RESEARCH SUB-PROGRAM

DEVELOPMENT AND APPLICATION OF STANDARIZED METHODOLOGY FOR SAMPLING SOIL LANDSCAPE POLYGONS

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F O R W A R D

This report is one of a series of **COESA** (Canada-Ontario Environmental Sustainability Accord) reports from the Research Sub-Program of the Canada-Ontario Green Plan. The **GREEN PLAN** agreement, signed Sept. 21, 1992, is an equally-shared Canada-Ontario program totalling $64.2 M, to be delivered over a five-year period starting April 1, 1992 and ending March 31, 1997. It is designed to encourage and assist farmers with the implementation of appropriate farm management practices within the framework of environmentally sustainable agriculture. The Federal component will be delivered by Agriculture and Agrifood Canada and the Ontario component will be delivered by the Ontario Ministry of Agriculture and Food and Rural Assistance.

From the 30 recommendations crafted at the Kempenfelt Stakeholders conference (Barrie, October 1991), the Agreement Management Committee (AMC) identified nine program areas for Green Plan activities of which the three comprising research activities are (with Team Leaders):

1. **Manure/Nutrient Management and Utilization of Biodegradable Organic Wastes** through land application, with emphasis on water quality implications
   - **A.** Animal Manure Management (nutrients and bacteria)
   - **B.** Biodegradable organic urban waste application on agricultural lands (closed loop recycling) (Dr. Bruce T. Bowman, Pest Management Research Centre, London, ONT)

2. **On-Farm Research**: Tillage and crop management in a sustainable agriculture system. (Dr. Al Hamill, Harrow Research Station, Harrow, ONT)

3. **Development of an integrated monitoring capability** to track and diagnose aspects of resource quality and sustainability. (Dr. Bruce MacDonald, Centre for Land and Biological Resource Research, Guelph, ONT)

The original level of funding for the research component was $9,700,000 through Mar. 31, 1997. Projects will be carried out by Agriculture and Agri-Food Canada, universities, colleges or private sector agencies including farm groups.

This Research Sub-Program is being managed by the Pest Management Research Centre, Agriculture and Agri-Food Canada, 1391 Sandford St., London, ONT. N5V 4T3.

Dr. Bruce T. Bowman
Scientific Authority

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The following report, approved by the Research Management Team, is reproduced in its entirety as received from the contractor, designated on the previous page.

EXECUTIVE SUMMARY

The "Soil Landscape of Canada" (SLC) is a consistent and comparable source of information about soil and land attributes nation wide. It is a large scale planning tool used to assess land use potential for large areas of Canada. It maps soil landscape polygons at a scale of 1:1,000,000. The SLC mapping in southern Ontario is a compilation derived from larger scale, county level soil survey maps. The soil landscape polygons generally consist of dominant and subdominant components. The dominant component is mapped and described in terms of a standard set of attributes considered important for plant growth, land management, and terrain sensitivity. The attributes include the mode of deposition, textural group of the parent material, soil development, surface form and slope class. Additional attributes further describe the dominant and subdominant components of each SLC polygon. The full array of attributes are located in a detailed computerized database available on diskette in ASCII Format. The source for much of the soil and land attributes contained in the SLC database is the National Soil Data Base in CanSIS.

The SLC is increasingly being used to make decisions regarding the state of the soil resources and land use potential at regional, provincial and national scales. This study assesses the quality of the data contained in the detailed computerized legend and the map polygons, and develops a methodology to sample soils in the landscapes that best represent the SLC polygon.

To assess the quality of the SLC database, five soil landscape polygons in the Regions of Niagara and Haldimand-Norfolk and five in Oxford County were selected. The SLC description of the soil and land attributes was compared to the actual soil series mapped in each of the polygons based on their respective soil survey information. To develop a sampling methodology a two phased approach was used. First the study developed a sampling methodology to determine the variability of selected soil attributes within the soil landscape. Based on these results a methodology to sample soil landscape polygons that can be applied over a large area of southern Ontario was developed. Agricultural fields were sampled in a systematic manner, independent of land use history, which resulted in soil samples and soil attributes that are representative of the majority of agricultural soils within each of the SLC polygons.

The study determined that there was very limited correlation between the major soil attributes (soil development, mode of deposition, and textural class of the parent material) described by the SLC for the five SLC polygons studied in Niagara and Haldimand-Norfolk. There was, however, a good correlation between the SLC polygon descriptions and the Oxford County Soil Survey. The study also determined that there is significant variability between the pH and soil organic carbon values within the soil landscape and at different locations. Based on this information, a sampling methodology was developed and applied to Oxford County where each of the major soil landscape components within the SLC polygon was sampled.

The study concluded that the accuracy of the SLC is highly variable. In some locations the SLC mapping and database correlates well to the detailed soil data. The use of the SLC mapping and data for large scale planning purposes would be appropriate in these locations. In other locations the correlation is poor and may limit the value of the SLC for large scale planning purposes. Recompilation of the SLC database and mapping may be required before interpretative decisions can be made depending on the level of accuracy required for the users objectives. Further, depending on the level of decision making it may be preferable to use the more detailed soil map information rather than relying on the SLC.

Sommaire

Le rapport «Pédo-paysages du Canada» (PPC) constitue une source d'information complète et comparable sur les attributs des sols et des terres partout au pays. Il s'agit d'un outil de planification à grande échelle utilisé pour évaluer le potentiel d'occupation des sols dans de grandes régions du Canada. Il cartographie les polygones de pédo-paysages à une échelle de 1:1 000 000. La cartographie du PPC du sud de l'Ontario constitue une compilation provenant de cartes de levées des sols à plus grande échelle au niveau du comté. Les polygones de pédo-paysages consistent généralement en des composantes dominantes et sous-dominantes. La composante dominante est cartographiée et décrite en termes d'un ensemble normalisé d'attributs considérés importants pour la croissance des plantes, de la gestion des terres et la vulnérabilité du terrain. Les attributs comprennent le mode de dépôt, le groupe textural du matériau parental, l'aménagement des sols, la forme de terrain et la classe de pente. D'autres attributs décrivent plus en détail les composantes dominantes et sous-dominantes de chaque polygone du PPC. La gamme complète des attributs se trouve dans une banque de données informatisées détaillée, disponible sur disque ASCII. La Base nationale de données sur les sols du Système d'information sur le sol du Canada (SISCan) est la source d'une bonne partie des attributs pédologiques et terrestres contenus dans la base de données du PPC.

Le PPC est de plus en plus utilisé pour prendre des décisions concernant l'état des ressources pédologiques et du potentiel d'utilisation des terres aux niveaux régional, provincial et national. Cette étude évalue la qualité des données contenues dans la légende informatisée détaillée et les polygones cartographiques, et élabore une méthodologie visant à échantillonner les sols dans les paysages qui représentent le mieux le polygone PPC.

Afin d'évaluer la qualité de la base de données du PPC, cinq polygones de pédo-paysages ont été choisis dans les régions de Niagara et Haldimand-Norfolk et cinq dans le comté d'Oxford. La description du sol et des attributs terrestres faite par le PPC a été comparée aux séries pédologiques réelles cartographiées dans chacun des polygones en fonction des renseignements contenus dans leurs études pédologiques respectives. On a utilisé une approche à double étape pour élaborer cette méthode d'échantillonnage. D'abord, l'étude a mis au point une méthode d'échantillonnage visant à déterminer la variabilité des attributs choisis des sols dans le pédo-paysage. D'après ces résultats, on a mis au point une méthode d'échantillonnage des polygones de pédo-paysages qui peut être appliquée à une grande partie du sud de l'Ontario. Les terres arables ont été échantillonnées de façon systématique, sans tenir compte de l'historique de l'utilisation des terres, ce qui a donné des échantillons de sol et d'attributs pédologiques représentatifs de la majorité des sols agricoles dans chacun des polygones PPC.

Cette étude a permis de déterminer qu'il y avait très peu de corrélation entre les principaux attributs pédologiques (aménagement du sol, mode de dépôt et type de texture du matériau parental) décrits par le PPC pour les cinq polygones PPC étudiés dans la région de Niagara et Haldimand-Norfolk. Il y avait cependant une bonne corrélation entre les descriptions de polygones PPC et l'étude pédologique du comté d'Oxford. L'étude a également permis de déterminer qu'il y avait une grande variabilité entre les valeurs du pH et du carbone organique du sol à l'intérieur du pédo-paysage ainsi qu'à différents endroits.

D'après cette information, on a élaboré une méthode d'échantillonnage qu'on a appliquée au comté d'Oxford, où chacun des principaux éléments du pédo-paysage du polygone PPC a été échantillonné.

L'étude a conclu que la précision du PPC est très variable. À certains endroits, la cartographie et la base de données du PPC correspondent bien aux données pédologiques détaillées. L'utilisation de la cartographie et des données du PPC pour la planification à grande échelle serait appropriée à ces endroits. Ailleurs, la corrélation est faible et peut limiter la valeur du PPC pour la planification sur grande échelle. Il faudrait probablement compiler une nouvelle fois la base de données et la cartographie du PPC avant de prendre des décisions d'interprétation, selon le niveau de précision demandé par les objectifs des utilisateurs. De plus, il serait préférable, selon le niveau de prise de décision en jeu, d'utiliser l'information de cartographie pédologique la plus détaillée plutôt que de se fier au PPC.

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1. INTRODUCTION

1.1 Objective

The objective of the study is to:

- assess the quality of the SLC data;
- develop and test a methodology for the collection, analysis and interpretation of soils data (specifically organic carbon, textural class and pH) obtained from selected soil landscape polygons identified in the Soil Landscapes of Canada, Ontario-South (1:1,000,000); and,
- to apply the methodology to a large portion of southern Ontario in order to characterize and update the current state of the soil resources. The proposed study will also supplement, update and enhance existing soils and landscape information provided by soil surveys and the Soil Landscapes of Canada database.

The intent of the study is to develop a broad scale State of the Resources reporting tool that can provide a "snap shot" of the soil resource quality under established agricultural management systems throughout Ontario using the Soil Landscapes of Canada.

1.2 Study Components

There are three basic components to the study.

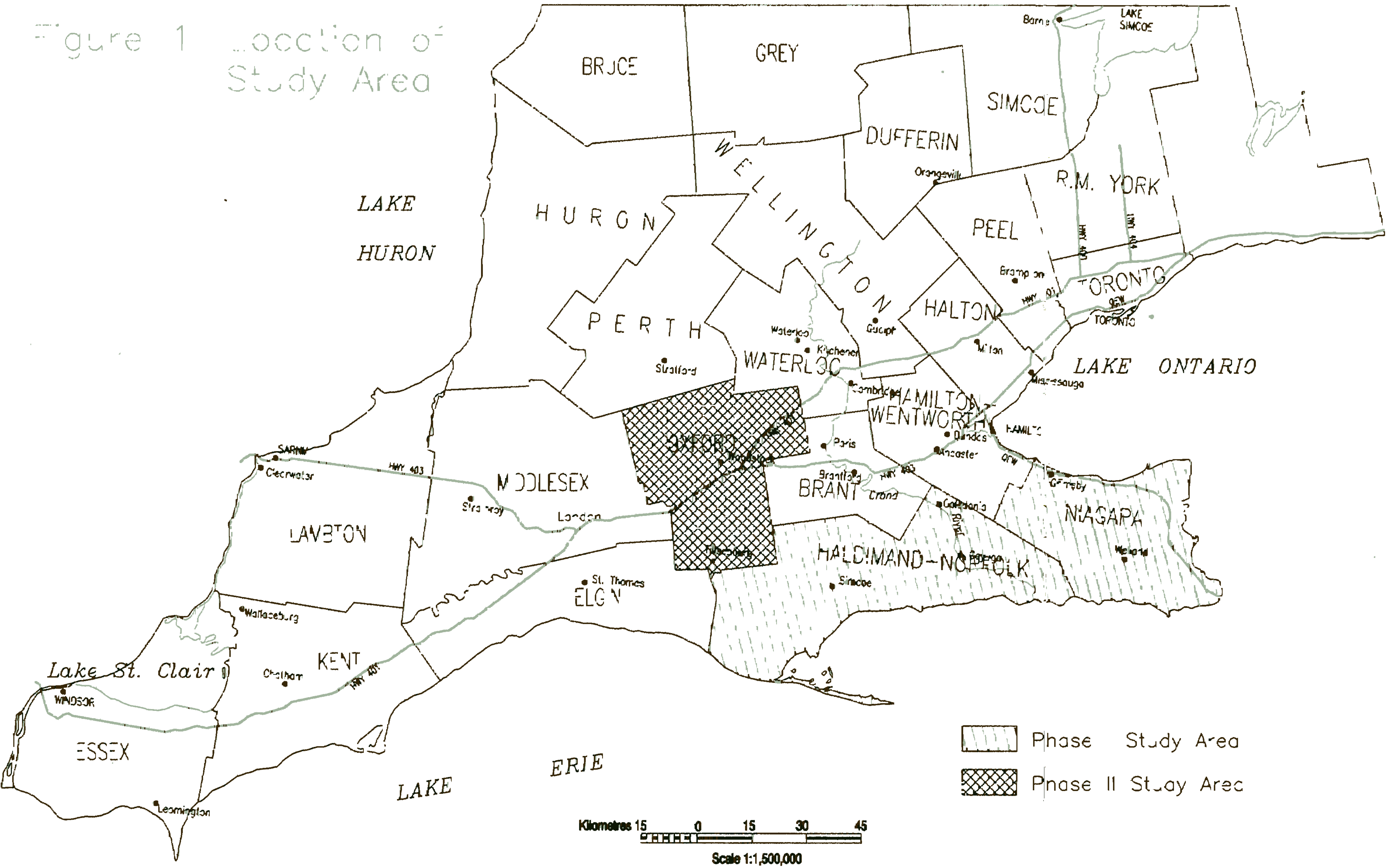
1. The compilation and comparison of relevant databases to assess the quality of the SLC database.

2. The development and application of a sampling methodology to determine the soil attribute variability in the landscape and to compare field observations to SLC mapping and the SLC database (Phase I sampling).

3. Development of a sampling methodology that can be applied to a broad area (i.e., Oxford County) using the SLC polygon boundaries and database.

Figure 1 illustrates the study areas for the second and third study components (i.e. Phase I and Phase II sampling areas).

Figure 1 Location of Study Area



2. BACKGROUND

2.1 Soil Landscapes of Canada

The "Soil Landscapes of Canada" is a small-scale planning tool used to assess the land use potential for large areas of Canada. The SLC is a combination of a computerized database of soil and land attributes and mapping at a scale of 1:1,000,000 illustrating soil landscape polygons. There are 23 maps that illustrate these soil and land attributes nationwide. Southern Ontario is depicted on one map.

The maps are comprised of polygons each having a unique number and described in terms of a standard set of attributes considered important for plant growth, land management and terrain sensitivity. These major attributes are used to differentiate one polygon from another. They include:

Ë mode of deposition;
Ë texture group of parent material;
Ë soil development (soil taxonomic classifications);
Ë surface form;
Ë slope class; and
Ë kind of rock outcrop or other material surface.

The majority of soil landscape polygons in southern Ontario are relatively complex, having a dominant and subdominant component. Several polygons also contain inclusions. For polygons having a dominant and subdominant component, 70% of the polygon is considered to be the dominant component and 30% the subdominant component. For those polygons having inclusions, 60% of the polygon is considered the dominant component, 25% the subdominant component and 15% the inclusion. These percentages are for calculation purposes. In fact, a soil landscape must comprise at least 40% of the polygon to be considered a dominant component. A subdominant component ranges between 16% and 40% of the polygon and inclusions represent a maximum of 15% of the polygon.

Additional information for each SLC polygon is located in the extended legend provided with each SLC map. It provides descriptions of the major soil and land attributes (except texture group) for the dominant and subdominant components of the SLC polygon as well as other important soil attributes and non-soil features such as rock outcrops and water bodies. These additional attributes are:

Ë textural class of the parent material;
Ë surface texture class;
Ë drainage class (i.e., rapid, well, moderately well, imperfect, poor, and very poor);
Ë calcareousness of parent material;
Ë depth to water table (dominant only);
Ë type of compacted, consolidated, or contrasting layer (dominant only);
Ë depth to compacted, consolidated, or contrasting layer (dominant only); and,
Ë soil landscape inclusion.

Not published with the SLC mapping and report but also available digitally in ASCII format is the detailed computerized legend. This database contains the full array of soil and land attributes describing each component and inclusion for every SLC polygon.

The source for most of the SLC data is derived from county level soil survey reports. The soil survey information contains detailed descriptions of the physical and chemical attributes for the soils mapped. This information is stored electronically in the National Soil Database in CanSIS. The physical and chemical attributes of a soil as described by its' modal description in the soil survey report is recorded by the SLC detailed computerized database. The attribute data, however is considered to be general and applies to large areas of land rather than site specific. Where attribute data is quantitative it is expressed as the most likely numeric value.

There are, however, inconsistencies in the data as a result of changing soil survey methods over the years.

As an example, organic carbon measurements recorded for a particular soil type in one soil report may be higher than what would be expected in an agricultural field under a continuous row cropping land use system. This is because in the older soil surveys, soil samples were often taken along hedge rows or in wooded areas not in the fields. Therefore, these measurements may not be indicative of the actual organic carbon contents of lands in agricultural production.

The values provided by the SLC in the detailed extended legend must be assumed to be very general values and not precise measurements .

This study will develop, test and apply a method of sampling important soil attributes in order to characterize, on a broad scale, soil landscape polygons in Ontario. Along with data collected in the field, detailed soil information contained in the soil surveys of Niagara and Haldimand-Norfolk will be used to develop the methodology and make comparisons between the quality of the SLC database and the detailed map information. Similar comparisons between the SLC database and the Oxford County mapping were also made to assess the SLC data quality of an area mapped at a different scale.

Other data sources such as physiographic mapping and generalized soil mapping were reviewed and compared to the SLC mapping. Extensive use of this information was not made because the detailed soil information provides more useful and detailed information.

2.2 Data Sources

As discussed previously, the full array of soil and land attributes contained in the SLC are found in the detailed computerized legend. These data were obtained digitally in ASCII format along with the SLC map and polygon digital files. The methodology used for map compilation and a description of the soil and land attributes is contained in the soil landscape of Canada, Procedures Manual and Users Handbook.

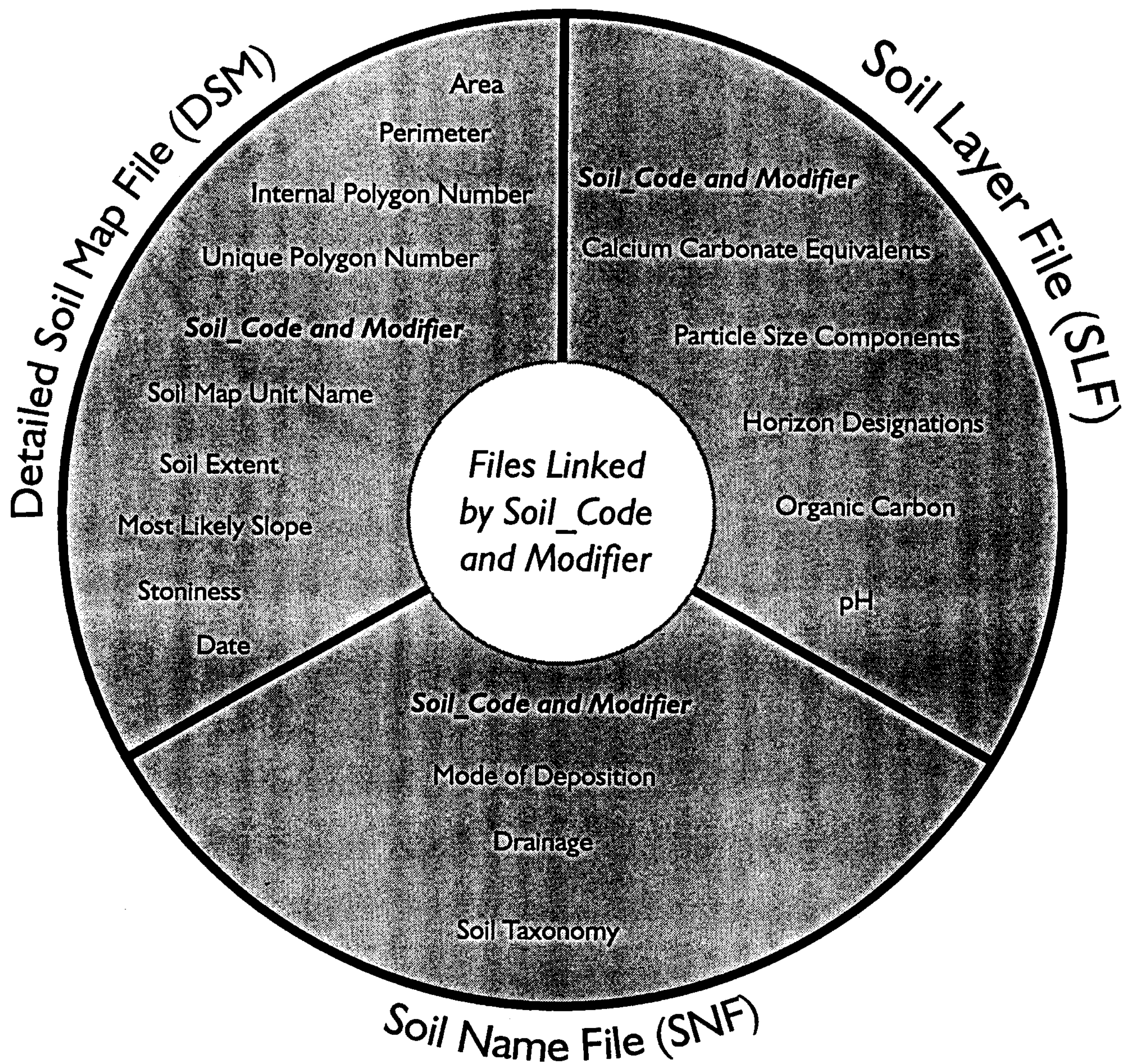
The Niagara and Haldimand-Norfolk soil survey reports and maps (1:25,000) and the Oxford County soils report maps (1:63,360) provide more detailed soil attribute data. The larger scale soil maps and the attribute data are available digitally as part of the National

Soil Database in CanSIS. The data files used include the *detailed soil map unit file* (DSM), the *soil name file* (SNF) and the *soil layer file* (SLF).

The DSM contains information from the larger-scale soil inventory mapping. It provides information such as the *area*, *perimeter*, *internal polygon number*, *unique polygon user number*, *soil map unit name*, soil as designated by the *soil code* (soil series) and *modifier* (soil series phase), *soil extent*, *most likely slope %*, *stoniness*, and *date*.

The soil code and modifier is linked to the Soil Names File (SNF) and Soil Layer File (SLF). The information obtained from the SNF includes the *mode of deposition, drainage*, and *soil taxonomy*. The information obtained from the SLF includes *horizon designations, particle size components, organic carbon* and *pH* in *calcium chloride.* Figure 2 illustrates how the three database files are linked.

Figure 2: Linkage of Database Files



3. PROCEDURES USED TO ASSESS SLC DATABASE AND DEVELOP SAMPLING METHODOLOGIES

The following section discusses the procedures and methodologies used for each of the three study components. The first component of the study was an assessment of the SLC database by comparing it to the more detailed information contained in the soil data files DSM, SNF and SLF.

The second component, Phase 1 sampling, relied heavily on the information generated by the database assessment. It was designed to determine soil attribute variability throughout the soil landscape and at several locations within an SLC polygon. This information was then used in the design of a methodology that can be applied on a broad scale. The results from this part of the study also contributed to the quality assessment of the SLC database and the mapping.

The final component, the development of a standardized sampling methodology applicable to broad geographic area (Phase II sampling), was developed after consideration of the results of the two earlier study components.

3.1 Assessment of the SLC Database

3.1.1 Choosing SLC Polygons

The first step in the assessment of the SLC database quality was choosing candidate SLC polygons. Five soil landscape polygons were chosen based on their location, size, and complexity. Soil landscape polygons were selected in the Regional Municipalities of Niagara and Haldimand-Norfolk because there is relatively recent soil survey information for these two regions and similar soil survey methods were employed. Both regions are adjacent to each other, thereby providing data over a large area incorporating many different physiographic regions and landforms.

A list of candidate SLC polygons was composed. A number of these polygons extended outside of one or both regions. As a result, DSM information, having a common survey intensity and mapping scale, could not obtained for these polygons. Therefore, SLC polygons not entirely inside the study area were eliminated. This process significantly reduced the number of candidate polygons.

The remaining polygons were assessed as to their complexity and modes of deposition. Complex polygons have significantly different components. An example of a simple polygon would be components having similar modes of deposition but a different textural groups of the parent material. An example of a complex polygon is a dominant component of glaciolacustrine fine sandy loam and the subdominant component a morainal clay loam. Polygons 52 and 53 are examples of a simple and complex polygon, respectively. It should be noted that this assessment of complexity differs from the complexity class of polygons identified by the SLC in the detailed computerized database. Five polygons were then selected from the list of candidate polygons.

3.1.2 Comparison of Databases

3.1.2.1 Correlation of Databases

To compare the SLC component descriptions to the DSM descriptions, the DSM polygons were overlayed onto the selected SLC polygons using ARC-INFO GIS procedures. The detailed computerized legend was combined with the DSM, SNF, and SLF in D-Base format to form one large database (SLCDSM.DBF). The SLCDSM.DBF file formed the basis for all analysis of the SLC database by comparison to the three detailed county level soil map files.

The distribution of the soil names was then determined for each SLC polygon. The DSM provides the Soil Map Unit Name for each soil polygon mapped. The Soil Map Unit Name is derived from the Soil Code and Modifier which links the DSM to the SNF and SLF databases. These three databases provide data similar to the SLC database. The fields in the SLC database could then be directly correlated to most of the fields in the detailed soil map databases.

There were, however, cases where the data had to be modified in order to make direct comparisons. For example, the soil layer file provides the particle size components for the Soil Code and Modifier whereas the SLC provided a textural class. A programme was obtained from the Ontario Centre for Soil Resource Evaluation (OCSRE) that analyzed the particle size distribution and assigned it to a textural class. This programme was modified slightly to provide the direct comparison between the SLC and the more detailed database.

In other cases correlations could not be made. Slope and landform can not be directly correlated. The DSM file provides up to seven slope gradient classes. The maps units are assigned a slope class of either A, B, C, D, E, F, or G with slope percentages of 0-0.5%. 0.5-2%, 2-5%, 5-9%, 9-15%, 15-30%, and 30-60%. There are six slope gradient classes identified by the SLC, 1-3%, 4-9%, 10-15%, 16-30%, 31-60% and >60%. First two slope classes for the SLC include the first four DSM slope classes and therefore they can not be directly correlated. The DSM slope information was used, however, to provide general slope characteristics of the SLC polygon and to assist in choosing sample locations.

In describing the landform of an SLC polygon a much broader area is considered than the more detailed mapping. Landform is not recorded in any of the more detailed soil map data files (DSM, SNF, and SLF). Therefore, no comparisons between the two databases can be made with regard to landform.

To identify the main components of the SLC using the DSM data, soils were grouped using three of the major attributes of the SLC that can be directly correlated to the DSM, namely the *texture group of the parent material, mode of deposition* and *soil development*. Each soil in a “Soil Group” has a similar textured parent material, mode of deposition and taxonomic classification. The percent distribution for each soil in the group and a total percentage for each Soil Group was determined. The Soil Groups with the highest percentages were identified as the main soil landscape components of the SLC polygon. These components were then compared to the SLC description of the polygon.

Other information also included was the area weighted slope, drainage and total hectares for each soil name. The area weighted slope was used in combination with percent occurrence distribution to target soils and slopes for sampling in the field. Drainage was used to double check the taxonomic classifications. For instance, all poorly and very poorly drained soils should be Gleysolic soils.

3.1.2.2 Creating Soil Groups

Soil Groups are formed from soils having the same taxonomic classification, mode of deposition, and a parent material of similar textural group. The SNF and SLF is the source of this information. The SNF provides the soil taxonomy, and mode of deposition. The SLF provides the texture group for the parent material.

Soil Groups were created by extracting 20 fields from the SLCDSM.DBF file. These fields and their source are summarized below.

SOIL_CODE1(2)	provides a three letter abbreviation of the soil name - DSM
MODIFIER1(2)	indicates the phase of the soil - DSM
EXTENT1(2)	indicates the % the soil occupies in DSM polygon - DSM
HECTARES	provides the area of the DSM polygon - DSM
SLOPE1(2)	indicates the most likely slope - DSM
POLYNUM	identifies the polygon number - SLC
SOILNAME1(2)	indicates the soil series - SNF
DRAINAGE1(2)	identifies the soil drainage - DSM
MDEP_11(2)	provides the mode of deposition - SNF
MDEP_21(2)	provides the second mode of deposition if present - SNF
G_GROUP1(2)	provides the taxonomic classification - SNF

The SOILGRP.DBF file was created by modifying the above fields to provide the following:

POLYNUM	(The SLC polygon number)
SOILNAME	(a combination of SOIL_CODE and MODIFIER for both SOILNAME 1 and 2)
AREAWTSLOP	(area weighted slope derived from SLOPE and EXTENT for each soil)
SOILDEV	(derived from the G_GROUP)
MDEP1	(mode of deposition)
MDEP2	(second mode of deposition if present)
TEXGROUP	(the textural group of the parent material, generally refers to the MDEP1 field, however, if MDEP2 horizon is judged to be more important the textural group applies to MDEP2)
DRAINAGE	(indicates the drainage associated with the soil name)
THA	(total hectares of the soil series in the SLC polygon)
PERCENT	(the percent occurrence of the soil in the SLC polygon)

SOILGRP.DBF was then created by sorting the fields first by SOILDEV, then by MDEP1 and finally by TEXGROUP. Soil Groups are formed where the fields SOILDEV, MDEP1 and TEXGROUP are similar. The PERCENT column subtotals each Soil Group. Non-soil features (eg., urban or not mapped areas) have been removed from some of the polygons and therefore, the subtotals do not add up to 100%.

Both the SLCDSM.DBF and SOILGRP.DBF files are included electronically on a 3.5" disk in Appendix A. A hard copy of SOILGRP.DBF is also included in Appendix A.

3.1.2.3 Comparison of Soil Attributes

For this component of the study, the key soil attributes are percent Organic Carbon, pH (in $CaCl_2$) and surface texture. The SLC attributes were compared to the detailed soil map information. The two databases are compared to determine whether the databases are consistent with each other. The SLC attributes are derived from the detailed computerized legend. Two values are given, one for each of the dominant and subdominant components. They are found under the DOMSRFTX, SUBSRFTX, DOMPHCAL, SUBPHCAL, DOMORGAN, AND SUBORGAN fields. They represent the soils listed under the fields DOMNAME1 and 2 and SUBNAME1 and 2.

The soil attribute data from the detailed soil map data is obtained by linking the DSM and SLF files through the Soil Code and Modifier. The ORGCARB and PHCA fields under LAYER_NO 1 were recorded. To determine surface texture, the textural fields under LAYER_NO 1 were recorded and converted to textural classes by the OCSRE programme referred to earlier.

3.2 Phase I Sampling Methodology

Phase 1 sampling was designed to identify a landscape position appropriate for sampling on a broad scale. This position ideally would be the least variable position in the landscape in terms of the key soil attributes.

The larger Soil Groups (those comprising the largest percentage of the polygon) were targeted for sampling. Generally Soil Groups greater than 15% of the polygon were sampled.

3.2.1 Sampling Procedure

The following methodology was used to collect soil samples to characterize the soil attribute variability within the soil landscape.

Step 1. <u>Choose candidate SLC polygons</u>.

Step 2. <u>Using the relevant soil maps, target 3 locations to sample a Soil Group within an SLC Polygon (up to a maximum of three Soil Groups per polygon).</u> Slope information was derived from the DSM and modified to provide an area weighted slope percentage. It was used to identify appropriate slope gradients for sampling.

Step 3. <u>Locate sample locations in the field; confirm 'target soil' and delineate soil landscape positions from upper slope to lower slope</u>. A hand held auger was used to expose the soil profile and confirm the soil type prior to sampling. If soil was not the 'target soil' but still a significant member of the Soil Group it was sampled. If the soil was not a member of the targeted Soil Group it was not sampled.

Step 4. <u>Sample three landscape positions at each sample location (the upper, mid and lower slope positions) and obtain three samples at each landscape position.</u> Each sample consisted of the upper 15cm of the soil. A total of nine samples per site were taken. Sampling did not occur outside of the targeted Soil Group.

Step 5. <u>Take a composite sample along the length of the slope from the upper most landscape position to the to the lowest</u>. One composite sample was taken at each sample location. Each composite sample was comprised of 30 samples. Ten samples from each of the upper, mid and lower slope positions equidistant apart The composite sample provides the central tendency across of the landscape. The reliability can be determined by comparing the central tendency to the results obtained from the samples taken from the three different slope positions.

The soil samples were analyzed for pH in $CaCl_2$, organic carbon content, and particle size. The data were statistically analyzed to characterize each SLC polygon sampled. Soil attributes were then compared within SLC polygons and between SLC polygons to determine if there were significant differences within and/or among polygons.

3.3 Phase II Sampling Methodology

The Phase II methodology is designed to sample soil landscape polygons in Oxford County. The methodology uses similar techniques as used in the first two components of this study and modified in order to apply it to a large area. These are as follows:

Ë The DSM files for Oxford County were combined with the SLF and SNF files. This information was then overlaid onto the SLC polygons in Oxford County.
Ë The percent distribution of the soils within each SLC polygon was then determined. The soils were sorted into Soil Groups.
Ë The Soil Groups that comprised the largest proportion of the SLC polygon were selected for sampling.
Ë The soil series that comprise the largest proportion of the Soil Group selected were then identified and targeted for sampling.
Ë The SLC detailed computerized legend was then used to identify the slope class to be sampled. The SLC was relied upon to provide the most likely slope class for the soil landscape.
Ë The Oxford County Soil map was used to identify potential sample locations. Sample locations were situated at the mid-slope position in agricultural fields. The target soil was confirmed by exposing the soil profile using a hand held auger. The upper 15cm of the surface horizon was sampled. The location of the sample was recorded using a Global Positioning System.

Half of the sample was analyzed for pH, % organic matter and surface texture. The remainder were archived. The analyses of the soil attributes are combined with the GPS locations in a GIS point file. This information is also located on diskette in Appendix A.

4. STUDY RESULTS

4.1 Selection of SLC Polygons

Approximately 28 polygons were identified in the two regions. This number was reduced to 14 candidate polygons, five of which were selected for study based on a range of modes of deposition and complexities.

They are identified as SLC polygon numbers 52, 53, 55, 56, and 428. The polygons 53, and 56 are located in the Fonthill area in the Regional Municipality of Niagara. Polygon 55 is a linear polygon lying north of the Niagara Escarpment between the Niagara River and the Vineland area in the Regional Municipality of Niagara. Polygon 52 is located in the Wainfleet area and straddles both area the Regional Municipality of Niagara and the Regional Municipality of Haldimand-Norfolk. Polygon 428 is located entirely within the Regional Municipality of Haldimand-Norfolk in the Simcoe area. Table 1 identifies the SLC map description of the five polygons. Figure 3 shows the location of these polygons.

Table 1.SLC Polygon Map Descriptions

Polygon No.	Soil Development	Texture Group of Parent Material	Mode of Depositio n	Surface Form	% Slope
52	Gray Brown Luvisol	Loam	Lacustrine	Undulating	1-3
53	Gray Brown Luvisol	Sandy Loam	Lacustrine	Rolling	4-9
55	Gleysolic	Clay	Morainal	Undulating	1-3
56	Gray Brown Luvisol	Sandy Loam	Glacio-fluvial	Undulating	4-9
428	Gray Brown Luvisol	Loam	Lacustrine	Rolling	4-9

4.2 Assessment of SLC Database

4.2.1 Correlation Between Databases

The descriptions in Table 1 are of the dominant component of the SLC polygon. Review of the extended legend shows that each of these polygons also have a subdominant component but no inclusions. For calculation purposes, SLC polygons having two soil landscapes (a dominant and subdominant) and no inclusions, 70% of the polygon is represented by the dominant component, and 30% by the subdominant component. When a polygon has inclusions, the breakdown is 60%, 25% and 15% respectively, for the dominant, subdominant, and inclusions.

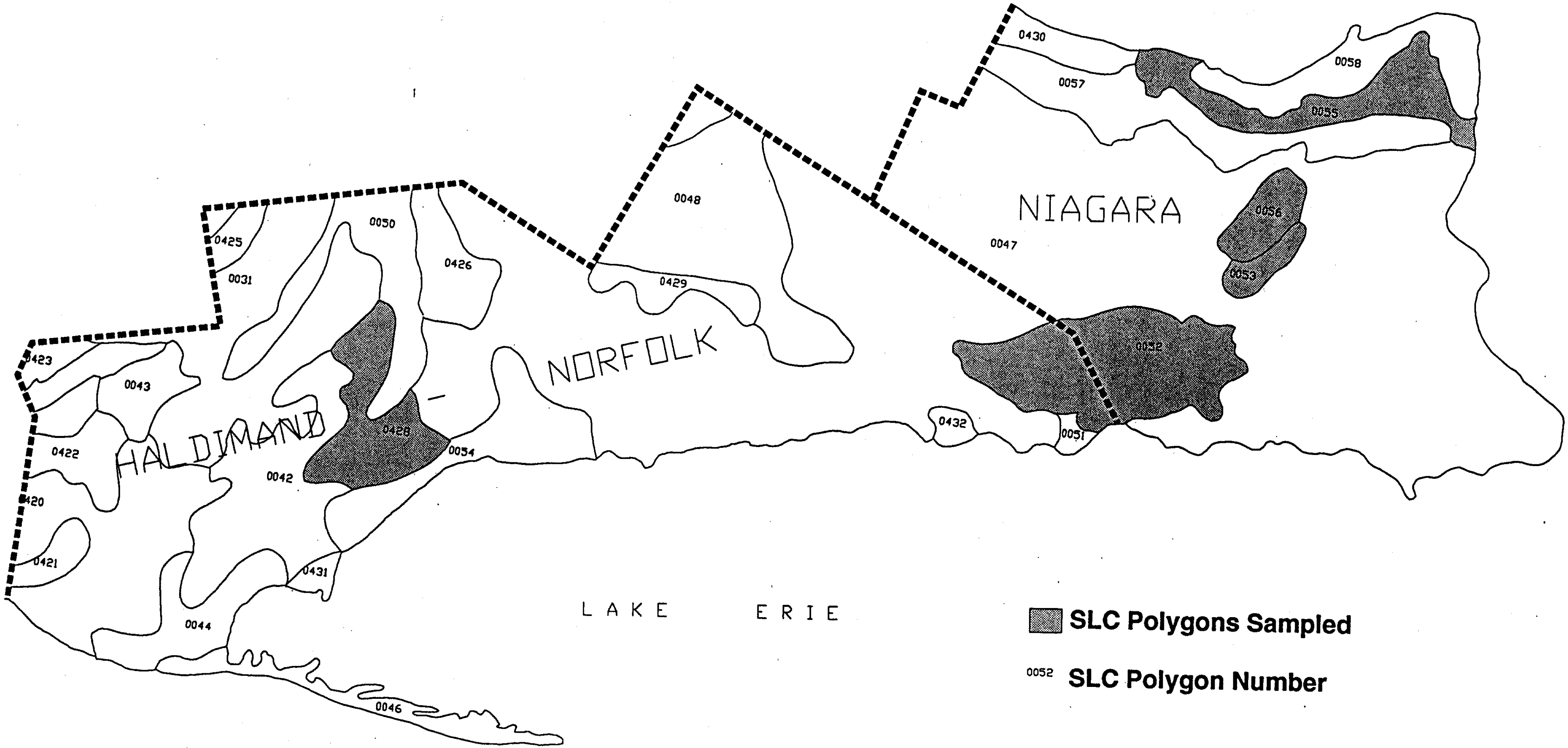


Figure 3. Location of SLC Polygons in Niagara and Halimand-Norfolk.

FILE: 93121_10.DWG

A comparison of the actual soil landscape components (the Soil Groups), as identified by the DSM, to the SLC description of the dominant and subdominant components indicated that there is not a good correlation between the two databases. Table 2 illustrates the actual percent occurrence of the SLC dominant and subdominant components within the SLC polygon. In two SLC polygons (53 and 56), 0% of the SLC components actually occur in the SLC polygons. Only 5% of the SLC components occur in polygon 52 (1% and 4% respectively for the dominant and subdominant components). Six percent of the SLC components are found in polygon 55 (5% and 1% respectively for the dominant and subdominant components).

Thirty-one percent of polygon 428 is represented by the SLC map descriptions (in the dominant component) and the subdominant component is represented by an additional 25% of the polygon. Only 55% of the polygon is correctly identified by the SLC polygon according to the DSM data. None of the components comprise the 40% occurrence required to meet the dominant component criteria.

The detailed map information does not support the descriptions of the dominant and subdominant components for the five SLC polygons studied.

4.2.2 SLC Components

It is apparent that the SLC polygons contain more than two main components and generally their percent occurrence is much less than identified by the SLC. Only in one case was a percentage found to be high enough (64%) that it could be considered a dominant component. For the purposes of this study, Soil Groups representing greater than 15% of the polygon are considered a main component. Soil Groups between 0-15% are inclusions. Main components ranged between 23% and 64% of the polygons with the average being approximately 35% of the polygon.

The detailed soil map information suggests that the SLC polygons can contain several components with percentages ranging between 15 and 40% each.

4.2.3 Soil Names

The SLC detailed computerized legend, provides two soil names for the dominant and subdominant components. Overall, the soil names are not consistent with the SLC map descriptions. The dominant and subdominant soil names identified by the SLC often have different taxonomic classifications, texture groups of parent material and modes of deposition.

For example, the dominant component in polygon 53 is a Gray Brown Luvisol, a sandy loam parent material and a glacio lacustrine mode of deposition. This subdominant component is a Gray Brown Luvisol, clay loam till parent material. The dominant soil names identified by the SLC are Grimsby and Tavistock. Grimsby soils are Gray Brown Luvisols, of glaciolacustrine origin and a sand textured parent material. The Tavistock soil is a Gray Brown Luvisol of glaciolacustrine origin but having a clay textured parent material. The subdominant soil names are Beverly and Colwood. Beverly soils are Gray Brown Luvisols of glaciolacustrine origin and a clay textured parent material. The Colwood soils are humic gleysols of glaciolacustrine origin and the parent material is in the loam textural group.

Tavistock and Beverly are in the same soil group and comprise the second largest component of the polygon. However, the SLC does not describe the Soil Group to which these soils belong. Grimsby and Colwood soils are not listed in Table 2 in any of the main components. The percent occurrence of these two soils in polygon 53 is approximately 5% and 2% for Grimsby and Colwood respectively. Both of these soils are the only representatives for their Soil Group in this polygon. Grimsby and Colwood soils do not represent this soil polygon.

Table **2.** **Comparison of Detailed Soil Map Data to SLC Polygon Data**

SLC Poly-gon #	% of Soil Group within SLC Polygon	Soil Group			SLC Description of Components	SLC Soil Names	DSM Soil Names
		Soil Development	Texture Group of P.M.	Mode of Dep.			
52	1	GBL	L	GLLC	Dominant	Tuscola Beverly	Tuscola* Tavistock
	4	GBL	CL	GLLC	Subdominant	Toledo Berrien	Berrien* Beverly*
	64	HG	CY	GLLC			Welland Lincoln Toledo* Maplewood Wauseon*
	10	GBL	CY	GLLC			Haldimand Beverly* Tavistock* Brantford Niagara
53	0.0	GBL	SL	GLLC	Dominant	Grimsb y Tavisto ck	
	0.0	GBL	CL	TILL	SLC Subdominant	Beverly Colwoo d	
	36.0	HG	CY	GLLC			Wauseon Toledo* Maplewood*
	23.0	GBL	CY	GLLC			Tavistock* Brantford Beverly*
	14.0	GBL	L	GLLC			Brant* Tuscola* Vittoria Vineland Walsher

Table **2.** **Comparison of Detailed Soil Map Data to SLC Polygon Data**

SLC Poly-gon #	% of Soil Group within SLC Polygon	Soil Group			SLC Description of Components	SLC Soil Names	DSM Soil Names
		Soil Development	Texture Group of P.M.	Mode of Dep.			
55	5	HG	CY	TILL	Dominant	Jeddo Chinga cousy	Jeddo R
	1	HG	L	TILL	Subdominant	Tavisto ck Malton	Jeddo RW* Jeddo W*
	14	HG	CY	GLLC			Welland Jeddo Lr Toledo* Maplewood Lincoln Jeddo L*
	13	HG	CL	TILL			Jeddo*
56	0.0	GBL	SL	GLFL	Dominant	Fonthill Grimsb y	
	0.0	GBL	SD	GLFL	Subdominant	Fonthill Fox	
	33	GBL	CY	GLLC			Brantford* Haldimand Beverly* Tavistock Bookton
	15	GBL	SD	GLLC			Fox* Grimsby* Brady
	14	MB	SD	GLFL			Fonthill
	13	GBL	LM	GLLC			Brant Vittoria Tuscola Vineland Walsher
428	30	GBL	LM	GLLC	Dominant	Brant Fox	Oakland Tuscola Brant* Walsher* Vittoria*
	25	GBL	SD	GLLC	Subdominant	Plainfiel d Walsing ham	Fox* Normandale Brady Watford
	15	GBL	SD	EOLI			Plainfield* Walsingham*

* Most commonly occurring soil in Soil Group

Similar discrepancies exist for each of the SLC polygons studied. The SLC soil names are not consistent with the description of the SLC dominant and subdominant components. The soil names often represent three different Soil Groups although the SLC only describes two components.

The soil names are comprised of soils from several catenas. The percentage of the polygon represented by the soils in the catena is higher than the SLC map descriptions in all 5 cases when the percent occurrence is totalled for each soil in the catena. The DSM Soil Groups, however, generally represent a higher proportion of the polygon. Table 3 illustrates the percent occurrence of the polygon represented by the soils in the Catena associated with the soil names for the dominant and subdominant components.

Table **3.** **Percent Occurrence by Catena, SLC and Soil Group**

Polygon #	**# of Catenas Represented by SLC Soil Names**	**% of Polygon Represented by Catenas**	**% of Polygon Represented by SLC**	**% of Soil Groups (>10%) in Polygon**
52	3	66	5	74
53	4	75	0	73
55	3	55	6	27
56	3	28	0	75
428	3	53	46	61

4.2.4 Soil Attributes

The key attributes, surface texture, organic carbon, and pH are not accurately reflected by the SLC database. This is because the values given are for the dominant soil name (DOMNAME1) and the subdominant soil name (SUBNAME1). These soil names do not generally represent a large portion of the SLC polygon. Even the Soil Group to which the soil belongs most often represents an area less than half the SLC polygon (see Table 2).

As an example, in Polygon 56 the DOMNAME1 is a Fonthill. This soil series represents approximately 14% of the polygon. The three soil attributes identified by the SLC for the Fonthill are a sandy loam surface texture, a pH (in $CaCl_2$) of 5.9 and an organic carbon content of 1%. The DSM data provides similar values for the Fonthill soil. However, the Fonthill soil is not representative of this SLC polygon.

Table 2 indicates that the soil group comprising the largest proportion of the SLC polygon (33%) contains mostly Brantford and Beverly soils. These soils represent approximately 31% of the polygon. The surface texture of these soils is a silty clay loam (silt loam for the

Beverly loamy phase). The pH of the Brantford and Beverly soils is 6.7 and 6.6 respectively (6.8 for the Beverly loamy phase) and the organic carbon content is 2.3% to 2.4%.

Although the SLC values are meant to be general, this example shows that there can be significant differences between the soil attributes identified by the SLC and the soil attributes of the more representative Soil Groups.

4.2.5 Reliability and Complexity Classes of Polygon

The detailed computerized legend contains a reliability class and complexity class for each polygon. The Soil Landscapes of Canada Procedures Manual and User's Handbook describe the classes for these two attributes. The Reliability Class of Polygon provides an indication of the confidence that can be placed in derivative interpretations for a polygon and to assist in assigning priorities for future field mapping projects. The reliability class is related to the generalized soil maps from which the SLC is comprised. There are four levels of reliability, Very Low, Low, Medium and High. They were established in relation to the inspection intensity of the soil survey, whether aerial photography was used during field mapping and the publication scale of the soil maps.

The map reliability for southern Ontario is shown generally in an inset on the SLC map. This provides an indication of the map reliability for large areas of southern Ontario based on soil survey source maps but not for individual polygons.

Polygons 53, 55, 56 and 428 are recorded as "High" indicating that the source maps were compiled from modern soil survey maps produced from field traverses at less than or equal to 1.6 km and with the aid of aerial photography. Polygon 52 is designated as "Medium" indicating a lower level of reliability. It is unclear why this polygon is classed as medium because the survey intensity levels and soil survey procedures used should not differ from the other polygons. Perhaps it is because the polygon lies within both Regions possibly reducing the reliability of the polygon due to map unit edging discrepancies between the two Regions.

A "High" class suggests that a high level of confidence can be placed in the interpretive decisions made based for four of the five SLC polygons investigated and a "Medium" level of confidence for the other polygon. The analysis indicates otherwise. The Reliability Class of Polygon is not meant to be used as a means of determining the accuracy of the SLC polygon description. The reliability class just provides an indication as to the how good the reliability of the map should be based on the source of the information. In fact, it has been shown that there may be poor levels of accuracy between the SLC polygon descriptions and the soil survey map information. The Reliability Class may not appropriately reflect the level of confidence that should be placed on the decisions made for interpretive uses of the SLC.

The Complexity of soil landscape attribute classes is determined from the information provided by the soil maps and the accompanying soil reports. This concept of complexity provides an indication of attribute variability within a polygon, particularly with respect to the classes of parent material deposition modes and soil development. There are three class levels of complexity mapped, Low, Medium and High. These classes provide a warning of variability to anyone interpreting the information presented by the SLC. A "Low" class rating indicates, for interpretation purposes, that the polygon is comprised of uniform soil and landscape attributes. In most cases, such a polygon will have only one dominant component.

For a "Medium" class rating the soil and landscape attributes are variable but predictable. Generally, both dominant and subdominant components exist, each of which have been generalized from no more than two classes of parent material or soil development or both. There may also be an inclusion in the polygon.

A "High" class rating indicates that the soil and landscape attributes are highly variable and unpredictable. Each polygon is composed of dominant, subdominant and inclusion components and each component has been generalized from more than two classes of parent material or soil development or both. This class is used to warn of extreme oversimplification for any interpretations from the extended legend.

Polygons 52, 53, 55 and 56 have a Complexity class of "Medium" and Polygon 428 has a "High" Complexity class. The greater number of component polygons the greater the variability within the polygon. The analysis shows that Polygon 52 is the only polygon that has a component that comprises a portion of the polygon high enough to be considered a dominant component. All other polygons contain a number of components that occur in percentages that are representative of a subdominant component or an inclusion. This would seem to indicate that most of the polygons are highly variable and that the components have been generalized from more than two classes of parent material or soil development or both.

4.3 Results of Phase 1 Sampling Methodology

4.3.1 Soil Groups Sampled

Four of the five soil landscape polygons assessed were chosen for Phase 1 sampling. These polygons are 52, 53, 56, and 428. Polygon 55 was not selected because Soil Groups were poorly represented.

Only one Soil Group and four locations were sampled in polygon 52. This Soil Group, identified as Soil Group 1, represented approximately 64% of the polygon. No other Soil Group comprised greater than 10% of the polygon. Instead of three locations, four were selected in this polygon since there was only one main component. The soils sampled were the Toledo loamy phase and the Wauseon. The slopes sampled were B slopes (0.5-2.0%).

Two Soil Groups were sampled in polygon 53 at a total of six locations. They consisted of Soil Groups 1 and 2 comprising 36% and 23% of the polygon, respectively. The most common soils in Soil Group 1 for this polygon are the Maplewood and Toledo loamy phase. Three locations were sampled, two were Maplewood and one Toledo on B slopes. Soil Group 2 consists primarily of the Tavistock and the Beverly soils. Two Tavistock red phase and one Beverly loamy phase were sampled on C slopes (2-5%).

Three Soil Groups were sampled in polygon 56 at a total of five locations. There is only one main component in this polygon. Thirty three percent of the polygon is represented by Soil Group 3, consisting mainly of Brantford and Beverly soils. Two Beverly loamy phase soils and one Brantford soil were sampled. Brantford soils were sampled on E and F slopes (10-30%). Beverly soils were sampled on C slopes.

One location was sampled in each of the other two Soil Groups, although both Soil Groups comprised 15% or less of the polygon. This was done to increase sample size. Originally it was expected that at least six locations within each polygon would be sampled if each polygon consisted of one dominant and subdominant component. Soil Group 3 represents 13% of the polygon and Soil Group 4 represents 15%. In Soil Group 3, Brant red phase soils were sampled on F slopes (15-30%). Grimsby soils on E slopes (10-15%) were sampled in Soil Group 4.

Two Soil Groups were sampled in polygon 428, Soil Groups 3 and 4. These Soil Groups represent 30% and 25% of the polygon, respectively. Three locations were sampled in each Soil Group for a total of six. Tuscola, Brant and Walsher soils were sampled in Soil Group 3. Tuscola soils were sampled on B slopes, Brant on E slopes and Walsher on C slopes. The soils sampled in Soil Group 4 included the Fox and Watford soils. Two locations on Fox soils were sampled on C and D slopes. One location on Watford soil was sampled on c slopes.

4.3.2 Analyses of Lab Results

There were a total of 21 locations sampled in the four SLC polygons. Nine bulk samples, three from each landscape position (upper, mid and lower slopes) and 21 composite samples were obtained for a total of 210 samples. The lab results are shown in Appendix B. The statistical analysis was performed on these results. The statistical methods included the determination of the Coefficient of Variation, the mean, and standard deviation. The analyses are shown in Table 4 and can be summarized as follows:

- there is a Main Effect in the ANOVA of Polygon for pH and organic carbon;
- there is a Main Effect in the ANOVA of Site for pH and organic carbon;
- there is a Main Effect in the ANOVA of Soil Group for organic matter and pH;
- there is No Main Effect in the ANOVA of Landscape Position for pH and organic carbon;
- there is No Significant Interaction in the ANOVA of Polygon and Landscape Position for pH and organic carbon;
- there is No Significant Interaction in the ANOVA of Site and Landscape Position for pH and organic carbon;
- there is a Significant Difference between all Soil Groups for organic matter; and
- there is a Significant Difference between all soil groups (with one exception, Soil Groups 3 and 4) for pH.

The results indicate that there is significant variability among soil attributes within an SLC polygon at each location sampled. As a result of this variability, no significant difference was detected for organic carbon and pH at the different landscape positions. A Power of the Test was performed and it determined a sample size of one thousand would be required before significant differences could be detected.

There is however, a significant difference between Soil Groups which gives the grouping process used some validity.

The composite sample obtained at each location provided the central tendency across the landscape. The values obtained were very similar to the average values of the bulk samples.

It is difficult to compare the lab results, which are specific to a location, to the SLC values for the soil attributes because the SLC values are more generalized. As well, there is a poor correlation between SLC polygons and the Soil Groups derived from the detailed soil map information. In some cases the values are similar and in others there are significant differences.

4.4 Phase 2 Sampling Methodology

The final stage of the study was the development of a methodology to sample SLC polygons at a broad scale in southern Ontario. The methodology was applied to Oxford County. Using GIS, the DSM, SNF and SLF databases for Oxford County were overlaid on to the SLC polygons. The distribution of the soils within each polygon was determined as described earlier. The soils were sorted into soil groups. The soil groups that comprised the largest percentage of the SLC polygon were then identified as the main components of the SLC polygon.

The assessment portion of this study determined that there were several components or Soil Groups in an SLC polygon. These components comprised on average approximately 35% of the each polygon. This average did not include components that occupy 15% or less of the polygon. There were a significant number of Soil Groups that contained between 10 and 15%. Therefore, for this part of the study, Soil Groups that comprised 10% or more of the SLC polygon were considered components and were sampled.

Table **4.** **Mean and Std. Error Values for Soil Groups by Slope Position**

		Organic Matter						pH					
		Slope Position						Slope Position					
		1		2		3		1		2		3	
Polygon	Soil Group	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error	Mean	Std. Error
52	1	**4.500**	0.285	**5.230**	0.240	**4.700**	1.000	**6.200**	0.153	**6.230**	0.120	**6.667**	0.088
52	1	**3.900**	0.451	**3.800**	0.379	**4.067**	0.203	**6.800**	0.321	**6.667**	0.467	**7.300**	0.058
52	1	**5.500**	0.800	**5.633**	0.318	**6.367**	0.437	**7.350**	0.050	**7.400**	0.000	**7.300**	0.058
52	1	**3.867**	0.203	**3.667**	0.219	**3.567**	0.088	**6.100**	0.153	**6.267**	0.426	**5.533**	0.285
53	1	**4.000**	0.153	**4.000**	0.173	**4.400**	0.231	**6.633**	0.033	**6.800**	0.000	**6.767**	0.033
53	2	**3.300**	0.200	**3.400**	0.321	**3.033**	0.186	**5.467**	0.273	**5.800**	0.351	**5.600**	0.351
53	2	**2.057**	0.240	**3.233**	0.120	**3.000**	0.153	**5.200**	0.252	**6.300**	0.208	**6.500**	0.100
53	2	**3.300**	0.100	**3.700**	0.200	**3.933**	0.285	**4.967**	0.033	**5.333**	0.033	**5.600**	0.058
53	2	**2.033**	0.088	**2.967**	0.088	**3.567**	0.145	**6.767**	0.067	**6.667**	0.088	**6.467**	0.033
53	2	**2.267**	0.176	**1.667**	0.219	**2.500**	0.300	**5.567**	0.088	**5.433**	0.033	**5.467**	0.088
56	2	**2.867**	0.033	**2.567**	0.067	**2.133**	0.033	**5.800**	0.153	**6.133**	0.033	**6.033**	0.067
56	2	**2.233**	0.088	**2.100**	0.265	**2.567**	0.186	**6.200**	0.231	**6.167**	0.418	**6.067**	0.088
56	2	**3.000**	0.000	**2.833**	0.186	**3.100**	1.000	**5.333**	0.601	**4.967**	0.145	**5.200**	0.173
56	3	**2.433**	0.384	**2.567**	0.240	**3.133**	0.145	**5.100**	0.200	**4.500**	0.115	**5.133**	0.296
56	4	**3.033**	0.186	**2.330**	0.133	**2.633**	0.233	**6.200**	0.000	**5.833**	0.167	**6.033**	0.067
428	3	**2.133**	0.067	**2.633**	0.186	**2.933**	0.145	**6.000**	0.115	**5.967**	0.176	**5.900**	0.289
428	3	**3.267**	0.203	**2.233**	0.033	**2.267**	0.088	**6.267**	0.133	**6.500**	0.058	**6.267**	0.067
428	3	**1.167**	0.033	**1.333**	0.067	**1.633**	0.088	**4.400**	0.153	**4.500**	0.289	**4.267**	0.176
428	4	**0.800**	0.058	**1.000**	0.115	**1.200**	0.000	**6.733**	0.088	**4.800**	0.058	**4.867**	0.033
428	4	**1.967**	0.088	**2.333**	0.240	**2.233**	0.176	**5.533**	0.441	**4.500**	0.115	**4.700**	0.000
428	4	**0.933**	0.120	**1.100**	0.100	**1.467**	0.120	**5.700**	0.153	**4.933**	0.088	**4.900**	0.058
52		**4.355**	0.257	**4.592**	0.291	**4.675**	0.336	**6.545**	0.174	**6.642**	0.197	**6.700**	0.227
53		**2.828**	0.190	**3.161**	0.193	**3.406**	0.172	**5.767**	0.176	**6.056**	0.151	**6.067**	0.137
56		**2.713**	0.113	**2.480**	0.098	**2.713**	0.115	**5.727**	0.167	**5.520**	0.197	**5.693**	0.131
428		**1.711**	0.211	**1.772**	0.164	**1.956**	0.147	**5.772**	0.191	**5.200**	0.192	**5.150**	0.177

Soil series were targeted for each main component in each SLC polygon. The SLC Detailed Computerized Legend was used to target the percent slope and surface form to be sampled. The soil map (1:63,360) of Oxford County was used to identify probable locations to sample the targeted soil. For consistency purposes, the mid slope position in agricultural fields was sampled. The mid-slope position is generally the easiest slope position to identify in the field. The soil sample was split, half was analyzed for pH, organic carbon and surface texture. The remainder was archived for future study. The sample locations are shown in Figure 4.

Another method that could have been chosen is to delineate the soil landscape at each location and collect a composite sample from upper slope to lower slope to give the central tendency.

4.4.1 Analysis of SLC Polygon in Oxford County

Soil Groups in Oxford county were created as described earlier. The Soil Groups in Oxford County correlated more closely to the SLC polygon descriptions than they did in Niagara and Haldimand-Norfolk. The Soil Groups for all soils in Oxford County are shown in Appendix C. Table 5 illustrates the correlation between the Soil Group and the SLC database.

Again there were discrepancies between the more detailed soil map data and the SLC descriptions. Some of the variation can be explained by the fact that several of the SLC polygons are not entirely contained within Oxford County. For example, the SLC polygons 30, 40, and 425 identify the dominant soil names 1 and 2 as a Muriel and Gobles soil. These soils are not mapped in Oxford County, although the Huron and Perth soils in Oxford County are similar to the Muriel and Gobles soils mapped in adjacent counties in the more recent soil surveys. Similar circumstances are also found in other polygons.

Five polygons were selected in Oxford County and correlated with the detailed soil survey information. These polygons were selected because they occurred predominantly within the County. Polygon 34 is the only SLC polygon that lies entirely in Oxford County. Polygons 32, 33, 35, and 471 are mostly within the county boundaries. Table 5 compares the SLC description of these polygons to the Soil Groups produced by the detailed soil map information. Significant areas of the remaining polygons were contained in adjacent counties and therefore these polygons were not used in this assessment.

Table **5.** **Comparison of SLC and Detailed Soil Map Data in Oxford County**

SLC Polygon Number	Soil Group Attributes (derived from soil survey maps)	% of Soil Groups (> 10%) in Polygon	SLC Map Attribute Description	% of Polygon Represented by SLC Map Unit	% Area Represented by DOMNAME1 and 2 (from SLC database)	% Area Represented by SLC Components (DOM and SUBDOM) (from SLC database)
32	GBL/TILL/CY	70	GBL/TILL/CY	70	70	78
33	GBL/TILL/CY	69	GBL/TILL/CY	0*	69	75
	GBL/TILL/L	12				
	Total	81				
34	GBL/TILL/L	53	GBL/TILL/L	64**	80	83
	GBL/GLLC-TILL/L-CY	15	GBL/TILL/L			
	Total	68				
35	GBL/GLLC-TILL/L-CY	35	GBL/TILL/L	17**	32	35
	GBL/GLLC-TILL/L-CY	32				
	GBL/TILL/L	17				
	Total	84				
471	GBL/GLLC/S	59	GBL/GLLC/S	59	59	67

Soil Development
GBL - Gray Brown Luvisol

Texture Group of Parent Material
S - Sand
L - Loam
CL- Clay Loam
CY - Clay
L-L - Loam over Loam (Honeywood)
L-CY - Loam over Clay (Tavistock)

Mode of Deposition
GLLC - Glaciolacustrine
TILL - Morainal Till
GLLC-TILL - Glaciolacustrine over Till

* The SLC map description of parent material texture group is a Clay Loam, however it identifies the SLC DOMNAME1 and 2 as Huron and Perth soils. These soils are mapped elsewhere in the County as having a Clay texture group for its parent material. If the Clay texture group replaces the Clay Loam texture group for this polygon the percentage represented by the SLC polygon increases to 68%.

** The SLC groups Guelph, Tavistock, and Honeywood soils together and maps the major attributes as GBL/Till/L. The DSM Soil Groups make a distinction between the three soils (GBL/GLLC-TILL/L-CY are Tavistock, GBL/GLLC-TILL/L-L are Honeywood, and GBL/TILL/L are Guelph soils).

There is generally a good correlation between the two databases. Soil Groups are present in percentages equivalent to SLC dominant components. There is often only one main component comprising a significant portion of the polygon.

In four of the five polygons, one dominant soil group is present. The percent occurrence of the SLC map descriptions in the polygon is much higher than observed in Niagara and Haldimand-Norfolk. In Polygons 32, 34 and 471 the percentages range from 59% to 70%. If a change in the texture group of parent material is made from clay loam to clay, the percentage would be 68%. This change is considered appropriate because the dominant soil names are Perth and Huron which have clay parent materials.

The lower percentage observed in Polygon 35 is probably the result of a difference in Soil Groupings for the Guelph, Honeywood and Tavistock soils. If these soils, which are similar in capability, are placed in the same soil group the percentage of the polygon represented by the SLC Map Unit would increase. In fact, the Soil Groups which represent these three soils comprise 84% of the Polygon.

Comparison of the per cent area represented by the SLC components (Domname 1 & 2 and Subname 1 & 2) in Oxford County to similar percentage in Niagara and Haldimand - Norfolk (determined from Table 2), shows much higher correlation to the Soil Names as identified by the SLC. The percentages range between 67% and 83% for Polygons 32, 33, 34 and 471 and 35% of Polygon 35.

The reliability class ratings for all five polygons is "medium". Because of the good correlation between the SLC and the DSM it appears that a "medium" rating is the minimum rating that could be applied to these polygons. A "high" rating may be more appropriate for some polygons.

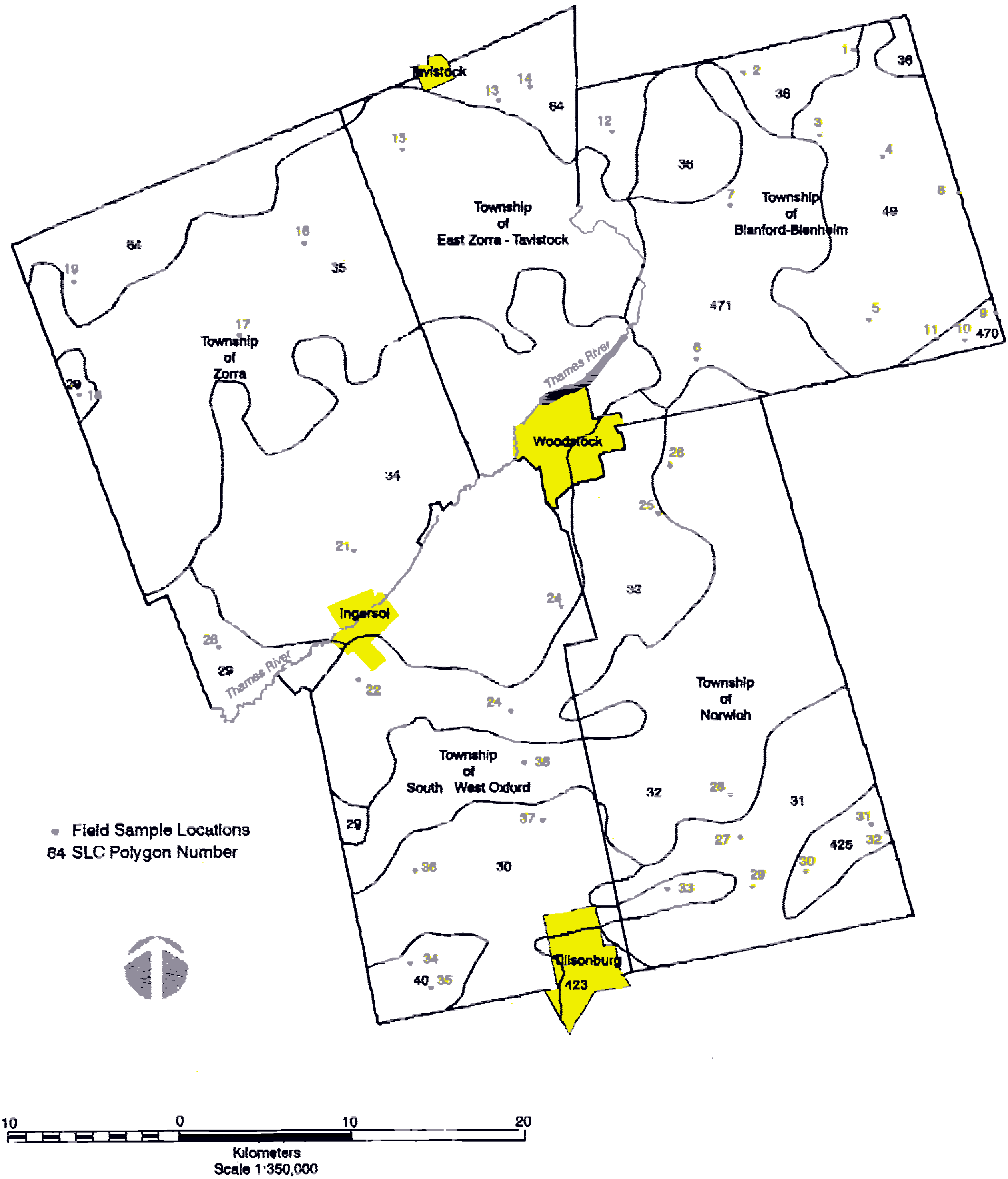
The complexity ratings for these polygons vary. Polygons 32, 35 and 471 are rated as "medium" and polygons 33 and 34 are "low". The analysis of these polygons suggests that most of the polygons are relatively uniform and comprised of one dominant component indicating a complexity rating of "low" would be appropriate (assuming that Honeywood, Tavistock and Guelph soils are grouped together in Polygon 35).

4.4.2 Snap Shot of Soil Quality

The data collected for the key soil attributes serves as baseline information to provide a "snap shot" of the soil fitness under a common agricultural system. It provides a general description of soil quality for that component of the SLC polygon. It also provides a location where detailed soil attribute data can be monitored over time to assess changes in soil quality. The sample locations were recorded using a GPS Garmin 100 Survey II. The accuracy of the GPS unit should enable one to return to the mid-slope position of the soil landscape sampled and within the same agricultural field. One can return to this location in the future to sample the soil and compare the soil attribute data.

The soil attribute data for each sample and the GPS location are contained in a GIS database along with the SLC polygon mapping for Oxford County. The data are located in Appendix A on diskette. Figure 4 illustrates the sample locations in Oxford County.

Figure 4: Oxford County Phase 2 Sample Locations



5. DECISION MAKING AND THE USE OF SOIL SURVEY INFORMATION

5.1 Accuracy and Precision in Soil Mapping

The Soil Landscapes of Canada identifies and maps soil associations delineated by landscapes. It provides very general descriptions of soil and land attributes at a scale of 1:1,000,000 that can be used as background information by decision makers at the regional, provincial or national level. The SLC can provide general soil inventory information that can be related to CLI capability classes and subclasses, thereby providing an indication of the agricultural capability of an area. Land use decisions can be made using the SLC, such as identifying potential areas suitable for growing certain crops or identifying areas susceptible to different soil degradation causes. There are many other possible uses of the SLC under such topics as Agriculture Research Planning and Policy, Education, Northern Terrain Sensitivity Analysis, and Forestry.

The SLC is a compilation of information gleaned from existing soil information sources (mapping and reports) for southern Ontario. Much of the information contained in this mapping is supplemented by inference through expert interpretations (eg. SLC polygon boundaries, slope and landform information). The information sources, the mapping scales and the expert interpretations all have a direct bearing on the accuracy and precision of the mapping.

The accuracy of a map refers to the closeness with which the information conveyed on the map, legend and report, reflect the actual or "true" soil conditions in the field. The term "reliability" when applied to soils maps is often used synonymously with accuracy. Precision is the closeness with which individual pedons from one soil resemble one another. The precision expresses the range or variability of soil characteristics for a soil or map unit. It reflects the specific or general nature of a soil map often referred to as the maps "level of detail" (A Soil Mapping System For Canada, Agriculture Canada, 1981).

The SLC polygons will often contain substantial areas of soils that do not fit the description of the map unit. Although the polygon description attempts to include the majority of the soils occurring in the polygon, the actual soils within the polygon can vary widely from the description of the polygon. The more variable the soils are in an area, the less precise the mapping will be. Also, incorrect inferences made during the map compilation process will further reduce the maps precision as well as its accuracy. For example, large areas may be misrepresented by the SLC map and its database by attributing certain general characteristics to a soil landscape (i.e. soil type, slope, texture, etc.) which do not accurately reflect actual conditions existing in the field.

Small scale soils maps, 1:1,000,000 or smaller should not attempt to identify soils at the series level because of the inherent imprecision. It is more appropriate to map the soil landscapes and taxonomic classifications, i.e., Great Group level, than soil series and phases.

The smaller the mapping scale the larger an area is represented on a map. At 1:1,000,000 an area 1 cm^2 on a map represents approximately 100 km^2 of land. At this level of detail there is inherent imprecision. The reliability of the map is low and variable, limiting the usefulness of the map for more detailed planning purposes (i.e. decisions at the county or township level).

Larger scale mapping provides more specific information for a smaller area. Mapping precision should improve as the map scale and the survey intensity increases. Soil surveys in southern Ontario were mapped at scales ranging from 1:63,360 to 1:25,000. The 1:63,360 scale mapping provides general soils information. This level of detail is appropriate for making more practical planning decisions at the county level. The 1:25,000 scale provides detailed information that is appropriate for making decisions at the local level.

Large scale soil surveys are used for detailed land use interpretations. Where detailed interpretations are required, soil series are divided into soil phases according to changes in soil characteristics which are significant to land use. For example a soil series with a loamy phase may require different management practice than the non-loamy phase of the soil series. The more recent detailed soil surveys in southern Ontario have often defined soil series in a narrower sense than used in the original, more generalized surveys. Detailed soil surveys often identify a greater number of soil series and/or soil phases. They better identify the variation inherent in soils across the landscape. Soil having similar modes of deposition, texture of parent material, and soil development are further divided into phases based on other defining characteristics, thus resulting in a larger number of soil series.

A comparison between Niagara and Haldimand-Norfolk (1:25,000) and Oxford County (1:63,360) mapping illustrates the difference in soil survey mapping scales. There are fewer soil series, soil phases and soil polygons mapped in Oxford County than there are in Niagara and Haldimand-Norfolk. The Oxford County mapping also has more pure map units (map units comprised of only one soil series). Complex map units (map units comprised of two soil series or slope classes) are very common in Niagara and Haldimand-Norfolk soil maps. Oxford County mapping also does not break out soil polygons by slope class further reducing the number of polygons.

Although the more detailed mapping identifies more soil series or phases, these additional soils are relatively similar with respect to their interpretive uses. In Niagara and Haldimand-Norfolk, the soil maps identify many different phases of a soil series, however, the CLI capability of the soil phases is similar to the soil series (with the exception of the peaty phase which is generally reduced by one class). A Haldimand, Haldimand loamy phase, and a Haldimand coarse phase each have a CLI class 3 capability. The interpretive use in this case is similar.

However, for other soil surveys a phase of a soil series can have a significant difference in CLI capability. For instance the shallow phase of a Guelph loam is down graded to class 3r from class 1. Similar reductions in CLI capability are common for changes in surface texture for some soils.

5.2 Reliability Analysis

This section assesses the reliability or the overall accuracy of the SLC mapping and database. The general soil characteristics, slope, and landform information provided by the SLC are generalized from more detailed information. Invariably, the SLC loses the detail provided by the larger scale, county level soil mapping due to cartographic limitations and the compilation methodology. Soil associations delineated by landscape are mapped rather than soil series. The SLC mapping becomes less precise as a result, but this imprecision is acceptable at this level of detail.

Correlation between the detailed soil mapping and the SLC mapping shows this imprecision. There are generally more Soil Groups identified by the detailed mapping. These Soil Groups are not always identified by the SLC mapping or identified in the computerized database. The greater number of Soil Groups within a polygon the more varied the soils are in relation to their mode of deposition, taxonomic classification, and textural group of parent material. The more varied the soils the more imprecise the mapping at a scale of 1:1,000,000.

In Niagara and Haldimand-Norfolk the SLC mapping proved to be unreliable (inaccurate) in comparison to the detailed soil map information and the SLC database, although the catenas associated with the soil names for the dominant and subdominant components were somewhat more reliable (Table 3). As an example, the SLC attempts to identify the soil series associated with the dominant and subdominant components. These soil series should be seen as examples of the soil series common to the soil landscape mapped. However, the soil series identified by the SLC database do not always correspond to the SLC map unit description. In polygon 52 the dominant soil series identified are the Tuscola and Beverly soil series in the polygon. The Toledo and Berrien soil series are identified as the subdominant soil series in the polygon. Polygon 52 is mapped as a Grey Brown Luvisol and correctly identifies Tuscola, Beverly, and Berrien as members of this group. However, Toledo is a Humic Gleysol. Its inclusion is understandable, as within the SLC polygon a significant proportion of the area is occupied by other soil landscapes. It was probably identified and included in this polygon as a result of expert interpretation. The GIS analysis confirmed its presence. It indicated that the dominant or most common soils in this polygon are Humic Gleysols (64%) and that Toledo soil series and its different phases are one of the more common soils (34%) in this polygon (percentages determined from SOILGRP.DBF in Appendix A).

The errors or discrepancies in Niagara and Haldimand-Norfolk are not confined to just one of the three main soil attributes used to group the soils (Table 2). In at least two cases the SLC described a polygon as a Grey Brown Luvisol when in fact the predominant Soil Group was found to be a Humic Gleysol (SLC polygons 52 and 53). In polygon 52, the largest component comprising 64% is a Humic Gleysol and approximately 76% of the polygon is a Humic Gleysol. In polygon 53, however, although the largest component is a Humic Gleysol comprising approximately 36% of the polygon, only 38% of the polygon is a Humic Gleysol. Approximately 48% of the polygon is a Grey Brown Luvisol, although the largest component only represents 23% of the polygon. Grey Brown Luvisol inclusions comprise the remaining 25% of the polygon.

Differences in texture group of parent material were common, but could be considered less severe if they were only out by one class (i.e., a clay vs. clay loam). However, a difference of two or more classes occurred in three of the five polygons. In polygons 52, 53, and 56 the SLC described the texture class of the parent material as either a loam or sandy loam. The texture class of the Soil Group comprising the largest percentage of the polygon as identified by the DSM is a clay. The texture class is correctly described by the SLC for the other two polygons.

The mode of deposition was more consistently identified by the SLC. In only one case was there a significant difference between the SLC description of the mode of deposition and the detailed soil map information. A glaciofluvial mode of deposition was described by the SLC for the dominant component, however, the DSM indicated that the largest component is of glaciolacustrine in origin. Only 14% of the polygon is actually of glaciofluvial origin as identified by the DSM.

In Oxford County the mapping detail is more generalized, as a result of its smaller scale in comparison to Niagara and Haldimand-Norfolk. The correlation between it and the SLC is far better (Table 5). There are fewer Soil Groups comprising greater than 10% of the SLC polygon in Oxford County. This indicates that the mapping did not identify a lot of variation among soils in Oxford County. The less variation within a polygon the greater the precision. The reliability of the SLC mapping for Oxford County is also much better than the SLC mapping of Niagara and Haldimand-Norfolk. There is generally a high percentage of Soil Groups which matched the SLC description of the dominant components (59%-84%). The SLC polygons also were generally comprised of one major or dominant Soil Group.

There are a number of possible reasons for the apparent better reliability in Oxford County than in Niagara and Haldimand-Norfolk.

Mapping Scale and Survey Intensity

The surveys were mapped at different levels of intensity thus providing different levels of detail. One would expect that the detailed surveys could identify a greater range of soils for a given area. As a result, fewer inclusions (soils within a polygon not identified by the map unit symbol or the map legend) of significant size would be contained in a soil polygon. In most cases, the soil polygons in Oxford County are larger than in Niagara and Haldimand-Norfolk and could contain more inclusions than would be identified at a larger scale. Because these inclusions are not identified by the soil survey of Oxford County due to a lower survey intensity, the correlation between it and the SLC is apparently better.

Cartographic limitations due to differences of scale may potentially be a reason for better correlation. The smallest area that can be shown on a map at 1:63,360 represents a much larger area than a similar size polygon mapped at 1:25,000. Many dissimilar soils that could be delineated at a larger scale would not be identified at the smaller scale. In their entirety these small polygons can represent a significant proportion of the area, however, they will not be identified by the mapping or the soil report because of the cartographic limitations. Where these smaller soil polygons are identified, it is not unusual to make an initial attempt at grouping these soils into larger polygons of similar soils followed by their incorporation into the most convenient polygon.

It is possible that if Oxford County was mapped at the same scale and survey intensity as Niagara and Haldimand-Norfolk, the correlation between the two databases may also be poor.

Variability
The three basic map attributes (i.e., soil development, mode of deposition, and texture class of parent material) used by the SLC may be less variable in Oxford County than they are in Niagara and Haldimand-Norfolk. Because Oxford County is a more generalized map than Niagara and Haldimand-Norfolk, it may be that it is easier to correlate it to the SLC.

Polygon Delineation
The soil polygons in Oxford County comprise, in most cases, larger areas than the soil polygons in Niagara and Haldimand-Norfolk, therefore it may have been easier during the interpretive process of map compilation to delineate the SLC polygon boundaries using soil polygon boundaries.

5.3 Risk Analysis

The study indicates that the accuracy level of the SLC mapping varies for the areas studied.

The information for Oxford County suggests that the SLC has good accuracy but low precision. In contrast, the information for Niagara and Haldimand-Norfolk suggests that the SLC has low accuracy and low precision. Where accuracy is high and precision is low it is certainly appropriate to use the SLC information for interpretations at the broad level.

The situation where accuracy is low and precision is low (e.g., Niagara and Haldimand-Norfolk) presents a problem for interpretation of the SLC. In these instances one has to determine how sensitive the decision making requirements are with respect to the anticipated variation in soil characteristics. In other words, one has to undertake a risk assessment to determine potential impacts of a decision. In this case,decisions should be made very carefully and perhaps made in combination with other sources of information when the risk of being wrong could have serious impacts. However, when the impact of a wrong decision is considered to be minimal, the use of the SLC as a general information tool is appropriate.

5.4 Further Work

There are three main areas which require further study. First, this study has developed a methodology to investigate the composition of the SLC polygons using more detailed soil survey data. This methodology can improve the accuracy of the SLC by better defining the soil components. The methodology could also be modified to redraw SLC polygon boundaries in order to reduce the variability of soils in the SLC polygons. This methodology could be applied to all of southern Ontario and even at the national level if problems similar to those observed in Southern Ontario are encountered. Application of this modified methodology at the provincial level would improve the soil database, increase the level of confidence for decision makers, reduce the potential negative impacts as a result of decisions based on inaccurate information, increase the potential uses of the SLC and improve the reliability of the SLC.

The inter-relationship of the major soil attributes used by the SLC to define a soil landscape polygon and their variability over a greater cross section of polygons should be studied. One could then identify the attributes that are most accurately identified by the SLC and which attributes are inherently more variable. This information could then be used as a basis for risk assessments when using the SLC to make recommendations for future interpretations.

This study indicated that the SLC polygons in Niagara and Haldimand-Norfolk (1:25,000) did not correlate well to more detailed soil survey information. This was in contrast to the good correlation observed in Oxford County (1:63,360). In order to conclude whether the correlation observed in Niagara and Haldimand-Norfolk or in Oxford County is more characteristic of the SLC and whether it is related to differences in mapping scale, the SLC database should be assessed in other areas in southern Ontario for soil surveys having different survey intensities.

This study has shown a significant difference between the precision and accuracy of the SLC when compared to more detailed soil survey information. The precision is related to the variability of the soils in an area as identified by the soil survey for the area. The problems associated with the accuracy of the SLC in different areas and scales needs to be investigated further in other areas before any conclusions can be made.

6. SUMMARY

The first component of this study involved assessing the SLC mapping and database quality by comparing detailed soil map information from the relatively recent soil surveys of Niagara and Haldimand-Norfolk. Five SLC polygons were selected and analyzed in these two regions. The analysis involved comparing the SLC map description to the detailed map unit descriptions (DSM).

The results indicated that there is a poor correlation between the SLC and the detailed soil survey information. The SLC mapping and extended legend did not describe the same major attributes as the more detailed information. In two cases (40% of the polygons analyzed) there was 0% correlation between the two databases. In only one case did the detailed map description concur with the SLC description of the dominant component, although not in a percentage high enough to be considered a dominant component (30%).

Further assessment of the database indicated that the soil series identified by the SLC for the dominant and subdominant components did not correlate well to the three major soil attributes mapped, the description of the dominant and subdominant components and the DSM data. The DSM indicated that one dominant and subdominant component may not exist for each SLC polygon. There can be several components in an SLC polygon and the percent distribution of the components varies from one polygon to another. Components that occurred in percentages of 15% and up were considered as a main component since the SLC considered anything less than 15% as an inclusion. The number of components in each polygon ranged from one in Polygon 52 (64%), two in Polygons 53 (36% and 23%) and 56 (33% and 15%), and three in Polygon 428 (30%, 25%, and 15%). There were no components comprising greater than 15% of the polygon in Polygon 55.

A similar quality comparison was also completed for five polygons in Oxford County. These polygons were selected for analysis because the majority if not all of the polygon lies within the boundaries of Oxford County. The detailed soil map information is derived from the 1:63,360 scale soil map of Oxford County.

The correlation between the SLC and the DSM for Oxford improved significantly from the observations noted in Niagara and Haldimand-Norfolk. The soil series that comprised the Soil Groups identified by the DSM corresponded well to the description of the SLC map unit and the dominant component. The DSM indicated that between 59% and 84% of the SLC polygon contained the dominant component described by the SLC. The composition of the SLC polygon in terms of the dominant component is much closer to what the SLC describes as the dominant component (an estimated 70% of the polygon).

There was good correlation between the DSM and the SLC in terms of the soil series observed by the DSM and the soil series identified in the SLC's detailed computerized legend for the dominant and subdominant components. Similar soil series were identified by both the DSM and the SLC. Percent correlation between the two databases was 78%, 75%, 83%, 35%, and 67%, for polygons 32, 33, 34, 35, and 471, respectively. The percent correlation in Polygon 35 would increase to 84% if the soil series Guelph, Honeywood, and Tavistock were all in the same Soil Group instead of three different ones. Since the interpretive uses of these three soils is similar, this grouping should be considered.

The SLC provides values for the soil attributes listed in the detailed computerized legend. The three soil attributes this study looked at included, soil pH (in $CaCl_2$), percent organic carbon and surface texture. These values may be misleading in polygons where the soils identified by the SLC do not occur in the proportions described by the SLC. The values provided by the SLC are very general. A range of values may be of more use than just the mean value provided by the SLC.

However, results of field samples taken for the second component of the study, indicated that these attribute values can vary significantly.

The second component of the study involved analysis of pH, percent organic carbon and the particle size distribution obtained from soil samples of the upper 15 cm of the soil profile. Statistical analyses of the values for pH and percent organic carbon indicated that there is a significant variability among soil attributes within an SLC polygon and at each location sampled. There was a significant difference among three of the four Soil Groups. There was no significant difference detected for organic carbon and pH for the different landscape positions.

These results indicated that there was not one landscape position that was less variable than another. Therefore, for the third and final component of the study, it was decided to always sample the mid-slope position. The methodology developed to sample SLC polygons on a broad scale employed the detailed soil survey data (DSM, SLF, and SNF) for Oxford County and the SLC data to identify the SLC's main components. These components or Soil Groups were then sampled if they comprised at least 10% of the polygon. The soil samples obtained for the SLC polygon components identified in Oxford County each have GPS locations associated with them.

SLC generally contains good information for soil and land attributes at a scale of 1:1,000,000. The polygon descriptions, although not always accurate, most often provide some relevant information regarding the soil and land attributes. That is, of the seven main attributes used to describe a dominant soil landscape, the SLC will accurately describe some of the attributes that actually occur in the polygon based on larger scale soil survey information. However, the accuracy of the map unit descriptions as a whole can vary significantly even when the number of attributes is reduced from seven to three (i.e., soil taxonomy, mode of deposition, and textural group of parent material).

In its present form, the existing SLC data could lead to poor decisions or misinterpretations of the soil and land resources. More investigation is necessary in other areas and at different mapping scales before an assessment of how likely one is to make a poor decision or conclusion based on the SLC data.

The methodology developed provides a means for assessing the reliability of the SLC polygon descriptions based on more detailed data sources, i.e., the county level soil maps and associated soil reports. It also provides a means of updating the soil landscape polygons using quantitative soil data derived from the National Soil Data Base and thereby putting less reliance on inference during the map compilation process.

APPENDIX A

Database Files

1. **SOILGRP.DBF (hard copy)**

2. **Diskette**
   - Ë **SLCDSM.DBF**
   - Ë **SOILGRP.DBF**
   - Ë **GPS.E00 (soil attribute data and GPS locations)**

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LAB  2
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        -1         0         0         0         0         0         0
IFO  2
GPS.BND                      XX   4   4  16         1
XMIN              4-1    14-1  12 3 60-1  -1  -1-1                   1
YMIN              4-1    54-1  12 3 60-1  -1  -1-1                   2
XMAX              4-1    94-1  12 3 60-1  -1  -1-1                   3
YMAX              4-1   134-1  12 3 60-1  -1  -1-1                   4
 4.9313600E+05 4.7437170E+06 5.4528500E+05 4.7972300E+06
GPS.PAT                      XX  28  28 145        38
AREA              4-1    14-1  12 3 60-1  -1  -1-1                   1
PERIMETER         4-1    54-1  12 3 60-1  -1  -1-1                   2
GPS#              4-1    94-1   5-1 50-1  -1  -1-1                   3
GPS-ID            4-1   134-1   5-1 50-1  -1  -1-1                   4
LABNUM            8-1   174-1   8-1 20-1  -1  -1-1                   5
SURVEY            7-1   254-1   7-1 20-1  -1  -1-1                   6
SITE             10-1   324-1  10-1 20-1  -1  -1-1                   7
PM                2-1   424-1   2-1 30-1  -1  -1-1                   8
TOPO             10-1   444-1  10-1 20-1  -1  -1-1                   9
SERIES           10-1   544-1  10-1 20-1  -1  -1-1                  10
SURVEYOR         10-1   644-1  10-1 20-1  -1  -1-1                  11
HORZ              8-1   744-1   8-1 20-1  -1  -1-1                  12
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UP           3-1  824-1   3-1 30-1  -1  -1-1          13
LOW          3-1  854-1   3-1 30-1  -1  -1-1          14
GR           4-1  884-1   4-1 30-1  -1  -1-1          15
VCS          4-1  924-1   4-1 30-1  -1  -1-1          16
CS           4-1  964-1   4-1 30-1  -1  -1-1          17
MS           4-1 1004-1   4-1 30-1  -1  -1-1          18
FS           4-1 1044-1   4-1 30-1  -1  -1-1          19
VFS          4-1 1084-1   4-1 30-1  -1  -1-1          20
SAND         5-1 1124-1   5-1 30-1  -1  -1-1          21
SILT         4-1 1174-1   4-1 30-1  -1  -1-1          22
CLAY         4-1 1214-1   4-1 30-1  -1  -1-1          23
TEXTURE      5-1 1254-1   5-1 20-1  -1  -1-1          24
PH           3-1 1304-1   3 1 40-1  -1  -1-1          25
CACO3        4-1 1334-1   4 1 40-1  -1  -1-1          26
OM           4-1 1374-1   4 1 40-1  -1  -1-1          27
OTHER        5-1 1414-1   5 3 40-1  -1  -1-1          28
 0.0000000E+00 0.0000000E+00        1        1G1     GPLAN  OXFORD     0
          E.S.P.    P036     0  0  10   0   2   6  11  11   30  45  25L
   7.2000000E+00 2.1000000E+00 2.0000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        2       10G10    GPLAN  OXFORD     0
          E.S.P.    P470     0  0   9   2   9  26  15   9   60  32   8SL
   7.0000000E+00 2.4000000E+00 3.8000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        3       11G11    GPLAN  OXFORD     0
          E.S.P.    P470     0  0   1   1   3  10  14  13   41  46  13L
   6.7000000E+00 8.0000000E-01 2.8000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        4       12G12    GPLAN  OXFORD     0
          E.S.P.    P64      0  0   1   1   2   6  10  10   29  48  23L
   7.3000000E+00 1.7000000E+00 4.6000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        5       13G13    GPLAN  OXFORD     0
          E.S.P.    P64      0  0   2   1   3   7  12  14   37  45  18L
   7.3000000E+00 2.0000000E+00 3.9000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        6       14G14                 0
                        0  0   0   0   0   0   0   0    0   0   0
   0.0000000E+00 0.0000000E+00 0.0000000E+00 0.0000000E+00
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 0.0000000E+00 0.0000000E+00        7        15G15    GPLAN  OXFORD    0
            E.S.P.    P35      0  0   1   2   2   3   6  14   27  51  22SI
L   7.2000000E+00 1.8000000E+00 5.7000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        8        16G16    GPLAN  OXFORD    0
            E.S.P.    P35      0  0   3   3   5   9  12  13   42  43  15L
   7.2000000E+00 1.8000000E+00 4.1000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        9        17G17    GPLAN  OXFORD    0
            E.S.P.    P35      0  0   0   0   1   3   6  15   26  56  18SI
L   6.8000000E+00 6.0000000E-01 4.8000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00       10        18G18    GPLAN  OXFORD    0
            E.S.P.    P29      0  0   1   1   2   6  10  11   31  53  16SI
L   7.0000000E+00 5.0000000E-01 4.1000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00       11        19G19    GPLAN  OXFORD    0
            E.S.P.    P64      0  0   5   1   2   5   9  10   27  53  20SI
L   7.4000000E+00 6.7000000E+00 3.1000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00       12         2G2     GPLAN  OXFORD    0
            E.S.P.    P36      0  0   2   1   3  16  30  18   68  24   8FS
L   7.1000000E+00 2.1000000E+00 1.9000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00       13        20G20    GPLAN  OXFORD    0
            E.S.P.    P29      0  0   0   0   1   3  11  39   54  37   9VF
SL  7.2000000E+00 1.4000000E+00 3.7000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00       14        21G21    GPLAN  OXFORD    0
            E.S.P.    P34      0  0   2   1   2   9  15  13   40  45  15L
   7.3000000E+00 1.7000000E+00 4.6000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00       15        22G22    GPLAN  OXFORD    0
            E.S.P.    P33      0  0   5   3   6  16  19  15   59  30  11FS
L   7.1000000E+00 1.6000000E+00 3.8000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00       16        23G23    GPLAN  OXFORD    0
            E.S.P.    P33      0  0   1   1   1   2   6  13   23  53  24SI
L   7.2000000E+00 1.8000000E+00 5.2000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00       17        24G24    GPLAN  OXFORD    0
            E.S.P.    P34      0  0   2   1   5  20  18  12   56  35   9FS
L   6.9000000E+00 1.8000000E+00 2.2000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00       18        25G25    GPLAN  OXFORD    0
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            E.S.P.    P33      0  0   3   2   3   4   6  13   27  56  16SI
L   7.3000000E+00 3.6000000E+00 3.2000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        19         26G26     GPLAN  OXFORD     0
            E.S.P.    P32      0  0   1   1   2   9  15  13   39  42  18L
   7.2000000E+00 1.1000000E+00 3.0000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        20         27G27     GPLAN  OXFORD     0
            E.S.P.    P31      0  0   0   0   1  17  44  17   79  15   6LF
S   7.2000000E+00 2.4000000E+00 2.4000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        21         28G28     GPLAN  OXFORD     0
            E.S.P.    P32      0  0   2   1   2   6   8   8   25  50  25SI
L   7.5000000E+00 1.5000000E+00 2.4000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        22         29G29     GPLAN  OXFORD     0
            E.S.P.    P31      0  0   4   2  10  15  18  13   58  31  11FS
L   7.4000000E+00 3.6000000E+00 2.4000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        23          3G3     GPLAN  OXFORD     0
            E.S.P.    P49      0  0   9   2   5  14  18   9   48  35  17L
   7.1000000E+00 1.5000000E+00 4.2000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        24         30G30     GPLAN  OXFORD     0
            E.S.P.    P425     0  0   2   0   2  10  22  16   50  33  17L
   7.1000000E+00 1.4000000E+00 2.6000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        25         31G31     GPLAN  OXFORD     0
            E.S.P.    P425     0  0   0   0   2  16  43  22   83  11   6LF
S   7.1000000E+00 8.0000000E-01 3.5000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        26         32G32     GPLAN  OXFORD     0
            E.S.P.    P425     0  0   0   0   1  14  44  26   85  11   5LF
S   6.5000000E+00 6.0000000E-01 3.2000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        27         33G33     GPLAN  OXFORD     0
            E.S.P.    P30      0  0   2   1   2   9  14  11   37  44  19L
   7.1000000E+00 1.0000000E+00 3.9000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        28         34G34     GPLAN  OXFORD     0
            E.S.P.    P40      0  0   4   0   1   2   5   9   18  55  27SI
L   7.5000000E+00 1.2000000E+00 5.2000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        29         35G35     GPLAN  OXFORD     0
            E.S.P.    P40      0  0   1   0   0  19  30  15   65  26   8FS
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L   7.2000000E+00 1.6000000E+00 3.7000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        30        36G36    GPLAN  OXFORD     0
                E.S.P.    P30       0  0   1   0   1   1   4  28   35  50  15SI
L   7.3000000E+00 7.0000000E-01 2.7000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        31        37G37    GPLAN  OXFORD     0
                E.S.P.    P30       0  0   0   0   1   3   7  14   26  55  18SI
L   7.2000000E+00 1.6000000E+00 4.4000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        32        38G38    GPLAN  OXFORD     0
                E.S.P.    P32       0  0  13   5   5   5   8  11   35  48  17L
    7.5000000E+00 3.2400000E+01 2.6000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        33         4G4     GPLAN  OXFORD     0
                E.S.P.    P46       0  0   3   0   2   8  24  35   69  25   6VF
SL  7.4000000E+00 1.2700000E+01 1.2000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        34         5G5     GPLAN  OXFORD     0
                E.S.P.    P49       0  0   2   0   3  12  24  15   55  33  11FS
L   7.0000000E+00 1.1000000E+00 2.6000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        35         6G6     GPLAN  OXFORD     0
                E.S.P.    P471      0  0   4   1   4  25  45  14   89   7   4S
    7.3000000E+00 3.0000000E+00 1.8000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        36         7G7     GPLAN  OXFORD     0
                E.S.P.    P471      0  0  16   3   6  22  30  13   74  19   7SL
    7.4000000E+00 3.0000000E+00 2.4000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        37         8G8     GPLAN  OXFORD     0
                E.S.P.    P49       0  0   2   1   3   6  13  15   38  48  14L
    7.4000000E+00 1.6000000E+00 3.5000000E+00 0.0000000E+00
 0.0000000E+00 0.0000000E+00        38         9G9     GPLAN  OXFORD     0
                E.S.P.    P470      0  0   4   2   6  16   9  14   46  45   8L
    7.1000000E+00 2.0000000E+00 2.1000000E+00 0.0000000E+00
GPS.TIC                  XX   3   3  12        4
IDTIC          4-1   14-1   5-1 50-1  -1  -1-1              1
XTIC           4-1   54-1  12 3 60-1  -1  -1-1              2
YTIC           4-1   94-1  12 3 60-1  -1  -1-1              3
        1 4.9313600E+05 4.7437170E+06
        2 5.4528500E+05 4.7437170E+06
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3 4.9313600E+05 4.7972300E+06
4 5.4528500E+05 4.7972300E+06
EOI
EOS

POLY	SOILNAME	AREAWTSLOP	SOILDEV	MDEP1	MDEP2	TEXGROUP	DRAINAGE	THA	PERCENT
0052	PLAINFIELD-2	3.500	GBL	EOLI	-	SD	w	84.81	0.38%
0052	PLAINFIELD-D2	7.151	GBL	EOLI	-	SD	w	180.27	0.82%
0052	WALSINGHAM-2	3.495	GBL	EOLI	-	SD	1	1239.50	5.62%
									6.82%
0052	ALLUVIUM1-2	1.000	GBL	FLUV	-	LM	-	244.74	1.11 %
0052	BERRIEN-T2	3.500	GBL	GLLC	TILL	CL	1	45.83	0.21%
0052	BERRIEN-2	3.435	GBL	GLLC	GLLC	CL	1	813.33	3.69%
0052	BEVERLY-C2	3.330	GBL	GLLC			1	91.58	0.420%
									4.31%
0052	HALDIMAND-2	1.780	GBL	GLLC	-	CY	1	82.06	0.37%
0052	BEVERLY-LR2	1.000	GBL	GLLC	-	CY	1	5.69	0.03%
0052	BERRIEN-1-12	1.000	GBL	GLLC	GLLC	CY	1	120.47	0.55%
0052	HALDIMAND-1-2	1.000	GBL	GLLC	GLLC	CY	1	12.59	0.06%
0052	TAVISTOCK-2	2.911	GBL	GLLC	GLLC	CY	1	607.98	2.76%
0052	HALDIMAND-C2	1.002	GBL	GLLC	GLLC	CY	1	34.11	0.15%
0052	BEVERLY-2	3.855	GBL.	GLLC	-	CY	1	468-15	2.12%
0052	BRANTFORD-2	21.328	GBL	GLLC	-	CY	w	7.36	0.03%
0052	NIAGARA-2	3.500	GBL	GLLC	-	CY	1	16.69	0.08%
0052	BEVERLY-R2	2.094	GBL	GLLC	-	CY	1	48.87	0.220/6
0052	BEVERLY-1-2	2.684	GBL	GLLC	GLLC	CY	1	795.19	3.60%
									9.97%
0052	TAVISTOCK-TR2	2.250	GBL	GLLC	TILL	LM	1	23.87	0.11%
0052	TUSCOLA-2	2.892	GBL	GLLC	-	LM	1	78.44	0.36%
0052	TUSCOLA-R2	3.500	GBL	GLLC	-	LM	1	51.59	0.23%
									0.70%
0052	GRIMSBY-132	7.500	GBL	GLLC	-	SD	w	**2.24**	**0.01%**
0052	NORMANDALE-2	3.181	GBL	GLLC	-	SD	1	13.32	0.06%
									0.07%
0052	VINELAND-132	1.000	GBL	GLLC	-	SL	1	**23.19**	**0.11%**

0052	ONEIDA-R2	3.500	GBL	TILL	-	CY	w	3.67	0.02%
0052	WATERIN-2	1.000	HG	EOLI	-	SID	P	14.86	0.07%
0052	WAUSEON-T2	1.000	HG	GLLC	TILL	CL	p	106.93	0.48%
0052	WELLAND-2	1.000	HG	GLLC	-	CY	p	13.78	0.06%
0052	WELLAND-1-2	1.000	HG	GLLC	GLLC	CY	p	94.51	0.43%
0052	TOLEDO-R2	1.000	HG	GLLC	-	CY	P	45.15	0.20%
0052	TOLEDO-1-2	1.000	HG	GLLC	GLLC	CY	p	3766.62	17.07%
0052	MAPLEWOOD-2	1.000	HG	GLLC	GLLC	CY	p	.1782.01	8.08%
0052	TOLEDO-C2	1.042	HG	GLLC	GLLC	CY	P	1274.25	5.78%
0052	LINCOLN-L2	1.000	HG	GLLC	GLLC	CY	P	60.30	0.27%
0052	TOLEDO-LR2	1.000	HG	GLLC	GLLC	CY	p	5.69	0.03%
0052	LINCOLN-C2	1.000	HG	GLLC	GLLC	CY	p	162.89	0.74%
0052	WAUSEON-2	1.176	HG	GLLC	GLLC	CY	P	3917.11	17.75%
0052	LINCOLN-2	1.000	HG	GLLC	-	CY	P	393.53	1.78%
0052	TOLEDO-2	1.000	HG	GLLC	-	CY	P	2524.02	11.44%
									63.64%
0052	SILVER HILL-2	1.152	HG	GLLC	GLLC	LM	p	231.54	1.05%
0052	COLWOOD-2	1.000	HG	GLLC	-	LM	p	350.37	1.59%
									2.64%
0052	COLWOOD-C2	1.000	HG	GLLC	GLLC	SID	P	17.23	0.08%
0052	ST. WILLIAMS-2	1.000	HG	GLLC	-	SID	p	4.98	0.02%
0052	LOWBANKS-2	1.415	HG	GLLC	-	SD	VP	1360.38	6.17%
									6.27%
0052	FLAMBOROUGH-1	11.000	HG	GLLC	-	SL	p	68.98	0.31%

SOILGRP

0052 0052	OUARRY-2 LORRAINE-2	1.000 1.000	HG HG	UNDO UNDO	- -	CL CL	VP VP	85.76 24.16	0.39% 0.11%
									0.50%
0052	TOLEDO-P2	1.000	HG	UNDO	GLLC	CY	VP	117.32	0.53%
0052	FON HILL-2	7.50~O	M B	GLFL		S D	w	1.77	0.01%
0053	ALLUVIUM1-2	1.000-				CY	-	23.19	1.00%
0053	BERRIEN-2	1.437	GBL	GLLC	GLLC	CL	I	93.61	4.02%
0053	BEVERLY-C2	3.500	GBL	GLLC	GLLC	CL	I	17.66	0.76%
									4.78%
0053 0053 0053 0053 0053 0053 0053	TAVISTOCK-2 BRANTFORD-LR2 TAVISTOCK-R2 BRANTFORD-2 BEVERLY- Y-2 BEVERLY-L2 BEVERLY-LR2	1.520 1.000 2.531 7.500 5.006 2.414 1.000	GBL GBL GBL GBL GBL GBL GBL	GLLC GLLC GLLC GLLC GLLC GLLC GLLC	GLLC GLLC GLLC - - GLLC -	CY CY CY CY CY CY CY	I W I W I I I	151.04 3.33 184.19 4.31 7.40 183.71 3.22	6.49% 0.14% 7.91% 0.19% 0.32% 7.89% 0.14%
									23.07
0053	BRANT-R2	8.811	GBL	GLLC	-	LM	W	73.89	3.17%
0053 0053	BRANT-2 TUSCOLA-2	7.500 2.003	GBL GBL	GLLC GLLC	- -	LM -LM	W I	4.11 98.49	0.18% 4.23%
0053 0053	TUSCOLA-R2 VITTORIA-2	2.047 2.541	GBL GBL	GLLC GLLC	 GLLC	LM LM	I I	81.61 18.46	3.51% 0.79%
0053 0053	VINELAND-2 WALSHER-2	2.464 3.750	GBL GBL	GLLC UNDM	- GLLC	LM LM	I W	50.96 11.53	2.19% 0.50%
									14.57%
0053	GRIiTS-BY-2	4.868	GB-L	GLLC		SD	W	11091	4.76%

SOILGRP

0053	LINCOLN-L2	1.000	HG	GLLC	GLLC	CL	P	2.72	0.12%
0053	MAPLEWOOD-2	1.009	HG	GLLC	GLLC	CY	P	224.47	9.64%
0053	MAPLEWOOD-R2	1.000	HG	GLLC	GLLC	CY	P	92.30	3.96%
0053	TOLEDO-LR2	1.000	HG	GLLC	GLLC	CY	P	53.29	2.29%
0053	TOLEDO-2	1.000	HG	GLLC	-	CY	P	104.59	4.49%
0053	TOLEDO-L2	1.000	HG	GLLC	GLLC	CY	P	308.49	13.25%
0053	WAUSEON-2	1.000	HG	GLLC	GLLC	CY	P	43.34	1.86%
									35.50%
0053	OLWOOD-R2	1.000	HG	GLLC	-	LM	P	37.55	1.61%
0055	ALLUVIUMII-2	1.000		FLUV	-		-	173.00	1.56%
0055	CHINGUACOUSY-	1.232	GBL	GLLC	TILL	CL	I	48.52	0.44%
0055	BERRIEN-2	1.000	GBL	GLLC	GLLC	CL	I	7.15	0.06%
0055	BENNINGTON-2	1.519	GBIL	GLLC	GLLC	CL	W	6.41	0.06%
0055	CHINGUACOUSY-	1.159	GBL	GLLC	TILL	CL	I	51.78	0.47%
0055	TRAFALGAR-1-2	2.964	GBL	GLLC	GLLC	CL	I	40.42	0.37%
0055	BERRIEN-T2	1.291	GBL	GLLC	TILL	CL	I	20.06	0.18%
0055	ONEIDA-L2	7.500	GBL	GLLC	TILL	CL	W	5.51	0.05%
0055	TRAFALGAR-2	1.451	GBL	GLLC	-	CL	I	36.40	0.33%
0055	TAVISTOCK-T2	1.370	GBL	GLLC	TILL	CL	I	213.50	1.93%
0055	PEEL-1-2	1.506	GBL	GLLC	TILL	CL	I	76.95	0.70%
0055	CHINGUACOUSY-	1.351	GBL	GLLC	TILL	CL	I	521.29	4.71%
									9.29%
0055	TAVISTOCK-R2	1.000	GBL	GLLC	GLLC	CY	I	25.85	0.23%
0055	SMITHVILLE-2	7.106	GBL	GLLC	-	CY	w	3.06	0.03%
0055	PEEL-2	1.540	GBL	GLLC	TILL	CY	1	326.52	2.95%
0055	BEVERLY-2	1.398	GBL	GLLC	-	CY	1	142.69	1.29%
0055	BRANTFORD-2	25.095	GBL	GLLC	-	CY	w	18.28	0.17%
0055	TAVISTOCK-2	1.820	GBL	GLLC	GLLC	CY	I	61.41	0.56%
0055	HALDIMAND-2	3.382	GBL	GLLC	-	CY	I	21.41	0.19%
0055	PEEL-C2	1.000	GBL	GLLC	TILL	CY	I	5.19	0.05%

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0055	BEVERLY-L-2	1.493	GBL	GLLC	GLLC	CY	I	67.26	0.61%
0055	CASHEL-29	27.245	GBL	GLLC	TILL	CY	w	167.58	1.51%
									7.59%
0055	VINELAND-B2	1.428	GBL	GLLC	-	LM	I	16.54	0.15%
0055	VINELAND-2	1.604	GBL	GLLC	-	LM	I	407.42	3.68%
0055	TAVISTOCK-TR2	1.313	GBL	GLLC	TILL	LM	I	172.01	1.55%
0055	BRANT-R2	3.500	GBL	GLLC	-	LM	w	1.96	0.02%
0055	TUSCOLA-R2	1.000	GBL	GLLC	-	LM		0.84	0.01%
0055	VITTORIA-R2	1.000	GBL	GLLC	GLLC	LM		14.63	0.13%
0055	TRAFALGAR-S2	1.410	GBL	GLLC	-	LM	I	15.56	0.14%
									5.69%
0055	BRADY-2	1.000	GBL	GLLC	-	SD	I	8.59	0.08%
0055	GRIMSBY-2	3.060	GBL	GLLC	-	SD	w	36.09	0.33%
0055	FOX-2	3.500	GBL	GLLC	-	SD	w	8.59	0.080/6
									0.480/6
0055	CHINGUACOUSY	1.261	GBL	TILL	-	CL	I	483.76	4.37%
0055	ONEIDA-W2	3.500	GBL	TILL	-	CL	w	5.33	0.05%
0055	ONEIDA-2	21.962	GBL	TILL	-	CL	w	80.16	0.72%
									5.15%
0055	CHINGUACOUSY-	1.556	GBL	TILL	-	CY		99.66	0.90%
0055	ONEIDA-R2	17.490	GBL	TILL	-	CY	w	45.73	0.41%
									1.31%
0055	ONEIDA-RW2	3.500	GBL	TILL	-	LM	w	4.94	0.04%
0055	CHINGUACOUSY.	1.754	GBL	TILL	-	LM	I	154.46	1.40%
0055	CHINGUACOUSY-	1.711	GBL	TILL	-	LM	I1	121.27	1.10%
0055	FRANKTOWN-S2	2.250	GBL	UNDM	-	LM	I	6.77	0.06%
									2.60%
0055	MALTON-2	1.000	HG	GLLC	TILL	CL	P	529.64	4.79%
0055	MA EWOOD-T2	1.000	HG	GLLC	TILL	CL	P	4.35	0.04%
0055	MORLEY-2	1.000	HG	GLLC	-	CL	P	81.45	0.74%

0055	WAUSEON-2	1.ooo	HG	GLLC	GLLC	CL	P	3.06	0.03%

SOILGRP

									5.59%
0055	WELLAND-2	1.000	HG	GLLC	-	CY	P	7.49	0.07%
0055	JEDDO-LR2	1.000	HG	GLLC	TILL	CY	P	41.08	0.37%
0055	TOLEDO-2	1.000	HG	GLLC	-	CY	P	961.10	8.69%
0055	TOLEDO-1-2	1.000	HG	GLLC	GLLC	CY	P	93.57	0.85%
0055	MAPLEWOOD-2	1 , 000	HG	GLLC	GLLC	CY	P	8.51	0.08%
0055	MAPLEWOOD-R2	1.000	HG	GLLC	GLLC	CY	P	31.63	0.29%
0055	LINCOLN-2	1.000	HG	GLLC	-	CY	P	203.72	1.84%
0055	JEDDO-1-2	1.000	HG	GLLC	TILL	CY	P	249.74	2.26%
									14.43%
0055	MAPLEWOOD-TR	1.000	HG	GLLC	TILL	LM	P	118.38	1.07%
0055	FLAMBOROUGH-,	1.000	HG	GLLC	-	SL	P	58.45	0.53%
0055	JEDDO-2	1.000	HG	TILL	-	CL	P	1474.61	13.33%
0055	JEDDO-R2	1.000	HG	TILL	-	CY	P	576-19	5.21%
0055	JEDDO-RW2	1.000	HG	TILL	-	LM	P	75.50	0.68%
0055	JEDDO-W2	1.000	HG	TILL	-	LM	P	58.21	0.53%
									1.21%
0055	FONTHILL-2	2.163	MB	GLFL	-	SD	W	66.39	0.60%
0055	RIDGEVILLE-2	1.000	MB	GLFL	-	SL	I	69.54	0.63%
0055	FARMINGTON-V2	9.000	MB	UNDM	-		W	4.01	0.04%

SOILGRP

0056	ALLUVIUMI-2	1.000		FLUV				375.24	9.23%
0056	BENNINGTON-2	3.957	GBL	GLLC	GLLC	C	W	25.96	0.64%
0056	BENNINGTON-R2	3.500	GBL	GLLC	GLLC	CL	W	25.52	0.63%
									1.27%
0056	BRANTFORD-R2	23.821	GBL	GLLC	-	CY	W	90.04	2.22%
0056	HALDIMAND-L2	2.877	GBL	GLLC	GLLC	CY	I	13.16	0.32%
0056	HALDIMAND-2	2.239	GBL	GLLC	-	CY	I	24.08	0.59%
0056	BEVERLY-L2	2.422	GBL	GLLC	GLLC	CY	I	39.48	0.97%
0056	BEVERLY-2	3.207	GBL	GLLC	-	CY	I	543.68	13.38%
0056	TAVISTOCK-R2	1.411	GBL	GLLC	GLLC	CY	I	22.75	0.56%
0056	BRANTFORD-2	18.969	GBL	GLLC	-	CY	W	579.20	14.25%
0056	BOOKTON-R2	3.500	GBL	GLLC	GLLC	CY	W	13.21	0.33%
									32.62%
0056	BRANT-R2	26.946	GBL	GLLC		LM	W	372.44	9.17%
0056	VITTORIA-2	3.500	GBL	GLLC	GLLC	LM	I	19.01	0.47%
0056	VITTORIA-R2	1.000	GBL	GLLC	GLLC	LM	I	7.42	0.18%
0056	TUSCOLA-2	1.000	GBL	GLLC	-	LM	I	7.06	0.17%
0056	VINELAND-B2	1.000	GBL	GLLC	-	LM	I	5.13	0.13%
0056	BRANT-2	12.500	GBL	GLLC	-	LM	W	3.45	0.08%
0056	TUSCOLA-R2	2.911	GBL	GLLC	-	LM	I	7.40	0.18%
0056	VINELAND-2	1.702	GBL	GLLC	-	LM-	I	100.93	2.48%
0056	TAVISTOCK-2	3.500	GBL	GLLC	GLLC	LM	I	5.01	0.12%
0056	WALSHER-2	7.500	GBL	UNDM	GLLC	LM	W	10.85	0.27%
									13.26%
0056	FOX-R2	7.148	GBL	GLLC	-	SD	W	84.67	2.08%
0056	FOX-2	11.771	GBL	GLLC	-	SD	W	7.22	0.18%
0056	GRIMSBY-B2	8.198	GBL	GLLC	-	SD	W	35.19	0.87%
0056	BRADY-R2	1.000	GBL	GLLC	-	SD	I	0.02	0.00%
0056	GRIMSBY-2	14.150	GBL	GLLC	-	SD	W	472.72	11.63%
									14.76%

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0056	TOLEDO-LR2	1.000	HG	GLLC	GLLC	CY	P	1.15	0.03%
0056	TOLEDO-L2	1.000	HG	GLLC	GLLC	CY	P	30.39	0.75%
0056	LINCOLN-2	1.000	HG	GLLC	-	CY	P	14.18	0.35%
0056	TOLEDO-2	1.500	HG	GLLC	-	CY	P	88.18	2.17%
									3.30%
0056	COLWOOD-R2	1.000	HG	GLLC	-	LM	P	111.42	2.74%
0056	MAPLEWOOD-R2	1.000	HG	GLLC	GLLC	LM	P	1.33	0.03%
0056	MAPLEWOOD-2	3.500	HG	GLLC	GLLC	LM	P	2.10	0.05%
									2.83%
0056	GRANBY-2	1.000	HG	GLLC	-	SD	P	1.50	0.04%
0056	FLAMBOROUGH-,'	1.000	HG	GLLC	-	SL	P	43.53	1.07%
0056	GRANBY-PR2	1.000	HG	UNDO	GLLC	SD	VP	0.85	0.02%
0056	HOLLY-2	1.000	HG	UNDO	-	SD	VP	0.36	0.01%
									0.03%
0056	FONTHILL-2	5.464	MB	GLFL	-	SD	w	550.22	13.54%
0056	RIDGEVILLE-2	1.000	MB	GLFL	-	SL	I	18.89	0.46%
0056	FARMINGTON-V2	3.500	MB	UNDM	-		w	4.42	0.11%
0056	FARMINGTON-2	3.500	MB	UNDM	-		w	1.90	0.05%
									0.16%
0428	WATER	0.000	-					14.41	0.13%
0428	URBAN LAND-2	0.000	-					344.08	3.07%
0428	ALLUVIUM1-2	1.000	-	FLUV				532.38	4.74%
									7.94%

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0428	PLAINFIELD-D2	9.469	GBL	EOLI	-	SD	W	1619.85	14.44%
0428	PLAINFIELD-2	9.212	GBL	EOLI	-	SD	W	58.96	0.53%
0428	WALSINGHAM-2	1.659	GBL	EOLI	-	SD		34.92	0.31%
									15.27%
0428	BERRIEN-2	1.484	GBL	GLLG	GLLC	CL		87.14	0.78%
0428	BEVERLY-C2	3.500	GBL	GLLC	GLLC	CL	I	0.01	0.00%
									0. 78%
0428	TAVISTOCK-2	1.016	GBL	GLLC	GLLC	CY		34.24	0.31%
0428	BRANTFORD-2	20.464	GBL	GLLC	-	CY	W	98.59	0.88%
0428	HALDIMAND-L2	1.000	GBL	GLLC	GLLC	CY	I	6.97	0.06%
0428	BRANTFORD-L2	1.000	GBL	GLLC	GLLC	CY	W	25.13	0.22%
0428	BERRIEN-H2	1.000	GBL	GLLC	GLLC	CY	I	12.25	0.11%
0428	BOOKTON-2	3.597	GBL	GLLC	GLLC	CY	W	135.48	1.21%
									2.79%
0428	OAKLAND-2	1.000	GBL	GLLC	GLFL	LM		50,24	0.45%
0428	TUSCOLA-C2	1.185	GBL	GLLC	GLLC	LM		110.21	0.98%
0428	BRANT-C2	3.266	GBL	GLLC	GLLC	LM	W	204.74	1.82%
0428	TUSCOLA-2	1.154	GBL	GLLC	-	LM	I	340.90	3.04%
0428	BRANT-2	11.569	GBL	GLLC	-	LM	W	1178.13	10.50%
0428	VITTORIA-2	1.128	GBL	GLLC	GLLC	LM	I	489.14	4.36%
0428	WALSHER-2	3.696	GBL	UN -DM	GLLC	LM	W	978.33	8.72%
									29.87%
0428	FOX-2	5.016	GBL	GLLC	-	SD	W	1158.49	10.33%
0428	NORMANDALE-2	1.161	GBL	GLLC	-	SD	I	141.23	1.26%
0428	BRADY-2	1.106	GBL	GLLC	-	SD	I	311.65	2.78%
0428	WATTFORD-2	4.081	GBL	GLLC		SD	W	1201.77	10.71%
									25.07%
0428	SCOTLAND-2	3.871	GBL	GLLC	GLFL	SL	W	77.00	0.69%
0428	WILSONVILLE-2	7.391	GBL	TILL	-	SD	W	35.41	0.32%

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0428	WATERIN-2	1.000	HG	EOLI		SD	P	153.63	1.37%
0428	LINCOLN-1-2	1.000	HG	GLLC	GLLC	CY	P	7.78	0.07%
0428	WAUSEON-2	1.000	HG	GLLC	GLLC	CY	P	31.20	0.28%
0428	TOLEDO-2	1.000	HG	GLLC		CY	P	40.38	0.36%
0428	LINCOLN-C2	1.000	HG	GLLC	GLLC	CY	P	29.87	0.27%
0428	TOLEDO-C2	1.000	HG	GLLC	GLLC	CY	P	35.63	0.32%
0428	LINCOLN-2	1.000	HG	GLLC	-	CY	P	16.25	0.14%
									1.44%
0428	SILVER HILL-2	1.000	HG	GLLC	GLLC	LM	P	510.92	4.55%
0428	COLWOOD-2	1.035	HG	GLLC	-	LM	P	386.21	3.44%
0428	COLWOOD-C2	1.000	HG	GLLC	GLLC	LM	P	80.62	0.72%
									8.71%
0428	ST. WILLIAMS-2	1.000	HG	GLLC		SD	P	119.25	1.06%
0428	GRANBY-2	1.000	HG	GLLC		SD	P	325.43	2.90%
									3.96%
0428	VANESSA-2	.1.000	HG	GLLC	GLFL	SL	P	128.84	1.15%
0428	OAKVIEW-2	1.000	HG	UNDO	-	LM	VP	14.43	0.13%
0428	GRANBY-P2	1.000	HG	UNDO	GLLC	SID	VP	37.83	0.34%
0428	HAMPIDEN-2	1.000	HG	UNDO	-	SD	VP	2.70	0.02%
									0.36%
0428	VANESSA-P2	1.750	HG	UNDO	GLLC	SL	VP	17.24	0.15%

APPENDIX B

Laboratory Results from Phase I Sampling

LABSAMPIL

POLY_#	LABNUM	SOIL-GROUP	SOIL-NAME	SITE-NAME	SITE	SITENO	SLOPE-POSI	REP	TEXTURE	TEX_GROUP	DRAINAGE	SLOPE-%	pH	OM
P53	41	1	TOLEDO-L	3 COMP	3	3	4	1	L	3	2	1	5.8	3.1
P53	42	1	TOLEDO-L	3L1	3	3	3	1	L	3	2	1	4.9	2.9
P53	43	1	TOLEDO-L	3L2	3	3	3	2	L	3	2	1	5.9	28
P53	44	1	TOLEDO-L	3L3	3	3	3	3	L	3	2	1	6.0	3.4
P53	45	1	TOLEDO-L	3M1	3	3	2	1	L	3	2	1	5.1	2.9
P53	46	1	TOLEDO-L	3M2	3	3	2	2	L	3	2	1	6.1	3.3
P53	47	1	TOLEDO-L	3M3	3	3	2	3	L	3	2	1	6.2	4.0
P53	48	1	TOLEDO-L	3U1	3	3	1	1	L	3	2	1	5.1	3.5
P53	49	1	TOLEDO-L.	3U2	3	3	1	2	L	3	2	1	6.0	2.9
P53	50	1	TOLEDO-L	3U3	3	3	1	3	L	3	2	1	5.3	3.5
										Average values for site			5.4	3.2
P53	21	1	MAPLEWOOD	2 COMP	2	2	4	1	VFSL	3	2	1	6.6	4.4
P53	22	1	MAPLEWOOD	2L1	2	2	3	1	L	3	2	1	6.7	4.0
P53	23	1	MAPLEWOOD	2L2	2	2	3	2	L	3	2	1	6.8	4.4
P53	24	1	MAPLEWOOD	2L3	2	2	3	3	L	3	2	1	6.8	4.8
P53	25	1	MAPLEWOOD	2M1	2	2	2	1	VFSL	3	2	1	6.8	4.3
P53	26	1	MAPLEWOOD	2M2	2	2	2	2	VFSL	3	2	1	6.8	4.0
P53	27	1	MAPLEWOOD	2M3	2	2	2	3	VFSL	3	2	1	6.8	3.7
P53	28	1	MAPLEWOOD	2U1	2	2	1	1	VFSL	3	2	1	6.6	3.9
P53	29	1	MAPLEWOOD	2U2	2	2	1	2	VFSL	3	2	1	6.6	4.3
P53	30	1	MAPLEWOOD	2U3	2	2	1	3	VFSL	3	2	1	6.7	3.6
										Average values lor site			6.7	4.2
P53	111	I	MAPLEWOOD	5 COMP	5	5	4	1	LVFS	3	2	1	6.1	2.9
P53	112	1	IMAPLEWOOD	5L1	5	5	3	1	VFSL	3	2	1	6.6	3.3
P53	113	1	MAPLEWOOD	5L2	5	5	3	2	VFSL	3	2	1	6.3	2.8
P53	114	1	MAPLEWOOD	5L3	5	5	3	3	VFSL	3	2	1	6.6	2.9
P53	115	1	MAPLEWOOD	5M1	5	5	2	1	VFSL	3	i	1	6.6	3.3
P53	116	1	MAPLEWOOD	5M2	5	5	2	2	LVFS	3	2	1	5.9	3.0
P53	117	1	MAPLEWOOD	5M3	5	5	1	3	VFSL	3	2	1	6.4	3.4

P53	118	1	MAPLEWOOD	5U1	5	5	1	1	LFS	3	2	1	5.4	2.2
P53	119	1	MAPLEWOOD	5 U2	5	5	1	2	LFS	3	2	1	5.5	2.4
P53	120	1	MAPLEWOOD	5 U3	5	5	1	3	LFS	3	2	1	4.7	1.6
										Average values for site			5.5	2.8
										Average values for soil - MWD			5.8	3.4
										Average values for Sod Group-1			5.6	3.41
P53	61	2	TAIASTOCK-R	4 COMP	4	4	4	1	VFSL	3	1	1	6.5	2.8
P53	62	2	TAVISTOCK-R	4LI	4	4	3	1	VFSL	3	1	1	6.5	3.3
P53	63	2	TAVISTOCK-R	4L2	4	4	3	2	VFSL	3	1	1	6.4	3.8
P53	64	2	TAVISTOCK-R	4 L3	4	4	3	3	L	3	1	1	6.5	3.6
P53	65	2	TAVISTOCK-R	4 MI	4	4	2	1	VFSL	3	1	1	6.51	3.11
P53	66	2	TAVISTOCK-R	4 M2	4	4	2	2	VFSL	3	1	1	6.7	3.0

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P53	67	2	TAVISTOCK-R	4 M3	4	4	2	3	VFSL	3	1	1	6.8	2.8
P53	68	2	TAVISTOCK-R	4 U1	4	4	1	1	VFSL	3	1	1	6.7	2.2
P53	69	2	TAVISTOCK-R	4 U2	4	4	1	2	LVFS	3	1	1	6.7	2.0
P53	70	2	TAVISTOCK-R	4 U3	4	4	1	3	LVFS	3	1	1	6.9	1.9
										Average values for site			6.6	2.9
P53	121	2	TAVISTOCK-R	6 COMP	6	6	4	1	VFSL	3	1	1	5.6	2.3
P53	122	2	TAVISTOCK-8	6L1	6	6	3	1	VFSL	3	1	1	5.5	2.2
P53	123	2	TAVISTOCK-R	6L2	6	6	3	2	VFSL	3	1	1	5.6	3.1
P53	124	2	TAVISTOCK-A	6L3	6	6	3	3	VFSL	3	1	1	5.3	2.2
P53	125	2	TAVISTOCK-R	6M1	6	6	2	1	VFSL	3	1	1	5.5	2.1
P53	126	2	TAVISTOCK-R	6M2	6	6	2	2	VFSL	3	1	1	5.4	1.4
P53	127	2	TAVISTOCK-R	6 M3	6	6	2	3	VFSL	3	1	1	5.4	1.5
P53	128	-2	TAVISTOCK-R	6 U1	6	6	1	1	VFSL	3	1	1	5.4	2.6
P53	129	2	TAVISTOCK-R	6 U2	6	6	1	2	VFSL	3	1	1	5.7	2.2
P53	130	2	TAVISTOCK-R	6U3	6	6	1	3	VFSL	3	1	1	5.6	2.0
										Average values for site			5.5	2.2
P53	1	2	BEVERLY-L	1 COMP	I	1	4	1	L	3	1	1	5.2	3.7
P53	2	2	SEVERLY-L	1 LI	I	1	3	1	L	3	1	1	5.5	3.7

P53	3	2	BEVERLY-L	1 L2	1	1	3	2	L	3	1	1	5.7	3.6
P53	4	2	BEVERLY-L	1L3	1	1	3	3	L	3	1	1	5.6	4.5
P53	5	2	BEVERLY-L	1 M1	1	1	2	1	L	3	1	1	5.4	3.9
P53	6	2	BEVERLY-L	I M2	1	1	2	2	L	3	1	1	5.3	3.3
P53	7	2	BEVERLY-L -1	1M3	1	1	2	3	L	3	1	1	5.3	3.9
P53	8	2	BEVERLY-L	1 U1	1	1	1	1	L	3	1	1	5.0	3.4
P53	9	2	BEVERLY-L	I U2	I	1	1	2	L	3	1	1	4.9	3.1
P53	10	2	BEVERLY-L	1 U3	I	1	1	3	L	3	1	1	5.0	3.4
										Average values for site			5.2	3.7
										Average values for SoIL Group -2			5.5	2.9
P52	81	1	TOLEDO-L	I COMP	1	7	4	1	L	3	2	1	6.3	5.0
P52	82	1	TOLEDO-L	1 L1	1	7	3	1	VFSL	3	2	1	6.8	4.8
P52	83	1	TOLEDO-L	1L2	1	7	3	2	L	3	2	1	6.5	4.8
P52	84	1	TOLEDO-L	1L3	1	7	3	3	VFSL	3	2	1	6.7	4.5
P52	85	1	TOLEDO-L	1 MI	1	7	2	1	L	3	2	1	6.0	4.8
P52	86	1	TOLEDO-L	1 M2	1	7	2	2	L	3	2	1	6.4	5.6
P52	87	1	TOLEDO-L	1 M3	1	7	2	3	L	3	2	1	6.3	5.4
P52	88	1	TOLEDO-L	1 U1	1	7	1	1	VFSL	3	2	1	6.4	4.3
P52	89	1	TOLEDO-L	1 U2	1	7	1	2	VFSL	3	2	1	6.3	5.1
P52	90	1	TOLEDO-L	I1U3	1	7	1	3	VFSL	3	2	1	5.9	4.2
										Average values for site			6.3	4.9
P52	91	1	TOLEDO-L	2 COMP	2	8	4	1	L	3	2	1	7.2	4.2
P52	92	1	TOLEDO-L	2L1	2	8	3	1	L	3	2	1	7.2	3.7
P52	93	1	TOLEDO-L	21.2	2	8	3	2	L	3	2	1	7.3	4.1
P52	94	1	TOLEDO-L	2 L3	2	8	3	3	CL	5	2	1	7.4	4.4
P52	95	1	TOLEDO-L	2 M1	2	8	2	1	L	3	2	1	6,8	3.7
P52	96	1	TOLEDO-L	2M2	2	8	2	2	L	3	2	1	5.8	4.5
P52	97	1	TOLEDO-L	2 M3	2	8	2	3	L	3	2	1	7.4	3.2
P52	98	1	TOLEDO-L	2UI	2	8	1	1	L	3	2	1	6.2	4.8
P52	99	1	TOLEDO-L	2 U2	2	8	1	2	L	3	2	1	6.9	3.5

P52	100	1	TOLEDO-L	2U3	2	8	1	3	L	3	2	1	7.3	3.4
										Average values for site			6.5	4.0
										Average values for soil-(TLD)			6.4	4.4
P52	101	1	WAUSIFON	3 COMP	3	9	4	1	L	3	2	1	7.2	6.4
P52	102	1	WAUSEON	3L1	3	9	3	1	L	3	2	1	7.4	5.5
P52	103	1	WAUSEON	3L1	3	9	3	2	L	3	2	1	7.3	6.9
P52	104	1	WAUSEON	3 L3	3	9	3	3	L	3	2	1	7.2	6.7
P52	105	1	WAUSEON	3MI	3	9	2	I	L	3	2	1	7.4	6.2
P52	106	1	WAUSEON	3M2	3	9	2	2	L	3	2	1	7.4	5.6
P52	107	1	WAUSEON	3M3	3	9	2	3	VFSL	3	2	1	7.4	5.1
P52	108	1	WAUSEON	3U1	3	9	1	1	VFSL	3	2	1	7.4	4.7
P52	109	1	WAUSEON	3U2	3	9	1	2	L	3	2	1	6.9	12.3
P52	110	1	WAUSEON	3U3	3	9	1	3	VFSL	3	2	1	7.3	6.3
										Average values for site			7.3	6.6
P52	141	1	WAUSEON	4COMP	4	10	4	1	SL	2	2	1	6.9	3.1
P52	142	1	WAUSEON	4L1	4	10	3	1	FSL	2	2	1	6.1	3.7
P52	143	1	WAUSEON	4L.2	4	10	3	2	FSL	2	2	1	5.2	3.4
P52	144	1	WAUSEON	4 L3	4	10	3	3	FSL	2	2	1	5.3	3.6
P52	145	1	WAUSEON	4MI	4	10	2	1	FSL	2	2	1	5.7	3.5
P52	146	1	WAUSEON	4IM2	4	10	2	2	L	3	2	1	6.0	4.1
P52	147	1	WAUSEON	4 M3	4	10	2	3	L	3	2	1	7.1	3.4
P52	148	1	WAUSEON	4U1	4	10	1	I	FSL	2	2	1	6.3	3.9
P52	149	1	WAUSEON	4 U2	4	10	1	2	L	3	2	1	5.8	4.2
P52	150	1	WAUSEON	4 U3	4	10	1	3	FSL	2	2	1	6.2	3.5
										Average values for site			5.7	3.6
										Average values for soil - TLD			6.0	5.1
										Average values for Soil Group -1			6.1	4.8
P56	11	2	BRANTFORD	1 COMP	I	11	4	1	SICL	4	1	1	6.2	2.3
P56	12	2	BRANTFORD	1 L1	1	11	3	1	SIL	3	1	1	5,9	2.1
P56	13	2	BRANTFORD	1 L2	1	11	3	2	SICL	4	1	1	6.1	21
P56	14	2	BRANTFORD	I L3	1	11	3	3	SICL	4	1	1	6.1	2.2
P56	15	2	BRANTFORD	1 MI	1	11	2	1	SICL	4	1	1	6.2	2.5

P56	16	2	BRANTFORD	1 M2	1	11	2	2	SICL	4	1	1	8.1	2.5
P56	17	2	BRANTFORD	1 M3	1	11	2	3	SICL	4	1	1	6.1	2.7
P56	is	2	BRANTFORD	1 U1	1	11	1	1	SICL	4	1	1	5.9	2.8

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P56	19	2	BRANTFORD	1 U2	1	11	1	2	SICIL	4	1	1	6.0	2.9
P56	20	2	BRANTFORD	1 U3	1	11	1	3	SICL	4	1	1	5.5	2.9
										Average values for site			5.9	2.5
P56	31	2	BEVERLY	2 COMP	2	12	4	1	SIC	5	1	1	6.5	2.2
P56	32	2	BEVERLY	2L1	2	12	3	1	SICL	4	1	1	5.9	2.8
P56	33	2	BEVERLY	2L2	2	12	3	2	SICL	4	1	1	6.2	2.7
P56	34	2	BEVERLY	2 L3	2	12	3	3	SICL	4	1	1	6.1	2.2
P56	35	2	BEVERLY	2 MI	2	12	2	1	SLC	5	1	1	5.7	2.5
P56	36	2	BEVERLY	2 M2	2	12	2	2	SLC	5	1	1	5.8	2.2
P56 -	37	2	BEVERLY	2 M3	2	12	2	3	SLC	5	1	1	7.0	1.6
P56	38	2	BEVERLY	2U1	2	12	1	1	SLC	5	1	1	6.6	2.1
P56	39	2	BEVERLY	2 U2	2	12	1	2	SIC	5	1	1	6.2	2.4
P56	40	2	BEVERLY	2 U3	2	12	1	3	SIC	5	1	1	5.8	2.2
										Average values for site			6.0	2.3
P56	131	2	BEVERLY	5 COMP	5	15	4	1	SICL	4	1	1	5.1	2.0
P56	132	2	BEVERLY	5L1	5	15	3	1	SIL	3	1	1	4.9	2.9
P56	133	2	BEVERLY	5 L2	5	15	3	3	SIL	3	1	1	5.5	3.2
P56	134	2	BEVERLY	5 L3	5	15	3	3	SIL	3	1	1	5.2	3.2
P56	135	2	BEVERLY	5 MI	5	15	2	1	SICL	4	1	1	5.0	2.7
P56	136	2	BEVERLY	5 M2	5	15	2	2	SICL	4	1	1	4.7	2.6
P56	137	2	BEVERLY	5 M3	5	15	2	3	SICL	4	1	1	5.2	3.2
P56	138	2	BEVERLY	5U1	5	15	1	1	SICL	4	1	1	4.5	3.0
P56	139	2	BEVERLY	5 U2	5	15	1	2	SICL	4	1	1	5.0	3.0
P56	140	2	BEVERLY	5 U3	5	15	1	3	SICL	4	1	1	6.5	3.0
										Average values for site			5.0	2.9
										Average values for soil - BVY			5.2	2.6
										Average values for Soil Group -2			5.4	2.6

P56	51	3	BRANT-R	3 COMP	3	13	4	1	SICL	4	1	1	4.8	2.7
P56	52	3	BRANT-R	3L1	3	13	3	1	SIL	3	1	1	5.0	3.4
P56	53	3	BRANT-R	3L.2	3	13	3	2	SIL	3	1	1	4.7	3.1
P56	54	3	BRANT-R	3 L3	3	13	3	3	SIL	3	1	1	5.7	2.9
P56	55	3	BRANT-R	3 MI	3	13	2	1	SIL	3	1	1	4.3	2.7
P56	56	3	BRANT-R	3 M2	3	13	2	2	SIL	3	1	1	4.7	2.9
P56	57	3	BRANT-R	3 M3	3	13	2	3	SIL	3	1	1	4.5	2.1
P56	58	3	BRANT-R	3 U1	3	13	1	1	SIC	5	1	1	5.5	1.7
P56	59	3	BRANT-R	3 U2	3	13	1	2	SICL	4	1	1	4.9	3.0
P56	60	3	BRANT-R	3 U3	3	13	1	3	SICL	4	1	1	4.9	2.6
										Average values for site			4.7	2.7
P56	71	4	GRIMSBY	4 COMP	4	14	4	1	FSL	2	1	1	6.2	2.0
P56	72	4	GRIMSBY	4L1	4	14	3	1	VFSL	3	1	1	5.9	2.4
P56	73	4	GRIMSBY	4L2	4	14	3	2	VFSL	3	1	1	6.1	2.4
P56	74	4	GRIMSBY	4L3	4	14	3	3	VFSL	3	1	1	6.1	3.1
P56	75	4	GRIMSBY	4 M1	4	14	2	1	GFSL	2	1	1	6.0	2.6
P56	76	4	GRIMSBY	4 M2	4	14	2	2	FSL	2	1	1	6.0	2.2
P56	77	4	GRIMSBY	4 M3	4	14	2	3	FSL	2	1	1	5.5	2.2
P56	78	4	GRIMSBY	4 U1	4	14	1	1	GSL	2	1	1	6.2	2.8
P56	79	4	GRIMSBY	4 U2	4	14	1	2	GSL	2	1	1	6.2	3.4
56	80	4	GRIMSBY	4 U3	4	14	1	3	GSL	2	1	1	6.2	2.9
										Average values for site			6.0	2.6
										Average values for Soil Group -3			5.0	2.6
P428	151	3	TUSCOLA	1 COMP	1	16	4		SIL	3	1	1	6.5	2.5
P428	152	3	TUSCOLA	1 L1	1	16	3		SIL	3	1	1	5.9	3.2
P428	153	3	TUSCOLA	1 L2	1	16	3		SIL	3	1	1	5.4	2.9
P428	154	3	TUSCOLA	1L3	1	16	3		SIL	3	1	1	6.4	2.7
P428	155	3	TUSCOLA	1M1	1	16	2		SIL	3	1	1	5.9	2.4
P428	156	3	TUSCOLA	1M2	1	16	2		SIL	3	1	1	6.3	2.5
P428	157	3	TUSCOLA	1M3	1	16	2		SIL	3	1	1	5.7	3.0

P428	158	3	TUSCOLA	1U1	1	16	1		SIL	3	1	1	6.2	2.2
P428	159	3	TUSCOLA	1U2	1	16	1		SIL	3	1	1	6.0	2.0
P428	160	3	TUSCOLA	1U3	1	16	1		SIL	3	1	1	5.8	2.2
										Average values site			5.9	2.6
P428	181	3	BRANT	4COMP	4	19	4		L	3	1	2	6.2	1.8
P428	182	3	BRANT	4L1	4	19	3		L	3	1	2	6.4	2.1
P428	183	3	BRANT	4 L2	4	19	3		L	3	1	2	6.2	2.4
P428	184	3	BRANT	4 L3	4	19	3		L	3	1	2	6.2	2.3
P428	185	3	BRANT	4M1	4	19	2		L	3	1	2	6.5	2.2
P428	186	3	BRANT	4 M2	4	19	2		L	3	1	2	6.4	2.2
P428	187	3	BRANT	4 M3	4	19	2		L	3	1	2	6.6	2.3
P428	188	3	BRANT	4 U1	4	19	1		L	3	1	2	6.4	3.3
P428	189	3	BRANT	4 U2	4	19	1		L	3	1	2	6.0	3.6
P428	190	3	BRANT	4 U3	4	19	1		L	3	1	2	6.4	2.9
										Average values for site			6.3	2.5
P428	191	3	WALSHER	5COMP	5	20	4		LFS	1	1	2	5.3	1.6
P428	192	3	WALSHER	5L1	5	20	3		LFS	1	1	2	4.6	1.6
P428	193	3	WALSHER	5L2	5	20	3		LFS	1	1	2	4.2	1.8
P428	194	3	WALSHER	5 L3	5	20	3		LFS	1	1	2	4.0	1.5
P428	195	3	WALSHER	5M1	5	20	2		LFS	1	1	2	4.5	1.4
P428	196	3	WALSHER	5 M2	5	20	2		LFS	1	1	2	4.0	1.2
P428	197	3	WALSHER	5M3	5	20	2		FS	1	1	2	5.0	1.4
P428	198	3	WALSHER	5U1	5	20	1		LFS	1	1	2	4.3	1.1
P428	199	3	WALSHER	5 U2	5.	20	1		LFS	1	1	2	4.7	1.2
P428	200	3	WALSHER	5 U3	5	20	1		LFS	1	1	2	4.2	1.2
										Average values for site			4.3	1.3
										Average values for Soil Group -3			4.8	2.2

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P428	171	4	WATFORD	3COMP	3	18	4		LVFS			1	4.7	2.0
P428	172	4	WATFORD	3LI	3	18	3		LVFS			1	4.7	2.5
P428	173	4	WATFORD	3L.2	3	18	3		LVFS			1	4.7	2.3
P428	174	4	WATFORD	3L3	3	18	3		LVFS			1	4.7	1.9

P428	175	4	WATFORD	3MI	3	18	2		VFS			1	4.3	2.0
P428	176	4	WATFORD	3 M2	3	18	2		VFS			1	4.7	2.8
P428	177	4	WATFORD	3 M3	3	18	2		VFS	1	1	1	4.5	2.2
P428	178	4	WATFORD	3 UI	3	18	1		LVFS	I	1	1	4.7	2.0
P428	179	4	WATFORD	3 U2	3	18	1		LVFS	I	1	1	6.2	2.1
P428	180	4	WATFORD	3 U3	3	18	I		LVFS	1	1	1	5.7	1.8
										Average values for site			4.7	2.2
P428	161	4	FOX	2COMP	2	17	4		S	1	1	1	5.0	1.1
P428	162	4	FOX	2L1	2	17	3		LS	1	1	1	4.9	1.2
P428	163	4	FOX	2L.2	2	17	3		LS	1	1	1	4.8	1.2
P428	164	4	FOX	2L3	2	17	3		S	1	1	1	4.9	1.2
P428	165	4	FOX	2M1	2	17	2		S	1	1	1	4.7	1.0
P428	166	4	FOX	2M2	2	17	2		S	1	1	1	4.8	0.8
P428	167	4	FOX	2M3	2	17	2		S	1	1	1	4.9	1.2
P4 28	168	4	FOX	2U1	2	17	1		S	1	1	1	6.7	0.8
P428	169	4	FOX	2 U2	2	17	1		S	1	1	1	6.6	0.9
P428	170	4	FOX	2 U3	2	17	1		S	1	1	1	6.9	0.7
										Average values for site			5.0	1.0
P428	201	4	FOX	6COMP	6	21	4		LS	1	1	1	5.2	1.2
P428	202	4	FOX	6L1	6	21	3		LS	I	1	1	4.9	1.3
P428	203	4	FOX	61.2	6	21	3		LS	I	1	1	4.8	1.4
P428	204	4	FOX	6 L3	6	21	3		LS	1	1	1	5.0	1.7
P428	205	4	FOX	6M1	6	21	2		S	I	1	1	5.1	1.0
P428	206	4	FOX	6 M2	6	21	2		S	1	1	1	4.8	1.0
P428	207	4	FOX	6 M3	6	21	2		LS	1	1	1	4.9	1.3
P428	208	4	FOX	6L1	6	21	1		LS	1	1	1	6.0	1.0
P428	209	4	FOX	6 U2	6	21	1		LS	1	1	1	5.6	1.1
P428	210	4	FOX	6 U3	6	21	1		S	I	1	1	5.5	0.7
										Average values for site			5.0	1.2
										Average values for soil - FOX			5.0	1.1
										Average values for Sol Group -4			4.9	1.5

APPENDIX C

Soil Groups for Oxford County

OXFORD COUNTY SOIL GROUPS NB. Areas designated NM, Muck, URB, B.L.., or ZZ have been excluded.

POLY NUM	SOIL	SYMBOL	SOIL *GROUP*	% *AREA* SOIL	% AREA *GRP*	SLC DOMI	SLC DOM2	SLCSUBI	SLC SUB2	DOMISLP	SUBSILP
29	Berrien	Besl	GBL/GLLC/TILL/CL	4.14	4.14	LON	GUP	BUF	GFD	A	A
29	Buford	Bul	GBL/GLGF/S	0.01							
29	Buford	Busl	GBLIGLGF/S	60.62	60.63						
29	Brady	Bysl	GBL/GLLC/S	5.13							
29	Fox	Fxsl	GBL/GLLC/S	0.30							
29	Fox	Fxsl-r	GBL/GLLC/S	0.00	5.16						
29	Huron	Hucl	GBL/TILL/CY	11.54							
29	Huron	Husil	GBL/TILL/CY	0.08							
29	Perth	Pcl	GBL/TILL/CY	0.19							
29	Perth	Psil	GBL/TILL/CY	0.23	12.04						
29	Embro	Emsil	GBL/GLLC/TILL/L.	0.08	0.08						
29	Guelph	GI	GBL/TILL/L	5.37	5.37						
29	Granby	Grsl	HG/TILLC/S	1.10	1.10						
29	Parkhill	Pal	HG/TILL/L	OAI	0A1						
29	Tavistock	Tasil	GBL/GLLC/TILL/CY	0.76	0.76						
30	Huron	Hucl	GBL/TILL/CY	31.64		MUL	GOB	BNG	TVK	C	A
30	Huron	Husil	GBL/TILL/CY	11.17							
30	Perth	Pcl	GBL/TILLJCY	0.93							
30	Perth	Psil	GBL/TILL/CY	8.06	51.8						
30	Brady	Bysl	GBL/GLLC/S	0.02							
30	Fox	FxsI	GBL/GLLC/S	0.16							
30	Fox	Fxls	GBL/GLLC/S	5.89	6.07						
30	Embro	Emsil	GBL/GLLC/TILL/L	20.18							
30	Honeywood	Hosil	GBL/GLLC/TILL/L	6.07	26.25						
30	Buford	Bul	GBL/GLGF/S	0.29	0.29						
30	Crombie	Crsil	HG/GLLC/TILL/L	6.67	6.67						
30	Brookston	Bsil	HG/TILL/CY	0.56	0.56						
30	Granby	GrsI	HG/GLLC/S	0.61	0.61						

POLY NUM	SOIL	SYMBOL	SOIL GROUP	% AREA SOIL	% AREA GRP	SLC DOM1	SLC DOM2	SLC SUBI	SLC SUB2	DOMSLP	SURSLP
31	Huron	Hucl	GBL/TILL/CY	1.24		FOX	BAY	GNY		A	A
31	Huron	Husil	GBLITILL/CY	2.63							
31	Perlh	Pcl	GBL/TILL/CY	3.48							
31	Perth	Psll	GBL/TILL/CY	0.55	7.9						
31	Fox	Fxsl	GBL/GLLC/S	0.02							
31	Fox	Fxls	GBL/GLLC/S	69.51							
31	Brady	Bysl	GBL/GLLC/S	8.57							
31	Brady	Byls	GBL/GLLC/S	10.36	88.46						
31	Honeywood	Hosil	GBL/GLLC/TILL/L	0.06	8.57						
31	Granby	Grsl	HG/GLLC/S	2.32	2.32						
31	Berrilen	Besl	GBL/GLLCTILL/CL	0.06	0.06						
31	Bookton	Bosl	GBL/GLLC/TILL/CY	0.62	0.62						
32	Huron	Hucl	GBL/TILL/CY	18.87		PTH	HLIO	HWY	EBR	A	A
32	Huron	Husil	GBL/TILL/CY	6.40							
32	Perth	Pd	GBL/TILL/CY	16.08							
32	Perth	Psil	GBL/TILL/CY	28.61	69.96						
32	Bookton	Bosl	GBL/GLLC/TILL/CY	1.02							
32	Bennington	Bnsil	GBL/GLLC/TILL/CY	0.36	1.38						
32	Buford	Bul	GBL/GLGF/S	0.22							
32	Brisbane	BxsI	GBL/GLCF/S	0.67							
32	Donnybrook	Dosl	GBL/GLGF/S	0.07	0.96						
32	Brady	Bysl	GBL/GLLC/S	1.11							
32	Fox	Fxsl	GBL/GLLC/S	2.34							
32	Fox	FxIs	GBL/GLLC/S	0.88							
32	Fox	Fxfsl	GBL/GLLC/S	0.11	4.44						
32	Guelph	GI	GBL/TILL/L	2.89							
32	London	LoL	GBL/TILL/L	2.00	4.89						
32	Brookston	Bsil	HG/TILL/CY	0.14							
32	Brookston	Bd	HG/TILL/CY	1.90	2.04						

32	Embro	Emsil	GBL/GLLC/TILL/L.	2.06							
32	Honeywood	Hosil	GBL/GLLC/TILL/L	5.47	7.53						
32	Maplewood	Mwsil	HG/GLLC/TILL/CY	0.17							
32	Wauseon	Wasl	HG/GLLC/TILL/CY	0.45	0.62						
32	Berrien	Besl	GBL/GLLC/TILL/CL	2.16	2.16						
32	Crornbie	Crsil	HG/GLLC/TILL/L	0.76	0.76						
32	Parkhill	Pal	HG/TILL/L	0.27	0.27						

POLY NUM	SOIL	SYMBOL	SOIL GROUP	% AREA SOIL	% AREA GRP	SLC DOMI	SLCDOM2	SLC SUBI	SLCSUB2	DOMSLP	SUBSLP
33	Huron	Hucl	GBL/TILL/CY	52.09		HUO	PTH	PTH	FOX	C	A
33	Huron	Husil	GBL/TILL/CY	10.31							
33	Perth	Pcl	GBL/TILL/CY	4.66							
33	Perth	Psil	GBL/TILL/CY	1.03	68.09						
33	Guelph	Gl	GBL/TILL/L	7.05							
33	Guelph	Gsil	GBL/TILL/L	3.65							
33	London	Lol	GBL/TILL/L	0.47							
33	London	Losil	GBL/TILL/L	0.73	11.90						
33	Burford	Bul	GBL/GLGF/S	2.04							
33	Brisbane	Bxsl	GBL/GLGF/S	1.28	3.32						
33	Brady	Bysl	GBL/GLLC/S	0.02							
33	Fox	Fxsl	GBL/GLLC/S	0.17							
33	Fox	Fxls	GBL/GLLC/S	0.49							
33	Fox	Fxsl-r	GBL/GLLC/S	0.29	0.97						
33	Embro	Emsil	GBL/GLLC/TILL/L	0.29							
33	Honeywood	Hosil	GBL/GLLC/TILL/L	0.07	0.36						
33	Brookslon	Bcl	HG/TILL/CY	0.40	0.40						
33	Berrien	Besl	GBL/GLLC/TILL/CL	0.29	0.29						
33	Bookton	Bosl	GBL/GLLC/TILL/CL	0.11	0.11						
33	Crombie	Crsil	HG/GLLC/TILL/L	0.17	0.17						
33	Granby	Grsl	HG/GLLC/S	1.97	1.97						
33	Parkhill	Pal	HG/TILL/L	1.61	1.61						
		Hosil-Gl	GBL/TILL/L	1.47	1.47						

POLYNUM	SOIL	SYMBOL	SOIL GROUP	% AREA SOIL	% AREA GRP	SLC DOM1	SLC DOM2	SLC SUB1	SLC SUB2	DOMSLP	SUBSLP
34	Huron	Hucl	GBL/TILL/CY	0.11		GUP	HYW	PLL		B	A
34	Huron	Husil	GBL/TILL/CY	0.04							
34	Perth	Pcl	GBL/TILL/CY	0.17	0.32						
34	Brady	Bysl	GBL/GLLC/S	0.01							
34	Fox	Fxsl	GBL/GLLC/S	0.21							
34	Fox	Fxls	GBL/GLLC/S	0.06							
34	Fox	Fxsl-r	GBL/GLLC/S	o.72	1						
34	Guelph	Gl	GBL/TILL/L	42.7							
34	Guelph	Gsil	GBL/TILL/L	0.77							
!14	London	Lol	GBL/TILL/L	8.72							
34	London	Losil	GBL/TILL/L	0.4	52.59						
34	Parkhill	Pal	HG/TILL/L	2.25							
34	Parkhill	Pasil	HG/TILL/L	0.43	2.68						
34	Embro	Emsil	GBL/GLLC/TILL/L	3.92							
14	Honeywood	Hosil	GBL/GLLC/TILL/L	0.16	4.08						
14	Burford	Bul	GBL/GLGF/S	0.49							
14	Burford	Busl	GBL/GLGF/S	1.34	1.83						
14	Brookston	Bcl	HG/TILL/CY	0.07	0.07						
14	Berrien	Besl	GBL/GLLC/TILL/CL	0.13	0.13						
14	Bookton	Bosl	GBL/GLLC/TILL/CY	0.02	0.02						
14	Cromble	Crsil	HG/GLLC/TILL/L	0.72	0.72						
14	Granby	Grsl	HG/GLLC/S	1.34	1.34						
14		Hosil-Gl	GBL/TILL/L	22.59	22.59						

POLY_NUM	SOIL	SYMBOL	SOIL GROUP	% AREA SOIL	% AREA GRP	SLC DOM1	SLCDOM2	SLCSUBI	SLCSUB2	DOMSLP	SUBSLP
35	Huron	Hucl	GBL/TILL/CY	2.08		TVK	BNO	MPW			A
35	Huron	Husil	GBL/TILL/CY	0.32							
35	Perth	Pcl	GBL/TILL/CY	o.2							
35	Perth	Psil	GBL/TILL/CY	OJ5	2.75						

35	Guelph	Gl	GBL/TILL/L	1015							
35	London	Lol	GBL/TILL/L	1.22							
35	London	Losil	GBL/TILL/L	0.44	12.01						
35	Burford	Bul	GBL/GLGF/S	0.06							
35	Burford	Busl	GBL/GLGF/S	0.13							
35	Donnybrook	Dosl	GBL/GLGF/S	0.28	0.47						
35	Brady	Bysl	GBL/GLLC/S	0.14							
35	Fox	Fxsl	GBL/GLLC/S	0.24							
35	Fox	Fxsl-r	GBL/GLLC/S	2.35	2.73						
35	Bennington	Bnsil	GBL/GLLC/TILL/CY	5.84							
35	Tavistock	Tasil	GBL/GLLC/TILL/CY	25.9	31.74						
35	Parkhill	Pal	HG/TILL/L	1.23							
35	Parkhill	Pasl	HG/TILL/L	0.04	1.27						
35	Embro	Emsil	GBL/GLLC/TILL/L	21.32							
35	Honeywood	Hosil	GBL/GLLC/TILL/L	8.77	30.09						
35	Brookston	Bd	HG/TILL/CY	0.27	0.27						
35	Cromble	Crsll	HG/GLLC/TILL/L	2.43	2.43						
35	Granby	Grsl	HG/GLLC/S	0.61	0.61						
35	Maplewood	Mwsil	HG/GLLC/TILL/CY	2.72	2.72						
35		Hosil-Gl	GBL/TILL/L	9.73	9.73						

POLY **NUM**	SOIL	SYMBOL	SOIL GROUP	% AREA SOIL	% AREA GRP	SLC DOM1	SLC DOM2	SLC SUB1	$LC SUB2	DOMSLP	SUBSLP
36	Huron	Hucl	GBL/TILL/CY	3.55		HYW	GUP	FOX	BUF	c	B
36	Huron	Husil	GBL/TILL/CY	1.03							
36	Perth	PCI	GBL/TILL/CY	2.14	6.72						
36	Guelph	GI	GBL/TILL/L	28.51							
36	London	Lot	GBL/TILL/L	2.20	30.71						
36	Brady	Bysl	GBL/GLLC/S	0.51							
36	Fox	FxsI	GBL/GLLC/S	2.56							
36	Fox	Fxls	GBL/GLLC/S	3.11							
36	Fox	FxsI-r	GBL/GLLC/S	1.50	7.68						

36	Burford	Bust	GBL/GLGF/S	5.73							
36	Burford	But	GBL/GLGF/S	0.19							
36	Brisbane	Bxsl	GBL/GLGF/S	2.24	8.16						
36	Embro	Emsil	GBL/GLLC/TILL/L	5.30							
36	Honeywood	Hosil	GBL/GLLC/TILL/L	26.94	32.24						
36	Bennington	Bnsll	GBL/GLLC/TILL/CY	3.88	3.88						
36	Crombie	Crsil	HG/GLLC/TILL/L	0.36	0.36						
36	Granby	Grsl	HG/GLLC/S	0.53	0.53						
36	Gilford	Gisil	HG/GLGF/S	0.34	0.34						
36		Hosil-Gl	GBL/TILL/L	0.10	0.10						
40	Huron	Hucl	GBL/TILL/CY	1.84		GOB	MUI	wus	WRN	A	A
40	Huron	Husil	GBL/TILL/CY	1.74							
40	Perth	PSI	GBL/TILL/CY	60.60	64.18						
40	Brady	Bysl	GBL/GLLC/S	9.10							
40	Fox	Fxsl	GBL/GLLC/S	11.58	20.68						
40	Brookston	Bsil	HG/TILL/CY	4.59	4.59						
40	Granby	Grsl	HG/GLLC/S	9.26	9.26						

POLY_NUM	SOIL	SYMBOL	SOIL GROUP	% AREA SOIL	% AREA GRP	SLC DOMI	SLC DOM2	SLCSUB1	SLC SUB2	DOMSLP	SUBSLP
49	Huron	Hucl	GBL/TILL/CY	0.21		BUF	FOX	GUP	GNY	A	c
49	Huron	Husil	GBL/TILL/CY	7.86							
49	Perth	Psil	GBL/TILL/CY	16.99							
49	Perth	Pcl	GBL/TILL/CY	0.14	25.20						
49	Guelph	Gl	GBL/TILL/L	13.79							
49	London	Lol	GBL/TILL/L	3.18	16.97						
49	Burford	Busl	GBL/GLGF/S	12.76							
49	Burford	But	GBL/GLGF/S	1.12							
49	Brisbane	Bxsl	GBL/GLGF/S	1.39							
49	Donnybrook	Dosl	GBL/GLGF/S	3.15	18.42						
49	Brady	ByslAugust 13, 1999	GBL/GLLC/S	1.05							
49	Fox	Fxsl	GBL/GLLC/S	1.84							

49	Fox	Fxls	GBL/GLLC/S	7.73							
49	Fox	Fxsl-r	GBL/GLLC/S	9.07							
49	Fox	Fxfsl	GBL/GLLC/S	1.77							
49	Fox	Fxls-r	GBL/GLLC/S	0.90	22.36						
49	Brookston	Bd	HG/TILL/CY	0.16	0.16						
49	Berrien	Besl	GBL/GLLC/TILL/CL	0.21	0.21						
49	Bennington	Bnsl	GBL/GLLC/TILL/CY	0.82	0.82						
49	Granby	Grsl	HG/GLLC/S	0.40	0.40						
49	Gilord	Gisl	HG/GLGF/S	0.98	0.98						
49	Honeywood	Hosil	GBL/GLLC/TILL/L	4.09	4.09						
64	Huron	Hucl	GBL/TILL/CY	19.80		HUO	PTH	BKN	BUF	B	A
64	Huron	Husil	GBL/TILL/CY	7.78							
64	Perth	Pcl	GBL/TILL/CY	37.91	65.49						
64	Bennington	Bnsl	GBL/GLLC/TILL/CY	5.01							
64	Tavistock	Tasil	GBL/GLLC/TILL/CY	11.04	16.05						
64	Brookston	Bd	HG/TILL/CY	1.67	1.67						
64	Donnybrook	Dosl	GBL/GLGF/S	2.63	2.63						
64	Crombie	Crsil	HG/GLLC/TILL/L	0.95	0.95						
64	Fox	Fxsl-r	GBL/GLLC/S	0.15	0.15						
64	Granby	Grsl	HG/GLLC/S	0.10	0.10						
64	Honeywood	Hosil	GBL/GLLC/TILL/L	2.19	2.19						
64	Guelph	Gl	GBL/TILL/L	0.03	0.03						
64	Maplewood	Mwsil	HG/GLLC/TILL/CY	0.13	0.13						
64		Hosil-Gl	GBL/TILL/L	1.42	1.42						

POLY_NUM	SOIL	SYMBOL	SOIL GROUP	% AREA SOIL	% AREA GRP	SLC DOM1	SLC DOM2	SLC SUB1	SLC SUB2	DOMSLP	SUBSLP
423	Fox	Fxls	GBL/GLLC/S	12.43	12.43	PFD	WAM	FOX	800	A	A
423	Huron	Husil	GBL/TILL/CY	2.37	2.37						
423	Perth	Psil	GBL/TILL/CY	0.03	0.03						
425	Berrien	Besl	GBL/GLLC/TILL/CL	5.90	5.90	MUI	GOB	GOB	FOX	B	A
425	Bookton	Bosl	GBL/GLLC/TILL/CY	34.23	34.23						

425	Brady	Bysl	GBL/GLLC/S	10.09							
425	Brady	Byls	GBL/GLLC/S	3.02							
425	Fox	Fxls	GBL/GLLC/S	38.51	51.62						
425	Granby	Grsl	HG/GLLC/S	2.16	2.16						
425	Huron	Hucl	GBL/TILL/CY	4.19	4.19						
470	Huron	Hucl	GBL/TILL/CY	4.44		BUF	FOX	GUP	GNY	A	C
470	Huron	Husil	GBL/TILL/CY	23.48							
470	Perth	Psil	GBL/TILL/CY	2.40							
470	Perth	Pd	GBL/TILL/CY	7.23	37.55						
470	Brady	Bysl	GBL/GLLC/S	3.44							
470	Fox	Fxlsl	GBL/GLLC/S	8.50							
470	Fox	Fxls	GBL/GLLC/S	24.00	35.94						
470	Burford	Busl	GBL/GLGF/S	10.02	10.02						
470	Brookston	Bd	HG/TILL/CY	1.45	1.45						

POLY_NUM	SOIL	SYMBOL	SOIL GROUP	% AREA SOI	% AREA GRP	SLC DOMI	SLC DOM2	SLCSUBI	SLC SUB2	DOMISLP	SUBSLP
471	Brady	Bysl	GBL/GLLC/S	4.84		FOX	BAY	GNY		A	A
471	Brady	Byls	GBL/GLLC/S	3.48							
471	Fox	Fxsl	GBL/GLLC/S	3.28							
471	Fox	Fxls	GBL/GLLC/S	31.74							
471	Fox	Fxsl-r	GBL/GLLC/S	10.34							
471	Fox	Fxls-r	GBL/GLLC/S	5.02	58.70						
471	Huron	Hucl	GBL/TILL/CY	0.13							
471	Perth	Psil	GBL/TILL/CY	0.01							
471	Perth	Pd	GBL/TILL/CY	0.03	0.17						
471	Burford	Busl	GBL/GLGF/S	2.17							
471	Burford	Bul	GBL/GLGF/S	0.15							
471	Brisbane	Bxsl	GBL/GLGF/S	1.85	4.17						
471	Benninglon	Bnsl	GBL/GLLC/TILL/CY	0.02							
471	Bookton	Bosl	GBL/GLLC/TILL/CY	1.53	1.55						
471	Guelph	Gl	GBL/TILL/L	4.76							
471	Guelph	Gsil	GBL/TILL/L	0.67							

471	London	Lol	GBL/TILL/L	0.45	5.88						
471	Embro	Emsil	GBL/GLLC/TILL/L	0.47							
471	Honeywood	Hosil	GBL/GLLC/TILL/L	1.46	1.93						
471	Granby	Grsl	HG/GLLC/S	8.08	8.08						
471	Gillord	Gisil	HG/GLGF/S	1.05	1.05						
471	Berrien	Besl	GBL/GLLC/TILL/CL	0.65	0.65						
471	Parkhill	Pal	HG/TILL/L	0.07	0.07						
471		Hosl-Gl	GBL/TILL/L	0.78	0.78						