Maryland Department of the Environment

Fill Material and Soil Management

Five Example Scenarios

The purpose of this document is to provide example scenarios for the reuse of dewatered dredged material (or fill material) and excess soil during the cleanup and redevelopment of properties throughout Maryland. To ensure that all projects are addressed consistently, the Department has prepared a draft Innovative Reuse and Beneficial Use of Dredged Material Guidance Document and accompanying Fill Material and Soil Management Fact Sheet. The fact sheet lists four categories of fill or soil material. The following hypothetical scenarios provide selected examples of how the guidance document and fact sheet can be applied to projects at sites under the purview of Land and Materials Administration's (LMA) regulatory programs.

Scenarios:

1. Use of fill material at a residential development (Category 1)
2. Use of fill material at a park, school, recreational facility, with or without an environmental cap (Categories 1 and/or 2)
3. Use of blended fill material for industrial redevelopment, with or without an environmental cap (Categories 1, 2, and/or 3)
4. Use of fill material for landfill cover (daily, intermediate and final) or on top of landfill closure cap (Categories 1 and/or 2)
5. Use of fill material impacted by oil or a controlled hazardous substance (Categories 1, 2, and/or 3)

Sources of dewatered dredged material or fill material and the proposed end use of the material or property will influence sampling requirements. Contact the Department for specific sampling requirements. The proposed fill material is sampled based on the projected volume of material that will be transported to the site and potentially the area of the site affected. Generally, a comprehensive multi-incremental sampling of source material is recommended in order to demonstrate that chemical concentrations meet the appropriate category criteria. Users of fill material must ensure appropriate erosion and sediment control mechanisms are in place to protect surface waters of the State.

1. Use of fill material at a residential development

- A developer needs fill material for a residential development grading project. Because this is a residential development, fill material must be initially screened against Category 1 screening criteria (based on an HQ of 0.1 and a 10^{-6} cancer risk). The fill material may be sampled as received or after any blending that is needed for the project. If the material passes the initial Category 1 screening criteria, the material may be used with no restrictions. If it does not pass the initial Category 1 screening criteria, a residential risk assessment may be conducted. The risk assessment is a more detailed process that takes into account site-specific factors but allows for a more flexible risk standard (based on an HI of 1 and a 10^{-5} cancer risk). By undergoing this additional

evaluation, the developer may determine that the dredged material is acceptable for the proposed Category 1 use even though it did not meet the initial screening criteria,

Groundwater Use Areas - Additional Considerations

If Scenario 1 occurs in a groundwater use area, the following additional considerations would apply:

- The Department discourages placement of fill material at or below the water table.
- Volume and source of fill material, geochemistry of fill material, local geology and hydrology as well as any other site specific factors, including mitigating factors that may exist or will be implemented, should be considered when placing large volumes of fill material in groundwater use areas.
- The Department may restrict the volume, depth, thickness of placement, and design features of a soil placement area, or reject the proposal, if the leachability of constituents of the material is likely to render groundwater unpotable or cause other material harm to the environment or public health or safety.

2. Use of fill material at a park, school, recreational facility, with or without an environmental cap

- A municipality or school needs fill material to construct recreational ball fields. For this type of end use (i.e., recreational facility, park, school), proposed fill material should be initially screened against Category 1 screening criteria (based on an HQ of 0.1 and a 10^{-6} cancer risk). The fill material may be sampled as received or after any blending that is needed for the project (either blending for engineering or vegetative growth purposes).

Scenario A: Use at a site with existing Category 1 soils:

- If the proposed fill material in the above example passes the initial Category 1 screening criteria, the material may be used with no restrictions. If it does not pass the initial Category 1 screening criteria, a recreational risk assessment may be conducted (based on an HI of 1 and a 10^{-5} cancer risk) to determine if the material may be used without restrictions.

Scenario B: Use at a site with existing Category 2 or 3 soils:

- If the proposed fill material in the above example is determined by sampling to fall within Category 2 or 3 rather than Category 1, it may be used at a park, school, or recreational facility under an environmental cap as long as existing soils or fill materials at the site fall within the same or less stringent category. For example, off-site fill material that falls within Category 2 may be used under an environmental cap at a site with existing soils within Categories 2, 3, or 4, while off-site fill material that falls within Category 3 may only be used under an environmental cap at a site with existing soils within Categories 3 or 4. In this scenario, an environmental cap that meets a recreational or residential land use and institutional LUCs would be required.

Groundwater Use Areas - Additional Considerations

If Scenario 2 occurs in a groundwater use area, the following additional considerations would apply:

- The Department discourages placement of fill material at or below the water table.
- Volume and source of fill material, geochemistry of fill material, local geology and hydrology as well as any other site specific factors, including mitigating factors that may exist or will be implemented should be considered when placing large volumes of fill material in groundwater use areas.
- The Department may restrict the volume, depth, thickness of placement, and design features of a soil placement area, or reject the proposal, if the leachability of constituents of the material is likely to render groundwater unpotable or cause other material harm to the environment or public health or safety.

3. Use of blended fill material for industrial redevelopment, with or without an environmental cap

Scenario A: Use at a site with existing Category 2 soils:

- A developer is redeveloping an industrial site and needs a large quantity of fill material. The existing soils at the site fall within Category 2. The proposed fill material is sampled after being blended to meet engineering specifications. The sampling results show that the material meets the initial Category 2 screening criteria (based on an HQ of 0.1 and a 10^{-6} cancer risk). No further risk assessment is required and the material may be used at the site without a cap. An institutional LUC should be implemented to ensure that the property remains in industrial or commercial use.

- If the proposed fill material in the above example does not meet the initial Category 2 screening criteria, the developer may conduct a non-residential risk assessment that considers the final end use of the property. If the risk assessment shows that the fill material is acceptable for use at the site (based on an HI of 1 and a 10^{-5} cancer risk), the material fits within Category 2 and may be used at the site without a cap. An institutional LUC should be implemented to ensure that the property remains in industrial or commercial use.

Scenario B: Use at a site with existing Category 4 soils.

- A developer is redeveloping an industrial site and needs a large quantity of fill material. The existing soils at the site fall within Category 4. The proposed fill material is sampled, after being blended to meet engineering specifications. Based on a risk assessment of the fill material, some of the fill material falls into Category 1, some into Category 2, and some into Category 3 . Fill material that falls into Categories 1 and 2 may be used throughout the site and may serve as an environmental cap. Fill material that falls into Category 3 may be used as fill material beneath an environmental cap. An institutional LUC should be implemented to ensure that the property remains in industrial or commercial use and that the environmental cap is maintained.

Groundwater Use Areas - Additional Considerations

If Scenario 3 occurs in a groundwater use area, the following additional considerations would apply:

- The Department discourages placement of fill material at or below the water table.
- Volume and source of fill material, geochemistry of fill material, local geology and hydrology as well as any other site specific factors, including mitigating factors that may exist or will be implemented should be considered when placing large volumes of fill material in groundwater use areas.
- The Department may restrict the volume, depth, thickness of placement, and design features of a soil placement area, or reject the proposal, if the leachability of constituents of the material is likely to render groundwater unpotable or cause other material harm to the environment or public health or safety.

4. Use of fill material for landfill cover (daily, intermediate and final) or on top of landfill closure cap

- **Scenario A: Use as daily cover**. Fill material proposed for use as daily cover should meet Category 1 or 2 screening criteria (based on an HQ of 0.1 and a 10^{-6} cancer risk). The fill material may be sampled as received or after any blending that is needed for the project. If the material does not meet the Category 2 screening criteria, a non-residential risk assessment may be performed (based on an HI of 1 and a 10^{-5} cancer risk) to assist LMA in evaluating the use of the material as daily cover. All applicable regulations governing the landfill apply.
- **Scenario B: Use as intermediate or final cover**. Fill material proposed for use as intermediate or final cover should meet Category 1 or 2 screening criteria (based on an HQ of 0.1 and a 10^{-6} cancer risk). The fill material may be sampled as received or after any blending that is needed for the project. If the fill material falls into Category 1 or 2, it may be used at a landfill as intermediate or final cover if it will support vegetative growth. If the material does not meet the Category 2 screening criteria, a non-residential risk assessment may be performed (based on an HI of 1 and a 10^{-5} cancer risk) to assist LMA in evaluating the use of the material as intermediate or final cover. All applicable regulations governing the landfill apply.
- **Scenario C: Use on a closure cap**. Fill material that falls into Category 1 may be used at a landfill as the final two feet of soil over the closure cap. Fill material that meets Category 2 may be used with LUCs restricting future use of the landfill for recreational purposes. The fill material may be sampled as received or after any blending that is needed for the project. If the material does not meet the Category 2 screening criteria, a site-specific risk assessment (based on an HI of 1 and a 10^{-5} cancer risk) can be performed that takes into account the final end use of the property (e.g., recreational facility, park, etc.) to assist LMA in evaluating the use of the material on the closure cap. All applicable regulations governing the landfill apply.

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Five Example Scenarios

5. Use of fill material impacted by oil or a controlled hazardous substance

- **Scenario A: Category 1 fill material impacted by oil or a hazardous substance**. A developer needs 500 tons of Category 1 fill material. The fill material may be sampled as received or after any blending that is needed for the project. When sampling for TPH, soil compositing is not recommended. All chemical concentrations fall within the initial Category 1 screening criteria (based on an HQ of 0.1 and a 10^{-6} cancer risk), or the proposed fill material undergoes a residential risk assessment (based on an HI of 1 and a 10^{-5} cancer risk) that determines the material is acceptable for use at the site. Additionally, total petroleum hydrocarbon (TPH) diesel range organics (DRO) or gasoline range organics (GRO) concentrations are below the Category 1 screening criteria of 230 mg/kg. The oil and controlled hazardous substance impacted fill material may be used with no restrictions. Note: Category 1 fill material may also serve as a clean cap on properties that require an environmental cap. An institutional LUC is not necessary unless the fill material will serve as an environmental cap on a contaminated property.
- **Scenario B: Category 2 fill material impacted by oil or a hazardous substance**. A developer needs a large quantity of Category 2 fill material. The fill material may be sampled as received or after any blending that is needed for the project. When sampling for TPH, soil compositing is not recommended. All chemical concentrations fall within the initial Category 2 screening criteria (based on an HQ of 0.1 and a 10^{-6} cancer risk), or the proposed fill material undergoes a non-residential risk assessment (based on an HI of 1 and a 10^{-5} cancer risk) that determines the fill material is acceptable for use at the site. Additionally, TPH-DRO and TPH-GRO concentrations are below the Category 2 screening criteria of 620 mg/kg. No further risk assessment is required and the material may be used at the site without a cap. An institutional LUC should be implemented to ensure that the property remains in industrial or commercial use.
- **Scenario C: Category 3 fill material impacted by oil or a hazardous substance**. A developer needs fill material to use as engineered fill underneath environmental caps on an industrial property. The fill material may be sampled as received or after any blending that is needed for the project. When sampling for TPH, soil compositing is not recommended. All chemical concentrations fall within the Category 3 screening criteria and TPH-DRO and TPH-GRO concentrations are below 620 mg/kg. No risk assessment is required and the material may be used at the site beneath an environmental cap. An institutional LUC should be implemented to ensure that the property remains in industrial or commercial use.
- **Scenario D: Category 4 material impacted by oil or a hazardous substance**. Proposed fill material is sampled after any blending and is found to exceed Category 3 criteria, or TPH-DRO and TPH-GRO concentrations are found to exceed 620 mg/kg. The material should not be used as soil or fill material. LMA may require a LUC and cap maintenance requirements if the material will remain in place, or may require transfer of the material to a waste facility permitted to accept the material.

Groundwater Use Areas - Additional Considerations

If Scenario 5 occurs in a groundwater use area, the following additional considerations would apply:

- In groundwater use areas, users of fill material impacted by liquid phase mobile contaminants of concern, such as petroleum hydrocarbons and liquid phase industrial products, must ensure placement of fill material does not adversely impact groundwater resources.
- The Department discourages placement of fill material at or below the water table.
- Volume and source of fill material, geochemistry of fill material, local geology and hydrology as well as any other site specific factors, including mitigating factors that may exist or will be implemented should be considered when placing large volumes of fill material in groundwater use areas.

Additional factors to consider when utilizing fill material

- Volatiles are not a common component of most fill materials such as dredged material or most urban fill. However, if fill materials are from locations with known volatile organic compound (VOCs) impacts, or facilities with known recognized environmental conditions where VOCs are present, the user should consider vapor intrusion and potentially other engineering controls prior to use of fill material.
- Site and use specific factors should always be considered when utilizing fill materials and the guidance and supporting documents are designed to work in conjunction with existing laws and regulations and do not constitute a substitute for those laws and regulations. This is particularly relevant for erosion and sediment control.
- Other alternate uses and sources of fill material will be considered on a case by case basis and the Department encourages research in these fields.