

C.0 APPENDIX C: DATA COLLECTION

C.1 Dye circulation/dispersion studies

Espey Consultants, Inc. (EC) performed a circulation study February 18 through 22, 2008. The purpose of the circulation study is to develop field data from which to calculate dispersion coefficients in tested coves. The circulation study was performed by releasing predetermined volumes of 20% solution of Rhodamine WT (RWT 20%) dye in several canal systems within Lake Granbury.

The specific cove systems characterized by this field test were Oak Trail Shores, Rolling Hills Shores, Sky Harbor, Port Ridglea East, Waters Edge, Indian Harbor, and Ports O' Call subdivisions. Each canal system was revisited multiple times to measure the concentration of the dye using a Turner Designs 10-AU fluorometer with flow through cell and pump. The pump intake was located 1.0 – 1.5 feet below the water surface, and the pump discharge was located on the opposite side of the boat.

Circulation patterns, and therefore circulation studies, are sensitive to wind, flow and lake recreation in the study area. Inflows to and outflows from the lake were relatively low and decreasing during the period of the study (60 to 120 cfs). A temporary wind station was set up to collect wind data on-site during the study. Boat traffic inside the canals can potentially impact circulation dye studies, but boat traffic was negligible. Three boaters were spotted throughout the entire study period with only one boat spotted in a canal. Disruption due to survey boat velocity was minimized by traveling at low velocity with a small trolling motor to reduce the impact of data collection on the natural water circulation.

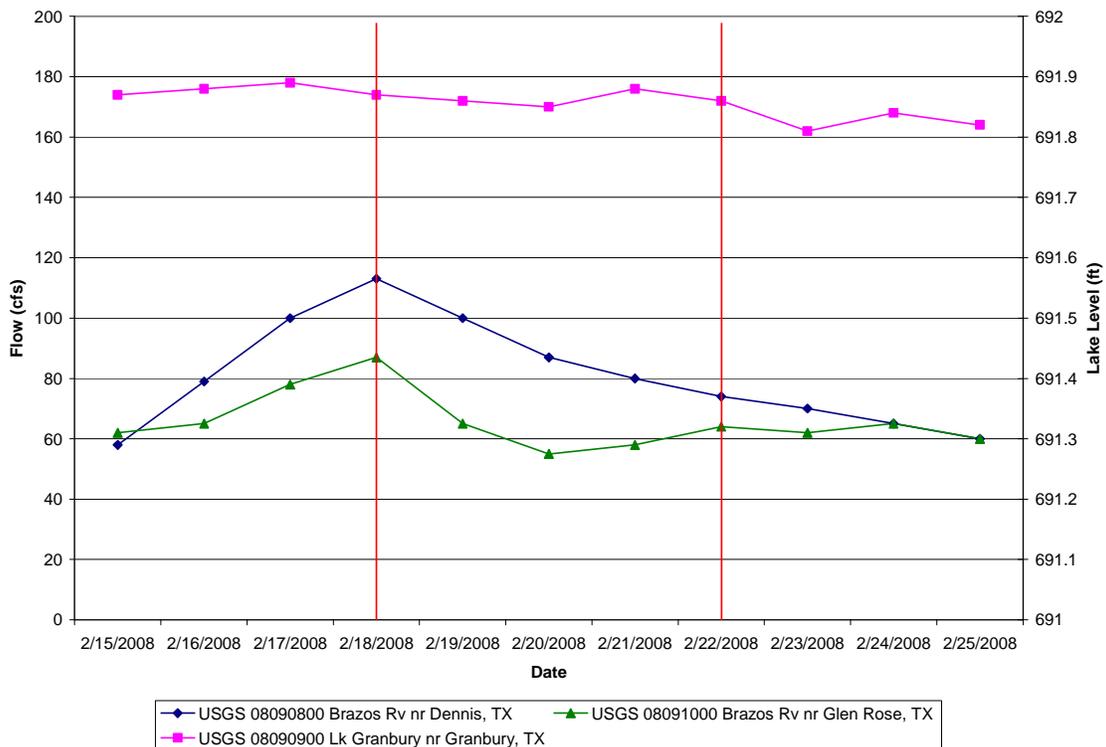


Figure C.1 Stream Flow

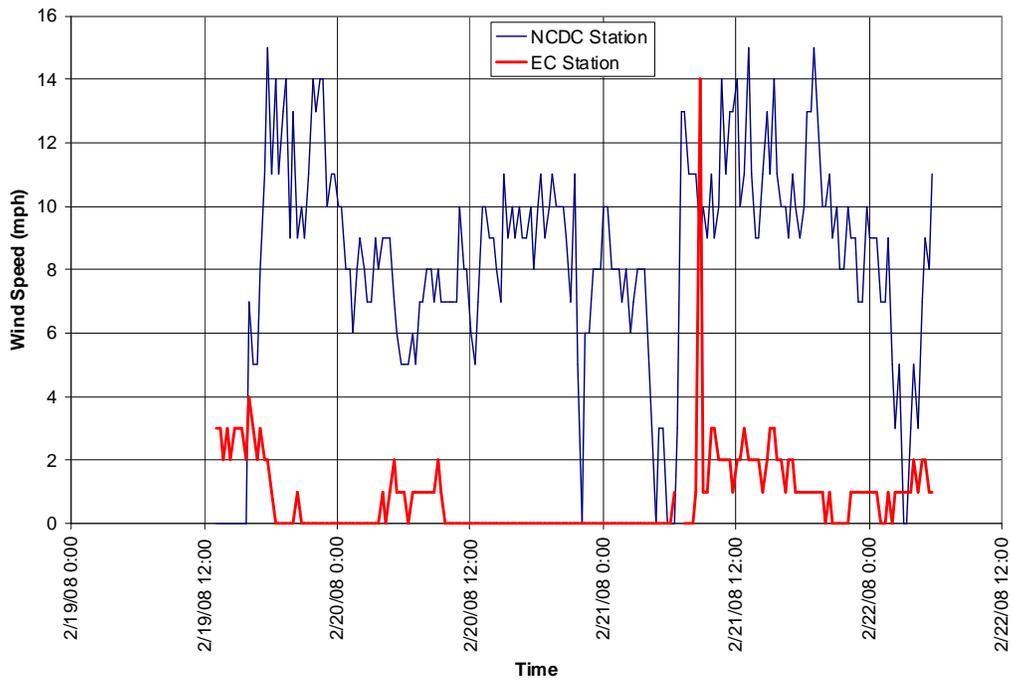


Figure C.2 EC weather station wind data and NCDC wind data comparison



Figure C.3 Weather station

C.1.1 Circulation: Oak Trail Shores



Figure C.4 and Figure C.5 RWT 20% released in canal

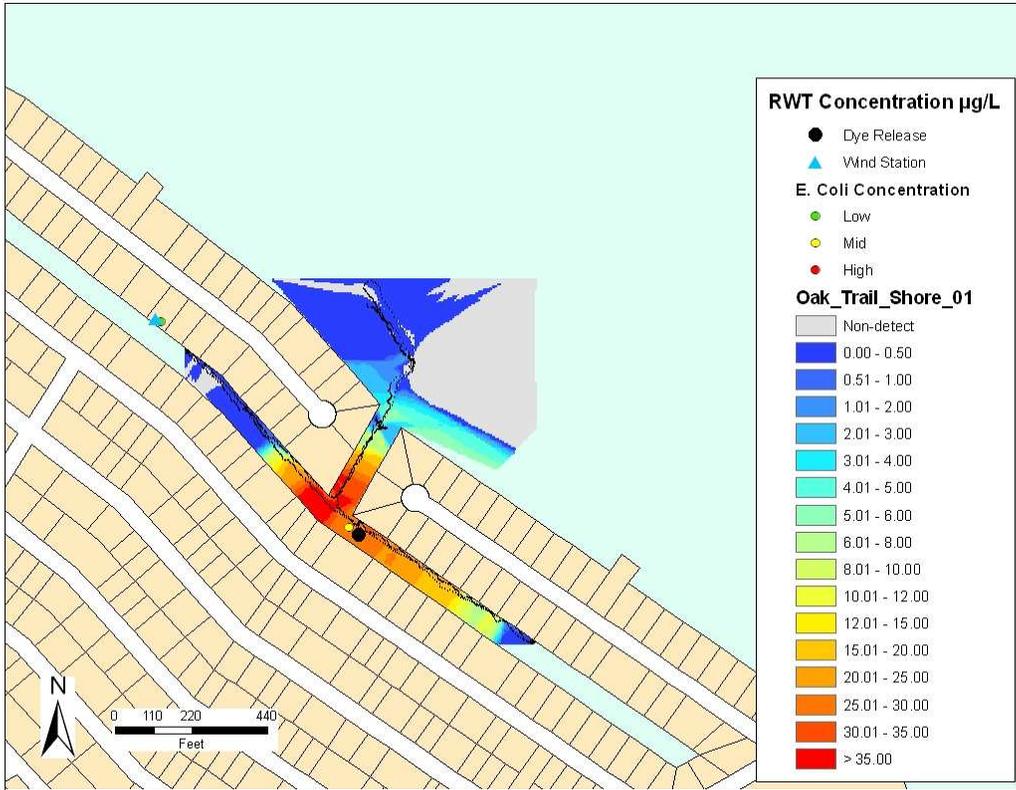


Figure C.6 Oak Trail Shores 02-19-2008 16:26 – 17:19, Hours since dye release: 3

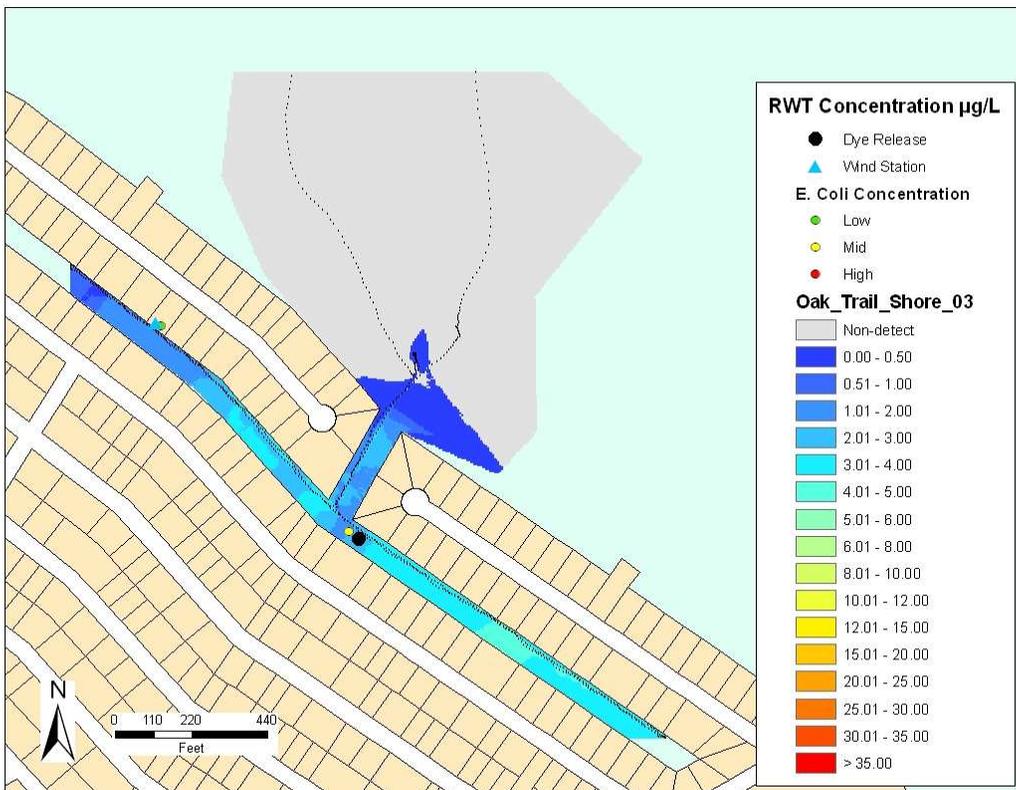


Figure C.7 Oak Trail Shores 02-20-2008 16:15 – 17:30, Hours since dye release: 27

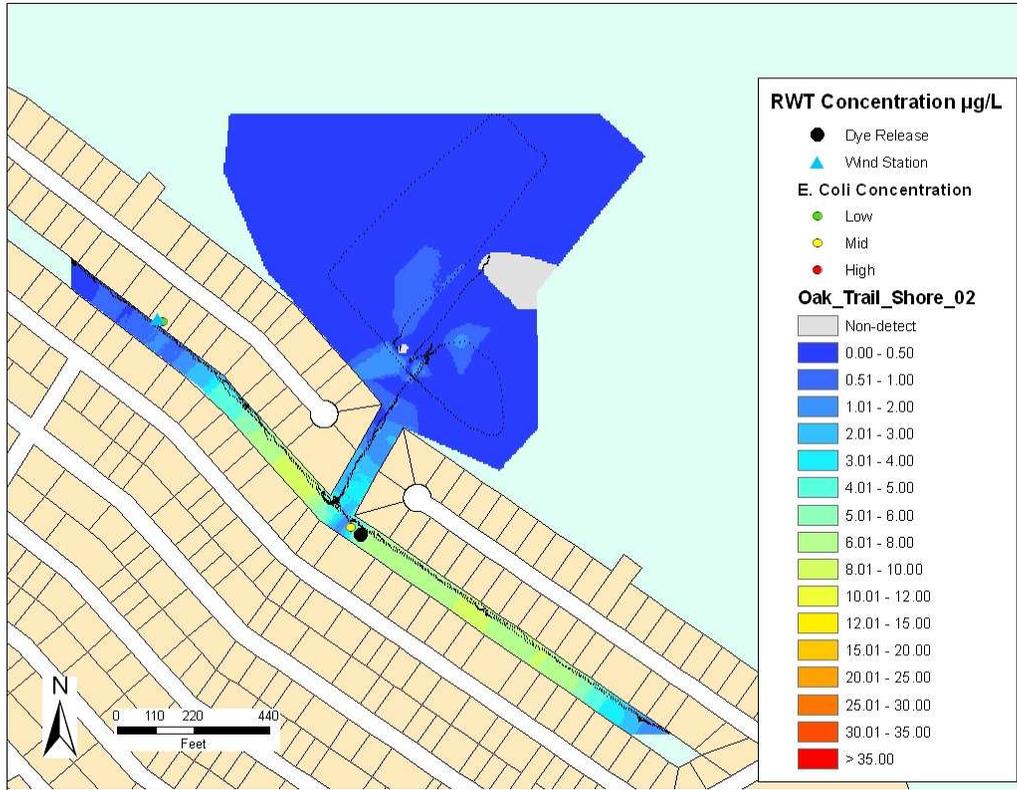


Figure C.8 Oak Trail Shores 02-22-2008 13:48 – 14:19, Hours since dye release: 72

C.1.2 Circulation: Sky Harbor



Figure C.9 and Figure 2.C.10 RWT 20% dye release at Sky Harbor

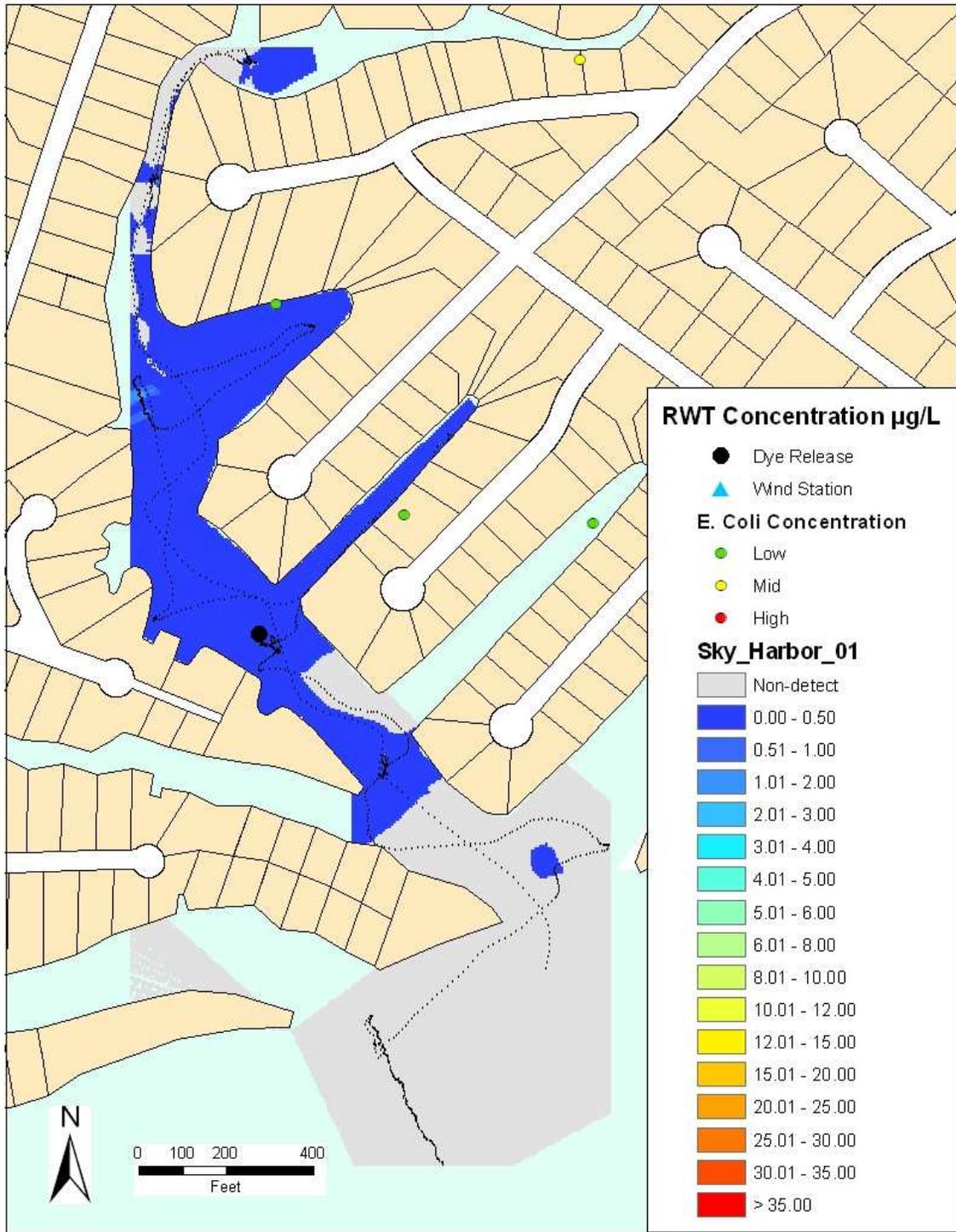


Figure C.11 Sky Harbor 02-20-2008 07:43 – 08:37 Hours since release: 16

C.1.3 Circulation: Port Ridglea East



Figure C.12 RWT 20% dye release at Port Ridglea East

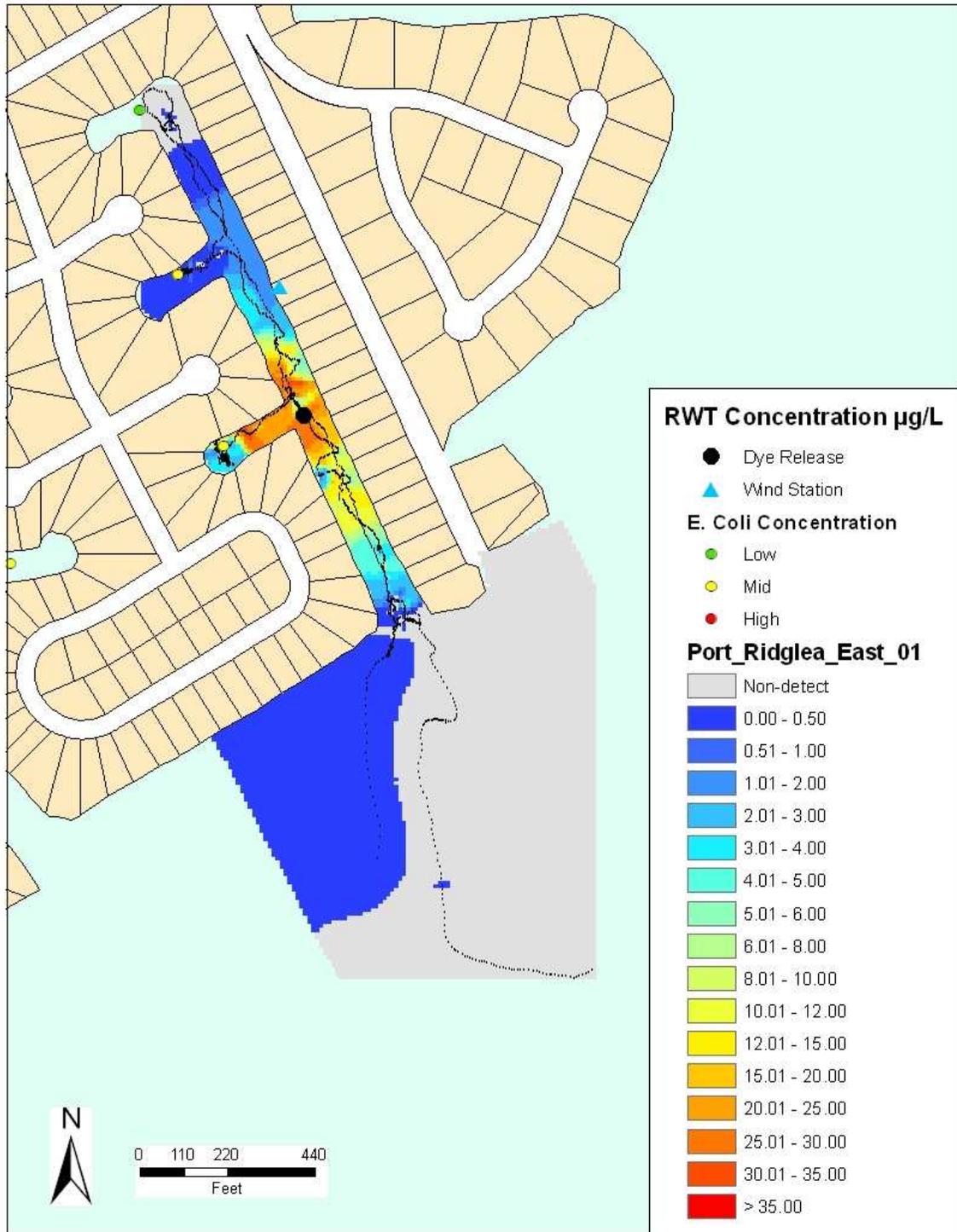


Figure C.13 Port Ridglea East 02-21-2008 14:13 – 15:22, Hours since dye release: 3

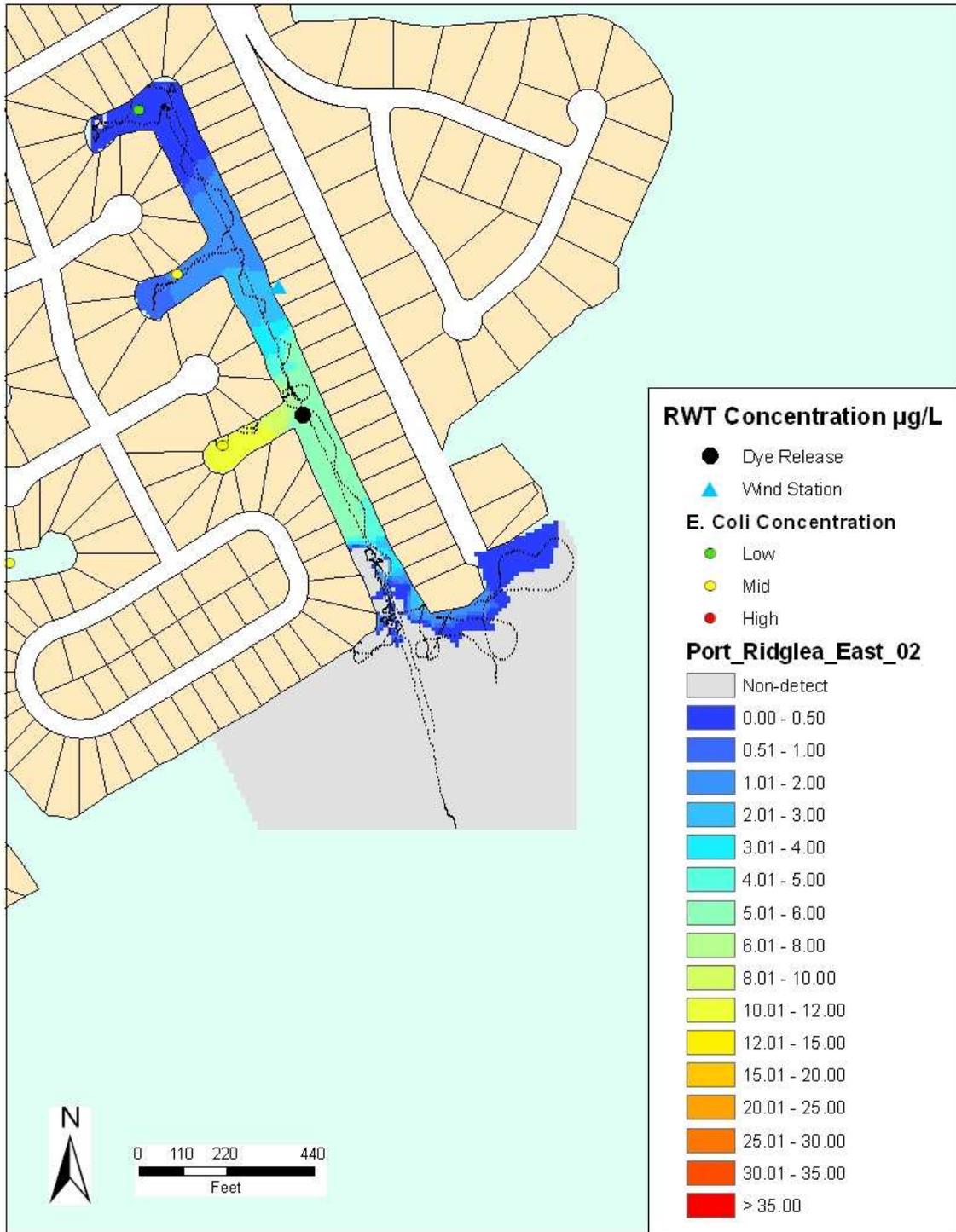


Figure C.14 Port Ridglea East 02-22-2008 09:16 – 10:15, Hours since dye release: 22

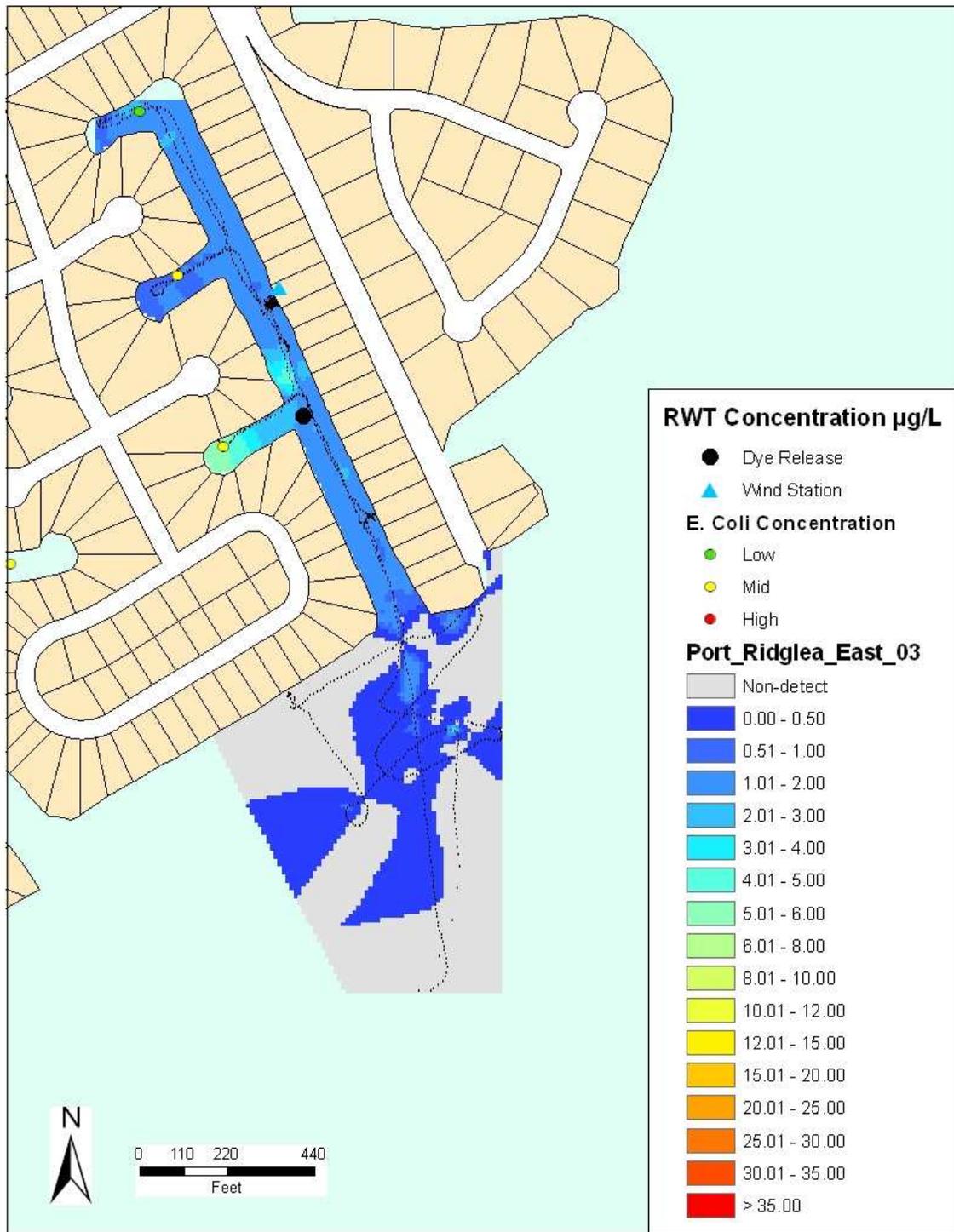


Figure C.15 Port Ridglea East 02-22-2008 16:53 – 17:51, Hours since dye release: 30

C.1.4 Circulation: Waters Edge



Figure C.16 and Figure C.17 RWT 20% dye release at Water's Edge

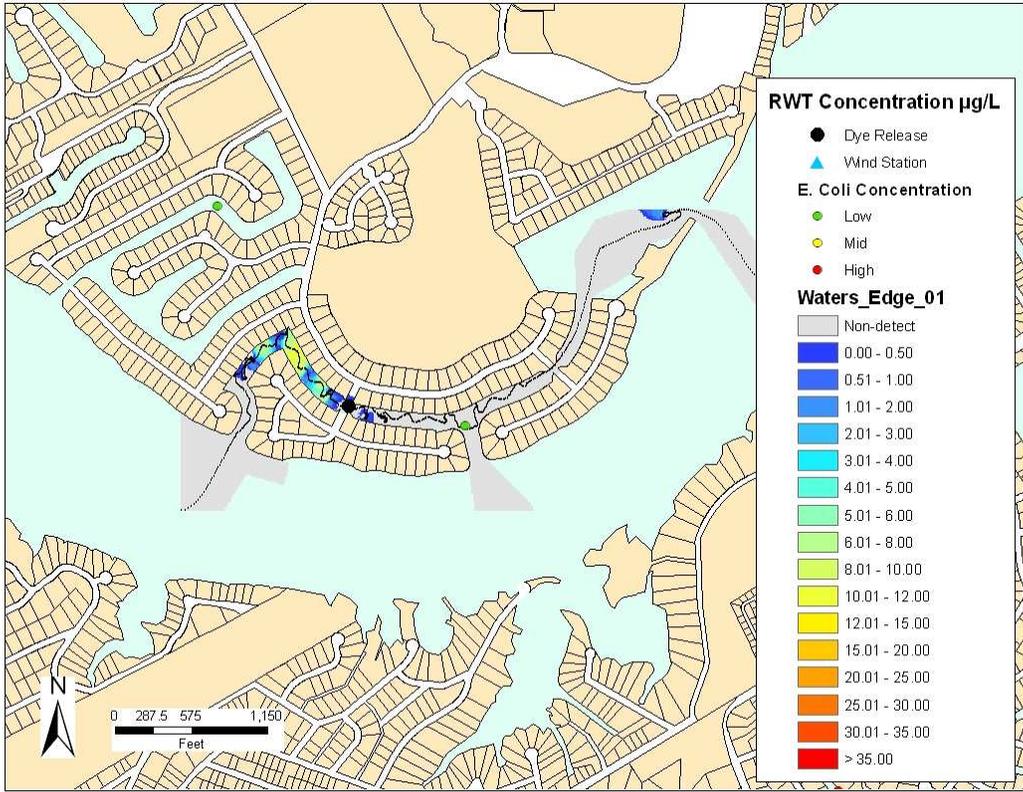


Figure C.18 Waters Edge 02-21-2008 16:54 – 18:03, Hours since dye release: 4

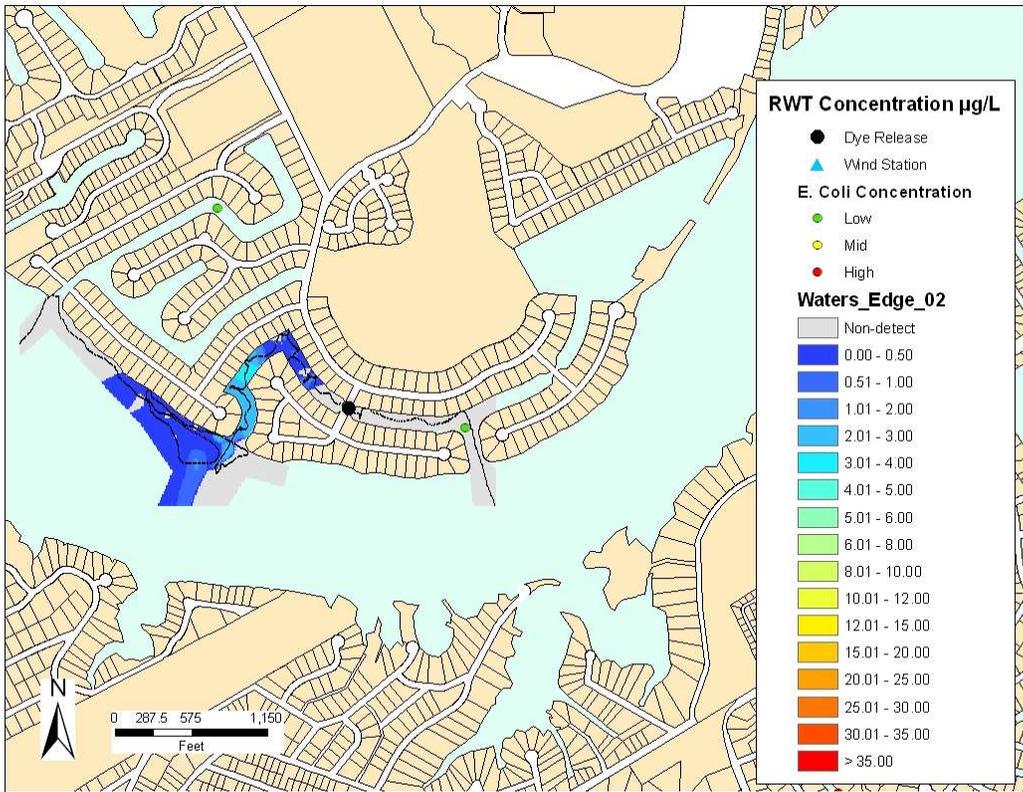


Figure C.19 Waters Edge 02-22-2008 12:07 – 13:13, Hours since dye release: 23

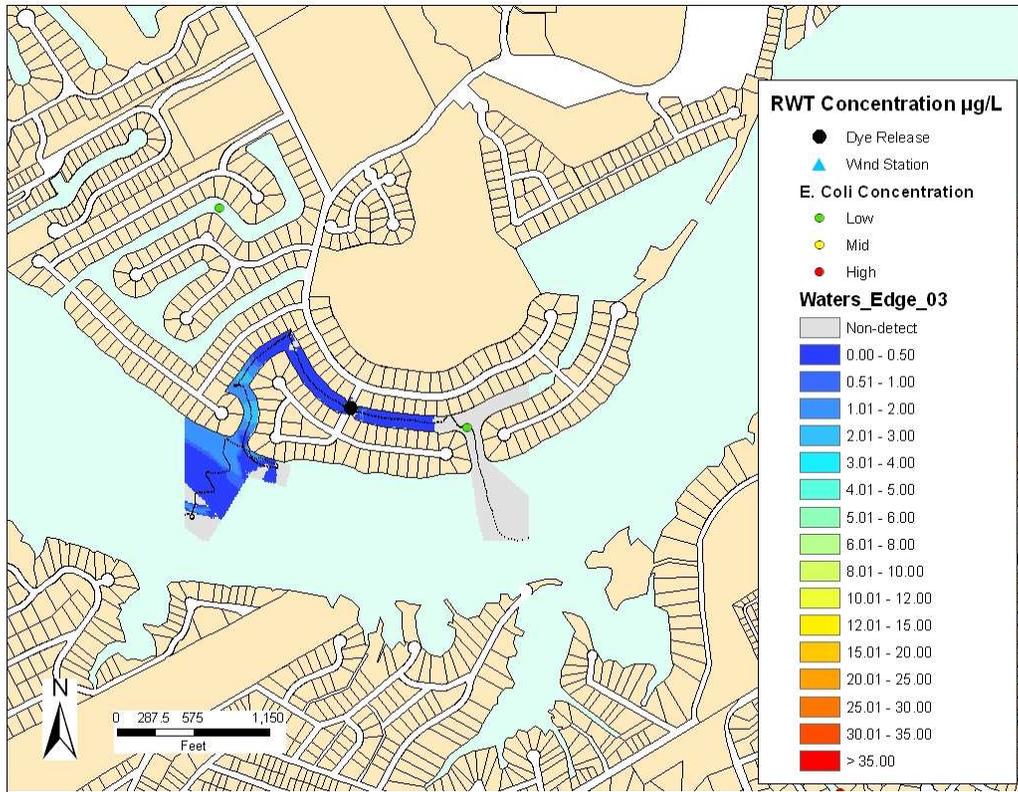


Figure C.20 Waters Edge 02-22-2008 15:23 – 15:47, Hours since dye release: 26

C.1.5 Circulation: Ports O' Call



Figure C.21 and Figure C.22 RWT 20% dye release at Ports O Call

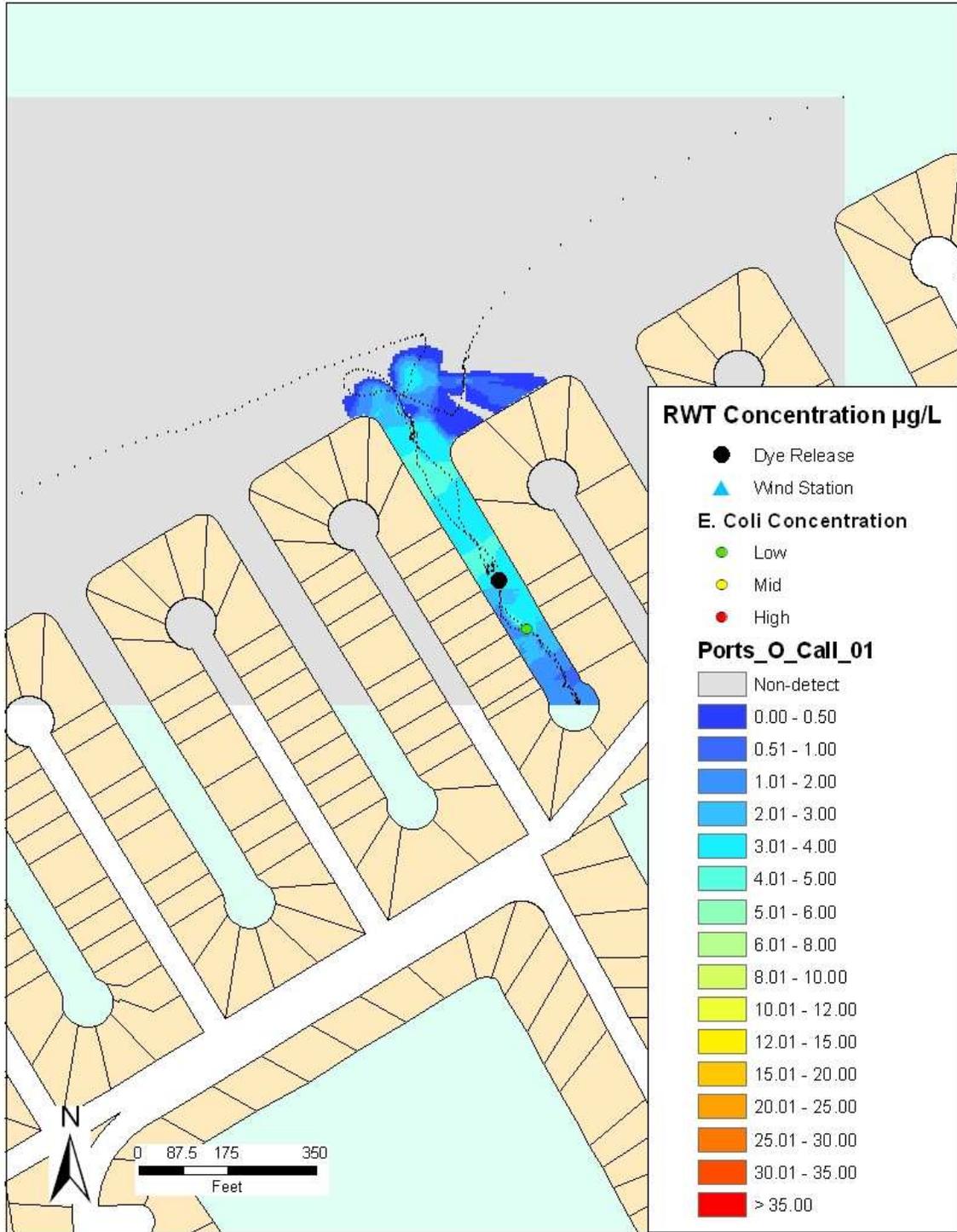


Figure C.23 Ports O Call 02-21-2008 16:29 – 16:46, Hours since dye release: 4

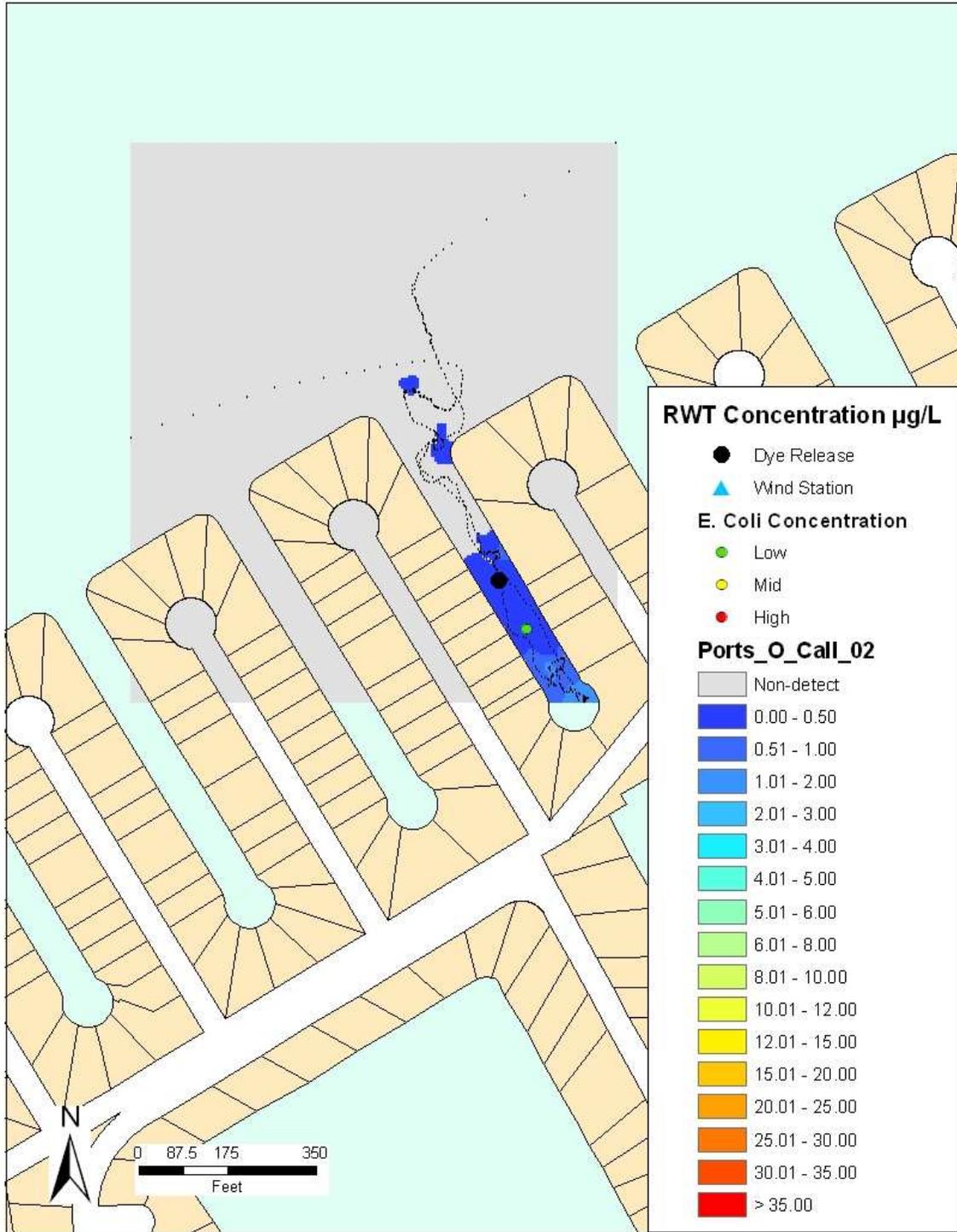


Figure C.24 Ports O Call 02-22-2008 11:42 – 12:01, Hours since dye release: 23

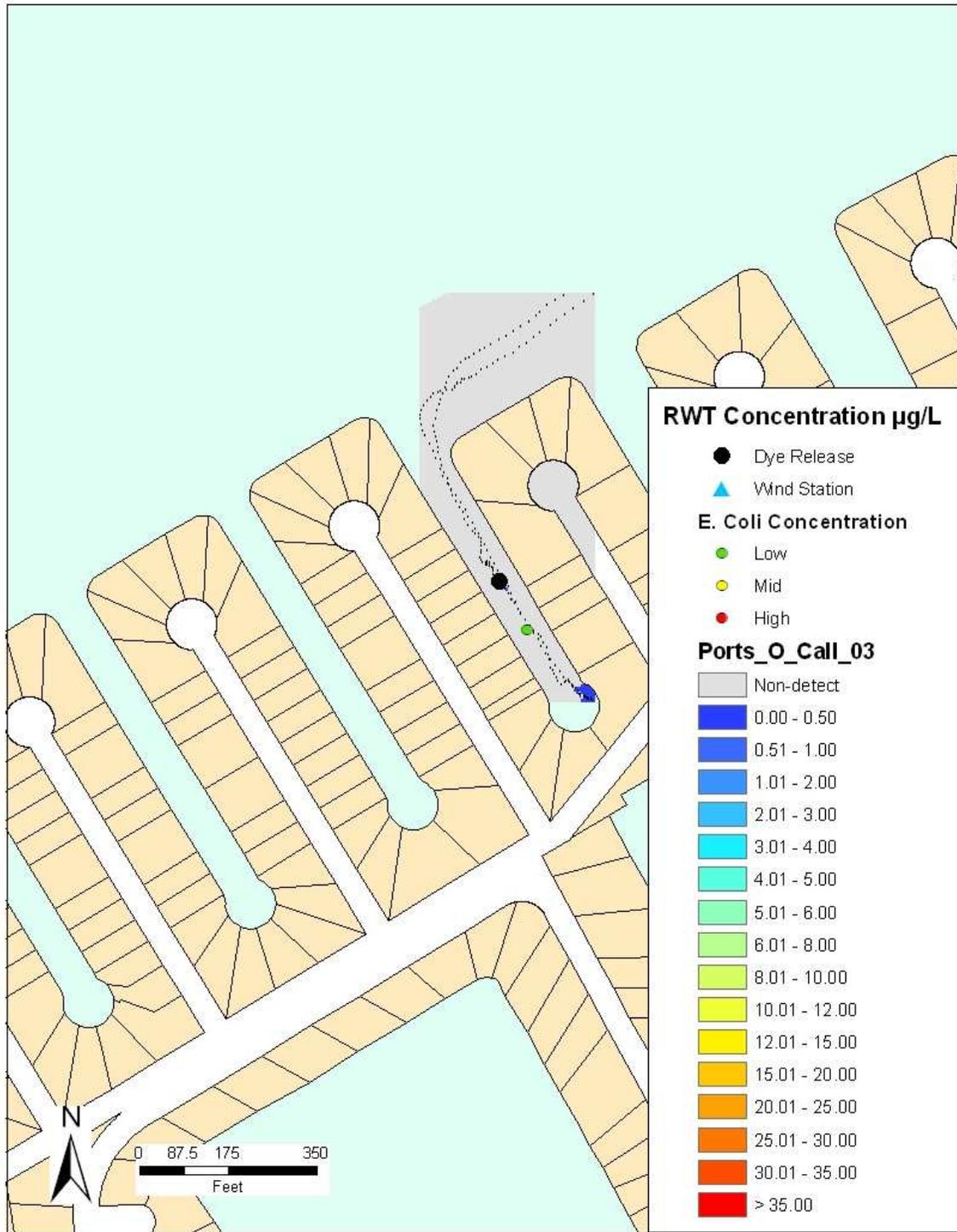


Figure C.25 Ports O Call 02-22-2008 16:02 – 16:10, Hours since dye release: 28

C.1.6 Circulation: Indian Harbor (lagoon)



Figure C.26 and Figure C.27 RWT 20% dye release at Indian Harbor

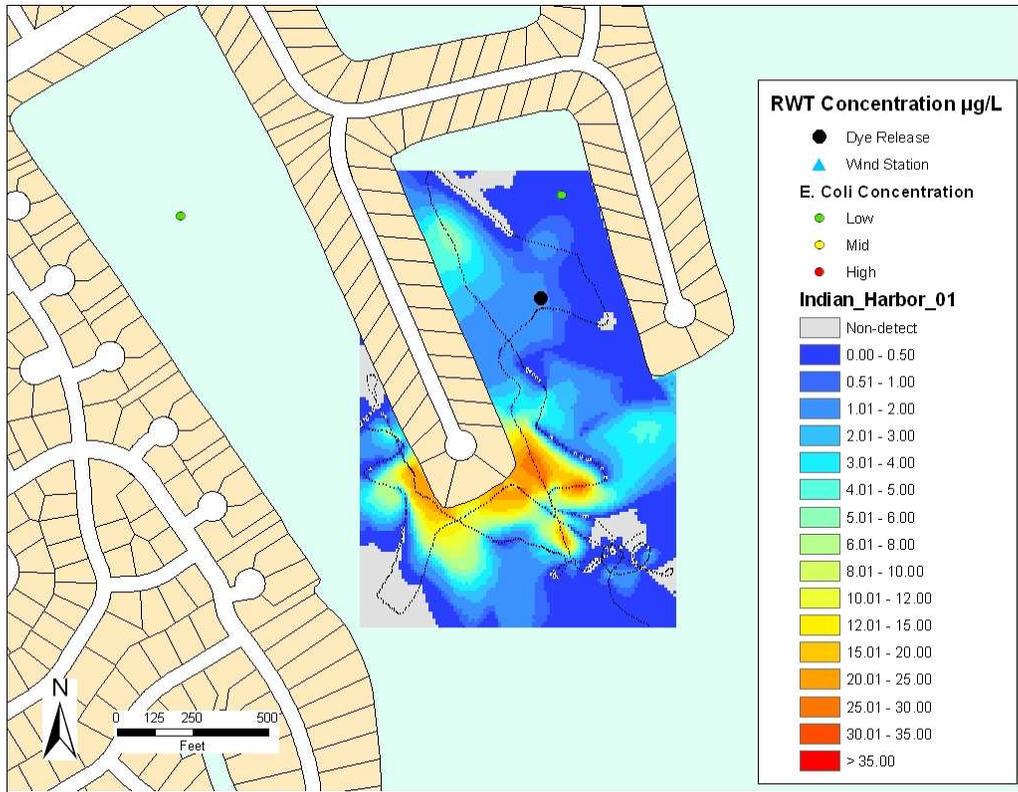


Figure C.28 Indian Harbor 02-21-2008 15:56 – 16:22, Hours since dye release: 4

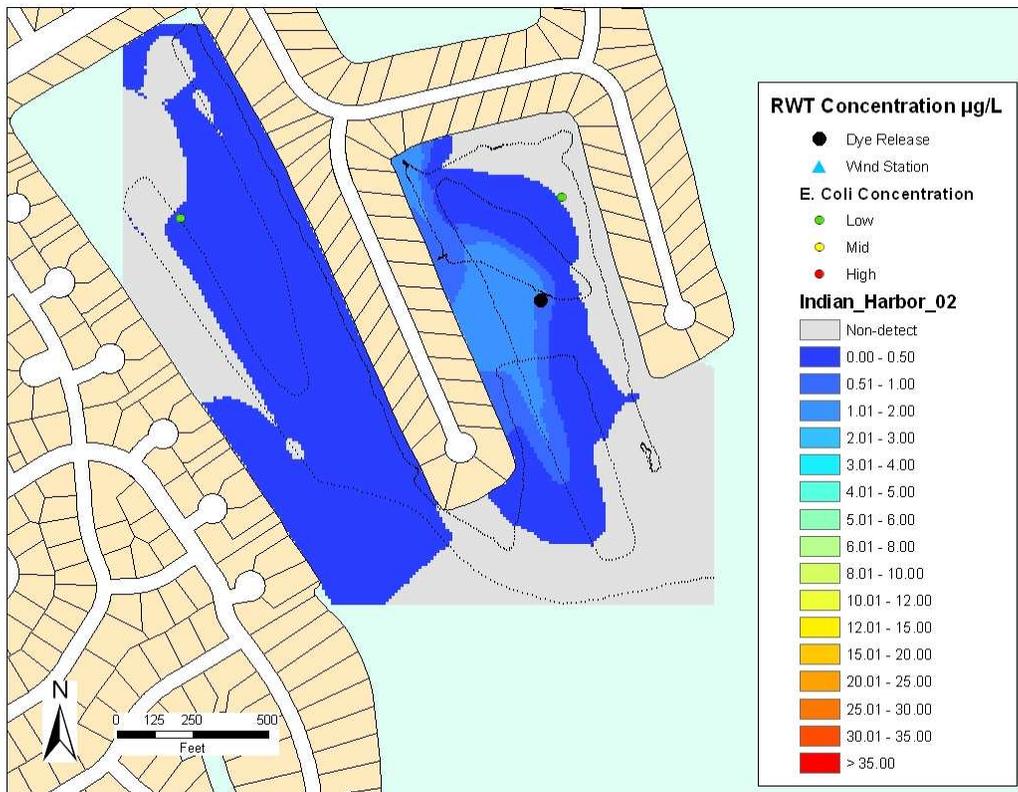


Figure C.29 Indian Harbor 02-22-2008 10:29 – 11:34, Hours since dye release: 23

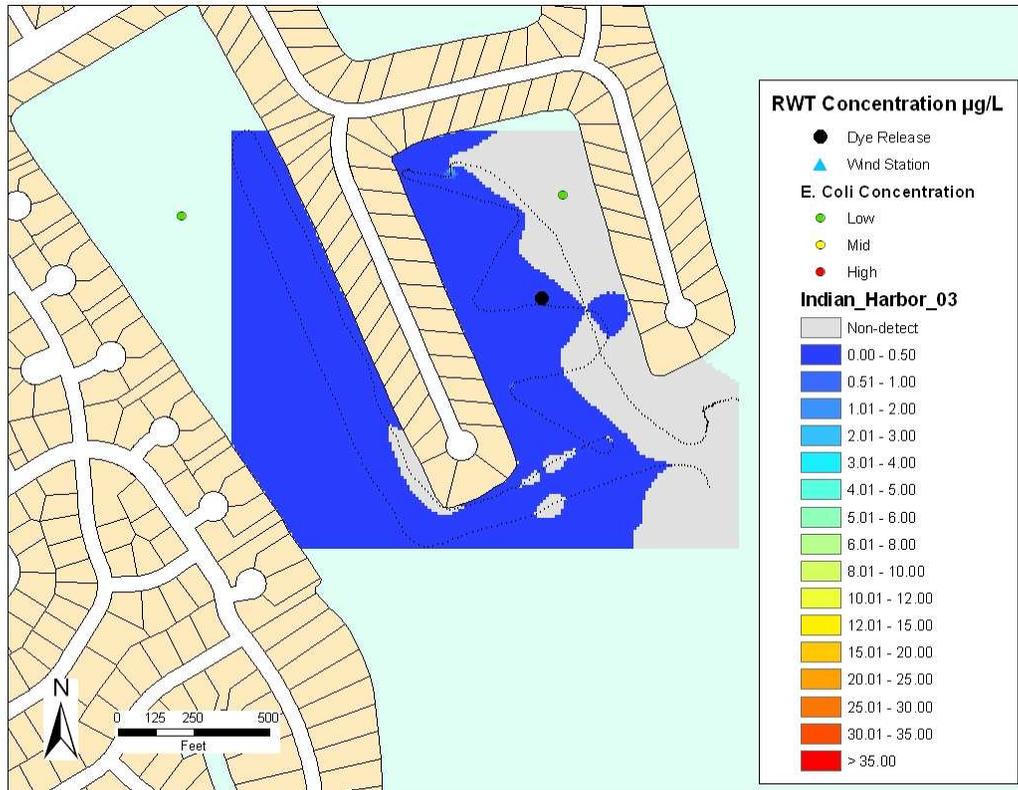


Figure C.30 Indian Harbor 02-22-2008 16:22 – 16:46, Hours since dye release: 28

C.1.7 Circulation: Rolling Hills Shore

EC attempted to access Rolling Hills Shores canal system via boat on February 19, 2008. However, the channel into the canal was too shallow for entry. Due to the inaccessibility of the site, a circulation study was not conducted.

C.1.8 Circulation: Summary

Ward (1985) performed a dye study for Texas bays, and methods used for that study were adopted to calculate the dispersion coefficients for Lake Granbury. The calculated dispersion coefficients are listed in Table C-1. The parameters for unvisited canals were estimated according to canals with similar conditions where data was available.

Table C-1. Calculated Dispersion coefficients

Subdivision	Dispersion Coefficients (m ² /s)
Indian Harbor	0.02
Oak Trail Shores	0.1
Port Ridglea East	0.125
Ports O' Call	0.09
Sky Harbor	0.18
Waters Edge	0.08

C.2 Septic system leakage dye study

Table C-2 Breakdown of contacts for septic study

Subdivision	Letters	Subdivision	Phone Calls
Oak Trail Shores	161	Oak Trail Shores	85
Rolling Hills Shores	78	Rolling Hills Shores	52
Port Ridglea	238	Port Ridglea	167
Sky Harbor	313	Sky Harbor	237
Total	790	Total	541

The number of responses, including both willing and non-willing participants, as well as the number of residents actually visited in each subdivision are listed in Table C-3. These are also illustrated in Figure C.31 to Figure C.34 for all four subdivisions.

Table C-3 Residents Responses for septic study

Subdivision	Responses		Actually Visited
	Yes	No	
Oak Trail Shores	5	14	3
Rolling Hills Shores	1	6	0
Port Ridglea	35	24	PRE 18/ PRW 8
Sky Harbor	34	16	15
Total	75	60	44
	135		

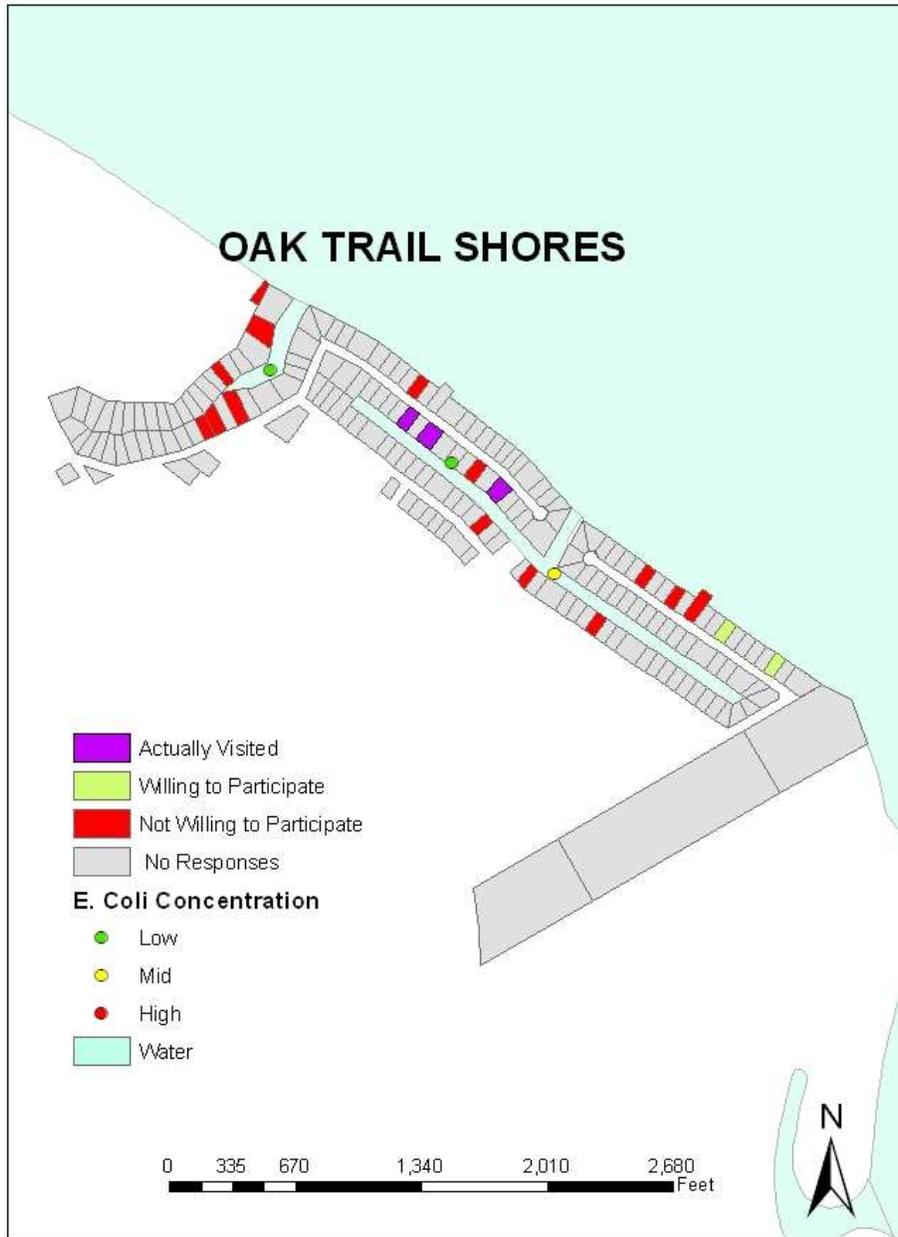


Figure C.31 Septic Study statistics in Oak Trail Shores

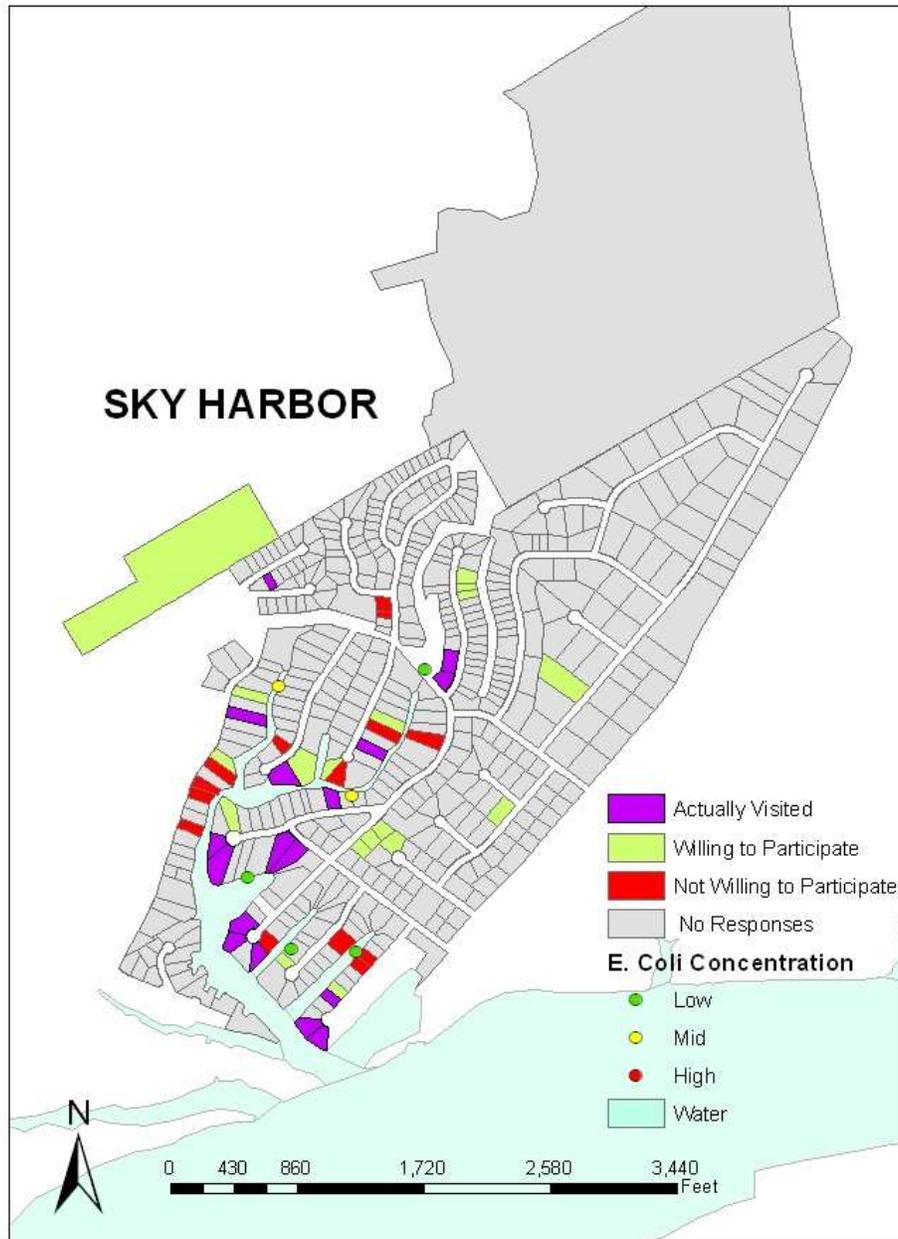


Figure C.32 Septic Study statistics in Sky Harbor

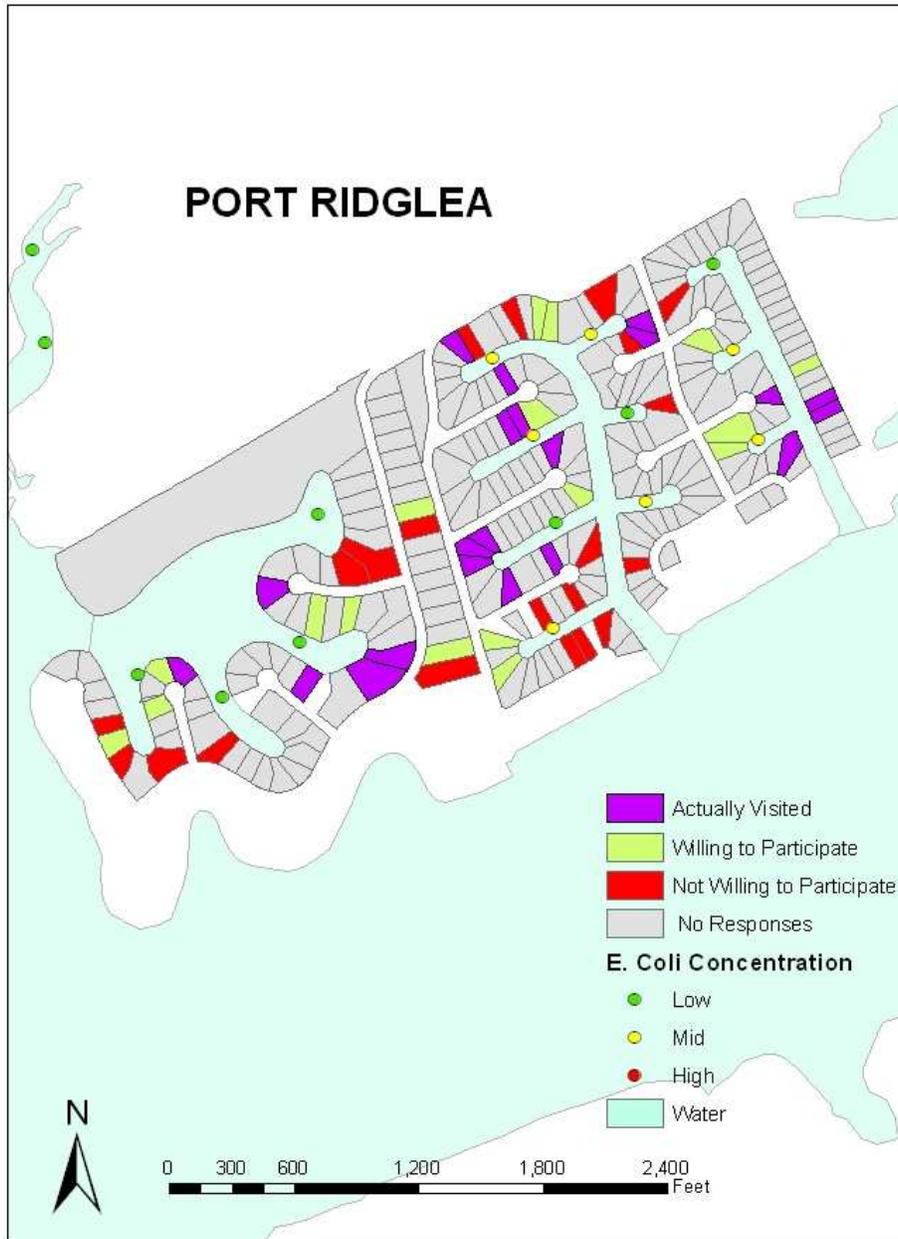


Figure C.33 Septic Study statistics in Port Ridglea

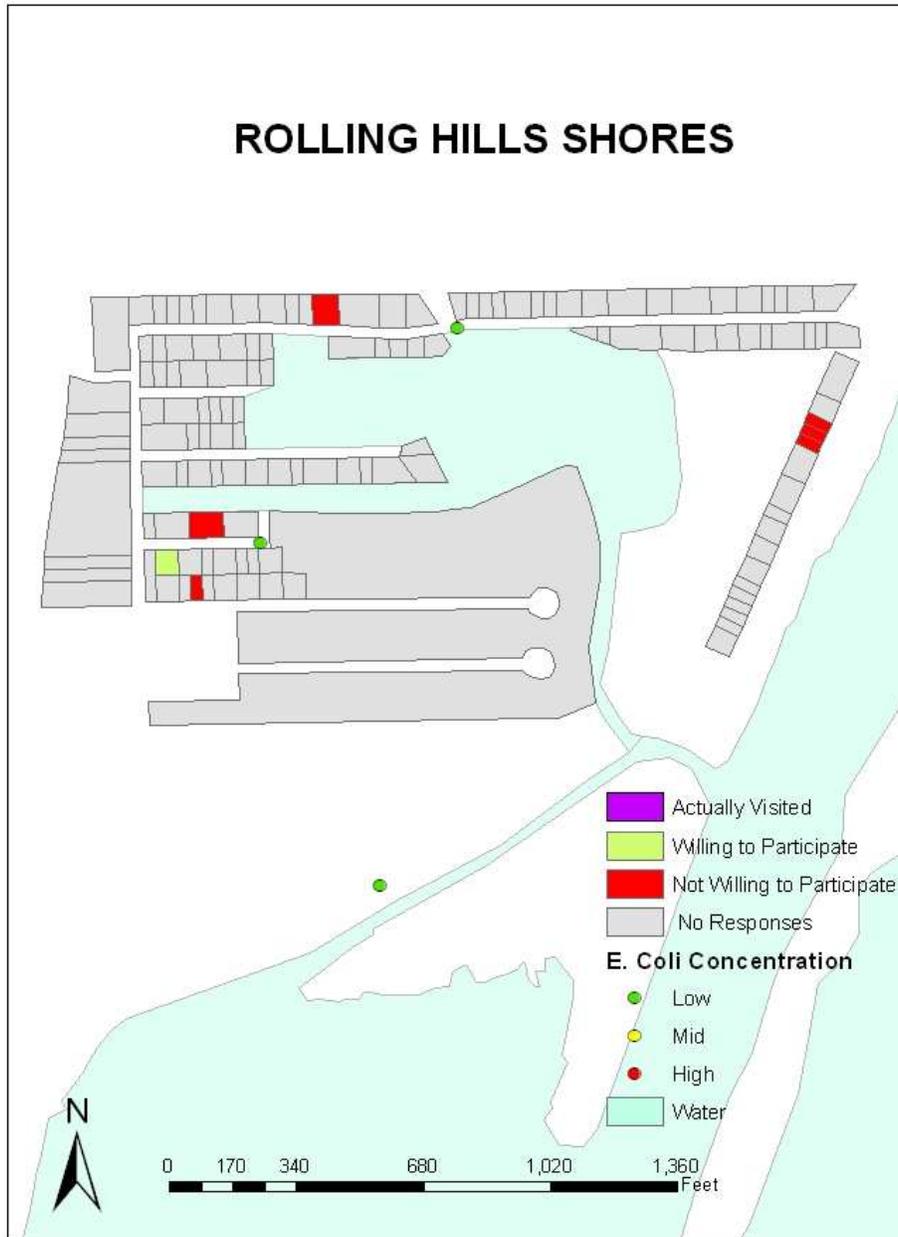


Figure C.34 Septic Study statistics in Rolling Hills Shores