MONTCLAIR
LAKE MANAGEMENT PROGRAM PLAN

Providing a Community Perspective for
Use and Stewardship of Lake Montclair and Its Watershed Ecosystem
in the Chesapeake Bay Basin

provided by

MONTCLAIR PROPERTY OWNERS ASSOCIATION
LAKE MANAGEMENT COMMITTEE

Version 2
13 March 2019

Previous MPOA BoD-approved LMPP available on-line at MPOA website www.montclairva.com

Lake Management Program Plan for Use and Stewardship of Lake Montclair and its Watershed Ecosystem
Provided by Montclair Property Owners Association (MPOA) Lake Management Committee (LMC)*

The management of the Lake Montclair ecosystem is informed and influenced within the context of the lake being a part of the Powells Creek Watershed that flows into the Potomac River – all in the Chesapeake Bay Basin.

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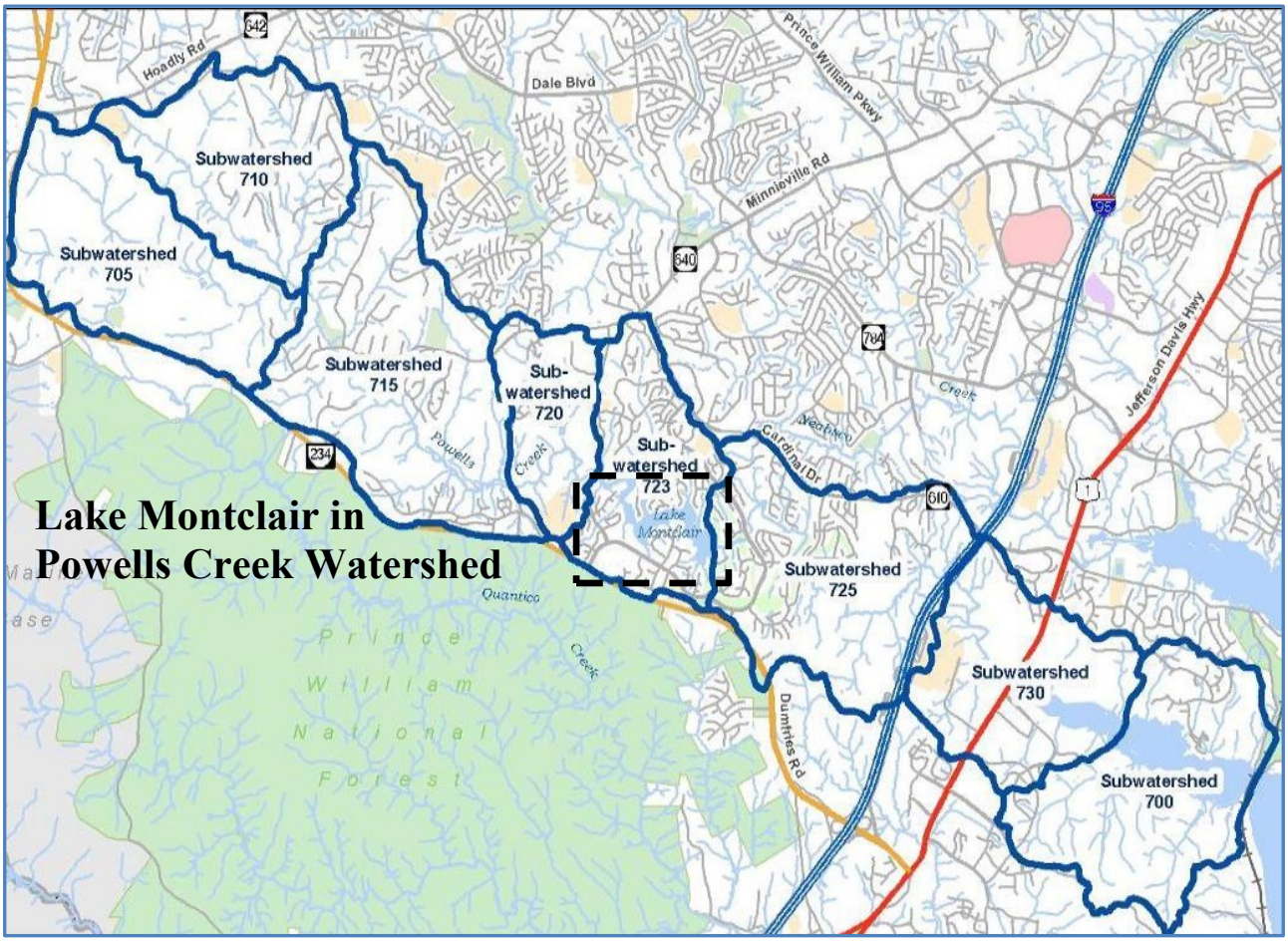
*First approved by MPOA Board of Directors on 11 Sep 2013 this LMPP continues to evolve; covering community priorities, strategies and programs that reflect a resilience-centric approach focused on safeguarding the continuity of lake-ecosystem functions along with a human-centric approach focused on enabling harmonious use of the lake & its "ribbon of life" assets.

LMPP Editor and Principal Author Joe Jarzombek. LMPP input/comments can be sent to LMC Chair.



Montclair Lake Management Program Plan

Executive Overview

This Lake Management Program Plan (LMPP) is provided by the Montclair Property Owners Association (MPOA) Lake Management Committee (LMC), as authorized by the MPOA Board of Directors (BoD). It addresses stakeholder needs and responsible stewardship of Lake Montclair as part of the Powells Creek Watershed. The MPOA BoD established the LMC to assure that the quality of the lake and its environment is maintained and to oversee and manage the water quality, lake ecology, fishery, lake dredging, dam maintenance, and common areas that abut Lake Montclair. The LMC provides recommendations to the BoD on wildlife habitat, treatment and controls with the community as it relates to the lake. As appropriate, the LMC works with other committees and organizations on issues affecting recreation areas, wildlife areas, and the environment in and around the lake.

As indicated in its charter, in pursuit of its mission, the LMC establishes plans for specific projects and takes action to effect improvements that will not only maintain the current level of quality, but will also increase it. Consistent with recommendations of the Storm Water Task Force, the LMC uses this LMPP to address long-term actions for managing the overall health and resilience of the lake, as well as to provide tools and procedures to assist the property management agent and staff in managing water level and monitoring the lake and weather conditions. This plan integrates projects associated with dam management, shoreline protection, water quality management, storm water management, and fish and wildlife management in support of water use and sporting/recreational activities such as swimming, boating, fishing, birding, and photography. As such, this LMPP:

- Provides a framework for stewardship and management objectives with the MPOA coordinating services provided by volunteers, property management staff, the county, the state, and federal agencies;
- Facilitates specific strategies and actions with associated studies and plans accounting for Lake Montclair being an important part of the Powells Creek Watershed in the Chesapeake Bay basin, and
- Accounts for Montclair being a well-established suburban community with a 108-acre lake, beaches, docks, golf course, bird sanctuary, parks, and trails which will continue to evolve with needs of residents.

This LMPP supports efforts to document and guide strategies and actions which might better enable Montclair to have a unified, comprehensive program, used in conjunction with the Powells Creek Watershed Plan, to address residents' needs, MPOA community guidelines, and regional statutes. This LMPP leverages other efforts; references relevant plans, and offers considerations for progressing toward more informed strategies. To better ensure long-term, sustainable stewardship of the lake and its watershed, it is essential that people who live, work, and play in the watershed and lake-ecosystem understand relevant issues and are actively involved in implementing actions for addressing issues; ensuring that appropriate progress is made. To provide an historical continuity and a common basis for community discussion about activities and practices responsive to evolving needs, this LMPP:

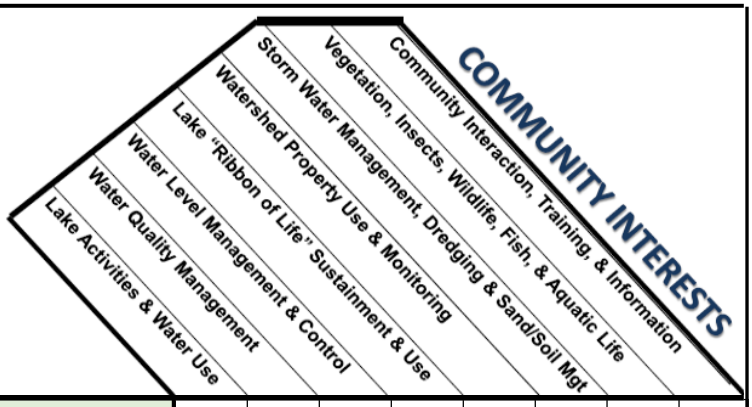
- Provides guiding principles and factors influencing stewardship of the lake and its watershed, including regional patterns and statutes, water use, lake water quality, and the lake-watershed connection (such as watershed features and hydrology, precipitation, soils, and land use).
- Identifies stakeholders and provides a compressive framework for informing and specifying practices associated with monitoring, assessing and managing: water quality, water use, water level control, land use, "ribbon of life" health and use, wildlife, aquatic life, and respective habitat in the lake ecosystem.
- Specifies 25 objectives with strategies for taking action and measuring progress responsive to lake management focus areas: hydrology, soils, vegetation, fish & wildlife, materials, and human well-being.
- Serves as MPOA's comprehensive program plan for lake-ecosystem stewardship (consolidating separate plans for lake management, storm water management, environmental water quality management, etc.), and integrates relevant information described in other applicable plans and reports that are exercised or updated annually, such the Lake Montclair Environmental Quality Report, the Emergency Action Plan, etc.

Ultimately, systematic and purposeful management, along with the responsible participation and stewardship by all stakeholders, will influence the long-term resilience and sustainability of Lake Montclair. As such, this LMPP serves as an information resource linking 25 lake management objectives with community interests. MPOA uses this LMPP to provide a collaborative source for documenting and discussing processes and actions for managing efforts responsive to a broad range of stakeholders with varying interests and backgrounds. As such, this plan is used to inform all with an interest in the stewardship and use of the lake. This LMPP serves as a part of the LMC's

communication efforts for informing and engaging stakeholders about lake issues. It addresses pertinent background, authorities, guidance, and support for lake management in Sections I and II which include the framework for six focus areas that group the 25 objectives for Lake Management. These focus areas and objectives for sustainable sites and lake management are aligned with the *"Chesapeake 2000"* five program areas (shown in Section VII of this LMPP) and delineated in Sections III-VII of this LMPP (depicted in the matrix). Providing a context for strategies and practices that address lake-related concerns and community interests, these six focus areas and 25 objectives reflect a resilience-centric approach focused on safeguarding lake-ecosystem functions while also enabling human-centric objectives focused on enabling harmonious use of the lake and its "ribbon of life" assets.

Lake Management Program Objectives Related to Community Interests

*This matrix indicates content organization of LMPP sections that elaborate on how 25 lake management program objectives delineated in Section II address community interests via strategies and actions specified in Sections III-VII.



LAKE MANAGEMENT PROGRAM OBJECTIVES								
1. HYDROLOGY FOCUS AREA								
1-1 Manage water to sustain or regenerate healthy hydrologic processes	V.a	III.a	III.c					
1-2 Mitigate risk from harmful nutrients/hazards/pollutants/contaminants		III.b						VI.a
1-3 Sustain environmental water quality and healthy biological communities		III.a/b					V.b	
1-4 Monitor water quality and periodically report to enable timely action		III.a						III+VI
1-5 Manage and control water level and report changes			III.c/d			IV.b		III-VI
2. SOILS FOCUS AREA								
2-1 Promote soil health to sustain ecosystem services thru protection/reuse					IV.a	IV.b		VI.a
2-2 Sustain storm water management and minimize soil erosion					IV.a	IV.b		
2-3 Minimize use of chemicals that harm human and ecological health					IV.a			VI.a
2-4 Sustain integrity of the lake and its 'ribbon of life'			III.c	V.c	IV.a	IV.b		
2-5 Monitor changes in watershed land use & report trends that affect lake					IV.a	IV.b		
3. VEGETATION FOCUS AREA								
3-1 Encourage natural ecological processes in managing plant resources							V.b	VI.a
3-2 Use vegetation to sustain and enhance on-site ecosystem services						IV.a	V.b	
3-3 Manage lake vegetation consistent with natural balance of ecosystem				V.c			V.b	
4. FISH & WILDLIFE FOCUS AREA								
4-1 Provide habitat & food sources for fish/wildlife for a natural balance							V.b	VI.a
4-2 Monitor & control destructive/disease-carrying insects							V.b	VI.a
4-3 Manage fish & wildlife for water quality/fishing/lake vegetation							V.b	
4-4 Monitor/report status of fish/aquatic life/wildlife for action plans							V.b	VI.a
5. MATERIALS FOCUS AREA								
5-1 Promote management of material resources and reduced energy use					IV.a			VI.a
5-2 Mitigate risks from potentially toxic and harmful materials		III.b						VI.a
5-3 Reduce foreign material in the lake		III.b						
6. HUMAN WELL-BEING FOCUS AREA								
6-1 Sustain lake-ecosystem conditions for physiological/health benefits				V.c				VI.a
6-2 Promote learning benefits of nature for human cognitive functions	V.a			V.c				VI.a
6-3 Promote social dynamics using the lake and 'ribbon of life' assets	V.a			V.c				VI.a
6-4 Enhance conditions for use of the lake and 'ribbon of life' assets	V.a			V.c				VI.a
6-5 Provide resources for community engagement, notification, & education	V.a	III	III.c/d	V.c	IV.a	IV.b	V.b	I - VII

Updated by MPOA LMC and approved by MPOA BoD, this LMPP is a 'living' document. Periodic review ensures this LMPP continues to supportively align with applicable community guidelines and regional statutes.

Montclair Lake Management Program Plan

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I. Introduction

a. Background on Lake Management

Residents value Lake Montclair[1] for its contributions to their quality of life. As part of the Powells Creek Watershed[2] within the Chesapeake Bay basin, Lake Montclair provides significant storage volume for run-off peaks, helping to regulate flow of stormwater into the Potomac River. However, few people understand or appreciate the full spectrum of collaborative efforts required for sustaining a healthy, resilient lake, and its watershed ecosystem. As such, this Lake Management Program Plan (LMPP) provides a framework for addressing needs of Lake Montclair, the Powells Creek Watershed and the community.[3] It supports efforts to specify objectives and strategies that can better enable Montclair stakeholders to have a unified lake management program to address regional statutes, residents' needs, and covenants of Montclair Property Owners Association (MPOA).[4]

This LMPP offers considerations for progressing toward more comprehensive, informed strategies and practices. Pertinent background on lake management provides the context for stakeholder interests, and includes physical and biological characteristics of the lake and watershed; regional patterns, social demographic needs, and water use, as well as, information about the lake-watershed connection. Ultimately, systematic and purposeful management and responsible participation of all stakeholders will influence the long-term stewardship and resilient sustainability of Lake Montclair.

Responsible management of the lake and its watershed facilitates stewardship and use of the lake and its "ribbon of life" (composed of the dam, shores, docks, and beaches); enabling actions responsive to use trends and environmental changes, and informing property use consistent with guiding principles of "sustainable sites."

1. Purpose and Scope of this Lake Management Program Plan (LMPP).

The MPOA Lake Management Committee (LMC)[5] uses this Lake Management Program Plan (LMPP)[6] to address community and ecosystem interests. The LMC was established to assure the quality of the lake and its environment is maintained; oversee and manage the water quality, lake ecology, fishery, lake dredging, dam maintenance, and common areas that abut Lake Montclair. The LMC provides recommendations to the MPOA Board of Directors (BoD) on wildlife habitat, treatment and controls with the community as it relates to the lake. As appropriate, the LMC works with others on issues affecting recreation areas, wildlife areas, and the environment in and around the lake. As indicated in its charter, in pursuit of its mission, the LMC establishes plans for specific projects and takes action to effect improvements that will not only maintain the current level of quality, but will also increase it.

As recommended by the MPOA Storm Water Task Force,[7] the LMC uses this LMPP to address long-term actions for managing the overall health of the lake, as well as tools and procedures to assist property management staff in managing water level and monitoring lake and weather conditions. It provides information for MPOA and others with interests in the lake. This plan integrates resources and projects, including training for dam management, boating safety for the community, and other resources for storm water management, swimming, boating, fishing, birding, and wildlife management. Addressing watershed and lake-ecosystem stewardship, this LMPP:

- Facilitates specific strategies and actions with associated studies and plans accounting for Lake Montclair being an important part of the Powells Creek Watershed in the Chesapeake Bay basin;
- Accounts for Montclair being a well-established suburban community with a 108-acre lake, beaches, docks, golf course, bird sanctuary, parks, and trails which will continue to be improved consistent with evolving needs of residents and the watershed ecosystem, and
- Provides a framework for stewardship and management objectives with the MPOA coordinating services provided by volunteers, property management staff, the county, the state, and federal agencies.

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[1] Lake Montclair (and its boundaries) is described in the Exhibit A of the Deed which conveyed the lake to MPOA on September 24, 1988.

[2] In the middle of the Powells Creek Watershed, the Lake Montclair ecosystem is heavily influenced by the watershed ecosystem.

[3] The MPOA community has ~16,000 residents in ~3,850 homes/townhomes that are part of MPOA and its seven sub-associations. Historical background on the lake and community evolution is in "Montclair Virginia - 40th Anniversary" by Montclair History Committee.

[4] MPOA Articles of Incorporation, Bylaws, & Community Guidelines are available at MPOA and http://www.montclairva.com/documents/.

[5] MPOA Board of Directors established LMC in fiscal year 1996/97; its charter is in MPOA Community Guidelines Article 3, Enclosure 1.

[6] MPOA LMC internal report "*Lake Montclair Management: Considerations for Progressing toward More Comprehensive Stewardship for the Lake and its Watershed Consistent with Goals for Sustainable Sites and Responsive to Changes in Environment and Use Trends,"* Aug 26, 2008, submitted by LMC member Joe Jarzombek, provided recommendations for a comprehensive Lake Management Program Plan.

[7] Report of the Storm Water Task Force to MPOA BoD, September 10, 2008 (on file in MPOA office) included recommendations for a Lake Management Plan (LMP) and a Storm Management Plan (SMP) – this LMPP serves to integrate the two into one program management plan.

This LMPP provides information that is used to support and facilitate projects. To provide a common basis for community discussion for specifying objectives and updating practices responsive to evolving needs, this LMPP:

- Identifies stakeholders and provides a compressive framework for informing and specifying practices associated with monitoring, assessing and managing: water quality, water use, water level control, land use, "ribbon of life" health and use, wildlife, aquatic life, and respective habitat in the lake-ecosystem.
- Provides guiding principles and factors influencing stewardship of the lake and its watershed, including regional patterns and statutes,[8] water use, lake water quality, and the lake-watershed connection (such as watershed features and hydrology, precipitation, soils, and land use).
- Specifies 25 objectives with applicable strategies and implementing mechanisms and actions for monitoring risks and measuring progress responsive to lake management focus areas for: hydrology, soils, vegetation, fish & wildlife, materials, and human well-being.
- Integrates relevant information described in more detail in other applicable reports and plans, such the Lake Montclair Environmental Quality Report, the Emergency Action Plan,[9] etc.

2. Community Involvement in Periodic Review and Update of Lake Management Activities.

This LMPP and associated reports serve as communication and educational resources for informing users of the lake and community residents of roles contributing to stewardship of the lake-ecosystem while supporting the functions of healthy ecosystems and natural processes. It addresses varying interests of lake stakeholders, ranging from swimming and use of beaches to fishing and use of watercraft. It provides information about how property 'not on the lake' is 'connected to the lake' by flow of water which, in turn, could carry pollutants, sediments and nutrients that could adversely affect the lake; potentially jeopardizing future vitality of the lake.

Prince William County has demonstrated its commitment to protecting streams and waterways, reducing non-point source pollution loads, monitoring air and water quality, and protecting properties and the public from flooding. PWC shares the commitment to meeting and exceeding the Federal and Virginia guidelines related to monitoring and improving local waters.[10] PWC Department of Public Works undertakes a variety of projects to help protect waterways and improve water quality. The projects range from stream restoration and storm water management pond inspections to drainage and flood control.[11] These activities help safeguard the water quality and reduce the pollution in streams, creeks and rivers which eventually flow to the Chesapeake Bay.

While much of this LMPP addresses actions to be performed by MPOA property management staff and volunteers on the MPOA LMC (as approved by the MPOA BoD) or by professionals in government agencies, this LMPP also addresses responsible practices by those using the lake and living in the Powells Creek Watershed. As such, community involvement in the periodic review and update of lake management activities will better empower citizens to take responsibility for their roles in the use and stewardship of the lake-ecosystem.

b. Pertinent Information on the Lake, the Watershed and Community Influencing Lake Management

Important considerations in this LMPP have been informed by the lake's physical and biological characteristics, watershed land use, regional patterns, and social/demographic trends for use of the watershed, lake and its "ribbon of life" assets (eg., shoreline, beaches, trails, docks, etc.). This information was derived as a result of conducting site assessments[12] to examine and clarify existing conditions, outline opportunities, determine objectives, and identify valuable site resources, as well as features that might be ecologically degraded if not properly managed.[13] Other key factors that influence lake management include water use and the lake-watershed connection.

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[8] See Virginia Department of Conservation and Recreation (DCR) http://www.dcr.virginia.gov for The Chesapeake Bay Preservation Act (known as 'The Bay Act' adopted by Virginia General Assembly in 1988); VA Dam Safety Act, Article 2, Chapter 6, Title 10.1 (10.1-604) of the Code of Virginia and Dam Safety Regulations established by the Virginia Soil and Water Conservation Board, and other guidelines and programs for soil and water conservation within the watershed. The Chesapeake Bay Preservation Area Designation and Management Regulations were adopted in 1990 and amended in December 2001. DCR addresses the impact of watershed land use.

[9] Reports and plans for Lake Montclair Environmental Quality, Emergency Action, etc. are on file in the MPOA office.

[10] Section II.b.2.c of this LMPP describes Prince William County's programs for addressing the watershed ecosystem.

[11] For PWC projects, see http://www.pwcgov.org/government/dept/publicworks/environment/Pages/Protect-Water-Resources.aspx or contact PWC Department of Public Works at703-792-7070.

[12] Sustainable Sites Initiative assessments guide http://www.sustainablesites.org/SustainableSitesInitiative_PreliminaryReport_110107.pdf.

[13] See PWC Watershed Studies at http://www.pwcgov.org/government/dept/publicworks/environment/Pages/Watershed-Studies.aspx.

1. Physical and Biological Characteristics of the Lake and Watershed.

Located in rolling hills of Prince William County (PWC), Lake Montclair[14,15] and the Powells Creek Watershed[16] are in the cusp of the northern 'Piedmont Plateau' and 'Coastal Plain' physiographic provinces[17] of the Chesapeake Bay Basin, and this influences the water-flow patterns of the area and provides a specific habitat for native vegetation, wildlife and other biological communities.[18] Lake Montclair was created in 1964-65 by a large man-made earthen dam and filled in 1966.[19] Figure 1-1 aerial photo illustrates that it is a 108-acre lake with forebays, coves, beaches, parks, and trails along its shoreline. The elevation of the lake is 188 feet mean sea level (msl), and its deepest point is 54 feet deep.[20] The dam is designed and constructed with a low-level outlet valve, a spillway, and an emergency spillway (with dual use as Dolphin Beach).

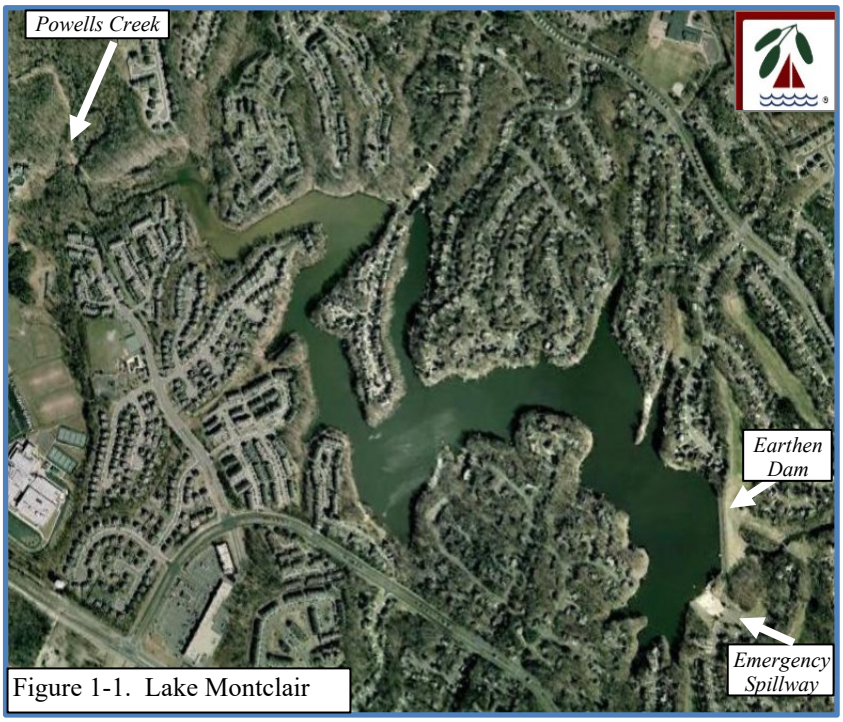

Figure 1-1. Lake Montclair

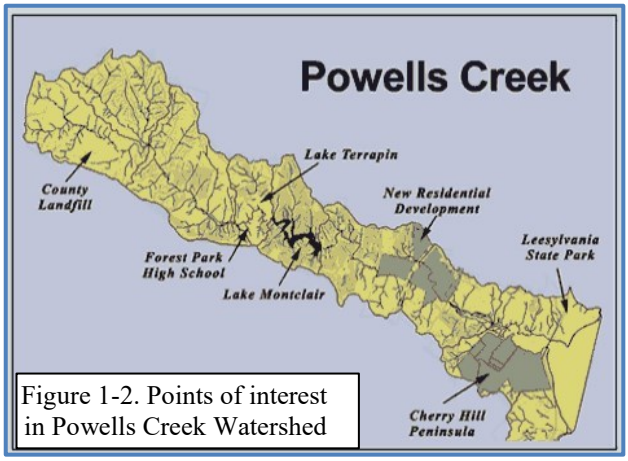

Figure 1-2. Points of interest in Powells Creek Watershed

As shown in Figures 1-1 & 1-2 (and Figure 1-3 on the next page), Lake Montclair is fed primarily by Powells Creek, along with Spring Branch and the upstream catchment area of about 11 square miles in the surrounding watershed.[21] Powells Creek Watershed drains to the Potomac River to the southeast and is bounded at the south by Prince William Forest Park and the town of Dumfries (Quantico Creek Watershed) and to the north by Dale City (Neabsco Creek Watershed) and Hoadly Road to the northwest. The Powells Creek Watershed covers about 18 square miles (11,520 acres). It begins at high points around Independent Hill and flows past the PWC landfill on Rte 234; then on through the Montclair community where it is interrupted by Lake

[14] Lake Montclair (and its boundaries) is described in the Exhibit A of the Deed which conveyed the lake to MPOA on September 24, 1988. Lake Montclair is located in the community of Montclair, Virginia, about 1.5 miles West of I-95 between State Route 234 and Prince William County Route 610 and is used primarily for recreation and storm water control of Powells Creek that flows into the Potomac River.

[15] Aerial photo of lake from 2010 "Prince William County (PWC) Lake Montclair Sediment Forebay Final Report and Recommendations."

[16] The topography of the watershed is characterized in hydraulic analysis by steep slopes and ravines that drain to the Powells Creek channel; eroded to bedrock in places, with an average longitudinal slope of 0.3 percent. Below US Route 1 the Powells Creek channel is a flat marshy wetland area until it flows into the tidal Potomac River.

[17] The geomorphology fall line between the provinces is in the vicinity where Powells Creek flows beneath Interstate 95. The watershed flows in a southeast fashion as a linear watershed. The Northern Piedmont Province is located upstream of the Interstate 95 and is where the majority of sediment is collected and transported within the watershed. Most of Powells Creek and its tributaries are controlled with sporadic bedrock knick points and are single threaded channels, except in areas where there has been the influence of beaver activity. Nearly all the channels within this province are showing signs of erosion due to the flashy hydraulic response attributable to upstream urbanization.

[18] Lake Montclair is a live ecosystem with several biological communities composed of native bacteria, amoeba, aquatic worms, etc.

[19] Lake Montclair Dam was constructed in 1964 and the lake was first filled in July 1965.There are no known plans or drawings for the construction of the dam for Lake Montclair, formerly known as Country Club Lake.

[20] The dam is an earthen embankment 650 feet long and 74 feet high. The primary spillway is a siphon activated spillway with a crest elevation of 188 feet above mean sea level (msl), with a knife gate valve controlling the low-level 24-inch outlet pipe (elevation at 136 feet msl). The crest of the dam proper is at elevation 206.5 feet msl with the emergency spillway crest at elevation 194 feet msl. The emergency spillway is located beyond the right abutment of the dam and has a channel width of about 150 feet. The lake's deepest point (54 feet) is in the old channel of Powells Creek at the toe of the dam; about 150 feet from the concrete control pad (with lake bottom at about 134 msl).

[21] Powells Creek Watershed is long & narrow; this affects drainage characteristics (Prince William Conservation Alliance, pwconserve.org).

Montclair (southeast of the Lake Terrapin community). Powells Creek resumes below Lake Montclair; crosses Route 1 just north of Powells Creek Blvd (south of Cardinal Drive), and flows through the Port Potomac development and eventually discharges into the Potomac River at Leesylvania State Park. The southern boundary for the watershed generally follows Cherry Hill Road near the Potomac River shoreline.

2. Lake-Watershed Connection.

The sub-watersheds for Powells Creek Watershed are shown in the Figure 1-3 map with Lake Montclair in the center sub-watershed 723.[22] The lake provides significant storage volume for runoff peaks and therefore regulates flow characteristics of the lower watershed. Local runoff empties into the lake from the property immediately surrounding the lake, as well as from storm drains carrying water into the lake from streets. Lake Montclair functions as the county's largest storm water flood control structure; holding back and controlling the drainage of flood waters, and serving as a sediment sink for the upper half of the watershed.[23] Lake Montclair and Powells Creek are valuable resources that Prince William County factors into watershed planning efforts. Several studies have been conducted that comprehensively address, in part or in whole, the hydrologic functions of Powells Creek and the lands that drain to it, and they have been used to inform findings and recommendations in watershed management planning efforts.[24] The August 1989 hydrologic and hydraulic analysis of the Powells Creek Watershed report pointed out that Lake Montclair provides primary flood mitigation for the watershed.[25] The study noted: "clearly the importance of Lake Montclair to the overall hydrologic response of the watershed cannot be overstated and any program aimed to correct real or perceived issues within the watershed should be designed to work in concert with Lake Montclair."[26] As such, Prince William County is able to place more emphasis on issues associated with more frequent flooding events and

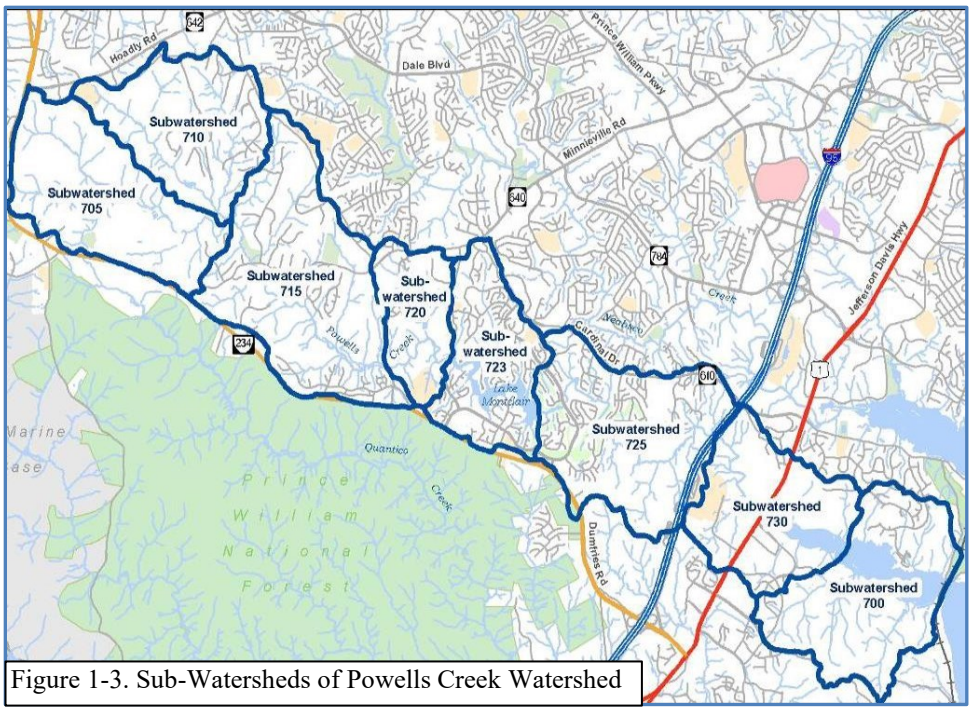

Figure 1-3. Sub-Watersheds of Powells Creek Watershed

[22] The middle third of the watershed is built out with medium density residential neighborhoods, mainly around Lake Terrapin and Montclair.

[23] If water flow to the lake exceeds capacity of the downpipe and outflow gate, and the lake elevation increases 6 feet, then water would flow through Dolphin Beach, around the dam and reenter Powells Creek below the dam. This only occurred once in 1972 with Hurricane Agnes.

[24] June 2008 Powells Creek Watershed Management Plan (source for Figure 1-3 sub-watershed map) used information from previous studies such as Prince William County Stream Protection Strategy; Powells Creek Watershed Study: Hydraulic Analysis; Prince William County Water Quality Monitoring Program (Spriggs Road Station); Virginia DEQ 303(d) List of Impaired Waters Needing TMDL Studies, and Bioassessment of Nonpoint Source Impacts in Three Northern Virginia Watersheds..

[25] In 1970, the dam for Lake Montclair was raised by 6.5 feet, with improvements being made to the principal and emergency spillway. At the time of the 1989 Hydraulic Study, the dam was being further modified per the recommendations of the 1978 US Army Corps of Engineers Phase I report to turn ownership over to MPOA. The permanent pool elevation for Lake Montclair was reported to be 188 feet (NGVD) with the emergency spillway invert set at 193 feet (NGVD).

[26] In an effort to address adequate outfall issues and the implementation of water quality Best Management Practices (BMPs), the 1989 Hydraulic Study evaluated the alternatives of strategic 'over-detention' for site developments or regional facilities for storm water management. After considering a number of scenarios for mitigating the impacts of development, it was concluded that very little, if any, activity foreseen in the Powells Creek Watershed would be expected to have a serious effect on the floodplain elevations associated with the 100-year flood event due to the flood reduction provided by Lake Montclair. A significant factor that exists now, but was not an obstacle in the late 1980's is the permitting of on-line or regional facilities. The assessment showed that Lake Montclair attenuates discharges in the lower portion of the watershed to rates comparable to historic land-use discharges that reflect the conditions of 1956, which is before the structure was built. The hydrologic results showed that Lake Montclair reduces the discharges for existing conditions to historic rates all the way to the Potomac. Ultimate land-use discharge rates are reduced to historic rates essentially down to I-95 (within +/-10%) without consideration of additional attenuation provided by site and regional BMPs.

the impact that these events have on the drainage infrastructure.[27] Hydraulic studies indicate Lake Montclair provides regulatory-adequate 10-year detention below historic levels for existing development around and below the lake.[28] The PWC Department of Public Works (DPW) undertakes a variety of studies throughout the county to assess, monitor, evaluate, and seek improvements for water resources. These include studies relevant to watershed management, such as stream restoration, storm water pond and culvert retrofits, and Lake Montclair sedimentation control. These studies help determine courses of action to provide pollution control, prevent flooding, and improve water quality. As studies are completed, the reports are made available online for review and information.[29]

Having voluntarily adopted the Chesapeake Bay Preservation Act in 1990 into its local ordinance to cover Resource Protection Areas (RPAs) and Resource Management Areas (RMAs), PWC provides the governance of watershed management. RPAs and RMAs protect water quality, filter pollutants out of storm water runoff, reduce the volume of storm water runoff, prevent erosion, and perform other important biological and ecological functions. All of PWC is considered an RMA. Any property within 100 feet of Powells Creek or Lake Montclair is in an RPA; designated on all properties, both new and existing along all waterways in the county. The Lake Montclair "ribbon of life" is all in the RPA since it includes the shoreline, beaches and common area along the lake. No development, land disturbance, or vegetation removal is allowed in the RPA without approval by PWC Dept of Public Works.[30]

The connection between the lake and the watershed is affected by the watershed size, hydrology, precipitation, soils, and land use.[31, 32] Properties in the watershed 'not on the lake' can be 'connected to the lake' by flow of water which, in turn, could carry debris, pollutants, sediments and nutrients that could adversely affect environmental water quality; potentially jeopardizing the lake-ecosystem and future vitality of the lake. This includes actions, no

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[27] **Drainage infrastructure** is dependent upon hydraulic analysis and storm water design calculations. For adequate design of catch basins, storm drainage pipes, channels and culverts it is appropriate to estimate the peak discharge of the drainage area for the required design frequency. The peak discharge is then used to calculate the capacity of the storm drainage system based on the system's hydraulic characteristics. **Hydraulic analysis** is built upon fundamental hydraulic principles that lead to deterministic mathematical equations used to derive the physical properties of flow depth and flow velocity upon which all design works rely. The design of properly sized storm drainage systems requires knowledge of the watershed hydrologic behavior and hydraulic principles of fluids. **Hydrology** is the study of the movement, distribution, and quality of water, including the hydrologic cycle, water resources and environmental watershed sustainability. Domains of hydrology include hydrometeorology, surface hydrology, hydrogeology, drainage basin management and water quality.

[28] Some other interesting conclusions were provided to a sensitivity analysis performed by the 1989 Hydraulic Study for Powells Creek Watershed that investigated multiple scenarios of land cover and storm water management strategies. These included:

- Lake Montclair will continue to provide adequate 10-year detention, below historic levels, when all basins draining to the lake and those above Northgate Drive are fully developed. From Route 1 to the mouth of Powells Creek, the increase in discharge from 2000 cfs to 3500 cfs equates to an average depth increase of approximately 0.5 ft, neglecting tidal effects which would reduce the impact further.
- On-site detention in the lower half of the watershed provides minimal reductions in flood flows along Powells Creek. Storm water Management is necessary, however, to protect tributaries to the Powells Creek channel from contributing to downstream impairments.

[29] See PWC Watershed Studies at http://www.pwcgov.org/government/dept/publicworks/environment/Pages/Watershed-Studies.aspx

[30] Any Property Improvement Request (PIR) for property requiring development, land disturbance, or vegetation removal within the 100 foot RPA requires approval by PWC Department of Public Works before approval by MPOA would be considered. With approval by PWC Department of Public Works, property owners can selectively remove vegetation within the 100 foot RPA buffer:

- To provide limited water views; must be replaced with lower growing vegetation to provide equivalent water quality protection.
- To remove dead, dying or diseased trees and shrubs, and to remove noxious weeds and invasive plants.
- To provide for shoreline erosion control, provided that the buffer is replanted with native, woody vegetation.
- To create a water access path (boardwalk or trail) as long as it does not cause erosion.
- For water dependent uses, such as docks, piers and outfalls; and for utilities, public roads and driveways.

[31] As documented in the Powells Creek Watershed Management Plan of 2008, the storm drain infrastructure, including storm water management facilities, for the watershed is generally indicative of the age and density of the development. Due to the presence of regional lakes such as Lake Montclair and Lake Terrapin, the center of the Powells Creek watershed holds the key to the overall hydrologic response of Powells Creek. Another significant factor is the percent of higher density residential development that exists, much of which has little or no distributed storm water management in place. This includes sub-watersheds 720, 723 and to a lesser degree 725. The *Powells Creek Watershed Study: Hydraulic Analysis* details the hydrologic impact that this facility has on the watershed as a whole. Lake Terrapin, in sub-watershed 720, provides regional control of almost all of the developed (and developing) areas for half of the sub-watershed.

[32] The lower middle section of the Powells Creek Watershed is directly below Lake Montclair. This sub watershed 725 consists of three basic drainage conditions: (1) Development associated with the Montclair community that has no appreciable storm water management, but drains through an extensive storm drain network into Powells Creek; (2) Characterized by piped drainage systems in residential subdivisions, most of which lead to some form of storm water management, and (3) Rapidly disappearing wooded land cover. The final section of the watershed is the lower sub-watersheds downstream of Interstate 95. This area contains some development that has been in place for a longer period of time (i.e. along US Route 1) which have limited or no storm water management. The biggest trend in these areas is the development of large, high density residential subdivisions, including schools. The newer subdivisions do appear to have adequate drainage and storm water management, which (combined with the attenuating effects of Lake Montclair), should provide ample protection for Powells Creek.

matter how apparently insignificant, which individuals might perform on property in the watershed, such as keeping debris and pet waste out of the lake and reducing the amount of fertilizer on lawns and salt on driveways. This LMPP addresses resource management and protection considerations for watershed land use and lake management.

Much of the resilience and health of Lake Montclair is dependent upon use of properties affiliated with MPOA and those upstream in the Powells Creek Watershed. The Montclair community has more than 16,000 residents in more than 3,850 homes and townhomes that are affiliated with MPOA, along with its seven sub-associations; making up the residential community surrounding the man-made lake and golf course (seen in Figure 1-4).[33]

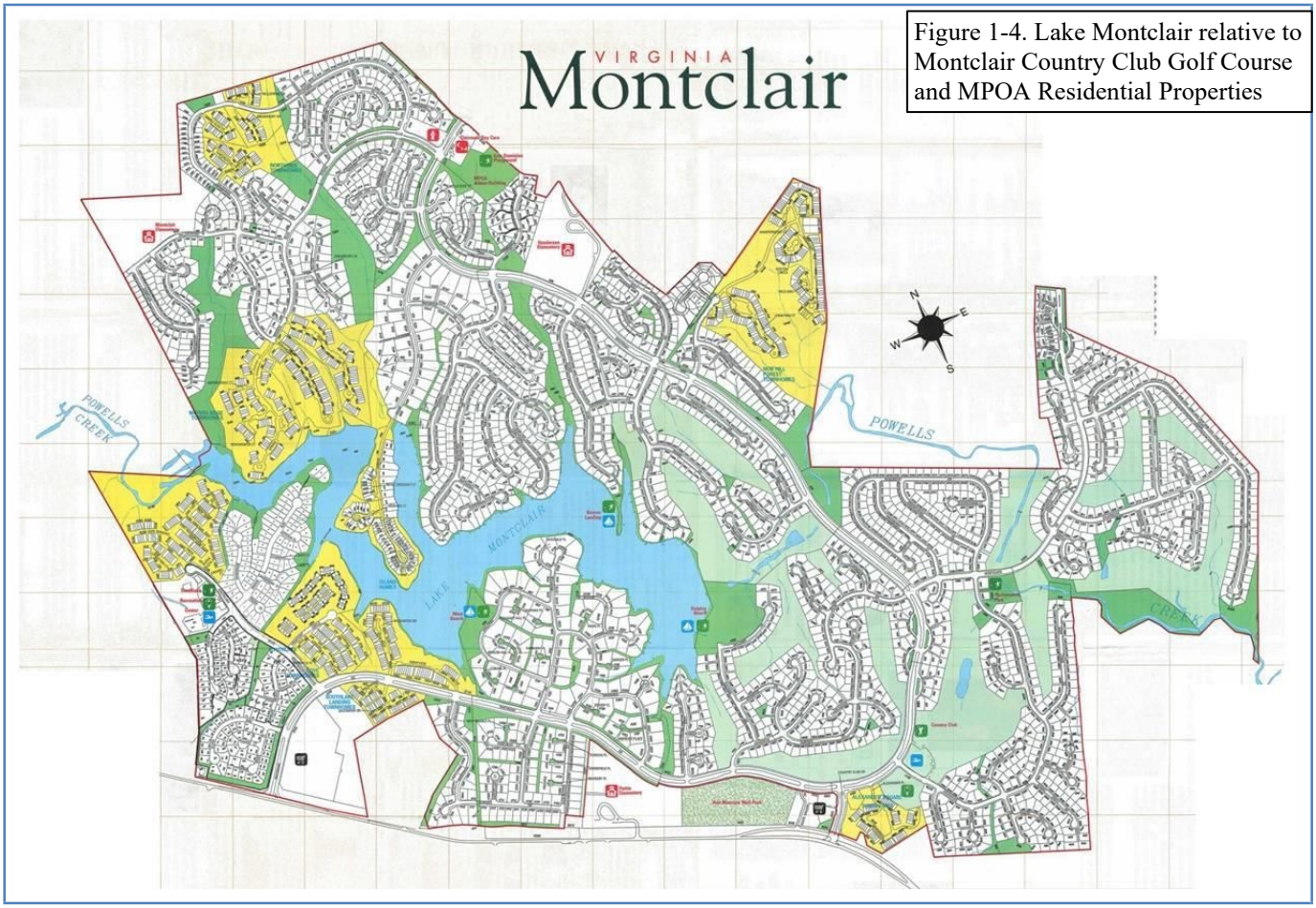

Figure 1-4. Lake Montclair relative to Montclair Country Club Golf Course and MPOA Residential Properties

As part of the Potomac District in Prince William County (PWC), "Montclair" is also a census-designated place (shown in the map in Figure 1-5), covering 6.2 square miles from Spriggs Road on the west and Minnieville Road on the northwest extending to Interstate 95 between Hwy 234 and Cardinal Drive) with a population of over 21,000. As such, census-designated Montclair is more than the homes, townhomes and residents affiliated with MPOA. However, having derived the "Montclair" name designation from the MPOA community, and the jurisdictional authority for management of Lake Montclair is under MPOA, the use of "Montclair" in this LMPP is considered equivalent to the community of residents and properties affiliated with MPOA. Communities outside of MPOA have properties that are

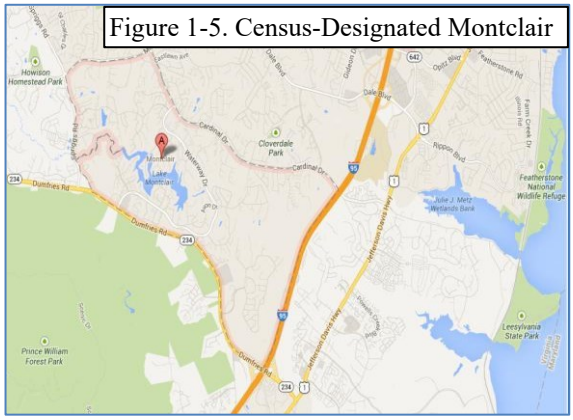

Figure 1-5. Census-Designated Montclair

[33] MPOA also includes seven sub-associations (highlighted in yellow in the Montclair map in Figure 1-4): Island Homes Association, Waters Edge Townhome Association, Southlake Cove, Southlake Landing, and Nob Hill, Northside Townhome Association, and Alexander Square HOA. Census-designated Montclair is more than the homes, townhomes and residents affiliated with MPOA. Some of the census-designated Montclair is outside of the Powells Creek Watershed; yet all of MPOA is in that watershed. For purposes of this LMPP, the use and reference to "Montclair" is equivalent to the community of residents and properties affiliated with MPOA.

connected to Lake Montclair and Powells Creek by flow of water. Property use and development in the watershed has had an impact on Lake Montclair and watershed ecosystem downstream of the lake.

Field assessments associated with Lake Montclair sedimentation control (with one of the maps in Figure 1-6) have revealed much about storm water management efforts and provide a baseline for planning activities.[34]

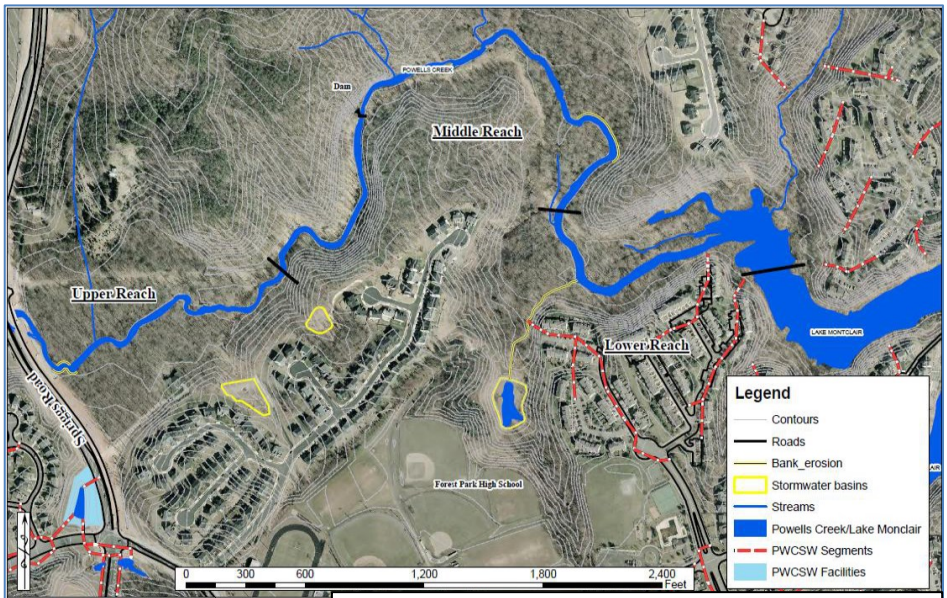

Figure 1-6. Powells Creek upstream of Lake Montclair

Environmental impacts downstream of the lake could potentially be attributable to property use in Monclair or upstream in the watershed. As such, the lake is affected by actions of those inside and outside of Montclair. Indeed, single points of failure and acts of negligence have had environmental impacts on Lake Montclair, primarily through cumulative effects. Fortunately, several stewardship activities (discussed in this LMPP) have contributed to restoring and retaining ecosystem services vital to sustaining a healthy, resilient lake.

Responsibilities for lake management and stewardship address issues much broader than activities in and on the lake and along the shoreline; so considerations for the Lake Montclair "ribbon of life" and "lake-watershed connection" contribute to lake management focused objectives.[35]

3. Regional Patterns, Social/Demographic Needs, and Water Use.

Powells Creek Watershed, like much of Prince William County, has undergone significant development. Within the last two decades the County has experienced an upsurge in growth and responded to social/demographic changes with various developments that have caused much disruption to the watershed with implications for Lake Montclair. Large tracts of land have been cleared for housing with asphalt, concrete and storm sewers taking the place of pervious surfaces, vegetation and other water retaining ground cover.[36] There is also extensive housing development with drainage from asphalt streets surrounding Lake Montclair and in the watershed above the lake.[37]

Storm water runoff into the lake necessitates periodic dredging to maintain a minimum depth of 4 feet and a 4:1 horizontal to vertical slope from the shoreline. Minimizing loss of the lake footprint (surface area) and retaining an adequate water depth are important to maintain water quality.[38] For example, in late 2007 Lake Montclair was dredged at a cost of $900,000 to MPOA. This dredging was necessary because of the large amounts of silt discharged into the headwaters of Lake Montclair at Powells Creek from commercial and housing development, the

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[34] Prince William County Dept of Public Works "Sedimentation Control Feasibility Study" (conducted by WR&A) Report July 2008.

[35] The 'ribbon of life' for Lake Montclair (discussed in Section V.c of this LMPP) is generally the area within 100 feet of the shoreline (on shore and within the lake). It is the most biologically diverse and ecologically sensitive area, and it is the most used area for recreation. It includes the earthen dam, beaches, and common areas along shoreline for fishing, trails, docks, ramps, racks, storage, and swimming platforms. Many activities that take advantage of the lake occur on the lake or within the 100 foot Resource Protection Area (RPA). These include parcels of land specifically designed and equipped as recreational areas (i.e., Dolphin Beach, West Beach, and Beaver Landing). The MPOA restricts use to fishing-only for other common areas contiguous to the lake (and surrounded by abutting privately owned property). Community shoreline fishing areas are on the northwestern side of the lake. The earthen dam has a paved trail at its crest that residents can use; yet traversing along, or fishing from, the slope embankments are prohibited (due to liabilities from potential accidents and potential damage to the dam.

[36] Prince William County is the third most populous jurisdiction in Virginia and has experienced rapid and steady growth which places additional pressures on the abundant natural resources that provide watershed ecosystem services.

[37] A large map guide of the Montclair community and the lake is available for residents via the MPOA office.

[38] Areas that become shoaled-in significantly would need to be considered for dredging prior to them becoming dry land or a wetland to prevent them from becoming potential fish-kill areas due to risk of reduced oxygen.

failure of storm fences for the Spriggs Road construction project, and the breach of the Lake Terrapin storm water management pond.[39] Also, over recent years some of the waterfront property along Lake Montclair has been cleared (some without replacement of ground cover) by the homeowners to provide a better view or access to the lake.[40] Moreover, responsive to changes in regional growth patterns in the Powells Creek Watershed, the Virginia Department of Transportation has extended the network of roads and widened others, such as Highway 234 and Spriggs Road; increasing the rate of storm water runoff into Lake Montclair. These combined factors have had an environmental impact on the lake, in general, but more specifically on storm water management of the lake. Any proposed changes to roadways in the Powells Creek Waterway (such as Hwy 234, Spriggs Rd, Hoadly Rd, Minnieville Rd, etc.) should be assessed within the context of ecosystem stewardship, including analysis of potential impacts to storm water management, residents' safety, and noise pollution abatement.

Fortunately, several positive factors contribute to enhancing the local watershed ecosystem. The 250 acre buffer surrounding the county landfill (designated as an "Audubon at Home Wildlife Sanctuary" in 2012) and numerous undeveloped acres in the watershed provide pervious surfaces for absorbing precipitation and slowing water flow. Moreover, many MPOA and PWC programs continue to contribute to ongoing stewardship of the lake and watershed. Several improvements have been made to drainage culverts around Lake Montclair to slow water flow and control soil erosion. These factors offer considerations for addressing environmental water quality of the lake within the context of its use[41] and role in the watershed.

As described in Section V of this LMPP, water use from Lake Montclair is primarily for recreational activities; supporting boating, fishing, swimming, birding, and photography activities. The lake is not used as a source for drinking water. Siphoning of water from the lake is primarily associated with the dam for water level control, and there is some pumping for irrigation sprinkler systems associated with the golf course of the Montclair Country Club and property lots adjacent to the lake. More significant than contributing to the quality of life in and around Montclair, the lake serves a function in contributing to the healthy sustainment of the Powells Creek Watershed and the restoration of the Chesapeake Bay, especially through MPOA's lake ecosystem management, including periodic dredging of sediment and efforts to reduce nitrates and phosphates in the lake.

For Lake Montclair to remain a healthy, resilient resource, many contributing activities by a broad range of organizations and people must be accomplished. As such, this LMPP will continue to be updated to reflect collaborative efforts addressing stewardship and use of the lake and watershed ecosystem. Supplemented by annual submittals of the Lake Montclair Environmental Quality Report (LMEQR) to the MPOA BoD, this LMPP will continue to assist in enabling more informed decision-making associated with ecosystem stewardship and use of the lake and watershed within the context of social needs and water use for the "broader-than-MPOA" community of stakeholders. Implementing strategies and activities delineated in this LMPP for Lake Montclair and the Powells Creek Watershed should serve to assist in enabling many organizations and residents to make relevant contributions in commitments to restore the Chesapeake Bay.

This LMPP provides community perspectives for use and stewardship of the lake and watershed ecosystem.

[39] Prior to the Fall 2007 dredging, portions of Lake Montclair were dredged in Fall 1991, 1996, and again in 2001 when approximately 18,000 cubic yards of silt were removed from specified sites; collected silt was taken to the PWC landfill on Hwy 234. MPOA has absorbed all expenses (without cost-sharing) for dredging even though more than 60% of sediment collected from the lake comes from Powells Creek.

[40] Shoreline lot development was essentially completed in the late 1990's as marked by the last homes being built on remaining waterfront property on Lake Montclair. As such, disturbance of vegetation and soil within 100 feet of the lake can be more readily controlled.

[41] Environmental water quality is a primary concern of Montclair residents, especially those who fish and swim in the lake. See Section V.a.3 of this LMPP for use of water in Lake Montclair. Monitoring and mitigating risks to environmental water quality remain high priorities for MPOA LMC and the Property Management Agent, in coordination with County and State organizations (see Section III of this LMPP).

II. Guidance and Support Strategies for Lake-Ecosystem Stewardship and Use

a. Priorities and Objectives that Guide and Inform Lake Management Strategies and Actions.

Seven guiding principles for lake-ecosystem stewardship, aligned with statutory requirements and evolving needs of the community, have influenced priorities and objectives for watershed land use and lake management. This LMPP provides clarifying intent of 25 objectives, along with strategies, practices, systems, tools, and means for measuring progress to reflect alignment with stewardship priorities and Chesapeake Bay protection initiatives.[42]

1. Guiding Principles for Lake-Ecosystem Stewardship.

Guiding Principles of Sustainable Sites, supplemented with landscape limnology, have provided key considerations for developing a comprehensive framework to address the responsible stewardship and use of the lake and its watershed.[43] Table 2-1 addresses seven principles for the collaborative stewardship approaches related to sustaining ecosystem services in informing and guiding associated decision-making for lake management.

Table 2-1. Principles of Sustainable Sites: Considerations for Watershed Land Use and Lake Management

Use a "Sustainable Ecosystem" Systems-Thinking Approach	Understand and value the relationships in an ecosystem and use an approach that reflects and sustains ecosystem services; consider the integral and essential relationship between natural processes and human activity.
Use a Collaborative, Ethical Approach and Maintain Integrity in Communications and Leadership	Encourage direct and open communication among all stakeholders; provide practices responsive to environmental changes, and link ethical responsibility with stewardship. Implement transparent and participatory leadership; develop alternatives with technical rigor, and communicate findings & recommendations in a consistent and timely manner.
Support a Living Process Responsive to Regional and Environmental Conditions	Continuously re-evaluate assumptions and values, and adapt to demographic and environmental change. Create and implement designs and practices that are responsive to economic, environmental, and cultural conditions within the local and regional context.
Use a Decision-Making Hierarchy of Preservation, Conservation & Regeneration	Maximize and mimic the benefits of ecosystem services by preserving existing environmental features; conserving resources in a sustainable manner, and regenerating lost or damaged ecosystem services.
Foster Environmental Stewardship and Do No Harm to Ecosystem Services	Make no changes that would degrade the surrounding environment; promote projects that encourage the use of conservation practices, and present opportunities to regenerate ecosystem services through sustainable design.
Be Cautious yet Mindful of Alternatives and Open to Input from All Stakeholders	Be cautious in making decisions that could create risk to the environment and human health; avoid actions which could cause irreversible damage; examine the full range of alternatives, and be open to input from all affected parties.
Provide Regenerative Systems as Intergenerational Equity	Provide future generations with a sustainable environment supported by regenerative systems and endowed with regenerative resources.

2. Stewardship Objectives and Strategies for Lake Management and Watershed Land-Use.

This LMPP addresses the desired outcomes for a sustainable lake and its watershed, and it provides strategies and practices for achieving those outcomes. To provide a common basis for community discussion for updating practices responsive to evolving needs, this LMPP addresses all factors influencing lake stewardship.[44] These factors include: regional patterns and statutes, water use, the lake-watershed connection (such as watershed features and hydrology, precipitation, soils, and land use), and lake water quality monitoring and assessment. The focus areas of interest for sustainable sites address: hydrology, soils, vegetation, fish & wildlife, materials, and human well-being. As such, this LMPP provides a compressive framework for informing and specifying strategies

[42] Individuals are encouraged to review this LMPP and contact the LMC to gain a better appreciation of how community interests are addressed by the respective objectives and strategies, and why they are included in priorities for Lake Montclair and its watershed.

[43] This LMPP is guided by an adaptation of Sustainable Sites principles (see http://www.sustainablesites.org/report), along with landscape limnology, a sub-discipline of fresh water science, in managing and conserving lake aquatic ecosystems using landscape perspectives.

[44] 25 years after the lake was conveyed to MPOA this LMPP was first published 11 Sept 2013. Prior to this, MPOA used several separate reports. In April 2003 an Interim Lake Management Plan was provided by the LMC intended to address: 1) water quality monitoring, 2) fishery management, 3) lakeside vegetation & hydrilla control, and 4) dredging [with only #1 & #3 completed and published at that time].

and practices in managing and monitoring: watershed land use, water quality, water use, water level, the lake's "ribbon of life," and biological communities in and around the lake. This LMPP includes both normative and informative strategies to achieve the objectives; so it delineates practices that are required to comply with statutes or community guidelines along with practices that are primarily intended to inform stakeholders of community norms and expectations for harmonious use of the lake and its "ribbon of life" assets.

Organized by topic focus areas of interest, the objectives for watershed land use and lake management are initially sorted for sustainable sites and lake management. Focus areas of interest are interrelated in natural processes and healthy systems; they are highlighted because their associated strategies contribute to ecosystem services and human well-being. The six focus areas are aligned with the five program areas of Chesapeake 2000.[45] The 25 statements of objectives in Table 2-2 are consistent with needs for sustainable sites and stewardship of a lake and its watershed. They are intended to inform the process of setting priorities for lake management.[46]

Table 2-2. Objectives for Watershed Land Use and Lake Management grouped by Focus Areas of Interests

Focus Areas	for Sustainable Sites Considerations:	for Lake Management Considerations:
1. HYDROLOGY	1-1. Manage water on site to sustain or regenerate healthy hydrologic processes. 1-2. Mitigate risks from identified hazards, pollutants, contaminants, and eutrophication-causing nutrients.	1-3. Sustain environmental water quality and healthy biological communities. 1-4. Monitor water quality and provide periodic reporting to better enable timeliness of action. 1-5. Manage and control water level, and report changes to enable timeliness of actions.
2. SOILS	2-1. Promote soil health to sustain or enhance ecosystem services through protection and reuse of soil and sand. 2-2. Sustain proper drainage for storm water management; minimize soil erosion.	2-3. Minimize use of soil amendments, chemicals & pollutants that harm human & ecological health. 2-4. Sustain integrity of lake & its "ribbon of life". 2-5. Monitor changes in watershed land use and report on trends that affect the lake ecosystem.
3. VEGETATION	3-1. Encourage use of natural ecological processes in managing plant resources.	3-2. Design and use vegetation to sustain or enhance on-site surrounding ecosystem services. 3-3. Manage lake vegetation consistent with use and natural balance of ecosystem services.
4. FISH & WILDLIFE	4-1. Provide habitat and food sources for fish and wildlife consistent with sustaining a natural balance. 4-2. Monitor insect populations & control destructive/disease-carrying insects.	4-3. Manage fish & wildlife consistent with needs for controlling water quality, fishing, and lake vegetation. 4-4. Monitor and report status of fish, aquatic life, and shoreline wildlife to inform action plans.
5. MATERIALS	5-1. Promote the efficient management of material resources and reduction of energy use, both embodied and operational.	5-2. Mitigate risks from potentially toxic and harmful materials. 5-3. Reduce foreign material in the lake.
6. HUMAN WELL-BEING	6-1. Design and sustain lake-ecosystem conditions to promote health and physiological benefits. 6-2. Promote the learning benefits of natural elements to enhance human cognitive functions.	6-3. Promote positive social dynamics in using the lake and "ribbon of life" assets. 6-4. Enhance conditions for use of the lake and its "ribbon of life" assets. 6-5. Provide resources for community engagement, notification, and education relative to lake issues.

This LMPP provides clarifying "intent" of the 25 objectives with associated strategies, practices, systems, tools, and means for monitoring risks and measuring progress to reflect community priorities. Table 2-3 (on the next three pages) provides the associated strategies and practices required to accomplish the respective objectives.[47]

[45] Chesapeake 2000 outlines over 100 commitments in five program areas: *Living Resource Protection and Restoration, Vital Habitat Protection and Restoration, Water Quality Protection and Restoration, Sound Land Use, and Stewardship and Community Engagement.*

[46] Objectives listed "for Lake Management Considerations" and some "for Aspects of Sustainable Sites" are explicitly addressed in this LMPP; all serve as information to guide responsible land use and contribute to lake management and stewardship considerations.

[47] Objectives marked with an asterisk * are explicitly addressed in this LMPP with processes and practices; others contribute to responsible stewardship of properties abutting the lake and in the watershed. This LMPP provides a compressive framework for specifying practices, some of which would fall within the scope of responsibilities of other MPOA committees and government organizations.

Table 2-3. Enabling Strategies for Lake Management Grouped by Focus Areas and Objectives

1.	**HYDROLOGY**
*	**1-1. Manage water on site to sustain or regenerate healthy hydrologic processes.** o Monitor and control storm water discharge to manage water flow, water level, and water quality. o Maintain surface runoff levels and landscape to filter or allow infiltration of surface runoff. o Maintain or enhance infiltration to reach target water balance conditions. o Reduce use of potable water in landscaping; promote use of storm water or "grey water" for irrigation.
*	**1-2. Mitigate risks of identified hazards, pollutants, contaminants, & eutrophication-causing nutrients.** o Identify corrective actions (with contingency plans) for toxic hazards, pollutants and contaminants. o Promote the prevention or reduction of eutrophication, and when needed, take corrective action. o Provide information and signs about drainage on "properties not on the lake" are connected to the lake.
*	**1-3. Sustain environmental water quality and healthy aquatic biological communities.** o Maintain or enhance physical condition of on-site and off-site receiving water bodies. o Filter pollutants to maintain or enhance water quality of on-site and off-site receiving water resources. o Monitor and sustain beneficial biological communities of on-site and off-site receiving water resources.
*	**1-4. Monitor water quality and provide periodic reporting to better enable timeliness of actions.** o Monitor the lake and watershed, through routine sampling, for pollutants and contaminants (LMEQR). o Monitor the lake for harmful bacteria and eutrophication-causing nutrients. o Provide periodic and annual reports on water quality (consistent with reporting in the LMEQR).
*	**1-5. Manage and control water level, and report changes to enable timeliness of actions.** o Monitor upstream rainfall & water flow in the watershed and lake water levels for potential warnings. o Provide an emergency action plan, compliant with regional statutes, to address needs and response to potentially catastrophic events that could adversely affect the dam or integrity of the lake (see EAP). o Provide storm water management planning to address the control of water levels during storms with reporting and procedures for property owners and those with roles and responsibilities for the lake. o Provide drainage at lower levels than required for emergency action to minimize property damage. o Provide publicized periodic lowering of water level to facilitate shoreline and dock maintenance. o Provide staffing and ensure training of staff for functions to manage water level and the dam. o Provide guidelines for pumping and irrigation sprinkling systems that use water from the lake.
2.	**SOILS**
*	**2-1. Promote soil health to sustain & enhance ecosystem services through protection & reuse of soil/sand.** o Maximize reuse of soils on-site (ie., sand washed from beaches and soil extracted from lake dredging). o Minimize disturbing vegetation and, where removal is unavoidable, protect soils to minimize damage. o Promote use of conservation practices in the treatment of soil to reduce greenhouse gas emissions. o Build soil organic matter; incorporate compost and mulch as soil amendments in landscaping. o Sustain areas of healthy soils; improve health of degraded soils in Resource Management Areas.
*	**2-2. Sustain proper drainage for storm water management, and minimize soil transport and soil erosion.** o Monitor surface water flow and take corrective action, as needed, to minimize soil transport. o Retain proper drainage and maintain drainage culverts and riparian buffers to minimize soil erosion. o Maintain aerobic conditions by limiting compaction and maintaining subsurface drainage.
*	**2-3. Minimize use of soil amendments, chemicals and pollutants that harm human and ecological health.** o Promote maintaining healthy soils so that harmful materials are not needed to support plant growth. o Minimize use of harmful materials, and use materials in the manner for which they are intended. o Promote efficient use of fertilizers & use of soil testing to verify need before using nitrogen fertilizers.
*	**2-4. Sustain integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs).** o Provide routine, periodic inspections of the earthen dam and spillways (reported in LMEQR). o Take corrective action on earthen impounding structure (dam & spillways) in a timely basis, as needed. o Provide lake dredging and maintain catch basin, forebay, culverts and drainage (reported in LMEQR). o Provide monitoring and corrective actions, as needed, to protect/sustain RPAs, shoreline & beaches.
*	**2-5. Monitor changes in watershed land use and report on trends that affect the lake ecosystem.** o For waterfront lots and beaches, monitor changes in use consistent with sustainability of the lake. o For Montclair lots "connected to the lake," review property improvements for construction practices. o Monitor upstream developments for practices conformant with the "Bay Act" and Chesapeake 2000. o Provide periodic and annual reports on changes in watershed land use relevant to impacts on the lake.

3.	**VEGETATION**
	3-1. Encourage use of natural ecological processes in managing plant resources. o Promote sustainment of sites to minimize management resources and reduce waste of plant resources. o Promote sustainable practices in the growth, installation and maintenance of vegetation. o Promote waste generation reduction during maintenance; recover landscape trimmings for composting.
*	**3-2. Design and use vegetation to sustain or enhance on-site surrounding ecosystem services.** o Use vegetation to achieve target water balance conditions through interception and evapotranspiration. o Promote use of native plants in landscaping and habitat restoration; and removal of harmful vegetation. o Conserve existing native vegetation consistent with regional reference landscape. o Sustain shoreline vegetation and submerged aquatic vegetation to maximize the ecosystem services provided by plants in riparian buffers, drainage culverts, catch basins, and forebays.
*	**3-3. Manage lake vegetation consistent with use and natural balance of ecosystem services.** o Monitor lake and shoreline for possible introduction of harmful, invasive vegetation (see LMEQR). o Provide periodic and annual inspections of submersed aquatic vegetation (see updates in LMEQR). o Monitor maintenance of shoreline vegetation to retain integrity of lake and to avoid undesired growth or unplanned encroachment of wet land conditions (see updates in LMEQR).
4.	**FISH & WILDLIFE**
*	**4-1. Provide habitat and food sources for fish and wildlife consistent with sustaining a natural balance**. o Provide and maintain "fish structures" consistent with the LMC Fish Habitat planning. o Provide reports on habitat status consistent with Fish Habitat planning reported in the LMEQR. o Monitor wildlife habitat protection efforts in the improvement of sites. o Sustain conditions for "bird sanctuary" environment consistent with lake & "ribbon of life" use trends.
*	**4-2. Monitor insect populations and control destructive/disease-carrying insects.** o Monitor changes in insect populations and their breeding areas, and coordinate control efforts. o Provide habitat for bats and insect-feeding birds that control mosquitoes and other harmful insects. o Control disease-carrying insects and promote use of natural controls, such as dragonflies, birds & bats.
*	**4-3. Manage fish & wildlife consistent with needs of controlling water quality, fishing, & lake vegetation.** o Provide fish flesh testing and submersed aquatic vegetation inspection (described in the LMEQR). o Sustain a healthy and plentiful balance of fish (consistent with program described in the LMEQR). o Take corrective action, as needed, to control populations of species that pollute the lake or shoreline.
*	**4-4. Monitor and report status of fish, aquatic life, and shoreline wildlife to inform action plans.** o Provide reports on fish, aquatic life, and wildlife (in annual updates in the LMEQR). o Monitor changes in aquatic life, fish population and lake vegetation that might provide early warning indicators for adverse or unhealthy changes in the lake environment, such as mercury and PCBs. o Monitor and report changes in venomous and destructive species and their habitats and food sources.
5.	**MATERIALS**
	5-1. Promote the efficient management of material resources and reduction of energy use. o Promote reduction of urban 'heat island' effect by using shading & pervious or semi-pervious surfaces. o Promote reclamation, reuse, and recycling of materials, and the reduction of material consumption. o Promote use of sustainable landscape materials that require reduced resource input to maintain. o Promote use of materials that are renewable or extracted, processed, and manufactured locally. o Promote the use of landscape lighting and equipment with low operational energy. o Promote the use of low embodied energy products and those powered with renewable energy sources.
*	**5-2. Mitigate risks from potentially toxic and harmful materials.** o Minimize use of materials, products and practices which are harmful to humans and the environment. o Promote minimizing the use of materials that produce hazardous pollutants during their life cycle. o Promote decreasing the need for toxic substances, herbicides, pesticides, phosphates and nitrates. o Coordinate with appropriate officials to monitor upstream development and site use, and provide for clean-up, containment or removal of any potentially toxic and hazardous materials, as needed.
*	**5-3. Reduce foreign material in the lake.** o Monitor introduction of debris, garbage, petroleum products, and other foreign material in the lake. o Establish lake-clean-up projects, as needed; monitor watershed property for possible clean-up efforts.

6.	HUMAN WELL-BEING
*	**6-1. Design and sustain lake-ecosystem conditions to promote health and physiological benefits.** o Provide spaces for interaction with nature, such as shoreline trails, benches, docks, beaches, and parks. o Provide safe spaces for physical activity, such as trails, parks, beaches, and swimming platforms. o Promote healthy environments using riparian gardens/trails and on-site food production gardens.
*	**6-2. Promote the learning benefits of natural elements to enhance human cognitive functions.** o Provide annotated maps of the lake and community indicating habitat for fish and wildlife. o Provide maps of common areas around the lake and throughout the community and neighboring parks. o Provide information about fish and wildlife in the lake ecosystem, including their beneficial roles. o Provide information on regional biodiversity and resources on local ecosystems and their functions. o Provide opportunities for passive experiences with nature; optimizing views of large trees and water.
*	**6-3. Promote positive social dynamics in safely using the lake and its "ribbon of life" assets.** o Provide spaces for safe social interaction, such as beaches and community areas with tables & seating. o Design spaces that address needs of children and any special needs of residents in the local community. o Provide safety training relative to boating, fishing, swimming, and using docks & swimming platforms. o Promote social activities and events on the lake, on beaches and in common areas with lake access.
*	**6-4. Enhance conditions for use of the lake and its "ribbon of life" assets.** o Survey use trends and identify potential conflicts in use of the lake and any parts of its "ribbon of life." o Provide lake access and improve "ribbon of life" use areas (ie., restrooms, benches, boat ramps, etc.). o Provide secure storage for boats and provide resources to promote safe use of beaches and the lake. o Minimize waterfront light pollution and control noise pollution (from vocal or electronic sources). o Coordinate with local authorities to minimize crime on the lake, beaches, and waterfront property.
*	**6-5. Provide resources for community engagement, notification, and education relative to lake issues.** o Provide storm alerts through regional/county government systems and community notification systems. o Provide alert system to report rapid changes in water level that might adversely affect property. o Provide information resources for enhancing awareness of lake water quality and watershed needs. o Provide information on community norms and expectations for safe and harmonious use of the lake and its "ribbon of life," especially addressing fishing, boating, swimming, trail use, & beach activities. o Use community media, such as newsletters and web sites, to provide information about the lake and its watershed, including environmentally safe alternatives for toxics, safe boating, safe swimming, etc. o Provide forums for stakeholder interaction in community meetings and town-hall sessions, as needed. o Provide means for empowering citizens to monitor/report on issues relevant to the lake & its resources. o Coordinate with local, state and regional programs in offering training relevant to lake stewardship. o Provide periodic reports to stakeholders on the status of watershed and lake interests and focus areas.

Aligned with regional,[48] state,[49] and county[50] programs and reflected in applicable plans, these 25 objectives (with associated strategies) reflect both a resilience-centric approach[51] focused on safeguarding the continuity of lake-ecosystem functions and a human-centric approach focused on enabling harmonious use of the lake and its "ribbon of life" assets. Informed and guided by these objectives and strategies, the MPOA continues to coordinate with others in evolving this LMPP; providing a common basis for stakeholder discussion for updating practices responsive to needs of the community, the lake and its watershed. This LMPP also serves as a communication tool for informing community residents of their roles contributing to the use and stewardship of the lake.[52] It provides information about how property 'not on the lake' can be 'connected to the lake' by flow of water which, in turn, carries pollutants, sediments and nutrients that could adversely affect the lake, watershed and Chesapeake Bay; potentially jeopardizing future enjoyment of the lake and regional natural resources.[53]

[48] See Table 7-1 on page VII-1 of this LMPP for matrix mapping of Montclair LMPP objectives to 'Chesapeake 2000' program areas. The Chesapeake 2000 agreement outlines over 100 commitments in five program areas: *living resource protection and restoration, vital habitat protection and restoration, water quality protection and restoration, sound land use, and stewardship and community engagement.*

[49] Virginia Department of Game and Inland Fisheries (VDGIF), the governing body for all state maintained lakes, provides guidance for relevant practices in the "Management of Virginia Ponds for Fishing." Other state programs are addressed in Section II.b.2.b of this LMPP.

[50] Prince William County (PWC) programs and support services are addressed in Section II.b.2.c and elsewhere in this LMPP.

[51] 'Resilience' refers to the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions, such as accidents and naturally occurring incidents and storms.

[52] This LMPP addresses several topics described in appropriate reports and plans that are described in Section VI.c of this LMPP.

[53] The intended audience of this LMPP is a broad range of stakeholders with varying levels of interests and background understanding.

b. Authorities, Guidance and Support for Lake Management.

The authorities for guiding actions relevant to lake management range from regional statutes to MPOA community guidelines. They provide the basis for Prince William County programs and MPOA efforts. Moreover, stewardship of the lake relies on partnerships both within and external to the Montclair community.

1. Regional Authorities and Statutes.

As part of the Chesapeake Bay basin,[54] the Powells Creek Watershed (in which Lake Montclair is a part) is under the governance of several regional authorities and statutes. Through participation in the Federal-Interstate Chesapeake Bay Program (CBP) and implementation of special state initiatives, the Commonwealth of Virginia[55] and Prince William County maintain firm commitments to rehabilitate and wisely manage estuarine resources. Several state initiatives are intended to restore and preserve the Chesapeake Bay and its tidal tributaries. The most relevant programs and regulatory guidelines associated with the Bay Act that influence stewardship activities for Lake Montclair and the Powells Creek Watershed are administered by county and state agencies.[56,57,58]

a) ***Federal - Interstate Chesapeake Bay Program.*** Virginia is part of the Chesapeake Bay Agreement (CBA) and the Chesapeake Executive Council that signed Chesapeake 2000 – a far-reaching agreement that guides combined efforts to restore and protect the Chesapeake Bay.[59] Chesapeake 2000 outlines over 100 commitments in five program areas – *Living Resource Protection and Restoration, Vital Habitat Protection and Restoration, Water Quality Protection and Restoration, Sound Land Use, and Stewardship and Community Engagement* – detailing protection and restoration goals critical to the health of the Bay watershed. It embraces stewardship and community engagement as a means for achieving the goals; recognizing the dependence upon citizen actions in the watershed. One of the Chesapeake 2000 goals, "promote individual stewardship and assist individuals, community-based organizations, businesses, local governments and schools to undertake initiatives to achieve the goals and commitments of this agreement," commits to increasing financial and human resources to localities to meet the challenges of restoring the Chesapeake Bay.[60, 61]

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[54] Chesapeake Bay, the largest estuarine system in the contiguous United States, has a watershed of almost 64,000 square miles. The total surface area of the Bay is 3,830 square miles. This unique ecosystem also contains more than 1,500 square miles of wetlands that provide critical habitat for fish, shellfish, and wildlife; filter and process residential, agricultural, and industrial wastes; and buffer coastal areas against storm and wave damage – see http://www.epa.gov/oaqps001/gr8water/xbrochure/chesapea.html.

[55] The Commonwealth of Virginia has over 2,200 square miles of the estuarine waters of Chesapeake Bay and its tidal tributaries. Adverse trends in water quality and living resources noted in the late 1970s prompted the creation of the Federal-Interstate Chesapeake Bay Program (CBP). "Summary of Outcomes from the October 2011 Chesapeake Bay Toxic Contaminants Workshop and Options for Scientific and Technical Advisory Committee (STAC) Involvement" noted 72% of tidal segments are partially or fully impaired due to toxic contaminants; contributing to intersex conditions in fish and poor stream health conditions; as such, more must be done to address toxics contamination.

[56] Virginia Department of Conservation and Recreation (DCR) http://www.dcr.virginia.gov addresses the impact of watershed land use for the Chesapeake Bay Preservation Act (known as 'The Bay Act' adopted by Virginia General Assembly in 1988); VA Dam Safety Act, Article 2, Chapter 6, Title 10.1 (10.1-604) of the Code of Virginia and Dam Safety Regulations established by the Virginia Soil and Water Conservation Board, and other guidelines and programs for soil and water conservation within the watershed. The Chesapeake Bay Preservation Area Designation and Management Regulations were adopted in 1990 and amended in December 2001.

[57] Virginia Dept of Environmental Quality (DEQ) has primary responsibility for point source discharge issues, bringing together programs in areas of surface & groundwater protection, waste management, and air pollution control. DCR is lead for nonpoint source control programs.

[58] Virginia Department of Game and Inland Fisheries (VDGIF), the governing body for all state maintained lakes, provides guidance for relevant practices in the "Management of Virginia Ponds for Fishing."

[59] Virginia, Maryland, Pennsylvania, District of Columbia, Environmental Protection Agency, and the Chesapeake Bay Commission signed the Chesapeake Bay Agreement (CBA) in 1983, formally initiating restoration and protection of the Bay. The approach established specific mechanisms for coordination among the Program participants. Several updated and new Bay Agreements, Executive Council Directives and pollution reduction strategies have been adopted by Bay Program partners, making goals and objectives of restoration effort more specific, establishing timelines and measurable outcomes to gauge progress. [Chesapeake 2000 program areas are mapped to Montclair objectives in LMPP Section VII.] See Chesapeake Bay Watershed Partnership at http://www.chesapeakebay.net/content/publications/cbp_12081.pdf.

[60] Despite some reductions in pollution resulting from nutrient load reduction efforts, the Chesapeake Bay and most of its tidal tributaries are still on the "impaired waters" list due to non-attainment of water quality standards. Per Section 303(d) of the Clean Water Act, this action necessitated the development of a "total maximum daily load" (TMDL) that sets Bay watershed annual limits for nitrogen, phosphorus, and sediment for each jurisdiction. A goal has been set to put all pollution control measures in place by 2025, with 60% of actions being completed by 2017. Increased dissolved oxygen concentrations, improved water clarity and growth of submerged aquatic vegetation (SAV), and the reduction in the frequency and size of algal blooms are among the anticipated outcomes in water quality from these actions (Chesapeake Bay TMDL: http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/tmdlexec.html).

[61] As one of the regulatory agencies, the DEQ in Virginia has been actively involved with EPA in the development of the Total Maximum Daily Load (TMDL) that set limits for nitrogen, phosphorus and sediment in Virginia's 39 tidal segments of the Bay and its tributaries.

b) ***Water Quality and Habitat Monitoring Initiatives for the Chesapeake Bay Program.*** Monitoring is vital to understanding environmental problems; it is necessary for developing strategies for managing the Bay's resources and assessing progress of management practices. The purpose of the Chesapeake Bay Program (CBP) Water Quality and Habitat Monitoring Program is to assess status and trends in water quality and living resources in the Virginia portion of the Bay and its major tidal tributaries. Monitoring, relative to water quality standards and basic ecological health indicators, is a vital component of the CBP and lake ecosystem stewardship.[62]

c) ***Watershed Implementation Plan (WIP)***. Virginia's WIP for the Bay "total maximum daily load" (TMDL) is an evolution of Virginia's Tributary Strategies Program started in 2005. The WIP establishes authorities, actions, and control measures to be implemented in achieving the source TMDL allocations for pollution loads to wastewater treatment plants, agriculture, forest, urban storm water, septic, and air sources.[63]

d) ***Community-based Watershed Management and Prevention of Toxics and Pollution.*** With the signing of the Chesapeake Bay Agreement (CBA) in 1987, Virginia committed to develop, adopt and implement a toxics strategy to achieve a *reduction of toxic pollutants* consistent with the 1987 Water Quality Act. The strategy was strengthened with adoption of the 1994 Basin-Wide Toxics Reduction and Prevention Strategy to have a "*bay free of toxics by reducing and eliminating the input of chemical contaminants from all controllable sources to levels that result in no toxic or bioaccumulative impact on living resources that inhabit the Bay or on human health."* Building upon progress achieved through implementation of previous strategies, CBP adopted the "Toxics 2000 Strategy" with an objective to strive for zero release of chemical contaminants from point and non-point sources through pollution prevention and other voluntary means. This includes commitments that provide the means to measure progress toward meeting the overall strategy goal. This is aligned with the *Pollution Prevention (P2)* initiative that is a hierarchy of activities and techniques to reduce or eliminate wastes at their source of generation. Many P2 techniques both decrease chemical discharges and waste generation, and result in increased production efficiency and reduced waste disposal costs. *To achieve the Toxics Strategy goal, a community-based watershed management approach is encouraged to tailor restoration, protection, prevention, and assessment actions to the needs of specific small watersheds and to chemicals of concern.*[64]

To ensure long-term success in eliminating and preventing toxics impacts in small watersheds, it is essential that people who live, work, and play in the watershed understand chemical contaminant issues and are actively involved in addressing relevant problems in their watershed; ensuring that progress is made and sustained.

2. Collaboration, Partnerships, Grants, and Services Relevant to Lake-Ecosystem Stewardship. Because Powells Creek watershed flows into the Potomac River which is part of the Chesapeake Bay basin, it is governed by CBA/CBP regional statutes and program initiatives administered by state and county authorities. As such, several programs, agreements and partnerships with Federal and State agencies, along with support by County and volunteer organizations enable MPOA to leverage the use of others' resources to sustain the Lake Montclair ecosystem consistent with stewardship needs of the community in the Chesapeake Bay basin.

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[62] Virginia's Chesapeake Bay monitoring program addresses those parameters directly related to Water Quality Standards (e.g. dissolved oxygen, water clarity, chlorophyll *a,* etc…) as well as basic ecological health indicators such as primary productivity, phytoplankton species, nutrients, etc. It provides water quality monitoring at numerous fixed stations; water quality monitoring and estimates of nutrient loading at numerous stations throughout the Bay watershed; monitoring of phytoplankton communities at several stations; monitoring of benthos communities in the Bay and its tributaries at 19 fixed stations and 100 random stations per year; spatially and temporally intensive monitoring of selected water quality parameters on a rotating water body basis for 3-year periods.

[63] Virginia's Watershed Implementation Plan (WIP) for the Bay TMDL charts out a study designed to evaluate the numeric chlorophyll *a* standards used to determine nutrient impairment. The WIP is designed through collaboration of agencies under the Secretary of Natural Resources, local and regional non-regulatory governmental bodies, concerned citizen groups, and the regulated community to accomplish the allocation goals set by the Bay TMDL. It is anticipated that many of these allocations will be achieved through the enforcement of current and proposed regulations. Proposed tax credits and existing grant programs (such as Virginia's Water Quality Improvement Fund) will facilitate Best Management Practices and system upgrades that prevent and/or reduce nutrient and sediment pollution. More information about Virginia's Phase I WIP can be found at the following website: http://www.deq.state.va.us/tmdl/baywip.html.

[64] Toxics 2000 Strategy at http://www.chesapeakebay.net/content/publications/cbp_12083.pdf encourages development of plans that *tailor restoration, protection, prevention, and assessment actions to the needs of specific small watersheds and to chemicals of concern.* It provides a focus for *Areas with Low Probability for Adverse Effects* to remain un-impacted. Virginia is committed to: regularly monitor these areas to detect early warning signs of increased chemical contaminant loads or ambient levels that may pose a risk to living resources; encourage sound land use and development activities to prevent or reduce current chemical contaminant loads by taking voluntary actions that go beyond point and nonpoint source regulatory programs, particularly in areas under growth and development pressures.

a) ***Assistance, Grants and Agreements with U.S. Federal Government organizations*****.** To fulfill its stewardship responsibilities, MPOA has leveraged the use of cooperative agreements and opportunities for grants[65] with Federal departments and agencies for managing the lake-watershed ecosystem and the quality of water, as well as providing inspection and monitoring services.

1) **U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS)** provides support via a Cooperative Service Agreement with MPOA[66] with assistance from the Wildlife Services (WS) in managing the goose population on Lake Montclair. USDA APHIS WS provides Federal leadership and expertise to resolve wildlife conflicts to allow people and wildlife to coexist.[67] The efforts help people resolve wildlife damage to resources and reduce threats to human health and safety. Funding for the Wildlife Services Program is a combination of federal appropriations and cooperator-provided funds.

2) **U.S. Fish and Wildlife Service (FWS)** has programs focused on minimizing the risk from contaminants, especially Endocrine (Hormone) Disruptors,[68] to address water quality concerns affecting health of people, as well as other mammals, amphibians, fish, birds, and reptiles. FWS co-sponsors the SMARxT DISPOSAL[69] campaign to inform people to protect the nation's aquatic resources by safely disposing of medicines.

3) **U.S. Federal Emergency Management Agency (FEMA)** has Federal Guidelines for Emergency Action Planning for Dams (FEMA Pub-64) with guidance to help dam owners, in coordination with emergency management authorities, to effectively develop and exercise Emergency Action Plans for dams.[70]

4) **U.S. Environmental Protection Agency (EPA)** Chesapeake Bay Program Grant and Cooperative Agreement (CBPG&CA) provides funds to focus on the restoration and protection of the Chesapeake Bay watershed while simultaneously recognizing that those funds are only one piece in achieving this fundamental goal. Overall mission success is directly tied to the success of the CBP partners' ability to effectively utilize all resources, regardless of source, in reducing the level of nutrients and sediments in the Chesapeake Bay and restoring living resources. ***Small Watershed Grants***, CBPG&CA Section 117(g)(2), applies to the management of the Lake Montclair ecosystem.[71] The grants program has been designed to encourage the sharing

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[65] Grants and Cooperative Agreements: *"Grant"* is the instrument used when (1) the principal purpose of the relationship is to transfer a thing of value to the State, local government, or other recipient to carry out a public purpose of support or stimulation authorized by a law of the United States instead of acquiring (by purchase, lease, or barter) property or services for the direct benefit of the Government; and (2) substantial involvement ***is not*** expected between the executive agency and the State, local government, or other recipient when carrying out the activity contemplated in the agreement. *"Cooperative Agreement"* is the instrument used when the relationship is as stated for a Grant and "substantial involvement ***is*** expected between the executive agency and the State, local government, or other recipient when carrying out the activity contemplated in the agreement."

[66] Cooperative Agreements and Grants associated with the US Department of Agriculture (USDA) Animal and Plant Health Inspection Service are addressed via their website at http://www.aphis.usda.gov/mrpbs/fmd/agreements_faq.shtml

[67] USDA APHIS WS conducts program delivery, research, and other activities through its Regional and State Offices, the National Wildlife Research Center (NWRC) and its Field Stations, as well as through its National Programs. WS biologists apply the integrated wildlife damage management approach to provide technical assistance and direct management operations in response to requests for assistance. WS NWRC research scientists are dedicated to the development of wildlife damage management methods. WS conducts its activities pursuant to agreements and legal authorities, and conducts environmental review processes to comply with the National Environmental Policy Act. WS develops Annual Program Data Reports to provide the public with information about its wildlife damage management activities.

[68] As evidenced by male Bass fish bearing eggs found across the Potomac River Watershed, there is mounting concern on a wide range of substances, known as endocrine disruptors that may interfere with the normal functioning of a living organism's hormone system. Endocrine disruption has the potential to cause reproductive, behavioral, immune system, and neurological problems and tumors. They may pose the greatest risk to offspring during prenatal and early postnatal development when organ and neural systems are developing. However, adverse consequences may not be apparent until much later in life. In addition, endocrine disruptors may affect not just the offspring of exposed mothers during pregnancy, but future offspring as well. Chemicals that mimic or antagonize the female estrogenic hormones, male androgenic hormones (such as testosterone), or thyroid hormones, are currently receiving the most attention since these are needed to support life in mammals, including people, as well as amphibians, fish, birds, and reptiles. Possible effects on invertebrates also are getting attention.

[69] See SMARxT Disposal campaign at http://www.smarxtdisposal.net/, co-sponsored by US FWS, American Pharmacists Association and Pharmaceutical Research and Manufacturers of America.

[70] FEMA is part of the U.S. Department of Homeland Security. The purpose of the guidance in FEMA 64 is to assist in emergency action planning. This document is an update of FEMA 64, Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners.

[71] See http://www.epa.gov/region3/chesapeake/grants/2012Guidance/2012_CBPO_Grant_Guidance_Nov2011.pdf. U.S. Environmental Protection Agency (EPA) Chesapeake Bay Program Grant and Cooperative Agreement Guidance (November 2011), was issued pursuant to EPA Delegation No. 2-46 Chesapeake Bay Program and EPA Region III Delegation No. 2-46, which, together, delegate the Director of the Chesapeake Bay Program the authority to promulgate Agency Guidance for grants issued under Clean Water Act Section 117.

of innovative ideas among the many organizations wishing to be involved in watershed protection activities. It specifies that grants can be awarded under Section 117(d) to local governments, nonprofit organizations, and individuals in the Chesapeake Bay region working at a local level to protect and improve watersheds while building citizen-based resource stewardship. The purpose of the grants program is to demonstrate effective techniques and partnership-building to achieve CBP objectives at the small-watershed scale.[72]

b) ***Support from Departments and Agencies in the Commonwealth of Virginia.*** Many statutes and programs associated with the Bay Act are administered by Virginia state-level agencies (often with county-level programs) to provide relevant regulatory guidelines and support for Lake Montclair and the Powells Creek Watershed. MPOA and Prince William County are eligible to gain assistance from state-sponsored programs.

1) **Department of Conservation and Recreation (DCR)**[73] provides "Local Watershed Management Planning" guidance for environmental planning conducted by local governments and communities; it serves as a resource for prioritizing goals and addressing needs that incorporate a wide range of social, economic and environmental factors.[74] DCR provides the Virginia Dam Owner's Handbook and conducts workshops for dam owners/operators.[75] DCR provides grants for dam safety and flood prevention and protection that encourage and enable people to enjoy, protect and restore natural and cultural treasures. DCR works in cooperation of partners and customers, such as PWC and MPOA, to provide improvements to the quality of resource lands and waters by serving as a trusted steward of outdoor recreational and natural resources; promoting conservation and enjoyment of Virginia's diverse and unique environment for future generations, and protecting public safety through regulatory programs and conservation law enforcement. DCR coordinates programs for storm water management, dam safety, recreational planning, trails, and grants; as well as land conservation and natural heritage. Eligible projects for *Dam Safety* (for government and private entities) include: dam break inundation zone analysis, mapping and digitization; hazard classification analysis and ACER M-11, emergency action plan development; incremental damage analysis, spillway capacity analysis, and engineering & design for dam repairs.[76] In 2014 MPOA successfully obtained grants from DCR in support of

50% matching, reimbursable grant funds for dam and lake ecosystem stewardship **are available to dam owners and local governments from the Virginia Dam Safety, Floodplain Prevention and Protection Assistance Fund.**

[72] Aligned with the *Chesapeake 2000* goal of "achieving and maintaining the water quality necessary to support the aquatic living resources of the Bay and its tributaries and to protect human health," these grants can be awarded non-competitively to any watershed jurisdiction that has signed the CBA. The U.S. EPA Region 3's Chesapeake Bay Program Office (CBPO) administers funds to focus on the restoration and protection of the Chesapeake Bay watershed. The guidance presents organizations with the best possible information needed to apply for funding. It provides a framework to attain successful assistance agreements that work toward achieving goals set forth in the first Chesapeake Bay Agreement of 1983 and subsequent agreements.

[73] Virginia Department of Conservation and Recreation (DCR) http://www.dcr.virginia.gov addresses the impact of watershed land use for the Chesapeake Bay Preservation Act (known as 'The Bay Act' adopted by Virginia General Assembly in 1988); VA Dam Safety Act, Article 2, Chapter 6, Title 10.1 (10.1-604) of the Code of Virginia and Dam Safety Regulations established by the Virginia Soil and Water Conservation Board, and other guidelines and programs for soil and water conservation within the watershed. The Chesapeake Bay Preservation Area Designation and Management Regulations were adopted in 1990 and amended in December 2001. DCR provides opportunities that encourage and enable people to enjoy, protect and restore Virginia's natural and cultural treasures.

[74] Considerations about water quality, stream management, habitat restoration, and the relationship between land use planning and healthy watersheds have become key components of planning at community and regional levels. Local Watershed Management Planning (at http://dcr.cache.vi.virginia.gov/stormwater_management/documents/wshedguideb2b.pdf) in Virginia addresses the benefits of using watersheds as realistic delineators for natural resource planning efforts. More localities are using watershed management planning either within their existing comprehensive planning or to promote regional cooperation. The Virginia Watershed Advisory Committee, a consortium of Virginia agencies, regional organizations and local government representatives involved in watershed management and restoration, developed the guide to give communities tools to develop local, effective, community-based watershed management plans. These plans are a framework to improve management of Virginia's 494 watersheds through strategies encompassing local solutions. Effective watershed management plans can help Virginia's local governments meet new regulatory requirements, including Total Maximum Daily Load (TMDL) and stormwater provisions of the federal Clean Water Act. Plans developed locally also will help the state meet commitments in the Chesapeake 2000 Agreement. Most importantly, watershed plans enable communities to make appropriate decisions at a level that allows them to meet local residents' needs, such as improved water quality or enhanced recreational opportunities. This guide provides a related checklist and explores the relationship between local watershed management planning and state and federal water quality programs.

[75] Virginia Dam Owner's Handbook provides the applicable safety laws and regulations, relevant forms and reports, guidance documents, examples for emergency action plans, and many other resources. MPOA annually sends representatives to DCR 'dam owners' workshops.

[76] The Grant Manual details how to apply for a 50% matching, reimbursable grant and is available online at www.dcr.virginia.gov under Dam Safety & Floodplain Management; applications are normally taken annually before May. In 2014 the MPOA was awarded grants totaling $11,200 associated with Lake Montclair Dam operations certification to partially cover expenses associated with the Dam Break Inundation Study, the Dam Incremental Damage Analysis, and the Spillway Integrity Analysis.

efforts associated with the recertification for operations and maintenance of the dam. Within DCR, the Virginia Soil and Water Conservation Board oversees 4VAC50-20 impounding structure regulations and guides delivery of soil and water conservation services.[77]

2) **Department of Environmental Quality (DEQ)**[78] protects and enhances Virginia's environment, and promotes the health and well-being of the citizens of the Commonwealth. DEQ enables residents to enjoy cleaner water; available for all uses, along with improved air quality that supports the community and watershed ecosystems. As needed, DEQ supports efforts restoring any contaminated land in and around Montclair.

3) **Virginia Department of Game and Inland Fisheries (VDGIF)**[79] is responsible for the management of inland fisheries, wildlife, and recreational boating in the Commonwealth of Virginia. It also manages the Watchable Wildlife program; providing technical assistance to land stewards to improve their land for wildlife viewing.[80] MPOA coordinates with VDGIF, as applicable, to manage wildlife and inland fish to maintain optimum populations of all species consistent with serving the needs of the community. VDGIF provides opportunity for all to enjoy wildlife, inland fish, boating and related outdoor recreation; to safeguard the rights of Montclair residents to legally fish on Lake Montclair; to promote safety for persons and property in connection with boating and fishing; and to provide educational outreach programs and materials that foster an awareness of and appreciation for Virginia's fish and wildlife resources, their habitats, and fishing, and boating opportunities.

4) **Other Government Organizations in the Commonwealth of Virginia** provide vital support for addressing lake management and water quality concerns[81] -- they include: Forestry, Health, Marine Resources Commission, Agriculture and Consumer Services, and units with the Virginia Institute of Marine Science and Old Dominion University. As needed, MPOA and PWC coordinate with these organizations (and others) to obtain relevant information and support for activities concerning the lake and the watershed.

c) ***Prince William County (PWC) Programs and Support Services.*** Aligned with Federal and State programs associated with the Bay Act, and responsive to residents' needs, Prince William County programs provide relevant stewardship services for the Powells Creek Watershed which has the most significant impact on the ecosystem of Lake Montclair. PWC programs, primarily through the Department of Public Works, function in collaboration with MPOA in fulfilling stewardship roles for Lake Montclair and the community.

1) **PWC Department of Public Works** undertakes a variety of projects to help protect waterways and improve water quality.[82] PWC shares the commitment to meeting and exceeding the Federal and State guidelines related to monitoring and improving local waters. Montclair benefits from county projects that range from stream restoration, drainage and flood control to inspections for storm water management ponds. The PWC studies assess, monitor, and seek improvements for water resources. These studies help

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[77] Supported by DCR's Divisions of Stormwater Management and Dam Safety and Floodplain Management, the VSWCB's responsibilities include: 1) oversight and support of Virginia's soil and water conservation districts; 2) oversight and enforcement of nonpoint source pollution control programs including Chesapeake Bay preservation areas, stormwater management, erosion and sediment control and municipal separate storm sewer systems; 3) oversight and enforcement of dam safety and floodplain management programs and regulations; and 4) approval of loan criteria for loans from the Dam Safety, Flood Prevention and Protection Assistance Fund.

[78] DEQ has primary responsibility for point source discharge issues, bringing together programs in the areas of surface and groundwater protection, waste management, and air pollution control. DCR has lead for nonpoint source control programs.

[79] Virginia Department of Game and Inland Fisheries (VDGIF), http://www.dgif.virginia.gov/ the governing body for all state maintained lakes, provides guidance for relevant practices in the "Management of Virginia Ponds for Fishing," and is responsible for fishing and hunting licenses and boat registration and titling.

[80] See the Watchable Wildlife program http://www.dgif.virginia.gov/wildlifewatching/ that enhances, elevates and promotes wildlife viewing and nature appreciation for the benefit of society, while building community awareness, understanding and support for conservation of the wildlife and habitats upon which these activities depend. This program provides technical assistance to both public and private land stewards to improve their land for wildlife viewing, and to address urban wildlife issues through workshops, publications, and web-based information.

[81] To help citizens understand which Government Agency is responsible for various programs associated with water quality, the Virginia Water Research Center compiled a guide http://vwrrc.vt.edu/pdfs/AgencyGuide.pdf. State regulations cover water-supply and wastewater facilities, aquatic-resource protection and management, fishing, shellfishing, boating, storm water management, waste management, handling of pesticides and other toxic materials, and many other activities affecting Virginia's water resources. Many agencies and citizen boards are involved in developing water-related regulations in Virginia. Once adopted regulations become a part of the *Virginia Administrative Code*.

[82] For PWC projects, see http://www.pwcgov.org/government/dept/publicworks/environment/Pages/Protect-Water-Resources.aspx or contact PWC Department of Public Works at703-792-7070.

determine the course of action to prevent pollution control, flooding, improve water quality and protect sources of drinking water. As studies are completed, the reports are made available online for review and information. Watershed and lake sediment reports are available for the Powells Creek Watershed.[83] The PWC Department of Public Works sponsors planting and restoration projects along streams and creeks to help create buffers, safeguard stream banks, stabilize soil against erosion, and control run-off to protect water quality.[84] *Preservation of Resource Protection Areas (RPAs) and Resource Management Areas (RMAs)* is an important aspect of storm water management and ecosystem stewardship. RPAs and RMAs protect water quality, filter pollutants out of storm water runoff, reduce the volume of storm water runoff, prevent erosion and perform other important biological and ecological functions. Having voluntarily adopted the Chesapeake Bay Preservation Act in 1990 into its local ordinance to cover RPAs and RMAs, Prince William County provides the governance of watershed management. All of PWC is considered an RMA. Any property within 100 feet of Powell's Creek or Lake Montclair is in an RPA; designated on all properties, both new and existing along all waterways in the county.[85]

No development, land disturbance, or vegetation removal is allowed in a RPA (within 100 feet of water) without approval by PWC Department of Public Works.

2) **PWC's Storm Water Management Program** is responsive to the county's unique topography and evolving needs which require development, operation, and maintenance of a storm water management system that consists of man-made components (pipes, ditches, and ponds) and natural components (creeks, wetlands, and floodplains) to control the quantity and enhance the quality of storm water. The program[86] is responsible for enhancing water quality, monitoring air quality, protecting properties and the public from flooding due to storms, and pollution prevention through public outreach projects. The program manages PWC's water resources through protection of wetlands, control of storm water runoff, implementation of pollution prevention activities, public education, review of site development plans, use of Low Impact Development (LID) strategies, and inspection of developments for proper drainage and erosion control.[87] PWC has demonstrated its commitment to protecting waterways, reducing non-point source pollution loads, monitoring air & water quality, and protecting properties and the public from flooding. These activities help safeguard the water quality and reduce the pollution in Lake Montclair and Powells Creek Watershed which flows into the Potomac River and the Chesapeake Bay.

3) **PWC's Environmental Monitoring Program** supports the stewardship of Powells Creek watershed which includes the ecosystem of Lake Montclair. In 2003 PWC initiated a voluntary surface water, storm water, and sediment monitoring program at the PWC Sanitary Landfill. The landfill area is situated in the Powells Creek Watershed on a north-facing slope which is drained on the north side by Powells Run. The monitoring program was implemented by PWC in response to its commitment to constructing and operating a landfill that meets or exceeds regulatory requirements and protects the surrounding environment and neighborhoods. The purpose of the monitoring program is to assist in evaluating the landfill and landfill-related operations for potential impacts to surface water quality in Powells Creek (and Powells Run). PWC provides the Environmental Monitoring Report[88] to MPOA, and it provides documentation of the sampling and analysis activities PWC has implemented in accordance with the voluntary monitoring program.

4) **PWC's Virginia Cooperative Extension (VCE)**, a partnership of Virginia Tech and Virginia State University, is the cooperation of local, state and federal governments in partnership with thousands of citizens. With the help of the Extension Leadership Council, local extension offices design, implement and evaluate VCE's programs that help protect the environment and improve the impact of urban horticulture on the

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[83] See PWC Watershed Studies at http://www.pwcgov.org/government/dept/publicworks/environment/Pages/Watershed-Studies.aspx

[84] PWC Conservation Alliance Community Stream Stewards offers opportunities; those interested in volunteering, should call 703-792-6819.

[85] With approval by PWC Department of Public Works, property owners can selectively remove vegetation within the 100 foot buffer:

- To provide limited water views; must be replaced with lower growing vegetation to provide equivalent water quality protection.
- To remove dead, dying or diseased trees and shrubs, and to remove noxious weeds and invasive plants.
- To provide for shoreline erosion control, provided that the buffer is replanted with native, woody vegetation.
- To create a water access path (boardwalk or trail) as long as it does not cause erosion.
- For water dependent uses, such as docks, piers and outfalls; and for utilities, public roads and driveways.

[86] The PWC Storm Water Management Program was established on May 15, 1994 by the Board of County Supervisors.

[87] Learn more about PWC storm water management efforts with the flier on the Stormwater Program and view information on the Stormwater Education Program. PWC contacts to address watershed services: Marc Aventi and Chuck Williamson at 703 792 4064.

[88] See Environmental Monitoring Reports, PWC Sanitary Landfill, Permit No 029, Ref 07396604XX, on file in MPOA office.

environment. In conjunction with PWC's Department of Public Works, VCE's Environment and Natural Resources Storm Water Management Program educates organizations about appropriate best management practices for storm water run-off. PWC VCE Staff and Master Gardener volunteers work with property owners to conduct site visits for evaluation on common best management practices for storm water management. By addressing citizens' needs for attractive, problem-free lawns and gardens, PWC VCE contributes to minimizing potential water quality impairments.[89] Because all water that goes down neighborhood storm drain flows directly into local creeks, streams, lakes, rivers, and eventually the Chesapeake Bay, the PWC VCE has recommended practices for residents through "Storm Water Smarts: 6 Ways to Protect Our Waterways!"[90] This is significant for Montclair since community street drainage flows into Lake Montclair; so materials on streets get into the lake.[91]

5) **PWC's Stream Protection Strategy and Volunteer Programs** for protecting the environment enable residents to make a difference in moving toward a greener and cleaner community. Volunteers help by starting or increasing efforts to conserve energy; reduce waste, control emissions and reduce pollution. Many resources are available to restore and improve local natural areas. Tips are offered for voluntary adoption that can be put into practice to help protect the watershed environment.[92] Residents can learn about the conditions of streams and environmentally sensitive areas in the County through the Stream Assessment Viewer.[93]

d) ***Collaboration with Conservation Organizations and Volunteer Groups.*** Several non-government conservation groups have programs well-aligned with watershed and lake management stewardship.

1) **Chesapeake Bay Foundation (CBF)** is the largest conservation organization dedicated solely to saving the Chesapeake Bay basin.[94] Their motto, "Save the Bay" (through *education*, *advocacy*, *litigation*, and *restoration*) defines the organization's mission and commitment to reducing pollution, improving

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[89] Contact a PWC VCE Master Gardener by calling the Horticulture Help Line at 703-792-7747, or e-mail master_gardener@pwcgov.org. MPOA Landscape & Facilities Management Committee has a VCE Master Gardener as a member.

[90] PWC Storm Water Management http://www.pwcgov.org/government/dept/vce/Pages/Stormwater-Management-Education-Program.aspx education program offers the *Storm Water Smarts: 6 Ways to Protect Our Waterways:*

- Limit fertilizer and pesticide use. Use the proper amount of fertilizer at the right time. Do not apply if rain is in the forecast. Sweep up any fertilizer from hard surfaces (driveway, sidewalk, and street); keep it from getting washed into our storm drains.
- Use a pooper scooper! Viruses, parasites and bacteria from pet waste can easily wash into storm drains and end up in our waterways without being treated. People would not want to swim in water with this in it!
- Check vehicles for fuel and oil leaks. Grease and oil drippings from cars wash directly into storm drains and go straight waterways.
- Wash cars on the lawn or go to a car wash. Water at car washes goes to water treatment plants. Dirt and oils washed off cars can hurt fish and animals if it goes straight into storm drains. The grass and soil acts as natural filters capturing the material from cars.
- Properly dispose of leaves and grass clippings. Start a compost pile. Don't dispose of yard waste in gutters, creeks, or lakes.
- Dispose of any hazardous home chemicals and electronics at the PWC Landfill on Wednesdays & Saturdays from 10 a.m. to 5 p.m. Call 703-792-5750 for more information.

[91] In addition to staffing the Extension Horticulture Help Desk, PWC staff and Master Gardener volunteers help in a number of ways:

- Seasonal plant clinics to answer questions on insect, disease, or gardening problems (with Basics of Gardening Series each winter);
- Great Scapes lawn program, and low maintenance gardening techniques demonstrated at the Teaching Garden.
- Free lectures to the public, and education for businesses and nonprofit organizations in the management of stormwater runoff;
- Soil test kits; and training for interested citizens who wish to become Master Gardener volunteers.

[92] See PWC at http://www.pwcgov.org/government/dept/publicworks/environment/Pages/Volunteers-Make-A-Difference!.aspx and tips:

- Conserve water resources; control runoff and prevent erosion from your property to protect local creeks, streams and rivers;
- Grow groundcover and plants to reduce run off from property; plant native species and grasses for lawns;
- Reduce pollutants/nutrients washing off lawns; fertilize properly; reduce use of oil-based products & gasoline powered devices;
- Sweep and dispose of materials properly so they don't wash into storm drains; report illegal dumping into storm drains;
- Dispose of household hazardous waste properly; look for alternatives to potentially hazardous materials;
- Remove salt and sand from driveways and parking lots after snow storms, as well as clear debris and motor oil from lots;
- Prevent litter; pick up litter, use a litter bag in cars and boats, and cover trash so it cannot blow about or be picked up by animals;
- Compost yard waste at home or bring to PWC compost facilities; leave grass clipping on lawn after mowing as natural fertilizer;
- Reduce, reuse . . . then recycle. Reduce drive times by combining errands and planning trips; carpool or walk when possible.

[93] The Stream Assessment Viewer http://gisweb.pwcgov.org/webapps/pwcsav can assist in answering such questions as: Which stream reaches have been studied? Where are the dump, erosion, obstruction, utility crossing, ditch crossing, buffer disturbance, and crossing sites located on the studied stream reaches? What is the physical condition of a stream? Pictures of these sites might be available.

[94] With state offices in Virginia, the Chesapeake Bay Foundation headquarters is in Annapolis, MD at the Philip Merrill Environmental Center, 6 Herndon Ave., Annapolis, MD 21403; see http://www.cbf.org for more information about their education programs on field experiences; teacher professional development; principals environmental leadership program, and student leadership resources. MPOA Lake Management Committee has at least one member who has volunteer membership affiliation with the Chesapeake Bay Foundation.

fisheries, and protecting and restoring natural resources. CBF operates 15 environmental education programs that offer resources for activities, classroom curricula, and water quality monitoring relevant to watershed-ecosystem.

2) **Businesses for the Bay** is a voluntary team of forward-looking businesses, industries, government facilities and other organizations committed to implementing pollution prevention in daily operations and reducing releases of chemical contaminants and other wastes in the Chesapeake Bay basin. Businesses for the Bay[95] are aligned with the *Pollution Prevention (or P2) initiative*[96] that provides a hierarchy of activities and techniques to reduce or eliminate wastes at their source of generation. Business and industry have been leaders in developing many P2 techniques and are proponents of this voluntary approach to eliminating or reducing the generation of wastes. The Virginia Mentoring Network volunteers are available to provide assistance to organizations seeking to implement pollution prevention programs.[97]

3) **Prince William Conservation Alliance** is a non-profit watershed organization working to preserve, protect and enhance natural resources through stewardship, recreation and education.[98] The alliance engages citizens in productive activities to protect water quality and natural areas. The alliance's Community Stream Stewards offers an opportunity for concerned citizens interested in preserving and improving water quality from PWC to the Chesapeake Bay.[99] PWC's Soil and Water Conservation District sponsors the Adopt-a-Stream Program in which volunteers pick up litter and plant trees along designated streams and creeks.

4) **Other Conservation-Oriented Volunteer Groups**, such as Montclair Earth Day, provide opportunities for residents to self-organize projects that help advance environmentally sound stewardship practices to help slow rain water from washing off property with rain gardens and native plantings. Some address broader environmental stewardship issues[100] and others provide information resources and sponsor local projects.[101]

3. MPOA Board of Directors (BoD), Committees, and Community Guidelines and Procedures.

In 1988 Lake Montclair was conveyed to MPOA as a privately-owned lake.[102] As such, all guidance for sustainment and stewardship of the lake is under the purview of the MPOA BoD.[103] To properly fulfill this charge the BoD is empowered to adopt and amend rules and regulations within MPOA Community Guidelines to maintain and improve the quality of life in Montclair. As such, all Lake Management efforts are performed under the auspices of the MPOA BoD who must ensure activities comply with applicable statutes. MPOA committees are established under the authority of and in accordance with MPOA documents under the direction of the BoD.

a) Lake Management Committee (LMC) Charter and Responsibilities. MPOA Community Guidelines Article 3, Section 3.3.1 "Standing Committees," paragraph f, and Enclosure 1 specifies the Lake Management Committee was established to perform long-term or continuous tasks with the purpose to

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[95] Businesses for the Bay is administered by the EPA's Chesapeake Bay Program office in Annapolis, MD and coordinated by the state pollution prevention program of the signatory states (VA, MD, PA, and DC). Members make annual commitments to reduce wastes, and they report on their successes; they are eligible for public recognition and awards from the Chesapeake Bay's Executive Council.

[96] *Pollution Prevention (P2)* was embraced by the Chesapeake Bay Program because many P2 techniques not only decrease chemical discharges and waste generation, but also result in increased production efficiency and reduced waste disposal costs.

[97] Virginia has over 170 members with 70 volunteer mentors in Businesses for the Bay, and the entire program has over 300 members with more than over 110 mentors included in the Virginia Mentoring Network.

[98] Prince William Conservation Alliance, http://www.pwconserve.org/, 703-499-4954, email alliance@pwconserve.org, monitors progress on Chesapeake Bay commitments and environmental regulatory processes, and provides the Chesapeake Bay Field Study to community groups.

[99] Citizens can attend lectures and field tours to learn about the biology, dynamics and physical characteristics of streams, and discover ways to improve local streams, protect drinking water supply and preserve local waters - http://www.pwconserve.org/events/streamstewards.html.

[100] GreenFaith http://greenfaith.org is an interfaith conservation group for environmental justice and stewardship. Locally relevant projects for Montclair and the Powells Creek Watershed are coordinated by volunteers in St Francis of Assisi Catholic Parish http://www.stfrncis.org. One of the members of the MPOA LMC is a member of the local GreenFaith team of volunteers.

[101] Some projects help neighbors understand that storm drains on the streets flow to local streams and creeks and eventually to the Bay. Scouting organizations with youth in Montclair continue to have conservation projects that are aligned with stewardship objectives of the lake. As example, BSA Eagle Scout projects have had several volunteers place decals on Montclair storm drains to help residents understand that only rain water should go down the drain; to adopt practices that limit pollutants, trash and contaminates from entering storm drains.

[102] Lake Montclair (and its boundaries) is described in the Exhibit A of the Deed which conveyed the lake to MPOA on September 24, 1988.

[103] Article 5 of the MPOA *Articles of Incorporation* provides for a BoD with duties and responsibilities (delineated in Section 4.1 of the Bylaws) to manage the business and affairs of MPOA; Articles of Incorporation, Bylaws, & Community Guidelines are available at MPOA office and http://www.montclairva.com/documents/. The lake is privately owned by MPOA for more than 3,856 homes and townhomes.

oversee and manage lake dredging, maintenance of the dam, and lake ecology[104,105,106] The MPOA BoD communicates with LMC, via the LMC chairperson, through the Committees' Coordinator and the LMC Board Liaison. Objectives, administration, and responsibilities of the LMC are delineated in Table 2-4.

Table 2-4. Lake Management Committee (LMC) Objectives, Administration, and Responsibilities

Objectives of the Lake Management Committee (LMC)	As members of the LMC, Montclair volunteers serve the community and its BoD to assure that the quality of the lake and its environment is maintained. The LMC will oversee and manage water quality, lake ecology, fishery, lake dredging, dam maintenance, and common areas abutting Lake Montclair. In pursuit of this mission, the LMC establishes plans for specific projects and takes action to effect improvements that will not only maintain the current level of quality, but will also increase it. Actions by the LMC will occur following recommendations to the BoD, approval by the BoD, and the provision of funding. The LMC will provide recommendations to the BoD on wildlife habitat, treatment and controls within the community as it relates to the lake. As appropriate, the LMC will work with other committees on issues affecting recreation area, wildlife areas, and the environment in and around the lake.
Administration of the LMC	Article 3 of the MPOA Community Guidelines of Montclair (Committees) is used as the basic document for administration of the Committee activities.
Membership of the LMC:	The Community Manager and Maintenance Chief are ex-officio members of the LMC. There are no specific qualifications required to serve as a volunteer on the LMC; yet a genuine interest in the quality of the lake's environment and its value to the community is highly desired. There are five considerations: Activities, Committee Size, Responsibilities, and Attendance and Voting Expectations.
1. LMC Member Activities	Expertise and willingness to contribute to the plans and actions are needed in activities such as: • Preparing, reviewing and recommending to the BoD methods and practices for stewardship of the lake-ecosystem and ensuring water quality in Lake Montclair. • Coordinating with property management staff in fulfilling lake management program plan objectives. • Accompanying officials during dam inspections and executing follow-on plans of action. • Developing long-range lake dredging plans and developing specifications for bid proposals. • Participating in proposal evaluation and make recommendations to the BoD. • Developing and executing plans for lake vegetation controls, game fish, and fish habitat.
2. LMC Size of Committee	The body of the committee should consist of a realistic number of individuals so that it will effectively function as a committee through a voting process. Seven to twelve members are considered a manageable size for efficient committee work. A LMC of this size is desired for the following reasons: a. Staff the LMC with a spectrum of experience/expertise. b. Assignments to LMC activities and projects; and obtaining a meaningful, democratic vote. c. Open discussions for agreement or disagreement on plans, action, and recommendations to the BoD.
3. LMC Chairperson Responsi-bilities	Responsibilities are listed in Community Guidelines, Article 3, Section 3.7.1; indicating the Chair will: a. Not hold a meeting without a quorum; which is defined as a majority of the LMC membership. b. Prepare an agenda for each meeting. Agenda input will be requested from each committee member. c. Lead LMC discussions; facilitate the addressing of all agenda items. Assure consideration of concerns and issues by all members so that recommendations for action will reflect membership viewpoints. d. Keep LMC membership informed on results of liaison meetings with BoD and MPOA Management.
4. LMC Member Respon-sibilities	Members will keep the Chairperson informed on their availability for meetings in a timely manner; & will: a. Attend scheduled meetings for the purpose of discussions, planning and voluntary action assignments. b. Provide agenda input to the Chairperson; participate in the voting process. Each member of the LMC may submit a minority vote result to the BoD, if such input is considered to be of personal concern. c. Accept assignments to execute action plans and provide post-action information and status to LMC. d. Routinely observe the lake and its watershed to note trends affecting the quality; present observations for LMC consideration and make recommendations.
5. LMC Attendance and Voting Expectations	Any member of the LMC who misses three consecutive meetings or half of the annual meetings is subject to dismissal by the President of the BoD upon recommendation by the LMC membership. If two members of the same residence are members of the LMC, either or both may participate in the meetings; yet only one vote will be accepted.

[104] MPOA LMC charter, with objectives, administration and responsibilities, is in MPOA Community Guidelines Article 3, Enclosure 1.
[105] The MPOA Board of Directors in fiscal year 1996/97 determined that the Common Area Management Committee (CAMC) responsible for maintenance, care, and improvements of the common areas and lake should be divided into two independent committees. This resulted in the formation of the Lake Management Committee (LMC) and the Landscape and Facilities Management Committee (LFMC).
[106] MPOA LMC uses this LMPP to specify objectives and strategies associated with lake stewardship. As such, this LMPP provides both normative and informative practices to conform to regulatory statutes and covenants, as well as practices for harmonious use of the lake.

The LMC meetings and projects are collaborative activities; they encourage direct and open communication among all stakeholders, and address issues responsive to community and environmental changes.[107] The LMC meeting format enables transparent and participatory leadership, and enables the LMC to develop alternatives with technical rigor and communicate findings and recommendations in a consistent and timely manner. Beyond the MPOA property management staff and LMC, the lake management activities involve others outside the community. For Montclair, the MPOA BoD serves as the steering committee, and the LMC serves as the advisory group and technical committee, reporting to the MPOA BoD.[108] When needed, and as approved by the MPOA BoD, technical expertise could be requested to provide study reports with findings and recommendations and/or to perform tasks beyond the expertise of volunteers or MPOA property management staff and resources.

b) ***Other MPOA committees relevant to lake management interests.*** In addition to the LMC, the MPOA has several other committees with responsibilities for issues relevant to lake stewardship and use (as indicated in Table 2-5). For relevant activities, and on an as-needed basis, the LMC might need to coordinate with another committee.[109] Any such coordination would be via the LMC chairperson, through the Committees' Coordinator and the LMC Board Liaison. As needed, the LMC chairperson may request to meet with the Board.

Table 2-5. Lake Management Committee (LMC) Interests in Activities of other MPOA Committees[110]

Covenants Committee (CC) receives and reviews all requests for alterations and additions made on or to existing structures and lots which have been conveyed to a homeowner. The CC strives to preserve the natural beauty of Montclair, maintain and enhance property values, and ensure that all modifications adhere to MPOA protective covenants. The CC **Modifications Subcommittee** is charged with ensuring that proposed exterior alterations comply with the objectives set forth in the covenants, this involves regular and systematic review of all Property Improvement Request (PIR) applications for exterior alterations submitted by members.	**LMC interests in Covenants activities:** LMC has interests in PIRs since changes might inadvertently negatively impact water quality or flow and potentially contribute to harmful nutrients going into the lake. All of Montclair is in the CBA RMA; all properties within 100 feet of the lake and Powells Creek are in RPAs. LMC review of PIRs for docks/structures in RPAs benefits MPOA.
Landscape & Facilities Management Committee monitors matters which might have an impact on the community. When appropriate, the committee acts in the community's interest as a liaison with developers, businesses, and local government agencies. Some of the issues include planned area development with particular concern over the Powells Creek watershed, environmental dumping, and community promotion.	**LMC interests in LFMC activities:** LMC has interests in development in the watershed that flows into Lake Montclair with particular concern for the Powells Creek watershed (which includes the landfill on Hwy 234), and environmental dumping.
Safety Committee provides oversight over the implementation of policies, directives, resolutions, and communications of the MPOA BOD concerning safety and security in the community, and develops and recommends necessary safety measures that will best serve the citizens of Montclair.	**LMC interests in Safety activities:** LMC has safety interests in use of the lake, and security & safety interests in use of the lake 'ribbon of life' assets.
Communications Committee provides creative and technical methods to enhance all avenues of communications between the BOD and members of the association, as well as, suggesting methods of facilitating information flow from sources outside of the Montclair community. These avenues of communication include but are not limited to the MPOA web site, *The Montclairion*, FSRConnect, mailings, and community bulletin boards.	**LMC interests in Communications activities:** LMC relies on these MPOA-managed media resources, such as alerts, the MPOA website and *The Montclairion* to convey information to the broader stakeholder community in Montclair.
Community Events Committee sponsors traditional community-wide events, and it pursues the enhancement of community spirit and continually seeks additional opportunities to provide for the enjoyment of Montclair residents.	**LMC interests in Events:** For community activities using the lake and beaches, such as the Triathlon, LMC coordinates with others.

c) ***MPOA community guidelines relevant to lake management.*** MPOA community guidelines (covenants)[111] provide guidelines relevant to lake management.[112] Article 3 addresses committees. Articles 4 and 5 cover the lake, beaches, picnic areas, common areas, docks, piers, and wharves.

[107] As needed, the LMC chairperson may request to meet with the MPOA Board of Directors.
[108] Example guidelines for developing a Lake Management Plan can be found in searches, such as How to Write A Lake Management Plan found at http://www.shorelandmanagement.org/depth/plan.pdf. Guidelines for lake management programs suggest a framework which involves a steering committee, an advisory group, and a technical committee to educate the steering committee and stakeholders.
[109] Coordination with LMC on decisions and actions relevant to the lake can help avert unintended consequences, especially for covenants issues and statutory guidelines associated with properties in the RPA.
[110] Committee charters, with objectives, administration and responsibilities, are in MPOA Community Guidelines Article 3, Enclosure 1.
[111] MPOA community guidelines are available in the MPOA office; accessible online at http://www.montclairva.com/documents/guidelines.
[112] MPOA community guidelines take precedence over practices specified in this LMPP intended to supportively align with the covenants.

1) Covenants covering Lake Montclair. MPOA Article 4, Paragraph 4.3 covers authorized users of the lake, winter use of the lake, swimming and diving, inflatable and floating equipment, fishing (areas and licensing), and boating on Lake Montclair, including requirements for safety, types of boats and motors, mooring, storage, and registration. Designated launch areas are specified, and prohibitions are specified on dumping, pouring, or throwing any material into the lake or onto the beaches or areas adjacent to or part of common areas abutting the lake. Section IV of this LMPP addresses the related guidelines and practices.

2) Covenants covering beaches, picnic areas and common areas near beaches. MPOA Articles 4, Paragraphs 4.2, 4.4, and 4.6 address Dolphin Beach, West Beach, and Beaver Landing, and provide guidance covering beach recreation areas, beach grooming, swimming, lifeguards, and geese on the beach. They address the use and restrictions of use for shorelines and common areas adjacent to the lake. Sections IV & V of this LMPP address the related guidelines and practices.

3) Covenants covering Docks, Piers, and Wharves. MPOA Article 5, Paragraph 5.4.8 covers the requirements and restrictions for docks, piers, and wharves on Lake Montclair, including permitting and general liability insurance coverage requirements. Section IV of this LMPP addresses the related guidelines and practices.

d) *MPOA processes and procedures for addressing lake-related concerns.* Each month the LMC addresses topics relevant to lake management focus areas to determine what efforts are needed to fulfill actions relevant to objectives specified in the LMPP. The LMC uses a calendar timeline with specified actions and issues to be addressed each month.[113] The calendared reviews and actions are aligned with the timelines used by the MPOA BoD, the Property Management Company, and LMC communications efforts. LMC has a cyclical set of monthly activities, such as review of lake-related activities of MPOA property management staff (including review of the monthly dam inspection) and submittal of articles to *The Montclairion* on topics relevant to lake issues; plus it addresses other activities based on seasonal environmental conditions and MPOA calendar timelines, as reflected in Table 2-6. Several topics are addressed on an 'as needed' basis, such as the review of PIRs, lake surveys and dredging, forebay dredging, beach security, lake access, water quality, and the review of Lake Management strategies and activities. Cyclical activities are linked to environmental conditions and MPOA timelines.[114] A budget request is submitted annually to the MPOA BoD. Periodic review of LMC strategies provides a chance for updating this LMPP. Any requests for support and equipment are to be made by the LMC chairperson to the MPOA Community Manager. MPOA BoD meets monthly to address topics of community interests, including lake-related recommendations by LMC with other issues brought directly from residents.

Table 2-6. Example Activities of LMC throughout the Year (beyond regular monthly topics)

Month	Topics	Month	Topics
Jan	Obtain Geese control permit for egg addling in Spring Begin write-up of LMC Annual Report	Jul	Review water testing results Practice Emergency Action Plan (EAP)
Feb	Inspect drainage areas Install fish habitat (mostly from Christmas Trees) Volunteer Appreciation Banquet	Aug	Review water testing results Determine training needs Begin to prepare budget
Mar	Conduct Fish stocking, as needed. Attend Dam Workshop Submit recommendations to annual report	Sep	Finalize budget plans Review Lake Management strategies and activities to determine what needs to be done
Apr	Assist in Goose egg addling, as needed Review Water testing procedures	Oct	Submit Budget
May	Participate in Montclair Beautification Day Assess goose population; determine need for round up	Nov	Support lake lowering to allow for clean up and maintenance
Jun	Conduct lake tour in lieu of meeting in MPOA bldg Participate in any goose round up, if needed Participate in 4th of July planned activities	Dec	Inspect drainage areas Evaluate programs offered relative to LMPP objectives

[113] Except for its June meeting (which is normally a committee lake inspection), the LMC meets the 3rd Monday of each month at 7:30pm in the MPOA office, 3561 Waterway Drive, Montclair, Virginia 22025 and – see MPOA calendar at http://www.montclairva.com.

[114] For instance, winter months are good times to inspect the drainage areas due to lack of vegetation and summer critters, and lake lowering and dredging are timed to reduce impact on nesting of aquatic life.

e) *Communication Efforts for Informing and Engaging Stakeholders about Lake Issues.*

The primary means for LMC communicating with the MPOA BoD is through the LMC Chairman, the LMC Board Liaison, and LMC reports and minutes. As needed, the LMC Chairperson may request to meet with the Board. On an annual basis, the LMC provides a Lake Montclair Environmental Quality Report (LMEQR) with updates to this LMPP to the MPOA BoD. Realizing the stakeholder community for the lake is much broader than the MPOA BoD and residents of Montclair, the LMC uses a schedule of communications activities to ensure that residents and other stakeholders are kept properly informed and to elicit their continued buy-in and support. LMC aligns its communications efforts with MPOA Property Management staff that provides public notices for issues relevant to lake management, such as boat and dock registration.[115] LMC communications efforts are periodically assessed to determine the means and media to be used to reach community stakeholders on particular topics.[116]

The primary media sources used by the LMC for reaching residents are the MPOA website, *The Montclairion* monthly neighborhood newsletter, and *FSRConnect*.[117] As indicated in Table 2-7, the LMC often uses a calendar timeline to provide examples of topics to be addressed each month in *The Montclairion*.[118] Once the timeline and topics for *The Montclairion* article submission has been established, LMC members are asked to take the lead for respective articles (so that they could start in advance of need date).

Table 2-7. Example Topic Schedule for Montclairion Article Submission from LMC

Jan (for Feb publication)	Drainage – properties not on the lake are connected to the lake
Feb (for Mar publication)	Lake Management accomplishments/what's been done for the lake
Mar (for Apr publication)	Goose population control and impact on water quality and beach conditions
Apr (for May publication)	Safe boating
May (for Jun publication)	Water Safety (safe swimming & use of docks, platforms & beaches)
Jun (for Jul publication)	Lake services: Water level control, boat storage
Jul (for Aug publication)	Green gardening/lawn care and safe alternatives for toxic chemicals and impact to water quality
Aug (for Sep publication)	Fishing: fish habitat and safe fish (potential problems with larger fish)
Sep (for Oct publication)	Fall clean-up alternatives to dumping leaves in the lake and drains
Oct (for Nov publication)	Lake lowering and clean up in Nov
Nov (for Dec publication)	Clean Lake Tips
Dec (for Jan publication)	Facts about the lake and watershed

Many organizations sponsor relevant projects that contribute to use and stewardship of the lake and watershed ecosystems. It is important for the MPOA LMC to continue to communicate with these collaborative partnerships in efforts focused on sustaining Lake Montclair as a healthy, vital resource for the community and the watershed. This LMPP serves as a part of the LMC's communication efforts for informing and engaging stakeholders about lake issues. Table 2-8 (on next page) provides the framework for the six focus areas that group the 25 objectives for this Lake Management Program. As delineated in this LMPP's Sections III-VII, the objectives provide a context for the strategies, processes and procedures for addressing lake-related concerns and community interests:

- Lake Recreational Activities and Water Use;
- Water Quality Management and Water Level Management and Control;
- Lake 'Ribbon of Life' Sustainment, Access and Use;
- Watershed Property Use and Monitoring Relevant to Lake Ecosystem Management;
- Storm Water Management, Dredging, and Management of Soil, Sand and Sediment;
- Biological Communities (vegetation, insects, wildlife, fish, and aquatic life) in/around the lake; and
- Systems and Procedures for Community Interaction, Training, and Information Resources.

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[115] Some covenants-related public notices are cyclical, such as boat and dock registration requirements that are both required to be completed the end of October each year. As such, instructions and forms are published in the September issue of *The Montclairion.*

[116] Section VI of this LMPP addresses broader means for community interaction and other information resources. LMC facilitates efforts in communicating the right information, to the right people, at the right time by informally determining:

- What MPOA/LMC wants to accomplish with stakeholder communications (Lake Management Program objectives);
- Ways in which those objectives could be accomplished (MPOA & LMC activities and community projects),
- To whom communications would be addressed (stakeholder audiences with interests in Powells Creek Watershed),
- How and when specified objectives would be accomplished (the tools and timetable), and
- How MPOA and LMC would assess the results and outcomes of communication efforts (evaluation).

[117] See Montclair website at http://www.montclairva.com and ***FSRConnect***, a secure, password-protected website separate from the MPOA website for Montclair homeowners only – see http://dcmetro.fsrconnect.com/cws_v3/Registration/Register.aspx for *FSRConnect*.

[118] LMC aligns its calendar of topics for communication with the MPOA BoD & Property Management Agent in addressing topics/issues.

Table 2-8. Lake Management Program Objectives Related to Community Interests [119]

*This matrix indicates content organization of LMPP sections that elaborate on how 25 lake management program objectives delineated in Section II address community interests via strategies and actions specified in Sections III-VII.

LAKE MANAGEMENT PROGRAM OBJECTIVES	Lake Activities & Water Use	Water Quality Management	Water Level Management & Control	Lake "Ribbon of Life" Sustainment & Use	Watershed Property Use & Monitoring	Storm Water Management, Dredging & Sand/Soil Mgt	Vegetation, Insects, Wildlife, Fish, & Aquatic Life	Community Interaction, Training, & Information
1. HYDROLOGY FOCUS AREA								
1-1 Manage water to sustain or regenerate healthy hydrologic processes	V.a	III.a	III.c					
1-2 Mitigate risk from harmful nutrients/hazards/pollutants/contaminants		III.b						VI.a
1-3 Sustain environmental water quality and healthy biological communities		III.a/b					V.b	
1-4 Monitor water quality and periodically report to enable timely action		III.a						III+VI
1-5 Manage and control water level and report changes			III.c/d			IV.b		III-VI
2. SOILS FOCUS AREA								
2-1 Promote soil health to sustain ecosystem services thru protection/reuse					IV.a	IV.b		VI.a
2-2 Sustain storm water management and minimize soil erosion					IV.a	IV.b		
2-3 Minimize use of chemicals that harm human and ecological health					IV.a			VI.a
2-4 Sustain integrity of the lake & its 'ribbon of life'			III.c	V.c	IV.a	IV.b		
2-5 Monitor changes in watershed land use & report trends that affect lake					IV.a	IV.b		
3. VEGETATION FOCUS AREA								
3-1 Encourage natural ecological processes in managing plant resources							V.b	VI.a
3-2 Use vegetation to sustain and enhance on-site ecosystem services						IV.a	V.b	
3-3 Manage lake vegetation consistent with natural balance of ecosystem				V.c			V.b	
4. FISH & WILDLIFE FOCUS AREA								
4-1 Provide habitat & food sources for fish/wildlife for a natural balance							V.b	VI.a
4-2 Monitor and control destructive/disease-carrying insects							V.b	VI.a
4-3 Manage fish & wildlife for water quality/fishing/lake vegetation							V.b	
4-4 Monitor/report status of fish/aquatic life/wildlife for action plans							V.b	VI.a
5. MATERIALS FOCUS AREA								
5-1 Promote management of material resources and reduced energy use					IV.a			VI.a
5-2 Mitigate risks from potentially toxic and harmful materials		III.b						VI.a
5-3 Reduce foreign material in the lake		III.b						
6. HUMAN WELL-BEING FOCUS AREA								
6-1 Sustain lake-ecosystem conditions for physiological/health benefits				V.c				VI.a
6-2 Promote learning benefits of nature for human cognitive functions	V.a			V.c				VI.a
6-3 Promote social dynamics using the lake and 'ribbon of life' assets	V.a			V.c				VI.a
6-4 Enhance conditions for use of the lake and 'ribbon of life' assets	V.a			V.c				VI.a
6-5 Provide resources for community engagement, notification, & education	V.a	III	III.c/d	V.c	IV.a	IV.b	V.b	I - VII

This LMPP serves as an information resource linking 25 lake management objectives with community interests. Aligned with regional and county programs and MPOA community guidelines, these reflect a resilience-centric approach focused on safeguarding lake-ecosystem functions and a human-centric approach focused on enabling harmonious use of the lake and its "ribbon of life" assets. Purposeful management and stewardship with participation of all stakeholders will influence the long-term sustainability and resilience of Lake Montclair.

Lake management objectives support community interests for use and stewardship of lake and watershed ecosystems.

[119] LMPP Sections III, IV, V, VI & VII delineate the strategies, processes and procedures for addressing the objectives associated with lake-related concerns and community interests. Since 2013, LMC has used this matrix to better address coverage of relevant topics by MPOA.

III. Water Quality and Water Level Monitoring, Control, Risk Mitigation, and Notification

a. Environmental Water Quality Monitoring and Assessment

From a regulatory protection perspective, ***environmental water quality***[120] is perhaps the most important concern for lake management. On-going monitoring and assessment activities of Lake Montclair and Powells Creek Watershed ecosystem provide information vital for evaluating water quality to determine whether the lake is safe for swimming, fishing and other uses. These monitoring activities provide early warning indicators to inform decision-making for follow-up action.[121] To monitor water quality and provide periodic reporting to better enable timeliness of actions, MPOA coordinates with PWC to monitor the lake and watershed, through routine sampling, for pollutants and contaminants (with results reports annually in the LMEQR). MPOA collaborates with county and state organizations on strategies to fulfill objectives associated with water quality monitoring and assessment specified in Table 3-1.

Table 3-1. Relevant Objectives for Water Quality Monitoring and Assessment

1-1. Manage water on site to sustain or regenerate healthy hydrologic processes.
1-3. Sustain environmental water quality and healthy aquatic biological communities.
1-4. Monitor water quality and provide periodic reporting to better enable timeliness of actions.
6-5. Provide resources for community engagement, notification, and education relative to lake issues.

1. Spectrum of Monitoring and Testing for Environmental Quality.

To better enable timeliness of actions, MPOA (via LMC and the Property Management Agent) coordinates with PWC and state organizations to monitor water quality and provide periodic reporting. Updated annually, this LMPP and the Lake Montclair Environmental Quality Report (LMEQR)[122] support action planning focused on ensuring the continued quality of the lake. Implementation of this LMPP is the responsibility of the MPOA LMC with support from the contracted property management staff to prepare and submit an annual LMEQR to the MPOA BoD in February of each year.[123] The annual report represents a progressive extension of reports from previous years with updates reflected in this LMPP. MPOA property management agent and the LMC continue to monitor fish, water, and bottom sediment as part of the LMEQR approved and directed for implementation by the MPOA Board of Directors.

Lake Montclair Environmental Quality Report (LMEQR) provides test results relevant to water quality issues:
- ***Surface water, ground water and sediment tests;***
- ***Water testing for E-Coli at beaches in swimming season;***
- ***Fish flesh testing, and lake vegetation inspection***

a) Surface Water, Ground Water & Sediment Tests (as Specified by VDEQ). Monitoring and assessment of the Powells Creek Watershed is critical to sustaining water quality in Lake Montclair. Approximately every two years since 2003 Prince William County (PWC) provides an Environmental Monitoring

[120] **Water quality** refers to chemical, physical and biological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose. It is used by reference to a set of standards against which compliance can be assessed. The most common standards used to assess water quality relate to health of ecosystems, safety of human contact and drinking water. Water from Lake Montclair is not the source for the community's drinking water; so that is not addressed in this LMPP. **Environmental water quality**, also called **ambient water quality,** relates to water bodies such as lakes, and is the focus of water quality management for this LMPP. Water quality standards for surface waters vary significantly due to different environmental conditions, ecosystems, and intended human uses. Toxic substances and high populations of certain micro-organisms can present a health hazard for non-drinking purposes such as irrigation, swimming, fishing, rafting, boating, and other uses. These conditions may also affect wildlife, which use the water for drinking or as a habitat. Modern water quality laws, such as those associated with the Chesapeake Bay Act, generally specify protection of fisheries and recreational use, and the laws require, as a minimum, retention of current quality standards. Most environmental laws focus on the designation of particular uses of a water body. Given the landscape changes (e.g., land development, urbanization, clearcutting) in the watersheds of many freshwater bodies, returning to pristine conditions would be a significant challenge; so environmental programs focus on achieving goals for maintaining healthy ecosystems and may concentrate on the protection of populations of endangered species and protecting human health.

[121] LMC, in coordination with the Montclair Property Management Agent, periodically updates the LMEQR to address water quality.

[122] See annual updates of the Lake Montclair Environmental Quality Report (LMEQR) that also addresses Fish Habitat planning.

[123] Implementation of the Lake Montclair Environmental Quality Report (LMEQR) is the responsibility of the Lake Management Committee with support from contracted staff. In accordance with this plan LMC coordinates with MPOA property management staff to prepare and submit an annual report to the MPOA Board of Directors; made available NLT April of each year. The purpose of the LMEQR is to document actions taken to ensure the continued quality of the lake, and provide information to MPOA Board of Directors and community.

Report to summarize the results of the surface water, storm water and the sediment monitoring program voluntarily implemented by the Solid Waste Division of Public Works at the PWC Sanitary Landfill (Permit No. 29) and along Powells Creek and Lake Montclair.[124] PWC implemented the voluntary monitoring program in response to its commitment to constructing and operating a landfill that meets or exceeds regulatory requirements and protects the surrounding environment and neighborhoods. The purpose of the monitoring program is to assist the County in evaluating the landfill and landfill-related operations for potential impacts to surface water quality in Powells Run and Powells Creek.[125] Sample collection locations have been chosen at strategic points around the property in an attempt to evaluate possible sources of contaminants that may be caused by landfill operations. The locations allow the County to identify, isolate, and correct possible threats to surface water quality from construction activities, groundwater impacts, or other factors. The sampling of upstream areas helps evaluate potential impacts that may be originating from off-site sources. Surface water samples are collected prior to the collection of sediment samples. Powells Run surface water samples are collected beginning with the downstream sample location, followed by successive upstream sample locations. Lake Montclair surface water samples are collected from the bank at the outlet of Powells Creek into Lake Montclair.[126] Quantified monitoring results are systematically evaluated beginning with a value-to-value comparison to quality standards established for the monitoring points.[127]

b) Water Testing for E-Coli at Beaches during Swimming Season. The LMEQR provides annual updates of test results of the water at each of the Lake Montclair beaches.[128] Typically, E-Coli test are conducted during summer months, and high levels have been isolated. Increases in E-Coli during hot summer weeks (mid-June – mid-August) at West Beach and at all beaches after a rainstorm are most likely attributed to excessive fecal waste being washed over the beaches and upstream from properties in the watershed.

c) Fish Flesh Testing and Lake Vegetation Inspections. MPOA coordinates with state agencies to ensure testing of fish in the lake is periodically conducted for mercury, Polychlorinated Biphenyls (PCBs), and other pollutants because of the potential impact on human health. On a periodic basis, the Virginia Department of Environmental Quality (VDEQ) visits Lake Montclair to take samples of several types of fish in order to test for contaminants. Fish flesh testing is done every three to five years and the LMC is actively involved in coordinating with the VDEQ to conduct fish sampling. According to the VDEQ, these tests are the only way to determine long-term effects of heavy metal contamination and consequently to protect consumers of fish and to evaluate trends and cause. Results of the past tests function as baseline comparisons. Within the last decade this type of testing has been completed in 2004, 2006, 2009, and 2012, and the test results are made available to MPOA upon completion of the respective reports.[129] The reports from the Virginia Department of Health (VDH) and VDEQ recommend limiting consumption to no more than two 8-ounce portions of large fish a month for the general public and no

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[124] Prince William County provides each Environmental Monitoring Report to MPOA, as it is completed.

[125] The landfill and landfill operations area are situated on a north-facing slope that is drained on the north side by Powells Run, a tributary to Powells Creek. Downgradient from the site, Powells Creek flows through Lake Montclair and eventually discharges into the Potomac River.

[126] At each location, samplers wade to the middle of the surface water body, facing upstream, and collect the sample at mid-depth without disturbing the sediment. Lake Montclair samples are collected from the bank at the outlet of Powells Creek using a stainless steel scoop.

[127] If a monitoring result exceeds the quality standard on a value-to-value basis, the monitoring result is statistically compared to the quality standard using a Lower Confidence Limit (LCL) statistical evaluation. Statistical evaluations are performed in accordance with the Virginia Department of Environmental Quality's (DEQ 2003) Data Analysis Guidelines for Solid Waste Facilities and US Environmental Protection Agency (EPA) statistical evaluation guidance. If a statistical exceedance of the quality standard is indicated, a Mann-Kendall statistical analysis is performed on the monitoring results for the constituent of interest to determine if an increasing concentration trend is apparent.

[128] Since 2007 Joiner Laboratories has conducted surface water tests at all three beaches on a weekly basis from mid-May to end of August. Past records indicate higher-than-acceptable readings immediately after rainstorms (most likely attributable to storm water run-off transporting fecal waste over beaches and upstream watershed properties). West Beach often has higher-than-acceptable E-Coli reading between mid-July to mid-August each year. MPOA maintenance crews routinely remove and dispose of goose droppings in an effort to reduce the E-coli counts. Resident Canada Geese on the lake leave excessive amounts of fecal droppings on turf and beach areas. Goose droppings have contributed to high levels of E-Coli bacteria in the lake creating human health hazards as well as aesthetic losses and property damage. MPOA staff did not addle goose eggs in 2012. At the time of molt, MPOA determines if Lake Montclair has an excessive amount of Canada Geese (25 or more) as to warrant a goose roundup by the USDA. Excessive pet waste also contributes to E-Coli in Lake Montclair.

[129] Past test results are documented on the VDEQ website at: deq.state.va.us/fishtissue/fishtissue. The sample station ID is: 1APOW009.8. Not fish flesh testing was conducted in 2012. The MPOA General Manager contacted Dr. Hale, Dept. of Environmental & Aquatic Animal Health of the William & Mary Virginia Institute of Marine Science, School of Marine Science, to determine if they could do the testing of fish flesh for PCVs and Mercury. While the school labs could do the work, the estimated cost was $675 per fish to test for both PCBs and Mercury at this time. When the VELAP (Virginia Environmental Laboratory Accreditation Program) certification is required, price goes up to $1,350 per fish. After discussion, the LMC voted to suspend fish flesh testing until a more affordable testing program could be found. The LMC also approved republication of an article in *The Montclarion* concerning the results of the testing done in 2006.

consumption by children and nursing mothers. The mercury levels in the trophy size Largemouth Bass do not necessarily indicate a problem with lake water, and residents should not be concerned about swimming. Other species collected and tested in the laboratory included Crappie, Sunfish, Sucker, Channel Catfish, Yellow and Brown Catfish. None of these fish contained levels of PCBs, mercury, or any other toxic pollutants that exceeded acceptable levels; as such, they are safe to eat.[130,131] LMC members and several community members remain vigilant in preventing renewed hydrilla growth in Lake Montclair, and inspections have found no new growth of hydrilla aquatic weed. MPOA continues to request that all Sterile Triploid Grass Carp be released unharmed as they were purchased and stocked to control invasive weeds, such as hydrilla. The Grass Carp have effectively performed their intended function (see Section Va & b of this LMPP for more information on fish and aquatic vegetation).

2. Measurement, Testing, and Sampling Procedures.

Prince William County continues to monitor construction sites and roadways within the area for oil and grease. Consistent with the County's operational objective, PWC continues the routine sediment, surface water, and storm water monitoring activities.[132] With input from residents, the MPOA LMC continues to review test coverage in terms of 'what should be tested'[133] and provide recommended changes in the location and frequency of sampling and monitoring activities.[134] Specific water quality testing parameters, locations, and frequency are contained in previous submittals of the *Lake Montclair Environmental Quality Plan (predecessor of the LMEQR*).[135] The Prince William County *Environmental Monitoring Report*[136] provides documentation of the sampling and analysis activities the County has implemented in accordance with the voluntary monitoring program:

- Semi-annual sampling of surface water in Powells Run and Powells Creek (Spriggs Road crossing and Lake Montclair confluence) for water quality parameters;
- Semi-annual sampling and analysis of storm water discharge (at the outfall), if present, from site storm water basins for water quality parameters;
- Annual sampling and analysis of sediment from designated surface water points, Spriggs Road crossing of Powells Creek and Lake Montclair confluence, and site storm water basins for primary pollutants, and
- Quarterly sampling of specified surface water monitoring stations for selected volatile organic compounds.

To better enable timeliness of actions, MPOA LMC and property management staff coordinates with County and State organizations to monitor the lake and watershed through periodic sampling for pollutants and contaminants (including those categorized as emerging contaminants) and monitor the lake for E-Coli, potentially harmful bacteria, and eutrophication-causing nutrients. The primary purpose of testing water at Lake Montclair beaches is to examine the level of fecal coliform and to assess: possible impact on health of swimmers; long term trends of fecal coliform counts at each beach, and causes and potential actions to correct issues stemming from fecal

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[130] The Virginia Department of Environmental Quality (VDEQ) chose Lake Montclair to take part in a 2012 survey of public and private lakes. The MPOA BoD approved the survey participation and VDEQ representatives collected water samples from 10 different areas around the lake perimeter and tested them for water quality, algae, vegetation, etc. They also tested the oxygen and mercury levels on the lake bottom. One of their teams was in a gas powered boat and the other was in a canoe. Staff monitored a majority of their visit on the lake, between the two boats. The MPOA Management Staff received a quick summary over the phone from DEQ after their visit. DEQ representatives noted that the lake was in excellent condition, water seemed very clean, oxygen levels were good, fertilizer levels low, etc. The only concern they had was the sediment buildup at the top of the lake where they were measuring 1 to 1.5 meters. The test was at no cost to Montclair. The subsequent report was forwarded to MPOA.

[131] The 2004 test report by VDEQ from sampling of several types of fish indicated that a single trophy size carp (33 inches and 23 pounds) contained elevated concentrations of PCBs that are apparently not unusual for a fish that size and age. The 2006 test report indicated elevated levels of mercury were found in the sampling of largemouth bass exceeding 14 inches. Both reports also offer some explanation of the test results. For example, the older/larger Largemouth bass (trophy size) are top predators and have consumed numerous smaller fish and have thereby accumulated more PCBs and can contain higher mercury levels than other fish. The Virginia Department of Health (VDH) recommends limiting consumption of Carp to no more than two meals per month.

[132] The 2012 PWC plan did not include a contract to conduct sediment testing in Powell's Creek. Since 2013 PWC Solid Waste Division continues to conduct surface and ground water tests, and sediment tests in Powell's Creek. The tests are no longer being conducted on a six-month cycle; instead, the County conducts the tests annually.

[133] Lake Montclair is a living ecosystem with biological communities; so it has water-borne amoeba, parasites, aquatic worms, and bacteria that are native (naturally occurring) in this region of the Chesapeake Bay basin. As such, MPOA does not test for these biological organisms.

[134] Environmental water quality is a primary concern of Montclair residents, especially those who fish and swim in the lake. Some residents have reported a skin rash after swimming, and attributed the rash to a biological organism. Precautions and preventative actions are listed in Section V.a.3 of this LMPP. Monitoring and mitigating risks to water quality remains a high priority for MPOA and LMC.

[135] Testing results reported in LMEQR include explanation of acceptable readings are 235/100 ml for a single sample of maximum and a monthly average limit of 126/100ml.

[136] Environmental Monitoring Report, PWC Sanitary Landfill, Permit No 029, Ref 07396604XX – periodic reports on file in MPOA office.

coliform. Each year during the May-August swimming season, Surface Water Testing for E-Coli is conducted with results recorded for each of the three beaches on Lake Montclair. Results are recorded using one 100 ml sample from each beach tested for counts of fecal coliform with an indication of the day, time and weather condition (rain, sun and no sun). Table 3-2 shows example results of those tests at beaches during the 2011-2014 swimming seasons.[137, 138] Updates for subsequent years are provided in the annual LMEQR provided to the MPOA BoD. Test results for more than ten years indicate higher-than-acceptable readings immediately after rainstorms (most likely attributable to storm water run-off transporting fecal waste over beaches and upstream watershed properties). Trends indicate West Beach often has higher than acceptable readings for E-Coli from mid-June to mid-August.

Table 3-2. Surface Water Testing for E-Coli at MPOA Beaches during the Summer Months of 2011-2014

Date	Day	West Beach #3	Dolphin Beach #2	Beaver Landing #1	Weather Conditions (if recorded)	Monthly Average
05/18/11	Wed	23	130	50	Showers?	
05/24/11	Tue	11	30	50	???	
05/31/11	Tue	300	23	14	???	W-112, D- 61, B-38
06/07/11	Tue	73	18	36	Low 90's, Sunny & Breeze low humiditiy	
06/14/11	Tue	205	727	20	???	
06/21/11	Tue	33	54	20	Sunny, hot & humid 90's	
06/28/11	Tue	96	14	20	Sunny, hot & humid 90's & rain late in the day	W-102, D-204, B-24
07/05/11	Tue	197	156	178	Sunny, hot & humid high 90's	
07/12/11	Tue	2420	1553	152	Sunny, hot & humid high 90's	
07/19/11	Tue	2420	19	32	Sunny, hot & humid high 90's	
07/26/11	Tue	1733	3	102	Sunny, hot & humid high 90's	W-1693, D-433, B-
08/02/11	Tue	86	8	9	Sunny, hot, low humidity low 90's	
08/09/11	Tue	488	21	14	Sunny, hot, low humidity low 90's	
08/16/11	Tue	345	4	2	???	
08/23/11	Tue	548	14	10	Sunny, mild, low humidity	W- 367, D- 12, B- 9
05/22/12	Tue	1120	770	435	Flash flooding Monday night up stream	
05/29/12	Tue	36	40	6	Sunny, hot, humid, 90's	W-578, D-405, B-221
06/05/12	Tue	75	40	18	Sunny, warm low humidity, low 70's	
06/12/12	Tue	130	32	21	Cloudy, light rain on and off, low 80's	
06/19/12	Tue	326	10	26	Sunny, hot, low 90's	
06/26/12	Tue	22	11	24	Sunny, low humidity, high 80	W-138, D-23, B-22
07/03/12	Tue	15	30	24	Sunny, hot humid, 95-100	
07/10/12	Tue	225	19	19	Sunny, hot humid, 95-100	
07/17/12	Tue	16	23	5	Sunny, hot humid, High 80's	
07/24/12	Tue	30	4	5	???	
07/31/12	Tue	980	4	24	Sunny, hot humid,80's	W-253, D-16, B-15
08/07/12	Tue	105	3	1	Overcast, humid low 90's	
08/14/12	Tue	2420	28	30	Early morning heavy rain, overcast, low 80's?	
08/21/12	Tue	186	6	11	???	W-904, D-12, B-14
05/15/13	Wed	9	225	29	Drizzle during the day, rained heavy on Tuesday	
05/22/13	Wed	44	13	20	Cloudy, 79 and humid	
05/29/13	Wed	67	25	50	Sunny, hot high 89	W-40, D-88, B- 33
06/05/13	Wed	19	23	7	Overcast, 75 and warm	
06/12/13	Wed	613	461	488	Heavy Rain all day Tuesday, Sunny, slighty humid 80's	
06/19/13	Wed	770	52	40	Heavy Rain on Tuesday, Nice and 72	
06/26/13	Wed	64	12	4	Late Afternoon Thunderstorm, 80 and humid	W-367, D-13, B-135
07/01/13	Mon	649	17	21	78 and Rainy	
07/10/13	Wed	154	12	8	Scattered Thunderstorms with rain 83 and humid	
07/17/13	Wed	435	29	<1	Low 90's and sunny	
07/24/13	Wed	40	1	4	High 85, Sunny and Breezy	
07/31/13	Wed	84	9	5	Overcast, Dry, High 85	W-272, D-14, B-7
08/07/13	Wed	2420	3	9	Overcast, Dry High 78	
08/14/13	Wed	2420	9	4	Sunny, Dry, High 68	
08/21/13	Wed	154	63	<1	???	W-1665, D-25, B- 4
05/14/14	Wed	9	23	13	Overcast, High 66	
05/21/14	Wed	19	14	25	Mostly Cloudy, Mean 70, Thunderstorm late	
05/28/14	Wed	137	1120	20	Cloudy, mean 75, thunderstorm nite before 0.73 inches rain	W-55, D- 579, B-19
06/04/14	Wed	14	10	19	Mostly Cloudy, Mean 84	
06/11/14	Wed	435	345	59	Heavy Thunderstorms AM, Mean 76	
06/18/14	Wed	816	119	40	Partly Cloudy & Humid, Mean 83 High 93	
06/25/14	Wed	8	3	6	Partly cloudy & Humid, Mean 76 High 87	W-318, D-119, B-31
07/02/14	Wed	4	6	6	Partly cloudy & Humid, Mean 86 High 97	
07/09/14	Wed	105	26	14	Foggy, Rainy, & Thunderstorms; Mean 78 High 87	
07/16/14	Wed	1986	770	613	Partly Cloudy, Clear Skies; Mean 74 High 80	
07/23/14	Wed	488	75	4	Cloudy and Humid, PM Thunderstorms; Mean 82 High 91	
07/30/14	Wed	18	15	9	Clear skies and cool; Mean 66 High 78	W-520, D-178, B-129
08/06/14	Wed	1203	15	2	Clear skies and humid; evening rain; Mean 76 High 84	
08/13/14	Wed	921	308	488	Clear skies and low humidity Mean 76 High 82	
08/20/14	Wed	548	2	17	Cloudy/very humid; evening thunderstorms; mean 75 high 85	
08/27/14	Wed	3	7	649	Clear skies and humid; Mean 74 High 87	W-669, D-83, B-289

[137] Surface water testing for E-Coli at Montclair's three beaches has been conducted each summer by Joiner Labs since 2007. E-Coli test results reflect the Most Probable Number (MPN) 3-dilutions. *Acceptable readings: 235/100ml for a single sample maximum and a monthly average limit of 126/100ml.* Anything above those readings warrant caution. The response challenge is related to providing timely information in a manner to be meaningful to take action, if needed.

[138] LMC periodically evaluates alternatives for monitoring water quality. Criteria for considering other tests would include potential impact

for change. This means that if a test would primarily be informational, and no resulting action would take place regardless of the test results, then such test could be deemed an inappropriate use of MPOA funds. Criteria for considering alternative testing include: how often testing would be conducted, how long it takes to get results, who collects samples, who conducts testing, what are the associated costs, what is the required training, etc. Stakeholders are encouraged to review test coverage and procedures and make recommendations.

3. Reporting and Follow-Up Actions Resulting from Monitoring and Assessment Activities.

Scheduled tests and samplings provide data that contribute to aggregated findings and information required for decision-making; providing the basis for follow-up actions associated with lake management and ecosystem stewardship.[139] With knowledge of surface water tests, MPOA and residents can make risk informed decisions and take precautionary measures for swimming off West Beach mid-June through mid-August and any beach after a rainstorm. Reviews of results obtained through previous monitoring periods indicate that the PWC Landfill facility's storm water management systems appear to be functioning as designed. Notably, no value-to-value exceedances of quality standards for surface water and sediment samples have been statistically confirmed, indicating that storm water discharges from the facility's sediment basins have not adversely impacted surface water and sediment quality in Powells Run or Powells Creek.[140] Based on the data evaluations presented by PWC studies, it has been concluded that the landfill operations are not resulting in a measurable degradation of water quality in Powells Run or Powells Creek that is the primary source of water for Lake Montclair.

The MPOA dredging program for Lake Montclair minimizes or eliminates TKN concentrations[141] associated with degrading plant matter and animal waste. Dredging also contributes to controlling phosphorus levels in the lake.[142]

Prince William County "Pooper Scooper" law and MPOA Community Guidelines require residents to clean up after their pets.

Pet waste contributes to degradation of water quality. Residents should be aware of the impact that unattended or improperly disposed pet waste has on the lake.[143] The PWC "Pooper Scooper" law requires residents to clean up after their pets,[144] and it is reinforced by MPOA community guidelines. Pet waste left to decay on sidewalks or grassy areas near the street could be washed into storm drains which drain directly into the lake. As pet waste decays, it uses up oxygen, releasing ammonia, supporting weed and algae growth; introducing risks for fish, human health, and water quality. Residents with an understanding of pet waste risks, can work together to remove the nuisance. As shown in the picture (at the left) MPOA has provided pet waste stations in community parks, along trails and sidewalks, and in public places people frequently walk their dogs.[145] The control of wildlife feces is difficult due to the irregularity associated with the presence of wildlife in local site water bodies, making the control of TKN more difficult.[146] Nevertheless, PWC continues with its "bird and other vermin control" program in an attempt to minimize, to the extent practicable, wildlife residency

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[139] Consistent with operational objectives, Prince William County intends to continue with the routine sediment, surface water, storm water, and storm water monitoring activities and regularly scheduled best management practices (BMP) activities for subsequent monitoring periods. Due to changes in Prince William County budget priorities, some testing and sampling activities have been reduced in recent years.

[140] PWC installed Best Management Practices (BMP) structures at the landfill and performed routine maintenance of existing structures for the continued protection of the environment and surrounding neighborhoods. As expected, these activities appeared to mitigate the single statistically confirmed exceedance of TSS at Basin B.

[141] Statistical evaluations prepared for the data indicate that, with the exception of infrequent concentrations of copper, nickel, TSS (Total Suspended Solids), TDS (Total Dissolved Solids), and TKN (Total Kjeldahl Nitrogen), monitored constituents present in the storm water leaving the facility basins are not present in concentrations that statistically exceed the site-specific Water Quality Standards.

[142] Phosphorous is an essential nutrient for plants and animals; yet too much phosphorous (from fertilizer run-off and organic matter decomposition can have adverse effects, including: algae blooms, accelerated plant growth, and low dissolved oxygen.

[143] Every time it rains, pet waste washes down storm drains into creeks, lakes and the Chesapeake Bay. If left to decay on sidewalks or grass, and not disposed of properly, pet waste flows directly into nearby streams and creeks without being treated at wastewater treatment facilities. Residents' health may be at risk, too. Adults working in their gardens, children playing outside and family pets are the most at risk for infection from some of the bacteria and parasites found in pet waste.

[144] In Prince William County it is against the law (Section 4-11 & 4-26) to allow your animal to knowingly or willfully urinate or defecate on private property of other persons or on publicly owned property except parts of parks as posted as dog run areas. It is a Class 4 Misdemeanor with a maximum fine of $250 per offense. Those who walk their dogs should take along a pooper scooper and/or bag to pick up any feces. It is unhealthy, unsightly and unlawful to leave pet waste in common areas. Be considerate of neighbor's health and property. Scoop it up!

[145] What can residents do to mitigate risks of animal feces impacting water quality:

- Pick up pet waste in your yard. It is not a fertilizer. Contact MPOA or local parks to inquire about providing additional pet waste stations in area parks, along trails and in public places where people frequently walk their dogs.
- Carry disposable bags with you when you walk your dog. When disposing of the waste, wrap it carefully to avoid spilling.
- Do not dispose of pet waste in street drains – they drain into the lake. Flush it down the toilet where it will go to a sewage treatment plant. Don't flush debris or cat litter that can cause plumbing problems. Secure used cat litter in a plastic bag for the trash.
- Bury it in a hole or trench, at least 12 inches deep away from gardens, wells and water source and cover with at least eight inches of soil to let it decompose slowly. Don't add it to your compost pile as most piles do not get hot enough to "cook" the bacteria.
- Put it in the trash wrapped carefully. Another option is to install an underground pet waste digester that works like a small septic tank.

[146] The source of the TKN (Total Kjeldahl Nitrogen) exceedance is likely to be degrading plant matter and/or animal waste.

in storm water control ponds. MPOA continues to coordinate with the USDA in controlling geese populations on the lake. Resident Canada Geese on Lake Montclair leave excessive amounts of fecal droppings on turf and beach areas. The decrease in goose droppings is due in part to MPOA Board approved methods being judiciously applied, as needed, such as goose roundups, goose booms installed around each beach, and goose-egg addling, which have all contributed to a reduced E-Coli bacteria level.[147] Two methods of population control are capture/euthanasia and egg addling/oiling.[148] The control of geese on Lake Montclair has proven to be very effective resulting in no geese being removed in most years. MPOA staff obtains a permit each year to addle/oil Canada Geese eggs. Several nests are treated by MPOA staff in late March to early April after clutches have 3 to 6 eggs (sometimes more) to effectively reduce population growth.

Periodic reports on environmental water quality are provided and addressed in the LMEQR to complement monitoring and assessment activities that continue to be important aspects of the Lake Management Program focused on sustaining water quality and healthy aquatic biological communities. MPOA property management staff and LMC provide periodic reports to stakeholders on the status of watershed and lake interests; providing recommendations and the annual LMEQR to the MPOA BoD, and reporting to stakeholders via information articles in *The Montclairion* and community website. Section III.d.1.a of this LMPP provides information relevant to notification procedures to residents in the event of detrimental changes in water quality, such as e-Coli.[149] This LMPP provides information resources to enable stakeholders to better appreciate the value of the lake's water quality. These resources provide enablers for responsible contributions by residents for the stewardship of the lake. LMC continues to advance better means for empowering citizens to monitor/report on issues relevant to environmental water quality. To provide resources for community engagement, notification, and education relative to lake water quality issues, MPOA LMC and property management staff coordinate with State and County programs to provide information resources relevant to sustaining water quality.[150]

b. Risk Mitigation and Prevention Efforts Focused on Sustaining Environmental Water Quality

In addition to monitoring and assessment, water quality management also includes risk management and prevention strategies. Risk identification is substantially enabled by monitoring and assessment activities; yet more comprehensive risk mitigation efforts provide explicit prevention practices focused on minimizing hazardous materials and pollutants from entering the lake and mitigating harmful impacts of inadvertent introduction of contaminants into the lake. MPOA collaborates with county and state organizations on risk mitigation and prevention strategies to accomplish objectives listed in Table 3-3 to sustain water quality in Lake Montclair.[151]

Table 3-3. Relevant Objectives for Risk Mitigation and Prevention Efforts for Sustaining Water Quality

1-2. Mitigate risks from identified hazards, pollutants, contaminants, and eutrophication-causing nutrients.
1-3. Sustain environmental water quality and healthy aquatic biological communities.
5-2. Mitigate risks from potentially toxic and harmful materials.
5-3. Reduce foreign material in the lake.
6-5. Provide resources for community engagement, notification, and education relative to lake issues.

1. Preventing and Reducing Harmful Bacteria and Eutrophication-Causing Nutrients.

The LMC coordinates with the property management agent to sustain water quality and healthy aquatic biological communities. LMC reviews stakeholder efforts to delineate contingency plans and identify corrective actions, as

[147] The US Department of Agriculture Wildlife Services provides information and assistance to citizens of Virginia to reduce or eliminate damage caused by resident Canada Geese.

[148] In accordance with a Cooperative Service Agreement with US Dept of Agriculture, Animal and Plant Health Inspection Service, (Wildlife Services), excessive resident Canada Geese will be rounded up during the molting period and removed. Once removed from the site, geese will be taken to a processor and euthanized, processed and donated to zoos or wildlife rehabilitators for use as food for zoo and wild animals.

[149] Actions focused primarily on reporting of test data will be lagging since test reports, at best, give an indication of past conditions. The MPOA LMC resilience-centric approach focuses on safeguarding the continuity of the lake-ecosystem in assessing and mitigation risks.

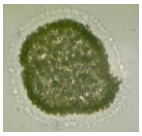
[150] Assessment studies have yet to be conducted to determine the potential impact on Lake Montclair on proposed expansions of roadways in the Powells Creek Watershed, such as Highway 234. Such expanded uses of the roadways could potentially introduce higher concentrations of hazardous material flowing into the lake and further exacerbate storm water overflow issues associated with previous expansions.

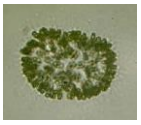
[151] The associated strategies for sustaining water quality are outlined in Section II, Table 2-3 of this LMPP.

needed. LMC promotes the prevention or reduction of eutrophication[152] (from decomposing leaves and fertilizer) in the lake. MPOA provides information and signs that indicate street drains on properties "not on the lake" are connected to the lake (this includes publishing articles in *The Montclairion* to inform residents about the lake-watershed connection). When needed, MPOA coordinates with others to take corrective action to mitigate risks, such as those associated with blue-green bacterial or algae bloom.[153] This includes coordinating with others to use community, county and state resources to maintain or enhance physical condition of the lake.[154, 155] In autumn 2013 the level of observed algal bloom in Lake Montclair warranted analysis. Samples were analyzed to determine algae and water quality and sediment phosphorus.[156] Table 3-4 (in parts a, b & c) provides results of the analysis. Findings associated with water quality parameters at that time in October 2013 revealed the lake was eutrophic.[157]

Residents should minimize runoff of fertilizer from lawns and not deposit leaves in the lake.

Table 3-4a. Algae Identification Results from Lake Montclair (Oct 2013)





Identification	Classification	Description	Density
Synura sp. (dominant)	Chrysophyta-Golden Algae	Flagellated, planktonic, colony former, potential odor producer	887,000 cells/mL
Anabaena sp. (moderate density)	Cyanophyta-Blue-green algae	Filamentous, scum former, nitrogen fixer, potential toxin and taste/odor producer	8,000 cells/mL

Table 3-4b. Water Quality Results from Lake Montclair

Analysis	Measurement	Description
pH (SU)	7.1	Near Neutral
Dissolved Oxygen (mg/L)	8.38	Acceptable for fish
Conductivity (µS/cm)	147	Acceptable for freshwaters
Alkalinity (mg/L as $CaCO_3$)	33	Low Buffering Capacity
Hardness (mg/L as $CaCO_3$)	42	Soft
Turbidity (NTU)	22.3	Moderately high

Table 3-4c. Nutrient Results from Lake Montclair

Analysis	Measurement	Description
Total Phosphorus (µg/L)	73.2	High amount: eutrophic
Free Reactive Phosphorus (µg/L)	5.5	Low amount
Total Sediment Phosphorus (mg/kg)	158	Moderate

[152] **Eutrophication** is a syndrome of ecosystem responses to human activities (such as runoff of fertilizer from suburban lawns) that deplete oxygen in the water and introduce nitrogen and phosphorus into a body of water, often leading to changes in animal and plant populations and degradation of water and habitat quality. It is an increase in the rate of supply of organic matter in an ecosystem; the process by which a body of water acquires a high concentration of nutrients. Anthropogenic eutrophication is water pollution caused by excessive plant nutrients.

[153] Mammals and birds can get sick and die from drinking water with blue-green bacteria or cyanobacteria that can grow rapidly or "bloom" to form a visible film or scum on the surface of the water. Some bacterial bloom toxins are directly harmful to fish and can cause fish kills. See http://www.vdh.state.va.us/epidemiology/dee/habs/cyanobacteria/. The algal bloom that is sometimes seen in Lake Montclair is a small one that can occasionally occur in most fresh bodies of water. The cause of this particular bloom often has several natural and artificial causes that create the abundance of nutrients needed for it to occur; including sunny weather, application of fall fertilizer, early lake turnover, or periods of low lake flow. Any one of these factors is usually not solely the cause for the bloom seen in Lake Montclair; it is a combination. The effects of the small algal bloom sometimes seen in Lake Montclair are mostly aesthetic and should not pose any threat to the lake's inhabitants and visitors. It is a naturally occurring event seen in fresh bodies of water when conditions are right and eventually slowly disperses as the weather turns cooler and falls in line with the season.

[154] These efforts include filtering pollutants and sustaining the biological communities of on-site and off-site receiving water bodies.

[155] Several members of the Virginia Department of Environmental Quality (DEQ) and the US Environmental Protection Agency (EPA) visited Lake Montclair on October 10, 2012, and the general consensus was that Montclair has a very clean lake. Analysis of the water in October 2013 revealed changes in environmental water quality.

[156] Report of SOLitude Lake Management SeSCRIPT Analysis from samples taken at an average depth of 10 feet in Lake Montclair and received 21 Oct 2013. Analysis was used for determining an algae and water quality baseline bundle and sediment phosphorus.

[157] Results of Oct 2013 water quality and algae analyses enabled proposed treatment recommendations for algae and nutrient management.

Alternatives for algae management (using an algaecide and water quality enhancer)[158] and phosphorus management (using phosphorus removal solutions for recovery or reset to restore water quality in the lake)[159] were submitted with the analysis report.[160,161] Based on these site specific water parameters, MPOA considered alternative solutions for implementing Phoslock phosphorus removal to restore water quality in Lake Montclair; yet dredging was determined to be the better solution at the time to mitigate issues associated with both the algae and phosphorous since dredging is one of the environmentally better means for minimizing algae and reducing sediment phosphorus.

2. Mitigating Risks from Hazardous Material, Pollutants, and Contaminants.

Risk management activities focus on minimizing the introduction of harmful elements that could degrade water quality. The LMC coordinates with the MPOA property management agent to use community, county, and state resources to mitigate risks to Lake Montclair from potentially toxic and harmful materials. MPOA coordinates with appropriate officials to monitor upstream development and site use, and, as needed, provides for clean-up, containment or removal of any potentially toxic and hazardous materials.[162] MPOA Community Guidelines prohibit dumping, pouring, or throwing any material into the lake or onto beaches and common areas abutting the lake.[163] MPOA relies on using community and government resources to reduce foreign material in the lake by monitoring introduction of debris, garbage, petroleum products, and other foreign material into the lake.[164]

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[158] Algae Management. In order to control targeted algae at this site, apply: SeClear Algaecide and Water Quality Enhancer at a rate range of 1.3 to 3.9 gallons/acre- foot (0.2 to 0.6 mg Cu/L); take caution with fish. Certified professionals should be consulted for guidance on final application rate selection, technique and frequency based on project objectives, site conditions, algae location and density at treatment time.

[159] Phosphorus Management. Analysis of the water quality parameters in Lake Montclair in Oct 2013 revealed this system was eutrophic. Based on these site specific water parameters, recommendations were made to consider implementing one of the following Phoslock phosphorus removal solutions (for recovery or reset) to restore water quality in the lake.

- Recovery Solution: Improve water quality by incorporating strategic applications of Phoslock to remove free reactive phosphorus from the water column. Integrate with SePRO algaecide applications as needed to control algae and achieve desired water quality objectives. Apply 21,600 pounds of Phoslock to target phosphorus removal from the water column, based upon the sample analyzed.
- Reset Solution: A more comprehensive solution to water quality restoration. Reset the ecological clock and restore water quality in your pond by implementing a Reset application strategy customized by water body. This Phoslock solution targets and permanently removes free reactive phosphorus in the water column and accumulated in water body sediments over time. Apply 63,000 pounds of Phoslock to target both water and sediment phosphorus in this system.

[160] SOLitude Lake Management conducted the analysis and offered recommendations for treatment, and could provide further guidance on choosing the most effective management approach based on site conditions and objectives. 888-480-5253 Email: SJunior@solitudelake.com

[161] The golden algae or chrysophytes are a large group of algae, found mostly in freshwater. Golden algae is also commonly used to refer to a single species, Prymnesium parvum, which causes fish kills. Cyanobacteria, formerly called "blue-green algae" are relatively simple, primitive life forms closely related to bacteria. Typically much larger than bacteria, they photosynthesize like algae. Depending upon the species, cyanobacteria can occur as single cells, filaments of cells, or colonies. Cyanobacteria contain a characteristic pigment which gives the group their blue-green coloration. When cyanobacteria blooms begin to die and disintegrate, this pigment may color the water a distinctive bluish color. Cyanobacteria are found in freshwater and marine habitats, but blooms typically occur in freshwater. Nutrient-rich bodies of water, such as some lakes or ponds, may support rapid growth of cyanobacteria. With the right conditions, a "clear" body of water can become very turbid with green, blue-green or reddish-brown colored algae within just a few days. High concentrations of an alga species in a water body form "blooms". Many species can regulate their buoyancy and float to the surface to form a thin "oily" looking film or a blue-green scum several inches thick. The film may be mistaken for a paint spill. Cyanobacteria cannot maintain this abnormally high population for long and will rapidly die and disappear after one to two weeks. If conditions remain favorable, another bloom can quickly replace the previous one. In fact, successive blooms may overlap so that it may appear as if one continuous bloom occurs for up to several months. Why are they a problem? Blue-green blooms can pose a human health concern. Although most blue-green blooms are not toxic, some blue-green algae produce nerve or liver toxins. Toxicity is hard to predict in part because a single species of algae can have toxic and non-toxic strains. Also a bloom that tests non-toxic one day can turn toxic the next day. People may become ill after swimming or water skiing in lakes with toxic blue-green algae. Rarely, humans may experience stomach pains, vomiting, diarrhea, and skin rashes. Nerve and liver damage have been observed following long-term exposure such as drinking water with toxic blooms.

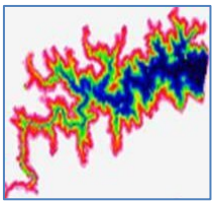
[162] As applicable, these efforts could include additional means to help residents minimize use of materials, products and practices which are harmful to humans and the environment. These efforts could also include promoting and minimizing the use of materials that produce hazardous pollutants during their life cycle; as well as decreasing the need for toxic substances, phosphates, herbicides, and pesticides.

[163] MPOA Covenants, Article 4, Paragraph 4.3 addresses prohibitions associated with dumping, pouring or throwing of materials into the lake or onto beaches and common areas. Boaters who use their boats on other bodies of water, and those who keep gasoline powered engines on their boats while on Lake Montclair, are asked to check and/or clean the hulls prior launching their boats on Lake Montclair to avoid transporting non-native biological organisms and to ensure their engines are not dripping petroleum products into the lake.

[164] An "All Hazards Response" analysis should be conducted as part of planning and risk assessment for any possible expanded uses of roads or enhanced drainage of roads (that potentially reduce 'green filters' and increase 'gray funnels') in the Powells Creek Watershed, such as Highway 234, Spriggs Road, Hoadly Road, Minnieville Road, etc. Such a risk analysis should be required to account for any needed mitigations to avoid detrimental impacts on Lake Montclair, Powells Creek Watershed, and ultimately the Chesapeake Bay. Hazards risk analysis should address issues associated with transport of suspended soils, contaminants, pollutants, and foreign material in storm water.

3. Reporting and Follow-Up from Surveys of the Lake and Samplings in the Watershed.

LMC coordinates with the property management agent in planning for (and recommending to the MPOA BoD) relevant bathymetric, hydrographic and topographic surveys in order to determine needs and to set baselines for dredging.[165] Storm water runoff into the lake necessitates periodic dredging to maintain a minimum depth of 4 feet and a 4:1 horizontal to vertical slope from the shoreline. Minimizing loss of the lake footprint (surface area) and retaining an adequate water depth are important to maintain water quality[166, 167] Section IV.b.4 of this LMPP addresses sediment monitoring, lake surveys and periodic dredging in the lake. The integration of topographic[168] and hydrographic[169] surveys is common in the management of dredge areas in bodies of water.[170] Bathymetric surveys[171] are needed annually for Lake Montclair to quantify changes/results of watershed runoff.[172]



With LMC recommendations based on results of water quality testing, the MPOA coordinates with Prince William County and other applicable stakeholders in mitigating risks attributable to hazards, pollutants, contaminants, eutrophication-causing nutrients, and blue-green algae bloom. PWC follows-up on sampling activities that detect hazardous material, pollutants, contaminants, and petroleum products in the watershed. If needed, efforts could be focused on establishing lake-clean-up projects and monitoring watershed property for possible clean-up efforts.[173]

c. Water Level Management, Monitoring and Control

Storm surges represent the most significant risk to properties adjacent to Lake Montclair and Powells Creek; so MPOA coordinates with PWC to manage and control water level in the lake. Many practices and procedures have been part of lake management processes for several years, and they have continued to evolve; responsive to needs, especially after two abnormal storm surges in Sep 2007 and May 2008 that led to the subsequent appointment of the Storm Water Task Force (SWTF).[174] The resulting report from the SWTF contained findings and recommendations that contributed to changes in water level management and control[175] beyond those specified in the Emergency

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[165] See Section IV.b.4 of this LMPP for the need and role of bathymetric, hydrographic and topographic surveys.

[166] Areas that become shoaled-in significantly would need to be considered for dredging prior to them becoming dry land or a wetland to prevent them from becoming potential fish-kill areas due to risk of reduced oxygen.

[167] In late 2007 Lake Montclair was dredged at a cost of $900,000 to MPOA. This dredging was necessary because of the large amounts of silt discharged into the headwaters of Lake Montclair at Powells Creek from commercial and housing development, the failure of storm fences for the Spriggs Road construction project, and the breach of the Lake Terrapin storm water management pond. Prior to the Fall 2007 dredging, portions of Lake Montclair were dredged in 1991, 1996, and again in 2001 when approximately 18,000 cubic yards of silt were removed from specified sites. The collected silt was taken to the PWC landfill.

[168] **Topography** is the description of surface shapes and features (especially their depiction in maps). Topographic maps with elevation contours have made "topography" synonymous with relief. Topography specifically involves the recording of relief or terrain, the three-dimensional quality of the surface, and the identification of specific landforms. This is also known as geomorphometry. This involves generation of elevation data in electronic form. It is often considered to include the graphic representation of the landform on a map by a variety of techniques, including contour lines, hypsometric tints, and relief shading.

[169] **Hydrography** refers to the mapping or charting of water's topographic features. It involves measuring the depths, tides, and currents of a body of water and establishing the topography and morphology of lake beds.

[170] Several real-time quality control techniques can be used to quickly appraise the information to overcome the variables introduced by mixing survey types, and these should be addressed in the context of data acquisition and data analysis.

[171] The principle of the **bathymetric** method is to send an acoustic signal and measure the travel time to derive a depth. This depth conversion process is done by first measuring the velocity of sound in the water at different depths. The water depth measurements should be expected to be accurate to within ± 10 cm. The bathymetry equipment is small and can be mounted on a boat so that the survey can be conducted along with other geo-physical methods. The survey is conducted in a grid pattern. The line spacing is decided based on the resolution required. The more accurate positioning is achieved using a Differential Global Positioning System.

[172] GBA recommendations specified a need to conduct a metric survey of the whole lake to determine locations of accumulated sediment.

[173] Oil and grease were detected in the water samples (taken December 16, 2009, and June 23, 2010 by PWC) at both the Spriggs Road and Lake Montclair locations. Subsequent sampling at those two locations on Dec. 15, 2010, showed a much lower level at Lake Montclair and a non-detect level at Spriggs Road. Subsequent samples taken June 22, 2011, and Dec. 31, 2011, at both locations were non-detect, indicating that the source was transient/temporary. Sampling upstream and at the landfill during that same time period indicated that the landfill was not a source of the oil and grease. County staff investigations were not able to identify a specific source, but County staff will continue to monitor construction sites and roadways within the area.

[174] Report of the Storm Water Task Force (SWTF) to the MPOA Board of Directors, September 10, 2008 is on file at MPOA office and available on the Montclair website. The SWTF was headed by the Lake Management Committee Chairman with members from Safety, Communications, and Covenants committees. The SWTF included recommendations for a Lake Management Plan and a Storm Water Management Plan (and these are combined in this LMPP).

[175] Follow-up response to the recommendations made in the report of Storm Water Task Force led to specific changes in MPOA processes.

Action Plan (EAP).[176] Residents should appreciate that Lake Montclair is designed with spillways intended to mitigate the risk of homes being flooded.[177] However, properties adjacent to the spillway and downstream of the lake are potentially at risk from storm surges that require emergency response. Moreover, properties on the lake are subject to damage resulting from rapid rising of the lake due to storm surges. To manage and control water level, the LMC and MPOA focus on strategies to accomplish objectives specified in Table 3-5.[178]

Table 3-5. Relevant Objectives for Managing and Controlling Water Level

1-1. Manage water on site to sustain or regenerate healthy hydrologic processes.
1-5. Manage and control water level, and report changes.
2-4. Maintain integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs).
6-5. Provide resources for community engagement, notification, and education relative to lake issues.

1. Impounding Structure (Earthen Dam & Spillways) Management and Operations.

The most important asset associated with sustaining Lake Montclair is the impounding structure composed of the earthen dam and spillways; so a significant part of retaining the integrity of the lake is focused on dam management and operations.[179] Training for personnel involved in dam operations is a key factor for water level management, monitoring and control. MPOA Staff periodically review the roles and responsibilities identified in the EAP, and have ensured the chain of command (including backup roles) is understood; roles are clearly assigned; training requirements are identified for each role, and personnel monitored to ensure they receive the required training. As documented in annual updates of the LMEQR, the MPOA LMC coordinates with the property management agent to provide routine, periodic inspections of the earthen dam, and as needed, takes corrective action on the earthen dam in a timely basis.[180] Several times a year MPOA Maintenance exercises the gate drawdown valve.[181] LMC members often attend the bi-annual inspections of the dam performed by MPOA maintenance and the dam engineer, along with other inspections and actions.[182] In 2014 MPOA contracted for an inundation study and spillway stability analysis in support of the recertification for operations and maintenance of the dam.[183]

2. Storm Water Monitoring, Response, and Discharge Control.

Weather and lake condition monitoring is important in planning for proactive actions and applicable warnings; so MPOA collaborates with PWC in monitoring rainfall and water flow in the watershed.[184] These efforts focus on maintaining surface runoff levels and landscape to filter or allow infiltration of surface runoff. MPOA publicizes periodic lowering of water level to facilitate shoreline and dock maintenance. To manage water level, MPOA uses

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[176] Emergency Action Plan for Montclair is on file at MPOA; it is required per Virginia Impounding Structure Regulations 4VAC50-20. The EAP provides information to emergency responders and Montclair residents about actions to protect lives and property in the event of impending or actual sudden release of water from Lake Montclair caused by natural disaster, accident to, or failure of the dam.

[177] The primary spillway is siphon activated with a crest elevation of 188 feet above mean sea level (msl), with a knife gate valve controlling the low-level 24-inch outlet pipe (elevation at 136 feet msl). The emergency spillway crest is at elevation 194 feet msl; it is located beyond the right abutment of the dam and has a channel width of about 150 feet (and dual-purpose serves as Dolphin Beach). Flow in the emergency spillway creates a potentially hazardous situation for residents living on Spillway Lane, which parallels the emergency spillway. Since Spillway Lane is a cul-de-sac, no easy means of escape is available to the impacted residents. Therefore, these residents must be warned and evacuated before the water levels and velocity in the emergency spillway have made Spillway Lane impassable. The emergency spillway has undergone modifications including deepening which may either partially or totally alleviate this problem.

[178] The associated strategies for managing and controlling water level are also outlined in Section II, Table 3 of this LMPP.

[179] For dam operations, an outflow mechanism includes the concrete structure at the water side of the dam. This vertical siphon spillway is 6'3" x 8' and is ~60' high. At the bottom is an outflow 235' long 5'x8' concrete tube that carries the water out of the lake. At the lake-side end of this tunnel is a 24" gate used to lower the elevation of the lake, when necessary. When open, this gate flows at a rate of 1,025 gallons per second and lowers the lake at a rate 1" per hour under normal lake inflows.

[180] Section IV.c.7 of this LMPP discusses specific monitoring and inspection activities for the Lake Montclair dam.

[181] MPOA Maintenance has repaired the old sluice gate; so a viable backup is available.

[182] The SWTF recommended that MPOA sponsor an annual public forum during which the dam engineer and maintenance personnel meet with all interested Montclair homeowners to address plans regarding dam operation and maintenance. LMC members are invited for "cracks in dam" inspections and maintenance efforts, such as sluice gate repair.

[183] The 11 July 2014 Report of Inundation Study for Montclair Dam (Inventory #15303) F&R Record #62R-3350 was submitted by Froehling & Robertson, Inc, reflecting the analysis resulting in a hazard classification statement, flood inundation mapping, and incremental damage assessment. The report included results of the stability analysis on the auxiliary spillway under the 100 year, ½ Probable Maximum Flood, the Spillway Design Flood, and the PMF events.

[184] PWC monitors upstream rainfall and water flow in the watershed, and MPOA monitors lake water levels for potential warnings. MPOA coordinates with PWC to manage water on site to sustain or regenerate healthy hydrologic processes.

systems to provide drainage to minimize property damage (associated with rapid rise of water that might not activate the EAP). These provide applicable notifications to Montclair residents with specific notifications to lakefront owners through email and phone.[185] MPOA "storm anticipation" procedures include criteria for monitoring and triggering the timing of the sluice gate opening and other pre-emptive actions.[186, 187, 188]

In anticipation of storms, MPOA has made several preparations based on lessons-learned and recommendations from the Storm Water Task Force.[189] This includes monitoring and using criteria for triggering pre-emptive action, and identifying who gets the weather forecast, from where, and what they are expected to do with the information.[190, 191] If severe weather is predicted, then the MPOA property management agent begins monitoring gauge levels or, if predicted ahead of time, the sluice gate is opened to lower lake level. Response procedures have evolved to address storm surges that have provided examples[192] for how MPOA manages operations of the dam to successfully mitigate risks to properties on the lake, adjacent to the spillway, and downstream of the lake. Also, a "3 person team" is in place to make recommendations to MPOA President. Working with PWC and the State will continue to be a priority for MPOA to ensure issues relevant to Lake Montclair are addressed as priorities.[193] Periodic bathymetric surveys are needed to quantify changes/results of watershed runoff.[194]

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[185] The 'dam cam' and cameras installed by MPOA enable the property management agent to monitor the beach areas for safety and security. An upstream gauge has not been installed (per recommendation of the LMC). There has been consideration for getting an automated notification system that would be activated by water level; yet the current system seems adequate to provide notification via email to lakefront owners when MPOA management determines conditions warrant such notice. Contact information is in dock registrations.

[186] For example, notification went out on October 26, 2012 to all lakefront owners via email from MPOA (using the predecessor of FSRConnect). Lakefront residents were notified that if the storm stalled over Lake Montclair, staff would leave the gate open throughout the storm. The notice included reminders to take any necessary precautions to protect lakefront property and watercraft (e.g. adjust pontoon retaining lines to accommodate increased water levels; properly secure or remove boats, kayaks, and other floating items from docks).

[187] Procedures for opening the sluice-gate clarify criteria conditions warranting opening, including those based on National Weather Service (NWS) forecasts, with consideration of lake level rising 10 inches in one hour to trigger opening of knife/sluice gate under most conditions.

[188] Recommendations balance the benefits of opening the sluice gate against the risks. MPOA has taken mitigation actions to minimize the risks of opening the sluice gate by having a back-up gate. MPOA and PWC continue to examine ways to control runoff into Lake Montclair.

[189] The Storm Water Task Force (SWTF) recommended changes in dam operation and processes responsive to weather-related storm surges. Due to a particularly severe rainstorm on May 11, 2008, resulting in damage to private docks on Lake Montclair, the President of the MPOA appointed the SWTF headed by the Chairman of the LMC with members from the Safety, Communications, and Covenants committees. The report contained findings and recommendations. The watershed received over three inches of rain between Thursday, May 8 and Friday, May 9, 2008. While there was little rain on Saturday, May 10, 2008, the National Weather Service (NWS) issued a flood watch Saturday afternoon for Eastern PWC and the Montclair area with locally heavy rains predicted for Sunday, May 11, 2008. A storm stalled over the area on Sunday evening resulting in an additional 4 inches of rain. MPOA Property Management staff personnel remotely monitored the weather conditions beginning on Friday. Due to worsening conditions, management personnel arrived on site Sunday evening to prepare for the possibility of invoking Stage I of the Emergency Action Plan (EAP). The personnel continuously monitored the situation, both at the dam and the MPOA office, until approximately midnight when the decision was made to open the sluice gate. The lake crested at one inch below 192 feet above mean sea level at approximately 4:00 a.m. on Monday, May 12, which is three feet eleven inches above normal (188 MSL). During this entire time the lake level at the dam required for Stage I of the Lake Montclair EAP was not reached and the EAP did not require activation. As a result of the May 11-12, 2008, storm, no one was injured and there was no damage to the Lake Montclair dam. Unfortunately, some private docks were either damaged or destroyed. According to the property manager, 7 docks were reported as detached and adrift, with 48 needing repairs or replacement out of a total of 166 docks on the lake.

[190] MPOA Staff prints a copy of the NOAA weather report on daily basis and maintains copy of reports in office.

[191] MPOA provides staffing and ensure training of staff for functions to manage water level and the dam. MPOA provides the EAP, compliant with regional statutes, to address needs and response to potentially catastrophic events that could adversely affect the dam or integrity of the lake. In conjunction with the EAP, this LMPP also serves as a storm water management plan to address how to manage water levels during a storm with procedures to be followed by property owners and those with roles and responsibilities associated with lake, and it provides procedures for drainage at lower levels than required for emergency action (to minimize property damage). MPOA uses a system to provide notification to property management staff to engage LMC and a weather-knowledgeable person.

[192] For example: Hurricane Sandy hit Montclair in Fall 2012. The lake was lowered 36" on October 28-29, 2012, in preparation of the storm. The gate of the dam was opened at 9:00am on Oct. 28 at an elevation of 188.176'. By Oct. 29 at 3:30pm, the lake was lowered to 185.607' and the gate was closed. On Oct. 31, 2012, at approximately 4:30pm, the lake level rose to 188.438' and the data collected shows that the siphon engaged at or around this time as the water level began dropping. The hurricane brought a total of approximately 5.15 inches of rain but because the gate was opened two days in advance, the siphon was able to control the lake level. It was not apparent that the siphon engaged a second time. There was no reported damage to docks or boats.

[193] MPOA continues to coordinate with PWC to examine ways to control runoff into Lake Montclair with possible mends including repairs to Powells Creek stream embankments and forebays in the Creek and at the beginning of Lake Montclair. MPOA and PWC need to continue coordinating with the State on storm water management. VDOT has taken actions to manage roads to the detriment of Lake Montclair in terms of storm water release; several culverts have been replaced with larger culverts, minimizing water retention, resulting in the lake water level rising faster with storms. Cumulative effects of upstream development and changes to culverts need to be addressed.

[194] See Sections III.b.3 and IV.b.4 of this LMPP on the need and use of bathymetric surveys for managing the integrity of the lake.

3. Emergency Action Planning, Preparedness, and Response.

MPOA's Emergency Action Plan for the Lake Montclair Dam is compliant with regional statutes,[195] and addresses needs and response to potentially catastrophic events that could adversely affect the dam or integrity of the lake.[196] Roles and responsibilities are specified in the EAP.[197] MPOA has an established chain of command (with primary and backup); roles are clearly assigned with training requirements identified for each role, and personnel are monitored to ensure they receive the required training. In accordance with PWC requirements, a the EAP is exercised on an annual basis. Because the Lake Montclair dam (impounding structure and spillways)[198] is in a residential development with homes downstream, several precautionary functions have been designed and built to address potential hazards.[199] The dam and emergency spillways are designed to pass the Probable Maximum Flood (PMF).[200] The emergency spillway has undergone modifications including deepening which may either partially or totally alleviate this problem due to the elevation relative to the crest of the dam and the water level in the lake. Homes located in other areas downstream from the dam are also at risk of being flooded in the event of an emergency; so these areas and the conditions which will precipitate evacuation have been identified in the EAP.[201] Several methods for notification and warnings have been put in place. In order to implement the various stages of the EAP, MPOA uses systems for notification, warning and instructions that would be passed to emergency responders and affected residents via a redundant communications network. These networks include: phone, radio, television and mobile communication vehicle.[202] Residents are encouraged to sign-up with the Prince William County Alert Network (PWCAN) that delivers important emergency alerts, notifications and updates to residents via phone, pager, e-mail, or wireless PDA.[203]

MPOA is the owner/operator of the Lake Montclair dam (impounding structure with spillways), and the General Manager (GM), as the designated Dam Operator and EAP Coordinator, is responsible for notifying local government and Montclair residents of any problems or potential problems at the dam site.[204] If needed, once a condition requiring evacuation would be established, the MPOA GM

MPOA uses a computerized Water Level Warning system at the dam site to provide automated notification when the lake water level reaches or nears flood stage.

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[195] As owner/operator of the Lake Montclair Dam, MPOA complies with Virginia Impounding Structure Regulations 4VAC50-20 by using the Emergency Action Plan (EAP) to address emergency planning and response to potentially catastrophic events that could adversely affect the dam, integrity of the lake, and people living in homes on properties bordering Powells Creek downstream of the dam. It addresses preventative mitigation efforts and contingency measures to provide reasonable warning to affected areas in event that weather conditions or accidents threaten the dam and lives/property in the path of possible overflows. EAP procedures are in place to inform residents of protective measures to be implemented if weather, natural disaster, or accidents threaten the dam. The EAP describes conditions which require actions pursuant to the plan and details the responsibilities of the MPOA and local authorities if an emergency condition occurs. Lives and property downstream from the dam have never been threatened. Floodwater flow over the emergency spillway has not occurred since Hurricane Agnes brought unusually heavy rainstorms over PWC in 1972; after which improvements were made to the emergency spillway.

[196] The purpose of EAP is to provide information to Montclair residents about emergency action to protect lives and property in the event of impending or actual sudden release of water from Lake Montclair caused by a natural disaster, accident to, or failure of the dam.

[197] See Emergency Action Plan (EAP) via the Montclair website. All responsible persons are given detailed instructions and procedures to be followed in the event of emergency actions. These instructions and procedures are reviewed and discussed on a periodic basis as determined by the MPOA General Manager. The EAP is tested at least once annually. This includes a hypothetical communications exercise within the community and with County offices and individuals concerned. The EAP is reviewed and updated annually.

[198] The dam is an earthen embankment 650 feet long and 74 feet high. The primary spillway is a siphon activated spillway with a crest elevation of 188 feet above mean sea level (msl), with a knife gate valve controlling the low-level 24-inch outlet pipe (elevation at 136 feet msl). The crest of the dam proper is at elevation 206.5 feet msl with the emergency spillway crest at elevation 194 feet msl. The emergency spillway is located beyond the right abutment of the dam and has a channel width of about 150 feet and serves dual-use as Dolphin Beach.

[199] The fact that homes are located downstream of the dam requires that the downstream area be technically classified as "high hazard." The classification used to categorize a dam is determined by physical location and is unrelated to the type of condition of the dam.

[200] Failure by flooding over the top (overtopping) of the dam is not a probable mode of failure because of the design of emergency spillways.

[201] A six-hour storm depositing 3.3 inches of rain on the watershed area could in all likelihood cause the emergency spillway to flow. Total depth of emergency spillway available before the crest of the dam is overtopped would be 12.5 feet. Flow in the emergency spillway would create a potentially hazardous situation for residents living on Spillway Lane, which parallels the emergency spillway. Since Spillway Lane is a cul-de-sac, no easy means of escape by vehicle is available to the impacted residents. Therefore, these residents must be warned and evacuated before the water levels and velocity in the emergency spillway have made Spillway Lane impassable.

[202] It is suggested that residents, particularly those in areas A, B and C maintain a continuous listening watch on a battery operated portable radio tuned to one of the following radio stations: WASH 97.1 (1-866-927-4361), WAVA 105.1 FM (703-807-2266), WJFK 106.7 FM (1-800-636-1067), WMZQ 98.7 FM (1-800-505-0098), WTOP 103.5 FM (1-202-895-5006), or WT 1500 AM (1-202-895-5000).

[203] See www.pwcgov.org/pwcan to register for the Prince William County Alert Network (PWCAN). The EAP describes areas to be evacuated and the conditions required for implementation of the evacuation plan. During severe storm conditions, the likelihood of telephone and television failure is relatively high. Much dependence will be placed on radio and mobile communications.

[204] See the responsibilities matrix in the Lake Montclair EAP.

would be responsible for affecting evacuation in accordance with the respective procedures.[205] The EAP defines the various stages of emergency actions and their initiation under prescribed conditions, and it identifies officials and organizations with associated responsibilities. Conditions requiring actions under the EAP are brought about by actual precipitation or "sunny day" emergency conditions which could occur at or near the dam. Staff gauges are at the concrete structure that contains the primary spillway and in the emergency spillway, and a rain gauge is at the MPOA office. This provides information for determining the emergency stages when monitoring the water level onsite. MPOA uses a state of the art computerized water level warning system at the dam site on Dolphin Beach, allowing MPOA Management to remotely monitor the lake and dam.[206] This system warns MPOA staff when the water level reaches or nears flood stage.[207] MPOA Staff provide surveillance of weather-related conditions (frequency of observation and reports of rainfall and emergency flow level by rainfall/staff gauge observed) during the various surveillance stage conditions. Summarizing the more detailed descriptions in EAP Section V, the chart in Table 3-6 summarizes how MPOA detects hazardous conditions, assesses emergency conditions and determines Emergency Level Stages that would be used to direct subsequent notification and response actions.

Table 3-6. Activity Steps Associated with Emergency Conditions

Step 1 -- Hazardous Condition Detection	**Incident Detection** (See Section V of EAP)		
Step 2 -- Emergency Level Stage Determination	**Assess Situation -- Determine Emergency Level Stage** (See Section V of EAP)		
	Emergency Level Stage 1 Non-Emergency Incident	***Emergency Level Stage 2 Spillway Activation***	***Emergency Level Stage 3 Dam Failure***
	Flood Watch or Heavy Continuous Rain – ***Slowly Developing Situation***	Emergency Spillway Activation / Overtopping up to 1 foot of water flow – ***Rapidly Developing Situation***	Emergency Spillway Overtopping with 10 foot of water & rising -- Dam Failure or Breach is Imminent or in Progress – ***Urgent Situation***
Step 3 -- Notification and Communication	Notification List for Non-Emergency Situation (See Sections II & VI of EAP)	Notification List for Rapidly Developing Situation (See Sections II & VI of EAP)	Notification List for Urgent Situation (See Sections II & VI of EAP)
Step 4 -- Frequency of Observations & Expected Actions	Inspect Dam Every 4-8 hours: Monitor and Listen to Weather Forecast	Inspect Dam Every 1 hour: Check Staff Gage hourly, Notify Emergency Responders	Constant Inspection of Dam: Continuous Contact with Emergency Responders
Step 5 -- Follow-up and Termination	Termination of Monitoring Conditions at the Dam; Proceed to Evaluate Damages and Plan for Repairs		

In the event of an impending storm with a prediction of rain totaling 3.5 inches of rain within a four hour period or 4 inches within a twelve hour period or the forecast of a Hurricane traversing over Montclair with torrential rains, the MPOA General Manager or the designees will: 1) assess the weather conditions by monitoring the National Weather Forecast prediction and if conditions warrant lowering Lake Montclair the Board President will be notified with recommendations before any action is taken; 2) notify the Communications Director to send out an Emergency Message via FSRConnect and the Montclair Website and a warning telephone message for lakefront owners, and 3) ~~notify the MPOA Maintenance~~ Director to open the sluice gate prior to the predicted storm or hurricane and lower

[205] The residents specifically affected are listed in EAP online via the Montclair website and on file at the MPOA office. With the exception Spillway Lane residents, the list of evacuees was developed by hypothetically breaching Lake Montclair Dam under Probable Maximum Flood (PMF) conditions. In the hypothetical breach, approximately 70 percent of the dam was assumed to fail within a 30-minute period at the peak of the PMF. The dam will not be overtopped during a PMF. For the most part, the majority of the residents would be affected only by the flood wave from the hypothetical breach.

[206] The Water Level Warning System will call the first number, and at the end of the prompt, will ask the user to acknowledge the alarm. If the user does not acknowledge the alarm or does not answer the call, the System will move to the second number and so forth. Once the alarm has been acknowledged, the System will not continue to call subsequent numbers. The System is equipped with an advanced datalogger, Sutron's Xlite 9210, and Sutron tipping bucket rain gauge. The datalogger will log data in its internal flash memory where the user can access the data either by connecting directly to the datalogger using a laptop or PDA, or remotely through a telephone line.

[207] At 189.5' MSL the system sends out a warning by calling three key staff members, the Dam Operator (GM), the EAP Coordinator (Assistant GM), and MPOA Maintenance Director. MPOA property management staff and members of the MPOA BoD can view the System's data which includes: Lake Level in Feet, Rain Accumulation (for 15-minute, 1-hour, and 24-hour periods), System's Battery Power, and Lake Level Increase or Decrease in Inches.

the lake to the level as directed by the MPOA Board President (up to three feet). If warranted, the sluice gate may remain open during the storm to allow additional rainfall to flow through the dam.

Several "rainy day" and "sunny day" conditions that may occur at or near the dam could constitute an emergency situation. Adverse conditions that could cause failure of the dam might be related to maintenance issues, extreme weather events, or accidental or intentional damage to the dam or spillways. Situational conditions have been grouped by type of event in Table 3-7 to identify the most likely resultant emergency level condition. The groupings are provided as guidance only. As such, various hazardous conditions could contribute to one or more emergency situations associated with the Lake Montclair Dam and spillways. In addition to 'triggers' based on rainfall at or above specified rates, many of the conditions warranting escalation of Emergency Level Stages are identified with other criteria for Emergency Level Stages. These situational conditions require evaluation and Emergency Level Stage determination; these include other factors associated with: Spillway Activations and Overtopping Flows, Storm Surge and Flooding, Embankment/Impounding Structure Overtopping, Earthquakes, Embankment Movement and Cracking, Seepage & Sinkholes, and Security Threat, Sabotage, and Vandalism.[208]

Table 3-7. Event Criteria for Determining the Emergency Level Stage

EVENT	SITUATION	EMERGENCY LEVEL STAGE*[209]
Spillway Blockage or Activation	Principle spillway severely blocked with debris or structurally damaged	1
	Principle spillway leaking with muddy flows	1
	Emergency spillway flowing with erosion or severely blocked	2
	Principle spillway blocked with debris and lake is rapidly rising	2
	Emergency spillway flowing with advancing head cut risking the control section	3
Storm Surge & Flooding	National Weather Service issues flood warning for the area	1
	Lake elevation reaches predetermined notification trigger for spillway and/or dam	2
	Spillway overtopping flow is flooding roads and property downstream	3
	Storm surge or flood flows damage dam and/or spillway	2
Vortex in Lake; Seepage & Sinkholes	New seepage areas spotted in or near the dam	1
	Boils observed downstream of dam	1
	Boils observed downstream of dam with cloudy discharge	2
	New seepage area with cloudy discharge or increasing flow rate	2
	Seepage observed with discharge greater than 10 gallons per minute	3
	Observation of whirlpool in lake with discharge downstream	3
	Rapidly enlarging sinkhole observed	3
Earthquakes, Embankment Movement & Cracking	Visual movement/slippage of the embankment slope	1
	Cracks in the embankment observed with seepage	1
	Measurable earthquake felt or reported within 50 miles of the dam	1
	Earthquake resulting in visible damage to the dam or appurtenances	2
	Earthquake resulting in uncontrolled release of water from the dam	3
Security Threat, Sabotage & Vandalism	Verified bomb threat that, if carried out, could result in damage to dam	1
	Modification to dam or appurtenances that could adversely impact dam	1
	Damage to dam or appurtenances with no impacts to dam functions	1
	Detonated bomb that results in damage to the dam or appurtenances	2
	Damage to dam or appurtenances that results in seepage flow	2
	Damage to dam or appurtenances causing uncontrolled water release	3

If the EAP stages progress through Stage 2 Condition and evacuation of residents has taken place, the MPOA General Manager, in accordance with the Dam Operator Standard Operating Procedure shall coordinate with State

[208] Not all emergency conditions are listed, and the dam operator is expected to use conservative judgment in determining whether specific conditions should be defined as emergency situations associated with the dam or spillways.

[209] See Table 3-6 in this LMPP for pre-determined notification triggers. *Emergency Level Stage 1: Flood Watch or Heavy Continuous Rain (Pre-emergency conditions) -- Slowly Developing Situation; *Emergency Level Stage 2: Emergency Spillway Overtopping or Activation -- Rapidly Developing Situation; *Emergency Level Stage 3: Impounding Structure Overtopping or Breach -- Dam Failure Imminent/In Progress - Urgent Situation

and County officials and issue an all clear notification after the lake waters have returned to normal level (188 feet) and a complete inspection of the dam by qualified engineers to determine safety and stability has been conducted.

4. Periodic Lowering of the Lake for Maintenance of Dam, Shoreline and Docks.

Each fall after Thanksgiving, the water level of Lake Montclair is lowered temporarily to permit maintenance of the down pipe structure grates and sluice gate of the dam.[210] A thorough cleaning of the Montclair beaches and common property abutting the Lake is also accomplished. Sand on the beaches and in the swimming areas is replenished as necessary. After work is completed, the sluice gate will be closed, allowing the water level to naturally return to 188 feet above mean sea level. Powells Creek flow and rainfall will determine how long this actually takes. Prior to the lowering, lakefront property owners and residents are reminded to take actions necessary to protect their personal property, i.e. adjust pontoon retaining lines to accommodate the lower water level and properly secure or remove boats, kayaks, and other floating items.[211] This is also an excellent time for lakefront property owners to perform dock repairs, place rip rap, and perform other waterfront improvements, such as cleaning the exposed lake bottom along their shoreline. These activities contribute significantly to the health and appearance of Lake Montclair. Advance notification of the lowering of the lake water level is provided to allow sufficient time for the submittal and approval of Property Improvement Requests (PIR) where required.

d. Community Alert and Notification for Changes in Water Quality and Water Level

Based on monitoring of upstream rainfall and watershed water flow and lake water levels, MPOA provides warnings and notifications associated with potential rapid rise or need for lowering of water level. Based on the results of water quality monitoring and testing, MPOA provides notification to residents on any potential hazards, pollutants, or contaminants. Table 3-8 addresses objectives for using systems and procedures to enable community alert and notification for potentially detrimental or hazardous changes in water quality and water level.[212]

Table 3-8. Relevant Objectives for Community Alert/Notification for Changes in Water Level and Quality

1-4. Monitor water quality and provide periodic reporting to better enable timeliness of action.
1-5. Manage and control water level, and report changes to enable timeliness of action.
6-5. Provide resources for community engagement, notification, and education relative to lake issues.

MPOA (via the LMC and property management agent) coordinates with PWC to provide storm alerts through government and community notification systems and provides an alert system to report rapid changes in water level

[210] Normally, on the Monday following Thanksgiving weekend, Lake Montclair's water level will be scheduled to be lowered three feet, and remain lowered for one week.

[211] The lake has often been lowered three feet. Several methods are used to notify waterfront property owners so they could position their boats and plan clean-up and repair work while the lake was low. Prior to the March 2018 lowering to prepare for the Emergency Spillway modification, eight feet was the most the lake had been dropped in preparation for repairs associated with the dam. See Section IV.b.5 of this LMPP for the historic 20 foot lowering.

[212] The associated strategies for community notification, education and interaction are outlined in Section II, Table 2-3 of this LMPP.

that might adversely affect property. MPOA uses community media, such as *The Montclarion* monthly newsletter, the Montclair website, and *FSRConnect* to provide information about the lake and the watershed, including environmentally safe alternatives for toxics, safe boating, safe swimming, etc. As needed, MPOA provides forums for stakeholder interaction in LMC meetings and town-hall sessions. [213] MPOA LMC continues to seek better means for empowering residents to monitor and report on the lake and its resources.

1. Community Alert Systems and Notification Procedures for Residents.

MPOA and Prince William County provide alert systems and have established notification procedures that provide timely information to residents to take action, as needed, both in terms of addressing changes in water quality and water level. This includes means for alerting residents of potentially detrimental changes in water quality and changes (either raising or lowering) in water level, as well as weather-related hazardous conditions.[214] MPOA property management staff meets at least once annually with PWC officials to review the Lake Emergency Action Plan (EAP), and update it, as needed.[215] Complementary to the Lake EAP, this LMPP addresses those pre-emergency actions designed to mitigate risks in advance of actual emergencies, and it indicates the conditions that require opening the sluice gate to preclude activation of the EAP. This LMPP also addresses other criteria and situations such as an annual lowering of the lake level to allow homeowners to clean-up their shorelines, repair docks, and take precautionary measures to reduce risk of damage to lakefront property.

a) Notification of detrimental changes in water quality. Overall, water quality remains good; yet sometimes the levels of E-Coli have risen. As a result of water sampling and testing, such as E-coli testing conducted during summer months, MPOA property management staff have sometimes determined that water quality at certain locations might be unsafe.[216] When this occurs, a notice is posted on the bulletin board of the respective beach and an article is posted on the community website. Based on the results of water quality monitoring and testing, residents are notified of applicable warnings via community bulletin boards at beaches, articles in *The Montclairion*, and the MPOA website. Sections III.a and III.b of this LMPP provide details of other activities that provide information relevant to water quality.

b) Alert and notification of rising and lowering of the lake water level. In response to storm surges, MPOA has an established emergency alert notification protocol. As indicated in the *Lake Montclair Emergency Action Plan* (EAP) MPOA is prepared to take emergency action to protect lives and property in the event of impending or actual sudden release of water from Lake Montclair caused by a natural disaster, accident, or failure of the dam. Residents will be notified via procedures specified in the EAP.[217] Near real-time communications with lakefront residents has been enabled by requiring all dock owners to register for

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[213] Due to a particularly severe rainstorm on May 11, 2008, resulting in damage to private docks on Lake Montclair, the President of the MPOA appointed a Task Force headed by the Chairman of the Lake Management Committee with members from the Safety, Covenants, and Communications Committees. The Storm Water Task Force made several recommendations to the Board to address vulnerabilities; educate dock permit holders of the risk they have assumed; additional security support to execute the Emergency Action Plan (EAP), and additional training for the staff (i.e. PWC Emergency Services Sponsored EAP Workshops, State Sponsored Dam Workshops). The recommended actions and the actions taken were included in the report's table: "MPOA Lake Management Committee Follow-Up Response to Suggestions Submitted by Homeowners in Storm Water Task Force Report."

[214] The LMC discussed the use of Alert Warning flags at all three beaches of Lake Montclair for visually alerting residents of potentially detrimental changes in water quality and changes (either raising or lowering) in water level, as well as potentially hazardous weather conditions; yet no recommended changes in practices were made after considering staffing and resource issues. Past records of surface water testing for E-Coli indicate higher than acceptable readings immediately after rainstorms (most likely attributable to storm water run-off transporting fecal waste over beaches and upstream properties in the watershed). Trends indicate West Beach often has higher than acceptable readings for E-Coli from mid-July to mid-August; so residents could make risk informed decisions and take precautionary measures in swimming off West Beach during that period each summer or any beach after a rainstorm. Weather alert warnings from NOAA and PWC can help residents better understand to proceed with caution in hazardous conditions. As appropriate, supplementary material would be posted on the Montclair website and *The Montclairion*.

[215] Conformant with federal and state guidelines, PWC requires an annual dry-run of the EAP, consistent with statutory requirements.

[216] Some determination of "less than safe" water quality conditions has to be based on experiential judgment since E-Coli test results lag by as much as a week (providing an indication of past conditions). In late Summer/early Fall a green algal bloom scum can sometimes be seen in the lake. It can occasionally occur in most fresh bodies of water. The cause of this particular bloom often has several natural and artificial causes that create the abundance of nutrients needed for it to occur; including sunny weather, application of fall fertilizer, early lake turnover, or periods of low lake flow. Notice about any algal scum is reported to lake front property residents, and an article is published in *The Montclairion*. The effects of the small algal bloom are mostly aesthetic and should not pose any threat to the lake's inhabitants and visitors.

[217] See emergency notification procedures in the Emergency Action Plan (EAP). MPOA Staff is aware of its duties under the EAP. The current EAP and those of past years are on file in the MPOA offices.

FSRConnect.[218] This has enabled MPOA to send messages for pre-storm preparation and emergency situations (i.e., loosen boat lines, remove loose items from docks, lowering of lake in preparation for rainstorm, EAP being activated, etc.). In the case of an emergency for lake lowering (due to a pending storm) the MPOA will send out emails notifying residents of immediate lake lowering. Typically, when MPOA staff lowers the lake for shoreline cleanup, a letter is sent notifying residents. All residents, especially dock owners, are encouraged to sign-up for *FSRConnect* and Prince William Community Alert Network (PWCAN) at www.pwcgov.org/pwcan to receive emails for notification.[219]

In accordance with the EAP, in the event of an impending storm (with a prediction of rain totaling 3.5 inches within a 4 hour period or 4 inches within a 12 hour period or the forecast of a Hurricane traversing over Montclair and Powells Creek watershed with torrential rains), the MPOA property management agent will assess the weather conditions by monitoring the National Weather Forecast prediction and, if conditions warrant, lower the lake. The MPOA Board President will be notified with recommendations before any action is taken.

Based on the output of monitoring upstream rainfall, watershed water flow and lake water levels, the MPOA provides mechanisms for potential warnings. This includes providing alerts to report rapid changes in water level that might adversely affect property. Moreover, storm alerts are provided through PWC government systems.[220] MPOA also installed computer system to provide automated notification system activated by water level. Real-time data is available to staff by an onsite computer system to monitor storm information via the internet, and real-time data is being made available on community web page and/or *FSRConnect* to assist the lake front owners in their preparations. As a result of SWTF recommendations the MPOA has implemented additional response procedures. A three-person team has been in place to determine what to do in advance and make recommendations to MPOA BoD President. That team is made up of MPOA property management GM, Maintenance Director, and LMC Board Liaison (lakefront owner) MPOA property management staff has procedures to be followed once the EAP is enacted and conditions exist when EAP is activated.[221]

2. Preparation and After-Incident Communication.

MPOA focuses on minimizing the possibility of incidents associated with changes in water quality and water level.[222] However, natural events cannot be controlled; so MPOA has taken pre-emptive actions to mitigate risks and prepare for potentially hazardous conditions, especially those associated with storm surges.

In preparation for mitigating risks associated with weather-related incidents MPOA assures continuous site access and provides surveillance and monitoring to enable timely response. Access to the site in all weather conditions has been preplanned by the staff gauge observer and alternate observer to ensure the performance of associated duties. MPOA has an established chain of command (with primary and backup); roles are clearly assigned with training requirements identified for each role, and personnel are monitored to ensure they receive the required training. To provide continuous automated warning of changes in water level in Lake Montclair, the MPOA uses a computerized Water Level Warning system at the dam site on Dolphin Beach. The system (installed in November 2009) provides warning to MPOA when the water level reaches or nears flood stage. MPOA has an established process for pro-actively responding to pending weather conditions projected by the National Weather Forecast prediction. Alternative Systems of Communications during any emergency event should not be a problem because of alternative phones for key personnel and the widespread use of underground utilities in Montclair. Telephone land lines would be used as the first means of communications with cellular telephone used as alternative back-ups. Several methods for notification and warnings have been put in place. MPOA Key Personnel shall report to the Emergency Action Plan (EAP) Coordinator when emergency level stage 1 conditions have been initiated. MPOA Maintenance shall provide equipment and vehicles for possible use in emergency situations to MPOA buildings and

[218] SWTF Recommendation #14. "Notification of Lake Lowering" resulted in MPOA putting the lake-lowering notification on boards at entrance to Montclair.

[219] Residents are encouraged to register for free alert services of PWCAN at www.pwcgov.org/pwcan so that they could receive weather alerts relevant to the watershed and lake. MPOA requires all dock owners, when registering their docks, to register for FSRConnect so that MPOA Staff can send messages for pre-storm preparation and emergency situations (i.e. loosen boat lines, remove loose items from docks, lake lowering in prep for rainstorm). No separate siren is used; if necessary, the community could use fire engine sirens to alert residents.

[220] Residents can register for government alerts via the Prince William County Alert Network (PWCAN) at www.pwcgov.org/pwcan.

[221] MPOA Staff is also signed up to receive emergency texts from NOAA when emergency weather conditions are at hand.

[222] Preparation and follow-up communications are important for human-centric objectives for uses of the lake.

property as well as emergency backup power to operate communication equipment used by the Dam Operator. MPOA personnel will use the automated messaging system and have someone available or on call around the clock.

The EAP contains the records for training, testing, exercising, updating, and distribution. The EAP is available via the Montclair website for all residents to understand MPOA preparedness for emergency situations relative to the Lake Montclair dam and emergency spillway. All responsible persons are given detailed instructions and procedures to be followed in the event of emergency actions. These instructions and procedures are reviewed and discussed on a periodic basis as determined by the MPOA General Manager. The EAP is exercised at least once annually; including hypothetical communications exercises within the community and with Prince William County offices and individuals concerned.

MPOA has processes in place to quickly react and respond to weather-related events; yet, because some extreme conditions might create incidents that could affect property or health, MPOA seeks to ensure "after-incident" reports promptly inform the community of the facts via all channels of communications.[223] *FSRConnect*, the Montclair website, and *The Montclairion* monthly newsletter are used to communicate with residents. Town hall meetings are often held after storms, as needed, and information and messages are developed to be consistent between 'what gets reported in meetings' and 'what is published in *The Montclairion*.' MPOA maintains a list of dock numbers along with owners' contact information and has instructed property management personnel as to how that data should be used in the event of an emergency. After storms, residents will be reminded that MPOA Maintenance should remove debris from water in a timely manner, and that owners should secure docks and other material in a timely manner. Residents will also be reminded that the PIR process would be expedited through the LMC and Covenants Committee for recommendation to the BoD. Residents must go through proper channels to have PIRs approved in advance of making such repairs.[224]

e. Summary of Efforts Focused on Environmental Water Quality and Water Level Management.

MPOA maintains the integrity of the lake and its "ribbon of life" in Resource Protection Areas, and to enable residents to better respond to incidents MPOA provides resources for community engagement, notification, and education relative to lake issues associated with environmental water quality and water level management. MPOA coordinates with PWC to sustain environmental water quality and manage water on site to sustain or regenerate healthy hydrologic processes. MPOA has programs and systems in place to manage and control water level, and report changes to enable timeliness of action. The MPOA LMC coordinates with the property management staff to monitor water quality and provide periodic reporting to better enable timeliness of actions. Programs are in place to mitigate risks from identified hazards, pollutants, contaminants, and eutrophication-causing nutrients, and to reduce foreign material in the lake.

Water quality and water level management require ongoing monitoring, control, reporting, and notification efforts that reflect community perspectives for use and stewardship of the lake and watershed ecosystem.

[223] SWTF #15. "After-Incident Communications" recommendations included ensuring messages/information is consistent between what's reported in meetings versus The Montclairion, along with promptly informing the community of facts via all channels of communications.
[224] SWTF #9. "Damaged Docks & Safety" recommendation indicated MPOA should address docks that are never repaired like other covenants violations, including requiring the homeowner to remove the dock. After storms, community residents are reminded that docks requiring more than 30% repair will need a Property Improvement Request (PIR) in accordance with MPOA covenants.

IV. Storm Water Management and Watershed Land Use Relevant to Lake Ecosystem Sustainment

a. Property Use, Development and Monitoring in the Watershed Relevant to Lake Montclair

Because property in Powells Creek Watershed "not on the lake" is "connected to the lake" through flow of water in the watershed ecosystem, the MPOA (primarily through the LMC and property management agent) coordinates with county and state organizations and non-governmental conservation organizations to accomplish strategies to achieve objectives identified in Table 4-1 for watershed land use that are applicable to lake management.

Table 4-1. Relevant Objectives for Watershed Land Use Applicable to Lake Management

2-1. Promote soil health to sustain or enhance ecosystem services through protection and reuse of soil and sand.
2-2. Sustain proper drainage for storm water management, and minimize soil transport and soil erosion.
2-3. Minimize use of soil amendments, chemicals, and pollutants that harm human and ecological health.
2-4. Maintain integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs).
2-5. Monitor changes in watershed land use and report on trends that affect the lake ecosystem.
3-2. Design and use vegetation to sustain or enhance on-site surrounding ecosystem services.
5-1. Promote the efficient management of material resources and reduction of energy use.
6-5. Provide resources for community engagement, notification, and education relative to lake issues.

1. Monitoring of Upstream Developments and Land Use outside of Montclair.

The ecosystem of Lake Montclair is affected by the surrounding Powells Creek Watershed which flows into the lake and subsequently into the Potomac River.[225] PWC initiated a voluntary surface water, storm water, and sediment monitoring program at the PWC Sanitary Landfill in 2003. The monitoring program was implemented by PWC in response to its commitment to constructing and operating a landfill that meets or exceeds regulatory requirements and protects the surrounding environment and neighborhoods. The purpose of the monitoring program is to assist the County in evaluating the landfill and landfill-related operations for potential impacts to surface water quality in Powells Creek. The landfill area is situated on a north-facing slope which is drained on the north side by Powells Run, a tributary to Powells Creek. Down-gradient from the site, Powells Creek flows through Lake Montclair and eventually discharges into the Potomac River. The Environmental Monitoring Report[226] provides documentation of the sampling and analysis activities PWC has implemented in accordance with the voluntary monitoring program:

- Semi-annual sampling of surface water in Powells Creek (Spriggs Road crossing and Lake Montclair confluence) for water quality parameters;
- Semi-annual sampling and analysis of storm water discharge (at the outfall), if present, from site storm water basins for water quality parameters;
- Annual sampling and analysis of sediment from designated surface water points, Spriggs Road crossing of Powells Creek and Lake Montclair confluence, and site storm water basins for primary pollutants, and
- Quarterly sampling of specified surface water monitoring stations for selected volatile organic compounds.

Moreover, PWC continues to monitor construction sites and roadways within the area for oil and grease. Consistent with the County's operational objective, PWC intends to continue with the routine sediment, surface water, and storm water monitoring activities and regularly scheduled best management practices (BMP) maintenance activities. A review of the monitoring results obtained during the last monitoring period indicates that the storm water management systems associated with landfill operations appear to be functioning as designed. According to PWC, discharge of storm water from the landfill storm water basins has not adversely impacted surface water and sediment quality in Powells Creek. Based on the data evaluations presented in the most recent Environmental Monitoring Report, it has been concluded that the landfill operations are not resulting in a measurable degradation of water quality in Powells Creek.[227]

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[225] See description of Prince William County (PWC) and Powells Creek Watershed in Section I.b.1 of this LMPP.

[226] See annual Environmental Monitoring Reports, PWC Sanitary Landfill, Permit No 029, Ref 0739660411.111, (in MPOA office).

[227] Statistical evaluations indicate that, with the exception of selected occurrences of total Kjeldahl nitrogen (TKN) at one storm water basin, monitored constituents present in storm water leaving the landfill are not present in concentrations that statistically exceed quality standards. 2014 report represents the last monitoring period for which MPOA has results.

2. Planning and Review of Proposed Changes to Properties in Montclair.

As documented in MPOA covenants, guidelines for submitting, reviewing and approving Property Improvement Requests (PIRs) provide information relevant to considerations for changes to properties on the lake and in the watershed. The MPOA Covenants Committee is responsible for reviewing all requests for alterations and additions made on or to existing structures and lots which have been conveyed to a homeowner.[228] The Covenants Committee is charged with ensuring that proposed exterior alterations comply with the objectives set forth in the covenants. This involves regular and systematic review of all PIR applications for exterior alterations submitted by members. In carrying out its responsibilities, the committee strives to preserve the natural beauty of Montclair, maintain and enhance property values, and ensure that all modifications adhere to protective covenants.

3. Conservation Practices and Use of Native Plants in Landscaping and Habitat Restoration.

Conservation practices help control soil erosion, reduce sediment in waterways, improve water quality, conserve water, increase food and shelter for birds and other wildlife, inspire a stewardship ethic, and beautify landscapes. *"Backyard Conservation"*[229] supports efforts to design and use vegetation to sustain or enhance on-site surrounding ecosystem services, and better enables residents to adopt practices that help conserve and improve natural resources. These practices have been adapted for use around homes, and they help the environment and can make yards more attractive and enjoyable. Most backyard conservation practices are easy to use. Whether in a private yard or a community lot in the watershed, people can help protect the environment and add beauty and interest to their surroundings. Ten conservation practices have been scaled down for homeowners; with tip sheets that offer "how to" steps and helpful hints on: Backyard Pond, Backyard Wetland, Composting, Mulching, Nutrient Management, Pest Management, Terracing, Tree Planting, Water Conservation, and Wildlife Habitat.

The Powells Creek Watershed is in the cusp of the 'Coastal Plain' and 'Piedmont Plateau' physiographic regions of the Chesapeake Bay Watershed, and this influences the water-flow patterns of the area and provides a specific habitat for native vegetation, wildlife and other biological communities. There has been a growth in the encouraged use of native plants in landscaping and habitat restoration within the watershed. By using locally native plants, communities and individuals are enhancing and restoring habitat, solving ecological problems, reducing maintenance, and beautifying surroundings. "Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed" Guide[230] provides information on native species appropriate for planting in the Chesapeake Bay watershed.[231] To promote soil health and to sustain or enhance ecosystem services through protection and reuse of soil and sand, the MPOA coordinates with county and conservation organizations to maximize reuse of soils on-site (ie., sand washed from beaches and soil extracted from lake dredging). Residents are encouraged to minimize disturbing vegetation and, where removal is unavoidable, protect soils to minimize damage; to build soil organic matter; incorporate compost and mulch as soil amendments in landscaping, and to sustain areas of healthy soils and improve health of degraded soils in Resource Management Areas.[232] To maintain integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs), MPOA coordinates with PWC to provide routine, periodic inspections of the earthen dam and shoreline, and takes corrective action on the earthen dam, shoreline, and beaches, as needed, in a timely basis (and reports actions annually via the LMEQR). As

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[228] MPOA Community Guidelines, Section 3.3.1 Standing Committees – Covenants Committee. LMC review of PIRs in the RPA (all property within 100 feet of the water), especially for docks and structures near water, benefits MPOA.

[229] "Backyard Conservation" is a cooperative project of the National Association of Conservation Districts, the Wildlife Habitat Council, the National Audubon Society, and USDA's Natural Resources Conservation Service http://www.nrcs.usda.gov/ The tip sheets and a colorful booklet on Backyard Conservation are available free by calling 1-888-LANDCARE, emailing landcare@usda.gov, or visiting the NRCS publications web site. Lesson plans are available to teach students in elementary, middle school, and high school about Backyard Conservation through hands-on studies that promote field investigation and action.

[230] "Native Plants for Wildlife Habitat and Conservation Landscaping: Chesapeake Bay Watershed" Guide, published by the U.S. Fish & Wildlife Service, Chesapeake Bay Field Office,.see free guide at http://www.dcr.virginia.gov/storm water_management/ripbufflinks.shtml

[231] Published by the U.S. Fish & Wildlife Service, the guide displays the great diversity of available plants; addresses the benefits of conservation landscaping and the use of native plants, and the value of native plants to wildlife. It aids in choosing native plants by describing the purpose of the various native plants as means for solutions based on habitat conditions, such as slopes, shade, bogs, and meadows; and it provides information on deer-resistant plants. It covers ferns, grasses & grass-like plants, herbaceous plants, shrubs, trees and vines. As a free, on-line comprehensive resource, it can be used to plan and design planting of native plants, whether in a small corner of a homeowner's yard or along the shoreline of Lake Montclair to enhance or restore the lake ecosystem.

[232] Resources for Conservation and Erosion Control: International Erosion Control Association http://www.ieca.org, American Society of Landscape Architects http://www.ASLA.org, Northern Virginia Soil & Water Conservation District http://www.fairfaxcounty.gov/nvswcd, and Potomac Watershed Roundtable: http://www.potomacroundtable.org The LMC promotes the use of conservation practices in the treatment of soil to reduce greenhouse gas emissions.

needed, the MPOA provides lake dredging and maintains integrity of catch basins and forebays (with annual reporting via the LMEQR). To monitor changes in watershed land use and report on trends that affect the lake ecosystem, MPOA coordinates with PWC and the State to provide periodic and annual reports on changes in watershed land use relevant to impacts on the lake. For waterfront lots and beaches, MPOA monitors changes in use consistent with sustainability of the lake. For lots "connected to the lake," the MPOA reviews and approves property improvements, including construction practices. For properties in the Powells Creek Watershed, the MPOA works with county and regional organizations to monitor upstream developments for silt control and practices compliant with the Chesapeake Bay Act.

Residents and others volunteer and coordinate with PWC and conservation organizations to promote efficient management of material resources and reduction of energy use. This includes advocating the reduction of urban 'heat island' effect by using shading and pervious or semi-pervious surfaces.[233] The LMC and LFMC promote the use of landscape lighting and equipment with low operational energy, along with the use of low embodied energy products and those powered with renewable energy sources. To sustain proper drainage for storm water management, and minimize soil transport and soil erosion, MPOA coordinates with PWC to monitor surface water flow and take corrective action as needed to minimize soil transport. LMC, in coordination with the MPOA property management agent, provides regular monitoring around the lake to ensure applicable efforts are focused on retaining proper drainage and maintaining drainage culverts and riparian buffers to minimize soil erosion. LMC and LFMC also advocate that residents take appropriate actions to maintain aerobic conditions by limiting compaction and maintaining subsurface drainage. To minimize use of soil amendments, chemicals, or pollutants that harm human and ecological health, MPOA coordinates with PWC and conservation organizations on efforts to minimize use of harmful materials and to promote the use materials in the manner for which they are intended. In concert with the Virginia Cooperative Extension in PWC, the LMC promotes the efficient use of fertilizers; use of soil testing to verify need before using nitrogen fertilizers, and maintaining healthy soils so that harmful materials are not needed to support plant growth. [234] The LMC promotes adoption of PWC recommended practices for residents through "Storm Water Smarts: 6 Ways to Protect Our Waterways!"[235] Tips are offered for voluntary adoption that can be put into practice to help protect the watershed environment.[236] These are significant for Montclair since community street drainage flows into Lake Montclair; so materials on streets get into the lake. To

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[233] The MPOA LMC promotes the reclamation, reuse, and recycling of materials, and the reduction of material consumption. The LMC also promotes the use of sustainable landscape materials that require reduced resource input to maintain, including the use of renewable materials.

[234] In addition to staffing the Extension Horticulture Help Desk, PWC staff and Master Gardener volunteers help in a number of ways:

- Seasonal plant clinics to answer questions on insect, disease, or gardening problems (with Basics of Gardening Series each winter);
- Great Scapes lawn program, and low maintenance gardening techniques demonstrated at the Teaching Garden.
- Free lectures to the public, and education for businesses and nonprofit organizations in the management of stormwater runoff;
- Soil test kits; and training for interested citizens who wish to become Master Gardener volunteers.

[235] PWC Storm Water Management http://www.pwcgov.org/government/dept/vce/Pages/Stormwater-Management-Education-Program.aspx education program offers the *Storm Water Smarts: 6 Ways to Protect Our Waterways:*

- Limit fertilizer and pesticide use. Use the proper amount of fertilizer at the right time. Do not apply if rain is in the forecast. Sweep up any fertilizer from hard surfaces (driveway, sidewalk, and street); keep it from getting washed into our storm drains.
- Use a pooper scooper! Viruses, parasites and bacteria from pet waste can easily wash into storm drains and end up in our waterways without being treated. People would not want to swim in water with this in it!
- Check vehicles for fuel and oil leaks. Grease and oil drippings from cars wash directly into storm drains and go straight waterways.
- Wash cars on the lawn or go to a car wash. Water at car washes goes to water treatment plants. Dirt and oils washed off cars can hurt fish and animals if it goes straight into storm drains. The grass and soil acts as natural filters capturing the material from cars.
- Properly dispose of leaves and grass clippings. Start a compost pile. Don't dispose of yard waste in gutters, creeks, or lakes.
- Dispose of any hazardous home chemicals and electronics at the PWC Landfill on Wednesdays & Saturdays from 10 a.m. to 5 p.m. Call 703-792-5750 for more information.

[236] See PWC at http://www.pwcgov.org/government/dept/publicworks/environment/Pages/Volunteers-Make-A-Difference!.aspx and tips:

- Conserve water resources; control runoff and prevent erosion from your property to protect local creeks, streams and rivers;
- Grow groundcover and plants to reduce run off from property; plant native species and grasses for lawns;
- Reduce pollutants/nutrients washing off lawns; fertilize properly; reduce use of oil-based products & gasoline powered devices;
- Sweep and dispose of materials properly so they don't wash into storm drains; report illegal dumping into storm drains;
- Dispose of household hazardous waste properly; look for alternatives to potentially hazardous materials;
- Remove salt and sand from driveways and parking lots after snow storms, as well as clear debris and motor oil from lots;
- Prevent litter; pick up litter, use a litter bag in cars and boats, and cover trash so it cannot blow about or be picked up by animals;
- Compost yard waste at home or bring to PWC compost facilities; leave grass clipping on lawn after mowing as natural fertilizer;
- Reduce, reuse . . . then recycle. Reduce drive times by combining errands and planning trips; carpool or walk when possible.

provide resources for community engagement, notification, and education relative to property use in terms of storm water management and watershed land use, MPOA coordinates with county and state organizations and non-governmental conservation organizations to provide information resources for enhancing awareness of lake water quality and watershed needs. As applicable, MPOA coordinates with local, state and regional programs in offering training relevant to lake stewardship.

b. Storm Water Management, Dredging, and Management of Soil, Sand and Sediment

Erosion and sediment control is a primary consideration for storm water management. Storm water runoff into the lake is the primary source for the accumulation of silt as sediment that necessitates periodic dredging. Over time the progressive build-up of sediment in Lake Montclair requires dredging to properly sustain or restore lake-ecosystem functions. Riparian buffers, street drains, culverts, catch basins, and forebays serve significant roles in storm water management. MPOA coordinates with county and state organizations on strategies to accomplish objectives listed in Table 4-2 for storm water management, dredging and the management of soil, sand and sediment in the lake.

Table 4-2. Relevant Objectives for Storm Water Management, Dredging, and Soil Management

1-5. Manage and control water level, and report changes to enable timeliness of action.
2-1. Promote soil health to sustain or enhance ecosystem services through protection and reuse of soil and sand.
2-2. Sustain proper drainage for storm water management, and minimize soil transport and soil erosion.
2-4. Maintain integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs).
2-5. Monitor changes in watershed land use and report on trends that affect the lake ecosystem.
6-5. Provide resources for community engagement, notification, and education relative to lake issues.

Powells Creek Watershed has undergone significant development that has caused much upstream disruption to the ecosystem. Large tracts of land have been cleared for housing with asphalt, concrete and storm sewers taking the place of pervious surfaces, vegetation and other water retaining ground cover.[237] There is also extensive housing development with drainage from asphalt streets surrounding Lake Montclair and in the watershed above the lake.[238] Residents need to be informed about changes in the watershed, along with actions focused on sustaining the lake-ecosystem. To provide resources for community engagement, notification, and education on the role of riparian buffers, catch basins, forebays, and culverts in sustaining the ecosystem, along with the needs for dredging and management of soil, sand and sediment in the lake, MPOA LMC coordinates with PWC and conservation organizations to provide information resources for enhancing awareness about the interconnection between the Powells Creek Watershed and Lake Montclair, along with the impact of upstream activities on the lake.[239] MPOA property management staff and LMC use community media, such as *The Montclairion* newsletter, FSRConnect, and the Montclair website to provide information about the lake and its watershed. LMC continues to rely on residents to assist in monitoring and reporting on issues relevant to the lake and its resources.

1. Resource Management for Sustaining the Integrity of the Lake.

To sustain proper drainage for storm water management, MPOA coordinates with PWC to monitor surface water flow and take corrective action, as needed, to minimize soil transport and soil erosion. LMC and MPOA property management staff periodically assess areas abutting the lake to retain proper drainage; maintain drainage culverts and riparian buffers to minimize soil erosion, and maintain aerobic conditions by limiting compaction and sustaining subsurface drainage. Consistent with the LMEQR, to maintain integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs), the LMC leads MPOA efforts in coordination with PWC and contract services to provide routine, periodic inspections of the lake's shoreline; provide lake dredging and maintain integrity of forebays and catch basins, and provide monitoring and corrective actions, as needed, to protect and sustain shoreline. To monitor changes in watershed land use and report on trends that affect the lake ecosystem,

[237] Prince William County is the third most populous jurisdiction in Virginia and has experienced rapid and steady growth which places additional pressures on the abundant natural resources.

[238] A large map guide of the Montclair community and the lake is available for residents via the MPOA office.

[239] MPOA is responsible for managing and controlling water level in Lake Montclair, and MPOA ensures changes in water level are reported to residents and other stakeholders to enable timeliness of actions (see Section III.c of this LMPP). MPOA in coordination with PWC monitors upstream rainfall and water flow in the watershed and lake water levels for potential warnings.

MPOA coordinates with county and regional government and non-governmental conservation organizations to monitor upstream developments for silt control and practices compliant with the Chesapeake Bay Act. PWC provides periodic reports on changes in watershed land use relevant to impacts on the lake. MPOA property management staff and LMC monitor changes in use of property on the lake consistent with community guidelines and sustainability of the lake,[240] and for Montclair lots "connected to the lake" (but not on the lake) MPOA reviews property improvements for construction practices.

MPOA LMC provides information resources that can assist property owners in protecting the lake's shoreline. Residents appreciate the fact that living along the shoreline brings many rewards, such as a great view, closeness to nature and a tranquil setting for families. Most residents also realize that living along the lake shoreline has associated responsibilities, and shoreline property owners need to take care to help protect the lake ecosystem.[241] Shoreline residents should plan their activities and improvements on their property with consideration for the environment. Residents' actions can have a real impact on the lake and the shoreline. There are a few types of waterfront property on Lake Montclair: some are nestled in quiet coves, while others are more in the open, subject to wave or current action. Some properties have lost land from the effects of steady erosion, while others are stable or even growing from accumulated soil. Building bulkheads or riprap revetments (rock embankments) has been one approach to shoreline protection; yet MPOA LMC and many shoreline property owners have learned much about the conditions that make for a healthy lake environment. Studies have shown that vegetated shorelines can provide erosion protection while allowing the natural shoreline ecosystem to flourish. Natural shoreline ecosystems include the vegetation along the shorelines as well as bottom dwelling organisms and aquatic life which inhabits the lake. In many cases, where the shoreline is subject to current or waves of low to moderate energy, there are effective alternatives to shoreline hardening (use of rocks and riprap). These methods of shoreline protection employ plants, grading and the use of natural materials such as live trees and matting and are referred to as "soft" or "living" methods of shoreline protection.[242] Some of the benefits to this approach are: lower construction costs when compared to bulkheads or revetments; reduction in both sediment and pollutant flow into the creek or lake; maintaining a link between the aquatic and upland habitats; creating a natural shoreline appearance, and restoring or maintaining a spawning or nursery area for fish and aquatic life.

2. Use of Riparian Buffers for Storm Water Management.

MPOA LMC promotes the use of riparian gardens, zones, and trails to create buffers to slow the flow of water. Riparian buffers provide important contributions for Storm Water Management,[243] and they are included as Resource Protection Areas (RPAs) under the Bay Act, which means that they are protected under state law and local ordinances.[244] RPAs extend 100 feet inward from the shoreline and are often described as the *'last line of defense'* for the protection of water quality. These buffers stabilize shorelines and creek banks, filter pollutants, reduce volume of storm water runoff and provide critical habitat for aquatic species and wildlife.[245] Converting lawn area to landscape beds along the perimeters of yards can slow the amount of storm water leaving properties. Plant selection for street buffers is usually more flexible because the growing conditions are more tolerant than for

[240] In November 2012 MPOA LMC member Ken Melson made a video of the entire shoreline of Lake Montclair as seen from a boat. There were no obvious areas where animals might be burrowing into the dam. The video also helped to document the condition of the docks, areas with fallen trees and areas where trash has accumulated. This video also serves as a baseline reference for future annual recordings. Through this recording and site surveys within the upper reaches of Powells Creek the LMC is working on a proposal to conduct a bathymetric survey of the lake in preparation of the next lake dredging maintenance effort.

[241] MPOA periodically has professional divers conduct inspections of the swimming areas of Montclair's three beaches. In 2012 they removed approximately two bags of trash, most of which was found under the swimming platforms. The MPOA maintenance crew cleared an accumulation of brush and removed two trees where Powell's Creek enters Lake Montclair to allow greater access to the creek upstream. The area is more open for the use of canoes and paddle boats.

[242] MPOA LMC has also studied the use of "bio-logs" for shoreline protection, and given some consideration to the value of providing a demonstration of bio-logs; however, LMC has made no recommendation about bio-logs.

[243] See http://www.dcr.virginia.gov/storm water_management/ripbufflinks.shtml for more information on storm water management.

[244] Virginia enacted the Chesapeake Bay Preservation Act in 1988. This Act required local governments to adopt water quality protections into County Ordinances and enact stringent local requirements to protect RPAs as a means to safeguard the Chesapeake Bay from nutrient and sediment pollution. Violations and fines may be imposed for RPA disturbance without prior authorization.

[245] RPAs are corridors of environmentally sensitive lands that lie alongside or near the banks of lakes, streams, creeks and other waterways in tidal areas of Virginia. The RPA buffer extends 100 feet inward from the shoreline and protects the wooded buffer along the stream, which in turn helps to filter out pollutants and prevent erosion along the shoreline. All waters in Prince William County eventually flow into the Potomac River then into the Chesapeake Bay, so safeguarding these areas is critical for water quality protection.

a shoreline garden. Trees and shrubs in riparian buffers offer benefits to property owners as well by increasing property value, reducing erosion, reducing noise, improving air quality, increasing shoreline stability and providing shade in the summer and windbreaks in the winter.[246,247] Generally, no development, land disturbance, or vegetation removal is allowed in an RPA (within 100 feet of the water), except as approved by PWC Department of Public Works.[248] However, people do not have to live on the water to have a buffer garden work for them and contribute to improvements in the lake ecosystem. This is because most storm water runoff from properties enters local waterways through the storm water system.

Benefits derived from vegetated riparian buffers (especially those with trees, shrubs, and groundcover) include water quality enhancement, storm water and floodwater management, creek bank and shoreline stabilization, water temperature modification, wildlife habitat protection, and absorption of airborne pollutants. Buffers may also serve as recreation areas for birders and photographers. Restoring a buffer or planting a buffer garden helps protect the area's waterways from pollution and erosion. Shrubs and groundcover can hold the soil on banks in place, thus increasing shoreline stability and preventing the storm water runoff directly entering the waterway from lawns. By converting lawns to landscape beds, and planting salt tolerant shrubs, trees, perennials and non-turf grasses along the water's edge or along the edge of a shoreline, people can help filter pollutants and sediments from storm water runoff, provide habitat and food for wildlife, and lower overall yard maintenance efforts.

3. Sustaining Drainage, Culverts, Catch Basins, and Forebays.

Reduction of soil transport, erosion control, and management of sediment are the primary reasons MPOA and Prince William County spend considerable resources on the sustainment of street drainage, culverts, catch basins, and forebays. Catch basins and forebays provide significant sediment control. Culverts slow water flow, catch some suspended soil, and collect trash from streets and roads (requiring periodic clean-up, as depicted in Figure 4-1). Several improvements have been made to drainage culverts around Lake Montclair to slow water flow and control soil erosion. Several projects in recent years involving sustainment of catch basins and forebays have contributed to the overall storm water management objectives for Lake Montclair.[249,250] Prince William County conducted a Powells Creek storm drainage feasibility study to manage silt being deposited into the upper reaches of the lake; yet no proposal has been approved in order to move forward with a requisite project.[251] Possible mends include repairs to Powells Creek stream embankments and modifications to the forebay at beginning of Lake Montclair or upstream in Powells Creek.[252]

Figure 4-1. Drainage culvert with accumulated trash

[246] See PWC's Resource Protection Area Brochure at http://www.pwcgov.org/government/dept/publicworks/documents/006995.pdf.

[247] See the *Riparian Buffers Modification and Mitigation Guidance Manual,* from the Virginia Department of Conservation and Recreation (DCR) at http://dcr.cache.vi.virginia.gov/stormwater_management/documents/BufferManual_06Rev.pdf

[248] With approval by PWC Department of Public Works, property owners can selectively remove vegetation within the 100 foot RPA buffer:

- To provide limited water views; must be replaced with lower growing vegetation to provide equivalent water quality protection.
- To remove dead, dying or diseased trees and shrubs, and to remove noxious weeds and invasive plants.
- To provide for shoreline erosion control, provided that the buffer is replanted with native, woody vegetation.
- To create a water access path (boardwalk or trail) as long as it does not cause erosion.
- For water dependent uses, such as docks, piers and outfalls; and for utilities, public roads and driveways.

[249] The Southlakes storm drainage tributary forebay was assessed. It runs from its headwaters originating from within Southlake Landing Townhomes Association, down through Southlake Cove Townhome Association into Lake Montclair. A small energy dissipation basin just below Waterway Drive was dredged. This ravine has been cleaned of residential trash, debris and sediment. A riprap baffle wall at the base of this tributary was rebuilt by the MPOA Maintenance staff.

[250] Timber Ridge storm drainage tributary which runs from its headwaters origination from Cardinal Station, through Northside Townhome Association, across Hollyside Drive and Spring Branch Boulevard, through Waters Edge Townhome Association, as well as a small forebay and floating debris catch basin at Timber Ridge Drive was studied and evaluated for expansion and dredging considerations. This forebay has been considered adequate for collecting trash and floating debris routinely cleaned by MPOA maintenance staff. Forebay enlargement for sediment control has been considered but not approved by the MPOA Board of Directors. Edgehill Drive storm drainage ravine, which runs from its headwaters near Maywood Drive, was studied and evaluated. The lower three hundred feet of this ravine will be cleared of overgrowth, re-graded, and a riprap lined ditch constructed.

[251] Three proposals were presented to the MPOA requiring construction of access roadways through the Southlakes Townhome Association common areas. These proposals were denied by Southlakes. PWC continues to examine ways to control runoff into Lake Montclair.

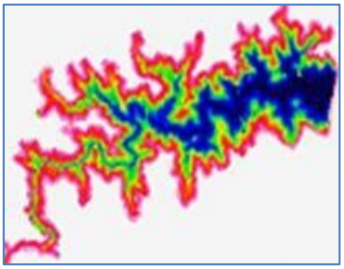
[252] Without viable alternative for managing silt deposits, MPOA will need to continue to pay for expensive periodic dredging operations -- approximately every seven years. Some residents have advocated the need for an additional forebay in Powells Creek and other means to dissipate storm water energy so as to reduce the amount of suspended particles from entering Lake Montclair.

Sustainment of forebays, culverts and drainage areas require periodic inspections and attention, as needed.[253] Restoration and sustainment of drainage downstream of the lake continues to have important considerations for the Montclair community. For example, the Northgate Stream Restoration Project by PWC Environmental Services corrected severe bank erosion of Powells Creek downstream of the dam; mitigating significant amounts of sediment being washed downstream.[254]

4. Sediment Monitoring, Lake Surveys and Periodic Dredging in the Lake.

Lake Montclair provides significant storage volume for runoff peaks and therefore regulates flow characteristics of the lower part of Powells Creek Watershed. Local runoff empties into the lake from the property immediately surrounding the lake, as well as from storm drains carrying water into the lake from streets. Lake Montclair functions as the county's largest storm water flood control structure; holding back and controlling the drainage of flood waters, and serving as a sediment sink for the upper half of Powells Creek Watershed.[255] As such, MPOA LMC incorporates sediment monitoring as part of the lake management program to assist in scheduling necessary dredging or other maintenance work ahead of time; providing the required time to initiate the necessary permit applications. Sediment monitoring requires bathymetric, hydrographic, and topographic surveys.

The integration of topographic[256] and hydrographic[257] surveys is common in the management of dredge areas in bodies of water.[258] Annual bathymetric surveys are needed for Lake Montclair to quantify changes/results of watershed runoff.[259] Bathymetry is performed to map the underwater bottom with a high level of accuracy. It complements correlation and interpretation of the data obtained from other methods, which yield sub-bottom information and allow a quality check of the results. Since the other methods measure thickness from the bottom, this accuracy is essential.[260] Together, these surveys provide important information relevant to the creek bed and lake morphology[261] and enable more informed decision-making in support of efforts to sustain the integrity of the lake.



[253] For the Timber Ridge Forebay, Lake Services brought in equipment to remove debris and reposition large rocks to provide a better flow through the forebay. The estimate was that over 600 cubic yards of material were removed July 18, 2012. In 2012 LMC members also examined the drainage area between Corwin Place and Waterway Drive near West Beach. There was a 12' to 15' deep washout close to a PWC Service Authority manhole. A manhole cover was not properly installed and there were several feet of exposed sewer line which could be a source of sewer spillage into the lake. LMC recommended the PWC Service Authority be notified. Prince William County Service Authority completed work on an exposed sewer line and displaced manhole cover behind Corwin Place. Timbers were stacked under the sewer pipe to support it, and plastic sheeting and rip rap were installed to mitigate the erosion.

[254] Project restored original channel via elimination of a gravel bar, stabilized the stream bank, and provided sewer line rip rap armament.

[255] As the primary sediment sink for the upper half of Powells Creek Watershed, Lake Montclair contributes to reducing sediment entering the Potomac River that would otherwise have more suspended particles going into the Chesapeake Bay. By periodically dredging the lake, MPOA contributes to the restoration of the Bay.

[256] **Topography** is the description of surface shapes and features (especially their depiction in maps). The topography of an area can also mean the surface shape and features; it is concerned with local detail in general, including not only relief but also natural and artificial features. Topographic maps with elevation contours have made "topography" synonymous with relief. Topography specifically involves the recording of relief or terrain, the three-dimensional quality of the surface, and the identification of specific landforms. This is also known as geomorphometry. This involves generation of elevation data in electronic form. It is often considered to include the graphic representation of the landform on a map by a variety of techniques, including contour lines, hypsometric tints, and relief shading.

[257] **Hydrography** refers to the mapping or charting of water's topographic features. It involves measuring the depths, tides, and currents of a body of water and establishing the topography and morphology of lake beds.

[258] Several real-time quality control techniques can be used to quickly appraise the information to overcome the variables introduced by mixing survey types, and these should be addressed in the context of data acquisition and data analysis.

[259] GBA recommendations addressed need for conducting a metric survey of the whole lake to determine locations of accumulated sediment.

[260] The principle of the **bathymetric** method is to send an acoustic signal and measure the travel time to derive a depth. This depth conversion process is done by first measuring the velocity of sound in the water at different depths. The water depth measurements should be expected to be accurate to within ± 10 cm. The bathymetry equipment is small and can be mounted on a boat so that the survey can be conducted along with other geo-physical methods. The survey is conducted in a grid pattern. The line spacing is decided based on the resolution required. The more accurate positioning is achieved using a Differential Global Positioning System.

[261] **Morphology** and its synonym fluvial geomorphology are used to describe the shapes of water channels and how they change over time. The morphology of a creek or river channel is a function of a number of processes and environmental conditions, including the composition and erodibility of the bed and banks (e.g., sand, clay, bedrock); vegetation and the rate of plant growth; the availability of sediment; the size and composition of the sediment moving through the channel; the rate of sediment transport through the channel and the rate of deposition on the floodplain, banks, bars, and bed; and regional aggradation or degradation due to subsidence or uplift.

Storm water runoff carries heavier amounts of particles that settle into the lake and necessitates periodic dredging to maintain a minimum depth of 4 feet and a 4:1 horizontal to vertical slope from the shoreline. Minimizing loss of the lake surface area footprint and retaining an adequate water depth are important to maintain water quality.[262]

In the Fall 2007 (report completed in 2008) Lake Montclair was dredged at a cost of $900,000 to MPOA. This dredging was necessary because of the large amounts of silt discharged into the headwaters of Lake Montclair at Powells Creek from commercial and housing development, the failure of storm fences for the Spriggs Road construction project, and the breach of the Lake Terrapin storm water management pond.[263]

As indicated in Figure 4-2 and Table 4-3 the majority of dredging (over 70%) for Lake Montclair occurs in the northwest part of the lake nearest to where Powells Creek dumps into the lake – the headwater of the lake (indicated as Dredging Area A).[264]

The dredging volumes in autumn 2014 are consistent with historical dredging numbers shown in Table 4-4 (on the next page).

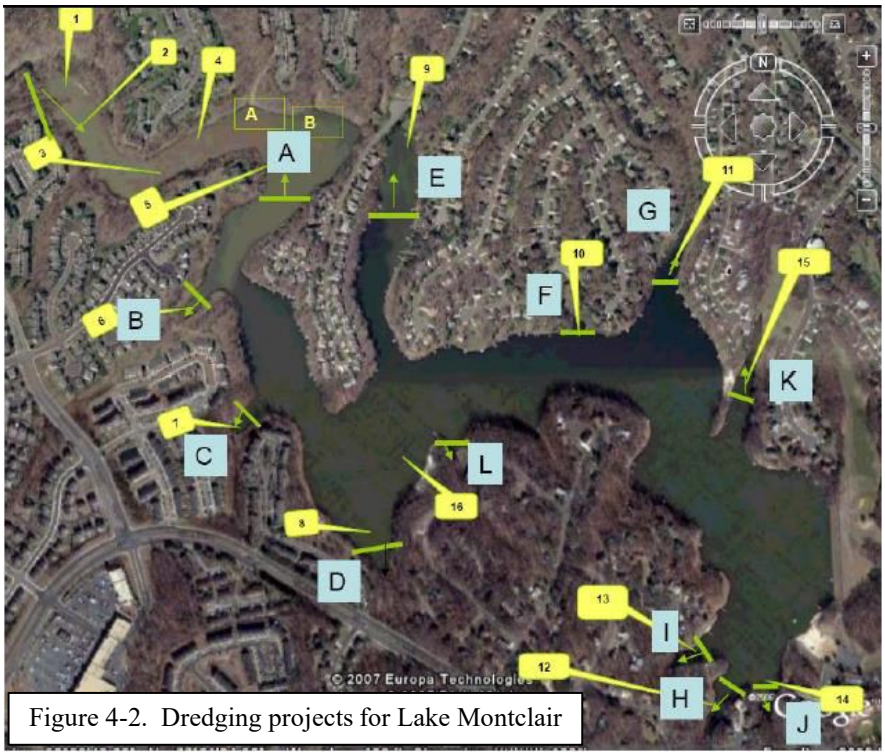


Figure 4-2. Dredging projects for Lake Montclair

Table 4-3. Dredging Volumes in Cubic Yards for Lake Montclair in 2014[265]

Dredge Area	Sub Area	Volume (CY)	% By Volume	% By Volume Area A	Locations
A	1	1,327	8.5%	73.1%	Northern most portion of Powells Forebay area
	1a	1,940	12.5%		Powells Creek Forebay - NO dredging outside of MPOA
	2	4,216	27.1%		Powells Creek Channel and Forebay
	3*	*			Windward Ct. – Breezeway, Cove & Shoreline Channel
	4*	3,219	20.7%		WETA Boat Launch Ramp Area
	5	200	1.3%		WETA Cove A
	5A	0			WETA Cove B
	A	245	1.6%		Montclair Point
	B	245	1.6%		Keswick Ct. Island Homes Point
B	6	380	2.4%		Outlook Place – Clariton Place Cove
C	7	340	2.2%		Viewpoint Circle – Widewater Drive Cove
D	8	300	1.9%		Montview Dr. – Corvin Place Cove by West Beach
E	9	780	5.0%		Timber Ridge Cove
F	10	0			Fisherman's – Yorktown Cove
G	11	780	5.0%		Silvan Glen Cove
H	12	260	1.7%		Larchmont Ct. – Cove Lane Cove
I	13	340	2.2%		Barger Place - Larchmont Ct. Cove
J	14	100	0.6%		Cove Lane – Dolphin Drive Cove
K	15	580	3.7%		Golf Club Dr. – Silvan Glen Cove
L	17	240	1.5%		Moncure Cove
N	8	40	0.3%		Golf Club Dr. – Cul-de-sac
N	7	50	0.3%		Fallstone Place --- Cul-de-sac
		15,582	100.0%		Total Cubic Yards

* Volumes for Sections A3 & A4 were lumped together

As shown in Figure 4-3 (on next page) high concentrations of suspended soil from Powells Creek are highly visible in Lake Montclair after and during rain storms when sediment dispersal is greatest at the northwest part of the lake. Even though evidence of higher amounts of suspended particles (that contribute to the sediment) are from Powells Creek above the lake, PWC assumes no shared responsibility for sediment being deposited into Lake Montclair, even though more than 60% of sediment material originates outside of Montclair.

[262] Areas that become shoaled-in significantly would need to be considered for dredging prior to them becoming dry land or a wetland to prevent them from becoming potential fish-kill areas due to risk of reduced oxygen.

[263] Prior to the Fall 2007-2008 dredging, portions of Lake Montclair were dredged in Fall 1991-1992, 1996, and again in 2001 when approximately 18,000 cubic yards of silt were removed from specified sites. The collected silt was taken to the PWC landfill on Hwy 234.

[264] The Jan 2008 draft Forebay Assessment Study for Lake Montclair concluded that up to half of sediment being dredged could be avoided through better control of local outflow and channels, some that originate outside Montclair.

[265] Dredging estimates and recommendations provided in Gahagan & Bryant Associates (GBA) Lake Montclair Hydrographic Survey Study Report, August 2014.

Figure 4-3. Visibly dense suspended soil deposited into Lake Montclair from Powells Creek with rain storms.

Dredging will continue to be one of the major planned projects for Lake Montclair. Field assessments associated with sedimentation control have revealed much about storm water management efforts and provide a baseline for planning future activities (see map in Figure 1-6 in Section I of this LMPP).

Table 4-4. Lake Montclair Historical Dredging[266]

Lake Montclair Historical Dredging							AVG ANNUAL SILTATION Based on quantities removed during each dredging cycle				AVG Silta-tion Per Year Over 22 Years	AVG % of Silta-tion By Area for 22 Years
Area		Dredging Location	1992	1996	2001	2008	6	4	5	7		
1	A	Powells Creek Forebay	5,651	6,100	2,955	7,805						
2	A	Powells Creek Channel	0	2,300	9,200	6,015	942	2100	2582	2097	1,893	64
12	A	Montclair Point	0	0	755	856						
13	B	Outlook Place – Clariton Place Cove	0	0	466	279	0	0	93	40	34	1
14	C	Viewpoint Circle – Widewater Dr Cove	0	0	290	417	0	0	58	60	32	1
9	D	Cove south of West Beach	504	750	510	1,454	84	188	102	208	146	5
3	E	Timber Ridge / Edge Hill	3,261	1,800	0	1,001	544	450	0	143	276	9
11		Notley Lane	612	0	646	161	102	0	129	23	65	2
4	G	Yorktown Cove / Silvan Glen	969	1,000	510	394	162	250	102	56	131	4
7	H	Larchmont / Cove Lane	0	800	0	460	0	200	0	66	57	2
8	I	Clearwater / Larchmont	307	750	0	164	51	188	0	23	56	2
6	J	Dolphin Beach South	612	650	920	213	102	163	184	30	109	4
5	K	Silvan Glen / Golf Club	517	850	420	472	86	213	84	67	103	3
10	L	Cove north of West Beach	84	650	0	460	14	163	0	66	54	2
15		Miscellaneous Coves	0	0	0	0	0	0	0	0	0	0
		AVG ANNUAL SILT REMOVED					2,086	3,913	3,334	2,879	2,954	100
		Total Cubic Yards	12,517	15,650	16,672	20,151	NOTE:					
		Mobilization / Demobilization Cost	$27,330		$28,423	$94,855	LAKE MONTCLAIR WAS CONVEYED					
		Cost	$298,330		$478,689	$782,745	TO MPOA IN SEPTEMBER 1988					
		Cost /CY	$26.02	$21.16	$30.42	$43.55						

[266] MPOA LMC member Austin Carroll provided historical dredging statistics. Dates indicate year of report for dredging in previous autumn.

Preparation for dredging of Lake Montclair requires months of planning and contract-related activities prior to the expected dredging operations, as reflected in Table 4.5. In the year preceding the dredging, MPOA LMC and property management staff make preparations and take action associated with the Request for Proposal (RFP), including conducting an analysis of survey data previously collected.

Table 4.5. Sample Plan of Action & Milestones (POA&M) for Dredging of Lake Montclair[267]

Year of Dredging	Milestone	Action	Notes / Reference
Jan BOD Meeting: __ Jan LMC meeting: __ Jan	**BOD DECISION: fund lake survey analysis and approve release pre and post dredging survey RFP when finalized**	Award contract for lake survey analysis and report	Tab A – Previous Survey RFPs and dredging contracts used as examples
Feb BOD Meeting:__ Feb LMC meeting:__ Feb	Survey analysis and written report received by ____, evaluated and selection of dredging areas.	LMC & FirstService Residential work on pre and post dredging surveys RFP	Tab B - 2007 & 2014 Dredging RFPs used as examples
Mar BOD Meeting:__ Mar LMC meeting:__ Mar	Determine scope of work. Identify areas for pre and post dredging surveys	LMC & FirstService Residential finalize work on pre and post dredging surveys RFP and send out Finalize dredging RFP using survey data and BOD input.	Tab C - Pre Dredging Survey from 2007 and 2014 used as examples
Apr BOD Meeting:__ Apr LMC meeting:__ Apr	**BOD DECISION: fund Lake Surveys and approve sending out Dredging RFP**	Selection and contract award for Pre and Post Survey LMC & FirstService Residential finalize Dredging RFP and then mail out.	
May BOD Meeting: __ May LMC meeting: __ May	Proposals for dredging due. Source selection	FirstService Residential and LMC evaluate proposals for selection process. Write summary for BOD.	Tab D – 2007 & 2014 Bids used as examples
Jun BOD Meeting: __ Jun LMC meeting: __ Jun	**BOD DECISION to fund Dredging Project** Contractor acceptance letter and contract signature.	Award dredging contract FirstService Residential/Contractors finalize contracts.	
July BOD Meeting: __ Jul LMC meeting: __ Jul	File permits application. Coordinate w/PWC landfill. Newsletter on Dredging	Contractor & FirstService Residential	
Aug BOD Meeting: __ Aug LMC meeting: __ Aug	**Conduct pre dredging survey and receive report**	Survey Contractor to begin in last week of Aug	
Sep BOD Meeting: __ Sep LMC meeting: __ Sep	Raise lake level 12" (flashboards in spillway riser) **Begin dredging (__ Sep).** Dredging complete. Areas restored.(by end Sep)	Contractor & FirstService Residential Contractor. FirstService Residential QA/monitor	
Oct BOD Meeting: __ Oct LMC meeting: __ Oct	**Post-dredging survey completed.** Survey contractor report by beginning of Oct. Pay Contractors	FirstService Residential report to LMC & BOD	Tab E – Post Dredging Report
Nov BOD Meeting: __ Nov LMC meeting: __ Nov	After action report to LMC file.	LMC; copy to BOD and FirstService Residential	Lessons learned

After the dredging operations are completed, follow-up lessons learned are provided, in addition to a post-dredging report.

[267] Sample Plan of Action & Milestones for Dredging of Lake Montclair derived from actual plan used for 2014 dredging.

Over recent years some of the waterfront property along Lake Montclair has been cleared (some without replacement of ground cover) by the homeowners to provide a better view or access to the lake, and MPOA addresses these properties consistent with PWC enforcement of RPA requirements. Responsive to changes in regional growth patterns in the Powells Creek Watershed, the Virginia Department of Transportation has extended the network of roads and widened others, such as Hwy 234 and Spriggs Road; increasing the rate of storm water runoff into Lake Montclair. These combined factors have caused an environmental impact on the lake, in general, but more specifically on storm water management of the lake. MPOA will continue to work with residents, PWC and VDOT to ensure issues relevant to Lake Montclair are addressed and identified as priorities.[268]

5. Emergency Spillway Modification Increased Stormwater Surge Capacity.

The Auxiliary Spillway (Dolphin Beach) was modified in 2018 in order to meet Virginia Regulatory Dam Safety requirements. According to the regulations the dam's spillways needed have the capacity to pass the Spillway Design Flood (90% of the flood resulting from Probable Maximum Precipitation).[269] In addition, the auxiliary spillway did not meet the stability requirements.

Under flood conditions the spillway would erode into the lake resulting in a sudden release of water. The solution to addressing regulatory requirements was the widening and deepening of the auxiliary spillway to correct the capacity deficiency and the construction of a cutback protection wall to address the stability deficiency.[270]

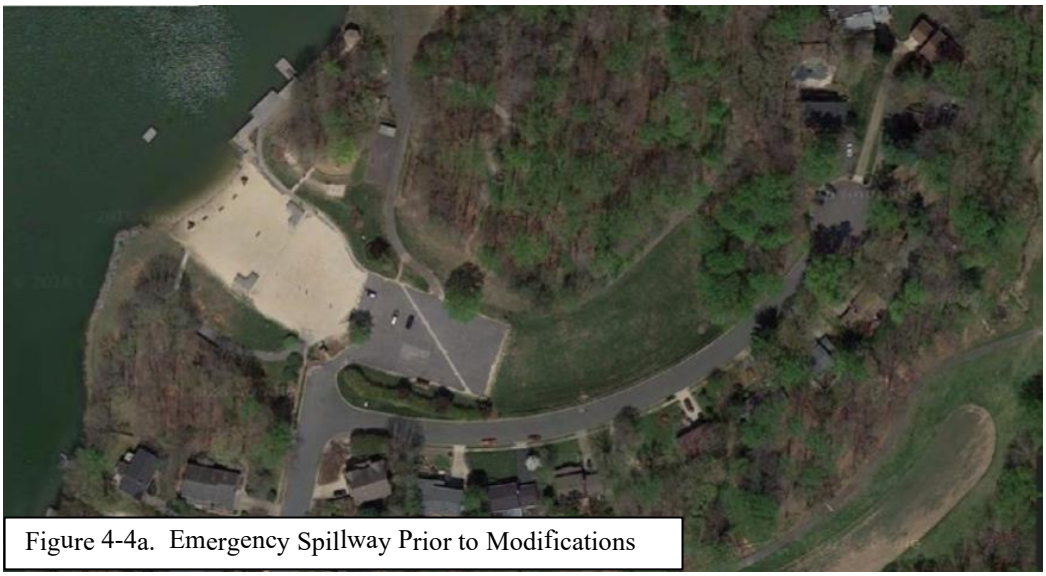


Figure 4-4a. Emergency Spillway Prior to Modifications

Figure 4-4b. Modification to Emergency Spillway -- Construction of Cut Back Wall

Structural reinforced concrete sections varying from 6 to 20 feet tall were anchored to bedrock with the top below the level of the beach surface. The wall extends across the entire width of the spillway.

Once work was complete Lake Montclair Dam and Spillways were in full compliance. Once compliant, Montclair was able to obtain the Regular Operation and Maintenance Certificate that was needed to legally operate Montclair Dam. Montclair had been operating with a "Conditional" Operation and Maintenance Certificate that directed corrective action.

[268] MPOA continues to engage PWC on runoff water controls because upstream developments and disturbances in watershed land use contribute to increases in soil transfer into Lake Montclair. VDOT has taken actions to manage roads to the detriment of Lake Montclair. Several VDOT-managed culverts have been replaced with larger culverts, minimizing retention; so the lake now rises faster during and after rain storms, and sediment now accumulates faster from storm water. Cumulative effects of upstream development and changes to culverts need to be more consistently addressed and publicly supported. Potential changes associated with a proposed expanded use of Highway 234 need to be assessed in terms of their potential impact to Powells Creek Watershed and Lake Montclair.

[269] In 2014, Virginia's Dam Safety Office required MPOA to conduct an Inundation Study and a Spillway Stability Analysis. MPOA contracted Froehling & Robertson, Inc. (F&R, Inc) to conduct the work. The result of the study and analysis was that the Montclair Dam spillways did not have the capacity to handle the water flow that would result from the largest probable flood.

[270] A "cutback protection wall" is a concrete structure (wall) that is anchored to the bedrock. The cutback protection wall protects the spillway from failure due to erosion during a flood.

F&R Inc provided engineering support and dam consulting services related to Montclair Dam Spillway project, and they had experience in design of earth, rockfill, roller compacted concrete, and concrete gravity dams.[271]

After design work was completed, an Alteration Permit Application was sent to Virginia's Dam Safety Office on April 24, 2017. Once the state approved the design, MPOA sought a contractor for the construction phase. Shirley Contracting Company LLC was selected as the construction contractor.[272]

Starting in February of 2018 the lake was lowered by 20 feet to facilitate the construction operations. This was a safety precaution to ensure that water did not flow through the spillway during construction. The lowered pool would provide some protection against potential flood conditions.[273] The lowering actions and procedures were conducted in close coordination with the Virginia Dam Safety Office, F&R project manager, construction contractor Shirley Contracting and MPOA management staff.

Figure 4-4c. Modifications to Emergency Spillway increased storm water surge capacity of Lake Montclair

Both Prince William Co. Environmental Services (watershed) and VA Department of Game and Inland Fisheries were contacted for information regarding impact of drawing down a lake. Powell's Creek is a perennial stream (it constantly flows) so water flowed into the lowered lake constantly.

Aquatic plants died as the water was lowered and terrestrial plant growth grew densely on the exposed lake bed during 2018 summer months. Controlled lake lowering crowded the fish together and the bigger fish ate littler fish. There was increased bird activity in harvesting fish as well. A fish kill did not happen, and there was no offensive smell during the drawdown. Mammals and birds adapted well to lower water levels.

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[271] F&R Inc services included: Dam Safety Inspections, Hazard Classification Assessments, Inundation Studies, Emergency Action Plans, Geotechnical Analysis, Dam Removal, Remedial Design, Structure Design, Plans and Specifications, Construction Administration and Inspection. The lead engineer (David Krisnitski) for the Lake Montclair project had over two decades of experience providing engineering and project management services for construction projects of all types and sizes. Immediately prior to joining F&R, he served as the Facilities Engineer for the Virginia Department of Game and Inland Fisheries, (VDGIF) a position in which he oversaw the maintenance of the largest collection of dams in Virginia (41 total).

[272] After soliciting 7 qualified contractors for bids for the Spillway Alteration Project, MPOA received proposals from 3 of those contractors. Those 3 bids were subsequently reviewed by the Spillway Task Force in consultation with David Krisnitski on 24 Jan 2018. That group reviewed the materials in detail, evaluating the proposals line by line. Questions were raised by the group relative to the differences in pricing in some of the bid parts. Those questions were asked of David Krisnitski, who provided his insight relative to the proposed cost differences. After careful and considerate review of the proposals, it was the recommendation of the Spillway Task Force that the contract be awarded to Shirley Contracting. Supporting factors for that recommendation are as follows: Shirley Contracting complied with all the requirements for submitting a proposal, to include a Statement of Qualifications, including a list of references, and information regarding other projects of similar scope that they have performed in the past. Included in that information were details regarding another spillway alteration project that they performed in Fairfax County of similar scope. No other bidder provided a statement of qualifications. Shirley Contracting was the only contractor that reached out to MPOA staff during the compilation of their proposal to request permission to re-visit the site. After reviewing all the bids submitted, David Krisnitski from F&R, designer of the project and our consulting engineer, recommends the contract be awarded to Shirley Contracting. Shirley Contracting also provided the lowest bid of the three bids that were received. MPOA Board of Directors approved Shirley Contracting as the construction company for the Spillway project on 31 Jan 2018.

[273] MPOA remained liable for any damages resulting from a dam failure event, even if the lake were totally drained for the project. Virginia's Dam Safety Office agreed that lowering pool was the easiest step a dam owner could take to limit the potential for downstream impacts. The Dam Safety regulations are for the safety of everyone downstream of the project. Because Montclair Lake has an earthen Dam, Virginia regulations restrict lowering water level to no more than 6 inches a day. If the water levels were to remain at normal pool, then the possibility of water flowing into the spillway during flood conditions would be much higher.

MPOA closed all of the beaches until water levels returned to normal. Dolphin Beach was completely fenced off since that was where all the construction took place. There was no access to lake or the exposed bottom. The mud was deep in some places and posed a safety risk to anyone who would venture out into the exposed lake bottom.

Figure 4-4d. Emergency Spillway Project

The Emergency Spillway construction project lasted through the summer of 2018 and was largely complete in August 2018. The lake had returned to normal pool by the end of September 2018.

There are multiple documents and presentations posted on the MPOA website under the title "Spillway Project" for reference. The project cost was in excessive of $1.2M.

6. Resource Conservation and Management of on-Site Soil, Sand and Sediment.

Erosion and sediment control and resource conservation are the primary considerations for management of on-site soil and sand. MPOA has been reclaiming sand washed from beaches into the lake and reusing it either on the beaches or elsewhere in Montclair. With each dredging, sediment has been transported off-site to the local landfill within the Powells Creek Watershed upstream of Lake Montclair; so it is reused in a more useful manner and not deposited into the Chesapeake Bay (as would have occurred if the lake did not serve as a sediment control sink).

In sustaining and enhancing ecosystem services through protection and reuse of soil and sand, MPOA LMC seeks to protect and maximize reuse of on-site resources (such as reusing sand washed from beaches and soil extracted from lake dredging) and to sustain areas of healthy soils.[274] MPOA also seeks to improve health of degraded soils in Montclair since all of the community is in the Resource Management Areas of the Chesapeake Bay. The LMC continues to address sediment transport issues. To maintain integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs) the MPOA coordinates with PWC and contracts with private companies to provide lake dredging and maintain integrity of catch basins and forebays (consistent with the LMEQR). This includes monitoring and corrective actions, as needed, to protect and sustain shoreline and beaches.

Diversion of surface water away from exposed soils provides the most economic and effective erosion control possible since it is more advantageous to control erosion at the source than to design controls to trap suspended sediment.

Figure 4-5. Storm Drainage Upgrade

Long-term planning is emphasized for resource conservation.[275] More integration of surface and storm drainage systems will be essential parts of planned community efforts to manage on-site soil, sand, and sediment.[276] Virginia localities are required to develop storm water management programs to reduce runoff pollution and better protect streams and lakes connected with the Chesapeake Bay.[277] As such, future LMC plans should clearly specify: location and capacity of diversions and debris basins; paved or other types of chutes, outlets and waterways; drop inlets; open or closed drains; stream channel protection & bank erosion structures. MPOA will continue to coordinate with PWC to more explicitly consider how erosion and sedimentation could be controlled in small drainage areas.

[274] During 2014 dredging operations over 200 tons of sand was retrieved from the lake near West Beach and placed on the beach for reuse.

[275] The most effective solutions to erosion and sediment problems are centered on natural resource and watershed planning. This type of planning can guide and control land use. The natural resource planning process integrates ecological (natural resource), economic, and social considerations to meet private and public needs. This approach, which emphasizes identifying desired future conditions, improves natural resource management, minimizes conflict, and addresses problems and opportunities. Watershed planning is another useful tool for building a community's land use plans because watersheds are defined by natural hydrology, representing the most logical basis for managing water and soil resources. The resources become the focal point, and planners are able to gain a more complete understanding of overall conditions in an area and the stressors which affect those conditions.

[276] From a historical perspective, most of Montclair was developed by utilizing the existing topography wherever possible. Current practices for property improvement minimize impacts on-site soil by maintaining vegetative buffer strips between disturbed and adjacent areas. Existing woody or native vegetation on a site should be retained and protected, as required.

[277] The Virginia Stormwater Local Assistance Fund was intended to help localities implement their programs by 2014.

As part of the Lake Management Program by MPOA LMC, future efforts could focus on developing an **Erosion and Sediment Control (ESC) Plan**.[278, 279] An ESC plan would show the site's existing topography, and how and when it will be altered. It would also show the ESC measures that would be used to reduce sediment pollution and how and when the control measures would be sustained. ESC practices are divided into vegetative and structural controls:

- **Vegetative Controls** — The best way to protect the soil surface and limit erosion is to preserve the existing vegetative groundcover (and it is required within an RPA). Where land disturbance is necessary, temporary seeding or mulching must be used on areas which will be exposed for more than 14 days. Permanent stabilization should be performed as soon as possible after completion of grading. ESC plans must contain provisions for permanent stabilization of disturbed areas. Seed type, soil amendments, seedbed preparation, mulch, and mulch anchoring must be described on the plans. Selection of permanent vegetation should address the following considerations for each plant species: 1) establishment requirements; 2) adaptability to site conditions; 3) aesthetic and natural resource values, and 4) maintenance requirements.
- **Structural Controls** — Structural erosion control practices may be necessary when disturbed areas cannot be promptly stabilized with vegetation. Structural practices should be developed to be an integral part of the site design.

c. Summary of Efforts for Storm Water Management and Watershed Ecosystem Conservation.

In coordination with PWC, the MPOA sustains proper drainage for storm water management and minimizes soil transport and soil erosion. MPOA takes actions to satisfy Virginia Regulatory Dam Safety requirements for storm water management, including the structural modification of the auxiliary/emergency spillway (Dolphin Beach) in 2018 in order to increase storm water surge capacity. MPOA manages and controls water level, and reports changes to enable timeliness of action. LMC promotes soil health to sustain or enhance ecosystem services through protection and reuse of soil and sand, and LMC promotes minimizing the use of soil amendments, chemicals, or pollutants that harm human and ecological health. LMC leads MPOA's efforts to maintain the integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs), and LMC promotes efforts to use vegetation to sustain and enhance on-site surrounding ecosystems services. LMC coordinates with others in monitoring changes in watershed land use and report on trends that affect the lake ecosystem. As illustrated in Figure 4.6 dual-use assets, such as Dolphin Beach, support storm water management and recreation activities. The LMC also promotes the efficient management of material resources and reduction of energy use. MPOA provides resources for community engagement, notification, and education relative to lake issues associated with storm water management and watershed ecosystem conservation efforts that have contributed to sustainment of a healthy, resilient lake.

Figure 4.6. Lake Montclair emergency spillway dual-use as Dolphin Beach prior to 2018 modification to increase storm water surge capacity.

Watershed land use affects water quality and water level management; requiring programs that reflect community perspectives for stewardship of the lake and watershed ecosystem.

[278] Natural resources need to be identified in the planning process in order to design an appropriate Erosion and Sediment Control (ESC) plan. The plan must have resource protection at its core and emphasize ***Erosion Control*** (controlling runoff and stabilizing soil), as its main component and ***Sediment Control*** as a management practice. The reduction of soil loss decreases the cost and maintenance of sediment control practices, reduces the risk of degrading natural resources and improves the overall appearance of the site.

[279] An ESC plan should be required for any proposed expanded use of road and highways in the Powells Creek Watershed, such as Hwy 234.

V. Resource Use and Management of the Lake's "Ribbon of Life," Water, and Biological Communities

a. Recreational Activities and Use of Lake Montclair.

The MPOA owns Lake Montclair (as a private lake) and grants property owners and residents the privilege to use the lake as a community recreation facility.[280] Swimming, boating, fishing, birding, and photography activities represent the primary recreational uses of Lake Montclair.[281] The lake is not used as a source for drinking water. There is some pumping for sprinkling systems primarily associated with the golf course of the Montclair Country Club. Table 5-1 outlines the objectives for managing the use of water in and around Lake Montclair.

Table 5-1. Relevant Objectives for Recreational Activities and Use of Water

1-1. Manage water on site to sustain or regenerate healthy hydrologic processes.
6-2. Promote the learning benefits of natural elements to enhance human cognitive functions.
6-3. Promote positive social dynamics in safely using the lake and "ribbon of life" assets.
6-4. Enhance conditions for use of the lake and its "ribbon of life."
6-5. Provide resources for community engagement, notification, and education relative to lake issues.

1. Landscaping Use of Water from Lake Montclair's Ecosystem.

The Montclair Country Club golf course can use water from the lake for irrigation sprinkling systems.[282] Siphoning water from the lake is primarily associated with the dam for water level control. In managing water on site to sustain or regenerate healthy hydrologic processes, MPOA monitors and controls storm water discharge, and maintains surface runoff levels and landscape to filter or allow infiltration of surface runoff.[283] Moreover, MPOA seeks to reduce use of potable water in landscaping by promoting the use of captured and stored rain water and storm water or untreated "grey water" for irrigation.

2. Birding and Photography on and around Lake Montclair.

As indicated on signs entering the community, Montclair is designated as a Bird Sanctuary. Lake Montclair and its 'ribbon of life' serve as attractive sources of food and habitat for several species of birds. As such, birding and photography from boats and the shoreline areas continues to be popular for many residents.[284] Section V.b.2 of this LMPP describes the birds and their nesting habitat and feeding areas on and around Lake Montclair, along with efforts by MPOA and residents to manage bird populations consistent with harmonious use of the lake ecosystem.

3. Swimming and Sporting/Recreational Activities in and around Lake Montclair.

Lake Montclair remains one of the better "swimmable" lakes in the region because of the continued focus on sustaining water quality. Overall, the lake is clean, and the lake water is tested regularly and found to be typical for this type of lake in this region.[285] The beaches and recreational areas are cleaned and maintained on a regular basis. To promote positive social dynamics in safely using the lake and its "ribbon of life" assets, the LMC coordinates with the property management agent to provide safety training and information relative to swimming and using docks, swimming platforms and beaches. The LMC provides resources to promote safe use of the lake, and the LMC also coordinates with others in Montclair to promote social activities that take advantage of the lake.[286]

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[280] Persons displaying valid MPOA recreation tags and their children and guests may use Lake Montclair and common areas abutting the lake Unauthorized persons are subject to eviction and/or arrest.

[281] MPOA provides resources to enable recreational use of Lake Montclair and its 'ribbon of life' assets. The recreational activities represent some of the better means of indirectly promoting the learning benefits of natural elements to enhance the human cognitive functions.

[282] Some pumping for sprinkler systems is done to preserve pervious landscaping and vegetation in RPA property lots adjacent to the lake.

[283] The associated strategies for using water in Lake Montclair are outlined in Section II, Table 3 of this LMPP. The lake supports many use uses; yet water taken directly from the lake is not recommended for drinking without further treatment.

[284] The Virginia Watchable Wildlife program http://www.dgif.virginia.gov/wildlifewatching/ enhances, elevates/promotes wildlife viewing and nature appreciation for the benefit of society, while building community awareness, understanding and support for conservation of the wildlife and habitats upon which these activities depend. This program provides technical assistance to both public and private land stewards to improve their land for wildlife viewing, and to address urban wildlife issues through workshops, publications, and web-based information.

[285] Water quality is a primary concern of Montclair residents who swim in the lake. The lake is a live ecosystem with biological organisms. As indicated in Section III of this LMPP, several precautions and preventative actions can be taken by residents to minimize or avoid skin rash and swimmers' itch. Monitoring and mitigating risks to water quality remain high priorities for MPOA.

[286] See MPOA Community Guidelines Article 4, Section 4.2. "Beaches" – residents in good standing have the opportunity to reserve certain areas of Montclair beaches. The LMC coordinates with others, such as the MPOA Events Committee, in promoting social activities.

a) Health and safety considerations and guidelines for activities in and around the lake. Lake Montclair is a living ecosystem with typical biological communities in this region, such as wildlife and plants, including bacteria,[287] amoeba, and aquatic worms.[288] Overall, the water and beach conditions are safe,[289] and several precautions and preventative measures can be taken by residents to minimize or avoid skin rash and swimmers' itch (from swimming in lakes) and to minimize the possibility of picking up microscopic parasites from pet waste.[290] MPOA provides showers at beaches to enable residents to rinse after swimming or participating in recreational activities.[291] Use of the water, including boating and swimming, is at a person's own risk regardless of location in Lake Montclair. Shoreline residents are responsible for ensuring the safety of swimmers from their property. Swimming at beaches is restricted to within the delineated roped areas. Swimming or jumping off boardwalks or docks at all beach recreation areas is prohibited. Diving is prohibited at all times from all platforms, boardwalks, and docks at all beaches. There is a 15-minute period each hour for adult swim time when all bathers under 18 years of age will be required to leave the water. Swimmers at Montclair beaches may use personal flotation devices less than six feet in length. Flotation devices will be used in a manner consistent with safety, as determined by lifeguards on duty. People 12 years and older with valid Montclair unrestricted recreation tags are permitted to use the beaches.[292] During the Winter everyone is prohibited from entering or going upon any frozen portion of the lake. Without limitation, no ice-related recreation or activity is permitted on Lake Montclair.[293]

b) Lifeguards, recreational guards, and sporting activities. Lifeguards are provided for the safety of swimmers near beaches. Lifeguards' instructions are to be obeyed while they are on duty. Swimmers are not to gather at the lifeguard stands and are not to distract them from their primary duty. Persons interfering with the lifeguards' duties or disregarding their requests will be referred to the MPOA recreation guard or other Security personnel. Sanctions, including suspension of the use of the beaches, may be imposed by the MPOA Managing Agent. Swimming in the lake, even near the beaches, is considered at the person's own risk. MPOA assumes no liability for use of the beaches when lifeguards are not on duty.[294] The lifeguards or recreation guards may also require people to leave the water for safety considerations. Recreation guards will be hired by the Managing Agent

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[287] Effects of small algal bloom sometimes seen in Lake Montclair are mostly aesthetic and should not pose any risk to the lake's users. See http://www.vdh.state.va.us/epidemiology/dee/habs/cyanobacteria for protective measures against effects of blue-green bacteria.

[288] Aquatic worms are close relatives of earthworms, but they live in fresh water instead of the ground. They move soil by eating mud, and this is important to keeping the lake healthy by breaking down pollutants which settle to the bottom and potentially poison the water. They have many predators; are a favorite food for young fish, tadpoles, turtles, ducks, and aquatic insects, and are sometimes hosts for parasites.

[289] As noted in Section III.a.2 of this LMPP past results of surface water testing for E-Coli at Montclair's three beaches indicate higher-than-acceptable readings immediately after rainstorms (most likely attributable to storm water run-off transporting fecal waste over beaches and upstream watershed properties). Trends also indicate West Beach often has higher than acceptable readings for E-Coli from mid-July to mid-August. As such, residents could make risk informed decisions and take precautionary measures in swimming off West Beach during that period each summer or any beach after a rainstorm.

[290] Beach users need to be aware that, even though dogs are not permitted on beaches, some dog owners have ignored MPOA covenants and health considerations of residents by allowing their dogs on the beaches. The feces of dogs can contain two common microscopic parasites that are contagious to humans. They are roundworms and hookworms, and here are some important facts about them:

- Roundworm eggs: are ingested (i.e., eating without washing hands or placing hands in one's mouth after playing in contaminated sand or soil); develop into larvae in the intestines and then can migrate through abdominal organs, the eye, and nervous system, causing blindness and organ damage; and last for years in the soil and are extremely resistant to extremes in weather and to chemicals, including bleach (recommendations for contaminated soil include removal of the top 4-6 inches, burning the area, or cementing over it).
- Hookworm larvae: enter via the mouth or through intact skin (i.e., laying on contaminated sand or walking barefoot on the beach); cause a severe rash in the affected area; and last 3-4 weeks in the soil under the right environmental conditions.

[291] Precautions and preventative measures to minimize or avoid skin rash and swimmers' itch, and to minimize the possibility of picking up microscopic parasites attributable to pet waste:

- Avoid digging or stirring up underwater sediments while submerged in shallow warm water areas, and avoid swallowing lake water.
- Swim in open water where swimming is permitted, not in vegetated areas, and walk on sandy beaches, not on the natural lake bottom.
- Shower with soap and change into dry clothes after swimming;
- Dry off thoroughly and rigorously after leaving the water, and wash beach towels after each day of use.
- Keep dogs off the beach, and watch children digging in sand (to ensure they do not accidently encounter feces from unattended dogs).

[292] Children under 12 must be accompanied by a person 16 years of age or older. That person is solely responsible for the child. Children ages 12 years of age and older may bring guests who are 12 years of age and older. Persons displaying a valid unrestricted recreation tag may be accompanied by up to four guests for whom they are responsible, except at Montclair community events.

[293] Any person found in violation of this rule may be prosecuted for trespass in addition to any other sanction that may be imposed by MPOA. Moreover, MPOA shall have no responsibility or liability for injury, death or damage resulting from a violation of these prohibitions.

[294] Consistent with PWC curfew ordinance and MPOA community guidelines, persons found at the beaches after dusk and prior to 6 a.m. are subject to eviction and/or arrest for trespassing (except for West Beach boat launching. Notwithstanding the posted hours, MPOA staff may close the beaches because of weather conditions, emergency situations, or other extenuating circumstances.

and are empowered to enforce all MPOA rules and regulations. In no event shall MPOA be liable to any person for the violation by others of any covenant, rule, or regulation. Sporting activities on the beaches are restricted to designated areas. Participation in sporting events at Montclair recreation facilities require the display of proper MPOA recreation tags and compliance with guest rules. Participation is at the person's own risk.

4. Boating and Use of Recreational Equipment on Lake Montclair.

MPOA grants property owners and residents the privilege to use the lake as a community recreation facility, and some of the primary uses are boating and related activities.[295] To enhance conditions for use of the lake, the LMC coordinates with the property management agent to survey use trends and identify potential conflicts in use of the lake.[296, 297] To promote positive social dynamics in safely using the lake, the LMC coordinates with the property management agent to provide safety training and information relative to boating. MPOA provides lake access, such as boat ramps and provides secure storage for boats, and MPOA Community Guidelines provide provisions and requirements for watercraft registration, insurance requirements, and equipment.[298]

a) ***Watercraft registration and insurance requirements.*** All boats[299] on Lake Montclair shall be registered annually in October at the MPOA office and shall display a current MPOA registration sticker on the port side of the bow. All boats must be maintained in good working order and appearance and shall be operated in accordance with federal, state and local requirements including, but not limited to, all requirements with respect to loading, life preservers and safety equipment. No boat of a length greater than eighteen feet shall be launched onto or used on the Lake without expressed consent of the MPOA BoD. No boats may be moored or left unattended on the Lake after dark and before dawn except at the boat owner's own MPOA-approved dock. The owner of any boat moored on the Lake overnight shall register on the FSRConnect webpage and shall provide MPOA property management telephone number(s) at which the owner may be contacted.

b) ***Equipment and motor guidelines and limitations.*** MPOA specifically prohibits gas-engine powered boats on Lake Montclair, with the exception of emergency response units and MPOA maintenance watercraft. Authorized users of Lake Montclair may launch a boat from West Beach with a gasoline engine affixed to the craft; however, the gas tank(s) must be removed before being allowed entry to the launch area and the out-drive of the motor must remain out of the water. Boats with non-removable gas tanks are prohibited on Lake Montclair.[300] Boats operated on Lake Montclair may be powered by electric motors. However, no boat used or operated on Lake Montclair may be powered by one or more electric motor having a total power of more than 195 pounds thrust, or the equivalent of 3.5 horsepower.

c) ***Boating safety.*** MPOA provides the "Virginia Department of Game and Inland Fisheries - Virginia Watercraft Owner's Guide"[301] boating safety information to residents when they register their boats. MPOA LMC provides water safety articles for *The Montclairion* and promotes boating safety and training courses

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[295] Any boat launched, operated or moored on Lake Montclair in violation of MPOA Community Guidelines is subject to impoundment. The owner of an impounded boat shall be liable for costs of removal and all storage charges. An impounded boat may be recovered by its owner upon showing proof of ownership and paying all removal and storage charges but may not be re-launched on Lake Montclair except in compliance with MPOA Guidelines. Any impounded boat not recovered by its owner within thirty days of impoundment is subject to sale by auction or by such other means as the MPOA Board of Directors may determine appropriate.

[296] Dumping, pouring, or throwing any material into the lake or onto the beaches or common area abutting the lake, is forbidden.

[297] Residents should be vigilant about cleaning boat hulls, fishing gear and recreational equipment that has been transported among several water bodies. Reports by EPA and others indicate transporting gear and equipment are pathways for disease organisms and invasive species into other waters. The "Aquatic Nuisance Species (ANS) Task Force" (an intergovernmental organization dedicated to preventing and controlling aquatic nuisance species) at http://www.protectyourwaters.net/hitchhikers/plants_hydrilla.php discusses Hydrilla (a problem in Lake Montclair in the past). Hydrilla, zebra mussels and milfoil have been introduced this way.

[298] See MPOA Community Guidelines Article 4, Section 4.3.5 "Boating on Lake Montclair."

[299] For purposes of the MPOA Community Guidelines, a "boat" is defined as a vessel propelled by oars, paddles, sail, or electric power and having the following characteristics: 1) Over 6 feet in length but not exceeding 18 feet, and having no more than one deck. 2) Constructed so as to have a hull, frame, body or casing made of durable and water repellent material or pontoons attached which provide the flotation necessary for the buoyancy of a main platform (i.e., pontoon craft). 3) Have the capacity to accommodate a passenger with a life preserver on board unless designed for one person only. 4) Routinely propelled with oars, paddles, sails, or small electric motors.

[300] No boat with a gas tank or a gas engine may be stored, docked, moored or fueled on the lake. Boats that may be properly used on the lake may be docked at West Beach temporarily during the process of launching or removing the boat.

[301] The VDGIF Virginia Watercraft Owners Guide, available through www.dgif.virginia.gov provides requirements for watercraft registration, titling, and sales tax, along with equipment regulations, speed laws, unsafe practices, homeland security, environmental laws, boat theft prevention, capsizing and falls overboard, boating education information, boating safety education requirements, etc.

for staff and residents. Boating is not permitted at any time within designated (roped-in) swimming areas. Lakefront property owners may use their boat docks for launching boats and fishing.

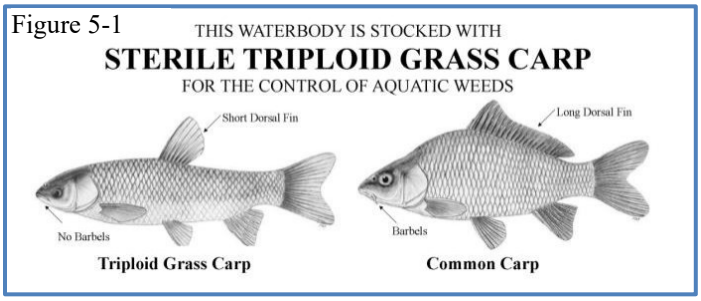
d) ***Boat ramps and access points.*** Kayaks and other recreational equipment that can be hand-carried may be launched from any public point around the lake. For other boats, approved community boat launching areas are West Beach, South Lake Landing, and Waters Edge Town Home Association. Lakefront property owners may launch boats from their property.[302] The West Beach boat ramp is chained off and locked when beach guards are not on duty. Property owners and residents in good standing, desiring to launch boats from the ramp when beach guards are not on duty, must have a key issued by MPOA for the lock. After a boat is launched or retrieved via the ramp, the owner must replace the chain and affix the lock.[303] Under no circumstances may a boat trailer or vehicle be left anywhere on West Beach, the access road, or in boat rack areas.[304] Parking is only allowed in designated areas.

e) ***Other recreational equipment on the lake.*** The use of inflatable docks, islands, trampolines, swimming or diving platforms, or other floating or anchored recreational apparatus (excluding boats and stand-up paddle boards) anywhere on Lake Montclair is prohibited.[305]

5. Fishing on Lake Montclair.

Lake Montclair has a variety of freshwater fish, including bass, black and white crappie, several types of catfish and sunfish, along with triploid carp that are part of Montclair's aquatic weed control initiative (see Figure 5-1).[306] In general, fish are safe to consume (see Section III.a.1.c of this LMPP for fish flesh testing program and results).[307] Section IV.b.1 of this LMPP provides details on managing fish and fishery habitat in Lake Montclair. To optimize learning benefits of natural elements to enhance human cognitive functions, the LMC coordinates with property management staff to provide information about fish in the lake, including their beneficial roles. The LMC also attempts to provide information on regional biodiversity and resources on local ecosystems and their functions. To promote positive social dynamics in safely using the lake, the LMC coordinates with the property management agent to provide safety training and information relative to fishing, such as maps with locations of fishery habitat in the lake. LMC also coordinates with the MPOA Events Committee in hosting the Montclair fishing tournament.

Figure 5-1



a) ***Fishing License requirements.*** Fishing is available to persons displaying a valid MPOA recreation tag and their children and guests. All persons are required to identify themselves when requested by Staff of the Managing Agent. Failure to do so will subject a person to eviction and/or arrest. Fishing is authorized from boats or the lake shoreline but not within the swimming area (roped-in demarcation area) of the beaches. MPOA assumes no responsibility or liability for persons fishing at Lake Montclair. All persons fishing in Lake Montclair should also comply with licensing requirements of the Virginia Department of Game and Inland Fisheries.[308]

b) ***Fishing from shoreline, docks, and boats.*** The fish in Lake Montclair are safe to eat; however, since the bass forage on smaller fish they accumulate greater amounts of metals than the other species. It is recommended that bass exceeding 14 inches be returned to the water to be caught another day.

Triploid Carp are protected species in Lake Montclair since they are part of Montclair's weed control initiative; as such, they cannot be hunted, killed, or removed from the lake and must be released if accidently caught.

[302] MPOA Community Guidelines Article 4, Section 4.2. "Beaches" provides details about legitimate areas for launching boats on the lake.
[303] Keys may be obtained from the MPOA, and may be retained by Owners for future use. Owners will be required to leave a security deposit for the key, which will be refunded when the key is returned. Only one key at a time will be provided to any one household.
[304] Violators are subject to an assessment of charges and/or loss of boating privileges as well as having vehicle/trailer towed at their expense.
[305] See MPOA Community Guidelines, Article 4.3.3 "Recreation Equipment."
[306] Plant-eating, sterile Triploid Grass Carp were brought into Lake Montclair in 1998 to provide a non-chemical, biological control of submerged aquatic Hydrilla Verticillata plants after the lake had become overwhelmed by a nearly impenetrable mat of stems and leaves at water surface that crowded out beneficial native vegetation (making swimming and recreational activities virtually impossible). Triploid Carp have a torpedo-like body (olive green shading to brownish yellow with a white belly) with a rounded snout and over-hanging upper lip.
[307] Fish species collected and tested have included Bass, Crappie, Sunfish, Sucker, Channel Catfish, Yellow and Brown Catfish.
[308] MPOA Community Guidelines Article 4, Section 4.3.4 "Fishing" and VDGIF licensing requirements.

Fishing is permitted from community docks and most MPOA common areas contiguous to the lake. The shoreline that abuts private lake- front property and the docks of lake-front property owners may only be used by or with the permission of the property owner. If in doubt, residents should check with the MPOA Office. Fishing from the dam is not authorized. The concrete platform which houses the dam gate control is strictly off limits. Persons found at that location will be subject to arrest. Fishing from boats that are registered with MPOA (as indicated by yearly stickers on the boat) is permitted for Montclair residents and their guests.[309] Fishing is not permitted at any time within the designated roped-off swimming areas.

b. Biological Communities of Fish, Wildlife, Insects, and Vegetation in and around Lake Montclair

Use of Lake Montclair is interdependent upon the resilience and vitality of life in and around the lake, and continued use is dependent upon the stewardship and sustainment[310] of biological resources in and around the lake, such as fish and vegetation. It also includes efforts for controlling destructive/disease carrying insects and venomous/destructive wildlife. MPOA collaborates with county and state organizations to accomplish strategies to achieve objectives in Table 5-2 that are relevant to vegetation, insects, wildlife, fish, and other aquatic life.

Table 5-2. Relevant Objectives for Vegetation, Insects, Wildlife, Fish, and Other Aquatic Life

1-3. Sustain environmental water quality and healthy biological communities.
3-1. Encourage use of natural ecological processes in managing plant resources.
3-2. Design and use vegetation so that on-site and surrounding ecosystem services are sustained or enhanced.
3-3. Manage lake vegetation consistent with use and natural balance of ecosystem services.
4-1. Provide habitat, water and food sources for fish and wildlife consistent with sustaining a natural balance.
4-2. Monitor insect populations and control destructive, disease-carrying insects.
4-3. Manage fish & wildlife consistent with needs for controlling water quality, fishing, and lake vegetation.
4-4. Monitor and report status of fish, aquatic life, and shoreline wildlife to inform action planning.
6-5. Provide resources for community engagement, notification, and education relative to lake issues.

1. Fish and Fish Habitat.

Lake Montclair has a variety of freshwater fish, including bass, black and white crappie, several types of catfish and sunfish, along with triploid carp that are part of Montclair's aquatic weed control initiative.[311,312] To manage fish consistent with needs for controlling water quality, fishing, and lake vegetation, MPOA coordinates with Prince William County (PWC) and Virginia State agencies to maintain a healthy and plentiful balance of fish (consistent with program described in the LMEQR).[313]

a) ***Fish stocking.*** On an annual basis, the LMC reviews input from the community in making its recommendations for restocking of fish. The conditions in Lake Montclair are more suitable for certain species while others are unable to thrive. For instance, the water is too warm in the summer to support trout. Some species are introduced for the sustainment of a healthy lake-ecosystem while others are primarily for the benefit of fishing.

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[309] Boats that have been in other bodies of water should have hulls cleaned to mitigate risk of transporting non-native species. Any boats with engines (that cannot be used on Lake Montclair) should be checked to ensure they are not leaking gasoline or petroleum products.

[310] **Stewardship** is an ethic that embodies the responsible planning and management of resources. The concepts of stewardship can be applied to the environment, health, property, etc. Stewardship is linked to the principle of sustainability which is the capacity to endure. In ecology it is how biological systems remain diverse and productive over time. Sustainability requires the reconciliation of environmental, social equity and economic demands - also referred to as the "three pillars" of sustainability (or the 3 Es). Healthy ecosystems and environments are necessary to the survival and flourishing of humans and other organisms. There are a number of major ways of reducing negative human impact. The first of these is environmental management.

[311] MPOA continues to request that all Sterile Grass Carp be released unharmed as they were purchased and stocked to control invasive submerged aquatic weeds, such as Hydrilla. As discussed in Section III of this LMPP, other species collected and tested in the laboratory included Crappie, Sunfish, Sucker, Channel Catfish, Yellow and Brown Catfish. None of these fish contained levels of PCBs, mercury, or any other pollutants that exceeded acceptable levels and are safe to eat.

[312] Largemouth Bass are top predators and can contain higher mercury levels than other fish because of the way they feed. Mercury levels in trophy size Largemouth Bass do not necessarily indicate a problem with lake water and residents should not be concerned about swimming.

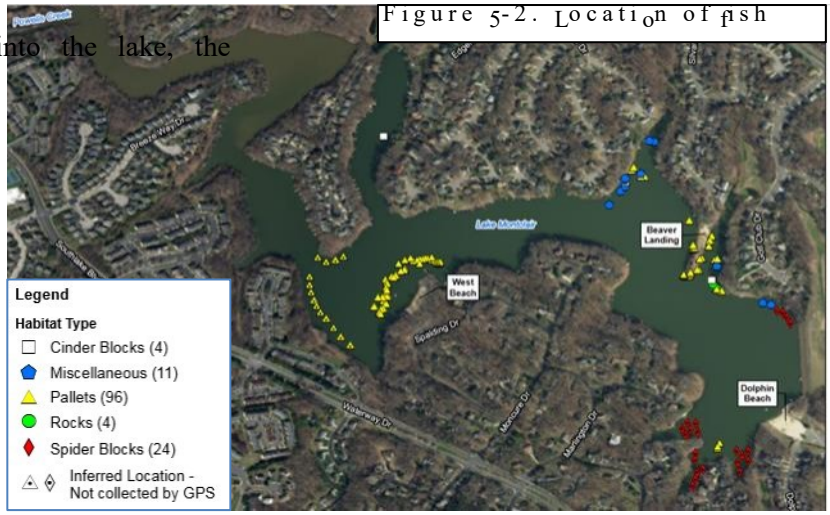
[313] To inform action planning, MPOA coordinates with PWC and Virginia State agencies to provide fish flesh testing and submersed aquatic vegetation inspection (described in the LMEQR), and to monitor changes in aquatic life, fish population and lake vegetation that might provide early warning indicators for adverse or unhealthy changes in the lake environment, such as mercury.

Channel Catfish stocking is recommended by VDGIF to be done every 4 years. A catfish stocking was done in 2010, and a Triploid Carp fish stocking was done in 2003.[314]

b) *Fishery habitat.* To provide habitat, water and food sources for fish, consistent with sustaining a natural balance, MPOA property management agent and volunteers on the LMC provide and maintain "fish structures" (as described in the LMC Fish Habitat plan). Reports are provided on an annual basis on habitat status (consistent with reporting in the LMEQR and Fish Habitat plan). Over the past decade, a concerted effort by the MPOA LMC has been ongoing to improve the lake's fishery, and one of those actions has been the addition of habitat structures and cover for fish. These are necessary for contributing to a healthy and balanced fish ecosystem. Fish need this habitat for several reasons: it is essential for some species to spawn or reproduce, baitfish and minnows use it to feed on and hide in, and predators use it to ambush and hunt. Adding habitat allows the lake to support more fish, as well as to grow larger predator fish (bass and crappie in particular). While dredging has been absolutely vital to the health of the lake, one of the side effects has been a considerable loss of habitat. Fish habitat consists of various components such as water plants, docks, fallen trees and logs. Everywhere the dredging occurred, water plants and grasses, and all of the fallen trees and shrubs along the shoreline were removed. These are all essential fish habitat that needs to be replaced. Over time, more trees will fall and water plants will fill back in. Meanwhile, however, it is essential to provide fish the structures that they require to develop their full potential.

Fish habitats can consist of natural materials such as Christmas trees, wooden pallets, or other artificial structures, such as Spider Blocks.[315] By placing submerged structures into the lake, the LMC helps to replace the habitat which is destroyed with dredging, as well as that which deteriorates naturally over time. As sites are emplaced, maps are updated and notification posted in *The Montclairion*.[316] As depicted in Figure 5-2 map and also available on *FSRConnect* there are 120 approved locations for fish habitat structures.[317] Locations are also marked on the map posted near the boat launch at West Beach. As other sites are established, maps will be updated, and notification will be posted in *The Montclairion.*

Figure 5-2. Location of fish habitat structures



2. Birds and Their Nesting Habitat and Feeding Areas.

To provide habitat, water and food sources for birds consistent with sustaining a natural balance, MPOA collaborates with PWC, state agencies, conservation organizations, and local residents to monitor nesting habitat and to sustain conditions for "bird sanctuary" environment consistent with lake and "ribbon of life" use trends. This includes protection efforts in the improvement of sites and other efforts that might provide early warning indicators for adverse or unhealthy changes in the lake environment, such as e-coli. Consistent with needs for controlling water quality and lake vegetation, MPOA coordinates with PWC and State agencies to take corrective action, as needed, to control populations of species such as geese and seagulls that pollute the lake and beeches. U.S. Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) provides support via a Cooperative Service Agreement with MPOA[318] to provide assistance from the Wildlife Services (WS) in managing the goose population on Lake Montclair. The goose population size is managed primarily through the egg addling program approved by the USDA. This practice has been deemed necessary to mitigate harmful nutrient

[314] Approximately 3,000 10"-12" catfish were placed into Lake Montclair on November 14, 2012. Fish appeared to be healthy and adapted well to our lake. Half of the fish were released at Dolphin Beach and the rest at West Beach.

[315] PVC commercial structures and trees were used in the past; in 2018, 24 Spider Blocks and 96 wooden pallets were emplaced and mapped.

[316] As part of the on-going program to improve fish habitat, MPOA provides a map showing the locations of the fish habitats available on the Montclair web site.

[317] Residents are not permitted to place their own fish habitat – such action would be considered dumping of trash into the lake.

[318] Cooperative Agreements and Grants associated with the US Department of Agriculture (USDA) Animal and Plant Health Inspection Service are addressed via their website at http://www.aphis.usda.gov/mrpbs/fmd/agreements_faq.shtml

levels and E-Coli accumulating in the lake and on beaches. MPOA prohibits the feeding geese at any of the beaches and common areas because of the problems associate with geese on or near beaches.[319] Several predator bird species feed on aquatic life and wildlife along the shoreline; yet none have represented a harmful presence in the community. Bald eagles that nest nearby fly over and fish in Lake Montclair.[320] Seagulls have seasonal use of the lake, at which time they are seen in large flocks. Blue Herons are frequently seen fishing in shallow water along the shoreline. Migratory double-crested Cormorants are seen in spring and fall on pilings and limbs after catching fish on extended underwater dives. Insect-feeding birds help to naturally control bugs; so the LMC promotes efforts of residents to provide nesting habitat for Purple Martins and other insect-feeding birds. Montclair has many song birds, such as Cardinals and wrens. MPOA continues to use community media, such as *The Montclairion* and the Montclair website, to provide information about birds in the local area and the relationship of birds to lake, and to provide means for empowering citizens to monitor/report on issues relevant to birds around the lake and its resources. Periodic reports are provided on the status of bird populations in and around Lake Montclair.[321]

3. Reptiles and Amphibians and Their Habitat in and around Lake Montclair.

Snakes seen in Lake Montclair are common water snakes. They are not poisonous. There are no Cotton Mouth Moccasins in the lake. Copperhead snakes are poisonous and are seen near the shoreline and throughout Montclair, especially near piles of wood and underbrush. Residents are asked to be mindful of activities near such habitat, and are encouraged to minimize piles of wood and underbrush in areas where children play. Several species of turtles and frogs are found in and around Lake Montclair. LMC plans and coordinates the lowering of the lake and dredging activities so as to minimize the impact on the nesting and egg laying of turtles and frogs in the area.

4. Mammals and Their Habitat in and around Lake Montclair.

Lake Montclair provides habitat and food for several mammals, such as foxes, beavers and bats. Bats are among the beneficial species since they contribute to the control of mosquitoes. MPOA and residents provide habitat for bats to control mosquitoes. Beaver dams in Lake Montclair and Powells Creek (as shown in the picture in Figure 5-3) provide habitat for numerous beavers. With a thriving beaver population, lakeside residents often have trees and saplings removed by beavers unless precautions are taken, such as wrapping the base of trees with chicken wire.[322] MPOA coordinates with PWC to monitor and report changes in destructive species of mammals and their habitats and food sources. MPOA LMC also reports on wildlife (consistent with reporting described in the LMEQR).

Figure 5-3. Beaver Dam in Powells Creek

One of the major threats to water quality is from the feces of residents' pets around the lake and along streets of Montclair. The Prince William County "Pooper Scooper" law requires residents to clean up after their pets. Because of the higher volume, pet waste is causing issues for water quality and beach cleanliness.[323] When pet waste is disposed of improperly, water quality isn't the only thing that suffers.[324] Residents' health may be at risk,

[319] The USDA APHIS WS provides Federal leadership and expertise to resolve wildlife conflicts to allow people and wildlife to coexist. The program's efforts help people resolve wildlife damage to a variety of resources and to reduce threats to human health and safety. Funding for the Wildlife Services Program is a combination of federal appropriations and cooperator-provided funds. WS biologists apply the integrated wildlife damage management approach to provide technical assistance and direct management operations in response to requests for assistance. WS NWRC research scientists are dedicated to the development of wildlife damage management methods. WS conducts its activities pursuant to agreements and legal authorities, and conducts environmental review processes to comply with the National Environmental Policy Act.

[320] Bald eagles nest in the 250 acre buffer surrounding the county landfill, designated as an "Audubon at Home Wildlife Sanctuary" in 2012.

[321] See annual updates of the LMEQR. MPOA coordinates with PWC to provide alerts and report changes in water quality, especially as related to changes in E-Coli levels normally attributable to geese and dogs (see LMPP Section V.b.4).

[322] Beavers have cut down trees larger than eight inches diameter; seeking to make upper reaches more accessible via the water. Beavers are also known carriers of giardia; yet no known cases have been reported in Lake Montclair – so that risk has been determined to be low.

[323] In Prince William County it is against the law (Section 4-11 & 4-26) to allow your animal to knowingly or willfully urinate or defecate on private property of other persons or on publicly owned property except parts of parks as posted as dog run areas. Those who walk their dogs should take along a pooper scooper to pick up any feces. It is unhealthy, unsightly and unlawful to leave it in our common areas. In Prince William County it is a Class 4 Misdemeanor with a maximum fine of $250 per offense. Residents who take dogs off their private property should be considerate of neighbor's health and property. Scoop it up! Many residents report that pet waste causes more issues than the feces from foxes, squirrels, rodents, and other mammals in and around the lake.

[324] Pet waste washes down storm drains into creeks and lakes and the Chesapeake Bay. If left to decay on sidewalks or grass, and not disposed of properly, pet waste flows directly into nearby streams, creeks and lakes without being treated at wastewater treatment facilities.

too. Adults working in their gardens, children playing outside and family pets are the most at risk for infection from some of the bacteria and parasites found in pet waste.[325] Pet waste that is left to decay on sidewalks or grasses near the street may be washed into storm drains, which drain directly into Lake Montclair. Pet waste then decays, using up oxygen, releasing ammonia, and encouraging weed and algae growth. All of these mean trouble for water quality and fish. When residents understand problems from pet waste, they can work together to remove the nuisance.[326] PWC's "pooper scooper" law is reinforced by MPOA guidelines.[327] MPOA provides pet waste stations in community parks, along trails and sidewalks, and in public places people frequently walk their dogs.[328, 329]

5. Insects and Efforts to Mitigate Risks associated with Destructive/Disease-Carrying Species.

Insects have an impact on the lake-ecosystem, both in terms of human well-being and sustainment of vegetation. MPOA coordinates with PWC to monitor insect populations and their breeding areas and to control disease-carrying insects, and LMC promotes the use of natural controls, such as dragonflies, bats and insect-feeding birds. The mission of the PWC program[330] is to reduce and control populations of **mosquitoes**,[331] **gypsy moths**,[332] and **fall cankerworms**.[333] This occurs through the use of an integrated pest management approach and programs that use

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[325] Even well-intentioned dog owners who have their dogs stool checked yearly can never be sure that their dogs have not contracted microscopic parasites, such as hookworms and roundworms. (See health issues and preventative measures on page IV-2 of this LMPP).

[326] Recommendations to dog owners to keep their own beaches and their pets safe include:

- Having a microscopic fecal exam done by your vet in April or May before the start of the summer season;
- Walking your dog in your yard when you know it is likely to need to defecate, before taking it on your beach;
- Keeping your dog on year-round heartworm preventative that contains de-wormers for roundworms and hookworms;
- Keeping your dog on a leash so you know if and where it eliminates and to assure it stays on your property;
- Picking up any stool on the beach with a plastic bag; making sure to take some of the underlying sand with it;
- Not allowing your dog to defecate in any standing water, in the lake or at the water's edge as effective clean up is nearly impossible.

[327] MPOA does not allow dogs on Montclair beaches for this very reason. It is expected that dog owners take the initiative in the matter and not allow their dogs on the beach. Although no one can stop dog owners from having their dogs on their own beaches, it is appropriate for dog owners to respect the rights and health concerns of their neighbors by keeping their dogs on their own property. The health of people, especially small children digging in the sand, far outweighs the inconvenience of not walking one's dog on the beach.

[328] Keeping the water and sand clean for all to enjoy is everyone's responsibility. Too many incidents of dog owners either leaving dog feces on the beach; covering it up with sand (even worse because a child could dig it up unknowingly); or throwing it in the lake. There have been incidents of unleashed dogs running well ahead of their owners on the beach or in common areas abutting the lake where owners cannot see what they are doing (i.e., perhaps eating another dog's feces and subsequently getting infected). It is unfortunate that many dog owners deliberately wait until beaches are not monitored by lifeguards to let their dogs run unleashed on Montclair's beaches.

[329] Residents can take action to mitigate risks associated with pet waste impacting water quality and health of people, pets, and fish:

- Pick up pet waste in your yard. It is not a fertilizer. Contact MPOA or local parks to inquire about providing additional pet waste stations in area parks, along trails and in public places where people frequently walk their dogs.
- Carry disposable bags with when walking dog. When disposing of pet waste, wrap it carefully to avoid spilling.
- Do not dispose of pet waste in street drains – they drain into the lake. Flush it down the toilet where it will go to a sewage treatment plant. Don't flush debris or cat litter that can cause plumbing problems. Secure used cat litter in a plastic bag for the trash.
- Bury pet waste in a hole or trench, at least 12 inches deep away from gardens, wells and water source and cover with at least eight inches of soil to let it decompose slowly. Don't add it to your compost pile as most piles do not get hot enough to "cook" the bacteria.
- Put it in the trash wrapped carefully. An option is to install an underground pet waste digester that works like a small septic tank.

[330] The PWC Gypsy Moth & Mosquito Control program is managed by the Environmental Services Division in Department of Public Works. See PWC http://www.pwcgov.org/government/dept/publicworks/Pages/Gypsy-Moth-and-Mosquito-Control.aspx

[331] See http://www.pwcgov.org/government/dept/publicworks/Pages/Asian-Tiger-Mosquito.aspx. The Asian Tiger mosquito is the most common daytime biting mosquito in Prince William County. This mosquito spreads dog heart-worm, encephalitis, and may be a carrier of West Nile virus. Unlike many native mosquitoes, the Asian tiger mosquito does not breed in swamps or other wet natural habitats. This mosquito breeds in artificial containers such as rain gutters, bird baths, flower pots, tires, barrels, boats, tarps, cans, and garden pools. They feed mainly during daylight hours, making them a major urban pest for people working or playing outside. Only female mosquitoes feed on blood, which they use in producing eggs. Females can survive for a month or more. All mosquitoes pass through four life stages: egg, larva, pupa and adult. The **first three stages must have water** for development.

[332] The PWC Gypsy Moth and Mosquito Control Branch monitors for gypsy moths every year from August through November to assess the potential populations for the next year. This is done by counting egg masses. In years when the populations are high enough, PWC participates in a voluntary aerial spraying program coordinated with the Virginia Department of Agriculture and Consumer Services and the USDA Forest Service. Residents are notified in advance, and may opt out of spraying if desired. The most commonly used insecticide to combat gypsy moths is ***Bacillus thuringiensis kurstaki*** (BTk) that is a naturally occurring bacterium that is effective in controlling gypsy moth caterpillars. It does not harm humans or pets, but can kill other caterpillars present at the time of spraying. For more information, see http://www.pwcgov.org/government/dept/publicworks/Pages/Gypsy-Moth.aspx.

[333] Fall cankerworms (also commonly known as 'inch worms') are forest pests that attack deciduous trees and shrubs. These pests damage trees by causing defoliation that can lead to tree mortality. They feed on a variety of trees including ash, beech, elm, hickory, linden, maples and oak. For more information, see http://www.pwcgov.org/government/dept/publicworks/Pages/Fall-Cankerworm.aspx.

current, comprehensive information on the life cycles of pests and their interaction with the environment. These efforts have contributed to fewer mosquitoes and fewer destructive insects around the lake and in Montclair.[334] The PWC Gypsy Moth & Mosquito Control program manages pest damage by the most economical means and with the least possible hazard to people, property, and the environment. The program objectives seek to:

- minimize tree defoliation and mortality caused by the gypsy moth and the fall cankerworm;
- minimize mosquito-transmitted disease by reducing mosquito populations and breeding sites, and
- minimize adverse environmental and human health impacts resulting from the treatment of these pests.

MPOA and PWC provide community media, such as PWC government and Montclair web sites and *The Monclairion*, to provide information about insects, including environmentally safe alternatives for dealing with insects.[335] The LMC seeks to provide additional means for empowering residents to monitor and report on issues relevant to insects around the lake.[336] Residents can best control mosquitoes by eliminating breeding sites. Many neighborhood mosquito problems come from water-filled containers that residents can help to eliminate by draining any standing water around homes.[337] MPOA LMC encourages residents to provide habitat for bats and insect-feeding birds to control mosquitoes and disease-carrying insects.[338]

6. Shoreline and Aquatic Vegetation.

MPOA LMC and property management staff provide periodic and annual inspections of submersed aquatic vegetation (described in the LMEQR, as applicable) and monitor maintenance of shoreline vegetation to retain integrity of the lake and avoid undesired growth or unplanned encroachment of wet land conditions.[339] To manage lake vegetation consistent with use and natural balance of the ecosystem, the LMC and property management staff monitors lake and shoreline for possible introduction of harmful, invasive vegetation.[340, 341] Section IV.a.3 of this LMPP provides details about conservation practices and use of native plants in landscaping and habitat restoration to sustain and enhance ecosystem services.[342] To ensure the design and use of vegetation so that on-site and surrounding ecosystem services are sustained or enhanced, MPOA property management staff and LMC use vegetation to achieve target water balance conditions through interception and evapotranspiration. MPOA property management staff maintains vegetation to maximize the ecosystem services provided by plants in riparian buffers,

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[334] The PWC Gypsy Moth & Mosquito Control Branch typically sprays at night for adult mosquitoes Monday through Friday throughout the mosquito season in late May to early June. There is no set schedule spraying; rather, there are criteria established by the branch that trigger mosquito spray in a given area or neighborhood. One trigger that could result in mosquito spray is based on surveillance trapping of adult mosquitoes. If a threshold number of female mosquitoes is met or exceeded on a given night, this can trigger mosquito spray for that trap area. Another trigger for mosquito spray is that the mosquitoes caught in a trap area test positive for **West Nile Virus**.

[335] Residents are reminded that Montclair has several beneficial insects, such as butterflies, bees, lady bugs, and praying-mantis that could be inadvertently killed if environmentally safe alternatives are not used in dealing with non-desired destructive/disease-carrying insects. MPOA, in coordination with PWC, provides resources for community engagement, notification, and education relative to insects around the lake.

[336] The fall webworm, Hyphantria cunea, is a moth known principally for its larval stage, which creates characteristic webbed nests on tree limbs of a wide variety of hardwoods in late summer and fall. It is mainly an aesthetic pest; not believed to harm otherwise healthy trees.

[337] Water filled cans, tires, pots, and blocked rain gutters should be drained. If empty containers must be stored they should either be drilled to allow drainage, turned over, or placed in a location that does not allow them to fill with water. Residents with standing water and/or adult mosquitoes in or around their property can contact PWC at 703-792-6279. To hear recorded updates about spraying, call 703-PWC-INFO (703-792-4636). This hotline is updated weekdays after 4 p.m. during the spray season. Breeding source reduction and citizens' actions, like eliminating standing water around properties, are efficient and effective mosquito control measures. See www.pwcgov.org/mosquito. Residents can reduce chances of being bitten by Asian tiger mosquitoes by using insect repellents and wearing long-sleeved shirts and pants.

[338] MPOA LMC promotes use of natural controls, such as dragonflies, bats & insect-feeding birds (with PWC insect-control program).

[339] Lake Montclair is a live ecosystem with several biological communities composed of native wildlife and plants, including bryozoan, bacteria, amoeba, and aquatic worms. Microscopic parasites, such as roundworms and hookworms, could be inadvertently introduced to the ecosystem by dog feces left on beaches and common areas or improperly disposed in street drains. To encourage use of natural ecological processes in managing on-site biological resources, the LMC promotes sustainable practices in the growth, installation and maintenance of vegetation and sustainment of healthy biological communities.

[340] MPOA's integrated aquatic weed control strategy has focused on hydrilla control that is now sustained by Triploid sterile Grass Carp. Prior to the introduction of Triploid Carp, a chemical treatment was applied in the lake in 2000 to control overly invasive hydrilla.

[341] Dodder can be a problem in shoreline landscapes; it is a thread-like, parasitic annual vine that is yellow or orange in color because it lacks chlorophyll. Leaves are small and scale-like. Dodder grows rapidly, enveloping its' host; forming large mats with modified roots that penetrate the host plant to extract nutrients. Its flowers are small, white or pink, and found in many clusters. The fruit is a tiny capsule that usually contains 4 seeds. Seeds persist in the soil for a long time; germinating in the spring. Dodder can be managed and controlled by hand-pulling; it should be disposed as soon as it is noticed. Pre-emergent herbicides can be used to control dodder before it germinates.

[342] In collaboration with conservation organizations LMC also promotes the sustainment of sites to minimize management resources and reduce waste of plant resources; promotes waste generation reduction during maintenance, and promotes the recovery of landscape trimmings for composting.

drainage culverts, catch basins, and forebays. MPOA promotes use of native plants in landscaping and habitat restoration; and removal of harmful vegetation, and conservation of existing native vegetation (consistent with regional reference landscape). [343, 344]

c. Lake 'Ribbon of Life' Sustainment, Access and Use

Activities and events on the lake and property abutting the lake (its 'ribbon of life') contribute to the quality of life in Montclair. To manage the use and sustainment of the 'ribbon of life' the MPOA focuses on strategies to accomplish objectives specified in Table 5-3.[345]

Table 5-3. Relevant Objectives for Sustaining and Using the Lake's "Ribbon of Life"

2-4. Maintain integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs).
3-3. Manage lake vegetation consistent with use and natural balance of ecosystem services.
6-1. Design and sustain lake-ecosystem conditions to promote health and physiological benefits.
6-2. Promote the learning benefits of natural elements to enhance human cognitive functions.
6-3. Promote positive social dynamics in safely using the lake and "ribbon of life" assets.
6-4. Enhance conditions for use of the lake and its "ribbon of life" assets.
6-5. Provide resources for community engagement, notification, and education relative to lake issues.

1. MPOA Recreational Areas and Facilities in the "Ribbon of Life" of Lake Montclair.

As depicted in aerial photo of Lake Montclair (in Figure 5-4), the 'ribbon of life' for the lake includes the earthen dam, beaches, common areas along shoreline for fishing, trails, docks, ramps, racks, storage, and swimming platforms. Many activities that take advantage of the lake occur on the lake or within the 100 foot Resource Protection Area (RPA). These include parcels of land specifically designed and equipped as recreational areas (i.e., Dolphin Beach, West Beach, and Beaver Landing). The MPOA restricts use to fishing-only for other common areas contiguous to the lake (and surrounded by abutting privately owned property). Community shoreline fishing areas are on the northwestern side of the lake. The earthen dam has a paved trail at its crest that residents can use; yet traversing along, or fishing from, the slope embankments are prohibited (due to liabilities from potential accidents and potential damage to the dam.

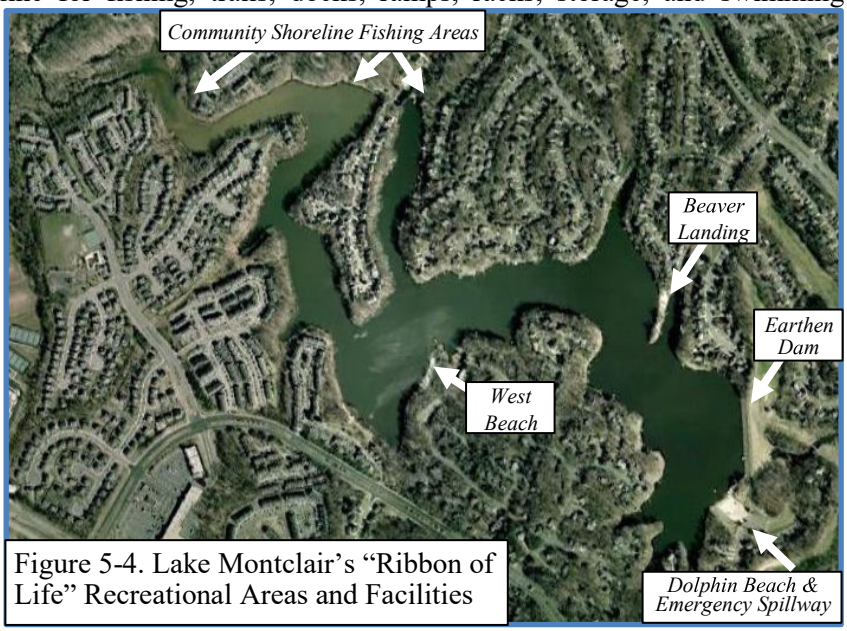

Figure 5-4. Lake Montclair's "Ribbon of Life" Recreational Areas and Facilities

a) MPOA beaches and common areas contiguous to the lake.

MPOA provides safe spaces for fishing and physical activity, such as common area shorelines, parks and beaches (Dolphin Beach, Beaver Landing, and West Beach).[346] MPOA has provided spaces for interaction with nature, such as benches, docks, beaches, swimming platforms, parks, shoreline trails, and recreational storage space. As a thriving suburban community Montclair has evolved, and over time (responsive to residents' needs) MPOA has

[343] LMC has studied the use of biologs in other northern Virginia lakes to determine potential beneficial uses of biologs in Lake Montclair, in terms of aesthetic perspectives (in contrast to rip rap) and shoreline protection. LMC has considered providing a biolog demonstration area along West Beach, south of the fishing dock, to enable residents to assess the value of using biologs on shoreline property.

[344] MPOA approval is required to remove trees larger than four inches in diameter. Shoreline Alders should not be cut shorter than 3 feet.

[345] Associated strategies for managing and sustaining the 'ribbon of life' are outlined in Section II, Table 2-3 of this LMPP.

[346] Several MPOA covenants cover beaches, picnic areas and common areas near beaches: MPOA Article 4, Paragraphs 4.2, 4.4, and 4.6 address Dolphin Beach, West Beach, and Beaver Landing, and provide guidance covering beach recreation areas, beach grooming, swimming, lifeguards, and geese on the beach. They address use and restrictions of use for shorelines and common areas adjacent to lake.

enhanced lake-ecosystem conditions to promote health and physiological benefits. MPOA has invested in enhancing conditions of the lake and its 'ribbon of life' assets; providing lake access and improving use areas with benches, fishing areas, boat ramps, restrooms, etc.[347, 348] Picnic areas within Montclair are located at Dolphin Beach, West Beach, and Beaver Landing, and these beaches open Memorial Day weekend to Labor Day weekend.[349, 350] Grooming of the beaches takes place daily 8-11 a.m. Persons on the beaches prior to 11 a.m. are asked to stay clear of equipment during grooming operations. Hours of access to beaches are posted and are conformant with PWC curfew laws.[351] A significant amount of common area exists throughout the community, and much of this is in close proximity to residential lots. To respect the right of owners around common areas, the use of such MPOA property, except for fishing where authorized, is restricted from dusk to 6 a.m. Persons loitering or engaged in activities that impact residents in the surrounding area are subject to eviction and/or arrest for trespassing. There shall be no traversing, loitering, picnicking, camping, or fishing on all other MPOA property contiguous to Lake Montclair without the approval of each abutting property owner. MPOA provides parcels of land specifically designed and equipped as recreational areas (i.e., Dolphin Beach, West Beach, and Beaver Landing). MPOA restricts use of other areas contiguous to the lake, and surrounded by abutting privately owned property. As shown in Figure 5-4 (on page V-10), the following shoreline common areas may be used for fishing:

- On cove between Timber Ridge and Edgehill Drives (access is from Parcel L, Section 3).
- On cove between Timber Ridge Drive and Inlet Place at Waters Edge (access at Timber Ridge Drive turn-around).
- Between Lindenberry Lane and Beachwater Court at Waters Edge area (access is from Tallowwood Dr).

b) MPOA community boat racks, docks, and swimming platforms.

MPOA provides safe spaces, such as docks and swimming platforms, for interaction with nature and physical activity. Beaches have docks, swimming platforms, and pylons with floating goose booms (roped-off demarcations that also serve as barriers to keep geese away from swimming areas and beaches). Through the LMC and property management agent, MPOA has coordinated efforts to provide secure storage for boats and provide resources to promote safe use of beaches and the lake. [352] Boat storage at West Beach is restricted to the MPOA boat racks. Boat racks shall only be used by valid MPOA recreation tag holders, who have registered their boats with MPOA,

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[347] Residents in good standing have the opportunity to reserve certain areas of Montclair beaches. Covenants covering Lake Montclair: MPOA Community Guidelines Article 4, Paragraph 4.3 covers authorized users of the lake, winter use of the lake, swimming and diving, inflatable and floating equipment, fishing (areas and licensing), and boating on Lake Montclair, including requirements for safety, types of boats and motors, mooring, storage, and registration. Designated launch areas are also specified for larger boats.

[348] MPOA has monitored, enhanced, and protected the shoreline. The managed shoreline with beaches, common areas and trails also enhances the learning benefits of natural elements by providing spaces for fishing, birding and photography with views of large trees and water; providing opportunities for passive experiences with nature to enhance human cognitive functions. MPOA promotes and sponsors social activities and events on the lake, on beaches and in parks. MPOA promotes positive social dynamics in safely using the lake and 'ribbon of life' assets. The community provides spaces for safe social interaction, and common areas with tables and seating. Spaces have been designed to address needs of special needs of residents and children. Feeding geese is prohibited on any common area, including beaches and areas contiguous to Lake Montclair.

[349] See MPOA Community Guidelines, Article 4, Section 4.4, "Picnic Areas." There are three beaches from which to choose; all Montclair beaches adhere to the same standards: All are lifeguard protected; all are well-maintained by the MPOA Maintenance Team; all are free; yet admission requires the current year's MPOA Recreation Tags; all require parental supervision for children ages 11 and under:

- Dolphin Beach is probably the most familiar and popular beach in Montclair. Dolphin Beach and the surrounding area hosts many of Montclair's special events - from the annual Adult Beach Party, Teen Beach Party, and 4th of July festivities, to name a few. The Beach complex features a covered picnic area above the beach, basketball court, and has a beach volleyball court (new white sand this year). Moms, dads, and grandparents will find the sand texture and beach gradient particularly conducive to small children – plus there's a swimming dock in the beach area for the bigger kids. Directions: From Waterway Drive, take Ashgrove Drive to Dolphin Drive.
- West Beach has the longest beach area of the three. Are you interested in combining boating or fishing and swimming? West Beach is conveniently located near the boat storage area, boat launching area, and fishing pier. Other unique aspects of West Beach are picnic tables located close to the beach, a play area for the kids and lots of tall trees for shade for those HOT summer days. West Beach can offer diverse lake activities for the whole family. Directions: From Waterway Drive, take Moncure Drive to Spalding Drive.
- Beaver Landing Beach is also unique among the three beaches. It is substantially smaller than the other two and normally has fewer patrons. Beaver Landing Beach has a private beach feel - with your own lifeguard! Beaver Beach is part of Beaver Beach Landing. Beyond the beach area you'll find a picnic area and a small dock for fishing. Beware that a consideration is the lack of convenient parking. Unlike the two other beaches, it does not have a parking lot. You'll need to park at the top of the cul-de-sac and walk down to the beach. Directions: From Waterway Drive, take Silvan Glen Drive all the way to the end of the culdesac.

[350] The exact dates are published in *The Montclairion* monthly newsletter and posted on the community bulletin boards and MPOA website.

[351] Consistent with PWC curfew ordinance and MPOA Community Guidelines, persons found at the beaches after dusk and prior to 6 a.m. are subject to eviction and/or arrest for trespassing (except for West Beach boat launching. Notwithstanding the posted hours, MPOA staff may close the beaches because of weather conditions, emergency situations, or other extenuating circumstances.

[352] MPOA is not responsible for loss or damage to boats stored on common property.

paid the $25 service fee, and have properly affixed boat stickers to their boats. A valid MPOA recreation tag must be in the possession of the boat owner to remove a boat from the rack for launching purposes.[353]

2. Private Docks, Storage, Beaches and Shoreline Waterfront.

MPOA Community Guidelines, Article 5, Paragraph 5.4.8 covers the requirements and restrictions for docks, piers, and wharves on Lake Montclair, including permitting and general liability insurance coverage requirements. Dock registration includes requirements for providing email and phone number of dock owners. All dock owners are required to have valid general liability insurance coverage of not less than $1Million,[354] and are responsible for their docks remaining in conformance with MPOA covenants, including assuring the safety and structural integrity of the dock. PWC code for electricity is required for docks; as such, dock improvements require county inspection for PIR approval. PIRs are required for the refinishing, resurfacing and refurbishing of greater than 30% of an existing dock, pier or wharf. All dock owners are responsible for obtaining an annual MPOA dock permit.[355] Floating docks may not be removed from the water or stored on the shoreline.[356, 357]

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[353] Boats must be affixed to the rack by use of chains and a lock. When removing a boat from the rack, the boater must also remove the chain and lock from the rack. No racks are reserved. Leaving the chain and lock on the rack does not reserve that rack. Persons returning to the rack area may place their boat on any vacant rack even though a chain or lock is affixed to that rack. Under no circumstances is a person to cut the chain or lock belonging to another person or touch physically or move a boat occupying a space on the rack. Boats stored on the boat racks may be launched between the hours of dusk and 6 a.m. without the necessity of having Security personnel drop the chain barrier. It is recommended that the Security Dispatcher be notified of such actions to lessen the chances of being detained by patrolmen on duty who have eviction authority in the beach areas. Launching may be done by boat owners or family members displaying a valid unrestricted MPOA recreation tag. MPOA BoD may set an appropriate limit on the number of boats stored at West Beach based on safety and space available.

[354] All dock owners, including sub-associations that request community docks, will be required to provide MPOA with proof of valid general liability insurance coverage of not less than One Million Dollars ($1,000,000) and must list the MPOA as a certificate holder or as additional insured when available through the insurance carrier. Owners with insurance carriers providing the necessary coverage but unable to have MPOA listed as a certificate holder or additional insured will be required to provide MPOA a copy of a letter signed by the Insurance Provider addressed to the Owner indicating that coverage is in place for a current annual period, *and* that the carrier will not provide the requested services (certificate holder or additional insured), and that the Insurance Provider will provide MPOA with notice of any change to or cancellation or renewal of the policy. Property owners will obtain all applicable county permits and will accept liability for any damages that may occur to sewer lines, other utilities, or other MPOA property. The dock owner has the sole responsibility for obtaining a survey of the property abutting the lake before submitting plans to the LMC and Covenants Committee for recommended approval. The owner is solely responsible for the safety and structural integrity of the dock. The LMC has sample drawings for MPOA-conformant docks and racks.

[355] The owner is responsible for displaying an annual MPOA dock permit, clearly visible on the dock from waterside approach. Dock permits will be renewed annually, to owners in good standing, between October 1-31 upon receipt of an MPOA Dock Permit Application. Renewal fee is $5.00 (no cash accepted) when renewed by October 31. There will be a $200 late fee unless there is proof by November 10 that insurance was in effect since November 1 of that year. An owner who fails to submit a complete annual Dock Permit Application, payment of the renewal fee and evidence of the required insurance by November 10th will be referred to legal counsel for immediate action to cause the removal of the owner's dock from Lake Montclair and to recover all unpaid fees and all costs, including attorneys' fees, associated with the removal and with any legal actions to effect removal.

[356] For the purposes of MPOA guidelines, the word "dock" means anything, whether natural or man-made, used or intended to be used to moor a boat to the shore and to provide access to the boat. The installation and maintenance of a dock within Lake Montclair is a privilege and shall be permitted only upon strict compliance with the terms of MPOA covenants. Any request for construction of a dock, pier, or wharf, prior to approval by the Board of Directors of MPOA must have received the review and approval from the Covenants Committee and the LMC for compliance with MPOA regulations and guidelines as to size, design, and location.

a. The Chesapeake Bay Resource Protection Act of 1988 RPA (Act) established a protected "restrictions on watershed areas impacting the Bay" a 100-foot buffer of land between the Chesapeake Bay and developed land. Pursuant to that Act, such a protected 100-foot buffer has been established for Lake Montclair. All waterfront homes must now present approval of the PWC Public Works Department for any construction within 100 feet of Lake Montclair when submitting a PIR (paragraph 1 of Section 5.4). Under the Act, as well as MPOA regulations, no owner may make any modification, changes, or alterations to property without approval by PWC. This restriction includes a proscription on removal of any plant life, trees, or shrubs, from the protected area or the water, even if dead, unless it creates a danger to the dwelling or its occupants, and then only after approval by the MPOA Board of Directors.

b. Only legally defined lake front lots may have individual docks. There shall be no more than one dock per authorized lot. The 12-foot side setback requirement for single-family homes extends to the 189-foot contour shoreline. Docks may not be located within the 12-foot side setback. Stationary docks may not extend any further than 12 feet into the lake. Floating docks may not extend any further than 14 feet into the lake. Any dock must have a width of no more than 18 feet. All docks shall maintain a low structural profile complimentary to the natural setting of the area so that they minimize any disruption of the natural shoreline and flow of water.

c. Sheds, gazebos, boat-landing covers, electronic insect traps, tires used as bumpers, and speaker systems are not allowed on docks.

[357] Previously approved docks on Lake Montclair were grandfathered as of February 23, 1989. Any current dock approved by the previous owner of the lake, Second Montclair Corporation, shall comply with the requirements for insurance, proper County permits, and the annual MPOA dock permit. New permits for existing docks, piers, and wharfs are required by the County only when structural changes are made or the structure is being rebuilt or re-anchored. Replacing worn boards, resurfacing, refurbishing, and refinishing existing docks do not require County permits. However, any change replacement, or repair of greater than 30 percent of an existing dock requires a PIR containing the information requested below pertaining to PIRs for refinishing, resurfacing, and refurbishing existing docks.

3. Controlling Light Pollution and Noise Pollution on the Lake, Beaches and Public Areas.

To enhance conditions for use of the lake and its "ribbon of life" assets, MPOA attempts to minimize waterfront light pollution and control noise pollution (from vocal or electronic sources). LMC promotes use of landscape lighting with low operational energy and shoreline/dock lighting that minimizes directed lighting onto the lake. Noise Control is addressed in MPOA covenants[358] and County ordinances.[359,360] It is recognized that recreational areas are naturally noisy. Talking, laughing, and good time sounds are expected. Yelling and screaming should be curtailed in the interest of being able to hear valid calls for "help." Radios and music devices should be set at reasonable volume levels. The use of whistles and horns at the beaches is prohibited except by lifeguards, recreation guards, and MPOA Security. The use of loud or abusive language in any way is prohibited. Excessive or prolonged noise and the use of loud or abusive language in other MPOA common areas are also prohibited. Prolonged or intense barking or other harsh or excessive noises made by animals and pets is also prohibited.[361]

4. Access Control and Measures to Address Trespassing on the Lake and Waterfront Property.

To enhance conditions for use of the lake and its "ribbon of life" assets, MPOA coordinates with local authorities to minimize crime on the lake, beaches, and waterfront property. MPOA Community Guidelines address access control and trespassing on the lake and waterfront property.[362] Recreation or 'beach' tags provide residents exclusive access to Montclair's beaches and recreation areas.[363] In 2012 the MPOA arranged installation of a gate locking system that is activated by holding an authorized magnetic key tag within 8 inches of a panel.[364]

5. Shoreline Monitoring and Maintenance.

MPOA manages lake vegetation consistent with use and natural balance of the ecosystem. As described in the LMEQR and Section V.b.6 of this LMPP, the LMC and property management agent monitor lake and shoreline for possible introduction of parasitic or harmful, invasive vegetation. The community monitors maintenance of shoreline vegetation to retain integrity of lake and to avoid undesired growth or unplanned encroachment of wet land conditions. LMC coordinates with the property management agent in providing periodic and annual inspections of submersed aquatic vegetation.

6. Earthen Dam Monitoring, Inspections, and Breach Inundation Assessments.

The most significant structure in Montclair is the earthen dam that enabled the creation of Lake Montclair and remains the primary means for sustaining the lake and managing water level.[365] Lake Montclair was created in 1964-65 by the man-made earthen dam and completed in 1966.[366] Figure 5-5 provides a picture of the earthen dam (as viewed from the southern crest). Figure 5-4 (on page V-10 of this LMPP) shows an aerial photo of Lake Montclair with the location of the dam relative to the rest of the lake assets. To maintain integrity of the lake and its "ribbon of life" assets the LMC coordinates with the property management staff to provide routine, periodic inspections of the earthen dam and shoreline, as reported in the Lake Montclair Environmental Quality Report (LMEQR).

Figure 5-5. Montclair Earthen Dam

[358] MPOA Community Guidelines, Article 4, Section 4.1.10 "Noise Control."

[359] In Prince William County it is against the law (Section 14-5.1) to allow prolonged or intense barking or other harsh or excessive noises to be made by animals and pets under one's ownership, at any time.

[360] In accommodating additional traffic on Hwy 234, VDOT has not provided suitable sound-abatement; so more road noise is now polluting the serenity of Lake Montclair. VDOT has plans for more commuter traffic on Hwy 234; yet has no known plans to address associated noise.

[361] Pet owners are responsible for controlling excessive barking or noise by their pets. Parents and guardians of minors are responsible for the actions of their children, including conduct on the lake and common areas, such as beaches. MPOA has no liability or responsibility for protecting violators of noise guidelines or ordinances from residents who might take action to enforce the guidelines and ordinances.

[362] Parents and guardians of minors are responsible for the actions of their children, including consequences of injury and damages associated with trespassing on waterfront property and private docks. MPOA has no liability or responsibility for protecting trespassers from property owners who might take action to enforce their rights to privacy and their private property.

[363] Recreation tags are normally made available the beginning of May each year. Application forms are available at MPOA office and on the Montclair website.

[364] The gate locking system allows MPOA to gather information on key activity. This locking system is used for accessing the boat ramp at West Beach. A deposit is required for a key tag to be issued. The deposit is returned when the property owner returns the key tag to MPOA.

[365] A Maintenance and Operating Plan for the dam was first completed in October 1986.

[366] Lake Montclair Dam has been in place for more than 50 years since mid-2014; constructed in 1964 with the lake was first filled in July 1965. There are no known plans or drawings for the construction of the dam for Lake Montclair, formerly known as Country Club Lake, with a top elevation of 200 ft (NGVD). The dam was raised to EL 206.5 in 1970.

The elevation of the lake is 188 feet mean sea level (msl), and its deepest point is 54 feet deep.[367] The crest of the dam is at 206.5 msl. The dam is designed and constructed with a low-level outlet valve, a spillway, and an emergency spillway (with dual use as Dolphin Beach).[368] Water Level Monitoring Equipment is located in the same shed on the Dolphin Beach edge of the dam as the golf course irrigation controls.[369] Because there are no known plans or drawings for the construction of the dam for Lake Montclair,[370] this LMPP uses depictions and descriptions of typical earthen dams to address actions for the sustainment of the dam. Figure 5-6 provides depiction of a typical impounding structure with the names of various parts of an earthen dam and its spillways.[371]

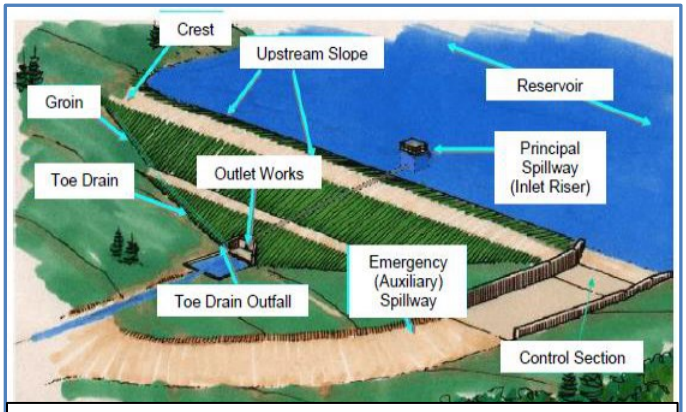

Figure 5-6. Typical components of an impounding structure

Figure 5-7. Cross section depiction of typical impounding structure.

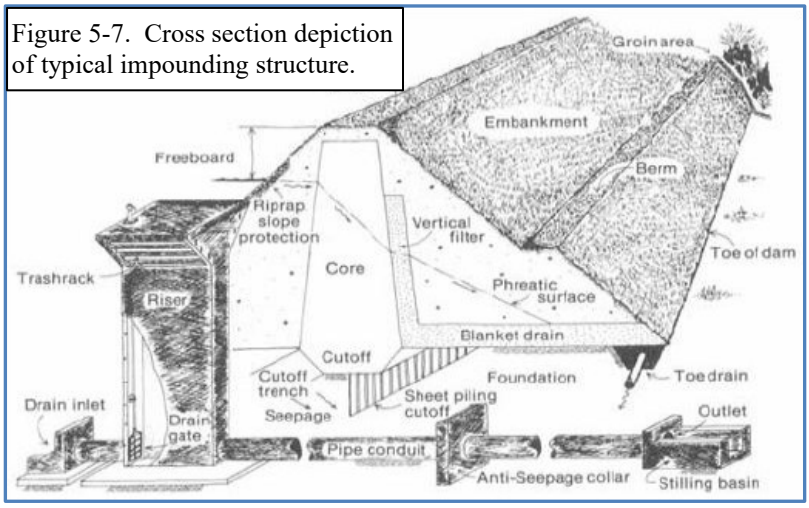

Figure 5-7 provides a cross section depiction of a typical earthen embankment dam.[372] Periodic inspections address all parts of the impounding structure. MPOA Property Management Maintenance Staff exercises the drawdown valve for the gate several times during the year. Peizometers and rain gauge readings are recorded monthly by MPOA Maintenance. Periodically, MPOA gains permit approval with the Virginia Department of Conservation and Recreation (DCR) to make repairs to cracks inside the spillway tunnel. MPOA is responsible for conducting the annual inspection of the dam.[373] At least every other year a certified

[367] The dam for Lake Montclair is an earthen embankment 650 feet long and 74 feet high. The spillway is siphon-activated with a crest elevation of 188 feet above mean sea level (msl), with a knife gate valve controlling the low-level 24-inch outlet pipe (elevation at 136 feet msl). The crest of the dam proper is at elevation 206.5 feet msl with the emergency spillway crest at elevation 194 feet msl. The emergency spillway is located beyond the right abutment of the dam and has a channel width of about 150 feet. The lake's deepest point (54 feet) is in the old channel of Powells Creek at the toe of the dam; about 150 feet from the concrete control pad (with the lake bottom at about 134 msl).

[368] A deeper channel was excavated in the emergency spillway in Fall 1987 as one of the modifications required by the Commonwealth of Virginia for issuance of a full and unrestricted operating permit for the dam prior to the lake being conveyed to MPOA.

[369] Sutron Electronics, located in Sterling, VA, is responsible for the maintenance of the equipment. The equipment has been operating very well. A maintenance agreement between Sutron and Montclair was signed in 2012 to manage the system (i.e. update software, manage system issues, conduct annual maintenance of system).

[370] MPOA is still seeking any drawings or plans from the original construction of the dam; so anyone with knowledge of possible sources of such material is encouraged to contact the MPOA property management agent or LMC Chairman.

[371] Description of dam provided in Summary Report of Lake Montclair Hydrographic Survey and Topographic Survey Services, prepared by GBA, July 2007. In discussing the upkeep and operation of the dam, it is important to use a common nomenclature for parts of the embankment dam, identified in Figures 4-5 and 4-6. Communication is unnecessarily complicated when different people call a feature by multiple names. For instance, the emergency spillway can also be called an auxiliary spillway. The crest of the dam is usually the top of the dam; yet the emergency spillway also has a crest that is sometimes referred to as the control section, and is the high point of the spillway. Outlet works could be a plunge pool or an impact basin. The principal spillway could be called a riser tower. On the tower should be a ladder for access, a gate operator, and trash racks or screens to keep debris out.

[372] Depiction provided by the Virginia Department of Conservation & Recreation (DCR). The stilling basin shown at the outfall can be different structures entirely. A common energy dissipater is a plunge pool, but another structure serving the same purpose is an impact basin. The berm shown on the downstream embankment can be called a bench also. All different features shown in this depiction may not be present in all dams. The core, blanket drain, and toe drain, for instance, might not be there. In that case the dam would have homogeneous earth fill (the embankment mad of the same materials). Blanket drains, and to some extent, toe drains are not common in older dams. Sheet piling cutoff "walls" are also not very common.

[373] For example, the Annual Inspection Report for Virginia Regulated Impounding Structures was conducted by both Philip M. Hoover, P.E., of H&M Engineering, Inc. and MPOA Staff on June 1, 2009.

engineer completes this inspection.[374] In past inspections, a certified engineer guided MPOA staff in completing the Property Owner's Annual Inspection to enable staff to know how to complete the inspection in subsequent years. Maintenance follow-up actions from inspections contribute to the sustainment of the dam.

The following are typical actions completed by MPOA Maintenance Staff during each inspection of the dam:

- Inspect dam for rodent burrows;
- Inspect for seepage on the sides of the dam embankment;
- Inspect earthen spillway for obstructions to flow such as rodent burrows, debris, etc.;
- Inspect for deterioration in the approach or discharge channel;
- Inspect downstream slope for woody vegetation, rodent burrows, seepage drains flowing and wet areas;
- Inspect stilling basin for rip rap to be in good condition; with no deterioration of basin;
- Inspect gates to be in acceptable working condition;
- Inspect lake banks around the rim for slides or erosion, and
- Inspect outlet pipe for any water flowing outside of discharge pipe through the impounding structure and any deflection or damage to pipe.

As needed, MPOA takes corrective action on the earthen dam, in a timely basis (noted in the LMEQR), such as:

- Reseed front and back side of dam to address minor erosion on embankment;
- Replace trash racks on the Intake Box; and
- Remove small trees and vegetation along right abutment.

As a result of past inspections or events within the last decade on Lake Montclair, MPOA Maintenance has:

- Replaced the old gate on negative side of tunnel as a backup gate (since heavy rains caused backup gate yoke to bend and come loose);
- Installed French drain to redirect water on backside of dam;
- Installed Sutron Computer Monitoring Equipment and rain gauge at pump house to electronically monitor lake level and alert Dam Operators when lake level rises or falls above or below safe level.

A breach inundation assessment[375] has been conducted because the Lake Montclair impounding structure (dam with spillways)[376] is in a residential development with homes downstream.[377] The dam and emergency spillways are designed to pass the Probable Maximum Flood (PMF) so failure by flooding over the top (overtopping) of the dam is not a probable mode of failure.[378] The emergency spillway has undergone modifications including deepening to alleviate problems due to the water level elevation relative to elevation of the crest of the dam.[379] As discussed in

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[374] Periodic inspection of the Montclair dam is conducted by Mr. Phil Hoover. Findings indicate that there are no major concerns and the dam remains in very good condition; it is well maintained and operated. Some recent recommendations have addressed future inspections, the installation of survey monuments to track any seepage or movement of the dam, maintenance of the forebay, cover for part of the downstream embankment and remedial work on some piezometers. Three trash racks on the dam intake box needed to be replaced, and that was later addressed as an item for the subsequent budget planning.

[375] See Lake Montclair Dam Breach Inundation Study Report, December 22, 1986. Because development has introduced substantial housing downstream of the dam since 1986, a subsequent inundation analysis was conducted in April 2014. In July 2014 the Virginia DCR Soil and Water Conservation Board approved grant awards for the Virginia Dam Safety, Flood Prevention and Protection Assistance Fund, and as part of that MPOA was awarded grants totaling $11,200.00 associated with Lake Montclair Dam operations certification to partially cover expenses associated with the Dam Break Inundation Study, the Dam Incremental Damage Analysis, and the Spillway Integrity Analysis.

[376] The dam is an earthen embankment 650 feet long and 74 feet high. The primary spillway is a siphon activated spillway with a crest elevation of 188 feet above mean sea level (msl), with a knife gate valve controlling the low-level 24-inch outlet pipe (elevation at 136 feet msl). The crest of the dam proper is at elevation 206.5 feet msl with the emergency spillway crest at elevation 194 feet msl. The emergency spillway is located beyond the right abutment of the dam and has a channel width of about 150 feet and serves dual-use as Dolphin Beach.

[377] The fact that homes are located downstream of the dam requires that the downstream area be technically classified as "high hazard." The classification used to categorize a dam is determined by physical location and is unrelated to the type of condition of the dam. In 2014 another breach inundation assessment was conducted, along with a subsurface stability analysis of the dam and emergency spillway.

[378] A six-hour storm depositing 3.3 inches of rain on the watershed area will in all likelihood cause the emergency spillway to flow. Total depth of emergency spillway available before the crest of the dam is overtopped would be 12.5 feet. Flow in the emergency spillway creates a potentially hazardous situation for residents living on Spillway Lane, which parallels the emergency spillway. Since Spillway Lane is a cul-de-sac, no easy means of escape is available to the impacted residents. Therefore, these residents must be warned and evacuated before the water levels and velocity in the emergency spillway have made Spillway Lane impassable.

[379] Homes located in areas downstream from the dam (including those permitted to be built in the inundation area) are also at risk of being flooded in the event of an emergency. These areas and the conditions which will precipitate evacuation have been identified in the EAP.

Section IV.b.5 of this LMPP, in 2018 a major modification to the emergency spillway was completed to provide additional stormwater surge capacity in compliance with new requirements established by DCR. The impounding structure remains in compliance with the Virginia Soil and Water Conservation Board 4VAC50-20 regulations.[380] MPOA, as the owner/operator of the dam, remains compliant with Virginia Soil and Water Conservation Board guidance on impounding structures.[381]

d. Summary of Use and Management of the Lake's Ribbon of Life, Water and Biological Communities

Primarily through the LMC, property management staff and shoreline property owners, MPOA maintains integrity of the lake and its "ribbon of life" in Resource Protection Areas (RPAs) and manages water on site to sustain or regenerate healthy hydrologic processes. The LMC monitors and promotes efforts to manage lake vegetation consistent with use and natural balance of the ecosystem; encourages use of natural ecological processes in managing plant resources, and uses vegetation so that on-site and surrounding ecosystem services are sustained or enhanced. These efforts sustain environmental water quality and healthy biological communities. In coordination with PWC, MPOA monitors insect populations and coordinates the control of destructive, disease-carrying insects. MPOA LMC provides habitat, water and food sources for fish and wildlife consistent with sustaining a natural balance; manages biological communities consistent with needs for controlling water quality and supporting recreational use of the lake. LMC and the property management staff monitor and report status of fish, aquatic life, and shoreline wildlife to inform action planning. MPOA sustains lake-ecosystem conditions to promote health and physiological benefits. The LMC promotes the learning benefits of natural elements to enhance human cognitive functions and promotes positive social dynamics in safely using the lake and "ribbon of life" assets. The LMC coordinates with MPOA property management staff to enhance conditions for use of the lake and its "ribbon of life" assets. MPOA also provides resources for community engagement, notification, and education relative to lake issues.

Interests in the 'ribbon of life' and water use and protection, along with interests in wildlife, fish and other biological communities continue to reflect community perspectives for stewardship of the lake and watershed ecosystem.

[380] VS&WCB 4VAC50-20 Impounding Structure Regulations cover requirements, procedures and permits for operations.

[381] As part of the Virginia Department of Conservation and Recreation's Division of Dam Safety and Floodplain Management, the Virginia Soil and Water Conservation Board provides guidance on impounding structures. The Dam Safety Act in the Code of Virginia contains the authorities applicable to dam ownership and operation, including § 10.1-613.4 liability of owner/operator for damage to the property of others or injury to persons, including, but not limited to, loss of life resulting from the operation or failure of a dam. The Impounding Structure Regulations contain guidance 4VAC50-20-105 on Regular Operation and Maintenance Certificates required for impounding structures, and shall include the following based on hazard classification (applicable to the Lake Montclair Dam because of downstream developments): High Hazard Potential Regular Operation and Maintenance Certificate. The owner of an impounding structure shall apply for the renewal of the six-year Regular Operation and Maintenance Certificate 90 days prior to its expiration to avoid the board taking appropriate enforcement action. Contact dam@dcr.virgina.gov or 804-371-6095 for any questions regarding the application of this guidance.

VI. Community Interaction, Training, and Information Resources

To ensure the long-term vitality and resilience of Lake Montclair, it essential that people who live in Montclair and participate in recreational activities in and around the lake comprehend issues relevant to watershed ecosystem sustainment and appreciate efforts focused on the stewardship of the lake. It is important that residents understand how their active involvement in contributing to stewardship efforts can make a positive difference, and how negligence of a few people could have detrimental consequences. MPOA and PWC encourage broad stakeholder involvement; provide opportunities for community engagement, and provide information resources relevant to lake needs. This LMPP aids in advancing the understanding of stewardship efforts, and addresses efforts focused on informing and engaging stakeholders about lake-ecosystem issues. MPOA also coordinates with county, state, and non-government organizations to accomplish strategies focused on achieving objectives in listed in Table 6-1 relevant to community interaction, training and information resources focused on advancing lake-ecosystem stewardship.[382] These objectives can only be achieved if residents remain involved with the respective strategies.[383]

Table 6-1. Relevant Objectives for Community Interaction, Training, and Information Resources

6-5. Provide mechanisms for community engagement, notification, and education relative to lake issues.
6-4. Enhance conditions for use of the lake and its "ribbon of life" assets.
6-3. Promote positive social dynamics in safely using the lake and "ribbon of life" assets.
6-2. Promote the learning benefits of natural elements to enhance human cognitive functions.
6-1. Design and sustain lake-ecosystem conditions to promote health and physiological benefits.
5-3. Reduce foreign material in the lake.
5-2. Mitigate risks from potentially toxic and harmful materials.
5-1. Promote the efficient management of material resources and reduction of energy use.
4-4. Monitor and report status of fish, aquatic life, and shoreline wildlife to inform action planning.
4-2. Monitor insect populations and control destructive/disease-carrying insects.
4-1. Provide habitat and food sources for fish and wildlife consistent with sustaining a natural balance.
3-1. Encourage use of natural ecological processes in managing plant resources.
2-3. Minimize use of soil amendments, chemicals, and pollutants that harm human and ecological health.
2-1. Promote soil health to sustain or enhance ecosystem services through protection and reuse of soil and sand.
1-5. Manage and control water level; report changes to enable timeliness of action.
1-4. Monitor water quality and provide periodic reporting to better enable timeliness of action.
1-2. Mitigate risks from identified hazards, pollutants, contaminants, and eutrophication-causing nutrients.

a. Information and Educational Resources Relevant to Lake-Ecosystem Stewardship.

Many resources are available to assist in lake management and ecosystem stewardship. Realizing the stakeholder community for the lake is much broader than residents of Montclair, the LMC uses an informal communication strategy to assist in creating a schedule of communications activities (as indicated in Section II.b.3 of this LMPP) to ensure that all stakeholders are kept properly informed, and as applicable, better addressing their continued support.

1. Use of this LMPP as a Resource for Lake Management and Ecosystem Stewardship.

This LMPP provides information resources for enhancing awareness of needs for lake and watershed ecosystem stewardship. It serves as an educational tool for informing users of the lake and community residents of their roles contributing to the sustainment and enjoyment of the lake. This LMPP provides information about how property 'not on the lake' can be 'connected to the lake' by flow of water which, in turn, carries pollutants, sediments and nutrients that could adversely affect the lake, the watershed and the Chesapeake Bay; potentially jeopardizing future enjoyment of the lake and regional natural resources. The intended audience of this LMPP is a broad range of individuals with varying levels of interest and background in ecosystem stewardship. Ultimately, systematic and purposeful management and responsible participation of all stakeholders will influence the long-term sustainability

[382] More than 2/3 of the 25 objectives for lake-ecosystem use and stewardship require community engagement to be fully realized.
[383] The matrix in the Executive Overview and Table 8 in Section II of this LMPP indicates the majority of intersecting concerns for community interests and lake management objectives are those that involve engagement of informed residents.

of Lake Montclair. *To ensure long-term success, it is essential that people who live, work, and play in the watershed understand relevant issues and are actively involved in developing a plan for addressing problems in their watershed and lake; ensuring that progress is made and sustained.*[384, 385]

The strategies and practices specified in this LMPP are consistent with regional and state programs,[386] and several are reflected in related MPOA community guidelines. These objectives and strategies reflect both a resilience-centric approach[387] focused on safeguarding the continuity of lake-ecosystems functions and a human-centric approach focused on harmonious use of the lake and its "ribbon of life" assets. Informed and guided by these objectives and strategies, the LMC continues to coordinate with others in evolving this LMPP; providing a common basis for stakeholder discussion for updating practices responsive to needs of the community, the lake and watershed ecosystem, and the Chesapeake Bay.

This LMPP includes both normative and informative practices needed to achieve objectives; so it delineates practices that are required to comply with statutes and MPOA community guidelines, along with practices that are primarily intended to inform stakeholders of community norms and expectations for harmonious use and stewardship of the lake and its "ribbon of life" assets, especially addressing fishing, boating, swimming, common use, and beach activities. This LMPP also serves as a communication tool for informing users of the lake and community residents of their roles contributing to the use and stewardship of the lake.

2. MPOA Community Guidelines Applicable to Lake Management.

As addressed in Section II.b.3.c of this LMPP, MPOA community guidelines[388] provide many practices relevant to lake management. These provide pertinent information from which residents might derive authoritative guidance. Article 3 addresses MPOA committees and their respective responsibilities. Articles 4 and 5 cover the lake, beaches, picnic areas, common areas, docks, piers, wharves, and boating. Article 4, Paragraph 4.3 covers authorized users and uses of the lake, swimming and diving, inflatable and floating equipment, fishing (areas and licensing), and boating on Lake Montclair, including requirements for safety, types of boats and motors, mooring, storage, and registration. Designated launch areas are specified, and prohibitions are specified on dumping, pouring, or throwing any material into the lake or onto the beaches and common areas abutting the lake. Article 4 (paragraphs 4.2, 4.4, and 4.6) addresses Dolphin Beach, West Beach, and Beaver Landing, and provide guidance covering beach recreation areas, beach grooming, swimming, lifeguards, and geese on the beach. They address the use and restrictions of use for shorelines and common areas adjacent to the lake. Article 5, Paragraph 5.4.8 covers the requirements and restrictions for docks, piers, and wharves on Lake Montclair, including permitting and general liability insurance coverage requirements.

3. Training Workshops Relevant to Lake Management and Watershed Ecosystem Stewardship.

Operation and maintenance of the dam and spillways is one of the priority topics of interest for which MPOA management staff and LMC members attend workshops on an annual basis.[389] MPOA coordinates with local, state and regional programs in offering training relevant to lake stewardship.[390] Other relevant seminars and workshops

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[384] Virginia Department of Game and Inland Fisheries (VDGIF), the governing body for all state maintained lakes, provides guidance for relevant practices in the "Management of Virginia Ponds for Fishing"

[385] Toxics 2000 Strategy http://www.chesapeakebay.net/content/publications/cbp_12083.pdf encourages development of plans that *tailor restoration, protection, prevention, and assessment actions to the needs of specific small watersheds and to chemicals of concern.*

[386] In addition to plans already mentioned, also see the National Wildlife Federation's Backyard Habitat program.

[387] Resilience refers to the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions, such as accidents and naturally occurring incidents and storms.

[388] MPOA community covenants are available in the MPOA office; accessible online at http://www.montclairva.com/documents/guidelines.

[389] In June 2014 DCR's Dam Safety staff conducted training workshops sponsored by Virginia Lakes and Watersheds on ***Table Top Exercises for Emergency Action Plans.*** Five MPOA LMC members attended, including MPOA staff. Call 804-786-0113 for more information or contact Amanda.pennington@dcr.virginia.gov.

[390] The US Department of Homeland Security (DHS) offers web-based independent study training courses that provide dam stakeholders with the knowledge required to enhance protection and resilience at their facilities. These courses: effectively provide information on security vulnerabilities; improve the ability to assess risks to facilities; support effective protective programs being put into practice, and improve incident response capabilities within an all-hazards strategy. Some web-based courses are hosted by FEMA Emergency Management Institute, such as the Crisis Management (IS-870) course that explains the application of crisis management concepts as integral components of an overall risk management program. It provides planning guidance for Dam Sector partners to use when developing emergency action, recovery continuity of operations, pandemic preparedness, and exercise plans. For more information, people can contact the DHS Dams Sector at dams@hq.dhs.gov.

are offered on a periodic basis by state agencies and conservation organizations that are relevant to watershed ecosystem stewardship. MPOA also provides information about warning networks. MPOA provides information about monitoring for water quality and upstream rainfall and water flow in the watershed and lake water levels, along with other systems and procedures to enable community interaction and training.[391]

4. Montclair Community Resources on Watershed and Lake-Ecosystem Stewardship.

LMC relies on the use of community media, such as *The Montclairion* newsletter, Montclair web site at www.montclairva.com, and FSRConnect to provide information about the lake and its watershed. The primary media source used by LMC for reaching residents is *The Montclairion* monthly neighborhood newsletter and FSR Connect. LMC aligns its communications efforts with the MPOA Property Management Agent that provides public notices for issues relevant to lake management, such as boat and dock registration.[392]

Figure 6-1. Community Information Resources

As indicated in Section II, Table 2-7 of this LMPP, the LMC uses a calendar timeline to provide examples of topics to be addressed each month in *The Montclairion*. LMC members are asked to take the lead for respective articles (so that they could start in advance of need date).[393] Some significant topics addressed are: boating safety, goose population control and risk mitigation for pet waste, lake facts, and lake use. As shown in Figure 6-1, MPOA also provides signs around Montclair and at beaches to inform residents about lake-ecosystem topics of interest. MPOA also provides New Resident Guide addressing many of the topics about the lake and its 'ribbon of life' assets.

5. External Community Resources Relevant to Lake-Ecosystem Stewardship.

Several websites, on-line references and other resources are listed in the footnotes of this LMPP as relevant sources of information for lake-ecosystem stewardship. Several resources are available through Prince William County. The PWC VCE has recommended practices for residents through *"Storm Water Smarts: 6 Ways to Protect Our Waterways!"*[394] This is significant for Montclair since community street drainage flows into Lake Montclair; so

[391] The associated strategies for community notification, education and interaction are outlined in Section II, Table 2-3 of this LMPP. Community notification and alerts are specified in Section II.b.3 of this LMPP.

[392] Some covenants-related public notices are cyclical, such as boat and dock registration requirements that are now both required to be completed the end of October each year. As such, instructions and forms are published in the September Montclairion.

[393] LMC aligns its calendar of topics for communication with the MPOA BoD & Property Management Agent in addressing topics/issues.

[394] PWC Storm Water Management http://www.pwcgov.org/government/dept/vce/Pages/Stormwater-Management-Education-Program.aspx education program offers the *Storm Water Smarts: 6 Ways to Protect Our Waterways:*

- Limit fertilizer and pesticide use. Use the proper amount of fertilizer at the right time. Do not apply if rain is in the forecast. Sweep up any fertilizer from hard surfaces (driveway, sidewalk, and street); keep it from getting washed into our storm drains.
- Use a pooper scooper! Viruses, parasites and bacteria from pet waste can easily wash into storm drains and end up in our waterways without being treated. People would not want to swim in water with this in it!
- Check vehicles for fuel and oil leaks. Grease and oil drippings from cars wash directly into storm drains and go straight waterways.
- Wash cars on the lawn or go to a car wash. Water at car washes goes to water treatment plants. Dirt and oils washed off cars can hurt fish and animals if it goes straight into storm drains. The grass and soil acts as natural filters capturing the material from cars.
- Properly dispose of leaves and grass clippings. Start a compost pile. Don't dispose of yard waste in gutters, creeks, or lakes.
- Dispose of any hazardous home chemicals and electronics at the PWC Landfill on Wednesdays & Saturdays from 10 a.m. to 5 p.m. Call 703-792-5750 for more information.

materials on streets get into the lake.[395] PWC's Stream Protection Strategy and Volunteer Programs for protecting the environment enable residents to make a difference in moving toward a greener and cleaner community. Volunteers help by starting or increasing efforts to conserve energy; reduce waste, control emissions and reduce pollution. Many resources are available to restore and improve local natural areas. Tips are offered for voluntary adoption that can be put into practice to help protect the watershed environment.[396] Residents can learn about the conditions of streams and environmentally sensitive areas in the County through the Stream Assessment Viewer.[397]

b. Provisions for Community Engagement, Reporting, and Recognition.

Both MPOA and PWC encourage involvement of residents and provide opportunities for community engagement in watershed ecosystem stewardship activities.

1. Community Alert Systems and Lake-Ecosystem Status Reporting.

MPOA provides several means for reaching stakeholders.[398] Section III.d of this LMPP provides information on community alert and notification for changes in water quality and changes in the level of water.[399] Residents are encouraged to register for FSRConnect from the Montclair website to receive community alerts and notifications.

The LMC and MPOA property management agent monitor and control water level and coordinate with PWC to report changes and provide notification to residents to enable timeliness of action. This includes:

- Providing an emergency action plan, compliant with regional statutes, to address needs and response to potentially catastrophic events that could adversely affect the dam or integrity of the lake -- see EAP;
- Providing storm management planning as part of this LMPP to address how to control water levels during storms with reporting and procedures for property owners and those with roles/responsibilities for the lake;
- Providing notification of drainage at lower levels than required for the EAP to minimize property damage;
- Providing publicized periodic lowering of water level to facilitate shore and dock maintenance.

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[395] In addition to staffing the Extension Horticulture Help Desk, PWC staff and Master Gardener volunteers help in a number of ways:
- Seasonal plant clinics to answer questions on insect, disease, or gardening problems (with Basics of Gardening Series each winter);
- Great Scapes lawn program, and low maintenance gardening techniques demonstrated at the Teaching Garden.
- Free lectures to the public, and education for businesses and nonprofit organizations in the management of storm water runoff;
- Soil test kits; and training for interested citizens who wish to become Master Gardener volunteers.

[396] See PWC at http://www.pwcgov.org/government/dept/publicworks/environment/Pages/Volunteers-Make-A-Difference!.aspx and tips:
- Conserve water resources; control runoff and prevent erosion from your property to protect local creeks, streams and rivers;
- Grow groundcover and plants to reduce run off from property; plant native species and grasses for lawns;
- Reduce pollutants/nutrients washing off lawns; fertilize properly; reduce use of oil-based products & gasoline powered devices;
- Sweep and dispose of materials properly so they don't wash into storm drains; report illegal dumping into storm drains;
- Dispose of household hazardous waste properly; look for alternatives to potentially hazardous materials;
- Remove salt and sand from driveways and parking lots after snow storms, as well as clear debris and motor oil from lots;
- Prevent litter; pick up litter, use a litter bag in cars and boats, and cover trash so it cannot blow about or be picked up by animals;
- Compost yard waste at home or bring to PWC compost facilities; leave grass clipping on lawn after mowing as natural fertilizer;
- Reduce, reuse . . . then recycle. Reduce drive times by combining errands and planning trips; carpool or walk when possible.

[397] The Stream Assessment Viewer http://gisweb.pwcgov.org/webapps/pwcsav can assist in answering such questions as: Which stream reaches have been studied? Where are the dump, erosion, obstruction, utility crossing, ditch crossing, buffer disturbance, and crossing sites located on the studied stream reaches? What is the physical condition of a stream? Pictures of these sites might be available.

[398] To provide resources for community engagement, notification, and education relative to lake issues, MPOA coordinates with PWC to:
- Provide storm alerts through regional or county government systems or community notification system.
- Provide alert system to report rapid changes in water level that might adversely affect property.
- Provide information resources for enhancing awareness of lake water quality and watershed needs.
- Provide information on community norms and expectations for safe and harmonious use of the lake and its "ribbon of life," especially addressing fishing, boating, swimming, trail use, & beach activities.
- Use community media, such as the Monclarion monthly newsletter and Montclair web site to provide information about the lake and its watershed, including environmentally safe alternatives for toxics, safe boating, safe swimming, etc.
- Provide forums for stakeholder interaction in community meetings and town-hall sessions, as needed.
- Provide means for empowering citizens to monitor/report on issues relevant to the lake & its resources.
- Coordinate with local, state and regional programs in offering training relevant to lake stewardship.

[399] LMC longer-term plans are addressing the possibility of providing a "lake-ecosystem dashboard" via the Montclair website to display status of weather, air quality, water level, and water quality -- overall, at each beach, and at Powells Creek entrance to Lake Montclair.

To monitor water quality and provide periodic reporting to better enable timeliness of actions, the LMC coordinates activities with PWC to monitor the lake and watershed, through routine sampling for pollutants and contaminants, including those categorized as emerging contaminants (specified in LMEQR), and periodic monitoring of the lake that include assessments of changes in bacteria and eutrophication-causing nutrients. The LMC also provides periodic and annual reports on water quality (consistent with reporting in the LMEQR). MPOA and PWC also provide information for residents to enable more direct participation in controlling mosquitoes and other potentially harmful insects. LMC provides information on insect control, as needed.

2. Opportunities for Residents to Report and Engage in Lake Management Activities.

MPOA provides forums for stakeholder interaction in LMC meetings and town-hall sessions, as needed, and seeks to provide means for empowering citizens to monitor and report on the lake and its resources. In coordination with the MPOA property management agent, LMC provides periodic reports to stakeholders on the status of watershed and lake interests and focus areas. The Montclair community does not currently have a formal reporting program for residents other than notifying MPOA of issues.[400] Citizen reporting programs could include water quality monitoring;[401] participating in creek/lake cleanups and bank restoration, and helping inform residents. It is important that residents understand that properties in the watershed 'not on the lake' can be 'connected to the lake' by flow of water which, in turn, could carry debris, pollutants, sediments and nutrients that could adversely affect the lake's water quality; potentially jeopardizing the lake-ecosystem and future enjoyment of the lake. It would be useful for residents to understand they have a channel for reporting issues relevant to lake-ecosystem issues.[402]

3. Opportunities for Community Engagement in Lake-Ecosystem Projects.

Lake clean-up projects and special events such as the Lantern event and Fishing tournament provide opportunities for residents to engage in lake-related projects. Other events using the Montclair beaches offer opportunities for residents to get involved in community events that take advantage of the lake and its 'ribbon of life' assets Other "lake clean-up" and "ecosystem sustainment" projects periodically provide opportunities for residents to participate in stewardship activities. Many lake management projects would welcome involvement of additional residents. People do not need to be residents of Montclair or on an MPOA committee to participate in lake-related projects.

4. Forums and Meetings Relevant to Lake-Ecosystem Stewardship.

LMC meetings are open for any resident to attend and learn more about community efforts focused on lake management and ecosystem stewardship. Residents can also propose topics to be discussed at LMC meetings. Montclair residents can also attend MPOA BoD meetings. As needed, MPOA holds town-hall meetings as forums for lake-related issues. Prince William County, the Commonwealth of Virginia, and conservation organization hold events that are relevant to use of lakes and ecosystem stewardship, and the LMC coordinates with MPOA to inform residents of those events.[403] Residents also have an opportunity to share information via the Montclair Facebook Group that offers exclusive access for Montclair residents.[404] PWC has constructed a new public library in Montclair, near Prince William Forest Park and Lake Montclair, and the LMC considers this an opportune venue to provide local residents information on watershed and lake-ecosystem stewardship.[405]

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[400] Virginia Department of Environmental Quality can assist in developing programs for citizens interested in protecting natural resources.

[401] Environmental water quality monitoring includes watching for potential accumulation of blue-green bacteria or cyanabacteria (or algae bloom) that forms a visible film or scum on the surface of stagnate water.

[402] Water quality is a primary concern of Montclair residents, especially those who fish and swim in the lake. For example, some residents have reported observations of skin rashes after swimming. These reported observations of skin rashes came indirectly to the MPOA LMC from residents. Section IV.a.3 addresses health considerations and precautions/preventative measures in using the lake. Monitoring and mitigating risks to water quality remains a high priority for MPOA and LMC (see Section III of this LMPP), and it is important that residents know how to report issues to appropriate authorities in Montclair and PWC. "See something – say something to people who can take action."

[403] For example, Leesylvania State Park (at the point where Powells Creek flows into the Potomac River) holds several information sessions (free and open to the public) relative to sustaining healthy water systems and aquatic biological communities. These sessions have been publicized in *The Montclairion.*

[404] A Facebook group with exclusive access for Montclair residents was approved at the May 2013 Board of Directors meeting. Residents are invited to participate in open discussion about happenings in the area. Visit https://www.facebook.com/groups/308311132604694/ and request an invitation to join the group. This Montclair Facebook group could become a useful media for exchanging information.

[405] Having a local library near Lake Montclair provides an opportunity to have education and information resources focused on watershed-ecosystem stewardship for parents and teachers to highlight how active involvement of residents contributes to stewardship efforts can make a positive difference, and how negligence of a few people could have detrimental consequences. The library could have a large map of Lake Montclair and Powells Creek Watershed; illustrating how it flows to the Potomac River and into the Chesapeake Bay.

5. Promotion of Conservation and Stewardship Practices for Sustainable Ecosystems.

LMC seeks to enhance efforts in enabling residents to adopt practices for sustainable ecosystems. To promote soil health to sustain and enhance ecosystem services through protection and reuse of soil/sand, MPOA LMC seeks to maximize reuse of soils on-site (ie., sand washed from beaches and soil extracted from lake dredging). LMC members also advocate sustaining areas of healthy soils and improving health of degraded soils in all of Montclair which is in a Chesapeake Bay Resource Management Area. To minimize use of soil amendments, chemicals, or pollutants that harm human and ecological health, the LMC promotes maintaining healthy soils so that harmful materials are not needed to support plant growth. LMC advocates minimizing the disturbance of vegetation and, where removal is unavoidable, protect soils to minimize damage. LMC promotes use of conservation practices in the treatment of soil to reduce greenhouse gas emissions, and advocates building soil organic matter and incorporating compost and mulch as soil amendments in landscaping. LMC members coordinate with Montclair residents, and conservation organizations to promote the use conservation practices, including the use of riparian gardens and on-site food production gardens for healthy environments. The LMC promotes practices to minimize use of harmful materials, and to use materials in a manner for which they are intended. The LMC also promotes efficient use of fertilizers and the use of soil testing to verify need before using nitrogen fertilizers. To mitigate risks of identified hazards, pollutants, contaminants, and eutrophication-causing nutrients, the LMC coordinates with County and State agencies, as well as with conservation organizations, to identify and publicize corrective actions (with contingency plans) for specific hazards, pollutants and contaminants. The LMC also promotes the prevention or reduction of eutrophication,[406] and when needed, coordinates with MPOA property management staff to take corrective action. The LMC coordinates with community residents and volunteer groups to provide information and signs that indicate street drains are connected to the lake. To encourage use of natural ecological processes in managing plant resources, the LMC promotes sustainment of sites to minimize management resources and reduce waste of plant resources. The LMC provides information to help residents understand the relationship between conservation practices with the health of the lake and watershed. The LMC promotes sustainable practices in the growth, installation and maintenance of vegetation; and the LMC promotes waste generation reduction during maintenance and the recovery of landscape trimmings for composting.[407]

The LMC promotes minimizing the use of materials that produce hazardous pollutants during their life cycle, and it promotes decreasing the need for toxic substances, phosphates, herbicides, and pesticides. The LMC coordinates with appropriate officials to monitor upstream development and site use, and provide for clean-up, containment or removal of any potentially toxic and hazardous materials, as needed. To reduce foreign material in the lake, the LMC coordinates with the MPOA property management staff to monitor potential introduction of debris, garbage, petroleum products, and other foreign material in the lake. As needed, the LMC coordinates with MPOA to establish lake-clean-up projects. MPOA coordinates with PWC to monitor watershed property for possible clean-up efforts relevant to the lake-ecosystem. LMC members coordinate with the property management agent and other Montclair stakeholders to promote the efficient management of material resources and reduction of energy use.[408] The LMC advocates providing more information resources focused on enabling residents to mitigate risks attributable to potentially toxic and harmful materials. In collaboration with conservation-oriented organizations, the LMC coordinates with conservation organizations to provide information about minimizing use of materials, products and practices which are harmful to humans and the environment.

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[406] **Eutrophication** is a syndrome of ecosystem responses to human activities (such as runoff of fertilizer from fields or suburban lawns) that introduce larger than normal amounts of nitrogen (N) and phosphorus (P) into bodies of water, often leading to changes in animal and plant populations and degradation of water and habitat quality. Eutrophication is the process by which a body of water acquires an addition of high concentration of nutrients (an increase in the rate of supply of organic matter in an ecosystem, especially nitrates and phosphates), through plant matter, fertilizers or sewage. Negative environmental effects include hypoxia, the depletion of oxygen in the water, which induces reductions in biological populations. As such, eutrophication has emerged as a key human stressor on many aquatic ecosystems.

[407] This LMPP is guided by an adaptation of Sustainable Sites principles (see http://www.sustainablesites.org/report), along with landscape limnology, a sub-discipline of fresh water science, in managing and conserving lake aquatic ecosystems using landscape perspectives.

[408] Consistent with stewardship and conservation practices for sustainable sites, to provide the requisite focus for promoting efficient management of material resources and reduction of energy use, the LMC:

- Promotes reduction of urban 'heat island' effect by using shading and pervious or semi-pervious surfaces;
- Promotes reclamation, reuse, and recycling of materials, and the reduction of material consumption;
- Promotes use of sustainable landscape materials that require reduced resource input to maintain;
- Promotes use of materials that are renewable or extracted, processed, and manufactured locally;
- Promotes the use of landscape lighting and equipment with low operational energy, and
- Promotes the use of low embodied energy products and those powered with renewable energy sources.

6. Lake Appreciation Efforts and Recognition of Volunteers.

Community engagement is vital to the long-term sustainable stewardship of the lake.[409] To aid in advancing 'lake appreciation' among residents and promote positive social dynamics in safely using the lake and "ribbon of life" assets, MPOA sponsors and publicizes social activities and events on the lake, on beaches and in parks with access to the lake.[410] Special events such as the lantern event and fishing tournaments provide opportunities for residents to gain a better appreciation of the lake. The LMC coordinates with others to provide safety training and information relative to boating, fishing, swimming, and use of docks and platforms. The LMC coordinates with other Montclair stakeholders to optimize learning benefits of natural elements around Lake Montclair to enhance human cognitive function.[411] To enhance conditions for use of the lake and its "ribbon of life" assets, LMC coordinates with other Montclair stakeholders to determine use trends and identify potential conflicts in use of the lake and any parts of its "ribbon of life." All this takes a commitment of volunteers; so MPOA continues to seek ways to provide appropriate means (such as during the Montclair volunteer reception) for publicly recognizing residents and others who have made noteworthy contributions toward the stewardship of Lake Montclair.

c. Reports and Plans Providing Information for Watershed and Lake-Ecosystem Management.

Periodic and annual reports to MPOA BoD and community stakeholders, along with information from organizations external to Montclair, provide the basis for informed decision-making. The Emergency Action Plan and Lake Montclair Environmental Quality Plan have specific reporting instructions and procedures for keeping stakeholders informed. This LMPP also provides MPOA property management and MPOA BoD information for decision making.[412] The PWC Department of Public Works undertakes a variety of studies throughout the community to assess, monitor, evaluate and seek improvements for water resources. These studies help determine the course of action to prevent pollution, control flooding, improve water quality and protect sources of drinking water. As studies are completed, the reports are made available via MPOA and online for review and information. Several reports are available relevant to the Powells Creek Watershed[413] and the Lake Montclair ecosystem.

1. Lake Management Program Plan (LMPP).

MPOA uses this LMPP to provide a collaborative source for documenting and delineating processes and actions for managing efforts responsive to a broad range of needs from stakeholders with varying interests and backgrounds. As such, this plan is used to inform all with an interest in the stewardship and use of the lake. This LMPP serves as a part of the LMC's communication efforts for informing and engaging stakeholders about lake issues. It addresses pertinent background, authorities, guidance, and support for lake management in Sections I and II which include the framework for six focus areas that group the 25 objectives for MPOA Lake Management Program. These focus areas and objectives for sustainable sites and lake management are aligned with the *"Chesapeake 2000"* five program areas.[414] They provide a context for strategies and practices that address lake-related concerns and community interests. They reflect a resilience-centric approach focused on safeguarding lake-ecosystem functions while also enabling human-centric objectives focused on enabling harmonious use of the lake and its "ribbon of life" assets. As recommended by the Storm Water Task Force,[415] the LMC uses this LMPP to address long-term actions for managing the overall health of the lake, as well as tools and procedures to assist property management staff in managing water level and monitoring lake and weather conditions. It provides information for MPOA and

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[409] Several Chesapeake Bay protection efforts indicate emphasize that in order to guarantee long-term success in eliminating and preventing hazardous impacts in small watersheds, it is essential that people who live, work, and play in the watershed understand issues and are actively involved in developing a plan for addressing problems in their watershed and ensuring that progress is made and sustained.

[410] Social events on the lake and beaches include the annual fishing tournament, lantern events, community events on Dolphin Beach, and informal events such as the monthly "boat tie-up" on the first Friday of each Summer month.

[411] To optimize learning benefits of natural elements around Lake Montclair to enhance human cognitive function, the LMC seeks to provide:

- Maps of trails around the lake and throughout the community and neighboring forest and parks.
- Annotations to the Montclair community plat and lake map indicating habitat for fish and wildlife.
- Information about fish and wildlife in the lake-ecosystem, including their beneficial roles.
- Information on regional biodiversity and resources on local ecosystems and their functions (including Prince William Forest Park).

[412] The Emergency Action Plan is exercised annually and the Lake Montclair Environmental Quality Report (LMEQR) is updated annually.

[413] See PWC Watershed Studies at http://www.pwcgov.org/government/dept/publicworks/environment/Pages/Watershed-Studies.aspx

[414] See Table 7-1 of this LMPP for the matrix mapping the 25 objectives of this LMPP to the *Chesapeake 2000* five program areas.

[415] Report of the Storm Water Task Force to MPOA BoD, September 10, 2008 (on file in MPOA) recommended development of a Lake Management Plan (LMP) and a Storm Management Plan (SMP) – this LMPP serves to integrate the two into one program management plan.

others with interests in the lake. This plan integrates resources and projects, including training for dam management, boat safety training for the community, and other resources for storm water management, swimming, boating, fishing, birding, and wildlife management. Addressing watershed and lake stewardship, this LMPP facilitates specific strategies and actions with associated studies and plans accounting for Lake Montclair being an important part of the Powells Creek Watershed in the Chesapeake Bay basin. It provides a framework for specifying objectives for managing efforts with the MPOA coordinating services provided by volunteers, property management staff, the county, the state, and federal agencies.[416]

2. Powells Creek Watershed Management Plan.

The PWC Watershed Management Branch tasked Michael Baker Corporation with examining the entire Powells Creek Watershed to build on previous watershed assessment studies; evaluate current conditions in the watershed; and present the findings in a series of strategic and focused conceptual project plans to be used to budget future Capital Improvement Project (CIP) funds. Additional objectives were to provide mitigation for ongoing County projects and to measure progress toward protecting the watershed. The study report was provided by Prince William County in June 2008. This report presented general recommendations applicable to the full watershed and suggested nineteen concepts for potential CIP projects. The concepts presented include: stream restoration, stream enhancement, storm water pond retrofits, culvert retrofits, and Low Impact Development (LID) projects. Anyone can view the full report on the **Powells Creek Watershed Management Plan** along with supporting documents in **Powells Creek Watershed Plan Appendix A** and **Powells Creek Watershed Plan Appendix B**.[417]

3. Environmental Monitoring Reports.

The Prince William County *Environmental Monitoring Report*[418] provides documentation of the sampling and analysis activities that the County has implemented in accordance with the voluntary monitoring program:

- Semi-annual sampling of surface water in Powells Run and Powells Creek (Spriggs Road crossing and Lake Montclair confluence) for water quality parameters;
- Semi-annual sampling and analysis of storm water discharge (at the outfall), if present, from site storm water basins for water quality parameters;
- Annual sampling and analysis of sediment from designated surface water points, Spriggs Road crossing of Powells Creek and Lake Montclair confluence, and site storm water basins for primary pollutants, and
- Quarterly sampling of specified surface water monitoring stations for selected volatile organic compounds.

4. Lake Montclair Environmental Quality Report (LMEQR).

Submitted annually to the MPOA Board of Directors, the Lake Montclair Environmental Quality Report (LMEQR) supports action planning focused on ensuring the continued quality of the lake. Development of the LMEQR is the responsibility of the MPOA LMC with support from the contracted property management staff to prepare and submit an annual LMEQR to the MPOA BoD.[419] The annual report represents a progressive extension of reports from previous years. MPOA property management agent and the LMC continue to monitor fish, water, and bottom sediment as part of the LMEQR approved and directed for implementation by the MPOA BoD. Summary findings and recommendations from other reports and plans, such as water quality testing, fish flesh testing, and fish habitat planning are now consolidated for inclusion in the annual submittal of the LMEQR.

a) Lake Montclair Water Quality Reports. Each summer Lake Montclair surface water is tested at beaches for E-Coli,[420] and the analysis is used to inform decision-making associated with providing safety

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[416] The LMPP has been written so as to only require minimal update every few years. Annual updates associated with lake management efforts are provided to the MPOA BoD through the Lake Montclair Environmental Quality Report (LMEQR).

[417] See http://www.pwcgov.org/government/dept/publicworks/documents/11336.pdf for **Powells Creek Watershed Management Plan** and the respective appendices.

[418] Environmental Monitoring Reports, PWC Sanitary Landfill, Permit No 029, Ref 07396604XX (yearly reports on file in MPOA office).

[419] Implementation of the Lake Montclair Environmental Quality Report (LMEQR is the responsibility of the LMC with support from the contracted manager and staff. In accordance with this plan the MPOA's Property Management Staff shall prepare and submit an annual report to the Board of Directors not later than April of each year. The purpose of the LMEQR is to ensure the continued quality of the lake. With approval/adoption of the LMPP by the MPOA BoD in 2013 the LMEQ 'Plan' was designated as the annual LMEQ 'Report'.

[420] Surface water testing for E-Coli at Montclair's three beaches has been conducted each summer by Joiner Labs since 2007. E-Coli test results reflect the Most Probable Number (MPN) 3-dilutions. *Acceptable readings: 235/100ml for a single sample maximum and a monthly average limit of 126/100ml.* Anything above those readings warrant caution. Past trends indicate higher-than-acceptable readings after rainstorms (most likely attributable to storm water run-off transporting fecal waste over beaches and upstream watershed properties), and

precautions and potential beach closings. In autumn 2013 the level of observed algal bloom in Lake Montclair warranted analysis. Samples were sent to determine algae and water quality baseline bundle and sediment phosphorus.[421] Water quality parameters revealed the lake was eutrophic.[422] Alternatives for algae management (using an algaecide and water quality enhancer)[423] and phosphorus management (using phosphorus removal solutions for recovery or reset to restore water quality in the lake) were submitted with the analysis report.[424] Based on the site specific water parameters, MPOA considered alternative solutions for implementing Phoslock phosphorus removal to restore water quality in Lake Montclair. [425, 426] Summary findings and recommendations from water quality testing were consolidated for inclusion in the submittal of the LMEQR.

b) Lake Montclair Fish Flesh Test Reports. MPOA coordinates with state agencies to ensure testing of fish in the lake is periodically conducted for mercury, Polychlorinated Biphenyls (PCBs), and other pollutants because of the potential impact on human health. On a periodic basis, the Virginia Department of Environmental Quality (VDEQ) visits Lake Montclair to take samples of several types of fish in order to test for contaminants. Fish flesh testing is done every three to five years and the LMC is actively involved in coordinating with the VDEQ to conduct fish sampling. Results of the past tests function as baseline comparisons. Within the last decade this type of testing has been completed in 2004, 2006, 2009, and 2012; and the test results are made available to MPOA upon completion of the respective reports.[427]

West Beach often has higher-than-acceptable readings for E-Coli from mid-June to mid-August; so residents can make risk informed decisions; taking precautionary measures in swimming off West Beach during that summer period or off any beach after a rainstorm.

[421] Report of SOLitude Lake Management SeSCRIPT Analysis from samples taken at an average depth of 10 feet in Lake Montclair and received 21 Oct 2013. Analysis was used for determining an algae and water quality baseline bundle and sediment phosphorus.

[422] Results of Oct 2013 water quality and algae analyses enabled proposed treatment recommendations for algae and nutrient management.

[423] Algae Management. In order to control targeted algae at this site, apply: SeClear Algaecide and Water Quality Enhancer at a rate range of 1.3 to 3.9 gallons/acre- foot (0.2 to 0.6 mg Cu/L); take caution with fish. Certified professionals should be consulted for guidance on final application rate selection, technique and frequency based on project objectives, site conditions, algae location and density at treatment time.

[424] SOLitude Lake Management conducted the analysis and offered recommendations for treatment, and could provide further guidance on choosing the most effective management approach based on site conditions and objectives. 888-480-5253 Email: SJunior@solitudelake.com

[425] Phosphorus Management. Based on these site specific water parameters, recommendations were made to consider implementing one of the following Phoslock phosphorus removal solutions (for recovery or reset) to restore water quality in the lake.

- Recovery Solution: Improve water quality by incorporating strategic applications of Phoslock to remove free reactive phosphorus from the water column. Integrate with SePRO algaecide applications as needed to control algae and achieve desired water quality objectives. Apply 21,600 pounds of Phoslock to target phosphorus removal from the water column, based upon the sample analyzed.
- Reset Solution: A more comprehensive solution to water quality restoration. Reset the ecological clock and restore water quality in the lake by implementing a Reset application strategy customized by water body. This Phoslock solution targets and permanently removes free reactive phosphorus in the water column and accumulated in water body sediments over time. Apply 63,000 pounds of Phoslock to target both water and sediment phosphorus in this system.

[426] The golden algae or chrysophytes are a large group of algae, found mostly in freshwater. Golden algae is also commonly used to refer to a single species, Prymnesium parvum, which causes fish kills. Cyanobacteria, formerly called "blue-green algae" are relatively simple, primitive life forms closely related to bacteria. Typically much larger than bacteria, they photosynthesize like algae. Depending upon the species, cyanobacteria can occur as single cells, filaments of cells, or colonies. Cyanobacteria contain a characteristic pigment which gives the group their blue-green coloration. When cyanobacteria blooms begin to die and disintegrate, this pigment may color the water a distinctive bluish color. Cyanobacteria are found in freshwater and marine habitats, but blooms typically occur in freshwater. Nutrient-rich bodies of water such as some lakes or ponds may support rapid growth of cyanobacteria. With the right conditions, a "clear" body of water can become very turbid with green, blue-green or reddish-brown colored algae within just a few days. High concentrations of an alga species in a water body form "blooms". Many species can regulate their buoyancy and float to the surface to form a thin "oily" looking film or a blue-green scum several inches thick. The film may be mistaken for a paint spill. Cyanobacteria cannot maintain this abnormally high population for long and will rapidly die and disappear after one to two weeks. If conditions remain favorable, another bloom can quickly replace the previous one. In fact, successive blooms may overlap so that it may appear as if one continuous bloom occurs for up to several months. Why are they a problem? Blue-green blooms can pose a human health concern. Although most blue-green blooms are not toxic, some blue-green algae produce nerve or liver toxins. Toxicity is hard to predict in part because a single species of algae can have toxic and non-toxic strains. Also a bloom that tests non-toxic one day can turn toxic the next day. People may become ill after swimming or water skiing in lakes with toxic blue-green algae. Rarely, humans may experience stomach pains, vomiting, diarrhea, and skin rashes. Nerve and liver damage have been observed following long-term exposure such as drinking water with toxic blooms.

[427] Fish flesh testing was last conducted in 2006 for Lake Montclair. VDEQ indicates these tests are the only way to determine long-term effects of heavy metal contamination, to evaluate trends and causes and consequently to protect consumers of fish. The VDEQ website at: http://www.deq.state.va.us provides past test results. The sample station ID is: 1APOW009.8. The MPOA General Manager contacted Dr. Hale, Dept. of Environmental & Aquatic Animal Health of the William & Mary, Virginia Institute of Marine Science, School of Marine Science, to determine if they could do the testing of fish flesh for PCVs and Mercury. While the school labs could do the work, the estimated cost was $675 per fish to test for both PCBs and Mercury at this time. When the VELAP (Virginia Environmental Laboratory Accreditation Program) certification is required, price goes up to $1,350 per fish. After discussion, the LMC voted to suspend fish flesh testing until a more affordable testing program could be found. An article in *The Montclarion* provided the results of the testing done in 2006.

c) Lake Montclair Fish Habitat Plan. Now submitted as part of LMEQR the Lake Montclair Fish Habitat Plan documents the process for placing submerged tree and brush structures into the lake. The LMC helps to replace the habitat which is destroyed with dredging, as well as that which deteriorates naturally over time. MPOA's yearly Christmas tree collection supports the LMC and property management staff efforts in submerging the trees to create fish habitat throughout the lake. As sites are emplaced, maps are updated and notification posted in *The Montclairion.* As depicted in Figure 5-2 map (in Section V.b.1 of this LMPP) and also available on *FSRConnect,* there are nineteen approved locations for fish habitat structures.[428, 429] Locations are also marked on the map posted near the boat launch at West Beach. As other sites are established, maps will be updated, and notification will be posted in *The Montclairion.*

5. Bathymetric, Hydrographic and Topographic Surveys of Lake Montclair.

Reports from bathymetric, hydrographic and topographic surveys support decision-making associated with determining the requirements for dredging. The lake requires periodic dredging to maintain a minimum depth of 4 feet and a 4:1 horizontal to vertical slope from the shoreline[430] to minimize loss of the lake footprint[431] and to reduce sediment transport into the lower part of the Powells Creek Watershed and the Potomac River. Dredging also contributes to efforts to manage phosphorous and control algae scum.

6. Lake Montclair Dam Inspection and Breach Inundation Studies and Reports.

Reports from inspections of the Lake Montclair Dam are filed in the MPOA office. MPOA is responsible for conducting annual inspections of the dam, and inspections have been conducted since before MPOA owned the dam.[432] Inspections of the dam are performed by MPOA maintenance and the dam engineer.[433] As part of the transfer of ownership, a Lake Montclair Dam Breach Inundation Study was conducted in 1986 with the report submitted December 22, 1986. In 2014 MPOA contracted for an inundation study and spillway stability analysis in support of the recertification for operations and maintenance of the dam.[434]

7. Lake Montclair Sediment and Forebay Study Reports.

The purposes of the sedimentation and forebay studies have been to support decision-making associated with erosion and sediment transport and deposits. The volume of sediment removed between 2001 and 2007 seems to

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[428] As part of the on-going program to improve fish habitat, in March 2012, MPOA and LMC completed emplacement of 145 trees in designated places within Lake Montclair. There is a map showing the locations of the fish habitats available on the Montclair web site.

[429] Residents are not permitted to place their own fish habitat – such action would be considered dumping of trash into the lake.

[430] Areas that become shoaled in significantly need to be considered for dredging prior to them becoming dry land/wetland. Maintaining the lake footprint (ie., surface area) to an adequate water depth is important to maintain water quality. If the lake was allowed to shoal and maintenance dredging was not performed, water quality would degrade over time (ie., dissolved oxygen, turbidity, total suspended solids, etc.) Shallow water on windy days would turn cloudy due to material lifted into suspension. Shallow water areas in hot summer days warm up quickly; reducing oxygen and generating potential fish kills in these areas. In late 2007 Lake Montclair was dredged at a cost of $900,000 to MPOA. Previously, portions of Lake Montclair were dredged in 1991, 1996, and again in 2001 when approximately 18,000 cubic yards of silt were removed from specified sites. The material was taken to the PWC landfill.

[431] Periodic dredging is necessary because of the large amounts of silt discharged into the headwaters of Lake Montclair at Powells Creek from commercial and housing development, the failure of storm fences for construction projects, and inadequacies of the Lake Terrapin storm water management pond. Much of the waterfront property along Lake Montclair has been cleared (some without replacement of ground cover) by the homeowners to provide a better view or access to the lake.

[432] Prior to transfer of ownership of the dam to MPOA, dam inspections had been conducted. For example, a 1979 dam inspection of the Lake Montclair dam was conducted by Dewberry & Davis, and the inspection included the requisite forms to be submitted to the Commonwealth of Virginia, Office of Water Resources Management, State Water Control Board. William O. Doll, Consulting Engineers performed a stability analysis of the dam in 1979 and concluded that the dam was stable. Thirteen test borings were drilled in July 1979 by East Coast Drilling and Boring, Inc., and observed by a representative from W.O. Doll, Consulting Engineers. Of the thirteen borings, nine were drilled in the embankment and four were located along the emergency spillway. Laboratory tests on the soil samples were performed: water contents, soil unit weight, grain size analysis (mechanical sieve and hydrometer), Atterburg limits (liquid and plastic limits), triaxial tests, and permeability tests.

[433] The SWTF recommended that MPOA sponsor an annual public forum during which the dam engineer and maintenance personnel meet with all interested Montclair homeowners to address plans regarding dam operation and maintenance. LMC members are invited for "cracks in dam" inspections and maintenance efforts, such as sluice gate repair.

[434] The 11 July 2014 Report of Inundation Study for Montclair Dam (Inventory #15303) F&R Record #62R-3350 was provided by Froehling & Robertson, Inc, reflecting the analysis resulting in a hazard classification statement, flood inundation mapping, and incremental damage assessment. The report included results of the stability analysis on the auxiliary spillway under the 100 year, ½ Probable Maximum Flood, the Spillway Design Flood, and the PMF events.

exceed the historical rate of sediment accumulation; so MPOA continues to be interested in determining the feasibility of using a forebay to reduce the cost of sediment removal from the lake.

a) ***Lake Montclair Sedimentation Control Feasability Study – July 2008.*** The PWC Watershed Management Branch engaged Whitman Requardt & Associates to evaluate erosion and sediment transport in the upper reaches of Powells Creek above Lake Montclair. The purpose of the study was to determine the feasibility of reducing the sediment load and deposition to Lake Montclair. The final report presents the findings of the study and provides information about the condition of the upper stream reaches sediment transport mechanisms and three conceptual designs and locations for a sediment trapping forebay in the vicinity of the upper end of Lake Montclair. Anyone can view the full report for the **Lake Montclair Sedimentation Control Study**.[435]

b) ***"Lake Montclair Sediment Forebay Final Report and Recommendation" – June 2010***. Rinker Design Associates (RDA) conducted an alternatives analysis of the conceptual design for an in-lake forebay previously presented by Whitman Requardt & Associates. This RDA report examined numerous design and location alternatives and presented findings with recommendations that no forebay construction be under taken at that time due to relative stability in the upper Powells Creek Watershed. RDA further recommended periodic bathymetric monitoring of Lake Montclair's upper end to determine actual amount of sedimentation over time.[436]

8. Storm Water Studies and Reports.

Report of the Storm Water Task Force (SWTF) to MPOA BoD, September 10, 2008 is on file in MPOA office and available through the LMC. Due to a particularly severe rainstorm on May 11, 2008, resulting in damage to private docks on Lake Montclair, the President of the MPOA appointed a Task Force headed by the Chairman of the Lake Management Committee with members from the Safety, Communications, and Covenants committees. The resulting report contained the findings and recommendations of the Storm Water Task Force. The SWTF recommended development of a Lake Management Plan (LMP) and a Storm Management Plan (SMP)[437] to address long-term actions for managing the overall health of the lake, as well as tools and procedures to assist property management staff in managing water level and monitoring lake and weather conditions (this LMPP serves to integrate the functions of both proposed LMP and SMP).

9. Lake Montclair Emergency Action Plan (EAP).

Reviewed and tested annually (and updated, as needed), the *"Lake Montclair Emergency Action Plan"* specifies roles & responsibilities and provides information about emergency action to protect lives and property in the event of impending or actual sudden release of water from Lake Montclair caused by a natural disaster, accident to, or failure of the dam.[438] MPOA provides the EAP, compliant with regional statutes,[439] to address needs and response to potentially catastrophic events that could adversely affect the dam or integrity of the lake.[440]

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[435] See www.pwcgov.org/government/dept/publicworks/documents/11335.pdf for Lake Montclair Sedimentation Control Study.

[436] The full report for the **Lake Montclair Sediment Forebay Report** is available along with supporting documents **Sediment Forebay Report Appendix A**, **Sediment Forebay Study Appendix B**, **Sediment Forebay Study Appendix C**, **Sediment Forebay Appendix D**, **Sediment Forebay Report Appendix E**, **Sediment Forebay Report Appendix F**, **Sediment Forebay Report Apps** and **Sediment Forebay Report Options.**

[437] Report of the Storm Water Task Force to MPOA BoD, September 10, 2008 (on file in MPOA office) recommended development of a Lake Management Plan (LMP) and a Storm Management Plan (SMP) – this LMPP integrates the two into one program management plan.

[438] See Emergency Action Plan (EAP) via the Montclair website. All responsible persons are given detailed instructions and procedures to be followed in the event of emergency actions. These instructions and procedures are reviewed and discussed on a periodic basis as determined by the MPOA General Manager. The EAP is reviewed and tested at least once annually (and updated as needed). This includes a hypothetical communications exercise within the community and with County offices and individuals concerned.

[439] State regulations require that dam owners establish contingency measures to provide reasonable warning to affected areas in the event that weather conditions or accidents threaten the dam and the lives and property in the path of possible overflows. The MPOA has developed the EAP to advise all residents of protective measures to be implemented if weather, natural disaster, or accidents threaten the dam. The EAP describes conditions which require actions pursuant to the plan and details the responsibilities of the MPOA and local authorities if an emergency condition occurs. Lives and property downstream from the dam have never been threatened, and floodwater flow over the emergency spillway has not occurred since Hurricane Agnes brought unusually heavy rainstorms over PWC in 1972.

[440] See Emergency Action Plan (EAP) via the Montclair website. All responsible persons are given detailed instructions and procedures to be followed in the event of emergency actions. These instructions and procedures are reviewed and discussed on a periodic basis as determined by the MPOA General Manager. The EAP is tested at least once annually. This includes a hypothetical communications exercise within the community and with County offices and individuals concerned. The EAP is reviewed and updated annually.

d. Summary of Community Engagement and Information Resources

MPOA provides mechanisms for community engagement, notification, and education relative to lake issues. More than 2/3 of the 25 objectives in this LMPP for lake-ecosystem use and stewardship require community engagement to be fully realized. Through LMC and property management staff, the MPOA works with residents to enhance conditions for use of the lake and its "ribbon of life" assets. MPOA LMC promotes positive social dynamics in safely using the lake and "ribbon of life" assets, and promotes the learning benefits of natural elements to enhance human cognitive functions. Community efforts have contributed to sustaining lake-ecosystem conditions to promote health and physiological benefits.

In coordination with State and County programs, MPOA LMC monitors and reports status of fish, aquatic life, and shoreline wildlife to inform action planning. In coordination with PWC, MPOA monitors insect populations and supplements community information resources associated with controlling destructive/disease-carrying insects. The LMC provides habitat and food sources for fish and wildlife consistent with sustaining a natural balance, and it encourages use of natural ecological processes in managing plant resources.

The LMC advocates minimizing the use of soil amendments, chemicals, or pollutants that harm human and ecological health. LMC also promotes soil health to sustain or enhance ecosystem services through protection and reuse of soil and sand. MPOA has programs and staff to manage and control water level; report changes to enable timeliness of action. LMC works in coordination with MPOA property management staff to monitor water quality and provide periodic reporting to better enable timeliness of action. As needed, the LMC and property management staff coordinate with residents and PWC representatives to mitigate risks from identified hazards, pollutants, contaminants, and eutrophication-causing nutrients. PWC and community efforts have focused on reducing foreign material and mitigating risks from potentially toxic and harmful materials in Powells Creek Watershed and the lake ecosystem. LMC also promotes the efficient management of material resources.

MPOA and PWC information resources associated with watershed and lake ecosystem stewardship are offered now and continue to improve; better enabling all residents to contribute efforts focused on sustaining a healthy, resilient lake that provides enjoyment for current and future residents.

To ensure long-term stewardship of the lake, it is essential that people who live, work, and play in the watershed understand relevant issues and are actively involved in addressing problems in their watershed and the lake; ensuring that *progress is made and sustained.*

VII. Intergenerational Environmental Stewardship for the Lake and Watershed Ecosystem.

a. Continued Alignment among Montclair LMPP Objectives and Chesapeake 2000 Program Areas.

This LMPP serves as an information resource illustrating alignment of lake management program objectives with commitments in the *Chesapeake 2000* program areas.[442] Table 7.1 provides a mapping to illustrate alignment among the regional program areas and LMPP 25 objectives that reflect a resilience-centric approach focused on safeguarding lake-ecosystem functions and a human-centric approach focused on harmoniously using the lake and its "ribbon of life" assets.

Table 7-1. Matrix Mapping of Lake Management Program Objectives to Chesapeake 2000 Program Areas[443]

*This matrix indicates content organization of LMPP sections that elaborate on how addressing lake management focus areas and 25 objectives specified in LMPP Section II address the Five Program Areas of "Chesapeake 2000" via strategies and actions specified in LMPP Sections III-VII.

FOCUS AREAS	LAKE MANAGEMENT PROGRAM OBJECTIVES	CHESAPEAKE 2000 PROGRAM AREAS: Living Resource Protection and Restoration	Vital Habitat Protection and Restoration	Water Quality Protection and Restoration	Sound Land Use	Stewardship and Community Engagement
1. HYDROLOGY	1-1 Manage water to sustain or regenerate healthy hydrologic processes	■	■	■	■	■
	1-2 Mitigate risk from harmful nutrients/hazards/pollutants/contaminants	■		■		■
	1-3 Sustain environmental water quality and healthy biological communities	■	■	■		■
	1-4 Monitor water quality and periodically report to enable timely action	■	■	■		■
	1-5 Manage and control water level and report changes			■		■
2. SOILS	2-1 Promote soil health to sustain ecosystem services thru protection/reuse	■		■	■	■
	2-2 Sustain storm water management and minimize soil erosion			■	■	■
	2-3 Minimize use of chemicals that harm human and ecological health	■	■	■	■	■
	2-4 Sustain integrity of the lake & its 'ribbon of life'	■	■	■	■	■
	2-5 Monitor changes in watershed land use & report trends that affect lake	■	■	■	■	■
3. VEGETATION	3-1 Encourage natural ecological processes in managing plant resources	■	■	■	■	■
	3-2 Use vegetation to sustain/enhance on-site ecosystem services	■	■	■	■	■
	3-3 Manage lake vegetation consistent with natural balance of ecosystem	■	■	■	■	■
4. FISH & WILDLIFE	4-1 Provide habitat & food sources for fish/wildlife for a natural balance	■	■		■	■
	4-2 Monitor and control destructive/disease-carrying insects	■	■			■
	4-3 Manage fish & wildlife for water quality/fishing/lake vegetation	■	■	■		■
	4-4 Monitor/report status of fish/aquatic life/wildlife for action plans	■	■	■		■
5. MATERIALS	5-1 Promote management of material resources and reduced energy use		■		■	■
	5-2 Mitigate risks from potentially toxic and harmful materials	■			■	■
	5-3 Reduce foreign material in the lake			■	■	■
6. HUMAN WELL-BEING	6-1 Sustain lake-ecosystem conditions for physiological/health benefits	■		■	■	■
	6-2 Promote learning benefits of nature for human cognitive functions	■	■			■
	6-3 Promote social dynamics using the lake and 'ribbon of life' assets					■
	6-4 Enhance conditions for use of the lake and 'ribbon of life' assets	■	■		■	■
	6-5 Provide resources for community engagement, notification, & education	■	■	■	■	■

[442] Chesapeake 2000 agreement outlines over 100 commitments in five program areas: *living resource protection and restoration, vital habitat protection and restoration, water quality protection and restoration, sound land use, and stewardship and community engagement.*

[443] LMPP Sections III, IV, V, VI & VII delineate the strategies and processes for addressing the 25 objectives that are aligned with the program areas of Chesapeake 2000 are associated with lake-related concerns and community interests. Blue cells in the matrix indicate efforts focused on achieving LMPP objectives also contribute to achieving one or more of the commitments of the Chesapeake 2000 program areas. More than 2/3 of the LMPP 25 objectives rely on engagement of community residents to be fully realized.

In alignment with Virginia's commitment to achieve the Chesapeake Bay Toxics Strategy goal and the Total Maximum Daily Load (TMDL) limits for nitrogen, phosphorus and sediment, the Montclair Lake Management Program supports Prince William County's community-based watershed management approach to tailor restoration, protection, prevention, and assessment actions to the needs of the Powells Creek watershed and to chemicals of concern.[444] Purposeful management and stewardship with participation of all stakeholders will continue to influence the long-term sustainability and resilience of Lake Montclair. Because much of the lake ecosystem relies on healthy conditions of the Powells Creek Watershed ecosystem above and around the lake, MPOA and Montclair residents will continue to coordinate with Prince William County and conservation organizations in conducting stewardship and sustainment activities in the watershed. Figure 7-1 serves as reminder that Lake Montclair is part of the Powells Creek Watershed ecosystem within the Chesapeake Bay basin. This interconnected ecosystem is the primary reason that lake management and stewardship concerns extend well beyond the shorelines of Lake Montclair. It illustrates why stewardship of the lake relies on services inside and outside of Montclair and contributes to commitments to restoring the Chesapeake Bay.

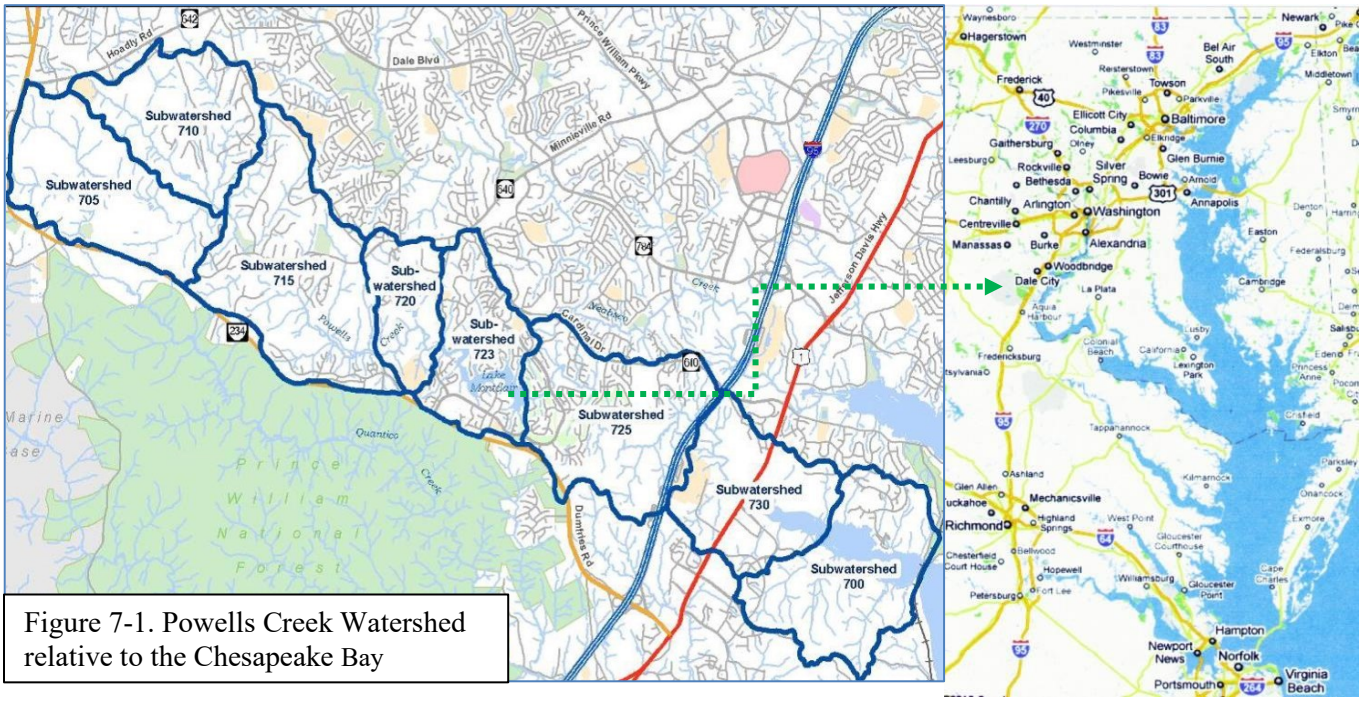

Figure 7-1. Powells Creek Watershed relative to the Chesapeake Bay

This LMPP provides key considerations for aligning responsible stewardship of Lake Montclair with the Powells Creek Watershed; better enabling MPOA, PWC, and residents to make relevant contributions in commitments to restore the Chesapeake Bay.[445] As addressed in Table 2-1 in Section II of this LMPP, the collaborative systems approach and strategies for achieving objectives related to sustaining ecosystem services will continue to guide associated decision-making focused on providing future generations with a sustainable, resilient lake supported by regenerative systems and resources.[446]

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[444] Toxics 2000 Strategy at http://www.chesapeakebay.net/content/publications/cbp_12083.pdf encourages development of plans that *tailor restoration, protection, prevention, and assessment actions to the needs of specific small watersheds and to chemicals of concern.* It provides a focus for *Areas with Low Probability for Adverse Effects* to remain un-impacted. Virginia is committed to: regularly monitor these areas to detect early warning signs of increased chemical contaminant loads or ambient levels that may pose a risk to living resources; encourage sound land use and development activities to prevent or reduce current chemical contaminant loads by taking voluntary actions that go beyond point and nonpoint source regulatory programs, particularly in areas under growth and development pressures.

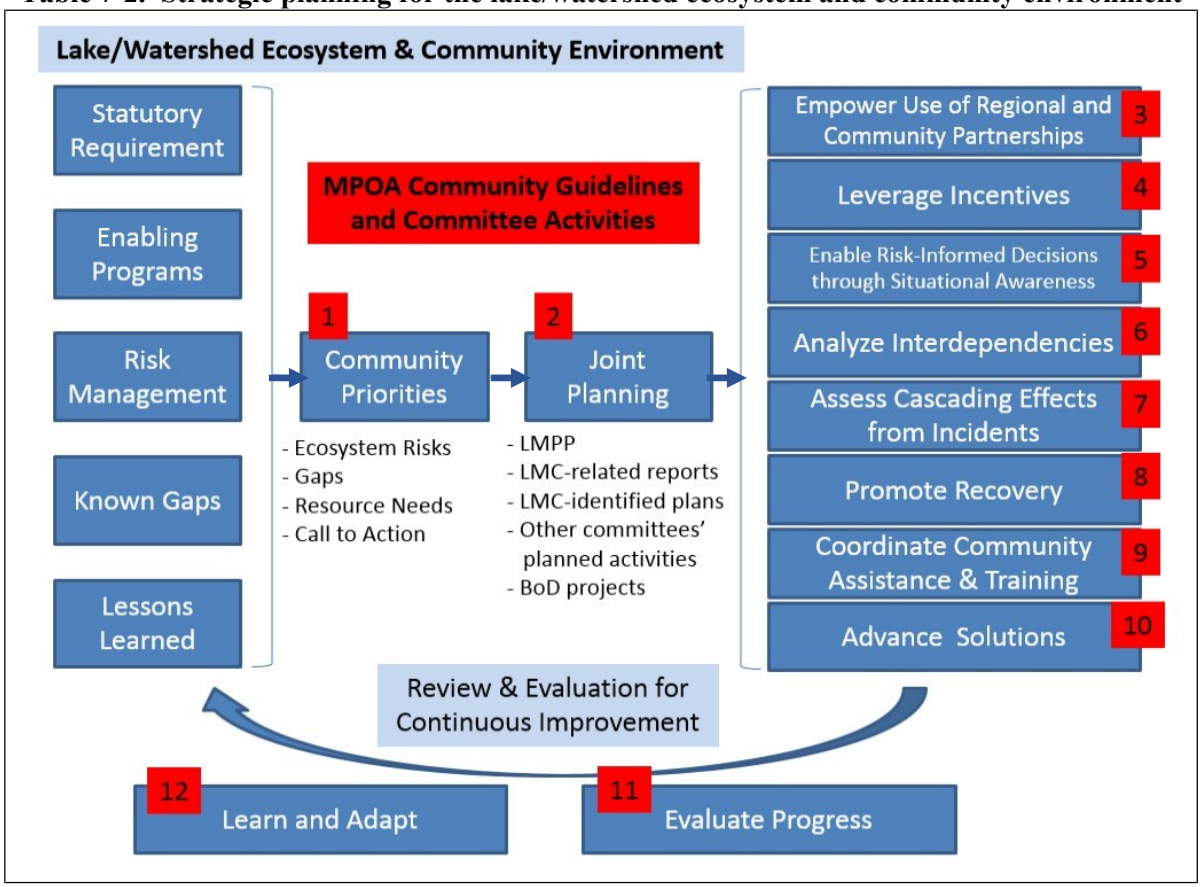
[445] MPOA's periodic dredging reduces sediment going into Powells Creek downstream of Lake Montclair; ultimately contributing to reduced sediment being transported into and by the Potomac River. Efforts by property owners and residents in Montclair to properly use fertilizers and other treatments contributes to reduced amounts of nitrogen and phosphorus being introduced into the lake.

[446] Virginia (along with the other six Bay states and the District of Columbia) has plans to meet Environmental Protection Agency (EPA) statutory limits by 2025. Together the pollution targets and the states' plans comprise a Clean Water Blueprint for the Chesapeake and its rivers and streams. If fully implemented, this will ensure pollution reduction and result in the "fishable, swimmable" waters promised by the Clean Water Act of 1972. The Chesapeake Clean Water Blueprint: ensures everyone shares in the responsibility for cleaning up our waterways. The Clean Water Act provision for the Total Maximum Daily Load (or TMDL) focuses on restoration with enforceable pollution limits for nitrogen, phosphorus, and sediment pollution in the Chesapeake Bay.

b. Strategic Alignment of Lake Ecosystem Management Planning with Community Priorities

Strategic planning considerations and activities are reflected in this LMPP and the EAP.[447] These activities represent efforts in which MPOA manages the stewardship and use of Lake Montclair and its "ribbon of life" assets. Twelve strategic planning activities associated with the lake/watershed ecosystem and community environment are shown in Table 7-2 with the 'red boxed' numbers reflecting the subsequent descriptions of those activities. Lake Management priorities are influenced by MPOA and local authorities. LMC planning efforts reflect stewardship, resilience, security/safety, risk management and harmonious use of the lake and 'ribbon of life' assets.

Table 7-2. Strategic planning for the lake/watershed ecosystem and community environment



These planning efforts are aligned with MPOA strategic goals and objectives, Community Guidelines and regional statutory requirements, and they require collaboration with stakeholders in and outside of Montclair. Community level execution of planning reflects a leveraging of local and regional collaboration efforts. Specific 'call to action' activities are undertaken, as needed, to make progress toward aims, especially those reliant upon residents' cooperation and MPOA BoD approved projects. As such, these 12 strategic planning activities contribute to overall ecosystem resource use and resilience by functioning as input to lake/watershed management.

1. Community Priorities for lake/watershed ecosystem stewardship and use (documented in Section II of this LMPP) are informed and influenced by: a) statutory requirements, b) enabling programs managed by federal, state, and county governments, MPOA, and volunteer non-government organizations, c) risk management efforts that identify, analyze and mitigate the effects of hazards, threats and vulnerabilities, d) known gaps in services and resources, and e) lessons learned, such as those documented in the report of the Storm Water Task Force.[448] Known gaps in services and resources are identified in LMC-proposed priority requirements for projects.

[447] The Lake Montclair Emergency Action Plan (EAP) is on file in the MPOA office and available online via the Montclair website.
[448] Report of the Storm Water Task Force (SWTF) to the MPOA Board of Directors, September 10, 2008 is on file at MPOA office and available on the Montclair website. The SWTF was headed by the LMC Chairman with members from Safety, Communications, and Covenants committees. The SWTF included recommendations for a Lake Management Plan and a Storm Water Management Plan (combined in this LMPP).

Other community priorities identified in Section II of this LMPP are derived from desired benefits of achieving lake management objective, such as environmental water quality that contributes to recreational use of the lake (which also has an impact on property values in Montclair). The periodic review of community priorities reflect more than just input from MPOA residents; they are influenced by an understanding of ecosystem risks, gaps in services, resource needs, and calls to action of relevant stakeholders. Annual update of this LMPP, along with the annual submittal of the Lake Montclair Environmental Quality Report (LMEQR) keeps stakeholders informed of ongoing efforts focused on addressing priorities associated with community interests relevant to environmental quality:

- Lake Recreational Activities and Water Use;
- Lake 'Ribbon of Life' Sustainment, Access and Use;
- Storm Water Management, Dredging, and Management of Soil, Sand and Sediment;
- Water Quality Management and Water Level Management and Control;
- Biological Communities (vegetation, insects, wildlife, fish, and aquatic life) in/around the lake;
- Watershed Property Use and Monitoring Relevant to Lake Ecosystem Management;
- Systems and Procedures for Community Interaction, Training, and Information Resources.

These seven community interests are the categories used in organizing the annual update of the LMEQR, and they serve as the 'needs' categories aligned with community priorities for LMC recommendations for MPOA strategic goals and objectives that contribute to the quality of life in Montclair and the resilience and use of Lake Montclair:

- Enhance Facilities for Water Use and Recreational Activities on Shoreline & Beaches and in the Lake:
    - Bathrooms at all beaches
    - Dock improvements at beaches,
    - Shoreline egress/ingress improvements for kayaks/canoes at beaches and shoreline common areas
    - Improvement of fishing access points at beaches and shoreline common areas
    - Upgrade of safety/security monitoring and access control at beaches and the lake
- Enhance Impounding Structure (Dam & Spillways) and Community Emergency Preparedness:[449]
    - Upgrade of Impounding Structure (Dam and Spillways) in compliance with 4VAC50-20
    - Enhance monitoring/inspection capabilities for earthen embankment dam and spillways
    - Enhance downstream emergency warning and response capabilities
- Enhance Storm Water Management and Management of Soil, Sand and Sediment:
    - Upgrade erosion management with vegetation & structural controls in culverts, basins & forebays
    - Periodic Dredging (and recycling of dredged sediment soil upstream in the watershed)
    - Recovery/recycling and replenishment of sand on beaches
    - Clearing of Powells Creek above the lake and downstream of the dam
- Enhance Capabilities for Water Quality Management and Water Level Management and Control:
    - Environmental water quality testing at Powells Creek/Lake Montclair convergence
    - Upgrade of storm water monitoring and discharge control
    - Upgrade of community alert system with flags at beaches (for weather & water quality conditions)[450]
- Sustain Healthy Biological Communities in/around the Lake:
    - Fish restocking for aquatic weed control and recreational fishing
    - Periodic fish flesh testing for determining health of the lake and aquatic life
    - Habitat for fish, bats and insect-feeding birds
    - Inspection of shoreline and aquatic vegetation
    - Population management of species that are venomous or contribute to unsafe conditions in the lake
- Promote Sustainable Practices for Watershed Property Use and Lake Ecosystem Management:
    - Safe use of fertilizers and proper disposal of pet waste
    - Resource conservation practices and use of native plants in landscaping and habitat restoration
- Enhance Resources, Systems and Procedures for Community Interaction, Training, and Information:
    - Montclair Library display/section on environmental stewardship
    - Events using the beaches and/or lake
    - Montclair website updates for communicating information about health and safety considerations and guidelines for activities in and around the lake.
    - Community recognition program; promote involvement of residents in lake-ecosystem sustainment.

[449] Upgrades support renewal of Dam operations & maintenance certification every 6 years, dam inspections, and update of EAP.

[450] After submitting the list to MPOA in August 2014, the LMC considered benefits versus staffing and resource issues associated with community alert systems, and voted to not make recommendations to MPOA BoD for using flags at beaches as part of the alert system.

2. **Joint Planning** efforts for lake/watershed ecosystem stewardship and use (documented in Section II of this LMPP) are facilitated by MPOA LMC, as approved by the MPOA BoD, in coordination with other MPOA committees and property management staff. Regional statutes and community priorities influence long-term requirements associated with strategic and tactical objectives that necessarily involve a broad range of stakeholders (many external to MPOA, as indicated in Section II.b of this LMPP). Some actions, such as recertification of the earthen impounding structure (dam and spillways) for operations and maintenance, require coordination and approval by county and state offices.

3. **Government Empowers Use of Regional and Community Partnerships**; reflecting the reality that Lake Montclair is part of the Powells Creek Watershed in the Chesapeake Bay basin. Thus, many associated resources and contributing influences needed for sustaining the lake are external of MPOA. As needed, MPOA relies on cooperation of county and state-level organizations and volunteer groups (specified in Section II.b of this LMPP) to implement projects that contribute to the sustainment of a healthy, resilient lake/watershed ecosystem.

4. **MPOA Leverages Incentives** such as grants from state and federal organizations (identified in Section II of this LMPP); this provides a means for MPOA to access the use of additional resources to sustain the lake and "ribbon of life" assets, especially the impounding structure (dam and spillways) that sustain and control the lake level. PWC and MPOA continue to assess potential incentives (including county ordinances and MPOA community guidelines) for incentivizing and encouraging residents to adopt practices that contribute toward accomplishing ecosystem stewardship objectives.

5. **MPOA Enables Risk-Informed Decisions through Situational Awareness**; this is an important aspect of emergency action planning and preparation, as documented in the Lake Montclair Emergency Action Plan (EAP) and Section III of this LMPP. The EAP describes the means for detection of conditions that could contribute to emergency situations. These are a part of MPOA risk mitigation measures that provide information to assist the Dam Owner/Operator in determining the appropriate emergency level for the respective incidents or events.

6. **MPOA LMC and Property Management Analyze Interdependencies**; this is a key aspect of emergency planning (specified in the EAP) and environmental stewardship efforts (identified in Section III of this LMPP) such as the lake-watershed connection. The LMC addresses many interdependencies that extend beyond the lake, shoreline, and Montclair community.

7. **MPOA LMC and Property Management Assess Cascading Efforts from Incidents** as an integral part of emergency planning and response (specified in the EAP) and environmental stewardship efforts (identified in Sections I and III of this LMPP). The EAP provides the activity steps associated with addressing cascading emergency conditions; starting with hazardous condition detection, followed by emergency level stage determination. The emergency level stages start with slowly developing situations (that are actually pre-emergency conditions); followed by rapidly developing situations to urgent situations. Each emergency level stage has pre-established conditions that enable rapid assessment of potentially cascading situations.

8. **MPOA LMC Promotes Recovery** as part of emergency planning and response (specified in the Lake Montclair EAP); this includes activities associated post-incident evaluation and follow-up. Within the context of environmental stewardship efforts (identified in Section III of this LMPP) the LMC promotes recovery as an integral part of MPOA efforts focused on resilience and rehabilitation of lake-ecosystem services. As part of efforts to mitigate risks attributable to hazardous incidents, MPOA coordinates recovery from weather-related incidents with Prince William County, along with any clean-up, containment or removal efforts stemming from any potentially toxic or hazardous materials in the Powells Creek Watershed and the lake.

9. **MPOA Coordinates Community Assistance and Training** associated with sustaining the lake and its "ribbon of life" assets, including operation of the dam; it is a responsibility of the MPOA (via the property management staff and LMC volunteers). As elaborated in Section VI of this LMPP, many training and information resources are available for committee volunteers and residents to learn more about how they can contribute toward the stewardship of Lake Montclair. MPOA coordinates community assistance and training with County and State organizations, such as training associated with dam operations and emergency action planning and response. *The Montclairion* is used to feature many local programs available to residents.

10. **MPOA LMC Advances Solutions** for the stewardship of Lake Montclair, especially those consistent with the harmonious use of the lake and its "ribbon of life" assets relevant to safeguarding resilient lake-ecosystem functions. These solutions (delineated in Sections III-VII of this LMPP) require the cooperation of residents, and several rely on stakeholders who manage resources upstream of Lake Montclair.[451] Some solutions may require multi-year efforts that involve continued vigilance to others that encompass phased improvements, such as those associated with erosion and sediment control.[452, 453] Guiding Principles of Sustainable Sites,[454] informed by landscape limnology,[455] will continue provide guidance for advancing solutions for the stewardship of the lake and watershed.

11. **MPOA Evaluates Progress** relative to the LMPP objectives and community priorities; this is a responsibility of the LMC to provide input to MPOA BoD. Review and evaluation of LMPP objectives are part of MPOA's continuous improvement and sustainment of Lake Montclair and its "ribbon of life" assets.

12. **MPOA Learns and Adapts** as deliberate actions associated with LMPP objectives; they represent outcomes of the associated strategic planning activities contributing to MPOA's lessons learned, such as those in the report of the Storm Water Task Force. These actions are part of MPOA's continuous improvement of processes involved with the operation and sustainment of Lake Montclair and its "ribbon of life" assets.

c. MPOA Lake Management Committee Resources and Expectations for LMPP Evolution.

The MPOA LMC will continue to offer resources for the MPOA BoD and community residents to better enable all to contribute to the stewardship and sustainment of Lake Montclair.[456] The LMC will continue to serve the community focal point to address activities associated with storm water management, water quality, and other objectives specified in this LMPP. More significantly, the LMC will continue to serve in a collaborative manner with all stakeholders with an interest in the stewardship and use of Lake Montclair.

Updated periodically by MPOA LMC with input from other stakeholders, this LMPP is a 'living' document; responsive to evolving needs of ecosystem services and community uses of the lake and its 'ribbon of life' assets. It is submitted to the MPOA BoD as an LMEQR attachment and posted on the MPOA website. Table 7.3 (on the next page) reflects the change history of this LMPP as updates are incorporated.[457] Periodic review ensures this LMPP (and the lake management program and projects it reflects) continues to supportively align with applicable community guidelines and regional statutes and programs.[458] Residents and other stakeholders are encouraged to provide input to this LMPP and become more engaged in lake management and stewardship activities.[459]

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[451] Residents' cooperation and assistance are needed in accomplishing many of the lake management objectives, especially in efforts associated with sustaining environmental water quality. From minimizing pet-waste getting into the lake to cleaning boat hulls, fishing gear and other recreational equipment that are used in several water bodies since these are pathways for disease organisms and invasive species (plants, animals, or pathogens that are non-native or alien to the lake ecosystem) and whose introduction causes or is likely to cause harm.

[452] Natural resources need to be identified in the planning process in order to design an appropriate Erosion and Sediment Control (ESC) plan. The plan must have resource protection at its core and emphasize ***Erosion Control*** (controlling runoff and stabilizing soil), as its main component and ***Sediment Control*** as a management practice. The reduction of soil loss decreases the cost and maintenance of sediment control practices, reduces the risk of degrading natural resources and improves the overall appearance of the site.

[453] As addressed in Section IV.b of this LMPP, an Erosion and Sediment Control (ESC) plan would include vegetative and structural controls and measures that would be used to reduce sediment pollution and how and when the control measures would be sustained.

[454] See Sustainable Sites Initiative http://www.sustainablesites.org/report.

[455] This LMPP uses principles of Sustainable Sites supplemented with the sub-discipline of fresh water science (landscape limnology) to focus efforts in managing and conserving the lake aquatic ecosystem. Using landscape perspectives, it leverages a division of ecology or environmental science that covers the biological, chemical, physical, geological, and other attributes of all inland waters (running and standing, fresh or saline, natural or man-made). **Limnology** is closely related to aquatic ecology and hydrobiology, which study aquatic organisms in particular regard to their hydrological environment.

[456] Internally, past articles in *The Montclairion* relevant to Lake and Watershed Ecosystem Stewardship offer reference material for members and residents. The LMC will continue to assist residents by providing sample plans, drawings and instructions for docks and boat racks conformant with MPOA community guidelines. LMC will continue to leverage resources of other organizations to assist residents in completing actions the enable them to contribute to the stewardship and harmonious use of the lake and its 'ribbon of life' assets.

[457] Unless otherwise directed, this LMPP will be updated annually and submitted with the annual LMEQR to the MPOA Board of Directors.

[458] See processes and procedures for addressing lake-related concerns in Section II.b.3 of this LMPP; available at www.montclairva.com.

[459] Recommendations and comments relevant to this LMPP and the Montclair Lake Management Program can be sent to Joe Jarzombek, LMPP Editor & Principal Author, at sjoejazz7@gmail.com. Stakeholder review comments are appreciated. This LMPP has been developed, written, and edited relying 100% on uncompensated labor efforts of volunteers serving on the MPOA Lake Management Committee.

Table 7.3. Change History of this Lake Management Program Plan (LMPP)

LMPP Version#	Date of Release	Description of Changes:
LMPP version 1.0	Sep 11, 2013	***Approved & adopted by MPOA Board of Directors for public release and use on 9-11; commemorating the 25 year anniversary of MPOA ownership of Lake Montclair.*** • First published version reflecting content of previous revised drafts & editorial mark-ups stemming from July 15 through Sep 9 review period in 2013. • Review drafts incrementally incorporated recommended changes from Prince William County (PWC) Public Works Watershed Management Branch of the Environmental Staff, members of the MPOA LMC and Property Management staff, and members of the MPOA Board of Directors.
LMPP version 1.1	Mar 24, 2014	Approved update reflected editorial changes; updated strategies for sustaining healthy biological communities, management of algae bloom, and management of dredging-related activities; added note on breach inundation assessment; reflected change in name of property management company from Armstrong to FSR; made title change to annual Lake Montclair Environmental Quality 'Plan' to 'Report' (LMEQP to LMEQR).
LMPP version 1.2	Mar 11, 2015	Approved update reflected edits to LMPP v1.1 along with the following content changes: • added Section VII.b on Strategic Alignment of Planning with Community Priorities, including LMC recommendations for Montclair strategic goals and objectives; • added note in Section II.b.3b Table 2-5 about LMC relation with Community Events Committee for planning events using the lake & beaches; • added material on 2014 dredging operations in Section IV.b.4; • added material in Section II about DCR's Virginia Soil and Water Conservation Board that oversees 4VAC50-20 impounding structure regulations; • added FEMA 64 guidance and Virginia Dam Owner's Handbook/workshop in Sect II; • added notes in Sections III, V, & VI.c about Dam Inundation Study -- analysis resulted in a hazard classification statement, flood inundation mapping, and incremental damage assessment; report included results of stability analysis on auxiliary spillway under 100 year, ½ Probable Maximum Flood, Spillway Design Flood, and PMF events. • revised Section III.c/d to align with update of EAP, including Tables for activity steps with emergency conditions and event criteria for determining emergency level stage; • added a note in V.a.4 about need for vigilance in cleaning boat hulls, fishing gear and recreational equipment that has been transported among several water bodies; • added statement in V.a.3 that swimming in the lake, even near beaches, is considered at the person's own risk; changed/reworded title of section V.b to align with LMEQR; • added note in Sections II & V on Virginia DCR Soil and Water Conservation Board grants of $11,200 to MPOA to maintain Lake Montclair Dam operations certification; partially covering dam break inundation study and analysis of dam incremental damage & spillway integrity; • added notes in Section V.b (5&6) about web worms and Dodder parasitic vine that could be problematic for shoreline landscapes; • updated Table 3-2 to reflect 2014 Surface Water Testing for E-Coli and added note in Section V.a.3 about swimming at own risk at beaches after rainstorms and at West Beach from mid-June to mid-Aug and at any beach after a rainstorm due to historical trends of higher-than-acceptable levels of E-Coli at those beaches during those periods; • updated Section V.a.4.d to indicate any boat that can be hand-carried can ingress/egress at any MPOA common area or public beach/shoreline location on the lake.
LMPP version 2	Mar 13, 2019	Update to LMPP previous version 1.2 reflects the following editorial and content changes: • moved some content to footnotes (without changing the content) to enable other content changes to 'fit' within the pages of the specified sections; • updated Section V.b.1.b to reflect changes in fish habitat and mapping of 120 structures; • added footnote in Section V.b.3 with reference to the Virginia Herpetological Society's website that provides information on identifying the Northern copperhead and harmless look-a-like snakes, along with tips when outdoors that can lessen chances of a snake bite; • added footnote in Section V.c with content from the 29 Sep 1988 deed that conveyed responsibilities to MPOA for maintaining and operating Lake Montclair; • added footnote in Section VI.b.5 on Virginia law banning use of lawn fertilizer containing phosphorus, and prohibition on sale of de-icers containing urea (carbamide), nitrogen or phosphorus; • added Section IV.b.5 on emergency spillway modifications needed to provide additional stormwater surge capacity required by DCR.

To ensure long-term sustainability and resilience of the lake, it is essential that people who live, work, and play in the watershed understand relevant ecosystem issues and remain actively involved in the stewardship of the lake and in evolving plans for addressing problems in the watershed and the lake; ensuring that *progress is made.*

Lake Montclair LMPP is available on MPOA website at http://www.montclairva.com