# SAND AND GRAVEL MINING IN PRINCE GEORGE'S COUNTY

## PAST, PRESENT, AND FUTURE

THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

Prince George's County Planning Department

2020

# ABSTRACT

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Title: Sand and Gravel Mining in Prince George's County
Past, Present, and Future

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Abstract: The Community Planning Division of The Maryland-National Capital Park and Planning Commission, Prince George's County Planning Department, conducted this study in response to an inquiry by the Prince George's County Council on the status of the sand and gravel extraction industry and opportunities for adaptive reuse of closed sand and gravel mines. This report reflects information collected in literature searches, a geographic information system (GIS) survey of sand and gravel extraction sites, site visits to operating and closed sand and gravel mines, and interviews of state, County, and mining industry officials.

This study describes sand and gravel mining in Prince George's County and its impacts, and makes recommendations for its future, including how closed sand and gravel mines may be reused.

This study addresses the following objectives:

- Provides basic information on sand and gravel mining.
- Identifies the approximate location of unmined sand and gravel deposits in Prince George's County.
- Describes the economic, social, environmental, and transportation impacts of sand and gravel mining operations in Prince George's County.
- Recommends potential new land uses, or adaptive reuses, that are appropriate for reclaimed sand and gravel mines.

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## Past, Present, and Future

2020

The Maryland-National Capital Park and Planning Commission
Prince George's County Planning Department
14741 Governor Oden Bowie Drive
Upper Marlboro, MD 20772
www.pgplanning.org

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The Commission has three major functions:

- The preparation, adoption, and, from time to time, amendment or extension of the General Plan for the physical development of the Maryland-Washington Regional District.
- The acquisition, development, operation, and maintenance of a public park system.
- In Prince George's County only, the operation of the entire County public recreation program.

The Commission operates in each county through a Planning Board appointed by and responsible to the County government. All local plans, recommendations on zoning amendments, administration of subdivision regulations, and general administration of parks are responsibilities of the Planning Boards.

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Our mission is to help preserve, protect and manage the County's resources by providing the highest quality planning services and growth management guidance and by facilitating effective intergovernmental and citizen involvement through education and technical assistance.

Our vision is to be a model planning department of responsive and respected staff who provide superior planning and technical services and work cooperatively with decision makers, citizens, and other agencies to continuously improve development quality and the environment and act as a catalyst for positive change

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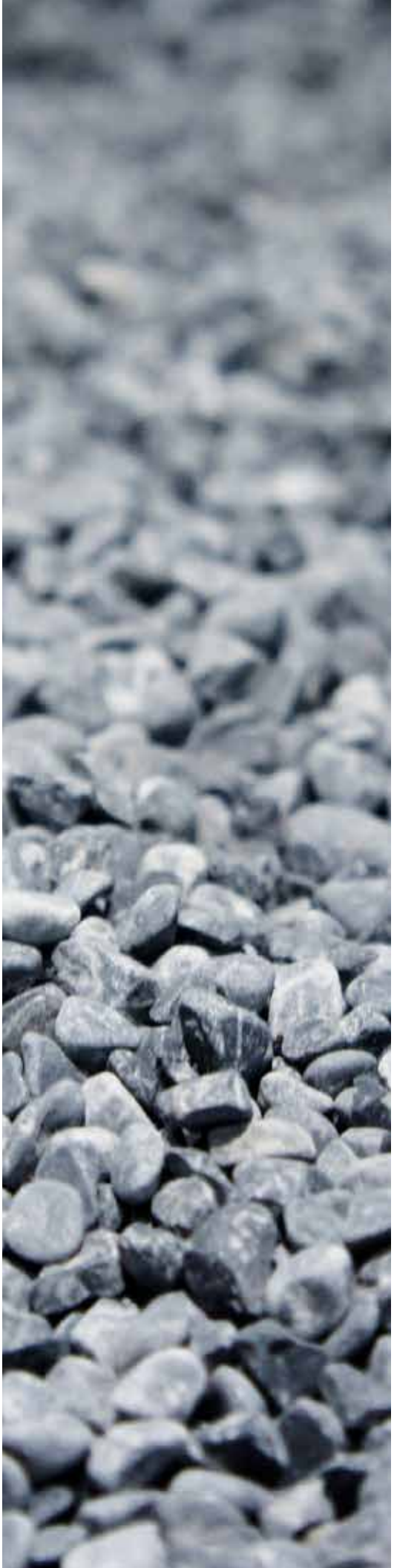


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# INTRODUCTION

Sand, gravel, and clay are the main mineral resources in Prince George's County—of these, sand and gravel are the primary resources. Sand and gravel can occur in silt deposits near the surface and in beds deeper underground, sometimes below the water table. Sand and gravel are extracted via a process called strip mining, which is the practice of mining a seam of mineral by first removing a long strip of the overlying soil and rock (called overburden).

By itself, surface mining of sand and gravel is not a significant contributor to the County's gross domestic product (GDP), but it is critical to some of the County's leading industries such as construction. Sand and gravel operations in Prince George's County contributed over $21 million to the County's GDP in 2013[1] and accounted for $14.25 million in direct spending in 2015.[2] Sand and gravel mining generated $32.4 million between 2010 and 2018.[3] Extraction of sand and gravel provides a readily available supply of construction material for real estate and infrastructure development locally and throughout the Baltimore-Washington Metropolitan Area, as well as a base for jobs and other value-added services. The sand and gravel are used in concrete products, asphalt, road base, and other miscellaneous products for roads, curbs and sidewalks, housing construction, and other uses important for the region's growth and development. In that regard, it is a key contributor of raw materials to industries that are economically significant regionwide. Significant deposits of sand and gravel remain in Prince George's County, and opportunities for continued mining of this valuable resource exist in the southern part of the County.

Despite its economic significance, however, the extraction, processing, and transport of this material have emerged as areas of potential conflict with local communities, raising social, environmental, and traffic concerns.

## OBJECTIVES

The Community Planning Division of The Maryland-National Capital Park and Planning Commission, Prince George's County Planning Department, conducted this study in response to an inquiry by the Prince George's County Council on the status of the sand and gravel extraction industry and opportunities for adaptive reuse of closed sand and gravel mines. This report reflects information collected in literature searches, a geographic information system (GIS) survey of sand and gravel extraction sites, site visits to operating and closed sand and gravel mines, and interviews of state, County, and mining industry officials.

This study describes sand and gravel mining in Prince George's County and its impacts, and makes recommendations for its future, including how closed sand and gravel mines may be reused.

This study addresses the following objectives:

- Provides basic information on sand and gravel mining.
- Identifies the approximate location of unmined sand and gravel deposits in Prince George's County.
- Describes the economic, social, environmental, and transportation impacts of sand and gravel mining operations in Prince George's County.
- Recommends potential new land uses, or adaptive reuses, that are appropriate for reclaimed sand and gravel mines.

# SAND AND GRAVEL MINING: A PRIMER


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## SAND AND GRAVEL RESOURCES

The State of Maryland defines "minerals" as "any solid material, aggregate, or substance of commercial value, whether consolidated or loose, found in natural deposits on or in the earth, including clay, diatomaceous earth, gravel, marl, metallic ores, sand, shell, soil, and stone. The term does not include coal."[4]

Sand, gravel, and clay are the main mineral resources in Prince George's County—of these, sand and gravel are the primary resources. Sand and gravel can occur in silt deposits near the surface, and in beds deeper underground, sometimes below the water table. Most of the sand and gravel used in the construction industry occurs in upland deposits.[5] Lesser amounts of the County's sand and gravel come from upstream terrace deposits along major streams, and Potomac Group sand and gravel deposits. A more detailed description of each unit, adapted from Maryland Geological Survey (MGS) data[6], follows:

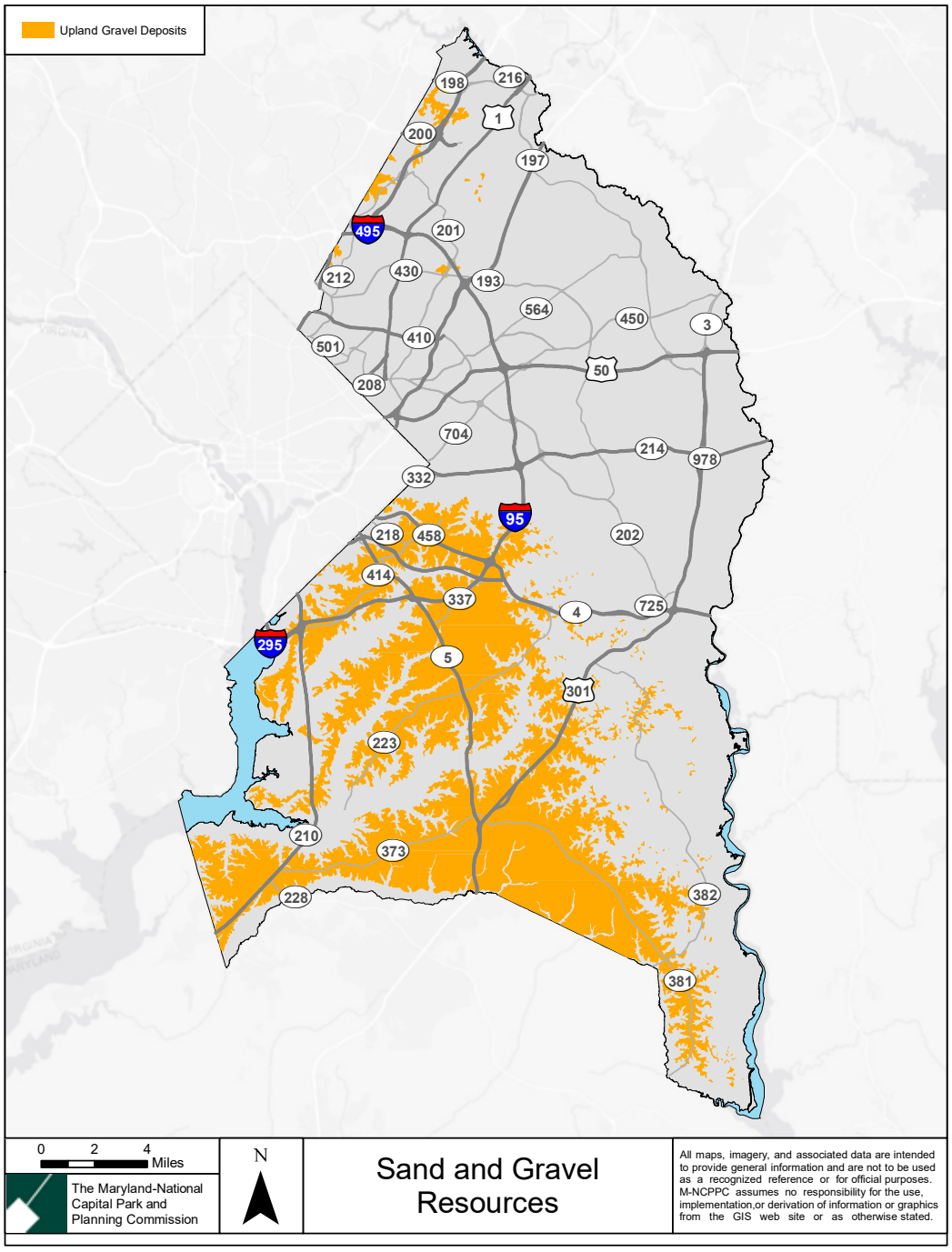
- **Upland Deposits.** Historically, different names have been assigned to this geologic unit, which is the main source of the County's sand and gravel.[7] In some areas, the sand-gravel portion of the deposit can be covered by as much as 15 feet of sandy loam. The average composition of this unit throughout the County is 63.4 percent gravel, 33.3 percent sand and 3.3 percent silt and clay.[8]

- **Upstream Terrace Deposits Along the Patuxent River.** Unlike in adjacent Anne Arundel County, terrace deposits along the Patuxent River in Prince George's County tend to be thinner and more variable with less gravel, especially toward the south of the County. Sand and gravel were once extracted from terraces along the Patuxent River near Bowie State University south to just past Queen Anne Road. Areas south of Queen Anne Road do not appear to have been mined. According to MGS, dredging the banks, tidal flats, and beds of the Potomac River, Patuxent River near Bowie, and the mouths of Indian Creek and other confluent streams, once provided most of the County's sand and gravel. These dredging operations date back to 1899.

- **Potomac Group Sand-gravel Associations.** These consist of interbedded layers of gravel, sand, silt, and clay. Deposits in the northwestern part of the County contain mainly sand and gravel. Analyses of this group in Prince George's County indicate an average composition of 49 percent gravel, 39 percent sands, and 12 percent clay.[9] This portion of the Potomac Group has been mined for many years.

According to MGS, extensive sand and gravel deposits that appeared to be in the sand-gravel facies[10] of the Potomac Group, rather than upland deposits, occurred on both sides of Indian Creek in the northern part of the County, as widespread outcrops that varied in sand and gravel content. Maryland Department of the Environment (MDE) has identified some of the surface mines that were active in that area as of 2010). Extensive sand and gravel resources also occur as thinner deposits in the southern half of the County, and in small scattered deposits in terraces along the major streams (see Map 1).

*Map 1. Approximate Location of Upland Sand and Gravel Deposits in Prince George's County, 2018**




*The above information was taken from data compiled by Maryland Geological Survey quoting data, literature, and field investigations from 1975 to 1979. The upland gravel deposits shown in Map 1 comprise approximately 75,000 acres.

## SAND AND GRAVEL EXTRACTION AND WET-PROCESSING

Sand and gravel are extracted via a process called strip mining, which is the practice of mining a seam of mineral by first removing a long strip of the overlying soil and rock (overburden). Strip mining is appropriate for the extraction of minerals such as sand and gravel that are near the surface, relatively flat-lying, and occurring in thin deposits. The State of Maryland requires that prior to excavating sand and gravel, the topsoil and subsoil layers on the site must be removed and carefully stockpiled away from where excavation will occur. This material is used to reclaim the site once mining operations are completed. The following is a general overview of surface mining and processing of the raw material into a salable product in Prince George's County. The process may differ in other parts of the country because available materials for mining may vary by geography and location.

**Site Preparation:** Prior to the commencement of mining, the site requires preparation to conform to federal, state, and local permit requirements. As part of this process, the mining boundaries are established on the ground and the sediment and erosion control structures for the area to be disturbed are established. The initial disturbance is generally the construction of the sediment and erosion control structures as required per the approved sediment and erosion control plan to manage the runoff during the site preparation process. The next step, if required, is to clear any trees that may be in the mining area. As this work is completed, the site entrance is established and any protective measures such as visual berms or plantings required as a condition of Special Exception (SE) approval, are put in place. If berms are required, as many sites use them for noise attenuation, dust mitigation, and visual screening, their construction utilizes the upper layer topsoil in the mining area. The topsoil is later used as the topping material in the final reclamation process. Surface mining can commence once the site preparation processes have been completed.

**Mining:** The actual mining process consists of three distinct operations—stripping the overburden, mining the material, and reclamation. The overburden material consists of clays and silts overlaying the sand and gravel deposit. This must be removed to get the layer of usable sand and gravel, prior to loading the reserve on vehicles for transport (see Figure 1). The overburden material may be used in construction of the screening berms if the available topsoil does not provide enough material for berm construction.

Extraction of sand and gravel commences once the overburden has been removed. A systematic approach to material movement can be established once the first mining cut is stripped down to the sand and gravel. A typical mining cut is approximately 30–40 feet wide and runs the length of the area being mined. Sand and gravel are extracted and loaded onto trucks for hauling to the processing plant (see Figure 1). Using this method allows for the removal of the sand and gravel while leaving a defined area or cut, the same width as the mining area, to receive the stripped overburden as the next cut is established. This mining sequence is commonly known as the cut and fill method. The mining cuts are side by side and when stripping the next mining cut, the overburden material can be excavated and placed back into the area previously mined. This method reduces the movement of material and places the overburden back in the previously mined area for use in the reclamation process.

Once a phase or section is completed the reclamation grading can be completed. The reclamation grading generally restores the mined area to its original contours.

Surface elevation will be reduced by the depth of the sand and gravel deposit removed. Once the area is fine-graded, topsoil is reintroduced prior to final vegetation being established, and the area is considered reclaimed.[11]

**Wet-Processing of Sand and Gravel:** A wet-processing plant, or wash plant, consists of conveyors, radial stackers, multiple screens, crushers, sand tanks, and multiple sand screws. It receives the mined sand and gravel for washing and sizing. The material is washed to remove silts and clays from the final, finished product to meet industry construction material specifications. The washing process begins with conveying the material to the top of the wash plant where water is introduced, and the initial screening takes place. This wet process removes most of the silts and clays while separating the coarse material (gravel) from the fine material (sand) through the screening process.

The gravel is directed to the gravel processing equipment and sand is directed to the sand processing portion of the plant. The gravel is then washed a second time through a coarse aggregate processor prior to being conveyed to a second set of screens for sizing and conveyance to the stockpile area. Oversized gravel (two-inch diameter and larger) is redirected to a crusher for size reduction and then reintroduced to the process for further washing and screening prior to stockpiling. The sand is directed to the sand tank where the material is immersed in water for cleaning and sizing purposes before being directed to the sand screws for dewatering prior to conveyance and stockpiling. The wash water used in processing is recycled in a closed loop pond system for reuse at the wash plant. In normal operations, the wash plant produces three to four different sizes of gravel and two different sizes of sand for the marketplace.

*Figure 1. Photograph illustrating sand and gravel mining operation in progress, southern Prince George's County, 2018.*

Wash plants are usually located to reduce the trucking distance between them and active mining operations. Three wash plants remain in the County, two of which are owned by Aggregate Industries and one by the Rockhill Sand and Gravel Company. The Aggregate Industries plants are located on the Bardon Tract (5601 Accokeek Road, Brandywine) and on the Kirby Road Pit (5401 Kirby Road, Clinton), while the Rockhill Sand and Gravel wash plant is located at 14750 Gibbons Church Road in Aquasco. These three wash plants serve the County's remaining operational mines.[12]

## MINE RECLAMATION

The state defines a reclaimed mine as one where mining operations have ceased, and the site has been returned to its original grade and successfully replanted (seeded) for a minimum of two years. As of 2018, 107 mines, comprising nearly 11,000 acres, have been reclaimed in Prince George's County.

In the County's Rural and Agricultural Areas, reclaimed sand and gravel mines have been primarily reused as open space, woodland conservation, and agriculture (cropland). Some closed mines have been converted to landfills[13] and rubble fills[14] in both rural and suburban areas. Table 9 and Table 10 in Appendix 4, and Figures 2 to 6, illustrate some of the end uses for reclaimed mines located in the County's rural areas.

Figure 2. Mature woodland retained as buffer on closed mine.

Figure 3. Dinosaur Park on portion of reclaimed mine.

Figure 4. Corn crop on reclaimed sand and gravel mine.

Figure 5. Created wetlands on closed sand and gravel mine.

Figure 6. Parkland created on reclaimed sand and gravel mine.

Figure 7. Sorghum crop on reclaimed sand and gravel mine.

Figure 8. Nationally certified water-skiing site on portion of reclaimed sand and gravel mine.

In the Established Communities Policy Area of Plan 2035, 35 sites, comprising 4,620 acres, have been redeveloped mainly as residential, institutional, and commercial uses. Figures 7–12 illustrate several adaptive reuses of former mines in the Established Communities.

For more information about the state and County policy and regulatory framework for sand and gravel mining, please see Appendix 1.

*Figure 11. Manufacturing institution on a former sand and gravel mine.*

*Figure 9. Mixed multifamily and single-family residential development on part of reclaimed sand and gravel mine.*


*Figure 10. Manufacturing establishment development on part of The Brick Yard in Beltsville—site of a former mine.*

*Figure 12. Single-family residential development on part of former sand and gravel mine.*

**At the end of extraction operations, the mine must be reclaimed as required by state law. In the reclamation process, topsoil and subsoil layers that were removed and stockpiled separately prior to excavating sand and gravel, are replaced. The overburden is replaced first, followed by the subsoil and the topsoil. In the process of reclamation, all back-filling must be done with clean fill and may not exceed the original grade of the site. Further, any high walls on the site must be graded out and full vegetative cover must be established for at least two growing seasons or be otherwise stabilized as required for an approved post-mining land use. In summary, the state defines a reclaimed sand and gravel mining site as one that has been returned to its original grade with full vegetative cover (usually grass) established for at least two growing seasons. Once reclamation is completed successfully, the state releases the mining permit, and the County releases any bonds or deposits. This brings the mining process to an end but leaves the reclaimed mine ready for other appropriate post-mining land uses. Post-mining land uses should provide some benefit from a public policy or economic standpoint.**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# PAST, PRESENT, AND FUTURE TRENDS

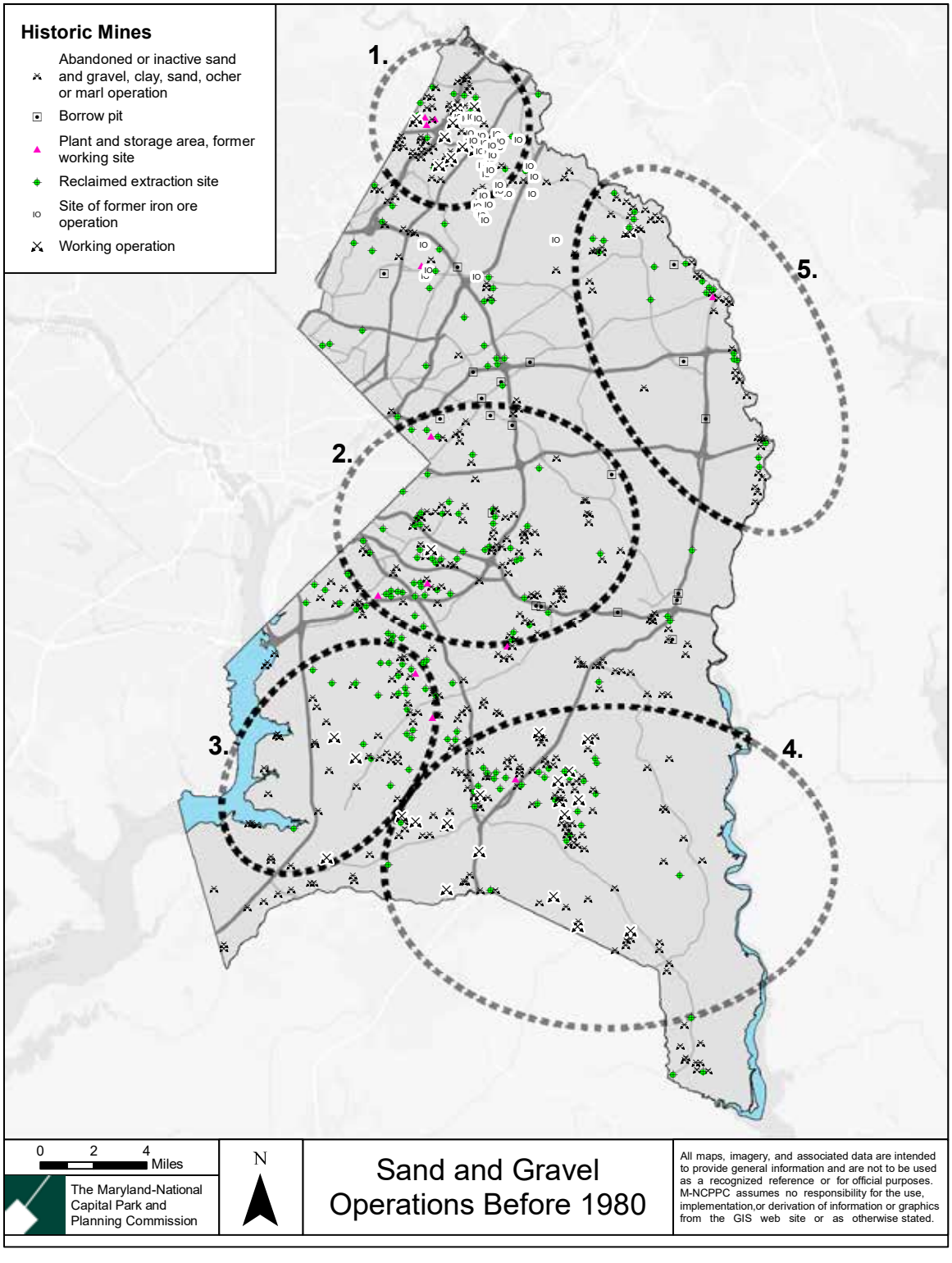
## HISTORICAL SAND AND GRAVEL MINING OPERATIONS

State mapping shows sand and gravel mining operations in the County in 1899 with dredging of the banks, tidal flats, and beds of the Patuxent River and the mouths of some confluent streams in the northeast. The large operations from the 1930s to the late 1980s and the major projects they supplied material for, are listed in Table 9 and their locations in the County are illustrated in Map 2, These sites were located in close proximity to major development or infrastructure projects dependent on sand and gravel. Similar data for sand and gravel mining operations from the 1980s to 2018 and the projects they supplied material for, are listed in Table 11 and Map 10 in Appendix 2.

Historical data derived from the Maryland Geologic Survey mapping show 549 sand and gravel, clay, sand, ocher, or marl operations in the County prior to 1980, the majority of which are presently reclaimed, redeveloped, or inactive.

For more information about Historical Sand and Gravel Mining Operations, see Appendix 2.

*Map 2. Approximate location of sand and gravel operations before 1980.*



## CURRENT SAND AND GRAVEL MINING OPERATIONS

As of 2018, the County had 124 sand and gravel mines and associated uses covering 14,376 acres (The 124 mines and associated uses are listed in Table 13, Appendix 4). This database includes three wash plants[15], and five operational or working mines, located in Councilmanic District 9 (see Table 1). Table 2 provides additional information on the status of the County's sand and gravel mines by Councilmanic District, while Table 3 shows their acreage and Map 3 illustrates their approximate location.

A total of 12 mine sites comprising 2,456 acres are listed as "Active."[16] An additional 107 mines, comprising 10,894 acres, have been reclaimed[17] as required by law (Table 3).

*Table 1. Operational or Working Mines in Prince George's County, 2018*

| Mine Name | Location | Operator/Property Owner |
|---|---|---|
| Cedarville Pit | Bevard Road, Aquasco | Aggregate Industries |
| Millville (Gaslight #2) | 5601 Accokeek Road, Brandywine | Aggregate Industries |
| Robindale (Golf Course) | McKendree Road, Danville | Aggregate Industries |
| Anthony George | Evergreen Way, off Route 301, Brandywine | Rockhill Sand and Gravel Company |
| Jenkins | Aquasco Road, Aquasco | Metro earthworks, LLC |

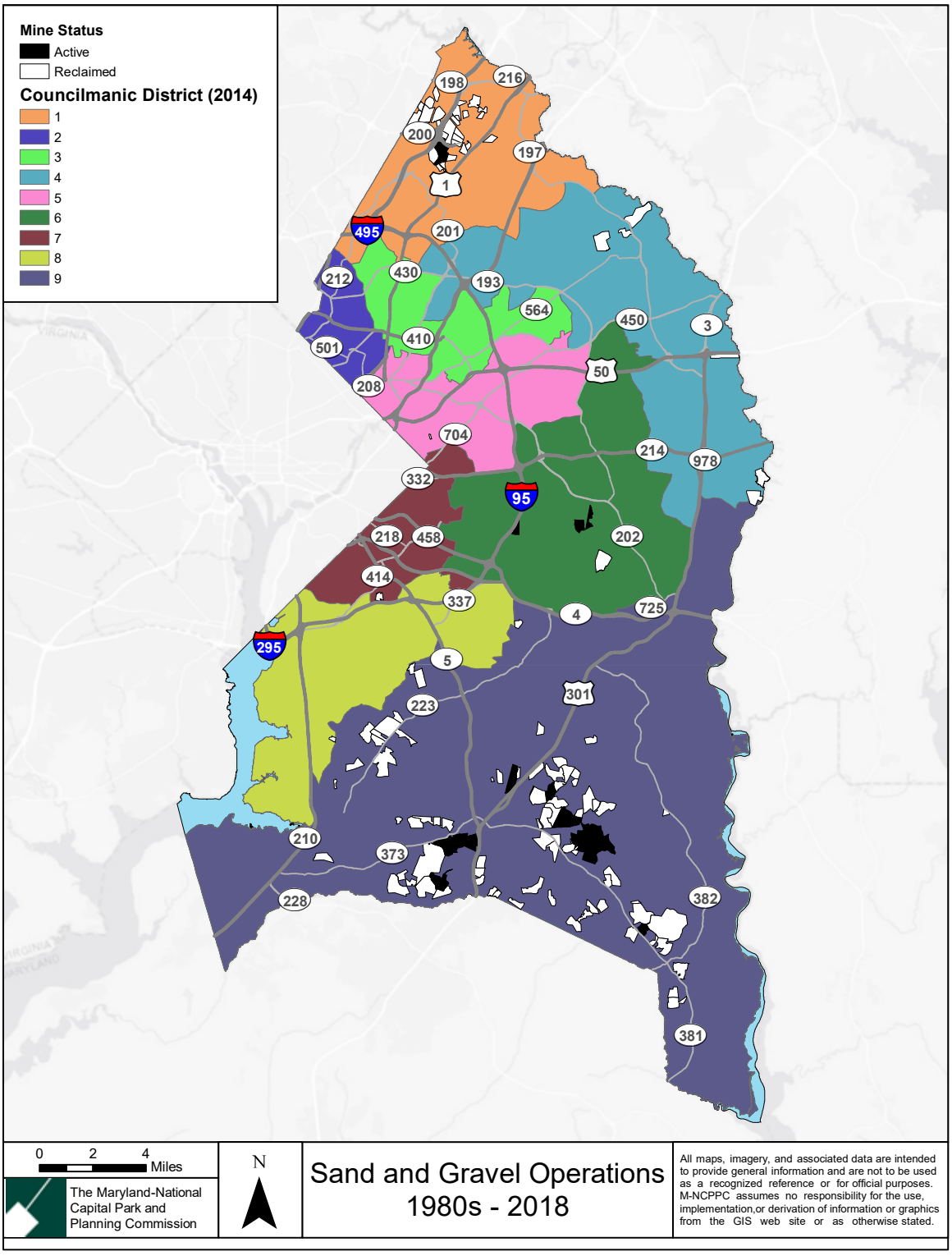
*Table 2. Status Of Sand And Gravel Mines By Prince George's County, By Councilmanic District, 2018*

| Councilmanic District | Number Of Mines | | | Total Mines |
|---|---|---|---|---|
| | Operational | Active (Permits) | Reclaimed | |
| 1 | 0 | 2 | 28 | 30 |
| 2[18] | 0 | 0 | 0 | 0 |
| 3 | 0 | 0 | 0 | 0 |
| 4 | 0 | 0 | 6 | 6 |
| 5 | 0 | 0 | 0 | 0 |
| 6 | 0 | 4 | 1 | 5 |
| 7 | 0 | 0 | 1 | 1 |
| 8 | 0 | 0 | 2 | 2 |
| 9 | 5 | 6 | 69 | 80 |
| Total | 5 | 12 | 107 | 124 |

*Table 3. Status of Mining Operations by Acreage*

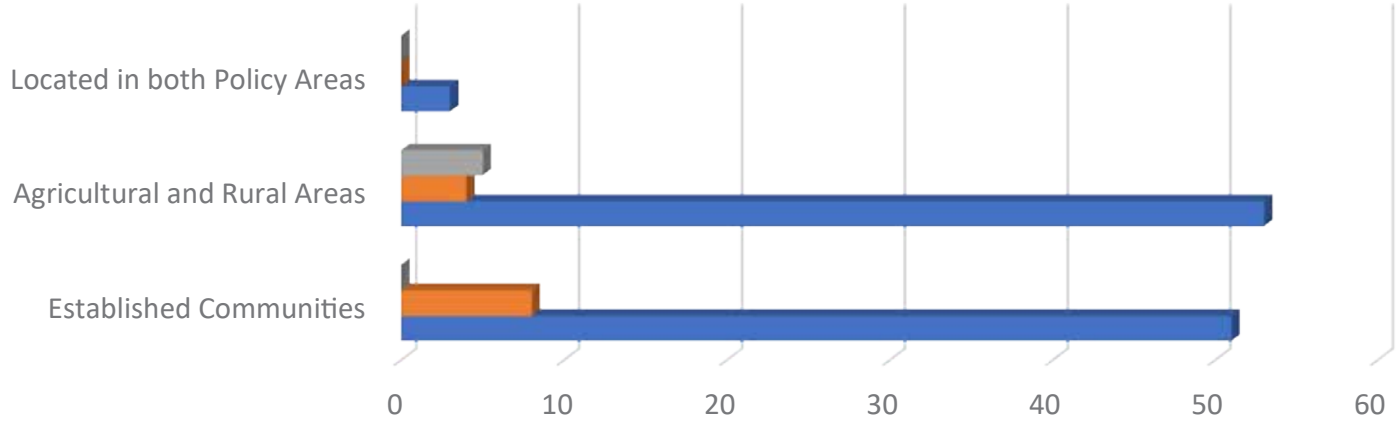
| Operational Sites | Active Sites | Reclaimed Sites | Mine Total |
|---|---|---|---|
| 1,0125.62 acres (7.14%) | 2,456.74 acres (17.08%) | 10,894.03 acres (75.77%) | 14,376.39 acres (100%) |

*Map 3. Approximate Location of Sand and Gravel Mines in Prince George's County, by Councilmanic District*



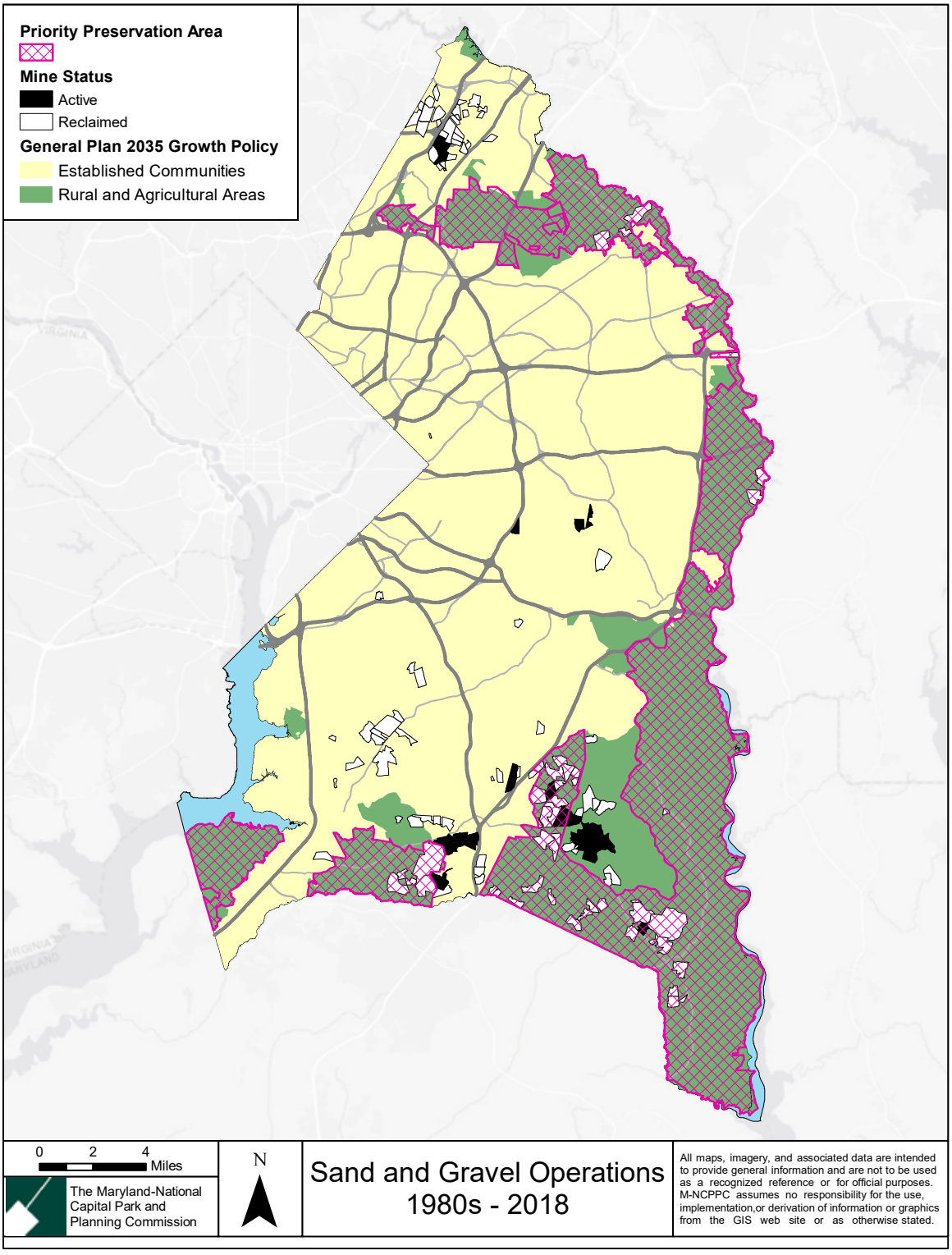
As of 2018, the County's sand and gravel mines are distributed almost evenly between the Established Communities and the Rural and Agricultural Areas (i.e., areas outside the Established Communities). Figure 13 and Map 4 show this distribution.

*Figure 13. Distribution of Sand and Gravel Mines by Plan 2035 Policy Area, 2018*




| | Established Communities | Agricultural and Rural Areas | Located in both Policy Areas |
|---|---|---|---|
| Operational | 0 | 5 | 0 |
| Active | 8 | 4 | 0 |
| Reclaimed | 51 | 53 | 3 |

*Map 4. Approximate location of sand and gravel mines by Plan 2035 Policy Areas*



# THE FUTURE OF SAND AND GRAVEL MINING IN PRINCE GEORGE'S COUNTY

Several trends in the County's sand and gravel mining industry will influence how and where the industry evolves in the future.

## PRODUCTION FLUCTUATES

Recent data show annual sand and gravel production in Prince George's County being relatively consistent between 2010 and 2018 with a peak in 2016 (see Figure 14). Production figures for 19 counties within Maryland show more fluctuation across the state. Comparative data for these 19 counties are shown in Tables 4 and 6. According to these state data[19] Prince George's County produced 15.2 million tons of sand and gravel (valued at $32.4 million) between 2010 and 2018, making it the second highest producer in the state (after Cecil County) during that timeframe. Staff observes that production may not always follow the same trend as demand, and that the industry may base production on maintaining an available supply/inventory in anticipation of fluctuations in future demand.

*Figure 14. Sand and Gravel Production Trends in Prince George's County, 2010 to 2018*

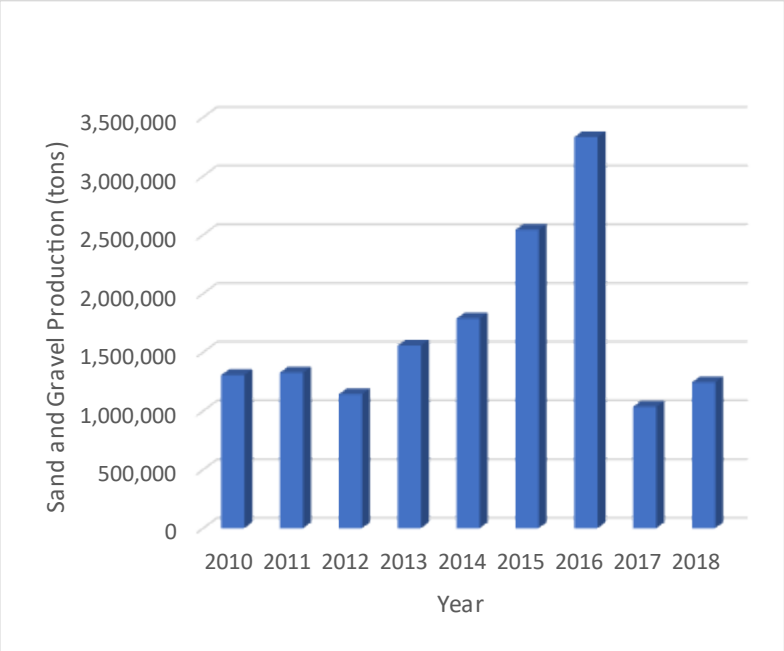
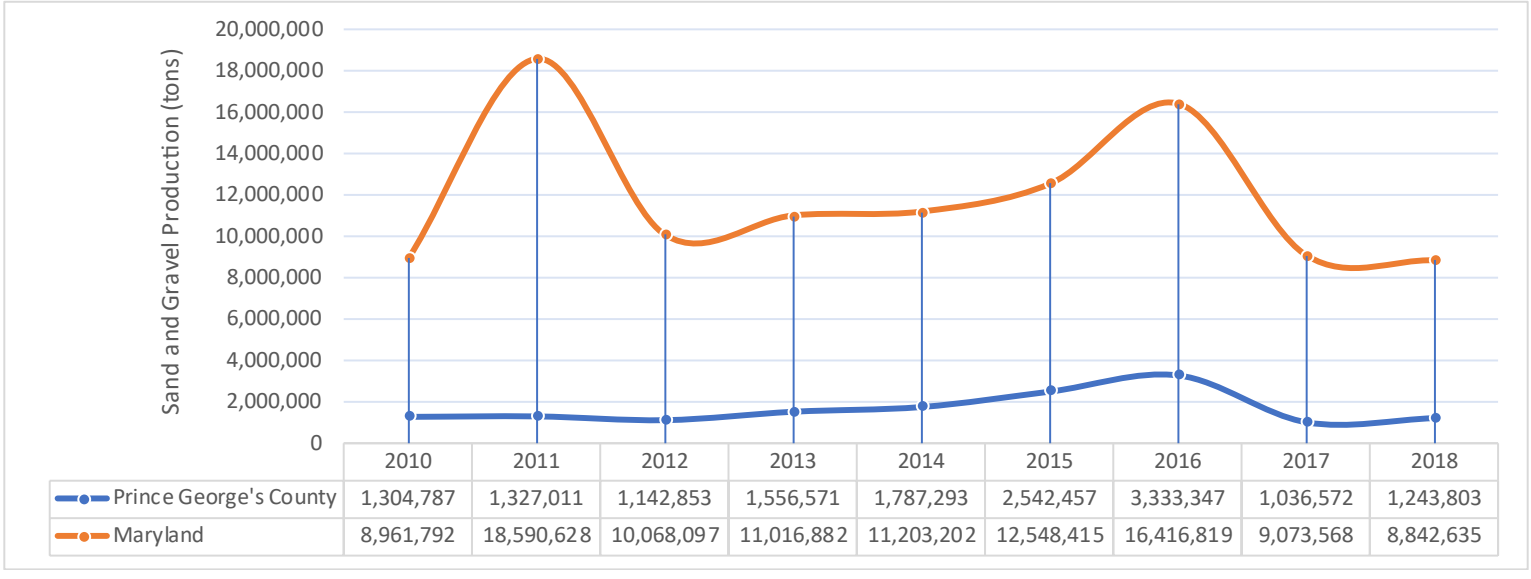


*Table 4. Sand and Gravel Production (tons) by Year, 2010 to 2018, for 19 Maryland Counties*[20]

| County | Sand and Gravel Production (tons) | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | |
| Anne Arundel County | 815,999 | 1,140,187 | 740,844 | 459,870 | 779,331 | 293,831 | 847,405 | 740,100 | 373,800 | 6,191,366 |
| Baltimore County | 219,537 | 144,455 | 201,558 | 653,042 | 166,973 | 254,517 | 258,481 | 125,249 | 561,628 | 2,585,440 |
| Caroline County | 3,030 | 0 | 1,050 | 18,700 | 0 | 0 | 0 | 0 | 0 | 22,780 |
| Cecil County | 1,775,344. | 1,830,950 | 1,835,859 | 2,773,269 | 1,900,447 | 2,665,495 | 1,409,877 | 2,416,446 | 2,226,646 | 18,834,333 |
| Charles County | 1,275,179 | 1,996,688 | 2,532,427 | 1,540,426 | 1,538,773 | 1,535,184 | 1,502,511 | 1,041,613 | 486,460 | 13,449,260 |
| Calvert County | 614,153 | 9,067,579 | 439,524 | 815,524 | 524,295 | 642,505 | 1,366,740 | 1,019,474 | 651,036 | 15,140,831 |
| Dorchester County | 245,805 | 283,098 | 231,046 | 176,749 | 1,107,487 | 191,226 | 226,165 | 161,874 | 331,309 | 2,954,759 |
| Garrett County | 0 | 0 | 0 | 0 | NA | NA | NA | NA | NA | 0 |
| Harford County | 1,045 | 82,500 | 96,400 | 57,900 | 33,747 | 95,700 | 164,340 | 173,878 | 77,784 | 783,294 |
| Howard County | 0 | 0 | 0 | 26,860 | 0 | 0 | 0 | 0 | 0 | 26,860 |
| Kent County | 531,616 | 331,609 | 437,616 | 581,459 | 396,844 | 1,614,822 | 355,069 | 433,442 | 390,346 | 5,072,824 |
| Montgomery County | 9,408 | 8,824 | 9,066 | 8,948 | 12,313 | 320 | 9,362 | 9,335 | 6,254 | 73,830 |
| Prince George's County | 1,304,787 | 1,327,011 | 1,142,853 | 1,556,571 | 1,787,293 | 2,542,457 | 3,333,347 | 1,036,572 | 1,243,803 | 15,274,694 |
| Queen Anne's County | 348,530 | 607,795 | 574,940 | 447,505 | 900,770 | 167,665 | 4,655,196 | 262,507 | 751,896 | 8,716,804 |
| Somerset County | 50,350 | 104,300 | 19,230 | 22,684 | 120,139 | 86,602 | 10,966 | 10,380 | 16,750 | 441,401 |
| St. Mary's County | 919,678 | 824,250 | 892,247 | 798,675 | 894,835 | 1,506,281 | 1,113,561 | 1,019,093 | 1,018,242 | 8,986,862 |
| Talbot County | 67,280 | 58,294 | 76,423 | 48,508 | 302,832 | 100,941 | 87,578 | 72,654 | 335,853 | 1,150,362 |
| Wicomico County | 48,677 | 109,003 | 109,566 | 95,243 | 89,927 | 96,665 | 411,430 | 110,000 | 208,000 | 1,278,511 |
| Worcester County | 731,375 | 674,085 | 727,448 | 934,949 | 647,196 | 754,206 | 664,791 | 440,951 | 162,828 | 5,737,829 |
| Maryland State Total Production by Year | 8,961,792 | 18,590,628 | 10,068,097 | 11,016,882 | 11,203,202 | 12,548,415 | 16,416,819 | 9,073,568 | 8,842,635 | 106,722,038 |

| | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | |
|---|---|---|---|---|---|---|---|---|---|---|
| Prince George's County | 1,304,787 | 1,327,011 | 1,142,853 | 1,556,571 | 1,787,293 | 2,542,457 | 3,333,347 | 1,036,572 | 1,243,803 | 15,274,694 |
| Maryland | 8,961,792 | 18,590,628 | 10,068,097 | 11,016,882 | 11,203,202 | 12,548,415 | 16,416,819 | 9,073,568 | 8,842,635 | 106,722,038 |

*Figure 15. Sand and Gravel Production Trends in Prince George's County, 2010 to 2018*



## ACCESS TO SAND AND GRAVEL DEPOSITS IS THREATENED BY DEVELOPMENT

Maryland requires counties, in their comprehensive plan, to balance mineral resource extraction with other land uses and prevent the preemption of mineral resource extraction by other land uses. Plan 2035, and the Resource Conservation Plan recommend several of the initial steps in meeting this requirement. However, until specific policies and regulations are enacted to reduce or eliminate preemption of mineral resource extraction by other uses, the potential remains for unexploited sand and gravel deposits to continue preemption mainly by residential development (see Appendix 1). The risk is greater in the Established Communities policy area where public water and sewer are available, and the demand for housing and other development is higher. Rapid development of land has also had the unintended effects of fragmenting the sand and gravel resource base as more and more lands with mineable deposits become surrounded or separated from each other by communities; to the extent that future mining potential is becoming more limited to small, individual parcels scattered throughout the southern third of the County. The strength of the residential market in Prince George's County is a driving force for this continued preemption of sand and gravel extraction opportunities.

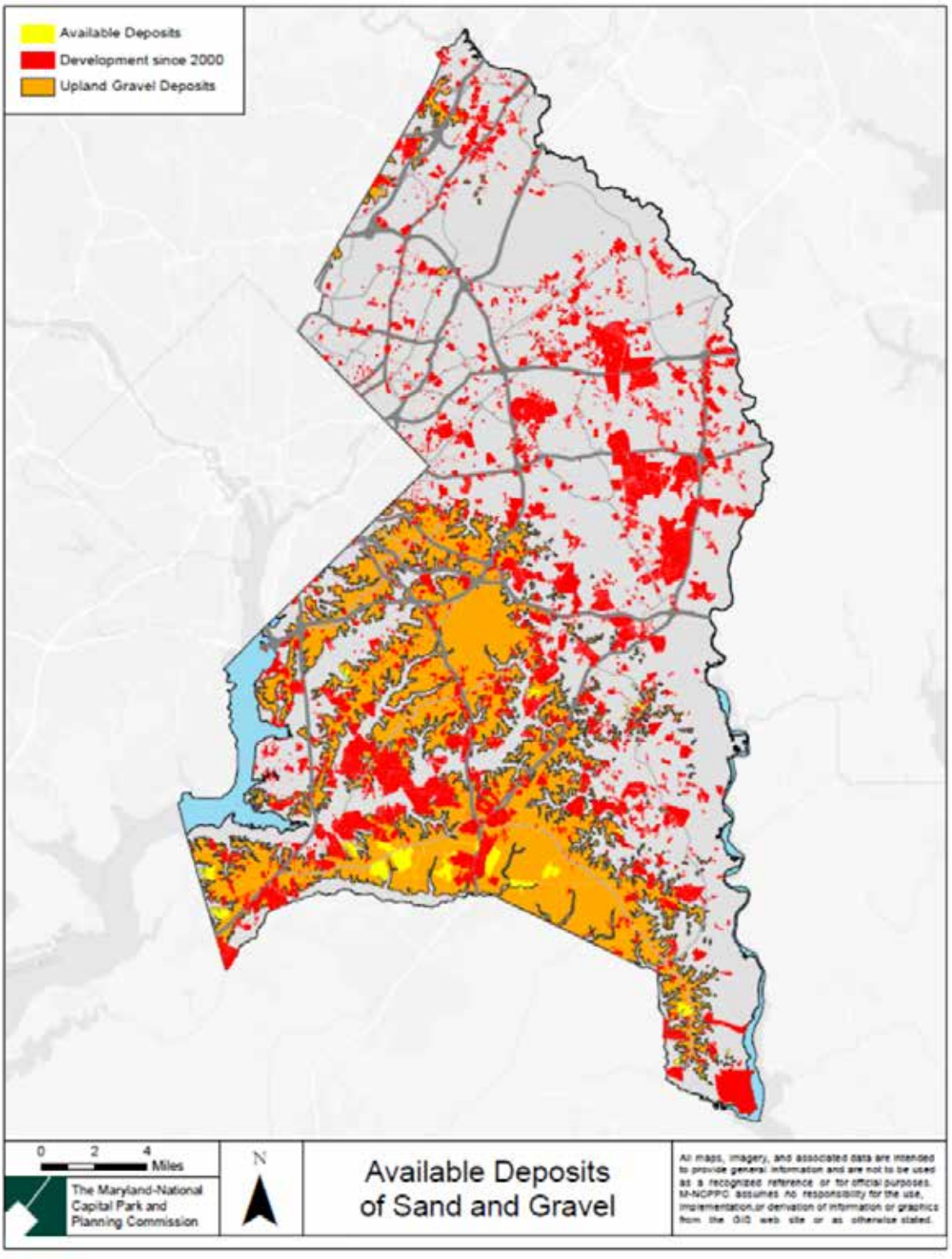
Interviews with some mining industry professionals identified perceived challenges posed by the permitting process, sometimes in response to citizen and political opposition to mining. They saw County regulations as restrictive (e.g., attempts to limit sand and gravel extraction to certain parts of the County, and five-year time limits set by SE for mining operations which they perceived as being in conflict with the state's regulatory functions), making sand and gravel extraction a slightly insecure business in their view. The high cost and the lengthy timeframe of going through the SE permit process were also listed as impediments.[21] Sand and gravel mining has high front-end and capital costs that increase the financial risks of mining a site. Additionally, the resource is variable in depth with some "veins" buried under up to 20 or 30 feet of overburden that must first be removed before mineable material becomes available. Moreover, geologic units are not uniformly thick and they are not uniform in lithology, which impacts the per acre yield of sand and gravel mining. Protection of environmentally sensitive areas[22] and exclusion of waste material[23] also limit the per acre yield and potential revenues generated by mining operations.

The Prince George's County Planning Department staff calculated approximately 4,600 acres of mineable sand and gravel were preempted by mainly residential development between 2000 and 2018 in the southern part of the County (see Map 5). Additionally, large state and federal properties such as Joint Base Andrews (JBA), Rosaryville State Park, and GlobeCom, as well as some private lands within the Mount Vernon Viewshed, and lands with Maryland Agriculture Land Preservation Foundation (MALPF) easements, Prince George's County Soil Conservation District Historic Agricultural Resources Preservation Program (HARPP) easements, and Maryland Environmental Trust (MET) easements in the south of the County, contain an estimated 8,600 acres of land with unmined sand and gravel deposits that the industry now considers to be unavailable.

To safeguard the future of the sand and gravel mining industry and to ensure its continued level of contribution to the County's economy, efforts should be made to limit the preemption of mineable sand and gravel by delaying uses such as housing, commercial development, or woodland preservation that are generally in competition with resource extraction, at least until the resource has been extracted. In that regard, the following process might be helpful:

- Identify rural lands with economically viable sand and gravel deposits.
- Delay the construction of new residential communities until the resource has been extracted, particularly in the Established Communities.
- Control resource extraction through carefully developed timelines that precede residential and other development.

*Map 5. Preemption of sand and gravel by residential and other development since 2000*



The 1993 Subregion V Master Plan estimated that about 38,500 acres of potential sand and gravel resources were available for future mining within the master plan area (estimated to last at least 69 years). Data collected for this report show nearly 40,000 acres of land countywide, including some of the lands within Subregion V, have been developed without the extraction of exploitable sand and gravel deposits contained on these lands. This includes mineable sand and gravel deposits on nearly 5,000 acres preempted by development occurring between 2000 and 2018, mainly in Brandywine, Westphalia, and areas at or near JBA. The situation is only slightly better in the Rural and Agricultural Areas, where unexploited sand and gravel deposits remain in some areas approved for potential future development (see Map 4).

Residential development in the Agriculture and Rural Areas even at the lower densities allowed by current zoning, also impacts sand and gravel extraction potential. Residential development in rural areas depends on individual well and septic systems because public water and sewer are not available. State and County laws require drainage areas (septic fields) for septic sewage disposal to remain undisturbed. All lands left undisturbed to preserve septic fields for planned development become unavailable for mining.

Some jurisdictions protect mineral-rich lands through legislation, such as mineral overlays that preclude the preemption of resource-rich lands by other competing land uses. Prince George's County does not have a mineral overlay zone, but its adoption of low-density zoning (e.g., R-O-S, O-S, R-A, R-E, zones in the existing Zoning Ordinance; ROS, AG, AR, RE zones in the 2018 Zoning Ordinance) for its rural areas has served as one way of protecting resource-rich lands by limiting the type of development that can occur there. This helps to guarantee a sustainable supply of sand and gravel necessary for current and future growth and development.

## HIGHEST POTENTIAL FOR SAND AND GRAVEL MINING IN SOUTHERN PRINCE GEORGE'S COUNTY

Map 1 on page 8 illustrates the location of the highest remaining sand and gravel mining potential in the southern, rural part of the County. These remaining deposits are concentrated in the Brandywine to Accokeek areas, generally south of MD 373 (Accokeek Road). These deposits are becoming progressively more fragmented by other land uses and development. As of 2018, the Prince George's County Planning Department staff had identified only about 20 potential sand and gravel mining sites covering about 1,180 acres, in the southern part of the County, where mineable sand and gravel deposits were on relatively large properties (100 acres or greater) free of conflicts with other land uses.

## CLOSED MINES REUSED AS LANDFILLS AND RUBBLE FILLS RETAIN ADAPTIVE REUSE POTENTIAL

Table 14 in Appendix 4 shows a listing of closed class 3 landfills and rubble fills in Prince George's County, and Map 8 illustrates their approximate location within the County. Many of these sites were former sand and gravel mines; these sites can be re-tasked to a range of uses that include reforestation/afforestation and renewable energy generation (solar and wind).[24] In other jurisdictions around the nation, such sites are used as fitness parks, off-road vehicle (ORV) and mountain bike racing tracks, obstacle courses, parkland, hiker/biker trails, and for skiing.

Several of these sites are in or near the flight paths of JBA or violate the height restrictions of the Military Installation Overlay Zone (MIOZ). The Ketts and Tayman Property Class 3 Fill, and the Baker Property Class 3 Fill, in particular, pose a direct threat to the base due to their elevation and proximity. Consideration should be given to reducing the height of these rubble fills as a matter of priority. See the Recommendations section on page 48, for more discussion on possible adaptive uses for closed landfills and rubble fills.

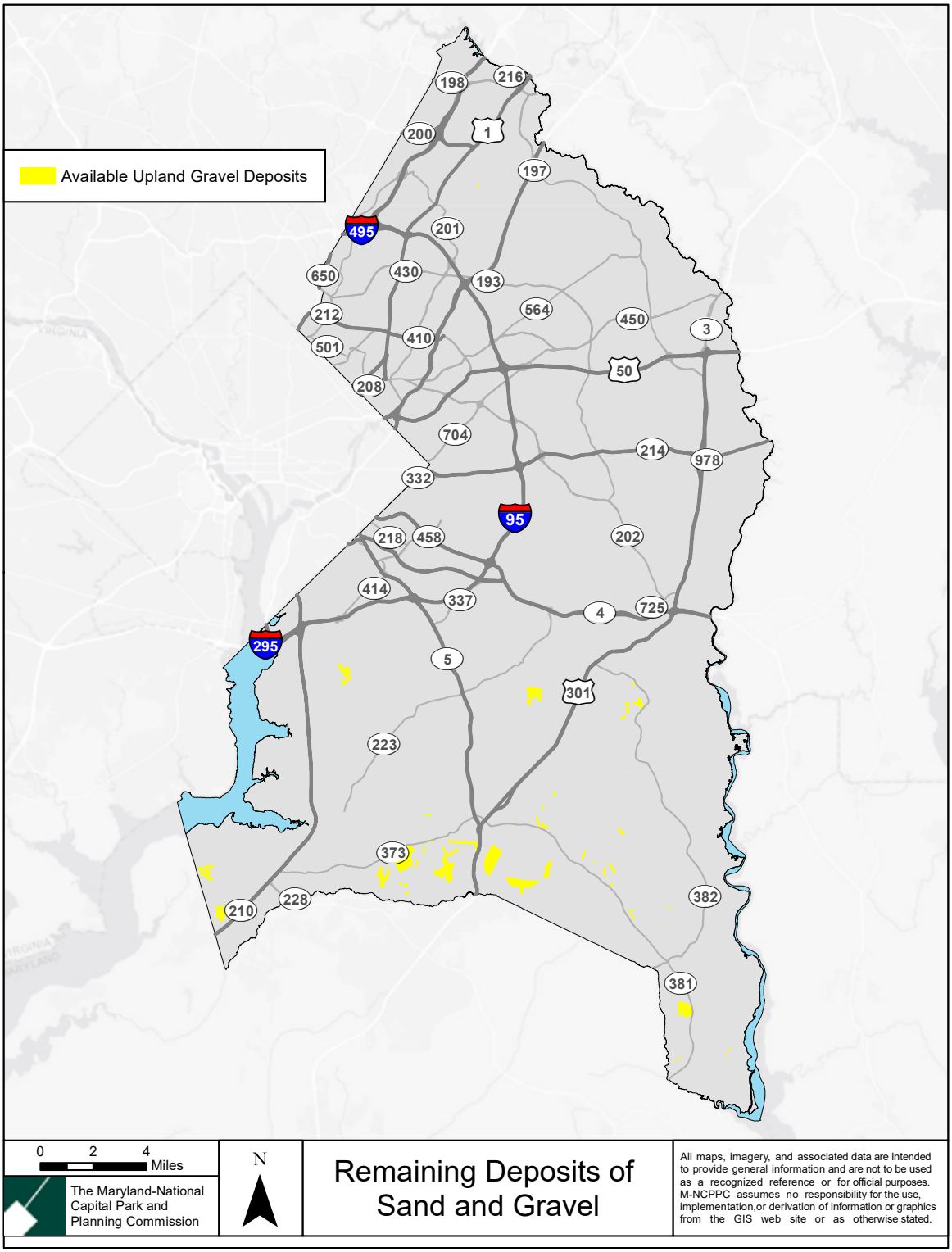
## LOCATION OF POTENTIAL FUTURE EXTRACTION

In determining estimates for future extraction, Staff conducted an analysis that focused solely on upland deposits ( formerly called the Brandywine Formation) as the geologic unit containing mineable sand and gravel, because it has been mined in the past and is currently being mined in the County, making it a proven economic resource, as defined by MDE. Staff's analysis did not consider other units such as the sand-gravel facies of the Potomac Group that also have mineable deposits because most of these deposits have been preempted by development or remain in or near residential communities.

Staff found that approximately 17,000 acres (2 percent of the County) remain with no major constraints to mining. Staff estimates that this acreage could theoretically be mined in approximately 117 years. However, only an estimated 1,180 acres (≤1 percent of the County) met the mining industry's consideration as optimal for mining, in terms of property size. (The mining industry considers properties 100 acres or fewer in area as uneconomical or not cost effective to mine). Per Staff estimates, this reduced area could theoretically be mined in about 8 to 20 years. Map 6 illustrates the location of these areas.

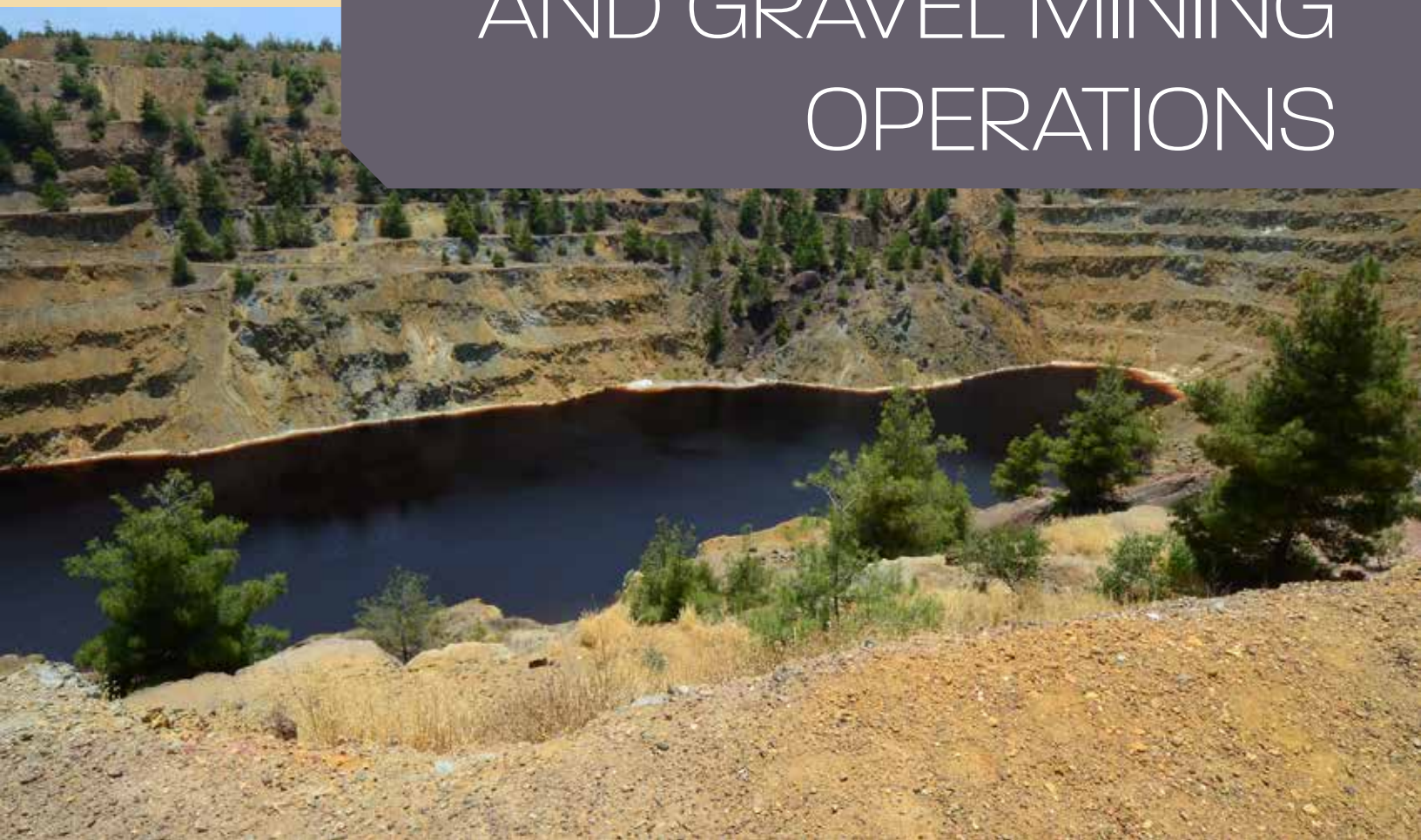
A full description of the staff's methodology, with additional maps, is located in Appendix 3.

*Map 6. Approximate location of remaining sand and gravel mining potential.**




*Property size and other limitations to mining excluded. (Approximate Area: 1,180 acres)

# THE IMPACTS OF SAND AND GRAVEL MINING OPERATIONS



Sand and gravel mining has demonstrable economic benefits as well as social and environmental impacts that are considered when determining the County's policies and regulations concerning these operations. The economic benefits and adverse impacts of these operations are described below.

## ECONOMIC IMPACTS

### *Economic Benefit of Sand and Gravel Operations*

To capture the total economic input of sand and gravel operations in the County, one must account for indirect spending that is associated with an industry. Indirect spending refers to the purchase of goods and services that are not directly incorporated into a product being manufactured. An example would be when workers in the industry go to a restaurant for lunch while on the job. Once a multiplier has been applied, the result represents the industry's contribution to the County's GDP. After applying the appropriate multiplier, the total contribution of sand and gravel operations to the County's economy in 2015 was approximately $40,327,500.[25] Every dollar in direct spending on sand and gravel operations generated approximately $2.83 in additional spending. (See Table 5)

The final contribution of the sand and gravel operations to the County's economy involves the number of jobs supported and the wages generated. As with spending and wages there are both direct and indirect impacts associated with the industry in the County. Combined sand and gravel operations in the County support a total of 152 jobs accounting for $10,683,920 in annual wages.[26]

*Table 5. Economic Contribution Of Some Businesses That Rely On The Sand And Gravel Mining Industry In Prince George's County, 2017*

| Prince George's County 2nd Quarter 2017 | | | | | | | |
|---|---|---|---|---|---|---|---|
| (8-Digit) Naics Data | Quarterly Establishments | Employment | | | Average 2017 2nd Quarter Employment | Total Quarterly Wages ($) | Average Weekly Wage ($) |
| | | April | May | June | | | |
| Highway, street, and bridge construction | 26 | 941 | 976 | 996 | 971 | 13,660,250 | 1,082,000 |
| Other heavy construction | 6 | 530 | 471 | 506 | 502 | 7,708,525 | 1,180,000 |
| Residential poured foundation contractors | 36 | 423 | 428 | 444 | 432 | 5,400,137 | 962,000 |
| Nonresidential poured foundation contractors | 13 | 320 | 317 | 314 | 317 | 3,738,864 | 907,000 |
| Residential masonry contractors | 34 | 213 | 212 | 226 | 217 | 2,745,237 | 973,000 |
| Nonresidential masonry contractors | 20 | 1,002 | 969 | 974 | 982 | 13,626,120 | 1,068,000 |
| Ready-mix concrete manufacturing | 7 | 76 | 77 | 73 | 75 | 1,239,901 | 1,266,000 |
| Masonry material merchant wholesalers | 14 | 252 | 250 | 249 | 250 | 3,358,265 | 1,032,000 |
| TOTALS | | | | | 3,746 | 51,477,299 | 8,470,000 |
| SOURCE: North American Industry Classification System (NAICS), 2017 | | | | | | | |

# PRINCE GEORGE'S COUNTY'S CONTRIBUTION TO THE STATE MINING INDUSTRY

**Sand and gravel operations in Prince George's County accounted for 14.3 percent of the state's total sand and gravel production between 2010 and 2018. The County produced 15,274,693.61 tons of sand and gravel that decade, placing it second of 19 counties in the state. (see Table 6). According to these data between 2010 and 2018 the County consistently ranked second in the state except in 2012 and 2017 when it ranked third.**

*Table 6. Sand and Gravel Production (tons) by Maryland County, 2010 to 2018*

| County | Total (10-year) Production | Percent of total | Ranking |
|---|---|---|---|
| Cecil County | 18,834,333.38 | 17.64 | 1 |
| Prince George's County | 15,274,693.61 | 14.31 | 2 |
| Calvert County | 15,140,830.52 | 14.18 | 3 |
| Charles County | 13,449,260.11 | 12.60 | 4 |
| St. Mary's County | 8,986,861.60 | 8.42 | 5 |
| Queen Anne's County | 8,716,804.00 | 8.16 | 6 |
| Anne Arundel County | 6,191,366.31 | 5.80 | 7 |
| Worcester County | 5,737,828.50 | 5.37 | 8 |
| Kent County | 5,072,823.54 | 4.75 | 9 |
| Dorchester County | 2,954,758.96 | 2.76 | 10 |
| Baltimore County | 2,585,440.00 | 2.40 | 11 |
| Wicomico County | 1,278,510.60 | 1.19 | 12 |
| Talbot County | 1,150,361.69 | 1.08 | 13 |
| Harford County | 783,294.00 | 0.73 | 14 |
| Somerset County | 441,400.65 | 0.41 | 15 |
| Montgomery County | 73,830.22 | 0.07 | 16 |
| Howard County | 26,860.00 | 0.02 | 17 |
| Caroline County | 22,780.10 | 0.02 | 18 |
| Garrett County | N/A | N/A | 19 |
| TOTAL | 106,722,037.79 | 100.00 | |

## SOCIAL, ENVIRONMENTAL, AND TRANSPORTATION IMPACTS

Surface mining can have a negative impact on adjacent properties, property owners, and nearby communities, particularly with respect to the following:

- Social impacts: the perceived loss of community character.
- Environmental impacts: dust, noise, soil compaction, soil erosion, water quality loss, and habitat degradation and loss.
- Transportation impacts: roadway traffic issues, truck traffic, and emissions issues.

### *Social Impacts*

Rural character refers to the patterns of land use and development where land uses are dominated by areas with low-density development, and an abundance of open spaces, such as woodland and farms. Due to their size needs, and cognizant of the potential for noise and visual impacts, sand and gravel mines are often located in sparsely populated areas. This is no different in Prince George's County; mining almost exclusively occurs in the southern part of the County where rural character may be adversely affected. Some mines are in or near areas where County policy promotes the preservation of rural character and aesthetics. Strip mining, with its removal of tree cover, noise, dust, and truck traffic issues, is not conducive to preserving rural character. Many residents consider it an eyesore.

### *Environmental Impacts*

Sand and gravel mining, by its very nature, alters the natural environment, sometimes significantly. Operations occur wherever the resources exist—whether near a stream or in mature woodland where tree clearing will be required—and changes to the natural landscape become inevitable. Sand and gravel mining operations may generate serious environmental impacts, such as dust, noise pollution, soil compaction, soil erosion, water pollution, and habitat loss.

#### Dust

Dust is a common emission from sand and gravel mining and a source of irritation and health problems for nearby communities. Dust is particularly harmful to vulnerable populations such as asthmatics and those with respiratory problems, children, and the elderly. These are sources of concern for residents, who occasionally oppose and protest these operations. For approval of an SE for sand and gravel mining, the Prince George's County Zoning Ordinance requires that mining operations use techniques, such as watering, to minimize the effects of dust on local communities, take steps to minimize soil exposure to wind, and provide vegetated buffers for screening and dust control.

#### Noise Pollution

In the regulation of land use, noise is generally defined as unwanted or disturbing sound. In the mining industry, noise is caused by a variety of sources. Stone crushers and truck traffic, particularly where backup beepers are used, are significant contributors of noise from sand and gravel mining operations. Wind direction can influence noise pollution levels, making the situation better or worse, depending on wind direction. The County addresses this

**The establishment of class three fills and landfills to reclaim current or former sand and gravel mines on Residential-Agricultural (R-A) zoned land can also contribute to this perception of loss of rural character for sites located within the Agricultural and Rural Areas.**

issue by requiring noise berms and the retention of mature woodland, setting hours of operation to limit interference with community life, and requiring screening and setbacks from adjacent residential neighborhoods, schools and playgrounds. Figure 17 shows a mature woodland that buffered Aquasco Road from noise from a nearby sand and gravel mine (now closed).

### Soil Compaction

Soil compaction was observed on abandoned mining roads and parts of closed mines that had previously been graded and reseeded[27] as part of the mine reclamation process pursuant to state permit requirements and County SE conditions of approval (see Figure 16).

### Soil Erosion

Soil erosion was a common impairment observed on some closed sand and gravel mines. Gully formation was well advanced on one site (see Figures 18 and 19). Also observed were failed mitigation measures like breached and abandoned silt fences and collapsed riprap walls, which in one instance, resulted in siltation of a nearby Mattawoman Watershed tributary. Sand and gravel extraction, excavation, and trucking can lead to soil compaction, increasing the risk of soil loss through wind action. Windblown soil (dust) can cause siltation of wetlands, streams, ponds and other bodies of water, and have demonstrable health impacts, especially on vulnerable populations such as children, the sick, and elderly.

*Figure 16. Bare, compacted ground on a closed sand and gravel mine in Agricultural and Rural Areas policy area.*

*Figure 17. Mature woodland left to screen operations on a nearby mine from Aquasco Road.*

*Figure 18. Erosion and transport of sand and gravel from a nearby mine into surrounding woodland.*

*Figure 19. Gully forming from the edge of closed mine off Aquasco Road is nearly 20 feet deep.*

### Water Quality

Water is an important element of the sand and gravel extraction process. High volumes of groundwater are drawn for the dewatering that occurs in the processing of gravel mining. Dewatering is the process of pumping groundwater away from a mining site to permit excavation when the water table is above the sand and gravel deposits. This adversely affects the site's hydrology, exposes groundwater to potential contamination from spills and sedimentation, and may deplete water supplies to wells on adjoining lands by modifying the hydrological conditions of the area. Water is also used extensively for cleaning mining equipment, cooling, washing aggregates, and to control dust on roadways to and through the mine site.

*Figure 20. Breached silt fencing allows erosion of sand and gravel from closed mine into nearby stream.*

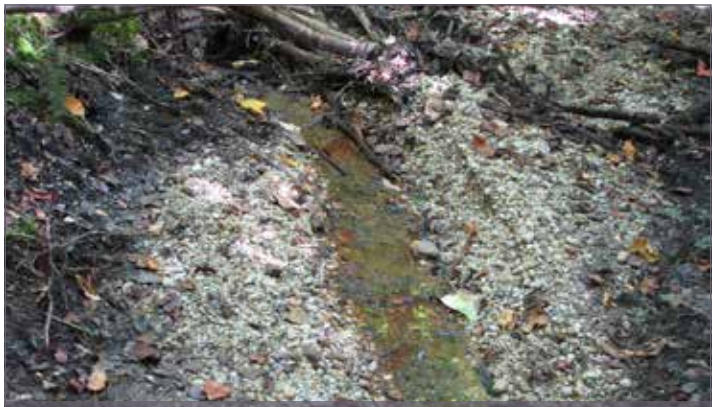


*Figure 21. Small Mattawoman Watershed tributary being overrun by deposits from mine near Aquasco Road.*

### Habitat Loss

Preparing a mine site prior to sand and gravel extraction includes the complete removal of vegetation. In addition to the physical loss of habitat for nesting and foraging that accompany deforestation, there is a marked increase in subsurface temperature. The research from Andrew H MacDougall and Hugo Beltrami[28] shows that "warming of the ground surface is the dominant response to deforestation, consistent with the limited field data that exist." They note that the change in temperature can range from –0.48 degrees Celsius to 1.78 degrees Celsius, globally. Additionally, they state that the impact is long-lasting, "Overall our simulations suggest that deforestation has a large impact on subsurface temperatures for centuries following deforestation." Thus prepping, followed by surface mining, can render perfectly suitable mammalian and avian wildlife habitat unsuitable for a very long time. Figure 22 illustrates completely different habitat conditions.

*Figure 22. Wooded sites with sand and gravel deposits can be transformed from woodland habitat, as seen in the top photo, to bare ground, as seen in the bottom photo, following prepping of the site.*

### *Transportation Impacts*

The economic costs of construction material are directly related to the proximity of sand and gravel mines to the sites where the material will be used. Consequently, sand and gravel mines have historically been located in areas where they can easily supply high demand for the construction of homes, offices, or highway infrastructure. Moreover, because of the high weight-to-cost ratio of sand and gravel, and high haulage costs, many of the County's 124 mines were located adjacent to major roadways to reduce haulage costs. This increased the adverse effects of sand and gravel mining operations on local communities.

Excessive mining-related traffic in rural areas is particularly problematic in terms of emissions, traffic congestion on narrow roads, and road wear. As Figure 23 illustrates, truck traffic can significantly outpace private vehicle use on small, local roadways.

Mining trucks hauling aggregate to local markets contribute to emissions and traffic congestion on local roads, especially in the rural areas of Prince George's County where most mines are now located. Emissions from traffic including idling haulage trucks contain carbon that contributes to global warming and climate change. Additionally, frequent use of small rural roads by heavily laden trucks can significantly affect road traffic and road conditions, damaging road structure and road conditions. Where haul routes are on local highways, trucks entering or leaving a highway can increase traffic safety concerns and the risk of accidents.

County regulations address these issues by requiring traffic studies, setting hours of operation, and approving haul routes in advance of mining as part of the SE approved for each mining operation. The Prince George's County Department of Permitting, Inspections and Enforcement (DPIE) also requires and holds a financial bond for the duration of the mining operation that is returned to the operator at the end of sand and gravel mining unless there are roadway and other impacts that need to be addressed.

*Figure 23. Portion of Cedarville Road, illustrating the dominance of truck traffic on a small rural roadway and the potential for traffic conflicts.*

# FINDINGS AND RECOMMENDATIONS

## FINDINGS

1. New mining potential continues to be limited by entitlement of future residential development on potential sand and gravel deposits through the approval of subdivisions.

2. Continued preemption of mining by other land use and development, competition from other resource-based industries such as agriculture and forestry, coupled with the current costs of extraction, may lead to disinvestment in the sand and gravel mining industry in Prince George's County and could render it uneconomical in the near future.

3. Sand and gravel deposits associated with the upland deposits geological formation are significant generators of economic activity in Prince George's County. The highest remaining sand and gravel mining potential is in the southern, rural part of the County.

4. Nearly 20 percent of 10,894 acres of previously mined land has not been redeveloped into appropriate post-mining land uses, such as parks, agriculture, woodland, or (in areas so designated by Plan 2035) residential, commercial and other development.[29]

5. Some abandoned or inactive sand and gravel mines in the Established Communities have been used in the past as sites for dumping dirt, household trash, and rubble. Many of these sites are now closed landfills and rubble fills that present opportunities for other uses, such as afforestation and energy generation through solar energy systems (SES).

## RECOMMENDATIONS

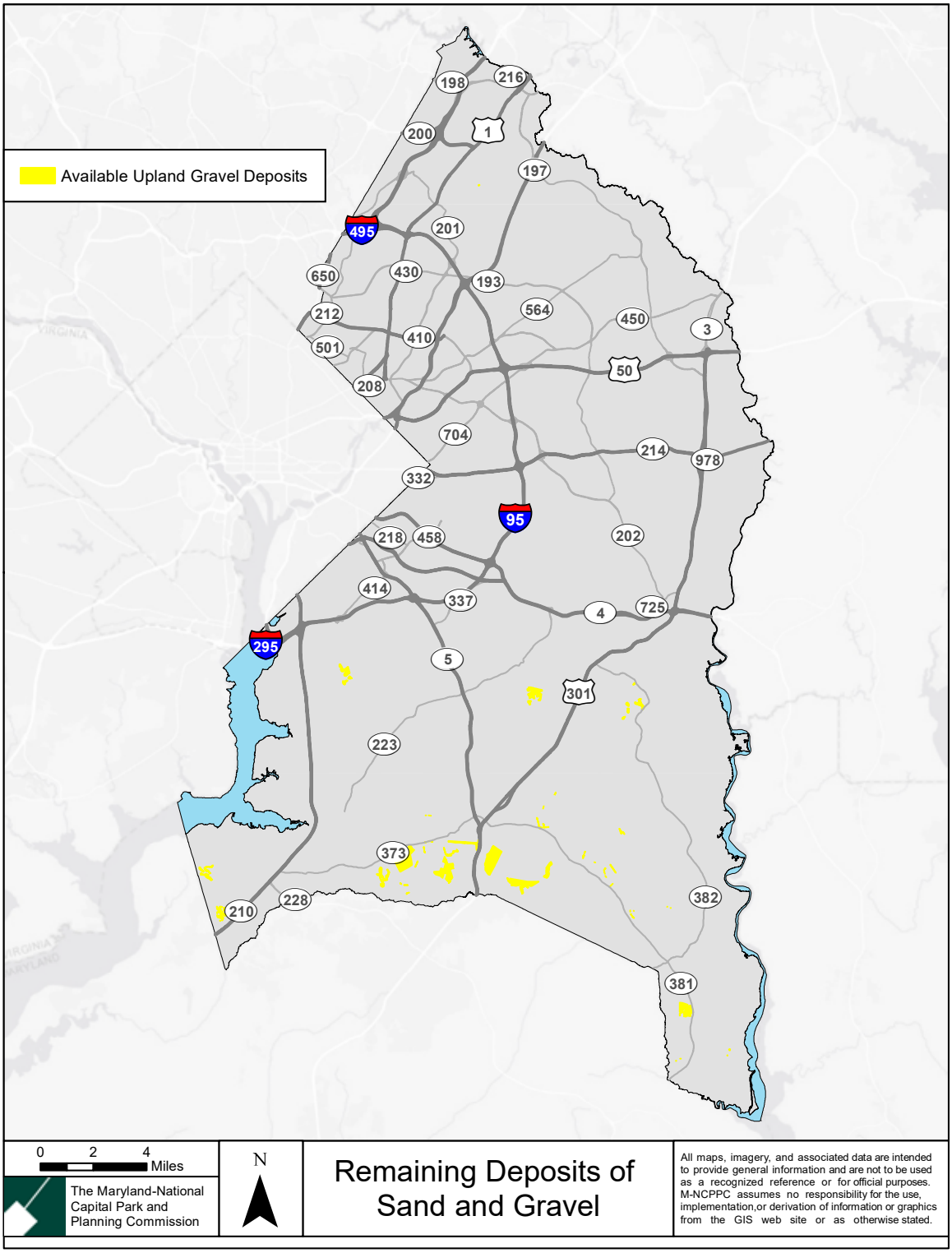
1. **Explore revisions to the 2018 Zoning Ordinance. In keeping with the Court of Special Appeals ruling in the Queen Anne's County East Star case in 2012, align the SE requirements with the term of the state mining permit, subject to periodic review of public health and environmental impacts by the Commission.**

Mining permits are issued by MDE. Once issued they are valid for the duration of the sand and gravel mining operation. By contrast, permits issued pursuant to an approved SE in Prince George's County are valid for a period of five years and must be renewed. Mining operators complain that the SE process is costly, onerous and time-consuming; occasionally, the SE application may go beyond the five-year time frame before the approval is granted. This situation unduly delays the mining operation. An automatic extension methodology for the SE should be developed subject to periodic inspections and annual reporting on compliance with SE conditions of approval.

This process will be dependent on the monitoring of SE and other conditions of approval in parallel with enforcement of the sand and gravel mining permit by the state. Based on these periodic inspections, approval should be automatically extended if the mining operation is in full compliance with the terms and conditions of the SE.

2. **To protect the sand and gravel mining resource, the County must strengthen its efforts to protect economically recoverable sand and gravel resources from preemption until the material is extracted and the mined land is reclaimed for productive use.**

*Map 7. Sand and Gravel Resources Remaining*



Given the importance of the sand and gravel mining industry to the County's economy, it is to the County's advantage if the interests of the extractive industry are given equal consideration to other land uses when policy and regulatory decisions are made concerning lands adjacent to areas that the industry may mine in the future.

Nearly 20 percent of 10,894 acres of previously mined land has not been redeveloped into appropriate post-mining land uses, such as parks, agriculture, woodland, or (in areas so designated by Plan 2035) residential, commercial and other development.[30]

Some of these lands are in the Agricultural and Rural Areas where mining has rendered many acres unsuitable for residential development (even at the reduced densities permitted by zoning) because drainage areas for septic sewage disposal systems have been disturbed by the operations. In these areas, forestry, agriculture, and open space should be favored as post-mining land uses. Landowners should be approached for creation of private open space.

3. **Reclaim mines within the Priority Preservation Area (PPA) to support the County's woodland conservation and agricultural preservation efforts.**

Lands outside of the Established Communities policy area are designated by Plan Prince George's 2035 Approved General Plan as Rural and Agricultural Areas. These areas contain the County's remaining farmland and woodland, as well as environmental, rural, and historic resources. The County seeks to preserve rural resources, rural character, and open space. Per the Land Use Article of the Annotated Code of Maryland, §1-508[a], PPAs must be in Tier IV (i.e., areas that are not planned for sewerage service and are:(i) areas planned or zoned by a local jurisdiction for land, agricultural, or resource protection, preservation, or conservation;(ii) areas dominated by agricultural lands, forest lands, or other natural areas; or(iii) rural legacy areas, priority preservation areas, or areas subject to covenants, restrictions, conditions, or conservation easements for the benefit of, or held by a State agency, as defined in § 9-206 of the Environment Article, or a local jurisdiction for the purpose of conserving natural resources or agricultural land.

The land use focus for reclaimed mines in this area should continue to favor environmental uses, farming, parks and open space. Use of these areas for SES should not be encouraged.

4. **Properly stabilize closed or abandoned rubble fills and landfills and prioritize the sites for use as sources of renewable energy (e.g., SES and wind-generated energy) or reforestation/ afforestation sites as appropriate.**

There are 27 Class 3 landfills and abandoned rubble fills in the County. These are listed by Councilmanic District in Table 7, and their approximate location is illustrated in Map 8. The sites should be evaluated on a case-by-case basis for a variety of adaptive uses that include afforestation/reforestation, parkland, and SES. It is strongly recommended that the Baker Property Class 3 Fill adjacent to JBA in Councilmanic District 9, and the Ketts and Tayman Property fill in Councilmanic District 6, should be excavated to reduce their height to the height of the adjacent tree canopy as a matter of priority (see Table 7 and Figures 24 and 25).

Where SES is considered as a reclamation use, evaluations should include confirmation that the sites meet requirements in the 2017 Prince George's County SES Guidelines for Mandatory Referral Cases. These Guidelines

*Figure 24. Baker Property Class 3 Fill site adjacent to JBA.*

*Figure 25. Ketts and Tayman Class 3 Fill site in Westphalia. Note: The Class 3 Fill site has been largely graded and remediated, and is being developed for residential (townhouse) development. Remaining portion of the fill site is in the picture foreground.*

provide parameters for the Planning Board to review SES proposals for conformance to the County's comprehensive land use plans. For SES, a ballast may need to be used instead of piling to protect the capping.

The fill sites should be evaluated for both SES and reforestation/afforestation with SES favoring the south-facing slopes and afforestation/ reforestation on north-facing slopes.

Afforestation and/or reforestation of closed landfills and rubble fills can potentially contribute ecosystem services locally by creating new habitat areas, improved air quality (especially the reduction of windblown dust from fill mounds), stormwater management and quality improvements, and additional woodland areas in the future. However, these sites must first be carefully evaluated to determine their suitability for these uses in terms of slope, soil depth, and other characteristics.

Given the nature of Class 3 sites (high, unstable earth and rubble mounds, shallow cover soil depth often combined with capping, increased transpiration due to elevation, and consistent winds and exposure), replanting is likely to be costly and will require an extended maintenance period (of bonding) before success can be assured. The sites must be stabilized prior to any use, and slopes must be reduced to 3:1 where possible to facilitate tree planting. A planting of seedlings or container-grown whips is most likely to be successful on such difficult sites. Plantings can be accomplished using seedlings provided inexpensively[31] by the Maryland Forest Service, and with professional planting crews contracted by the Maryland Forest Service annually for this purpose. The species of the planting is also important in survival.

In setting up these types of projects, it might be more appropriate for the County's Department of the Environment to act as the lead agency, using existing funding sources such as Stormwater Management Fees or Woodland Conservation Funds to provide ecosystem services that are valuable to the County under the Watershed Implementation Plan under the Chesapeake Bay Program. The Soil Conservation District (SCD) has cost-sharing programs for planting at $0.30 per square foot for bonding. Cost-sharing options are also available with the Natural Resources Conservation Service for the implementation of conservation practices and should be explored. Examples of sites where the County has already implemented this process include a seedling installation project at the Sandy Hill Creative Disposal Site in Bowie in 2012, and a reforestation/afforestation project at the Panorama Class 3 Fill site on Tucker Road, which is currently used for offsite woodland conservation for County projects and is an approved site for future SES.

*Figure 26. Silver Hill Class 3 Fill site, as seen from Cremen Road in Silver Hill*

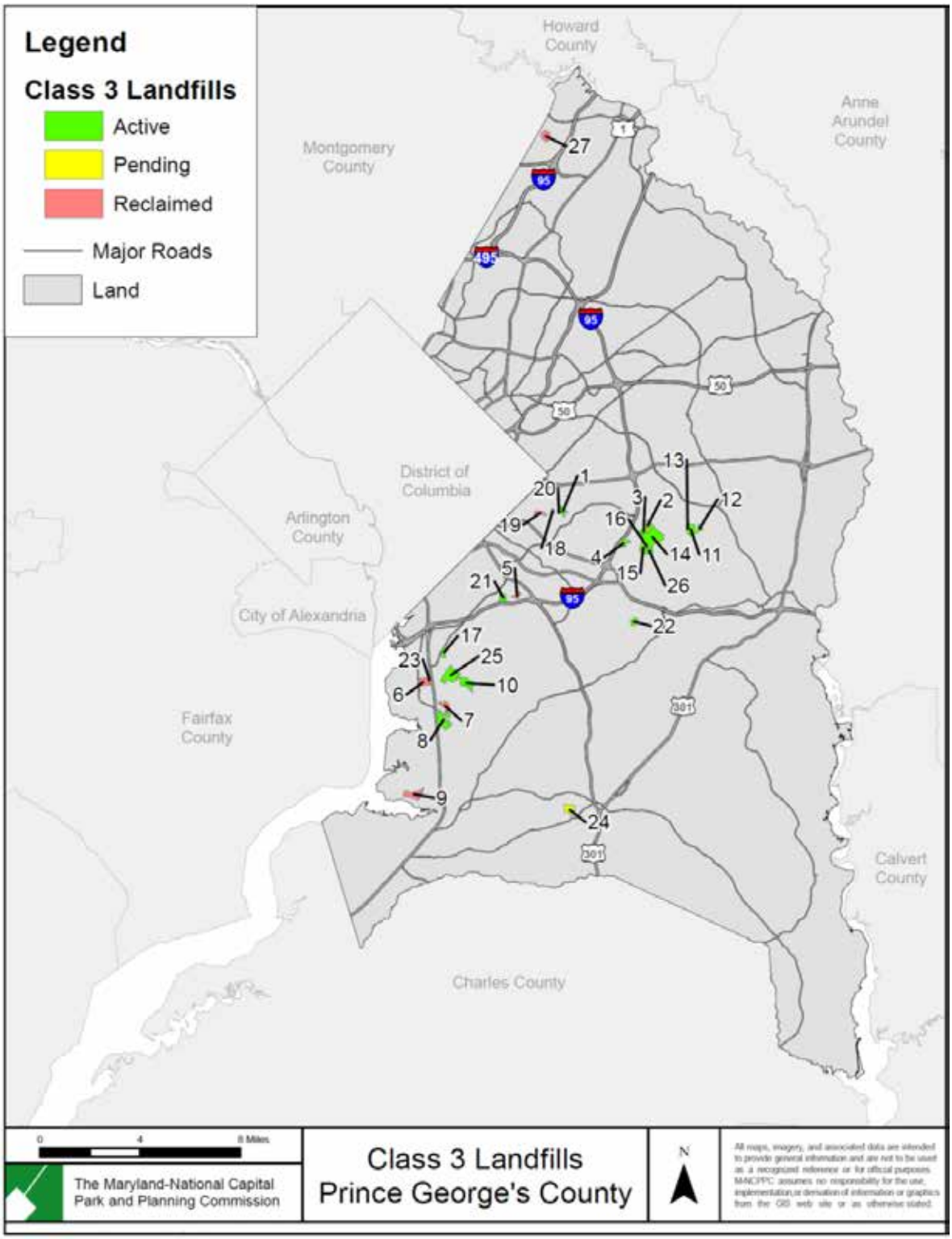
*Table 7. Recommendations For Closed Class 3 Landfills And Rubble Fills In Prince George's County, By Councilmanic District, 2018*

| Site Name | Councilmanic District | Recommendation | Notes |
|---|---|---|---|
| Old Gunpowder Road Class 3 Fill Site | 1 | SES | This site is adjacent to the Burtonsville Substation (No. 20). The northern part is about 400 feet elevation. The solar arrays should be designed so that they do not become an eyesore to the nearby Fairland Park community. In that regard SES could be screened by afforestation. |
| MD Reclamation (3 sites) | 6 | Afforestation/Stream Valley Park | These three Upper Marlboro sites should be stabilized, afforested, and incorporated into the Western Branch Stream Valley Park system when operations are completed. |
| Richie Land Reclamation<br><br>Sansbury Class 3 Fill Site<br><br>Vesham and Patricia Scales Property | 6 | Reforestation/Parkland | Where mounds do not conform to the MIOZ height limits, reduce mound heights to conform. The Westphalia Sector Plan recommends the consideration of phasing and remediation issues associated with converting these Class 3 Fill sites to active park use: "Develop a comprehensive phasing and remediation plan for each rubble fill or Class 3 Fill site prior to conversion to active park uses that, at a minimum, address land infill and settling, filtration, and safety."[33]<br><br>Potential future development as fitness parks, equestrian trails, and ORV trails should be considered. |
| Brandywine Enterprises<br><br>Westphalia Road Fill Site<br><br>Westphalia of MD Fill Site | 6 | Reforestation/Parkland | On completion of operations, reduce mound heights to meet MIOZ height limits<br><br>Incorporate into Westphalia Central Park system |
| Ketts and Tayman Property | 6 | Reduce mound height to tree canopy height | This rubble fill is a potential hazard to JBA given its location in or near the JBA flight path. |

*Table 7. Recommendations For Closed Class 3 Landfills And Rubble Fills In Prince George's County, By Councilmanic District, 2018*

| Site Name | Councilmanic District | Recommendation | Notes |
|---|---|---|---|
| Smith and Garrett Property<br>Rollins Avenue Class 3 Fill<br>Walker Mill Class 3 Fill<br>Oakcrest Community Center | 7 | Reforestation/ Afforestation once the sites are stabilized and the slope issues addressed. | Heights of these landfills range from about 200 feet to over 240 feet. Solar panels are not recommended due to the mounds' proximity to JBA and the potential impact of glare from the panels may on the base's flight operations. |
| Silver Hill<br>Beech Property | 7 | Reforestation | Solar panels not recommended because of proximity to JBA flight operations.<br>Beech Property is zoned I-1 |
| Livingston Road Class 3 Fill<br>Panorama Class 3 Fill Site<br>Palmer Road Class 3 Fill Site<br>Kirby Property<br>Weitzman Property<br>Smith and Garrett Property<br>Rollins Avenue Fill Site<br>Driggs Property<br>Fort Washington Properties | 8 | SES | Mounds should be stabilized and community concerns relating to viewshed should be addressed. The Panorama site is already being used for SES. |
| Arundel Land Group | 9 | SES | Incorporate into park system |
| Baker Property | 9 | Discontinue use as a rubble fill and reduce mound height to tree canopy height | This rubble fill poses a potential security threat to JBA and its operations due to its height and proximity to the base. |
| Brandywood Estates (Part 4) | 9 | Reforestation/ Afforestation | This is a former sand and gravel mine (State permit 83-sp-0156) |

*Map 8. Approximate locations of Class 3 Fill Sites in Prince George's County*



5. **Evaluate closed sand and gravel mines outside the Established Communities and outside the PPA, for renewable energy generation if they meet the criteria and guidelines for SES. Approximately 6,000 acres on 46 closed mines could be evaluated in that regard (see Table 8).**

Consideration should be given to evaluating reclaimed sand and gravel mines outside the PPA for SES, on a case-by-case basis if they meet certain criteria.[32] The land use needs that make closed sand and gravel mines good sites for SES include their distance from public view (i.e., not on scenic or historic roadways, away from main thoroughfares such as US 301, and away from residential communities), nonresidential land uses, and their definition as disturbed lands. An estimated 2,200 acres contained on 12 reclaimed mines should be considered (see Table 8). Many current and reclaimed sand and gravel mines are located in the rural areas of the County.

The Brandywine Lapin Rubble Fill, located on Aquasco Road, Aquasco is an example of a reclaimed sand and gravel mine that could be utilized in part, for SES. It is a 166.8-acre site that was mined intermittently from 1970 to 2000. The site is within the PPA but is heavily compacted and grass-covered. It has not been successfully used for agriculture in the recent past.

Other reclaimed mines have reforested naturally and are now decades-old woodland. Where these occur on sites within the PPA, they should be protected through current environmental and agricultural easement programs (e.g., HAARP, MALPF, etc.) for their biological diversity and aesthetic value, or purchased for parkland (stream valley parks, camp sites and other forms of recreational parks). Reclaimed mines in the Established Communities should continue to be prioritized for recreational parks, as well as residential, commercial, and institutional development to meet community needs.

*Table 8. Recommended Sites For Evaluation For SES*

| Mine Name | State Permit | Approximate Area (Acres) |
|---|---|---|
| A.H. Smith Pit | No permit | 553.61 |
| Arundel Operations | No permit | 75.42 |
| Benefield Tract | 82-SP-0128-A | 138.55 |
| Bryan Tract | 82-SP-0126 | 18.60 |
| Butler Tract | 84-SP-0192-A | 190.24 |
| DuVall Property | 89-SP-0298-2 | 26.96 |
| Hitt Pit | 77-SP-0034 | 30.30 |
| Hunt Pit | 89-SP-0308 | 57.42 |
| Naylor Tract | 89-SP-0329-A | 786.48 |
| North Keys Pit | 84-SP-0184-1 | 149.88 |
| Sellner-Reeder Tract | 87-SP-0270 | 111.43 |
| Van Brady Road Pit | 78-SP-0207 | 68.45 |
| TOTAL | | 2,207.34 |

*Figure 27. Brandywine-Lapin Rubblefill showing grassland-type habitat.*

6. Coordinate with Maryland Department of Natural Resources (DNR) and the U.S. Fish and Wildlife Service on opportunities to recreate specialized habitats on closed sand and gravel mines, especially inside the PPA.

Sand and gravel mining and the development of land have both contributed to the decline of native forest communities in Prince George's County. Reclamation of closed sand and gravel mines offers opportunities to recreate some of the County's former habitats, including key wildlife habitats, such as the Coastal Plain Pine-Oak Woodland (Pine Barrens), and the Coastal Plain Seepage Swamp. Additionally, grassland areas dominated by native grasses can be valuable wildlife (meadow) habitat. The M-NCPPC should partner with the Prince George's County Department of Environment, Maryland DNR and other agencies to work toward recreating these valuable, lost habitats and the plant and animal species they once harbored. The following is an example of a closed sand and gravel mine that is so compacted that it appears to have taken on the characteristics of a grassland. In that regard, it could be evaluated for the creation of a habitat for species that inhabit grassland-type areas.

*Figure 28. Reclaimed sand and gravel mine near Aquasco Road showing grassland-type habitat.*

7. Evaluate the use of easement overlays, a transfer of development rights (TDR) program, or other programs to encourage and incentivize mine owner participation in land use conservation.

The current woodland conservation mitigation process as applicable to sand and gravel mining, should be improved into a more formal TDR system. Currently, woodland conservation banks are established on sand and gravel mines (mainly in the Agricultural and Rural Areas) for development projects on properties (in the Established Communities) that do not meet conservation requirements onsite. This system is equivalent to a TDR program and has the advantage of growing woodland in areas that are more appropriate for that use. The tree plantings are placed into perpetual easements and conserved as woodland. Owners should be incentivized to create woodland conservation banks on their sites as receiving areas for development in sending areas, i.e., in the Established Communities.

8. Continue dialogue among agencies, Industry officials, and the public on potential establishment of a task force or similar committee to facilitate the following post-mining activities:

- Improve the inefficiencies of the two-tiered (state and local) government influence on implementation of control measures for sand and gravel mining.
- Strengthen the accountability for the implementation and enforcement of the conditions of mining permits and post-mining requirements.
- Increase the inspection capacity to enforce mining permit and woodland conservation/mitigation conditions.

# APPENDICES

## APPENDIX 1: REGULATION OF SAND AND GRAVEL MINING

### *Regulation of Sand and Gravel Mining*

#### State Regulation and Policy

Surface mining of sand and gravel in Prince George's County is allowed by state permit. The 1977 Surface Mining Control and Reclamation Act, or SMCRA[34], gave each state that establishes federally approved enforcement programs the primary responsibility for enforcing mining regulations in that state. The Maryland Environmental Code[35] is the source of authority for the regulation of the state's mineral resources. Regulations governing the state's enforcement of mining laws are found in the Code of Maryland Regulations Title 26, Subtitles 19–21. They facilitate sustainable resource extraction, while both protecting the public and the environment from potential adverse impacts of active mining and promoting the restoration and enhancement of active and closed mine lands. Lands disturbed by mining must be reclaimed to their approximate original contour as required under SMCRA.

In Prince George's County, surface mining operations are subject to the specific provisions in Environmental Article 15, Subtitle 8. Section 15-808, which requires applicants for surface mining operations to obtain a permit from the MDE. MDE performs inspections for compliance with all mining-related permits (except air permits) including sediment controls, wetlands, woodland conservation for mining sites, water appropriation, and national pollutant discharge elimination system permitting. The agency also oversees reclamation to ensure that the environment is protected from any potential impacts and responds to specific complaints about mining operations.

### *County Regulations and Policy*

#### Plan 2035

Under the provisions of Maryland land use law[36], a comprehensive plan must incorporate land use policies and recommendations to balance mineral resource extraction with other land uses and prevent the preemption of mineral resource extraction by other uses. Plan 2035 recommends the County:

> Evaluate the impacts of extractive industries, such as sand and gravel mining, on resource lands, rural character, economic development, and post-reclamation requirements in the Rural and Agricultural Areas. Map remaining sand and gravel natural resources to locate potential future sand and gravel operations, update and revise development standards, and identify post reclamation land uses, including residential development, agriculture, and forestry. Propose comprehensive legislation to revise County codes and identify recommendations for the Zoning Ordinance update.[37]

The 2017 Approved Resource Conservation Plan recommends the following:

> POLICY 4: Identify valuable mineral resources, seek methods to protect and manage access and reclaim these areas where possible for future farm or forest enterprises or agricultural support services.
>
> Strategies:
>
> - 4.1 Enforce the reclamation requirements on sand and gravel mines including the implementation of the tree conservation plan, the grading permit, and the restoration of the preserved topsoil.

- 4.2 Determine appropriate uses for previously mined lands including restoring the soil for agricultural purposes, forestry enterprises, or other community or recreational uses.
- 4.3 Revise the Environmental Impact Report process to require applicants to provide the report and all required information regarding potential impacts of mining applications.[38]

Pursuant to its authority under Division 2 of the Maryland Land Use Article, Prince George's County has developed zoning conditions and permit requirements to regulate mining(Section 27-445.02-Surface Mining, sand and gravel wet-processing) and sets the conditions under which sand and gravel extraction may occur in the County. Sand and gravel mining operations are subject to an extensive County-level review and approval process with policies governing environmental management and safety. The relevant local agencies and regulations playing a supporting role are described below:

### Zoning

Surface mining is a land use that is permitted within Prince George's County by SE in most residential, commercial and industrial zones. SEs are defined in state law as permitted uses that are subject to conditional approval. In Prince George's County, the District Council or Zoning Hearing Examiner may approve an SE.

Section 27-410 of the Zoning Ordinance sets forth the specific requirements for approval of an SE to evaluate each sand and gravel surface mining operation. These requirements cover areas related to the protection of County assets, as well as the health, safety and welfare of local communities (e.g., hours of operation, haulage routes, grading, as well as compliance with air quality, noise, woodland conservation, water quality and other environmental quality requirements).

In addition, Section 27-548.01 of the Zoning Ordinance contains requirements for the issuance of permits for surface mining operations in the County's mixed-use and Chesapeake Bay Critical Area Overlay zones.

**Section 27-410(a)(4) of the Zoning Ordinance imposed a five-year time limit on an SE approval for surface mining of sand and gravel in all zones, except for certain undeveloped areas in a Rural-Residential (R-R) zone or in a Heavy Industrial (I-2) zone.**

**These requirements have been impacted by recent Special Court of Appeals decisions in Queen Anne's County and Prince George's County. The Maryland Court of Special Appeals' 2012 ruling in East Star, LLC. et al. v. The County Commissioners of Queen Anne's County (No. 2616), found that the 5-year time limit was invalid due to direct conflict with state permitting regulations, and that reclamation restrictions on mining operations were "not traditional areas of regulation controlled by local government." This ruling prohibits Prince George's County from enforcing a five-year time limit on sand and gravel mining operations.**

**In addition, the District Council attempted to prohibit sand and gravel mining in the "Developing Tier" (today's Established Communities) through its approval of the 2013 Subregion 5 Master Plan. In its 2016 ruling in County Council of Prince George's County, MD sitting as the District Council v. Chaney Enterprises Limited Partnership et al. (454 Md. 514 Court of Appeals of Maryland), the Court of Special Appeals sided with the plaintiff (Chaney Enterprises Limited) in determining that the Prince George's County Council, sitting as the District Council, had erred when they approved a master plan amendment to prohibit sand and gravel mining in the "Developing Tier" in Prince George's County.**

Prior to submitting an SE application, the applicant will typically have performed geotechnical investigations on the specific property to determine how much of the material is on the property and at what depth. This information on the specific mining potential of the site is included as part of an environmental impact report (EIR).

Pursuant to state law[39], M-NCPPC is required to prepare an EIR for each SE application for the mining of sand and gravel. The EIR is required to evaluate the SE request comprehensively and provide an analysis of factors such as noise, watershed and water quality, traffic and traffic safety, biological resources, and other environmental factors relating to health, safety and welfare, that may be affected by the mining operation. The EIR is required to include a map showing the subject application and all landfills, wash plants, rubble fills, class 3 fills, and known or pending mining sites. This analysis may inform the approval of an SE.

### Transport Regulation

The Prince George's County DPIE sets and enforces the conditions for haul road permits pursuant to the County Road Code (Subtitle 23), as a means of protecting County roads. DPIE also requires use and occupancy permits (pursuant to the Zoning Ordinance) for onsite buildings that are associated with the mining operations.[40] DPIE requires mining operators to obtain haul road permits if material is to be hauled (trucked) over local County roads.

In that process, DPIE sets weight limits based on the mining operators' estimate of the number of trucks and loads that will be hauled during the operations, and approves the routes that the trucks must follow, directing them toward commercial routes and away from local communities. DPIE sets and collects a financial bond for road use, that it holds during the entirety of the mining operation. At the conclusion of mining operations, the bond is returned to the operator if the roads are in good repair or it is used to make necessary repairs to any portions of roadways damaged by mining trucks.

The Department of Public Works and Transportation (DPW&T) conducts traffic studies to help set policy for mitigating the impacts of sand and gravel mining trucks on road traffic. DPW&T also sets hours of operation, and approves haul routes in advance of mining as part of the SE approved for each mining operation. The agency also requires and holds a financial bond for the duration of the mining operation that is returned to the operator at the end of sand and gravel mining unless there are roadway and other impacts that need to be addressed.

### Soil Conservation and Reforestation

The Prince George's County SCD provides input on grading and sediment control plans, rural preservation and other services, to protect the County's soil and water resources. SCD, which operates under state law and regulations, is required to review the sediment control plans for active sand and gravel mine sites. It issues Sediment and Erosion Control Permits to control all grading required for the mining operation. These permits are issued for a period of five years and are renewable at the end of each period for the duration of a mining permit. However, SCD does not conduct mine inspections or enforcement, though it may be called into an advisory role to help mitigate sediment and erosion control issues. All mine inspections for compliance with sediment and erosion control are done by the state.

When reforestation is required as mitigation for sand and gravel mining operations, DPIE also imposes a reforestation bond set at 30 cents per square foot of reforestation. The bond is released at the end of the bond period (usually five years) based on the survival rate of the planted material. The Maryland DNR enforces woodland conservation for mining sites.

## APPENDIX 2: HISTORICAL SAND AND GRAVEL MINING OPERATIONS

State mapping shows sand and gravel mining operations in the County in 1899 with dredging of the banks, tidal flats, and beds of the Patuxent River and the mouths of some confluent streams in the northeast. The large operations from the 1930s to the late 1980s and the major projects they supplied material for, are in Table 9. Their location in the County is illustrated in Map 9, which shows the sites located in close proximity to major development or infrastructure projects dependent on sand and gravel.

*Table 9. Sand and Gravel Mining Operations And Major Development Projects, 1930s To 1980*

| Sand and Gravel Operation | Major Project(s) | Map ID |
|---|---|---|
| Contee Sand and Gravel Company (several sites, mainly 1970s and 1980s)<br>A. H. Smith (plant and storage site)<br>Cherry Hill Sand and Gravel Company<br>Willard Sand and Gravel Company<br>Ammendale Sand and Gravel, Inc. | • Residential and commercial development projects in North Baltimore area, Columbia, Montgomery County, and Washington, D.C.<br>• US 1 (Baltimore Avenue)<br>• Greenbelt area | 1 |
| Smoot Sand and Gravel (mined in the 1930s and 1940s)<br>Daisy Brothers, Inc.<br>A. H. Smith (plant and storage site)<br>Dico, Inc. (Owner, not a mining company)<br>Arundel Asphalt Company<br>Brandywine Sand and Gravel Company<br>Hil-Mar Corporation<br>Silver Hill Sand and Gravel Company<br>Buffalo Sand and Gravel Mining Company | • Andrews Air Force Base<br>• Development of the Greenbelt, Morningside. Marlow Heights, Forestville, Forest Heights, Eastover, and Glassmanor areas<br>• Capital Beltway<br>• MD 4 (Pennsylvania Avenue) development | 2 |

*Table 9. Sand and Gravel Mining Operations And Major Development Projects, 1930s To 1980*

| Sand and Gravel Operation | Major Project(s) | Map ID |
|---|---|---|
| Inland Materials, Inc.<br>Lone Star Industries, Inc.<br>A. H. Smith (plant and storage site)<br>Contee Sand and Gravel Company | • Woodrow Wilson Bridge<br>• FedEx Field<br>• Roadway and residential development projects in Montgomery County and Washington, D.C.<br>• Andrews Air Force Base | 3 |
| Accokeek Mining Company<br>A. H. Smith<br>Prince George's Bank Run Gravel Corporation<br>Lone Star Industries, Inc.<br>Brandywine Sand and Gravel Company<br>Western Shore Mining Company<br>E. L. Gardener (acquired by Accokeek Industries in 1996)<br>Brandywine Mining Company<br>Contee Sand and Gravel Company<br>Daisy Brothers, Inc<br>Inland Materials Inc. (mined in the 1960s to 1980s)<br>Sleepy Hollow, Inc. | • Residential, commercial and other development projects in Washington, D.C. and Northern Virginia<br>• Andrews Air Force Base<br>• Capital Beltway | 4 |
| A. H. Smith (plant and storage site)<br>Arundel Asphalt Company<br>Daisy Brothers, Inc. | • Bowie area development<br>• Development projects in southern Baltimore, Columbia, Laurel, Montgomery County, and Washington, D.C. | 5 |

Historical data derived from MGS mapping (see Map 9) show more than 500 sand and gravel, clay, sand, ocher, or marl operations in the County between 1960 and 1980. The majority of these sites are presently reclaimed, redeveloped, or inactive.

According to MGS, sand and gravel mining operations disturbed about 8,716 acres of the County between 1960 and 1980. The disturbed lands consisted of inactive and abandoned sites (38.7 percent), reclaimed sites (47.1 percent), and working or operational sites (14.2 percent) as outlined in Figure 29.

*Figure 29. Sand and Gravel Mining Operations Distribution by Acreage*

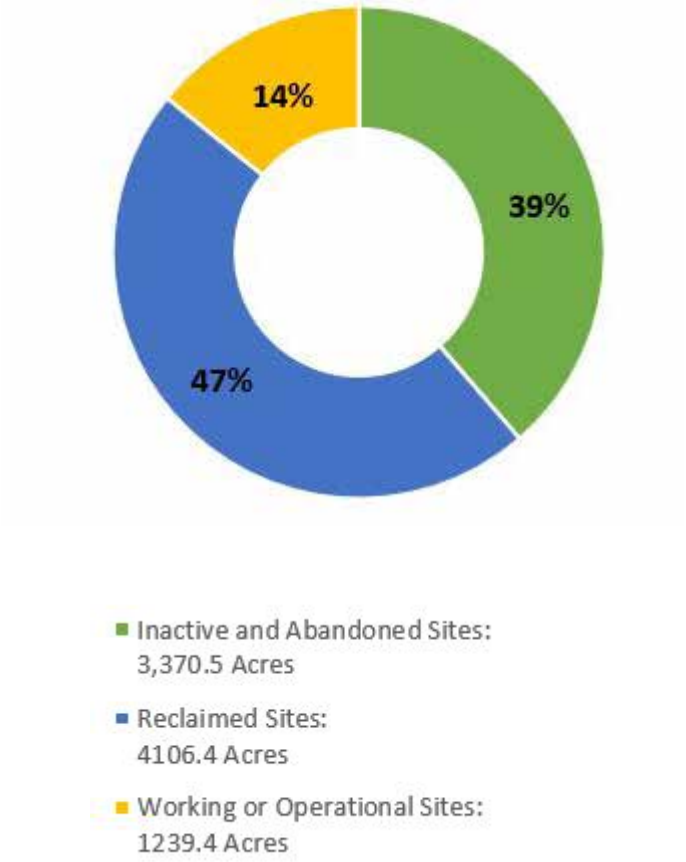
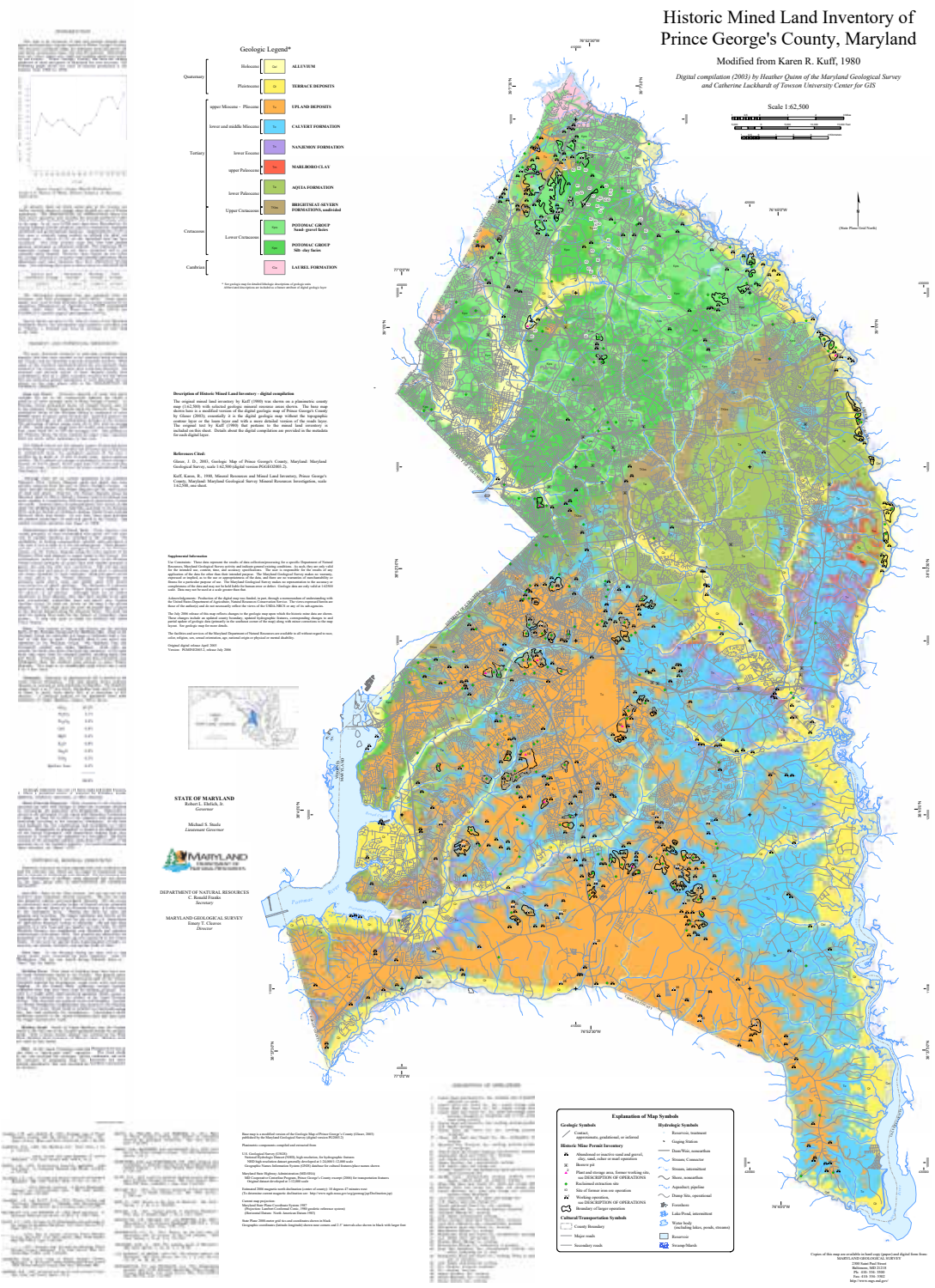



*Table 10. Sand and Gravel Mining Operations Distribution by Acreage, 1960 to 1980*

| Inactive and Abandoned Sites | Reclaimed Sites | Working or Operational Sites | Total |
|---|---|---|---|
| 3,370.5 acres (38.7%) | 4,106.4 acres (47.1%) | 1,239.4 acres (14.2%) | 8,716.3 acres |

## *Map 9. Historic Mined Land*



From the 1980s to the present, sand and gravel mining continued to support major development and infrastructure projects throughout the region.

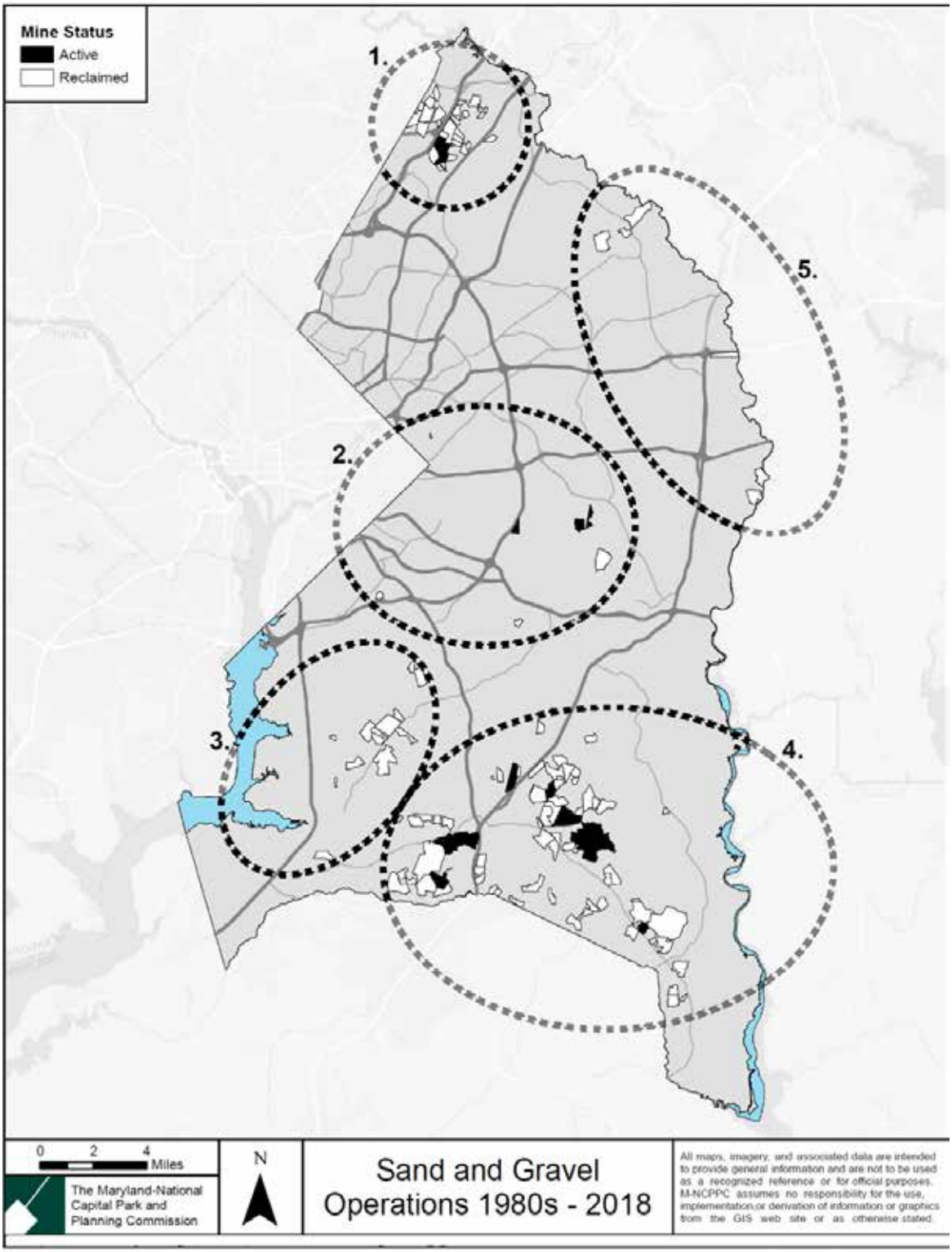
*Table 11. Sand and Gravel Mining Operations and Major Development Projects, 1980 to 2018*

| Sand and Gravel Operator/Permittee | Councilmanic District | Major Project(s) |
|---|---|---|
| Laurel Sand and Gravel, Inc. (reclaimed site being developed as Konterra)<br>Strittmatter Land LLC (previous A. H. Smith pit developed as residential,)<br>Jackson Shaw/Brickyard Limited Partnership (reclaimed mine now in Industrial use)<br>Dico, Inc. (property owner) | 1 | Projects in Montgomery County, Baltimore and Washington, D.C. areas |
| C. B. Barger<br>Silver Hill Aggregates (now Aggregate Industries)<br>Bardon, Inc. (now Aggregate Industries)<br>Dico, Inc. (mine site owner)<br>William A. Gallahan (landowner)<br>Russell Brady Excavating (Business)<br>DC Earthmovers, Inc.<br>Maryland Reclamation LLC | 6, 7 | Joint Base Andrews<br>Marlow Heights Shopping Center<br>Branch Avenue Metro (and adjacent M-X-T development)<br>Census Bureau<br>Smithsonian Institution (DC)<br>Capital Beltway<br>Forestville and Morningside areas<br>Boulevard at Capital Center<br>Largo County offices |
| Aggregate Industries<br>Bardon, Inc. (now Aggregate Industries)<br>Zachair Limited (Owner of Hyde Field, formerly mined by Aggregate Industries)<br>D C Earthmovers, Inc. | 8, 9 | Woodrow Wilson Bridge<br>National Museum of the American Indian (Washington, D.C.)<br>Walter E. Washington Convention Center (Washington, D.C.)<br>New 11th Street Bridge (Washington, D.C.)<br>National Museum of African-American History and Culture (Washington, D.C.)<br>FedEx Field |

*Table 11. Sand and Gravel Mining Operations and Major Development Projects, 1980 to 2018*

| Sand and Gravel Operator/Permittee | Councilmanic District | Major Project(s) |
|---|---|---|
| H. Smith Assoc. Ltd. Partnership<br>Aquasco Materials, LLC (also Metro Earthworks, LLC)<br>Rockhill Sand and Gravel Company<br>Bardon, Inc (now Aggregate Industries)<br>North Keys Road Property, LLC<br>Aggregate and Dirt Solutions<br>Forestville Asphalt Company (also F. O. Day Bituminous Company)<br>Meinhardt, Meinhardt and Flinchum<br>Brandywine Sand and Gravel Company<br>Charles County Sand and Gravel (also Chaney Enterprises Limited Partnership)<br>Silver Hill Materials, LLC (now Aggregate Industries) | 9 | National Harbor<br>Tanger Outlets<br>MGM Hotel and Casino<br>FedEx Field<br>Naylor Road Metro<br>Largo County offices |
| A. H. Smith Assoc. Ltd. Partnership<br>Contee Sand and Gravel<br>Laurel Sand and Gravel<br>Brandywine Mining Company (Brandywine Enterprises, Inc.) | 4 | US 50 (John Hanson Highway)<br>Bowie residential and commercial development |

*Map 10. Approximate Locations of Sand and Gravel Mines in Prince George's County, 1980 to 2018*



## APPENDIX 3. FUTURE LOCATIONS FOR SAND AND GRAVEL EXTRACTION: METHODOLOGY

In determining estimates for future extraction, staff conducted an analysis that focused solely on upland deposits ( formerly called the Brandywine Formation) as the geologic unit containing mineable sand and gravel, because it has been mined in the past and is currently being mined in the County, making it a proven economic resource as defined by MDE. Staff's analysis did not consider other units such as the sand-gravel facies of the Potomac Group that also have mineable deposits because most of these deposits have been preempted by development or remain in or near residential communities.

Staff made several assumptions to arrive at the estimate of the potential future sand and gravel mining resource. Firstly, staff assumed that the sand and gravel content of the Upland Gravels geological formation was homogeneous, and uniformly rich, throughout the south of the County, and that the annual consumption of sand and gravel in the region would continue at today's levels i.e there would be no economic downturns or other factors to slow or limit growth and infrastructure development. Secondly, staff assumed that all remaining mineable sand and gravel deposits were on large (more than 100 acres per parcel), contiguous areas with limited environmental and other constraints. The third assumption was that the remaining areas with sand and gravel resources would continue to yield at today's average of 25,000 tons of mineable sand and gravel per acre, uniformly distributed over these remaining resource areas. Finally, staff assumed that no more than 15 percent of the raw material mined would be waste or unusable.

Staff used these assumptions to estimate the approximate location and acreages of remaining mineable lands in Prince George's County. The data provided via that process are at best, an approximation, to be used for planning purposes and not as a basis for making sand and gravel extraction, or industry management decisions. Obviously, the quality and availability of sand and gravel resources on any given parcel cannot be accurately determined except through a thorough analysis including site surveys, sampling and testing conducted by experienced mining and geotechnical engineering professionals.

The remaining mineable resource base is on variably sized properties scattered over much of the southern half of the County.

It should be noted that the approximate location and acreages of mineable lands provided via the process shown below are at best, an approximation, to be used for planning purposes and not as a basis for making sand and gravel extraction, or industry management decisions. Obviously, the quality and availability of sand and gravel resources on any given parcel cannot be accurately determined except through a thorough analysis including site surveys, sampling and testing conducted by experienced mining and geotechnical engineering professionals.

The process and steps used to generate these data follow:

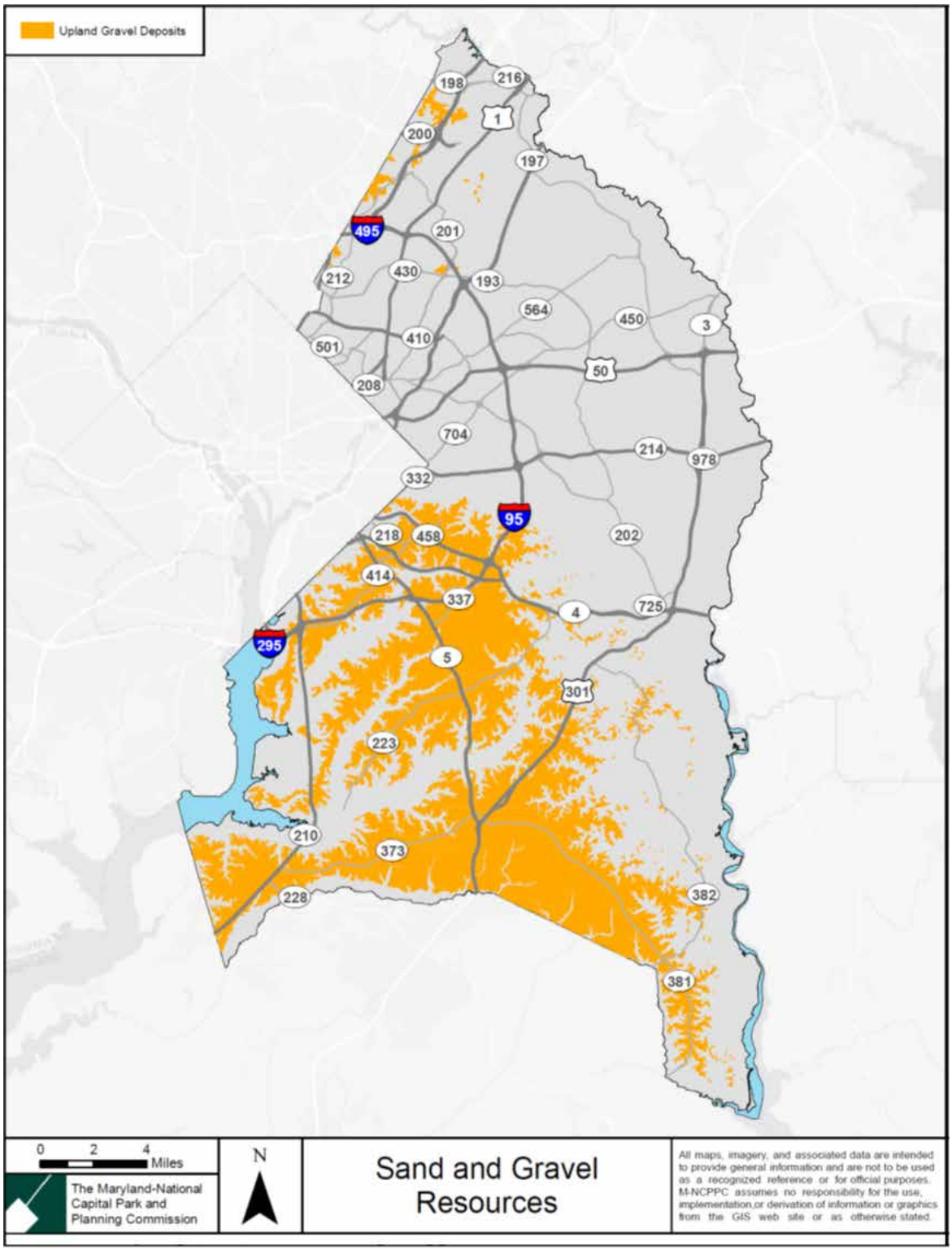
### *Process*

- Identify and map constraints to sand and gravel mining.
    - » Overlay current and historic mine lands layers to determine how much of the resource base has been mined in the past or is in the process of being mined.

- Overlay public lands layers to determine where sand and gravel mining potential is located on public lands (i.e., local, state, and federal land).
- Overlay land development data from 2000 to 2018 to determine how much of this unmined sand and gravel has been/could be preempted by residential, commercial, and other development.
- Overlay land ownership layers to determine where sand and gravel mining potential has been preempted by institutional land uses.
- Identify and map parcels and properties smaller than 100 acres in area to determine the acreage and approximate location of potential future sand and gravel mining potential with the optimal site size preferred by the mining industry.

Staff's analysis showed that as of 2018, Upland Gravels covered an area of approximately 78,000 acres (8.5 percent) of Prince George's County (See Map 11). Except for very small remaining deposits along the I-95 Corridor in the Beltsville to Konterra area in the extreme north of the County, most of this mineable sand and gravel is in the southern half of the County, generally concentrated in the Brandywine to Accokeek areas, along MD 373, south to the Prince George's County border.

*Map 11. Upland Gravel Deposits base map (Total Area: Approximately 78,000 acres)*



### *Steps to Determine Future Mining Potential*

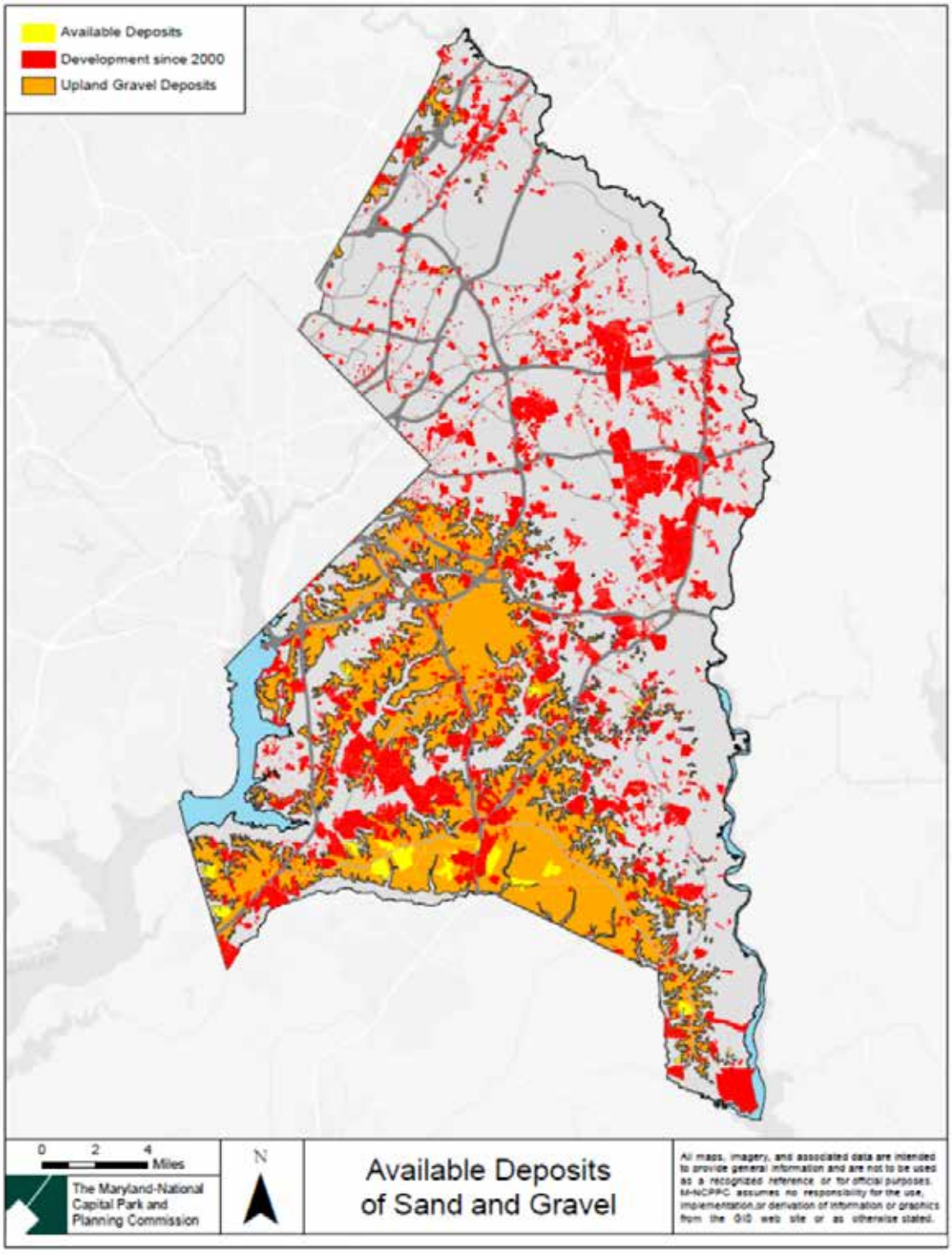
1. From the remaining resource base, exclude areas where mining occurred historically and areas where mining operations were ongoing.

| | |
|---|---|
| Upland Gravels | 77,610 acres |
| Less – Previously Mined Lands | 13,628 acres |
| Less – Currently Active Mine Sites | 1,615 acres |
| Remaining Unmined Deposits (1) | **64,934 acres**[41] |

2. Identify and map the approximate location of sand and gravel deposits occurring on lands that are currently residential and other development, or approved for that use, or where access to unmined sand and gravel deposits is limited as land is subdivided for development, thereby creating uneconomical units of mining production. See Map 12.

| | |
|---|---|
| Remaining Unmined Deposits (1) | 64,934 acres |
| Less – Residential and Other Development (up to 2000) | 45,050 acres |
| Less – Residential and Other Development (2000 to 2018) | 4,595 acres |
| Remaining Unmined Deposits (2): | 26,955 acres |

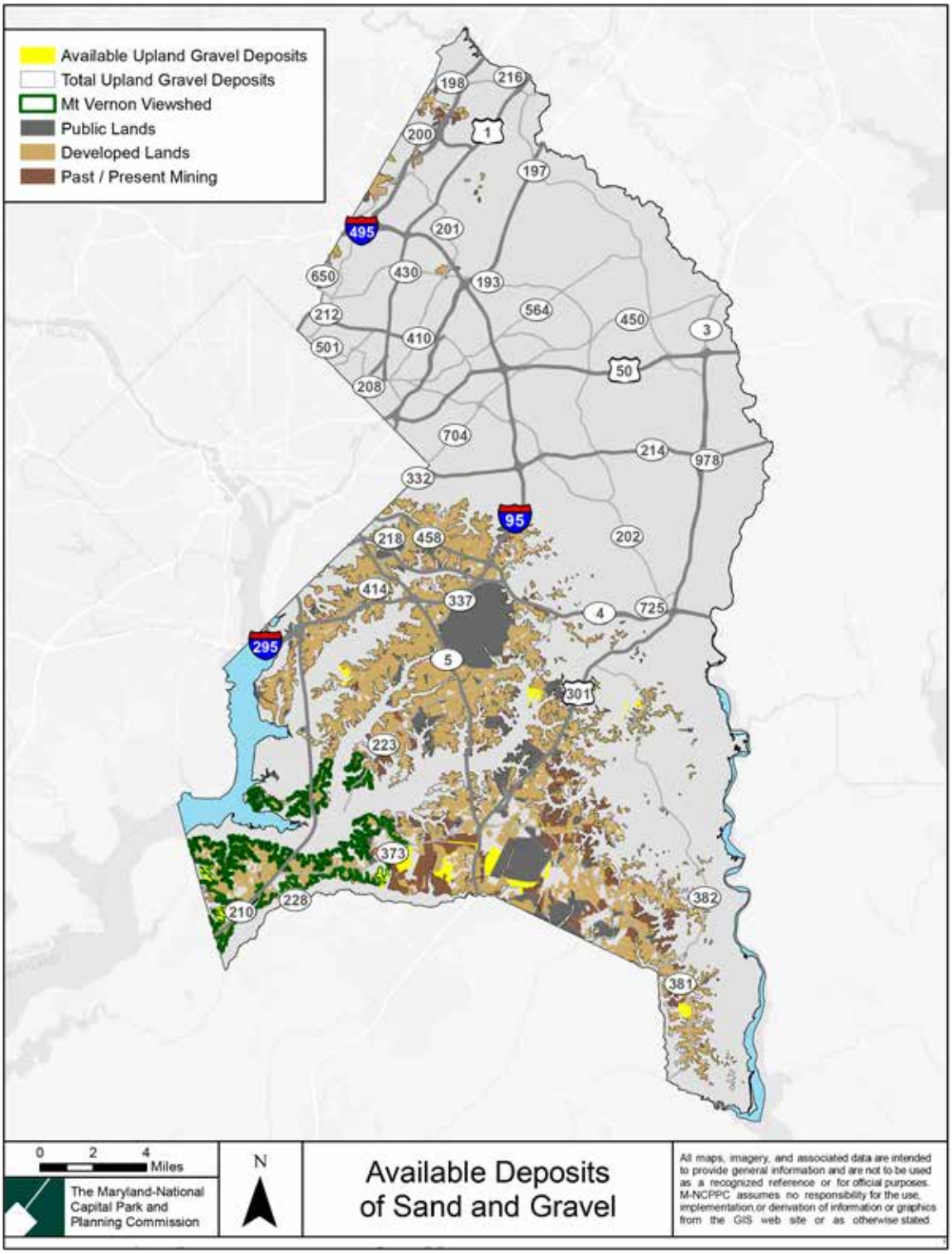
*Map 12. Approximate Location of Remaining Sand and Gravel Mining Potential Preempted by Development Occurring Since 2000*



3. Identify and map areas where economically viable sand and gravel mining potential was located on lands in public ownership. (This step required the exclusion of local, state, and federal property such as JBA, Rosaryville State Park, GlobeCom (United States Military Reservation Brandywine Communications Site), and others that are unavailable for mining).

| | |
|---|---|
| Remaining Unmined Deposits (3): | 26,955 acres |
| Less – Public Lands (Local): | 3,640 acres |
| Less – Public Lands (State): | 2,363 acres |
| Less – Public Lands (Federal): | 7,112 acres |
| Remaining Unmined Deposits (4): | 23,706 acres |

*Map 13. Available Deposits of Sand and Gravel*



4. Identify and map the approximate areas where environmental, conservation, and other policy limitations restrict mining (e.g., Woodland Conservation Areas, rural legacy lands, MALPF/HARPP and MET easements, etc.).

| | |
|---|---|
| Remaining Unmined Deposits (4): | 23,706 acres |
| Less – Lands with policy limitations[42]: | 8,610 acres |
| Remaining Unmined Deposits (5): | **16,767 acres** |

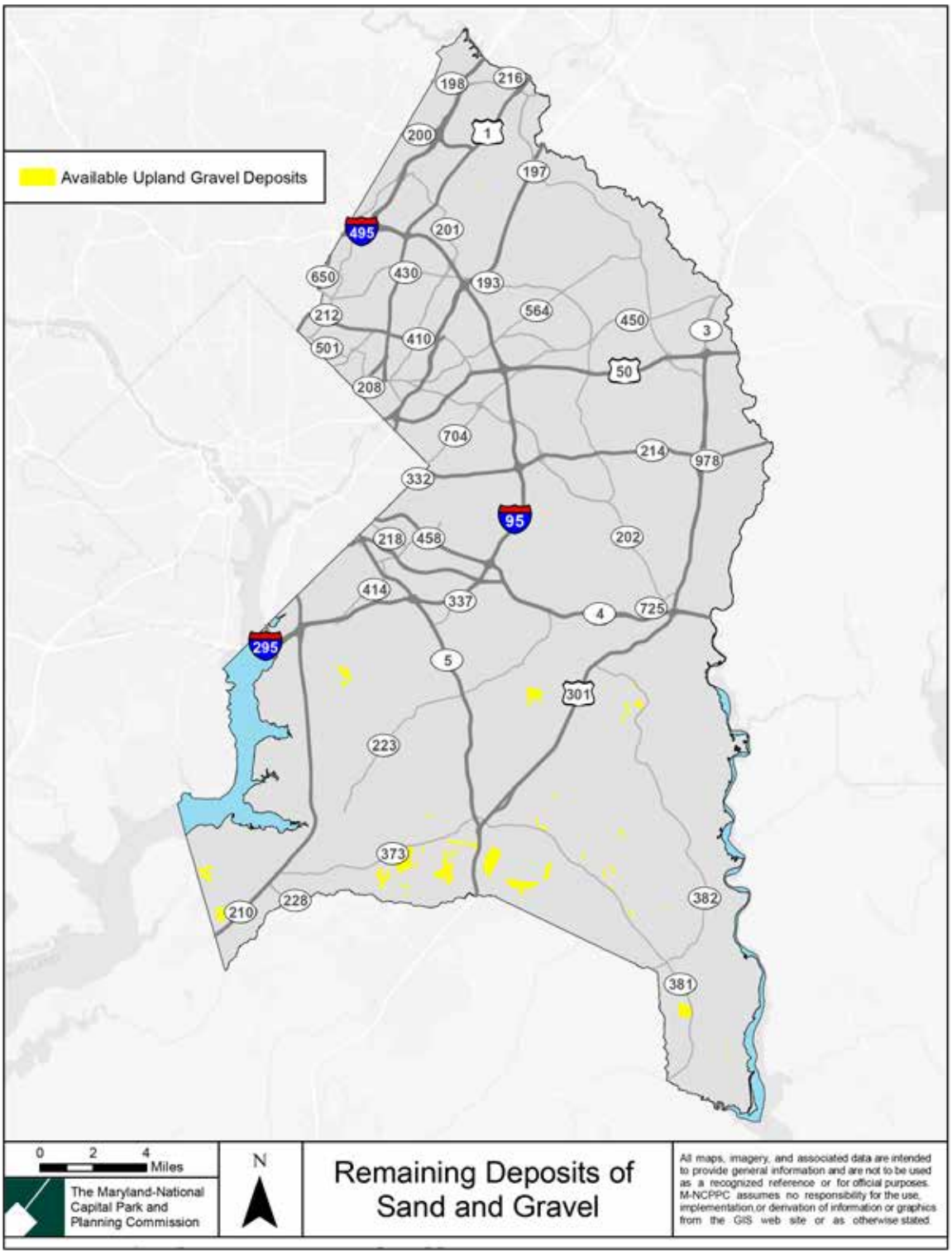
The above figures approximate the County's remaining mineable sand and gravel resource base with all constraints excluded. If this approximately 17,000-acre resource base was on contiguous acreage or on adjoining large properties, mining could theoretically occur over an estimated 120 years. (See Table 12)

However, the remaining mineable resource base is on variably sized properties scattered over much of the southern half of the County (see Map 13) Indeed, Only an estimated 1,180 acres of mineable sand and gravel are on properties that the sand and gravel mining industry considers optimal for mining. Per industry estimates, this reduced area could theoretically be mined in about 8 to 20 years.

*Table 12. Analysis Of Potential Sand And Gravel Extraction And Timeframe For Resource Consumption*

| | | |
|---|---|---|
| Total raw area to be mined | 17,000 acres | Assumes 17,000 contiguous acres on large adjacent parcels. |
| Estimated total acres to be mined after exclusion of environmental (wetlands, streams, floodplain, slope, etc.) and other constraints | 12,750 acres | Assumes environmental constraints prevent mining on 25 to 30 percent of the area |
| Total raw material (including waste material) to be extracted | 318,750,000 tons | Assumes best case scenario: uniformly thick (20 feet or greater) deposit with uniform lithology, and uniform distribution over the area. Assumes 25,000 tons of sand and gravel material per acre |
| Total marketable material excluding waste | 270,940,000 tons | Assumes 15 percent waste (47.8 million tons) from raw material total |
| Projected annual consumption of processed sand and gravel, Prince George's County | 2,300,000 tons | Assumes annual consumption will remain at current (2018) annual consumption level into the future |
| Estimated time to mine 17,000 acres under 2018 market conditions | Estimated 117 years. | The number of years to mine will vary according to the annual consumption rate. |

*Map 14. Approximate Location of Remaining Sand and Gravel Mining Potential with Exclusions*[43]



## APPENDIX 4: ADDITIONAL TABLES

Sand and Gravel Mines and Associated Uses, Prince George's County, 2018

| Map ID | SE No. | State Table. Permit # | Common/Pit Name | Location | Type of Use | Status/ Post-Reclamation Use |
|---|---|---|---|---|---|---|
| 1 | SE-4176 | 96-SP-0499 | Wooten-Hopkins | East side Old Gunpowder Rd. | Mining | Vacant |
| 2 | SE-4073 | 92-SP-0425 | Bond Property (Liptak) | Gunpowder Rd, Laurel | Mining | Vacant |
| 3 | NCU | 87-SP-0247-B | Whitehead N.E. | Gunpowder Road, Laurel | Mining | Post-Reclamation: Industrial (Grant County Mulch) |
| 4 | NCU | 87-SP-0246 | Whitehead NW #1 | Gunpowder Road, Laurel | Mining | Reclaimed: Residential SF Homes (Bentley Park) |
| 5 | | 83-SP-0150 | M-NCPPC Property | W. of Gunpowder Rd on Co line | Mining | Reclaimed: M-NCPPC Parkland (Fairland Regional Park) |
| 6 | NCU | 82-SP-0136 | Whitehead South Pit | Gunpowder/Van Dusen Road | Mining | Reclaimed: Industrial (Schuster Concrete, Laurel Asphalt) |
| 7 | NCU | 84-SP-0167 | Seven Knolls Farm | Laurel | Mining | Reclaimed: Model Airpark (Freestate Aeromodelers) |
| 8 | NCU | 90-SP-0351 | Zantzinger Tract | Van Dusen Road, Laurel | Mining | Vacant |
| 9 | 6880-84-U | 85-SP-0207 | Flester Pit #1 | Contee Rd., next to I-495, Laurel | Mining | Vacant: Expired Permit. |
| 10 | 1022-76-U | 77-SP-0124 | Seven Knolls | Van Dusen Road, Laurel | Mining | Reclaimed: Westside Development (Townhouses) |
| 11 | SE-4074 | 92-sp-0424 | Gould Property | Konterra Drive | Mining | Vacant |
| 12 | NCU | 89-SP-0310-A | Magruder Tract #3 | Van Dusen and Muirkirk, Laurel | Mining | Vacant: Planned for Res/ Commercial/Retail/Hotel |
| 13 | | 77-SP-0020-A | Contee Sand and Gravel | Virginia Manor Rd. | Mining | Vacant: Planned for 2,161 multifamily dwelling units and 2 million square feet of Residential/ Commercial/Retail/Hotel/<br><br>Office development per DSP-08011 |
| 14 | NCU | 83-SP-0151-B | Magruder W. Central Pit | Van Dusen and Muirkirk, Laurel | | |
| 15 | NCU | 82-SP-0137 | Magruder South Pit #2 | Virginia Manor Road, Laurel | Mining | Vacant |

Sand and Gravel Mines and Associated Uses, Prince George's County, 2018

| Map ID | SE No. | State Table. Permit # | Common/Pit Name | Location | Type of Use | Status/ Post-Reclamation Use |
|---|---|---|---|---|---|---|
| 16 | NCU | 84-SP-0160-A | Magruder South Pit #1 | Virginia Manor Road, Laurel | Mining | Vacant |
| 17 | NCU | 89-SP-0313-A | Magruder Tract #5 | Virginia Manor Road, Laurel | Mining | Vacant |
| 18 | SE-2671 | 77-SP-0125 | Ammendale Road Pit | Ammendale Road | Mining | Reclaimed: Institutional (National Lab Center, GSA) |
| 19 | NCU | 88-SP-0297 | Magruder Tract #1 | Virginia Manor Road, Laurel | Mining | Vacant: Planned for 2,161 multifamily dwelling units and 2 million square feet of Residential/ Commercial/Retail/Hotel/<br><br>Office development per DSP-08011 |
| 20 | NCU | 89-SP-0311 | Magruder Tract #2 | Laurel | | |
| 21 | NCU | 89-SP-0305 | Magruder Tract #4 | Laurel | | |
| 22 | SE-2816 | 77-SP-0049 | Muirkirk Pit | Muirkirk Road/VA Manor Road | Mining | Reclaimed: Konterra Business Campus |
| 23 | SE-2322 | NA | Yajo Property | Cinder Road, Laurel | Mining | Reclaimed: Konterra Business Campus |
| 24 | NCU | 90-SP-0349-A | Frye Tract | Konterra Drive, Laurel | Mining | Reclaimed: Residential (Single-Family) |
| 25 | NCU | 90-SP-0368 | Frye Tract | Cherry Hill & Van Dusen Rds. | Mining | Reclaimed use – Residential (Single-Family) |
| 26 | | 85-SP-0214 | Hatter-Gude #2 | Van Dusen Rd/Laurel Prof. Park | Mining | Reclaimed: Residential (Single-Family) |
| 27 | NCU | 84-SP-0188-B | Hatter-Gude Pit | Van Dusen Rd, Laurel | Mining | Reclaimed: Residential (Single-Family) Development |
| 28 | NCU | 77-SP-0132 | Muirkirk Mine | Old Baltimore Pike, Beltsville | Mining | Reclaimed: Commercial: The Brickyard |
| 29 | SE-919 | 77-SP-0072-A | Sandy Hill Landfill | West of Relocated Route 197 | Mining | Reclaimed: Landfill |
| 30 | SE-0448 | 80-SP-0767 | Bogley Tract | Laurel Bowie Road, Bowie | Mining | Reclaimed: Woodland, City of Bowie Rec facilities |
| 31 | NCU | 77-SP-0011-B | Ritter Tract | Jericho Park Rd., Bowie | Mining | Reclaimed: M-NCPPC Parkland (eastern half) |

Sand and Gravel Mines and Associated Uses, Prince George's County, 2018

| Map ID | SE No. | State Table. Permit # | Common/Pit Name | Location | Type of Use | Status/ Post-Reclamation Use |
|---|---|---|---|---|---|---|
| 32 | N/A | 95-SP-0441 | Zehner Pit | SE quad of US 50 and US 301 | Mining | Reclaimed: Woodland, Agriculture |
| 33 | - | 79-SP-0448 | Hazelwood Farm | Queen Anne Road | Mining | Reclaimed: M-NCPPC Parkland (Patuxent River Park 2) |
| 34 | SE-1512 | NA | Historic | | Mining | Reclaimed: Woodland, Agriculture |
| 35 | SE-967 | 80-SP-04771 | Barger Pit | Brown Station Road | Mining | Active: Brown Station Sanitary Landfill |
| 36 | 1407-G | 80-SP-0496-D | Hammett Pit | Brown Station Road | Mining | Active. Class 3 Rubblefill; two sites |
| 37 | SE-3163 | 80-SP-0496-B | Hammett Enterprises | Brown Station Road, Forestville | Mining | Reclaimed: Woodland |
| 38 | SE-4044 | 93-SP-0439 | GKG Partnership Property | NE Quadrant, I-95 and D'Arcy Road | Mining | Active mining permit but no current mining operations |
| 39 | SE-347 | NA | Silver Hill Property | off Cremen Road, Temple Hills | | Reclaimed. Soil and rubble (crushed concrete) fill[44] |
| 40 | | NA | ECOROC | Dower House Road | Mining | Vacant: Capped rubble and dirt fill mound[45] |
| 41 | NCU | 79-SP-0095 | Kirby Road Pit | Kirby Road, Camp Springs | Mining | Active Mining Permit[46] (Wash plant, Concrete Plant, Asphalt Plant) |
| 42 | SE-4154 | 91-SP-0385-1 | Wash. Exec. Air Park | Piscataway Road, Clinton | Mining | Vacant: Mining completed reclamation in progress.[47] |
| 43 | SE-1041 | 89-SP-0304-A | Miller Farm | Piscataway Rd, Clinton | Mining | Reclaimed. Industrial and Residential uses[48] |
| 44 | SE-4145, 4350 | 89-SP-0323 | Edelen/Shyrock Tract | Piscataway Rd, Clinton | Mining | Vacant: Woodland. Same ownership as #46 |
| 45 | SE-3810 | 88-SP-0294-1 | Padgett Tract | Piscataway Rd, Clinton | Mining | Vacant: Same ownership and end use as # 42 |
| 46 | | 80-SP-0882 | The Edelen Pit (Homesite) | Piscataway Road, Clinton | Mining | Vacant. Same ownership as #44 |
| 47 | | 84-SP-0182 | Thorne Pit | Old Fort Road | Mining | Reclaimed: Woodland (Old #77-SP-0024) |

Sand and Gravel Mines and Associated Uses, Prince George's County, 2018

| Map ID | SE No. | State Table. Permit # | Common/Pit Name | Location | Type of Use | Status/ Post-Reclamation Use |
|---|---|---|---|---|---|---|
| 48 | | 80-SP-0469 | Gallahan Pit | Gallahan Road, Clinton | Mining | Reclaimed: Agriculture |
| 49 | | 77-SP-0039-A | Farm Pit | Between Gallahan & Piscataway | Mining | Reclaimed: Agriculture |
| 50 | SE-3755, 3266 | 84-SP-0169-1 | Faller Pit | Piscataway Road, Tippett | Mining | Reclaimed: Woodland |
| 51 | SE-3086 | 78-SP-0739-A | Dunn Property | Berry Rd. north of Accokeek Rd. | Mining | Reclaimed: Woodland, Farming, Mount Vernon Viewshed |
| 52 | NCU | 77-SP-0034 | Hitt Pit | S. Springfield Rd, Danville | Mining | Reclaimed: Woodland, Woodland Conservation Bank |
| 53 | - | 77-SP-0083 | PG Bank Run Gravel Corp. | South Springfield Rd | Mining | Reclaimed: Sludge field (Owners – ERCO) |
| 54 | SE-4043 | 93-SP-0440 | ERCO Property | Accokeek Road, Danville | Mining | Reclaimed: Woodland (Old # 93-SP-0440-1) |
| 55 | SE-3253 | 84-SP-0166 | F.O. Day, 3 Property | So. Hill Rd, Floral Park Rd | Mining | Reclaimed: Agriculture, Woodland |
| 56 | ? | 83-SP-0156 | Littleworth Pit | Accokeek Road | Mining | Reclaimed: Mostly woodland, some agriculture |
| 57 | SE-4647 | 14-SP-1109 | Gaslight #2 (Millville) | Accokeek Road | Mining | Operational (prep work in progress January 2018). |
| 58 | SE-4402 | ? | Bardon Tract (Aggregate Ind.) | | Mining | Active: Wash plant. Reclaimed: WCA[49] |
| 59 | SE-4334 | 99-SP-0556 | Gardner Road Pit | Gardener Road, Danville | Mining | Reclaimed: Woodland, Agriculture |
| 60 | SE-4230 | 88-SP-0286-B | Meinhardt/Gardner Rd. Pit | Gardner Road, Danville | Mining | Expired Permit: Reclaimed (Agriculture) |
| 61 | SE-4479, 4218 | 98-SP-0532 | Gardner/Queen Property | Gardner Rd., Danville | Mining | Active |
| 62 | SE-4669 | 10-SP-1081 | Robindale | Mc Kendree Road, Danville | Mining | Operational (mining to end in 2018) |
| 63 | SE-2970 | 86-SP-0238 | Dr. Dobson Pit | McKendree Road, Danville | Mining | Reclaimed: Agriculture (Old # 79-SP-0860) |

Sand and Gravel Mines and Associated Uses, Prince George's County, 2018

| Map ID | SE No. | State Table. Permit # | Common/Pit Name | Location | Type of Use | Status/ Post-Reclamation Use |
|---|---|---|---|---|---|---|
| 64 | SE-3272 | 79-SP-0190-B | Timothy Farms Pit #1 | Route 301, Cedarville | Mining | Reclaimed: Part of Brandywine Town Ctr. |
| 65 | SE-3064 | 79-SP-0190-B | Timothy Farms/ Brandywine | Route 301, Cedarville | Mining | Reclaimed: Part of Brandywine Town Ctr. |
| 66 | SE-3273 | 82-SP-0134-B | Pit #2 (Montgomery Ward) | Cedarville Road, Brandywine | Mining | Reclaimed: part of Brandywine Commercial Center |
| 67 | | 77-SP-0143 | Simon Pit | Cedarville Rd, Brandywine | Mining | Reclaimed: Woodland, Agriculture |
| 68 | | 86-SP-0224 | Simon Pit | Cedarville Rd, Brandywine | Mining | Reclaimed: Woodland (Old # 82-SP-0116) |
| 69 | NCU | 77-SP-0025 | Cedarville Pit | Cedarville Road, Cedarville | Mining | Reclaimed: Agriculture |
| 70 | SE-3558 | 86-SP-0230-B | Dobson-Miller Pit | Cedarville Rd, Brandywine | Mining | Reclaimed: Created Wetlands |
| 71 | NCU | 78-SP-0316 | Simon Pit | Cedarville Road | Mining | Reclaimed |
| 72 | SE-3957 | NA | Bevard Property | Bevard Road, Brandywine | Mining | Active. Temporary biosolids lagoon [50] |
| 73 | 10593-89-U | 77-SP-0038-B | Cedarville Pit | Bevard Rd, Cedarville | Mining | Vacant (operations have moved south to adjoining property) |
| 74 | 10593-89-U | 77-SP-0038-B | Cedarville Pit | Bevard Rd, Cedarville | Mining | Active (permit still active) |
| 75 | 10593-89-U | 77-SP-0038-B | Cedarville Pit | Bevard Rd, Cedarville | Mining | Active (permit still active) |
| 76 | 10593-89-U | 77-SP-0038-B | Cedarville Pit | Bevard Rd, Cedarville | Mining | Operational |
| 77 | SE-3688 | 87-SP-0270 | Sellner-Reeder Tract | Cedarville Road, Cedarville | Mining | Reclaimed: Woodland, Agriculture (livestock) |
| 78 | SE-3967 | 98-SP-0538 | Arundel Operation | West side Rt. 381 south of Rt. 382 | Mining | Vacant: (Permit Denied). Current use – Woodland, Agriculture |
| 79 | SE-15-74-M | 77-SP-0023-A | Hall Suite Lee Tract | Aquasco Road, Aquasco | Mining | Reclaimed: Mostly Woodland, some Agriculture |
| 80 | SE-3433 | 80-SP-0926-1 | Brandywine Lapin | Aquasco Road, Aquasco | Mining | Reclaimed: Woodland, Grassland – Solar Panel use?? |

Sand and Gravel Mines and Associated Uses, Prince George's County, 2018

| Map ID | SE No. | State Table. Permit # | Common/Pit Name | Location | Type of Use | Status/ Post-Reclamation Use |
|---|---|---|---|---|---|---|
| 81 | SE-3450 | 85-SP-0204 | Trueman Pit | MD 381, Brandywine | Mining | Reclaimed: Woodland |
| 82 | SE-4462 | 89-SP-0329-A | Naylor Tract (Financial Pit) | MD 381, Brandywine | Mining | Reclaimed: Mainly woodland, Agriculture |
| 83 | SE-4674 | 12-SP-1095 | Jenkins | Aquasco Road, Aquasco | Mining | Operational |
| 84 | | 77-SP-0053-A | Sleepy Hollow | MD 381 and Horsehead Rd | Mining | Reclaimed: Woodland, Winery (?) |
| 85 | | 80-SP-0402-B | Cherry Hill Pit | MD 381, Brandywine | Mining | Reclaimed: Agriculture, Woodland |
| 86 | NCU | 82-SP-0126 | Bryan Tract | Baden Westwood Rd, Brandywine | Mining | Reclaimed: Woodland |
| 87 | NCU | 82-SP-0127-D | Ford Rooney Tract | Baden Westwood Rd, Brandywine | Mining | Reclaimed: Mostly agriculture |
| 88 | NCU | 82-SP-0128-A | Benfield Tract | Baden Westwood Rd, Brandywine | Mining | Reclaimed: Agriculture, Woodland |
| 89 | SE-4352 | 00-SP-0563 | AH Smith Property | E side of MD Route 381 | Mining | Active: Agriculture, Woodland |
| 90 | NCU | 77-SP-0022-C | Duley Pit | US 301/Cheltenham Rd. | Mining | Active: silt drying fields |
| 91 | SE-4646 | | Anthony George | Evergreen Way off Route 381 | Mining | Operational |
| 92 | | | Rockhill Sand and Gravel | Gibbons Church Road, Aquasco | Mining | Active: Wash plant |
| 93 | SE-3667, 4046 | 87-SP-0267-1 | Southstar Limited Property | Brandywine | Mining | Reclaimed: Recreation (water ski-ing) |
| 94 | SE-4348 | 95-SP-0483 | Reeder Property | Brandywine Road, Brandywine | Mining | Reclaimed: Woodland, Stormwater Management |
| 95 | SE-4102 | 95-SP-0477 | Brandywine #1 (Cheyney Ent.) | North Key Road | Mining | Reclaimed: Brandywine Road Park, WCA |
| 96 | SE-4485 | | Bowie Pit | 10322 North Keys Rd, B/wine | Mining | Reclaimed: Keys Energy Center parking lot[51] |
| 97 | SE-4429 | 96-SP-0506 | Bowie Pit | North Keys Rd., Brandywine | Mining | Reclaimed: Industrial use. Keys Energy Center.[52] |

Sand and Gravel Mines and Associated Uses, Prince George's County, 2018

| Map ID | SE No. | State Table. Permit # | Common/Pit Name | Location | Type of Use | Status/ Post-Reclamation Use |
|---|---|---|---|---|---|---|
| 98 | SE-3561 | 77-SP-0013-H | Glatfelter Tract | No. Keys Rd. Brandywine | Mining | Reclaimed: Agriculture. (Site of closed Glatfelter Wash Plant) |
| 99 | SE-3122 | 77-SP-0013-H | Glatfelter Tract | No. Keys Rd., Brandywine | Mining | Active[53] |
| 100 | | 77-SP-0075 | PEPCO Fly Ash Disposal Prop | North Keys Road, Brandywine | Ash Disposal | Active |
| 101 | SE-3436 | 84-SP-0192-A | Butler Tract | Cross Road Trail, Brandywine | Mining | Reclaimed: Mostly woodland, some agriculture |
| 102 | SE-3807 | 89-SP-0308 | Hunt Pit | North Keys Rd, Brandywine | Mining | Reclaimed: Woodland |
| 103 | SE-3893 | 84-SP-0184-1 | North Keys Pit | North Keys Rd, Brandywine | Mining | Reclaimed: Woodland |
| 104 | NCU | 89-SP-0298-2 | DuVall Property | Croom Rd, Croom | Mining | Reclaimed: Woodland, Agriculture |
| 105 | - | 77-SP-0084 | Lange Pit | Cross Road Trail | Mining | Reclaimed: Woodland |
| 106 | | 77-SP-0069 | Old Indian Head Road | Old Indian Head Road | Mining | Reclaimed: Agriculture, Woodland |
| 107 | SE-3701 | 88-SP-0287-1 | Murray Pit | Cross Road Trail, Brandywine | Mining | Active. Reclamation in progress, Woodland |
| 108 | SE-3442, 3035 | NA | Brandywine Rubblefill | Cross Road Trail, Brandywine | Mining | Vacant: Reclaimed |
| 109 | NCU | 84-SP-0178-A | Cross Rd. Trail Gravel Pit | Cross Road Trail, Brandywine | Mining | Reclaimed: Woodland |
| 110 | SE-3930 | 89-SP-0343-A | Cross Trails Pit #2 | Cross Road Trail, Brandywine | Mining | Reclaimed: WCA (Cross Road Trail Preserve) |
| 111 | SE-3930 | 89-SP-0343 | Cross Trails Pit #2 | Cross Road Trail, Brandywine | Mining | Reclaimed: WCA (Cross Road Trail Preserve) |
| 112 | | 82-SP-0124 | Hall Suite Lee Pit (Ripple Pit) | Route 301 | Mining | Reclaimed: Woodland, Agriculture |
| 113 | - | 79-SP-0200 | Weitzel Pit/Lee Pit 2 | Cross Road Trail, Brandywine | Mining | Reclaimed: Agriculture, Woodland |
| 114 | | 98-SP-0528 | Ripple Farm Pit (Lee Pit) | Cross Rd. Trail, Brandywine | Mining | Reclaimed: Agriculture, Woodland |

Sand and Gravel Mines and Associated Uses, Prince George's County, 2018

| Map ID | SE No. | State Table. Permit # | Common/Pit Name | Location | Type of Use | Status/ Post-Reclamation Use |
|---|---|---|---|---|---|---|
| 115 | | 77-SP-0052 | Quail Hollow Inc. | Between Dyson and Surratts Rd | Mining | Reclaimed: WCA |
| 116 | NCU | 00-SP-0571-1 | Smith 301 Brandywine Pit | west side of US Rt. 301 | Mining | Vacant [54] |
| 117 | SE-3371 | 84-SP-0159-A | Billingsley Property | Between Dyson and Surratts Rd | Mining | Reclaimed: M-NCPPC Parkland (Piscataway Creek SVP 2) |
| 118 | SE-3370 | 84-SP-0159 | Billingsley Property | Between Dyson and Surratts Rd | Mining | Reclaimed: Woodland |
| 119 | | 77-SP-0019-1 | Howe Tract | Frank Tippett Rd., Cheltenham | Mining | Reclaimed: SF Residential (Marlboro Woods Subdivision) |
| 120 | | 78-SP-0207 | Van Brady Road | Duley Station Road | Mining | Reclaimed: Woodland, Agriculture |

*Table 13. Closed Landfills And Abandoned Rubblefills in Prince George's County, 2018*

| Name | Address | Permit Number | Area (Acres) |
|---|---|---|---|
| Smith & Garrett Property Class 3 Fill | 1150 Rollins Avenue | 16869-2001-G | 46.63 |
| Vesharn & Patricia Scales | Ritchie Marlboro Road | None | 48.21 |
| Sansbury Class 3 Fill | 2100 block of Sansbury Road | 1315-95-G | 37.23 |
| Ketts & Tayman Property Class 3 Fill | 6000 D'Arcy Road, Westphalia | 13834-2001-G | 57.40 |
| Beech Property Class 3 Fill | 5000 Beech Road | 50150-2000-G | 28.71 |
| Weitzman Property Class 3 Fill | 8590 Oxon Hill Road | 8204-86-G | 75.40 |
| Driggs Property | 9400 block Indian Head Highway | 181-1988-G | 55.88 |
| Fort Washington Properties Class 3 Fill Site | 9800 block Old Fort Road | 12147-2001-G | 158.75 |
| Fort Washington Marina Dredge Spoil Site | 13300 block Old Fort Road | 1887-88-G | 119.08 |
| Panorama Class 3 Fill | 2301 Tucker Road | 3315-1996-G | 113.70 |
| MD Reclamation | 2300 Brown Station Road | 1407-98-G | 86.01 |
| MD Reclamation | 2300 Brown Station Road | 1407-98-G | 24.89 |
| MD Reclamation | 2300 Brown Station Road | 1407-98-G | 2.58 |
| Ritchie Land Reclamation | 2001 Richie Marlboro Road | 288757-06 | 287.10 |
| Brandywine Enterprises Class 3 Fill | 9702 Westphalia Road | 444-2000-G | 61.20 |
| Westphalia Road Fill Site | 9706 Westphalia Road | 444-2000-G | 12.51 |
| Livingston Road Class 3 Fill | Livingston Road & Busitgo Avenue | 10205-1995-G | 34.17 |
| Rollins Avenue Class 3 Fill | 1543 Rollins Avenue | 7127-99-G | 15.45 |

*Table 13. Closed Landfills And Abandoned Rubblefills in Prince George's County, 2018*

| Name | Address | Permit Number | Area (Acres) |
|---|---|---|---|
| Oakcrest Community Center | 5200 Marlboro Pike | 2119-88-C | 33.74 |
| Walker Mill Class 3 Fill | 1306 Rollins Avenue | 10427-95-G & 5 | 4.30 |
| Silver Hill Class 3 Fill | 4714 St. Barnabas Road | 5791-1997-G | 254.11 |
| Baker Property Class 3 Fill | 5900 Dowerhouse Road | 35439-2001-G | 142.59 |
| Kirby Property Class 3 Fill | 8405 Indian Head Highway | 297-96-G | 29.62 |
| Property of Brandywood Estates (Part 4) | 6910 Accokeek Road | | 91.60 |
| Palmer Road Class 3 Fill | 1914 Palmer Road | 8565-93-G | 180.61 |
| Westphalia of MD Class 3 Fill | 9908 Westphalia Road | 1971-1999-G | 38.78 |
| Old Gunpowder Road Class 3 Fill | 14705 Gunpowder Road | 10488-96-G | 72.58 |
| Total Acreage | | | 2,112.84 |

*Table 14. Woodland Conservation Areas on Reclaimed Sand and Gravel Mines*

| Mine Name | WCA Name | WCA Area (Acres) | TCP2 | Councilmanic District |
|---|---|---|---|---|
| Aggregate Industries | Bevard Properties | 77.11 | TCP2-070-06 | 9 |
| Arundel Operation | Arundel Property | 24.84 | TCP2-094-90 | 9 |
| Benefield Tract | Newman Property | 3.55 | TCP2-033-13 | 9 |
| Benefield Tract | Rockhill Sand and Gravel | 38.56 | TCP2-119-99 | 9 |
| Bevard Property | Bevard Property | Jb | TCP2-047-96 | 9 |
| Billingsley Property | Danner Property, TM 135 P.48 | 8.33 | TCP2-089-06 | 9 |
| Bond Property | Virginia Manor Road West | 2.73 | TCP2-014-12 | 1 |
| Bowie Pit | Glatfelter Pit WC Bank | 145.48 | TCP2-087-07 | 9 |
| Brown Station Landfill – Barger Pit | DPWT Brooke Lane WC Bank | 0.25 | TCP2-001-09 | 6 |
| Brown Station Landfill – Barger Pit | Brown Station Landfill | 49.75 | TCP2-021-17 | 6 |
| Chaney Enterprises | Mattawoman Energy, Parcel 21 | 10.69 | TCP2-017-16 | 9 |
| Chaney Enterprises | Cedarwoods | 50.87 | TCP2-068-94 | 9 |
| Cherry Hill Pit | Jenkins Property Surface Mining | 9.76 | TCP2-054-09 | 9 |
| Contee Sand and Gravel | Konterra Town Center East | 5.54 | TCP2-065-08 | 1 |
| Cross Trails Pit #2 | Cross Road Trail Preserve | 216.62 | TCP2-025-06 | 9 |
| Edelen / Shyrock Tract | Bevard North | 5.26 | TCP2-060-06 | 9 |
| F.O. Day 3 Property | Becker Road Property | 11.20 | TCP2-011-96 | 9 |
| Faller Pit | Bevard East | 33.50 | TCP2-074-06 | 9 |
| Frye Tract | Beltsville-Laurel Senior Center | 2.17 | TCP2-031-09 | 1 |
| Gardner Queen Property | Robindale Surface Mining Site | 1.16 | TCP2-061-09 | 9 |

*Table 14. Woodland Conservation Areas on Reclaimed Sand and Gravel Mines*

| Mine Name | WCA Name | WCA Area (Acres) | TCP2 | Councilmanic District |
|---|---|---|---|---|
| Gardner Road Pit | Accokeek Road Surface Mining | 32.51 | TCP2-009-01 | 9 |
| Glatfelter Tract Wash Plant | Glatfelter Pit WC Bank | 154.28 | TCP2-087-07 | 9 |
| Hall Suite Lee Pit | Colevas Property WC Bank | 18.81 | TCP2-097-06 | 9 |
| Hitt Pit | Springfield Road, Lots 1 &2 | 1.69 | TCP2-002-09 | 9 |
| Hitt Pit | The Ridges 3 | 23.27 | TCP2-006-93 | 9 |
| Lange Pit | Glatfelter Pit WC Bank | 69.69 | TCP2-087-07 | 9 |
| M-NCPPC Fairland Regional Park | Fairland Regional Park | 1.37 | TCP2-151-91 | 1 |
| Magruder Tract #1 | Konterra Town Center East | 2.87 | TCP2-065-08 | 1 |
| Magruder Tract #2 | Konterra Town Center East | 0.41 | TCP2-065-08 | 1 |
| Magruder Tract #4 | Konterra Town Center East | 0.0379 | TCP2-065-08 | 1 |
| Mienhardt Property | Anderson Company, LLC Parcels 37 & 39 | 149.60 | TCP2-033-16 | 9 |
| Miller Farm | Woodburn Estates | 1.74 | TCP2-146-05 | 9 |
| Muirkirk Mine | The Brick Yard | 0.95 | TCP2-118-05 | 1 |
| Muirkirk Pit | Konterra Business Campus, LOT 1-C | 3.07 | TCP2-119-97 | 1 |
| Naylor Tract | Stephen Meinhardt WC Bank #2 | 26.32 | TCP2-034-13 | 9 |
| Naylor Tract | Jenkins Property Surface Mining | 9.76 | TCP2-054-09 | 9 |
| PEPCO Fly Ash Disposal Site | Brandywine North Keys Community Park | 2.50 | TCP2-021-11 | 9 |
| PEPCO Fly Ash Disposal Site | Glatfelter Pit WC Bank | 0.23 | TCP2-087-07 | 9 |
| Quail Hollow, Inc. | Quail Hollow Industrial Park | 10.52 | TCP2-007-07 | 9 |
| Ripple Farm Pit | Brandywine Lions Club | 35.03 | TCP2-140-01 | 9 |
| Rockhill Sand and Gravel | Duley Wash Plant | 4.77 | TCP2-255-91 | 9 |
| Rockville Crushed Stone | Kaine Property | 3.13 | TCP2-026-16 | 9 |
| Rockville Crushed Stone | Baker Property | 6.18 | TCP2-168-92 | 9 |
| Sandy Hill Landfill | Sandy Hill Landfill | 3.33 | TCP2-009-96 | 4 |
| Sandy Hill Landfill | Sandy Hill Park | 0.52 | TCP2-031-93 | 4 |
| Silver Hill Property | Pyles Property | 0.85 | TCP2-093-98 | 7 |
| Sleepy Hollow | PGCPS William S. Schmidt Center | 99.52 | TCP2-067-98 | 9 |
| Sleepy Hollow | Brown Preserve | 75.82 | TCP2-098-05 | 9 |
| Southstar Limited Property | Lake Chaney Ski Club | 9.86 | TCP2-087-95 | 9 |
| Timothy Farms Pit #1 | Brandywine 301 Industrial Park | 12.41 | TCP2-133-91 | 9 |
| Timothy Farms Pit #1 | Brandywine 301 Industrial Park | 7.06 | TCP2-133-91 | 9 |

*Table 14. Woodland Conservation Areas on Reclaimed Sand and Gravel Mines*

| Mine Name | WCA Name | WCA Area (Acres) | TCP2 | Councilmanic District |
|---|---|---|---|---|
| Van Brady Road | Duley Station Road Property WC Bank | 152.28 | TCP2-030-13 | 9 |
| Van Brady Road | Brookwood 2 Mitigation Bank | 41.94 | TCP2-077-06 | 9 |
| Weitzel Pit, Lee Pit 2 | Colevas Property WC Bank | 18.81 | TCP2-097-06 | 9 |

*Table 15. Parks Located Wholly or Partly on Closed Sand and Gravel Mines*

| Mine Name | Park Name | Park Ownership | Park Area (Acres) | Councilmanic District |
|---|---|---|---|---|
| Kirby Road Pit | Tinkers Creek SVP | M-NCPPC | 755.41 | 8 |
| Kirby Road Pit | Stephen Decatur Community Center | M-NCPPC | 26.22 | 9 |
| Faller Pit | Piscataway Road Park | M-NCPPC | 13.91 | 9 |
| Whitehead NW #1 | Bentley Park | M-NCPPC | 40.00 | 1 |
| Gallahan Pit | Tinkers Creek SVP | M-NCPPC | 755.41 | 9 |
| PEPCO Fly Ash Disposal Site | Brandywine North Keys Park | M-NCPPC | 55.81 | 9 |
| Reeder Property | Brandywine Road Park | M-NCPPC | 299.85 | 9 |
| Howe Tract | Cheltenham Woods Park | M-NCPPC | 70.83 | 9 |
| Simon Pit | Mattawoman Watershed SVP | M-NCPPC | 475.39 | 9 |
| Billingsley Property | Piscataway Creek SVP 2 | M-NCPPC | 553.66 | 9 |
| Bogley Tract | Adnell Park | M-NCPPC | 12.36 | 4 |
| Hazelwood Farm | Patuxent River Park 2 | M-NCPPC | 1084.44 | 4 |
| Sandy Hill Landfill | Sandy Hill Creative Disposal Area | M-NCPPC | 237.94 | 4 |
| Muirkirk Mine | Dinosaur Park | M-NCPPC | 3.63 | 1 |
| Muirkirk Mine | Longwood Park | M-NCPPC | 58.59 | 1 |
| Brown Station Landfill – Barger Pit | Randall Maintenance Facility | M-NCPPC | 270.29 | 6 |
| Littleworth Pit | Pleasant Springs Park | M-NCPPC | 66.28 | 9 |
| M-NCPPC Fairland Regional Park | Fairland Aquatic Center | M-NCPPC | 1.88 | 1 |
| M-NCPPC Fairland Regional Park | Storm Water Mgmt. Demonstration Building | M-NCPPC | 0.12 | 1 |
| M-NCPPC Fairland Regional Park | Fairland Regional Park | M-NCPPC | 128.25 | 1 |
| M-NCPPC Fairland Regional Park | Gardens Ice House | PRIVATE | 9.00 | 1 |
| M-NCPPC Fairland Regional Park | Gunpowder Golf Course | M-NCPPC | 15.00 | 1 |
| M-NCPPC Fairland Regional Park | Fairland Athletic Center | M-NCPPC | 1.66 | 1 |
| M-NCPPC Fairland Regional Park | Northern Area Mtce. Facility at Fairland | M-NCPPC | 3.07 | 1 |

*Table 15. Parks Located Wholly or Partly on Closed Sand and Gravel Mines*

| Mine Name | Park Name | Park Ownership | Park Area (Acres) | Councilmanic District |
|---|---|---|---|---|
| Chaney Enterprises | Brandywine Road Park | M-NCPPC | 299.85 | 9 |
| Ritter Tract | Fran Uhler Park | M-NCPPC | 28.03 | 4 |
| Ritter Tract | Patuxent River Park 2 | M-NCPPC | 1084.44 | 4 |
| Naylor Tract | Black Swamp Creek SVP | M-NCPPC | 149.74 | 9 |
| Ritter Tract | Fran Uhler Park | M-NCPPC | 28.03 | 4 |
| Ritter Tract | Patuxent River Park 2 | M-NCPPC | 1084.44 | 4 |
| Simon Pit | Cedarville State Forest | State of Maryland | 1,316.08 | 9 |
| Cedarville Pit | Cedarville State Forest | State of Maryland | 1,316.08 | 9 |
| Cedarville Pit | Cedarville State Forest | State of Maryland | 1,316.08 | 9 |
| Bevard Property | Cedarville State Forest | State of Maryland | 1,316.08 | 9 |
| Barger Pit | Black Swamp Creek Stream Valley Park | M-NCPPC | 149.74 | 9 |
| Glatfelter Tract | Brandywine North Keys Park | M-NCPPC | 55.68 | 9 |

## ENDNOTES

1 Multiplier from RIMS II I-O Model, U.S. Department of Commerce, Bureau of Economic Analysis, 2000

2 Direct spending is the total cost of producing a product. With regard to sand and gravel mining, direct spending includes costs associated with extraction, refining, trucking and bringing the product to market for sale or export, etc).. The figure quoted represents 15 percent of the State's direct spending on sand and gravel (United States Geological Survey (USGS) 2015 Minerals Yearbook).

3 Source: Edward Larrimore, Mining Program, Maryland Department of the Environment by email dated October 2019.

4 Maryland Environmental Code Sec. 15-801(i) (2017)

5 Historically, this geologic unit has been assigned different names by different geologists. The name Brandywine formation, for example, was used by earlier geologists—a term that is no longer used today. Additionally, given that upland deposits typically contain a significant amount of sand and gravel, other geologists have also called them upland gravel units. The term upland deposits was used instead of upland gravel as an informal geologic unit on the 2003 Prince George's County geologic map to convey to the public that the unit is not all sand and gravel. (,MGS, September 2018).

6 Heather Quinn, Maryland Geological Survey, by E-mail dated September 11, 2018

7 Historically, this geologic unit has been assigned different names by different geologists. The name Brandywine formation, for example, was used by earlier geologists—a term that is no longer used today. Additionally, given that upland deposits do typically contain a significant amount of sand and gravel, it has also been called upland gravel units by other geologists. The term upland deposits was used instead of upland gravel as an informal geologic unit on the 2003 Prince George's County geologic map to convey to the public that the unit is not all sand and gravel. (MGS, September 2018).

8 Historic Mined Land Inventory of Prince George's County, Maryland (digital compilation by Heather Quinn of Maryland Geological Survey and Catherine Luckhardt of Towson University Center for GIS, 2003).

9 Historic Mined Land Inventory of Prince George's County, Maryland (digital compilation by Heather Quinn of Maryland Geological Survey and Catherine Luckhardt of Towson University Center for GIS, 2003).

10 Part of a rock that is visibly different from other parts of the rock or from other rocks, because of its composition or the conditions of its formation.

11 The mined area may then be returned to beneficial uses that include parkland and agriculture in a rural area, or residential and other permanent development, inside the Growth Boundary (i.e., in the Plan 2035-designated Established Communities policy area) where public water and sewer service is available.

12 Source: Tim Bevard, Aggregate Industries, Ltd., April 2017.

13 A landfill is a designed structure built into or on top of the ground to isolate trash from the surrounding environment. Solid waste landfills use a synthetic liner (usually plastic) to isolate the trash from the environment (groundwater, air, rain).

14 A rubble fill is formed by dumping irregular fragments of loose rock or masonry either into shallow ditches or holes such as those resulting from closed sand and gravel mines, or on top of the ground, and slowly dumping dirt fill over it to form a mound.

15 Three wash plants are Gibbons Church Road (Owner: Rockhill Sand and Gravel); Kirby Road, and Accokeek Road (owner: Aggregate Industries)

16 "Active" mines are those sites for which the State has not formally closed or released the permit i.e., sites that have been mined but reclamation is still ongoing, or sites with mining-related uses such as wash plants, silt-drying beds, and temporary storage of sand, gravel, or biosolids, located on sites of former operations.

17 Per Environment Article 15.801(r) "Reclamation means the reasonable rehabilitation of the affected land for useful purposes and the protection of the natural resources of the surrounding area including ponds."(Ed Larimore, Mining Program Manager, Maryland Department of the Environment, by E-mail dated December 17, 2018).

18 There are no recent sand and gravel mines in Councilmanic Districts 2 and 3. However, the state's Historic Mined Land Inventory map shows the boundaries of two large operations (Arundel Asphalt Company and A. H. Smith plant and storage site), five borrow pits, 9 reclaimed extraction sites, and 12 abandoned or inactive sand and gravel, clay, ocher, or marl operations in the two Councilmanic Districts in the 1980s. Map 3 shows the distribution of sand and gravel mines by Councilmanic District.

19 Email dated 10/30/2019 from Letia J.Cole on behalf of Edward Larrimore, Mining Program Manager, MDE

20 Data Source: Email dated 10/30/2019 from Letia J.Cole on behalf of Edward Larrimore, Mining Program Manager, MDE

21 Timothy Bevard by personal interview in June 2015 and E-mail dated December 12, 2018; Brent Dilts, President, Brandywine Sand and Gravel, personal interview in August 2017.

22 Estimated at 25 to 30 percent of a site.

23 Estimated at 15 percent or more of the gross tonnage mined.

24 Solar panels for rubble fills that are in close proximity to JBA should be evaluated for potential impacts to base operational safety.

25 Multiplier from RIMS II I-O Model, U.S. Department of Commerce, Bureau of Economic Analysis, 2000.

26 Staff estimate using 2019 Bureau of Labor Statistics with data from USGS 2015 Mineral Yearbook.

27 Reseeding is an erosion-control measure involving the application of grass seed to cover bare soil in the early stages of mine reclamation. The state requires a seeding mixture in the Mining and Reclamation Plan that will grow in the environment given. It may include grasses, trees and cover crop. MDE generally requires two successful growing seasons to consider reseeding as successful. Source: Ed Larimore, MDE, by E-mail dated December 12, 2018.

28 Andrew H MacDougall and Hugo Beltrami; Published 10 July 2017 • © 2017 IOP Publishing Ltd. Environmental Research Letters, Volume 12. Number 7

29 Residential development is a preferred post-mining land use in the Established Communities, while

commercial and mixed-use development are appropriate for reclaimed mines at or near Plan 2035-designated Centers in the Established Communities.

30 Residential development is a preferred post-mining land use in the Established Communities, while commercial and mixed-use development are appropriate for reclaimed mines at or near Plan 2035-designated Centers in the Established Communities.

31 Prices range from $0.07 per tree to $0.27 per tree depending on the quantities being ordered. The price for larger planting stock used in other plantings ranges from $5.00 to $15.00 per tree.

32 Source: 2007 Approved Westphalia Sector Plan and Sectional Map Amendment, page 56.

33 Prince George's County Solar Energy Systems (SES) Guidelines for Mandatory Referral Cases, Prince George's County Planning Board, March 1, 2018.

34 30 U.S.C. § 1265(b)(3)

35 Maryland Environmental Code, Title 15 (Mines and Mining)

36 Maryland Land Use Code § 3-107

37 Plan 2035, Strategy LU11.3, p. 117.

38 2017 Approved Resource Conservation Plan: A Countywide Functional Master Plan, Agriculture Conservation Plan, Policy 4 and related strategies, p 90.

39 Source: Mary Giles, Associate Director, Prince George's County Department of Permitting, Inspections and Enforcement (DPIE) by E-mail dated May 2, 2018

40 Source: Mary Giles, Associate Director, Prince George's County Department of Permitting, Inspections and Enforcement (DPIE) by E-mail dated May 2, 2018

41 Discrepancy due to some properties registering as both "previously mined lands" and "current mined lands."

42 Includes privately owned property with scenic and environmental easements within Piscataway Park and the Moyaone Reserve), Southern Maryland Medical Center (116 acres), D'Arcy Road Landfill (48 acres)

43 Excluding previously mined lands, residential and other development, deposits on institutional and publicly owned lands, and other conflicting land uses limiting sand and gravel mining potential.

44 Former Glatfelter wash plant, now a capped rubble (crushed concrete) and dirt fill.

45 Old concrete recycling plant, now a capped rubble fill

46 Portion of site south of Kirby Road in use for a Wash Plant, Concrete Plant, Asphalt Plant, and sand drying. The portion north of Kirby Road is a Single-Family Residential housing area (Kirby Woods Subdivision)

47 Site approved for 154 single-family (detached), 135 townhouses, and 50 three to four- story multifamily dwellings in 2015. Same ownership as #42.

48 Western half of site graded for industrial development; 87-acre eastern portion platted for 51 single-family dwellings as part of Woodburn Estates per Preliminary Plan 4-04016, DSP-05053, and Final Plat 5-06379

49 Accokeek Road Surface Mining Project

50 Biosolids lagoon operated by Synagro Technologies, Inc., for temporary storage of biosolids (sludge) in winter and extended inclement weather. Biosolids spread as farm fill in Virginia and MD East Coast

51 Site of Mandatory Referral No. MR-12002F North Keys Center.

52 Eastern portion being graded for new natural gas power plant (per MR-12002F).

53 Site of old Glatfelter wash plant, now closed. Western ¾ of site used for sand storage, automobile and equipment storage, and Industrial uses; Eastern ¼ is M-NCPPC parkland (North Keys Park).

54 Former Strittmatter wash plant and sand drying site. Future (168-acre) Renard Lakes development: 398 dwelling units per CDP-0503. Southern half of site platted for 45 single-family (detached) dwellings per 5-06327 and Preliminary Plan 4-05048.

# ACKNOWLEDGMENTS

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THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

# Prince George's County Planning Department