

**City of Jacksonville, Florida Wellhead
Protection Program-Implementation of a
Pathway Focused Approach to Wellhead
Protection-Status Report**

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Environmental Quality Division

Environmental Resource Management Department

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Key Aspects of City of Jacksonville Wellhead Protection Program

- Local ordinance adopted in October 2004 to protect Public Potable Water Wells (PPWWs) completed into the Floridan Aquifer System
- The Pathway Focused Approach addresses the potential for anthropogenic groundwater contamination to migrate from the Surficial Aquifer System to the underlying Floridan Aquifer System through poorly constructed or deteriorating private wells.
- The private wells of primary concern are cased into or through the approximately 400 foot thick Intermediate Aquifer/Confining Unit (sands, clays, and carbonates of the Hawthorn Group)
- Identification, mapping, inspection, and evaluation of private wells and contamination sites within the 750-foot radius Wellhead Protection Areas (WHPAs) established for PPWWs.
- Risk of Contamination Determination

Program Statistics

- Currently 165 WHPA Wells
- WHPA wells range from approximately 400 to 1,500 feet in depth
- Constructed to Public Supply Well Standards-Continuously Cased
- 20-Inch Diameter Production Casings are typical on newly installed Community, Public Supply Wells
- All produce water from the Floridan Aquifer System

Hydrogeologic Framework

(from Sepulveda and Spechler, 2004)

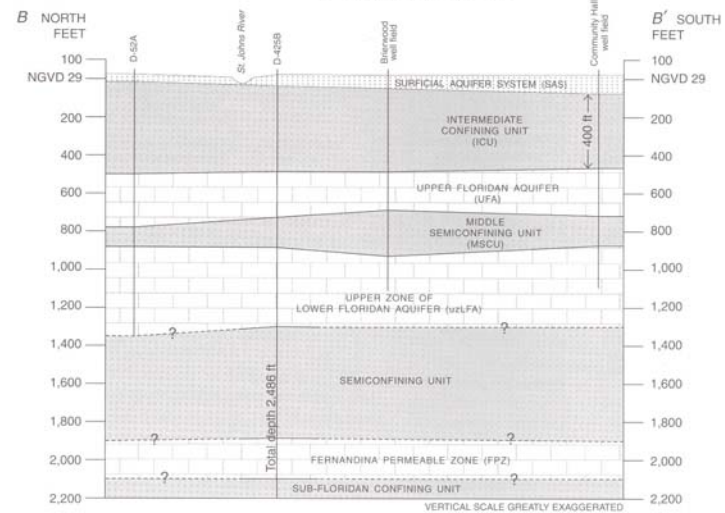
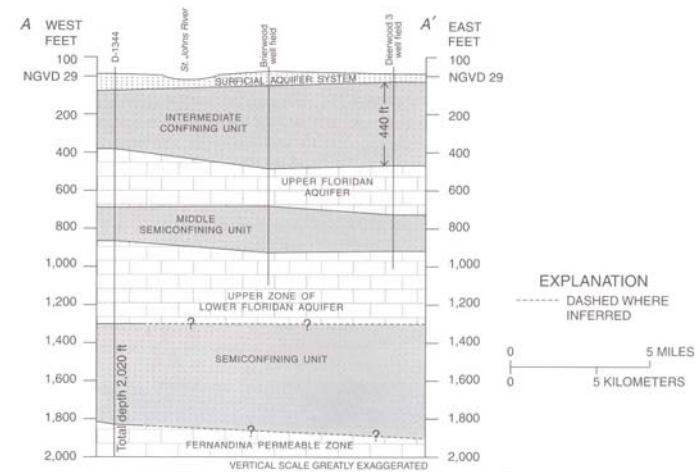
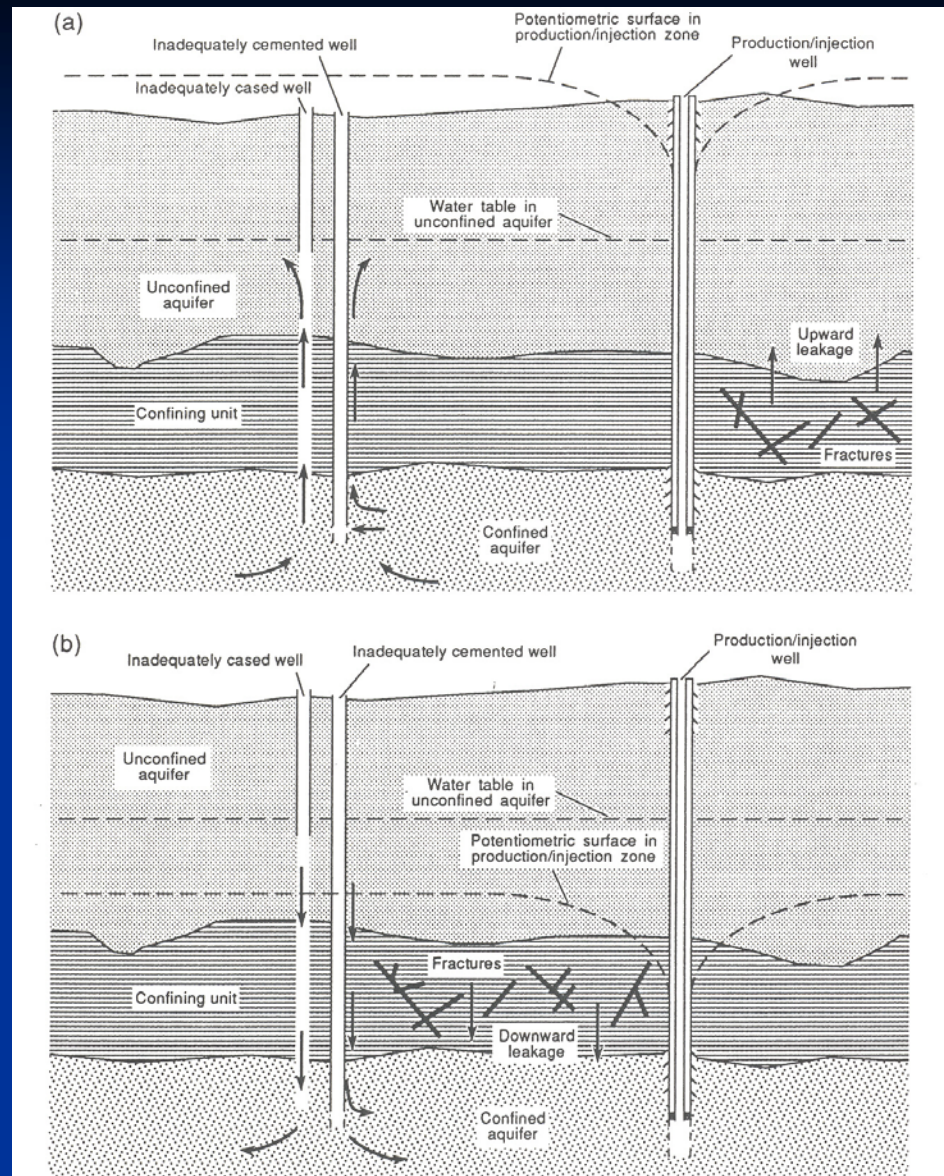


Figure 4. Generalized hydrogeologic sections A-A' and B-B' (section lines shown in figure 2).

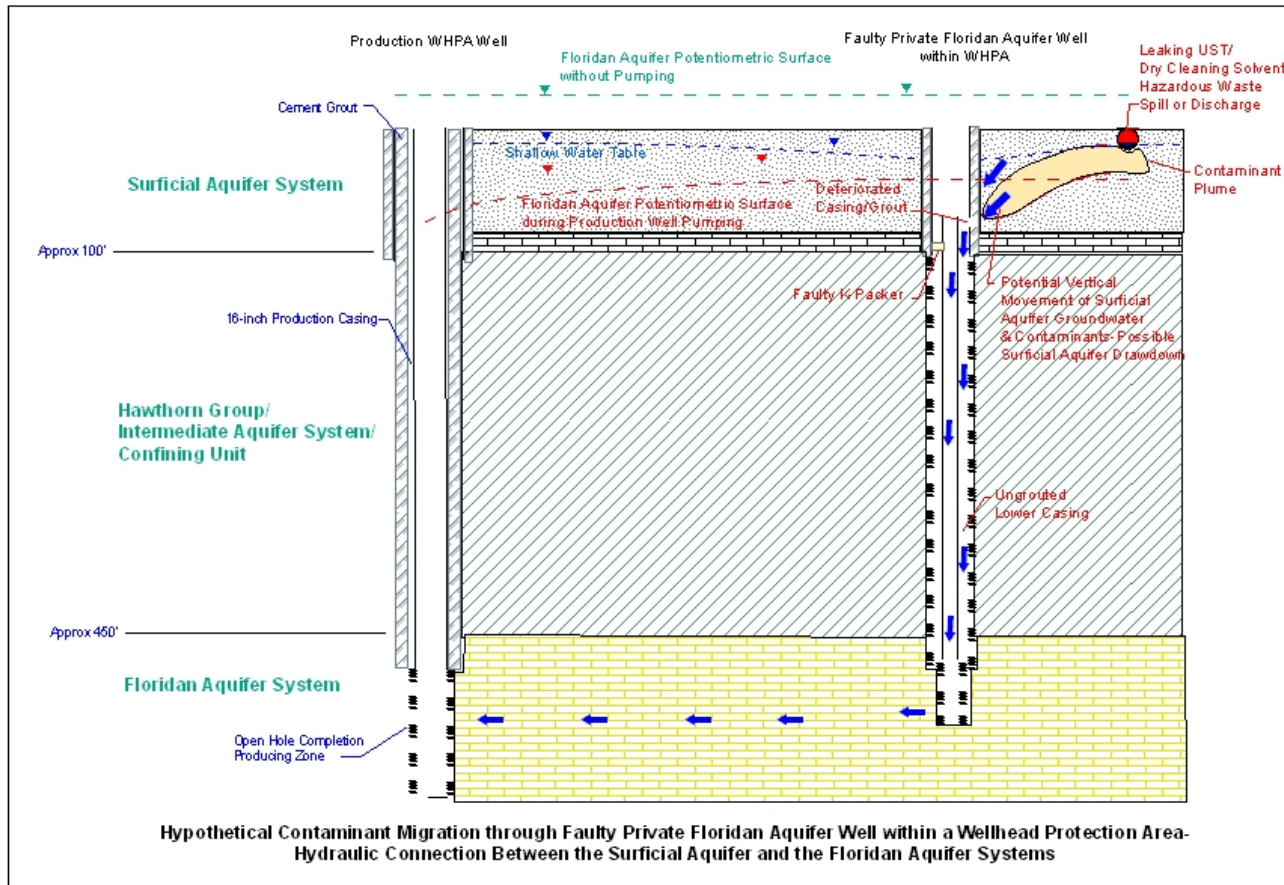
Illustration of Faulty Well Contamination Conduit Scenario

(from U.S. EPA, 1991)



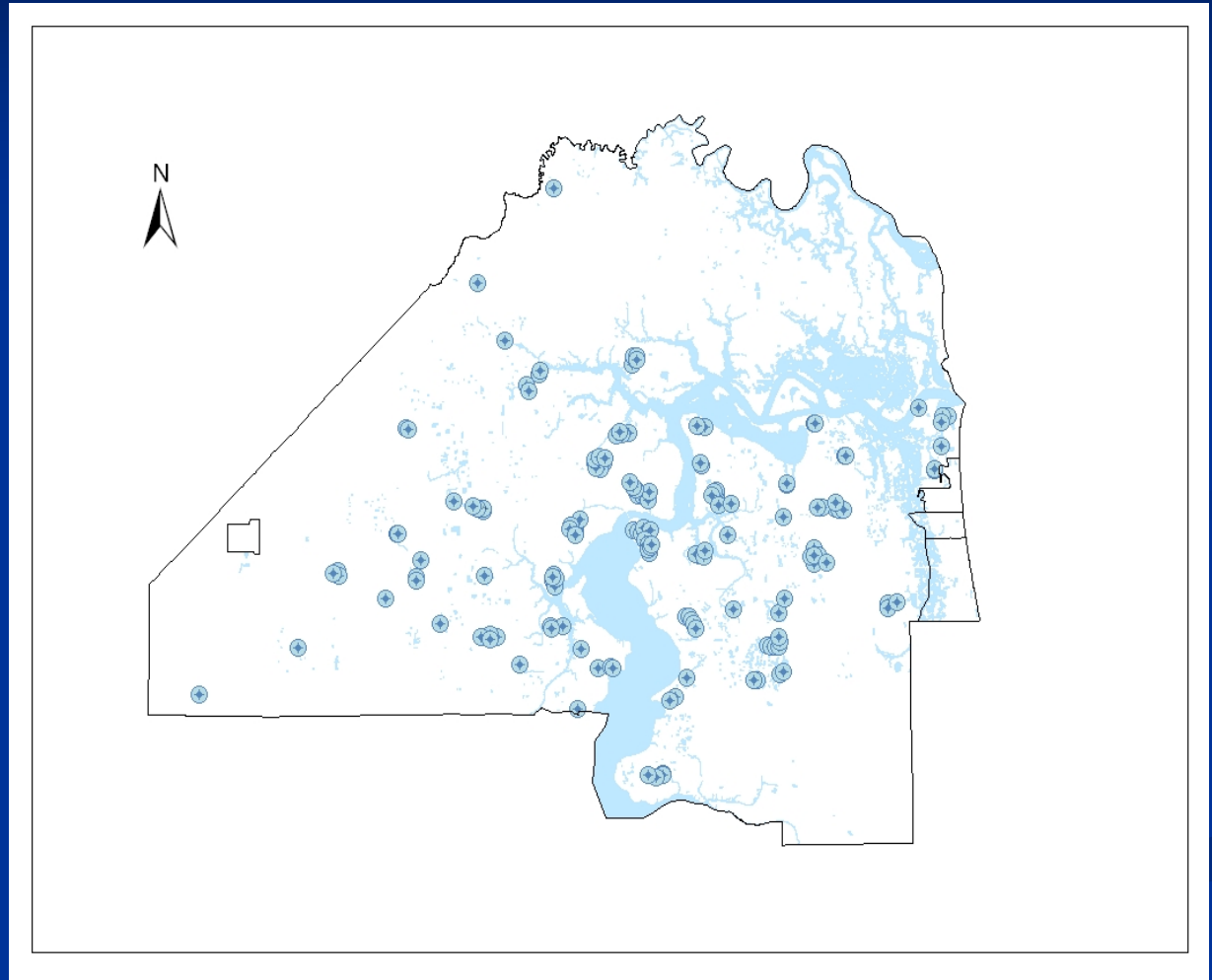
QA 14886c

Figure 4. (a) Confined aquifer where the potentiometric surface is higher than the water table of the overlying unconfined aquifer. The potential for ground-water flow is upward. (b) Confined aquifer where the potentiometric surface is lower than the water table aquifer. The potential for ground-water flow is downward. Downward flow is needed for contaminants to migrate from a shallower unconfined aquifer to a deeper confined aquifer (from U.S. Environmental Protection Agency, 1987).



Public Potable Water Wells

- 165 WHPA Wells
- Floridan Aquifer System
- Community and Non-Transient, Non-Community Wells



Private Wells within WHPAs

- Floridan Aquifer Wells (39)
- Deep Hawthorn Group Wells (“Salt & Pepper Wells”-9)
- Wells with no depth/construction information (Approx 66)

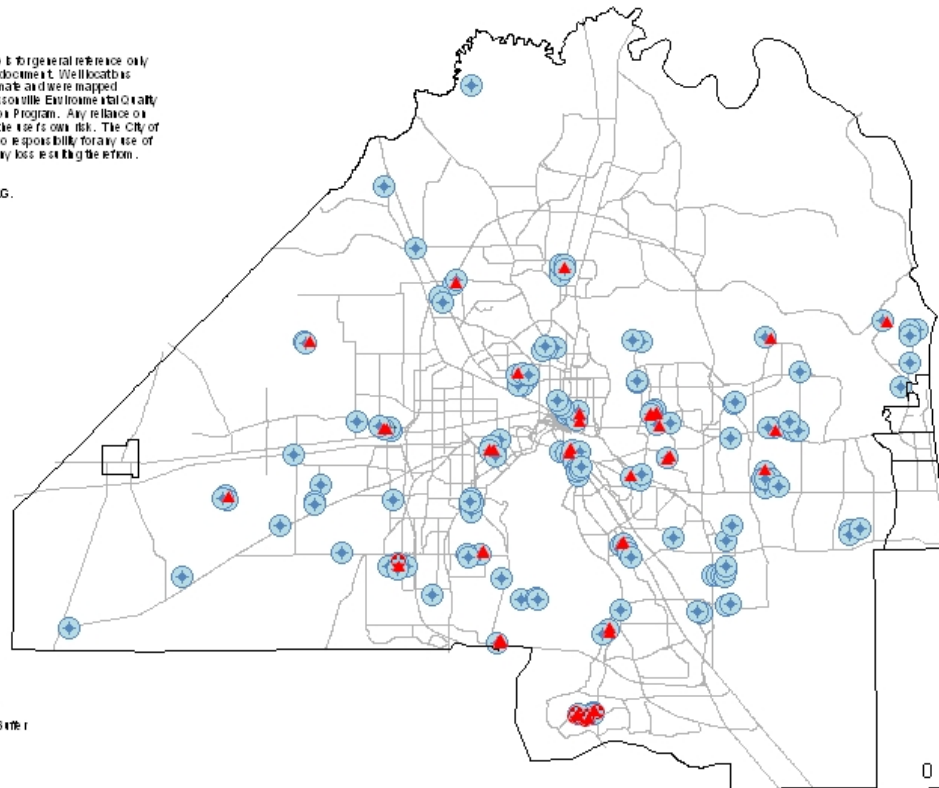
(Based on Review of the COJ Well Inventory Database, SJRWMD CUP Database, USGS Well Inventory; All Floridan and majority of Deep Hawthorn Wells have been inspected by EQD personnel)








Notes & Disclaimer:

The information provided on this map is for general reference only and is not to be construed as a legal document. Wellhead locations represented on this map are approximate and were mapped specifically for use by the City of Jacksonville Environmental Quality Division's (EQD's) Wellhead Protection Program. Any reliance on the information contained herein is at the user's own risk. The City of Jacksonville and its agents assume no responsibility for any use of the information contained herein or any loss resulting therefrom.

Map prepared by: Kevin R. Hayes, P.G.
Technical Services Branch
Environmental Quality Division
City of Jacksonville
August 2006



Legend

-  City of Jacksonville WHPA Well
-  Wellhead Protection Area 750 ft Buffer
-  WHPA Private Floridan Well
-  WHPA Private Hawthorn Well
-  Major Roads

**Private Floridan Aquifer and Deep Hawthorn Wells within
Wellhead Protection Areas
Jacksonville, Duval County, Florida
August 2006**

WHPA Contamination Sites – Statistics

Based on available GIS datasets, the following summarizes the types of contamination sites located within WHPAs and the frequency of occurrences:

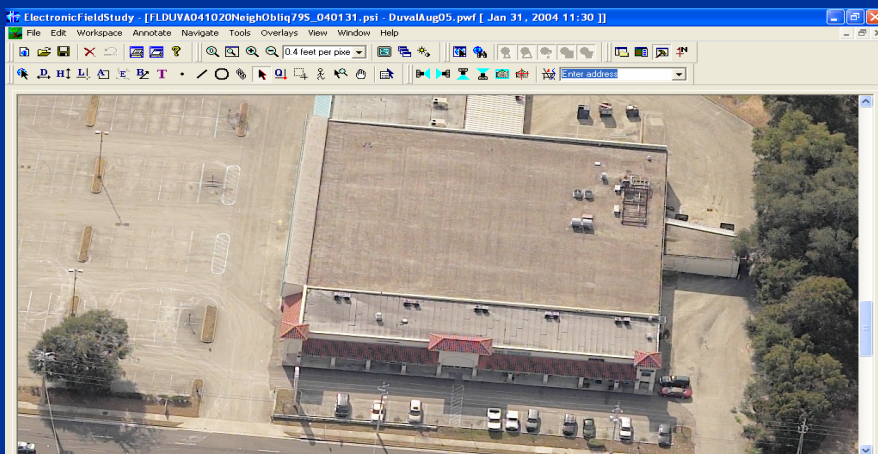
- Petroleum UST/AST Discharge Sites (21)
- Dry Cleaning Solvent Cleanup Program Sites (4)
- Responsible Party Hazardous Waste Sites (5)
- Former Dump/Landfill Sites (7)
- Ash Sites (2)

(Based on data provided by the Duval County Health Department, the City of Jacksonville, and the Florida Department of Environmental Protection, 2004-2006)

Typical Contamination Sites of Interest

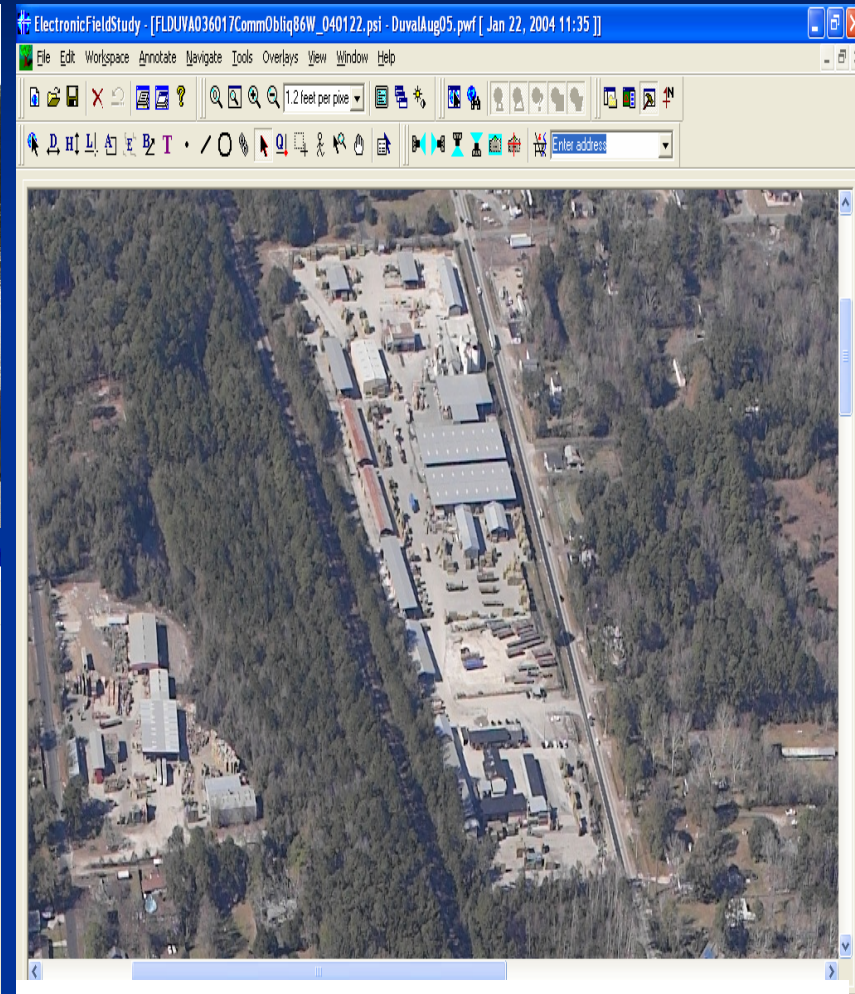


Petroleum UST/AST Sites



Dry Cleaner Sites

(Pictometry International 2004)



Industrial Sites

(Pictometry International 2004)

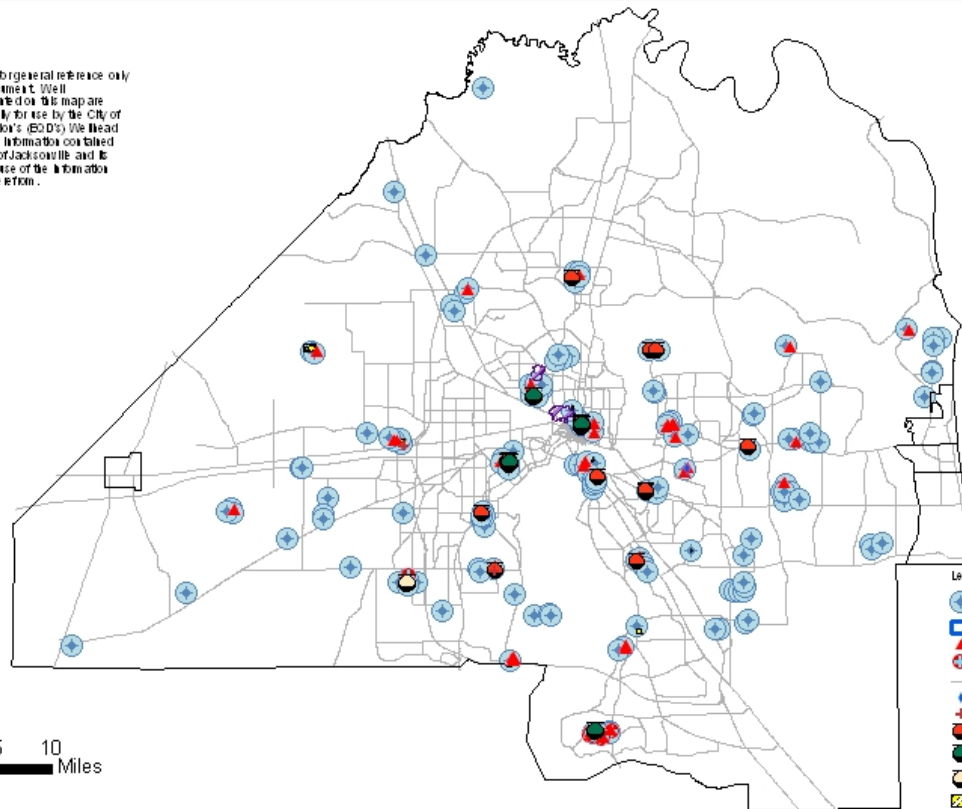


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Technical Services Branch
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August 2006

0 2.5 5 7.5 10
Miles



Legend

- City of Jacksonville WHPA Wells
- Wellhead Protection Area (WHPA) Buffer
- WHPA Private Floridan Well
- WHPA Private Hawthorn Well
- Major Roads
- FDEP Dry Cleaning Solvent Cleanup Program Sites within WHPAs
- Hazardous Waste Responsible Party Sites within WHPAs
- FDEP Petroleum Program Eligible Sites within WHPAs
- Petroleum Responsible Party Sites within WHPAs
- Petroleum Responsible Party Program Eligible Sites within WHPAs
- Dump Landfill Sites within WHPAs
- Ash Sites within WHPAs

Contamination Sites & Private Floridan Aquifer/Hawthorn Wells within Wellhead Protection Areas Jacksonville, Duval County, Florida August 2006

Petroleum Contamination Sites within Wellhead Protection Areas

Jacksonville, Duval County, Florida

Site Name	Address	Facility ID	WHPA	Year of Discharge/ Discovery	Status	Contamination Offsite
Gate #1110 ^a	10044 Atlantic Blvd	168506957	Leon Road MHP	1988	RA-O&M	Yes
Hess #09314 ^a	4586 San Juan Av	168507035	Lakeshore No. 1	1990	RA-O&M	No
Lil Champ Food Store #24 ^a	5102 Timuquana Rd	168507101	Groff Apts	1990	SRCO ^p	No
Lil Champ Food Store #1100 ^a	3006 Post St	168507188	McDuff No. 1	1987	SRCO ^p	No
Lil Champ Food Store #506 ^a	4275 University Blvd N	168521496	Woodmere	1986	RA-SR	Yes
Earl Horne Inc. ^a	1100 N Main St	168629813	Main St	1988	RA-O&M	No
Osteen Volvo ^a	2525 Phillips Hwy	168838524	River Oaks No. 1	1990	SRCO	No
DCSB-Highlands Elementary ^a	1000 DePaul Dr	168842007	Highlands	1994	SA-SSA	No
Snack & Gas #2 ^a	6680 Powers Av	168944325	Brierwood	1992	RA-SR	No
Hess #09388 ^a	5405 Beach Blvd	169101711	Lovegrove	1991	SRCO	No
JEA FWS Woodmere WTP ^a	5710 Edenfield Rd	169200050	Woodmere	1992	SRCO	No
EHT Corporation ^a	937 N Main St	168733502	Main St	1991	RA-O&M	No
Jacksonville LLC #7 ^a	1060 S McDuff Av	168841871	McDuff No. 1	1988	SRCO	No
Bostwick Trust Property ^a	940 S McDuff Av	169101446	McDuff No. 1	1991	RA-O&M	No
Mike Shad Ford ^a	Spring Glen Rd	168629604	Lovegrove	1988	NAM	No
Publix Supermarket #165 ^a	4399 Roosevelt Blvd	168731711	Lakeshore No. 1	1991	RA-O&M	No
Jacksonville City-#12 ^b	1055 S McDuff Av	168521416	McDuff No. 1	1989	Rescored	Undetermined
DCSB-Susie Tolbert Elementary ^b	1925 W 13th St	169600846	Fairfax	1998	SA-SSA	No
JEA Water Works & Museum ^b	1002 N Main St	169804591	Main St	2003	RA-SR	Undetermined
Halsema Nursery ^b	2525 Orange Picker Rd	169807137	Community Hall	2004	SRCO ^p	No
JEA Southwest WTP ^c	7754 Wheat Rd	168737286	Southwest	1987	RA-RAP-PT	No

Dry Cleaning Solvent Cleanup Program Sites within Wellhead Protection Areas

Jacksonville, Duval County, Florida

Site Name	Address	Facility ID	WHPA	Year of Discharge/ Discovery	Status	Contamination Offsite
Crown Cleaners	5150 Timuquana Rd #1	169500733	Groff Apartments	1996	VC	No
Debi Sages Cleaners	4429 Roosevelt Blvd #1	169500758	Lakeshore No. 1	1996	ReScore	Undetermined
Dixie Cleaners (former)	1931-1951 Blanding Blvd	169500772	Lakeshore No. 1	Pre-Mid 1998	RA	Yes
Star Cleaners Depot	7181 Crane Av	169701279	HA Ranch Daycare	Pre-Mid 1998	ReScore	Undetermined

Hazardous Waste Responsible Party Sites within Wellhead Protection Areas

Jacksonville, Duval County, Florida

Site Name	Address	Facility ID	WHPA	Year of Discharge/Discovery	Status	Contamination Offsite
Dantzler Lumber & Export Co.	7850 W Beaver St	10450	Marietta	Pre-1987	RA	Yes
Park View Inn	901 N Main St	152721	Main St	Pre-1912	SA	Yes
Main St. MGP/Confederate Park	Main, Orange, & Phelps Sts	185118	Main St	Pre-1912	SA	Yes
JTA-Montana Avenue Property	Montana Av	186179	Hendricks No. 3	Pre-1998	RA	Undetermined
JTA-Kings Av.-Intermodal Center	1201 Kings Av	168662	Hendricks No. 3	Pre-2000	RA	Undetermined

Dump-Landfill Sites within Wellhead Protection Areas

Jacksonville, Duval County, Florida

Site Name	Address	DCHD Facility ID	WHPA	Years of Operation	Status	Contamination Offsite
Reed Street Dump	Reed St-Alamo St	D050	Hendricks No. 3	1950s-1970s?	SA	Undetermined
Aslan Demolition Dump	216 McCargo St	D177	Marietta	Unknown	--	Undetermined
Cope Farm	5825 Cisco Rd	D031	Westlake	Unknown	--	Undetermined
Island Dump	9000 Block San Jose Blvd	D256	Beauclerc Bay Apts	Unknown	--	Undetermined
Brewer Dirt & Fill	6118 Bowden Rd	D016	Daniel Memorial	Unknown	--	Undetermined
Hogan's Creek	2nd St & Silver St	D263	Main St	Late 1800s-Early 1900s	SA	Undetermined
Nevada-Greeland Dump	Nevada St & Greeland St	D278	Marietta	1960s-1980s	SA	Undetermined

Private Floridan Wells and Groundwater Contamination within WHPAs

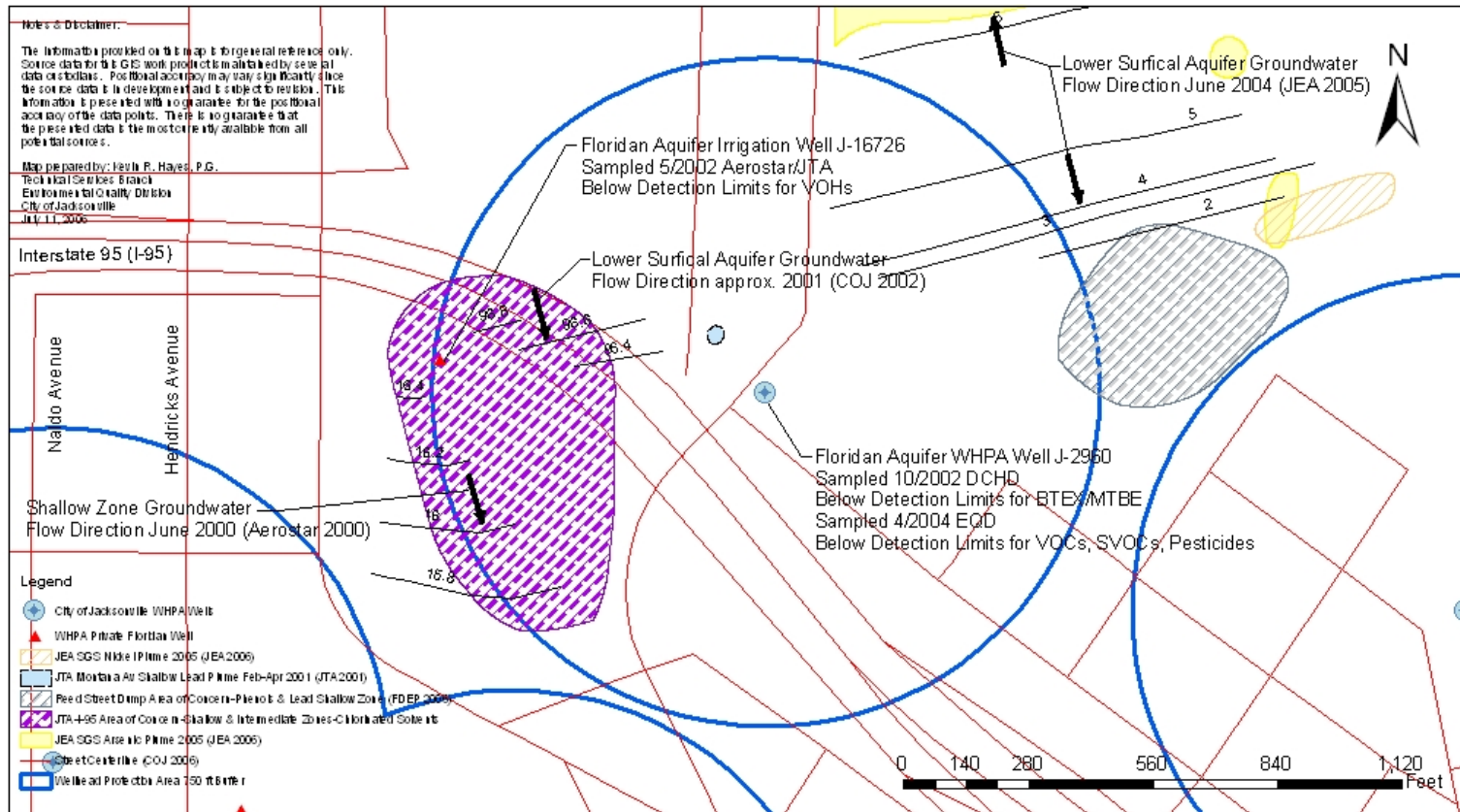
- Two known instances with groundwater contamination plumes in close proximity to Private Floridan Aquifer Wells: Former Halsema Nursery and JTA-Kings Avenue-Intermodal Center
- Vast majority of the groundwater contamination plumes are in closest proximity to the WHPA production wells (not private Floridan Aquifer wells)



Groundwater Contamination Community Hall WHPAs J-12889 (Well 5) & J-8696 (Well 4) August 2006

Unused Floridan Irrigation Well at Former Halsema Nursery Property-Excavated Area of Petroleum Contaminated Soils in Background





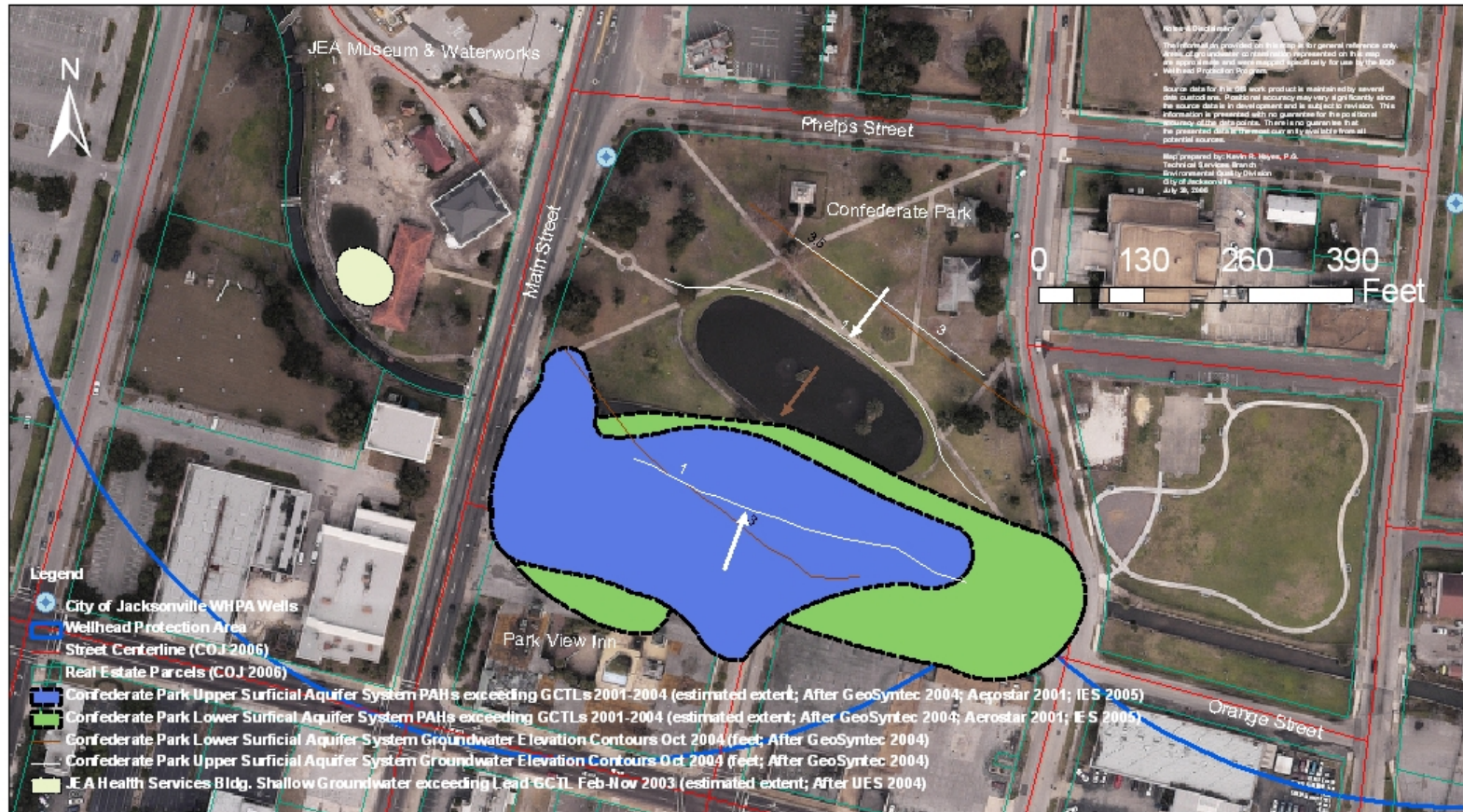
Groundwater Contamination & Private Floridan Aquifer Wells Hendricks Avenue Wellhead Protection Area - Well #2 (J-2960) Jacksonville, Duval County, Florida July 2006

Private Floridan Wells and Groundwater Contamination within WHPAs

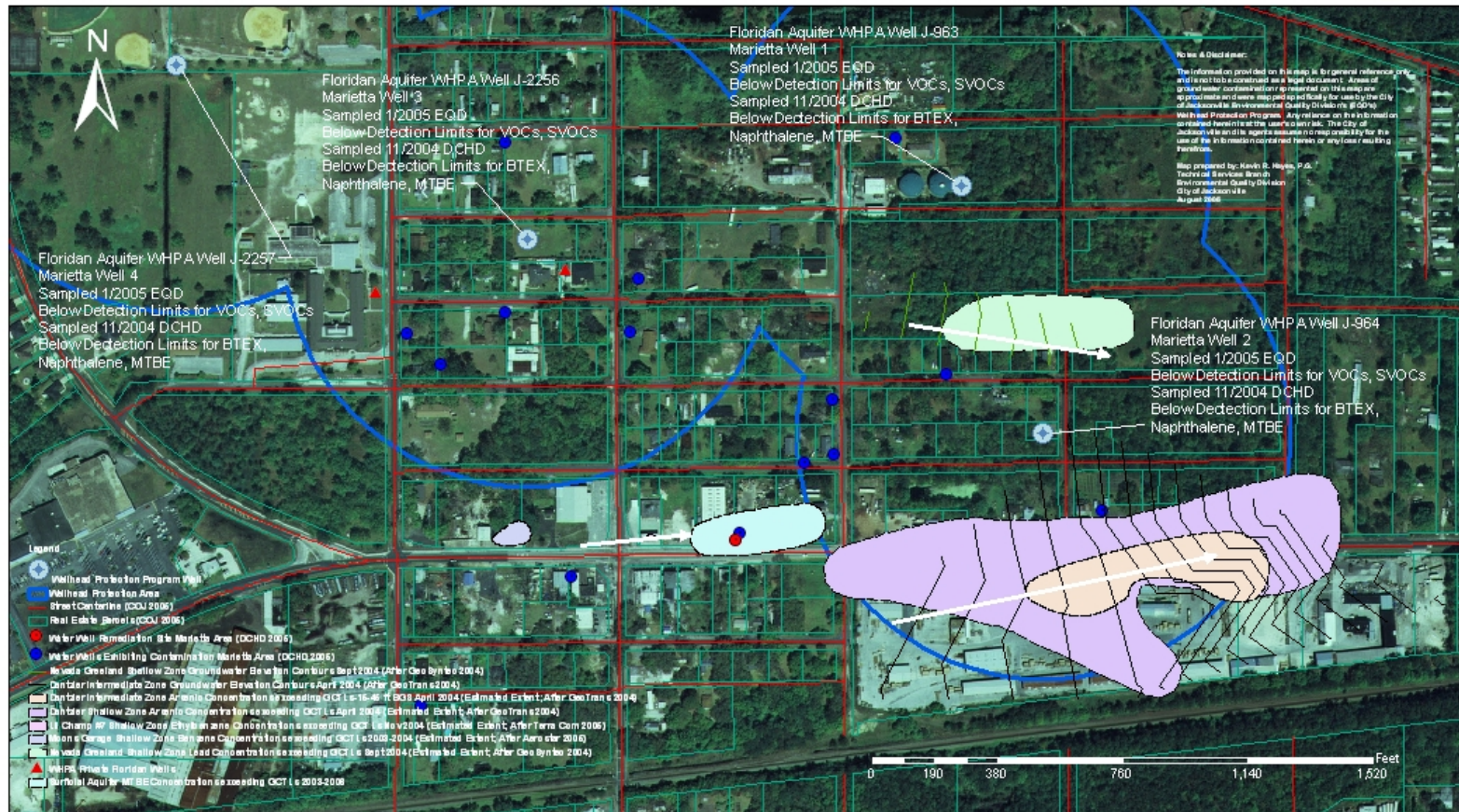
- Sampling of both Private Floridan Aquifer Wells in the vicinity of the groundwater plumes indicated neither well was impacted
- Additionally, the WHPA production wells have been sampled by various agencies, including EQD, with no detected contaminants
- Infer a lack of hydraulic connection between contaminated Surficial Aquifer zones and the deeper Floridan Aquifer wells

Additional Examples of Mapped Contaminant Plumes within WHPAs & Well Sampling Program

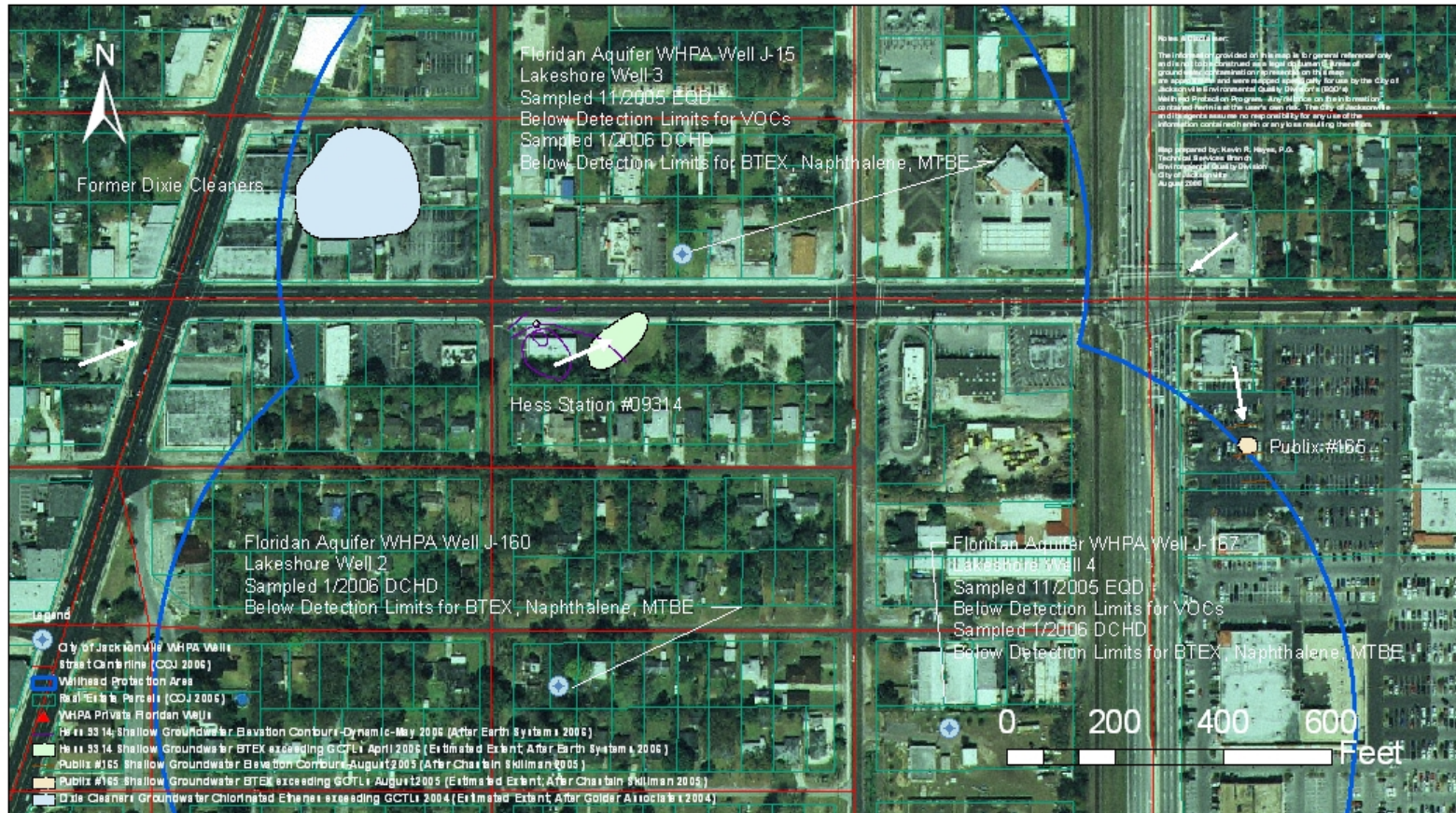
- Main Street, Marietta, Hendricks Avenue, Lakeshore WHPAs each contain multiple Surficial Aquifer Contaminant Plumes
- Petroleum, Dry Cleaners, Hazardous Waste, Dump-Landfill Sites
- Close Proximity of some plumes to WHPA Wells (JEA SW, Groff Apts, HA Ranch Daycare)
- Sampling of potentially threatened WHPA/Private Wells by EQD, DCHD, JEA



Groundwater Contamination Main Street WHPA Well 2 (J-244) July 2006



Groundwater Contamination Marietta WHPA J-963/964/2256/2257 August 2006



Groundwater Contamination Lakeshore No 1. WHPA J-15/160/167/398 August 2006



Groundwater Contamination Groff Apartments WHPA J-20107 August 2006



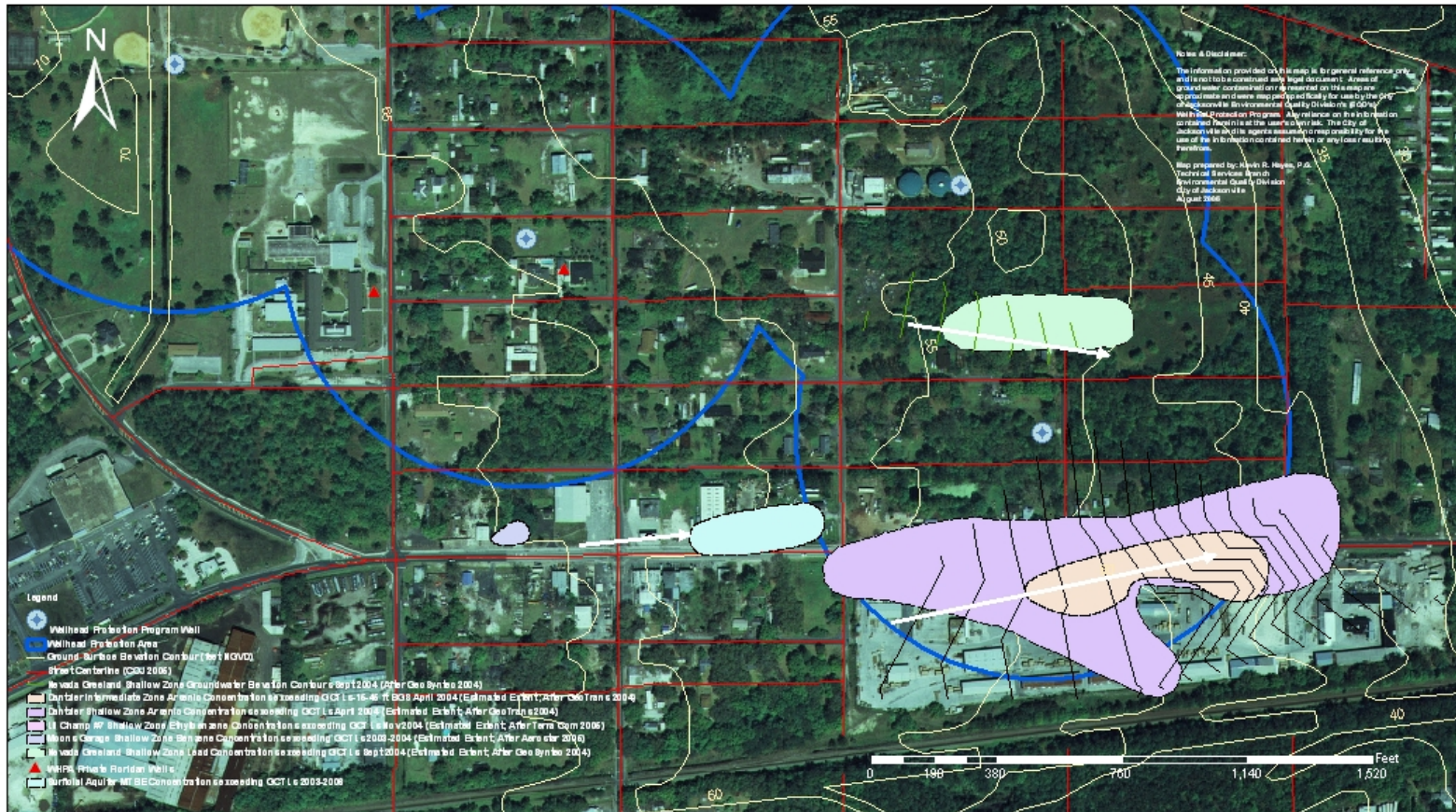
Groundwater Contamination JEA Southwest No. 1 WHPA J-2949/2950/2961/18797 August 2006

General Contaminant Plume Observations

- One third of the petroleum discharges within WHPAs have received SRCOs
- Only two of the dissolved petroleum plumes with source areas within WHPAs extend beneath adjacent properties
- Dissolved petroleum contamination does not extend more than 30 feet below the water table at all of the characterized sites within WHPAs (most < 10 feet)-MTBE contamination in the Marietta area may be the exception
- All of the characterized contaminant plumes are confined to the Surficial Aquifer System with the exception of the Confederate Park Manufactured Gas Plant (MGP) site-Groundwater at a depth of approximately 70 feet BGS exceeded the benzene GCTL (approximately 30 feet into the clayey sediments of the Hawthorn Group).

General Contaminant Plume Observations (continued)

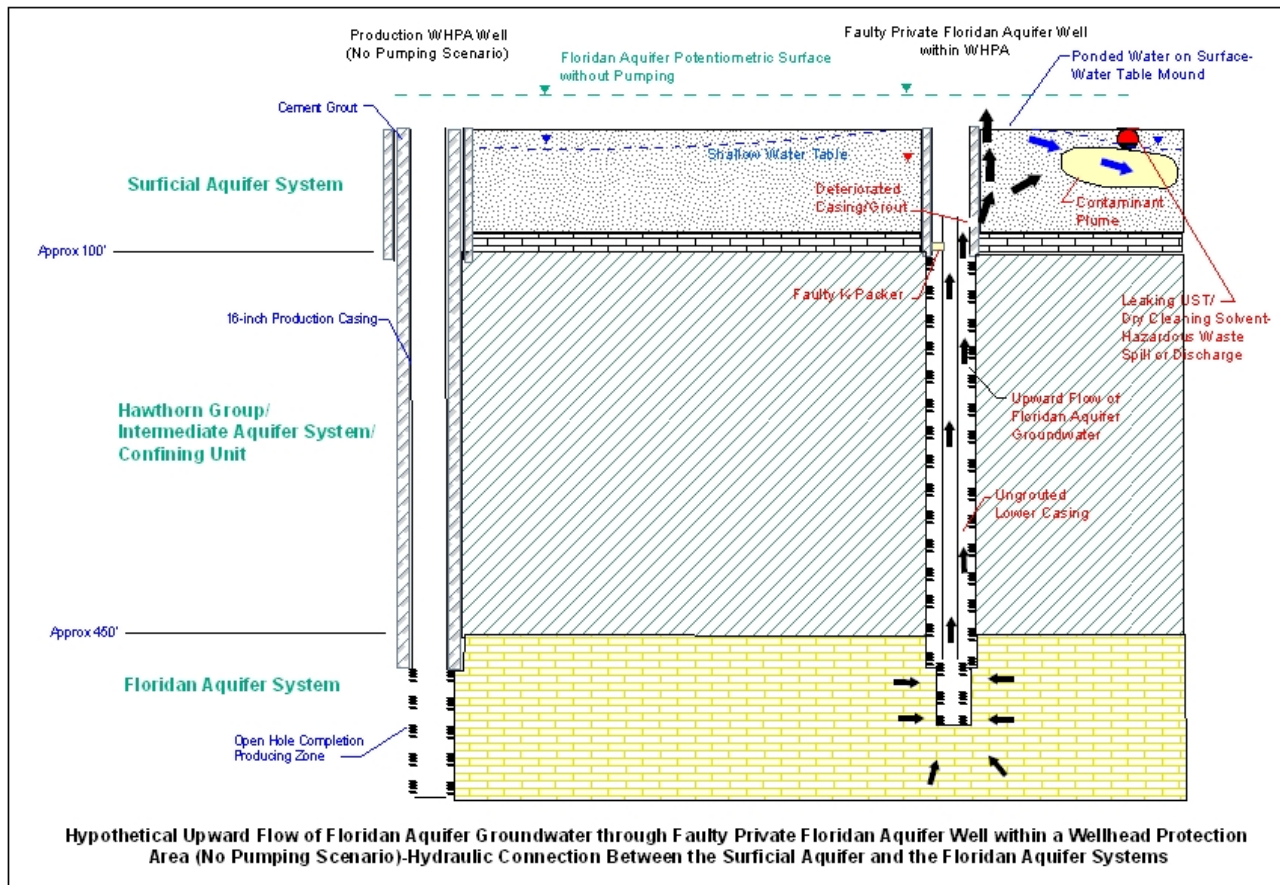
- Surficial Aquifer groundwater flow mapping at the contamination sites generally reflects the area topography and the influence of local hydrologic features (rivers, creeks)-No obvious indications of “drawdown” or upflow due to faulty wells
- Sampling of both WHPA Public Supply wells and private Floridan wells within WHPAs have consistently been below detection limits for the contaminants of concern
- Very limited number of private Floridan or Deep Hawthorn wells in the vicinity of known plumes
- ReScore requests to FDEP for one petroleum discharge site and two Dry Cleaning Solvent Cleanup Program sites



Comparison of Surficial Aquifer Groundwater Elevation Contours and Contaminant Plume Distribution with Ground Surface Topography Marietta WHPA August 2006



**Comparison of Surficial Aquifer Groundwater Elevation Contours and
 Contaminant Plume Distribution with Ground Surface Topography
 JEA Southwest No. 1 WHPA
 August 2006**





**Influence of a Failed Flowing Well on the Shallow Water Table
 Picketville Road Area
 Well J-16221
 August 2006**

Floridan Well J-16221



Ponded Water Downslope of Floridan Well



Downslope Runoff to Little Sixmile Creek



Failed Flowing Floridan Well- Influence on Water Table

- The groundwater mound on the water table in the vicinity of the Floridan boil is estimated at approximately 1.5 to 3 feet
- Groundwater flow into the hillside from the vicinity of the boil was mapped
- The surveyed water level elevation in the surface water boil was over five feet higher than the water level in Little Sixmile Creek approximately 35 feet to the Northwest

Summary & Conclusions

- Thirty nine Private Floridan Aquifer wells have been mapped and inspected within WHPAs-Nine Deep Hawthorn Wells are located within WHPAs
- Mapping and evaluation of over thirty five contamination sites, located within WHPAs, including petroleum, dry cleaning, hazardous waste, and landfill sites
- Sampling of both WHPA Public Supply Wells and Private Floridan Aquifer wells within WHPAs has been conducted by various agencies, including EQD, with no detections of contaminants of concern
- Relatively few instances of private Floridan or Hawthorn wells located near dissolved groundwater plumes
- The current evaluation of groundwater plumes, contamination site hydrogeology, well sampling results, and the WHPA private wells does not indicate the presence of a Risk of Contamination to the Floridan Aquifer through faulty wells in the vicinity of known contamination sites

Future Program Efforts

- Inspect WHPA Private Wells with no construction information
- Continue search for Private Floridan and Hawthorn wells
- Investigate DOD sites
- Continue with GIS mapping efforts to improve the work product
- Update the contamination site data within WHPAs within the GIS

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