CB60-2017

From: Belkacem Manseur, 14017 Big Branch Drive, Dayton

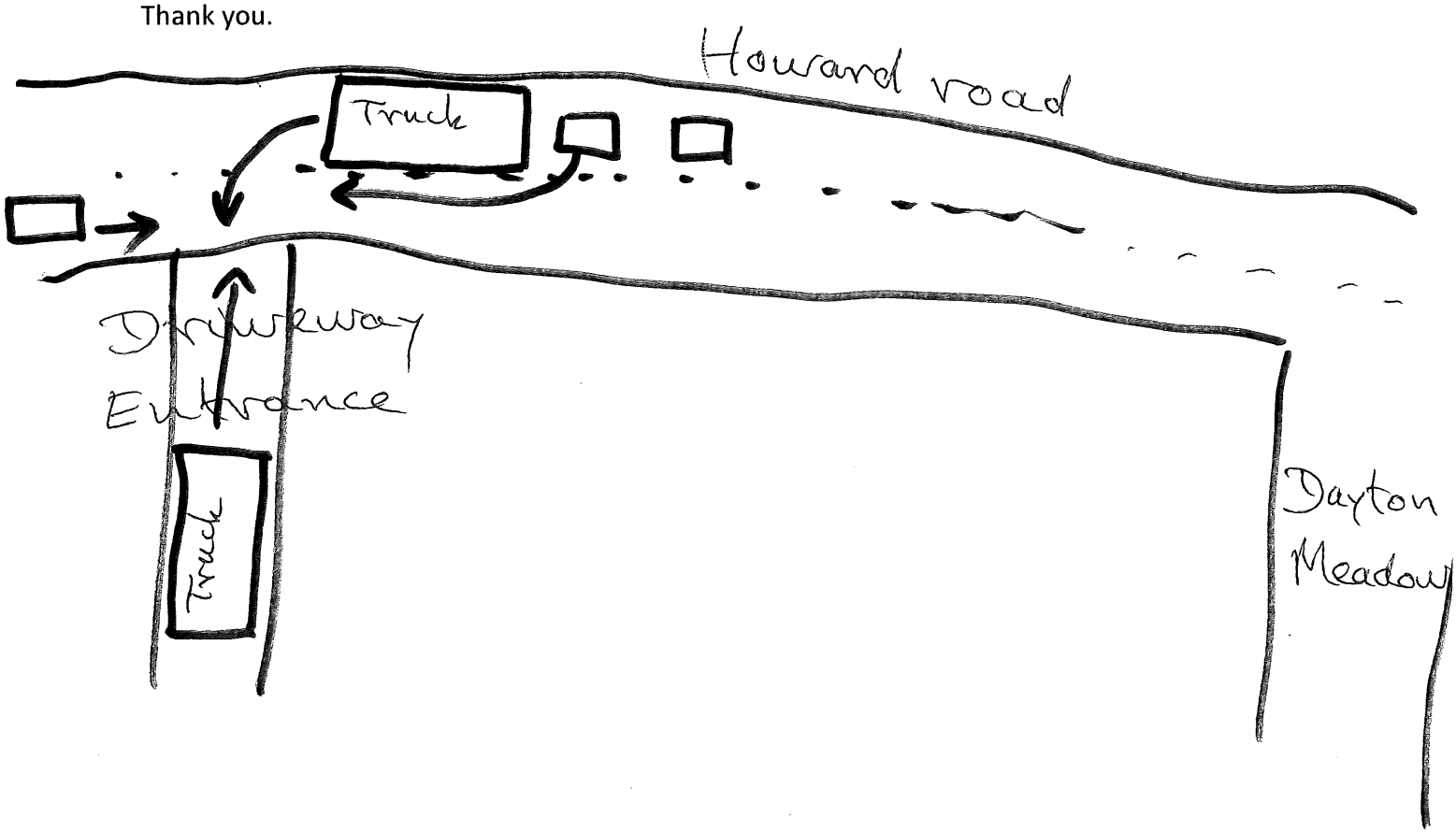
Subject: Opposition to CB60 without Major Amendments

County Council,

I would like to add my voice to oppose CB60. I have personally witnessed the following close call that illustrates the concerns about safety, health, environment, and quality of life. On June 30 ~~29~~, I was driving south on Howard road around 8:30 in the morning and when I got close the intersection of Howard road and Dayton Meadows Court, before the entrance to the proposed mulching facility, I saw a big truck that stopped on top of the hill apparently for no reason. I slowed down and as I was getting close, I saw a few cars waiting behind this truck and all of a sudden one of those cars decided to pass the truck at high speed and almost hit me. I continued driving up because I had right of way and I saw another big truck coming out of the driveway and I understood why the first big truck had to stop on Howard road before making a left turn onto the farm. The driveway cannot accommodate two truck and that creates a very unsafe traffic situation.

Traffic safety is another reason why industrial mulching should not be allowed in the area.

Thank you.



5020 Morning Star Drive

Dayton, Maryland 21036-1116

17 July 2017

Thank you for the opportunity to express my views this evening re:

Council Bill 60-2017 (ZRA 180).

- **I have lived in Howard County Maryland since 1978.**
- **In 2014, when Mr. Robert Orndorf wanted to use <u>for industrial mulching purposes</u> 10% of the farmland he purchased; many residents in the affected area and those who faced the same problem from businessmen from other Maryland areas expressed their outrage that this would be allowed by county officials who are supposed to protect the health, safety and the quality of life of its citizens.**
- **Health, safety, traffic, infrastructure, quality of life issues were enumerated and discussed in detail in 2014.**
- **In 2014, Mr. Allan H. Kittleman addressed one of our meetings and was definitely opposed to industrial mulching facilities on Ag preserved land.. I inferred from his remarks that the provision allowing for a !0% non-agricultural use of Ag preserved property was <u>NEVER</u> intended for industrial mulching and composting.**
- **At that time- 2014, it was determined that industrial mulching and composting was not an appropriate use of Ag preservation land.**
- **I thought that the issue was dead and buried. I cancelled my out of state relocation search.**
- **Well, here we are -2017, and the issue has again raised its ugly head. Why?**

- **If Mr. Orndorf and businessmen like him now put on their tree farmer hats, have all the negatives aspects that were discussed in 2014 now become positives?**
  - **Is daily sharing narrow rural roads with heavy trucks – narrow, rural roads where residents walk, bicycle, children get on and off school buses now a good thing?**
  - **Is breathing the fungal spores and wood dust now good for one's health?**
  - **Are mulch fires now also good for the respiratory system and a good use of water?**
  - **Is the noise generated by the truck traffic and machinery now an enhancement?**

- **Mr. Orndorf is interested in his bottom line NOT the well-being of the citizens of Maryland.**

- **I believe Howard County government officials should be interested in the benefit of all its citizens not just those with power, money and influence.**

- **If you would not feel comfortable and safe living in the vicinity of an industrial mulching and composting facility, if you would not want your family members living in that environment, why would you think anyone should live in such an environment?**

- **I ask you to please fix this situation ONCE AND FOR ALL so that Mr. Orndorf and his compatriots cannot come up with another scheme, ruse to get what they want re: industrial mulching and composting or any other activity that will negatively impact the health, safety, and well-being of the citizens of Maryland.**

Thank you

Eileen Haggerty

Eileen Haggerty

CB60-2017 Testimony - July 17, 2017

My name is Leslie Long, a farmer and RN that resides in Woodbine, MD.

I emphatically oppose CB60.

I am speaking first-hand about my and other resident's experiences from being subjected to a Natural Wood Waste Recycling Facility, Oak Ridge Farm, in Woodbine. That facility is not allowed to even operate in Howard County.

WHEN WOODGRINDING IS OCCURING,

The residents walk out the door and smell this horrible mulch stench much like rotten wood mixed with feces. Their nose and eyes will start burning and running. Shortly after the uncontrollable coughing and sneezing start. Headaches and labored breathing (dyspnea) would follow. Days later, one could have sinusitis, respiratory illness or other symptoms. Many people with known allergies, asthma or other respiratory issues do experience flare-ups or a worsening of their condition. All this coincides with processing at this facility. Residents must close their windows and stay indoors to escape the airborne contaminants. While indoors the vibration from the industrial equipment rattles their windows. The slamming of the tailgates and the dropping of wood into steel trailers sounds louder than thunder.

On previous occasions, what appeared to be wood dust was coated everywhere. The horses and other animals were coughing and in distress. This Oak Ridge Operation interferes with farming. The boarders and tenants complain about noise, truck traffic, burning and watery eyes. They can't wear their contact lenses and must use special ophthalmic drops. Who is going to reimburse residents for their medical expenses? Who is going to provide remediation if wells are contaminated with heavy metals?

One step I made was to contact Dr. Martin, a foremost authority on NWWRF. He explained the problem is mold spores, which travel for miles as well as the other "critters" emitted in the air with this type of operation. Another medical professional, Dr. Velculescu presented the Task Force with a summary of hazards to wood dust to include cancer.

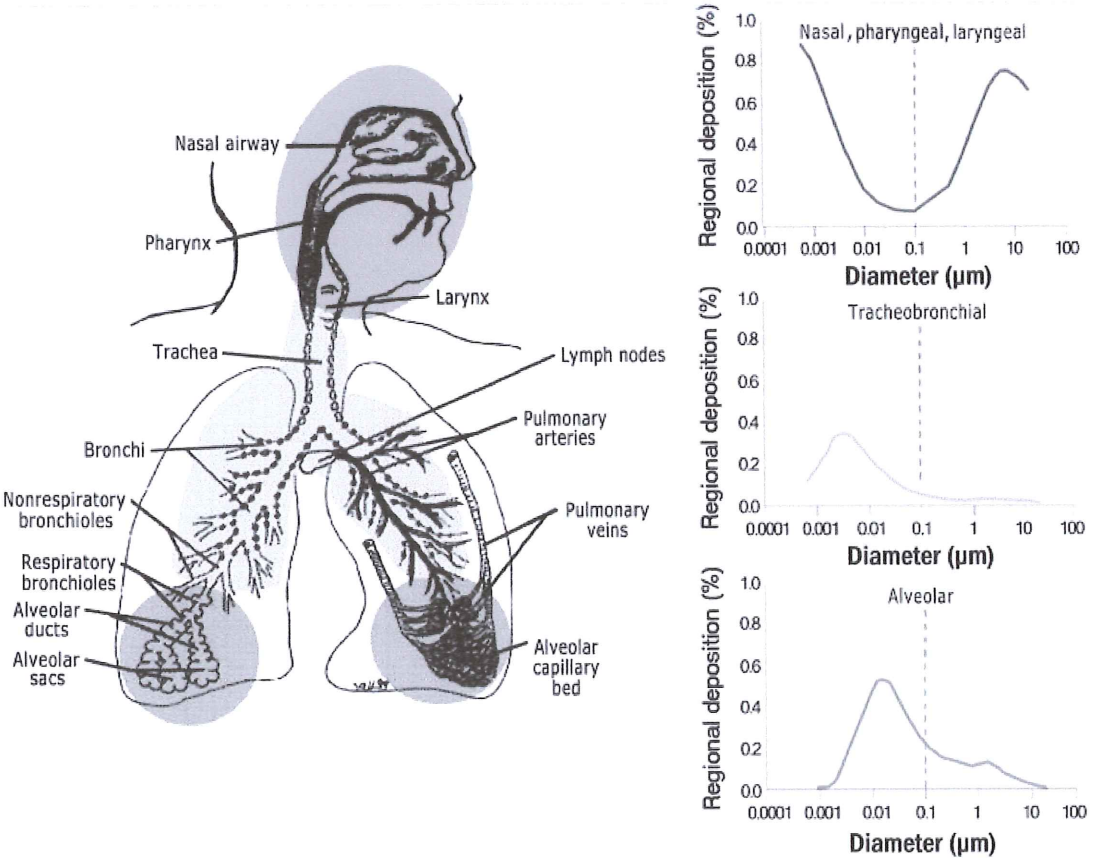
In the community, another enormous complaint is the nuisances caused by Oak Ridge. For over 7 years, the noise, truck traffic, hours of

operation, dust, and mud on the road have plagued the people in Woodbine. These noises can be heard by residents over a mile, starting at 5:00am. and go past midnight 7 days per week. People complain about the stress raising their blood pressure, the inability to sleep, headaches. This operation is not even allowed in Howard County and DPZ has failed to enforce zoning.

These open air (uncontained) mulch, wood waste, soil compro facilities are being shut down across the county because of the health and safety issues. M1/M2 sites keeps the truck traffic. Howard County has a blend of developments intermingled with farms. Let's keep the tranquility.

Please don't let the avarice of certain individuals guide you. Do no harm. Please Vote against CB60.

Fig. 4.1 Deposition of inhaled particles in the human respiratory tract during nasal breathing



From Oberdörster *et al.*, (2005). Drawing courtesy of J Harkema. Reproduced with permission from Environmental Health Perspectives.

Extracted from the presentation, dated 7 Oct 2014, by Dr. Velculescu to the Task Force.

Otolaryngology Houston

Bechara Y. Ghorayeb, MD
OTOLARYNGOLOGY - HEAD & NECK SURGERY
Memorial Hermann Professional Buildng
1140 Business Center Drive, Suite 560
Houston, Texas 77043
For appointments, call 713 464 2614

Back to Pictures

Sinus Pictures

Frontal Sinus Carcinoma

Frontal Sinus

Caldwell-Luc

External Ethmoidectomy

Total Maxillectomy

Medial Maxillectomy

Mucormycosis of the Ethmoids

Maxillary Mucormycosis

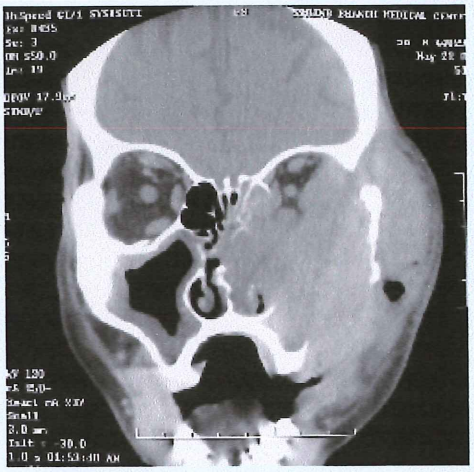
Nasal Polyposis

Septoplasty

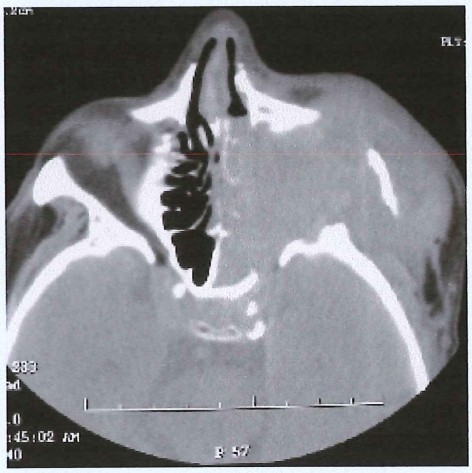
Post-Op Info

Carcinoma of the Paranasal Sinuses

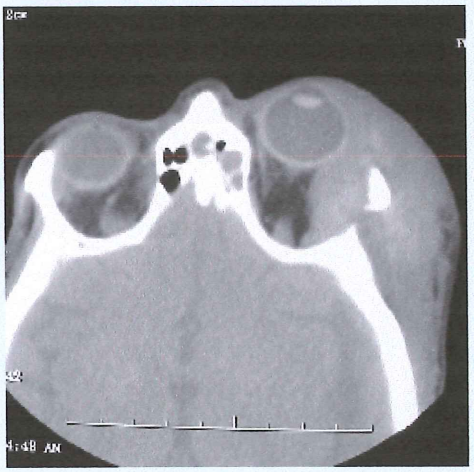
Advanced squamous cell carcinoma of the maxillary sinus extending from the alveolar ridge to the orbit.



Coronal CT scan of the patient to th left. Note the erosion of the maxilla, ethmoid and orbit.



Axial CT showing involvement of the maxillary sinus and ethmoids.



Axial CT showing involvement of the left orbit and proptosis.

Search

Carcinoma of the Paranasal Sinuses

Squamous cell carcinomas make up 50 to 80 % of paranasal sinus tumors.
Adenocarcinomas of salivary gland origin make up 4 to 8%.
Adenoid cystic carcinoma is the second most common salivary tumor of the sinuses.
Mucoepidermoid carcinoma is a distant third in frequency.

CE _____-_____

Department of Planning and Zoning

Division of Public Service and Zoning Administration
3430 Courthouse Drive, Ellicott City, Maryland 21043 410-313-2350 [FAX: 410-313-3391]

Request to Conduct Zoning Inspection and Acknowledgment of Disclosure Laws

I request that an inspection for compliance with the Howard County Zoning Regulations be conducted at the following address:

2600 WOODBINE RD., WOODBINE, MD. 21797 - MULCH-GRINDING KNOWN
(Address of Alleged Violation)

AS OAK RIDGE FARM, LLC AND/OR RECYCLED GREEN INDUSTRIES
Nature of Complaint: (Continue on Back of Form if Necessary) - NO DPZ SPECIAL EXEMPTION

NOISE POLLUTION - LOUD EXCESSIVE NOISE FROM A MULCHING MACHINE, BULLDOZERS, LOADERS, TRUCKS AND EQUIPMENT. NOISE STARTS EARLY AM TO PM, 6-7 DAYS/WK. MULCH GRINDER IS LOUDER THAN A COMBINE AND CAN BE over

Please read: In accordance with the Maryland Public Information Act, and the Department of Planning and Zoning Policy in implementing this Act, please be advised that your name may be disclosed to any interested party upon the closing of any violation case. For this reason, the Department is unable to guarantee confidentiality regarding this request, after the case is closed.

By signing below, I hereby acknowledge that I have read and understand the statement above:

Leslie P. Long — 11/20/2013
(Signature) (Date)

LESLIE P. LONG
(Print Name)

2701 WOODBINE RD., WOODBINE, MD. 21797
(Print Your Address--Required)

410-442-9705 OR LAUREL REGIONAL HOSPITAL 301-497-7 BON SECOURS HOSPITAL - 410-362-3234
(Phone Number During Business Hours)

SUNNYSIDE1998@AOL.COM
(Email Address)

(Nature of Complaint, Continued)

HEARD INDOORS WHILE WEARING EARPLUGS.

TRUCK TRAFFIC - FREQUENTLY, NUMEROUS TRACTOR TRAILERS AND 50FT. PLUS TRUCKS (MARKED REQUIRED GREEN) ARRIVE AND DEPART FROM ENTRANCE OFF RT 94. SECOND ENTRANCE IS OFF FLORENCE RD.

AIR POLLUTION - MALODOROUS AIR CONTAMINATES ARE ON OUR FARM AND SURROUNDING AREA. AIRBORNE PARTICULATE MATTER (WOOD DUST) IS SEEN INSIDE AND OUTSIDE OUR HOME, BARNS, ET

HEALTH HAZARD - RESIDENTS ON OUR FARM ARE EXPERIENCING "FLU-LIKE" SYMPTOMS (? ODTS - ORGANIC DUST TOXIC SYNDROME), SINUSITIS, PRURITIS, DYSPNEA, SHORTNESS OF BREATH, COUGHING, HEADACHE, MALAISE, FATIGUE, RHINITIS, EYE IRRITATION WITH WATERING, PSYCHOLOGICAL STRESS. HORSES AND LIVESTOCK ARE COUGHING, CHOKING AND EXHIBITING SIGNS OF RESPIRATOR DISTRESS.

NEGATIVE HEALTH IMPACT -
EXPOSURE FROM MULCH PROCESSING MAY CAUSE "ORGANIC DUST TOXIC SYNDROME", PULMONARY FIBROSIS, CANCER OF THE PARANASAL SINUSES AND MUCH MORE. WOOD DUST IS A CATEGORY I CARCINOGEN. THE WIND BLOWS FROM THE TOP OF THAT HILL TOWARD OUR FARM. THE BIOAEROSOLS CARRY BACTERIA, FUNGI, AND MOLD SPORES THAT CAN CAUSE MANY INFECTIONS SUCH AS LEGIONELLOSIS, ASPERGILLOSIS, ETC.
WATER RUN-OFF CONTAMINATION - MULCH OPERATION IS ON A MUCH HIGHER ELEVATION THAN OUR FARM. THERE IS A POTENTIAL FOR POLLUTION OF SURFACE WATER RUN-OFF FROM FINE ORGANIC MATERIAL, LEACHATE AND CHEMICAL CONTAMINATES TO OUR CROPLAND AND PASTURES. THIS POSES A SIGNIFICANT HEALTH HAZARD IF CONTAMINATED COMPOSITES ENTER THE FOOD CHAIN.

17 July 2017

Subject: CB60-2017 Mulching

Good evening. My name is Stu Kohn and I reside at 8709 Yellow Bird Court, Laurel, Md. 20723. I am the President of the Howard County Citizens Association, HCCA. I was a member of the Task Force where we met 24 times and unfortunately we have nothing to show three years later. The fact that the Maryland Department of the Environment refused to appear in any of our meetings was atrocious. The former DPZ Director asked them to participate, but they refused. You have heard and will here tonight the overwhelming and compelling concerns regarding Health and Safety issues from residents – your constituents. We only hope you will take more seriously these concerns as compared to the Planning Board when we met with them on 25 May. They completely ignored the volume of material presented. Their sole goal was to make a decision that same night regardless of the volume of evidence before them. They just did not care about the concerns of Howard County citizens. If nothing else they should have continued the case so they could analyze the facts before any decision was made.

When you take a look at the Power Point presentation last Monday to the Council I refer you to the last slide. It consists of recommendations to conduct studies in various areas. The question is -- if one has to conduct studies then there are obvious concerns which need to be rectified before thinking about passing such a Bill without amendments. The slide states the following:

- Study additional road access criteria by road type to further limit truck traffic.
- Study need for specific emergency declaration in zoning regulations.
- Study IRS tax implications on ALLP properties based on commercial activities.
- Study establishing ALLP cumulative totals for composting and NWWR in association with tree farms.
- Determine need for Christmas tree farms as part of ALLP uses.
- Addition of MALPF properties to ZRA.
- Explore need for Tier 2 Large facilities.

So nothing should happen until at a minimum the aforementioned studies are completed.

I was also a member of the APFO Task Force. On three different occasions, Fire Chief John Butler appeared at our meetings. This was because he wanted to voice his concerns regarding the Cisterns in western Howard County being able to handle any potential disaster.

We concerned citizens are in no way anti-farmer. What we are is anti-having someone or a corporation taking advantage of a situation that if the "I" isn't dotted and the "T" not crossed could very well be detrimental to us all. You simply cannot allow this to happen to if you care about the health and safety of your constituents. So please review all the facts before you as the future depends on your sound judgement.

Thank You,

Stu Kohn
HCCA, President

Testimony to Howard County Council regarding CB60-2017 provided on 17 Jul 2017

My name is James Nickel residing in Dayton, Maryland. I oppose CB60-2017.

Beginning 29 April, I wrote the County Executive and Council Members Fox and Sigaty regarding my concerns on the health risks of mulch manufacturing. That correspondence has fallen on deaf ears; I never received a direct response to the specific points made. I was only referred to a "Fact Sheet" prepared by DPZ.

That "Fact Sheet" was rife with errors, baseless claims, and undefined tests pretending to manage health risks. One example was a "soil test." There was no information about what tests would be performed or if those tests were relevant.

This "Fact Sheet" listed groups that were consulted in preparation of CB60. **Nowhere did it mention the Health Department**. When DPZ briefed the County Council on 10 July, they presented the groups they consulted. **Again, no mention of the Health Department**. When I asked the County Executive about the comments from the Health Department to the Suffolk County Investigation into water contamination at mulch and composting sites there was no response.

I also never received a response to the fact that **of the 12,200 farmers in Maryland not a single operating farm was a Natural Wood Waste Recycling Facility [NWWRF]**. Nor did I receive a response to my projection that **a 2-acre facility could produce 24,000 tons annually of mulch and that would rank 5th highest producer in Maryland**. That projection was based on REAL DATA from MDE using the Grant County Mulch operation in Frederick County. On RC, non-Ag Pres properties where up to 5 acres could be used, that would project an operation ranked in the top 3 of all NWWRFs.

I also wrote to the Maryland Secretary of the Environment and received a prompt reply from the Director of Land Management Administration, Hilary Miller [attached].

Ms. Miller agreed that while the Department had issued guidelines in 2012 that it was necessary, as required by House Bill 171, to further study the issue of "the diversion of organic material from **refuse disposal sites**". Note that Ms. Miller said, "**refuse disposal sites**" and NOT "**accessory uses to farming**".

Ms. Miller further stated that the Suffolk County Investigation and the presentation by Dr. Velculescu summarizing the potential hazards associated with wood dust would both be included in their study; two reports which the County Executive and DPZ have, by all indications, ignored. DPZ chooses to frame a "refuse disposal site" as "an accessory to farming" and pretend that it is not an industrial operation suited only to M1/M2.

There is no justification to pass any version of CB60 until the study required by House Bill 171 is completed and recommendations provided based on a thorough assessment of the health risks. I'm tired of being lied to. Kill this bill.

Maryland
Department of
the Environment

Larry Hogan
Governor

Boyd Rutherford
Lieutenant Governor

Ben Grumbles
Secretary

June 28, 2017

Mr. James O. Nickel
4904 Green Bridge Road
Dayton, MD 21036

Dear Mr. Nickel:

Thank you for your letter to Secretary Ben Grumbles regarding the potential health and environmental hazards of natural wood waste recycling and other organic waste processing facilities. The Secretary received your letter and asked me to respond on his behalf. The Department appreciates your interest in this matter.

As you point out in your letter, House Bill (HB) 171 – *Yard Waste, Food Residuals, and Other Organic Materials Diversion and Infrastructure - Study* requires the Department, in consultation with certain organizations, to study and make recommendations regarding the diversion of organic material from refuse disposal facilities. We will be convening a workgroup to assist the Department in this study over the coming year.

In 2012, the Department conducted an extensive review of composting operations with a diverse workgroup that culminated in the development of the new composting regulations at COMAR 26.04.11. Composting has the potential to release liquids containing nutrients and organic acids that can mobilize metals and that can act as pollutants if they are not properly controlled. In order to address this issue, the regulations include increased controls such as run off controls and location restrictions and a tiered structure for larger sites. HB 171 requires the Department to study and identify any applicable sanitary and public health concerns related to organic materials diversion, so these concerns will be reexamined over the 2-year study period. The Department will include the information in the Suffolk report in its study for HB171. We also appreciated your enclosure of the PowerPoint slideshow by Dr. Victor Velescu of Johns Hopkins University, which was a succinct summary of the potential hazards associated with wood dust. Although we have not yet examined his opinions from an epidemiological perspective, the concepts and evidence expressed will also be considered during the HB171 study.

Thank you again for your letter. If you would like to discuss this further, please call me at 410-537-3304 or contact me by email at *hilary.miller@maryland.gov*.

Sincerely,

Hilary Miller

Hilary Miller, Director
Land Management Administration

cc: Ben Grumbles, Secretary, MDE

CB- 60 -2017

NATURAL WOOD WASTE RECYCLING AND COMPOSTING REGULATIONS

COUNTY COUNCIL PUBLIC HEARING

JULY 17, 2017

CB 60 Summary

- Does not permit industrial or large scale mulch operations on ALPP properties.
- Allows composting and wood waste recycling activities that do not require an MDE permit, are farming related, and accessory to a farm use.
- MDE regulations, MDA- required Nutrient Management Plans, and Conditional Use criteria address many environmental issues.
- CB 60 contains criteria (such as setbacks and size limits) that are enforceable and objective.
- Howard County Zoning Regulations includes a Conditional Use process to allow for public input.
- Proposed amendments have been under study for some time based on additional public input.

Not a Recipe for Disaster Steps 1 & 2

Step 1: Operator purchases or leases farmland. Five acres requires an active 100 acre farm.

Step 2: Operator sets up a 3-acre "composting facility" for commercial shipment under a county permit (Section 128). CB60 contains no restriction on use of compost. CB60 requires composting to be accessory to a farm with limited opportunity for sales and with commercial vehicle restrictions.

Accessory Use *- a use that is customarily incidental to the principal use, serving no other use, and which is subordinate in area, intensity, and purpose to the principal use.*

Not a Recipe for Disaster Step 3

Step 3: Operator hires local farmer to plant 13.3 acres of trees so that he can apply for a Conditional Use (CU) to operate a "natural wood waste recycling facility" (NWWR) on 2 acres, fulfilling the condition in CB60 that the NWWR facility shall not exceed 15% of the area actively farmed in trees. Planting trees does not constitute a tree nursery.

Not a Recipe for Disaster Step 4

Step 4: Once CU is approved, operator sets up a 5 acre facility for industrial mulching/NWWR and industrial composting combined. According to CB60, the NWWR facility is "accessory to the farm," and therefore allows the operator to ship the mulch he produces without also shipping out any trees, shrubs, or plants grown on the farm.

Cannot be industrial – must be accessory to the farm.

Not a Recipe for Disaster

- He can use 18-wheel tractor-trailers to continuously truck wood waste product onto the farm for processing, and continuously ship his mulch and/or compost product off the farm for commercial sale. That truck size currently serves many existing farms.
- His 5-acre facility will use at least 20 tractor-trailers each day to ship 40,000 tons of product each year, conservatively. The basis for 40,000 tons is incorrect –that volume is based on a transfer station not a NWWR facility.
- This allows the operators primary revenue generating activity to be industrial NWWR/compost on a limitless scale and not farm product, but that is OK according to C B60. Scale is limited to that allowed by the conditional use and must be accessory to the farm - it cannot be the primary revenue generator.

County Executive and Sponsor Amendments

- Limit truck traffic on local county roads - restrict mulching/compost operations to properties close to state roads and interstate. Require site access to be approximately within 0.5 mile of a state arterial road or interstate.
- Strike the emergency declaration – do not believe it is needed.
- Look at establishing ALPP cumulative totals for composting and NWWR in association with tree farms.
- Need for Christmas tree farms as part of ALPP uses?
- Apply the CB 60 ALPP regulations to MALPF properties.
- Need for Tier 2 Large facilities?
- Continued assessment of IRS tax implications on ALLP properties for certain commercial activities.

The Washington Post

Local

Tractor-trailer strikes, kills two children as they run across road to school bus

By Dana Hedgpeth and Justin Wm. Moyer March 30

Two children were struck and killed by a tractor-trailer Thursday morning when they ran across a road to board a school bus near the town of Dillwyn in central Virginia, officials said.

At about 7:40 a.m., officers responded to a report of a fatal crash in Buckingham County just north of Dillwyn, which is about 65 miles west of Richmond, the Virginia State Police said in a statement.

A tractor-trailer was traveling north on Route 15 when a Buckingham County school bus, with its yellow flashing lights activated, approached from the opposite direction to pick up a group of children, the statement said. As the bus slowed, two children ran across the road toward it. The driver of the tractor-trailer braked, but the vehicle, loaded with 75,000 pounds of mulch and traveling downhill, hit the children before it could stop.

The children, identified as Tori Perez, 5, and Jaiden Bartee, 6, died at the scene.

The tractor-trailer driver, a 66-year-old man from Dillwyn, has a valid commercial driver's license, according to police, and the tractor-trailer was in compliance with commercial vehicle regulations.

No charges will be filed, police said.

Dana Hedgpeth is a Post reporter, working the early morning, reporting on traffic, crime and other local issues. Follow @postmetrogirl

Justin Wm. Moyer is a reporter for The Washington Post.
Follow @justinwmmoyer

March 30, 2017: State police and investigators look over a tractor-trailer that was involved in an accident that killed two children waiting for a school bus in Dillwyn, Va. (AP/Richmond Times-Dispatch)

The Washington Post

Local

Massive mulch pile catches fire in Centreville

By Justin Jouvenal April 13

Firefighters are battling a blaze that sent flames and smoke shooting from a massive mulch pile in the Centreville area overnight, according to the Fairfax County fire department.

The blaze was sparked early this morning in the 15700 block of Lee Highway, sending firefighters from Fairfax, Prince William and Loudoun counties to the scene.

Video from the scene showed firefighters were using ladder trucks and backhoes to attack the large, smoldering pile after dawn on Thursday morning. The flames had been knocked down.

No injuries or damages to structure were reported.

Mulch Fire Sends Clouds of Smoke Over Parts of Centreville

By Connie Howard and Samuel Nassau

You may see some smoke in the air Thursday morning if you live in the Centreville area. Firefighters are on the scene of a mulch fire at a mulch plant along Lee Highway. News4's Derrick Ward has more from the scene.

(Published Thursday, April 13, 2017)

You may see some smoke in the air Thursday morning if you live in the Centreville, Virginia, area.

Firefighters spent the morning extinguishing a smoking pile of mulch along Lee Highway. A passerby discovered the fire at the mulch plant next to the Luck Stone Quarry about 1:45 a.m. Thursday.

More than 100 firefighters were called to the scene.

No injuries were reported.

At 7 a.m., backhoes were still digging through the smoking mulch.

Firefighters used a crane to douse the flames.

The cause of the fire is under investigation.

Published at 8:13 AM EDT on Apr 13, 2017

Crews respond to mulch fire in Centreville

WUSA *10:52 AM. EDT April 13, 2017*

CENTREVILLE, VA. (WUSA9) - Crews responded to a mulch fire in the Centreville area overnight, according to Fairfax County officials.

The large mulch pile fire started around 1:45 a.m. in the 15000 block of Lee Hwy. This was a big water supply operation due to lack of hydrants in the area.

There were some eastbound lane closures on Lee Hwy due to the fire, officials said.

Drivers in the area are being advised to slow down and be aware of the apparatus.

CB60 – A Recipe for Disaster

County Executive Kittleman, Council Member Fox and Council Member Sigaty as well as DPZ think CB60 will not allow for industrial mulching and/or industrial composting in RR, RC and Howard County ag preserve farmland. Think again.

The "recipe for disaster" outlined here shows what is possible under the irresponsible zoning language in the proposed CB60.

Howard County Ag Preserve Farmland (ALPP)

Step 1: Operator purchases or leases farmland.

Step 2: Operator sets up a 3-acre "composting facility" for commercial shipment under a county permit (Section 128). CB60 contains no restriction on use of compost.

Step 3: Operator hires local farmer to plant 13.3 acres of trees so that he can apply for a Conditional Use (CU) to operate a "natural wood waste recycling facility" (NWWR) on 2 acres, fulfilling the condition in CB60 that the NWWR facility shall not exceed 15% of the area actively farmed in trees.

Step 4: Once CU is approved, operator sets up a 5 acre facility for industrial mulching/NWWR and industrial composting combined. According to CB60, the NWWR facility is "accessory to the farm," and therefore allows the operator to ship the mulch he produces without also shipping out any trees, shrubs, or plants grown on the farm. He can use 18-wheel tractor-trailers to continuously truck wood waste product onto the farm for processing, and continuously ship his mulch and/or compost product off the farm for commercial sale. His 5-acre facility will use at least 20 tractor-trailers each day to ship 40,000 tons of product each year, conservatively.

This allows the operators primary revenue generating activity to be industrial NWWR/compost on a limitless scale and not farm product, but that is OK according to CB60.

Rural Residential (RR), Rural Conservation (RC) and State of MD Ag Preserve Farmland (MALPF) as part of RC

Same as above, but instead of a 5-acre facility, the operator sets up a 10-acre NWWR/compost facility combined (5-acres of each through the CU process).

In RR, RC (includes State of MD ag preserve farmland) there are:
NO restrictions on amount of wood waste material trucked onto the farm
NO restrictions on the amount of mulch/compost trucked off the farm
NO limit on size of trucks
NO tie in for mulching/composting processing to any other activities on the farm/parcel
NO restrictions on commercial sale
NO way DPZ can enforce what will be allowed per CB60 (they can't even enforce clear violators of CB20)
ALLOWS for Tier I and Tier II composting, which means on Howard County ag, RR and RC composting of grass, leaves, food waste, manure and in some case animal carcasses is allowed (3-5 acres near you)

ALLOWS for retail sales on site

In essence, an industrial processing facility with limitless trucking in/out at scale.

If this is County Executive Kittleman's idea of good leadership, then we need new leadership. Councilmembers Sigaty and Fox, as well as DPZ's Director Lazdins and Deputy Director Amy Gowan, also have their fingerprints on crafting CB60, so there is plenty of blame to go around for everyone in charge of your family's health and safety in Howard County.

CB60 is blatantly irresponsible and reckless in terms of the risks it now puts on residents throughout all of Howard County. If you weren't angry before this "**recipe for disaster**," then hopefully you are now. The following steps will ensure we have a massive response with one unified voice to express our collective opposition to CB60:

1. Email councilmail@howardcountymd.gov to express your anger with CB60 and issue a call for major amendments. We have a letter ready for you on our DRPS website at www.preservedayton.com to copy and paste as your email.

2. Sign up to testify on July 17 at www.howardcountymd.gov through the weblink located across the top bar of the homepage that will take you to the 'County Council' page. From there you can navigate your way to registering and signing up to testify at the July 17 County Council session where we can voice our opposition to CB60 one-by-one (Banneker Room in the George Howard Building).

3. Encourage everyone you know within Howard County to show up in person on July 17 at 7pm so our County Council can see firsthand just how off the mark CB60 is.

Bottom line, CB60 does not get the job done to protect residents in the rural communities and beyond. Keep industrial mulching/composting facilities located in M1/M2 commercial zones, and make sure if they exist in those areas they are run properly to also keep nearby residents safe from any health risks (i.e., protection from mulch dust). Please stand with us as one unified voice of thousands to express your unwillingness to accept CB60 as is. Many thanks.

Here are our MAJOR concerns with CB60:

NO restrictions on use or scale

NO restrictions on amount of mulch/compost/wood waste in or out of the facility

NO restrictions on commercial sale of any kind (even retail sales on site at the facility)

ENDLESS/LIMITLESS trucking in and out of wood waste into the facility (18-wheeler tractor-trailers and 3-axle large commercial trucks)

ENDLESS/LIMITLESS mulch or compost trucked out after industrial processing at the facility (18-wheeler tractor-trailers and 3-axle large commercial trucks)

NO requirement to be associated with tree farming or legitimate farming of ANY kind

NO restriction on size or frequency of trucks in and out of the facility all day long

NO restrictions on State of MD ag farmland (MALPF)

ALLOWS for Tier I and Tier II composting, which means on Howard County ag, RR and RC composting of grass, leaves, food waste, manure and in some case animal carcasses is allowed (3-5 acres near you).

NO ability for DPZ to enforce CB60 for mulching/composting given what it allows (unacceptable). DPZ has shown an inability to enforce, or exercised selective enforcement discretion, for even clear violators of CB20. To expect anything more from DPZ would be ridiculous (how can they distinguish between mulch and compost when they admit they can't even enforce something as simple as mulch pile height).

If this is County Executive Kittleman's idea of good leadership, then we need new leadership. CB60 is blatantly irresponsible and reckless in terms of the risks it now puts on residents, families, children throughout all of Howard County. If you weren't angry before this "recipe for disaster" then hopefully you are now, and willing to take the following steps now to ensure we have a massive response with one unified voice to express our collective opposition to CB60:

Please email councilmail@howardcountymd.gov to express your anger with CB60 and a call for major amendments (visit www.preservedayton.com to copy-and-paste the CB60 opposition letter to email).

Please sign up to testify at www.howardcountymd.gov through the weblink located across the top bar of the homepage that will take you to the 'County Council' page. From there you can navigate your way to registering and signing up to testify on July 17 at 7pm for the County Council session where we can voice our opposition to CB60 one-by-one (Banneker Room in the George Howard Building).

Please encourage everyone you know within Howard County to show up in person July 17 so our County Council can see firsthand just how off the mark CB60 is, thanks to poor leadership putting your families in harm's way.

Bottom line, CB60 does not get the job done to protect residents in the rural communities and beyond. Keep industrial mulching/composting facilities located in M1/M2 commercial zones, and make sure if they exist in those areas they are run properly to also keep nearby residents safe from any health risks (i.e., protection from mulch dust). Please stand with us as one unified voice of thousands to express your unwillingness to accept CB60 as is. Many thanks.

Amendments Required for CB60

1) Mulching only conducted on M1/M2 zoned parcels and under appropriate conditions (ie covering, misting).
2) Limit mulching and composting operations to 1 acre for mulch and 1 acre of compost on all ag preserve, which included Howard County ag (ALPP) and State of MD ag (MALPF).
3) No trucking out of mulch or compost for commercial sale on RR/RC, which includes all ag preserve in Howard County.
4) Limitations on truck size that will prohibit any 3 axle or tractor trailer trucks in/out for mulching and composting operations.
5) Mulch product only to be trucked out if combined with trees, plants, or shrubs as part of legitimate tree farming operations.
6) Specific Tier I and Tier II materials (food waste, manure, and animal carcasses) prohibited for composting.
7) No industrial grade tub grinders allowed for mulching operations.
8) Escalating fines for violations for those that continue to operate in violation of zoning regulations.

COMMUNITY MEETING TO OPPOSE INDUSTRIAL MULCHING ON AG PRES

JUNE 29, 2017

CALLS TO ACTION
LEADING UP TO CB60 COUNCIL VOTE

- **June 29**: Community Meeting; we've taken the first step
- Spread the word to everyone (countywide issue)
- Email councilmail@howardcountymd.gov stating your opposition to industrial mulching on farmland including RR, RC, ag preserve, and cluster subdivision parcels given safety, health and environmental risks
- **July 5**: Sign up to testify for the County Council meeting on July 17th where CB60 will be introduced
- **July 17**: Attend the County Council meeting (7pm) along with your entire family, children included
- **July 31**: Be prepared to attend the Legislative Session where CB60 will be voted on by our County Council **with amendments** (could be tabled if we flood the gates)

HOW WE GOT HERE

- 2013: Comprehensive zoning allowed for mulching to be considered farming
  - Up to 10 acres compost/mulch on ag preserve land - "unintended consequences"
- Jan 2014: Conditional use submitted by RLO
- Large community meetings and large turnout at legislative session
  - We don't win without you
- Feb 2014: DRPS filed its own ZRA
- Apr 2014: Greg Fox sponsored modified DRPS ZRA, with Courtney Watson as co-sponsor

CURRENT ZONING LAW: CB20

- June 2014: CB20 passed, 4-0
- Compost/mulch no longer allowed on Howard County ag preserve farmland per Greg Fox and DRPS input
- Compost/mulch no longer allowed on State of MD ag preserve farmland - credit goes to Calvin Ball (Amendment 5)
- Committee to be formed to further study issue – Resolution 74

KITTLEMAN'S CAMPAIGN PROMISE

"In response to your inquiry regarding industrial mulching on agricultural farm land, I can unequivocally state that I am opposed.

There have been three major public hearings on this issues: one at Dayton Oaks Elementary School, one in Sykesville and another at the Ten Oaks Ballroom with an estimated attendance of over five hundred, where I stated that I firmly opposed industrial mulching.

As County Executive, I will actively continue my opposition.

I hope this addresses your concerns. I appreciate that you have taken the time to personally contact me.

Sincerely,
Allan Kittleman"

CB58-2017 AG PRESERVE PARCEL EASEMENT LANGUAGE

- The property will only be used for agricultural purposes and the owner will give up development rights

- "Development Rights" means the rights of the Seller in the Land to develop the Land for any purpose other than Agricultural Uses. "Development Rights" shall include, but not be limited to, the right to use the Land for industrial or commercial uses.

- The County will receive the Seller's development rights in the Land for conservation purposes, which includes the preservation of farm land, forest land and open space, pursuant to the County's conservation policy and to enhance agriculture in Howard County and protect natural and ecological resources.

MULCH TASK FORCE

- July 2014 to March 2015
- 19 members: county representatives, farmers, residents
- 2 "leaders" – one representing the farmers, one representing the residents
- Committee met for 3 hr sessions, 25 times
- Majority and Minority report
  - Not allowed on ag passes by a slim margin
  - Tighter regulations on M1/M2 (covered facilities, etc)
  - Minority report submitted as "Concerned Citizens Report"
- CCR was basis for DRPS ZRA 160

MTF STACKED DECK

- We lost almost every vote (4-15)
- Attempted to shut-out our request for medical expert to present
- Richard Goldman – residents' representative
  - served at Mary Kay Sigaty's request
  - voted against us on almost every issue

President's Message – May 2017

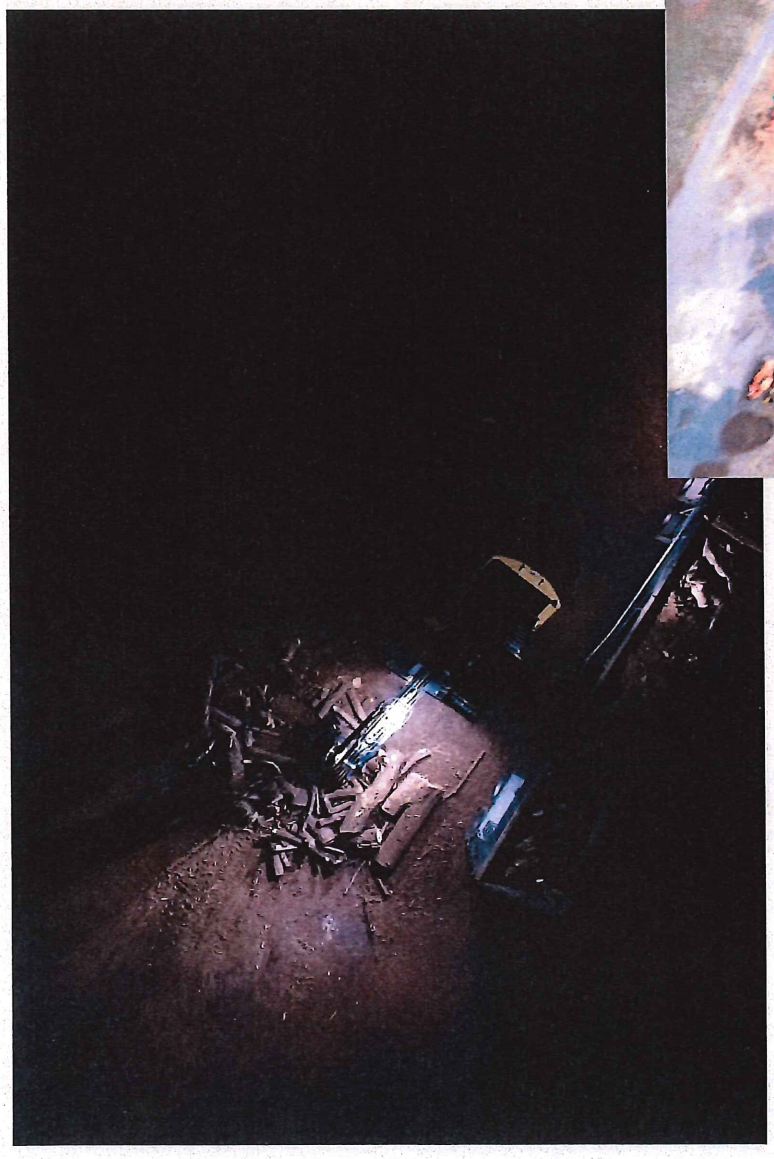
MAY 2017

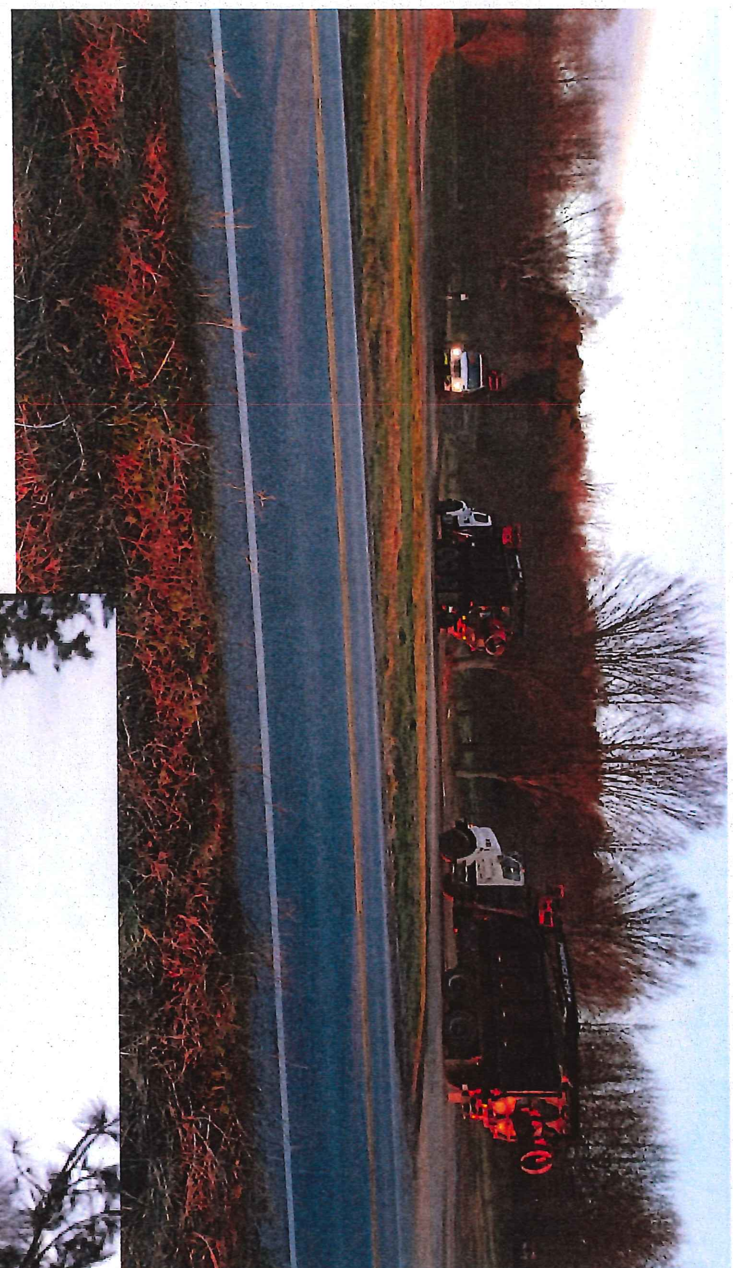
by Howie Feaga, President – Howard County Farm Bureau

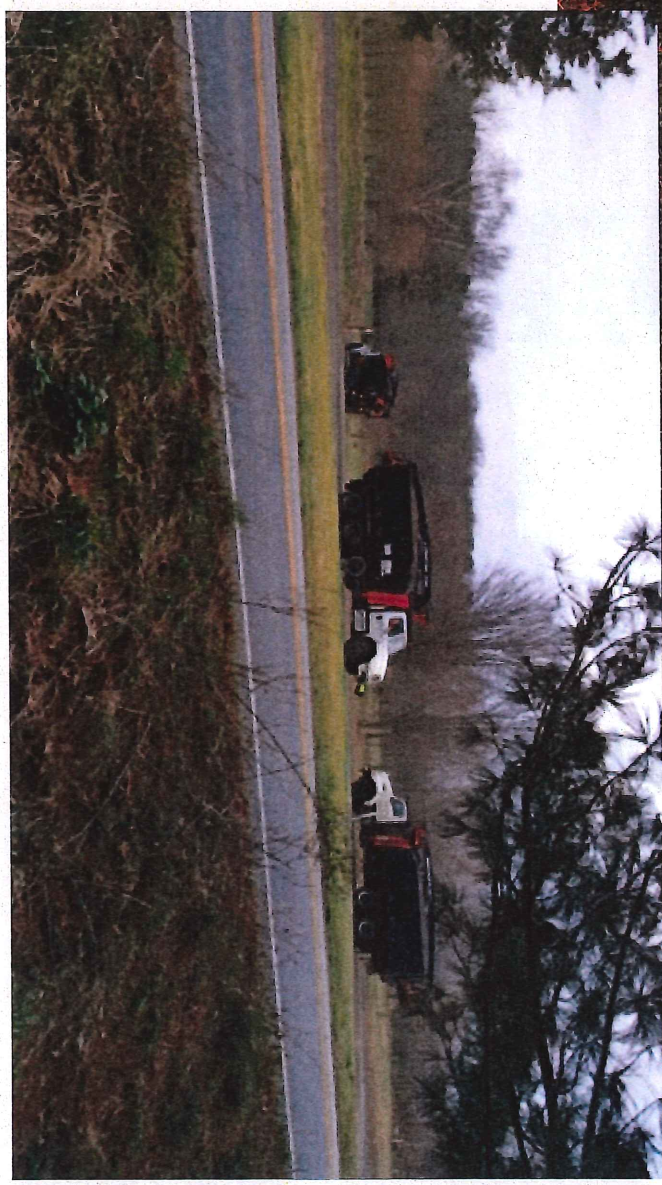
The "Friend of the Farmers" award went to Richard Goldman, he was the cochairman at the mulch task force with Zack Brendel. They did a great job and Richard was a great person to win the award.

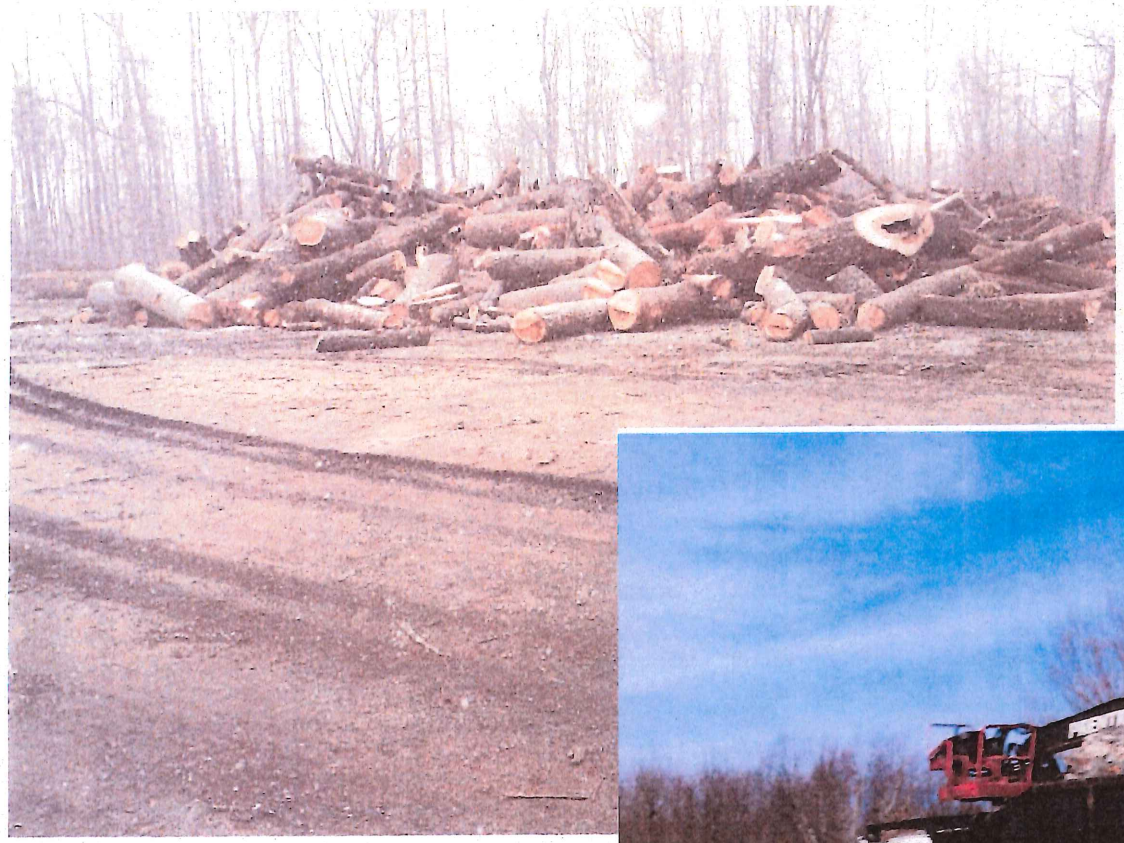
BONNER/OAK RIDGE
5 YEAR HISTORY OF VIOLATIONS

- 2010 – Woodbine residents suffer from dust, noxious odors, truck traffic and noise
- 2012 – Complaints made to DPZ
- Mar 2012 – Oak Ridge found in violation of Deed of Easement for mulch processing
- Jan 2013 – Oak Ridge found in violation for mulch manufacturing, soil processing and compro processing
- Sep 2014 – Oak Ridge reminded by DPZ of violations found 7 months prior
- Nov 2014 – Consent order issued by Hearing Examiner to shut down Bonner/Oak Ridge operations; fined $1,000









2017 BONNER/OAK RIDGE

- March 9, 2017 letter from DPZ: "As no violations of the Howard County Zoning Regulations were observed, there is no cause for further action by this department and the case is being closed."
- March 15, 2017 letter from DPZ: "...the letter closing the case was sent prematurely...the issues raised in your complaints are still being studied by this department."
- April 21, 2017 letter from DPZ: "A zoning violation case was opened for this property...Should the violations not be corrected in a timely manner, the County will pursue enforcement actions..."

LACK OF ENFORCEMENT ACTION OR SELECTIVE ENFORCEMENT

Community Pressure

- Mar 10, 2017 – DRPS letter to address shocking news that Bonner/Oak Ridge investigation was closed with no violation despite overwhelming evidence to the contrary
- Apr 19, 2017 – meeting with County Executive Kittleman and DPZ Director Lazdins

  Presented Bonner/Oak Ridge photos

  Val Lazdins – *"hard to catch offenders in the act"*

It is unacceptable that the burden to hold DPZ accountable for addressing violations be on county residents

DPZ DIRECTOR VAL LAZDINS

- Reporting to County Executive Kittleman
- August 2015 meeting: CCR core team along with DPZ Deputy Director to discuss CCR position
- *"I'm okay with mulch on one side of the road and blueberry fields on the other"*
- CCR core team forced follow-up meeting with County Executive and DPZ Director to align on position on industrial mulching

ZRA 160 FILED BY DRPS - AUG 2015

- Attempts to meet farming community needs

- Compost
  - RR/RC/Ag – up to 3 acres for farming use only (materials shipped in and processed are used on the farm or are shipped with farming crops such as trees and shrubs; industrial shipment not allowed)

- Mulch
  - RR/RC/Ag – up to one acre for farming use only (materials shipped in and processed are used on the farm or are shipped with farming crops such as trees and shrubs; industrial shipment not allowed)
  - Large facilities requiring an MDE permit not allowed
  - Trucks not allowed off-site

SMALLER ROUND OF MEETINGS FARMER AND RURAL COMMUNITY

- Aug 2015 – Strong reaction by Mary Kay Sigaty due to filing of DRPS ZRA
- Jan 2016 to Oct 2016 – small group meetings with DPZ (Val Lazdins and Amy Gowan)
  - Limit to tree farmers but could not reach agreement on industrial sale/shipment on ag preserve
- May 2017 – ZRA 180 submitted by DPZ/County Exec/ Greg Fox/Mary Kay Sigaty
  - Imposes limits but loopholes allow for industrial shipment

ZRA 180 / CB60-2017

"Introduced...at the request of the County Executive"

County Council of Howard County, Maryland

2017 Legislative Session

Legislative Day No. **10**

Bill No. 60-2017 (ZRA 180)

Introduced by: The Chairperson at the request of the County Executive and cosponsored by Greg Fox and Mary Kay Sigaty

AN ACT allowing certain composting facilities and emergency natural wood waste recycling facilities as accessory uses under certain conditions in certain Zoning Districts; allowing certain natural wood waste recycling facilities and composting facilities as a use permitted as a matter of right under certain conditions in certain Zoning Districts; providing supplementary regulations for composting facilities and emergency natural wood waste recycling facilities; providing conditional use standards for composting facilities and natural wood waste recycling facilities; defining certain terms; making certain technical corrections; and generally relating to the Howard County Zoning Regulations.

MAY 17, 2017 – TOWN HALL MEETING
HCCA ANNUAL MEETING

Question posed to County Executive Kittleman:

Has your stance in any way changed from your campaign promise that industrial mulching on Agricultural Preservation which includes both County and State should never happen? How can we be assured of enforcement of regulations regarding illegal mulching activities? The current fines are peanuts to those who profit from disobeying regulations.

"My stance has not changed. I live on agricultural preservation farm. I don't believe there should be industrial mulching on that."

MAY 25, 2017 – PLANNING BOARD MEETING

- ZRA 160 (DRPS) vs ZRA 180 (DPZ)
- DRPS as sponsor of ZRA 160 provided detailed testimony to urge Planning Board to consider safety and health concerns and to state that ZRA 180 was unacceptable
- DRPS recommended to maintain CB20 in its current form, or to accept ZRA 160, and to reject ZRA 180
- Other core team members that presented urged Planning Board to amend ZRA 180
- DPZ unwilling to even consider our amendment suggestions
- "Industry" vs "industrial"
- Dismissive of health and safety concerns

MAY 25, 2017 – PLANNING BOARD MEETING

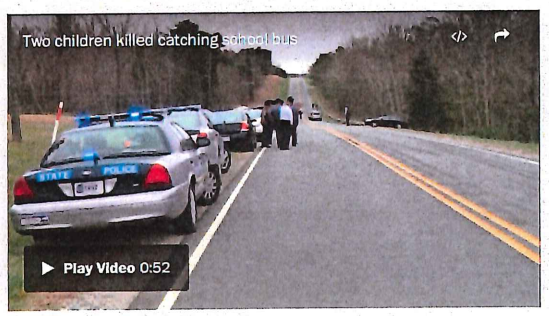
- **Low turnout = no amendments!**

KEY CONCERNS

- Safety
- Fire
- Groundwater contamination
- Carcinogens
- Traffic
- Noise

SCHOOL CHILDREN FATALITIES

"A tractor-trailer was traveling north on Route 15 when a Buckingham County school bus, with its yellow flashing lights activated, approached from the opposite direction to pick up a group of children…As the bus slowed, two children ran across the road toward it. The driver of the tractor-trailer braked, but the vehicle, loaded with 75,000 pounds of mulch and traveling downhill, hit the children before it could stop. The children, identified as Tori Perez, 5, and Jaiden Bartee, 6, died at the scene."



March 30, 2017: State police and investigators look over a tractor-trailer that was involved in an accident that killed two children waiting for a school bus in Dillwyn, Va. (AP/Richmond Times-Dispatch)

MULCH FIRE RISK

- Lack of public water supply
  - Recycled Green Fire, Woodbine, 9/26/2013
    - < 1 acre
    - 10 Hours, 80 firefighters, and 4 counties to control,
    - Over 360,000 gallons of water transported
- Lack of regulations enforcement
  - 7800 Block, Kabik Ct.
    Woodbine, 5/14/2017
    - < 1 acre
    - 2 counties, 25+ firefighters
    - Pile height 68'; MDE requirements set limit at 10'
- Huge resource commitment
  - Nova Services, 711 Pittman Rd.
    Curtis Bay, 4/05/2013
    - 1/4 acre
    - 2 counties + Baltimore City + Ft. Meade, 100+ firefighters

GROUNDWATER CONTAMINATION

- Data suggests that compost operations can cause an elevation of manganese concentrations in groundwater

- Finding in multiple states (CT, OR, NY) of heavy metals (manganese) groundwater contamination downstream of mulch/compost facilities confirmed

WOOD DUST: CARCINOGENIC RISK

- Cancers have been associated with wood dust exposure
- The National Institute for Occupational Safety and Health (NIOSH) considers both hardwood and softwood dust to be potentially carcinogenic to humans
- The three types of cancers associated with wood dust exposure are
  - nasal and sinus cavity cancer
  - lung and other cancers
  - Hodgkin's disease

MULCH DUST: CARCINOGENIC RISK

From Centers for Disease Control and Prevention:

"Exposure to wood dust has long been associated with a variety of adverse health effects, including dermatitis, allergic respiratory effects, mucosal and nonallergic respiratory effects, and cancer."

"The association between occupational exposure to wood dust and various forms of cancer has been explored in many studies and in many countries."

MULCHING OPERATIONS AND MAJOR MEDICAL RISKS DUE TO ENDOSPORES

While mulch is generally considered "safe," the context is typically residential application, not acres of mulch shredded and turned multiple times

Five studies that begin to touch on the potential consequences.

Fulminant Mulch Pneumonitis: An Emergency Presentation of Chronic Granulomatous Disease
- Infectious Diseases Society of America

Pulmonary responses after wood chip mulch exposure.
- US National Libratory of Medicine, NIH

Binding of Aspergillus fumigatus spores to lung epithelial cells and basement membrane proteins: relevance to the asthmatic lung.
- I.M. Bromley and K. Donaldson

Fungal spores: hazardous to health
- US National Libratory of Medicine, NIH

Adverse Human Health Effects Associated with Molds in the Indoor Environment
- American College of Occupational and Environmental Medicine

ZRA 180 / CB60-2017

- Composting
  - RR/RC/State of MD Ag
    - Up to 3 acres by right
    - Up to 5 acres with conditional use [Type 1 (grass) and 2 (manure/food) materials]
  - Howard County Ag Preserve
    - Up to 3 acres with County permit (Type 1 and 2 materials)
  - State of MD Ag Preserve
    - Not mentioned
- Mulch (NWWR)
  - RR/RC/State Ag - Up to 5 acres with conditional use (limitless in/out)
  - County Ag – Up to 2 acres with Conditional Use for a tree farm only
    - *Loophole: Does not restrict industrial sale/shipment or size of truck*
- Emergency Mulch (NWWR)
  - Allowed on RR/RC/Ag up to one acre
  - Must be triggered by natural disaster or disease
  - Limited to 90 days per year

PROPOSED CHANGES

- Compost/Mulch on RR/RC/All Ag
  - Limit shipment to that required for the farming product produced
    - i.e. shipment with trees, shrubs, plants
  - Limit truck size to small trucks (include definition) that must contain product from the farm
  - Restrict Industrial Shipment to M1/M2
    - Add restrictions on M1/M2 (covered facilities)
  - Add State Ag to County Ag – same rules
  - Ban these uses on cluster subdivision parcels
  - Stricter enforcement, larger fines that escalate as violations continue, and more aggressive enforcement for violations
  - Further define "Emergency NWWR"

CONCERNS FOR RECENT RLO INDUSTRIAL TRUCK ACTIVITY

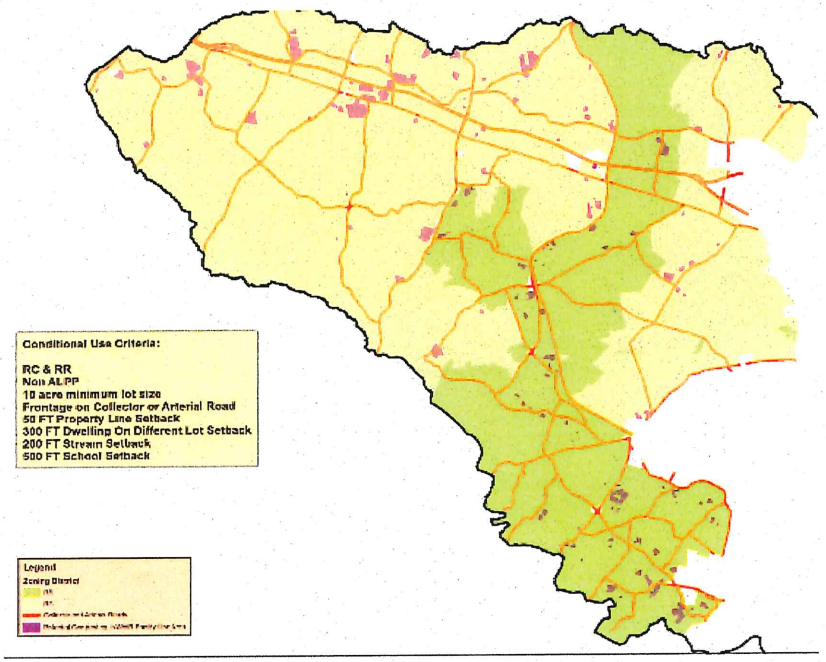
- Won contract for Rt. 32 land clearing
- Recent truck action
- Soon to be legislative session
- All spells trouble and confirms what we read in that CB60 contains serious loopholes to allow for industrial mulching

...a loophole you can literally drive a truck through

RLO TRUCK VIDEO

ELIGIBILITY MAP

Eligible Sites



HOWARD COUNTY GOVERNMENT, DEPARTMENT OF
PLANNING AND ZONING

M1 M2 SOLID WASTE OVERLAY

COMMUNITY MEETING TIME-OUT

- Let's take action now and email the entire County Council and County Executive Kittleman
- councilmail@howardcountymd.gov
- akittleman@howardcountymd.gov
- "Do not pass CB60 without major amendments that will protect our families, our children, and our communities from industrial mulching."

WHAT WE NEED FROM YOU

- **June 29**: Community Meeting; we've taken the first step
- Spread the word to everyone (countywide issue)
- Email councilmail@howardcountymd.gov stating your opposition to industrial mulching on farmland including RR, RC, ag preserve, and cluster subdivision parcels given safety, health and environmental risks
- **July 5**: Sign up to testify for the County Council meeting on July 17th where CB60 will be introduced
- **July 17**: Attend the County Council meeting (7pm) along with your entire family, children included
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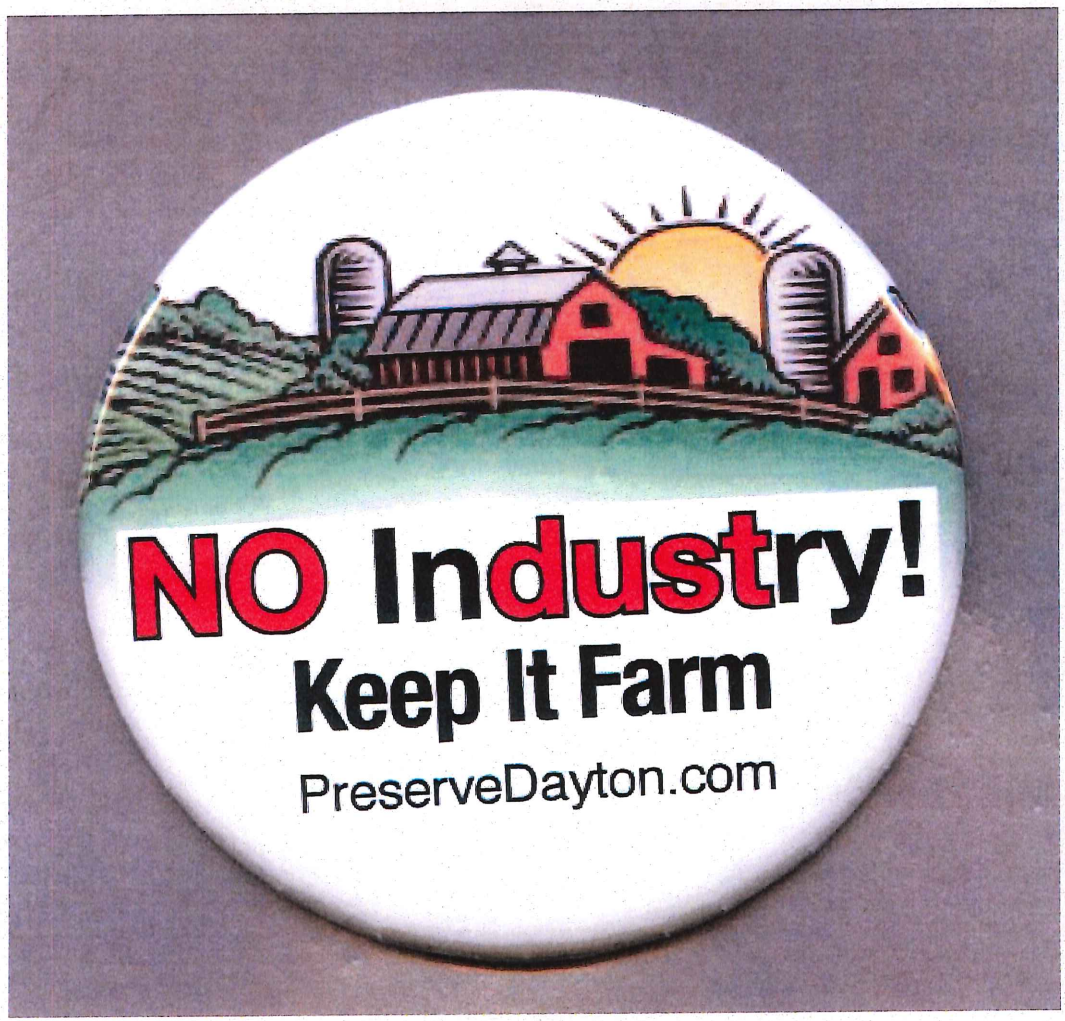
THANK YOU!



Groundwater Metals Contamination from Wood Waste Recycling Facilities

Jeff Harp
August 2014

Manganese Health Risk

- Recently published research identifies exposure to manganese via drinking water causes adverse health effects such as neurological disorders similar to Parkinson's disease
- Neuro-developmental disabilities including autism, attention deficit, hyperactivity, dyslexia and other cognitive impairments
- Epidemiological studies document manganese as a developmental neuro-toxicant
- Maternal manganese levels are associated with low birth weight

Groundwater Contamination

- Four distinct sites
  - New York State Department of Environmental Conservation (NYDEC) verified surface and groundwater manganese contamination from more than 12 mulch and natural vegetative composting facilities
  - Bassler Forest Recycling Products site in Howard County, Maryland is identified with groundwater metals contamination

Groundwater Contamination

- Oregon State Engineers Office and Oregon Department of Environmental Quality published a research paper titled "Groundwater Pollution by Wood Waste Disposal"- identified Manganese groundwater contamination

- Connecticut Department of Energy and Environmental Pollution, Remediation Division Chief Bill Warzecha confirmed wood waste leachate as causing significant manganese groundwater contamination

New York Environmental Investigation Report

- New York State Department of Environmental Conservation (NYSDEC)
- NY State Department of Health
- Suffolk County Department of Health Services
  - Horseblock Road Investigation, Yaphank, NY (July 2013)

New York State Investigation Conclusion

- "This data in conjunction with the data from the current investigation suggests that compost/vegetative organic waste site operations can cause an elevation of manganese concentrations in groundwater."

New York State Response

- Residents using drinking water wells were connected to municipal water supply due to exposure to high levels of manganese

- Tens of millions of dollars was spent to remediate, retrofit facilities, and promulgated new regulations for operations and to limit the amount and type materials allowed at wood waste recycling facilities

Bassler Forest Recycling Products (FRP)

- Howard County Natural Yard Waste Composting Facility
  - Accepted wood waste to naturally decompose through compost processes in static and windrow piles
  - Located west of Clarksville, MD, 1.7-miles east of the proposed Dayton mulch/compost and soil screening facility with the same geologic setting "Wissahickon Schist"
  - Seven wells continue to monitor groundwater quality since at least 2007

Bassler FRP Groundwater Contamination

Contaminant	Max Conc. (µg/L)	Average Conc. (µg/L)	MCL/RSL (µg/L)	Number of Exceedances
Lead	77	44	15	19
Thallium	13	2.2*	2	10
Antimony	34	21.1	6	3
Cadmium	12	11.6	5	3
Arsenic	11	9.2*	10	3
Manganese	13,000	1960	320	56
Iron	52,000	31,000	11,000	12

Five of the seven metals noted have maximum contaminant levels (MCLs) regulated by the Safe Drinking Water Act that are legally enforceable in public water supply systems

RSLs are risk based calculations that set concentration limits

*Calculated using ½-U qualifier concentration

Oregon Environmental Investigation

- Groundwater Pollution by Wood Waste Disposal

- Investigation identified:
  - Wood waste leachate-yielded high concentrations of volatile organic acids
  - Leachate was oxygen demanding and created a reducing environment
  - High concentrations of Manganese were identified in the groundwater to 106,000 μg/L

Oregon Environmental Investigation

- Investigation Conclusion:
  - The reducing environment disassociated manganese from the substratum significantly increasing manganese in the groundwater
  - These environmental factors degraded groundwater to non-potable quality

Oregon Environmental Investigation Response

- Response:
  - City of Turner extended community water supply to the affected home owners

Connecticut Department of Energy and Environmental Protection

- Remediation Division Chief Bill Warzecha
  Tel: 860-424-3776

- Confirmed significant environmental contamination associated with organic leachate
  - Confirmed the process by leachate creating reducing environment
  - Currently gathering data for distribution

Manganese

Manganese (µg/L)	FDA Bottled Water Limit	EPA Regional Screening Level (May 2013)	Connecticut Drinking Water Action Level	ATSDR 1-Day Child Health Advisory	Max Conc. (µg/L)
New York	50	320		1,000	43,000
Bassler (MD)	50	320		1,000	13,000*
Oregon (City of Turner)	50	320		1,000	106,000
Connecticut	50	320	500	1,000	

*Manganese background average for Clarksville West- 20 µg/l

Sources of pollution rich in organic matter such as wood compost can increase the release of manganese and other metals from soil and bedrock into groundwater.

Connecticut Factsheet

Connecticut Department of Public Health maintains a factsheet titled "Manganese in Drinking Water."

- Set a drinking water action level for manganese at 500 μg/L to ensure the protection against manganese toxicity
- "Exposure to high concentrations of manganese over the course of years has been associated with toxicity to the nervous system, producing a syndrome that resembles Parkinsonism."

Leaching Mechanism

Natural wood waste recycling/composting operations allow ground up natural vegetation to compost in large windrows over long time periods. The piles are wetted to help eliminate spontaneous combustion. The water used in wetting operations including rain creates an organic discharge that infiltrates the porous ground surface.

The discharge water is high in organic content (carbohydrates, organic acids, lignin, humic material, carboxylic, hydroxides and amino acids). When the high organic discharge water infiltrates the ground, multiple geochemical reactions occur that mobilize the existing metals from the soil structure

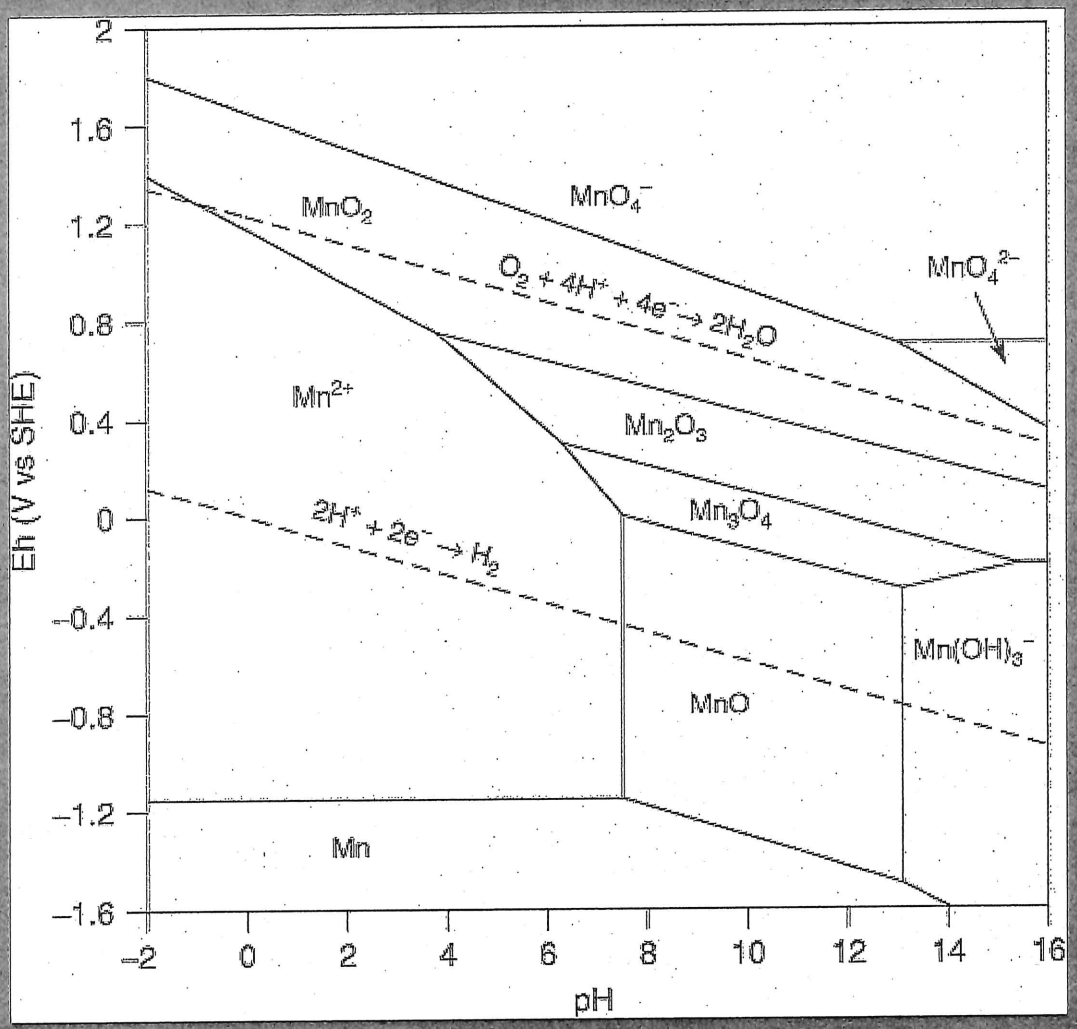
- Creates a negative Oxidation Reduction Potential environment
- Creates a low pH environment
- Water soluble complexes form
- Colloidal transport

Negative ORP

- Organic material, high in chemical and biological oxygen demand, create a low Eh / negative Oxidation Reduction Potential (ORP) or reducing environment
- Negative oxygen reducing potential allows the manganese (cations) to be electron acceptors
- Metal oxides reduce, allowing the cations to become mobile in a low valence, soluble ionic form

$$Mn^{(4+)}O_2 + C_xH_y \longrightarrow Mn^{(0)} + CO_2 + H_2O$$

Manganese Eh-pH Diagram



Low pH Environment

- Organic acids reduce the pH and allow the H^+ ions to replace cations in soil structure releasing metals in ionic form
- Metals phase stability of manganese begins leaching at a pH of 6
- As water reaches a lower pH, a wider variety of metals are liberated and migrate

Water Soluble Complexes

- Organics form water-soluble complexes with the metals that are less reactive with the soil structure and become mobile.

Colloidal Flow

- Flushing of metals through the soil to the groundwater table occurs as colloidal particles

Manganese Health Risk

- Recently published research identifies exposure to manganese via drinking water causes adverse health effects such as neurological disorders similar to Parkinson's disease
- Neuro-developmental disabilities including autism, attention deficit, hyperactivity, dyslexia and other cognitive impairments
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References

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- http://www.dec.ny.gov/docs/materials_minerals_pdf/horseblockrd072013.pdf
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- "Ground-Water Pollution by Wood Waste Disposal," H.R Sweet and R.H. Fetrow, *Groundwater* v13(2), 1975.
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- "Leaching of metals into groundwater-understanding the causes and an evaluation of remedial approaches," Worcester Polytechnical Institute, A. Albright et al, 2012.
- Manganese in Drinking Water, Connecticut Department of Public Health.
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- Drinking Water Health Advisory for Manganese, Environmental Protection Agency (2004).
- http://www.epa.gov/safewater/ccl/pdfs/reg_determine1/support_ccl_magnese_dwreport.pdf
- National Primary Drinking Water Regulations, EPA.
- http://water.epa.gov/drink/contaminants/
- Chemical Mixtures and Children's Health, Clause Henne B et al. 2014.
- http://www.ncbi.nlm.nih.gov/pubmed/24536499?report=abstract
- New Insights into manganese toxicity and speciation, Michalcke B et al. 2014.
- http://www.ncbi.nlm.nih.gov/pubmed/24200516#maincontent
- Neurobehavioural effects of developmental toxicity, Lancet Neurol. 2014.
- http://www.ncbi.nlm.nih.gov/pubmed/24556010#maincontent
- Maternal blood manganese level and birth weight: a MOCEH Birth Cohort Study. 2014.
- http://www.ncbi.nlm.nih.gov/pubmed/24775401#maincontent

Health Hazards of Industrial Wood Waste and Composting

Victor Velculescu, M.D., Ph.D.
Sidney Kimmel Comprehensive Cancer Center
Johns Hopkins University

Submitted to Howard County Task Force, December 14, 2014

Health Hazards

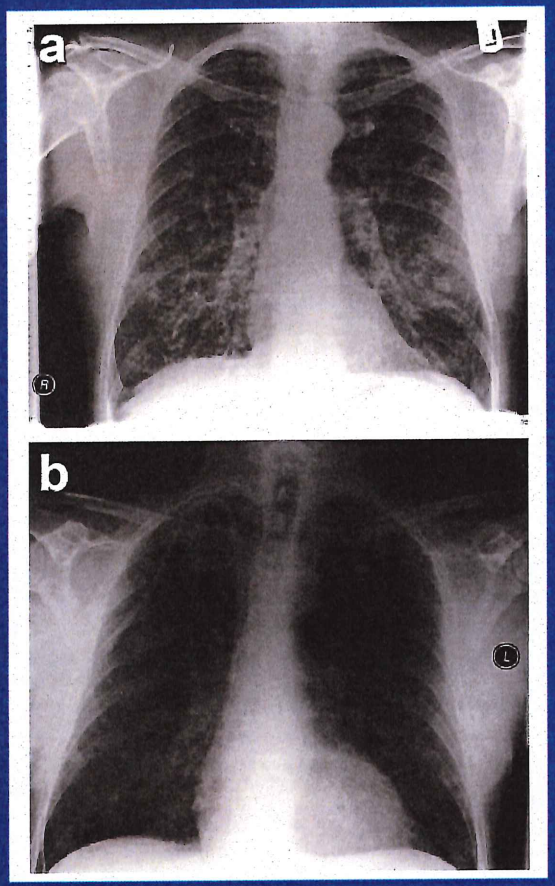
Industrial mulch processing and composting results in increased health risks

- Mulch infectious agents – fungi and bacteria
- Wood dust – allergic and mucosal effects
- Wood dust – cancer
- Composting – volatile compounds, organic dust, infectious agents
- Exposure and risk

Infectious agents example: acute fungal pneumonia

At presentation

2 months later



A 69 year old retired man with no significant medical history. Develope acute pneumonia after spreading tree bark mulch.

Hospitalized, developed kidney injury and failure. Remained dialysis dependent and housebound.

Died of sepsis 10 months later.

Inhalation of fungal spores from mulc was determined be the likely route of infection.

Medical MycologyCaseReports2(2013)125–127

Infectious agents example: acute fungal pneumonia

Mulch culture showing growth of microogranisms (Aspergillus fumigatus, Rhizopus spp., Sporobolomyces spp. and bacteria)

Medical MycologyCaseReports2(2013)125–127

Studies of mulch related infections in medical literature

1: Ameratunga R, Woon ST, Vyas J, Roberts S. Fulminant mulch pneumonitis in undiagnosed chronic granulomatous disease: a medical emergency. Clin Pediatr (Phila). 2010 Dec;49(12):1143-6. doi: 10.1177/0009922810370057. Epub 2010 Aug 19.

2: Siddiqui S, Anderson VL, Hilligoss DM, Abinun M, Kuijpers TW, Masur H, Witebsky FG, Shea YR, Gallin JI, Malech HL, Holland SM. Fulminant mulch pneumonitis: an emergency presentation of chronic granulomatous disease. Clin Infect Dis. 2007 Sep 15;45(6):673-81. Epub 2007 Aug 8.

3: Veillette M, Cormier Y, Israël-Assayaq E, Meriaux A, Duchaine C. Hypersensitivity pneumonitis in a hardwood processing plant related to heavy mold exposure. J Occup Environ Hyg. 2006 Jun;3(6):301-7.

4: Nagai K, Sukoh N, Yamamoto H, Suzuki A, Inoue M, Watanabe N, Kuroda R, Yamaguchi E. [Pulmonary disease after massive inhalation of Aspergillus niger]. Nihon Kokyuki Gakkai Zasshi. 1998 Jun;36(6):551-5. Japanese.

5: Weber S, Kullman G, Petsonk E, Jones WG, Olenchock S, Sorenson W, Parker, Marcelo-Baciu R, Frazer D, Castranova V. Organic dust exposures from compost handling: case presentation and respiratory exposure assessment. Am J Ind Med. 1993 Oct;24(4):365-74.

6: Johnson CL, Bernstein IL, Gallagher JS, Bonventre PF, Brooks SM. Familial hypersensitivity pneumonitis induced by Bacillus subtilis. Am Rev Respir Dis. 1980 Aug;122(2):339-48. PubMed PMID: 6774642.

Dozens of examples of scientific articles from throughout the world related to infectious agents in mulch.

Particularly important and dangerous for immune compromised individuals.

Recent study found that of patients with fulminant mulch pneumonitis, half of those died of due to infection and underlying kidney disease.

Health Hazards

Industrial mulch processing and composting results in increased health risks

- Mulch infectious agents – fungi and bacteria
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- Wood dust – cancer
- Composting – volatile compounds, organic dust, infectious agents
- Exposure and risk

Health Effects of Wood Dust

From Centers for Disease Control and Prevention:

"Exposure to wood dust has long been associated with a variety of adverse health effects, including dermatitis, allergic respiratory effects, mucosal and nonallergic respiratory effects, and cancer. The toxicity data in animals are limited, particularly with regard to exposure to wood dust alone; there are, however, a large number of studies in humans."

1988 CDC OSHA PEL Documentation

Health Effects of Wood Dust

From *Ann Agric Environ Med* 2010, **17**, 29–44.

- **Abstract:** This paper reviews the literature on associations between dry wood dust exposure and non-malignant respiratory diseases … The results support an association between dry wood dust exposure and asthma, asthma symptoms, coughing, bronchitis, and acute and chronic impairment of lung function. In addition, an association between wood dust exposure and rhino-conjunctivitis is seen across the studies."

Dermatitis

- "Dermatitis. There are a large number of case reports, epidemiological studies, and other data on the health effects of wood dust exposure in humans. Dermatitis caused by exposure to wood dusts is common, and can be caused either by chemical irritation, sensitization (allergic reaction), or both of these together. As many as 300 species of trees have been implicated in wood-caused dermatitis."

1988 CDC OSHA PEL Documentation

Asthma

- "Allergic respiratory effects. Allergic respiratory responses are mediated by the immune system, as is also the case with allergic dermatitis. Many authors have reported cases of allergic reactions in workers exposed to wood dust … Asthma is the most common response to wood dust exposure"

1988 CDC OSHA PEL Documentation

Other Lung Effects

- "Mucosal and nonallergic respiratory effects (changes in the structure and function of the nasal mucosa and respiratory tract that are caused by exposure to wood dust). These changes include nasal dryness, irritation, bleeding, and obstruction; coughing, wheezing, and sneezing; sinusitis; and prolonged colds."

1988 CDC OSHA PEL Documentation

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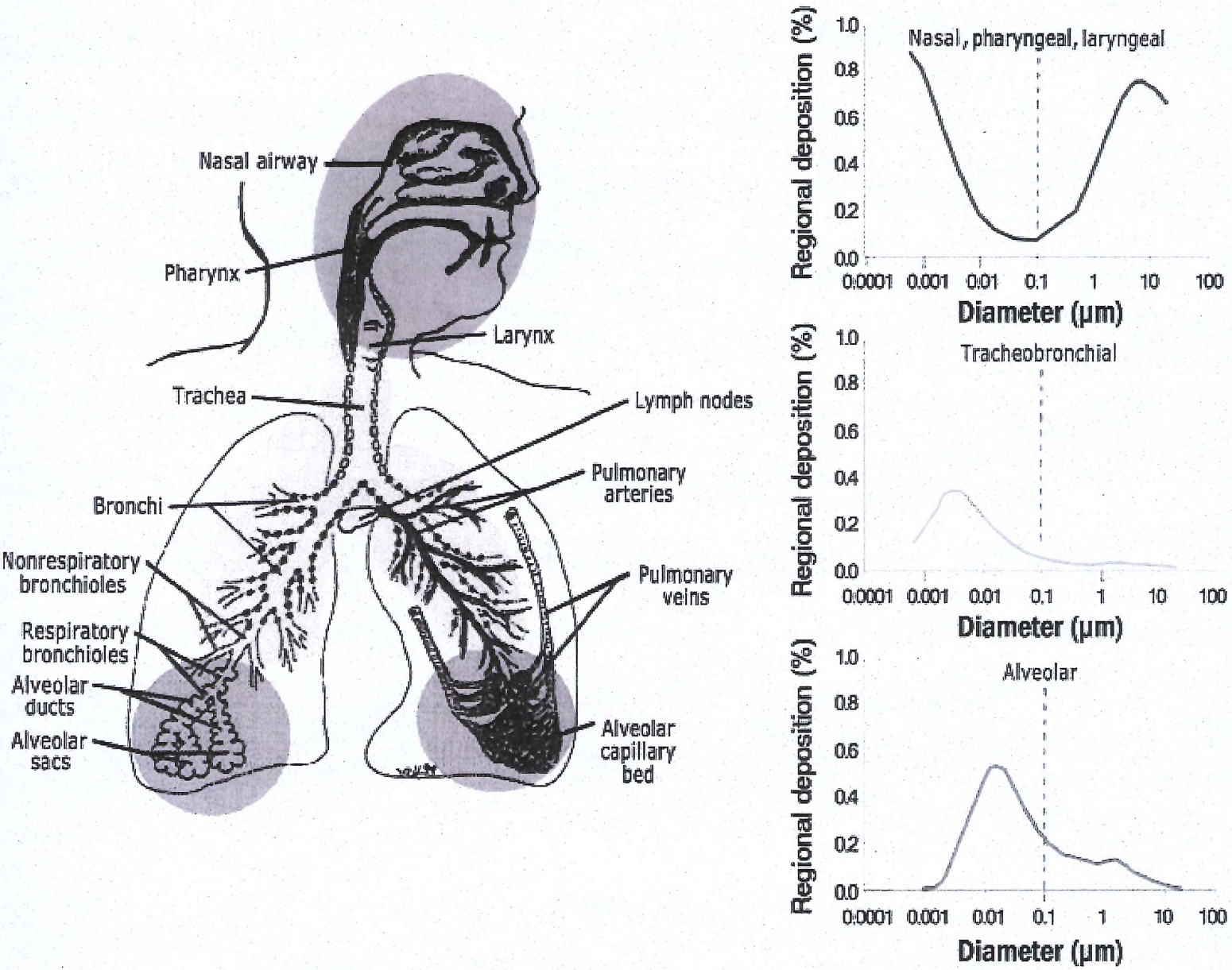
Cancer

- "The association between occupational exposure to wood dust and various forms of cancer has been explored in many studies and in many countries." (CDC)
- "There is *sufficient evidence* in humans for the carcinogenicity of wood dust. Wood dust causes cancer of the nasal cavity and paranasal sinuses and of the nasopharynx. Wood dust is *carcinogenic to humans (Group 1).*" (WHO, IARC)

Fig. 4.1 Deposition of inhaled particles in the human respiratory tract during nasal breathing



From Oberdörster *et al.*, (2005). Drawing courtesy of J Harkema. Reproduced with permission from Environmental Health Perspectives.

Nasal Cancer

- "Summary of evidence for nasal and sinus cavity cancers. The literature clearly demonstrates an association between wood dust exposure and nasal cancer. "
- English studies first identified this link by showing a 10- to 100 times-greater incidence of nasal adenocarcinoma among those exposed to wood dust than in the general population.
- "In the United States, three studies have reported a fourfold risk of nasal cancer or adenocarcinoma … and wood dust exposure."

1988 CDC OSHA PEL Documentation

Lung Cancer

- "Pulmonary cancer. A number of studies investigating the association between wood dust exposure and the development of lung cancer have been conducted."
- Milham (1974/Ex. 1-943) found a significant excess of malignant tumors of the bronchus and lung in workers who exposed to wood dust.

1988 CDC OSHA PEL Documentation

Hodgkin Lymphoma

- "Hodgkin's disease. Milham and Hesser concluded, on the basis of a case-cohort study of 1,549 white males dying of this disease … that there was an association between Hodgkin's disease and exposure to wood dust."
- Other studies concluded that men working in the wood industries in the eastern United States as well as Washington state were at special risk for Hodgkin's disease.

1988 CDC OSHA PEL Documentation

Other Cancers

- "Other cancers. NIOSH (1987a/Ex. 1-1005) concluded that the data on the relationship between occupational exposure to wood dust and the development of cancers other than nasal, Hodgkin's disease, or lung cancers are insufficient and inconclusive."
- Emerging evidence that risks of oral cancer increase with exposure to wood dust.

1988 CDC OSHA PEL Documentation

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Composting

A commonly used method of waste management involving aerobic, biological process of degradation of biodegradable organic matter

Composting Health Effects – VOC's

- Composting generates volatile organic compounds (VOCs)
- VOCs can comprise hundreds of compounds including benzene, toluene, m,p-xylene, o-xylene, styrene, formaldehyde, chloroform, ethylbenzene among others.
- High levels of VOC's observed in many studies at variety of composting sites

Environ. Sci. Techno/. 1995, 29, 896-902
J.L. Domingo, M. Nadal / Environment International 35 (2009) 382–389

Composting Health Effects – VOC's

VOC's comprise substances that are

- Carcinogenic: examples include benzene, a risk factor for leukemia, and formaldehyde, associated with nasal carcinoma
- Toxic: includes many VOC's that may lead to renal, hematological, neurological and hepatic damage as well as mucosal irritation.

J.L. Domingo, M. Nadal / Environment International 35 (2009) 382–389

Composting Health Effects – Biologic Agents

Composting sites due to their contents comprise infectious, allergenic, toxic, and carcinogenic agents including

- Fungi such as Aspergillus fumigatus (A. fumigatus), gram negative bacteria, and parasitic protozoa, all involved in a variety of infectious conditions
- Endotoxins produced by bacteria and fungi, including aflatoxins which are known to be associated with liver cancer

J.L. Domingo, M. Nadal / Environment International 35 (2009) 382–389

Composting Health Effects – Biologic Agents

Composting sites due to their contents comprise infectious, allergenic, toxic, and carcinogenic agents including

- Organic dusts that can lead to pulmonary inflammation (acute inflammation, hypersensitive pneumonitis), occupational asthma, chronic bronchitis, gastrointestinal disturbances, fevers, and irritation of eyes, ear and skin.

J.L. Domingo, M. Nadal / Environment International 35 (2009) 382–389

Composting Health Effects – Animal Mortality and Leachate

- Composting process can lead to increases in solubility of hazardous metals and organic substances in contaminated water (leachate)
- Burial of animal carcasses can lead to significant contamination of soil and groundwater with antimicrobials, steroid hormones, other veterinary pharmaceuticals

Q. Yuan et al. / Science of the Total Environment 456–457 (2013) 246–253

Composting Health Effects – Food Wastes and Pathogens

- "There have been numerous studies on pathogen content in the composting process."
- "In San Jose, California literally hundreds of people were affected by a nearby composting yard. This case illustrates the importance of carefully siting compost facilities with adequate setbacks from residential areas. One study, presented at a BioCycle conference recommended two miles isolation distance from residential and high travel areas."

Cronin, C. Pathogens and Public Health Concerns with Composting
Vermont Department of Environmental Conservation

Local Example – MDE and Recycled Green Industries

- "A Woodbine company that had been processing food scraps into composted materials with commercial applications … has ceased those operations after hearing concerns about pollution from the Maryland Department of the Environment… Food scraps present different environmental concerns than yard waste, the spokesman said. Namely, food contains "nutrients and potential pathogens" not found in yard waste, and are harmful to the environment when washed into surface and ground water, said Jay Apperson, the spokesman, in an email… The letter said water samples taken by the department on or near the company's property "confirm that the operation is generating polluted leachate and storm water and is discharging pollutants without a permit in violation of state law."

Rector, K. Baltimore Sun, Feb 6, 2012

Real World Example of Composting Health Effects on Nearby Residents

- Health effects to a residential area from environmental outdoor pollution hundreds of meters from a composting site (Occup Environ Med 2003;60:336–342)

Reported health complaints§	SS¶	Bioaerosol pollution in residential air‡ up to $>10^5$ CFU m^{-3} air		Duration of present residency >5 years	
		OR**	95% CI††	OR	95% CI
Respiratory tract					
Frequency of colds >5×/year	209	1.94	0.65 to 6.78	**4.72**	**1.19 to 31.83**
Bronchitis	210	**3.02**	**1.35 to 7.06**	**2.91**	**1.29 to 7.03**
Waking up due to coughing	202	**2.70**	**1.23 to 6.10**	**2.51**	**1.19 to 5.53**
Wheezing	207	1.96	0.84 to 4.82	**2.95**	**1.22 to 7.99**
Shortness of breath at rest	203	**3.99**	**1.31 to 15.19**	1.50	0.56 to 4.49
Coughing on rising or during the day‡‡	210	**2.67**	**1.17 to 6.10**	1.51	0.69 to 3.29
Shortness of breath after exertion	205	**4.23**	**1.74 to 11.34**	2.03	0.90 to 4.91
Eyes and general health					
Itching eyes >10×/year	206	1.35	0.61 to 3.05	**2.85**	**1.31 to 6.50**
Smarting eyes >10×/year	205	**2.44**	**1.02 to 6.22**	**2.42**	**1.06 to 5.86**
Nausea or vomiting >5×/year	204	2.65	0.87 to 9.97	**4.10**	**1.28 to 18.44**
Excessive tiredness >5×/year	200	**2.80**	**1.22 to 6.72**	1.83	0.84 to 4.11
Shivering	210	**4.63**	**1.44 to 20.85**	**3.67**	**1.32 to 12.20**
Joint trouble >10×/year	207	1.27	0.54 to 3.07	1.52	0.65 to 3.71
Muscular complaints >10×/year	201	1.17	0.47 to 2.99	1.39	0.55 to 3.86

Health Hazards

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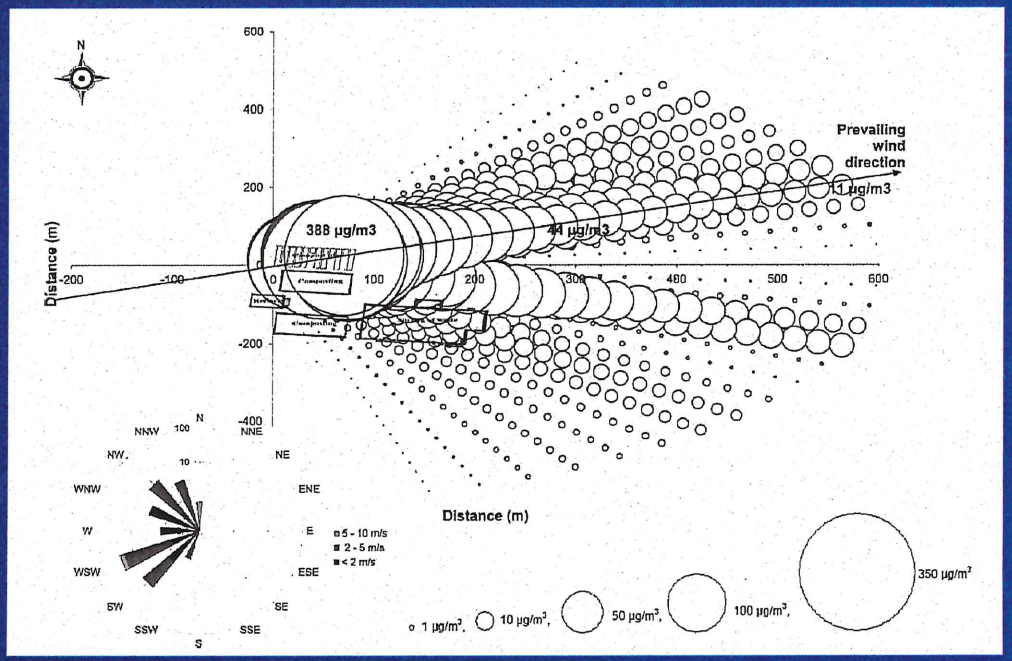
- Exposure and risk

Significant Medical Literature of Effects of Emissions from Waste Facilities

- Chalvatzaki E, Aleksandropoulou V, Glytsos T, Lazaridis M. The effect of dust emissions from open storage piles to particle ambient concentration and human exposure. Waste Manag. 2012 Dec;32(12):2456-68
- Nadal M, Inza I, Schuhmacher M, Figueras MJ, Domingo JL. Health risks of the occupational exposure to microbiological and chemical pollutants in a municipal waste organic fraction treatment plant. Int J Hyg Environ Health. 2009 Nov;212(6):661-9.
- Domingo JL, Nadal M. Domestic waste composting facilities: a review of human health risks. Environ Int. 2009 Feb;35(2):382-9.
- Herr CE, Nieden Az Az, Stilianakis NI, Eikmann TF. Health effects associated with exposure to residential organic dust. Am J Ind Med. 2004 Oct;46(4):381-5.
- Herr CE, zur Nieden A, Stilianakis NI, Gieler U, Eikmann TF. Health effects associated with indoor storage of organic waste. Int Arch Occup Environ Health.
- Herr CE, Zur Nieden A, Jankofsky M, Stilianakis NI, Boedeker RH, Eikmann TF. Effects of bioaerosol polluted outdoor air on airways of residents: a cross sectional study. Occup Environ Med. 2003 May;60(5):336-42.

Dust Emissions and Distance

- Dust emissions from open piles of mulch / organic waste can be measured at distances >500 m (>1500 feet) (Waste Management 32 (2012) 2456–2468)



Microorganisms and VOC's - Dispersion Distance

- High levels of molds, fungi, thermophilic fungi, bacteria and other microorganisms (concentrations of $>10^4$ colony forming units) could be measured >300 m (>1000 feet) in residential air neighboring outdoor organic waste (Am. J. Ind. Med. 46:381–385, 2004)
- Volatile organic compounds can detected at distances of up to 800 meters (Environment International 35 (2009) 382–389) and others

Dispersion of infectious agents – worst case scenario

- Infectious agents have been shown to be dispersed at larger distances. Prominent example includes outbreak of Legionnaires disease in a radius of 6km through release from an elevated water tower
- Dispersion led to 86 infected cases of which 18 (21%) were fatal

J Infect Dis. 2006 Jan 1;193(1):102-11

Summary

- Mulch and composting sites can pose risks for human health due to increased exposure of infectious agents, toxic substances, and VOC's. These include
  - infections due to fungal spores and bacteria
  - Increased risk of dermatitis, allergic respiratory effects, and mucosal and nonallergic respiratory effects
  - Increased risk of cancer, including nasal, lung, and Hodgkin lymphoma
- Exposure risks can occur at significant distances from waste processing area
- Numerous examples of exposure risks have been document in affected populations world-wide

COUNTY OF SUFFOLK

STEVEN BELLONE
SUFFOLK COUNTY EXECUTIVE

DEPARTMENT OF HEALTH SERVICES

JAMES L. TOMARKEN, MD, MPH, MBA, MSW
Commissioner

January 27, 2016

Eugene Leff, Esq.
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Dear Ms. Gallagher:

Attached is a Suffolk County Department of Health Services (SCDHS) report summarizing additional groundwater sampling conducted in the vicinity of vegetative organic waste management facilities (VOWM). This "Investigation of the Impacts to Groundwater Quality from Compost/Vegetative Organic Waste Management Facilities in Suffolk County" was conducted in follow up to a prior SCDHS groundwater investigation in the vicinity of the Great Gardens/Long Island Compost facility in Yaphank, NY, results of which were released by the New York State Department of Environmental Conservation (NYSDEC) in a 2013 report titled; *Horseblock Road Investigation, Yaphank NY.*

SCDHS initiated this additional study to investigate whether groundwater impacts similar to those observed in the Horseblock Road investigation would be observed downgradient of other VOWM sites. The attached report provides the results of groundwater samples taken downgradient of eleven VOWM sites between July of 2011 and October 2014.

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The results of this groundwater sampling effort confirm the prior observation of elevated metals, primarily manganese, and atypical elevated concentrations of radiological parameters, in groundwater downgradient of VOWM facilities. Based on these findings, the attached report provides specific recommendations to address these groundwater concerns, including revisions to NYSDEC Solid Waste Management regulations.

SCDHS would like to acknowledge our appreciation to the Region 1 Office of the New York State Department of Environmental Conservation for their assistance, and the New York State Department of Health (NYSDOH) Wadsworth Laboratory for performing a subset of the radiological analyses of the groundwater samples.

Sincerely,

James L. Tomarken, MD, MPH, MBA, MSW
Commissioner

JLT/srg

cc: Ajay Shah, P.E., Regional Engineer, NYSDEC
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Investigation of the Impacts to Groundwater Quality from Compost/Vegetative Organic Waste Management Facilities in Suffolk County

SUFFOLK COUNTY
DEPARTMENT OF HEALTH SERVICES

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January 22, 2016

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Table of Contents

List of Figures and Tables

Executive Summary

The Suffolk County Department of Health Services (SCDHS) Office of Water Resources investigated impacts to groundwater at eleven current or former vegetative organic waste management (VOWM) sites located throughout Suffolk County. These investigations were prompted after samples collected from a residential drinking water well, and subsequently installed monitoring wells, located downgradient of the Long Island Compost/Great Gardens facility in Yaphank indicated several contaminants at concentrations in excess of New York State drinking water maximum contaminant levels (MCLs) and New York State Department of Environmental Conservation (NYSDEC) groundwater standards/guidance values. This report summarizes the data from 233 groundwater and two surface water samples that were collected from 30 temporary profile wells and six permanent monitoring wells installed by the SCDHS primarily downgradient of VOWM related sites. The general investigation approach used in this study is consistent with other landuse impact studies the SCDHS has performed in the past.

Samples were collected from July of 2011 through October of 2014. Elevated metals concentrations were the primary impact observed to the groundwater downgradient of the sites investigated. Elevated metals concentrations were observed in monitoring wells downgradient of 10 sites, and in four private wells downgradient of one site. The primary constituent that exceeded groundwater and drinking water standards most frequently, and at the highest concentrations, was manganese. Other metals such as antimony, arsenic, beryllium, cadmium, chromium, cobalt, germanium, molybdenum, thallium, titanium and vanadium exhibited detection rates that were at least two times that of typical Suffolk County shallow private wells. Additionally, the number of radiological detections (gross alpha and gross beta) was higher than what is typically observed in native Suffolk County groundwater. Relatively low concentrations of pesticides were reported at a majority of the sites, but due to past and current farming activities at many of the sites, these impacts cannot be exclusively attributable to VOWM activities. The pesticide dichlorvos was reported at two sites that have no apparent history of farming, and therefore its presence could be attributable to the VOWM activity. Additionally, low concentrations of pharmaceuticals, personal care products and wastewater related contaminants (PPCPWRCs) were consistently detected downgradient of the sites, and in some instances may be attributable to the VOWM activity at the sites.

The potential for the existence of private wells downgradient of the investigation sites was evaluated. Private well sampling surveys were performed at three of the sites. Site #1 was the only site that has private wells downgradient which exhibited degraded water quality consistent with VOWM related groundwater impacts. This information has been forwarded to the NYSDEC. The location of public water supply wellfields in the vicinity of each investigation site was also evaluated. Three of the eleven sites have public water supply wellfields located in the downgradient

groundwater flow direction. Two of the sites are located greater than 100 years of groundwater travel time to the wellfields, and the third site is located outside the wellfield's groundwater contributing area, therefore no public wellfields have been identified as being imminently threatened by the groundwater impacts observed in this study.

The data collected indicates that water quality downgradient of the vegetative organic waste management facilities studied exhibited impacts. Further evaluation indicates that groundwater impacts are attributable to VOWM activities at eight of the sites, and impacts were indeterminate at three sites. The water quality data shows similar impacts to the groundwater quality that was previously observed in the SCDHS data collected at the Great Gardens/Long Island Compost facility in Yaphank NY, and documented in the report entitled *Horseblock Road Investigation, Yaphank NY* issued by the New York State Department of Environmental Conservation. Most notably, an increase in metals concentrations, particularly manganese, and increased detections of radiological parameters (gross alpha and gross beta) were observed downgradient of both the Great Gardens/Horseblock Road Facility and the sites evaluated in this study. The groundwater impacts observed downgradient of the Great Gardens/Horseblock Road Facility do not appear to be unique to this facility. Similar groundwater impacts have now been observed at many compost/vegetative organic waste facilities throughout Suffolk County and appear to be related to the compost/vegetative waste operations taking place at these sites.

Based upon the study's findings and conclusions, the following recommendations are made:

- The NYSDEC should ensure that mechanisms are in place and that operating practices at VOWM facilities prevent detrimental impacts to groundwater and surface water quality.

- NYSDEC Part 360 Solid Waste Management Regulations governing VOWM facilities should be revised to protect against impacts to groundwater and surface water quality. Until this is accomplished, prior to the issuance of any new VOWM permits/registrations, the NYSDEC should evaluate, and take measures to ensure that any potential impacts to public/private wells, and/or surface water bodies located hydraulically downgradient of these facilities are mitigated.

- NYSDEC Part 360 Solid Waste Management Regulations should be expanded to include facilities that process vegetative organic type materials which currently do not fall under the purview of current regulations.

- The NYSDEC should further investigate the detection of parameters typically related to septic waste (e.g., pharmaceuticals, personal care products, wastewater related

contaminants, etc.) observed downgradient and within surface water run-off related to vegetative organic wastes.

- The NYSDEC should investigate the mechanisms that cause elevated concentrations of gross alpha/gross beta, metals, inorganic parameters and detections of pharmaceuticals and personal care products downgradient of compost/vegetative organic waste management sites.

- The Suffolk County Department of Health Services should continue to identify areas where private wells may be used downgradient of VOWM sites, and conduct private well sampling surveys as appropriate. The NYSDEC should provide an alternative water supply or filtration to owners whose on-site water sources are determined to have been impacted from VOWM operations.

- New or current facilities that are permitted or registered for vegetative organic waste operations should be required by the NYSDEC to assess the quality of the groundwater migrating from the site.

Summary of Findings

Site #	Site Name	Location	Impacted Groundwater from VOWM Activity Observed	Comments
1	Fifth Avenue	Speonk	Yes	Significant impacts observed in the on-site and 3 downgradient private wells.
2	Moriches-Riverhead Rd Farm	Eastport	Yes	Significant groundwater impacts observed in 2 of 3 monitoring wells.
3	Papermill Rd Facility	Manorville	Yes	Significant impacts observed in all 3 monitoring wells. Groundwater impacts from historical site use (landfill, septic sludge lagoons) also observed.
4	Exit 69 LIE Ramp	Manorville	Yes	Significant groundwater impacts observed in the groundwater profile well. Contaminants typically associated with septic waste observed in a pool of run-off water.
5	South Street Farm	Manorville	Indeterminate	Although slight groundwater impacts were observed, no definitive conclusions can be drawn due to the significant distance from the compost windrows to the monitoring wells.
6	Moriches-Yaphank Rd Farm	Manorville	Indeterminate	Although slight groundwater impacts were observed, no definitive conclusions can be drawn most likely due to the site not having any significant VOWM activity for 5 years prior to groundwater sampling.
7	East Main Street	Yaphank	Yes	Significant groundwater impacts observed in 4 of 5 monitoring wells.
8	LIE North Service Rd Farm	Yaphank	Indeterminate	Additional wells need to be installed further to the east in order to appropriately assess potential impacts from vegetative organic wastes. The significant distance from potential sources to well locations could be a confounding factor.
9	Islip Town Compost Facility	Ronkonkoma	Yes	Significant groundwater impacts observed in both the monitoring wells installed at this site.
10	Conklin St. Site	Farmingdale	Yes	Moderate groundwater impacts observed in 1 of 3 monitoring wells.
11	Peconic Ave Site	Medford	Yes	Significant groundwater impacts observed in 3 of 5 downgradient monitoring wells.

Background

In order to investigate the source of impacts to a private well located on Horseblock Road in Yaphank, in 2009, the Suffolk County Department of Health Services (SCDHS) initiated a groundwater investigation in the vicinity of the Great Gardens/Long Island Compost facility in Yaphank, N.Y. This groundwater investigation consisted of the installation and sampling of groundwater monitoring wells. The results of this investigation are included in a report entitled *Horseblock Road Investigation, Yaphank NY* and was released by the New York State Department of Environmental Conservation (NYSDEC) in July of 2013. This report concluded that the Great Gardens/Long Island Compost Facility was the source of the exceedances of groundwater standards for manganese, iron, thallium, gross alpha, gross beta, radium, chloride and ammonia.

The present study was undertaken to evaluate the groundwater quality downgradient of other vegetative organic waste management (VOWM) sites (e.g., storing of land clearing debris, composting, mulching, etc.) to determine if impacts similar to those documented at the Great Gardens/Long Island Compost facility were occurring. This study was performed in conjunction with the NYSDEC and the New York State Department of Health (NYSDOH). The NYSDEC primarily assisted in obtaining access for the SCDHS to install groundwater monitoring wells at the Town of Islip Compost Facility, and Brookhaven Town's Papermill Road Composting Facility, and also coordinating a subset of radiological analyses performed by the NYSDOH Wadsworth Laboratory.

Approach to Investigations

The investigations consisted of the installation of between one and five temporary profile monitoring wells at 10 of the sites, and six permanent monitoring wells at one site, for a total of 36 wells. These wells were located hydraulically downgradient of the site with respect to the direction of regional groundwater flow. Wells were installed to depths ranging from 65 feet to 135 feet deep, with a well screen five feet in length. Each of the temporary profile wells were initially sampled at the deepest level and then pulled up every ten feet and sampled again. This process was repeated until the top of the water table was reached. This procedure resulted in the collection of five to nine samples in each well, producing in an analytical profile of the groundwater from the top of the water table down to the depth at which the well was drilled. A total of 233 groundwater samples were collected. Samples were collected beginning in July of 2011 and continued through October of 2014. At two locations, surface water samples were collected and analyzed.

It should be noted that, except for Site #11, temporary profile wells were only installed in the general downgradient groundwater flow direction. The general approach used in this investigation is consistent with other landuse impact studies the SCDHS has performed in the past.

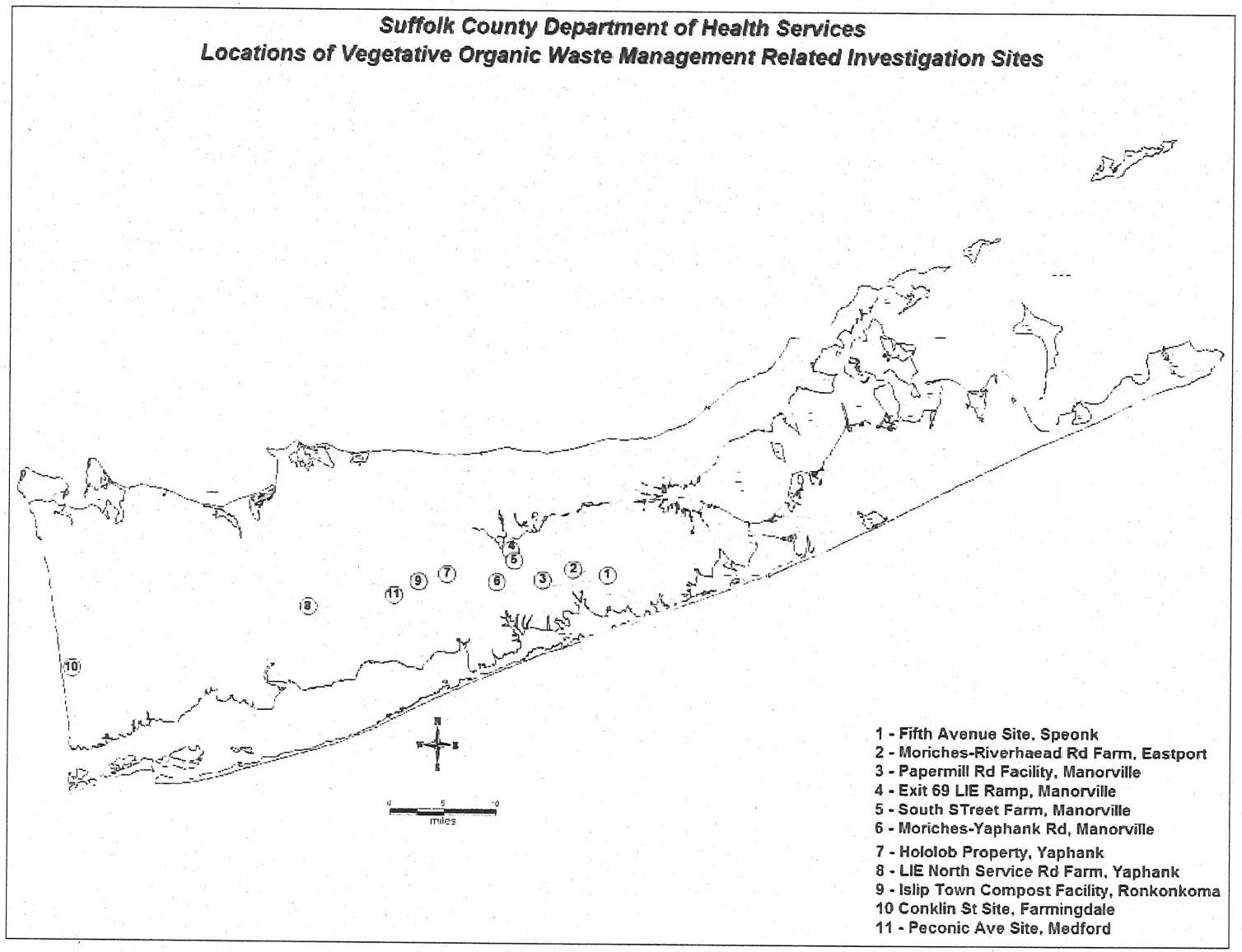
Sites

Table 1 lists the sites investigated for this study. Sites were selected either from information obtained from the NYSDEC, or from the review of landuses using aerial photographs. One important factor that had to be considered prior to an inclusion of a site in this study was appropriate access for the installation of groundwater monitoring wells in the downgradient groundwater flow direction from the site. The subsequent sections provide a description of the investigative activities performed at each of the sites and the findings.

Table 1 - List of Study Sites

Site #	Site Name	Location
1	Fifth Avenue	Speonk
2	Moriches-Riverhead Rd Farm	Eastport
3	Papermill Rd Facility	Manorville
4	Exit 69 LIE Ramp	Manorville
5	South Street Farm	Manorville
6	Moriches-Yaphank Rd Farm	Manorville
7	East Main Street	Yaphank
8	LIE North Service Rd Farm	Yaphank
9	Islip Town Compost Facility	Ronkonkoma
10	Conklin St. Site	Farmingdale
11	Peconic Ave Site	Medford

Figure 1 –Study Site Locations



Site #1
Fifth Avenue
Speonk, NY

Site Description

The site is located on a nine acre tax lot along Fifth Avenue in Speonk. Review of historical aerial photography (Appendix A) indicates that approximately half the site was cleared in 1947, and by 1969-70 the entire site was cleared and being used for the storage of vehicles. This site use appears to be consistent through 1999. The 2001 photograph shows the first indication of possible vegetative organic waste material on the site, primarily on the northern half of the property. All the subsequent aerial photographs (2004 – 2013) indicate significant VOWM activity across most of the site. The site is regulated by NYSDEC as a Part 360 Registered Facility, and is authorized to process unaltered wood. Another NYSDEC registered yard waste composting facility (Long Island Compost Farm #30) is located in the vicinity, to the northwest of this site (Figure 2).

SCDHS Monitoring Wells

The SCDHS installed 3 temporary profile monitoring wells in the vicinity of this site. The locations of these wells were based upon a south-southwest regional groundwater flow direction. Subsequent to the installation and sampling of these wells, additional site-specific groundwater flow direction information became available from the NYSDEC BB&S Lumber Superfund site, located just to the west of the facility (Figure 2). This site specific groundwater flow information indicated a slight variation from the regional groundwater flow direction, suggesting a more south-southeast groundwater flow direction. A consequence of the slight shift in groundwater flow direction is that the three temporary profile wells do not appear to be located downgradient of the target site. Therefore, the results from the three profile wells are not indicative of the water quality downgradient of this facility, and cannot be used to assess potential impacts of the site related activity on groundwater quality.

In each of the three wells, six levels were sampled resulting in the collection of 18 distinct groundwater samples. None of the parameters tested exceed their respective drinking water maximum contaminant levels (MCLs), guidance values or groundwater standards. However, as discussed above, information obtained subsequent to the installation of these wells indicate that they were not optimally located downgradient of the facility, and the results cannot be used to assess impacts to water quality from the operations from this facility.

Figure 2 - Site #1 & Vicinity – Fifth Ave, Speonk

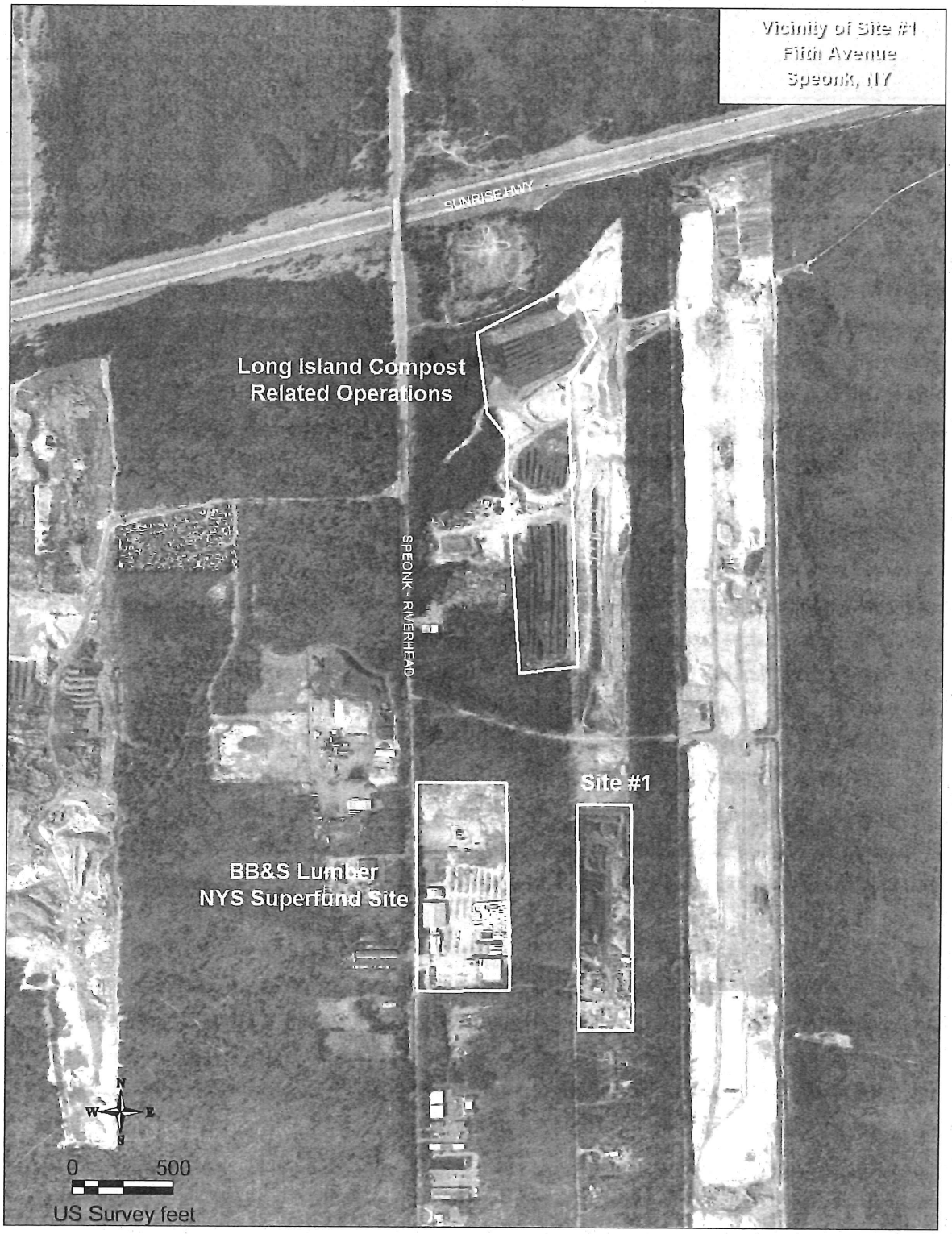
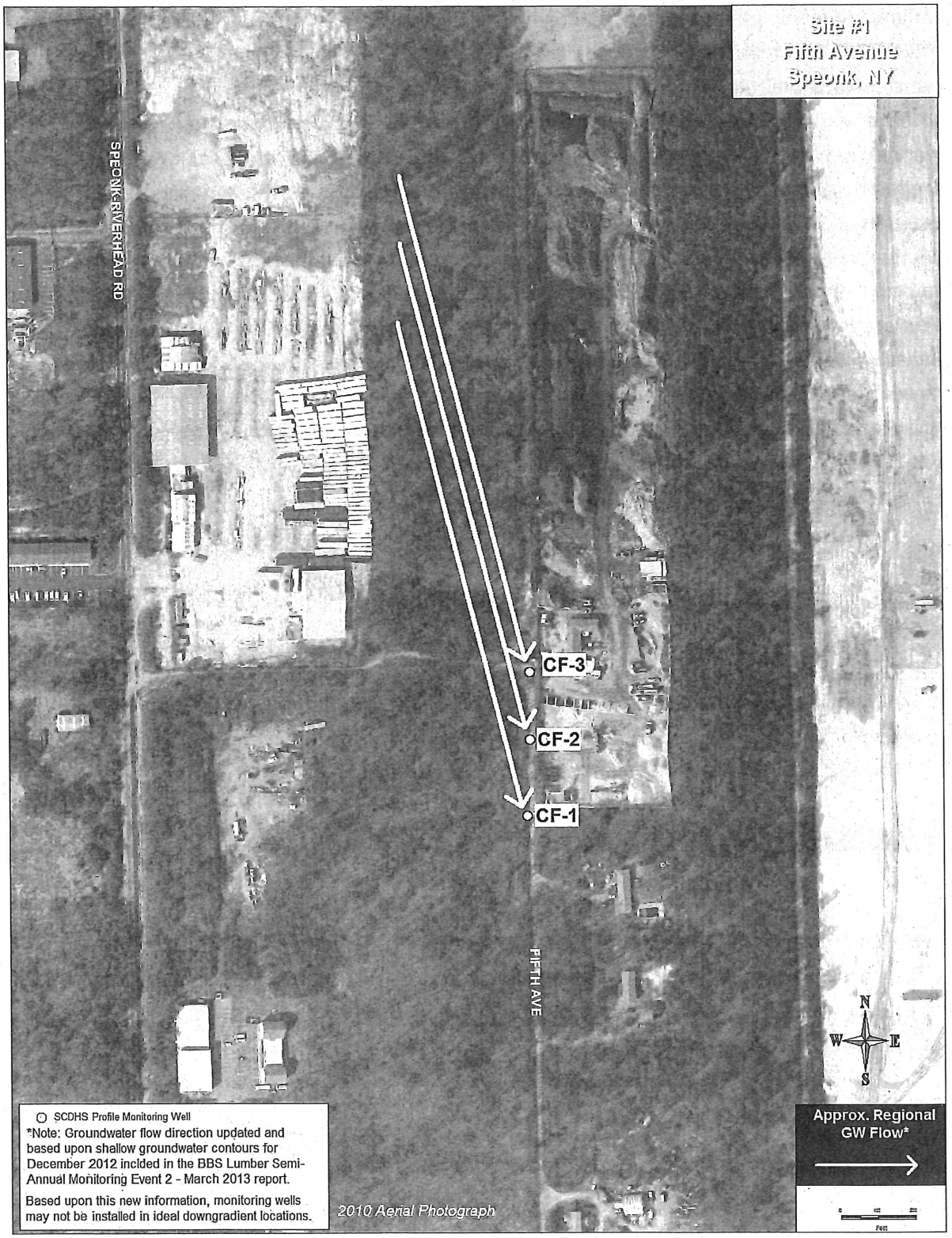


Figure 3 - Site #1 – Fifth Ave, Speonk Well Locations



Private Wells

Ten properties in the vicinity of this facility are located in the general downgradient direction from the site and are served by private wells (including the facility itself). Due to the proximity of this facility to the NYSDEC BB&S Lumber Superfund Site, the SCDHS and NYSDEC have historically conducted a number of private well sampling surveys in the area. Samples have been collected on some of these properties as early as 1999. A review of the data (SCDHS & NYSDEC) indicates that the quality of the water in four private wells are exhibiting impacts consistent with those from groundwater impacted at other vegetative organic waste management sites within Suffolk County. Recent sampling in all four of these private wells shows a general increasing trend in metal concentrations when compared with the older samples. Metals such as barium, manganese and potassium, which were also found at elevated concentrations downgradient of the Great Gardens/Long Island Compost Facility in Yaphank, exhibited particularly significant increases in these wells (e.g., in one well the 1999 manganese concentration was 8.8 parts per billion (ppb), by 2013 it had increased to 1,070 ppb). Since the older private well samples had relatively low concentration of these metals, it appears likely that more recent landuse activity upgradient of these wells has caused the degradation of the water quality in this area. The following analytes have been detected in these private wells at concentrations exceeding a drinking water and/or groundwater standard:

Manganese	**Zinc**
Copper	**Iron**

Public Wellfields

The nearest public supply wellfield is approximately 0.75 miles from the site and is not located downgradient of the site. Any impacts to groundwater quality as results of this site's operations would not be expected to affect the water quality of this wellfield.

Summary of Significant Analytical Results

Metals

As noted above, there was an increasing trend in the concentration of manganese, zinc, copper and iron in four of the private wells located downgradient of the site (e.g., in one well the 1999 manganese concentration was 8.8 parts per billion (ppb), by 2013 it had increased to 1,070 ppb). Other metals such as barium and potassium also showed increasing trends.

Discussion

The three groundwater monitoring wells installed at this site were subsequently found to be located side gradient of the site rather than downgradient, and therefore the results from these wells cannot be used to assess impacts to groundwater quality occurring from operations at this site. However,

since these wells are not located downgradient of this site, the information can be used to provide information on the general background water quality that may be expected in this area. Review of the private well data indicates that at least 4 private wells appear to have been impacted by VOWM related activities.

Wells Impacted by VOWM Activity

There were no profile wells that were affected; however, at least 4 private wells appear to be impacted in connection with VOWM related activities.

Table 2
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #1
Speonk, NY

Well Information			Parameters					Metals											
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Depth To Water (Feet)	Dissolved Oxygen(mg/L)	Temperature (Celsius)	pH	Conductivity (uS)	Aluminum (ppb)	Barium (ppb)	Cobalt (ppb)	Manganese (ppb)	Molybdenum (ppb)	Nickel (ppb)	Lead (ppb)	Strontium (ppb)	Magnesium (ppm)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	-	-	35	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	1,000	-	300	-	100	25	-	-	20	-	-
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	2,000	-	300	-	100	15***	-	-	-	-	-
CF-1	50-55	1/31/2012	41	6.24	11.8	5.4	74	28	17	<1	15	<1	<0.5	<1	64	2.9	5.6	2.7	0.9
	60-65	1/31/2012	41	6.44	11.7	5.6	43	12	8	<1	3	<1	<0.5	<1	24	1.3	3.8	1.4	0.5
	70-75	1/31/2012	41	6.52	11.7	5.7	49	7	9	<1	1	<1	<0.5	<1	19	1.5	4.2	1.7	0.6
	80-85	1/4/2012	41	8.75	10.2	6.12	62	<5	9	<1	<1	<1	<0.5	<1	17	1.9	5.3	1.5	0.5
	90-95	1/4/2012	41	9.93	10.2	6.2	48	<5	7	<1	<1	<1	<0.5	<1	12	1.2	4.2	0.9	0.4
	100-105	1/4/2012	41	9.36	9.2	6.1	61	<5	8	<1	<1	<1	<0.5	<1	16	1.7	4.7	1.5	0.4
CF-2	50-55	2/6/2012	41.65	5.99	12.9	6.71	69	19	18	2	39	<1	<0.5	<1	60	1.7	5.7	1.8	0.7
	60-65	2/6/2012	41.65	6.27	13.3	6.78	61	6	12	<1	2	<1	<0.5	<1	34	1.7	4.5	1.7	0.6
	70-75	2/6/2012	41.65	5.98	13	6.84	58	<5	11	<1	<1	<1	<0.5	<1	26	1.5	4.2	2.7	0.6
	80-85	2/6/2012	41.65	6.45	13	6.8	69	5	12	<1	<1	<1	<0.5	<1	23	2.2	5.6	1.7	0.6
	90-95	2/6/2012	41.65	7.04	13.4	6.98	50	15	7	<1	<1	<1	<0.5	<1	14	1.4	4.1	1	4
	100-105	2/6/2012	41.65	6.78	NA	7.32	60	<5	7	2	<1	<1	<0.5	1	17	1.6	4.4	1.3	0.4
CF-3	50-55	2/15/2012	41.6	6.71	12.5	6.55	77	32	2.1	<1	90	<1	1.1	<1	55	1.7	6.1	2.6	0.8
	60-65	2/15/2012	41.6	7.79	12.2	6.78	65	25	12	<1	4	<1	<0.5	<1	36	1.8	4.6	2.4	0.6
	70-75	2/15/2012	41.6	7.54	11.4	7.17	74	8	14	<1	2	<1	0.5	<1	31	2	5.3	2.5	0.7
	80-85	2/14/2012	41.6	7.08	11.8	8.71	175	18	15	<1	1	2	0.6	<1	26	2.7	5.7	2.1	0.7
	90-95	2/14/2012	41.6	8.41	11.6	7.55	53	<5	7	<1	<1	<1	<0.5	<1	15	1.5	4.2	1.1	0.4
	100-105	2/14/2012	41.6	8.43	11.4	9.93	69	<5	9	<1	<1	<1	<0.5	<1	22	1.9	4.9	1.8	0.4

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
uS = micro siemens
☐ indicates concentration exceeds a standard or guidance value

Table 2
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #1
Speonk, NY

Well Information			Radiologicals (pCi/L)												Standard Inorganics				VOCs (ppb)
			SCDHS PEHL			NYSDOH Wadsworth													
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta*(AGB)	Gross Alpha	Gross Beta	Ruthenium 106	Cesium 137	Zirconium 95	Potassium 40	Actinium 228	Radium 224	Radium 226	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Total Alkalinity(mg CaCO3/L)	Chloroform (ppb)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^	-	15^	1,000	-	-	-	-	-	-	-	250	250	10	-	7
DOH Drinking Water Standards Subpart 5-1			15	-	50**	15	-	-	-	-	-	-	-	5^^^	250	250	10	-	80
CF-1	50-55	1/31/2012	<1	6.9±0.7	6.7±0.7	<0.25	3.1 ±0.8	<2.9	<0.3	<0.78	<2.5	<1	NA	NA	10	11	<0.5	NA	1.3
	60-65	1/31/2012	<1	4.9±0.7	4.5±0.7	<0.18	0.8 ±0.7	<2.3	<0.23	<0.66	<2.1	<0.84	NA	NA	7	5	<0.5	NA	0.7
	70-75	1/31/2012	<1	5.0±0.7	4.5±0.7	<0.18	<0.8	<2.6	<0.24	<0.96	<2.1	<0.79	NA	NA	7	6	<0.5	NA	1.3
	80-85	1/4/2012	<1	<1	<1	<0.18	<0.8	<2.5	<0.24	<0.87	<1.9	<0.81	NA	NA	7	7	<0.5	8	0.7
	90-95	1/4/2012	<1	<1	<1	<0.17	<0.8	<3.1	<0.32	<1.2	<2.8	<1.1	NA	NA	6	6	<0.5	4	1.2
	100-105	1/4/2012	<1	<1	<1	<0.31	<0.8	<2.9	<0.31	<1.2	0.4 ±0.29	<1	NA	NA	7	7	<0.5	9	1.4
CF-2	50-55	2/6/2012	<1	3.1±0.2	2.5±0.2	<0.35	3 ±0.7	<2.4	<0.24	<0.8	<2.1	NA	NA	NA	9	6	<0.5	NA	0.8
	60-65	2/6/2012	<1	<1	<1	<0.37	1.4 ±0.6	<2.4	<0.24	<0.8	<2	NA	NA	NA	8	5	<0.5	NA	0.7
	70-75	2/6/2012	<1	<1	<1	<0.24	<1	<2.3	<0.26	<0.63	0.8 ±0.73	<0.64	NA	NA	7	6	<0.5	NA	1.2
	80-85	2/6/2012	<1	<1	<1	<0.25	<1	<2.7	<0.29	<0.7	<2.5	<0.82	NA	NA	8	6	<0.5	NA	1.4
	90-95	2/6/2012	<1	<1	<1	<0.22	<0.7	<2.2	<0.27	<0.57	<2.1	<0.82	NA	NA	5	6	0.5	NA	0.9
	100-105	2/6/2012	<1	<1	<1	<0.22	<0.7	<3.3	<2.8	<1.1	<2.4	1.3 ±0.8	NA	NA	5	7	0.6	NA	<0.5
CF-3	50-55	2/15/2012	<1	3.1+/-0.2	2.4±0.2	<0.2	3 ±0.8	<2.2	<0.27	<0.74	3.5 ±1.7	NA	NA	NA	11	5	<0.5	11	0.7
	60-65	2/15/2012	<1	1.4+/-0.1	0.9±0.1	<0.2	1.5 ±0.7	<2.4	<0.27	<0.73	1.9 ±1.2	NA	NA	NA	8	7	<0.5	7	0.9
	70-75	2/15/2012	<1	<1	<1	<0.28	<0.8	<2.5	<0.25	<0.64	<2.2	NA	0.88 ±0.76	NA	9	6	<0.5	10	1
	80-85	2/14/2012	<1	<1	<1	0.55 ±0.43	<0.8	<2.8	<0.32	<0.86	0.5 ±0.46	NA	NA	NA	8	6	<0.5	NA	1
	90-95	2/14/2012	<1	<1	<1	<0.22	<0.6	<2.6	<0.26	<0.66	3.5 ±1.9	NA	NA	NA	6	5	0.9	NA	0.9
	100-105	2/14/2012	<1	<1	<1	<0.27	<0.6	<3.1	<0.3	<0.87	<2.6	NA	NA	NA	6	7	0.8	NA	<0.5

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie

^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
^^^ = MCL is for combined Radium 226 + Radium 228
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
☐ indicates concentration exceeds a standard or guidance value

Site #2
Moriches-Riverhead Road Farm
Eastport NY

Site Description

The site is located on the south-west corner of Moriches-Riverhead Road and Port Jefferson-Westhampton Road, in Eastport. It consists of two tax parcels totaling 27 acres in size. Review of aerial photography (Appendix B) shows that the site was vacant in 1947, and although some structures appear on the northeast portion of the site in the 1984 photo, the majority of the land was still vacant. This is consistent on the 1994 and 1996 photos. In 1999, the first compost windrows appear on the site, parallel to the site's northwestern boundary. With the exception of 2001, these windrows are consistent up to and including the 2006 aerial photo. Several additional, smaller windrows appear on the site's northern and southern boundary in 2003 and only on the northern boundary in 2004. No windrows appear on the 2007 photo, and the 2010 and 2013 photos do not indicate any evidence of compost windrows on the site. This site is regulated by the NYSDEC as "Long Island Compost Farm #18", and is authorized to accept yard waste for composting.

SCDHS Monitoring Wells

The SCDHS installed three temporary profile monitoring wells (RC-1, RC-2 and RC-3) in the vicinity of this site, on Moriches-Riverhead Road, south of Eastport Manor Road. Figure 4 shows the location of the profile wells on the 2010 aerial photograph, and Figure 5 shows the well locations relative to the historic windrow locations on the 2006 aerial photograph. The locations of these wells were based upon a south-southwest regional groundwater flow direction, and were sited to assess past and/or current impacts from vegetative organic waste activity occurring on the parcels located south of Eastport Manor Road. All three wells were installed to a depth of 95 feet below grade (fbg), and sampled at 10 foot intervals as they were retracted. Five levels were sampled from RC-1, with the uppermost located at the 50 to 55 foot interval, whereas six levels were sampled in both RC-2 and RC-3, with the uppermost level located at the 40-45 foot interval, yielding a total of 17 groundwater samples collected and analyzed from this site. The following analytes were detected in the indicated monitoring wells at concentrations exceeding drinking water and/or groundwater standards:

Manganese (RC-2, RC-3)
Magnesium (RC-2)
Sodium (RC-1, RC-2, RC-3)
Nitrate (RC-3)

Table 3 contains a summary of the results of the analytes detected.

Figure 4 - Site #2 Well Locations -2010 Aerial Photograph

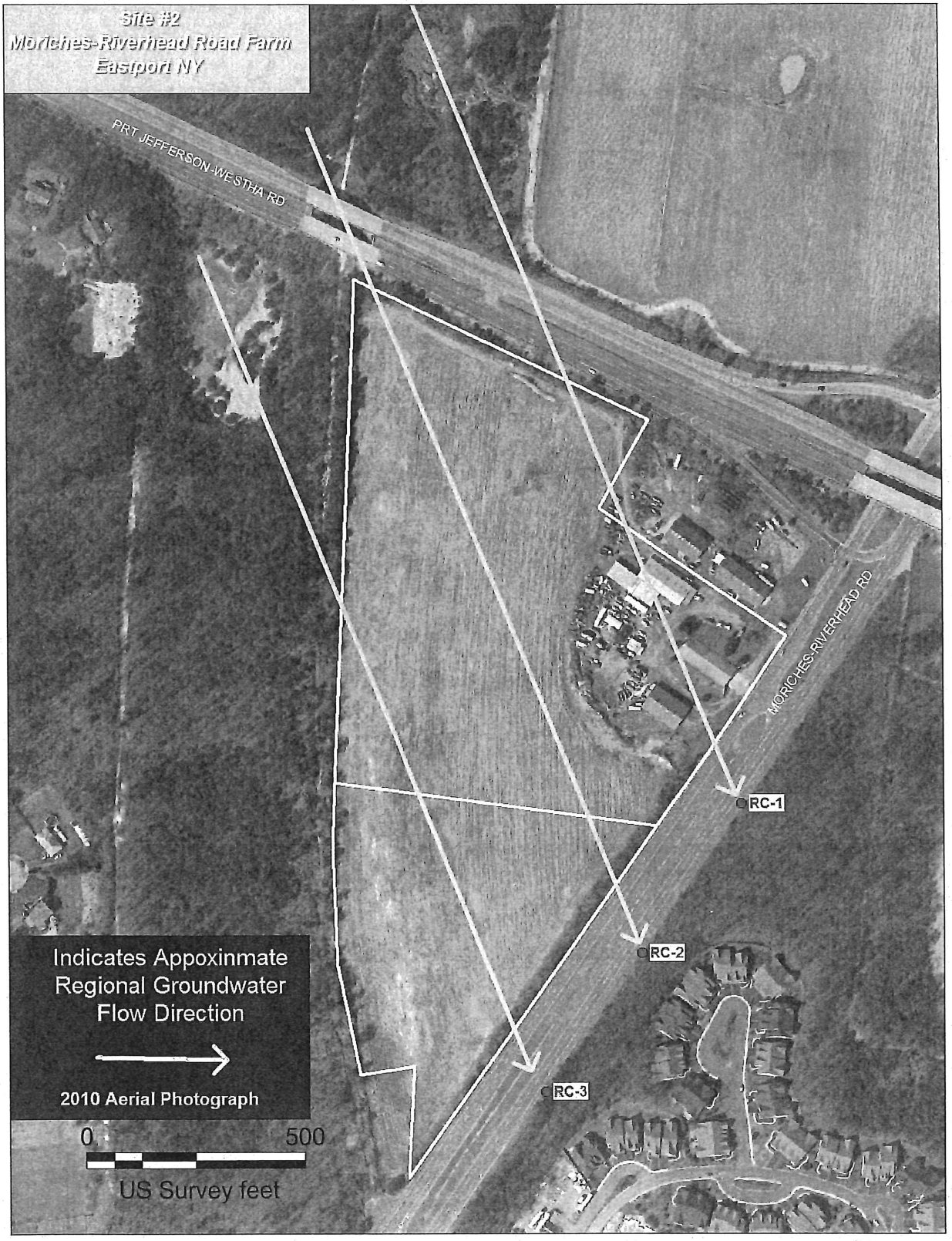


Figure 5– Site #2 Well Locations - 2006 Aerial Photograph

Private Wells

Five potential private wells were initially identified in the vicinity of this site. Subsequently, all five locations were confirmed to be served by public water.

Public Wellfields

The nearest public supply wellfield is approximately 1.1 miles from the site and is not located downgradient of the site. Any impacts to groundwater quality as results of this site's operations would not be expected to affect the water quality of this wellfield.

Summary of Significant Analytical Results

Metals

Of the three monitoring wells, RC-3 exhibited the most degraded water quality with manganese concentrations of 2,730 ppb, which is over nine times the NYS drinking water standard of 300 ppb. The sodium concentration exceeded the groundwater standard (20 ppm) in profile level 80-85 fbg (20.1 ppm). Other analytes were also detected in RC-3 at elevated concentrations, but their concentrations either did not exceed a drinking water standard, or no standard currently has been established. These include aluminum (up to 892 ppb), barium (up to 872 ppb), beryllium (up to 1.4 ppb), thallium (0.4 ppb), and potassium (up to 55.7 ppm).

Manganese concentrations in RC-2 also were elevated and exceeded standards in three profile levels (50-55 fbg, 60-65 fbg and 70-75 fbg) , with the highest concentration detected at 1,970 ppb in the 60-65 fbg profile level. Sodium concentrations were elevated, exceeding the groundwater standard (20 ppm) in four levels in both RC-1 (maximum 87.7 ppm) and RC-2 (maximum 70.4 ppm). The groundwater standard for magnesium (35 ppm) was exceeded in well RC-2 in the 50-55 fbg profile level (461 ppm), and for thallium (0.5 ppb) in RC-2 (0.6 ppb) and RC-3 (0.6 ppb) each at the 60-65 fbg profile level.

Radionuclides

Gross alpha concentrations, although not exceeding the drinking water standard, were elevated in RC-3 at concentrations above what is typically observed in Suffolk County groundwater (Table 16), the highest concentration (8.9 pCi/l) was in the 80-85 fbg profile level.

Other Notable Results

The drinking water and groundwater standards for nitrate (10 ppm) were exceeded in six of the eight profile levels of well RC-3 (up to 17.9 ppm). Ammonia was detected below the groundwater standard in the two deepest profile levels of well RC-3 (80-85 fbg and 90-95 fbg) at 0.76 ppm and 1.58 ppm respectively. All three wells had detections of the pesticide metolachlor and/or a

metolachlor metabolite. The pesticides simazine, atrazine and two atrazine metabolites were detected in low concentrations in well RC-3, as was the pesticide degredate 2,6-dichlorbenzamide.

Discussion

Review of historic aerial photographs of this site (Appendix B) indicates that the western portion of the site was used for VOWM activities for approximately eight years (1999 – 2006). VOWM activities are not evident in aerial photographs taken within the last seven years. Water quality data from the three monitoring wells installed hydraulically downgradient of this site indicate the western-most well (RC-3) exhibited the most degraded water quality, and the eastern well (RC-1) was the least impacted. The degraded water quality, particularly in well RC-3, is consistent with water quality impacts observed downgradient of the Great Gardens/Long Island Compost facility in Yaphank that were determined to be a result of VOWM activities.

Figure 5 is an aerial photograph of the site from 2006 that shows the site VOWM activity, the SCDHS monitoring wells, and the approximate direction of the regional groundwater flow direction in relation to each of the monitoring wells. This figure illustrates that water quality in well RC-3 appears to have been most influenced from the VOWM activity on this site. It also shows that water quality in well RC-2 may have been slightly influenced by the northern extent of VOWM activity, and water quality in well RC-1 does not appear to incur any influence from the VOWM activity. The extent of potential VOWM influence on each well's water quality, with respect to groundwater flow direction, appears to coincide with the severity of water quality degradation observed in each well (e.g., the more potential influence from VOWM activity, the more degraded the water quality).

Wells Impacted by VOWM Activity

Two of the three profile wells (RC-2 and RC-3) that were installed appear to have been impacted from past VOWM activity that occurred at this site.

Table 3
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #2
Eastport, NY

Well Information			Parameters					Metals												
Well ID	Screen Interval (ft)(depth below grade)	Sample Date	Depth To Water (Feet)	Dissolved Oxygen (mg/L)	Temperature (Celsius)	pH	Conductivity (µS)	Aluminum (ppb)	Barium (ppb)	Beryllium (ppb)	Chromium (ppb)	Manganese (ppb)	Nickel (ppb)	Strontium (ppb)	Thallium (ppb)	Titanium (ppb)	Magnesium (ppm)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	3	-	-	-	-	0.5	-	35	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	1,000	-	50	300	100	-	-	-	-	20	-	-
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	2,000	4	100	300	100	-	2	-	-	-	-	-
RC-1	50-55	2/21/2012	41.93	NS	NS	5.6	335	35	11	<1	<1	47	1.2	101	<0.3	<1	2.3	42.7	7.8	3.5
	60-65	2/21/2012	41.93	NS	NS	5.7	467	16	124	<1	<1	81	1.2	132	<0.3	<1	2.3	68.9	5.9	3.9
	70-75	2/21/2012	41.93	NS	NS	5.7	480	15	166	<1	<1	70	0.7	124	<0.3	<1	3.3	65.4	8.2	4.6
	80-85	2/21/2012	41.93	NS	NS	5.9	648	10	166	<1	<1	24	1	104	<0.3	<1	6.1	87.7	8	3.5
	90-95	2/21/2012	41.93	NS	NS	6.4	118	<5	8	<1	<1	3	<0.5	16	<0.3	<1	1.3	15.5	2	0.6
RC-2	40.45	3/6/2012	38.74	6.57	14.3	6.5	482	29	67	<1	<1	128	1.6	101	<0.3	2	3	70.4	11.7	3.6
	50-55	3/6/2012	38.74	9.09	14.1	5.7	205	49	291	<1	<1	461	1.5	131	<0.3	<1	461	10.3	7.8	9.9
	60-65	2/28/2012	38.65	5.77	13.5	5.7	206	29	158	<1	<1	1,560	1.8	64	0.6	<1	3.8	18.2	4.2	6.5
	70-75	2/28/2012	38.65	6.47	12.8	6.2	208	<5	48	<1	<1	1,970	<0.5	14	<0.3	<1	0.6	28.7	1.6	5.2
	80-85	2/28/2012	38.65	6.29	12.7	6.4	218	6	42	<1	<1	155	<0.5	23	<0.3	<1	1.6	29.5	1.9	4.3
	90-95	2/28/2012	38.65	5.18	12.6	6.4	215	<5	66	<1	<1	64	0.6	38	<0.3	<1	2.9	22.3	3.8	6.8
RC-3	40-45	3/20/2012	35.69	2.64	16.3	5.3	253	280	107	0.5	2	111	1.5	23	<0.3	<1	6.3	10.3	20	5.2
	50-55	3/20/2012	35.69	2.27	15.6	4.8	342	892	50	1.4	3	677	2.6	31	<0.3	<1	6.2	10.4	20.4	24.6
	60-65	3/20/2012	35.69	0.65	15.2	5.1	352	546	66	0.7	2	549	1.7	12	0.6	<1	5.8	9.1	9.3	46.7
	70-75	3/6/2012	35.69	3.4	14.1	5.3	425	636	63	0.6	<1	793	2.1	<2	0.4	<1	7.5	12.4	8.4	55.7
	80-85	3/6/2012	35.69	1.07	14.4	5.6	348	167	461	<0.3	<1	2,650	1.2	34	<0.3	<1	4	20.1	8.5	28
	90-95	3/6/2012	35.69	11.49	14.5	5.9	375	37	872	<0.3	3	2,730	6.3	44	<0.3	<1	5	18.2	11.1	30.5

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
uS = micro siemens
ppm = part per million
ppb = part per billion
☐ indicates concentration exceeds a standard or guidance value

Table 3
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #2
Eastport, NY

Well Information			Radiologicals (pCi/L)												Standard Inorganics						VOCs (ppb)	
			SCDHS PEHL			NYSDOH Wadsworth																
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta* (AGB)	Gross Alpha	Gross Beta	Ruthenium 106	Cesium 137	Zirconium 95	Potassium 40	Actinium 228	Radium 224	Radium 226	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Ammonia (ppm)	Total Alkalinity(mg CaCO3/L)	Perchlorate (ppb)	Chloroform (ppb)	Methyl-tertiary-butl-ether
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	10
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^	-	-	1,000	-	-	-	-	-	-	-	250	250	10	2	-	-	7	-
DOH Drinking Water Standards Subpart 5-1			15	-	50**	15	-	-	-	-	-	-	-	5^^^	250	250	10	-	-	18	80	10
RC-1	50-55	2/21/2012	<1	3.6±0.2	<1	<0.6	3.3 ±0.8	<3	<0.27	<0.93	<2.3	NA	NA	NA	84	8	3.1	<0.5	5	1	<0.5	<0.5
	60-65	2/21/2012	1.2±0.6	6.4±0.6	3.2±0.6	<0.7	3.5 ±0.8	<3.1	<0.31	<0.94	1.4 ±1.2	NA	NA	NA	123	7	3.8	<0.5	6	<0.2	<0.5	<0.5
	70-75	2/21/2012	1.7±0.4	3.7±0.2	<1	1.8 ±1.3	4.7 ±0.9	<2.4	<0.25	<0.78	3.8 ±2.9	NA	NA	NA	129	<15	2.4	<0.5	5	1.2	<0.5	<0.5
	80-85	2/21/2012	1.1±0.7	5.0±0.6	2.13±0.6	<1.4	2.3 ±1.1	<3	<0.29	<0.84	<2.3	NA	NA	NA	180	<10	2.3	<0.5	7	0.7	<0.5	<0.5
	90-95	2/21/2012	<1	<1	<1	<0.3	<0.7	<2.7	<0.25	<1.4	<2.3	NA	NA	NA	24	<5	1.2	<0.5	8	0.2	0.7	<0.5
RC-2	40.45	3/6/2012	<1	4.1±0.2	1.1±0.2	<0.94	4.9 ±0.9	<2.6	<0.31	<0.8	5.9 ±4.9	NA	1.68 ±0.71	NA	102	20	4.7	<0.5	24	0.5	<0.5	<0.5
	50-55	3/6/2012	1.4±0.4	13.2±0.3	4.9±0.3	1.3 ±0.7	10 ±1.2	<2.3	<0.25	<0.6	9.9 ±2.8	NA	NA	1.5 ±1.2	24	16	6.7	<0.5	5	0.5	<0.5	<0.5
	60-65	2/28/2012	<1	7.8±0.2	2.5±0.2	0.5 ±0.5	6.2 ±0.9	<2.7	<0.32	<0.8	2.7 ±2.2	NA	NA	NA	39	10	4	<0.5	6	0.4	<0.5	0.6
	70-75	2/28/2012	<1	4.2±0.2	<1	<0.3	4.3 ±0.8	<2.4	<0.26	<0.76	3.7 ±2.6	NA	NA	NA	40	8	2.7	<0.5	13	0.4	<0.5	0.9
	80-85	2/28/2012	<1	3.0±0.2	<1	<0.3	2.6 ±0.7	<2.7	<0.32	<0.96	4.5 ±3.2	NA	NA	NA	52	5	<0.5	<0.5	11	0.2	<0.5	1
	90-95	2/28/2012	<1	6.0±0.2	<1	<0.3	4.4 ±0.8	<2.9	<0.27	<0.98	5.2 ±3.4	NA	NA	NA	54	<5	<0.5	<0.5	9	<0.2	0.6	<0.5
RC-3	40-45	3/20/2012	1.4±0.3	7.3±0.2	3.0±0.2	2.3 ±1	5.8 ±1	<3	<0.28	<1.2	5 ±2.7	NA	NA	NA	19	41	8.9	<0.5	5	0.2	<0.5	<0.5
	50-55	3/20/2012	3.0±0.3	26.7±0.6	5.8±0.6	2 ±1	22.9 ±2	<2.4	<0.26	<0.89	23 ±5.2	1.7 ±1.5	NA	NA	19	66	11.5	<0.5	1	0.4	<0.5	<0.5
	60-65	3/20/2012	6.0±0.5	49.7±1.1	10.7±1.1	4.1 ±1.3	43.3 ±3.2	<3.2	<0.34	<1.1	39 ±7.1	2.2 ±1.3	0.95 ±0.62	NA	17	73	9.6	<0.5	3	0.7	<0.5	<0.5
	70-75	3/6/2012	5.5±0.4	53.9±1.0	7.3±1.0	3.5 ±1.3	51 ±3.6	<2.8	<0.31	<0.79	61 ±9	2.4 ±1.5	NA	NA	21	76	14	<0.5	5	0.8	<0.5	<0.5
	80-85	3/6/2012	8.9±0.4	28.7±0.6	5.0±0.6	4.3 ±1.4	27 ±2.2	<3.1	<0.31	<0.74	27 ±7.2	2.4 ±1.6	NA	NA	46	16	14.5	0.76	3	0.7	<0.5	<0.5
	90-95	3/6/2012	7.8±0.4	30.4±0.6	5.0±0.6	5.7 ±1.6	29 ±2.4	<2.3	<0.25	<0.58	31 ±5.5	2.5 ±1.2	0.98 ±0.69	NA	40	17	17.9	1.58	9	1.1	<0.5	<0.5

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie

^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
^^^ = MCL is for combined Radium 226 + Radium 228
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
☐ indicates concentration exceeds a standard or guidance value

Table 3
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #2
Eastport, NY

Well Information			Herb Mets (ppb)								Semi-Volatile Organic	
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Bisphenol A	Deisoprpylatrazine	Desethylatrazine	2,6-Dichlorobenzamide	Imidacloprid	Metolachlor	Metolachlor OA	Metolachlor ESA	Atrazine (ppb)	Simazine (ppb)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	50	50	7.5	0.5
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	10	-	-	7.5	0.5
DOH Drinking Water Standards Subpart 5-1			50	50	50	50	50	50	50	50	3	4
RC-1	50-55	2/21/2012	<0.2	<0.2	<0.4	<0.5	0.3	<0.2	Trace	0.5	<0.1	<0.07
	60-65	2/21/2012	<0.2	<0.2	<0.4	<0.5	<0.2	Trace	0.4	0.6	<0.1	<0.07
	70-75	2/21/2012	<0.2	<0.2	<0.4	<0.5	<0.2	Trace	Trace	0.3	<0.1	<0.07
	80-85	2/21/2012	<0.2	<0.2	<0.4	<0.5	<0.2	Trace	Trace	0.3	<0.1	<0.07
	90-95	2/21/2012	<0.2	<0.2	<0.4	<0.5	<0.2	<0.2	<0.3	<0.3	<0.1	<0.07
RC-2	40.45	3/6/2012	<0.2	<0.2	<0.4	<0.5	<0.2	<0.2	Trace	0.3	<0.1	<0.07
	50-55	3/6/2012	<0.2	<0.2	<0.4	<0.5	<0.2	<0.2	0.3	0.4	<0.1	<0.07
	60-65	2/28/2012	Trace	<0.2	<0.4	<0.5	<0.2	<0.2	0.5	0.4	<0.1	<0.07
	70-75	2/28/2012	<0.2	<0.2	<0.4	<0.5	<0.2	<0.2	0.3	0.3	<0.1	<0.07
	80-85	2/28/2012	<0.2	<0.2	<0.4	<0.5	<0.2	<0.2	<0.3	Trace	<0.1	<0.07
	90-95	2/28/2012	<0.2	<0.2	<0.4	<0.5	<0.2	<0.2	<0.3	Trace	<0.1	<0.07
RC-3	40-45	3/20/2012	<0.2	0.2	Trace	<0.5	<0.2	<0.2	<0.3	0.3	0.4	<0.07
	50-55	3/20/2012	<0.2	Trace	Trace	<0.5	<0.2	<0.2	<0.3	Trace	0.2	<0.07
	60-65	3/20/2012	<0.2	Trace	Trace	<0.5	<0.2	<0.2	<0.3	0.3	<0.1	<0.07
	70-75	3/6/2012	<0.2	<0.2	<0.4	<0.5	<0.2	<0.2	<0.3	Trace	Trace	0.1
	80-85	3/6/2012	<0.2	<0.2	<0.4	Trace	<0.2	<0.2	<0.3	Trace	Trace	0.1
	90-95	3/6/2012	<0.2	<0.2	<0.4	<0.6	<0.2	<0.2	<0.3	Trace	<0.1	0.2

Notes: NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppm = part per million
ppb = part per billion
☐ indicates concentration exceeds a standard or guidance value

Site #3
Papermill Road Facility
Manorville NY

Site Description

The site is located in Manorville, at the northern end of Papermill Road and approximately 1,000 feet north of Jamaica Avenue, and is comprised of three tax parcels totaling approximately 33 acres. The Town of Brookhaven has owned and operated the Papermill Road Compost Facility (PRCF) site since the mid-1950's. The site has had a variety of waste disposal and waste treatment uses throughout the years, including landfilling and the disposal of septic and municipal sanitary waste sludges. Historical aerial photographs (Appendix C) indicate that the site was undeveloped in 1947, and by 1962 the center of the site was cleared and actively being used. The first compost windrows appear on the site in the 1994 aerial photograph, and these windrows are consistently present on all subsequent photos, up to and including the 2013 photograph. Currently, the site is regulated by the NYSDEC as a Part 360 permitted yard waste composting facility.

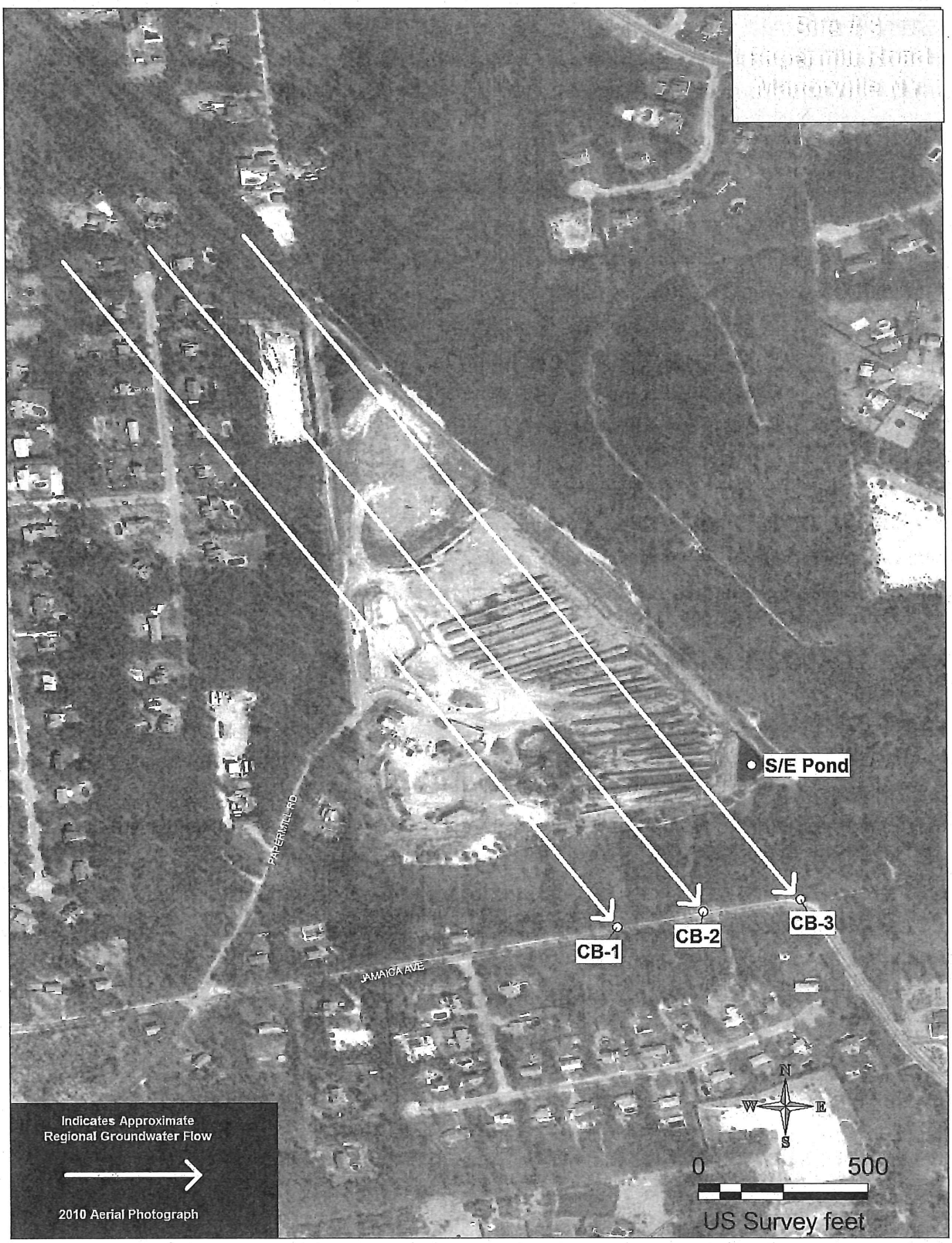
SCDHS Monitoring Wells

The SCDHS installed three temporary profile monitoring wells (CB-1, CB-2 and CB-3) south of the facility, on Chapman Blvd (Figure 6). The locations of these wells were based upon a south-southwest regional groundwater flow direction, and were sited to assess past and/or current impacts from vegetative organic waste activity occurring on the site. All three wells were installed to a depth of 115 fbg, and sampled at 10 foot intervals as they were retracted. Eight levels were sampled from CB-2, with the uppermost located at the 40 to 45 foot interval, whereas seven levels were sampled in both CB-1 and CB-3, with the uppermost level located at the 50-55 foot interval, yielding a total of 22 groundwater samples collected and analyzed from this site. The following analytes have been detected in these monitoring wells at concentrations exceeding the drinking water standard:

Arsenic	**(CB-3, Pond)**	**Sodium**	**(CB-1)**
Manganese	**(CB-1, CB-2, CB-3)**	**Gross Alpha**	**(CB-3)**
Thallium	**(CB-1, CB-2)**	**Gross Beta**	**(CB-3)**
Iron	**(CB-1, CB-2, CB-3, Pond)**	**Ammonia**	**(CB-1, CB-2, CB-3)**
		Chlorobenzene	**(CB-1, CB-2)**

Table 4 contains a summary of the results of the analytes detected.

Figure 6 – Site #3 Well Locations – 2010 Aerial Photograph



Surface Water Sample

One surface water sample (S/E Pond) was collected from an area of ponded water located on the southeast corner of the property (Figure 6). This area collects surface run-off from the site.

Private Wells

Six homes served by private wells were identified in the vicinity of the Papermill Road Facility and were sampled in 2012. Five of the homes were also sampled in 2008. Two of the private wells exhibited iron concentrations in excess of the drinking water standard. These homes, although located in the vicinity of the facility, are not located hydraulically downgradient with respect to groundwater flow, and therefore the private wells have not been impacted by activity at the site. Although results from 2 private wells indicated iron concentrations in exceedance of drinking water standards, other water quality parameters are not consistent with water quality impacts observed as a result of vegetative organic waste operations.

Public Wellfields

The nearest public supply wellfield is approximately 1 mile from the site and is not located downgradient of the site. Any impacts to groundwater quality as results of this site's operations would not be expected to affect the water quality of this wellfield.

Summary of Significant Analytical Results (Groundwater Samples)

Metals

Concentrations of manganese (up to 5,310 ppb) and iron (up to 28 ppm) significantly exceeded their respective groundwater and drinking water standards in all three profile wells. Thallium also exceeded the groundwater standard in wells CB-1 and CB-2, and sodium exceeded the groundwater standard in CB-1. Arsenic was detected in all three wells, and concentrations exceeding the drinking water standard were detected in three of the profile levels in well CB-2 (up to 14 ppb). There were a number of other metals that exhibited atypically elevated concentrations for Suffolk County groundwater (Table 13), including barium (up to 410 ppb), cobalt (up to 23 ppb), magnesium (up to 25.9 ppm), calcium (up to 50.5 ppm) and potassium (up to 39.3 ppm).

Volatile Organic Compounds (VOCs)

Five different volatile organic compounds (VOCs) were detected in well CB-1 and four compounds were detected in well CB-2. All these detections were at concentrations below standards (all were less than 2 ppb), with the exception of chlorobenzene. In CB-1, the chlorobenzene concentrations exceeded the drinking water and groundwater standard of 5 ppb in six of the seven profile levels (up to 27 ppb), and two of the five profile levels in well CB-2 (up to 7.5 ppb).

Radionuclides

Gross alpha was detected in all three wells, in all but four of the profile levels. The most significant detections were in wells CB-2 (10.6 pCi/l) and CB-3 (15.4 pCi/l), the latter exceeding the drinking water standard of 15 pCi/l. Gross beta was detected in all the groundwater samples collected for this site. The most significant gross beta detections were in the bottom four profile levels of well CB-3. These samples had relatively low potassium concentrations, so when these gross beta concentrations are adjusted for the potassium 40 contribution, they are still elevated (the adjusted gross beta concentration in the 80-85 fbg profile level (58 pCi/l) exceeds the drinking water screening level of 50 pCi/l).

Other Notable Results

Ammonia concentrations were elevated in all three wells (up to 18.4 ppm), trace concentrations of the pesticide dichlorvos was detected in one profile level of CB-2, and seven of nine profile levels in well CB-3. Bisphenol A was detected in low concentrations (less than 0.4 ppb) in numerous profile levels of wells CB-1 and CB-2. Contaminants typically associated impacts from septic waste were also detected at low concentrations, including MBAS (detergents), caffeine, DEET, and acetaminophen.

Summary of Significant Analytical Results (Surface Water Sample)

One surface water sample (S/E Pond) was collected from an area of ponded water that collects surface run-off from the site, located on the southeast corner of the property. The sample exhibited elevated concentrations of arsenic (15 ppb), iron (1.27 ppm), lead (23 ppb) and potassium (84.8 ppm). This sample also contained a trace concentration of the pesticide dichlorvos.

Discussion

Three profile wells were installed and sampled south of the PRCF site. Figure 6 indicates that, based upon the regional groundwater flow direction, all three wells were appropriately located to evaluate impacts to the groundwater as a result of activity from the PRCF site. The source of the groundwater contamination observed in the three SCDHS monitoring wells appears to be the PRCF site. The relative contribution of the potential historic on-site sources (legacy landfill/septic waste related sources remaining onsite) and/or the more recent and current composting activities has not been determined. The current groundwater data suggests that a combination of the historic sources and the current composting activity are both contributing to the degraded water quality observed downgradient of the site. The presence of ammonia and metals (e.g., arsenic, iron, potassium) at elevated concentrations in the surface water drainage pond indicates that an above-grade source for these contaminants is currently present on the site. Ammonia and metals have been observed at elevated concentrations in the groundwater downgradient at other VOWM sites, therefore the

presence of these contaminants in the groundwater may be related to the site's current activity (composting). The presence of chlorobenzene in the groundwater downgradient of the site has been long established as related to the legacy septic waste operation at the site[1], and this contaminant has not been observed in the groundwater downgradient of any other VOWM sites to date. Therefore the chlorobenzene detected in the groundwater is most likely due to historic site use and legacy sources from these past operations that remain on the site.

Wells Impacted by VOWM Activity

All three profile wells that were installed, as well as the on-site surface water sample, appear to have been impacted by this site; however, no private wells have been impacted from this site's operations.

[1] *Ground-Water Quality Near a Scavenger-Waste Disposal Facility in Manorville, Suffolk County, New York, 1984-85,* U.S. Geological Survey Water-Resources Investigations Report 88-4074, Scorca, M., 1990

Table 4
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #3
Manorville, NY

Well Information			Parameters					Metals																					
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Depth To Water (Feet)	Dissolved Oxygen (mg/L)	Temperature (Celsius)	pH	Conductivity (µS)	Aluminum (ppb)	Arsenic (ppb)	Barium (ppb)	Cobalt (ppb)	Chromium (ppb)	Copper (ppb)	Germanium (ppb)	Manganese (ppb)	Molybdenum (ppb)	Nickel (ppb)	Lead (ppb)	Antimony (ppb)	Strontium (ppb)	Thallium (ppb)	Titanium (ppb)	Vanadium (ppb)	Zinc (ppb)	Magnesium (ppm)	Iron (ppm)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	0.5	-	-	2,000	35	-	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	25	1,000	-	50	200	-	300	-	100	25	3	-	-	-	-	-	-	0.3	20	-	-
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	10	2,000	-	100	1300***	-	300	-	100	15***	6	-	2	-	-	5,000	-	0.3	-	-	-
CB-1	50-55	10/5/2011	47.5	1.83	14.7	6.4	170	43	<1	76	1	4	<1	<1	147	<1	2.8	<1	<0.4	69	<0.3	2	<1	<50	1.5	0.56	9.6	13.2	6.4
	60-65	10/5/2011	47.5	0.11	14.8	6.6	510	21	<1	190	3	5	5	<1	4,090	<1	3.1	<1	<0.4	62	0.8	<1	1	<50	7.5	0.97	20.8	25.3	26.1
	70-75	10/5/2011	47.5	0.1	14.7	6.6	690	7	<1	473	23	6	<1	2	2,695	<1	3.6	<1	<0.4	84	<0.3	<1	2	<50	9.8	25.75	23.9	25.2	28.2
	80-85	10/5/2011	47.5	0.14	14.9	6.91	278	<5	2	141	5	2	<1	<1	1,070	1	1.5	<1	<0.4	30	<0.3	<1	<1	<50	3.4	7.57	7.9	8.6	14.1
	90-95	10/4/2011	47.5	0.07	14.5	6.7	319	11	3	117	6	3	<1	1	1,950	<1	1.7	<1	<0.4	49	<0.3	<1	<1	<50	5.8	16	12.4	14.3	11.4
	100-105	10/4/2011	47.5	0.08	14.3	6.73	266	<5	1	95	5	2	<1	1	1,520	<1	1.8	<1	<0.4	35	<0.3	<1	<1	<50	6.3	12.8	10	13.5	8.5
	110-115	10/4/2011	47.5	0.1	14.1	6.57	257	<5	<1	195	8	2	<1	2	1,190	<1	3.2	<1	<0.4	33	<0.3	<1	<1	<50	4.7	20	13.5	13.2	4.6
CB-2	40-45	10/11/2011	39.76	3.74	16.6	6.16	15.8	41	<1	83	2	2	2	<1	383	<1	1.2	<1	<0.4	16	<0.3	2	<1	<50	2.7	0.64	4.5	5.4	11
	50-55	10/11/2011	39.76	1.42	17.1	6.3	420	19	1	337	9	2	3	1	2,960	<1	1.8	<1	<0.4	45	0.3	<1	<1	<50	6.7	11	11.8	13.7	26.1
	60-65	10/11/2011	39.76	0.72	14	6.64	778	<5	2	410	16	9	<1	3	1,890	<1	3.4	<1	<0.4	77	0.3	<1	3	<50	12.3	29	17.3	23.1	38.5
	70-75	10/6/2011	39.76	0.1	14.5	6.52	515	21	4	363	11	8	<1	2	5,310	<1	2.9	<1	<0.4	69	0.6	1	2	<50	8.2	18.3	13	19.9	30
	80-85	10/6/2011	39.76	0.08	14.3	6.78	308	8	5	139	6	4	<1	1	3,390	<1	2	<1	<0.4	45	<0.3	<1	1	<50	2.9	12.6	7.5	10.2	12.6
	90-95	10/6/2011	39.76	0.1	13.9	6.75	332	18	5	220	8	4	<1	1	2,760	<1	2.7	<1	<0.4	47	<0.3	<1	1	<50	3.4	12.7	7.5	9.3	16.9
	100-105	10/6/2011	39.76	0.58	13.7	6.41	360	24	2	275	13	4	1	1	3,600	<1	4.4	<1	<0.4	48	<0.3	1	1	<50	2.7	14.6	9	10.5	12.8
	110-115	10/6/2011	39.76	0.14	13.6	6.45	246	14	1	228	11	2	<1	<1	3,740	<1	3.2	<1	<0.4	31	<0.3	<1	<1	<50	1.7	10.6	6.8	6.6	8.9
CB-3	50-55	11/1/2011	44	NA	13.7	6.78	250	263	<1	131	2	2	3	<1	784	<1	1.8	<1	<0.4	34	<0.3	11	2	<50	4.5	1.15	5.3	10	15.6
	60-65	11/1/2011	44	NA	13.6	6.83	330	330	8	102	9	4	2	2	457	1	2.7	1	<0.4	33	<0.3	15	4	<50	4.7	28.7	5.3	13.2	32.1
	70-75	11/1/2011	44	NA	13.9	6.8	352	684	12	138	5	5	5	1	496	<1	2.6	4	<0.4	35	<0.3	33	11	<50	6.8	25	6	18.7	39.3
	80-85	10/26/2011	44	2.04	14.2	6.79	514	487	9	209	5	5	5	2	740	<1	2.3	4	<0.4	45	<0.3	27	9	<50	25.9	<0.1	9.9	50.5	2.4
	90-95	10/26/2011	44	1.84	14.1	6.67	506	128	14	233	5	5	5	2	902	<1	2.1	1	<0.4	48	<0.3	8	8	<50	1	<0.1	<1	1.4	0.3
	100-105	10/26/2011	44	2.82	13.5	6.64	373	92	14	250	8	4	2	2	1,009	<1	2.4	<1	<0.4	31	<0.3	6	6	<50	1	<0.1	<1	1.5	0.3
	110-115	10/26/2011	44	2.24	14	6.65	236	33	6	157	7	2	<1	2	1,029	<1	2.6	<1	<0.4	25	<0.3	2	1	<50	7.8	<0.1	17.6	40.7	1.9
S/E Pond	Surface Water	2/28/2012	-	7.25	6.3	7.75	528	825	15	22	2	3	45	<1	100	3	6.3	23	1	62	<0.3	40	7	74	7.3	1.27	12.6	22.2	84.8

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppm = part per million
uS = micro siemens
ppb = part per billion
*** Action Level for Public Water Suppliers for Lead and Copper
☐ indicates concentration exceeds a standard or guidance value

Table 4
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #3
Manorville, NY

Well Information			Radiologicals (pCi/L)												Standard Inorganics							VOCs (ppb)				
			SCDHS PEHL			NYSDOH Wadsworth																				
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta* (AGB)	Gross Alpha	Gross Beta	Ruthenium 106	Cesium 137	Zirconium 95	Potassium 40	Actinium 228	Radium 224	Radium 22 6	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Ammonia (ppm)	Total Alkalinity (mg CaCO3/L)	MBAS (ppb)	Perchlorate (ppb)	Chlorodifluoromethane	1,2-Dichlorobenzene (o)	1,4-Dichlorobenzene (p)	Chlorobenzene	Benzene
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	3	3	5	1
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^	-	-	1,000^^	-	-	-	-	-	-	-	250	250	10	2	-	500	-	-	3	3	5	1
DOH Drinking Water Standards Subpart 5-1			15	-	50**	15	-	-	-	-	-	-	-	5^^^	250	250	10	-	-	-	18	5	5	5	5	5
CB-1	50-55	10/5/2011	<1	7.9±0.9	2.7±0.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	13	11	1.6	1.56	NA	NA	0.4	<0.5	<0.5	<0.5	0.8	<0.5
	60-65	10/5/2011	1.6±0.9	26.3±1.4	5.0±1.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	41	<10	<1	14.4	NA	NA	<0.2	<0.5	<0.5	0.6	10	<0.5
	70-75	10/5/2011	6.1±1.5	33.0±1.3	9.9±1.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	73	<100	<10	15.2	NA	NA	<0.2	0.8	0.6	1.4	27	0.7
	80-85	10/5/2011	1.3±0.7	13.9±1.1	2.3±1.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	<60	<100	<2	7.62	NA	NA	<0.2	<0.5	<0.5	0.7	8.4	<0.5
	90-95	10/4/2011	1.1±0.6	13±0.9	3.7±0.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	<30	<50	<5	5.04	NA	NA	<0.2	<0.5	<0.5	0.5	10	0.5
	100-105	10/4/2011	<1	8.1±0.7	1.1±0.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	<30	<50	<5	1.74	NA	NA	<0.2	<0.5	<0.5	<0.5	5.6	<0.5
	110-115	10/4/2011	2	4.9±0.6	1.1±0.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	<30	<50	<5	0.84	NA	NA	<0.2	<0.5	<0.5	<0.5	5.3	<0.5
CB-2	40.45	10/11/2011	<1	12.8±1.0	3.8±1	NS	NS	NS	NS	NS	NS	NS	NS	NS	8	22	1.3	0.42	NA	<0.1	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
	50-55	10/11/2011	2.0±0.9	29.2±1.5	7.8±1.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	32	26	<2	4.31	NA	<0.1	<0.2	<0.5	<0.5	<0.5	2.1	<0.5
	60-65	10/11/2011	10.6±2.4	48.8±2.1	17±2.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	<150	<250	<25	10.9	NA	<0.1	<0.2	<0.5	<0.5	0.6	3.6	<0.5
	70-75	10/6/2011	2.7±1.0	34.7±1.3	10±1.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	<60	<100	<10	18.4	NA	NA	<0.2	0.5	<0.5	1.1	7.5	<0.5
	80-85	10/6/2011	<1	13.8±0.9	3.5±0.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	<60	<100	<10	11.6	NA	NA	<0.2	0.5	<0.5	0.5	2.3	<0.5
	90-95	10/6/2011	1.3±1.0	19.0±1.2	5.1±1.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	<60	<100	<10	10.8	NA	NA	<0.2	0.5	<0.5	0.7	<0.5	<0.5
	100-105	10/6/2011	2.4±0.7	15.0±0.9	4.5±0.9	NS	NS	NS	NS	NS	NS	NS	NS	NS	<60	<100	<10	15.1	NA	NA	<0.2	0.5	<0.5	0.7	6.2	<0.5
	110-115	10/6/2011	1.5±0.7	9.7±0.8	2.4±0.8	NS	NS	NS	NS	NS	NS	NS	NS	NS	<60	<100	<10	9.6	NA	NA	<0.2	0.5	<0.5	0.5	4.6	<0.5
CB-3	50-55	11/1/2011	1.5+/-0.6	17.7+/-1.1	4.9±1.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	<30	<50	<5	NA	NA	0.1	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	60-65	11/1/2011	2.3+/-1	35.4+/-1.6	9.1±1.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	<150	<250	<25	NA	NA	<0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
	70-75	11/1/2011	2.9+/-1.1	38.7+/-1.	6.5±1	NS	NS	NS	NS	NS	NS	NS	NS	NS	<150	<250	<25	NA	NA	<0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
	80-85	10/26/2011	15.4±2.3	60.1±1.3	58±1.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	<300	<500	<50	3.77	NA	<0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
	90-95	10/26/2011	3.8±1.2	49.3±1.5	49±1.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	<300	<500	<50	2.93	NA	<0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
	100-105	10/26/2011	5.8+/-1.3	41.1+/-1.3	41±1.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	<300	<500	<50	3.71	NA	0.1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
	110-115	10/26/2011	1.8+/-0.7	23+/-1	21±1	NS	NS	NS	NS	NS	NS	NS	NS	NS	<300	<500	<50	1.08	NA	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5
S/E Pond	Surface Water	2/28/2012	<1	79.3+/-2.8	9.5±2.8	<1.1	84 ±6.1	<2.7	<0.27	<0.74	87 ±10.1	NS	NS	NS	<300	<500	<50.0	1.5	132	NR	<2.0	<2.5	<2.5	<2.5	<2.5	<2.5

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie

^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
^^^ = MCL is for combined Radium 226 + Radium 228
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
☐ indicates concentration exceeds a standard or guidance value

Table 4
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #3
Manorville, NY

Well Information			Herb Mets (ppb)				
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Bisphenol A	Caffeine	Dichlorvos	Diethyltoluamide (DEET)	Acetaminophen
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-
DOH Drinking Water Standards Subpart 5-1			50	50	50	50	50
CB-1	50-55	10/5/2011	<0.2	<0.2	<0.6	Trace	<0.2
	60-65	10/5/2011	0.4	Trace	<0.6	0.7	<0.2
	70-75	10/5/2011	0.4	<0.2	<0.6	0.8	0.2
	80-85	10/5/2011	0.3	<0.2	<0.6	0.2	<0.2
	90-95	10/4/2011	0.3	<0.2	<0.6	0.4	<0.2
	100-105	10/4/2011	0.3	<0.2	<0.6	0.3	<0.2
	110-115	10/4/2011	0.2	<0.2	<0.6	0.3	<0.2
CB-2	40.45	10/11/2011	<0.2	<0.2	<0.6	<0.2	Trace
	50-55	10/11/2011	<0.2	<0.2	Trace	Trace	Trace
	60-65	10/11/2011	<0.2	<0.2	<0.6	Trace	0.2
	70-75	10/6/2011	Trace	Trace	<0.6	Trace	0.2
	80-85	10/6/2011	Trace	<0.2	<0.6	Trace	Trace
	90-95	10/6/2011	Trace	<0.2	<0.6	Trace	Trace
	100-105	10/6/2011	Trace	<0.2	<0.6	0.3	Trace
	110-115	10/6/2011	Trace	Trace	<0.6	0.3	<0.2
CB-3	50-55	11/1/2011	<0.2	<0.2	<0.6	<0.2	<0.2
	60-65	11/1/2011	<0.2	Trace	<0.6	<0.8	Trace
	70-75	11/1/2011	<0.2	<0.2	Trace	<1	Trace
	80-85	10/26/2011	<0.2	<0.2	Trace	<0.8	0.2
	90-95	10/26/2011	<0.2	<0.2	Trace	<0.8	0.2
	100-105	10/26/2011	<0.2	<0.2	Trace	<0.8	Trace
	110-115	10/26/2011	<0.2	<0.2	Trace	<0.4	Trace
S/E Pond	Surface Water	2/28/2012	<0.2	<0.2	Trace	<0.2	<0.2

Notes: NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
☐ indicates concentration exceeds a standard or guidance value

Site #4
Exit 69 LIE Ramp
Manorville NY

Site Description

This site is located in Manorville, on the west side of Wading River Road, and is bounded on the north side by Long Island Railroad tracks and on the south side by the Long Island Expressway west-bound entrance ramp (Exit 69). The property consists of approximately 18 acres of farmland, and is registered by the NYSDEC as a Part 360 facility, authorized to accept yardwaste and source separated organics for composting. This facility is one of the Long Island Compost/Great Gardens "On Farm Composting sites ("Long Island Compost Farm #6"). The use of this site as a farm is evident on each of the aerial photographic records dating back to 1947 (see Appendix D). It also appears from the photographic record that some composting windrows are evident in the central portion of the site (on the western side) in the 1962, 1969 and 1984 aerial photos. These composting windows are no longer visible on the 1994 and 1996 aerials. The first evidence of composting windows occurring at the present location (southwest corner of the site) appears on the 1999 aerial photo, and is indicated on the remaining photographic record through 2013. A second area, located in the northwest corner of the property, appears initially on the 2007, and is also evident on the 2010 and 2013 aerial photographs.

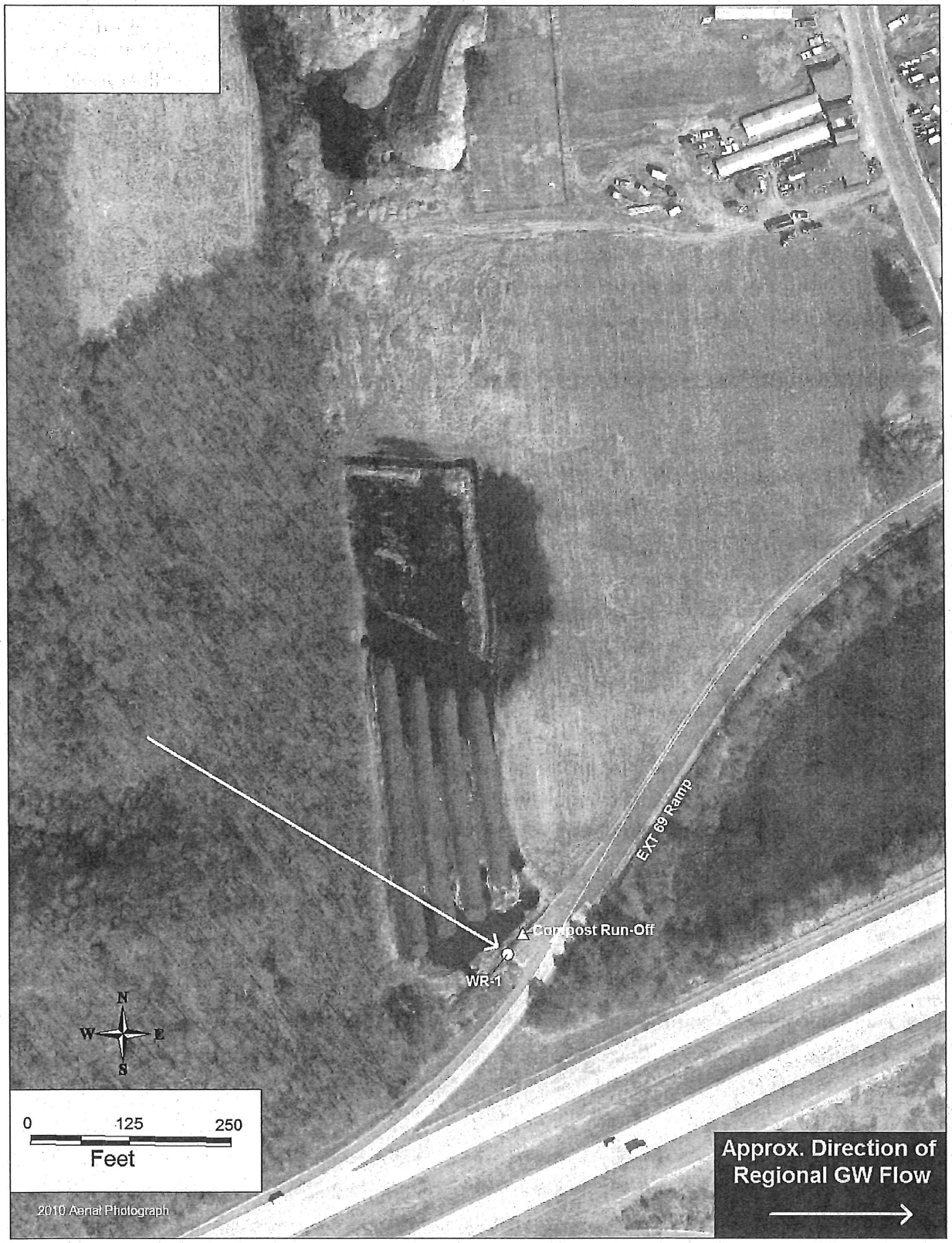
SCDHS Monitoring Wells

The SCDHS installed one temporary profile monitoring wells (WR-1) in the vicinity of this site, on the Long Island Expressway westbound Exit 69 entrance ramp (Figure 7). The location of this well was based upon a southwest regional groundwater flow direction, and was sited to assess impacts from vegetative organic waste activity occurring on the southwest corner of the site. This well was installed to a depth of 95 fbg, and sampled at 10 foot intervals as the well was retracted. Nine levels were sampled, with the uppermost level located at the 10 to 15 foot interval, yielding a total of nine groundwater samples. The depth to water is relatively shallow, at approximately 10 fbg. The following analytes have been detected in this monitoring well at concentrations exceeding a drinking water and/or groundwater standard:

Manganese (WR-1)
Arsenic (Compost Run-off Pond)
Iron (WR-1, Compost Run-off Pond)
Sodium (WR-1)
Chloride (WR-1)

Table 5 contains a summary of the results of the analytes detected.

Figure 7 – Site #4 Well Location – 2010 Aerial Photograph



Surface Water Sample

One surface water sample was collected from an area of ponded water located near the southeast corner of the property, on the road right of way, next to monitoring well WR-1. This water was beside the windrow and appears to have been generated by rainwater runoff from the windrow.

Private Wells

No potential private wells were identified downgradient of this site.

Public Wellfields

The nearest public supply wellfield is approximately 1.75 miles from the site and is not located downgradient of the site. Any impacts to groundwater quality as results of this site's operations would not be expected to affect the water quality of this wellfield.

Summary of Significant Analytical Results (Groundwater Samples)

Metals

Of the nine profile levels sampled in well WR-1, the uppermost level, closet to the water table (screened at 10 – 15 fbg), exhibited the most impacted water quality. The manganese concentrations in this level were 18,300 ppb, which is 61 times the drinking water and groundwater standard of 300 ppb. This level also had an iron concentration of 14.7 ppm, which is significantly above the drinking/groundwater standard of 0.3 ppm and sodium was reported at 110, which is above the groundwater standard of 20 ppm. Other parameters that were detected at elevated concentrations, but either did not exceed a standard or no standard has been established, include barium, cobalt, strontium, potassium.

Four of the remaining eight profile levels exhibited manganese is excess of the drinking water/groundwater standard, ranging in concentration between 359 ppb to 670 ppb. Manganese was the only parameter that exceeded a standard in all the remaining profile levels. Some other metals such as barium, strontium and potassium were slightly elevated in the 30 – 35 fbg profile level; however these were not as high as the concentrations exhibited in the uppermost profile level (10 – 15 fbg).

Radionuclides

Gross alpha was detected at 6 pCi/l in the top profile level (10-15 fbg), which is in excess of typical concentrations observed in Suffolk County groundwater (Table 16). Low concentrations of gross beta were detected in eight of the nine profile levels (it was not detected in the deepest level, 90-95 fbg).

Other Notable Results

The chloride concentration in the top profile level (272 ppm) exceeded the groundwater and drinking water standard of 250 ppm. Ammonia (0.77 ppm and 0.31 ppm) and the pesticide dichlorvos (trace

concentrations) were detected in two profile levels (10-15 fbg and 30-35 fbg, respectively). Acetaminophen (trace) and DEET (0.2 ppb) were detected in the top profile level.

Summary of Significant Analytical Results (Surface Water Sample)

One surface water run-off sample was collected from ponded water adjacent to the compost windrow, on the road right-of-way, located at the southwest corner of the site, near monitoring well WR-1. Arsenic (18 ppb), iron (1.29 ppm) and potassium (122 ppm) reported elevated concentrations. Gross alpha was detected at a low concentration (1.6 pCi/l), and although the gross beta was elevated (116.6 pCi/l), the adjustment for the potassium 40 contribution indicates the majority of the beta is from the potassium in the sample. The pesticide dichlorvos was detected at a trace concentration, and several pharmaceutical and personal care products were detected that are typically associated with water impacted by septic waste, including MBAS (detergents), caffeine, ibuprofen, DEET and acetaminophen.

Discussion

The compost windrows on this site are located at the extreme southwest corner of the property, which allowed for the installation of monitoring well WR-1 on the road right-of-way (Figure 7) to be very close to the windrows (less than 100 feet). Considering the southeast groundwater flow direction, the location of WR-1 was ideal to assess impacts the compost windrows may be having on the groundwater quality. It should be noted that hydraulically upgradient of these windows is appoximately 30 acres of vacant land owned by Suffolk County. Historical aerial photographs (Appendix D) indicate these 30 acres have been vacant since at least 1947. Therefore, it is very likely that the observed groundwater impacts (particularly at the top of the water table) are not from an upgradient source, but are from the compost windrows located in the southwest corner of the property. Elevated concentrations of manganese, iron, barium, cobalt, strontium and potassium appear to be consistent with elevated metals associated with groundwater impacted by VOWM sites. Since this well is located on a heavily trafficked Long Island Expressway on ramp, the elevated sodium and chloride concentrations observed in the uppermost sampling level (10 – 15 fbg) could be associated with road salting. Collectively the low-level detections of ammonia, DEET and trace detection of acetaminophen could be indicative of septic waste (although there is no obvious septic waste source in the vicinity), or potentially other wastes that contain these types of contaminants (e.g., animal waste).

One surface water run-off sample was collected from ponded water adjacent to the compost windrow located at the southwest corner of the site, near monitoring well WR-1. Several metals exhibited elevated concentrations (e.g., arsenic, iron and potassium), which is consistent with impacts observed in groundwater downgradient of VOWM sites. Additionally, several

pharmaceuticals and personal care products, as well as MBAS (detergents), were detected. The collective presence of these parameters in groundwater is typically indicative of septic waste. No obvious source of septic waste was identified in the vicinity of this sampling location.

Wells Impacted by VOWM Activity

The single profile well that was installed appears to have been impacted by the compost windrows located at this this facility. In addition, water quality results from one surface water (runoff) sample collected adjacent to this site also appears to be impacted from VOWM activity.

Table 5
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #4
Manorville, NY

Well Information			Parameters					Metals																					
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Depth To Water (Feet)	Dissolved Oxygen(mg/L)	Temperature (Celsius)	pH	Conductivity (µS)	Aluminum (ppb)	Arsenic (ppb)	Barium (ppb)	Cobalt (ppb)	Chromium (ppb)	Copper (ppb)	Manganese (ppb)	Molybdenum (ppb)	Nickel (ppb)	Lead (ppb)	Antimony (ppb)	Strontium (ppb)	Thallium (ppb)	Titanium (ppb)	Magnesium (ppm)	Vanadium (ppb)	Iron (ppm)	Zinc (ppb)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	0.5	-	35	-	-	2,000	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	25	1,000	-	50	200	300	-	100	25	3	-	-	-	-	-	0.3	-	20	-	-
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	10	2,000	-	100	1300***	300	-	100	15***	6	-	2	-	-	-	0.3	5,000	-	-	-
WR-1	10-15	9/1/2011	10.02	3.33	20.6	6.1	1,020	<5	2	226	53	6	2	18,300	<1	11.9	<1	<0.4	237	0.4	<1	11.8	2	14.7	<50	110	22.4	17.1
	20-25	9/1/2011	10.02	4.38	17.2	6.8	91	23	<1	28	3	3	<1	188	<1	2.4	<1	<0.4	36	<0.3	<1	1.9	<1	<0.1	<50	7.3	4.1	1.8
	30-35	9/1/2011	10.02	5	17.5	7	217	69	<1	144	7	3	2	1,670	<1	3.2	<1	<0.4	187	<0.3	<1	4.5	<1	<0.1	<50	8.9	14.2	5.9
	40-45	8/31/2011	10.02	3.5	17.2	6.9	113	16	<1	46	6	2	<1	359	<1	5.8	<1	<0.4	100	<0.3	<1	3.4	<1	<0.1	<50	5.4	5.8	2.9
	50-55	8/31/2011	10.02	5.08	16.8	7.27	60	27	<1	19	2	2	<1	447	<1	6.4	<1	<0.4	17	<0.3	<1	1.3	<1	<0.1	<50	4.6	2.8	1.3
	60-65	8/31/2011	10.02	6.26	16.5	7.45	60	17	<1	19	2	1	<1	374	<1	6	1	<0.4	14	<0.3	<1	0.9	<1	<0.1	<50	3.9	2.9	1.4
	70-75	8/31/2011	10.02	6.2	15.7	7.9	68	10	<1	28	2	1	1	228	<1	4.3	<1	<0.4	18	<0.3	<1	0.9	<1	<0.1	<50	4.4	4	1.8
	80-85	8/25/2011	10.02	5.74	15.6	8.19	65	17	<1	24	2	1	2	189	<1	4.7	<1	<0.4	18	<0.3	<1	1	<1	<0.1	<50	4.3	4.8	1.6
	90-95	8/25/2011	10.02	3.55	15.4	8.73	66	10	<1	20	<1	1	4	60	<1	1.5	<1	<0.4	22	<0.3	<1	1	<1	<0.1	<50	4.8	4.3	0.8
Compost Run-off	Surface Water	11/22/2011	-	1.23	8.8	7.07	748	3,270	18	17	2	3	7	70	2	8.8	5	<0.4	81	<0.3	111	12	6	1.29	<50	11.5	26	122

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
uS = micro siemens
*** Action Level for Public Water Suppliers for Lead and Copper
▭ indicates concentration exceeds a standard or guidance value

Table 5
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #4
Manorville, NY

Well Information			Rads (pCi/L)			Standard Inorganics						Herb Mets (ppb)					
Well ID	Screen Interval (ft.) (depth below grade)	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta* (AGB)	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Ammonia (ppm)	MBAS (ppb)	Perchlorate (ppb)	2-Butanone (MEK)	Caffeine	Dichlorvos	Ibuprofen	Diethyltoluamide(DEET)	Acetaminophen
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^	-	250	250	10	2	500	-	-	-	-	-	-	-
DOH Drinking Water Standards Subpart 5-1			15	-	50**	250	250	10	-	-	18	50	50	50	50	50	50
WR-1	10-15	9/1/2011	6.0+/-1.5	15.9+/-1.2	1.9±1.2	272	<15	<1.5	0.77	<0.1	<0.2	<20	<0.2	Trace	<0.2	0.2	Trace
	20-25	9/1/2011	<1	1.8+/-0.6	<1	12	9	<0.5	<0.02	<0.1	<0.2	<20	<0.2	<0.6	<0.2	<0.2	<0.2
	30-35	9/1/2011	1.1+/-1.0	7.7+/-1.0	2.9±1	45	8	1.5	0.31	<0.1	<0.2	<20	<0.2	Trace	<0.2	<0.2	<0.2
	40-45	8/31/2011	<1	2.5+/-0.7	<1	12	6	4.6	<0.02	<0.1	0.3	<20	<0.2	<0.6	<0.2	<0.2	<0.2
	50-55	8/31/2011	<1	1.1+/-0.6	<1	6	8	1.3	<0.02	<0.1	<0.2	<20	<0.2	<0.6	<0.2	<0.2	<0.2
	60-65	8/31/2011	<1	1.4+/-0.6	<1	5	7	1	<0.02	<0.1	<0.2	<20	<0.2	<0.6	<0.2	<0.2	<0.2
	70-75	8/31/2011	<1	1.7+/-0.6	<1	7	6	1.5	<0.02	0.1	<0.2	21	<0.2	<0.6	<0.2	<0.2	<0.2
	80-85	8/25/2011	<1	1.2+/-0.6	<1	6	7	1.5	<0.02	<0.1	<0.2	<20	<0.2	<0.6	<0.2	<0.2	<0.2
	90-95	8/25/2011	<1	<1	<1	7	8	0.7	<0.02	<0.1	<0.2	<20	<0.2	<0.6	<0.2	<0.2	<0.2
Compost Run-off	Surface Water	11/22/2011	1.6 +/-1.2	116.6+/-2.7	16.6±2.7	<150	<250	<25	N/A	0.3	<0.2	<0.5	0.2	Trace	0.2	0.2	Trace

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie

^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
indicates concentration exceeds a standard or guidance value

Site #5
South Street Farm
Manorville NY

Site Description

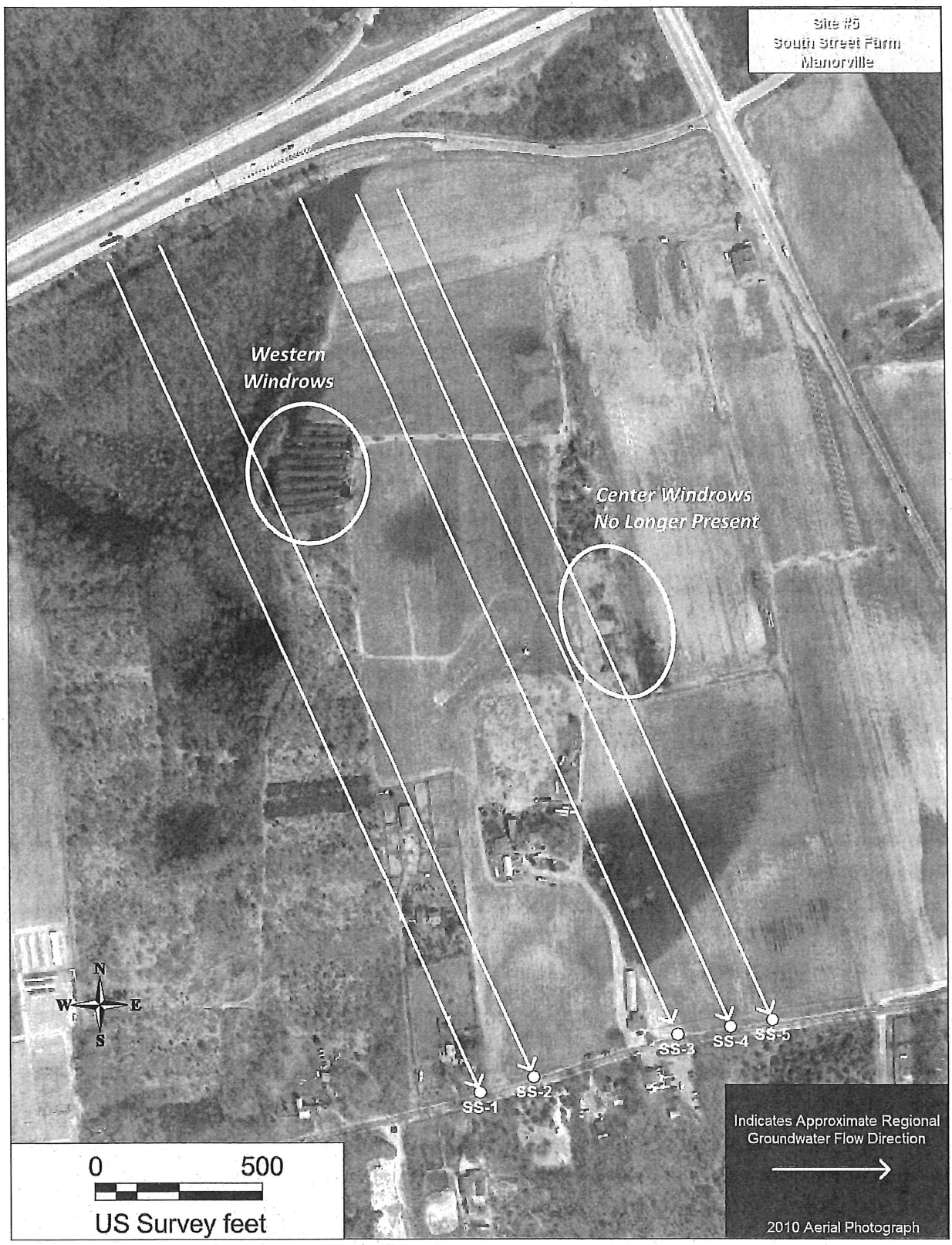
This site is located on the north side of South Street, and on the west side of Wading River Road, in Manorville, and consists of three separate tax parcels totaling about 107 acres. The site is regulated by NYSDEC as "Long Island Compost Farm #2" and is authorized to accept yard waste for composting. The use of this site as a farm is evident on each of the aerial photographic records dating back to 1947 (Appendix E). Figure 8 indicates that in 2004 two distinct areas of the site had compost windows, an area in the northwestern portion of the site ("western windrows"), and an area in central portion of the site ("center windrows"). The western compost windrows are first observable on the 1999 aerial photograph, and are evident in all the subsequent aerial photographs (Appendix E). The center windrows first appear on the 2004 aerial, and can also be observed on the 2005 aerial. However, by 2006 the center windows are no longer present and are not evident on any subsequent photos (Appendix E), including in 2010 (Figure 9).

SCDHS Monitoring Wells

The SCDHS installed five temporary profile monitoring wells (SS-1, SS-2, SS-3, SS-4 and SS-5) along southern property boundary of this site, on South Street in Manorville. Two wells (SS-1 and SS-2) are located approximately 1,800 feet southeast of the western windrows, and three wells (SS-3, SS-4 and SS-5) are located approximately 1,100 feet south of the center windrows. The locations of these wells were based upon a general south-southwest regional groundwater flow direction, in order to assess past and/or current impacts from vegetative organic waste activity. The final well locations were dependent upon well site accessibility (e.g., the presence of underground utilities, storm drains, overhead wires, etc.). Three of the wells (SS-2, SS-4, and SS-5) were installed to a depth of 70 fbg, one well (SS-1) was installed to a depth of 65 feet, and another well (SS-3) was installed to a depth of 85 feet. All the wells were sampled at 10 foot intervals as they were retracted. Five levels were sampled in well SS-1, with the uppermost located at the 20 – 25 foot interval. Six levels were sampled in wells SS-2, SS-4 and SS-5, with the uppermost level located at the 15 – 20 foot interval, while seven levels were sampled in well SS-3, with the uppermost interval located at 20 -25 feet. A total of 31 groundwater samples were collected from this site.

Figure 8 – Site #5 Well Locations – 2004 Aerial Photograph

Figure 9 – Site #5 Well Locations – 2010 Aerial Photograph



The following analytes have been detected in these monitoring wells at concentrations exceeding a groundwater and/or drinking water standard:

Manganese	**(SS-4, SS-5)**	**Nitrate**	**(SS-1, SS-2, SS-3, SS-4, SS-5)**
Iron	**(SS-2, SS-4, SS-5)**	**Chloride**	**(SS-5)**
Sodium	**(SS-3, SS-4, SS-5)**	**1,2,3-Trichloropropane**	**(SS-5)**

Table 6 contains a summary of the results of the analytes detected.

Private Wells

No potential private wells were identified in the downgradient vicinity of this site.

Public Wellfields

The nearest public supply wellfield is approximately 3.75 miles from the site and although it is located in the general downgradient direction of the site, source water assessments indicate that water entering the water table at this site is not expected to reach this wellfield within 100 years.

Summary of Significant Analytical Results

Metals

Monitoring well SS-2 exceeded the drinking/groundwater standard of 0.3 ppm for iron in five of the seven profile levels sampled. Well SS-4 exceeded the drinking/groundwater standard for manganese in the top level (screened 15 to 20 fbg) and iron in three of the seven profile levels. Monitoring well SS-5 exceeded the groundwater/drinking water standard for manganese in the uppermost level (15 to 20 fbg) and the 55 to 60 fbg level, while iron exceeded in the bottom three levels. Chloride exceeded in the upper level, and barium appeared to be most elevated in well SS-2 (all levels) and SS-5 (upper two levels). Beryllium was also detected in SS-1 (bottom three levels), SS-2 (all levels) and SS-5 (top three levels). The highest potassium concentrations were reported in SS-2 (up to 13.9 ppm) and SS-5 (up to 10.6 ppm).

Radiologicals

Gross alpha was detected in four of the five wells (it was not detected in SS-4). None of the concentrations exceed he drinking water standard of 15 pCi/l, however, gross alpha concentrations were elevated in several samples above what is typically observed in Suffolk County groundwater (Table 16), particularly in the 45-50 fbg profile level of well SS-2 (6.3 pCi/l). Gross beta was detected in all the profile levels in each of the five wells. The adjusted gross beta concentrations (Table 6) indicate that the majority of the gross beta can be attributed to potassium, and were significantly

below the drinking water action level of 50 pCi/l (the highest concentration was 7.7 pCi/l in well SS-2). The NYSDOH Wadsworth Center analyzed split samples and confirmed the presence of potassium 40 in almost all of the samples.

Other Notable Results

Nitrate concentrations exceeded the 10 ppm drinking water and groundwater standard in at least one profile level in each well (up to 17.6 ppm). Low concentrations of pesticides and pesticide metabolites (less than 2 ppb), including metolachlor OA, metolachlor ESA, trichlorfon and Aldicarb sulfone were detected in all the monitoring wells except SS-1. Gemfibrozil (a pharmaceutical product) and caffeine were detected in SS-1 and SS-4 respectively, at low concentrations (less than 1 ppb).

Discussion

Five profile wells were installed along Moriches-Middle Island Road, downgradient of this site. Since this is a very large site, and the target compost windrows are located in the north and center of the site, the profile wells were located a great distance from the potential source areas (as far as 2,000 feet). Ideally, monitoring wells should be located as close to the potential source areas as possible, but that is not always possible. In situations where the wells are located a significant distance from the source areas, it can be difficult to observe impacts, and draw definitive conclusions. Although some water quality impairments were observed, the most significant impact was the nitrate concentrations. Elevated nitrates have not been observed at other VOWM sites, and are most likely a result of the use fertilizers as part of the historical farming that has taken place at the site. Also, the compost windrows located at the center of the site appear to have only been in place for a short period of time (approximately two years), making detection of impacts to the groundwater from these windrows difficult. Therefore, due to the constraints of this site, no conclusions can confidently be drawn with respect to the relation of the groundwater impacts observed at this site and the site's compost activity.

Wells Impacted by VOWM Activity

Although some parameters were slightly elevated, due to a number of confounding factors, no definitive conclusions can be drawn regarding impacts to groundwater from the compost activities on this site.

Table 6
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #5
Manorville, NY

Well Information			Parameters						Metals																				
Well ID	Screen Interval (ft)(depth below grade)	Sample Date	Depth To Water (Feet)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Temperature (Celsius)	pH	Conductivity (µS)	Aluminum (ppb)	Barium (ppb)	Beryllium (ppb)	Cobalt (ppb)	Chromium (ppb)	Copper (ppb)	Manganese (ppb)	Molybdenum (ppb)	Nickel (ppb)	Lead (ppb)	Antimony (ppb)	Strontium (ppb)	Titanium (ppb)	Zinc (ppb)	Magnesium (ppm)	Iron (ppm)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	3	-	-	2,000	35	-	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	-	1,000	-	-	50	200	300	-	100	25	3	-	-	-	-	0.3	20	-	-
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	-	2,000	4	-	100	1300***	300	-	100	15***	6	-	-	5,000	-	0.3	-	-	-
SS-1	20-25	4/11/2012	17.85	60	3.93	12.8	6.29	82	15	17	<0.3	<1	<1	<1	15	<1	0.8	<1	<0.4	27	<1	<50	1.8	<0.1	4.1	5.4	0.9
	30-35	4/11/2012	17.85	41	3.52	13.1	6	141	28	25	<0.3	<1	<1	<1	26	<1	0.8	<1	<0.4	24	<1	<50	3.2	<0.1	3.1	11.5	2.8
	40-45	3/21/2012	17.06	-	4.78	14.7	5.2	176	495	111	0.4	<1	2	1	82	<1	1.1	<1	<0.4	22	4	<50	5	<0.1	3.4	15.3	5.7
	50-55	3/21/2012	17.06	-	3.55	14.1	5	183	1060	173	0.6	<1	1	<1	133	<1	1.4	<1	<0.4	29	7	<50	5.7	<0.1	3.7	15.6	4.8
	60-65	3/21/2012	17.06	-	3.76	13.7	5.2	210	588	166	0.4	<1	<1	<1	86	<1	1.2	<1	<0.4	27	<1	<50	5.7	<0.1	3.5	19.1	5.4
SS-2	15-20	4/10/2012	12.8	59	2.45	11.8	5.1	220	479	217	0.7	<1	2	3	147	<1	5.9	<1	<0.4	27	5	<50	5.2	0.69	2.8	15.8	11.7
	25-30	4/10/2012	12.8	67	8.21	12.7	5	179	699	188	0.5	<1	<1	<1	107	<1	1.5	<1	<0.4	21	<1	<50	3.6	<0.1	2.5	10.2	10.5
	25-30	3/27/2012	12.85	-	4.01	10.9	5.3	178	618	206	0.7	<1	2	2	141	<1	3.2	3	<0.4	20	6	<50	4	0.79	2.9	11.4	10.1
	35-40	3/27/2012	12.85	-	4.25	11.7	4.9	235	919	255	0.6	<1	2	<1	126	<1	1.7	<1	<0.4	27	2	<50	5.6	<0.1	3.5	16	13.9
	45-50	3/27/2012	12.85	-	4	11.9	5.1	206	1133	185	0.8	<1	3	7	104	<1	2	<1	<0.4	25	9	312	4.9	0.42	3.1	13.4	10.8
	55-60	3/27/2012	12.85	-	3.24	11.8	5.3	183	936	204	0.7	<1	3	2	108	<1	2.9	<1	<0.4	25	11	<50	4.4	0.95	2.9	13.5	7.7
	65-70	3/27/2012	12.85	-	2.6	11.2	5.8	178	515	153	0.6	<1	3	1	65	<1	1.3	<1	0.5	94	10	<50	4.5	0.48	4.4	15.1	3.6
SS-3	20-25	5/2/2012	11.1	-	11.1	13.5	5.8	581	120	60	<0.3	4	2	1	284	<1	13.4	<1	<0.4	117	3	126	6.6	<0.1	88.4	23.2	6.6
	30-35	5/2/2012	11.1	-	4.11	13.4	5.8	227	57	91	<0.3	<1	1	<1	159	<1	0.9	<1	<0.4	95	<1	<50	5.6	<0.1	5.2	19	6.9
	40-45	5/2/2012	11.1	-	3.12	13	5.6	139	51	63	<0.3	<1	1	<1	26	<1	0.7	<1	<0.4	73	<1	<50	3	<0.1	3.6	12.8	3.6
	50-55	5/2/2012	11.1	-	3.91	12.8	5.6	101	47	61	<0.3	<1	<1	1	98	<1	3.2	<1	<0.4	45	<1	<50	2.3	<0.1	3.7	6.9	3.7
	60-65	4/30/2012	11.1	-	7.41	13.7	5.9	129	28	48	<0.3	<1	1	<1	4	<1	3.1	<1	<0.4	80	<1	<50	2.9	<0.1	3.9	9.9	3
	70-75	4/30/2012	11.1	-	7.52	14.1	5.9	113	17	36	<0.3	<1	2	1	4	<1	1.2	<1	<0.4	64	<1	<50	2.1	<0.1	3.6	9.1	3.3
	80-85	4/30/2012	11.1	-	8.92	12.7	5.9	102	11	36	<0.3	<1	2	<1	2	<1	0.6	<1	<0.4	34	<1	<50	1.7	<0.1	3.6	8.2	2.8
SS-4	15-20	4/11/2012	10.25	-	8.11	11.8	6.5	382	18	96	<0.3	3	<1	<1	384	<1	3.9	<1	<0.4	77	<1	<50	2.5	<0.1	50.3	12	6.4
	25-30	4/9/2011	10.25	-	1.49	13.7	6.4	349	10	52	<0.3	1	<1	<1	173	<1	6.8	<1	<0.4	204	<1	<50	10.6	0.16	11.9	24.7	2.4
	35-40	4/9/2011	10.25	74	1.58	13.6	6	262	37	97	<0.3	3	<1	<1	265	<1	7.5	<1	<0.4	149	<1	<50	5.9	1	4.6	21.2	4.3
	45-50	4/9/2011	10.25	-	3.81	12.5	6.2	254	19	37	<0.3	<1	<1	<1	15	<1	2.2	<1	<0.4	133	4	<50	6.2	<0.1	6.5	24.5	3.1
	55-60	4/3/2012	11	68	0.42	12.5	6.1	186	75	29	<0.3	3	<1	<1	22	<1	1.6	<1	<0.4	115	4	<50	3.8	0.42	7.4	15.3	2.6
	65-70	4/3/2012	11	74	0.59	13	5.8	242	105	122	<0.3	3	<1	<1	57	1	3.3	<1	<0.4	187	5	<50	4.1	0.68	6.2	22.1	5.6
SS-5	15-20	4/3/2012	13.75	112	0.74	12.4	5.94	1070	360	287	0.6	4	3	2	326	<1	6.6	<1	<0.4	205	5	<50	10.4	0.49	146.1	22.8	10.6
	25-30	4/3/2012	13.75	85	2.79	13.2	6.25	708	1190	167	1.3	1	2	2	148	<1	2	<1	<0.4	47	2	53	6.9	<0.1	99.4	16.8	9.6
	35-40	4/2/2012	13.75	-	7.62	12.7	5	178	973	28	0.7	2	1	2	116	<1	6.8	<1	<0.4	34	4	1,320	4.7	0.22	4.6	13	3.4
	45-50	4/2/2012	13.75	36	2.94	12.2	6.2	334	59	52	<0.3	<1	2	<1	139	<1	4.3	<1	<0.4	186	3	<50	10.4	0.4	9.9	27.9	3.2
	55-60	4/2/2012	13.75	38	5.57	12	5.9	233	300	61	<0.3	4	6	1	475	4	16.5	<1	<0.4	109	19	<50	6.9	4.08	5.6	20.8	5.1
	65-70	4/2/2012	13.75	200	4.5	11.9	6.1	280	181	48	<0.3	<1	5	<1	69	2	3.2	<1	<0.4	135	9	<50	8.8	1.07	9	24.1	4.1

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppm = part per million
uS = micro siemens
ppb = part per billion
*** Action Level for Public Water Suppliers for Lead and Copper
indicates concentration exceeds a standard or guidance value

Table 6
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #5, Manorville, NY

Well Information			Radiologicals (pCi/L)												Standard Inorganics					VOCs (ppb)		Herb Mets (ppb)						Carba-mate Pests (ppb)
			SCDHS PEHL			NYSDOH Wadsworth																						
Well ID	Screen Interval (ft)(depth below grade)	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta* (AGB)	Gross Alpha	Gross Beta	Ruthenium 106	Cesium 137	Zirconium 95	Potassium 40	Actinium 228	Radium 224	Radium 226	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Total Alkalinity (mg CaCO3/L)	Perchlorate (ppb)	1,2,3-Trichloropropane	1,2-Dichloropropane	Caffeine	Alachlor ESA	Metolachlor OA	Metolachlor ESA	Gemfibrozil	Trichlorfon	Aldicarb Sulfone
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	0.04	1	-	-	50	50	-	-	2
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^	-	15^	1,000^^	-	-	-	-	-	-	-	250	250	10	-	-	0.04	1	-	-	-	-	-	-	-
DOH Drinking Water Standards Subpart 5-1			15	-	50**	15	-	-	-	-	-	-	-	5^^^	250	250	10	-	18	5	5	50	50	50	50	50	50	2
SS-1	20-25	4/11/2012	<1	1.2+/-0.1	<1	<0.3	0.9 ±0.7	<2.8	<0.28	<0.99	<2.3	NA	NA	NA	9	8	1.8	7	1.5	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	30-35	4/11/2012	1.8+/-0.2	4.1+/-0.2	1.8 ±0.2	<0.4	2.7 ±0.8	<2.8	<0.31	<1.3	<2.3	NA	NA	NA	12	18	3.9	7	1.1	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	40-45	3/21/2012	3.6+/-0.3	8.5+/-0.3	3.8 ±0.3	2.3 ±0.9	7.4 ±1	<3.4	<0.31	<1.3	7 ±2.7	1.9 ±1.2	NA	NA	10	21	9.2	2	1.1	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	50-55	3/21/2012	2.7+/-0.4	8.9+/-0.3	5 ±0.3	2.9 ±1	5.9 ±1	<2.6	<0.24	<0.74	3.9 ±2.2	[illegible]	NA	NA	12	12	12.4	<1	0.9	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	60-65	3/21/2012	<1	6.5+/-0.2	2.1 ±0.2	1.9 ±0.9	6.8 ±1.1	<2.6	<0.24	<0.69	5.3 ±3	NA	NA	NA	11	19	13.3	1	1.5	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
SS-2	15-20	4/10/2012	4.4+/-0.4	14.1+/-0.4	4.4 ±0.4	2.1 ±1	12.3 ±1.4	<2.5	<0.26	<1.0	9.8 ±3.8	1.4 ±1.1	NA	NA	14	22	14.7	<1	1.4	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	25-30	4/10/2012	1.0+/-0.4	12±0.3	3.4 ±0.3	1.5 ±0.8	8.7 ±1.2	<3.5	<0.31	<1.3	6.5 ±3.3	NA	NA	NA	<12	22	9.9	<1	0.8	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	25-30	3/27/2012	<1	16.3+/-0.9	7.7 ±0.9	4.3 ±1.3	11.2 ±1.3	<2.9	<0.31	<0.84	16 ±6	NA	NA	NA	13	24	10.4	1	0.8	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	0.5
	35-40	3/27/2012	2.6+/-0.4	17.6+/-0.5	6.6 ±0.5	4 ±1.3	14.1 ±1.5	<2.7	<0.29	<0.71	16 ±6.3	1.4 ±1.2	NA	NA	13	21	17.6	<1	0.9	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	45-50	3/27/2012	6.3+/-0.5	16.3+/-0.4	7.1 ±0.4	3.7 ±1.2	12.5 ±1.4	<2.8	<0.31	<0.78	12 ±3.5	NA	NA	NA	13	18	14.5	<1	1	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	55-60	3/27/2012	2.1+/-0.2	10.4+/-0.3	3.7 ±0.3	4 ±1.3	8.6 ±1.1	<2.4	<0.24	<0.65	11 ±4	NA	NA	NA	13	16	12.7	1	1	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	65-70	3/27/2012	<1	5.6+/-0.2	2.6 ±0.2	1.9 ±0.9	5 ±1	<2.7	<0.3	<0.82	4.9 ±3	NA	NA	NA	11	14	11.2	2	1.5	<0.5	0.6	<0.2	<0.2	<0.3	<0.5	<0.4	Trace	<0.5
SS-3	20-25	5/2/2012	1.8+/-0.4	7.7+/-0.3	2.3 ±0.3	1.7 ±0.9	6.4 ±1.1	<3.1	<0.3	<0.79	14 ±4.4	NA	NA	NA	106	<50	10.2	15	0.8	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	30-35	5/2/2012	<1	9.3+/-0.3	3.6 ±0.3	<0.4	7.2 ±1	<3	<0.3	<0.77	4.6 ±3.2	NA	NA	NA	20	18	10.7	6	1	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	40-45	5/2/2012	<1	5.4+/-0.2	2.4 ±0.2	<0.4	4.2 ±0.8	<2.6	<0.27	<0.7	3.6 ±2.7	NA	NA	NA	11	14	5.7	4	0.6	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	50-55	5/2/2012	<1	4.8+/-0.2	1.8 ±0.2	0.7 ±0.5	4.1 ±0.9	<3.1	<0.32	<0.85	3.2 ±1.7	NA	NA	NA	6	20	<0.5	6	<.02	<0.5	<0.5	<0.2	<0.2	<0.3	Trace	<0.4	<0.3	<0.5
	60-65	4/30/2012	<1	4.4+/-0.2	1.9 ±0.2	<0.4	3.1 ±0.8	<2.8	<0.29	<0.86	2.3 ±1.7	NA	NA	NA	11	18	3.3	8	0.3	<0.5	<0.5	<0.2	<0.2	<0.3	Trace	<0.4	<0.3	<0.5
	70-75	4/30/2012	<1	4.9+/-0.2	2.2 ±0.2	1.5 ±0.7	4.2 ±0.9	<2.5	<0.26	<0.78	5.9 ±3.3	1.9 ±1.4	NA	NA	<12	<20	2.6	3	0.4	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	80-85	4/30/2012	<1	2.7±0.1	<1	0.5 ±0.4	3.6 ±0.7	<2.5	<0.27	<0.81	2.3 ±2	NA	NA	NA	5	19	2.5	1	0.2	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
SS-4	15-20	4/11/2012	<1	3.4+/-0.2	<1	<0.8	3.8 ±1	<3	<0.28	<1.3	<2.6	NA	NA	NA	60	20	11.1	12	2.9	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	25-30	4/9/2011	<1	2.3±0.1	<1	1 ±0.9	2.4 ±0.8	<3	<0.28	<1.3	0.18 ±0.1	NA	NA	NA	24	47	15.2	14	0.5	<0.5	<0.5	Trace	0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	35-40	4/9/2011	<1	5.8±0.2	2.3 ±0.2	<0.3	2.6 ±0.7	<3	<0.33	<1.2	<2.2	NA	NA	NA	17	20	14.8	10	0.9	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	45-50	4/9/2011	<1	3.7±0.2	1.2 ±0.2	<0.7	4.6 ±1	<3.1	<0.31	<1.2	4.7 ±3.2	NA	NA	NA	15	48	6.8	12	0.3	<0.5	<0.5	<0.2	0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	55-60	4/3/2012	<1	2.8+/-0.2	<1	<0.4	2 ±0.7	<2.4	<0.26	<0.72	<2.4	NA	NA	NA	16	30	5.2	7	0.2	<0.5	<0.5	<0.2	<0.2	<0.3	0.5	<0.4	<0.3	<0.5
	65-70	4/3/2012	<1	6.5+/-0.2	1.9 ±0.2	1.7 ±0.8	5.4 ±0.9	<2.4	<0.23	<0.72	7.2 ±2.9	NA	NA	NA	17	39	8.6	4	<0.2	<0.5	<0.5	<0.2	<0.2	0.6	1.4	<0.4	<0.3	<0.5
SS-5	15-20	4/3/2012	<1	9.1+/-0.5	<1	3.8 ±2.7	8.6 ±2.3	<2.9	<0.33	<0.96	9.7 ±3.1	2 ±1.2	NA	NA	297	24	4.2	5	0.7	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	25-30	4/3/2012	3.7+/-0.6	4.8+/-0.2	<1	3.1 ±1.8	5.9 ±1.5	<3.7	<0.31	<1.5	5.6 ±3	1.3 ±0.9	NA	NA	187	33	9.3	<1	1.1	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	35-40	4/2/2012	<1	4.6+/-0.2	1.8 ±0.2	<0.4	3.6 ±0.8	<2.6	<0.25	<0.7	1.3 ±1.2	NA	NA	NA	16	22	7.1	<1	2.3	<0.5	<0.5	<0.2	<0.2	<0.3	<0.5	<0.4	<0.3	<0.5
	45-50	4/2/2012	<1	3.9+/-0.2	1.3 ±0.2	0.8 ±0.8	2.5 ±0.8	<2.5	<0.26	<0.83	1.3 ±1.1	NA	NA	NA	19	61	8.9	16	0.3	0.5	<0.5	<0.2	0.4	<0.3	<0.5	<0.4	<0.3	<0.5
	55-60	4/2/2012	<1	5.6+/-0.2	1.4 ±0.2	<0.5	4.2 ±0.9	<2.6	<0.26	<0.88	<2.7	NA	NA	NA	21	22	10.1	11	0.6	<0.5	<0.5	<0.2	Trace	<0.3	<0.5	<0.4	<0.3	<0.5
	65-70	4/2/2012	<1	4.3+/-0.2	<1	1.2 ±0.9	3.5 ±0.8	<2.7	<0.24	<0.57	3.2 ±2.5	NA	NA	NA	21	54	6.8	12	0.4	<0.5	<0.5	<0.2	0.2	<0.3	<0.5	<0.4	<0.3	<0.5

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie
^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
^^^ = MCL is for combined Radium 226 + Radium 228
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
☐ indicates concentration exceeds a standard or guidance value

Site #6
Moriches-Yaphank Road Farm
Manorville NY

Site Description

This site is located northwest of the intersection of Weeks Ave and Moriches-Middle Island Road in Manorville, and consists of four separate tax parcels, three contiguous five acre parcels, and one non-contiguous 10 acre parcel located south of the northern three. This site is a former Long Island Compost NYSDEC Part 360 regulated site. Farming activities are evident from historical aerial photographs (Appendix F) on one or more of the parcels since 1947. What appear to be VOWM windrows first appear on the site in the 1999 photo, and are evident on the 2006 photo, but not on any of the subsequent photos (2007, 2010, 2013). Two sets of historical windrows appear to have been used; one set on the 10 acre parcel located approximately 150 feet north of Moriches-Middle Island Road, and the other set on the three five acre parcels located approximately 900 feet north of Moriches-Middle Island Road (Figure 10).

SCDHS Monitoring Wells

The SCDHS installed three temporary profile monitoring wells south of the site located on Moriches-Yaphank Road (MMIR-1, MMIR-2 and MMIR-3). The locations of these wells were based upon a southerly regional groundwater flow direction, and were sited to assess past and/or current impacts from vegetative organic waste activity occurring at the site. All three wells were installed to a depth of 115 fbg, and sampled at 10 foot intervals as they were retracted. Nine levels were sampled from each of the three wells, with the uppermost level screened at the 30 to 35 foot interval, yielding a total of 27 groundwater samples collected from this site. The following analytes have been detected in the indicated monitoring well at concentrations exceeding a groundwater and/or drinking water standard:

Manganese (MMIR-1)
Iron (MMIR-1)
Sodium (MMIR-1)

Table 7 contains a summary of the results of the analytes detected.

Private Wells

Five homes potentially served by private wells were identified downgradient of this site. Three of these homes were confirmed to be connected to the public water supply, one lot did not have a water supply, and no response was received from the final home.

Figure 10– Site #6 Well Locations on 2004 Aerial Photograph

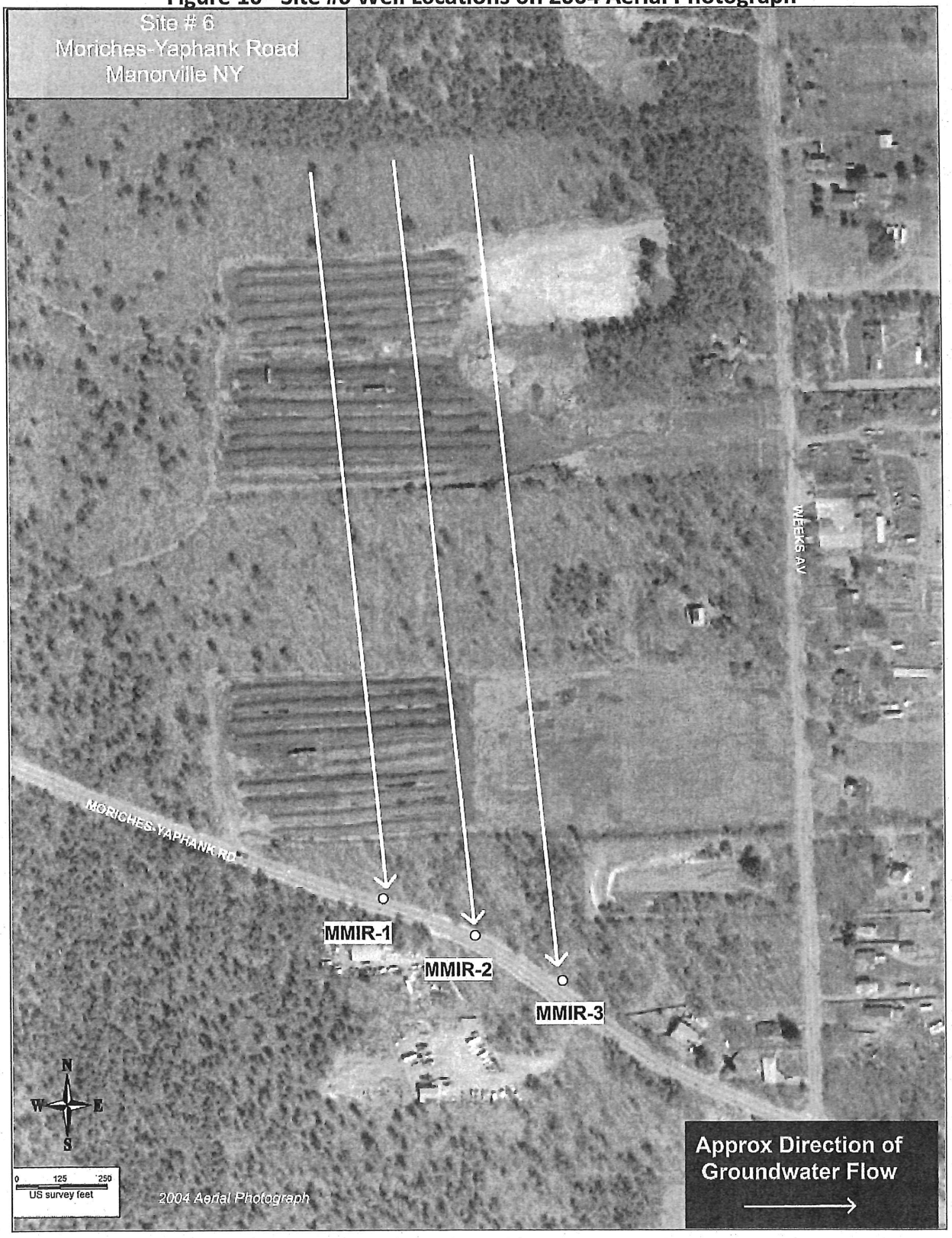
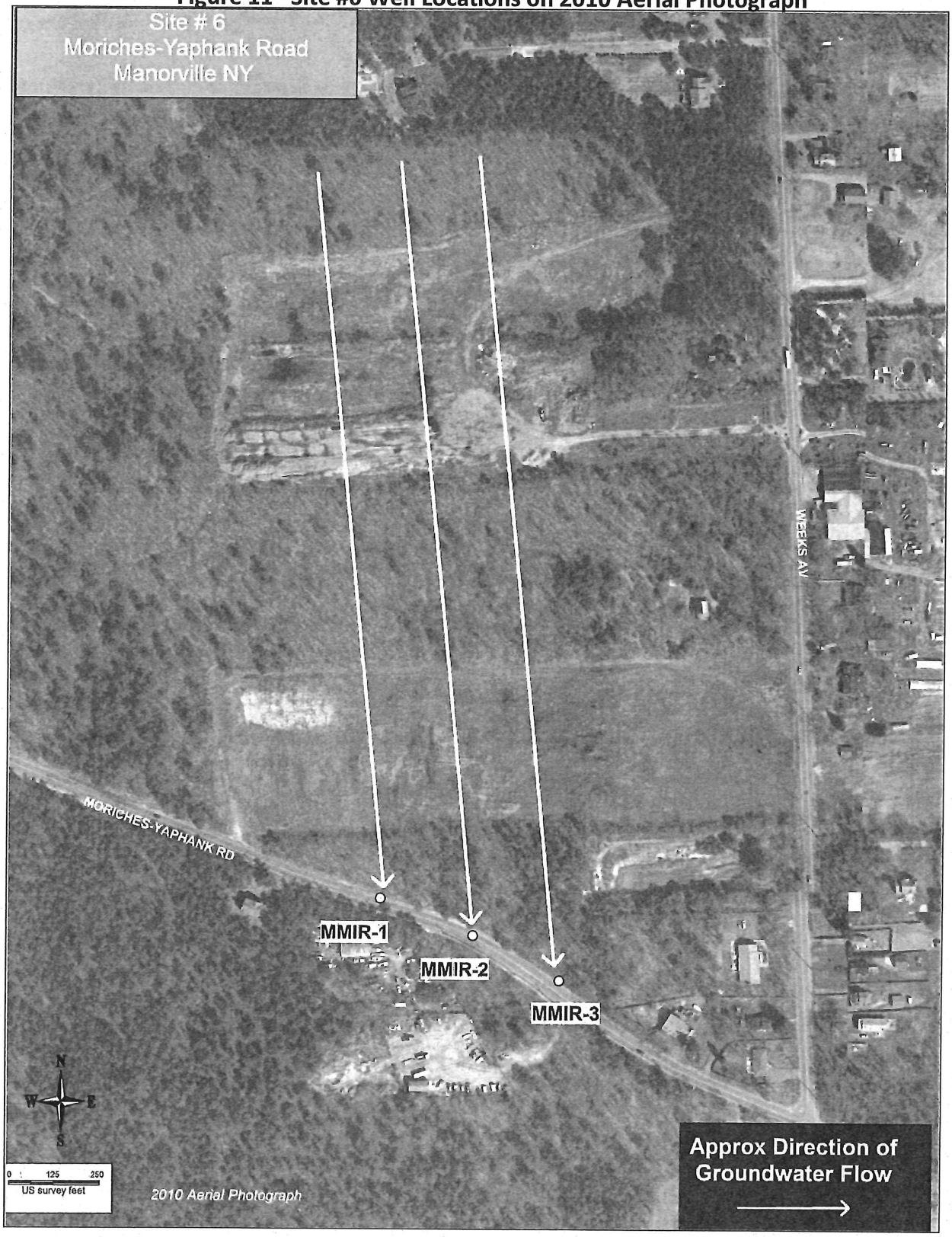


Figure 11– Site #6 Well Locations on 2010 Aerial Photograph



Public Wellfields

The nearest public supply wellfield is approximately 1.1 miles from the site and is not located downgradient of the site. Any impacts to groundwater quality as results of this site's operations would not be expected to affect the water quality of this wellfield.

Summary of Significant Analytical Results

Metals

Well MMIR-1 was the only one of the three wells installed that exhibited analytes with concentrations in excess of a standard. The uppermost profile level (30-35 fbg) had a manganese concentration of 804 ppb, exceeding the groundwater and drinking water standard of 300 ppb. The manganese concentration in the top profile level of MMIR-2 was elevated at 297 ppb, just below the groundwater/drinking water standard. The four profile levels of well MMIR 1, extending from 80 feet to 115 fbg, all exhibited iron concentrations in excess of groundwater and drinking water standards. There was also one exceedance of the sodium groundwater standard in the 80 to 85 fbg profile. Potassium concentrations were notably elevated in the upper profiles of MMIR-1 (7.2 ppm, 14.6 ppm and 6.5 ppm) and MMIR-2 (23.1 ppm).

Other Notable Results

Trace detections of the pesticide metabolite metolachlor OA was detected in the top profile level in each of the three wells, and a companion metabolite, metolachlor ESA, was also detected at trace concentrations in the top two profile levels of wells MMIR-1 and MMIR-2. Low concentrations of chloroform (less than 3 ppb) were reported in the same seven profile levels (50 – 115 fbg) in all three of the wells. Freon (trichlorofluoromethane) was also detected at low concentrations (less than 1 ppb) in two profile levels of MMIR-3 (70-75fbg and 80-85 fbg). Caffeine was detected in all three wells.

Discussion

Three profile monitoring wells were installed downgradient of this site, along Moriches-Yaphank Road. Figure 10 illustrates the compost windows as they existed in 2004 relative to the three monitoring wells, and Figure 11 shows the site as it existed in 2010, a year prior to the installation of the wells in 2011. The regional groundwater flow arrow for well MMIR-1 shows that this well is located downgradient of the historical windrows which are located approximately 150 feet to the north (on the 10 acre parcel), and 850 feet to the north (on the three five acre parcels). Well MMIR-2 is situated downgradient of the edge of the area of the windrows located 150 feet to the north, and is downgradient of the windrows that were located 850 feet to the north. Well MMIR-3 does not appear to be located directly downgradient of any of the historic windrows, but is downgradient of the land that had historical farmland use. The upper profile levels of wells MMIR-1 and MMIR-2 appear to exhibit slight impacts associated with VOWM sites (elevated manganese, potassium), while the water quality of well MMIR-3 did not appear to exhibit significant impacts. This is consistent with the locations of the wells relative to the historic locations of windrows and the regional groundwater flow direction (Figure 10). In addition,

the historical aerial photographic record (Appendix F) indicates that very little if any VOWM activity has occurred on this site since 2006. The five years of minimal VOWM activity may have allowed much of the potentially impacted water to have travelled past the wells, toward the south. For example, the most distant window from well MMIR-1 (the well optimally located to observe VOWM related groundwater impacts) is located approximately 1,350 feet to the north (on the most northern five acre parcel). Considering an average of 300 feet groundwater travel/year, it would take groundwater impacted from this window approximately 4.5 years to travel to well MMIR-1. MMIR-1 was installed and sampled in the fall of 2011; approximately 4.5 years after windows were removed in early 2007 (Appendix F).

Wells Impacted by VOWM Activity

One profile well, MMIR-1 appears to indicate slightly impacted groundwater quality (elevated concentrations of manganese, iron, sodium and potassium), which could be due to historic VOWM activity at the sight. However, since this site has not been used since approximately 2006 for significant VOWM related activities, no definitive conclusions can be drawn regarding VOWM related groundwater impacts from this site.

Table 7
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #6
Manorville, NY

Well Information			Parameters					Metals														
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Depth To Water (Feet)	Dissolved Oxygen(mg/L)	Temperature (Celsius)	pH	Conductivity (uS)	Aluminum (ppb)	Barium (ppb)	Cobalt (ppb)	Chromium (ppb)	Copper (ppb)	Manganese (ppb)	Molybdenum (ppb)	Nickel (ppb)	Strontium (ppb)	Titanium (ppb)	Magnesium (ppm)	Iron (ppm)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	-	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	1,000	-	50	200	300	-	100	-	-	-	0.3	20	-	-
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	2,000	-	100	1300***	300	-	100	-	-	-	0.3	-	-	-
MMIR-1	30-35	11/9/2011	26.25	7.5	14.8	5.44	145	63	38	<1	<1	1	804	<1	1.8	31	<1	6.7	<0.1	7.6	10.9	7.2
	40-45	11/9/2011	26.25	5.33	14.8	5.43	141	11	216	1	1	<1	209	<1	1	59	<1	3.2	<0.1	4.6	4.9	14.6
	50-55	11/9/2011	26.25	6.05	14.5	5.63	136	11	79	1	1	1	7	<1	1.3	110	<1	4.8	<0.1	7.9	9.3	6.5
	60-65	11/9/2011	26.25	8.34	14.5	6.04	101	6	14	1	1	1	4	<1	1.2	52	<1	3.6	<0.1	7.1	6.9	0.6
	70-75	11/9/2011	26.25	8.75	14.1	6.26	110	<5	13	<1	1	1	2	<1	1	45	<1	3.6	<0.1	6.6	8.5	0.6
	80-85	11/3/2011	26.25	9.59	14.2	6.31	53	117	8	<1	1	<1	15	<1	1.2	14	11	18	3.68	38.1	56.8	4.7
	90-95	11/3/2011	26.25	9.67	13.9	6.41	50	95	8	<1	1	<1	8	<1	1	15	6	1.5	0.36	4.2	3.5	0.5
	100-105	11/3/2011	26.25	8.96	14	6.84	50	111	9	<1	1	<1	13	<1	1.1	12	7	1	0.34	4	2.3	0.4
	110-115	11/3/2011	26.25	9.3	13.4	6.85	48	86	9	<1	2	<1	6	<1	<0.5	14	5	1.2	0.33	4.4	3.2	0.4
MMIR-2	30-35	11/22/2011	24.8	2.84	14.5	6.05	220	10	46	<1	<1	<1	297	<1	1.7	25	<1	5.9	<0.1	6.8	9.9	23.1
	40.45	11/22/2011	24.8	6.16	141	5.71	174	33	80	<1	<1	<1	20	<1	1.8	47	2	6.4	<0.1	8	9.7	4.5
	50-55	11/21/2011	24.8	8.28	14	6.32	129	115	35	<1	2	<1	23	<1	3	81	5	4.6	<0.1	6.1	8.5	1.5
	60-65	11/21/2011	24.8	8.62	14.2	6.65	99	164	16	<1	3	<1	27	<1	4.9	51	8	3.1	0.16	6	6.3	0.8
	70-75	11/21/2011	24.8	9.29	14.3	6.73	93	105	10	1	2	<1	15	<1	4.6	31	5	2.9	<0.1	4.3	6.8	0.5
	80-85	11/21/2011	24.8	9.52	14.3	7.02	82	132	9	2	2	<1	11	<1	1.7	24	6	2.4	<0.1	4.1	5.4	0.4
	90-95	11/14/2011	24.8	8.68	14.7	6.33	71	42	15	<1	<1	<1	10	<1	1.3	39	3	4.1	0.15	6.9	9.9	0.6
	100-105	11/14/2011	24.8	9.65	14.7	6.62	47	37	6	<1	1	<1	8	<1	1.2	14	2	1.3	<0.1	3.9	3.1	0.3
	110-115	11/14/2011	24.8	10.6	14.3	6.6	43	16	6	<1	1	<1	5	<1	0.7	12	<1	0.9	<0.1	4	2.2	0.3
MMIR-3	30-35	1/31/2012	23.45	7.63	12	7.01	93	152	21	<1	<1	<1	87	<1	0.6	6	<1	2.1	<0.1	3.9	3.4	5.3
	40.45	1/31/2012	23.45	7	11.8	7.46	171	19	72	<1	<1	<1	17	<1	0.5	53	<1	5.4	<0.1	7.8	7.6	2
	50-55	1/25/2012	23.45	7.47	11.5	5.35	200	13	30	<1	1	<1	6	<1	4	109	<1	6.9	<0.1	8.3	11.6	0.9
	60-65	1/25/2012	23.45	8.01	11.3	5.65	180	6	25	<1	<1	<1	2	<1	1.5	94	<1	5.5	<0.1	6	12.5	0.7
	70-75	1/25/2012	23.45	7.36	11.1	5.69	276	6	36	<1	<1	<1	2	<1	2.7	116	<1	8.9	<0.1	7.8	20.3	0.9
	80-85	1/25/2012	23.45	7.97	11.2	5.72	280	8	43	<1	1	<1	2	<1	6	115	<1	8.6	<0.1	7.5	20.5	0.9
	90-95	1/25/2012	23.45	9.03	11.1	6.39	50	5	7	<1	<1	<1	1	2	1.2	14	<1	1	<0.1	3.5	2.4	0.3
	100-105	1/25/2012	23.45	8.99	11.1	6.22	49	<5	7	<1	<1	<1	<1	<1	<0.5	15	<1	1	<0.1	3.5	2.3	0.3
	110-115	11/22/2011	23.95	7.46	13.5	6.41	50	192	10	<1	3	<1	16	<1	1.8	14	9	1	0.2	3.9	2	0.4

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
ppb = part per billion
ppm = part per million
uS = micro siemens
"<" = less than, indicating no detection
*** Action Level for Public Water Suppliers for Lead and Copper
☐ indicates concentration exceeds a standard or guidance value

Table 7
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #6
Manorville, NY

Well Information			Radiologicals (pCi/L)												Standard Inorganics				VOCs		Herb Mets (ppb)		
			SCDHS PEHL			NYSDOH Wadsworth																	
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta* (AGB)	Gross Alpha	Gross Beta	Ruthenium 106	Cesium 137	Zirconium 95	Potassium 40	Actinium 228	Radium 224	Radium 226	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Perchlorate (ppb)	Chloroform (ppb)	Trichlorofluoromethane (ppb)	Caffeine	Metolachlor OA	Metolachlor ESA
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	5	-	50	50
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^	-	15^	1,000^^	-	-	-	-	-	-	-	250	250	10	-	7	5	-	-	-
DOH Drinking Water Standards Subpart 5-1			15	-	50**	15	-	-	-	-	-	-	-	5^^^	250	250	10	18	80	5	50	50	50
MMIR-1	30-35	11/9/2011	1.3±0.8	7.1±0.8	1.2±0.8	1.5 ±0.8	6.4 ±1.1	<2.8	<0.33	<0.67	5 ±2.2	NA	NA	NA	27	25	3.6	<0.2	<0.5	<0.5	<0.2	Trace	Trace
	40-45	11/9/2011	1.1±0.6	15.1±1.1	3.1±1.1	1 ±0.6	15 ±1.6	<3	<0.32	<0.65	8.1 ±4.7	NA	NA	NA	13	19	1.9	0.2	<0.5	<0.5	<0.2	<0.3	Trace
	50-55	11/9/2011	<1	6.7±0.8	1.4±0.8	<0.3	6.3 ±1.1	<2.9	<0.3	<0.64	3.6 ±1.6	NA	NA	NA	18	13	3.9	0.3	0.5	<0.5	Trace	<0.3	<0.3
	60-65	11/9/2011	<1	<1	<1	<0.5	<1	<2.6	<0.27	<0.7	<2.4	NA	NA	NA	12	9	1.6	0.3	1	<0.5	<0.2	<0.3	<0.3
	70-75	11/9/2011	<1	<1	<1	<0.5	<1	<2.8	<0.32	<0.64	<2.4	NA	NA	NA	14	10	1.2	0.2	1.1	<0.5	<0.2	<0.3	<0.3
	80-85	11/3/2011	<1	<1	<1	<0.4	<0.7	<3	<0.3	<0.67	NA	NA	NA	NA	<30	<50	<5	<0.2	1.9	<0.5	<0.2	<0.3	<0.3
	90-95	11/3/2011	<1	<1	<1	<0.3	<0.7	<2.7	<0.3	<0.64	0.9 ±0.4	NA	NA	NA	<9	<15	<1.5	<0.2	1.4	<0.5	<0.2	<0.3	<0.3
	100-105	11/3/2011	<1	<1	<1	0.9 ±0.5	<0.7	<2.8	<0.32	<0.7	<2.7	NA	NA	NA	<12	<20	<2	<0.2	1	<0.5	<0.2	<0.3	<0.3
	110-115	11/3/2011	<1	1.5±0.6	1.2±0.6	0.5 ±0.4	<0.7	<3	<0.32	<0.8	<2.2	NA	NA	NA	<9	<15	<1.5	<0.2	0.5	<0.5	<0.2	<0.3	<0.3
MMIR-2	30-35	11/22/2011	1.3+/-0.9	21.9+/-1.4	3.0±1.4	0.9 ±0.7	24 ±2.1	<3.3	<0.3	<0.86	20 ±8.2	<0.97	NA	NA	16	27	3.9	0.3	<0.5	<0.5	<0.2	Trace	Trace
	40-45	11/22/2011	<1	6.1+/-0.8	2.4±0.8	<0.5	4.1 ±1	<2.5	<0.23	<0.74	<2.3	<0.79	NA	NA	24	19	<0.2	0.4	<0.5	<0.5	0.2	<0.3	Trace
	50-55	11/21/2011	<1	1.3±0.6	<1	<0.4	1.5 ±0.6	<3.8	<0.33	<2.4	1.4 ±1.3	<0.91	NA	NA	14	10	4.5	0.3	0.6	<0.5	<0.2	<0.3	<0.3
	60-65	11/21/2011	<1	<1	<1	<0.5	<0.7	<2.8	<0.28	<0.85	<2.4	<0.86	NA	NA	11	<5	4.4	0.2	1.1	<0.5	<0.2	<0.3	<0.3
	70-75	11/21/2011	<1	<1	<1	<0.6	0.8 ±0.6	<2.5	<0.25	<0.81	<1.9	<0.78	NA	NA	9	<5	3.4	<0.2	1.3	<0.5	<0.2	<0.3	<0.3
	80-85	11/21/2011	<1	<1	<1	<0.4	0.8 ±0.6	<3.1	<0.29	<0.84	<2.2	<1	NA	NA	7	5	1.6	<0.2	1.7	<0.5	<0.2	<0.3	<0.3
	90-95	11/14/2011	<1	<1	<1	0.9 ±0.7	<1	<2.7	<0.3	<0.67	<2.6	1.3 ±1.1	NA	NA	<30	<50	5.9	<0.2	1.2	<0.5	<0.2	<0.3	<0.3
	100-105	11/14/2011	<1	<1	<1	<0.4	<0.7	<2.7	<0.3	<0.54	1.1 ±0.8	NA	NA	NA	<30	<50	<1	<0.2	1.4	<0.5	Trace	<0.3	<0.3
	110-115	11/14/2011	<1	<1	<1	<0.3	<0.7	<2.7	<0.31	<0.65	NA	NA	NA	NA	5	5	<0.5	<0.2	0.7	<0.5	<0.2	<0.3	<0.3
MMIR-3	30-35	1/31/2012	<1	9.0+/-0.8	4.7±0.8	0.5 ±0.4	4.9 ±0.9	<2.4	<0.25	<0.68	7.8 ±3.4	<0.82	NA	NA	7	18	<0.5	0.6	<0.5	<0.5	<0.2	Trace	<0.3
	40.45	1/31/2012	<1	6.7+/-0.7	5.0±0.7	<0.4	2.4 ±0.9	<9.5	<1.2	<2.6	<6.1	<2.9	NA	NA	17	22	2.9	0.3	<0.5	<0.5	<0.2	<0.3	<0.3
	50-55	1/25/2012	<1	<1	<1	<0.33	<1	<2.9	<0.32	<0.76	3.2 ±1.9	<1	1.4 ±0.7	NA	24	25	3.8	0.3	0.6	<0.5	<0.2	<0.3	<0.3
	60-65	1/25/2012	<1	<1	<1	<0.55	<0.7	<2.8	<0.3	<0.69	1.8 ±1.5	<0.93	NA	NA	17	15	6.3	0.2	1.1	<0.5	<0.2	<0.3	<0.3
	70-75	1/25/2012	<1	1.0+/-0.1	<1	<0.71	1.2 ±0.7	<2.6	<0.32	<0.73	<2.2	<0.88	NA	NA	26	40	5.5	0.3	0.7	0.7	<0.2	<0.3	<0.3
	80-85	1/25/2012	1.2+/-0.4	1.1+/-0.1	<1	<0.7	1.1 ±0.7	<3.1	<0.27	<1.5	<2.3	<1	NA	NA	25	38	6	0.2	0.9	0.8	<0.2	<0.3	<0.3
	90-95	1/25/2012	<1	<1	<1	<0.41	<0.7	<2.9	<0.32	<0.83	<2.3	<0.91	NA	NA	5	6	<0.5	<0.2	2.3	<0.5	<0.2	<0.3	<0.3
	100-105	1/25/2012	<1	<1	<1	<0.22	<0.6	<2.8	<0.29	<0.86	<1.9	<0.88	NA	NA	5	6	<0.5	<0.2	1.8	<0.5	0.4	<0.3	<0.3
	110-115	11/22/2011	<1	3.0+/-0.7	2.7±0.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	<12	<20	<2	<0.2	1.4	<0.5	<0.2	<0.3	<0.3

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie

^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
^^^ = MCL is for combined Radium 226 + Radium 228
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
☐ indicates concentration exceeds a standard or guidance value

Site #7
East Main Street
Yaphank NY

Site Description

This site is located along East Main Street in Yaphank, just north of the Long Island Expressway and consists of four separate tax parcels totaling approximately 29 acres. As indicated on Figure 12, the two northern parcels are labelled "Froehlich" and total 19 acres; the southern parcel is 10 acres and is labelled "Hololob". With respect to VOWM activities, the NYSDEC currently designates the sites as follows:

Froehlich - Inactivated Part 360 Registered site; currently storing exempted wood mulch and some yard waste composting material.

Hololob - exempted land clearing debris processing facility.

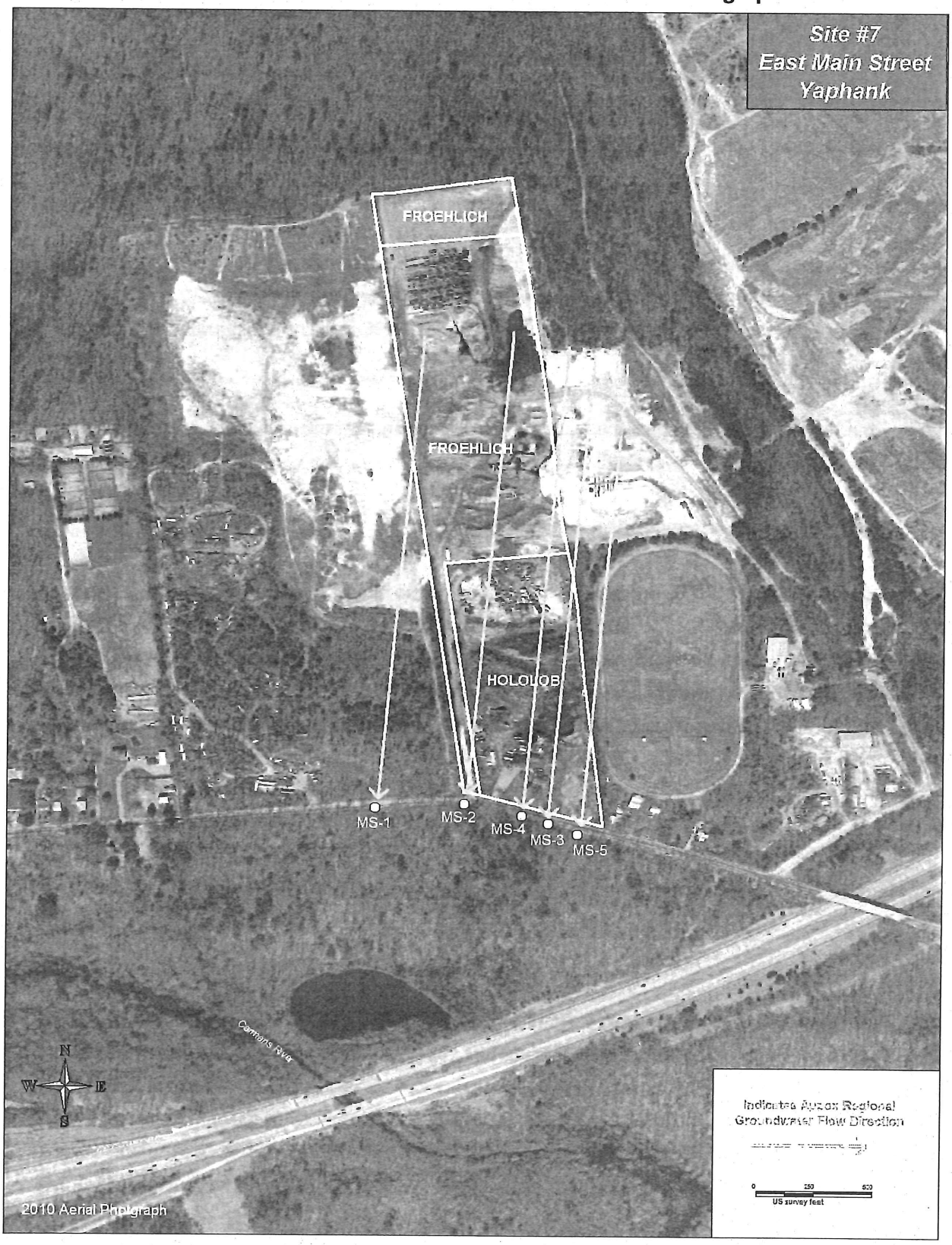
Historical aerial photographs (Appendix G) indicate that the southern portion of the site was already developed as farmland in 1947, and farming use is evident on the 1969 and 1978 photographs. The first indication of vegetative organic waste materials at the site occur on the southern Hololob property in the 2007 aerial photograph, and is also evident in the spring and fall 2013 photographs. Vegetative organic waste materials become evident on the northern Froehlich property in 2010, and are also present in both the spring and fall 2013 photographs. Additionally, the fall 2013 aerial photo shows a significant amount of flooding on the northern Froehlich property, as well as on the property to the west.

It should be noted that the Carmans river is located approximately 1,000 feet hydraulically downgradient of this site.

SCDHS Monitoring Wells

The SCDHS installed five temporary profile monitoring wells (MS-1, MS-2, MS-3, MS-4 and MS-5) south of this site, located on Main Street in Yaphank (Figure 12). The locations of these wells were based upon a southerly regional groundwater flow direction, and were sited to assess impacts from past and/or current landuses of this site. Three of the five wells (MS-1, MS-2, and MS-3) were installed to a depth of 95 fbg, and two of the wells (MS-4 and MS-5) were installed to a depth of 85 fbg. All the wells were sampled at 10 foot intervals as they were retracted. Eight levels were sampled from wells MS-1, MS-2

Figure 12– Site #7 Well Locations on 2010 Aerial Photograph



and MS-3, the uppermost at the 20 – 25 foot interval, and six levels were samples from wells MS-4 and MS-5, with the uppermost level screened at the 30 – 35 foot interval. A total of 41 groundwater samples were collected in the vicinity of this site, with the uppermost profile levels of each of the five wells being resampled in July of 2014 (the original sampling took place in 2011 and 2012). The following analytes were detected in the profile monitoring wells downgradient of this site at concentrations exceeding their respective drinking water and/or groundwater standards:

Manganese	**(MS-2, MS-3, MS-4, MS-5)**	**Nitrate**	**(MS-3, MS-5)**
Thallium	**(MS-4, MS-5)**	**Ammonia**	**(MS-3, MS-5)**
Iron	**(MS-3, MS-4, MS-5)**	**Benzene**	**(MS-3)**
Sodium	**(MS-3, MS-4, MS-5)**		

Table 8 contains a summary of the results of the analytes detected.

Private Wells

Thirteen potential private wells were identified in the vicinity of this site. Eleven wells were sampled, and two did not respond to the SCDHS offer to sample their wells. Of the eleven private wells sampled, only one is located in a potentially downgradient direction (the ten other wells are located side-gradient to the site). One private well slightly exceeded the drinking water standard for iron, and another slightly exceeded for iron and Total Aldicarb (a pesticide). Except for these two private wells, water quality for all the other private wells tested met drinking water standards. The private wells with the exceedances for iron were not located downgradient of the site and did not otherwise exhibit elevated water quality indicators of VOWM impacts that have been observed downgradient at other VOWM sites.

Public Wellfields

There were no public supply wellfields identified downgradient of this site.

Surface Waters

The Carmans River is located approximately 1,000 feet downgradient of this site. Groundwater modelling performed by Camp, Dresser and McKee for the Suffolk County Comprehensive Water Resources Management Plan indicates that the southern Hololob property is within the 0 to 2 year groundwater travel time to the Carmans River. This indicates that groundwater at the top of the water table located at the Hololob property would take between 0 to 2 years to discharge into the Carmans River. Additionally, the modelling shows that groundwater at the top of the water table on the Froehlich property takes between 2 and 5 years to discharge into the Carmans River.

Summary of Significant Analytical Results (2011 and 2012 Sampling Events)

Metals

Well MS-1 was the most westerly located well, and exhibited the least observed VOWM related water quality impacts. Figure 12 indicates that the regional groundwater flow direction is to the south-west, resulting in a landuse impact contribution from only a portion of the northernmost "Froehlich" property, which, although has had recent VOWM activity (since 2010), it does not appear to have had significant historical VOWM uses (Appendix G). The uppermost profile level (screened 20 to 25 fbg) of well MS-2 exhibited an exceedance of the groundwater and drinking water standard for manganese (3,990 ppb), which is over thirteen times the groundwater and drinking water standard of 300 ppb. Analytes in the deeper profile levels all indicated background concentrations for metals and do not indicate VOWM related impacts. This is an indication that the contaminant source is located in relative close proximity to the well, most likely the Hololob property. The five upper profile levels of well MS-3 (from 20 to 75 fbg) exhibited significantly elevated concentrations of manganese, up to 49,300 ppb, which is over 160 times the drinking water and groundwater standard of 300 ppb. Other metals such as thallium, iron and sodium also exceeded drinking water and/or groundwater standards. Several other metals such as barium, cobalt, strontium and potassium were also notably elevated relative to mean concentrations typically found in the shallow aquifer (Table 13). MS-4 and MS-5 also exhibited elevated concentrations of manganese (up to 17,500 ppb and 16,300 ppb, respectively). Elevated concentrations of iron were reported in these wells, and thallium exceeded the groundwater standard (0.5 ppb) in well MS-5.

Radionuclides

Gross alpha concentrations were below detection limits in well MS-1, and a low concentration (1.4 pCi/l) was reported in the uppermost profile level of MS-2. Although not exceeding the drinking water standard of 15 pCi/l, wells MS-3, MS-4 and MS-5 exhibited elevated concentrations of gross alpha (11.2 pCi/l, 8.46 pCi/l and 14.3 pCi/l respectively), primarily within the upper three profile sampling levels.

Well MS-3 exhibited the highest gross beta concentrations, 49.2 pCi/l in the 30–35 fbg level, and 44.4 pCi/l in the 40–45 fbg level. However, when these concentrations are adjusted for the gross beta contribution of potassium 40 (a naturally occurring radioactive isotope of potassium), the concentrations are 10.4 pCi/l and 6.9 pCi/l respectively, significantly below the drinking water guidance value of 50 pCi/l. Table 8 indicates all the gross beta concentration detections and their corresponding concentrations that are adjusted for potassium 40. A review of this information shows that the majority of the gross beta concentrations reported is a result of the relatively high potassium concentrations in the samples, and the potassium 40 contained therein.

Pesticides

The pesticides Alachlor OA, Alachlor ESA and pesticide metabolite 2,6-dichlorobenzamide were detected

in both trace (below quantifiable limits) and quantifiable concentrations (up to 8.8 ppb) in all five of the profile wells, significantly below the drinking water standard of 50 ppb. These pesticides were primarily found in the deeper profile sampling levels, indicating the source is not proximate to the wells, but is located a further distance away in the upgradient (northeast) direction. The pesticide Metalaxyl was detected in wells MS-2, MS-3, MS-4 and MS-5 at low concentrations (trace to 0.2 ppb). These detections were also reported primarily in the deeper sampling levels, indicating a relatively distant source. The pesticide dichlorvos was detected in trace concentrations in the top four sampling levels of well MS-3, and in the top level of MS-4 (30-35 fbg).

Volatile Organic Compounds (VOCs)

VOCs were detected in four of the five monitoring wells (they were not detected in well MS-5). Although the reported concentrations were relatively low (less than 3 ppb), the groundwater and drinking water standards for these types of compounds are also relatively low (e.g., the groundwater standard for benzene is 1 ppb). None of the reported VOCs concentrations exceeded their respective drinking water standards; however benzene did exceed the 1 ppb groundwater standard with 2.4 ppb in well MS-3 (30-35 fbg).

Other Notable Results

Ammonia was detected in four of the five wells (it was not detected in MS-1). Wells MS-2 and MS-4 only had detections in the uppermost sampling level, while MS-3 and MS-5 had detections in the upper five and four sampling levels respectively. The ammonia concentrations exceeded the groundwater standard of 2 ppm in three sample levels from MS-3 (from 40 to 65 fbg), and in the top sampling level of MS-5 (30-35 fbg). The highest concentration of ammonia was 9.74 ppm reported in well MS-3 at the 60-65 fbg sampling level.

The nitrate drinking water and groundwater standard of 10 ppm was exceeded in wells MS-3 and MS-5 (10.4 ppm and 12 ppm) at deep sampling levels (80-85 fbg). Although not exceeding standards, elevated nitrates were also reported in wells MS-2 and MS-4 also at the 80-85 fbg sampling level (7.3 ppm and 9 ppm respectively). It should be noted that due to elevated turbidity, the nitrate detection limit, which is typically 0.5 ppm, had to be raised significantly in some samples (as high as 10 ppm). These results can be found in Table 8.

DEET was reported at trace concentrations in wells MS-1, MS-3 and MS-4, and acetaminophen was reported at low concentrations in well MS-3 in the upper four sampling levels.

2014 Sampling Event

The uppermost levels of all five monitoring wells were resampled in July of 2014. The results were generally consistent with the results from the previous sampling performed in 2011-2012, with a few

exceptions. The manganese concentration reported in MS-2 (20-25 fbg) of 131 ppb was considerably lower than the concentration reported for that profile level in 2011 (3,990 ppb). Also, caffeine was detected at trace concentrations in MS-2, MS-3 and MS-4 (caffeine was reported in MS-3 in 2011, but at a much deeper profile level). Other compounds detected in 2014 that were not previously detected include the pesticide metolachlor (MS-3), the pesticide metabolites deisopropylatrazine (MS-3) and metolachlor OA (MS-4), and a metabolite of an antiepileptic pharmaceutical product, 4-hyroxyphenytoin (MS-4 and MS-5).

Discussion

Five profile wells were installed downgradient of this site, along East Main Street. The water quality in the western most well (MS-1) did not exhibit significant impairment, and did not have any analyte concentrations exceeding drinking water or groundwater standards. This well did have low concentrations of petroleum related VOCS (e.g., 1,2,4-trimethylbenzene, benzene, xylene, toluene) and chloroform. These were primarily detected in the deeper profile levels. MS-1 had low concentrations of pesticides and DEET also detected in the deeper profile levels. The VOC and pesticide detections in this well do not appear to be a result of VOWM activity. Figure 12 indicates that the groundwater flow to this well includes the property west of the Hololob property, and upper portion of the Froehlich property. Historical aerial photographs (Appendix G) indicate that since at least 1947, and through the mid-1970s, the Hololob property and property located to the west was farmland, therefore there exists a potential that the pesticide detections in this well are from the legacy farming of land upgradient of this well.

Only the top profile level in well MS-2 had elevated manganese concentrations (3,990 ppb), which would indicate water quality impacts could be a result of VOWM activity occurring at the Hololob property. MS-3, MS-4 and MS-5 all exhibited significant water quality impacts (e.g., significantly elevated metals concentrations, in addition to elevated gross alpha and ammonia concentrations) that appear to be from vegetative organic waste activity occurring at the Hololob site. Figure 12 demonstrates that these wells are appropriately located to assess any VOWM activity impacts to the groundwater. Also, consistent with other VOWM sites, trace to low concentrations of pharmaceutical and personal care product contaminants typically associated with septic waste (e.g., acetaminophen, DEET, caffeine, 4-Hydro-xyphenytoin (an antiepileptic metabolite)) were detected in the most impacted profile levels. Also, the Carmans River is located approximately 1,000 feet downgradient of this site and it is likely a discharge point for the contaminants observed in these wells.

Wells Impacted by VOWM Activity

Four of the five profile wells installed appear to have been impacted by the VOWM related landuse activity occurring at this site.

Table 8 - Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #7, Yaphank, NY

Well Information			Parameters					Metals																				Rads (pCi/L)		
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Depth To Water (Feet)	Dissolved Oxygen (mg/L)	Temperature (Celsius)	pH	Conductivity (uS)	Aluminum (ppb)	Arsenic (ppb)	Barium (ppb)	Cobalt (ppb)	Chromium (ppb)	Copper (ppb)	Germanium (ppb)	Manganese (ppb)	Molybdenum (ppb)	Nickel (ppb)	Strontium (ppb)	Titanium (ppb)	Thallium (ppb)	Vanadium (ppb)	Magnesium (ppm)	Iron (ppm)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)	Zinc (ppb)	Gross Alpha	Gross Beta	Adjusted Gross Beta* (AGB)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	35	-	-	-	-	2,000	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	25	1,000	-	50	200	-	300	-	100	-	-	-	-	-	0.3	20	-	-	-	15^	1,000^^	15^
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	10	2,000	-	100	1300***	-	300	-	100	-	-	2	-	-	0.3	-	-	-	5,000	15	-	50**
MS-1	20-25	7/21/2011	15.97	7.03	12.7	5.42	64	63	<1	14	<1	<1	<1	<1	17	<1	0.9	28	4	<0.3	<1	1.3	<0.1	2.3	6.3	0.9	<50	<1	1.4 +/-0.6	<1
	30-35	7/21/2011	15.97	8.35	12.5	5.49	62	25	<1	15	<1	1	<1	<1	14	<1	0.8	31	2	<0.3	<1	2.2	<0.1	3.6	3.6	0.8	<50	<1	<1	<1
	40-45	7/21/2011	15.97	9.69	12.6	5.67	64	25	<1	10	<1	1	<1	<1	6	<1	0.7	25	2	<0.3	<1	1.9	<0.1	4.2	4.1	0.5	<50	<1	<1	<1
	50-55	7/20/2011	15.97	9.66	12.9	5.78	63	11	<1	10	<1	1	<1	<1	3	<1	<0.5	24	<1	<0.3	<1	1.9	<0.1	4.1	4.6	0.5	<50	<1	<1	<1
	60-65	7/20/2011	15.97	9.35	13	5.88	62	57	<1	9	<1	1	<1	<1	4	<1	0.6	25	1	<0.3	<1	1.9	<0.1	4.1	4.1	0.5	74	<1	<1	<1
	70-75	7/18/2011	15.97	9.65	13	5.93	84	26	<1	15	<1	1	<1	<1	21	<1	0.6	30	2	<0.3	<1	2.8	<0.1	4.3	5.9	0.5	<50	<1	<1	<1
	80-85	7/18/2011	15.97	8.84	13.1	5.95	132	46	<1	35	<1	1	<1	<1	11	<1	1	52	4	<0.3	<1	4.7	0.11	5	10.2	0.7	<50	<1	<1	<1
	90-95	7/18/2011	15.97	8.91	13.1	5.91	133	70	<1	6	<1	2	<1	<1	10	<1	1.2	45	6	<0.3	<1	4.3	0.17	7.2	9.8	0.7	<50	<1	<1	<1
MS-1 Resample	20-25	7/28/2014	15.67	5.02	12.2	5.8	60	24	<1	10	<1	<1	<5	<0.5	8	<1	0.4	26	<1	<0.2	<1	1.2	<0.1	2.6	4.2	0.9	<5	<1	1.4±0.1	<1
MS-2	20-25	7/26/2011	18.85	0.6	12.9	5.92	189	34	<1	97	22	<1	1	<1	3,990	<1	12	67	2	<0.3	<1	3.3	<0.1	8.1	15.3	8.6	<50	1.4+/-0.9	8.9+/-1.0	1.8±1
	30-35	7/26/2011	18.85	8.69	13.9	5.63	68	12	<1	16	<1	<1	<1	<1	9	<1	1.7	18	<1	<0.3	<1	1.9	<0.1	3.9	4.9	0.6	<50	<1	<1	<1
	40-45	7/26/2011	18.85	8.88	13.6	5.82	62	6	<1	13	<1	1	<1	<1	10	<1	0.7	24	<1	<0.3	<1	2	<0.1	3.6	3	0.5	<50	<1	<1	<1
	50-55	7/26/2011	18.85	8.7	13.4	5.8	91	17	<1	15	<1	1	<1	<1	6	<1	0.8	35	1	<0.3	<1	6	<0.1	5.2	5.9	0.7	<50	<1	<1	<1
	60-65	7/25/2011	18.85	9.2	13.4	6.08	134	37	<1	24	<1	1	<1	<1	7	<1	1	41	3	<0.3	<1	3.5	<0.1	5.6	7.9	0.7	<50	<1	<1	<1
	70-75	7/25/2011	18.85	8.95	13.1	6.02	161	22	<1	40	<1	<1	<1	<1	6	<1	1.2	59	2	<0.3	<1	5.7	<0.1	5.1	12.7	0.7	<50	<1	<1	<1
	80-85	7/25/2011	18.85	8.62	12.7	6.28	156	57	<1	38	<1	2	<1	<1	11	<1	1.2	63	1	<0.3	<1	5.7	<0.1	6.2	23.8	0.8	83	<1	<1	<1
	90-95	7/25/2011	18.85	8.42	12.5	6.43	120	77	<1	8	<1	2	<1	<1	9	<1	1	45	<1	<0.3	<1	4	<0.1	7.3	14.2	0.8	104	<1	<1	<1
MS-2 Resample	20-25	7/28/2014	18.54	2.08	12.3	6.4	125	21	<1	21	1.6	<1	<5	<0.5	131	<1	2.7	54	<1	<0.2	<1	1.6	0.2	7.6	9.3	3.7	36	<1	3.4±0.1	<1
MS-3	20-25	8/4/2011	19.92	0.27	14.8	7.3	656	72	<1	62	3	<1	4	<1	49,300	<1	3.3	178	3	<0.3	<1	10	<0.1	25.1	51.5	13.5	<50	4.3+/-2	14.6+/-1.7	3.5±1.7
	30-35	8/4/2011	19.92	0.93	14.8	7.49	915	82	<1	746	81	<1	6	<1	31,500	<1	26.4	229	3	1.6	<1	14	1.94	33.4	46	47.3	<50	11.2+/-2.5	49.2+/-4	10.4±4
	40-45	8/3/2011	19.92	0.29	14.7	7.5	800	7	2	468	28	6	2	<1	26,700	3	21.7	221	<1	2.7	2	12	1.07	31.1	46.7	45.7	<50	8.5+/-1.5	44.4+/-2.9	6.9±2.9
	50-55	8/3/2011	19.92	0.54	14.5	7.58	330	6	<1	154	4	2	<1	<1	3,790	3	3.8	89	<1	<0.3	<1	3.8	0.74	17.6	15	20.5	<50	<1	16.6+/-1.5	<1
	60-65	7/28/2011	19.92	2.65	15.4	7.57	184	9	<1	35	3	<1	<1	<1	6,270	1	1.5	56	<1	<0.3	<1	2.5	<0.1	18	10.1	3.2	<50	<1	2.3+/-0.6	<1
	70-75	7/28/2011	19.92	7.96	13.5	7.78	195	7	<1	28	2	<1	<1	<1	665	<1	3.2	37	<1	<0.3	<1	2.8	<0.1	25.8	6	1.2	<50	<1	1.1+/-0.6	<1
	80-85	7/27/2011	19.92	9.48	15	8.12	292	11	<1	30	<1	<1	<1	<1	7	<1	0.8	23	<1	<0.3	<1	7	<0.1	40.8	3.9	1.2	<50	<1	<1	<1
	90-95	7/27/2011	19.92	8.78	15.8	8.3	497	14	<1	35	<1	2	<1	<1	29	<1	1	45	1	<0.3	<1	3.7	<0.1	84.8	8.9	2	<50	<1	<1	<1
MS-3 Resample	20-25	7/30/2014	19.82	1.31	15.1	6.8	637	22	1.9	149	21	1.5	<5	0.9	21,082	<1	4	243	<1	0.2	<1	9.5	34	32	55	13	40	2.4±0.4	19±0.5	8.3±0.5
MS-4	30-35	6/5/2012	20.08	4.79	13.4	7.1	664	10	<1	198	20	<1	<1	1	17,500	2	5.8	246	10	<0.3	<1	9.6	9.68	32.5	61.3	9.9	<50	8.46	11.0+/-0.3	2.9±0.3
	40-45	6/5/2012	20.08	3.71	13.4	7	395	22	1	83	16	<1	<1	<1	8,050	<1	8.9	188	1	<0.3	<1	6.9	2.76	17.3	43.1	3.7	<50	2.5+/-0.3	4.6+/-0.2	1.6±0.2
	50-55	6/5/2012	20.08	3.29	13	6.8	290	17	<1	63	3	<1	<1	<1	3,030	<1	7.8	116	<1	<0.3	<1	8.8	1.56	13.4	28.1	2.2	<50	<1	2.8+/-0.2	<1
	60-65	6/5/2012	20.08	5.19	12.7	6.7	337	31	<1	56	3	2	1	<1	2,280	9	13.6	170	2	<0.3	<1	15	1.3	12.6	27.5	1.7	<50	3.1+/-0.4	3.3+/-0.2	1.9±0.2
	70-75	6/5/2012	20.08	6.92	12.3	6.4	183	32	<1	35	1	2	1	<1	220	4	6.8	78	1	<0.3	<1	6.7	0.97	6.1	14.8	0.7	<50	<1	1.9+/-0.1	1.3±0.1
	80-85	6/5/2012	20.08	7.18	12	6.2	185	55	<1	42	2	3	1	<1	374	8	9.6	78	3	<0.3	<1	6.6	1.77	5.9	14.7	0.8	<50	2.6+/-0.3	1.4+/-0.1	<1
MS-4 Resample	30-35	7/30/2014	20.16	1.75	14.9	7.4	406	31	6.8	143	11	<1	<5	0.6	12,300	1	3.6	173	<1	<0.2	<1	6.4	15	10	47	6.3	33	<1	6.9±0.2	1.7±0.2
MS-5	30-35	5/30/2012	22.31	NA	19	7.3	342	136	<1	104	4	4	4	<1	13,500	10	12.6	76	10	0.8	<1	5.7	0.54	15.5	12.6	18.5	<50	14.3+/-1	19.5+/-0.8	4.3±0.8
	40-45	5/30/2012	22.31	NA	18.2	7.1	240	188	<1	142	10	4	10	<1	7,430	2	6.9	59	12	1.1	<1	4.1	0.97	15.7	9.8	11	<50	2.2+/-0.4	11.3+/-0.3	2.3±0.3
	50-55	5/30/2012	22.31	NA	18.1	7.1	229	403	<1	106	6	17	15	<1	5,784	4	8.2	30	15	<0.3	1	3.3	1.7	19.6	5.8	15.2	<50	9.5+/-0.5	18+/-0.4	5.5±0.4
	60-65	5/30/2012	22.31	NA	NA	7	215	154	<1	51	11	7	9	<1	5,084	2	9.5	44	6	<0.3	<1	2.7	0.65	22.1	7.3	11.6	<50	4.9+/-0.4	11.7+/-0.3	2.2±0.3
	70-75	5/30/2012	22.31	NA	17.7	7	162	62	<1	27	4	2	2	<1	5,010	3	3.3	88	8	0.3	<1	3.8	1.31	5.9	11.5	1.4	<50	<1	2.5+/-0.2	1.4±0.2
	80-85	5/30/2012	22.31	NA	15.2	6.4	215	14	<1	238	31	<1	1	<1	16,300	<1	17.6	100	<1	<0.3	<1	3.4	<0.1	6	15	1	<50	2.6+/-0.3	1.5+/-0.1	<1
MS-5 Resample	30-35	7/30/2014	20	1.19	14.6	7.2	243	153	<1	57	11	2.7	<5	<0.5	11,135	<1	9.2	68	6.3	<0.2	<1	4	0.4	10	19	3.9	19	<1	3.7±0.2	<1

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppm = part per million
ppb = part per billion
uS = micro siemens
^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
pCi = picocurie
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
indicates concentration exceeds a standard or guidance value

Table 8 - Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #7, Yaphank, NY

Well Information			Standard Inorganics						VOCs (ppb)					Herb Mets (ppb)											
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Ammonia (ppm)	Total Alkalinity (mg CaCO3/L)	Perchlorate (ppb)	1,2,4-trimethylbenzene	Chloroform	Benzene	Toluene	Total Xylene	Alachlor OA	Alachlor ESA	2,6-dichlorobenzamide	Caffeine	Dichlorvos	Diethyltoluamide (DEET)	Metalaxyl	Acetaminophen	Deisopropyl-atrazine	Metolachlor	Metolachlor OA	4-Hydroxyphenytoin
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	5	7	1	5	-	-	-	-	-	-	-	-	-	-	-	50	-
DEC Part 703 Class GA Groundwater Standards			250	250	10	2	-	-	5	7	1	5	-	-	-	-	-	-	-	-	-	-	10	-	-
DOH Drinking Water Standards Subpart 5-1			250	250	10	-	-	18	5	80	5	5	5	50	50	50	50	50	50	50	50	50	50	50	50
MS-1	20-25	7/21/2011	4	12	<0.5	<0.2	NA	0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	30-35	7/21/2011	4	9	0.5	<0.2	NA	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	40-45	7/21/2011	5	9	<0.5	<0.2	NA	0.3	<0.5	0.8	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	50-55	7/20/2011	5	9	<0.5	<0.2	NA	<0.2	<0.5	0.8	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	60-65	7/20/2011	5	9	<0.5	<0.2	NA	<0.2	<0.5	0.9	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	70-75	7/18/2011	7	10	1.3	<0.2	NA	<0.2	<0.5	<0.5	<0.5	0.9	0.6	<0.4	0.2	Trace	<0.2	<0.6	Trace	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	80-85	7/18/2011	8	21	3.4	<0.2	NA	0.2	0.6	<0.5	<0.5	2.1	1.8	Trace	5.2	4.6	<0.2	<0.6	Trace	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	90-95	7/18/2011	9	22	3.2	<0.2	NA	<0.2	0.5	<0.5	<0.5	2	1.7	<0.4	0.8	3.9	<0.2	<0.6	Trace	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
MS-1 Resample	20-25	7/28/2014	5	8	1	<0.5	7	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
MS-2	20-25	7/26/2011	14	19	<0.3	0.11	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	30-35	7/26/2011	4	13	0.6	<0.02	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	40-45	7/26/2011	4	9	<0.1	<0.02	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	50-55	7/26/2011	6	15	0.6	<0.02	NA	<0.2	<0.5	1.2	<0.5	<0.5	<0.5	<0.4	Trace	Trace	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	60-65	7/25/2011	7	17	0.9	<0.02	NA	<0.2	<0.5	0.9	<0.5	<0.5	<0.5	Trace	0.4	0.6	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	70-75	7/25/2011	8	22	5.8	<0.02	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	2	3.8	5.1	<0.2	<0.6	<0.2	Trace	<0.2	<0.2	<0.2	<0.3	<0.5
	80-85	7/25/2011	9	18	7.3	<0.02	NA	0.3	<0.5	<0.5	<0.5	<0.5	<0.5	2.5	3.7	8.2	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	90-95	7/25/2011	8	8	<0.1	<0.02	NA	0.4	<0.5	0.5	<0.5	<0.5	<0.5	<0.4	<0.2	1.2	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
MS-2 Resample	20-25	7/28/2014	13	12	[illegible]	<0.5	21	NA	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	Trace	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
MS-3	20-25	8/4/2011	37	51	<2	0.39	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	Trace	<0.2	<0.2	Trace	<0.2	<0.2	<0.3	<0.5
	30-35	8/4/2011	15	18	<1.5	0.09	NA	<0.2	<0.5	<0.5	2.4	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	Trace	Trace	Trace	0.3	<0.2	<0.2	<0.3	<0.5
	40-45	8/3/2011	54	<50	<5	3.94	NA	<0.2	<0.5	<0.5	0.7	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	Trace	Trace	Trace	0.4	<0.2	<0.2	<0.3	<0.5
	50-55	8/3/2011	<60	<100	<10	3.99	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	Trace	Trace	<0.2	Trace	<0.2	<0.2	<0.3	<0.5
	60-65	7/28/2011	64	<100	<10	9.74	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	Trace	0.2	0.8	<0.2	<0.6	<0.2	0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	70-75	7/28/2011	11	19	9.6	<0.02	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	1.5	5.5	<0.2	<0.6	<0.2	0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	80-85	7/27/2011	21	25	10.4	<0.02	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1.3	8.7	Trace	<0.6	<0.2	Trace	<0.2	<0.2	<0.2	<0.3	<0.5
	90-95	7/27/2011	111	23	8.3	0.02	NA	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	1	8.8	<0.2	<0.6	<0.2	Trace	<0.2	<0.2	<0.2	<0.3	<0.5
MS-3 Resample	20-25	7/30/2014	97	63	<20	0.4	220	NA	1.2	<0.5	<0.5	<0.5	1.5	Trace	<0.2	<0.5	Trace	<0.6	Trace	<0.2	<0.2	0.2	Trace	<0.3	<0.5
MS-4	30-35	6/5/2012	66	<100	<10	0.5	220	<0.2	<0.5	<0.5	0.6	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	Trace	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	40-45	6/5/2012	24	60	<2	<0.5	107	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	Trace	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	50-55	6/5/2012	15	49	<2	<0.5	80	<0.2	<0.5	0.6	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	60-65	6/5/2012	23	55	<3	<0.5	85	<0.2	<0.5	0.6	<0.5	<0.5	<0.5	Trace	Trace	Trace	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	70-75	6/5/2012	<18	<30	6.4	<0.5	14	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	1.4	1.9	3.4	<0.2	<0.6	<0.2	Trace	<0.2	<0.2	<0.2	<0.3	<0.5
	80-85	6/5/2012	<18	<30	9	<0.5	11	0.2	<0.5	<0.5	<0.5	<0.5	<0.5	3.6	3.7	5.2	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
MS-4 Resample	30-35	7/30/2014	47	43	<10	0.3	151		<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	Trace	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	0.3	Trace
MS-5	30-35	5/30/2012	<30	<50	<5	3.51	137	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	40-45	5/30/2012	<30	<50	<5	1.27	88	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	Trace	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	50-55	5/30/2012	<60	<100	<10	1.14	70	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	<0.2	Trace	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
	60-65	5/30/2012	<30	<50	<5	0.55	63	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.4	Trace	Trace	<0.2	<0.6	<0.2	Trace	<0.2	<0.2	<0.2	<0.3	<0.5
	70-75	5/30/2012	<30	<50	<5	<0.5	39	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	1.5	2.5	<0.2	<0.6	<0.2	Trace	<0.2	<0.2	<0.2	<0.3	<0.5
	80-85	5/30/2012	11	18	12	<0.5	12	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	Trace	0.3	<0.5	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.5
MS-5 Resample	30-35	7/30/2014	17	30	<0.5	0.3	60		<0.5	<0.5	<0.5	<0.5	<0.5	Trace	0.7	Trace	<0.2	<0.6	<0.2	<0.2	<0.2	<0.2	<0.2	<0.3	Trace

Notes: NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppm = part per million
ppb = part per billion
☐ indicates concentration exceeds a standard or guidance value

Site #8
LIE North Service Rd Farm
Yaphank NY

Site Description

This site is comprised of approximately 73 acres located on the north side of the Long Island Expressway (LIE) Service Road, west of LIE Exit 66, in Yaphank. Historical aerial photographs (Appendix H) indicate that the site was undeveloped in 1947, and in 1984 approximately 29 acres of the site, located south of a high tension wire right-of-way (HTRW), was developed as farmland. In 1996, unspecified activity can be noted on approximately 11 acres located on the northern side of the HTRW, while the 29 acres to the south was still used for farming. The 1999 and 2001 photographs show that 18 acres of land north of the HTRW was used for the storage of vegetative organic waste material, and farming continued on the southern portion of the site. The 2007, 2010 and 2013 aerials indicate that while the approximately 26 acres of land north of the HTRW was used for activities concerning vegetative organic waste materials, the 29 acres south of the HTRW did not appear to be actively used, except for about 2 acres used to store vegetative material in 2013. The NYSDEC currently considers this site a Part 360 exempt facility.

SCDHS Monitoring Wells

The SCDHS installed two temporary profile monitoring wells (CF-4 and CF-5) south of this site, on the Long Island Expressway North Service Road (Figure 13). The locations of these wells were based upon a southeast regional groundwater flow direction. Several more wells were originally intended to be installed, continuing east along the LIE Service Road. However, due to a number of confounding factors, these wells were ultimately not installed. Well CF-4 was installed to a depth of 125 fbg, and Well CF-5 was installed to a depth of 135 feet. Five profile levels were sampled in well CF-4 and CF-5, with the uppermost profile level in well CF-4 screened at the 80 to 85 fbg, and the uppermost profile level in well CF-5 screened at 90 to 95 fbg. The following analytes have been detected in these monitoring wells at concentrations exceeding their respective drinking water and/or groundwater standard:

Manganese (CF-4)
Sodium (CF-5)

Table 9 contains a summary of the results of the analytes detected.

Private Wells

No potential private wells were identified in the downgradient vicinity of this site.

Figure 13– Site #8 Well Locations on 2010 Aerial Photograph

Public Wellfields

The nearest public supply wellfield is approximately 0.70 miles from the site and is not located downgradient of the site. Any impacts to groundwater quality as results of this site's operations would not be expected to affect the water quality of this wellfield.

Summary of Significant Analytical Results

Metals

The uppermost profile level of well CF-4 (screened 80 to 85 fbg) had a manganese concentration of 603 ppb, which exceeds the drinking water and groundwater standard for manganese (300 ppb). Barium and potassium concentrations were also elevated in this level (142 ppb and 10.3 ppb respectively). The deeper profile levels (screened 90 to 125 fbg) did not have any analytes exceeding standards and metal concentrations were generally within concentration ranges typically associated with unimpacted groundwater. Although the upper two profile levels of well CF-5 (screened 90 to 105 fbg) had some metals with marginally elevated concentrations, none exceeded their respective standards. The sodium concentration of 21.9 ppm was slightly in excess of the groundwater standard of 20 ppm.

Discussion

Two profile wells were installed to the south of this site, along the Long Island Expressway (LIE) North Service Road. Several more wells were originally intended to be installed, continuing east along the LIE Service Road. However, due to a number of confounding factors, these wells were ultimately not installed. Figure 13 indicates that, although the two wells installed (CF-4 and CF-5) are downgradient of the southern portion of this site, the groundwater does not represent impacts from the VOWM activity occurring at this site. As discussed above, the historical aerial photographs of the site (Appendix H) indicate that the main VOWM activity at this site was, and continues to be, located on the northern portion of the site (north of the HTRW). Based upon the groundwater flow direction, the groundwater exhibiting impacts from the VOWM landuse flows to the east of wells CF-4 and CF-5. In order to appropriately assess landuse impacts from this site, additional profile wells would need to be installed and sampled to the east of well CF-5. The source of the impacts observed in the uppermost profile levels (slightly elevated metals concentrations) could be from a berm of VOW material that is apparent on the perimeter of the site, just to the north of these wells.

Wells Impacted by VOWM Activity

The two profile wells installed at this site did not exhibit significant groundwater quality impacts attributable to the VOWM activities of this site. In order to appropriately assess impacts from past and current VOWM activities, additional profile wells would have to be installed further to the east along the LIE North Service Road. It appears that one of the profile wells was potentially impacted by VOWM materials possibly from a berm of vegetative organic waste that runs along the southern boundary of the site.

Table 9
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #8
Yaphank, NY

Well Information			Parameters					Metals												
Well ID	Screen Interval (ft)(depth below grade)	Sample Date	Depth To Water (Feet)	Dissolved Oxygen(mg/L)	Temperature (Celsius)	pH	Conductivity (uS)	Aluminum (ppb)	Barium (ppb)	Cobalt (ppb)	Chromium (ppb)	Manganese (ppb)	Molybdenum(ppb)	Nickel (ppb)	Strontium (ppb)	Titanium (ppb)	Magnesium (ppm)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	-	-	-	35	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	1,000	-	50	300	-	100	-	-	-	20	-	-
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	2,000	-	100	300	-	100	-	-	-	-	-	-
CF-4	80-85	9/14/2011	81	3.4	16	4.85	322	132	142	<1	4	603	<1	3.7	37	<1	9.1	7.8	23.4	10.3
	90-95	9/14/2011	81	5.14	16.8	5.2	200	29	66	2	2	102	<1	2.5	46	1	3.5	18	9.3	3.5
	100-105	9/14/2011	81	5.58	16.3	5.15	225	16	70	<1	2	18	<1	1.4	85	<1	4.1	18.7	10.6	3.8
	110-115	9/14/2011	81	4.58	18.4	5.33	185	30	41	<1	2	15	<1	2.3	77	1	4.1	13.8	9	3.4
	120-125	9/13/2011	81	4.6	15.6	5.53	169	<5	37	<1	<1	3	<1	0.6	77	<1	2.8	11.2	9.4	4.1
CF-5	90-95	10/4/2011	82.2	3.05	14.8	5.26	218	29	129	5	4	221	<1	2.3	64	<1	6.5	11.3	13.5	5.3
	100-105	10/3/2011	82.2	3.44	14	5.25	202	26	104	3	2	201	<1	1.6	80	<1	3.9	17.7	9.4	4.5
	110-115	10/3/2011	82.2	3.39	14	5.36	218	21	128	3	3	97	<1	1.8	98	<1	2.7	21.9	9.2	5.9
	120-125	10/3/2011	82.2	3.37	13.8	5.64	115	6	23	4	3	5	<1	1.7	46	<1	2.7	10.4	5.2	3
	130-135	9/28/2011	82.2	7.36	24.8	5.66	115	9	19	<1	6	9	1	5.8	39	<1	3.2	8.3	6	1.5

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
uS = micro siemens

ppm = part per million
ppb = part per billion
▭ indicates concentration exceeds a standard or guidance value

Table 9
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #8
Yaphank, NY

Well Information			Rads (pCi/L)			Standard Inorganics					VOCs (ppb)				Herb Mets (ppb)	
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta*	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Ammonia (ppm)	Perchlorate (ppb)	Chloroform	Tetrachloroethene	MTBE	Toluene	Caffeine	Metalaxyl
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	7	5	10	5	-	-
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^	-	250	250	10	2	-	7	5	-	5	-	-
DOH Drinking Water Standards Subpart 5-1			15	-	50**	250	250	10	-	18	80	5	10	5	50	50
CF-4	80-85	9/14/2011	<1	9.0±0.9	<1	47	25	8.6	<0.02	0.4	<0.5	<0.5	<0.5	<0.5	Trace	<0.2
	90-95	9/14/2011	<1	2.9±0.6	<1	29	18	3.6	<0.02	0.7	<0.5	<0.5	<0.5	<0.5	Trace	<0.2
	100-105	9/14/2011	NA	NA	NA	35	16	5.2	<0.02	1.1	<0.5	<0.5	1.4	<0.5	Trace	<0.2
	110-115	9/14/2011	NA	NA	NA	20	19	5.2	<0.02	0.5	<0.5	<0.5	0.8	<0.5	<0.2	Trace
	120-125	9/13/2011	NA	NA	NA	21	12	4.3	<0.02	0.3	0.8	<0.5	0.6	<0.5	<0.2	Trace
CF-5	90-95	10/4/2011	<1	6.6±0.7	2.3±0.7	24	18	8.2	<0.02	0.7	<0.5	<0.5	<0.5	0.6	<0.2	<0.2
	100-105	10/3/2011	<1	4.6±0.7	<1	29	15	5.6	0.02	1.1	<0.5	<0.5	3.1	<0.5	<0.2	<0.2
	110-115	10/3/2011	<1	8.1±0.7	3.3±0.7	30	17	6.6	<0.02	1.1	<0.5	<0.5	1.8	<0.5	<0.2	<0.2
	120-125	10/3/2011	<1	2.7±0.6	<1	11	17	2.3	<0.02	0.3	0.7	<0.5	<0.5	<0.5	<0.2	<0.2
	130-135	9/28/2011	<1	1.5±0.6	<1	12	14	2.9	<0.02	NA	1.3	0.6	1.2	<0.5	<0.2	<0.2

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie

^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
☐ indicates concentration exceeds a standard or guidance value

Site #9
Islip Town Compost Facility
Ronkonkoma NY

Site Description

This site is approximately 40 acres in size and is located on Railroad Avenue in Ronkonkoma, bordering on the northern portion of Islip's McArthur Airport, just south of the Long Island Railroad's Ronkonkoma train station. The property was developed as a yard waste composting facility in 1988[2]. Historical aerial photographs (Appendix I) show that the property was undeveloped in 1947 and 1984, indicating that the site has only ever been used as a composting facility. The historical aerial photos also show that, except for an expansion of recharge basins located at the southern portion of the site, the site's configuration has remained unchanged since being developed in the late 1980s. The facility is operated by the Town of Islip and is currently a Part 360 permitted composting, brush and leaf processing facility.

SCDHS Monitoring Wells

The SCDHS installed two temporary profile monitoring wells (ICF-1, and ICF-2) on this site, in the downgradient groundwater flow direction (Figure 14). The locations of these wells were based upon a south-southwest regional groundwater flow direction. Both of the wells were installed to a depth of 105 fbg, and sampled at 10 foot intervals as they were retracted. Six levels were sampled, with the uppermost screened at the 50 to 55 foot interval, yielding a total of 12 groundwater samples. The following analytes have been detected in the indicated monitoring wells at concentrations exceeding a drinking water and/or groundwater standard:

Manganese	**(ICF-1, ICF-2)**	**Sodium**	**(ICF-1, ICF-2)**
Thallium	**(ICF-1, ICF-2)**	**Gross Alpha**	**(ICF-1)**
Iron	**(ICF-1, ICF-2)**		

Table 10 contains a summary of the results of the analytes detected.

Private Wells

No potential private wells were identified in the downgradient vicinity of this site.

Public Wellfields

The nearest public supply wellfield is approximately 0.5 miles from the site and is not located downgradient of the site. Any impacts to groundwater quality as results of this site's operations would not be expected to affect the water quality of this wellfield.

[2] Islip Resource Recovery Agency website, http://toirra.com/mac_arthur_compost.html

Summary of Significant Analytical Results

Metals

Elevated metal concentrations were observed in both wells ICF-1 and ICF-2. The wells exhibited their highest manganese concentrations in the uppermost profile level (screened 50 to 55 fbg). Thallium, iron and sodium concentrations also exceeded drinking water and/or groundwater standards. Other metals that were also notably elevated above typical background concentrations (Table 13) include barium, strontium (well ICF-1 only) and potassium.

Radiologicals

Gross alpha concentrations were elevated in the five uppermost profile levels in well ICF-1 (screened 10 to 95 fbg). The most significant concentration was 16.8 pCi/l detected in the second profile level (screened 60 to 65 fbg), which is an exceedance of the 15 pCi/l drinking water standard. Gross alpha was detected only in the uppermost profile level of ICF-2 at 2.4 pCi/l. Gross beta was detected in all profile levels in both wells. All the concentrations were below the 1,000 pCi/l groundwater standard, and after adjusting the gross beta concentrations for potassium 40, all the concentrations were below the 50 pCi/l drinking water guidance value. The NYSDOH Wadsworth Center performed a gamma radiological analysis on all the samples. Detections of potassium 40 were reported in all the samples from well ICF-1, and three of the six samples collected in ICF-2. Detections of radium 224 and radium 226 were reported in the uppermost level of well ICF-1 (and could be contributing to the elevated gross alpha concentration of 12.4 pCi/l observed in this sample), and actinium 228 was detected in the uppermost level of ICF-2.

Other Notable Results

Two pesticides, hexazinone and dichlorvos, were detected at trace concentrations (detected below a quantifiable concentration) in well ICF-1. Hexazinone was detected in five of six sampling levels, and dichlorvos was detected in the upper two sampling levels (50-55 feet below grade and 60-65 feet below grade). Acetaminophen and caffeine were detected at trace concentrations in ICF-1, and a trace of acetaminophen was detected in the upper sampling level of ICF-2. Low concentrations of acetaminophen and caffeine are often associated with septic waste impacts.

Discussion

Each of the two profile wells installed downgradient of the compost windrows at this site had at least one parameter exceeding a drinking water and groundwater standard. The majority of these exceedances were for manganese, iron, thallium, sodium and gross alpha, which was primarily detected in the upper aquifer levels, indicating a nearby source. Impacts to groundwater quality observed from the two wells installed at this site are consistent with water quality impacts related to VOWM activities observed at other vegetative organic waste management sites.

Wells Impacted by VOWM Activity

The groundwater observed in profile wells ICF-1 and ICF-2 appeared to be impacted by this site's VOWM activities.

Figure 14– Site #9 Well Locations on 2010 Aerial Photograph

Table 10
Summary of Detected Analytes
Monitoring Wells Installed at Site #9
Ronkonkoma, NY

Well Information			Parameters					Metals																	
Well ID	Screen Interval (ft)(depth below grade)	Sample Date	Depth To Water (Feet)	Dissolved Oxygen (mg/L)	Temperature (Celsius)	pH	Conductivity (uS)	Aluminum (ppb)	Arsenic (ppb)	Barium (ppb)	Cobalt (ppb)	Chromium (ppb)	Copper (ppb)	Germanium (ppb)	Manganese (ppb)	Nickel (ppb)	Strontium (ppb)	Titanium (ppb)	Thallium (ppb)	Vanadium (ppb)	Magnesium (ppm)	Iron (ppm)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.5	-	35	-	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	25	1,000	-	50	200	-	300	100	-	-	-	-	-	0.3	20	-	-
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	10	2,000	-	100	1300***	-	300	100	-	-	2	-	-	0.3	-	-	-
ICF-1	50-55	12/20/2011	48.8	2.51	16.3	6.5	779	308	<1	237	4	2	4	<1	5,210	2.9	107	16	2	1	10	0.62	35	25	80
	60-65	12/19/2011	48.4	1.61	14.8	6.6	631	170	1	253	1	2	5	<1	1,581	2.5	92	9	1.1	<1	11	0.23	34	28	69
	70-75	12/19/2011	48.4	1.96	14.9	6.4	539	16	<1	159	<1	<1	1	<1	104	2.1	118	<1	0.8	<1	11	<0.1	32	25	37
	80-85	12/19/2011	48.4	2.1	14.2	6.6	521	16	<1	120	<1	1	2	<1	36	1.4	100	<1	<0.3	<1	9.4	<0.1	26	25	45
	90-95	12/19/2011	48.4	2.08	14.1	6.4	500	12	<1	83	<1	1	1	<1	28	1.2	100	<1	0.4	<1	9.2	<0.1	28	25	34
	100-105	12/19/2011	48.4	1.89	13.3	6.1	285	19	<1	63	<1	1	1	<1	58	0.9	121	<1	0.3	<1	5.1	<0.1	23	15	10
ICF-2	50-55	12/20/2011	46.8	2.08	15.8	6.5	304	166	3	78	6	1	2	2	8,840	2.1	33	9	1.1	<1	2.7	28	16	4.9	14
	60-65	12/19/2011	45.37	4.31	13.9	6.6	125	6	<1	13	1	<1	<1	<1	1,017	1	9	<1	0.4	<1	1	<0.1	17	2.1	5.7
	70-75	12/19/2011	45.37	5.62	14.1	6.7	119	<5	<1	6	<1	<1	<1	<1	94	0.7	6	<1	0.4	<1	0.4	<0.1	19	1.6	3.1
	80-85	12/19/2011	45.37	4.41	13.9	6.8	132	<5	<1	5	<1	<1	<1	<1	82	<0.5	4	<1	0.3	<1	0.2	<0.1	24	0.9	2.2
	90-95	12/19/2011	45.37	3.16	12.7	6.8	580	6	1	22	<1	<1	<1	<1	2,140	0.6	28	<1	0.8	<1	1.4	<0.1	84	5.7	4.8
	100-105	12/19/2011	45.37	4.41	13.3	6.4	313	8	<1	11	<1	<1	<1	<1	387	0.6	53	<1	<0.3	<1	1	<0.1	45	3.2	2.5

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppm = part per million
uS = micro siemens
ppb = part per billion
*** Action Level for Public Water Suppliers for Lead and Copper
☐ indicates concentration exceeds a standard or guidance value

Table 10
Summary of Detected Analytes
Monitoring Wells Installed at Site #9
Ronkonkoma, NY

Well Information			Radiologicals (pCi/L)												Standard Inorganics					
			SCDHS PEHL			NYSDOH Wadsworth														
Well ID	Screen Interval (ft)(depth below grade)	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta* (AGB)	Gross Alpha	Gross Beta	Ruthenium 106	Cesium 137	Zirconium 95	Potassium 40	Actinium 228	Radium 224	Radium 226	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Ammonia (ppm)	Total Alkalinity(mg CaCO3/L)	Perchlorate (ppb)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^	-	15^	1,000^^	-	-	-	-	-	-	-	250	250	10	2	-	-
DOH Drinking Water Standards Subpart 5-1			15	-	50**	15	-	-	-	-	-	-	-	5^^^	250	250	10	-	-	18
ICF-1	50-55	12/20/2011	12.4±2.6	78.3±2.6	12.8±2.6	10.3 ±3.7	87.2 ±6.7	<2.3	<0.27	<0.49	79 ±9.8	<0.95	1.8 ±0.9	1.3±1.2	128	38	<0.4	0.23	112	<0.2
	60-65	12/19/2011	16.8±2.4	68.1±1.7	11.8±1.7	8.6 ±3.1	74.2 ±5.6	<3	<0.33	<0.67	61 ±9.7	<1	NA	NA	82	28	<1.0	0.23	129	0.3
	70-75	12/19/2011	9.6±1.7	45.1±1.4	15.2±1.4	3.8 ±2	44.4 ±3.7	<2.9	<0.33	<0.62	34 ±8	<1	NA	NA	91	35	1.4	<0.02	67	0.6
	80-85	12/19/2011	7.7±1.6	56.2±1.5	19.7±1.5	<1.5	48.7 ±4	<2.4	<0.27	<0.5	50 ±6.6	<0.78	NA	NA	62	41	1.9	<0.02	92	0.3
	90-95	12/19/2011	7.0±1.4	43.4±1.4	15.3±1.4	1.6 ±1.6	42 ±3.6	<2.7	<0.33	<0.65	44 ±7.8	<0.96	NA	NA	67	41	2.4	<0.02	73	0.4
	100-105	12/19/2011	1.8±1.1	12.0±1.0	3.6±1	1 ±0.9	11.2 ±1.4	<2.9	<0.3	<0.69	13 ±4.1	<0.99	NA	NA	45	24	2.9	<0.02	24	0.6
ICF-2	50-55	12/20/2011	2.4±0.6	18.1±0.8	6.5±0.8	<0.95	15.1 ±1.7	<2.9	<0.32	<1.2	14 ±3.5	2 ±1.1	NA	NA	<150	<250	<25	1.14	75	<0.2
	60-65	12/19/2011	<1	4.8±0.2	<1	<0.49	4.7 ±1	<2.8	<0.34	<0.88	7.5 ±2.5	<0.96	NA	NA	17	<5	1.1	<0.02	24	<0.2
	70-75	12/19/2011	<1	2.2±0.1	<1	<0.43	3 ±0.9	<2.6	<0.3	<0.82	<2.4	<0.9	NA	NA	18	5	1.1	<0.02	17	<0.2
	80-85	12/19/2011	<1	1.5±0.1	<1	<0.49	1.3 ±0.9	<3	<0.32	<0.86	3.1 ±2.1	<0.93	NA	NA	21	6	1.5	<0.02	17	0.7
	90-95	12/19/2011	<1	2.6±0.2	<1	<0.83	2.9 ±1	<2.9	<0.32	<0.83	<2.6	<1.1	NA	NA	166	<10	<1.9	<0.02	17	0.4
	100-105	12/19/2011	<1	1.9±0.1	<1	<0.39	1.5 ±0.7	<2.9	<0.31	<0.92	<2.3	<0.91	NA	NA	82	6	1.1	<0.02	7	<0.2

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie

^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
^^^ = MCL is for combined Radium 226 + Radium 228
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
☐ indicates concentration exceeds a standard or guidance value

Table 10
Summary of Detected Analytes
Monitoring Wells Installed at Site #9
Ronkonkoma, NY

Well Information			Semi-Volatile	Herb Mets (ppb)		
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Hexazinone (ppb)	Acetaminophen	Caffeine	Dichlorvos
DEC TOGS 1.1.1 Guidance Values			50	-	-	-
DEC Part 703 Class GA Groundwater Standards			50	-	-	-
DOH Drinking Water Standards Subpart 5-1			50	50	50	50
ICF-1	50-55	12/20/2011	<1	<0.2	<0.2	Trace
	60-65	12/19/2011	Trace	<0.2	<0.2	Trace
	70-75	12/19/2011	Trace	<0.2	<0.2	<0.6
	80-85	12/19/2011	Trace	Trace	Trace	<0.6
	90-95	12/19/2011	Trace	<0.2	<0.2	<0.6
	100-105	12/19/2011	Trace	<0.2	<0.2	<0.6
ICF-2	50-55	12/20/2011	<1	Trace	<0.2	<0.6
	60-65	12/19/2011	<1	<0.2	<0.2	<0.6
	70-75	12/19/2011	<1	<0.2	<0.2	<0.6
	80-85	12/19/2011	<1	<0.2	<0.2	<0.6
	90-95	12/19/2011	<1	<0.2	<0.2	<0.6
	100-105	12/19/2011	<1	<0.2	<0.2	<0.6

Notes: NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million

☐ indicates concentration exceeds a standard or guidance value

Site #10
Conklin Street
Farmingdale NY

Site Description

This site is located in Farmingdale, east of Route 110, bordered on the north by the long Island Railroad tracks, and on the south by Conklin Street. The "Study Area" for this site consists of approximately 11 acres, comprised of three individual tax parcels (two complete tax parcels on the western side of the Study Area, and approximately 2.5 acres of the west side of a larger 20 acre tax parcel, see Figure 15). Historical aerial photographs (Appendix J) indicate that all three properties were industrially developed in 1947. The property contained within the northwestern portion of the study area first indicates the possible storage of materials (e.g., sand, gravel and/or vegetative organic waste) in the 1999 photo, and a similar use is consistent through the 2007 photograph. The 2010 and 2013 photos do not indicate the storage of materials on the site. The photographic record indicates that the southern parcel was never used for material storage, and the first indication of material storage on the 2.5 acre portion of the larger eastern parcel is in the 2010 photograph. This use is consistent in the 2013 aerial photograph. The NYSDEC currently classifies this site as an exempt Part 360 facility that processes land clearing debris.

SCDHS Monitoring Wells

The SCDHS installed three temporary profile monitoring wells (CS-1, CS-2 and CS-3) south of the site, on Conklin Street. The locations of these wells were based upon a predominantly southern regional groundwater flow direction. Well CS-1 was installed to a depth of 115 fbg, while well CS-2 and CS-3 were both installed to 95 fbg. All three wells were sampled at 10 foot intervals as they were retracted. The uppermost level sampled on all three wells was the 30 to 35 fbg interval, yielding nine samples for well CS-1, six samples in well CS-2 and seven samples in well CS-3. The following analytes have been detected in these monitoring wells at concentrations exceeding their respective drinking water and/or groundwater standard:

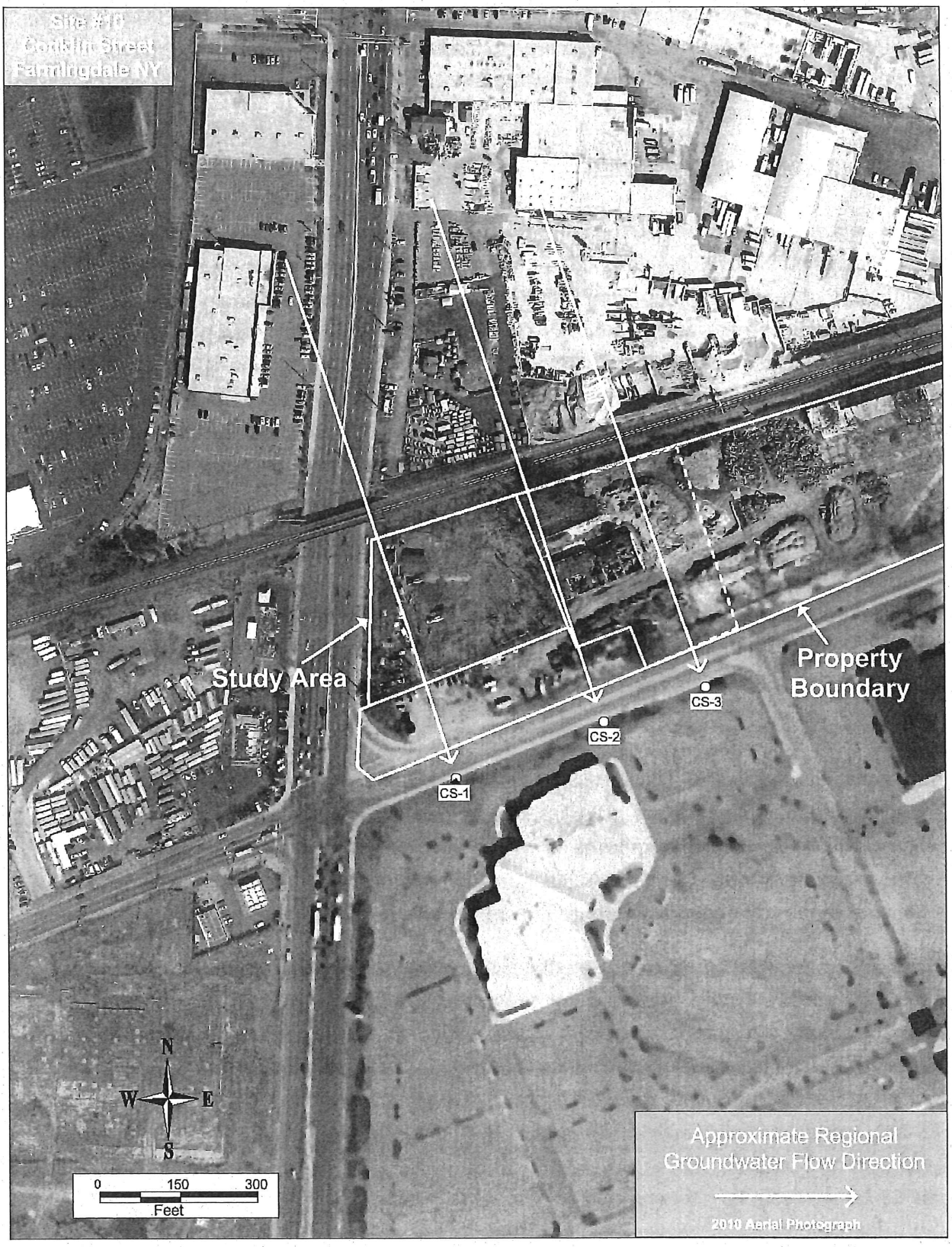
Manganese (CS-1, CS-3) **Sodium (CS-1, CS-2, CS-3)**
Iron (CS-2, CS-3)

Table 11 contains a summary of the results of the analytes detected.

Private Wells

No potential private wells were identified in the downgradient vicinity of this site.

Figure 15– Site #10 Well Locations on 2010 Aerial Photograph



Public Wellfields

The nearest public supply wellfield is approximately 4 miles from the site and is located in the general downgradient direction of the site. However, due to the distance from the site, source water assessments indicate that water entering the water table at this site is not expected to reach the wellfield for approximately 100 years.

Summary of Significant Analytical Results

Metals

Manganese concentrations exceeded the drinking water and groundwater standard of 300 ppb in the top profile level (screened 30 to 35 fbg) in well CS-1 (396 ppb), and all seven profile levels of well CS-3 (maximum 2,645 ppb at 80 to 85 fbg). Iron exceeded the drinking water and groundwater standard of 0.3 ppm in the uppermost profile level (screened 30 to 35 fbg) of well CS-2 (21.9 ppm) and in the 50 to 55 fbg screened level of well CS-3 (0.55 ppm). Sodium concentrations exceeded groundwater standards in five of nine profile levels in CS-1, two of five profile levels in CS-2 and six of seven profile levels in CS-3. Thallium was detected in the top profile levels in CS-3, screened from 30 to 65 fbg. Barium, strontium and potassium concentrations were notably elevated in the upper two profile levels of CS-3.

Other Notable Results

Two volatile organic compounds (VOCs), trichloroethene and tetrachloroethene, were detected at low concentrations (maximum of 2.4 ppb) in six profile levels of well CS-1 (from 50 to 115 fbg). The VOC chlorobenzene was detected at less than one ppb in two levels of profile well CS-3 (from 40 to 55 fbg). Low concentrations of bisphenol A, DEET and gemfibrozil were detected in CS-3, and a detection of bisphenol A was reported in well CS-1.

Discussion

The water quality data of well CS-3, in particular the elevated metals concentrations of barium, manganese, strontium and potassium, as well as the presence of cadmium, cobalt and thallium in the upper most profile levels, appear to indicate an impact consistent with VOWM related activity. The metals concentrations of wells CS-1 and CS-2 do not appear to be elevated, and in general are closer to metals concentrations more typical of Suffolk County groundwater (see Table 13).

Figure 15 indicates the location of wells CS-1, CS-2 and CS-3 and the regional groundwater flow direction with respect to each of the wells. According to the regional groundwater flow, CS-3 is ideally situated to observe landuse impacts to groundwater from VOWM activities occurring at the 2.5 acre portion of the larger eastern parcel. The water quality data did indicate that the metals concentrations were elevated in the upper profile levels of this well, and were similar to impacts observed at other VOWM sites. Wells CS-1 and CS-2 do not appear to be located downgradient of current VOWM activity. The historic aerial photographic record indicates that VOWM activity on the western portion of the study area upgradient of CS-1, and CS-2 lasted only for a short period of time, and had ceased by 2010. Since these wells are

located approximately 450 feet from the northern portion of the site, and considering an average groundwater flow velocity of 300 feet/year, it would take approximately 1.5 years from the removal of the source for all the impacted groundwater to pass south of monitoring wells. Since the VOWM source appears to have been removed on the properties upgradient of CS-1 and CS-2 in 2010, and the wells were sampled in 2012, it is possible that groundwater impacted from this site has travelled past the monitoring wells. This may explain the lack of apparent VOWM related impacts on the groundwater quality observed in these two wells.

Wells Impacted by VOWM Activity

One of three profile wells installed (CS-3) appears to have been impacted by this site.

Table 11
Summary of Detected Analytes
Monitoring Wells Installed at Site #10
Farmingdale, NY

Well Information			Parameters						Metals																	
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Depth To Water (Feet)	Turbidity (NTU)	Dissolved Oxygen(mg /L)	Temperature (Celsius)	pH	Conductivity (uS)	Aluminum (ppb)	Barium (ppb)	Cadmium (ppb)	Cobalt (ppb)	Chromium (ppb)	Copper (ppb)	Germanium (ppb)	Manganese (ppb)	Nickel (ppb)	Strontium (ppb)	Titanium (ppb)	Thallium (ppb)	Zinc (ppb)	Magnesium (ppm)	Iron (ppm)	Sodium (ppm)	Calcium (ppm)	Potassium (ppm)
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	0.5	2,000	35	-	-	-	-
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	-	1,000	5	-	50	200	-	300	100	-	-	-	5,000	-	0.3	20	-	-
DOH Drinking Water Standards Subpart 5-1			-	-	-	-	-	-	-	2,000	5	-	100	1300***	-	300	100	-	-	2	5,000	-	0.3	-	-	-
CS-1	30-35	5/16/2012	24.32	-	5.37	17.1	6.7	520	162	58	<1	<1	1	<1	<1	396	2	150	6	<0.3	<50	4.9	<0.1	51.2	27.7	5.4
	40-45	5/16/2012	24.32	-	5.68	17.1	6.6	264	153	40	<1	<1	1	<1	<1	2	1	80	8	<0.3	<50	3.2	<0.1	23.2	15.5	2.6
	50-55	5/16/2012	24.32	-	4.58	17.1	6.5	235	57	39	<1	<1	<1	<1	<1	<1	0.6	58	2	<0.3	<50	2.7	<0.1	22.5	11.2	2.8
	60-65	5/15/2012	24.32	-	1.81	16.9	6.3	231	55	39	<1	<1	2	<1	<1	2	1.1	61	2	<0.3	<50	3.2	<0.1	20.3	11.8	2.8
	70-75	5/15/2012	24.32	-	3.71	16.7	6.2	284	25	57	<1	<1	1	<1	<1	1	0.8	71	1	<0.3	<50	4.1	<0.1	24.7	14.4	3.4
	80-85	5/15/2012	24.32	-	3.41	16.9	6.1	190	84	39	<1	<1	1	<1	<1	5	1.1	58	3	<0.3	<50	3.7	<0.1	12.3	12.4	2.4
	90-95	5/14/2012	24.32	-	3.14	16.5	5.9	171	66	37	<1	<1	<1	<1	<1	8	1.2	63	2	<0.3	<50	3.2	<0.1	11.4	10.8	2.5
	100-105	5/14/2012	24.32	-	2.19	16.9	5.9	168	135	37	<1	<1	<1	<1	<1	15	2	59	5	<0.3	<50	3.1	<0.1	10.8	10.6	2.3
	110-115	5/14/2012	24.32	-	3.21	16.1	5.9	175	31	40	<1	<1	<1	<1	<1	6	1	58	<1	<0.3	<50	3.1	<0.1	11.7	10.7	2.5
CS-2	30-35	1/9/2013	27.65	21.7	2.93	17.5	6.17	259	186	35	<1	<1	2	1	<1	10	1.3	88	8	<0.3	<50	6	21.9	36.8	31.6	3.4
	40-45	1/9/2013	27.65	20.2	3.75	17	6.07	230	78	35	<1	<1	1	1	<1	4	1.1	70	4	<0.3	<50	3.2	<0.1	20	17.5	3.2
	50-55	1/9/2013	27.65	2.3	3.31	16.7	6	234	8	39	<1	<1	<1	1	<1	2	0.6	74	<1	<0.3	<50	4.6	0.18	10.6	10.7	1.5
	60-65	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	70-75	7/11/2012	26.69	1.69	1.64	18	6.1	267	<5	40	<1	<1	<1	<1	<1	1	0.7	80	<1	<0.3	<50	3.6	<0.1	19.3	17.7	3
	80-85	7/11/2012	26.69	8.87	1.74	17.6	6.1	286	8	46	<1	<1	<1	<1	<1	2	0.8	80	<1	<0.3	<50	3.9	<0.1	21.6	18	3.1
	90-95	7/11/2012	26.69	6.1	1.28	17.7	6	265	<3	40	<1	<1	<1	<1	<1	22	1.1	76	<1	<0.3	<50	3.8	<0.1	19.6	16	3.1
CS-3	30-35	1/9/2013	29	14	0.17	20.2	6.8	385	NR	126	3	2	1	2	NR	1,438	1.8	276	NR	0.5	NR	5.5	0.24	19.1	39.1	12.3
	40-45	1/9/2013	29	1.07	0.18	20.1	6.42	439	16	89	<1	1	1	2	1	905	1.3	267	11	0.5	<50	4.9	<0.1	38.1	35.6	7.7
	50-55	1/9/2013	29	1.1	0.21	19.2	6.54	301	NR	77	<1	5	1	1	NR	432	1.5	105	NR	0.3	NR	3.7	0.55	30.3	21.2	3.7
	60-65	1/8/2013	29	1.7	0.12	19.2	6.6	299	43	56	<1	3	<1	2	<1	653	1.7	87	<1	0.4	53	3.8	<0.1	29.3	20	4.1
	70-75	1/8/2013	29	0.9	0.13	18.9	6.3	300	12	91	<1	5	<1	2	<1	1,889	1.4	71	<1	<0.3	<50	3.8	<0.1	29.8	18	4.3
	80-85	1/8/2013	29	2.3	0.1	18.1	6.4	317	101	96	<1	4	1	2	<1	2,645	1.4	68	2	<0.3	<50	3.7	0.15	31.9	16.9	4.4
	90-95	1/8/2013	29	2.7	0.15	17.5	6.5	256	64	31	<1	3	<1	2	<1	605	1.4	58	2	<0.3	<50	3.2	0.13	28.5	12	2.8

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppm = part per million
uS = micro siemens
ppb = part per billion
*** Action Level for Public Water Suppliers for Lead and Copper
Indicates concentration exceeds a standard or guidance value

Table 11
Summary of Detected Analytes
Monitoring Wells Installed at Site #10
Farmingdale, NY

Well Information			Radiologicals (pCi/L)											
			SCDHS PEHL			NYSDOH Wadsworth								
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta*(AGB)	Gross Alpha	Gross Beta	Ruthenium 106	Cesium 137	Zirconium 95	Potassium 40	Actinium 228	Radium 224	Radium 226
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	-	-	-	-	-	-	3
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^	-	15^	1,000^^	-	-	-	-	-	-	-
DOH Drinking Water Standards Subpart 5-1			15	-	50**	15	-	-	-	-	-	-	-	5^^^
CS-1	30-35	5/16/2012	1.2 ±0.4	5.9 ±0.2	1.5±0.2	<0.9	4.3 ±1.3	<2.4	<0.24	<0.71	5.6 ±2.8	NA	NA	NA
	40-45	5/16/2012	<1	2.6 ±0.2	<1	NA	NA	NA	NA	NA	NA	NA	NA	NA
	50-55	5/16/2012	<1	2.1 ±0.1	<1	0.6 ±0.6	2.5 ±0.7	<2.9	<0.29	<0.9	<0.3	NA	NA	NA
	60-65	5/15/2012	<1	2.0 ±0.1	<1	1 ±0.8	2.6 ±0.8	<2.6	<0.25	<0.85	2.3 ±1.3	NA	NA	NA
	70-75	5/15/2012	<1	2.5 ±0.1	<1	<0.8	2.6 ±0.8	<3	<0.33	<0.97	2.9 ±1.3	NA	NA	NA
	80-85	5/15/2012	1.1 ±0.2	2.8 ±0.1	<1	<0.6	2.6 ±0.8	<3	<0.32	<0.99	3.3 ±3.1	NA	NA	NA
	90-95	5/14/2012	1.6 ±0.3	2.8 ±0.1	<1	0.8 ±0.6	2.3 ±0.7	<3	<0.33	<0.94	2.2 ±0.9	NA	NA	NA
	100-105	5/14/2012	4.9 ±0.5	7.2 ±0.2	5.3±0.2	5.8 ±1.4	6.6 ±1	<3.1	<0.31	<0.89	7.6 ±4.1	2.4 ±1.57	1.3 ±0.9	NA
	110-115	5/14/2012	<1	3.8 ±0.2	1.8±0.2	<3.6	1.9 ±0.8	<2.6	<0.25	<0.72	2 ±1.3	NA	NA	NA
CS-2	30-35	1/9/2013	<1	2.7±0.1	<1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	40.45	1/9/2013	<1	2.8±0.1	<1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	50-55	1/9/2013	<1	2.8±0.1	1.6±0.1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	60-65	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	70-75	7/11/2012	<1	3.5 ±0.2	1±0.2	NS	NS	NS	NS	NS	NS	NS	NS	NS
	80-85	7/11/2012	<1	3.6 ±0.2	1.1±0.2	NS	NS	NS	NS	NS	NS	NS	NS	NS
	90-95	7/11/2012	2.0 ±0.4	3.6 ±0.2	1.1±0.2	NS	NS	NS	NS	NS	NS	NS	NS	NS
CS-3	30-35	1/9/2013	2.6 ±0.2	11.2 ±0.3	1.1±0.3	NS	NS	NS	NS	NS	NS	NS	NS	NS
	40.45	1/9/2013	<1	6 ±0.2	<1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	50-55	1/9/2013	<1	2.9 ±0.1	<1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	60-65	1/8/2013	1.3 ±0.2	3.2 ±0.1	<1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	70-75	1/8/2013	<1	3.5 ±0.2	<1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	80-85	1/8/2013	<1	3.5 ±0.2	<1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	90-95	1/8/2013	<1	2.5 ±0.1	<1	NS	NS	NS	NS	NS	NS	NS	NS	NS

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie

^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
^^^ = MCL is for combined Radium 226 + Radium 228
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
☐ indicates concentration exceeds a standard or guidance value

Table 11
Summary of Detected Analytes
Monitoring Wells Installed at Site #10
Farmingdale, NY

Well Information			Standard Inorganics					VOCs			Herb Mets (ppb)		
Well ID	Screen Interval (ft) (depth below grade)	Sample Date	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Total Alkalinity (mg CaCO3/L)	Perchlorate (ppb)	Trichloroethene (ppb)	Chlorobenzene (ppb)	Tetrachloroethene (ppb)	Bisphenol A	Diethyltoluamide (DEET)	Gemfibrozil
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	5	5	5	-	-	-
DEC Part 703 Class GA Groundwater Standards			250	250	10	-	-	5	5	5	-	-	-
DOH Drinking Water Standards Subpart 5-1			250	250	10	-	18	5	5	5	50	50	50
CS-1	30-35	5/16/2012	100	<20	<2.0	59	<0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
	40-45	5/16/2012	42	14	1	30	0.2	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
	50-55	5/16/2012	37	15	1.7	18	0.5	1.1	<0.5	0.5	<0.2	<0.2	<0.4
	60-65	5/15/2012	35	17	2	16	0.4	1.5	<0.5	0.6	<0.2	<0.2	<0.4
	70-75	5/15/2012	52	19	2.1	9	0.4	1.9	<0.5	0.9	<0.2	<0.2	<0.4
	80-85	5/15/2012	23	20	2.3	12	0.4	2.4	<0.5	1.1	<0.2	<0.2	<0.4
	90-95	5/14/2012	19	23	2.3	4	0.3	2	<0.5	1.1	<0.2	<0.2	<0.4
	100-105	5/14/2012	20	25	2.3	6	0.4	2.4	<0.5	1.2	<0.2	<0.2	<0.4
	110-115	5/14/2012	19	23	2.3	3	0.4	2.4	<0.5	1.2	0.2	<0.2	<0.4
CS-2	30-35	1/9/2013	40	14	1.8	NA	NA	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
	40.45	1/9/2013	33	16	2.4	NA	NA	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
	50-55	1/9/2013	32	18	2.7	NA	NA	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
	60-65	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	70-75	7/11/2012	38	18	2.9	NR	NA	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
	80-85	7/11/2012	44	20	3.1	NR	NA	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
	90-95	7/11/2012	43	18	2.9	NR	NA	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
CS-3	30-35	1/9/2013	25	22	<2	NA	NA	<0.5	<0.5	<0.5	Trace	<0.2	<0.4
	40.45	1/9/2013	54	21	<1	NA	NA	<0.5	0.9	<0.5	0.5	<0.2	<0.4
	50-55	1/9/2013	49	16	<0.5	NA	NA	<0.5	0.7	<0.5	<0.2	<0.2	<0.4
	60-65	1/8/2013	49	17	2.2	NA	NA	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
	70-75	1/8/2013	49	16	2.8	NA	NA	<0.5	<0.5	<0.5	<0.2	Trace	Trace
	80-85	1/8/2013	53	15	2.3	NA	NA	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4
	90-95	1/8/2013	47	16	<0.5	NA	NA	<0.5	<0.5	<0.5	<0.2	<0.2	<0.4

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million

☐ indicates concentration exceeds a standard or guidance value

Site #11
Peconic Avenue
Medford NY

Site Description

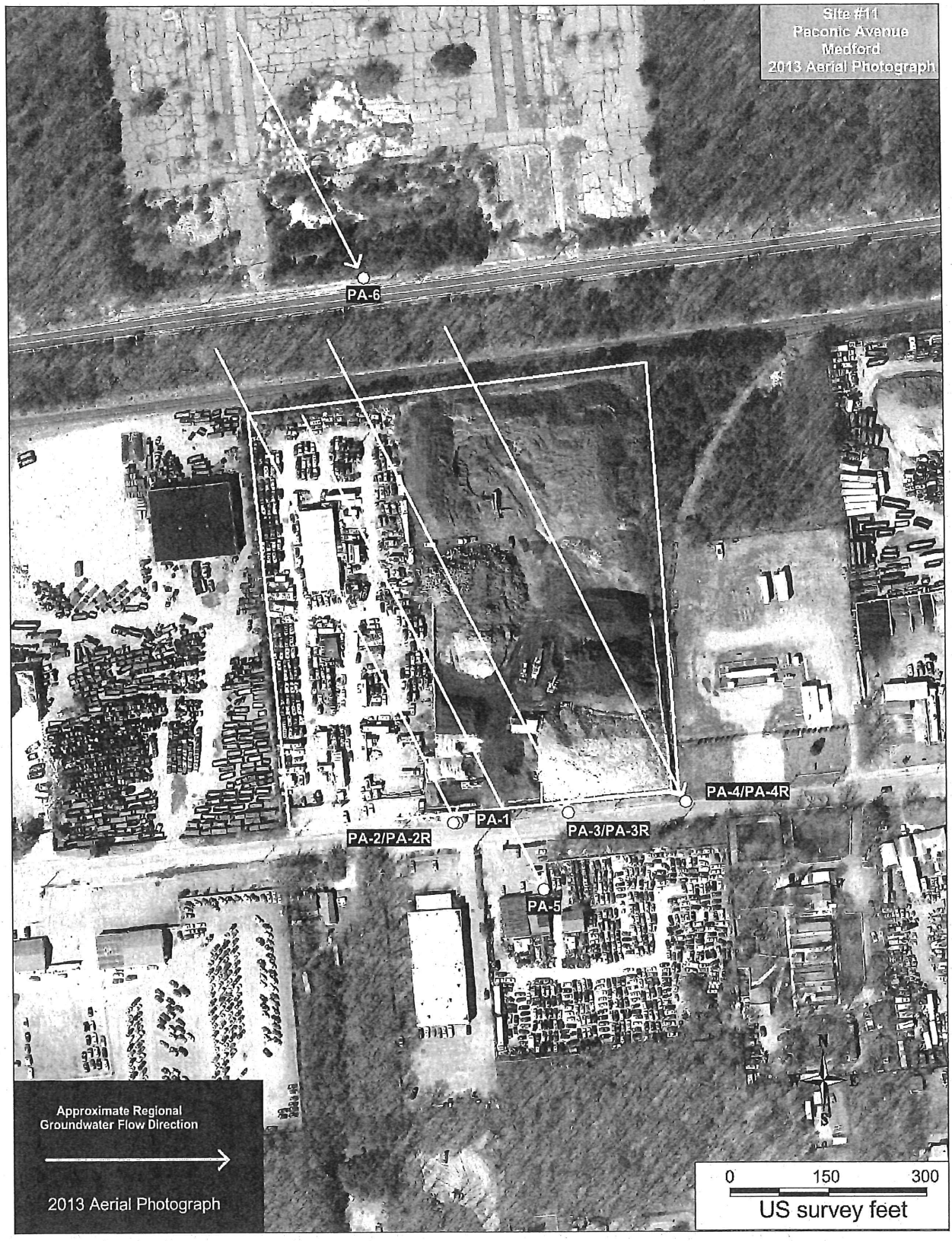
The 139 Peconic Avenue site consists of nine acres located on the north side of Peconic Avenue, south of LIRR tracks, in Medford. Historical aerial photographs of the site (Appendix K) indicate the site was undeveloped in 1947, and was developed in 1962 with a structure located on the western side of the property. The aerial photographic record indicates that from 1984 through 1999 the site was primarily used for the storage of motor vehicles. From 2001 through 2007 the photographs show that approximately three acres of the eastern portion of the site was used for a sand/gravel operation, while the western six acres contained stored motor vehicles. The 2010 photograph shows an expansion of the eastern sand/gravel use from three acres to five acres, and this photograph is the first to indicate that small amount of darker material, potentially vegetative in nature, is present on the site. Figure 16 shows the profile well locations and groundwater flow directions on the 2007 aerial photograph, prior to the importing of significant vegetative organic waste material onto the site. Figure 17 shows the wells on the 2013 aerial photograph relative to the vegetative organic waste material stored on the site at that time. The 2013 photograph indicates approximately two acres of vegetative organic waste material is stored on the site, and the 2014 photograph (Appendix K) shows that the vegetative organic waste material is no longer present on the site. Records indicate the site was historically used as an auto wrecking yard and a scrap metal yard.

SCDHS Monitoring Wells

Permanent monitoring wells were installed in nine locations, with well PA-6 installed as an upgradient well (Figure 16). Due to a decrease in water table elevation after the 2010 sampling event, three of the original six wells (PA-2, PA-3 and PA-4) were re-drilled and set with 10 foot well screens (the originals had five foot screens) at the top of the water table. This was done to accommodate future water table fluctuations and ensure there would be enough water in the wells for sampling. The re-drilled wells were designated PA-2R, PA-3R and PA-4R. The wells were sampled in 2010, 2013 and 2014. Wells PA-2R, PA-3R and PA-4R were sampled twice in 2014 (June and October), and PA-6 was sampled twice in both 2013 and 2014 (June/November, and June/October, respectively).

Figure 16– Site #11 Well Locations on 2007 Aerial Photograph

Figure 17– Site #11 Well *Locations on 2013 Aerial Photograph*



The following analytes have been detected in these wells exceeding a drinking water and/or groundwater standard:

Arsenic	**(PA-3R, PA-4R, PA-5)**	**Gross Alpha**	**(PA-3R, PA-4R)**
Manganese	**(PA-3R, PA-4R, PA-5)**	**Sulfate**	**(PA-3)**
Lead	**(PA-3R, PA-4R, PA-5)**	**Nitrate**	**(PA-3)**
Thallium	**(PA-2R, PA-3R, PA-4R)**	**Sodium**	**(PA-1, PA-2R, PA-3R, PA-4R, PA-5, PA-6)**
Iron	**(PA-1, PA-2R, PA-3R, PA-4R, PA-5, PA-6)**		

Table 12 contains a summary of the results of the analytes detected.

Private Wells

No potential private wells were identified in the downgradient vicinity of this site.

Public Wellfields

The nearest public supply wellfield is approximately 1 mile from the site. Source water assessments indicate that the site is approximately 500 feet east of the source water contributing area for this wellfield, therefore, as long as there are no significant increases to water pumpage from this wellfield, impacts to groundwater quality as results of this site's operations would not be expected to affect the water quality of this wellfield.

Summary of Significant Analytical Results

2010 Sample Event

Metals

The five wells located downgradient of the site (PA-1, PA-2, PA-3, PA-4, PA-5) did not exceed groundwater and/or drinking water standards for metals in 2010, with the exception sodium, which exceeded the groundwater standard of 20 mg/l in all five wells (maximum concentration of 236 mg/l in well PA-3). Although they did not exceed any standards, in general, the barium and strontium concentrations were elevated above typical Suffolk County groundwater concentrations (see Table 13 for typical Suffolk County metals concentrations). The metals concentrations in the upgradient well, PA-6, met all standards with the exception of iron, which had a concentration of 0.6 mg/l, exceeding the groundwater and drinking water standard of 0.3 mg/l.

Radionuclides

Radiological samples were not collected in the 2010 sampling event.

2013 Sample Event

Metals

All six wells were sampled in 2013, and the upgradient well, PA-6, was sampled twice, both in June and November 2013. Iron and sodium concentrations exceeded groundwater and/or drinking water standards in all 4 downgradient wells sampled (PA-2R, PA-3R, PA-4R and PA-5), and only iron exceeded standards in the November 2013 sampling event in well (PA-6). Thallium concentrations exceeded groundwater standards in wells PA-2R, PA-3R and PA-4R. Arsenic, manganese and lead exceeded groundwater and/or drinking water standards in PA-3R, PA-4R and PA-5. It should be noted that there were a number of metals that exhibited significant increases in concentrations when compared to the 2010 sampling event, including aluminum, arsenic, manganese, lead, thallium and iron.

Radionuclides

Sampling for radionuclides (gross alpha, gross beta and tritium) were collected in five of the six wells in 2013 (no radiological sample was collected in PA-5 due to a low water level in the well). The drinking water standard of 15 pCi/l for gross alpha was exceeded in wells PA-3R and PA-4R (20.3 pCi/l and 18.1 pCi/l, respectively). There were no exceedances of either the groundwater or drinking water standards for gross beta.

2014 Sample Event

Metals

All six wells were sampled in June of 2014, and four of the wells (PA-2R, PA-3R, PA-5 and PA-6) were also sampled in October of 2014. All six wells exceeded the drinking water and/or groundwater standard for both iron and sodium in at least one of the 2014 sampling events. PA-3R, PA-4R and PA-5 exceeded the groundwater and drinking water standard for manganese (300 ppb) in at least one of the 2014 sampling events. Thallium exceeded the groundwater standard of 0.5 ppb in well PA-2R, and the drinking water standard of 2.0 ppb in well PA-4R in both the June and October sampling events. PA-3R and PA-4R also exceeded the drinking water and/or groundwater standard for arsenic in one or both 2014 Sampling events.

Radionuclides

All six wells were sampled for radionuclides in 2014 and detection of gross alpha was noted in five of the six wells (no gross alpha detection in PA-6). Although none of the detected concentration exceeded the 15 pCi/l drinking water standard (the highest concentration was exhibited in PA-4R at 14.2 pCi/l), the concentrations were above what is typically observed in Suffolk County groundwater (Table 16). Gross

beta was detected in all six wells, however concentrations were below both the drinking water and groundwater standard (50 pCi/l and 1,000 pCi/l respectively).

Other Notable Results – All Sampling Events

In 2010, well PA-3 exhibited sulfate (374 mg/l) and nitrate (16 mg/l) concentrations in exceedance of the drinking water and groundwater standards of 250 mg/l and 10 mg/l respectively. Also, low concentrations and traces of pharmaceuticals and personal care products typically associated with groundwater impacted by septic waste (e.g., MBAS (indicating the presence of detergents), caffeine, DEET, Dilantin) were detected in a number of wells, primarily in the 2013 and 2014 sampling events.

Discussion

The 139 Peconic Avenue site is unique among the sites evaluated in this study because wells were installed and sampled prior to VOWM activities occurring on the site. This "background" sampling event (relative to VOWM activities) that occurred in 2010 indicates generally unimpacted water quality with respect to metal concentrations. This may be somewhat unexpected, considering the historical use of the site as an auto wrecking and scrap metal yard. A general increase in metal concentrations is observed in samples collected in 2013 and 2014 in the downgradient wells, particularly in wells PA-3, PA-4 and PA-5, which are located downgradient of more vegetative organic waste material with respect to groundwater flow direction than PA-1 and PA-2 (Figure 16). The increase in metal concentrations in the groundwater observed downgradient of this site, as well as the timing of the increases, implicates the VOWM activity as a cause for the degraded water quality, most notably for arsenic, manganese, lead and thallium.

Wells Impacted by VOWM Activity

Three of the five downgradient profile wells appeared to have been impacted by the VOWM activities occurring at this site.

Table 12
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #11, Medford, NY

Well Information			Parameters				Metals																														
Well ID	Screen Interval	Sample Date	pH	D.O.	Temp	Conductivity (uS)	Lithium (ppb)	Beryllium (ppb)	Aluminum (ppb)	Antimony (ppb)	Arsenic (ppb)	Titanium (ppb)	Barium (ppb)	Cadmium (ppb)	Chromium (ppb)	Cobalt (ppb)	Copper (ppb)	Manganese (ppb)	Germanium (ppb)	Nickel (ppb)	Lead (ppb)	Molybdenum (ppb)	Selenium (ppb)	Strontium (ppb)	Thallium (ppb)	Thorium (ppb)	Tin (ppb)	Vanadium (ppb)	Uranium (ppb)	Zinc (ppb)	Calcium (ppm)	Iron (ppm)	Magnesium (ppm)	Potassium (ppm)	Sodium (ppm)		
DEC TOGS 1.1.1 Guidance Values			-	-	-	-	-	3	-	3	-	-	-	5	-	-	-	-	-	-	-	-	10	-	0.5	-	-	-	-	2,000	-	-	35	-	20		
DEC Part 703 Class GA Groundwater Standards			-	-	-	-	-	-	-	3	25	-	1,000	5	50	-	200	300	-	100	25	-	10	-	-	-	-	-	-	-	-	0.3	-	-	20		
DOH Drinking Water Standards Part 5-1			-	-	-	-	-	4	-	6	10	-	2,000	5	100	-	1,300***	300	-	100	15***	-	50	-	2	-	-	-	-	5,000	-	0.3	-	-	-		
PA-1	40-45	5/4/2010	-	3.77	15	940	NA	<0.3	61	<0.1	2	4	154	<1	2	<1	2	10	<1	3.6	<1	<1	<4	338	<0.3	<4	NA	<1	<5	<50	74.4	<0.1	6.8	9.7	103		
PA-1	40-45	6/4/2013	6.3	3.8	15.4	308	NA	<0.5	9	<0.4	<1	<1	33	<1	<1	<1	1	1	<1	0.5	<1	<1	<4	135	<0.3	<4	NA	<1	<1	<50	30.7	<0.1	3.4	4.9	19.2		
PA-1	40-45	6/11/2014	6.9	NA	NA	704	<1	<0.2	400	0.4	<1	19	148	<1	1	<1	8	24	0.5	2.1	2	<1	<1	292	0.3	<2	1.3	1	<0.5	21	68	0.8	10.9	26.1	44.7		
PA-2	35-45	5/4/2010	-	4.79	17.3	664	-	<0.3	45	0.4	<4	3	98	<1	3	<1	3	15	<1	3.5	<1	<1	<1	250	<0.3	<4	-	<1	<1	<50	64.8	0.12	4.6	7	60.6		
PA-2R	39-49	11/21/2013	6.8	3.4	12.7	577	2	0.3	3,008	2.1	4	147	268	<1	6	2	10	116	<0.5	5.1	10	<1	<4	187	0.6	<2	0.5	11	0.7	24	47.6	6.83	8.1	13	41		
PA-2R	39-49	6/11/2014	6.8	NA	NA	612	2	0.2	2,410	0.4	2	93	281	<1	4	2	12	173	0.5	4.3	6	<1	<1	183	0.8	<2	1	7	<0.5	13	48.5	4.04	8.4	18	37		
PA-2R	39-49	10/15/2014	6.8	2.2	15.8	714	2	0.3	3,282	0.4	4	148	396	<1	6	3	17	113	0.6	5.9	9	<1	<1	233	1.2	<2	0.5	11	0.6	33	58	5.44	11.5	36	37		
PA-3	35-45	5/4/2010	-	5.92	20.6	1844	-	<0.3	129	<0.1	<4	5	111	<1	6	4	6	15	1	3.9	<5	<1	<4	635	<3	<10		<1	<5	<50	140	0.17	9.3	60	236		
PA-3R	39-49	11/21/2013	6.7	2.45	15.4	663	9	2	17,026	0.7	38	708	127	2	23	28	44	4,121	2.3	17.9	46	3	<1	70	0.7	7	1.2	52	3.9	120	30.3	81.1	6.6	27	71.2		
PA-3R	39-49	6/10/2014	7.6	NA	NA	944	2	0.4	3,982	0.4	64	141	147	<1	5	10	19	1,587	2.2	6.6	9	3	<1	141	0.3	<2	0.8	14	0.9	21	39	54	7.2	97	76		
PA-3R	39-49	10/15/2014	6.9	2.3	17.1	786	<1	<0.2	1,662	<0.1	30	66	96	<1	2	11	10	2,620	1.5	4.9	5	<1	<1	189	<0.2	<2	<0.5	6	<0.5	56	42.4	33.8	6.5	37	43.7		
PA-4	35-45	5/4/2010	-	5.32	16.3	668		<0.3	13	0.5	<1	<1	53	<1	1	<1	2	4	<1	2.1	<1	<1	<4	220	<0.3	<4	-	<1	<1	<50	53.5	<0.1	5.4	7.6	61.6		
PA-4R	44-54	11/21/2013	7.2	2.6	13.5	951	4	0.5	6,025	1.1	13	249	120	<1	9	12	16	531	1.5	12.9	17	3	<1	334	1	2	0.8	20	2	106	86.3	30.9	14.1	46	55.4		
PA-4R	44-54	6/10/2014	7.5	NA	NA	1,145	2	0.3	4,063	0.9	14	157	116	<1	8	16	32	266	1.6	9.7	11	5	2	406	2.9	<2	1.3	20	2.4	74	102	28.2	15.3	74	75.7		
PA-4R	44-54	10/15/2014	6.9	3.55	16.5	988	<1	<0.2	1,674	0.5	5	71	61	<1	3	7	19	100	0.9	8	5	1	<1	331	2.1	<2	0.6	8	<0.5	37	78	5.22	11.8	31.4	60.8		
PA-5	35-45	5/4/2010	-	3.02	22	710	-	<0.3	29	<0.1	<1	2	95	<1	2	<1	1	17	<1	3.3	<1	1	<4	249	<0.3	<4	-	<1	<1	<50	63.9	<0.1	5.9	9.9	73.4		
PA-5	35-45	6/6/2013	6.88	-	16.1	280	<1	2.4	25,301	0.4	21	651	96	<1	38	16	46	1,650	3	18.6	46	<1	<4	57	<0.3	7	<0.5	65	3	<50	26	71.4	5.8	9.8	25.8		
PA-5	35-45	6/12/2014	6.63	NA	NA	602	3	0.6	4,742	0.3	7	182	94	<1	10	4	16	368	0.7	5.9	11	<1	<1	124	0.2	2	1.7	17	0.8	35	34.3	13.6	5.6	20	46.4		
PA-6	35-45	5/4/2010	-	5.95	17	59	-	<0.3	434	<0.1	<1	10	6	<1	3	1	2	162	<1	4.8	<1	7	<4	26	<0.3	<4	-	<1	<1	<50	9.2	0.55	1.1	0.4	<1.0		
PA-6	35-45	6/5/2013	6.4	7.7	17.3	247	-	<0.5	117	<0.4	<1	4	21	<1	1	<1	1	12	<1	0.7	<1	<1	<4	65	<0.3	<4	-	<1	<1	<50	50	0.13	3.2	1.7	14.6		
PA-6	35-45	11/22/2013	7.3	7.6	13.5	218	<1	<0.2	164	<0.1	<1	13	16	<1	4	<1	<5	27	<0.5	1.5	<1	<1	<1	94	<0.2	<2	<0.5	<1	<0.5	7	31.1	0.81	2.9	1.3	6.5		
PA-6	35-45	6/11/2014	7.2	NA	15.5	337	<1	<0.2	810	<0.2	<1	37	28	<1	4	<1	6	59	<0.5	1.6	2	<1	<1	54	<0.2	<2	<0.5	2	<0.5	<5	25.2	1.39	2.9	1.5	33.5		
PA-6	35-45	10/15/2014	7.3	NA	NA	175	1	<0.2	1,510	<0.1	1	64	18	<1	10	1	7	143	<0.5	3.1	4	2	<1	53	<0.2	<2	<0.5	4	<0.5	6	20.8	2.84	2.9	1	4.3		

Notes: NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection

ppm = part per million
ppb = part per billion pCi = picocurie
uS = micro siemens

*** Action Level for Public Water Suppliers for Lead and Copper
☐ indicates concentration exceeds a standard or guidance value

Table 12
Summary of Detected Analytes
Monitoring Wells Installed in the Vicinity of Site #11, Medford, NY

Well Information			Rads (pCi/L)				Standard Inorganics						VOCs (ppb)	Herb Mets (ppb)								
Well ID	Screen Interval	Sample Date	Gross Alpha	Gross Beta	Adjusted Gross Beta* (AGB)	Tritium	Chloride (ppm)	Sulfate (ppm)	Nitrate (ppm)	Ammonia (ppm)	MBAS (ppm)	Total Alkalinity (mg CaCO3/L)	MTBE	Alachlor OA	Bisphenol A	Bisphenol B	Caffeine	DEET	Dinoseb	Metolachlor ESA	Phenytoin (Dilantin)	Propamocarb hydrochloride
DEC TOGS 1.1.1 Guidance Values			-	-		20,000	-	-	-	-		-	10	-	-	-	-	-	1	50	-	-
DEC Part 703 Class GA Groundwater Standards			15^	1,000^^		-	250	250	10	2		-	-	-	-	-	-	-	-	-	-	-
DOH Drinking Water Standards Part 5-1			15	-	50**	20,000	250	250	10	-		-	10	50	50	50	50	50	7	50	50	50
PA-1	40-45	5/4/2010	NS	NS	-	-	163	148	3.8	<0.02	-	NS	<0.5	<0.4	<0.2	<0.2	<0.2	-	<0.5	<0.3	<0.2	<0.3
PA-1	40-45	6/4/2013	<5	4.2+/-0.2	<4	<200	31	33	1.5	<0.5	<0.1	NS	<0.5	<0.4	<0.2	<0.2	Trace	Trace	<0.5	<0.3	<0.2	<0.3
PA-1	40-45	6/11/2014	5.1±0.5	31.2±0.7	9.8	<200	84	57	4.3	<0.5	0.1	130	<0.5	<0.4	<0.2	<0.2	<0.2	<0.2	<0.5	<0.3	<0.2	<0.3
PA-2	35-45	5/4/2010	NS	NS	-	-	97	130	2.5	0.4	<0.2	NS	<0.5	<0.4	<0.2	<0.2	<0.2	<0.2	<0.5	<0.3	<0.2	<0.3
PA-2R	39-49	11/21/2013	3.4+/-0.5	11.7+/-0.3	1.0	<200	70	58	<5	<0.5	NS	82	<0.5	-	4.7	<0.2	<0.2	NA	<0.5	<0.3	<0.2	<0.3
PA-2R	39-49	6/11/2014	8.6±0.5	19.3±0.5	4.5	<200	85	47	4	<0.5	<0.1	91	<0.5	-	<0.2	<0.2	Trace	-	<0.5	<0.3	-	<0.3
PA-2R	39-49	10/15/2014	3.2±0.4	29.2±0.6	<4	<200	81	52	5.6	<0.5	NS	122	<0.5	Trace	<0.2	<0.2	<0.2	<0.2	<0.5	<0.3	<0.2	<0.3
PA-3	35-45	5/4/2010	NS	NS	-	NS	245	374	16	2	NS	NS	<0.5	-	<0.2	<0.2	<0.2	-	<0.5	<0.3	<0.2	<0.3
PA-3R	39-49	11/21/2013	20.3+/-1	21.7+/-0.6	<4	213	101	54	<5	<0.5	NS	77	1.4	<0.4	<0.2	<0.2	<0.2	-	<0.5	<0.3	<0.2	<0.3
PA-3R	39-49	6/10/2014	16.2±0.9	105±2.5	25.5	-	69	77	<5	0.58	0.1	262	<0.5	<0.4	-	0.2	<0.2	<0.2	<0.5	<0.3	<0.2	<0.3
PA-3R	39-49	10/15/2014	6.2±0.6	47.2± 1.0	16.9	<200	104	<10	<10	<0.5	NS	165	2.2	<0.4	<0.2	<0.2	0.3	-	<0.5	<0.3	<0.2	<0.3
PA-4	35-45	5/4/2010	NS	NS	-	-	101	71	2.2	<0.02	<0.2	NS	<0.5	<0.4	<0.2	<0.2	<0.2	NA	<0.5	<0.3	<0.2	<0.3
PA-4R	44-54	11/21/2013	18.1+/-1	46.4+/-1.3	8.7	<200	80	150	<5	<0.1	NS	153	<0.5	<0.4	<0.2	<0.2	<0.2	<0.2	<0.5	<0.3	<0.2	<0.3
PA-4R	44-54	6/10/2014	14.2±0.9	61.6±1.6	<4	<200	90	192	6.8	<0.5	0.1	188	<0.5	<0.4	<0.2	<0.2	<0.2	<0.2	<0.5	<0.3	Trace	<0.3
PA-4R	44-54	10/15/2014	2±0.4	22.7±0.5	<4	<200	104	164	5.1	<0.5	NS	107	<0.5	Trace	<0.2	<0.2	<0.2	<0.2	<0.5	Trace	<0.2	<0.3
PA-5	35-45	5/4/2010	NS	NS	-	-	101	77	1.8	<0.02	-	NS	<0.5	<0.4	<0.2	<0.2	Trace	NA	<0.5	<0.3	<0.2	Trace
PA-5	35-45	6/6/2013	NS	NS	-	NS	NS	NS	NS	NS	<0.1	NS	<0.5	NS	NS	NS	NS	NS	NS	NS	NS	NS
PA-5	35-45	6/12/2014	10.4±0.5	19.2±0.5	2.8	<200	66	29	9.4	NS	<0.1	NS	<0.5	<0.4	Trace	<0.2	Trace	<0.2	<0.5	<0.3	<0.2	<0.3
PA-6	35-45	5/4/2010	NS	NS	-	NS	<12	<10	<2	<0.02	NS	NS	<0.5	<0.4	<0.2	<0.2	<0.2	NA	Trace	Trace	<0.2	<0.5
PA-6	35-45	6/5/2013	NS	NS	-	-	23	23	<2	<0.5	<0.1	NS	<0.5	<0.4	<0.2	<0.2	<0.2	<0.2	<0.5	<0.3	<0.2	<0.3
PA-6	35-45	11/22/2013	<4	1.4+/-0.1	<4	<200	9	16	0.5	<0.5	NS	72	<0.5	<0.4	<0.2	<0.2	<0.2	<0.2	<0.5	<0.3	<0.2	<0.3
PA-6	35-45	6/11/2014	<4	1.2±0.1	<4	<200	56	18	0.8	<0.5	<0.1	54	<0.5	<0.4	<0.2	0.2	<0.2	<0.2	<0.5	<0.3	<0.2	<0.3
PA-6	35-45	10/15/2014	<4	1.9±0.1	1.1	<200	16	<10	<2	<0.5	<0.2	53	<0.5	Trace	<0.2	<0.2	<0.2	<0.2	<0.5	<0.3	0.4	<0.3

Notes:
NA = Sample collected, analyte not reported
NS = No Sample Collected
"<" = less than, indicating no detection
ppb = part per billion
ppm = part per million
pCi = picocurie

^ = excluding radon and uranium
^^ = excluding strobtium-90 and alpha emitters
* AGB = gross beta - 0.82* potassium conc. in mg/l
**AGB has a guidance activity value of 50 pCi/l that is used for screening under Subpart 5-1 of the NYS Sanitary Code
☐ indicates concentration exceeds a standard or guidance value

Significant Findings of the Investigation

Metals Data

The groundwater impacts attributable to VOWM activities consistently include elevated metals concentrations. Table 13 compares information on the number of detections and concentrations observed for metals in samples collected in this study, with almost 1,200 shallow groundwater samples collected by the SCDHS. These 1,200 SCDHS samples were collected between 2010 and 2014, and were compiled primarily from untreated private well samples, but also include some subdivision test wells. For comparison purposes, on the aggregate, this data can be considered "typical" for Suffolk County shallow water quality. For a number of metals, the percent of detection for samples from the study sites were significantly elevated compared to the typical Suffolk County water quality (e.g., arsenic, beryllium, germanium, thallium, etc.). Additionally, the concentrations observed in a number of the study samples had maximum concentrations and mean concentrations significantly exceeding the corresponding values reported in more typical Suffolk County groundwater (e.g., aluminum, arsenic, manganese, thallium, titanium, etc.).

Table 14 illustrates the analytes in the study that had concentrations reported in exceedance of a groundwater and/or drinking water standard, nine of which were metals (manganese, sodium, iron, thallium, arsenic, lead, copper, zinc, magnesium). Sodium, manganese, and iron exceeded a standard in the most number of wells (24, 22 and 22 wells respectively), and monitoring wells PA-3, PA-4 and PA-5 from Site # 11 (Peconic Avenue, Medford) each had six different metals exceeding a standard.

Manganese exceeded the groundwater/drinking water standard of 300 ppb most consistently at significant concentrations. Of the 233 groundwater samples analyzed for manganese, 34% (80) exceeded the standard, and 12% (27) had concentrations that were at least 10 times the standard. The well exhibiting the highest manganese concentration was MS-3 located at Site # 7 (East Main St., Yaphank) with the top three profile levels reporting concentrations of 49,300 ppb, 31,500 ppb and 26,700 ppb (20-25 fbg, 30-35 fbg, and 40-45 fbg respectively). Table 15 summarizes the manganese concentrations found at each site, and shows that each site had at least one downgradient well with a sample containing a manganese concentration in excess of the 300 ppb groundwater/drinking water standard.

Radiological Data

All the samples were analyzed by the SCDHS Public and Environmental Health Laboratory (PEHL) for the radiological parameters gross alpha, gross beta, and tritium. Four wells from three different sites (one from Site #3, one from Site #9, and two from Site #11) exceeded the gross alpha drinking water standard

Table 13 – Compost Study Metals Data Comparison to Metals in Suffolk County Private

Parameter	Investigation	# Samples Analyzed	# of Samples with Detection	% Samples with Detection	Maximum Concentration Detected	Overall Mean Concentration#	Mean Concentration of Detected^
Aluminum (ppb)	11 Study Sites*	230	208	90%	25,301	433	478
	Suffolk Shallow Private Wells**	1,196	655	55%	2,580	39	69
Antimony (ppb)	11 Study Sites	233	13	6%	2.1	0.22	0.66
	Suffolk Shallow Private Wells	1,196	1,183	1%	1.1	0.18	0.62
Arsenic (ppb)	11 Study Sites	233	37	16%	64	1.8	8.5
	Suffolk Shallow Private Wells	1,196	35	3%	7	0.55	2.1
Barium (ppb)	11 Study Sites	232	232	100%	872	92	92
	Suffolk Shallow Private Wells	1,196	1,166	97%	243	36	37
Beryllium (ppb)	11 Study Sites	233	26	11%	2.4	0.23	0.72
	Suffolk Shallow Private Wells	1,196	26	2%	1	0.15	0.5
Cadmium (ppb)	11 Study Sites	232	2	0.9%	3	0.52	2.5
	Suffolk Shallow Private Wells	1,196	9	0.8%	6	0.51	1.9
Calcium (ppm)	11 Study Sites	232	232	100%	140	17	17
	Suffolk Shallow Private Wells	1,197	1,187	99%	127	14	14
Chromium (ppb)	11 Study Sites	232	145	63%	38	2.2	3.2
	Suffolk Shallow Private Wells	1,196	216	18%	10	0.7	1.5
Cobalt (ppb)	11 Study Sites	232	100	43%	81	3.5	7.5
	Suffolk Shallow Private Wells	1,196	39	3%	25	0.62	4.1
Copper (ppb)	11 Study Sites	232	84	36%	46	2.3	5.3
	Suffolk Shallow Private Wells	1,196	1,160	97%	2,727	127	132
Germanium (ppb)	11 Study Sites	230	33	14%	3	0.6	1.4
	Suffolk Shallow Private Wells	1,195	8	0.67%	2	0.4	1.0
Iron (ppm)	10 VOWM Sites	232	88	38%	81	3.3	8.5
	Suffolk Shallow Private Wells	1,197	383	32%	33	0.3	0.9
Lead (ppb)	11 Study Sites	233	21	9%	46	1.3	9.4
	Suffolk Shallow Private Wells	1,196	620	52%	488	5.2	9.6
Magnesium (ppm)	11 Study Sites	232	231	100%	461	6.7	6.7
	Suffolk Shallow Private Wells	1,197	1,175	98%	212	5.0	5.1
Manganese (ppb)	11 Study Sites	232	221	95%	49,300	1,618	1,698
	Suffolk Shallow Private Wells	1,196	1,093	91%	7,000	102	112
Molybdenum (ppb)	11 Study Sites	233	29	12%	10	0.83	3.1
	Suffolk Shallow Private Wells	1,196	8	0.67%	17	0.5	3.3
Nickel (ppb)	11 Study Sites	232	210	91%	26	3.1	3.4
	Suffolk Shallow Private Wells	1,196	853	71%	57	1.4	1.9
Potassium (ppm)	11 Study Sites	232	232	100%	97	9.2	9.2
	Suffolk Shallow Private Wells	1,197	1,190	99%	53	2.6	2.6
Sodium (ppm)	11 Study Sites	232	229	99%	236	20	20
	Suffolk Shallow Private Wells	1,197	1,196	100%	1,360	22	22
Strontium (ppb)	11 Study Sites	232	231	100%	635	79	79
	Suffolk Shallow Private Wells	1,196	1,174	98%	1,030	68	69
Thallium (ppb)	11 Study Sites	232	38	16%	2.9	0.26	0.79
	Suffolk Shallow Private Wells	1,196	13	1%	0.62	0.1	0.4
Titanium (ppb)	11 Study Sites	230	108	47%	708	14	30
	Suffolk Shallow Private Wells	1,196	28	2%	20	0.6	3
Vanadium (ppb)	11 Study Sites	233	32	14%	65	1.7	9.3
	Suffolk Shallow Private Wells	1,196	27	2%	10	0.6	2.9
Zinc (ppb)	11 Study Sites	230	26	11%	1,320	34	108
	Suffolk Shallow Private Wells	1,195	560	47%	5,400	114	217

* Note that these statistics include data from all wells and profile levels included in the study, even those exhibiting little or no water quality degradation.

** Untreated water quality data from private wells collected by the SCDHS from January 2010 – June 2014.

One half the detection limit was used in the calculation of the mean for samples that had concentrations reported as not detected.

^ This is the mean concentration of only the samples that had concentrations above their respective detection limits.

Table 14 – Analytes Exceeding a Groundwater and/or Drinking Water Standard

Site #	Site Name	Site Location	Well	Manganese	Sodium	Iron	Nitrate	Thallium	Ammonia	Arsenic	Lead	Copper	Zinc	Gross Alpha	Gross Beta	Chloride	Magnesium	Sulfate	VOCs
1	Fifth Avenue	Speonk	CF-1																
			CF-2																
			CF-3																
			Private Wells	X		X						X	X						
2	Moriches-Riverhead Rd Farm	Eastport	RC-1		X														
			RC-2	X	X												X		
			RC-3	X	X		X												
3	Papermill Rd Facility	Manorville	CB-1	X	X	X		X	X										X
			CB-2	X		X		X	X										X
			CB-3	X		X			X	X				X	X				
4	Exit 69 LIE Ramp	Manorville	WR-1	X	X	X				x						X			
5	Doziak Farm	Manorville	SS-1				X												
			SS-2			X	X												
			SS-3		X		X												
			SS-4	X	X	X	X												
			SS-5	X	X	X	X									X			X
6	Bruno Farm	Manorville	MMIR-1	X	X	X													
			MMIR-2																
			MMIR-3																
7	Hololob/Froehlich Site	Yaphank	MS-1																
			MS-2	X															
			MS-3	X	X	X	X		X										X
			MS-4	X	X	X		X											
			MS-5	X	X	X	X	X	X										
8	LIE North Service Rd Farm	Yaphank	CF-4	X															
			CF-5		X														
9	Islip Town Compost Facility	Ronkonkoma	ICF-1	X	X	X		X						X					
			ICF-2	X	X	X		X											
10	Conklin Site	Farmingdale	CS-1	X	X														
			CS-2		X	X													
			CS-3	X	X	X													
11	Peconic Ave Site	Medford	PA-1		X	X													
			PA-2		X	X													
			PA-3	X	X	X	X	X		X	X			X				X	
			PA-4	X	X	X		X		X	X			X					
			PA-5	X	X	X		X		X	X								
			PA-6		X	X													
For Comparison																			
Great Gardens		Yaphank		X	X	X		X	X		X			X	X	X	X		

"X" means analyte exceeded a standard in one or more of the profile levels in the indicated well.

Table 15 - Summary of Manganese Concentrations by Site

Site #	Site Name	# Wells	Sampling Date Range	Manganese			
				# Detects/ # Analyzed	Range of Concentrations		# Samples Exceeding MCL (300 ppb)
					Min	Max	
1	Fifth Avenue (Private Wells)*	12	9/23/99 - 8/29/14	12/12*	<1	3,650	4*
2	Moriches-Riverhead Rd	3	2/21/12 - 3/20/12	17/17	3	2,730	8
3	Papermill Rd Facility	3	10/4/11 - 11/1/11	22/22	147	5,310	21
4	Exit 69 LIE Ramp	1	8/25/11 - 9/11/11	9/9	60	18,300	5
5	South Street Farm	5	3/21/12 - 5/2/12	31/31	2	475	3
6	Moriches-Yaphank Rd	3	11/3/11 - 1/31/12	26/27	1	804	1
7	East Main Street	5	7/18/11 - 6/5/12	36/36	3	49,300	18
8	LIE North Service Rd	2	9/14/11 - 10/4/11	10/10	3	603	1
9	Islip Town	2	12/19/11 - 12/20/11	12/12	28	8,840	6
10	Conklin St	3	5/14/12 - 1/9/13	21/22	<1	2,645	8
11	Peconic Ave	6	5/4/10 - 6/12/14	23/23	1	4,121	7
SURFACE WATERS							
3	Papermill Rd	-	2/28/12	1/1	100		-
4	Exit 69 LIE Ramp	-	11/22/11	1/1	70		-
For Comparison Purposes							
Great Gardens		26	9/1/09 - 11/13/12	130/130	2	31,600	59

of 15 pCi/l (Table 14 – Analytes Exceeding a Groundwater and/or Drinking Water Standard). The highest gross alpha concentration was 20.3 pCi/l reported from well PR-3R at Site #11 (Peconic Ave., Medford). Table 16 compares information on the number of detections and concentrations observed in the gross alpha samples collected for this study with 1,231 gross alpha concentrations from private well samples analyzed by the SCDHS from 1997 through 2014. For comparison purposes, these private well samples can be considered "typical" gross alpha concentrations for Suffolk County's shallow groundwater. Table 16 illustrates that gross alpha concentrations in Suffolk County's groundwater are typically low, with only 10% of the samples reporting concentrations above the detection limit. The mean concentration of gross alpha samples from "typical" Suffolk County shallow groundwater that exhibited detectable gross alpha concentrations was 2.0 pCi/l, and only one sample exceed the drinking water standard of 15 pCi/l. The

gross alpha samples collected in the vicinity of the vegetative organic waste management sites for this study had 38% of the samples reporting gross alpha detections, a mean concentration of detected samples of 4.9 pCi/l, and five samples with concentrations above the drinking water standard. This comparison illustrates that the groundwater downgradient of the VOWM sites studied generally have a higher frequency of detection, and higher concentrations of gross alpha than what is typically exhibited in Suffolk County's shallow groundwater.

Table 16
Comparison of Gross Alpha Concentrations

	# Samples Analyzed	Number of Detections	% Samples With Detections	Maximum Activity (pCi/l)	Mean Activity (pCi/l)[3]	Mean of Detects (pCi/l)	Number of Samples Exceeding MCL	% of Samples Exceeding MCL
11 Study Sites	221	83	38%	20.3	2.1	4.9	5	2.2%
SCDHS Private Well Samples	1,231	118	10%	21	0.65	2.0	1	0.09%

Gross beta was detected in 176 of the 221 samples, or 80% of the samples analyzed. Seven samples collected from four different sites exhibited elevated gross beta concentrations (above the NYSDOH guidance value of 50 pCi/l). However, since potassium has a naturally occurring form that is a beta-emitting isotope (potassium-40), gross beta concentrations can often be elevated when potassium concentrations are elevated. In order to adjust for the potassium-40 contribution to the gross beta concentrations, an adjustment based on the sample's total potassium concentration is made[4]. After adjustment for the potassium concentrations, only one of the seven samples exhibiting elevated gross beta still exceeded the 50 pCi/l guidance value (58 pCi/l in well CB-3 of Site #3).

The New York State Department of Health's Wadsworth Center (NYSDOHWC) performed analyses for gross alpha, gross beta and a gamma analysis on 113 samples collected from seven of the sites. Overall, four radionuclides had detectable concentrations; these were potassium 40, actinium 228, radium 224 and radium 226. Radium 226 has a groundwater standard of 3 pCi/l and a drinking water standard of 5 pCi/l[5]. The highest reported radium 226 concentration was 1.3 pCi/l observed in the top profile level of well ICF-1, from Site #9 (Islip Town Compost Facility, Ronkonkoma). These results also illustrate that postassiun-40 was the primary beta contributor of samples exhibiting elevated gross beta concentrations.

[3] One half the detection limit was used in the mean calculation for samples with concentrations below the reporting limit.
[4] Adjusted gross beta has a guidance value of 50 pCi/l that is used as a screening under Part 5-1 of the NYS Sanitary Code.
[5] This drinking water maximum contaminant level (MCL) is a combined MCL for the sum of radium 226 and radium 228.

It should be noted that gamma analyses were not performed on the four samples exhibiting gross alpha concentrations above the drinking water standard.

Pesticide Data

Nineteen different pesticides and pesticide breakdown products were detected in the study. The concentrations detected were generally low (ranging from trace detections to 8.8 ppb), and none exceeded their respective standards. The pesticides detected at the most number of sites were metolachlor, and/or one of its two metabolites (metolachlor OA and metolachlor ESA), which was detected at five different study sites, and dichlorvos, which was detected at four different sites. Table 17 summarizes the well detections for the six pesticides that were reported in monitoring wells at more than one site (alachlor, atrazine, 2,6-dichlorobenzimide, dichlorvos, metalaxyl, metolachlor). Since the historical aerial photographs contained in Appendices A through K indicate that a number of the study sites are current or former farms, many of the low level pesticide detections could be related to this land use. In these cases, it is not possible to distinguish the source of the pesticide detections as VOWM related or current/former farming related. However, historical aerial photographs for Site #3 (Appendix C - Papermill Road Facility, Manorville) and Site #9 (Appendix I - Islip Town Compost Facility) show that neither of these sites appear to have been used as farmland, and there are no indications of significant farming activity having taken place in the vicinity. These sites both exhibited trace detections of the pesticide dichlorvos, and considering there is no potential current/historical farming source, these detections could be related to the VOWM activities at these two sites.

Pharmaceuticals, Personal Care Products and Wastewater Related Contaminants (PPCPWRC) Data

Nine different pharmaceutical, personal care products and wastewater related contaminants were detected at low concentrations in the study (ranging from trace detections to 4.7 ppb). The PPCPWRCs detected at the most number of sites were caffeine, which was detected at seven different study sites, and DEET, which was detected at five different sites. Table 17 summarizes the well detections for the six PPCPWRs that were reported in monitoring wells at more than one site (acetaminophen, bisphenol A, caffeine, DEET, gemfibrozil, MBAS). When these types of PPCPWRCs co-occur in groundwater samples, the source is typically associated with a wastewater discharge (e.g., septic system). Although it would not be unusual to find low concentrations of PPCPWRCs in areas of high density residentially developed areas served by on-site septic systems, the majority of the study sites are located in less developed areas, with few if any potential upgradient septic system sources. For example, Figure 7 shows that the property upgradient of the Site #4 (Exit 69 LIE Ramp, Manorville) compost windrows is vacant land, and the historical aerial photographs in Appendix D show that this property has been undeveloped since at least 1947. Therefore, since there are no apparent septic system sources, the only potential source of DEET and acetaminophen detected in the top profile level (10 – 15 fbg) of well WR-1 is the compost windrows. Additionally, the "Compost Run-off" sample collected from a surface water puddle next to the site contained low concentrations of caffeine, ibuprofen, DEET, MBAS (detergents) and acetaminophen, further implicating the compost windrows as a potential source of the wastewater related contaminants.

Table 17 – Pesticides, Pharmaceuticals and Personal Care Product Detections

Site & Well Information				Pesticides Detected at More Than One Site						Multiple Pharmaceuticals/Personal Care Products/Wastewater Related Detects					
Site #	Site Name	Site Location	Well Number	Alachlor*	Atrazine*	2,6-dichlorobenzimide	Dichlorovos	Metalaxyl	Metolachlor*	Acetaminophen	Bisphenol A	Caffeine	DEET	Gemfibrozil	MBAS
1	Fifth Avenue	Speonk	CF-1												
			CF-2												
			CF-3												
			Private Wells									X			
2	Moriches-Riverhead Rd Farm	Eastport	RC-1						X						
			RC-2						X		X				
			RC-3		X	X			X						
3	Papermill Rd Facility	Manorville	CB-1							X	X	X	X		NS
			CB-2				X			X	X	X	X		
			CB-3				X			X		X			X
4	Exit 69 LIE Ramp	Manorville	WR-1				X			X			X		X
5	South Street Farm	Manorville	SS-1											X	
			SS-2												
			SS-3						X						
			SS-4	X					X			X			
			SS-5	X											
6	Moriches-Yaphank Rd Farm	Manorville	MMIR-1						X			X			
			MMIR-2						X			X			
			MMIR-3						X			X			
7	East Main Street Site	Yaphank	MS-1	X		X							X		
			MS-2	X		X		X				X			
			MS-3	X	X	X	X	X	X	X		X	X		
			MS-4	X		X	X	X	X			X	X		
			MS-5	X		X		X							
8	LIE North Service Rd Farm	Yaphank	CF-4					X				X			
			CF-5												
9	Islip Town Compost Facility	Ronkonkoma	ICF-1				X			X		X			
			ICF-2							X					
10	Conklin Street Site	Farmingdale	CS-1								X				
			CS-2												
			CS-3								X		X	X	
11	Peconic Ave Site	Medford	PA-1									X	X		X
			PA-2	X							X	X			
			PA-3									X			X
			PA-4	X					X						X
			PA-5								X	X			
			PA-6	X					X						
For Comparison															
	Great Gardens	Yaphank					X		X		X				

* Detections of parent compounds and/or metabolites

X means analyte was detected in one or more of the profile levels in the indicated well.

Private Well Assessments

The potential for the existence of private wells downgradient of the investigation sites was evaluated using information from past SCDHS private well sample locations, construction permits issued by the SCDHS and information obtained from the Suffolk County Water Authority. Four of the 11 sites (Site #1, #3, #6, and #7) were determined to have the potential for private wells to exist downgradient. Further investigation determined that the homes downgradient of Site #6 were connected to public water, and no private wells were located downgradient. Private well surveys were performed, and samples were collected at the remaining three sites. Site #1 was the only site that has private wells downgradient which exhibited degraded water quality consistent with VOWM related groundwater impacts. This information has been forwarded to the NYSDEC. Table 1 summarizes the results of the private well assessments performed for each of the sites.

Table 18
Summary of Private Well Assessments

Site #	Site Name	Potential Private Wells Downgradient?	Private Well Survey Conducted?	Samples Collected?	Wells Exceed MCLs?
1	Fifth Avenue	Yes	Yes	Yes	Yes
2	Moriches-Riverhead Rd	No	No	-	-
3	Papermill Rd Facility	Yes	Yes	Yes	No
4	Exit 69 LIE Ramp	No	No	-	-
5	South Street Farm	No	No	-	-
6	Moriches-Yaphank Rd	Yes	Yes	No	No
7	East Main Street	Yes	Yes	Yes	No
8	LIE North Service Rd	No	No	-	-
9	Islip Town Compost Facility	No	No	-	-
10	Conklin Site	No	No	-	-
11	139 Peconic Ave	No	No	-	-

Public Water Supply Wellfields

The location of public water supply wellfields in the vicinity of each investigation site was evaluated. Three of the eleven sites (Sites #5, #10 and #11) have public water supply wellfields located in the downgradient groundwater flow direction. Source water contributing areas for the wellfields downgradient of Site #5 and Site #10 indicate that these sites are beyond the 100 year travel time to the wells. The source water assessment for the wellfield downgradient of Site #11 indicates that the site is approximately 500 feet east of the wellfield contributing area,

therefore, as long as there are no significant increases to water pumpage from this wellfield, impacts to groundwater quality as results of this site's operations would not be expected to affect the water quality of this wellfield. Table 19 summarizes the results of the public wellfield assessments performed for each of the sites.

Table 19
Summary of Public Wellfield Assessments

Site #	Distance to Wellfield (miles)	Wellfield Downgradient?	Approximate Travel Time to Wellfield
1	0.75	No	-
2	1.1	No	-
3	1	No	-
4	1.75	No	-
5	3.75	Downgradient	Greater than 100 year
6	1.1	No	-
7	None	No	-
8	0.7	No	-
9	0.5	No	-
10	4	Downgradient	100 Years
11	1	Downgradient	Not in contributing area

Conclusions

In order to evaluate the potential impact of VOWM sites on the quality of groundwater, the SCDHS installed 30 temporary groundwater profile wells and six permanent wells in the vicinity of 11 VOWM related sites throughout Suffolk County. From these 36 wells, the SCDHS collected and analyzed 233 groundwater samples. Two surface water samples were also collected. 95 of these samples were sent to the NYSDOH Wadsworth Laboratory and analyzed for gamma emitting radiological parameters. One of the primary purposes of this study was to assess if the impacts to groundwater quality documented downgradient of the Great Gardens/Long Island Compost facility in Yaphank are unique to this facility, or if there are similar impacts occurring at other VOWM related sites throughout the County.

Ten of the eleven sites included in this investigation had at least one monitoring well sample exhibiting an exceedance of a groundwater and/or a drinking water standard. Eight sites had groundwater impacts observed in monitoring wells that can be attributable to current or past VOWM activities at the site (Table 20). A determination regarding VOWM related groundwater impacts at three sites could not be made due to a number of confounding factors, including significant distances from the monitoring wells to the vegetative organic waste material, wells not aligned with groundwater flow paths from potential sources, a time lag from when the source material was removed to when groundwater sampling occurred.

Elevated metals concentrations was the primary impact observed to the groundwater downgradient of the VOWM facilities investigated. An increase in the number of radiological detections (gross alpha and gross beta), was also generally observed. Elevated metals concentrations were observed in monitoring wells downgradient of 10 sites, and in four private wells in the vicinity of one site. The primary constituent that exceeded groundwater and drinking water standards most frequently, and at the highest concentrations, was manganese. Other metals such as antimony, arsenic, beryllium, cadmium, chromium, cobalt, germanium, molybdenum, thallium, titanium and vanadium were detected at rates that were at least two times that of typical Suffolk County shallow private wells. Gross alpha was detected in 83 of 221 samples, which is a 38 % detection rate, higher than the typical Suffolk County shallow private well detection rate of approximately 10%. The drinking water standard for gross alpha was exceeded in five of the 221 samples analyzed, which is an 2.2% rate of exceedance, higher than the typical Suffolk County shallow private well exceedance rate of 0.09%.

Nineteen different pesticides were reported at relatively low concentrations at a majority of the sites. It is not generally possible to attribute the source of these detections exclusively to VOWM operations, since many of the sites are current or former farms. The exception however, may be the pesticide dichlorvos, which was reported at two sites that have no apparent history of farming, and therefore the pesticide detections could be attributable to the

VOWM activity. Additionally, low concentrations of pharmaceuticals, personal care products and wastewater related contaminants (PPCPWRCs) were consistently detected downgradient of the sites, and in some instances may be attributable to the VOWM activity at the sites.

The potential for the existence of private wells downgradient of the investigation sites was evaluated. Private well sampling surveys were performed at three of the sites. Site #1 was the only site that has private wells downgradient which exhibited degraded water quality consistent with VOWM related groundwater impacts. This information has been forwarded to the NYSDEC. The location of public water supply wellfields in the vicinity of each investigation site was also evaluated. Three of the eleven sites have public water supply wellfields located in the downgradient groundwater flow direction. Two of the sites are located greater than 100 years of groundwater travel time to the wellfields, and the third site is located outside the wellfield's groundwater contributing area, therefore no public wellfields have been identified as being imminently threatened by the groundwater impacts observed in this study.

The data collected clearly indicates that water quality downgradient of the vegetative organic waste management facilities studied exhibited impacts. Further evaluation indicates that groundwater impacts are attributable to VOWM activities at eight of the sites, and impacts were indeterminate at three sites (Table 20). Wells that were located such that VOWM activity was occurring in their groundwater flow paths generally exhibited a greater degree of water quality degradation.

In general, the data evaluated for this study shows similar types of impacts to the groundwater quality previously observed in the SCDHS data collected at the Great Gardens/Long Island Compost facility in Yaphank NY, and documented in the report entitled *Horseblock Road Investigation, Yaphank NY* issued by the New York State Department of Environmental Conservation. The Horseblock Road Investigation provided compelling site-specific evidence of relatively distinctive groundwater impacts (i.e., a chemical fingerprint of elevated metals concentrations, particularly manganese, atypical elevated concentrations of radiological parameters and other contaminants). Because the same chemical fingerprint was detected immediately downgradient of the great majority of VOWM sites evaluated in this study, this evaluation significantly validates that the Horseblock Road findings are not unique to the Horseblock Road site, and that VOWM operations can have significant adverse impacts on groundwater. Similar groundwater impacts have now been observed at many compost/vegetative organic waste facilities throughout Suffolk County and appear to be related to the compost/vegetative waste operations taking place at these sites.

Table 20 – Summary of Site Impacts to Groundwater from VOWM Activity

Site #	Site Name	Location	Impacted Groundwater from VOWM Activity Observed	Comments
1	Fifth Avenue	Speonk	Yes	Significant impacts observed in the on-site and 3 downgradient private wells.
2	Moriches-Riverhead Rd Farm	Eastport	Yes	Significant groundwater impacts observed in 2 of 3 monitoring wells.
3	Papermill Rd Facility	Manorville	Yes	Significant impacts observed in all 3 monitoring wells. Groundwater impacts from historical site use (landfill, septic sludge lagoons) also observed.
4	Exit 69 LIE Ramp	Manorville	Yes	Significant groundwater impacts observed in the groundwater profile well. Contaminants typically associated with septic waste observed in a pool of run-off water.
5	South Street Farm	Manorville	Indeterminate	Although slight groundwater impacts were observed, no definitive conclusions can be drawn due to the significant distance from the compost windrows to the monitoring wells.
6	Moriches-Yaphank Rd Farm	Manorville	Indeterminate	Although slight groundwater impacts were observed, no definitive conclusions can be drawn most likely due to the site did not having any significant VOWM activity for 5 years prior to groundwater sampling.
7	East Main Street	Yaphank	Yes	Significant groundwater impacts observed in 4 of 5 monitoring wells.
8	LIE North Service Rd Farm	Yaphank	Indeterminate	Additional wells need to be installed further to the east in order to appropriately assess potential impacts from vegetative organic wastes. The significant distance from potential sources to well locations could be a confounding factor.
	Islip Town Compost Facility	Ronkonkoma	Yes	Significant groundwater impacts observed in both the monitoring wells installed at this site.
10	Conklin St. Site	Farmingdale	Yes	Moderate groundwater impacts observed in 1 of 3 monitoring wells.
11	Peconic Ave Site	Medford	Yes	Significant groundwater impacts observed in 3 of 5 downgradient monitoring wells.

Table 21

Statistical Data Comparison of Parameters Exceeding a Standard in this Study to Groundwater Data Collected in the Vicinity of the Great Gardens/Long Island Compost Facility (Horseblock Rd Investigation)

Parameters Exceeding a Standard	Investigation	# Samples Analyzed	Maximum Concentration	Minimum Concentration of Detected	Mean of Detected	# of Samples with Detection	% Samples with Detection	# Samples Exceeding a Standard	% of Detected Exceeding a Standard
Ammonia (ppm)	11 Study Sites	201	18.4	0.02	3.9	44	22%	18	41%
	Great Gardens	103	25	0.04	3.1	38	37%	17	17%
Arsenic (ppb)	11 Study Sites	233	64	1	8.5	37	16%	9	24%
	Great Gardens	103	5	1	2.0	12	12%	0	0%
Benzene	11 Study Sites	224	2.4	0.5	0.98	5	2.2%	1	0%
	Great Gardens	99	-	-	-	0	0%	-	-
Chloride (ppm)	11 Study Sites	231	297	4	38	195	84%	2	1%
	Great Gardens	103	445	5	55	88	85%	2	2%
Chlorobenzene	11 Study Sites	222	27	0.7	6.3	15	6.8%	8	53%
	Great Gardens	99	-	-	-	0	0%	-	-
Gross Alpha	11 Study Sites	221	20	1	4.9	83	38%	5	6%
	Great Gardens	103	58	1.0	7.4	36	35%	4	4%
Gross Beta	11 Study Sites	221	105	1	13	176	80%	1	0.5%
	Great Gardens	103	253	1.0	30	73	71%	2	2%
Iron (ppm)	11 Study Sites	232	81	0.11	8.5	88	38%	72	82%
	Great Gardens	103	34	0.1	3.4	43	42%	29	28%
Lead (ppb)	11 Study Sites	233	46	1	9.4	21	9%	3	14%
	Great Gardens	103	2	1	1.3	3	3%	0	0%
Magnesium (ppm)	11 Study Sites	232	461	0.2	6.7	232	100%	1	0.4%
	Great Gardens	103	42	0.3	6	102	99%	2	2%
Manganese (ppb)	11 Study Sites	232	49,300	1	1,698	221	95%	80	36%
	Great Gardens	103	31,600	3.0	3,824	103	100%	49	48%
Nitrate (ppm)	11 Study Sites	231	18	0.5	5.1	139	60%	21	15%
	Great Gardens	103	9.2	0.5	1.6	26	42%	0	0%
Perchlorate (ppb)	11 Study Sites	233	2.9	0.2	0.6	93	40%	0	0%
	Great Gardens	99	105	0.3	10	65	66%	12	12%
Sodium (ppm)	11 Study Sites	232	229	2.3	20	229	99%	67	29%
	Great Gardens	103	299	3.3	24	103	100%	32	31%
Sulfate (ppm)	11 Study Sites	231	374	5	27	178	77%	1	0.6%
	Great Gardens	103	74	5	17	62	99%	0	0%
1,2,3-Trichloropropane	11 Study Sites	228	0.5	0.5	0.5	1	0.44%	1	0%
	Great Gardens	99	-	-	-	0	0%	-	-
Thallium (ppb)	11 Study Sites	232	2.9	0.2	0.8	38	16%	19	50%
	Great Gardens	100	3.1	0.3	0.8	15	15%	7	7%

Recommendations

- The NYSDEC should ensure that mechanisms are in place and that operating practices at VOWM facilities prevent detrimental impacts to groundwater and surface water quality.

- NYSDEC Part 360 Solid Waste Management Regulations governing VOWM facilities should be revised to protect against impacts to groundwater and surface water quality. Until this is accomplished, prior to the issuance of any new VOWM permits/registrations, the NYSDEC should evaluate, and take measures to ensure that any potential impacts to public/private wells, and/or surface water bodies located hydraulically downgradient of these facilities are mitigated.

- NYSDEC Part 360 Solid Waste Management Regulations should be expanded to include facilities that process vegetative organic type materials which currently do not fall under the purview of current regulations.

- The NYSDEC should further investigate the detection of parameters typically related to septic waste (e.g., pharmaceuticals, personal care products, wastewater related contaminants, etc.) observed downgradient and within surface water run-off related to vegetative organic wastes.

- The NYSDEC should investigate the mechanisms that cause elevated concentrations of gross alpha/gross beta, metals, inorganic parameters and detections of pharmaceuticals and personal care products downgradient of compost/vegetative organic waste management sites.

- The Suffolk County Department of Health Services should continue to identify areas where private wells may be used downgradient of VOWM sites, and conduct private well sampling surveys as appropriate. The NYSDEC should provide an alternative water supply or filtration to owners whose on-site water sources are determined to have been impacted from VOWM operations.

- New or current facilities that are permitted or registered for vegetative organic waste operations should be required by the NYSDEC to assess the quality of the groundwater migrating from the site.

Appendices

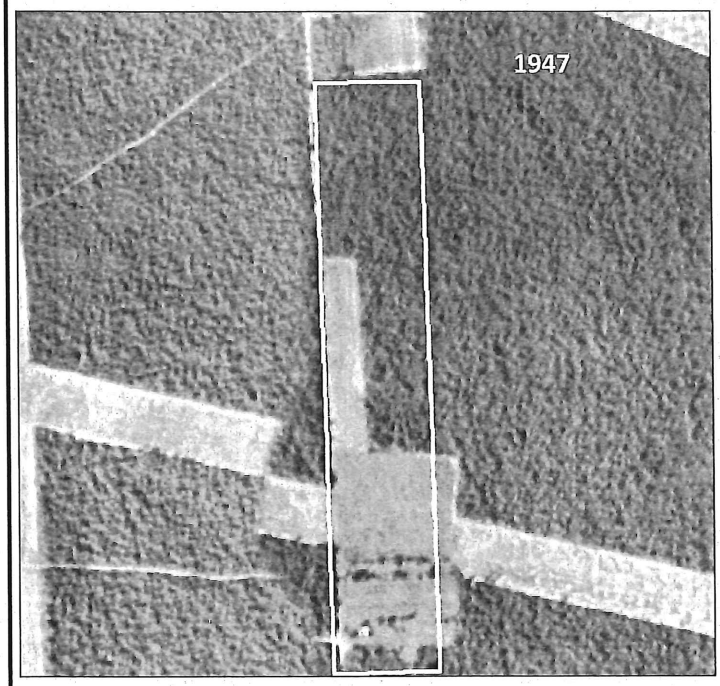
Appendix A

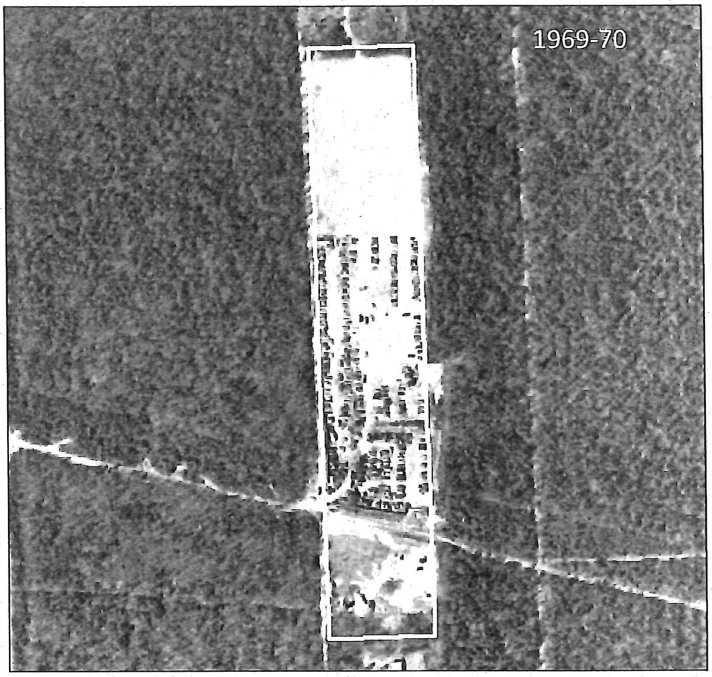
Site #1

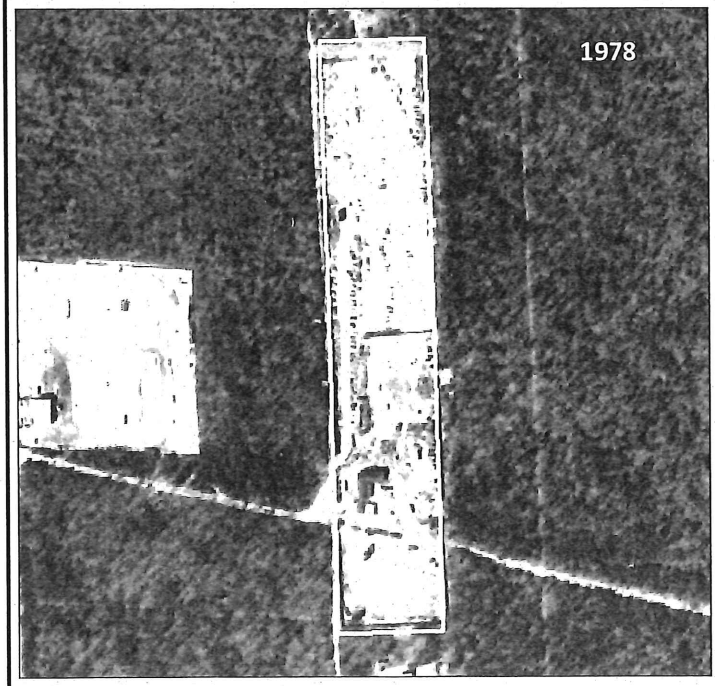
5th Avenue

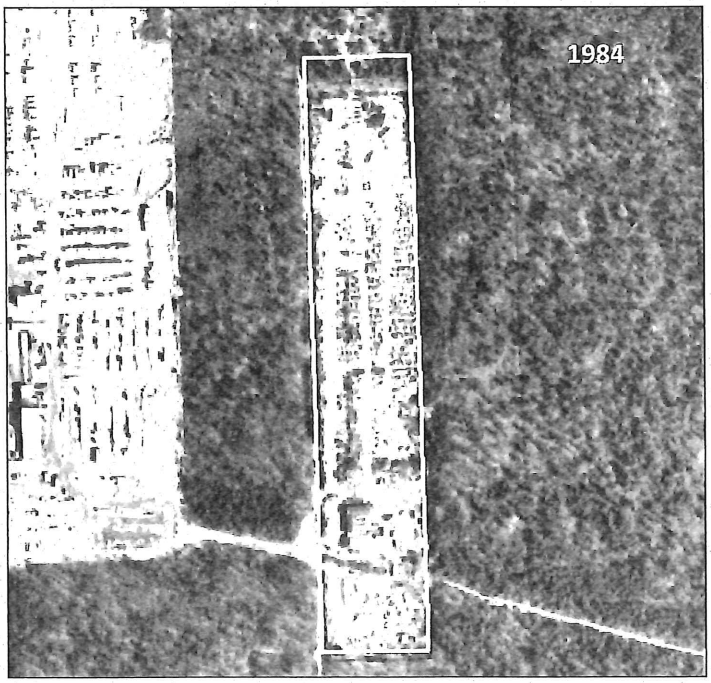
Speonk

Site #1 – 5th Avenue, Speonk

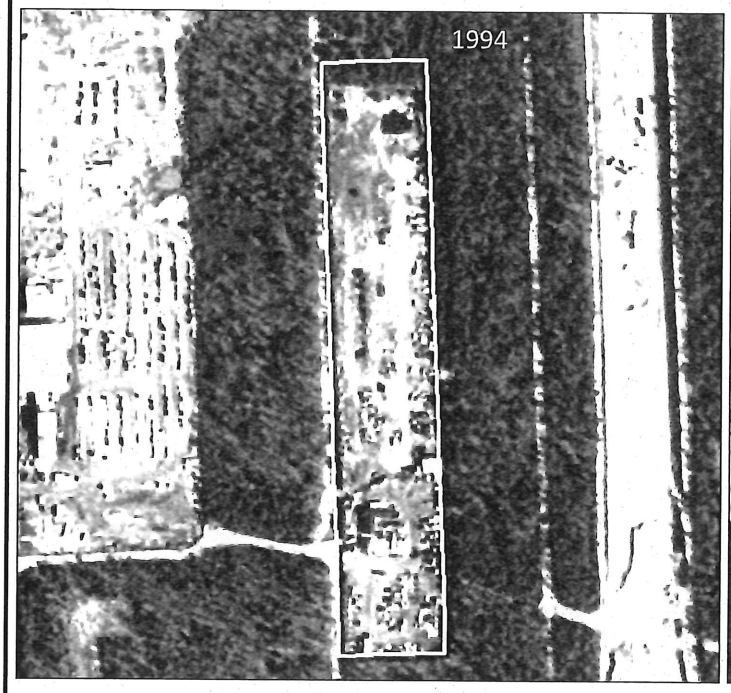


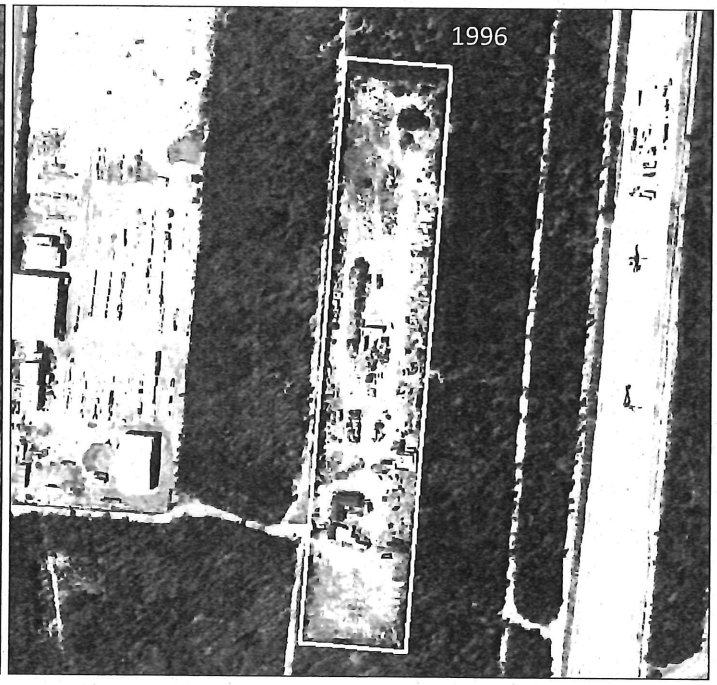


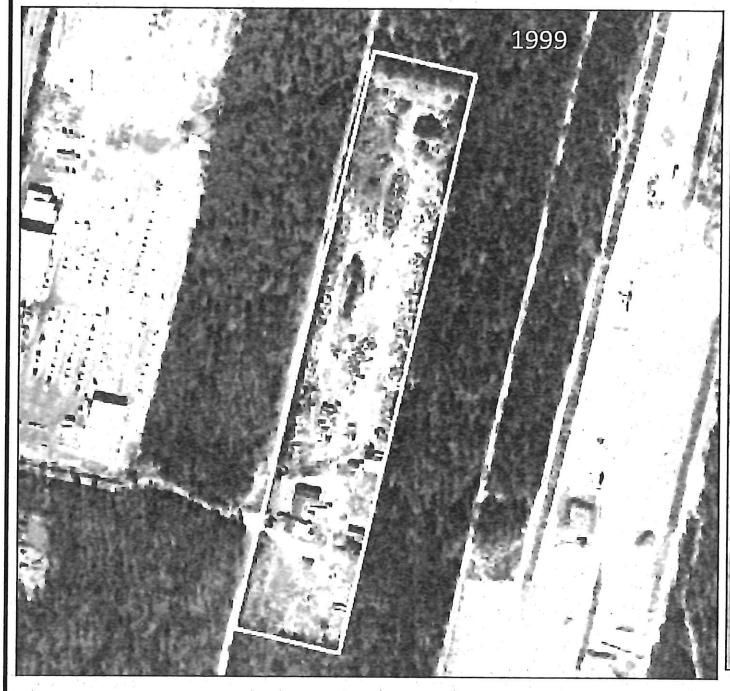


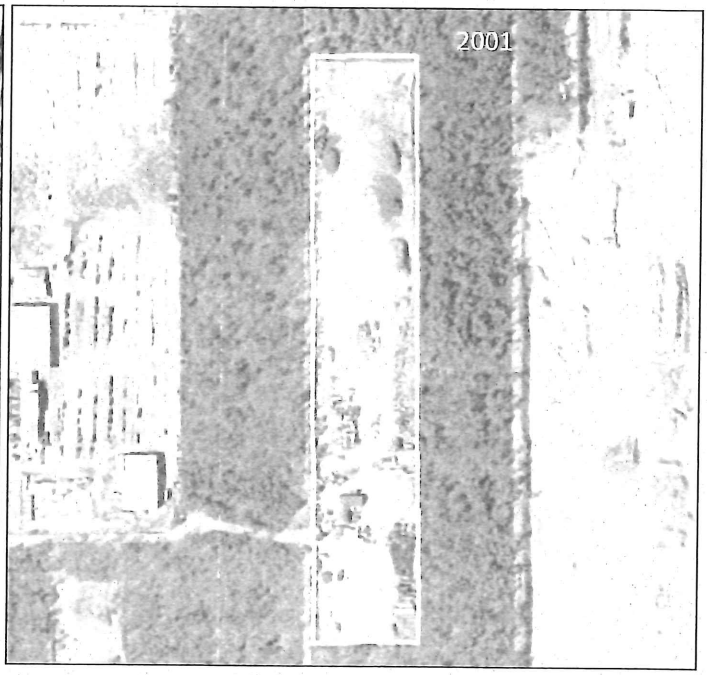


Site #1 – 5th Avenue, Speonk

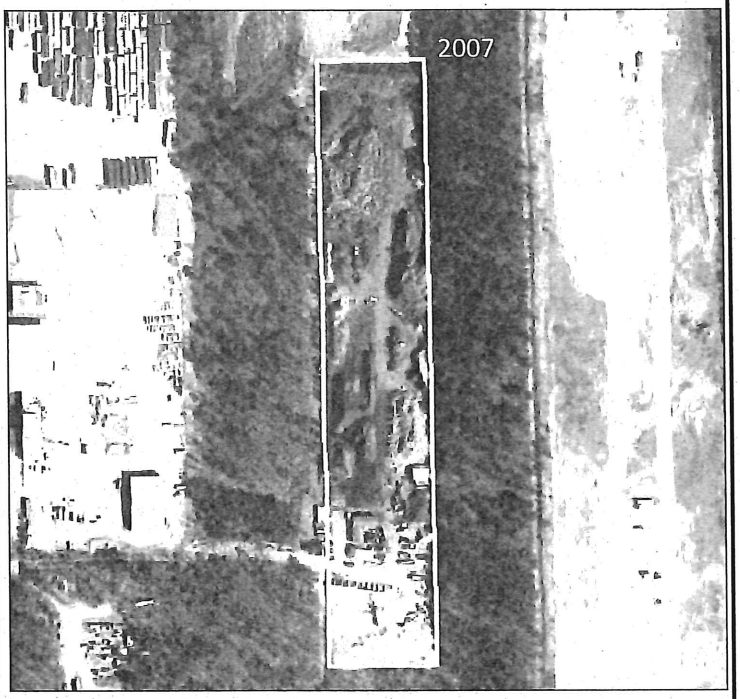


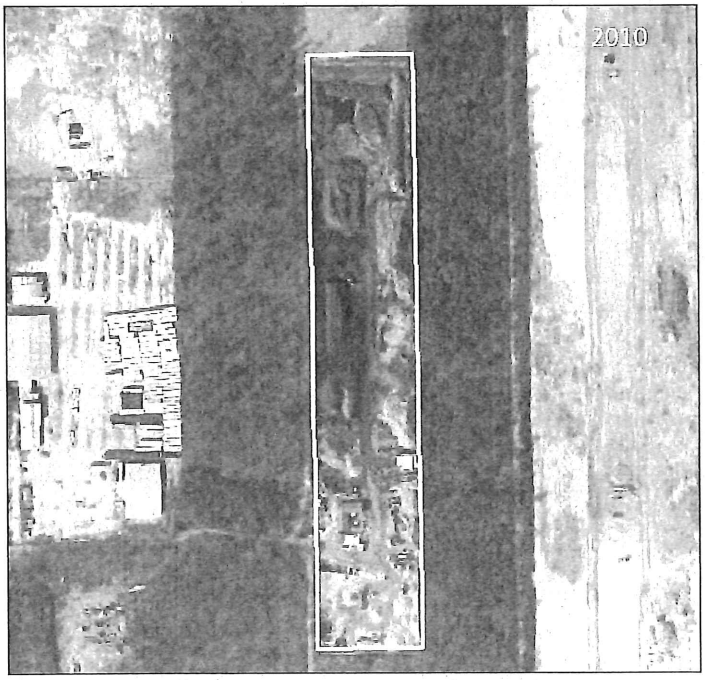


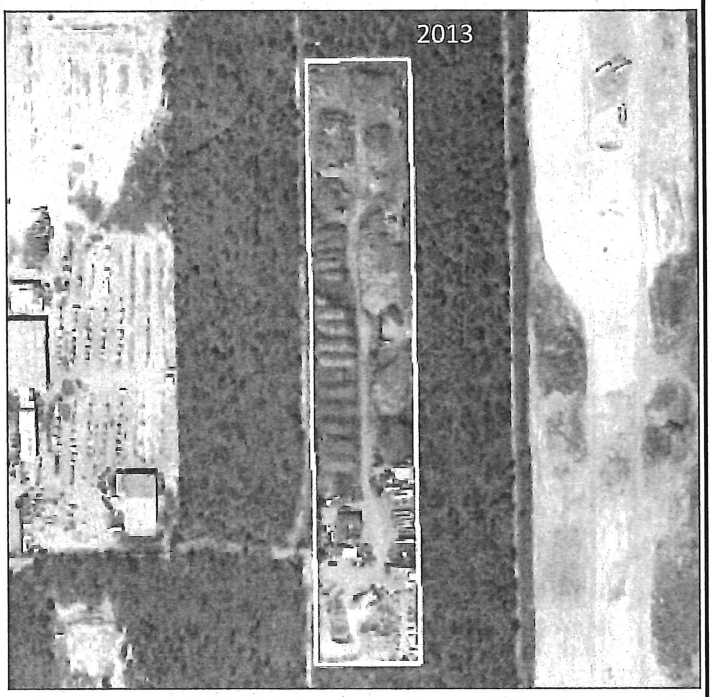




Site #1 – 5th Avenue, Speonk



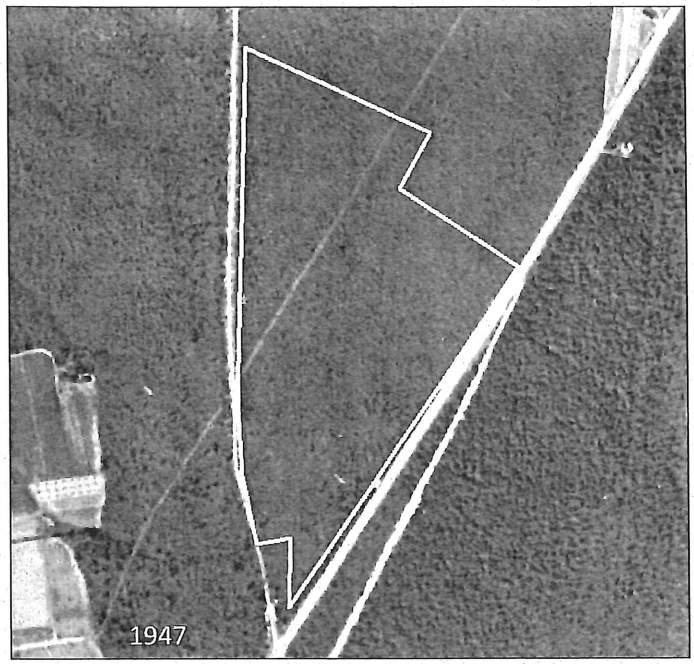




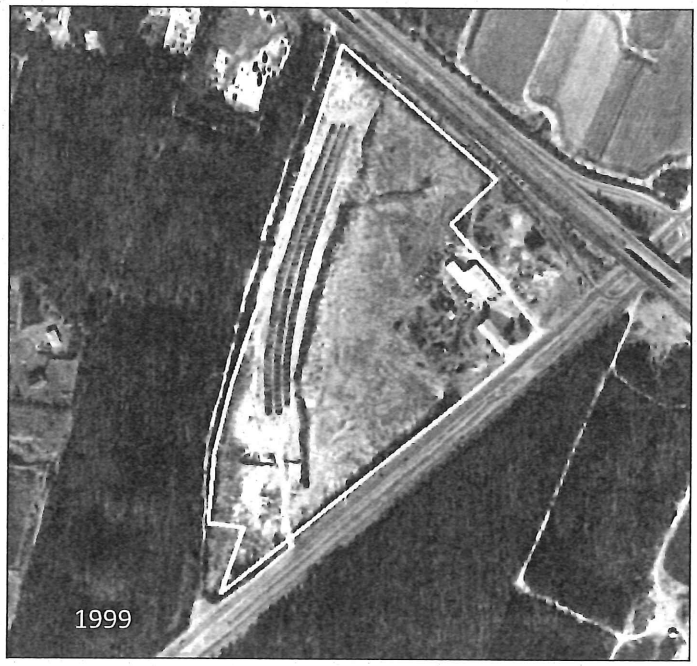
Appendix B

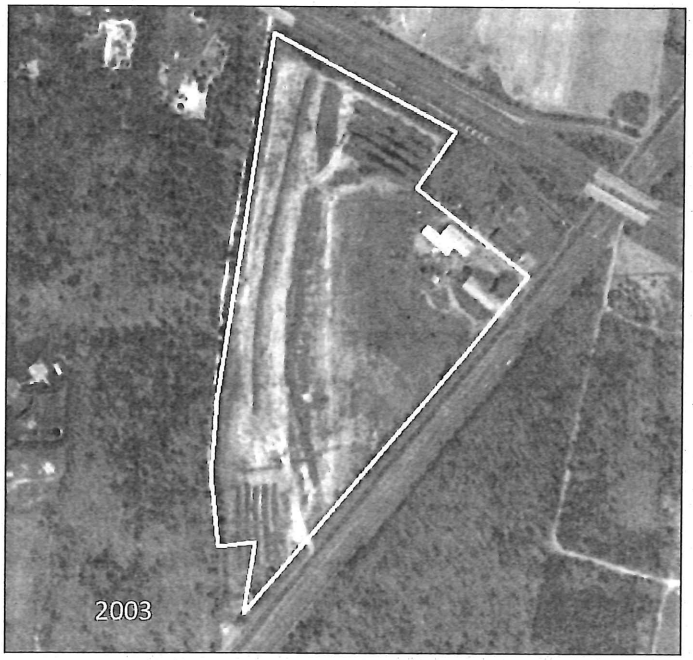
Site #2
Moriches-Riverhead Road Farm

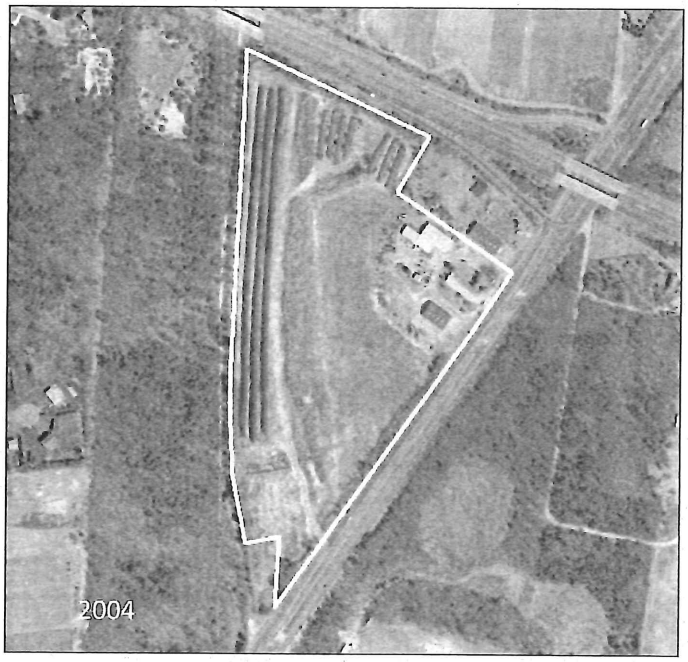
Site #2 – Moriches-Riverhead Road Farm, Eastport



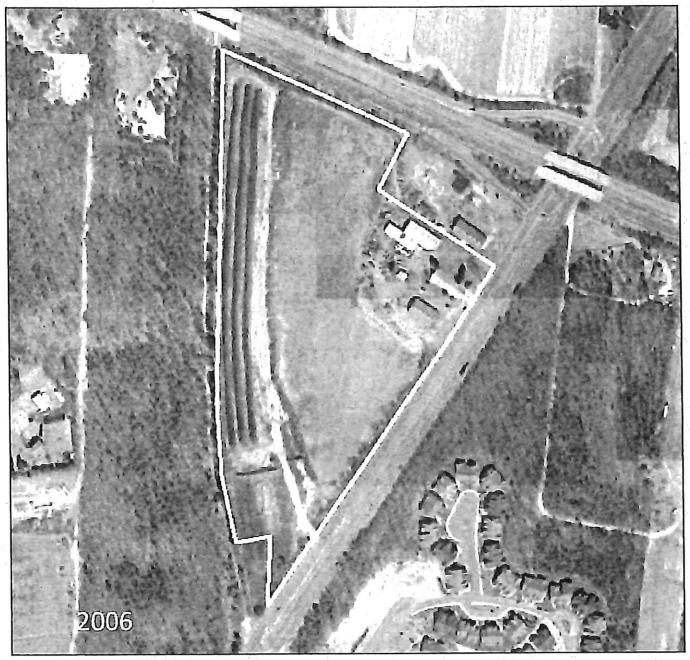
Site #2 – Moriches-Riverhead Road Farm, Eastport

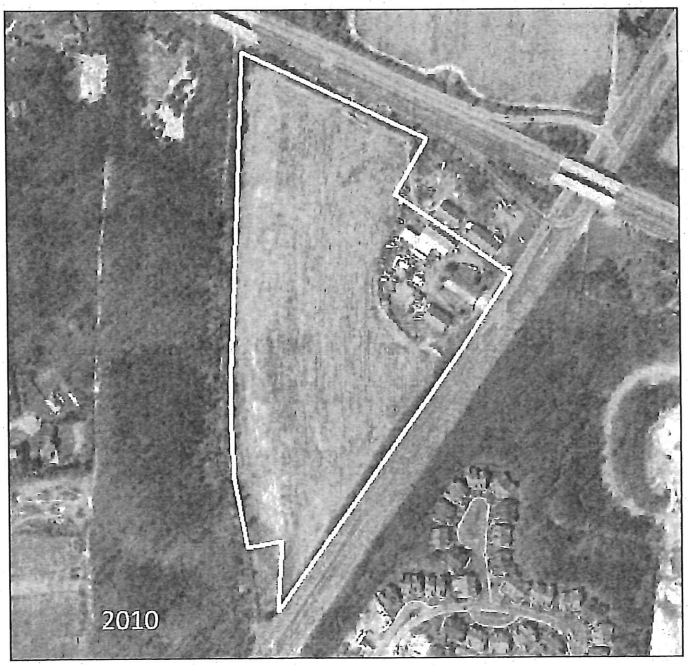






Site #2 – Moriches-Riverhead Road Farm, Eastport



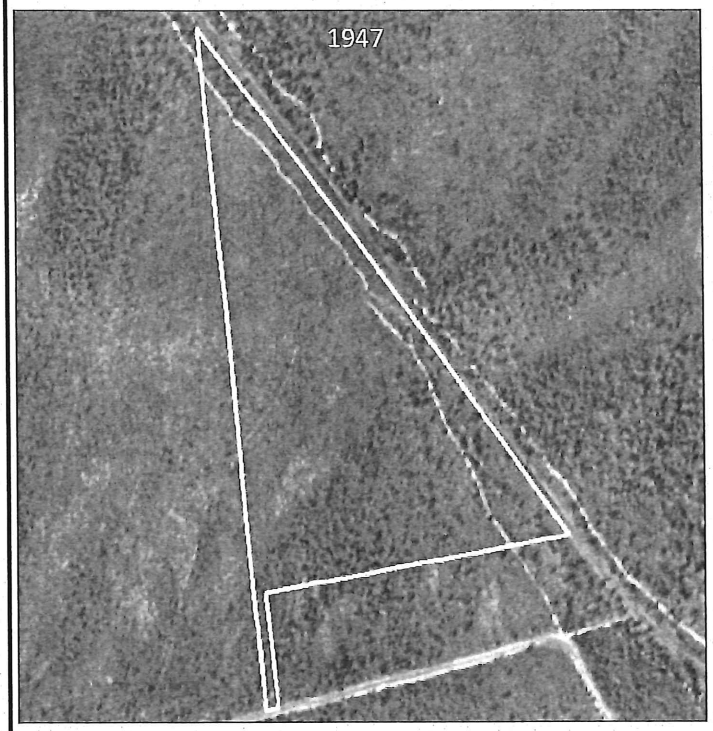


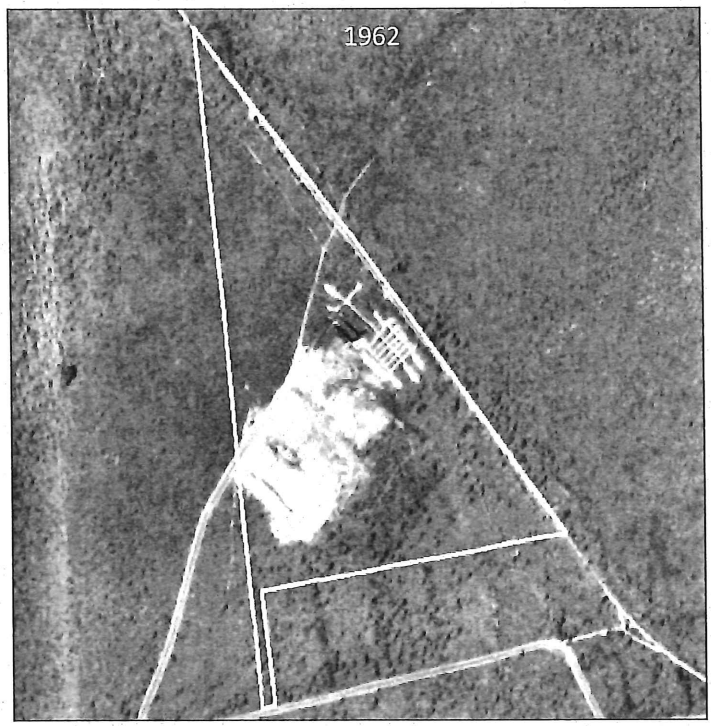
Appendix C

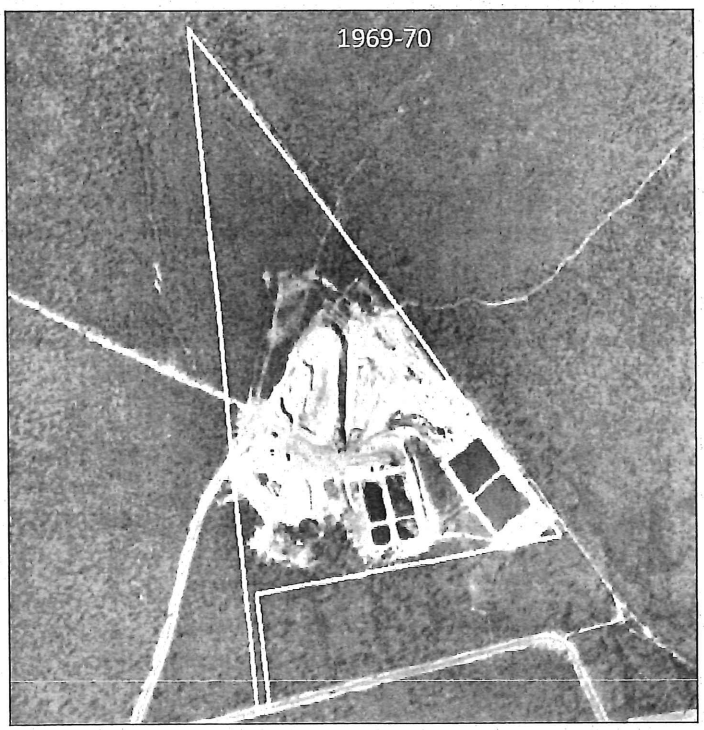
Site #3

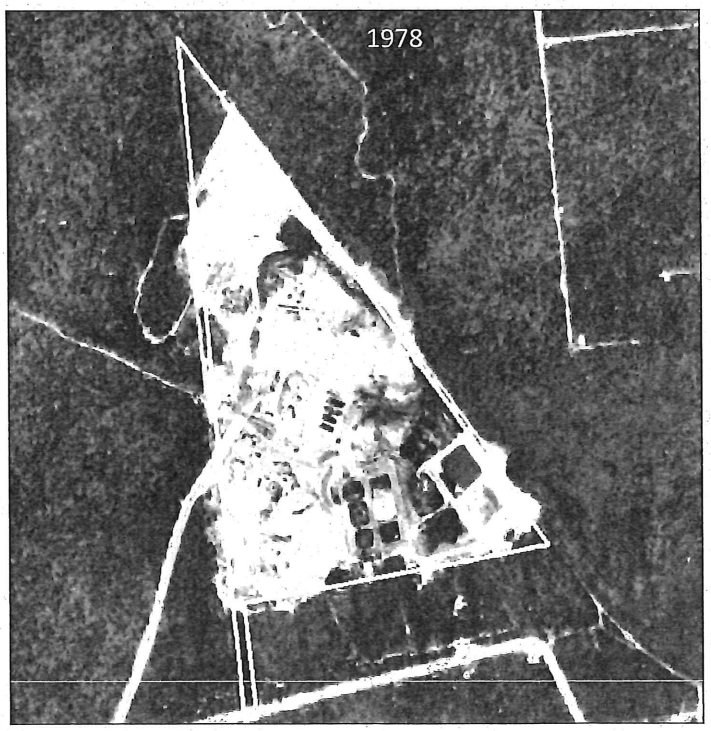
Papermill Road Facility
Manorville, NY

Site #3 – Papermill Road Facility, Manorville

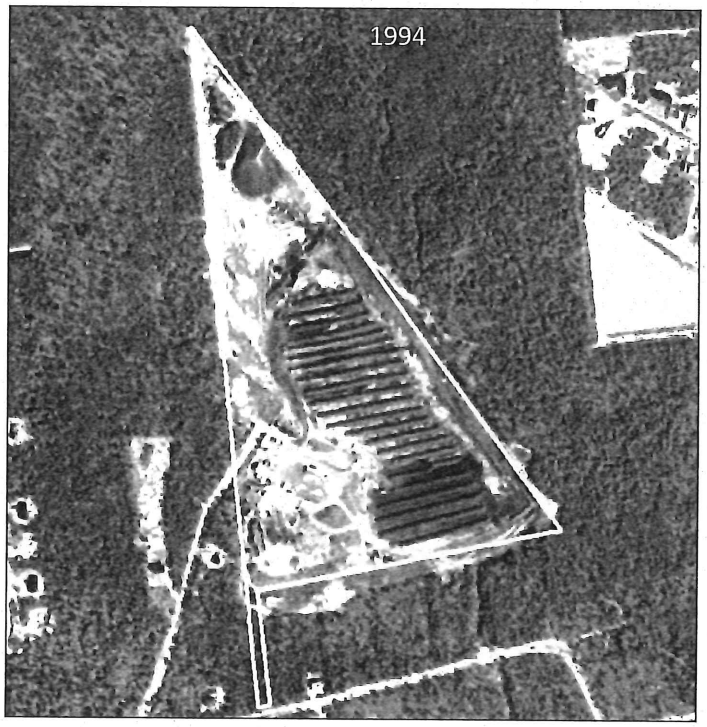


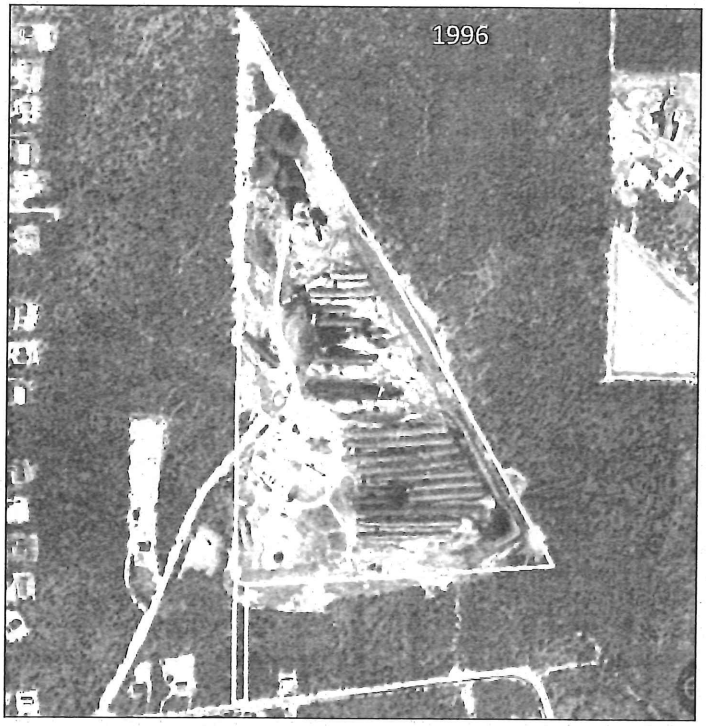


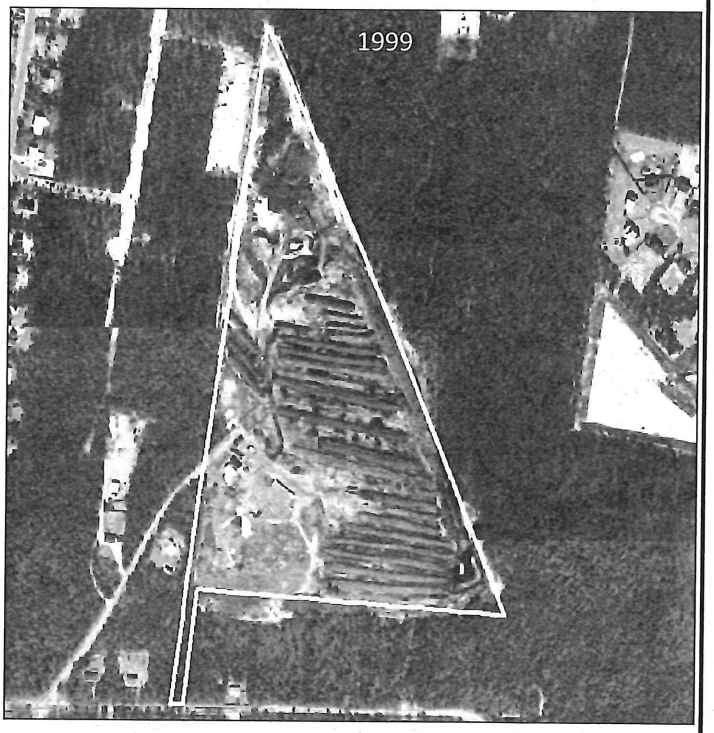




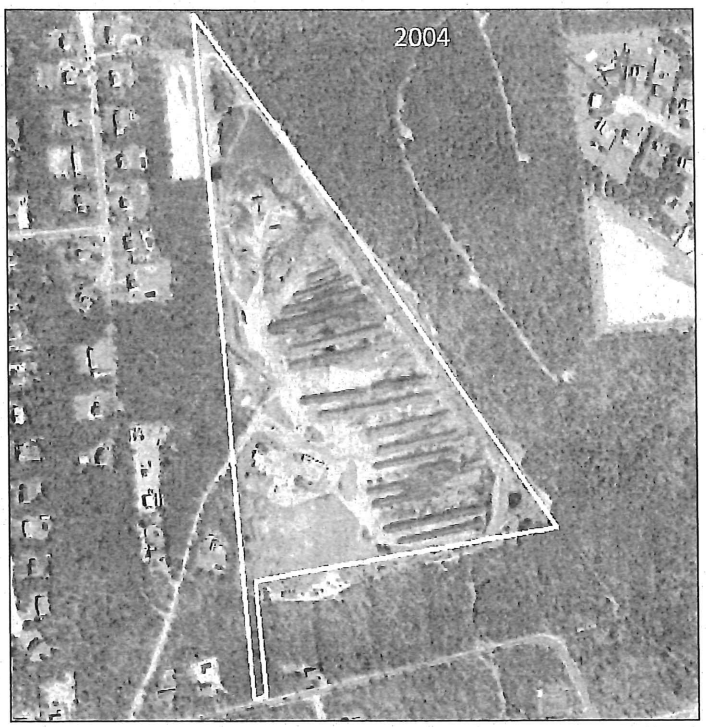
Site #3 – Papermill Road Facility, Manorville

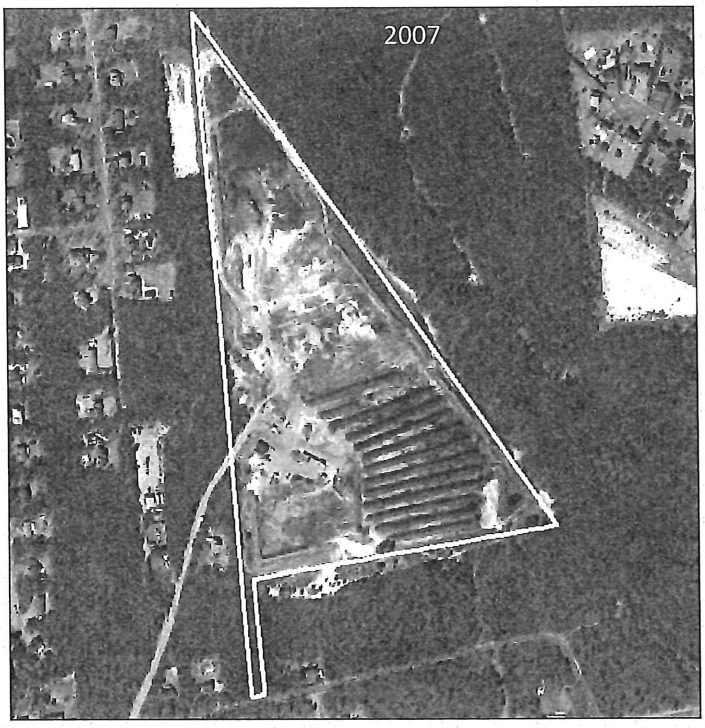


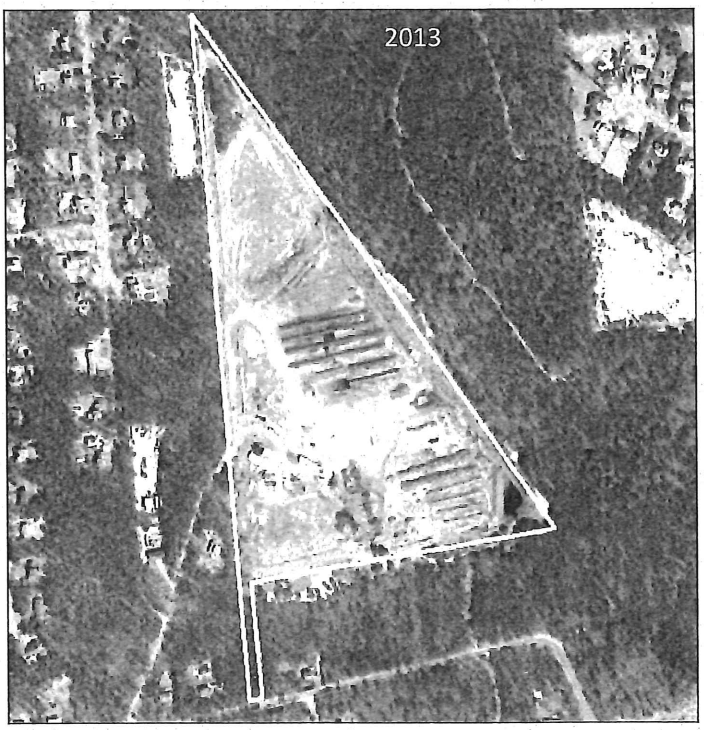




Site #3 – Papermill Road Facility, Manorville







Appendix D

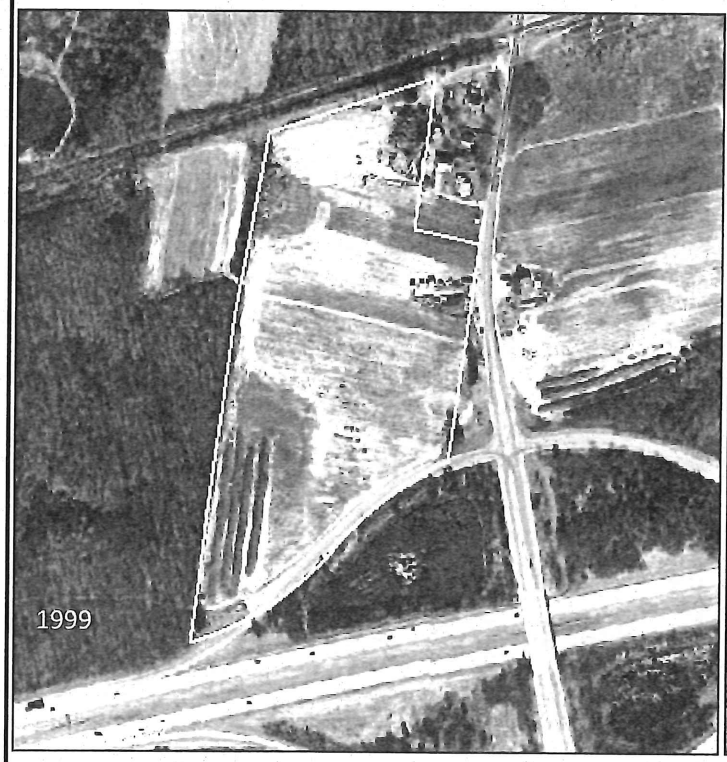
Site #4

Exit 69 LIE Ramp

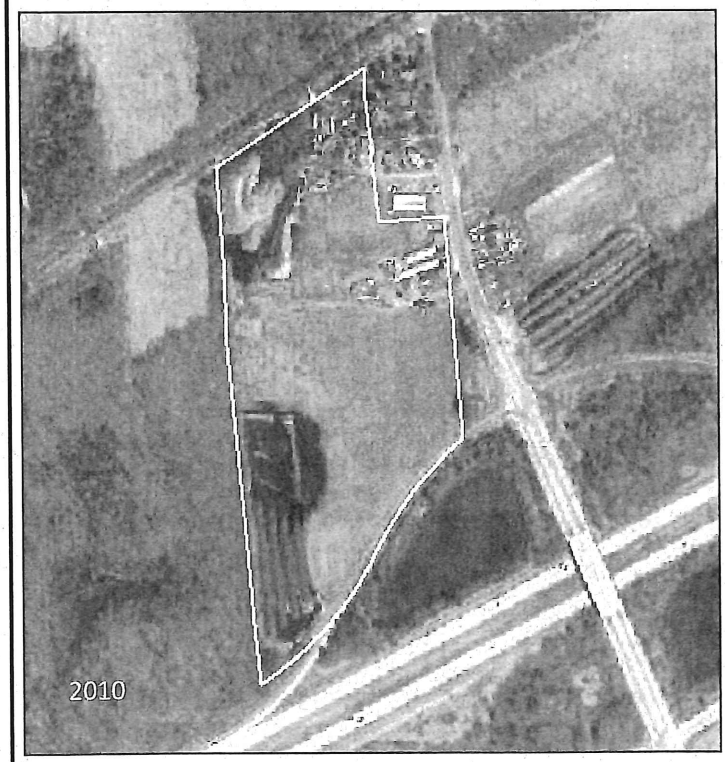
Yaphank, NY

Site #4 – Exit 9 LIE Ramp, Yaphank

Site #4 – Exit 9 LIE Ramp, Yaphank



Site #4 – Exit 9 LIE Ramp, Yaphank



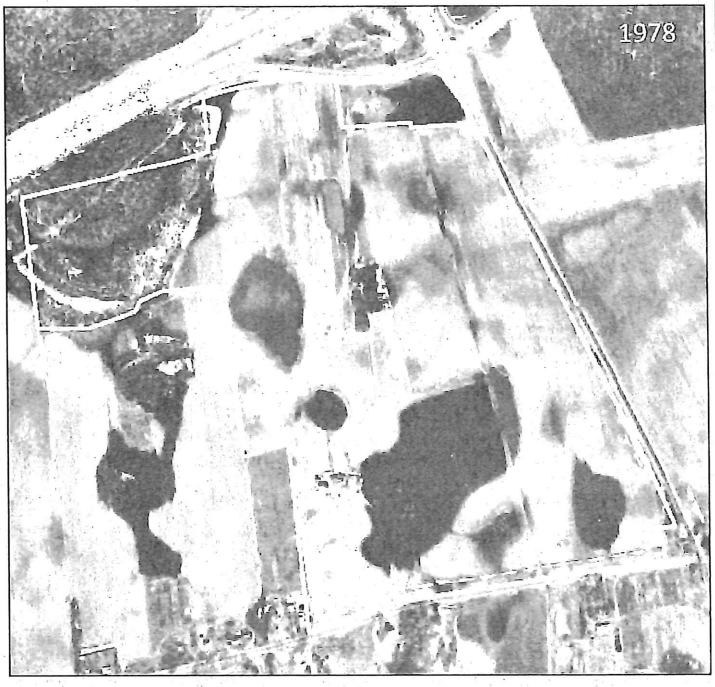
Appendix E

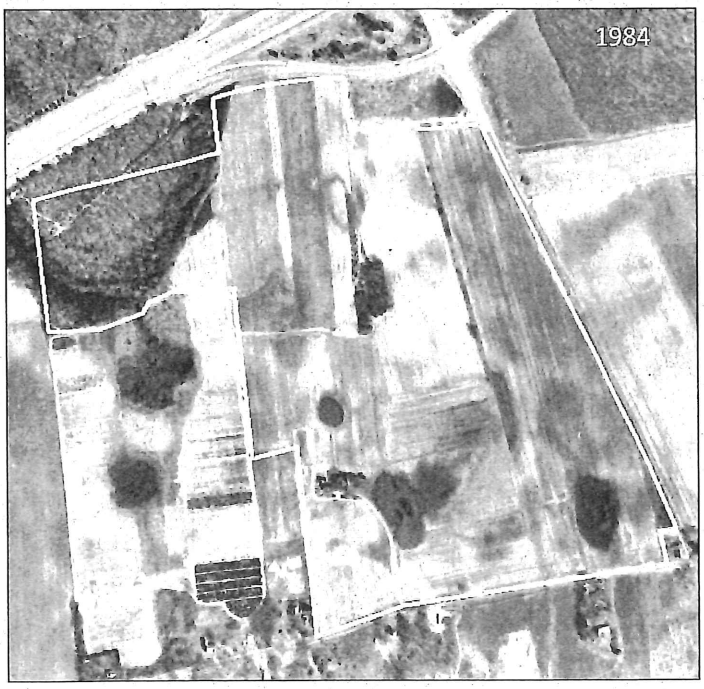
Site #5

South Street Farm

Manorville

Site #5 - South Street Farm, Manorville





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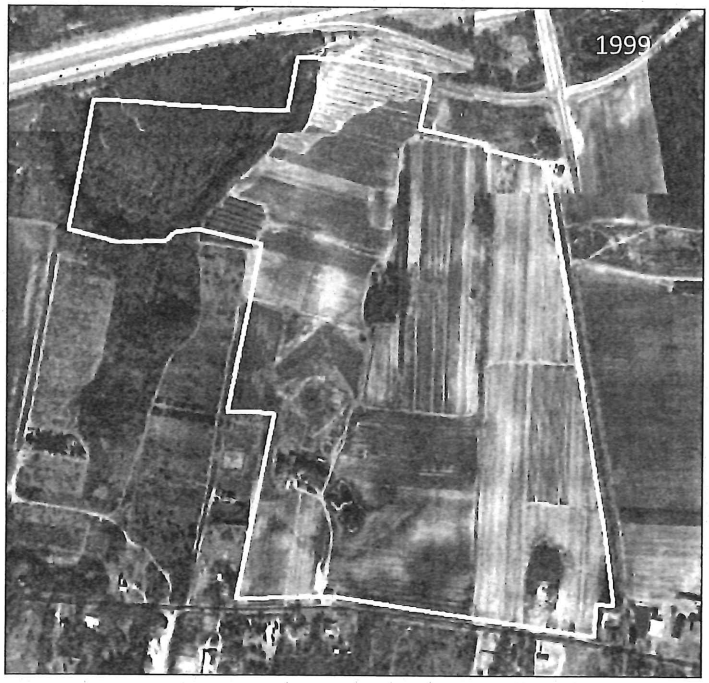
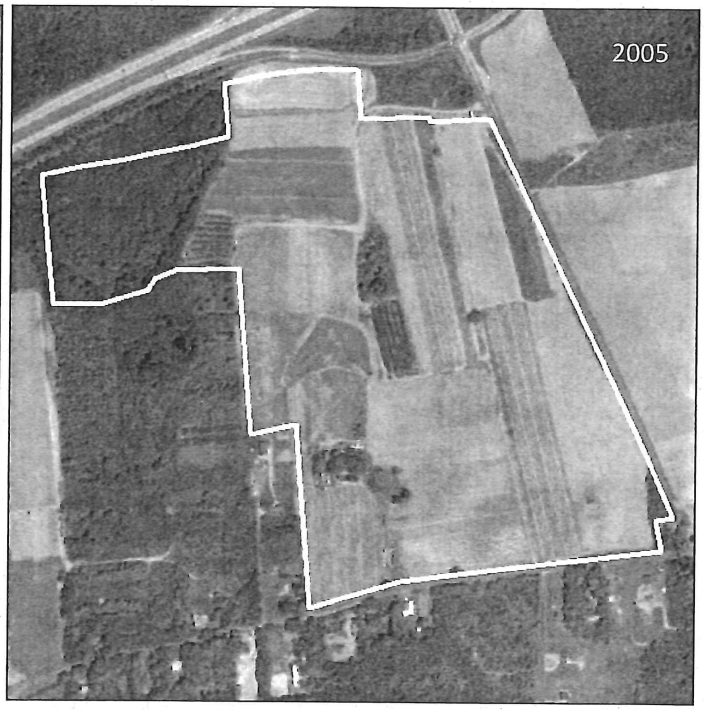
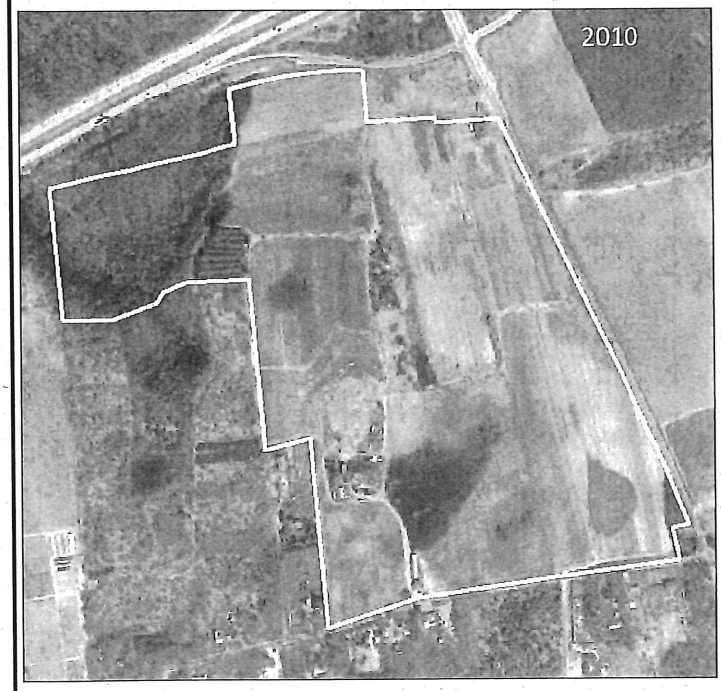




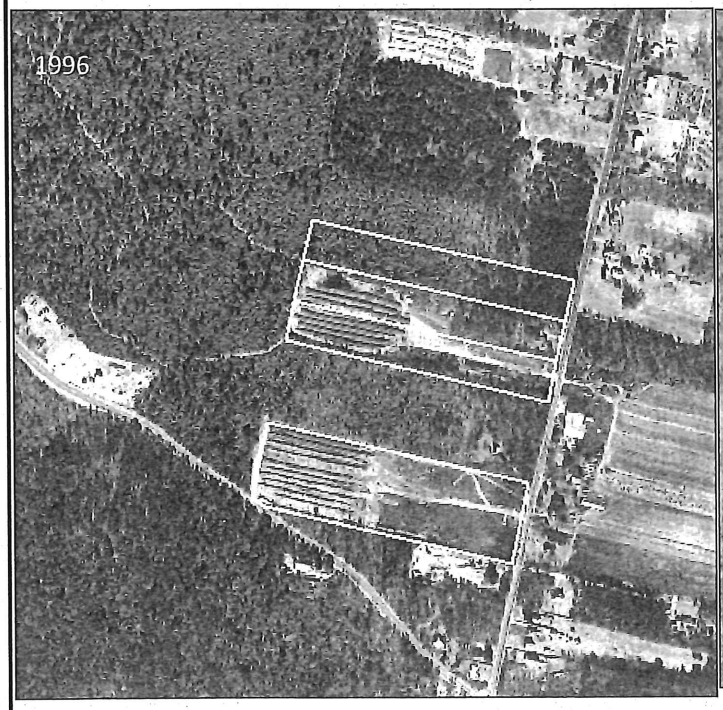
Site #5 - South Street Farm, Manorville

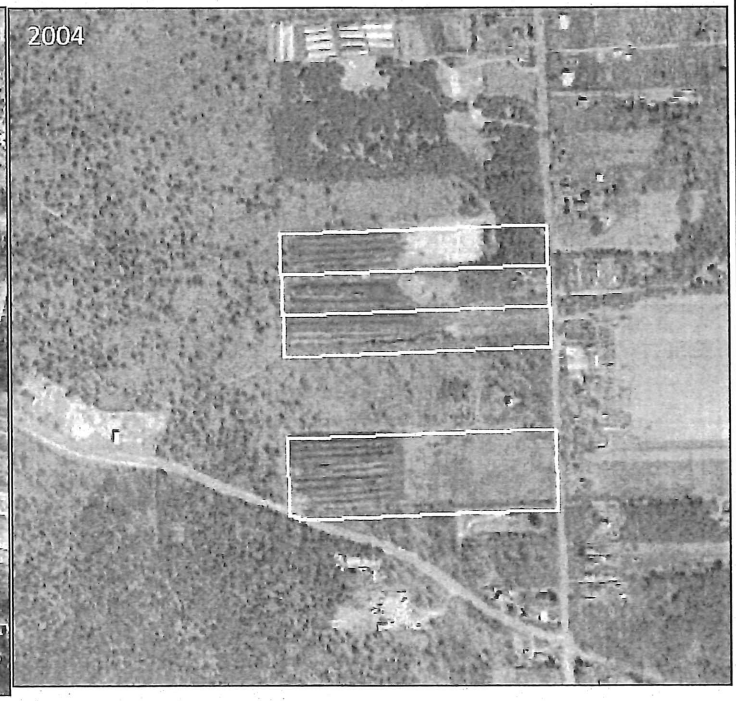


Appendix F

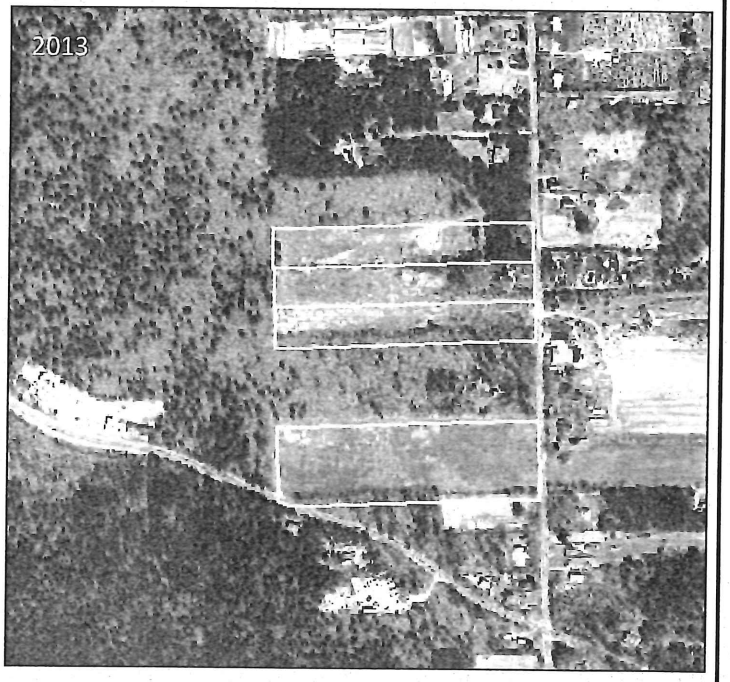
Site #6
Moriches –Yaphank Rd Farm
Moriches NY

Site #6 - Moriches-Yaphank Road Farm, Moriches





Site #6 - Moriches-Yaphank Road Farm, Moriches



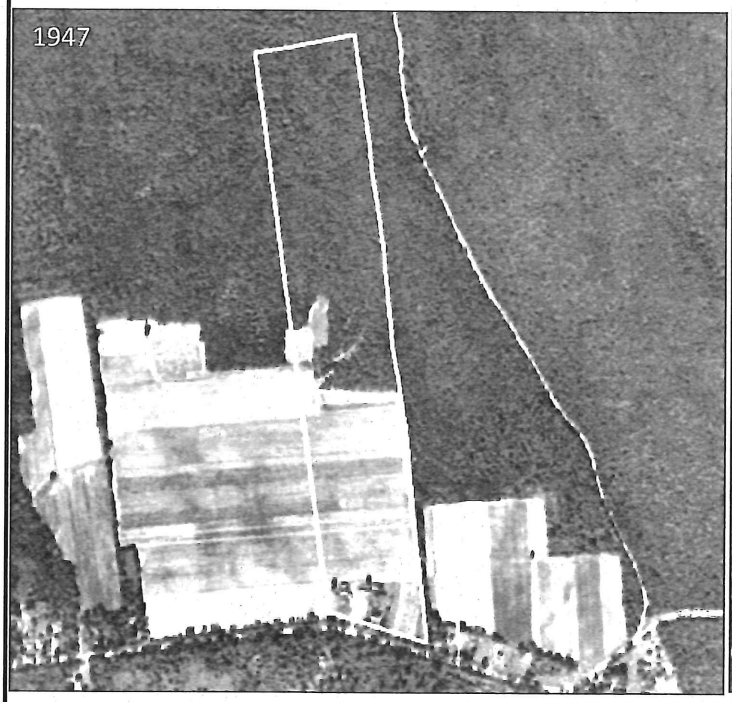
Appendix G

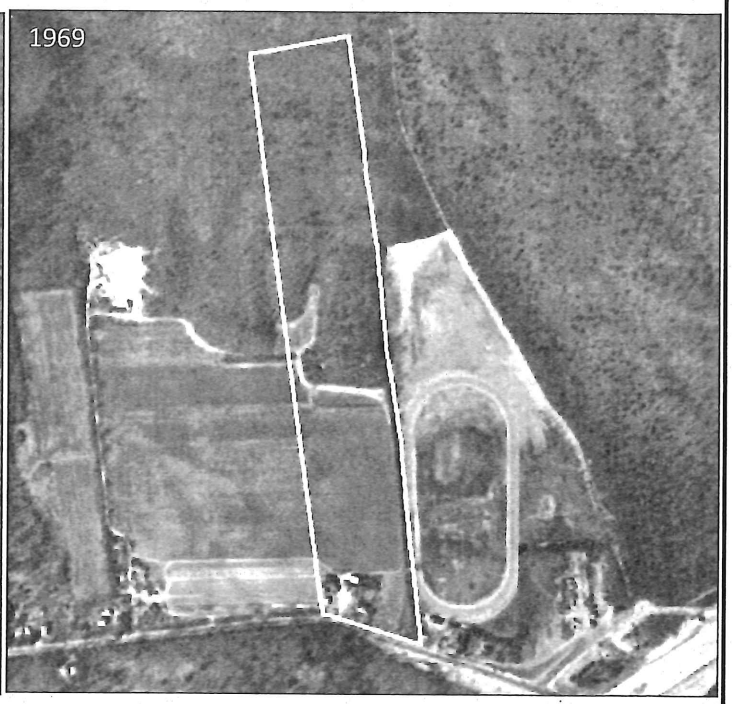
Site #7

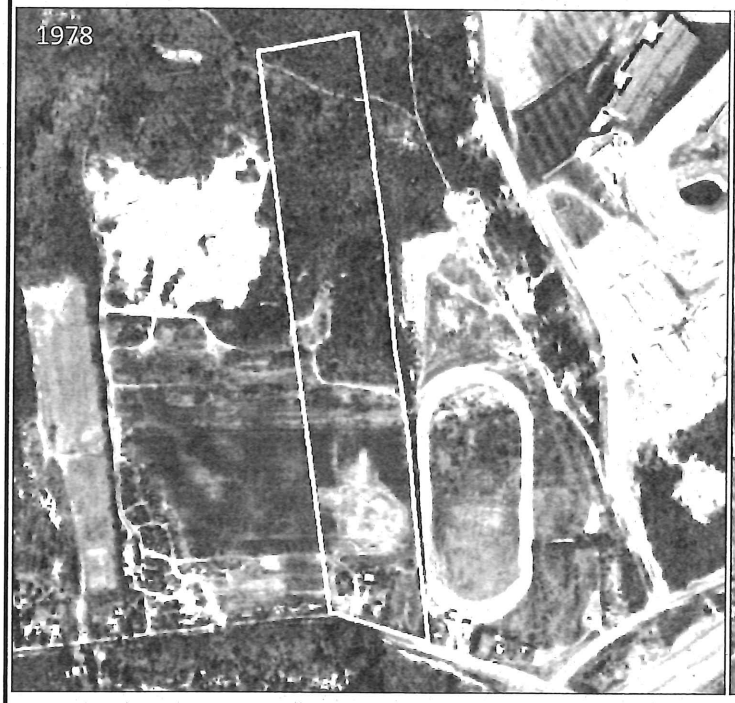
East Main St.

Yaphank, NY

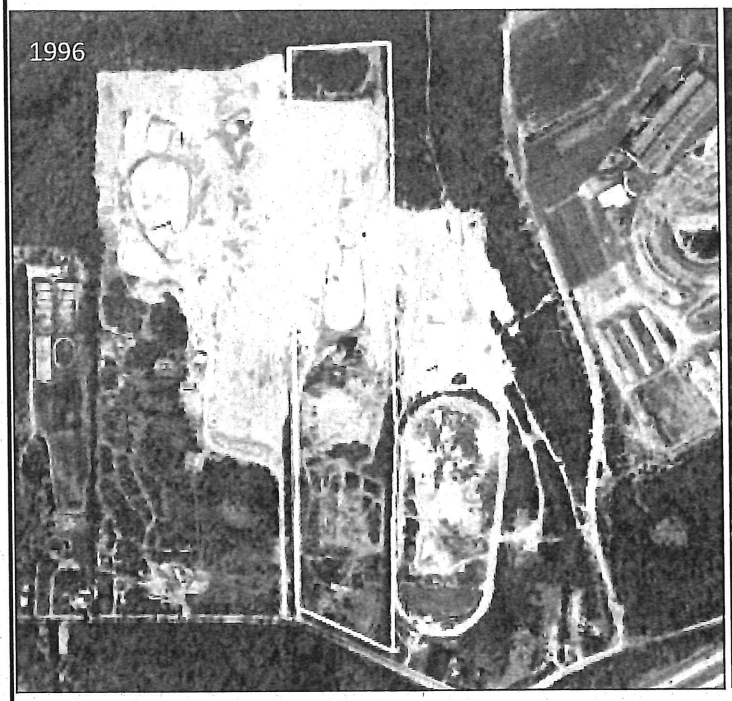
Site #7 – East Main Street Site, Yaphank

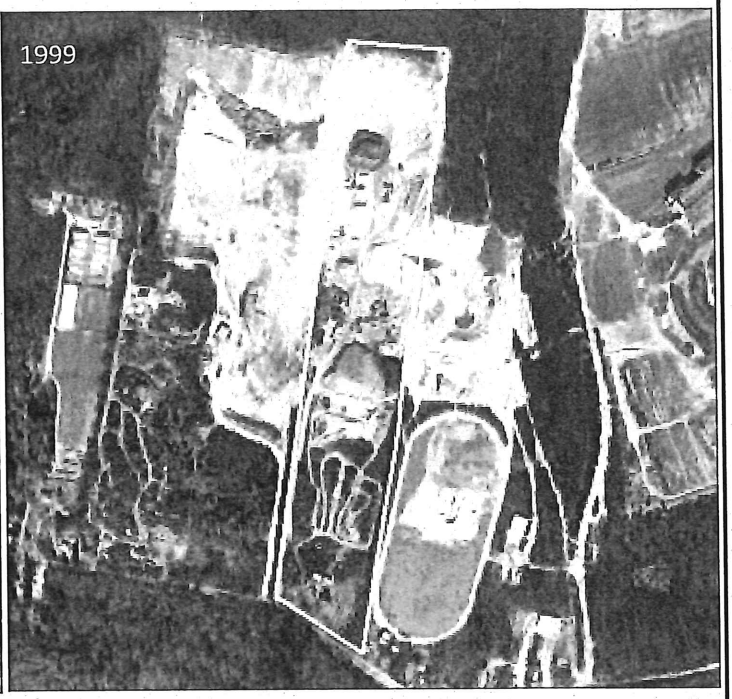






Site #7 – East Main Street Site, Yaphank





Site #7 – East Main Street Site, Yaphank

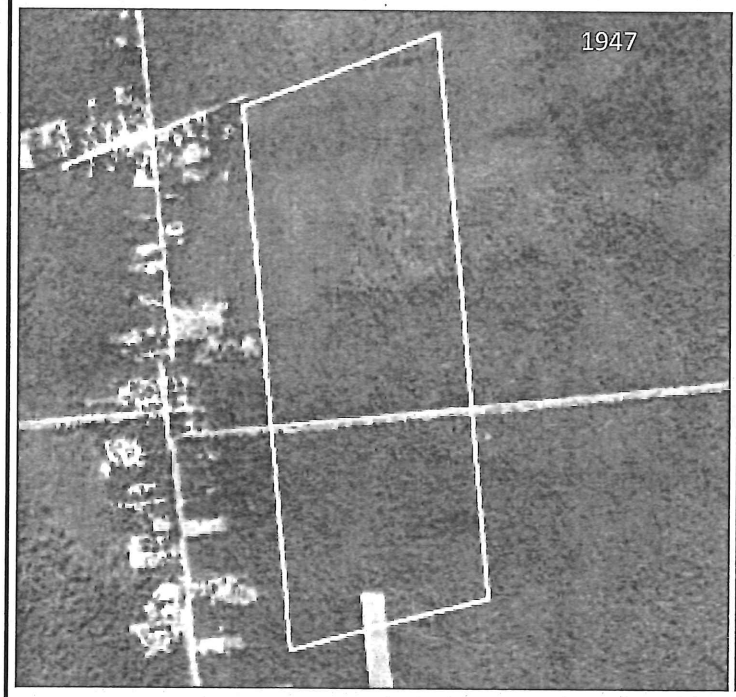
Appendix H

Site #8

LIE North Service Rd Farm

Yaphank, NY

Site #8 – LIE N. Service Rd Farm, Yaphank



Site #8 – LIE N. Service Rd Farm, Yaphank

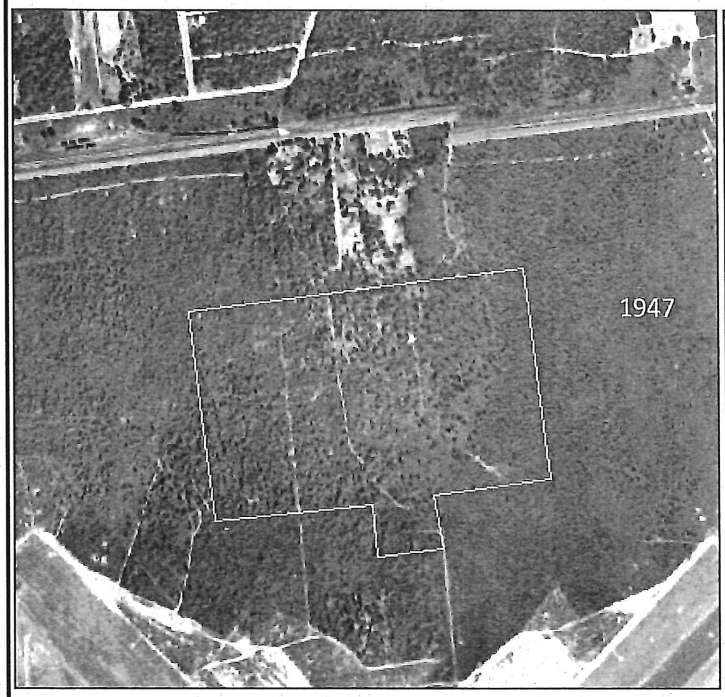
Appendix I

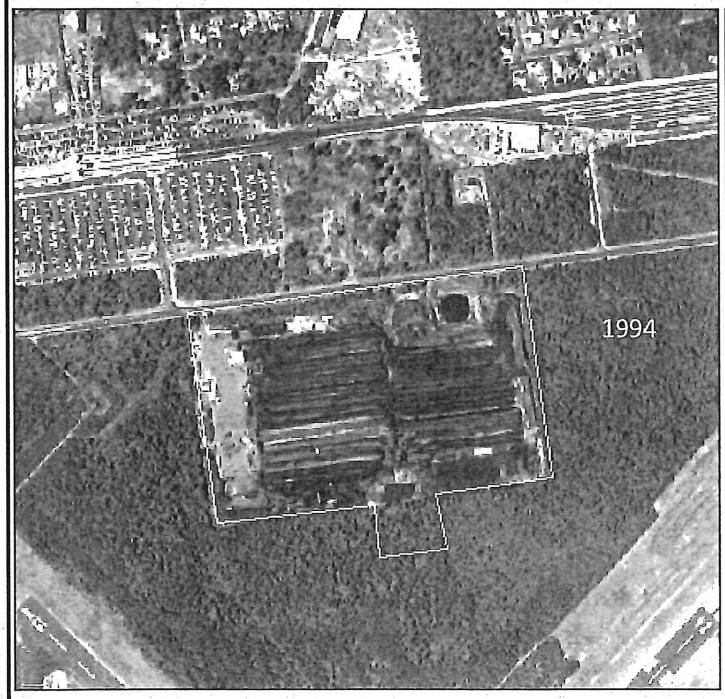
Site #9

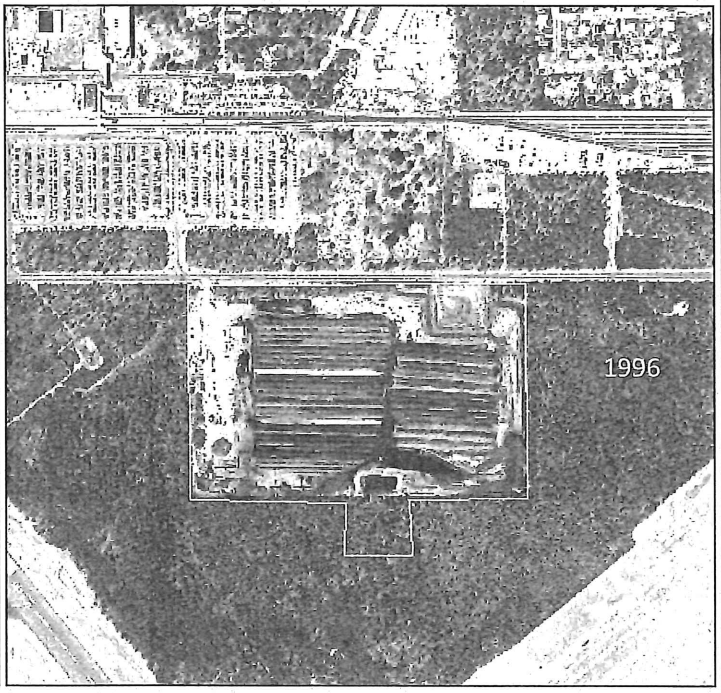
Islip Town Compost Facility

Ronkonkoma, NY

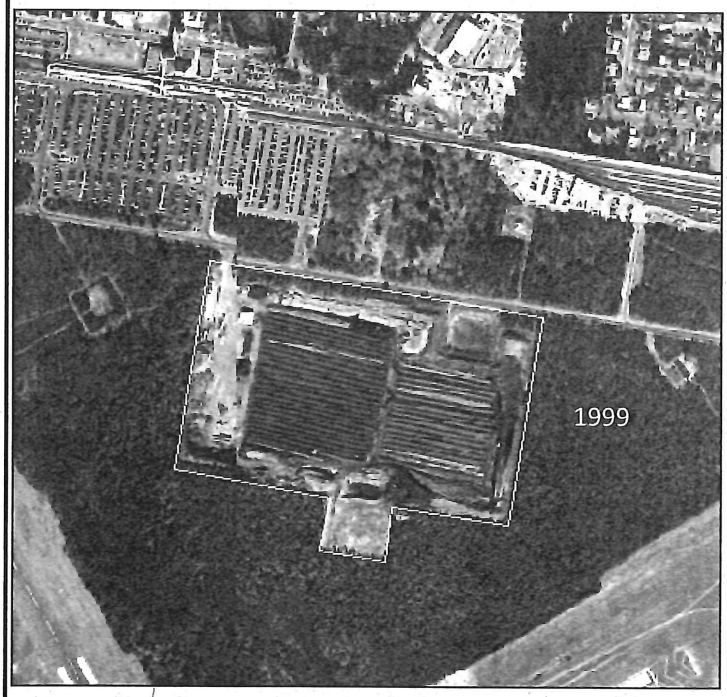
Site #9 – Islip Town Compost Facility, Ronkonkoma

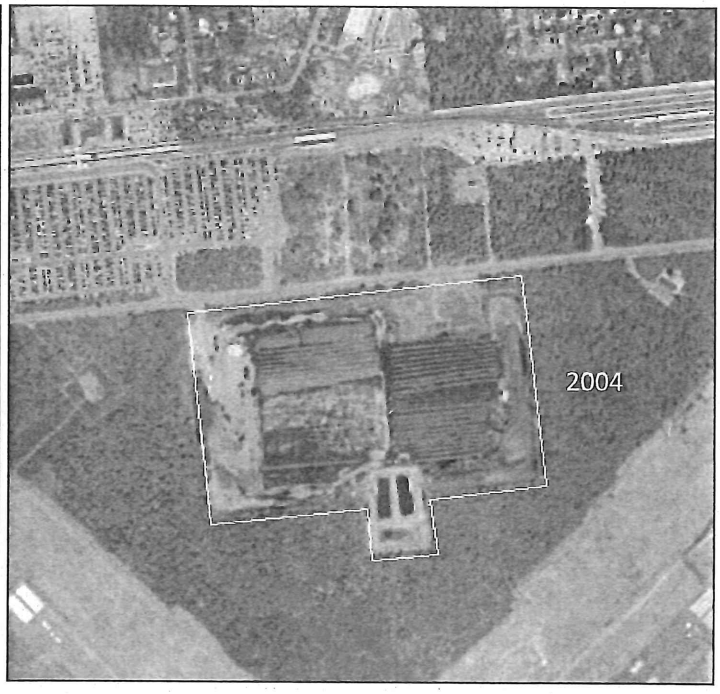


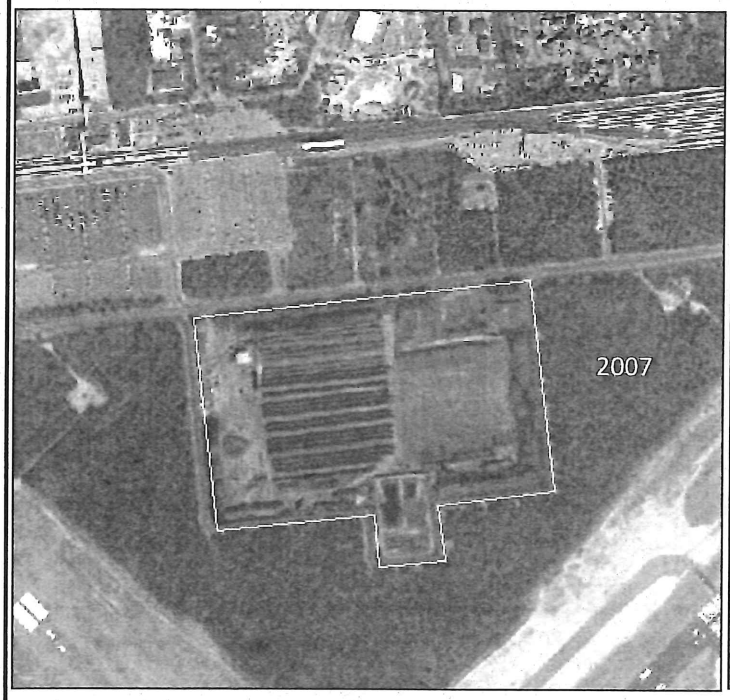




Site #9 – Islip Town Compost Facility, Ronkonkoma



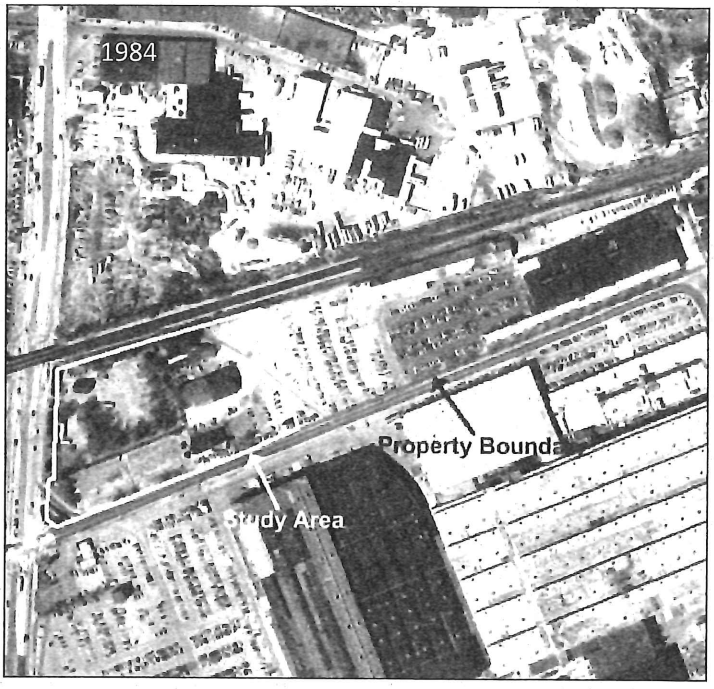


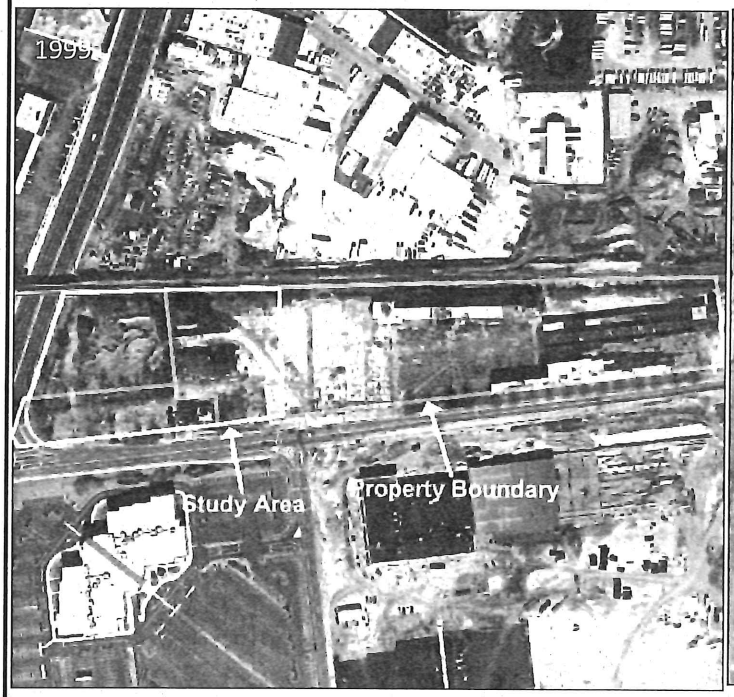


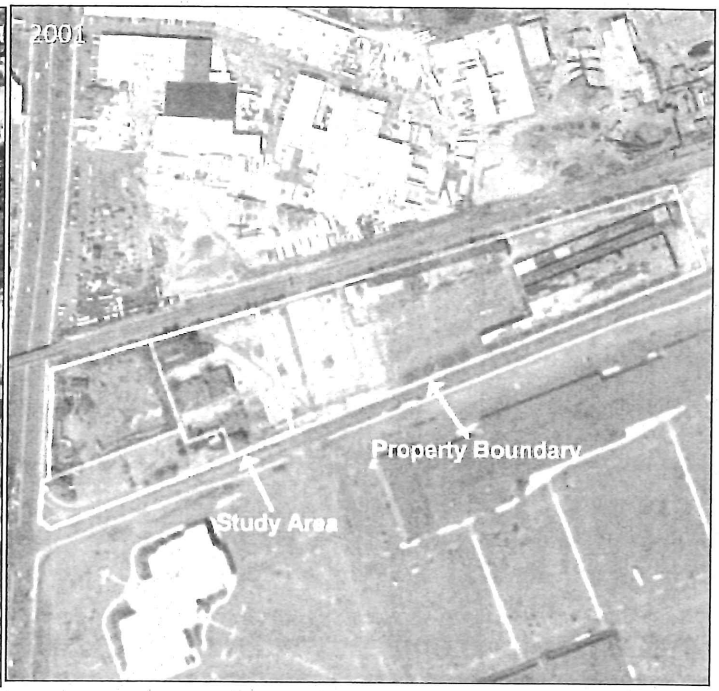
Appendix J

Site #10
Conklin Street
Farmingdale, NY

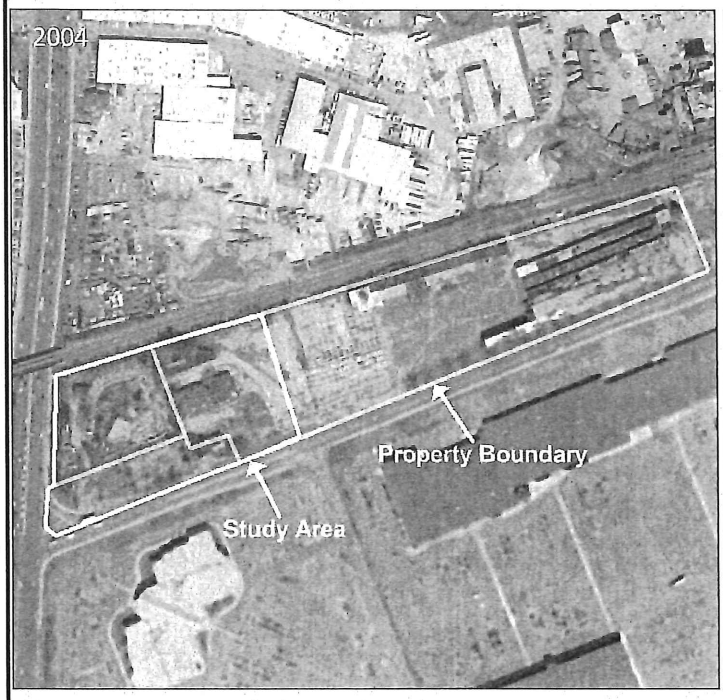
Site #10 – Conklin St, Farmingdale

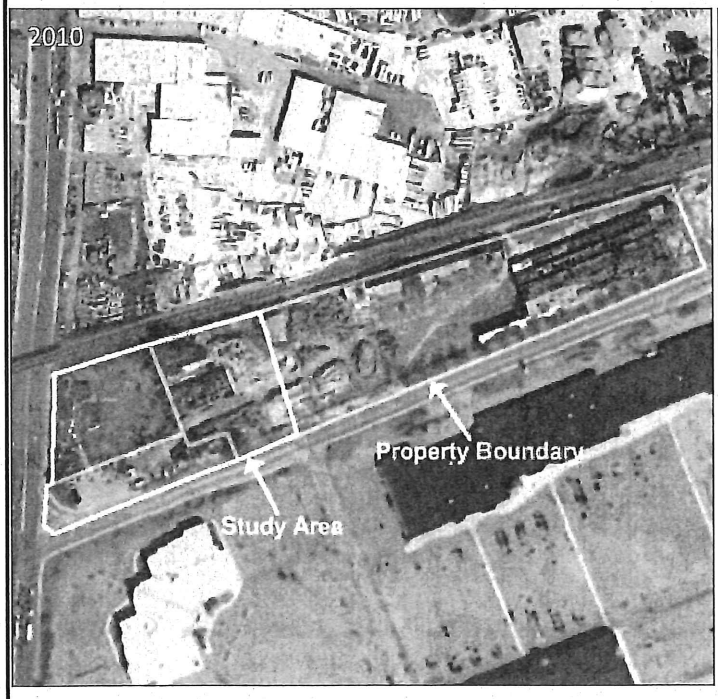


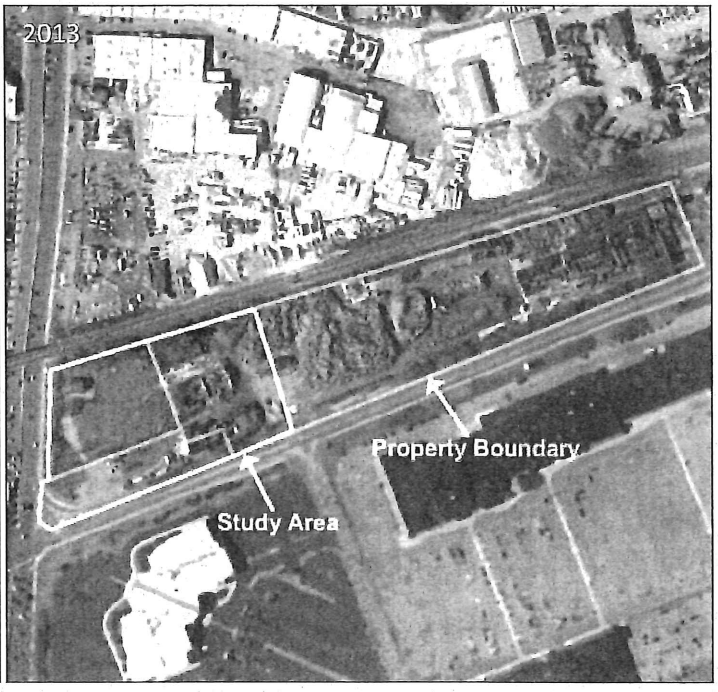




Site #10 – Conklin St, Farmingdale



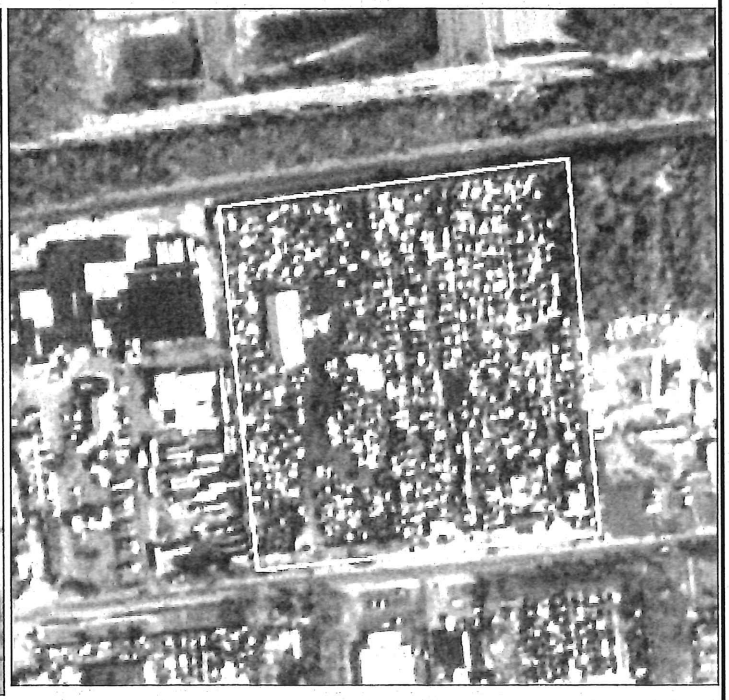




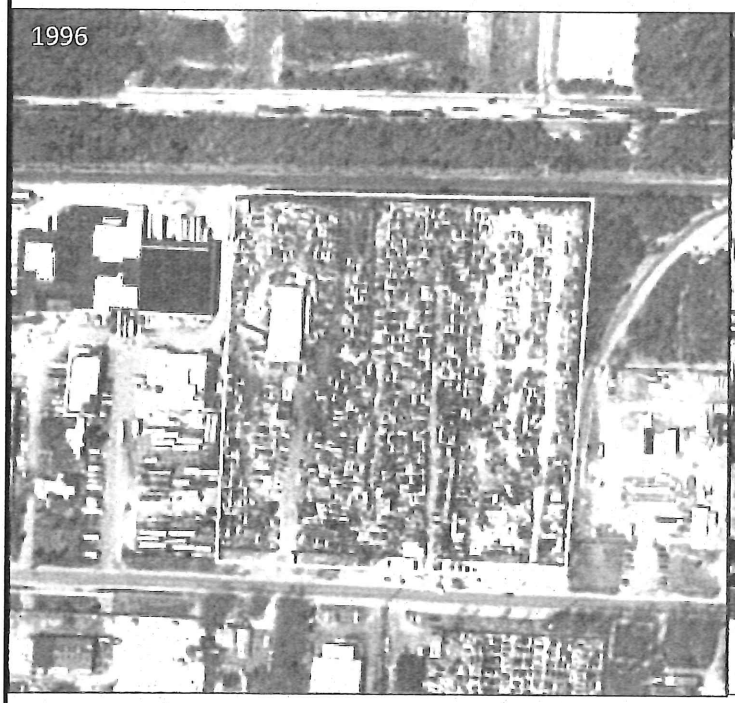
Appendix K

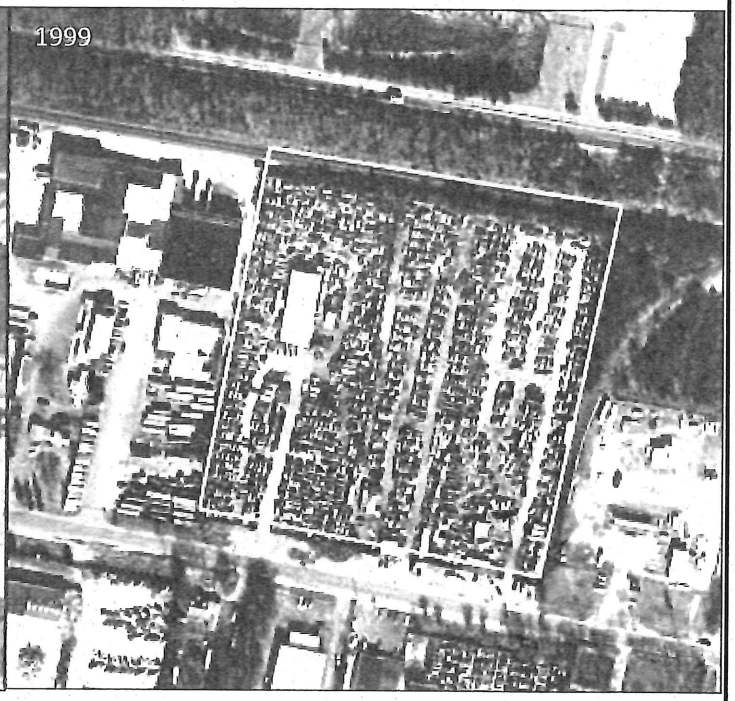
Site #11
Peconic Avenue
Medford, NY

Site #11 –Peconic Ave Medford

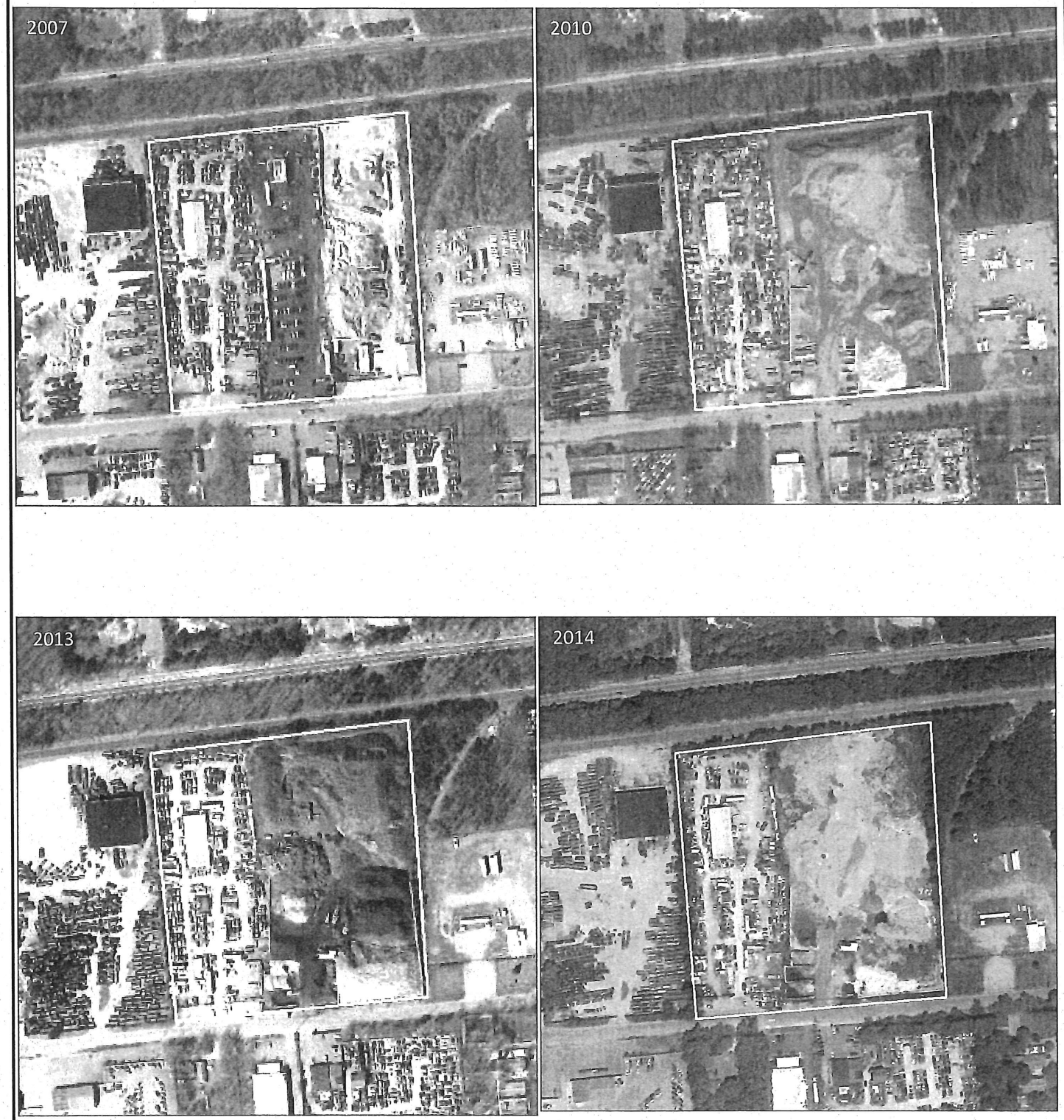


Site #11 –Peconic Ave Medford





Site #11 –Peconic Ave Medford



Appendix L

SCDHS Analytical Parameters

Standard SCDHS Groundwater Analyte List

1,1,1,2-Tetrachloroethane ug/l
1,1,1-Trichloroethane ug/l
1,1,2,2-Tetrachloroethane ug/l
1,1,2-Trichloroethane ug/l
1,1-Dichloroethane ug/l
1,1-Dichloroethene ug/l
1,1-Dichloropropene ug/l
1,2,3-Trichlorobenzene ug/l
1,2,3-Trichloropropane ug/l
1,2,4,5-Tetramethylbenzene ug/l
1,2,4-Trichlorobenzene ug/l
1,2,4-Trimethylbenzene ug/l
1,2-Dibromo-3-chloropropane ug/l
1,2-Dichlorobenzene (o) ug/l
1,2-Dichloroethane ug/l
1,2-Dichloropropane ug/l
1,3,5-Trimethylbenzene ug/l
1,3-Dichlorobenzene (m) ug/l
1,3-Dichloropropane ug/l
1,4-Dichlorobenzene (p) ug/l
1,4-Dichlorobutane ug/l
17 alpha Ethynylestradiol ug/l
17 beta Estradiol ug/l
1-Bromo-2-chloroethane ug/l
1-Methylnaphthalene ug/l
2,2-Dichloropropane ug/l
2,3-Dichloropropene ug/l
2,6-Dichlorobenzamide ug/l
2-Bromo-1-chloropropane ug/l
2-Butanone (MEK) ug/l
2-Chlorotoluene ug/l
2-Methylnaphthalene ug/l
3-HYDROXY CARBO ug/l
4,4 DDD ug/l
4,4 DDE ug/l
4,4 DDT ug/l
4-Androstene-3,17-dione ug/l
4-Chlorotoluene ug/l
4-Hydroxyphenytoin ug/l

A.SULFONE ug/l
A.SULFOXIDE ug/l
Acenaphthene ug/l
Acenaphthylene ug/l
Acetaminophen ug/l
Acetochlor ug/l
Acrylonitrile ug/l
Alachlor ESA ug/l
Alachlor OA ug/l
Alachlor ug/l
Aldicarb ug/l
Aldrin ug/l
Allethrin ug/l
Allyl chloride ug/l
Alpha - BHC ug/l
Aluminum ug/l
Ammonia (not distilled) mg/l N
A-NAPHTHOL ug/l
Anthracene ug/l
Antimony ug/l
Arsenic ug/l
Atrazine ug/l
Azoxystrobin ug/l
Barium ug/l
Benfluralin ug/l
Benzene ug/l
Benzo(a)anthracene ug/l
Benzo(a)pyrene ug/l
Benzo(b)fluoranthene ug/l
Benzo(ghi)perylene ug/l
Benzo(k)fluoranthene ug/l
Benzophenone ug/l
Beryllium ug/l
Beta - BHC ug/l
bis(2-ethylhexyl) adipate ug/l
bis(2-ethylhexyl) phthalate ug/l
Bisphenol A ug/l
Bisphenol B ug/l
Bloc ug/l

Note: ug/l = microgram per liter; mg/l = milligram per liter

Bromacil ug/l
Bromide mg/l
Bromobenzene ug/l
Bromochloromethane ug/l
Bromodichloromethane ug/l
Bromoform ug/l
Bromomethane ug/l
Butachlor ug/l
Butyl benzyl phthalate ug/l
Butylated Hydroxyanisole ug/l
Butylated Hydroxytoluene ug/l
Cadmium ug/l
Caffeine ug/l
Calcium mg/l
Carbamazepine ug/l
CARBARYL ug/l
Carbazole ug/l
Carbofuran ug/l
Carbon disulfide ug/l
Carbon tetrachloride ug/l
Carisoprodol ug/l
CGA-354743 ug/l
CGA-37735 ug/l
CGA-40172 ug/l
CGA-41638 ug/l
CGA-51202 ug/l
CGA-67125 ug/l
Chlordane ug/l
Chloride mg/l
Chlorobenzene ug/l
Chlorodifluoromethane ug/l
Chloroethane ug/l
Chlorofenvinphos ug/l
Chloroform ug/l
Chloromethane ug/l
Chlorothalonil ug/l
Chloroxylenol ug/l
Chlorpyriphos ug/l
Chromium ug/l
Chrysene ug/l
cis-1,2-Dichloroethene ug/l
cis-1,3-Dichloropropene ug/l
Cobalt ug/l
Copper ug/l
Cyfluthrin ug/l
Cypermethrin ug/l
Dacthal ug/l
Delta - BHC ug/l
Deltamethrin ug/l
Dibenzo(a,h)anthracene ug/l
Dibromochloromethane ug/l
Dibromomethane ug/l
Dibutyl phthalate ug/l
Dichlobenil ug/l
Dichlorodifluoromethane ug/l
Dichlorvos ug/l
Dieldrin ug/l
Diethyl ether ug/l
Diethyl phthalate ug/l
Diethylstilbestrol ug/l
Diethyltoluamide (DEET) ug/l
Dimethyl phthalate ug/l
Dimethyldisulfide ug/l
Dinoseb ug/l
Dioctyl phthalate ug/l
Disulfoton sulfone ug/l
Disulfoton ug/l
Diuron ug/l
d-Limonene ug/l
Endosulfan I ug/l
Endosulfan II ug/l
Endosulfan Sulfate ug/l
Endrin Aldehyde ug/l
Endrin ug/l
EPTC ug/l
Estrone ug/l
Ethenylbenzene (Styrene) ug/l
Ethofumesate ug/l

Note: ug/l = microgram per liter; mg/l = milligram per liter

Ethyl parathion ug/l
Ethylbenzene ug/l
Ethylene dibromide ug/l
Ethylmethacrylate ug/l
Etofenprox alpha-CO ug/l
Etofenprox ug/l
Fluoranthene ug/l
Fluorene ug/l
Fluoride mg/l
Freon 113 ug/l
G-28273 ug/l
G-28279 ug/l
G-30033 ug/l
G-34048 ug/l
Gamma - BHC ug/l
Gemfibrozil ug/l
Germanium ug/l
Gross Alpha E pCi/l
Gross Beta pCi/l
Heptachlor Epoxide ug/l
Heptachlor ug/l
Hexachlorobenzene ug/l
Hexachlorobutadiene ug/l
Hexachlorocyclopentadiene ug/l
Hexachloroethane ug/l
Hexavalent Chromium ug/l
Hexazinone ug/l
Ibuprofen ug/l
Imidacloprid ug/l
Imidacloprid Urea ug/l
Indeno(1,2,3-cd)pyrene ug/l
Iodofenphos ug/l
Iprodione ug/l
Iron (Ferric) mg/l
Isobutane ug/l
Isofenphos ug/l
Isopropylbenzene ug/l
Kelthane ug/l
Lead ug/l
Lithium ug/l
m,p-Xylene ug/l
Magnesium mg/l
Malaoxon ug/l
Malathion ug/l
Manganese ug/l
MBAS (Low Sensitivity) mg/l
Mercury ug/l
Metalaxyl ug/l
Methacrylonitrile ug/l
METHIOCARB SULFONE ug/l
METHIOCARB ug/l
METHOMYL ug/l
Methoprene ug/l
Methoxychlor ug/l
Methyl isothiocyanate ug/l
Methyl parathion ug/l
Methyl sulfide ug/l
Methylene chloride ug/l
Methylmethacrylate ug/l
Methyl-tertiary-butyl-ether ug/l
Metolachlor ug/l
Metribuzin ug/l
Molybdenum ug/l
MONO METHYL ug/l
Naled (Dibrom) ug/l
Naphthalene ug/l
Napropamide ug/l
n-Butane ug/l
n-Butylbenzene ug/l
Nickel ug/l
Nitrate mg/l N
Nitrite mg/l N
n-Propylbenzene ug/l
Ortho-Phosphate mg/l P
OXAMYL ug/l
o-Xylene ug/l
p-Diethylbenzene ug/l
Pendimethalin ug/l

Note: ug/l = microgram per liter; mg/l = milligram per liter

Pentachlorobenzene ug/l
Pentachloronitrobenzene ug/l
Perchlorate ug/l
Permethrin ug/l
Phenanthrene ug/l
Phenytoin (Dilantin) ug/l
Picaridin ug/l
Piperonyl butoxide ug/l
p-Isopropyltoluene ug/l
Potassium mg/l
Prallethrin ug/l
Prometon ug/l
Prometryne ug/l
Propachlor ug/l
Propamocarb hydrochloride ug/l
Propanal ug/l
Propiconazole (TILT) ug/l
PROPOXUR ug/l
Pyrene ug/l
Resmethrin ug/l
Ronstar ug/l
sec-Butylbenzene ug/l
Selenium ug/l
Siduron ug/l
Silver ug/l
Simazine ug/l
Sodium mg/l
Strontium ug/l
Sulfate mg/l SO4
Sumithrin ug/l
TCTP ug/l
Tebuthiuron ug/l
Tellurium ug/l
Terbacil ug/l
tert-Butylbenzene ug/l
Tetrachloroethene ug/l
Tetrahydrofuran ug/l
Thallium ug/l
Thorium ug/l
Tin ug/l
Titanium ug/l
Toluene ug/l
Total Xylene ug/l
trans-1,2-Dichloroethene ug/l
trans-1,3-Dichloropropene ug/l
Triadimefon ug/l
Trichlorfon ug/l
Trichloroethene ug/l
Trichlorofluoromethane ug/l
Triclosan ug/l
Trifluralin ug/l
Tritium pCi/l
Uranium ug/l
Vanadium ug/l
Vinclozolin ug/l
Vinyl chloride ug/l
Zinc ug/l

Note: ug/l = microgram per liter; mg/l = milligram per liter