

Middle River, Maryland
Middle River Complex and Martin State Airport
Environmental Studies and Cleanup

September 2021

forget who we're working for



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

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.

The Middle River Complex consists of eight parcels of 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 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.

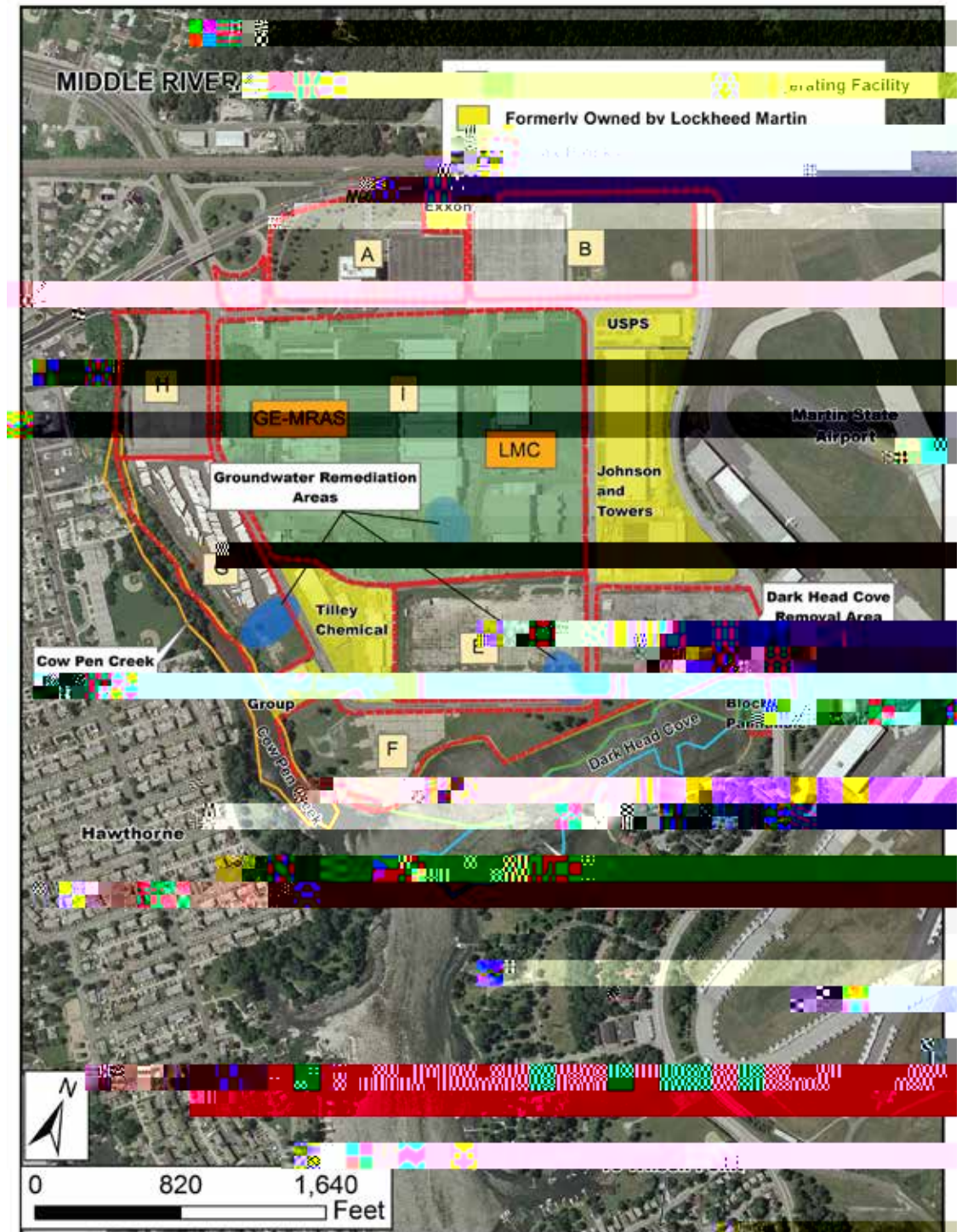
Soil Investigations and Cleanup

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

in 2010 by removing and disposing contaminated soil at 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.

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 reviewed and commented on the plans. A 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 a secure disposal facility. The contaminated soil found along part of the roadway and median will be removed.

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 functional condition.

Because radioactive materials were used in the former D-Building, the Nuclear Regulatory Commission conducted an investigation 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 area cleaned up. Lockheed Martin surveyed the area in 2004 and in 2012 and found no detectable radiation levels 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 areas. 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.

levels established for Dark Head Cove and Cow Pen Creek.
water monitoring program, based on swimming criteria

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.

Nqemjggf"Octvkv"ugswgvgtgf"vjg"yqtm"ctgc"ykvj"ci"i"qcvkpi" 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

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. PCB sampling results from 2017-2018 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. Monitoring will continue through 2020.

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

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 in 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

be addressed in support of airport operations and how to

Lockheed Martin voluntarily sampled for the same eight
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

fgvgevfgf"kp"vjg"gh"wgpv."kpfkecvkpi"vjcv"RHCU"ku"dgkpi" 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. 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

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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 ykvj"tgikqpcn"Łpfkpiu."cpf"tkumu"vq"jwo"cp"jgcnvj"cpf"vjg" environment appear negligible. In 2010 the Maryland Fgrctv"ogpv"qh"vjg"Gpxktq"ogpv"pqvkŁgf"Nqemjggf"Octvkp"

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 — 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 (PCBs) in electric transformers.

Chromium — an element found naturally in the earth's 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

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 electrical transformers, among many other applications.

PFAS — a group of man-made substances that have been used in a variety of industries

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 or www.lockheedmartin.com/martinstateairport

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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For information on career opportunities at Lockheed Martin, visit <http://www.lockheedmartinjobs.com>