Appendix A

Summary of TMDL Pollutants, Potential Sources, and Potential Control Strategies

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DEPARTMENT OF ENERGY & ENVIRONMENT

TMDLs and MS4 WLAs have been established for the following classes of pollutants in the District:

- Bacteria
- Nutrients
- TSS
- Metals
- Organic chemicals
- PCBs
- Trash
- Oil and Grease
- BOD

This Appendix provides a summary of each individual pollutant type for which MS4 WLAs exist in the District. It also provides information on common sources and potential reduction strategies for the individual pollutants.

Bacteria

Bacteria are disease-causing microorganisms which can be found in fecal waste of humans and animals. Bacteria generally wash off the land from wild animal, farm animal, and pet waste, and can enter waterways from leaky sewer lines, CSOs, and boat sanitary disposal systems. Exposure to pathogens that reach water bodies can cause a number of health problems.

Common Sources - Common sources of fecal coliform in storm water include birds, such as geese or pigeons; vermin such as rats and mice; and pets - especially dogs. Other sources in an urban environment are illegal sanitary sewer connections to the storm drain, cross connections between a sanitary sewer and the storm drain, and sanitary sewer exfiltration (either directly or indirectly via groundwater seepage to the storm drain).

Reduction Strategies - The primary reduction strategy for bacteria is source control to eliminate bacteria from entering the watershed. For human bacteria sources, the primary source control strategy is to identify and eliminate pathways such as illicit connections and leakage from sanitary systems to the MS4. For domestic pet sources, the primary reduction strategy is public outreach, such as educating pet owners on the importance of collecting and disposing of waste. For wildlife sources, minimal source control options are available, particularly because public sentiment may be against options such as wildlife culling or population control. However, reductions in suitable habitat (such as reducing habitat suitable for Canada geese populations) have successfully controlled goose populations in other areas (need citation).

Bacteria source tracking/microbial source tracking (BST/MST) provides a methodology to identify the general sources of bacteria (i.e., humans, domestic animals, wildlife), after which targeted source controls can be identified more easily. BST/MST and how it will be used in the Consolidated TMDL IP is discussed in Section 5.3.2.a of the IP document.

Nutrients and Sediments

Sediments, especially in the form of total suspended solids (TSS), increase water turbidity, reduce the penetration of light within the water column, and limit the growth of desirable aquatic plants. Solids that settle out as bottom deposits contribute to sedimentation and can alter and eventually destroy habitat for fish and bottom-dwelling organisms. Nutrients, including nitrogen and phosphorus, are common pollutants associated with eutrophication, excessive algal growth (algal blooms), and low dissolved oxygen conditions in bottom waters (U.S. EPA, 1999).

Nitrogen

Common Sources – The primary sources of nitrogen in urban stormwater are:

- Atmospheric deposition
- Wash-off of fertilizers
- Nitrogen attached to eroded soils and stream banks
- Organic matter (such as pollen and leaves) and pet wastes that are deposited on impervious surfaces
- Streambank erosion (CSN, 2011)

Much of the nitrogen found in urban runoff is deposited from the atmosphere, either in the form of dry fall or wet fall. Schueler (2011) found that, based on monitoring in the Washington Metropolitan area, atmospheric loading rates are roughly equivalent to the total nitrogen in urban stormwater. Another important source area is urban lawns. Schueler further reports that monitoring indicates that lawn runoff has nitrogen concentrations that are five times higher than the average stormwater concentration. This suggests that nitrogen can wash-off from fertilized lawns, particularly if they have heavily compacted soils. Sampling also suggests that deposited organic matter (i.e., urban detritus) is a moderate source of nitrogen (leaves, pollen, pet waste, organic debris, etc.). About two thirds of the nitrogen measured in stormwater is in organic form, which provides indirect evidence for the importance of organic matter as a nitrogen source. Streambank erosion is also believed to be a potentially major source of nitrogen in urban watersheds.

Reduction Strategies – Reduction strategies for nitrogen include BMP implementation, source control, public education, and stream restoration. Public education on proper fertilizer use, good housekeeping practices of organic detritus (yard and leaf waste), and proper disposal of organic matter and pet waste are key to reducing nitrogen loads for these sources. Source control can be used to limit nitrogen contributions from fertilizer. Nitrogen that is already present in stormwater can be treated by many different types of BMPs. Nitrogen loads from streambank erosion can be addressed through various stream restoration practices.

Phosphorus

Common Sources – The sources of phosphorus in stormwater runoff are similar to those for nitrogen, but their relative contribution is very different. For example, atmospheric deposition is not as important as a source of total phosphorus and roughly only accounts for about a third of the phosphorus load in stormwater from urban areas.

Source area sampling suggests that runoff of eroded soils and fertilizer from lawns is an important source of phosphorus. Total phosphorus concentration in lawn runoff can be approximately six times greater than that measured in stormwater runoff (Schueler, 2011). Another key phosphorus source is the deposition and subsequent wash off of organic matter, pet wastes and litter from impervious surfaces. In particular, adjacent trees may account for a large portion of the phosphorus load when they shed leaves, pollen, flowers or fruits onto paved surfaces that subsequently break down and decompose. Stream bank erosion is also a known source of phosphorus in urban watersheds.

Reduction Strategies – Reduction strategies for phosphorus are the same as for nitrogen and include BMP implementation, source control, public education, and stream restoration. Public education on proper fertilizer use, good housekeeping practices of organic detritus (yard and leaf waste), and proper disposal of organic matter and pet waste are key to reducing phosphorus loads for these sources. Source control can be used to limit phosphorus contributions from fertilizer. Phosphorus that is already present in stormwater can be treated by many different types of BMPs. Phosphorus loads from streambank erosion can be addressed through various stream restoration practices (CSN, 2011).

Total Suspended Solids

Common Sources – TSS is one of the most common contaminants found in urban storm water. Solids originate from many sources including the erosion of pervious surfaces and dust, litter and other particles deposited on impervious surfaces from human activities and the atmosphere. Stream bank erosion and erosion at construction sites are also major sources of solids.

Reduction Strategies – Reduction strategies for total suspended solids include BMP implementation, source control, and stream restoration. Source controls that focus on minimizing soil disturbance (such as soil and erosion controls) and vegetating barren areas may be most effective in controlling solids from entering stormwater runoff. TSS that is already present in stormwater can be treated by many different types of BMPs. TSS loads from streambank erosion can be addressed through various stream restoration practices (U.S. EPA, 1999).

Metals

Metals are common inorganic chemical pollutants that are very resistant to breakdown, tend to be passed through the food chain, and therefore concentrate in top animal and fish predators. Metals listed as TMDL pollutants for the District watersheds include arsenic, mercury, lead, zinc, and copper. In addition to industrial point source discharges, metals can enter water bodies through the disposal and combustion of fuels, as well as from vehicular wear and tear, and from building materials. Metals have the tendency to accumulate in sediments and can be found in point bars and depositional areas. The primary reduction strategies for metals include source control and source reduction. In addition, most metals are positively charged and tend to bond with negatively charged soil particles such as clay and silt. Therefore, removal practices that manage TSS have also been identified as strategies to remove metals from stormwater.

Arsenic

Common Sources – Multiple sources can potentially contribute arsenic to the environment. Arsenic occurs naturally and is widely distributed in soils and minerals. However, in addition to naturally-occurring arsenic, human-generated sources of arsenic include air releases from industrial sources such as power plants, ore processing, and smelters; leaks, spills, or leaching from arsenic and arsenic alloys used in automobile batteries, semiconductors, and metal finishing; and leaching from arsenic-treated wood products, such as plywood, wood decking and patios, wood utility poles, wood pilings, and piers. Arsenic may also have accumulated in soils due to its prior use as an insecticide and pesticide.

Arsenic can be directly deposited in waterbodies through atmospheric deposition, or it may run off from arsenic-contaminated sites. Because arsenic occurs in soils, it may also be released as a result of soil erosion and resuspension.

Reduction Strategies – Unlike several other metals (e.g., copper, lead and zinc), arsenic removal has not researched been for many of the BMPs. However, controls that remove TSS may also remove arsenic. Source controls, such as minimizing and/or managing runoff from arsenic treated wood and minimizing exposure from industrial and commercial users of arsenic, will also reduce the impact of arsenic.

Copper

Common Sources - Common industrial sources of copper and its alloys include electrical wiring, sheet metal, pipes, and metal plating on automobiles. Copper is also an important component of pesticides, fungicides, and insecticides, including the preservative used to weatherproof wood products. Copper is found in atmospheric particulate matter, which can be made soluble by acid rain in runoff.

Reduction Strategies - Source reduction and source control options include using alternatives to copper-containing fungicides and insecticides and proper management of fungicides and insecticides, and evaluating and controlling runoff from industrial facilities that could potentially discharge copper. With respect to treating copper that has already entered stormwater runoff, treatment techniques that manage TSS are a potential reduction strategy. Copper bonds with soil particles and has a low solubility in water, thus making BMPs that remove TSS effective for copper removal as well.

Lead

Common Sources - Lead sources include industrial processes and atmospheric and airborne particulate matter from burning fuel and solid waste. Acid rain can release this matter to soluble form in runoff to drains and streams. Lead was commonly used in plumbing pipes and paints and as gasoline additives, but the use of lead in these applications has been phased out or greatly reduced. Sources of lead in urban environments include contaminated soil from automobile exhaust and paint chips from old houses and buildings prior to when lead based paint use was prohibited.

Reduction Strategies - Source reduction and source control options include outreach and public education to promote proper vehicle operation and maintenance and proper disposal of batteries, as well as evaluating and controlling runoff from industrial facilities that could potentially discharge lead. With respect to treating lead that has already entered stormwater runoff, treatment techniques that manage TSS are a potential reduction strategy. Lead bonds with soil particles and has a low solubility in water, thus making BMPs that remove TSS effective for lead removal as well.

Mercury

Common Sources - Mercury is a naturally occurring element that is found in air, water, soil, and rocks. It exists in several forms, including elemental mercury, inorganic mercury compounds, and organic mercury compounds. Methyl mercury, a highly toxic form that builds up in fish, shellfish, and animals that consume fish, is formed in aquatic systems through the actions of microorganisms. Atmospheric deposition of mercury (primarily resulting from emissions from coal-burning power plants, which are the largest human-caused source of mercury emissions to the air in the United States, accounting for about 40 percent of all domestic mercury-containing emissions) has caused build-up of mercury in soils. Burning hazardous wastes can also release mercury into the air, as can the production of chlorine. Mercury can also enter the environment through breaking mercury-containing products such as thermometers or CFL bulbs, as well as through the improper treatment and disposal of products or wastes containing mercury.

Reduction Strategies – National efforts to control mercury through controlling emissions at power plants and incinerators are reducing mercury in the air and airborne deposition (U.S. EPA, 2006). However, these types of efforts are beyond the control of local government. On the local scale, public education and outreach efforts aimed at reducing use of mercury containing products, as well as proper clean-up and disposal/recycling of mercury waste and spills can be an effective means of reducing mercury in the environment. In addition, because mercury is found in soils, soil erosion control and treatment techniques that manage TSS are strategies for reduction of mercury in MS4 discharges.

Zinc

Common Sources - Zinc is a naturally occurring metal and is one of the most common elements in the earth's crust. It is found in air, soil, and water. The most common human-generated sources of zinc include heavy industrial manufacturing processes such as steel production and coal burning. Zinc has a variety of industrial uses including use for coatings to prevent rust and to galvanize steel. It is also a constituent in paint, rubber, dyes, and batteries. Zinc can be found in atmospheric particulate matter, which can be made soluble by acid rain in runoff.

Reduction Strategies – Emissions controls on dischargers that emit zinc can be effective in reducing zinc into the environment, but manufacturers emitting zinc are not prevalent in the District. Therefore, at the local level, source reduction and source control strategies for zinc include outreach and education on proper vehicle operation and maintenance and proper disposal of batteries, as well as evaluating and controlling runoff from industrial facilities that could potentially discharge zinc. Zinc commonly bonds with soil particles, therefore treatment techniques that manage TSS are also potential reduction strategies for zinc.

Organic Chemicals

Organic chemicals include persistent, organic substances that have similar chemical characteristics, are generally hydrophobic, and have the affinity to bind to carbon, TSS, and other particles. Organic chemicals persist in the environment, bioaccumulate through the food web, and pose a risk of causing adverse effects to human health and the environment. Organic chemicals for which TMDLs have been completed in the District include pesticides (chlordane, dieldrin, heptachlor epoxide, DDT, DDE, and DDD); total PCBs and polycyclic aromatic hydrocarbons (PAHs). PAHs are a byproduct of combustion from the burning of wood, garbage, coal, petroleum products, and organic substances. Some PAHs are still used to make dyes and plastics. The manufacture and use of many of these chemicals – including PCBS and all of the pesticides except heptachlor epoxide - has been banned in the U.S. However, these organic chemicals continue to persist in the environment in low concentrations and are extremely hard to target for removal. Direct removal techniques for organic chemicals from storm water are not known at present, and since most of the organic chemicals have an affinity to bind with soil particles, removal practices that manage TSS have been identified as strategies to remove organic chemicals from the watershed.

PAHs

PAH pollutants in District waters consist of three distinct groups of compounds, described as PAH-1 (which is composed of naphthalene, 2-methyl napthalene, acenapthylene, acenapthene, fluorene, and phenanthrene), PAH-2 (which is composed of fluoranthene, pyrene, benz[a]anthracene, and chrysene), and PAH-3 (which is composed of benzo[k]fluoranthene, benzo[a]pyrene, perylene, indeno[1,2,3-c,d]pyrene, benzo[g,h,i]perylene, and dibenz[a,h+ac]anthracene).

Common Sources – PAHs are typical components of fuels, oils, greases, vehicle (diesel and gasoline) emissions, asphalt roads, and tobacco smoke, and contamination results primarily from use of petroleum products in construction and the combustion of petroleum, coal, oil, and wood. Sources of PAHs include vehicle emissions, heating and power plants, industrial processes, and open burning of wastes. PAHs typically enter surface water through runoff.

Reduction Strategies – Because PAH contamination occurs from human activity, source control is a potential strategy for PAH reduction. However, many sources are dispersed, and thus source control must result primarily from behavioral changes by the people whose everyday actions result in the emissions of PAHs – including drivers, construction workers, and energy consumers. For example, recent research in the District shows that PAHs from vehicle emissions dominate other sources (Hwang, 2006), and thus targeted control of highway and road runoff may help to reduce PAHs. Public education regarding automobile emissions, energy use, and other activities that contribute to the emission of PAHs can also help to reduce the ongoing sources of PAHs in the environment. In addition, specific targeted source control activities, such as the District's coal tar ban, can help to remove PAHs that are already in the environment. Coal tar pavement products contain high concentrations of PAHs, and enforcing the ban keeps additional PAHs from being added to the environment. In addition, through the ban, DDOE inspects paving sites to ensure that they are in compliance with the ban. During the inspection, DDOE removes any coal tar that has been applied, thus removing existing PAH sources from the District. For example, in FY 2013, DDOE conducted 152 inspections, issued 2 Notice of Violations (NOVs), and removed 27,360 square feet of coal tar.

With respect to removing PAHs that are already contaminating runoff, treatment techniques that manage TSS are the best reduction strategy for removal of PAHs, especially for roadway runoff. PAHs do not easily dissolve in water, but instead bind tightly to soil and sediment particles, and therefore removal of TSS will typically capture PAHs as well.

Chlordane, Heptachlor Epoxide and Dieldrin

Common Sources - Chlordane was used as a pesticide on agricultural crops, lawns, and gardens and as a fumigating agent. It has also been used to control termites in homes by applying underground around the foundations of homes. Chlordane is persistent in the environment and remains as a residue in soils; therefore, chlordane may still occur in soils that had been previously treated or exposed. Heptachlor epoxide, which is a breakdown product of the heptachlor pesticide (which is in itself a component of chlordane) may exist as a residue in soils (upper soil layers) that have been treated with heptachlor or chlordane. Heptachlor epoxide can also be found in plants and crops grown in soil treated with heptachlor. Dieldrin is a synthetic pesticide that was used in agriculture; for public health control of diseases carried by insects; for termite control; and as a wood preservative. Dieldrin may exist as a residual in the upper soil layers that have been treated with dieldrin. It can also be found in plants grown in soils treated with dieldrin, as well as in animals that feed on these plants. The historic widespread use of these chemicals means they are potentially ubiquitous in District soils.

Reduction Strategies – Because these three pollutants are no longer manufactured or used, traditional source controls, such as clean-ups of point sources, are not viable reduction strategies for them in MS4 discharges. Because these chemicals are potentially ubiquitous in the District, controls that focus on minimizing soil disturbance (such as soil and erosion controls) may be most effective in controlling residual amounts of these pollutants from entering runoff. The MS4 system itself may be a source of these pollutants, as may contaminated sediments in District waterbodies. Source controls such as targeted sewer cleaning and sediment capping can be effective source controls if sewers or sediments, respectively, are potential sources. MS4 monitoring data, as well as other sources of monitoring data (e.g., the ambient monitoring program; other special studies; etc.) will be used to identify and track high concentrations of these pollutants, which can help "track back" upstream to potential sources. With respect to control of these pollutants once they have already contaminated runoff, structural BMPs may be effective. Because each of these pollutants bonds with soil particles and has a low solubility in water, treatment techniques that manage TSS are the best reduction strategies for their removal.

DDT, DDE, and DDD

Common Sources - DDT and its DDD and DDE breakdown products initially entered soils during their manufacture and use as insecticides. They are persistent chemicals that remain in the soil for a long time; therefore, the majority of these pollutants found in the environment today is residual from past use. The historic widespread use of these chemicals means they are potentially ubiquitous in District soils.

Reduction Strategies – Similarly to other pollutants that are no longer manufactured or used, traditional source controls, such as clean-ups of point sources, are not viable reduction strategies in MS4 discharges. Controls that focus on minimizing soil disturbance (such as soil and erosion controls) may be most effective in controlling residual amounts of these pollutants from entering runoff. The MS4 system itself may be a source of these pollutants, as may contaminated sediments in District waterbodies. Source controls such as targeted sewer cleaning and sediment capping can be effective source controls if sewers or sediments, respectively, are potential sources. MS4 monitoring data, as well as other sources of monitoring data (e.g., the ambient monitoring program; other special studies; etc.) will be used to identify and track high concentrations of these pollutants, which can help "track back" upstream to potential sources. With respect to control of these pollutants once they have already contaminated runoff, structural BMPs may be effective. Because each of these pollutants bonds with soil particles and has a low solubility in water, treatment techniques that manage TSS are the best reduction strategies for their removal.

Total PCBs

Common Sources – PCBs, which were banned in 1977, were used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. Other uses included heat transfer fluid, hydraulic fluid, dye carriers in carbonless copy paper, and plasticizers in paints, adhesives, and caulking compounds. Many electrical transformers and capacitors filled with PCBs are still in service today. In addition, PCB-containing fluorescent lights (i.e., in the ballast), electrical devices, and appliances may still exist in older buildings. Many of these potential point sources of have not been identified. In addition, PCBs exist as a residue in soils and in landfills where PCB wastes were placed. While there are many controls and restrictions in place to mitigate potential impacts of remaining PCBs and PCB-containing materials, demolition and removal of PCB-containing materials (such as transformers, capacitors, fluorescent lights), accidental leaks and spills from landfills or during transport, and burning of PCB-containing wastes in municipal and industrial incinerators are all potential PCB sources.

Reduction Strategies – Because of the very low WLAs for PCBs in many TMDLs, as well as the relative ineffectiveness of structural BMPs in removing PCBs, many PCB TMDLs and TMDL implementation plans focus on developing and implementing PCB Pollutant Minimization Plans (PMPs) to address WLAs. This is the case with the Potomac PCB TMDL. The "TMDL Implementation and Reasonable Assurance" Section of this TMDL study states that the WLAs will be achieved by implementing non-numeric BMPs focusing on PCB source tracking and elimination at the source. PMP implementation for PCBs has precedent in the District; in response to the PCB WLA for the Blue Plains WWTP from the Potomac PCB TMDL, a requirement to evaluate PCBs for the potential development of a PCB PMP was included in the facility's NPDES discharge permit. A general discussion of PMPs is provided in Section 5.3.1.d.

Other Pollutants

Other pollutants for which there are WLAs in the MS4 include trash, oil and grease, and BOD.

Trash

Common Sources – Trash is a pollutant associated with a large range of human activities, and as such, it is ubiquitous in the environment. Examples include bottles (plastic or glass), cans, plastic bags, take-out containers, toiletries, and food packaging.

Reduction Strategies – Because sources of trash are ubiquitous in the District, source control must result primarily from behavioral changes by the people whose everyday actions result in the release of trash into the environment. Public education regarding the proper disposal of trash is key in reducing the overall amount of trash. Additionally, actions such as providing more public trash receptacles and regularly cleaning out the trash receptacles can also reduce the amount of trash in stormwater. Regulatory actions that may incite behavioral changes, such as a plastic bag fee and a Styrofoam container ban, can also have a big impact on reducing trash at the source.

Once trash is picked up by stormwater, BMPs such as trash traps and trash skimmer boats can collect and reduce the amount of trash that is released to waterbodies. Similarly, community trash clean up events also reduces the amount of trash in waterbodies.

Oil and Grease

Common Sources – Oil and grease are pollutants associated with a large range of human activities and as such are ubiquitous in the environment. Common sources of oil and grease include improper disposal, spills, and illicit discharges of oil and grease products, as well as the use of any vehicle, power tool, or appliances that require oil for proper operation.

Reduction Strategies – Because sources of oil and grease are ubiquitous in the District, source control must result primarily from behavioral changes by the people whose everyday actions result in the release of oil and grease. Public education regarding the proper disposal of oil and grease products, and the proper maintenance of vehicles, tools, and appliances can help to reduce the ongoing sources of oil and grease in the environment.

With respect to removing oil and grease that is present in storm water, some BMP types can remove or minimize oil and grease from entering waterways. These include proprietary BMPs, skimmers, water quality inlets, and infiltration-based BMPs.

BOD

Common Sources – Biological oxygen demand (BOD) in stormwater is in itself not thought to be substantial, but stormwater with high nutrient concentration can lead to high BOD level. In other words, high BOD levels are the byproduct of nutrient enrichment and eutrophication.

Reduction Strategies – Reduction strategies for BOD include targeting nutrient and sediment removal. These reduction strategies are explained in the previous subsections.

References

Schueler, T. 2011. CSN Technical Bulletin No. 9. Nutrient Accounting Methods to Document Local Stormwater Load Reductions in the Chesapeake Bay Watershed. http://chesapeakestormwater.net/wp-content/uploads/downloads/2012/03/TB-9-Nutrient-Accounting-FINAL-DRAFT.pdf.

Appendix B

TMDL Fact Sheets

DEPARTMENT OF ENERGY & ENVIRONMENT

Consolidated TMDL Implementation Plan – Revised Draft

August 2016

List of Tables

Table B- 1. Hickey Run TMDL Water Quality Management Plan to Control Oil and Grease, PCB & Chlordane	
BACKGROUND	
Issue Date	1998
Author	DC DoH
303(d) Listing	1996
Impairments and Pollutant Causes	Class D: Protection of human health related to consumption of fish and shellfish. Causes of impairment: oil and grease, pH, pathogens and other pollutants. (Reference: 1)
Impairment Notes	N/A
Sources of Pollutants	Chronic discharge of oil and by-products, runoff, and polluted groundwater. (Reference: 1)
MODELING	
Modeling approach	N/A
EMCs	Because of the nature of the discharges, EMCs could not be estimated even with available monitoring data. (Reference: 1)
ALLOCATIONS	
Allocation notes	There was no specific WLA or LA developed for oil and grease, but in accordance with D.C. WQS the allowable concentration of oil and grease in D.C. waters is 10 mg/L for class C waters. This is the concentration at which a visible sheen occurs. (Reference: 1)
	Water quality monitoring data indicates that PCB and chlordane are below the detection limits in the water column, but because these pollutants have been a major concern in the District regarding public health, it is the policy in the District not to allow any discharge of PCB or chlordane into the waters. (Reference: 1)
IMPLEMENTATION	
Implementation	The TMDL for oil and grease will be implemented through management actions focusing on identifying and controlling sources. The TMDLs for chlordane and PCBs will be implemented by prohibiting the discharge of these pollutants into Hickey Run. (Reference: 1)
Other issues	
REFERENCES AND IMPORTANT DOCUMENTS	
1	Hickey Run TMDL Water Quality Management Plan to Control Oil and Grease, PCB & Chlordane, DC DoH, January 1998

Table B- 2. Total Maximum Daily Load for BOD in Upper and Lower Anacostia		
BACKGROUND		
Issue Date	2001	
Author	DC DoH	
303(d) listing	1996 and 1998	
Impairments and Pollutant Causes	Mainstem Anacostia, Upper and Lower segments: Protection of human health related to consumption of fish and shellfish. Causes of impairment: BOD, Nitrogen, and Phosphorus. (Reference: 1)	
Impairment Notes		
Sources of Pollutants	CSOs, SSOs, direct drainage, and Upstream sources. (Reference: 1)	
MODELING		
Modeling Approach	Modeling framework includes four components, the Tidal Anacostia Model (TAM), Water Quality Simulation Program (WASP), Water Transport, and the Sediment Diagenesis Model. (Reference: 1)	
EMCs	The daily input load for each of the eight modeled constituents for each model segment were generally calculated differently for each of the five different sources of flow, and were often calculated differently for each constituent. (Reference: 3)	
ALLOCATIONS		
WLAs	No MS4 WLAs	
Annual Ave. LAs (lbs/year)	Upper Anacostia	• BOD= 81083 • Nitrogen= 29196 • Phosphorus= 4887
	Lower Anacostia	• BOD= 51724 • Nitrogen= 15319 • Phosphorus= 2631
Allocation Notes	No MS4 WLAs provided (stormwater allocations included direct drainage). Superseded by 2008 Anacostia Watershed Nutrients and BOD TMDL. (Reference: 1)	
IMPLEMENTATION		
Implementation	TMDL cites Chesapeake Bay Agreement, which states "By 2010, the District of Columbia, working with its watershed partners, will reduce pollution loads to the Anacostia River in order to eliminate public health concerns and achieve the living resources, water quality, and habitat goals of this and past agreements" as an existing agreement that demonstrates a commitment and a completion date for “implementation of those activities necessary the load reductions allocated in this TMDL” (Reference: 1)	
Other Issues		
REFERENCES AND IMPORTANT DOCUMENTS		
1	Final TMDL for BOD in the Upper and Lower Mainstream Anacostia, DC DOH, August 2001	
2	Decision Rationale Total Maximum Daily Loads Anacostia River Watershed For Biochemical Oxygen Demand, U.S. EPA, 2001	
3	"The Tam/WASP Model: A Modeling Framework for the Total Maximum Daily Allocation in the Tidal Anacostia River -- Final Report," Oct. 2000, Ross Mandel and Cherie L. Schultz	

Table B- 3. Total Maximum Daily Loads Upper Anacostia River Lower Anacostia River District of Columbia Total Suspended Solids	
BACKGROUND	
Issue Date	2002
Author	EPA
303(d) Listing	1996 and 1998
Impairments and Pollutant causes	Mainstem Anacostia, Upper and Lower segments: Protection and propagation of fish, shellfish, and wildlife. Cause of impairment: total suspended solids (TSS). (Reference: 1)
Impairment Notes	The mainstem Anacostia does not support protection and propagation of fish, shellfish and wildlife based on water clarity problems caused by high TSS concentrations. (Reference: 1)
Sources of Pollutants	Tributaries, stormwater runoff, CSOs, direct surface runoff. (Reference: 1)
MODELING	
Modeling Approach	TAM for hydrodynamics, WASP TOXI5 for sediment transport and concentrations. (Reference: 1)
EMCs	EMCs documented in Table 2-5 of ICPRB Modeling Report. Report states that 94 mg/L TSS concentrations for most subsheds were based on provisional DC Water LTCP modeling results, while 227 mg/L for Pope Branch, Fort Dupont, and Nash Run were based on Pope Branch monitoring data. (Reference: 2)
ALLOCATIONS	
Seasonal Ave. LAs (tons/growing season)	• Upper Anacostia= 113.3 • Lower Anacostia= 34.3
Seasonal Ave. LAs (lbs/day/growing season)	• Upper Anacostia= 1000.0 • Lower Anacostia= 400.0
Allocation Notes	MS4 stormwater loads were considered nonpoint sources for this TMDL and were included with the NPS LAs. MOS for all allocations is implicit. (Reference: 1)
IMPLEMENTATION	
Implementation	No specific implementation plan in TMDL. (Reference: 1)
Other Issues	Notes that DC SWMP "should provide additional mechanisms for achieving the load reductions identified in this TMDL." (Reference: 1)
	Difference in TMDL endpoints between EPA TMDL and DOH TMDL, primarily due to new WQS adopted by DC but not submitted for public notice as final standards during EPA review of DOH TMDL. Load reduction percentages - 83-86% in DOH TMDL, versus 77% in EPA TMDL - were similar. (Reference:3)
REFERENCES AND IMPORTANT DOCUMENTS	
1	Total Maximum Daily Loads Upper Anacostia River Lower Anacostia River District of Columbia Total Suspended Solids, U.S. EPA, 2002
2	Calibration of the TAM/WASP Sediment Transport Model - Final Report, ICPRB, 2001/rev 2003
3	Decision Rationale: Total Maximum Daily Loads Total Suspended Solids Upper Anacostia River Lower Anacostia River District of Columbia, U.S. EPA *(date?)*

<table>
<tr><th colspan="3">Table B- 4. Total Maximum Daily Load for Fecal Coliform Bacteria in Anacostia and Tributaries</th></tr>
<tr><td colspan="3">BACKGROUND</td></tr>
<tr><td>Issue Date</td><td colspan="2">Original fecal coliform TMDL 2003; E. coli revision 2014</td></tr>
<tr><td>Author</td><td colspan="2">DC DoH (original fecal coliform TMDL); DDOE (E. coli revision)</td></tr>
<tr><td>303(d) listing</td><td colspan="2">1998, 2002</td></tr>
<tr><td rowspan="2">Impairments and Pollutant Causes</td><td colspan="2">Primary Contact Recreation. Causes of impairment: Fecal Coliform (Fort Chaplin, Fort Dupont, Fort Stanton, Nash Run, Popes Branch, Texas Ave. Tributary, and Watts Branch lower). (Reference: 1998, 2002 303(d) lists)</td></tr>
<tr><td colspan="2">Protection and Propagation of Fish, Shellfish, and Wildlife. Cause of impairment: Fecal coliform (Hickey Run). (Reference: 1998, 2002 303(d) lists)</td></tr>
<tr><td>Impairment Notes</td><td colspan="2">Endpoints for TMDL are defined as bacteria concentrations to meet Class A and B designated uses</td></tr>
<tr><td>Sources of Pollutants</td><td colspan="2">CSOs, SSOs, Stormwater runoff, and direct deposits. (Reference: 1)</td></tr>
<tr><td colspan="3">MODELING</td></tr>
<tr><td>Modeling Approach</td><td colspan="2">MS4 loads estimated using MOUSE hydrology and SSWS sheds from DC Water LTCP. Mainstem water quality modeled using TAM/WASP. Tributary loads modeled using the Watts Branch HSPF model and the DC Small Tributaries Model. (Reference: 1). Translation from fecal coliform to E. coli done using DC translator tool (Reference: 4).</td></tr>
<tr><td>EMCs</td><td colspan="2">Original fecal coliform WLAs: Mainstem: 28,265 MPN/100 mL; Tributaries 17,300 MPN/100 mL (Reference: 2, pp. 19-20)</td></tr>
<tr><td colspan="3">ALLOCATIONS</td></tr>
<tr><td>E. coli
Annual Ave. WLAs (MS4)
(MPN/100ml/year)</td><td>• Anacostia= 2.30E14
• Fort Stanton= 1.08E6
• Fort Davis= 8.17E5
• Fort Dupont= 2.34E6
• Fort Chaplin= 1.32E6
• Hickey Run= 6.31E6</td><td>• Nash Run= 2.23E6 (includes MD loads)
• Pope Branch= 1.67E6
• Texas Ave. Tributary= 1.36E6
• Watts Branch= 1.20E7 (includes MD loads)</td></tr>
<tr><td>E. coli
Daily Ave. WLAs (MS4)
(MPN/100ml/day)</td><td>• Anacostia= 6.56E11
• Fort Stanton= 2.95E3
• Fort Davis= 2.24E3
• Fort Dupont= 6.41E3
• Fort Chaplin= 3.62E3
• Hickey Run= 1.73E4</td><td>• Nash Run= 6.11E3 (includes MD loads)
• Pope Branch= 4.57E3
• Texas Ave. Tributary= 3.72E3
• Watts Branch= 3.28E4 (includes MD loads)</td></tr>
<tr><td>E. coli
Daily Max. WLAs (MS4)
(MPN/100ml/day)</td><td>• Anacostia= 1.50E13
• Fort Stanton= 9.17E3
• Fort Davis= 6.96E3
• Fort Dupont= 1.99E4
• Fort Chaplin= 1.13E4
• Hickey Run= 5.37E4</td><td>• Nash Run= 1.90E4 (includes MD loads)
• Pope Branch= 1.42E4
• Texas Ave. Tributary= 1.16E4
• Watts Branch= 1.02E5 (includes MD loads)</td></tr>
<tr><td>E. coli
Annual Ave. LAs
(MPN/100ml/year)</td><td>• Anacostia= 8.10E12</td><td></td></tr>
<tr><td>E. coli
Daily Ave. LAs
(MPN/100ml/day)</td><td>• Anacostia= 6.71E10</td><td></td></tr>
</table>

Table B- 4. Total Maximum Daily Load for Fecal Coliform Bacteria in Anacostia and Tributaries		
E. coli Daily Max. LAs (MPN/100ml/day)	• Anacostia= 4.33E11	
Fecal coliform Annual Ave. WLAs (MS4) (MPN/100ml/year)	• Upper Anacostia= Not defined (reported WLA includes MS4 and CSO) • Lower Anacostia= Not defined (reported WLA includes MS4 and CSO) • Fort Stanton= 4.09E5 • Fort Davis= 1.15E6 • Fort Dupont= 1.13E6	• Fort Chaplin= 2.70E6 • Hickey Run= 1.08E7 • Nash Run (DC loads)= 3.63E6 • Popes Branch= 5.81E6 • Texas Ave. Tributary= 4.38E6 • Watts Branch (Upper Watts)= 1.19E7 • Watts Branch (Lower Watts)= 4.40E6
Fecal coliform LAs (MPN/100ml/year)	• Upper Anacostia= 1.11E13 • Lower Anacostia= 5.98E12 • Fort Stanton= 2.13E6 • Fort Davis= 6.26E5 • Fort Dupont= 4.68E6 • Fort Chaplin= 6.90E5 • Hickey Run= 7.14E6	• Nash Run (DC loads)= 4.68E4 • Popes Branch= 2.72E5 • Texas Ave. Tributary= 5.00E5 • Watts Branch (Upper Watts)= 2.61E5 • Watts Branch (Lower Watts)= 1.02E5
Allocation notes	Original tributary fecal coliform WLAs appear to be calculated incorrectly. Translator incorrectly applied to tributaries, so E. coli WLAs for tributaries should be redone.	
IMPLEMENTATION		
Implementation	TMDL cites Chesapeake Bay Agreement, which states "By 2010, the District of Columbia, working with its watershed partners, will reduce pollution loads to the Anacostia River in order to eliminate public health concerns and achieve the living resources, water quality, and habitat goals of this and past agreements" as an existing agreement that demonstrates a commitment and a completion date for "implementation of those activities necessary the load reductions allocated in this TMDL" (Reference: 1)	
Other Issues		
REFERENCES AND IMPORTANT DOCUMENTS		
1	Final TMDL for Fecal Coliform Bacteria in Anacostia River and Tributaries, DC DOH, August 2003	
2	Amended Decision Rationale Total Maximum Daily Loads Anacostia River Watershed For Fecal Coliform Bacteria, U.S. EPA, 2003	
3	Final Memo Summarizing DC Bacteria Data and Recommending a DC Bacteria Translator (Task 2), LimnoTech, 2011.	
4	Appendix C, E. coli Bacteria Allocations and Daily Loads for the Anacostia and Tributaries, February 2013. New appendix to original "Final TMDL for Fecal Coliform Bacteria in Anacostia River and Tributaries" document (DC DOH, 2003).	

Table B- 5. Total Maximum Daily Load for Metals and Organics in Anacostia and Tributaries			
BACKGROUND			
Issue Date	2003		
Author	DC DoH		
303(d) listing	1996 and 1998		
Impairments and Pollutant Causes	Mainstem Anacostia, Upper and Lower segments: Protection of human health related to consumption of fish and shellfish. Causes of impairment: arsenic, copper, lead, zinc, heptachlor epoxide, dieldrin, chlordane, DDD, DDE, DDT, PAH1, PAH2, PAH3, total PCBs. (Reference: 6)		
	Anacostia Tributaries: Protection and propagation of fish, shellfish and wildlife. Causes of impairment: Metals and Organics (Nash Run, Popes Branch, Texas Avenue Tributary); Metals (Fort Chaplin, Fort Davis, Fort Dupont); Organics (Fort Stanton, Hickey Run, Upper and Lower Watts Branch). See above for list of specific metals and organics causing impairments. (Reference: 1)		
Impairment Notes	Anacostia and tributaries do not support fish consumption use based on public health advisory published by DC Commissioner of Health in 1994 (Source: Integrated Report). Organics and metals of concern identified from fish tissue and sediment analysis in Anacostia mainstem (Reference: 1).		
Sources of Pollutants	Upstream, CSO, and stormwater (Reference: 1)		
MODELING			
Modeling Approach	DC Small Tributaries Model; TAM/WASP Toxics Screening Level Model		
EMCs	EMCs documented in Table 2b, p. 11, Small Tributaries Model Report, ICPRB July 2003. Small Tributaries Model Report states that "Storm flow concentrations were obtained by averaging the DC Water LTCP separate sewer system EMCs (DC WASA, 2000a; 2000b) with means of the recent DC MS4 monitoring results; except arsenic, which was based on MS4 monitoring data." (Reference: 3)		
ALLOCATIONS			
Annual Ave. WLAs (MS4) (lb/year)	Upper Anacostia	• Arsenic= 1.44 • Copper= 3.88E2 • Lead= 3.88E2 • Zinc= 2.39E3 • Chlordane= 0.0141 • DDD= 0.0052 • DDE= 0.0127	• DDT= 0.034 • Dieldrin= 0.0082 • Heptachlor Epoxide= 0.0041 • PAH1= 0.193 • PAH2= 1.144 • PAH3= 0.73
	Lower Anacostia	• Arsenic= 3.41 • Copper= 2.19E2 • Lead= 2.19E2 • Zinc= 1.34E3 • Chlordane= 0.0078 • DDD= 0.0087 • DDE= 0.0211	• DDT= 0.057 • Dieldrin= 0.0035 • Heptachlor Epoxide= 0.002 • PAH1= 0.106 • PAH2= 0.641 • PAH3= 0.409
	Fort Chaplin	• Arsenic= 0.38 • Copper= 18.29	• Lead= 7.67 • Zinc= 135.2
	Fort Davis	• Arsenic= 0.10 • Copper= 4.73	• Lead= 1.95 • Zinc= 42.4

Annual Ave. WLAs (MS4) (lb/year)	Fort Dupont	• Arsenic= 0.17 • Copper= 7.66*	• Lead= 3.56 • Zinc= 228.9*
	Fort Stanton	• Arsenic= 0.05 • Copper= 2.48 • Lead= 1.05 • Zinc= 91.1 • Chlordane= 0.0002 • DDD= 0.00009 • DDE= 0.0001	• DDT= 0.00015 • Dieldrin= 0.000023 • Heptachlor Epoxide= 0.00002 • PAH1= 0.078 • PAH2= 0.009 • PAH3= 0.006
	Hickey Run	• Chlordane=0.0142 • DDD= 0.03259* • DDE= 0.0069 • DDT= 0.00687* • Dieldrin= 0.000758*	• Heptachlor Epoxide= 0.00074* • PAH1= 3.882 • PAH2= 0.470 • PAH3= 0.300
	Nash Run (DC loads)	• Arsenic= 0.86 • Copper= 52.93* • Lead= 19.65 • Zinc= 320.1* • Chlordane= 0.0032 • DDD= 0.00139* • DDE= 0.0029*	• DDT= 0.00286* • Dieldrin= 0.000329 • Heptachlor Epoxide= 0.00031 • PAH1= 1.594 • PAH2= 0.192 • PAH3= 0.123
	Pope Branch	• Arsenic= 0.52* • Copper= 25.67* • Lead= 10.82 • Zinc= 163.2* • Chlordane= 0.0017 • DDD= 0.001* • DDE= 0.0016	• DDT= 0.00161* • Dieldrin= 0.00025* • Heptachlor Epoxide= 0.0019 • PAH1= 0.804 • PAH2= 0.093 • PAH3= 0.059
	Texas Ave. Tributary	• Arsenic= 0.40 • Copper= 19.78 • Lead= 8.31 • Zinc= 138.2 • Chlordane= 0.0013 • DDD= 0.00699 • DDE= 0.0012	• DDT= 0.04011 • Dieldrin= 0.000174 • Heptachlor Epoxide= 0.00014 • PAH1= 0.613 • PAH2= 0.071 • PAH3= 0.045
	Watt Branch (DC Upper Branch)	• Chlordane= 0.0096 • DDD= 0.00396* • DDE= 0.0079* • DDT= 0.000396* • Dieldrin= 0.000945	• Heptachlor Epoxide= 0.00088* • PAH1= 4.372* • PAH2= 0.525* • PAH3= 0.335*
	Watt Branch (DC Lower Branch)	• Chlordane= 0.0037 • DDD= 0.00154* • DDE= 0.0031* • DDT= 0.000154* • Dieldrin= 0.000368	• Heptachlor Epoxide= 0.00034* • PAH1= 1.701* • PAH2= 0.204* • PAH3=0.130*

Annual Ave. LAs (lb/year)	Fort Chaplin	• Arsenic= 0.10 • Copper= 4.67	• Lead= 1.96 • Zinc= 34.5
	Fort Davis	• Arsenic= 0.05 • Copper= 2.57	• Lead= 1.06 • Zinc= 10.8
	Fort Dupont	• Arsenic= 0.68 • Copper= 31.71	• Lead= 14.75 • Zinc= 58.4
	Fort Stanton	• Arsenic= 0.26 • Copper= 12.94 • Lead= 5.47 • Zinc= 23.3 • Chlordane= 0.0009 • DDD= 0.00049 • DDE= 0.0008	• DDT= 0.0008 • Dieldrin= 0.000122 • Heptachlor Epoxide= 0.00010 • PAH1= 0.404 • PAH2= 0.047 • PAH3= 0.030
	Hickey Run	• Chlordane= 0.0000 • DDD= 0.02163 • DDE= 0.0046 • DDT= 0.00456 • Dieldrin= 0.000503	• Heptachlor Epoxide= 0.00049 • PAH1= 2.577 • PAH2= 0.312 • PAH3= 0.199
	Nash Run (DC loads)	• Arsenic= 0.01 • Copper= 0.68 • Lead= 0.25 • Zinc= 81.7 • Chlordane= 0.0000 • DDD= 0.00002 • DDE= 0.0000	• DDT= 0.00004 • Dieldrin= 0.000004 • Heptachlor Epoxide= 0.000004 • PAH1= 0.021 • PAH2= 0.002 • PAH3= 0.002
Annual Ave. LAs (lb/year)	Popes Branch	• Arsenic= 0.04 • Copper= 1.98 • Lead= 0.83 • Zinc= 41.6 • Chlordane= 0.0001 • DDD= 0.00008 • DDE= 0.0001	• DDT= 0.00012 • Dieldrin= 0.000019 • Heptachlor Epoxide= 0.00001 • PAH1= 0.062 • PAH2= 0.007 • PAH3= 0.005
	Texas Ave. Tributary	• Arsenic= 0.07 • Copper= 3.56 • Lead= 1.50 • Zinc= 35.3 • Chlordane= 0.0002 • DDD= 0.00126 • DDE= 0.0002	• DDT= 0.00722 • Dieldrin= 0.000031 • Heptachlor Epoxide= 0.00003 • PAH1= 0.110 • PAH2= 0.013 • PAH3= 0.008
	Watt Branch (DC Upper Branch)	• Chlordane= 0.0002 • DDD= 0.00009 • DDE= 0.0002 • DDT= 0.000009 • Dieldrin= 0.000021	• Heptachlor Epoxide= 0.00002 • PAH1= 0.097 • PAH2= 0.012 • PAH3= 0.007

	Watt Branch (DC Lower Branch)	• Chlordane= 0.0001 • DDD= 0.00003 • DDE= 0.0001 • DDT= 0.000003 • Dieldrin= 0.000008	• Heptachlor Epoxide= 0.00001 • PAH1= 0.038 • PAH2= 0.005 • PAH3= 0.003
Allocation Notes	Allocations taken from Reference 2 Appendix A.		
	*MS4 WLAs moved to category 3 in 2014 303(d) list		
	Copper WLAs for Upper and Lower Anacostia are incorrect.		
	TMDL also includes Maryland allocations for Nash Run and Watt Branch. (Reference: 1)		
	Original TMDL aggregated MS4 and direct drainage loads together as "stormwater" loads. EPA Decision Rationale developed separate MS4 WLAs.		
IMPLEMENTATION			
Implementation	No specific implementation plan in TMDL. (Reference: 1)		
Other Issues	Tributary impairments based on data from the mainstem Anacostia, not from tributaries themselves		
	Sewershed delineations updated		
	Some EMCs developed based on data from Maryland		
REFERENCES AND IMPORTANT DOCUMENTS			
1	Final TMDL for Organics and Metals in the Anacostia and Tributaries, DC DOH, August 2003		
2	Amended Decision Rationale, Total Maximum Daily Loads, Anacostia River Watershed for Metals and Organics. U.S. EPA, 2003		
3	Small Tributaries Model Report, ICPRB, 2003		
4	DC WASA. 2000a. Study Memorandum 5-5A: CSS and SSWS Monitoring Results, August 1999 - February 2000		
5	DC WASA. 2000b. Study Memorandum 5-5B: CSS and SSWS Monitoring Results, March - July 2000		
6	2012 Integrated Report to the US Environmental Protection Agency and Congress Pursuant to Sections 305(b) and 303(d) Clean Water Act (P.L. 97-117), DDOE, 2012		

Table B- 6. Total Maximum Daily Load for Oil and Grease in the Anacostia River	
BACKGROUND	
Issue Date	2003
Author	DC DoH
303(d) Listing	1998
Impairments and Pollutant Causes	Class A: Primary contact recreation, Class B: Secondary contact recreation and aesthetic enjoyment, and Class C: Protection and propagation of fish, shellfish, and wildlife. (Reference: 1)
	A visible sheen of oil was visible on Hickey Run, a tributary to the Anacostia River. Oil from Hickey Run would enter the Anacostia River and cause exceedances of the criteria. (Reference: 1)

Table B- 6. Total Maximum Daily Load for Oil and Grease in the Anacostia River	
Impairment Notes	Analysis of current data suggests that the Anacostia River is no longer impaired by oil and grease deposited through Hickey Creek and Kingman Lake. (Reference: 1)
Sources of Pollutants	Stormwater point and nonpoint sources, CSOs, MS4. (Reference: 1)
MODELING	
Modeling Approach	Average stormwater flow data was obtained from the TAM/WASP model used in previous Anacostia River TMDLs. (Reference: 2)
EMCs	No EMCs were developed due to reduction in oil and grease concentrations resulting from on-going activities described in the Hickey Run Action Plan (2002). (Reference: 1)
ALLOCATIONS	
Daily Ave. WLAs (MS4) (lbs/day)	• Upper Anacostia= 366.3 • Lower Anacostia= 200.376
LAs	N/A
Allocation Notes	Table 6-3 of the TMDL document also lists upstream stormwater loads from Maryland, as well as CSO waste load allocations. (Reference: 1)
	Anacostia River oil and grease TMDL builds upon the efforts made in previous TMDLs for the watershed. Since there is little in-stream data on the existing oil and grease loadings and their sources within the river, the TMDL loadings required to maintain ambient water quality are based upon the stream's assimilative capacity determined by multiplying the stream's flow and the oil and grease criteria of 10 mg/l. (Reference: 1)
IMPLEMENTATION	
Implementation	Expected implementation of this TMDL focuses on source control. A specific 2001-2003 project (Environmental Education for the Compliance of Auto Repair Shops [EE-CARS]), and Hickey Run BMPs are expected to promote source control of oil and grease in the watershed. (Reference: 1)
Other Issues	
REFERENCES AND IMPORTANT DOCUMENTS	
1	District of Columbia Final TMDL for Oil and Grease in the Anacostia River, DC DOH, October 2003
2	Decision Rationale TMDL for the Anacostia River Watershed and Kingman Lake for Oil and Grease, U.S. EPA, 2003
3	Hickey Run Action Plan, 2002

Table B- 7. Total Maximum Daily Load for Fecal Coliform Bacteria in Kingman Lake	
BACKGROUND	
Issue Date	2003 and revised in 2013
Author	DC DoH; DDOE (revision)
303(d) Listing	1996, 1998
Impairments and Pollutant Causes	Class A: Primary contact recreation. Impairment causes: fecal coliform bacteria. (Reference: 1)

Table B- 7. Total Maximum Daily Load for Fecal Coliform Bacteria in Kingman Lake	
Impairment Notes	N/A
Sources of Pollutants	MS4 (Reference: 1)
MODELING	
Modeling Approach	The analysis was conducted using the Tidal Anacostia Model (TAM) with the underlying assumptions of the Anacostia River Bacterial TMDL. (Reference: 1)
EMCs	28,265 MPN/100 ml (fecal). (Reference: 1)
ALLOCATIONS	
E. coli Monthly Ave. WLAs (MS4) (MPN/100ml/month)	7.05E10
E. coli Daily Ave. WLAs (MS4) (MPN/100ml/day)	2.35E09
E. coli Daily Max WLAs (MS4) (MPN/100ml/day)	7.31E9
Fecal coliform Monthly Ave. WLAs (MS4) (MPN/100ml/day)	1.72E11
E. coli Monthly Ave. LAs (MS4) (MPN/100ml/month)	4.51E10
E. coli Daily Ave. LAs (MPN/100ml/day)	1.50E9
E. coli Daily Max LAs (MPN/100ml/day)	4.67E9
Fecal coliform Monthly Ave. LAs (MPN/100ml/day)	1.10E11
Allocation Notes	The 2003 TMDL only included average monthly loads while the 2014 revision included daily maximum and average allocations. (References 1 and 2)
	Translator incorrectly applied, so E. coli WLAs should be redone.
IMPLEMENTATION	
Implementation	No specific implementation plan

Table B- 7. Total Maximum Daily Load for Fecal Coliform Bacteria in Kingman Lake	
Other Issues	Two TMDLs have been approved for Kingman lake FC Bacteria, one in 2003 and a revision in 2014. The revision includes daily loads that were not included in the 2003 TMDL. (Reference: 1, 2)
REFERENCES AND IMPORTANT DOCUMENTS	
1	Total Maximum Daily Load for Fecal Coliform Bacteria in Kingman Lake, DC DoH, October 2003
2	Decision Rationale 2014 E. coli Bacteria Allocations and Daily Loads for Kingman Lake, TMDL Revision, District of Columbia, U.S. EPA, July 2014
3	Appendix A: E. coli Bacteria Allocations and Daily Loads for Kingman Lake, 2013
4	Final Memo Summarizing DC Bacteria Data and Recommending a DC Bacteria Translator (Task 2), LimnoTech, 2011

Table B- 8. Total Maximum Daily Loads for Organics and Metals in Kingman Lake		
BACKGROUND		
Issue Date	2003	
Author	DC DoH	
303(d) Listing	1996 and 1998	
Impairments and Pollutant Causes	Class A: Primary contact recreation. Impairment Cause: organics, and metals. (Reference: 1)	
Impairment Notes	Impairment listed because Hickey Run had a visible sheen of oil and grease and is a tributary to the Anacostia River with confluence 300 feet upstream of the inlet to Kingman Lake. (Reference: 1)	
Sources of Pollutants	MS4. (Reference: 1)	
MODELING		
Modeling Approach	TAM/WASP Toxics Screening Level Model (Reference: 1)	
EMCs	EMCs documented in Table 2b, p. 11, Small Tributaries Model Report, ICPRB July 2003. Small Tributaries Model Report states that "Storm flow concentrations were obtained by averaging the DC Water LTCP separate sewer system EMCs (DC WASA, 2000a; 2000b) with means of the recent DC MS4 monitoring results; except arsenic, which was based on MS4 monitoring data." (Reference: 3)	
ALLOCATIONS		
Annual Ave. WLAs (MS4) (lbs/year)	• Arsenic= 3.97E-2 • Copper= 1.00E1* • Lead= 4.87 • Zinc= 2.98E1* • Chlordane= 1.78E-4 • DDD= 1.30E-4* • DDE= 2.87E-4*	• DDT= 7.77E-3 • Dieldrin= 1.12E-4* • Heptachlor Epoxide= 5.39E-5* • PAH1= 1.20E-1 • PAH2= 7.08 • PAH3= 4.50E-1

Table B- 8. Total Maximum Daily Loads for Organics and Metals in Kingman Lake		
Annual Ave. LAs (lbs/year)	• Arsenic= 2.54E-2 • Copper= 6.40E1 • Lead= 3.12 • Zinc= 1.90E1 • Chlordane= 1.14E-4 • DDD= 8.32E-4 • DDE= 1.84 E-4	• DDT= 4.96E-3 • Dieldrin= 7.14E-4 • Heptachlor Epoxide= 3.45E-5 • PAH1= 7.68E-1 • PAH2= 4.52 • PAH3= 2.88E-1
Allocation Notes	*MS4 WLAs moved to category 3 in 2014 303(d) list	
	WLAs documented in EPA Decision Document, Table 4. (Reference and 2)	
IMPLEMENTATION		
Implementation	No specific implementation plan.	
Other Issues		
REFERENCES AND IMPORTANT DOCUMENTS		
1	Total Maximum Daily Loads for Organics and Metals in Kingman Lake, DC DoH, September 2003	
2	Decision Rationale Total Maximum Daily Loads Kingman Lake for Organics and Metals, U.C. EPA, October 2003	
3	Small Tributaries Model Report, ICPRB, 2003	

Table B- 9. Total Maximum Daily Load for TSS, Oil and Grease, and BOD in Kingman Lake	
BACKGROUND	
Issue Date	2003
Author	DC DoH
303(d) Listing	1998
Impairments and Pollutant Causes	Class A: Primary contact recreation. Impairment Causes: TSS, Oil and Grease, and BOD. (Reference: 1)
Impairment Notes	TMDL found no impairments for TSS or BOD, so no MS4 WLAs established for these pollutants.
Sources of Pollutants	MS4 and stormwater, upstream sources from the Anacostia and Hickey Run. (Reference: 1)
MODELING	
Modeling Approach	Assimilative load capacity calculation. (Reference: 2)
EMCs	Shown in table on page 6 of TMDL. (Reference: 1)
ALLOCATIONS	
Daily Ave. WLAs (MS4) (lbs/day)	• Oil and Grease= 1278.35
LAs	No LAs required
Allocation Notes	EPA determined that the TMDL applications for the Anacostia River were more than sufficient in reducing TSS and BOD below impairment levels for Kingman Lake. (References 3 and 4)
IMPLEMENTATION	

Table B- 9. Total Maximum Daily Load for TSS, Oil and Grease, and BOD in Kingman Lake	
Implementation	Implementation includes District managed stormwater load reduction programs (street sweeping, stormwater control regulations, nonpoint source management plan, etc.). (Reference: 1)
Other Issues	The oil and grease TMDL was completed by the district to partially meet the third-year TMDL milestone commitments under the requirements of the 2000 TMDL lawsuit settlement of Kingman Park Civic Association et al. (Reference: 2)
REFERENCES AND IMPORTANT DOCUMENTS	
1	Total Maximum Daily Loads for TSS, Oil and Grease, and BOD in Kingman Lake, DC DoH, October 2003
2	Decision Rationale Total Maximum Daily Loads Anacostia River Watershed and Kingman Lake for Oil and Grease, U.S. EPA, October 2003
3	EPA Justification Not to Require a TMDL for TSS in Kingman Lake, U.S. EPA, October 2003
4	EPA Justification Not to Require a TMDL for BOD in Kingman Lake, U.S. EPA, October 2003

Table B- 10. Total Maximum Daily Load for Biochemical Oxygen Demand in Fort Davis Tributary	
BACKGROUND	
Issue Date	2003
Author	DoH
303(d) Listing	1998
Impairments and Pollutant Causes	Class C: Protection and propagation of fish, shellfish, and wildlife. Cause of impairment: low concentrations of DO. (Reference: 1)
Impairment Notes	At the time of the TMDL, it stated that Fort Davis was not directly classified in the DC water quality standards as a separate waterbody, but was classified for designated uses as a tributary of the Anacostia Rover. Anacostia tributaries must meet DO standards for Class C waters. The basis for the listing Fort Davis was the 1998 Water Quality Assessment report (305(b)) report which indicated an 11.1% violation in DO. The purpose of the TMDL was to determine the limit to which BOD must be reduced and to achieve and maintain the Water Quality Standards for DO, and the DO level that would support the fish population or would not cause fish mortality.
Sources of Pollutants	Four storm sewer outfalls discharging to the Fort Davis Tributary. (Reference: 1)
MODELING	
Modeling Approach	N/A
EMCs	N/A
ALLOCATIONS	
WLAs	N/A. Data was provided for five years representing seasonal variation between 1997 and 2001. This data indicated that the Fort Davis Tributary DO concentrations were within daily average limits throughout the five year period. (Reference: 2)
LAs	N/A
Allocation Notes	No allocations because monitoring data indicated that the Fort Davis Tributary is no longer impaired by low DO. (Reference: 2)
IMPLEMENTATION	
Implementation	No specific implementation plan.
Other Issues	This impairment no longer requires a TMDL per EPA justification document. (Reference: 2)
REFERENCES AND IMPORTANT DOCUMENTS	
1	Draft Total Maximum Daily Load for Biochemical Oxygen Demand in Fort Davis Tributary, DoH, March 2003
2	EPA Justification not to require a TMDL for BOD for the Fort Davis Tributary to the Anacostia River. U.S. EPA, October 2003

Table B- 11. Total Maximum Daily Load for TSS in Watts Branch	
BACKGROUND	
Issue Date	2003
Author	DC DoH
303(d) listing	1996 through 2002
Impairments and pollutant causes	Class C: Protection and propagation of fish, shellfish, and wildlife. Impairment Causes: TSS. (Reference: 1)
Impairment Notes	Instream erosion identified as a cause of impairment.
Sources of pollutants	High TSS levels in Watts are caused almost exclusively from the erosion of its streambanks due to urbanization and stream channelization. (Reference: 1)
MODELING	
Modeling approach	HEC-6 model to simulate scour and re-deposition along Watts Branch. (Reference: 1)
EMCs	227 mg/L used initially to calculate total load. 60 mg/L used after stream erosion was broken out (Reference: 1)
ALLOCATIONS	
Annual Ave. WLAs (MS4) (tons/year)	• Upper Watts Branch= 14.8 • Lower Watts Branch= 5.6
Seasonal Ave. WLAs (MS4) (tons/growing season)	• Upper Watts Branch= 9.9 • Lower Watts Branch= 3.7
Annual Ave. LAs (tons/year)	• Upper Watts Branch= 9.2 • Lower Watts Branch= 3.8
Allocation notes	Instream erosion loads assigned to nonpoint source LA. (Reference: 2)
IMPLEMENTATION	
Implementation	Anacostia Watershed Restoration Agreement. (Reference: 1)
Other issues	
REFERENCES AND IMPORTANT DOCUMENTS	
1	Total Maximum Daily Load for TSS in Watts Branch, DC DoH, June 2003
2	Decision Rationale Total Maximum Daily Loads Watts Branch for TSS, U.S. EPA, December 2003

Table B- 12. Total Maximum Daily Load for Sediment/TSS in Anacostia and Tributaries		
BACKGROUND		
Issue Date	2007	
Author	DDOE, MDE	
303(d) Listing	1996, 1998 (DC)	
Impairments and Pollutant Causes	Class C: Protection and propagation of fish, shellfish, and wildlife. (Reference: 1)	
Impairment Notes	The objectives of the sediment/TSS TMDLs established in this document are 1) to ensure that aquatic life is protected in the tidal and non-tidal waters of the Anacostia; 2) to ensure that MD's and DC's sediment-related water quality standards that support aquatic life are met in their respective portions of the watershed; and 3) to ensure in particular that the numeric criteria for water clarity are met in the tidal waters. The endpoint of the TMDL (the most stringent reduction in sediment loads) is DC's tidal Anacostia water clarity criterion.	
Sources of Pollutants	Direct deposit, MS4, NPDES point sources, CSOs, stream erosion. (Reference 1 and 2)	
MODELING		
Modeling Approach	The modeling framework used for the analysis was a coupled watershed/hydrodynamic/water quality model that includes TAM/WASP, the watershed model (Hydrologic Simulation Program -- FORTRAN, (HSFP)), and the USGS's ESTIMATOR model. (Reference: 1)	
EMCs	94 mg/L for all Anacostia Tribs in Table 2-5 except for Nash Run, Pope Branch and Fort Dupont. 227 for Nash Run , Fort Dupont, Pope Branch (Reference: 3)	
ALLOCATIONS		
Annual Ave. WLAs (MS4) (tons/year)	• Anacostia Upper= 84.6 • Anacostia Lower= 46.4 • Lower Beaverdam Creek= 0.6	• Northwest Branch= 26.2 • Watts Branch= 24.2
Daily Ave. WLAs (MS4) (tons/day)	• Anacostia Upper= 0.78 • Anacostia Lower= 0.43	• Lower Beaverdam Creek= 0.0016 • Watts Branch= 0.1114
Daily Max WLAs (MS4) (tons/day)	• Anacostia Upper= 18.35 • Anacostia Lower= 10.24	• Lower Beaverdam Creek= 0.0954 • Watts Branch= 3.425
Seasonal Ave. WLAs (MS4) (tons/growing season)	• Anacostia Upper= 60.4 • Anacostia Lower= 33.6 • Lower Beaverdam Creek= 0.4	• Northwest Branch= 20.7 • Watts Branch= 15.5
Seasonal Ave. WLAs (MS4) (lbs/day/growing season)	• Anacostia Upper= 2360.0 • Anacostia Lower= 1320.0	• Lower Beaverdam Creek= 4.0 • Watts Branch= 263.6
Seasonal Max WLAs (MS4) (lbs/day/growing season)	• Anacostia Upper= 36700 • Anacostia Lower= 20480	• Lower Beaverdam Creek= 186 • Watts Branch= 6850
Annual Ave. LAs (tons/year)	• Anacostia Upper= 29.8 • Anacostia Lower= 20.7	• Northwest Branch= 0.149 • Watts Branch= 3.129

Table B- 12. Total Maximum Daily Load for Sediment/TSS in Anacostia and Tributaries	
Allocation Notes	Allocations in the Decision Rationale also include daily maximum, daily average, seasonal maximum, and seasonal average expressions for load allocations. (Reference:2)
IMPLEMENTATION	
Implementation	TMDL implementation includes DC Water LTCP for the reduction of CSOs and the sediment loads associated with them, and implementation of a stormwater management plan to control the discharge of pollutants from separate storm sewer outfalls in DC. (Reference: 1)
Other issues	This TMDL replaces the 2002 Anacostia TSS TMDL. (Reference: 2)
REFERENCES AND IMPORTANT DOCUMENTS	
1	TMDL of Sediment/TSS for the Anacostia River Basin, Montgomery and Prince George's Counties, Maryland and the District of Columbia, MD EPA, June 2007
2	Decision Rationale TMDL Anacostia River basin watershed for Sediment/TSS, U.S. EPA
3	Anacostia Sediment Models: Phase 3 Anacostia HSPF Watershed Model and Version 3 TAM/WASP Water Clarity Model, Schultz, Kim, Mandel, Nagle, ICPRB Report 07-10, March 2007.

Table B- 13. Total Maximum Daily Load of Nutrients/BOD for the Anacostia River Basin	
BACKGROUND	
Issue Date	2008
Author	DDOE, MDE
303(d) Listing	1998 (DC)
Impairments and Pollutant Causes	DC tidal Anacostia designated use; Class C: Protection and propagation of fish, shellfish and wildlife. This designated use is impaired by low DO. (Reference: 1)
Impairment Notes	The specific water quality impairments addressed in these TMDLs are the violation of DC's DO criteria in its tidal waters. In addition to resolving the listed impairments, the TMDLs for nutrients and BOD must demonstrate that (1) DO criteria are met for all designated uses in MD and DC portions of the Anacostia; (2) DC chlorophyll a criteria are met in DC's segments in the tidal river; and (3) water clarity standards are met in both MD's and DC's tidal waters. (Reference: 1)
Sources of Pollutants	Stormwater runoff, subsurface drainage, erosion and in-stream scour, industrial and municipal point sources, CSOs. (Reference: 1)
MODELING	
Modeling Approach	The modeling framework used for the analysis was a coupled watershed/hydrodynamic/water quality model that includes TAM/WASP, the watershed model (Hydrologic Simulation Program -- FORTRAN, (HSFP)), and the USGS's ESTIMATOR model.
EMCs	No listed EMCs. The TMDL document states that EMCs were based on monitoring data performed for storm sewer drainage and direct drainage under the MS4 program, and for CSOs performed under the DC Water LTCP. (Reference: 1)
ALLOCATIONS	

Table B- 13. Total Maximum Daily Load of Nutrients/BOD for the Anacostia River Basin		
Annual Ave. WLAs (MS4) (lbs/year)	Upper Anacostia	• BOD= 181841 • Nitrogen= 10493 • Phosphorus= 966
	Lower Anacostia	• BOD= 98435 • Nitrogen= 5172 • Phosphorus= 509
	Lower Beaverdam Creek	• BOD= 403 • Nitrogen= 45 • Phosphorus= 6
	Northwest Branch	• BOD= 14421 • Nitrogen= 1955 • Phosphorus= 162
	Watts Branch	• BOD= 14252 • Nitrogen= 1731 • Phosphorus= 248
Daily Ave. WLAs (MS4) (lbs/year)	Upper Anacostia	• BOD= 564 • Nitrogen= 34.70 • Phosphorus= 3.460
	Lower Anacostia	• BOD= 312 • Nitrogen= 16.10 • Phosphorus= 1.610
	Lower Beaverdam Creek	• BOD= 1.10 • Nitrogen= 0.12 • Phosphorus= 0.02
	Watts Branch	• BOD= 39 • Nitrogen= 4.74 • Phosphorus= 0.678
Daily Max WLAs (MS4) (lbs/year)	Upper Anacostia	• BOD= 18330 • Nitrogen= 964 • Phosphorus= 104.2
	Lower Anacostia	• BOD= 9588 • Nitrogen= 433 • Phosphorus= 47.6
	Lower Beaverdam Creek	• BOD= 32.30 • Nitrogen= 3.57 • Phosphorus= 0.47
	Watts Branch	• BOD= 1125 • Nitrogen= 138 • Phosphorus= 20.1
Annual Ave. LAs (lbs/year)	Upper Anacostia	• BOD= 66548 • Nitrogen= 4123 • Phosphorus= 361
	Lower Anacostia	• BOD= 29704 • Nitrogen= 1868 • Phosphorus= 162

Table B- 13. Total Maximum Daily Load of Nutrients/BOD for the Anacostia River Basin		
	Lower Beaverdam Creek	• BOD= 865 • Nitrogen= 54 • Phosphorus= 5
	Northwest Branch	• BOD= 333 • Nitrogen= 21 • Phosphorus= 2
	Watts Branch	• BOD= 6988 • Nitrogen= 433 • Phosphorus= 38
Allocation Notes	CSOs are included in the allocation as well. (Reference: 1)	
	Allocations are not split up into WLAs and Las in the TMDL, but are in the Decision Rationale. (References 1 and 2)	
IMPLEMENTATION		
Implementation	The TMDL states that, owing to EPA's policy to designate MS4 WLAs as point sources and to assign WLAs to MS4s, "This provides regulatory assurances that the urban stormwater sources will be managed to the maximum extent practicable." (Reference: 1)	
Other Issues	This TMDL supersedes the 2001 Anacostia BOD TMDL.	
REFERENCES AND IMPORTANT DOCUMENTS		
1	Total Maximum Daily Loads of Nutrients/Biochemical Oxygen Demand for the Anacostia River Basin, Montgomery and Prince George's Counties, Maryland and the District of Columbia, MDE, DDOE, 2008	
2	Decision Rationale Total Maximum Daily Loads for Biochemical Oxygen Demand and Nutrients Anacostia River Basin Watershed. U.S. EPA, 2008	

Table B- 14. Total Maximum Daily Loads of Trash for the Anacostia River Watershed , Montgomery and Prince George's Counties, Maryland and the District of Columbia	
BACKGROUND	
Issue Date	2010
Author	DDOE, MDE
303(d) Listing	2006, 2008
Impairments and Pollutant causes	Mainstem Anacostia, Upper and Lower segments: Secondary contact recreation and aesthetic enjoyment. Cause of impairment: debris, floatables, and trash. (Reference: 1)
Impairment Notes	n/a
Sources of Pollutants	Stormwater runoff, MS4s, CSOs, illegal dumping. (Reference: 1)
MODELING	
Modeling Approach	No modeling to support this TMDL. (Reference: 1)
EMCs	No EMCs were developed, as TMDL allocations are equal to 100% removal of the baseline trash load. (Reference: 1)
ALLOCATIONS	

Table B- 14. Total Maximum Daily Loads of Trash for the Anacostia River Watershed , Montgomery and Prince George's Counties, Maryland and the District of Columbia	
Annual Ave. WLAs (MS4) (lbs/year to be removed)	• Upper Anacostia= 83868 • Lower Anacostia= 24480
Daily Ave. WLAs (MS4) (lbs/year to be removed)	• Upper Anacostia= 229.8 • Lower Anacostia= 67.1
LAs (lbs/year to be removed)	• Upper Anacostia= 19260 • Lower Anacostia= 1790
Allocation Notes	MOS for all allocations is 5%. (Reference: 1)
IMPLEMENTATION	
Implementation	Adoption of storm drain capture technologies, street sweeping, WASA/USACOE floatables removal program, catch basin cleaning and sweeping, regulatory and housing inspections. (Reference: 1)
Other Issues	Existing trash reduction agreements, partnerships, and plans in DC: MWCOG's Anacostia Restoration Partnership, Alice Ferguson Foundation's 2005 *Potomac River Watershed Trash Treaty*, Anacostia Watershed Society's 2008 *Anacostia Watershed Trash Reduction Plan*. (Reference:1)
REFERENCES AND IMPORTANT DOCUMENTS	
1	Total Maximum Daily Loads of Trash for the Anacostia River Watershed , Montgomery and Prince George's Counties, Maryland and the District of Columbia, MDE & DDOE, 2010

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Table B- 15. Total Maximum Daily Load for Fecal Coliform Bacteria in the Potomac River		
BACKGROUND		
Issue Date	Original fecal coliform TMDL 2004; E. coli revision 2014	
Author	DC DoH; DDOE (E. coli revision)	
303(d) Listing	1996, 1998	
Impairments and Pollutant Causes	Class A: Primary contact recreation. Impairment causes: Fecal Coliform Bacteria. (Reference: 1)	
Impairment Notes		
Sources of Pollutants	Sources are ubiquitous and include CSOs, SSO, stormwater runoff, direct deposits, and upstream sources. (Reference: 1)	
MODELING		
Modeling Approach	The models used to generate loads from the drainage basin, convey them through drainage systems, and then predict their contribution to the receiving waters were formulated using a combination of MOUSE hydrology for SSWS direct drainage sewersheds per the DC Water LTCP and the Small Tributary model for tributaries. The in-stream processes were simulated using the EPA's Dynamic Estuary Model (DEM). (Reference: 1)	
EMCs	Original fecal coliform WLAs: SSWS direct drainage: 28,265 MPN/100 mL; Tributaries 17,300 MPN/100 mL (Reference: 2, pp. 9-11).	
ALLOCATIONS		
E. coli Annual Ave. WLAs (MS4) (MPN/100ml/year)	• Battery Kemble Creek= 7.04E10* • Dalecarlia Tributary= 4.01E11* • Foundry Branch= 6.85E10*	• Potomac Lower= 2.65E14 • Potomac Middle= 1.24E13 • Potomac Upper= 2.35E14
E. coli Daily Ave. WLAs (MS4) (MPN/100ml/day)	• Battery Kemble Creek= 3.19E8* • Dalecarlia Tributary= 1.59E9* • Foundry Branch= 3.06E8*	• Potomac Lower= 7.92E11 • Potomac Middle= 6.48E10 • Potomac Upper= 6.97E11
E. coli Daily Max. WLAs (MS4) (MPN/100ml/day)	• Battery Kemble Creek= 9.93E8* • Dalecarlia Tributary= 4.95E9* • Foundry Branch= 9.50E8*	• Potomac Lower= 1.44E13 • Potomac Middle= 1.38E12 • Potomac Upper= 2.98E13
Fecal coliform Annual Ave. WLAs (MS4) (MPN/100ml/year)	• Battery Kemble Creek= 5.38E11 • Dalecarlia Tributary= 3.40E12 • Foundry Branch= 5.22E11	• Potomac Lower= 6.69E14 • Potomac Middle= 3.13E13 • Potomac Upper= 5.93E14
Fecal coliform Annual Ave. LAs (MPN/100ml/year)	• Battery Kemble Creek= 1.19E10 • Dalecarlia Tributary= 0.00 • Foundry Branch= 4.44E10	• Potomac Lower= 4.04E13 • Potomac Middle= 6.93E13 • Potomac Upper= 1.76E13
Allocation Notes	*Translator incorrectly applied, so E. coli WLAs should be redone. In addition, original fecal coliform WLAs for these tributaries appear to be calculated incorrectly.	
IMPLEMENTATION		
Implementation	Implementation includes the Chesapeake Bay Agreement, DC Water LTCP, NPDES permitting authority, and the District's Water Pollution Control Act. (References 1 and 2)	
Other Issues		
REFERENCES AND IMPORTANT DOCUMENTS		
1	Total Maximum Daily Load for Fecal Coliform Bacteria in the Potomac River, DC DoH, July 2004	

Table B- 15. Total Maximum Daily Load for Fecal Coliform Bacteria in the Potomac River	
2	Decision Rationale Total Maximum Daily Loads Potomac River Watershed for Fecal Coliform Bacteria, U.S. EPA
3	District of Columbia Small Tributaries Total Maximum Daily Load Model Final Report, prepared for DC DOH by ICPRB, July 2003.
4	Final Memo Summarizing DC Bacteria Data and Recommending a DC Bacteria Translator (Task 2), LimnoTech, 2011.

Table B- 16. Total Maximum Daily Load for Bacteria in Chesapeake and Ohio Canal	
BACKGROUND	
Issue Date	2004; E. coli revision 2014
Author	DC DoH; DDOE (E. coli revision)
303(d) Listing	1998
Impairments and Pollutant Causes	Class A: Primary contact recreation, and Class B: Secondary contact recreation and aesthetic enjoyment.
	Pollutant causes: developed areas, pets, and wildlife. (Reference: 1)
Impairment Notes	
Sources of Pollutants	MS4, direct drainage. (Reference: 1)
MODELING	
Modeling Approach	The Hydrologic Simulation Program-Fortran (HSPF) model was used to establish the TMDL allocations. (Reference: 1)
EMCs	17,300 (fecal coliform)
ALLOCATIONS	
E. coli Annual Ave. WLAs (MS4) (MPN/100ml/year)	9.59E10*
E. coli Daily Ave. WLAs (MS4) (MPN/100ml/year)	2.63E8*
E. coli Daily Max. WLAs (MS4) (MPN/100ml/year)	8.17E8*
E. coli Annual Ave. LAs (MPN/100ml/year)	1.43E11*
E. coli Daily Ave. LAs (MPN/100ml/year)	3.91E8*
E. coli Daily Max. LAs (MPN/100ml/year)	1.22E9*
Fecal coliform Annual Ave. WLAs (MS4) (MPN/100ml/year)	7.72E11

Table B- 16. Total Maximum Daily Load for Bacteria in Chesapeake and Ohio Canal	
Fecal coliform Annual Ave. LAs (MPN/100ml/year)	1.15E12
Allocation Notes	*Translator incorrectly applied, so E. coli WLAs should be redone.
IMPLEMENTATION	
Implementation	Implementation includes District managed stormwater load reduction programs (street sweeping, stormwater control regulations, nonpoint source management plan, etc.), the Chesapeake 2000 agreement, CHOH regulations, and public participation. (Reference: 1)
Other Issues	This TMDL is required to comply with the previously developed TMDL for fecal coliform in Rock Creek requiring a 95% reduction in fecal coliform in the C&O canal. However (see comment in allocation notes) it was not necessary to reduce loads by the full 95%. (Reference: 1)
REFERENCES AND IMPORTANT DOCUMENTS	
1	TMDL for Bacteria in Chesapeake and Ohio Canal, DoH, October 2004
2	Decision Rationale TMDL for Fecal Coliform Bacteria In Chesapeake and Ohio Canal , U.S. EPA, December 2004
3	Final Memo Summarizing DC Bacteria Data and Recommending a DC Bacteria Translator (Task 2), LimnoTech, 2011.

Table B- 17. Total Maximum Daily Load for Organics, Metals and Bacteria in Oxon Run	
BACKGROUND	
Issue Date	Original TMDL in 2004; E. coli revision in 2014
Author	DC DoH; DDOE (E. coli revision)
303(d) listing	1998 through 2004
Impairments and Pollutant Causes	Class A: Primary contact recreation. Impairment Causes: fecal coliform bacteria, metals, and organics. (Reference: 1)
Impairment Notes	
Sources of Pollutants	NPDES permitted discharges, direct deposit, urban runoff, MS4. (Reference: 1)
MODELING	
Modeling Approach	Modified version of the DC small Tributaries TMDL model, also TAM/WASP. (References 1 and 2)
EMCs	EMCs were developed based on land use for the watershed. (Reference: 1)
ALLOCATIONS	
E. coli Annual Ave. WLAs (MS4) (MPN/100ml/year)	• 9.52E12#
E. coli Daily Ave. WLAs (MS4) (MPN/100ml/day)	• 2.61E10#

Table B- 17. Total Maximum Daily Load for Organics, Metals and Bacteria in Oxon Run		
E. coli Daily Max. WLAs (MS4) (MPN/100ml/day)	• 8.11E10#	
Fecal coliform Annual Ave. WLAs (MS4) (MPN/100ml/year)	• 9.82E13	
Organics and Metals Annual Ave. WLAs (MS4) (lbs/year)	• Arsenic= 1.8* • Copper= 67.8* • Lead= 22.7 • Zinc= 631.3* • Chlordane= 6.51E-3* • DDT= 5.02E-3*	• Dieldrin= 7.29E-4 • Heptachlor Epoxide= 8.73E-4* • PAH1= 3.51* • PAH2= 3.51E-1* • PAH3= 2.63E-1* • TPCB= 3.28E-4
E. coli Annual Ave. LA (MPN/100ml/year)	• 1.00E12#	
E. coli Daily Ave. LA (MPN/100ml/day)	• 2.75E9#	
E. coli Daily Max. LA (MPN/100ml/day)	• 8.54E9#	
Fecal coliform Annual Ave. LA (MPN/100ml/year)	• 1.03E13	
Organics and Metals Annual Ave. LAs (lbs/year)	• Arsenic= 0.2 • Copper= 7.4 • Lead= 2.4 • Zinc= 68.1 • Chlordane= 7.30E-4 • DDT= 6.40E-4	• Dieldrin= 1.19E-4 • Heptachlor Epoxide= 1.22E-4 • PAH1= 4.01E-1 • PAH2= 3.81E-2 • PAH3= 2.82E-2 • TPCB= 3.78E-5
Allocation Notes	#Translator incorrectly applied, so E. coli WLAs should be redone. *MS4 WLAs moved to category 3 in 2014 303(d) list	
IMPLEMENTATION		
Implementation	Implementation includes District managed stormwater load reduction programs (street sweeping, stormwater control regulations, nonpoint source management plan, etc.) and is a signatory to the Chesapeake Bay Agreement and a partner in the Chesapeake Bay Program, which seek to significantly reduce nonpoint pollutant loads to the Chesapeake Bay. (Reference: 1)	
Other Issues		
REFERENCES AND IMPORTANT DOCUMENTS		
1	Total Maximum Daily Load for Organics, Metals and Bacteria in Oxon Run, DC DoH, December 2004	

Table B- 17. Total Maximum Daily Load for Organics, Metals and Bacteria in Oxon Run	
2	Decision Rationale Total Maximum Daily Loads Oxon Run for Organics, Metals, and Bacteria, U.S. EPA, December 2004
3	Appendix B, E. coli Bacteria Allocations and Daily Loads for Oxon Run, February 2013. New appendix to original TMDL document.
4	Final Memo Summarizing DC Bacteria Data and Recommending a DC Bacteria Translator (Task 2), LimnoTech, 2011.

Table B- 18. Total Maximum Daily Loads for Organics and Metals in Battery Kemble Creek, Foundry Branch, and Dalecarlia Tributary			
BACKGROUND			
Issue Date	2004		
Author	DC DoH		
303(d) Listing	1996, 1998, and 2002		
Impairments and Pollutant Causes	Impairment: Protection and Propagation of Fish, Shellfish and Wildlife. Impairment causes: Metals, Organics, Bacteria, Dissolved Oxygen (depending on the specific tributary). P. 3 of the TMDL states "Because of general lack of data in the District's tributaries, the list of chemicals of concern for this TMDL were determined from data derived from fish tissue and sediment analysis in the Anacostia River."		
Impairment Notes	Chemicals of concern were determined through fish tissue and sediment analysis. (Reference: 1)		
Sources of Pollutants	NPDES MS4 outlets and direct runoff. (Reference: 1)		
MODELING			
Modeling Approach	DC Small Tributaries TMDL Model		
EMCs	EMCs are in Tables 2a and 2b, p. 11, Small Tributaries Model Report, ICPRB July 2003 (Reference 3).		
ALLOCATIONS			
Annual Ave. WLAs (MS4) (lbs/year)	Battery Kimble Creek	• Arsenic= 1.782E-1* • Copper= 8.665*	• Lead= 3.634 • Zinc= 6.406E1*
	DC Dalecarlia Tributary	• Chlordane= 3.550E-3* • DDD= 1.634E-3* • DDE= 3.005E-3* • DDT= 3.034E-3* • Dieldrin= 3.979E-4	• Heptachlor Epoxide= 3.458E-4 • PAH1= 1.624* • PAH2= 1.924E-1* • PAH3= 1.226E-1* • TPCB= 1.596E-4
	Foundry Branch	• Arsenic= 1.674E-1 • Copper= 1.033E1	• Lead= 3.830 • Zinc= 7.738E1
Annual Ave. LAs (lbs/year)	Battery Kimble Creek	• Arsenic= 6.170E-3 • Copper= 3.001E-1	• Lead= 1.258E-1 • Zinc= 2.218
	DC Dalecarlia Tributary	• Chlordane= 3.015E-4 • DDD= 1.388E-4 • DDE= 2.552E-4 • DDT= 2.576E-4 • Dieldrin= 3.379E-5	• Heptachlor Epoxide= 2.936E-5 • PAH1= 1.379E-1 • PAH2= 1.634E-2 • PAH3= 1.041E-2 • TPCB= 1.355E-5

Table B- 18. Total Maximum Daily Loads for Organics and Metals in Battery Kemble Creek, Foundry Branch, and Dalecarlia Tributary			
	Foundry Branch	• Arsenic= 0 • Copper= 0	• Lead= 0 • Zinc= 0
Allocation Notes	*MS4 WLAs moved to category 3 in 2014 303(d) list		
IMPLEMENTATION			
Implementation	No specific implementation plan included in TMDL.		
Other Issues			
REFERENCES AND IMPORTANT DOCUMENTS			
1	Total Maximum Daily Loads for Organics and Metals in Battery Kemble Creek. Foundry Branch, and Dalecarlia Tributary, DC DoH, August 2004		
2	Decision Rationale Total Maximum Daily Loads for Organics and Metals in Battery Kemble Creek, Foundry Branch, and Dalecarlia Tributary, U.S. EPA, 2004		
3	Small Tributaries Model Report, ICPRB, 2003		

Table B- 19. Total Maximum Daily Loads for pH in Washington Ship Channel	
BACKGROUND	
Issue Date	2004
Author	DC DoH
303(d) listing	1998
Impairments and pollutant causes	pH measurements violate standards for Class A (primary contact recreation); Class B: (secondary contact recreation and aesthetic enjoyment); and Class C (protection and propagation of fish, shellfish, and wildlife) designated uses.
Impairment Notes	P. 6 of TMDL states that pH exceedances are caused by algal activities, which are in turn related to high nutrients. Thus, TMDL completed for phosphorus.
Sources of pollutants	MS4, direct drainage, and also affected by the Potomac and Anacostia Rivers. (Reference: 1)
MODELING	
Modeling approach	Chesapeake Bay water quality model, a simple analytical approach. (Reference: 2)
EMCs	None used.
ALLOCATIONS	
Annual Ave. WLAs (MS4) (lbs/year)	977
Annual Ave. LAs (lbs/year)	408
Allocation notes	MS4 WLA is above existing phosphorus loads, so no reduction is needed to meet WLA. (Reference: 1)
IMPLEMENTATION	
Implementation	None needed. Upstream phosphorus reductions will achieve TMDL. (Reference: 1)
Other issues	
REFERENCES AND IMPORTANT DOCUMENTS	

Table B- 19. Total Maximum Daily Loads for pH in Washington Ship Channel	
1	Total Maximum Daily Loads for pH in Washington Ship Channel, DC DoH, December 2004
2	Decision Rational Total Maximum Daily Loads for pH in Washington Ship Channel. U.S. EPA, December 2004

Table B- 20. Total Maximum Daily Load for Bacteria in Tidal Basin and Washington Ship Channel	
BACKGROUND	
Issue Date	Original TMDL 2004, E. coli revision 2014
Author	DC DoH; DDOE (E. coli revision)
303(d) listing	1998
Impairments and pollutant causes	Tidal Basin and Washington Ship Channel: Primary contact recreation. Cause of impairment: bacteria as measured by fecal coliform. (Reference: 1)
Impairment Notes	While the current use of the waterbodies is Class B (secondary contact recreation and aesthetic enjoyment), the designated uses also includes Class A (primary contact recreation), and so Class A uses must be achieved. (Reference: 1)
Sources of pollutants	Separate storm, Direct Runoff, Direct Deposits. (p. 10, Reference 1)
MODELING	
Modeling approach	EFDC, a 3D hydrodynamic, sediment transport, and water quality model. (Reference: 1)
EMCs	Appendix A states that "Storm water loads were calculated using event mean concentrations. The storm water runoff was estimated by multiplying the precipitation rate, infiltration loss percentage, and the drainage area. For TSS and fecal coliform in the storm water, event mean concentrations (EMC) of 94 mg/L and 28265 MPN/100ml were used, respectively." (Reference: 1)
ALLOCATIONS	
E. coli Annual Ave. WLAs (MS4) (MPN/100ml/year)	• Tidal Basin= 5.53E13 • Washington Ship Channel= 1.83E14
E. coli Daily Ave. WLAs (MS4) (MPN/100ml/day)	• Tidal Basin= 5.10E11 • Washington Ship Channel= 1.69E12
E. coli Daily Max. WLAs (MS4) (MPN/100ml/year)	• Tidal Basin= 3.21E12 • Washington Ship Channel= 1.06E13
E. coli Annual Ave. LAs (MPN/100ml/year)	• Tidal Basin= 4.48E13 • Washington Ship Channel= 7.67E13
E. coli Daily Ave. LAs (MPN/100ml/day)	• Tidal Basin= 4.13E11 • Washington Ship Channel= 7.08E11
E. coli Daily Max. LAs (MPN/100ml/year)	• Tidal Basin= 2.60E12 • Washington Ship Channel= 4.45E12

Table B- 20. Total Maximum Daily Load for Bacteria in Tidal Basin and Washington Ship Channel	
Fecal coliform Annual Ave. WLAs (MS4) (MPN/100ml/year)	• Tidal Basin= 1.44E14 • Washington Ship Channel= 4.76E14
Fecal coliform Annual Ave. LAs (MPN/100ml/year)	• Tidal Basin= 1.17E14 (direct drainage only) • Washington Ship Channel= 2.00E14 (direct drainage only)
Allocation notes	TMDL identifies separate stormwater system and sets an allocation, but the Decision Rationale identifies the separate stormwater as an MS4 WLA. (References 1 and 2)
	The Decision Rationale also combines Direct Runoff and Direct Deposits into the LA. (Reference: 2)
	The Margin of Safety for all allocations is 10%. (Reference: 1)
IMPLEMENTATION	
Implementation	No specific implementation plan in TMDL. (Reference: 1)
Other issues	Stormwater quality is not a likely source of water quality violations in the Tidal Basin or Ship Channel because 1) the model simulation revealed that stormwater quality does not cause water quality violations, and 2) there was a known cross connection originating from a major rest area facility that is in the process of being fixed. (Reference: 1)
REFERENCES AND IMPORTANT DOCUMENTS	
1	Total Maximum Daily Loads for Bacteria in Tidal Basin and Washington Ship Channel, DoH, December 2004
2	Decision Rationale: Total Maximum Daily Loads for Bacteria in Tidal Basin and Washington Ship Channel, EPA, December 2004
3	Appendix B, E. coli Bacteria Allocations and Daily Loads for the Tidal Basin and Washington Ship Channel, February 2013. New appendix to original TMDL document.
4	Final Memo Summarizing DC Bacteria Data and Recommending a DC Bacteria Translator (Task 2), LimnoTech, 2011.

Table B- 21. Total Maximum Daily Load for Organics in Tidal Basin and Washington Ship Channel	
BACKGROUND	
Issue Date	2004
Author	DoH
303(d) listing	1998
Impairments and pollutant causes	Tidal Basin and Ship Channel: primary contact recreation. Cause of Impairment: chlordane, DDT, endosulfan, heptachlor epoxide, hexachlorobenzene, total PAHs, and total PCBs. (Reference: 1)
Impairment Notes	List of chemicals evaluated was based on fish tissue and sediment analysis in the Anacostia River. (Reference: 1)
Sources of pollutants	Stormwater, direct drainage, water quality conditions in the Potomac and Anacostia (Reference: 1)
MODELING	
Modeling approach	EFDC, a 3D hydrodynamic, sediment transport, and water quality model. (Reference: 1)

Table B- 21. Total Maximum Daily Load for Organics in Tidal Basin and Washington Ship Channel			
EMCs	Appendix A states "Storm water loads were calculated using event mean concentrations. The storm water runoff was estimated by multiplying the precipitation rate, infiltration loss percentage, and the drainage area. For TSS in the storm water, an event mean concentration (EMC) of 94 mg/L was used. The event mean concentrations used for various organics are the same as what were used in the DC Small Tributaries Model" (Reference: 1). EMCs are summarized in Tables 2a and 2b, p. 11, Small Tributaries Model Report, ICPRB July 2003 (Reference 3).		
ALLOCATIONS			
Annual Ave. WLAs (MS4) (lbs/year)	Tidal Basin	• Chlordane=3.980E-3* • DDD=3.372E-3* • DDE=3.980E-3* • DDT=3.980E-3* • Dieldrin=3.260E-4*	• Heptachlor Epoxide=7.419E-4* • PAH1=7.403E-1* • PAH2=2.091E-1* • PAH3=2.091E-1* • TPCB=3.141E-4
	Ship Channel	• Chlordane=1.315E-2* • DDD=1.115E-2* • DDE=1.315E-2* • DDT=1.315E-2* • Dieldrin=1.077E-3*	• Heptachlor Epoxide=2.452E-3* • PAH1=2.446* • PAH2=6.910E-1* • PAH3=6.910E-1* • TPCB=9.788E-4
Annual Ave. LAs (lbs/year)	Tidal Basin	• Chlordane=3.223E-3 • DDD=2.732E-3 • DDE=3.223E-3 • DDT=3.223E-3 • Dieldrin=2.641E-4	• Heptachlor Epoxide=6.010E-4 • PAH1=5.996E-1 • PAH2=1.694E-1 • PAH3=1.694E-1 • TPCB=2.534E-4
	Ship Channel	• Chlordane=5.524E-3 • DDD=4.681E-3 • DDE=5.524E-3 • DDT=5.524E-3 • Dieldrin=4.525E-4	• Heptachlor Epoxide=1.030E-3 • PAH1=1.027 • PAH2=2.902E-1 • PAH3=2.902E-1 • TPCB=4.104E-4
Allocation notes	*MS4 WLAs moved to category 3 in 2014 303(d) list		
	TMDL identifies separate stormwater system and sets an allocation, but the Decision Rationale identifies the separate stormwater as an MS4 WLA. (Reference: 1)		
IMPLEMENTATION			
Implementation	No specific implementation plan for MS4 WLAs included in TMDL.		
Other issues			
REFERENCES AND IMPORTANT DOCUMENTS			
1	Total Maximum Daily Loads for Organics in Tidal Basin and Washington Ship Channel, DoH, 2004.		
2	Decision Rationale: Total Maximum Daily Loads for Organics in Tidal Basin and Washington Ship Channel, EPA, 2004		
3	Small Tributaries Model Report, ICPRB, 2003		

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Table B- 22. Total Maximum Daily Load for Fecal Coliform Bacteria in Rock Creek	
BACKGROUND	
Issue Date	Original TMDL 2004; E. coli revision 2014
Author	DC DoH; DDOE (E. coli revision)
303(d) Listing	1998
Impairments and Pollutant Causes	Class A: Primary contact recreation and Class B: Secondary contact recreation. Impairment Causes: Increased levels of Fecal Coliform Bacteria. (Reference: 1)
Impairment Notes	
Sources of Pollutants	Pollutant sources are ubiquitous but include CSOs, SSOs, stormwater runoff, and direct deposits. (Reference: 1)
MODELING	
Modeling Approach	Two components make up the model: 1) the Land Models developed for the DC Water LTCP and 2) EPA's SWMM model. (Reference: 1)
EMCs	28,265 (Table 5, EPA Decision Rationale Document (Reference 2).
ALLOCATIONS	
E. coli Annual Ave. WLAs (MS4) (MPN/100ml/year)	• Rock Creek Upper= 2.870E13 • Rock Creek Lower= 1.010E13
E. coli Daily Ave. WLAs (MS4) (MPN/100ml/day)	• Rock Creek Upper= 8.620E10 • Rock Creek Lower= 3.450E10
E. coli Daily Max. WLAs (MS4) (MPN/100ml/day)	• Rock Creek Upper= 2.920E12 • Rock Creek Lower= 9.080E11
E. coli Annual Ave. LAs (MPN/100ml/year)	• Rock Creek Upper= 1.550E12 • Rock Creek Lower= 2.030E13
E. coli Daily Ave. LAs (MPN/100ml/day)	• Rock Creek Upper= 1.300E10 • Rock Creek Lower= 1.700E11
E. coli Daily Max. LAs (MPN/100ml/day)	• Rock Creek Upper= 8.390E10 • Rock Creek Lower= 1.100E12
Fecal coliform Annual Ave. WLAs (MS4) (MPN/100ml/year)	• Rock Creek Upper= 6.266E13 • Rock Creek Lower= 2.206E13
Fecal coliform Annual Ave. LAs (MPN/100ml/year)	• Rock Creek Upper= 3.403E12 • Rock Creek Lower= 2.659E12
Allocation Notes	
IMPLEMENTATION	
Implementation	No specific implementation plan for MS4 WLA included in TMDL document. (Reference: 1)

Other Issues	
REFERENCES AND IMPORTANT DOCUMENTS	
1	Total Maximum Daily Load for Fecal Coliform Bacteria in Rock Creek, DC DoH, February 2004
2	Decision Rationale Total Maximum Daily Loads for Fecal Coliform Bacteria in Rock Creek, U.S. EPA, February 2004
3	Appendix B, E. coli Bacteria Allocations and Daily Loads for Rock Creek, February 2013. New appendix to original TMDL document.
4	Final Memo Summarizing DC Bacteria Data and Recommending a DC Bacteria Translator (Task 2), LimnoTech, 2011.

Table B- 23. Total Maximum Daily Load for Metals in Rock Creek	
BACKGROUND	
Issue Date	2004
Author	DC DoH
303(d) Listing	1998
Impairments and Pollutant Causes	Class A: Primary contact recreation and Class B: Secondary contact recreation. Impairment Causes: Lead, zinc, and mercury and potentially cadmium and copper. (Reference: 1)
Impairment Notes	The District of Columbia's Section 303(d) list does not specifically identify the and metals impairing Rock Creek's water quality. A general lack of data in the Rock Creek watershed required that fish tissue and sediment analysis in the Anacostia River serve as the basis for the selection of the pollutants of concern. Analysis of available water quality data suggested the need for a limited number of TMDLs. Many of the pollutants of concern most likely do not contribute to the impairment of Rock Creek or they have been banned and future loadings of these pollutants of concern should be minimal. It was decided that TMDLs were required for lead, zinc, and mercury while insufficient data to determine whether or not TMDLs were required for cadmium and copper. A wet weather monitoring program was implemented to determine whether or not cadmium and copper TMDLs are required. During all sampling events, concentrations of cadmium were significantly below all existing water quality standards. However, copper concentrations found within Rock Creek indicated possible violations of water quality standards. Therefore, TMDLs were completed for copper, lead, mercury, and zinc, but not for cadmium (Reference: 1).
Sources of Pollutants	CSOs, urban stormwater runoff, and potentially habitat modification and stream bank destabilization. (Reference: 1)
MODELING	
Modeling approach	The model was based on previous SWMM models of Rock Creek constructed for the DC Water LTCP and the District's Bacteria TMDLs in Rock Creek. (Reference: 1)
EMCs	EMCs are given in Table 5 of the Decision Rationale (Reference: 2)
ALLOCATIONS	

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Table B- 23. Total Maximum Daily Load for Metals in Rock Creek		
Annual Ave WLAs (MS4) (lbs/year)	Rock Creek Upper	• Copper= 147.82 • Zinc= 346.79 • Lead= 9.55 • Mercury= 0.055
	Rock Creek Lower	• Copper= 142.19 • Zinc= 333.58 • Lead= 9.19 • Mercury= 0.053
Annual Ave. LAs (lbs/year)	Rock Creek Upper	• Copper= 1.66 • Zinc= 3.88 • Lead= 0.11 • Mercury= 0.001
	Rock Creek Lower	• Copper= 1.24 • Zinc= 2.91 • Lead= 0.08 • Mercury= 0.001
Allocation Notes		
IMPLEMENTATION		
Implementation	No specific implementation plan for MS4 WLA included in TMDL document. (Reference: 1)	
Other Issues		
REFERENCES AND IMPORTANT DOCUMENTS		
1	Total Maximum Daily Load for Metals in Rock Creek, DC DoH, February 2004	
2	Decision Rationale Total Maximum Daily Loads Rock Creek for Metals, U.S. EPA, February 2004	

Table B- 24. Total Maximum Daily Load for Organics and Metals in Rock Creek Tributaries	
BACKGROUND	
Issue Date	2004
Author	DC DoH
303(d) listing	1996 through 2002
Impairments and pollutant causes	Class A: Primary contact recreation. Impairment Causes: cadmium, copper, lead, mercury, and zinc, with probable chemicals being chlordane, DDT, endosulfan, heptachlor epoxide, hexachlorobenzene, total PAHs, and total PCBs. (Reference 1)
Impairment Notes	
Sources of pollutants	MS4, direct runoff, and CSOs. (Reference: 1)
MODELING	
Modeling approach	DC Small Tributaries TMDL Model. (Reference: 1)
EMCs	EMCs are summarized in Tables 2a and 2b, p. 11, Small Tributaries Model Report, ICPRB July 2003 (Reference 3).
ALLOCATIONS	

Table B- 24. Total Maximum Daily Load for Organics and Metals in Rock Creek Tributaries			
Annual Ave. WLAs (MS4) (lbs/year)	Broad Branch	• Chlordane= 2.815E-3 • DDD= 1.379E-3 • DDE= 2.423E-3 • DDT= 2.457E-3 • Dieldrin= 3.391E-1	• Heptachlor Epoxide= 2.847E-4 • PAH1= 1.290 • PAH2= 1.518E-1 • PAH3= 9.656E-2 • TPCB= 1.275E-4
	Dumbarton Oaks	• Chlordane= 6.225E-5 • DDD= 2.401E-5* • DDE= 5.043E-5* • DDT= 5.032E-5* • Dieldrin= 5.661E-6	• Heptachlor Epoxide= 5.475E-6 • PAH1= 2.827E-2* • PAH2= 3.413E-3* • PAH3= 2.183E-3* • TPCB= 2.736E-6
	Fenwick Branch	• Chlordane= 4.926E-4* • DDD= 2.719E-4* • DDE= 4.389E-4* • DDT= 4.489E-4 • Dieldrin= 6.801E-5	• Heptachlor Epoxide= 5.369E-5 • PAH1= 2.271E-1* • PAH2= 2.630E-2* • PAH3= 1.668E-2* • TPCB= 2.275E-5
	Kingle Valley Creek	• Chlordane= 1.373E-3* • DDD= 5.473E-4* • DDE= 1.121E-3* • DDT= 1.121E-3* • Dieldrin= 1.299E-4	• Heptachlor Epoxide= 1.230E-4 • PAH1= 6.242E-1* • PAH2= 7.511E-2* • PAH3= 4.800E-2* • TPCB= 6.046E-5
	Luzon Branch	• Chlordane= 4.790E-4 • DDD= 1.954E-4* • DDE= 3.932E-4* • DDT= 3.938E-4* • Dieldrin= 4.658E-5	• Heptachlor Epoxide= 4.348E-5 • PAH1= 2.180E-1* • PAH2= 2.617E-2* • PAH3= 1.672E-2* • TPCB= 2.117E-5
	Melvin Hazen Valley Branch	• Chlordane= 5.321E-4* • DDD= 2.178E-4* • DDE= 4.372E-4* • DDT= 4.379E-4* • Dieldrin= 5.194E-5	• Heptachlor Epoxide= 4.839E-5* • PAH1= 2.422E-1* • PAH2= 2.907E-2* • PAH3= 1.857E-2* • TPCB= 2.355E-5
	Normanstone Creek	• Chlordane= 7.771E-4 • DDD= 3.329E-4 • DDE= 6.457E-4 • DDT= 6.487E-4 • Dieldrin= 8.008E-5	• Heptachlor Epoxide= 7.255E-5 • PAH1= 3.543E-1 • PAH2= 4.232E-2 • PAH3= 2.701E-2 • TPCB= 3.457E-5
Annual Ave. WLAs (MS4)(lbs/year)(cont.)	Pinehurst Branch	• Chlordane= 6.595E-4* • DDD= 3.944E-4* • DDE= 6.023E-4* • DDT= 6.196E-4* • Dieldrin= 9.963E-5	• Heptachlor Epoxide= 7.572E-5 • PAH1= 3.053E-1* • PAH2= 3.494E-2* • PAH3= 2.211E-2* • TPCB= 3.085E-5
	Piney Branch	• Arsenic= 1.465E-2* • Copper= 5.097E-1* • Lead= 1.694E-1 • Zinc= 4.254* • Chlordane= 5.410E-5 • DDD= 3.140E-5* • DDE= 4.055E-5*	• DDT= 4.253E-5* • Dieldrin= 8.149E-6 • Heptachlor Epoxide= 8.344E-5 • PAH1= 1.908E-2* • PAH2= 2.085E-3* • PAH3= 2.616E-3* • TPCB= 1.377E-6

Table B- 24. Total Maximum Daily Load for Organics and Metals in Rock Creek Tributaries			
	Portal Branch	• Chlordane= 1.824E-4* • DDD= 1.014E-4* • DDE= 1.628E-4* • DDT= 1.666E-4* • Dieldrin= 2.538E-5	• Heptachlor Epoxide= 1.997E-5 • PAH1= 8.411E-2* • PAH2= 9.728E-3* • PAH3= 6.169E-3* • TPCB= 8.394E-6
	Soapstone Creek	• Chlordane= 1.965E-3 • DDD= 7.282E-4* • DDE= 1.578E-3* • DDT= 1.570E-3* • Dieldrin= 1.703E-4	• Heptachlor Epoxide= 1.691E-4 • PAH1= 8.913E-1* • PAH2= 1.080E-1* • PAH3= 6.912E-2* • TPCB= 8.579E-5
Annual Ave. LAs (lbs/year)	Broad Branch	• Chlordane= 8.254E-4 • DDD= 4.044E-4 • DDE= 7.105E-4 • DDT= 7.204E-4 • Dieldrin= 9.944E-5	• Heptachlor Epoxide= 8.348E-5 • PAH1= 3.784E-1 • PAH2= 4.451E-2 • PAH3= 2.832E-2 • TPCB= 3.738E-5
	Dumbarton Oaks	• Chlordane= 6.559E-4 • DDD= 2.530E-4 • DDE= 5.313E-4 • DDT= 5.302E-4 • Dieldrin= 5.965E-5	• Heptachlor Epoxide= 5.769E-5 • PAH1= 2.979E-1 • PAH2= 3.596E-2 • PAH3= 2.300E-2 • TPCB= 2.883E-5
	Fenwick Branch	• Chlordane= 8.376E-5 • DDD= 4.624E-5 • DDE= 7.462E-5 • DDT= 7.632E-5 • Dieldrin= 1.156E-5	• Heptachlor Epoxide= 9.130E-6 • PAH1= 3.862E-2 • PAH2= 4.471E-3 • PAH3= 2.836E-3 • TPCB= 3.868E-6
	Kingle Valley Creek	• Chlordane= 8.112E-5 • DDD= 3.234E-5 • DDE= 6.623E-5 • DDT= 6.623E-5 • Dieldrin= 7.677E-6	• Heptachlor Epoxide= 7.269E-6 • PAH1= 3.689E-2 • PAH2= 4.439E-3 • PAH3= 2.837E-3 • TPCB= 3.573E-6
	Luzon Branch	• Chlordane= 2.113E-3 • DDD= 8.620E-4 • DDE= 1.735E-3 • DDT= 1.735E-3 • Dieldrin= 2.055E-4	• Heptachlor Epoxide= 1.918E-4 • PAH1= 9.617E-1 • PAH2= 1.155E-1 • PAH3= 7.375E-2 • TPCB= 9.337E-5
	Melvin Hazen Valley Branch	• Chlordane= 2.013E-4 • DDD= 8.238E-5 • DDE= 1.654E-4 • DDT= 1.657E-4 • Dieldrin= 1.965E-5	• Heptachlor Epoxide= 1.831E-5 • PAH1= 9.163E-2 • PAH2= 1.100E-2 • PAH3= 7.024E-3 • TPCB= 8.911E-6
	Normanstone Creek	• Chlordane= 1.631E-4 • DDD= 6.988E-5 • DDE= 1.355E-4 • DDT= 1.362E-4 • Dieldrin= 1.681E-5	• Heptachlor Epoxide= 1.523E-5 • PAH1= 7.437E-2 • PAH2= 8.883E-3 • PAH3= 5.669E-3 • TPCB= 7.257E-6

Table B- 24. Total Maximum Daily Load for Organics and Metals in Rock Creek Tributaries			
Annual Ave. LAs (lbs/year)(cont.)	Pinehurst Branch	• Chlordane= 4.551E-4 • DDD= 2.722E-4 • DDE= 4.157E-4 • DDT= 4.277E-4 • Dieldrin= 6.876E-5	• Heptachlor Epoxide= 5.226E-5 • PAH1= 2.107E-1 • PAH2= 2.411E-2 • PAH3= 1.526E-2 • TPCB= 2.129E-5
	Piney Branch	• Arsenic= 2.816E-2 • Copper= 9.739E-1 • Lead= 3.255E-1 • Zinc= 8.171 • Chlordane= 1.039E-4 • DDD= 6.036E-5 • DDE= 7.785E-5	• DDT= 8.172E-5 • Dieldrin= 1.567E-5 • Heptachlor Epoxide= 1.603E-5 • PAH1= 3.665E-2 • PAH2= 4.009E-3 • PAH3= 5.027E-3 • TPCB= 0
	Portal Branch	• Chlordane= 2.682E-5 • DDD= 1.491E-5 • DDE= 2.395E-5 • DDT= 2.451E-5 • Dieldrin= 3.733E-6	• Heptachlor Epoxide= 2.937E-6 • PAH1= 1.237E-2 • PAH2= 1.431E-3 • PAH3= 9.074E-4 • TPCB= 1.235E-6
	Soapstone Creek	• Chlordane= 3.701E-4 • DDD= 1.371E-4 • DDE= 2.971E-4 • DDT= 2.957E-4 • Dieldrin= 3.207E-5	• Heptachlor Epoxide= 3.184E-5 • PAH1= 1.679E-1 • PAH2= 2.034E-2 • PAH3= 1.302E-2 • TPCB= 1.616E-5
Allocation notes	*MS4 WLAs moved to category 3 in 2014 303(d) list		
	Maryland Fenwick Branch, Maryland Pinehurst Branch, and Maryland Portal loads also listed in table on pages 19 through 27 TMDL. (Reference: 1)		
	All the WLAs are broken into CSO and SS loadings, but Piney Branch is the only basin that has a CSO. (Reference: 1)		
IMPLEMENTATION			
Implementation	No specific implementation plan for MS4 WLA included in TMDL document. (Reference: 1)		
Other issues			
REFERENCES AND IMPORTANT DOCUMENTS			
1	Total Maximum Daily Load for Organics and Metals in Rock Creek Tributaries, DC DoH, February 2004		
2	Decision Rationale Total Maximum Daily Loads Rock Creek Tributaries for Organics and Metals, U.S. EPA, February 2004		
3	Small Tributaries Model Report, ICPRB, 2003		

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Table B- 25. Chesapeake Bay TMDL for Nitrogen, Phosphorus and Sediment		
BACKGROUND		
Issue Date	2010	
Author	U.S. EPA	
303(d) Listing	2008	
Impairments and Pollutant Causes	TMDL addresses only the restoration of aquatic life uses for the Bay and its tidal tributaries and embayments that are impaired from excess nitrogen, phosphorus, and sediment pollution. (Reference: 1)	
Impairment Notes		
Sources of Pollutants	Pollutant causes: wastewater facilities, industrial discharge facilities, CSOs, SSOs, NPDES permitted stormwater, and CAFOs. (Reference: 1)	
MODELING		
Modeling Approach	The two major components of the Chesapeake Bay TMDL modeling framework are the Phase 5.3 Chesapeake Bay Watershed Model, and the Chesapeake Bay Water Quality and Sediment Transport Model. (Reference: 1)	
EMCs	The Bay Watershed Model Version 5.3 uses edge-of-field erosion rates for different land use types to establish loads from different land use types. EMCs reflective of high and low density residential land uses, which were used in the Phase 5.3 model. But values of 2.0 mg/L for TN and 0.27 mg/L for TP are cited.	
ALLOCATIONS		
Annual Ave. WLA (MS4) (lbs/year)	ANATF_DC:	• TN= 41517 • TP= 6498 • TSS= 1682470
	ANATF_MD:	• TN= 10424 • TP= 1444 • TSS= 314421
	POTT_DC	• TN= 39427 • TP= 2975 • TSS= 3843847
	POTT_MD	• TN= 15019 • TP= 536 • TSS= 363762
Annual Ave. LA. (lbs/year)	ANATF_DC:	• TN= 11293 • TP= 1459 • TSS= 348544
	ANATF_MD:	• TN= 616 • TP= 41 • TSS= 10062
	POTT_DC	• TN= 20156 • TP= 1365 • TSS= 1582051
	POTT_MD	• TN= 2481 • TP= 42 • TSS= 36900

Table B- 25. Chesapeake Bay TMDL for Nitrogen, Phosphorus and Sediment	
Allocation Notes	Modeling was done on a very large scale (64,000 sq. mile watershed scale), and so allocations to sectors (such as MS4) on a small (jurisdictional) scale may not match allocations done at a smaller modeling scale.
IMPLEMENTATION	
Implementation	The District has developed Phase I and Phase II Watershed Implementation Plans describing how it will attain its goals. It also sets Two-Year Milestones on a regular basis to help track progress. DDOE is required to report progress to the Bay Program on a regular basis. There are goals for implementation to be in place to meet 60% of the goals by 2017, and 100% by 2025. (Reference: 1)
Other Issues	TMDL was prompted by insufficient progress and continued poor water quality in the Chesapeake Bay and its tidal tributaries and responds to consent decrees in Virginia and the District from the late 1990s. (Reference: 1)
	This TMDL is a compilation of 92 smaller TMDLs developed within the Chesapeake bay watershed. (Reference: 1)
REFERENCES AND IMPORTANT DOCUMENTS	
1	Chesapeake Bay TMDL for Nitrogen, Phosphorus and Sediment, U.S. EPA, 2010
2	Chesapeake Bay TMDL Watershed Implementation Plan, DC DoE, November, 2010

Table B- 26. Total Maximum Daily Loads of PCBs for Tidal Portions of the Potomac and Anacostia Rivers in DC, Maryland, and Virginia		
BACKGROUND		
Issue Date	2007	
Author	Interstate Commission on the Potomac River Basin for DDOE, MDE and VDEQ	
303(d) Listing	1996 and 1998, 2003 for the Anacostia	
Impairments and Pollutant Causes	Class D: Protection of human health related to the consumption of fish and shellfish. Pollutant Causes: elevated levels of PCBs in fish tissue. (Reference: 1)	
Impairment Notes		
Sources of Pollutants	Upstream sources, direct drainage, WWTPs, CSOs, atmospheric deposition, and contaminated sites. (Reference: 1)	
MODELING		
Modeling Approach	Hydrodynamics were modeled with a 1D branched version of DYNHYD5 coupled to a modified version of WASP5/TOXI5. (Reference: 3)	
EMCs		
ALLOCATIONS		
Annual Ave. WLAs (MS4) (g/year)	• Anacostia Upper= 1.76 • Anacostia Lower= 0.612 • Oxon Run= 1.09 • Potomac Lower= 5.41	• Potomac Middle= 7.42 • Potomac Upper= 1.46 • Washington Ship Channel= 0.0824
Daily Ave. WLAs (MS4) (mg/day)	• Anacostia Upper= 4.82 • Anacostia Lower= 1.68 • Potomac Lower= 14.80	• Potomac Middle= 20.3 • Potomac Upper= 4.00

Table B- 26. Total Maximum Daily Loads of PCBs for Tidal Portions of the Potomac and Anacostia Rivers in DC, Maryland, and Virginia		
Daily Max WLAs (MS4) (mg/day)	• Anacostia Upper= 300 • Anacostia Lower= 125 • Potomac Lower= 924	• Potomac Middle= 1130 • Potomac Upper= 197
Annual Ave. LAs (g/year)	• Anacostia Upper= 0.262 • Anacostia Lower= 0.173 • Oxon Run= 0.232 • Potomac Lower= 0.923	• Potomac Middle= 0.843 • Potomac Upper= 0.141 • Washington Ship Channel= 0.093
Allocation Notes	The TMDLs developed in this document replace the previously developed 2003 Anacostia TMDL. (Reference: 1)	
	TMDL also includes CSO allocations, and daily maximum expressions of the LA. (Reference: 1)	
IMPLEMENTATION		
Implementation	P. 21 of the TMDL states that "Upon approval of the TMDL "NPDES-regulated municipal stormwater and small construction storm water discharges effluent limits should be expressed as Best Management Practices (BMPs) or other similar requirements, rather than as numeric effluent limits" (US EPA 2002)." Further, p. 41 of the TMDL states that "Following the approval of the TMDL for the tidal Anacostia and Potomac River estuary, the water quality-based effluent limitations (WQBELs) in NPDES permits that are issued, reissued or modified after the TMDL approval date must be consistent with the WLAs (CFR 2007b). EPA's NPDES regulations at 40 CFR 122.44(k) allow permits to use non-numeric, BMP-based WQBELs under certain conditions. The regulation, in subsections 3 and 4, states that BMP based WQBELs can be used where "Numeric effluent limitations are infeasible; or [t]he practices are reasonably necessary to achieve effluent limitations and standards or to carry out the purposes and intent of the CWA."" This section goes on to state that "The jurisdictions intend to use non-numeric WQBELs to comply with the WLA provisions of the TMDL because BMPs are appropriate and reasonably necessary to achieve water quality standards and to carry out the goals of the CWA for the tidal Potomac PCB TMDL. This approach will first entail additional data collection from selected NPDES permitted facilities to better characterize PCB discharges. Where warranted, non-numeric, BMPs will be implemented. These BMPs are intended to focus on PCB source tracking and elimination at the source, rather than end-of-pipe controls." (Reference: 1)	
Other issues	This document is the result of a consent decree that requires the District of Columbia to complete a PCB TMDL by September 30, 2007. (Reference: 1)	
REFERENCES AND IMPORTANT DOCUMENTS		
1	Total Maximum Daily Loads of PCBs for Tidal Portions of the Potomac and Anacostia Rivers in DC, Maryland, and Virginia, Interstate Commission on the Potomac River Basin, September 2007	
2	Decision Rationale Total Maximum Daily Loads for PCBs Tidal Potomac and Anacostia River Watershed, U.S. EPA, October 2007	
3	PCB TMDL Model for the Potomac River Estuary, LimnoTech, 2007	

Appendix C

TMDL Watershed Maps

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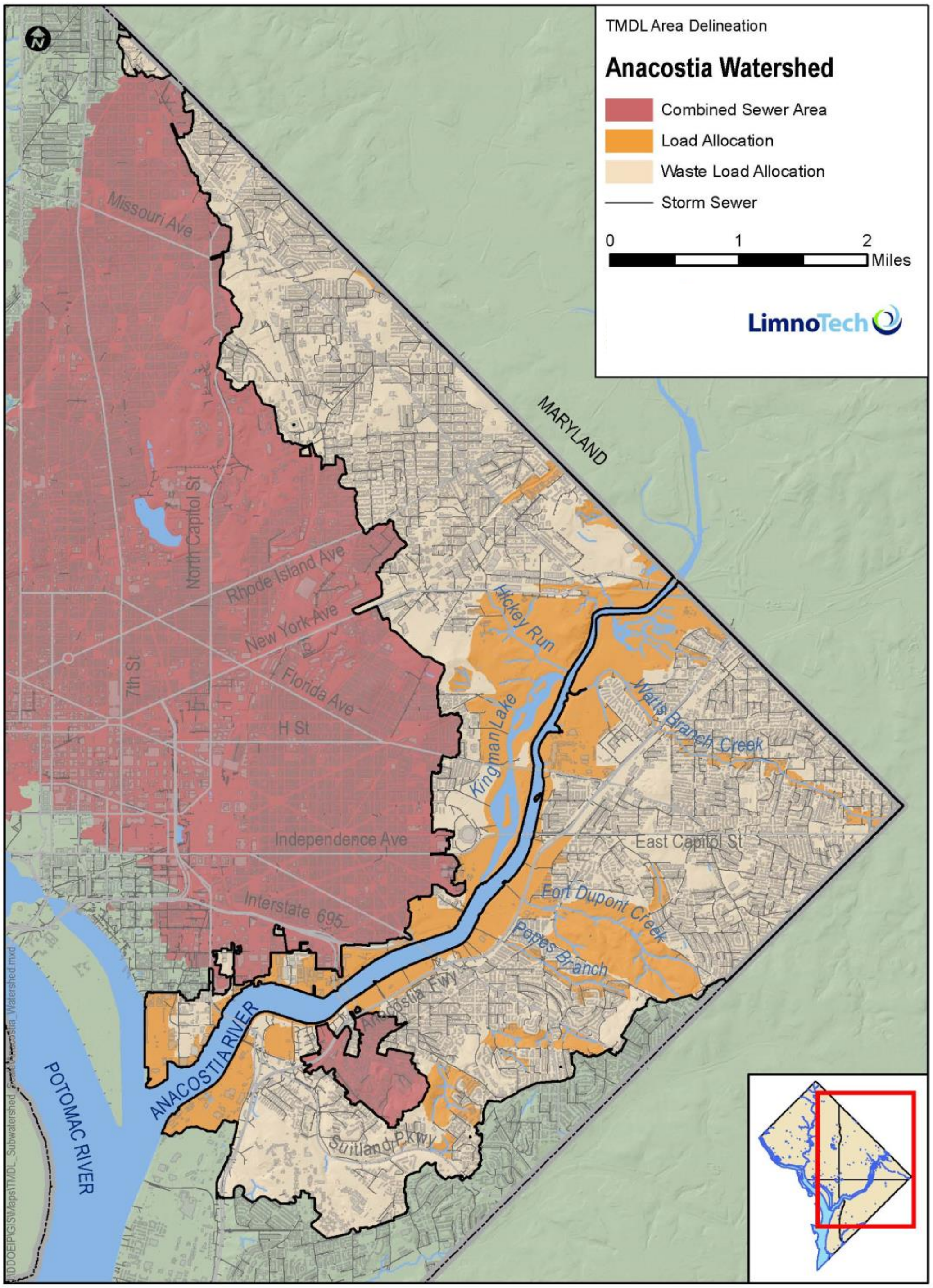
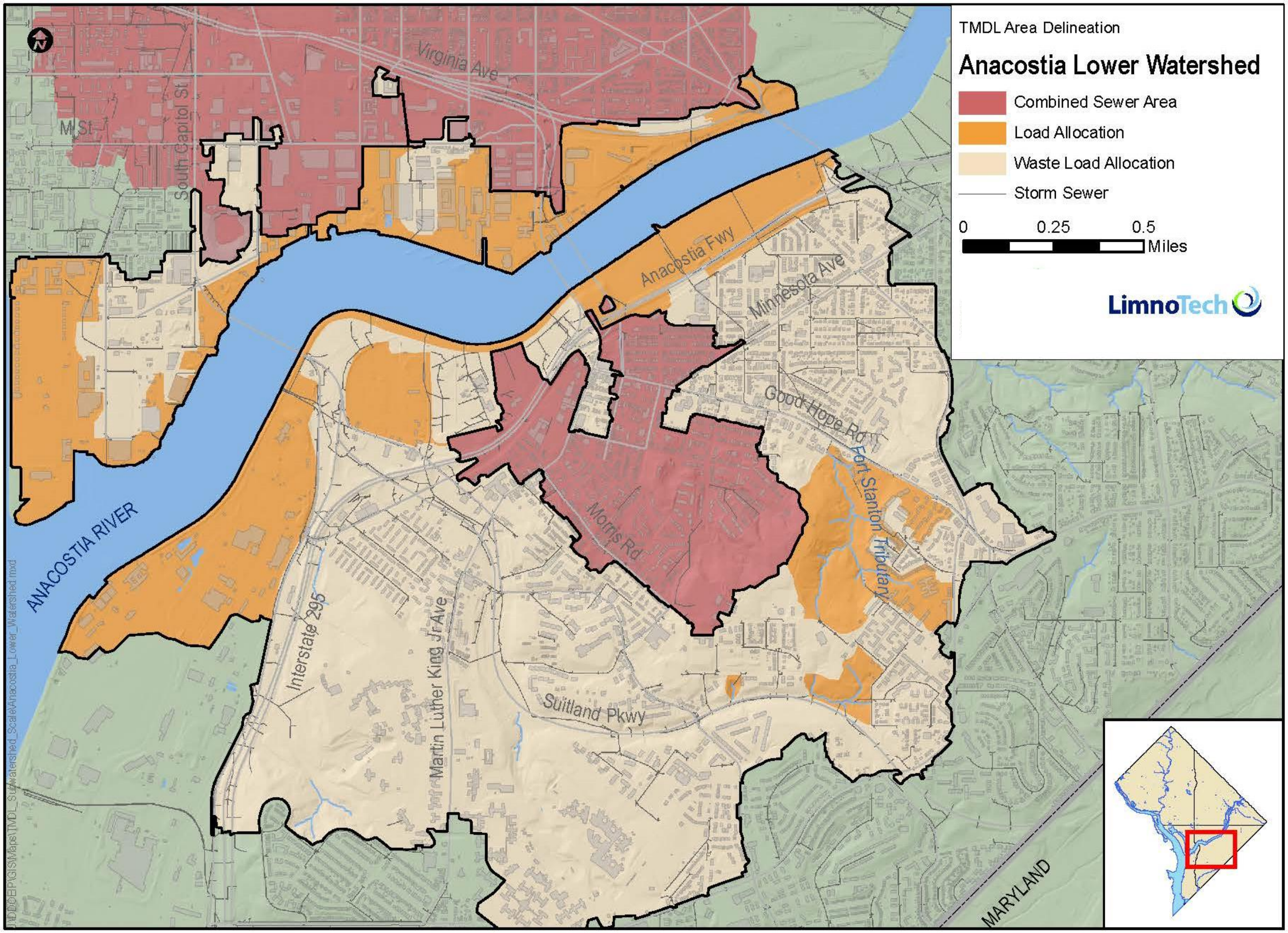


Figure C- 1. Anacostia Watershed



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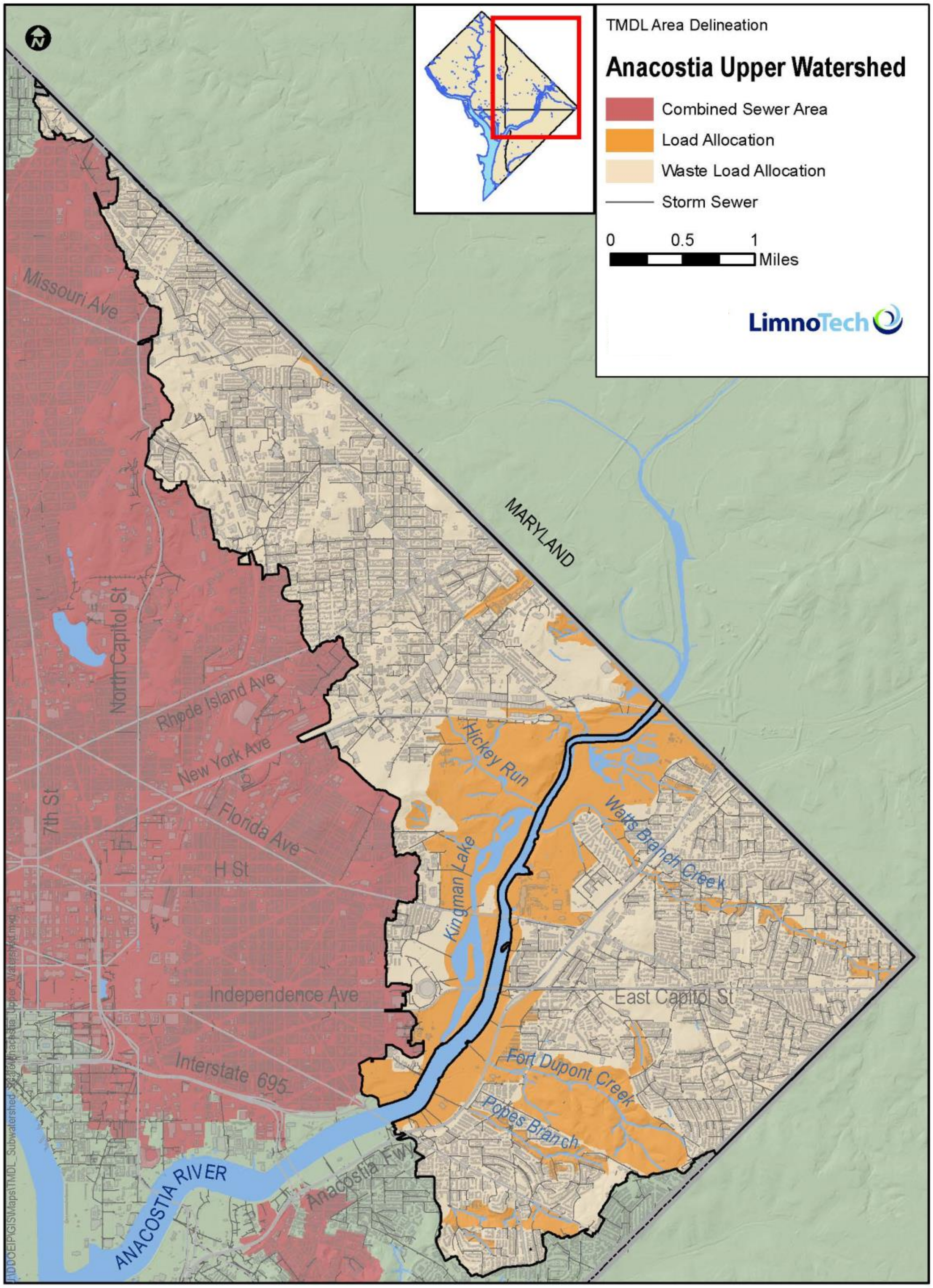

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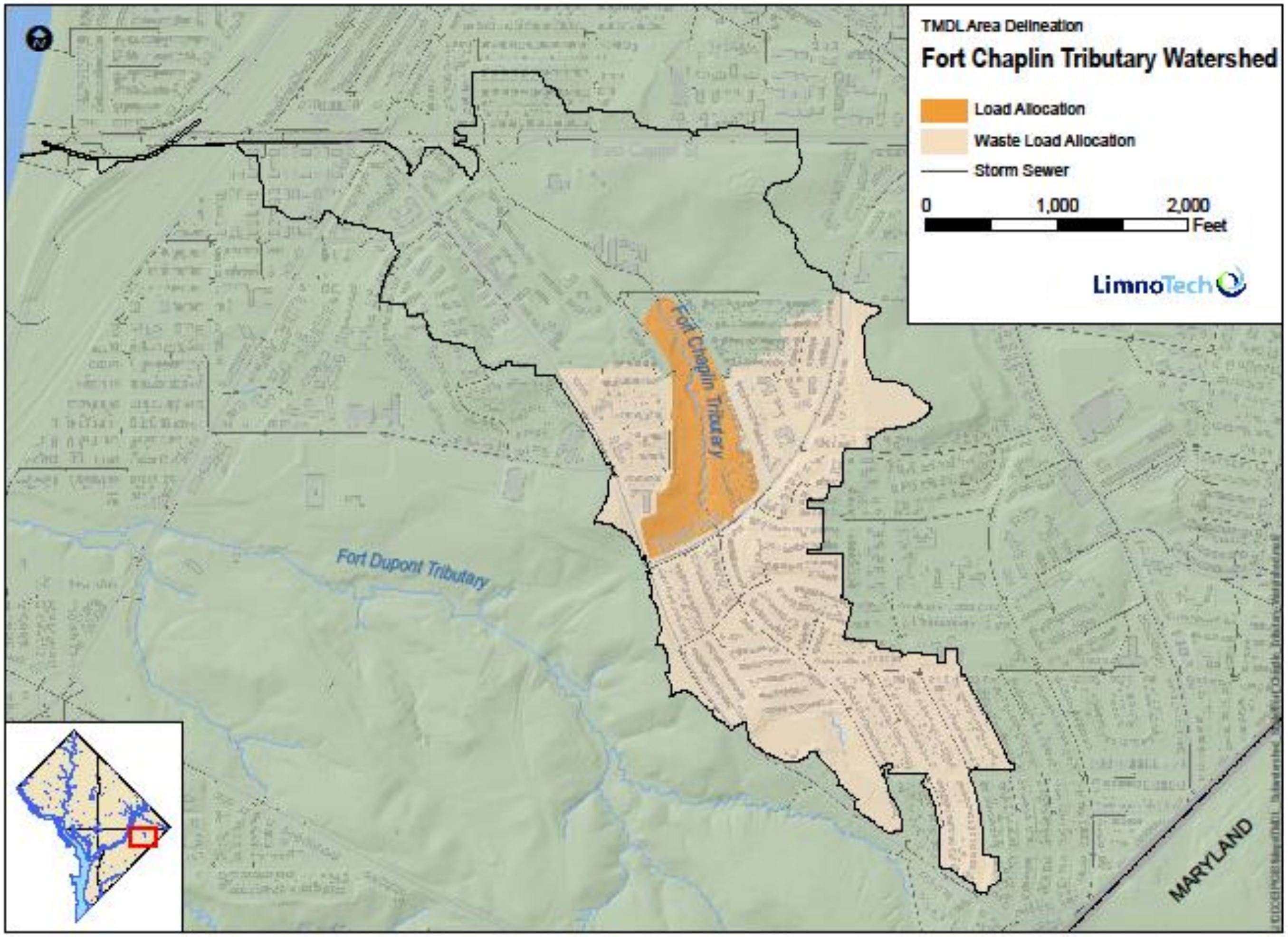

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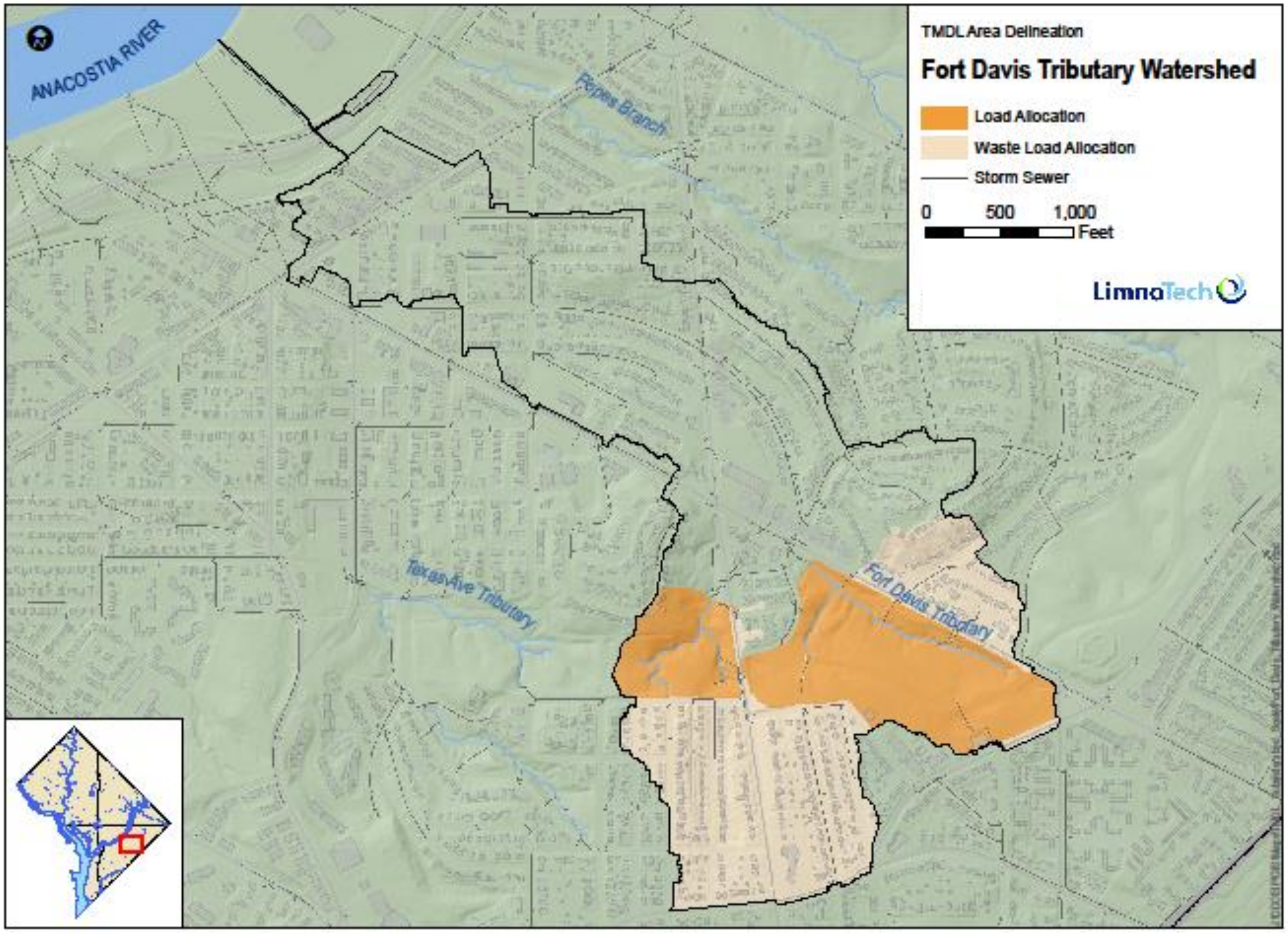

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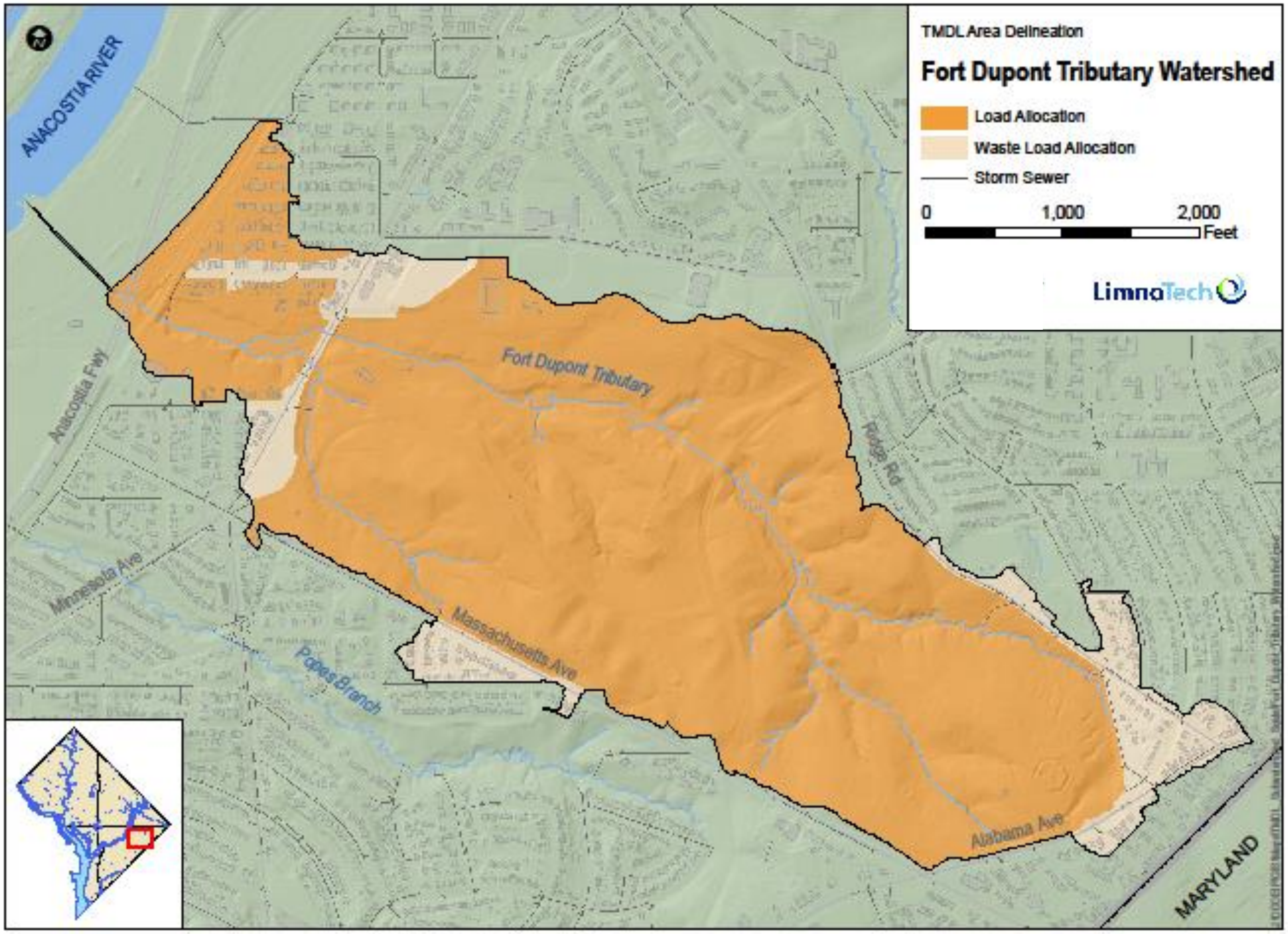

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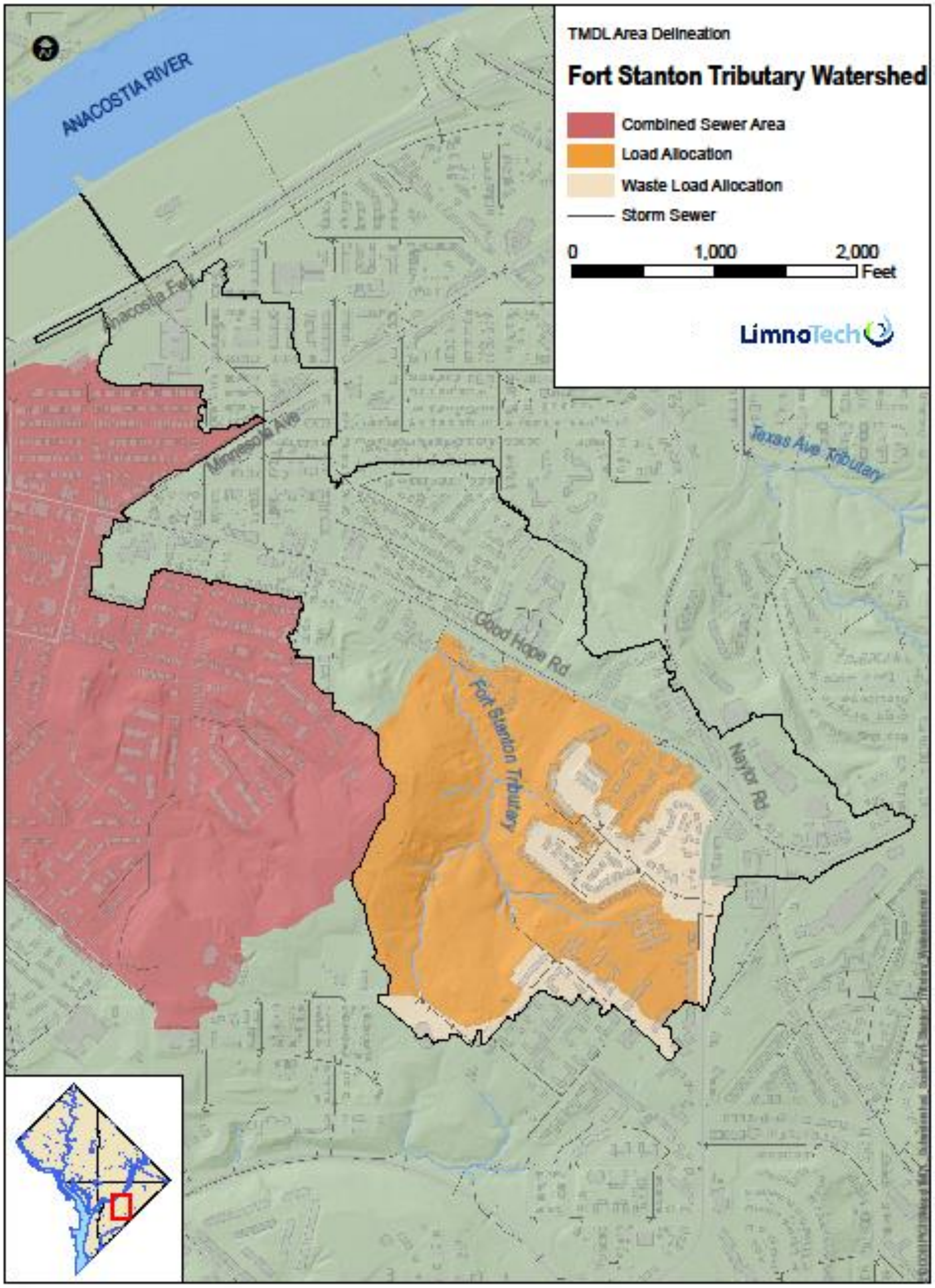

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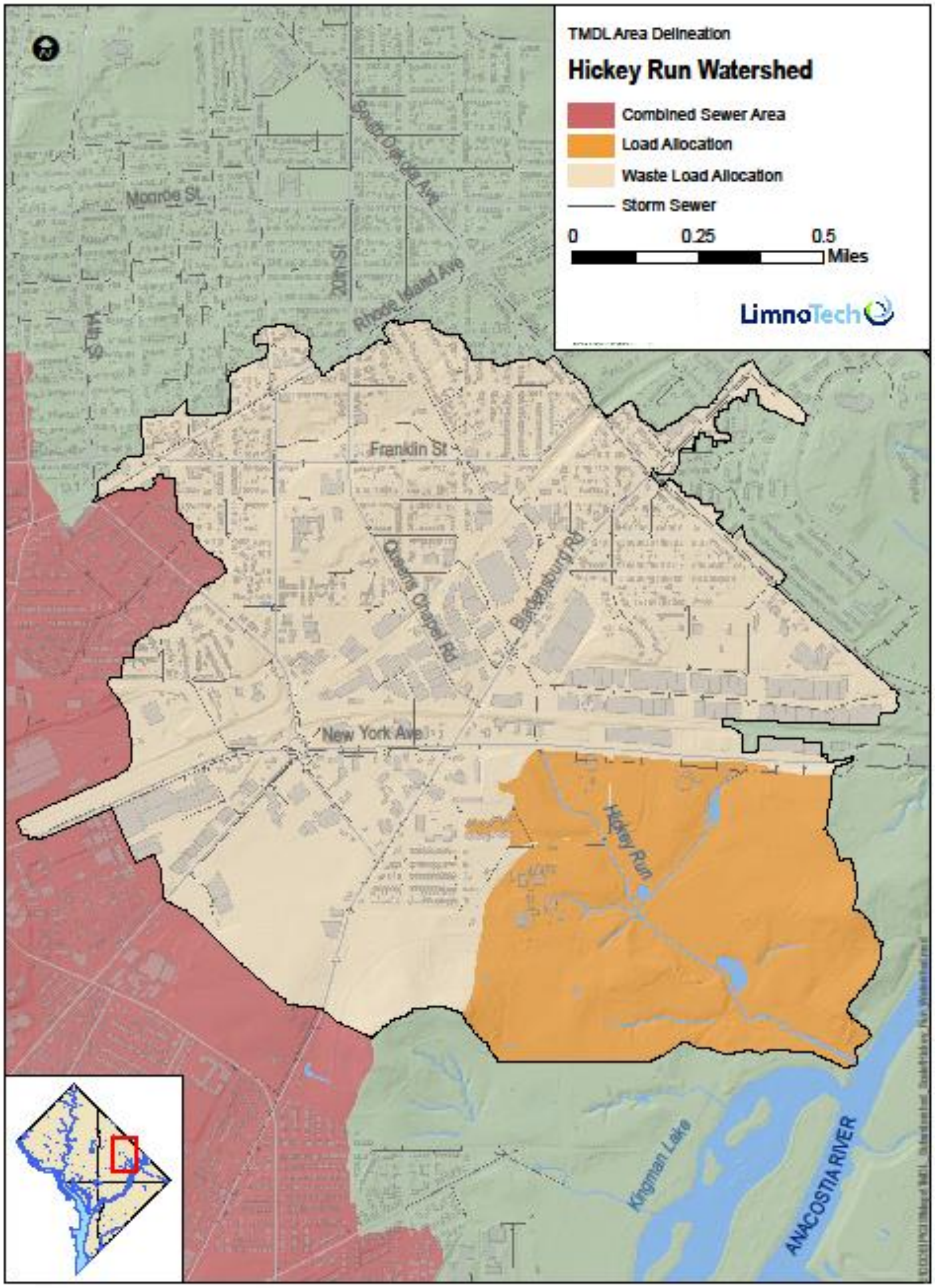

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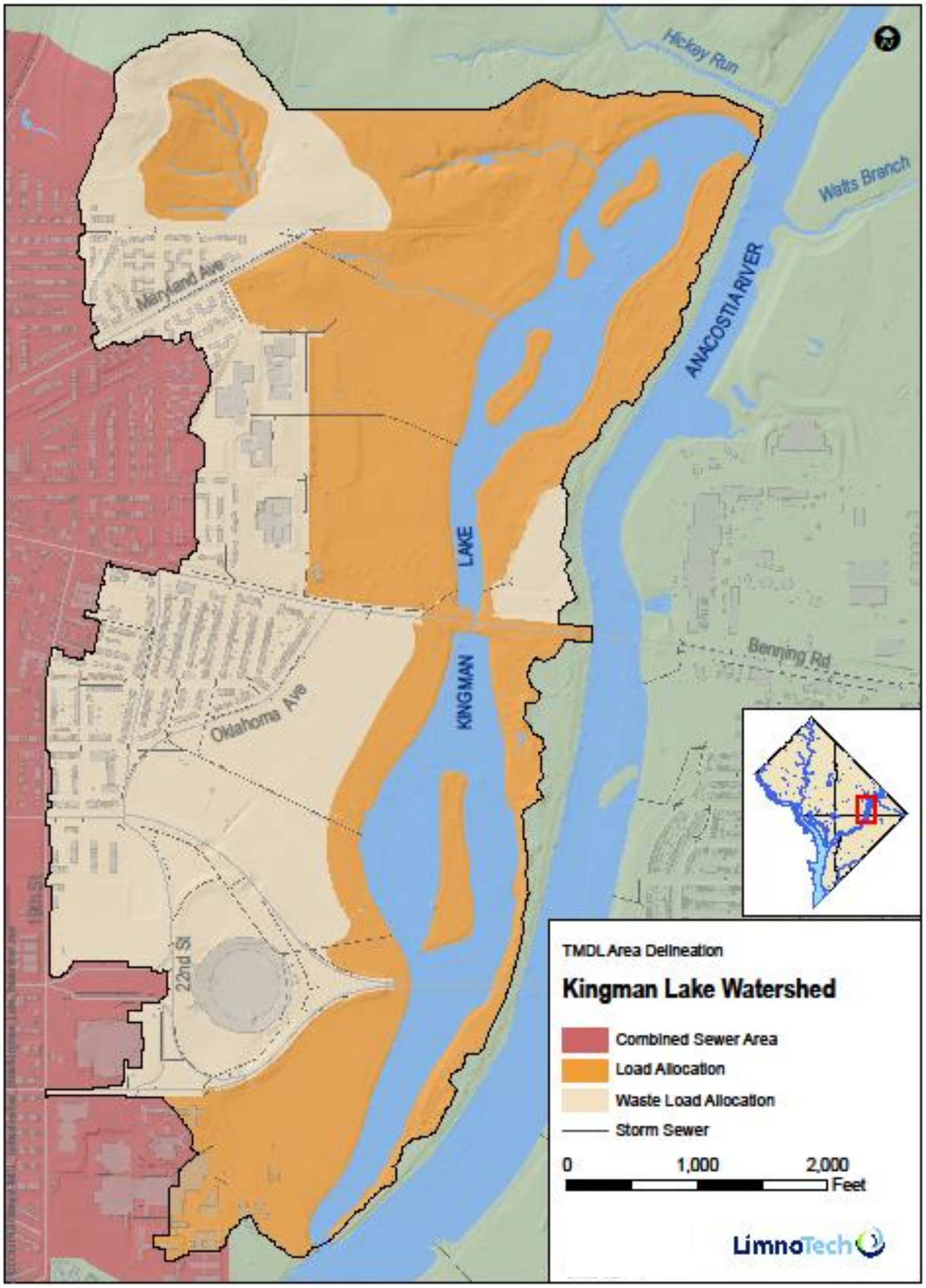

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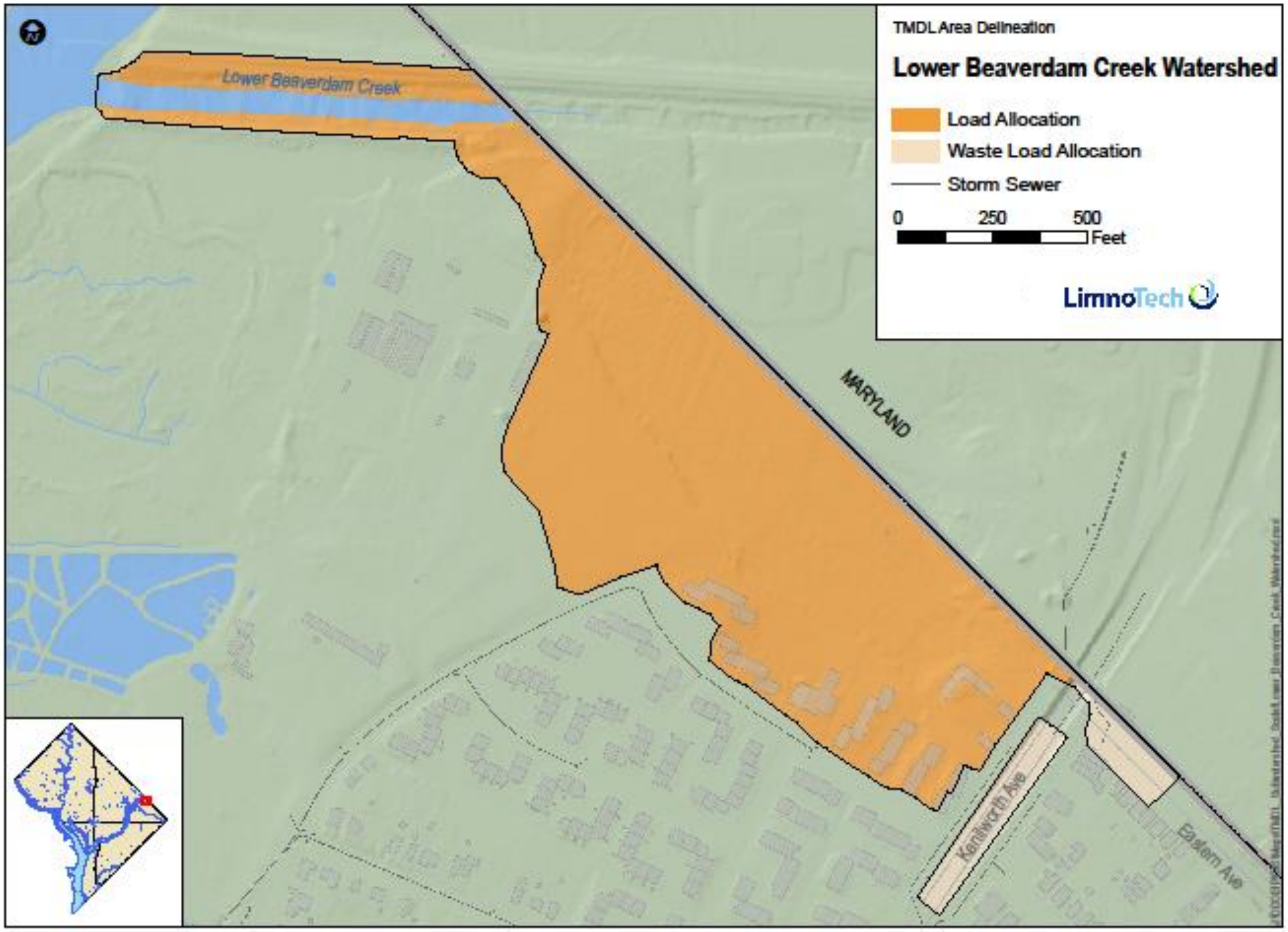

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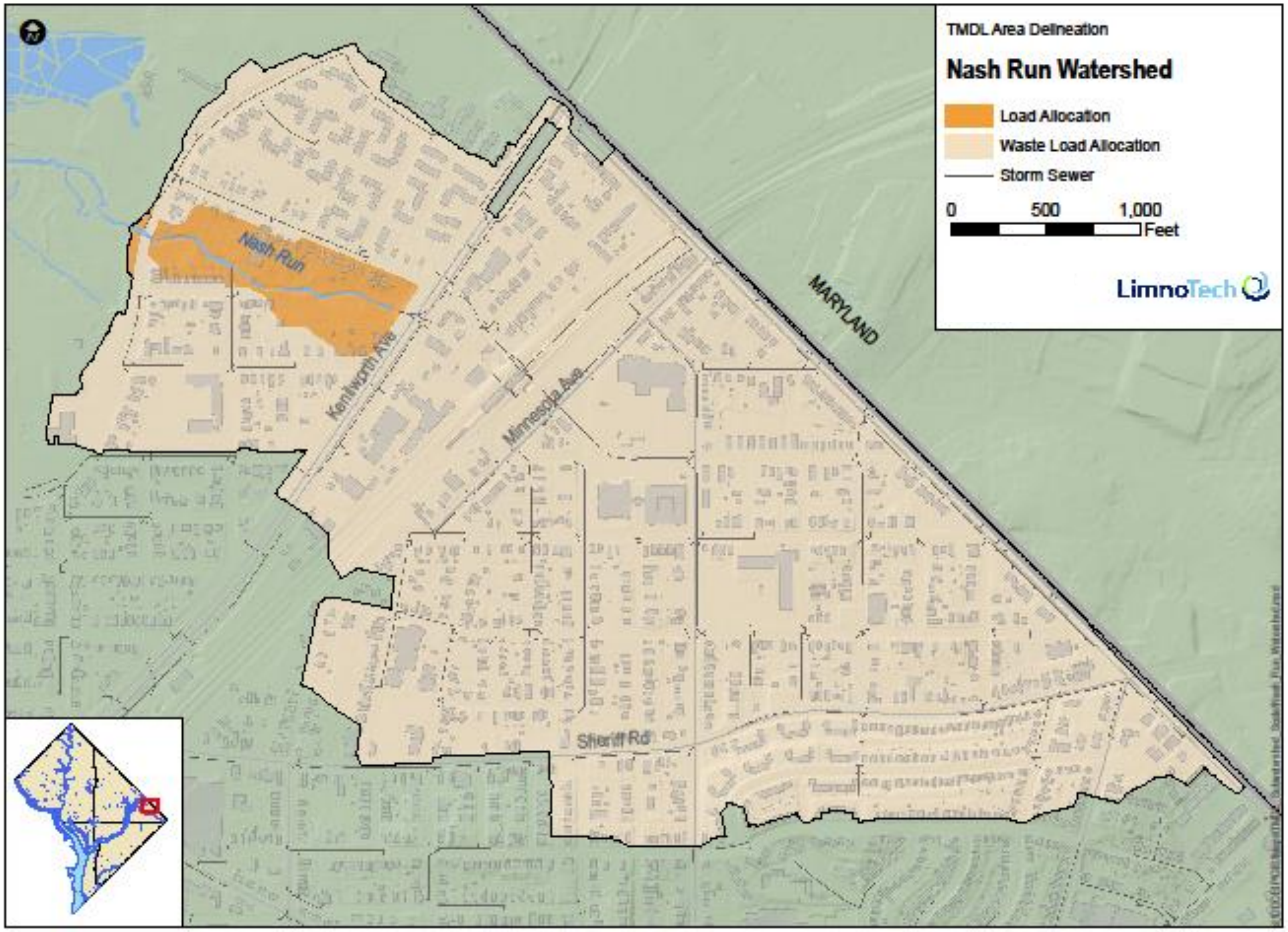

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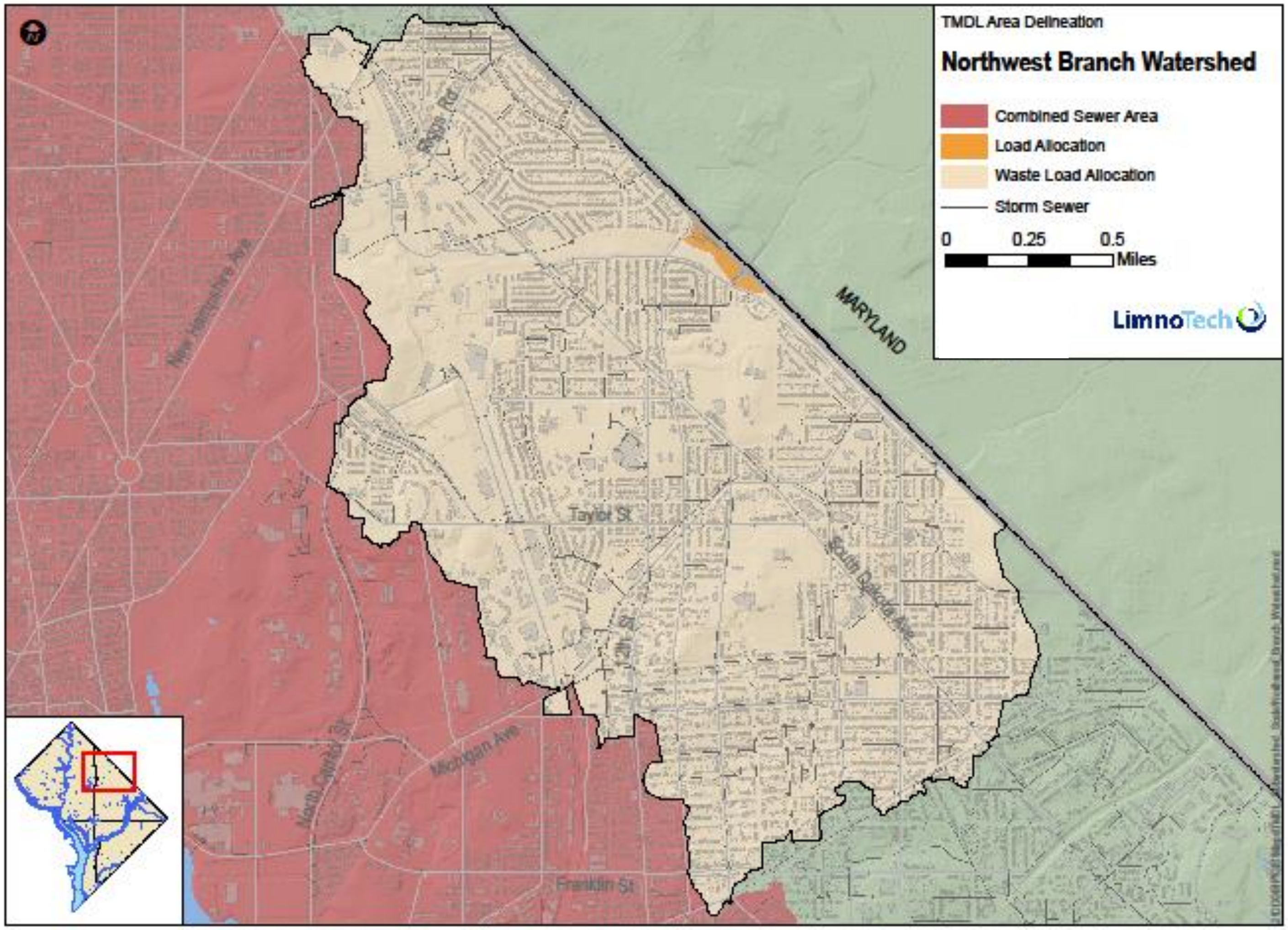

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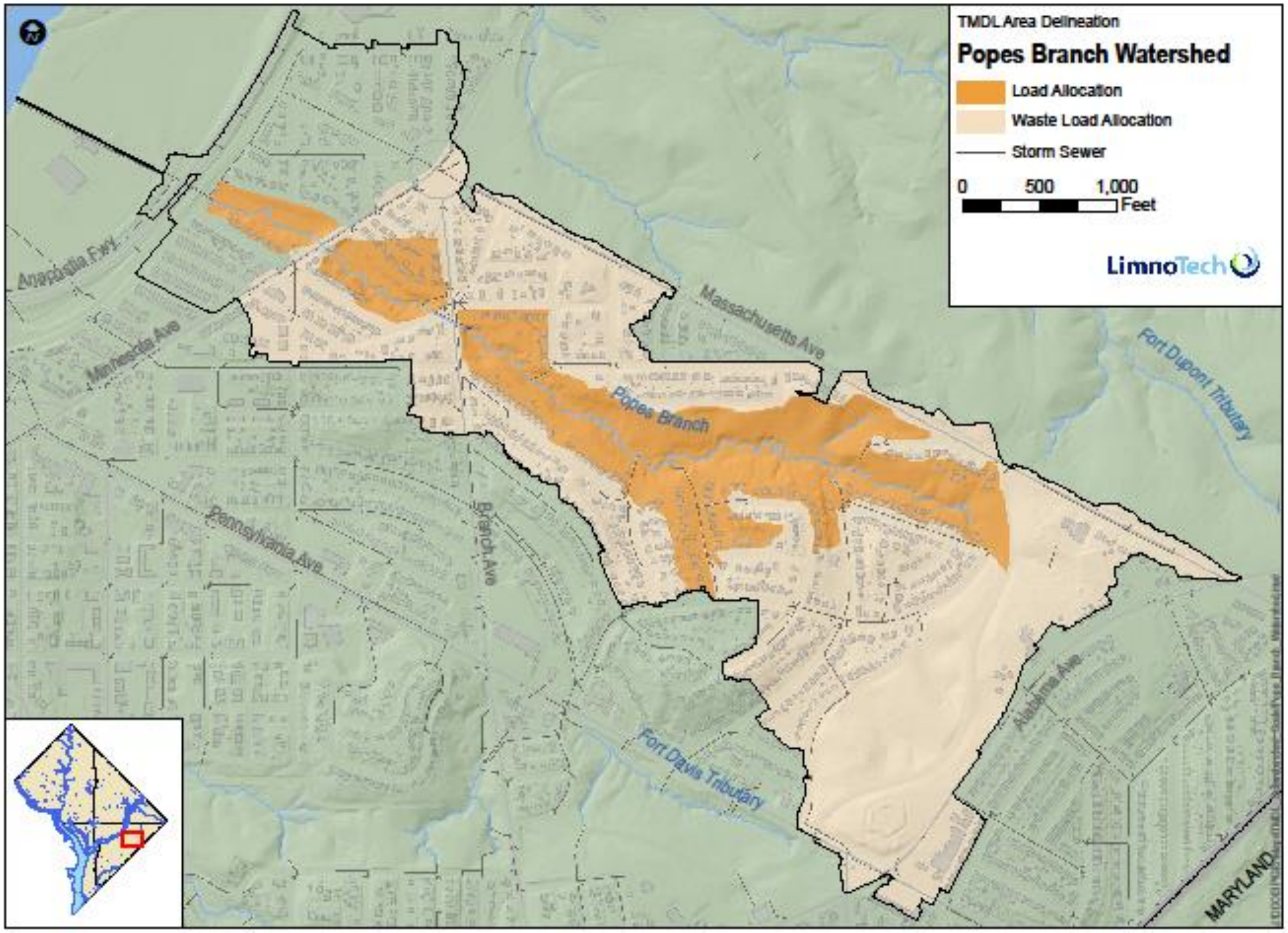

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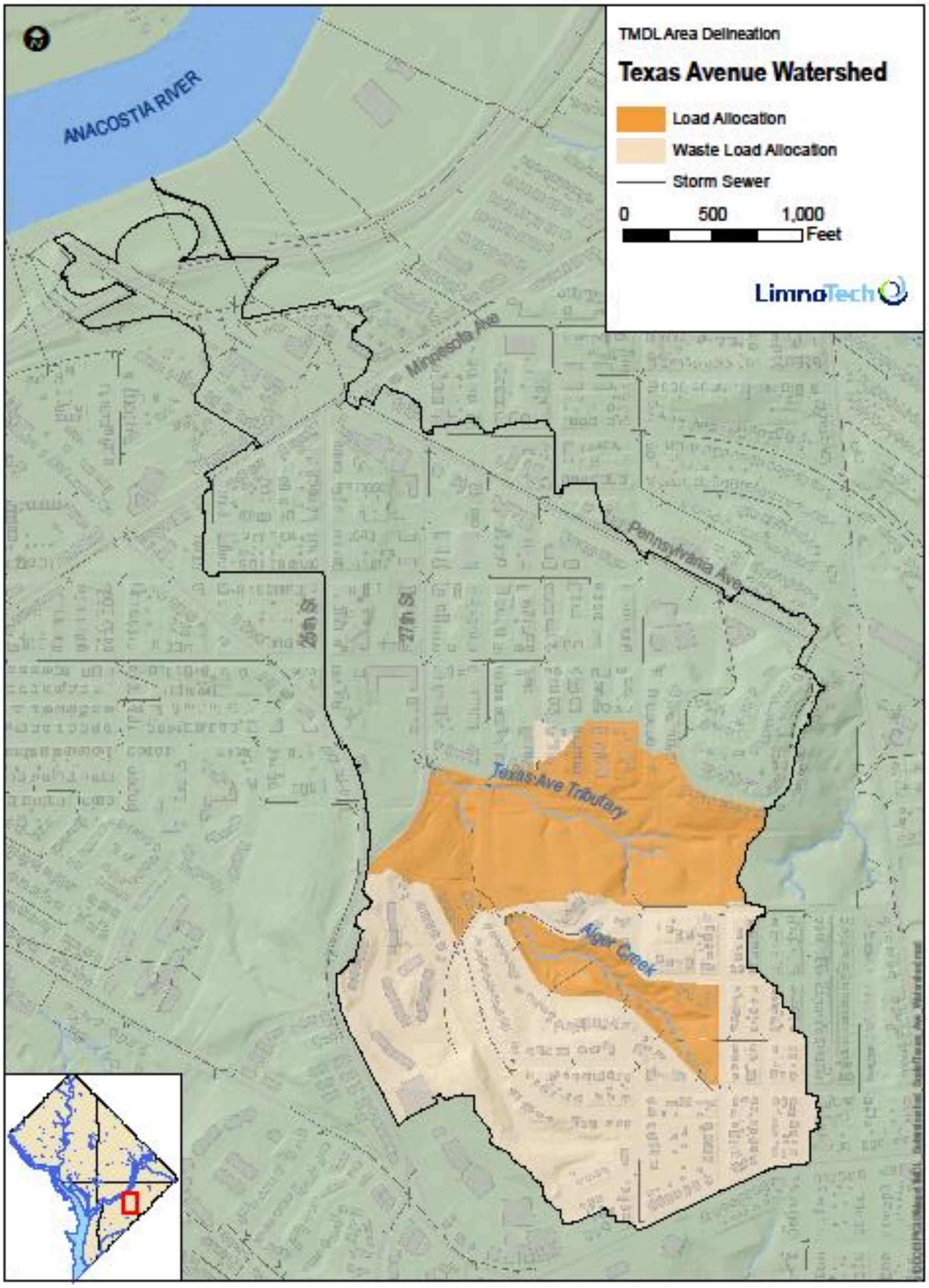

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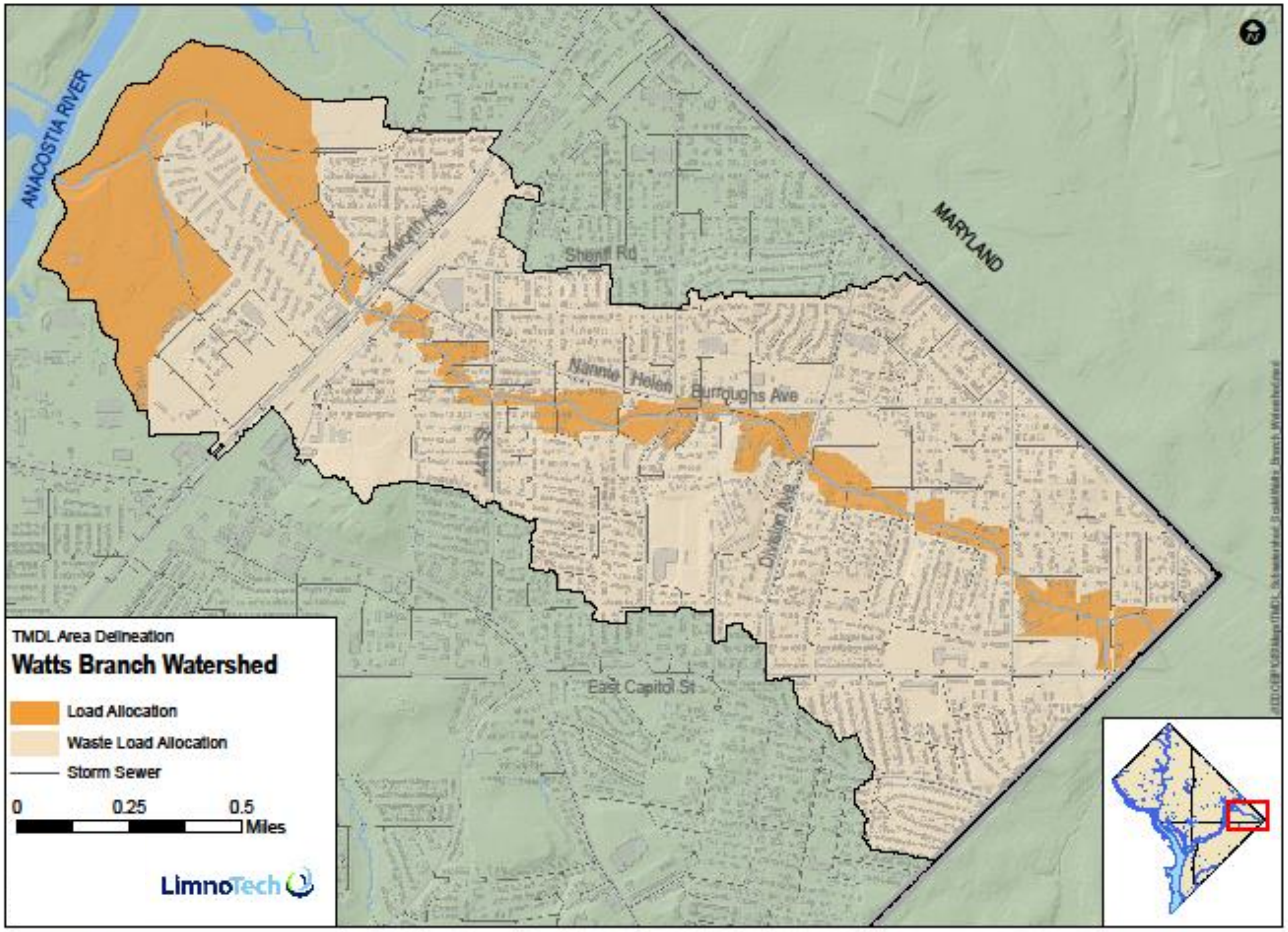

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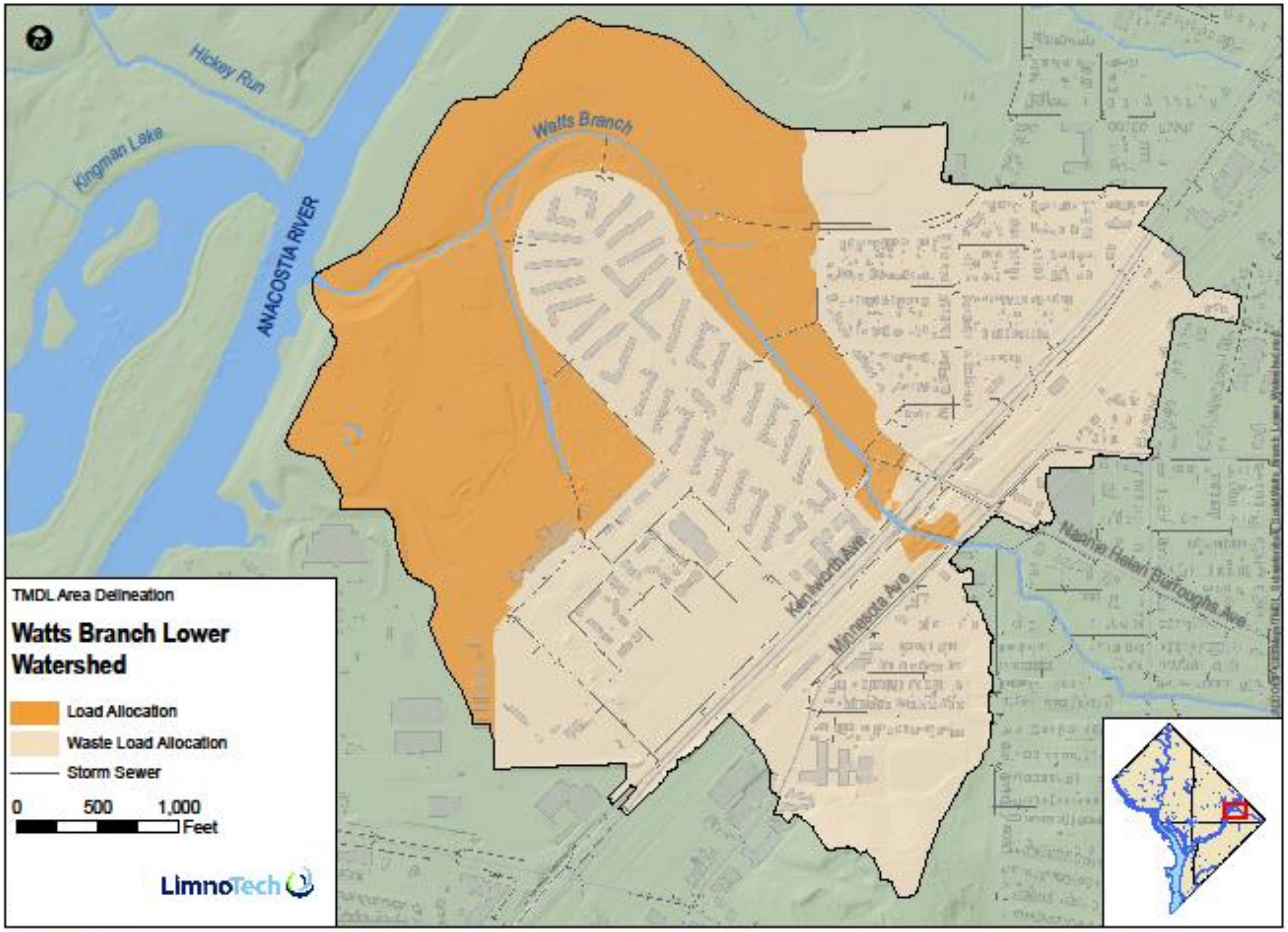

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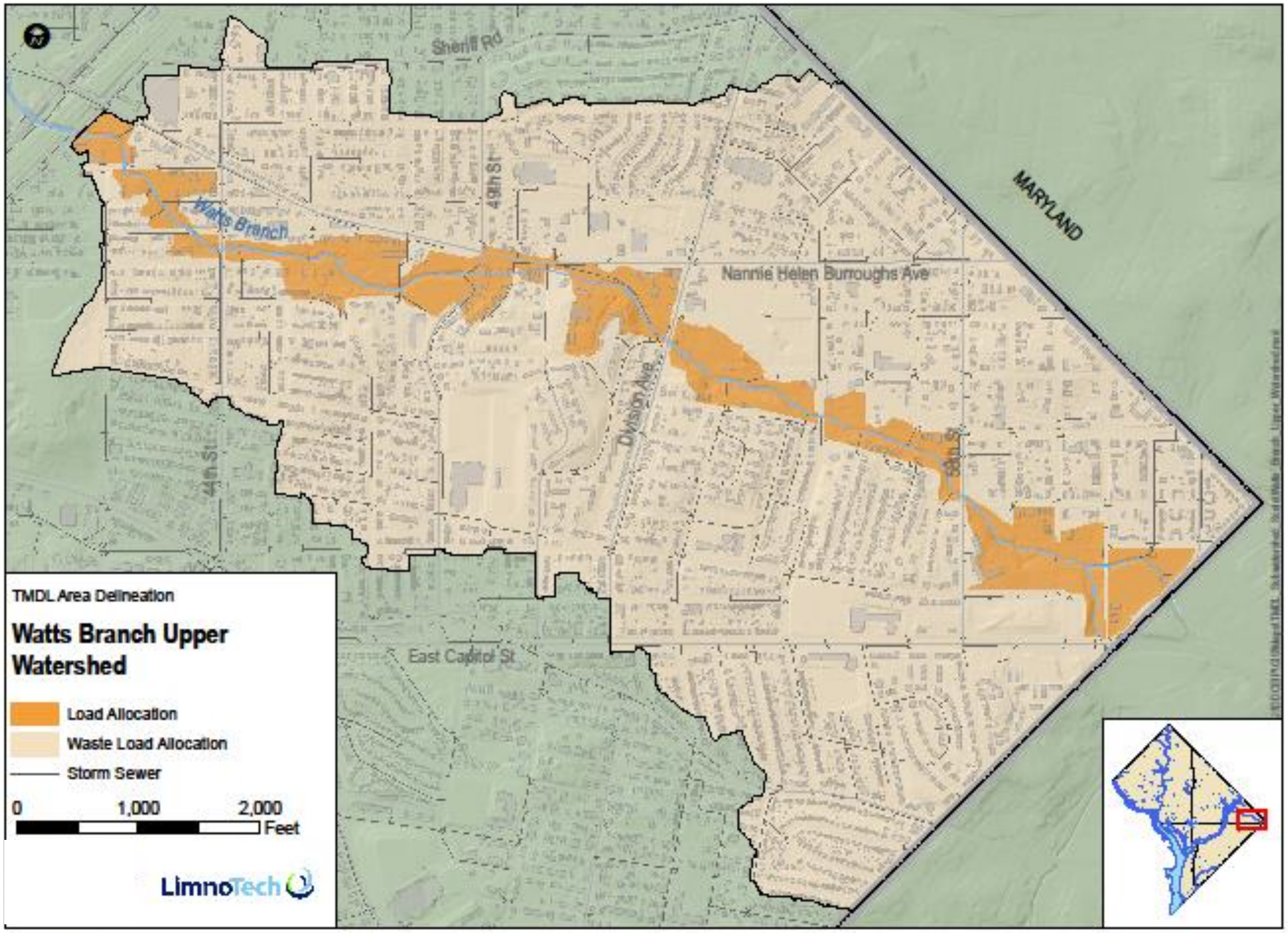

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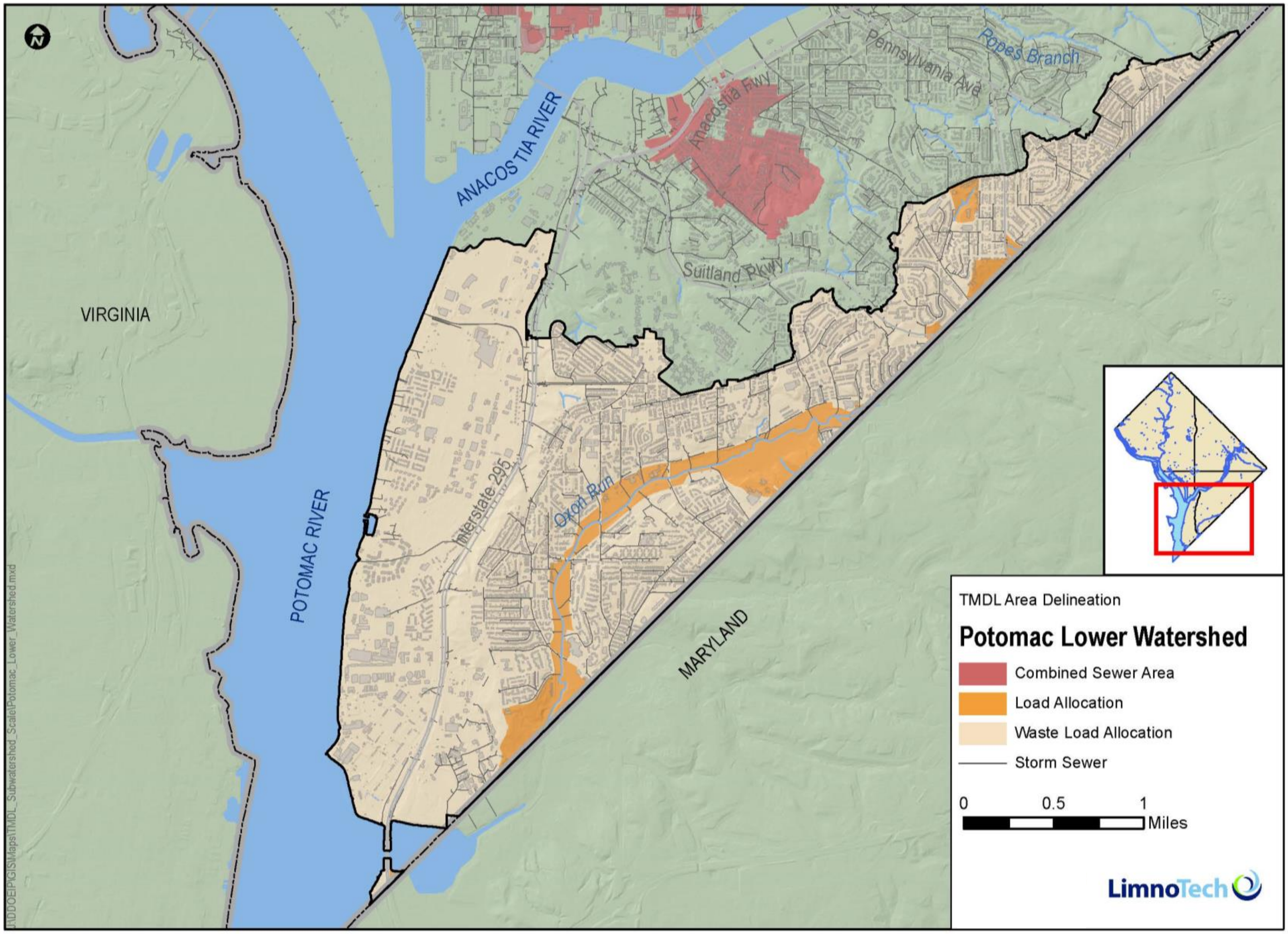

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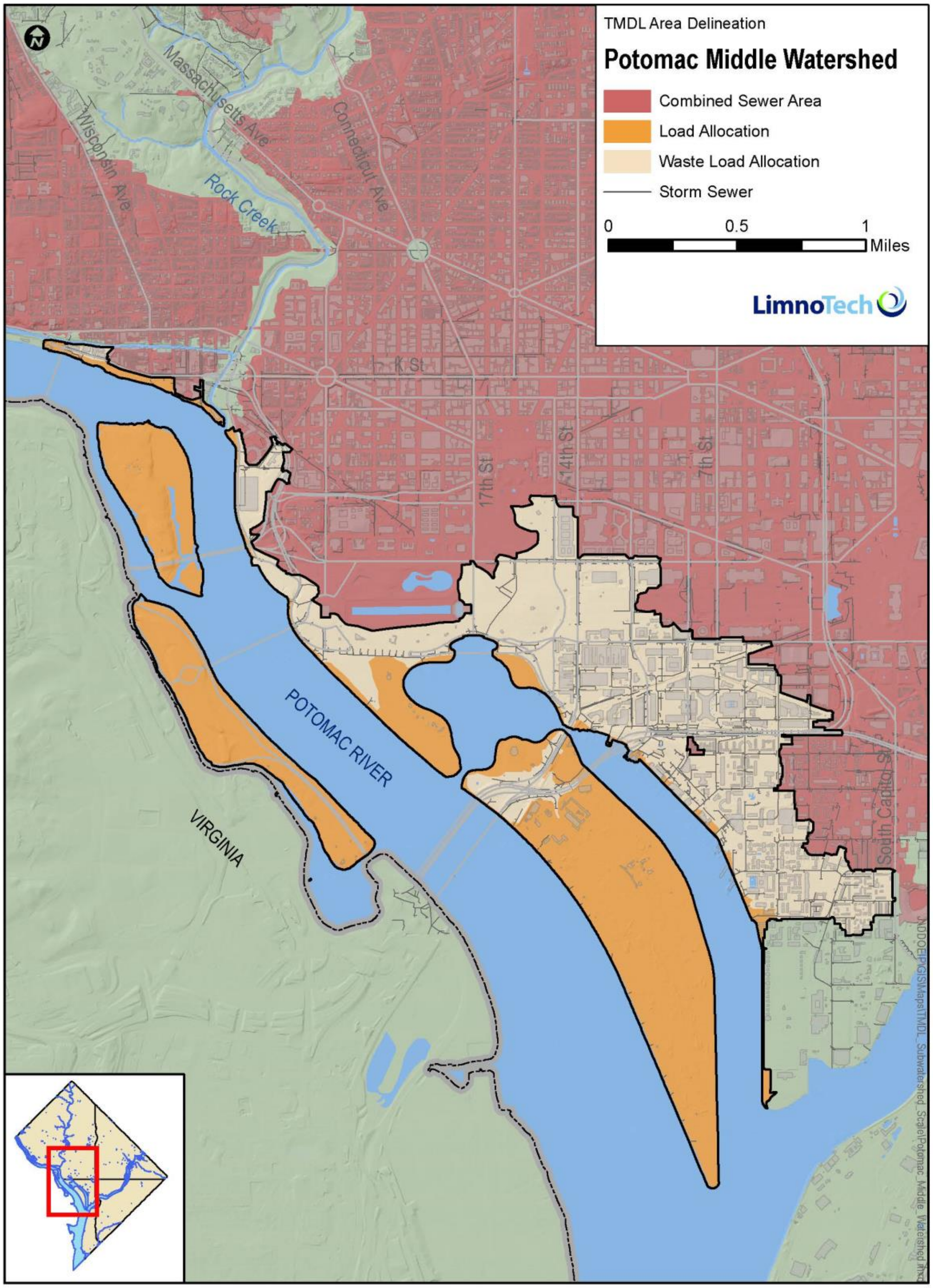

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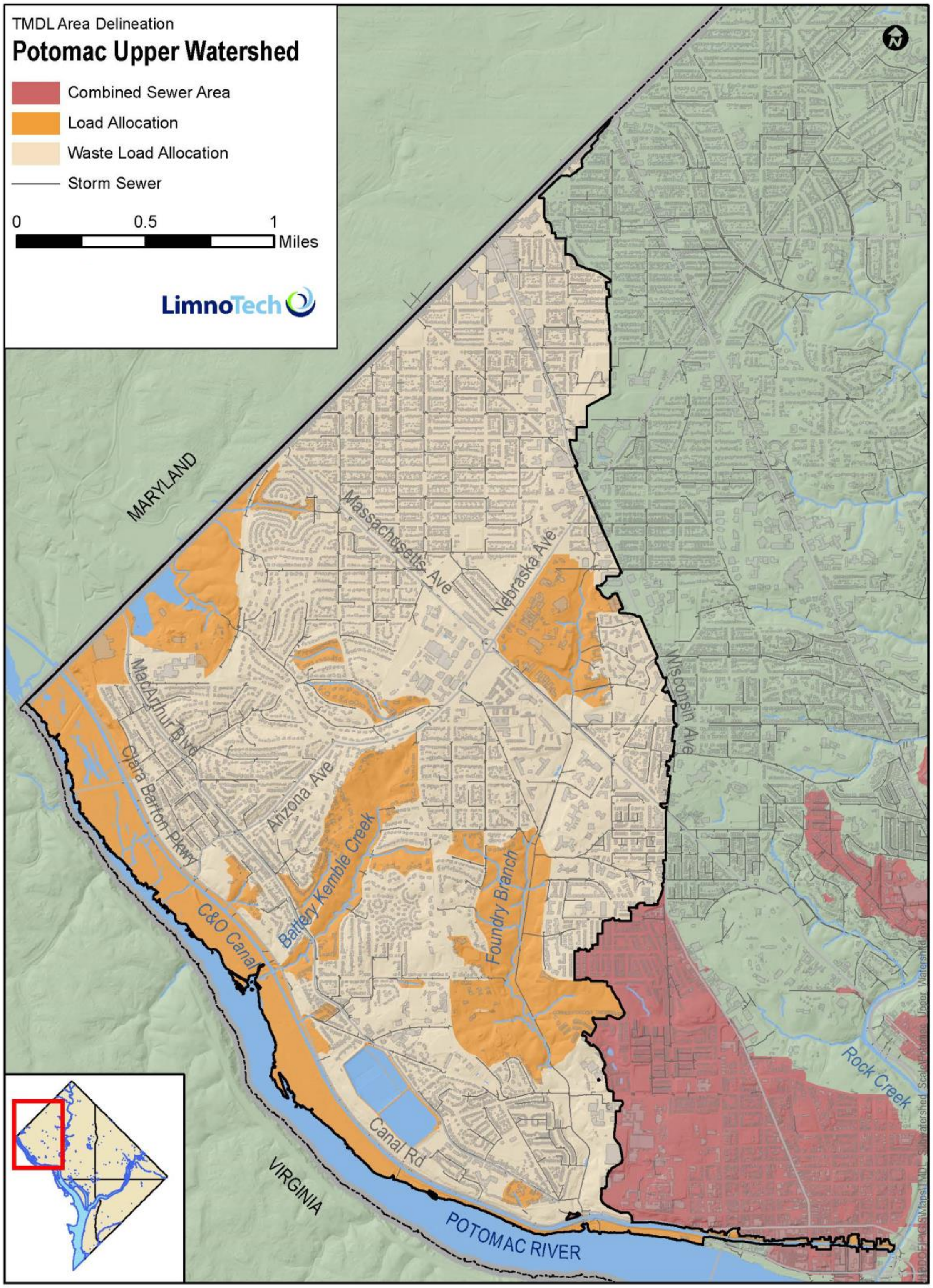

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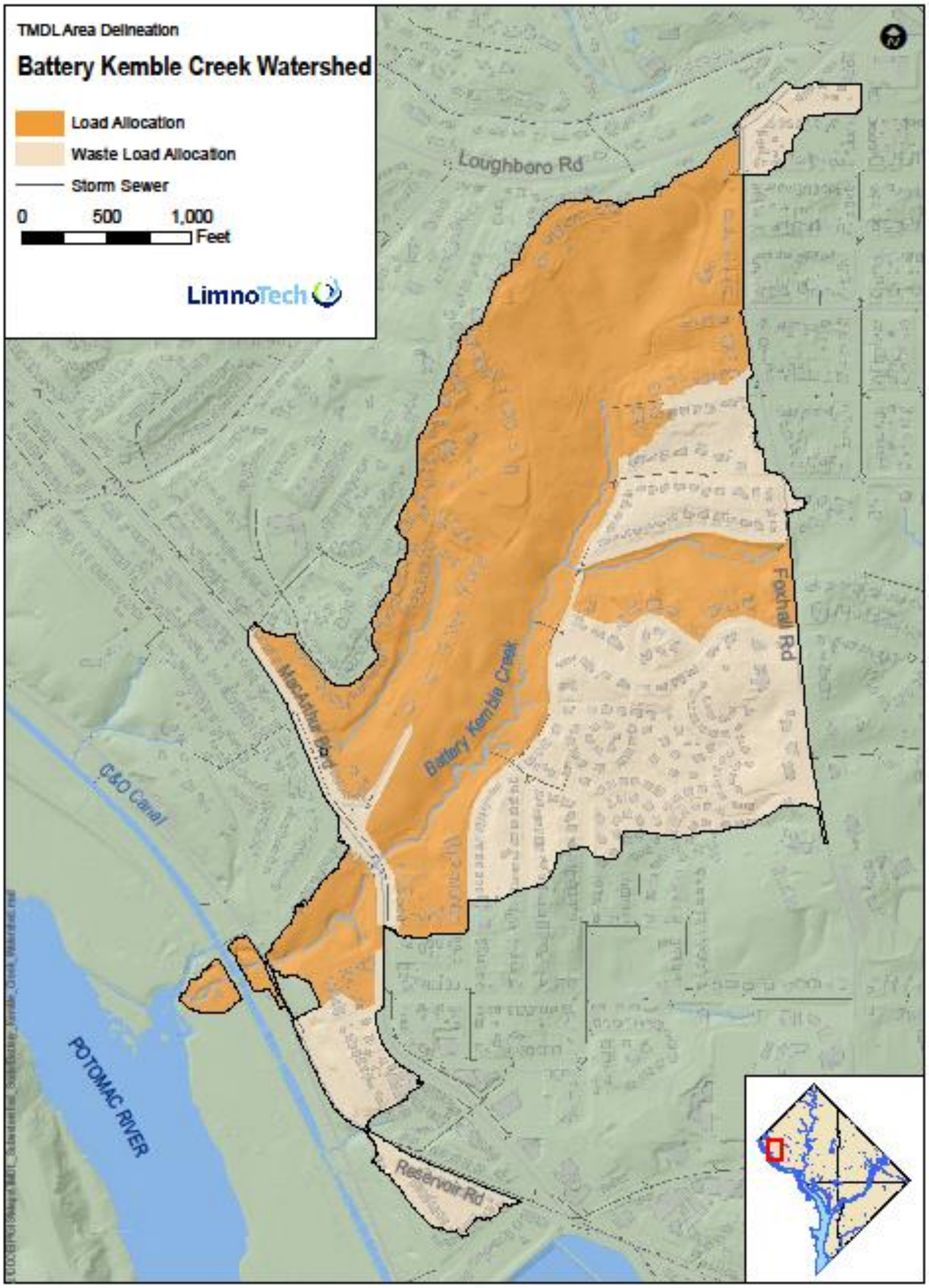

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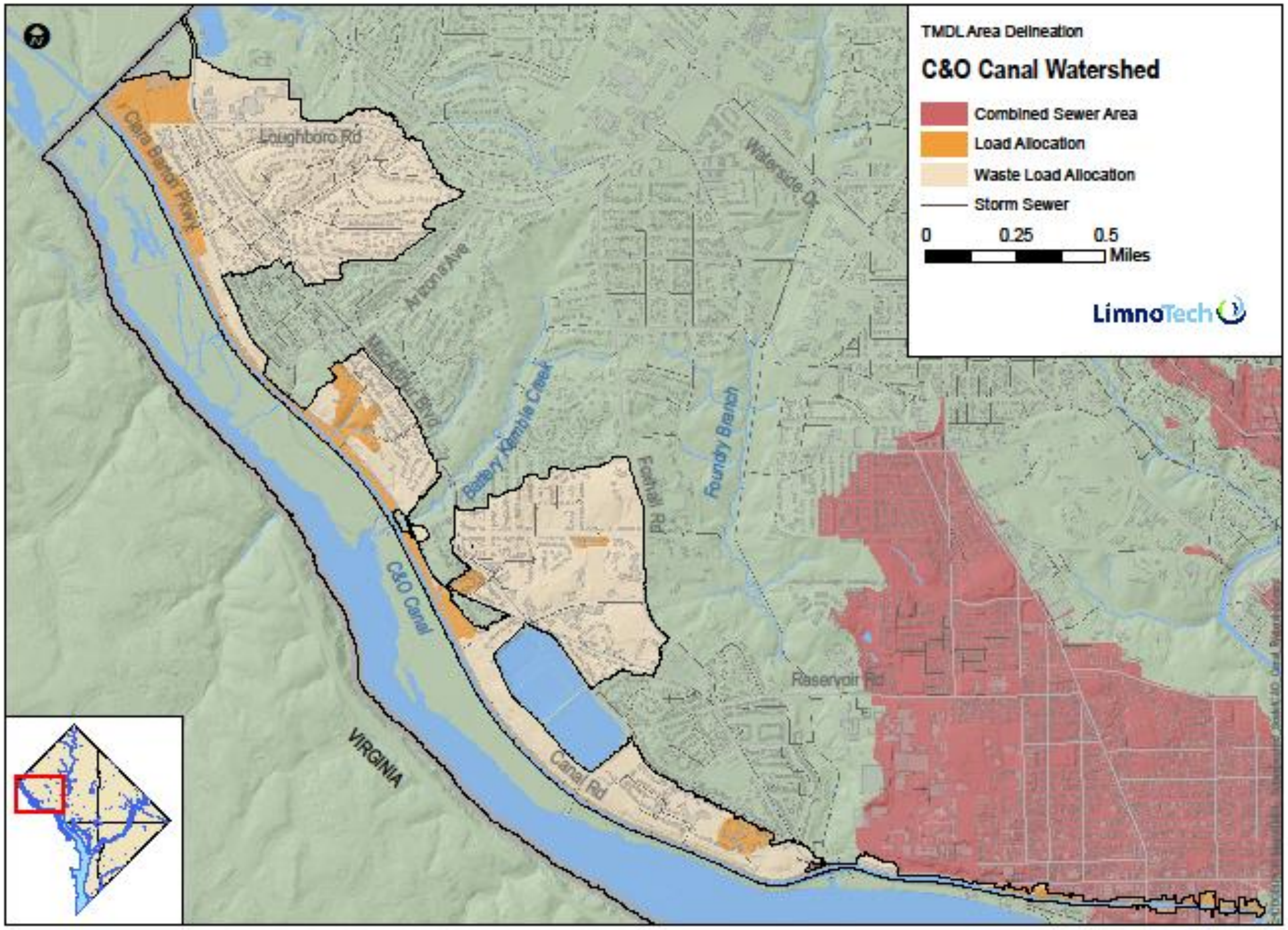

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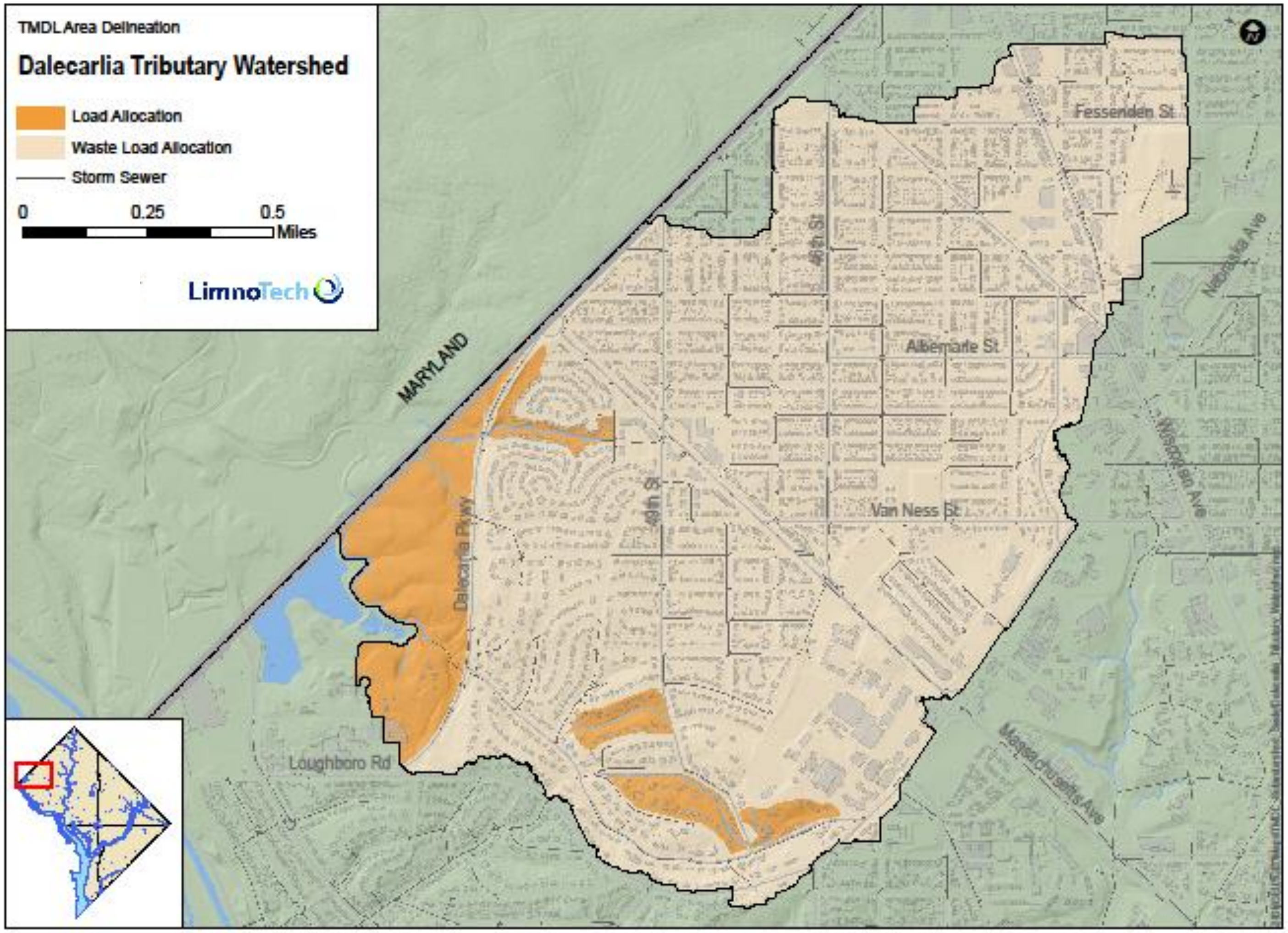

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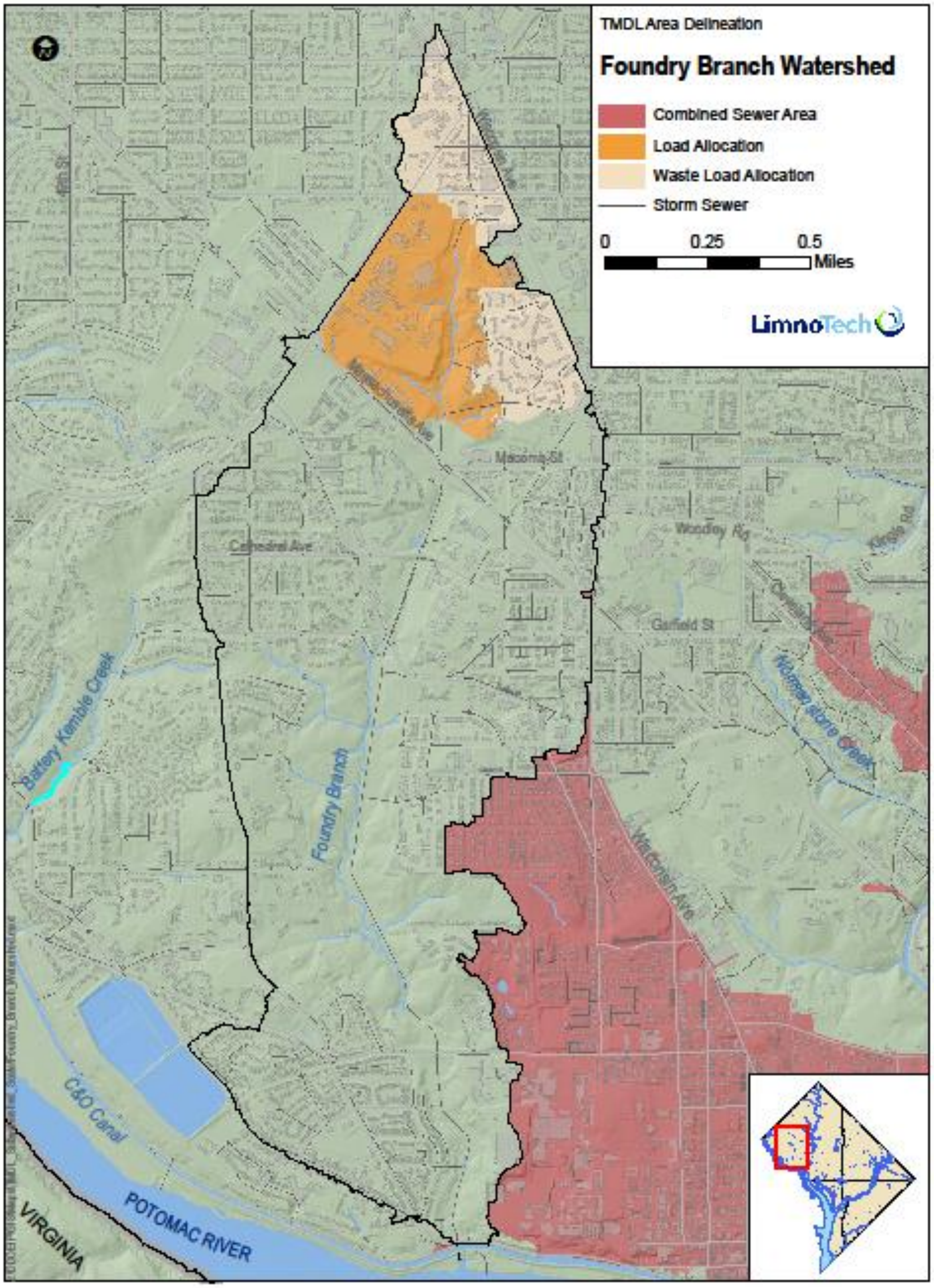

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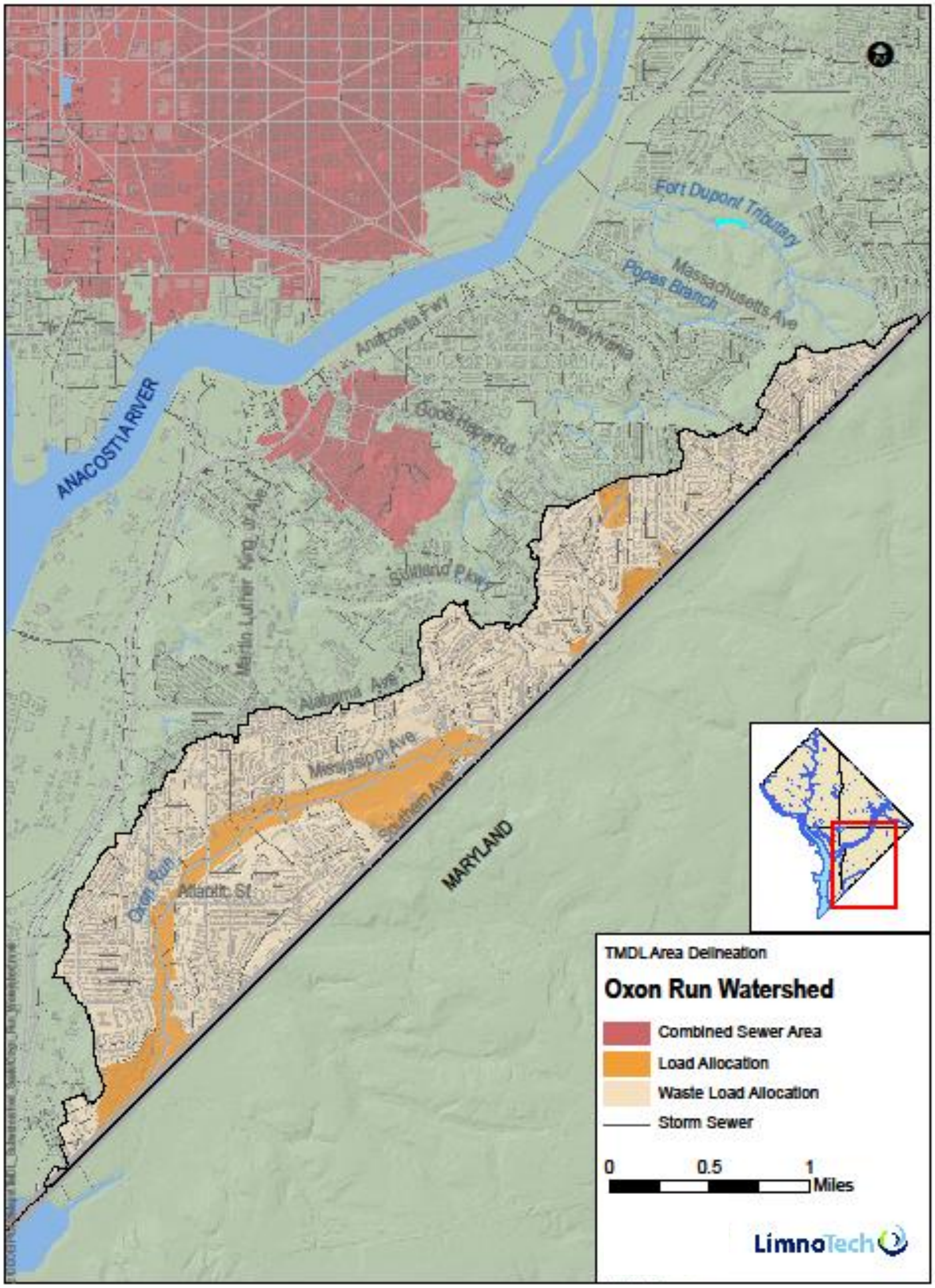

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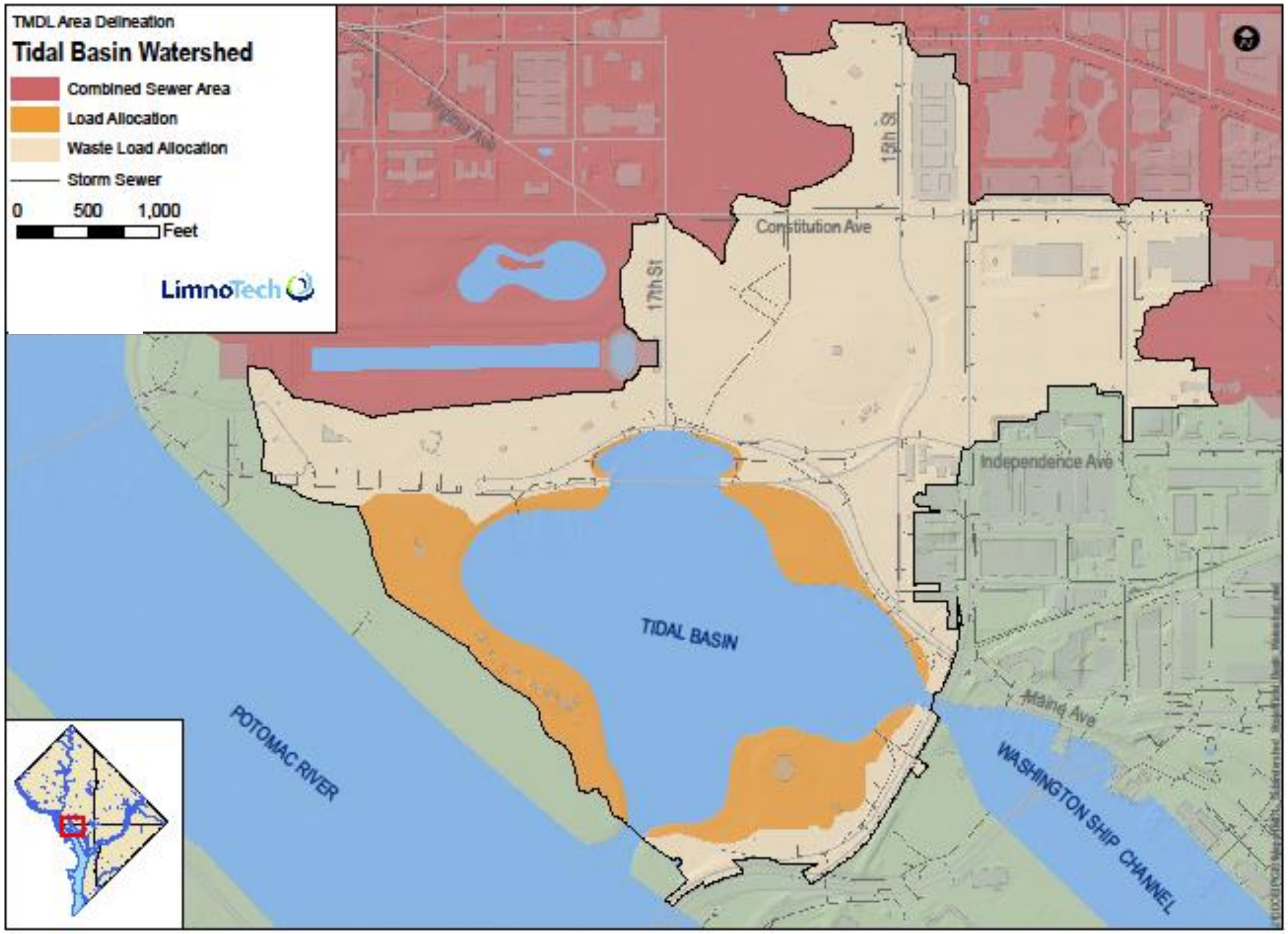

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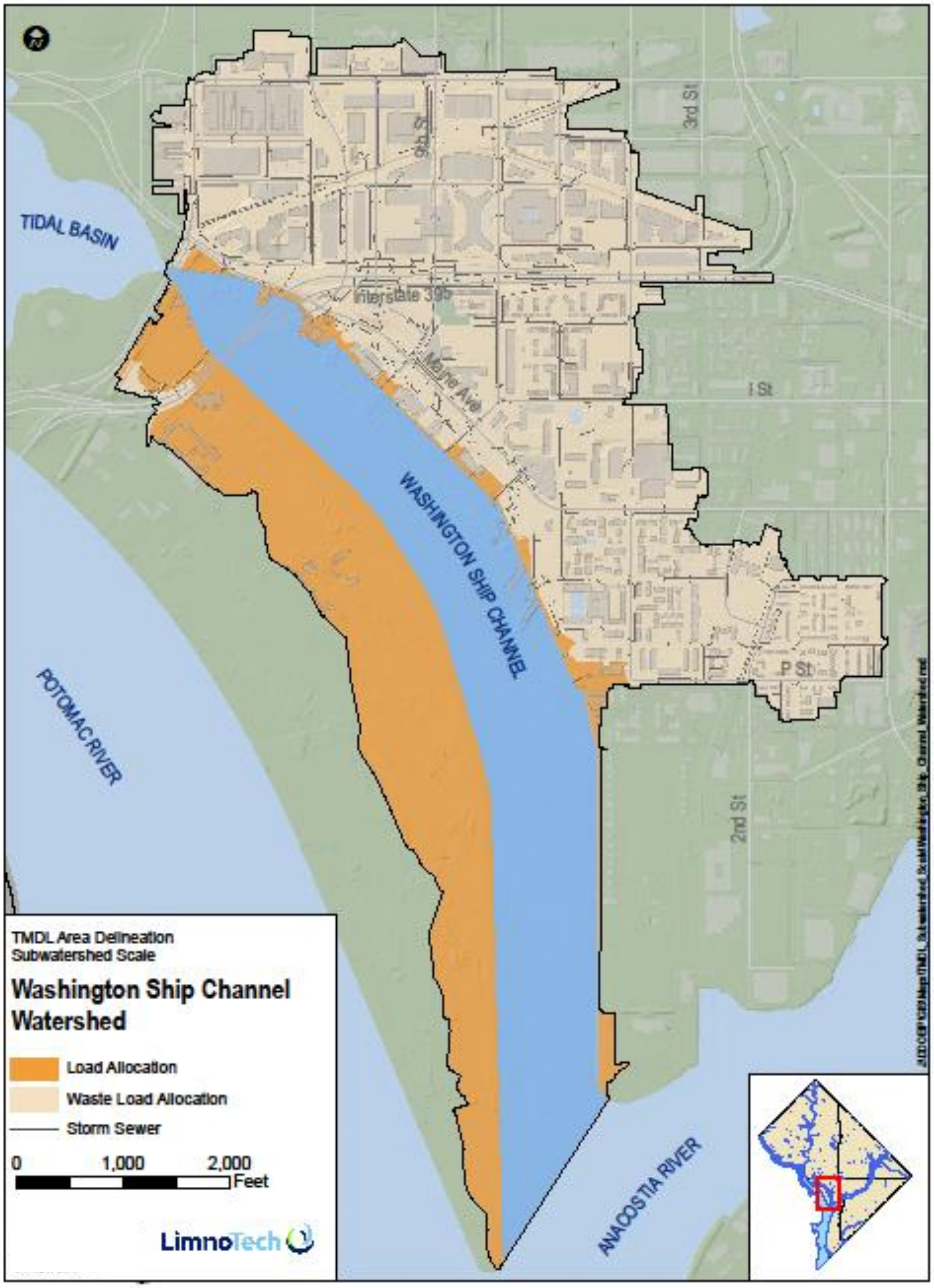

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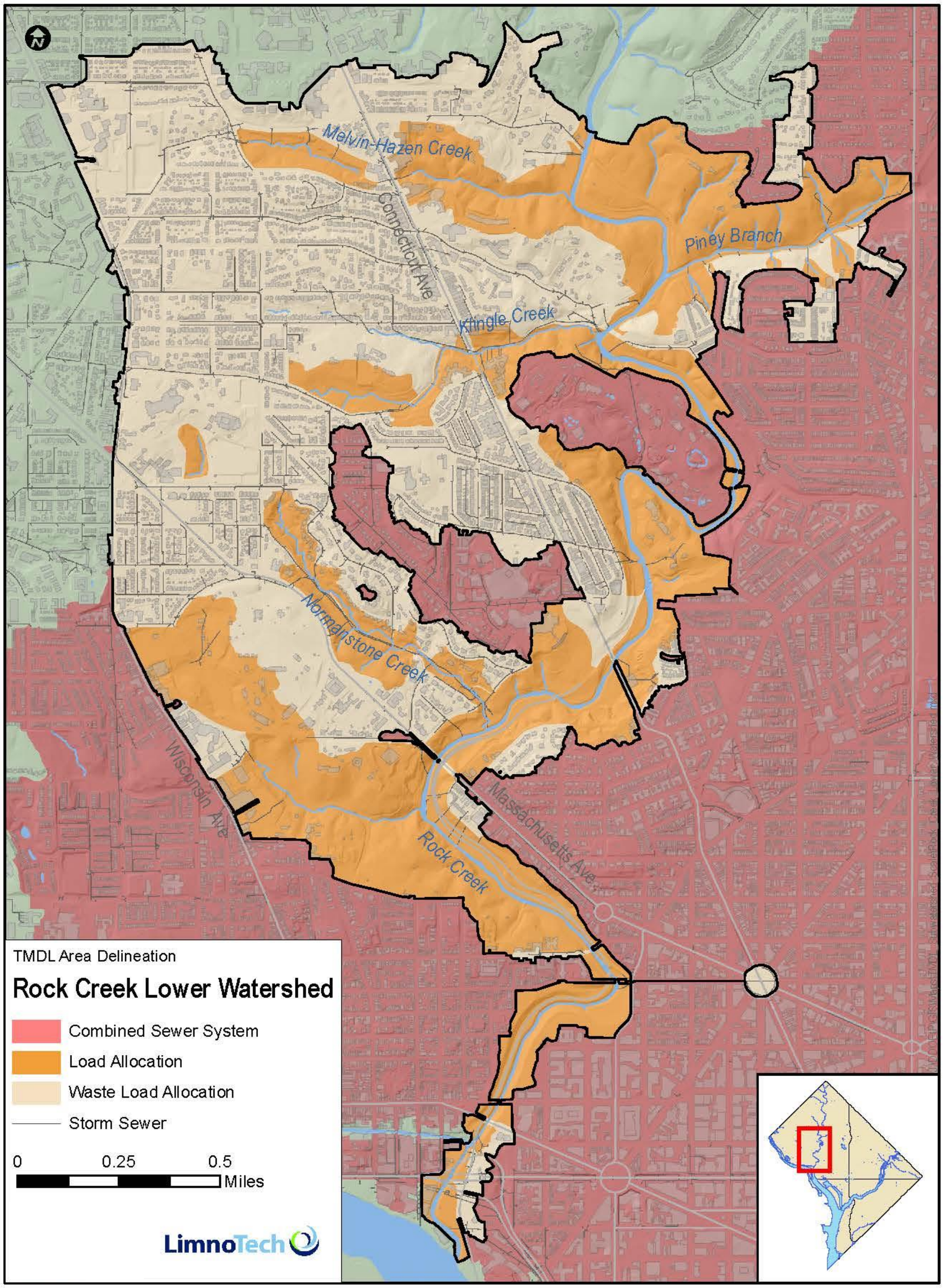

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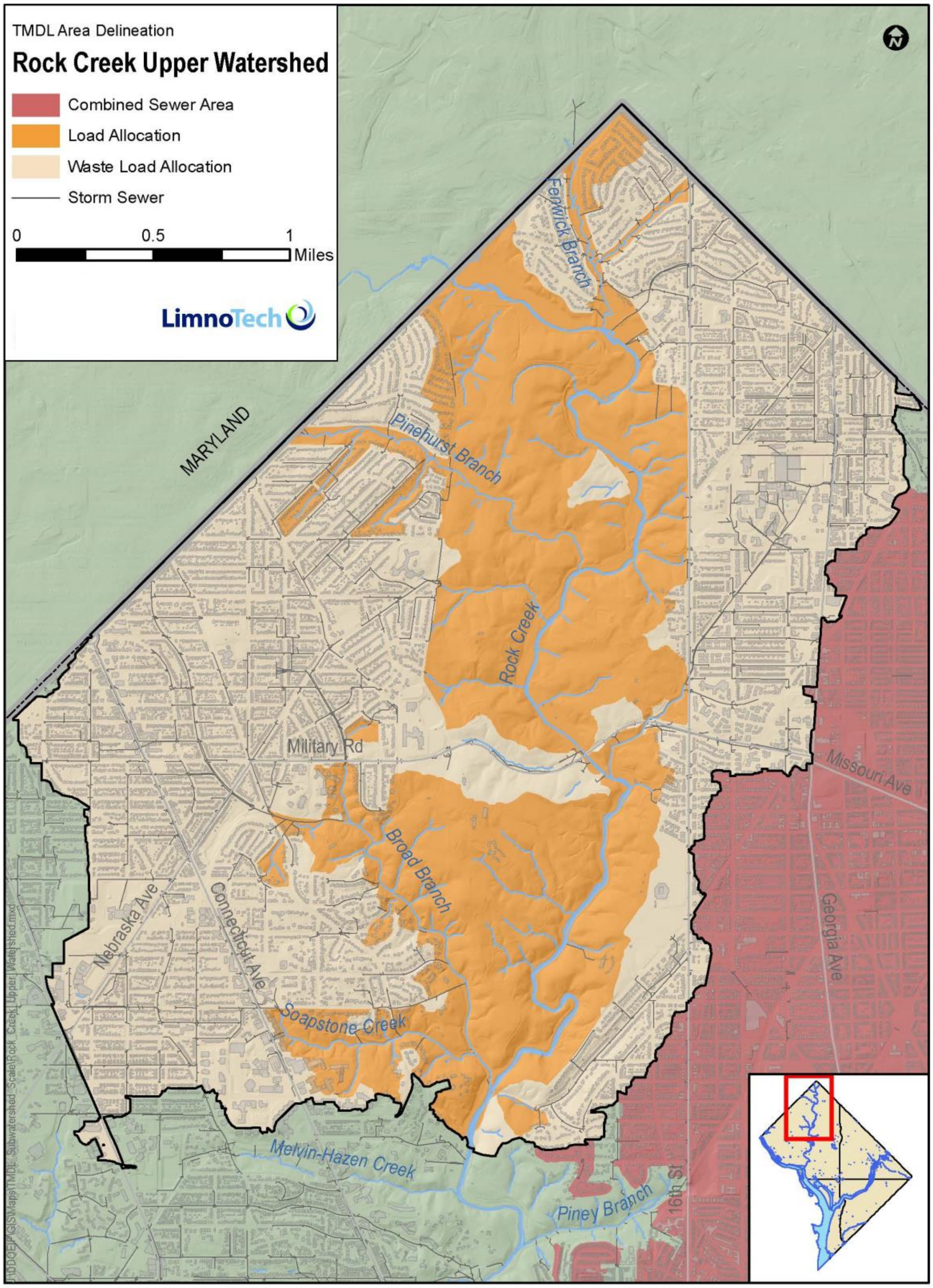

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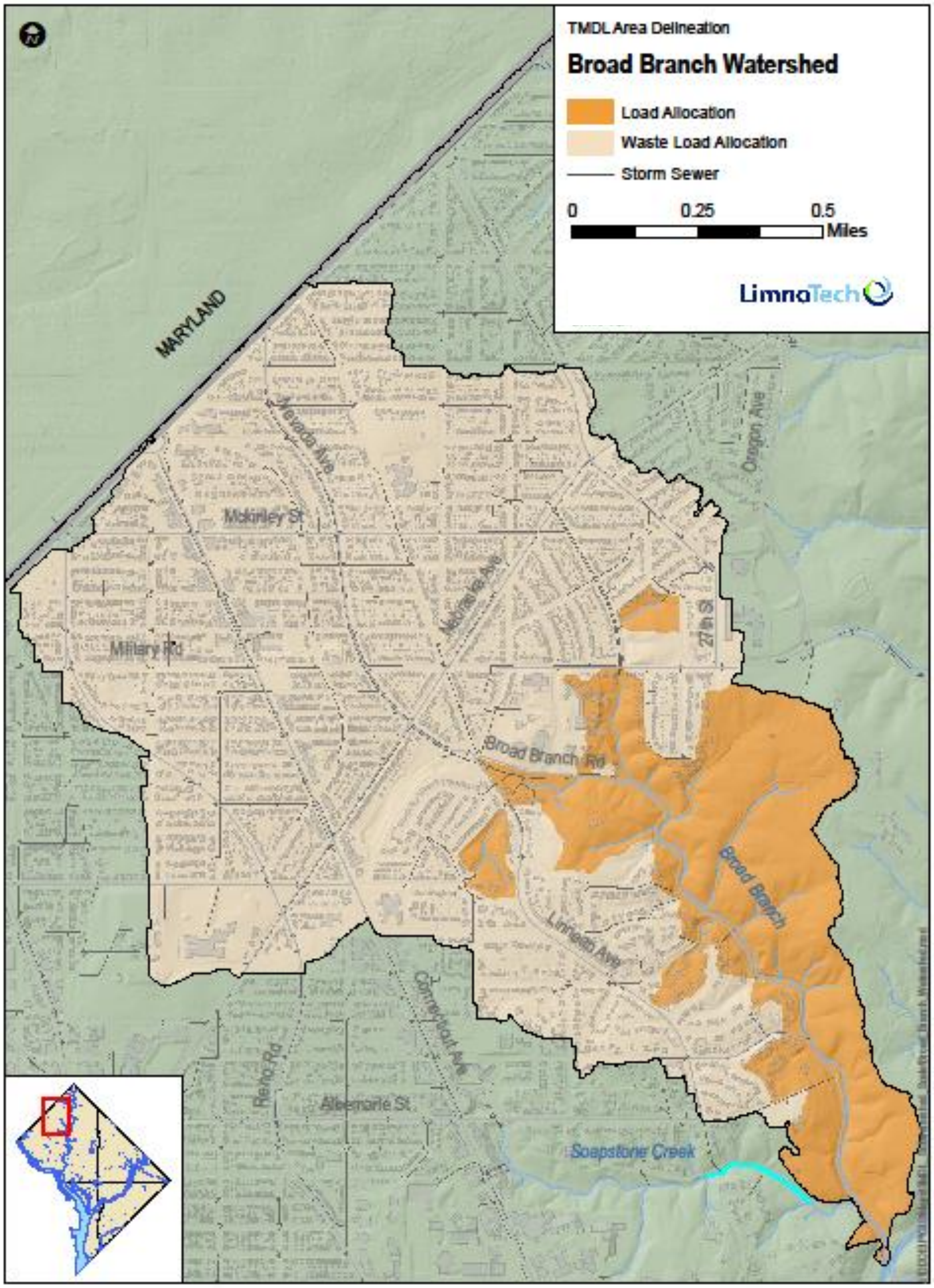

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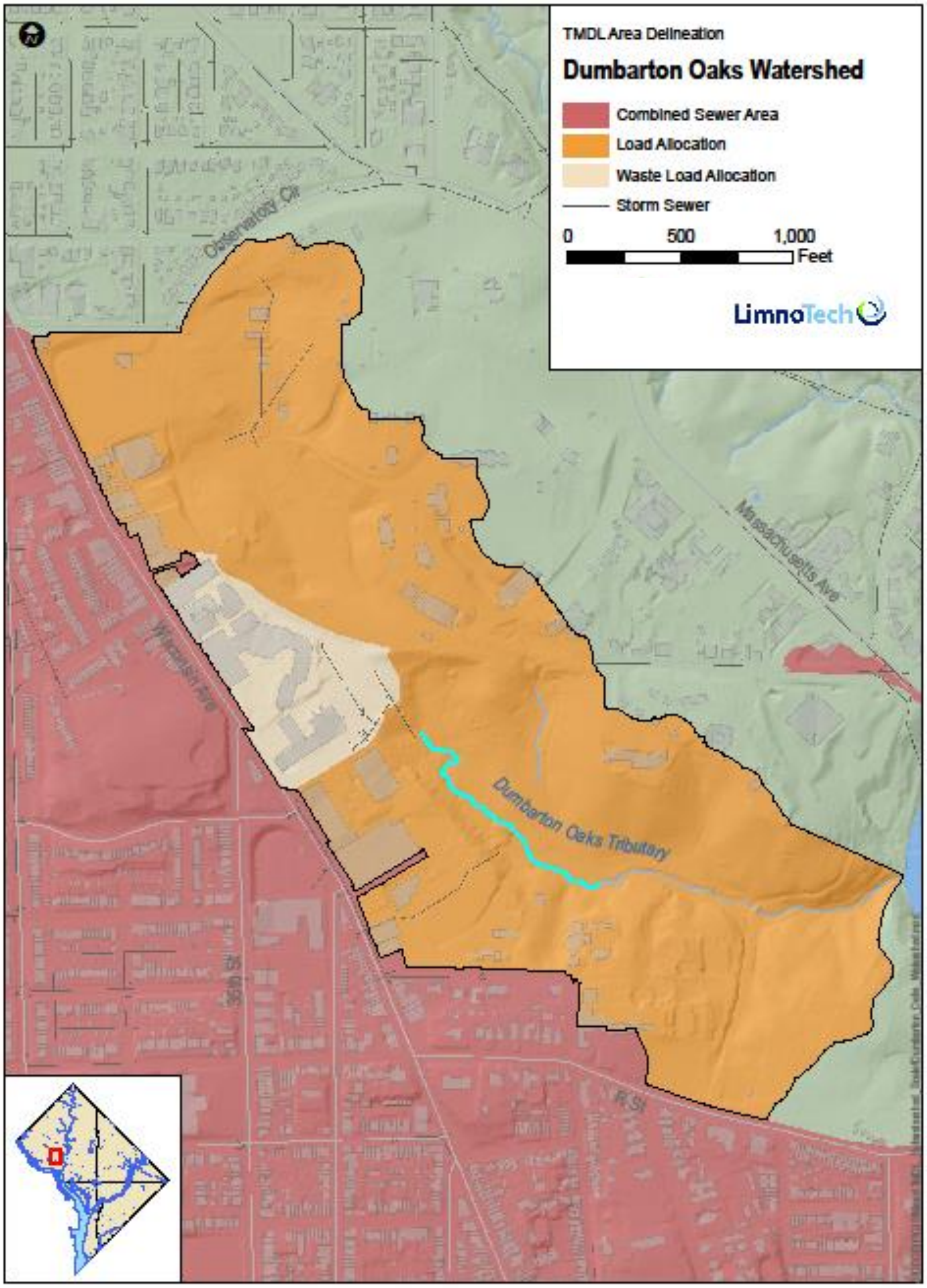

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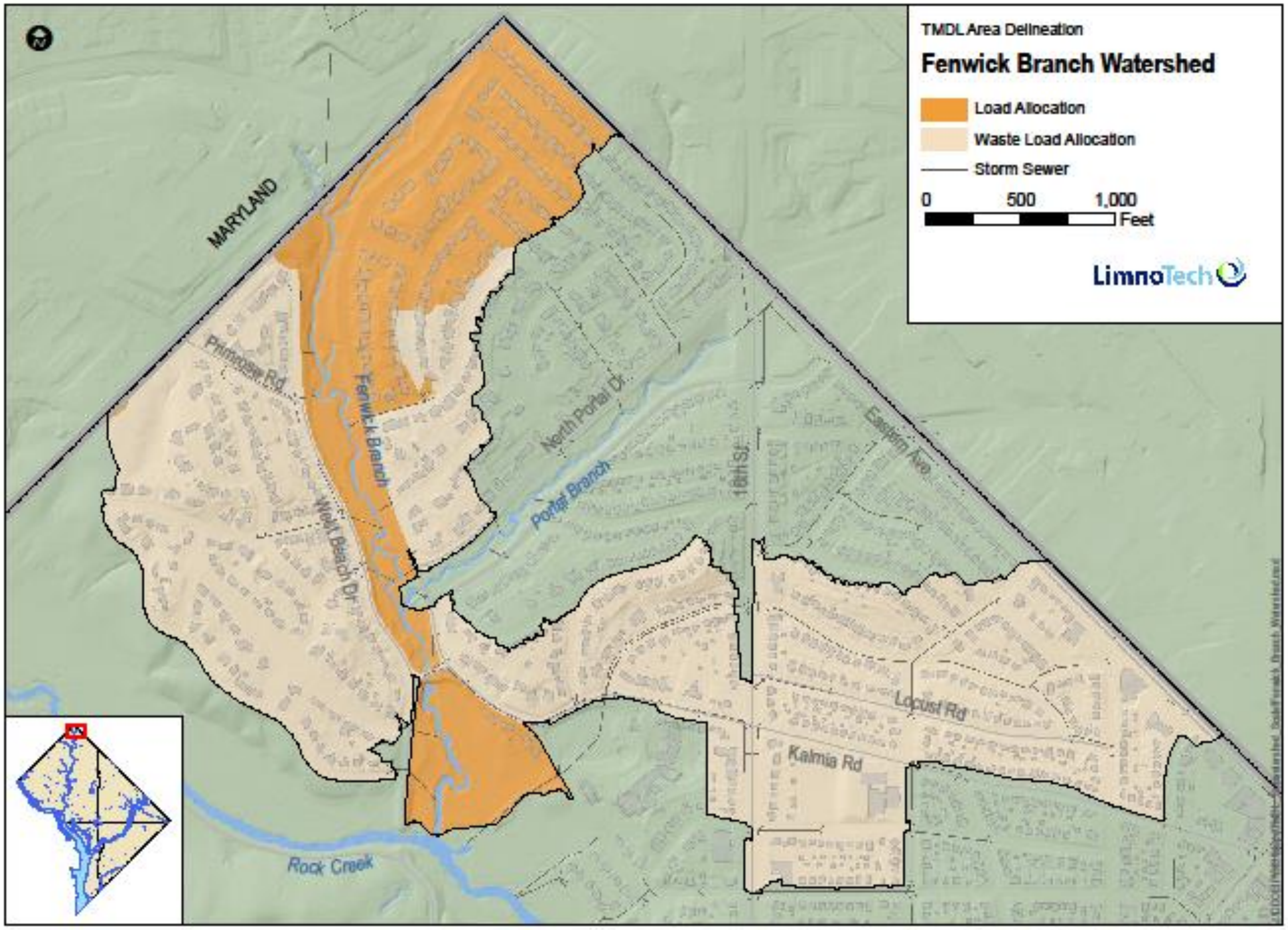

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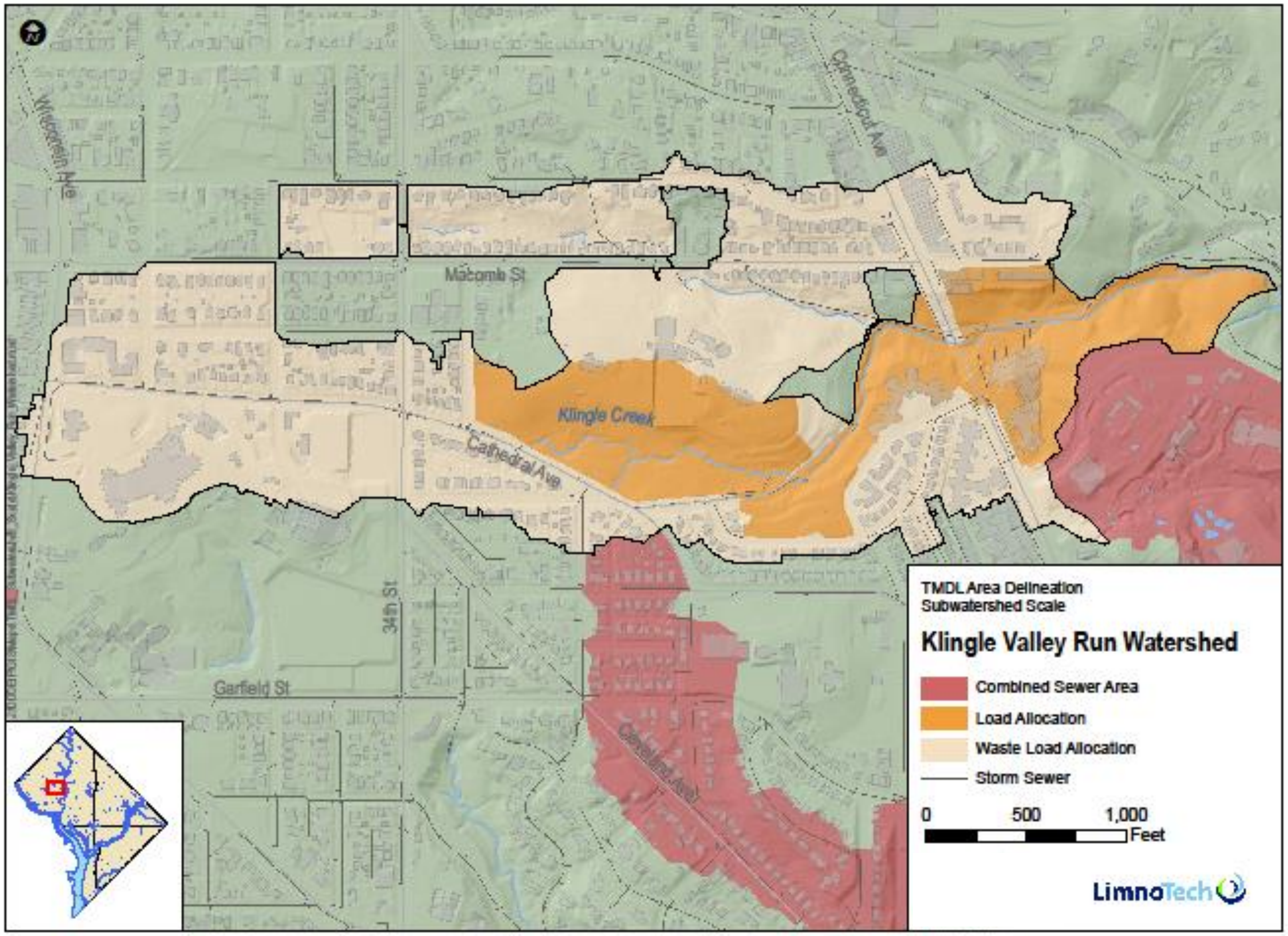

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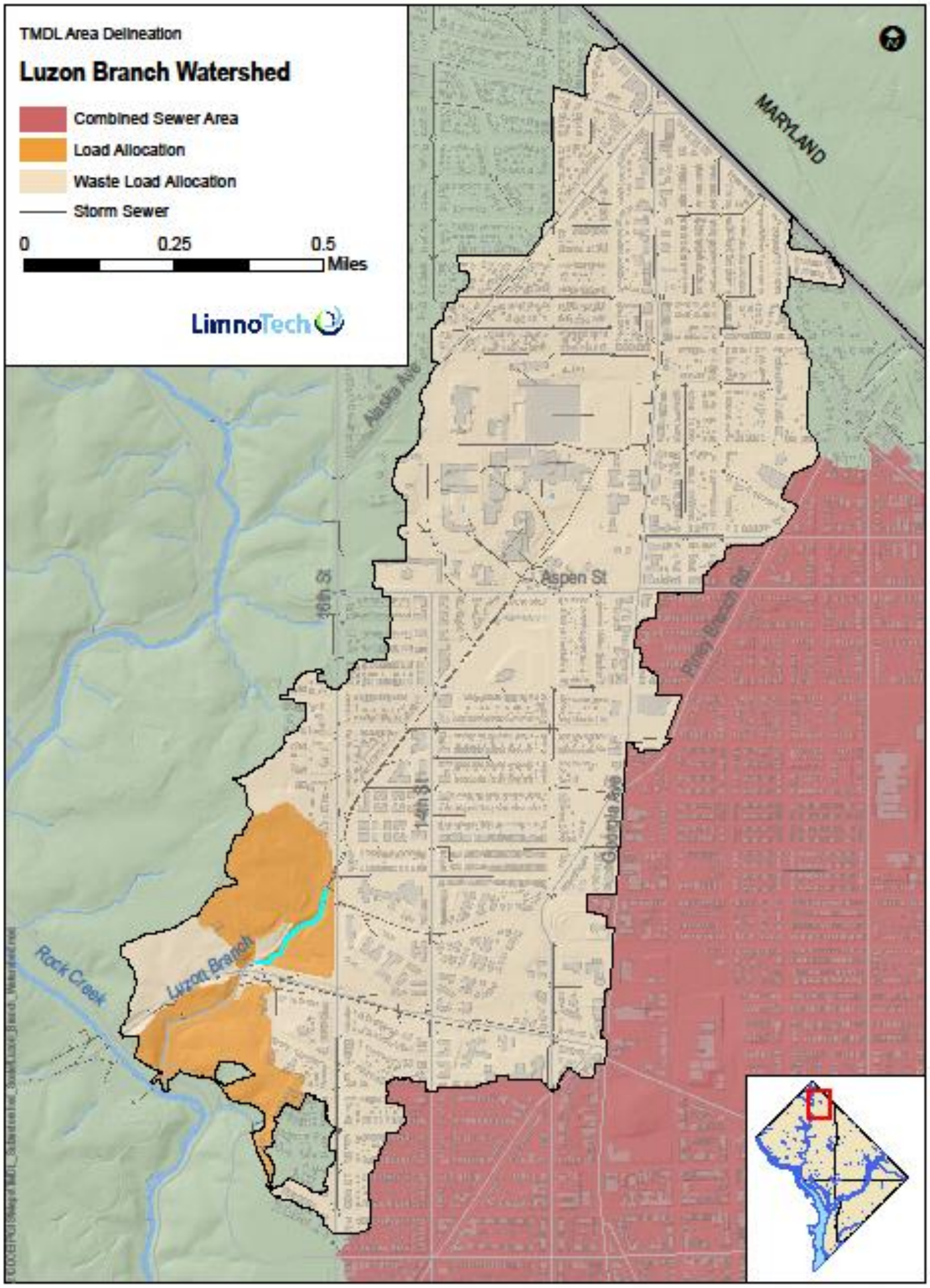

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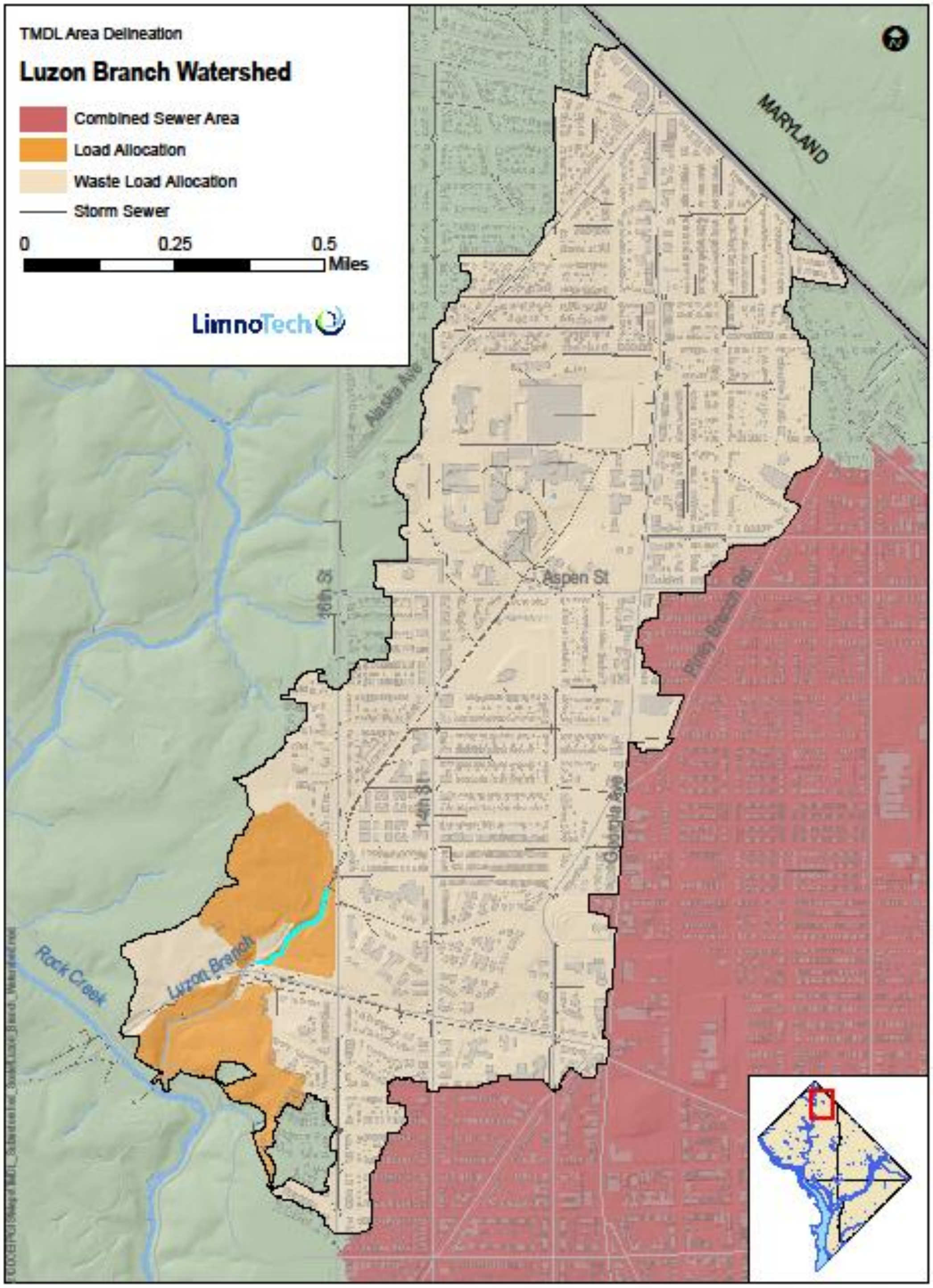

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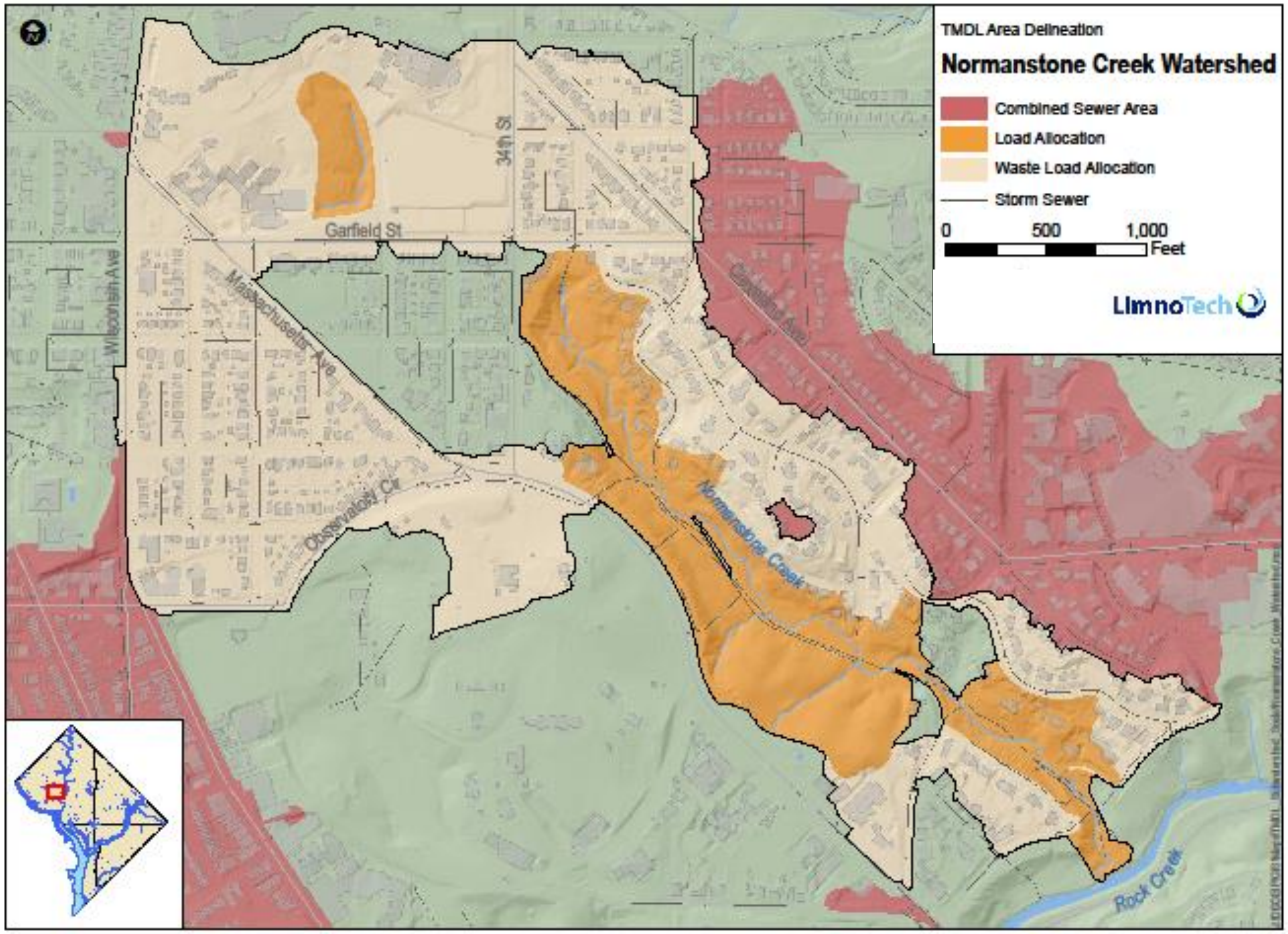

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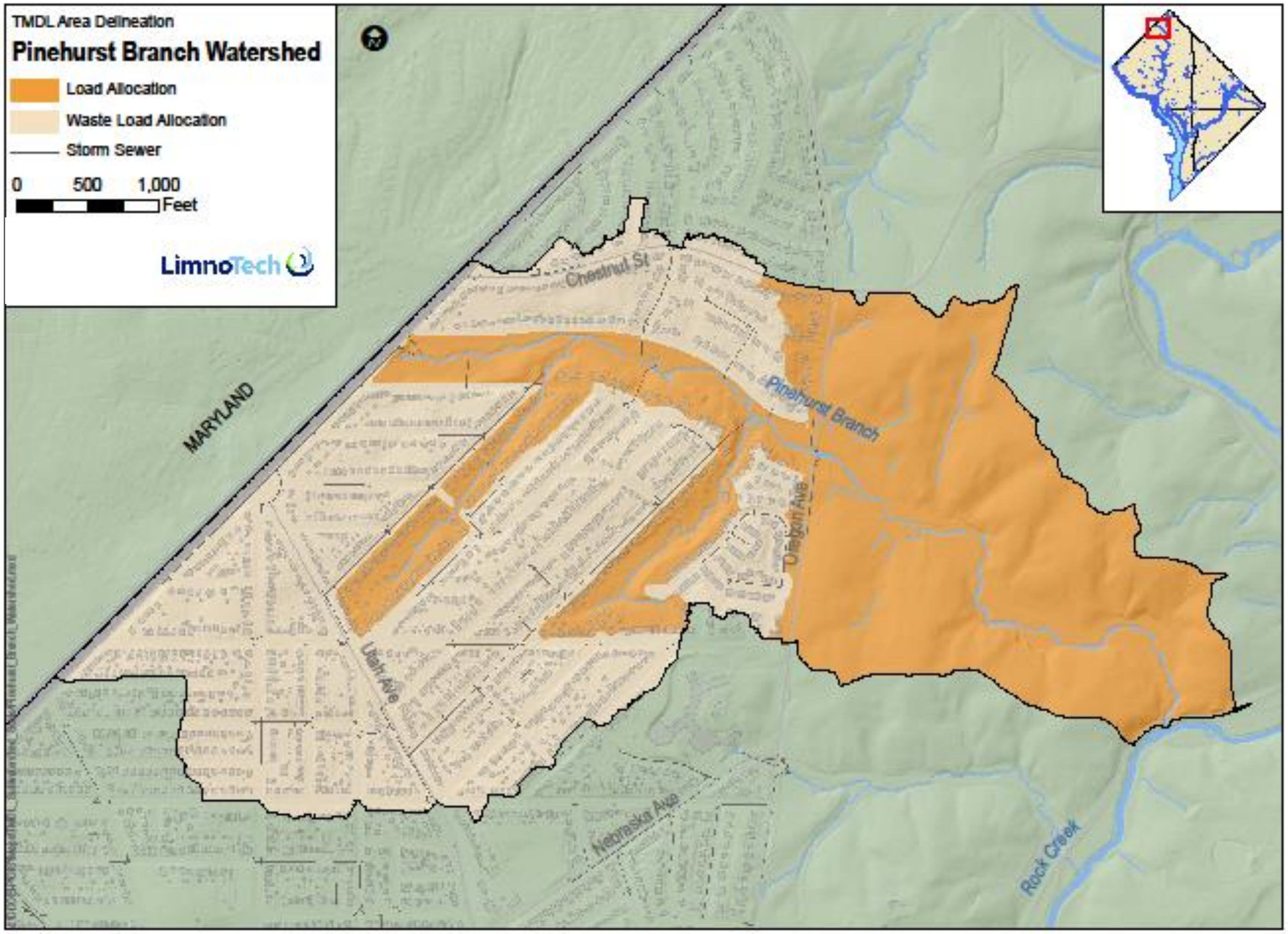

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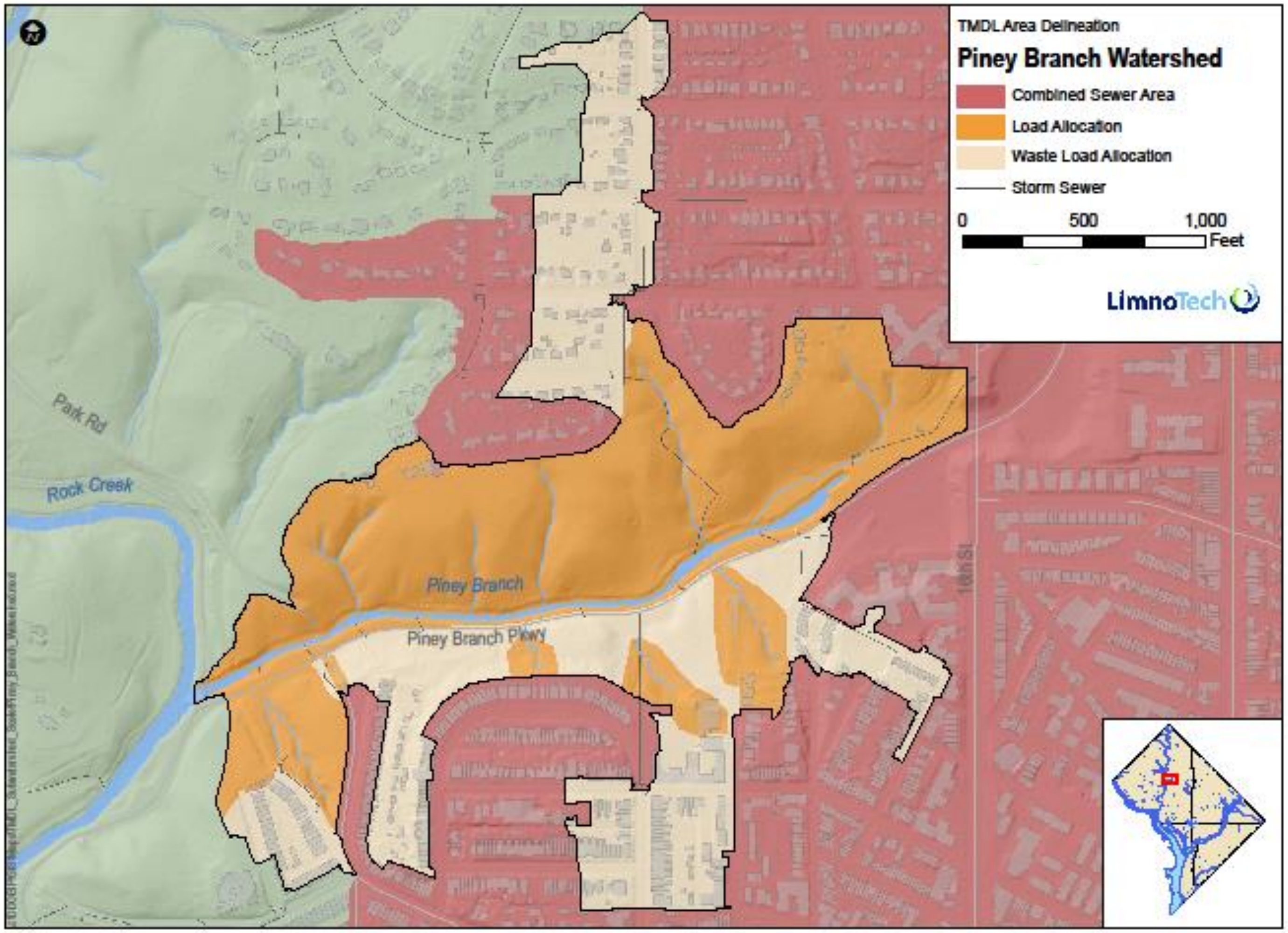

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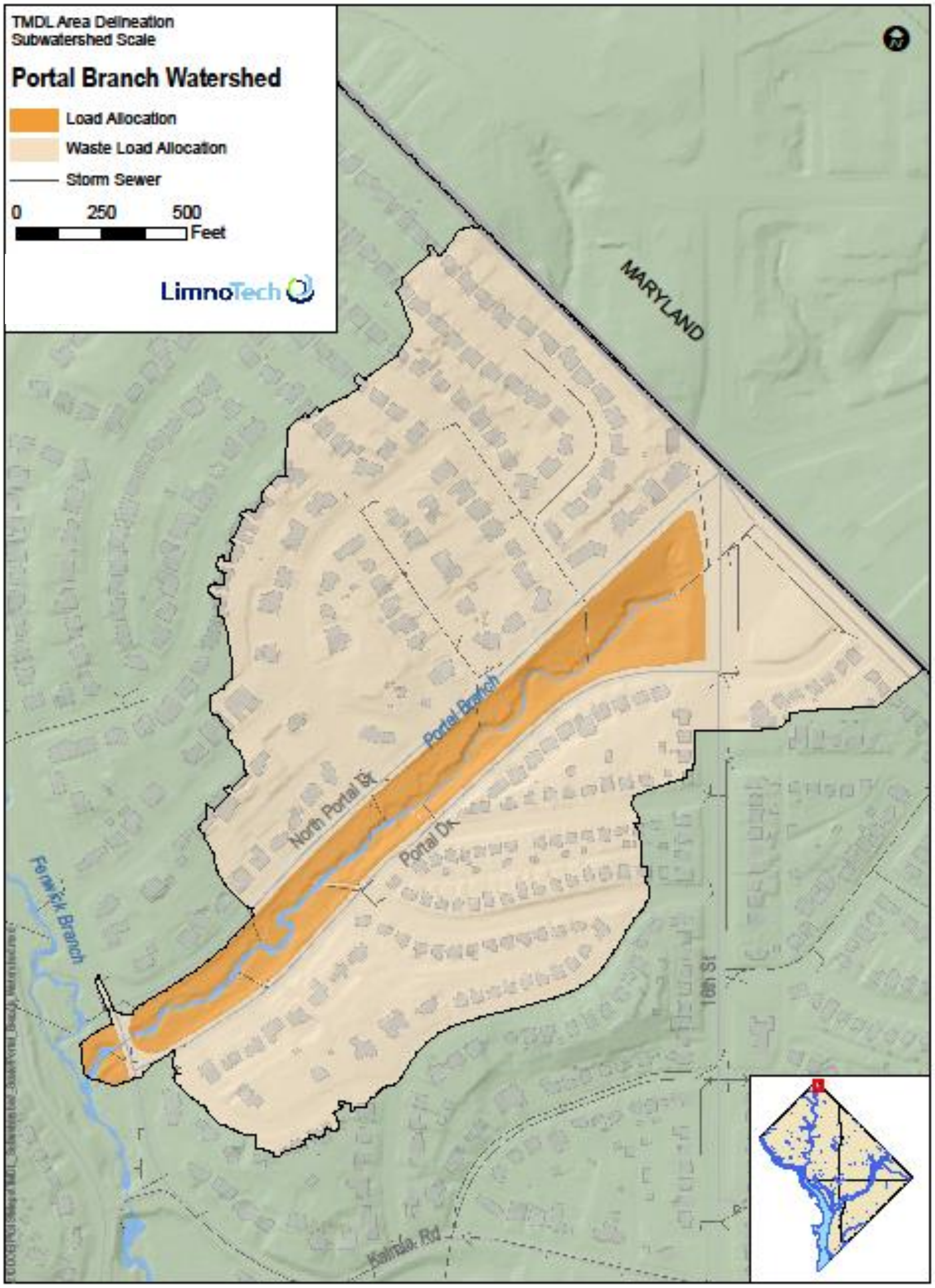

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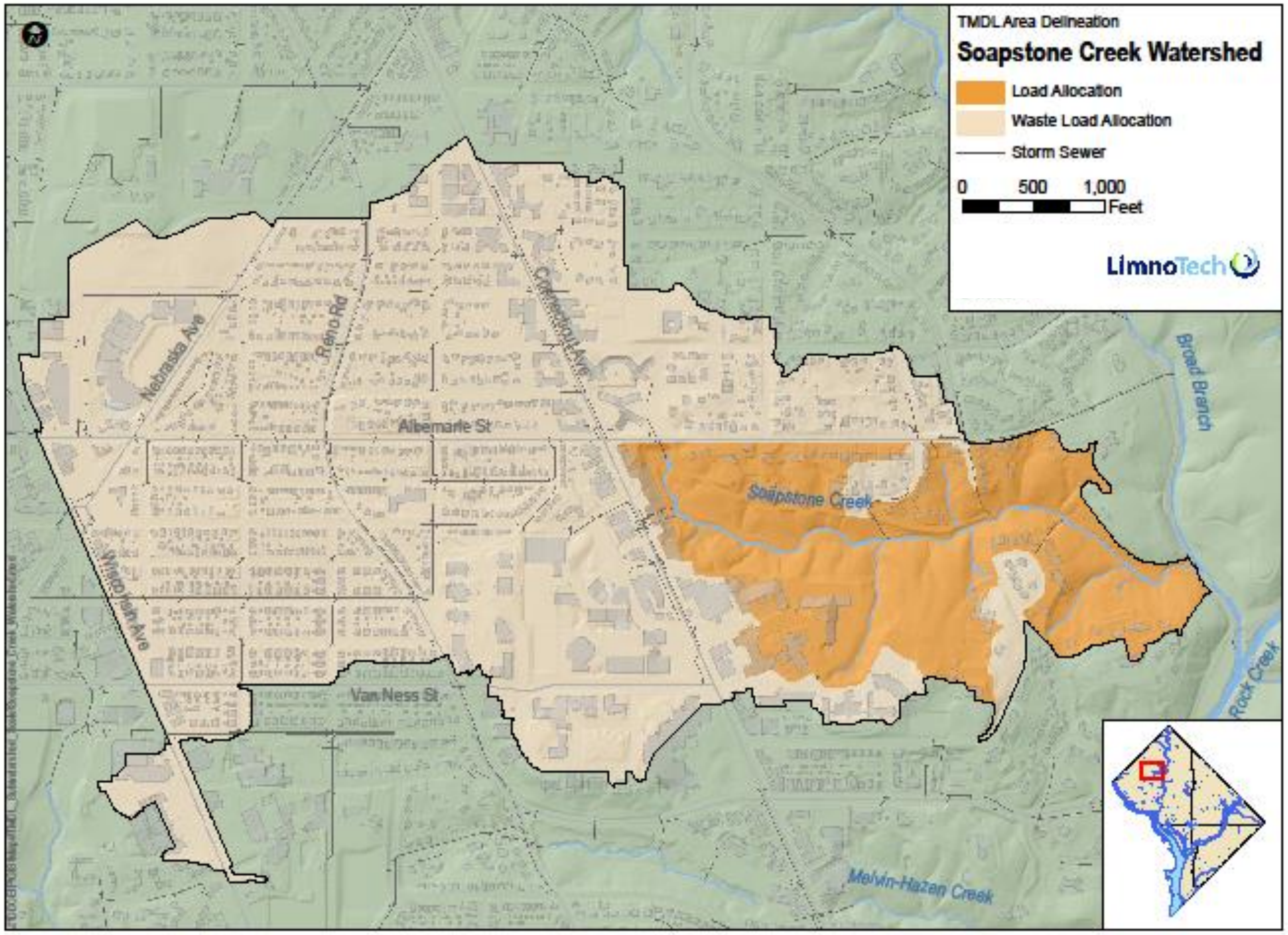

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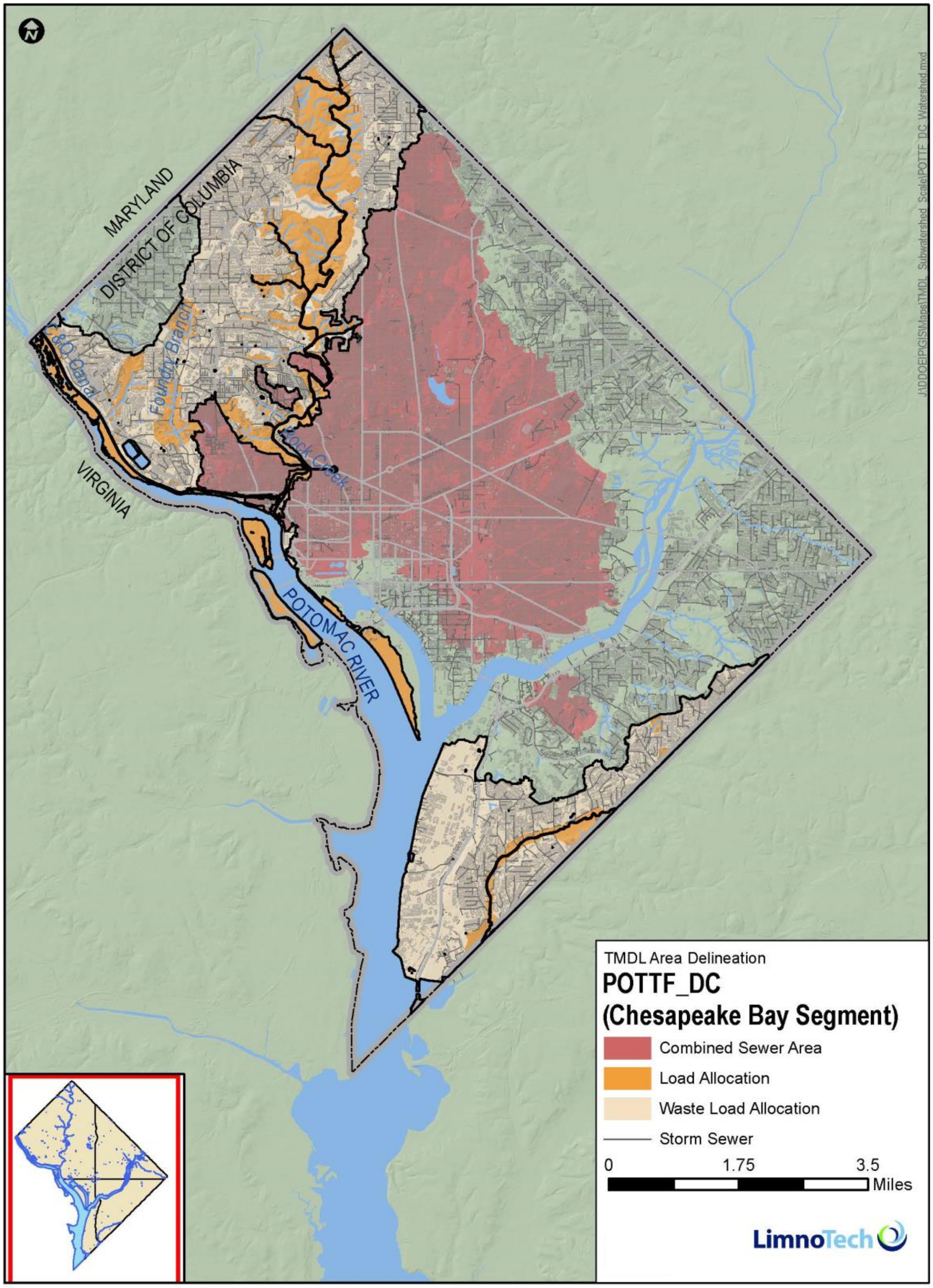

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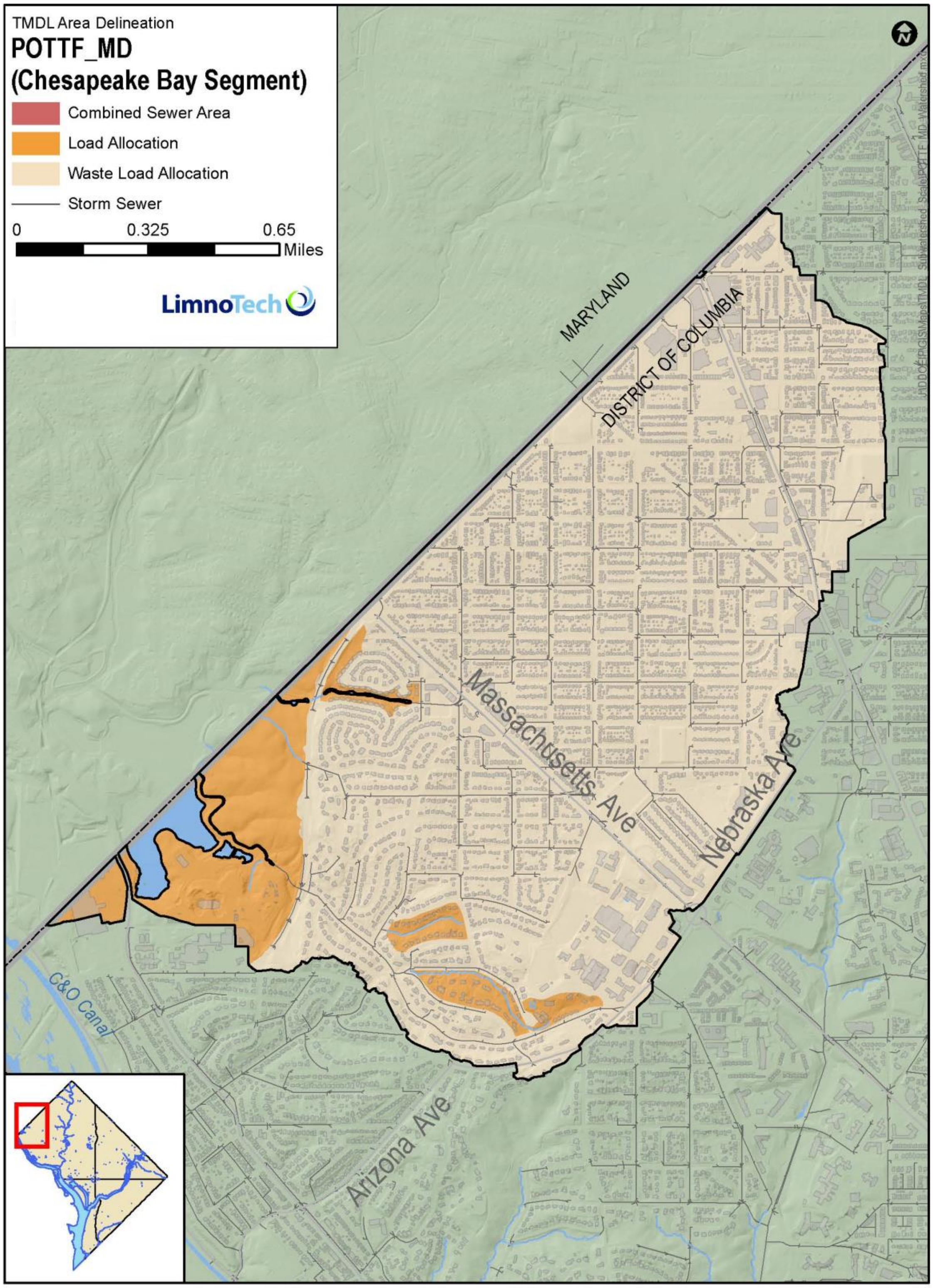

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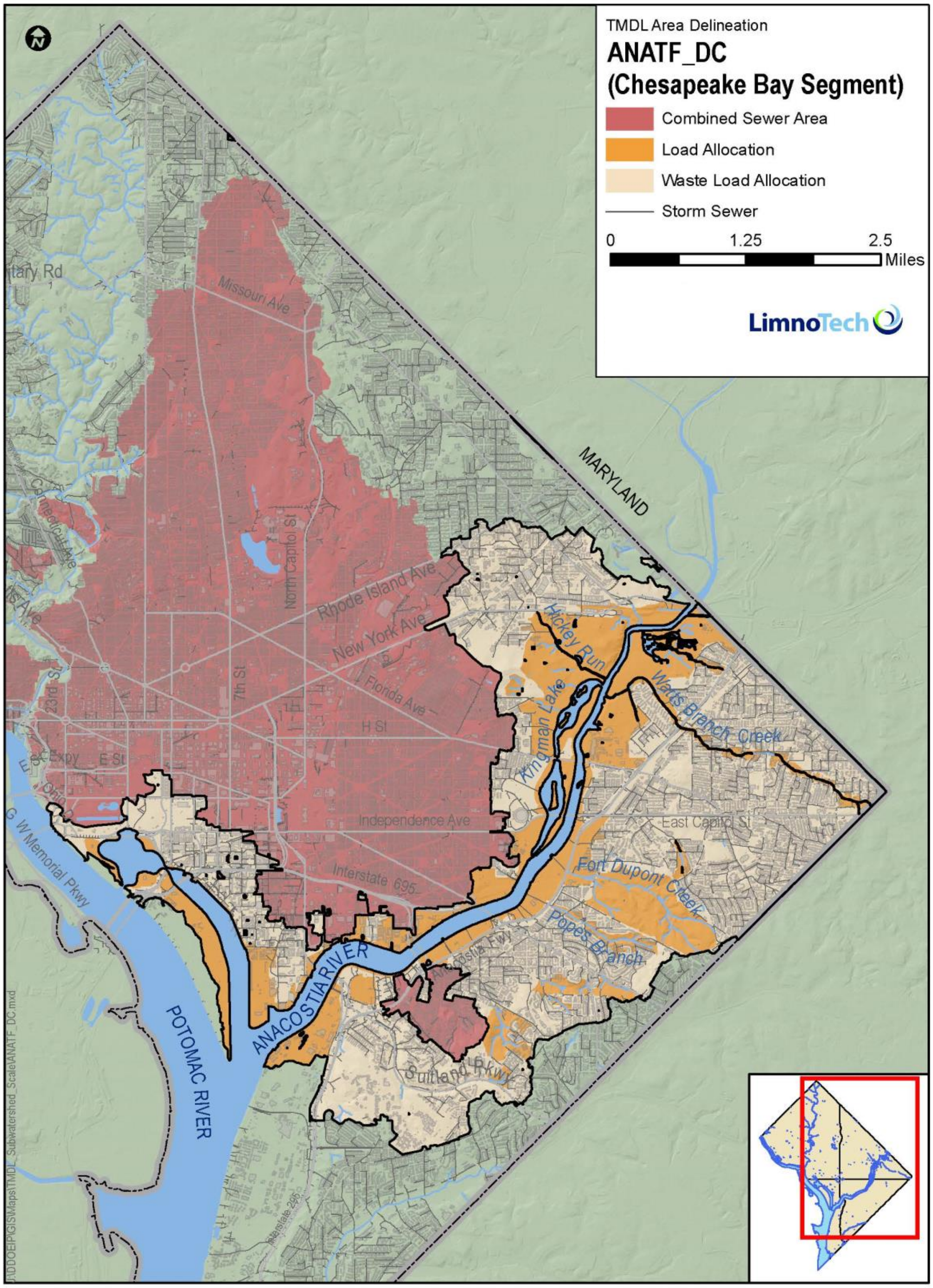

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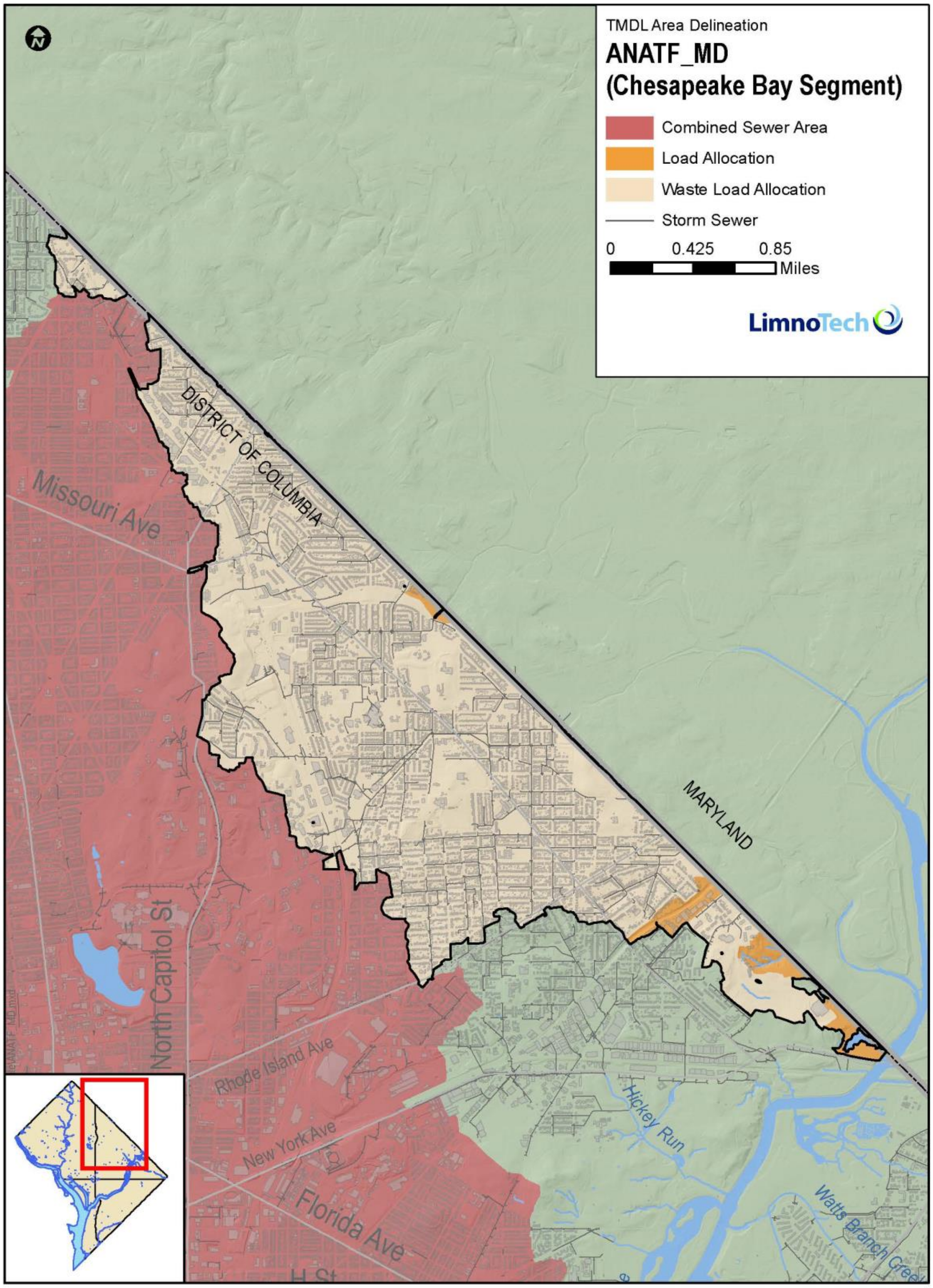

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Consolidated TMDL Implementation Plan – Revised Draft

August 2016

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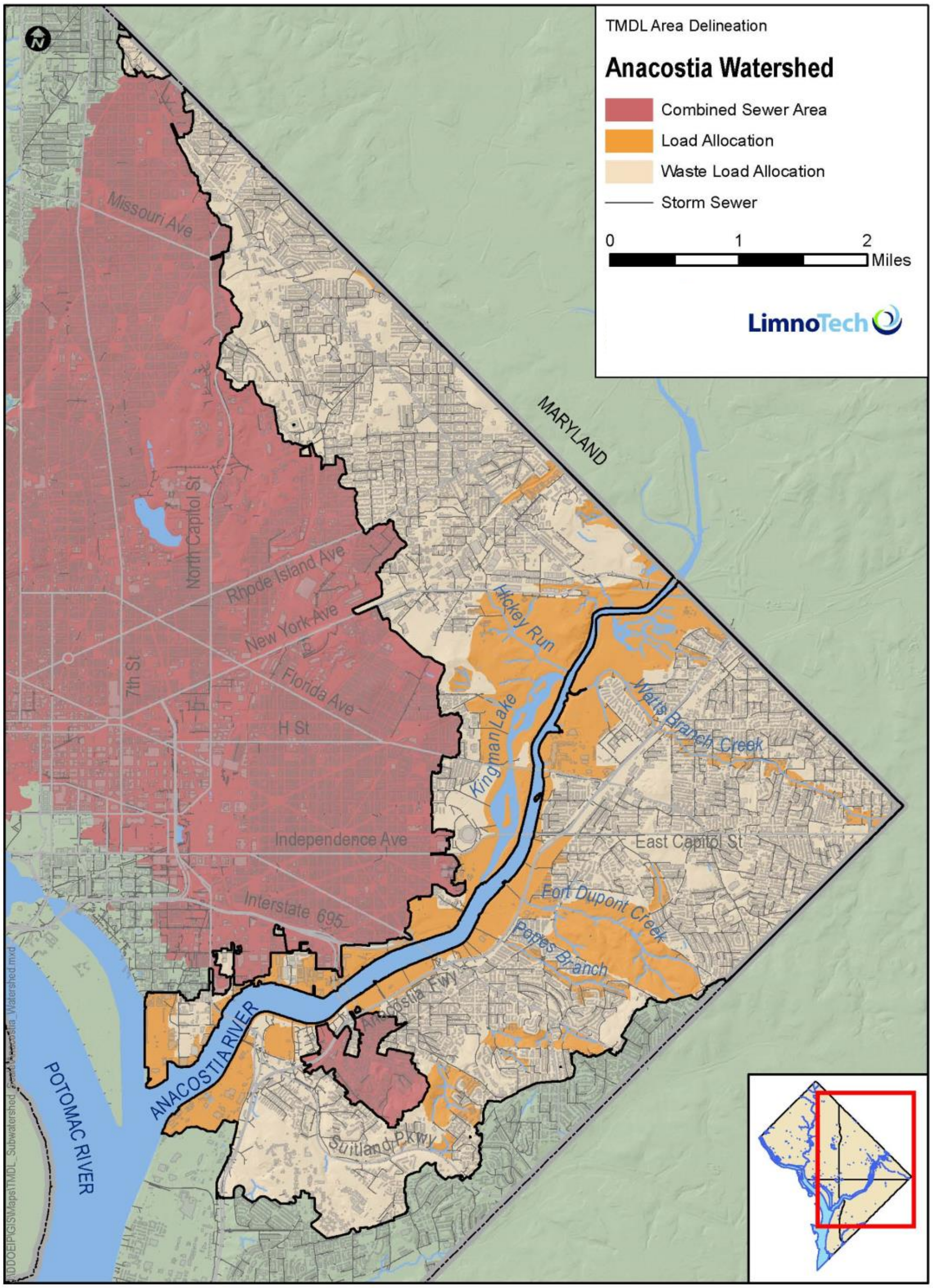

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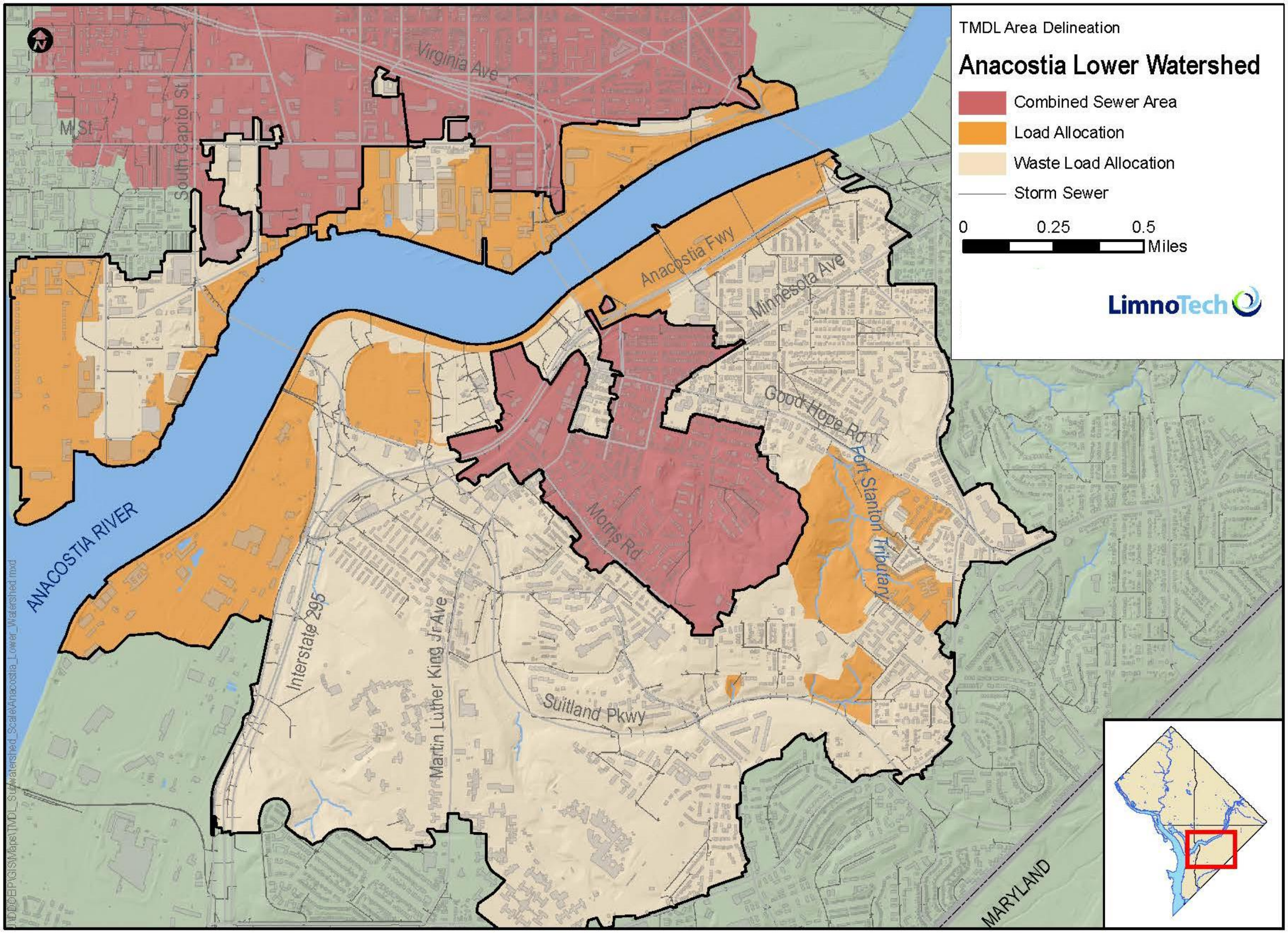

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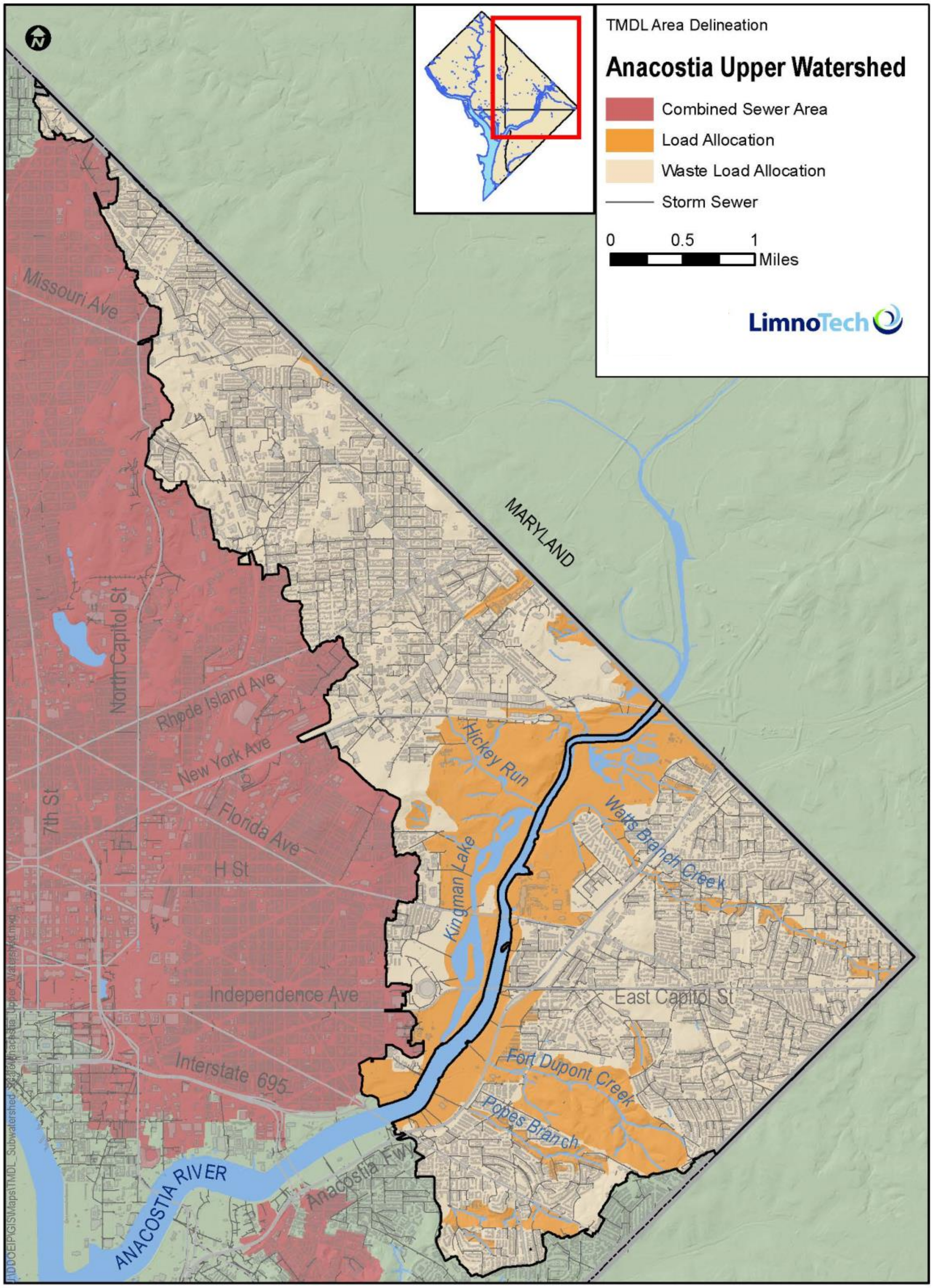

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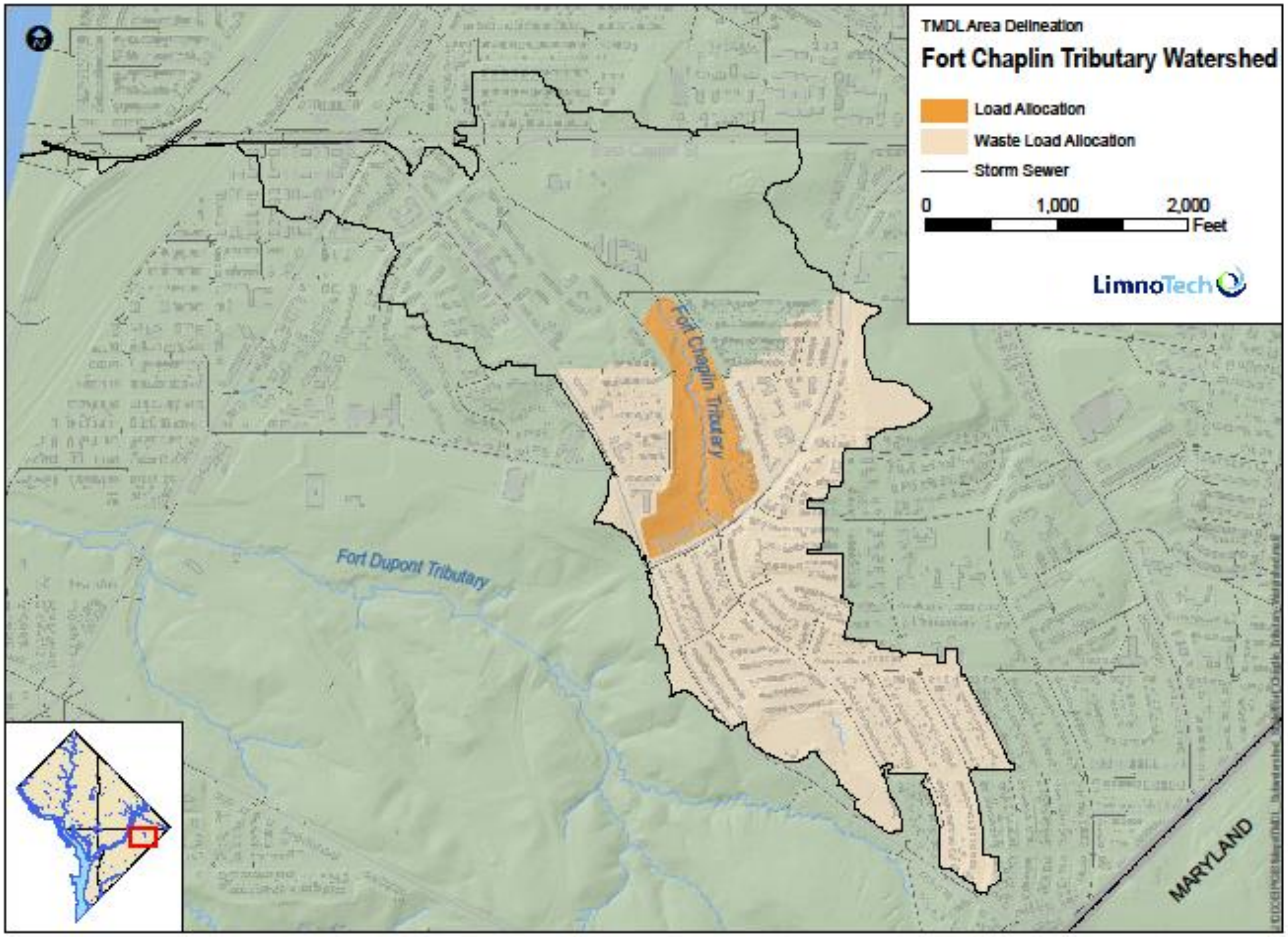

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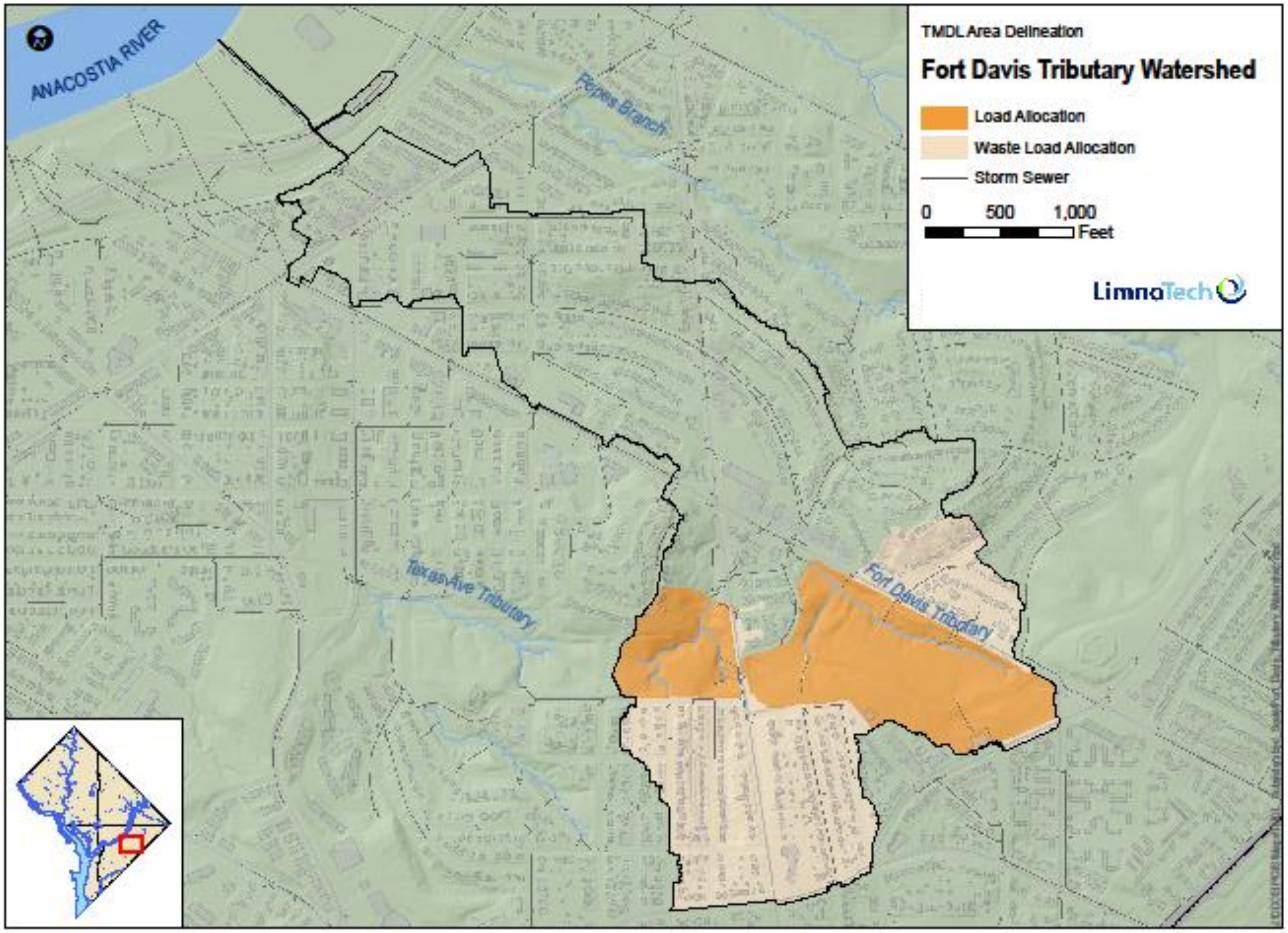

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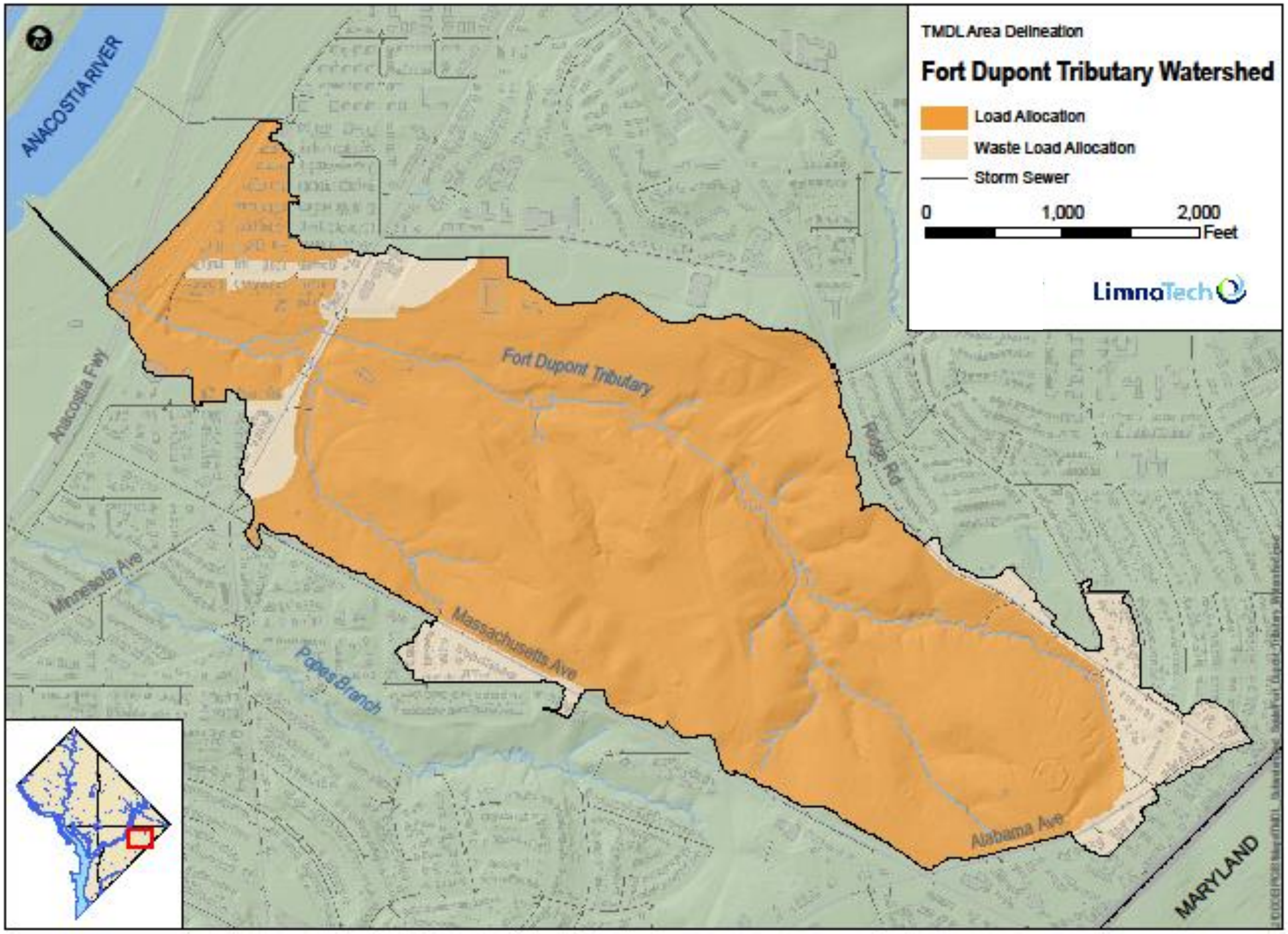

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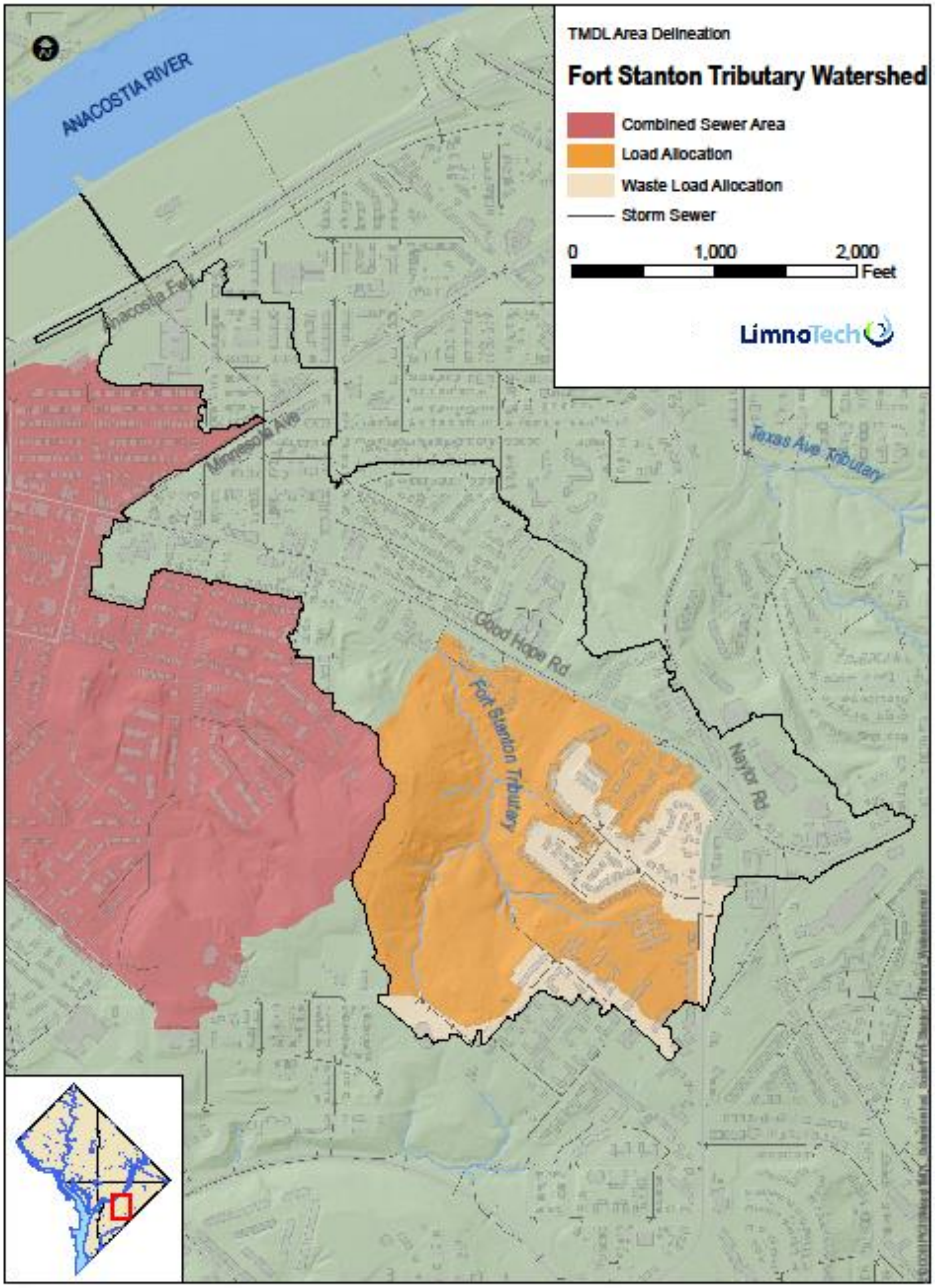

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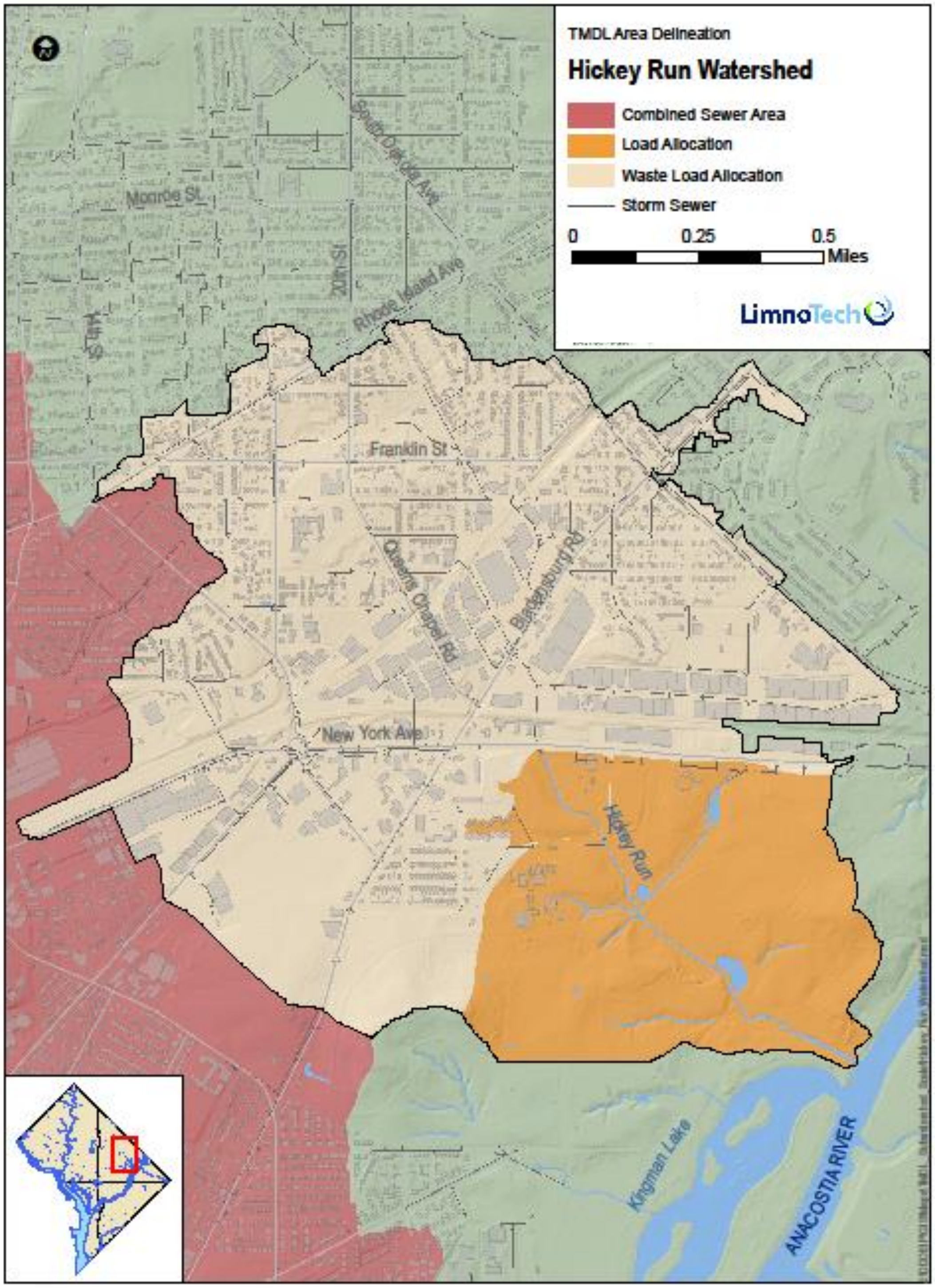

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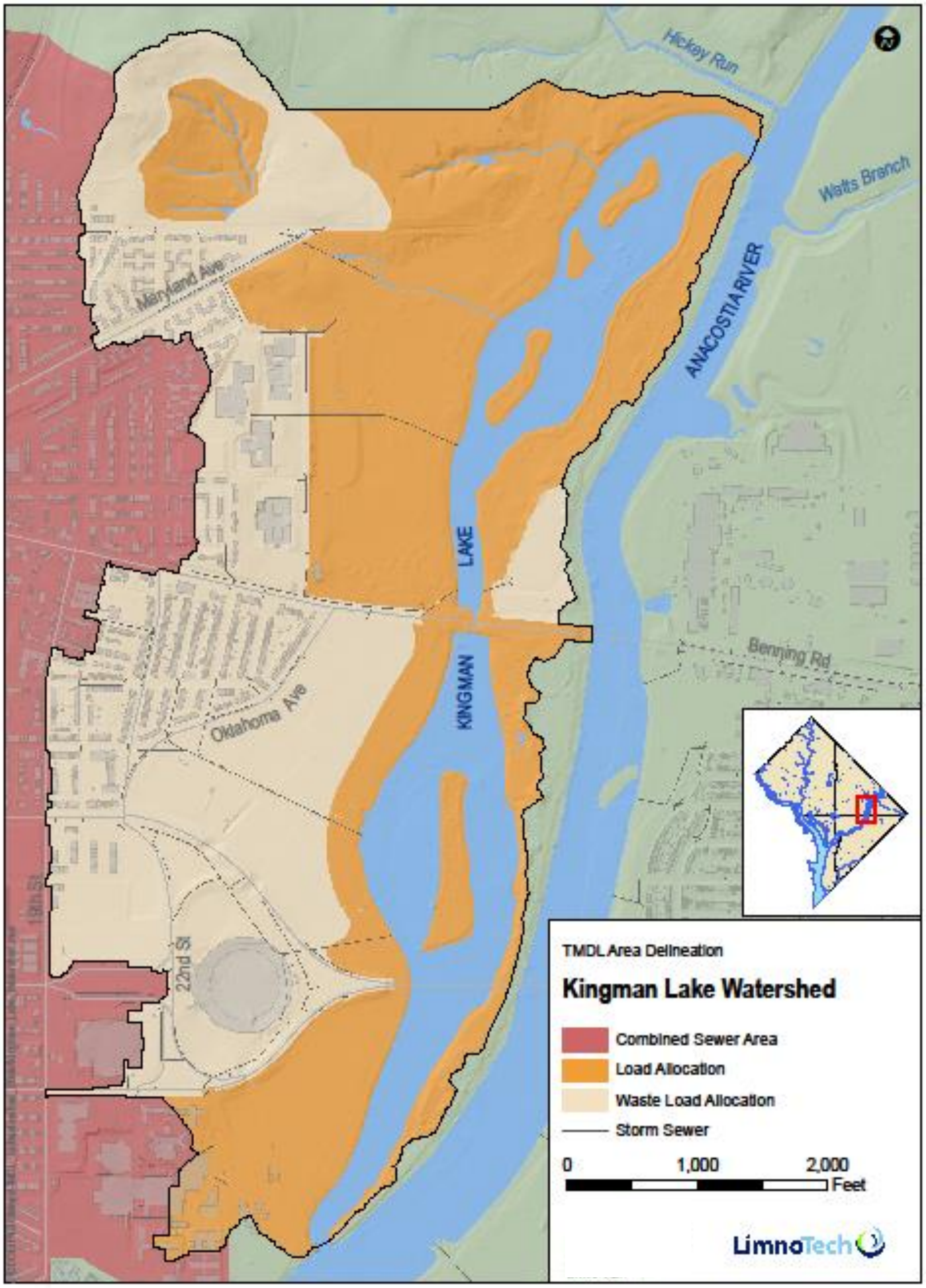

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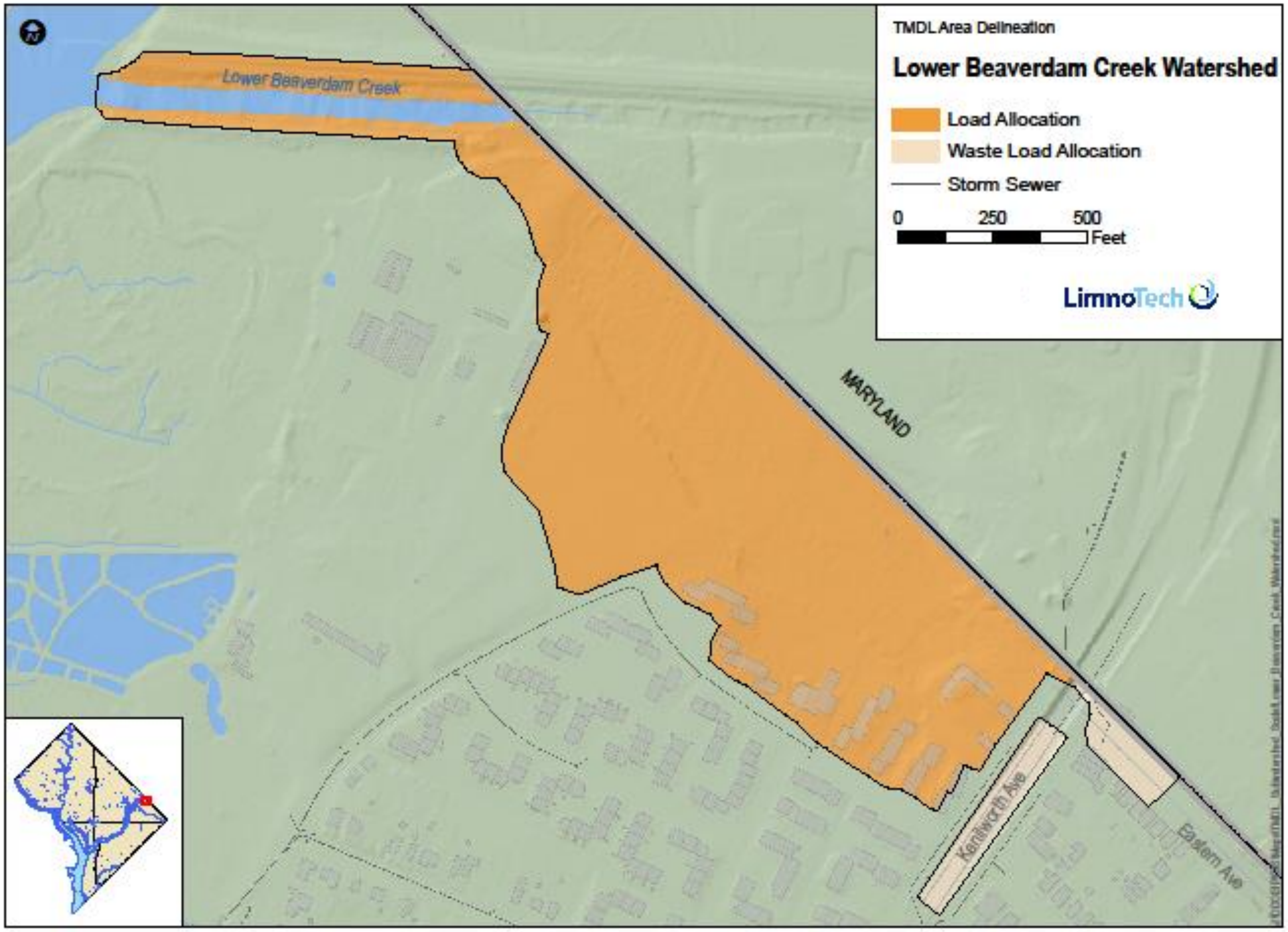

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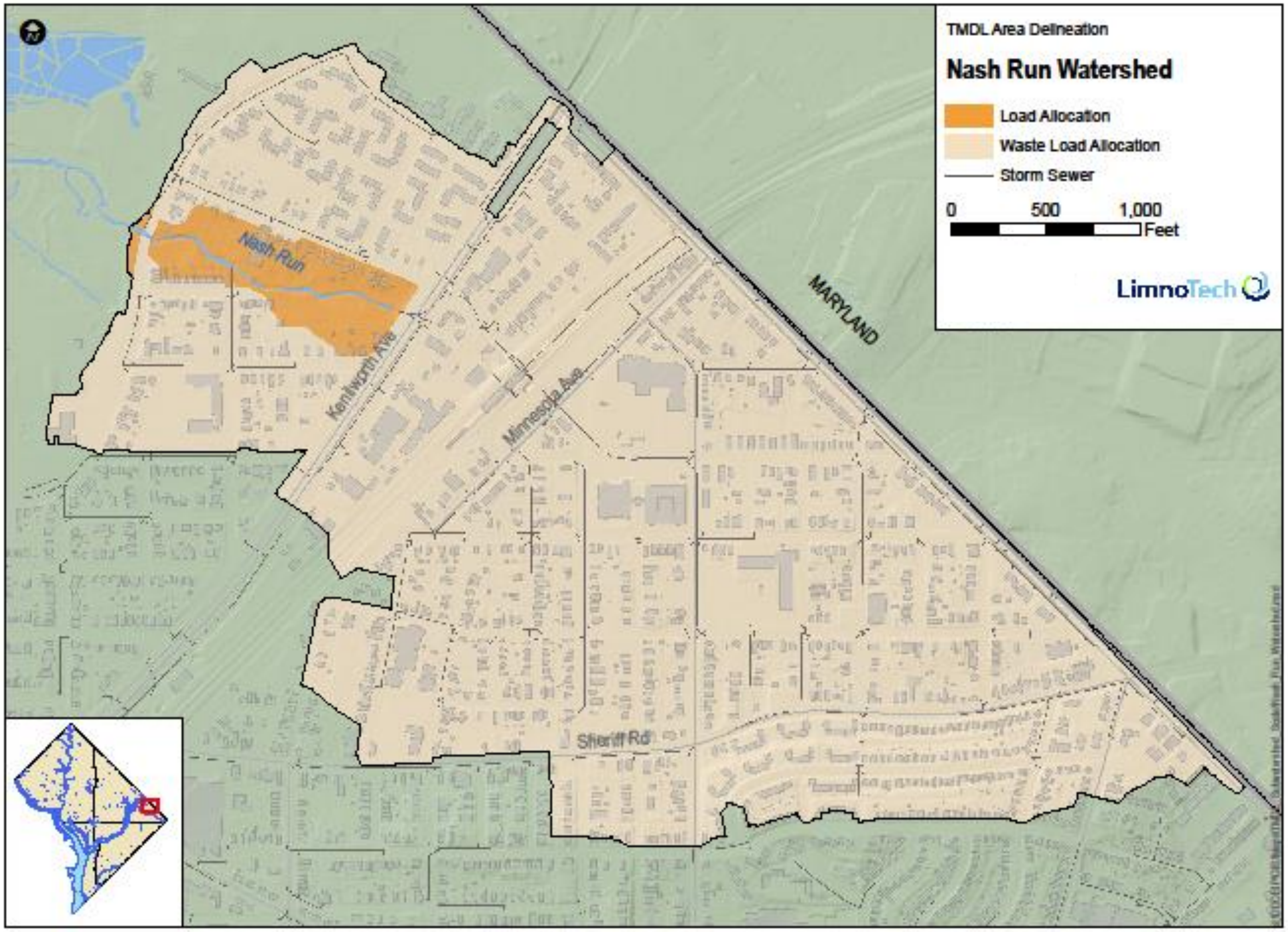

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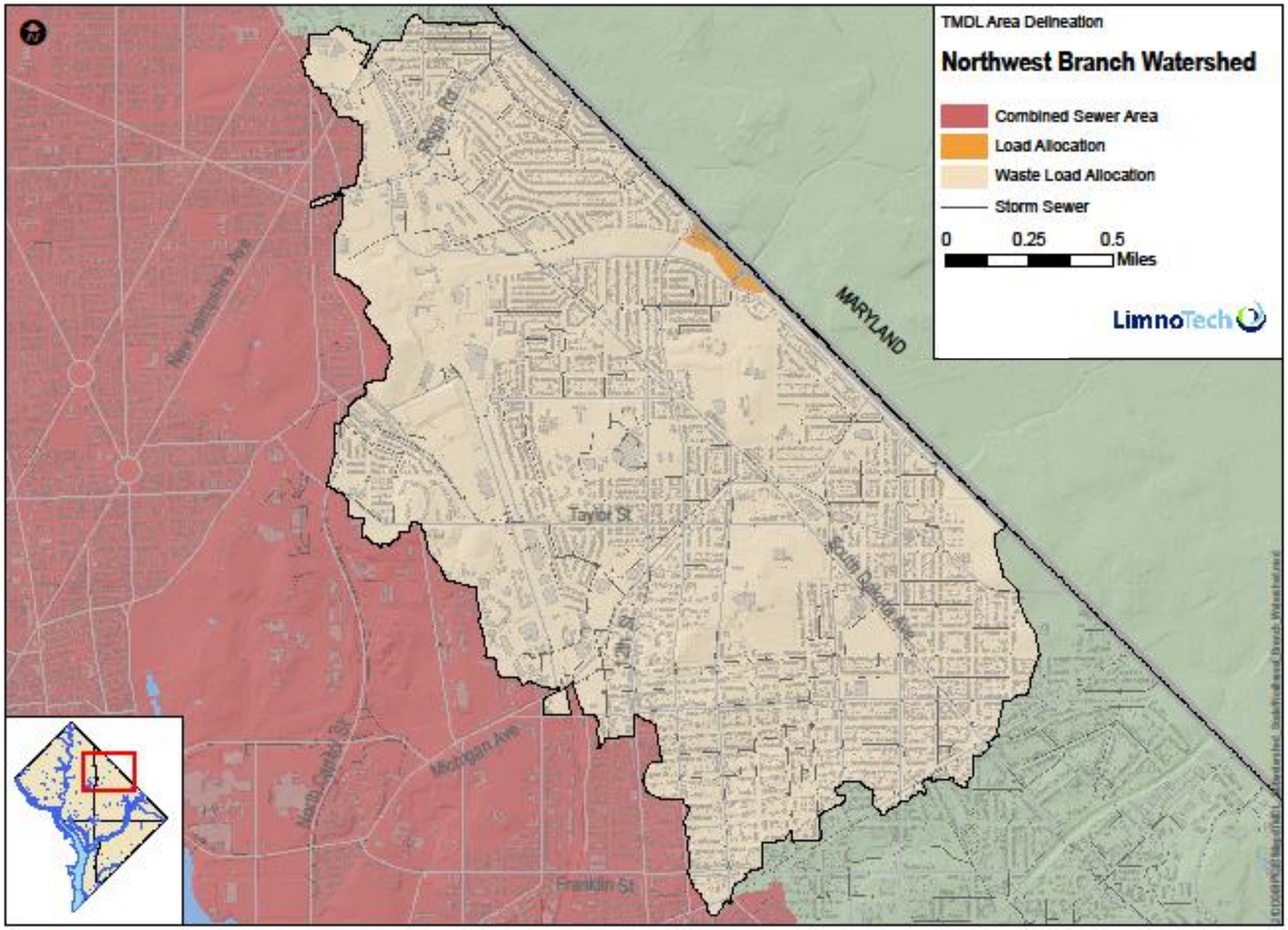

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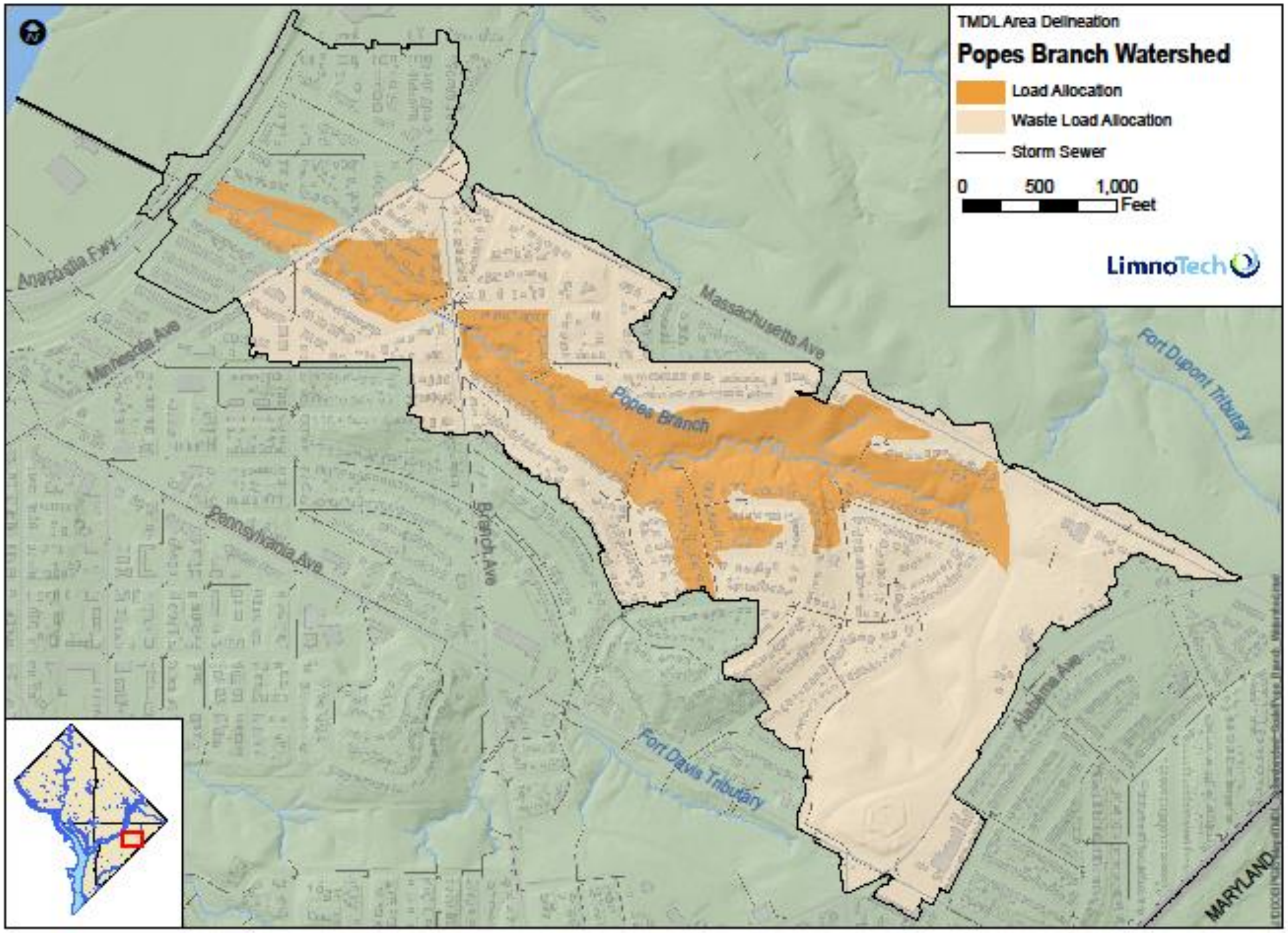

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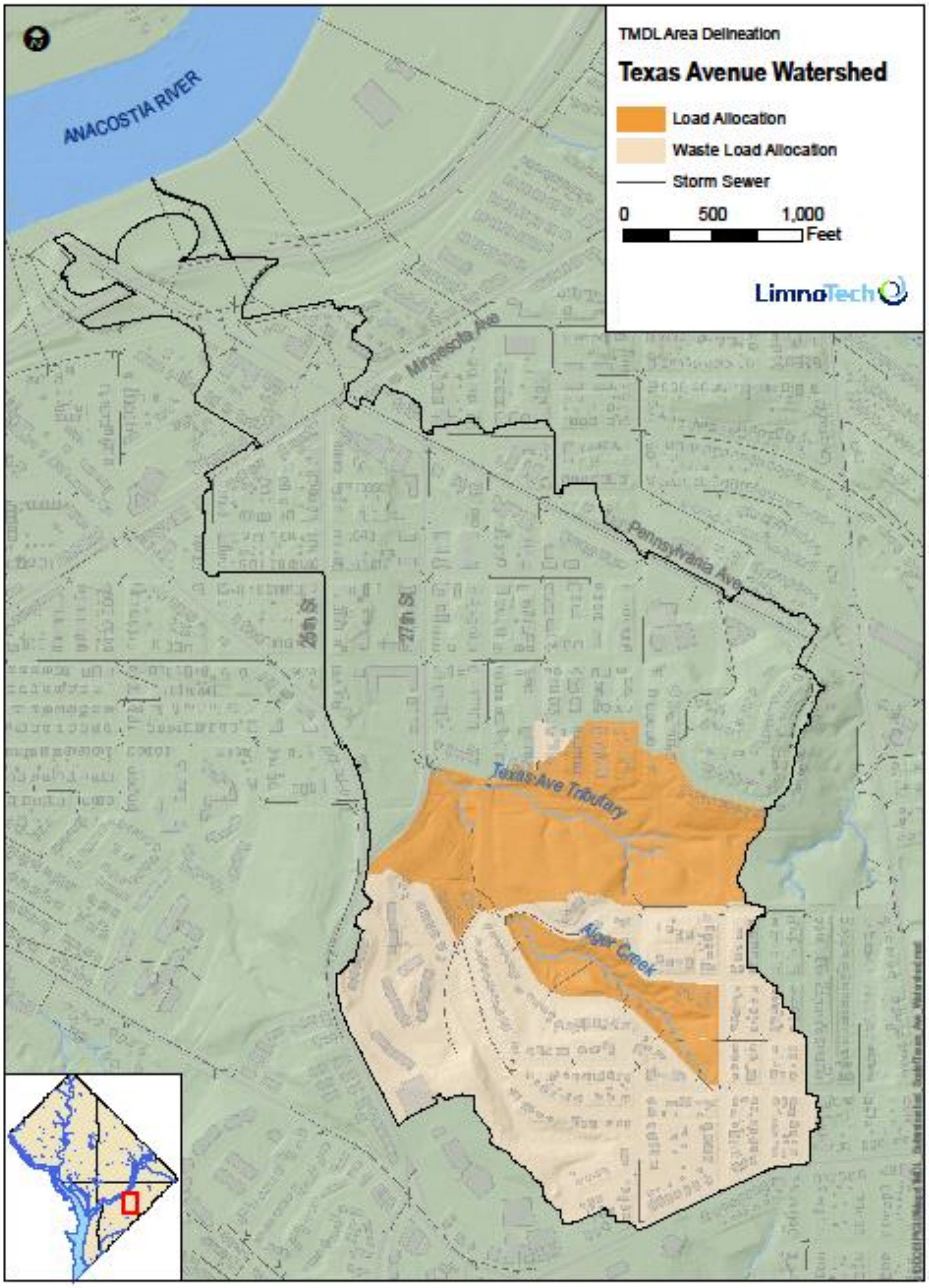

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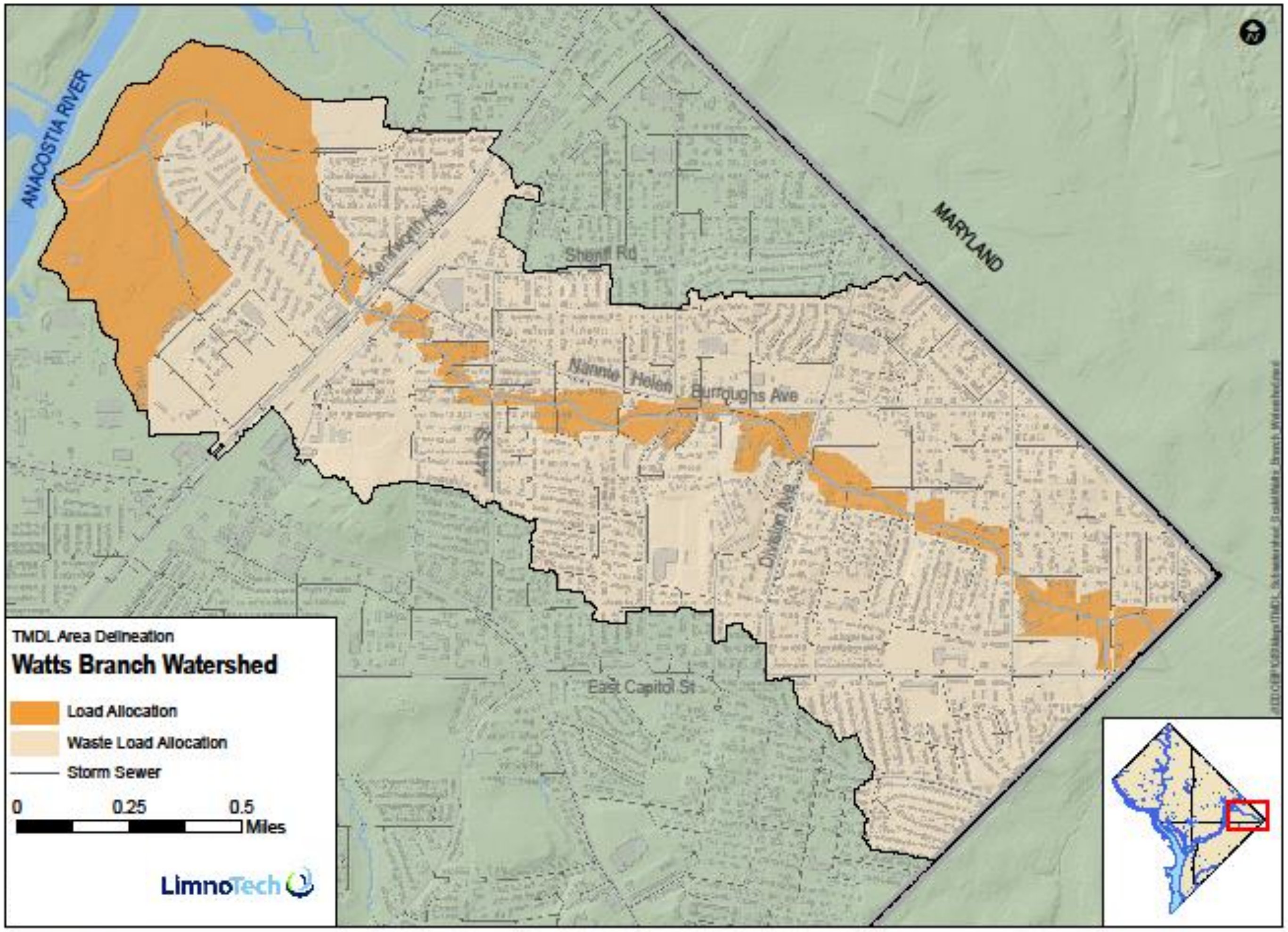

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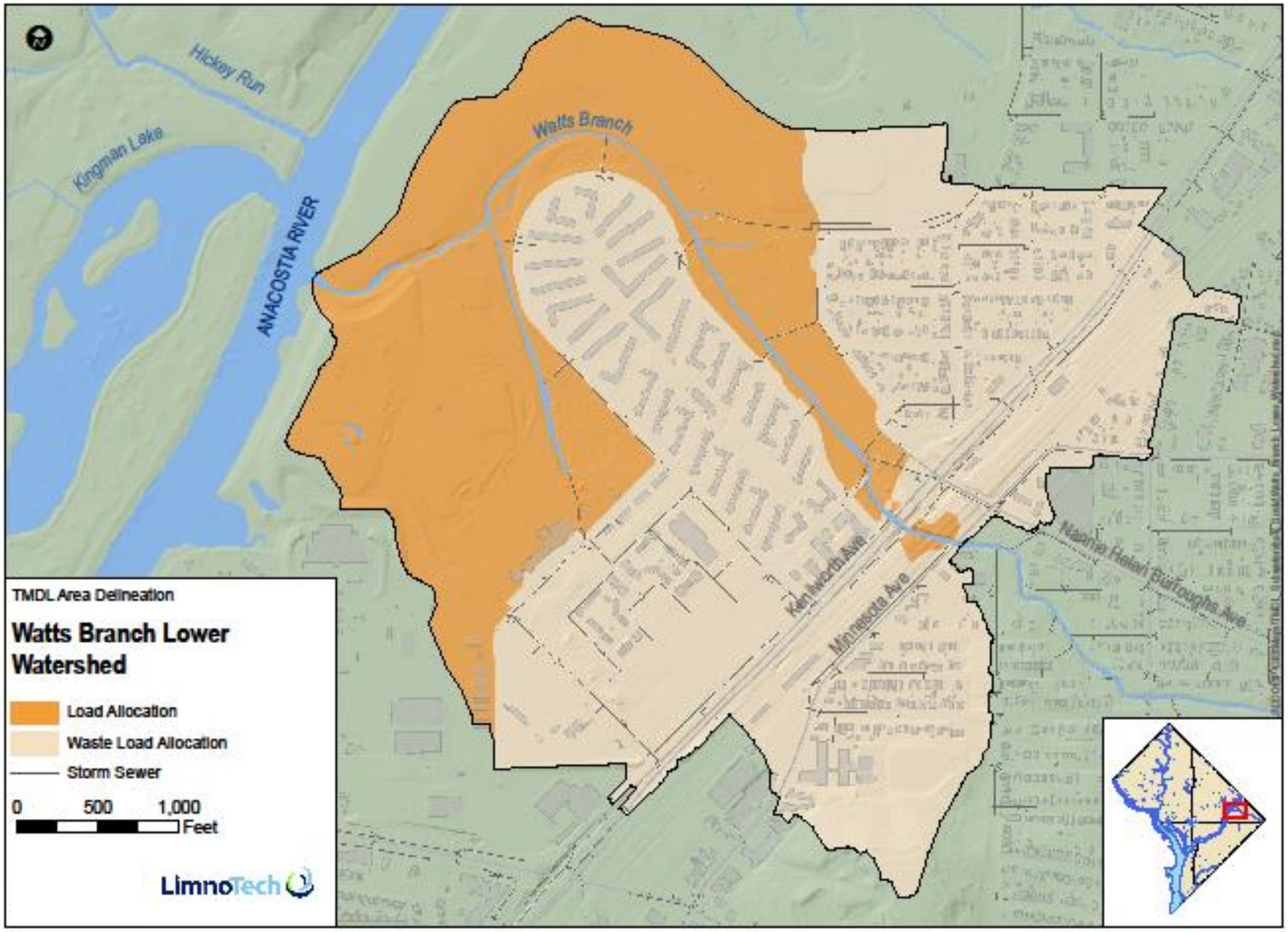

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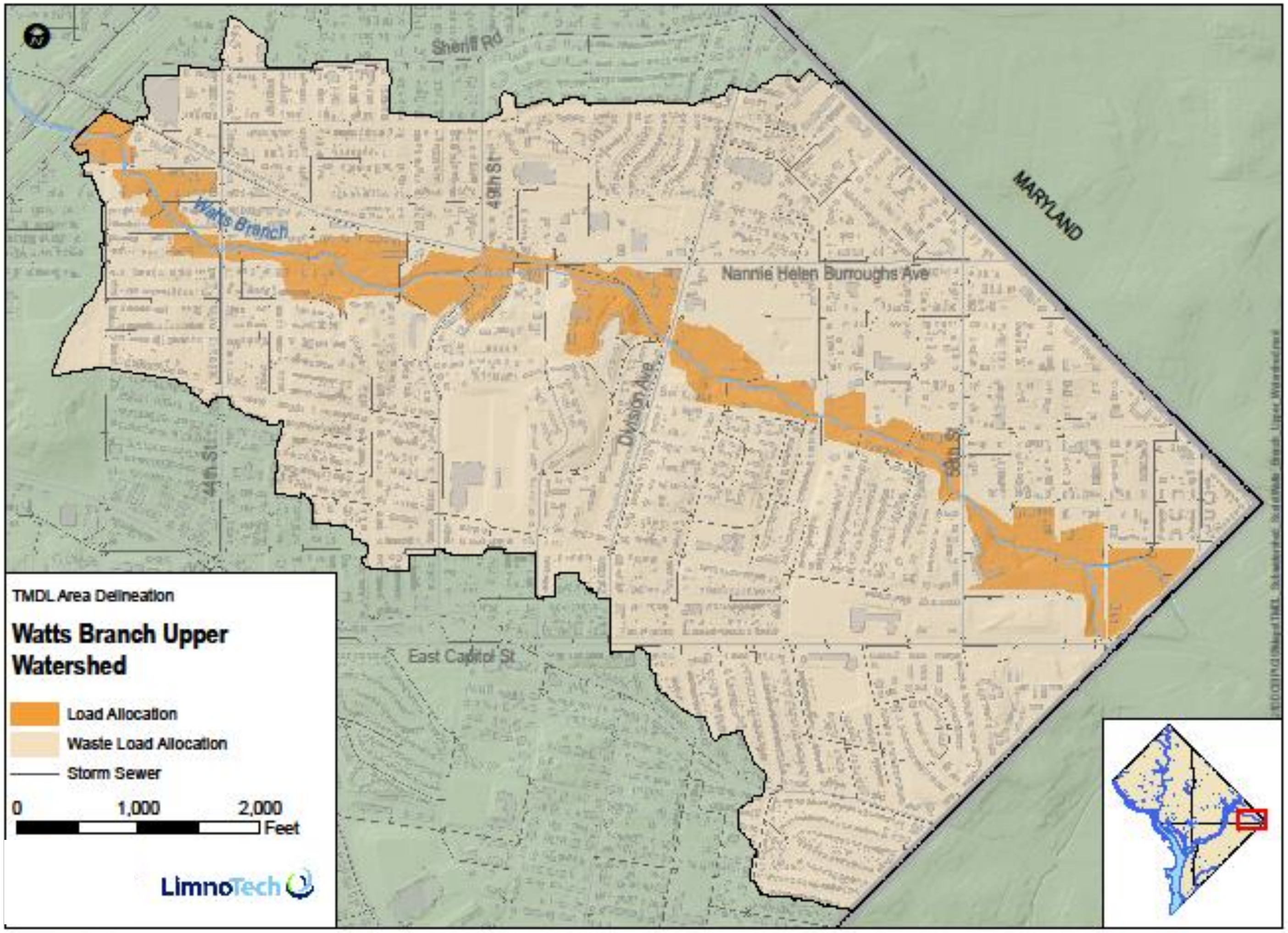

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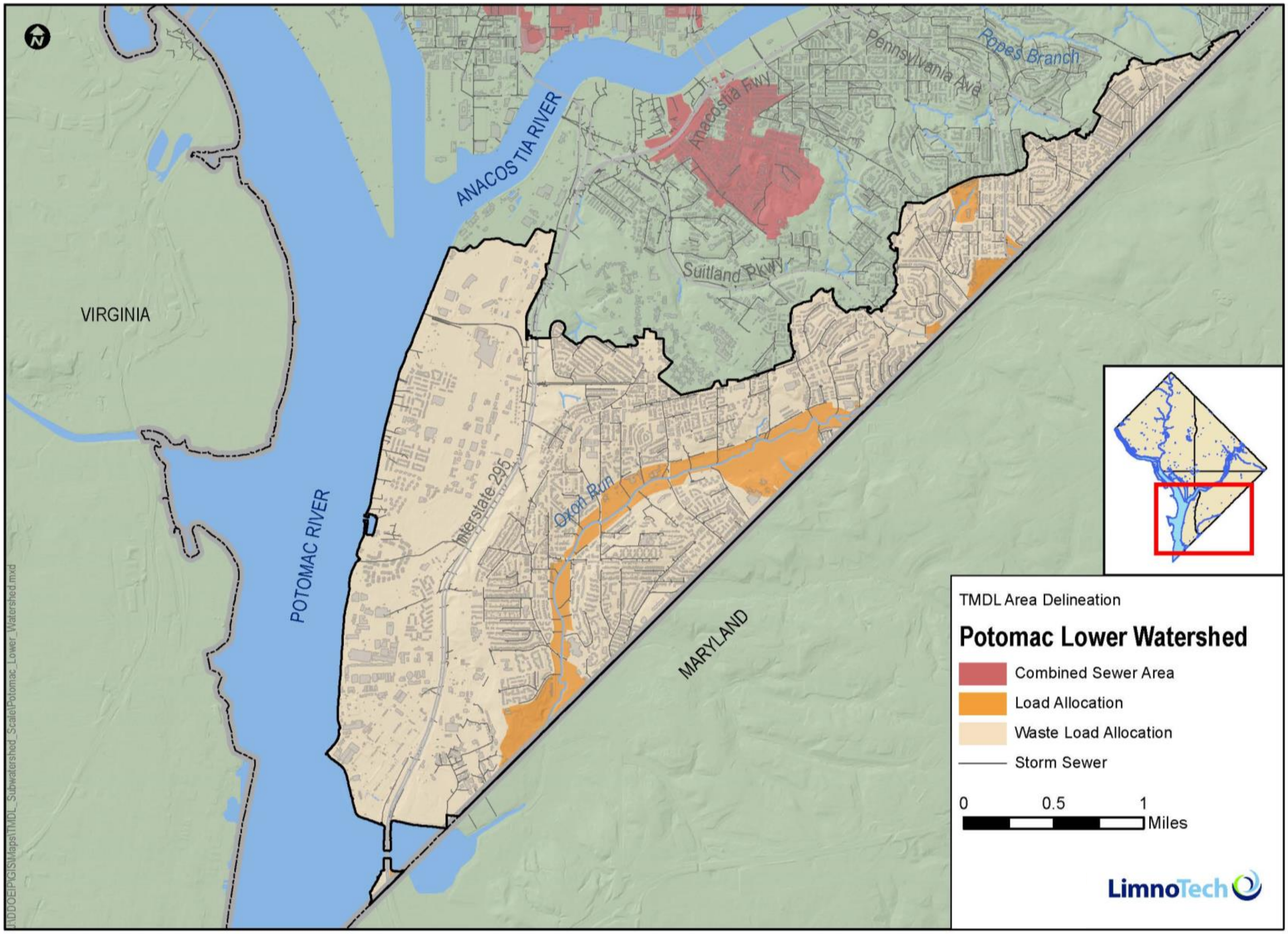

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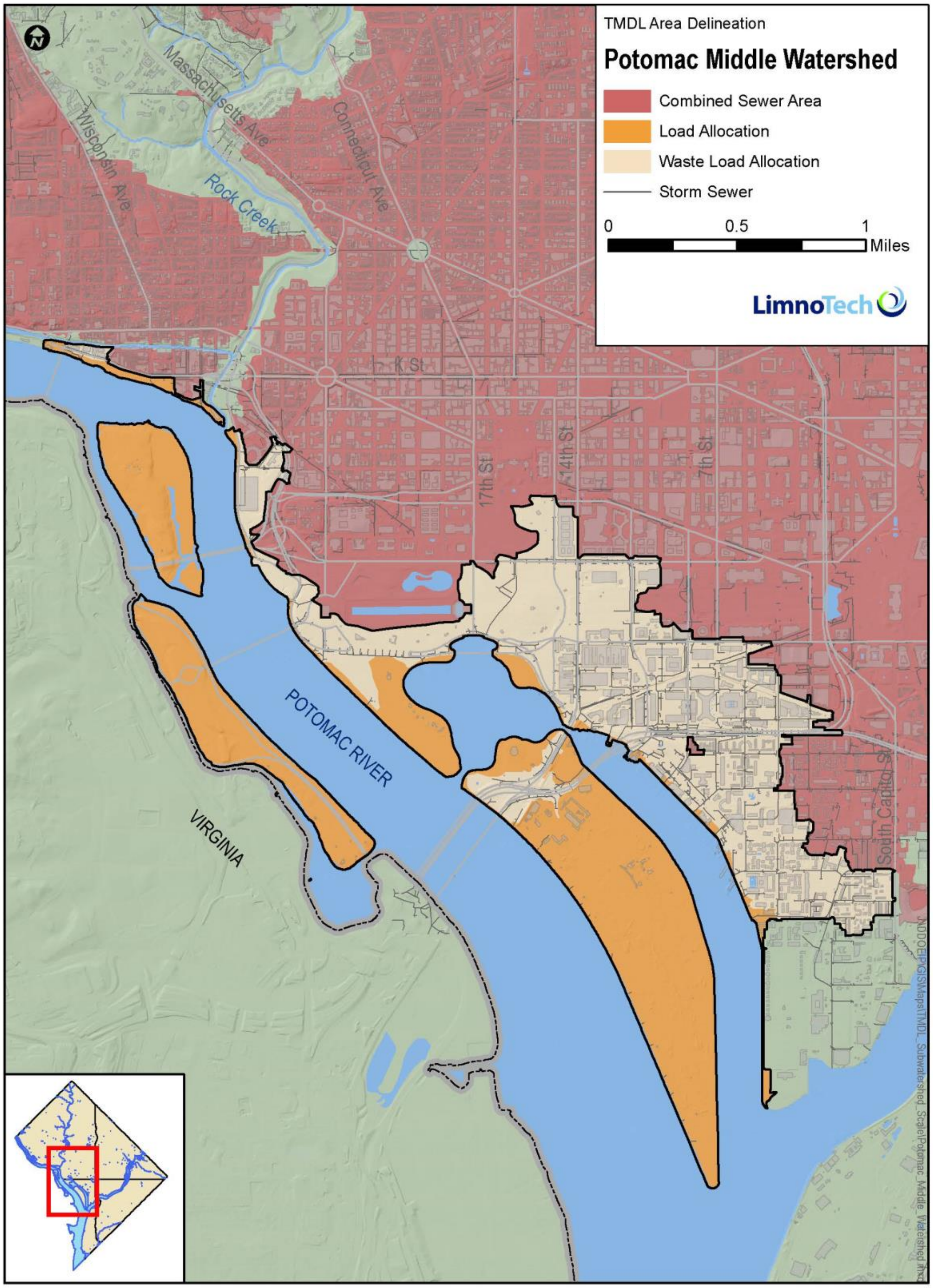

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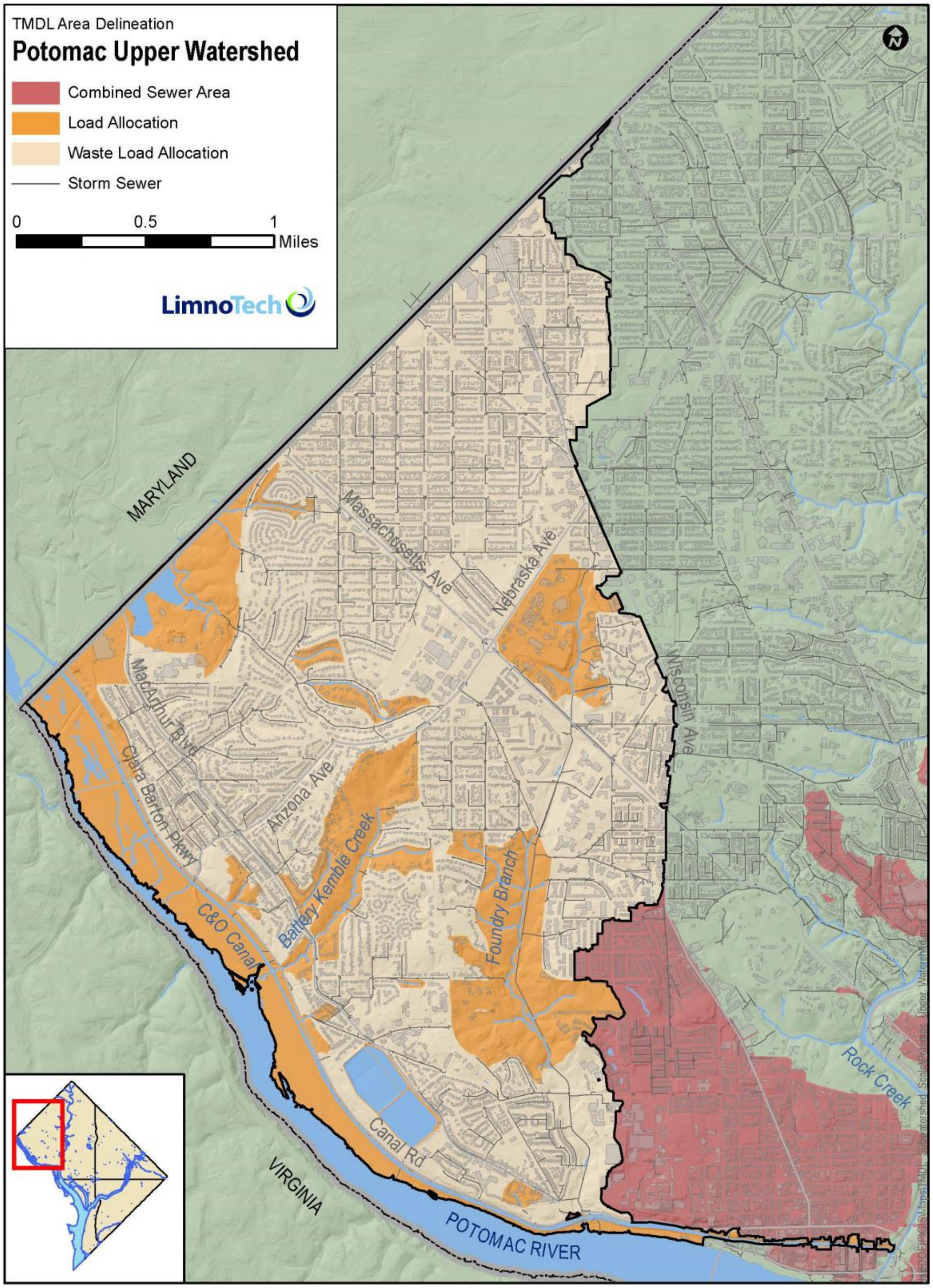

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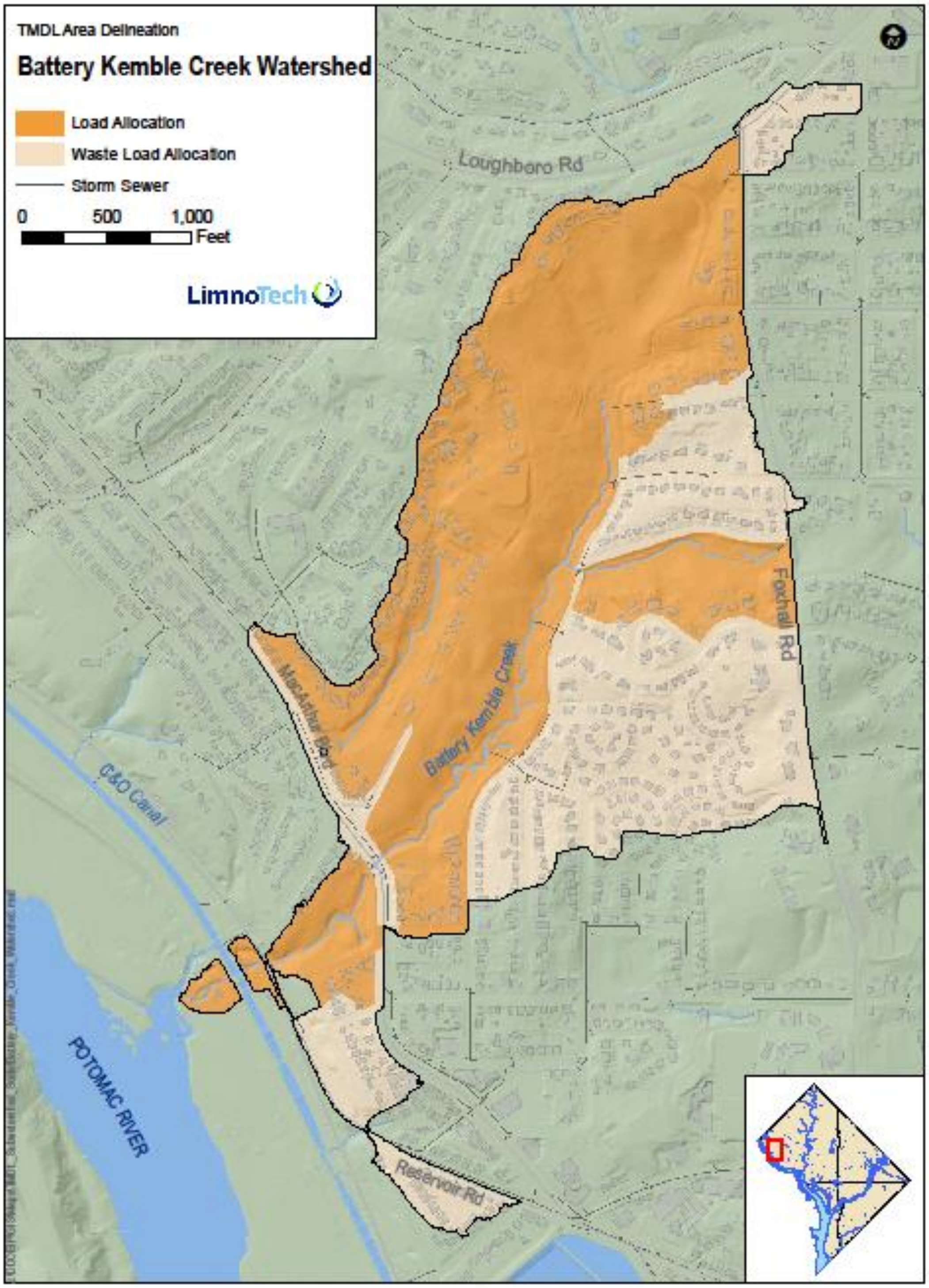

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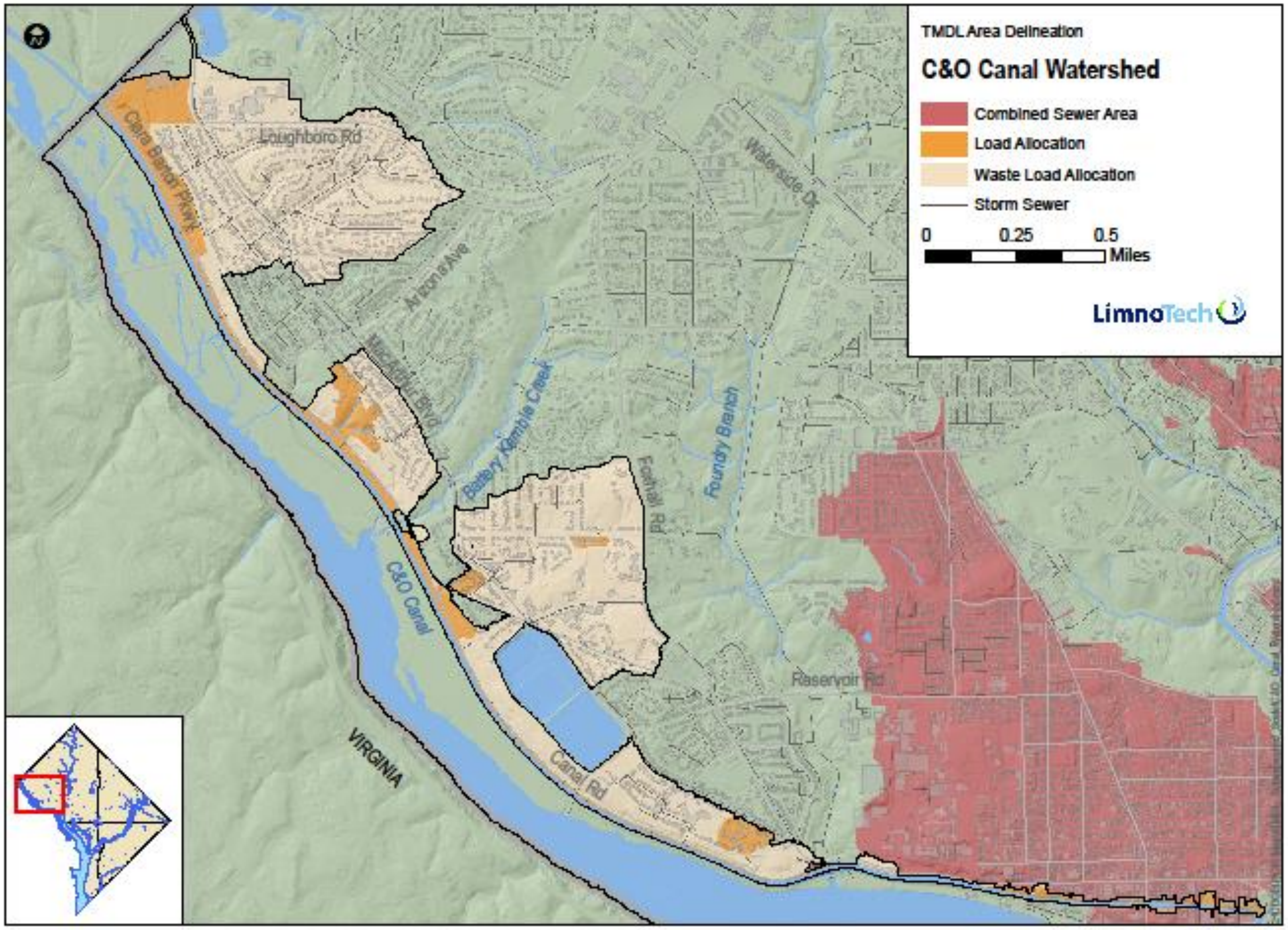

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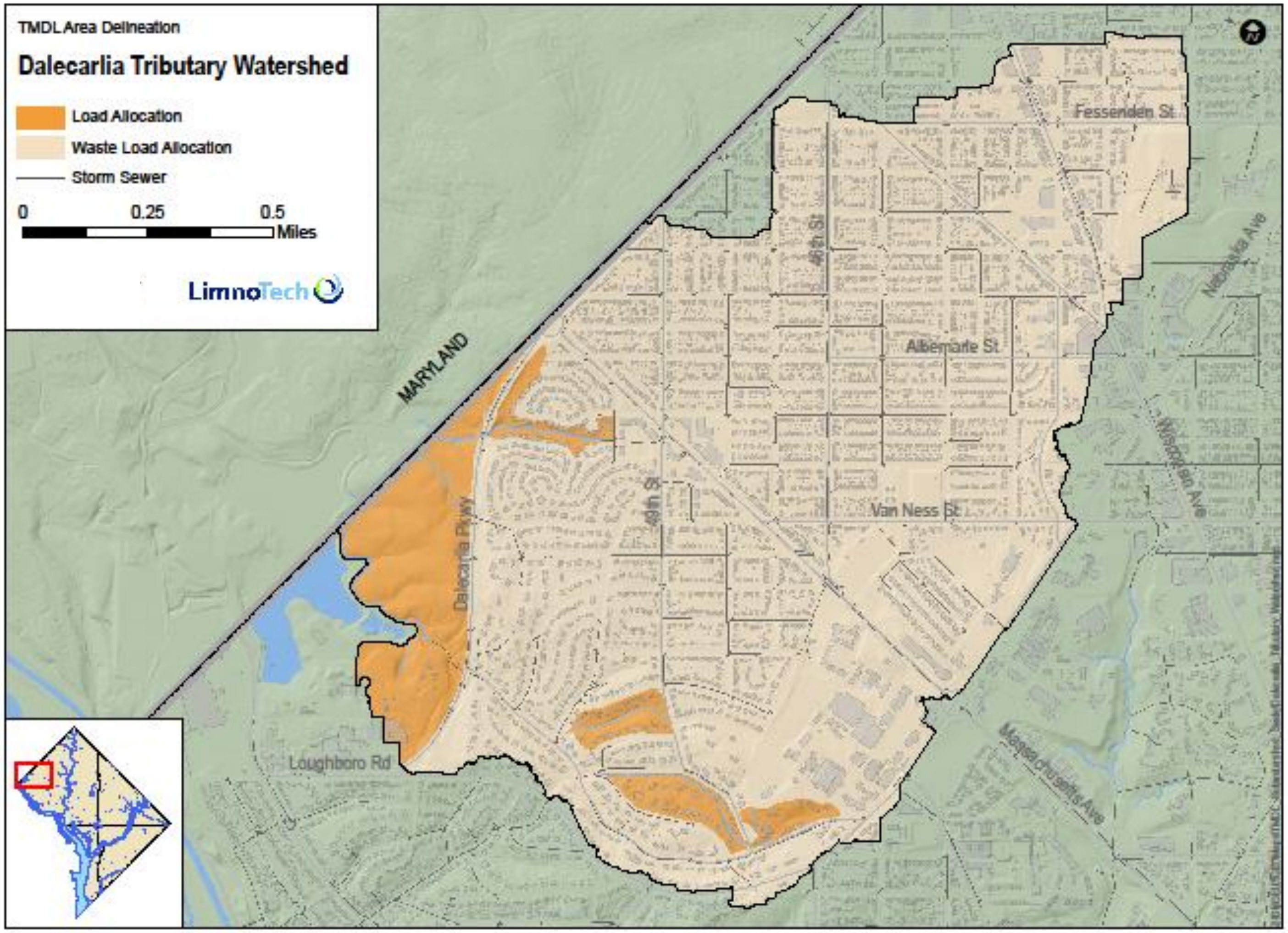

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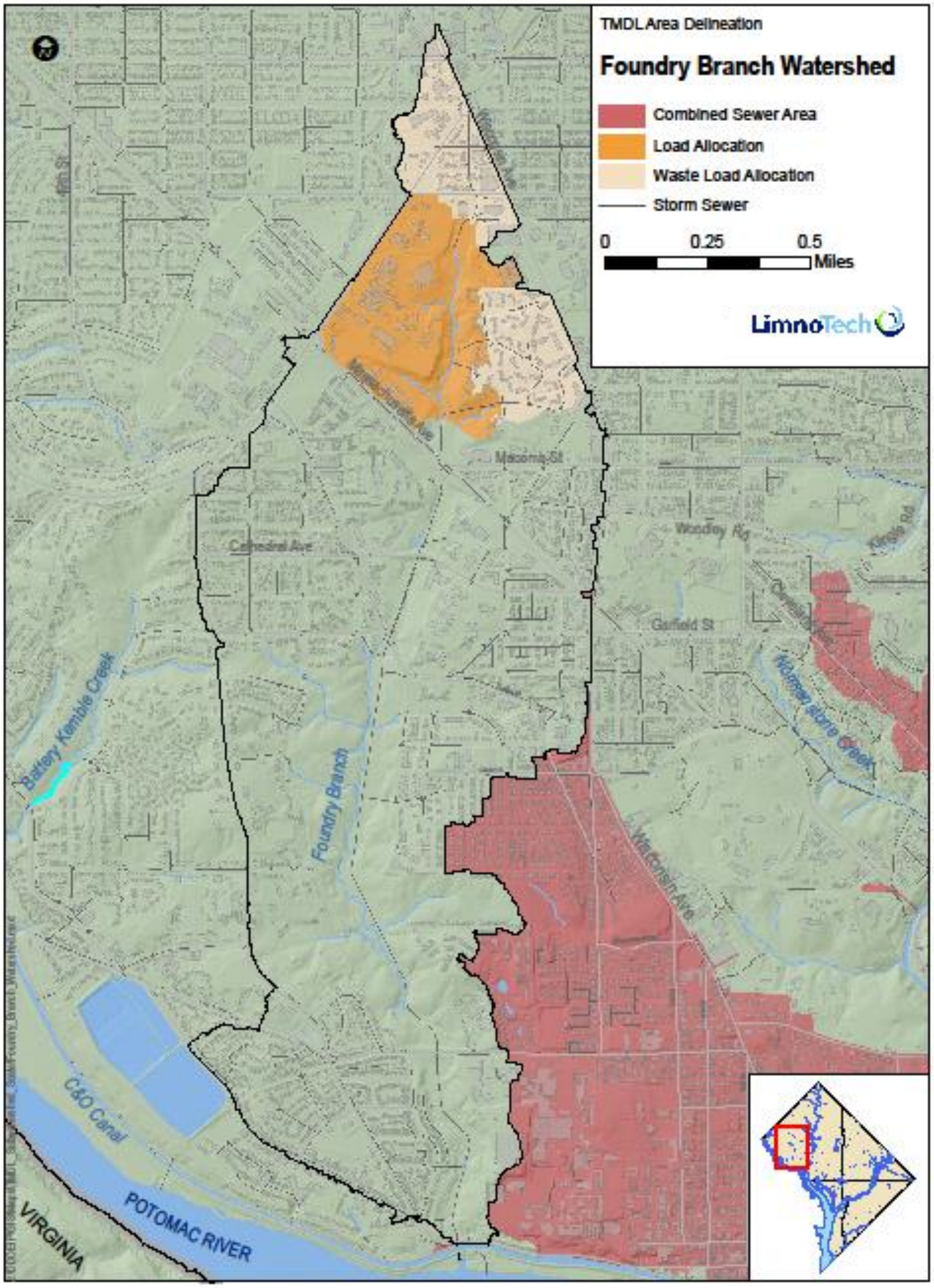

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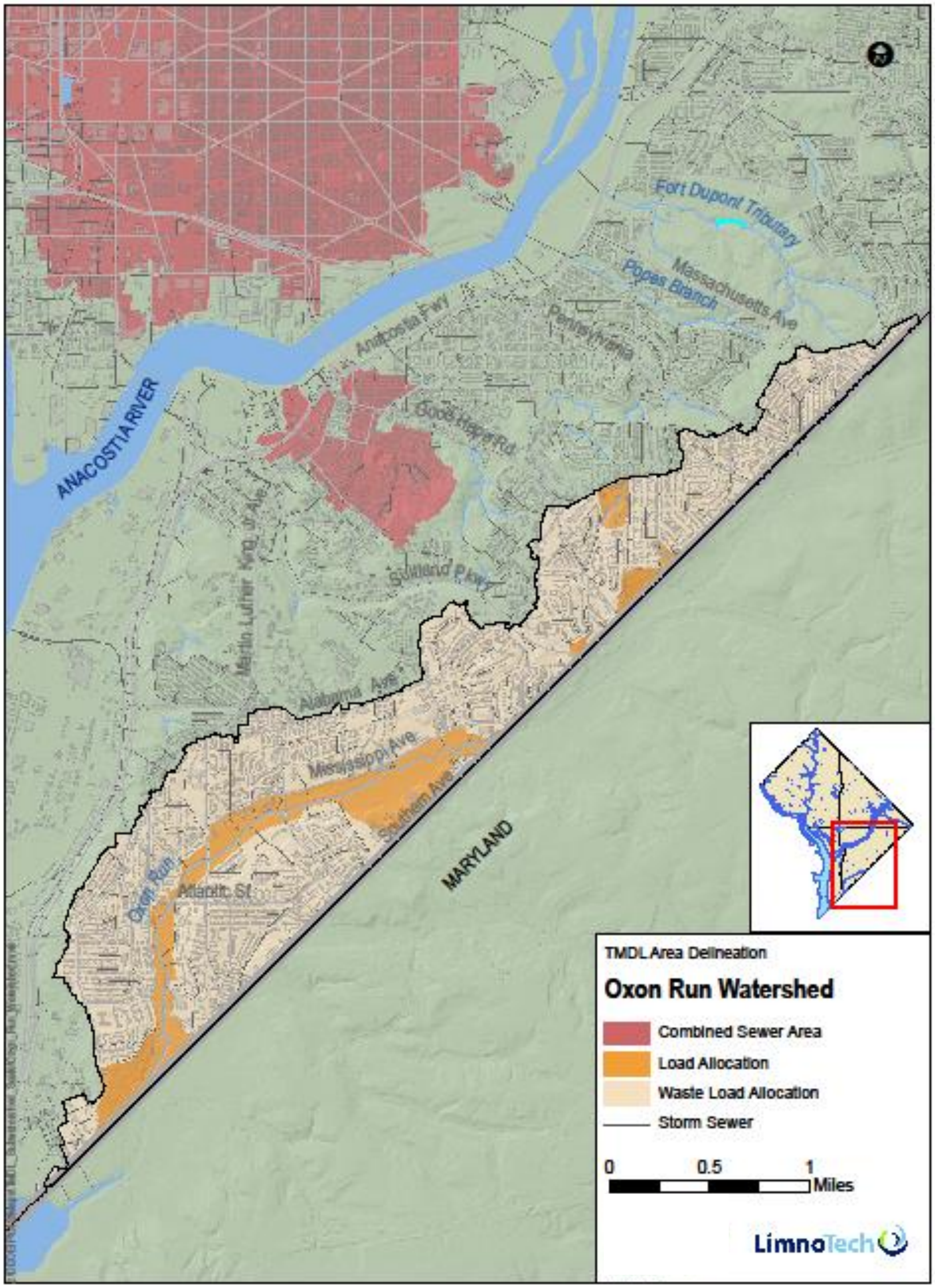

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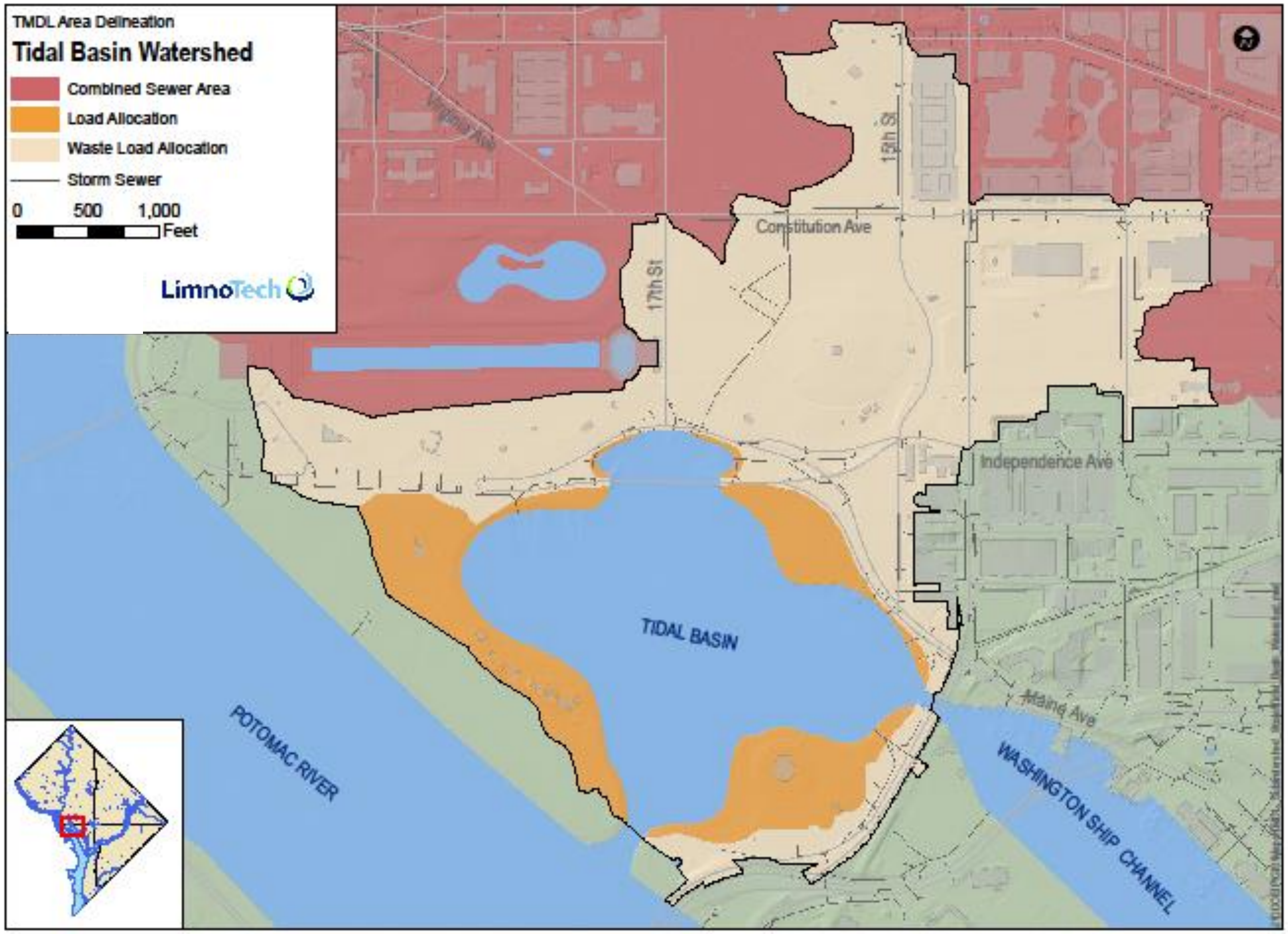

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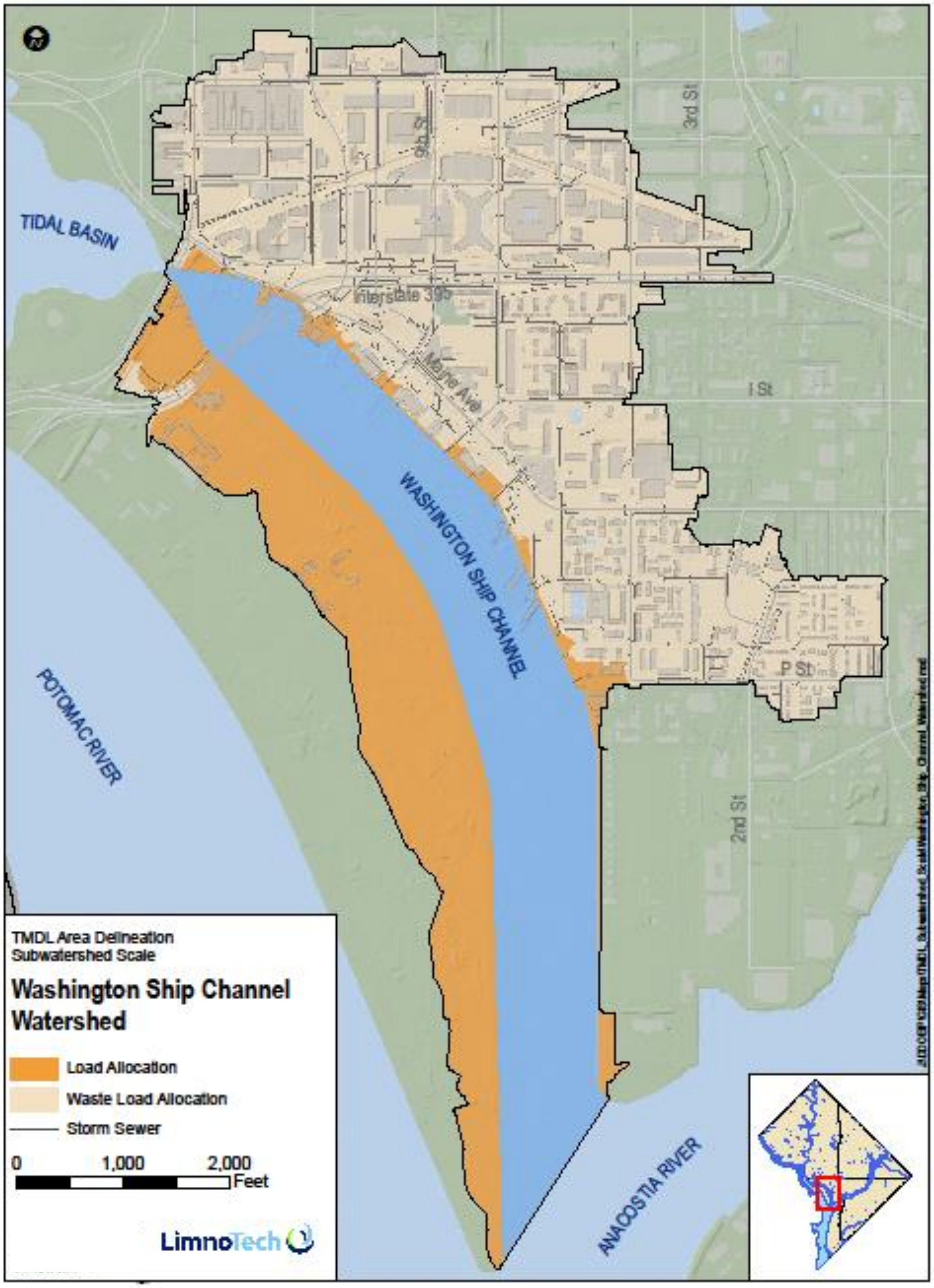

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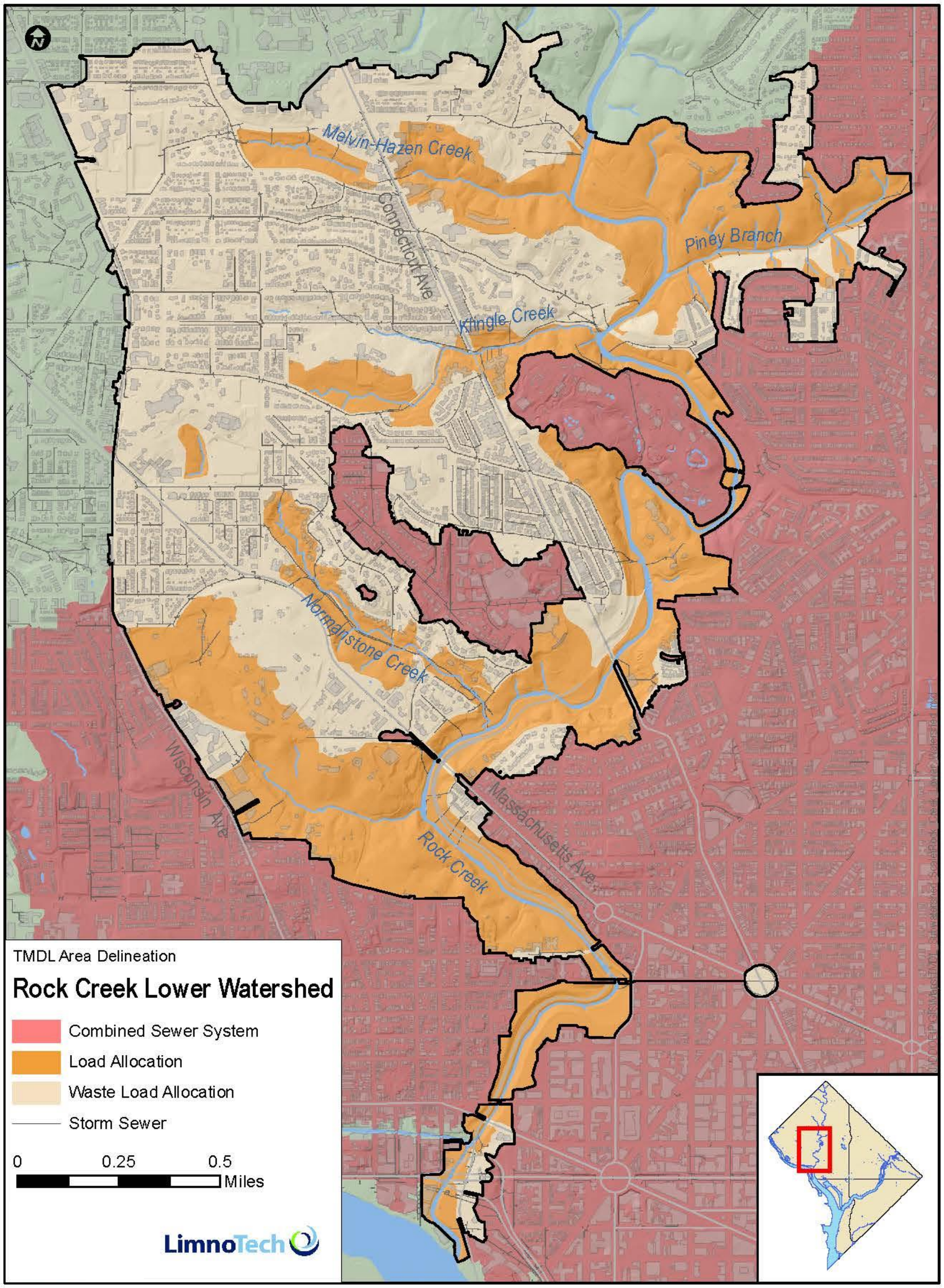

Figure C- 28. Rock Creek Lower

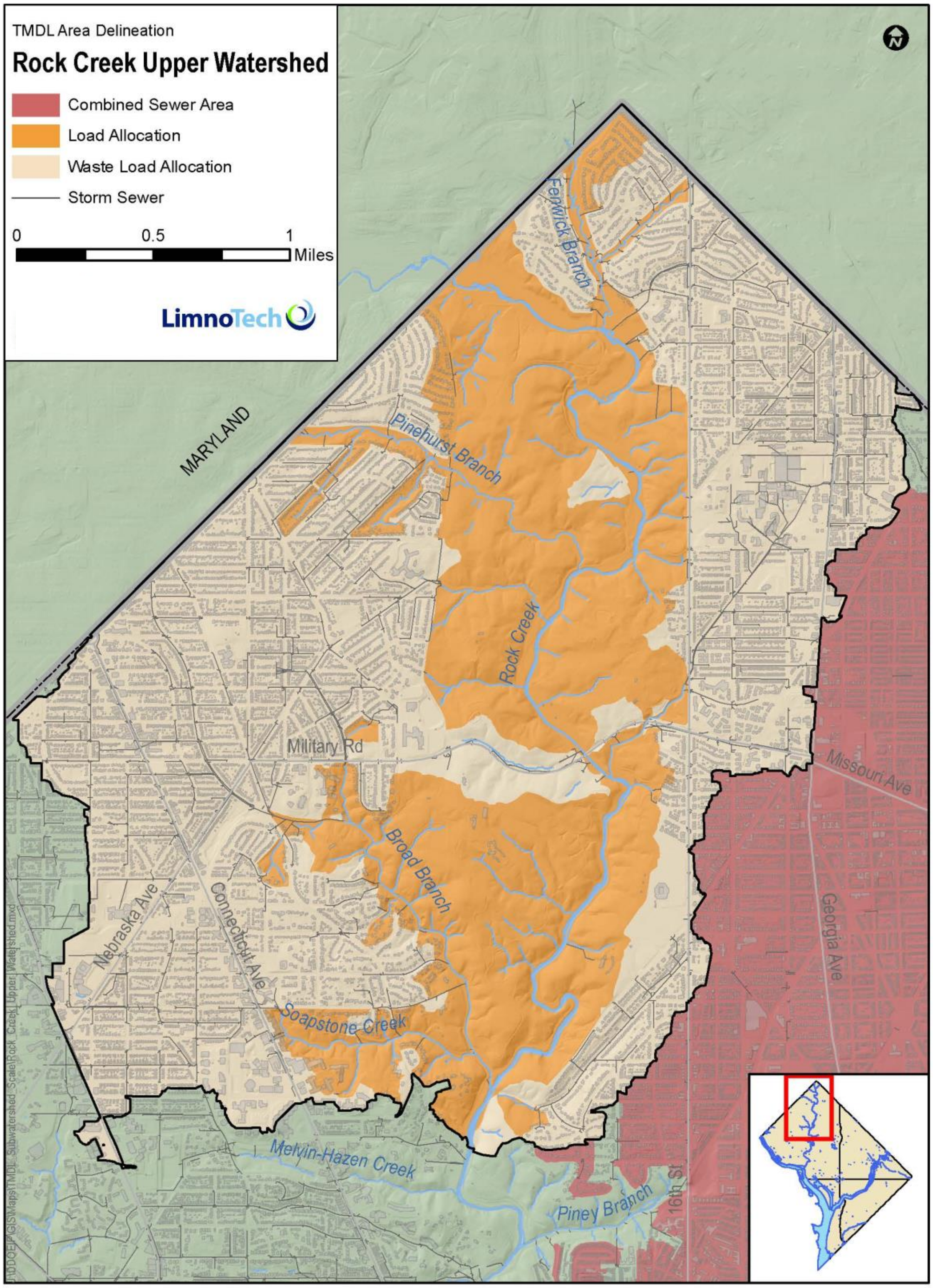

Figure C- 29. Rock Creek Upper

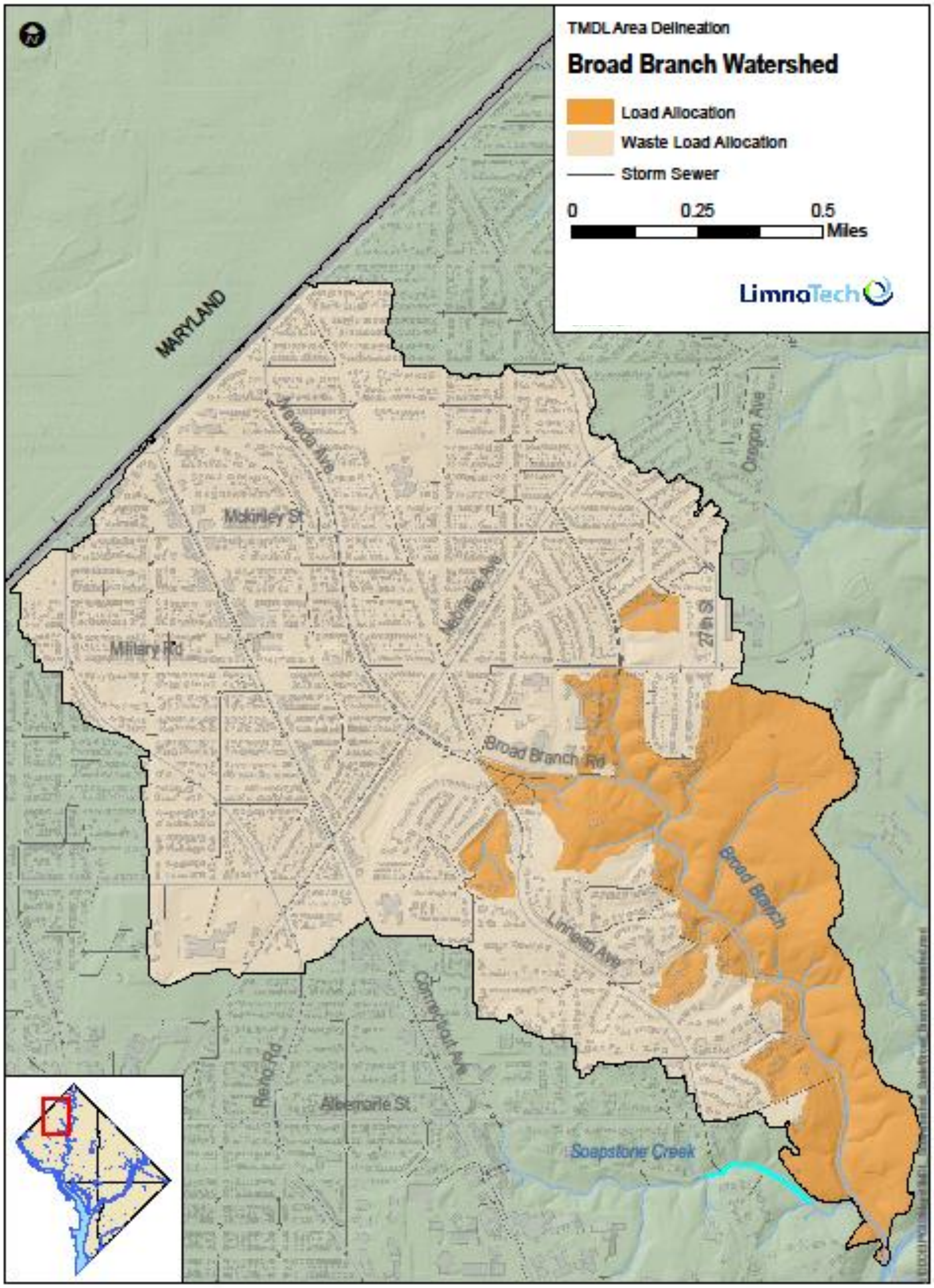

Figure C- 30. Broad Branch

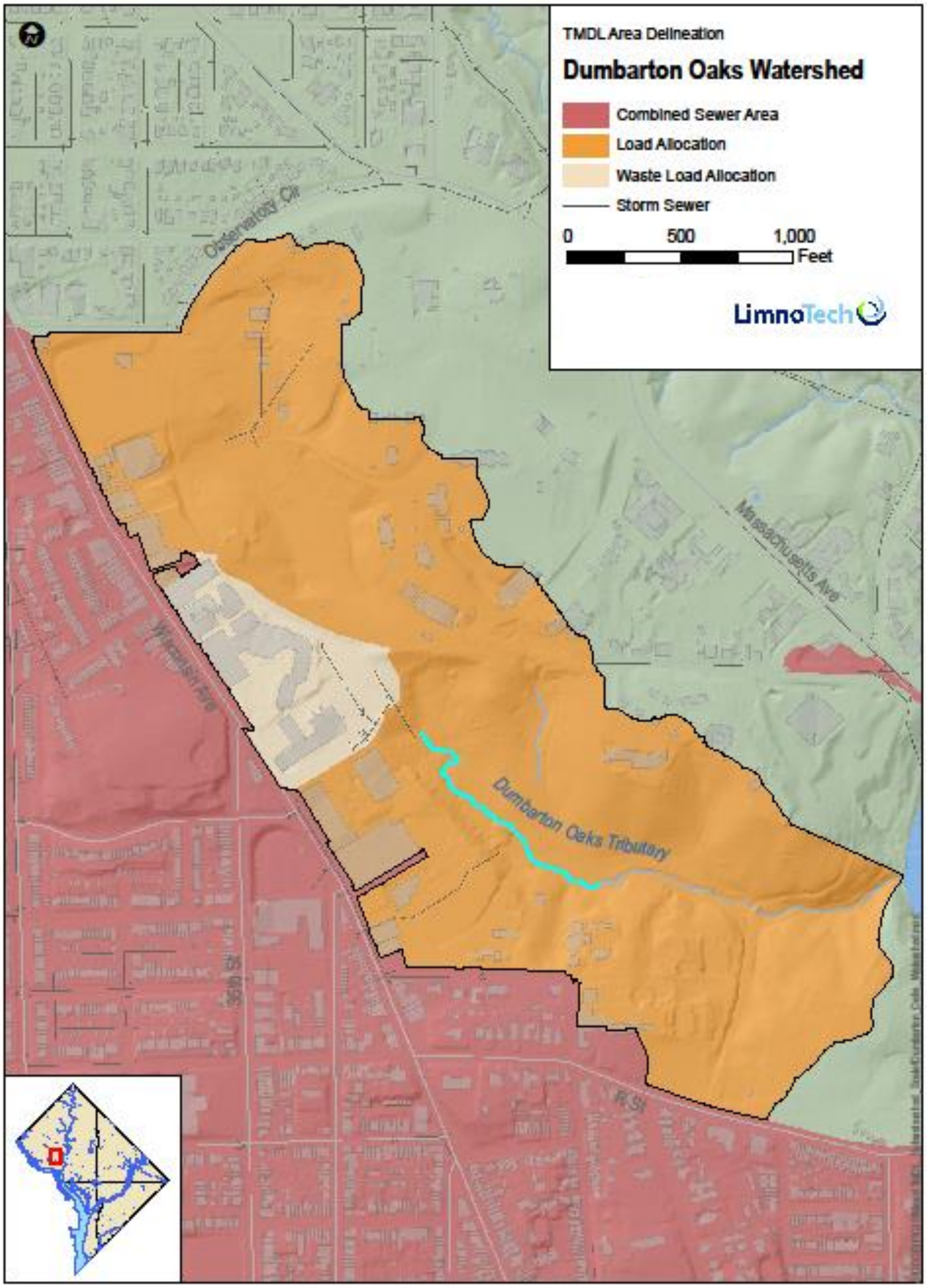

Figure C- 31. Dumbarton Oaks

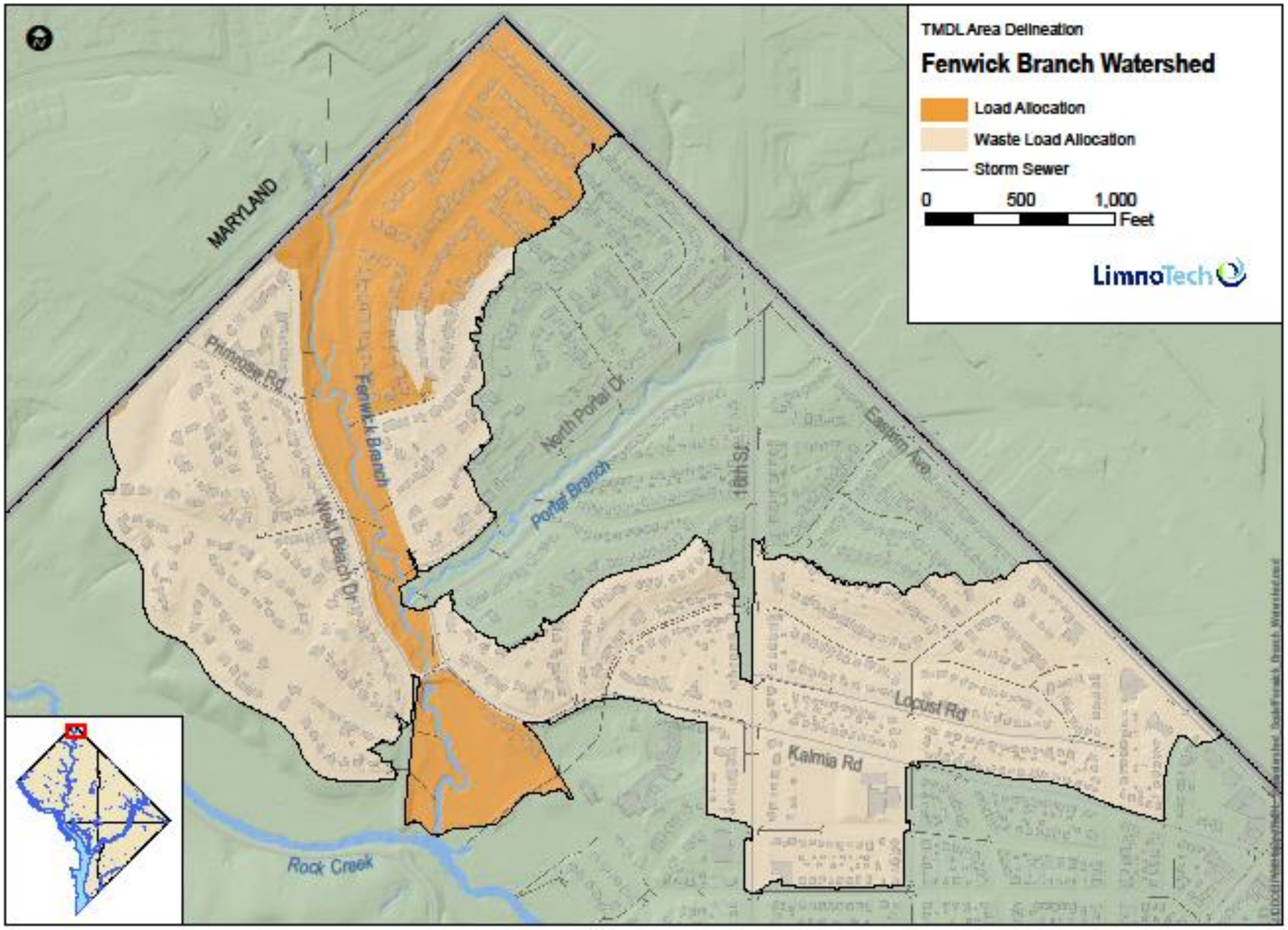

Figure C- 32. Fenwick Branch

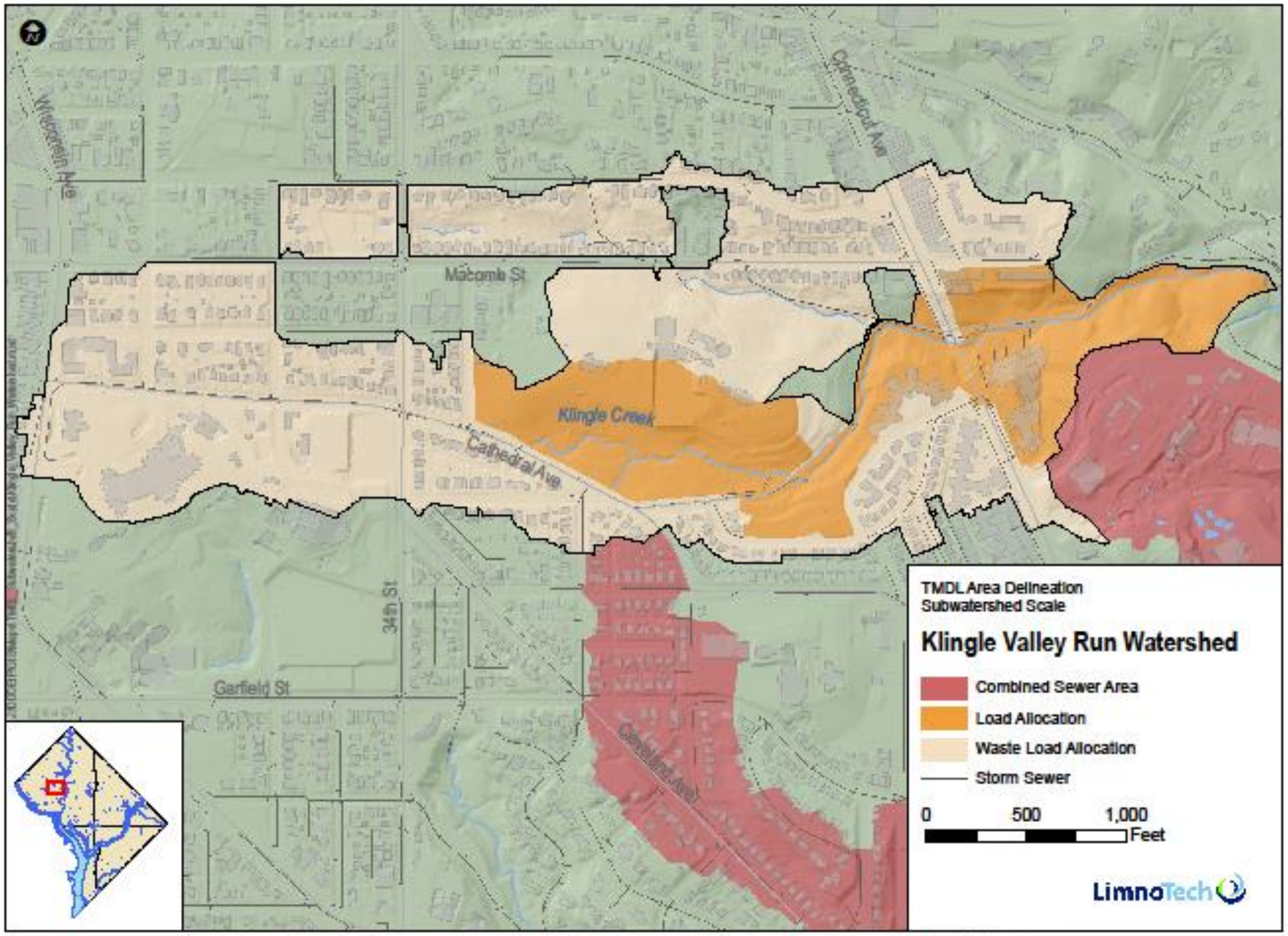

Figure C- 33. Klingle Valley Run

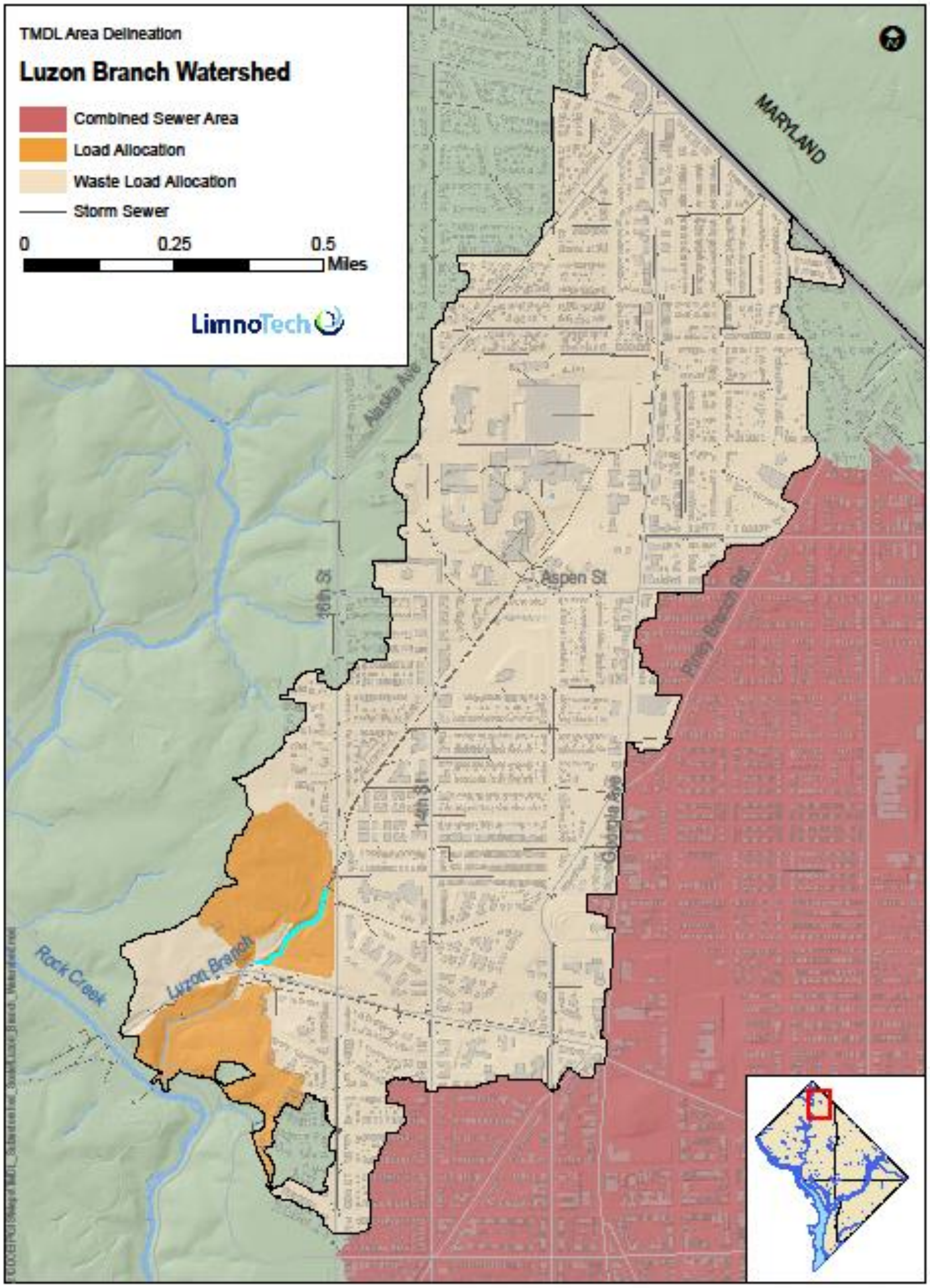

Figure C- 34. Luzon Branch

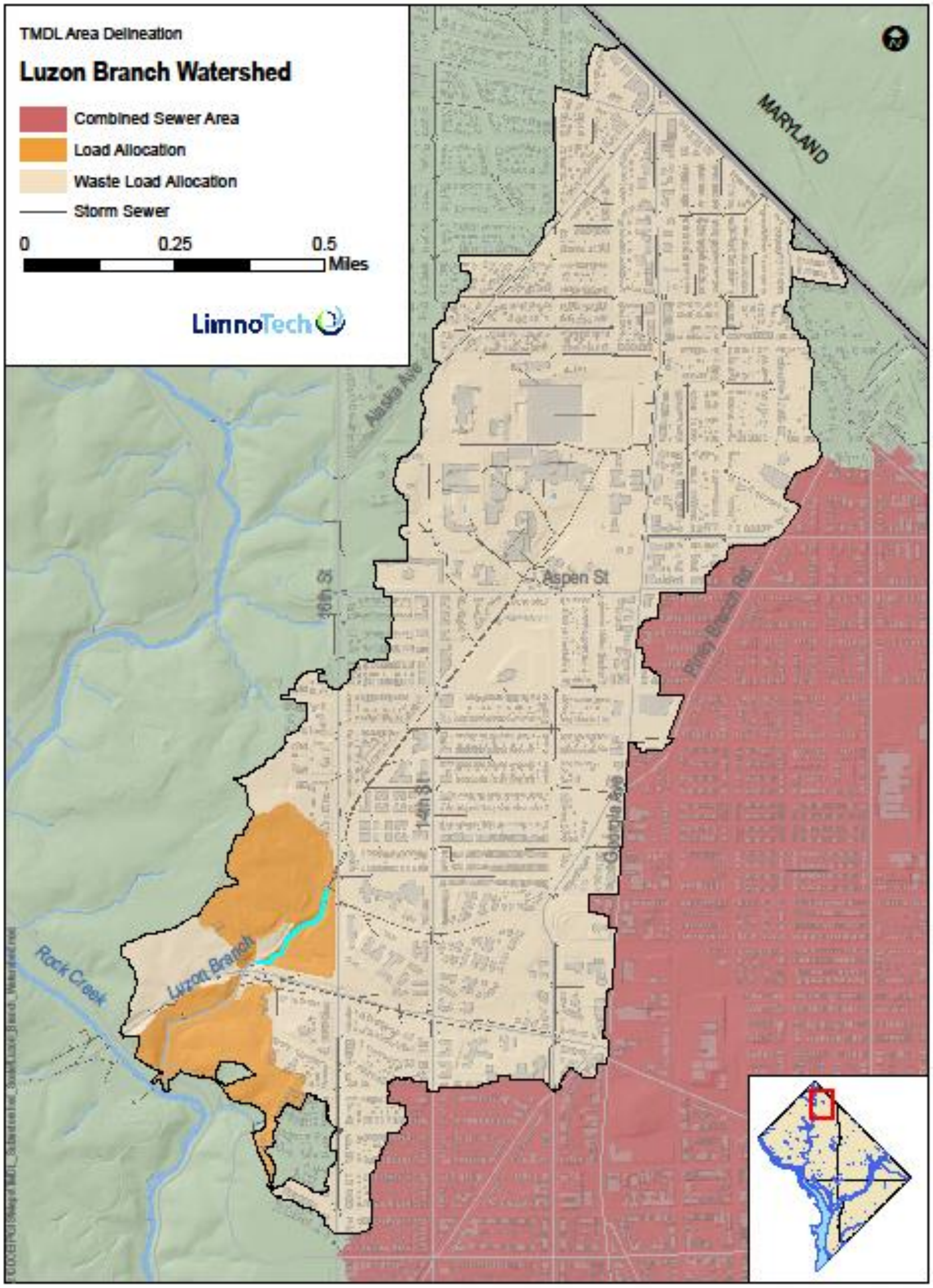

Figure C- 35. Melvin Hazen Valley Branch

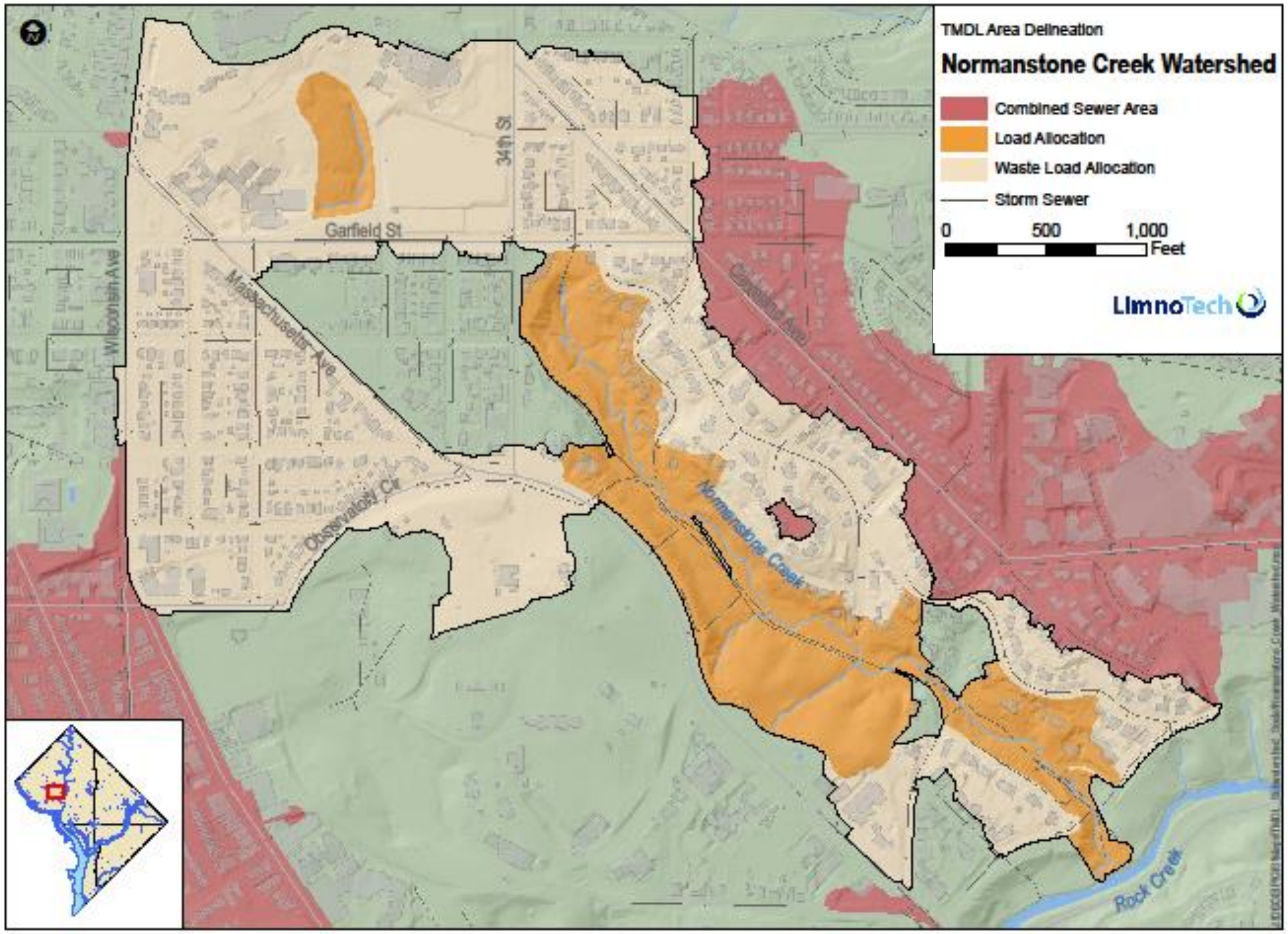

Figure C- 36. Normanstone Creek

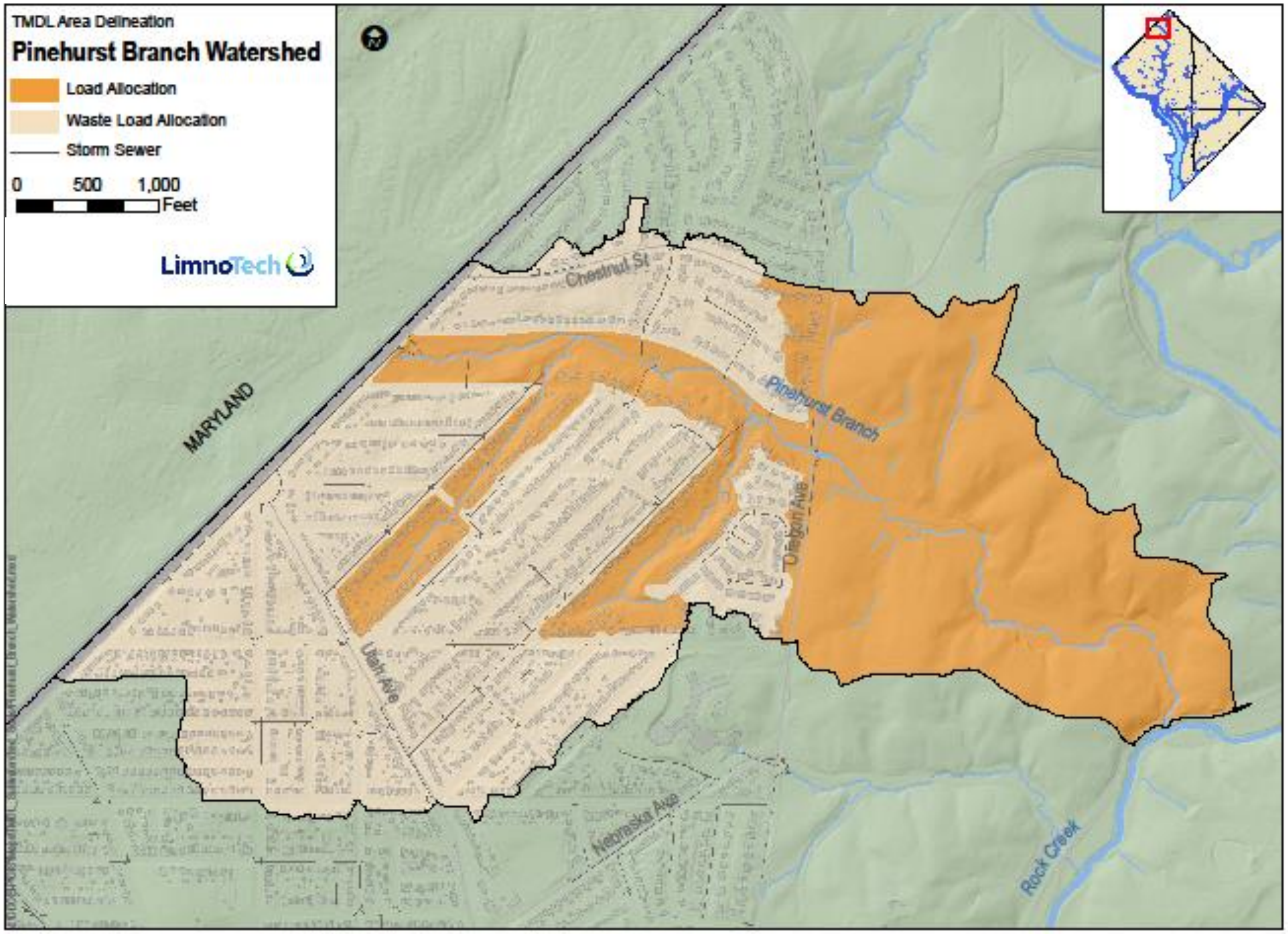

Figure C- 37. Pinehurst Branch

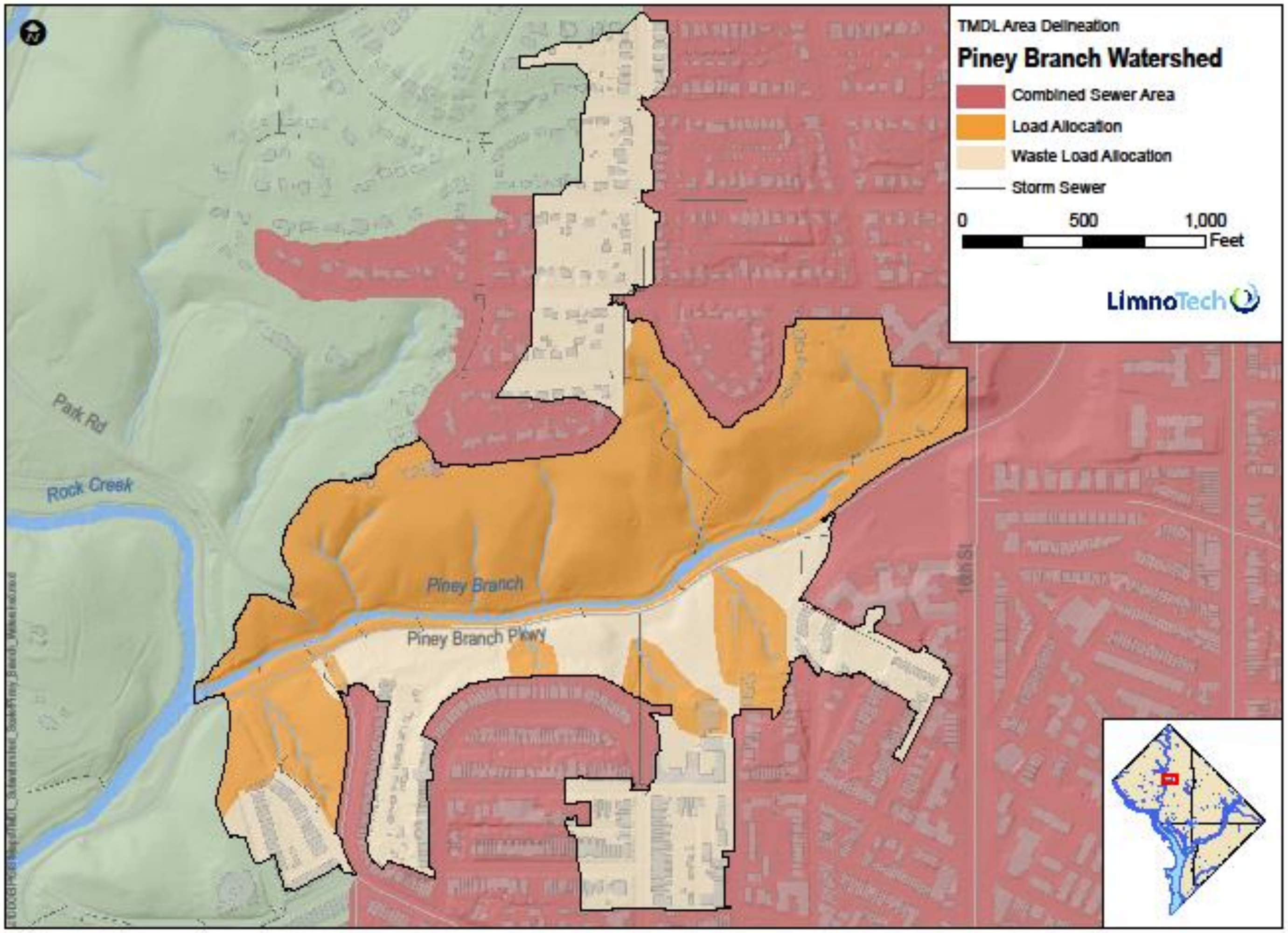

Figure C- 38. Piney Branch

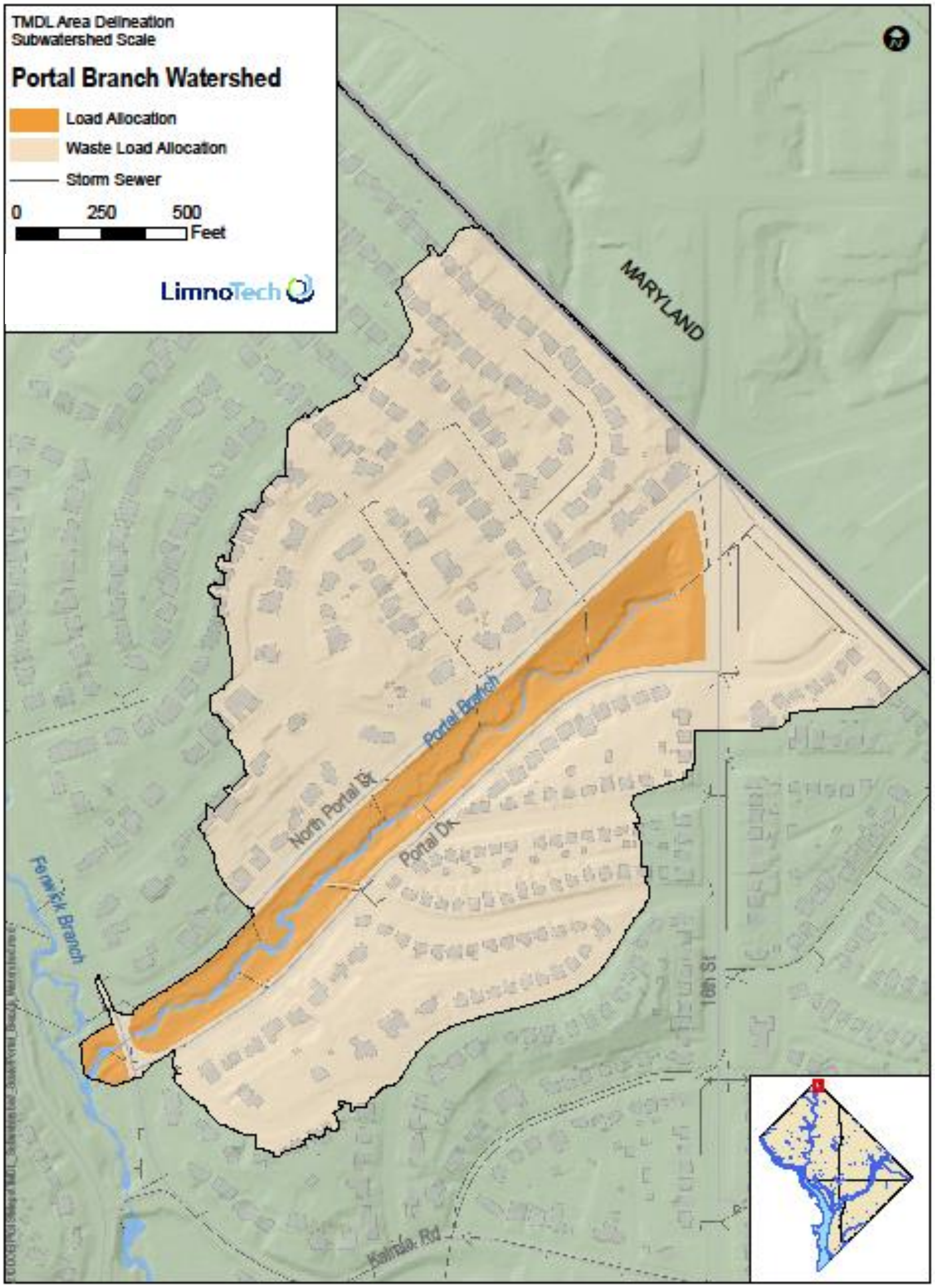

Figure C- 39. Portal Branch

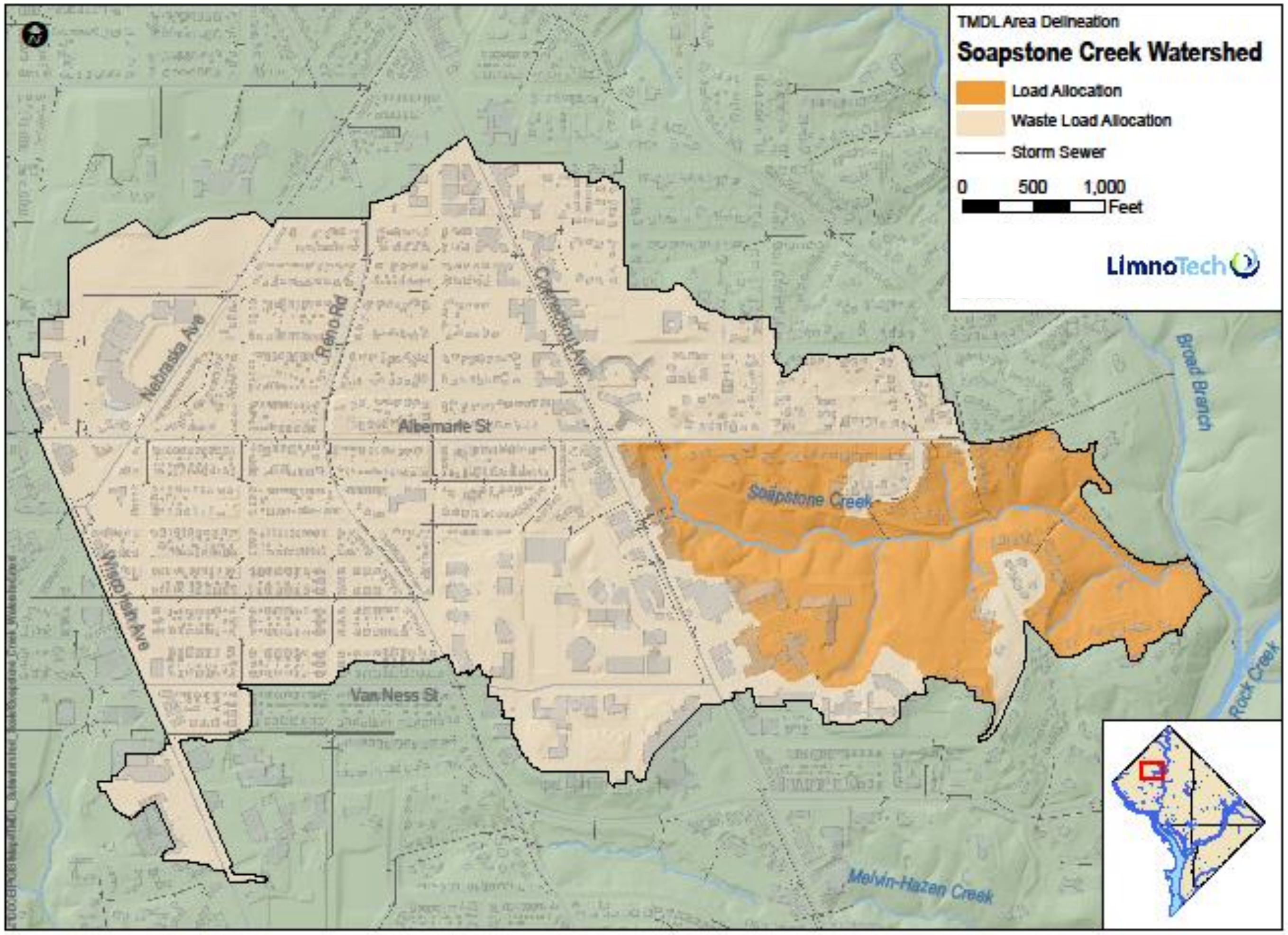

Figure C- 40. Soapstone Creek

Chesapeake Bay TMDL Segments

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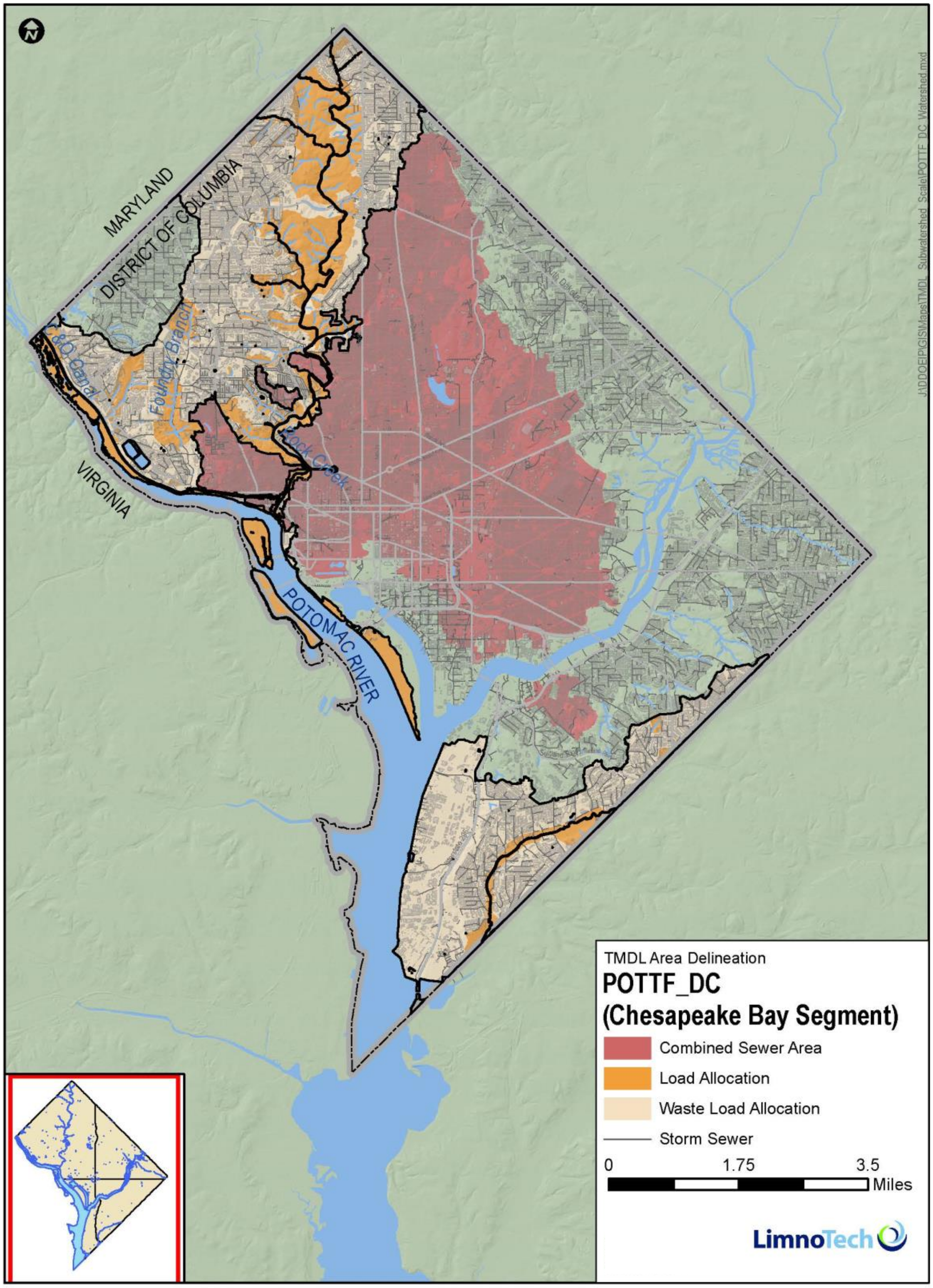

Figure C- 41. POTTF_DC Chesapeake Bay Segment

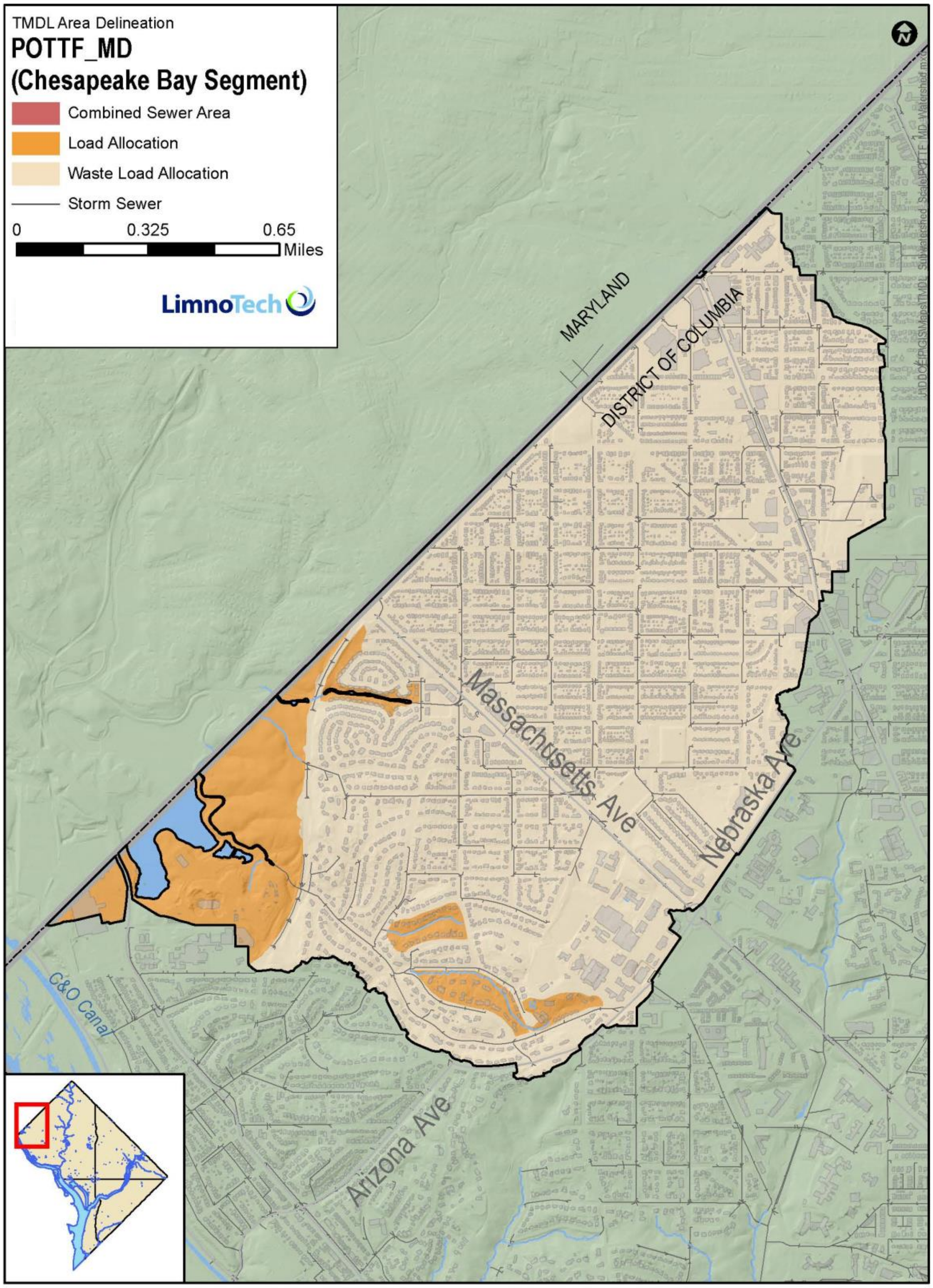

Figure C- 42. POTTF_MD Chesapeake Bay Segment

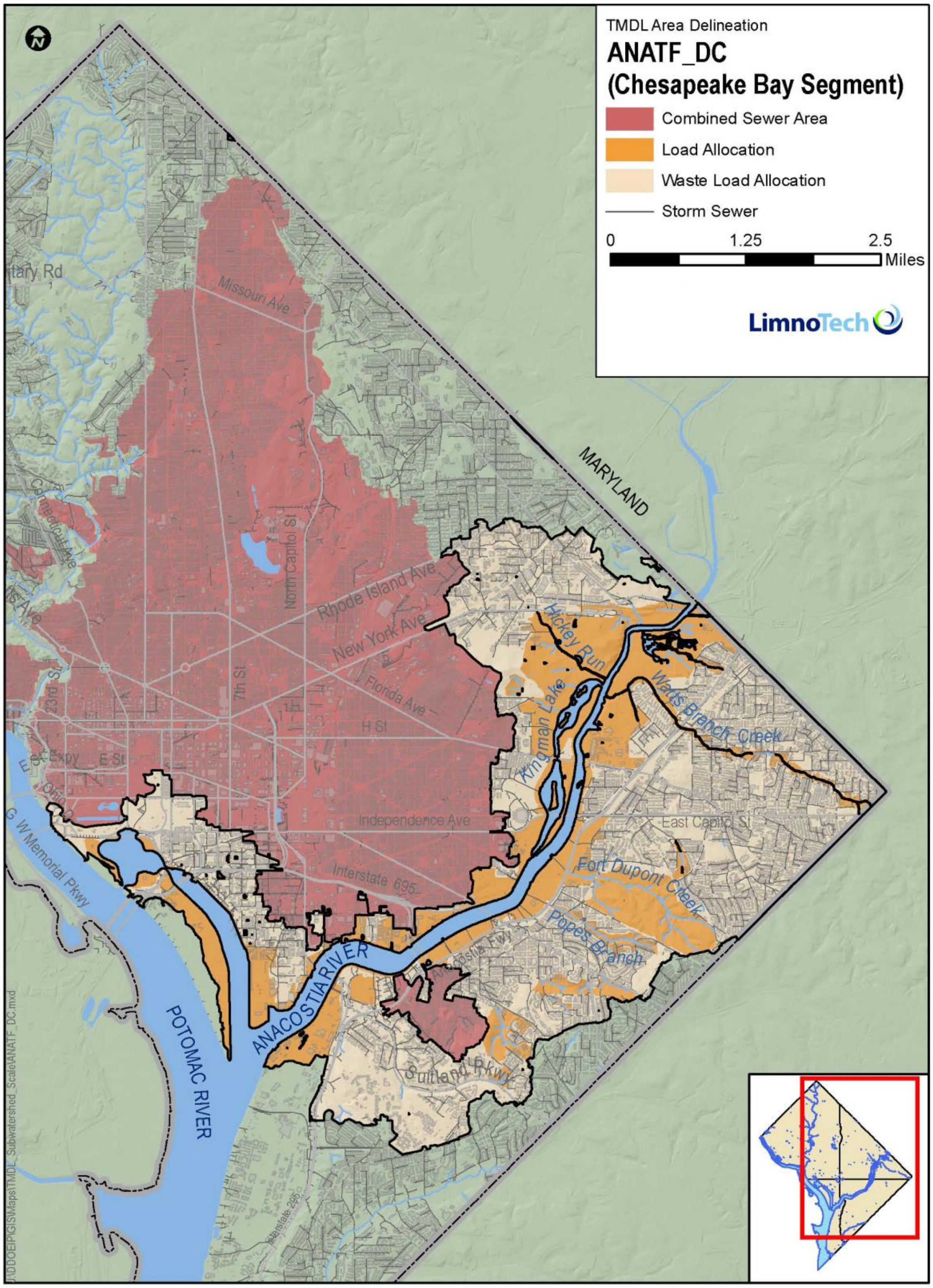

Figure C- 43. ANATF_DC Chesapeake Bay Segment

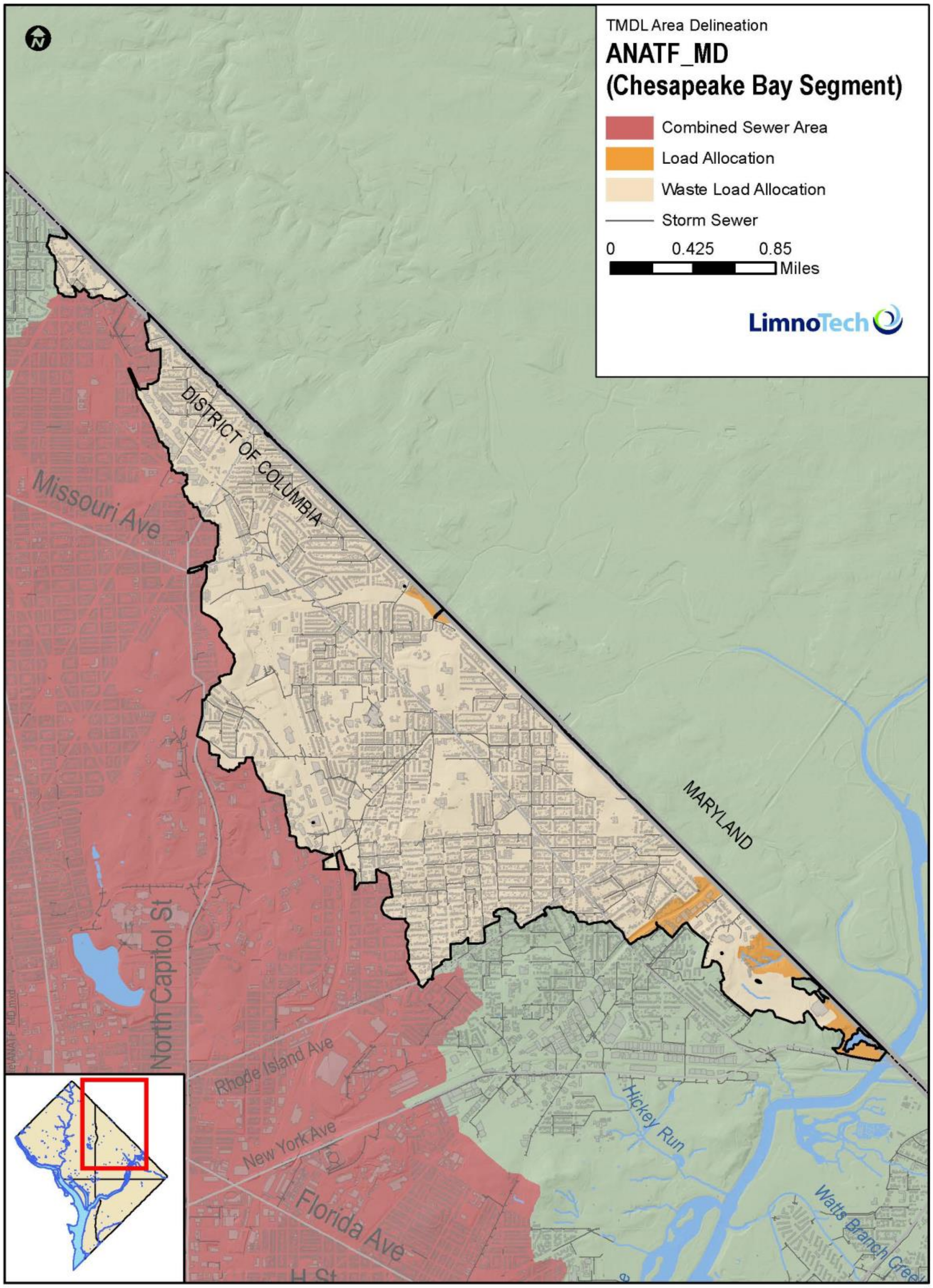

Figure C- 44. ANATF_MD Chesapeake Bay Segment

Appendix D

Summary Tables for Baseline and Current Loads, Gaps, and WLA Achievement by TMDL Watershed

Consolidated TMDL Implementation Plan – Revised Draft

August 2016

DEPARTMENT OF ENERGY & ENVIRONMENT

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Table D- 1. Anacostia							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	916059	905097	230000	675097	74.59%	2097	

Table D- 2. Anacostia Lower							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Arsenic	9.7	9.4	3.4	6.0	63.75%	2068	
Chlordane	6.2E-02	6.1E-02	7.8E-03	5.3E-02	87.25%	2130	
DDD	1.9E-02	1.8E-02	8.7E-03	9.5E-03	52.29%	2055	
DDE	8.4E-02	8.0E-02	2.1E-02	5.9E-02	73.75%	2078	
DDT	0.22	0.21	5.7E-02	1.5E-01	72.49%	2077	
Dieldrin	1.8E-03	1.8E-03	3.5E-03	0	-	2014	
Heptachlor Epoxide	6.1E-03	6.0E-03	2.0E-03	4.0E-03	66.73%	2073	
Lead	101	96	219	0	-	2014	
PAH1	4.2	4.1	0.11	4.0	97.44%	2145	
PAH2	26	26	0.64	25	97.51%	2143	
PAH3	17	16	0.41	16	97.46%	2139	
Zinc	765	732	1339	0	-	2014	
TSS	463963	439179	92800	346379	78.87%	2083	
BOD	227331	225614	98435	127179	56.37%	2061	
TN	21006	20457	5172	15285	74.72%	2080	
TP	2404	2205	509	1696	76.92%	2077	
Trash	24480	8829	24480	8829	36.06%	2017	WLA expressed as lbs to be removed. Percent Reduction Required expressed as % of baseline.

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Table D- 3. Anacostia Upper							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
Arsenic	47	47	1.4	45	96.92%	2145	
Chlordane	0.30	0.30	1.4E-02	2.8E-01	95.28%	2143	
DDD	9.1E-02	9.1E-02	5.2E-03	8.6E-02	94.28%	2141	
DDE	0.41	0.40	1.3E-02	3.9E-01	96.85%	2145	
DDT	1.0	1.0	3.4E-02	1.0	96.72%	2145	
Dieldrin	8.8E-03	8.8E-03	8.2E-03	6.1E-04	6.93%	2019	
Heptachlor Epoxide	2.9E-02	2.9E-02	4.1E-03	2.5E-02	85.76%	2129	
Lead	486	483	388	95	19.75%	2036	
PAH1	20	20	0.19	20	99.03%	2148	
PAH2	127	126	1.1	125	99.09%	2148	
PAH3	82	81	0.73	80	99.10%	2148	
Zinc	3685	3665	2385	1279	34.91%	2051	
TSS	2234484	2220940	169200	2051740	92.38%	2139	
BOD	1094845	1090988	181841	909147	83.33%	2124	
TN	101166	100662	10493	90169	89.58%	2135	
TP	11579	11017	966	10051	91.23%	2131	
Trash	83868	8048	83868	8048	9.06%	2017	WLA expressed as lbs to be removed. Percent Reduction Required expressed as % of baseline.

Table D- 4. Chesapeake Bay TMDL Segment ANATF_DC							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
TN	101285	100692	41517	59175	58.77%	2071	
TP	11597	11014	6498	4516	41.00%	2049	
TSS	2248361	2209237	1682470	526767	23.84%	2035	

Table D- 5. Chesapeake Bay TMDL Segment ANATF_MD							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
TN	33706	33676	10424	23252	69.05%	2092	
TP	3858	3675	1444	2231	60.70%	2078	
TSS	744473	743461	314421	429040	57.71%	2078	

Table D- 6. Fort Chaplin Tributary							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	13082	12981	1.3E-03	12981	99.99999%	2149	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly
Arsenic	0.81	0.80	0.38	0.42	52.69%	2081	
Copper	28	28	18	9.3	33.67%	2062	
Lead	8.4	8.3	7.7	0.64	7.73%	2034	
Zinc	64	63	135	0	-	2014	

Table D- 7. Fort Davis Tributary							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	6254	6194	8.2E-04	6194	99.99%	2148	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly
Arsenic	0.39	0.38	0.10	0.28	73.92%	2103	
Copper	13	13	4.7	8.4	64.06%	2092	
Lead	4.0	4.0	2.0	2.0	50.82%	2078	
Zinc	30	30	42	0	-	2014	

Table D- 8. Fort Dupont Tributary							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	5276	5265	2.3E-03	5265	99.99%	2151	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly.
Arsenic	0.33	0.33	0.17	0.16	47.81%	2073	
Lead	3.4	3.4	3.6	0	-	2014	

Table D- 9. Fort Stanton Tributary							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	3811	3791	0	3791	99.99%	2152	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly
Arsenic	0.24	0.23	0.05	0.18	78.69%	2114	
Chlordane	1.5E-03	1.5E-03	2.0E-04	1.3E-03	86.66%	2133	
Copper	8.1	8.1	2.5	5.6	69.21%	2093	
DDD	4.6E-04	4.6E-04	9.0E-05	3.7E-04	80.31%	2119	
DDE	2.0E-03	2.0E-03	1.0E-04	1.9E-03	95.06%	2145	
DDT	5.2E-03	5.2E-03	1.5E-04	5.1E-03	97.12%	2148	
Dieldrin	4.4E-05	4.4E-05	2.3E-05	2.1E-05	48.00%	2066	
Heptachlor Epoxide	1.5E-04	1.4E-04	2.0E-05	1.2E-04	86.03%	2130	
Lead	2.4	2.4	1.1	1.4	56.74%	2076	
PAH1	0.10	0.10	0.08	2.2E-02	22.34%	2039	
PAH2	0.64	0.63	9.0E-03	0.63	98.58%	2150	
PAH3	0.41	0.41	6.0E-03	0.40	98.53%	2149	
Zinc	19	18	91	0	-	2014	

Table D- 10. Hickey Run							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	99979	99697	0	99697	99.99%	2150	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly
Chlordane	3.9E-02	3.9E-02	1.4E-02	2.5E-02	63.96%	2073	
DDE	0.05	0.05	0.0	4.6E-02	87.05%	2132	
PAH1	2.6	2.6	3.9	0	-	2014	
PAH2	16.7	16.6	0.47	16.2	97.18%	2146	
PAH3	10.8	10.7	0.30	10.4	97.20%	2146	

Table D- 11. Kingman Lake							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Arsenic	2.2	2.2	4.0E-02	2.2	98.20%	2147	
Chlordane	1.4E-02	1.4E-02	1.8E-04	1.4E-02	98.74%	2148	
DDT	4.9E-02	4.9E-02	7.8E-03	4.1E-02	84.13%	2128	
Lead	23	23	4.9	18	78.65%	2093	
PAH1	0.95	0.95	0.12	0.83	87.33%	2133	
PAH2	6.0	6.0	7.1	0	-	2014	
PAH3	3.9	3.8	0.45	3.4	88.27%	2133	

Table D- 12. Lower Beaverdam Creek							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
TSS	959	943	1200	0	-	2014	
BOD	470	462	403	59	12.75%	2016	
TN	43	43	45	0	-	2014	
TP	5.0	4.8	6.0	0	-	2014	

Table D- 13. Nash Run							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Arsenic	2.1	2.1	0.9	1.2	58.87%	2079	
Chlordane	1.3E-02	1.3E-02	3.2E-03	1.0E-02	76.06%	2104	
Dieldrin	4.0E-04	3.9E-04	3.3E-04	6.6E-05	16.62%	2029	
Heptachlor Epoxide	1.3E-03	1.3E-03	3.1E-04	9.9E-04	76.19%	2104	
Lead	22	22	20	2.0	9.11%	2026	
PAH1	0.90	0.90	1.6	0	-	2014	
PAH2	5.7	5.7	0.19	5.5	96.60%	2145	
PAH3	3.7	3.6	0.12	3.5	96.62%	2145	

Table D- 14. Northwest Branch							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
TSS	585312	582673	52400	530273	91.01%	2137	
BOD	286790	285817	14421	271396	94.95%	2142	
TN	26500	26394	1955	24439	92.59%	2139	
TP	3033	2880	162	2718	94.38%	2134	

Table D- 15. Pope Branch							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	14984	14892	1.7E-03	14892	99.99%	2149	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly
Chlordane	5.9E-03	5.9E-03	1.7E-03	4.2E-03	71.13%	2098	
DDE	8.0E-03	8.0E-03	1.6E-03	6.4E-03	79.89%	2113	
Heptachlor Epoxide	5.8E-04	5.7E-04	1.9E-04	3.8E-04	66.67%	2092	
Lead	9.6	9.5	10.8	0	-	2014	
PAH1	0.40	0.39	0.80	0	-	2014	
PAH2	2.5	2.5	0.09	2.40	96.27%	2144	
PAH3	1.6	1.6	0.06	1.54	96.32%	2144	

Table D- 16. Texas Avenue Tributary							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	6684	6620	1.4E-03	6620	99.99%	2149	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly
Arsenic	0.41	0.41	0.40	9.9E-03	2.42%	2016	
Chlordane	2.6E-03	2.6E-03	1.3E-03	1.3E-03	50.40%	2072	
Copper	14	14	20	0	-	2014	
DDD	8.1E-04	8.0E-04	7.0E-03	0	-	2014	

Table D- 16. Texas Avenue Tributary							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
DDE	3.6E-03	3.5E-03	1.2E-03	2.3E-03	66.07%	2090	
DDT	9.2E-03	9.1E-03	4.0E-02	0	-	2014	
Dieldrin	7.8E-05	7.7E-05	1.7E-04	0	-	2014	
Heptachlor Epoxide	2.6E-04	2.5E-04	1.4E-04	1.1E-04	44.78%	2066	
Lead	4.3	4.2	8.3	0	-	2014	
PAH1	0.18	0.18	0.61	0	-	2014	
PAH2	1.1	1.1	7.1E-02	1.0	93.59%	2141	
PAH3	0.72	0.71	4.5E-02	0.67	93.69%	2141	
Zinc	32	32	138	0	-	2014	

Table D- 17. Watts Branch							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
TSS	333496	330338	48200	282138	85.41%	2129	
BOD	163405	162865	14252	148613	91.25%	2137	
TN	15099	15004	1731	13273	88.46%	2133	
TP	1728	1635	248	1387	84.83%	2111	

Table D- 18. Watts Branch - Lower							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Chlordane	1.1E-02	1.1E-02	3.7E-03	7.3E-03	66.50%	2076	
Dieldrin	3.3E-04	3.3E-04	3.7E-04	0	-	2014	
TSS	82517	82340	11200	71140	86.40%	2131	

Table D- 19. Watts Branch - Upper							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Chlordane	3.4E-02	3.3E-02	9.6E-03	2.4E-02	71.32%	2091	
Dieldrin	9.9E-04	9.9E-04	9.5E-04	4.4E-05	4.48%	2017	
TSS	250979	247998	29600	218398	88.06%	2122	

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Table D- 20. Potomac Lower							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
E. coli	383104	381680	265000	116680	30.57%	2046	

Table D- 21. Potomac Middle							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
E. coli	102822	102508	12400	90108	87.90%	2133	

Table D- 22. Potomac Upper							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
E. coli	268779	267273	235000	32273	12.08%	2037	

Table D- 23. Chesapeake Bay TMDL Segment POTTF_DC							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
TN	127818	127345	39427	87918	69.04%	2090	
TP	14709	13933	2975	10958	78.65%	2099	
TSS	2153124	1968592	3843848	0	-	2014	

Table D- 24. Chesapeake Bay TMDL Segment POTTF_MD							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
TN	15716	15700	15019	681	4.34%	2023	
TP	1811	1728	536	1192	68.98%	2092	
TSS	228866	228558	363762	0	-	2014	

Table D- 25. Battery Kemble Creek							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
E. coli	8410	8377	70	8306	99.16%	2148	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly.
Lead	5.4	5.4	3.6	1.7	32.21%	2059	

Table D- 26. C&O Canal							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
E. coli	43788	43434	96	43338	99.78%	2148	E. coli translation appears to be done incorrectly.

Table D- 27. Dalecarlia Tributary							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Dieldrin	1.1E-03	1.1E-03	4.0E-04	7.4E-04	65.07%	2092	
E. coli	98187	97675	401	97274	99.59%	2148	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly.
Heptachlor Epoxide	3.8E-03	3.8E-03	3.5E-04	3.4E-03	90.80%	2137	

Table D- 28. Foundry Branch							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Arsenic	0.69	0.68	0.17	0.52	75.51%	2097	
Copper	24	23	10	13	55.98%	2071	
E. Coli	11089	11048	69	10979	99.38%	2148	Original fecal coliform WLA appears to be calculated incorrectly. E. coli translation appears to be done incorrectly.
Lead	7.1	7.1	3.8	3.2	45.86%	2061	
Zinc	45	45	77	0	-	2014	

Table D- 29. Oxon Run							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Dieldrin	2.3E-03	2.3E-03	7.3E-04	1.6E-03	68.39%	2090	
E. coli	198920	197668	9520	188148	95.18%	2146	E. coli translation appears to be done incorrectly.
Lead	127	127	23	104	82.06%	2126	

Table D- 30. Tidal Basin							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	25703	25669	55300	0	-	2014	

Table D- 31. Washington Ship Channel							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
E. coli	65337	65070	183000	0	-	2014	
TP	997	971	977	0	-	2014	

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Table D- 32. Rock Creek Lower							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
Copper	226	225	142	83	36.75%	2060	
Lead	68	68	9	59	86.43%	2131	
Mercury	0.81	0.81	0.05	0.76	93.44%	2140	
Zinc	435	432	334	99	22.85%	2047	
E. coli	106419	105811	10100	95711	90.45%	2136	

Table D- 33. Rock Creek Upper							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
Copper	657	654	148	506	77.39%	2105	
Lead	198	197	10	187	95.15%	2143	
Mercury	2.4	2.3	0.05	2.3	97.74%	2146	
Zinc	1263	1257	347	911	72.42%	2100	
E. coli	309154	307668	28700	278968	90.67%	2137	

Table D- 34. Broad Branch							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
Chlordane	3.6E-02	3.6E-02	2.8E-03	3.3E-02	92.23%	2139	
DDD	1.1E-02	1.1E-02	1.4E-03	9.7E-03	87.51%	2132	
DDE	4.9E-02	4.9E-02	2.4E-03	4.7E-02	95.05%	2142	
DDT	0.13	0.13	2.5E-03	0.12	98.05%	2146	
Dieldrin	1.1E-03	1.1E-03	3.4E-04	7.3E-04	68.29%	2097	
Heptachlor Epoxide	3.5E-03	3.5E-03	2.8E-04	3.2E-03	91.93%	2138	
PAH1	2.4	2.4	1.3	1.1	46.86%	2075	
PAH2	15.4	15.3	0.15	15.2	99.01%	2148	
PAH3	9.9	9.9	0.1	9.8	99.02%	2148	

Table D- 35. Dumbarton Oaks							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Chlordane	6.9E-04	6.9E-04	6.2E-05	6.3E-04	91.04%	2153	
Dieldrin	2.0E-05	2.0E-05	5.7E-06	1.5E-05	72.38%	2115	
Heptachlor Epoxide	6.8E-05	6.8E-05	5.5E-06	6.2E-05	91.91%	2154	

Table D- 36. Fenwick Branch							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
DDT	2.1E-02	2.1E-02	4.5E-04	2.1E-02	97.88%	2144	
Dieldrin	1.8E-04	1.8E-04	6.8E-05	1.1E-04	62.23%	2089	
Heptachlor Epoxide	6.0E-04	5.9E-04	5.4E-05	5.4E-04	90.96%	2135	

Table D- 37. Klingle Valley Run							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Dieldrin	1.5E-04	1.5E-04	1.3E-04	2.2E-05	14.32%	2041	
Heptachlor Epoxide	5.0E-04	5.0E-04	1.2E-04	3.8E-04	75.42%	2102	

Table D- 38. Luzon Branch							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
Chlordane	2.8E-02	2.8E-02	4.8E-04	2.7E-02	98.26%	2147	
Dieldrin	8.2E-04	8.1E-04	4.7E-05	7.7E-04	94.27%	2142	
Heptachlor Epoxide	2.7E-03	2.7E-03	4.3E-05	2.6E-03	98.37%	2147	

Table D- 39. Melvin Hazen Valley Branch							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
Dieldrin	1.2E-04	1.2E-04	5.2E-05	7.1E-05	57.90%	2080	

Table D- 40. Normanstone Creek							
Pollutant	Baseline Load (lbs/yr; E. coli in billion MPN/yr)	Current Load (lbs/yr; E. coli in billion MPN/yr)	WLA (lbs/yr; E. coli in billion MPN/yr)	Gap (lbs/yr; E. coli in billion MPN/yr)	Percent Reduction Required	Projected WLA Attainment Date	Notes
Chlordane	6.8E-03	6.8E-03	7.8E-04	6.0E-03	88.54%	2133	
DDD	2.1E-03	2.1E-03	3.3E-04	1.7E-03	83.87%	2124	
DDE	9.2E-03	9.1E-03	6.5E-04	8.5E-03	92.94%	2139	
DDT	2.4E-02	2.4E-02	6.5E-04	2.3E-02	97.24%	2144	
Dieldrin	2.0E-04	2.0E-04	8.0E-05	1.2E-04	60.00%	2086	
Heptachlor Epoxide	6.6E-04	6.6E-04	7.3E-05	5.9E-04	89.02%	2134	
PAH1	0.46	0.45	0.35	0.10	22.06%	2048	
PAH2	2.9	2.9	4.2E-02	2.82	98.52%	2146	
PAH3	1.9	1.8	2.7E-02	1.82	98.53%	2146	

Table D- 41. Pinehurst Branch							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Dieldrin	2.8E-04	2.8E-04	1.0E-04	1.8E-04	64.35%	2094	
Heptachlor Epoxide	9.2E-04	9.2E-04	7.6E-05	8.5E-04	91.79%	2138	

Table D- 42. Piney Branch							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Chlordane	1.7E-03	1.7E-03	5.4E-05	1.6E-03	96.80%	2143	
Dieldrin	5.0E-05	5.0E-05	8.2E-06	4.2E-05	83.63%	2119	
Heptachlor Epoxide	1.6E-04	1.6E-04	8.3E-06	1.6E-04	94.92%	2141	
Lead	2.7	2.7	0.2	2.57	93.81%	2139	

Table D- 43. Portal Branch							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	Notes
Dieldrin	6.9E-05	6.8E-05	2.5E-05	4.3E-05	62.89%	2092	
Heptachlor Epoxide	2.3E-04	2.3E-04	2.0E-05	2.1E-04	91.15%	2139	

Table D- 44. Soapstone Creek							
Pollutant	**Baseline Load (lbs/yr; E. coli in billion MPN/yr)**	**Current Load (lbs/yr; E. coli in billion MPN/yr)**	**WLA (lbs/yr; E. coli in billion MPN/yr)**	**Gap (lbs/yr; E. coli in billion MPN/yr)**	**Percent Reduction Required**	**Projected WLA Attainment Date**	**Notes**
Chlordane	1.9E-02	1.9E-02	2.0E-03	1.7E-02	89.54%	2136	
Dieldrin	5.6E-04	5.5E-04	1.7E-04	3.8E-04	69.29%	2095	
Heptachlor Epoxide	1.8E-03	1.8E-03	1.7E-04	1.7E-03	90.76%	2137	

Notes

The tables in this appendix are populated by the 206 annual WLAs which were evaluated in the IPMT. Specific allocations may have been excluded from the modeling process for one of the following reasons:

- WLAs are not annual
- WLA was calculated with MD components – Nash Run and Watts Branch E. coli
- WLA value was reported with errors – Lower Anacostia and Upper Anacostia Copper
- Receiving waterbody is no longer impaired – Fort Davis BOD; multiple WLAs from 2014 303(d) list
- WLA to be met through management plan – Hickey Run for Chlordane, Oil and Grease, and PCBs; all PCB TMDLs
- TMDL not required – Kingman Lake TSS and BOD

Appendix E

Milestones

DEPARTMENT OF ENERGY & ENVIRONMENT

Consolidated TMDL Implementation Plan – Revised Draft

August 2016

Cumulative Area Managed (acres)					
Basin	**2020**	**2025**	**2030**	**2035**	**2040**
Anacostia	552	1104	1655	2207	2759
Potomac	335	670	1005	1340	1675
Rock Creek	151	302	454	605	756
Total	**1,038**	**2,076**	**3,114**	**4,152**	**5,190**

Anacostia (Cumulative Load Reduction Milestones)																							
Pollutant	2045	2050	2055	2060	2065	2070	2075	2080	2085	2090	2095	2100	2105	2110	2115	2120	2125	2130	2135	2140	2145	2150	2154
TN (lbs)	38897	44512	50128	55744	61360	66976	72592	78207	82713	85659	88605	91551	94498	96470	97794	99117	100441	103199	106459	107118	107118	107118	107118
TP (lbs)	4452	5095	5738	6380	7023	7666	8309	8901	9398	9735	10072	10410	10747	10973	11124	11276	11427	11745	11829	11829	11829	11829	11829
TSS (lbs)	859108	983146	1107185	1231224	1355263	1479301	1603340	1727379	1835667	1900739	1965812	2030885	2095957	2139528	2168763	2197998	2227233	2288147	2370181	2420302	2420302	2420302	2420302
E. coli (Billion MPN)	285113	327202	369291	411380	453469	495558	537647	579736	618143	641820	665498	675097	678901	681626	683632	685639	687645	691741	697229	702718	708206	712713	712751
BOD (lbs)	410074	470850	531626	592402	646678	697460	748242	799024	846026	877910	909794	941678	973562	994911	1009235	1023560	1036326	1048630	1065174	1078017	1081512	1081512	1081512
Trash (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic (lbs)	18	20	23	25	28	30	33	35	37	38	40	41	42	43	44	44	45	46	48	50	51	51	51
Copper (lbs)	9.4	12	14	16	18	19	20	21	22	23	23	23	23	23	23	23	23	23	23	23	23	23	23
Lead (lbs)	97	99	101	103	105	107	109	111	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112
Mercury (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc (lbs)	1065	1236	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279	1279
Chlordane (lbs)	0.11	0.13	0.15	0.16	0.18	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.30	0.31	0.32	0.33	0.34	0.34	0.34
DDD (lbs)	0.0	3.9E-02	4.4E-02	4.9E-02	5.3E-02	5.7E-02	6.1E-02	6.6E-02	7.0E-02	7.2E-02	7.5E-02	7.8E-02	8.0E-02	8.2E-02	8.3E-02	8.4E-02	8.6E-02	8.8E-02	9.1E-02	9.5E-02	9.5E-02	9.5E-02	9.5E-02
DDE (lbs)	0.15	0.17	0.20	0.22	0.24	0.26	0.29	0.31	0.33	0.34	0.35	0.36	0.37	0.38	0.39	0.39	0.40	0.41	0.42	0.44	0.45	0.45	0.45
DDT (lbs)	0.39	0.45	0.51	0.56	0.62	0.68	0.74	0.79	0.83	0.86	0.90	0.93	0.96	0.98	0.99	1.00	1.02	1.05	1.08	1.12	1.15	1.15	1.15
Dieldrin (lbs)	6.6E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04	6.7E-04
Heptachlor Epoxide (lbs)	1.1E-02	1.3E-02	1.4E-02	1.6E-02	1.7E-02	1.9E-02	2.1E-02	2.2E-02	2.3E-02	2.4E-02	2.5E-02	2.6E-02	2.7E-02	2.7E-02	2.8E-02	2.8E-02	2.8E-02	2.9E-02	2.9E-02	2.9E-02	2.9E-02	2.9E-02	2.9E-02
PAH1 (lbs)	7.5	8.6	9.7	10.9	12.0	13.1	14.2	15.3	16.3	17.0	17.6	18.2	18.9	19.3	19.6	19.9	20.2	20.8	21.7	22.6	23.5	23.8	23.8
PAH2 (lbs)	47.5	55	62	69	76	83	90	97	103	107	111	115	119	122	124	126	127	132	137	143	148	150	150
PAH3 (lbs)	30.6	35.1	40	44	49	53	58	62	67	69	72	74	77	79	80	81	82	85	88	92	95	96	96

Potomac (Cumulative Load Reduction Milestones)																							
Pollutant	2045	2050	2055	2060	2065	2070	2075	2080	2085	2090	2095	2100	2105	2110	2115	2120	2125	2130	2135	2140	2145	2150	2154
TN (lbs)	21244	25574	29905	34236	38567	42897	46930	50771	54274	56420	56431	56431	56431	56431	56431	56431	56431	56431	56431	56431	56431	56431	56431
TP (lbs)	2274	2805	3337	3868	4399	4931	5462	5993	6483	6804	7082	7281	7281	7281	7281	7281	7281	7281	7281	7281	7281	7281	7281
TSS (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
E. coli (Billion MPN)	176573	193901	211229	228557	245885	263213	280541	297869	314063	325723	337382	349042	360701	368254	373069	377885	382700	392455	405505	418554	431603	435151	435151
BOD (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trash (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic (lbs)	0.18	0.22	0.26	0.30	0.34	0.37	0.41	0.45	0.48	0.50	0.51	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52	0.52
Copper (lbs)	6.3	7.6	8.9	10.2	11.6	12.9	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1	13.1
Lead (lbs)	41.7	47.9	54.2	60.4	66.1	71.7	77.2	82.8	87.9	91.1	94.3	97.5	100.7	103.0	104.7	106.4	108.1	108.8	108.8	108.8	108.8	108.8	108.8
Mercury (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Zinc (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chlordane (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DDD (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DDE (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DDT (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dieldrin (lbs)	9.0E-04	1.1E-03	1.2E-03	1.4E-03	1.5E-03	1.7E-03	1.9E-03	2.0E-03	2.2E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03	2.3E-03
Heptachlor Epoxide (lbs)	6.3E-04	8.3E-04	1.0E-03	1.2E-03	1.4E-03	1.6E-03	1.8E-03	2.0E-03	2.2E-03	2.4E-03	2.5E-03	2.7E-03	2.9E-03	3.0E-03	3.0E-03	3.1E-03	3.1E-03	3.2E-03	3.4E-03	3.4E-03	3.4E-03	3.4E-03	3.4E-03
PAH1 (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PAH2 (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
PAH3 (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Rock Creek (Cumulative Load Reduction Milestones)																							
Pollutant	2045	2050	2055	2060	2065	2070	2075	2080	2085	2090	2095	2100	2105	2110	2115	2120	2125	2130	2135	2140	2145	2150	2154
TN (lbs)	13180	16178	19176	22173	25171	28168	31166	34164	36897	38571	38580	38580	38580	38580	38580	38580	38580	38580	38580	38580	38580	38580	38580
TP (lbs)	1509	1852	2195	2538	2881	3224	3567	3910	4223	4415	4606	4762	4762	4762	4762	4762	4762	4762	4762	4762	4762	4762	4762
TSS (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
E. coli (Billion MPN)	85408	105785	126161	146538	166915	187292	207669	228046	247865	265451	283038	300624	318211	328584	334149	339713	345278	356649	371890	374679	374679	374679	374679
BOD (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Trash (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Arsenic (lbs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Copper (lbs)	181	225	268	311	343	375	406	438	469	497	526	555	584	588	588	588	588	588	588	588	588	588	588
Lead (lbs)	55	68	81	94	107	120	133	146	159	170	181	193	204	210	214	218	221	228	236	243	246	246	246
Mercury (lbs)	0.65	0.81	0.96	1.12	1.27	1.43	1.6	1.7	1.9	2.0	2.2	2.3	2.4	2.5	2.6	2.6	2.6	2.7	2.8	3.0	3.0	3.1	3.1
Zinc (lbs)	346	416	476	536	596	656	716	776	835	890	945	1000	1001	1001	1001	1001	1001	1001	1001	1001	1001	1001	1001
Chlordane (lbs)	2.2E-02	2.6E-02	3.0E-02	3.4E-02	3.9E-02	4.3E-02	4.7E-02	5.2E-02	5.6E-02	5.9E-02	6.3E-02	6.7E-02	7.0E-02	7.3E-02	7.4E-02	7.5E-02	7.6E-02	7.9E-02	8.2E-02	8.4E-02	8.5E-02	8.6E-02	8.6E-02
DDD (lbs)	2.1E-03	2.7E-03	3.4E-03	4.1E-03	4.8E-03	5.4E-03	6.1E-03	6.8E-03	7.5E-03	8.1E-03	8.7E-03	9.4E-03	1.0E-02	1.0E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02	1.1E-02
DDE (lbs)	9.1E-03	1.2E-02	1.5E-02	1.8E-02	2.1E-02	2.4E-02	2.7E-02	3.0E-02	3.3E-02	3.6E-02	3.9E-02	4.2E-02	4.4E-02	4.6E-02	4.7E-02	4.8E-02	4.9E-02	5.0E-02	5.2E-02	5.4E-02	5.5E-02	5.5E-02	5.5E-02
DDT (lbs)	2.7E-02	3.6E-02	4.5E-02	5.4E-02	6.2E-02	7.1E-02	8.0E-02	8.9E-02	9.7E-02	1.1E-01	1.1E-01	1.2E-01	1.3E-01	1.4E-01	1.4E-01	1.4E-01	1.4E-01	1.5E-01	1.5E-01	1.6E-01	1.7E-01	1.7E-01	1.7E-01
Dieldrin (lbs)	7.6E-04	9.2E-04	1.1E-03	1.2E-03	1.4E-03	1.6E-03	1.7E-03	1.9E-03	2.0E-03	2.2E-03	2.3E-03	2.3E-03	2.3E-03	2.4E-03	2.4E-03	2.4E-03	2.4E-03	2.4E-03	2.4E-03	2.5E-03	2.5E-03	2.5E-03	2.5E-03
Heptachlor Epoxide (lbs)	2.5E-03	3.0E-03	3.5E-03	4.1E-03	4.6E-03	5.1E-03	5.6E-03	6.2E-03	6.7E-03	7.2E-03	7.6E-03	8.1E-03	8.6E-03	8.8E-03	9.0E-03	9.1E-03	9.3E-03	9.6E-03	9.9E-03	1.0E-02	1.0E-02	1.0E-02	1.0E-02
PAH1 (lbs)	0.45	0.60	0.72	0.85	0.97	1.10	1.22	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
PAH2 (lbs)	2.86	3.8	4.7	5.7	6.6	7.5	8.5	9.4	10.3	11.2	12.1	13.0	13.9	14.4	14.7	14.9	15.2	15.7	16.4	17.0	17.7	18.0	18.0
PAH3 (lbs)	1.84	2.4	3.1	3.7	4.3	4.9	5.5	6.1	6.7	7.2	7.8	8.4	9.0	9.3	9.5	9.6	9.8	10.1	10.6	11.0	11.4	11.6	11.6

Appendix F

Annual Benchmarks

DEPARTMENT OF ENERGY & ENVIRONMENT

Consolidated TMDL Implementation Plan – Revised Draft
August 2016

List of Tables

Table F- 1. Annual Benchmarks for Anacostia Mainstem	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	8134
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 2. Annual Benchmarks for Anacostia Lower Mainstem	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	232
TP	27
TSS	5020
E. coli	No allocation
BOD	2706
Trash	No benchmark established
Arsenic	0.11
Copper	Benchmark not established because original TMDL allocation is incorrect
Lead	Projected as met in 2014
Mercury	No Allocation
Zinc	Projected as met in 2014
Chlordane	4.6E-04

Table F- 2. Annual Benchmarks for Anacostia Lower Mainstem	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDD	2.3E-04
DDE	9.3E-04
DDT	2.4E-03
Dieldrin	Projected as met in 2014
Heptachlor Epoxide	6.8E-05
PAH1	3.1E-02
PAH2	0.19
PAH3	0.13
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	Projected as met in 2014

Table F- 3. Annual Benchmarks for Anacostia Upper Mainstem	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	745
TP	86
TSS	16414
E. coli	No Allocation
BOD	8265
Trash	No benchmark established
Arsenic	0.35
Copper	Benchmark not established because original TMDL allocation is incorrect
Lead	4.3
Mercury	No Allocation
Zinc	35
Chlordane	2.2E-03
DDD	6.8E-04
DDE	3.0E-03
DDT	7.7E-03
Dieldrin	1.2E-04
Heptachlor Epoxide	2.1E-04
PAH1	0.15
PAH2	0.93
PAH3	0.60
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	Projected as met in 2014

Table F- 4. Annual Benchmarks for ANATF_DC Chesapeake Bay TMDL Segment	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	1038
TP	129
TSS	25084
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 5. Annual Benchmarks for ANATF_MD Chesapeake Bay TMDL Segment	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	298
TP	35
TSS	6704
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation

Table F- 5. Annual Benchmarks for ANATF_MD Chesapeake Bay TMDL Segment	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 6. Annual Benchmarks for Fort Chaplin Tributary	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	96
BOD	No Allocation
Trash	No Allocation
Arsenic	6.3E-03
Copper	0.19
Lead	3.2E-02
Mercury	No Allocation
Zinc	Projected as met in 2014
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 7. Annual Benchmarks for Fort Davis Tributary	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	46
BOD	No Allocation
Trash	No Allocation
Arsenic	3.2E-03
Copper	0.11
Lead	3.1E-02
Mercury	No Allocation
Zinc	Projected as met in 2014
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 8. Annual Benchmarks for Fort Dupont Tributary	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	38
BOD	No Allocation
Trash	No Allocation
Arsenic	2.6E-03
Copper	No Allocation
Lead	Projected as met in 2014
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 9. Annual Benchmarks for Fort Stanton Tributary	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	27
BOD	No Allocation
Trash	No Allocation
Arsenic	1.8E-03
Copper	7.1E-02
Lead	2.2E-02
Mercury	No Allocation
Zinc	Projected as met in 2014
Chlordane	1.1E-05
DDD	3.5E-06

Table F- 9. Annual Benchmarks for Fort Stanton Tributary	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDE	1.5E-05
DDT	3.8E-05
Dieldrin	4.1E-07
Heptachlor Epoxide	1.1E-06
PAH1	9.0E-04
PAH2	4.6E-03
PAH3	3.0E-03
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 10. Annual Benchmarks for Hickey Run	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	733
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	4.3E-04
DDD	No Allocation
DDE	3.9E-04
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	Projected as met in 2014
PAH2	0.12
PAH3	7.9E-02
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No annual benchmark established because TMDL implementation is through management plan

Table F- 11. Annual Benchmarks for Kingman Lake	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation*
BOD	No Allocation
Trash	No Allocation
Arsenic	1.6E-02
Copper	No Allocation
Lead	0.23
Mercury	No Allocation
Zinc	No Allocation
Chlordane	1.0E-04
DDD	No Allocation
DDE	No Allocation
DDT	3.6E-04
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	7.0E-03
PAH2	Projected as met in 2014
PAH3	2.8E-02
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	Projected as met in 2014
*Kingman Lake was assigned a monthly WLA for E. coli, but no annual WLA for E. coli, so no annual benchmark was calculated.	

Table F- 12. Annual Benchmarks for Lower Beaverdam Creek	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	Projected as met in 2014
TP	Projected as met in 2014
TSS	Projected as met in 2014
E. coli	No Allocation
BOD	29
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation

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Table F- 12. Annual Benchmarks for Lower Beaverdam Creek	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 13. Annual Benchmarks for Nash Run	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No benchmark established because allocation includes loads from Maryland
BOD	No Allocation
Trash	No Allocation
Arsenic	1.9E-02
Copper	No Allocation
Lead	0.16
Mercury	No Allocation
Zinc	No Allocation
Chlordane	1.1E-04
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	4.4E-06
Heptachlor Epoxide	1.1E-05
PAH1	Projected as met in 2014
PAH2	4.2E-02
PAH3	2.7E-02
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 14. Annual Benchmarks for Northwest Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	196
TP	23
TSS	4311
E. coli	No Allocation
BOD	2120
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 15. Annual Benchmarks for Pope Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	110
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	Projected as met in 2014
Mercury	No Allocation
Zinc	No Allocation
Chlordane	5.0E-05
DDD	No Allocation

Table F- 15. Annual Benchmarks for Pope Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDE	6.4E-05
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	4.9E-06
PAH1	Projected as met in 2014
PAH2	1.8E-02
PAH3	1.2E-02
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 16. Annual Benchmarks for Texas Avenue Tributary	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	49
BOD	No Allocation
Trash	No Allocation
Arsenic	5.0E-03
Copper	Projected as met in 2014
Lead	Projected as met in 2014
Mercury	No Allocation
Zinc	Projected as met in 2014
Chlordane	2.3E-05
DDD	Projected as met in 2014
DDE	3.1E-05
DDT	Projected as met in 2014
Dieldrin	Projected as met in 2014
Heptachlor Epoxide	2.2E-06
PAH1	Projected as met in 2014
PAH2	8.2E-03
PAH3	5.3E-03
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 17. Annual Benchmarks for Watts Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	112
TP	14
TSS	2453
E. coli	No benchmark established because allocation includes loads from Maryland
BOD	1208
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 18. Annual Benchmarks for Watts Branch - Lower	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	608
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation

Table F- 18. Annual Benchmarks for Watts Branch - Lower	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
Chlordane	1.2E-04
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	Projected as met in 2014
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 19. Annual Benchmarks for Watts Branch - Upper	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	2022
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	3.1E-04
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	1.5E-05
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

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Table F- 20. Annual Benchmarks for Potomac Lower Mainstem	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	3646
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 21. Annual Benchmarks for Potomac Middle Mainstem	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	757
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation

Table F- 21. Annual Benchmarks for Potomac Middle Mainstem	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 22. Annual Benchmarks for Potomac Upper Mainstem	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	1403
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 23. Annual Benchmarks for POTTF_DC Chesapeake Bay TMDL Segment	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	1157
TP	129
TSS	Projected as met in 2014
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 24. Annual Benchmarks for POTTF_MD Chesapeake Bay TMDL Segment	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	76
TP	15
TSS	Projected as met in 2014
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation

Table F- 24. Annual Benchmarks for POTTF_MD Chesapeake Bay TMDL Segment	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 25. Annual Benchmarks for Battery Kemble Creek	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	62
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	3.8E-02
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 26. Annual Benchmarks for C&O Canal	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	323
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 27. Annual Benchmarks for Dalecarlia Tributary	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	726
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation

Table F- 27. Annual Benchmarks for Dalecarlia Tributary	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	9.5E-06
Heptachlor Epoxide	2.8E-05
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 28. Annual Benchmarks for Foundry Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	82
BOD	No Allocation
Trash	No Allocation
Arsenic	6.2E-03
Copper	0.23
Lead	6.9E-02
Mercury	No Allocation
Zinc	Projected as met in 2014
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 29. Annual Benchmarks for Oxon Run	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	1425
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	0.93
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	2.1E-05
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 30. Annual Benchmarks for Tidal Basin	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	Projected as met in 2014
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation

Table F- 30. Annual Benchmarks for Tidal Basin	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 31. Annual Benchmarks for Washington Ship Channel	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	Projected as met in 2014
TSS	No Allocation
E. coli	Projected as met in 2014
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

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Table F- 32. Annual Benchmarks for Rock Creek Lower	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	785
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	1.80
Lead	0.50
Mercury	6.0E-03
Zinc	3.0
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 33. Annual Benchmarks for Rock Creek Upper	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	2268
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	5.56
Lead	1.5
Mercury	1.7E-02
Zinc	10.6
Chlordane	No Allocation
DDD	No Allocation

Table F- 33. Annual Benchmarks for Rock Creek Upper	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDE	No Allocation
DDT	No Allocation
Dieldrin	No Allocation
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No Allocation
Oil and Grease	No Allocation

Table F- 34. Annual Benchmarks for Broad Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	2.7E-04
DDD	8.2E-05
DDE	3.6E-04
DDT	9.3E-04
Dieldrin	8.8E-06
Heptachlor Epoxide	2.6E-05
PAH1	1.9E-02
PAH2	0.11
PAH3	7.3E-02
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 35. Annual Benchmarks for Dumbarton Oaks	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	4.6E-06
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	1.5E-07
Heptachlor Epoxide	4.4E-07
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 36. Annual Benchmarks for Fenwick Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation

Table F- 36. Annual Benchmarks for Fenwick Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDD	No Allocation
DDE	No Allocation
DDT	1.6E-04
Dieldrin	1.5E-06
Heptachlor Epoxide	4.5E-06
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 37. Annual Benchmarks for Klingle Valley Run	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	8.0E-07
Heptachlor Epoxide	4.3E-06
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 38. Annual Benchmarks for Luzon Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	2.0E-04
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	6.0E-06
Heptachlor Epoxide	2.0E-05
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 39. Annual Benchmarks for Melvin Hazen Valley Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation

Table F- 39. Annual Benchmarks for Melvin Hazen Valley Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	1.1E-06
Heptachlor Epoxide	No Allocation
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 40. Annual Benchmarks for Normanstone Creek	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	5.0E-05
DDD	1.6E-05
DDE	6.8E-05
DDT	1.8E-04
Dieldrin	1.7E-06
Heptachlor Epoxide	4.9E-06
PAH1	2.9E-03
PAH2	2.1E-02
PAH3	1.4E-02
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 41. Annual Benchmarks for Pinehurst Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	2.2E-06
Heptachlor Epoxide	6.8E-06
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 42. Annual Benchmarks for Piney Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	2.1E-02
Mercury	No Allocation

Table F- 42. Annual Benchmarks for Piney Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
Zinc	No Allocation
Chlordane	1.3E-05
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	4.0E-07
Heptachlor Epoxide	1.2E-06
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 43. Annual Benchmarks for Portal Branch	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	No Allocation
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	5.5E-07
Heptachlor Epoxide	1.6E-06
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Table F- 44. Annual Benchmarks for Soapstone Creek	
Pollutant	**Annual Benchmark (lbs/yr; billion MPN/yr reduced for E. coli)**
TN	No Allocation
TP	No Allocation
TSS	No Allocation
E. coli	No Allocation
BOD	No Allocation
Trash	No Allocation
Arsenic	No Allocation
Copper	No Allocation
Lead	No Allocation
Mercury	No Allocation
Zinc	No Allocation
Chlordane	1.4E-04
DDD	No Allocation
DDE	No Allocation
DDT	No Allocation
Dieldrin	4.7E-06
Heptachlor Epoxide	1.4E-05
PAH1	No Allocation
PAH2	No Allocation
PAH3	No Allocation
PCBs	No annual benchmarks are established for PCBs
Oil and Grease	No Allocation

Appendix G

Potential Source Database

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Potential Source Database

A database of potential pollutant sources of toxics and metals in the District was developed in order to help identify potential source locations of these types of pollutants in the various TMDL watersheds.

The first step in developing the potential source database was to collect information on business types, NPDES-permittees, known hazardous waste handling/storage locations, RCRA/CERCLA sites, pesticide applicators, and other potential pollutant sources within the District. Specific sources of potential pollutant sources included:

- BusinessPt GIS shapefile – This is a general file on businesses in the District that includes approximately 59,000 records. Records include name of business, address, and the Standard Industrial Classification (SIC) code for that business. The SIC code classifies businesses by type, and SIC codes can be linked to typical pollutant types through various EPA studies (see below). In many instances, SIC codes are being replaced by North American Industry Classification System (NAICS) codes, but the BusinessPt data still uses the SIC code system.

- Pretreatment database from DC Water – DC Water is required to implement a pretreatment program to identify and control potential hazardous or impairing discharges to the Blue Plains WWTP, thereby helping to avoid treatment upsets and pass-through discharges of pollutants. Pretreatment permits are issued to dischargers identified as requiring them, which primarily consist of industrial facilities and other users who generate, handle or dispose of specific pollutants. The pretreatment program imposes discharge limits on arsenic, copper, lead, mercury, zinc, PCBs, PAHs, and pesticides, all of which are TMDL pollutants in the District. The pretreatment database includes the name and address of the discharger, as well as a SIC code that identifies the discharger type and allows identification of potential pollutants being discharged from that discharger.

- List of hazardous waste generators in the District – DDOE's Toxic Substances Division provided information on known hazardous waste generators in the District. Information included name of business, location, and a code indicating the amount of waste generated (consisting of either large quantity generator [LQG], small quantity generator [SQG] or conditionally-exempt small quantity generators [CEG]).

- NPDES permittees – a list of NPDES permittees in the District was obtained from EPA's website at http://www.epa.gov/reg3wapd/npdes/dcpermits.htm. These permits are for different types of discharges depending on the permittee, and include wastewater (e.g., Blue Plains WWTP,), stormwater (e.g., Potomac Electric Power Company Benning Generating Station, National World War II Memorial), cooling water (GenOn [formerly Mirant] Potomac River Generating Station), and other types of discharges. However, the permits are a good source of information on potential sources of pollutants at these locations that could potentially be discharged to the MS4.

- List of pesticide applicators - DDOE's Toxic Substances Division provided information on known hazardous waste generators in the District. Information included the name of business and the address.

These data were combined into one comprehensive database of potential industrial and commercial pollutant sources. In many cases, records were duplicated between the different data sources (for example, records in the pretreatment database should also have an equivalent record in the BusinessPt data); however, this was not always the case, most likely due to factors such as the fact that the various data sources may not be all up to date, and that changes or differences in business names may prevent a comprehensive match between datasets. Duplicate records were removed where possible.

Data common to all sources were compiled, and include the name, address, and SIC code of the pollutant source. Also, the data source (or sources) of each record (i.e., what dataset contained the original information on the potential source) were tracked; however, as stated above, some records occurred in multiple datasets, and so sometimes multiple sources were tracked. The only additional information tracked was information on hazardous waste code, which was tracked for the locations on the list of hazardous waste generators.

In order to link these potential pollutant sources to specific potential pollutant types, a second dataset linking potential pollutants to SIC codes was created. Data sources for potential pollutants by SIC code are:

- Typical Pollutant Concentration (TPC) tables included in the "Improving Point Source Loadings Data for Reporting National Water Quality Indicators" (prepared by Tetra Tech for EPA Office of Wastewater Management, September 1999) document. These tables were intended as an update to the TPC tables contained in a 1993 National Oceanic and Atmospheric Administration (NOAA) document. The updates were intended to inform effluent data statistics to allow users of the Permit Compliance System (PCS) to calculate more accurate point source loadings where point source monitoring data were not available. This document contains information on various types of dischargers and the typical concentrations of pollutants that they discharge.
- National Pretreatment Report to Congress (U.S. EPA, July 1991). Table 5-2 includes a summary of industrial categories with pretreatment standards, and an indication as to whether that industrial category has a standard for an individual pollutant.

These sources of pollutants were compiled in a table that identifies industry type and potential pollutants associated with that industry based on the source tables. In order to be able to relate the industry types in this table to the industries in the potential pollutant sources table described above, SIC codes were assigned to the industry/discharger descriptions included in the tables. The industrial categories from the pretreatment document were linked by reviewing the 40 CFR 403.6: National Categorical Standard – Industrial Categories, while the TPC data was linked by using Best Professional Judgment to link discharger descriptions in the tables to SIC codes. Together, these data sources were used to indicate whether a specific type of industry had the potential to discharge specific pollutant types. The reasoning behind this was that if an industry type either has a TPC or a pretreatment standard for a given pollutant, then it is feasible that that pollutant could be discharged from that industry type. This is not to conclude that any individual facility actually does discharge that specific type of pollutant, or that the discharge would consist of stormwater contaminated with that pollutant. Rather, the goal is to associate industry types with specific pollutant types, and identifying those industries as being potential sources for those pollutants.

The potential pollutant source tables were then connected to the potential pollutant type tables using queries based on linking SIC codes. These queries enable the identification of specific locations/facilities that have specific potential pollutants associated with them. The combined database was then displayed in a GIS using the address field so that potential pollutant sources could be spatially superimposed over the MS4 delineation watershed. This spatial overlay is a powerful tool to identify potential sources of industrial and commercial pollutants in TMDL segments that have WLAs for those pollutants. The identification of the potential sources can be used to further inspect the potential sources for actual pollutant releases, which in turn can help target pollution prevention strategies, source control, and/or BMP strategies to reduce pollutants and help meet WLAs.

Appendix H

Review of Existing Watershed Plans

Consolidated TMDL Implementation Plan – Revised Draft

August 2016

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Review of Existing Watershed Plans

This Appendix summarizes information in existing watershed plans that have been completed for District waterbodies, including:

- Anacostia Watershed Total Maximum Daily Load Waste Load Allocation Implementation Plan (DC Stormwater Administration, 2005);
- Anacostia River Watershed Restoration Plan and Report (multiple authors, 2010);
- Anacostia River Watershed Implementation Plan (DDOE, 2012);
- Rock Creek Watershed Total Maximum Daily Load Waste Load Allocation Implementation Plan (DC Stormwater Administration, 2005);
- Rock Creek Watershed Implementation Plan (DDOE, 2010);
- Oxon Run Watershed Implementation Plan (DDOE, 2010);

Anacostia Watershed Total Maximum Daily Load Waste Load Allocation Implementation Plan (DC Storm Water Administration, 2005)

The Anacostia Watershed TMDL WLA IP (the 2005 Anacostia TMDL IP) was developed to fulfill an NPDES requirement to submit an implementation plan for compliance with the TMDLs for pollutants from the Anacostia watershed within the District. This document covered the following TMDLs: BOD, TN and TP in the mainstem Anacostia (2001); TSS in the mainstem Anacostia (2002); metals and organics in the mainstem Anacostia and the tributaries (2003); fecal coliform bacteria in the mainstem Anacostia (2003); oil and grease in the mainstem Anacostia (2003); fecal coliform bacteria in Kingman Lake (2003); and metals and organics in Kingman Lake (2003). The document summarizes each of the individual pollutants included in the various TMDLs and describes a general reduction strategy for that pollutant. These reduction strategies include source controls, public outreach, standard structural devices, street and catch basin cleaning, and inspection and enforcement. The document then summarizes the ongoing management activities under the storm water management program that will be used to control pollutants, including a management plan to detect and remove illicit discharges, an enforcement plan, and public education, among other programmatic elements.

While the document includes runoff and pollutant loading calculations, it does not quantitative comparisons to numeric WLAs. Instead, the document makes a qualitative evaluation of implementing the TMDLs. To determine a specific plan for reducing pollutant loads, multiple potential stormwater management devices or techniques were identified, screened and ranked using a present worth annual cost per pound of pollutant removed. The most cost-effective devices and techniques for each pollutant of concern were identified for use in implementing pollutant load reductions. Based on this screening, the proposed implementation plan included:

- Street sweeping;
- Catch basin cleaning;

- Inspection and enforcement;
- Public outreach; and
- Constructed LIDs and BMPs

Many of these proposed implementation activities are part of the District's ongoing stormwater management program, and thus parts of the implementation plan have been executed. In order to determine the effectiveness of this implementation, the document indicates that the Storm Water Administration will continue the permit-required MS4 monitoring of the Anacostia watershed, and develop additional monitoring as necessary. The document also notes that ongoing sampling in the Anacostia will be used as inputs to the Simple Method load calculations to demonstrate compliance with load tracking requirements. DDOE has continued to track and report load reductions in the Anacostia watershed from implementation of BMPs and management measures through use of a spreadsheet load reduction tracking tool.

Anacostia River Watershed Restoration Plan (AWRP) (Multiple Authors, 2010)

The Anacostia Watershed Restoration Committee, which was formed as a result of the 1987 Anacostia Watershed Restoration Agreement between the District of Columbia, Montgomery and Prince George's Counties, State of Maryland, U.S. Army Corps of Engineers, U.S. EPA, and National Park Service, established six restoration goals for the Anacostia watershed in 1991. These goals included:

1. Dramatically reduce the amount of pollution flowing into the Anacostia River and watershed.
2. Protect and restore the watershed's ecological integrity- improving water quality and supporting wildlife habitat and recreational amenities.
3. Improve fish passage to enable fish to migrate and spawn in the river and its tributaries.
4. Increase wetland acreage to support water filtration and the proliferation of plants and animals.
5. Expand forest cover.
6. Increase public and private participation in understanding and advocating for the health of the watershed and river.

The AWRP was produced through a two year planning effort that resulted in a systematic 10-year plan for environmental and ecological restoration within the Anacostia River watershed that addressed these goals. The AWRP was developed primarily based on field surveys and included an inventory of restoration opportunities for the Anacostia and its tributaries.

The AWRP proposed several projects organized into eight strategies that were designed to meet the watershed restoration goals outlined above. The strategies, as well as the number of projects identified for each strategy and the projected outcomes of the projects, are summarized in Table H-1 (Note that since the AWRP covers the entire Anacostia watershed, including both Washington, DC, and Maryland segments, only a portion of these projects are located within the District):

Table H-1 Proposed Restoration Strategies in Anacostia River Watershed Restoration Plan		
Proposed Projects by Restoration Strategy	**Number of Projects**	**Anticipated Results**
1. Stormwater Retrofit	1,892	10,600 acres of controlled impervious surface
2. Stream Restoration	342	Restoration of 72.5 miles of streams
3. Wetlands Restoration	116	Restoration, creation or acquisition of 137.4 acres of wetlands
4. Fish Blockage Removal/Modification	146	Reopening of 41.7 miles of streams for fish to migrate and spawn
5. Riparian Reforestation, Meadow Creation, Street Tress, and Invasive Management	152	Restoration, creation or acquisition of 347 acres riparian area
6. Trash Reduction	181	Clean-up or sweeping of 124.7 miles of stream and/or roads
7. Toxic Remediation	0	Remediation efforts occurring under other initiatives
8. Parkland Acquisition	189	Acquire 2512.1 acres of parkland

Projects were developed based on an intensive field investigation, which entailed stream walks to identify potential BMP locations. The majority of the projects focus on three major practices: LID installation, stream restoration, and reforestation. In addition, other projects that benefit fish and wildlife were identified. These projects include removal of barriers to fish passage, the purchase of land for parkland, trash reduction projects, and the installation or rehabilitation of wetlands. Due to the large size of the Anacostia watershed, effort was concentrated on identifying opportunities for LID in the public space and in highly visible private property locations. Some additional projects on private property were added when the size of the property or its proximity to the Anacostia elevated a location's importance. Inventories of the identified projects are provided in the WIP document and online at www.anacostia.net.

An individual inventory report of potential projects was created for each subwatershed within the Anacostia watershed. These reports provide a project brief summary, a description of existing conditions, a summary of the type of BMP proposed, and its drainage and impervious areas in acres.

Anacostia Watershed Implementation Plan (WIP) (DDOE, 2012)

As part of the CWA Section 319 program, DDOE developed the Anacostia WIP as a watershed-based non-point source pollution control plan to address impairments identified in previous TMDLs, including TMDLs for BOD (2001), TSS (2002), fecal coliform bacteria (2003) and organics and metals (2003). The goal of the WIP was to address the pollutants impairing the water body and ultimately to delist the Anacostia for these impairments. The WIP was primarily based on the ARWP, but included additional analysis to meet CWA Section 319 requirements for WIPs, including discussions on causes and sources of impairments; current and proposed management measures; expected load reductions; implementation schedule and milestones; financial and technical resources; and a monitoring strategy.

As part of the WIP requirements to summarize current and proposed management measures, DDOE identified both "General Management Measures" that are ongoing throughout the watershed, as well as specific projects to be implemented in the future. The WIP defines General Management Measures generally as non-structural BMPs, which seek to reduce pollutants before they enter the Anacostia or its tributaries. These non-structural BMPs include legal regulation, construction plan review and regulation, public education, illicit discharge detection and enforcement, and the management of the District's solid waste through street sweeping, trash collection, catch basin cleaning, and floatable reduction as primary means to control pollutants. General management measures also include programs to encourage the installation of structural BMPs through voluntary measures on private lands. Specific programs discussed in the WIP include the RiverSmart Homes, Rain Leader Disconnect, and Green Roof Retrofit programs. The document also discusses DDOT's LID strategies to control runoff from streets and alleys.

DDOE incorporated the LID, stream restoration, reforestation and riparian buffers, wetlands, fish passage barrier removal, and parkland acquisition projects identified in the AWRP into the WIP. As discussed above for the AWRP, DDOE had worked with USACE and a contractor to perform project inventories for the Anacostia River and its tributaries. The Team spent several months in the field identifying appropriate locations for LID practices and other BMPs. WIP identified 290 sites for LID (at an approximate cost of $152,000,000), 16 potential stream restorations projects (at a potential cost of approximately $8,000,000), and 17 potential areas for tree planting (at an estimated cost of $622,000) in the District based on the AWRP. The LID projects focus on cistern installation, establishment of bioretention cells, retrofit of vegetated (green) roofs and installation of pervious pavers. Stream projects were identified to restore over two miles of streams, with effectiveness enhanced by the identified LID projects, which are designed to help stabilize stream valleys by reducing stormwater flows. Approximately 104 acres of tree planting projects were identified.

The identified projects will treat total of seven percent area of the Anacostia watershed. Once implemented, these projects are expected to reduce TMDL pollutants to help meet the MS4 WLAs. Load reduction calculations for metals, organics, and bacteria were done using reduction efficiencies summarized in the Anacostia Watershed TMDL Allocation Implementation Plan (DDOE, 2005). These calculations show that these practices, once implemented are expected to help meet most, but not all, of the Anacostia watershed MS4 WLAs. WLAs that are <u>not</u> projected to be met include chlordane in the mainstem Anacostia and Watts Branch, and dieldrin in the mainstem Anacostia, Nash Run, Pope Branch, Texas Avenue, and Watts Branch.

The WIP proposes a 30-year schedule for completion of these projects, and includes phasing implementation to prioritize watersheds for restoration. The WIP breaks the restoration work into five-year increments, with an average of two watersheds as the focus of each five year interval. Using a phased approach with five year increments also aligns with the Chesapeake Bay Program and District MS4 permit timelines. The WIP also notes that because DDOE does not own any of the land on which these proposed projects are located, the implementation schedule will be dependent on cooperation of the individual landowners on which projects are proposed. The proposed Milestone Schedule from the WIP is provided in Table H-2 below.

Table H-2 Proposed Milestone Schedule for Anacostia Watershed Implementation Plan		
Timeframe (years)	Sub-watersheds Attaining Water Quality Standards	Percent of the Anacostia Watershed Attaining Water Quality Standards (Cumulative)
0-5 Years	Fort Dupont Pope Branch	7.5 %
5-10 Years	Fort Chaplin Fort Davis Nash Run	8.5 % (16.0%)
10-15 Years	Watts Branch (Upper and Lower)	11.4% (27.4 %)
15-20 Years	Hickey Run	13.7% (41.1%)
20-25 Years	Fort Stanton Texas Avenue	3.1 % (44.2%)
25-30 Years	Upper Anacostia Lower Anacostia	55.8 % (100%)

The estimated for implementing the specific projects identified in the WIP is $172,293,000 over the 30-year implementation timeframe, or approximately $5,743,100 per year. The estimated total cost for the general management measures included in the WIP is an additional $236,175,000, or approximately $7,873,000 per year. The cost is proposed to be covered by stormwater fees, annual grants from the Chesapeake Bay Program and EPA Non-point Source Pollution Program, and District budget appropriations. However, there is expected to be a budget shortfall in meeting these funding needs. The WIP identifies several options for making up the shortfall, including increasing the stormwater fee and allocating funds from the recently implemented fee on plastic bags to stormwater project implementation.

Rock Creek Watershed Total Maximum Daily Loads (TMDL) Implementation Plan (DC Storm Water Administration, 2005):

The Rock Creek Watershed TMDL WLA IP (the 2005 Rock Creek TMDL IP) was developed to fulfill requirements to submit an implementation plan for compliance with the TMDLs for pollutants from the Rock Creek watershed within the District that was included in the District's 2004 MS4 permit. The objectives of this plan were to:

- Document past efforts to reduce pollutants identified in the Rock Creek watershed TMDL documents and estimate the magnitude of the reductions achieved.
- Identify existing District activities and programs for additional effort focused on reducing specific pollutants in the MS4 discharges to the Rock Creek watershed.
- Identify and prioritize additional programs and activities to achieve the necessary additional reduction in specific pollutants.
- Develop a methodology to calculate the cost effectiveness of and financial requirements to implement the additional programs and activities presented in the plan.

This document covered the following TMDLs: metals in the mainstem Rock Creek (2004); fecal coliform bacteria in the mainstem Rock Creek (2004); and metals and organics in the Rock Creek tributaries (2004). The document summarizes each of the individual pollutants included in the various TMDLs and describes a general reduction strategy for that pollutant. These reduction strategies include source controls, public outreach, erosion and sediment control, street sweeping, inlet cleaning, and use of structural BMPs. The document then summarizes the ongoing management activities under the SWM Program that will be used to control pollutants. The primary management activities for controlling pollutants are outlined in the District's SWM Plan, which emphasizes non-structural BMPs - such as public education, illicit discharge detection and enforcement, and the management of the District's solid waste through street sweeping, trash collection, catch basin cleaning.

As required by the permit, the document calculates pollutant runoff for pollutants identified in the watershed; specifically, the Simple Method is used to calculate pollutant loading generated from runoff entering the MS4. The document also states that "input data used to develop the TMDLs was used in the Simple Method to establish baseline pollutant loading from the MS4. These loadings will be compared to future loadings calculated using MS4 permit required wet weather monitoring results in the Simple Method to demonstrate compliance with the percentage reductions required in the TMDL documents." Specifically, "the Simple Method was modified to incorporate removal efficiencies to estimate the anticipated pollutant load reductions from the implementation of structural and programmatic BMPs in the Rock Creek watershed." The document goes on to state that "to measure compliance, future MS4 Permit compliance sampling analytical results will be used to develop EMCs for use with the Simple Method to calculate current loadings. The percentage reduction will then be compared to the percentage reduction required…"

After describing the methodology for determining compliance with the TMDLs, the document describes the planned pollutant management measures for meeting the TMDLs. The document states "The District has achieved significant pollutant reduction through the implementation of activities included in the management areas of the SWM Program." However, the document notes that "…Some of the programs and activities lend themselves to direct measurement and estimation of pollutant reductions (e.g., installation of structural BMPs, elimination of illicit discharges). Pollutant reductions from the majority of the programs and activities, however, are difficult to estimate, and uncertainties exist with any such estimates." Therefore, the document includes quantitative assessments of pollutants where it has data to do so, and qualitative assessments in cases where insufficient data exist to develop quantitative assessments. Where possible, site specific monitoring data and details were used in the calculations. In cases where these data were not available, data from reference literature were used to complete the calculations.

To determine a specific plan for continuing reduction of pollutant loads, multiple potential stormwater management devices or techniques were identified, screened and ranked using a present worth annual cost per pound of pollutant removed. The most cost-effective devices and techniques for each pollutant of concern were identified for use in implementing future pollutant load reductions.

Based on this screening, the implementation plan includes:

- Street sweeping;
- Catch basin cleaning;
- Inspection and enforcement;
- Public outreach; and
- Constructed LIDs and BMPs

The Plan then describes how each of these BMPs is expected to contribute to future pollutant load reduction. The ongoing programs are described in terms of how they will contribute to expected future TMDL compliance. The Plan also includes a set of potential LID/BMP locations in Appendix C. However, the Plan does not include calculations of load reduction from proposed BMP implementation. The Plan states that “At this time, there are no site-specific storm water pollutant load data for the potential locations where recommended implementation projects and activities can be undertaken. Therefore, quantification of load reductions attributable to the recommended projects and activities is not possible. By employing the most efficient, cost-effective projects and activities, maximum pollutant load reductions will be achieved. Progress towards TMDL WLA compliance will be determined by approved monitoring and evaluation methods as described in the Plan.

In order to determine the effectiveness of this implementation, the document indicates that the Storm Water Administration will continue the permit-required MS4 monitoring of the Rock Creek watershed, and develop additional monitoring as necessary. The document also notes that ongoing sampling in Rock Creek will be used as inputs to the Simple Method load calculations to demonstrate compliance with load tracking requirements. The document also states that upstream and downstream sampling of installed BMPs and LIDs may be done to aid in the assessment of removal efficiencies and load reductions for BMPs and LID.

The document includes an analysis of the budget and a funding plan for implementation, as well as a specific budget plan for the short term funding of implementation activities.

Rock Creek Watershed Implementation Plan (WIP) (DDOE, 2010):

The Rock Creek WIP was developed in order to provide a more detailed plan for addressing impairments in the Rock Creek watershed than was achieved with the Rock Creek TMDL Implementation Plan (DC DOH, 2005). The Rock Creek WIP is a CWA Section 319 program- compliant plan to address the TMDLs for bacteria in the Rock Creek mainstem (2004), metals in the Rock Creek mainstem (2004), and organics and metals in the Rock Creek tributaries (2004). The WIP follows the same general structure as the Anacostia and Oxon Run WIPS, and includes background, an overview of the TMDLs for Rock Creek, and specific management measures to address the pollutants.

The WIP presents a plan to achieve load reductions through implementing new stormwater management projects or programs (e.g. LID), pollution prevention, reforestation, remediation of illegal dumping sites, increased enforcement, sanitary sewer repair, stream restoration, and improved environmental education and outreach activities.

Similarly to the Anacostia and Oxon Run WIPs, the Rock Creek WIP summarizes General Management Measures that are ongoing throughout the watershed. As with the Anacostia, these are non-structural BMPs, which include legal regulation, construction plan review and regulation, public education, illicit discharge detection and enforcement and the management of the District’s solid waste through street sweeping, trash collection, catch basin cleaning, and programs to encourage BMPs installation in private properties.

In addition to existing General Management Measures, the Plan WIP proposes several additional BMPs throughout the Rock Creek watershed that will aid in load reductions. The majority of the projects proposed based on this field effort focus on three major pollution reducing practices: LID installation, stream restoration, and reforestation. In addition, other projects that benefit fish and wildlife were identified. These projects include removal of barriers to fish passage, the purchase of land for parkland, trash reduction projects, and the installation or rehabilitation of wetlands. Effort was concentrated on identifying opportunities for LID in public land, and in highly visible private property.

As part of the effort to identify potential project areas in the watershed, DDOE staff spent several weeks in the field identifying appropriate locations for LID practices and other BMPs. Low Impact Development Practices focused on four practices: cistern installation, establishment of bioretention cells, retrofit of vegetated (green) roofs and installation of pervious pavers. Three hundred sixty six (366) individual LID projects were identified in the Rock Creek watershed. These projects could treat 1,325 acres of the watershed where there are currently no stormwater controls. This equates to about 10 percent of the District's portion of the Rock Creek watershed. In addition, 35 stream restoration projects encompassing over 21 stream miles and 13 wetlands projects were identified. Finally, 151 sites encompassing 106 acres were identified for reforestation/tree planting.

The projects were categorized into three groups based on their environmental impact, their ability to be implemented, and their educational value. Installation for high ranking projects will be prioritized, followed by projects that ranked highly in environmental impact and their ability to be implemented but with lower scores for educational value (except projects on school grounds). In 30-years implantation timeframe for the WIP it moves from high ranking projects to low ranking projects. Until 2013, initial a short term implementation schedule for Rock Creek Restoration projects have been prepared that identified 12 specific projects within the Watershed from the completed list provide by the WIP.

Short term projects included an implementation schedule from 2009 through 2013. It is expected that the activities laid out in this WIP will inform the specific restoration actions and the more long-term load reduction targets.

The total cost of implementing WIP proposed projects over the 30-year timeframe is estimated at $171,809,000. See Table H-3 for a breakdown of projected costs by BMP type. The annual cost of WIP implementation is $5,727,000 per year. Similarly to the Anacostia WIP, the cost is proposed to be covered by stormwater fees, annual grants from the Chesapeake Bay Program and EPA Non-point Source Pollution Program, and District budget appropriations. However, there is expected to be a budget shortfall in meeting these funding needs. The WIP identifies several options for making up the shortfall, including increasing the stormwater fee and allocating funds from the recently implemented fee on shopping bags to stormwater project implementation.

Table H-3 Projected Costs of BMP Implementation for the Rock Creek Watershed Implementation Plan

Identified BMP Project	Cost of Implementation
LID Installation	$70,000,000
Tree Planting	$1,070,000
Stream Restoration (linear feet)	$ 96,000,000
Wetland Restoration	$1,040,000
Trash Removal	$69,000
Fish Passage Installation	$3,630,000
Total Cost	**$171,809,000**

It should be noted that the Rock Creek WIP discusses potential problems with the impairment listings that led to the TMDLs in the watershed. As a result, DDOE proposes to substitute the control and monitoring of TSS, TN, and TP instead of those currently listed as impairing Rock Creek. The WIP includes several reasons for this proposal, including the uncertainty of the existing impairments and considerations of efficiency, as well as other problems in the watershed.

<u>Oxon Run Watershed Implementation Plan (WIP) (DDOE, 2010):</u>

Like the Anacostia WIP, the Oxon Run WIP was also prepared as a CWA Section 319 program- compliant plan to address the TMDLs developed in 2004 for bacteria, metals and organics. The WIP presents a plan to achieve load reductions through implementing new stormwater management projects or programs (e.g. LID), pollution prevention, reforestation, remediation of illegal dumping sites, increased enforcement, sanitary sewer repair, stream restoration, and improved environmental education and outreach activities.

Again, similarly to the Anacostia WIP, the Oxon Run WIP summarizes General Management Measures that are ongoing throughout the watershed. As with the Anacostia, these include legal regulation, construction plan review and regulation, public education, illicit discharge detection and enforcement and the management of the District's solid waste through street sweeping, trash collection, catch basin cleaning, and programs to encourage BMPs installation in private properties.

In addition to existing General Management Measures, the WIP proposes additional BMPs throughout the Oxon Run watershed that will aid in load reductions. As part of the effort to identify potential project areas in the watershed, DDOE staff spent several weeks in the field identifying appropriate locations for LID practices and other BMPs. The majority of the projects proposed based on this field effort focus on three major pollution reducing practices: LID installation, stream restoration, and reforestation. In addition, other projects that benefit fish and wildlife were identified. These projects include removal of barriers to fish passage, the purchase of land for parkland, trash reduction projects, and the installation or rehabilitation of wetlands. Effort was concentrated on identifying opportunities for LID in public land, in the public right of way and on quasi-public land (e.g., churches), and highly visible private property. Investigators also noted businesses and government facilities where pollution prevention or enforcement activities where required. Approximately 170 BMP opportunities are identified in the WIP, which would provide treatment for a total area of 287 acres, or 11 percent of the watershed. The WIP also identifies 50 acres for potential reforestation and riparian planting as well as 20 acres of green roof installations and stream restoration.

Load reduction calculations for metals, organics, and bacteria were done using reduction efficiencies summarized in the Rock Creek TMDL Allocation Implementation Plan (DC Stormwater Administration, 2005). As in the Anacostia WIP, the Oxon Run WIP notes that "The TMDL loads in the District portion of the Oxon Run watershed are assigned to the MS4 portion of the watershed." Thus, load reductions are compared to MS4 WLAs). Collectively, the identified projects achieve between 0.2 and 22 percent load reductions, which is typically not sufficient to meet of the targeted load reductions stipulated in the TMDL report. Therefore the WIP includes tables that show the results from treating incrementally larger portions of the watershed, from 10 percent to 100 percent. These tables were then used to determine the optimal mix of stormwater and other pollution management practices that could be employed to reach reduction goals for metals and organics.

Specifically, for metals, the WIP shows that the identified projects will meet the MS4 WLA for zinc, but not for arsenic, copper, or lead. Additional load reduction beyond the identified projects will need to be done to meet these WLAs. The bacteria and organics MS4 WLAs will also not be achieved, and additional load reduction beyond the identified projects will need to be done to meet these WLAs.

In order to achieve WLAs, the WIP developed three pollutant management practices implementation scenarios. The first scenario includes a moderate amount (10-20%) of the watershed being treated with structural stormwater controls and an intensive amount (60%) treated with vacuum sweeping. This scenario will achieve reductions in all constituents but dieldrin. The second scenario includes implementing structural stormwater practices to treat an intensive amount of the watershed (20-30%) while also treating a moderate amount (10%) of the watershed with vacuum sweeping. This scenario achieves similar results to Scenario 1 with respect to how many MS4 WLAs are achieved, with dieldrin again not achieving its MS4 WLA. The third scenario included both intensive structural stormwater controls (20-30%) and intensive vacuum sweeping (60% of the watershed). Again, all MS4 WLAs were reached in Scenario 3, except for dieldrin (note that none of these scenarios included the reforestation, riparian planting, green roof, and stream restoration projects. The WIP notes that "these best management practices we not modeled in the scenarios above because it is assumed that the reduction efficiencies for metal and organic constituents would be small." However, the WIP continues on to state that "the cumulative effect of the implementation of these projects would certainly have a positive impact on water quality and will contribute to reaching target reductions."

The WIP includes an implementation schedule, but the schedule is provided in terms of prioritization of specific projects, and not in terms of specific years. For the purposes of schedule, the identified projects are classified into three groups that are designed to achieve short- , intermediate- and long-term goals. Short term goals are designed to address areas of immediate water quality impartment. According to the WIP, projects fulfilling short-term goals will take advantage of development opportunities to demonstrate the use of LID technologies in this watershed and engage the public knowledge and stewardship. In contrast, projects implemented to address intermediate goals will deal with degrading infrastructure in the stream channel, stream bank stabilization and restoration of in-stream habitat, removal of fish blockages, and riparian and wildlife restoration in the stream corridor. Finally, projects implemented to address long term goals will include the retrofitting of the storm sewer system to reduce stormwater volumes through onsite retention of stormwater, pollution prevention through improved catch basin and end of pipe BMPs, expanded street sweeping, and coordination with Prince Georges County to address upstream sources of pollution. Table H-4 below summarizes the phase and timeframe for the various project goals.

Table H-4 Proposed Milestone Schedule for Oxon Run Watershed Implementation Plan

Timeframe	Phase	Description
0-5 years	Short-Term	Targeted enforcement of likely sources of water quality impairment; LID demonstration projects in the watershed; stepped up community outreach and engagement; and riparian and wildlife corridor improvements.
0-15 Years	Intermediate Term	Stream restoration and fish blockage removal; and sewer line infrastructure repair.
0-30 Years	Long-Term	Stormwater volume reductions through onsite retention and LID retrofits on public lands and in the public right of way; expanded street sweeping; and retrofitting of the MS4 system with catch basin and end of pipe BMPs

The WIP also notes that because DDOE does not own any of the land on which these proposed projects are located, the implementation schedule will be dependent on cooperation of the individual landowners on which projects are proposed.

The total cost of implementing WIP proposed projects over the 30-year timeframe is estimated at $145,115,143 and excludes the cost incurred from trash removal and pollution prevention enforcement. The annual cost of WIP implementation is $4,837,171 per year. Similarly to the Anacostia WIP, the cost is proposed to be covered by stormwater fees, annual grants from the Chesapeake Bay Program and EPA Non-point Source Pollution Program, and District budget appropriations. However, there is expected to be a budget shortfall in meeting these funding needs. The WIP identifies several options for making up the shortfall, including increasing the stormwater fee and allocating funds from the recently implemented fee on shopping bags to stormwater project implementation. A cost summary for implementation of identified BMP projects plus costs for additional BMP implementation required to meet MS4 WLAs is provided in Table H-5 below.

Table H-5 Projected Costs of BMP Implementation for the Oxon Run Watershed Implementation Plan

Project Type	Cost of Implementation
Identified BMP Projects	
Green Roof Projects	$18,223,118
Permeable Pavement	$4,442,826
All other LID Projects	$21,043,671
Regenerative Stormwater Conveyance	$285,640
Stream Restoration	$10,000,000
Riparian Reforestation	$243,298
General Reforestation	$1,579,500
Subtotal	**$55,818,053**
Additional BMP Implementation Needed to Meet Targets	
Bioretention	$13,908,040
Pervious Pavement	$50,238,100
Constructed Wetland	$7,970,910
Tree Boxes	$17,180,040
Vacuum Sweeping	$656,221/year
Subtotal	**$89,297,090**
Grand Total	**$145,115,143**

It should be noted that the WIP acknowledges that there potential problems with the impairment listings that led to the TMDLs in the watershed. While the WIP is designed to meet legal permit requirements to address the TMDLs as they currently exist, the WIP also states that “Oxon Run TMDLs may be flawed, and at a minimum require more robust data collection to support the assumptions.”