

Eastham Water System Project Overview

BOS Meeting
June 15, 2009

Environmental  Partners

GROUP

A partnership for engineering solutions.

www.envpartners.com

Town-Wide Water System

- n **Lots Served** - approximately 6,100

- n **Demands**

Annual average	1.00 MGD
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Summer average	1.86 MGD
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Peak Day	2.65 MGD
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- n **Water Supply Needs**

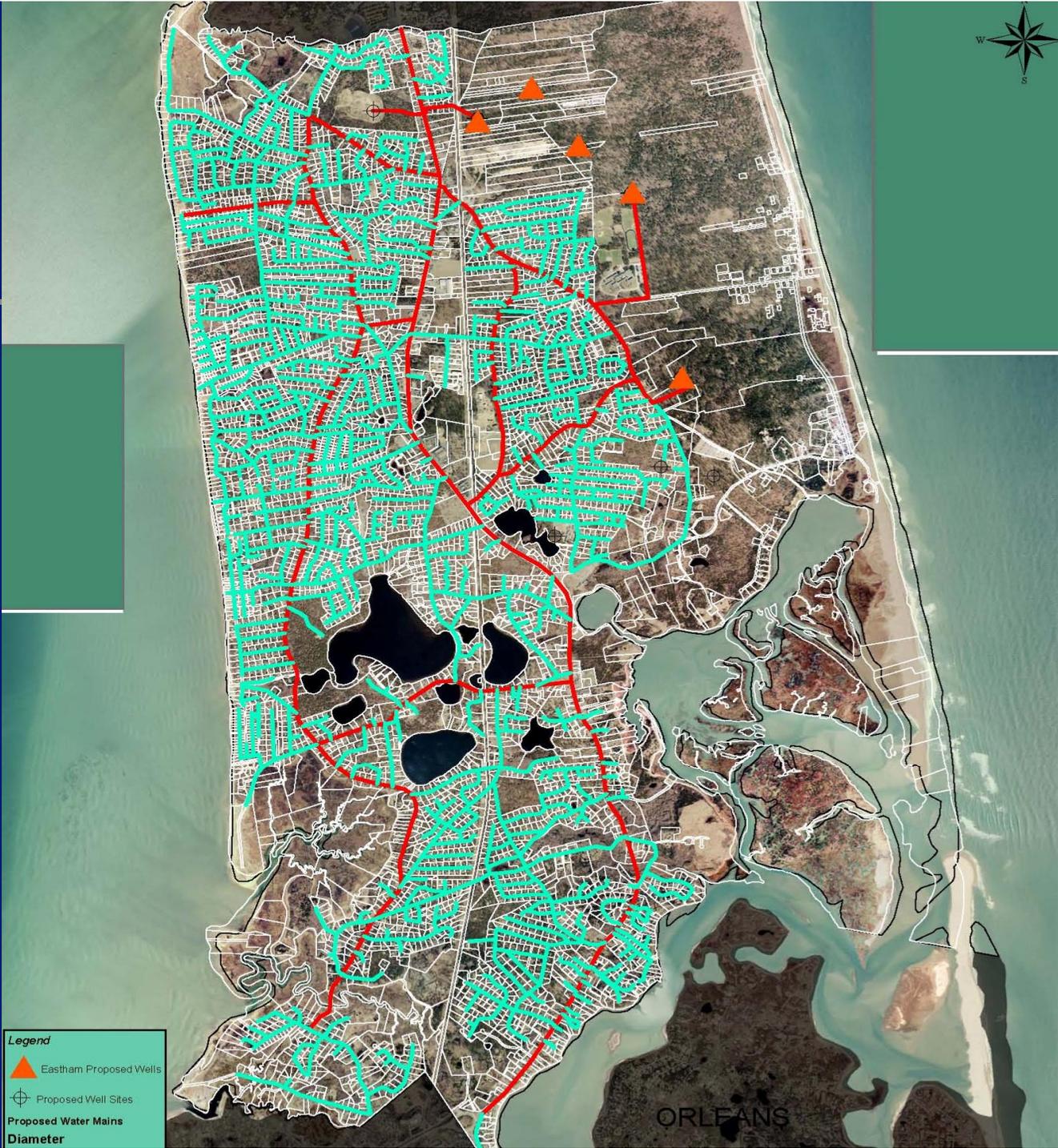
Seek three 1 MGD wells in Town

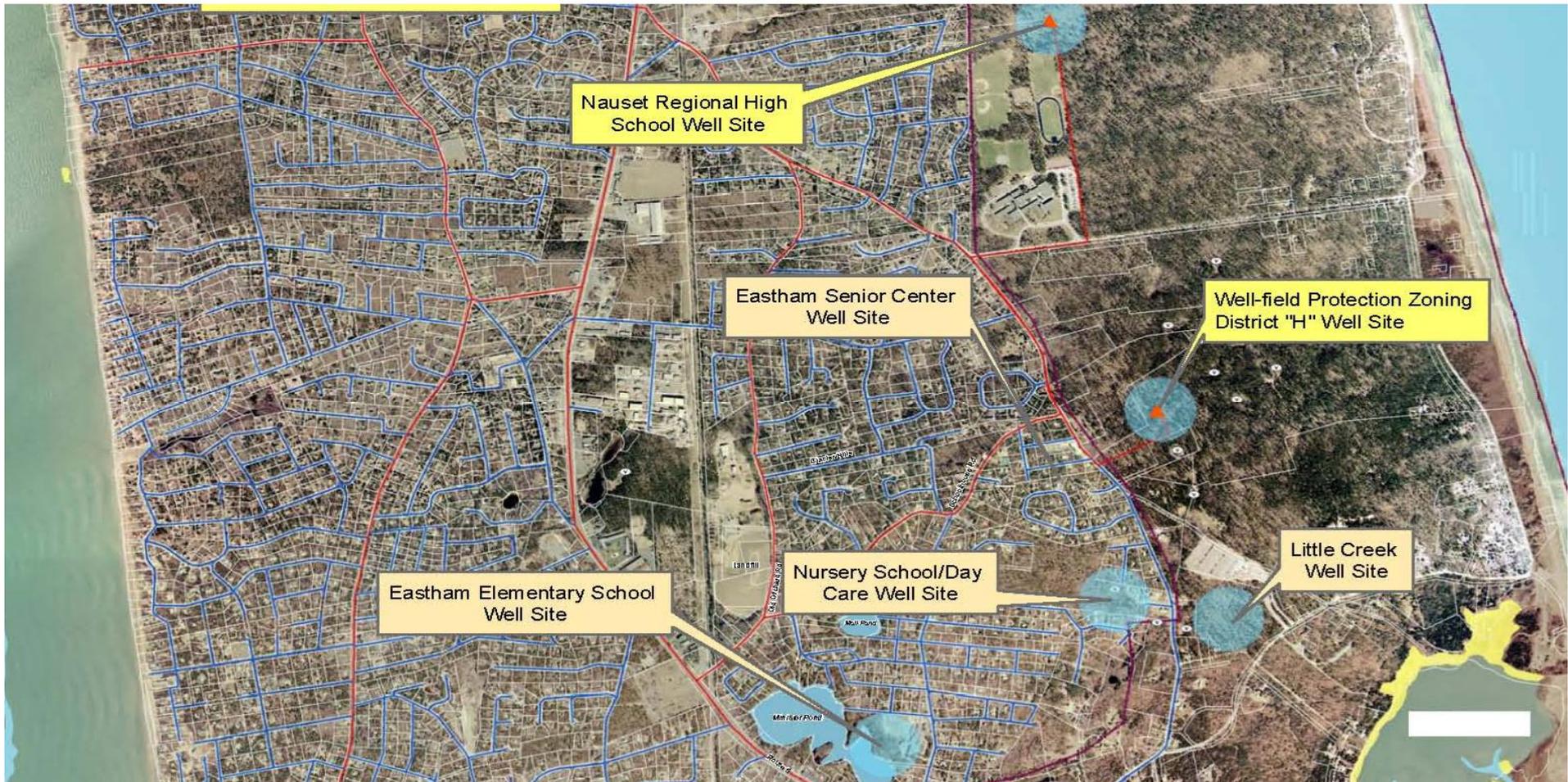
Other supplies (Orleans; Wellfleet)



Town-Wide Distribution System

Conceptual Layout





Water Supply Evaluation (Regional)

Orleans

Can provide 0.5 MGD

Marconi Site in Wellfleet

Promising as a regional source

Possible yield of 1 MGD



Water Supply Investigations (In Eastham)

District H Pump Test

Permitted for 100,000 GPD
Larger yields possible

Nauset Regional High School

Permitted for 100,000 GPD
Larger yields possible

District G

Preliminary tests very promising
Large yields likely

Roach Property

Not viable for large yield

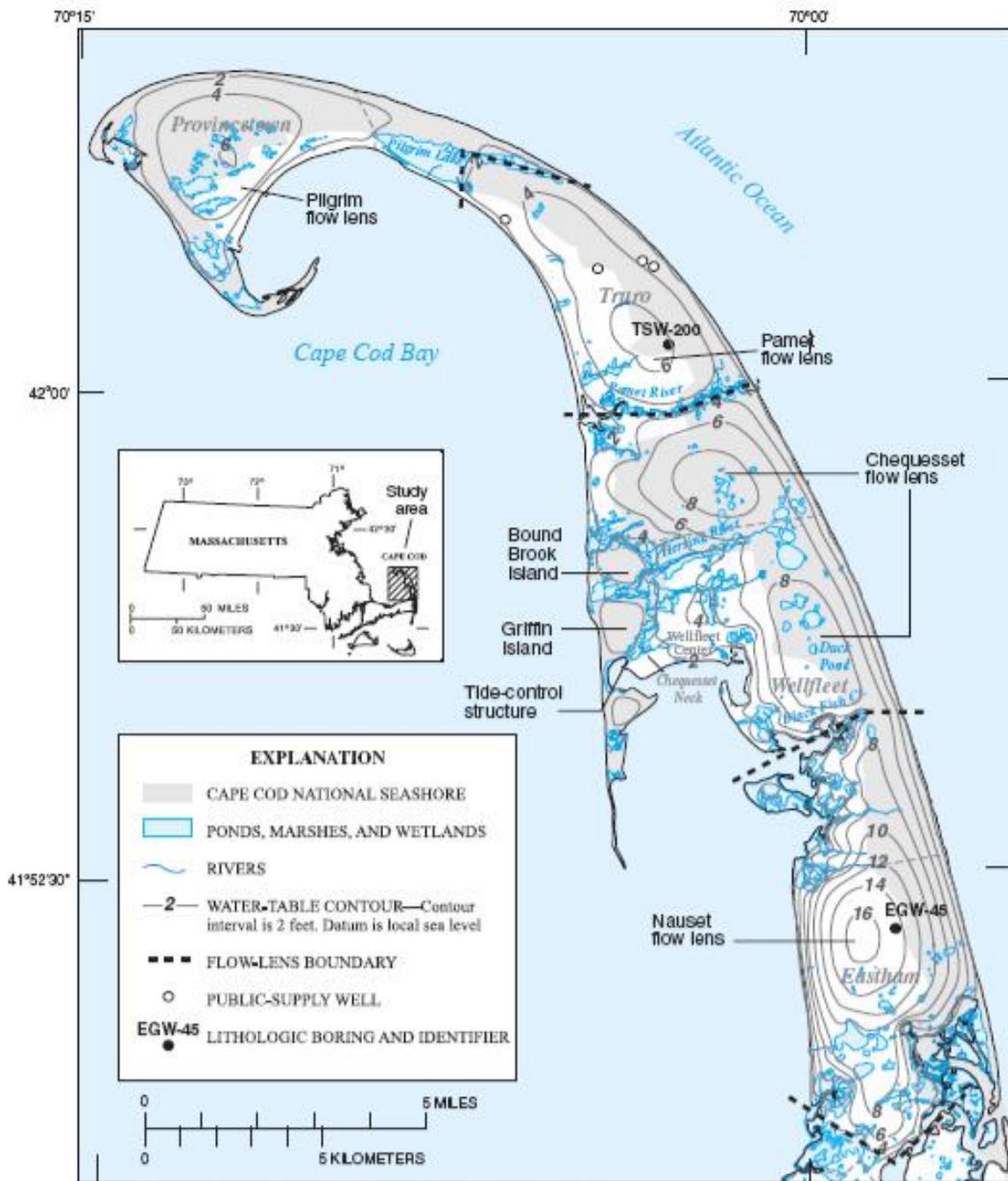


FY '10 Annual Town Meeting

Article 17 – Appropriate \$3.15M to:

- n Conduct pump tests to establish the quantity and quality of water available from...Districts G, H and Nauset Regional High School and perform permitting necessary to provide up to 1 MGD from each site.
- n Evaluate feasibility of obtaining 0.5 MGD or more water from Orleans





Base from U.S. Geological Survey Digital Line Graphs, and topographic quadrangles, Provincetown, Wellfleet, and Orleans, Massachusetts, 1:25,000, Polyconic projection, NAD 1927, Zone 19



Geologic Framework: Nauset Lens

Depositional environment

Layers (sequence):

- Overburden (production zone) – sand and gravels, 100 -150' bgs
- Layered silts and clays – 300' thick
- Bedrock

Groundwater – 30'bgs

Transition zone

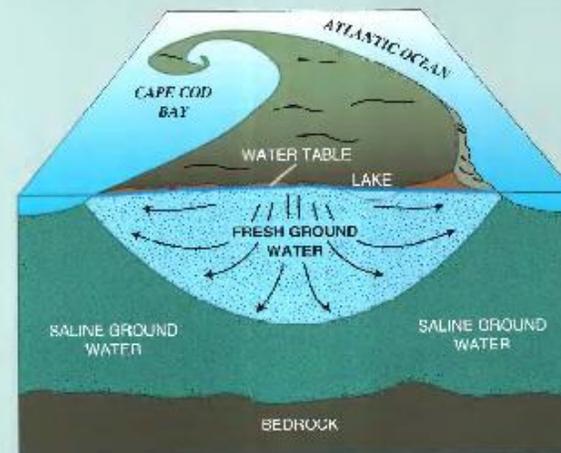
- Aquifer thickness: 300 – 400'
- Interface in silt/clay zone

A partners



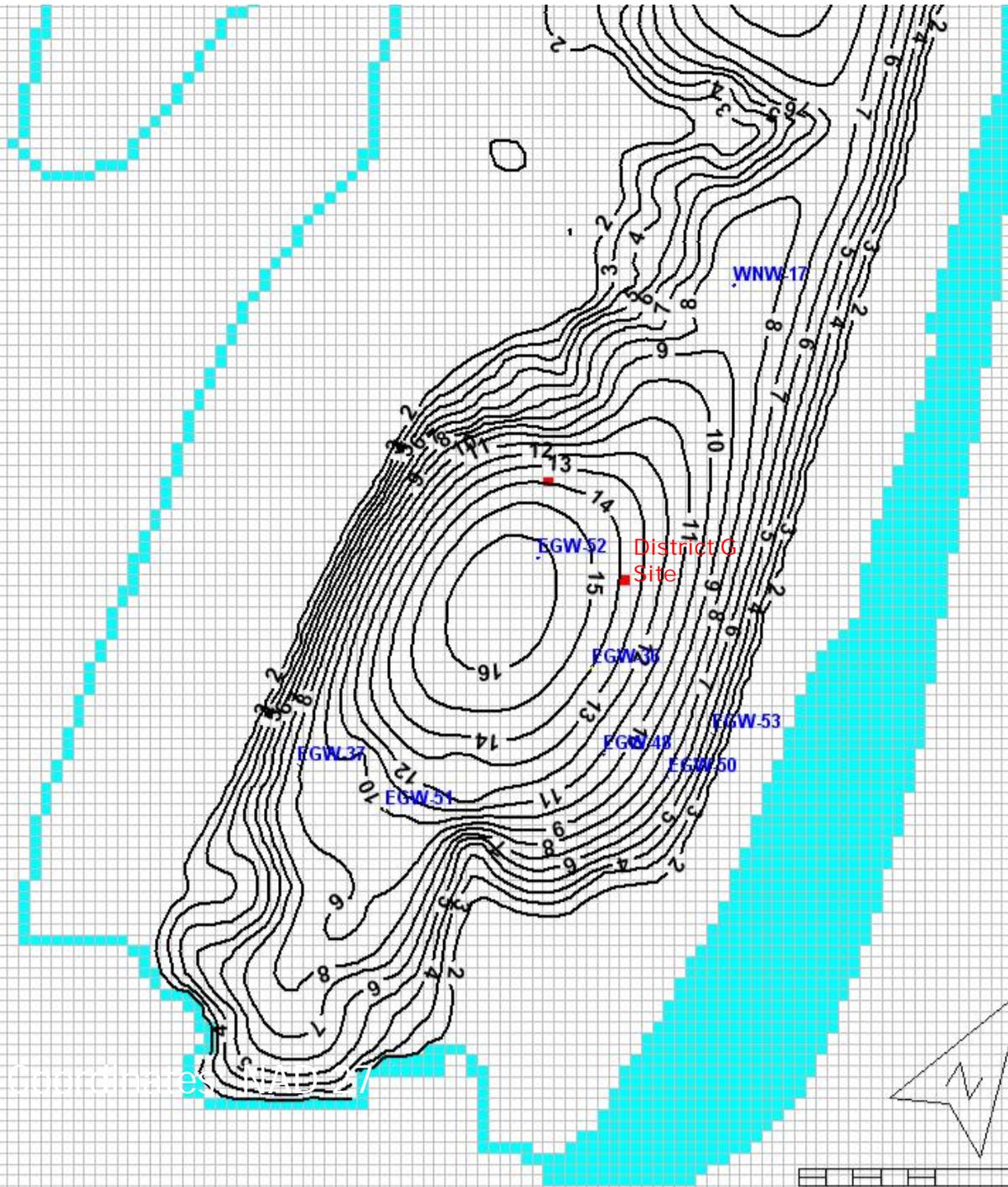
In cooperation with the
National Park Service,
Massachusetts Executive Office of Environmental Affairs,
Cape Cod Commission, and the
Towns of Eastham, Provincetown, Truro, and Wellfleet

Simulated Interaction Between Freshwater and Saltwater and Effects of Ground-Water Pumping and Sea-Level Change, Lower Cape Cod Aquifer System, Massachusetts



Scientific Investigations Report 2004-5014

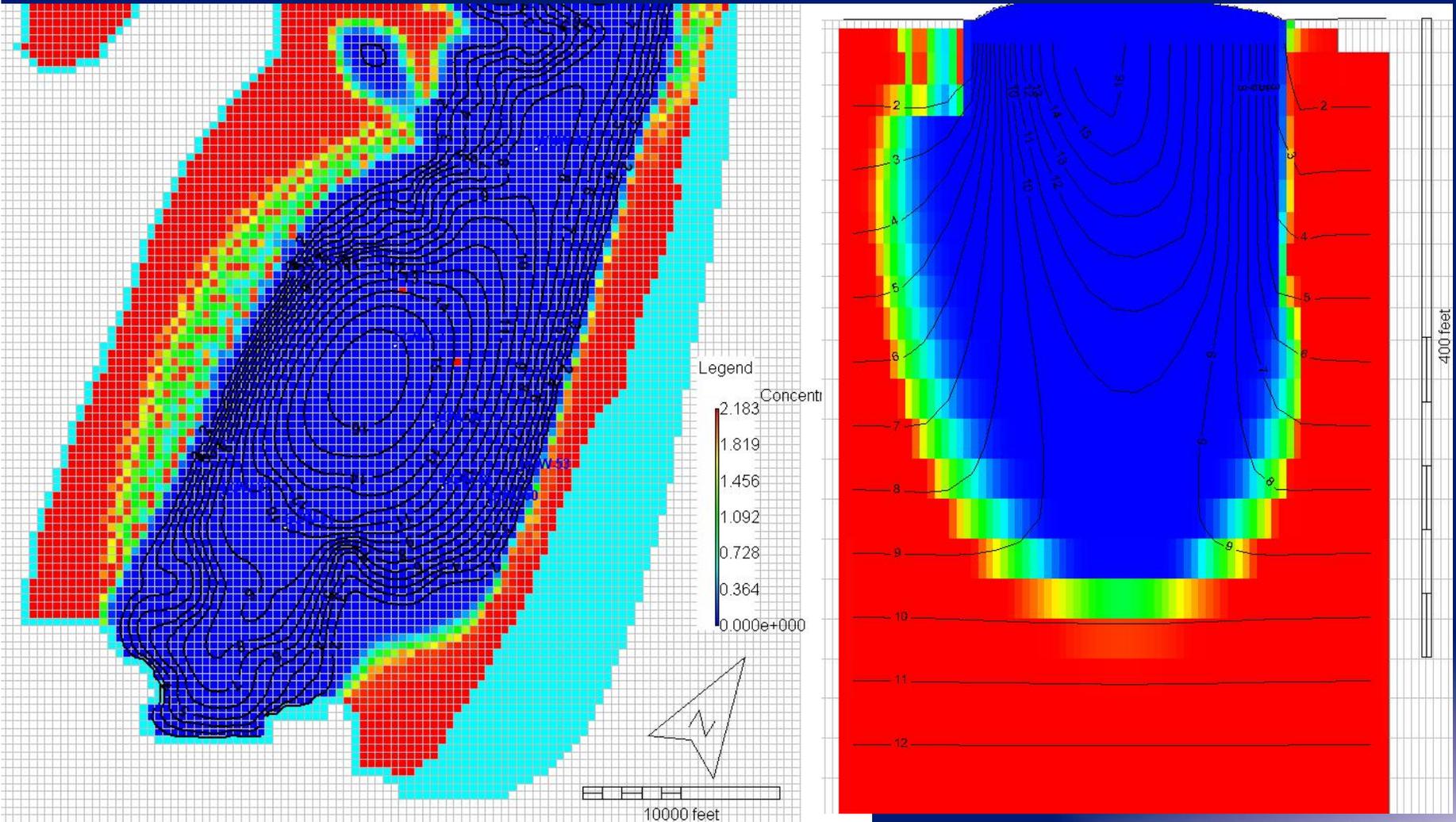
U.S. Department of the Interior
U.S. Geological Survey



Coordinates: NAD 83



SEAWAT MODEL – SALT WATER



Eastham New Water Supply Source Phase 1 – Program Goals

- n Evaluate Orleans connection
- n Gain site-specific information on:
 - Groundwater conditions
 - Aquifer characteristics
 - Nearby resource areas (vernal pools, wetlands)
- n Initial assessment of potential yields
- n Initiate DEP permitting program



Phase 1 Tasks

- n Orleans Water Source Feasibility Study
- n Survey
- n Initial Site Investigations
 - Exploratory Borings/Test Wells
 - Step Drawdown Tests
- n Groundwater Modeling
- n DEP Permitting
 - Request for Site Exam
 - Scope of Work – Aquifer Performance Test



Orleans Connection - Issues

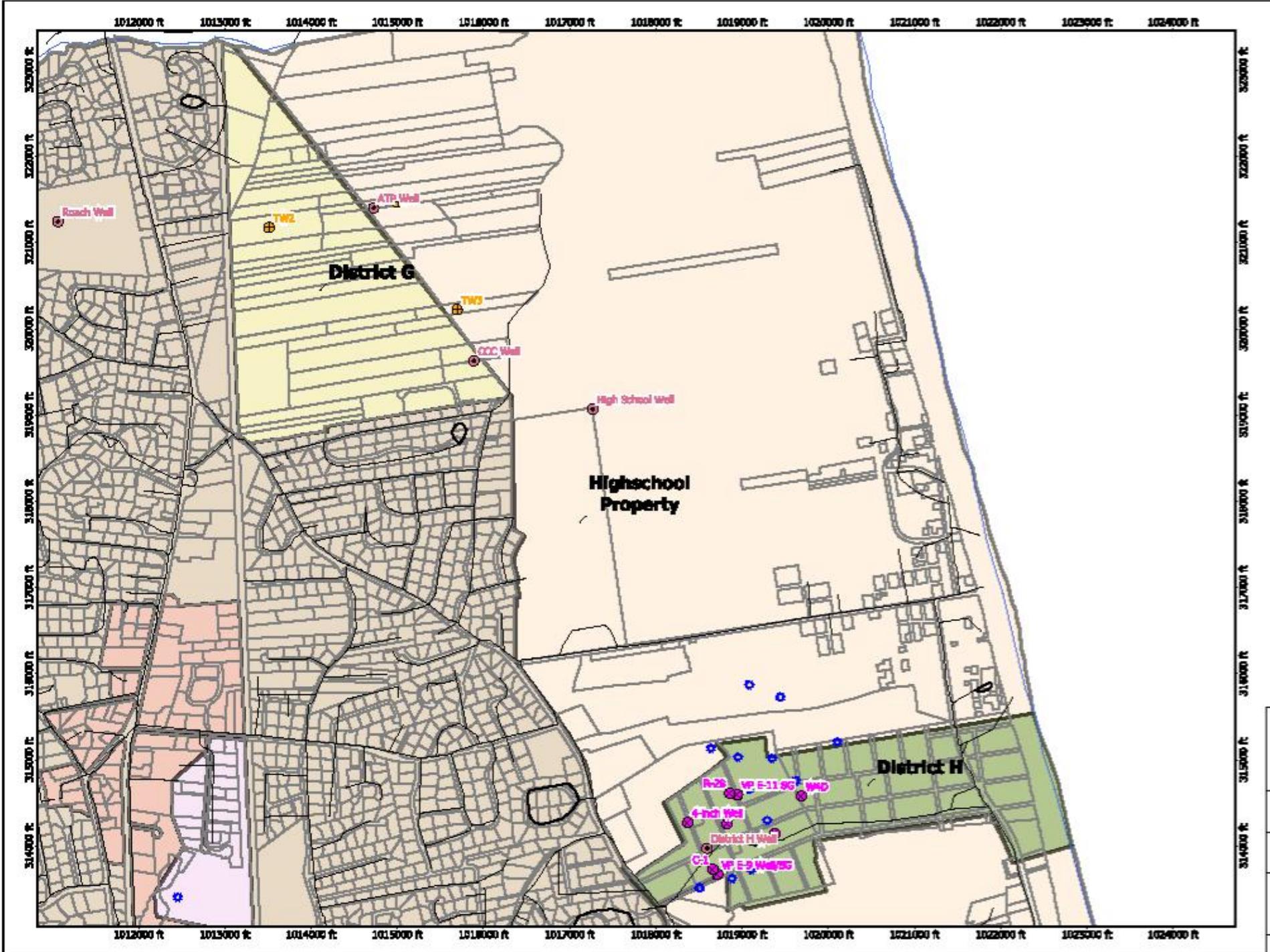
- n Water quantity
- n Connection system (transmission main)
- n Pricing structure
- n Administration

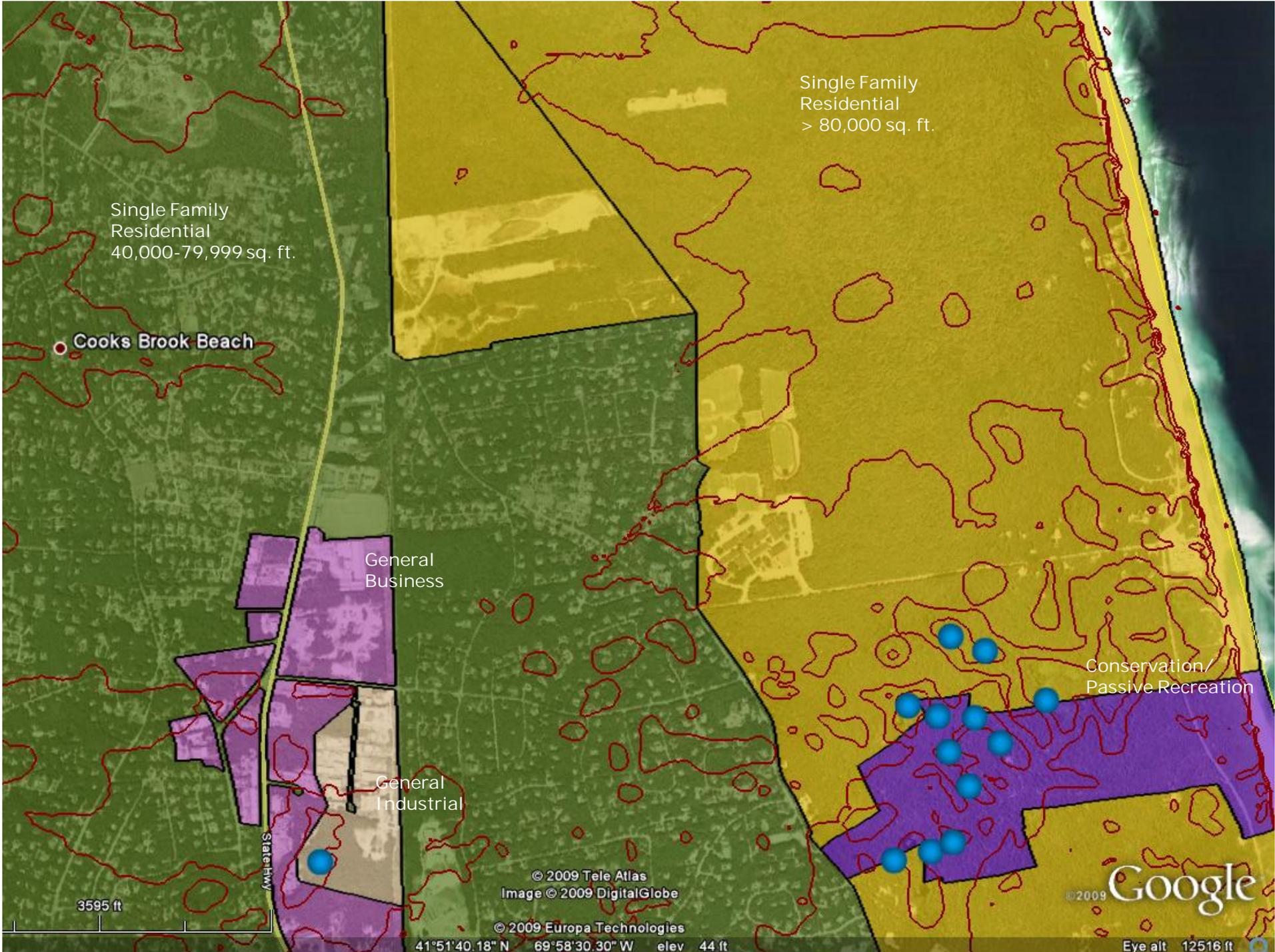


Site survey

- n Property line locations
 - Confirm limit of Town parcels
 - Identify Zone 1 areas
- n Boring locations – elevation
- n Vernal pools, ponds, streams



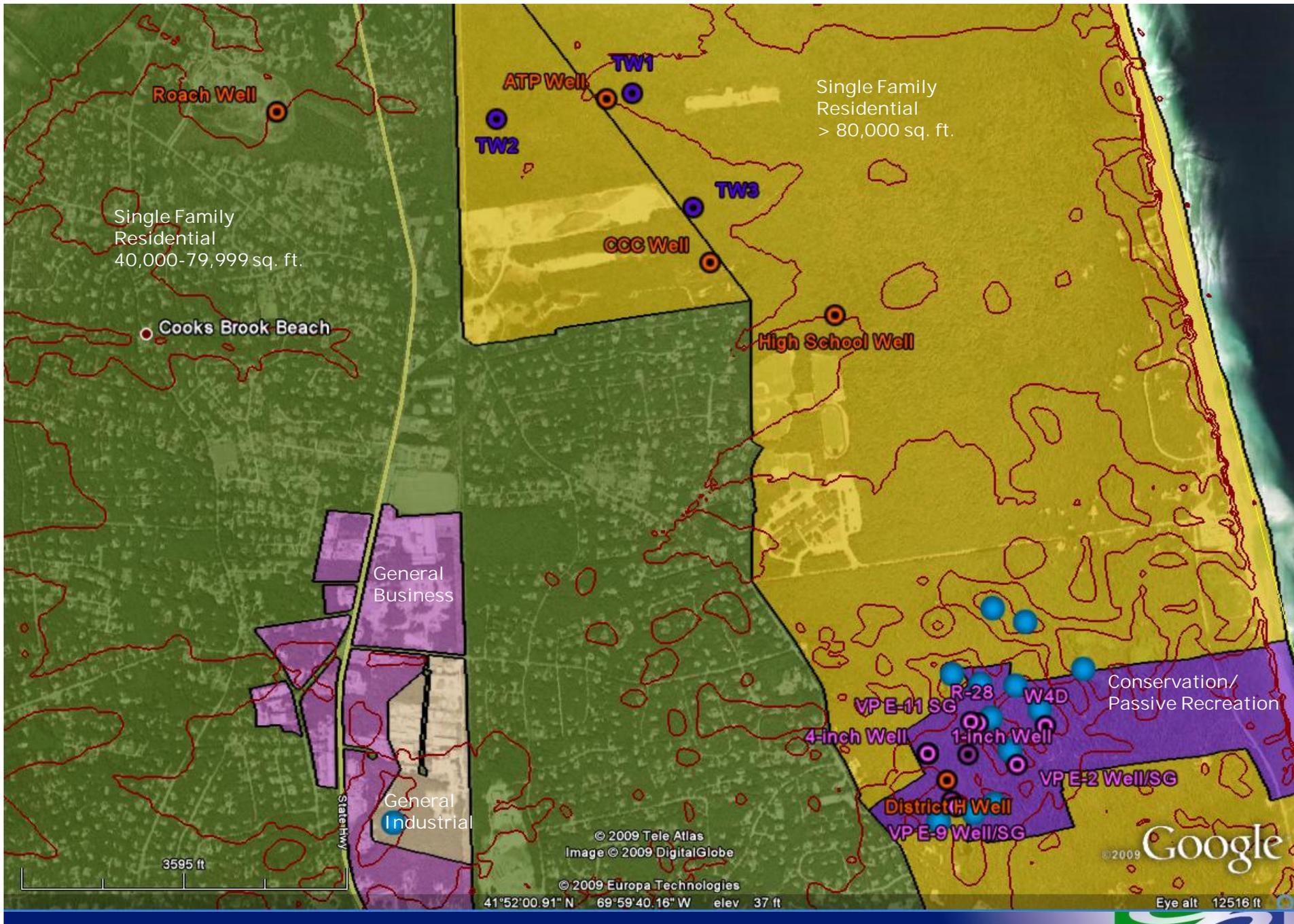




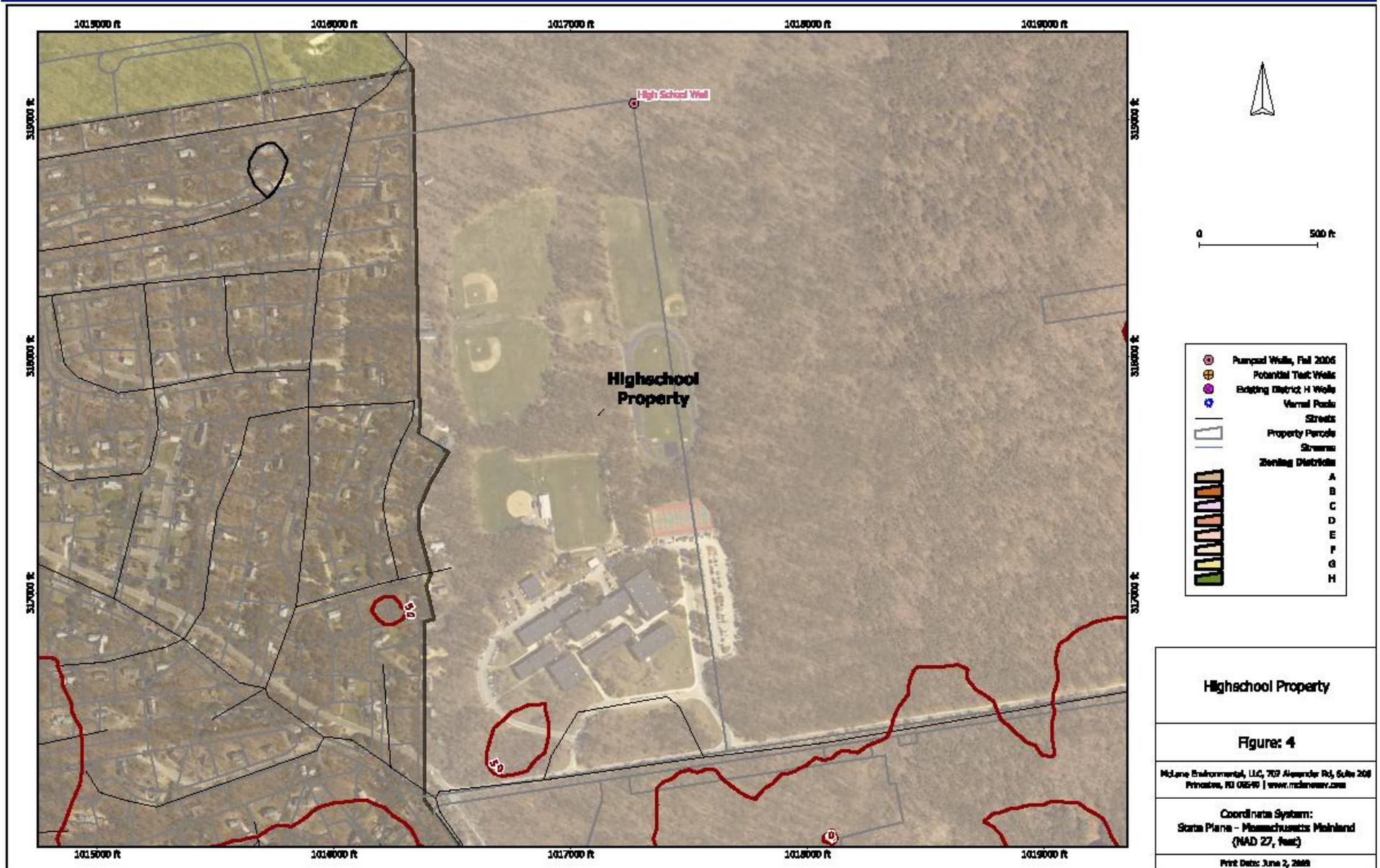
Site Investigations

- n Deep boring: site-specific lithology
- n Install wells at 3 horizons (shallow, medium, deep)
- n Limited pump test
- n Determine aquifer parameters
 - Hydraulic conductivity
 - Specific capacity
 - Transmissivity

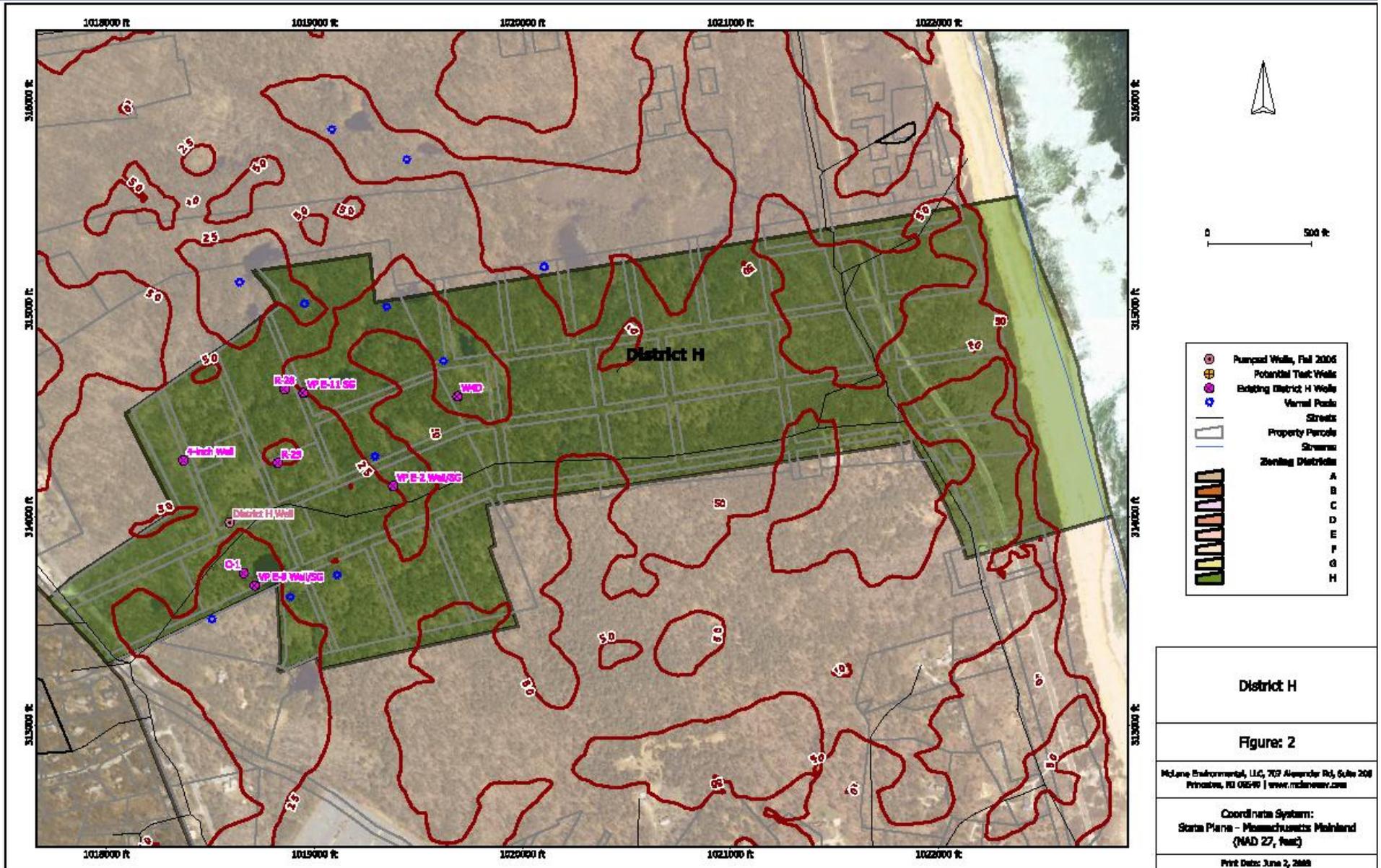




Nauset High School



District H



District H

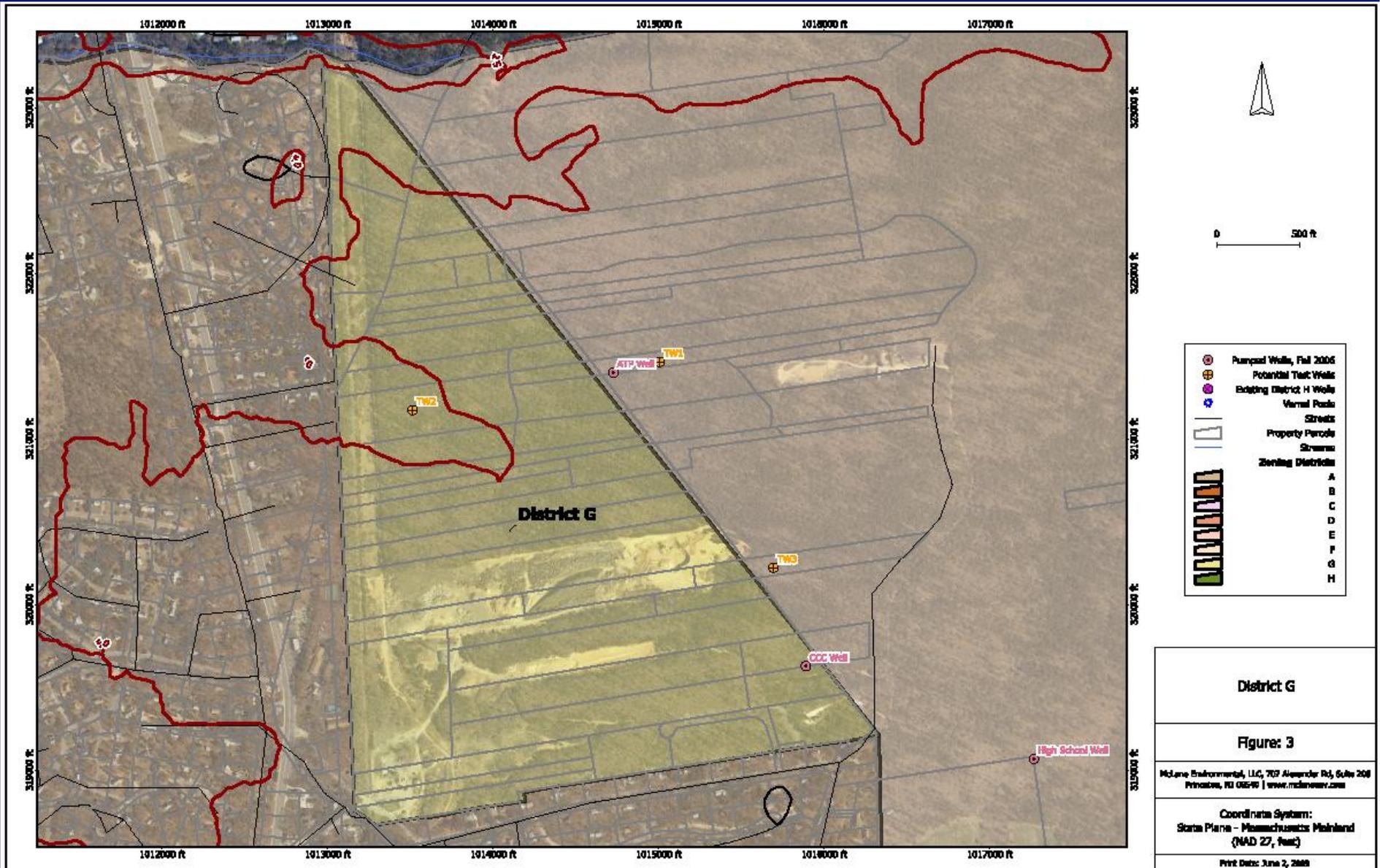
Figure: 2

McLane Environmental, LLC, 707 Alexander Rd, Suite 208
 Princeton, NJ 08540 | www.mclanenv.com

Coordinate System:
 State Plane - Massachusetts Mainland
 (NAD 27, Feet)

Print Date: June 2, 2009

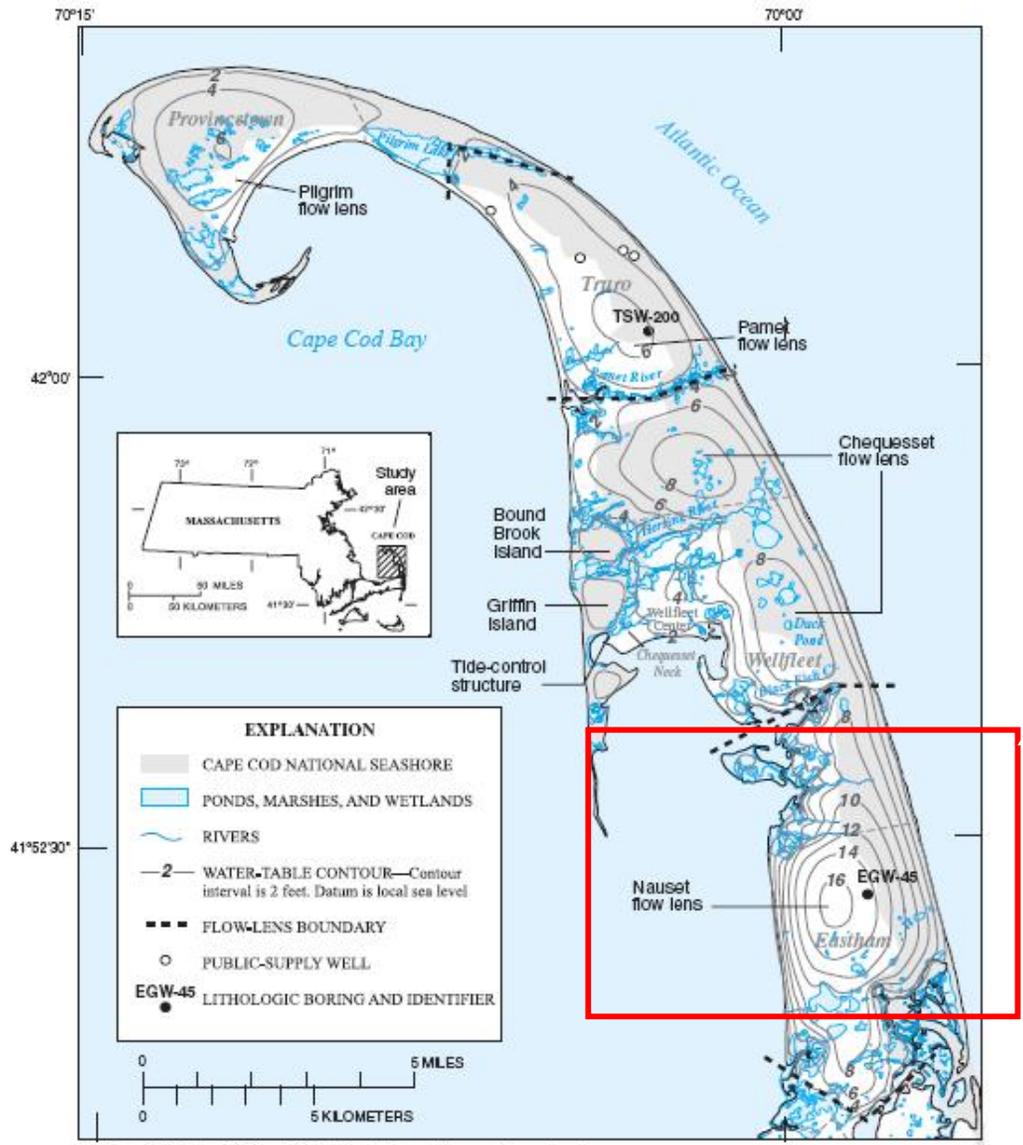
District G



Initial Yield Estimates – Groundwater Modeling

- n Use USGS regional flow model (MODFLOW)
- n Incorporate site-specific information
 - Soil conditions (lithology)
 - Aquifer parameters
- n Withdrawals scenarios/drawdown effects
- n Preliminary assessment of yield





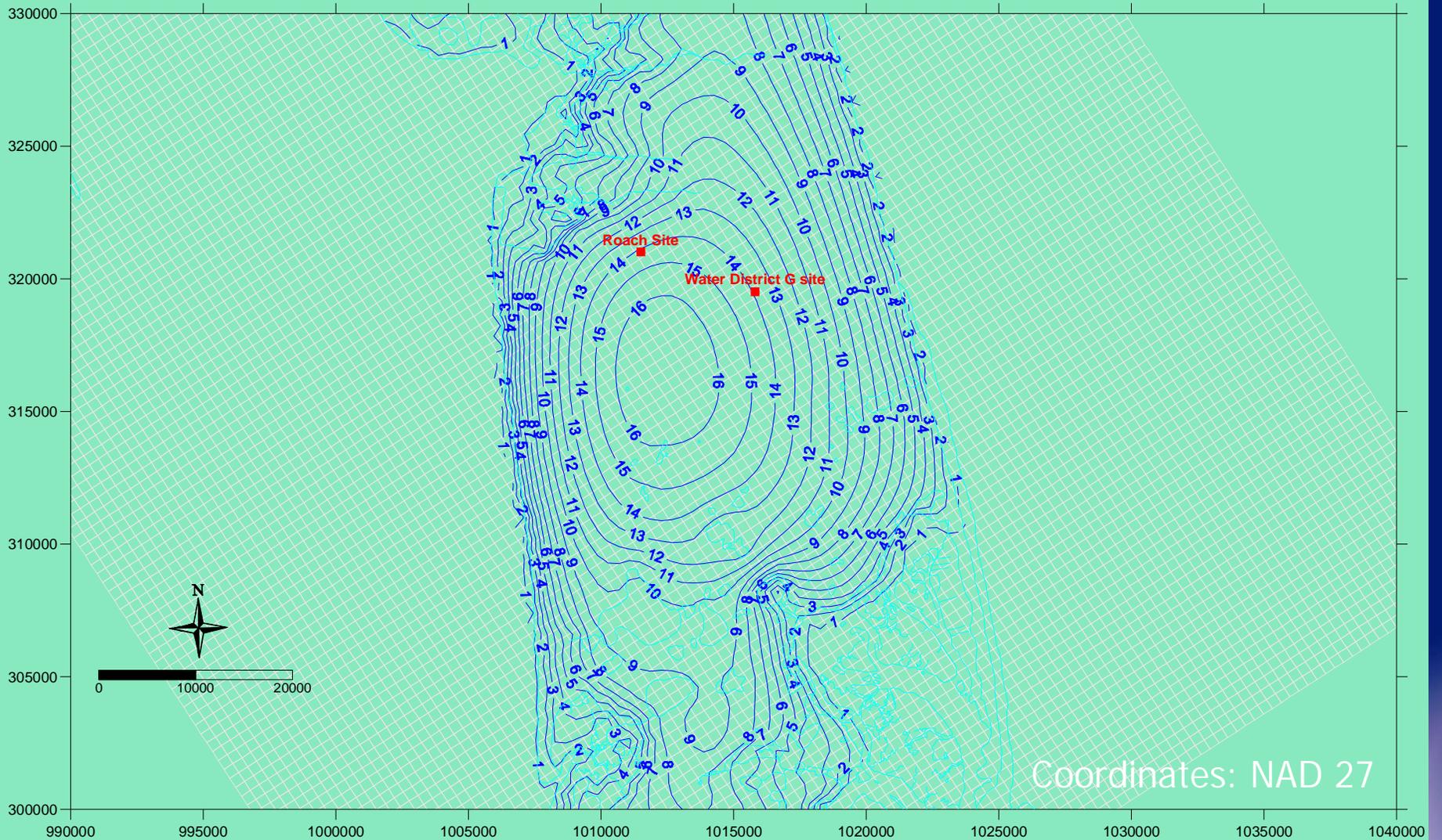
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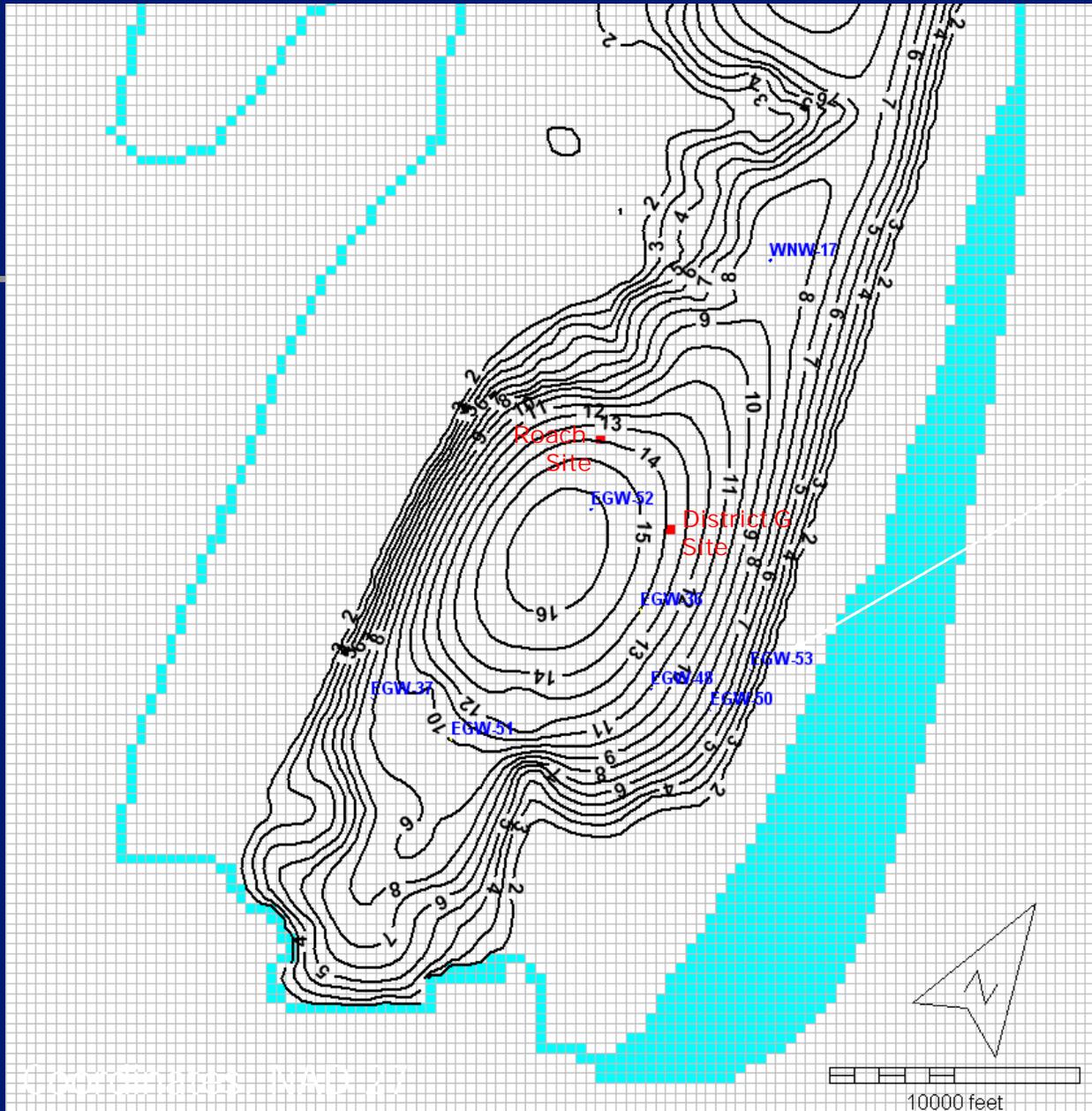
Figure 1. Location of the four flow lenses of the Lower Cape Cod aquifer system and model-calculated water-table contours, Cape Cod, Massachusetts.

USGS
SEAWAT
Model

TMR
Nauset Flow
Lens







USGS
Calibration
Wells

à Need to
add
New
Monitoring
Wells

à Update
Proposed
Pumping

USGS SEAWAT MODEL FLOW

A Partnership for engineering solutions.



Implementation Schedule

1. Survey July – August '09
2. Initial Investigations July – October '09
3. Modeling Sept - December '09
4. DEP Permitting Aug '09 – Feb '10
Site Exam; SOW for Aquifer Test
5. Orleans Study July – December '09



Discussion

