Addendum

Introduction and Background

Maryland is a state with no natural lakes, every large body of water in the state of Maryland is man-made. State law requires that every new development built must have a plan for managing stormwater runoff, which is typically handled via a Stormwater Management Pond (SWMP). In some communities the SWMP is fed by a natural water source at all times and is able to maintain a certain level of water, creating an aesthetic value to the community. In Canal Run, the SWMP is fed by rain runoff from houses and streets, and by a dry storm fed creek that carries water to the SWMP during times of heavy rain in the hills to the north of the community. The combination of local runoff and creek fed water are sufficient to fill the SWMP to the point where water levels are at times higher than the concrete retaining wall. During extended periods of little to no rainfall, the Canal Run SWMP may be completely empty of water, leaving a three acre mud pit in the center of the community.

In November 2017, the Lake Committee was formed with the goal of investigating low water levels in the SWMP, and to consider options for mitigation of potential leaks and increasing water flow into the SWMP. This document details the committee findings as an addendum to the Report on the Stormwater Management Pond of 2012 by the Pond Task Force, and the Lake Report of 2013/14 by Tom Wellock.

Discovery

The performed site visits to the pond and creek, and reviewed original engineering documents, Frederick County assessments, as well as reports from the HOA Pond Task Force, and the Lake Report by Tom Wellock. The findings reached by the committee are outlined below:

Leaks:

Pond

While leaks and holes on the edges and bankgs of the pond have in the past been successfully patched and filled with concrete, the community has long held the belief that the floor of the pond has cracks and leaks which have contributed to an increasing rate of water loss. The

committee was able to view the pond at its lowest water point, a time when there was no water in the pond and has reached the following conclusions:

1. There are three large depressions on the floor of the pond that the committee believes were created from the weight of the water pressing down into the clay floor lining, forcing the soil through the cracks, with water draining out through bedrock cracks beneath the clay liner.
2. New cracks were discovered at the end of the rock outfall where the creek empties into the pond. The force of the water has scoured the clay, creating two long channels exposing the underlying soil.
    a. In the photo below, water filling the channel began to freeze, however, before it could freeze, the water below the surface has drained away, leading to the thin sheet of surface ice collapsing into the channel

    <insert photo from Rizzo>

Creek

The creek is typically dry, however, after sufficient rain to the north of the community, rainwater will fill the creek and continue to flow into the pond for up to 48 hrs after rains have ended. The developer of the community Andy McIntosh once stated that the water flowing through the creek would disappear somewhere along the creek, and reappear further downstream.

1. One of the committee members was able to identify this location, and is shown in the photo below

    <insert photo of creek>

Mitigation:

In looking at mitigation options for the pond and the creek, the committee considered functionality, aesthetic value to the community, and the potential cost to the community for mitigation.

Pond

The SWMP is functioning as designed, with water from homes and streets being contained in the pond allowing time for sediment to settle to the bottom of the pond. Options for mitigation of Pond Leak items 1 and 2 are outlined below:

1. **Bentonite Layer:** Bentonite would be spread across the bottom of the pond to cover the large areas where depressions were noted. Bentonite is hydrophilic and expands to 30x its size and is used to seal and repair pond leaks. Bentonite can be applied either by boat when the lake has water, or when drained. Best results are achieved when the pond is empty of water, with bentonite spread evenly and graded into the bed of the pond.
    a. Applying bentonite is considered the most cost-effective solution, but one that has mixed results.
2. **Concrete Patching:** Concrete patching is effective in patching previously discovered sinkholes, and would be poured at a depth of 4" to fill and patch the three large areas previously identified. However, while effective, patching the pond bed would require either draining the pond, or waiting for a period if and when the pond is empty of water.
    a. Concrete patching is low to mid-level expenditure, expected to cost ~$20K
3. **Clay:** The bed of the pond is a standard clay liner. With the pond drained of water, additional clay with bentonite would be added to the identified areas, graded, and compacted.
4. **Plastic Lining:** Plastic lining would cover the bottom of the lake, extend up to and over the concrete wall, and would require draining the lake to ensure it remained empty during installation.
    a. Plastic lining is the most expensive option, expected to cost $100K+

Creek

Mitigation options for the creek are limited:

1. **Debris:** Clearing debris and dams along its course would allow water to flow more quickly into the pond, minimizing the impact of seepage areas.
2. **Bentonite:** Identified areas of seepage would be raked with Bentonite to seal the floor of the creek, providing additional water to flow into the pond.
3. **Concrete Patching:** Identified areas of seepage would be patched with concrete to seal the floor of the creek.
4. **Stream Restoration:** Stream restoration would involve contracting with a firm specializing in this work and is considered out-of-scope for the community.

Conclusion:

The primary focus of the committee is not the normal operation of the SWMP, as it has been proven in the past that the pond is operating as designed, rather, the committee focus is on aesthetics to the community. The committee also took into consideration that even after

mitigation of identified problems, there is no guarantee that the pond would not run dry at some point in the future during extended dry periods.

Pond

With these considerations in mind, the committee is recommending implementation of option #2 for the bed of the pond and the outfall area of the creek at a time when the water level in the pond has receded to where work can begin.

Option #1 is a low-cost alternative, however, sourcing a contractor to perform the work may well prove problematic and results are not as guaranteed as concrete patching. Option #3 is a close second to option #2, however, with the condition of the subsurface rock unknown, this solution may well produce no positive outcome. #3 is a guaranteed solution, however, as water recedes, the plastic liner would be visible and create a different type of eyesore to the community.

Creek

The committee recognizes that debris in the stream is creating dams along its path, as well as depositing debris into the pond. Recommendations are for options #1,2, and 3. As the creek is dry except in periods of heavy rain, a two-man work crew will be able to clear debris from along the creek path, and can begin at any time. With debris cleared, bags of bentonite can be raked into the creek bed. Next rainfall would force the bentonite into the cracks and seal the creek. Option #3 of concrete patching is seen as a more expensive last resort option, as while the committee has identified an area of seepage, we do not know if once this area is patched, will another appear making bentonite a more cost effective solution. Option #3 was considered and deemed unnecessary, as this is a dry storm-fed creek.