**Canada - Alberta Environmentally
Sustainable Agriculture Agreement (CAESA)**

AGRASID Version 3.0: Soil Landscapes User's Manual

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2001

Table of Contents

List of Tables

List of Figures

Preface

The Agricultural Region of Alberta Soil Inventory Database AGRASID was the result of the Canada - Alberta Environmentally Sustainable Agriculture (CAESA) Soil Inventory Project (SIP). The project was a cooperative effort involving the Alberta Research Council; Alberta Agriculture Food and Rural Development; Agriculture and Agri-Food Canada - Land Resource Unit, and private sector consulting firms. Funding for the project was provided through the CAESA agreement and by the three previously mentioned Federal and Provincial agencies.

AGRASID Version 3.0 is the modified version of AGRASID Version 1.0, the digital product distributed on CD-ROM and created by the many people associated with CAESA SIP. Version 2 of AGRASID was an internal working copy.

Acknowledgements

Additional Information

In addition to this manual, users of AGRASID are referred to the following references for additional background information regarding AGRASID:

- CAESA Soil Inventory Project Procedures Manual (*also referred to as AGRASID Procedures Manual)* (CAESA Soil Inventory Project Working Group 1997).

- AGRASID Land Systems User's Manual (Brierley et al. 1998).
  These references are available online at Alberta Soil Information Centre.

Digital Data

AGRASID is subject to revisions and update, as errors are identified and improvements incorporated. All revisions and updates will be flagged by a change of version number, and will be announced and described at Alberta Soil Information Centre.

Welcome to AGRASID Version 3.0

This manual introduces the user to AGRASID, briefly describes how the database was compiled, provides information about the differences between Version 3 and Version 1, and describes the data fields in the files of the relational database files. For a more detailed explanation of the concepts, symbols and overall methodology the user is directed to the CAESA Soil Inventory Project Procedures Manual.

Versions 2.0 through 2.7 of AGRASID were designations used internally, for developmental stages in the creation of AGRASID Version 3.0.

What is AGRASID?

AGRASID is a digital database consisting of seamless Geographic Information System (GIS) coverages and relational data files that describe the soil landscapes for the agricultural area of Alberta, an area of approximately 26 million hectares (Figure 1.). The data in AGRASID Version 3.0 may be displayed in two formats - either as soil landscape polygons or as land system polygons. The soil landscape polygons and attribute data were compiled at a scale of 1:100 000. The soil landscape data was 'rolled up' to produce land systems polygons. Land systems attribute data are contained in the Land Systems Legend file (AG30LSLG). Land Systems are intended to be presented at a scale of 1: 250 000.

For details of the soil types that make up the soil landscape and land system polygons, the polygon attribute table, and the Land systems legend file (AG30LSLG) can be linked to the Alberta Soil Names File (AG30SNF) and the Alberta Soil Layer File (AG30SLF).

Figure 1. Extent of agricultural lands in Alberta.

Introduction to AGRASID Version 3.0

Background Information

Soil surveys in Alberta were initiated in 1920 by the University of Alberta. Since the initiation of soil mapping in Alberta, over 70 reconnaissance soil surveys have been conducted by the Alberta Research Council, Agriculture and Agri-Food Canada and the University of Alberta. The soils maps and reports were compiled by different mappers, at different map scales (ranging from 1:30 000 to 1:750 000), using different mapping concepts, a variety of classification systems and on a variety of presentation media. Soil map symbols and legends also changed over time.

AGRASID was developed to address the needs of users of soil inventory information in the agricultural portion of Alberta. AGRASID provides more information on soils and landscapes than was contained in older maps and brings the inventory information to a uniform standard that encompasses modern concepts, terminology and technology. AGRASID differs from traditional Alberta soil survey information products in that:

- The products are digital.

- The way some of the soil and landscape attributes are described is a departure from the nationally defined classes (i.e. landform and slopes, parent materials).

- The soil mapping procedure employed during the course of this project was a departure from the traditional soil mapping techniques (refer to background studies documented in the 'Procedures Manual' (CAESA Soil Inventory Working Group 1997)).

Some of the key traditions retained in AGRASID include:

- The use of soil series names as a key to a list of soil attributes. In fact, the correlation and definition of series names was improved during the project, and

- The use of Soil Landscape Models (called Soil Map Units in earlier soil survey reports)

Since the release of AGRASID Version 1.0 in 1998, some modifications have been made to this database. The modifications and some of the impacts on the resulting database contents and appearance are described in the following section.

Differences Between AGRASID Version 1.0 and Version 3.0

Since 1998, when AGRASID Version 1.0 was released and distributed on CD-ROM, this database has undergone several modifications. Apart from changes with respect to projection, datum, and method of distribution, as well as a number of editorial changes to all the files, the principal modification was the removal of the township grid from AGRASID polygon coverage. This in turn had a domino effect on some of the files in this relational database.

1. Removal of the Township Grid. - Originally each polygon within AGRASID was unique to a township. The implication of this inherent feature was that a soil landscape polygon that crossed a township line had two or more attribute records in the polygon attribute file. This township-based approach was very useful during the compilation of AGRASID, but unnecessary upon completion. Therefore it was decided that the township grid could and should be removed. In Version 1.0 there are over 68,000 polygons. Through removing the township grid, amalgamating soil landscape polygons with similar soil landscape model symbols (i.e. BZR2/H1m) that were previously subdivided by one (or more)

township line(s), the total number of polygons in the Version 3.0 was reduced to 28,370.

In AGRASID Version 1.0, each polygon was ultimately linked to a specific township.   With the removal of the grid, polygons are no longer specific to a single township.   In AGRASID Version 3.0, the centroid of each polygon has been identified to a township. This information was captured in the "LOCATOR" field of the AG30 Polygon Attribute Table. A township grid was also been available should you wish to obtain a copy.

2. The Soil Landscape File (SL.dbf) is now merged into the AG30 Polygon Attribute Table - A result of the removal of the township grid was that there was a one-to-one relationship between the polygon attribute table and what used to be in the Soil Landscape file (SL.dbf), permitting the soil landscape information to be included in the polygon attribute table, where it belongs.   Unfortunately when a polygon was split into two or more components by a township grid, in AGRASID Version 1.0, the pieces did not always belong to the same soil landscape model.   In these cases, expert opinion was applied to select which soil landscape model the polygon fell.

3. Revision of the Basic Soil Evidence File (MAS.dbf) and creation of AG30MAS - The Basic Soil Evidence File, which identifies the soil types within a soil landscape polygon, also had to be edited for inconsistencies across township lines.   Where such inconsistencies occurred, the polygon description in MAS.dbf with the largest number of identified soil types was selected for inclusion in the new AG30MAS.

4. Other editorial corrections to database files - In addition to the above described modifications to the respective files, other editorial corrections have been incorporated into AGRASID Version 3.0. These include some revisions to the Land System data and corresponding legend file, and revisions to the Soil Names and Soil Layer Files. These are too numerous and varied to individually describe. However, users should be aware that if some attributes were used from AGRASID Version 1.0 to derive value-added products , then some differences may become apparent, when compared to similar products derived from AGRASID Version 3.0. Generally these differences are relatively minor; in all cases they should be improvements.

5. Spatial data projections and formats - The spatial data contained in AGRASID Version 1.0 was in a 10 degree Transverse Mercator projection, (sometimes called Alberta 10TM, with central meridian of -115, and a scale factor of 0.9992) using the NAD 27 datum. AGRASID Version 3. 0 is provided in two projections: 10TM ; and in geographic decimal degrees. The two formats are identified by the presence of T and G following the various AG30 coverage files.

All coverages in AGRASID Version 3.0 are based on the NAD 83 datum.

AGRASID Version 3.0 is available in ESRI's Export format, and in ESRI's Shapefile format.

6. AGRASID Version *3.0 Distribution* - AGRASID Version 3.0 has been distributed free of charge, via the World Wide Web.   The reasons for this decision were many. In general, they are based in a realization that the value of AGRASID to the taxpayers of Alberta is directly related to how frequently AGRASID is used in decision making, and that use of AGRASID Version 1.0 was limited by cost. Furthermore, the World Wide Web provides a means of distribution with negligeable per-copy costs.   A survey conducted amongst the original purchasers of AGRASID Version 1.0 showed very strong support for this decision.

7. The AGRASID viewer - A specialized viewer has been under construction for AGRASID Version 3.0 for approximately six months. Final implementation is expected by the end of the fiscal year. A number

of powerful and user-friendly GIS viewers have become available, free of charge to the user, via the internet, since AGRASID Version 1.0 was released.   One is ArcExplorer® from ESRI.

Soil Landscape Inventory
The Soil Landscape Inventory information described in AGRASID is intended to be represented at a scale of 1:100, 000 map scale. During the compilation of the soil mappers used existing maps and data to apply a uniform and consistent set of landscape models to the entire White Area. The soils and landscapes were recognized and separated by differences in surface form, surficial geological materials, drainage, and soil patterns. The soil mappers also captured and recorded soils information so that an automated set of rules could be run to generate a Soil Landscape Model symbol for each delineated polygon. The methodology used for collection and compilation of the soil information is documented in more detail in the CAESA Soil Inventory Project Procedures Manual (CAESA Soil Inventory Working Group 1997).

Soil Landscape Model Symbol
The Soil Landscape Model is a conceptual entity summarizing the principal characteristics of several areas of land. These models represent and cryptically describe the repeating pattern of soils and landscapes that were identified on aerial photographs and in the field by the soil mapper. The Soil Landscape Model is an amalgamation of two components, specifically Soil Model and Landscape Model as illustrated in Figure 2. The Soil Model is a composite of the dominant, or co-dominant and significant soils found within the soil polygon. The Landscape Model is a composite of the morphology, genesis, relief, slope class and surface form modifier attributes.

The Soil Landscape Model Symbol was generated automatically based upon rules that are documented in Section 2.3.9 of the 'Procedures Manual'.
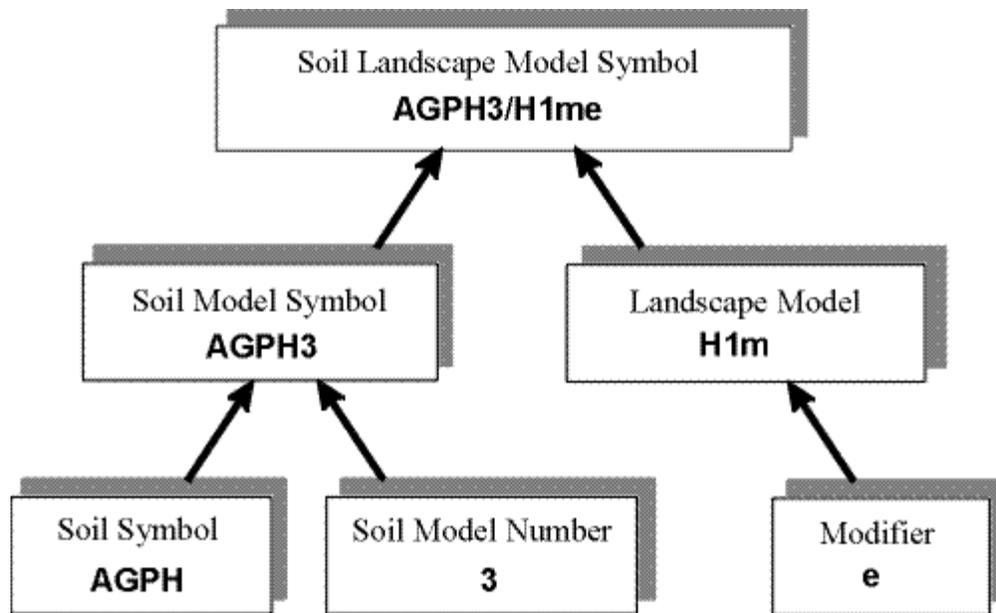
Figure 2. Components of a Soil Landscape Model Symbol.

5

The Soil Landscape Model Symbol is a short hand way summarizing and expressing the data from the two principle files within AGRASID, specifically -MAS and -SL files. Once the user understands the derivation of this symbol the user may quickly identify the distinguishing characteristics of adjacent soil polygons. The following sections describe the composition and define codes within the Soil Model Symbol, (Soil Symbol and Soil Model Number) and Landscape Model Symbol.

Soil Model Symbol
The Soil Model Symbol consists of a 3 or 4 letter code followed by a 1 or 2 digit model number. A 3 letter code means that one soil name is recognized as being the dominant soil, occupying 60% or more of the soil polygon. A 4 letter code means that two soil names are recognized as being co-dominant, with each soil occupying between 30% and less than 60 % of the soil polygon.

The 1 or 2 digit soil model number, used in conjunction with the 3 or 4 letter Soil Model Symbol, describes the recognizable pattern of significant contrasting soils characteristic of different soil landscapes. Significant soils are defined as occupying between 10% and less than 30% of the soil polygon. These significant soils may or may not have been named as a specific soil name or may be described as more general miscellaneous soils (including wet soils associated sloughs, Solonetzic soils, etc.). An individual soil polygon contains from 0 to 5 significant soils depending upon the complexity of the soils in a given area. The meaning and rationale for assigning these soil model numbers are briefly explained in the next section.

Soil Model Number
A program was written to automatically generate the Soil Landscape Model Symbol. An important component of this program included the rationale for deriving the soil model number based upon the significant soils identified for each soil polygon. The program is documented in more detail in the CAESA Soil Inventory Project Procedures Manual (CAESA Soil Inventory Working Group 1997). The Soil Model Numbers are briefly described in Table 1.

Table 1. Soil Model Numbers.

Unit	Description
1	Soils occupying ≥10% to <30 % are either not identified in the polygon or not strongly contrasting from the dominant soil (occupying ≥60%) or co-dominant soils (each occupying ≥30% to <60%)
2	Soils occupying ≥10% to <30 % are poorly drained (P) or have area ponding (AP). The rule is not applied if dominant soil (occupying ≥60%) or co-dominant soils (each occupying ≥30% to <60%) are poorly drained or have area ponding.
3	Soils occupying ≥10% to <30 % are saline.
4	Soils occupying ≥10% to <30 % have Rego profiles, are calcareous or eroded. This rule is not applied if the soil polygon has an *e* landscape modifier or if the dominant soil (occupying ≥60%) or co-dominant soils (each occupying ≥30% to <60%) have a Rego subgroup.
5	Soils occupying ≥10% to <30 % are finer textured than the dominant soil (occupying ≥60%) or co-dominant soils (each occupying ≥30% to <60%)
6	Soils occupying ≥10% to <30 % are coarser textured than the dominant soil (occupying ≥60%) or co-dominant soils (each occupying ≥30% to <60%)

Table 1 (continued)

Unit	Description
7	Soils occupying ≥10% to <30 % are Solonetzic. The rule is not applied if the dominant soil (occupying ≥60%) or co-dominant soils (each occupying ≥30% to <60%) are Solonetzic.
8	Meets the criteria of units 2 and 4
9	Meets the criteria of units 2 and 6
10	Meets the criteria of units 2 and 7
11	Meets the criteria of units 4 and 6
12	Meets the criteria of units 2, 4 and 6.
13	Meets the criteria of units 3 and 4
14	Meets the criteria of units 4 and 7.
15	Meets the criteria of units 6 and 7.
16	Soils occupying ≥10% to <30 % are Chernozemic. This rule is not applied if the dominant soil (occupying ≥60%) or co-dominant soils (each occupying ≥30% to <60%) soils are Chernozemic.
17	Meets the criteria of units 5 and 7
18	Meets the criteria of units 2 and 5
19	Meets the criteria of units 16 and 2.
20	Soils occupying ≥10% to <30 % are freely or imperfectly drained and the dominant soil (occupying ≥60%) or co-dominant soils (each occupying ≥30% to <60%) are poorly drained or have area ponding.
21	Soils occupying ≥10% to <30 % are Organic and the dominant soil (occupying ≥60%) or co-dominant soils (each occupying ≥30% to <60%) are Gleysols.

Example Soil Landscape Model Symbols

The following examples are included to show how the Soil Landscape Symbol is generated based upon the relevant soil and landscape attributes listed in the respective AG30MAS file and AG30 polygon attribute table within AGRASID. Soil name and areal extent are from the AG30MAS and Landscape Model and the final Soil Landscape Model Symbol are located in the AG30 polygon attribute table.

Example #1.

Soil Names	Areal Extent	Landscape Model	Soil Landscape Model
AGS	D(≥60%)	H1l	**AGS6**/H1l
PHS	S1(≥10% and <30%)		

The symbol AGS6/H1l is generated because:

- Dominant soil is AGS (a Black Chernozem developed on medium textured till) thus a 3 letter code

- Significant soil is PHS (similar soil developed on coarse textured water lain materials). Since this soil is coarse textured and the dominant soil is medium textured, the soil model number "6" appears.

- Landscape Model - H1l (hummocky, low relief) is placed in the denominator.

Example #2.

Soil Names	Areal Extent	Landscape Model	Soil Landscape Model
AGS	C1(≥30% and <60%)	U1h	**AGPO**1/U1h
POK	C2(≥30% and <60%)		

The symbol AGPO1/U1h is generated because:

- 2 Co-dominant soils AGS and POK (a Black Chernozem developed on medium textured water lain materials) are identified. The first 2 letters of each soil code are combined to give a 4 letter soil symbol

- No significant soils identified, thus Soil Model Number "1" appears.

- Landscape Model - U1h (undulating, high relief) is placed in the denominator.

Example #3.

Soil Names	Areal Extent	Landscape Model	Soil Landscape Model
AGS	C1(≥30% and <60%)	H1l	**AGPO**9/H1l
POK	C2(≥30% and <60%)		
PHS	S1 (≥10% and <30%)		
ZGW	S2 (≥10% and <30%)		

The symbol AGPO9/H1l is generated because:

- 2 Co-dominant soils AGS and POK (both soils developed on medium textured materials) are identified. The first 2 letters of each soil code are combined to give a 4 letter soil symbol

- 2 Significant soils PHS (similar soil developed on coarse textured water lain materials) and ZGW (wet soils associated with sloughs) are identified. Since PHS is coarse textured and ZGW represent poorly drained soils and the co-dominant soils are medium textured and well drained, the Soil Model Number "9" appears.

- Landscape Model - H1l (hummocky, low relief) is placed in the denominator.

Landscape Model
The Landscape Model Symbol combines the following three attributes that are used to characterize landscapes:

- **Surface Form**
- **Slope Classes** (Agriculture Canada Expert Committee on Soil Survey 1987)
- **Surface Form Modifier**

The complete listing and definition of the Landscape Models and Surface Form Modifiers used in AGRASID are provided in Table 2 and Table 3 respectively. The Surface Form Modifiers are used to describe unique features of a particular Landscape Model, but are relevant when assigning some

interpretative ratings.

Table 2. Landscape Models.

Code	Description	Slope Class(es)
D1	longitudinal dunes l. low relief m. moderate relief h. high relief	3 to 4, 4 4 to 5, 5 5 to 6, 6+
D2	parabolic or u-shaped dunes l. low relief m. moderate relief h. high relief	3 to 4, 4 4 to 5, 5 5 to 6, 6+
DL	any disturbed land (urban, gravel pits, areas not suitable for arable crops)	
FP1	meander floodplain	1 to 2, 2, 2 to 3
FP2	unconfined braided channel	1 to 2, 2, 2 to 3
FP3	confined floodplain, possibly terraced	2, 2 to 3 (1)
GZ	Green Zone area (not mapped in the CAESA Project)	
H1	hummocky l. low relief m. moderate relief h. high relief	3 to 4, 4 (3) 4 to 5, 5 to 6
H5	hummocky draped moraine over soft rock l. low relief m. moderate relief h. high relief	3, 3 to 4 4 to 5 5 to 6
HP1	hummocky stagnation moraine with nearly-level lacustrine plateaus (morainal lake scenarios) m. moderate relief h. high relief	4 to 5, with 2-3 5 to 6, with 2-3
HR2	hummocky and ridged m. moderate relief h. high relief	4 to 5 5 to 6, 6+
I1	inclined plain (slope length > 400 m) l. low relief	2 to 3 (2)
I3	inclined to steep, single slope landforms with (ex. fans, aprons) l. low relief m. moderate relief h. high relief	3 to 4, 4 4 to 5, 5 5 to 6, 6+

Table 2. (continued)

Code	Description	Slope Class(es)
I4	inclined to steep, single slope landforms with >10% exposed bedrock l. low relief m. moderate relief h. high relief	 3 to 4, 4 (3) 4 to 5, 5 5 to 6, 6+
I5	inclined, steep landforms with extensive failure slumps	5 to 6, 6 +
IU	inclined and undulating l. low relief h. high relief	 < 5% > 5%
L1	level plain	1, 1 to 2
L2	level and closed basin (depression with raised edges)	1 to 2
L3	level and terraced, not within modern stream channels	2, 2 to 3
M1	Rolling (inclined slopes > 400 m, multi-directional) m. moderate relief h. high relief	 4, 4 to 5 5, 5 to 6
O1	Organic - level, flat, horizontal or plateau	1, 1 to 2
O2	Organic - basin (bowl)	1, 1 to 2
O3	Organic - channeled, ribbed or net	1, 1 to 2
O4	Organic - sloping	1, 1 to 2
O5	Organic - level with hummocky mineral soils	2, 3-6
R2	Ridged (includes fluted terrain) l. low relief m. moderate relief h. high relief	 3 4 to 5 5 to 6, 6+
RR	reclaimed or reconstructed land	
SC1	valley with confined floodplain l. low relief h. high relief (steep sides)	 <9% side slopes >9% slopes
SC2	wide valley with one or more terraces (coulees included)	
SC3	v-shaped valley with no terraces or floodplain	
SC4	sub-glacial channel (intermittently incised)	
U1	undulating l. low relief h. high relief	 2 (1) 2 to 3, 3
W1	Channel sloughs and ponds in linear arrangement, no channel banks. Often old ice-walled channel feature.	
W2	Non-aligned aggregation of sloughs and ponds with little inter-slough area. Can have significant inter-water area.	
W3	A single water body basin that may be filled or partly filled with water (greater than 65 ha).	

Table 3. Surface Form Modifiers.

Code	Description
c	channeled (< 50 cm, rill, re-occur at the same position year after year)
d	dissected (> 50 cm, gully, same position year after year)
e	eroded pits (specific to Solonetzic soils)
n	concavities
r	shallow to bedrock (within 5 metres)

AGRASID Version 3.0 Database

AGRASID Version 3.0 is a relational database consisting of a total of 4 files which describe the soil and landscape characteristics of each delineated polygon contained in the coverage files. Figure 3 illustrates the relationship between these files. The field names identified on the arrows between the files are the relational "link" fields within the respective files that should be used in compiling this relational database.

Brief descriptions of each file are provided on the subsequent pages. In Appendices 1 to 5 the contents of the each file are listed and each field is briefly described. Where appropriate, a reference to either the Procedures Manual, the Alberta Soil Names file (Gen 3.0) or the Alberta Soil Layer file (Gen 3.0) is included if more information about each field is required. The attribute fields used to link or join files are shaded in the file structure.
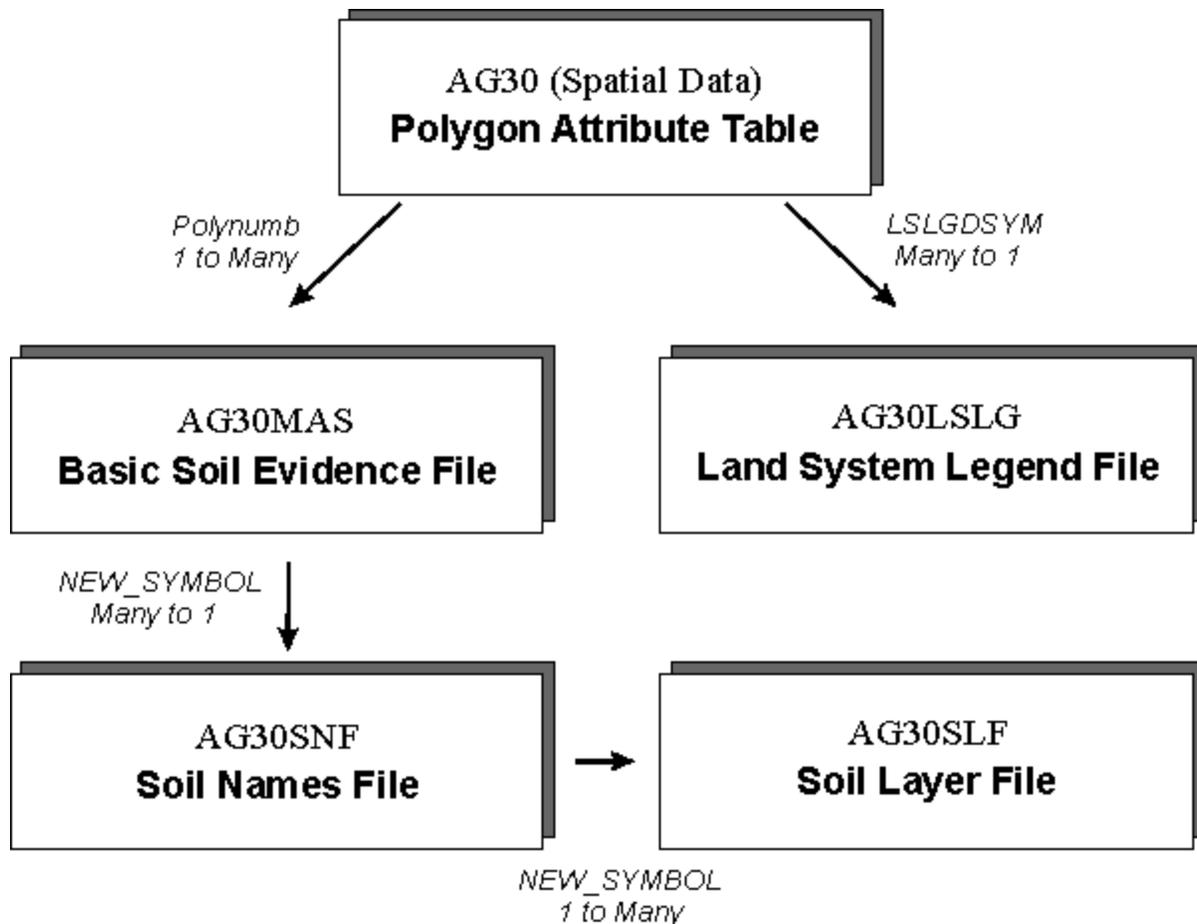
Figure 3. Relationships between database files in AGRASID Version 3.0.

Spatial files
The GIS coverage files contain the lines delineating the recognized soil landscape polygons. The coverage is geo-referenced to the 1:20 000 provincial digital base map with a projection of 10 degree Transverse Mercator (10TM, central meridian:-115:00:00, scale factor:0.9992) and NAD 83 . Geographic projection of the coverage is also provided for users of this information, outside of the Alberta setting.

The coverages are distributed in 2 ways. For the user interested in downloading soil landscape information for the entire agricultural region of Alberta (the shaded area on Figure 4) then the user is directed to the "whole" coverage folder. This file is approximately_?__mega bytes in size. If the user is interested in a specific portion of the province then it is suggested that the user refer to the "Map Sheet" coverage folder. Here the coverage is subdivided into National Topographic System (NTS) map sheets that intersect with the agricultural region. , These files are smaller and thus quicker to download and manipulate.

Also these coverages are provided in 2 GIS formats; as .E00 files for utilization with any GIS software, and as shape files (.shp) for direct use in ArcView.

Attribute files
AG30 - Polygon Attribute Table - May be considered the Soil Landscape Attribute File. In addition to containing specific polygon attribute data such as area, perimeter, etc., this file contains information that

provides a geographic setting for each polygon, landscape information as well as the cryptic soil landscape model symbol.   The geographic setting information of each polygon is described in terms of values present in Soil Correlation Area, Ecoregion, Ecodistrict and Land System fields.

AG30MAS - Basic Soil Evidence File - The Basic Soil Evidence Database File (AG30MAS) contain data on the soils contained within each soil polygon described. The number of soils identified and allocated to each polygon varies depending upon the extent of each of the soils. Some fields contained within this file contain many blank values. However these fields are necessary because the information contained within them represents the data that the soil analyst recorded about the soils contained within a soil polygon.

AG30SNF - Soil Names File - The Soil Names File (AG30SNF) contains information on all the soil names currently recognized in Alberta. The version of the Soil Names File provided is current to the date of AGRASID Version 3.0.

AG30SLF - Soil Layer File - The Soil Layer File (AG30SLF) contains information on the chemical and physical properties for each soil name listed in the Alberta Soil Names File (AG30SNF). Within the SLF, each recognized soil horizon or layer unique to each soil name is assigned an individual record. Therefore, although there are approximately 2000 records in AGSNF30 there are over 11 000 records in AG30SLF. The fields defined in this file are the minimum data set necessary for interpreting soils for agronomic purposes (CanSIS Manual 3 Procedures and Users Guide revised 1994).
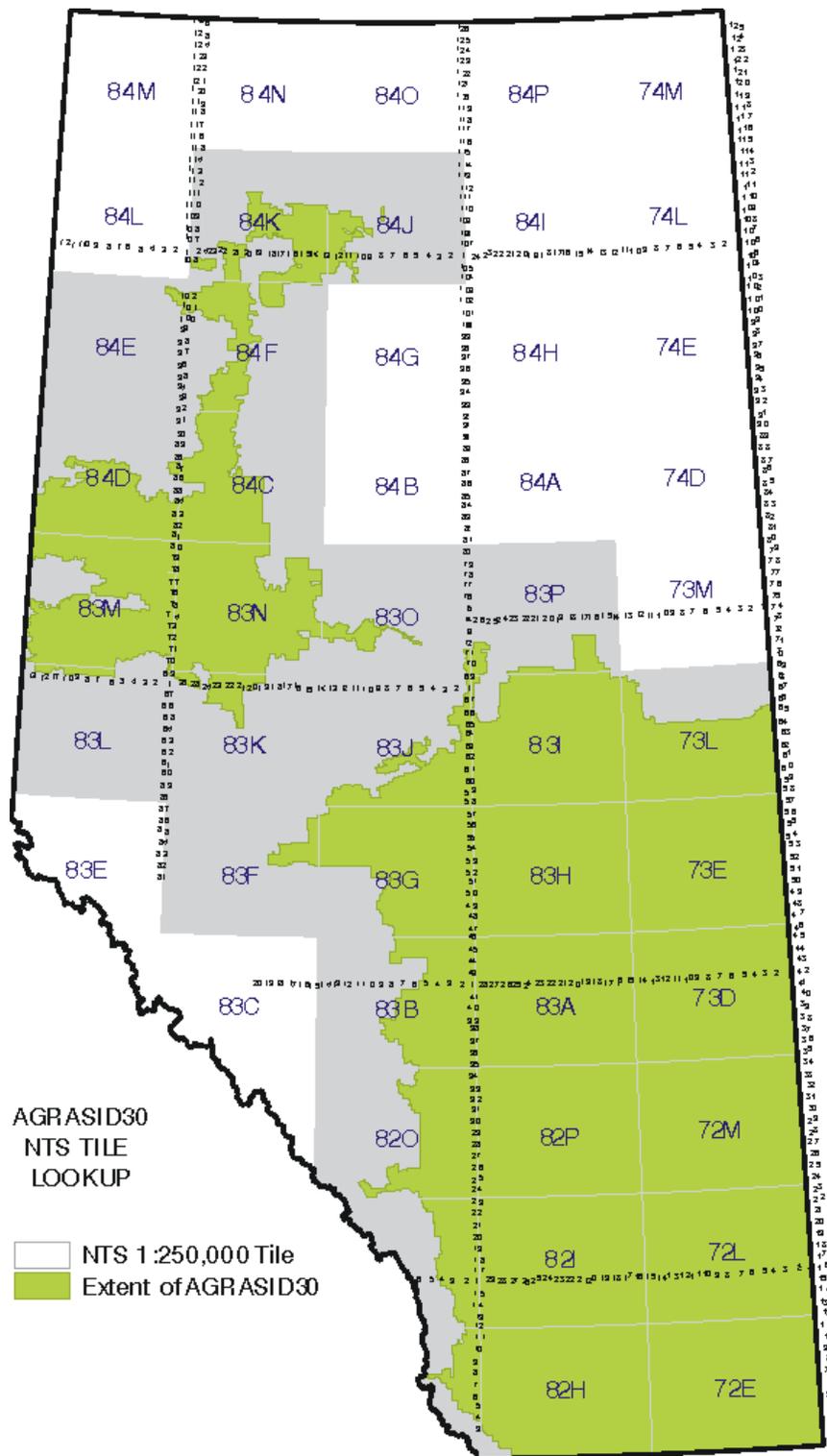
Figure 4. Spatial extent of AGRASID Version 3.0 by NTS mapsheet.

Glossary of Terms

Co-dominant soil: A soil that is estimated to occupy more than 30% and less than 60% of a soil polygon. Up to 3 co-dominant soils may be identified for a soil polygon.

Correlation Team: A group of individuals (Scientific Leader, Block Leaders, Agriculture Canada Correlators and Field Assistants) responsible for maintaining consistency in soil taxonomy and interpretation. The correlation team also ensures the standardization of basic soil attributes and the development of soil landscape model concepts.

Dominant soil: A soil that is estimated to occupy more than 60 % of a soil polygon. Only one dominant soil may be identified for a soil polygon.

Land System: Subdivision of Ecodistrict in the Ecological Land Classification hierarchy.

Land System Database: An electronic spatial database (the map) linked to an attribute database created by the CAESA-SIP. The main attributes of the database are: Land System Name, Land System Number, Surficial Geology, Regional Surface Form, Groundwater Discharge, Stream Courses, Regional Bedrock, Lakes and Wetlands, Regional Soil Models.

Land System Inventory: An inventory compiled at the 1:250 000 scale. Land Systems within one ecodistrict are recognized and separated by differences in one or more of: general pattern of land surface form, surficial geological materials, amount of lakes or wetlands, or general soil pattern. All Land Systems within one ecodistrict have the same general climate for agriculture but differences in microclimate patterns can be recognized. An average sized Land System is approximately three to four townships (32,000 hectares).

Landscape Model: A sub-model used in building a soil landscape model. The Landscape Model includes slope class, surface form, a surface form modifier and many other attributes of a landscape.

Legend: A brief explanatory list of the symbols, cartographic units, patterns (shading and color hues), and other cartographic conventions appearing on a map, chart, or diagram.

Parent Material: The unconsolidated and more or less chemically weathered mineral or organic matter from which the solum of a soil has developed by pedogenic processes.

Regional Soil Models: A conceptual description of the Soil Model with the greatest aerial extent in the Land System (1:250 000).

Regional Surface Form: A conceptual description of a recognizably distinct landscape.

Significant soil: A soil that is estimated to occupy more than 10% and less than 30% of a soil polygon. Up to 5 significant soils may be identified for a soil polygon.

Soil Classification: The systemic arrangement of soils into categories and classes on the basis of their characteristics. Broad groupings are made on the basis of general characteristics and subdivisions on the basis of more detailed differences in specific properties.

Soil Correlation Area (SCA): An area with similar agroclimate and landscape ecology such that it defines the geographic limits for usage of soil series names.

Soil Inventory Meta Data: Data that explains soil inventory data structures, terminology, classification systems, models and procedures.

Soil Landscape: (1) A subdivision of a Land System in the Ecological Land Classification hierarchy. (2) An actual piece of land identified in a Soil Landscape inventory as an entity for which attributes are described.

Soil Landscape Inventory: Subdivision of a Land System into Soil Landscapes based on recognition of differences in patterns of surface form, surficial geological materials, lakes and wetlands, and soils, and descriptions of associated attributes.

Soil Landscape Model: A conceptual description of recurring soil and land patterns appropriate for the Soil Landscape level of the Ecological Land Classification hierarchy. It is an amalgamation of the Soil Model and the Landscape Model. Referred to as 'soil map units' in previous soil survey reports.

Soil Landscape Model Symbol: The Soil Landscape Model Symbol used to describe the Soil Model and the Landscape Model on an output report. Found in the AG30 file under the field MUNAME.

Soil Map Delineation (soil polygon): Area delineated on a map to represent a definite tract of land (a Soil Landscape) about which information is to be communicated. For a tract to be definite, distinct from its neighbors the tract must have discernible consistency in attributes i) that are important, and ii) that (individually or collectively) can be conceptualized, defined, and named. Assigned to the delineation, usually through symbols, the names and definitions impart the meaning of the tract it represents.

Since difference in important attributes is what justifies differentiation of adjacent tracts, therefore one or more polygon symbols (and attribute names and concepts they denote) must differ between adjacent polygons. Lines on the map (polygon boundaries) represent the places on Earth's surface where, for practical purposes, changeover in attributes can be said to occur.

Soil Map Unit: (See Soil Landscape Model) A combination of kinds of soil, or miscellaneous land types that can be shown at the scale of mapping for the defined purpose and objectives of a particular soil survey.

Soil Mapper (analyst): A person responsible for soil mapping and coding of soil attribute data into AGRASID.

Soil Name (series) Symbol: A code that identifies a Soil Name (e.g. CMO for Camrose).

Soil Model: Consists of a dominant or co-dominant soil series and any significant soils.

Soil Series: A category in the Canadian System of Soil Classification. This is the basic unit of soil classification, and consists of soils that are essentially alike in all major profile characteristics except the texture of the surface.

White Area: An administrative boundary considered the 'settled area' of Alberta. The White Area as of March 1992 was 63,248,640 acres (approx. 2745 townships).

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Appendices

Appendix 1. AG30 Polygon Attribute Table
The polygon attribute table contains spatial/graphic as well as geographic setting information for each of the 28 340 recognized soil landscape polygons.

Field Name	Type	Width	Allowable values	Explanation of Field Name
AREA	Numeric	12		Area of polygon (square meters)
PERIMETER	Numeric	12		Perimeter of polygon (meters)
AGRASID30#	Numeric	11		ESRI Coverage internal record number r
AGRASID-ID	Numeric	11		ESRI Coverage internal ID number
POLYNUMB	Numeric	9		AGRASID 3.0 Primary Key
HECTARES	Numeric	12		Area of Polygon in Hectares
SCA	Numeric	2	1 -24	Soil Correlation Area number
LMOD	Character	1	d, r, e, n, c	Landscape model (Table 2 in this User's Manual or Table 4.11 in the AGRASID Version 1.0 Procedures Manual)
LMODEL	Character	4		Landscape model (Table 2 in this User's Manual or Table 4.14 in the AGRASID Version 1.0 Procedures Manual)
MUNAME	Character	14		Generated soil symbol based upon the soil data collected and documented by the soil mapper. For explanation of the concepts and symbol refer to Section 2.0 of the AGRASID Version 1.0 Procedures Manual.
ECODIST	Character	6		Concatenation of ECO_REG and ECO_DIST
ECO_REG	Character	2		Ecoregion code (Fig. 2.1 in AGRASID Version 1.0 Procedures Manual)
ECO_DIST	Character	3		Ecodistrict code (Table 4.1 in the AGRASID Version 1.0 Procedures Manual)
NSLC200	Character	8		New Soil Landscape of Canada (SLC) number (SLC-Alberta, Phase 1 White zone, June 2000 CD-ROM)
LSYS_-NO	Character	2		Unique Land System number within an Ecodistrict.
LS_COMP	Character	1		Code given to non-contiguous portions of a Land System
LS_SYM	Character	9		Complete Land System symbol. Unique identifier for each LS component. Concatenation of ECO_REG, ECO_DIST, LSYS_NO and LS_COMP.
LSLGDSYM	Character	9		Land System symbol. Link to AG30LSLG. Concatenation of ECO_REG, ECO_DIST, and LSYS_NO.
TOWNSHIP	Numeric	3	1-125	Township

RANGE	Numeric	2	1-30	Range
MERIDIAN	Numeric	1	4-6	Meridian
LOCATOR	Numeric	6		Locator field identifying the centroid for each Soil Landscape Polygon. Value is concatenation of Meridian, Range and Township.
LEG_DESC	Character	12		Alberta Township System Descriptor unique to C&D, AAFRD.

Appendix 2. AG30MAS - Basic Soil Evidence Database File

The Basic Soil Evidence Database file contain data on the soils contained within each soil landscape polygon (uniquely identified by POLYNUMB). The number of soils described per polygon varies depending upon the extent of each of the soils. Some fields contained within this file contain many blank values. However these fields are necessary because the information contained within them represents the data that the soil mapper recorded about the soils contained within a soil polygon.

This file is linked to the AG30 Polygon attribute Table by the POLYNUMB field and to the AG30SNF and AG30SLF by the NEW_SYMBOL field.

Field Name	Type	Width	Allowable values	Explanation of Field Name
POLYNUMB	Numeric	8		Soil polygon number, assigned by soil analyst. SOILPOLY is used to link to the GIS coverage and the SL.DBF.
MAS_WET	Character	2	FD, I, P, AP	Soil drainage categories (Table 4.5 in the AGRASID Version 1.0 Procedures Manual).
MAS_ORDER	Character	4		Soil Order (see the Canadian System of Soil Classification (1997) for allowable codes)
MAS_GG	Character	14		Soil Great Group (see the Canadian System of Soil Classification (1997) for allowable codes)
MAS_SG	Character	12		Soil Sub-Group (see the Canadian System of Soil Classification (1997) for allowable codes or Table 4.8 in the AGRASID Version 1.0 Procedures Manual).
MAS_MOD	Character	4		Soil Sub-Group Modifier (see Table 4.9 in the AGRASID Version 1.0 Procedures Manual).
MAS_PM	Character	4		A unique set of parent material texture codes developed specifically for the project (see Table 4.7 in the AGRASID Version 1.0 Procedures Manual).
MAS_EXT	Character	2		Extent of each identified soil type (see Section 2.0 in the Procedures Manual).
MAS_SYM	Character	3		Soil name symbol (as defined in the Alberta Soil Names File (1997)).
MAS_VARNT	Character	4		Soil variant (see the Alberta Soil Names File (1997) or Table 4.9 in the Procedures Manual). The variant is used to describe soils that are sufficiently different to warrant recognition but do not justify a new soil name

				due to limited geographic extent.
NEW_SYMBOL	Character	7		MAS_SYM and MAS_VARNT are concatenated to create this field. The NEW_SYMBOL field is used to join (or link) to the Soil Names File (SNF) and Soil Layer File (SLF).

Appendix 3. AG30SNF - Soil Names File

The AGRASID Soil Names File contains information on all the soil series that are currently described and documented in Alberta. The version of the Soil Names File provided is current to the date of publishing of AGRASID. However the file is continually updated and revised based upon the observations and feedback provided to the Alberta soils Correlator by soil inventory specialists. The Correlator makes additions and deletions to the file but changes to the database structure are not common.

This file is linked to the AG30MAS andAG30SLF by the NEW_SYMBOL field.

Field Name	Type	Width	Allowable values	Explanation of Field Name
NEW_SYMBOL	Character	7		This field contains a concatenated version of the soil series name and soil variant. The NEW_SYMBOL field is used to join (or link) to the Basic Soil Evidence File (MAS.DBF) and link to the Soil Layer File (SLF).
SERIES	Character	24		Soil series name. The variant is attached if the series is not modal.
VARIANT	Character	4		The variant is used to describe soils that are sufficiently different to warrant recognition but do not justify a new soil name due to limited geographic extent. Up to two variants may be used
LU	Character	1	N, A	Land Use - N = Native (Ah horizon) and A = Agricultural (Ap horizon)
SCA	Numeric	2		Soil correlation area number
DRAINAGE	Character	2		Soil drainage class (ECSS 1983). These classes are different from those used for data capture in the CAESA project.
CALCAR	Character	4		Calcareousness class of the first C horizon delineated. Classes are delineated in the field based on the amount of carbonates expressed as $CaCO_3$ equivalent (ECSS 1983).
SALINITY	Character	4		Salinity class (of the most saline parent material) (ECSS 1983).
PM1_TEX	Character	4		Texture of parent material 1 (usually the first C-horizon or in some cases the first material below the A-horizon) (ECSS 1987).
PM1_TYP	Character	4		Genetic origin of the first parent material (ECSS 1987).

PM2_TEX	Character	4		Texture of parent material 2 (ECSS 1987).
PM2_TYP	Character	4		Genetic origin of the second parent material (ECSS 1987).
MAS_PM	Character	4		A unique set of parent material texture codes developed specifically for AGRASID (see Table 4.7 in the AGRASID Version 1.0 Procedures Manual).
REPORT	Character	20		Identifies where a representative soil profile can be found.
ORDER	Character	2		Soil Order (Canadian System of Soil Classification 1997)
S_GROUP	Character	4		Soil Subgroup (Canadian System of Soil Classification 1997)
G_GROUP	Character	3		Soil Great Group (Canadian System of Soil Classification 1997)
SG	Character	8		Soil Subgroup abbreviation (concatenated Subgroup and Great Group)
SG_MOD	Character	8		Identifies 'taxonomic' characteristics not recognized at the subgroup level. Examples include peaty, acidic, saline and so on.
CORRNOTE	Character	254		Specific comments about soil name.

Appendix 4. AG30SLF - Soil Layer File

The Soil Layer File contains information on the chemical and physical properties for each layer (horizon) associated with each soil name listed in the Alberta Soil Names File (Gen3.0). There is a one to many relationship between soil name and associated layers. The fields defined in this file were determined to be the minimum data set necessary to interpret a soil specifically for agronomic purposes (CanSIS Manual 3 Procedures and Users Guide revised 1994).

This file is linked to the AG30SNF by the NEW_SYMBOL field.

Field Name	Type	Width	Decimal	Explanation of Field Name
NEW_SYMBOL	Character	7		This field contains a concatenated version of the soil series name and soil variant. The NEW_SYMBOL field is used to link to the Soil Names File (SNF.DBF).
VARIANT	Character	4		The variant is used to describe soils that are sufficiently different to warrant recognition but do not justify a new soil name due to limited geographic extent. Up to two variants may be described
LU	Character	1		Land Use - N = Native (Ah horizon) and A = Agricultural (Ap horizon)
LAYER_NO	Character	1		Horizon number
HZN_LIT	Character	1		Horizon lithological discontinuity
HZN_MAS	Character	3		Master horizon (uppercase)
HZN_SUF	Character	5		Horizon suffix (lowercase)

HZN_MOD	Character	1		Horizon modifier
UDEPTH	Numeric	3		Upper horizon depth (cm)
LDEPTH	Numeric	3		Lower horizon depth (cm)
COFRAG	Numeric	3		Coarse fragment content (% by volume)
DOMSAND	Character	2		Dominant sand fraction
VFSAND	Numeric	3		Very fine sand (% by weight)
TSAND	Numeric	3		Total sand (% by weight)
TSILT	Numeric	3		Total silt (% by weight)
TCLAY	Numeric	3		Total clay (% by weight)
ORGCARB	Numeric	5	1	Organic Carbon (% by weight)
PHCA	Numeric	4	1	pH in $CaCl_2$
PH2	Numeric	4	1	pH in water
BASES	Numeric	2		Base saturation (%)
CEC	Numeric	3		Cation Exchange Capacity (meq/100g)
KSAT	Numeric	6	3	Saturated hydraulic conductivity (cm/h)
KP0	Numeric	3		Water retention at 0 kilopascals (% by total soil volume)
KP10	Numeric	3		Water retention at 10 kilopascals (% by total soil volume)
KP33	Numeric	3		Water retention at 33 kilopascals (% by total soil volume)
KP1500	Numeric	3		Water retention at 1500 kilopascals (% by total soil volume)
BD	Numeric	5	2	Bulk density (g/cm^3)
EC	Numeric	3		Electrical conductivity (mS/cm) (ECSS 1983).
CACO3	Numeric	2		Calcium carbonate equivalent (%) (ECSS 1983).
VONPOST	Numeric	2		Von Post estimate of decomposition (ECSS 1983).
WOOD	Numeric	2		Volume of woody material

Appendix 5. AG30LSLG - Land System Legend File

The Land System Legend File identifies the attributes specific that have been assigned to each of the 789 recognized land systems. For background information regarding the Land System concept and it's application during the compilation of AGRASID, refer to the Chapter 2 in the Procedures Manual as well as the Land Systems User's Manual, AGRASID Version 1.0.

Field Name	Type	Width	Explanation of Field Name
OBJECTID	Numeric	11	Consecutive numbering of Land Systems within the file (Values from 1-789)
LSLGDSYM	Character	8	Land System symbol. This field provides the link to the AG30 Polygon Attribute Table.
NAME	Character	23	Unique geographic name given to each land system.
MORPLOL	Character	11	Morphological descriptor (Table 4.2, AGRASID Version 1.0 Procedures Manual)

SCA	Numeric	11	Soil Correlation Area number
SOIL_ZONE	Character	14	Soil zone as defined by the SCA number
AG_CLIMATE	Character	12	Agricultural climate rating from the Ecodistricts legend (Table 4.1, AGRASID Version 1.0 Procedures Manual)
ORD1	Character	6	Soil Order of the 1st representative soil (Table 3.3, AGRASID Version 1.0 Procedures Manual)
ORD2	Character	6	Soil Order of the 2nd representative soil (Table 3.3, AGRASID Version 1.0 Procedures Manual)
MAJOR1	Character	8	1st major representative soil name symbol (>20% of the land system)
MAJOR2	Character	8	2nd major representative soil name symbol (>20% of the land system)
MAJOR3	Character	8	3rd major representative soil name symbol (>20% of the land system)
MINOR1	Character	8	1st minor representative soil name symbol (between 5-20 of the land system)
MINOR2	Character	8	2nd minor representative soil name symbol (between 5-20 of the land system)
SURFORM1	Character	11	1st representative landscape model (landscape models described in Table 2 of this manual)
SURFORM2	Character	11	2ndt representative landscape model (landscape models described in Table 2 of this manual)
SURFORM3	Character	11	3rd representative landscape model (landscape models described in Table 2 of this manual)