

AGFOCUS

A Guide to Agricultural Land Use Inventory



**BRITISH
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Food and Fisheries



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Contents

Introduction	1
Part I – Benefits of an Agricultural Land Use Inventory ..	4
Part II – Conducting an Agricultural Land Use Inventory	5
1. Identifying the survey area	6
2. Deciding what data to collect	6
3. Preparing for the survey	7
4. Conducting the survey	10
Staff	10
Time	11
Safety considerations	12
5. Recording the data	12
Tips on surveying	12
Using a laptop for data entry	13
Using maps for data entry	14
Part III – The Data Model	15
The Parcel table	15
The Activity table	16
The Land Cover table	18
The Data Entry Form	20
Additions to the database - conducting inventory updates	22
Additions to the database – recording alienated land	23
Additions to the database – incorporating field boundaries	24

Part IV - Using the Data	25
Part V - Coding the Data	29
Land Use Activities.....	29
Agricultural Land Use Activities	30
Condition of Land Covers	31
Land Cover Codes	32
Appendix - Contacts.....	40

List of Figures

Figure 1 A laptop is a useful tool for recording land use data.....	5
Figure 2 Aerial photography is a valuable source of information.....	9
Figure 3 Sample data entry form in MS Access	21
Figure 4 Smart Info query tool	25
Figure 5 The Land Cover query tool	26
Figure 6 Maps can be produced with a GIS	27

List of Tables

Table III-I Scale of the livestock operation	18
Table IV-I Maps and statistics that can be generated	28
Table V-I Land use activities on data entry form	29
Table V-II Agricultural land use activities to be entered.....	30
Table V-III Descriptive comments about state/condition of land cover ..	31
Table V-IV Land Cover codes	33
Table V-V Agricultural Practice codes	38
Table V-VI Livestock codes	39

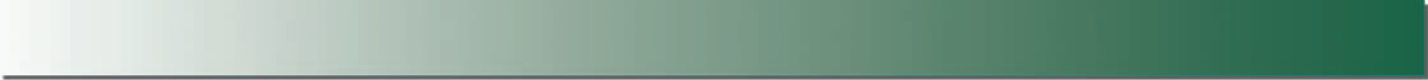
Introduction

Agriculture is a cornerstone activity important to the health and well being of British Columbians. Since the early days of the province, farming and farm families have played an important role in many BC communities. Land used for agriculture can account for a large part of many local jurisdictions, and has significant relationships with the environment, urban development, transportation and other resource uses. The agri-food sector that has evolved today makes significant economic, environmental and social contributions. Despite the importance of farming and ranching, fewer and fewer people have a direct link with agriculture. This has resulted in the gradual erosion of a first-hand understanding of agriculture, its various land use relationships and the issues associated with operating a farm or ranch.

In an effort to improve links between local governments, provincial agencies and the farm community, the Ministry of Agriculture, Food and Fisheries introduced the Strengthening Farming Program. This program has initiated several projects to improve these linkages and foster agricultural awareness. A key project that was successfully completed under the Strengthening Farming Program was the Pitt Meadows GIS pilot project.

The pilot project was undertaken in partnership with the District of Pitt Meadows to explore the benefits of adding agricultural data and tools to a Geographic Information





System (GIS). The results are outlined in the report *AgFocus - An Agricultural GIS*¹. The report highlights the use of GIS in farming areas to provide a broader understanding of agriculture, promote local agriculture and assist with land use decision making processes. A key component of the system was incorporating land use inventory data into the GIS. Since the completion of the pilot project, MAFF has worked with several other local governments, to conduct agricultural land use inventories and incorporate the data into their GIS.

This document, *AgFocus - A Guide to Agricultural Land Use Inventory*, looks at the benefits of an agricultural inventory and considers a range of practical topics associated with conducting an inventory. It is a companion document to the GIS report and is **meant to serve as a guide for communities interested in undertaking an inventory of their agricultural land base**. The guide includes procedures for conducting an agricultural land use inventory, a suggested data model focusing on land use activities and land covers, and a coding system which allows for varying levels of detail.

AgFocus - A Guide to Agricultural Land Use Inventory is intended to build on the Strengthening Farming Program's commitment to ensure strong working relationships between the Province, local governments and the agri-food industry. The Ministry of Agriculture, Food and Fisheries looks forward to working with municipalities, regional districts and other agencies interested in pursuing land use inventory work in their farming and ranching areas and developing an agricultural GIS.

¹ The *AgFocus - An Agricultural GIS* report and summary brochure can be found on the B.C. Ministry of Agriculture, Food and Fisheries web site, <http://www.gov.bc.ca/agf/> under 'Reports & Publications' / Resource Management.



Part I – Benefits of an Agricultural Land Use Inventory

Effective land use planning requires a comprehensive understanding of a variety of elements, including the spatial patterns of the area under study. Many agencies in British Columbia are finding that Geographic Information Systems (GIS), in combination with land use inventory data, is a useful tool in helping to understand, analyze and display these spatial patterns.

An agriculture land use inventory can serve several purposes, such as:

- provide a record of land uses in farming or ranching areas and act as a benchmark for monitoring land use change;
- improve the understanding of land use and resource relationships;
- identify impacts of proposed policies and regulations;
- improve the information base to assist land use decision-making including official community plan and bylaw updates;
- help identify challenges and opportunities to enhance agriculture; and
- identify opportunities for greater land use and resource compatibility.

By incorporating agricultural land use data into a GIS, people can enhance their knowledge of farming areas and be better prepared to plan for and promote agriculture.

Part II – Conducting an Agricultural Land Use Inventory

While there are a number of ways to acquire land use information, the method developed by MAFF involves a team of two surveyors conducting a “windshield” survey. Using a combination of drive-by observations and aerial photographic interpretation, the survey team examines each legal parcel in the study area, recording both the land covers and the land use activities. Examples of land covers include buildings, crops and vegetated areas, while land use activities include such categories as agricultural, residential and industrial use. The information is coded into data tables in a computer, which are then linked to a GIS layer of the survey area’s legal parcels. A GIS user can then query and map the land use inventory information.

The basic steps to collecting an inventory are:

1. Identifying the survey area
2. Deciding what data to collect
3. Preparing for the survey
4. Conducting the survey
5. Recording the data



Figure 1 A laptop is a useful tool for recording land use data during the survey.



1. Identifying the survey area

The survey may encompass a subset of the farming community where a specific need exists for information, or it may cover all land in the municipality's ALR if a broad information base is needed. When surveying the entire ALR area, it is a good idea to also include land along the urban side of the ALR boundary. Having information about land use on either side of the ALR boundary will be particularly important if more focussed "edge" planning to promote land use compatibility is anticipated. In addition, if farming areas exist outside of a municipality's ALR lands, these areas should be considered for surveying as well.

2. Deciding what data to collect

Before collecting any data, it is important to identify what information is needed and how it is going to be used. People who might be working with the data in the future should be consulted as to whether there's anything they wish the surveyor to pay particular attention to. For example, people dealing with water and drainage issues may have different needs and interests than those charged with bylaw enforcement or updating an official community plan.

Other factors to consider are the size of the study area and the scale at which the data is likely to be displayed. For a small survey area, it might be feasible to record a great deal of detail about the landscape. For a large area, it might be practical to only record major land use activities. While collecting the most detailed level of information gives the most comprehensive data, there might not be the time, expertise, or need for it.



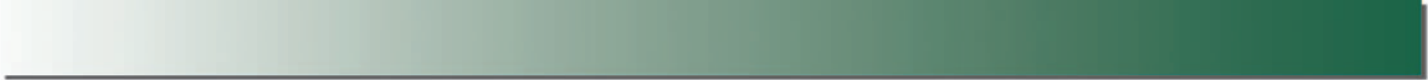
3. Preparing for the survey

The following is a list of the elements needed to conduct a survey.

- Vehicle
- Survey maps
- Street map for navigation
- Laptop computer (if available)
- Adapter for powering laptop from the vehicle
- List of land use codes for recording data (see Part V)
- Any existing data about parcels

When conducting the survey, maps are used to identify properties and features. If a laptop computer is not available for data entry, maps can also be used for recording data. If this is the case, large scale survey maps such as 1:2500 are desirable so there is room to record data on them. If the maps are not used to record information on, a scale of about 1:5000 will suffice. Ideally, the survey maps should include:

- the legal parcel boundaries
- unique identifiers for each legal parcel
- the ALR boundary
- base features such as streets, street names, watercourses and contours
- aerial photography



The survey data is recorded on a parcel by parcel basis, thus it is necessary to have a GIS layer of the survey area's legal parcels, or cadastre. It is essential that a unique identifier exist for each parcel, as it is used to link the land use data to the GIS cadastral coverage. Many local governments use the BC Assessment roll number to identify parcels, but this value can be problematic because sometimes two or more parcels can have the same roll number. If the local government has some other value to uniquely identify a parcel then this can be used instead.

In addition to the parcel identifiers, a GIS department may already have other information about parcels. If data such as property addresses, ownership, BC Assessment Farmland classification and actual use code, inclusion in the ALR, zoning, or data from previous inventories is available, it is useful to have it on hand during the survey. This information will help the surveyors to better locate properties as well as understand land use and land use changes.

Aerial photography provides a valuable source of information for the survey maps. Without aerial photography, it is difficult to tell which buildings are on which parcels, or to estimate the area of a crop. The photography also helps to identify crops and structures which are not easily seen from the road if, for example, shrubs or trees are blocking the view. The cost of digital aerial photography will vary depending on its age and resolution.



Figure 2 Aerial photography is a valuable source of information during land use inventory mapping.


4. Conducting the survey

STAFF

The survey can usually be conducted by two people. One person drives and the other navigates and records land use information. The recorder directs the driver to the next property, then both surveyors look over the property to determine its land covers and land use activities. The recorder notes this information, ideally directly into a laptop computer. For safety reasons it may be useful to have a third surveyor present on difficult roads such as those with a high traffic volume, so that the driver can focus solely on the traffic.

It is critical that at least one of the surveyors have a strong understanding of the agricultural activities and crops which are common in the study area, to serve as the “agricultural eyes” of the survey team. It is recommended that this person be present throughout the entire survey, to ensure consistency in how data is recorded. Besides familiarity with agriculture, other essential skills for the survey team include interpreting maps and aerial photography. If using a laptop, the data recorder should be computer literate and familiar with the data entry tool.

Agricultural expertise may be found within the community itself by way of a retired farmer or rancher or member of a local Agricultural Advisory Committee. An agrologist, with a good general grounding in agriculture, is another option. Where an agricultural land use inventory is undertaken by a municipi-



pality or regional district, it is advantageous if at least one of the survey team is drawn from the local government's planning, GIS, or mapping department staff. This will ensure a local staff person is aware of the details of how the survey was conducted in order to respond to any questions regarding data collection and interpretation.

The Resource Management Branch staff of the Ministry of Agriculture, Food and Fisheries will assist local governments in implementing an agricultural land use survey to the greatest extent possible. This may include providing the electronic data entry form (created in MS Access) and other 'start-up' assistance. Resource Management Branch staff may also be able to join the survey team for a day or two at the beginning of the survey if further assistance is required. Local district or regional agrologists of the Ministry may be able to assist the survey team in answering any particular questions about agricultural land uses that may arise during the course of the survey.

TIME

On average, surveying can be done at a rate of about 1000 hectares per day. Surveying may be slower than this in an area with small parcels and complex land uses. The rate of surveying will also vary depending on traffic, weather, the experience of the surveyors and the level of detail being recorded. If the data is recorded manually rather than into a laptop, several days or even weeks will be needed for data entry back at the office. If a laptop is used, data entry is done during the survey, but several days will still be needed to check over the data and fix any errors.



SAFETY CONSIDERATIONS

Conducting a survey requires driving slowly and stopping often, while maintaining a high level of focus on the landscape being surveyed. The following safety considerations will help in dealing with traffic:

- Use a clearly marked government vehicle.
- When stopping frequently, turn on hazard lights to alert other drivers.
- Be aware of which roads have a high volume of traffic, and plan to avoid these routes during rush hours. The least busy time of day is usually in the late morning.
- Be aware of which roads have a wide shoulder or parking lane for stopping, so that roads without a shoulder or parking lane can be avoided during rush hours.

5. Recording the data

TIPS ON SURVEYING

- Be consistent in how you record information, such as observing land covers in a certain order each time. This makes it less likely to skip things. For example, you may wish to record information in the following order:
 - crops, eg. berries, pastures
 - agricultural structures, eg. barns, paddocks
 - livestock types associated with the pastures or structures
 - agricultural practices associated with crops or structures

- non-agricultural structures and land covers, e.g. residences, treed areas
- land use activities
- Even if no livestock is visible from the road, sometimes livestock can be identified by other clues, e.g. whether a pasture has been recently grazed, the type of fencing or barns, or the presence of a horse trailer in the driveway.
- Look for signs on the road or at the farm entrance for clues about the property. Signs may indicate the farm name or the types of commodities produced, e.g. “Farm Fresh Eggs” or “U-Pick Raspberries”.
- Use the aerial photography to identify structures that can’t be seen from the road.
- Be prepared for questions from residents. It is a good idea to have an information plan to inform people of what you are doing; carry business cards to give out, put an article about the survey in the local paper, and have contact names that people can call with questions.



USING A LAPTOP FOR DATA ENTRY

During the survey, land use data can be recorded directly into a laptop, drawing power from the vehicle. If a laptop is used, the recorder should still make notes on the survey map when necessary. For example, on a large parcel with several different types of crops, the recorder should note on the map which crops are being grown on which sections of the parcel.





USING MAPS FOR DATA ENTRY

If a laptop is not available, the surveyors' observations should be recorded directly onto the survey maps. The land covers can be recorded on the map in words or in codes, depending on the recorder's preference. If recording data directly onto a map, observe the following tips:

- Determine beforehand what colour pen shows up best on the map and have several on hand.
- Write neatly and clearly.
- The person who recorded the data during the survey should be the same one to transfer the data into the computer. Data entry should be done soon after the survey is conducted when the details are still fresh in the surveyor's mind.

Part III – The Data Model

Land use information can be recorded in many different ways. The following methodology has been developed over time based on MAFF's experience with various land use inventories. A database has been developed in MS Access which can be used to enter and store the information collected via this methodology. This database can be provided to interested parties, although some customization may be required to make it suit an area's needs. The following section discusses the three main tables which exist in the database and the fields within those tables.

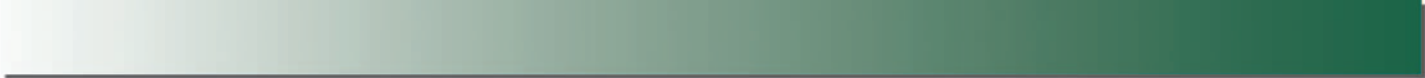
The Parcel table

The Parcel table contains existing information about the parcels. This table is essentially the polygon attribute table of a municipality's GIS cadastral coverage, containing information such as the unique identifier (i.e. Parcel ID), the street address, BC Assessment information, etc..

The Parcel ID is used to link all three data tables together. It is also used to link the land use inventory data to a GIS layer of the survey area's cadastre so that the survey data can be mapped.

Existing parcel information should be present in the database before the survey commences. In addition, blank fields are added to this table, to be filled in during the survey. These fields include:

- **Farm name** – Farm name (or business name, if a store or other commercial operation exists)
- **Comments** – Surveyor comments about the parcel as a whole, e.g. if the property has a "For Sale" sign

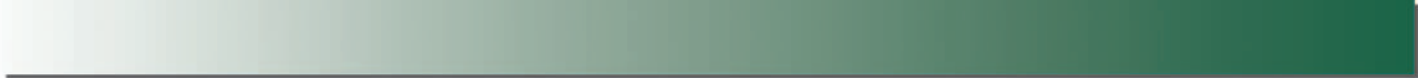
- 
- **Confidence** – the recorder’s confidence level about the data for that property. For example, possible values could include “Some features hidden by trees”, “Livestock type inferred, not seen”, “Suspect that livestock were missed” or “Very confident can see all of property”.
 - **Change** – Land use change since the last survey, if a previous survey was conducted. Here the recorder can note such things as “pasture converted to blueberries”. After the survey is complete, the recorder may wish to group this information into a small number of categories. This field allows a map of land use change to be created.

The Activity table

The second data table contains information about land use activities. The Activity table has a one-to-one relationship with the Parcel table; i.e. for each parcel in the Parcel table, only one record exists in the Activity table. The tables are linked together by the Parcel ID.

The fields in the Activity table are as follows:

- **Parcel ID** – The unique identifier for the parcel
- **Primary activity** – The primary land use activity taking place on the parcel. This is a general description, such as “Agriculture”, “Residential” or “Commercial/Service”. A detailed list of land use activities with definitions/examples is found in Table V-I on Page 29. The list can be modified to suit a particular survey area.

- 
- **Secondary activity** – The secondary land use activity
 - **Tertiary activity** – The tertiary land use activity
 - **Primary agricultural activity** – The primary agricultural land use activity occurring on a parcel, such as “Beef Cattle Farm”, or “Greenhouse Operation”. This value is only filled in if “Agriculture” is listed as a primary, secondary or tertiary activity. The primary agricultural activity is the one which is likely the greatest source of income. It is recognized that in some cases this may be difficult to determine, so the distinction between primary, secondary, tertiary and quaternary agricultural activity is at times a best guess.

A detailed list of suggested activities to be entered in the primary, secondary, tertiary or quaternary agricultural activity fields is found in Table V-II on page 30. The list can be modified to suit the needs of an individual project area.

- **Primary agricultural activity scale** – An estimate of the size or scale of the agricultural operation. It is generally used to describe livestock operations. The value is an estimate of the number of livestock present, based on the number observed and from the size of barns, pastures and other livestock-related facilities. The criteria that has been used for the Lower Mainland is listed in Table III-I below. The table can be modified to address other areas of the province where much larger operations exist. This field could also be used to describe the scale of other types of operations, such as greenhouses or berry farms.

Table III-I Scale of the livestock operation based on the estimated number of livestock present. Values may differ for areas outside the Lower Mainland.

	Small	Medium	Large
Horses	1-4	5-10	11+
Beef cattle, sheep, goats, llamas	1-10	11-50	51+
Dairy cattle	1-50	51-100	101+

- **Secondary agricultural activity** – The agricultural land use activity which is of secondary importance, in terms of income generation.
- **Secondary agricultural activity scale** – The scale of the secondary agricultural activity. This uses the criteria from Table III-I, as do the tertiary and quaternary agricultural activity scales.
- **Tertiary agricultural activity** – The agricultural land use activity which is of tertiary importance, in terms of income generation.
- **Tertiary agricultural activity scale** – The scale of the tertiary agricultural activity.
- **Quaternary agricultural activity** – The agricultural land use activity which is of quaternary importance, in terms of income generation.
- **Quaternary agricultural activity scale** – The scale of the quaternary agricultural activity.

The Land Cover table

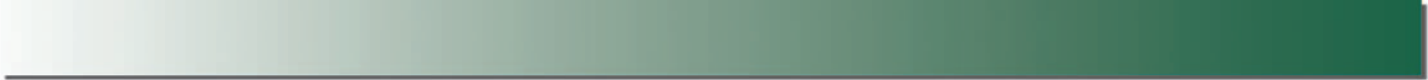
The third data table contains information about land covers. Land covers include, for example, buildings, crops, and natural features, such as water-courses or trees, – anything that covers the land. The Land Cover table has a one-to-many relationship with the Parcel table; i.e. for each parcel in the Par-



cel table, many records may exist in the Land Cover table. The tables are linked together by the Parcel ID.

The fields in the Land Cover table are as follows:

- **Parcel ID** – The unique identifier for the parcel
- **Land Cover code** – This code describes the land cover, e.g. buildings, farm structures, natural features or crops, and is entered in the Cover field. Six major categories of land covers have been defined in the coding system: Agriculture (AL), Mineral extraction (M), Recreation (R), Settlement (S), Vegetated areas (V) and Water Management areas (WM). The coding system is hierarchical, allowing different levels of detail to be recorded and displayed. An extensive list of land cover codes is found in Table V-IV starting on page 33.
- **Agricultural Practice code (AP)** – This code describes the agricultural practice taking place on a land cover, if any, and is entered in the Practice field. Some examples of agricultural practices include irrigation or crop protection. A detailed list of agricultural practice codes is found in Table V-V on Page 38.
- **Livestock code (AP8)** – This code describes the type of livestock associated with land covers such as barns, paddocks and pastures. More than one type of livestock can be recorded if necessary, i.e. if both sheep and cows are grazing in a pasture. A detailed list of livestock codes is found in Table V-VI on Page 39.
- **Percent of parcel** – This is an approximation of how much of the parcel is occupied by a particular land cover, e.g. a blueberry field occupying 70% of the farm. This value gives a rough idea of the area of the land cover and is most easily determined from aerial photography. Care should be taken to ensure that the total for all land covers on a parcel does not exceed 100%.

- 
- **Count** – This is the total number of a certain land cover where more than one exist, e.g. where there are several houses or beef barns on a farm.
 - **Condition** – This is a descriptive comment about the condition of a land cover, e.g. abandoned, inactive, new or under construction. Definitions are found in Table V-III on page 31. More than one condition can be recorded if necessary.
 - **Obtained by airphoto** – This is a Yes/No field, which is set to “Yes” when the land cover has been identified by airphoto alone, because the view from the road was obscured. This indicates to those interpreting the data that there is some doubt about the accuracy of the land cover, as it was not visually confirmed.
 - **Comments** – Any additional comments the surveyors may have regarding a land cover.

The Data Entry Form

When using the data entry form developed by MAFF as part of its land use database, the recorder enters the unique identifier for a parcel, in order to access the information for that parcel. The recorder can then enter the data describing the parcel’s land use. The data entry form displays information from the three different data tables. Information from the Activity table and the Cover table is displayed in the two “sub-forms” on the main form. When entering a land cover Code (e.g. AL141) into the data entry form, the code’s description fills in automatically (e.g. “Improved pasture”). This helps ensure against errors when typing in codes. A small triangle to the right of a field indicates a pull-down menu, where the recorder can select the appropriate code from a list.

Land use 2004

Parcel info		Land Use Activities				
Parcel ID	1234	Activities (general)		Agricultural Activities		
Address	722 Cherrytree Lane	Primary:	Agriculture	1	Beef Cattle Farm	
Farm name	Pleasant Meadows Farm	Secondary:	Residential Use		3	Field Vegetable Farm
Comments		Tertiary:		medium		
Confidence				2	Horse Farm	
Change	new vegetables			small	4	


Land Covers							
Cover	AL141	Used pasture	% of parcel	75	Comments	Airphoto	<input type="checkbox"/>
Practice			Count				
Livestock	AP812	Beef cattle	AP813	Horse	Condition		
Cover	AL150	Field crop production - Vegetables	% of parcel	15	Comments	Airphoto	<input type="checkbox"/>
Practice	AP260	Trickle irrigation	Count				
Livestock			Condition	new			
Cover	AL310	Housing Animals	% of parcel		Comments	Airphoto	<input checked="" type="checkbox"/>
Practice			Count				
Livestock	AP812	Beef cattle	AP813	Horse	Condition		
Cover	S111.2	Medium house (1500 - 3500 sq ft)	% of parcel		Comments	Airphoto	<input type="checkbox"/>
Practice			Count				
Livestock			Condition				

Figure 3 Sample data entry form in MS Access, displaying information from the Parcel, Activity and Cover tables.



Additions to the database – conducting inventory updates

The database can be altered to accommodate different needs. The form can be used when conducting an inventory update, if a previous inventory of the survey area has already been conducted. A button is added to the form, which when selected will copy the previous survey's data onto the new form for a particular parcel. Updates can then be quickly made to that parcel's land use data when re-surveying. By updating the previous information rather than starting data entry from scratch, consistency is maintained between surveys. After updating the information, the recorder can then fill in the "Change" field in the Parcel table, if a major land use change has occurred. Although changes in land use can be determined from the data by comparing data from different years, this field is useful because the surveyor can use their own discretion in determining whether significant land use change has occurred or not. For example, the surveyor may decide that changing from "Forage Operation" to "Pasture" is not significant enough to be considered a land use change. The Change field also allows a map of land use change to be easily generated using GIS.



Additions to the database – recording alienated land

Some surveyors are interested in recording the amount of the landscape which has been *alienated* from agricultural use. Alienated land is defined as farmable land within the ALR that cannot be used for agricultural purposes because of a conflicting land use activity. To accommodate this, a field can be added to the Activities table called “Alienated”. This is a boolean field, meaning it only accepts “Yes” or “No” as a value.

On the data entry form, the recorder can place a tick in a checkbox for parcels considered alienated. Default values can be set prior to conducting the survey, i.e. the checkbox would automatically be ticked if the following values are entered as the parcel’s Primary Activity: Commercial/Service Use, Cultural/Entertainment, Golf Course, Industrial Use, Institutional Use, Military Area, Mobile Home Park, Park, Recreational Use, Residential Use, Residential Use – Multi-family, Storage Yard, Transportation and Communications, or Wildlife Area. Definitions and examples of these activities can be found in Table V-I on Page 29. Agriculture related activities including “Agriculture, Freshwater aquaculture, and Unused farmland” by definition cannot be considered alienated.

Additions to the database - incorporating field boundaries

Another adaptation of the data entry method is incorporating field crop boundaries. This method was piloted in the Regional District of Comox-Strathcona where agricultural field boundaries were provided by Ducks Unlimited, one of the partners in the data collection project. In this method, field boundaries are digitized from orthophotography, using relatively permanent physical boundaries such as forests, ditches, roads and buildings. Each field is given a unique identifier. The field boundary GIS coverage is unioned with the cadastre coverage, in order to calculate the area and percentage of each parcel which is inside the fields. After the coverages are unioned, sliver polygons are deleted, e.g. any polygon which is less than 4% of a parcel and less than 0.1 hectares in size.

A fourth data table, the Crops table, is then added to the MS Access database, with the same data fields as the Cover table. A form is also added, so that data can be entered into this Crops table on a field by field basis. The surveyor has both forms open during the survey, so that information can be entered for parcels and for fields. The data about a field need only be entered once, even if the field extends over several different parcels. The field information and percent of parcel will automatically be filled in for all the parcels the field intersects.

Using the regular land use inventory method, only parcels containing a certain crop type can be pinpointed using GIS, rather than the exact locations of that crop type. By integrating field boundaries into the methodology, exact locations of crops can be shown on a map and more accurate acreages of land devoted to crops can be calculated.

Part IV - Using the Data in a GIS

The data tables are populated during the survey through the data entry form. The tables can then be used in a GIS either by connecting directly to the MS Access database or by importing the tables. Using ArcView 3, MAFF has designed special tools which will join or link the various data tables to the GIS cadastral layer using the Parcel ID as the unique identifier. These tools (Smart Info and Land Cover query) allow users to easily run queries. MAFF has also prepared detailed instructions for using the data in ArcGIS 8 (e.g. setting up joins and relates between tables) which are available upon request.

An individual parcel in the cadastral GIS layer can be queried to obtain its land use inventory information. The **Smart Info query tool** is used to select a specific parcel and retrieve a listing of its land covers or land use activities.

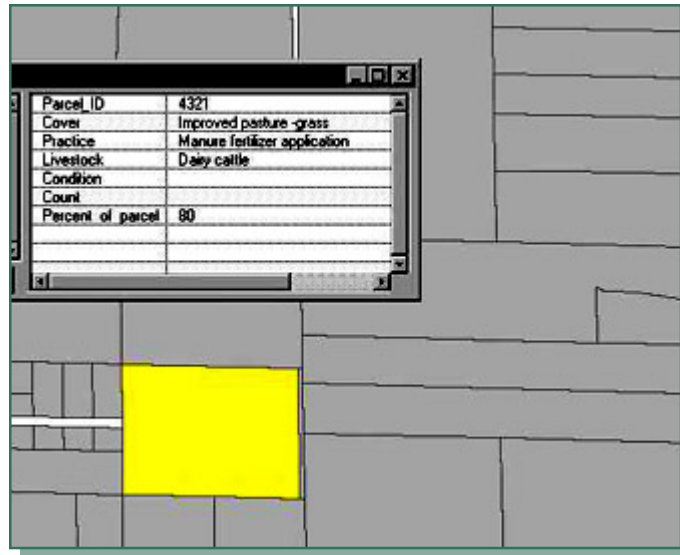


Figure 4 Smart Info query tool can retrieve land cover or land use activities associated with a specific parcel.

The data can also be examined at a local government or sub-area scale to identify which parcels contain a specific land cover or land use activity. Since the land cover coding is hierarchical, different levels of detail can be displayed. For example, a map can be created showing all parcels producing “Berries” (whether the primary use or not), or a more specific map identifying “Cranberries”. The **Land Cover query tool** provides the user with a list of land covers to select from, and then generates a new GIS layer of parcels which contains the specified land cover (Figure 5). Maps can also be created showing livestock (e.g. dairy cattle) or agricultural practices (e.g. parcels with netting over crops).

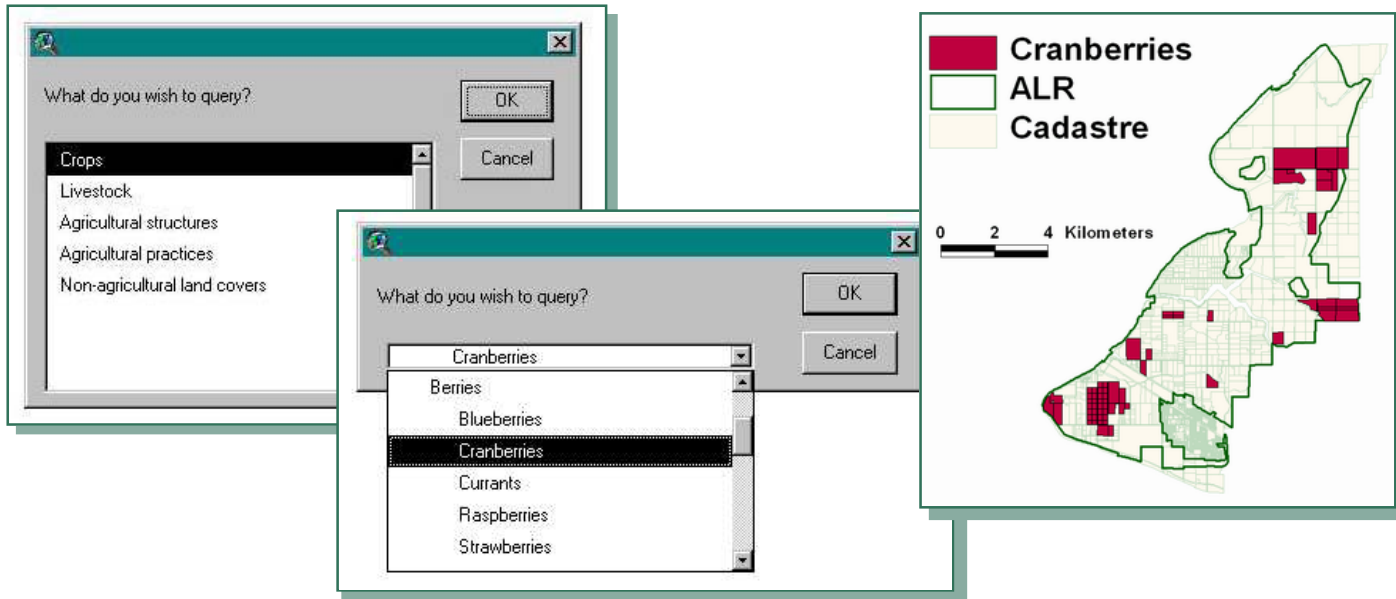


Figure 5 The Land Cover query tool can be used to identify and map specific land covers, such as cranberries.

In addition to mapping specific land covers, overview maps can be generated which summarize land use activities for the study area. Using the data from the Activity table, a colour-coded map can be produced to show a particular field, for example primary agricultural activities (Figure 6).

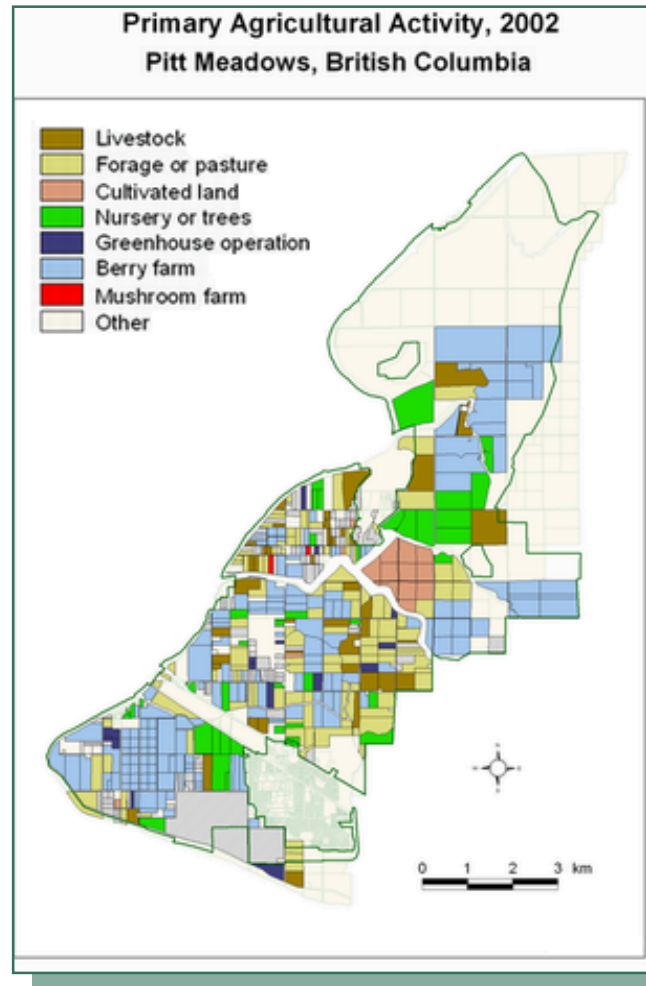


Figure 6 Maps can be produced with a GIS to identify general or specific land use activities.

Other GIS layers (e.g. aerial photography, streams, ALR boundary, etc.) can be incorporated with the new land use data to create detailed maps. The following table (Table IV-I) lists various maps and statistics that can be generated from the land use data.

Table IV-I Maps and statistics that can be generated from the land use inventory

Maps and Statistics	Examples
Land use activities in the ALR	Primary land use activities
Agricultural landscape in the ALR	Primary agricultural activities grouped into categories such as: livestock operations, field vegetables & flowers, forage & pasture operations, berry & vine crops, greenhouse operations, nursery and tree farms, cultivated or fallow land, mushroom farms
Non-agricultural uses in the ALR	Unused farmland, parcels alienated from agriculture
Changes to Agriculture	Parcels no longer in agricultural use, parcels with new agricultural use, commodities that have increased since the previous survey
Dwellings in the ALR	Parcels with large houses, net change in number of dwellings per parcels since the previous survey
Activities on the urban-rural edge	Primary land use activities on the urban-rural edge, agricultural activities on the urban rural edge
Water Usage in ALR	Irrigated and non-irrigated farmland, type of irrigation systems

A disadvantage of this data model is that no single map can be produced that summarizes the entire agricultural landscape. For example, a farm with “beef cattle” as its primary agricultural activity and “greenhouse operation” as its secondary agricultural activity cannot easily have both activities displayed on the same map. Similarly, a farm with both field vegetables and strawberries as land covers cannot easily have both crops displayed.

An alternative data model is to summarize all the land use activities in a single description. While this allows for producing a single overview map of land use, it lacks detail. In an area where farm uses are complex and varied, most of the properties will be classified as “mixed use”, which is not as informative.

For more information on land use data in GIS, see the report *AgFocus – An Agricultural GIS* prepared by MAFF.

Part V – Coding the Data

Several fields on the data entry form are selected from pull-down lists. This section describes the values in the pull-down lists.

Land Use Activities

Table V-I below outlines the land use activities which can be entered under the Primary, Secondary, or Tertiary Activity fields on the data entry form. Items may be removed from or added to this list to suit the characteristics of a particular survey area.

Table V-I Land use activities to be entered in the Primary, Secondary or Tertiary Activity fields on the data entry form.

<i>Land Use Activity</i>	<i>Description / Examples</i>
Agriculture	Property with agricultural activity generating product(s) for sale, e.g. beef operation, nursery, vegetable production
Commercial/Service Use	Store, gas station
Cultural/Entertainment Use	Zoo, museum
Freshwater aquaculture	Hatchery
Golf Course	
Hobby – Amenity Use	Property with agricultural activity, but for amenity use only, i.e. no indication of farm products for sale (e.g. residential property with 1 horse)
Indian Reserve	
Industrial Use	Wood processing plant
Institutional Use	School, church
Land in Transition	Construction site, tree removal
Military Area	
Mineral extraction	Gravel pit
Mobile Home Park	RV & Mobile Home Park
Not in use	Natural state (e.g. wooded area, trees, wetland, riparian, ravine)
Park	Officially designated green space for public use
Recreational Use	Trails, running track
Residential Use	Home or mobile home. Classified as Primary Activity when house (plus pool and garage etc.) \geq 25% of the total property area.
Residential Use – Multi-family	Apartment, townhouse
Storage Yard	Junkyard, car/truck storage
Transportation and communication	Airport, road right-of-way
Unused farmland	Abandoned pasture
Utility	Power lines, pumphouse
Vacant	Neglected property that has signs of previous urban use, e.g. signs of demolished buildings
Water Management	Majority of area consists of watercourse(s)/ waterbody, shoreline, dyke
Wildlife Area	Designated wildlife area, e.g. bird sanctuary, habitat protection area, wildlife rehabilitation centre, wildlife management area.

Agricultural Land Use Activities

The following table (Table V-II) outlines various agricultural land use activities that can be entered in the Primary, Secondary, Tertiary or Quaternary Agricultural Activity fields on the data entry form. Items may be removed from or added to this list to suit the characteristics of a particular survey area.

Table V-II Agricultural land use activities to be entered in Agricultural Activity fields on the data entry form.

Agri-commercial	Field Vegetable Farm	Pasture
Agritourism	Forage Operation	Poultry - backyard flock
Allotment Gardens	Fur Farm	Poultry Farm
Apiary	Game Bird Farm	Range
Beef Cattle Farm	Game Farm	Ratite Farm
Berry Farm	Ginseng Farm	Sheep/Goat Farm
Christmas Tree Farm	Grain Production	Specialty Crop Production
Commercial Cat Kennel	Greenhouse Operation	Stable/Riding Facility
Commercial Dog Kennel	Horse Farm	Swine operation
Crop Preparation/Processing	Horse Farm -Breeder	Tree Farm
Cultivated Land	Livestock operation - type unknown	Turf Farm
Dairy Farm	Llama/Alpaca Farm	Veterinary Clinic
Donkey Farm	Mixed Livestock (small-scale)	Vineyard
Dry cow facility	Mushroom Farm	Vineyard (incl. Winery)
Duck Farm	Nursery	Water Management
Equestrian Facility	Nursery (incl. Greenhouses)	Winery
Fallow Land	Nut Farm	Woodlot
Feedlot	On-farm Bed and Breakfast	
Field Flower Farm	Orchard	

Condition of Land Covers

Table V-III below describes the values that can be entered into the Condition field of the Land Cover table.

Table V-III Descriptive comments about the state or condition of the land cover. Values are entered in the Condition field on the data entry form.

Abandoned – The state of a structure or planting that exhibits signs of prolonged neglect, implying that the original use of the structure or planting has not occurred recently and likely will not be resumed in the future.

Neglected – The state of a structure or planting that exhibits some signs of neglect (e.g. tall weeds between blueberry bushes) but implying the possibility of resumed or improved activity.

Inactive – The state of a structure that does not necessarily exhibit signs of neglect, but the use of which is discontinued for the time being, e.g. an empty dairy barn.

New – May pertain to any structure or planting and means that the item has obviously just been established or was not found on recent air photos.

Under construction – means that a structure is in the process of being built.

Small – For purposes of this survey “small” describes non-commercial structures or plantings, such as a two-stall horse barn or garden crops, or may describe the size of a storage structure or facility.

Large – For purposes of this survey “large” describes commercial structures or the size of a farm structure.



Land Cover Codes

Table V-IV, starting on page 33, lists the land cover codes to be recorded in the Cover field on the data entry form. The six major categories of land covers include: Agriculture (AL), Mineral extraction (M), Recreation (R), Settlement (S), Vegetated areas (V) and Water Management areas (WM). Codes were originally based on the RIC (Resource Inventory Committee) system and have been adapted as needed. Codes may be added or removed to suit the characteristics of a particular study area.

Agricultural Practice Codes (AP)

Table V-V on Page 38 lists the codes that describe the agricultural practices occurring on the parcel. The code is entered in the Practice field on the data entry form. More than one type of practice can be entered if necessary.

Livestock Codes (AP8)

Table V-VI on Page 39 lists the codes describing the livestock on the farm. More than one type of livestock can be entered if necessary. The code is entered in the Livestock field on the data entry form.

Table V-IV Land Cover codes to be entered in the Cover field on the data entry form.

AL000 Agriculture

AL100 Field crop production

AL110 Grains, cereals and oilseeds

- AL111 Barley
- AL112 Canola
- AL113 Oats
- AL114 Rye
- AL115 Wheat

AL120 Tree fruit crops

- AL121 Apples
- AL122 Apricots
- AL123 Cherries
- AL124 Crabapples
- AL125 Peaches
- AL126 Pears
- AL127 Plums
- AL128 Nectarines

AL130 Vine and berry crops

- AL131 Vine crops
 - AL131.1 Grapes
 - AL131.2 Kiwis
 - AL131.3 Blackberries
- AL132 Berries
 - AL132.1 Blueberries
 - AL132.2 Cranberries
 - AL132.3 Currants
 - AL132.4 Gooseberries
 - AL132.5 Loganberries
 - AL132.6 Raspberries
 - AL132.7 Saskatoonberries
 - AL132.8 Strawberries
 - AL132.9 Tayberries

AL140 Forage and pasture crops

- AL141 Used pasture
 - AL141.1 Grass
 - AL141.11 Perennial
 - AL141.12 Annual
 - AL141.2 Legume
 - AL141.21 Perennial
 - AL141.22 Annual
 - AL141.3 Forage cereal
 - AL141.4 Forage corn
- AL142 Unused pasture
 - AL142.1 Good condition
 - AL142.2 Poor condition
- AL143 Range

AL150 Vegetable crops

- AL151 Cole crop
 - AL151.1 Broccoli
 - AL151.2 Brussel sprouts
 - AL151.3 Cabbage
 - AL151.4 Cauliflower
 - AL151.5 Kale
 - AL151.6 Kohlrabi
- AL152 Cucurbits
 - AL152.1 Cucumbers
 - AL152.2 Marrow
 - AL152.3 Pumpkin
 - AL152.4 Squash
 - AL152.5 Zucchini
- AL153 Leafy vegetables
 - AL153.1 Celery
 - AL153.2 Lettuce
 - AL153.3 Spinach
 - AL153.4 Swiss chard

AL154 Legumes

- AL154.1 Beans
- AL154.2 Peas
- AL155 Root vegetables
 - AL155.1 Beet
 - AL155.2 Carrots
 - AL155.3 Onions
 - AL155.4 Parsnip
 - AL155.5 Potatoes
 - AL155.6 Radish
 - AL155.7 Turnip
- AL156 Misc. vegetables
 - AL156.1 Peppers
 - AL156.2 Sweet Corn
 - AL156.3 Leek
 - AL156.4 Tomatoes

AL160 Floriculture

- AL161 Bulbs
 - AL161.1 Daffodil
 - AL161.2 Iris
 - AL161.3 Gladiolas
 - AL161.4 Tulip
- AL162 Cut flowers
 - AL162.1 Aster
 - AL162.2 Orchid
 - AL162.3 Rose
 - AL162.4 Sunflower
 - AL162.5 Sweet pea
- AL163 Bedding plants

AL170 Specialty crops

- AL171 Medicinal
 - AL171.1 Ginseng
 - AL171.2 Echinacea
- AL172 Turf

Table V-IV Land Cover codes to be entered in the Cover field on the data entry form. (Cont'd)

AL173 Nuts	AL223 Tropicals and other specialty plants	AL700 Farm accessories
AL173.1 Hazelnut	AL224 Nursery	AL710 Storage
AL173.2 Walnut	AL230 Cold frame	AL711 Crop storage
AL173.3 Filbert	AL240 Mushroom barn	AL711.1 Bunker silo
AL174 Woody cuts		AL711.2 Upright silo
AL174.1 Holly	AL300 Housed and site based animal production	AL711.3 Hayshed
AL174.2 Viburnum	AL310 Housing animals	AL711.4 Silage bags
AL174.3 Willow	AL320 Feedlot	AL711.5 Refrigerated storage, fruits and vegetables
AL174.4 Witchhazel	AL321 Woodwaste feedlot	AL711.6 Non-refrigerated storage, fruits and vegetables
AL175 Misc. specialty crops	AL322 Sand feedlot	AL711.7 Granary/grain bin
AL175.1 Asparagus	AL323 Concrete feedlot	AL712 Chemical storage
AL175.2 Garlic	AL330 Seasonal feeding area	AL712.1 Fertilizer storage
AL175.3 Herbs	AL340 Corral/paddock	AL712.2 Pesticide storage
AL175.4 Hops	AL341 Woodwaste corral/paddock	AL712.3 Fuel storage
AL175.5 Mushroom	AL342 Sand corral/paddock	AL713 Machinery and tool storage
AL175.6 Rhubarb	AL343 Concrete corral/paddock	AL714 Woodwaste storage
AL180 Nursery	AL350 Equestrian facility	AL714.1 Woodwaste facility
AL181 Trees (plantation)	AL351 Outdoor riding ring	AL714.11 Covered
AL181.1 Christmas trees	AL351.1 Woodwaste riding ring	AL714.12 Uncovered
AL181.2 Fine wood	AL351.2 Sand riding ring	AL714.2 Woodwaste pile
AL181.3 Fibre/pulp	AL352 Indoor riding ring	AL714.21 Covered
AL181.4 Forestry stock	AL352.1 Indoor riding ring w/attached stalls	AL714.22 Uncovered
AL181.5 Fuel	AL353 Equestrian racetrack	AL715 Storage shed, contents unknown
AL182 Ornamentals and shrubs	AL360 Commercial dog kennel	
AL182.1 Cedar hedging	AL361 Doggie day care	AL720 On farm preparation and processing
AL190 Unspecified/other crops	AL370 Bee hives	AL72 Crop preparation/processing facility
AL191 Cultivated land	AL400 Code not in use	
AL192 Fallow land	AL500 Freshwater aquaculture	
AL200 Housed crop production	AL600 Marine aquaculture	
AL210 Residential/hobby greenhouse		
AL220 Commercial greenhouse		
AL221 Vegetables		
AL222 Floriculture		

Table V-IV Land Cover codes to be entered in the Cover field on the data entry form. (Cont'd)

AL722 Egg-sorting facility	AL743.1 Pile on pad	AL780 Farm building, type unknown
AL723 Livestock processing facility	AL743.11 Covered	AL800 Inactive agricultural land and facilities
AL724 Milkhouse or milking parlour	AL743.12 Uncovered	AL810 Abandoned or neglected farm land
AL725 Winery	AL743.2 Pile	AL811 Neglected grassland
AL726 Winery with restaurant	AL743.21 Covered	AL812 Neglected vegetative area
AL727 Feed processing	AL743.22 Uncovered	AL820 Abandoned or unused farm structure
AL730 Direct marketing structure	AL750 Manure facility	AL830 Land in transition
AL731 Permanent store	AL751 Concrete or Metal Tank	AL840 Farm yard area
AL731.1 Produce	AL751.1 Covered	
AL731.2 Floriculture and/or tropicals	AL751.2 Uncovered	
AL731.3 Nursery	AL752 Concrete Pad	
AL732 Seasonal/temporary produce stand	AL752.1 Covered	
	AL752.2 Uncovered	
AL740 Composting facility	AL753 Concrete Lagoon	<u>M000 Mineral extraction</u>
AL741 Vegetative compost	AL753.1 Covered	M100 Surface mining and quarrying
AL741.1 Pile on pad	AL753.2 Uncovered	M110 Open pit metal mines
AL741.11 Covered	AL754 Earthen Lagoon	M120 Open pit coal mines
AL741.12 Uncovered	AL755 Bin	M130 Quarries-rock and industrial minerals
AL741.2 Pile	AL756 On ground storage	M140 Peat extraction
AL741.21 Covered	AL756.1 Covered	M150 Topsoil removal
AL741.22 Uncovered	AL756.2 Uncovered	M160 Extraction of gravels and sands
AL742 Mushroom medium compost	AL760 Well	M170 Other surface extraction
AL742.1 Facility	AL761 Domestic	
AL742.2 Pile on pad	AL762 Irrigation	<u>R000 Recreation</u>
AL742.21 Covered	AL763 Stock Watering	R100 Intensive facility based recreational activities
AL742.22 Uncovered		R110 Municipal and regional open spaces
AL742.3 Pile	AL770 Pumps	R111 Municipal or regional park
AL742.31 Covered	AL771 Drainage	R112 Picnic area/playground
AL742.32 Uncovered	AL771.1 Electric Motor	R113 Zoo
AL743 Spent mushroom medium	AL771.2 Combustion Motor	R114 Garden
	AL772 Irrigation	R120 Golf course
	AL772.1 Electric Motor	R121 Driving range
	AL772.2 Combustion Motor	

Table V-IV Land Cover codes to be entered in the Cover field on the data entry form. (Cont'd)

R130	R122 Clubhouse	S124	Tennis court	S243	Outdoor stage
R140	Indoor recreation or sports facility	S125	Swimming pool	S244	Movie theatre
	Outdoor sports and recreation	S126	Landscaped/decorative pond	S250	Parking area/roadway
	R141 Tennis court	S130	Attached (apartment and townhouse)	S251	Impervious (paved)
	R142 Swimming pool	S140	Mobile home	S252	Pervious (dirt or gravel)
	R143 Sports field	S141	Mobile home park/RV Park	S300 Industrial	
	R144 Running track	S150	Ancillary residential (e.g. picker cabin)	S310	Light industry
	R145 Vehicle race track	S151	Home based business	S311	Recycling facility
	R146 Shooting range	S152	Home based Bed & Breakfast	S312	Soil mixing facility
R150	Trail or corridor, walking and bicycle	S160	Construction and resource employee camp	S313	Composting facility
R160	Fairground, amusement park	S170	Junk storage	S320	Medium and heavy industry
		S200	Commercial and service facilities	S321	Cement plant
S000 Settlement		S210	Retail, services, office	S322	Chemical plant
S100 Residential		S211	Store	S323	Wood processing facility
S110	House	S212	Strip Mall	S324	Manufacturing facility
	S111 Single family dwelling	S213	Restaurant	S325	Gravel processing operation
	S111.1 Small house (<1500 sq ft)	S214	Office building	S330	Food processing
	S111.2 Medium house (1500-3500 sq ft)	S215	Automotive shop	S340	Oil and gas storage tank farm
	S111.3 Large house (3500-5000 sq ft)	S216	Veterinary clinic	S350	Outdoor material and equipment storage
	S111.4 Very large house (>5000 sq ft)	S217	Gas station	S360	Auto wrecker
	S112 Duplex	S218	Garden centre	S400 Institutional	
S120	Residential features	S220	Wholesale and warehouse facility	S410	Government
	S121 Yard, lawn or landscaping	S221	Storage	S411	Office
	S122 Auxiliary building, e.g. garage or workshop	S230	Hotel or motel	S412	Fire hall
	S123 Parking area / roadway	S240	Cultural or entertainment facility	S413	Police office
	S123.1 Impervious (paved)	S241	Museum	S414	Municipal hall, court house
	S123.2 Pervious (dirt or gravel)	S242	Library	S415	Maintenance yard
				S420	Religious facility, e.g. church
				S430	Hospitals or medical centre
				S440	Education facility
				S441	Pre-school
				S442	Elementary

Table V-V Agricultural Practice codes to be entered in the Practice field on the data entry form.

AP000 Agricultural Practices

AP100 Crop Protection/Enhancement

AP110 Crop support/Trellis

AP120 Integrated Pest Management

AP130 Material application

AP131 Fertilizer

AP131.1 Compost

AP131.2 Manure

AP131.3 Synthetic fertilizer

AP132 Mulch

AP132.1 Compost

AP132.2 Plastic

AP132.3 Straw

AP132.4 Topsoil

AP132.5 Vegetative debris

AP132.6 Woodwaste

AP133 Pesticide application

AP133.1 Fungicide

AP133.2 Herbicide

AP133.3 Insecticide

AP133.4 Molluscicide

AP140 Noise generation

AP141 AV alarms

AP142 Bird distress calls

AP143 Propane exploders

AP150 Organic/No spray

AP160 Physical wildlife barrier

AP161 Fencing

AP162 Netting

AP170 Temperature/light control

AP171 Shade cloth

AP171.1 Cloth

AP171.2 Plastic

AP172 Tunnel/floating cover

AP172.1 Cloth

AP172.2 Plastic

AP173 Wind machine

AP180 Wind break

AP181 Fencing

AP182 Treed buffer strip

AP190 Stream bank enhancement

AP191 Grass buffer strip

AP192 Livestock fencing

AP193 Riparian planting

AP200 Irrigation

AP210 Surface irrigation

AP211 Flood

AP212 Furrow

AP220 Sub-surface irrigation

AP230 Sprinkler irrigation

AP231 Handline sprinkler

AP232 Wheeline sprinkler

AP233 Solid set

AP233.1 Undertree

AP233.2 Overtree

AP234 Microsprinkler

AP240 Centre pivot sprinkler

AP241 Low pressure pivot

AP250 Giant gun

AP251 Stationary gun

AP252 Travelling gun

AP253 Solid set gun

AP260 Trickle irrigation

AP261 Drip emitter

AP261.1 Drip, buried

AP261.2 Drip, above ground

AP262 Spray emitter

AP300 Drainage

AP310 Surface

AP320 Sub-surface

AP400 Direct Farm Marketing

AP410 Products for sale

AP420 U-Pick

AP430 Xmas tree cutting

AP500 Agritourism

AP510 Corn Maze

AP520 Petting farm

AP530 Holiday events

AP540 Accommodation

AP541 Guest ranch

AP542 On-farm Bed & Breakfast

AP600 Agroforestry

AP700 Cultivation

AP710 Contour planting

AP720 Contour ploughing

AP730 Conventional till

AP740 Minimum till

AP750 Downslope planting

AP760 Downslope ploughing

AP770 No till

AP900 Commodity specific practices

AP910 Forage crops

AP911 Grazing/pasture

AP912 Seed

AP913 Silage or hay

AP913.1 Silage

AP913.2 Hay

AP920 Nursery crops

AP921 Bare root

AP922 Ball and burlap

AP923 Container

AP924 Caliper

AP930 Tree fruits

AP931 Espalier

Table V-VI Livestock codes to be entered in the Livestock field on the data entry form.

AP800 Livestock

AP810 Conventional livestock	AP820 Specialty livestock	AP830 Poultry/Fowl
AP811 Dairy cattle	AP821 Llama	AP831 Chicken
AP812 Beef cattle	AP822 Alpaca	AP831.1 Broiler breeder
AP812.1 Veal	AP823 Musk ox	AP831.2 Broiler
AP813 Horse	AP824 Game	AP831.3 Hatchery
AP813.1 Pony	AP824.1 Deer	AP831.4 Layer
AP813.2 Miniature horse	AP824.2 Reindeer	AP831.5 Free range layer
AP814 Swine	AP824.3 Bison	AP832 Turkey
AP814.1 Breeder	AP824.4 Elk	AP832.1 Breeder
AP814.2 Farrow	AP825 Game bird	AP832.2 Meat
AP814.3 Farrow-to-finish	AP825.1 Partridge	AP833 Duck
AP814.4 Finisher	AP825.2 Pheasant	AP834 Goose
AP814.5 Weaner	AP825.3 Pigeon	AP840 Fur-bearing
AP815 Sheep	AP825.4 Quail	AP841 Fox
AP816 Goat	AP826 Ratites	AP842 Mink
AP817 Donkey	AP826.1 Emu	AP843 Rabbit
AP818 Mule	AP826.2 Ostrich	AP844 Chinchilla
	AP826.3 Rhea	AP845 Nutria
	AP827 Peacock	AP850 Beekeeping and honey production

Appendix – Contacts

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The AgFocus – An Agricultural GIS report and summary brochure can be found on the B.C. Ministry of Agriculture, Food and Fisheries web site, <http://www.gov.bc.ca/agf/> under ‘Reports & Publications’ / Resource Management.

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