Permit No. CP0001799

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

The Missouri Department of Natural Resources hereby issues a permit to:

City of Otterville
P.O. Box 58
Otterville, MO 65348

for the construction of (described facilities):

See attached.

Permit Conditions:

See attached.

Construction of such proposed facilities shall be in accordance with the provisions of the Missouri Clean Water Law, Chapter 644, RSMo, and regulation promulgated thereunder, or this permit may be revoked by the Department of Natural Resources (Department).

As the department does not examine structural features of design or the efficiency of mechanical equipment, the issuance of this permit does not include approval of these features.

A representative of the department may inspect the work covered by this permit during construction. Issuance of a permit to operate by the department will be contingent on the work substantially adhering to the approved plans and specifications.

This permit applies only to the construction of water pollution control components; it does not apply to other environmentally regulated areas.

February 11, 2016
Effective Date

Sara Parker Pauley, Director, Department of Natural Resources

February 10, 2018
Expiration Date

John Madras, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

This is a DEMONSTRATION project and additional monitoring requirements are included in the operating permit in accordance with the draft Approval Process for Innovative Technology Factsheet.

The upgrade will be a BiO_2 Solutions system, which will modify the existing three cell lagoon and consists of a biological aeration system (algae injection) and an electrocoagulation system.

The headworks will include a one and one-half inch (1.5") slotted bar screen for pre-screening ahead of an eight inch (8") automated in channel screw screen capable of a maximum throughput of 200 gpm and a compactor. A prefabricated Parshall flume will be installed, equipped with an ultrasonic level sensor.

A duplex lift station will be installed in a six foot (6') diameter manhole with a working capacity of 500 gallons. The lift station will have two submersible pumps with one operational and one standby during normal operations and will pump flow from the headworks to the influent of lagoon cell #1. Each pump will be controlled by an ultrasonic level sensor and will be capable of changing speed and flowrate as necessary. Each pump will have a maximum flow capacity of 100 gpm at a TDH of 12 feet for a total maximum capacity of 200 gpm.

The Biological Control Center structure will house four microalgae culture tanks with a nominal working capacity of 750 gallons each. The culture tanks will be initially seeded with a patented multi-strain mix of microalgae. A conventional liquid plant fertilizer will be continuously introduced through the makeup water supply to the culturing tanks through metering pumps. The system will have ultraviolet (UV) lights located above each growth tank that will activate automatically during periods of low naturally occurring UV radiation. The system will use thermostatically-controlled tank immersion heaters during cold weather periods. The primary water supply for the microalgae culture tank will be provided from the final treated water supplied from the EC treatment system. Carbon-filtered potable water from the city will also be provided as a backup water supply and will have a backflow prevention device. Cultivated microalgae will flow continuously to a 150 gallon central collection tank with a liquid float level control and submersible distribution pump capable of two (2) gpm at 81 feet TDH. It will be pumped into two separate distribution lines to the inflow point of cell #1.

Three (3) floating baffle curtains will be installed in cell #1 and three (3) in cell #2. The baffles will create four flow channels in each cell. A total of 48 nine inch (9") diameter fine bubble diffusers will be installed with 36 diffusers located in cell #1 and 12 diffusers located in cell #2.

A duplex lift station with a debris screen will be installed in the existing outlet structure for cell #3 to pump the discharge through approximately 539 linear feet of three inch (3") HDPE to the EC system. The duplex lift station will be equipped with two submersible pumps with one operational and one in standby during normal operations. Each pump will be controlled by an ultrasonic level sensor allowing the pumps to change speed and flowrate as necessary. Each pump has a maximum capacity of 66 gpm at 48 feet TDH.

The EC system is a dual reactor configuration to provide system redundancy with a nominal treatment capacity ranging from 28 to 66 gpm. The system will have sacrificial stainless steel treatment reactor plates and intermediate carbon steel plates. Two spare cartridges with plates and electrical busses will also be included. Heavy particles of rust or scale that may slough off of the treatment plates, and that are not entrained in the water stream, can be removed from the bottom of the treatment reactor.

Effluent from the EC will gravity flow to a 587 gallon post-EC tank and then be conveyed via the post-EC pump capable of 60 gpm at 60 feet TDH to a 523 gallon de-foam tank with an agitator. Treated water will then flow to an 846 gallon flocculation tank. Polymer will be fed from two (2) polymer tanks to the flocculation tank. A slant plate clarifier will remove the settleable solids and treat 0.25 gpm/square foot of projected surface area. The effective surface area of the clarifier plate system is 264 square feet. Treated water will flow by gravity from the clarifier to a 517 gallon post treatment tank. The water will be pumped with a post treatment duplex pump capable of pumping 35 gpm at 88 feet TDH from the post treatment tank to four (4) zeolite media filters for ammonia polishing. Water from the post treatment tank will also be pumped to the headworks with a pump capable of 26 gpm at 118 ft. TDH to be re-used as rinse water for the headworks and in the biological control center.

Final effluent from the EC system will be returned to the existing outfall line through approximately 550 linear feet of three-inch (3") HDPE pipe.

Sludge from the bottom of the slant plate clarifier will periodically be pumped via a 1.5" air-operated double diaphragm pump into a cone bottom sludge thickening tank with a capacity of 1,500 gallons. This pump can also be used to drain the de-foam, flocculation, and post treatment tanks for periodic maintenance. Sludge will gravity flow to a shallow concrete sludge drying basin external to the EC building.

Approximately 60 cubic yards (CY) of compacted fill will be added to the lagoons – seven (7) CY in the northeast corner of cell #1 and 53 CY in the northwest corner of cell #2 – to provide adequate space for placement of the EC building. The fill areas will be graded at a two to one (2:1) slope.

This project will include other general site work appropriate to the scope and purpose of the project, including upgrading electrical services, installing potable water service from city water service, relocating the fence, and installing site outflow measurement.

II. COST ANALYSIS FOR COMPLIANCE

Pursuant to Section 644.145, RSMo, when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a "finding of affordability" on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits that do not include new requirements may be deemed affordable.

The department is required to determine "findings of affordability" because the permit applies to a **combined or separate sanitary sewer system for a publically-owned treatment works.**

Cost Analysis for Compliance - The department has made a reasonable search for empirical data indicating the permit is affordable. The search consisted of a review of department records that might contain economic data on the community, a review of information provided by the applicant as part of the application, and public comments received in response to public notices of this draft permit. If the empirical cost data was used by the permit writer, this data may consist of median household income, any other ongoing projects that the department has knowledge, and other demographic financial information that the community provided as contemplated by Section 644. 145.3. See **Appendix – Cost Analysis for Compliance**

III. CONSTRUCTION PERMIT CONDITIONS

The permittee is authorized to construct subject to the following conditions:

1. This construction permit does not authorize discharge.

2. All construction shall be in accordance with the plans and specifications submitted by Wild Heart Partners LLC on October 14, 2015 and revisions submitted February 3, 2016.

3. The department must be contacted in writing prior to making any changes to the approved plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(8).

4. State and federal law does not permit bypassing of raw wastewater, therefore steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the department's Northeast Regional Office per 10 CSR 20-7.015(9)(E)2.

5. This construction permit is invalid for projects required to comply with the requirements contained in 10 CSR 20-4, "Grants and Loans"

6. Protection of drinking water supplies shall be in accordance with 10 CSR 20-8.120(10). "There shall be no physical connections between a public or private potable water supply system and a sewer, or appurtenance thereto which would permit the passage of any wastewater or polluted water into the potable supply. No water pipe shall pass through or come in contact with any part of a sewer manhole."

7. Sewers in relation to water works structures shall meet the requirements of 10 CSR 23-3.010 with respect to minimum distances from public water supply wells or other water supply sources and structures.

   A. Sewer mains shall be laid at least 10 feet horizontally from any existing or proposed water main. The distances shall be measured edge-to-edge. In cases where it is not practical to maintain a 10 foot separation, the department may allow a deviation on a case-by-case basis, if supported by data from the design engineer. Such a deviation may allow installation of the sewer closer to a water main, provided that the water main is in a separate trench or on an undisturbed earth shelf located on either side of the sewer and at an elevation so the bottom of the water main is at least 18 inches above the top of the sewer. If it is impossible to obtain proper horizontal and vertical separation as described above for sewers, the sewer must be constructed of slip-on or mechanical joint pipe or continuously encased and be pressure tested to 150 pounds per square inch to assure water tightness.

B. Manholes should be located at least 10 feet horizontally from any existing or proposed water main.

C. Manholes shall be located with the top access at or above grade level.

D. Sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sewer. This shall be the case where the water main is either above or below the sewer. The crossing shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer to maintain line and grade. When it is impossible to obtain proper vertical separation as stipulated above, one of the following methods must be specified:

a. The sewer shall be designed and constructed equal to the water pipe and shall be pressure tested to assure water tightness prior to backfilling; or

b. Either the water main or sewer line may be continuously encased or enclosed in a watertight carrier pipe which extends 10 feet on both sides of the crossing, measured perpendicular to the water main. The carrier pipe shall be of materials approved by the department for use in water main construction.

8. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of one acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the department's ePermitting system available online at www.dnr.mo.gov/env/wpp/epermit/help.htm. See www.dnr.mo.gov/env/wpp/stormwater/sw-land-disturb-permits.htm for more information.

9. A United States (U.S.) Army Corps of Engineers (COE) permit (404) and a Water Quality Certification (401) issued by the department or permit waiver may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied. If construction activity will disturb any land below the ordinary high water mark of jurisdictional waters of the U.S. then a 404/401 will be required. Since the COE makes determinations on what is jurisdictional, you must contact the COE to determine permitting requirements. You may call the department's Water Protection Program at 573-751-1300 for more information. See www.dnr.mo.gov/env/wpp/401/ for more information.

10. Upon completion of construction;

A. The city of Otterville will become the continuing authority for operation, maintenance, and modernization of these facilities;

B. Submit the enclosed form Statement of Work Completed to the department in accordance with 10 CSR 20-6.010(5)(D) and request the operating permit modification be issued; and

C. Submit an electronic copy of the as builts if the project was not constructed in accordance with previously submitted plans and specifications.

IV. REVIEW SUMMARY

1. AMMONIA

The Water Protection Program is providing this notice to inform permittees that EPA's published ammonia criteria for aquatic life protection is lower than the current Missouri criteria. The department has initiated stakeholder discussions on this topic and at this time, there is no firm target date for starting the rulemaking to adopt new standards. More information can be found at http://dnr.mo.gov/pubs/pub2481.pdf .

The operating permit effective April 1, 2014 for this facility included a detailed description of the EPA's new water quality criteria for ammonia and potential implications.

2. CONSTRUCTION PURPOSE

The upgrade will be a demonstration project for the BiO_2 Solutions system, which will modify the existing three cell lagoon and consists of a biological aeration system (algae injection) and an electrocoagulation system.

The previous permit, which expired in January 2014, required the city to meet disinfection by December 31, 2013. The city has not yet met the disinfection requirement and is currently in non-compliance. The existing operating permit was renewed April 1, with a schedule of compliance to meet ammonia effluent limits by April 1, 2021.

The proposed system is intended to enhance treatment capabilities to enable the WWTF to meet final ammonia and *E. coli* limits.

3. FACILITY DESCRIPTION

The existing facility is a three-cell non-aerated lagoon system without tertiary treatment enhancements or disinfection capabilities with a design flow of 43,560 gpd from a population equivalent of 542. The existing operating permit states the facility discharges to an unnamed tributary to Long Branch Creek; however it actually discharges to Long Branch Creek and the operating permit will be modified to reflect this. Below is a summary of the existing facility's performance:

Parameter	Units	Permit Monthly Average Effluent Limit	Average discharge*
Flow	MGD	*	0.039
Biochemical Oxygen Demand$_5$	mg/L	45	31.2
Total Suspended Solids	mg/L	80	28.6
Ammonia as N-summer	mg/L	*	4.5
Ammonia as N-winter	mg/L	*	8.4

* monitoring only * discharge monitoring reports November 01, 2010 through September 30, 2015

The proposed construction project consists of the addition of the BiO_2 Solutions system to the existing three cell lagoon system. The BiO_2 Solutions system consists of a biological aeration system (algae injection) and an electrocoagulation system. The biological aeration system includes a greenhouse, culture tanks, filtered fresh water source, grow-light system, immersion heaters, distribution tank, microbial introduction system, microalgae feed supply system, distribution manifold, and purge system. The electrocoagulation system will consist

of an electrolytic cell with multiple anode/cathode parallel plates. The system will be enhanced with a chemical feed system for chemical addition to improve flocculation and coagulation performance. Sedimentation tanks will be provided for sludge removal. A sludge drying bed will be provided for sludge dewatering of sludge generated by the electrocoagulation system. In addition to contaminate removal, disinfection is also realized with this system.

4. COMPLIANCE PARAMETERS

The city applied for a construction permit in order to meet more protective ammonia effluent limits, which will become effective April 1, 2021, and disinfection requirements. As this is a demonstration project for an innovative technology, additional monitoring will be required to demonstrate the efficacy of the process, and an intermediate monitoring point (#IMP1) will be located after the lagoon system, but prior to the electrocoagulation system. Because algae consume oxygen at night, seasonal diurnal studies have been incorporated into the operating permit to demonstrate that dissolved oxygen concentrations in the lagoons are maintained above two (2) mg/L level at all times. A Demonstration Project Report is required to be submitted to the department to present the data and an evaluation of the WWTF during the first year of operation. If the new WWTF system operated satisfactorily the permittee can request the operating permit be modified to reduce monitoring requirements.

The following limits will become effective for the facility following the completion of construction:

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand$_5$	mg/L	30
Total Suspended Solids	mg/L	30
E. coli	#/100mL	126
Ammonia as N-summer	mg/L	1.4
Ammonia as N-winter	mg/L	2.9
Oil & Grease	mg/L	10
Dissolved Oxygen	mg/L	*
pH	SU	6.5-9.0
Temperature	°F	*

* monitoring only

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

The BiO_2 Solutions system is a new technology not addressed in the department's Design Guides, 10 CSR 20-8. As a demonstration project, the data gathered with the operating permit will be used to help develop design criteria for future projects.

This system will treat an average daily flow of 41,059 gallons per day (gpd), a peak hourly flow of 121.5 gallons per minute (gpm), and a peak daily flow of 130,978 gpd from a population equivalent of 602.

The values used for calculated oxygen production from microalgae photosynthesis are provided below. The source of these table values is the result of research performed by Stewart Environmental Consultants, Inc. on behalf of BiO_2 Solutions. The research was initially presented in the document "The BiO_2 Solution™: Wray Alpha Test", dated February, 2010.

Parameter	Value for December (month with the least amount of sunlight)	Value for June (month with the most amount of sunlight)
Energy available for photosynthesis (Assume 5% of that from sunlight)	50 kJ/ft²/day	75 kJ/ft²/day
Microalgae cell production by photosynthesis (Assume 24 J produce 1 mg of algal cells)	2,083 mg algal cells/ft²/day	3,125 mg algal cells/ft²/day
Oxygen production by microalgae cells (1.56 mg of O_2 for every 1 mg of algal cells)	3,250 mg O_2/ft²/day	4,875 mg O_2/ft²/day
Oxygen production in terms of pounds per acre per day in stagnant pond	310 lbs O_2/acre/day	470 lbs O_2/acre/day
Total oxygen production with mixing and continuous microalgae addition (200% that of a stagnant pond)	620 lbs O_2/acre/day	940 lbs O_2/acre/day

Each of the 48 fine bubble diffusers will require one SCFM of compressed air, which will be supplied by twelve compressors capable of supplying five SCFM each, providing air supply redundancy.

Due to site space constraints, approximately 60 cubic yards (CY) of compacted fill will be added to the lagoons to provide adequate space for placement of the EC building. To minimize disruption to the existing cells and minimize costs, a deviation was approved for the fill areas to be graded at a two to one (2:1) slope.

FEMA has not established a 100-year base flood elevation for this area. Research was performed as part of this project in cooperation with USDA Natural Resources Conservation Service (NRCS) Cooper County to develop a conservative estimate of the 100-year floodplain from existing contour maps at 690 feet. The base elevation of all proposed structures for the project will be at 695 feet or above.

Spacing between baffles in cell #1 will be approximately 140 feet and approximately 60 feet in cell #2. A conservative flow path width of 40 feet was used to estimate hydraulic retention time (HRT) as 32 days in cell #1 and 21 days in cell #2 for a combined total of 53 days

Design sludge production from the EC system is expected to be less than ten (10) pounds per month.

6. OPERATING PERMIT MODIFICATION

Operating permit MO-0101125 will require a modification to reflect the construction activities. A draft operating permit modification was on public notice from July 10, 2015 until August 20, 2015. No comments were received. Upon construction completion submit the enclosed form Statement of Work Completed to the department in accordance with 10 CSR 20-6.010(5)(D) and request the operating permit modification be issued.

Cailie Carlile, EI
Engineering Section
cailie.carlile@dnr.mo.gov

Appendix – Cost Analysis for Compliance

Missouri Department of Natural Resources
Water Protection Program
Affordability Determination and Finding
(In accordance with RSMo 644.145)

Otterville WWTF, Permit Renewal
City of Otterville
Missouri State Operating Permit #MO-0101125

Section 644.145 RSMo requires DNR to make a "finding of affordability" when "issuing permits under" or "enforcing provisions of" state or federal clean water laws "pertaining to any portion of a combined or separate sanitary sewer system for publicly-owned treatment works."

This affordability analysis is based on data available to the Department as provided by the permittee and what can be obtained from readily available sources. A request for information was sent to the permittee, seeking data for input into this analysis prior to its development.

Facility Description: Three cell lagoon / sludge retained in lagoon

Receiving Stream:	Long Branch (U)
First Classified Stream and ID:	Lamine (C) (0847)
USGS Basin & Sub-watershed No.:	(10300103-0502)

Residential Connections:	206
Commercial Connections:	22
Total Connections[1]:	228

New Permit Requirements or Requirements Now Being Enforced:

Permit No. MO-0101125 expired on 01/29/2014. The Department received an application for renewal on 09/19/2013. The permit requires compliance with new effluent limitations for ammonia, which may require the design, construction and operation of new technology. The cost assumptions in this affordability analysis anticipate complete replacement of the existing treatment facility. Because the methods used to derive the analysis estimate costs that are greater than actual costs associated with an upgrade, it reflects a conservative estimate anticipated for a community. This is because it is not possible to determine what existing equipment and structures will be reused in the upgraded facility.

Range of Anticipated Costs Associated with Complying with the New Requirements:

The Department estimates the cost for adding disinfection treatment is between $132,000 and $822,580 (*CAPDETWORKS cost estimator was used*) and includes a consideration of both UV and chlorine for disinfection. This cost, if financed through user fees, might cost each household between $9 and $68 per month.

The Department estimates the cost for complete replacement of the existing treatment facility in order to meet new ammonia effluent limits is between $505,884 and $1,035,600 (*CAPDETWORKS cost estimator was used*). This cost, if financed through user fees, might cost each household between $58 and $92 per month. In instances where the current user rate falls within the CAPDETWORKS cost estimator range for the permits new or expanded requirements, the current user rate is utilized as the low end of the range when determining what percentage of MHI could be attributed to future wastewater user rates.

A community sets their user rates based on several factors. The percentage of the current user rate that is available to cover new debt is unknown to the Department. The new or upgraded facility may have lower operational costs than the existing facility. The costs estimated in CAPDETWORKS are associated with a new treatment plant. It is unknown to the Department why the user rates have been established to the current amount. CapDet does not evaluate individual communities other financial information or wastewater commitments, such as existing debts, MS4, pretreatment, Inflow/Infiltration work or that existing equipment could be reused. These commitments are further discussed in Items five and seven below.

[1] The number of connections was obtained from Form B of the application for permit renewal.

CAPDETWORKS (CapDet) is a preliminary design and costing software program from Hydromantis[1] for wastewater treatment plants. CapDet uses national indices, such as the Marshall and Swift Index and Engineering News Records Cost Index for pricing in development of capital, operating, maintenance, material, and energy costs for each treatment technology. As the program works from national indices and each community is unique in its budget commitments and treatment design, the estimated costs are higher than actual costs. For example, this program overestimates actual costs by a large margin for small flow facilities. The Department continues to make adjustments to account for this issue. We are currently working to identify costs associated with package plants and smaller systems that will project a more accurate estimate of future user costs for a small flow facility. The package plants and the smaller systems being evaluated have been determined to meet current and future ammonia criteria.

Land application costs are not estimated in this analysis, however, the Department is currently working on efforts to incorporate this treatment option. The cost of land incorporated into the Capdet calculator will expressed across the various regions of the State. A no discharge facility, of which land application is the most common form, is required to be demonstrated as infeasible before a discharging system may be constructed per [10 CSR 20-6.010(4)(D).] When land is available, it is the Department's stance that land application is an important treatment option to be considered because of the expected lower cost associated with construction, operation and maintenance. Also, the no discharge system is of value to the permittee when considering additional costs associated with possible future changes to Water Quality Standards.

The Department evaluated multiple technologies through CapDet at a range of flows, then using a linear interpolation developed the spreadsheet for high and low costs for treatment plants. To calculate the estimated user cost per 5000 gallons, the Department used the equations currently being used in the Financial Assurance Center's rate calculator. The equations account for replacement costs, debt retirement, capital costs, and an inflation factor.

This affordability analysis does not dictate how a permittee will upgrade their facility, or how they will comply with the new permit requirements.

For any questions associated with the CAPDETWORKS cost estimator, please contact the Engineering Section at (573) 751-6621.

(1) A community's financial capability and ability to raise or secure necessary funding;

Current User Rates:	$14.20
Rate Capacity or Pay as You Go Option:	Unknown
Municipal Bond Rating (if applicable):	Unknown
Bonding Capacity: *(General Obligation Bond capacity allowed by constitution:* *cities=up to 20% of taxable tangible property* *sewer districts=up to 5% of taxable tangible property)* *Without site specific information about bond capacity, the Department must assume the community does have bond capacity sufficient to fund upgrades.*	Unknown
Current outstanding debt:	Unknown
Other indicators:	

If the community increases user costs to finance and operate an upgrade, the costs may need to be between $67 and $160 per month, which may make each household cost as high as 5.4% of the community's median household income (MHI). Percentages above 2% could create a high burden for a community.

(2) Affordability of pollution control options for the individuals or households of the community;

Current annual operating costs (exclude depreciation):	Unknown
Current user rate[2]:	$14.20
Estimated capital cost of pollution control options:	$637,884 - $1,858,180
Annual Cost of Additional (Operating Costs & Debt Service):	$72,748
Estimated Resulting User Cost per Household:	$67 - $160
Median Household Income	$35,604
Cost per Household as a Percent of Median Household Income: [3]	2.25% - 5.4%

The Estimated User Cost is composed of three factors, Operation & Maintenance (O&M), and Debt Retirement Costs.

O&M cost[4] is includes operations, maintenance, materials, and electrical costs for the facility on an annual basis. It includes items that are expected to replace during operations, such as pumps. O&M is estimated between 15% and 45% of the user cost.

Debt retirement[5] is associated with capital cost (CC) of this project, not existing debt the facility may have. Debt retirement is estimated between 2.0% and 5% of the user cost.

Check Appropriate Box	**Financial Impact**	**Residential Indicator** (Usage Cost as a percent of MHI = annual cost/MHI)
☐	Low	Less than 1% MHI
☐	Medium	Between 1% and 2% MHI
☒	High	Greater than 2% MHI

If increase user rates are required to finance the new permit requirements, the rates could be between 2.25% and 5.4% of the MHI, and result in a high financial impact. The high range cost that CapDet has estimated is for either an oxidation ditch or sequencing batch reactor. These two technologies are capable of meeting the new water quality criteria set for as described by the EPA.

(3) An evaluation of the overall costs and environmental benefits of the control technologies;

The new permit limits on ammonia and *E.coli* are anticipated to cost between $637,884 and $1,858,180. The environmental benefit of increased ammonia and *E.coli* removal is that conditions for aquatic life in the receiving stream will improve.

This permit renewal requires final effluent limitations for Ammonia as N based on Missouri Water Quality Standards (WQS) 10 CSR 20-7 and the Clean Water Act. Ammonia (NH_3) is toxic to early stages of aquatic life. NH_3 removal prevents damage to aquatic life and enables the receiving stream to support a healthier and diverse aquatic life community.

E. coli is an indicator of the presence of fecal contamination in water and possible disease-causing bacteria and viruses in water and wastewater. The receiving stream has a WBC (B) designated use to protect human health in accordance with Water Quality Standards (10 CSR 20-7) and the Clean Water Act. Disinfection benefits human health by reducing exposure to disease-causing bacteria and viruses. The City of Otterville will have to upgrade the treatment facility with a disinfection system in order to meet the final effluent limitations.

[2] This figure was obtained from a spreadsheet compiled by the Missouri Public Utility Alliance regarding water and wastewater rates, updated March 16, 2012
[3] 67/(35,604/12)*100 = 2.25 and 160/(35,604/12)*100 = 5.4
[4] O&M costs per user per month: ((O&M/365days)/ gpd)*5,000 g
[5] Debt retirement per user per month: (-PMT(IR, EL, CC))/EL/12 months/# of users

(4) An inclusion of ways to reduce economic impacts on distressed populations in the community, including but not limited to low and fixed income populations. This requirement includes but is not limited to:

(a) Allowing adequate time in implementation schedules to mitigate potential adverse impacts on distressed populations resulting from the costs of the improvements and taking into consideration local community economic considerations.
(b) Allowing for reasonable accommodations for regulated entities when inflexible standards and fines would impose a disproportionate financial hardship in light of the environmental benefits to be gained.

Potentially Distressed Populations – City of Otterville	
Unemployment [6]	5.0%
Median Household Income (MHI)[7]	$35,604
Percent Change in MHI (1990-2011)	+61.0%
Percent Population Growth/Decline (1990-2011)[8]	-5.7%
Change in Median Age in Years (1990-2011)	-2.8
Percent of Households in Poverty[9]	17.4%
Percent of Households Relying on Food Stamps	23.8%

Opportunity for cost savings or cost avoidance:

If available, connection to a larger centralized sewer system in the area may be more cost effective for the community.

The permittee may apply for State Revolving Fund (SRF) financial support in order to help fund a Capital Improvements Plan. Other loans and grants also exist for which the facility may be eligible. Contact information for the Department's Financial Assistance Center (FAC) and more information can be found on the Department's website at http://dnr.mo.gov/env/wpp/srf/wastewater-assistance.htm.

If the permittee can demonstrate that the proposed pollution controls result in substantial and widespread economic and social impact, the permittee may use the Use Attainability Analysis (UAA) process to modify designated uses of the receiving water body.

Opportunity for changes to implementation/compliance schedule, new technology, site specific criteria, use attainability analysis:

The facility may propose changes to the schedule of compliance based on their own cost estimate or financial information.

(5) An assessment of other community investments relating to environmental improvements;

The community is currently constructing their new ultraviolet disinfection system to meet the new *E.coli* requirements.

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[6] Unemployment data was obtained from Missouri Department of Economic Development (October 2013) – http://www.missouriconomy.org/pdfs/urel1310.pdf
[7] Median Household Income data from American Community Survey – Median income in the past 12 months – http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table
[8] Population trend data was obtained from online at:
2011 Census Bureau Population Data - http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?fpt=table
2000 Census Bureau Population Data - http://www.census.gov/popest/data/cities/totals/2009/tables/SUB-EST2009-04-29.xls
1990 Census Bureau Population Data - http://www.census.gov/prod/cen1990/cp1/cp-1-27.pdf
[9] Poverty data – American Community Survey - http://factfinder2.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t

(6) An assessment of factors set forth in the United States Environmental Protection Agency's guidance, including but not limited to the "Combined Sewer Overflow Guidance for Financial Capability Assessment and Schedule Development" that may ease the cost burdens of implementing wet weather control plans, including but not limited to small system considerations, the attainability of water quality standards, and the development of wet weather standards;

Secondary indicators for consideration:

Indicators	Strong (3 points)	Mid-Range (2 points)	Weak (1 point)	Score
Bond Rating Indicator	Above BBB or Baa	BBB or Baa	Below BBB or Baa	Unknown
Overall Net Debt as a % of Full Market Property Value	Below 2%	2% - 5%	Above 5%	Unknown
Unemployment Rate	>1% below Missouri average	± 1% of Missouri average	>1% above Missouri average	2
Median Household Income	More than 25% above Missouri MHI	± 25% of Missouri MHI	More than 25% below Missouri average	1
Property Tax Revenues as a % of Full Market Property Value	Below 2%	2% - 4%	Above 4%	Unknown
Property Tax Collection Rate	Above 98%	94% - 98%	Below 94%	Unknown

Secondary Indicators Average Score: 1.5
Residential Indicator (from Criteria #2 above): 2.25% - 5.4%

Financial Capability Matrix:

Financial Capability Indicators Score from above ↓	**Residential Indicator (User cost as a % of MHI)**		
	Low (Below 1%)	Mid-Range (Between 1.0% and 2.0%	High (Above 2.0%)
Weak (below 1.5)	Medium Burden	High Burden	High Burden
Mid-Range (1.5 – 2.5)	Low Burden	Medium Burden	High Burden
Strong (above 2.5)	Low Burden	Low Burden	Medium Burden

Estimated Financial Burden: High Burden

(7) An assessment of any other relevant local community economic condition.

The community did not report any other relevant local economic conditions.

Conclusion and Finding

As a result of new regulations, the Department is proposing modifications to the current operating permit that may require the WWTF to add ammonia and *E.coli* treatment. The Department identified the actions for which an affordability analysis is required under Section 644.145 RSMo.

The Department estimates the cost for complete replacement of the existing treatment facility in order to meet new ammonia and *E.coli* effluent limits will cost the City of Otterville an estimated $637,884 - $1,858,180. Should these costs be financed through user fees, it may require user fees between 2.25% and 5.4% of the community's MHI. Considering that several of the economic factors show a weak financial capability in this community, this analysis concludes that the evaluated permit action will result in user fees above 2% of the community's median household income.

The Department considered all seven (7) of the criteria presented in subsection 644.145.3 when evaluating the affordability of the relevant actions. Taking into consideration these criteria, this analysis examined whether the above referenced permit modifications affects the ability of an individual customer or household to pay a utility bill without undue hardship or unreasonable sacrifice in the essential lifestyle or spending patterns of the individual or household. As a result of reviewing the above criteria, the Department hereby finds that the action described above will likely result in a High burden with regard to the community's overall financial capability and a High financial impact for most individual customers/households. All of the effluent control technologies examined would result in this high financial impact, and may not be characterized by the community as "affordable." However, the Department is required to issue a permit that implements the current Water Quality Standards.

However, this determination is based on readily available data, and may over-estimate the financial impact on the community. When the community submits their facility plan as part of the construction permit process, the plan includes a discussion of community details, what the community can afford, existing obligations, future growth potential, an evaluation of options available to the community with cost information, and a discussion on no-discharge alternatives. The cost information provided through the facility plan process, which is developed by the community and their engineer, is more comprehensive of the community's individual factors in relation to selected treatment technology and costing information. The Department understands the economic challenges associated with achieving compliance, and is committed to using all available tools to make an accurate and practical finding of affordability for the communities in the State. Additionally, the Department recognizes communities of all sizes will find it challenging to upgrade wastewater treatment facilities to meet new water quality requirements. Considering these challenges as well as the many other challenges that your community faces, the Department will continue to work to identify some ways that can help you look at your options and decide what makes the most sense for the future. In instances where a high financial impact has been noted, the Department has intentionally included a long schedule of compliance in your permit to allow for planning, financing and other activities that may be necessary to achieve a successful outcome. In this longer time frame, the Department will work with you to explore the wastewater treatment options that make the most sense for your community. By working more closely with your community, the Department and permittees will be able to identify opportunities to extend the schedule of compliance, if appropriate. Because each community is unique, we want to make sure that you have the opportunity to consider all your options and tailor solutions to best meet your community's needs.

MO-0001125
CP0001777 C152:8

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
APPLICATION FOR CONSTRUCTION PERMIT
WASTEWATER TREATMENT FACILITY

RECEIVED
OCT 14 2015
Water Protection Program

FOR DEPARTMENT USE ONLY	
APP NO.	CP NO.
FEE RECEIVED $1000.00	CHECK NO. 14697
DATE RECEIVED 10/14/15 SB	

APPLICATION OVERVIEW

The Application for Construction Permit – Wastewater Treatment Facility form has been developed in a modular format and consists of Part A and B. **All applicants must complete Part A.** Part B should be completed for applicants who currently land-apply wastewater or propose land application for wastewater treatment. **Please read the accompanying instructions before completing this form. Submittal of an incomplete application may result in the application being returned.**

PART A – BASIC INFORMATION

1.0 APPLICATION INFORMATION (Note – If any of the questions in this section are answered NO, this application may be considered incomplete and returned.)

1.1 Is this a Federal/State funded project? ☐ YES ☑ N/A Funding Agency: _____ Project #: _____

1.2 Has the Missouri Department of Natural Resources approved the proposed project's antidegradation review?
☐ YES Date of Approval: _____

1.3 Has the department approved the proposed project's facility plan*?
☑ YES Date of Approval: 2015 ☐ NO ☐ N/A (If Not Applicable, complete No. 1.4.)

1.4 [Complete only if answered Not Applicable on No. 1.3.] Is a copy of the engineering report* for wastewater treatment facilities with a design flow less than 22,500 gpd included with this application?
☐ YES ☐ NO

1.5 Is a copy of the appropriate plans* and specifications* included with this application?
☑ YES Denote which form is submitted: ☑ Hard copy ☐ Electronic copy (See instructions.) ☐ NO

1.6 Is a summary of design* included with this application? ☑ YES ☐ NO

1.7 Has the appropriate operating permit application (A, B, or B2) been submitted to the department?
☑ YES Date of submittal: 2014
☐ Enclosed is the appropriate operating permit application submittal. Denote which form: ☐ A ☐ B ☐ B2
☐ N/A Please explain: _____

1.8 Is the facility currently under enforcement with the department or the Environmental Protection Agency? ☑ YES ☐ NO

1.9 Is the appropriate fee included with this application? ☑ YES ☐ NO (See instructions for appropriate fee.)

* Must be affixed with a Missouri registered professional engineer's seal, signature and date.

2.0 PROJECT INFORMATION

2.1 NAME OF PROJECT

City of Otterville

2.2 PROJECT DESCRIPTION

The City of Otterville is upgrading their wastewater lagoon system to meet disinfection limits, ammonia limits, and lower BOD and TSS limits. There is no change in the design flow or the actual flow from the wastewater treatment facility.

2.3 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION

A Sludge Management Plan will be submitted for approval.

2.4 DESIGN INFORMATION

A. Current population: 454 ; Design population: 542

B. Actual Flow: 38,798 gpd; Design Average Flow: 43,560 gpd;
Actual Peak Daily Flow: * gpd; Design Maximum Daily Flow: * gpd; Design Wet Weather Event: *

*= unknown at this time

2.5 ADDITIONAL INFORMATION

A. Is a topographic map attached? ☑ YES ☐ NO

B. Is a process flow diagram attached? ☑ YES ☐ NO

3.0 WASTEWATER TREATMENT FACILITY

NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
City of Otterville	660-366-4613	cityott@gmail.com

ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE	COUNTY
P.O. Box 58	Otterville	MO	65348	Cooper

Wastewater Treatment Facility: Mo- 0101125 (Outfall 001 Of 1)

3.1 Legal Description: ____ ¼, SW ¼, NE ¼, Sec. 03, T 45N, R 19W
(Use additional pages if construction of more than one outfall is proposed.)

3.2 UTM Coordinates Easting (X): 500671 Northing (Y): 4283288
For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

3.3 Name of receiving streams: ____ Unnamed tributary to Long Branch (U)

4.0 PROJECT OWNER

NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
City of Otterville	(660) 366-4613	cityott@gmail.com

ADDRESS	CITY	STATE	ZIP CODE
P.O. Box 58	Otterville	MO	65348

5.0 CONTINUING AUTHORITY: Permanent organization that will serve as the continuing authority for the operation, maintenance and modernization of the wastewater collection system.

NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
City of Otterville	(660) 366-4613	cityott@gmail.com

ADDRESS	CITY	STATE	ZIP CODE
P.O. Box 58	Otterville	MO	65348

5.1 A letter from the continuing authority, if different than the owner, is included with this application. ☐ YES ☐ NO ☑ N/A

5.2 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A MISSOURI PUBLIC SERVICE COMMISSION REGULATED ENTITY.

A. Is a copy of the certificate of convenience and necessity included with this application? ☐ YES ☑ NO

5.3 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A PROPERTY OWNERS ASSOCIATION.

A. Is a copy of the as-filed restrictions and covenants included with this application? ☐ YES ☐ NO

B. Is a copy of the as-filed warranty deed, quitclaim deed or other legal instrument which transfers ownership of the land for the wastewater treatment facility to the association included with this application? ☐ YES ☐ NO

C. Is a copy of the as-filed legal instrument (typically the plat) that provides the association with valid easements for all sewers included with this application? ☐ YES ☐ NO

D. Is a copy of the Missouri Secretary of State's nonprofit corporation certificate included with this application? ☐ YES ☐ NO

6.0 ENGINEER

ENGINEER NAME / COMPANY NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
Brad E. Eaton, PE Wild Heart Partners, LLC	(970) 584-3586	Brad.Eaton@wildheartpartners.com

ADDRESS	CITY	STATE	ZIP CODE
461 Bobcat Drive	Milliken	CO	80543

7.0 PROJECT OWNER: I hereby certify that I am familiar with the information contained in this application and to the best of my knowledge and belief such information is true, complete, and accurate, and if granted this permit, I agree to abide by the Missouri Clean Water Law and all rules, regulations, orders, and decisions, subject to any legitimate appeal available to applicant under Missouri Clean Water Law. I also understand the issuance of the construction permit does not guarantee the proposed wastewater treatment will meet the required effluent limitations of the issued Missouri State Operating Permit for this facility.

PROJECT OWNER SIGNATURE: Judy Bailey

PRINTED NAME	DATE
Judy Bailey	8/5/15

TITLE OR CORPORATE POSITION	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
City Clerk	(660) 366-4613	cityott@gmail.com

Mail completed copy to:
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
P.O. BOX 176
JEFFERSON CITY, MO 65102-0176

END OF PART A.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHETHER PART B NEEDS TO BE COMPLETE.

PART B – LAND APPLICATION ONLY
(Submit only if the proposed construction project includes land application of wastewater.)

8.0 FACILITY INFORMATION

8.1 Type of wastewater to be irrigated: ☐ Domestic ☐ State/National Park ☐ Seasonal business
☐ Municipal ☐ Municipal with a pretreatment program or significant industrial users
☐ Other (explain) _____

8.2 Months when the business or enterprise will operate or generate wastewater:
☐ 12 months per year ☐ Part of the year (list months): _____

8.3 This system is designed for:
☐ No-discharge.
☐ Partial irrigation when feasible and discharge rest of time.
☐ Irrigation during recreational season, April – October, and discharge during November – March.
☐ Other (explain) _____.

9.0 STORAGE BASINS

9.1 Number of storage basins: _____ (Use additional pages if greater than three basins.)

9.2 Type of basins: ☐ Steel ☐ Concrete ☐ Fiberglass ☐ Earthen ☐ Earthen with membrane liner

9.3 Storage basin dimensions at inside top of berm (feet). Report freeboard as feet from top of berm to emergency spillway or overflow pipe.
Basin #1: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____
Basin #2: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____
Basin #3: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____

9.4 Storage Basin operating levels (report as feet below emergency overflow level).
Basin #1: Maximum operating water level _____ ft Minimum operating water level _____ ft
Basin #2: Maximum operating water level _____ ft Minimum operating water level _____ ft
Basin #3: Maximum operating water level _____ ft Minimum operating water level _____ ft

9.5 Design depth of sludge in storage basins.
Basin #1: _____ ft Basin #2: _____ ft Basin #3: _____ ft

9.6 Existing sludge depth, if the basins are currently in operation.
Basin #1: _____ ft Basin #2: _____ ft Basin #3: _____ ft

9.7 Total design sludge storage: _____ dry tons and _____ cubic feet

10.0 LAND APPLICATION SYSTEM

10.1 Number of irrigation sites _____ Total Acres _____ Maximum % field slopes _____
Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres
Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres
Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres
(Use additional pages if greater than three irrigation sites.)

10.2 Type of vegetation: ☐ Grass hay ☐ Pasture ☐ Timber ☐ Row crops
☐ Other (describe) _____

10.3 Wastewater flow (dry weather) gallons per day: Average annual _____ Seasonal _____ Off-season _____

10.4 Land application rate (design flow including 1-in-10 year storm water flows):
Design: _____ inches/year _____ inches/hour _____ inches/day _____ inches/week
Actual: _____ inches/year _____ inches/hour _____ inches/day _____ inches/week

10.5 Total irrigation per year (gallons): Design: _____ gal Actual: _____ gal

10.6 Actual months used for irrigation (check all that apply):
☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec

10.7 Land application rate is based on:
☐ Hydraulic Loading ☐ Other (describe) _____
☐ Nutrient Management Plan (N&P) If N&P is selected, is the plan included? ☐ YES ☐ NO

CONSULTANT: I have prepared or reviewed this form and all attached reports and documentation. The conclusion proposed is consistent with the Antidegradation Implementation Procedure and current state and federal regulations.

SIGNATURE	DATE
Brad E. Eaton	08/03/2015

PRINT NAME

Brad E. Eaton, PE

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
970-584-3586	Brad.Eaton@wildheartpartners.com

Owner: I have read and reviewed the prepared documents and agree with this submittal.

SIGNATURE	DATE
Andy Bailey	8/5/15

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
660-366-4613	cityott@gmail.com

Continuing Authority: Continuing Authority is the permanent organization that will be responsible for the operation, maintenance and modernization of the facility. The regulatory requirement regarding continuing authority is available at www.sos.mo.gov/adrules/csr/current/10csr/10c20-6a.pdf.

I have read and reviewed the prepared documents and agree with this submittal.

SIGNATURE	DATE
Andy Bailey	8/5/15

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
660-366-4613	cityott@gmail.com

Return completed form with the appropriate Permit Application to:

Missouri Department of Natural Resources
Water Protection Program
Water Pollution Control Branch
P.O. Box 176
Jefferson City, MO 65102

MO780-2026 (01/09)