

RECORD OF PROCEEDINGS

MINUTES OF A REGULAR MEETING OF THE BOARD OF DIRECTORS OF THE TRAILMARK METROPOLITAN DISTRICT HELD MARCH 20, 2012

A regular meeting of the Board of Directors of the TrailMark Metropolitan District (referred to hereafter as "Board") was held on Tuesday, March 20, 2012 at 6:30 p.m., at the TrailMark Learning Center, 9743 South Carr Way, Littleton, Colorado. This meeting was open to the public.

ATTENDANCE

The regular meeting of the Board of Directors of the TrailMark Metropolitan District was called and held, as shown, in accordance with Colorado law. The following directors were present:

Michael Rogers
Jack Parsons
Sherman Steed
Richard Handley
Cathy LaClair (left at 8:30 p.m.)

Also present were:

Cathy Noon; Community Resource Services
Blair Leisure; IRIS Mitigation and Design
Curtis Fankhouser and Patricia Durso; Board Members Elect
Members of the Community

CALL TO ORDER

Director Rogers called the meeting to order at 6:32 p.m. Introductions of the Board and community members were made.

ADMINISTRATIVE ITEMS

Agenda: Ms. Noon presented the Board with the proposed agenda. Upon a motion by Director Steed and a second by Director Handley, the Board in attendance voted unanimously to approve the agenda as amended to include III. E. Aeration and VII C. Littleton City Council Visit.

Minutes: The minutes of the January 17, 2012 Regular Board meeting were presented to the Board. Upon a motion by Director Steed and a second by Director Parsons, the Board voted unanimously to approve said minutes as presented.

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Director Rogers welcomed the Board Member elects to the meeting.

Public Comments: There were none.

FINANCIAL ITEMS

Review and Approve Payment of Claims: After review, upon a motion by Director Steed and a second by Director Handley, the Board voted unanimously to approve the claims as presented.

Review Cash Position: Ms. Noon reviewed the cash position with the Board for the period ending March 14, 2012 and the Board accepted the cash position as presented.

Financial Statements: Ms. Noon reviewed the financial statements dated February 29, 2012. After review, the Board accepted the financial statements as presented.

Update on Notice from State Auditor Regarding 2010 Audit – Ms. Noon presented the State Auditor's letter stating the 2010 budget was in compliance.

Discussion on Employment Tax Payments – Ms. Noon informed the Board that all payroll tax payments are current and any penalties incurred for the 2nd or 3rd Quarter, 2011 filing will be paid by CRS. The District is now set up to file electronically with the Federal Government.

MAINTENANCE AND OPERATIONAL ITEMS

Update Regarding Conversion of Ponds A & G – Ms. Leisure reviewed her memo as well as the memo from Wright Watering Engineering regarding the hydrology of Ponds A & G, said memos being attached to and made a part of these minutes. Findings indicate the operations of either pond will not be adversely affected by a conversion to wetlands. Discussion was held on different alternatives for the conversions, if undertaken. The Board indicated a preference for Alternative #1 for Pond A to include cleaning the outlet and planting bulrush seedlings, noting the optimum time to plant is early to mid summer. Rough cost estimate is approximately \$10,000 plus the cost to clean the outlet. Ms. Leisure is to contact the Denver Botanic Gardens, Centennial Water and Sanitation, and the City of Littleton to gain their thoughts on a conversion. The Board directed Ms. Leisure to have the outlet in Pond G cleaned and to obtain a price for the suggested bathymetric study. The Board would like to monitor Pond G operation for 2012 before

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planning any further action.

Update of Wrapping of Trees at Beaver Pond – Director Rogers has marked over one hundred trees that need to be wrapped to prevent beaver damage. David Newell is to begin the wire mesh wrapping as soon as possible. Numerous neighborhood volunteers have offered to help and may be called upon if more trees need to be wrapped or wrapped quickly. Ms. Noon is to set up an account at Home Depot for the purchase of supplies. One large tree has severe beaver damage and needs removal. Director Steed will call Nelson Tree to take down the tree and provide other clean up as needed.

Discussion Regarding Fence Painting for Filing #2 – Ms. Noon reviewed the spreadsheet created by CRS staff to track the yearly fence painting. Director Steed will work further with CRS staff for additional updates to the spreadsheet. Discussion was held on summer 2012 work for Filing #2 painting. Upon a motion made by Director Steed and a second by Director Parsons, the Board voted unanimously to engage Gantner Painting for said painting and to approve a not-to-exceed amount of \$10,000 for the purchase of supplies for the project. Director Steed will contact Mr. Gantner.

Discuss Gate Policy – It was noted that in the TrailMark HOA Design Review Committee guidelines (page 8), there is a statement that “gates are to be approved by the TrailMark Metro District”. Directors Steed and Parsons reviewed past actions regarding the installation of gates in the perimeter fencing in the District where the District gave the authority to approve the gates to the HOA/DRC. No such policy was found in a search of the TrailMark Metropolitan District documents. Director Parsons will inquire with former Board members for any information regarding the gates. The HOA will send a violation notice to an unapproved gate located on Danzig Place.

Aeration at Fairview #1 – Director Rogers informed the Board that the Fairview #1 aeration system was not working at all. David Newell checked the electrical power and indicated it was working properly. Keeton Industries will be on sight March 23rd for repairs.

LEGAL

Executive Session – The Board moved to Executive Session at 9:02 p.m. upon a motion by Director Rogers, second by Director Steed and unanimously passed by the Board. The Board did not

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engage in substantial discussion of any matter not enumerated in section 24-6-402(4). The Board did not adopt any proposed policy, position, resolution, rule, regulation, or formal action. The Executive Session meeting was adjourned at 9:06 p.m. on a motion by Director Parsons, second by Director Handley and passed on the affirmative vote of four members.

Ratification of Expenditures for Water Rights Case – Upon a motion by Director Parsons and a second by Director Handley, the Board in attendance voted unanimously to ratify said expenditures to include an “expert opinion from Wright Water Engineering and for Wayne Forman, the District’s water attorney, to begin the next steps in the water rights case”.

COMMITTEE UPDATES

By-Laws Committee – The committee has not met and no report was given.

Communications Committee – It was noted that Director Parsons will make signage for the “Coffee in the Park” events.

TRAILMARK HOA/STAR CANYON HOA UPDATE

Update on Fence Painting of Star Canyon – Director Rogers will attend the Star Canyon HOA March Board meeting to update them

Annual Easter Egg Hunt - It was noted that the TrailMark HOA annual Easter Egg Hunt will be held on April 7, 2012.

Littleton City Council – Director Steed informed the Board that the Littleton City Council will visit TrailMark Metropolitan District on May 22, 2012 from 4:30 p.m. to 6:30 p.m. and will be providing food, fire trucks and staff to interact with the citizens.

OTHER BUSINESS

Update on ISO Ratings – The Board was informed that the Task Force met and that Littleton has contracted with West Metro Fire, but this may not help the ISO ratings. Various locations for a new fire station have been discussed by Littleton Fire, but no decision has been made to build a new station.

Update on Election – It was noted that the election will be cancelled as more nominations were not received than there were positions to be filled and that the Notice of Cancellation will be published on March 22, 2012. Director Rogers will make this announcement on Facebook.

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South Suburban Park and Recreation District Master Plan Update

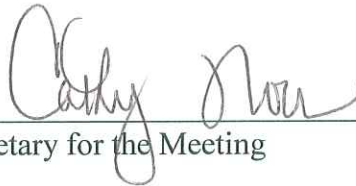
– Director Handley gave a brief update to inform the Board that the task force is looking to develop alternatives to bring to the citizens for their review. He wondered if the HOA and the District should meet with South Suburban.

Public Comments – There were none.

ADJOURNMENT

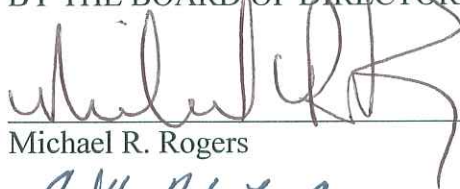
There being no further business to come before the Board, upon motion duly made by Director Steed, seconded by Director Handley, and passed unanimously, the meeting was adjourned at 9:08 p.m.

Respectfully submitted,



Secretary for the Meeting

THESE MINUTES ARE APPROVED AS THE OFFICIAL MARCH 20, 2012 MINUTES OF THE TRAILMARK METROPOLITAN DISTRICT BY THE BOARD OF DIRECTORS SIGNING BELOW:



Michael R. Rogers

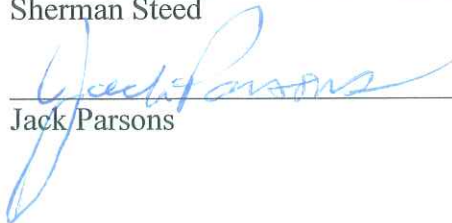


Catherine H. LaClair

Richard A. Handley



Sherman Steed



Jack Parsons



IRIS
MITIGATION AND DESIGN, INC.
Environmental Consulting

IRIS MITIGATION AND DESIGN, INC.
3450 W. 32nd Avenue, 2nd Floor
Denver, Colorado 80211
Phone: 720-272-1985
bleisure@irismitigation.com

TRAILMARK PONDS A AND G UP-DATE

Pond A

- Normal pool elevation of 5529 feet (bottom of holes)
- Water quality elevation of 5530.8 feet (top of holes)
- Bottom pipe invert is at 5525.63 feet
- Overflow is at 5535 feet
- 10-year storm event is at 5533.2 feet
- 100-year storm event is at 5535 feet

Normal water level should be at 5529 feet with average pond bottom of 5527 feet (should be 2 feet deep on average). We know that Pond A is 1 foot deep on average (from Aquatic Alternatives, Inc.) so there is likely sediment accumulation of approximately 1 foot deep with deeper water levels near the outlet pipe and box.

We know that we can open the bottom outlet plate/discharge pipe if needed (located at elevation 5525.63 feet asl) to drain the pond.

- Great for our wetland planting
- Great in case of excessive precipitation events



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Pond G

- Normal pool elevation of 5510 feet (bottom of holes)
- Water quality elevation of 5512.2 feet (top of holes)
- Discharge pipe invert is at 5505.2 feet
- Overflow is at 5515 feet
- Top of berm to east is at 5519 feet
- Top of road to west/north/south is greater than 5520+ feet
- 10-year storm event is at 5516 feet
- 100-year is at 5517.7 feet

The discharge pipe and potentially some water quality holes may be clogged. The berm located to the east is only 1'3" taller than 100-year storm event estimate of 5517.7 feet.

The emergency overflow spillway is wide (approximately 135 feet or so) at elevation 5515 feet

Could have a blow-out in a big storm – could not open the bottom pipe.

The Pond G water level is at approximately elevation 5512 feet since we have 2 acres of existing open water. (If water levels were at 5510 feet, we would have less than one acre of open water).

The average depth of bottom was 5507 feet according to design. It is currently approximately at 5510 feet as the pond is approximately 2 feet deep (according to Aquatic Alternatives, Inc.).

Pond G has approximately 3 feet of accumulated sediment if these numbers are correct.



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bleisure@irismitigation.com

Memorandum

To: TrailMark Metropolitan District Board
From: Blair Leisure, IRIS Mitigation and Design, Inc. (IRIS)
CC: Community Management Services, Inc.
Date: January 17, 2012
Re: Ponds A and G at TrailMark Subdivision – Potential as Wetland Ponds

IRIS Mitigation and Design, Inc. (IRIS) wetland scientist Blair Leisure recommends the following plan in order to proceed in creating wetland pond conditions at Ponds A and G including wetland plant establishment across a majority of the ponds with open water pockets remaining.

Pond A

IRIS recommends that a wetland planting be first assessed for Pond A. A wetland planting had been completed at Pond A by IRIS several years ago with an outcome of bulrush establishment in pockets around the pond. This pond is approximately 1 foot deep with thick organic muck of at least 1 foot below the water surface. There is a point during the summer when water level drops to even less than 1 foot deep in many locations around Pond A (according to Aquatic Alternatives, Inc.). The normal pool elevation at Pond A is at approximately 5529 feet and the discharge pipe is at 5525.63 feet. The location of the pipe invert creates a pocket of deeper water in this location. When the outlet box wheel is turned, the plate moves from the pipe and this pond drains successfully. This feature is used by both



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the Botanic Gardens and Centennial Water and Sanitation for passing water from Fairview Reservoir #1 down through the stormwater system into Deer Creek.

IRIS recommends that we approach the Denver Botanic Gardens and Centennial Water and Sanitation with an explanation that we are undertaking another wetland planting during the summer of 2012. We would determine when these groups will be taking draws off the pond in 2012 and schedule the wetland planting between draws when the largest time period is available. We would open the bottom pipe outlet and drain the pond allowing it to drain completely and potentially dry out the pond bottom slightly. We would then plant the pond with mainly bulrush plugs and other appropriate wetland species which thrive in approximately 1 to 3 feet of standing water. However, until somewhat established (at least 1.5 to 2 feet tall) the water level should remain low. We would plant the majority of Pond A up to an area near the outlet pipe where water levels are deeper. We would request that the outlet pipe remain open for as long as possible to allow the wetland plants to establish. Within approximately one to two months, draws could again be taken from Fairview Reservoir #1 leaving the discharge pipe open. This scenario would allow establishing wetland plants to more fully establish before closing the discharge pipe later in the summer. Alternatively, we may close the discharge pipe earlier and allow the plants to sit in approximately 1 foot of water as long as the plants are over 1.5 feet tall.

IRIS recommends that a qualified engineer review the 10-year and 100-year storm event elevation numbers with the understanding that the pond will now be a wetland pond and will be filled with wetland plant material. We would want to be sure that the emergency spillway overflow weir which is located at elevation 5535 feet is sufficient to handle these conditions. The top of the berm is at approximately 5536 feet which would empty any flows down into the Botanic Gardens property. In addition, we could always open the outlet pipe to drain the system more rapidly through the stormwater system down into Deer Creek. It is important to be sure that we understand how the new wetland conditions might affect both the 10-year and 100-year storm events.



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Pond G

IRIS recommends that minor clearing around the outlet box occur in winter/spring 2012 to allow normal pool elevation to recede from approximately elevation 5512 feet back down to elevation 5510 feet. This rise in water elevation may have occurred due to some of the water quality orifices being plugged by sediment/vegetation. A relatively minor clearing out of sediment around the outlet box could result in lowering the water level back to the normal pool elevation of 5510 feet as per the design. Aquatic Alternatives, Inc. representative Tammy Schneck explained to me in our phone conversation last week that Pond G is normally approximately 1.8 feet deep except for a deeper pocket in the eastern side of the pond just north of the outlet box, where water levels may be approximately 3' to 4' deep. It appears a majority of Pond G has filled in with between 2 to 3 feet of sediment based on design grading. This explains why the outlet pipe which is located at elevation 5505.2 feet is now clogged and the pond cannot be drained through this pipe. The pipe is likely sitting below 2 to 3 feet of accumulated sediment.

IRIS recommends that once the outlet box orifices are cleared that we watch what happens to the normal pool elevations and see if the pond level naturally drops so that many areas with inundated soils come to the surface with little standing water. IRIS would anticipate a deeper water pool remaining around the eastern portion of the pond due to the deeper water levels located there. Once water levels subside, we may want to try and jet the discharge pipe so that it functions and we can drain the pond as needed. This may involve some excavation of sediment around the discharge pipe itself. If conditions warrant a wetland planting, we could plant the appropriate portion of the pond with the same combination of bulrush species as planted at Pond A either in the summer of 2012 or 2013. Again, IRIS recommends that an engineer review how an established wetland at Pond G might impact the 10-year and 100-year storm events through the system. We want to be sure that the existing emergency overflow weir (which is approximately 125 feet in width) is adequate for handling up to the 100-year storm event.

WWE MEMORANDUM

To: TrailMark Metropolitan District
Board of Directors
Via Email to Cathy Noon: CNoon@CRSofColorado.com

From: Wright Water Engineers, Inc.
Charles R. Haines and David W. Foss, P.E.

Date: March 8, 2012

Re: Pond A and Pond G
Hydraulic Evaluation of Contemplated Modifications

INTRODUCTION

The TrailMark Metropolitan District (TrailMark or District) is considering creating shallow emergent wetlands within a majority of the surface areas of Detention Ponds A and G on the District's northern boundary. As currently designed, the ponds are deeper, consisting primarily of open water with some wetland fringe.

This memorandum was prepared by Wright Water Engineers, Inc. (WWE) to assess the hydrologic and hydraulic implications of converting Ponds A and G from deeper open water ponds to shallow water wetlands. This includes how the new wetland conditions might affect both the 10- and 100-year storm events. The scope of our assessment was limited primarily to hydrology and hydraulics, because we were informed that all other aspects of this feasibility evaluation, such as wetlands establishment, permitting, water rights, community reactions and legal aspects, are being handled by others.

BACKGROUND

When land to the southwest of the Chatfield Arboretum was considered for development, the Denver Botanic Gardens (DBG) raised concerns that development of the subdivision might adversely impact downstream water quality, in particular due to the addition of pollutants to stormwater runoff from the subdivision and increased quantities of runoff. Extensive analysis and planning were conducted to include features aimed at avoiding or minimizing adverse runoff and water quality impacts to the DBG property.

WWE has historic involvement with the hydrologic analysis of the Chatfield Green development (renamed "TrailMark"). As part of the hydrologic analysis, WWE prepared the *Chatfield Green Regional Hydrology Report* (Hydrology Report) in April 1998 (revised August 1998) to provide the site hydrology for the proposed development, including off-site runoff. As part of this report, runoff was calculated using the Colorado Urban Hydrograph Procedure (CUHP) model. The individual basin hydrographs, computed using CUHP, were routed using HydroCAD to determine the composite storm hydrographs at the detention pond locations.

To perform the current evaluation, WWE utilized:

1. WWE's *Chatfield Green Regional Hydrology Report* (Hydrology Report) in April 1998 (revised August 1998);
2. Carroll & Lange, Chatfield Green Filing No. 1, Pond A and B Plan and Profile, Sheet 29 of 31, Record Document (Pond A and B Record Document);
3. Carroll & Lange, Chatfield Green Filing No. 1, Pond G Plan and Profile, Sheet 29A of 31, Record Document (Pond G Record Document); and
4. *Amended and Restated Agreement Concerning Development of Chatfield Green Subdivision* dated December 22, 1997 (1997 Agreement).

These references were deemed reliable and accurate for our purposes.

FUNCTIONS OF DETENTION PONDS

TrailMark contains approximately 346 acres of primarily residential and some commercial development with approximately 30 percent open space. The design of TrailMark included features aimed at avoiding or minimizing adverse impacts to DBG. To address water quality concerns, as well as to attenuate post-development peaks to pre-development levels in accordance with City of Littleton drainage requirements, three detention ponds (Ponds A, B, and G) were included in TrailMark's drainage facility design. For purposes of this memorandum, WWE considered only Ponds A and G, since they are being contemplated for conversion from open water ponds to shallow emergent wetlands. The construction and maintenance of the ponds are required by the 1997 Agreement. (See generally Sections 6, 9 and 10 of the 1997 Agreement.)

As discussed in more detail below, the total hydraulic capacities of Ponds A and G can each be broken down into three or four components, which have distinct functions.

1. At the "bottom" of each pond is the "Normal Pool" or "dead pool" which remains full of water under normal conditions. Some stormwater detention basins (referred to as "wet basins") include a Normal Pool and some (referred to as "dry basins") do not. A function of the normal pool in a wet basin is to allow suspended particulates in the stormwater entering the pond to settle to the bottom by providing the water with some "residence time" in the pond and by providing storage capacity for the sediment to accumulate between maintenance operations to remove the sediment. Somewhat better pollutant removals have also been reported for wet basins than for wetlands or dry basins. The removal of both sediment and pollutants are part of the "water quality" function of the detention basin, because it is intended to improve the quality of the stormwater leaving the basin. The greatest incidence of high sediment concentrations in the stormwater runoff at TrailMark was during the grading of the subdivision and the construction of streets and homes. Since that phase is past, a significant reduction in the capacities of the normal pools may be reasonable. Shallow water wetlands could be created to replace much of the original volumes of the normal pools, provided that occasional maintenance may be required to remove sediment. The elevation of the top of the normal pool is determined either by the lowest row of holes in the "orifice plate" (see below) or—in the case of Pond G—by the invert elevation of the outlet pipe, which is approximately the same as the lowest holes in the orifice plate. When storm runoff enters a detention basin, water will begin to drain passively

from the detention basin through the holes until the storm runoff has fully drained out and the water level falls again to the top of the normal pool.

2. The next component of storage capacity in Pond A and G detention basins above the normal pool is the "Water Quality Capture Volume." This volume occupies the interval between the elevation of the lowest row of holes in the "orifice plate" and the invert (lowest point) of the overflow structure from the detention basin. As the water level within the Water Quality Capture Volume (WQCV) rises during a storm event, it submerges additional rows of holes in the orifice plate, so that the rate of flow leaving the detention basin increases. The WQCV is so-named because its function is to capture the routine storm runoff from the subdivision. The WQCV is sized to capture the runoff from a majority of the smaller storm events that will occur and the first runoff from large storm events. The controlled rate of flow leaving the detention basin through the holes in the orifice plate provides for sediment to settle to the bottom of the detention basin.
3. Once the water level in the detention basin rises above the invert of the overflow structure, the rate of outflow leaving the detention basin can increase rapidly, although not as rapidly as the rate of inflow increases. The result is that the highest (or "peak") rate of runoff during the storm event is stored temporarily in the detention basin. This is the hydraulic function of the detention basins. The hydraulic design of the overflow structure for the detention basin is intended to contain the peak of the inflow hydrograph, so that the peak of the outflow hydrograph is approximately what it would have been if the same storm event had occurred before the subdivision was developed with all of the impervious surfaces that cause an increase in the storm runoff hydrograph, i.e., historic pre-development flows. The design requirements for the Pond A and G detention basins are specified with reference to two specific storm events that have statistical probabilities of occurrence of once in every ten years and once in every hundred years. The maximum elevations of the water levels in the detention basins during each of these storm events, the peak rate of the outflow hydrographs for these "design storms," and the total volumes of water stored in the detention basins at those water levels are given in Tables 1 and 2 below. The "net" storage volume required by the hydraulic design refers to the storage volume above the WQCV elevation.

Pursuant to the City of Littleton *Storm Drainage Design and Technical Criteria (Criteria)*, Ponds A and G were designed to accommodate the 100-year flood event. Detention pond sizing criteria was based on the 10- and 100-year events. The detention ponds were sized according to the City of Littleton *Criteria* and to keep post-development flows at or below pre-development flows.

POND A

Pond A has a total tributary area of approximately 150 acres, with approximately 90 acres located within TrailMark. Table 1 recaps the design volumes and the release rates as provided on the Pond A and B Record Document.

Table 1
Pond A Record Document Volumes and Release Rates

Description	Total Volume (acre-feet)	Allowable Release Rate (cfs)	Water Surface Elevation (feet)
Normal Pool	0.71	--	5529.0
Water Quality Capture Volume	2.42	--	5530.8
10-Year	5.48	20.8	5533.2
100-Year ¹	8.36	76.8	5535.0

¹ Per the Record Document, "net 100-year volume required = 5.97 acre-feet (per report).
100-year provided = 8.36 acre-feet – 2.42 acre-feet = 5.94 acre-feet."

The Pond A outlet structure consists of a junction box with an orifice plate and a manually-operated gate bypass system with an 8-inch under-drain pipe. The orifice plate allows a slow release rate for minor storm events which allows sedimentation that provides water quality benefits. The Pond A and B Record Document, specifies the invert-in elevation of the 8-inch under-drain pipe as 5525.3 feet and the invert-out elevation is 5523.85 feet. Note that there is reportedly sediment accumulation at the bottom of the pond, so the actual depth of the normal pool may be less than design. The Pond A and B Record Document gives the elevation of the top of the water quality capture volume (WQCV) as 5530.8 (top of the orifice plate holes), the 10-year water surface elevation is 5533.2, and the 100-year water surface elevation is 5535.0.

Based on the design of the 8-inch under-drain pipe, when the bypass gate is open the pond can be fully drained. Leaving the bypass gate in an open position is discouraged, since this would cause the water to bypass the orifice plate, and would circumvent the water quality function of the pond.

If the bottom of the pond were to be filled in and raised to an elevation below the orifice plate, this would not affect the water surface elevations, volumes or release rates of the WQCV, 10-year event, or the 100-year event. Only the volume of the normal pool (dead storage) would be affected and WVE did not discern any calculations to indicate a required hydraulic residence time for the normal pool. Therefore, there would be no harmful hydrologic/hydraulic effects from decreasing the volume of the normal pool. However, a deeper open water pool should be maintained near the outlet structure to help keep the wetland plant detritus from clogging the orifice plate and to maintain the designed water quality function of the pond.

POND G

Pond G has a total tributary area of 880 acres, with approximately 232 acres located within TrailMark. Table 2 provides the design volumes and the release rates as given on the Pond G Record Document.

Table 2
Pond G Record Document Volumes and Release Rates

Description	Total Volume (acre-feet)	Allowable Release Rate (cfs)	Water Surface Elevation (feet)
Normal Pool	8.9	--	5510.0
Water Quality Capture Volume		--	5512.3
10-Year	22.8	Not provided on Pond G Record Document	5516.0
100-Year	32.5	1,131	5518.0

The emergency spillway overflow weir (approximate width: 125 feet) is at elevation 5516.0. Storm events greater than the 10-year event will overtop this emergency spillway. The emergency spillway weir is wide enough that a significant increase in the flow rate results in a relatively small increase in the depth of the water overtopping the weir. At the 100-year flow of 1,131 cfs the average velocity of the water passing over the weir would be 4.5 feet per second at the corresponding water surface elevation of 5518.0. There would be one foot of freeboard from the 100-year water surface elevation to the top of the berm.

The Pond G outlet structure complex consists of a junction box with an orifice plate for water quality and a manually operated gate and under-drain pipe to the bypass system, which has two 24-inch reinforced concrete pipes (RCP) connecting to the outlet structure type D inlet. The Record Document gives the invert of the 8-inch under-drain pipe as elevation 5505.05. The invert-out of the lower 24-inch RCP is at elevation 5509.70. Note that there is reportedly sediment accumulation near the outlet structure, so the actual depth of the normal pool may be less than the design. Per the Pond G Record Document, the elevation of the WQCV is 5512.2 (top of the orifice plate holes), the 10-year water surface elevation is 5516.0, and the 100-year water surface elevation is 5518.0.

Based on the current configuration of the outlet structure complex, when the bypass gate is open, the elevation of the pond will be that of the invert-out of the 24-inch RCP. Therefore, the pond cannot be drained via the bypass gate and under-drain pipe. However, operation with the bypass gate in an open position is discouraged, since this would allow the water to bypass the orifice plate, and circumvent the water quality function of the pond.

If the bottom of the pond were to be filled in and raised to an elevation below the orifice plate, this would not affect the water surface elevations, volumes or release rates of the WQCV, 10-year event, or the 100-year event. Only the volume of the normal pool (dead storage) would be affected and WVE did not discern any calculations to indicate a required hydraulic residence time for the normal pool. Therefore, there would be no harmful hydrologic/hydraulic effects from decreasing the volume of the normal pool. However, a deeper open water pool should be maintained near the outlet structure to help keep the wetland plants from clogging the orifice plate and to maintain the designed water quality function of the pond.

ADDITIONAL RECOMMENDATIONS AND OBSERVATIONS

In addition to recommendations made within this memorandum, WWE also has additional maintenance suggestions and other recommendations provided below.

As a professional courtesy, the Engineer of Record for the design of Ponds A and G should be contacted, if possible, and invited to comment on the proposed modifications to the ponds.

Any current sedimentation and plant growth immediately in front of the existing orifice plates needs to be removed to allow proper water quality function at the pond outlets.

Your wetlands consultant can advise TrailMark as to possible 404 Permit requirements for future maintenance activities involving the removal of sediments deposited in the wetlands.

Pond modifications to shallow emergent wetlands should still maintain deeper open water pools in front of the orifice plates and outlet works. Generally, no emergent wetland plants will grow in water 4 feet deep, or deeper. Regular maintenance will be required to maintain this depth.

The existing under-drain pipe inlets in the ponds should be maintained as constructed. Except during maintenance operations, the gates to these pipes should remain closed.

The potential for anoxic or "earthy" odors and the potential for increased mosquito nuisance that may be associated with wetlands should be assessed by your wetland and pond consultants.

Maintenance activities that may be associated with shallow emergent wetlands should be expanded to include routine and regular cleaning of plant debris from the orifice plate. Occasional plant detritus removal may also be required.

If shallow wetlands are established at points where surface storm drainage enter the ponds, energy dissipation should be provided for inflows as necessary to prevent erosion of the surface of the wetlands.

WWE is unaware of any water rights implications of these contemplated modifications, and we assume that this subject is being handled by others. Evapotranspiration associated with the wetlands would be expected to be similar to the free water evaporation, resulting in negligible changes in water consumption. Similarly, there are no water rights storage volumes associated with Pond A or Pond G.

To determine accurate pond dead storage volumes, and the related fill required to convert to shallow emergent wetlands, a bathymetric survey should be considered.

WWE recommends as a near-term next step, TrailMark obtain stakeholder reviews by DBG, City of Littleton, or other agencies that may be party to stormwater and water quality agreements or other contractual obligations that TrailMark may have engaged in regarding the ponds.

The 1997 Agreement between Chatfield Green (TrailMark's predecessor) and DBG contains the following provisions relative to Ponds A and G:

Section 10(e), Page 19: **Maintenance of Ponds A, B and G and the Stormwater Diversion Structures (Post Development Phase)**. During the post Development Phase the District shall be responsible for the maintenance, operation, and repair of Ponds A, B and G and the Stormwater Diversion Structures to their design capacity, and for their replacement in the event the structure can no longer operate as designed through continued maintenance and repair. If the District fails to commence to perform and diligently pursue the necessary operation and maintenance work to achieve those results within fifteen (15) days after being requested to do so by the Gardens, the Gardens shall have the right to perform such work on any of those structures and be reimbursed by the District.

EXHIBIT I, A. General 2. (consecutively numbered page 75): Commencing in the sixth year after the satisfaction of all the Filing No. 1 requirements, stormwater sampling and analysis would be conducted by the District, but on a cost-shared basis then agreed upon between the District and the Gardens.

EXHIBIT I, A. General 3. (consecutively numbered page 75): All post construction monitoring would be non-compliance oriented. When recommended concentrations are exceeded, homeowner education and informational programs would be triggered. The programs would be funded and conducted jointly by the District, homeowners association, and the Gardens.

EXHIBIT I, B. Post Development Phase – Surface Water Quality 2. (consecutively numbered pages 75-76): After the initial five-year period, the monitoring frequency would be reduced to one storm event per year in perpetuity, or until such time as the parties agree further modifications in monitoring frequency are appropriate or routine monitoring is no longer necessary. Appropriate sampling and preservation, chain-of-custody, and analytical procedures as indicated in Exhibit J would be followed.

Questions concerning the interpretation of these and other provisions of the 1997 Agreement with respect to the mutual duties and potential liabilities of TrailMark and DBG as relates to the contemplated pond modifications should be referred to TrailMark's attorney.

CONCLUSION

Based on this hydraulic evaluation, the stormwater detention functions of Pond A and Pond G would not be affected by converting the ponds to shallow emergent wetlands. The water surface elevations, volumes, and release rates of the WQCV, 10-year, and 100-year storm events will remain unaffected if the bottoms of the ponds are filled to elevations lower than the orifice plates. The nominal volume that the emergent wetland plant mass may occupy above the WQCV elevation would generally be expected to help with water quality and would not be expected to occupy a significant portion of existing storage volumes.

cc: Blair Leisure