



*A Citizens' Guide to Understanding the Proposed Interim Remedial Action  
for Groundwater in the Dump Road Area at Martin State Airport*

Fall 2011

701 Wilson Point Road | Middle River, Maryland



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## Introduction

After extensive investigation and evaluation, Lockheed Martin has submitted a report to the Maryland Department of the Environment (MDE) that outlines the Corporation's proposed cleanup of groundwater contamination in the Dump Road Area at Martin State Airport in Middle River, Md.

This Citizens' Guide is designed to help interested parties understand the information in the report, including the Lockheed Martin team's:

- investigation of the groundwater contamination,
- evaluation of cleanup alternatives, and
- proposal for the best cleanup solution in the Dump Road Area.

The groundwater cleanup in the Dump Road Area is termed "Interim Remedial Action," or IRA, because it's the first step to be implemented in cleanup of the contaminated groundwater. The primary goal is to contain the groundwater contamination on the airport property so it does not discharge into the nearby Frog Mortar Creek. Cleaning up the contamination across the

landfilled portion of the airport (the "Dump Road Area") will be addressed after more investigation has been completed.

This guide addresses only the groundwater cleanup at Martin State Airport. Additional guides will be produced as needed for other cleanup efforts at Martin State Airport and the nearby Middle River Complex.

Lockheed Martin's groundwater Interim Remedial Action feasibility study was based on data from investigations conducted between 1992 and 2010 and on the results and conclusions of a remedial investigation report, including human health and ecological risk assessments.

With that information in hand, the Lockheed Martin team developed a list of possible remedial action alternatives, then proposed the best alternative to achieve its goal of containing the contaminants on-site.

After the MDE and public have provided input on the feasibility study, Lockheed Martin will implement an Interim Remedial Action that meets agency approval. The selected groundwater Interim Remedial Action remedy will be designed and implemented so it minimizes



interference with future soil and landfill waste remediation projects at the site or with likely future site uses.

The Lockheed Martin team is committed to working with regulators and the Middle River community to ensure everyone is fully informed and has an opportunity to provide input on the upcoming work.

## Background Information

### Where is Martin State Airport?

Martin State Airport is located at 701 Wilson Point Road in Middle River, Md. The airport lies just east of the Middle River Complex on the south side of Eastern Boulevard. It is bounded by Frog Mortar Creek to the east and Stansbury Creek to the west. Both creeks join the Chesapeake Bay to the south of the airport.

### Where is the Dump Road Area site at the airport?

The Dump Road Area site is on the southeast portion of the airport and is bounded by Frog Mortar Creek to the east and Taxiway Tango and the main airport runway to the west.

### What is the history of the site?

Martin State Airport was owned and operated by the Glenn L. Martin Company from about 1929 to 1975. In September 1975, the Maryland Aviation Administration (MAA) purchased the land now used as the airfield.

The company's Middle River Complex was originally used for aircraft manufacturing, beginning in 1932. Runways and hangars at the neighboring Martin State Airport were built in 1939 and 1940. In July 1955, the Maryland Air National Guard (MD ANG) began leasing part of the property from the Glenn L. Martin Company.

The Glenn L. Martin Company consolidated with American Marietta Corporation in September 1961 to form Martin Marietta Corporation. Lockheed Corporation and Martin Marietta merged in 1996 to form Lockheed Martin Corporation.

### When were environmental issues discovered at the Dump Road Area site?

Environmental issues associated with the Dump Road Area site were initially identified in July 1991, when MAA found four drums adjacent to Taxiway Tango during trenching to install an electrical cable. These drums, which contained dried zinc-chromate paint, were later properly disposed off-site.

Discovery of these buried drums led to investigation of the surrounding area for possible soil and groundwater contamination. These investigations also showed that the Dump Road Area site had been used as a landfill for wastes associated with aircraft manufacturing.

### What was the source of contamination found in the Dump Road Area?

The contamination originated from activities conducted decades ago at the Dump Road Area site, including landfilling to create the runway and taxiway. At one time, the two ponds on-site were used for disposal of acid wastes. Environmental investigations and testing indicate that waste was disposed of across about 25 acres in the Dump Road Area as part of the airport expansion in the 1950s. The waste is a maximum of about 10 feet thick in places where land depressions and inlets of Frog Mortar Creek were infilled.

### How did contaminants get from the surface to the groundwater?

Contaminants from these wastes seeped through the soil to the groundwater. From there, the contaminated groundwater moved downward and toward Frog Mortar Creek.

***The Lockheed Martin team is committed to working with regulators and the Middle River community to ensure everyone is fully informed and has an opportunity to provide input on the upcoming work.***

## **Is this groundwater the same as our drinking water source?**

Drinking water for the Middle River area is publicly provided. It originates from several surface water reservoirs located in the county and is piped to the area for distribution to individual houses. Shallow groundwater in this region is typically not used as a drinking water source. We have confirmed that the shallow groundwater at the Dump Road Area is not used as a drinking water source.



## **Environmental Investigations**

### **When were environmental investigations conducted?**

The Maryland Aviation Administration conducted environmental investigations between 1991 and 1997, and the Lockheed Martin team conducted investigations between 1998 and 2011.

### **How extensive was the sampling?**

Over these 20 years, environmental teams conducted about 20 site investigations and/or sampling events to outline the extent of environmental contamination on the 25-acre Dump Road Area site.

### **How were the site investigations conducted?**

Site investigations included monitoring well installation, soil and groundwater sampling, test pit excavations and geophysical surveys.

As part of the 20 site investigations, more than 540 groundwater samples have been collected from 87 permanent monitoring wells and 125 temporary monitoring wells, and more than 320 soil samples have been collected from approximately 180 borings and 65 test pits or trenches.

### **How were the areas of concern identified?**

The areas of concern were identified based on the analysis of soil samples and observations of debris and waste material found over about 25 acres at the Dump Road Area site. The entire airport totals 747 acres.

### **What did the early investigations find at the Dump Road Area site?**

The early investigations identified four areas of concern within the Dump Road Area site where soil and groundwater contaminant levels are higher than in the Dump Road Area as a whole:

- Taxiway Tango Median Anomaly
- Drum Area
- Two ponds
- Petroleum Hydrocarbon Area.

These investigations also helped identify the extent of historical landfilling and waste disposal.

### **What happened after the areas of concern were identified?**

After the areas of concern were identified, further characterization was conducted to determine the extent of the material in the landfill area and to measure the amount of contamination in the groundwater. The investigation also helped identify the northern extent of groundwater contamination. This investigation was performed in late 2009, and the investigation report was completed in May 2010.

### **How were the groundwater sampling results obtained?**

The Lockheed Martin team used 87 permanent monitoring wells at varying depths to measure and assess the location, depth and concentration of the contamination. Some of the wells were very deep, allowing for sampling as deep as 100 feet below the surface.

### What did the remedial investigation find?

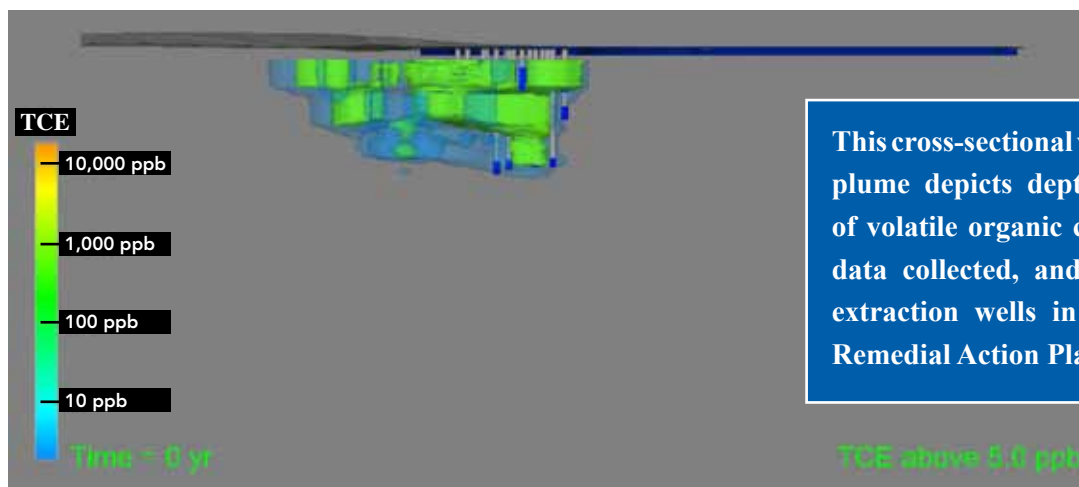
The groundwater investigations of the Dump Road Area site found:

- Concentrations of chlorinated volatile organic compounds such as trichloroethene, a solvent commonly used in industrial processes, as well as cis-1,2-dichloroethene and vinyl chloride. The levels of these volatile organic compounds exceeded federal and Maryland groundwater standards in a large portion of the investigation area and at different depths below the ground.

***Off-site sampling helped Lockheed Martin determine that contamination exists adjacent to the Dump Road Area in Frog Mortar Creek, but that it most likely has not moved to other waterways.***

- The compound 1,4-dioxane was detected primarily in groundwater samples from below the ground surface down to 45 feet deep.
- Concentrations of cadmium exceeded the Maryland groundwater standards in 20 percent of samples. The greatest concentrations of cadmium are associated with high levels of volatile organic compounds from 15 feet to 45 feet below the ground surface.
- Petroleum-related compounds such as benzene were

### Schematic Drawing



***The selected groundwater Interim Remedial Action will be designed and implemented so it does not interfere with future soil and landfill waste remediation projects at the site.***

detected less frequently and at lower concentrations than the chlorinated volatile organic compounds.

### Were all of the samples taken at the Dump Road Area site?

Sampling was done off-site as well. The off-site sampling helped Lockheed Martin determine that contamination exists adjacent to the Dump Road Area in the surface water of Frog Mortar Creek, but that it most likely has not moved to other waterways.

### Has Lockheed Martin been monitoring the conditions in Frog Mortar Creek?

Yes, it has been monitoring the conditions in Frog Mortar Creek. It has monitored surface water and sediment in the creek since 2004.

Until recently, the sampling results showed no reason for concern. Sampling results in the past year indicate that the plume is discharging into the surface water. July 2010 and March 2011 samples showed increased levels of volatile organic compounds (VOCs), which has prompted Lockheed Martin — with the Maryland Department of the Environment's approval — to initiate a quarterly sampling

**This cross-sectional view of the groundwater plume depicts depths and concentrations of volatile organic compounds as found in data collected, and it shows locations of extraction wells in the proposed interim Remedial Action Plan.**

schedule. The first two such rounds, conducted in June and August 2011, showed very low VOC levels.

The third round, conducted in September 2011, showed higher VOC levels than the June and August 2011 samples, but less than the concentrations observed in March 2011. Lockheed Martin will continue to monitor the surface water to better understand seasonal fluctuations of VOC concentrations.

## Assessing Groundwater Concerns

### What happened after the remedial investigation was completed?

After completing the remedial investigation, Lockheed Martin conducted a feasibility study to develop, screen and evaluate alternative actions for cleanup. This feasibility study was based on the results from more than 200 groundwater samples collected from 2007 through 2009.

### What was evaluated in the feasibility study?

In assessing the groundwater concerns, the Lockheed Martin team evaluated the chemicals of concern to determine characteristics, location and the impact they could have on human health and the environment.

The team also considered the “pathways,” or routes, the

***Vapor Intrusion: Soil vapor intrusion is a condition in which a chemical present in groundwater travels through soil and enters a building. Vapor intrusion can occur in any type of building through a crack or opening in a basement, crawl space or slab.***

chemicals would follow and whether people would come in contact with the chemicals.

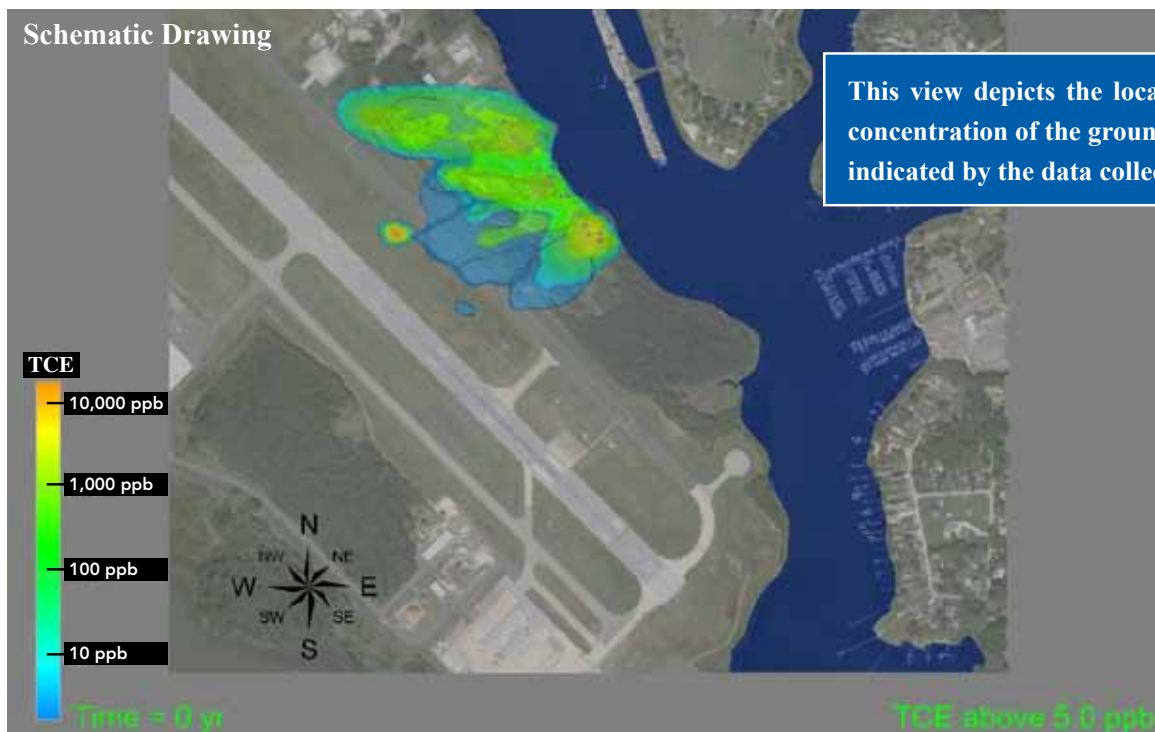
The feasibility study also included establishing cleanup objectives and the response actions necessary to achieve the objectives.

### How were chemicals of concern in the groundwater identified?

Chemicals of concern in groundwater were identified based on a human health risk assessment prepared as part of the remedial investigation report.

### What happened once the chemicals of concern were identified?

A preliminary cleanup goal was developed for each of the primary contaminants. Preliminary cleanup goals that are protective of human health were selected based on Maryland Groundwater Cleanup Criteria and U.S.



Environmental Protection Agency drinking water standards.

**How did Lockheed Martin assess the risks to human health?**

Lockheed Martin's human health risk assessment evaluated the levels that would be necessary to negatively impact human health, and it considered whether people could be exposed to the groundwater contamination in either residential or non-residential circumstances.

**Did Lockheed Martin set preliminary goals for the cleanup?**

Yes. Lockheed Martin's preliminary goals were established for groundwater contamination at the Dump Road Area site in the Interim Remedial Action feasibility study document; these goals were developed to reduce unacceptable risks to human health and the environment associated with the groundwater.

**Does Lockheed Martin have a primary objective for the Interim Remedial Action?**

Yes. Lockheed Martin's primary objective is to contain the contaminated groundwater at the Dump Road Area site.

**Are there other considerations?**

Yes. Lockheed Martin also is evaluating doing an initial limited cleanup of high concentration areas at the Dump Road Area site. Such a cleanup would help decrease the amount of time necessary for containment activities.

**What are Lockheed Martin's remedial action objectives for groundwater cleanup at the site?**

Lockheed Martin's remedial action objectives for groundwater cleanup are to:

- Prevent contaminated groundwater from moving toward Frog Mortar Creek,
- Prevent human exposure to groundwater containing chemicals of concern in concentrations that exceed regulatory standards,
- Prevent human exposure to volatile organic compounds from vapor intrusion into buildings.



**Is vapor intrusion a concern if there aren't buildings on the Dump Road Area site?**

Chemicals of concern migrating as vapor from groundwater to indoor air could potentially expose occupants of a future residence or industrial building above the groundwater plume. Although no buildings exist above the plume now, the site could be developed in the future.

**Are there any plans for developing the site?**

The Dump Road Area site currently is undeveloped and consists of open space adjacent to the airport taxiway.

Current site use is commercial/industrial. Future land use is not expected to change, so the site is expected to remain classified as commercial/industrial.

**Does Lockheed Martin plan to clean out the landfill?**

The Corporation's interim plan is to leave the landfill in place. Cleaning out the landfill would disturb the wetlands and woodlands, which is an important undeveloped section of the Chesapeake Bay Critical Area. The wetlands and woodlands slow water runoff into the Chesapeake Bay waterways and can act as a filter to remove contaminants common to industrial areas. Lockheed Martin is considering limited landfill removal underneath and around Taxiway Tango in the Dump Road Area, to be conducted in conjunction with the renovations of Taxiway Tango anticipated in 2013.

***The primary goal is to contain the groundwater contamination on the airport property so it doesn't discharge into the nearby Frog Mortar Creek.***



## Will the landfill always be there?

Lockheed Martin's solutions are aimed at preserving the wetlands, woodlands and airport property while at the same time minimizing contamination that reaches surface water. At this time, it is premature to say whether the landfill will always be there.

## Evaluating Possible Cleanup Methods

### What is the first step in the evaluation process?

One of the first steps in the evaluation process is to determine what technologies are available and which ones would be appropriate for the cleanup. To that end, the Lockheed Martin team started by analyzing possible technologies, then it conducted a more detailed evaluation based on specific criteria.

### What criteria were used for the detailed evaluation?

Criteria were considered for three categories —

#### **What are institutional controls?**

*Institutional controls are administrative and legal actions that help minimize the potential for human exposure to contamination and ensure that the remedy continues to protect people. For example, controls may prohibit the use of groundwater as drinking water or*



*may require monitoring and special procedures (such as wearing protective clothing) when conducting work that could expose workers to contamination.*

#### **What is in situ bioremediation?**

*In situ (which means “in place” or “in its original location”) bioremediation is a process that injects a mixture of water and nutrients into the ground to encourage naturally occurring bacteria to break down the contamination. For example, the groundwater cleanup solution for the Middle River Complex calls for food grade vegetable oil and lactate, a non-toxic food additive that is produced from sugars of corn or beets.*

effectiveness, implementability and cost.

For “effectiveness,” each technology and process option was evaluated based on whether it would:

- Protect human health and the environment; lessen the impact of the contaminants; provide a long-term solution
- Address the estimated areas or volumes of the chemicals
- Help achieve the cleanup objectives
- Be reliable.

For “implementability,” each technology and process option was evaluated based on whether it would:

- Be feasible to implement
- Be readily available
- Meet long-term maintenance and operation requirements.

For “cost,” each technology and process option was evaluated for:

- Capital costs
- Operation and maintenance costs.

### What was considered when selecting the alternatives?

The alternatives were selected based on their ability to contain the contamination at the Dump Road Area site. Some of the alternatives include limited treatment of contamination at the source.

### Were there a lot of options to choose from?

The number of processes and technologies that could be applied was limited, particularly because the interim objective is to contain — rather than remove — the contamination.

### How many options did the Lockheed Martin team consider?

The team considered 22 process options. After a detailed screening of the options, the team selected six alternatives for further evaluation.

### What were the six alternatives selected for the final evaluation?

The six alternatives selected for the final evaluation were:

- **Alternative G-1** — No action.
- **Alternative G-2** — Pumping the contaminated groundwater out of the ground to prevent contaminants from entering the surface water, treating it at a water treatment facility, discharging the treated water back into the environment, monitoring the process, and applying institutional controls that limit land use.
- **Alternative G-3** — Pumping the contaminated groundwater out of the ground to prevent contaminants from entering the surface water, treating it at a water treatment facility, adding a compound that promotes natural biological remediation, discharging the enhanced groundwater near high-concentration areas, monitoring the process, and applying institutional controls that limit land use. *(As you'll read below, the Lockheed Martin team has proposed this alternative as the best option.)*
- **Alternative G-4** — Pumping the contaminated groundwater out of the ground to prevent contaminants from entering the surface water and remove groundwater from high concentration areas, treating it at a water treatment facility, adding a compound that promotes natural biological remediation, discharging the enhanced groundwater near high-concentration areas, monitoring the process, and applying institutional controls that limit land use.

- **Alternative G-5** — Pumping the contaminated groundwater out of the ground to prevent contaminants from entering the surface water and remove groundwater from high concentration areas, treating it at a water treatment facility, discharging it off-site into the sewer system, using “in-situ” (which means “in-place”) bioremediation to naturally treat the highly concentrated contamination, monitoring the process, and applying institutional controls that limit land use.
- **Alternative G-6** — Creating a permeable reactive barrier for passive treatment of groundwater contaminants instead of a more aggressive pump and treat system. This alternative also would monitor the process and apply institutional controls that limit land use.

### Why would Alternative G-1, which is “no action,” be a feasible alternative?

Alternative G-1 was developed and analyzed as a baseline against which the other alternatives could be compared. Evaluation of the “No Action” alternative is required as part of the regulatory evaluation process because it could be a viable alternative at some sites, and it serves as an important baseline at every site.

### Were any other criteria considered?

Yes. Lockheed Martin also evaluated each alternative based on its sustainability. Sustainability is an important consideration for Lockheed Martin Corporation and is evaluated here to minimize the environmental footprint of the remedial action, while still protecting human health and the environment. Flexibility also was evaluated. Since these alternatives are for the Interim Remedial Action, it is important that the alternative provides flexibility to expand the system, if desirable, when the final remedy is put in place. A full remedy will be tied to the future soil and landfill solutions.

## Selecting the Best Alternative

### Which alternative was selected?

When the Lockheed Martin team compared the alternatives, Alternative G-3 best met the criteria for

Interim Remedial Action for groundwater cleanup at the Dump Road Area site.

### **Why was Alternative G-3 considered the best alternative?**

It was determined that this alternative meets the criteria because it will best contain the contamination and minimize the chance that trichloroethene, 1,4-dioxane and cadmium will move off-site.

The groundwater pumping will take place near the site's boundary, and it will create a hydraulic barrier that ensures the groundwater does not flow into Frog Mortar Creek.

Additionally, this alternative is economical and provides both effective treatment of all chemicals of concern and operational flexibility.

### **How long will it take to begin controlling the plume?**

Once the system is turned on, it would begin to control the Dump Road Area plume. The system is designed to eliminate groundwater discharge to the creek from the Dump Road Area plume.

### **How will this alternative allow for future remedial action?**

The system will provide additional groundwater treatment capacity so that the groundwater extraction system can be expanded, particularly after the soil and landfill waste have been remediated.

Future expansion of this alternative could include recirculation of treated groundwater for injection in the areas of high concentrations of contamination and in situ bioremediation in the high concentration areas to help break down some of the chemicals.

### **What is in situ bioremediation?**

In situ (which means "in place" or "in its original location") bioremediation is a process that injects a mixture of water and nutrients into the ground to encourage naturally occurring bacteria to break down the contamination.

For example, the in situ bioremediation proposed for the cleanup at the Middle River Complex includes nutrients

***Sustainability: Sustainability is operating in a thoughtful and strategic manner that conserves energy and natural resources, improves efficiency, and protects the well-being of people and the environment today and for many years to come.***

such as food grade vegetable oil and lactate, a non-toxic food additive that is produced from sugars of corn or beets.

### **Did Martin State Airport stakeholders have an opportunity to respond to the proposed plans?**

Yes. The Lockheed Martin team presented the groundwater Interim Remedial Action feasibility study to the Maryland Aviation Administration and the Maryland Air National Guard. Comments from these stakeholders were incorporated in the report that was submitted to the Maryland Department of the Environment (MDE).

## **Implementing the Solution**

### **What will Alternative G-3 involve?**

The proposed alternative will include the installation of a series of 16 groundwater extraction wells at three depths, with the deepest well extending 90 feet below the surface. The wells will run parallel to Frog Mortar Creek near the east or southeast portion of the Dump Road Area site.

Lockheed Martin would install the wells, pump the groundwater out via the wells, and remove the chemicals of concern from the water using a treatment facility. The treated water will then be discharged to the sewer under a Baltimore County permit, or to Frog Mortar Creek through an outfall permitted under the National Pollutant Discharge Elimination System (NPDES).

The wells are designed to cut off groundwater movement from the Dump Road Area to Frog Mortar Creek.

In a secondary phase, a compound that promotes natural biological remediation would be added to the treated groundwater, then the water would be reinjected in areas of high concentrations of contamination.

**What infrastructure is required to operate the system?**

The infrastructure will include the installation of the 16 groundwater extraction wells and building the groundwater treatment facility. Before the extracted water is sent to the sewer, the contaminants will be removed to regulated levels. That treatment process will take place in a specially designed water treatment facility.

The system also will require excavation for other piping infrastructure that will be required underground between the treatment plant and the extraction wells.

**Where will the water treatment facility be located?**

The location has not been determined. Potential locations are under evaluation.

**How will the project impact neighbors?**

Neighbors will see more trucks on the road during construction. Operations at Martin State Airport and the Maryland Air National Guard will not be impacted. The activities will take place primarily during normal business hours. Dust, noise and traffic control measures will be implemented to minimize any affects on the surrounding communities.

**Is there a proposed timeline for construction?**

The proposed timeline is that construction will begin in early 2014 and will be completed in 2015.

**Does this alternative provide a long-term solution?**

Yes. The pump and treat system could operate for more than 30 years.

**How does this alternative take future remedial action into consideration?**

This is an interim action designed to stop the plume from moving into Frog Mortar Creek. This alternative



builds in the capacity for Lockheed Martin to treat the high concentration areas by enhancing natural biological processes. It is intended to reduce the concentration of the contamination in the source area.

This option affords the team the possibility that additional cleanup actions can be conducted in conjunction with the soil remediation project, which is still under investigation.

### **Where does the interim groundwater project stand now?**

Lockheed Martin's plans have been submitted to the Maryland Department of the Environment (MDE). The plans must be approved by MDE before work can begin. The public also will have an opportunity to provide input. Lockheed Martin will implement an Interim Remedial Action that meets agency approval.

## **Future Actions**

### **What can the community expect in terms of future actions on this project?**

After the Lockheed Martin team receives guidance on its proposal from the Maryland Department of the Environment (MDE), future actions will include:

- Designing of the containment portion of Alternative G-3. This includes groundwater extraction and treatment to prevent contaminants from entering the surface water;
- Installing and operating the containment portion, which will discharge treated water to the publicly owned treatment works or to surface water via a permitted outfall;
- Installing the injection portion of the remedy in coordination with the final soil/landfill waste and groundwater remedies.

### **How will Lockheed Martin know exactly where to put the groundwater extraction wells and the bioremediation injection wells in the high-concentration areas?**

Lockheed Martin plans investigations in 2012 in the sections of the Dump Road Area where soil and groundwater contaminant levels are relatively high, and which are considered potential source areas for the groundwater contaminant plume.

These investigations will evaluate the nature and extent of the contamination and determine which source areas merit focused remediation to shorten the overall length of the groundwater treatment.

### **When and how will the bioremediation be implemented?**

After the groundwater plume has been contained by the extraction well system, a portion of the treated water from the treatment plant, amended with nutrients, may be pumped back to the Dump Road Area, where it will be injected into the source areas to promote bioremediation of the soil and groundwater contaminants.

The return piping and other aspects of the source area treatment are being incorporated into the Groundwater Interim Remedial Action from the outset, to minimize disruption to the system and to the community when source-area treatment is added.

### **Has a schedule been set for when this work will be done?**

The potential source areas will be characterized in 2012, but the schedule and full scope of the treatment method(s) will not be known until more detailed information is available about the source areas.

### **What can the community expect in terms of the Lockheed Martin team's work on other projects at the Dump Road Area site?**

Related to the other projects, the Lockheed Martin team will:

- Complete the soil/landfill waste and final groundwater feasibility studies;
- Seek concurrence from Maryland Aviation Administration (MAA), Maryland Air National Guard (MD ANG) and approval from relevant regulatory agencies

such as the Maryland Department of the Environment;

- Design and coordinate final remedies for site groundwater and soil/landfill waste;
- Implement final groundwater and soil/landfill waste remedies once designs are complete.

## Martin State Airport and Middle River Complex Groundwater Solutions

### Are the Martin State Airport and Middle River Complex groundwater projects the same?

No. The Martin State Airport and Middle River Complex groundwater projects are separate projects, and they are quite different.

The Martin State Airport project is being overseen by Maryland's Controlled Hazardous Substance Enforcement Division (formerly the State Superfund Program). The Middle River Complex project is being conducted through the Maryland Department of the Environment's Voluntary Cleanup Program.

Additionally, the contamination sources, extent, depth, and concentrations are quite different at Martin State Airport. The site soils at Martin State Airport are significantly different than at the Middle River Complex and allow for the contaminants to flow toward the surface water at a much higher rate. As a result, the proposed processes are different.

### Are there similarities in the programs?

Yes. For example, the contaminants in the groundwater are similar in both projects.

### What are some of the differences in the projects?

One of the biggest differences between the projects is that sampling has detected that contamination in the groundwater at Martin State Airport has migrated off-site and into the surface water of Frog Mortar Creek.

Groundwater contamination at the Middle River Complex

does not pose a risk to human health because people are not exposed to the chemicals of concern.

Because sampling has shown contamination in Frog Mortar Creek, the groundwater cleanup at Martin State Airport warrants a more aggressive approach. Thus, the Interim Remedial Action calls for containing the contamination to the Dump Road Area site and pumping and treating the groundwater for more immediate results.

### Are there other differences?

Yes. The Martin State Airport feasibility study proposed an interim groundwater remedial action, while the Middle River Complex proposal for in situ bioremediation (a natural, in-place cleanup) is proposed as the final solution.

Additionally, the plume is more extensive and has a higher level of contamination at Martin State Airport, the consistency of the soil allows for more rapid transport of contaminants in the groundwater, and the contamination travels deeper (90 feet) at Martin State than at the Middle River Complex (35 feet).

### How can the public stay informed and involved?

Public informational meetings will be held about each of these projects. Invitations will be mailed to those on the Lockheed Martin mailing list and provided to the nearby civic associations as well as the local newspapers. We present updates and current information to the civic associations when invited. Reports are routinely made available both in the Essex public library and on the Lockheed Martin website — <http://www.lockheedmartin.com/aboutus/energy-environment/places/remediation/>.

A Citizens' Guide on the Middle River Complex Groundwater Remedial Action Plan is also available.

## Glossary and Acronyms List

**1,4-dioxane** – A volatile organic compound that is used as a solvent or as a preservative in other solvents. It does not break down naturally in the environment, so it tends to linger in soil and groundwater for a very long time.

**Benzene** – A colorless, flammable, liquid aromatic hydrocarbon derived from petroleum and used in fuel or to manufacture a wide variety of chemical products.

**Bioremediation** – Injections of nutrients to encourage the growth of naturally occurring bacteria and other microscopic-sized living things in the water under the ground. Bioremediation may also include injections of additional bacteria to add to those naturally present.

**Cadmium** — Cadmium is an element found naturally in soil and rocks. It is also found in some foods, and in manmade consumer products such as batteries, plastics, pigments, paints and metal coatings. Cadmium does not break down in the environment and generally does not dissolve in water. In the ground, it typically clings to soil and sediment.

**Chlorinated solvents** – Chemicals that include methylene chloride, perchloroethylene, trichloroethylene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and carbon tetrachloride, commonly used in industry for such applications as degreasing.

**cis-1,2-dichloroethene** – A breakdown product of TCE or trichloroethene, a volatile organic compound, that will vaporize when exposed to room temperatures.

**EPA** – U.S. Environmental Protection Agency

**Feasibility study** — A comprehensive study conducted to develop, screen and evaluate alternative actions for cleanup.

**in situ** – In place; commonly used to describe water treatment/cleanup that is done in place, rather than treating water after pumping it out of the ground.

**Institutional controls** – Administrative tools to limit exposure to contaminants, such as deed restrictions to prevent use of groundwater as drinking water.

**MDE** – Maryland Department of the Environment

**Middle River Complex** – The site of Lockheed Martin’s Mission Systems and Sensors (MS2) facility and General Electric’s Middle River Aircraft System (MRAS); also known locally as Plant 1.

**MRAS** – Middle River Aircraft Systems, a subsidiary of General Electric Company, which leases space mainly

inside Buildings A, B and C at the Middle River Complex to manufacture aircraft parts.

**MS2** – Mission Systems and Sensors (MS2) business unit of the Lockheed Martin Corporation, which leases space mainly inside the Vertical Launch Systems building at the Middle River Complex to assemble launch electronic systems.

**National Pollutant Discharge Elimination System (NPDES)** — A provision of the Clean Water Act, which regulates release of pollutants into waters of the United States through a permit issued by U.S. EPA, a state or, where delegated, a tribal government on an Indian reservation.

**Sediment** – Refers to sand, silts, and clays washed from the land into water, usually after rain or snowmelt. Sediment is found under water in storm drains, ponds, lakes, creeks, streams, rivers, and oceans.

**Surface Water** – All water bodies naturally open to the atmosphere (rivers, creeks, storm drains, lakes, reservoirs, ponds, streams, impoundments, seas, estuaries, etc.).

**Sustainability** — Sustainability is operating in a thoughtful and strategic manner that conserves energy and natural resources, improves efficiency, and protects the well-being of people and the environment today and for many years to come.

**TCE or trichloroethene, also called trichloroethylene** – Used to clean metals and in specialty adhesives. A commonly used degreaser in industrial operations, TCE is a volatile organic compound (VOC).

**Vapor Intrusion** — The term “vapor intrusion” describes a process in which certain types of chemicals — volatile organic compounds (VOCs) — that are present in soil or groundwater move through the soil and enter the air of an overlying building. Vapor intrusion can occur in any type of building through a crack or opening in a basement, crawl space or slab.

**VCP** – Voluntary Cleanup Program, operated by Maryland Department of the Environment. Participation by companies is voluntary and is used to clean up brownfield sites.

**Vinyl chloride** – A breakdown product of TCE or trichloroethene, a volatile organic compound that will vaporize when exposed to room temperatures.

**VOCs** – Volatile organic compounds, a type of chemical (organic compound) that will vaporize when exposed to room temperatures.

## For More Info

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All documents are available at the Essex Library, 410-887-0295, or on Lockheed Martin's Web site at:

<http://www.lockheedmartin.com/aboutus/energy-environment/places/remediation/>

*(Look for separate Martin State Airport and Middle River links on the left.)*



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