
FINAL REPORT AAFC-3

**Documentation for Pilot Watershed Study Digital Data:
Essex Test and Control Watersheds**

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**Compilation of a Computerized Database using Data Assembled under the
Pilot Watershed Study of the Soil and Water Environmental
Enhancement Program (SWEEP)**

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EXECUTIVE SUMMARY

This report is the third in a series of five concerning digital data assembled during the Pilot Watershed Study (PWS), a major component of the Soil and Water Environmental Enhancement Program (SWEET). Previous reports in this series have i) assessed the temporal resolution, spatial resolution, and potential integration of these data; and have ii) documented the structure and organization of the newly created PWS digital database. This paper builds on earlier reports by providing an overview of the digital data files associated with the Essex test and control watersheds. The overall aim of this report is to assist users of the PWS database by providing a manual for interpreting the contents of specific data files. Accordingly, the report lists and describes both the available spatial coverages in Arc/Info format, and their associated attribute files. This is followed by a series of highly detailed tables which outlines the structure of individual attribute files.

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1. INTRODUCTION AND OBJECTIVES

This report is the third in a series pertaining to data gathered during the course of the Pilot Watershed Study (PWS), a major research sub-program of the Soil and Water Environmental Enhancement Program (SWEEP). The initial report in this series (Couturier 1995a) documents the nature and quantity of data collected during the PWS available in digital form, which i) have potential application to the Indicators of Risk of Water Contamination (IROWC) currently being developed by MacDonald and Spaling (1995a,b), and which ii) are appropriate for incorporation into the Ontario Land Resource Unit (OLRU) database. The PWS data have subsequently been integrated into a 3-level hierarchical digital database. The organization of this database, as well as linkages among its components, are detailed in the second report in this series (Couturier 1995b). The purpose of this report is to document the available spatial coverages and associated attribute information pertaining to the Essex test and control watersheds which now reside in the OLRU database. This information is provided in the remainder of the report.

2. OVERVIEW OF PWS DIGITAL DATABASE - ESSEX TEST AND CONTROL WATERSHEDS

This section describes the contents of the Essex portion of the PWS database. First, a brief description of the available spatial coverages is provided. This is followed by a general listing of Info data files and their contents. Lastly, the precise structure (item names, width, description, etc.) of individual data files, or groups of similar files is detailed. The reader is reminded that all files discussed in this report are located in the directory **olru/gis-data/ondata/sweep/essex**. Additional information concerning file naming conventions and database organization and linkages can be found in Report 2 of this series (Couturier 1995b).

2.1 Spatial Coverage Accuracy Assessment and Definitions

A variety of **spatial coverages** have been incorporated into the PWS database in Arc/Info format (Table 1). All of these coverages have been digitized from original paper maps supplied by the PWS contractors, BEAK, Ecologistics, and Ecological Services for Planning. As noted in Couturier (1995b), the coverages have not yet been registered to a real-world coordinate system. In its current state, therefore, the database can be used for thematic mapping and spatial association, but cannot be used to calculate distances and areas. Registration should be relatively straight forward, since road intersections in the Essex road coverages can be matched with identical locations in other OLRU coverages.

Table 1. Spatial Coverages and Descriptions

COVERAGE NAME	NO. RECS	LENGTH	DESCRIPTION
ECBENCH	2	46	Essex Control Soil Benchmark Monitoring Sites
ECBOUND	2	46	Essex Control Watershed Boundary
ECCESIUM	2	46	Essex Control Cesium Benchmark Sites
ECFLD889	36	46	Essex Control Field Boundaries 1989
ECFLD890	37	46	Essex Control Field Boundaries 1990
ECFLD991	37	46	Essex Control Field Boundaries 1991
ECMICRO	3	46	Essex Control Micro-basin locations
ECROADS	7	74	Essex Control Watershed Main Roads
ECISOILS	11	46	Essex Control Soil Polygons
ECGROUND	2	46	Essex Control Groundwater Monitoring Sites
ETBENCH	2	46	Essex Test Soil Benchmark Monitoring Sites
ETBOUND	2	46	Essex Test Watershed Boundary
ETCESIUM	2	46	Essex Test Cesium Benchmark Sites
ETFLD889	67	46	Essex Test Field Boundaries 1989
ETFLD890	64	46	Essex Test Field Boundaries 1990
ETFLD991	63	46	Essex Test Field Boundaries 1991
ETMICRO	3	46	Essex Test Micro-basin locations
ETROADS	7	74	Essex Test Watershed Main Roads
ETSOILS	6	46	Essex Test Soil Polygons
ETGROUND	2	46	Essex Test Groundwater Monitoring Sites

The accuracy of all coverages is unknown, since procedures used to create the original paper maps are not documented. However, it is apparent that the soil polygons, soil benchmark sites, cesium benchmark sites, and the watershed boundary were all originally drawn on an OBM 1:10000 sheet, which was subsequently digitized by the contractor. Field boundary maps for three crop seasons, as well as micro-basin location maps, were ferreted from the plethora of PWS materials delivered by Ecologistics. Fortunately, these maps utilized the same watershed boundary and control points as the OBM soils map, so that spatial integration of the soils, crops, and micro-basin layers was possible. Thus, while the accuracy of coverages *as a whole* is unknown (but is assumed accurate due to the large scale base map), the accuracy of the coverages *relative to one another* is deemed high. The locations of groundwater monitoring sites were unavailable on an accurately defined base map, and thus were visually estimated (digitized on-screen) using roads and fields boundaries as guides.

2.2 Info Data File Descriptions

This section provides a general overview and listing (Table 2) of the **data files**

associated with the spatial coverages described above. As with the spatial features, the accuracy of the attribute data is unknown. Any files containing **area** measurements, e.g., field hectares (E*CROPS*), should be treated with caution, as these items were estimated by farm operators and PWS field staff (while digitizing the field boundary maps, many errors and inconsistencies in field sizes were apparent). Furthermore, since yield per hectare data were based on possibly incorrect field sizes, these values should also be treated with caution, and may need to be recalculated. Once the database has been registered to real-world coordinates, it will be possible to check the estimated values against the values generated by the GIS. Finally, where individual fields or entire records (=1 day in climate files) of data are missing, a value such as -99, or some variation thereof, has been inserted to maintain a continuous sequence of values. This should be considered when performing arithmetic operations.

Table 2. Info File Definitions and Descriptions

TYPE	NAME	NO. RECS	LENGTH	DESCRIPTION
DF	ESSATMP	1323	160	Hourly Air Temperature degrees celsius
DF	ESSPREC	1485	160	Hourly Precipitation mm
DF	ESSSRAD	1291	160	Hourly Solar Radiation langleys
DF	ESSWSPD	1336	160	Hourly Wind Speed m/s
DF	ESSWDIR	1291	160	Hourly Wind Direction degrees from north
DF	ESSRHUM	42	200	Daily Relative Humidity %
DF	ESSST5	44	268	Daily Soil Temperature 5cm depth
DF	ESSST50	44	206	Daily Soil Temperature 50cm depth
DF	ESSST150	40	206	Daily Soil Temperature 150cm depth
DF	ESSEVAP	4	80	Monthly Potential Evaporation mm
DF	ECCROPS889	26	154	Essex Control Crop and Tillage Data 1988-89
DF	ECCROPS890	27	144	Essex Control Crop and Tillage Data 1989-90
DF	ECCROPS991	27	144	Essex Control Crop and Tillage Data 1990-91
DF	ESSOIL	14	164	Essex Soil Polygon Legend File (both Control and Test)
DF	ECBENCH	24	458	Essex Control Soil Benchmark Data
DF	ECFLOW	1315	170	Essex Control Hourly Discharge cubic dm
DF	ECWQUAL	379	118	Essex Control Water Quality Monitoring
DF	ECB1FLOW	48	222	Essex Control Micro-basin 1 Daily Discharge cubic m
DF	ECB1WQL	102	62	Essex Control Micro-basin 1 Water Quality Monitoring
DF	ECB2FLOW	48	284	Essex Control Micro-basin 2 Daily Discharge cubic m
DF	ECB2WQL	120	62	Essex Control Micro-basin 2 Water Quality Monitoring
DF	ECGWD	8	70	Essex Control Groundwater Depth m
DF	ECGPC	47	48	Essex Control Groundwater Phosphorous Concentration mg/l
DF	ETCROPS889	46	154	Essex Test Crop and Tillage Data 1988-89
DF	ETCROPS890	45	144	Essex Test Crop and Tillage Data 1989-90
DF	ETCROPS991	43	154	Essex Test Crop and Tillage Data 1990-91
DF	ETBENCH	24	458	Essex Test Soil Benchmark Data
DF	ETFLOW	1315	170	Essex Test Hourly Discharge cubic dm
DF	ETWQUAL	382	118	Essex Test Water Quality Monitoring
DF	ETB1FLOW	48	222	Essex Test Micro-basin 1 Daily Discharge cubic m
DF	ETB1WQL	128	62	Essex Test Micro-basin 1 Water Quality Monitoring
DF	ETB2FLOW	48	222	Essex Test Micro-basin 2 Daily Discharge cubic m
DF	ETB2WQL	106	62	Essex Test Micro-basin 2 Water Quality Monitoring
DF	ETGWD	8	70	Essex Test Groundwater Depth m
DF	ETGPC	57	48	Essex Test Groundwater Phosphorous Concentration mg/l

2.3 Info Data File Structures

The remainder of the report describes the structure of individual data files, or groups of similar files. The actual structure of each file depends primarily upon the frequency at which data were sampled, e.g. hourly, daily, monthly, etc. Generally, files containing data recorded on an hourly basis (e.g. air temperature, precipitation) share the same basic structure: year, month and day, followed by 24 fields of data (one for each hour). Similarly, files containing data gathered at daily increments share a common structure: year, month, followed by 31 fields of data (one for each day of each month). Data files with monthly measurements consist of: year, month, value (e.g. monthly evaporation). The remaining files (those containing a variety of parameters not gathered at regular intervals) vary in their structure. The structures of the entire set of Info files associated with the Essex control and test watersheds are documented below.

Note: For additional information regarding the nature of PWS digital data (units, methods, temporal duration, etc.), the reader is directed to Report 1 in this series (Couturier 1995a) and to the associated SWEEP reports cited therein. Also, in special cases, notations are provided in the following pages to indicate where additional information can be found, i.e., the values for many of the items in the files described below are already documented elsewhere.

ESSATMP - Hourly Air Temperature

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	2	2	I	-	Year
3	MM	2	2	I	-	Month
5	DD	2	2	I	-	Day
7	T0	6	6	N	2	12:00am Hourly Temperature degrees celsius
13	T1	6	6	N	2	1:00
19	T2	6	6	N	2	2:00
25	T3	6	6	N	2	3:00
31	T4	6	6	N	2	4:00
37	T5	6	6	N	2	5:00
43	T6	6	6	N	2	6:00
49	T7	6	6	N	2	7:00
55	T8	6	6	N	2	8:00
61	T9	6	6	N	2	9:00
67	T10	6	6	N	2	10:00
73	T11	6	6	N	2	11:00
79	T12	6	6	N	2	12:00pm
85	T13	6	6	N	2	13:00
91	T14	6	6	N	2	14:00
97	T15	6	6	N	2	15:00
103	T16	6	6	N	2	16:00
109	T17	6	6	N	2	17:00
115	T18	6	6	N	2	18:00
121	T19	6	6	N	2	19:00
127	T20	6	6	N	2	20:00
133	T21	6	6	N	2	21:00
139	T22	6	6	N	2	22:00
145	T23	6	6	N	2	23:00
151	NAME1	10	10	C	-	Watershed I.D.**

**link to .PAT

ESSPREC - Hourly Precipitation

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	2	2	I	-	Year
3	MM	2	2	I	-	Month
5	DD	2	2	I	-	Day
7	T0	6	6	N	3	12:00am Hourly precipitation mm
13	T1	6	6	N	3	1:00
19	T2	6	6	N	3	2:00
25	T3	6	6	N	3	3:00
31	T4	6	6	N	3	4:00
37	T5	6	6	N	3	5:00
43	T6	6	6	N	3	6:00
49	T7	6	6	N	3	7:00
55	T8	6	6	N	3	8:00
61	T9	6	6	N	3	9:00
67	T10	6	6	N	3	10:00
73	T11	6	6	N	3	11:00
79	T12	6	6	N	3	12:00pm
85	T13	6	6	N	3	13:00
91	T14	6	6	N	3	14:00
97	T15	6	6	N	3	15:00
103	T16	6	6	N	3	16:00
109	T17	6	6	N	3	17:00
115	T18	6	6	N	3	18:00
121	T19	6	6	N	3	19:00
127	T20	6	6	N	3	20:00
133	T21	6	6	N	3	21:00
139	T22	6	6	N	3	22:00
145	T23	6	6	N	3	23:00
151	NAME1	10	10	C	-	Watershed I.D.**

**link to .PAT

ESSRAD - Hourly Solar Radiation

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	2	2	I	-	Year
3	MM	2	2	I	-	Month
5	DD	2	2	I	-	Day
7	T0	6	6	N	1	12:00am Hourly Solar Radiation langleys
13	T1	6	6	N	1	1:00
19	T2	6	6	N	1	2:00
25	T3	6	6	N	1	3:00
31	T4	6	6	N	1	4:00
37	T5	6	6	N	1	5:00
43	T6	6	6	N	1	6:00
49	T7	6	6	N	1	7:00
55	T8	6	6	N	1	8:00
61	T9	6	6	N	1	9:00
67	T10	6	6	N	1	10:00
73	T11	6	6	N	1	11:00
79	T12	6	6	N	1	12:00pm
85	T13	6	6	N	1	13:00
91	T14	6	6	N	1	14:00
97	T15	6	6	N	1	15:00
103	T16	6	6	N	1	16:00
109	T17	6	6	N	1	17:00
115	T18	6	6	N	1	18:00
121	T19	6	6	N	1	19:00
127	T20	6	6	N	1	20:00
133	T21	6	6	N	1	21:00
139	T22	6	6	N	1	22:00
145	T23	6	6	N	1	23:00
151	NAME1	10	10	C	-	Watershed I.D.**

**link to .PAT

ESSWSPD - Hourly Wind Speed

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	2	2	I	-	Year
3	MM	2	2	I	-	Month
5	DD	2	2	I	-	Day
7	T0	6	6	N	2	12:00am Hourly Wind Speed m/s
13	T1	6	6	N	2	1:00
19	T2	6	6	N	2	2:00
25	T3	6	6	N	2	3:00
31	T4	6	6	N	2	4:00
37	T5	6	6	N	2	5:00
43	T6	6	6	N	2	6:00
49	T7	6	6	N	2	7:00
55	T8	6	6	N	2	8:00
61	T9	6	6	N	2	9:00
67	T10	6	6	N	2	10:00
73	T11	6	6	N	2	11:00
79	T12	6	6	N	2	12:00pm
85	T13	6	6	N	2	13:00
91	T14	6	6	N	2	14:00
97	T15	6	6	N	2	15:00
103	T16	6	6	N	2	16:00
109	T17	6	6	N	2	17:00
115	T18	6	6	N	2	18:00
121	T19	6	6	N	2	19:00
127	T20	6	6	N	2	20:00
133	T21	6	6	N	2	21:00
139	T22	6	6	N	2	22:00
145	T23	6	6	N	2	23:00
151	NAME1	10	10	C	-	Watershed I.D.**

**link to .PAT

ESSWDIR - Hourly Wind Direction

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	2	2	I	-	Year
3	MM	2	2	I	-	Month
5	DD	2	2	I	-	Day
7	T0	6	6	N	1	12:00am Hourly Wind Direction deg. from north
13	T1	6	6	N	1	1:00
19	T2	6	6	N	1	2:00
25	T3	6	6	N	1	3:00
31	T4	6	6	N	1	4:00
37	T5	6	6	N	1	5:00
43	T6	6	6	N	1	6:00
49	T7	6	6	N	1	7:00
55	T8	6	6	N	1	8:00
61	T9	6	6	N	1	9:00
67	T10	6	6	N	1	10:00
73	T11	6	6	N	1	11:00
79	T12	6	6	N	1	12:00pm
85	T13	6	6	N	1	13:00
91	T14	6	6	N	1	14:00
97	T15	6	6	N	1	15:00
103	T16	6	6	N	1	16:00
109	T17	6	6	N	1	17:00
115	T18	6	6	N	1	18:00
121	T19	6	6	N	1	19:00
127	T20	6	6	N	1	20:00
133	T21	6	6	N	1	21:00
139	T22	6	6	N	1	22:00
145	T23	6	6	N	1	23:00
151	NAME1	10	10	C	-	Watershed I.D.**

**link to .PAT

ESSRHUM - Daily Relative Humidity

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	2	2	I	-	Year
3	MM	2	2	I	-	Month
5	D1	6	6	N	2	Daily Relative Humidity %
11	D2	6	6	N	2	
17	D3	6	6	N	2	
23	D4	6	6	N	2	
29	D5	6	6	N	2	
35	D6	6	6	N	2	
41	D7	6	6	N	2	
47	D8	6	6	N	2	
53	D9	6	6	N	2	
59	D10	6	6	N	2	
65	D11	6	6	N	2	
71	D12	6	6	N	2	
77	D13	6	6	N	2	
83	D14	6	6	N	2	
89	D15	6	6	N	2	
95	D16	6	6	N	2	
101	D17	6	6	N	2	
107	D18	6	6	N	2	
113	D19	6	6	N	2	
119	D20	6	6	N	2	
125	D21	6	6	N	2	
131	D22	6	6	N	2	
137	D23	6	6	N	2	
143	D24	6	6	N	2	
149	D25	6	6	N	2	
155	D26	6	6	N	2	
161	D27	6	6	N	2	
167	D28	6	6	N	2	
173	D29	6	6	N	2	
179	D30	6	6	N	2	
185	D31	6	6	N	2	
191	NAME1	10	10	C	-	Watershed I.D.**

**link to .PAT

ESSST5, ESSST50, ESSST150 - Daily Soil Temperature, 5cm, 50cm, and 150cm depth

COLUMN ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1 YY	2	2	I	-	Year
3 MM	2	2	I	-	Month
5 D1	6	6	N	2	Daily Soil Temperature degrees celsius
11 D2	6	6	N	2	
17 D3	6	6	N	2	
23 D4	6	6	N	2	
29 D5	6	6	N	2	
35 D6	6	6	N	2	
41 D7	6	6	N	2	
47 D8	6	6	N	2	
53 D9	6	6	N	2	
59 D10	6	6	N	2	
65 D11	6	6	N	2	
71 D12	6	6	N	2	
77 D13	6	6	N	2	
83 D14	6	6	N	2	
89 D15	6	6	N	2	
95 D16	6	6	N	2	
101 D17	6	6	N	2	
107 D18	6	6	N	2	
113 D19	6	6	N	2	
119 D20	6	6	N	2	
125 D21	6	6	N	2	
131 D22	6	6	N	2	
137 D23	6	6	N	2	
143 D24	6	6	N	2	
149 D25	6	6	N	2	
155 D26	6	6	N	2	
161 D27	6	6	N	2	
167 D28	6	6	N	2	
173 D29	6	6	N	2	
179 D30	6	6	N	2	
185 D31	6	6	N	2	
191 NAME1	10	10	C	-	Watershed I.D.**

**link to .PAT

ESSEVAP - Monthly Potential Evaporation

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	4	4	I	-	Year
5	M1	5	5	N	1	January
10	M2	5	5	N	1	February
15	M3	5	5	N	1	March
20	M4	5	5	N	1	April
25	M5	5	5	N	1	May
30	M6	5	5	N	1	June
35	M7	5	5	N	1	July
40	M8	5	5	N	1	August
45	M9	5	5	N	1	September
50	M10	5	5	N	1	October
55	M11	5	5	N	1	November
60	M12	5	5	N	1	December
65	NAME1	10	10	C	-	Watershed I.D.**

**link to .PAT

ECCROPS889, ETCROPS889 - Crop and Tillage data, 1988-89

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	NAME3	10	10	C	-	Field No.**
11	ACRES	3	3	N	0	Field Acres
14	HECTARES	5	5	N	1	Field Hectares
19	CROP	3	3	I	-	Crop Type
22	PRITILL	3	3	I	-	Primary Tillage
25	SECTILL	40	40	C	-	Secondary Tillage
65	COVER1088	5	5	N	1	% Cover October 1988
70	CODE1	5	5	C	-	Method of cover calculation
75	COVER489	5	5	N	1	% Cover April 1989
80	CODE2	5	5	C	-	Method of cover calculation
85	COVER689	5	5	N	1	% Cover June 1989
90	CODE3	5	5	C	-	Method of cover calculation
95	COVER1089	5	5	N	1	% Cover October 1989
100	CODE4	5	5	C	-	Method of cover calculation
105	TOTYIELD	11	11	N	1	Total Yield kg
116	YIELD	9	9	N	1	Yield kg/ha
125	SOURCE	10	10	C	-	Method of yield calculation
135	NAME1	10	10	C	-	Watershed I.D.
145	NAME2	10	10	C	-	Sub-watershed I.D.

**link to .PAT

Please refer to Appendix D of *Pilot Watershed Study Report #4: Evaluation of Conservation Systems: Soils and Crops* (Ecologistics Limited 1994b) to interpret codes for crop type, primary tillage, secondary tillage, and method of yield calculation.

ECCROPS890, ETCROPS890 - Crop and Tillage data, 1989-90

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	NAME3	10	10	C	-	Field No.**
11	ACRES	3	3	N	0	Field Acres
14	HECTARES	5	5	N	1	Field Hectares
19	CROP	3	3	I	-	Crop Type
22	PRITILL	3	3	I	-	Primary Tillage
25	SECTILL	40	40	C	-	Secondary Tillage
65	COVER490	5	5	N	1	% Cover April 1990
70	CODE2	5	5	C	-	Method of cover calculation
75	COVER690	5	5	N	1	% Cover June 1990
80	CODE3	5	5	C	-	Method of cover calculation
85	COVER990	5	5	N	1	% Cover September 1990
90	CODE4	5	5	C	-	Method of cover calculation
95	TOTYIELD	10	10	N	1	Total Yield kg
105	YIELD	9	9	N	1	Yield kg/ha
114	SOURCE	10	10	C	-	Method of yield calculation
124	NAME1	10	10	C	-	Watershed I.D.
134	NAME2	10	10	C	-	Sub-watershed I.D.

**link to .PAT

Please refer to Appendix D of *Pilot Watershed Study Report #4: Evaluation of Conservation Systems: Soils and Crops* (Ecologistics Limited 1994b) to interpret codes for crop type, primary tillage, secondary tillage, and method of yield calculation.

ECCROPS991, ETCROPS991 - Crop and Tillage data, 1990-91

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	NAME3	10	10	C	-	Field No.**
11	ACRES	3	3	N	0	Field Acres
14	HECTARES	5	5	N	1	Field Hectares
19	CROP	3	3	I	-	Crop Type
22	PRITILL	3	3	I	-	Primary Tillage
25	SECTILL	40	40	C	-	Secondary Tillage
65	COVER491	5	5	N	1	% Cover April 1991
70	CODE2	5	5	C	-	Method of cover calculation
75	COVER691	5	5	N	1	% Cover June 1991
80	CODE3	5	5	C	-	Method of cover calculation
85	COVER991	5	5	N	1	% Cover September 1991
90	CODE4	5	5	C	-	Method of cover calculation
95	TOTYIELD	10	10	N	1	Total Yield kg
105	YIELD	9	9	N	1	Yield kg/ha
114	SOURCE	10	10	C	-	Method of yield calculation
124	NAME1	10	10	C	-	Watershed I.D.
134	NAME2	10	10	C	-	Sub-watershed I.D.

**link to .PAT

Please refer to Appendix D of *Pilot Watershed Study Report #4: Evaluation of Conservation Systems: Soils and Crops* (Ecologistics Limited 1994b) to interpret codes for crop type, primary tillage, secondary tillage, and method of yield calculation.

ESSSOIL - Soil Polygon Legend File

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	NAME3	10	10	C	-	Soil Polygon I.D.**
11	NAME2	10	10	C	-	Sub-watershed I.D.
21	NAME1	10	10	C	-	Watershed I.D.
31	SOILCODEP1	4	4	C	-	Soil Type
35	VARIANTP1	12	12	C	-	Soil Phase
47	DEPOSITION	5	5	C	-	Ap Horizon Depth
52	EROSION	5	5	C	-	Degree of Erosion
57	SLOPECLASS	7	7	C	-	Slope Class
64	DRAINAGE	4	4	C	-	Drainage Class
68	AREA	10	10	N	1	Soil Polygon Area ha
78	SOILNAME	20	20	C	-	Soil Name
98	TEXTURE	6	6	C	-	Soil Texture
104	LIMITINCLU	50	50	C	-	Complexity of Soil Polygon
154	PERSLOPE	10	10	C	-	Percent Slope

**link to .PAT

Please refer to *Soil Survey of the Pilot Watersheds, Southwestern Ontario Soil and Water Environmental Enhancement Program* (Ecological Services for Planning 1990) for further information on the Soil Polygon Legend File.

ECBENCH, ETBENCH - Soil Benchmark Monitoring

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	NAME3	10	10	C	-	Benchmark Site I.D.**
11	SLOPE_POS	1	1	I	-	Slope Position (1=Top 2=Middle 3=Bottom)
12	YEAR	4	4	I	-	Year
16	SEASON	15	15	C	-	Post-harvest, Pre-plant, etc.
31	INFILT	7	7	N	2	Infiltration Rate m/s
38	BDENSITY_5	7	7	N	2	Bulk Density 5cm depth g/cm3
45	BDENSITY_10	7	7	N	2	Bulk Density 10cm depth g/cm3
52	BDENSITY_15	7	7	N	2	Bulk Density 15cm depth g/cm3
59	BDENSITY_20	7	7	N	2	Bulk Density 20cm depth g/cm3
66	BDENSITY_25	7	7	N	2	Bulk Density 25cm depth g/cm3
73	BDENSITY_30	7	7	N	2	Bulk Density 30cm depth g/cm3
80	MOIST_SURF	7	7	N	2	Moisture Content - surface
87	MOIST_15	7	7	N	2	Moisture Content - 15cm depth
94	MOIST_30	7	7	N	2	Moisture Content - 30cm depth
101	AVGBDENS_015	7	7	N	2	Average Bulk Density 0-15cm g/cm3
108	AVGBDENS_1530	7	7	N	2	Average Bulk Density 15-30cm g/cm3
115	PSDC_GRAVEL	7	7	N	2	Particle Size Dist. - Calgon Dispersed
122	PSDC_VCSAND	7	7	N	2	"
129	PSDC_CSAND	7	7	N	2	"
136	PSDC_MSAND	7	7	N	2	"
143	PSDC_FSAND	7	7	N	2	"
150	PSDC_VFSAND	7	7	N	2	"
157	PSDC_SAND	7	7	N	2	"
164	PSDC_SILT	7	7	N	2	"
171	PSDC_CLAY	7	7	N	2	"
178	TEXTURE	20	20	C	-	Soil Texture
198	PSDW_GRAVEL	7	7	N	2	Particle Size Dist. - Water Dispersed
205	PSDW_VCSAND	7	7	N	2	"
212	PSDW_CSAND	7	7	N	2	"
219	PSDW_MSAND	7	7	N	2	"
226	PSDW_FSAND	7	7	N	2	"
233	PSDW_VFSAND	7	7	N	2	"
240	PSDW_SAND	7	7	N	2	"
247	PSDW_SILT	7	7	N	2	"
254	PSDW_CLAY	7	7	N	2	"
261	TEXT2	20	20	C	-	Soil Texture
281	BIOMASS	7	7	N	2	Biological Activity Index - microbial biomass
288	AUPL_015	7	7	N	2	Atterburg Upper Plastic Limit 0-15cm %
295	AUPL_1530	7	7	N	2	Atterburg Upper Plastic Limit 15-30cm %
302	ALPL_015	7	7	N	2	Atterburg Lower Plastic Limit 0-15cm %
309	ALPL_1530	7	7	N	2	Atterburg Lower Plastic Limit 15-30cm %
316	API_015	7	7	N	2	Atterburg Plasticity Index 0-15cm
323	API_1530	7	7	N	2	Atterburg Plasticity Index 15-30cm

330 ORGANMAT	7	7	N	2	Organic Matter %
337 PHOSPHOROUS	8	8	N	2	Phosphorous mg/l
345 POTASSIUM	8	8	N	2	Potassium mg/l
353 MAGNESIUM	8	8	N	2	Magnesium mg/l
361 CALCIUM	8	8	N	2	Calcium mg/l
369 AGGSTABIL	7	7	N	2	Wet Aggregate Stability %
376 PH	7	7	N	2	Soil pH
383 CEC	7	7	N	2	Cation Exchange Capacity meq/100g
390 CALCARB	7	7	N	2	Calcium Carbonate %
397 AMHC_015_SAT	7	7	N	2	Moisture Retention 0-15cm saturated
404 AMHC_015_100MB	7	7	N	2	Moisture Retention 0-15cm 100mB
411 AMHC_015_15BAR	7	7	N	2	Moisture Retention 0-15cm 15 Bar
418 AMHC_1530_SAT	7	7	N	2	Moisture Retention 15-30cm saturated
425 AMHC_1530_100MB	7	7	N	2	Moisture Retention 15-30cm 100mB
432 AMHC_1530_15BAR	7	7	N	2	Moisture Retention 15-30cm 15 Bar
439 NAME1	10	10	C	-	Watershed I.D.
449 NAME2	10	10	C	-	Sub-watershed I.D.

**link to .PAT

Please refer to Appendix B of *Pilot Watershed Study Report #4: Evaluation of Conservation Systems: Soils and Crops* (Ecologistics Limited 1994b) and to the report *Soil Survey of the Pilot Watersheds, Southwestern Ontario Soil and Water Environmental Enhancement Program* (Ecological Services for Planning 1990) for additional information concerning soil benchmark monitoring.

ECFLOW, ETFLOW - Sub-watershed Hourly Discharge

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	2	2	I	-	Year
3	MM	2	2	I	-	Month
5	DD	2	2	I	-	Day
7	T0	6	6	N	4	12:00am - Hourly discharge cubic dm
13	T1	6	6	N	4	1:00
19	T2	6	6	N	4	2:00
25	T3	6	6	N	4	3:00
31	T4	6	6	N	4	4:00
37	T5	6	6	N	4	5:00
43	T6	6	6	N	4	6:00
49	T7	6	6	N	4	7:00
55	T8	6	6	N	4	8:00
61	T9	6	6	N	4	9:00
67	T10	6	6	N	4	10:00
73	T11	6	6	N	4	11:00
79	T12	6	6	N	4	12:00pm
85	T13	6	6	N	4	13:00
91	T14	6	6	N	4	14:00
97	T15	6	6	N	4	15:00
103	T16	6	6	N	4	16:00
109	T17	6	6	N	4	17:00
115	T18	6	6	N	4	18:00
121	T19	6	6	N	4	19:00
127	T20	6	6	N	4	20:00
133	T21	6	6	N	4	21:00
139	T22	6	6	N	4	22:00
145	T23	6	6	N	4	23:00
151	NAME1	10	10	C	-	Watershed I.D.
161	NAME2	10	10	C	-	Sub-watershed I.D.**

**link to .PAT

ECWQUAL, ETWQUAL - Sub-watershed Water Quality Monitoring

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	2	2	I	-	Year
3	MM	2	2	I	-	Month
5	DD	2	2	I	-	Day
7	TIME	4	4	I	-	Time
11	TSS	8	8	N	1	Suspended Solids mg/l
19	AMMON	8	8	N	3	Ammonia mg/l
27	TKN	8	8	N	2	Total Kjeldahl Nitrogen mg/l
35	NITRI	8	8	N	1	Nitrite mg/l
43	NITRA	8	8	N	1	Nitrate mg/l
51	TP	8	8	N	3	Phosphorous mg/l
59	FRP	8	8	N	3	Filtered Reactive Phosphorous mg/l
67	PH	7	7	N	2	pH
74	CHLOR	8	8	N	1	Chloride mg/l
82	POTASS	8	8	N	1	Potassium mg/l
90	COND	8	8	I	-	Conductivity
98	NAME1	10	10	C	-	Watershed I.D.
108	NAME2	10	10	C	-	Sub-watershed I.D.**

**link to .PAT

ECB1FLOW, ECB2FLOW, ETB1FLOW, ETB2FLOW - Micro-basin Daily Discharge

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	4	4	I	-	Year
5	MM	2	2	I	-	Month
7	D1	6	6	N	2	Daily Discharge - cubic metres
13	D2	6	6	N	2	
19	D3	6	6	N	2	
25	D4	6	6	N	2	
31	D5	6	6	N	2	
37	D6	6	6	N	2	
43	D7	6	6	N	2	
49	D8	6	6	N	2	
55	D9	6	6	N	2	
61	D10	6	6	N	2	
67	D11	6	6	N	2	
73	D12	6	6	N	2	
79	D13	6	6	N	2	
85	D14	6	6	N	2	
91	D15	6	6	N	2	
97	D16	6	6	N	2	
103	D17	6	6	N	2	
109	D18	6	6	N	2	
115	D19	6	6	N	2	
121	D20	6	6	N	2	
127	D21	6	6	N	2	
133	D22	6	6	N	2	
139	D23	6	6	N	2	
145	D24	6	6	N	2	
151	D25	6	6	N	2	
157	D26	6	6	N	2	
163	D27	6	6	N	2	
169	D28	6	6	N	2	
175	D29	6	6	N	2	
181	D30	6	6	N	2	
187	D31	6	6	N	2	
193	NAME1	10	10	C	-	Watershed I.D.
203	NAME2	10	10	C	-	Sub-watershed I.D.
213	NAME3	10	10	C	-	Micro-basin I.D.**

**link to .PAT

ECB1WQL, ECB2WQL, ETB1WQL, ETB2WQL - ~~Micro-basin Water Quality Monitoring~~

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	YY	4	4	C	-	Year
5	MM	2	2	I	-	Month
7	DD	2	2	I	-	Day
9	TIME	4	4	I	-	Time
13	TSS	6	6	N	0	Suspended Solids mg/l
19	TP	7	7	N	3	Phosphorous mg/l
26	LEVEL	7	7	N	3	Water Level m
33	NAME1	10	10	C	-	Watershed I.D.
43	NAME2	10	10	C	-	Sub-watershed I.D.
53	NAME3	10	10	C	-	Micro-basin I.D.**

**link to .PAT

ECGWD, ETGWD - ~~Groundwater Depth~~

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	NAME3	10	10	C	-	Groundwater Site I.D.**
11	YY	4	4	I	-	Year
15	M1	3	3	N	0	January
18	M2	3	3	N	0	February
21	M3	3	3	N	0	March
24	M4	3	3	N	0	April
27	M5	3	3	N	0	May
30	M6	3	3	N	0	June
33	M7	3	3	N	0	July
36	M8	3	3	N	0	August
39	M9	3	3	N	0	September
42	M10	3	3	N	0	October
45	M11	3	3	N	0	November
48	M12	3	3	N	0	December
51	NAME1	10	10	C	-	Watershed I.D.
61	NAME2	10	10	C	-	Sub-watershed I.D.

**link to .PAT

ECGPC, ETGPC - ~~Groundwater Phosphorous Concentration~~

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	DESCRIPTION
1	NAME3	10	10	C	-	Groundwater Site I.D.**
11	YY	2	2	I	-	Year
13	MM	2	2	I	-	Month
15	DD	2	2	I	-	Day
17	TIME	4	4	I	-	Estimated Time
21	TP	7	7	N	3	Phosphorous mg/l
28	NAME1	10	10	C	-	Watershed I.D.
38	NAME2	10	10	C	-	Sub-watershed I.D.

**link to .PAT

3. SUMMARY AND CONCLUSIONS

This report documents the digital spatial coverages and associated attribute files received from the Pilot Watershed Study which pertain to the Essex watershed. The data are thought to be relatively accurate, although a precise estimate of their accuracy cannot be made (they were provided by a third party). These data will be used to apply and test the IROWC methodology at a variety of temporal and spatial scales. This report will serve both as a guide for locating files of interest, and as a manual for deciphering and interpreting the contents of specific files. For additional information, the reader is directed to the various reports cited in this document.

REFERENCES

- Couturier, A. 1995a. *Status and Assessment of Pilot Watershed Study Data*. Final Report AAFC-1. Guelph: Agriculture and Agri-Food Canada, Ontario Land Resource Unit.
- Couturier, A. 1995b. *File Organization and Linkages for the Pilot Watershed Study Digital Database*. Final Report AAFC-2. Guelph: Agriculture and Agri-Food Canada, Ontario Land Resource Unit.
- Ecological Services for Planning. 1990. *Soil Survey of the Pilot Watersheds. Southwestern Ontario Soil and Water Environmental Enhancement Program*. Guelph: Agriculture Canada.
- Ecologistics Limited. 1994b. *Pilot Watershed Study Report #4: Evaluation of Conservation Systems: Soils and Crops*. Guelph: Agriculture and Agri-Food Canada.
- MacDonald, K.B. and H. Spaling. 1995a. *Indicators of Risk of Water Contamination: Concepts and Principles*. Agri-Environmental Indicator Project Working Paper. Guelph: Agriculture and Agri-Food Canada, Ontario Land Resource Unit.
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