

Sediment Cleanup Begins in October

Preliminary work has begun on the final phase of sediment cleanup in Dark Head Cove and Cow Pen Creek. Lockheed Martin contractors are mobilizing equipment, materials and silt fences. Other features, such as stone construction entrances, have been placed to control land-based erosion and sediment. Containment bins for receiving the dredged material are being installed in Block G. A silt curtain placed across the mouth of Dark Head Cove beginning October 17 effectively isolates the work area. The boom line and curtain will protect the water quality of Dark Head Creek downstream of the cove and will also close off Dark Head Cove and Cow Pen Creek to boat traffic.

The old shore-retention bulkheads on the north side of Dark Head Cove will be replaced. The in-water work window begins on October 15; work on the bulkhead begins on October 19 in the small inlet near Outfall 005

continued on page 2



Monitoring was performed before work began in 2014 to establish what the turbidity level was during “normal” conditions. After work began, the turbidity levels were monitored regularly both inside and outside the work area. This was done to assess what effects the dredge operations might create, and to confirm that water quality requirements were met.

The Martin State Airport Groundwater Treatment Facility Is ‘Out Of The Ground!’

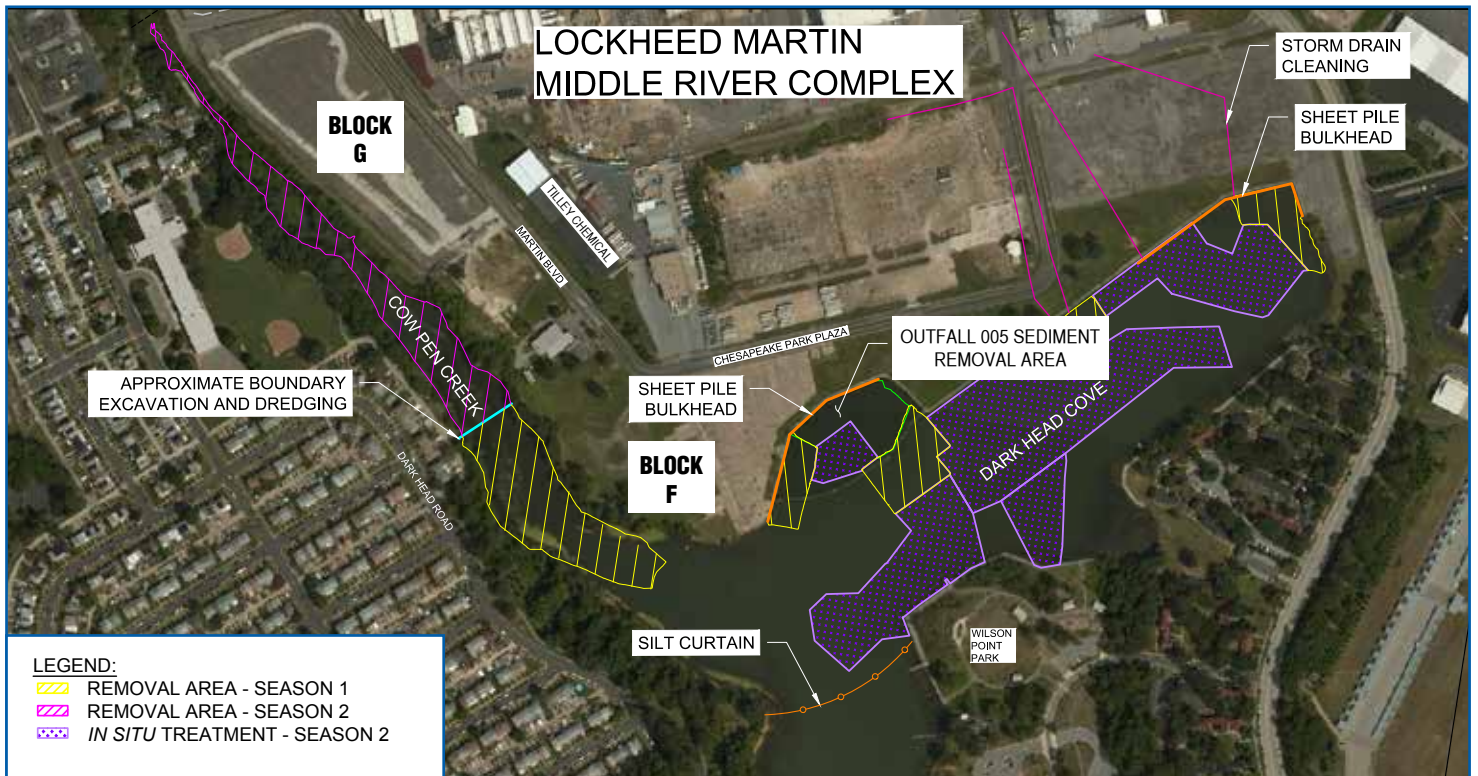
Mid-September marked a major milestone in construction of the groundwater treatment facility at Martin State Airport—we finished the foundation and began placing the concrete floor. Building the foundation has been an important and challenging task given that the new facility sits atop the former dump. We used 250 concrete piles to provide the strength and stability we needed for the foundation. The piles extend through the former dump into the underlying natural sand formation.

Once the piles and foundation walls were in place, we installed a three-layer vapor barrier across the facility footprint. The barrier will prevent potentially contaminated soil vapor beneath the building floor from seeping into the building.

continued on page 6



The vapor barrier was installed around infrastructure beneath the building. The PVC pipe shown here acts as an exterior vent to prevent vapors from accumulating beneath the building.



Dark Head Cove and Cow Pen Creek, adjacent to the Lockheed Martin property, have been closed off with a silt curtain and boom as displayed above. A sediment removal dredging project is underway in this area.

continued from page 1

and proceeding to the bulkhead at the east end of Dark Head Cove. Marine-grade sheet metal pilings will be driven on the water side of the old corroded sections using vibrating hammers. The sheets are tongue and groove and will interlock with each other. The gap between the old and new sheet metal will be filled with stone and topped with concrete. The five storm drains on the northeastern portion of the cove will be cleaned and repaired and three of these will be extended through the new bulkhead with new piping.

Dredging will proceed as the new sections of bulkhead are completed. As in the Outfall 005 sediment cleanup in Dark

Head Cove during the winter of 2014-15, a crane operating from a barge in the cove uses a clamshell bucket to capture the sediments. Dredging will proceed about 500 feet farther up Cow Pen Creek than originally planned because Lockheed Martin's contractor has determined that it will be more efficient and effective to dredge both the cove and the lower part of the creek in the same operation. A second barge-mounted crane will be used to dredge in this area. At least 35,000 yards (or approximately 1,750 truckloads, which will be 30-40 truckloads per day) of sediment will be removed during the dredging operation.

As in the past, Lockheed Martin contractors will actively monitor the in-water work using fixed buoys with sensors and mobile sensors deployed by hand from a boat. Control of the silt stirred up during dredging can be achieved by changing work practices, such as slowing down the pace of dredging, if necessary. If the water around the work area becomes measurably murky, an additional silt curtain could be added. The monitoring points will be outside the silt curtain and will be monitored with floating sensors that communicate continuously with a land-based monitoring station. The monitoring data is sent routinely to the regulators.

Dredged sediment will be barged to the shore, off-loaded near the old concrete pad on Block F (the old sea plane ramp) and trucked to the containment areas on Block



Arrival of first dredge barge and crane as shown in 2014.

G. There, the sediment will be allowed to drain in the specially constructed bins, and drying materials may be added if necessary. From Block G, the stabilized sediment will be transported by truck to any one of the five permitted landfills in Pennsylvania and Virginia that have been approved by Lockheed Martin, the State of Maryland and the U.S. Army Corps of Engineers. The dredging and treatment processes will be the same as that used in the winter of 2014-2015 to handle the sediment that was dredged near Outfall 005, except that this time the material being dredged is non-hazardous and will be mixed with municipal solid waste at the landfills. The dredging operation is expected to be complete by mid-February 2017, weather permitting. In-water work that is capable of stirring up silt or disturbing the cove bed must cease at that time to stay within the required time frame of the work window to ensure no disturbance of fish spawning. Processing, loading and shipping of waste may continue on shore for as long as needed.

Tom Blackman, Lockheed Martin's project manager, noted that, "We'll be taking samples of the cove bottom during the dredging operation to make sure that we've removed all the objectionable material. Once we've achieved that goal, we'll place sand on top of the dredged area, which should give us a topmost layer that is about as close to clean as you can get."

The U.S. Environmental Protection Agency (EPA) has conditionally approved applying a layer of activated carbon granules atop the remaining 14 acres of Dark Head Cove to treat those areas where concentrations of PCBs are so low that dredging doesn't make sense. (Activated carbon is commonly found in the home in water filters and aquarium filters, among other uses.) It will take time for the carbon granules to integrate with the material in the bottom of the cove and become fully effective. Final approval by the EPA for the activated carbon remedy will depend on future monitoring results. Samples will be taken one, three and five years after the carbon has been placed to determine how effective it is. Placement of the carbon is scheduled to begin after commencement of the next in-water work window, in mid-October 2017.

Excavation of Cow Pen Creek will begin mid-June 2017. Work will start from the upstream end near Eastern Blvd., and progress downstream to the location of the first season's dredging. Over 12,600 cubic yards (or about 630 truckloads) of sediment will be excavated from Cow Pen Creek. Cofferdams, which are temporary watertight walls

or water-filled bladders, will be placed on the streambed. The water within these temporary dams will be pumped out, exposing the creek bottom for excavation. The cofferdams will be deployed, removed and redeployed in sequence as the work proceeds. The Lockheed Martin team will also remove any debris and waste material it finds.

Cow Pen Creek will be restored to a natural condition. The creek bed will be shaped to resemble its previous course as much as possible, and wetlands will be restored. Native trees, shrubs and plants will be planted. Clean sand and gravel, along with submerged structures, will be placed on the channel bottom to provide good conditions for fish spawning. Aquatic vegetation will be planted. Tom Blackman stated that, "If all goes well, given the expanded dredging project and consequently smaller excavation project, we could very well finish cleaning up the cove and creek in 2017, making them again available to the community, and in better condition than they have been for years."

Plans for the cleanup of sediments in Dark Head Cove and Cow Pen Creek were presented to the community at the Public Information Session held at Marshy Point Nature Center on April 4, 2016. Since that time, Lockheed Martin has secured numerous permits required for the different aspects of the work from federal, Maryland and Baltimore County agencies. The Maryland Board of Public Works approved the project on September 21. All permits are expected to be in place before the start of in-water work on October 17th.

Soil Cleanup Achieves Major Milestone

Soil cleanup is officially complete in tax Blocks H, G, F, D and D panhandle at the Middle River Complex. With the exception of Block G, the construction completion reports for these blocks have been approved by the Maryland Department of the Environment (MDE). The construction completion report for Block G was submitted for MDE review in early October. Block G completion was delayed while the Lockheed Martin team followed up on reports from former employees that transformers and underground storage tanks might still be buried there. While Lockheed Martin didn't find any intact transformers, it did find a few pieces and scraps. Lockheed Martin also found a 10,000-gallon tank and associated piping, which were removed. Restoration of all blocks was completed this past spring, including grading and seeding. However lack of

continued from page 3

adequate rain in the spring and summer resulted in reduced growth of grass cover and so final restoration is continuing this fall.

“Completion of the soil cleanup in these blocks marks the achievement of a major milestone in the remediation of the Middle River Complex,” Tom Blackman, Lockheed Martin project manager, stated. “However,” he added, “we still have the cleanup of Block E in front of us, which will take several years to complete.”

The process for cleaning up each of the blocks is essentially the same: identify what contaminants might be located in the ground, as well as any man-made underground objects such as storage tanks that need to be removed; develop a plan for removing the contaminants and features; review the plans with the public and submit them for government approval. Finally, obtain the permits necessary to carry out the plans and begin work. As anyone who has been following the progress of remediation at the Middle River Complex and Martin State Airport knows, it takes years to get to the point where cleanup actually begins. The number of issues that can arise is large, each of which must be resolved, each of which may require a separate plan of action. Block E is a case in point.

Block E is the site of former D Building, which started as a World War II airplane factory. The building eventually became the research and production facility for Glenn

L. Martin’s historical nuclear division, which produced portable nuclear power generators, among other things. Only the slab of D Building remains. Determining what lies beneath the surface of the soil in Block E, including under the D Building slab, has been a major focus of Lockheed Martin’s activities. Because radioactive materials were used there, the Nuclear Regulatory Commission conducted a closeout surface survey at the site in 1994; Lockheed Martin also surveyed the surface of the area in 2004 and 2012 and concluded that there was no radiation significantly above background.

“As we have moved toward the day when we begin removing the slab,” Tom Blackman said, “we have been systematically investigating what contaminants remain in Block E. We found and removed an underground storage tank on the southern perimeter of the block. When we were laying the pipe for the groundwater treatment system we were installing for Block E, we found two additional underground storage tanks, one that was used for petroleum and one for trichloroethene, or TCE, a cleaning solvent. We removed both tanks. There was a high level of TCE around the TCE tank, requiring us to install a vacuum system to extract and treat the majority of the TCE. What little TCE remains is being treated by the groundwater treatment system. Each of these is a step towards our major goal of removing the D Building foundation slab.”

Besides the underground storage tanks, Lockheed Martin also has found low levels of uranium and thorium in soil five to fifteen feet deep under the D Building slab that are not an immediate threat to human health or the environment. The cleanup team also found polychlorinated biphenyls (PCBs) in surface and subsurface soil outside and beneath the D Building slab, and asbestos containing



Location of Block E at the Middle River Complex

materials in subsurface soil in areas surrounding the slab. Lockheed Martin has fenced off the areas where these contaminants were found so that they are not accessible to the public. Access is also limited for people who work in or near Block E. For example, an area previously leased to Tilley Chemical for truck parking where PCBs were found in surface soil is fenced off to prevent access. The area in the eastern portion of Block E where volunteers at the Glenn L. Martin Aviation Museum store aircraft parts is outside the most affected areas and not a concern. Groundskeepers who mow and trim the grass in Block E are specially trained to avoid contact with the contaminants.

Meanwhile, Lockheed Martin continues to investigate the conditions under the D Building slab, methodically boring through it in a coordinated pattern, removing and testing samples of the sub-slab soil, all focused on creating as clear a vision as possible of what's under the slab. It's not likely that investigations will be complete until 2018. This information will guide the development of the Remedial Action Plan (RAP), which will summarize site contamination, analyze remedial alternatives and recommend a plan for cleaning up Block E contamination. It will also address removing the slab, contamination under the slab and throughout the Block, and contamination in and around the storm drains. The plan will be reviewed by the community and will require approval by the Maryland Department of the Environment and the U.S. Environmental Protection Agency. Soil excavation and slab removal is anticipated to begin in 2021.

Surface Water Sampling

Lockheed Martin periodically monitors surface water in Dark Head Cove and Cow Pen Creek to evaluate water quality. This practice helps protect human health, wildlife and the environment by ensuring identification of any site-related contaminants. Should any exceedances occur, Lockheed Martin will take appropriate action in collaboration with the Maryland Department of the Environment. To date, no exceedances have occurred requiring such action.

Groundwater Update

Lockheed Martin's groundwater treatment program at the Middle River Complex is focused on three tax blocks: G, I and E. The Corporation's cleanup strategy uses a process called bioremediation to stimulate bacteria that are already

present in the soil to break down contaminants, in this case, volatile organic compounds. A mixture of water and nutrients is distributed through a system of underground injection wells. Following injection of the nutrients, we sample the groundwater to see if the volatile organics have been reduced. We can add additional nutrients if necessary to further stimulate the naturally occurring bacteria.

We can also inject bacteria of a type normally present in the soil to increase the rate of contaminant breakdown. This process is called bioaugmentation.

Block G

Bioremediation of the groundwater in Block G is the farthest along. We have

Overall, the volatile organics in Block G have been reduced more than 90 percent.

completed two injections of nutrients, including one with bioaugmentation. The results have been excellent and at the moment, we don't see the need to do any more injections. We will sample the groundwater in Block G in 2017, and if the concentrations of contaminants continue their present downward trend, our active cleanup work there will transition to monitoring. We plan to ask the Maryland Department of the Environment for a declaration that no further action needs to be taken at Block G. Overall, the volatile organics in Block G have been reduced more than 90 percent.

Block I

Bioremediation in Block I is being conducted outside the buildings of the Middle River Complex. We have completed two injections of nutrients here as well, and the volatile organics have been reduced by about 50 percent. However, the nutrients are not dispersing underground as well as had been hoped. Over the coming winter we will try injecting nutrients in some wells at the same time as we pump out groundwater from other wells to see if we can help move the nutrients along and disperse them more broadly to more effectively bioremediate. The water we pump out will be treated and discharged to the sanitary sewer system. We had anticipated that this might happen and included it as a contingency option in the plan that we submitted to the Maryland Department of the Environment.

continued from page 1

“We began this work early this past winter,” said Paul Calligan, Lockheed Martin’s project manager. “People will remember that it was a cold winter with a major blizzard. That was in the early stages of the project, and it really slowed us down. Then we had heavy rainfall early this summer. We all feel tremendous about finally bringing the facility out of the ground, but I also want to add that working this close to the water, one of our most rigorous construction requirements was storm water and erosion control, which has been particularly important during the spring and summer deluges this year. The Maryland Aviation Administration and Maryland Department of the Environment inspect our site regularly to make sure all storm water and erosion controls in our construction area are maintained and functioning.”

With the foundation piers and slab in place, the building construction will move ahead this autumn. The new building is pre-engineered, and parts began arriving in late September, beginning with the steel framing. It will take most of November to erect the frame. The walls are made of about 40 prefabricated concrete panels, each 14-foot



Vapor barrier components are sealed around all penetrations, such as this foundation pile.

tall. The panels will be hauled three to four on a trailer, and then lifted directly into place on the building walls. The concrete walls will be topped by a band of translucent panels that will wrap the building and provide natural light. The roof and walls of the building should be in place



A rendering of the groundwater treatment building shows the concrete foundation piles. The piles extend through the former dump to the underlying natural sand formation to provide a strong foundation.

For more information on the project, a Project Bulletin is available at: www.lockheedmartin.com/martinstat



Extraction wells located along Frog Mortar Creek will withdraw groundwater at multiple depths. The wells are set within concrete vaults for ready access and protection.

by early December, allowing us to begin installation of the groundwater treatment equipment and the rest of the building interior.

This spring and summer, we installed the groundwater-extraction wells. The 16 wells are set within concrete vaults and are spaced in a line that is about 1,000 feet long and 100 to 150 feet inland from Frog Mortar Creek so that they can intercept contaminated groundwater moving from the dump toward Frog Mortar Creek.

Construction of the treatment facility should be complete by April 2017. This milestone will be followed by



Treated and cleaned water will be released back into Frog Mortar Creek through an outfall. The outfall area is marked off by yellow warning buoys.

extensive system testing to ensure proper operation, with full operations beginning by late spring 2017. The construction work requires extensive coordination with Martin State Airport and the Maryland Air National Guard base. Lockheed Martin is very grateful to both groups for their assistance throughout this project.

Frog Mortar Creek Water Sampling Update

As a part of the environmental investigations and cleanup plans under way at the Martin State Airport site, Lockheed Martin has conducted extensive surface water and sediment investigations in Frog Mortar Creek since 2004. In July 2010, as part of the ongoing monitoring program, surface water sampling results unexpectedly showed higher contaminant levels than had been previously detected. Lockheed Martin worked with the Maryland Department of the Environment to evaluate the new data. Consequently, the Maryland Department of the Environment issued a water contact advisory for a 2,000-foot long stretch of shoreline along Martin State Airport, recommending that swimming within 200 feet of the shoreline be limited to no more than 4 hours per day and a total of approximately 70 days per year. That advisory is still in effect, with the area marked by signs posted along the shore.

Lockheed Martin and the Maryland Department of the Environment now regularly monitor the surface water in Frog Mortar Creek. Forty water samples are collected six times a year, focusing on the summer swimming months (June to September). Samples are also collected in the off-season (March and December). Sampling results typically vary depending on factors such as the amount of rainfall and water flow in the creek. This summer, concentrations in Frog Mortar Creek have been within the range of values seen in the past, indicating that the water contact advisory continues to be protective. The results for samples collected in late September are not yet available. Results of monitoring are made available on the Martin State Airport project website when the reports are finalized, and also conveniently summarized on a poster each new year at www.lockheedmartin.com/martinstate.

Samples will be taken again in December and corresponding months in 2017.

Block E

We are continuing to work on the introduction of bioremediation in the treatment of Block E groundwater. Recapping the history of Block E groundwater cleanup, in 2013 we were installing piping for bioremediation injection when we discovered two abandoned underground storage tanks, one containing the solvent trichloroethene. The tanks and their contents were removed. When we investigated the area around the tanks, we found quantities of trichloroethene that were too concentrated to be treated effectively by bioremediation. Instead, we installed a pumping and vacuum system that removed the bulk of the trichloroethene from the groundwater and adjacent soil via four wells. We removed approximately 560 pounds of the trichloroethene and disposed of it at a licensed waste facility. We shut down the vacuum treatment system in late 2015.

Earlier this year, the pipes for carrying a nutrient mixture were connected to the wells and we injected a salt solution to see how well it flowed and dispersed. This will help us determine the ideal flow rate for introducing a nutrient mixture to bioremediate the groundwater. After we assess the results of these ‘tracer’ tests, we will do our first injection of the nutrient mixture, probably in early 2017.

For More Information

Questions may be addressed to:
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All documents are available at the Essex Library, 410-887-0295, or on Lockheed Martin’s website at www.lockheedmartin.com/middleriver or www.lockheedmartin.com/martinstate

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