Septic Tank Research

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Objectives

- Get a better handle on nitrogen (N) inputs into main stem and tributaries from ground water seepage at subdivisions on septic tanks (important for the LSJR Main Stem Nutrient BMAP)
- Evaluate “post closure” nitrogen concentrations in the ground at sites where homes had hooked up to sewer
- Provide some data to help calibrate a model being developed by FSU

Task	Schedule of Tasks (months after contract execution)																								Total Months to Complete
	2009												2010												
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
Site Set-up and Characterization	■	■	■	■	■	■																			6
Field Sampling and Laboratory Analysis							■	■	■	■	■	■	■	■	■	■	■	■	■	■					19
Data Analysis and Report Writing																	■	■	■	■	■	■			22
Draft Report Submission																						■			22
Final Report Submission																								■	24

Figure 3. P[illegible] Timeline

Setup, July 2009

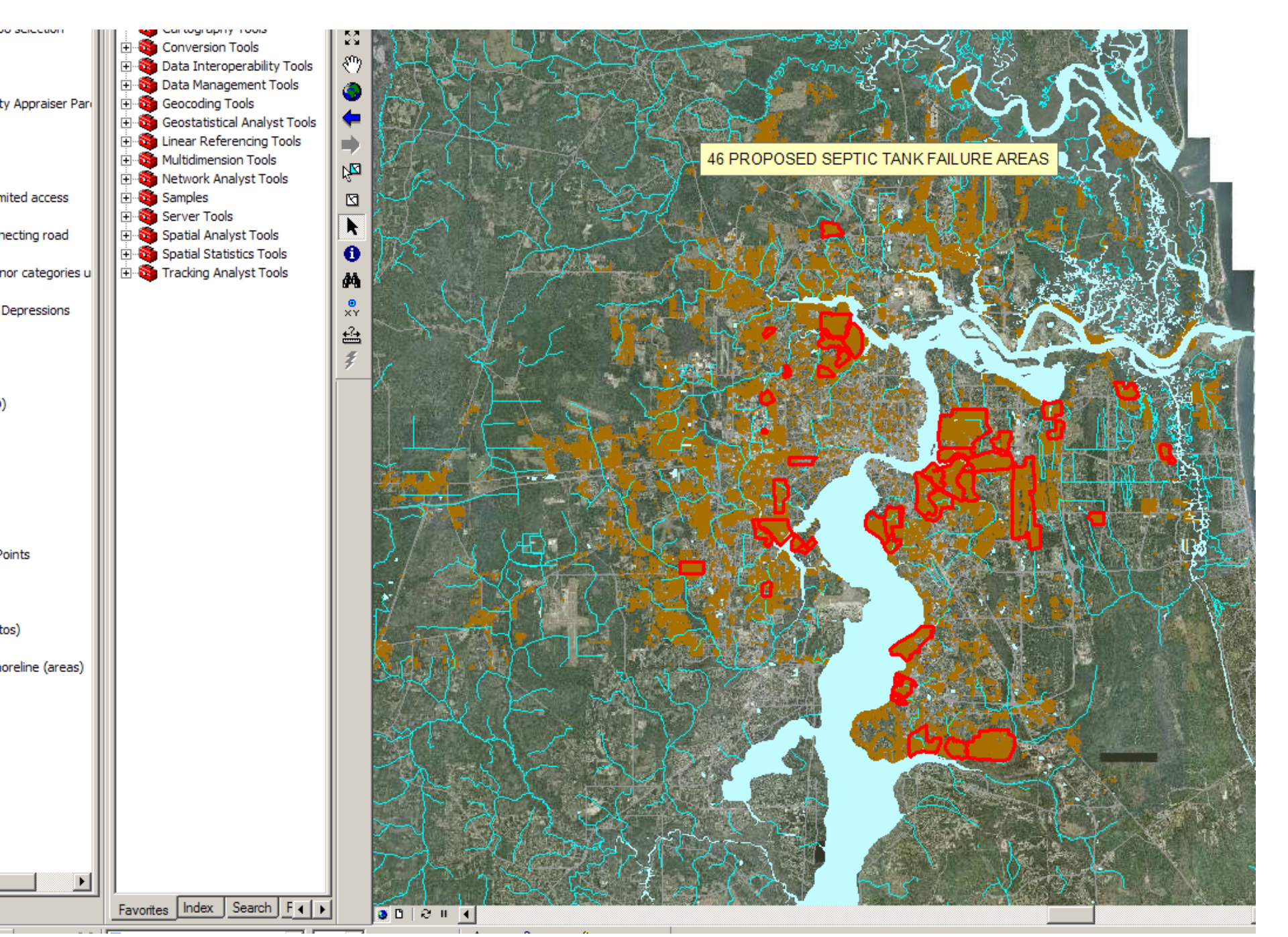
Sample Dec 2009

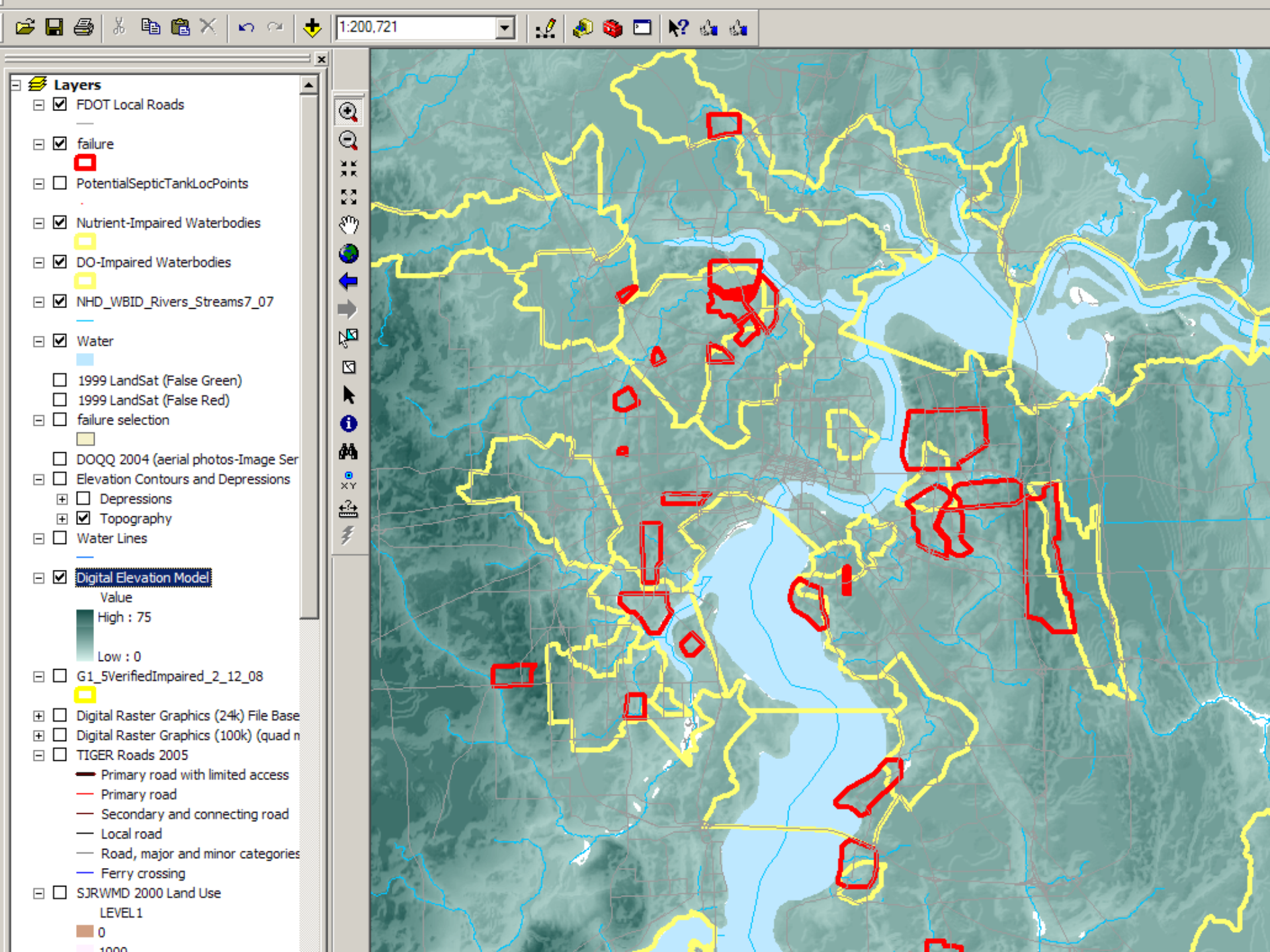
Sample May 2010

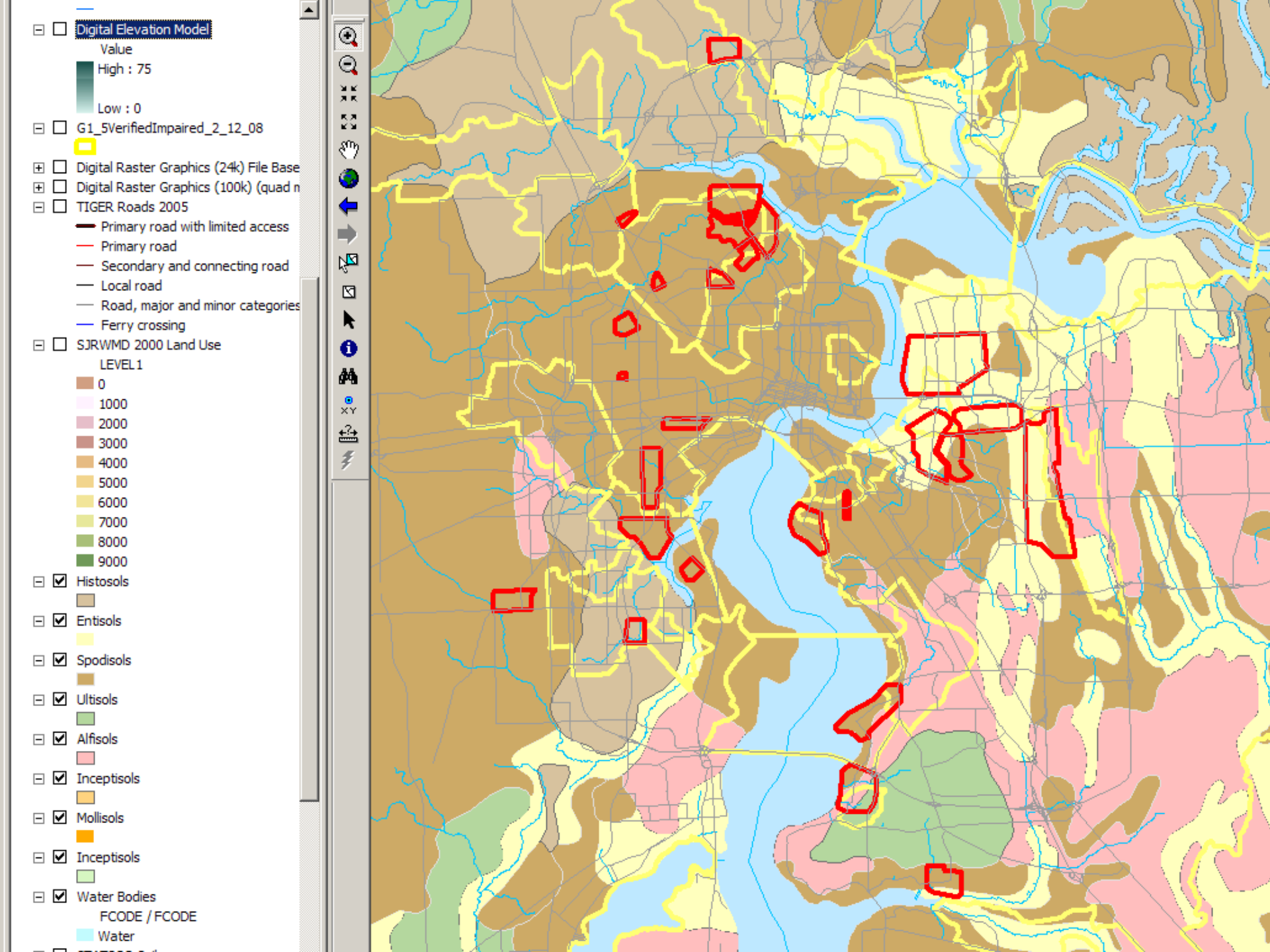
Sample Aug 2010?

Site Selection

- Identify study areas
  - Near representative nutrient impaired waterbodies
  - High-density septic tank areas
  - COJ/WSEA priority septic tank failure areas
  - Representing variety of topographic/geologic conditions
  - Variety of soil drainage and chemical characteristics
  - Where we can combine small-scale with more regional data


Conversion Tools
Data Interoperability Tools
Data Management Tools
Geocoding Tools
Geostatistical Analyst Tools
Linear Referencing Tools
Multidimension Tools
Network Analyst Tools
Samples
Server Tools
Spatial Analyst Tools
Spatial Statistics Tools
Tracking Analyst Tools
Favorites
Index
Search
46 PROPOSED SEPTIC TANK FAILURE AREAS


1:200,721
Layers
FDOT Local Roads
failure
PotentialSepticTankLocPoints
Nutrient-Impaired Waterbodies
DO-Impaired Waterbodies
NHD_WBID_Rivers_Streams7_07
Water
1999 LandSat (False Green)
1999 LandSat (False Red)
failure selection
DOQQ 2004 (aerial photos-Image Ser
Elevation Contours and Depressions
Depressions
Topography
Water Lines
Digital Elevation Model
Value
High : 75
Low : 0
G1_5VerifiedImpaired_2_12_08
Digital Raster Graphics (24k) File Base
Digital Raster Graphics (100k) (quad n
TIGER Roads 2005
Primary road with limited access
Primary road
Secondary and connecting road
Local road
Road, major and minor categories
Ferry crossing
SJRWMD 2000 Land Use
LEVEL1
0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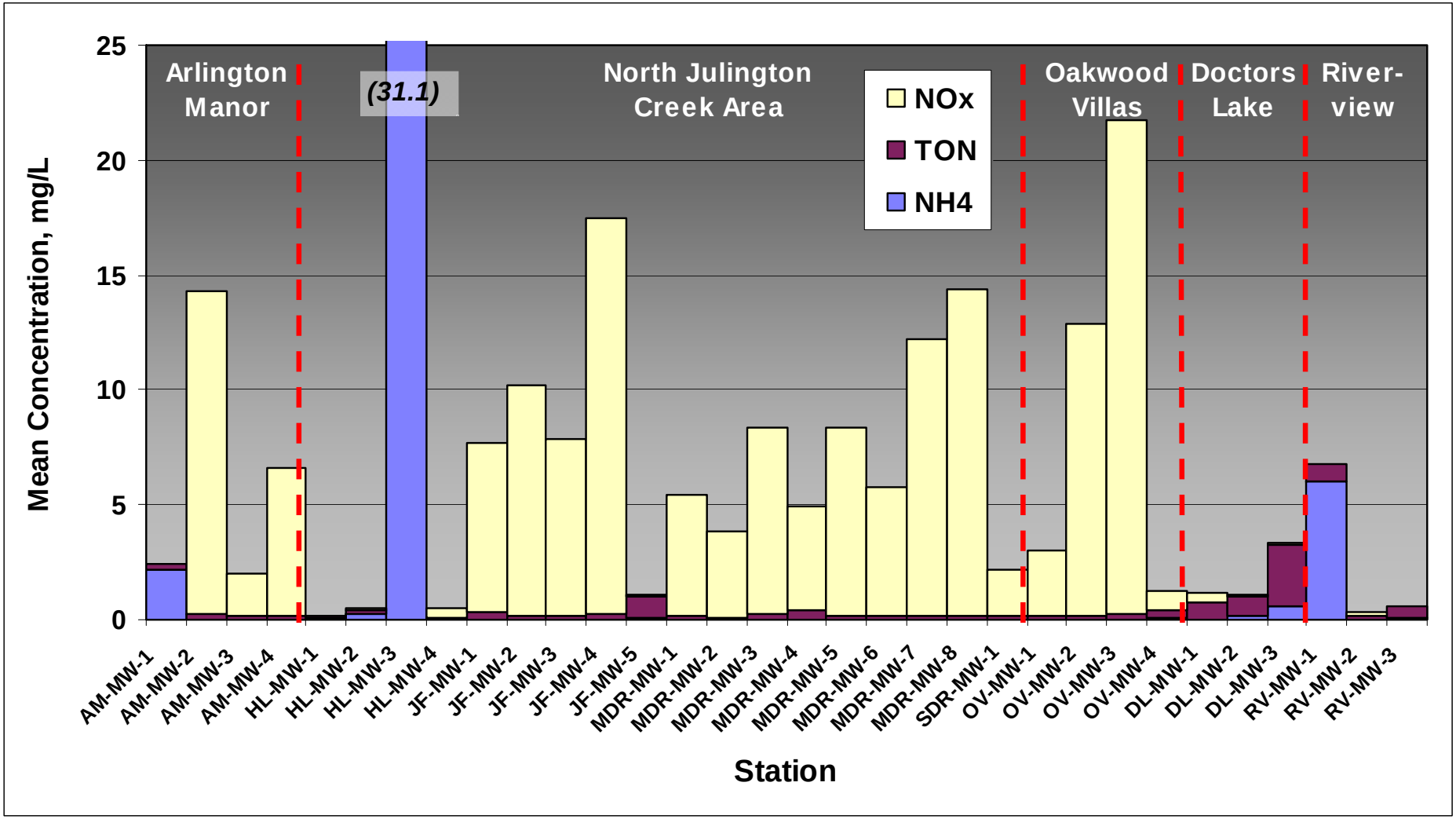
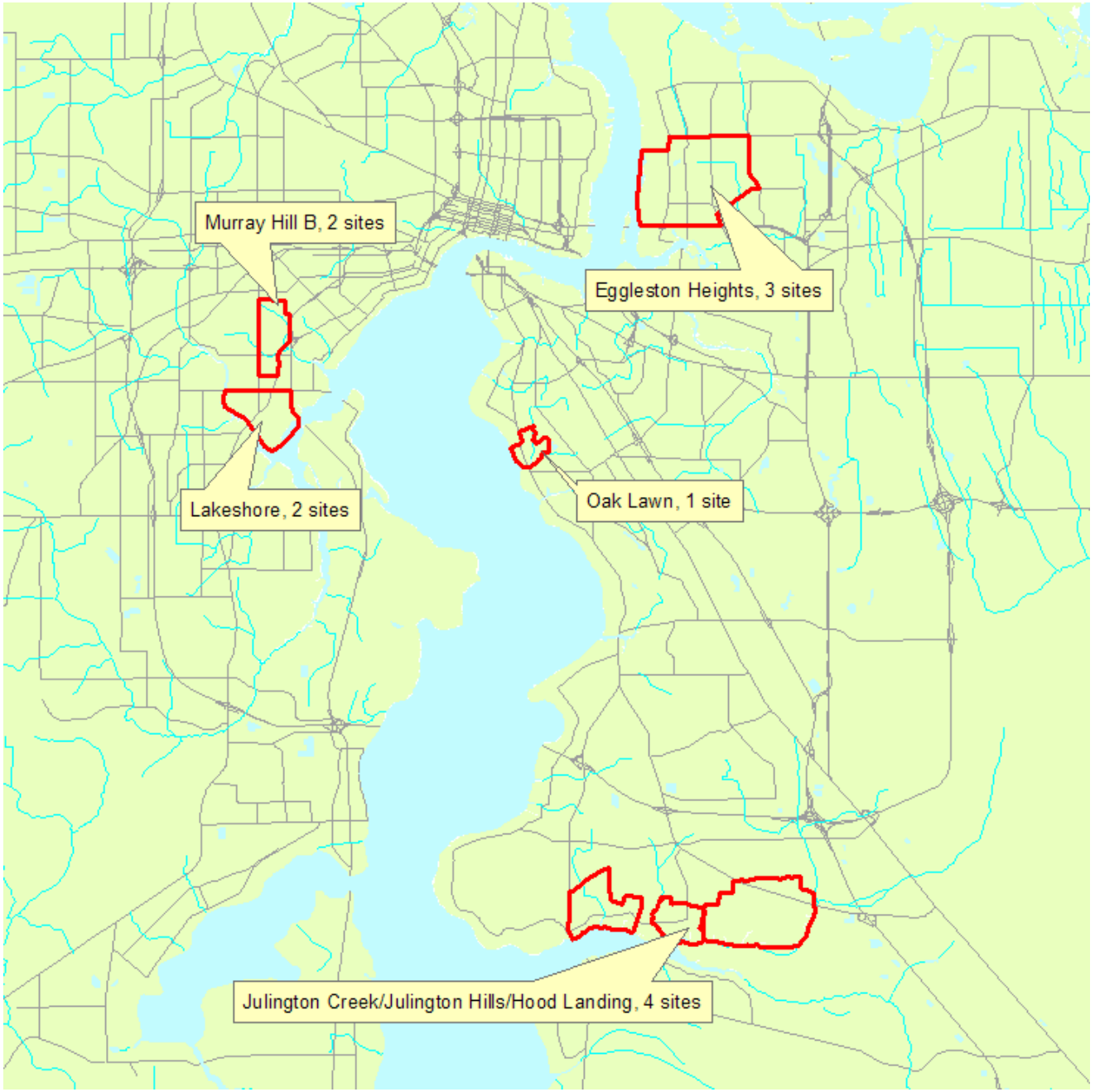
TIGER Roads 2005
Primary road with limited access
Primary road
Secondary and connecting road
Local road
Road, major and minor categories
Ferry crossing
SJRWMD 2000 Land Use
LEVEL 1
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
Histosols
Entisols
Spodisols
Ultisols
Alfisols
Inceptisols
Mollisols
Inceptisols
Water Bodies
FCODE / FCODE
Water

Intensive Sampling Data-SJRWMD




Murray Hill B, 2 sites
Eggleston Heights, 3 sites
Lakeshore, 2 sites
Oak Lawn, 1 site
Julington Creek/Julington Hills/Hood Landing, 4 sites

Scope

- Identify magnitude and extent of nitrogen plumes at individual sites
- If possible, estimate loading into adjacent surface water
- Methods
  - Pushpoint wells for plume characterization
  - Measure seepage
  - Measure hydraulic gradient
  - Estimate K from soil porosity

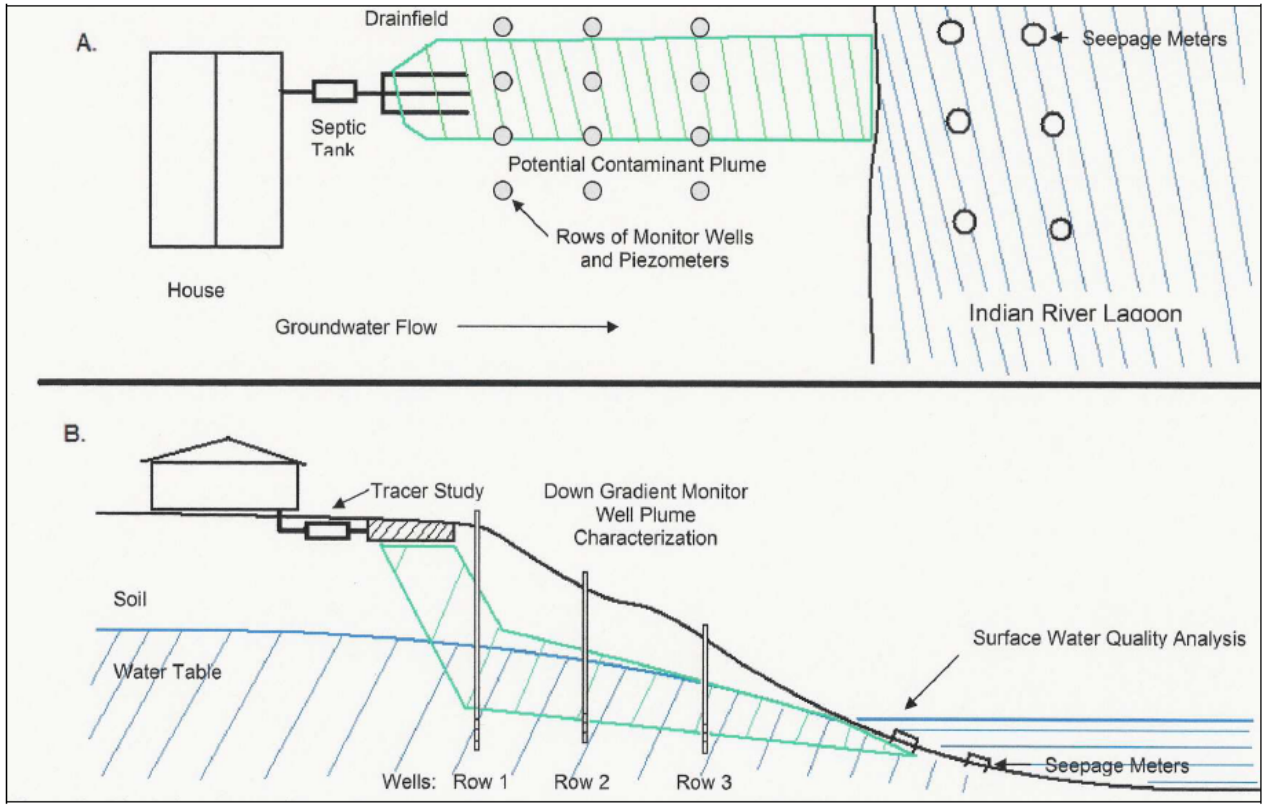


Figure 1. Typical Monitoring Set-Up

The following seven (7) subdivisions were selected for monitoring:

Lakeshore (3-4 sites)---The Lakeshore area is characterized by a high density of

Analytes

- Nitrogen species
- Phosphorus
- Fecal coliform
- Chloride, boron
- Trichlosan, caffeine, fluorescent whiteners
- Nitrogen isotopes


geopump 2


Once a Gator ...
ALWAYS
...a Gator

Sampling Results To Date, What Do They Show?

- Mixed bag. Some sites look like what we'd expect, others do not…
- 4 sites with existing systems have high nitrogen
- 3 former septic sites show a range of good to bad news
- 5 sites with existing systems have low levels of NO3
- Positive seepage to adjacent waterbodies

A few other things

- Two of the sites showed incomplete nitrification (high ammonia). Does that mean water table gets too high or the drainfield is backing up?
- Boron and chloride serve as good tracers for the plume, outlast the nitrogen
- Almost all fecal coliform concentrations in ground water were low to non-detect in comparison to surface water samples
- Nitrogen isotope results, with a few exceptions, suggest that nitrate is entirely/primarily from organic sources

What we need to understand about high NO3 sites

- Most are in well drained sands with deep water table. Can this be extrapolated to other areas?
- Our data are supported by SJRWMD regional monitoring.

What we need to understand about low N sites

- In one area, near non-detect NO3 is most likely attributable to denitification based on correlation with high water table, low DO
- Sampling equipment limitations could be a factor for some of the sites where we find low DO. This needs to be evaluated further.

Some other things we hope to learn

- What are the factors that influence NO3 concentration differences between sites?
- Can we do enough work to make general statements related to physical and geochemical conditions?
- At these sites, how significant are other sources of NO3?

What we can say about former septic sites

- Mixed bag
- After 3 years, BQ had no nitrogen but JB had >15 mg/L NO3.
- After >10 years, CS had some, but that could be due to another source…waiting on isotopes.

Next…

- Final phase of sampling later this summer
- Final report in approximately 12 months