

# Fact Sheet

## *Middle River, Maryland*

### *Middle River Complex and Martin State Airport*

#### *Environmental Studies and Cleanup*



September 2021

Lockheed Martin Middle River Complex  
2323 Eastern Boulevard  
Middle River, Maryland

## History

In 1929, the Glenn L. Martin Company, a predecessor to Lockheed Martin Corporation, purchased land in Middle River, Maryland, to build and test aircraft. This land is now part of the Middle River Complex and Glenn L. Martin State Airport. In 1975, the airport was sold to the state of Maryland, through the Maryland Department of Transportation (MDOT). The Maryland Aviation Administration (MAA), a unit of the Maryland Department of Transportation, operates the airport. Other land parcels sold around the same time include the properties now occupied by Ashley Furniture, Johnson & Towers, Tilley Chemical, Total Industrial Group, the U.S. Postal Service, and a gas station-convenience store.

Martin Marietta Corporation merged with Lockheed Corporation in 1995 to form Lockheed Martin Corporation, which today conducts engineering and research at the Middle River Complex. The complex is owned by LMC Properties, Inc., which provides global real estate and asset management services to Lockheed Martin. Lockheed Martin's Rotary and Mission Systems business operates at the facility. Aircraft components are also assembled and tested in A-, B-, and C-Buildings by MRA Systems, Inc.

### ***Beginning Environmental Studies***

In the 1990s, two developments prompted inquiries about environmental conditions at Lockheed Martin's Middle River Complex and at Martin State Airport: first, china, papers, and other items associated with the former Glenn L. Martin Company were found by the Maryland Aviation Administration in excavations for utility work at Martin State Airport; second, Baltimore County developed an economic revitalization plan for the Middle River community and inquired about Lockheed Martin's plans for vacant waterfront parcels at the Middle River Complex.

***Newsletters and Project Bulletins updating the community on timely information and Citizen's Guides covering groundwater, soil, and sediment can be found at [lockheedmartin.com/middleriver](http://lockheedmartin.com/middleriver) or [lockheedmartin.com/martinstate](http://lockheedmartin.com/martinstate).***

Since that time, Lockheed Martin has conducted extensive environmental studies at Martin State Airport in an area between Taxiway T or "Tango" and Frog Mortar Creek, the Dump Road Area, in cooperation with the Maryland Department of the Environment's (MDE) Land Restoration Program, also known as the State Superfund Program, and the Maryland Aviation Administration. Additional environmental investigations have been performed around the Main Terminal, Strawberry Point, Greater Strawberry Point, in Frog Mortar Creek, and in Stansbury Creek.

Environmental studies also have been conducted at the Middle River Complex. Lockheed Martin entered the Maryland Department of the Environment's Voluntary Cleanup Program after beginning soil and groundwater investigations at the Middle River Complex. Lockheed Martin and the Maryland Department of the Environment mutually agreed to move the Middle River Complex Remediation Project from the Voluntary Cleanup Program, which is only available for real estate owned by the remediating entity, to the Land Restoration Program when investigations expanded to adjacent surface water bodies owned by the State of Maryland. This change allows all planned cleanup activities to be consolidated under one State of Maryland-administered program, which are addressed in an administrative consent order.

### ***Environmental Sampling***

Lockheed Martin has collected thousands of soil, surface water, sediment, groundwater, soil vapor, and indoor air samples at the Middle River Complex and Martin State Airport. All samples were tested for chemicals known to have been used during aircraft manufacturing and assembly and related industrial operations. Chemicals used in the Middle River Complex were found beneath pavement and buildings, in fenced-off areas with limited access, and near storm water outfalls along Cow Pen Creek and Dark Head Cove. Sampling at Martin State Airport identified the Dump Road Area as the primary area of concern and revealed a groundwater plume containing contaminants moving towards Frog Mortar Creek. Some of these compounds have been found in Frog Mortar Creek, which prompted the Maryland Department of the Environment to issue a water contact advisory along parts of the airport shoreline, and Lockheed Martin to construct a groundwater treatment

system on the airport property (see below). Sampling results were used to assess potential risks to human health and the environment and to assess the appropriate level of cleanup in consideration of current and anticipated future use of the properties.

## Middle River Complex

The Middle River Complex consists of eight parcels of land, called tax blocks, identified separately by the letters A, B, and D through I. Investigations have been conducted primarily by tax block or site-wide by medium (e.g., groundwater).

### Risk Assessments

Soil, groundwater, soil vapor, indoor air, and sediments were assessed to evaluate potential risks to human health and the environment. The risk assessments determined specific chemicals to target for cleanup in all the various media, and proposed target cleanup concentrations for the current use and potential future uses of the site such as industrial, residential, or recreational. The information provided in the risk assessments was used to select and design appropriate cleanup remedies that could reduce chemical concentrations in soil, groundwater, indoor air, surface water, and sediments to health-protective levels in a timely manner.

### Soil Investigations and Cleanup

Soil around and underneath existing and former buildings, parking lots, and in secured, fenced-off areas along the waterfront included areas containing elevated concentrations of petroleum compounds, polycyclic aromatic hydrocarbons (PAHs); metals such as arsenic, mercury and lead; and polychlorinated biphenyls (PCBs).

Block B (the parking lot

and ball field area on Eastern Avenue) was cleaned up in 2010 by removing and disposing contaminated soil at a licensed landfill and replacing it with clean soil. The Maryland Department of the Environment has notified Lockheed Martin that no further soil or groundwater cleanup is necessary on Block B. However, since contaminated groundwater is located under the adjacent Block I, a land-use restriction prohibiting use of groundwater on Block B has been recorded in the Baltimore County land records.

Block A primarily includes a Lockheed Martin office building. The Maryland Department of the Environment agrees that the site history and characterization support



*Middle River Complex*



the conclusion that Block A does not require remediation. However, Block A is subject to the same land-use restriction regarding use of groundwater as Block B, because it is also adjacent to Block I.

Based on results of the risk assessments, soil Remedial Action Plans (RAPs) were required for Blocks D, F, G, and H. The resulting Remedial Action Plans were approved by the Maryland Department of the Environment in 2013 and early 2014, and in 2016 the public reviewed and commented on the plans, which proposed cleaning the soils to industrial standards, consistent with current and historical property use. Lockheed Martin proposed cleaning the panhandle portion of Block D to recreational standards. The blocks were cleaned up in 2015 and 2016. In 2018, the Maryland Department of the Environment notified Lockheed Martin that no further soil cleanup is necessary on these Blocks. Land-use restrictions prohibiting the use of groundwater and prescribing soil management requirements have been recorded in the Baltimore County land records. Additional remediation might need to be completed should residential, commercial, or recreational land use changes within Blocks F, G, or H, or the non-panhandle portion of Block D, be planned in the future.

Environmental monitoring continues at Block I, which contains Middle River Aerostructure Systems (MRAS) production facilities and operations of Lockheed Martin's Rotary and Mission Systems (RMS). Environmental monitoring of Block I will continue after the anticipated closure in 2023 of Lockheed Martin's RMS local business operations.

Polychlorinated biphenyls (PCBs) were found at elevated concentrations in Block E, prompting additional investigations and remedial actions for this area under a U.S. Environmental Protection Agency (USEPA) program. Lockheed Martin has completed remedial investigations of Block E and the feasibility study (or Remedial Action Plan) evaluating potential remedial actions that may be effective in cleaning up Block E. The Remedial Action Plan, which includes the preferred cleanup alternative, has been approved by the Maryland Department of the Environment. A Risk Based Disposal Approval Application, documentation required by the USEPA, has also been approved. Construction design was completed, permits were received, and construction has been underway since the spring of 2021. The remedy focuses on removing the contaminated soil in Block E, down to a depth of 20 feet in certain areas, and replacing it with clean soil. The contaminated soil will be taken to licensed landfills, located out-of-state. Contaminated soil found along part of the roadway and median will be removed.

***A Citizens' Guide and Addendum, Project Bulletin, and Website Virtual Photo Tour on Soil Cleanup are available at [lockheedmartin.com/middleriver](http://lockheedmartin.com/middleriver)***

The foundation of the former D-Building will also be removed, with any clean concrete recycled locally. Many of the original storm drains and inlet structures, which Lockheed Martin has been cleaning and rehabilitating since 2011, will be removed and replaced. The site will be restored to a fully-vegetated field including a pollinator meadow.

Because radioactive materials were used in the former D-Building, the Nuclear Regulatory Commission conducted a closeout verification survey of that parcel in 1994 and concluded that no detectable radiation levels above background were present and that the location was suitable for unrestricted use in its current condition, with the basement floor slab in place and the floor drains plugged with concrete. Lockheed Martin surveyed the area in 2004 and in 2012 and concluded that there was no radiation significantly above background levels at the ground's surface. Additional sampling for potential residual radioactive materials at the former location of D-Building continued during soil investigations. Radioactive materials are still present in some floor drains under the foundation slab. Therefore, a remedial action strategy including necessary precautions has been developed and incorporated into the construction design so that any radiological constituents found as the building slab is being removed will be properly handled and disposed.

Remedial action at Block E began in late April 2021. The project is expected to take seven to eight months to complete and will include temporary closure of Chesapeake Park Plaza road for about a month in part of September and October to accommodate remediation and replacement of the storm drain system.

### ***Groundwater Investigations and Cleanup***

During investigations of groundwater at the Middle River Complex, Lockheed Martin identified three shallow groundwater plumes containing elevated concentrations of chlorinated solvents including trichloroethene (TCE) that originated from the industrial facility in the center of the complex (Block I) and in the southeast corner of Block E. There also were several small, isolated areas containing petroleum compounds such as benzene in shallow groundwater near former underground storage tanks beneath the Middle River Complex industrial buildings. Site workers and visitors do not come into contact with these chemicals because groundwater at the site is not used for any purpose. Mitigation systems have been installed under portions of Block I buildings to protect indoor air quality by removing vapors of contaminants emanating from contaminated soil and groundwater present beneath the building. Any future use of shallow groundwater is restricted by the Maryland Department of the Environment.

Shallow groundwater at the Middle River Complex discharges to Dark Head Cove and Cow Pen Creek. The slow rate of discharge to these surface waters results in very small discharge of contaminants that rapidly disperse, resulting in low levels that meet the site-specific swimming screening

levels established for Dark Head Cove and Cow Pen Creek. This is confirmed by periodic sampling under a surface water monitoring program, based on swimming criteria approved by the Maryland Department of the Environment.

Groundwater treatment systems began operating in 2014 to treat two of the three shallow groundwater plumes. These systems rely on in situ (meaning “in place”) bioremediation to reduce trichloroethene in areas of the highest concentration. In bioremediation, a mixture of water and lactate produced from sugars such as from corn or beets is injected into the ground to stimulate naturally occurring bacteria that consume and break down the contaminants. A total of 271 truckloads of contaminated soil were excavated to allow for installation of treatment wells and piping. The removed soil was sent to a licensed landfill, and certified clean soil and gravel replaced the contaminated soil. Groundwater treatment in Blocks G and I met cleanup objectives.

***A Citizens’ Guide, Project Bulletin, and Construction Photo Tour on groundwater are available at [lockheedmartin.com/middleriver](https://lockheedmartin.com/middleriver)***

During excavation for the third shallow groundwater plume in Block E in 2013, two previously unknown underground storage tanks were discovered, one of which contained trichloroethene (TCE), a solvent commonly used to clean industrial parts. The tanks were removed and disposed of following Maryland Department of the Environment regulations. Follow-up investigations revealed trichloroethene in the groundwater was at concentrations too high to be removed effectively by only the type of groundwater bioremediation treatment system that had been recently installed for the other two groundwater plumes. A high vacuum extraction system was temporarily installed in this area to remove the highest concentrations of trichloroethene from groundwater and soil. The extracted groundwater was treated prior to discharge to the Baltimore County sanitary sewer system. The system operated in 2014-2015 and removed approximately 550 pounds of trichloroethene.

Lockheed Martin collected groundwater samples from Block E and adjacent Block F to develop a better understanding of the trichloroethene groundwater plume, and completed a feasibility study proposing a preferred remedy; the Maryland Department of the Environment has approved the remedy. Lockheed Martin has proposed a multi-part approach to cleaning up the trichloroethene plume. Groundwater will be treated using bioremediation close to the original contamination source in Block E. A permeable reactive barrier was also proposed downgradient in Block F across the width of the plume. The barrier, consisting of small iron particles, could potentially help break the trichloroethene down into non-toxic byproducts. A pilot

test of the permeable reactive barrier was performed, and the data is currently being analyzed. Contaminated groundwater on the other side of the barrier will be extracted via two extraction wells and pumped to a treatment system. Construction of this multi-faceted system began in mid-2020. Complications with COVID-19 as well as the time necessary to secure a building permit to house the treatment system slowed progress in late 2020. Lockheed Martin resumed construction of the treatment building in spring 2021. Meanwhile, Lockheed Martin is monitoring the groundwater plume for any movement of trichloroethene toward Dark Head Cove, including sampling surface water in the cove. Groundwater investigations also confirm that the groundwater contamination does not move underneath the creek to the adjacent Hawthorne or Wilson Point neighborhoods.

While investigating groundwater in preparation for Block E soil remediation, Lockheed Martin defined the extent of 1,2,4-trichlorobenzene and other chlorinated benzene compounds in Block F groundwater and developed an addendum to its groundwater response action plan that presents alternatives for addressing these plumes. That plan was shared with the public in Summer 2021.

Lockheed Martin voluntarily sampled for eight compounds from a group of per- and polyfluoroalkyl substances (PFAS) at both the Middle River Complex (MRC) and Martin State Airport. At MRC 40 of the 41 groundwater samples had low-level PFAS concentrations. None of the samples exceeded the EPA’s human health advisory levels of 70 parts per trillion (ppt) for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), either individually or combined. PFOS concentrations detected in 2 locations sampled exceeded the U.S. EPA groundwater screening level of 40 ppt (measured concentrations of 42 and 47 ppt).

### ***Sediment Sampling and Proposed Sediments Cleanup***

The sediments of Dark Head Cove and Cow Pen Creek have been sampled extensively. Sediments in Cow Pen Creek and along the bulkhead and airport discharge points in Dark Head Cove contained elevated concentrations of polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and metals such as cadmium and chromium. These concentrations indicated the need for appropriate action to reduce potential risks associated with long-term direct contact, uptake of contaminants by fish, and potential impact to organisms residing in the sediment. (Consumption of fish taken in these waters is guided by Maryland Department of the Environment and Maryland Department of Natural Resources fish advisories for the Chesapeake Bay and the Baltimore region, which include the Middle River area.)

Lockheed Martin worked with the community to develop a preferred approach to remediating sediment in Cow Pen Creek and Dark Head Cove adjacent to the Middle River

Complex. The approach was presented in a Feasibility Study and approved by the Maryland Department of the Environment and the U.S. Environmental Protection Agency in 2013. The approach included removing contaminated sediments through dredging and excavation; in situ (“in place”) treatment to reduce contaminant mobility; and monitored natural recovery that relies on natural processes to return sediment to natural levels. The preferred approach included shoreline stabilization, habitat enhancement, and creek bed plantings in Cow Pen Creek. Additional tests assessed benthic organisms (such as worms) and environmental conditions in the sediment to help determine the level of activated carbon to be used in in situ treatment. Test results submitted to regulators were also incorporated into designing the remedy. Lockheed Martin conducted cleanup between 2014 and 2017. The stages are described below.

### ***Sediment Dredging and Removal***

In 2013, sampling activities in preparation for sediment remediation revealed higher concentrations of polychlorinated biphenyls (PCBs) near Outfall 005 than had previously been detected elsewhere in Dark Head Cove. (PCBs were commonly used in electrical transformers and may have been released when D-Building was dismantled.) Lockheed Martin, the U.S. Environmental Protection Agency, and the Maryland Department of the Environment agreed the best course of action was to clean up this location before the full sediment remedy was implemented.

Lockheed Martin sequestered the work area with a floating boom in the spring of 2014. Sediments were removed in the winter of 2014. Dredged sediments were moved to dump trucks at the nearby bulkhead, and the trucks transported the sediments to a bermed and lined dewatering pad for draining. Additives were mixed with the sediments to

***A Citizens’ Guide and Photo Tours on sediments are available at [lockheedmartin.com/middleriver](http://lockheedmartin.com/middleriver)***

achieve necessary dryness and stability. The sediments were then transported to an approved and licensed disposal facility in New York State. In-water work was completed in mid-February 2015, which was the end of the allowable winter work window.

Similar practices were used for the full remedy dredging in Dark Head Cove and Cow Pen Creek, which occurred during the winter of 2016-2017.

Excavation work in Cow Pen Creek began in July 2017 and all work was completed by December 2017. The creek was piped around dammed-off segments, creating dry work areas. Fish were moved downstream to the creek section located below work areas. Following contaminant removal, the creek

was restored with native plants, including submerged aquatic vegetation. Restored and replanted areas are being monitored to ensure they recover properly. First and second year monitoring showed mostly good recovery in plantings in and upland to the creek, with a few areas needing to be replanted due to oversaturation. Replanting took place in 2020 with only modest success. Efforts continue to be made to monitor and restore Cow Pen Creek.

In total, the combined dredging and excavation removed approximately 55,500 cubic yards (3,285 truckloads) of contaminated sediments from nearly 12 acres. (For comparison, 1.3 acres is approximately equal to one football field.)

In winter 2017-2018 a layer of activated carbon was placed over an additional 13.7 acres of sediments in un-dredged portions of Dark Head Cove, creating a protective layer to absorb any remaining PCBs. This area is also being monitored and the results from the first year of monitoring were very positive, showing that remaining low levels of PCBs are being effectively sequestered from the food chain. The second monitoring event (conducted three years after construction completed) data is currently under evaluation but preliminary results look similar or better than first year monitoring.

Because Cow Pen Creek and Dark Head Cove are considered waters of the State of Maryland and of the United States, and are within the Chesapeake Bay Critical Area, the Maryland Department of the Environment made cleanup decisions in consultation with other governmental authorities, including the U.S. Environmental Protection Agency, the Maryland Department of Natural Resources, the U.S. Army Corps of Engineers, and the Maryland Critical Area Commission.

### ***Lockheed Martin’s Rotary and Mission Systems and MRA Systems, Inc. Facilities Vapor Mitigation***

Lockheed Martin continues environmental sampling in and outside A-, B-, and C-Buildings (Block I) to assess if there is any potential risk to human health in soil, groundwater, and sub-slab vapor. Soil-gas sampling indicates the presence of volatile organic compounds (VOCs) in several locations under and outside the buildings. In early 2008, Lockheed Martin took the precaution of installing sub-slab vapor-mitigation systems in the two areas of A- and C-Buildings where sub-slab vapor concentrations exceeded established screening concentrations. The systems are essentially vacuums that draw out the sub-slab vapor and direct it through a filter before releasing the vapor to the outside air. The systems have significantly reduced volatile organic compounds concentrations in vapors under the buildings

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and have helped maintain concentrations in indoor air below the conservative screening levels calculated by the U.S. Environmental Protection Agency and the Maryland Department of the Environment.

Air samples collected while the A-Building system was shut down in March 2013 for maintenance revealed that concentrations of volatile organic compounds remain below risk levels even when the system is not operating. Nonetheless, the mitigation system continues to be operated proactively. Monitoring in C-Building basement identified additional areas of volatile organic compounds in sub-slab vapor in the east-central part of the basement. Although indoor air samples do not indicate unacceptable risk levels, the C-Building sub-slab vapor-mitigation system was expanded proactively in 2012-13. An additional expansion took place in A-Building in 2016. The operation of the systems is periodically evaluated to be sure they effectively control the potential for vapor intrusion.

Over the past year, study has focused on the former Drop Hammer Building located to the west of A-Building. Elevated levels of VOCs have been found under the building slab but current data indicate the air quality inside the building is acceptable for site workers. Study is ongoing with more sampling being planned. In an abundance of caution, Lockheed Martin is proposing to install a new vapor mitigation system in the Drop Hammer Building. The new system is expected to be operational by the end of 2021.

Indoor air monitoring in the basement of A-Building indicated more persistent levels of volatile organic compounds, with several samples exceeding screening criteria. While this basement work space is occupied infrequently, it does require routine access for maintenance activities, and an air filtration system was installed in 2015 and expanded during 2017. The filtration system cleans the air and then discharges the treated air back into the basement. Additional investigations in 2017 evaluated whether trichloroethene vapors from the basement sumps and drains could be removed and treated using the existing A-Building sub-slab vapor-mitigation system. Based on positive results, one sump was covered and connected to the sub-slab vapor-mitigation system. Formerly used heating vents in the main work space of A-Building were sealed off to prevent vapors traveling from beneath the building or the basement into work areas. Additional sampling and flow monitoring of water leaving the sumps took place during 2018 and Lockheed Martin studied ways to permanently retire unused piping and sumps. One sump was permanently abandoned with concrete in 2019 without any adverse effects. Two more sumps were abandoned in 2020 and are currently being monitored for any adverse effects. Monitoring to date has indicated the abandonment of these two sumps is also successful.

Sampling of indoor air quality in the Vertical Launching System facility in 2006 and again in 2014 indicated no need

for additional sampling in that building. Sub-slab vapor in additional outlying buildings was sampled during 2017 and 2018, and results verify there are no concerns for vapor intrusion into indoor air.

## Martin State Airport

Lockheed Martin conducts environmental investigations at Martin State Airport, including sampling of the adjacent Frog Mortar and Stansbury Creeks, in cooperation with the Maryland Department of the Environment. Lockheed Martin coordinates investigations, remediation, and permitting activities at Martin State Airport with the State of Maryland, represented by the Maryland Aviation Administration (the property owner), and with the Maryland Air National Guard (a major tenant at the airport).

### *Dump Road Area*

Investigations in the Dump Road Area revealed the presence of contaminants—concentrations of chlorinated volatile organic compounds (CVOCs) including trichloroethene (TCE), cis-1,2 dichloroethene, and vinyl chloride at concentrations exceeding federal and Maryland groundwater standards—in a plume originating from the Dump Road Area and moving towards Frog Mortar Creek. Lockheed Martin constructed a groundwater treatment plant to contain the flow of the contaminated groundwater from the Dump Road Area, thereby preventing the discharge of the chlorinated volatile organic compounds to Frog Mortar Creek. This Interim Remedial Action (IRA) consists of a series of extraction wells located parallel to Frog Mortar Creek in the Dump Road Area that extract groundwater and pump it to the groundwater treatment facility. Treated groundwater is discharged through a submerged outfall in Frog Mortar Creek, and the treated water quality is regularly monitored to ensure compliance with permit limits. Construction of the facility was completed in late 2017, and operation began in December 2017. Operation of the groundwater collection and treatment system has significantly improved the water quality in the creek, virtually eliminating any detections of the contaminants of concern by 2019.

Lockheed Martin continues to assess potential sources of groundwater contamination in the Dump Road Area and close to Taxiway Tango and is evaluating supplementing groundwater treatment with additional extraction wells in the areas of highest groundwater contaminant concentrations and with in situ (“in place”) remedies that could be implemented to decrease the time needed to complete the groundwater treatment (currently expected to take decades). Lockheed Martin also coordinates with the Maryland Aviation Administration and the Maryland Air National Guard to control the risk of exposure to workers conducting airport maintenance or construction in the area. Lockheed Martin and the Maryland Aviation Administration are working together to determine what environmental conditions may need to

be addressed in support of airport operations and how to effectively close the landfill.

Lockheed Martin voluntarily sampled for the same eight per- and polyfluoroalkyl substances (PFAS) at Martin State Airport as was done at the Middle River Complex (MRC). Two rounds of sampling occurred at both the Greater Strawberry Point and Dump Road Area. Sampling results

ranged widely. The highest result at Greater Strawberry Point was 520 parts per trillion (ppt) for PFOS in round one in a sample located in a drainage ditch. The corresponding sample in round two had a PFOS level of less than 5 ppt. Near the Dump Road Area, the highest levels were in the north (3,000 ppt for PFOS) and south of the area (7,800 ppt for PFOS). At the groundwater treatment plant, PFAS was detected in plant influent samples, but was not



*Martin State Airport*



***A Citizens' Guide and Construction Photo Tour on groundwater are available at [lockheedmartin.com/martinstateairport](http://lockheedmartin.com/martinstateairport)***

detected in the effluent, indicating that PFAS is being introduced to the groundwater treatment plant process water via the extraction wells, but is effectively being removed by the carbon treatment vessels.

While earlier sampling found no issues of concern, sampling between 2012 and 2017 indicated the discharge of some concentrations of the volatile organic compounds (VOCs) trichloroethene (TCE), cis-1,2-dichloroethene, and vinyl chloride into Frog Mortar Creek, resulting in surface water volatile organic compounds concentrations in a portion of Frog Mortar Creek above the swimming criteria developed for this project. The highest concentrations were in a small area along the shoreline of Frog Mortar Creek in the Dump Road Area. Consequently, following a public information meeting, in April 2012 the Maryland Department of the Environment issued a water contact advisory for a 2,000-foot long stretch of shoreline next to the airport, recommending that swimming within 200 feet of the shoreline be limited to four hours per day and approximately 70 days per year. Lockheed Martin and the Maryland Department of the Environment established an ongoing surface water monitoring program for Frog Mortar Creek where water samples are collected six times a year, focusing on the summer swimming months. Results are published in an annual report. A summary of average summer Frog Mortar Creek Surface Water Conditions is available as a poster that is updated annually and can be found on the project website at: [www.lockheedmartin.com/martinstateairport](http://www.lockheedmartin.com/martinstateairport). Sampling results since the groundwater treatment facility began operating consistently demonstrate improved water quality in the creek, virtually eliminating any detections of the contaminants of concern by 2019. Lockheed Martin will work with the Maryland Department of the Environment to modify, and in the future remove, the water contact advisory.

### ***Frog Mortar Creek***

While earlier sampling found no issues of concern, sampling between 2012 and 2017 indicated the discharge of some concentrations of the volatile organic compounds (VOCs) trichloroethene (TCE), cis-1,2-dichloroethene, and vinyl chloride into Frog Mortar Creek, resulting in surface water volatile organic compounds concentrations in a portion of Frog Mortar Creek above the swimming criteria developed for this project. The highest concentrations were in a small area along the shoreline of Frog Mortar Creek in the Dump Road Area. Consequently, following a public information meeting, in April 2012 the Maryland Department of the Environment issued a water contact advisory for a 2,000-foot long stretch of shoreline next

to the airport, recommending that swimming within 200 feet of the shoreline be limited to four hours per day and approximately 70 days per year. Lockheed Martin and the Maryland Department of the Environment established an ongoing surface water monitoring program for Frog Mortar Creek where water samples are collected six times a year, focusing on the summer swimming months. Results are published in an annual report. A summary of average

***A Frog Mortar Creek Surface Water Conditions summary poster is available at [lockheedmartin.com/martinstateairport](http://lockheedmartin.com/martinstateairport)***

summer Frog Mortar Creek Surface Water Conditions is available as a poster that is updated annually and can be found on the project website at: [www.lockheedmartin.com/martinstateairport](http://www.lockheedmartin.com/martinstateairport). Sampling results since the groundwater treatment facility began operating consistently demonstrate improved water quality in the creek, virtually eliminating any detections of the contaminants of concern by 2019. Lockheed Martin will work with the Maryland Department of the Environment to modify, and in the future remove, the water contact advisory.

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### ***Stansbury Creek***

Lockheed Martin collected sediment samples in Stansbury Creek in 2009 to identify and characterize the nature and extent of possible contamination resulting from current and past airport activities. Elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) were found next to one outfall that drains paved surfaces associated with airport operations. These concentrations were consistent with regional findings, and risks to human health and the environment appear negligible. In 2010 the Maryland Department of the Environment notified Lockheed Martin that based on the agency's review of the corporation's reports, no remediation was required for Stansbury Creek. In 2016, Lockheed Martin collected sediment and surface water samples near the northern end of Stansbury Creek and adjacent to streams draining wetlands in Greater Strawberry Point



and draining storm water from the airfield. Similar to the 2009 results, elevated polycyclic aromatic hydrocarbons concentrations and some elevated metal concentrations were detected in the sediment by these outfalls in Stansbury Creek. No elevated volatile organic compounds concentrations were detected in the creek surface water and sediment.

### ***Strawberry Point and Greater Strawberry Point***

Lockheed Martin has been investigating the Greater Strawberry Point area of Martin State Airport since 2007 to determine the nature and extent of possible contamination in soil and groundwater in areas of former Glenn L. Martin Company operations. These investigations revealed limited instances of chemicals of concern in groundwater that exceed thresholds established by Maryland Department of the Environment. Although groundwater plumes containing low levels of chemicals are moving towards Stansbury and Frog Mortar Creek, the plumes remain close to their sources and the chemicals are not expected to reach the creeks or impact the surface water of the creeks as they will naturally attenuate, or diminish.

Soil and groundwater investigations in the southern part of Greater Strawberry Point, from the airport fuel storage area north to the airport maintenance facility, did not find contaminants at levels that present a risk to human health or the environment. Follow-up soil and groundwater investigations in the part of Greater Strawberry Point north of the airport maintenance facility show some areas of groundwater contamination. The area is largely woodlands and was the site of several former Glenn L. Martin facilities that have mostly been demolished.

Based on the feasibility study approved in 2019, Lockheed Martin began monitoring the natural attenuation of groundwater contamination in Greater Strawberry Point in 2020. Surface water samples have also been collected from Stansbury Creek as part of this assessment. Chemical concentrations in groundwater in this area of Greater Strawberry Point are sufficiently low that active cleanup techniques do not significantly improve upon natural processes to reduce the time needed to achieve remediation goals. No VOCs have been detected in Stansbury Creek. In addition to the monitored natural attenuation, Lockheed Martin will institute land-use controls and five-year reviews of the cleanup progress.

### ***Main Terminal***

The airport Main Terminal area surrounding Hangars 1 through 6 was investigated starting in 2011. Geophysical and soil vapor surveys and soil and groundwater sampling were conducted in areas of former Glenn L. Martin Company operations near these hangars, which were part of the original Glenn L. Martin Airport. The report for the Main Terminal work was completed in 2012. Additional

groundwater investigations were also conducted in summer 2012. No contaminants were discovered at levels that present a risk to human health or the environment. Biannual groundwater monitoring of two wells continues in the Main Terminal area due to the presence of low levels of fuel-related compounds. These contaminants are expected to degrade naturally without impacting nearby waterways.

## **Public Outreach and Citizen Participation**

Lockheed Martin is committed to ensuring that employees at the Middle River Complex, interested citizens, neighbors, the media, and local, state, and federal officials are kept informed of the progress of the work at both sites. Lockheed Martin also shares all airport findings with the Maryland Aviation Administration and Maryland Air National Guard. The Corporation has conducted and will continue to conduct informational, educational, and working sessions, tours, briefings, and presentations with stakeholders, and to provide poster and public availability sessions throughout the course of the investigations and cleanup. Lockheed Martin is keeping the public informed about the cleanup through newsletters, personal update letters, and its website.

Lockheed Martin has a long-standing tradition and a philosophy of involving community members and neighbors and encouraging them to provide their input and insight into the remedial investigations and proposed cleanup alternatives. As a part of this community outreach effort in the Middle River area, the Corporation has conducted regular briefings and updates with civic association leaders, hosted community meetings, and been an active participant in community events.

During many permitting activities, public comment periods are sponsored by state and federal governmental authorities. Lockheed Martin will share information about these opportunities through its ongoing community outreach program.

## Glossary and Acronym List

**Arsenic** — an odorless and tasteless semi-metal that enters bodies of water naturally from the earth and from industrial processes.

**Attenuation** — the decrease of a contaminant concentration in soil or groundwater over time due to processes such as microbial breakdown of the compound (biodegradation), sorption onto soil or sediment particles, dilution as contaminants move through an aquifer and mix with clean groundwater, evaporation of volatile organic compounds, and chemical reactions due to natural soil and groundwater conditions.

**AWQC** — Ambient Water Quality Criteria: numeric values of chemicals that show the limit of what is allowed in our nation's waters in order to help protect human health and the environment.

**Background radiation** — radiation that comes from natural sources and is always present in the environment. This includes solar and cosmic radiation as well as radioactive elements in the ground, building materials, and the human body.

**Benzene** — a colorless, flammable, liquid aromatic hydrocarbon derived from petroleum and used in the manufacture of a wide variety of chemical products.

**Cadmium** — an element found naturally in soil and rocks. Cadmium is also found in some foods and in man-made 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, cadmium typically clings to soil and sediment.

**Chlorinated solvents** — chemicals that include methylene chloride, perchloroethylene, trichloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and carbon tetrachloride. Chlorinated solvents are typically used as cleaning and degreasing agents.

**Chlorobenzene** — is a common solvent and a widely used in the manufacture of other chemicals. 1,2,4-trichlorobenzene is also used in dielectric fluid along with polychlorinated biphenyls (PCBs) in electric transformers.

**Chromium** — an element found naturally in the earth's soil and water and all plants. Ore refining, chemical and refractory processing, cement plants, automobile and aircraft parts production, tanning and chrome pigments may also add chromium to the environment.

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

**In situ** — in place

**IRA** — Interim Remedial Action

**Lead** — used in the manufacture of batteries, metal products, and ammunition, and occurs naturally.

**MAA** — Maryland Aviation Administration

**MDANG** — Maryland Air National Guard

**MDE** — Maryland Department of the Environment

**MDNR** — Maryland Department of Natural Resources

**Mercury** — a metal used in manmade products such as batteries and thermometers, and occurs naturally.

**Middle River Complex** — the site that includes Lockheed

Martin's Rotary and Mission Systems (RMS) facility; an MRA Systems, Inc. facility; and other businesses.

**Mitigation** — process that lessens the severity of an environmental risk or condition.

**MRA Systems, Inc.** — leases space mainly inside A-, B-, and C-Buildings at the Middle River Complex to manufacture aircraft parts.

**PAHs** — polycyclic aromatic hydrocarbons — a group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat. There are more than 100 different polycyclic aromatic hydrocarbons. Also commonly found in asphalt paving and roofing materials and urban environments.

**PCBs** — polychlorinated biphenyls — a group of synthetic organic chemicals. There are no known natural sources of polychlorinated biphenyls. Polychlorinated biphenyls are either oily liquids or solids and are colorless to light yellow. They were once used commonly as a component of dielectric fluids in electrical transformers, among many other applications.

**PFAS** — Per- and polyfluoroalkyl substances (PFAS) are a large group of man-made substances that have been used in a variety of industries since the 1940s and were used in the manufacture of commercial products, including stain- and water-resistant fabrics, waxes, paints, and cleaning products, and are used in industry and fire-fighting.

**RAP** — Remedial Action Plan

**RMS** — Lockheed Martin's Rotary and Mission Systems (RMS) business area.

**Sediment** — sand, silt, and clay 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 soils** — topsoil found usually within the first six inches to one foot of the land surface. It is assumed that people could come into contact with surface soils when doing normal activities around the home or work place, such as shallow digging for fencing, gardening, landscaping, and mowing the lawn.

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

**TCE** — trichloroethene — a volatile organic compound (VOC) used to clean metals and in specialty adhesives. It was used commonly as a degreaser in industrial operations. Trichloroethylene is another, older name for the same chemical.

**USEPA** — U.S. Environmental Protection Agency

**UST** — underground storage tank

**VCP** — Voluntary Cleanup Program. Administered by the Maryland Department of the Environment. Participation by companies is voluntary. The program is used to clean up brownfield sites (abandoned or underused industrial and commercial facilities available for re-use).

**VLS** — Vertical Launching System

**VOC** — volatile organic compound — A type of chemical that transforms from a liquid to a gas at room temperature.



## Further Information

Final environmental reports and other public information covering Lockheed Martin's environmental remediation activities at the Middle River Complex and Martin State Airport sites may be found at the Essex Public Library at 1110 Eastern Boulevard, Essex, Maryland, 21221. For more information about the library, call 410-887-0295.

Information also is available on the Lockheed Martin website: [www.lockheedmartin.com/middleriver](http://www.lockheedmartin.com/middleriver) or [www.lockheedmartin.com/martinstateairport](http://www.lockheedmartin.com/martinstateairport)

## Contact Information

Interested members of the public, or the media, are invited to contact Lockheed Martin at any time with questions or requests for additional information.

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