Greater Terrace Agricultural Area Plan

Land Use and The Agricultural Land Base

Prepared for the City of Terrace and Regional District of Kitimat Stikine

Prepared by:
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STATEMENT OF LIMITATIONS FOR THIS REPORT "*Land Use and the Agricultural Land Base*"

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Cover photo: Kitselas Road - Copper City Flats - Class 5/3 alluvial soils in the Agricultural Land Reserve (ALR). This field is used seasonally for cattle and has a remnant fruit orchard near the original location of Stuart's Landing. Stuart's Landing, an 1890's sternwheeler stop for cordwood, had one of the first apple orchards in the Greater Terrace area.

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Recommendation LU.2.b.	***Interview experienced and retired farmers. Document important local agricultural information and knowledge.***
Recommendation LU.2.c.	***Facilitate exchanges of agricultural information and ideas between experienced farmers and new farmers and food producers.***

LU.3. Working with the North Coast Climate

Recommendation LU.3.a.	***Compile climate information relevant to local agriculture.***
Recommendation LU.3.b.	***Facilitate workshops regarding climate factors important to local agriculture.***
Recommendation LU.3.c.	***Facilitate workshops regarding climatic farming techniques.***
Recommendation LU.3.d	***Facilitate the availability of construction plans for greenhouses and other climatic farming techniques.***
Recommendation LU.3.e.	***Facilitate the availability of cost-effective building materials for climatic farming techniques.***
Recommendation LU.3.f.	***Facilitate the availability of building plans and workshops regarding home and commercial food storage facilities.***
Recommendation LU.3.g.	***Examine the feasibility of cooperative storage facilities for commercial agricultural products.***
Recommendation LU.3.h.	***Facilitate research identifying the factors affecting pollination of local agricultural crops, in particular fruit trees.***

LU.4. Soil and Water - the Foundation for Agriculture

Recommendation LU.4.a.	***Facilitate workshops regarding the characteristics of local soils and techniques for soil conservation. Facilitate the availability of this information on an ongoing basis.***
Recommendation LU.4.b.	***Facilitate workshops regarding soil nutrients and the techniques for the organic enhancement of soil nutrients.***
Recommendation LU.4.c.	***Facilitate access to soil testing for local farmers.***
Recommendation LU.4.d.	***Examine the potential for cooperative purchases of soil improvement materials and cover crops.***
Recommendation LU.4.e.	***Examine the sale and movement of topsoil and compostable materials in the Greater Terrace area.***
Recommendation LU.4.f.	***Determine how water supplies and water regulations impact existing and potential local agriculture.***
Recommendation LU.4.g.	***Evaluate drainage, erosion, and agricultural contamination issues associated with clay soils.***
Recommendation LU.4.h.	***Evaluate the impacts of agriculture on groundwater quality and domestic water supplies in coarse soils with high percolation rates.***

LU.5. Floodplains and Terrain Hazards

Recommendation LU.5.a.	***Document and undertake a geotechnical assessment of the patterns of bank erosion affecting agricultural areas next to the Skeena River and Kitsumkalum River.***
Recommendation LU.5.b.	***Work with agricultural operators located in floodplains to reduce the impacts of flooding on land and infrastructure investments.***
Recommendation LU.5.c.	***Provide information regarding terrain hazards to agricultural operators and farmers.***
Recommendation LU.5.d.	***Include assessment of potential terrain hazards in determination of regulations that permit agriculture and rural land development in the Greater Terrace area.***

LU.6. Land Use and the Agricultural Land Base

Recommendation LU.6.a.	***Facilitate the availability of soil capability mapping.***
Recommendation LU.6.b.	***Facilitate the availability of information regarding the Agriculture Land Reserve, ALR locations, and associated regulations.***
Recommendation LU.6.c.	***Request a review of current ALR boundaries.***
Recommendation LU.6.d.	***Request that Statistics Canada review the agricultural operations contact list for the Greater Terrace area before the 2016 Census of Agriculture.***
Recommendation LU.6.e.	***Facilitate workshops and availability of information regarding BC Assessment Authority's Farm Class property tax reductions.***
Recommendation LU.6.f.	***Facilitate the compilation of accurate statistics for agriculture and food growing activities in the Greater Terrace area.***
Recommendation LU.6.g.	***Maintain an up-to-date list of agricultural operations, agricultural land parcels, and the locations of agricultural activities.***
Recommendation LU.6.h.	***Assess and define agricultural districts and important farming areas within the Greater Terrace area and implement supportive bylaws and regulations.***
Recommendation LU.6.i.	***Assess the roles of non-commercial agriculture and food production activities in the life styles and community food security for the Greater Terrace area***
Recommendation LU.6.j.	***Facilitate workshops and access to information about the care and cultivation of fruit trees in the Greater Terrace area.***
Recommendation LU.6.k.	***Assess the land use needs of larger livestock in the Greater Terrace area, in particular horses and cattle, and their seasonal uses of agricultural lands.***
Recommendation LU.6.l.	***Assess the number, densities, and locations of horses, cattle, and other large livestock in agricultural and non-agricultural areas of Greater Terrace.***
Recommendation LU.6.m.	***Facilitate workshops and information regarding best management practices for the care of livestock and siting of pens and waste piles on smaller land parcels.***
Recommendation LU.6.n.	***Review bylaws and local government policies with regards to encouraging food producing activities within urban areas, both in private and public spaces***

LU. 7. Implementation of Recommendations

Recommendation LU.7.1. ***Establish a permanent on-line archive for agricultural information and links to agricultural information relevant to the Greater Terrace area.***

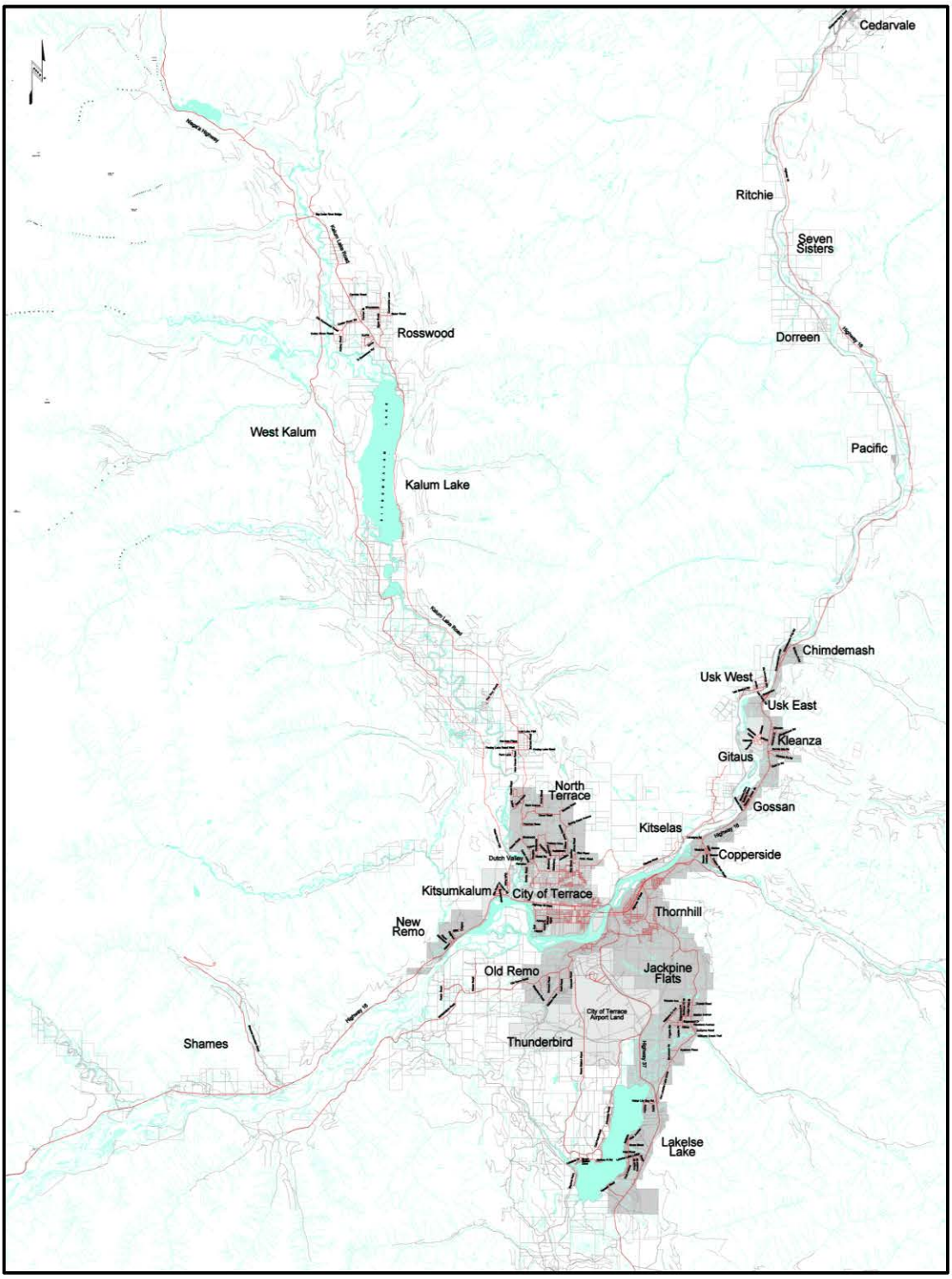
Recommendation LU.7.2. ***Maintain and update the on-line archive on an ongoing basis.***

Recommendation LU.7.3. ***Establish a permanent Agricultural Advisory Committee.***

Recommendation LU.7.4. ***Encourage and support the establishment of a permanent farmers' organization which supports activities and dissemination of knowledge to local agricultural operators and food growers.***

Recommendation LU.7.5. ***Review and modify bylaws and other regulations in order to promote agriculture as an important economic and life-style land use activity within the Greater Terrace area.***

Class 5(4) alluvial soils; ALR; Chimdemash area; market garden; berries; rhubarb; poultry; seasonal livestock.



Map 1: Greater Terrace Area - Geographic Setting
Map prepared by Regional District of Kitimat-Stikine

LU.1. Introduction: Land Use and The Agriculture Land Base

This report provides an overview of the Greater Terrace **agricultural land base**, including information regarding land use, climate, soils, agricultural capability, water supplies, and barriers to agriculture arising from the characteristics of the land base[9]. The report is one component of the development of an agricultural area plan for the Greater Terrace area[15,20]. Forty-two recommendations for action arise from this aspect of the planning processes.

The Greater Terrace area (Map 1) is located on the north coast of British Columbia, 120 km inland from the Port of Prince Rupert and 800 km by air north of Vancouver, at 54°30'N latitude (half way up the Province of British Columbia). Situated in the lower watershed of the Skeena River, the study area ranges from 35 meters to 250 meters in elevation. Surrounding mountains reach altitudes in excess of 1500 to 1800 meters. The west coast temperate rain forest environment of the Greater Terrace area results from proximity to the North Pacific Ocean and the area's inland valley location on the mid-windward side of the North Coast mountain ranges.

The Greater Terrace area has many bioclimatic characteristics suitable to agriculture. Located in a 5 km wide valley, with an average of 151 frost free days per year, 1471 bright sunshine hours, 133 cm of precipitation, and a mean annual temperature of 6.3° C[12], the Greater Terrace area has a mild climate for its latitude and represents agricultural opportunities not found elsewhere in northwestern B.C. Adjacent communities on the coast, such as Prince Rupert, experience twice as much precipitation as Terrace, as well as reduced sunshine hours, lower average summer temperatures, and limited soil development. To the interior of the Terrace area, in communities such as Smithers and Burns Lake, continental influences shorten the growing season to less than 80 frost-free days annually[12], limiting the range of agricultural crops.

As a result, the Greater Terrace area has had over one hundred years of successful agricultural history unique to northwestern British Columbia[3]. This area is well suited to the growth of tree fruits, in particular, apples and cherries. Production levels of small fruits, such as raspberries and strawberries, and field crops, such as potatoes, cabbage, and kale, are excellent. If these agricultural opportunities are to continue and be expanded, it is important that the assets and limitations of the agricultural land base are understood and addressed.

LU.2. Historical Relationships to the Greater Terrace Agricultural Land Base

LU.2.1. Historical Overview[3,16]

The Greater Terrace area falls within the traditional lands of the Kitsumkalum and Kitselas First Nations[16]. Through management of house territories, portions of the Greater Terrace area were modified for food production. Crabapple orchards, house gardens, and berry-producing patches were cultivated within and next to large villages. The richest food-producing sites were adjacent to major river courses. Silt and nutrients carried by floodwaters kept the soils rich and productive. The First Nations of this region maintained the land base in a sustainable fashion and looked upon food harvesting as a stewardship responsibility.

In 1871, the colony of British Columbia joined the Dominion of Canada. Due to the isolation and ruggedness of the North Coast, the immediate Greater Terrace area had limited impacts from European settlement until the 1890's, when a small number of settlers established riverboat landings or mining camps along the Skeena River[3]. Cultivation was restricted to home gardens and small orchards.

At the start of the 1900's, the Province opened up the Skeena, Lakelse, and Kitsumkalum Valleys for land pre-emptions. Under the pre-emption system, Provincial crown land was acquired by staking it for agricultural purposes. The Kitsumgallum (Terrace) area attracted attention due to the mild climate and large acreages of rich soils and flat, arable land. By 1909, most of the land in the Greater Terrace area had been staked for agricultural pre-emptions and timber licenses[16].

The silty to sandy alluvial soils of the river benches and floodplains in the Greater Terrace area were ideal for open field farming. By 1912, the Grand Trunk Pacific Railway was completed to Terrace and, by 1914, Terrace was connected to the rest of Canada. The arrival of the railway allowed farm produce, including meat, eggs, berries, potatoes, tree fruits, vegetables, and dairy products, to move quickly from the farms in the Skeena Valley to markets in Prince Rupert, the interior of B.C., and beyond. Tree fruits were exported to the Canadian Prairies and as far away as England. The agricultural industry in Terrace boomed and most of the developable land close to the railway was under cultivation by 1920[16].

From 1900 to the 1960's, the Greater Terrace area was known as the 'Okanagan of the North', the 'Northern Breadbasket', and the 'Potato Capital of the Northwest'[3,16]. Agricultural production peaked in the late 1940's, then steadily declined as full-time farming diminished due to competition with high wages offered in the forest industry, rapid population growth, housing developments which overran agricultural land, and the advent of cheap produce at supermarkets. There was a brief resurgence of agriculture in the 1950's and 1960's when a number of German and Dutch immigrants settled on the farm lands of Old Remo, New Remo, and Terrace but, by the mid-1980's, only a small number of half-time and full-time farmers were left in the Greater Terrace area[16].

LU.2.2. Historical Relationships to the Agricultural Land Base

The traditional relationship of the Tsimpsean First Nations with the land base of the Greater Terrace area minimized impacts upon the natural vegetation cover. Except for modifications to berry producing areas, fertilization of house gardens and orchards, use of fire to change forest succession patterns, and harvesting of trees and tree products on a selective basis, the landscape was left to natural soil and vegetation processes.

With the advent of European settlers into the Greater Terrace area, the relationship to the land base changed significantly[16]. In order to grow European crops, the forest cover was removed and the soil base tilled and planted. The most successful farms were those located on fine, arable soils, such as the river flats and alluvial benches of the Terrace area. Farms located too far from the railway or on poor soils or lands prone to flooding or erosion, were abandoned by the 1920's.

Some of the richest farms historically in the Greater Terrace area were located in Old Remo, New Remo, Braun's Island, east Graham Avenue, and Copper City Flats. Situated in the Skeena River floodplain, these areas had the best natural soils. The middle bench (Horseshoe area) of the central valley, although above recent floodplain levels, also had excellent soils and attracted the greatest number of tree fruit orchards, dairies, and market gardens. Areas of droughty, stony soils, such as Jackpine Flats and parts of Thornhill, were not developed for farming. Those areas dominated by clay, such as Terrace North, Rochester Basin, and the Thunderbird area, were also not developed as larger farms due to drainage and soil structure problems[3,16]

Modern agriculture in the Greater Terrace area reflects this pattern of early pre-emptions, followed by abandonment or persistence of homesteads. Some agriculture activity still occurs in areas of good soils which were first cleared and farmed over 100 years ago, such as Braun's Island and Copper City Flats. The rich soils of New Remo and Old Remo, despite flooding and bank erosion by the Skeena River, have had farming activity over many decades of ownership changes. Other areas, with low agriculture potential, such as Kalum Lake Road and portions of Rosswood, have food production activities, but not due to proximity to markets or good soils. Many of these farms are historical remnants of early homesteads which were established to support trapping, mining, cedar pole logging, and sawmilling[3,13,14,16].

More recent historical relationships to the agricultural land base, from the 1960's through to the 1980's, saw agricultural and food growing activities established in rural subdivisions surrounding the City of Terrace and Thornhill. The attraction for farming in these locations, such as Kleanza, Gossan, Jackpine Flats, and the uplands subdivisions at Lakelse Lake, was largely based on the availability of large lots or parcels, rather than the capability of the soil for farming or food production. In some of these locations, especially those with stony to bouldery soils, conflicts between the density of agricultural land uses, residential properties, and groundwater safety, may influence the persistence of farming over time[16].

The resultant mosaic of agricultural activity in the Greater Terrace area is a combination of historically persistent farm areas with good soils, historic farming remnants from homesteads established for other purposes than agriculture, and more recent agricultural ventures based on land availability opportunities, often without clear relationships to the attributes of the land base to support agriculture.

LU.2.3. Transferring Historical Knowledge and Experience

One of the consistent requests during the public events supporting development of this Plan, was access good information regarding the history of agriculture in the Greater Terrace area. Historical agriculture information, including soils, varieties of crops, and farming techniques, could provide a foundation upon which the new round of agriculture in the Greater Terrace area might be based. Intergenerational transfer of knowledge between members of extended farm family groups or within neighbourhoods already occurs in the Greater Terrace area, but a consistent and persistent mechanism by which historical farming "know-how" is being preserved and passed on to new farmers, has not been established.

Recommendation LU.2.a. Establish an archive of historical agricultural information.

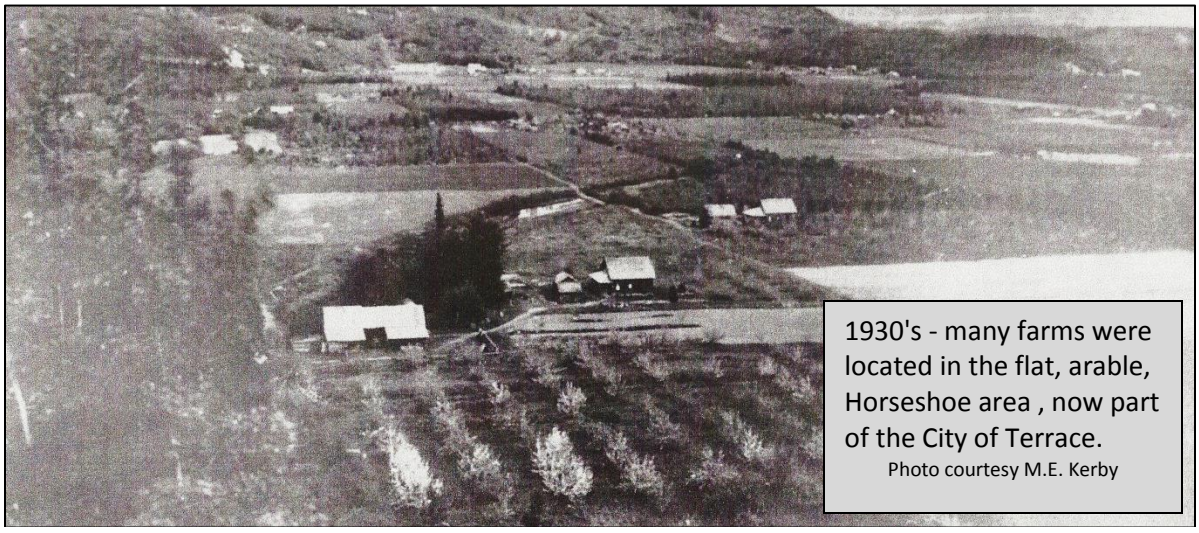
Establish an archive of historical agricultural information relevant to the Greater Terrace area, including maps and publications from historical experimental farms, the B.C. Department of Agriculture, and the Canadian Department of Agriculture, as well as other local historical records and a bibliography of agricultural publications and Internet links.

Recommendation LU.2.b. Interview experienced and retired farmers. Document important local agricultural information and knowledge.

Interview and record information and knowledge from experienced farmers, agricultural operators, and seniors in the Greater Terrace area, and make this information available to new farmers through a publically accessible archive.

Recommendation LU.2.c. Facilitate exchanges of agricultural information and ideas between experienced and new farmers and food producers.

Examine mechanisms by which experienced and new farmers and food producers in the Greater Terrace area can meet one another and exchange information and ideas. Assist this process by providing information regarding funding sources and structural choices by which farm mentoring can occur and a permanent farmers' organization established.



1930's - many farms were located in the flat, arable, Horseshoe area , now part of the City of Terrace.
Photo courtesy M.E. Kerby

LU.3. Working with a North Coast Climate

LU. 3.1. Climatic Characteristics of the Greater Terrace Area[12,16]

LU.3.1.1. Climate Patterns

The milder climate of the Greater Terrace area is one of the most important assets in its potential future for viable commercial agriculture and effective community food security. The Greater Terrace area is located at 54°30'N latitude, 120 km inland from the Pacific Ocean at the City of Prince Rupert and 55 km inland from the District of Kitimat at the head of the Douglas Channel. Located within a **temperate marine west coast rainforest climate**, Terrace is drier than the outer coast due to the rain shadow effects of the Coast Mountains. It is warmer in the summer than the coast as the result of its distance from the cooling effects of the ocean, and colder in the winter than the coast due to its inland location, combined with winter outflows of cold continental air towards the ocean[12,16].

Under certain weather conditions, the flow of milder coastal air up the Kitimat River and Skeena River valleys ameliorates spring, winter, and fall temperatures, helping to make the Greater Terrace area warmer annually than the central interior. Warmer annual temperatures are also affected by the location of the summer Hawaiian high pressure system over the B.C. coast. Persistence of the Hawaiian high on the North Coast influences the amount and duration of clear weather in the Greater Terrace area during the growing season.

The Greater Terrace area is subject to year to year oscillations in weather conditions resulting from **El Nino versus La Nina** Pacific Ocean air pressure patterns. During El Nino events, moist air moves against the North Coast, producing large amounts of cloud and precipitation. In comparison, during La Nina years, continental influences dominate and summers in the Terrace area can have 6 to 8 weeks of sunshine, leading to droughty soil conditions. The dramatic differences between these two types of yearly weather patterns are important to consider in the design of agricultural crops and agricultural operations in the Greater Terrace area.

Class 7 soils; not ALR; Rosswood area

LU.3.1.2. Climate Values

Environment Canada[12] calculates 30 year climate normals for weather stations. The Greater Terrace area has two weather sites, the Terrace Airport (***Terrace A***) at 210 meters elevation, and the Terrace PCC (***Terrace PCC***) site at 58 meters elevation. The following data is from the 1970 to 2000 climate normals, the most recent values available for this area. Extreme values are taken from total years of record (60 years for the Terrace Airport).

Table 1. **Climate Normals for the Terrace Area**

Terrace A	Max ^{o}C Daily	Min ^{o}C Daily	Daily ^{o}C Average	Extreme Max ^{o}C*	Extreme Min ^{o}C*	Precipitation mm(snow[&])	ExPr. mm* (snow cm)
January	-2.2	-6.4	-4.3	9.4	-25.0	168.2 (111)	66.3 (99.1)
TerracePCC	*-0.8*	*-6.2*	*-3.5*	*9.5*	***-25.6***	*137.7 (68.3)*	*61.5(61.5)*
February	1.1	-3.8	-1.4	10.0	-25.0	119.8 (65.2)	99.7(**113.4**)
TerracePCC	*2.6*	*-3.7*	*-0.5*	*11.0*	*-22.8*	*99.4 (35.0)*	*66.8* (***66.8***)
March	5.7	-1.2	2.3	16.9	-18.3	84.8 (34.7)	49.3 (40.4)
TerracePCC	*7.3*	*-1.0*	*3.2*	*19.0*	*-16.7*	*70.7 (13.4)*	*46.7* (*46.7*)
April	10.7	1.6	6.2	25.0	-8.3	71.0 (9.7)	59.2 (49.6)
TerracePCC	*12.2*	*1.6*	*6.9*	*26.1*	*-6.7*	*58.9 (2.1)*	*50.0* (*27.9*)
May	15.4	5.2	10.3	34.6	-2.2	53.3 (0.4)	39.6 (6.1)
TerracePCC	*16.7*	*5.1*	*10.9*	*35.0*	*-2.8*	*47.4 (0)*	*38.4 (0.5*)
June	18.6	8.8	13.7	34.4	0.6	51.3 (0)	35.4 (0)
TerracePCC	*19.6*	*8.5*	*14.1*	*34.4*	*1.0*	*46.9 (0)*	*29.0* (0)
July	21.3	11.3	16.4	35.6	3.3	52.7 (0)	39.4 (0)
TerracePCC	*22.3*	*10.9*	*16.6*	*35.0*	*3.0*	*47.3 (0)*	*33.6* (0)
August	21.1	11.4	16.3	**36.2**	2.8	62.7 (0)	71.8 (0)
TerracePCC	*22.1*	*10.9*	*16.5*	***36.5***	*1.1*	*57.4 (0)*	*40.7* (0)
September	16.3	8.1	12.2	32.2	-1.4	98.6 (0)	106.6 (0.3)
TerracePCC	*17.5*	*7.1*	*12.6*	*33.3*	*-2.5*	*93.6 (0)*	*97.0* (0)
October	9.1	3.7	6.4	21.4	-13.5	186.6 (3.8)	115 (21.3)
TerracePCC	*10.4*	*3.8*	*7.1*	*22.5*	*-12.0*	*174.3 (0.1)*	*85.9* (*11.0*)
November	2.4	-1.3	0.6	21.4*	-25.3	181.7 (54.6)	95.8 (38.8)
TerracePCC	*3.7*	*-0.8*	*1.5*	*14.4*	*-23.5*	*159.7 (25.8)*	*78.7* (*51.0*)
December	-1.0	-4.8	-2.9	11.3	**-26.7**	191.6 (96.6)	**142** (82.8)
TerracePCC	*0.2*	*-4.3*	*-2.1*	*11.5*	***-25.6***	*167.4 (59.0)*	*74.0* (*48.0*)
Yearly	**9.9**	**2.7**	**6.3**	**36.2**	**-26.7**	**1322.4(375)**	**142** (**113.4**)
TerracePCC	***11.2***	***2.7***	***6.9***	***36.5***	***-25.6***	***1160.6(204)***	***94*** (*66.8*)

Based on Canadian Climate Normals 1971-2000, Environment Canada
Terrace A = Terrace Airport: 54^{o}27'59"N 128^{o}34'39"W Elevation: 217 meters
Terrace PCC = Terrace at Graham Ave.: 54^{o}30'07"N 128^{o}37'29"W Elevation: 58 meters
* - extreme daily value on record; extreme daily precipitation (in mm) = extreme snowfall (in mm water equivalent) + rainfall; & - average monthly value - snowfall in cm; water equivalent for snow included in total precipitation values (in mm)

LU.3.1.3. Temperatures[12]

Average temperatures in the Terrace area are milder than those for communities located in the central interior of British Columbia at the same latitude. Compared to mean daily temperatures in the Terrace area of 6.3°C at the Airport, the mean annual temperatures of Smithers, Burns Lake, and Prince George are 3.9°C, 2.8°C, and 4.0°C respectively[12].

Location within the Greater Terrace area itself also affects temperature values. On average, air temperatures drop 0.64°C per 100 meters increase in elevation. The mean annual temperature at the Terrace Airport (217 m elevation) is 6.3°C. As most agricultural lands in the Greater Terrace area are below 100 meters elevation, they are warmer than the Airport bench. The mean annual temperature of the Terrace PCC station on Graham Ave. (at 58 m elevation) is 6.9°C[12]. In contrast, Rosswood, at 160 m elevation, is inland from the warming influences of the Skeena Valley. Its average temperatures are colder and more interior in characteristics than both the Terrace and Thornhill areas.

Extreme temperature values impact the varieties of agricultural crops which can grow in the Greater Terrace area, and the level of productivity of certain crops such as potatoes. The extreme maximum temperature on record at the low elevation Terrace PCC station is 36.5°C, whereas the extreme minimum temperature on record is -26.7°C at the Terrace Airport[12,16]. These values are very important for fruit trees, which can live for eight or more decades. It is essential to recognize that extreme low temperatures in the Terrace area can dip below -25°C. This changes the zone category for suitable tree varieties in the Greater Terrace area from a Zone 4/5 to a Zone 3 rating[1a] .

The Greater Terrace area has a **long growing season**. The average frost free period in Terrace, based on 30 year climatic norms, is 153 days, from May 14 to October 13, compared to 74 days for the Hazeltons and 68 days in Prince George[16]. The latest frost on record at Terrace was June 11, 1938, and the earliest on record was September 15, 1916, giving an extreme frost free period of 120 days[16]. Relative to freezing levels, 328 days per year on average have a maximum temperature above 0°C, and 238 days per year have a minimum temperature above 0°C. In total, Terrace averages 2868 degree days above zero and 677 degree days above 10°C, compared to Smithers with 2281 degree days above zero and 459 degree days above 10°C , and Burns Lake with 2129 degree days above zero and 394 degree days above 10°C[12,16].

Compared to other locations in northwestern British Columbia, the milder temperatures of the Greater Terrace area are beneficial, not only to the number of crops that can be grown, but also for economic viability of season extending techniques, such as unheated and heated greenhouses.

LU.3.1.4. Precipitation[12]

Precipitation is a major factor affecting agriculture viability in the Greater Terrace area. Terrace receives an average of 133 cm of precipitation per year, compared to central interior values of 51 cm for Smithers and 46 cm for Burns Lake. This compares to 260 cm of precipitation annually for Prince Rupert on the coast[12]. Terrace's total annual precipitation averages 375 cm of snowfall and 97 cm of rain. The deepest snowfalls occur during southwesterly storms in December and January. The largest amounts of rainfall are associated with Pacific cyclonic storms in October

and November. Extreme precipitation events triggered by Pacific weather systems can be very dramatic. The extreme rainfall in the last 60 years was 11.5 cm of rain in 24 hours at the end of October in 1978. In comparison, 191 cm of wet snow fell during one day in February, 1972[12].

Precipitation levels vary across the Greater Terrace area. Locations next to or on mountain slopes receive higher amounts of adiabatic precipitation. Rosswood, which lies in a more pronounced rainshadow than the Terrace/Thornhill area, receives less annual precipitation. Small differences in elevation e.g. Braun's Island versus the West Bench, can produce significant differences as to whether precipitation is rainfall or snowfall during the winter months.

Over all, precipitation in the Greater Terrace area directly affects agricultural success. Heavy winter snowfalls are capable of collapsing greenhouses and the roofs of sheds unless the buildings are correctly constructed. These heavy wet snowfalls break unprotected fruit trees and crush canes on small fruits such as raspberries. Heavy rainfalls can be equally destructive, eroding exposed soils and washing fine particles away from sandy (or coarser) soils unless the upper surface of the soil is protected. Conversely, lower precipitation levels in summer months, especially during La Nina cycles, generate water stress for plants and necessitate watering or irrigation of crops on sandy and coarser soils.

LU.3.1.5. Sunshine[12]

Compare to an interior location such as Smithers, which has 292 days with measurable sunshine in a year, Terrace averages 267 days per year with measurable sunshine, for a total 1471 hours of bright sunshine in a year, compared to 1651 hours for Smithers, 1823 hours for Burns Lake, and 1229 hours for Prince Rupert on the coast[12].

The Greater Terrace area has sufficient sunshine[16] for successful agriculture during La Nina or non-El Nino years, the majority of which is concentrated from April through to September. During this period of time, the hours of daylight are greater than 12 hours per day, reaching a maximum of 17 hours of daylight by summer solstice. This provides long hours of sunshine for plant growth if the weather is clear. After the Autumn equinox, the hours of sunlight per day are less than 12 hours, diminishing to 7 hours per day by the Winter Solstice. In addition to fewer hours of daylight, the angle of the sun in the sky becomes reduced until it reaches a low of 11.5^{o} above the horizon at solar noon on December 21st. Winter use of heated greenhouses requires artificial lighting in order to grow crops.

C.3.1.6. Wind[12]

Wind is a climatic factor that is important to farming in the Greater Terrace area. Although the Greater Terrace area on average has less than 9 days per year with winds greater than 52 km/hr[12], the severity of the impacts from storm winds depends very much on location within the valley systems of the Plan area. The main Skeena Valley, northeast of Thornhill and extending southwest along the Skeena River through the Plan area, is subject to strong northerly outflow winds during the winter months. These blustery winds, reaching maximums of 80 km per hour or higher, are sufficient to strip coverings from greenhouses and blow roofs off sheds. Even more dramatic are southerly winds associated with Pacific cyclonic storms. Reaching maximum gust speeds of 90 to 124 km/hr[12], these winds can cause fruit trees to uproot, and will strip leaves

from field crops. Careful management of wind breaks and the use of topography and construction design can lessen susceptibility to wind damage in wind prone areas.

LU.3.2. Access to Climate Records

Due to the Greater Terrace area's northern inland coastal climate, with its oscillations of weather conditions between seasons and between years, as well as the extreme weather conditions associated with north Pacific cyclonic storms, it is important that climate information be made available to existing and potential farmers. Access to climate and weather information can help maximize farming efforts and assist sustainable agriculture in a climatic regime which is very different to other agricultural areas in Canada.

Recommendation LU.3.a. Compile climate information relevant to local agriculture.

Establish an on-line site with descriptions of the climate characteristics of the Greater Terrace area and with links to applicable published climate information. This site should include pages about or links to explanations of long-term climatic factors affecting this area, such as records of extreme frosts, extreme precipitation events, snow depths, degree growing days, and sunshine hours, as well El Nino and La Nina oscillation patterns. As well, facilitate the collection of localized weather readings from the subareas, such as Rosswood and Chimdemash, where local weather conditions and climate factors affecting agriculture vary from those of the Terrace subarea.

Recommendation LU.3.b. Facilitate workshops regarding climate factors important to local agriculture.

Facilitate workshops to assist farmers in gaining knowledge about climate factors in the Greater Terrace area, in order to be better able to design their agricultural operations to withstand this area's weather oscillations and extreme weather events.

LU.3.3. Farming Techniques Relevant to the Greater Terrace Area's Climatic Conditions

Historically, farmers in the Greater Terrace area recognized the climatic limitations and benefits of Terrace's inland coastal climate and **adjusted farming techniques** accordingly. Terrace sits in the transition between coastal and interior climate influences. Although able to grow a wide range of crops, in any one growing season the area might have weather with greater similarities to the wet, cool north coast or, conversely, to the drier central interior. There are also variations across the Greater Terrace area. Rosswood is drier, colder, and more interior in climate than the subareas close to the Skeena River and at low elevations, such as Braun's Island and Old Remo.

The most common technique used historically to average out weather variations characteristic of the Greater Terrace area was the greenhouse, heated or unheated, but other techniques such as row covers, cold frames, hot beds, raised garden beds, garden boxes, water radiators, black plastic, and lithic (stone) heating are employed by longer term residents of this area to extend the growing season and to overcome cyclic cool, wet summers during El Nino years.

Recommendation LU.3.c. ***Facilitate workshops regarding climatic farming techniques.***

Compile, distribute, and facilitate workshops regarding climatic farming techniques which assist sustainable agriculture, such as greenhouses, row covers, cold frames, hot beds, raised garden beds, garden boxes, water radiators, black plastic, and lithic (stone) heating.

Recommendation LU.3.d. ***Facilitate the availability of construction plans for greenhouses and other climatic farming techniques.***

Obtain cost-effective construction plans for climatic farming techniques, such as greenhouses and raised garden beds, and make them available to the public.

Recommendation LU.3.e. ***Facilitate the availability of cost-effective building materials for climatic farming agricultural structures.***

Obtain information and encourage cooperative methods of obtaining cost-effective building materials for climatic farming features such as raised garden beds and greenhouses.

LU.3.4. Over-Winter Storage facilities

The Greater Terrace area has a **short agricultural growing season** compared to major world agricultural regions such as California and Mexico. On average, the growing season in Terrace is 4 to 5 months for open field crops and 6 to 7 months in unheated, unlighted greenhouses. This climatic limitation is an impediment to commercial viability, as farmers are not able to provide fresh produce to local retail outlets on a year-round basis. If year-round storage facilities were available for crops such as potatoes and apples, local farmers could extend their revenues into the non-growing season. Similarly, for non-commercial food growers, temperature-reducing storage facilities are necessary for allowing produce such as root crops to be stored through the winter.

Recommendation LU.3.f. ***Facilitate the availability of building plans and workshops regarding home and commercial food storage facilities.***

Review building regulations, obtain building plans, and hold workshops to provide information regarding the safe construction of temperature reducing storage facilities, including root cellars and cold rooms, for both residences and for larger farm operations.

Class 5(4) soils; not ALR; cornfield in Horseshoe area of the City of Terrace; corn is sold at the Farmers' Market.

Recommendation LU.3.g. ***Examine the feasibility of cooperative storage facilities for commercial agriculture.***

Undertake a feasibility study to determine the need for and economic feasibility of year-round cooperative storage facilities for commercial agricultural crops.

LU.3.5. Climatic impacts on pollinators

One issue that arose during the public input processes of the GTAAP was **the impact of weather and climatic factors on pollinators**. Fruit trees are open pollinated plants and require winged pollinators in order to produce fruit. Cold springs, such as during 2011 and 2012, are difficult for wild pollinators and can lead to reduced fruit crops. There are local commercial bee keepers who might be interested in working with local orchardists to ensure better pollination rates.

Recommendation LU.3.h. ***Facilitate research regarding the factors affecting pollination of local agricultural crops, in particular tree fruits.***

Facilitate discussions regarding the cooperation between local apiarists and fruit growers in terms of pollination of agricultural crops and production of honey. Promote research that examines the impacts of weather variations and other factors on fruit tree pollinators.

Class 2 soils - silty loams; ALR; Skeena River floodplains; Old Remo area; full-time farmer; open field crops, pasture land, and greenhouses; active seller in Skeena Valley Farmers' Market .

LU.4. Soils and Water - the Foundation for Agriculture

LU.4.1. Soils of the Inland North Coast [1b,1c,10,13,14,16,25]

Receiving an average annual precipitation of 133 cm and with a cool yearly daily average temperature of 6.3°C, most soils in the Greater Terrace area are leached, acidic, and shallow in depth. Natural nutrient levels are low due to both the granitic bedrock from which the soil materials arose, plus the amount of acidic leaching that removes nutrients from the soils. It is important that farmers understand the structural, nutritional, and erosional characteristics of the soils with which they are working, as the soil forming processes in the Greater Terrace area are slow, and most soil types are easily damaged by incorrect farming techniques.

LU.4.1.1. Types of Soil-forming Materials

The natural soil type of the Greater Terrace area, which develops on drained slopes over different types of parent materials, is called a **podzol**[1b,1c,16] A podzol has a heavily leached, white upper mineral layer overlying a red iron-rich lower layer. Nutrients in these soils under natural coniferous forest covers are largely found in the plant roots and organic litter layer. In comparison, soils found in poorly drained areas form either saturated soils called gleysols or deep organic soils, as found in the marshes and bogs around the Lakelse Hotsprings. Beginning regosol soils and poorly developed brunisols are found in recently disturbed sites such as active floodplains or revegetating landslides.

The type of material upon which a soil develops is critical to the agricultural potential of that soil. There are **five basic types of parent materials** for soils in the Greater Terrace area - silts and sands in active alluvial floodplains; sands and sandy gravels in elevated glaciofluvial deltas; clays in glaciofluvial marine or glaciolacustrine (lake) deposits; coarse gravels and bouldery gravels in glacial outwash plains; and broken rock (colluvium) on mountain slopes[10,13,16].

The best parent materials for agriculture soil, in terms of arability and natural nutrients, are the silty to sandy alluvial deposits of recent floodplains, in particular at Old Remo, New Remo, Braun's Island, south of Graham Avenue, Copper City Flats, and the Beaver River Flats at the north end of Kitsumkalum Lake. In comparison, glaciofluvial deltas, which formed into marine water as the glaciers retreated over 9,500 years ago, are elevated above modern floodplains. The sands and sandy gravels of these ancient deltas form soils that are arable, but subject to droughtiness (lack of soil water) in summer. Examples include the large benches within the City of Terrace and Thornhill, as well as the Airport bench[10,13,16].

Weaker soils for agriculture are formed on parent materials that are either poorly drained or excessively drained. Thick glaciofluvial marine clays, deposited into the ocean at the end of the Pleistocene, are often saturated, massive in structure, and subject to rapid erosion when disturbed. These clays are common in the Thunderbird, Old Remo Road, and Terrace North areas. Other clay parent materials, formed as deposits into glacial lakes, are found in Rosswood and Usk East. In contrast, the coarse gravels and boulder fields of glacial outwash plains, such as Jackpine Flats and north of Deep Creek in the Kalum Valley, have little natural water or nutrient retention. They form soils that are normally unsuitable for agriculture[10,13,16].

Greater Terrace Area Soils

Soil Where Water Drains Away

Natural soils in the Greater Terrace area that form on drained slopes are known as **podzols**. Due to the large amounts of precipitation (1.5 meters per year) and cool temperatures, nutrients are drained downwards in the soil, leaving a bleached mineral layer at the top. An organic mat, full of roots and fungi, develops overtop of the mineral material. Most of the nutrients in a coastal coniferous forest are found in the plants and in this organic layer. Podzols can be arable, but they tend to be nutrient poor and acidic if not treated with lime and nitrogen-fixing plants.

Floodplain Soils

The richest soils are found in the floodplains of the Skeena and Kitsumkalum Rivers. Deep layers of silt and sand make fine textured, easily cultivated parent materials. In areas where floodplains are less frequently flooded, soils have time to form surface organic materials, which active communities of worms and other invertebrates turn into humus rich topsoil. Floodplain forests are dominated by deciduous cottonwood trees which drop large volumes of compostable leaves. The resulting soils are nutrient rich and less acidic than uplands soils under conifers.

Cultivated Soils

Compared to podzolic soils, which are often only 60 to 80 cm deep before parent material is reached, floodplain soils are deep and well suited for tilling. With their silty texture, moisture is retained but can also drain through the soil, unlike soils on clay substrates. The cultivated high capability (Class 2 and 3) soils in the alluvial floodplains are valuable for farming

Soil Parent Materials - important for drainage characteristics and structure of soil

Glaciofluvial Marine Clays

Deposited into marine water at the end of the last Ice Age 9500 years ago, marine clay parent materials are dense, poorly drained, erodible, and inclined to slope failure. Formed from rock flour and salt crystals, their natural fertility levels are low. Most marine clay deposits in the Greater Terrace area form Class 4 or Class 5 podzolic soils - suitable for pasture and forage, but limited for crops.

Glaciofluvial Outwash Gravels

Large areas of the Greater Terrace valley bottom land base are covered with glacio-fluvial outwash plains. Deposited as the glaciers retreated up the valleys, these poorly sorted fluvial materials range from sand sized to boulder sized. Due to the coarseness of the material, the Class 7 soils which develop on these gravels are very water stressed during dry summers. Natural fertility and arability are low.

Glaciofluvial Deltas

Deposited into marine water, the large glaciofluvial deltas in the Greater Terrace area, such as the upper benches of the Airport, Thornhill and the City of Terrace, are formed of sorted sands and sandy gravels. The best farm areas on these benches have Class 5 (improved Class 4) sandy loams, able to support fruit orchards and market gardens. Inclined to droughtiness in summer, their natural fertility is low but their arability is good.

Mountain Soils

Some subareas of Greater Terrace are close to the base of mountains or have bedrock outcrops. The soils in these areas are often collections of broken, sharp pieces of rock or colluvium, plus washed-in materials from glacial veneers of clay and finer materials upslope. The resulting soils can support home gardens or permanent pasture, but are not suited to larger scale farming. Soils are shallow and may be easily damaged.

Pockets of Good Soils

Deglaciation in the valleys of Greater Terrace was very complex and the resulting parent materials for soils can vary dramatically within short distances. For example, in the Rosswood area, most of the valley bottom, outside of alluvial floodplains, is coarse, gravelly glaciofluvial outwash plain, but there are some pockets of fine textured clay soils of good agricultural potential, derived from glaciolacustrine (lake) deposits[10].

Organic Soils

Organic parent materials are found in poorly drained areas, such as the wetlands, bogs, marshes, and swamps of the Greater Terrace area. Often containing sensitive fish and wildlife habitat, there is little local history of farmers draining and using these areas for crops. Organic materials in wetlands tend to be acidic and subject to frequent flooding during fall storms and snow melt. Many of the natural open marshes and bogs, though, are important as rural groundwater sources for domestic wells.

LU.4.1.2. Agriculture and Soils

Farmers benefit from knowledge of the structural and nutritional characteristics of the soils with which they are working. Due to this area's soil parent materials and textures, as well as seasonally high amounts of rainfall, natural soils in the Greater Terrace area are normally acidic and deficient in important nutrients such as nitrogen, phosphorus, calcium, magnesium, and boron. Corrections of these deficiencies through sustainable farming techniques can be essential to productive agriculture. In addition, information as to how to avoid damaging soils in a wet climate, as well as what can be undertaken to enhance the productivity of natural soils, is important to successful farming. Unless a farmer is trucking soil to their property, and using techniques such as raised garden boxes, they must be able to work with the soils at their location.

Recommendation LU.4.a. ***Facilitate workshops regarding the characteristics of local soils and techniques for soil conservation. Facilitate the availability of this information.***

Facilitate workshops and put information online explaining the structures and characteristics of the soils of this region, and how to work with them in terms of soil conservation and preservation.

Recommendation LU.4.b. ***Facilitate workshops regarding soil nutrients and techniques for the organic enhancement of soil nutrients.***

Facilitate workshops and make information available explaining soil nutrients and sustainability techniques which can be used to enhance soil nutrients, as well as to reduce acidity, levels of leaching, and removal of fine particle fractions from the soil.

Recommendation LU.4.c. ***Facilitate access to soil testing for local farmers.***

Assist the access of local food growers to soil testing. The natural soils in the Greater Terrace area have nutrient deficiencies which, if not addressed by appropriate farming techniques, can significantly affect the growth of crops.

Recommendation LU.4.d. ***Examine the potential for cooperative purchases of soil improvement materials and cover crops.***

Examine the potential for cooperative purchases and use of appropriate soil improvement materials, such as lime for acidity, seed for winter field cover crops, and seed for nitrogen-fixing rotational crops, which will allow soil improvements in a sustainable fashion.

Trucking of topsoil and compostable materials about the Greater Terrace area, used to correct growing opportunities in locations with poor natural soils, does come with its own set of problems, such as spread of weeds and soil diseases, as well as damage to areas from where the topsoil was removed. This is an issue which warrants examination, as some farm operations located on the coarser parent materials in the Greater Terrace area are utilizing imported topsoil to compensate for their low capability materials.

Recommendation LU.4.e. Examine the sale and movement of topsoil and compostable materials in the Greater Terrace area.

Examine the sale and movement of topsoil and compostable materials throughout the Greater Terrace area, both extractive and receiving locations, in terms of impacts from spread of weeds and soil diseases, plus the impacts of soil removal.

LU.4.2. Water Supplies for Agriculture[7,10,16,26]

The Greater Terrace area averages 1.3 meters of precipitation annually. Most streams in the Greater Terrace area are perennial and groundwater tables are often close to the surface. One would expect that this amount of water would facilitate sufficient water supplies for any type of agricultural venture. This is not the case, as precipitation can vary both seasonally (e.g. drought in summer and floods during fall cyclonic storms) and spatially (e.g. location in a valley bottom with clay soils versus location on top of a ridge with gravel soils). The deglaciation history at the end of the Pleistocene 9500 years ago left a complex mosaic of surficial geology in the valley bottoms[10], and access to water depends upon location within this mosaic.

The subareas of the Greater Terrace area are very unequal in terms of access to sufficient volumes of water to support commercial agriculture. Some of the factors influencing availability of water supplies include: proximity to mountain slopes from which groundwater moves into the valley bottom e.g. Jackpine Flats, Usk, and Chimdemash; and distance from coastal rainfall influences e.g. Rosswood has reduced levels of precipitation compared to Terrace. During the growing season, farms in the same general location may be faced with different water problems dependent upon the substrate material (e.g. gravel vs clay), slope exposure (e.g. southerly vs northerly facing), amount of vegetation cover (e.g. exposed bare soil vs well-developed grazing lands), and topographic location (e.g. in a wet hollow vs on top of a ridge).

Water problems are also dependent upon whether a farm has access to a community water system (Map 2), or has an independent water supply. Most of the Greater Terrace area is located outside coverage by a community water system. Properties in unserviced areas may have individual or group water systems based on shallow wells (e.g. Usk, Jackpine Flats, Old Remo, and New Remo), deep wells (e.g. Old Remo Road, Airport Bench), surface streams (e.g. Lakelse Lake), or water brought in by barrels (e.g. parts of Rosswood). The availability of water for agriculture in these areas is on a property-specific basis and can vary from surplus water during certain times of the year (spring and fall) or during El Nino years, to severe deficiencies during other times of the year (late winter and late summer) or during La Nina years.

There are some subareas serviced by community water systems (Map 2 - portions of North Terrace and Braun's Island, City of Terrace, and Thornhill) but the abilities of these community water systems to support the volumes required by commercial agriculture have not been determined. Planning processes are required to delineate the relationships between expanded commercial agriculture and the desirability of having these community water systems support this level of agricultural activity. Historically, some larger agricultural operations utilized both a community water system and their own wells in order to have sufficient water supplies during the growing season.

Recommendation LU.4.f. ***Determine how water supplies and water regulations impact existing and potential local agriculture.***

Work with agriculture operations in each subarea to determine how water supplies might be an issue for agriculture, and what might be possible in terms of environmentally-sound solutions to these issues. Evaluate the availability of water systems to supply agricultural operations, including both community water systems and surface and subsurface water supplies.

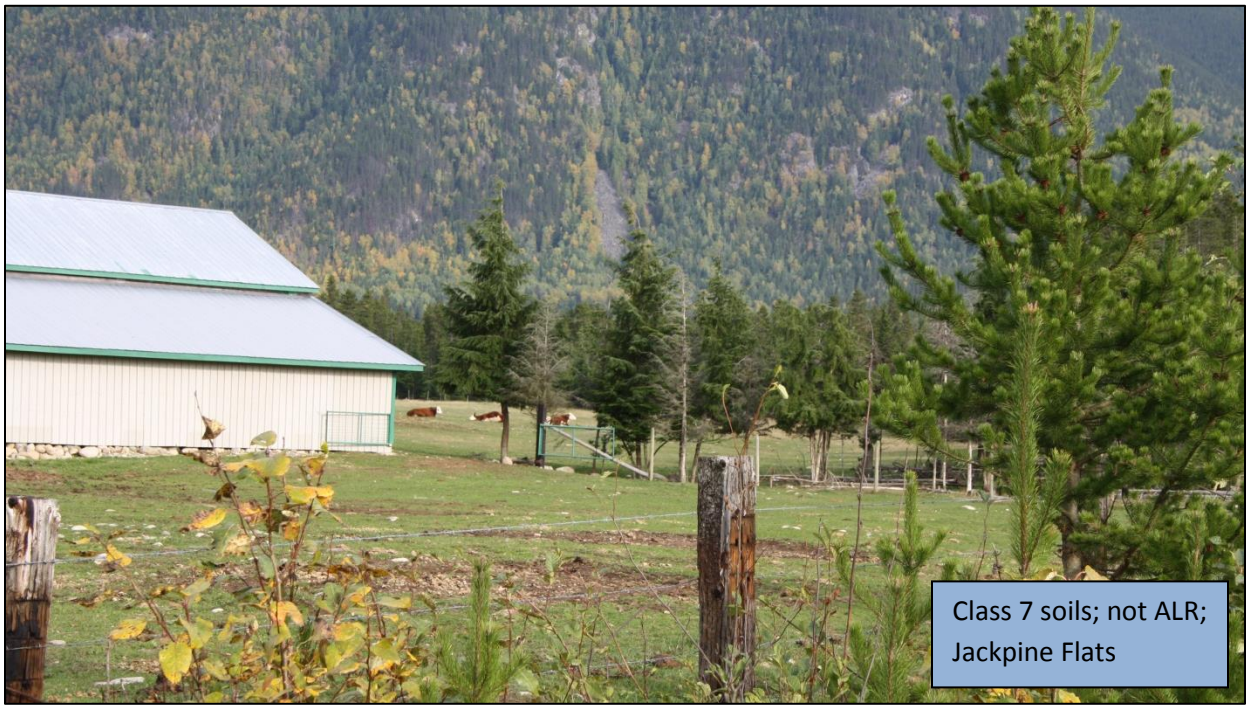
Agriculture itself can be an issue affecting water quality in some subareas of the Greater Terrace area, ranging from surface movement of agriculture-impacted waters over clay-based soils, such as North Terrace, to excessive percolation rates of manure-contaminated water into groundwater tables, especially in soils with coarse gravel to boulder subsoils, such as Jackpine Flats.

Recommendation LU.4.g. ***Evaluate drainage, erosion, and agricultural contamination issues associated with clay soils.***

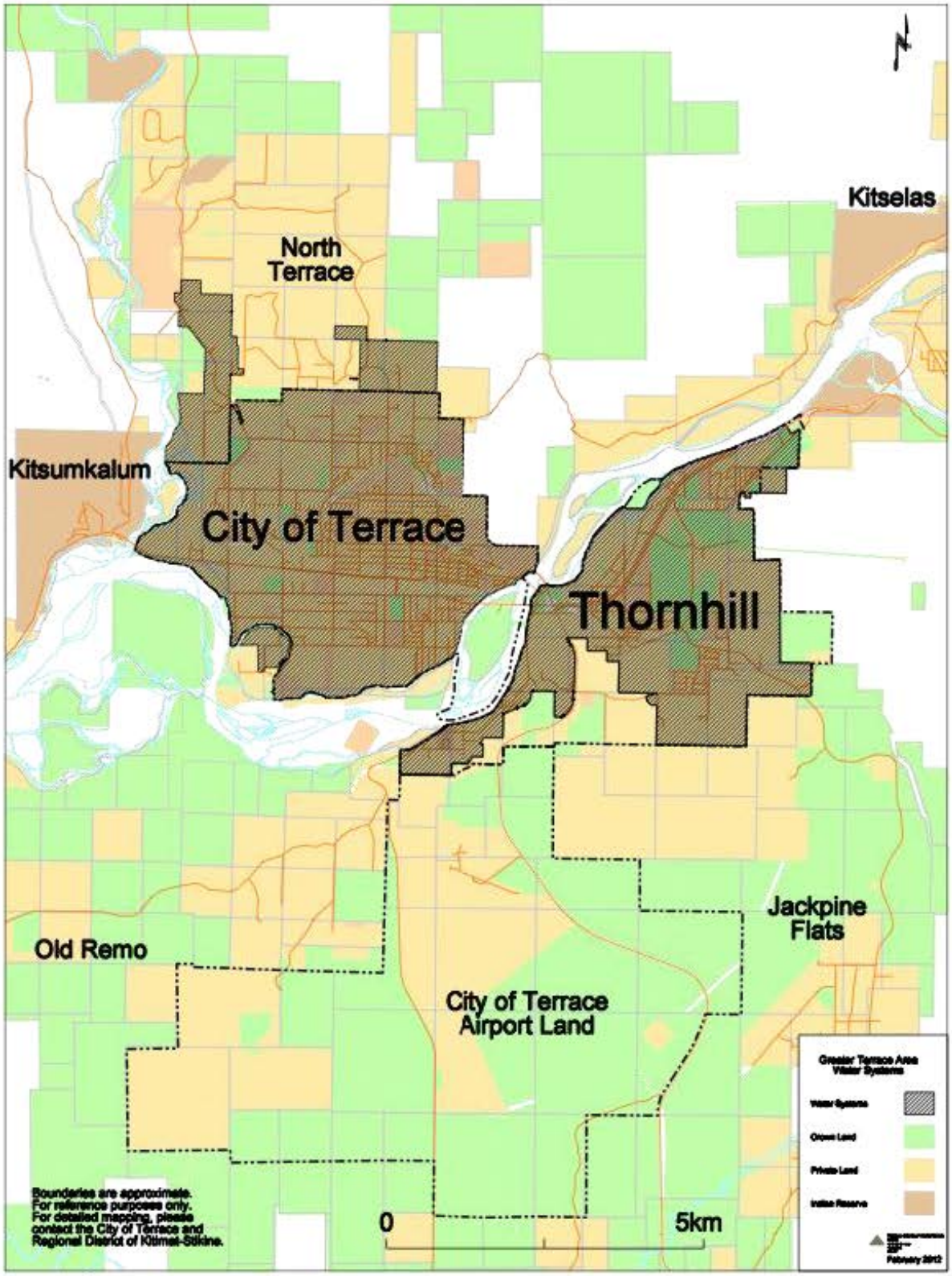
Examine drainage issues in subareas of the Greater Terrace area with clay soils and determine how appropriate farming techniques can be used to avoid contamination of surface waters and erosion problems associated with these soils.

Recommendation LU.4.h. ***Evaluate the impacts of agriculture on groundwater quality and domestic water supplies in coarse soils with high percolation rates.***

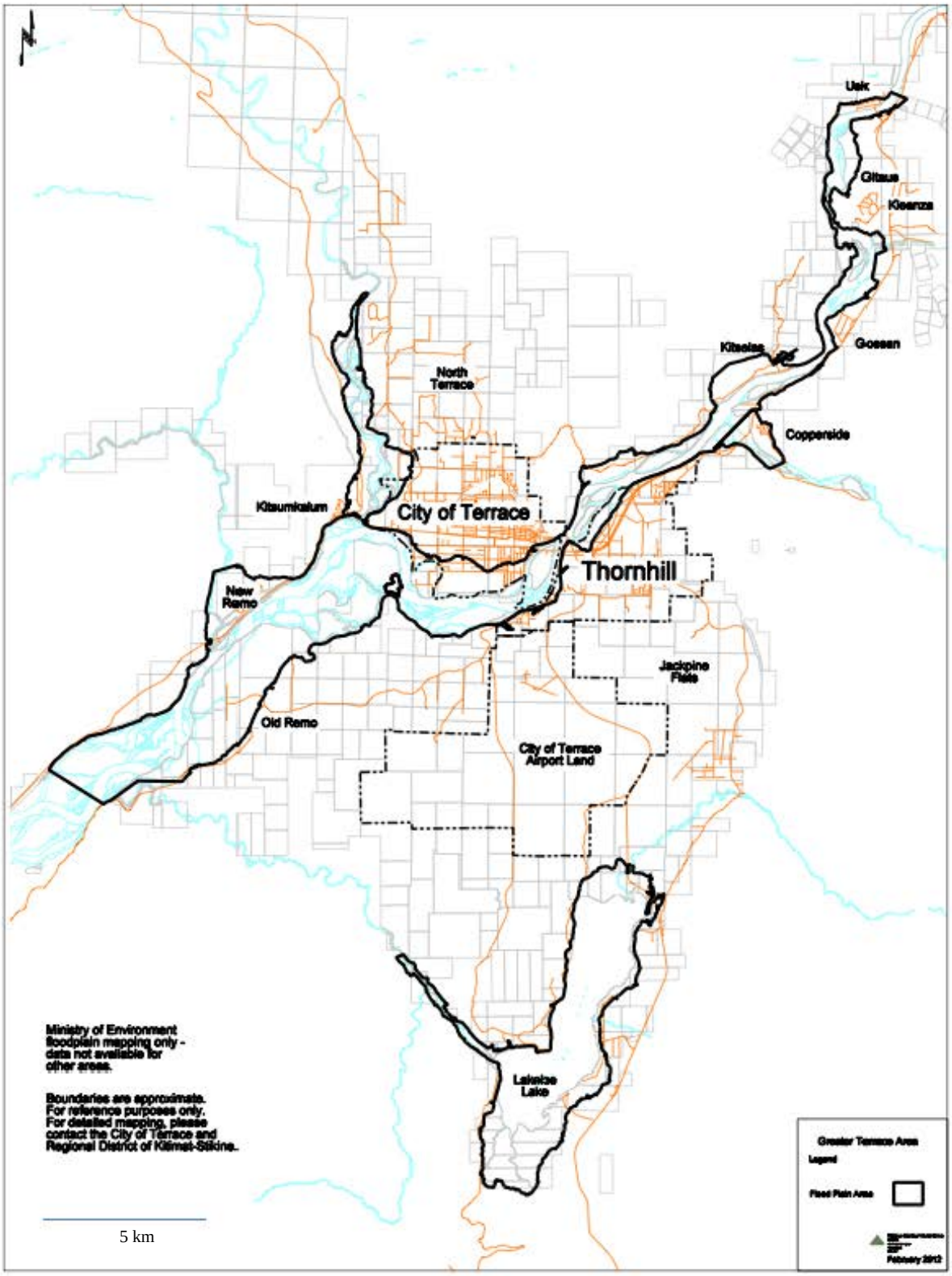
Examine the impacts of agriculture on groundwater and domestic wells in those subareas of the Greater Terrace area which have coarse soils with high percolation rates.



Class 7 soils; not ALR; Jackpine Flats



<u>Map 2</u>: Greater Terrace Area - Community Water Supplies
Map prepared by Regional District of Kitimat-Stikine



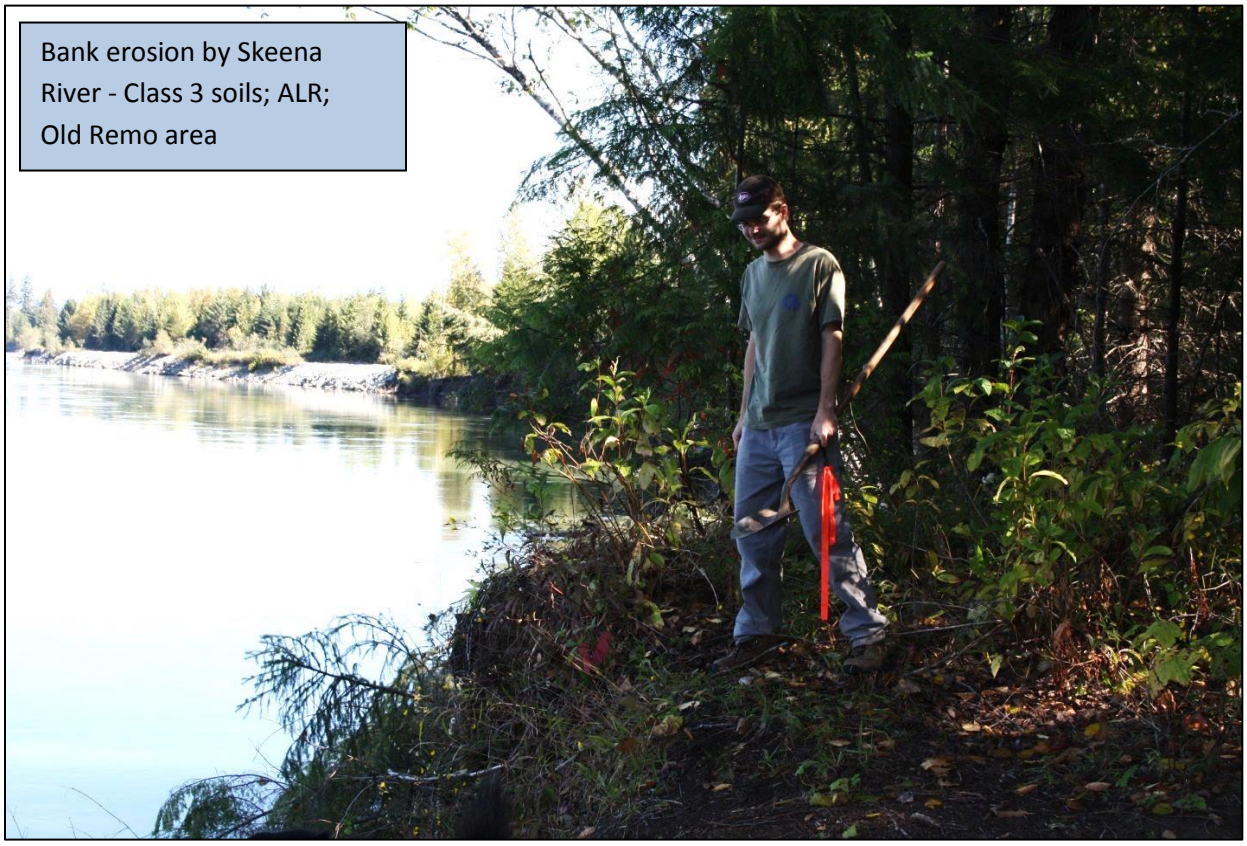
<u>Map 3</u>: Greater Terrace Area: Major Floodplains
Map prepared by Regional District of Kitimat-Stikine

LU.5 Floodplains and Terrain Hazards [10,16,18,25]

LU.5.1. Floodplains

The best soils for agriculture in the Greater Terrace area are found in the floodplains of the Skeena River and Kitsumkalum River (Map 3). These important soils, both in terms of natural biodiversity and, where developed, productive agriculture, are subject to frequent flooding. River flooding can range from static rise of water (e.g. over sites in lower frequency floodplains e.g. 1 in 150 year to 1 in 200 year floodplains) to water flowing with a current across the land (e.g. 1 in 50 year floodplains or more frequent floodplains closer to the main channel of a river). Flooding with a current can remove topsoil and deposit debris over agricultural land.

Floodplains are also subjected to bank erosion[18]. **This is a major problem**. Areas with high capability alluvial soils can be removed by a flood. Active erosion and land removal, for example, are occurring along the east bank of Copper City Flats, parts of Chimdemash and Usk, some sections south of Graham Avenue, Little Island, Braun's Island, south end of Dutch Valley, Old Remo along the east bank of the Skeena River, and Whitebottom Road. Maps, airphotos, and Google Earth images of floodplains with high capability soils and in the Agricultural Land Reserve, can be quickly out-of-date in terms of which lands still remain at a location.



Bank erosion by Skeena River - Class 3 soils; ALR; Old Remo area

Erosion and flooding were major issues raised during the public input process of the Plan. Avoidance of floodplains was a deciding factor for some farmers in their decision as to where they would locate their operations. Bank erosion was also expressed as a significant issue, as farmers felt they did not individually have the resources to stop removal of their farm land. As the patterns of erosion were changed dramatically following the flood of 2007, documentation of current and potential impacts of land removal by bank erosion is not readily available to farmers. If these farm lands are considered a valuable asset for future food production, then an assessment of which actions should be taken to prevent further land removal might be of value.

Recommendation LU.5.a. Document and undertake a geotechnical assessment of the patterns of bank erosion and flooding affecting the agricultural areas next to the Skeena and Kitsumkalum Rivers.

Document and undertake a geotechnical assessment of the current configuration of bank edges and the patterns of bank erosion affecting the agricultural areas along the Skeena and Kitsumkalum Rivers. Develop projections as to how this erosion will impact the agricultural land base into the future. Document potential methods and investments which might be used to correct significant areas of potential agricultural land removal.

Recommendation LU.5.b. Work with agricultural operators located in floodplains to reduce the impacts of flooding on land and infrastructure investments.

Facilitate workshops and make available information regarding regulations which affect agriculture in floodplains. Work with agricultural operators located in floodplains to provide information and programs which might reduce the impacts of flooding of agricultural land and infrastructure investments.

Flooding with a Current: Dutch Valley, 2007
Photo courtesy of Regional District of Kitimat-Stikine

Floodplains and Farms within the Agricultural Land Reserve - Flood of 2007

(photos courtesy Regional District of Kitimat-Stikine)

River Drive -Thornhill; ALR; Class 3 soils

South of Graham Ave. - City of Terrace; ALR; Class 3 soils


Class 3 soil; ALR;
Braun's Island


Class 5(3) soils;
Usk West

LU.5.2. Terrain Hazards

Terrain hazards, such as avalanches, landslides, and accelerated erosion, are not minor issues in the Greater Terrace area. With high amounts of both rainfall and snowfall, combined with soil types prone to failure, such as glaciofluvial marine clays and regosols on steep mountain slopes, agricultural operations can be placed at jeopardy if they are located in the wrong spot on the landscape or undertake land modifications which trigger land failures[16]. This is not a well-known factor to farmers in this area. As some agricultural operations may locate on less stable soils and landforms, it is important that existing and new farmers be aware of terrain hazards.

<u>Recommendation LU.5.c.</u> Provide information regarding terrain hazards to agricultural operators and farmers.

Facilitate information for agricultural operators on-line and through workshops regarding terrain hazards in the Greater Terrace area, including hazards associated with mountain slopes and steep terrain, as well as the potential for some types of surficial materials, such as glaciofluvial marine clays and alluvial silts, to erode, gulley, and fail with disturbances.

<u>Recommendation LU.5.d.</u> Include assessment of potential terrain hazards in determination of regulations that permit agricultural and rural land development in the Greater Terrace area.

Include assessment of potential terrain hazards in the determination of regulations that permit agriculture and rural land development in the Greater Terrace area.

Erosion gully in silty Class 3 soils; ALR; Copper City Flats

LU.6. Land Use and the Agricultural Land Base

Planning for agriculture within a land base of mixed land uses is a difficult process. Agricultural land use studies and agricultural area plans elsewhere in the Province have taken a variety of approaches[22,24,28,29] and were used as examples during the Greater Terrace area planning processes. This report is only one aspect of a larger planning exercise[A,B,21] which examined land use planning for agriculture in the Greater Terrace area.

LU.6.1. Land Use Areas within the Greater Terrace Agricultural Area Plan

The Greater Terrace Agricultural Area Plan encompasses **privately owned lands only**[19] (Map 4). The Plan **does not include crown land** except where that land is under agricultural or range lease. It does not include tree farm licenses, timber licenses, or Provincial park land. The Greater Terrace Agricultural Area Plan **does not include First Nations Reserves**. Land use analysis for the Greater Terrace agricultural land base is restricted to privately owned properties contained within the Plan boundaries (Map 4) and does not follow natural landscape features or industrial or management activities centered on crown lands or other excluded features of the land base.

The following subareas and communities within the Greater Terrace Agricultural Area Plan are included within the agricultural land base analysis (see Appendix 1 for descriptions of subareas). This report encompasses **privately owned lands** only within these subareas and communities and does not include crown lands (Map 4).

Urban areas: Both the City of **Terrace** and **Thornhill**, Electorial Area E, are included in the Greater Terrace Agricultural Area Plan. Key agricultural neighbourhoods within the City of Terrace are **Graham Avenue** and the **West Bench** (Thomas Street, west Halliwell Avenue, west McConnell Avenue, and Kalum Lake Drive). Key agricultural neighbourhoods within Thornhill are **Kofoed/River Drive**, **Queensway Drive**, **Krumm Road**, and **Laurel Street**.

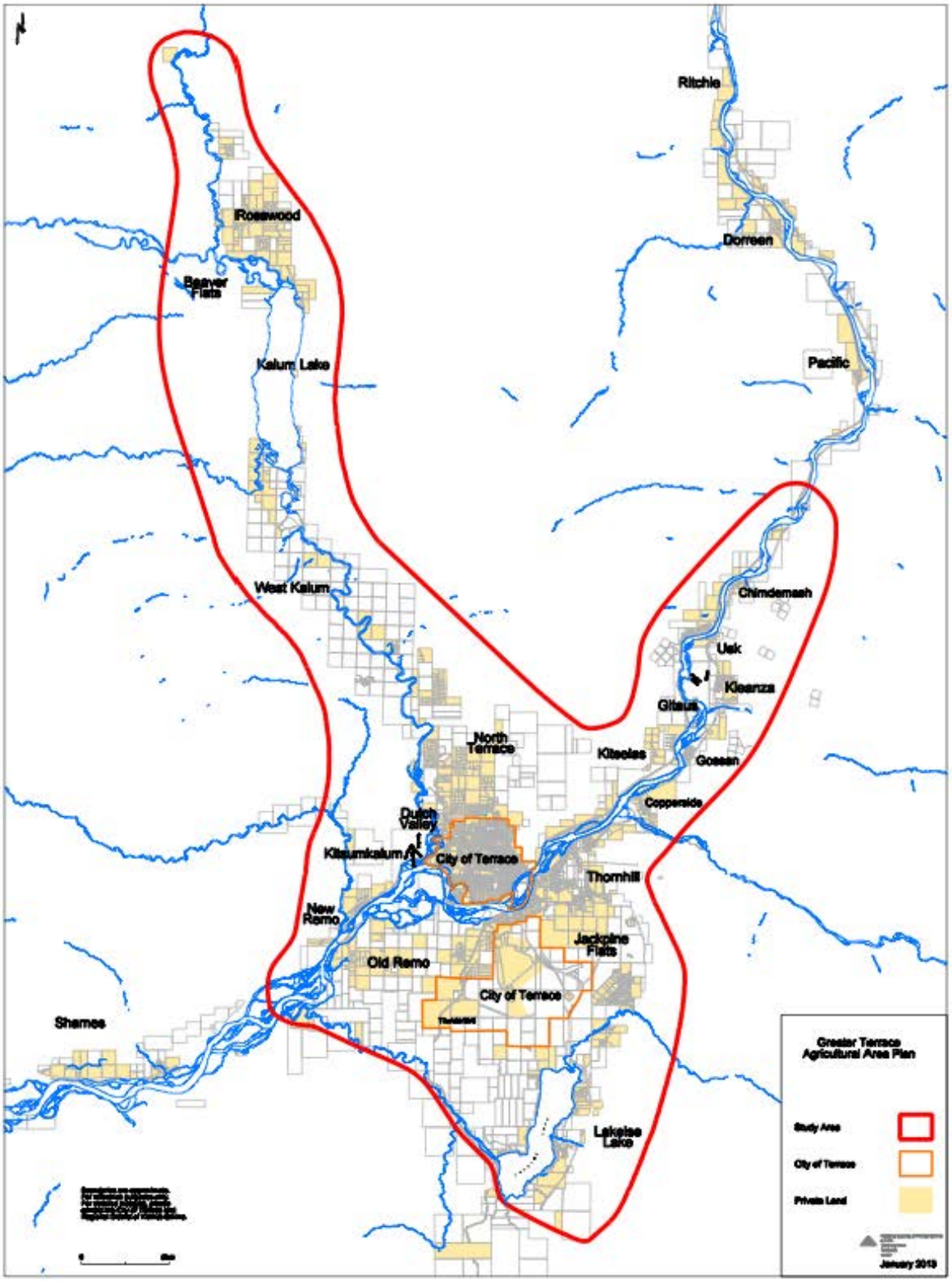
Northeast: Plan boundaries extend northeast along **Highway 16 East** to DL 6637, and include **Chimdemash**, **Usk** East, **Kleanza**, **Gossan**, and **Copperside** on the east side of the Skeena River, and **Usk West**, **Kitselas Road** and **Copper City Flats** on the west side of the river.

Southeast: Plan boundaries extend southeast along **Old Lakelse Lake Road** and include **Jackpine Flats** south to DL 5130.

North: Plan boundaries extend north to include **Rosswood**, **Kalum Lake Road**, **Woodland Park**, **Dover Road**, **Merkley Road**, and **Dutch Valley**. The community of Rosswood, the furthest north within the Plan, is located 35 km by air NNW of the City of Terrace.

West: Plan boundaries extend west to include **New Remo**, **Braun's Island** and **Little Island**.
Southwest: Plan boundaries include **Old Remo Road** and side roads, **Old Remo**, **Whitebottom Road** (to Lakelse River), the **Thunderbird** area, and **Beam Station Road**.

South: the southern boundary of the GTAAP is south of the **Mt. Layton Hotsprings** properties (DL 683, 684 and 5129), and includes both the west and east sides of **Lakelse Lake**, and **Old Lakelse Lake Road** north to DL 5130.



Map 4: Greater Terrace Area - Privately Owned Land
Map prepared by Regional District of Kitmat-Stikine

LU.6.2. Potential Areas of Agricultural Land Use

LU.6.2.1. Agricultural Soil Capabilities[1,2,16,25]

The agricultural capability of a landscape is based on four factors - the ability of that landscape to be cultivated, the natural attributes of the soil, the range of crops that the land can produce, and the severity of limitations to agricultural crop growth at that location. The natural attributes of the soil that make it suitable for agriculture, known as agricultural soil capability, depends upon a number of soil characteristics, including the type of parent material for the soil, drainage, soil depth, soil texture, stoniness, tendency to droughtiness, and the impacts of climate. Using a scale from 1 to 7, with Class 1 being the best agricultural soils and Class 7 being soils without agriculture potential, definitions have been established through the Canada Land Inventory to rank the ability of mineral soils to support agricultural uses (Table 2)[1a,2].

Due to climatic and soil limitations, Class 1 soils are not found in the Terrace area. Classes 2, 3, and 4 soils in this area have limiting factors, such as erosion, soil structure, flooding, and droughtiness, but these three soil classes have the ability to grow a range of agricultural crops. Class 5 soils in this area have significant limitations, such as topography or stoniness, and are best suited to permanent pasture or forage. Class 7 soils have no potential for agriculture productivity due to severe limitations such as large rocks or bedrock close to the surface. Class 6 soils, natural grasslands, are not found in this area.

Table 2: Soil Capability Classes in the Greater Terrace Area[1a,2]

Class	Capability	Potential Range of Crops		Limitations for Agriculture	
2	Highest soil attributes in the GT area	Widest range of open field crops; minor limiting factors for growth/arability		D = soil structure e.g. dense clay subsoils	I = flooding e.g. standing water
3	High value soils	Wide range of open field crops; moderate limits to growth or cultivation		E = erosion e.g. gullies, landslides, cutbanks, avalanches	W = excess water e.g. bogs, seepage
4	Restrictions to agriculture	Suitable for only a few types of crops; with specific limiting factors		T = topography e.g. steep slopes such as bench escarpments	F = low fertility e.g. gravel
5	Only special crops, e.g. forage crops	Due to limitations, best for permanent pasture or hay; some Class 5 soils are suitable for fruit trees		M = severe moisture deficiencies e.g. dry in summer; droughtiness in sandy soils	R = bedrock near the surface
7	Not arable or sustainable for farming	No potential for profitable agriculture due to severe limitations		P = stoniness; from gravel-sized to large boulders	Climatic limitations

Soils are ranked by the characteristics of the natural soils, then by improvement to the soils if techniques such as irrigation are supplied. For example, Class 5 sandy soils in the Greater Terrace area can move to Class 4 if they are watered during the growing season.

The land capability classes for agricultural soils have very specific distributions across the Greater Terrace area. Soil capabilities are associated with the pattern of glaciofluvial landforms, erosion features, and recent alluvial floodplains[10,16]. In the Greater Terrace area, the highest capability soils (best for agriculture) are Class 2 and 3 soils, found in the alluvial floodplains of the Skeena River. The lowest soil capabilities are the Class 7 soils, which include very coarse, rocky soils in locations such as Jackpine Flats, Copperside Road, and north of Deep Creek.

Table 3: Greater Terrace Area: Locations of Unimproved Soil Capability Classes*[10,16,25]

Class	Types of Soils	Landforms	Examples of Locations
2	Silty loams; silty sandy loams; often brunisols due to disturbance	Alluvial floodplains and benches - fine-grained deep soils; naturally fertile; easy to cultivate; support a wide range of market garden crops; suitable for mechanized tilling	Old Remo floodplain; Whitebottom Road floodplain; New Remo floodplain; Gossan Creek floodplain; subject to flooding and bank erosion.
3	Silty loams; silty sandy loams; often brunisols due to flooding frequencies	Alluvial floodplains and benches; some glaciofluvial marine clays - fine-grained soils; naturally fertile; easy to cultivate; grow a wide range of market garden crops; subject to flooding and bank erosion.	New Remo; Old Remo; Little Island; Braun's Island; Copper City Flats and Kitselas Road; Kitselas; Usk East; DL 6637; W of Kofoed Drive (Thornhill); S of Graham Ave. (Terrace)
4	Mostly clay-based podzols	{Glaciofluvial marine clays} or (lacustrine/lake clays); limitations to agriculture due to soil structure problems associated with clay soils.	(Kitselas/Gitaus); {crown land in Thunderbird area}; (clay areas in Rosswood); subject to surface and slope erosion.
5	Sandy loams, sandy gravels, and some clay-based soils; mostly podzols	Glaciofluvial deltas and kames; (lacustrine/lake clays); {glaciofluvial marine clays}; normally 60 to 80 cm of soil development; leached upper layers; acidic, nutrient poor soils. - sandy soils are suitable for mechanized tilling but droughty during dry summers; good for fruit trees and irrigated market gardens. - clay soils can be prone to erosion, gulleying, and slope failures.	Chimdemash Loop; Usk West; (Usk East); Gossan; N Kitselas Road; Benches and Horseshoe in City of Terrace; lower and upper benches in Thornhill; Dutch Valley; Airport Bench; portions of Lakelse area; {Rochester Basin; Thunderbird; Beam Station Road; Old Remo Road; Whitebottom Road}
7	Podzols and regosols	On gravel to boulder glaciofluvial outwash plains; (bedrock outcrops); {eroded glaciofluvial clay deposits} - soil structure types or lack of soil limit agricultural activities.	Kalum Lake Road N of Deep Creek; Copperside; parts of Rosswood; (N Kitselas Road); (Old Remo Road); {Terrace North; Old Remo Road}

** examples of locations; private land parcels only; soil capabilities are mapped at a 1:50,000 scale in polygon format and soil capability ratings can vary within a polygon at a larger scale.*

In the complex mosaic of soil types in the Skeena, Lakelse, and Kitsumkalum Valleys, soil capability maps are very important in the process of identifying areas of soils which may have the most important natural attributes for existing and potential food production[10,16,25].

Recommendation LU.6.a. Facilitate the availability of soil capability mapping.

Soil capability mapping is an essential tool for existing and potential farmers in determination of the capability of their land for commercial field agriculture. Many farmers would benefit from access to soil capability mapping.

LU.6.2.2. The Agricultural Land Reserve[2,16,21,25]

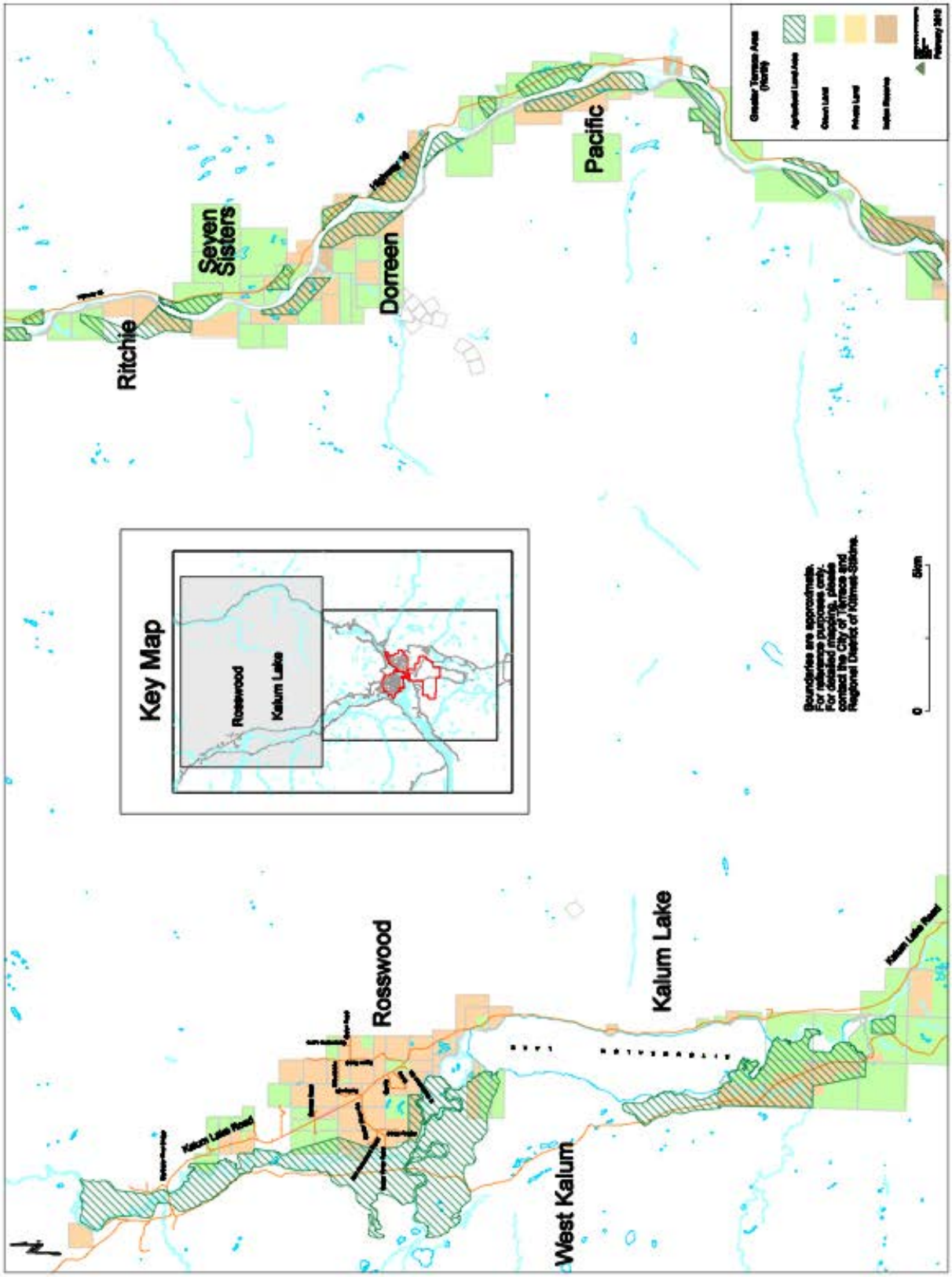
The Agriculture Land Reserve (ALR), of which there are approximately 15,000 hectares[21] designated as ALR within the area of the Greater Terrace Agricultural Area Plan, is primarily based upon the **capability of the soil for agriculture**. The Agriculture Land Reserve includes both Crown lands and private lands and is protected through the Agricultural Land Commission Act from uses or actions which would diminish the agricultural capabilities of the soil[2].

The Agriculture Land Reserve[2] was implemented in the 1970's as a mechanism to preserve the ability of the Province of British Columbia to produce food into the future. Selection of lands to be protected under the Agricultural Land Reserve was largely undertaken through identification of high capability soils, active farming areas, and Crown lands with agricultural leases. Legislation for preservation of ALR lands takes precedence over local and regional government processes and changes to ALR status must be approved by the Agricultural Land Commission.

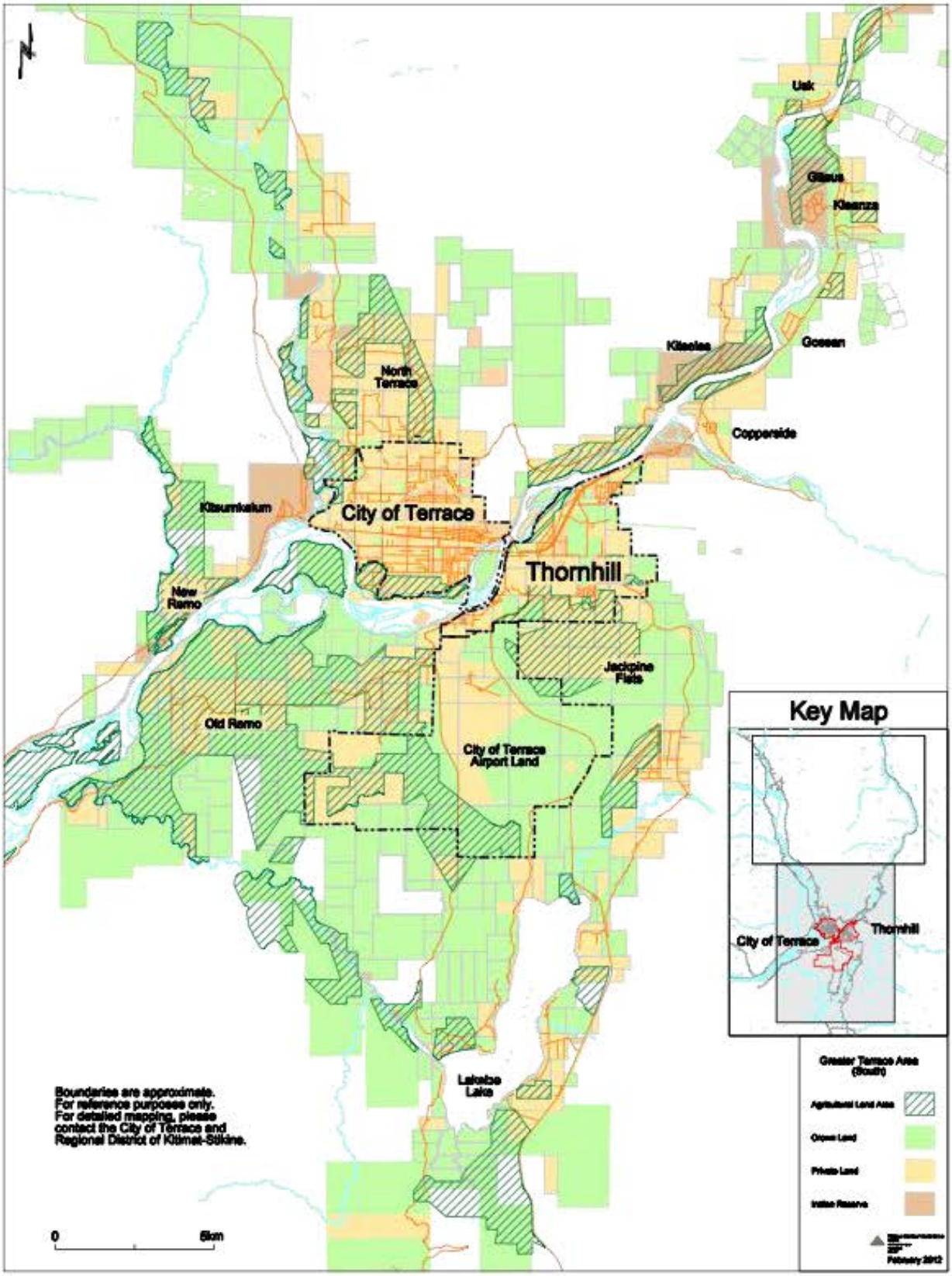
The Greater Terrace area has extensive hectares of Agricultural Land Reserve. Based on data from the Ministry of Agriculture's 2012 *Greater Terrace Agricultural Land Use Inventory*[21], there are **14,933 hectares** of designated ALR within the Plan area, of which **95% is not used** for farming or associated activities. **Only 761 hectares or 5% of the land base of the ALR in the Greater Terrace area is used for farming** - either solely for farming(193 ha) or for land uses associated with farming (residential, transportation, utilities - 569 ha)[21]. Of the remaining hectares of ALR within the Plan area, **9,492 ha of ALR or 64% are found in surveyed and unsurveyed Crown lands** (7,934 ha), foreshores (339 ha), tree farm licenses (446 ha), and right-of-ways (773 ha). The remaining **4,680 ha or 31% of the ALR is used for other types of privately owned land use** activities other than farming[21]. For example, 13% of total ALR hectares or 1,869 ha are occupied by residential land use, with no associated farming activities.

Provincial legislation limits acceptable uses on ALR lands and restricts subdivision in order to preserve these lands for food production[2]. As 64% of the ALR in the Greater Terrace area is within Crown lands (Maps 5a and 5b), the greatest impacts upon these lands have been changes caused by forest extraction activities and land erosion by floods and land failures.

Boundaries of ALR polygons follow legal lot boundaries. Although inclusion within the ALR is based upon soils suitable for agriculture, the Reserve may also include the non-arable soils within a specific district lot. The ALR in the Terrace area includes most of the Class 2 to 4 soils but also includes large areas of Class 5 or forage/permanent pasture soils not suitable for intensive farming techniques (Table 4 and Maps 5a and 5b). During the public input process of the Plan, many questions were asked regarding the Agricultural Land Reserve, ALR regulations, and permissible activities[17]. There was also the assumption that, if a property is located in the ALR, it is located in one of the best farming areas. With the large hectares of ALR Class 5 soils, this is not necessarily correct (Table 4).



Map 5a: Greater Terrace Area North - Agricultural Land Reserve
Map prepared by Regional District of Kitimat-Stikine



Map 5b: Greater Terrace Area South - Agricultural Land Reserve
Map prepared by Regional District of Kitimat-Stikine

Table 4: Greater Terrace Area: Agriculture Land Reserve + Soil Capability Classes*[10,16,25]

Location of Agriculture Land Reserve areas	Soil Capabilities (unimproved)	Landforms[10,16]	Agriculture Activities
Old Remo floodplain Whitebottom Road New Remo floodplain	Classes 2 and 3	Alluvial floodplains and benches; flat, easily tillable, nutrient rich floodplain soils	Some farming; includes crown land upstream in Zymacord Valley and in Lakelse River area.
Little Island; Braun's Island; Copper City Flats and lower Kitselas Road; Usk East; DL 6637 (north of Chimdemash); west of Kofoed Drive (Thornhill); south of Graham Ave. (Terrace)	Classes 3 and 5	Alluvial floodplains and benches; some glaciofluvial marine clays; naturally fertile; normally flat and suitable for intensive, mechanized farming.	Active farming areas - Braun's Island and Little Island; some activity along Kitselas Road/Copper City Flats; active farming areas in Thornhill and S of Graham Avenue.
Thunderbird area	Class 4	Glaciofluvial marine clays clays	- Thunderbird area and along Lakelse River
Chimdemash; Usk West; Usk East; N Kitselas Road; Dutch Valley; portions of Lakelse area; most of Rochester Basin (Thornhill and south); Thunderbird; Beam Station Road; Old Remo Road; Terrace North - Dover/Merkley Roads	Class 5	Sandy glaciofluvial deltas and marine glaciofluvial clays - suitable for pasture and forage crops; some sandy areas are suitable for fruit trees; - ALR has potential for mixed farm use.	- large areas of Class 5 soils are not included in the ALR due to urban and residential use, in particular within the City of Terrace and within Thornhill; the Airport bench is also excluded.

** examples of locations; private land parcels only; unimproved soil capabilities. 5% of the total land within ALR has been classified as "used for farming" by the 2012 Greater Terrace ALUI[21].*

Farm lands within the Agricultural Land Reserve are important resources for future agricultural development. It is important that the Farming Community understand ALR regulations.

Recommendation LU.6.b. Facilitate the availability of information regarding the Agriculture Land Reserve, locations of the ALR, and associated regulations.

Clear information regarding the Agriculture Land Reserve would be beneficial in clarifying regulations and permissible land uses in the Greater Terrace area.

Recommendation LU.6.c. Request a review of current ALR boundaries.

The ALR in the Greater Terrace area is based on boundaries established in the 1970's. Some areas of good agriculture potential have been missed. As well, the ALR includes areas which have been eroded away by the Skeena and Kitsumkalum Rivers. A review of the ALR in this area would be very beneficial.

LU.6.3. Standard Enumerations of 'Farmers', 'Farms', and 'Agricultural Operations'[4,20,27]

Agricultural soil capabilities and the Agricultural Land Reserve help define the potential of the biogeophysical landscape for agriculture. The actual use of that landscape for agricultural operations and food growing is more difficult to measure, due to the complex land use history in the Greater Terrace area and the small number of active commercial farms. Defining who is a farmer and which properties have agricultural land uses is problematic.

One starting point from which to analyze agricultural land use in the Greater Terrace area is by examining the standardized definitions for "agricultural operations", "farms" and "farmers" used by Provincial, Federal, regional, and local governments. These definitions have been utilized by government agencies to document agricultural activities. The subsequent statistics assist different government levels to evaluate agricultural land uses within the Greater Terrace area. Three standard methods have been used to define and enumerate agricultural land use - Agricultural Land Use Inventories[20,21], the Federal Census of Agriculture[27], and the B.C. Assessment Authority's Farm Class tax status properties[5].

An **Agricultural Land Use Inventory**[20] is a standardized air photo and field based survey which identifies active and dormant agricultural activities on identified properties greater than 0.4 ha (1 acre) in size. The methodology for this type of inventory in British Columbia is defined by the Ministry of Agriculture[20]. An Agricultural Land Use Inventory was undertaken for the **Greater Terrace area** in the summer of 2012[21]. The report and inventory results are available through the City of Terrace and Regional District of Kitimat-Stikine.

Definition of *'used for farming'* in an Agricultural Land Use Inventory[20]: a property ***'used for farming'*** (identified from air photos, field surveys, and government documentation) is greater than 1 acre in size and shows visual evidence of active or dormant agricultural activities which occupy a set percentage of the land parcel (see Appendix 1 for 'used for farming' definitions).

In comparison, Statistics Canada's **Census of Agriculture**[27] is a national census which identifies and quantifies all agricultural operations which sell or produce agricultural products for sale on their properties. It is undertaken every five years during census years. The last four census records are from 1996, 2001, 2006, and 2011. Analysis of these census surveys relative to the Greater Terrace Agricultural Area Plan has been completed by Lynda Gagne and is included in the Greater Terrace Agricultural Area Plan report[A]. A Census of Agriculture is intended to include all agricultural operations, regardless of size. Significant errors have been noted for the Census of Agriculture in the Greater Terrace area relative to missing agricultural operations and missing values of agricultural sales[A].

Definition of an 'Agricultural Operation' for the Census of Agriculture: Statistics Canada defines an '**agricultural operation**' as a property that produces agricultural products intended for sale. Farms of all sizes, including hobby farms, are intended to be part of the Census of Agriculture[27].

The BC Assessment Authority[4] grants **Farm Class tax status** to properties from which a set minimum dollar value of agricultural sales occurs. Qualifying for Farm Class status gives these properties a reduction in property tax rates. A rural property may have reduced taxes on both the value of the land and the value of the dwelling and other buildings. An urban property may have reduced taxes on the value of the land only[4]. Obtaining a Farm Class tax status designation requires completing an application process, plus achieving a set level of farm sales each year.

Definition of a 'Farm' by the BC Assessment Authority[4]: The BC Assessment Authority defines a farm as a property which produces a minimum dollar value of sales of eligible primary agricultural products in a year[8]. These values are: $10,000 in sales annually on less than 2 acres (0.8 ha); $2,500 of sales for parcels from 2 to 10 acres (0.8 to 4 ha); and $2,500 in sales plus a percentage of farm value in sales for parcels greater than 10 acres (4 ha) in size.

LU.6.4. Comparisons of Numbers of Agricultural Operations from the Census of Agriculture, Greater Terrace Agricultural Land Use Inventory, and Farm Class Status

During the public input processes for the Greater Terrace Agricultural Area Plan[17], a number of agricultural operators/farmers self-identified that they had either (or both) **not filled out a Census of Agriculture** or had **never applied for a Farm Class property tax status**, or had completed either the Census or Farm Class status but not both. Other operators located on properties less than 1 acre were missed in the Agricultural Land Use Inventory[21] because their properties were too small, whereas others were not counted as 'used for farming' as the extent of their agricultural pursuits did not match the definition of 'used for farming'[21].

Identified agricultural operations and/or land parcels utilized for farming were compared between the three methods to determine differences between estimations of the numbers of farmers and farms in the Greater Terrace area (Table 5). In Table 5, it is apparent that a total survey of all agricultural operations in the Greater Terrace area has not been achieved by any of the survey or census formats. Of the three methods, having **Farm Class property tax status**[5] accounted for the smallest number of both **surveyed land parcels associated with farming (62)** and **agriculture operations (48)**. This is the result, in part, according to the Farmers Focus meetings, to the reluctance of some farmers to apply for and maintain a Farm Class property tax reduction due to the amount of paperwork. They felt that it was not worth the effort, considering the low property taxes in rural areas.

The 2011 **Census of Agriculture** by the Federal Statistics Canada[27] had the next level of recorded agricultural operations in the Greater Terrace area (52) with 9 further operations added from the Farmers Survey (did not receive census forms[A]) for a total of **61 agricultural operations**. The Census numbers, by definition, should include all producers selling farm produce. It was observed during the Greater Terrace study that the Census numbers were minus major producers from this area[A]. Furthermore, the Farmers Surveys from the Farmers Focus Meetings did not comprehensively include all farmers in the Greater Terrace area (only 29 completed useable surveys[A]). The combined Census/Farmers survey number is also an underestimation of agricultural operations in the Greater Terrace area[A].

In comparison, data from the 2012 Greater Terrace Agricultural Land Use Inventory (ALUI) [21], shows that **78 privately owned parcels of land** were used for farming activities, out of a total of 1,816 parcels of privately owned land in the Greater Terrace survey. Of this, 15 parcels were used for farming without other land uses, and 63 parcels were mixed farm use (farming plus residential, transportation or utilities land uses). This is a **4% utilization rate for farming of privately owned land parcels** (greater than 0.4 ha or 1 acre in size).

The ALUI numbers **cannot be used** to determine the number of agricultural operators, as some operators own more than one parcel. For example, one long term agricultural operator lives on a large parcel in Terrace, but also owns and grazes his cattle on large forage parcels in Thornhill, Little Island, and Rosswood.

Table 5: Determination of Agricultural Operations in the Greater Terrace Area

Method	# of Farms, Land Parcels or Agricultural Operations	Hectares of Farm Land	Average Parcel Size (ha)***
2011 Census of Agriculture, with Greater Terrace Farmers Focus Survey	**61 agriculture operations** 52 (Census) + 9 (Farmers Survey) **# of A operations = 61***** Locations unknown	**1,512 ha** 1166 ha (Census) + 346 ha (Farmers Survey)	**24.8 ha**: **51 > 4 ha** >8 ha = not available **10** parcels < or = to 4 ha (10 acres) and > 0.4 ha (1 acre)
Agricultural Land Use Inventory (ALUI) 2012 data	**78 land parcels****** 19 within City of Terrace; 6 parcels in Thornhill; 53 parcels in rural GT*; **# of A operations = n/a**	**1,196 ha** 761 ha in ALR 435ha outside ALR	**15.3 ha**: **47 > 4 ha** 24 parcels > 8 ha **31** parcels < or = to 4 ha (10 acres) and > 0.4 ha (1 acre)
2012 B.C. Assessment Authority Farm Class Property Tax Status	**62 land parcels****** 21 within City of Terrace; 6 parcels in Thornhill; 35 parcels in rural GT; **# of A operations** = 48**	**856.3 ha** 537 ha in ALR 319 ha outside of ALR	**13.8 ha**: **39 > 4 ha** 26 parcels > 8 ha **23** parcels < or = to 4 ha (10 acres) and > 0.4 ha (1 acre)

Sources = *2011 Census of Agriculture[A] (Statistics Canada [27]) plus active farms in 2011 but not recorded by census (from Farmers Focus Survey[A]); data from 2012 Greater Terrace Agricultural Land Use Inventory[21] (B.C. Ministry of Agriculture); data from 2012 Farm Class Status[5] property tax rolls (BC Assessment Authority)*

GTAAP study area includes both incorporated and unincorporated privately owned parcels.

Key

* - *Rural GT = Plan area outside of the City of Terrace and Electorial Area E (Thornhill)*

** - *Agricultural operation = same owner for one or more parcels of farmed land*

*** - *Census average is for agricultural operations and not for land parcels (not available)*

**** - *Land parcel = a legally surveyed parcel; not all of the parcel is used for agriculture*

ALUI - see Appendix 1 for definitions of 'used for farming'

In comparing the **amount of land used for farming**[5,21,27] between the three surveys, the smallest value is from the Farm Class tax status properties (**856 ha**), with the combined Census of Agriculture/Farmers Survey having the highest value (**1,512 ha**) for privately owned farm land. This is 316 ha more than the Greater Terrace Agricultural Land Use Inventory value for privately owned farm land (**1,196 ha of land used for farming or 5% of the surveyed private land**).

Which value for the amount of farmed land in the Greater Terrace area is the most useful? The Census of Agriculture has been documented to be missing agricultural operations in the Greater Terrace area[A]. In comparison, the Greater Terrace Agricultural Land Use Inventory is a more comprehensive survey and provides, within the parameters of its inventory, an estimate of privately owned land in the Greater Terrace area used for visible farming activities. It does not include properties with agricultural activities below the defined thresholds of an agricultural land use inventory (Table 7; Appendix 1). It misses agricultural operations which are undertaking farming and producing products for sale, but whose activities are less than the prescribed percentages of the land parcel area[20]. The agriculture land use inventory's data for farm land also does not determine whether these farmed lands produce products for sale or for home consumption and exchange, only whether agricultural activities occur on that parcel.

These differences between survey and census methods utilized by various government levels to make decisions regarding agriculture in the Greater Terrace area are worrisome. The methodologies appear to be **underestimating** the number of operational farms and the value of farm sales occurring in the Greater Terrace area[A]. They also appear to miss mid to small sized agricultural operations which contribute significantly to local food production[B], but which have either been missed in surveys or fall outside of the definitions used by standardized surveys.

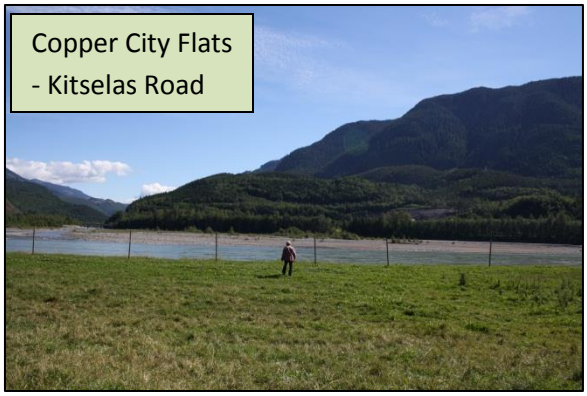
Recommendation LU.6.d. Request that Statistics Canada review the agricultural operations contact list for the Greater Terrace area before the 2016 Census of Agriculture.

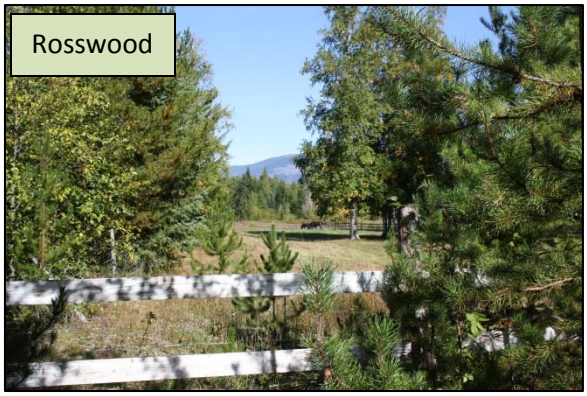
The Census of Agriculture surveys for 2011, 2006, and 2001 are clearly missing agricultural operations in the Greater Terrace area, including one of the biggest producers for the Northwest Region. It is important for planning and funding reasons that the Census includes all Greater Terrace agricultural producers which grow products for sale.

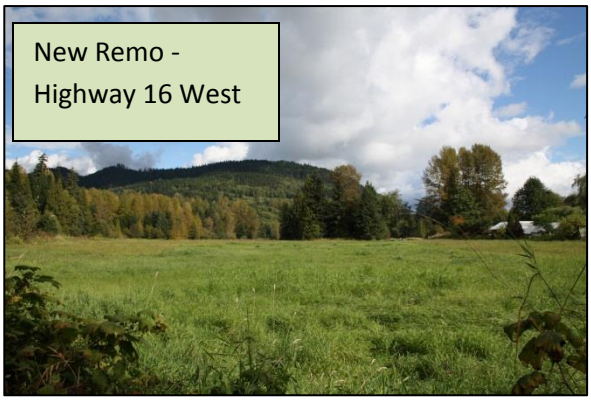
Recommendation LU.6.e. Facilitate workshops and availability of information regarding the BC Assessment Authority's Farm Class property tax reductions.

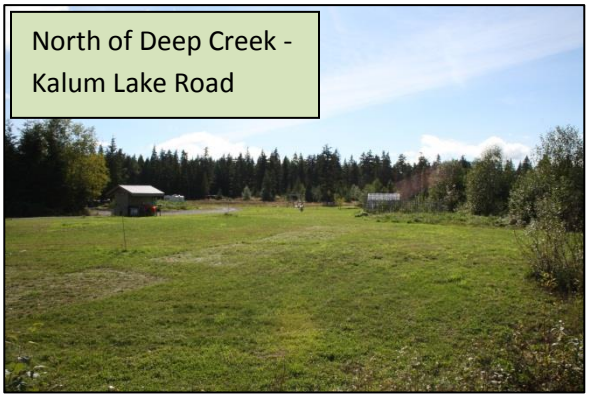
Receiving farm property tax benefits could be critical to allowing some farm operations in this area to become more economically viable. Helping farmers understand the property tax status and assisting them to achieve that status would be beneficial to encouraging farming in the Greater Terrace area.

Recommendation LU.6.f. Facilitate the compilation of accurate statistics for agriculture and food growing activities in the Greater Terrace area.
Accurate statistics for the spectrum of agricultural and farming activities would be very useful in planning for future community food security and food production in the area.









Agricultural Land Uses in the Greater Terrace Area

LU.6.5. Locations of Agricultural Operations

An important piece of information needed to plan for the future of agriculture in the Greater Terrace area is **where farming activities are located**. Of the three standard methods for agricultural surveys, the **Census of Agriculture** includes information about products and sales, but **does not include information about location**, due to confidentiality criteria associated with the Census. B.C. Assessment Authority's **Farm Class status** designations include **information regarding locations** and can be used to identify some agricultural operations which have had agricultural sales, but the value and types of those **sales are not available** (Table 6), and not all agricultural operations have Farm Class property status (Table 5).

The **Farmers Survey** utilized for this study has increased the information regarding locations of farms and the types of agricultural sales, but this survey was **not a comprehensive survey** of all producers in the Greater Terrace area, as it was completed on a voluntary basis[A].

The **Greater Terrace Agricultural Land Use Inventory is parcel-specific** and provides detailed land parcel locations, but **does not include information about sales** e.g. whether the parcels, which have been identified as **'used for farming'**, are being used to grow products for sale or to grow food for home consumption and non-sale exchanges[21].

Information regarding the locations of agricultural operations and land used for farming has been summarized in Tables 6 and 7 to provide some analysis as to where agricultural activities are occurring. As shown in these tables, agriculture and identifiable farming activities occur **throughout the Greater Terrace area** regardless of ALR or non-ALR designations, and regardless of the quality or suitability of the soil for agriculture.

Table 6 outlines the location of the land parcels receiving B.C. Assessment Authority's Farm Class property tax reductions. From this table, it is apparent that, for the 48 agricultural operators and 62 land parcels receiving farm property tax status, these activities are spread throughout the Plan area. The greatest numbers of farm property tax status parcels[4] are located on Class 5 sandy soils on the West Bench in the City of Terrace, but these parcels only encompasses 6% of the Farm Class land base. In comparison, Farm Class parcels in Old Remo on high capability Class 2 soils comprise 20% of the Farm Class land base, but make up only 8% of the agricultural operators with Farm Class property tax reductions in the Greater Terrace area.

If Farm Class tax status is used to define agricultural districts in the Greater Terrace area, then the subareas with the greatest concentrations of parcels and agricultural operations are:

1. West bench of the City of Terrace	largest # of parcels = 14
2. Old Remo	largest amount of land = 175 ha
3. Graham Avenue (Terrace) and Old Remo	2nd largest # of parcels = 7 each
4. Terrace North and Highway 16 East	2nd largest amt. of land = 109/104 ha

Well known farm areas e.g. Braun's Island and New Remo, rank lower than the rural residential areas in Terrace North and Highway 16 East for numbers of Farm Class properties and the amount of land utilizing the benefits of Farm Class property tax reductions[5].

Table 6: BC Assessment Farm Class Tax Status Properties:
Locations in Greater Terrace[5,25] (number and % of total parcels)

Location in Greater Terrace	# Farm Class parcels	Hectares of Farm ClassLand	# of Agriculture Operations	Soil Capabilities	Agriculture Land Reserve
Rosswood - Kalum Lake to DL 1041	2 2%	89 10%	1 2% (+ 1 from Terrace)	**Class 7** =1 parcel; Class 4 estimated for other parcel	None in ALR
S end Kalum Lake to Deep Creek	3 4%	50 6%	3 6%	**Class 5** (Class 7 soils in gravel areas; some improved Class 4 soils)	None in ALR
Terrace North-Deep Creek to City of Terrace	6 10%	109 12%	6 13%	**Class 5** (Class 7 in gullied clay areas; some improved Class 4 soils)	3/6 in ALR
Dutch Valley	1 2%	5 1%	1 2%	**Class 5** (improved 4)	1/1 in ALR
Old Remo	7 12%	175 20%	4 8%	**Class 2 /Class 5**	7/7 in ALR
New Remo	4 6%	75 9%	3 6%	**Class 2 /Class 5**	4/4 in ALR
Braun's Island	6 10%	24 3%	4 8%	**Class 3 /Class 5**	6/6 in ALR
City of Terrace - Graham Ave.	7 12%	41 5%	7 15%	**Class 3 /Class 5**	7/7 in ALR
City of Terrace - West Bench	14 23%	51 6%	10 21% (+ 1 in Chim demash)	**Class 5** (improved 4)	None in ALR
Thornhill	6 10%	95 11%	5 11% (+1 Terrace)	**Class 5** (improved 4) Class 3 - one parcel	3/6 in ALR
Little Island	1 2%	26 3%	(+1 in Terrace)	**Class 3 /Class 5**	1/1 in ALR
Jackpine Flats	1 2%	13 2%	1 2%	**Class 5** (improved 4)	1/1 in ALR
Hwy 16 East Copperside to Chimdemash	4 6%	104 12%	3 6%	**Class 5** (improved 4) = 1 parcel **Class 7** = 3 parcels	1/4 in ALR
Totals	**62** 100%	**857 ha**. 100%	**48** 100% **operators**	**37% Class2 and 3soils**	**55%** in ALR

2012 BC Assessment Records: 34/62 (**55%**) of Farm Class properties are located in the ALR. 45% of Farm Class properties are not within the ALR.
23/62 (**37%**) of Farm Class properties are located on Class 2 and Class 3 soils, with the remaining **63%** of Farm Class tax status properties located on lower capability soils.

Amount of Land with Farm Class Property Tax Status (in order): Old Remo (**175** ha), Terrace North (City of Terrace to Deep Creek)(**109** ha), Highway 16 East (Copperside to Chimdemash)(**104** ha), Thornhill (**95** ha), Rosswood (**89** ha), New Remo (**75** ha), City of Terrace (West Bench) (**51** ha), Kalum Lake to Deep Creek (**50** ha), City of Terrace (Graham Avenue) (**41** ha), Little Island (**26** ha), Braun's Island (**24** ha), Jackpine Flats (**13** ha), and Dutch Valley (**5** ha).

Another survey tool which provides locational information for farming activities is the **Greater Terrace Agricultural Land Use Inventory**[21]. According to data from the 2012 inventory, within the Greater Terrace area, **78 parcels of privately owned land** were used for farming (Table 7). This represents **8% (1,196 ha) of the privately owned land base of 15,489 ha**[21]. A further **69 parcels or 3.8% of parcels** (Table 7) had agricultural activity recorded but did not qualify as 'used for farming' (Appendix 1). These parcels occupy **654 ha or 4%** of the privately owned land base of 15,489 ha[21]. In total, **1,846 ha and 147 parcels** more 1 acre in size had agricultural activities. This is **12%** of the sampled land base and **8%** of the sampled land parcels.

Where are these parcels located? According to Table 7, 47/78 or **60% of land parcels** used for farming were located fully or partially within the ALR. Some parcels have evidence of agricultural activities but are 'not used for farming', according to the Agricultural Land Use Inventory definitions[21]. Of these parcels with evidence of agricultural activities (but not qualifying as 'used for farming'), 13/69 or **19% of land parcels** are within or partially within the ALR. Of all parcels showing agricultural activity (both 'used for farming' and 'evidence of agricultural activities'), **59% of parcels are not (all or partially) within the ALR**.

Where is the greatest amount of land 'used for farming'? Based on total lot sizes and not the amount of space used for farming (Table 7), the most land 'used for farming' was in Old Remo (**288** ha), followed by Lakelse South (**258** ha), Highway 16 East (Copperside to Chimdemash)(**135** ha), Thornhill (**134** ha), New Remo (**126** ha), Terrace North (City of Terrace to Deep Creek)(**61** ha), City of Terrace (Graham Avenue) (**55.5** ha), City of Terrace (West Bench) (**36** ha), Little Island (**34.5** ha), Jackpine Flats (**31** ha), Braun's Island (**15.5** ha), N of Deep Creek (**8** ha), and Dutch Valley (**6** ha). Rosswood has been identified in the study as not having any parcels 'used for farming' under the ALUI definitions (Appendix 1).

The ranking of amount of land in parcels 'used for farming' + 'evidence of agricultural activities' is Old Remo (**566** ha), Lakelse South (**260** ha), Thornhill (**185** ha), Highway 16 East (Copperside to Chimdemash)(**152.5** ha), New Remo (**149** ha), Terrace North (City of Terrace to Deep Creek)(**102.5** ha), **Rosswood (102 ha)**, Jackpine Flats (**92** ha), City of Terrace (Graham Avenue) (**68** ha), Kalum Lake to Deep Creek (**67** ha), City of Terrace (West Bench) (**39.5** ha), Little Island (**34.5** ha), Braun's Island (**20.5** ha), Dutch Valley (**6** ha), and Terrace Horseshoe (**1.5** ha).

The Greater Terrace Agricultural Land Use Inventory[21] (Table 7) presents five trends that are present in the other surveys used for this Plan (Table 6 and Table 8):

1. parcels of land 'used of farming' and 'not used for farming but with agricultural activity' are **located throughout the Greater Terrace area**.
2. there are more parcels involved in agriculture **outside of the ALR (59%)** but more hectares of land are involved in agriculture within the ALR than outside of it (62%).
3. the average size of a parcel of land 'used for farming' (15 ha) is **larger** than the average size of a parcel with evidence of agricultural activity (9.5 ha).
4. the majority of the parcels (**81%**), 'not used for farming' but with agricultural activities, are outside of the ALR.
5. the subarea with the most agricultural activity is the **Old Remo** area.

Table 7: Locations of Parcels in the Greater Terrace Agricultural Land Use Inventory[21]

Location in Greater Terrace	# of Farm parcels	Farm Land (ha)**	Parcels in ALR		# of parcels w/agr*	Parcels w/agr (ha)**	Parcels in ALR		Total Parcels	Total Land (ha)**
Rosswood	**0**	0	**0**		**6**	102 ha	**1** 62 ha		**6**	**102 ha**
Kalum Lake to Deep Creek	**1**	8 ha	**0**		**5**	59 ha	**0**		**6**	**67 ha**
Terrace North Deep Creek to City of Terrace	**6**	61 ha	**3** 39 ha		**7**	41.5 ha	**1** 19 ha		**13**	**102.5 ha**
Dutch Valley	**2**	6 ha	**2** 6 ha		**0**	0	**0**		**2**	**6 ha**
Old Remo	**16**	288 ha	**14** 280 ha		**18**	278 ha	**0**		**34**	**566 ha**
New Remo	**4**	126 ha	**4** 126 ha		**2**	23 ha	**2** 23 ha		**6**	**149 ha**
Braun's Island	**4**	15.5 ha	**4** 15.5 ha		**2**	5 ha	**2** 5 ha		**6**	**20.5 ha**
City of Terrace - Graham Ave.	**9**	55.5 ha	**9** 55.5 ha		**2**	12.5 ha	**2** 12.5 ha		**11**	**68 ha**
City of Terrace - West Bench	**10**	36 ha	**0**		**3**	3.5 ha	**0**		**13**	**39.5 ha**
Terrace - Horseshoe	**0**	0	**0**		**1**	1.5 ha	**0**		**1**	**1.5 ha**
Thornhill	**6**	134 ha	**5** 130 ha		**6**	51 ha	**2** 36.5 ha		**12**	**185 ha**
Little Island	**1**	34.5 ha	**1** 34.5 ha		**0**	0	**0**		**1**	**34.5 ha**
Jackpine Flats	**8**	31 ha	**3** 26 ha		**11**	61 ha	**1** 4.5 ha		**19**	**92 ha**
Hwy 16 East Copperside to Chimdemash	**9**	135 ha	**0**		**5**	17.5 ha	**2** 13 ha		**14**	**152.5 ha**
Lakelse South	**2**	258 ha	**2** 258 ha		**1**	2 ha	**0**		**3**	**260 ha**
Totals	**78**	**1,196**[21] **ha.**	**47** 971 ha ***		**69**	**654 ha**	**13** 175.5 ha ***		**147**	**1,846 ha**

2012 Greater Terrace Agricultural Land Use Inventory data, Ministry of Agriculture[21]

* - parcel with agricultural activity but not classified as an ALUI farm (Definitions, Appendix 1)

** - size of parcel, not the area of agricultural activities

*** - hectare values for ALR parcels vary from ALUI values of 761 ha; in this table, the amount of land in the entire parcel is counted, rather than the portion of the parcel within ALR.

In standard surveys used to determine agricultural activity in the Greater Terrace area, values vary due to (i.) definition differences between survey types for 'farms' and (ii.) completeness of survey methods[A] (Tables 5, 6, 7). In order to have efficient and effective planning processes for agriculture, it is important that land use values for agriculture be consistent and accurate.

Recommendation LU.6.g. Maintain an up-to-date list of agricultural operations, agricultural land parcels, and the locations of agricultural activities.

The locations of agricultural operations are important in planning for agricultural land uses. The Agricultural Land Use Inventory is based on 2012 land uses. It is important that an up-to-date inventory be kept of where agriculture is occurring.

Recommendation LU.6.h. Assess and define agricultural districts and important farming areas within the Greater Terrace area and implement supportive bylaws and regulations.

Agriculture operations and farming are spread throughout the Greater Terrace area, but, based on soil capabilities and location, some areas have a stronger long term potential for food production and agricultural activities. Although these areas may or may not have protection through the Agricultural Land Reserve, it is important that regional and local governments be supportive in preserving and enhancing their agricultural potentials.

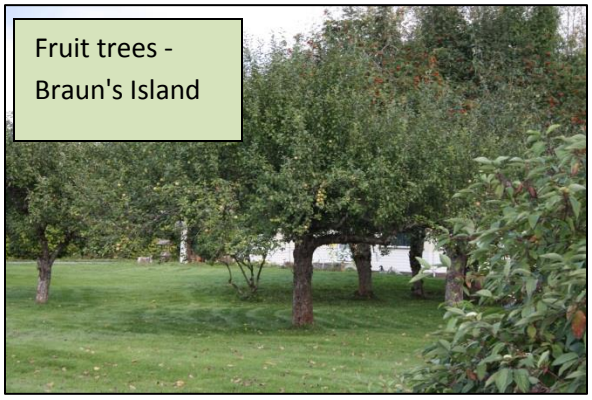
Orthophoto[18,25] showing agricultural areas within the Skeena River floodplain, including Little Island to the right (ALR; used for grazing beef), the Agricultural Land Reserve south of Graham Avenue in the City of Terrace (used for grazing beef, hay and forage, nurseries, greenhouses, fruit orchards, and market gardening), and Braun's Island (ALR; used for fruit trees, market gardens and hay). All of these locations have Class 3 to 5 soils, with long term potential for commercial agriculture. Fourteen BC Assessment Farm Class properties and 14 ALUI 'used for farming' parcels are found in the area shown on this orthophoto[5,21] .

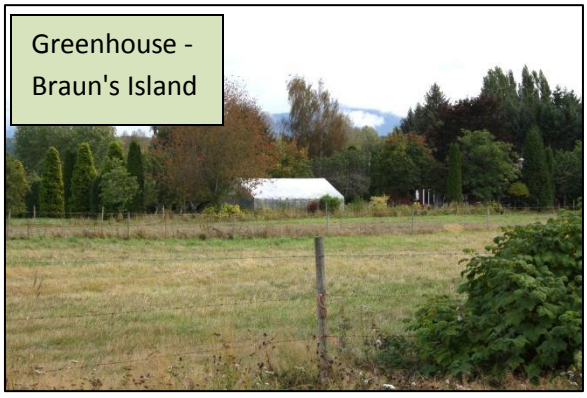
LU.6.6. Where are the Food Growing Land Uses?

The Greater Terrace Agricultural Land Use Inventory has recorded parcels of land 'used for farming', as defined by the Ministry of Agriculture[20], but farming in northwestern British Columbia occurs at many scales. Farmers are seldom full-time and often combine their farming endeavours with other methods of obtaining income. Food growing and agricultural activities in the Greater Terrace area do not necessarily mean that the resulting produce is available for sale. Food exchanges and gifting, as well as food production for home consumption, are **important life style aspects of living in the Greater Terrace area** and contribute significantly to community food production. The question then becomes, from the perspective of community food security, protection of agricultural lands, and encouragement of food production, **where are the food growing activities occurring**?

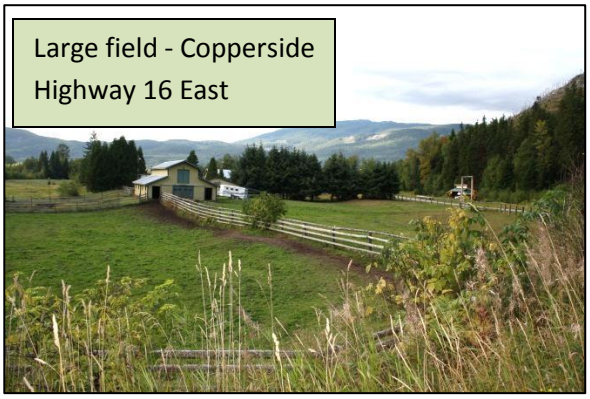
Determining the locations of farms which sell produce, compared to land parcels on which food production occurs but is not for sale, is difficult within the Plan area. Agricultural and food growing land uses are not concentrated in one or two subareas within the Greater Terrace area but are spread throughout the entire Plan area[5,21]. Agricultural operations can be found on ALR and non-ALR lands, on soil capabilities from Class 2 to Class 7, and within rural areas and urban incorporated areas (Tables 6 and 7). Small scale food producers, especially those within urban areas, are not included in agricultural statistics. From a land use regulation perspective, this generates challenges as to which subareas in the Greater Terrace area should be identified for special agricultural zones, and which types and densities of farming should be permitted within non-agricultural and non-rural land use designations . In addition, if food production is spread throughout the entire Plan area, how can this activity be accurately identified and enhanced?

Visual surveys (Table 8) were utilized to correlate locations of food-growing activities with soil types and ALR status. Three indicators were utilized for food growing activities - **fruit trees, greenhouses**, and **large gardens** (>10 m^2). In addition, **large fields** (>0.4 ha) and **horses and cattle** were recorded. All public roads in rural Greater Terrace were surveyed, as well as key agricultural areas and sample areas within the City of Terrace and Electorial Area E (Thornhill). The records of activities provide a minimum or at-least number for that activity, and not a definitive number due to limitations associated with visual surveys (Appendix 1).


Fruit trees - Braun's Island


Greenhouse - Braun's Island


Large garden - Braun's Island


Large field - Copperside Highway 16 East


Horses - Old Remo

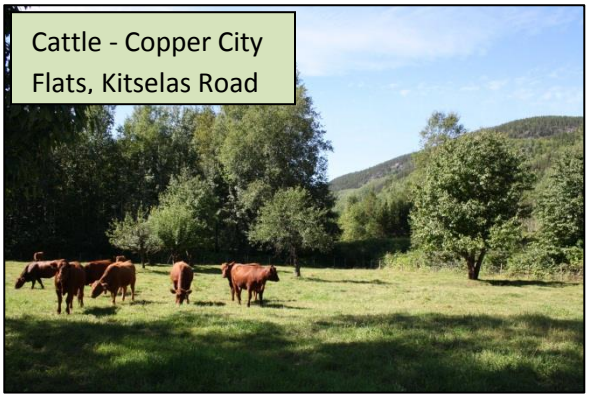

Cattle - Copper City Flats, Kitselas Road

Table 8: Greater Terrace Food Producing Activities: Based on Visual Surveys*

Location in Greater Terrace	# of parcels w/fruit trees	# of parcels- w/ green-houses	# of parcels- w/ large gardens	# of parcels- w/ large fields	# of parcels - with cattle(#)	# of parcels - with horses (#)	Total Uses (all columns)
Rosswood	3	14	13	20	2 (10)e	5 (11)	57
Kalum Lake to Deep Creek	9	5	17	6	2 (5)	6 (12)	45
Terrace North - Deep Creek to City of Terrace	42	28	37	15	2 (17)	7 (24)	131
Dutch Valley	7	2	5	4	1 (10)	1 (1)	20
Old Remo[1]	32	14	22	22	4 (20)	14 (40)	108
New Remo	30	7	13	6	2 (12)	4 (12)	62
Braun's Island	15	5	8	4	-	2 (6)	34
Little Island	-	-	-	1	1 (9&)	-	2
Jackpine Flats[2]	13	20	24	5	4 (18)	13 (36)	79
Lakelse[3]	10	20	26	2	-	-	58
Hwy 16 East[4]	69	18	57	13	2 (12)	8 (20)	167
Total Rural	**230**	**133**	**222**	**98**	**18 (104)**	**60 (162)**	**761**
Thornhill rural[5]	39	11	15	10	1 (1)	7 (12)	83
Graham CofT[6]	44	11	10	13	2 (20)	3 (7)	83
West Bench T[7]	42	17	18	24	4 (35)	12 (27)	117
Rural Urban	**125**	**39**	**43**	**47**	**7 (56)**	**22 (46)**	**283**
Total Rural and rural-Urban	**355 parcels**	**172 parcels**	**265 parcels**	**145 large fields**	**25 parcels with 160 cattle**	**82 parcels with 208 horses**	**1044 accumu-lative uses**
City of Terrace - Horseshoe[8]	*75*	*17*	*23*	-	-	-	*115*
City of Terrace - Medeek[9]	*69*	*18*	*29*	-	-	-	*116*

<u>2012 Visual Surveys</u>: <u>At least values</u> are based on actual sightings of features; and represent a minimum value for that attribute. Visual surveys included all public roads in rural Greater Terrace and sample/focus areas within Thornhill and the City of Terrace.

* = visual survey: what was seen was counted; represents 'at-least' and not definitive numbers for each value
parcel = based on one street address; viewed from public road - see Appendix 1 for full descriptions of subareas.
1= Old Remo, including Old Remo Road, Robin Road, all roads off Old RR, Thunderbird, Beam Station Road
2= Jackpine Flats, including Old Lakelse Lake Road from Goodwin Road to DL 5130.
3 = Lakelse, including west and east sides of Lakelse Lake and Old Lakelse Lake Road from DL 5130
4= Hwy 16 East, including Kitselas Road, Copperside, Lavergne, Gossan, Kleanza, Usk, and Chimdemash
5= Thornhill rural, including Farm Class properties, Krumm Road, Laurel Street, Queensway Drive, River Dr.
6 = Terrace rural, including floodplains S of Graham Ave.,and Frank, Skeena and west Haugland Streets
7= West Bench in City of Terrace, including N Thomas, W Halliwell, Gibbs, W McConnell, Kalum Lake Drive
8 = City of Terrace urban: 100 consecutive properties on 4800 blocks of Loen, Olson, Scott and Straume Avenue
9 = City of Terrace urban: 100 consecutive properties on 5000/5100 Medeek, Graham N side, Apple, Mills, Craig
& = cattle counted in total for West Bench, City of Terrace

As shown in Table 8, the visual survey results enhance information provided by the BC Assessment Farm Class properties (Table 6) and Agricultural Land Use Inventory locations (Table 7). They provide rather startling numbers for **food growing activities within the Greater Terrace area**. The values are based on at-least or minimum numbers for each of the activities.

The amount of food growing activities in the Greater Terrace area is significant. In **rural Greater Terrace** outside of the boundaries of Thornhill and the City of Terrace, there were at least **230 properties with fruit trees**. Of these properties, at least 16 properties had fruit orchards with more than 20 trees, in particular in the Old Remo area. The greatest number of properties with fruit trees was in the Highway 16 east area. In comparison, most likely due to its colder climate, the Rosswood area recorded the smallest number of properties with fruit trees.

Large gardens greater than 10 m^2 were also plentiful in rural Greater Terrace, with **at least 222 parcels with large gardens**, of which 8 had commercial-sized gardens. At least **133 active greenhouses** were found in rural Greater Terrace, most commonly used for tomatoes, cucumbers, and grapes. Greenhouses allow extensions of the growing season and food production during the cool, wet summers which occur cyclically in the Greater Terrace area.

When the rural visual survey results were combined with the results from the large lot survey of areas of Thornhill and the City of Terrace, the number of parcels rose to **355 parcels with fruit trees**, **265 parcels with large gardens** and **172 parcels with greenhouses**. In addition, **145 parcels had large open fields**, suitable for grazing or in the process of being grazed. **Food production activities are significant** across the non-urban sections of the Greater Terrace area.

Livestock are an important farming activity. In the combined rural areas, both within and outside the City of Terrace and Thornhill, **82 parcels were recorded as having 208 horses**. These are at-least numbers. Most likely there are more horses in the Greater Terrace area. Compared to the 2011 Census of Agriculture of 131 horses in the Greater Terrace area, the 208 horses visually recorded included horses on parcels used for farming and horses on non-farming lots in areas such as Jackpine Flats. The 160 cattle on 25 lots from the visual survey appear to be an underestimation, as a total of **252 cattle** were recorded in the 2011 Census + Farmers Survey[A]. Horses and cattle are close in terms of livestock importance in the Greater Terrace area, despite changes to meat regulations[6,23] in 2007 which led to some farmers to stop growing beef. Recent changes to slaughter licencing[23,A] may reverse this. The **importance of horses** in the Plan area, not in terms of food production but in terms of life style aspects, will need to be addressed in any agricultural planning and land use designations.

Class 7 soil; not ALR; Copperside

Compared to 78 or 5% of privately owned parcels being identified as used for farming (as found in the Agricultural Land Use inventory[21]), **at least 355 properties in the non-urban areas or at least 20% of privately owned parcels[21] have notable food growing activities**.

How does this significant amount of food production in the rural areas relate to urban food production? Is **food growing in urban areas** an important land use activity? Certain residential sections of the City of Terrace developed over former pre-World War II farm areas which had productive soils for fruit orchards and market gardens. Two of these areas were sampled during the study to see if gardens, greenhouses, and fruit trees were important to urban residents.

In 100 consecutive properties sampled in the Horseshoe area (Loen Avenue to Straume Avenue), **75% of the urban lots had fruit trees, and 23% had large gardens**(Table 8). The same high values were noted in the alluvial soils areas on Medeek Avenue and the north side of Graham Avenue. In this area, for 100 consecutive properties, **69% of the properties had fruit trees and 29% had large gardens**.

These numbers are very high in terms of residential lots. For some of the lots, the majority of the space in their backyards was occupied by fruit trees and gardens. It is apparent that **urban food production collectively in the City of Terrace could be an important contributor** to community food security and local food consumption economics.

The number of properties, both rural and urban, involved in food producing activities, provides strong evidence that food production for home consumption and other methods of non-sale food exchanges, are important and wide spread throughout the Plan area. These types of non-commercial food growing activities need to be considered in any discussions of community food security and agricultural land use planning. Their importance to the life styles, cultures, and food economics of the Greater Terrace area should not be undervalued.

Recommendation LU.6.i. Assess the roles of non-commercial agriculture and food production activities in the life styles and community food security for the Greater Terrace area

The values of agriculture and farming are not solely based on sale of products. As food production for home consumption and exchanges is a significant aspect of living in the Greater Terrace area, protection and enhancement of food growing activities and their land bases are important aspects of the future of farming in this area.

Recommendation LU.6.j. Facilitate workshops and access to information about the care and cultivation of fruit trees in the Greater Terrace area.

Based on the visual survey, fruit trees are the most common method of non-commercial food production in the Greater Terrace area. With the long history of fruit orchards in this region, and the large number of trees currently growing in the Greater Terrace area, assistance to both agricultural operators and local gardeners in caring for fruit trees and utilizing their crops would be very beneficial.

Recommendation LU.6.k. Assess the land use needs of larger livestock in the Greater Terrace area, in particular, horses and cattle and their seasonal uses of agricultural lands.

Large livestock, in particular cattle and horses, are moved about the Greater Terrace area to grazing areas and wintering areas. Assessment of the land needs of these types of livestock, and balancing uses between food production from cattle and agribusiness/recreational uses of horses, are necessary in the land use planning processes for larger agricultural spaces in the Greater Terrace area.

Recommendation LU.6.l. Assess the numbers and locations of horses, cattle, and other large livestock in agricultural and non-agricultural areas of Greater Terrace.

The keeping of large livestock in non-agricultural portions of the Greater Terrace area, such as rural residential subdivisions, may benefit from analyses of desirable densities of animals relative to land use conflicts and environmental impacts. This should be balanced with the importance of horses to the life styles and recreation of some people attracted to rural Greater Terrace for the acreages available to house their horses.

Recommendation LU.6.m. Facilitate workshops and information regarding best management practices for the care of livestock and siting of pens and waste piles on smaller land parcels.

Many agricultural activities, including raising large livestock, are occurring on smaller land parcels. It is important that management of large livestock avoids serious issues with surface water and groundwater contamination, and other environmental concerns.

Recommendation LU.6.n. Review bylaws and local government policies with regards to encouraging food producing activities within urban areas, in both private and public spaces.

As shown in Table 8, the densities of food growing activities in some urban areas are important contributors to community food security in the Greater Terrace area.

Turkey tractor - north of Deep Creek
Class 7 soils modified; not ALR

LU. 7. Implementation of Recommendations

The Greater Terrace area has a long history of farming. Fruit trees, livestock, horses, chickens, gardening, food exchanges, gifting, and food preservation are important aspects of the lifestyle of this region. The people who live here care about what they eat. A sustainable agricultural sector and effective community food security, though, will require long term investments in the agricultural land base of the Greater Terrace area, combined with individuals who are willing to invest time, energy, and money into growing agricultural products.

The agricultural land base is not a secure asset. Natural processes such as flooding, bank erosion, and soil damage can remove farming opportunities presented by the land base. Knowledge about this land base, and understanding of the unique North Coast climatic conditions found in the Greater Terrace area, are important to development of a durable and rigorous agricultural sector. Increased food production amongst non-commercial food growers is also dependent upon access to good agricultural information.

In implementation of the Greater Terrace Agricultural Area Plan, two of the most important aspects will be transfer of knowledge and retention of knowledge. This has been outlined in several recommendations and is a priority for ensuring that the Plan is effective in the encouragement of agriculture and food production. Five steps are recommended:

Recommendation LU.7.1. Establish a permanent on-line site for agricultural information, with links to agricultural information relevant to the Greater Terrace area

This on-line site should include information and links to information, such as the 'Beyond the Market' Program[11], historical information and reports, climate, farming techniques, workshop results, building plans for greenhouses, soils, soil capability, floodplains, and successful varieties of plants for the Greater Terrace area .

Recommendation LU.7.2. Maintain and update the on-line site on an ongoing basis.

As information becomes available, and as the local impacts of climate change are better understood, it is important that farmers have relevant information as soon as possible.

Recommendation LU.7.3. Establish a permanent Agricultural Advisory Committee.

Establishment of a local Agricultural Advisory Committee is important to the success of the Agricultural Area Plan. An Agricultural Advisory Committee[8,19] (AAC), with local representation from farmers, provides direct feedback to the City Council and Regional District Board and can provide advice to staff on issues and land use matters affecting agriculture[19]. An AAC serves in a valuable role during development and implementation of the Plan, such as planning for urban/farm interfaces, or review of regulations which affect agriculture. A permanent AAC provides advice from an agricultural perspective on such issues as applications for changes to the Agricultural Land Reserve (ALR), revisions to zoning and subdivision bylaws, and amendments to Official Plans (OCP or OSP).

Recommendation LU.7.4. Encourage and support the establishment of a permanent farmers' organization which supports activities and dissemination of knowledge to local agricultural operators and food growers.

There are several groups which are working with local food growers, but, at this time, there is not a permanent farmers' organization, such as a Farmers' Institute. For those growers who wish to start or expand their operations into bigger commercial operations, a farmers' organization would also provide a recognized mechanism by which local governments could contact agricultural operators.

Recommendation LU.7.5. Review and modify bylaws and other regulations in order to promote agriculture as an important economic and life-style land use activity within the Greater Terrace area.

The Greater Terrace area is complex in terms of where and how agricultural activities are occurring. Although there are certain districts, such as Old Remo, which can be easily defined in terms of agricultural activities, there are a greater number of farms and agricultural activities spread out across the entire agricultural plan area. Providing bylaws and regulations that recognize this and promote food production and agricultural activities in a variety of locations and land use circumstances will be necessary if farming is to increase and flourish in the Greater Terrace area.

Class 5(4) soils; not ALR; West Bench, Terrace

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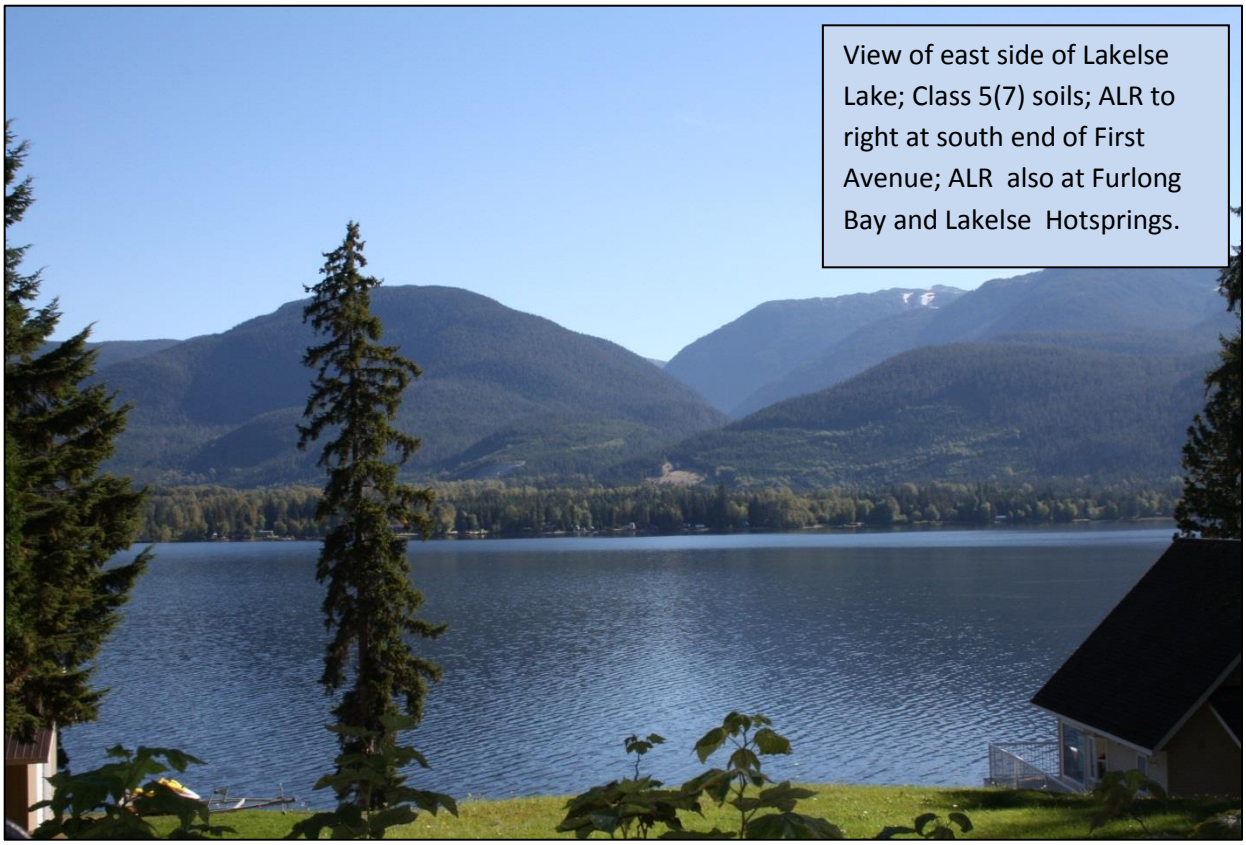
Class 3 soils; ALR; Copper City Flats; used for grazing.

Class 3 soils; ALR; Usk East side

North end of Dutch Valley looking northwest towards Kitsumkalum River; Class 5(4) soils; active floodplain; Agricultural Land Reserve.



View of east side of Lakelse Lake; Class 5(7) soils; ALR to right at south end of First Avenue; ALR also at Furlong Bay and Lakelse Hotsprings.


Class 5 (3) alluvial soils;
not ALR; West Usk

Appendix 1: Methods

Part 1. Subareas

The following definitions of subareas were used during analysis of land uses and the agricultural land base for the Greater Terrace Agricultural Area Plan. The Greater Terrace area is large and is approximately 70 km by air from Rosswood in the north to the south end of Lakelse Lake.

Rosswood - Kalum Lake to DL 1041	South end of Kalum Lake to DL 1041 at the east bend of the Cedar River, including roads = Kalum Lake, Egan, Brousseau, Geier, Curtis, Columbine, Parker, Cedar River, Old Rosswood, Abbey, Carlota, Happy Ranch Farm, and South Rosswood.
S end of Kalum Lake to Deep Creek	South end of Kalum Lake to Deep Creek, including roads = Kalum Lake, Pat Roy, Lost Lake Forest Service Road, Barnes, Findley Lake (East and West), New Haven, Fern Lane, Deep Creek, Oscar, Arthur, and Har-Lee's Place Roads.
Terrace North-Deep Creek to City of Terrace	Kalum Lake Road and adjoining roads including Dover, Pratt, Darci, Anna, Merkley, Spring Creek, Willow Creek, Johnston, Johns, Glen, Orde, Freeman, Giesbrecht, Hamer, Farko, Langer, Falcon, Douglas, Martel, Centennial, Ken Scott, Cranberry, Blueberry, Elderberry, Huckleberry, Woodland, and Fosbery Roads.
Dutch Valley	Dutch Valley Road, Hampton Road, and Bohler Roads.
Old Remo	Lakelse River bridge to Queensway Drive, including roads = Whitebottom, Old Remo, Robin, Kozier, Skaarland, Munson, Matson, Craft, Farkvam, Thunderbird Road, and Beam Station Road to DL 5143.
New Remo	From Zymagotitz River bridge on Highway 16 to DL 6483, including roads = Nelson, Wichmann, Royal, Gagnon, Kilby, Calgary, Zymacord FSR to DL 4985.
Braun's Island	Island including Ackroyd, Archer, Heppel, and Doll Roads.
City of Terrace - Graham Ave.	Roads including Frank Street, Skeena Street, West Haugland Avenue, and Graham Avenue from the 5100block to the 4500 block.
City of Terrace - West Bench	Roads including = North Eby, Dairy, Vesta, Thomas South to Gair, Halliwell West of Thomas, McConnell West of Marshal, and Kalum Lake Road.
Thornhill	Electorial Area E for standard surveys; visual survey area including roads = River Drive, Kofoed, Crescent, Old Lakelse Lake Road to Goodwin Road, Ziegler, Krumm, Creek, Laurel, Fire Creek, Miller, Johnston, Thornhill Golf Course, Queensway Drive, Kenworth, Scotton, and Lowrie.
Little Island	Island only.
Jackpine Flats	Old Lakelse Lake Drive from Goodwin Road to DL 5130, including roads = Jackpine, Attree, Layton Place, Frigerio, Roseland, Edgewood, Williams Creek, Sockeye Creek, Lodge Pole, Marion, Crystal, Woeste, Williams Creek Trail, Nystrom, and Strumecki.
Hwy 16 East Copperside to Chimdemash	D.L. 6637 south to Copper (Zymoetz) River bridge, including roads = Highway 16, Mannix Creek, Smitty's Road, Chimdemash Loop, Singlehurst Main, Usk East (Adams, Grandview, Usk frontage), Usk West (Ferry, Varner), Kleanza (Gooden, Kleanza,Singlehurst), Kleanza, Bornite Mountain, Gold Creek, Noble 5, Gossan (Skeena, Gossan Creek, Bulkley), Copperside west (Lavergne), Copperside East (Copper River, Muskat, Caribou, Beaver, Marten, Otter); subarea includes Kitselas Road and Copper City Flats on west side of Skeena River.
Lakelse	Beam Station Road after DL 5143, including roads = Beam Station, Lakeside, Mailbox Point, Catt Point, west side of Lakelse Lake, Westside, Muller's Bay, east side of Lakelse Lake, Waterlily Bay, Dakin, Lupine, Hull, Lakelse Lake Lodge, Kreston, Kroyer, First, Adel, Bruce, McBride, Mt. Layton Hotsprings, Hansen; Old Lakelse Lake Drive South of DL 5130; Highway 37 South to base of hill.

Part 2. Agricultural Land Use Inventories

The following are the criteria and descriptions used by agricultural land use inventories to define if a parcel of land is '***used for farming***'[20,21]. Please consult the Ministry of Agriculture for a full definition of criteria used in agricultural land use inventories.

Land Use and Farming[20]

Used for farming – Parcels where the majority of the parcel area is farmed OR parcels which exhibit significant intensity of farming are considered "Used for farming". Specifically, parcels that meet at least one of the following criteria:

- medium or large scale livestock, apiculture or aquaculture operations
- at least 40% parcel area in cultivated field crops (excluding unused forage or pasture)
- at least 40% parcel area built up with farm infrastructure
- at least 25% parcel area built up with crop cover structures (excluding unmaintained structures)
- at least 30% parcel area in cultivated field crops (excluding unused forage or pasture) or farm infrastructure and small scale livestock, apiculture or aquaculture operations
- at least 23% parcel area in cultivated field crops (excluding unused forage or pasture) and at least 45% parcel area in cultivated field crops (excluding unused forage or pasture) or farm infrastructure
- at least 10% parcel area in crop cover structures (excluding unmaintained structures) and at least 30% parcel area in cultivated field crops (excluding unused forage or pasture) or farm infrastructure
- at least 15% parcel area and at least 15 ha in cultivated field crops (excluding unused forage or pasture)
- at least 20% parcel area and at least 10 ha in cultivated field crops (excluding unused forage or pasture)
- at least 25% parcel area and at least 5 ha in cultivated field crops (excluding unused forage or pasture)
- at least 10% parcel area and at least 2 ha built up with crop cover structures (excluding unmaintained structures)
- at least 20% parcel area and at least 1 ha built up with crop cover structures (excluding unmaintained structures)
- at least 20% parcel area in cultivated field crops (excluding unused forage or pasture) or farm infrastructure and farm classification for tax assessment
- at least 5 ha in cultivated field crops (excluding unused forage or pasture) or farm infrastructure and farm classification for tax assessment

Not used for farming – Parcels that do not meet the "Used for farming" criteria presented above.

Used for grazing – Parcels "Not used for farming" with a significant portion of their area in natural pasture or rangeland and evidence of active grazing domestic livestock.

Unavailable for farming – "Not used for farming" parcels where future agricultural development is improbable because of a conflicting land use that utilizes the majority of the parcel area. For example, most residential parcels are considered not available for farming if the parcel size is less than 0.4 hectares (approximately 1 acre) since most of the parcel is covered by built structures, pavement and landscaping.

Available for farming – Parcels that can be used for agricultural purposes without displacing a current use. Includes all parcels that do not meet the "Unavailable for farming" criteria.

Not used for farming but available – Parcels that do not meet the "Used for farming" criteria but can be used for agricultural purposes without displacing a current use.

Part 3. Visual Surveys - Methods

In order to quantify the relationships between soil capabilities, Agricultural Land Reserve properties, and land uses within each of the subareas, in comparison to B.C. Assessment Farm Class parcels and agricultural values listed within the 2011 Census of Agriculture, **visual surveys** were undertaken for the rural properties in the Greater Terrace area outside of the City of Terrace and Electorial Area E (Thornhill). As well, selected properties within the agriculture and rural zones of the City of Terrace and Electorial Area E (Thornhill) were surveyed.

Soil capability polygons were identified through soil capability maps[2,25]. Agricultural Land Reserve maps and land parcel maps were provided by the Regional District of Kitimat-Stikine[25]. A list of Farm Class properties was compiled from the BC Assessment data base[5].

Data collected included surveys of soil capability types[2] and geomorphological landforms[10] through soil pits and cutbank profiles. Agricultural activities and identifiable food-associated land use features - greenhouses, fruit trees, gardens (> 10 m^2), large fields (> 0.4 ha), cattle, horses, poultry, and other livestock - were recorded. Parcels were identified by house number, map location, and/or GPS coordinates.

Parcels were viewed from public roads or from crown land. In the rural areas of Greater Terrace outside of the City of Terrace and Electorial Area E (Thornhill), all public roads were surveyed. Within the City of Terrace and Thornhill, selected properties zoned agriculture or rural, or having Farm Class property status, were surveyed. As well, two urban neighbourhoods within the City of Terrace were surveyed for food producing activities. In the Horseshoe area, 100 consecutive properties in the 4800 blocks of Loen Avenue, Olson Avenue, Scott Avenue, and a portion of Straume Avenue were surveyed. In the Southside area, 100 consecutive properties in the 5000 and 5100 house numbers of Medeek and north side of Graham, as well as the west end of Apple Street, Mills Avenue, and Craig Street, were sampled.

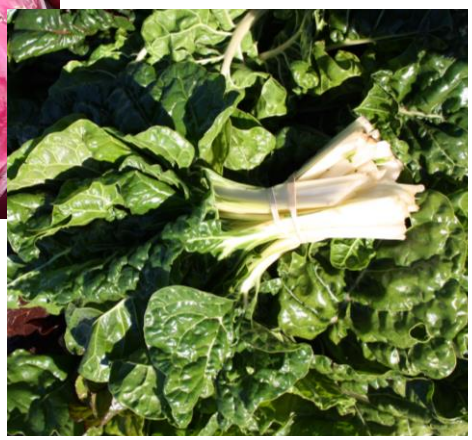
The value of visual surveys is that, if an agricultural feature is sighted e.g. a greenhouse, it is recorded. The sightings then provide "at least" numbers e.g. there are not fewer of a particular characteristic than the absolute number of sighted occurrences.

The limitation of visual surveys from public roads is that 'at least' numbers can be obtained but not absolute numbers. Total survey numbers are not possible because some features are not visible from a public road or some features may only seasonably be at a specific property e.g. grazing cattle. Deliberately hidden features, such as concealed greenhouses, were assumed to not be contributing to food production. There were also occasional difficulties with hostile driveways, where, in some cases, in addition to exclusion signs and large dogs, the owners had gated off publicly accessible right-of-ways. These properties were not surveyed and were noted as unknown in terms of their contributions to agricultural production.

Turf - an agricultural product in the Greater Terrace Area.

SKEENA VALLEY FARMERS' MARKET

The Skeena Valley Farmers' Market is held weekly from May to October. The local produce sold at the Market illustrates the array of agricultural products which can be grown successfully in the Greater Terrace area.



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Land Use and The Agricultural Land Base

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