LOCKHEED MARTIN
We never forget who we're working for®

Frog Mortar Creek Surface Water Investigation Frequently Asked Questions

February 2012

Brief Project Description

As a part of the environmental investigations and cleanup plans under way at the Martin State Airport site, Lockheed Martin has conducted extensive surface water and sediment investigations in Frog Mortar Creek since 2004. Previous investigations of the surface water and sediment were conducted by the airport operator (Maryland Aviation Administration) in 1997. The area under investigation is adjacent to the part of the property known as the Dump Road Area. These areas are shown in Graphic #1 on page 3.

Based on the three-phased study submitted to the Maryland Department of the Environment (MDE) in 2009, remediation of sediment or surface water in Frog Mortar Creek was not anticipated. However, ongoing sampling of surface water conducted in July 2010 detected unexpectedly higher levels of contaminants than previously detected. A timeline of sampling activities is provided in Graphic #2 on page 4.

Beginning in 2011 and in coordination with MDE, a quarterly surface water sampling program was started to: 1) establish whether sampling results might vary, and if so, whether seasonal or other influences such as tides or depths at which samples were taken might affect findings; and 2) to determine whether existing conditions might pose risks to recreational users of the area. The 2011 sampling data have shown a range of results over time, with the highest concentrations found following the thaw of ice and near the airport shoreline in March 2011. The Frog Mortar Creek surface water samples were taken in 3 locations in lines perpendicular to the shore - at the water's edge, at 50 feet and at 100 feet from the shore.

Human health risk calculations have been developed and updated with each set of quarterly sampling data. To date, these calculations have not indicated a need to actively restrict access to the area; however, it would be advisable to limit swimming in the portion of the creek located closest to the Dump Road Area. This month, MDE anticipates issuing a swimming advisory for Frog Mortar Creek, adjacent to the Martin State Airport. The advisory will not prohibit swimming yet leaves that decision as a personal choice of users of the area. However, it will advise the public about the chemicals that are present in the creek near the Dump Road Area shoreline.

Samples were taken in lines perpendicular to the shore, at the water's edge, at 50 feet and at 100 feet from the shore.

Lockheed Martin currently is proposing a treatment system to capture and treat groundwater in that area and by containing the movement of contaminated groundwater toward the creek, a reduction of contaminant concentrations in surface water is expected in the future. However, until that system can be approved and constructed, surface water monitoring will continue to be used to evaluate whether additional steps are needed to protect the health of people using the creek.

Frequently Asked Questions

1. What are the contaminants found in Frog Mortar Creek and also found in the groundwater in the Dump Road Area?

The primary contaminant in groundwater is trichloroethene, known as TCE, which breaks down and forms "daughter" byproducts. TCE and two such byproducts, cis-1,2-dichloroethene and vinyl chloride, are found in groundwater and in Frog Mortar Creek. Vinyl chloride is the final stage in the breakdown process before the contaminants become non-toxic. During this last stage, vinyl chloride is the most toxic of the compounds, so the vinyl chloride levels that regulators consider to be safe — or "allowable" — are extremely low.

2. What are the levels of these compounds that have been detected, and what levels are allowed as safe?

The levels of each of the three compounds have varied seasonally and between sampling locations. To date, the highest level of vinyl chloride has been 140 parts-per-billion (ppb), found adjacent to the Dump Road Area shoreline in March 2011, when swimming was unlikely due to the time of year. The highest observed summertime level of vinyl chloride has been 32 ppb, identified in July 2010. Because vinyl chloride is the most toxic of the three compounds being evaluated, its detection in Frog Mortar Creek triggered the development of risk-based screening levels designed to be protective of swimmers near the Dump Road Area shoreline. These swimming screening levels were derived to be conservative and protective of local residents who swim, or are assumed to be in the water, for four hours per day, 70 days per year, over the course of 30 years from childhood through adulthood. cis-1,2-Dichloroethene and TCE concentrations were below their swimming screening values of 300 ppb and 10 ppb, respectively, in all three 2011 swimming season rounds. The swimming screening level developed for vinyl chloride is 0.7 ppb. The average vinyl chloride concentration in June met the screening level of 0.7 ppb, the combined average of June and August results was 0.9 ppb and the combined average of June, August and September results was 1.8 ppb. The overall summertime average increased primarily due to an elevated concentration of vinyl chloride of 21 ppb at location SW-38 in September 2011. The table in Graphic #3 presents all 2011 summer season vinyl chloride results above the 0.7 ppb swimming screening level.

3. Why are these chemicals considered dangerous?

Studies have shown that some people exposed to high concentrations of these chemicals over long periods of time may have an increased risk of cancer over their lifetimes. People can potentially be exposed to these chemicals while swimming by accidentally ingesting water and by direct skin contact.

4. What happens to the chemicals when they reach Frog Mortar Creek?

The nature of these chemicals is to evaporate, or volatilize, which is why they are known as volatile organic compounds, or VOCs. Sampling indicates these chemicals are entering Frog Mortar Creek in the sediments closest to the shoreline near the Dump Road Area. Through dilution, dispersion, and volatilization, the concentrations generally decrease further away from the airport shoreline within that area. Higher water and air temperatures and tidal movements cause volatilization and mixing, continuing the process of lessening the effects of these VOCs. Graphic #3 on page 5 shows the locations of 2011 summer season samples with vinyl chloride concentrations exceeding the 0.7 ppb swimming screening level. Graphics #4 and #5 on pages 6-7 depict all locations and concentrations of TCE and vinyl chloride detected in June and September 2011.

5. Are measures needed to maintain public safety?

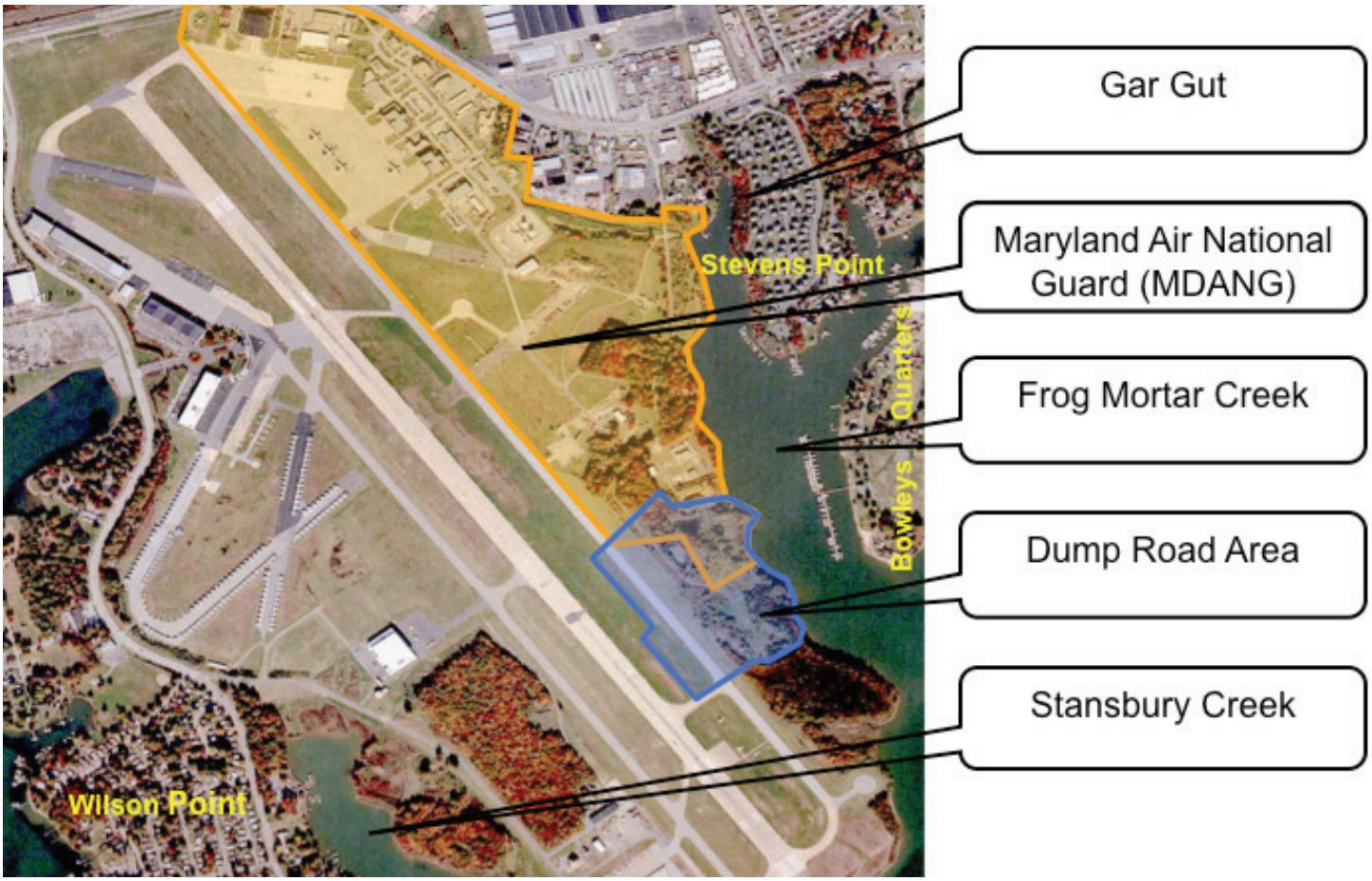
The results of sampling during the swimming season in 2011 indicate that there are risks due to increased concentrations in September and, as a result, actions are merited and warranted in the creek based upon potential current risks. However, the risks are chronic in nature and the swimming advisory anticipated to be issued by MDE does not actively restrict swimming in Frog Mortar Creek, rather, it leaves the choice to users of the area on how they limit swimming. The advisory will apply to an approximately 2,000-foot long stretch of the Martin State Airport shoreline, extending 200 feet or less into the creek from the airport shore. Through this handout, the public can be informed of the ongoing investigation, allowing informed decisions to be made by those choosing to boat, swim and recreate in the area, even though the shoreline is airport property and No Trespass signs are posted. Should conditions worsen, Lockheed Martin will work with the Maryland Department of the Environment and the property owner, the Maryland Aviation Administration, to establish additional measures to maintain public safety. Surface water quality will continue to be closely monitored,

particularly during the swimming and boating season, while plans to treat onsite groundwater become finalized and implemented, and until the resulting reduction in surface water contaminants is established as anticipated.

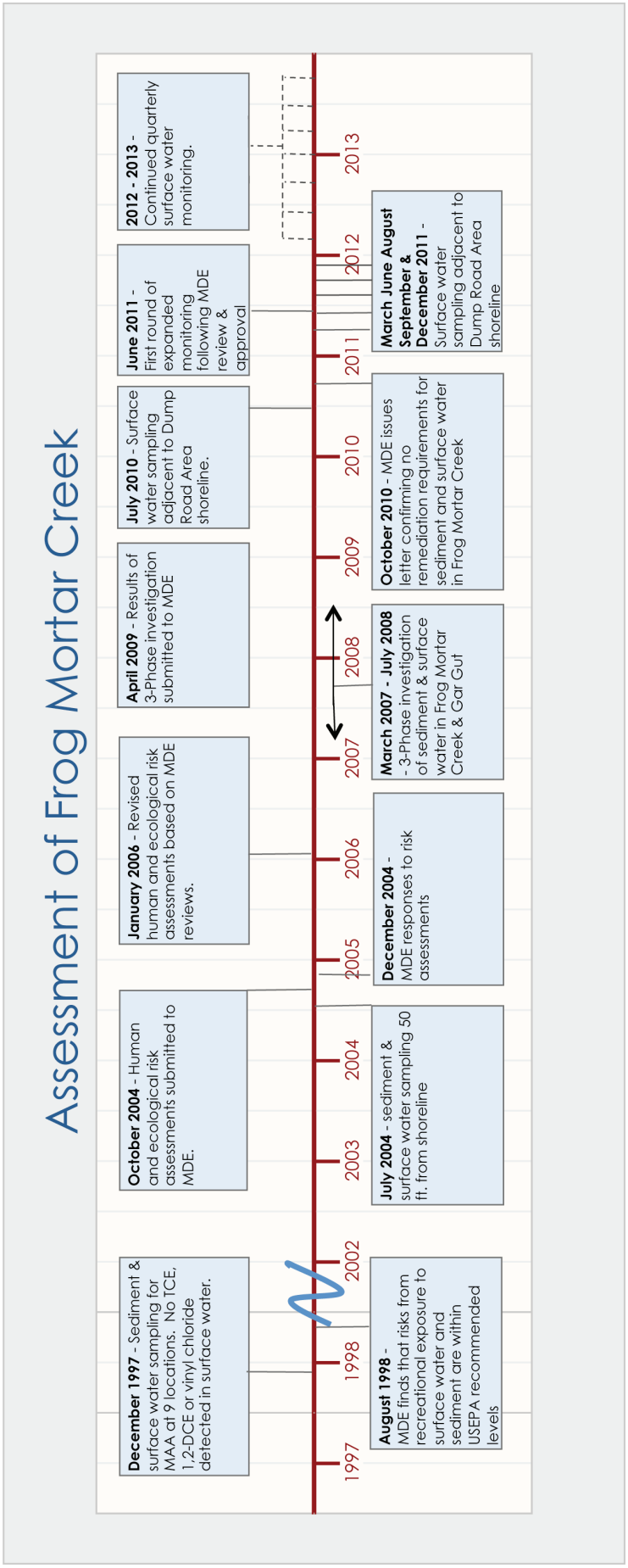
6. What steps would be taken if protective measures become necessary to maintain public safety?

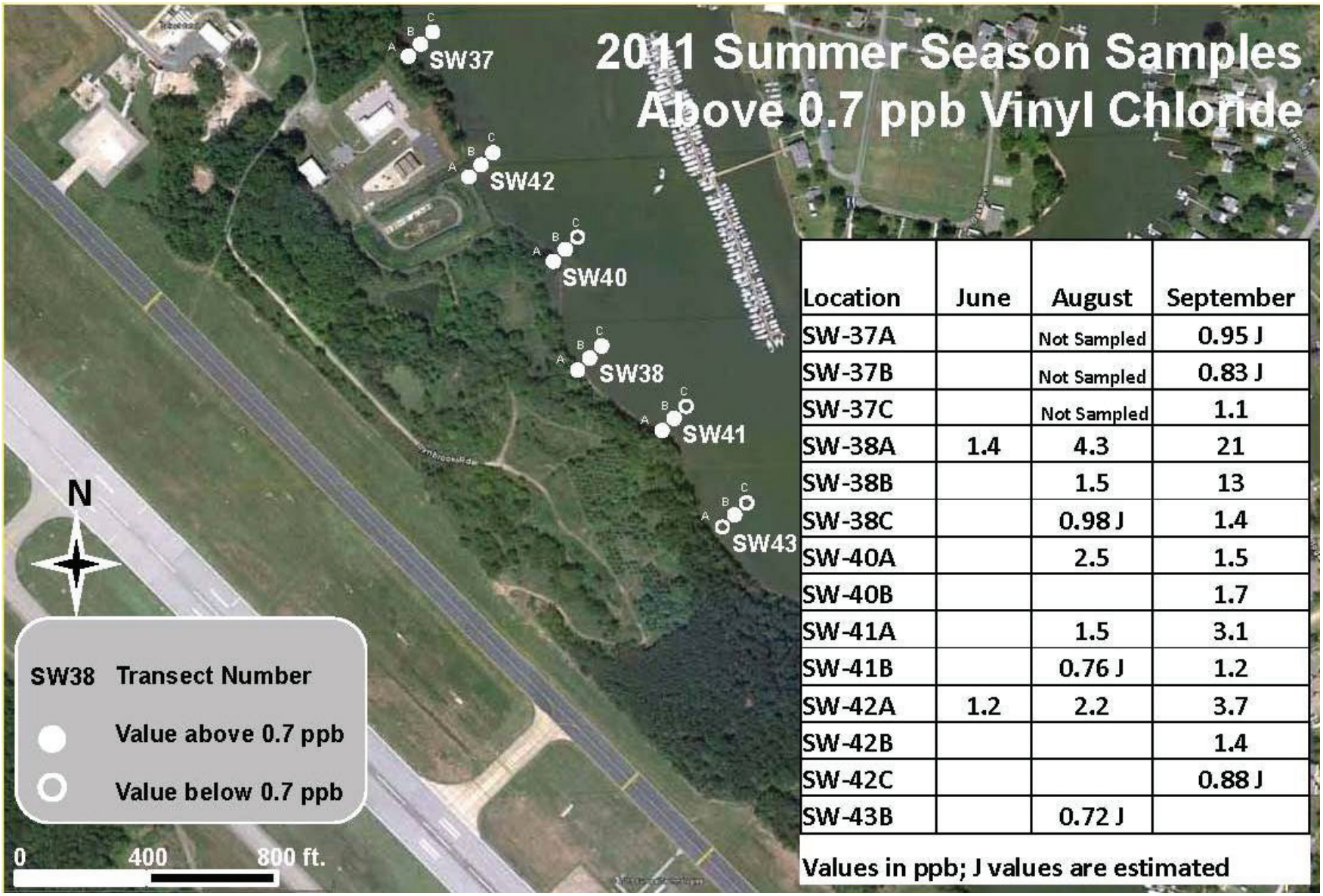
While at this time conditions do not require active swimming restrictions in Frog Mortar Creek, if conditions would worsen, Lockheed Martin and the Maryland Department of the Environment would coordinate any steps that may become needed to protect public safety. Working with the property owners and all necessary governmental authorities, steps would be defined, as appropriate, and could include placing buoys or fencing portions of the creek to restrict public access and usage, and communicating these steps to the public through a variety of public information avenues. Lockheed Martin is working to expedite the proposed groundwater treatment plans to capture groundwater contaminants as quickly as possible, reducing the potential threat to the safety of the public and the environment. *The Proposed Plan for the Interim Remedial Action for the Groundwater Operable Unit at the Dump Road Area Site at Martin State Airport* will be available to download from the Lockheed Martin website at: http://www.lockheedmartin.com/us/who-we-are/sustainability/remediation/msa.html and will be available in hard copy at the Essex Public Library, located at 1110 Eastern Boulevard, Essex, Maryland, 21221, open Mon-Thurs. 9 a.m.-9 p.m.; Fri-Sat 9 a.m.-5:30 p.m. A public comment period will be held from Feb. 8 to March 8, 2012.

Graphic #1:



Graphic #2:

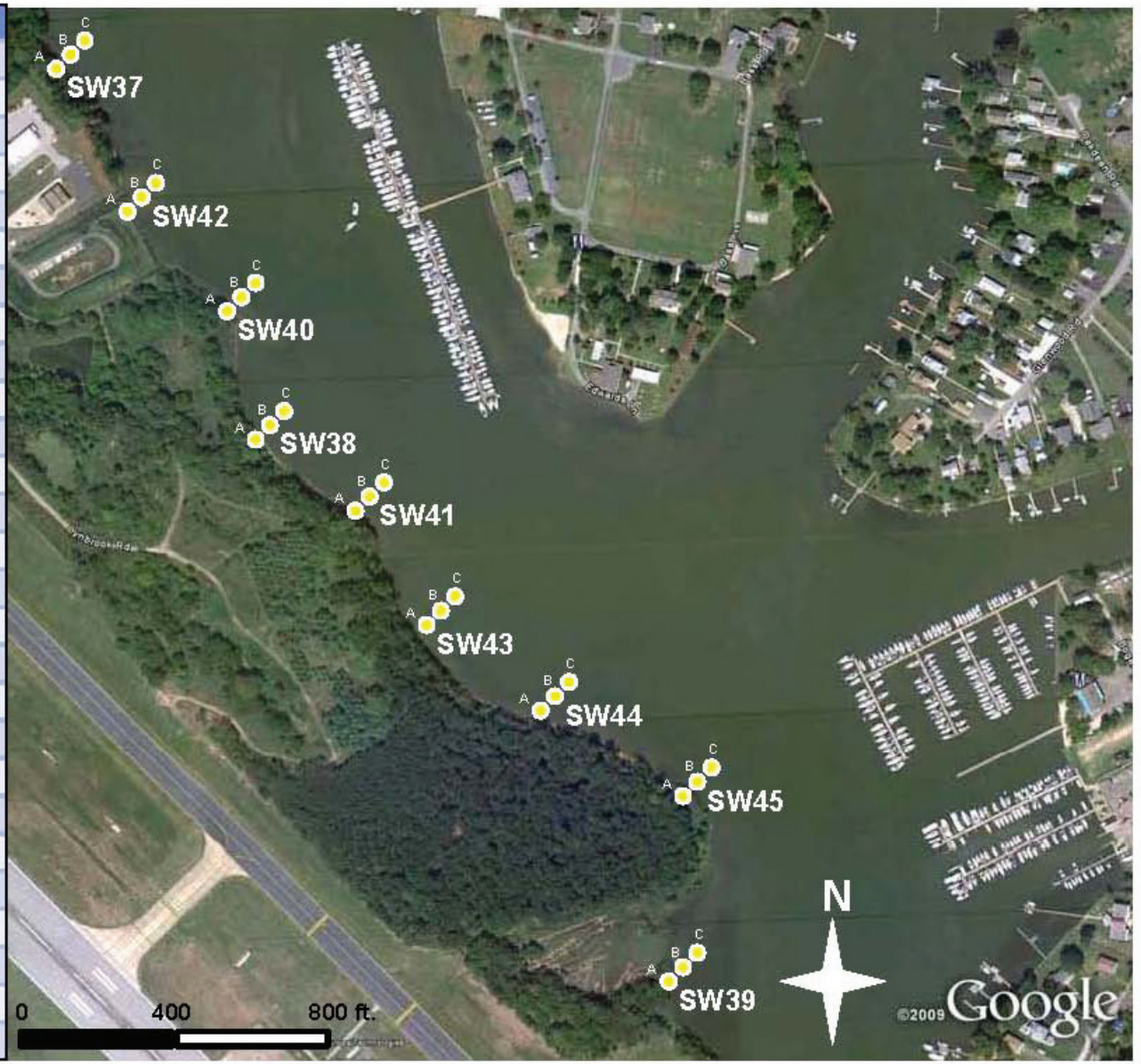

Assessment of Frog Mortar Creek
1997
1998
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
December 1997 - Sediment & surface water sampling for MAA at 9 locations. No TCE, 1,2-DCE or vinyl chloride detected in surface water.
August 1998 - MDE finds that risks from recreational exposure to surface water and sediment are within USEPA recommended levels
October 2004 - Human and ecological risk assessments submitted to MDE.
July 2004 - sediment & surface water sampling 50 ft. from shoreline
January 2006 - Revised human and ecological risk assessments based on MDE reviews.
December 2004 - MDE responses to risk assessments
April 2009 - Results of 3-Phase investigation submitted to MDE
March 2007 - July 2008 - 3-Phase investigation of sediment & surface water in Frog Mortar Creek & Gar Gut
July 2010 - Surface water sampling adjacent to Dump Road Area shoreline.
October 2010 - MDE issues letter confirming no remediation requirements for sediment and surface water in Frog Mortar Creek
June 2011 - First round of expanded monitoring following MDE review & approval
March June August September & December 2011 - Surface water sampling adjacent to Dump Road Area shoreline
2012 - 2013 - Continued quarterly surface water monitoring.



Location	June	August	September
SW-37A		Not Sampled	0.95 J
SW-37B		Not Sampled	0.83 J
SW-37C		Not Sampled	1.1
SW-38A	1.4	4.3	21
SW-38B		1.5	13
SW-38C		0.98 J	1.4
SW-40A		2.5	1.5
SW-40B			1.7
SW-41A		1.5	3.1
SW-41B		0.76 J	1.2
SW-42A	1.2	2.2	3.7
SW-42B			1.4
SW-42C			0.88 J
SW-43B		0.72 J	

Values in ppb; J values are estimated

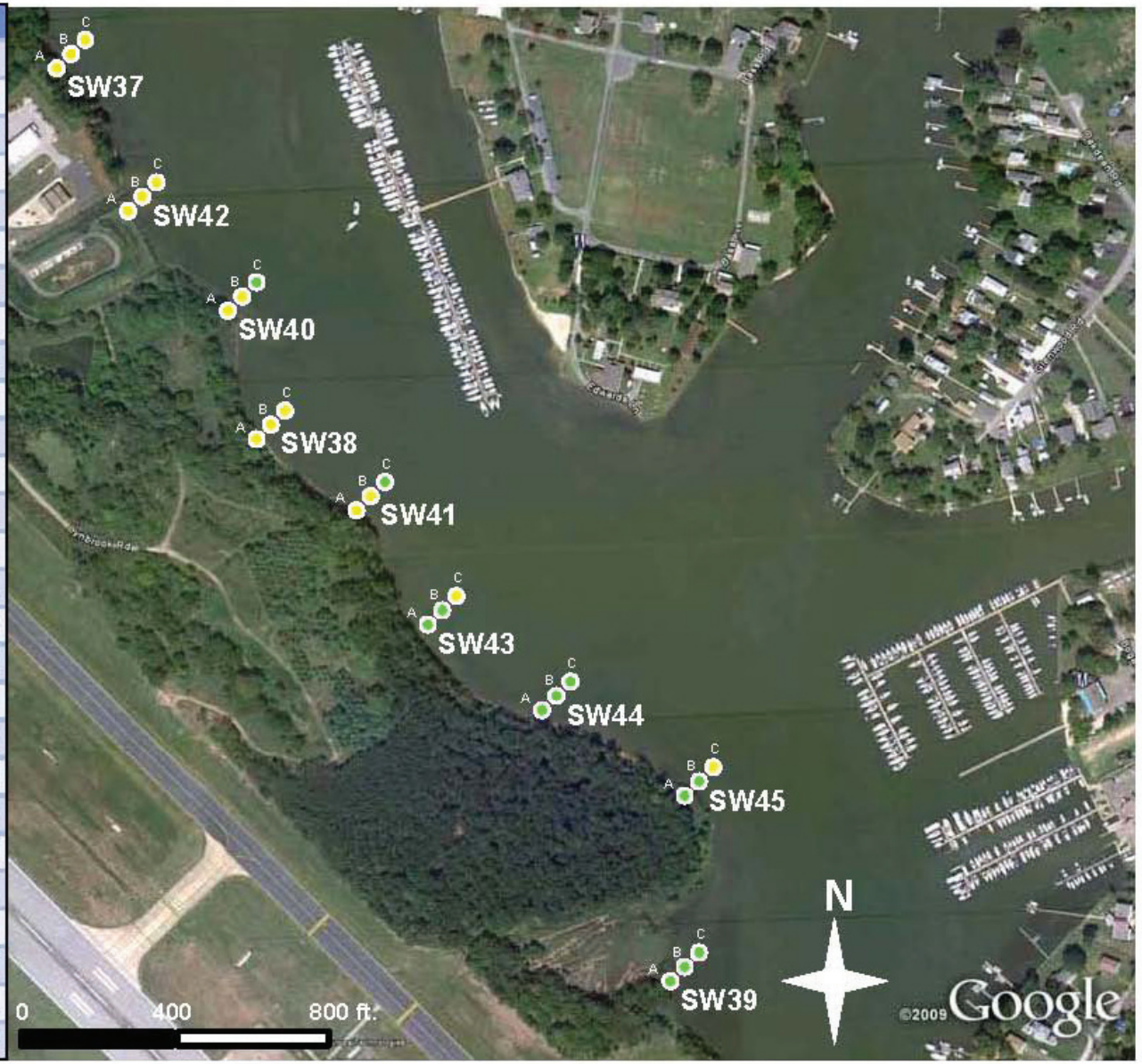
Sample	Jun-11	Sep-11
SW37A	0.48 J	1.1
SW37B	0.58 J	1.7
SW37C	0.68 J	1.8
SW42A	0.60 J	2.1
SW42B	0.66 J	2.4
SW42C	0.70 J	2.4
SW40A	1.4	3.4
SW40B	1.3	4.3
SW40C	0.73 J	2.1
SW38A	1.7	6
SW38B	1.5	4.7
SW38C	0.87 J	3.7
SW41A	1.4	9.5
SW41B	1.1	3.4
SW41C	0.58 J	1.3
SW43A	1.3	0.97 J
SW43B	1.2	1.4
SW43C	0.82 J	2.4
SW44A	0.92 J	1.1
SW44B	0.41 J	2.4
SW44C	0.37 J	2.1
SW45A	0.28 J	0.63 J
SW45B	0.24 J	1.1
SW45C	0.24 J	2.1
SW39A	Not Detected	0.48 J
SW39B	0.19 J	0.44 J
SW39C	Not Detected	0.59 J



- Trichloroethene (TCE) detected.
  Concentrations in parts per billion (ppb)
  J values are estimated by the laboratory
- Trichloroethene not detected

Frog Mortar Creek Sampling Locations & Trichloroethene Results for June 8 and September 13, 2011

Sample	Jun-11	Sep-11
SW37A	Not Detected	0.95 J
SW37B	0.42 J	0.83 J
SW37C	Not Detected	1.1
SW42A	1.2	3.7
SW42B	Not Detected	1.4
SW42C	Not Detected	0.88 J
SW40A	Not Detected	1.5
SW40B	0.58 J	1.7
SW40C	Not Detected	Not Detected
SW38A	1.4	21
SW38B	0.42 J	13
SW38C	Not Detected	1.4
SW41A	Not Detected	3.1
SW41B	Not Detected	1.2
SW41C	Not Detected	Not Detected
SW43A	Not Detected	Not Detected
SW43B	Not Detected	Not Detected
SW43C	Not Detected	0.54 J
SW44A	Not Detected	Not Detected
SW44B	Not Detected	Not Detected
SW44C	Not Detected	Not Detected
SW45A	Not Detected	Not Detected
SW45B	Not Detected	Not Detected
SW45C	Not Detected	0.39 J
SW39A	Not Detected	Not Detected
SW39B	Not Detected	Not Detected
SW39C	Not Detected	Not Detected



- Vinyl chloride (VC) detected.
  Concentrations in parts per billion (ppb)
  J values are estimated by the laboratory
- Vinyl chloride not detected

Frog Mortar Creek Sampling Locations & Vinyl Chloride Results for June 8 and September 13, 2011