Significant Groundwater Recharge Area Delineation
Niagara Peninsula Source Protection Area

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1. INTRODUCTION

1.1 Background and Objectives

The Niagara Peninsula Conservation Authority (NPCA) has completed this Significant Groundwater Recharge Area Delineation as part of the Niagara Peninsula Source Protection (NPSP) Area Source Water Protection (SWP) Assessment Report.

The delineation was funded by the province of Ontario. The study methodology was developed in consultation with the Ministry of Natural Resources (MNR) and is based on the March 2007 Draft Guidance Module – Water Budget and Water Quantity Risk Assessment (Guidance Module). This work also adheres to the Assessment Report Technical Rules (MOE, 2009), Regulation 287/07 and Technical Bulletin methodology descriptions (MNR, MOE, 2009).

The Technical Rules require the identification of Significant Groundwater Recharge Areas (SGRAs) as a specific type of vulnerable area that will be protected under the Clean Water Act (2006). The role of SGRAs is to support the protection of drinking water across the broader landscape. Delineated SGRAs will be further subdivided by areas of groundwater vulnerability as part of the Water Quality Threats Assessment process and reported on separately.

Recharge is the process whereby water moves from the ground surface through the unsaturated zone to the underlying water table. Groundwater recharge occurs across a watershed at a range of rates depending on soil type, land use, slope and climate. Within the NPSP Area, the results of the Water Availability Study provide an estimate of groundwater recharge (AquaResource Inc. and Niagara Peninsula Conservation Authority, 2009). This groundwater recharge was calculated from a calibrated (where available), HEC-HMS continuous surface water model based on fifteen years of climate data (1991-2005). HEC-HMS is the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Centre Hydrologic Modeling System (USACE, 2006).

1.2 Methodology

The Technical Rules (MOE, 2009) provide the following instructions for the delineation of SGRAs;

Part V.2 – Delineation of significant groundwater recharge areas

44. Subject to rule 45, an area is a significant groundwater recharge area if,

(1) the area annually recharges water to the underlying aquifer at a rate that is greater than the rate of recharge across the whole of the related groundwater recharge area by a factor of 1.15 or more; or
(2) the area annually recharges a volume of water to the underlying aquifer that is 55% or more of the volume determined by subtracting the annual

evapotranspiration for the whole of the related groundwater recharge area from the annual precipitation for the whole of the related groundwater recharge area.

45. Despite rule 44, an area shall not be delineated as a significant groundwater recharge area unless the area has a hydrological connection to a surface water body or aquifer that is a source of drinking water for a drinking water system.

46. The areas described in rule 44 shall be delineated using the models developed for the purposes of Part III of these rules and with consideration of the topography, surficial geology, and how land cover affects groundwater and surface water.

The MNR has further recommended to the NPCA to complete our analysis in a similar fashion to that of the Lake Erie Source Protection Region (Lake Erie SPR). The Lake Erie SPR approach has been adapted for the NPSP Area.

2. GROUNDWATER RECHARGE

Recharge is the process whereby water moves from the ground surface through the unsaturated zone to the underlying water table. Values of groundwater recharge across the NPSP Area were previously determined as part of the Tier 1 Water Budget – Water Availability Studies (AquaResource Inc, and Niagara Peninsula Conservation Authority, 2009). These values of recharge were calculated per catchment, the size of which ranged from 1 to 18 km^2 in size. However, to follow the Lake Erie SPR approach, as recommended by the MNR, local scale recharge values were developed. This section documents the "distribution" of the HEC-HMS modeled catchment results to individual cells, i.e. at a local scale of 225 m^2 cells, through the use of an infiltration factor approach recommended by the MOE.

2.1 Infiltration Factor

To produce the local scale recharge values, local scale infiltration factors were developed as recommended by the Guidance Module (MOE, 2007). Three documents key in the development of the local scale infiltration factors were:

(i) MOE Hydrogeological Technical Information Requirements for Land Development Applications, Section 4.5 (MOEE, 1995);
(ii) Stormwater Management Planning and Design Manual, Section 3.2 (MOE, 2003); and
(iii) Durham Region Groundwater Use Assessment (Gartner Lee Limited, 2003).

The land development document, a Guidance Module reference, is very generalized in its description (MOEE, 1995), however the stormwater manual (MOE, 2003) improves on the description as it applies the infiltration factor approach with a much more detailed methodology including the use of individual hydrologic soil groups and land cover types. This information and the Durham case study (Gartner Lee Limited, 2003) provided the information necessary to create an infiltration factor layer for the NPSP Area that used the best available information at a grid resolution of 15 m^2.

The infiltration factor is a function of topography, land cover and soil texture. For each of these three categories, an "infiltration value" was calculated and the "infiltration factor" was a sum of the three values. Final individual infiltration factor values ranged from 0.1 to 0.92 for the NPSP Area and represent the expected percent of recharge from a given water surplus.

2.1.1 Topography

High slope values affect groundwater recharge by increasing runoff. Conversely, flat areas favour ponding and groundwater infiltration. Table 2.1 shows infiltration factor values based on topography from the land development document (MOE, 1995).

Table 2.1 Topographic Infiltration Factor Values (MOEE, 1995)

Description of Area	Infiltration Factor Value
Flat land, average slope not exceeding 0.6 m per km	0.3
Rolling land, average slope of 2.8 to 3.8 m per km	0.2
Hilly land, average slope of 20 to 47 m per km	0.1

A non-linear regression model (Equation 2.1) was developed using the above data to generate infiltration values for any slope values within the slope range values from Table 2.1 and Figure 2.1.

$$TIV = 0.1242 \, Slope^{-0.267} \qquad \text{[Equation 2.1]}$$

where:

TIV: Topography infiltration value (dimensionless)
Slope: Slope in degrees

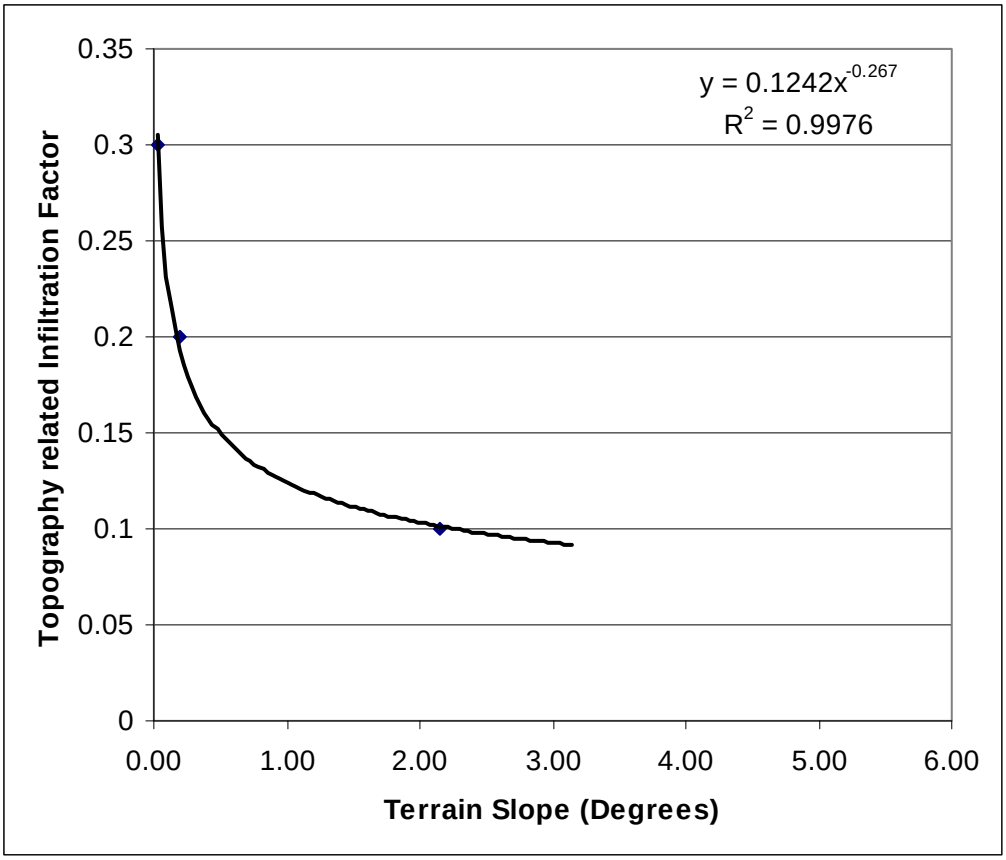

Figure 2.1 Topography related infiltration index factor as a function of terrain slope

This topography value was estimated by using a Digital Elevation Model (DEM). The DEM was constructed from mass points and breaklines that were assembled into a Triangulated Irregular Network (TIN) which was then converted to a 5 m cell-sized grid. To increase processing speed, the DEM was first resampled to a 15 m cell-sized grid using a cubic convolution resampling technique. A slope grid generated from the DEM

and Equation 1 was then used in a Geographic Information System (GIS) to generate the topographically related infiltration factor values (Figure 2.2).

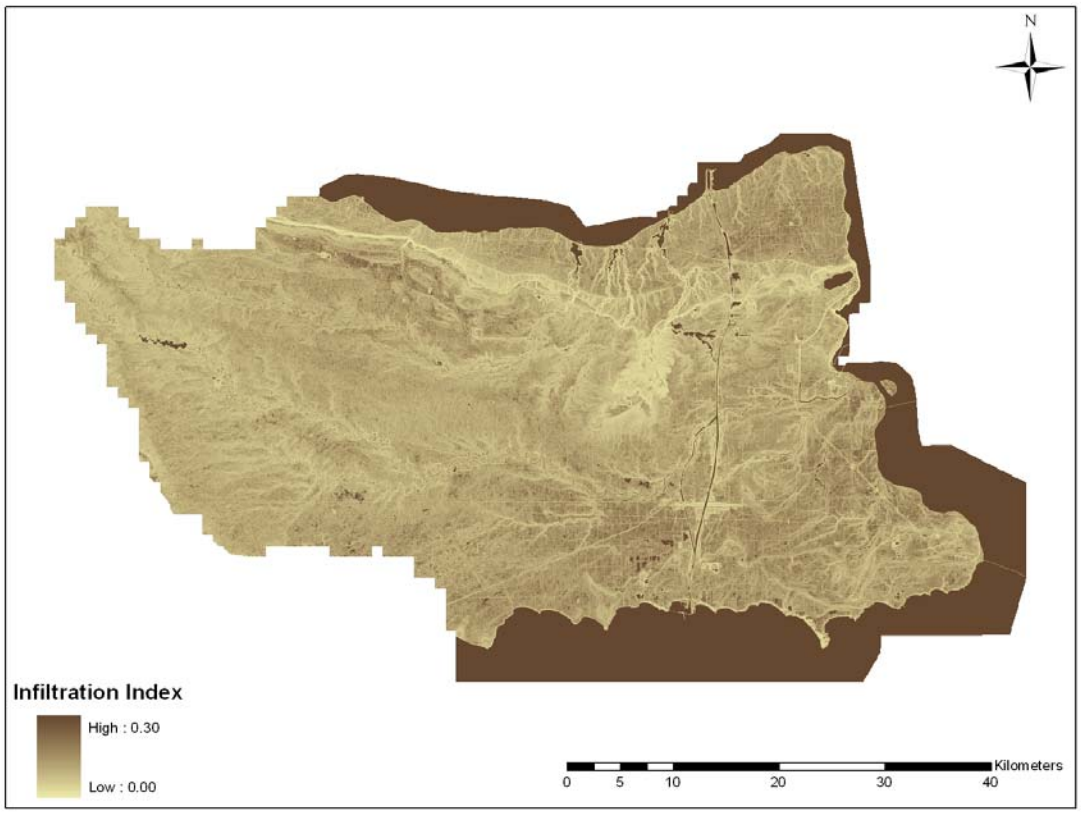

Figure 2.2 Topography related infiltration factor grid

2.1.2 Land Cover

Forested areas are assumed to favour groundwater recharge the most, while built-up areas are assumed to favour groundwater infiltration the least. A composite land cover layer was produced using version 1.2 and 2.0 of the Southern Ontario Land Resource Information System (SOLRIS) (MNR, 2006, 2007). This layer was used in conjunction with the infiltration factor values from Table 2.2 (MOEE, 1995) and Table 2.3 (MOE, 2003) to produce a land cover based infiltration value grid (Table 2.4 and Figure 2.3).

Table 2.2 1995 Cover Infiltration Values (MOEE, 1995)

Description of Area	Infiltration Factor Value
Cultivated lands	0.1
Woodland	0.2

Table 2.3 2003 Cover Infiltration Values (MOE, 2003)

Description of Area	Infiltration Factor Value
Urban Lawns/Shallow Rooted Crops (spinach,beans,carrots)	0.05
Moderately Rooted Crops (corn and cereal grains)	0.1
Pasture and Shrubs	0.15
Mature Forests	0.2

Table 2.4 SOLRIS Land cover infiltration values

Land Cover	Infiltration Value	Land Cover	Infiltration Value
Annual Crop	0.1	Mixed Agriculture	0.15
Bog	0.15	Mixed Crop	0.15
Built Up Impervious	0	Mixed Forest	0.2
Built Up Pervious	0.05	Monoculture	0.1
Coniferous Forest	0.2	Orchards	0.15
Deciduous Forest	0.2	Perennial Crop	0.15
Extraction- Rock (Sand and Gravel)	0 (0.2)	Plantations	0.2
Forest	0.2	Rural Land Use	0.15
Hedge Rows	0.2	Swamp	0.15
Idle Land	0.15	Transportation	0
Marsh	0.15	Vineyards	0.15

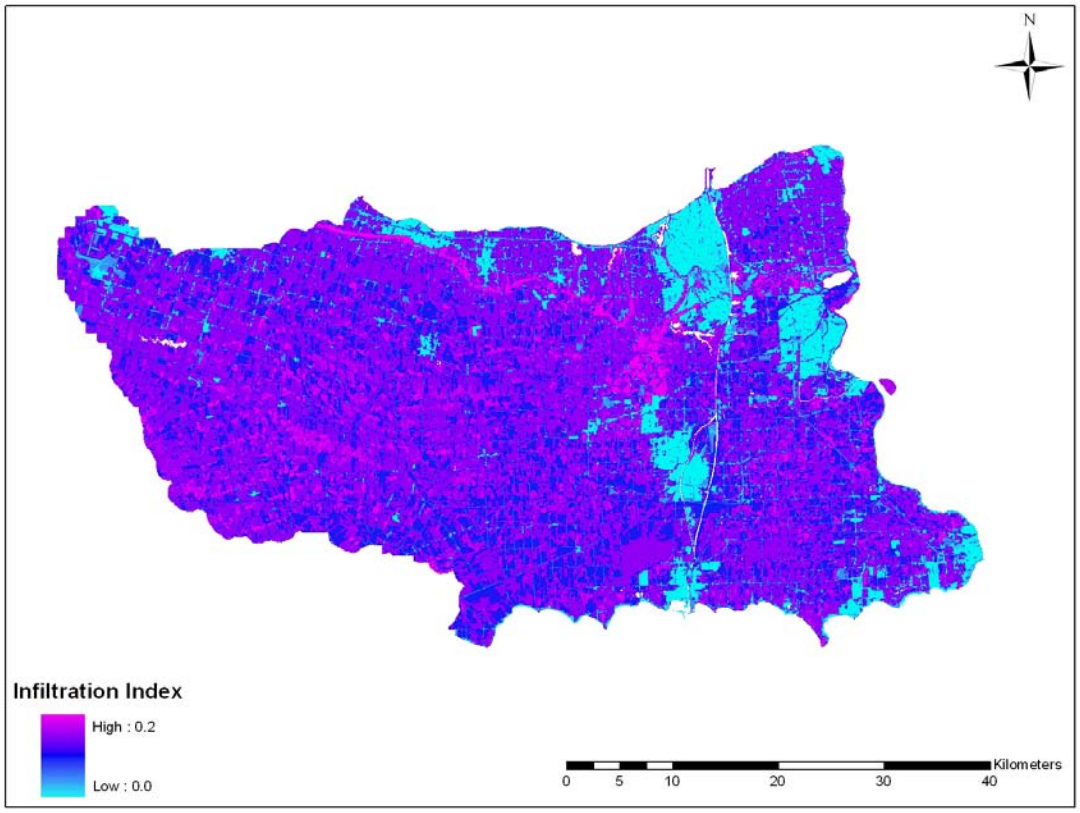

Figure 2.3 Land cover related infiltration factor grid

2.1.3 Soils

Infiltration values for soil can be based on general soil types (Table 2.5) or Hydrologic Soil Groups (Table 2.6). A soils layer obtained from the Ontario Ministry of Agriculture and Food was used in conjunction with the infiltration values for Hydrologic Soil Groups (Table 2.6) to produce a soils-related infiltration value grid (Figure 2.4). Urban soil polygons were assigned a value of 0.1. Soils mapped as bedrock at surface were assigned a value of 0.4, except for quarries assigned 0.05.

Table 2.5 1995 Soil Infiltration Values (MOEE, 1995).

Description of Area	Infiltration Value
Tight impervious clay	0.1
Medium combinations of clay and loam	0.2
Open sandy loam	0.4

Table 2.6 2003 Soil Infiltration Values (MOE, 2003).

Hydrologic Soil Group	Infiltration Value	Hydrologic Soil Group	Infiltration Value
A – Fine Sand	0.4	CD – Clay Loam	0.15
B – Fine Sandy Loam	0.3	D - Clay	0.1
C – Silt Loam	0.2		

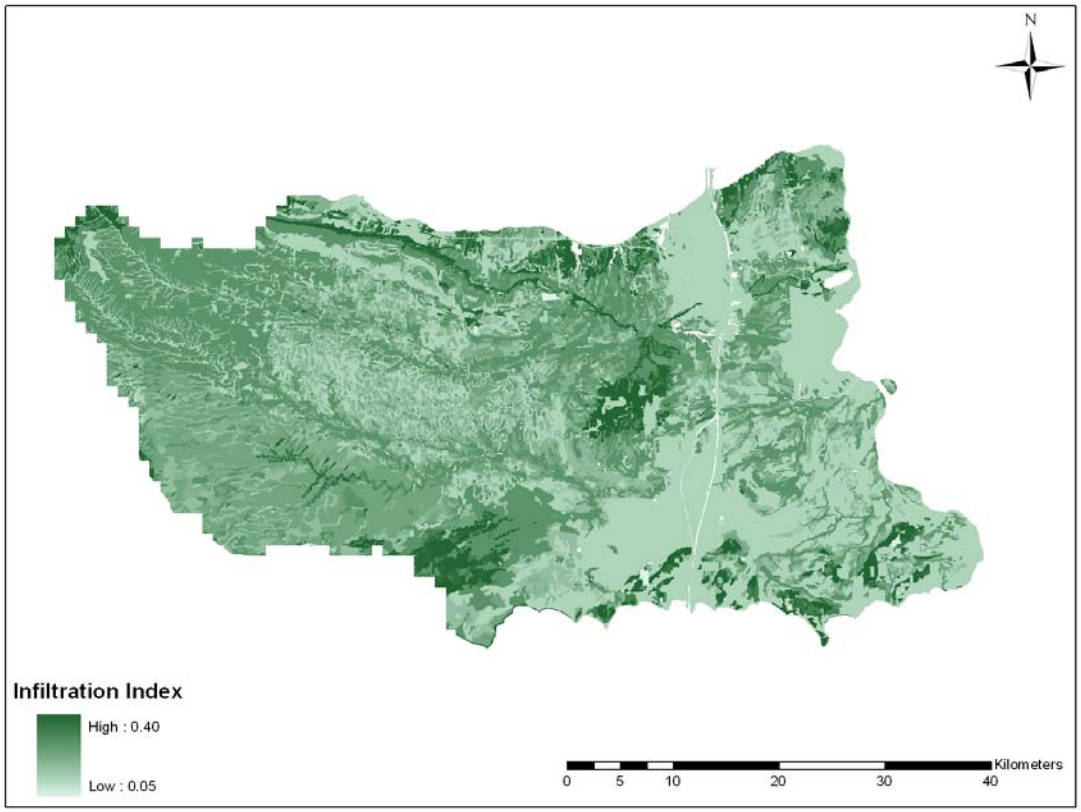

Figure 2.4 Soil HSG related infiltration value grid

The soils layer used was a combination of three soil surveys, Niagara, Hamilton and Haldimand at the scales of 1:25,000, 1:31,680 and 1:25,000, respectively.

2.1.4 Infiltration Factor Grid

The final infiltration factor grid (IFG) was created by adding the individual infiltration value grids derived from the slope, land cover and soils layers (Figure 2.5).

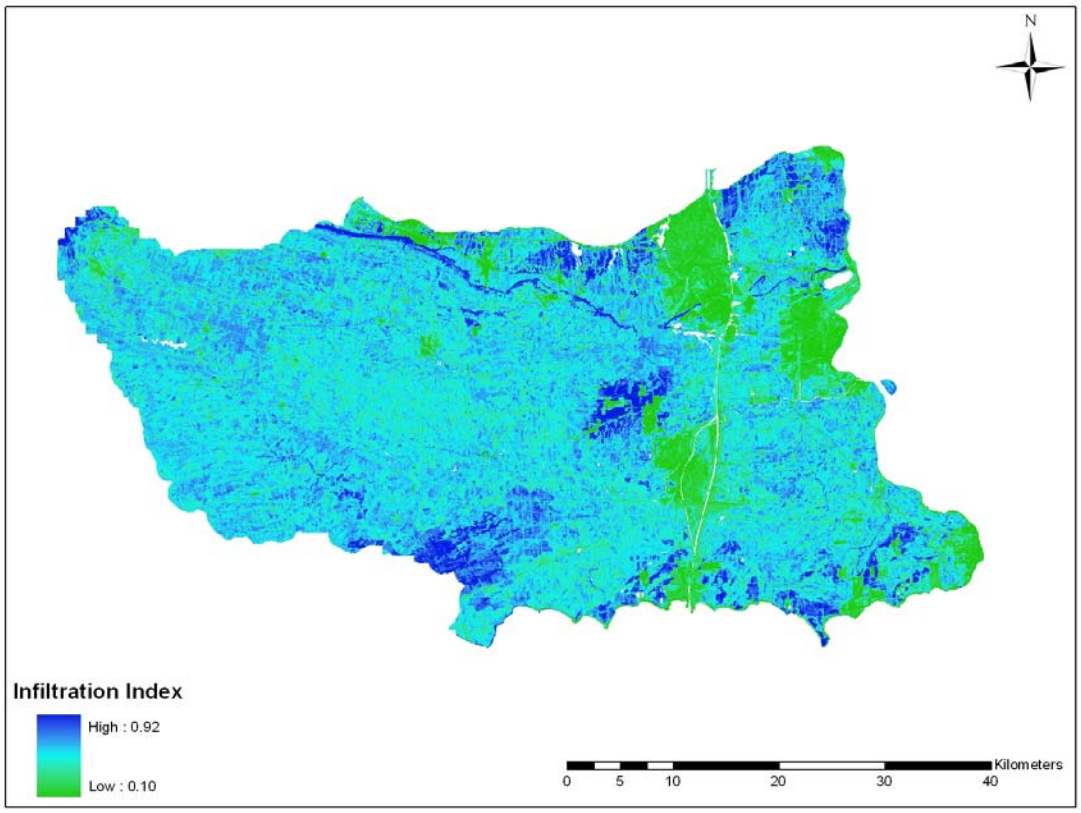

Figure 2.5 Infiltration factor grid (IFG)

2.2 Un-modelled Areas

The HEC-HMS continuous surface water models (AquaResource Inc. and NPCA, 2009) did not cover the total NPSP Area of 2,426 km^2. Niagara Falls Urban (NFU) and St.Catharines Urban (SCU) areas were excluded for consideration later and are 48 km^2 and 21 km^2 in size, respectively (Figure 2.6).

A number of areas were also excluded from the HEC-HMS modelling because they did not contain mapped watercourses (Figure 2.6). These excluded areas, not including NFU and SCU, amounted to about 3% (65 km^2) of the total NPSP Area. The excluded areas consisted of small 1st order lakeside catchments along Lake Erie, the Niagara River and Lake Ontario.

To facilitate distributed recharge mapping of the entire NPSP Area, HEC-HMS output results were assigned to un-modelled catchments, and NFU and SCU, through a "pro-rating" process. The pro-rating consisted of assigning modelled catchment results to un-modelled catchments having similar topography, land cover and soils. This was performed by considering similar recharge potentials.

Similar recharge potential was assumed for catchments having infiltration factor grid values +/-0.05 and the same HEC-HMS assigned weather station zone. This criterion was successful for 94% of the un-modelled catchments, or about 61 km^2, as well as NFU and SCU. Less than 4 km^2 of the un-modelled areas required use of a neighbouring weather station catchment, or a greater tolerance in the infiltration factor criterion to +/- 0.1. The greater tolerance in the infiltration factor was required to populate some largely urban, lower recharge, catchments and was considered reasonable.

2.3 Distributed Recharge

The HEC-HMS catchment groundwater recharge results, and the pro-rated results, (Figure 2.6) were distributed to a local scale (Figure 2.7) using the 15m Infiltration Factor Grid of Section 2.1. The grid, which represents the potential for water to infiltrate, was used to "weight" the distribution of the average catchment value. This approach follows Technical Rule 46 and uses the same three (3) key pieces of information used in HEC-HMS model set-up for the Infiltration Factor grid (IFG); topography, land cover and hydrologic soil group.

Figure 2.7 results are imperfect but still well represent expected conditions when compared to recharge rates based upon Ontario Geological Survey surficial geology (Figure 2.8 and Table 2.7). Groundwater recharge rates based upon surficial geology are generally similar or higher than those developed through the surface water modelling, e.g. Dunnville Sand Plain. In addition, using surficial geology mapping does not reflect impervious urban areas which were accounted for in the distributed recharge mapping.

Table 2.7 Typical Groundwater Recharge Rates (MOEE, 1995)

Soil Texture	**Recharge Rate (mm/year)**
Coarse sand and gravel	> 250
Fine to medium sand	200 – 250
Silty Sand to Sandy Silt	150 – 200
Silt	125 – 150
Clayey Silt	100 – 125
Clay	< 100

2.4 Distributed Water Surplus

The available water surplus was also distributed, from the HEC-HMS catchment values, by a methodology similar to that of recharge approach. The available water surplus was required to evaluate the application of Rule 44(2). This rule identifies significant

groundwater recharge areas as recharging 55% or more of the available water surplus. Rule 44(2) defines the surplus as the annual precipitation (P) minus the annual evapotranspiration (ET). The water surplus from the HEC-HMS annual average catchment results were:

Water Surplus (P-ET)=Interflow+Recharge(Baseflow)+Runoff

The creation of a distributed water surplus layer required the distribution of three HEC-HMS outputs; (i) recharge, (ii) interflow and (iii) runoff. The distribution of recharge was described above in Section 2.3 and this same approach was used for interflow. This is considered reasonable because the HEC-HMS modelling used the same algorithm for recharge (baseflow) as for interflow. The runoff component was distributed using 1-InfiltrationFactorGrid. Use of a Soil Conservation Service (SCS) curve number (CN) approach was also considered, however our surrogate of runoff potential maintains the proportionality of the water balance with the distribution of interflow and recharge and hence, was considered more appropriate.

3. DELINEATION OF SIGNIFICANT RECHARGE AREAS

NPSP Area Significant Groundwater Recharge Areas (SGRAs) were delineated using Rule 44(1); areas where groundwater is recharged by a factor of 1.15 of the average rate or more. This method was chosen because NPSP Area recharge rates are fairly homogenous and this method assists in distinguishing between high and low recharge, even though narrow ranges generally exist across the NPSP Area (MNR and MOE, 2009).

3.1 Rule 44(1) Application

Use of Rule 44(1) is a scale dependent exercise. Calculation of an arithmetic "average" value has to be within certain defined geographic boundaries. Some conservation authorities have explored using Rule 44(1) to different physiographic regions within their jurisdiction.

To explore the best Rule 44(1) approach for the NPSP Area, two sets of NPSP Area boundaries were evaluated, (i) the entire jurisdiction and (ii) four (4) physiographic areas. However provincial direction (MNR and MOE, 2009) encourages larger spatial scales for delineation of SGRAs to minimize edge-mapping issues.

AquaResource Inc. developed a technique to graphically evaluate the application of the Rule 44(1) SGRA criterion. This is by means of an exceedence graph. The exceedence graph consists of two plots in one, a histogram of recharge rates and a cumulative percent plot of volume and area. The distributed groundwater recharge results (Section 2.3) are plotted on the graph for each evaluated set of boundaries. Results can then be quantitatively described with respect to the volume of recharge provided for a given area and the associated SGRA criterion.

3.1.1 NPSP Area

The Technical Rule 44(1) SGRA criterion for the entire NPSP Area is 53 mm/year, based upon 1.15 times the average recharge rate of 46 mm/year. This low recharge rate reflects the largely clay nature of the soils. The distribution of recharge rate, with the SGRA criterion, is shown on Figure 3.1.

The exceedence graph for the NPSP Area (Figure 3.2, Table 3.1) indicates that at a SGRA criterion of 53 mm/year, about 25% of the NPSP Area produces 40% of the recharge volume, a recharge factor of about 1.6. For the purposes of this report "the recharge factor" is the ratio of percent area to percent volume; the higher the recharge factor the more recharge per unit area.

3.1.2 Physiographic Regions

From a review of surficial geology and physiographic mapping, four (4) major physiographic region boundaries were considered, the Haldimand Clay Plain, the Iroquois Shoreline (i.e. north of the Niagara Escarpment), the Fonthill Kame-Delta Complex and the Dunnville Sand Plain (Figure 2.8).

The SGRA criterion for the physiographic regions ranged from 52 to 151 mm/year (Table 3.2) based upon 1.15 times the average annual recharge rates, from 44 to 131 mm/year. The clay plain and shoreline dominate the NPSP Area rate as can be seen in their similar groundwater recharge rates and SGRA criterion.

Table 3.2 Significant Groundwater Recharge Area Thresholds

Physiographic Zone	**Area (km^2)**	**Average Annual Recharge Rate (AARR) (mm/year)**	**+/- NPSP Area Average (mm/year)**	**Threshold Recharge Rate (AARR*115%) (mm/year)**
NPSP Area	2,426	46	0	53
Haldimand Clay Plain	1,987 (82%)	44	-2	51
Iroquois Shoreline	337 (14%)	46	0	53
Fonthill Kame-Delta Complex	34 (1%)	131	+85	151
Dunnville Sand Plain	68 (3%)	61	+15	70

Exceedence graphs have been prepared for each of the physiographic areas (Appendix A, Figures A.1 through A.4, Tables A.1 through A.4) and indicate that:

- For the Haldimand Clay Plain, at an SGRA criterion of 51 mm/year, about 23% of the area produces 36% of the recharge, a recharge factor of 1.6;
- For the Iroquois Shoreline, at an SGRA criterion of 53 mm/year, about 40% of the area produces 60% of the recharge, a recharge factor of 1.5;
- For the Fonthill Kame-Delta Complex, at an SGRA criterion of 151 mm/year, about 37% of the area produces 67% of the recharge, a recharge factor of 1.8; and
- For the Dunnville Sand Plain, at an SGRA criterion of 70 mm/year, about 25% of the area produces 33% of the recharge, a recharge factor of 1.3.

This approach prioritizes areas of importance in each physiographic region. However, SGRAs by physiographic regions reduces needed protection for certain areas, e.g. Fonthill Kame-Delta Complex, while lowering the criterion on areas generally less endorsed for recharge protection, e.g. Haldimand Clay Plain. This is related to the NPSP Area being quite limited in recharge areas greater than 100 mm/year and watersheds outleting to three (3) major waterbodies (Lake Ontario, Niagara River and Lake Erie) rather than only one. These differences make the physiographic approach to SGRA delineation not as suitable as to the entire jurisdiction. Also the two largest physiographic regions, the Haldimand Clay Plain and the Lake Iroquois Shoreline, make up 96% of the NPSP Area and differ by only 2 mm/year in their SGRA criterion, showing little benefit to sub-dividing them.

3.2 Rule 44(2) Application

Areas that annually recharge 55% or more of the volume of water surplus can potentially be SGRAs under the Technical Rule 44(2) criterion. The delineated Rule 44(2) SGRAs are limited to about 43 km^2 or less than 2% of the NPSP Area (Figure 3.3). In fact, areas of recharge greater than 40% of the water surplus are almost entirely limited to the Fonthill Kame-Delta Complex. The area of 55% or more recharging is entirely within the Rule 44(1) delineated SGRAs.

Rule 44(2) was developed for areas where recharge rates are "heterogeneous through the watershed" (MOE, 2009). However, recharge rates in the NPSP Area are generally homogenous. This is shown by the dominance of clay-like recharge rates whereby 95% of the values, or two standard deviations of mean value, are less than or equal to 100 mm/year (Figure 3.2). The standard deviation of the distributed recharge rates was 27 mm/year.

Rule 44(2) serves to prioritize the importance of the Fonthill Kame-Delta Complex to groundwater recharge but should not be used alone to determine the SGRAs in the NPSP Area.

3.3 Filtered Results

The map of potential SGRAs (Figure 3.1) is very detailed (225m^2 blocks), showing relatively small parcels of land that are above the NPSP Area Rule 44(1) SGRA threshold of 53 mm/year. For the purposes of the Clean Water Act, and Provincial Policy Statement protection, i.e. sensitive recharge areas, it will likely be difficult to develop workable policy for these small parcels since the high level of precision in the mapping may not reflect the certainty of the modelling results. Figure 3.4 illustrates a modification of the potential SGRAs map that removes all isolated polygons with an area less than 2 hectares (ha) from the map after applying a majority filter to the dataset (the majority filter replaced cells based on the eight nearest neighbours to a cell and served to remove isolated values). A filter of 2 ha (20,000 m^2 or 0.02 km^2) was chosen to match existing NPCA and Niagara Region planning policies for wetlands and woodlots, respectively.

These modifications focus the delineated proposed SGRAs (Section 3.1) to larger features more suitable to planning policies. Completing the filtering exercise reduced the proposed SGRAs from 589 km^2 (24%) to 561 km^2 (23%) of the NPSP Area.

3.4 Rule 45

The Clean Water Act defines drinking water systems as having the same meaning as defined under the Safe Drinking Water Act (SDWA). The SDWA defines a drinking water system as "any system of works, excluding plumbing, that is established for the purpose of providing users of the system with drinking water…". This means that any system that provides drinking water, whether it is regulated under the SDWA or not, is a drinking water system for this rule. This includes domestic wells.

Rule 45 is an exception rule. It states that you can not delineate an SGRA as per Rule 44 unless there is a hydrological connection to a surface water body or aquifer that is a source of drinking water for a drinking water system, as defined under the SDWA. Therefore, it excludes any area that does not provide drinking water to someone.

There are over 6,600 private water well drinking water systems in the NPSP Area, excluding stock, irrigation, industrial, and cooling uses (MOE, 2006). The private water wells are generally completed in four (4) main aquifer groupings that largely cover the entire NPSP Area (Figure 3.5). These include (i) the "contact zone" aquifer or "basal granular and bedrock aquifer", (ii) the Guelph/Lockport Formations, (iii) the Onondaga/Bois Blanc Formations and (iv) the Fonthill Kame-Delta Complex. The proposed SGRAs are believed to be hydrologically connected to these aquifers as a result of the extensive private water system aquifer coverage and recharge providing over half of the overall groundwater supply (NPCA and AquaResource Inc, 2009).

The rural population not on municipal water was 77,829 in 2006 however, the proportion on private wells versus cisterns is unknown. Special consideration for recharge to municipal groundwater drinking water systems was not given as there are none in the NPSP Area.

The proposed SGRAs of Section 3.3 were however marginally reduced where (i) located inside an area that is serviced by municipal water and (ii) adjacent to a Great Lakes shoreline or the Niagara River, e.g. Fort Erie. However, where municipally water serviced areas were not adjacent to a Great Lakes shoreline, SGRAs were not reduced, e.g. Upper Welland River. This is because SGRAs away from the shoreline are expected to have a supply role for downgradient private well users. Removal of SGRAs in these areas serviced by municipal water only reduced the area associated with SGRAs by 6 km^2 from 561 km^2 to 555 km^2 of the NPSP Area (Figure 3.6).

4. SUMMARY

4.1 Conclusions

Significant Groundwater Recharge Areas (SGRAs) have been mapped according to Ministry of the Environment Technical Rules 44 (1) and 45 (MOE, 2009). The SGRAs cover 555 km^2 or about 23% of the Niagara Peninsula Source Protection (NPSP) Area (Figure 3.6). These SGRAs are based upon a Technical Rule 44 (1) criterion of a recharge rate of 53 mm/year or greater, calculated from a NPSP Area average groundwater recharge rate of 46 mm/year. The criterion is very low due to the high clay content in NPSP Area soils. However, potential SGRAs within municipally serviced areas that are adjacent to Great Lakes shorelines were not included in the final mapping.

SGRAs delineated by both Rule 44 (1) and Rule 44 (2), coinciding with the Fonthill Kame-Delta Complex, indicate an even higher level of significance (Figure 3.6).

4.2 Provincial Policy Statement Protection

Significant groundwater recharge areas are also to be protected under the Provincial Policy Statement (PPS) (Ontario Ministry of Municipal Affairs and Housing, 2005). However, the PPS refers to SGRAs as "sensitive groundwater features". Under the PPS, the Niagara Peninsula Conservation Authority, as a planning authority is required to:

> *"protect, improve or restore the quality and quantity of water by:*
> *…d) implementing necessary restrictions on development and site alteration to:*
> *…2. protect, improve or restore…sensitive groundwater features, and their hydrologic functions";*

The PPS goes on to state that:

> "*Development and site alteration shall be restricted in or near…sensitive groundwater features such that these features and their related hydrologic functions will be protected, improved or restored. Mitigative measures and/or alternative development approaches may be required…"*

4.3 Recommendations

4.3.1 Recharge

It is recommended that improvement in the amount of groundwater recharge be a goal for the Source Water Protection Plan and Provincial Policy Statement implementation in the Niagara Peninsula Source Protection Area. Consideration should be given to two levels of significance; SGRAs by Rules 44(1) and 44(2), i.e. Fonthill Kame-Delta Complex, and the SGRAs by Rule 44(1).

To increase and/or maintain the amount of groundwater recharge, it is recommended the Source Water Protection Plan include requirements for infiltration-based lot level and

conveyance controls in SGRAs. These are to achieve no decrease in groundwater recharge. Infiltration-based controls can mitigate the impacts that urbanization normally has, i.e. reducing groundwater recharge. Controls can maintain groundwater recharge and reduce the potential for flooding and erosion, and hence, the size and cost of stormwater infrastructure (MOE, 2003). This may however require a paradigm shift for stormwater designs to consider recharge (e.g. pre-post development water balances), as well as flood control. A further challenge may be maintenance and ownership of stormwater management systems by developers, municipalities and the public. Examples of controls include:

- Grassed swales
- Reduced grading to allow greater ponding of stormwater and natural infiltration
- Directing roof leaders to rear yard ponding areas, soakaway pits and cisterns
- Use of permeable pavers
- Limiting traditional sump-pump and tile-drainage installation below the water-table

4.3.2 Contaminant Management

Recognizing the vulnerability of SGRAs, requirements for contaminant management plans are also recommended. As defined in guidance prepared for the Conservation Authorities Moraine Coalition (CAMC) (Ogilvie, Ogilvie & Company and Anthony Usher Planning Consultant, 2005):

> ***A contaminant management plan****: A nutrient management strategy or plan if and as required by the Nutrient Management Act, 2002 or a municipal nutrient management bylaw, or a comparable management and contingency plan for the management of contaminants stored on or discharge from the subject lands and that are not nutrients as defined by the Nutrient Management Act, 2002. A contaminant management plan is binding on successive owners of the subject lands.*

The document recommended, under development approvals, contaminant management plans for SGRAs and:

- High and moderate threat land uses and/or contaminant storage. Their examples included but were not limited to sewage lagoons, petroleum fuels, road salt and golf courses. This could include site-specific management such as double-walled fuel storage tanks with a monitoring program; and
- New or expanded agricultural uses greater than 5 nutrient units of manure per year, e.g. more than 3 milking Holstein cows.

4.3.3 Future Updates

Future updates of Significant Groundwater Recharges Areas should be based upon:

- Investigation of varied levels of SGRA significance and associated management approaches
- Improved surface water modelling results, using (i) additional surface water flow calibration datasets, (ii) a more detailed loss/infiltration method , (iii) smaller catchments and (iv) tile drains.
- Improved hydrogeologic characterization, using more detailed documentation of water supply systems, aquifer extents and recharge processes.

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TABLES

Table 3.1
NPSP Area Exceedence Graph Inputs

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1	35800	8055000	8055000	100%	8055	0.008	0.008	100.0%
2	20576	4629600	12684600	99%	9259	0.009	0.017	100.0%
3	77	17325	12701925	99%	52	0.000	0.017	100.0%
4	1947	438075	13140000	99%	1752	0.002	0.019	100.0%
5	13247	2980575	16120575	99%	14903	0.015	0.034	100.0%
6	59651	13421475	29542050	99%	80529	0.081	0.115	99.9%
7	78795	17728875	47270925	98%	124102	0.124	0.239	99.8%
8	52129	11729024	58999950	98%	93832	0.094	0.332	99.7%
9	56564	12726900	71726850	97%	114542	0.115	0.447	99.6%
10	78046	17560350	89287200	96%	175604	0.176	0.623	99.4%
11	73903	16628175	105915375	96%	182910	0.183	0.806	99.3%
12	64397	14489326	120404700	95%	173872	0.174	0.979	99.1%
13	59716	13436100	133840800	94%	174669	0.175	1.154	99.0%
14	53868	12120300	145961100	94%	169684	0.170	1.324	98.8%
15	49454	11127150	157088250	93%	166907	0.167	1.491	98.6%
16	53772	12098699	169186949	93%	193579	0.194	1.684	98.5%
17	59929	13484025	182670974	92%	229228	0.229	1.913	98.3%
18	61914	13930651	196601625	92%	250752	0.251	2.164	98.0%
19	62634	14092650	210694275	91%	267760	0.268	2.432	97.8%
20	61667	13875075	224569350	91%	277502	0.278	2.709	97.5%
21	65474	14731650	239301000	90%	309365	0.309	3.019	97.3%
22	65856	14817599	254118600	89%	325987	0.326	3.345	97.0%
23	69486	15634351	269752950	89%	359590	0.360	3.704	96.6%
24	71118	16001551	285754501	88%	384037	0.384	4.088	96.3%
25	79128	17803800	303558301	87%	445095	0.445	4.534	95.9%
26	90983	20471175	324029476	86%	532251	0.532	5.066	95.4%
27	102253	23006924	347036400	85%	621187	0.621	5.687	94.8%
28	117743	26492176	373528576	84%	741781	0.742	6.429	94.2%
29	141382	31810950	405339527	83%	922518	0.923	7.351	93.3%
30	164384	36986400	442325927	81%	1109592	1.110	8.461	92.3%
31	181772	40898698	483224624	80%	1267860	1.268	9.729	91.2%
32	198429	44646523	527871148	78%	1428689	1.429	11.157	89.9%
33	220043	49509678	577380826	76%	1633819	1.634	12.791	88.4%
34	241586	54356849	631737675	73%	1848133	1.848	14.639	86.7%
35	258722	58212450	689950125	71%	2037436	2.037	16.677	84.8%
36	264354	59479653	749429778	69%	2141268	2.141	18.818	82.9%
37	267020	60079500	809509278	66%	2222942	2.223	21.041	80.9%
38	278919	62756776	872266054	63%	2384758	2.385	23.426	78.7%
39	288458	64903045	937169099	61%	2531219	2.531	25.957	76.4%
40	292543	65822175	1002991274	58%	2632887	2.633	28.590	74.0%
41	295551	66498976	1069490250	55%	2726458	2.726	31.316	71.5%
42	303462	68278946	1137769196	52%	2867716	2.868	34.184	68.9%
43	305210	68672250	1206441446	49%	2952907	2.953	37.137	66.2%
44	308545	69422625	1275864071	46%	3054596	3.055	40.192	63.5%
45	311297	70041822	1345905893	43%	3151882	3.152	43.343	60.6%
46	306223	68900179	1414806073	41%	3169408	3.169	46.513	57.7%
47	301337	67800824	1482606897	38%	3186639	3.187	49.700	54.8%
48	280656	63147599	1545754496	35%	3031085	3.031	52.731	52.1%
49	260640	58644000	1604398496	33%	2873556	2.874	55.604	49.4%
50	236378	53185050	1657583546	30%	2659253	2.659	58.263	47.0%
51	216490	48710250	1706293796	28%	2484223	2.484	60.748	44.8%
52	199892	44975697	1751269493	26%	2338736	2.339	63.086	42.6%

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53	184574	41529151	1792798644	25%	2201045	2.201	65.287	40.6%
54	170278	38312549	1831111193	23%	2068878	2.069	67.356	38.8%
55	157866	35519850	1866631043	22%	1953592	1.954	69.310	37.0%
56	149037	33533326	1900164369	20%	1877866	1.878	71.188	35.3%
57	139472	31381200	1931545568	19%	1788728	1.789	72.976	33.7%
58	130974	29469151	1961014719	18%	1709211	1.709	74.686	32.1%
59	122951	27663975	1988678694	16%	1632175	1.632	76.318	30.6%
60	112476	25307100	2013985794	15%	1518426	1.518	77.836	29.2%
61	102940	23161500	2037147294	14%	1412852	1.413	79.249	27.9%
62	95147	21408075	2058555368	13%	1327301	1.327	80.576	26.7%
63	87156	19610101	2078165469	13%	1235436	1.235	81.812	25.6%
64	80973	18218924	2096384393	12%	1166011	1.166	82.978	24.6%
65	72931	16409475	2112793868	11%	1066616	1.067	84.044	23.6%
66	66445	14950125	2127743993	11%	986708	0.987	85.031	22.7%
67	60513	13615424	2141359418	10%	912233	0.912	85.943	21.9%
68	55718	12536551	2153895968	9%	852485	0.852	86.796	21.1%
69	51764	11646899	2165542868	9%	803636	0.804	87.600	20.4%
70	47450	10676250	2176219118	9%	747338	0.747	88.347	19.7%
71	43994	9898651	2186117768	8%	702804	0.703	89.050	19.0%
72	41203	9270675	2195388444	8%	667489	0.667	89.717	18.4%
73	39002	8775449	2204163893	7%	640608	0.641	90.358	17.8%
74	37304	8393399	2212557293	7%	621112	0.621	90.979	17.3%
75	35685	8029125	2220586418	7%	602184	0.602	91.581	16.7%
76	33788	7602300	2228188718	6%	577775	0.578	92.159	16.2%
77	30154	6784650	2234973368	6%	522418	0.522	92.681	15.7%
78	28390	6387750	2241361118	6%	498244	0.498	93.180	15.3%
79	27256	6132600	2247493717	6%	484475	0.484	93.664	14.8%
80	26964	6066900	2253560617	5%	485352	0.485	94.149	14.4%
81	25909	5829525	2259390142	5%	472192	0.472	94.622	14.0%
82	24419	5494275	2264884417	5%	450531	0.451	95.072	13.6%
83	22074	4966650	2269851067	5%	412232	0.412	95.484	13.2%
84	20379	4585275	2274436342	4%	385163	0.385	95.869	12.8%
85	19098	4297050	2278733392	4%	365249	0.365	96.235	12.5%
86	18126	4078350	2282811742	4%	350738	0.351	96.585	12.2%
87	16603	3735675	2286547417	4%	325004	0.325	96.910	11.9%
88	15745	3542625	2290090042	4%	311751	0.312	97.222	11.6%
89	14791	3327975	2293418018	4%	296190	0.296	97.518	11.3%
90	14006	3151350	2296569368	3%	283622	0.284	97.802	11.1%
91	12744	2867400	2299436768	3%	260933	0.261	98.063	10.8%
92	12054	2712150	2302148918	3%	249518	0.250	98.312	10.6%
93	11208	2521800	2304670718	3%	234527	0.235	98.547	10.4%
94	10367	2332575	2307003293	3%	219262	0.219	98.766	10.2%
95	10016	2253600	2309256893	3%	214092	0.214	98.980	10.0%
96	9082	2043450	2311300343	3%	196171	0.196	99.177	9.8%
97	8661	1948725	2313249068	3%	189026	0.189	99.366	9.7%
98	8058	1813050	2315062118	3%	177679	0.178	99.543	9.5%
99	7657	1722825	2316784943	3%	170560	0.171	99.714	9.3%
100	7038	1583550	2318368493	3%	158355	0.158	99.872	9.2%
101	7679	1727775	2320096268	3%	174505	0.175	100.047	9.0%
102	7094	1596150	2321692418	2%	162807	0.163	100.209	8.9%
103	6206	1396350	2323088768	2%	143824	0.144	100.353	8.8%
104	5832	1312200	2324400968	2%	136469	0.136	100.490	8.6%
105	5369	1208025	2325608993	2%	126843	0.127	100.617	8.5%

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106	4907	1104075	2326713068	2%	117032	0.117	100.734	8.4%
107	4499	1012275	2327725343	2%	108313	0.108	100.842	8.3%
108	4434	997650	2328722993	2%	107746	0.108	100.950	8.2%
109	4161	936225	2329659218	2%	102049	0.102	101.052	8.1%
110	4098	922050	2330581268	2%	101426	0.101	101.153	8.0%
111	3649	821025	2331402293	2%	91134	0.091	101.244	8.0%
112	3463	779175	2332181468	2%	87268	0.087	101.332	7.9%
113	3134	705150	2332886618	2%	79682	0.080	101.411	7.8%
114	3048	685800	2333572418	2%	78181	0.078	101.489	7.7%
115	3066	689850	2334262268	2%	79333	0.079	101.569	7.7%
116	3072	691200	2334953468	2%	80179	0.080	101.649	7.6%
117	3590	807750	2335761218	2%	94507	0.095	101.743	7.5%
118	2656	597600	2336358818	2%	70517	0.071	101.814	7.4%
119	2017	453825	2336812643	2%	54005	0.054	101.868	7.4%
120	2019	454275	2337266918	2%	54513	0.055	101.922	7.3%
121	1549	348525	2337615443	2%	42172	0.042	101.965	7.3%
122	1615	363375	2337978818	2%	44332	0.044	102.009	7.3%
123	1578	355050	2338333868	2%	43671	0.044	102.053	7.2%
124	1819	409275	2338743143	2%	50750	0.051	102.103	7.2%
125	1691	380475	2339123618	2%	47559	0.048	102.151	7.1%
126	1508	339300	2339462918	2%	42752	0.043	102.194	7.1%
127	1374	309150	2339772068	2%	39262	0.039	102.233	7.1%
128	1283	288675	2340060743	2%	36950	0.037	102.270	7.0%
129	1170	263250	2340323993	2%	33959	0.034	102.304	7.0%
130	1086	244350	2340568343	2%	31766	0.032	102.336	7.0%
131	963	216675	2340785018	2%	28384	0.028	102.364	6.9%
132	965	217125	2341002143	2%	28661	0.029	102.393	6.9%
133	1234	277650	2341279793	2%	36927	0.037	102.430	6.9%
134	1271	285975	2341565768	2%	38321	0.038	102.468	6.8%
135	1646	370350	2341936118	2%	49997	0.050	102.518	6.8%
136	2174	489150	2342425268	2%	66524	0.067	102.584	6.7%
137	1257	282825	2342708093	2%	38747	0.039	102.623	6.7%
138	1122	252450	2342960543	2%	34838	0.035	102.658	6.7%
139	1116	251100	2343211643	2%	34903	0.035	102.693	6.6%
140	1130	254250	2343465893	2%	35595	0.036	102.729	6.6%
141	1169	263025	2343728918	2%	37087	0.037	102.766	6.6%
142	1076	242100	2343971018	2%	34378	0.034	102.800	6.5%
143	972	218700	2344189718	1%	31274	0.031	102.831	6.5%
144	959	215775	2344405493	1%	31072	0.031	102.862	6.5%
145	899	202275	2344607768	1%	29330	0.029	102.892	6.5%
146	1022	229950	2344837718	1%	33573	0.034	102.925	6.4%
147	1195	268875	2345106593	1%	39525	0.040	102.965	6.4%
148	1334	300150	2345406743	1%	44422	0.044	103.009	6.3%
149	1341	301725	2345708468	1%	44957	0.045	103.054	6.3%
150	1356	305100	2346013568	1%	45765	0.046	103.100	6.3%
151	1329	299025	2346312593	1%	45153	0.045	103.145	6.2%
152	1284	288900	2346601493	1%	43913	0.044	103.189	6.2%
153	1610	362250	2346963743	1%	55424	0.055	103.244	6.1%
154	2128	478800	2347442543	1%	73735	0.074	103.318	6.1%
155	2070	465750	2347908293	1%	72191	0.072	103.390	6.0%
156	1913	430425	2348338718	1%	67146	0.067	103.458	5.9%
157	1635	367875	2348706593	1%	57756	0.058	103.515	5.9%
158	1645	370125	2349076718	1%	58480	0.058	103.574	5.8%

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159	1521	342225	2349418943	1%	54414	0.054	103.628	5.8%
160	1497	336825	2349755768	1%	53892	0.054	103.682	5.7%
161	1365	307125	2350062893	1%	49447	0.049	103.731	5.7%
162	1442	324450	2350387343	1%	52561	0.053	103.784	5.6%
163	1387	312075	2350699418	1%	50868	0.051	103.835	5.6%
164	1361	306225	2351005643	1%	50221	0.050	103.885	5.5%
165	1362	306450	2351312093	1%	50564	0.051	103.936	5.5%
166	1385	311625	2351623718	1%	51730	0.052	103.987	5.5%
167	1514	340650	2351964368	1%	56889	0.057	104.044	5.4%
168	1782	400950	2352365318	1%	67360	0.067	104.112	5.3%
169	1886	424350	2352789668	1%	71715	0.072	104.183	5.3%
170	1854	417150	2353206818	1%	70916	0.071	104.254	5.2%
171	2003	450675	2353657493	1%	77065	0.077	104.331	5.1%
172	2204	495900	2354153393	1%	85295	0.085	104.417	5.1%
173	2285	514125	2354667518	1%	88944	0.089	104.506	5.0%
174	2342	526950	2355194468	1%	91689	0.092	104.597	4.9%
175	2351	528975	2355723443	1%	92571	0.093	104.690	4.8%
176	2280	513000	2356236443	1%	90288	0.090	104.780	4.7%
177	2354	529650	2356766093	1%	93748	0.094	104.874	4.7%
178	2200	495000	2357261093	1%	88110	0.088	104.962	4.6%
179	2089	470025	2357731118	1%	84134	0.084	105.046	4.5%
180	2018	454050	2358185168	1%	81729	0.082	105.128	4.4%
181	1876	422100	2358607268	1%	76400	0.076	105.204	4.4%
182	1825	410625	2359017893	1%	74734	0.075	105.279	4.3%
183	1762	396450	2359414343	1%	72550	0.073	105.352	4.2%
184	1776	399600	2359813943	1%	73526	0.074	105.425	4.1%
185	1744	392400	2360206343	1%	72594	0.073	105.498	4.1%
186	1673	376425	2360582768	1%	70015	0.070	105.568	4.0%
187	1530	344250	2360927018	1%	64375	0.064	105.632	4.0%
188	1596	359100	2361286118	1%	67511	0.068	105.700	3.9%
189	1595	358875	2361644993	1%	67827	0.068	105.767	3.8%
190	1543	347175	2361992168	1%	65963	0.066	105.833	3.8%
191	1560	351000	2362343168	1%	67041	0.067	105.900	3.7%
192	1475	331875	2362675043	1%	63720	0.064	105.964	3.7%
193	1500	337500	2363012543	1%	65138	0.065	106.029	3.6%
194	1478	332550	2363345093	1%	64515	0.065	106.094	3.5%
195	1430	321750	2363666843	1%	62741	0.063	106.157	3.5%
196	1441	324225	2363991068	1%	63548	0.064	106.220	3.4%
197	1425	320625	2364311693	1%	63163	0.063	106.283	3.4%
198	1335	300375	2364612068	1%	59474	0.059	106.343	3.3%
199	1352	304200	2364916268	1%	60536	0.061	106.403	3.3%
200	1312	295200	2365211468	1%	59040	0.059	106.462	3.2%
201	1256	282600	2365494068	1%	56803	0.057	106.519	3.2%
202	1216	273600	2365767668	1%	55267	0.055	106.574	3.1%
203	1233	277425	2366045093	1%	56317	0.056	106.631	3.1%
204	1128	253800	2366298893	1%	51775	0.052	106.682	3.0%
205	1086	244350	2366543243	1%	50092	0.050	106.733	3.0%
206	1059	238275	2366781518	1%	49085	0.049	106.782	2.9%
207	1067	240075	2367021593	1%	49696	0.050	106.831	2.9%
208	1012	227700	2367249293	1%	47362	0.047	106.879	2.8%
209	983	221175	2367470468	1%	46226	0.046	106.925	2.8%
210	928	208800	2367679268	1%	43848	0.044	106.969	2.7%
211	939	211275	2367890543	0%	44579	0.045	107.013	2.7%

Table 3.1
NPSP Area Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume ($m^3 10^6$/yr)	Cumulative Recharge Volume ($m^3 10^6$/yr)	%Volume Threshold
212	866	194850	2368085393	0%	41308	0.041	107.055	2.7%
213	837	188325	2368273718	0%	40113	0.040	107.095	2.6%
214	824	185400	2368459118	0%	39676	0.040	107.134	2.6%
215	762	171450	2368630568	0%	36862	0.037	107.171	2.6%
216	686	154350	2368784918	0%	33340	0.033	107.205	2.5%
217	733	164925	2368949843	0%	35789	0.036	107.240	2.5%
218	652	146700	2369096543	0%	31981	0.032	107.272	2.5%
219	640	144000	2369240543	0%	31536	0.032	107.304	2.4%
220	676	152100	2369392643	0%	33462	0.033	107.337	2.4%
221	624	140400	2369533043	0%	31028	0.031	107.368	2.4%
222	636	143100	2369676143	0%	31768	0.032	107.400	2.4%
223	541	121725	2369797868	0%	27145	0.027	107.427	2.3%
224	526	118350	2369916218	0%	26510	0.027	107.454	2.3%
225	491	110475	2370026693	0%	24857	0.025	107.479	2.3%
226	440	99000	2370125693	0%	22374	0.022	107.501	2.3%
227	435	97875	2370223568	0%	22218	0.022	107.523	2.2%
228	412	92700	2370316268	0%	21136	0.021	107.544	2.2%
229	440	99000	2370415268	0%	22671	0.023	107.567	2.2%
230	674	151650	2370566918	0%	34880	0.035	107.602	2.2%
231	975	219375	2370786293	0%	50676	0.051	107.653	2.1%
232	1186	266850	2371053143	0%	61909	0.062	107.715	2.1%
233	1295	291375	2371344518	0%	67890	0.068	107.782	2.0%
234	1315	295875	2371640393	0%	69235	0.069	107.852	1.9%
235	1249	281025	2371921418	0%	66041	0.066	107.918	1.9%
236	1195	268875	2372190293	0%	63455	0.063	107.981	1.8%
237	1117	251325	2372441618	0%	59564	0.060	108.041	1.8%
238	1159	260775	2372702393	0%	62064	0.062	108.103	1.7%
239	1008	226800	2372929193	0%	54205	0.054	108.157	1.7%
240	899	202275	2373131468	0%	48546	0.049	108.206	1.6%
241	877	197325	2373328793	0%	47555	0.048	108.253	1.6%
242	744	167400	2373496193	0%	40511	0.041	108.294	1.5%
243	700	157500	2373653693	0%	38273	0.038	108.332	1.5%
244	623	140175	2373793868	0%	34203	0.034	108.366	1.5%
245	585	131625	2373925493	0%	32248	0.032	108.398	1.4%
246	520	117000	2374042493	0%	28782	0.029	108.427	1.4%
247	645	145125	2374187618	0%	35846	0.036	108.463	1.4%
248	838	188550	2374376168	0%	46760	0.047	108.510	1.3%
249	928	208800	2374584968	0%	51991	0.052	108.562	1.3%
250	876	197100	2374782068	0%	49275	0.049	108.611	1.3%
251	788	177300	2374959368	0%	44502	0.045	108.656	1.2%
252	733	164925	2375124293	0%	41561	0.042	108.697	1.2%
253	709	159525	2375283818	0%	40360	0.040	108.737	1.1%
254	772	173700	2375457518	0%	44120	0.044	108.782	1.1%
255	746	167850	2375625368	0%	42802	0.043	108.824	1.1%
256	748	168300	2375793668	0%	43085	0.043	108.867	1.0%
257	741	166725	2375960393	0%	42848	0.043	108.910	1.0%
258	642	144450	2376104843	0%	37268	0.037	108.948	0.9%
259	609	137025	2376241868	0%	35489	0.035	108.983	0.9%
260	486	109350	2376351218	0%	28431	0.028	109.011	0.9%
261	412	92700	2376443918	0%	24195	0.024	109.036	0.9%
262	388	87300	2376531218	0%	22873	0.023	109.059	0.8%
263	336	75600	2376606818	0%	19883	0.020	109.078	0.8%
264	347	78075	2376684893	0%	20612	0.021	109.099	0.8%

Table 3.1
NPSP Area Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume ($m^3 10^6$/yr)	Cumulative Recharge Volume ($m^3 10^6$/yr)	%Volume Threshold
265	310	69750	2376754643	0%	18484	0.018	109.118	0.8%
266	323	72675	2376827318	0%	19332	0.019	109.137	0.8%
267	308	69300	2376896618	0%	18503	0.019	109.155	0.8%
268	295	66375	2376962993	0%	17789	0.018	109.173	0.7%
269	289	65025	2377028018	0%	17492	0.017	109.191	0.7%
270	304	68400	2377096418	0%	18468	0.018	109.209	0.7%
271	271	60975	2377157393	0%	16524	0.017	109.226	0.7%
272	297	66825	2377224218	0%	18176	0.018	109.244	0.7%
273	238	53550	2377277768	0%	14619	0.015	109.258	0.7%
274	228	51300	2377329068	0%	14056	0.014	109.272	0.7%
275	214	48150	2377377218	0%	13241	0.013	109.286	0.6%
276	228	51300	2377428518	0%	14159	0.014	109.300	0.6%
277	223	50175	2377478693	0%	13898	0.014	109.314	0.6%
278	273	61425	2377540118	0%	17076	0.017	109.331	0.6%
279	278	62550	2377602668	0%	17451	0.017	109.348	0.6%
280	235	52875	2377655543	0%	14805	0.015	109.363	0.6%
281	261	58725	2377714268	0%	16502	0.017	109.380	0.6%
282	237	53325	2377767593	0%	15038	0.015	109.395	0.5%
283	236	53100	2377820693	0%	15027	0.015	109.410	0.5%
284	245	55125	2377875818	0%	15656	0.016	109.425	0.5%
285	234	52650	2377928468	0%	15005	0.015	109.440	0.5%
286	238	53550	2377982018	0%	15315	0.015	109.456	0.5%
287	287	64575	2378046593	0%	18533	0.019	109.474	0.5%
288	315	70875	2378117468	0%	20412	0.020	109.495	0.4%
289	328	73800	2378191268	0%	21328	0.021	109.516	0.4%
290	330	74250	2378265518	0%	21533	0.022	109.537	0.4%
291	324	72900	2378338418	0%	21214	0.021	109.559	0.4%
292	392	88200	2378426618	0%	25754	0.026	109.584	0.4%
293	368	82800	2378509418	0%	24260	0.024	109.609	0.3%
294	354	79650	2378589068	0%	23417	0.023	109.632	0.3%
295	338	76050	2378665118	0%	22435	0.022	109.655	0.3%
296	302	67950	2378733068	0%	20113	0.020	109.675	0.3%
297	292	65700	2378798768	0%	19513	0.020	109.694	0.3%
298	291	65475	2378864243	0%	19512	0.020	109.714	0.3%
299	261	58725	2378922968	0%	17559	0.018	109.731	0.2%
300	253	56925	2378979893	0%	17078	0.017	109.748	0.2%
301	224	50400	2379030293	0%	15170	0.015	109.764	0.2%
302	214	48150	2379078443	0%	14541	0.015	109.778	0.2%
303	226	50850	2379129293	0%	15408	0.015	109.793	0.2%
304	198	44550	2379173843	0%	13543	0.014	109.807	0.2%
305	183	41175	2379215018	0%	12558	0.013	109.820	0.2%
306	162	36450	2379251468	0%	11154	0.011	109.831	0.1%
307	165	37125	2379288593	0%	11397	0.011	109.842	0.1%
308	159	35775	2379324368	0%	11019	0.011	109.853	0.1%
309	129	29025	2379353393	0%	8969	0.009	109.862	0.1%
310	101	22725	2379376118	0%	7045	0.007	109.869	0.1%
311	111	24975	2379401093	0%	7767	0.008	109.877	0.1%
312	124	27900	2379428993	0%	8705	0.009	109.886	0.1%
313	118	26550	2379455543	0%	8310	0.008	109.894	0.1%
314	87	19575	2379475118	0%	6147	0.006	109.900	0.1%
315	76	17100	2379492218	0%	5387	0.005	109.905	0.1%
316	79	17775	2379509993	0%	5617	0.006	109.911	0.1%
317	61	13725	2379523718	0%	4351	0.004	109.915	0.1%

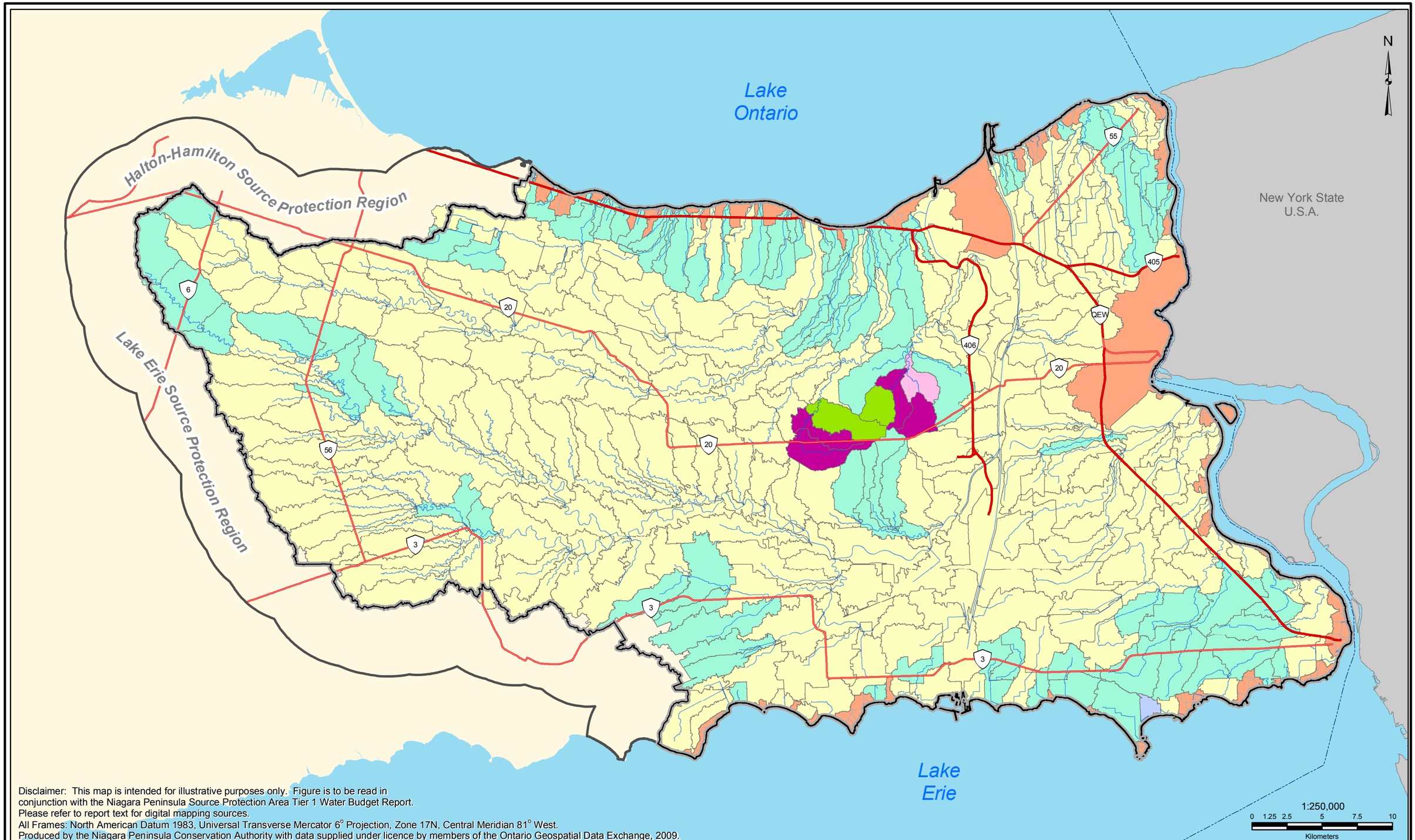
Table 3.1
NPSP Area Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume ($m^3 10^6$/yr)	Cumulative Recharge Volume ($m^3 10^6$/yr)	%Volume Threshold
318	59	13275	2379536993	0%	4221	0.004	109.920	0.1%
319	65	14625	2379551618	0%	4665	0.005	109.924	0.1%
320	47	10575	2379562193	0%	3384	0.003	109.928	0.1%
321	50	11250	2379573443	0%	3611	0.004	109.931	0.1%
322	58	13050	2379586493	0%	4202	0.004	109.936	0.0%
323	52	11700	2379598193	0%	3779	0.004	109.939	0.0%
324	37	8325	2379606518	0%	2697	0.003	109.942	0.0%
325	44	9900	2379616418	0%	3218	0.003	109.945	0.0%
326	47	10575	2379626993	0%	3447	0.003	109.949	0.0%
327	50	11250	2379638243	0%	3679	0.004	109.952	0.0%
328	27	6075	2379644318	0%	1993	0.002	109.954	0.0%
329	33	7425	2379651743	0%	2443	0.002	109.957	0.0%
330	33	7425	2379659168	0%	2450	0.002	109.959	0.0%
331	20	4500	2379663668	0%	1490	0.001	109.961	0.0%
332	25	5625	2379669293	0%	1867	0.002	109.963	0.0%
333	22	4950	2379674243	0%	1648	0.002	109.964	0.0%
334	18	4050	2379678293	0%	1353	0.001	109.966	0.0%
335	17	3825	2379682118	0%	1281	0.001	109.967	0.0%
336	19	4275	2379686393	0%	1436	0.001	109.968	0.0%
337	27	6075	2379692468	0%	2047	0.002	109.970	0.0%
338	11	2475	2379694943	0%	837	0.001	109.971	0.0%
339	13	2925	2379697868	0%	992	0.001	109.972	0.0%
340	14	3150	2379701018	0%	1071	0.001	109.973	0.0%
341	12	2700	2379703718	0%	921	0.001	109.974	0.0%
342	3	675	2379704393	0%	231	0.000	109.974	0.0%
343	4	900	2379705293	0%	309	0.000	109.975	0.0%
344	10	2250	2379707543	0%	774	0.001	109.975	0.0%
345	4	900	2379708443	0%	311	0.000	109.976	0.0%
346	7	1575	2379710018	0%	545	0.001	109.976	0.0%
347	8	1800	2379711818	0%	625	0.001	109.977	0.0%
348	9	2025	2379713843	0%	705	0.001	109.978	0.0%
349	8	1800	2379715643	0%	628	0.001	109.978	0.0%
350	6	1350	2379716993	0%	473	0.000	109.979	0.0%
351	10	2250	2379719243	0%	790	0.001	109.980	0.0%
352	3	675	2379719918	0%	238	0.000	109.980	0.0%
353	3	675	2379720593	0%	238	0.000	109.980	0.0%
354	0	0	2379720593	0%	0	0.000	109.980	0.0%
355	3	675	2379721268	0%	240	0.000	109.980	0.0%
356	2	450	2379721718	0%	160	0.000	109.980	0.0%
357	1	225	2379721943	0%	80	0.000	109.980	0.0%
358	3	675	2379722618	0%	242	0.000	109.981	0.0%
359	0	0	2379722618	0%	0	0.000	109.981	0.0%
360	4	900	2379723518	0%	324	0.000	109.981	0.0%
361	3	675	2379724193	0%	244	0.000	109.981	0.0%
362	1	225	2379724418	0%	81	0.000	109.981	0.0%
363	0	0	2379724418	0%	0	0.000	109.981	0.0%
364	4	900	2379725318	0%	328	0.000	109.982	0.0%
365	0	0	2379725318	0%	0	0.000	109.982	0.0%
366	3	675	2379725993	0%	247	0.000	109.982	0.0%
367	0	0	2379725993	0%	0	0.000	109.982	0.0%
368	1	225	2379726218	0%	83	0.000	109.982	0.0%
369	1	225	2379726443	0%	83	0.000	109.982	0.0%
370	2	450	2379726893	0%	167	0.000	109.982	0.0%

Table 3.1
NPSP Area Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume ($m^3 10^6/yr$)	Cumulative Recharge Volume ($m^3 10^6/yr$)	%Volume Threshold
371	0	0	2379726893	0%	0	0.000	109.982	0.0%
372	0	0	2379726893	0%	0	0.000	109.982	0.0%
373	2	450	2379727343	0%	168	0.000	109.982	0.0%
374	3	675	2379728018	0%	252	0.000	109.983	0.0%
375	0	0	2379728018	0%	0	0.000	109.983	0.0%
376	0	0	2379728018	0%	0	0.000	109.983	0.0%
377	0	0	2379728018	0%	0	0.000	109.983	0.0%
378	0	0	2379728018	0%	0	0.000	109.983	0.0%
379	3	675	2379728693	0%	256	0.000	109.983	0.0%
380	1	225	2379728918	0%	86	0.000	109.983	0.0%
381	0	0	2379728918	0%	0	0.000	109.983	0.0%
382	1	225	2379729143	0%	86	0.000	109.983	0.0%
383	0	0	2379729143	0%	0	0.000	109.983	0.0%
384	0	0	2379729143	0%	0	0.000	109.983	0.0%
385	0	0	2379729143	0%	0	0.000	109.983	0.0%
386	0	0	2379729143	0%	0	0.000	109.983	0.0%
387	1	225	2379729368	0%	87	0.000	109.983	0.0%
388	0	0	2379729368	0%	0	0.000	109.983	0.0%
389	0	0	2379729368	0%	0	0.000	109.983	0.0%
390	0	0	2379729368	0%	0	0.000	109.983	0.0%
391	0	0	2379729368	0%	0	0.000	109.983	0.0%
392	0	0	2379729368	0%	0	0.000	109.983	0.0%
393	0	0	2379729368	0%	0	0.000	109.983	0.0%
394	0	0	2379729368	0%	0	0.000	109.983	0.0%
395	0	0	2379729368	0%	0	0.000	109.983	0.0%
396	0	0	2379729368	0%	0	0.000	109.983	0.0%
397	0	0	2379729368	0%	0	0.000	109.983	0.0%
398	0	0	2379729368	0%	0	0.000	109.983	0.0%
399	0	0	2379729368	0%	0	0.000	109.983	0.0%
400	1	225	2379729593	0%	90	0.000	109.983	0.0%
401	0	0	2379729593	0%	0	0.000	109.983	0.0%
402	0	0	2379729593	0%	0	0.000	109.983	0.0%
403	0	0	2379729593	0%	0	0.000	109.983	0.0%
404	0	0	2379729593	0%	0	0.000	109.983	0.0%
405	0	0	2379729593	0%	0	0.000	109.983	0.0%
406	0	0	2379729593	0%	0	0.000	109.983	0.0%
407	0	0	2379729593	0%	0	0.000	109.983	0.0%
408	0	0	2379729593	0%	0	0.000	109.983	0.0%
409	0	0	2379729593	0%	0	0.000	109.983	0.0%
410	0	0	2379729593	0%	0	0.000	109.983	0.0%
411	0	0	2379729593	0%	0	0.000	109.983	0.0%
412	0	0	2379729593	0%	0	0.000	109.983	0.0%
413	0	0	2379729593	0%	0	0.000	109.983	0.0%
414	0	0	2379729593	0%	0	0.000	109.983	0.0%
415	63	14175	2379743768	0%	5883	0.006	109.989	0.0%

FIGURES



Disclaimer: This map is intended for illustrative purposes only. Figure is to be read in conjunction with the Niagara Peninsula Source Protection Area Tier 1 Water Budget Report. Please refer to report text for digital mapping sources.
All Frames: North American Datum 1983, Universal Transverse Mercator 6° Projection, Zone 17N, Central Meridian 81° West.
Produced by the Niagara Peninsula Conservation Authority with data supplied under licence by members of the Ontario Geospatial Data Exchange, 2009.

Legend

- International Boundary
- Major Highways
- Highways
- Watercourse
- Ponds, Reservoirs, Lakes
- Extended Context Area
- Source Water Protection Area
- HMS Rivers
- Non Modeled Areas

Annual groundwater recharge (mm/yr) 1991 - 2005

- < 53
- 53.0 - 100.0
- 100.1 - 125.0
- 125.1 - 150.0
- 150.1 - 200.0
- 200.1 - 250.0

DRINKING WATER SOURCE PROTECTION — ACT FOR CLEAN WATER

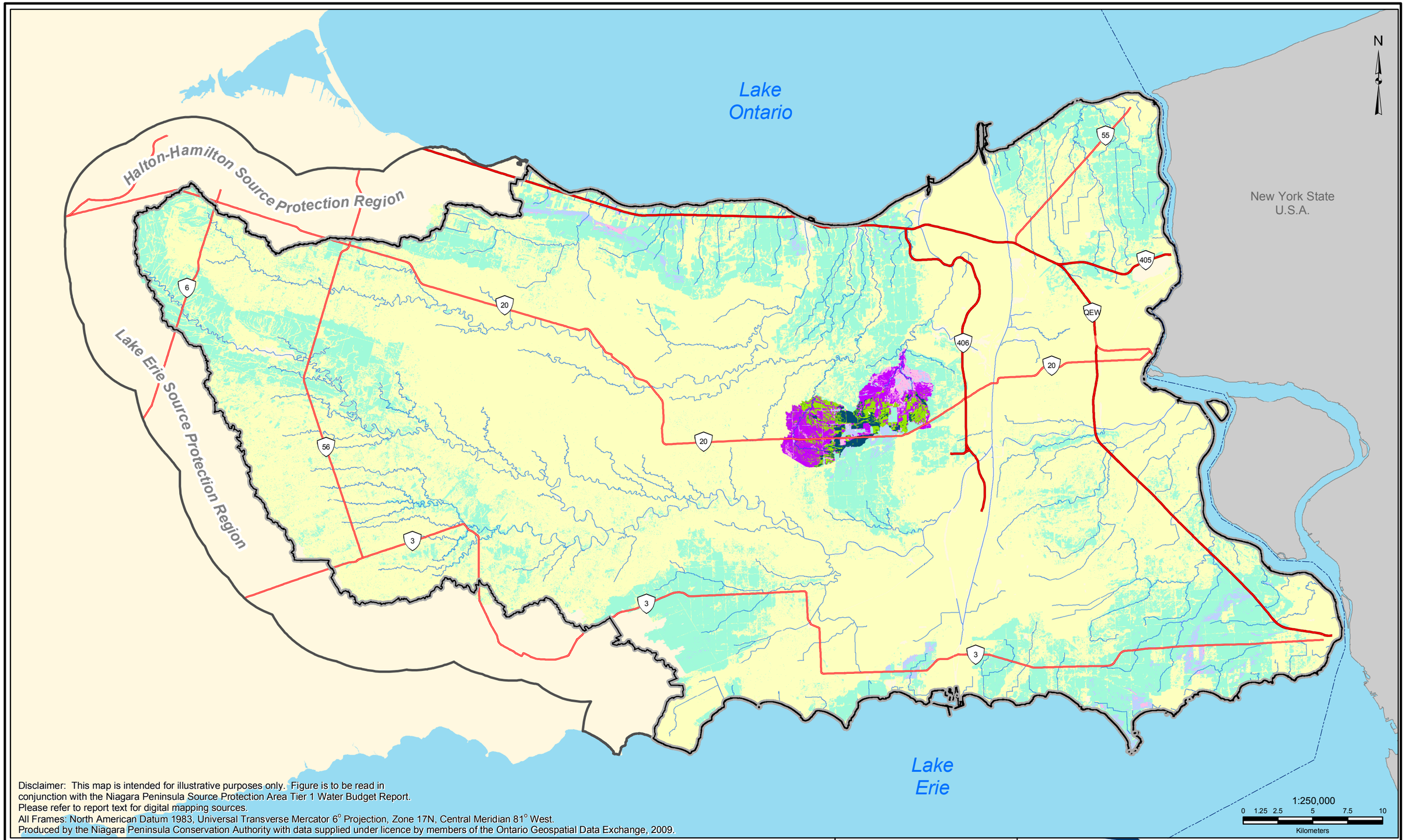
NPSP Area Significant Groundwater Recharge Areas

Figure 2.6:HEC-HMS Annual Catchment Groundwater Recharge

NIAGARA PENINSULA CONSERVATION AUTHORITY

Wednesday, October 21, 2009

Ontario



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Legend

- International Boundary
- Major Highways
- Highways
- Watercourse
- Ponds, Reservoirs, Lakes
- Extended Context Area
- Source Water Protection Area
- HMS Rivers
- Non Modeled Areas

Annual groundwater recharge (mm/yr) 1991 - 2005

- < 53
- 53.0 - 100.0
- 100.1 - 125.0
- 125.1 - 150.0
- 150.1 - 200.0
- 200.1 - 250.0
- > 250

DRINKING WATER SOURCE PROTECTION — ACT FOR CLEAN WATER

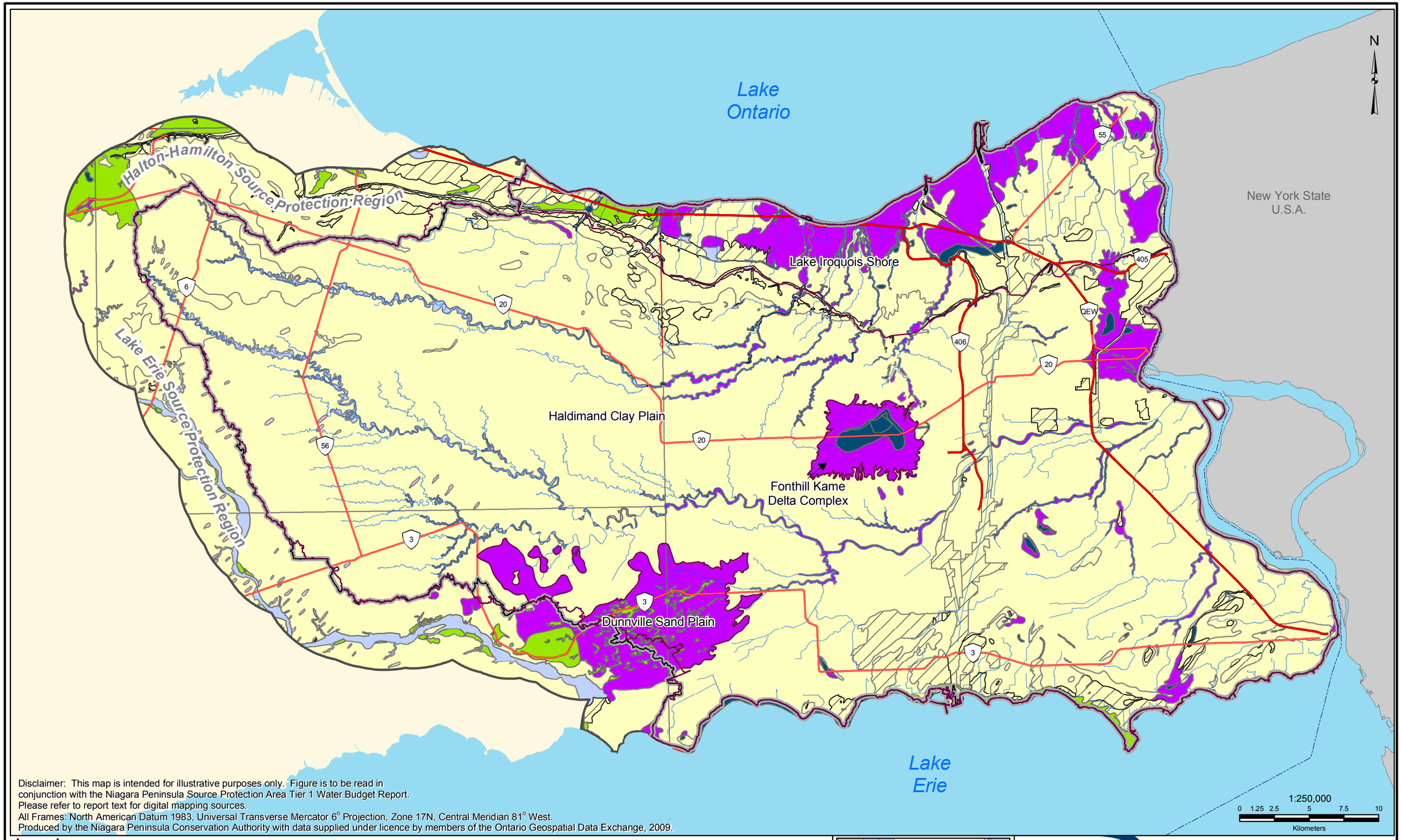
NPSP Area Significant Groundwater Recharge Areas

Figure 2.7: Local Scale Groundwater Recharge

NIAGARA PENINSULA CONSERVATION AUTHORITY

Wednesday, October 21, 2009

Ontario



Disclaimer: This map is intended for illustrative purposes only. Figure is to be read in conjunction with the Niagara Peninsula Source Protection Area Tier 1 Water Budget Report.
Please refer to report text for digital mapping sources.
All Frames: North American Datum 1983, Universal Transverse Mercator 6° Projection, Zone 17N, Central Meridian 81° West.
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Legend

- International Boundary
- Major Highways
- Highways
- Watercourse
- Ponds, Reservoirs, Lakes
- Extended Context Area
- Source Water Protection Area
- HMS Rivers
- Physiographic Zones

Recharge Rate (mm / yr)

- Clay < 100
- Bedrock, Fill, Organic Deposits < 100
- Clayey Silt 100 - 125
- Silt 125 - 150
- Silty Sand 150 - 200
- Sand 200 - 250
- Sand and Gravel > 250
- Halton Till < 100
- Silt Till 125 - 150

DRINKING WATER SOURCE PROTECTION — ACT FOR CLEAN WATER

NPSP Area Significant Groundwater Recharge Areas

Figure 2.8: Surficial Geology Recharge Rates

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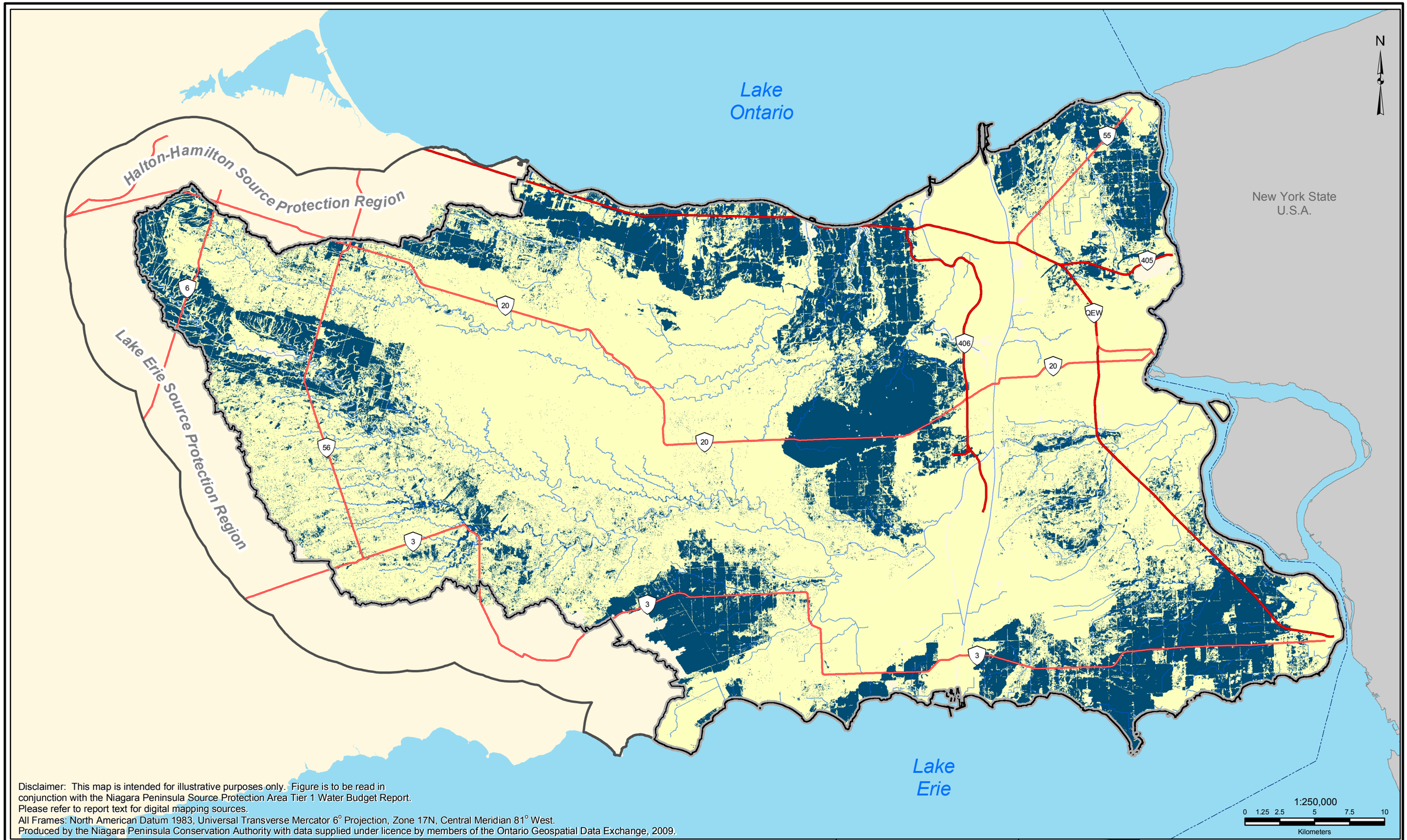

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Legend

- International Boundary
- Major Highways
- Highways
- Watercourse
- Ponds, Reservoirs, Lakes
- Extended Context Area
- Source Water Protection Area
- HMS Rivers
- Non Modeled Areas

Annual groundwater recharge (mm/yr) 1991 - 2005

- <= 53
- > 53, Potential SGRAs

DRINKING WATER SOURCE PROTECTION — ACT FOR CLEAN WATER

NPSP Area Significant Groundwater Recharge Areas

Figure 3.1: Potential SGRAs Rule 44(1) - NPSP Area

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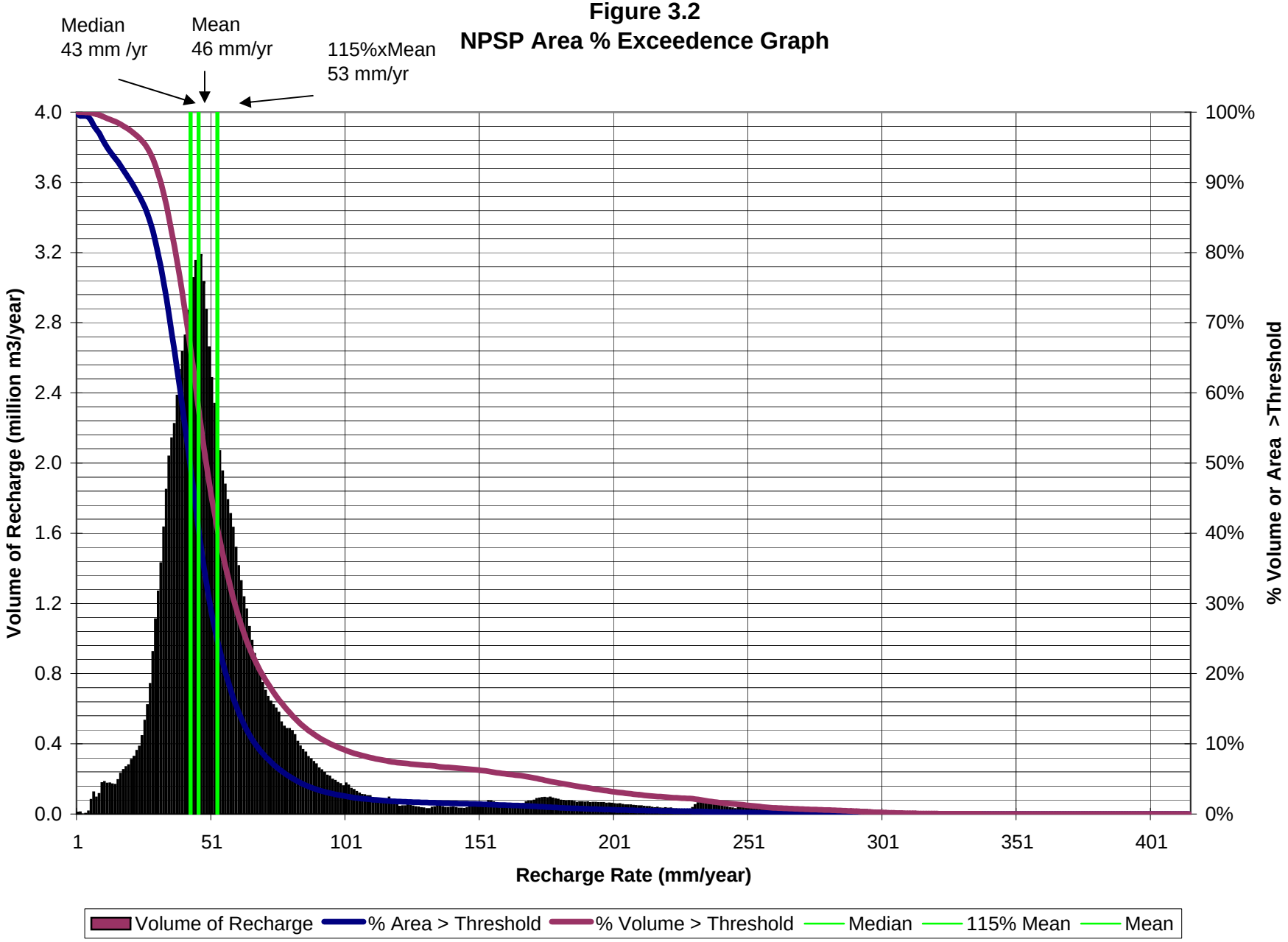
Figure 3.2
NPSP Area % Exceedence Graph



Lake Ontario

Halton-Hamilton Source Protection Region

Lake Erie Source Protection Region

New York State
U.S.A.

Lake Erie

N

1:250,000
0 1.25 2.5 5 7.5 10
Kilometers

Disclaimer: This map is intended for illustrative purposes only. Figure is to be read in conjunction with the Niagara Peninsula Source Protection Area Tier 1 Water Budget Report. Please refer to report text for digital mapping sources.
All Frames: North American Datum 1983, Universal Transverse Mercator 6° Projection, Zone 17N, Central Meridian 81° West.
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Legend

- International Boundary
- Major Highways
- Highways
- Watercourse
- Ponds, Reservoirs, Lakes
- Extended Context Area
- Source Water Protection Area
- HMS Rivers
- Non Modeled Areas

Annual groundwater recharge (%) 1991 - 2005

- < = 40
- > 40, <= 55
- > 55, Potential SGRAs

DRINKING WATER SOURCE PROTECTION
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NPSP Area Significant Groundwater Recharge Areas

Figure 3.3: Potential SGRAs Rule 44(2) - NPSP Area

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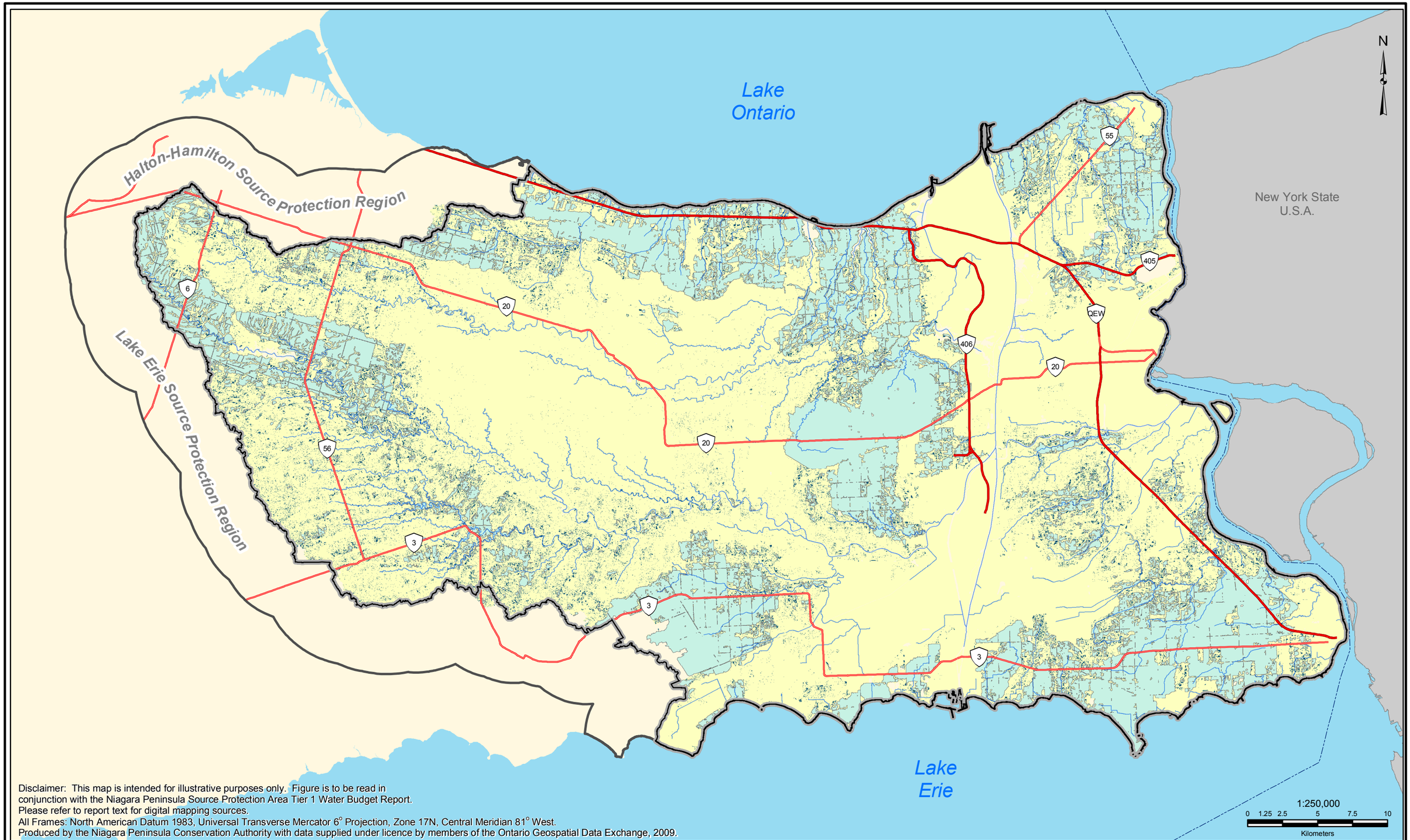

Disclaimer: This map is intended for illustrative purposes only. Figure is to be read in conjunction with the Niagara Peninsula Source Protection Area Tier 1 Water Budget Report. Please refer to report text for digital mapping sources.
All Frames: North American Datum 1983, Universal Transverse Mercator 6° Projection, Zone 17N, Central Meridian 81° West.
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1:250,000
0 1.25 2.5 5 7.5 10
Kilometers

Legend

- International Boundary
- Major Highways
- Highways
- Watercourse
- Ponds, Reservoirs, Lakes
- Extended Context Area
- Source Water Protection Area
- HMS Rivers
- Non Modeled Areas

Annual groundwater recharge (mm / yr) 1991 - 2005

- > 53 Proposed SGRAs Filtered
- > 53, Unfiltered Potential SGRAs
- <= 53

DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER

NPSP Area Significant Groundwater Recharge Areas

Figure 3.4: Proposed SGRAs - Filtered

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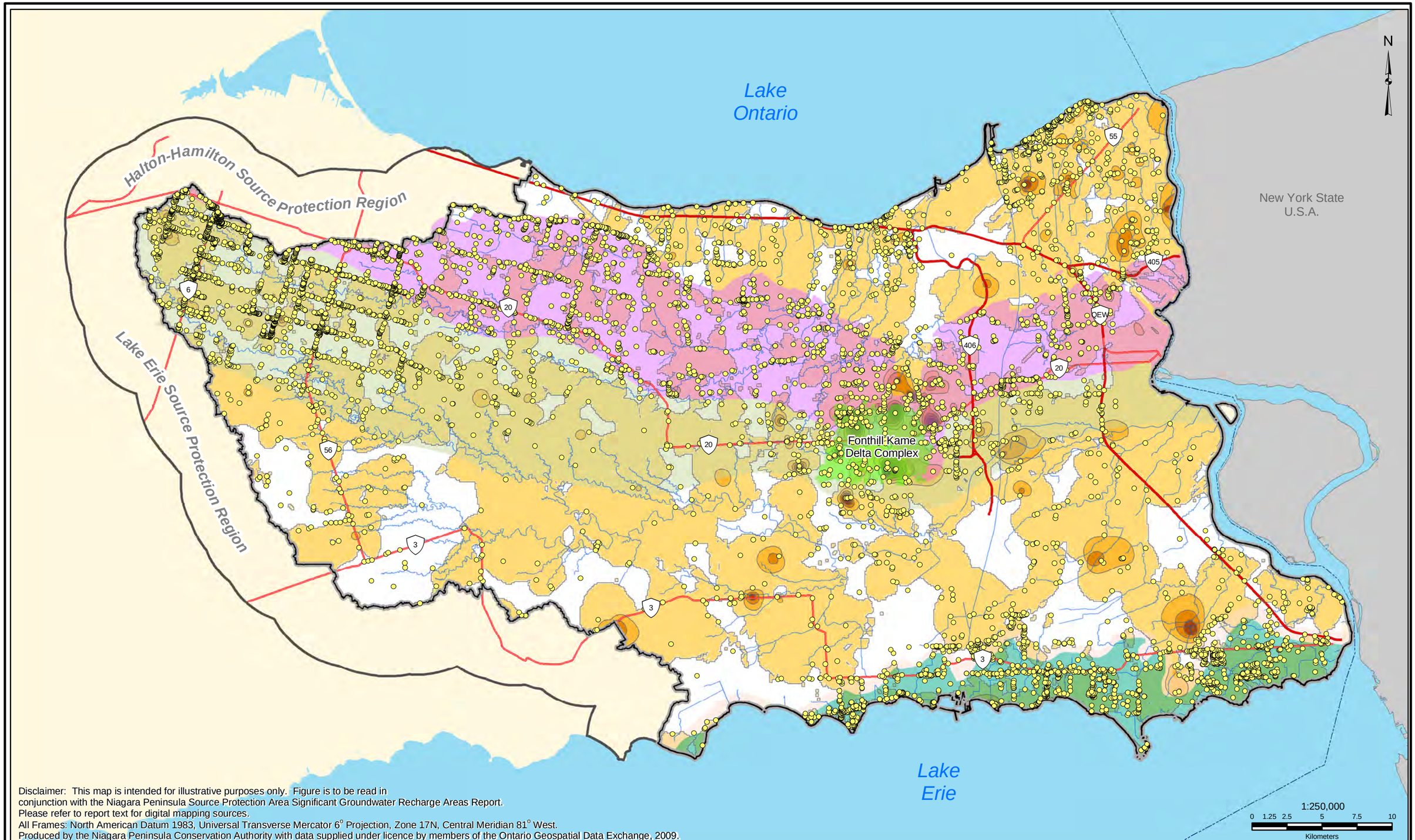
Ontario


Lake
Ontario
Halton-Hamilton Source Protection Region
Lake Erie Source Protection Region
New York State
U.S.A.
N
Fonthill Kame
Delta Complex
Lake
Erie
6
20
56
3
55
405
QEW
406
Disclaimer: This map is intended for illustrative purposes only. Figure is to be read in
conjunction with the Niagara Peninsula Source Protection Area Significant Groundwater Recharge Areas Report.
Please refer to report text for digital mapping sources.
All Frames: North American Datum 1983, Universal Transverse Mercator 6° Projection, Zone 17N, Central Meridian 81° West.
Produced by the Niagara Peninsula Conservation Authority with data supplied under licence by members of the Ontario Geospatial Data Exchange, 2009.
1:250,000
0 1.25 2.5 5 7.5 10
Kilometers
Legend
International Boundary
Major Highways
Highways
Watercourse
Ponds, Reservoirs, Lakes
Extended Context Area
Source Water Protection Area
HMS Rivers
Water Supply Wells
Aquifer Units
Fonthill Kame Delta Complex
Bois Blanc Formation
Onondaga Formation
Guelph Formation
Lockport Formation
Sand and Gravel Thickness Above Bedrock (m)
0
0.1 - 5
5.1 - 10
10.1 - 15
15.1 - 25
25.1 - 55
Lake Huron
Lake Ontario
Lake Erie
DRINKING WATER SOURCE PROTECTION
ACT FOR CLEAN WATER
NPSP Area Significant Groundwater Recharge Areas
Figure 3.5: Rule 45 - Drinking Water Systems and Major Aquifers
NIAGARA PENINSULA CONSERVATION AUTHORITY
Wednesday, October 21, 2009
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Disclaimer: This map is intended for illustrative purposes only. Figure is to be read in conjunction with the Niagara Peninsula Source Protection Area Tier 1 Water Budget Report.
Please refer to report text for digital mapping sources.
All Frames: North American Datum 1983, Universal Transverse Mercator 6° Projection, Zone 17N, Central Meridian 81° West.
Produced by the Niagara Peninsula Conservation Authority with data supplied under licence by members of the Ontario Geospatial Data Exchange, 2009.

Legend

- International Boundary
- Major Highways
- Highways
- Watercourse
- Ponds, Reservoirs, Lakes
- Extended Context Area
- Source Water Protection Area
- HMS Rivers
- Non Modeled Areas

Significant Groundwater Recharge Areas

- Rule 44(1) - Rule 44(2)
- Rule 44(1)

DRINKING WATER SOURCE PROTECTION — ACT FOR CLEAN WATER

NPSP Area Significant Groundwater Recharge Areas

Figure 3.6: Significant Groundwater Recharge Areas

NIAGARA PENINSULA CONSERVATION AUTHORITY

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Ontario

Appendix A

Figure A.1
Haldimand Clay Plain % Exceedence Graph

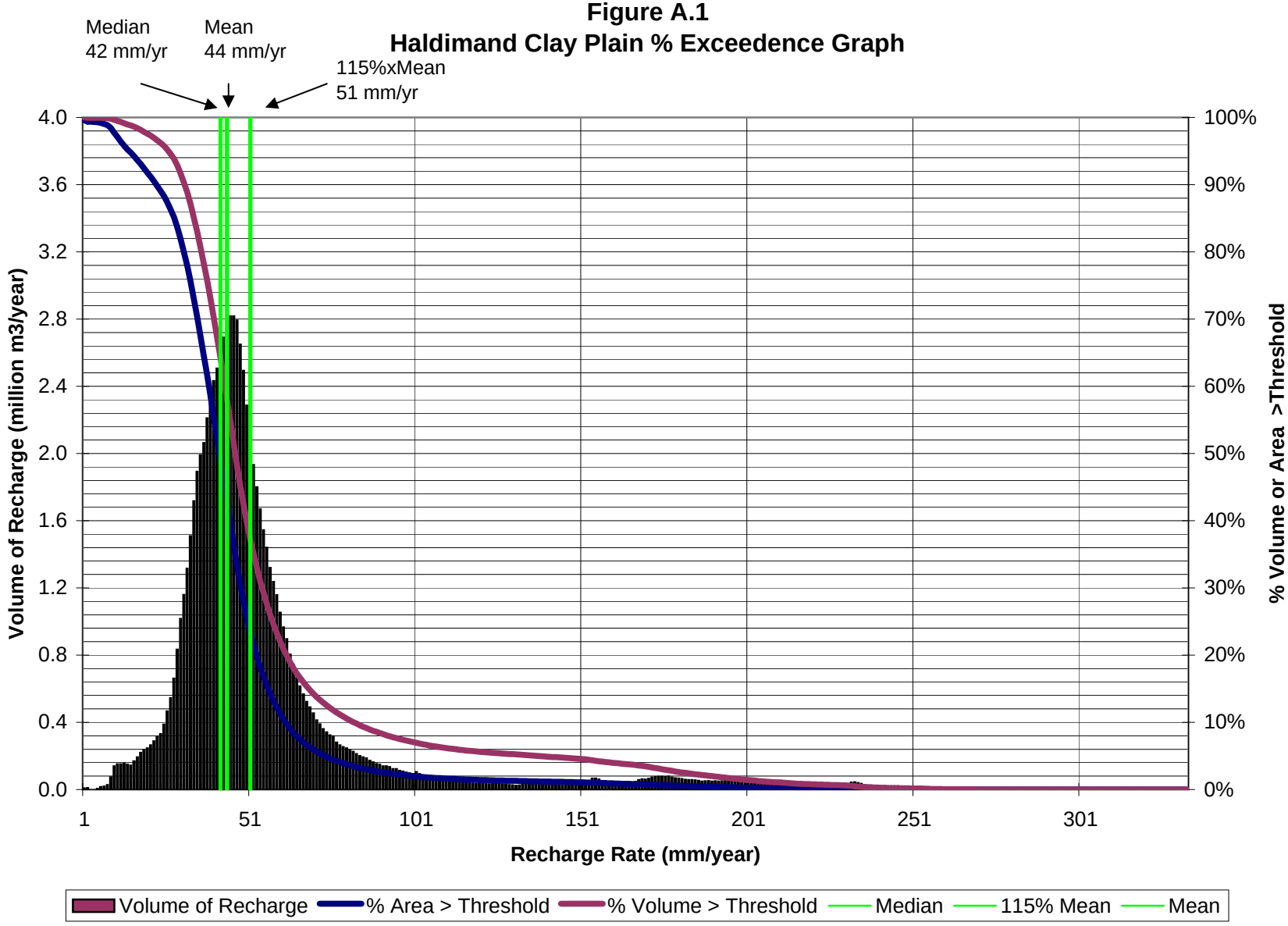

Figure A.2
Iroquois Shoreline % Exceedence Graph

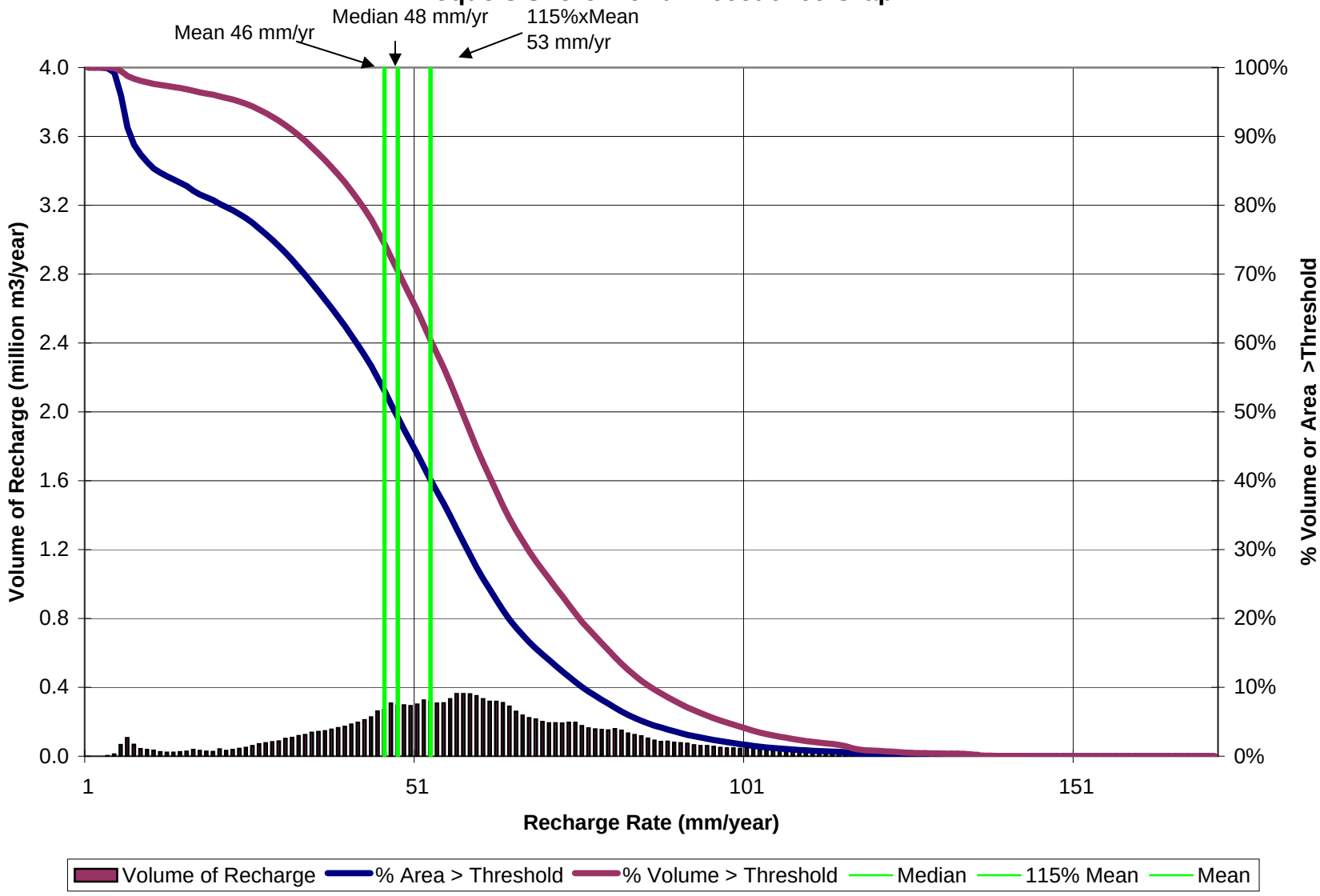

Figure A.3
Fonthill Kame-Delta Complex % Exceedence Graph

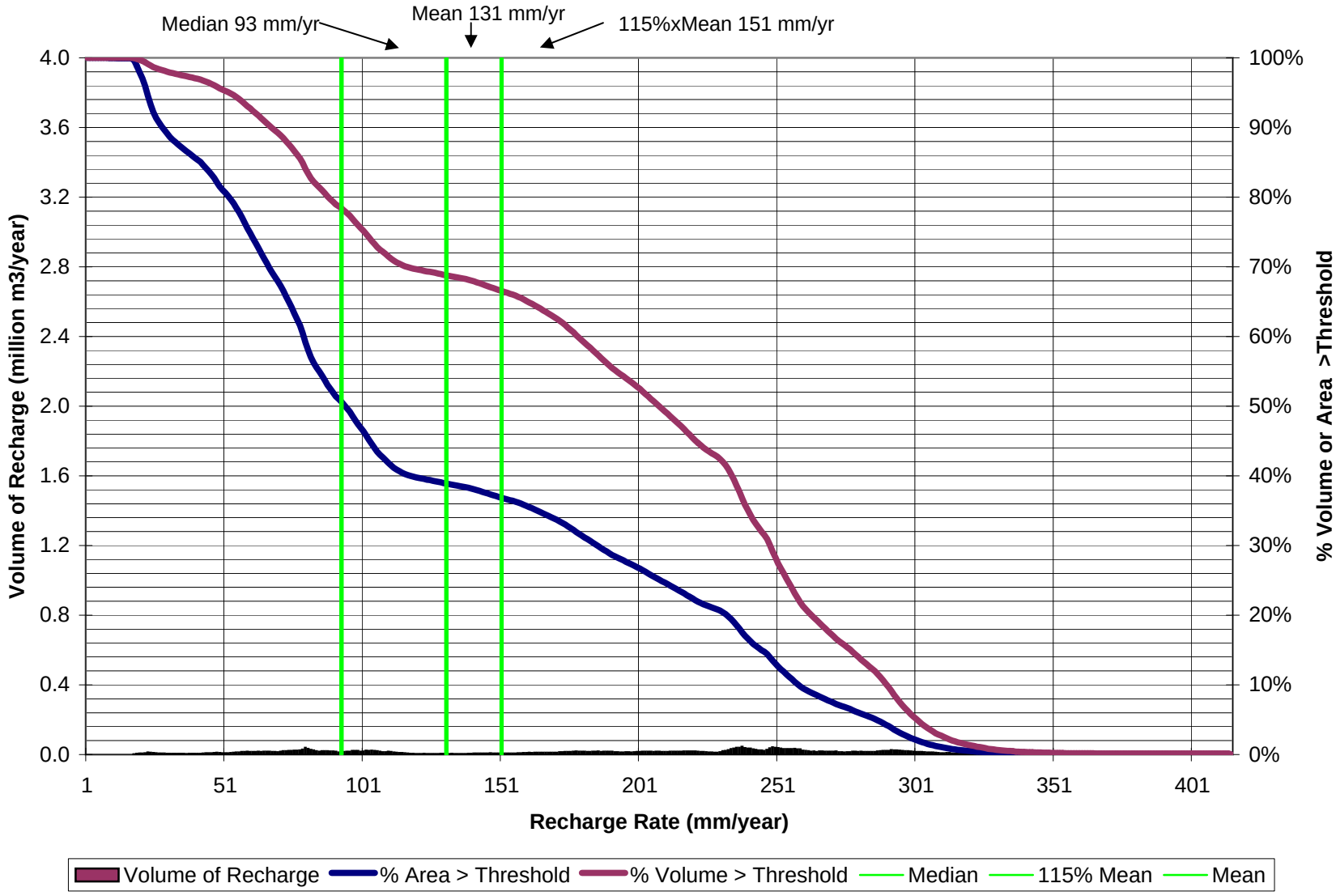

Figure A.4
Dunnville Sand Plain % Exceedence Graph

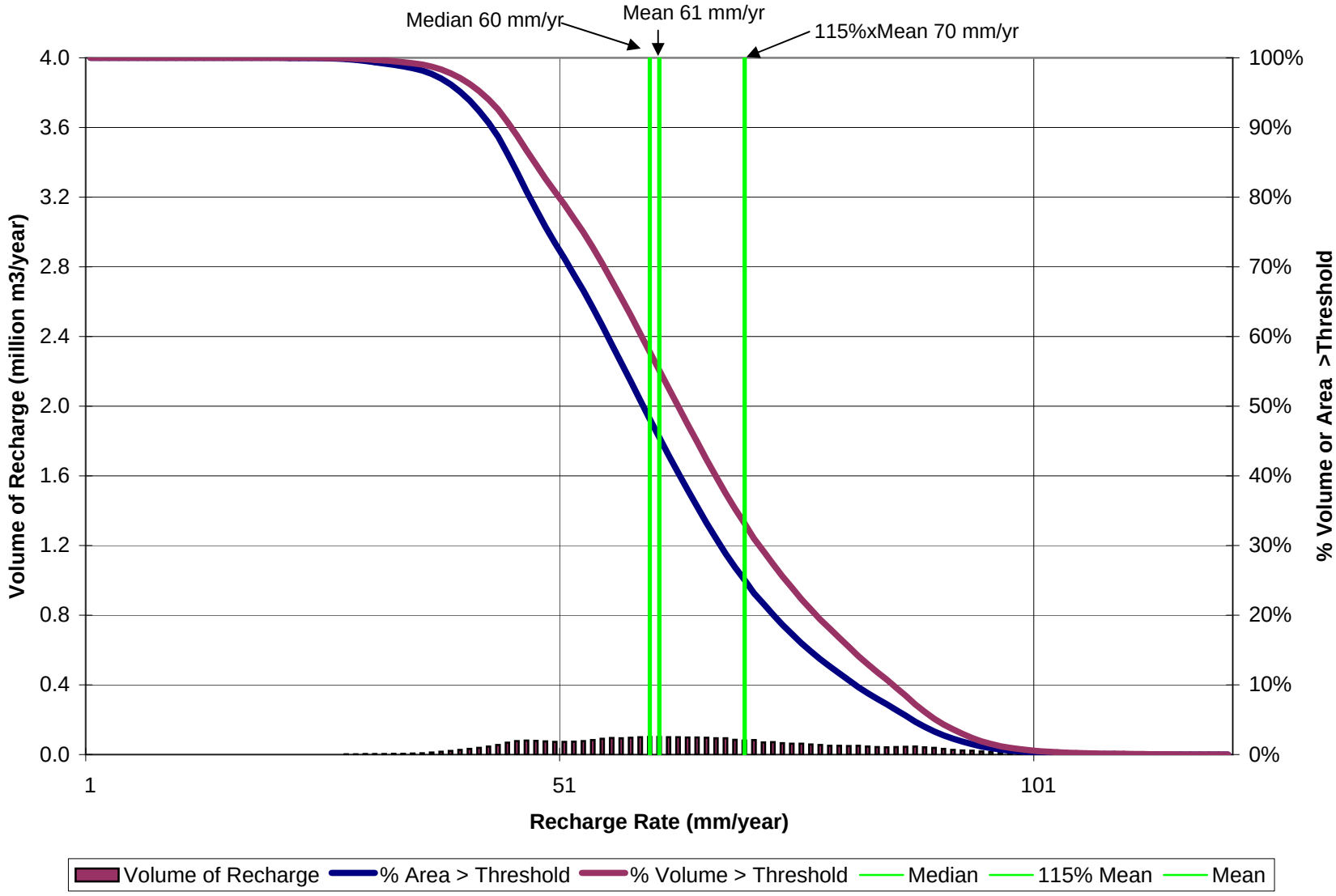

Table A.1
Haldimand Clay Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
1	35800	8055000	8055000	100%	8055	0.008	0.008	100.0%
2	20576	4629600	12684600	99%	9259	0.009	0.017	100.0%
3	77	17325	12701925	99%	52	0.000	0.017	100.0%
4	515	115875	12817800	99%	464	0.000	0.018	100.0%
5	3650	821250	13639050	99%	4106	0.004	0.022	100.0%
6	11193	2518425	16157475	99%	15111	0.015	0.037	100.0%
7	11621	2614725	18772200	99%	18303	0.018	0.055	99.9%
8	15196	3419100	22191300	99%	27353	0.027	0.083	99.9%
9	36089	8120025	30311325	98%	73080	0.073	0.156	99.8%
10	61408	13816800	44128125	98%	138168	0.138	0.294	99.7%
11	60468	13605300	57733425	97%	149658	0.150	0.444	99.5%
12	55671	12525975	70259400	96%	150312	0.150	0.594	99.3%
13	52343	11777174	82036575	96%	153103	0.153	0.747	99.1%
14	47262	10633950	92670524	95%	148875	0.149	0.896	99.0%
15	42271	9510975	102181499	95%	142665	0.143	1.039	98.8%
16	46497	10461825	112643324	94%	167389	0.167	1.206	98.6%
17	50082	11268450	123911775	94%	191564	0.192	1.398	98.4%
18	53838	12113550	136025325	93%	218044	0.218	1.616	98.1%
19	55197	12419326	148444651	92%	235967	0.236	1.852	97.9%
20	54557	12275325	160719976	92%	245507	0.246	2.097	97.6%
21	55716	12536100	173256076	91%	263258	0.263	2.360	97.3%
22	57861	13018724	186274800	90%	286412	0.286	2.647	96.9%
23	60208	13546800	199821600	90%	311576	0.312	2.958	96.6%
24	61192	13768201	213589801	89%	330437	0.330	3.289	96.2%
25	68737	15465825	229055626	88%	386646	0.387	3.675	95.8%
26	79490	17885250	246940876	87%	465017	0.465	4.140	95.2%
27	89625	20165625	267106501	86%	544472	0.544	4.685	94.6%
28	104696	23556600	290663101	85%	659585	0.660	5.344	93.8%
29	127611	28712476	319375578	84%	832662	0.833	6.177	92.9%
30	150434	33847650	353223228	82%	1015430	1.015	7.193	91.7%
31	166039	37358774	390582002	80%	1158122	1.158	8.351	90.4%
32	182494	41061148	431643150	78%	1313957	1.314	9.665	88.8%
33	203157	45710326	477353476	76%	1508441	1.508	11.173	87.1%
34	224309	50469526	527823002	73%	1715964	1.716	12.889	85.1%
35	240158	54035550	581858552	70%	1891244	1.891	14.780	82.9%
36	245572	55253701	637112253	67%	1989133	1.989	16.769	80.6%
37	247805	55756125	692868378	65%	2062977	2.063	18.832	78.2%
38	258393	58138428	751006806	62%	2209260	2.209	21.042	75.7%
39	266889	60050019	811056825	59%	2341951	2.342	23.384	73.0%
40	270092	60770700	871827525	55%	2430828	2.431	25.814	70.2%
41	271635	61117878	932945403	52%	2505833	2.506	28.320	67.3%
42	278164	62586899	995532302	49%	2628650	2.629	30.949	64.2%
43	278107	62574076	1058106377	46%	2690685	2.691	33.640	61.1%
44	279338	62851045	1120957423	43%	2765446	2.765	36.405	57.9%
45	278223	62600178	1183557601	39%	2817008	2.817	39.222	54.7%
46	272141	61231728	1244789329	36%	2816660	2.817	42.039	51.4%
47	263998	59399548	1304188877	33%	2791779	2.792	44.830	48.2%
48	245234	55177651	1359366528	30%	2648527	2.649	47.479	45.1%
49	226028	50856296	1410222824	28%	2491959	2.492	49.971	42.3%
50	203158	45710550	1455933374	26%	2285528	2.286	52.256	39.6%
51	183404	41265902	1497199276	23%	2104561	2.105	54.361	37.2%
52	165132	37154700	1534353975	21%	1932044	1.932	56.293	35.0%
53	150839	33938776	1568292751	20%	1798755	1.799	58.092	32.9%

Table A.1
Haldimand Clay Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
54	137341	30901725	1599194476	18%	1668693	1.669	59.761	31.0%
55	124699	28057275	1627251751	17%	1543150	1.543	61.304	29.2%
56	114251	25706475	1652958226	15%	1439563	1.440	62.743	27.5%
57	102892	23150700	1676108926	14%	1319590	1.320	64.063	26.0%
58	94695	21306375	1697415301	13%	1235770	1.236	65.299	24.6%
59	87120	19602000	1717017301	12%	1156518	1.157	66.455	23.2%
60	77984	17546400	1734563701	11%	1052784	1.053	67.508	22.0%
61	70302	15817951	1750381651	10%	964895	0.965	68.473	20.9%
62	64213	14447924	1764829576	10%	895771	0.896	69.369	19.9%
63	56651	12746475	1777576051	9%	803028	0.803	70.172	18.9%
64	51576	11604600	1789180651	8%	742694	0.743	70.914	18.1%
65	45436	10223100	1799403751	8%	664502	0.665	71.579	17.3%
66	41331	9299475	1808703226	7%	613765	0.614	72.193	16.6%
67	37534	8445150	1817148376	7%	565825	0.566	72.758	15.9%
68	34094	7671150	1824819526	7%	521638	0.522	73.280	15.3%
69	31550	7098750	1831918276	6%	489814	0.490	73.770	14.8%
70	28805	6481125	1838399401	6%	453679	0.454	74.224	14.2%
71	25789	5802525	1844201927	6%	411979	0.412	74.635	13.8%
72	23920	5382000	1849583927	5%	387504	0.388	75.023	13.3%
73	21874	4921650	1854505577	5%	359280	0.359	75.382	12.9%
74	20444	4599900	1859105477	5%	340393	0.340	75.723	12.5%
75	19138	4306050	1863411527	5%	322954	0.323	76.046	12.1%
76	18561	4176225	1867587752	4%	317393	0.317	76.363	11.8%
77	16176	3639600	1871227352	4%	280249	0.280	76.643	11.4%
78	15032	3382200	1874609552	4%	263812	0.264	76.907	11.1%
79	14214	3198150	1877807702	4%	252654	0.253	77.160	10.9%
80	13635	3067875	1880875577	4%	245430	0.245	77.405	10.6%
81	12803	2880675	1883756252	4%	233335	0.233	77.638	10.3%
82	12175	2739375	1886495627	3%	224629	0.225	77.863	10.0%
83	11296	2541600	1889037227	3%	210953	0.211	78.074	9.8%
84	10519	2366775	1891404002	3%	198809	0.199	78.273	9.6%
85	10009	2252025	1893656027	3%	191422	0.191	78.464	9.3%
86	9622	2164950	1895820977	3%	186186	0.186	78.650	9.1%
87	8699	1957275	1897778252	3%	170283	0.170	78.821	8.9%
88	8207	1846575	1899624827	3%	162499	0.162	78.983	8.7%
89	7588	1707300	1901332127	3%	151950	0.152	79.135	8.6%
90	7375	1659375	1902991502	3%	149344	0.149	79.285	8.4%
91	6734	1515150	1904506652	3%	137879	0.138	79.422	8.2%
92	6655	1497375	1906004027	2%	137759	0.138	79.560	8.1%
93	6403	1440675	1907444702	2%	133983	0.134	79.694	7.9%
94	5762	1296450	1908741152	2%	121866	0.122	79.816	7.8%
95	5678	1277550	1910018702	2%	121367	0.121	79.937	7.6%
96	5134	1155150	1911173852	2%	110894	0.111	80.048	7.5%
97	4889	1100025	1912273877	2%	106702	0.107	80.155	7.4%
98	4562	1026450	1913300327	2%	100592	0.101	80.256	7.3%
99	4333	974925	1914275252	2%	96518	0.097	80.352	7.2%
100	4095	921375	1915196627	2%	92138	0.092	80.444	7.1%
101	4588	1032300	1916228927	2%	104262	0.104	80.549	6.9%
102	4008	901800	1917130727	2%	91984	0.092	80.641	6.8%
103	3615	813375	1917944102	2%	83778	0.084	80.724	6.7%
104	3392	763200	1918707302	2%	79373	0.079	80.804	6.6%
105	3108	699300	1919406602	2%	73427	0.073	80.877	6.6%
106	2973	668925	1920075527	2%	70906	0.071	80.948	6.5%
107	2753	619425	1920694952	2%	66278	0.066	81.014	6.4%

Table A.1
Haldimand Clay Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
108	2696	606600	1921301552	2%	65513	0.066	81.080	6.3%
109	2593	583425	1921884977	2%	63593	0.064	81.143	6.3%
110	2521	567225	1922452202	2%	62395	0.062	81.206	6.2%
111	2350	528750	1922980952	2%	58691	0.059	81.264	6.1%
112	2252	506700	1923487652	2%	56750	0.057	81.321	6.0%
113	2169	488025	1923975677	2%	55147	0.055	81.376	6.0%
114	2154	484650	1924460327	2%	55250	0.055	81.432	5.9%
115	1887	424575	1924884902	2%	48826	0.049	81.480	5.9%
116	1788	402300	1925287202	1%	46667	0.047	81.527	5.8%
117	1539	346275	1925633477	1%	40514	0.041	81.568	5.8%
118	1369	308025	1925941502	1%	36347	0.036	81.604	5.7%
119	1274	286650	1926228152	1%	34111	0.034	81.638	5.7%
120	1600	360000	1926588152	1%	43200	0.043	81.681	5.6%
121	1245	280125	1926868277	1%	33895	0.034	81.715	5.6%
122	1211	272475	1927140752	1%	33242	0.033	81.748	5.6%
123	1147	258075	1927398827	1%	31743	0.032	81.780	5.5%
124	1255	282375	1927681202	1%	35015	0.035	81.815	5.5%
125	1218	274050	1927955252	1%	34256	0.034	81.849	5.4%
126	1152	259200	1928214452	1%	32659	0.033	81.882	5.4%
127	1084	243900	1928458352	1%	30975	0.031	81.913	5.4%
128	1051	236475	1928694827	1%	30269	0.030	81.943	5.3%
129	930	209250	1928904077	1%	26993	0.027	81.970	5.3%
130	869	195525	1929099602	1%	25418	0.025	81.996	5.3%
131	780	175500	1929275102	1%	22991	0.023	82.019	5.2%
132	783	176175	1929451277	1%	23255	0.023	82.042	5.2%
133	1031	231975	1929683252	1%	30853	0.031	82.073	5.2%
134	1078	242550	1929925802	1%	32502	0.033	82.105	5.1%
135	1095	246375	1930172177	1%	33261	0.033	82.139	5.1%
136	1441	324225	1930496402	1%	44095	0.044	82.183	5.0%
137	939	211275	1930707677	1%	28945	0.029	82.212	5.0%
138	884	198900	1930906577	1%	27448	0.027	82.239	5.0%
139	913	205425	1931112002	1%	28554	0.029	82.268	5.0%
140	944	212400	1931324402	1%	29736	0.030	82.297	4.9%
141	949	213525	1931537927	1%	30107	0.030	82.327	4.9%
142	853	191925	1931729852	1%	27253	0.027	82.355	4.9%
143	773	173925	1931903777	1%	24871	0.025	82.380	4.8%
144	749	168525	1932072302	1%	24268	0.024	82.404	4.8%
145	695	156375	1932228677	1%	22674	0.023	82.427	4.8%
146	817	183825	1932412502	1%	26838	0.027	82.453	4.7%
147	984	221400	1932633902	1%	32546	0.033	82.486	4.7%
148	1131	254475	1932888377	1%	37662	0.038	82.524	4.7%
149	1138	256050	1933144427	1%	38151	0.038	82.562	4.6%
150	1141	256725	1933401152	1%	38509	0.039	82.600	4.6%
151	1117	251325	1933652477	1%	37950	0.038	82.638	4.5%
152	1086	244350	1933896827	1%	37141	0.037	82.675	4.5%
153	1406	316350	1934213177	1%	48402	0.048	82.724	4.4%
154	1882	423450	1934636627	1%	65211	0.065	82.789	4.3%
155	1859	418275	1935054902	1%	64833	0.065	82.854	4.3%
156	1687	379575	1935434477	1%	59214	0.059	82.913	4.2%
157	1426	320850	1935755327	1%	50373	0.050	82.963	4.1%
158	1415	318375	1936073702	1%	50303	0.050	83.014	4.1%
159	1265	284625	1936358327	1%	45255	0.045	83.059	4.0%
160	1225	275625	1936633952	1%	44100	0.044	83.103	4.0%
161	1104	248400	1936882352	1%	39992	0.040	83.143	3.9%

Table A.1
Haldimand Clay Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
162	1169	263025	1937145377	1%	42610	0.043	83.186	3.9%
163	1121	252225	1937397602	1%	41113	0.041	83.227	3.8%
164	1092	245700	1937643302	1%	40295	0.040	83.267	3.8%
165	1076	242100	1937885402	1%	39947	0.040	83.307	3.8%
166	1117	251325	1938136727	1%	41720	0.042	83.349	3.7%
167	1219	274275	1938411002	1%	45804	0.046	83.395	3.6%
168	1483	333675	1938744677	1%	56057	0.056	83.451	3.6%
169	1596	359100	1939103777	1%	60688	0.061	83.511	3.5%
170	1562	351450	1939455227	1%	59747	0.060	83.571	3.4%
171	1681	378225	1939833452	1%	64676	0.065	83.636	3.4%
172	1829	411525	1940244977	1%	70782	0.071	83.706	3.3%
173	1902	427950	1940672927	1%	74035	0.074	83.781	3.2%
174	1936	435600	1941108527	1%	75794	0.076	83.856	3.1%
175	1933	434925	1941543452	1%	76112	0.076	83.932	3.0%
176	1879	422775	1941966227	1%	74408	0.074	84.007	2.9%
177	1944	437400	1942403627	1%	77420	0.077	84.084	2.9%
178	1799	404775	1942808402	1%	72050	0.072	84.156	2.8%
179	1667	375075	1943183477	1%	67138	0.067	84.223	2.7%
180	1630	366750	1943550227	1%	66015	0.066	84.289	2.6%
181	1535	345375	1943895602	1%	62513	0.063	84.352	2.5%
182	1425	320625	1944216227	1%	58354	0.058	84.410	2.5%
183	1363	306675	1944522902	1%	56122	0.056	84.466	2.4%
184	1349	303525	1944826427	0%	55849	0.056	84.522	2.3%
185	1306	293850	1945120277	0%	54362	0.054	84.577	2.3%
186	1232	277200	1945397477	0%	51559	0.052	84.628	2.2%
187	1115	250875	1945648352	0%	46914	0.047	84.675	2.2%
188	1176	264600	1945912952	0%	49745	0.050	84.725	2.1%
189	1185	266625	1946179577	0%	50392	0.050	84.775	2.1%
190	1115	250875	1946430452	0%	47666	0.048	84.823	2.0%
191	1139	256275	1946686727	0%	48949	0.049	84.872	1.9%
192	1101	247725	1946934452	0%	47563	0.048	84.919	1.9%
193	1136	255600	1947190052	0%	49331	0.049	84.969	1.8%
194	1161	261225	1947451277	0%	50678	0.051	85.019	1.8%
195	1100	247500	1947698777	0%	48263	0.048	85.068	1.7%
196	1102	247950	1947946727	0%	48598	0.049	85.116	1.7%
197	1082	243450	1948190177	0%	47960	0.048	85.164	1.6%
198	1032	232200	1948422377	0%	45976	0.046	85.210	1.6%
199	975	219375	1948641752	0%	43656	0.044	85.254	1.5%
200	929	209025	1948850777	0%	41805	0.042	85.296	1.5%
201	878	197550	1949048327	0%	39708	0.040	85.335	1.4%
202	827	186075	1949234402	0%	37587	0.038	85.373	1.4%
203	806	181350	1949415752	0%	36814	0.037	85.410	1.3%
204	746	167850	1949583602	0%	34241	0.034	85.444	1.3%
205	727	163575	1949747177	0%	33533	0.034	85.478	1.2%
206	708	159300	1949906477	0%	32816	0.033	85.510	1.2%
207	679	152775	1950059252	0%	31624	0.032	85.542	1.2%
208	704	158400	1950217652	0%	32947	0.033	85.575	1.1%
209	641	144225	1950361877	0%	30143	0.030	85.605	1.1%
210	630	141750	1950503627	0%	29768	0.030	85.635	1.1%
211	683	153675	1950657302	0%	32425	0.032	85.667	1.0%
212	625	140625	1950797927	0%	29813	0.030	85.697	1.0%
213	617	138825	1950936752	0%	29570	0.030	85.727	1.0%
214	606	136350	1951073102	0%	29179	0.029	85.756	0.9%
215	513	115425	1951188527	0%	24816	0.025	85.781	0.9%

Table A.1
Haldimand Clay Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
216	432	97200	1951285727	0%	20995	0.021	85.802	0.9%
217	429	96525	1951382252	0%	20946	0.021	85.823	0.8%
218	368	82800	1951465052	0%	18050	0.018	85.841	0.8%
219	369	83025	1951548077	0%	18182	0.018	85.859	0.8%
220	359	80775	1951628852	0%	17771	0.018	85.877	0.8%
221	328	73800	1951702652	0%	16310	0.016	85.893	0.8%
222	316	71100	1951773752	0%	15784	0.016	85.909	0.7%
223	254	57150	1951830902	0%	12744	0.013	85.921	0.7%
224	242	54450	1951885352	0%	12197	0.012	85.934	0.7%
225	245	55125	1951940477	0%	12403	0.012	85.946	0.7%
226	244	54900	1951995377	0%	12407	0.012	85.958	0.7%
227	208	46800	1952042177	0%	10624	0.011	85.969	0.7%
228	211	47475	1952089652	0%	10824	0.011	85.980	0.7%
229	220	49500	1952139152	0%	11336	0.011	85.991	0.6%
230	405	91125	1952230277	0%	20959	0.021	86.012	0.6%
231	627	141075	1952371352	0%	32588	0.033	86.045	0.6%
232	785	176625	1952547977	0%	40977	0.041	86.086	0.5%
233	818	184050	1952732027	0%	42884	0.043	86.129	0.5%
234	745	167625	1952899652	0%	39224	0.039	86.168	0.4%
235	649	146025	1953045677	0%	34316	0.034	86.202	0.4%
236	516	116100	1953161777	0%	27400	0.027	86.230	0.4%
237	459	103275	1953265052	0%	24476	0.024	86.254	0.3%
238	367	82575	1953347627	0%	19653	0.020	86.274	0.3%
239	349	78525	1953426152	0%	18767	0.019	86.293	0.3%
240	308	69300	1953495452	0%	16632	0.017	86.309	0.3%
241	262	58950	1953554402	0%	14207	0.014	86.323	0.3%
242	215	48375	1953602777	0%	11707	0.012	86.335	0.3%
243	209	47025	1953649802	0%	11427	0.011	86.346	0.2%
244	181	40725	1953690527	0%	9937	0.010	86.356	0.2%
245	166	37350	1953727877	0%	9151	0.009	86.366	0.2%
246	121	27225	1953755102	0%	6697	0.007	86.372	0.2%
247	156	35100	1953790202	0%	8670	0.009	86.381	0.2%
248	185	41625	1953831827	0%	10323	0.010	86.391	0.2%
249	178	40050	1953871877	0%	9972	0.010	86.401	0.2%
250	203	45675	1953917552	0%	11419	0.011	86.413	0.2%
251	136	30600	1953948152	0%	7681	0.008	86.420	0.2%
252	151	33975	1953982127	0%	8562	0.009	86.429	0.1%
253	183	41175	1954023302	0%	10417	0.010	86.439	0.1%
254	236	53100	1954076402	0%	13487	0.013	86.453	0.1%
255	216	48600	1954125002	0%	12393	0.012	86.465	0.1%
256	221	49725	1954174727	0%	12730	0.013	86.478	0.1%
257	191	42975	1954217702	0%	11045	0.011	86.489	0.1%
258	150	33750	1954251452	0%	8708	0.009	86.498	0.1%
259	123	27675	1954279127	0%	7168	0.007	86.505	0.1%
260	108	24300	1954303427	0%	6318	0.006	86.511	0.0%
261	89	20025	1954323452	0%	5227	0.005	86.516	0.0%
262	84	18900	1954342352	0%	4952	0.005	86.521	0.0%
263	67	15075	1954357427	0%	3965	0.004	86.525	0.0%
264	49	11025	1954368452	0%	2911	0.003	86.528	0.0%
265	58	13050	1954381502	0%	3458	0.003	86.532	0.0%
266	44	9900	1954391402	0%	2633	0.003	86.534	0.0%
267	23	5175	1954396577	0%	1382	0.001	86.536	0.0%
268	20	4500	1954401077	0%	1206	0.001	86.537	0.0%
269	20	4500	1954405577	0%	1211	0.001	86.538	0.0%

Table A.1
Haldimand Clay Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
270	30	6750	1954412327	0%	1823	0.002	86.540	0.0%
271	24	5400	1954417727	0%	1463	0.001	86.541	0.0%
272	20	4500	1954422227	0%	1224	0.001	86.543	0.0%
273	11	2475	1954424702	0%	676	0.001	86.543	0.0%
274	13	2925	1954427627	0%	801	0.001	86.544	0.0%
275	18	4050	1954431677	0%	1114	0.001	86.545	0.0%
276	11	2475	1954434152	0%	683	0.001	86.546	0.0%
277	13	2925	1954437077	0%	810	0.001	86.547	0.0%
278	8	1800	1954438877	0%	500	0.001	86.547	0.0%
279	4	900	1954439777	0%	251	0.000	86.547	0.0%
280	6	1350	1954441127	0%	378	0.000	86.548	0.0%
281	9	2025	1954443152	0%	569	0.001	86.548	0.0%
282	5	1125	1954444277	0%	317	0.000	86.549	0.0%
283	7	1575	1954445852	0%	446	0.000	86.549	0.0%
284	7	1575	1954447427	0%	447	0.000	86.550	0.0%
285	8	1800	1954449227	0%	513	0.001	86.550	0.0%
286	5	1125	1954450352	0%	322	0.000	86.550	0.0%
287	2	450	1954450802	0%	129	0.000	86.551	0.0%
288	4	900	1954451702	0%	259	0.000	86.551	0.0%
289	5	1125	1954452827	0%	325	0.000	86.551	0.0%
290	4	900	1954453727	0%	261	0.000	86.551	0.0%
291	5	1125	1954454852	0%	327	0.000	86.552	0.0%
292	2	450	1954455302	0%	131	0.000	86.552	0.0%
293	2	450	1954455752	0%	132	0.000	86.552	0.0%
294	2	450	1954456202	0%	132	0.000	86.552	0.0%
295	5	1125	1954457327	0%	332	0.000	86.552	0.0%
296	4	900	1954458227	0%	266	0.000	86.553	0.0%
297	2	450	1954458677	0%	134	0.000	86.553	0.0%
298	0	0	1954458677	0%	0	0.000	86.553	0.0%
299	1	225	1954458902	0%	67	0.000	86.553	0.0%
300	0	0	1954458902	0%	0	0.000	86.553	0.0%
301	0	0	1954458902	0%	0	0.000	86.553	0.0%
302	0	0	1954458902	0%	0	0.000	86.553	0.0%
303	0	0	1954458902	0%	0	0.000	86.553	0.0%
304	0	0	1954458902	0%	0	0.000	86.553	0.0%
305	0	0	1954458902	0%	0	0.000	86.553	0.0%
306	0	0	1954458902	0%	0	0.000	86.553	0.0%
307	2	450	1954459352	0%	138	0.000	86.553	0.0%
308	2	450	1954459802	0%	139	0.000	86.553	0.0%
309	3	675	1954460477	0%	209	0.000	86.553	0.0%
310	1	225	1954460702	0%	70	0.000	86.553	0.0%
311	0	0	1954460702	0%	0	0.000	86.553	0.0%
312	0	0	1954460702	0%	0	0.000	86.553	0.0%
313	0	0	1954460702	0%	0	0.000	86.553	0.0%
314	0	0	1954460702	0%	0	0.000	86.553	0.0%
315	0	0	1954460702	0%	0	0.000	86.553	0.0%
316	0	0	1954460702	0%	0	0.000	86.553	0.0%
317	0	0	1954460702	0%	0	0.000	86.553	0.0%
318	0	0	1954460702	0%	0	0.000	86.553	0.0%
319	0	0	1954460702	0%	0	0.000	86.553	0.0%
320	0	0	1954460702	0%	0	0.000	86.553	0.0%
321	0	0	1954460702	0%	0	0.000	86.553	0.0%
322	0	0	1954460702	0%	0	0.000	86.553	0.0%
323	0	0	1954460702	0%	0	0.000	86.553	0.0%

Table A.1
Haldimand Clay Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
324	0	0	1954460702	0%	0	0.000	86.553	0.0%
325	0	0	1954460702	0%	0	0.000	86.553	0.0%
326	1	225	1954460927	0%	73	0.000	86.554	0.0%
327	0	0	1954460927	0%	0	0.000	86.554	0.0%
328	0	0	1954460927	0%	0	0.000	86.554	0.0%
329	0	0	1954460927	0%	0	0.000	86.554	0.0%
330	0	0	1954460927	0%	0	0.000	86.554	0.0%
331	0	0	1954460927	0%	0	0.000	86.554	0.0%
332	0	0	1954460927	0%	0	0.000	86.554	0.0%
333	1	225	1954461152	0%	75	0.000	86.554	0.0%

Table A.2
Iroquois Shoreline % Exceedence Graph

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
1	0	0	0	100%	0	0.000	0.000	100.0%
2	0	0	0	100%	0	0.000	0.000	100.0%
3	0	0	0	100%	0	0.000	0.000	100.0%
4	1432	322200	322200	100%	1289	0.001	0.001	100.0%
5	9597	2159325	2481525	99%	10797	0.011	0.012	99.9%
6	48458	10903050	13384575	96%	65418	0.065	0.078	99.5%
7	67174	15114151	28498726	91%	105799	0.106	0.183	98.8%
8	36933	8309925	36808651	89%	66479	0.066	0.250	98.4%
9	20439	4598775	41407426	87%	41389	0.041	0.291	98.1%
10	16601	3735225	45142651	86%	37352	0.037	0.329	97.8%
11	13423	3020175	48162825	85%	33222	0.033	0.362	97.6%
12	8717	1961325	50124151	85%	23536	0.024	0.385	97.5%
13	7371	1658475	51782625	84%	21560	0.022	0.407	97.3%
14	6604	1485900	53268526	84%	20803	0.021	0.428	97.2%
15	7181	1615725	54884251	83%	24236	0.024	0.452	97.0%
16	7273	1636425	56520675	83%	26183	0.026	0.478	96.8%
17	9826	2210850	58731525	82%	37584	0.038	0.516	96.6%
18	7636	1718100	60449625	82%	30926	0.031	0.547	96.4%
19	6219	1399275	61848901	81%	26586	0.027	0.573	96.2%
20	5695	1281375	63130276	81%	25628	0.026	0.599	96.1%
21	8404	1890900	65021175	80%	39709	0.040	0.638	95.8%
22	6361	1431225	66452400	80%	31487	0.031	0.670	95.6%
23	7044	1584900	68037301	79%	36453	0.036	0.706	95.3%
24	7932	1784700	69822001	79%	42833	0.043	0.749	95.1%
25	8751	1968975	71790976	78%	49224	0.049	0.798	94.7%
26	10145	2282625	74073601	77%	59348	0.059	0.858	94.3%
27	11557	2600325	76673926	77%	70209	0.070	0.928	93.9%
28	12017	2703825	79377751	76%	75707	0.076	1.004	93.4%
29	12593	2833425	82211176	75%	82169	0.082	1.086	92.8%
30	12788	2877300	85088476	74%	86319	0.086	1.172	92.3%
31	14491	3260475	88348951	73%	101075	0.101	1.273	91.6%
32	14787	3327075	91676026	72%	106466	0.106	1.380	90.9%
33	15791	3552975	95229001	71%	117248	0.117	1.497	90.1%
34	16107	3624075	98853076	70%	123219	0.123	1.620	89.3%
35	17321	3897225	102750301	69%	136403	0.136	1.757	88.4%
36	17420	3919500	106669801	67%	141102	0.141	1.898	87.5%
37	17438	3923550	110593351	66%	145171	0.145	2.043	86.5%
38	18154	4084650	114678001	65%	155217	0.155	2.198	85.5%
39	18662	4198950	118876951	64%	163759	0.164	2.362	84.4%
40	19067	4290075	123167026	62%	171603	0.172	2.534	83.3%
41	19959	4490775	127657801	61%	184122	0.184	2.718	82.1%
42	20664	4649400	132307201	60%	195275	0.195	2.913	80.8%
43	21654	4872150	137179351	58%	209502	0.210	3.122	79.4%
44	22893	5150925	142330276	57%	226641	0.227	3.349	77.9%
45	25633	5767425	148097701	55%	259534	0.260	3.609	76.2%
46	25989	5847525	153945226	53%	268986	0.269	3.878	74.4%
47	28936	6510600	160455826	51%	305998	0.306	4.184	72.4%
48	27154	6109650	166565476	49%	293263	0.293	4.477	70.5%
49	26814	6033150	172598626	47%	295624	0.296	4.772	68.5%
50	25970	5843250	178441876	46%	292163	0.292	5.065	66.6%
51	26131	5879475	184321351	44%	299853	0.300	5.364	64.6%
52	27675	6226875	190548226	42%	323798	0.324	5.688	62.5%

Table A.2
Iroquois Shoreline % Exceedence Graph

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
53	26507	5964075	196512301	40%	316096	0.316	6.004	60.4%
54	25249	5681025	202193326	38%	306775	0.307	6.311	58.4%
55	24864	5594400	207787726	37%	307692	0.308	6.619	56.4%
56	26298	5917050	213704776	35%	331355	0.331	6.950	54.2%
57	28133	6329925	220034701	33%	360806	0.361	7.311	51.8%
58	27663	6224175	226258876	31%	361002	0.361	7.672	49.4%
59	27089	6095025	232353901	29%	359606	0.360	8.032	47.1%
60	25900	5827500	238181401	27%	349650	0.350	8.381	44.7%
61	24171	5438475	243619876	26%	331747	0.332	8.713	42.6%
62	22667	5100075	248719951	24%	316205	0.316	9.029	40.5%
63	22340	5026500	253746451	23%	316670	0.317	9.346	38.4%
64	21492	4835700	258582151	21%	309485	0.309	9.655	36.3%
65	19677	4427325	263009476	20%	287776	0.288	9.943	34.5%
66	17469	3930525	266940001	19%	259415	0.259	10.203	32.7%
67	15686	3529350	270469351	18%	236466	0.236	10.439	31.2%
68	14517	3266325	273735676	17%	222110	0.222	10.661	29.7%
69	13792	3103200	276838876	16%	214121	0.214	10.875	28.3%
70	12646	2845350	279684226	15%	199175	0.199	11.074	27.0%
71	11970	2693250	282377476	14%	191221	0.191	11.266	25.7%
72	11810	2657250	285034726	13%	191322	0.191	11.457	24.5%
73	11595	2608875	287643601	12%	190448	0.190	11.647	23.2%
74	11663	2624175	290267776	12%	194189	0.194	11.842	21.9%
75	11564	2601900	292869676	11%	195143	0.195	12.037	20.7%
76	10252	2306700	295176376	10%	175309	0.175	12.212	19.5%
77	9350	2103750	297280126	9%	161989	0.162	12.374	18.4%
78	8878	1997550	299277676	9%	155809	0.156	12.530	17.4%
79	8589	1932525	301210201	8%	152669	0.153	12.683	16.4%
80	8381	1885725	303095926	8%	150858	0.151	12.833	15.4%
81	8618	1939050	305034976	7%	157063	0.157	12.990	14.4%
82	8032	1807200	306842176	6%	148190	0.148	13.139	13.4%
83	7083	1593675	308435851	6%	132275	0.132	13.271	12.5%
84	6567	1477575	309913426	6%	124116	0.124	13.395	11.7%
85	6059	1363275	311276701	5%	115878	0.116	13.511	10.9%
86	5267	1185075	312461776	5%	101916	0.102	13.613	10.3%
87	4604	1035900	313497676	4%	90123	0.090	13.703	9.7%
88	4212	947700	314445376	4%	83398	0.083	13.786	9.1%
89	4227	951075	315396451	4%	84646	0.085	13.871	8.6%
90	3872	871200	316267651	4%	78408	0.078	13.949	8.0%
91	3674	826650	317094301	3%	75225	0.075	14.025	7.5%
92	3510	789750	317884051	3%	72657	0.073	14.097	7.1%
93	3041	684225	318568276	3%	63633	0.064	14.161	6.6%
94	2836	638100	319206376	3%	59981	0.060	14.221	6.3%
95	2751	618975	319825351	3%	58803	0.059	14.280	5.9%
96	2534	570150	320395501	2%	54734	0.055	14.334	5.5%
97	2278	512550	320908051	2%	49717	0.050	14.384	5.2%
98	2119	476775	321384826	2%	46724	0.047	14.431	4.9%
99	2084	468900	321853726	2%	46421	0.046	14.477	4.6%
100	1933	434925	322288651	2%	43493	0.043	14.521	4.3%
101	2082	468450	322757101	2%	47313	0.047	14.568	4.0%
102	1992	448200	323205301	1%	45716	0.046	14.614	3.7%
103	1565	352125	323557426	1%	36269	0.036	14.650	3.4%
104	1399	314775	323872201	1%	32737	0.033	14.683	3.2%
105	1310	294750	324166951	1%	30949	0.031	14.714	3.0%

Table A.2
Iroquois Shoreline % Exceedence Graph

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
106	1086	244350	324411301	1%	25901	0.026	14.740	2.8%
107	1004	225900	324637201	1%	24171	0.024	14.764	2.7%
108	1113	250425	324887626	1%	27046	0.027	14.791	2.5%
109	1007	226575	325114201	1%	24697	0.025	14.816	2.3%
110	908	204300	325318501	1%	22473	0.022	14.838	2.2%
111	697	156825	325475326	1%	17408	0.017	14.855	2.1%
112	663	149175	325624501	1%	16708	0.017	14.872	2.0%
113	529	119025	325743526	1%	13450	0.013	14.886	1.9%
114	529	119025	325862551	1%	13569	0.014	14.899	1.8%
115	824	185400	326047951	1%	21321	0.021	14.921	1.6%
116	1017	228825	326276776	1%	26544	0.027	14.947	1.5%
117	1794	403650	326680426	0%	47227	0.047	14.994	1.2%
118	1107	249075	326929501	0%	29391	0.029	15.024	1.0%
119	570	128250	327057751	0%	15262	0.015	15.039	0.9%
120	280	63000	327120751	0%	7560	0.008	15.046	0.8%
121	189	42525	327163276	0%	5146	0.005	15.052	0.8%
122	298	67050	327230326	0%	8180	0.008	15.060	0.7%
123	269	60525	327290851	0%	7445	0.007	15.067	0.7%
124	443	99675	327390526	0%	12360	0.012	15.080	0.6%
125	358	80550	327471076	0%	10069	0.010	15.090	0.5%
126	228	51300	327522376	0%	6464	0.006	15.096	0.5%
127	166	37350	327559726	0%	4743	0.005	15.101	0.5%
128	108	24300	327584026	0%	3110	0.003	15.104	0.4%
129	106	23850	327607876	0%	3077	0.003	15.107	0.4%
130	84	18900	327626776	0%	2457	0.002	15.110	0.4%
131	63	14175	327640951	0%	1857	0.002	15.111	0.4%
132	69	15525	327656476	0%	2049	0.002	15.113	0.4%
133	67	15075	327671551	0%	2005	0.002	15.115	0.4%
134	74	16650	327688201	0%	2231	0.002	15.118	0.3%
135	415	93375	327781576	0%	12606	0.013	15.130	0.3%
136	622	139950	327921526	0%	19033	0.019	15.149	0.1%
137	215	48375	327969901	0%	6627	0.007	15.156	0.1%
138	129	29025	327998926	0%	4005	0.004	15.160	0.1%
139	69	15525	328014451	0%	2158	0.002	15.162	0.0%
140	47	10575	328025026	0%	1481	0.001	15.164	0.0%
141	30	6750	328031776	0%	952	0.001	15.165	0.0%
142	28	6300	328038076	0%	895	0.001	15.165	0.0%
143	30	6750	328044826	0%	965	0.001	15.166	0.0%
144	18	4050	328048876	0%	583	0.001	15.167	0.0%
145	8	1800	328050676	0%	261	0.000	15.167	0.0%
146	3	675	328051351	0%	99	0.000	15.167	0.0%
147	8	1800	328053151	0%	265	0.000	15.168	0.0%
148	9	2025	328055176	0%	300	0.000	15.168	0.0%
149	3	675	328055851	0%	101	0.000	15.168	0.0%
150	5	1125	328056976	0%	169	0.000	15.168	0.0%
151	0	0	328056976	0%	0	0.000	15.168	0.0%
152	7	1575	328058551	0%	239	0.000	15.168	0.0%
153	5	1125	328059676	0%	172	0.000	15.169	0.0%
154	6	1350	328061026	0%	208	0.000	15.169	0.0%
155	4	900	328061926	0%	140	0.000	15.169	0.0%
156	2	450	328062376	0%	70	0.000	15.169	0.0%
157	2	450	328062826	0%	71	0.000	15.169	0.0%
158	0	0	328062826	0%	0	0.000	15.169	0.0%

Table A.2
Iroquois Shoreline % Exceedence Graph

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
159	0	0	328062826	0%	0	0.000	15.169	0.0%
160	2	450	328063276	0%	72	0.000	15.169	0.0%
161	0	0	328063276	0%	0	0.000	15.169	0.0%
162	0	0	328063276	0%	0	0.000	15.169	0.0%
163	1	225	328063501	0%	37	0.000	15.169	0.0%
164	2	450	328063951	0%	74	0.000	15.169	0.0%
165	0	0	328063951	0%	0	0.000	15.169	0.0%
166	1	225	328064176	0%	37	0.000	15.169	0.0%
167	0	0	328064176	0%	0	0.000	15.169	0.0%
168	1	225	328064401	0%	38	0.000	15.169	0.0%
169	0	0	328064401	0%	0	0.000	15.169	0.0%
170	0	0	328064401	0%	0	0.000	15.169	0.0%
171	0	0	328064401	0%	0	0.000	15.169	0.0%
172	1	225	328064626	0%	39	0.000	15.169	0.0%

Table A.3
Fonthill Kame-Delta Complex

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
1	0	0	0	100%	0	0.000	0.000	100%
2	0	0	0	100%	0	0.000	0.000	100%
3	0	0	0	100%	0	0.000	0.000	100%
4	0	0	0	100%	0	0.000	0.000	100%
5	0	0	0	100%	0	0.000	0.000	100%
6	0	0	0	100%	0	0.000	0.000	100%
7	0	0	0	100%	0	0.000	0.000	100%
8	0	0	0	100%	0	0.000	0.000	100%
9	36	8100	8100	100%	72.90000153	0.000	0.000	100%
10	37	8325	16425	100%	83.25	0.000	0.000	100%
11	12	2700	19125	100%	29.69999886	0.000	0.000	100%
12	9	2025	21150	100%	24.30000114	0.000	0.000	100%
13	2	450	21600	100%	5.849999905	0.000	0.000	100%
14	2	450	22050	100%	6.300000191	0.000	0.000	100%
15	2	450	22500	100%	6.75	0.000	0.000	100%
16	2	450	22950	100%	7.199999809	0.000	0.000	100%
17	21	4725	27675	100%	80.32500458	0.000	0.000	100%
18	439	98775	126450	100%	1777.950073	0.002	0.002	100%
19	1212	272700	399150	99%	5181.300293	0.005	0.007	100%
20	1399	314775	713925	98%	6295.5	0.006	0.014	100%
21	1339	301275	1015200	97%	6326.774902	0.006	0.020	100%
22	1619	364275	1379475	96%	8014.049805	0.008	0.028	99%
23	2212	497700	1877175	95%	11447.10059	0.011	0.039	99%
24	1974	444150	2321325	93%	10659.60059	0.011	0.050	99%
25	1610	362250	2683575	92%	9056.25	0.009	0.059	99%
26	1299	292275	2975850	91%	7599.149902	0.008	0.067	98%
27	961	216225	3192075	91%	5838.074707	0.006	0.073	98%
28	827	186075	3378150	90%	5210.100098	0.005	0.078	98%
29	841	189225	3567375	90%	5487.524902	0.005	0.083	98%
30	759	170775	3738150	89%	5123.25	0.005	0.088	98%
31	733	164925	3903075	89%	5112.674805	0.005	0.093	98%
32	644	144900	4047975	88%	4636.799805	0.005	0.098	98%
33	521	117225	4165200	88%	3868.425049	0.004	0.102	98%
34	505	113625	4278825	88%	3863.25	0.004	0.106	98%
35	517	116325	4395150	87%	4071.375	0.004	0.110	98%
36	491	110475	4505625	87%	3977.100098	0.004	0.114	97%
37	434	97650	4603275	87%	3613.049805	0.004	0.117	97%
38	481	108225	4711500	86%	4112.550293	0.004	0.122	97%
39	514	115650	4827150	86%	4510.349609	0.005	0.126	97%
40	444	99900	4927050	86%	3996	0.004	0.130	97%
41	449	101025	5028075	85%	4142.025391	0.004	0.134	97%
42	490	110250	5138325	85%	4630.5	0.005	0.139	97%
43	647	145575	5283900	85%	6259.725098	0.006	0.145	97%
44	689	155025	5438925	84%	6821.099609	0.007	0.152	97%
45	665	149625	5588550	84%	6733.125	0.007	0.159	96%
46	693	155925	5744475	83%	7172.550293	0.007	0.166	96%
47	817	183825	5928300	83%	8639.774414	0.009	0.174	96%
48	983	221175	6149475	82%	10616.40039	0.011	0.185	96%
49	870	195750	6345225	82%	9591.75	0.010	0.195	96%
50	723	162675	6507900	81%	8133.75	0.008	0.203	95%
51	653	146925	6654825	81%	7493.175293	0.007	0.210	95%
52	677	152325	6807150	80%	7920.899902	0.008	0.218	95%

Table A.3
Fonthill Kame-Delta Complex

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
53	767	172575	6979725	80%	9146.475586	0.009	0.227	95%
54	863	194175	7173900	79%	10485.44922	0.010	0.238	95%
55	965	217125	7391025	78%	11941.875	0.012	0.250	94%
56	959	215775	7606800	78%	12083.40039	0.012	0.262	94%
57	1125	253125	7859925	77%	14428.125	0.014	0.276	94%
58	1170	263250	8123175	76%	15268.5	0.015	0.292	93%
59	1235	277875	8401050	76%	16394.625	0.016	0.308	93%
60	1064	239400	8640450	75%	14364	0.014	0.322	93%
61	1096	246600	8887050	74%	15042.60059	0.015	0.337	92%
62	1095	246375	9133425	73%	15275.25	0.015	0.353	92%
63	1108	249300	9382725	73%	15705.90039	0.016	0.368	92%
64	1081	243225	9625950	72%	15566.39941	0.016	0.384	91%
65	1148	258300	9884250	71%	16789.5	0.017	0.401	91%
66	1092	245700	10129950	71%	16216.2002	0.016	0.417	91%
67	1055	237375	10367325	70%	15904.125	0.016	0.433	90%
68	1005	226125	10593450	69%	15376.5	0.015	0.448	90%
69	967	217575	10811025	69%	15012.6748	0.015	0.463	90%
70	865	194625	11005650	68%	13623.75	0.014	0.477	89%
71	1001	225225	11230875	67%	15990.97559	0.016	0.493	89%
72	1159	260775	11491650	67%	18775.80078	0.019	0.512	88%
73	1165	262125	11753775	66%	19135.125	0.019	0.531	88%
74	1240	279000	12032775	65%	20646	0.021	0.551	88%
75	1240	279000	12311775	64%	20925	0.021	0.572	87%
76	1280	288000	12599775	63%	21888	0.022	0.594	87%
77	1314	295650	12895425	62%	22765.05078	0.023	0.617	86%
78	1331	299475	13194900	62%	23359.04883	0.023	0.640	86%
79	1595	358875	13553775	61%	28351.125	0.028	0.669	85%
80	2121	477225	14031000	59%	38178	0.038	0.707	84%
81	1786	401850	14432850	58%	32549.85156	0.033	0.739	83%
82	1469	330525	14763375	57%	27103.05078	0.027	0.767	83%
83	1254	282150	15045525	56%	23418.44922	0.023	0.790	82%
84	989	222525	15268050	56%	18692.09961	0.019	0.809	82%
85	823	185175	15453225	55%	15739.875	0.016	0.824	81%
86	975	219375	15672600	54%	18866.25	0.019	0.843	81%
87	1022	229950	15902550	54%	20005.65039	0.020	0.863	81%
88	974	219150	16121700	53%	19285.19922	0.019	0.883	80%
89	880	198000	16319700	52%	17622	0.018	0.900	80%
90	849	191025	16510725	52%	17192.25	0.017	0.917	79%
91	765	172125	16682850	51%	15663.375	0.016	0.933	79%
92	595	133875	16816725	51%	12316.5	0.012	0.945	79%
93	602	135450	16952175	51%	12596.84961	0.013	0.958	78%
94	687	154575	17106750	50%	14530.0498	0.015	0.972	78%
95	743	167175	17273925	50%	15881.625	0.016	0.988	78%
96	734	165150	17439075	49%	15854.40039	0.016	1.004	77%
97	929	209025	17648100	49%	20275.42578	0.020	1.024	77%
98	965	217125	17865225	48%	21278.25	0.021	1.046	76%
99	912	205200	18070425	47%	20314.79883	0.020	1.066	76%
100	742	166950	18237375	47%	16695	0.017	1.083	76%
101	795	178875	18416250	46%	18066.375	0.018	1.101	75%
102	949	213525	18629775	46%	21779.55078	0.022	1.123	75%
103	899	202275	18832050	45%	20834.32422	0.021	1.143	74%
104	940	211500	19043550	45%	21996	0.022	1.165	74%
105	886	199350	19242900	44%	20931.75	0.021	1.186	73%

Table A.3
Fonthill Kame-Delta Complex

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
106	780	175500	19418400	43%	18603	0.019	1.205	73%
107	693	155925	19574325	43%	16683.97461	0.017	1.222	72%
108	581	130725	19705050	43%	14118.2998	0.014	1.236	72%
109	534	120150	19825200	42%	13096.34961	0.013	1.249	72%
110	646	145350	19970550	42%	15988.5	0.016	1.265	71%
111	584	131400	20101950	41%	14585.40039	0.015	1.279	71%
112	501	112725	20214675	41%	12625.2002	0.013	1.292	71%
113	403	90675	20305350	41%	10246.27441	0.010	1.302	71%
114	352	79200	20384550	41%	9028.799805	0.009	1.311	70%
115	336	75600	20460150	40%	8694	0.009	1.320	70%
116	258	58050	20518200	40%	6733.800293	0.007	1.327	70%
117	245	55125	20573325	40%	6449.625	0.006	1.333	70%
118	177	39825	20613150	40%	4699.350098	0.005	1.338	70%
119	171	38475	20651625	40%	4578.524902	0.005	1.343	70%
120	129	29025	20680650	40%	3483	0.003	1.346	70%
121	116	26100	20706750	40%	3158.100098	0.003	1.349	70%
122	111	24975	20731725	40%	3046.950195	0.003	1.352	70%
123	158	35550	20767275	40%	4372.649902	0.004	1.357	69%
124	117	26325	20793600	39%	3264.300049	0.003	1.360	69%
125	105	23625	20817225	39%	2953.125	0.003	1.363	69%
126	121	27225	20844450	39%	3430.350098	0.003	1.366	69%
127	119	26775	20871225	39%	3400.425049	0.003	1.370	69%
128	122	27450	20898675	39%	3513.599854	0.004	1.373	69%
129	145	32625	20931300	39%	4208.625	0.004	1.377	69%
130	133	29925	20961225	39%	3890.25	0.004	1.381	69%
131	117	26325	20987550	39%	3448.574951	0.003	1.385	69%
132	108	24300	21011850	39%	3207.600098	0.003	1.388	69%
133	125	28125	21039975	39%	3740.625	0.004	1.392	69%
134	113	25425	21065400	39%	3406.949951	0.003	1.395	69%
135	116	26100	21091500	39%	3523.5	0.004	1.399	68%
136	105	23625	21115125	39%	3213	0.003	1.402	68%
137	103	23175	21138300	38%	3174.975098	0.003	1.405	68%
138	115	25875	21164175	38%	3570.75	0.004	1.409	68%
139	142	31950	21196125	38%	4441.049805	0.004	1.413	68%
140	148	33300	21229425	38%	4662	0.005	1.418	68%
141	187	42075	21271500	38%	5932.575195	0.006	1.424	68%
142	196	44100	21315600	38%	6262.200195	0.006	1.430	68%
143	164	36900	21352500	38%	5276.699707	0.005	1.435	68%
144	189	42525	21395025	38%	6123.600098	0.006	1.441	68%
145	191	42975	21438000	38%	6231.375	0.006	1.447	67%
146	193	43425	21481425	37%	6340.049805	0.006	1.454	67%
147	206	46350	21527775	37%	6813.450195	0.007	1.461	67%
148	186	41850	21569625	37%	6193.799805	0.006	1.467	67%
149	168	37800	21607425	37%	5632.200195	0.006	1.472	67%
150	189	42525	21649950	37%	6378.75	0.006	1.479	67%
151	185	41625	21691575	37%	6285.374512	0.006	1.485	67%
152	166	37350	21728925	37%	5677.200195	0.006	1.491	66%
153	161	36225	21765150	37%	5542.424805	0.006	1.496	66%
154	164	36900	21802050	37%	5682.600098	0.006	1.502	66%
155	164	36900	21838950	36%	5719.5	0.006	1.508	66%
156	182	40950	21879900	36%	6388.199707	0.006	1.514	66%
157	209	47025	21926925	36%	7382.925293	0.007	1.521	66%
158	227	51075	21978000	36%	8069.849609	0.008	1.530	66%

Table A.3
Fonthill Kame-Delta Complex

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
159	251	56475	22034475	36%	8979.525391	0.009	1.539	65%
160	267	60075	22094550	36%	9612	0.010	1.548	65%
161	270	60750	22155300	35%	9780.75	0.010	1.558	65%
162	244	54900	22210200	35%	8893.799805	0.009	1.567	65%
163	274	61650	22271850	35%	10048.9502	0.010	1.577	64%
164	270	60750	22332600	35%	9963	0.010	1.587	64%
165	274	61650	22394250	35%	10172.25	0.010	1.597	64%
166	272	61200	22455450	35%	10159.19922	0.010	1.607	64%
167	292	65700	22521150	34%	10971.90039	0.011	1.618	64%
168	290	65250	22586400	34%	10962	0.011	1.629	63%
169	276	62100	22648500	34%	10494.90039	0.010	1.640	63%
170	291	65475	22713975	34%	11130.75	0.011	1.651	63%
171	285	64125	22778100	34%	10965.375	0.011	1.662	63%
172	330	74250	22852350	33%	12771	0.013	1.674	62%
173	341	76725	22929075	33%	13273.4248	0.013	1.688	62%
174	380	85500	23014575	33%	14877.00098	0.015	1.703	62%
175	382	85950	23100525	33%	15041.25	0.015	1.718	61%
176	382	85950	23186475	32%	15127.19922	0.015	1.733	61%
177	397	89325	23275800	32%	15810.52539	0.016	1.749	61%
178	432	97200	23373000	32%	17301.59961	0.017	1.766	60%
179	420	94500	23467500	32%	16915.5	0.017	1.783	60%
180	388	87300	23554800	31%	15714	0.016	1.799	59%
181	390	87750	23642550	31%	15882.74902	0.016	1.814	59%
182	377	84825	23727375	31%	15438.15039	0.015	1.830	59%
183	369	83025	23810400	31%	15193.5752	0.015	1.845	58%
184	405	91125	23901525	30%	16767	0.017	1.862	58%
185	395	88875	23990400	30%	16441.875	0.016	1.878	58%
186	412	92700	24083100	30%	17242.19922	0.017	1.895	57%
187	371	83475	24166575	30%	15609.8252	0.016	1.911	57%
188	390	87750	24254325	29%	16497	0.016	1.928	57%
189	389	87525	24341850	29%	16542.22656	0.017	1.944	56%
190	371	83475	24425325	29%	15860.25	0.016	1.960	56%
191	374	84150	24509475	29%	16072.64941	0.016	1.976	55%
192	302	67950	24577425	28%	13046.40039	0.013	1.989	55%
193	314	70650	24648075	28%	13635.4502	0.014	2.003	55%
194	272	61200	24709275	28%	11872.80078	0.012	2.015	55%
195	278	62550	24771825	28%	12197.25	0.012	2.027	54%
196	313	70425	24842250	28%	13803.2998	0.014	2.041	54%
197	301	67725	24909975	27%	13341.8252	0.013	2.054	54%
198	276	62100	24972075	27%	12295.7998	0.012	2.066	53%
199	302	67950	25040025	27%	13522.05078	0.014	2.080	53%
200	320	72000	25112025	27%	14400	0.014	2.094	53%
201	313	70425	25182450	27%	14155.4248	0.014	2.108	52%
202	344	77400	25259850	26%	15634.7998	0.016	2.124	52%
203	348	78300	25338150	26%	15894.89941	0.016	2.140	52%
204	352	79200	25417350	26%	16156.80078	0.016	2.156	51%
205	357	80325	25497675	26%	16466.625	0.016	2.172	51%
206	317	71325	25569000	26%	14692.94922	0.015	2.187	51%
207	363	81675	25650675	25%	16906.72461	0.017	2.204	50%
208	336	75600	25726275	25%	15724.7998	0.016	2.220	50%
209	329	74025	25800300	25%	15471.22559	0.015	2.235	50%
210	322	72450	25872750	25%	15214.5	0.015	2.250	49%
211	322	72450	25945200	24%	15286.94922	0.015	2.266	49%

Table A.3
Fonthill Kame-Delta Complex

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
212	354	79650	26024850	24%	16885.80078	0.017	2.283	49%
213	334	75150	26100000	24%	16006.9502	0.016	2.299	48%
214	335	75375	26175375	24%	16130.25098	0.016	2.315	48%
215	329	74025	26249400	24%	15915.375	0.016	2.331	47%
216	342	76950	26326350	23%	16621.19922	0.017	2.347	47%
217	365	82125	26408475	23%	17821.125	0.018	2.365	47%
218	353	79425	26487900	23%	17314.65039	0.017	2.382	46%
219	361	81225	26569125	23%	17788.27539	0.018	2.400	46%
220	375	84375	26653500	22%	18562.5	0.019	2.419	45%
221	344	77400	26730900	22%	17105.40039	0.017	2.436	45%
222	342	76950	26807850	22%	17082.90039	0.017	2.453	45%
223	291	65475	26873325	22%	14600.9248	0.015	2.468	44%
224	289	65025	26938350	22%	14565.60059	0.015	2.482	44%
225	251	56475	26994825	21%	12706.875	0.013	2.495	44%
226	220	49500	27044325	21%	11187	0.011	2.506	44%
227	238	53550	27097875	21%	12155.85059	0.012	2.518	43%
228	210	47250	27145125	21%	10773	0.011	2.529	43%
229	213	47925	27193050	21%	10974.8252	0.011	2.540	43%
230	267	60075	27253125	21%	13817.25	0.014	2.554	42%
231	362	81450	27334575	20%	18814.94922	0.019	2.573	42%
232	408	91800	27426375	20%	21297.59961	0.021	2.594	42%
233	490	110250	27536625	20%	25688.25	0.026	2.620	41%
234	600	135000	27671625	19%	31590	0.032	2.651	40%
235	657	147825	27819450	19%	34738.875	0.035	2.686	39%
236	716	161100	27980550	19%	38019.59766	0.038	2.724	39%
237	719	161775	28142325	18%	38340.67578	0.038	2.762	38%
238	838	188550	28330875	18%	44874.89844	0.045	2.807	37%
239	705	158625	28489500	17%	37911.375	0.038	2.845	36%
240	621	139725	28629225	17%	33534	0.034	2.879	35%
241	628	141300	28770525	16%	34053.30078	0.034	2.913	34%
242	537	120825	28891350	16%	29239.65039	0.029	2.942	34%
243	495	111375	29002725	16%	27064.125	0.027	2.969	33%
244	433	97425	29100150	15%	23771.70117	0.024	2.993	33%
245	430	96750	29196900	15%	23703.75	0.024	3.016	32%
246	387	87075	29283975	15%	21420.44922	0.021	3.038	32%
247	486	109350	29393325	14%	27009.45117	0.027	3.065	31%
248	651	146475	29539800	14%	36325.80078	0.036	3.101	30%
249	744	167400	29707200	14%	41682.60156	0.042	3.143	29%
250	691	155475	29862675	13%	38868.75	0.039	3.182	28%
251	652	146700	30009375	13%	36821.69922	0.037	3.219	27%
252	591	132975	30142350	12%	33509.69922	0.034	3.252	27%
253	545	122625	30264975	12%	31024.125	0.031	3.283	26%
254	553	124425	30389400	12%	31603.95117	0.032	3.315	25%
255	549	123525	30512925	11%	31498.875	0.031	3.346	25%
256	538	121050	30633975	11%	30988.79883	0.031	3.377	24%
257	561	126225	30760200	10%	32439.82617	0.032	3.410	23%
258	506	113850	30874050	10%	29373.29883	0.029	3.439	22%
259	508	114300	30988350	10%	29603.70117	0.030	3.469	22%
260	392	88200	31076550	10%	22932	0.023	3.492	21%
261	344	77400	31153950	9%	20201.40039	0.020	3.512	21%
262	322	72450	31226400	9%	18981.90039	0.019	3.531	20%
263	286	64350	31290750	9%	16924.04883	0.017	3.548	20%
264	309	69525	31360275	9%	18354.59961	0.018	3.566	20%

Table A.3
Fonthill Kame-Delta Complex

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
265	257	57825	31418100	9%	15323.625	0.015	3.581	19%
266	289	65025	31483125	8%	17296.65039	0.017	3.599	19%
267	289	65025	31548150	8%	17361.67578	0.017	3.616	18%
268	281	63225	31611375	8%	16944.29883	0.017	3.633	18%
269	271	60975	31672350	8%	16402.27539	0.016	3.649	18%
270	277	62325	31734675	8%	16827.75	0.017	3.666	17%
271	258	58050	31792725	7%	15731.5498	0.016	3.682	17%
272	288	64800	31857525	7%	17625.59961	0.018	3.700	17%
273	229	51525	31909050	7%	14066.3252	0.014	3.714	16%
274	216	48600	31957650	7%	13316.40039	0.013	3.727	16%
275	198	44550	32002200	7%	12251.25	0.012	3.739	16%
276	222	49950	32052150	7%	13786.19922	0.014	3.753	15%
277	212	47700	32099850	7%	13212.90039	0.013	3.766	15%
278	266	59850	32159700	6%	16638.29883	0.017	3.783	15%
279	272	61200	32220900	6%	17074.80078	0.017	3.800	14%
280	232	52200	32273100	6%	14616	0.015	3.814	14%
281	253	56925	32330025	6%	15995.9248	0.016	3.830	14%
282	234	52650	32382675	6%	14847.2998	0.015	3.845	13%
283	230	51750	32434425	6%	14645.25	0.015	3.860	13%
284	237	53325	32487750	5%	15144.30078	0.015	3.875	13%
285	230	51750	32539500	5%	14748.75	0.015	3.890	12%
286	236	53100	32592600	5%	15186.59961	0.015	3.905	12%
287	284	63900	32656500	5%	18339.29883	0.018	3.923	12%
288	308	69300	32725800	5%	19958.40039	0.020	3.943	11%
289	324	72900	32798700	5%	21068.09961	0.021	3.964	11%
290	326	73350	32872050	4%	21271.5	0.021	3.986	10%
291	322	72450	32944500	4%	21082.94922	0.021	4.007	10%
292	390	87750	33032250	4%	25622.99805	0.026	4.032	9%
293	367	82575	33114825	4%	24194.47656	0.024	4.057	9%
294	353	79425	33194250	3%	23350.95117	0.023	4.080	8%
295	338	76050	33270300	3%	22434.75	0.022	4.102	8%
296	302	67950	33338250	3%	20113.19922	0.020	4.122	7%
297	292	65700	33403950	3%	19512.89844	0.020	4.142	7%
298	291	65475	33469425	3%	19511.55078	0.020	4.162	6%
299	261	58725	33528150	2%	17558.77539	0.018	4.179	6%
300	252	56700	33584850	2%	17010	0.017	4.196	5%
301	223	50175	33635025	2%	15102.6748	0.015	4.211	5%
302	212	47700	33682725	2%	14405.39941	0.014	4.226	5%
303	225	50625	33733350	2%	15339.37598	0.015	4.241	4%
304	198	44550	33777900	2%	13543.2002	0.014	4.254	4%
305	183	41175	33819075	2%	12558.375	0.013	4.267	4%
306	162	36450	33855525	1%	11153.7002	0.011	4.278	4%
307	163	36675	33892200	1%	11259.22461	0.011	4.289	3%
308	158	35550	33927750	1%	10949.40039	0.011	4.300	3%
309	129	29025	33956775	1%	8968.725586	0.009	4.309	3%
310	101	22725	33979500	1%	7044.75	0.007	4.316	3%
311	111	24975	34004475	1%	7767.224609	0.008	4.324	3%
312	124	27900	34032375	1%	8704.799805	0.009	4.333	2%
313	118	26550	34058925	1%	8310.150391	0.008	4.341	2%
314	87	19575	34078500	1%	6146.550293	0.006	4.347	2%
315	76	17100	34095600	1%	5386.5	0.005	4.353	2%
316	79	17775	34113375	1%	5616.899902	0.006	4.358	2%
317	61	13725	34127100	1%	4350.824707	0.004	4.363	2%

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Fonthill Kame-Delta Complex

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
318	58	13050	34140150	1%	4149.900391	0.004	4.367	2%
319	65	14625	34154775	1%	4665.375	0.005	4.372	1%
320	47	10575	34165350	1%	3384	0.003	4.375	1%
321	50	11250	34176600	0%	3611.25	0.004	4.379	1%
322	58	13050	34189650	0%	4202.099609	0.004	4.383	1%
323	52	11700	34201350	0%	3779.100098	0.004	4.386	1%
324	37	8325	34209675	0%	2697.300049	0.003	4.389	1%
325	44	9900	34219575	0%	3217.5	0.003	4.392	1%
326	47	10575	34230150	0%	3447.449951	0.003	4.396	1%
327	50	11250	34241400	0%	3678.749756	0.004	4.400	1%
328	27	6075	34247475	0%	1992.600098	0.002	4.402	1%
329	33	7425	34254900	0%	2442.824951	0.002	4.404	1%
330	33	7425	34262325	0%	2450.25	0.002	4.406	1%
331	20	4500	34266825	0%	1489.5	0.001	4.408	1%
332	25	5625	34272450	0%	1867.499878	0.002	4.410	1%
333	21	4725	34277175	0%	1573.425049	0.002	4.411	1%
334	18	4050	34281225	0%	1352.700073	0.001	4.413	1%
335	17	3825	34285050	0%	1281.375	0.001	4.414	1%
336	19	4275	34289325	0%	1436.400024	0.001	4.415	0%
337	27	6075	34295400	0%	2047.274902	0.002	4.417	0%
338	11	2475	34297875	0%	836.5500488	0.001	4.418	0%
339	13	2925	34300800	0%	991.5750122	0.001	4.419	0%
340	14	3150	34303950	0%	1071	0.001	4.420	0%
341	12	2700	34306650	0%	920.6999512	0.001	4.421	0%
342	3	675	34307325	0%	230.8499908	0.000	4.422	0%
343	4	900	34308225	0%	308.7000122	0.000	4.422	0%
344	10	2250	34310475	0%	774	0.001	4.423	0%
345	4	900	34311375	0%	310.5	0.000	4.423	0%
346	7	1575	34312950	0%	544.9500122	0.001	4.423	0%
347	8	1800	34314750	0%	624.5999756	0.001	4.424	0%
348	9	2025	34316775	0%	704.7000122	0.001	4.425	0%
349	8	1800	34318575	0%	628.2000122	0.001	4.425	0%
350	6	1350	34319925	0%	472.5	0.000	4.426	0%
351	10	2250	34322175	0%	789.75	0.001	4.427	0%
352	3	675	34322850	0%	237.5999908	0.000	4.427	0%
353	3	675	34323525	0%	238.2750092	0.000	4.427	0%
354	0	0	34323525	0%	0	0.000	4.427	0%
355	3	675	34324200	0%	239.625	0.000	4.427	0%
356	2	450	34324650	0%	160.1999969	0.000	4.428	0%
357	1	225	34324875	0%	80.32499695	0.000	4.428	0%
358	3	675	34325550	0%	241.6500092	0.000	4.428	0%
359	0	0	34325550	0%	0	0.000	4.428	0%
360	4	900	34326450	0%	324	0.000	4.428	0%
361	3	675	34327125	0%	243.6749878	0.000	4.428	0%
362	1	225	34327350	0%	81.44999695	0.000	4.429	0%
363	0	0	34327350	0%	0	0.000	4.429	0%
364	4	900	34328250	0%	327.6000061	0.000	4.429	0%
365	0	0	34328250	0%	0	0.000	4.429	0%
366	3	675	34328925	0%	247.0499878	0.000	4.429	0%
367	0	0	34328925	0%	0	0.000	4.429	0%
368	1	225	34329150	0%	82.80000305	0.000	4.429	0%
369	1	225	34329375	0%	83.02500153	0.000	4.429	0%
370	2	450	34329825	0%	166.5	0.000	4.429	0%

Table A.3
Fonthill Kame-Delta Complex

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
371	0	0	34329825	0%	0	0.000	4.429	0%
372	0	0	34329825	0%	0	0.000	4.429	0%
373	2	450	34330275	0%	167.8500061	0.000	4.430	0%
374	3	675	34330950	0%	252.4500122	0.000	4.430	0%
375	0	0	34330950	0%	0	0.000	4.430	0%
376	0	0	34330950	0%	0	0.000	4.430	0%
377	0	0	34330950	0%	0	0.000	4.430	0%
378	0	0	34330950	0%	0	0.000	4.430	0%
379	3	675	34331625	0%	255.8250122	0.000	4.430	0%
380	1	225	34331850	0%	85.5	0.000	4.430	0%
381	0	0	34331850	0%	0	0.000	4.430	0%
382	1	225	34332075	0%	85.94999695	0.000	4.430	0%
383	0	0	34332075	0%	0	0.000	4.430	0%
384	0	0	34332075	0%	0	0.000	4.430	0%
385	0	0	34332075	0%	0	0.000	4.430	0%
386	0	0	34332075	0%	0	0.000	4.430	0%
387	1	225	34332300	0%	87.07499695	0.000	4.430	0%
388	0	0	34332300	0%	0	0.000	4.430	0%
389	0	0	34332300	0%	0	0.000	4.430	0%
390	0	0	34332300	0%	0	0.000	4.430	0%
391	0	0	34332300	0%	0	0.000	4.430	0%
392	0	0	34332300	0%	0	0.000	4.430	0%
393	0	0	34332300	0%	0	0.000	4.430	0%
394	0	0	34332300	0%	0	0.000	4.430	0%
395	0	0	34332300	0%	0	0.000	4.430	0%
396	0	0	34332300	0%	0	0.000	4.430	0%
397	0	0	34332300	0%	0	0.000	4.430	0%
398	0	0	34332300	0%	0	0.000	4.430	0%
399	0	0	34332300	0%	0	0.000	4.430	0%
400	1	225	34332525	0%	90	0.000	4.430	0%
401	0	0	34332525	0%	0	0.000	4.430	0%
402	0	0	34332525	0%	0	0.000	4.430	0%
403	0	0	34332525	0%	0	0.000	4.430	0%
404	0	0	34332525	0%	0	0.000	4.430	0%
405	0	0	34332525	0%	0	0.000	4.430	0%
406	0	0	34332525	0%	0	0.000	4.430	0%
407	0	0	34332525	0%	0	0.000	4.430	0%
408	0	0	34332525	0%	0	0.000	4.430	0%
409	0	0	34332525	0%	0	0.000	4.430	0%
410	0	0	34332525	0%	0	0.000	4.430	0%
411	0	0	34332525	0%	0	0.000	4.430	0%
412	0	0	34332525	0%	0	0.000	4.430	0%
413	0	0	34332525	0%	0	0.000	4.430	0%
414	0	0	34332525	0%	0	0.000	4.430	0%
415	63	14175	34346700	0%	5882.625	0.006	4.436	0%

Table A.4
Dunnville Sand Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
1	0	0	0	100%	0	0.000	0.000	100%
2	0	0	0	100%	0	0.000	0.000	100%
3	0	0	0	100%	0	0.000	0.000	100%
4	0	0	0	100%	0	0.000	0.000	100%
5	0	0	0	100%	0	0.000	0.000	100%
6	0	0	0	100%	0	0.000	0.000	100%
7	0	0	0	100%	0	0.000	0.000	100%
8	0	0	0	100%	0	0.000	0.000	100%
9	0	0	0	100%	0	0.000	0.000	100%
10	0	0	0	100%	0	0.000	0.000	100%
11	0	0	0	100%	0	0.000	0.000	100%
12	0	0	0	100%	0	0.000	0.000	100%
13	0	0	0	100%	0	0.000	0.000	100%
14	0	0	0	100%	0	0.000	0.000	100%
15	0	0	0	100%	0	0.000	0.000	100%
16	0	0	0	100%	0	0.000	0.000	100%
17	0	0	0	100%	0	0.000	0.000	100%
18	1	225	225	100%	4	0.000	0.000	100%
19	6	1350	1575	100%	26	0.000	0.000	100%
20	16	3600	5175	100%	72	0.000	0.000	100%
21	15	3375	8550	100%	71	0.000	0.000	100%
22	15	3375	11925	100%	74	0.000	0.000	100%
23	22	4950	16875	100%	114	0.000	0.000	100%
24	20	4500	21375	100%	108	0.000	0.000	100%
25	30	6750	28125	100%	169	0.000	0.001	100%
26	49	11025	39150	100%	287	0.000	0.001	100%
27	110	24750	63900	100%	668	0.001	0.002	100%
28	203	45675	109575	100%	1,279	0.001	0.003	100%
29	337	75825	185400	100%	2,199	0.002	0.005	100%
30	403	90675	276075	100%	2,720	0.003	0.008	100%
31	509	114525	390600	99%	3,550	0.004	0.011	100%
32	504	113400	504000	99%	3,629	0.004	0.015	100%
33	574	129150	633150	99%	4,262	0.004	0.019	100%
34	665	149625	782775	99%	5,087	0.005	0.024	99%
35	726	163350	946125	98%	5,717	0.006	0.030	99%
36	871	195975	1142100	98%	7,055	0.007	0.037	99%
37	1343	302175	1444275	98%	11,180	0.011	0.048	99%
38	1891	425475	1869750	97%	16,168	0.016	0.064	98%
39	2393	538425	2408175	96%	20,999	0.021	0.085	98%
40	2940	661500	3069675	95%	26,460	0.026	0.112	97%
41	3508	789300	3858975	94%	32,361	0.032	0.144	96%
42	4144	932400	4791375	92%	39,161	0.039	0.183	95%
43	4802	1080450	5871825	91%	46,459	0.046	0.230	94%
44	5625	1265625	7137450	89%	55,687	0.056	0.286	93%
45	6776	1524600	8662050	86%	68,607	0.069	0.354	91%
46	7400	1665000	10327050	84%	76,590	0.077	0.431	89%
47	7586	1706850	12033900	81%	80,222	0.080	0.511	87%
48	7285	1639125	13673025	78%	78,678	0.079	0.590	85%
49	6928	1558800	15231825	76%	76,381	0.076	0.666	83%
50	6527	1468575	16700400	73%	73,429	0.073	0.739	81%
51	6302	1417950	18118350	71%	72,315	0.072	0.812	79%
52	6408	1441800	19560150	69%	74,974	0.075	0.887	77%

Table A.4
Dunnville Sand Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
53	6461	1453725	21013875	67%	77,047	0.077	0.964	75%
54	6825	1535625	22549500	64%	82,924	0.083	1.047	73%
55	7338	1651050	24200550	62%	90,808	0.091	1.138	70%
56	7529	1694025	25894575	59%	94,865	0.095	1.232	68%
57	7322	1647450	27542025	56%	93,905	0.094	1.326	66%
58	7446	1675350	29217375	54%	97,170	0.097	1.423	63%
59	7507	1689075	30906450	51%	99,655	0.100	1.523	60%
60	7528	1693800	32600250	48%	101,628	0.102	1.625	58%
61	7371	1658475	34258725	46%	101,167	0.101	1.726	55%
62	7172	1613700	35872425	43%	100,049	0.100	1.826	53%
63	7057	1587825	37460250	40%	100,033	0.100	1.926	50%
64	6824	1535400	38995650	38%	98,266	0.098	2.024	47%
65	6670	1500750	40496400	36%	97,549	0.098	2.122	45%
66	6553	1474425	41970825	33%	97,312	0.097	2.219	42%
67	6238	1403550	43374375	31%	94,038	0.094	2.313	40%
68	6102	1372950	44747325	29%	93,361	0.093	2.407	37%
69	5455	1227375	45974700	27%	84,689	0.085	2.491	35%
70	5134	1155150	47129850	25%	80,861	0.081	2.572	33%
71	5234	1177650	48307500	23%	83,613	0.084	2.656	31%
72	4314	970650	49278150	22%	69,887	0.070	2.726	29%
73	4368	982800	50260950	20%	71,744	0.072	2.797	27%
74	3957	890325	51151275	19%	65,884	0.066	2.863	26%
75	3743	842175	51993450	17%	63,163	0.063	2.926	24%
76	3695	831375	52824825	16%	63,185	0.063	2.990	22%
77	3314	745650	53570475	15%	57,415	0.057	3.047	21%
78	3149	708525	54279000	14%	55,265	0.055	3.102	19%
79	2858	643050	54922050	13%	50,801	0.051	3.153	18%
80	2827	636075	55558125	12%	50,886	0.051	3.204	17%
81	2702	607950	56166075	11%	49,244	0.049	3.253	15%
82	2743	617175	56783250	10%	50,608	0.051	3.304	14%
83	2441	549225	57332475	9%	45,586	0.046	3.349	13%
84	2304	518400	57850875	8%	43,546	0.044	3.393	12%
85	2206	496350	58347225	7%	42,190	0.042	3.435	11%
86	2262	508950	58856175	6%	43,770	0.044	3.479	10%
87	2279	512775	59368950	6%	44,611	0.045	3.523	8%
88	2345	527625	59896575	5%	46,431	0.046	3.570	7%
89	2085	469125	60365700	4%	41,752	0.042	3.612	6%
90	1903	428175	60793875	3%	38,536	0.039	3.650	5%
91	1572	353700	61147575	3%	32,187	0.032	3.682	4%
92	1300	292500	61440075	2%	26,910	0.027	3.709	4%
93	1170	263250	61703325	2%	24,482	0.024	3.734	3%
94	1075	241875	61945200	1%	22,736	0.023	3.757	2%
95	849	191025	62136225	1%	18,147	0.018	3.775	2%
96	688	154800	62291025	1%	14,861	0.015	3.790	2%
97	564	126900	62417925	1%	12,309	0.012	3.802	1%
98	409	92025	62509950	1%	9,018	0.009	3.811	1%
99	329	74025	62583975	0%	7,328	0.007	3.818	1%
100	267	60075	62644050	0%	6,008	0.006	3.824	1%
101	215	48375	62692425	0%	4,886	0.005	3.829	0%
102	147	33075	62725500	0%	3,374	0.003	3.832	0%
103	130	29250	62754750	0%	3,013	0.003	3.835	0%
104	97	21825	62776575	0%	2,270	0.002	3.838	0%
105	65	14625	62791200	0%	1,536	0.002	3.839	0%

Table A.4
Dunnville Sand Plain Exceedence Graph Inputs

Recharge Rates (mm/yr)	Number of Cells	Area (m^2)	Cumulative Area (m^2)	%Area Threshold	Recharge Volume (m^3/yr)	Recharge Volume (m^3^6/yr)	Cumulative Recharge Volume (m3^6/yr)	%Volume Threshold
106	64	14400	62805600	0%	1,526	0.002	3.841	0%
107	49	11025	62816625	0%	1,180	0.001	3.842	0%
108	46	10350	62826975	0%	1,118	0.001	3.843	0%
109	31	6975	62833950	0%	760	0.001	3.844	0%
110	22	4950	62838900	0%	545	0.001	3.844	0%
111	18	4050	62842950	0%	450	0.000	3.845	0%
112	43	9675	62852625	0%	1,084	0.001	3.846	0%
113	25	5625	62858250	0%	636	0.001	3.847	0%
114	12	2700	62860950	0%	308	0.000	3.847	0%
115	18	4050	62865000	0%	466	0.000	3.847	0%
116	9	2025	62867025	0%	235	0.000	3.848	0%
117	6	1350	62868375	0%	158	0.000	3.848	0%
118	2	450	62868825	0%	53	0.000	3.848	0%
119	0	0	62868825	0%	0	0.000	3.848	0%
120	10	2250	62871075	0%	270	0.000	3.848	0%
121	1	225	62871300	0%	27	0.000	3.848	0%