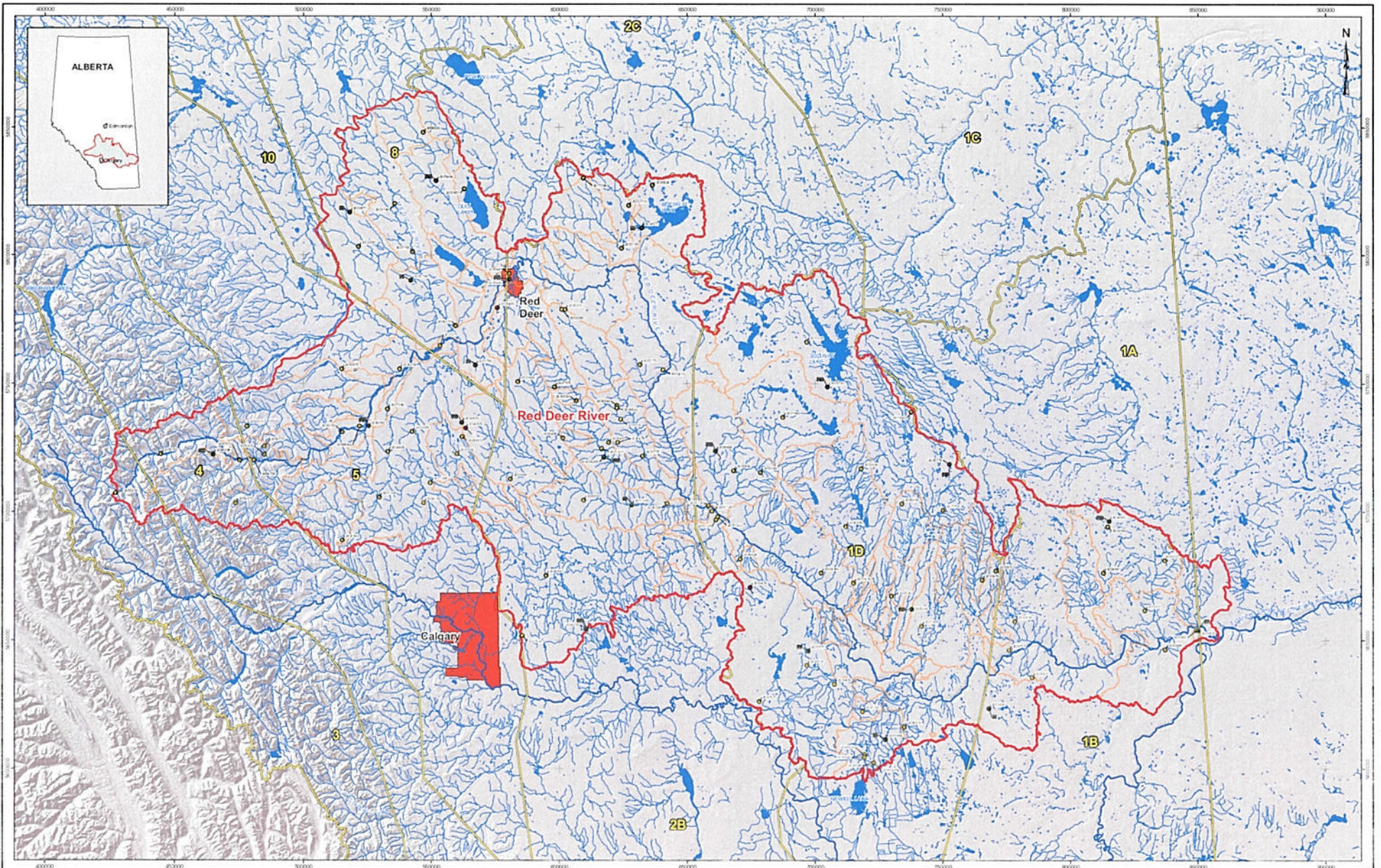




APPENDIX E

Red Deer River Basin



- LEGEND**
- CLIMATE STATION
 - INDEX STATION PRECIPITATION
 - INDEX STATION TEMPERATURE
 - RIVER
 - HYDROLOGIC REGION
 - LAKE
 - MAJOR RIVER BASIN
 - PFRA SUB-BASIN

REFERENCE
 Hydrography and city data for Canada obtained from Natural Resources Canada. Hydrography for the USA obtained from USGS.
 Hydrologic stations, hydrologic regions, basin and sub-basin data obtained from Alberta Environment.
 Projection: Alberta 12TM False Easting 300 000 at 115° W. Datum: NAD 83

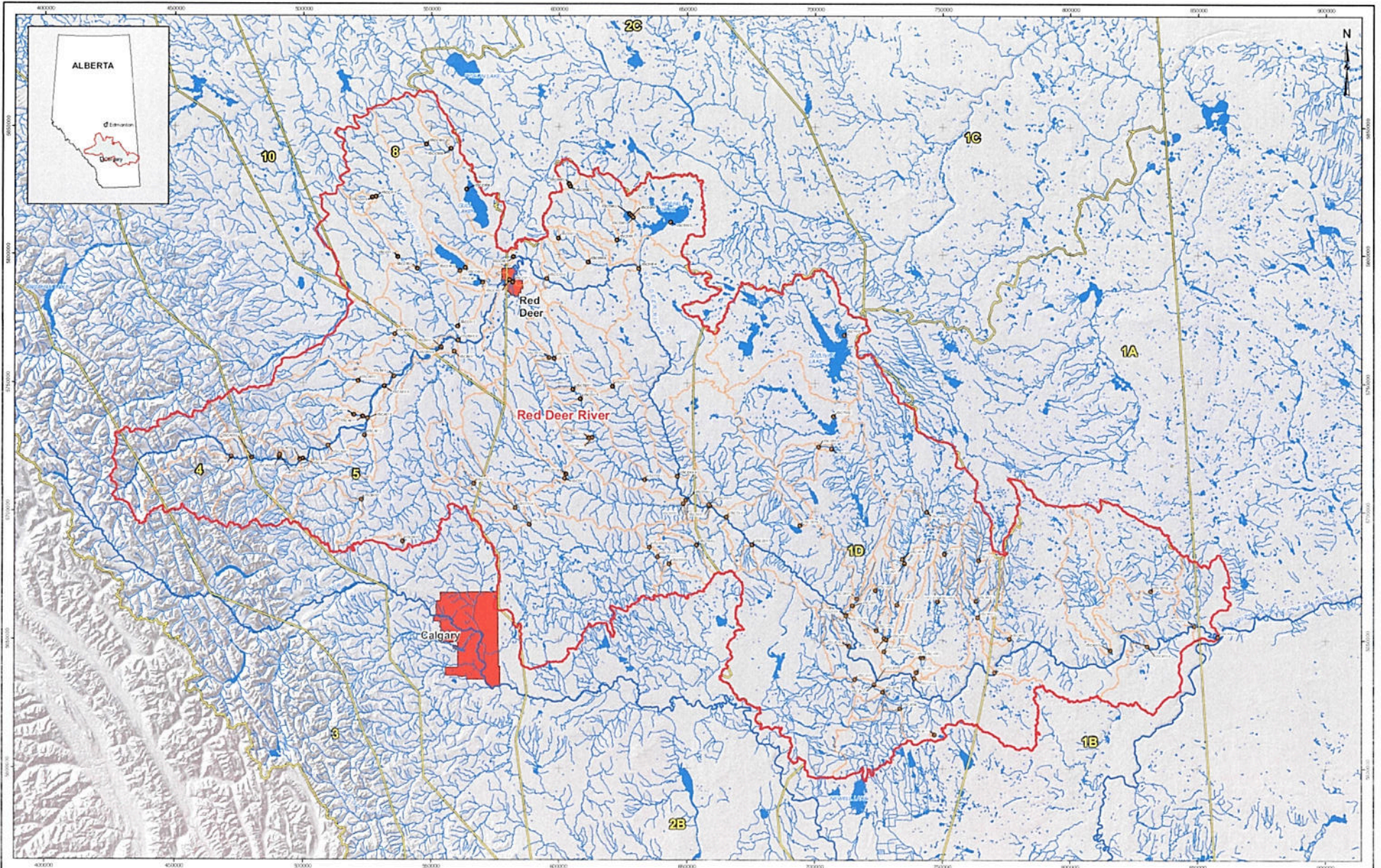


PROJECT: Government of Alberta | HYDRO-CLIMATE MODELLING OF THE SOUTH SASKATCHEWAN REGIONAL PLANNING AREA
 TITLE: CLIMATE STATIONS IN THE RED DEER RIVER BASIN



REV	DATE	BY	CHKD	TITLE	NO. OF SHEETS	TOTAL
DESIGN	26	26	26	26	26	26
REV	DATE	BY	CHKD	TITLE	NO. OF SHEETS	TOTAL
REV	26	26	26	26	26	26

FIGURE: E.1



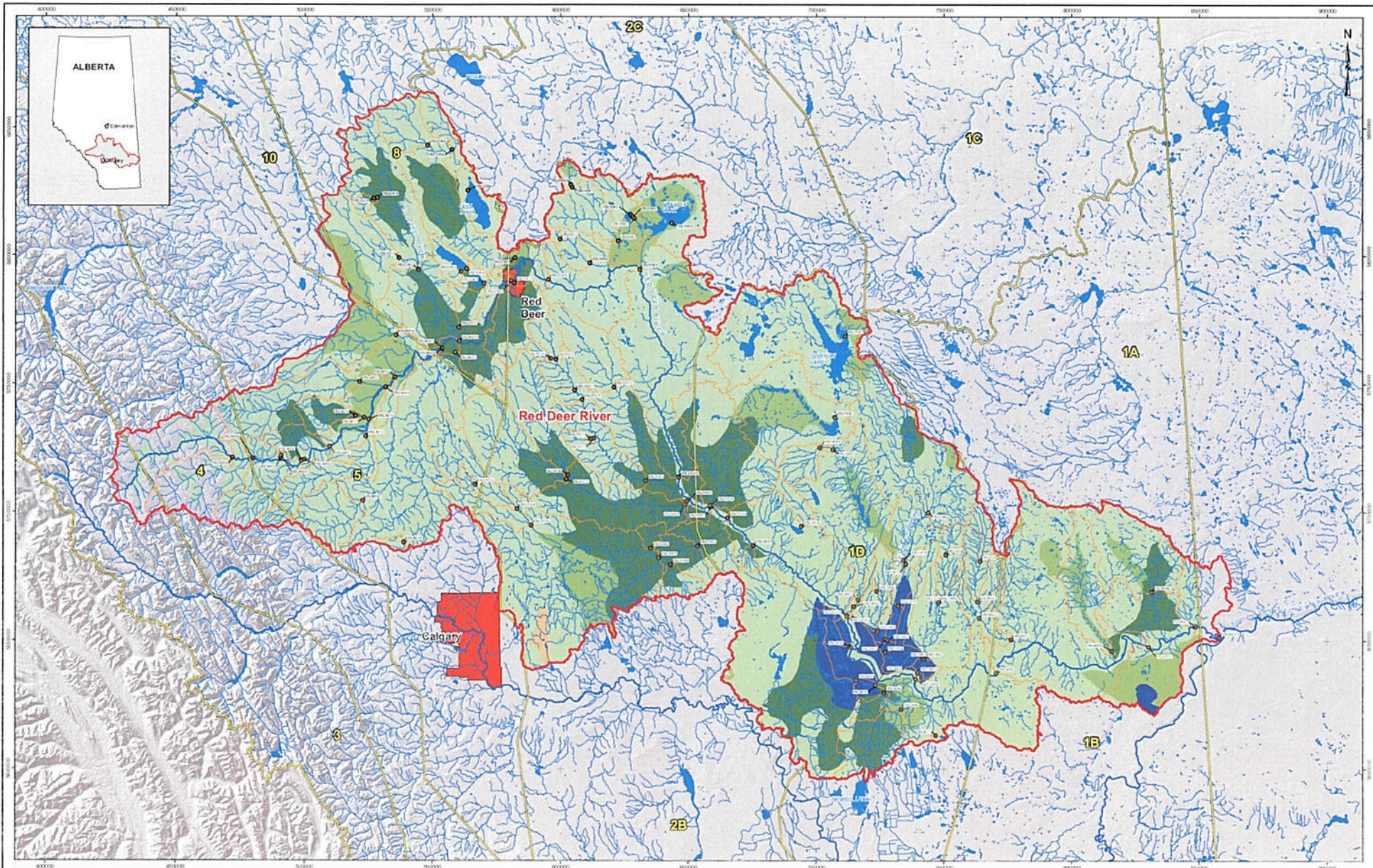
- LEGEND**
- HYDROMETRIC STATION
 - RIVER
 - HYDROLOGIC REGION
 - LAKE
 - MAJOR RIVER BASIN
 - PFA SUB-BASIN

REFERENCE
 Hydrography and city data for Canada obtained from Natural Resources Canada. Hydrography for the USA obtained from USGS.
 Hydro-metric stations, hydrologic regions, basin and sub-basin data obtained from Alberta Environment.
 Projection: Alberta 10TM False Easting 500,000 at 115°W. Datum: NAD 83



PROJECT Government of Alberta		HYDRO-CLIMATE MODELLING OF THE SOUTH SASKATCHEWAN REGIONAL PLANNING AREA	
TITLE HYDROMETRIC STATIONS IN THE RED DEER RIVER BASIN			
Golder ASSOCIATES Calgary, Alberta	PROJECT NO. 018-001	SCALE AS SHOWN	REV. 1
	04/04/16	25 July 2016	
	05/11/16	25 Nov 2016	
	14/01/17	25 Jan 2017	
	03/22/17	25 Jul 2017	

FIGURE: E.2



LEGEND

● HYDROMETRIC STATION	■ IMPERVIOUS	■ RAPIDLY DRAINED SAND
— RIVER	■ ORGANIC	■ RAPIDLY DRAINED TILL
— HYDROLOGIC REGION	■ WATER	■ WELL DRAINED CLAY LOAM
■ LAKE	■ POORLY DRAINED CLAY LOAM	■ WELL DRAINED SAND
■ MAJOR RIVER BASIN	■ POORLY DRAINED SAND	■ WELL DRAINED TILL
■ PFRA SUB-BASIN	■ POORLY DRAINED TILL	■ WELL DRAINED RESIDUAL
		■ NO DATA

REFERENCE
 Hydrography and city data for Canada obtained from Natural Resources Canada. Hydrography for the LEA obtained from USGS. Hydrometric stations, hydrologic regions, basin and sub-basin data obtained from Alberta Environment. Surficial Geology for Alberta obtained from Agriculture and Agri-Food Canada. Surficial Geology for Montana obtained from Natural Resources Conservation Service. Projection: Alberta 10TM False Easting 500,000 at 115° W. Datum: NAD 83.



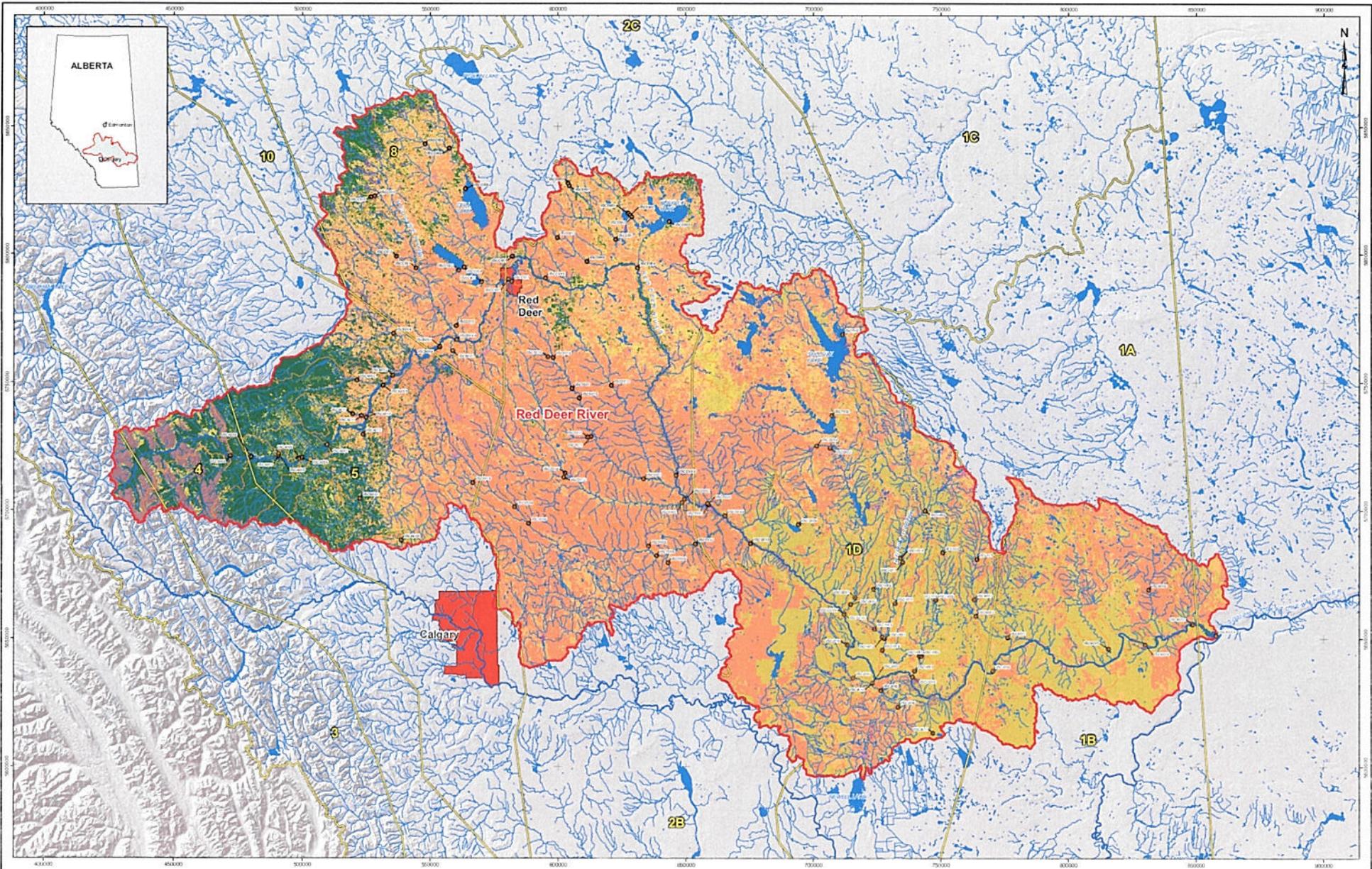
PROJECT: **Government of Alberta** HYDRO-CLIMATE MODELLING OF THE SOUTH SASKATCHEWAN REGIONAL PLANNING AREA

TITLE: **SURFICIAL GEOLOGY IN THE RED DEER RIVER BASIN**

Golder ASSOCIATES
 Calgary, Alberta

PREPARED BY: [Name]	DATE: 20 Sep 2018	SCALE: as shown	REV: 1
DESIGN: [Name]	DATE: 20 Sep 2018		
CHECK: [Name]	DATE: 20 Sep 2018		
APPROVED: [Name]	DATE: 20 Sep 2018		

FIGURE: E.3



- LEGEND**
- HYDROMETRIC STATION
 - RIVER
 - HYDROLOGIC REGION
 - LAKE
 - MAJOR RIVER BASIN
 - PFRA SUB-BASIN
 - UNCLASSIFIED
 - WATER
 - EXPOSED LAND
 - DEVELOPED
 - SHRUBLAND
 - WETLAND
 - GRASSLAND NATIVE GRASS
 - ANNUAL CROPLAND
 - PERENNIAL CROPS AND PASTURE
 - CONIFEROUS FOREST
 - DECIDUOUS FOREST
 - MIXED FOREST

REFERENCE
 Hydrography and city data for Canada obtained from Natural Resources Canada. Hydrography for the USA obtained from USGS. Hydrometric stations, hydrologic regions, basin and sub-basin data obtained from Alberta Environment.
 Landcover for Canada obtained from Agriculture and Agri-Food Canada. Landcover for the USA obtained from USGS.
 Projection: Alberta 10TM False Easting 500,000 at 115° W Datum: NAD 83

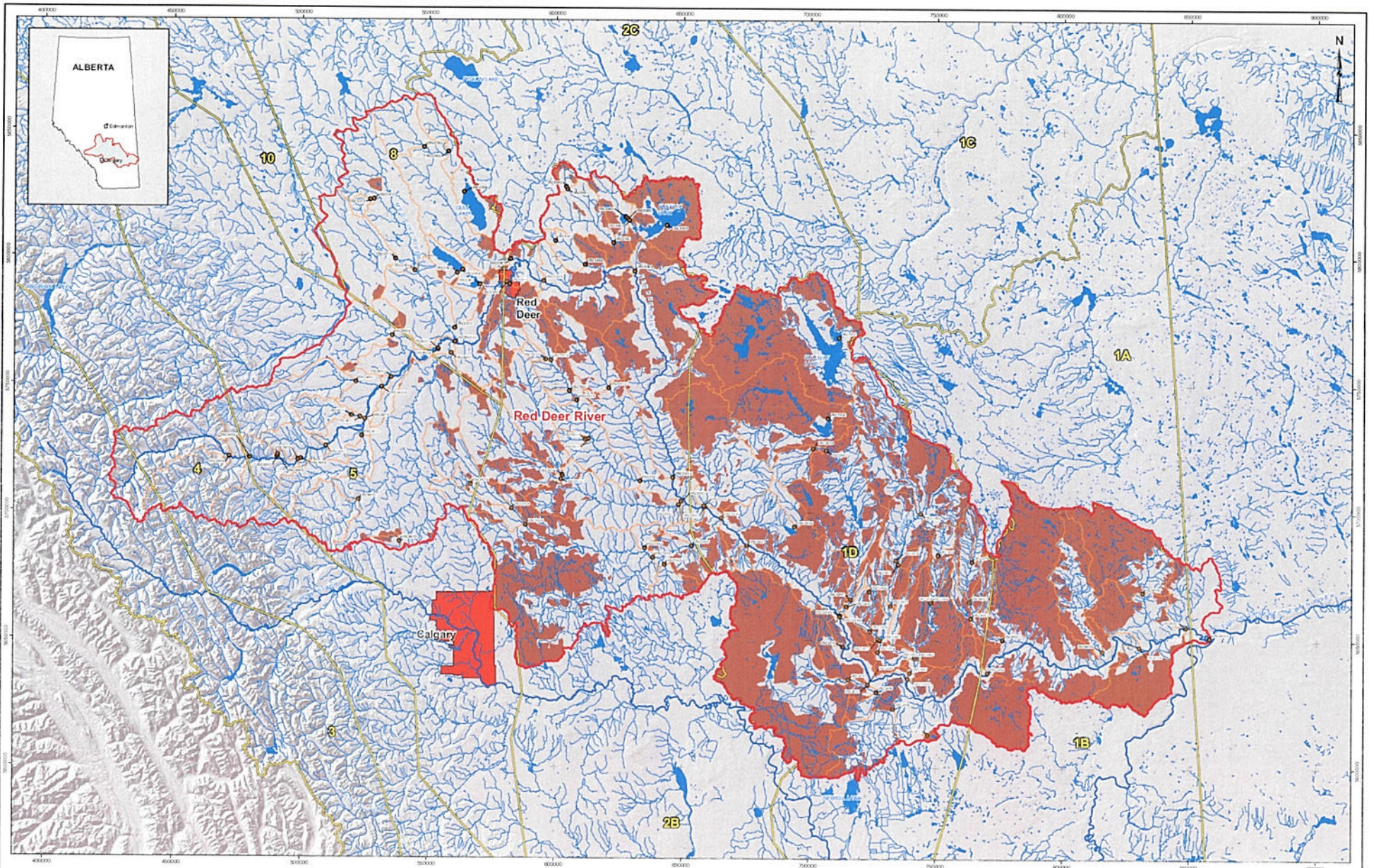


PROJECT
Government of Alberta HYDRO-CLIMATE MODELLING OF THE SOUTH SASKATCHEWAN REGIONAL PLANNING AREA
 E:\projects\...

TITLE
LAND COVER IN THE RED DEER RIVER BASIN

PROJECT NO.	10-124-184	SCALE AS SHOWN	REV. 1
DESIGN	24 Sep 2010		
DWG	14 Aug 2011		
CHECK	20 Sep 2011		
REVIEW	28 Sep 2011		

FIGURE: E.4



- LEGEND**
- HYDROMETRIC STATION
 - RIVER
 - HYDROLOGIC REGION
 - LAKE
 - MAJOR RIVER BASIN
 - NON-CONTRIBUTING AREA
 - PFRA SUB-BASIN

REFERENCE
 Hydrography and city data for Canada obtained from Natural Resources Canada. Hydrography for the USA obtained from USGS.
 Hydrometric stations, hydrologic regions, basin and sub-basin data obtained from Alberta Environment.
 Projection: Alberta 10TM False Easting 500,000 at 115° W. Datum: NAD 83



PROJECT
 Government of Alberta HYDRO-CLIMATE MODELLING OF THE SOUTH SASKATCHEWAN REGIONAL PLANNING AREA

TITLE
**NON-CONTRIBUTING AREAS
 IN THE RED DEER RIVER BASIN**

Goldier Associates
 Calgary, Alberta

DATE	BY	REVISION	SCALE	REV.
DESIGN	ME	25 Sep 2018	SCALE as shown	1
CHECK	ME	25 Mar 2019		
REVISION	ME	25 Jul 2019		
		25 Jul 2019		

FIGURE: E.5

Figure E.6. HSPF Schematic for the Upper and Lower Portions of the Red Deer River Basin

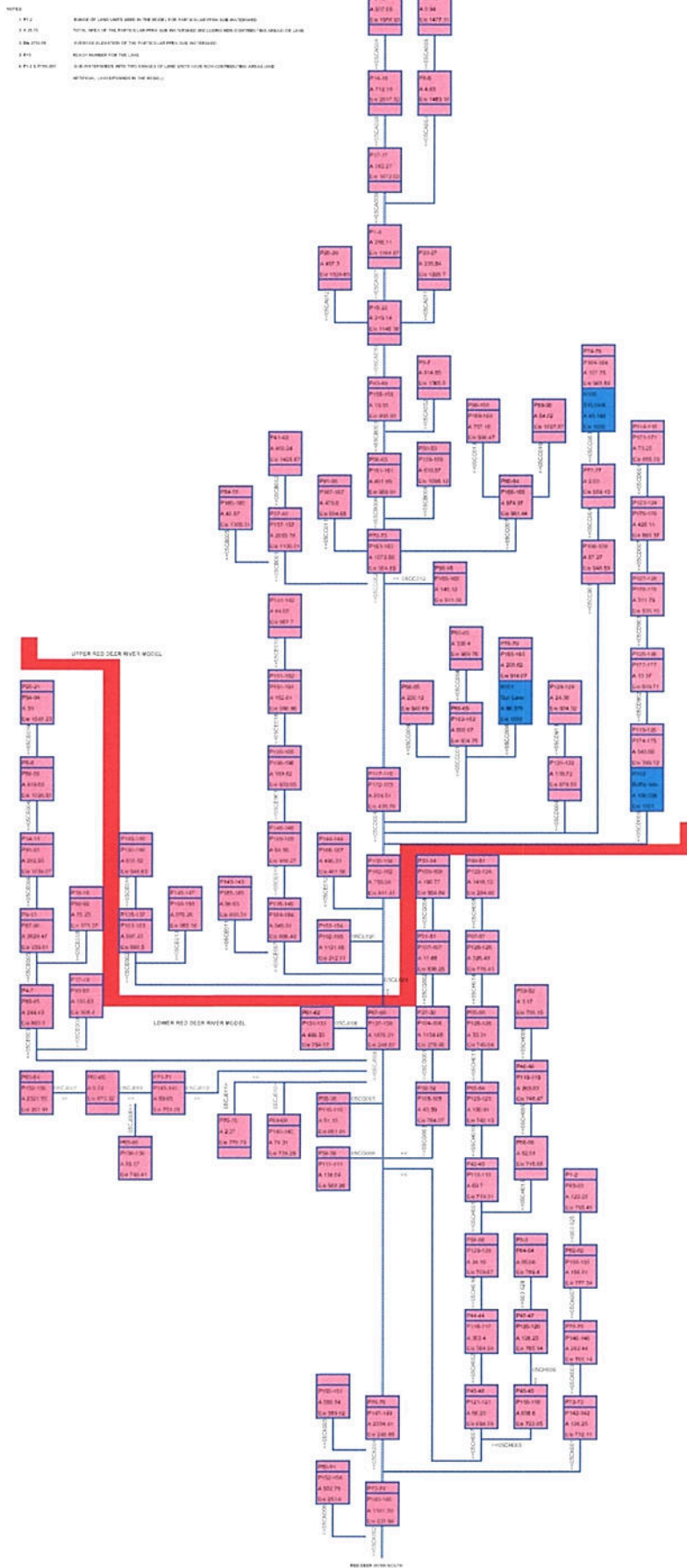


Table E-1a - Calibrated HSPF Parameters for the Upper Portion of the Red Deer River Basin

Previous Land Parameters		FOREST	UZSN	INFL1	KAARY	AGWRC	PETMAX	PETMIN	INFLXP	INSHLD	DEEPR	BAS1TP	AGW1TP	CLPSC	UZSN	SNR	INTFW	IRC	LZ1TP
Land Type	Description	The fraction of the previous land segment which is covered by forest	The lower zone storage	An index to the infiltration capacity at the soil	parameter which affects the behavior of ground-water recession flow, enabling it to be more potential in its decay with time	The basic ground-water recession rate of KAARY is zero and there is an inflow to ground-water	The air temperature below which E-T will be zero	The temperature below which E-T will be zero regardless of the value in the input time series	Exponent in the infiltration equation	Ratio between the maximum and mean infiltration capacities	Fraction of ground-water inflow which will enter deep (active) ground-water	Fraction of remaining potential E-T which can be satisfied from baseflow ground-water outflow, if enough is available	Fraction of remaining potential E-T which can be satisfied from active ground-water storage if enough is available	Interception storage capacity	Upper zone storage	Manning's n for the overland flow plane	Inflow parameter	Interflow recession parameter	Lower zone L-1 parameter
	Units	none	m	in/hr	1/m	1/day	degF	degF	none	none	none	none	in	m	complex	none	1/day	none	
Impervious - Coniferous Forest		0.8	0.2	0.1	0	0.996-0.998	40	35	2	2	0.1	0.005	0.005	see monthly table	0.2	0.25	3	0.95	see monthly table
Impervious - Exposed Land		0	0.2	0.1	0	0.996-0.998	40	35	2	2	0.1	0.005	0.005	see monthly table	0.2	0.25	3	0.95	see monthly table
Impervious - Grassland Native Grass		0.3	0.2	0.1	0	0.998	40	35	2	2	0.1	0.005	0.005	see monthly table	0.2	0.25	3	0.95	see monthly table
Well Drained Clay Loam - Annual Cropland		0.3	0.2-2	0.1-0.15	0.0	0.9-0.96	40	35	2	2	0.2-0.9	0.005-0.1	0.01-0.1	see monthly table	0.1-0.4	0.25	2.0-5.0	0.8-0.95	see monthly table
Well Drained Clay Loam - Coniferous Forest		0.8	0.2-0.3	0.02-0.1	1-1.5	0.938-0.998	40	35	2	2	0.1-0.7	0.01-0.05	0.02-0.05	see monthly table	0.1-0.2	0.25	3	0.95-0.965	see monthly table
Well Drained Clay Loam - Developed		0	0.25-0.3	0.000-0.15	1.2-1.5	0.9-0.938	40	35	2	2	0.6-0.7	0.01-0.05	0.01-0.05	see monthly table	0.1-0.2	0.25	2.0-3.0	0.8-0.93	see monthly table
Well Drained Clay Loam - Grassland Native Grass		0.3	0.2	0.1	1.5	0.938-0.998	40	35	2	2	0.2-0.7	0.01-0.05	0.02-0.05	see monthly table	0.1-0.4	0.25	3	0.95	see monthly table
Well Drained Clay Loam - Perennial Crops and Pasture		0.3-0.8	0.2-2	0.1-0.15	0.0	0.9-0.998	40	35	2	2	0.2-0.9	0.005-0.1	0.001-0.1	see monthly table	0.1-0.4	0.25	2.0-5.0	0.8-0.95	see monthly table
Well Drained Sand - Annual Cropland		0.1	2	0.5	1.5-3	0.96-0.998	40	35	2	2	0.1-0.9	0.005-0.04	0.01-0.04	see monthly table	0.2	0.25	5	0.85-0.95	see monthly table
Well Drained Sand - Coniferous Forest		0.8	2	0.5	1.5-2	0.96-0.998	40	35	2	2	0.1-0.7	0.01-0.04	0.01-0.04	see monthly table	0.2	0.25	5	0.85-0.95	see monthly table
Well Drained Sand - Deciduous Forest		0.8	2	0.5	1.5	0.96	40	35	2	2	0.2	0.01	0.01	see monthly table	0.2	0.25	5	0.85	see monthly table
Well Drained Sand - Grassland Native Grass		0.3	2	0.5	1.5	0.998	40	35	2	2	0.7	0.03	0.03	see monthly table	0.2	0.25	5	0.85-0.908	see monthly table
Well Drained Sand - Perennial Crops and Pasture		0.8	2	0.5	1.5-3	0.96-0.998	40	35	2	2	0.1-0.9	0.005-0.05	0.01-0.05	see monthly table	0.2	0.25	5	0.85-0.95	see monthly table
Well Drained Till - Annual Cropland		0.3-0.5	0.2	0.03-0.25	0.0	0.9-0.999	40	35	2	2	0.2-0.9	0.005-0.1	0.01-0.1	see monthly table	0.1-0.4	0.25-0.75	1.0-5.0	0.84-0.955	see monthly table
Well Drained Till - Coniferous Forest		0.8	0.2-0.8	0.02-0.7	0.0	0.91-0.998	40	35	2	2	0.1-0.4	0.005-0.05	0.005-0.05	see monthly table	0.1-0.3	0.25-0.75	3-3.1	0.93-0.965	see monthly table
Well Drained Till - Deciduous Forest		0.8	0.2	0.03-0.2	0.0	0.935-0.95	40	35	2	2	0.2	0.01-0.04	0.02-0.04	see monthly table	0.1-0.3	0.25	1.0-5.0	0.85-0.95	see monthly table
Well Drained Till - Grassland Native Grass		0.3	0.2-0.8	0.02-0.2	1.0	0.91-0.998	40	35	2	2	0.1-0.9	0.005-0.05	0.01-0.05	see monthly table	0.1-0.3	0.25-0.75	3	0.93-0.965	see monthly table
Well Drained Till - Perennial Crops and Pasture		0.3-0.8	0.2	0.03-0.25	0.0	0.9-0.999	40	35	2	2	0.2-0.9	0.005-0.05	0.01-0.05	see monthly table	0.2	0.25	3	0.95	see monthly table
Well Drained Till - Shrubland		0.3	0.2	0.2-2	1.5	0.993	40	35	2	2	0.9	0.05	0.05	see monthly table	0.1-0.3	0.25-0.75	1.0-5.0	0.84-0.95	see monthly table

Monthly Interception

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Impervious - Coniferous Forest	0.01	0.01	0.01	0.2	0.3	0.3	0.3	0.2	0.1	0.05	0.05	0.01
Impervious - Exposed Land	0	0	0	0	0	0	0	0	0	0	0	0
Impervious - Grassland Native Grass	0.01	0.01	0.01	0.2	0.3	0.3	0.3	0.2	0.1	0.05	0.05	0.01
Well Drained Clay Loam - Annual Cropland	0	0	0	0.1	0.01-0.2	0.1-0.3	0.05-0.4	0.15-0.5	0.4-0.5	0.4	0.2	0.005
Well Drained Clay Loam - Coniferous Forest	0.01-0.05	0.01-0.05	0.01-0.05	0.05-0.1	0.1-0.2	0.1-0.4	0.1-0.5	0.2-0.4	0.3-0.4	0.2-0.3	0.1	0.05
Well Drained Clay Loam - Developed	0	0	0	0	0	0	0	0	0	0	0	0
Well Drained Clay Loam - Grassland Native Grass	0.05	0.05	0.05	0.1	0.2	0.2-0.4	0.2-0.5	0.4	0.3-0.4	0.2	0.1	0.05
Well Drained Clay Loam - Perennial Crops and Pasture	0.01-0.2	0.01-1.5	0.05-1.2	0.05-0.4	0.05-0.7	0.1-0.3	0.05-0.3	0.1-0.5	0.3-0.4	0.1-0.4	0.1-0.4	0.01-1.5
Well Drained Sand - Annual Cropland	0.005	0.0-0.5	0.0-0.5	0.0-0.5	0.05	0.1-0.3	0.2-0.3	0.3	0.1-0.3	0.1-0.3	0.05-0.1	0-0.1
Well Drained Sand - Coniferous Forest	0.05-0.5	0.05-0.5	0.05-0.5	0.05-0.5	0.05	0.05-0.1	0.05-0.2	0.3-0.35	0.3-0.4	0.3-0.4	0.1-0.4	0.1-0.4
Well Drained Sand - Deciduous Forest	0	0	0	0	0.05	0.1	0.3	0.3	0.1	0.1	0.05	0
Well Drained Sand - Grassland Native Grass	0.01	0.01	0.01	0.05	0.1	0.3	0.3	0.3	0.3	0.3	0.05	0.01
Well Drained Sand - Perennial Crops and Pasture	0.005	0.0-0.5	0.0-0.5	0.0-0.5	0.05	0.1-0.3	0.2-0.3	0.3	0.1-0.3	0.1-0.3	0.05-0.1	0-0.1
Well Drained Till - Annual Cropland	0.005	0.0-0.5	0.0-0.5	0.0-0.5	0.05-0.2	0.1-0.3	0.2-0.3	0.3-0.5	0.1-0.4	0.05-0.3	0.05-0.2	0-0.1
Well Drained Till - Coniferous Forest	0.01-0.05	0.01-0.05	0.01-0.05	0.05-0.2	0.05-0.4	0.1-0.4	0.1-0.5	0.2-0.4	0.1-0.4	0.05-0.3	0.05-0.1	0.01-0.1
Well Drained Till - Deciduous Forest	0.01-0.05	0.01-0.05	0.01-0.05	0.05-0.1	0.05-0.2	0.1-0.2	0.2	0.3-0.4	0.3-0.5	0.2-0.4	0.1	0.01-0.1
Well Drained Till - Grassland Native Grass	0.01-0.05	0.01-0.05	0.01-0.05	0.05-0.2	0.05-0.3	0.1-0.4	0.1-0.5	0.2-0.4	0.3-0.4	0.2-0.3	0.1	0.05-0.1
Well Drained Till - Perennial Crops and Pasture	0.01-0.5	0.01-0.5	0.05-0.1	0.05-0.1	0.05-0.1	0.05-0.1	0.05-0.2	0.3-0.5	0.3-0.5	0.3-0.4	0.1-0.4	0.01-0.4
Well Drained Till - Shrubland	0.01	0.01	0.01	0.05	0.05	0.05	0.05	0.3	0.3	0.3	0.05	0.01

Lower Zone Evapotranspiration

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Impervious - Coniferous Forest	0.01	0.01	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.1	0.05	0.01
Impervious - Exposed Land	0	0	0	0	0	0	0	0	0	0	0	0
Impervious - Grassland Native Grass	0.01	0.01	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.1	0.05	0.01
Well Drained Clay Loam - Annual Cropland	0	0	0	0	0.2	0.2	0.2	0.2	0.4	0.5	0	0
Well Drained Clay Loam - Coniferous Forest	0.01	0.01	0.05-0.1	0.1	0.2-0.3	0.2-0.4	0.3-0.4	0.3-0.4	0.3-0.4	0.1-0.2	0.05-0.1	0.01
Well Drained Clay Loam - Developed	0	0	0	0	0	0	0	0	0	0	0	0
Well Drained Clay Loam - Grassland Native Grass	0.01	0.01	0.1	0.1	0.2-0.3	0.2-0.4	0.3-0.4	0.3-0.4	0.3-0.4	0.1-0.2	0.05	0.01
Well Drained Clay Loam - Perennial Crops and Pasture	0.01-0.3	0.01-0.5	0.05-0.6	0.1-0.8	0.2	0.2	0.3-0.3	0.3-0.4	0.3-0.4	0.2-0.5	0.01-0.5	0.01-0.6
Well Drained Sand - Annual Cropland	0.001	0.0-0.1	0.0-0.5	0.0-1	0.2	0.2-0.45	0.3-0.45	0.3-0.45	0.2-0.3	0.1-0.2	0.0-1	0.0-0.1
Well Drained Sand - Coniferous Forest	0.01-0.3	0.01-0.5	0.05-0.6	0.1-0.8	0.2	0.2	0.3-0.3	0.3-0.4	0.3-0.5	0.2-0.5	0.1-0.5	0.01-0.6
Well Drained Sand - Deciduous Forest	0	0	0	0	0.2	0.45	0.45	0.45	0.2	0.1	0	0
Well Drained Sand - Grassland Native Grass	0.1	0.1	0.1	0.1	0.2	0.3	0.3	0.2	0.2	0.2	0.1	0.1
Well Drained Sand - Perennial Crops and Pasture	0.001	0.0-0.1	0.0-0.5	0.0-1	0.2	0.2-0.45	0.3-0.45	0.3-0.45	0.2-0.3	0.1-0.2	0.0-1	0.0-0.1
Well Drained Till - Annual Cropland	0.001	0.0-0.1	0.0-0.5	0.0-1	0.2	0.2-0.45	0.3-0.45	0.3-0.45	0.2-0.3	0.1-0.2	0.0-1	0.0-0.1
Well Drained Till - Coniferous Forest	0.01	0.01	0.01-0.1	0.1	0.1-0.3	0.2-0.4	0.3-0.4	0.3-0.4	0.3-0.4	0.1-0.2	0.05-0.1	0.01
Well Drained Till - Deciduous Forest	0.01	0.01	0.01	0.1	0.1	0.2	0.3	0.4	0.4	0.2	0.05	0.01
Well Drained Till - Grassland Native Grass	0.01	0.01	0.01-0.1	0.1	0.1-0.3	0.2-0.4	0.3-0.4	0.3-0.4	0.3-0.4	0.1-0.2	0.05-0.1	0.01
Well Drained Till - Perennial Crops and Pasture	0.01-0.3	0.01-0.5	0.05-0.6	0.1-0.8	0.2	0.2	0.3-0.3	0.3-0.4	0.3-0.5	0.2-0.5	0.1-0.5	0.01-0.6
Well Drained Till - Shrubland	0	0	0	0	0.2	0.45	0.45	0.45	0.2	0.1	0	0

Snow Parameters

	SHADE	SNOWCI	COVIND	KMILT	TRASE	RBCSN	TSNOW	SNOWVP	CCFACT	MWATER	MGMILT
Description	The fraction of the land which is shaded from solar radiation by trees	Factor by which the input precipitation data will be multiplied	The maximum snowpack (water equivalent) at which the terry land will be covered with snow	Constant degree-day factor for the temperature index snowmelt method	The reference temperature for the temperature index method	The density of cold, new snow relative to water	The air temperature below which precipitation will be snow	A parameter which adapts the snow evaporation (sublimation) equation to field conditions	A parameter which adapts the snow condensation equation to field conditions	The maximum water content of the snow pack, in depth of water per depth of water	The maximum rate of snow melt by ground heat, in depth of water per day
Units	none	none	none	in/day F	degF	none	degF	none	none	none	in/day
Impervious- Coniferous Forest	0.8	1	3	0	32	0.1	40	0.2	0.0	0.8	0.01
Impervious- Opened Land	0.1	1	3	0	32	0.1	40	0.2	0.0	0.6	0.01
Impervious- Grassland Native Grass	0.5	1	3	0	32	0.1	40	0.2	0.01	0.8	0.01
Well Drained Clay Loam- Annual Cropland	0.3-0.6	1	5.0-6.0	0	32	0.2	37-40	0.2-0.4	0.01	0.5-0.8	0.0-0.03
Well Drained Clay Loam- Coniferous Forest	0.8	1	3	0	32	0.1	40	0.2	0.01	0.5-0.8	0.0-0.01
Well Drained Clay Loam- Deciduous	0.5	1	3	0	32	0.2	37-40	0.2-0.4	0.01	0.6-0.8	0.01-0.03
Well Drained Clay Loam- Grassland Native Grass	0.5	1	2	0	32	0.2	40	0.3	0.01	0.6	0.01
Well Drained Clay Loam- Perennial Crops and Pasture	0.3-0.8	1	5.0-6.0	0	32	0.2	37-40	0.2-0.4	0.01	0.5-0.8	0.0-0.03
Well Drained Sand- Annual Cropland	0.3-0.6	1	5.0-6.0	0	32	0.2	37-40	0.2-0.4	0.01	0.5-0.8	0.0-0.03
Well Drained Sand- Coniferous Forest	0.8	1	3	0	32	0.2	40	0.3-0.35	0.01	0.8	0.01-0.03
Well Drained Sand- Deciduous Forest	0.8	1	3	0	32	0.2	40	0.3	0.01	0.8	0.01
Well Drained Sand- Grassland Native Grass	0.3-0.6	1	5.0-6.0	0	32	0.2	40	0.3	0.01	0.6-0.8	0.01
Well Drained Sand- Perennial Crops and Pasture	0.3-0.8	1	5.0-6.0	0	32	0.2	37-40	0.2-0.35	0.01	0.5-0.8	0.01
Well Drained Till- Annual Cropland	0.3-0.6	1	5.0-6.0	0	32	0.2	37-40	0.2-0.6	0.01	0.3-0.8	0.01
Well Drained Till- Coniferous Forest	0.5-0.8	1	2.5-3.0	0	32	0.2	40	0.2-0.4	0.01	0.5-0.8	0.01
Well Drained Till- Deciduous Forest	0.5-0.6	1	2.5-3.0	0	32	0.2	37-40	0.2-0.35	0.01	0.5-0.8	0.01
Well Drained Till- Grassland Native Grass	0.3-0.6	1	2.5-3.0	0	32	0.2	37-40	0.2-0.4	0.01	0.3-0.6	0.01
Well Drained Till- Perennial Crops and Pasture	0.3-0.8	1	5.0-6.0	0	32	0.2	37-40	0.2-0.6	0.01	0.3-0.8	0.01
Well Drained Till- Shrubland	0.6	1	6	0	32	0.2	37	0.4	0.01	0.8	0

Table E.1b. Calibrated HSPF Parameters for the LOWER Portion of the Red Deer River Basin

Previous Land Parameters

Land Type	Parameter Description	FOREST	UZSN	INHLI	SVARY	AGWRC	PETMAX	PETMIN	INSEAP	INHLI	DEEPR	BASETP	AGWUTP	CLPSC	UZSN	SSLR	INTFW	IRC	UZETP
		The fraction of the previous land segment which is covered by forest	The lower zone normal storage	An index to the infiltration capacity of the soil	A parameter which affects the behavior of groundwater recession flows, enabling it to be non-exponential in its decay w/ time.	The base groundwater recession rate if SVARY is zero and there is no inflow to groundwater	The air temperature below which E-T will be zero regardless of the value in the input time series.	The temperature below which E-T will be zero regardless of the value in the input time series.	Exponent in the infiltration equation	Ratio between the maximum and mean infiltration capacities	Fraction of groundwater inflow which will enter deep (active) groundwater	Fraction of remaining potential E-T which can be satisfied from baseflow groundwater outflow, if enough is available	Fraction of remaining potential E-T which can be satisfied from active groundwater storage of enough is available	Interception storage capacity	Upper zone normal storage	Manning's n for the overland flow plane.	Inflow parameter	Interflow recession parameter	Lower zone E-T parameter
Units		none	m	in/hr	1 day	1 day	degF	degF	none	none	none	none	none	m	m	complex	none	1 day	none
Well Drained Clay Loam - Annual Cropland		0.5	0.4	0.5	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	1	0.95	see monthly table
Well Drained Clay Loam - Grassland Native Grass		0.5	0.4	0.25	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	1	0.95	see monthly table
Well Drained Clay Loam - Perennial Crops and Pasture		0.8	0.4	0.25	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	1	0.95	see monthly table
Well Drained Sand - Grassland Native Grass		0.5	2	0.5	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	5	0.95	see monthly table
Well Drained Sand - Perennial Crops and Pasture		0.8	2	0.5	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	5	0.95	see monthly table
Well Drained Sandland - Annual Cropland		0.5	2	0.5	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	1.1	0.95	see monthly table
Well Drained Sandland - Annual Cropland		0.5	2	0.5	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	1.1	0.95	see monthly table
Well Drained Till - Annual Cropland		0.5	0.3	0.25	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	1.1	0.95	see monthly table
Well Drained Till - Grassland Native Grass		0.5	0.3	0.25	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	1.1	0.95	see monthly table
Well Drained Till - Perennial Crops and Pasture		0.8	0.3	0.25	1.5	0.918	40	35	2	2	0.8	0.1	0.5	see monthly table	0.2	0.25	1.1	0.95	see monthly table

Monthly Interception

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Well Drained Clay Loam - Annual Cropland	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01
Well Drained Clay Loam - Grassland Native Grass	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01
Well Drained Clay Loam - Perennial Crops and Pasture	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01
Well Drained Sand - Grassland Native Grass	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01
Well Drained Sand - Perennial Crops and Pasture	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01
Well Drained Sandland - Annual Cropland	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01
Well Drained Sandland - Annual Cropland	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01
Well Drained Till - Annual Cropland	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01
Well Drained Till - Grassland Native Grass	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01
Well Drained Till - Perennial Crops and Pasture	0.01	0.01	0.01	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.05	0.01

Lower Zone Evapotranspiration

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Well Drained Clay Loam - Annual Cropland	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01
Well Drained Clay Loam - Grassland Native Grass	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01
Well Drained Clay Loam - Perennial Crops and Pasture	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01
Well Drained Sand - Grassland Native Grass	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01
Well Drained Sand - Perennial Crops and Pasture	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01
Well Drained Sandland - Annual Cropland	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01
Well Drained Sandland - Annual Cropland	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01
Well Drained Till - Annual Cropland	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01
Well Drained Till - Grassland Native Grass	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01
Well Drained Till - Perennial Crops and Pasture	0.01	0.01	0.01	0.01	0.1	0.45	0.45	0.45	0.1	0.1	0.01	0.01

Snow Parameters

Description	Units	SHADE	SNOWCF	COVIND	KMILT	TBASE	RDCSN	TSNOW	SNOWEVP	CCTACT	MWATER	MGMILT
		The fraction of the land which is shaded from solar radiation by trees	Factor by which the input precipitation data will be multiplied	The maximum snowpack water equivalent at which the entire land will be covered with snow	Constant degree-day factor for the temperature index snowmelt method	The reference temperature for the temperature index method	The density of cold, new snow relative to water	The air temperature below which precipitation will be snow	A parameter which adapts the snow evaporation (sublimation) equation to field conditions	A parameter which adapts the snow condensation/ice accretion eqn to field conditions.	The maximum water content of the snow pack, in depth of water per depth of water	The maximum rate of snowmelt by ground heat, in depth of water per day
Well Drained Clay Loam - Annual Cropland		none	none	none	in/day F	degF	none	degF	none	none	none	in/day
Well Drained Clay Loam - Annual Cropland		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00
Well Drained Clay Loam - Grassland Native Grass		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00
Well Drained Clay Loam - Perennial Crops and Pasture		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00
Well Drained Sand - Grassland Native Grass		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00
Well Drained Sand - Perennial Crops and Pasture		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00
Well Drained Sandland - Annual Cropland		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00
Well Drained Sandland - Annual Cropland		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00
Well Drained Till - Annual Cropland		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00
Well Drained Till - Grassland Native Grass		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00
Well Drained Till - Perennial Crops and Pasture		0.6	1	5	0	32	0.7	40	0.1	0.0	0.5	0.00