed Initiative

The entire Perseverance Creek Watershed is included in the greater Landscape Study Area, and a significant part of the smaller Forest Lands Strategy project area is within the Perseverance Creek watershed. The Village of Cumberland owns 25% of the watershed in support of its drinking water infrastructure. The rest of the watershed lands are owned by Timberwest (managed by Mosaic) and Comox Timber (managed by Manulife).

The watershed is the focus of a collaborative effort - the Perseverance Watershed Initiative (PWI) - by Mosaic Forest Management, The Village of Cumberland, and the CCFS. The purpose of the PWI is integrated watershed planning and management, and the identification of opportunities and pathways (e.g., ecological easements, acquisition) to set aside forest lands from the industrial forestry base for ecological and hydrological reasons. The PWI is collecting data that may be useful for the Forest Land Strategy planning. Data collected for the Strategy may also inform the PWI.

Community Cultural Mapping (Place Mapping)

Community mapping is a way to strengthen community understanding and connection to the surrounding landscape, as well as providing valuable information to planning processes like this one. Also called “place mapping” or “place keeping”, community mapping is a process that visualizes emotional, historical, or physical relationships to specific places. It’s used to highlight meaningful locations, uncover how people of all ages and abilities interact with their environment, or document local indigenous and cultural geography. The outputs can be technical or creative or both. The CCFS has done this kind of mapping with their Cumberland Forest Park Map, as well as through their collection of citizen observations for this project. The CCFS is planning for more of this kind of community engagement, the outputs of which will inform and strengthen land management planning.

Cumberland Wetlands and Lower Perseverance Creek Stewardship

A wetland assessment (Annschild 2020) outlined the ecological significance of the Cumberland wetlands, which are the large wetlands in Coal Creek Park and between the CCFP and the developed part of the Village of Cumberland - see Map 6. This assessment outlined potential wetland restoration activities for which more detailed planning could be done. The findings of this assessment may inform future land stewardship activities and may pertain to the flood risk assessment the Village of Cumberland is currently overseeing to understand the impact of the re-routing of Perseverance Creek.

In 2026, the CCFS secured funding from the Comox Valley Community Foundation for a two-year project to increase community understanding of the ecological value of the Cumberland wetlands through community mapping, interpretive signage, walking workshops, small planting projects, citizen science, educational events, and activities related to the habitat values of the wetlands including migratory nesting birds and human impacts on these values.

The CCFS also received 2026 funding from the Pacific Salmon Foundation for habitat restoration activities in Lower Perseverance creek, responding to recommendations from a 2019 fish habitat assessment (Ballin, et. al, 2019). The funded activities involve removing concrete and metals from the creek riparian area, and community supported riparian planning under the guidance of Current Environmental. This project will deepen community connections to, and understanding of, the Lower Perseverance Creek system.

Both these initiatives will collect useful information for future phases of land stewardship planning.

6.2 Planning Ahead for Silviculture Treatments

Silvicultural treatment plans will likely be developed in future project phases, with the objectives of reducing wildfire risk, increasing forest ecosystem health, and cultivating a more climate-resilient landscape. The Cumberland Forest Land Strategy planning process should anticipate the needed silvicultural treatments when designating park management zones. As tree thinning can be controversial, part of the planning should include public education about the need for this kind of forest disturbance.

7. Recommendations

The following actions are recommended for the short and medium term:

1. Use the information compiled in this assessment and future assessment phases to inform ongoing Forest Land Strategy planning. This may include planning for areas needing increased protection, areas needing remediation or restoration, and areas appropriate for reduced, ongoing or increased human presence.
2. Support the Village of Cumberland in their response to the January 30, 2026 flood event that re-routed Perseverance Creek, including seeking opportunities for collaboration with regard to research, data collection and restoration efforts. In addition, adjust CCFS ESA maps as appropriate to reflect any permanent changes to the creek location and associated riparian buffers.
3. Initiate Phase Two of this Ecological Assessment to inform ongoing Cumberland Forest Lands planning. This includes:
 - a. Refining the ESA #1 Species Specific Sensitive Areas through resourcing and completing Goshawk and Screech Owl surveys as well as refining migratory bird nesting area mapping. In addition, conduct surveys for painted turtle presence as resources allow.
 - b. Refining the ESA #2 Biodiverse Areas polygon boundaries through groundtruthing.
 - c. Refining the ESA #3 Wetlands and associated riparian buffers (ESA#4) through ground truthing small wetlands not included in the current wetland mapping
 - d. Refining waterway mapping and associated riparian buffers (ESA#4) by ground truthing known small waterways not included in the current waterway mapping.
 - e. Analyzing aerial photography to refine and complete the ESA #5 Mossy Outcrops data layer, particularly in the wider Landscape Study Area and bluffs in Raven Ridge / future acquisition areas.

- f. Mapping the boundaries of the coal spoil for ESA #6, including identifying additional coal spoil locations.
 - g. Detailed mapping of significant locations of cedar groves, yew trees, and areas of devil's club, through ground-truthing in the known wet areas mapped for this assessment.
 - h. Refining Cumulative Human Impact mapping and working in collaboration with Village and UROC to extend this analysis to trails, staging areas and Village infrastructure within the Project Area.
 - i. Updating Landscape Connectivity mapping as wetlands, biodiverse areas and waterways mapping is further refined. Considerations for this mapping are to include Wildland Urban Interface (WUI), Highway 19 and other fragmentation.
 - j. Developing new mapping for legacy forestry impact areas including former burn piles, landings, decommissioned roads, ditches and drainage, and invasive plant species corridors / disturbed areas.
 - k. Continuing to refine and improve mapping for portions of the Trent Watershed and Upper Perseverance watershed through data sharing or research access agreements with private timber land owners, as well as through any publically available data.
4. Compile and prioritize a list of lands management and ecological restoration projects within and outside the Forest Park, develop funding and partnerships, and collect further data as required. The following can be considered for inclusion:
- a. Addressing areas of trampling, compaction, erosion and trail braiding.
 - b. Instream and riparian restoration on the lower section of Perseverance Creek.
 - c. Assessing the condition and hydrology of the Cumberland Wetlands and other wetlands in the study area, and developing and implementing recommendations to increase their health and function. Eg. Wetlands Ecosystems Services Assessment Protocol, BCWF
 - d. A wildfire risk assessment within the Forest Park and current and proposed CCFS acquisition areas.
 - e. A forest health and biodiversity assessment for selected plantations in the study area, which could be conducted in tandem with the wildfire risk assessment
 - f. The development of silvicultural and other forest management prescriptions to address wildfire risk and improve forest health and biodiversity within the current Forest Park and/or planned acquisition areas.
 - g. Removing scotch broom from identified areas.
 - h. Repairing forest hydrology in areas where ditching and engineered drainage is negatively affecting forest health.
 - i. Identifying dry areas that are changing with the climate and that should be actively stewarded towards their likely future condition.
 - j. The establishment of gathering spaces for education and cultural activities to concentrate human impacts and protect surrounding forest lands (as recommended in the Education and Outreach Strategy).
 - k. Reviewing trail drainage infrastructure with the perspective of keeping water on adjacent landscapes, as opposed to channeling to legacy drainage ditches. Explore potential of current trail drainage to feed pocket wetlands, 7th Generation landscapes

5. Initiate new data collection projects for the study area as resources allow, including the following:
 - a. A soil assessment for the Landscape Study Area, to inform management actions with respect to flooding and erosion, including for the private land managers in the greater Perseverance Creek watershed.
 - b. An assessment of hazards such as wildfire, landslides and flooding and their potential impact on infrastructure, water quality, and ecosystem health
 - c. An updated species at risk Inventory and an assessment of habitat conditions and needs for selected species at risk that currently or historically inhabited the project area.
6. Work with the Comox Valley FireSmart Collaborative Table, Comox Valley Emergency Management, local fire protection and BC Wildfire to secure funding for forest management activities including RPF contract or staff funding and developing and implementing wildfire risk reduction treatments for the Community Forest Park.
7. Seek opportunities for collaboration, synergies, and resource sharing in the implementation of research and restoration projects on the landscape.
8. Continue to work collaboratively with adjacent land owners and rights holders to gain efficiencies and build relationships to benefit the ecological and hydrological health of the landscape.

8. Conclusion

Phase One of the Cumberland Forest Ecological Assessment provides context, mapping, and recommendations to inform the Cumberland Forest Land Strategy planning process as well as the broader objectives of the CCFS. The recommended next steps will refine this information and support the implementation of land stewardship and ecological restoration activities across the landscape.

References

- Annschild, R. 2020. Wetland & Stream Restoration Assessment of Perseverance Creek and Boundary Wetlands. Prepared by Wetland Restoration Consulting for the BC Wildlife Federations Wetlands Program and Cumberland Wetlands Working Group, January 28, 2020.
- Aqua-Tex Scientific Consulting Ltd. 2016. Comox Lake Watershed Protection Plan. Prepared for the Comox Valley Regional District. 113 pp. Risk Assessment updated 2022.
https://www.comoxvalleyrd.ca/sites/default/files/2023-01/CVRD%20WPP_20160603_update2022_4_online%20version.pdf
- Ballin, L., N. Wright, C. Ashcroft and D. Lacroix. 2017. Riparian and wetland prioritization in the Puntledge Watershed. Draft V1. Consultant's report prepared for the Fish and Wildlife Compensation Program by Ecofish Research Ltd., March 31, 2017
https://a100.gov.bc.ca/pub/acat/documents/r52594/COA_F17_F_1253_1500498102338_0493132903.pdf
- Ballin, L, Walshe, P., Wright, N., Woodruff, V. and A. Harwood. 2019. Perseverance Creek Fish Habitat and Proper Functioning Condition Assessment. Prepared for Cumberland Community Forest Society by Ecofish Research Ltd, January 24, 2019.
https://www.comoxvalleyrd.ca/sites/default/files/2024-08/Proper%20functioning%20condition%20and%20Fish%20Habitat_0.pdf
- Ballin, L, N. Nahirnick, M. Dyck and D. Lacroix. 2022. CVRD Coal Beach Property Baseline Inventory Assessment. Consultant's Report prepared for Comox Valley Regional District by Ecofish Research Ltd, February 11, 2022.
https://www.comoxvalleyrd.ca/sites/default/files/2024-08/Biological%20Inventory_Ecofish%20-%20CVRD%20Coal%20Beach%20Property%20Baseline%20Inventory.pdf
- B.C. Conservation Data Centre. CDC iMap (web application) 2014. Occurrence Report Summary Painted Turtle - Pacific Coast Population. Victoria, British Columbia. Available: <http://maps.gov.bc.ca/ess/hm/cdc>, (accessed Jan 9, 2026).
- B.C. Conservation Data Centre. 2019. BC Species and Ecosystems Explorer. B.C. Government, Victoria, B.C.
<http://a100.gov.bc.ca/pub/eswp/>
- B.C. Conservation Data Centre: Habitat Wizard (web application). 2026a. B.C. Government, Victoria, B.C.
https://a100.gov.bc.ca/pub/reports/rwservlet?habitat_wizard_streams_report&p_title=%22Ministry%20of%20Environment%22&P_STREAM_ID=887675 Accessed March 10, 2026.
- B.C. Conservation Data Centre: Habitat Wizard (web application). 2026b. B.C. Government, Victoria, B.C.
https://a100.gov.bc.ca/pub/reports/rwservlet?habitat_wizard_streams_report&p_title=%22Ministry%20of%20Environment%22&P_STREAM_ID=887717 Accessed March 10, 2026.
- B.C. Conservation Data Centre: Habitat Wizard (web application). 2026c. B.C. Government, Victoria, B.C.
https://a100.gov.bc.ca/pub/reports/rwservlet?habitat_wizard_streams_report&p_title=%22Ministry%20of%20Environment%22&P_STREAM_ID=887690 Accessed March 10, 2026.
- B.C. Conservation Data Centre: Habitat Wizard (web application) 2026d. B.C. Government, Victoria, BC.
<https://maps.gov.bc.ca/ess/hm/habwiz/>
Fish data file: <https://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=50554> Accessed March 10, 2025.

British Columbia Forest Analysis and Inventory Branch. 2024. VRI - 2024 - Forest Vegetation Composite Rank 1 Layer (R1). British Columbia Data Catalogue. <https://catalogue.data.gov.bc.ca/dataset/2ebb35d8-c82f-4a17-9c96-612ac3532d55>

Comox Valley Regional District. 2010. Comox Valley Regional District Regional Growth Strategy Bylaw No 120, 2010. <https://www.comoxvalleyrd.ca/media/8676>

Cumberland Community Forest Society. 2024. CCFS 2024-2028 Strategic Plan. <https://www.cumberlandforest.com/backwoods/wp-content/uploads/2024/01/2023-2028-CCFS-Strategic-Plan.pdf>

Cumberland Community Forest Society. 2023. Cumberland Community Forest & Coal Creek Historic Park - Education and Outreach Strategy.

Comox Valley Regional District. 2025. Comox Valley Regional Community Wildfire Resilience Plan. March 10, 2025. <https://www.comoxvalleyrd.ca/sites/default/files/2025-09/2024%20CV%20Regional%20WRP%20with%20Map%20reduced.pdf>

Davis, L. R., Puettmann, K. J., and G.F. Tucker 2007. Overstory response to alternative thinning treatments in young Douglas-fir forests of Western Oregon. Northwest Science. 81(1): 1-14 <https://research.fs.usda.gov/treearch/29688>

Ennis, T. 2019. Baseline Inventory - Village of Cumberland Forest Lands. Prepared for the Village of Cumberland by Latitude Conservation Solutions Company, August 2019.

Ennis, T. 2020. Cumberland Community Forest Phase III Baseline Documentation Report. August 2020.

Guimond, E. and M. Sheng. 2006. Perseverance Creek Flow Monitoring Study 2005. Prepared by Fisheries and Oceans Canada, May 31, 2006.

Juniper Environmental Services. 2014. Comox Valley Sensitive Ecosystems Inventory Disturbance Assessment. Prepared for the Comox Valley Conservation Strategy – Community Partnership, October, 2014. <https://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=54324>

Fyfe, L. 2013. Nature Without Borders, Second Edition. Comox Valley Conservation Strategy. Produced in collaboration with the CVCS Community Partnership by Juniper Environmental Services. https://cvlandtrust.ca/wp-content/uploads/2020/09/NWB_2ndED_web-1.pdf

Gifford, R., Brown, C., Baron, C., Clement, D., Melnychuk, N., Nelson, H., Sales, L. and Spittlehouse, D. (2022). British Columbia Chapter in Canada in a Changing Climate: Regional Perspectives Report, (ed.) F.J. Warren, N. Lulham and D.S. Lemmen; Government of Canada, Ottawa, Ontario. <https://changingclimate.ca/site/assets/uploads/sites/4/2020/11/British-Columbia-Regional-Perspective-Report.pdf>

Madrone Environmental Services Ltd. 2010. Data submission: Stream Classification using the Private Managed Forest Lands Act

McEwen, J, J. Stewart and A. Jeffries. 2022. Regional Framework for Nature Based Solutions in Southwest BC: CWHxm1 Terrestrial Ecosystem Mapping – Southern Comox Valley Regional District (BAPID 6641). Prepared by

Madrone Environmental Services Ltd. for the BC Conservation Foundation, the Coastal Douglas-fir Conservation Partnership, and the B.C. Ministry of Land, Water and Resource Stewardship. October 14, 2022.

<https://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=59933>

Morin, J. 2025. Cultural Values Report - Cumberland Community Forest Park. Prepared by Jessie Morin PhD and the K'omoks First Nation for the Village of Cumberland, May 30, 2025.

Tetra Tech. 2016. Stage 1 Preliminary Site Investigation Lake Front Acreage Property on the East Side of Comox Lake, Cumberland, British Columbia

Turner, N. 1998. *Plant Technology of the First Peoples in British Columbia*. UBC Press, Vancouver.

Village of Cumberland. 2014. Official Community Plan Bylaw No. 990, 2014. <https://cumberland.ca/ocp/>

Village of Cumberland 2014a. Coal Creek Historic Park Master Plan.

<https://cumberland.ca/wp-content/uploads/2013/02/Final-Coal-Creek-Master-Plan-July-20141.pdf>

Village of Cumberland. 2021. Forest Lands Management Direction Statement

Village of Cumberland. 2021. Interim Trail Management Strategy. May 2021.

<https://cumberland.ca/wp-content/uploads/2021/06/6.7a-CCFP-Interim-Trail-Management-Strategy-Final.pdf>

Appendix: Study Area Maps

- Map 1: CCFS Landscape Study Area
- Map 2: Village of Cumberland Planning Area for the Forest Land Strategy
- Map 3: Roads and Trails
- Map 4: ESA #1 Species Specific Sensitive Areas
- Map 5: ESA #2 Biodiverse Areas
- Map 6: ESA #3 Wetlands
- Map 7: ESA #4 Riparian buffers including floodplains
- Map 8: ESA #5 Rocky Outcrops
- Map 9: ESA #6 Coal Spoils and Legacy Coal Mining sites
- Map 10: Climate Resilience and 7th Generation Landscapes
- Map 11: Forest Stand Age and Composition
- Map 12: Cumulative Human Impact Areas
- Map 13: Landscape and Habitat Connectivity
- Map 14: Wildland Urban Interface Risk Classes and Risk Reduction Treatment Areas

Map 1 : CCFS Landscape Study Area

Legend

- CCFS Landscape Study Area
- VoC Primary Planning Area Of Interest
- VoC Secondary Planning Area Of Interest

Google Earth Imagery



CUMBERLAND
COMMUNITY
FOREST
SOCIETY

0 0.5 1 km

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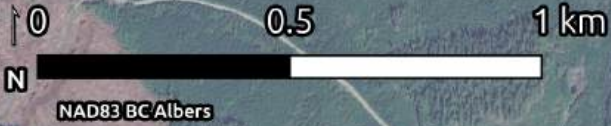
NAD83 BC Albers

Map 2: Village of Cumberland Planning Area for the Forest Land Strategy

Legend

- CCFS Landscape Study Area
- VoC Primary Planning Area Of Interest
- VoC Secondary Planning Area Of Interest

Imagery from Google Earth



Legend

- CCFS Landscape Study Area
- VoC Primary Planning Area Of Interest
- VoC Secondary Planning Area Of Interest

- Trail
- Logging Road

Imagery from Google Earth

Trent River Main

Davis Lake Main

Bear Burn Climb

BR524

43100

Allen Lake North

Allen Lake Main

Logging Road (Minor)

Logging Road

Perseverance Creek Main

Fiscal Access

Lighthouse Way

Idle Main

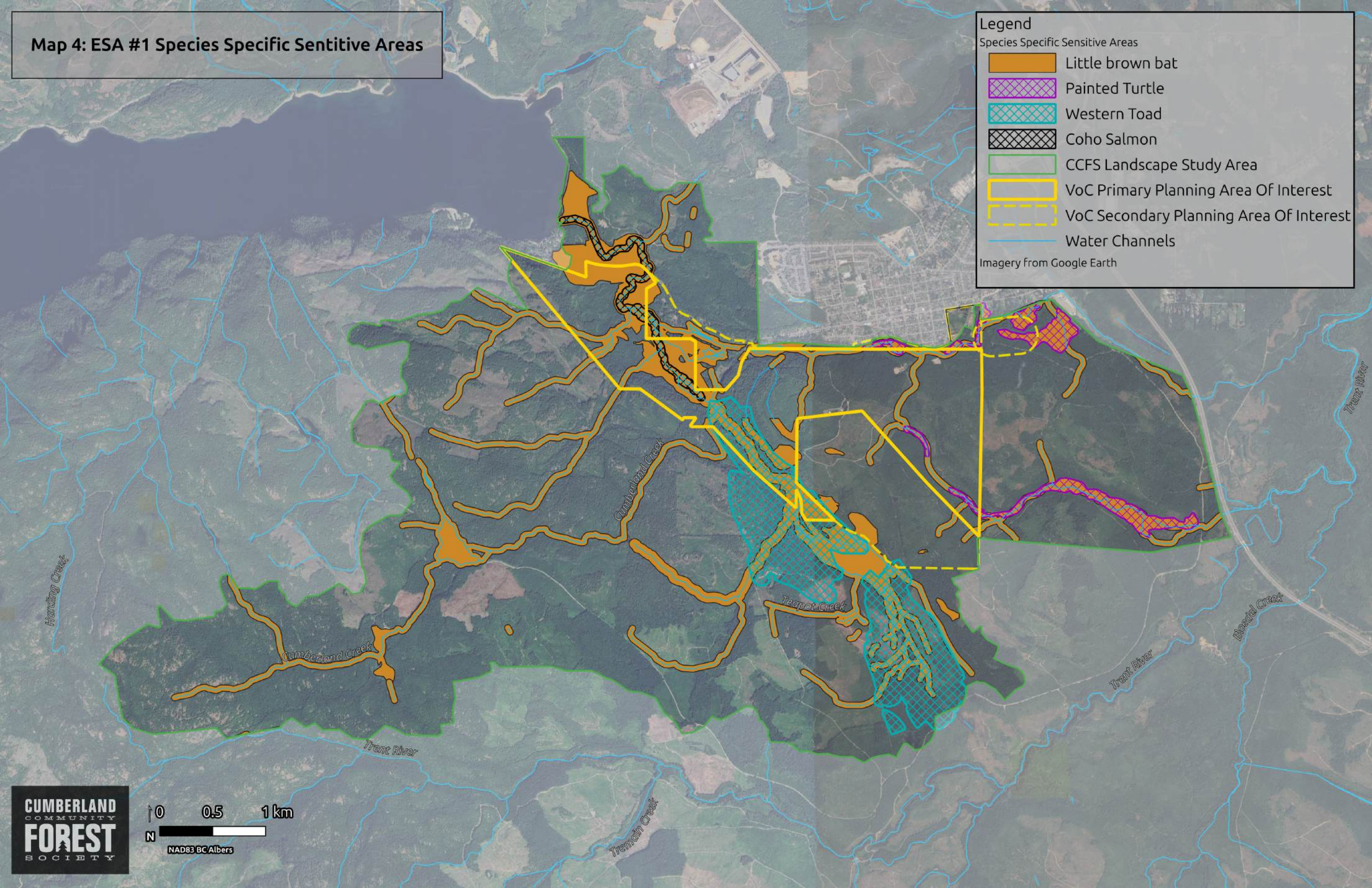
Map 4: ESA #1 Species Specific Sensitive Areas

Legend

Species Specific Sensitive Areas

- Little brown bat
- Painted Turtle
- Western Toad
- Coho Salmon
- CCFS Landscape Study Area
- VoC Primary Planning Area Of Interest
- VoC Secondary Planning Area Of Interest
- Water Channels

Imagery from Google Earth



Map 5: ESA #2 Biodiverse Areas

Legend

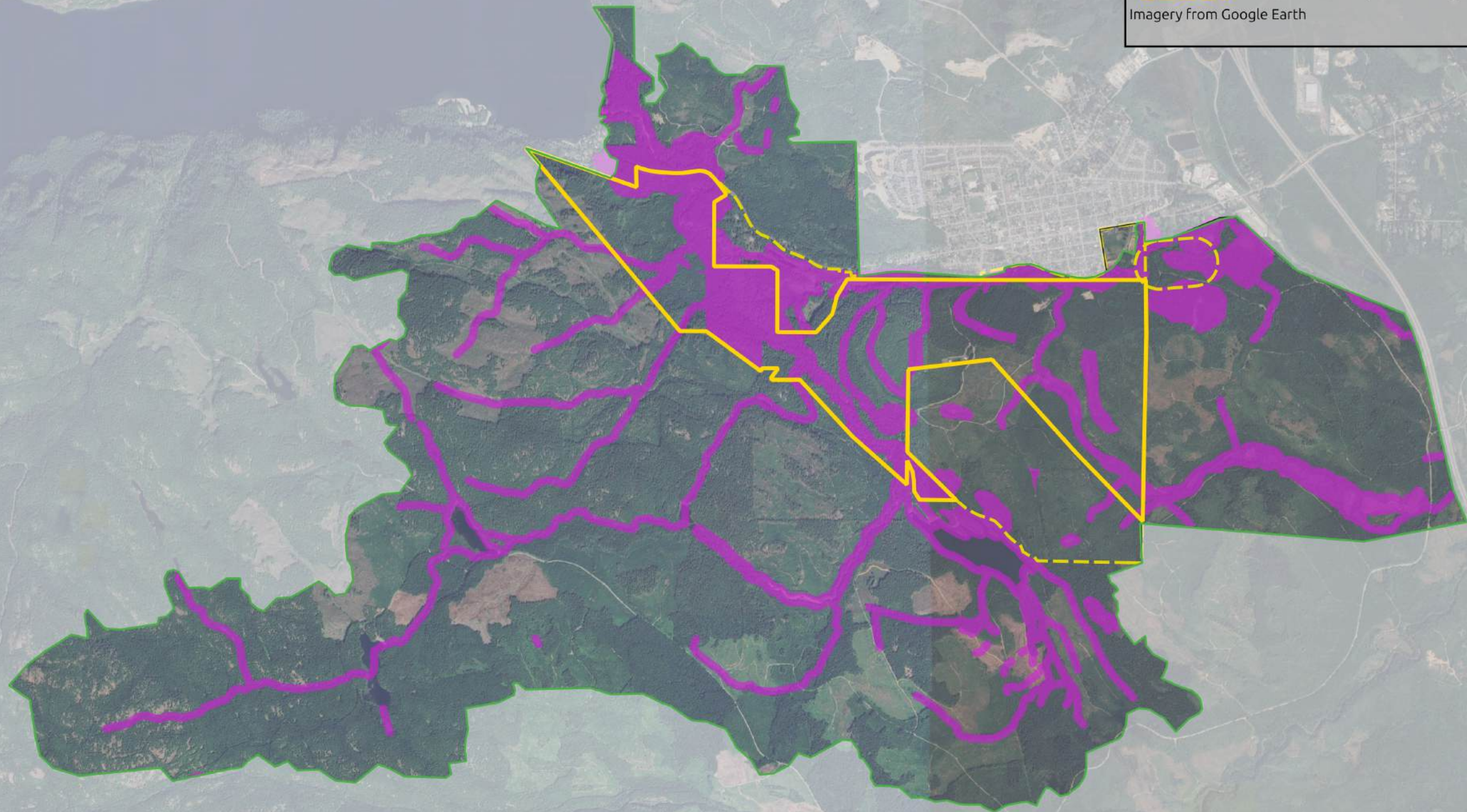
ESA 2 - Biodiverse Areas

CCFS Landscape Study Area

VoC Primary Planning Area Of Interest

VoC Secondary Planning Area Of Interest

Imagery from Google Earth



CUMBERLAND
COMMUNITY
FOREST
SOCIETY

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NAD83 BC Albers

Map 6: ESA #3 Wetlands

Legend

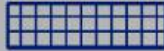
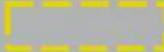
- ESA 3 Wetlands
- CCFS Landscape Study Area
- VoC Primary Planning Area Of Interest
- VoC Secondary Planning Area Of Interest

Imagery from Google Earth

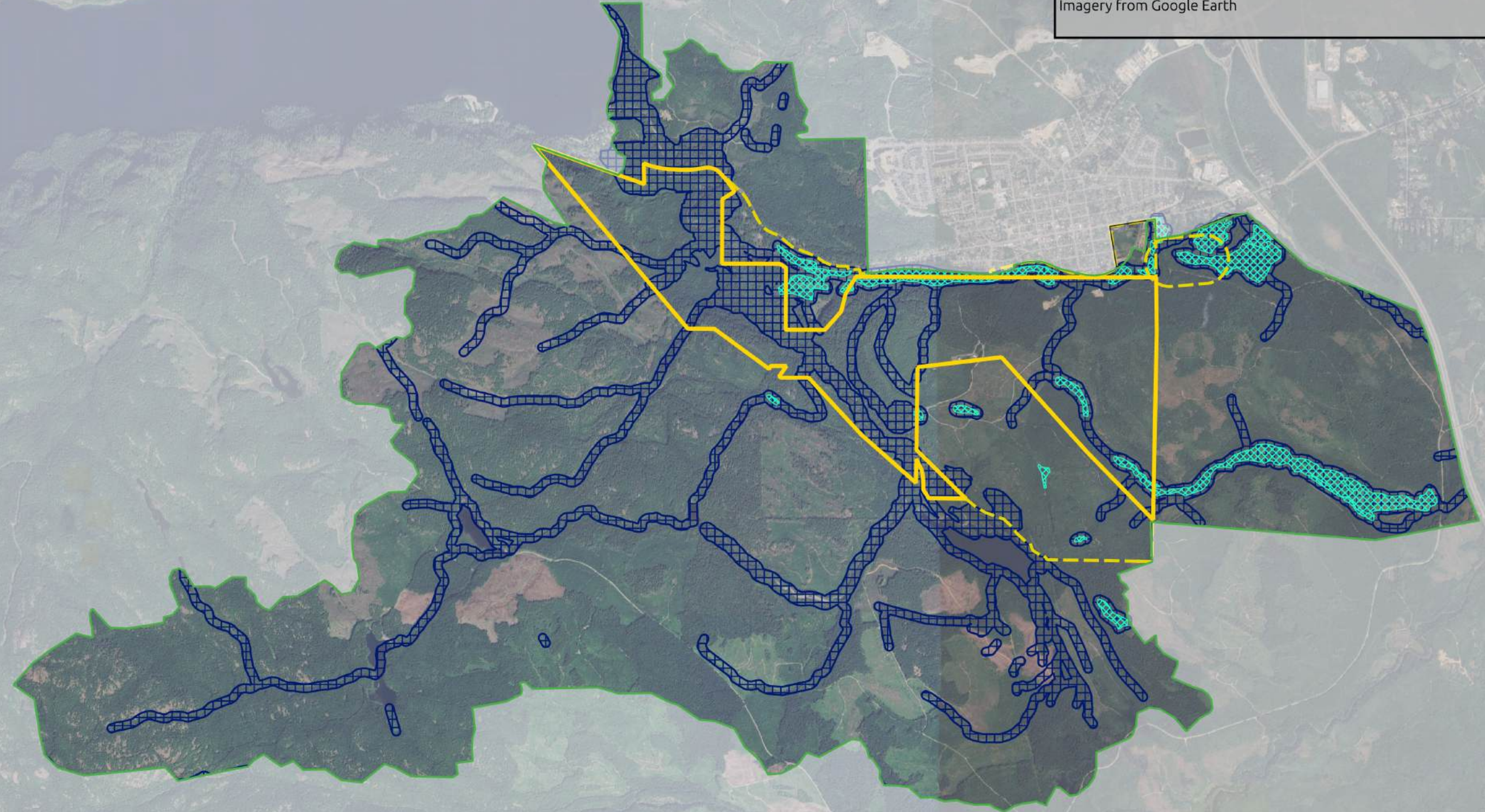
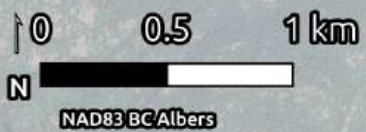
0 0.5 1 km
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NAD83 BC Albers

Map 7: ESA #4 Riparian Buffers

Legend

-  Wetlands
-  ESA 4 Riparian buffers including floodplains
-  CCFS Landscape Study Area
-  VoC Primary Planning Area Of Interest
-  VoC Secondary Planning Area Of Interest

Imagery from Google Earth

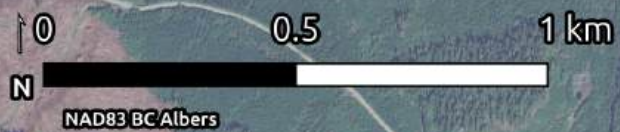


Map 8: ESA #5 Mossy Outcrops

Legend

- ESA 5 - Mossy Outcrops
- CCFS Landscape Study Area
- VoC Primary Planning Area Of Interest
- VoC Secondary Planning Area Of Interest

Imagery from Google Earth



**MAP 9: ESA# 6 Coal Spoil
and Legacy Coal Mining Sites**

Legend

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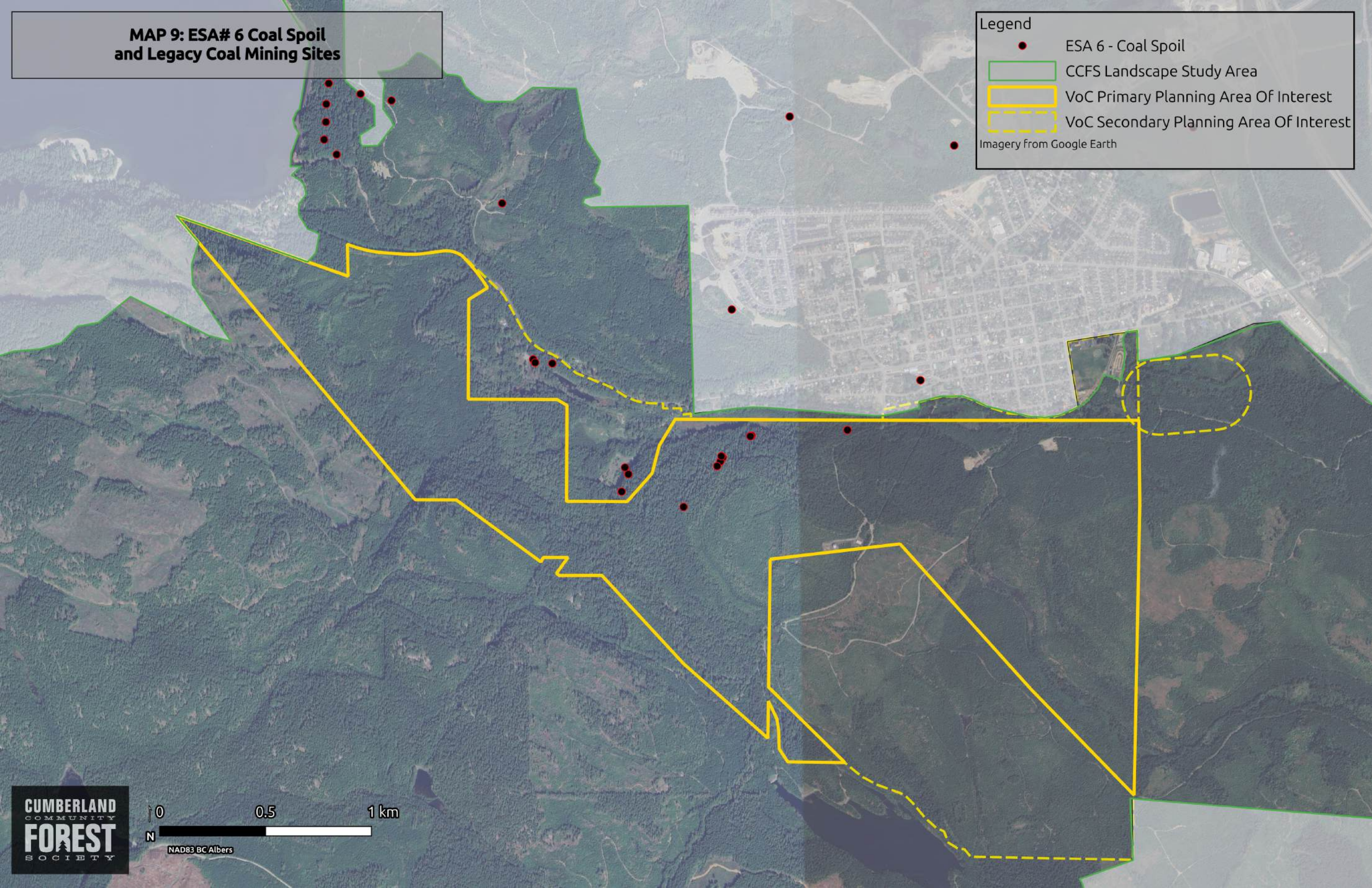
ESA 6 - Coal Spoil

CCFS Landscape Study Area

VoC Primary Planning Area Of Interest

VoC Secondary Planning Area Of Interest

●

Imagery from Google Earth

Map 10: Climate Resilience and 7th Generation Landscapes

Legend

TEM CWHxm01

- Site Series 06
- Site Series 07
- North Facing
- Wetland
- Outdated Data
- CCFS Landscape Study Area
- VoC Primary Planning Area Of Interest
- VoC Secondary Planning Area Of Interest

Imagery from Google Earth

Map 11: Forest Stand Age and Composition

Legend

Forest Age Class

	1: 1-20yr
	2: 21-40yr
	3: 41-60yr
	4: 61-80yr
	5: 81-100yr
	6: 101-120yr
	7: 121-140yr
	8: 141-250yr

CCFS Landscape Study Area

VoC Primary Planning Area Of Interest

VoC Secondary Planning Area Of Interest

Imagery from Google Earth

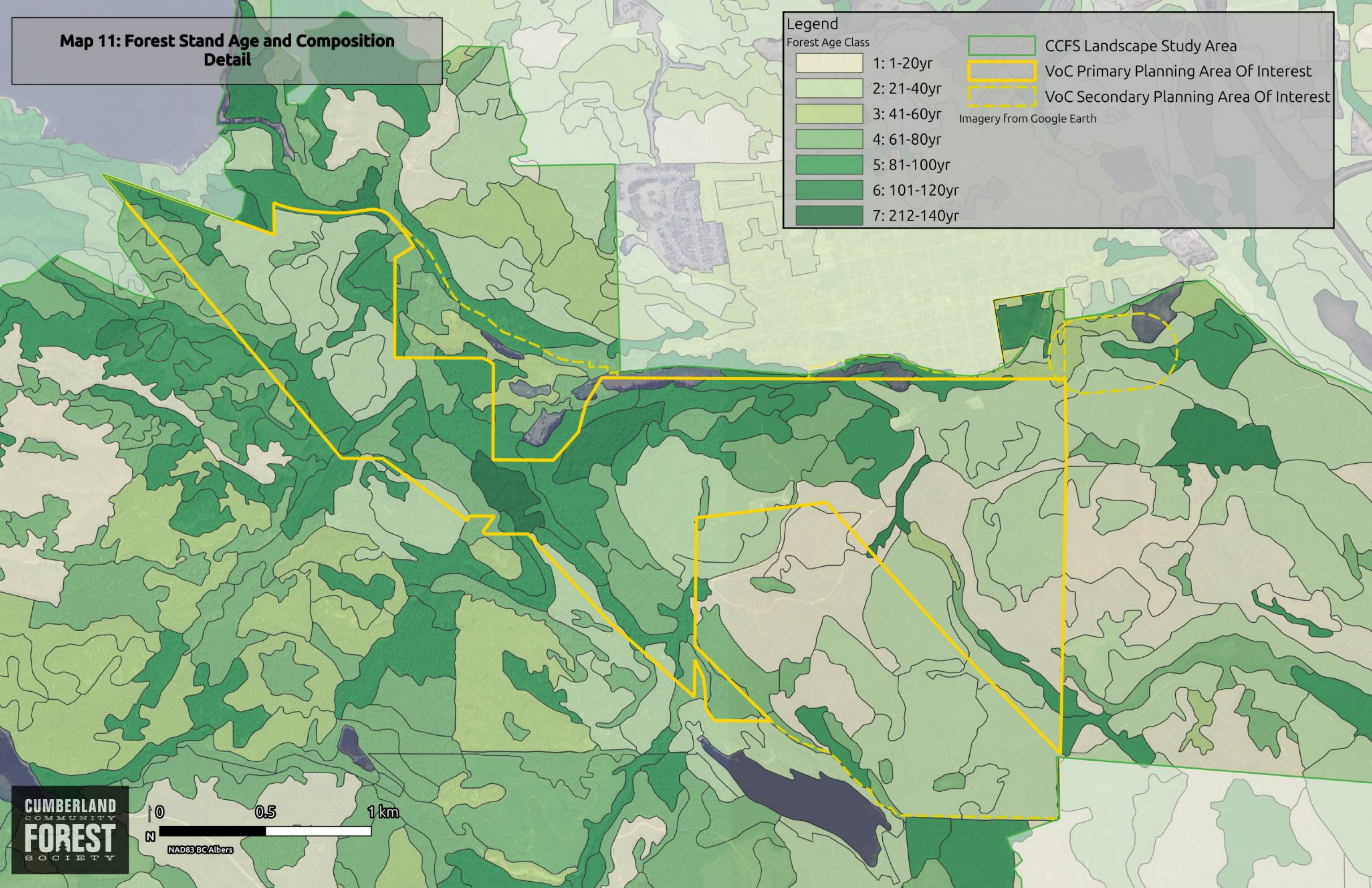
**Map 11: Forest Stand Age and Composition
Detail**

Legend

Forest Age Class

- 1: 1-20yr
- 2: 21-40yr
- 3: 41-60yr
- 4: 61-80yr
- 5: 81-100yr
- 6: 101-120yr
- 7: 212-140yr

- CCFS Landscape Study Area
- VoC Primary Planning Area Of Interest
- VoC Secondary Planning Area Of Interest
- Imagery from Google Earth



Map 12: Cumulative Human Impact Areas

Legend

- Human Impact Areas
- CCFS Landscape Study Area
- VoC Primary Planning Area Of Interest
- VoC Secondary Planning Area Of Interest

Imagery from Google Earth

0 0.5 1 km
N
NAD83 BC Albers

Map 13: Landscape and Habitat Connectivity

Legend

CCFS Landscape Study Area

VoC Primary Planning Area Of Interest

VoC Secondary Planning Area Of Interest

15. Landscape Connectivity

Imagery from Google Earth

CUMBERLAND
COMMUNITY
FOREST
SOCIETY

0

0.5

1 km

NAD83 BC Albers

Map 14: Wildland Urban Interface Risk Classes and Risk Reduction Treatment Areas

Legend

Local Fire Threat

High

Moderate

Low

Proposed Treatment

CCFS Landscape Study Area

VoC Primary Planning Area Of Interest

VoC Secondary Planning Area Of Interest

Imagery from Google Earth