Maryland Port Administration (MPA) Confined Aquatic Disposal (CAD)

Frequently Asked Questions (FAQs)

DREDGED MATERIAL MANAGEMENT PROGRAM

What is dredged material?

Dredged material is sediment excavated - or dredged - from the bottom of waterways.

Why is dredging necessary?

Over time, sediment accumulates at the bottom and sides of shipping channels due to wind, tides, and runoff. Several factors may impact the sediment depth in the shipping channels, such as runoff that originates from land-based activity, weather events, or underwater sediment that shifts in the wake of commercial and industrial ship traffic. As sediment accumulates, it makes it difficult for ships to navigate the channel.

How often do channels need to be dredged?

At the Port of Baltimore, dredging is an ongoing activity, with an average of 4.6 million cubic yards of sediment removed from shipping channels in the Chesapeake Bay each year. That's the equivalent of filling the Baltimore Ravens M&T Bank Stadium to the brim with sediment twice every year. The frequency of dredging in specific areas depends on the amount of sediment accumulated, but on average, 1.17 mcy are dredged from the Baltimore Harbor shipping channels annually. The Maryland Port Administration (MPA) and the US Army Corps of Engineers (USACE) work together to conduct dredging and find placement sites and solutions for this dredged material, which is also referred to as "maintenance dredging."

What is in dredged material?

Dredged material in the Chesapeake Bay and Baltimore Harbor is mostly fine silts, clay, and sand accumulating in the shipping channels. The geologic formations in the region, as well as human activities, affect the character of the sediment in different locations. Human activities affecting sediment include industrial activity, agriculture, and urban development. Dredged material from shipping channels generally does not contain pollutants at levels that could cause human or environmental harm and is not classified as hazardous.

CONFINED AQUATIC DISPOSAL (CAD)

What is confined aquatic disposal?

Confined Aquatic Disposal, or CAD, is a technique in which sediment are removed from the river bottom to create a depression, or CAD cell. That depression is then filled with dredged material from maintenance dredging of shipping channels and anchorages.

Why is MPA exploring the feasibility of CAD in Baltimore Harbor?

CAD is being investigated as a potential dredged material management solution as part of the State of Maryland's Dredged Material Management Program (DMMP), which identifies options for dredged material placement around the Port of Baltimore. MPA works to identify placement locations for material dredged from Baltimore Harbor channels. While current placement needs are being met by the existing Masonville and Cox Creek dredged material containment facilities (DMCFs), there may be times when placement in a DMCF is not possible because of construction activities. Confined Aquatic Disposal was being explicitly investigated for the

management of maintenance material dredged from Harbor Channels, when there are these pinch points in the 20-year rolling plan. In 2011, the Harbor Team, an advisory committee to the DMMP, recommended CAD as an alternative to the limited capacity available in DMCFs and as part of the statutory mandate for the DMMP to provide a continuous, long-term strategic plan for dredged material management.

Is CAD used in other ports?

CAD is successfully used in other locations in the United States including Los Angeles, CA; Bremerton, WA; Providence, RI; Boston, MA; and other locations, and MPA is exploring if CAD is a viable option for placing dredged material in Baltimore Harbor. The Maryland Department of the Environment (MDE) and the USACE approved the Phase I CAD Pilot Project in the Baltimore Harbor, which was constructed in 2016 next to the Masonville DMCF. Looking to the future, the MDE, Maryland Board of Public Works (BPW), and USACE would also have to approve any future CAD locations. CAD is a potential solution that MPA aims to continue to investigate, building on the successful implementation of the small-scale, successful CAD pilot project.

How would a CAD pilot project in Baltimore Harbor compare with those in other ports?

CAD cells have been widely adopted as a practical solution for dredged material placement nationwide. Similar to CAD cells in various regions, a CAD pilot site within Baltimore Harbor would be strategically located near a dredging site to maximize efficiency. A notable distinction between a CAD pilot project in Baltimore Harbor and CAD cells in other locations is the material placed. While CAD cells in other ports primarily contain contaminated material, a CAD pilot project in Baltimore Harbor would store maintenance dredged material, which generally does not contain pollutants at levels that could cause human or environmental harm and is not classified as hazardous.

Why must dredged material be contained?

Dredged material must be contained to comply with Maryland law (Environmental Article 5-1102(a)), which requires placement in contained areas with approval from MDE for all dredged material from Baltimore Harbor. Baltimore Harbor is defined as the tidal portions of the Patapsco River and its tributaries lying westward of a line extending from Rock Point in Anne Arundel County to North Point in Baltimore County. The exact language of the law is *Environment Article 5-1102.*

> *(a) A person may not redeposit in an unconfined manner dredged material from Baltimore Harbor into or onto any portion of the water or bottomland of the Chesapeake Bay or the tidewater portions of any of the Chesapeake Bay's tributaries outside of Baltimore Harbor. However, the dredged material may be redeposited in areas approved by the Department [MDE].*

How will dredged material be placed in a constructed CAD cell?

Dredged material can be placed within a CAD cell using several types of equipment and methods, depending on how it is initially dredged, how far it must be transported, and the available water depths. Expected operations at the Port of Baltimore include split-hull barges capable of opening at the bottom to release material within the cell limits. This method was utilized in the Phase I CAD Pilot Project, resulting in precise placement with water quality meeting or below the regulatory limits.

How are the depth and size of CAD cells determined?

The depth and size of the cell must be determined using specific information about the designated CAD cell location and the quantity of dredged material that needs to be placed for a specified planned dredging job. When a dredging job is identified to be placed in a CAD cell several years in advance, the amount to be dredged is one of the factors that will inform the size of the CAD cell to ensure enough space for the amount of material and incorporates additional space to allow for sediment expansion, otherwise known as bulking and to prevent overfilling of the cell. A location will be designated, and the characteristics of the sediment will be used to determine the cell's size and depth so that the cell remains above the naturally confining clay layer. Detailed scientific studies of the CAD cell location will include the depth to the sand layer, the total thickness of the sand layer, how hard the material is to dredge, the depth of the confining clay layer, the capability of the dredging equipment, and the amount of space needed for the material being placed in the CAD cell.

How do you determine if the material deposited within the CAD cell will remain in place?

Detailed scientific monitoring of sediment movement over an extended period of time is used to determine if the material is confined. This follows extensive scientific study of sediment movement behavior prior to placement to anticipate whether it will be confined using this process. For the Phase I CAD Pilot Project, a three-dimensional hydrodynamic model was used to predict if the material deposited within the CAD cell would remain in place. The model considered regular tides and storm impacts to assess sediment exposure, resuspension, and sediment transport. Existing harbor deposition will cover the sediment placed within the CAD cell. Results of the Pilot Project confirmed the model's prediction that the material would remain in place.

Based on the Phase I CAD Pilot Project findings, an additional model considered tides and storm impacts to assess sediment exposure, resuspension, and sediment transport and found that deeper sites reduce storm effects. Additional modeling incorporates site-specific currents, sediment data, CAD cell design, and depth and reveals that the extra space and deeper depth provided by a larger CAD cell can mitigate impacts from currents and waves. Natural sediment deposition over time will also aid in confining sediment to the cell.

Why is the presence of sand a critical consideration in site selection?

To be viable for a Confined Aquatic Disposal (CAD) cell in Baltimore Harbor, an area must have a high percentage of sand under the top layer of silts and clays. Sand is essential for two reasons: The sand surrounding a CAD cell ensures it is stable enough to contain the maintenance dredged material.

1. For a CAD project to be successful in providing capacity to the Dredged Material Management Plan, the sand can not be placed in a Maryland Port Administration Dredged Material Containment Facility (DMCF). This would offset any capacity gained by the use of the CAD technique. For CAD to be worth the effort, the sand must be innovatively and/or beneficially reused productively and not placed in a DMCF.
2. The sand surrounding a CAD cell ensures it is stable enough to contain the maintenance dredged material.

Sand is a construction commodity, and dredged sediment with a high enough percentage of sand removed during the construction of a CAD cell will likely be used in nearby construction.

What environmental impacts can be expected?

Any CAD project would be constructed and filled under federal and state environmental permits to protect water quality, the surrounding environment, and human health. Based on multiple in-depth environmental studies, the construction and filling of a CAD cell are anticipated to have temporary, minor impacts on the immediate surrounding environment. This will be confirmed with additional studies as deemed necessary should MPA decide to move forward with constructing a second CAD pilot cell in the future.

Water quality monitoring performed during the Phase I CAD Pilot Project showed only minor increases in turbidity, or the change in water's cloudiness along the river bottom during placement. This cloudiness dissipated quickly. No exceedances of state water quality criteria were observed. For detailed information, Sediment and Nutrient Investigation reports are available upon request. Please contact the MPA CAD Outreach Project Manager, Rachael Gilde, at rgilde@marylandports.com for these inquiries.

Work at a CAD site can only be conducted during specific times of the year, specified in the permits, to avoid fish spawning seasons and minimize any effect on larval populations. Fish are highly mobile and will likely avoid the area during construction. While the organisms will be temporarily displaced during construction, recolonization is expected within two years based on data seen from other dredging/placement projects within the Chesapeake Bay. Additional environmental studies may be planned to understand the existing habitat conditions.

What potential impacts could a CAD pilot project have on adjacent communities?

No significant additional long-term effects on the adjacent communities are expected from potential CAD pilot projects as sites are located near navigation channels where dredging already occurs regularly as part of ongoing channel maintenance. A CAD pilot project would have minimal, short-term, temporary impacts on the immediate project area during construction. Temporary short-term noise and light impacts are expected during CAD cell construction and filling and are a similar impact to existing construction activity in the area.

If an additional CAD pilot project is deemed feasible and an acceptable site is selected, MPA would work under the oversight of MDE in coordination with other state and federal regulatory agencies to determine if CAD adequately confines dredged material and is safe for the surrounding environment and adjacent communities.

Could implementing a CAD pilot project affect local fishing, crabbing, and recreation?

For a CAD pilot project to advance, both state and federal permits are required to ensure compliance with water quality standards and environmental assessments. Activities associated with implementing a CAD pilot project would also be subject to time-of-year restrictions targeted at protecting aquatic species. During active construction (approximately 4-8 months) or material placement (intermittent over 1-3 months) into the CAD pilot site, fishing, crabbing, and aquatic recreation would be prohibited at the CAD pilot site location.

What measures will be taken to monitor environmental impacts and ensure the site's stability?

If seeking a permit for a CAD pilot project, MPA will conduct comprehensive modeling, sampling, and studies to evaluate potential environmental impacts, including hydrodynamic modeling, water quality monitoring, and habitat assessments. If granted, the permits will specify monitoring requirements based on these findings to ensure environmental safety. Monitoring requirements, determined by the Maryland Department of the Environment (MDE), U.S. Army Corps of Engineers (USACE), and Maryland Board of Public Works (BPW), are

stipulated in issued permits. For example, the 2016 Baltimore Harbor CAD pilot project was evaluated using post-placement monitoring, including bathymetric surveys and geotechnical testing, to assess material consolidation and movement over one year. A similar approach could ensure stability for future CAD pilot projects.

What is the difference between CAD, Open water placement, Innovative Reuse (IR), and Beneficial Use (BU)?

In Maryland, open water placement, CAD, Innovative Reuse (IR), and Beneficial Use (BU) are separate and distinct methods for managing dredged material.

CAD places dredged material into an engineered and man-made underwater depression in a body of water.

Open water placement involves depositing dredged material directly into designated, naturally occurring deep underwater sites and is not permitted in Maryland. However, the EPA manages the Norfolk Ocean Disposal Site, an open water placement site located in federal waters off the coast of Norfolk, Virginia, used for disposing of dredged material.

IR, as defined in Maryland's Dredged Material Management Act (2001), is the use of dredged material in the development or manufacturing of commercial, industrial, horticultural, agricultural, or other products and includes upland uses of dredged material.

BU, as defined in Maryland's Dredged Material Management Act (2001), is the use of dredged material for the restoration of underwater grasses, island restoration, stabilization of eroding shorelines, the creation or restoration of wetlands, and the creation, restoration, or enhancement of fish or shellfish habitats.

DREDGED MATERIAL TESTING

Are the findings of independent analyses conducted as part of Maryland Port Administration (MPA) projects such as CAD shared publicly?

MPA projects are led by MPA staff and implemented by teams that include science, technology, and/or engineering firms with strong expertise related to each specific project. Additionally, MPA coordinates with academic institutions such as local universities to aid in project research. Independent laboratories with the required accreditations perform sample analyses that may be conducted as a part of MPA projects. Results are shared with stakeholders through the Dredged Material Management Program committee structure, the maryland-dmmp.com website, and by request.

How is dredged material tested for placement in a DMCF or CAD cell?

Sediment to be dredged from shipping channels is tested before dredging occurs. If the material meets state and federal regulations, it can then be placed in a containment facility, including a CAD cell. To evaluate dredged material from the federal navigation channels, the EPA's Inland Testing Manual is used to screen channel material during USACE evaluations for maintenance channel dredging.

MPA mandates testing of dredged sediments for various physical and chemical traits to determine sediment suitability for placement at DMCFs. Sediments are tested for organic contaminants, such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and pesticides that bind strongly to sediments. Tests include grain size, specific gravity, metals, nutrients, pH, total organic carbon, oil, total petroleum hydrocarbon

(TPH), ammonia, sulfides, cyanide, and tributyltin. A Toxicity Characteristic Leaching Procedure (TCLP), and EPA test procedure, is also performed, and a leaching procedure is used to evaluate a sample to determine which contaminants are present in the leachate and their concentrations.

How was sediment tested before placement into the first CAD cell?

For the Phase I CAD Pilot Project, sediment from navigation channels and the proposed CAD cell underwent standard testing protocols, including for grain size, solids, organic carbon, nutrients (nitrogen, phosphorus), metals, PAHs, total PCBs, and chlorinated pesticides. Sediment samples collected from the channel were tested for potential contaminant release into the water to simulate material placement into the CAD cell. This involved placing sediment in a chamber with site water, analyzing the resulting water quality, and comparing it against the original site water, which was evaluated against screening levels established in the USEPA and State of Maryland acute water quality criteria for the protection of aquatic life. These samples mixed with site water were tested for nutrients, metals, PAHs, total PCBs, and chlorinated pesticides. Water quality monitoring during material placement was consistent with the sample test results, existing data, modeling, and baseline studies. Monitoring occurred at specific depths and locations within the CAD cell. A similar testing regime is expected for future CAD projects. The Baltimore Harbor CAD Pilot Project Nutrient Investigation Report results from 2018 from the Pilot Project are available upon request. Please contact the MPA CAD Outreach Project Manager, Rachael Gilde, at rgilde@marylandports.com for these inquiries.

How does MPA ensure the projects adhere to regulatory protocols, particularly regarding testing standards?

MPA coordinates with qualified scientific and technical consultants to draft Sediment and Analysis Plans (SAP) that adhere to permit requirements. The SAP provides: a description of the project, the parameters to be analyzed, the sampling frequency, the quantity of material to be assessed, the sampling locations, including coordinates and depths, the method of sample collection, and the equipment to be used. The SAP also includes the name and certifications of the analytical laboratory proposed to conduct the analysis, the test methods, and the laboratory methods detection limits (MDLs) and reporting limits (RLs). SAPs must be approved by MDE before being implemented.

Which categories from the Maryland Department of the Environment (MDE) Innovative Reuse (IR) & Beneficial Use (BU) Guidance Document / Soil & Fill Guidance Document apply to the screening criteria of the material intended for placement within a CAD cell?

The categories outlined in the guidance document **do not apply** to sediment placed in a CAD cell. The MDE IR & BU and Fill Material and Soil Management Documents are specific to **reusing** dredged material, not placing it in a confined location. CAD is not categorized as a reuse of dredged material. Still, MPA requires that all dredged material be sampled before dredging and placement within MPA dredged material containment facilities to ensure that it is non-hazardous. This sampling would also be conducted before placing dredged material in a CAD cell.

Is there a risk of placed material contaminating the underlying aquifer?

No. Any future CAD cell would be located above an existing clay layer that serves as a confining layer separating any potential exchange with aquifers in the area. This was confirmed during the groundwater studies performed before the Phase I CAD Pilot Project. Additionally, analytical testing performed on the

maintenance dredged material demonstrates that the leaching of potential contaminants into the surrounding water column is unlikely (see the Confined Aquatic Disposal Pilot Project Sediment Investigation Report).

COMPLIANCE

What is the regulatory process for CAD?

The permitting process begins with initial consultations with the Maryland Department of the Environment (MDE) and the U.S. Army Corps of Engineers (USACE) to identify the necessary permits and minimize environmental impacts. A Joint Permit Application (JPA) is then submitted to both state and federal regulators. Required state permit approvals include a Water Quality Certification, which demonstrates compliance with state water quality standards, and a Tidal Wetlands License, which outlines potential impacts on tidal wetlands and strategies to minimize adverse effects. Federal permits may include a USACE Clean Water Act Section 404 Permit for dredging or filling activities in U.S. waters, a USACE Section 408 Authorization for modifications to federal civil works projects, and the Rivers and Harbors Act Section 10 Permit for work in navigable U.S. waters.

The joint review by MDE and USACE involves environmental, technical, and safety assessments, along with a public notice period for stakeholder and resource agency input. When the JPA is submitted, public notice is made available on MDE's website, and there is the opportunity for the public comment or to request a hearing. After USACE reviews the permits for consistency with federal laws, a determination is made on permit issuance. At the state level, MDE provides recommendations to the Maryland Board of Public Works (BPW), who provides a final determination to approve or deny requests for Tidal Wetland Licenses. Further details are available on the BPW Wetlands Administration website.

Federal and state permits are issued with conditions to minimize environmental impacts, including monitoring and mitigation if required. The USACE and MDE enforce these conditions. This integrated approach ensures that a project meets comprehensive ecological and safety standards.

If ecosystem impacts are identified during a pilot project, what remediation efforts are planned to address the impacts?

The permits necessary for a pilot project will require measures to avoid or minimize negative impacts to ensure MPA has tried to reduce the severity or extent of project impacts, if complete avoidance is not possible. Extensive monitoring and hydrodynamic modeling are conducted to mimic typical tide and storm conditions and evaluate different scenarios' effects on a CAD cell. This information helps regulators and the project team understand the potential for issues to arise and how they could be addressed. A mitigation strategy would be developed and implemented to address any unforeseen impacts, depending on the type of impact.

What happens if CAD is determined not to be an adequate solution for the Dredged Material Management Program (DMMP) based on the results of the pilot project?

If CAD is determined not to be an adequate solution for the DMMP based on the results of a pilot project, the project will not proceed beyond the pilot phase. Extensive engineering assessments and monitoring are conducted throughout the pilot project to evaluate its feasibility, effectiveness, and safety. If the results indicate that the CAD approach does not meet the necessary goals or requirements, MPA will terminate the project and seek new dredged material placement opportunities.

ENGAGEMENT

How can I get additional information on the MPA CAD program, including how to get involved?

Please visit the Innovative Solutions tab on the DMMP website for resources related to CAD and other Innovative Reuse and Beneficial Use of Baltimore Harbor dredged material. Community feedback will be incorporated and addressed throughout the exploration of this alternative method of dredged material management. The MPA Citizens Advisory Committee represents the public and advises the MPA and its DMMP partners on various dredging-related topics and issues, including CAD. The committee's quarterly meetings are open to the public and often have in-person and virtual attendance options.

For more CAD-related information, please visit the maryland-DMMP.com website and sign up for updates. MPA is also eager to provide presentations about the CAD program by request. Community members and stakeholders interested in being included on the CAD program distribution list or arranging a presentation for a group should contact Danielle Fisher, MPA Outreach Coordinator, at dfisher2@marylandports.com.

What is the purpose of the Bay Enhancement Working Group (BEWG) CAD Subcommittee?

As a subcommittee of the BEWG, the CAD Subcommittee was established in 2024 to review the technical aspects of a second CAD pilot project. The goals and objectives included, but were not limited to:

- Review the overall concept, need, viability, and available options associated with a potential second CAD pilot project to aid in meeting the long-term Harbor dredged material placement needs
- Identify and review potential environmental and socioeconomic benefits and impacts associated with a potential second CAD pilot project for Harbor maintenance material
- Assess the sediment quality of dredged material that would be placed within a potential CAD pilot
- Review and collaborate on the site selection process for a potential second CAD pilot site
- Develop a report with group consensus to be submitted to the DMMP Management and Executive Committees.

The CAD Subcommittee will produce a report with a group consensus to be submitted to the DMMP Management and Executive Committees. Based on the report findings and recommendations, MPA will determine the next steps in consultation with the DMMP Management and Executive Committees.

Is there an opportunity for public involvement, particularly regarding site selection?
CAD planning and design occur over a long period with multiple steps. As with all Dredged Material Management Program (DMMP) projects, regular updates and requests for feedback are shared through DMMP committee meetings, including the Citizens Advisory Committee and a suite of easily accessible resources such as the Maryland-DMMP website. Public meetings are also announced on the website and held periodically throughout the process to encourage public involvement. Another way the public can be involved is by providing input to regulators during the permitting process. A CAD pilot project requires obtaining state and federal permits before construction. Public notice is shared through the regulating authority website as part of the permitting process and in open committee meetings. MPA will send a notification about any public meetings related to CAD to everyone on the CAD stakeholder email distribution list (add your name to the list via this web form). The public can provide written or verbal comments that regulators review before issuing permits.