I. Welcome To Attendees And Roll Call Of Commission Members By Chair Lee

II. Review Tonight’s Agenda/Questions Or Comments

III. Review And Discussion Of The Site Development Plan (SDP) And Related Items By The Site Plan Subcommittee Of The Planning And Zoning Commission Regarding P.Z. 15-17 Babler Farms, L.L.C., C/O Tom Roberts, 550 Laurey Lane, Wildwood, Missouri, 63005 – A Conditional Use Permit (CUP) In The NU Non-Urban Residence District For A Fifty-Nine Point Nine (59.9) Acre Tract Of Land Located At The Terminus Of Laurey Lane, South Of Wild Horse Creek Road (Locator Numbers: 20X630015 And 20X630024/Street Addresses: 500 And 550 Laurey Lane). Proposed Use: An Existing Large Water Feature – Lake – And Associated Waterfall Structure – (As Defined By §415.030 Of The City Of Wildwood’s Zoning Regulations). The Large Water Feature Is Three Point Five (3.5) Acres In Size. (Ward
AGENDA for the CITY OF WILDWOOD'S SITE PLAN SUBCOMMITTEE OF THE PLANNING AND ZONING COMMISSION (ALL MEMBERS ARE WELCOME)

City Hall Council Chambers
- 16860 Main Street

Monday, June 15, 2020
6:00 p.m. to 6:50 p.m.

This Meeting will be via "Zoom Webinar Platform" and be Broadcast on the City of Wildwood's YouTube Channel

Please Visit: https://www.cityofwildwood.com/1976/Virtual-PZ-Meetings

Welcome To Attendees And Roll Call Of Commission Members By Chair Lee

Review Tonight's Agenda/Questions Or Comments

Review And Discussion Of The Site Development Plan (SDP) And Related Items By The Site Plan Subcommittee Of The Planning And Zoning Commission Regarding P.Z. 15-17 Babler Farms, L.L.C., C/O Tom Roberts, 550 Laurey Lane, Wildwood, Missouri, 63005 – A Conditional Use Permit (CUP) In The NU Non-Urban Residence District For A Fifty-Nine Point Nine (59.9) Acre Tract Of Land Located At The Terminus Of Laurey Lane, South Of Wild Horse Creek Road (Locator Numbers: 20X630015 And 20X630024/Street Addresses: 500 And 550 Laurey Lane). Proposed Use: An Existing Large Water Feature – Lake – And Associated Waterfall Structure (As Defined By §415.030 Of The City Of Wildwood's Zoning Regulations). The Large Water Feature Is Three Point Five (3.5) Acres In Size. (Ward – One)

- One)

- Overview of Plan and Related Items by Department of Planning Staff

- Response by Petitioner

- Comments and Questions by Subcommittee Members

- Consensus on Future Recommendation

Documents:

PZ 15-17 BABLER FARMS.PDF
PZ 15-17 DAVID HUDSON COMMENTS.PDF

IV. Public Comment

V. Other

VI. Closing Remarks And Adjournment

Note: The Site Plan Subcommittee of the Planning and Zoning Commission will consider and act upon the matters listed above and such other matters as may be presented at the meeting and determined to be appropriate for discussion at that time.

The City of Wildwood will provide reasonable accommodations for persons attending Site Plan Subcommittee meetings. Requests for reasonable accommodations should be made by contacting Megan Eldridge, City Clerk at 636-458-0440 or email at megan@cityofwildwood.com at least 48 hours prior to the start of the meeting.

If you would like to submit a comment regarding an item on this meeting agenda, please visit the Form Center.
Site Plan Subcommittee of the Planning and Zoning Commission
June 15, 2020 Meeting
City of Wildwood, Missouri
Prepared by the Department of Planning

Petition No.: P.Z. 15-17
Petitioner: Babier Farms, L.L.C., c/o Tom Roberts, 550 Laurey Lane, Wildwood, Missouri, 63005
Request: A Conditional Use Permit (CUP) in the NU Non-Urban Residence District for a fifty-nine point nine (59.9) acre tract of land. Proposed Use: An existing large water feature – lake – and associated waterfall structure – (as defined by §415.030 of the City of Wildwood’s Zoning Regulations). The large water feature is three point five (3.5) acres in size.
Location: Terminus of Laurey Lane, south of Wild Horse Creek Road (Locator Numbers: 20X630015 and 20X630024/Street Addresses: 500 and 550 Laurey Lane;
Ward: One

CONSIDERATIONS >>>

On June 18, 2018, the Planning and Zoning Commission granted a Conditional Use Permit (CUP) for an existing large water feature and associated waterfall structure on the subject property of this matter. The large water feature and associated waterfall structure had already been constructed without the benefit of the required permits, so the action of the Planning and Zoning Commission was premised on obtaining post-construction compliance to City codes and regulations. As part of this favorable action by the Planning and Zoning Commission, it included a list of conditions that were applicable to the large water feature and associated waterfall. These conditions were formulated to address the safety of the construction of the dam and water feature, along with ensuring the operation of it, and the associated waterfall, would not cause potential issues for surrounding property owners.

With the granting of the Conditional Use Permit (CUP), the property owner was now obliged to submit a Site Development Plan and supporting information to address the conditions of the permit and other regulations applicable to large water features, as well as the associated waterfall. The Site Development Plan is a requirement of the permit and reads as follows in this case:

Within twelve (12) months of the Conditional Use Permit (CUP) being granted by the Planning and Zoning Commission, and prior to any further site disturbance, the operator shall submit to the Planning and Zoning Commission for their review and approval a Site Development Plan. Where due cause is shown by the operator, this time interval may be extended once by the Planning and Zoning Commission in accord with requirements of Chapter 415.480 of the City of Wildwood
Zoning Ordinance  Said Site Development Plan shall include, but not be limited to, the following information:

a. Outboundary plat and legal description of the property.
b. Location and extent of all existing improvements, including all buildings and accessory structures, along with the planned large water feature and all improvements in association with it.
c. A general plan indicating setback lines along the perimeter of the subject tract of land and surrounding property lines and related improvements within two hundred (200) feet of this site’s boundaries, i.e. curb cut and access locations, stormwater facilities, and utility installations and easements.
d. Location of all roadways adjacent to the property, including required roadway right-of-way dedication and pavement widening, with existing and proposed improvements and trails, and general location, size, right-of-way, and pavement width of all interior drives.
e. Existing and proposed contours at vertical intervals of not more than two (2) feet.
f. General location of sanitary sewer and stormwater facilities.
g. A Landscape Plan including, but not limited to, the location, size, and general type of plant materials to be used in accord with the City of Wildwood’s Chapter 410 and accompanying Tree Manual.
h. An inventory of the percent of tree canopy or individual trees to be retained on the site indicated on a Tree Preservation Plan completed in accordance with the City of Wildwood Chapter 410 Tree Preservation and Restoration Code and accompanying Tree Manual.
i. Location of all existing and proposed easements.
j. All other information not mentioned above, but required on a preliminary plat in accord with Chapter 420.060 of the City of Wildwood Subdivision and Development Regulations.
k. A Stormwater Pollution Prevention Plan (SWPPP) for the site, which shall include the developer’s signature and acknowledgment of its requirements.
l. A maintenance plan for this large water feature that is based on annual inspections and reports to be submitted to the City of Wildwood’s Department of Planning. This plan shall indicate all steps and procedures that will be used to maintain the large water feature and ensure its stability and safety.

Obviously, the submittal of the plan has taken longer than anticipated by the permit itself, but was delayed in some regards due to the specific testing that had to be completed on this site relative to water quality, and, previously, noise. All of these studies were intended to ensure the safety of the operation and compliance to City codes, which are applicable in this specific case.

The property owner and the recipient of the permit has submitted the plan and it has been through four (4) reviews by the Department of Planning in this regard. The plan review process is iterative in nature and often does take a number of reviews to complete, given requested clarifications, additions, and other needs that are typical of this type of process. The intent of this review process is to complete the review process with the site plan package are ready for submittal to the Site Plan Subcommittee of the Planning and Zoning Commission, given its compliance in all regards. Therefore, by its nature, four (4) review cycles in this case is not out of the ordinary. However, in this case, the Department of Planning has reached an impasse in regards to the remaining comments relative to this large water feature and associated waterfall on the subject lot. This impasse relates to the property owner’s responses to requests that have been made by the Department in this regard and now having been advised by the property owner they will not be provided for the purposes of this process, which were described and identified by the Department of Planning to the property owner, as follows:
The results of this review indicate there remain several items that both parties, i.e. you and the City, have not been able to agree upon regarding the Conditional Use permit (CUP) and its interpretation. Accordingly, the Department of Planning will be submitting these items to the Planning and Zoning Commission for its consideration and final action, again inclusive of all components of the plan package at this stage. These items where agreement has not been reached by the parties are identified below for your review:

1. Please, on Figure #4 Sheet, provide the engineering calculations and supporting documentation for the outfall structure (Pond Drain) relative to the 6" thick reinforced concrete walls and floor. **Response:** The Conditional Use Permit (CUP) is for both the waterfall and the large water feature. Therefore, the request for this information is not inappropriate and is justified, given the governing permit requires such.

2. Please, on Figure #4 Sheet, provide the engineering calculations and supporting documentation for the choice of the 36" and 24" culvert pipes that were installed, as part of this structure. **Response:** The Conditional Use Permit (CUP) is for both the waterfall and the large water feature. Therefore, the request for this information is not inappropriate and is justified, given the governing permit requires such.

3. Please be advised the misspelling of the 'fountain to foundation' does not make this condition non-applicable in this case. The intent of this condition was to address the spray of water from the fountain to offer a cleaner source for it. Therefore, the Department would respectively request the condition be met in terms of a design concept and engineered details added to the appropriate Site Development Plan sheet.
   Again, the condition for pre-treatment is as follows: “the property owner shall be required to provide pre-treatment of runoff entering the large water feature, if a fountain foundation is installed as part of it. This pre-treatment facility shall be designed, engineered, and constructed as a forebay for water quality purposes, all being completed in accordance with the standards, specifications, and requirements of the Metropolitan St. Louis Sewer District (MSD) for such type of improvements, and as directed by City of Wildwood’s Department of Public Works.”

4. Please be advised the management protocol also needs to address the on-going maintenance of the pre-treatment improvements and the water quality of the large water feature as well.

5. The Department appreciates the description that you have provided relative to the treatment of the water in the lake feature, but it is not as detailed as necessary, based upon the discussions that have been held by the Planning and Zoning Commission over the course of the last several months. As you know, from the water testing completed of the large lake feature, certain levels of minerals and microcystins exist in it and do cause concerns regarding public health. These concerns dictate to the City the need to have a prescribed and complete twelve (12) month treatment program for the large water feature (the source of the water for the waterfall), which should include, but not limited to, the following steps or procedures:
   (a.) a monthly schedule, i.e. January through December, that identifies the frequency of treatment and the days of the month, when planned;
   (b.) chemicals or other materials that are planned to be used for treatment purposes and steps associated with them;
   (c.) identification of the issues that may arise with the large water feature that would prompt extra steps in terms of treatment actions, i.e. algae blooms; and
(d.) summary of costs on a yearly basis, which are not to exceed one thousand dollars ($1,000.00) per year; and
(e.) any other considerations that are planned to ensure the lake provides water to the waterfall structure that has been treated to minimize or eliminate mycosistins and any other harmful concentrations of minerals.

For purposes of review, the specific language of the condition from the permit is provided herein: "the maintenance of the existing fountain, as a component of the large water feature, shall be authorized, if water quality measures are provided of the stormwater runoff entering it, along with the chemical treatment of the water contained therein to address contaminants from other sources. This chemical treatment option(s) used shall not harm any fish, aquatic life, or mammals that may come in contact with the water in the feature, but ensure it maintains an acceptable quality level for the purposes of public health purposes," and does allow for these steps or procedures to be requested by the City for inclusion in this regard.

Given the responses you provided in your latest resubmittal to the Department’s 3rd review letter, the Planning and Zoning Commission will need to address the remaining items noted above (Items #1 through #5). The Department appreciates your responses, but they are typically not acceptable, when engineered structures lack the plan sheets representative of the participation of a registered professional engineer.

Therefore, tonight, at the Site Plan Subcommittee Meeting, the Department will be presenting the Site Development Plan package, as submitted by the petitioner, with these considerations noted above not addressed to the satisfaction of the City. It is the intent of the Department to identify all of the components of the plan package that are in compliance with the permit, as well as these five (5) outstanding considerations noted herein as well. The preparation of this letter is to advise the Planning and Zoning Commission Members in advance of tonight’s Subcommittee meeting of this somewhat unusual matter, so if questions arise, each of you have the background of the process to date.

If you should have any questions or comments on this item, please feel free to contact Travis Newberry or me at (636) 458-0440. Thank you for your consideration of this information and participation in tonight’s meeting.

Respectfully,

CITY OF WILDCWOOD

Joe Vujinich, Director
Department of Planning

Cc: Sam Anslem, City Administrator
    John A. Young, City Attorney
    Kathy Arnett, Assistant Director of Planning and Parks
    Travis Newberry, Planner
    Tom and Karin Roberts, Property Owners
MEETING MINUTES REGULATING WATERFALL OPERATION
I. **Welcome to Attendees and Roll Call of Commission Members**

Chair Archeski requested a roll call be taken by Planner Newberry. The roll call was taken, with the following results:

**PRESENT – (9)**
- Chair Archeski
- Commissioner Lee
- Commissioner Helfrey
- Commissioner Gragnani
- Commissioner Kohn
- Commissioner Beattie
- Commissioner Simpson
- Council Member Woerther
- Mayor Bowlin

**ABSENT – (1)**
- Commissioner Deppeler

Other City officials present: Director of Planning Vujnic, Planner Newberry, and Acting City Attorney Weber

II. **Review Tonight’s Agenda / Questions or Comments**

There were no questions or comments on the agenda.

III. **Approval of Minutes from the December 17, 2018 Meeting**

A motion was made by Commissioner Gragnani, seconded by Commissioner Simpson, to approve the minutes from the December 17, 2018 meeting. A voice vote was taken regarding the motion for approval of the minutes. Hearing no objections, Chair Archeski declared the motion approved by a vote of 9-0.

IV. **Department of Planning Opening Remarks**

The Department had no opening remarks.

V. **Public Comment Session**

Tom Roberts, 500 Laurey Lane, submitted a speaker’s card, but declined to address the Commission at this time, but would be available under the item relating to his property that is to be discussed later in the agenda.
VI. Public Hearings – One (1) Item for Consideration

a) P.Z. 12-18 2540 Lindy Lane, Andrew Hildebrand, 924 Forest Lake Court, Ballwin, Missouri 63021 – A request for a change in zoning from the NU Non-Urban Residence District to the R-3 10,000 square foot Residence District upon a property that is 0.39 acres in size, which is located on the east side of Lindy Lane, north of Manchester Road (Locator Number: 24V530131/Street Address: 2540 Lindy Lane). The subject property is designated ‘Neighborhood Edge’ District under the current Town Center Regulating Plan. Proposed Use: One (1) single family dwelling on the existing non-conforming lot. (Ward Eight)

Director Vujnic read the request into the record.

Planner Newberry provided a brief description of the request, as well as a slideshow of photographs of the current conditions of the property and various aerial imagery depicting its location within the City’s Town Center Area. Director Vujnic noted the petitioner is in attendance and available to provide a presentation of his request to the Commission.

Chair Archeski invited the petitioner to address the Commission.

Andrew Hildebrand, petitioner, stated he is requesting a change in zoning to accommodate the demolition of the existing uninhabitable dwelling, in order to construct a new home for his personal residence.

Chair Archeski invited members of the public to provide comment, as part of tonight’s Public Hearing on this request.

Bill Hill, 2538 Lindy Lane, expressed his concerns regarding the impact the construction of this new home might have on Lindy Lane relative to the future development of the other properties along the street, specifically relating to their current Neighborhood Edge Town Center District designation and the planned street network.

Discussion was held among Commission Members regarding the demolition of the existing structure; the depth of the proposed new dwelling; and the build-to requirements of the City’s Town Center Plan, as it relates to the proposed placement of the new building.

VII. Old Business – One (1) Item for Consideration

a) P.Z. 9-18 The Reserve at Wildwood, Payne Family Homes L.L.C., c/o Thomas Cummings, 10407 Baur Boulevard, Suite B, St. Louis, Missouri 63132 – A request for the following land use considerations upon a property that totals 50.65 acres of area, which is located on the west side of State Route 109, north of Manchester Road (Locator Numbers: 23V10022 and 23W3200013/Street Addresses: 2431 State Route 109 and 17225 Manchester Road):

1. A modification of the Street Network Map of the Town Center Plan, which reflects the petitioner’s intent to modify the location and design standards of the proposed extension of Main Street through the site, along with the accompanying planned network of internal roadways.
2. A modification to the current Town Center Regulating Plan designations associated with the tract of land from the ‘Workplace District’, ‘Neighborhood Edge District’, and ‘Neighborhood General District’, to the ‘Neighborhood Edge District’ designation for the entirety of the site.

3. A request for a change in zoning from the C-8 Planned Commercial District and R-6A 3,000 square foot Residence District, with a Planned Environment Unit (PEU), to the R-3 10,000 square foot Residence District, with a Planned Residential Development Overlay District (PRD).

These requests have been made upon the same tract of land that was under consideration by the Planning and Zoning Commission as P.Z. 20, 21, and 22-15 Ackerley Place, which has been postponed indefinitely. Proposed Use: A total of one hundred forty (140), detached single-family dwellings on individual lots, with common ground, and required public space areas. (Ward One)

Planner Newberry read the request into the record.

Director Vujnich stated the Department met with the petitioner following the Commission’s most recent meeting where this item was discussed to address certain components of the proposed development, specifically minimizing the visual impact of front entry garages on the street, if they are to be allowed. He stated the Department identified twelve (12) considerations, which are outlined in its report, of which the petitioner indicated four (4) of these items could be accommodated. Director Vujnich stated the Department is appreciative of the petitioner incorporating these items, but believes additional design components need to be included, which are also outlined in the Department’s report. He stated the petitioner contacted the Department, after its report was published, and would like to request a postponement at tonight’s meeting in order to further study the five (5) additional design components identified in the Department’s report.

Chair Archeski invited the petitioner’s representatives to address the Commission.

Mike Doster, petitioner’s legal counsel, respectfully requested the Commission postpone action on this matter, in order for the development team to further study the five (5) items identified by the Department.

No discussion was held among Commission Members.

A motion by Mayor Bowlin, seconded by Commissioner Beattie, to postpone action on the matter, until the Commission’s next regularly scheduled meeting.

A roll call vote was taken, with the following results:

Ayes: Commissioner Helfrey, Commissioner Lee, Commissioner Kohn, Commissioner Gragnani, Commissioner Beattie, Commissioner Simpson, Council Member Woerther, Mayor Bowlin, and Chair Archeski

Nays: None

Absent: Commissioner Deppeler

Abstain: None

Whereupon, Chair Archeski declared the motion approved by a vote of 9-0.

VIII. New Business – One (1) Item for Consideration

a) A review and determination regarding the renewal of an existing Conditional Use Permit (CUP) in the NU Non-Urban Residence District that was granted by the Planning and Zoning Commission in
2010 for a museum, research library, and meeting space for the Wildwood Historical Society (WHS); south side of State Route 100, west of Hencken Road (Locator Number 26Y630111) (P.Z. 4-10 *Wildwood Historical Society*). The governing Conditional Use Permit (CUP) requires that: it be reviewed, following its initial five (5) year period of time, which received favorable action by the Planning and Zoning Commission and City Council in 2015. This property is 5.4 acres in size and also listed on the City of Wildwood’s Historic Registry. (*Ward Six*)

Planner Newberry read the request into the record.

Director Vujnic provided a brief history of the existing Conditional Use Permit for the Wildwood Historical Society, which is also outlined in the Department’s report. He noted that, due to an error in the Department’s initial review of the file, the renewal of this permit is occurring approximately one (1) year early; however, the Department believes this approach is acceptable, given the circumstances outlined in its report. Director Vujnic stated that many of the rationales and justifications for granting the original Conditional Use Permit (CUP) in 2010 are still true today; therefore, the Department is recommending the extension of it until 2025.

Chair Archesi invited the representative from the Wildwood Historical Society to address the Commission.

*Marta Bunch, Wildwood Historical Society,* provided a brief summary of the positive benefits the Wildwood Historical Society provides to the community and respectfully requested the Commission extend the Conditional Use Permit (CUP).

No discussion was held among Commission Members.

A motion by Mayor Bowlin, seconded by Commissioner Gragnani, to extend the Conditional Use Permit (CUP), as recommended.

A roll call vote was taken, with the following results:

Ayes: Commissioner Helfrey, Commissioner Lee, Commissioner Kohn, Commissioner Gragnani, Commissioner Beattie, Commissioner Simpson, Mayor Bowlin, and Chair Archeski  
Nays: None  
Absent: Commissioner Deppeler  
Abstain: Council Member Woerther  

Whereupon, Chair Archeski declared the motion approved by a vote of 8-0, with one (1) abstention (Woerther).

**IX. Site Development Plans-Public Space Plans-Record Plats – One (1) Item for Consideration**

a) A recommendation report by the Department of Planning regarding the placement of recycling enclosures (two (2) per facility) in four (4) City-owned properties to assist in the changeover from single stream to dual stream efforts in this regard; Anniversary Park, Bluffview Park, Community Park, and City Hall (terminus of Wildwood Avenue in the Town Center Area); multiple zoning designations, i.e. PS Park and Scenic Districts and Amended C-8 Planned Commercial District; which is supportive of said locations under the need to promote and maintain current recycling efforts of Wildwood residents within this community. (*Wards – One, Four, Six, and Eight*)

Planner Newberry read the request into the record.
Director Vujnich provided an update to the Commission regarding the City's upcoming changes to its recycling program, which are being driven by major changes that are occurring within the international market. He noted that a component of these changes is the need to place collection facilities, i.e. recycling dumpsters, in some of the City's parks and other public properties. He stated the purpose of these collection areas is to allow residents to drop off recyclable materials that the City's contracted waste hauler will no longer provide at curbside, again, due to overall changes in the market for recyclable materials. Director Vujnich stated the dumpsters will be appropriately screened and the upkeep of the areas will be the responsibility of the waste hauler and closely monitored by City staff. He stated the Department is recommending approval of the identified locations, in order to offer this recycling service to its residents.

Discussion was held among Commission Members regarding the planned materials and design of the screening elements; concerns regarding illegal dumping; concerns regarding damage caused to the existing pavement by the larger trucks; and the maneuverability of the trucks at the Anniversary Park location.

A motion by Council Member Woerther, seconded by Commissioner Beattie, to approve the locations, as presented.

A roll call vote was taken, with the following results:

Ayes: Commissioner Helfrey, Commissioner Lee, Commissioner Kohn, Commissioner Gragnani, Commissioner Beattie, Commissioner Simpson, Council Member Woerther, Mayor Bowlin, and Chair Archieski
Nays: None
Absent: Commissioner Deppeler
Abstain: None
Whereupon, Chair Archieski declared the motion approved by a vote of 9-0.

X. Other – One (1) Item for Consideration

a) An update by the Department of Planning regarding P.Z. 15-17 Babler Farms, L.L.C., c/o Tom Roberts, 550 Laurey Lane, Wildwood, Missouri, 63005, which was a request for a Conditional Use Permit (CUP) in the NU Non-Urban Residence District for a fifty-nine point nine (59.9) acre tract of land that was ultimately granted by the Planning and Zoning Commission to allow certain existing improvements to be retained on the subject site, i.e. a large water feature (3.5 acres in size) and an associated waterfall structure in excess of five hundred (500) feet in overall length. (Ward – One)

Planner Newberry read the request into the record.

Director Vujnich provided an update on the Department's progress on finding a consultant to conduct the required air quality testing of this large water feature and associated waterfall structure. He noted the Department has been spending a great deal of time addressing concerns of the abutting neighbors regarding activity that is occurring on the petitioner's property. Director Vujnich stated the Department has also been addressing the request of the petitioner to operate the waterfall feature periodically for maintenance purposes, noting the specific schedule that has been proposed is not acceptable from the Department's perspective. He stated the Department does believe periodic maintenance is appropriate.
and is seeking direction from the Commission regarding an acceptable schedule for the petitioner to follow regarding the frequency and duration for the operation of the waterfall feature, again, for the purpose of maintenance at this time.

A motion by Council Member Woerther, seconded by Commissioner Gragnani, to open discussion regarding the matter. A voice vote was held regarding the motion to discuss. Hearing no objections, Chair Archeski declared the motion approved by a vote of 9-0.

Discussion was held among Commission Members regarding the depth of the intake pipes for the waterfall feature; the need to gather additional information regarding the pumps that are currently installed; the notion a full cycle of water should be pumped through the system, in order to vacate all stagnant water from it; and the reasonable frequency and duration of allowing the property owner to operate the waterfall feature for maintenance purposes.

Chair Archeski invited the petitioner to address the Commission.

**Tom Roberts, 500 Laurey Lane,** outlined his rationales for wanting to operate the waterfall periodically for maintenance purposes.

A motion by Commissioner Helfrey, seconded by Commissioner Kohn, to allow the running of the waterfall feature for maintenance purposes a total of two (2) to three (3) times per week for a duration of time that will allow an entire cycle of water to be run through the system, as calculated by the specifications of the pumps and associated piping, with a report by the Department regarding the status of this allowance in ninety (90) days.

A roll call vote was taken, with the following results:

Ayes: Commissioner Helfrey, Commissioner Lee, Commissioner Kohn, Commissioner Gragnani, Commissioner Beattle, Commissioner Simpson, Council Member Woerther, Mayor Bowlin, and Chair Archeski

Nays: None

Absent: Commissioner Deppeler

Abstain: None

Whereupon, Chair Archeski declared the motion approved by a vote of 9-0.

**XI. Closing Remarks and Adjournment**

A motion by Commissioner Lee, seconded by Council Member Woerther, to adjourn. A voice vote was held regarding the motion. Hearing no objections, Chair Archeski adjourned the meeting at 7:40 p.m.

Approved by: [Signature]

Secretary – City of Wildwood Planning and Zoning Commission

Note: Recordation of the opinions, statements, and/or other meeting participation in these minutes shall not be deemed to be an acknowledgement or endorsement by the Commission of the factual accuracy, relevance, or propriety thereof.
* If comment cards were submitted indicating they did not wish to speak at tonight's meeting, they have been attached and made part of the official record.
WATER QUALITY TESTING RESULTS
November 18, 2019

The Planning and Zoning Commission
City of Wildwood, Missouri
16860 Main Street
Wildwood, Missouri 63040

Re: Second Update on P.Z. 15-17 Babler Farms, L.L.C., c/o Tom Roberts, 550 Laurey Lane, Wildwood, Missouri, 63005 – A Conditional Use Permit (CUP) in the NU Non-Urban Residence District for a fifty-nine point nine (59.9) acre tract of land that is located at the terminus of Laurey Lane (Locator Numbers: 20X630015 and 20X630024/Street Addresses: 500 and 550 Laurey Lane). Authorized Conditional Use: An existing large water feature – lake – and associated waterfall structure – (as defined by §415.030 of the City of Wildwood’s Zoning Regulations). The large water feature is three point four (3.4) acres in size. (Ward One)

Commission Members:

As the Planning and Zoning Commission is aware, the City has been working to address the matter relating to a large water feature and associated waterfall, which required a City of Wildwood Conditional Use Permit (CUP). This issue has been under review for a number of months, and led to required water testing of the lake, which is the source for the waterfall feature, as well. This testing protocol, which was authorized by the Planning and Zoning Commission, tested for certain pathogens, BacT ID, and chemical analysis.

This testing took place on October 9, 2019 by ARDL, Inc. a firm from Mount Vernon, Illinois, that has participated in extensive testing services for the U.S. Army Corps of Engineers. Dean Dickerson, of ARDL, Inc., completed this testing on this morning and took multiple samples from the waterfall and one (1) sample from the large water feature. These samples were marked with information regarding time and location and packaged for shipping to two (2) testing laboratories. The delivery of the samples was to occur the same day of the collection of them to follow standard protocols in this regard.

The Department is in receipt of the testing results, which are dated November 6, 2019, and are attached to this letter for the Commission’s review and consideration. The Department did follow up with Mr. Dickerson to request additional assessment of the findings of the testing. Mr. Dickerson provided this assessment in an email correspondence dated November 14, 2019, which also attached to this letter.

Accordingly, the Department is seeking any comments or questions from the Planning and Zoning Commission Members at tonight’s meeting regarding these testing results and the assessment provided by the representative from ARDL, Inc. These comments, and then, any others from others in attendance at tonight’s meeting, would then be analyzed for any further actions, if necessary. With the November 14, 2019 email from ARDL, Inc., the Department would still support another opinion from a qualified source and, with that information, hope to finalize the permit process and then complete the remaining steps in it.
If any of the Planning and Zoning Commission Members should have comments or questions in this regard, please feel free to contact any of the Department of Planning staff at (636) 458-0440. Thank you for your consideration on this information and patience in its preparation and presentation.

Respectfully submitted,

CITY OF WILDWOOD

Joe Vujinich, Director
Department of Planning

Cc: The Honorable City Council of the City of Wildwood
    Sam Anselm, City Administrator
    John A. Young, City Attorney
    Kathy Arnett, Assistant Director of Planning and Parks
    Travis Newberry, Planner
Mr. Joe Vujnic
Director of Planning & Parks
16860 Main St.
Wildwood, MO 63040

RE: ARDL Report 301816, Sample collection and Analysis per Consultant/Services Agreement

Dear Mr. Vujnic:

ARDL collected samples from the Roberts Lake (sample ID 301816-02) and the watercourse (sample ID 301816-01) described as waterfall on October 9, 2019. Subsequent to the collection activities, ARDL delivered aliquots to Fed-Ex (1232 hours on Oct 9, 2019) for delivery to subsidiaries of National Testing Laboratories for analysis. In addition, aliquots of the samples were hand delivered to the PDC Laboratory location at 3278 N Hwy 67 in Florissant, MO at 1342 hours on Oct 9, 2019.

Due to verbal instructions received the afternoon of Oct. 8, 2019 from the property owner, Mr. Tom Roberts, the sample container for the pathogen panel test of the Roberts Lake was not transported to the site.

The testing performed by the subcontractors was as follows:

National Testing Laboratory subsidiary Zoologix performed the pathogen panel as described in line item #2 in our quotation. None of the pathogens tested for were found in the sample from the waterfall. Appendix A contains the laboratory report, a copy of the chain-of-custody sent with the sample, and a copy of the airbill under which it was sent.

National Testing Laboratory subsidiary Benchmark Environmental Labs, Inc. performed the Bacteria identification as described in line item #6 in our quotation. The waterfall sample contained 380 cfu/100 mL. These colonies were identified as bacillus licheniformis. The Roberts lake sample contained 630 cfu/100 mL of pseudomonas paucimobilis. Appendix B contains the laboratory report, a copy of the chain-of-custody sent with the sample, and a copy of the airbill under which it was sent.

PDC Laboratories performed the general chemistry, nutrient and microbiology testing as described in line item #3 in our quotation. No abnormally high results were found. Appendix C contains their laboratory report, which includes a copy of the chain-of-custody accompanying the samples.

ARDL appreciates the opportunity to provide the City of Wildwood with environmental services.

Regards,

Dean S. Dickerson
Vice President of Technical Services

"Test everything, keep the good" 1 Thes. 5:21
Appendix A

Informational Water Quality Report

Pathogen Panel

<table>
<thead>
<tr>
<th>Client:</th>
</tr>
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<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Ordered By:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARDL, Inc.</td>
</tr>
<tr>
<td>400 Aviation Drive</td>
</tr>
<tr>
<td>Mt. Vernon, IL 62864</td>
</tr>
<tr>
<td>ATTN: Dean Dickerson</td>
</tr>
</tbody>
</table>

Sample Number: 4003534

<table>
<thead>
<tr>
<th>Location:</th>
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<tbody>
<tr>
<td>301816-1</td>
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<table>
<thead>
<tr>
<th>Type of Water:</th>
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<tbody>
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<td></td>
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</table>

<table>
<thead>
<tr>
<th>Collection Date and Time:</th>
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<tbody>
<tr>
<td>10/9/2019 11:30 AM</td>
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<table>
<thead>
<tr>
<th>Received Date and Time:</th>
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<tbody>
<tr>
<td>10/10/2019</td>
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<table>
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<tr>
<th>Date Completed:</th>
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<tbody>
<tr>
<td>10/16/2019</td>
</tr>
</tbody>
</table>

Definition and Legend

This informational water quality report compares the actual test result to national standards as defined in the EPA's Primary and Secondary Drinking Water Regulations.

**Primary Standards:** Are expressed as the maximum contaminant level (MCL) which is the highest level of contaminant that is allowed in drinking water. MCLs are enforceable standards.

**Secondary standards:** Are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water. Individual states may choose to adopt them as enforceable standards.

**Action levels:** Are defined in treatment techniques which are required processes intended to reduce the level of a contaminant in drinking water.

**mg/L (ppm):** Unless otherwise indicated, results and standards are expressed as an amount in milligrams per liter or parts per million.

**Minimum Detection Level (MDL):** The lowest level that the laboratory can detect a contaminant.

**ND:** The contaminant was not detected above the minimum detection level.

**NA:** The contaminant was not analyzed.

- ✓ The contaminant was not detected in the sample above the minimum detection level.
- 🔴 The contaminant was detected at or above the minimum detection level, but not above the referenced standard.
- 🔴 The contaminant was detected above the standard, which is not an EPA enforceable MCL.
- 🔴 The contaminant was detected above the EPA enforceable MCL.
- 🔴 These results may be invalid.
<table>
<thead>
<tr>
<th>Status</th>
<th>Contaminant</th>
<th>Results</th>
<th>Units</th>
<th>National Standards</th>
<th>Min. Detection Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>Campylobacter (ln'o)</td>
<td>Absent</td>
<td>P/A</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>✓</td>
<td>Cryptosporidium (lnfo)</td>
<td>Absent</td>
<td>P/A</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>✓</td>
<td>E.Coli 0157:H7 (ln'o)</td>
<td>Absent</td>
<td>P/A</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>✓</td>
<td>Giardia (lnfo)</td>
<td>Absent</td>
<td>P/A</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>✓</td>
<td>Legionella (lnfo)</td>
<td>Absent</td>
<td>P/A</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>✓</td>
<td>Salmonella (lnfo)</td>
<td>Absent</td>
<td>P/A</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>✓</td>
<td>Shigella (lnfo)</td>
<td>Absent</td>
<td>P/A</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

We certify that the analyses performed for this report are accurate, and that the laboratory tests were conducted by methods approved by the U.S. Environmental Protection Agency or variations of these EPA methods.

These test results are intended to be used for informational purposes only and may not be used for regulatory compliance.

National Testing Laboratories, Ltd.
NATIONAL TESTING LABORATORIES, LTD
<table>
<thead>
<tr>
<th>SAMPLE NUMBER</th>
<th>DATE</th>
<th>TIME</th>
<th>COMP</th>
<th>CLR</th>
<th>NO. OF CONTAINERS</th>
<th>REMARKS OR SAMPLE LOCATION</th>
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</thead>
<tbody>
<tr>
<td>3014816-1</td>
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**Remarks/Special Instructions:**

- Relinquished by: (Signature)
  - Date: __________
  - Time: __________
- Received by: (Signature)
  - Date: __________
  - Time: __________
- Relinquished by: (Signature)
  - Date: __________
  - Time: __________
- Received for Laboratory by: (Signature)
  - Date: __________
  - Time: __________
  - Shipping Ticket No.

**Purchase Order No:** __________

**Copies:** White & Yellow copies accompany sample shipment to laboratory. Pink copy retained by sampler.
## Microbial Analyses

<table>
<thead>
<tr>
<th>Lab No.</th>
<th>Sample ID</th>
<th>Test</th>
<th>Result</th>
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<tbody>
<tr>
<td>M40155</td>
<td>399380 / H₂O</td>
<td>HPC</td>
<td>630 cfu / 100 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bacterial ID</td>
<td>P</td>
</tr>
<tr>
<td>M40156</td>
<td>399379 / H₂O</td>
<td>HPC</td>
<td>380 cfu / 100 ml</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bacterial ID</td>
<td>PP</td>
</tr>
</tbody>
</table>

*P – Microorganism identified is classified as a Pathogen.
C – Microorganism identified is classified as a Contaminant.
PP – Microorganism identified is classified as a Potential Pathogen.

---

**Michael C. Burns, Ph.D.**
Michael C. Burns, Ph.D., RM/SM (NRM)
Laboratory Director
Registered Microbiologist: Cert. No. 1041
Specialist Microbiologist: Cert. No. 852
(SM)ASCP

P.O. Box 14740, Columbus, OH 43214
(614) 267-4588
www.benchmarklabs.biz
<table>
<thead>
<tr>
<th>SAMPLE NUMBER</th>
<th>DATE</th>
<th>TIME</th>
<th>REMARKS OR SAMPLE LOCATION</th>
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<tbody>
<tr>
<td>301816-1</td>
<td>1999/9</td>
<td>1130X</td>
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</tr>
<tr>
<td></td>
<td>1</td>
<td>1145XX</td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS/SPECIAL INSTRUCTIONS:**
Report to: Dean Dickerson
ODICKERSON@ARDLINC.COM

PURCHASE ORDER NO: 0855

COPIES: White & Yellow copies accompany sample shipment to laboratory. Pink copy retained by sampler.
November 04, 2019

Dean Dickerson
ARDL, Inc.
PO Box 1566 400 Aviation Dr
Mt. Vernon, IL 62864

RE: ARDL City of Wildwood

Dear Dean Dickerson:

Please find enclosed the revised analytical results for the 2 sample(s) the laboratory received on 10/10/19 10:00 am and logged in under work order 9102738. All testing is performed according to our current TNI accreditations unless otherwise noted. This report cannot be reproduced, except in full, without the written permission of PDC Laboratories, Inc.

If you have any questions regarding your report, please contact your project manager. Quality and timely data is of the utmost importance to us.

PDC Laboratories, Inc. appreciates the opportunity to provide you with analytical expertise. We are always trying to improve our customer service and we welcome you to contact the Director of Client Services, Lisa Grant, with any feedback you have about your experience with our laboratory at 309-693-1764 or lgrant@pdclab.com.

Sincerely,

Kurt Stepping
Senior Project Manager
(309) 692-9688 x1719
kstepping@pdclab.com
## Analytical Results

**Sample**: S192738-01  
**Name**: 301816-1  
**Matrix**: Waste Water - Regular Sample  
**Sampled**: 10/09/19 11:30  
**Received**: 10/10/19 10:00

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<th>Unit</th>
<th>Qualifier</th>
<th>Prepared</th>
<th>Dilution</th>
<th>MRL</th>
<th>Analyzed</th>
<th>Analyst</th>
<th>Method</th>
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<tbody>
<tr>
<td>General Chemistry - PIA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SM 2510B</td>
</tr>
<tr>
<td>Conductivity</td>
<td>1.30</td>
<td>umhos/cm</td>
<td></td>
<td>10/22/19 09:15</td>
<td>1</td>
<td>0.10</td>
<td>10/22/19 09:15</td>
<td>MGU</td>
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</tr>
<tr>
<td>pH</td>
<td>8.17</td>
<td>pH Units</td>
<td>H</td>
<td>10/22/19 14:57</td>
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<td>0.10</td>
<td>10/22/19 14:57</td>
<td>TTH</td>
<td>SM 4500 H B</td>
</tr>
<tr>
<td>Sulfide</td>
<td>&lt; 2.0</td>
<td>mg/L</td>
<td></td>
<td>10/16/19 15:43</td>
<td>1</td>
<td>2.0</td>
<td>10/16/19 15:43</td>
<td>CS</td>
<td>SM 4500-S F*</td>
</tr>
<tr>
<td>Temperature at pH</td>
<td>14</td>
<td>°C</td>
<td></td>
<td>10/22/19 14:57</td>
<td>1</td>
<td>2.0</td>
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<td>TTH</td>
<td>SM 4500 H B*</td>
</tr>
<tr>
<td>measurement Total Nitrogen</td>
<td>&lt; 1.0</td>
<td>mg/L</td>
<td></td>
<td>10/21/19 06:47</td>
<td>1</td>
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<td>10/24/19 11:18</td>
<td>CJP</td>
<td>varies</td>
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</table>

**Microbiology - PIA**

<table>
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<th>Analyst</th>
<th>Method</th>
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<tbody>
<tr>
<td>Chlorophyll a</td>
<td>19</td>
<td>mg/L</td>
<td>10/14/19 12:00</td>
<td>1</td>
<td>1.0</td>
<td>10/14/19 12:00</td>
<td>MRM</td>
<td>SM 10200H*</td>
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<tr>
<td>Total Microcystin</td>
<td>&lt; 0.300</td>
<td>ug/L</td>
<td>10/22/19 15:02</td>
<td>1</td>
<td>0.300</td>
<td>10/22/19 15:02</td>
<td>SDW</td>
<td>EPA 546*</td>
</tr>
<tr>
<td>%CV</td>
<td>0.900</td>
<td>ug/L</td>
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<td>EPA 546*</td>
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**Nutrients - PIA**

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<th>Unit</th>
<th>Prepar</th>
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<th>MRL</th>
<th>Analyzed</th>
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<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrate/Nitrite-N</td>
<td>0.093</td>
<td>mg/L</td>
<td>10/18/19 13:56</td>
<td>1</td>
<td>0.020</td>
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<td>PMN</td>
<td>SM 4500-NO3 P*</td>
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<tr>
<td>Phosphorus - total as P</td>
<td>0.11</td>
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<td>0.10</td>
<td>10/23/19 07:50</td>
<td>CJP</td>
<td>SM 4500-P F*</td>
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<tr>
<td>Total Kjeldahl Nitrogen (TKN)</td>
<td>&lt; 1.3</td>
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### General Chemistry - PIA

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<th>Dilution</th>
<th>MRL</th>
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<tr>
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<td>TTH</td>
<td>SM-4500 H B</td>
</tr>
<tr>
<td>Sulfide</td>
<td>&lt; 2.0</td>
<td>mg/L</td>
<td></td>
<td>10/16/19 15:43</td>
<td>1</td>
<td>2.0</td>
<td>10/16/19 15:43</td>
<td>CS</td>
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<tr>
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<td>CJP</td>
<td>varies</td>
</tr>
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### Microbiology - PIA

<table>
<thead>
<tr>
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<th>MRL</th>
<th>Analyzed</th>
<th>Analyst</th>
<th>Method</th>
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</thead>
<tbody>
<tr>
<td>Chlorophyll a</td>
<td>44</td>
<td>mg/m3</td>
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<td>MRM</td>
<td>SM-9220H*</td>
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<tr>
<td>Total Microcyslin</td>
<td>0.332</td>
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<td>0.300</td>
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</tr>
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<td>%CV</td>
<td>3.70</td>
<td>ug/L</td>
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<td>1</td>
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<td>10/22/19 15:02</td>
<td>SDW</td>
<td>EPA 546*</td>
</tr>
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</table>

### Nutrients - PIA

<table>
<thead>
<tr>
<th>Parameter</th>
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<th>Prepared</th>
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<th>Method</th>
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</thead>
<tbody>
<tr>
<td>Nitrate/Nitrite-N</td>
<td>0.043</td>
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<td>0.020</td>
<td>10/18/19 13:59</td>
<td>PMN</td>
<td>SM-4300-NO3 F*</td>
</tr>
<tr>
<td>Phosphorus - total as P</td>
<td>0.33</td>
<td>mg/L</td>
<td>10/21/19 13:29</td>
<td>1</td>
<td>0.10</td>
<td>10/23/19 06:55</td>
<td>CJP</td>
<td>SM-4100-P F*</td>
</tr>
<tr>
<td>Total Kjeldahl Nitrogen (TKN)</td>
<td>1.3</td>
<td>mg/L</td>
<td>10/21/19 06:47</td>
<td>1</td>
<td>1.0</td>
<td>10/24/19 11:20</td>
<td>CJP</td>
<td>OA/PA-DK03 &amp; EPA-3051.2</td>
</tr>
</tbody>
</table>
NOTES

Specifications regarding method revisions and method modifications used for analysis are available upon request. Please contact your project manager.

* Not a TNI accredited analyte

Memos
Revised report: Corrected sample description error.

Certifications

CHI - McHenry, IL - 4314 W Crystal Lake Road A, McHenry, IL 60050
TNI Accreditation for Drinking Water, Wastewater, Fields of Testing through IL EPA Lab No. 100279
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17556

PIA - Peoria, IL - 2231 W Altofer Drive, Peoria, IL 61615
TNI Accreditation for Drinking Water, Wastewater, Hazardous and Solid Waste Fields of Testing through IL EPA Lab No. 100230
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17553
Drinking Water Certifications: owa (240); Kansas (E-10338); Missouri (870)
Wastewater Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)
Hazardous/Solid Waste Certifications: Arkansas (88-0677); Iowa (240); Kansas (E-10338)

SPIL - Springfield, IL - 1210 Capitol Airport Drive, Springfield, IL 62707
TNI Accreditation through IL EPA Lab No. 100323

SPMO - Springfield, MO - 1805 W Sunset Street, Springfield, MO 65807
USEPA DMR-QA Program

STL - St. Louis, MO - 3278 N Highway 67, Florissant, MO 63033
TNI Accreditation for Wastewater, Hazardous and Solid Waste Fields of Testing through KS Lab No. E-10389
TNI Accreditation for Wastewater, Hazardous, and Solid Waste Analysis through IL EPA Lab No. 200080
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 171050
Missouri Department of Natural Resources
Microbiological Laboratory Service for Drinking Water

Qualifiers

H Test performed after the expiration of the appropriate regulatory/advisory maximum allowable hold time.

Certified by: Kurt Stepping, Senior Project Manager
### CITY OF WILDWOOD

<table>
<thead>
<tr>
<th>SAMPLE NUMBER</th>
<th>DATE</th>
<th>TIME</th>
<th>NO. OF CONTAINERS</th>
<th>REMARKS OR SAMPLE LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>301816-1</td>
<td>1/19</td>
<td>11:30</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>-2</td>
<td>1/19</td>
<td>11:45</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**Remarks/Special Instructions:**

- 1/19/12 Report to: Dean Dickerson
- adickerson@ardlinc.com
- 1°C on ice @ DPR Lab  20.2°C
To All:

I received this e-mail late yesterday and am providing it in advance of Monday’s meeting.

Thank you,

Joe Vujnich

Begin forwarded message:

From: Dean Dickerson <ddickerson@ardlinc.com>
Subject: Re: ARDL Report 301816
Date: November 14, 2019 at 2:48:53 PM CST
To: Joe Vujnich <JVujnich@cityofwildwood.com>

Mr. Vujnich:

According to the USEPA Drinking Water Health Advisory for the Cyanobacterial Microcystin Toxins, June 2015, the levels of microcystin observed in the samples is well below the World Health Organization’s low risk threshold for recreational water of 10 µg/L. The levels are also below the USEPA Drinking Water Health Advisory for school-age children and adults of 1.5 µg/L.

The bacteria species identified in the water samples, while both are commonly found in the environment, are classified as either pathogens or potential pathogens by the analytical laboratory, which follows CDC designations. However, I have not been successful in finding confirmation on the CDC’s website.

According to PubMed.gov, “Pseudomonas paucimobilis (formerly CDC group IJK, biotype 1) is a strictly aerobic, nonfermenting, oxidase- and catalase-positive, gram-negative bacillus that is widely distributed in water and soil. Its name derives from the difficulty encountered in demonstrating its motility, even in liquid media. This microorganism is responsible for two types of infection in humans: sporadic or community-acquired infections, probably of endogenous or environmental origin (bacteremia, meningitis, urinary tract infection, and wound infection); and outbreaks of nosocomial infection associated with the contamination of sterile fluids employed in hospitals. The majority of infections produced by P. paucimobilis have a good prognosis; no deaths related to this entity have been reported in the literature.”

While the laboratory considers bacillus licheniformis as a potential pathogen, and indeed several species of the genus are known pathogens (i.e. B. anthracis and B. cereus among others), the USEPA Final Risk Assessment of bacillus licheniformis dated February 1997 states: “B. licheniformis is not a human pathogen nor is it toxigenic. It is unlikely to be confused with related species that are. However, if challenged by large numbers of this microorganism, compromised individuals or those suffering from trauma may be infected.”

The chemical and nutrient results are within reasonable levels in my opinion.

Regards,

Dean Dickerson
Vice President of Technical Services
ARDL, Inc.
(616) 244-3235 x227
(616) 731-4762 direct
www.ardlinc.com

--- Original Message ---

From: Joe Vujnich
To: Dean Dickerson
Sent: Thursday November 07, 2019 8:54 AM
Subject: Re: ARDL Report 301816

Mr. Dickerson
Thank you. Your efforts and patience in this regard are appreciated.

From your perspective, and certainly compensated for such, can an assessment of the findings be provided? The pathogens seem OK, while the Bac-T Id and the other item I am unclear upon.

Joe Vujnich

On Nov 6, 2019, at 5:58 PM, Dean Dickerson <ddickerson@ardlin.com> wrote:

Mr. Vujnich - attached please find our report for the samples collected Oct 9, 2019 at the Roberts property in Wildwood, MO. Our final invoice will follow next week.

ARDL appreciates the opportunity to provide the City of Wildwood with environmental services.

Regards,

Dean Dickerson
Vice President of Technical Services
ARDL, Inc.
(618) 244-3235 x227
(618) 731-4782 direct
www.ardlin.com

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DEPARTMENT’S EXPLANATION OF SITE DEVELOPMENT PLAN REVIEW PROCESSES OF THE CITY
December 9, 2019

Babler Farms, L.L.C.
c/o Tom Roberts
550 Laurey Lane
Wildwood, Missouri 63005

Re: Site Development Plan (SDP) for the Conditional Use Permit (CUP) - a Large Water Feature and Associated Waterfall Structure

Dear Mr. Roberts:

Thank you for the recent telephone call regarding the remaining process relative to the permit for the large water feature and associated waterfall structure. The process has reached its final stage, which is the Site Development Plan’s review and action by the Planning and Zoning Commission. This plan process will result in all of the appropriate improvements and requirements associated with these two (2) items being identified within the boundaries of the property for the purposes of compliance and on-going use. This process is identified in detail in the Conditional Use Permit (CUP) that was granted for the large water feature and associated waterfall. However, the Department has summarized the steps in this process, which are as follows:

1. Update the previously submitted Preliminary Development Plan to now meet all of the requirements that are set forth in the granted Conditional Use Permit (CUP) by the Planning and Zoning Commission. The Department has highlighted the key conditions of this permit below.
2. Submit the updated plan, now the required Site Development Plan (SDP), to the Department of Planning for its review, along with the Department of Public Works.
3. Revise the Site Development Plan (SDP), per the comment letter from the Departments of Planning and Public Works.
4. Participate in the Site Plan Subcommittee of the Planning and Zoning Commission, when meeting is scheduled, after all comments of the City have been addressed on the plan. The Site Plan Subcommittee of the Planning and Zoning Commission can meet on the first and third Mondays of the month.
5. Complete process, once the Site Plan Subcommittee of the Planning and Zoning Commission has made its recommendation regarding the plan, with the final meeting where the process is concluded.

These steps summarize the process from its beginning to end. Key in this process is the work of the engineer under your direction to prepare the plan and make changes that are necessary to comply with the permit that governs this large water feature and associated waterfall. Additionally, for the purposes of this letter, the Department has provided attached the conditions of the permit and highlight those items that are pertinent to this final step in the process for your reference and use.

If you should have any questions or comments regarding this process or the conditions associated with the Site Development Plan (SDP) process, please feel free to contact the Department of Planning at (636) 458-0440. Thank you again for your cooperation in this regard, given the length of the process to reach this stage. Such has been much appreciated.
Sincerely,
CITY OF WILDWOOD
Joe Vujinic, Director
Department of Planning

Cc: The Honorable James. R. Bowlin, Mayor
Council Members Brost and Gragnani, Ward One
Sam Anselm, City Administrator
John A. Young, City Attorney
Rick C. Brown, P.E. and P.T.O.E., Director of Public Works
Kathy Arnett, Assistant Director of Planning and Parks
Travis Newberry, Planner

1. PERMITTED USES

This Conditional Use Permit (CUP) shall authorize a large water feature, as defined by Chapter 415.030 Definitions of the City of Wildwood’s Zoning Ordinance and, under specific compliance conditions, a waterfall structure.

2. LOT, SIZE, AND USE REQUIREMENTS

   a. The authorized large water feature shall not exceed three point five (3.5) acres in overall size.

   b. The height of the dam shall not exceed thirty-three (33) feet, as measured from final finish grade at the base of it, outside the water impoundment area.

   c. The depth of the lake, at normal pool elevation, shall not exceed twenty (20) feet.

   d. The inclusion and use of the existing fountain, as a component of the large water feature, shall be authorized, if water quality measures are provided to treat stormwater runoff entering it, along with the chemical treatment of the water contained therein, to address contaminants from other sources. This chemical treatment option(s) that are to be used for these purposes shall not harm any fish, other aquatic life, or mammals that may come in contact with the water held in the feature, but ensure it maintains an acceptable quality level for the purposes of public health.

   e. The extent of any new/additional land disturbance, in association with the maintenance or care of this large water feature, may only be authorized by the Planning and Zoning Commission, as part of an Amended Site Development Plan review.

   f. The large water feature authorized by this permit, although created by the construction of a dam that is less than thirty-five (35) feet in height, shall meet all Missouri Department of Natural Resources (MDNR) requirements for design, engineering, and ongoing maintenance, including inspection frequencies and criteria. These requirements will be reviewed and acted upon by the Planning and Zoning Commission, as part of the Site Development Plan process, and as directed by the Department of Public Works. As part of this compliance to State stipulated requirements and standards, an Emergency Management Plan shall be provided that defines that, if dam failure occurs, the steps that have and will be taken to protect downstream properties.

   g. The waterfall structure shall not be expanded or extended from its current configuration and size, while its operation must comply with all of the City of Wildwood’s Performance Standards for Zoning Ordinance (Chapter 415.250). However, its operation is premised on a required sound study and compliance to regulations of the Noise Code and the Planning and Zoning Commission’s review and action on the required Site Development Plan.

3. PLAN SUBMITTAL REQUIREMENTS

Within twelve (12) months of the Conditional Use Permit (CUP) being granted by the Planning and Zoning Commission, and prior to any further site disturbance, the operator shall submit to the Planning and Zoning Commission for their review and approval a Site Development Plan. Where due cause is shown by the operator, this time interval may be extended once by the Planning and Zoning Commission.

(2)
Commission in accord with requirements of Chapter 415.480 of the City of Wildwood Zoning Ordinance. Said Site Development Plan shall include, but not be limited to, the following information:

a. Outboundary plat and legal description of the property.
b. Location and extent of all existing improvements, including all buildings and accessory structures, along with the planned large water feature and all improvements in association with it.
c. A general plan indicating setback lines along the perimeter of the subject tract of land and surrounding property lines and related improvements within two hundred (200) feet of this site's boundaries, i.e. curb cut and access locations, stormwater facilities, and utility installations and easements.
d. Location of all roadways adjacent to the property, including required roadway right-of-way dedication and pavement widening, with existing and proposed improvements and trails, and general location, size, right-of-way, and pavement width of all interior drives.
e. Existing and proposed contours at vertical intervals of not more than two (2) feet.
f. General location of sanitary sewer and stormwater facilities.
g. A Landscape Plan including, but not limited to, the location, size, and general type of plant materials to be used in accord with the City of Wildwood's Chapter 410 and accompanying Tree Manual.
h. An inventory of the percent of tree canopy or individual trees to be retained on the site indicated on a Tree Preservation Plan completed in accordance with the City of Wildwood Chapter 410 Tree Preservation and Restoration Code and accompanying Tree Manual.
i. Location of all existing and proposed easements.
j. All other information not mentioned above, but required on a preliminary plat in accord with Chapter 420.060 of the City of Wildwood Subdivision and Development Regulations.
k. A Stormwater Pollution Prevention Plan (SWPPP) for the site, which shall include the developer's signature and acknowledgment of its requirements.
l. A maintenance plan for this large water feature that is based on annual inspections and reports to be submitted to the City of Wildwood's Department of Planning. This plan shall indicate all steps and procedures that will be used to maintain the large water feature and ensure its stability and safety.

4. SITE DEVELOPMENT PLAN DESIGN CRITERIA

The above Site Development Plan shall adhere to the following specific design criteria:

Large Water Feature Setbacks

a. No large water feature and related improvements, including the waterfall, structure shall be located within the following setbacks, except as otherwise noted below:
   i. Seven hundred (700) feet from the southern property line and boundary of this Conditional Use Permit (CUP).
   ii. Four hundred (400) feet from the eastern property line and boundary of this Conditional Use Permit (CUP).
   iii. Forty (40) feet from the northern property line and boundary of this Conditional Use Permit (CUP).
   iv. Four hundred fifty (450) feet from the western property line and boundary of this Conditional Use Permit (CUP), except the waterfall structure may be located no closer than one hundred (100) feet to the same.

Landscape Requirements

b. Landscaping shall adhere to all requirements of Chapter 410 of the City's Tree Preservation and Restoration Code and its accompanying Sustainable Plantings Guide and Tree Manual, including the submittal of a Tree Preservation Plan, in conjunction with the Site Development Plan. All roadway frontages shall be appropriately landscaped, as required by Chapter 410 Tree Preservation and Restoration Code, and be approved by the Planning and Zoning Commission on the Site Development Plan.

c. The areas of existing vegetation within the Conditional Use Permit (CUP) boundaries identified as to be retained shall be marked on the site prior to the commencement of any disturbance in accord with the City of Wildwood's Chapter 410. These areas shall be indicated on the Site Development Plan submitted to the City of Wildwood for Planning and Zoning Commission review and approval. Existing mature tree canopy shall be preserved in accordance with the requirements of City of Wildwood's Chapter 410 Tree Preservation and Restoration Code.

d. All disturbed areas of the site shall be restored in compliance to the City's Sustainable Plantings Guide and Tree Manual by a combination of ground cover, landscaping, berms, natural stones, and other means to address stormwater runoff and erosion,
as well as improve overall site aesthetics. The restoration of disturbed areas shall be indicated on the required Landscape Plan and acted upon by the Planning and Zoning Commission.

e. A registered Landscape Architect shall prepare, submit, and sign all plan(s).

Miscellaneous Conditions

f. The hours of any future construction and grading activity in association with this large water feature shall be limited to 7:00 a.m. to 6:00 p.m. Monday through Friday, and 8:00 a.m. to 6:00 p.m. on Saturday. No development (grading and construction) activity shall be authorized on Sundays.

g. All retaining walls exceeding three (3) feet in height per section or crossing individual property lines shall be constructed of an appropriate inter-locking concrete block system or boulders. The Planning and Zoning Commission, as part of the Site Development Plan review process, shall review and act upon said materials and design.

h. The generalized location of all utility easements for proposed service to this development shall be as approved by the Planning and Zoning Commission on the Site Development Plan.

i. All utilities serving this site shall be installed underground in accord with the requirements of the City of Wildwood’s Subdivision and Development Regulations. Any existing easements located on the subject site, which are not being utilized, shall be vacated under the standard procedures of the City of Wildwood Subdivision and Development Regulations.

j. The property owner, or any assignee or successor, shall provide annual maintenance of this authorized large water feature on the subject property, with such being in accordance with State regulations for the same. A plan for this maintenance and upkeep shall be provided to the Planning and Zoning Commission, as part of the required Site Development Plan. Preventative maintenance shall be authorized on an as-need basis, along with any repairs, but does require an engineered plan be submitted to the City of Wildwood’s Department of Public Works for review and action. This plan will then be submitted to the Planning and Zoning Commission for receipt and filing.

5. VERIFICATIONS PRIOR TO APPROVAL OF THE SITE DEVELOPMENT PLAN

Prior to approval of the Site Development Plan, the developer shall provide the following:

Stormwater Improvements

a. Submit to the Planning and Zoning Commission an engineering plan approved by the City of Wildwood Department of Public Works showing that adequate handling of the stormwater drainage of the site is provided.

i. The developer is required to provide adequate stormwater systems in accordance with the City of Wildwood standards.
ii. All stormwater shall be discharged at an adequate natural discharge point.
iii. The developer of this site shall be solely responsible to provide the necessary mechanisms, as part of the Site Development Plan/Improvement Plan process, to implement “best management practices” for stormwater management/water quality and the construction of related facilities. Minimally, these practices/facilities should include rain gardens, vegetated swales, and other options to substantially reduce the amount of stormwater discharging from the subject site.
iv. The developer shall provide adequate detention and/or hydrologic calculations for review and approval of all stormwater that will encroach on City of Wildwood rights-of-way.
v. The property owner shall be required to provide pre-treatment of runoff entering the large water feature, if a foundation is installed as part of it. This pre-treatment facility shall be designed, engineered, and constructed as a forebay for water quality purposes, all being completed in accordance with the standards, specifications, and requirements of the Metropolitan St. Louis Sewer District (MSD) for such type of improvements, and as directed by City of Wildwood’s Department of Public Works.

Stormwater Pollution Prevention Plan

b. Prior to any land disturbance on this subject site, submit a Stormwater Pollution Prevention Plan, as part of the Site Development Plan review process, indicating compliance to Federal, State, and local requirements regarding the management of stormwater runoff to prevent siltation and erosion, both on-site and upon downstream properties.
Sound Study

c. The authorization of the Site Development Plan for this large water feature shall not include the waterfall structure, unless an independent sound study is conducted by the City of Wildwood with it in operation to determine the level of compliance to the Noise Code. This sound study must be conducted in accordance with accepted industry standards and by a consultant/firm with extensive experience in this field of sound analysis and testing. The results of the sound study must indicate compliance to the Noise Code, before the Site Development Plan can be acted upon for the waterfall structure.

Air Pollution Testing

d. The authorization of the Site Development Plan for this large water feature shall not include the waterfall structure, unless testing is provided regarding the odor issue associated with this improvement. This testing must be conducted in accordance with accepted industry standards and by a consultant/firm with extensive experience in this field of air pollution control. The results of the testing must indicate compliance to the Air Pollution Code, before the Site Development Plan can be acted upon for the waterfall structure.

6. RECORDING

Within sixty (60) days of granting of the Conditional Use Permit (CUP) by the Planning and Zoning Commission, the approved permit language and legal description of the property shall be recorded with the St. Louis County Recorder of Deeds.

7. VERIFICATION PRIOR TO PERMITS

Notification to Department of Planning

a. Subsequent to approval of the Site Development Plan, and prior to issuance of any grading or permit, all approvals from the Missouri Department of Transportation (MoDOT), the Department of Public Works, the U.S. Army Corp of Engineers, the Missouri Department of Natural Resources (MDNR), and the Monarch Fire Protection District must be received by the Department of Planning.

Nuisance Bond

b. Provide to the City of Wildwood a bond, letter of credit, or cash deposit in the amount of five thousand dollars ($5,000.00) for use to undertake any inspections or maintenance of the large water feature and dam, if the property and improvements are not maintained in accordance with said conditions of this permit. The City shall hold this deposit and it will be pre-authorized by the owner/operator, in writing, to exercise its use, if violations are noted and not abated in a timely manner.

8. GENERAL DEVELOPMENT CONDITIONS

a. Provide adequate temporary off-street parking for construction employees. Parking on non-surfaced areas shall be prohibited in order to eliminate the condition whereby mud from construction and employee vehicles is tracked onto the pavement causing hazardous roadway and driving conditions.

b. A grading permit is required prior to any grading on the site. Interim stormwater drainage controls in the form of siltation control measures are required and must comply with the Stormwater Pollution Prevention Plan for this development (SWPPP). The developer shall be solely responsible for obtaining any temporary slope and construction licenses needed to address the installation of public and private improvements on this site that require the use of adjoining parcels of ground that are not under their ownership or control.

c. The petitioner shall be responsible for obtaining all necessary permits from the Department of Natural Resources Clean Water Commission as they relate to the development of this tract of land.

d. The developer is advised that utility companies will require compensation for relocation of their utility facilities within public right-of-way. The developer should also be aware of extensive delays in utility company relocation and adjustments. Such delays will not constitute a cause to allow occupancy prior to completion of infrastructure improvements.

e. If cut and fill operations occur during a season not favorable for immediate establishment of a permanent ground cover, a fast germinating annual, such as Rye or Sudan Grasses, shall be utilized to prevent erosion. This restoration must occur within thirty (30) days of the conclusion of preliminary grading as determined by the Director of Public Works.
f. Failure to comply with any or all of the conditions of this ordinance shall be adequate cause for revocation of permits by issuing City of Wildwood Departments or Commissions.

g. The Zoning Enforcement Officer of the City of Wildwood, Missouri, shall enforce the conditions of this ordinance in accord with the Site Development Plan approved by the Planning and Zoning Commission and the Department of Planning. The owner/operator must acknowledge in writing that access to this site for inspection purposes by personnel of the City of Wildwood shall be authorized and, if refused, such action is grounds for revocation of said permit by the City.

h. Any other applicable zoning, subdivision, or other regulations or requirements of the City shall further apply to the development of this property, as authorized by this Conditional Use Permit (CUP), except as may be provided by law. Nothing herein shall be deemed a waiver of any subdivision, zoning, or other development regulation of the City whether by implication or reference.

i. This zoning approval is conditioned on compliance with the Zoning Ordinance, Subdivision and Development Regulations, and all applicable laws of the City. Such additional regulations are supplemental to the requirements herein and no modification of any applicable regulations shall result from this Conditional Use Permit (CUP), except where this ordinance has expressly modified such regulations by reference to the applicable provision authorizing such modification.

j. This Conditional Use Permit (CUP) shall be authorized for a period of one (1) year, with any adjustments to it based upon compliance to the requirements of the same. Renewal requests shall be the responsibility of the owner/operator to submit to the City and must be provided a minimum two (2) months in advance of each renewal for consideration and action by the Planning and Zoning Commission following this initial period of time. Subsequent renewals shall be on a three (3) year basis.
January 2, 2020

Tom Roberts
550 Laurey Lane
Wildwood, Missouri 63005

Re: Review Comments on the Large Water Feature and Associated Waterfall – A Conditional Use Permit (CUP) in the NU Non-Urban Residence District.

Dear Mr. Roberts:

The Department has completed its review of the Site Development Plan (SDP) package for the large water feature and associated waterfall that is located on the approximately sixty (60) acre site that is situated at the terminus of Laurey Lane. The review of this package focused on the compliance of the submitted plan sheets to the site-specific permit that governs this location, the regulations of the underlying zoning district designation (NU Non-Urban Residence District), and the City of Wildwood’s Design Criteria Handbook. The results of this review indicate several issues that preclude the Department from submitting the plan sheets to the Planning and Zoning Commission for its consideration and final action. These issues are identified below for your review:

1. Please add a new sheet to the Site Development Plan (SDP) package that depicts all current conditions of the Conditional Use Permit (CUP).
2. Please provide an overall Title Sheet that provides the information identified on the attached checklist.
3. Please show, and provide, a detailed description of pre-treatment improvements at the head waters of the large water feature. These improvement levels must reflect current Metropolitan St. Louis Sewer District (MSD) standards for pre-treatment of runoff entering the large water feature.
4. Please provide an on-going maintenance plan for the dam and large water feature.
5. Please provide an emergency management plan, which will address a potential dam failure.
6. Please provide a detailed description of planned chemical or natural treatment of the large water feature, as set forth in Condition 2(d.), for information and recently set forth by the Planning and Zoning Commission at its meeting on result of the water testing.
7. Please add/show all new improvements, particularly the waterfall structure and all other buildings and/or structures situated on the subject property.
8. Please show access improvements from the terminus of Laurey Lane through the subject lot.
9. Please add to Sheet 4 of 4 (ALTA/ACSM Land Title Survey) notes regarding the size of the large water feature, the size of the large water feature in terms of overall gallons of storage, the depth of the large water feature, and the height of the dam.

10. Please dimension the waterfall structure, specifically the total width and length.

11. Please provide details on the pumps and related piping system, as part of this single submittal package. Along with the requested plan depiction, provide manufacturers’ catalog cut sheets for the in-place equipment.

12. Please add to the Channel Cross-Section Detail a note that indicates that its depth varies, as constructed, unless such is not the case.

13. Please provide manufacturers’ catalog cut sheets for the fountain.

14. Please indicate compliance to Missouri Department of Natural Resources (MDNR) requirements and standards for the design, engineering, and on-going maintenance of the dam. Including inspection frequencies and criteria.

15. Please indicate on Sheet 4 of 4 the required setback distances for the large water feature from the governing permit – 700 feet (south); 400 feet (west); 40 feet (north); and 450 feet (east) for the large water feature and 100 feet (east) for the waterfall.

16. Please be advised the Department of Public Works is reviewing the dam structure design and overflow structure and related downstream improvements for acceptance or comments.

17. Please provide a five thousand dollar ($5,000.00) bond for inspections/maintenance of the large water feature and dam, if they are not conducted by you, as part of the overall maintenance plan for this large water feature and dam.

18. Please be advised that, once the Site Development Plan (SDP) is acted upon by the Planning and Zoning Commission, the permit will be reviewed in one (1) year timeframe. This review will be before the Planning and Zoning Commission.

Please review the provided comments and address the needed changes to the plan sheets for further City review. If you should have any questions or comments, or need my assistance in this regard, please feel free to contact me at (636) 458-0440. Thank you in advance for your anticipated cooperation in this regard.

Respectfully submitted,

CITY OF WILDWOOD

Joe Vujnic, Director
Department of Planning

Cc: The Honorable James R. Bowlin, Mayor
    Council Members Brost and Gragnani, Ward One
    Sam Anselm, City Administrator
    John A. Young, City Attorney
    Kathy Arnett, Assistant Director of Planning and Parks
    Travis Newberry, Planner
CITY OF WILDCOOD
PLAN/PLAT REVIEW CHECKLIST

**Please note: All checked items must be responded to on plan's resubmittal**

P. Z. #  P. Z. 15-17  DEVELOPMENT NAME  Tom Roberts' Large Water Feature

___ Provide Missouri Department of Transportation Conceptual Approval.

___ Provide Metropolitan St. Louis Sewer District Conceptual Approval.

___ Submit a Flood Plain Study to the Department of Public Works.

✓ Submit a Geotechnical Study to the Department of Public Works. (Check to determine if already submitted)

✓ A Professional Engineer and Engineer preparing geotechnical report must sign and seal the mylar.

___ Submit a street stub study to the Department of Public Works. 
NOTE: Developer shall install a street extension sign at roadway terminus which reads "THIS STREET TO BE EXTENDED AS PART OF FUTURE DEVELOPMENT"

___ Submit steep grade verification to Department of Public Works.

___ Add all ordinance conditions to the Site Development Plan, including T&G language.

___ Identify pavement and right-of-way width along ____________________________

___ Show and dimension all improvements, i.e., existing and new right-of-way and pavement, sidewalks, TSC., etc.

___ Provide Temporary Slope Construction License (TSCL) as directed by the Department of Public Works.

___ Provide photos per Section 30 of the Department of Public Works' "Design Criteria Handbook."

___ Provide verifications of required sight distance at all access points.

___ Please add as a note: Entrance, street intersection, cul-de-sac shall be constructed to City of Wildwood standards.

___ Indicate Driveways with on-site turnaround capabilities as directed by the Department of Public Works.

___ Show sight triangle at intersection/median. No plants, trees, signs, etc. shall be placed in this area as to restrict sight distance.

___ Show and note all sidewalks will be constructed to City of Wildwood ADA standards.

___ Provide easement for sidewalk conforming to City of Wildwood ADA standards adjacent to right-of-way.

___ Clarify if grading is proposed. If so, show and note grading per City of Wildwood standards.
CITY OF WILDWOOD
PLAN/PLAT REVIEW CHECKLIST
PAGE 2

- Show existing and proposed contours based on U.S.G.S. datum.

- Please add the note: Grading and drainage shall be per City of Wildwood and MSD standards.

- Please add the note: Slope shall not exceed 3 (horizontal): 1 (vertical), unless supported by geotechnical report.

- Please add the note: Stormwater shall be discharged at an adequate natural discharge point. Sinkholes are not adequate natural discharge points.

- Provide and show cross access (through the site) (between the proposed lots).

- Designate Public or Private streets.

- Provide Book and Page in which right-of-way, roadway, easement, TSCL, etc. has been recorded.

- Please provide a Location Map.

- Please provide a North Arrow.

- Please identify the Plan Scale.

- Please identify the Subject Site's Zoning District.

- Please provide the Subdivision Name, if applicable.

- Provide the Lot Number, if applicable.

- Identify the Dimensions of the Site.

- Identify the Area of the Site.

- Provide the Zoning of Adjacent Parcels, if different than the site.

- Identify the Plan Submitter - Name, Address, Phone.

- Provide the Proposed Building Use and Construction Type.

- Identify the Building and Structure Distance from Adjacent Property Lines.

- Provide the Building Dimensions and Gross Floor Area.

- Provide the Parking and Loading Space Calculations, as well as, the Location and Sizes of all Proposed Spaces.

- Identify the Parking Setbacks.

- Identify the Drive Aisle Widths.

- Identify the Type and Location of the Proposed Sanitary Sewer Treatment.
Identify the Stormwater Drainage Facilities, including Retention Ponds and Detention Facilities, if applicable.

Provide a Landscaping Plan and Legend.

Provide a rendering of all Proposed Signs, which identifies their Size, Height and Location on the Plan.

Locate all Easements - Existing and Proposed.

Identify all Light Standards - Location and Height.

Identify any Other Structures (Fences, Canopies, etc.) - with Dimensions.

**If you should have any questions regarding the information provided on these sheets, please feel free to contact the Department of Planning at 636-458-0440**
PETITIONER’S RESPONSE TO 1ST REVIEW LETTER
Hi, Joe –

On behalf of Babler Farm, please see Tom Roberts’ attached response and revised Site Development Plan which addresses all 18 comments from your January 2, 2020 letter, inclusive of incorporating the requested figure amendments from the checklist sent with the January 2nd letter.

If you have further questions, please let us know.

Sincerely,

- Elizabeth

Elizabeth B. Schlaeger, P.E.

EnviroAnalytics Group

Office: (314) 835-2802
Cell: (314) 207-1734
eschlaeber@enviroanalyticsgroup.com

From: Joe Vujnic [mailto:Joe@cityofwildwood.com]
Sent: Monday, January 13, 2020 5:00 PM
To: Elizabeth Schlaeger; Tom Roberts
Cc: Travis Newberry; Sam Anselm; Jim Bowlin; Larry Brost; John Gragnani; John Young
Subject: Re: 1st Review Letter for Large Water Feature and Associated Waterfall

Ms. Schlaeger:

PDF via e-mail is fine and thank you for asking.

Joe Vujnic

From: Elizabeth Schlaeger <ESchlaeber@enviroanalyticsgroup.com>
Date: Monday, January 13, 2020 at 4:30 PM
To: ''Joe@cityofwildwood.com'' <joe@cityofwildwood.com>, Tom Roberts <troberts@cdcco.com>
Cc: Travis Newberry <travis@cityofwildwood.com>, Sam Anselm <Sam@cityofwildwood.com>, Jim Bowlin <jbowlin@cityofwildwood.com>, Larry Brost <lbrost@cityofwildwood.com>, John Gragnani <jgragnani@cityofwildwood.com>, "jyoung@hamiltonweber.com" <jyoung@hamiltonweber.com>
Subject: RE: 1st Review Letter for Large Water Feature and Associated Waterfall

Hi, Joe –

Tom and I are just about to button up the response to your January 2 emailed letter. Can we simply respond with a PDF back to you, or would you like to have 1 or more hard copies mailed to your office, as well.

Please advise.

Thanks,

Elizabeth

Elizabeth B. Schlaeger, P.E.

EnviroAnalytics

Group

Office: (314) 835-2802
Cell: (314) 307-1734
eschlaeger@enviroanalyticsgroup.com

From: Joe Vujnic [mailto:joe@cityofwildwood.com]
Sent: Thursday, January 2, 2020 3:12 PM
To: Elizabeth Schlaeger; Tom Roberts
Cc: Travis Newberry; Sam Anselm; Jim Bowlin; Larry Brost; John Gragnani; jyoung@hamiltonweber.com
Subject: 1st Review Letter for Large Water Feature and Associated Waterfall

Ms. Schlaeger and Mr. Roberts:

I hope each of you had a wonderful holiday season and Happy New Year.

I have attached the comment letter regarding the current plan sheets on file with the City for the large water feature and associated waterfall structure. Please contact me with any questions or comments in this regard (636-458-0440).

Thank you in advance for your cooperation.

Joe Vujnic
January 16, 2020

Mr. Joe Vujnic, Director
Department of Planning
City of Wildwood

Re: Response to the City of Wildwood’s January 2, 2020 Comments on the Large Water Feature and Associated Waterfall – A Conditional Use Permit (CUP) in the NU Non-Urban Residence District letter

Dear Mr. Vujnic:

This letter and accompanying attachments are being submitted in response to a letter received on January 2, 2020 regarding the lake and waterfall feature located at 500 & 550 Laurey Lane. As requested in your letter, Babler Farm is presenting a cohesive, single package of information that addresses 18 separate comments, along with a corresponding checklist provided. Much of the information contained herein has been previously submitted to the City of Wildwood (CoWW), but we trust that this comprehensive Site Development Plan (SDP) package will be the last submittal needed for the Planning and Zoning Commission’s consideration to make their final decision regarding the CUP for the above referenced large water feature and associated waterfall.

CoWW comments are presented in black text with Babler Farm responses in red.

1) Please add a new sheet to the SDP package that depicts all current conditions of the CUP. Please see Figure 1 in the attached SDP package.

2) Please provide an overall Title Sheet that provides the information on the attached checklist. Not all checklist items could be demonstrated on one sheet. Pertinent figures were updated with checklist request, and all checklist requests were made. Please refer to Figures 1 through 5 in the attached SDP package.

3) Please show, and provide, a detailed description of pre-treatment improvements at the head waters of the large water feature. These improvement levels must reflect current Metropolitan St. Louis Sewer District (MSD) standards for pre-treatment of runoff entering the large water feature. Erosion and sediment control (E&SC) measures in the form of straw wattles have been installed at the head waters of the large water feature. This E&SC measure is consistent with MSD standards, per the St Louis County Sediment and Erosion Control Manual (STL S&ECM), page 100. The purpose of these E&SC measures is to intercept sheet flow, reduce flow velocity, remove sediment from the runoff, and reduce soil erosion of the head waters. The straw wattles are prefabricated and installed consistent with best management practices (BMPs), using type 1 staking and butt joints. Please refer to Attachment A of the SDP for the STL S&ECM figure demonstrating installation and staking, as well as photos of the installed wattles at the head water of the large water feature.
4) Please provide an on-going maintenance plan for the dam and large water feature.

*Attachment B of the SDP package contains the Dam Management and Emergency Action Plan, which contains the on-going maintenance plan for the dam and large water feature. Please refer to the “Inspection Protocol” section of that plan for the on-going maintenance plan components.*

5) Please provide an emergency management plan, which will address a potential dam failure.

*Please see Attachment B of the attached SDP package.*

6) Please provide a detailed description of planned chemical or natural treatment of the large water feature, as set forth in Condition 2(d.), for information and recently set forth by the Planning and Zoning Commission at its meeting on result of the water testing.

*Condition 2(d.) states the following:*

*The inclusion and use of the existing fountain, as a component of the large water feature, shall be authorized, if water quality measures are provided to treat stormwater runoff entering it, along with the chemical treatment of the water contained therein, to address contaminants from other sources. This chemical treatment option(s) that are to be used for these purposes shall not harm any fish, other aquatic life, or mammals that may come in contact with the water held in the feature, but ensure it maintains an acceptable quality level for the purposes of public health.*

As previously mentioned, straw wattles have been placed around the head waters of the large water feature to filter stormwater runoff, reducing total suspended solids. Should some significant rain event occur to cause the water to become overly murky, an appropriate polymer (likely some type of alum) would be applied. Further, copper sulfate pentahydrate (a commonly and commercially available pond cleaning agent) will be kept on hand to periodically condition and treat the water in the large water feature, as well.

7) Please add/show all new improvements, particularly the waterfall structure and all other buildings and/or structures situated on the subject property.

*Please refer to Figure 1 in the attached SDP package.*

8) Please show access improvements from the terminus of Laurey Lane through the subject lot.

*Please refer to Figure 1 in the attached SDP package.*

9) Please add to Sheet 4 of 4 (ALTA/ACSM Land Title Survey) notes regarding the size of the large water feature, the size of the large water feature in terms of overall gallons of storage, the depth of the large water feature, and the height of the dam.

*Please refer to Figure 2 of the attached SDP Package.*

10) Please dimension the waterfall structure, specifically the total width and length.

*Please refer to Figure 1 of the attached SDP Package.*

11) Please provide details on the pumps and related piping system, as part of this single submittal package. Along with the requested plan depiction, provide manufacturer’s catalog cut sheets for the in-place equipment.

*Please refer to Figure 3 of the attached SDP package for the plan depiction of the waterfall*
structure design details. Further, please refer to Attachment C for the cut sheets for the in-place equipment being utilized.

12) Please add to the Channel Cross-Section Detail a note that indicates that its depth varies, as constructed, unless such is not the case.
   Please refer to Figure 3 of the attached SDP Package.

13) Please provide manufacturers' catalog cut sheets for the fountain.
   Please refer to Attachment C for the cut sheets for the in-place equipment being utilized.

14) Please indicate compliance to Missouri Department of Natural Resources (MDNR) requirements and standards for the design, engineering, and on-going maintenance of the dam. Including inspection frequencies and criteria.
   To the best of my knowledge, the standards for the design, engineering, and on-going maintenance (including inspection frequencies and criteria) of the dam comply with applicable MDNR requirements.

15) Please indicate on Sheet 4 of 4 the required setback distances for the large water feature from the governing permit—700 feet (south); 400 feet (west); 40 feet (north); and 450 feet (east) for the large water water feature and 100 feet (east) for the waterfall.
   For the large water feature setback distances, please refer to Figure 2 of the attached SDP package; specifically refer to the dark blue dashed lines with distances provided. For the waterfall setback distance, please refer to Figure 1 of the attached SDP package; specifically refer to the yellow dashed line with distance.

16) Please be advised the Department of Public Works is reviewing the dam structure design and overflow structure and related downstream improvements for acceptance or comments.
    Understood.

17) Please provide a five thousand dollar ($5,000.00) bond for inspections/maintenance of the large water feature and dam, if they are not conducted by you, as part of the overall maintenance plan for this large water feature and dam.
    Inspections and maintenance are being conducted by the owner.

18) Please be advised that, once the Site Development Plan (SDP) is acted upon by the Planning and Zoning Commission, the permit will be reviewed in one (1) year timeframe. This review will be before the Planning and Zoning Commission.
    Understood.

Please let me know if there is anything else the Planning and Zoning Commission needs for this matter.

Sincerely,

Tom Roberts/Babler Farms, LLC
ATTACHMENTS
BABLER FARMS
550 LAUREY LANE
WILDWOOD, MO 63005

SITE DEVELOPMENT PLAN

for

LARGE WATER FEATURE & ASSOCIATED WATERFALL

January 2020
Table of Contents

Figure 1  Current Conditions, Improvements, & Property Layout
Figure 2  Babler Farm Survey & Setbacks (Sheet 4 of 4 of the ALTA/ACSM Land Title Survey, with additional notes)
Figure 3  Large Water Feature & Waterfall Design Details
Figure 4  Pond – Waterfall Layout and Elevation Detail
Figure 5  Topographic Map for the Pond and Surrounding Area

Attachment A  Erosion Control for Head Waters of Large Water Feature
              • STL S&EC Manual, page 100
              • Site Photos of S&EC Measures
Attachment B  Dam Management and Emergency Action Plan
Attachment C  Manufacturers’ Catalog Cut Sheets for All In-Place Equipment
ATTACHMENT A

Erosion Control for Head Waters of Large Water Feature:

STL S&EC Manual, page 100
Site Photos of S&EC Measures
FIBER ROLL SECTION & STAKING
(TYPE 2 & TYPE 3)

Notes: Construct a "J-hook" at each end of a continuous run of fiber rolls or wattles, by turning the end of the roll uphill, to prevent storm water runoff and rolls from flowing around the ends, when water behind the roll ponds up to a level even with the top of the roll.

ROW SPACING (Table 1)

<table>
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<th>Slope</th>
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<tr>
<td>2:1</td>
<td>19 Feet</td>
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<tr>
<td>2:1 to 4:1</td>
<td>15 Feet</td>
</tr>
<tr>
<td>&lt; 2:1</td>
<td>20 Feet</td>
</tr>
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</table>

STAKE NOTCH DETAIL
(TYPE 2 & TYPE 3)

GENERAL NOTES

1) Do not scale drawing, follow dimensions.
2) Row spacing for slope installations should be determined by site conditions such as slope gradient and roll type (see Table 1 for row spacing).
3) Installations as shown above are designed for slopes of 1:10 and steeper.
4) Netting, fiber sock or outer cover of rolls must be constructed of photodegradable or biodegradable materials.
5) Fiber Rolls and Wattles shall contain straw, flax, coconut fiber (coir), rice straw, aspen or excelerol. In a tight tubular roll, specifically designed for removal of sediments from storm water runoff. Fill material must be biodegradable and contain no chemical additives.
6) Fiber Rolls or Wattles may be weighted for use around stream inlets (internal) roll weight or by placing a weight, such as a concrete block, on the downstream side of the roll. Weight must not be placed on top of the roll, smashing or flattening the roll.
7) Follow the roll manufacturer's instructions and recommendations for the staking, installation and maintenance of all Fiber Rolls or Wattles.

STAKING WITH STAGGERED JOINTS
(TYPE 2)

STAKING WITH BUTT JOINTS
(TYPE 3)
Straw waddles for filtration
ATTACHMENT B

Dam Management and Emergency Action Plan
Dam Management and Emergency Action Plan

Dam Name: Tom's Dam
St. Louis County, Missouri

SEMA Area C

Reviewed and Updated:
12/12/2017

Tom Roberts
Name of dam owner/operator

12-19-17
Date
Basic Management Protocol

Purpose
The purpose of this Management protocol is to outline methods for inspection and repair to the dam to minimize risk of failure.

Dam/Lake Construction Details
Tom’s Dam was repaired/reconstructed in 2015 to eliminate the leaks from the lake and to provide needed maintenance. As part of this reconstruction process the lake was dredged to remove silt and sediment that was deposited in the lake previously. The lake bottom was then compacted at this time to help prevent future leaks. Areas of the dam that contained poor soil were replaced with clay, leaks were identified and properly repaired, and the dam was brought back to the original contours in shallow compacted lifts.

Inspection Protocol
Inspections will be divided into two classes, major and minor. Major inspection will occur on a semi annual basis in the spring and fall. Prior to a major inspection, areas around the dam and the dam itself will be mowed to allow for better viewing of the dam surface. After mowing has occurred the dam surface will be walked in its entirety and examined for burrowing of insect and/or animals, erosion, and seepage. If any seepage is found it will be immediately recorded and services for dam repair will begin as soon as possible. If burrowing animals or other surface erosion is noted then the source of the soil disturbance will be located and removed. If erosion in any isolated area becomes frequent the area will be checked for seepage and then lined with rock to prevent future erosion. Minor inspections will occur on a monthly basis; these inspections will not require mowing and will be performed along the northern face of the dam. This is the area with the greatest risk of damage should failure occur. Monthly/Minor inspections will be done to look for evidence of the same issues addressed with major inspections, and if these issues are found they will be addressed in the same manner. Contacts for repair services are provided as part of the emergency action plan, however the service providers at the time may change based on availability.
Basic EAP Data

Purpose
The purpose of this EAP is to reduce the risk to human life and minimize property damage during an unusual or emergency event at Tom's Dam.

Notification Procedure
This EAP provides general guidance for recognizing and characterizing an emergency situation occurring at the dam. The dam owner should act quickly to evaluate the emergency situation and then follow the notification procedures according to the corresponding level of emergency.

Potential Impacted Area
In the event of a dam failure, released water will be diverted to a pre-existing wet weather creek causing minimal impact to local residents, businesses, roads, and utilities.

Directions to Dam
From: 183 Plaza Dr, Wildwood, MO 63040

Head east on Plaza Dr toward Fountain Pl. turn right toward Main St, turn left onto Main St, then turn left onto Taylor Rd. Turn left onto Historic U.S. 66 W, take the MO-109 exit toward Eatherton Rd, and turn right onto MO-109 N. Turn left onto Wild Horse Creek Rd, take the 1st left onto Laurey Ln., and destination will be on the left at 500 Laurey Ln.
Guidance for Determining the Emergency Level

This information should be used as a general guide for recognizing and characterizing the type of emergency situation occurring at the dam. The dam owner should notify the appropriate emergency contacts based upon the emergency level assigned to each situation.

**Level 1 Emergency - Nonemergency, unusual event, slow to develop**
- Reservoir water surface elevation at emergency spillway crest or spillway is flowing with no active erosion.
- New seepage areas in or near the dam.
- New cracks in the embankment greater than ¼-inch wide without seepage.
- Visual movement/slippage of the embankment slope.
- Instrumentation readings beyond predetermined values.
- Measurable earthquake felt or reported on or within 50 miles of the dam.
- Damage (vandalism/sabotage) to dam or appurtenances with no impacts to the functioning of the dam.
- Modification (vandalism/sabotage) to the dam or appurtenances that could adversely impact the functioning of the dam.

**Level 2 Emergency - Potential dam failure situation, rapidly developing**
- Spillway flowing with active gully erosion.
- Spillway flow that could result in flooding of people downstream, if the reservoir level continues to rise.
- Reservoir level is 1 foot below the top of the dam.
- New seepage areas with cloudy discharge or increasing flow rate.
- Observation of new sinkhole in reservoir area, on embankment or downstream of dam.
- Cracks in the embankment with seepage.
- Earthquake resulting in visible damage to the dam or appurtenances.
- Verified bomb threat that, if carried out, could result in damage to the dam.
- Damage to dam (vandalism/sabotage) or appurtenances that has resulted in seepage flow.

**Level 3 Emergency - Urgent; dam failure imminent or is in progress**
- Spillway flowing with an advancing headcut that is threatening the control section.
- Spillway flow that is flooding people downstream.
- Water from the reservoir is flowing over the top of the dam (not just auxiliary/emergency spillway).
- Seepage that is obviously eroding soil from within the embankment or rapidly increasing in flow rate.
- Rapidly enlarging sinkhole.
- Sudden or rapidly progressing slides of the embankment slopes.
- Earthquake resulting in uncontrolled release of water from the dam.
- Detonated bomb that has resulted in damage to the dam or appurtenances.
- Damage to dam (vandalism/sabotage) or appurtenances that has resulted in uncontrolled water release.
Emergency Level 1 Notifications

Nonemergency, unusual event; slowly developing.

**Dam Operator or Owner**

Tom Roberts  
314-835-2888 (Office)  
314-799-4400 (Cell)

(1.)

**State Dam Safety Official**

Missouri  
Water Resources Center  
Robert Clay  
573-368-2175 (Office)  
573-341-5761 (Home)  
573-368-6191 (Cell)

(2.)

**Dam Operator’s Technical Reps. (if applicable)**

Owner’s engineer  
*Adam Peetz*  
314-616-0279 (Cell)

---

**Note:**  
1., 2., etc., denotes call sequence

**Legend:**

Calls by operator/owner  
Second level calls - - - -

See *Emergency Services Contacts* sheet for contact information about back-ups to the persons shown above and other emergency personnel.
Emergency Level 2 Notifications

Emergency event, potential dam failure situation; rapidly developing.

Dam Operator or Owner
Tom Roberts
314-835-2888 (Office)
314-799-4400 (Cell)

911
County Emergency Director/Sheriff
Jim Buckles
314-615-4724 (office)

State Dam Safety Official
Missouri Water Resources Center
Robert Clay
573-368-2175 (Office)
573-341-5761 (Home)
573-368-6191 (Cell)

Local Emergency Management Dispatcher

Missouri Highway Patrol Dispatcher

Local Law Enforcement/Fire Protection Agency Dispatcher

St. Louis County Amateur Radio Emergency Service:
Steve Wooten
kc0qmu@yahoo.com

Dam Operator’s Technical Reps. (if applicable)
Owner’s engineer
Adam Peetz
314-616-0279 (Cell)

National Weather Service
636-447-1876

Note:
1., 2., etc., denotes call sequence

Legend:
Calls by operator/owner
Second level calls

See Emergency Services Contacts sheet for contact information about back-ups to the persons shown above and other emergency personnel.
Emergency Level 3 Notifications

Urgent event, dam failure appears imminent or is in progress.

**Dam Operator or Owner**
Tom Roberts
314-835-2888 (Office)
314-799-4400 (Cell)

(1.)

**911**
County Emergency Director/Sheriff
Jim Buckles
314-615-4724 (office)

(2.)

**State Dam Safety Official**
Missouri Water Resources Center
Robert Clay
573-368-2175 (Office)
573-341-5761 (Home)
573-368-6191 (Cell)

(3.)

**Dam Operator’s Technical Reps. (if applicable)**
Owner’s engineer
Adam Peetz
314-616-0279 (Cell)

**Local Emergency Management Dispatcher**

**National Weather Service**
636-447-1876

**Missouri Highway Patrol Dispatcher**

**St. Louis County Amateur Radio Emergency Service:**
Steve Wooten
kc0qmu@yahoo.com

**Note:**
1., 2., etc., denotes call sequence

**Legend:**
Calls by operator/owner _______
Second level calls _______

See *Emergency Services Contacts* sheet for contact information for back-ups to the persons shown above and other emergency personnel.
# Emergency Services Contacts

<table>
<thead>
<tr>
<th>Agency / Organization</th>
<th>Principal Contact</th>
<th>Address</th>
<th>Office Phone No. with Area Code</th>
<th>Alternate Telephone Numbers</th>
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<tbody>
<tr>
<td>St. Louis County Sheriff</td>
<td>Jim Buckles</td>
<td>7900 Carondelet Ave, Ste Flr Clayton, MO 63105</td>
<td>314-615-4724</td>
<td></td>
</tr>
<tr>
<td>Owner/Representative of Tom's Dam</td>
<td>Tom Roberts</td>
<td>500 Laury Ln</td>
<td>314-835-2888</td>
<td>314-799-4400 (C)</td>
</tr>
<tr>
<td>County Emergency Management Director</td>
<td>Michael Smiley</td>
<td>1150 Hana Road Halliwin, MO 63021</td>
<td>314-615-9500</td>
<td></td>
</tr>
<tr>
<td>Wildwood Fire Department</td>
<td>Metro West Fire Protection Dist.</td>
<td>Po Box 310 Wildwood, MO 63040</td>
<td>636-458-2100</td>
<td></td>
</tr>
<tr>
<td>St. Louis County Police</td>
<td>Wildwood Precinct</td>
<td>16860 Main St. Wildwood, MO 63040</td>
<td>636-458-9194</td>
<td></td>
</tr>
<tr>
<td>Missouri Highway Patrol</td>
<td>Troop C</td>
<td>891 Technology Dr Weldon Spring, MO 63304</td>
<td>636-300-2800</td>
<td></td>
</tr>
<tr>
<td>St. Louis County Dept. of Highways &amp; Traffic</td>
<td>Contact Name, Supervisor</td>
<td>1050 N. Lindbergh Blvd. St. Louis, MO 63132</td>
<td>314-615-8538</td>
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<tr>
<td>Water Resources Center Dam and Reservoir Safety Program</td>
<td>Robert Clay</td>
<td>111 Fairgrounds Rd. Rolla, MO 65041</td>
<td>573-368-2175</td>
<td>573-341-5761 (H) 573-368-6191 (C)</td>
</tr>
<tr>
<td>Department of Natural Resources Emergency Response</td>
<td>Duty Officer</td>
<td>P.O. Box 176 Jefferson City, MO 65102</td>
<td>573-634-2436 (24 HOUR NO:)</td>
<td>573-526-3380 (Brian Allen, Chief, BEIR)</td>
</tr>
<tr>
<td>SEMA Duty Officer</td>
<td></td>
<td></td>
<td>573-751-2748</td>
<td></td>
</tr>
<tr>
<td>National Weather Service</td>
<td>Jim Kramper</td>
<td>St. Charles, MO</td>
<td>636-447-1876</td>
<td>1-800-852-7497 636-447-1769 (Fax)</td>
</tr>
<tr>
<td>National Weather Service</td>
<td>Andy Bailey</td>
<td>Kansas City, MO</td>
<td>816-540-5417</td>
<td></td>
</tr>
<tr>
<td>National Weather Service</td>
<td>Steve Runnels</td>
<td>Springfield, MO</td>
<td>417-863-1456</td>
<td></td>
</tr>
<tr>
<td>National Weather Service</td>
<td>Ricky Shanklin</td>
<td>Paducah, KY</td>
<td>270-744-6440</td>
<td></td>
</tr>
<tr>
<td>Missouri Department of Transportation</td>
<td>Emergency Operation Center 24-hour cell no.</td>
<td></td>
<td>573-522-9503</td>
<td></td>
</tr>
<tr>
<td>Missouri Department of Transportation</td>
<td>County Shed</td>
<td></td>
<td>636-938-5950</td>
<td></td>
</tr>
<tr>
<td>Natural Resources Conservation Service (For NRCS Dams)</td>
<td>Dick Purcell</td>
<td>601 Bus. Loop 70 W. Columbia, MO 65203</td>
<td>573-876-0910</td>
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Resources Available

Locally available resources include: (if not available please note)

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<th>Ready-mix Concrete Supply</th>
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<td>Busson Quarry – Antire Plant</td>
<td>Breckenridge Material Co</td>
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<tr>
<td></td>
<td>6800 Bussen Rd</td>
<td>2829 Breckenridge Industrial Ct</td>
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<tr>
<td></td>
<td>Eureka, MO 63025</td>
<td>St Louis, MO 63144</td>
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<tr>
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<td>636) 938-4910</td>
<td>314-962-1234</td>
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<th>Pumps</th>
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<td>K&amp;K Supply</td>
<td>American Underwater Contractors</td>
<td>Bussen Quarry – Antire Plant</td>
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<tr>
<td>535 North Highway Dr.</td>
<td>3426 Forester Rd</td>
<td>6800 Bussen Rd</td>
</tr>
<tr>
<td>Fenton, MO 63026</td>
<td>Hazelwood, MO 63044</td>
<td>Eureka, MO 63025</td>
</tr>
<tr>
<td>636-349-1141</td>
<td>314-739-5235</td>
<td>636-938-4910</td>
</tr>
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Appendix A

Unusual or Emergency Event Log
(To be completed during the emergency)

Dam name:  
County:  

When and how was the event detected?

Weather conditions:  

General description of the emergency situation:  

Emergency level determination:  
Made by:  

Actions and Event Progression

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<th>Time</th>
<th>Action/event progression</th>
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Appendix B

Glossary

**Abutment**
The part of the valley side against which the dam is constructed. The left and right abutments of dams are defined with the observer looking downstream from the dam.

**Appurtenances**
Structures incident to or annexed to dams essential to the proper operation, maintenance or functioning of the dam. This includes such structures as spillways, low level outlet works and water conduits, such as tunnels, pipelines or penstocks, either through a dam or its abutments.

**Breach**
An opening through the dam that allows draining of the reservoir. A controlled breach is an intentionally constructed opening. An uncontrolled breach is an unintended failure of the dam.

**Control section**
An usually level segment in the profile of an open channel spillway above which water in the reservoir discharges through the spillway.

**Dam**
An artificial barrier generally constructed across a watercourse for the purpose of impounding or diverting water.

**Emergency spillway**
The appurtenant structure that provides the controlled conveyance of excess water through, over, or around the dam.

**Instrumentation**
An arrangement of devices installed into or near dams that provide measurements to evaluate the structural behavior and other performance parameters of the dam and spillway structures. Examples include seepage measuring weirs, piezometers, inclinometers and survey monuments.

**Low level outlet works**
An appurtenant structure, usually consisting of a pipe through the embankment or principal spillway structure equipped with a valve, whose purpose is to allow lowering the lake level.

**Principal spillway**
The appurtenant structure that conveys normal inflow through or around the embankment.

**Reservoir**
The body of water impounded or potentially impounded by the dam.

**Seepage**
The natural movement of water through the embankment, foundation, or abutment of the dam.
## Appendix C

**Record of Holders of Control Copies of this EAP**

<table>
<thead>
<tr>
<th>Copy Number</th>
<th>Organization</th>
<th>Person receiving copy</th>
<th>E-mail Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tom Roberts</td>
<td>Tom Roberts</td>
<td><a href="mailto:troberts@cdcco.com">troberts@cdcco.com</a></td>
</tr>
<tr>
<td>2</td>
<td>St. Louis County Emergency Management</td>
<td>Mike Smiley</td>
<td><a href="mailto:msmiley@stlouisco.com">msmiley@stlouisco.com</a></td>
</tr>
<tr>
<td>3</td>
<td>Missouri Department of Natural Resources Dam Safety Program and address</td>
<td>Bob Clay</td>
<td><a href="mailto:bob.clay@dnr.mo.gov">bob.clay@dnr.mo.gov</a></td>
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## Record of Revisions and Updates Made to EAP

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ATTACHMENT C

Manufacturers' Catalog Cut Sheets for All In-Place Equipment
Eagle Fountain Works, Inc.
4751 E Moody Blvd Bldg 7
Bunnell, FL 32174

EFL-190 Lighted Fountain Specification Sheet

The EFL-190 fountain is for retention ponds/lakes. The minimum water depth required for proper operation is 42". The fountain spray height is approx 15' H X 15" W in a 3 tier or trumpet pattern. The following items are standard with every fountain:

Heavy Duty PVC vacuum formed float (not injection molded) is very strong and will not crack from the sun. The float body cavity is filled with polystyrene for floatation. The lighting system is built into the float.

We use a 3/4 HP stainless steel pump on the EFL190 fountain rated at 115 volts, 1 phase, 5 FLA (also available in 208/230 volts). The pumps have 3 sets of seals including 2 internal sets of silicon carbide face seals and an outboard set of lip seals. A stainless mesh filter cage is included which pre-filters water and prevents clogging of the spray heads especially in retention pond applications. All piping is 1-1/2" schedule 40 PVC.

The EFL-190 fountain cycle is fully automatic with a high quality Intermatic T-101P or T-1261P, 24 hr. system control timer. On 230volt models we use the Intermatic T104 timer. The stainless lighting control panel has GFCI protection on 115 volt units as requested. Timer service whip plugs into an 115volt or 230volt GFCI receptacle. The timer can be hardwired and locked if that option is chosen at time of ordering. All components are outdoor rated, NEMA 4 and weatherproof. Lights are machined brass fixtures with MR16 LED bulbs.

Our low voltage lighting system (12volt) is powered by a 115volt or 208/230volt transformer built into the stainless steel lighting control panel. Lights pull 1.5 amps and with both the pump and lights running the 115volt system is rated @ 6.5FLA.

100' #12 and #14 SJTOW water rated service cable is standard. Additional service cable is available up to 250' max. A 15' nylon anchor rope is included with the fountain. Customer to supply anchor, typically 3 red bricks available from a hardware store works fine.

The fountain with lights and pump operating pulls 6.5amps FLA at 115volts or 3.5 amps FLA at 230volts. We include 3 different spray head patterns for the EFL-190 fountain package.
Product Information Packet

L3711T

10HP, 3450RPM, 1PH, 60HZ, 215T, 3744LC, TEFC, F
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### AC Induction Motor Performance Data

Record # 11882 - Typical performance - not guaranteed values

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#### 230 V, 60 Hz: Single Voltage Motor

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#### Load Characteristics 230 V, 60 Hz, 10 HP

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1. STANDARD ROTATION IS CCW FACING END OPPOSITE SHAFT EXTENSION.
2. OPTIONAL THERMOSTAT IS PROVIDED WHEN SPECIFIED.
3. MULTIPLE CAPACITORS ARE CONNECTED IN PARALLEL UNLESS OTHERWISE SPECIFIED.
4. OPTIONAL OIL CAPACITOR IS PROVIDED WHEN SPECIFIED.
5. CAPACITORS MAY BE SEPARATELY MOUNTED.
6. LEAD COLORS ARE OPTIONAL. LEADS MUST ALWAYS BE NUMBERED AS SHOWN.
2ND REVIEW LETTER
February 6, 2020

Tom Roberts
550 Laurey Lane
Wildwood, Missouri 63005

Re: 2nd Review Comments on the Large Water Feature and Associated Waterfall – A Conditional Use Permit (CUP) in the NU Non-Urban Residence District.

Dear Mr. Roberts:

The Department has completed its second review of the Site Development Plan (SDP) package for the large water feature and associated waterfall that is located on the approximately sixty (60) acre site that is situated at the terminus of Laurey Lane. The review of this package focused on the compliance of the submitted plan sheets to the site-specific permit that governs this location, the regulations of the underlying zoning district designation (NU Non-Urban Residence District), the Department of Planning’s January 2nd Comment Letter, and the City of Wildwood’s Design Criteria Handbook. The results of this review indicate several issues that preclude the Department from submitting the plan sheets to the Planning and Zoning Commission for its consideration and final action. These issues are identified below for your review:

1. Please add a new sheet to the Site Development Plan (SDP) package that depicts all current conditions of the Conditional Use Permit (CUP).
2. Please, on Figure #1 Sheet, also identify the property boundaries as the extent of the Conditional Use Permit (CUP) that was granted by the Planning and Zoning Commission for the approximately sixty (60) acre site.
3. Please, on Figure #2 Sheet, identify the setback lines with the distances associated with each of them; in this case, thirty (30) feet, except at the terminus of Laurey Lane, which must reflect a small squared area of fifty (50) feet, being reflective of its front yard area.
4. Please, on Figure #3 Sheet, identify on the Channel Cross Section Diagram the Max. Depth as feet (0.11').
5. Please, on Figure #3 Sheet, provide the depth of the intake pipe within the large water feature that is used to feed the waterfall structure. The Department understands the normal pool elevation of this large water feature fluctuates, but a base depth must have been chosen to ensure the intake pipe would not be exposed, even in dry/drought conditions.
6. Please, on Figure #4 Sheet, provide the engineering calculations and supporting documentation for the outfall structure (Pond Drain) relative to the 6” thick reinforced concrete walls and floor.
7. Please, one Figure #4 Sheet, provide the engineering calculations and supporting documentation for the choice of the 36" and 24" culvert pipes that were chosen for installation, as part of this structure.

8. Please indicate on Sheet 4 of 4 the required setback distances for the large water feature from the governing permit – 700 feet (south); 400 feet (west); 40 feet (north); and 450 feet (east) for the large water feature and 100 feet (east) for the waterfall (indicated).

9. Please be advised, on Attachment A, the use of fiber rolls and wattles, for the pre-treatment option is not consistent with the intent of the conditions in the permit for this requirement of runoff into the lake. The condition notes the following for this pre-treatment requirement: "the property owner shall be required to provide pre-treatment of runoff entering the large water feature, if a foundation is installed as part of it. This pre-treatment facility shall be designed, engineered, and constructed as a forebay for water quality purposes, all being completed in accordance with the standards, specifications, and requirements of the Metropolitan St. Louis Sewer District (MSD) for such type of improvements, and as directed by City of Wildwood's Department of Public Works."

10. Please be advised the Basic Management Protocol addresses many of the steps sought by the City, but it does not: achieve the following considerations: the engineering report, geotechnical report, and/or soils report used, when the large water feature and dam were reconstructed, and the maintenance that is planned for the overflow structure and associated piping. These items, as noted above, should be provided or added to the plan to address this comment.

11. Please be advised the management protocol also needs to address the on-going maintenance of the pre-treatment improvements and the water quality of the large water feature as well.

12. Please advise if a vegetative buffer is planned along the perimeter of the large water feature. These types of vegetative buffers are generally used to filter runoff entering the body of water from sheet flow and also provide habitat and shade for fish and wildlife in the area.

13. Please add to the emergency action plan the statement the St. Louis County Police Department – Wildwood Precinct will be contacted in a Level 2 and Level 3 emergency situation. The contact will be Captain Jim Mundell at (636) 458-9194.

14. Please provide a list of steps that address the following, which would be part of the emergency action plan: an inspection determines a Level 1, 2, or 3 emergency and, thereafter, the property owner will contact the list of agencies and others, etc.

15. Please be advised, the Department appreciates the acknowledgement the large water feature has been constructed to Missouri Department of Natural Resource standards, but that does not suffice to meet the language of the condition in the permit, which reads as follows in this regard: "the large water feature authorized by this permit, although created by the construction of a dam that is less than thirty-five (35) feet in height, shall meet all Missouri Department of Natural Resources (MDNR) requirements for design, engineering, and on-going maintenance, including inspection frequencies and criteria. These requirements will be reviewed and acted upon by the Planning and Zoning Commission, as part of the Site Development Plan process, and as directed by the Department of Public Works." Accordingly, more detailed responses to the standards set forth in the attached checklist prepared by the Missouri Department of Natural Resources shall be provided.
16. The Department appreciates the description that you have provided relative to the treatment of the water in the lake feature, but it is not as detailed as necessary, based upon the discussions that have been held by the Planning and Zoning Commission over the course of the last several months. As you know, from the water testing completed of the large lake feature, certain levels of minerals and mycosistins exist in it and do cause concerns regarding public health. These concerns dictate to the City the need to have a prescribed and complete twelve (12) month treatment program for the large water feature (the source of the water for the waterfall), which should include, but not limited to, the following steps or procedures: (a) a monthly schedule, i.e. January through December, that identifies the frequency of treatment and the days of the month, when planned; (b) chemicals or other materials that are planned to be used for treatment purposes and steps associated with them; (c) identification of the issues that may arise with the large water feature that would prompt extra steps in terms of treatment actions, i.e. algae blooms, (d) summary of costs on a yearly basis, which are not to exceed one thousand dollars ($1,000.00) per year; and (e) any other considerations that are planned to ensure the lake provides water to the waterfall structure that has been treated to minimize or eliminate mycosistins and any other harmful concentrations of minerals. For purposes of review, the specific language of the condition from the permit is provided herein: “the maintenance of the existing fountain, as a component of the large water feature, shall be authorized, if water quality measures are provided of the stormwater runoff entering it, along with the chemical treatment of the water contained therein to address contaminants from other sources. This chemical treatment option(s) used shall not harm any fish, aquatic life, or mammals that may come in contact with the water in the feature, but ensure it maintains an acceptable quality level for the purposes of public health purposes,” and does allow for these steps or procedures to be requested by the City for inclusion in this regard.

17. Please be advised the Department of Public Works will continue its review of the dam structure design and overflow structure and related downstream improvements for acceptance, once the items noted above are provided to it.

18. Please be advised that, once the Site Development Plan (SDP) is acted upon by the Planning and Zoning Commission, the permit will be reviewed in a one (1) year timeframe. This review will be before the Planning and Zoning Commission.

Please review the provided comments and address the needed changes to the plan sheets for further City review. If you should have any questions or comments, or need my assistance in this regard, please feel free to contact me at (636) 458-0440. Thank you in advance for your anticipated cooperation in this regard.

Respectfully submitted,
CITY OF WILDWOOD

Joe Vujnic, Director
Department of Planning
Cc:  The Honorable James R. Bowlin, Mayor  
Council Members Brost and Gragnani, Ward One  
Sam Anselm, City Administrator  
John A. Young, City Attorney  
Kathy Arnett, Assistant Director of Planning and Parks  
Travis Newberry, Planner
MISSOURI DAM AND RESERVOIR SAFETY STAFF CHECKLIST FOR EVALUATING CONSTRUCTION PERMIT APPLICATIONS FOR MODIFICATIONS TO EXISTING EARTH DAMS

II. DESIGN REPORT CONSIDERATIONS

If modifications are to the existing spillway facilities or appurtenances, see Parts A, B, C, F, and G. If modifications involve raising the top of dam, changing the water storage elevation or making other geotechnical changes, see parts A, D, E, F, and G.

A. Description of Proposed Changes

1. Appurtenant Structures.
   a. Description of modifications to the principal and emergency spillways.
   b. Description of modifications to the water withdrawal works, drawdown works, and internal drain outlets.
   c. Description of modifications to the discharge channels.
   d. Description of blasting that will be performed within two (2) miles of the dam.
   e. Describe how the reservoir will be drawn while modifications are constructed.

2. Dam and Foundation
   a. Description of the modification to the height of the dam
   b. Description of modifications to the slopes and dimensions of the dam.
   c. Description of modifications to the internal drainage system.
   d. Description of modifications of the permeability of the dam and foundation by grouting.

B. Determination of an Environmental Class For Each Dam and Reservoir.

1. For Class I (Go to Part II - C.)
2. For Class II and III only

a) If a sufficient number of homes are located downstream of a dam, a breach analysis is required to justify a Class II or Class III downstream environmental zone. The following information should be submitted:

1) Topographic map showing: (The most recent USGS Topographic map is minimum acceptable).
   a) Location of dam and reservoir.
   b) Location of stream cross sections used in breach analysis.
   c) Flood plain as derived from breach analysis.
   d) Verified locations of permanent dwellings, campgrounds or industrial buildings within the dam breach flood plain.

2) Dam failure criteria:
   a) Final breach configuration (bottom width, top width, side slopes).
   b) Assumed time of failure.
   c) Description of the methodology used and the computations performed in the breach analysis.

3) Stream profile showing:
   a) Water surface elevation created by failure of the dam with the reservoir at the emergency spillway crest elevation.

(1) Stream cross section locations.

b. To show that a structure located in the dam breach flood plain is not inundated by the dam breach flood:

1) Replace cross-section data derived from topographic maps with field survey cross-sections.

2) Compare surveyed first floor elevation of structure to the computed water surface elevation for the dam breach flood.

c. In a situation where a dam is in very remote location where there are not enough buildings or other structures located downstream of the dam to justify a class I environmental zone, another environmental class may be
used without having to perform a detailed dam breach analysis. Engineers are advised to obtain the approval of the Dam and Reservoir Safety staff before using this option.

C. Evaluation of Spillway Capacity

1. The following data must be included in the application report:

   a. Drainage area (square miles or acres) shown on an up-to-date USGS topo map.

   b. SCS Curve Number for watershed draining into lake.

   c. Time of concentration for runoff draining into reservoir. Sufficient documentation should be provided to derive the value used.

   d. Storage (acre-feet) vs. elevation (feet) data for reservoir. This information should be provided for elevations ranging from the bottom of the reservoir to the final elevation of the dam. Surface area (acres) vs elevation data should also be submitted in support of this information.

   e. Minimum elevation of top of dam exclusive of the spillway(s).

      If the top of dam is not level, a profile of the top of dam is required.

   f. Height of dam (measured in accordance with 10 CSR 22-1.020 (13)).

   g. Length of Dam.

   h. Discharge (cubic feet per second) vs. elevation (feet) data for spillway(s) with backup computations.

   i. The required critical design in-flow hydrograph to the reservoir as determined by taking the appropriate percentage of the PMP as shown in Table 5, 10 CSR 22-3.020.

   j. The probable maximum precipitation values from Hydrometerological Report No. 51, the duration of the rainfall, and the rainfall distribution pattern used to compute the hydrograph must also be submitted. Sufficient information should be submitted to derive the hydrograph.

   k. The required design storm out-flow hydrograph derived by reservoir routing the required design storm in-flow hydrograph through the spillway.

2. Other items that must be addressed:

   a. The possibility of submergence of the spillway control(s) by backwater conditions in the spillway discharge channel.
b. The ability of the spillway and discharge channel to withstand the exit velocity expected through them during the required design storm.

c. The alignment of the spillway discharge channel with respect to the dam and what effect, if any, erosion or overtopping of the discharge channel will have on the dam.

C. Evaluation of Slope Stability

1. General design considerations
   a. Description of drilling and backhoe exploration
   b. Test results
   c. Physical and mechanical properties of construction materials

2. Stability analysis for loading conditions Table (10 CSR 22-3.020)
   a. Identification of all assumptions
   b. Tabulation of the minimum computed factors of safety
   c. Graphical presentation of the maximum dam section showing the configuration of the embankment, foundation and core trench including:
      1) The failure surfaces associated with the minimum factors of safety listed above
      2) The phreatic surface in the dam and foundation with the appropriate reservoir levels
      3) The physical and mechanical properties of the various zones of the embankment and foundation

3. Seismic Analysis (see CSR 22-3.020 (5) and (6))

D. Design of Modifications to the Internal Drain System

1. Filter design criteria used
2. Size gradation for filters and drains
3. Permeability and design capacity of drains

E. Design of New Concrete Structures
1. Discussion of procedures used to design concrete structures
2. Discuss foundation analysis for these structures

F. Description of General Work Plan
   1. Sequence of work
   2. Monitoring of embankment and seepage
   3. Emergency action plan
   4. Construction start date and time to complete
   5. Location and amount of borrow materials, if required

III. CONSTRUCTION DOCUMENTS

A. Drawings
   1. Certification by experienced Professional Engineer as required by 10 CSR 22-3.040 (1) (A) 13C.
   2. Certification by owner as required by 10 CSR 22-3.040 (1) (A) 13C.
   3. Site plans showing the location of the dam and all proposed modifications.
   4. Plans, profiles, sections, and details sufficient to construct the modifications to the dam.

B. Specifications (Include only those sections applicable to the modifications being proposed)
   1. Location of and protective measures used in conjunction with all drain lines, sewer lines, utilities, or other structures that pass through or under the dam.
   2. Fill Operation
   3. Testing and inspection
      a. Compaction of earth fill
      b. Density tests
      c. Structures
   4. Rip-rap
5. Filter material
6. Pipe construction
7. Concrete
8. Seeding and mulching
9. Record keeping and monitoring
PETITIONER’S RESPONSE TO 2ND REVIEW LETTER
February 6, 2020

Tom Roberts
550 Laurye Lane
Wildwood, Missouri 63005

Re: 2nd Review Comments on the Large Water Feature and Associated Waterfall – A Conditional Use Permit (CUP) in the NU Non-Urban Residence District.

Dear Mr. Roberts:

The Department has completed its second review of the Site Development Plan (SDP) package for the large water feature and associated waterfall that is located on the approximately sixty (60) acre site that is situated at the terminus of Laurye Lane. The review of this package focused on the compliance of the submitted plan sheets to the site-specific permit that governs this location, the regulations of the underlying zoning district designation (NU Non-Urban Residence District), the Department of Planning's January 2nd Comment Letter, and the City of Wildwood's Design Criteria Handbook. The results of this review indicate several issues that preclude the Department from submitting the plan sheets to the Planning and Zoning Commission for its consideration and final action. These issues are identified below for your review:

1. Please add a new sheet to the Site Development Plan (SDP) package that depicts all current conditions of the Conditional Use Permit (CUP). This was provided in our response letter to you on January 16, 2020 as Figure 1 in the SDP package.
2. Please, on Figure #1 Sheet, also identify the property boundaries as the extent of the Conditional Use Permit (CUP) that was granted by the Planning and Zoning Commission for the approximately sixty (60) acre site. Figure #1 has been revised to include the requested property boundary line.
3. Please, on Figure #2 Sheet, identify the setback lines with the distances associated with each of them; in this case, thirty (30) feet, except at the terminus of Laurye Lane, which must reflect a small squared area of fifty (50) feet, being reflective of its front yard area. Will not be provided as the requested information is unclear. Figure #1 identifies the 50’ setback.
4. Please, on Figure #3 Sheet, identify on the Channel Cross Section Diagram the Max. Depth as feet (0.11’). Figure #2 has been revised to include the max depth as (0.11’).
5. Please, on Figure #3 Sheet, provide the depth of the intake pipe within the large water feature that is used to feed the waterfall structure. The Department understands the normal pool elevation of this large water feature fluctuates, but a base depth must have been chosen to ensure the intake pipe would not be exposed, even in dry/drought conditions. Figure #2 has been revised to identify the intake pipe depth as 4’.
6. Please, on Figure #4 Sheet, provide the engineering calculations and supporting documentation for the outfall structure (Pond Drain) relative to the 6’ thick reinforced concrete walls and floor. Will not be provided as this is not relevant and has no bearing to the waterfall.
7. Please, one Figure #4 Sheet, provide the engineering calculations and supporting documentation for the choice of the 36" and 24" culvert pipes that were chosen for installation, as part of this structure. **Will not be provided as this is not relevant and has no bearing to the waterfall**

1. Please indicate on Sheet 4 of 4 the required setback distances for the large water feature from the governing permit – 700 feet (south); 400 feet (west); 40 feet (north); and 450 feet (east) for the large water feature and 100 feet (east) for the waterfall (indicated).
   
   Will not be provided as the requested setback distances are unclear and/or inaccurate (450 feet east for the large water feature and 100 feet east for the waterfall).

2. Please be advised, on Attachment A, the use of fiber rolls and wattles, for the pre-treatment option is not consistent with the intent of the conditions in the permit for this requirement of runoff into the lake. The condition notes the following for this pre-treatment requirement: "**the property owner shall be required to provide pre-treatment of runoff entering the large water feature, if a fountain is installed as part of it. This pre-treatment facility shall be designed, engineered, and constructed as a forebay for water quality purposes, all being completed in accordance with the standards, specifications, and requirements of the Metropolitan St Louis Sewer District (MSD) for such type of improvements, and as directed by City of Wildwood’s Department of Public Works**. This is not applicable as there is no foundation, but here is what I have done. Erosion and sediment control (E&SC) measures in the form of straw wattles have been installed at the head waters of the large water feature. These E&SC measures are consistent with MSD standards, per the St Louis County Sediment and Erosion Control Manual (STL S&ECM), page 100. The purpose of these E&SC measures is to intercept sheet flow, reduce flow velocity, remove sediment from the runoff, and reduce soil erosion of the head waters. The straw wattles are prefabricated and installed consistent with best management practices (BMPs), using type I staking and butt joints. Please refer to **Attachment A of the SDP for the STL S&ECM figure demonstrating installation and staking**, as well as photos of the installed wattles at the head water of the large water feature.

3. Please be advised the Basic Management Protocol addresses many of the steps sought by the City, but it does not achieve the following considerations: the engineering report, geotechnical report, and/or soils report used, when the large water feature and dam were reconstructed, and the maintenance that is planned for the overflow structure and associated piping. These items, as noted above, should be provided or added to the plan to address this comment. **These reports were all supplied in the original and previous submissions. The dam was never reconstructed, raised or altered - just a small leak was repaired. As the piping is just a gravity fed pipe for the runoff, the only maintenance required is to keep the inlet clear of debris, which is checked on a regular basis and completed.**

4. Please be advised the management protocol also needs to address the on-going maintenance of the pre-treatment improvements and the water quality of the large water feature as well. The straw wattles are checked on a regular basis and maintained.

5. Please advise if a vegetative buffer is planned along the perimeter of the large water feature. These types of vegetative buffers are generally used to filter runoff entering the body of water from sheet flow and also provide habitat and shade for fish and wildlife in the area. This area has already been seeded and strawed to establish a vegetative buffer.

6. Please add to the emergency action plan the statement the St. Louis County Police Department – Wildwood Precinct will be contacted in a Level 2 and Level 3 emergency situation. The contact will be Captain Jim Mundell at (636) 458-9194. **The requested statement has been**
added to Figure #1.

7. Please provide a list of steps that address the following, which would be part of the emergency action plan: an inspection determines a Level 1, 2, or 3 emergency and, thereafter, the property owner will contact the list of agencies and others, etc.

Owner inspects monthly & will contact the appropriate agency as needed

8. Please be advised, the Department appreciates the acknowledgement the large water feature has been constructed to Missouri Department of Natural Resource standards, but that does not suffice to meet the language of the condition in the permit, which reads as follows in this regard:

"the large water feature authorized by this permit, although created by the construction of a dam that is less than thirty-five (35) feet in height, shall meet all Missouri Department of Natural Resources (MDNR) requirements for design engineering and on-going maintenance, including inspection frequencies and criteria. These requirements will be reviewed and acted upon by the Planning and Zoning Commission as part of the Site Development Plan process, and as directed by the Department of Public Works." Accordingly, more detailed responses to the standards set forth in the attached checklist prepared by the Missouri Department of Natural Resources shall be provided. The dam or its elevation never changed as stated by SCI Engineering in a previous report and the dam has been there in excess of 50 years. Inspections are done on a regular basis, at least monthly.
The Department appreciates the description that you have provided relative to the treatment of the water in the lake feature, but it is not as detailed as necessary, based upon the discussions that have been held by the Planning and Zoning Commission over the course of the last several months. As you know, from the water testing completed on the large lake feature, certain levels of minerals and mycosistins exist in it and do cause concerns regarding public health. Joe — Please review the e-mail dated 11-14-19 at 2:48 pm from Mr. Dean Dickerson to you. Mr. Dickerson of company ARDL, Inc. was hired by the City to do an evaluation and he summarized that there is not a public health risk based on their testing results. I am attaching a partial comment from that e-mail for your convenience.

Mr. Vujnic:

According to the USEPA Drinking Water Health Advisory for the Cyanobacterial Microcystin Toxins, June 2015, the levels of microcystin observed in the samples is well below the World Health Organization’s low risk threshold for recreational water of 10 μg/L. The levels are also below the USEPA Drinking Water Health Advisory for school-age children and adults of 1.6 μg/L.

This is a Company that the City hired independently and he concluded that there is not a concern for public health.

9. These concerns dictate to the City the need to have a prescribed and complete twelve (12) month treatment program for the large water feature (the source of the water for the waterfall), which should include, but not limited to, the following steps or procedures: (a.) a monthly schedule, i.e. January through December, that identifies the frequency of treatment and the days of the month, when planned; (b.) chemicals or other materials that are planned to be used for treatment purposes and steps associated with them; (c.) identification of the issues that may arise with the large water feature that would prompt extra steps in terms of treatment actions, i.e. algae blooms, (d.) summary of costs on a yearly basis, which are not to exceed one thousand dollars ($1,000.00) per year; and (e.) any other considerations that are planned to ensure the lake provides water to the waterfall structure that has been treated to minimize or eliminate mycosistins and any other harmful concentrations of minerals. For purposes of review, the specific language of the condition from the permit is provided herein: "the maintenance of the existing fountain, as a component of the large water feature, shall be authorized, if water quality measures are provided of the stormwater runoff entering it, along with the chemical treatment of the water contained therein to address contaminants from other sources. This chemical treatment option(s) used shall not harm any fish, aquatic life, or mammals that may come in contact with the water in the feature, but ensure it maintains an acceptable quality level for the purposes of public health purposes," and does allow for these steps or procedures to be requested by the City for inclusion in this regard. Please see comment above. The City should have no concerns as it has been proven and stated as such by the City's hired consultant. Further treatment or testing is unnecessary and will not be undertaken. No chemicals will be introduced into the lake as it is currently balanced and healthy.

10. Please be advised the Department of Public Works will continue its review of the dam structure design and overflow structure and related downstream improvements for acceptance, once the items noted above are provided to it.

11. Please be advised that, once the Site Development Plan (SDP) is acted upon by the Planning and Zoning Commission, the permit will be reviewed in a one (1) year timeframe. This review will be before the Planning and Zoning Commission.

Please review the provided comments and address the needed changes to the plan sheets for further City review. If you should have any questions or comments, or need my assistance in this regard, please
feel free to contact me at (636) 458-0440. Thank you in advance for your anticipated cooperation in this regard.

The Planning and Zoning Commission voted on and passed this CUP in the fall of 2019 by a vote of 7 – 2. On January 2, 2020 you sent me a detailed letter requesting additional information for submission to the Planning and Zoning Commission. On January 16, 2020, I and my engineers supplied the detailed answers to your questions as you requested.

On February 6, 2020 you sent me the above list of additional questions and comments, some of which were previously supplied to you, which we have now answered. How many more rounds of questioning and submittals are going to be requested by the City? I have complied with all of your requests for over 3 years and this is still ongoing with no resolution in sight. This is a single family RESIDENCE and the level of government interference and scrutiny is unconscionable. The CUP has been voted on and the Planning and Zoning Commission want this permit issued.

Please respond back to me that this level of scrutiny and government oversight is going to be uniformly enforced for all residents and businesses in Wildwood in the future. I want to make sure that all lakes, ponds and large water features are as safe as mine and that all the residents have been held to the same engineering standards, including sound studies and water studies. Only then will the City be able to issue any future permits for water features, regardless of their size, in Wildwood. I am going to make sure that the health of the Wildwood residents is not impaired.

Respectfully submitted,

CITY OF WILDWOOD

Joe Vujnic
Department of Planning
Cc: The Honorable James R. Bowlin, Mayor
Council Members Brost and Gragnani, Ward One
Sam Anselm, City Administrator
John A. Young, City Attorney
Kathy Arnett, Assistant Director of Planning and Parks
Travis Newberry, Planner
3RD REVIEW LETTER
March 27, 2020

Tom Roberts
550 Laurey Lane
Wildwood, Missouri 63005

Re: 3rd Review Comments on the Large Water Feature and Associated Waterfall – A Conditional Use Permit (CUP) in the NU Non-Urban Residence District.

Dear Mr. Roberts:

The Department has completed its third review of the Site Development Plan (SDP) package for the large water feature and associated waterfall that is located on the approximately sixty (60) acre site that is situated at the terminus of Laurey Lane. The review of this package focused on the compliance of the submitted plan sheets to the site-specific permit that governs this location, the regulations of the underlying zoning district designation (NU Non-Urban Residence District), the Department of Planning’s January 2nd Comment Letter, and the City of Wildwood’s Design Criteria Handbook. The results of this review indicate several issues that preclude the Department from submitting the plan sheets to the Planning and Zoning Commission for its consideration and final action. These issues are identified below for your review:

1. Please be advised the requested additional sheet of all of the conditions from the Conditional Use Permit (CUP) still has not been found in the submitted items from you. The Department does apologize for this confusion, but it is requesting that an additional sheet be added to the packet of other items that shows all of the conditions from the permit, upon a single page. The permit is attached for your use.

2. Please, on Figure #4 Sheet, provide the engineering calculations and supporting documentation for the outfall structure (Pond Drain) relative to the 6” thick reinforced concrete walls and floor. **Response:** The Conditional Use Permit (CUP) is for both the waterfall and the large water feature. Therefore, the request for this information is not inappropriate and is justified, given the governing permit requires such.

3. Please, on Figure #4 Sheet, provide the engineering calculations and supporting documentation for the choice of the 36” and 24” culvert pipes that were installed, as part of this structure. **Response:** The Conditional Use Permit (CUP) is for both the waterfall and the large water feature. Therefore, the request for this information is not inappropriate and is justified, given the governing permit requires such.

4. Please be advised the misspelling of the ‘fountain to foundation’ does not make this condition non-applicable in this case. The intent of this condition was to address the spray of water from
the fountain to offer a cleaner source for it. Therefore, the Department would respectively request the condition be met in terms of a design concept and engineered details added to the appropriate Site Development Plan sheet.

Again, the condition for pre-treatment is as follows: “The property owner shall be required to provide pre-treatment of runoff entering the large water feature, if a fountain foundation is installed as part of it. This pre-treatment facility shall be designed, engineered, and constructed as a forebay for water quality purposes, all being completed in accordance with the standards, specifications, and requirements of the Metropolitan St. Louis Sewer District (MSD) for such type of improvements, and as directed by City of Wildwood’s Department of Public Works.”

5. Please be advised the Basic Management Protocol addresses many of the steps sought by the City, but it does not achieve the following considerations: please include the following: the company names, their office locations, and dates, when each of them completed the engineering report, the geotechnical report, and/or the soils report that were used, when the large water feature and dam were reconstructed on the property.

6. Please add the maintenance protocols that are planned for the overflow structure and associated piping. This item, and Item #5 noted above, should be added to the applicable plan sheet as notes.

7. Please be advised the management protocol also needs to address the on-going maintenance of the pre-treatment improvements and the water quality of the large water feature as well.

8. Please add the statement noted in the latest response to the City regarding the request from the Department to provide a list of steps that address the following, which would be part of the Emergency Action Plan: an inspection determines a Level 1, 2, or 3 emergency and, thereafter, the property owner will contact the list of agencies and others, etc.

9. Please be advised, the Department appreciates the acknowledgement the large water feature has been constructed to Missouri Department of Natural Resource standards, but that does not suffice to meet the language of the condition in the permit, which reads as follows in this regard: “The large water feature authorized by this permit, although created by the construction of a dam that is less than thirty-five (35) feet in height, shall meet all Missouri Department of Natural Resources (MDNR) requirements for design, engineering, and on-going maintenance, including inspection frequencies and criteria. These requirements will be reviewed and acted upon by the Planning and Zoning Commission, as part of the Site Development Plan process, and as directed by the Department of Public Works.” Accordingly, more detailed responses to the standards set forth in the attached checklist prepared by the Missouri Department of Natural Resources shall be provided by you.

10. The Department appreciates the description that you have provided relative to the treatment of the water in the lake feature, but it is not as detailed as necessary, based upon the discussions that have been held by the Planning and Zoning Commission over the course of the last several months. As you know, from the water testing completed of the large lake feature, certain levels of minerals and mycosistins exist in it and do cause concerns regarding public health. These concerns dictate to the City the need to have a prescribed and complete twelve (12) month treatment program for the large water feature (the source of the water for the waterfall), which should include, but not limited to, the following steps or procedures:
(a.) a monthly schedule, i.e. January through December, that identifies the frequency of treatment and the days of the month, when planned;
(b.) chemicals or other materials that are planned to be used for treatment purposes and steps associated with them;
(c.) identification of the issues that may arise with the large water feature that would prompt extra steps in terms of treatment actions, i.e. algae blooms,
(d.) summary of costs on a yearly basis, which are not to exceed one thousand dollars ($1,000.00) per year; and
(e.) any other considerations that are planned to ensure the lake provides water to the waterfall structure that has been treated to minimize or eliminate mycosistins and any other harmful concentrations of minerals.

For purposes of review, the specific language of the condition from the permit is provided herein: "the maintenance of the existing fountain, as a component of the large water feature, shall be authorized, if water quality measures are provided of the stormwater runoff entering it, along with the chemical treatment of the water contained therein to address contaminants from other sources. This chemical treatment option(s) used shall not harm any fish, aquatic life, or mammals that may come in contact with the water in the feature, but ensure it maintains an acceptable quality level for the purposes of public health purposes," and does allow for these steps or procedures to be requested by the City for inclusion in this regard.

Certainly, the Department does not want to prolong this review process by asking for items that you do not believe to be applicable. The Planning and Zoning Commission can review these matters at a meeting and interpret what the Department is seeking, what is being provided, and what is needed to comply with the permit itself. Please advise if you would like to have the Planning and Zoning Commission undertake this determination regarding the items being requested by the City, which you have noted will not be submitted for its consideration in the last letter on this matter.

Please review the provided comments and address the needed changes to the plan sheets for further City review. If you should have any questions or comments, or need my assistance in this regard, please feel free to contact me at (636) 458-0440. Thank you in advance for your anticipated cooperation in this regard.

Respectfully submitted,
CITY OF WILDWOOD

Joe Vujnic, Director
Department of Planning

Cc: The Honorable James R. Bowlin, Mayor
Council Members Brost and Gragnani, Ward One
Sam Anselm, City Administrator
John A. Young, City Attorney
ATTACHMENT B - CONDITIONS

1. PERMITTED USES

This Conditional Use Permit (CUP) shall authorize a large water feature, as defined by Chapter 415.030 Definitions of the City of Wildwood's Zoning Ordinance and, under specific compliance conditions, a waterfall structure.

2. LOT, SIZE, AND USE REQUIREMENTS

a. The authorized large water feature shall not exceed three point five (3.5) acres in overall size.

b. The height of the dam shall not exceed thirty-three (33) feet, as measured from final finish grade at the base of it, outside the water impoundment area.

c. The depth of the lake, at normal pool elevation, shall not exceed twenty (20) feet.

d. The inclusion and use of the existing fountain, as a component of the large water feature, shall be authorized, if water quality measures are provided to treat stormwater runoff entering it, along with the chemical treatment of the water contained therein, to address contaminants from other sources. This chemical treatment option(s) that are to be used for these purposes shall not harm any fish, other aquatic life, or mammals that may come in contact with the water held in the feature, but ensure i: maintains an acceptable quality level for the purposes of public health.

e. The extent of any new/additional land disturbance, in association with the maintenance or care of this large water feature, may only be authorized by the Planning and Zoning Commission, as part of an Amended Site Development Plan review.

f. The large water feature authorized by this permit, although created by the construction of a dam that is less than thirty-five (35) feet in height, shall meet all Missouri Department of Natural Resources (MDNR) requirements for design, engineering, and on-going maintenance, including inspection frequencies and criteria. These requirements will be reviewed and acted upon by the Planning and Zoning Commission, as part of the Site Development Plan process, and as directed by the Department of Public Works. As part of this compliance to State stipulated requirements and standards, an Emergency Management Plan shall be provided that defines that, if dam failure occurs, the steps that have and will be taken to protect downstream properties.

g. The waterfall structure shall not be expanded or extended from its current configuration and size, while its operation must comply with all of the City of Wildwood’s Performance Standards for Zoning Ordinance (Chapter 415.250). However, its operation is premised on a required sound study and compliance to regulations of the Noise Code and the Planning and Zoning Commission’s review and action on the required Site Development Plan.

3. PLAN SUBMITTAL REQUIREMENTS

Within twelve (12) months of the Conditional Use Permit (CUP) being granted by the Planning and Zoning Commission, and prior to any further site disturbance, the operator shall submit to the Planning and
Zoning Commission for their review and approval a Site Development Plan. Where due cause is shown by the operator, this time interval may be extended once by the Planning and Zoning Commission in accord with requirements of Chapter 415.480 of the City of Wildwood Zoning Ordinance. Said Site Development Plan shall include, but not be limited to, the following information:

a. Outboundary plat and legal description of the property.

b. Location and extent of all existing improvements, including all buildings and accessory structures, along with the planned large water feature and all improvements in association with it.

c. A general plan indicating setback lines along the perimeter of the subject tract of land and surrounding property lines and related improvements within two hundred (200) feet of this site’s boundaries, i.e. curb cut and access locations, stormwater facilities, and utility installations and easements.

d. Location of all roadways adjacent to the property, including required roadway right-of-way dedication and pavement widening, with existing and proposed improvements and trails, and general location, size, right-of-way, and pavement width of all interior drives.

e. Existing and proposed contours at vertical intervals of not more than two (2) feet.

f. General location of sanitary sewer and stormwater facilities.

g. A Landscape Plan including, but not limited to, the location, size, and general type of plant materials to be used in accord with the City of Wildwood’s Chapter 410 and accompanying Tree Manual.

h. An inventory of the percent of tree canopy or individual trees to be retained on the site indicated on a Tree Preservation Plan completed in accordance with the City of Wildwood Chapter 410 Tree Preservation and Restoration Code and accompanying Tree Manual.

i. Location of all existing and proposed easements.

j. All other information not mentioned above, but required on a preliminary plat in accord with Chapter 420.060 of the City of Wildwood Subdivision and Development Regulations.

k. A Stormwater Pollution Prevention Plan (SWPPP) for the site, which shall include the developer’s signature and acknowledgment of its requirements.

l. A maintenance plan for this large water feature that is based on annual inspections and reports to be submitted to the City of Wildwood’s Department of Planning. This plan shall indicate all steps and procedures that will be used to maintain the large water feature and ensure its stability and safety.

4. SITE DEVELOPMENT PLAN DESIGN CRITERIA

The above Site Development Plan shall adhere to the following specific design criteria:

Large Water Feature Setbacks

a. No large water feature and related improvements, including the waterfall, structure shall be located within the following setbacks, except as otherwise noted below:

i. Seven hundred (700) feet from the southern property line and boundary of this Conditional Use Permit (CUP).

ii. Four hundred (400) feet from the western property line and boundary of this Conditional Use Permit (CUP).

iii. Forty (40) feet from the northern property line and boundary of this Conditional Use Permit (CUP).
iv. Four hundred fifty (450) feet from the eastern property line and boundary of this Conditional Use Permit (CUP), except the waterfall structure may be located no closer than one hundred (100) feet to the same.

Landscape Requirements

b. Landscaping shall adhere to all requirements of Chapter 410 of the City's Tree Preservation and Restoration Code and its accompanying Sustainable Plantings Guide and Tree Manual, including the submittal of a Tree Preservation Plan, in conjunction with the Site Development Plan. All roadway frontages shall be appropriately landscaped, as required by Chapter 410 Tree Preservation and Restoration Code, and be approved by the Planning and Zoning Commission on the Site Development Plan.

c. The areas of existing vegetation within the Conditional Use Permit (CUP) boundaries identified as to be retained shall be marked on the site prior to the commencement of any disturbance in accord with the City of Wildwood's Chapter 410. These areas shall be indicated on the Site Development Plan submitted to the City of Wildwood for Planning and Zoning Commission review and approval. Existing mature tree canopy shall be preserved in accordance with the requirements of City of Wildwood's Chapter 410 Tree Preservation and Restoration Code.

d. All disturbed areas of the site shall be restored in compliance to the City's Sustainable Plantings Guide and Tree Manual by a combination of ground cover, landscaping, berms, natural stones, and other means to address stormwater runoff and erosion, as well as improve overall site aesthetics. The restoration of disturbed areas shall be indicated on the required Landscape Plan and acted upon by the Planning and Zoning Commission.

e. A registered Landscape Architect shall prepare, submit, and sign all plan(s).

Miscellaneous Conditions

f. The hours of any future construction and grading activity in association with this large water feature shall be limited to 7:00 a.m. to 6:00 p.m. Monday through Friday, and 8:00 a.m. to 6:00 p.m. on Saturday. No development (grading and construction) activity shall be authorized on Sundays.

g. All retaining walls exceeding three (3) feet in height per section or crossing individual property lines shall be constructed of an appropriate inter-locking concrete block system or boulders. The Planning and Zoning Commission, as part of the Site Development Plan review process, shall review and act upon said materials and design.

h. The generalized location of all utility easements for proposed service to this development shall be as approved by the Planning and Zoning Commission on the Site Development Plan.

i. All utilities serving this site shall be installed underground in accord with the requirements of the City of Wildwood's Subdivision and Development Regulations. Any existing easements located on the subject site, which are not being utilized, shall be vacated under the standard procedures of the City of Wildwood Subdivision and Development Regulations.
j. The property owner, or any assignee or successor, shall provide annual maintenance of this authorized large water feature on the subject property, with such being in accordance with State regulations for the same. A plan for this maintenance and upkeep shall be provided to the Planning and Zoning Commission, as part of the required Site Development Plan. Preventative maintenance shall be authorized on an as-need basis, along with any repairs, but does require an engineered plan be submitted to the City of Wildwood’s Department of Public Works for review and action. This plan will then be submitted to the Planning and Zoning Commission for receipt and filing.

5. VERIFICATIONS PRIOR TO APPROVAL OF THE SITE DEVELOPMENT PLAN

Prior to approval of the Site Development Plan, the developer shall provide the following:

Stormwater Improvements

a. Submit to the Planning and Zoning Commission an engineering plan approved by the City of Wildwood Department of Public Works showing that adequate handling of the stormwater drainage of the site is provided.

i. The developer is required to provide adequate stormwater systems in accordance with the City of Wildwood standards.

ii. All stormwater shall be discharged at an adequate natural discharge point.

iii. The developer of this site shall be solely responsible to provide the necessary mechanisms, as part of the Site Development Plan/Improvement Plan process, to implement “best management practices” for stormwater management/water quality and the construction of related facilities. Minimally, these practices/facilities should include rain gardens, vegetated swales, and other options to substantially reduce the amount of stormwater discharging from the subject site.

iv. The developer shall provide adequate detention and/or hydrologic calculations for review and approval of all stormwater that will encroach on City of Wildwood rights-of-way.

v. The property owner shall be required to provide pre-treatment of runoff entering the large water feature, if a foundation is installed as part of it. This pre-treatment facility shall be designed, engineered, and constructed as a forebay for water quality purposes, all being completed in accordance with the standards, specifications, and requirements of the Metropolitan St. Louis Sewer District (MSD) for such type of improvements, and as directed by City of Wildwood’s Department of Public Works.

Stormwater Pollution Prevention Plan

b. Prior to any land disturbance on this subject site, submit a Stormwater Pollution Prevention Plan, as part of the Site Development Plan review process, indicating compliance to Federal, State, and local requirements regarding the management of stormwater runoff to prevent siltation and erosion, both on-site and upon downstream properties.

Sound Study

c. The authorization of the Site Development Plan for this large water feature shall not include the waterfall structure, unless an independent sound study is conducted by the City of Wildwood with it in operation to determine the level of compliance to the Noise Code. This sound study must be conducted in accordance with accepted industry standards and by a consultant/firm with
extensive experience in this field of sound analysis and testing. The results of the sound study must indicate compliance to the Noise Code, before the Site Development Plan can be acted upon for the waterfall structure.

**Air Pollution Testing**

d. The authorization of the Site Development Plan for this large water feature shall not include the waterfall structure, unless testing is provided regarding the odor issue associated with this improvement. This testing must be conducted in accordance with accepted industry standards and by a consultant/firm with extensive experience in this field of air pollution control. The results of the testing must indicate compliance to the Air Pollution Code, before the Site Development Plan can be acted upon for the waterfall structure.

6. **RECORDING**

Within sixty (60) days of granting of the Conditional Use Permit (CUP) by the Planning and Zoning Commission, the approved permit language and legal description of the property shall be recorded with the St. Louis County Recorder of Deeds.

7. **VERIFICATION PRIOR TO PERMITS**

**Notification to Department of Planning**

a. Subsequent to approval of the Site Development Plan, and prior to issuance of any grading or permit, all approvals from the Missouri Department of Transportation (MoDOT), the Department of Public Works, the U.S. Army Corp of Engineers, the Missouri Department of Natural Resources (MDNR), and the McNach Fire Protection District must be received by the Department of Planning.

**Nuisance Bond**

b. Provide to the City of Wildwood a bond, letter of credit, or cash deposit in the amount of five thousand dollars ($5,000.00) for use to undertake any inspections or maintenance of the large water feature and dam, if the property and improvements are not maintained in accordance with said conditions of this permit. The City shall hold this deposit and it will be pre-authorized by the owner/operator, in writing, to exercise its use, if violations are noted and not abated in a timely manner.

8. **GENERAL DEVELOPMENT CONDITIONS**

a. Provide adequate temporary off-street parking for construction employees. Parking on non-surfaced areas shall be prohibited in order to eliminate the condition whereby mud from construction and employee vehicles is tracked onto the pavement causing hazardous roadway and driving conditions.

b. A grading permit is required prior to any grading on the site. Interim stormwater drainage controls in the form of siltation control measures are required and must comply with the Stormwater Pollution Prevention Plan for this development (SWPPP). The developer shall be solely responsible for obtaining any temporary slope and construction licenses needed to address the installation of
public and private improvements on this site that require the use of adjoining parcels of ground that are not under their ownership or control.

c. The petitioner shall be responsible for obtaining all necessary permits from the Department of Natural Resources Clean Water Commission as they relate to the development of this tract of land.

d. The developer is advised that utility companies will require compensation for relocation of their utility facilities within public right-of-way. The developer should also be aware of extensive delays in utility company relocation and adjustments. Such delays will not constitute a cause to allow occupancy prior to completion of infrastructure improvements.

e. If cut and fill operations occur during a season not favorable for immediate establishment of a permanent ground cover, a fast germinating annual, such as Rye or Sudan Grasses, shall be utilized to prevent erosion. This restoration must occur within thirty (30) days of the conclusion of preliminary grading as determined by the Director of Public Works.

f. Failure to comply with any or all of the conditions of this ordinance shall be adequate cause for revocation of permits by issuing City of Wildwood Departments or Commissions.

g. The Zoning Enforcement Officer of the City of Wildwood, Missouri, shall enforce the conditions of this ordinance in accord with the Site Development Plan approved by the Planning and Zoning Commission and the Department of Planning. The owner/operator must acknowledge in writing that access to this site for inspection purposes by personnel of the City of Wildwood shall be authorized and, if re'used, such action is grounds for revocation of said permit by the City.

h. Any other applicable zoning, subdivision, or other regulations or requirements of the City shall further apply to the development of this property, as authorized by this Conditional Use Permit (CUP), except as may be provided by law. Nothing herein shall be deemed a waiver of any subdivision, zoning, or other development regulation of the City whether by implication or reference.

i. This zoning approval is conditioned on compliance with the Zoning Ordinance, Subdivision and Development Regulations, and all applicable laws of the City. Such additional regulations are supplemental to the requirements herein and no modification of any applicable regulations shall result from this Conditional Use Permit (CUP), except where this ordinance has expressly modified such regulations by reference to the applicable provision authorizing such modification.

j. This Conditional Use Permit (CUP) shall be authorized for a period of one (1) year, with any adjustments to it based upon compliance to the requirements of the same. Renewal requests shall be the responsibility of the owner/operator to submit to the City and must be provided a minimum two (2) months in advance of each renewal for consideration and action by the Planning and Zoning Commission following this initial period of time. Subsequent renewals shall be on a three (3) year basis.
DEPARTMENT’S E-MAIL ON STATUS OF REVIEW
 Subject: Review of SDP for Large Water Feature and Waterfall  
 Date: Monday, May 11, 2020 at 5:28:32 PM Central Daylight Time  
 From: Joe Vujnich  
 To: Tom Roberts  
 CC: Travis Newberry  
  
Mr. Roberts:

The review has been completed. In the responses provided by you to the Department's letter on this matter, it is noted many of the requested items associated with the expansion of the large water feature were not used or completed by an engineering firm, rather by the builder and yourself. Along with that situation, other responses provide limited background relative to the detail sought by the City. It is my intent to move the matter, i.e. the plan set, to the Planning and Zoning Commission, since it has the authority to proceed forward or not. I am hoping to have the subcommittee meeting in June, which is the first of the required two (2) sessions before the Planning and Zoning Commission.

Thank you,

Joe Vujnich
May 26, 2020

Tom Roberts
550 Laurey Lane
Wildwood, Missouri 63005

Re: Final Review Comments on the Large Water Feature and Associated Waterfall – A Conditional Use Permit (CUP) in the NU Non-Urban Residence District.

Dear Mr. Roberts:

The Department has completed its final review of the Site Development Plan (SDP) package for the large water feature and associated waterfall, which was constructed on this approximately sixty (60) acre site being located at the terminus of Laurey Lane. The review of this plan package focused on the compliance of the submitted plan sheets to the site-specific permit that governs this location, the regulations of the underlying zoning district designation (NU Non-Urban Residence District), the Department of Planning’s March 23, 2020 Comment Letter, and the City of Wildwood’s Design Criteria Handbook. The results of this review indicate there remain several items that both parties, i.e. you and the City, have not been able to agree upon regarding the Conditional Use permit (CUP) and its interpretation. Accordingly, the Department of Planning will be submitting these items to the Planning and Zoning Commission for its consideration and final action, again inclusive of all components of the plan package at this stage. These items where agreement has not been reached by the parties are identified below for your review:

1. Please, on Figure #4 Sheet, provide the engineering calculations and supporting documentation for the outfall structure (Pond Drain) relative to the 6” thick reinforced concrete walls and floor. **Response:** The Conditional Use Permit (CUP) is for both the waterfall and the large water feature. Therefore, the request for this information is not inappropriate and is justified, given the governing permit requires such.
2. Please, on Figure #4 Sheet, provide the engineering calculations and supporting documentation for the choice of the 36” and 24” culvert pipes that were installed, as part of this structure. **Response:** The Conditional Use Permit (CUP) is for both the waterfall and the large water feature. Therefore, the request for this information is not inappropriate and is justified, given the governing permit requires such.
3. Please be advised the misspelling of the ‘fountain to foundation’ does not make this condition non-applicable in this case. The intent of this condition was to address the spray of water from the fountain to offer a cleaner source for it. Therefore, the Department would respectively
request the condition be met in terms of a design concept and engineered details added to the appropriate Site Development Plan sheet.

Again, the condition for pre-treatment is as follows: “the property owner shall be required to provide pre-treatment of runoff entering the large water feature, if a fountain foundation is installed as part of it. This pre-treatment facility shall be designed, engineered, and constructed as a forebay for water quality purposes, all being completed in accordance with the standards, specifications, and requirements of the Metropolitan St. Louis Sewer District (MSD) for such type of improvements, and as directed by City of Wildwood’s Department of Public Works.”

4. Please be advised the management protocol also needs to address the on-going maintenance of the pre-treatment improvements and the water quality of the large water feature as well.

5. The Department appreciates the description that you have provided relative to the treatment of the water in the lake feature, but it is not as detailed as necessary, based upon the discussions that have been helc by the Planning and Zoning Commission over the course of the last several months. As you know, from the water testing completed of the large lake feature, certain levels of minerals and microcystins exist in it and do cause concerns regarding public health. These concerns dictate to the City the need to have a prescribed and complete twelve (12) month treatment program for the large water feature (the source of the water for the waterfall), which should include, but not limited to, the following steps or procedures:

(a.) a monthly schedule, i.e. January through December, that identifies the frequency of treatment and the days of the month, when planned;
(b.) chemicals or other materials that are planned to be used for treatment purposes and steps associated with them;
(c.) identification of the issues that may arise with the large water feature that would prompt extra steps in terms of treatment actions, i.e. algae blooms; and
(d.) summary of costs on a yearly basis, which are not to exceed one thousand dollars ($1,000.00) per year; and
(e.) any other considerations that are planned to ensure the lake provides water to the waterfall structure that has been treated to minimize or eliminate microcystins and any other harmful concentrations of minerals.

For purposes of review, the specific language of the condition from the permit is provided herein: “the maintenance of the existing fountain, as a component of the large water feature, shall be authorized, if water quality measures are provided of the stormwater runoff entering it, along with the chemical treatment of the water contained therein to address contaminants from other sources. This chemical treatment option(s) used shall not harm any fish, aquatic life, or mammals that may come in contact with the water in the feature, but ensure it maintains an acceptable quality level for the purposes of public health purposes," and does allow for these steps or procedures to be requested by the City for inclusion in this regard.

Given the responses you provided in your latest resubmittal to the Department’s 3rd review letter, the Planning and Zoning Commission will need to address the remaining items noted above (Items #1 through #5). The Department appreciates your responses, but they are typically not acceptable, when
engineered structures lack the plan sheets representative of the participation of a registered professional engineer.

Given this approach, the first meeting on this plan package for the large water feature and associated waterfall will be held on June 15, 2020, before the Site Plan Subcommittee of the Planning and Zoning Commission, which normally includes not less than four (4) of its members, but no more than ten (10). The next meeting, which typically follows in a two (2) to four (4) week timeframe, is before the full body of the Planning and Zoning Commission and represents the final action of it on the plan package submitted to it for such. If you should have any questions or comments, or need my assistance in this regard, please feel free to contact me at (636) 458-0440. Thank you in advance for your anticipated cooperation in this regard.

Respectfully submitted,

CITY OF WILDWOOD

[Signature]

Joe Vujnic, Director
Department of Planning

Cc: The Honorable James R. Bowlin, Mayor
    Council Members Brost and Gragnani, Ward One
    Theresa Clark, Future Council Member, Ward One
    Sam Anselm, City Administrator
    John A. Young, City Attorney
    Kathy Arnett, Assistant Director of Planning and Parks
    Travis Newberry, Planner
SITE DEVELOPMENT PLAN SUBMITTAL PACKAGE
1. PERMITTED USES

This Conditional Use Permit (CUP) shall authorize a large water feature, as defined by Chapter 415-030 Definitions of the City of Wildwood’s Zoning Ordinance and, under specific compliance conditions, a waterfall structure.

2. LOT, SIZE, AND USE REQUIREMENTS

a. The authorized large water feature shall not exceed three point five (3.5) acres in overall size.

b. The height of the dam shall not exceed thirty-three (33) feet, as measured from final finish grade at the base of it, outside the water impoundment area.

c. The depth of the lake, at normal pool elevation, shall not exceed twenty (20) feet.

d. The inclusion and use of the existing fountain, as a component of the large water feature, shall be authorized, if water quality measures are provided to treat stormwater runoff entering it, along with the chemical treatment of the water obtained thereby, to address contaminants from other sources. This chemical treatment option(s) that are to be used for these purposes shall not harm any fish, other aquatic life, or mammals that may come in contact with the water held in the feature, but ensure it maintains an acceptable quality level for the purposes of public health.

e. The extent of any new/additional land disturbance, in association with the maintenance or care of this large water feature, may only be authorized by the Planning and Zoning Commission, as part of an Amended Site Development Plan review.

f. The large water feature authorized by this permit, although created by the construction of a dam that is less than thirty-five (35) feet in height, shall meet all Missouri Department of Natural Resources (MDNR) requirements for design, engineering, and on-going maintenance, including inspection frequencies and criteria. These requirements will be reviewed and acted upon by the Planning and Zoning Commission, as part of the Site Development Plan process, and as directed by the Department of Public Works. As part of this compliance to the State stipulated requirements and standards, an Emergency Management Plan shall be provided that defines that, if dam failure occurs, the steps that have and will be taken to protect downstream properties.

g. The waterfall structure shall not be expanded or extended from its current configuration and size, while its operation must comply with all of the City of Wildwood’s Performance Standards for Zoning Ordinance (Chapter 415-230). However, it is operation is premised on a required sound study and compliance to regulations of the Noise Code and the Planning and Zoning Commission’s review and action on the required Site Development Plan.

3. PLAN SUBMITTAL REQUIREMENTS

Within twelve (12) months of the Conditional Use Permit (CUP) being granted by the Planning and Zoning Commission, and prior to any further site disturbance, the operator shall submit to the Planning and Zoning Commission for their review and approval a Site Development Plan. Where due cause is shown by the operator, this time interval may be extended once by the Planning and Zoning Commission in accordance with requirements of Chapter 415-480 of the City of Wildwood Zoning Ordinance. Said Site Development Plan shall include, but not be limited to, the following information:

a. Outboundary plat and legal description of the property.

b. Location and extent of all existing improvements, including all buildings and accessory structures, along with the planned large water feature and all improvements in association.

c. A general plan indicating setback lines along the perimeter of the subject tract of land and surrounding property lines and related improvements within two hundred (200) feet of this site’s boundaries, i.e. curbs, poles, access locations, stormwater facilities, and utility easements.

d. A purpose of all roadways adjacent to the property, including required roadway right-of-way dedication and paving widening, with existing and proposed improvements and trails, and general location, size, right-of-way, and pavement width of all interior drives.

e. Existing and proposed contours at vertical intervals of not more than two (2) feet.

g. General location of sanitary sewer and stormwater facilities.

A Landscape Plan including, but not limited to, the location, size, and general type of plant materials to be used in accordance with the City of Wildwood’s Chapter 410 and accompanying Tree Manual.

h. An inventory of the percent of tree canopy or individual trees to be retained on the site indicated on a Tree Preservation Plan completed in accordance with the City of Wildwood Chapter 410 Tree Preservation and Restoration Code and accompanying Tree Manual.

i. Location of all existing and proposed easements.

j. All other information not mentioned above, but required on a preliminary plat in accordance with Chapter 420-060 of the City of Wildwood Subdivision and Development Regulations.

k. A Stormwater Pollution Prevention Plan (SWPPP) for the site, which shall include the developer's signature and acknowledgment of its requirements.

l. A maintenance plan for this large water feature that is based on annual inspections and reports to be submitted to the City of Wildwood’s Department of Planning. This plan shall indicate all steps and procedures that will be used to maintain the large water feature and ensure its stability and safety.

4. SITE DEVELOPMENT PLAN DESIGN CRITERIA

The above Site Development Plan shall adhere to the following specific design criteria.

Large Water Feature Setbacks

a. No large water feature and related improvements, including the waterfall, structure shall be located within the following setbacks, except as otherwise noted below:

i. Seven hundred (700) feet from the southern property line and boundary of this Conditional Use Permit (CUP).

ii. Four hundred (400) feet from the western property line and boundary of this Conditional Use Permit (CUP).

iii. Forty (40) feet from the northern property line and boundary of this Conditional Use Permit (CUP).

iv. Four hundred fifty (450) feet from the eastern property line and boundary of this Conditional Use Permit (CUP), except the waterfall structure may be located no closer than one hundred (100) feet to the same.

Landscape Requirements

b. Landscaping shall adhere to all requirements of Chapter 410 of the City of Wildwood’s Code of Ordinances, and its accompanying Sustainable Plantings Guide and Tree Manual, including the submittal of a Tree Preservation Plan, in conjunction with the Site Development Plan. All roadway frontages shall be appropriately landscaped, as required by Chapter 410 Tree Preservation and Restoration Code, and be approved by the Planning and Zoning Commission on the Site Development Plan.

c. The areas of existing vegetation within the Conditional Use Permit (CUP) boundaries identified as to be retained shall be marked on the site prior to the commencement of any disturbance in accordance with the City of Wildwood’s Chapter 410. These areas shall be indicated on the Site Development Plan submitted to the City of Wildwood for Planning and Zoning Commission review and approval. Existing mature tree canopy shall be preserved in accordance with the requirements of City of Wildwood’s Chapter 410 Tree Preservation and Restoration Code.

d. All disturbed areas of the site shall be restored in compliance with the City’s Sustainable Plantings Guide and Tree Manual by a combination of ground cover, landscaping, berms, natural stones, and other means to address stormwater runoff and erosion, as well as improve overall site aesthetics. The restoration of disturbed areas shall be indicated on the required Landscape Plan and acted upon by the Planning and Zoning Commission.

Miscellaneous Conditions

f. The hours of any future construction and grading activity in association with this large water feature shall be limited to 7:00 a.m. to 6:00 p.m. Monday through Friday, and 8:00 a.m. to 6:00 p.m. on Saturday. No development (grading and construction) activity shall be authorized on Sundays.

g. All retaining walls exceeding three (3) feet in height per section or crossing individual property lines shall be constructed of an appropriate inter-locking concrete block system or boulders. The Planning and Zoning Commission, as part of the Site Development Plan review process, will review and act upon said materials and design.

h. The generalized location of all utility easements for proposed service to this development shall be as approved by the Planning and Zoning Commission on the Site Development Plan.

i. All utilities serving this site shall be installed underground in accordance with the requirements of the City of Wildwood’s Subdivision and Development Regulations. Any existing easements located on the subject site, which are not being utilized, shall be removed under the standard procedures of the City of Wildwood Subdivision and Development Regulations.

j. The property owner, or any assignee or successor, shall provide annual maintenance of this authorized large water feature on the subject property, with such being in accordance with State regulations for the same. A plan for this maintenance and upkeep shall be provided to the Planning and Zoning Commission, as part of the required Site Development Plan. Preventive maintenance shall be authorized on an as-needed basis, along with any repairs, but does require an engineered plan be submitted to the City of Wildwood’s Department of Public Works for review and action. This plan will then be submitted to the Planning and Zoning Commission for receipt and filing.

5. VERIFICATIONS PRIOR TO APPROVAL OF THE SITE DEVELOPMENT PLAN

Prior to approval of the Site Development Plan, the developer shall provide the following:

Stormwater Improvements

a. Submit to the Planning and Zoning Commission an engineering plan approved by the City of Wildwood Department of Public Works showing that adequate handling of the stormwater drainage of the site is provided.
i. The developer is required to provide adequate stormwater systems in accordance with the City of Wildwood standards.

ii. All stormwater shall be discharged at an adequate natural discharge point.

iii. The developer of this site shall be solely responsible to provide the necessary mechanisms, as part of the Site Development Plan/Improvement Plan process, to implement "best management practices" for stormwater management/water quality and the construction of related facilities. Minimally, these practices/facilities should include rain gardens, vegetated swales, and other options to substantially reduce the amount of stormwater discharging from the subject site.

iv. The developer shall provide adequate detention and/or hydrologic calculations for review and approval of all stormwater that will encroach on City of Wildwood rights-of-way.

v. The property owner shall be required to provide pre-treatment of runoff entering the large water feature, if a foundation is installed as part of it. This pre-treatment facility shall be designed, engineered, and constructed as a forebay for water quality purposes, all being completed in accordance with the standards, specifications, and requirements of the Metropolitan St. Louis Sewer District (MSD) for such type of improvements, and as directed by City of Wildwood's Department of Public Works.

Stormwater Pollution Prevention Plan

b. Prior to any land disturbance on this subject site, submit a Stormwater Pollution Prevention Plan, as part of the Site Development Plan review process, indicating compliance to Federal, State, and local requirements regarding the management of stormwater in order to prevent sediment and erosion, both on-site and upon downstream properties.

Sound Study
c. The authorization of the Site Development Plan for this large water feature shall not include the waterfall structure, unless an independent sound study is conducted by the City of Wildwood with it in operation to determine the level of compliance to the Noise Code. This sound study must be conducted in accordance with accepted industry standards and by a consultant/firm with extensive experience in this field of sound analysis and testing. The results of the sound study must indicate compliance to the Noise Code, before the Site Development Plan can be acted upon for the waterfall structure.

Air Pollution Testing
d. The authorization of the Site Development Plan for this large water feature shall not include the waterfall structure, unless testing is provided regarding the odor issue associated with this improvement. This testing must be conducted in accordance with accepted industry standards and by a consultant/firm with extensive experience in this field of air pollution control. The results of the testing must indicate compliance to the Air Pollution Code, before the Site Development Plan can be acted upon for the waterfall structure.

6. RECORDING

Within sixty (60) days of granting of the Conditional Use Permit (CUP) by the Planning and Zoning Commission, the approved permit language and legal description of the property shall be recorded with the St. Louis County Recorder of Deeds.

7. VERIFICATION PRIOR TO PERMITS

Notification to Department of Planning

a. Subsequent to approval of the Site Development Plan, and prior to issuance of any grading or permit, all approvals from the Missouri Department of Transportation (MoDOT), the Department of Public Works, the U.S. Army Corps of Engineers, the Missouri Department of Natural Resources (MNR), and the Monarch Fire Protection District must be received by the Department of Planning.

Nuisance Bond

b. Provide to the City of Wildwood a bond, letter of credit, or cash deposit in the amount of five thousand dollars ($5,000.00) for use to undertake any inspections or maintenance of the large water feature and dam, if the property and improvements are not maintained in accordance with said conditions of this permit. The City shall hold this deposit and it will be pre-authorized by the owner/operator, in writing, to exercise its use, if violations are noted and not abated in a timely manner.

8. GENERAL DEVELOPMENT CONDITIONS

a. Provide adequate temporary off-street parking for construction employees. Parking on non-surfaced areas shall be prohibited in order to eliminate the condition whereby mud from construction and employee vehicles is tracked onto the pavement causing hazardous roadway and driving conditions.

b. A grading permit is required prior to any grading on the site. Interim stormwater drainage controls in the form of siltation control measures are required and must comply with the Stormwater Pollution Prevention Plan for this development (SWPPP). The developer shall be solely responsible for obtaining any temporary slope and construction licenses needed to address the installation of public and private improvements on this site that require the use of adjoining parcels of ground that are not under their ownership or control.

c. The petitioner shall be responsible for obtaining all necessary permits from the Department of Natural Resources Clean Water Commission as they relate to the development of this tract of land.

d. The developer is advised that utility companies will require compensation for relocation of their utility facilities within public right-of-way. The developer should also be aware of extensive delays in utility company relocation and adjustments. Such delays will not constitute a cause to allow occupancy prior to completion of infrastructure improvements.

e. If cut and fill operations occur during a season not favorable for immediate establishment of a permanent ground cover, a fast germinating annual, such as Rye or Sudan Grasses, shall be utilized to prevent erosion. This restoration must occur within thirty (30) days of the conclusion of preliminary grading as determined by the Director of Public Works.

f. Failure to comply with any or all of the conditions of this ordinance shall be adequate cause for revocation of permits by issuing City of Wildwood Departments or Commissions.

g. The Zoning Enforcement Officer of the City of Wildwood, Missouri, shall enforce the conditions of this ordinance in accord with the Site Development Plan approved by the Planning and Zoning Commission and the Department of Planning. The owner/operator must acknowledge in writing that access to this site for inspection purposes by personnel of the City of Wildwood shall be authorized and, if refused, such action is grounds for revocation of said permit by the City.

h. Any other applicable zoning, subdivision, or other regulations or requirements of the City shall further apply to the development of this property, as authorized by this Conditional Use Permit (CUP), except as may be provided by law. Nothing herein shall be deemed a waiver of any subdivision, zoning, or other development regulation of the City whether by implication or reference.

i. This zoning approval is conditioned on compliance with the Zoning Ordinance, Subdivision and Development Regulations, and all applicable laws of the City. Such additional regulations are supplemental to the requirements herein and no modification of any applicable regulations shall result from this Conditional Use Permit (CUP), except where this ordinance has expressly modified such regulations by reference to the applicable provision authorizing such modification.

j. This Conditional Use Permit (CUP) shall be authorized for a period of one (1) year, with any adjustments to it based upon compliance to the requirements of this ordinance.
NOTES:
- Pond Area: Approximately 3.3 acres
- Pond Volume: Approximately 8,000,000 Gallons
- Maximum Pond Depth: 12' - Height of Spillway: 550' - Height of Dam: 15' - Top of Dam Elevation: 559'
- Grading and discharge shall be per City of Wildwood and MSD Standards. - Slope shall not exceed 3 (horizontal) : 1 (vertical), unless supported by geotechnical report.
- Stormwater shall be discharged at an adequate natural discharge point. Sinkholes are not adequate natural discharge points.
- Water feature depth varies, as constructed.
  SCI Engineering, Inc.
  130 Point West Boulevard, St. Charles, MO
  (636) 949-8200 (contact Mr. Thomas Gouy or Mr. David Nolan)
- Since the overflow structure is below grade and constructed of concrete, the maintenance required is minimal, if any, for the next 20+ years. The top of the structure has a permeable grate to act as a further filter, which is cleaned of debris on an as needed basis.
FIGURE 3: POND OVERFLOW DRAIN AND DETAIL

NATURALLY OCCURRING DRAINAGE DITCH (FLOWS WNW)

OUTFALL DRAIN CONVEYANCE LINES (FLOWS NNE)

OUTFALL DRAIN (SEE DETAIL BELOW)

Pond Drain

6" thick reinforced concrete walls and floor

2X 72"X72" steel grate panels

36" culvert pipe
4"X6" steel beam

24" culvert pipe

Tie in to shoreline

144"
60"
6"
60"
33"
33"
12"
3"
FIGURE 5: TOPOGRAPHIC MAP FOR THE POND AND SURROUNDING AREA
No large water feature and related improvements, including the waterfall, structure shall be located within the following setbacks, except as otherwise noted below:

- Seven hundred (700) feet from the southern property line and boundary of this Conditional Use Permit (CUP).
- Four hundred (400) feet from the western property line and boundary of this Conditional Use Permit (CUP).
- Forty (40) feet from the northern property line and boundary of this Conditional Use Permit (CUP).
- Four hundred fifty (450) feet from the eastern property line and boundary of this Conditional Use Permit (CUP), except the waterfall structure may be located no closer than one hundred (100) feet to the same.
GEOTECHNICAL NOTES FROM PETITIONER'S ENGINEER
December 15, 2014

Mr. Gene Roentz  
Roentz Co., LLC  
PO Box 140  
St. Albans, Missouri 53073

RE: Compaction Testing - Dam Repair  
500 Laurey Lane  
Wildwood, Missouri  
SCI No. 2014-0456.00

Dear Mr. Roentz:

In accordance with your request, SCI Engineering, Inc. obtained density tests on the soil backfill placed in the northeast part of the dam area. It was our understanding that the dam never leaked, but that this area was continually saturated. The existing soils in this area of the dam were removed to natural limestone boulders and bedrock. On-site soils were then placed and compacted in this area. Neither specifications nor development plans existed.

Test results obtained on the soil fill placed in the dam area are shown on the enclosed Compaction Test Summary. The test results were compared to a modified Proctor compaction control curve (ASTM D 1557), developed earlier on a representative sample of the backfill materials. The control curve and other sample information are shown on Figure 1. In general, the soil backfill was compacted to a minimum dry density of at least 90 percent of the modified Proctor maximum dry density. Areas tested indicating densities less than this criteria were rerolled and recompacted until the desired degree of compaction was achieved or rerolled and visually accepted.

We appreciate the opportunity to be of service to you on this project. If you have any questions or comments, please call.

Respectfully,

SCI ENGINEERING, INC.

Thomas A. Gouy  
Senior Field Manager

TAG/DPN/bjs

Enclosures
# Compaction Test Report

**Project:** 500 Laurey Lane (Dam Repair)  
**Location:** Wildwood, Missouri  
**Client:** Roentz Co., LLC  
**Contact:** Gene Roentz  

## Backfill

**Test Method:** ASTM D 1557  
**Specification:** 90% Modified Proctor Control  
**Test Results:** Meets specifications

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<th>Offset</th>
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<th>Dry Density (pcf)</th>
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**COMPACTION TEST REPORT**

ASTM D 1557 Modified - Method A

ZaV = 2.70

Maximum Dry Density (pcf): 114.6
Optimum Moisture Content: 13.7%

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**Project Name:** Laurey Lane Pond  
**Project Location:** Wildwood, Missouri  
**Sample Location:** On-site Site Stockpile  
**Material Description:** Lean Clay (CL); Light Brown  
**Sample Number:** A-9204  
**Source:** N/A  
**Date Sampled:** 6/3/2014  
**Project Number:** 2014-0456.00  
**Client:** Gene Roentz  

**Tested By:** R. Robertson  
**Date Tested:** 6/5/2014  
**Reviewed By:** M. Rosenberger  
**Title:** Lab Supervisor  

SCI Engineering, Inc.  
130 Point West Blvd.  
St. Charles, Missouri 63301  
Figure 1
Tom Roberts

Subject: Re: 500 Laurey Lane - Dam Repair from 2014
Date: Wednesday, June 14, 2017 at 2:27:30 PM Central Daylight Time
From: Tom Roberts
To:  Joe Vujnich, Tom Roberts
CC:  Adam Peetz, Karin

Joe – As a further followup, the Field Engineer from SCI Engineering called back. He confirmed that all we did was repair the dam that was leaking and replace what was there back to the original level. He said you can call him if you need to. His name is Tom Gouy and his cell phone is 314-575-9487.

Thanks.

Tom Roberts

(314) 835-2888 Direct
(661) 457-1997 FAX
(314) 799-4400 Cell
troberts@cdcco.com

---

From: Joe Vujnich <jvujnich@cityofwildwood.com>
Date: Wednesday, June 14, 2017 at 11:55 AM
To: Tom Roberts <troberts@cdcco.com>
Cc: Adam Peetz <apeetz@enviroanalyticsgroup.com>, Gene Roentz <mroentz@charter.net>, Karin <karin.roberts@me.com>

Subject: Re: 500 Laurey Lane - Dam Repair from 2014

Thank you Mr. Roberts. I will review the item today or tomorrow and then advise.

I appreciate the information.

Joe Vujnich

P.S. Thanks to your wife and you for hosting the Commission at the State Route 109 property yesterday.

On Jun 14, 2017, at 11:52 AM, Tom Roberts <troberts@cdcco.com> wrote:

Joe – Here is what I received from SCI on the elevation of the dam at our house that was repaired.

SCI was not tasked to do anything but oversee, monitor and test the dam that was saturated. Per Gene’s e-mail thread below, the only work was to repair the dam. After that work was completed under the supervision of SCI, the dam was backfilled and returned to it’s original elevation.

Let me know if you need anything else.

Thanks.

Tom Roberts

<CF518B5B-E4A5-421B-8310-C3A1A16A5A00[1].png>
(314) 835-2888 Direct
(661) 457-1997 FAX
(314) 799-4400 Cell
troberts@cdcco.com
Subject: FW: 500 Laurey Lane - Dam Repair from 2014
Date: Wednesday, June 14, 2017 at 11:52:06 AM Central Daylight Time
From: Tom Roberts
To: Joe Vujnich
CC: Tom Roberts, Adam Peetz, Gene Roentz, Karin

Joe – Here is what I received from SCI on the elevation of the dam at our house that was repaired.

SCI was not tasked to do anything but oversee, monitor and test the dam that was saturated. Per Gene’s e-mail thread below, the only work was to repair the dam. After that work was completed under the supervision of SCI, the dam was backfilled and returned to it’s original elevation.

Let me know if you need anything else.

Thanks.

Tom Roberts

(314) 835-2888 Direct
(661) 457-1997 FAX
(314) 799-4400 Cell
troberts@cdcco.com

From: Jim Bauer <JBauer@sciengineering.com>
Date: Wednesday, June 14, 2017 at 11:38 AM
To: Tom Roberts <troberts@cdcco.com>
Cc: Tom Gouy <TGouy@sciengineering.com>
Subject: FW: 500 Laurey Lane - Dam Repair from 2014

Tom,

Attached is our compaction report for the dam repair in 2014. I have asked Tom Gouy who was our PM at that time to give you a call. Also, please see the email chain below. According to Roentz the dam was returned to its previous grade at the time of repair.

Let us know if you need anything else.

Thank you,

Jim

---
From: Marcia Roentz [mailto:mmroentz@gmail.com]
Sent: Wednesday, June 14, 2017 9:29 AM
To: Jim Bauer
Subject: Re: 500 Laurey Lane - Dam Repair from 2014

Jim,

There weren't any benchmarks set. The excavation was to repair the leak on the east side of the dam. When it was backfilled, the excavated area was returned to its original elevation which matched the existing dam.

The only site drawing that shows contours was prepared by Greg Starke at Buescher Ditch. His phone number is 314-852-4124.

Gene

On Jun 14, 2017 8:25 AM, "Jim Bauer" <JBauer@sciengineering.com> wrote:
Gene,

Yesterday afternoon I received a call from Tom Roberts of 500 Laurey Lane. He was asking if we had any documentation of the repaired dam height. It sounded like the City was asking if the dam height had been increased. I took a look through all our documents and don't have anything with elevations. I do know we tested about 19 feet of backfill with the excavation extending below grade. Based on photos it looks like the excavation to bedrock was 6 feet or so.

Do you have any plans with elevations or as-builts to help him out?

Thank you,

Jim

---
James P. Bauer, P.E. | Staff Engineer
SCI Engineering, Inc.
Direct: 636.757.1063
Mobile: 314.575.9535
Now serving clients with our new office in San Antonio, Texas!

This electronic communication and its attachments may contain confidential information. They are forwarded to you without passing through our standard review process. Design data and recommendations included herein should not be used for final design. If you have received this information in error, please notify the sender immediately.

This electronic communication and its attachments may contain confidential information. They are forwarded to you without passing through our standard review process. Design data and recommendations included herein should not be used for final design. If you have received this information in error, please notify the sender immediately.
WATERFALL DESIGN INFORMATION
Design for waterfall structure at 500 Laurey Lane.

This waterfall structure running adjacent to the driveway at 500 Laurey Lane is comprised a simple pumping system, supply and return piping, and a constructed waterfall that is constructed to mimic a small turbulent brook. The reservoir for this system is the adjoining pond and the water supply is pumped with 3 identical 10hp pumps. Due to the irregular nature of this waterfall and intentionally non-homogeneous channel shape calculation will be ran to show the velocity and depths of the channel under maximum and minimum restriction, as well as the expected average (normal) conditions. A drawing sheet showing the basic construction details is attached. Specifications on the pumping equipment are also attached.

Under the provided conditions the pumps are expected to provide approximately 500 gallons/min of flow in total. The pumps will be installed so that they can be operated in various “stages” providing the flow capacity of 1, 2, or all 3 pumps. Only the operating conditions with all three pumps operating will be analyzed as this will provide the anticipated maximum depth and velocity. These analyses are approximate and represent localized conditions. Slight variance in actual conditions is expected due to construction practices.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Channel Characteristics</th>
<th>Flow Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Width (ft)</td>
<td>Slope (ft/ft)</td>
</tr>
<tr>
<td>Maximum Velocity</td>
<td>8</td>
<td>0.3</td>
</tr>
<tr>
<td>Maximum Depth</td>
<td>8</td>
<td>0.05</td>
</tr>
<tr>
<td>Normal Conditions</td>
<td>10</td>
<td>0.15</td>
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<tr>
<td>Minimum Velocity</td>
<td>12</td>
<td>0.05</td>
</tr>
<tr>
<td>Minimum Depth</td>
<td>12</td>
<td>0.3</td>
</tr>
</tbody>
</table>

All calculations done assuming 67 cubic feet per minute flow rate.

Drawings and pump specifications are attached.
To:
EnviroAnalytics Group
1650 Des Peres Road, Suite 230
St. Louis, MO 63131

Attention:
Adam Peetz PE
Senior Project Engineer

Email:
apeetz@envioranalyticgroup.com

<table>
<thead>
<tr>
<th>Date Quoted</th>
<th>Quote Valid Until</th>
<th>Est. Lead Time</th>
<th>FOB</th>
<th>Prepared By</th>
<th>Quotation Number</th>
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<tr>
<td>11/2/2016</td>
<td>12/2/2016</td>
<td>4-6 weeks</td>
<td>SHIPPING POINT</td>
<td>AG</td>
<td>AG110216-1</td>
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</table>

<table>
<thead>
<tr>
<th>Qty</th>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>pump system</td>
<td>consisting of 3 pumps rated at approximately 175GPM @ 100' and a Nema 4/12 panel to control the system. Each pump will be mounted on a 48&quot; long by 15&quot; wide steel base coupled with coupling guard to a 10HP, 3600RPM, 230Volt, single phase, TEFC motor. Also included are 3 inch flanged discharge ball check valves, suction gauges, discharge gauges and air release valves. The pumps will be controlled by a 42&quot; X24' X 8' Nema 4/12 enclosure triplex panel. The panel will come with a 250 ampere main circuit breaker disconnect, 3 10HP, 230 volt 1 phase contactor/overloads, a 120 volt control transformer, 3 time delay switches, a DC power supply, 3 HOA switches, 3 green running pilot lights and a phone control module of your choice.</td>
</tr>
</tbody>
</table>

Unit Price | Line Amount |
-----------|-------------|

Best regards,

[Signature]

Tom Unckrich
Specifications:

SUCTION/DISCHARGE ............ 3" x 3" NPT, Female
LIQUID TEMPERATURE .......... 160°F (71°C) Continuous
INTERMEDIATE ................. Cast Iron ASTM A-48, Class 30
VOLUTE .......................... Cast Iron ASTM A-48, Class 30, Removable
BODY ............................. Cast Iron ASTM A-48, Class 30
PEDESTAL ......................... Cast Iron ASTM A-48, Class 30
IMPELLER: Design ............... Semi-Open, Dynamically Balanced, ISO G6.3
                       Material ............... Cast Iron ASTM A-48, Class 30
SHAFT ............................ Stainless Steel
SQUARE RINGS .................... Buna-N
HARDWARE ......................... Series Stainless Steel
PAINT ............................. Air Dry Enamel
SEAL: Design ................. Single Mechanical with Lip Seal
       Lubrication .............. Oil
       Material ................ Rotating Faces - Carbon
                       Stationary Faces - Ceramic
                       Elastomer - Buna-N
                       Hardware -300 Series Stainless
BEARING - PUMP END:
       Design ................ Single Row, Ball
       Lubrication .............. Grease
       Load ....................... Radial
BEARING - DRIVE END:
       Design ................ Single Row, Ball
       Lubrication .............. Grease
       Load ....................... Radial
CHECK VALVE:
       Material ................ Valve Flap-Neoprene
       Weight .................. Cast Iron ASTM A-48, Class 30
OPTIONAL EQUIPMENT ............ Seal Material, Flex Coupled Assy, with Base & OSHA Guard; Right Hand V-Belt Drive Assy, Left Hand V-Belt Drive Assy., and In-Line Vertical V-Belt Drive Assy, with Base, Motor Adjusting Base and OSHA Guard.

Series: 15ICU-1
MAX SPHERE 5/8"

DESCRIPTION:
SELF-PRIMING CENTRIFUGAL PUMPS
DESIGNED FOR MARINE, MUNICIPAL AND INDUSTRIAL APPLICATIONS
**Series 15ICU-1**

**Pump End**

3" NPT

**Self-Priming Universal/Electric Driven**

<table>
<thead>
<tr>
<th>MODEL NO</th>
<th>PART NO</th>
<th>WEIGHT NET LBS (kg)</th>
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<tbody>
<tr>
<td>15ICU-1</td>
<td>052596</td>
<td>224 (102)</td>
</tr>
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</table>

**IMPORTANT:**

1. DO NOT USE FOR PUMPING FLUIDS WITH A FLASH POINT OF LESS THAN 100° F.
2. MAKE CERTAIN THAT PUMP AND/OR MOTOR ASSEMBLY AND CONTROLS HAVE THE APPROPRIATE RATING FOR THE GIVEN APPLICATION AREA CLASSIFICATION (i.e., DIVISION I, AGENCY LISTING, ETC.)
Series 15ICU-1
Performance Curve
Pump End
Self-Priming Universal/Electric Driven

---

**DESIGN POINT DATA**

- **Project:**
- **Flow:** __GPM__, **TDH** __Ft__
- **Pump Speed:** __RPM__
- **HP:** __Hz__, **Vols** __
- **FLA:** __LRA__, **Phase** __
- **Motor Speed:** __RPM__
- **Impeller Dia.:** 6.00

---

Testing is performed with water, specific gravity 1.0 @ 68°F @ (20°C), other fluids may vary performance.
Noise Studies
Sound Level Tests

The Information below is provided for the property at 500 Laurey Lane, Wildwood MO. Tests were performed at 3 different spots along the fence line across from adjacent property. Tests were performed using a Radio Shack Sound Level Meter Cat. NO. 33-2055. Two tests were performed at each of the 3 locations. The test was done with pumps running using A-weighting and also tested with pumps not running using A-weighting.

Location 1: (pumps running)
A weighting 52 dB

Location 1: (pumps not running)
A weighting 52 dB (ambient noise)

Location 2: (pumps running)
A weighting 53 dB

Location 2: (pumps not running)
A weighting 53 dB (ambient noise)

Location 3: (pumps running)
A weighting 55 dB

Location 3: (pumps not running)
A weighting 55 dB (ambient noise)

Tests at Location 1 were done about a quarter of the way down the hill along the fence line. Tests at Location 2 were done half way between the first tests and the top of the hill. Tests at Location 3 were done at the top of the hill along the fence line.
As can be seen from the tests, there is no discernable difference in noise levels between the pumps when they were running and when they were not running.

Keith Fennewald,
TO WHOM IT MAY CONCERN,

THE PURPOSE OF THIS TEST IS TO DETERMINE THE SOUND GENERATED BY WATER FEATURE PUMPS. ON AUGUST 12, 2017, I MEASURED AT 3 LOCATIONS ALONG FENCE/PROPERTY LINE ABOUT 50' APART AND THE RESULTS OF THE TEST ARE SHOWN BELOW.

LOCATION #1  53 db A-weighted  PUMPS ON
             53 db A-weighted  PUMPS OFF

LOCATION #2  53 db A-weighted  PUMPS ON
             53 db A-weighted  PUMPS OFF

LOCATION #3  54 db A-weighted  PUMPS ON
             54 db A-weighted  PUMPS OFF

IN CONCLUSION, THERE IS NO MEASURABLE DIFFERENCE IN SOUND PRESSURE LEVEL AT THE PROPERTY LINE WITH PUMPS ON. PLEASE CALL ME @ (314) 223-0139 IF YOU HAVE ANY QUESTIONS.

THANK YOU,

ERIC CONNORS  owner
EMERGENCY MANAGEMENT PLAN
Guidance for Determining the Emergency Level

This information should be used as a general guide for recognizing and characterizing the type of emergency situation occurring at the dam. The dam owner should notify the appropriate emergency contacts based upon the emergency level assigned to each situation.

**Level 1 Emergency - Nonemergency, unusual event, slow to develop**
- Reservoir water surface elevation at emergency spillway crest or spillway is flowing with no active erosion.
- New seepage areas in or near the dam.
- New cracks in the embankment greater than ¼-inch wide without seepage.
- Visual movement.slippage of the embankment slope.
- Instrumentation readings beyond predetermined values.
- Measurable earthquake felt or reported on or within 50 miles of the dam.
- Damage (vandalism/sabotage) to dam or appurtenances with no impacts to the functioning of the dam.
- Modification (vandalism/sabotage) to the dam or appurtenances that could adversely impact the functioning of the dam.

**Level 2 Emergency - Potential dam failure situation, rapidly developing**
- Spillway flowing with active gully erosion.
- Spillway flow that could result in flooding of people downstream, if the reservoir level continues to rise.
- Reservoir level is 1 foot below the top of the dam.
- New seepage areas with cloudy discharge or increasing flow rate.
- Observation of new sinkhole in reservoir area, on embankment or downstream of dam.
- Cracks in the embankment with seepage.
- Earthquake resulting in visible damage to the dam or appurtenances.
- Verified bomb threat that, if carried out, could result in damage to the dam.
- Damage to dam (vandalism/sabotage) or appurtenances that has resulted in seepage flow.

**Level 3 Emergency - Urgent; dam failure imminent or is in progress**
- Spillway flowing with an advancing headcut that is threatening the control section.
- Spillway flow that is flooding people downstream.
- Water from the reservoir is flowing over the top of the dam (not just auxiliary/emergency spillway).
- Seepage that is obviously eroding soil from within the embankment or rapidly increasing in flow rate.
- Rapidly enlarging sinkhole.
- Sudden or rapidly progressing slides of the embankment slopes.
- Earthquake resulting in uncontrolled release of water from the dam.
- Detonated bomb that has resulted in damage to the dam or appurtenances.
- Damage to dam (vandalism/sabotage) or appurtenances that has resulted in uncontrolled water release.
Emergency Level 1 Notifications

Nonemergency, unusual event; slowly developing.

Dam Operator or Owner
Tom Roberts
314-835-2888 (Office)
314-799-4400 (Cell)

State Dam Safety Official
Missouri
Water Resources Center
Robert Clay
573-368-2175 (Office)
573-341-5761 (Home)
573-368-6191 (Cell)

Dam Operator’s
Technical Reps. (if applicable)
Owner’s engineer
Adam Peetz
314-616-0279 (Cell)

Note:
1., 2., etc., denotes call sequence

Legend:
Calls by operator/owner ————
Second level calls ————

See Emergency Services Contacts sheet for contact information about back-ups to the persons shown above and other emergency personnel.
Emergency Level 2 Notifications

Emergency event, potential dam failure situation; rapidly developing.

**Dam Operator or Owner**
Tom Roberts
314-835-2888 (Office)
314-799-4400 (Cell)

(1.)

911
County Emergency Director/Sheriff
Jim Buckles
314-615-4724 (office)

Local Emergency Management Dispatcher

(2.)

State Dam Safety Official
Missouri Water Resources Center
Robert Clay
573-368-2175 (Office)
573-341-5761 (Home)
573-368-6191 (Cell)

St. Louis County Amateur Radio Emergency Service:
Steve Wooten
kc0qmu@yahoo.com

Missouri Highway Patrol Dispatcher

Local Law Enforcement/Fire Protection Agency Dispatcher

(3.)

Dam Operator’s Technical Reps. (if applicable)
Owner’s engineer
Adam Peetz
314-616-0279 (Cell)

National Weather Service
636-447-1876

Note:
1., 2., etc., denotes call sequence

Legend:
Calls by operator/owner _______
Second level calls - - - - -

See Emergency Services Contacts sheet for contact information about back-ups to the persons shown above and other emergency personnel.
Emergency Level 3 Notifications

Urgent event, dam failure appears imminent or is in progress.

**Dam Operator or Owner**
Tom Roberts
314-835-2888 (Office)
314-799-4400 (Cell)

1.

**911**
County Emergency Director/Sheriff
Jim Buckles
314-615-4724 (office)

2.

**State Dam Safety Official**
Missouri Water Resources Center
Robert Clay
573-368-2175 (Office)
573-341-5761 (Home)
573-368-6191 (Cell)

3.

**Dam Operator’s Technical Reps. (if applicable)**
Owner’s engineer
Adam Peetz
314-616-0279 (Cell)

---

**Local Emergency Management Dispatcher**

**National Weather Service**
636-447-1876

**Missouri Highway Patrol Dispatcher**

**St. Louis County Amateur Radio Emergency Service:**
Steve Wooten
kc0qmu@yahoo.com

**Local Law Enforcement/Fire Protection Agency Dispatcher**

---

**Legend:**
Calls by operator/owner ———
Second level calls ————

---

See Emergency Services Contacts sheet for contact information for back-ups to the persons shown above and other emergency personnel.
# Emergency Services Contacts

<table>
<thead>
<tr>
<th>Agency / Organization</th>
<th>Principal Contact</th>
<th>Address</th>
<th>Office Phone No. with Area Code</th>
<th>Alternate Telephone Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Louis County Sheriff</td>
<td>Jim Buckles</td>
<td>7900 Carondelet Ave; 5th Flr</td>
<td>324-615-4724</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clayton, MO 63105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owner/Representative of Tom's Dam</td>
<td>Tom Roberts</td>
<td>500 Laury Ln</td>
<td>314-835-2888</td>
<td>314-799-4400 (C)</td>
</tr>
<tr>
<td>County Emergency Management Director</td>
<td>Michael Smiley</td>
<td>1150 Hana Road</td>
<td>314-615-9500</td>
<td></td>
</tr>
<tr>
<td>Wildwood Fire Department</td>
<td>Metro West Fire Protection Dist.</td>
<td>Po Box 310</td>
<td>636-458-2100</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wildwood, MO 63021</td>
<td></td>
<td></td>
</tr>
<tr>
<td>St. Louis County Police</td>
<td>Wildwood Precinct</td>
<td>16860 Main St</td>
<td>636-458-9194</td>
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<tr>
<td></td>
<td></td>
<td>Wildwood, MO 63040</td>
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<td></td>
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<tr>
<td>Missouri Highway Patrol</td>
<td>Troop C</td>
<td>891 Technology Dr</td>
<td>636-300-2800</td>
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<td></td>
<td></td>
<td>Weldon Spring, MO 63104</td>
<td></td>
<td></td>
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<tr>
<td>St. Louis County Dept of Highways &amp; Traffic</td>
<td>Contact Name, Supervisor</td>
<td>1050 N. Lindbergh Blvd.</td>
<td>314-615-8538</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>St. Louis, MO 63132</td>
<td></td>
<td></td>
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<tr>
<td>Water Resources Center</td>
<td>Robert Clay</td>
<td>111 Fairgrounds Rd.</td>
<td>573-368-2175</td>
<td>573-341-5761 (H)</td>
</tr>
<tr>
<td>Dam and Reservoir Safety Program</td>
<td>Chief Engineer</td>
<td>Rolla, MO 65401</td>
<td>573-368-6191 (C)</td>
<td></td>
</tr>
<tr>
<td>Department of Natural Resources Emergency</td>
<td>Duty Officer</td>
<td>P.O. Box 176</td>
<td><strong>24 HOUR NO:</strong> 573-634-2436</td>
<td>573-526-3380 (Brian Allen,</td>
</tr>
<tr>
<td>Response</td>
<td>EER</td>
<td>Jefferson City, MO 65102</td>
<td></td>
<td>Chief, EER)</td>
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<tr>
<td>SEMA Duty Officer</td>
<td></td>
<td></td>
<td>573-751-2748</td>
<td></td>
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<tr>
<td>National Weather Service</td>
<td>Jim Kramper</td>
<td>St. Charles, MO</td>
<td>636-447-1876</td>
<td>1-800-852-7497</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>636-447-1769 (Fax)</td>
</tr>
<tr>
<td>National Weather Service</td>
<td>Andy Bailey</td>
<td>Kansas City, MO</td>
<td>816-540-5417</td>
<td></td>
</tr>
<tr>
<td>National Weather Service</td>
<td>Steve Runnels</td>
<td>Springfield, MO</td>
<td>417-863-1456</td>
<td></td>
</tr>
<tr>
<td>National Weather Service</td>
<td>Ricky Shanklin</td>
<td>Paducah, KY</td>
<td>270-744-6440</td>
<td></td>
</tr>
<tr>
<td>Missouri Department of Transportation</td>
<td>Emergency Operation Center</td>
<td>24-hour cell no.</td>
<td>573-522-9503</td>
<td></td>
</tr>
<tr>
<td>Missouri Department of Transportation</td>
<td>County Shed</td>
<td></td>
<td>636-938-5960</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jason Bell</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Natural Resources Conservation Service</td>
<td>Dick Purcell</td>
<td>601 Bus. Loop 70</td>
<td>573-876-0910</td>
<td></td>
</tr>
<tr>
<td>(For NRCS Dams)</td>
<td>State Engineer</td>
<td>W. Columbia, MO 65203</td>
<td></td>
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Resources Available

Locally available resources include: (if not available please note)

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<tr>
<th>Heavy Equipment Service and Rental</th>
<th>Sand and Gravel Supply</th>
<th>Ready-mix Concrete Supply</th>
</tr>
</thead>
</table>
| Owner provided                     | Bussen Quarry – Antire Plant  
6800 Bussen Rd  
Eureka, MO 63025  
636) 938-4910 | Breckenridge Material Co  
2829 Breckenridge Industrial Ct  
St Louis, MO 63144  
314-962-1234 |

<table>
<thead>
<tr>
<th>Pumps</th>
<th>Diving Service</th>
<th>Sand Bags</th>
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</thead>
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| K&K Supply  
535 North Highway Dr.  
Fenton, MO 63026  
636-349-1141 | American Underwater Contractors  
3426 Forester Rd  
Hazelwood, MO 63044  
314-739-5235 | Bussen Quarry – Antire Plant  
6800 Bussen Rd  
Eureka, MO 63025  
636-938-4910 |
Appendix A

Unusual or Emergency Event Log
(To be completed during the emergency)

Dam name: 
County: 

When and how was the event detected?

Weather conditions:

General description of the emergency situation:

Emergency level determination: 
Made by:

Actions and Event Progression

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Action/event progression</th>
<th>Recorded by</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>
Appendix B

Glossary

Abutment  The part of the valley side against which the dam is constructed. The left and right abutments of dams are defined with the observer looking downstream from the dam.

Appurtenances  Structures incident to or annexed to dams essential to the proper operation, maintenance or functioning of the dam. This includes such structures as spillways, low level outlet works and water conduits, such as tunnels, pipelines or penstocks, either through a dam or its abutments.

Breach  An opening through the dam that allows draining of the reservoir. A controlled breach is an intentionally constructed opening. An uncontrolled breach is an unintended failure of the dam.

Control section  An usually level segment in the profile of an open channel spillway above which water in the reservoir discharges through the spillway.

Dam  An artificial barrier generally constructed across a watercourse for the purpose of impounding or diverting water.

Emergency spillway  The appurtenant structure that provides the controlled conveyance of excess water through, over, or around the dam.

Instrumentation  An arrangement of devices installed into or near dams that provide measurements to evaluate the structural behavior and other performance parameters of the dam and spillway structures. Examples include seepage measuring weirs, piezometers, inclinometers and survey monuments.

Low level outlet works  An appurtenant structure, usually consisting of a pipe through the embankment or principal spillway structure equipped with a valve, whose purpose is to allow lowering the lake level.

Principal spillway  The appurtenant structure that conveys normal inflow through or around the embankment.

Reservoir  The body of water impounded or potentially impounded by the dam.

Seepage  The natural movement of water through the embankment, foundation, or abutment of the dam.
### Appendix C

**Record of Holders of Control Copies of this EAP**

<table>
<thead>
<tr>
<th>Copy Number</th>
<th>Organization</th>
<th>Person receiving copy</th>
<th>E-mail Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tom Roberts</td>
<td>Tom Roberts</td>
<td><a href="mailto:troberts@cdc.co.com">troberts@cdc.co.com</a></td>
</tr>
<tr>
<td>2</td>
<td>St. Louis County Emergency Management</td>
<td>Mike Smiley</td>
<td>msм<a href="mailto:iley@stlouisco.com">iley@stlouisco.com</a></td>
</tr>
<tr>
<td>3</td>
<td>Missouri Department of Natural Resources Dam Safety Program and address</td>
<td>Bob Clay</td>
<td><a href="mailto:bob.clay@dnr.mo.gov">bob.clay@dnr.mo.gov</a></td>
</tr>
</tbody>
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### Record of Revisions and Updates Made to EAP

<table>
<thead>
<tr>
<th>Revision Number</th>
<th>Date</th>
<th>Revisions made</th>
<th>By whom</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Date</td>
<td>Describe revision to EAP</td>
<td>Name</td>
</tr>
</tbody>
</table>
David Hudson Comments Regarding P.Z. 15-17 Tom Roberts Large Water Feature

I hope that all the Commission Members are able to attend the Monday, June 15, 2020 Subcommittee Meeting to participate in the discussion of this incomplete Site Development Plan and ongoing public health issue.

I agree with the Planning Department’s finding that the required lake water pretreatment, treatment and maintenance are insufficient. The petitioner’s claim that the lake water is clean has been disproven by Wildwood’s own testing. The lake water has high levels of algae, high levels of nutrients (nitrogen and phosphorus) that feed the algae, and toxins that are a product of the algae. These are all harmful to human health. As required by the Department of Planning, lake water pretreatment, treatment and good lake management are essential for the protection and health of the Wildwood community. I have attached the EPA Cyanobacteria and Cyanotoxins Fact Sheet.

I also agree with the Planning Department’s findings that the outfall (Pond Drain) engineering calculations and supporting documentation need to be provided as requested in order to show that the outfall design is safe for Wildwood residents downstream.

I agree with the Planning Department’s final review of the Site Development Plan dated May 26, 2020, that the requirements to complete the CUP have not been met. Final approval for the CUP should not be granted until all conditions are satisfied.

No plumbing permits for the fountain or waterfall were provided to the City of Wildwood. The Wildwood plumbing code (UPC 1504.10.2) requires that reuse of stormwater runoff “in which it is sprayed or exposed shall be disinfected.”

The waterfall sourced by the untreated lake water continues to be a health hazard and should not be allowed to run until the CUP conditions are met as agreed to by the Commissioners. It is our request as residents of Wildwood, protected by City Code and Ordinances, that the proper notification be given to the petitioner to immediately cease all operation of the unpermitted waterfall. Furthermore, if the violation is not corrected, the appropriate summons be issued to allow the process of a legal remedy be engaged to protect our and the community’s health and safety as provided in the City Code.
Subject: David Hudson Comments Regarding P.Z. 15-17 Tom Roberts Large Water Feature I hope that all the Commission Members are able to attend the Monday, June 15, 2020 Subcommittee Meeting to participate in the discussion of this incomplete Site Development Plan...

Date: Friday, June 12, 2020 at 7:17:27 AM Central Daylight Time

From: Dave Hudson
To: Joe Vujnich

Attachments: EPA Cyanobacteria and Cyanotoxins Fact Sheet 06282019.pdf

David Hudson Comments Regarding P.Z. 15-17 Tom Roberts Large Water Feature

I hope that all the Commission Members are able to attend the Monday, June 15, 2020 Subcommittee Meeting to participate in the discussion of this incomplete Site Development Plan and ongoing public health issue.

The waterfall sourced by the untreated lake water continues to be a health hazard and should not be allowed to run until the CUP conditions are met as agreed to by the Commissioners.

I agree with the Planning Department’s finding that the required lake water pretreatment, treatment and maintenance are insufficient. The petitioner’s claim that the lake water is clean has been disproven by Wildwood’s own testing. The lake water has high levels of algae, high levels of nutrients (nitrogen and phosphorus) that feed the algae, and toxins that are a product of the algae. These are all harmful to human health. As required by the Department of Planning, lake water pretreatment, treatment and good lake management are essential for the protection and health of the Wildwood community. I have attached the EPA Cyanobacteria and Cyanotoxins Fact Sheet.

No plumbing permits for the fountain or waterfall were provided to the City of Wildwood. The Wildwood plumbing code (UPC 1504.10.2) requires that reuse of stormwater runoff “in which it is sprayed or exposed shall be disinfected.”

I also agree with the Planning Department’s findings that the outfall (Pond Drain) engineering calculations and supporting documentation need to be provided as requested in order to show that the outfall design is safe for Wildwood residents downstream.

I agree with the Planning Department’s final review of the Site Development Plan dated May 26, 2020, that the requirements to complete the CUP have not been met. Final approval for the CUP should not be granted until all conditions are satisfied.
Cyanobacteria and Cyanotoxins: 
Information for Drinking Water Systems

Summary
This fact sheet provides public water systems (PWSs) basic information on human health effects, analysis tools, and the effectiveness of various treatment processes to remove or inactivate four commonly occurring cyanotoxins in water bodies that are a source of drinking water throughout most of the U.S. Cyanotoxins are listed on the EPA’s fourth drinking water Candidate Contaminant List and include, but are not limited to, anatoxin-a, cylindrospermopsin, microcystins, and saxitoxin. This fact sheet does not address taste and odor issues caused by the cyanobacteria and will only focus on discussions of anatoxin-a, cylindrospermopsin, microcystins, and saxitoxin.

Background
The Safe Drinking Water Act (SDWA) protects public health by regulating the nation’s public drinking water supply, which relies on sources that include: rivers, lakes, reservoirs, springs, and ground water wells. The SDWA requires the EPA to publish a list of unregulated contaminants that are known or expected to occur in public water systems in the U.S. that may pose a risk in drinking water. This list is known as the Contaminant Candidate List (CCL).

The cyanotoxins included in the most recent CCL are produced by several species of cyanobacteria (cyanobacteria are known as blue-green algae). No federal regulatory guidelines for cyanobacteria or their toxins in drinking water or recreational waters exist at this time. The EPA published drinking water health advisories (HA) for microcystins and cylindrospermopsin in June 2015. The EPA recommends HA levels at or below 0.3 µg/L for microcystins and 0.7 µg/L for cylindrospermopsin in drinking water for children pre-school age and younger (less than six years old). For school-age children through adults, the recommended HA levels for drinking water are at or below 1.6 µg/L for microcystins and 3.0 µg/L for cylindrospermopsin. Young children are more susceptible than older children and adults as they consume more water relative to their body weight.

There are currently a few states that have established cyanotoxin monitoring guidelines and cyanotoxin threshold levels for public water systems (PWSs). PWSs are responsible for following those guidelines/thresholds and for undertaking any follow-up action required by their state.

Causes of cyanobacterial harmful algal blooms
Cyanobacteria are photosynthetic bacteria that share some properties with algae and are found naturally in lakes, streams, ponds, and other surface waters. Similar to other types of algae, when conditions are favorable, cyanobacteria can rapidly multiply in surface water and cause "blooms." Several types of cyanobacteria, for example Dolichospermum (previously Anabaena) flos-aquae, have gas-filled cavities that allow them to float to the surface or to different levels below the surface, depending on light conditions and nutrient levels. This can cause the cyanobacteria to concentrate on the water surface, causing a pea-soup green color or blue-green "scum." Some cyanobacteria, such as Planktothrix agardhii, can be found in bottom sediments and float to the surface when mobilized.
by storm events or other sediment disturbances. Other cyanobacteria blooms may remain dispersed through the water column (such as Raphidiopsis, previously Cylindrospermopsis sp.) leading to a generalized discoloration of the water.

Conditions that enhance growth of cyanobacterial harmful algal blooms

Factors that promote cyanobacterial bloom formation and persistence include:
- Extended periods of direct sunlight,
- Elevated nutrient availability (especially phosphorus and nitrogen),
- Elevated water temperature,
- pH changes,
- An increase in precipitation events,
- Calm or stagnant water flow, and water column stability/lack of vertical mixing.

Although bloom conditions in much of the U.S. are more favorable during the late summer, the interrelationship of these factors causes large seasonal and year-to-year fluctuations in the cyanobacteria levels. Some toxin-producing strains can occur early in the summer season while others are only found during late summer.

Effects of cyanobacterial harmful algal blooms

Cyanobacterial blooms can be harmful to the environment, animals, and human health. The bloom decay consumes oxygen, creating hypoxic conditions which result in plant and animal die-off. Under favorable conditions of light and nutrients, some species of cyanobacteria produce toxic secondary metabolites, known as cyanotoxins. Common toxin-producing cyanobacteria are listed in Table 1. The conditions that cause cyanobacteria to produce cyanotoxins are not well understood. Some species with the ability to produce toxins may not produce them under all conditions. These species are often members of the common bloom-forming genera. Both non-toxic and toxic varieties of most of the common toxin-producing cyanobacteria exist, and it is impossible to tell if a species is toxic or not toxic by looking at it. Also, even when toxin-producing cyanobacteria are present, they may not actually produce toxins. Furthermore, some species of cyanobacteria can produce multiple types and variants of cyanotoxins. Molecular tests are available to determine if the cyanobacteria, Microcystis for example, carry the toxin-producing gene. However, quantitative cyanotoxin analysis is needed to determine if the cyanobacteria are producing the toxin. Water contaminated with cyanobacteria can occur without associated taste and odor problems.

In most cases, the cyanobacterial toxins naturally exist intracellularly (in the cytoplasm) and are retained within the cell. Approximately 95% of anatoxin-a and the microcystin variants are found intracellularly during the growth stage of the bloom of certain cyanobacteria species. When the cyanobacteria cell dies or the cell membrane ruptures or is stressed, the toxins are released into the water (called "extracellular" toxins). However, more significant proportions of other cyanotoxins such as cylindrospermopsin, can be naturally released to the water by the live cyanobacterial cell. The reported ratio is about 50% intracellular and 50% extracellular during the growth stage of the bloom. Extracellular toxins may adsorb to clays and organic material in the water column and are generally more difficult to remove than the intracellular toxins.

Health effects caused from exposure to cyanotoxins

Exposure to cyanobacteria and their toxins could occur by ingestion of drinking water contaminated with cyanotoxins and through direct contact, inhalation and/or ingestion during recreational activities. The acute recreational exposure to cyanobacterial blooms and their cyanotoxins can result in a wide range of symptoms in humans including fever, headaches, muscle and joint pain, blisters, stomach cramps, diarrhea, vomiting, mouth ulcers, and allergic
reactions (see Table 1).

**Table 1. Cyanotoxins on the Contaminant Candidate List (CCL)**

<table>
<thead>
<tr>
<th>Cyanotoxin</th>
<th>Number of Variants</th>
<th>Primary Organ Affected</th>
<th>Health Effects(^1)</th>
<th>Most Common Cyanobacteria Producing Toxin(^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microcystins</td>
<td>&gt;100</td>
<td>Liver</td>
<td>Abdominal pain, Vomiting and diarrhea, Liver inflammation and hemorrhage, Acute pneumonia, Acute dermatitis, Kidney damage, Potential tumor growth promotion</td>
<td><em>Microcystis, Dolichospermum (previously Anabaena), Nodularia, Planktothrix, Fischerella, Nostoc, Oscillatoria, and Gloecotrichia</em></td>
</tr>
<tr>
<td>Cylindrospermopsin</td>
<td>3</td>
<td>Liver</td>
<td></td>
<td><em>Raphidiopsis (previously Cylindrospermopsis) raciborskii, Aphanizomenon flos-aquae, Aphanizomenon gracile, Aphanizomenon ovalisporum, Umezakia natans, Dolichospermum bergii, Dolichospermum lapponica, Dolichospermum planctonica, Lyngbya woliei, Rhaphidiopsis curvata, and Rhaphidiopsis mediterranea</em></td>
</tr>
<tr>
<td>Anatoxin-a group(^3)</td>
<td>2-6</td>
<td>Nervous System</td>
<td>Tingling, burning, numbness, drowsiness, incoherent speech, salivation, respiratory paralysis leading to death (symptoms observed in animals)</td>
<td><em>Chrysochromulina</em> (Aphanizomenon) ovalisporum, Cuspidothrix, Raphidiopsis, Cylindrospermum, Dolichospermum, Microcystis, Oscillatoria, Planktothrix, Phormidium, Dolichospermum flos-aquae, A. lemmernannii Raphidiopsis mediterranea (strain of Raphidiopsis raciborskii), Tychoinema and Woronichinia*</td>
</tr>
<tr>
<td>Saxitoxin</td>
<td>&gt;50</td>
<td>Nervous System</td>
<td>Tingling, numbness, headaches, dizziness, nausea, vomiting and diarrhoea, temporary blindness, paralysis and death</td>
<td><em>Aphanizomenon flos-aquae, Dolichospermum circinalis, Lyngbya woliei, Planktothrix spp. and a Brazilian isolate of Raphidiopsis raciborskii.</em></td>
</tr>
</tbody>
</table>

\(^1\) Sources: *Health Effects Support: Documents (HESD)* for microcystins, cylindrospermopsin and anatoxin-a (US EPA c,d,e) and *Testai et al., 2016*

\(^2\) Not all species of the listed genera produce toxin; in addition, listed genera are not equally as important in producing cyanotoxins.

\(^3\) The anatoxin-a group does not include the organophosphate toxin anatoxin-a(S) as it is a separate group. In the US, the most common member is thought to be anatoxin-a, and thus this toxin is listed specifically.
Such effects can occur within minutes to days after exposure. In severe cases, seizures, liver failure, respiratory arrest, and (rarely) death may occur. The cyanotoxins include neurotoxins (which affect the nervous system), hepatotoxins (which affect the liver), and dermatotoxins (which affect the skin). However, there have been new studies of effects in other systems, including hematological, kidney, cardiac, reproductive, and gastrointestinal effects. There is evidence that long-term exposure to low levels of microcystins and cylindrospermopsin may promote cell proliferation and the growth of tumors. However, more information is needed to determine the carcinogenicity of both microcystins and cylindrospermopsin.

There have been many documented reports of dog, bird, and livestock deaths throughout the world as a result of consumption of surface water with cyanobacterial blooms. In 1995, 116 patients at a renal dialysis clinic in Caruaru, Brazil experienced headache, eye pain, blurred vision, nausea and vomiting when they were exposed intravenously to water containing a mixture of microcystin and cylindrospermopsin (Carmichael et al., 2001). Subsequently, 100 of the affected patients developed acute liver failure, and, of these, 76 died. Analyses of blood, sera, and liver samples from the patients revealed only the microcystin toxin.

**Analytical Methods**

Table 2 describes the methods available for cyanotoxin measurement in freshwater. For drinking water, the EPA developed Method 544, a liquid chromatography/tandem mass spectrometry (LC/MS/MS) method for microcystins and nodularin (combined intracellular and extracellular), Method 545, a LC-ESI/MS/MS method for the determination of cylindrospermopsin and anatoxin-a, and Method 546, an ADDA-ELISA method.

Commerciaally available Enzyme-Linked Immunosorbtent Assay (ELISA) test kits are one of the more commonly utilized cyanotoxin testing methods, since they do not require expensive equipment or extensive training to run. Semi-quantitative field screening ELISA kits are available for the presence or absence of cyanotoxins. If cyanotoxins are detected by a field screening kit, repeat analysis is recommended using either a quantitative ELISA test or one of the other analytical methods identified in Table 2. More precise, quantitative ELISA test kits are available for microcystins/nodularins (including ADDA-ELISA), saxitoxin, anatoxin-a, and cylindrospermopsin. Although they provide rapid results, ELISA kits generally have limitations in selectivity and are not congener specific and recognizing different congeners can vary quantitatively due to different cross-reactivities.

Methods that utilize liquid chromatography combined with mass spectrometry (LC/MS) can precisely and accurately identify specific microcystin congeners for which standards are available. LC/MS methods have also been designed to minimize matrix interference. Currently, a few standards for a limited number of the known microcystin congeners are available. If congener-specific information is needed, an LC/MS (ion-trap, tandem mass spectrometry, TOF) method should be considered. Although HPLC-PDA methods are less selective than LC/MS methods and the quantitation is more problematic due to sample matrix interference, they could provide a measure of resolution of the congeners present. You may also consult the **EPA Frequently Asked Questions: Laboratory Analysis for Microcystins in Drinking Water** for more information.

**Sample handling considerations**

Samples must be handled properly to ensure reliable results. Detailed procedures are typically specified in the particular analytical methods/SOPs. Water systems should obtain and follow sample collection and handling procedures established by the laboratory performing the analysis. Laboratories establishing such procedures should adhere to analytical method defined protocols but may also consult the USGS sampling protocol **Guidelines for design and sampling for cyanobacterial toxin and taste-and-odor studies in lakes and reservoirs (2008)**.
Table 2. Methods Available for Freshwater Cyanotoxin Detection

<table>
<thead>
<tr>
<th>Methods</th>
<th>Anatoxins</th>
<th>Cylindrospermopsin</th>
<th>Microcystins</th>
<th>Saxitoxin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Biological Assays</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mouse</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Protein Phosphatase Inhibition Assays (PPIA)</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Neurochemical</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Enzyme-Linked Immunosorbent Assays (ELISA)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Chromatographic Methods</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><em>Gas Chromatography</em></td>
<td></td>
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</tr>
<tr>
<td>Gas Chromatography with Flame Ionization Detection (GC/FID)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Gas Chromatography with Mass Spectrometry (GC/MS)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td><strong>Liquid Chromatography</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid Chromatography / Ultraviolet - Visible Detection (LC/UV or LC/PDA)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Liquid Chromatography/ Fluorescence (LC/FL)</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Liquid Chromatography Combined with Mass Spectrometry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid Chromatography Ion Trap Mass Spectrometry (LC/IT MS)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Liquid Chromatography Time-of-Flight Mass Spectrometry (LC/TOF MS)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Liquid Chromatography Single Quadrupole Mass Spectrometry (LC/MS)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Liquid Chromatography Triple Quadrupole Mass Spectrometry (LC/MS/MS)</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Among the most important sample handling considerations are the following:

- **Collection** – Bottle type, volume, and preservative used depend on the laboratory doing the analysis. Generally, samples should be collected and stored in amber glass containers to avoid potential cyanotoxin adsorption associated with plastic containers and to minimize exposure to sunlight.
- **Quenching** – samples (particularly “finished” drinking water samples) that include a residual disinfectant, e.g., chlorine, should be quenched immediately upon sampling. Sodium thiosulfate or ascorbic acid are commonly used as quenching agents and their appropriateness can be specific to the analytical method selected to meet the monitoring data quality objectives. For example, EPA Method 544, an LC/MS/MS technique for measuring six microcystin congeners and nodularin in drinking water, specifies the use of ascorbic acid, along with other sample preservation reagents. On the other hand, EPA Method 546
(an ELISA technique for measuring "total microcystins" and nodularin in drinking water), exclusively specifies the use of sodium thiosulfate and prohibits the use of ascorbic acid. The different approaches are deliberate and designed to meet method performance goals that include established criteria for sample hold times.
- **Chilling** – samples should be cooled immediately after collection, during shipping, and pending analysis at the laboratory. Depending on the analytical method being used, sample freezing may be appropriate to extend holding times, taking precautions to avoid breakage.

**Sample analysis considerations**
When measuring both intracellular and extracellular toxins, rupturing cyanobacterial cells (lysing) is generally employed to break the cell wall and release the toxins into solution. Freeze/thaw cycling, traditionally carried out over three or more cycles, is the most common lysing technique, though some analytical methods rely on other approaches. Lysing is particularly important for samples collected prior to the PWS filter effluent. For a well-designed, well-operated PWS, lysing would not be expected to have a significant impact on finished water (post-filtration) samples as cyanobacteria cells should not be present at significant levels in the finished water. However, laboratories must carefully follow the requirements of the analytical methods and mandated monitoring programs, which may require lysing for all samples. Some analysts elect to confirm the effectiveness of raw-water lysing (or to judge the need for finished-water lysing) using microscopic examination for intact algal cells.

**Cyanotoxin treatment and bloom management**
Once cyanobacteria and/or their cyanotoxins are detected in the surface water supplying the water system, the treatment system operators can act to remove or inactivate them in several ways. Some treatment options are effective for some cyanotoxins, but not for others. Effective management strategies depend on understanding the growth patterns and species of cyanobacteria that dominates the bloom, the properties of the cyanotoxins (i.e., intracellular or extracellular), and appropriate treatment processes. For example, oxidation of microcystin depends on the chlorine dose, pH and the temperature of the water. Applying the wrong treatment process at a specific state in treatment could damage cells and result in the release rather than removal of cyanotoxins.

Table 3 summarizes the effectiveness of different types of water treatment to remove intact cyanobacteria cells and treatment processes that are effective in removing extracellular dissolved toxins of several of the most important cyanobacteria. You may also consult the EPA Water Treatment Optimization for Cyanotoxins document for more information.

To avoid the release of cyanotoxins into the water, drinking water treatment operators can undertake different management strategies to deal with cyanobacteria blooms. For example, those drinking water utilities that have access to more than one intake can switch to an alternate source that is not as severely impacted by the bloom. Another management alternative is to adjust intake depth to avoid drawing contaminated water and cells into the treatment plant.

Pretreatment oxidation at the intake poses several concerns with respect to lysing cells and releasing toxins. Copper sulfate and ozone at the intake are not recommended because of the risk of lysing algal cells. Chlorination, in addition to lysing the cells, has the potential to produce disinfection by-products during water treatment. If pretreatment oxidation is needed, it is important to carefully evaluate the influent, as successful pre-oxidation depends on the algal species, oxidant and dose.
### Table 3. Cyanotoxin Treatment Processes and Relative Effectiveness

<table>
<thead>
<tr>
<th>Treatment Process</th>
<th>Relative Effectiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intracellular Cyanotoxins Removal (Intact Cells)</strong></td>
<td></td>
</tr>
<tr>
<td>Pre-treatment oxidation</td>
<td>Oxidation often stresses or lyses cyanobacteria cells releasing the cyanotoxin to the water. If oxidation is required to meet other treatment objectives, consider using lower doses of an oxidant less likely to lyse cells. If oxidation at higher doses must be used, sufficiently high doses should be used to not only lyse cells but also destroy total toxins present (see extracellular cyanotoxin removal).</td>
</tr>
<tr>
<td>Coagulation/Sedimentation/Filtration</td>
<td>Effective for the removal of intracellular toxins (cyanobacteria cells). Ensure that captured cells accumulated in sludge are removed frequently so as not to release toxins. Ensure that sludge supernatant is not returned to the supply after sludge separation.</td>
</tr>
<tr>
<td>Membranes</td>
<td>Effective for removal of intracellular cyanotoxins (cyanobacteria cells). Microfiltration and ultrafiltration are effective when cells are not allowed to accumulate on membranes for long periods of time. More frequent cleaning may be required during a HAB.</td>
</tr>
<tr>
<td>Flotation</td>
<td>Flotation processes, such as Dissolved Air Flotation (DAF), are effective for removal of intracellular cyanotoxins since many of the toxin-forming cyanobacteria are buoyant.</td>
</tr>
<tr>
<td><strong>Extracellular (Dissolved) Cyanotoxins Removal</strong></td>
<td></td>
</tr>
<tr>
<td>Membranes</td>
<td>Depends on the type of cyanotoxin, membrane material, membrane pore size distribution, and influent water quality. Nanofiltration is generally effective in removing extracellular microcystins. Reverse osmosis filtration is generally applicable for removal of microcystins and cylindrospermopsin. Cell lysis is highly likely. Further research is needed to characterize performance.</td>
</tr>
<tr>
<td>Potassium Permanganate</td>
<td>Effective for oxidizing microcystins and anatoxins. Further research is needed for cylindrospermopsin. Not effective for oxidizing saxitoxin.</td>
</tr>
<tr>
<td>Ozone</td>
<td>Very effective for oxidizing microcystins, anatoxin-a, and cylindrospermopsin. Not effective for oxidizing saxitoxin.</td>
</tr>
<tr>
<td>Chloramines</td>
<td>Not effective.</td>
</tr>
<tr>
<td>Chlorine dioxide</td>
<td>Not effective at doses typically used in drinking water treatment.</td>
</tr>
<tr>
<td>Free Chlorine</td>
<td>Effective for oxidizing microcystins as long as the pH is below 8. Effective for oxidizing cylindrospermopsin and saxitoxin. Not effective for oxidizing anatoxin-a.</td>
</tr>
<tr>
<td>UV Radiation</td>
<td>UV radiation alone is not effective at oxidizing microcystins and cylindrospermopsin at doses typically used in drinking water treatment. When UV radiation is coupled with ozone or hydrogen peroxide (called &quot;advanced oxidation&quot;), the process is effective at oxidizing anatoxin-a, cylindrospermopsin, and with high UV doses, microcystins.</td>
</tr>
<tr>
<td>Treatment Process</td>
<td>Relative Effectiveness</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------</td>
</tr>
</tbody>
</table>
| Activated Carbon Adsorption | **Powdered activated carbon (PAC):** Effectiveness of PAC adsorption varies based on type of carbon, pore size, type of cyanotoxin, and other water quality parameters such as NOM concentration. Wood-based activated carbons are generally the most effective at microcystins adsorption. More research is needed to evaluate PAC’s effectiveness at adsorbing cylindrospermopsin, anatoxin-a, and saxitoxin, however the limited research has demonstrated promising results. Doses in excess of 20mg/L may be needed for complete toxin removal, especially if NOM concentrations are high.  
**Granular activated carbon (GAC):** Effectiveness of GAC adsorption varies based on type of carbon, pore size, type of cyanotoxin, and other water quality parameters such as NOM concentration. GAC is effective for microcystins, and likely effective for cylindrospermopsin, anatoxin-a and saxitoxin. The condition of the carbon is an important factor in determining GAC’s effectiveness for cyanotoxin removal. GAC may need to be regenerated more frequently to ensure adequate adsorption capacity for HAB season. |

In-line application of powdered activated carbon (PAC) could also be used to remove any toxins that may have been released.

**Intracellular cyanotoxin removal**
The conventional drinking water treatment processes (coagulation, flocculation, sedimentation and filtration) can be effective in removing intracellular cyanotoxins (cyanobacteria cells). Coagulation, flocculation and dissolved air flotation (DAF) are more effective than sedimentation. Microfiltration and ultrafiltration are highly effective at removing intact cyanobacterial cells. During an active bloom, operators may need to alter process parameters to account for the increased loading of cyanobacteria. It may be necessary to backwash filters more frequently to prevent retained cells from releasing intracellular toxins.

**Physical removal of extracellular cyanotoxins**
Common treatment techniques for the removal of extracellular toxins include adsorption by activated carbon, membrane filtration and chemical inactivation (disinfectants and oxidants). Both powdered activated carbon (PAC) and granular activated carbon (GAC) have been effective in adsorbing microcystins and cylindrospermopsin, although microcystin variants may have different adsorption efficiencies. The performance of activated carbon depends on the concentration of the toxin, influent water quality (i.e., NOM concentration), PAC dose, and type of activated carbon. Jar tests are recommended to test the effectiveness of various PAC types and doses, with the implementation of the carbon with the greatest capacity for removal of the target contaminants. GAC filters are effective in removing microcystins if they are properly regenerated to ensure adequate adsorption capacity is maintained. Nanofiltration and reverse osmosis may be effective in removing cylindrospermopsin and microcystin. However, site specific tests are recommended as removal efficiency depends on the membrane pore size distribution and water quality.
Oxidation of extracellular cyanotoxins

Ultraviolet (UV) radiation is not effective at typical water treatment plant doses. Much higher doses are required to photoolytically destroy microcystin, anatoxin-a, and cylindrospermopsin. For example, UV inactivation dose for *Cyanosporidium parvum* is about 40 mJ/cm², while the photolytic destruction dose for microcystin, cylindrospermopsin, anatoxin-a and saxitoxin ranges between 1530 to 20,000 mJ/cm². UV has been used along with a catalyst (e.g., ozone, hydrogen peroxide, or titanium dioxide) to oxidatively decompose the toxins (this is typically called advanced oxidation). However, the effectiveness of this process is largely dependent on the organic content of the water.

Oxidants such as free chlorine, ozone and permanganate can be used to inactivate microcystins but free chlorine’s effectiveness is pH-dependent (ideal range is 6-8). Anatoxin-a is resistant to oxidation by free chlorine. Ozone is an effective oxidant for microcystins, but its efficacy may be affected by the presence of organic matter. Ozone can also be used as an oxidant for anatoxin-a and cylindrospermopsin; however, ozone is pH-dependent for the oxidation of anatoxin-a (pH 7 to 10) and for cylindrospermopsin (4 and 10). Ozone is not effective for oxidizing saxitoxin. Permanganate is effective in oxidizing microcystin and anatoxin-a (from pH 6 to 8), but is not effective for cylindrospermopsin. Chloramines and chlorine dioxide are not effective treatments for microcystin, anatoxin-a or cylindrospermopsin.

Formation of disinfection by-products is another potential problem with the use of ozone, copper sulfate, and chlorine when there are high bromide concentrations in the water. However, results from studies on the impact of chlorination of cell-bound toxins and resulting disinfection by-products formation are contradictory. Most of the findings suggest that pre-chlorination should ideally be avoided during blooms, unless adequate CT¹ values can be guaranteed to ensure efficient oxidation of lysed cyanobacteria and the resulting extracellular cyanotoxins.

Drinking water operators are encouraged to monitor the treated water to confirm the removal of cyanotoxins.

**Developing a Risk Management Plan**

Water supply managers should consider developing a risk management plan for cyanobacterial bloom occurrence, especially those systems with source waters that are susceptible to HABs. Elements of such a plan should include monitoring, treatment and communication components. The plan could include a monitoring program to determine sampling locations and schedule; sample volume; whether to sample for cyanobacterial cells or specific cyanotoxins or both; which analytical screening test to use; and conditions when it is necessary to send sample(s) to an identified laboratory for confirmation. The EPA published Recommended Recreational Ambient Water Quality Criteria or Swimming Advisories for two Cyanotoxins, Microcystins and Cylindrospermopsin, that public water systems could use as part of the monitoring program during a severe bloom event with high levels of cyanobacteria and cyanotoxins in a surface water used for recreation and as a supply for drinking water treatment facilities. As part of the management plan, water supply managers should also develop strategies for effective treatment approaches to reduce the potential of cyanotoxins in the finished water. Additionally, as part of the plan, water supply managers should develop a communication plan that identifies the required communication steps to coordinate with the agencies involved, the appropriate actions that must be taken, and the steps to inform consumers and the public. The following are potential EPA resources for developing a management plan:

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¹ A CT value is used in the calculation of disinfectant dosage for chlorination of drinking water. A CT value, the product of the concentration of a drinking water disinfectant and the contact time with the water being disinfected (typically expressed in units of mg-min/L).
For more information

Additional information on cyanobacteria and cyanotoxins is available on the EPA’s Cyanobacteria Harmful Algal Blooms (CynoHABs) in Water website: https://www.epa.gov/cyanohabs

Additional information and resources about cyanotoxins in drinking water is available on the EPA’s Cyanotoxins in Drinking Water webpage: https://www.epa.gov/ground-water-and-drinking-water/cyanotoxins-drinking-water

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References


http://www.umweltdata.de/publikationen/fpdf-12910.pdf


Available on line at:
http://www.who.int/water_sanitation_health/bathing/srwel/en/
