VEENSTRA & KIMM, INC.
860 22nd Avenue - Suite 4 • Coralville, Iowa 52241-1565
319-466-1000 • 319-466-1008(FAX) • 888-241-8001(WATS)

LETTER OF TRANSMITTAL

TO City of West Branch
110 Poplar Street
West Branch, Iowa 52358

ATTENTION

DATE 9/23/19	JOB 368259
RE: Anti-Deg Alternatives Analysis	
West Branch, Iowa	

WE ARE SENDING YOU

☐ Copy of Letter ☐ Prints ☐ Plans ☐ Specifications
☐ Pay Estimate ☐ Change Order ☑ Report

Quantity	Description
2	Anti-deg Alternatives Analysis

THESE ARE TRANSMITTED as checked below:

☐ For Approval ☐ As Requested ☐ For Review and Comment
☐ For Your Use ☑ For Your Files ☐

REMARKS

SIGNED: Emily Kinebaugh

COPY TO

VEENSTRA & KIMM, INC.
860 22nd Avenue - Suite 4 • Coralville, Iowa 52241-1565
319-466-1000 • 319-466-1008(FAX) • 888-241-8001(WATS)

September 16, 2019

Larry Bryant
DNR Wastewater Engineering Section
Iowa Department of Natural Resources
502 E. 9th Street
Des Moines, Iowa 50319

WEST BRANCH, IOWA
WASTEWATER TREATMENT FACILITY IMPROVEMENTS
ANTIDEGRADATION ALTERNATIVES ANALYSIS

Enclosed for your review are three original signed copies of the Antidegradation Alternatives Analysis for the Wastewater Treatment Facility Improvements project for the City of West Branch, Iowa. Enclosed with the report is also the proof of publication from the local newspaper. The public notice letters were sent as required and the reviewer should have received copies of the letters at the time of notification.

A public notice was published in the local paper on August 15, 2019. The notice was also posted at City Hall. The notice was sent to US EPA Region VII, US Fish and Wildlife Service, Iowa Environmental Council, Environmental Law & Policy Center, Iowa League of Cities, IDNR Field Office No. 6, and Cedar County Public Health. No comments were received.

The City is moving forward with the facility planning process and anticipates submittal of the facility plan by the end of the month. On behalf of the City of West Branch, we request your review of the alternatives analysis. Please contact us with questions or comments.

VEENSTRA & KIMM, INC.

Original Signed By
Emily K. Linebaugh

Emily Linebaugh, P.E.
368258
Enclosures
cc: Redmond Jones, City of West Branch
Matt Goodale, City of West Branch

REPORT

ON

ANTIDEGRADATION ALTERNATIVES ANALYSIS

WASTEWATER TREATMENT FACILITY

WEST BRANCH, IOWA

September 2019

VEENSTRA & KIMM, INC.

REPORT

ON

ANTIDEGRADATION ALTERNATIVES ANALYSIS

WASTEWATER TREATMENT FACILITY

WEST BRANCH, IOWA

September 2019

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Signed: Date:

Emily Linebaugh 9/16/19

Emily K. Linebaugh, P.E.
Iowa License No. 18986
My license renewal date is December 31, 2019

LICENSED PROFESSIONAL ENGINEER
Emily K. Linebaugh
No. 18986
IOWA

Parts covered by this seal:

All

Prepared by
VEENSTRA & KIMM, INC.
Coralville,
Iowa

ANTIDEGRADATION ALTERNATIVES ANALYSIS
WASTEWATER TREATMENT FACILITY
WEST BRANCH, IOWA

CONTENTS

TABLES

FIGURES

FOLLOWS PAGE

APPENDICES

WEST BRANCH, IOWA
ANTIDEGRADATION ALTERNATIVES ANALYSIS

August 2019

EXECUTIVE SUMMARY

The City of West Branch is in the process of planning improvements to its wastewater treatment system. Changes to the State of Iowa's water quality standards have resulted in new NPDES effluent limits that the existing facilities are not capable of meeting. This Antidegradation Alternatives Analysis identifies and evaluates different potential treatment improvements that are (a) capable of meeting the new effluent limits and (b) offer a range of treatment and disposal capabilities to evaluate non-degrading and less-degrading alternatives as mandated by Iowa's antidegradation policy and implementation procedure.

A total of ten alternatives were evaluated including the base pollution control alternative (BPCA), three non-degrading alternatives (NDA) and six less-degrading alternatives (LDA). The alternatives were evaluated based on their practicability, economic efficiency, affordability and degradation on a pollutant-by-pollutant basis.

All three of the non-degrading alternatives, recycle/reuse, land application, and regional treatment, were determined to be non-practicable.

Of the seven remaining alternatives, the BPCA and six LDAs, Alternative No. 7, modifying the existing aerated lagoon wastewater treatment plant to an enhanced treatment aerated lagoon system with the submerged attached growth reactor (SAGR) process, was determined to be the least degrading preferred alternative. The other LDA alternatives (mechanical treatment plant with SBR, mechanical treatment plant with Aero-Mod, mechanical treatment plant with Biolac, enhanced treatment aerated lagoon systems with the NitrOx process, Revolving Algal Biofilm) were not preferred due to financial concerns as well as concerns regarding ease of operation.

Although the preferred alternative is considered less degrading and expected to improve overall water quality in the receiving stream for a number of pollutants, degradation for some pollutants of concern will occur. Therefore, a description of the social and economic importance of the project is included at the end of the analysis.

EXISTING CONDITIONS AND DESIGN PARAMETERS

Tables 1, 2 and 3 summarize existing flows and loads, permitted flows and loads and design flows and loadings for the City of West Branch.

Table 1: Existing Flows and Loadings[1]

Flows (mgd)		Maximum Month Influent Loads (lbs/d)	
ADW	0.244	BOD_5	433
AWW_{180}	n/a	TSS	513
AWW_{30}	0.732	TKN	82
MWW	2.785		
PHWW	5.790		

1. Flows and loads reflect population currently served by WWTP and do not include flows and loads associated with the Mobile Home Village. Estimated existing (2017) population = 2,496 Total Community. Estimated existing (2017) population served by WWTP = 2,037 (does not include Mobile Home Village)

Table 2: Permitted Flows and Loads[1]

Flows (mgd)		Maximum Month Influent Loads (lbs/d)	
ADW	0.242	BOD_5	544
AWW	0.792		
MWW	1.440		

1. Taken from NPDES Permit

Table 3: Design Flows and Loadings[1]

Flows (mgd)		Maximum Month Influent Loads (lbs/d)	
ADW	0.334	BOD_5	626
AWW_{180}	0.712	TSS	740
AWW_{30}	0.924	TKN	123
MWW	2.977		
PHWW	5.790		

1. Projected design year (2040) population = 3,167 Total Community (includes Mobile Home Village)

The City currently has a compliance schedule for ammonia and *E.coli* in their NPDES Permit No. 1694001. The existing treatment facility utilizes a 2-cell aerated lagoon system. The projected ADW and AWW_{30} design flows for the facility are 0.334 mgd and 0.924 mgd, respectively. The projected design organic loading is 626 lbs/day BOD_5. No significant industrial contributors are present or anticipated in the community. Figure 1 shows a schematic of the existing wastewater treatment facility.

RECEIVING STREAM NETWORK

The existing discharge receiving stream network for the facility consists of discharge to West Branch Wapsinonoc Creek which is tributary to the Cedar River, the Iowa River and the Mississippi River. The current receiving stream network designations, Use Attainability Analysis (UAA) and impairment statuses are summarized in Tables 4 and 5:

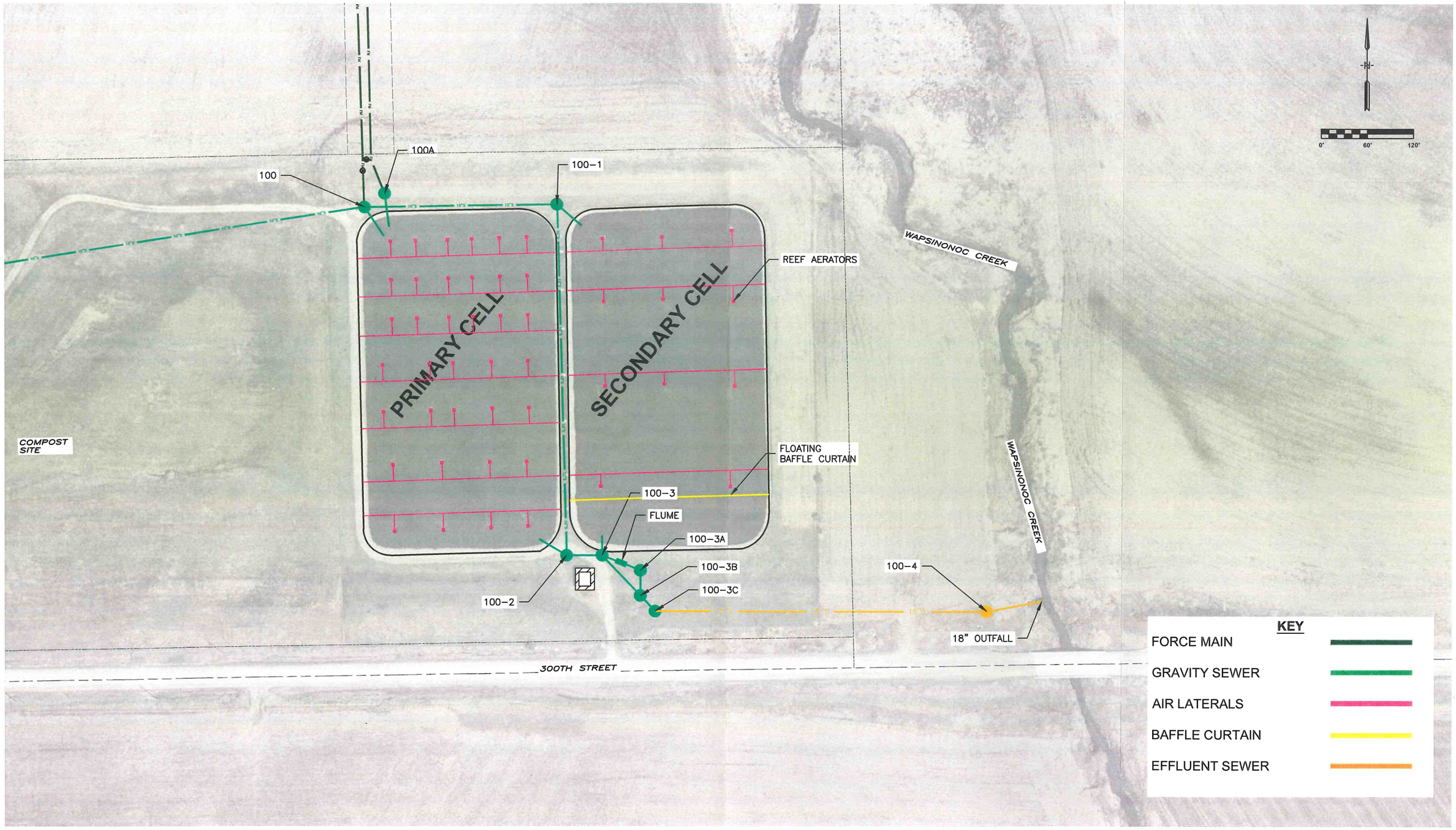
Table 4: Current Stream Designations

Stream	Current Designation	Source
West Branch Wapsinonoc Creek	A2, B(WW-2)	Iowa DNR Use Assessment/Attainability Analysis
Wapsinonoc Creek	A2, B(WW-1), HH	Iowa DNR Use Assessment/Attainability Analysis
Cedar River	A1, B(WW-1), HH	Iowa DNR Use Assessment/Attainability Analysis
Iowa River	A1, B(WW-1), HH	Iowa DNR Use Assessment/Attainability Analysis
Mississippi River	A1, B(WW-1), HH	Iowa DNR Use Assessment/Attainability Analysis

Table 5: Impairment Status[1]

Stream	Impairment(s)	TMDL Status	Notes
West Branch Wapsinonoc Creek	N/A	N/A	Not assessed.
Wapsinonoc Creek	N/A	N/A	Not assessed.
Cedar River	Indicator Bacteria – E.coli	Complete (2010)	Assessed as "partially supporting" based on IDNR ambient monitoring.
	pH	N/A	Assessed as "partially supporting" due to violations on the pH criterion of 9.0 unit.
Iowa River	Bacteria	Complete (2007)	
Mississippi River	Metals (aluminum)	TMDL Needed	Violations of chronic criterion.

1. Source: 2016 Impaired Waters List



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EXISTING FACILITY
WEST BRANCH, IOWA
FIGURE 1

EFFLUENT LIMITATIONS

The existing NPDES permits limits that are effective from 9/01/2017 to 12/31/2021 are shown in Table 6.

Table 6: Existing NPDES Permit Limits (9/01/2017 to 12/31/2021)

Parameter	Season	Concentration (mg/L)			Mass (lbs/d)		
		7-d	30-d	Max. day	7-d	30-d	Max. day
$CBOD_5$	Yearly	40.0	25.0[1]		264.0	165.0	
TSS	Yearly	120.0	80.0		792.0	528.0	
Ammonia	Jan		29.6	55.2		79	163
	Feb		32.0	63.7		87	190
	Mar		27.3	47.9		72	139
	Apr		14.2	32.0		34	93
	May		13.2	20.1		31	93
	Jun		11.4	15.5		25	93
	Jul		12.2	13.3		24	88
	Aug		11.0	11.0		23	73
	Sep		11.9	13.2		27	87
	Oct		16.8	18.9		43	110
	Nov		23.2	25.2		58	100
	Dec		25.2	41.5		65	118
D.O.	Yearly	5.0					
pH	Yearly	6.5 (minimum)		9.0			

1. Minimum 85% removal required (567 IAC 62.3(1))

Ammonia limitations effective until 12/31/2021 in the NPDES permit are less stringent than the water quality based limits that become effective on 1/01/2022. The compliance schedule listed in the NPDES permit is to allow the facility to make changes to meet the new, more stringent limits effective from 1/01/2022 to 8/31/2022 listed below in Table 7.

Table 7: New NPDES Permit Limits (1/01/2022 to 8/31/2022)

Parameter	Season	Concentration (mg/L)			Mass (lbs/d)		
		7-d	30-d	Max. day	7-d	30-d	Max. day
CBOD5	Yearly	40.0	25.0[1]		264.0	165.0	
TSS	Yearly	120.0	80.0		792.0	528.0	
Ammonia	Jan		3.4	6.9		26.2	53.5
	Feb		4.0	8.4		30.5	64.8
	Mar		3.4	8.4		26.2	64.8
	Apr		1.5	8.4		11.7	64.8
	May		1.7	8.4		13.4	64.8
	Jun		1.3	6.9		10.1	53.5
	Jul		1.0	6.9		7.7	53.5
	Aug		1.0	6.9		7.4	53.5
	Sep		1.1	8.4		8.1	64.8
	Oct		1.6	6.9		12.0	53.5
	Nov		2.3	5.7		17.9	44.1
	Dec		2.5	6.9		19.1	53.5
D.O.	Yearly	5.0					
pH	Yearly	6.5					
E-coli	3/15-11/15		630 #/100 mL geomean	630 #/100 mL geomean			

POC IDENTIFICATION AND TIER PROTECTION LEVEL

Table 8 identifies the pollutants of concern for the proposed treatment facility.

Table 8: Pollutants of Concern

POC	Secondary or WQBEL?	Beneficial Use Affected	Tier	Notes
Organic Matter ($CBOD_5$)	Yes	Aquatic life	1	See Table 11 for discharge alternative determinations of degradation.
Suspended Solids (TSS)	Yes	General uses	1	See Table 11 for discharge alternative determinations of degradation.
Ammonia-Nitrogen	Yes	Aquatic life	1	Compliance with WQBELs will not cause degradation.
Bacteria (E. coli)	Yes	Contact recreation	1	See Table 11 for discharge alternative determinations of degradation.
TRC	Yes	Aquatic life	2	Applicable only if chlorine is used to disinfect. Chlorine disinfection is not proposed.
Total Nitrogen	No	Human health (drinking water), aquatic life (indirect), general uses (nuisance aquatic life)	2	No WQS numeric criteria.
Phosphorus	No	Aquatic life (indirect), general uses (nuisance aquatic life)	2	No WQS numeric criteria.
Priority Pollutants	No	Human health, aquatic life	2	WQS numeric criteria, but no anticipated effluent limits based on reasonable potential.

IDENTIFICATION & DISCUSSION OF ALTERNATIVES

Without improvements, the existing aerated lagoon treatment facilities cannot meet the future ammonia-nitrogen limits listed in the newly received NPDES permits. The existing facilities would not be able to meet proposed bacterial limits without dedicated disinfection facilities.

The City of West Branch anticipates moderate increases in its influent flows and loadings over the next 20 years. These increases are accounted for in the future design flows and loadings.

ALTERNATIVE NO. 1: RECYCLE/REUSE

To be considered a Non-Degrading Alternative (NDA), this option must include recycle or reuse of the entire proposed increase in treated wastewater volume. This alternative was determined not to be practicable due to the following factors:

1. Seasonal constraints and lack of consumptive demand for agricultural irrigation, landscape irrigation, recreational area irrigation or industrial water use applications.

2. Aquifer augmentation through well disposal is prohibited by 567 IAC 62.9.

ALTERNATIVE NO. 2: LAND APPLICATION

Land application of the proposed increase in design loading in addition to treatment modifications necessary to meet the new WQEBLs was evaluated and determined to be economically inefficient. For estimating purposes, the costs associated with land application were added to Alternative No. 7, the base pollution control alternative (BPCA).

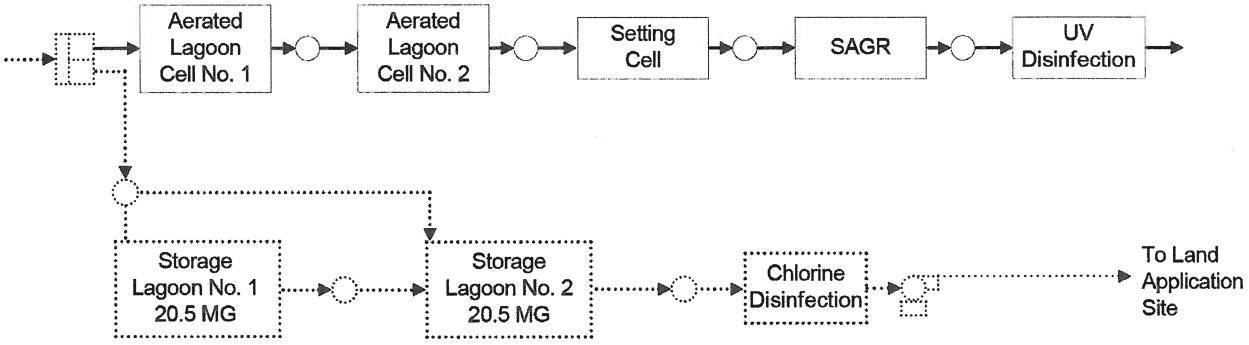
The Iowa Wastewater Facilities Design Standard Chapter 21 governs design requirements for land application of wastewater. The minimum storage required for land application is 205 days based on climatic restrictions in accordance with Figure 3 of Chapter 21. The additional volume of storage required to allow land application of the proposed increase in design flow was calculated by proportioning the future design flow such that any increases in wastewater flows above the existing design flow would be land applied.

Since the 20-year design flows are projected to increase by 38% above the facility's currently permitted capacity, 28% of the design wastewater flow would be diverted for dedicated land application. The storage requirements associated with storage of 28% of the design flows for 205 days was calculated to be 41 million gallons using the AWW_{180} as a conservative estimate for the maximum 205-day wet weather flow. The associated land area required for two 20.5-million-gallon storage lagoons would be approximately 10.5 acres each. The land application area required for slow rate application assuming a

maximum percolation rate of 10 inches per month and a 3-month application period would be approximately 50 acres neglecting any buffer area.

Assuming the land application site could be located adjacent to the existing treatment and storage site, the addition of a slow rate land application system to apply this proportion of the flow would add approximately $8,175,000 (present day) to the BCPA project cost. The cost includes storage lagoons, pumping station, chlorine disinfection prior to land application, land purchased and sprinkler system. Under this alternative, the BPCA would be designed for existing permitted flows and loadings rather than the projected flows and loadings through the 20-year design. Figure 2 shows a schematic of the proposed land application under Alternative 2.

Figure 2: Land Application Schematic



ALTERNATIVE NO. 3: REGIONAL TREATMENT

Regional treatment is only considered an NDA in this analysis if the authority receiving the wastewater has adequate surplus treatment capacity to receive the additional wastewater while remaining within its current permitted design capacities for both flow and loading. To qualify the new flow must be handled within the design capacity of the receiving treatment plant and a separate antidegradation review is not required.

A review of existing wastewater treatment facilities within a 10-mile radius of the City of West Branch indicated there is a potential to pump wastewater to West Liberty's treatment facility. This is assuming West Liberty's facility has available capacity. The cost to pump wastewater to West Liberty would add approximately $11,800,000 (present day) to the BCPA project cost. The cost includes a 9-mile force main, lift station and back-up generator. Under this alternative, the BPCA would be designed for existing permitted flows and loadings rather than the projected flows and loadings through the 20-year design.

Pumping wastewater 9 miles for regional treatment was determined economically inefficient and not to be a practical alternative. In addition to costs, there are also jurisdictional issues associated with regional treatment. The time frame to arrive at an agreement between the cities as well as construction of improvements makes this alternative not practical when compared to other alternatives using the existing plant site and infrastructure. Veenstra & Kimm, Inc. has determined this alternative not to be technically advisable.

ALTERNATIVE NO. 4: MECHANICAL TREATMENT (SEQUENCING BATCH REACTOR, SBR)

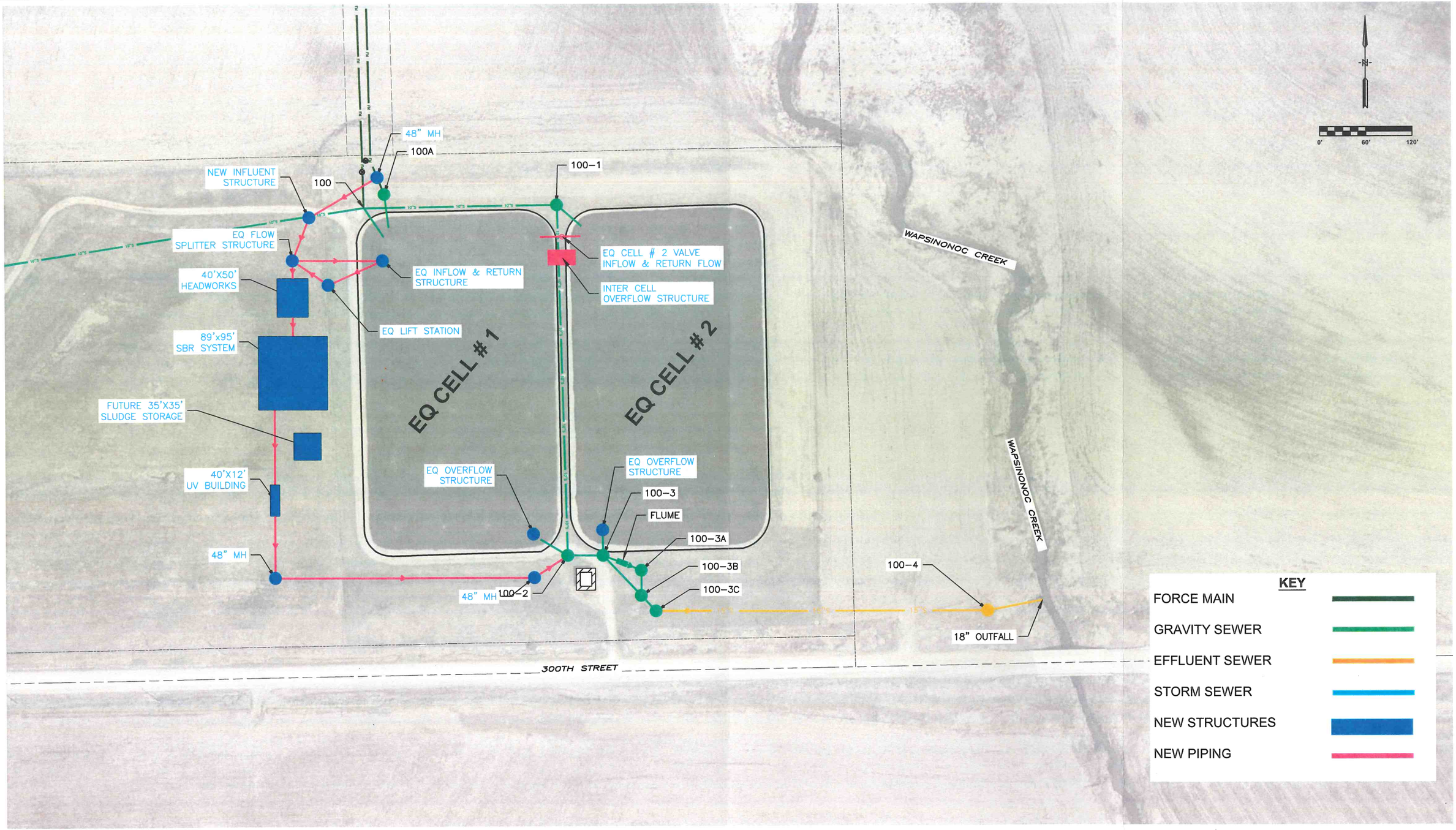
This alternative consists of a sequencing batch reactor (SBR) mechanical treatment facility being constructed at the existing lagoon site. The SBR system will allow the City to comply with their new, more stringent ammonia limits. UV disinfection facilities would also be constructed to ensure compliance with bacteria limits. The existing aerated lagoon cells would be converted to provide flow equalization. Due to the inherent solids storage capacity within the SBR system, no additional separate sludge storage would be needed at this time. Veenstra & Kimm, Inc. recommends re-evaluating sludge storage needs of the WWTF in 10-15 years. An EQ lift station and earthwork, a new headworks facility including screens and grit removal, activated sludge batch reactor basins and a UV disinfection system would be added as part of this alternative. A schematic of this alternative is shown in Figure 3.

This alternative is considered one of the less degrading of the alternatives due to the following factors:

1. Effluent mass loads from this process for $CBOD_5$, TSS, and ammonia are expected to be lower than other reasonable treatment process alternatives.

2. The extended air activated sludge process would incorporate provisions for biological nutrient removal in the design.

Although alternative No. 4 is energy intensive, requires a greater amount of operator expertise/attention than the lagoon alternatives, it does have some advantages. First, this treatment alternative could be expanded on the existing lagoon site if future growth is greater than anticipated. The lagoon alternatives cannot be easily expanded to accommodate greater than anticipated growth. Second, this alternative can be operated as a biological nutrient reduction system and allow the City to comply with more stringent TN and TP limits. West Branch's AWW flow is close to 1.0 MGD. AWW flows of 1.0 MGD or greater trigger TN and TP limits to be issued by IDNR. Based on conversation with IDNR, there is reasonable potential that nutrient limits could be issued to West Branch in the future. Third, it has the second lowest 20-year present worth cost.



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SBR SITE PLAN
WEST BRANCH, IOWA
FIGURE 3

ALTERNATIVE NO. 5: MECHANICAL TREATMENT (AERO-MOD SEQUOX)

This alternative consists of an Aero-Mod SEQUOX mechanical treatment facility being constructed at the existing lagoon site. The existing aerated lagoon cells would be converted to provide flow equalization. An EQ lift station and earthwork, a new headworks facility including screens and grit removal, SEQUOX equipment and reactor basins, a sludge storage facility and a UV disinfection system would be added as part of this alternative. A schematic of this alternative is shown in Figure 4.

This alternative is considered one of the less degrading of the alternatives due to the following factors:

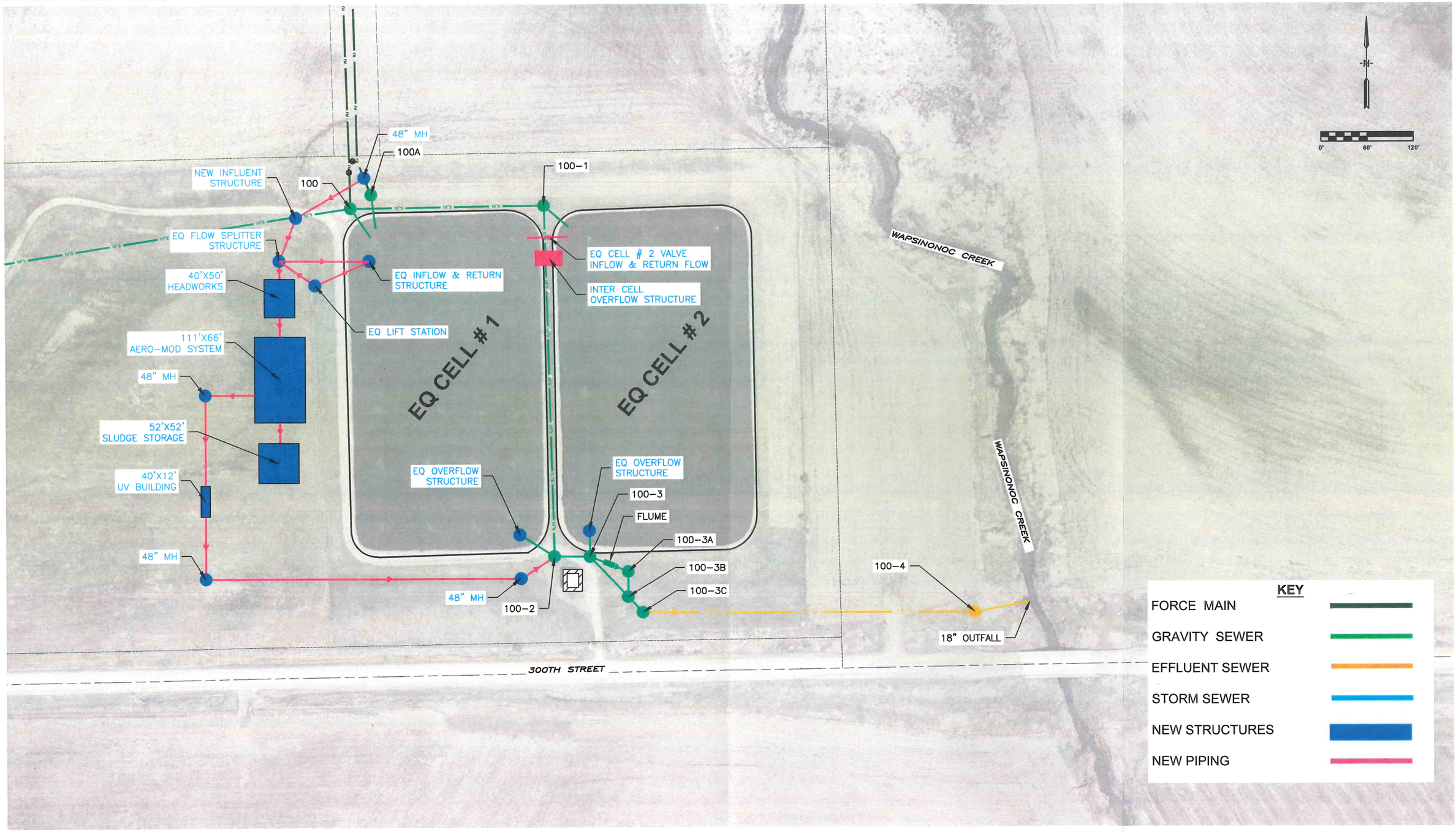
1. Effluent mass loads from this process for $CBOD_5$, TSS, and ammonia are expected to be lower than other reasonable treatment process alternatives.

2. The activated sludge process would incorporate provisions for biological nutrient removal in the design.

Although alternative No. 5 is energy intensive, requires a greater amount of operator expertise/attention than the lagoon alternatives and has the highest 20-year present worth cost of the reasonable alternatives, it does have some advantages over the lagoon alternatives. First, this treatment alternative could be expanded on the existing lagoon site if future growth is greater than anticipated. The lagoon alternatives cannot be easily expanded to accommodate greater than anticipated growth. Second, this alternative can be operated as a biological nutrient reduction system and allow the City to comply with more stringent TN and TP limits. West Branch's AWW flow is close to 1.0 MGD. AWW flows of 1.0 MGD or greater trigger TN and TP limits to be issued by IDNR. Based on conversation with IDNR, there is reasonable potential that nutrient limits could be issued to West Branch in the future.

ALTERNATIVE NO. 6: MECHANICAL TREATMENT (BIOLAC)

This alternative consists of a Biolac mechanical treatment facility being constructed at the existing lagoon site. The Biolac system will allow the City to comply with their new, more stringent ammonia limits. UV disinfection facilities would also be constructed to ensure compliance with bacteria limits. One of the existing aerated lagoons would be partially filled and the Biolac system would be constructed in that area. The remaining portion of that cell would be used for sludge storage. Because sludge is being stored in a lagoon, no sludge storage tanks are required. The other existing aerated lagoon cell would be converted to provide flow equalization. An EQ lift station and earthwork, a new headworks facility including screens and grit removal, Biolac equipment and reactor basins, Biolac clarifiers and a UV disinfection system would be added as part of this alternative. A schematic of this alternative is shown in Figure 5.



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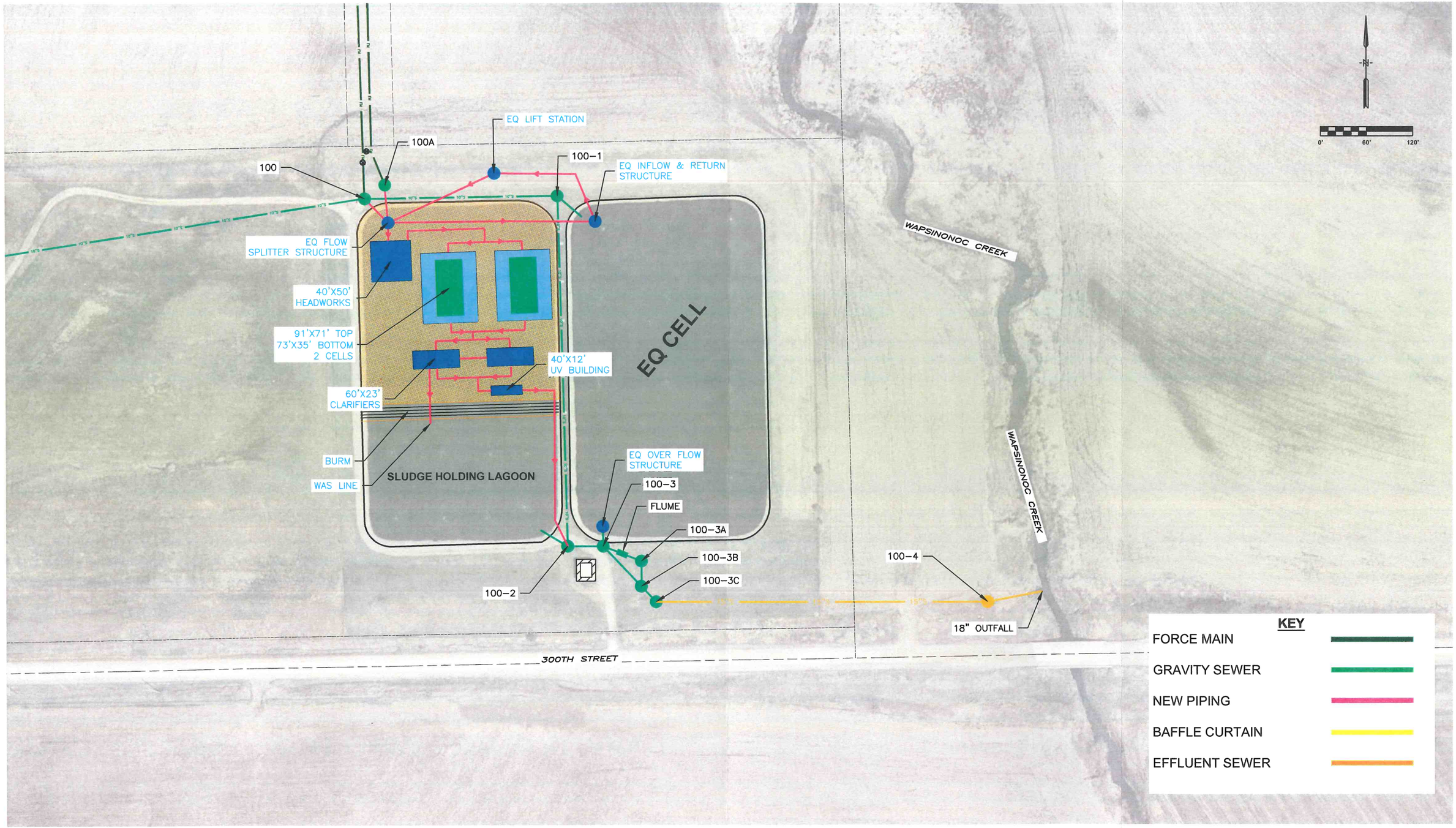
AERO-MOD SITE PLAN
WEST BRANCH, IOWA
FIGURE 4



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BIOLAC SITE PLAN
WEST BRANCH, IOWA
FIGURE 5

This alternative is considered one of the less degrading of the alternatives due to the following factors:

1. Effluent mass loads from this process for $CBOD_5$, TSS, and ammonia are expected to be lower than other reasonable treatment process alternatives.

2. The activated sludge process would incorporate provisions for biological nutrient removal in the design.

Although alternative No. 6 is energy intensive, requires a greater amount of operator expertise/attention than the lagoon alternatives and has the third highest 20-year present worth cost of the reasonable alternatives, it does have some advantages over the lagoon alternatives. The main advantage is that if this alternative can be operated as a biological nutrient reduction system and allow the City to comply with more stringent TN and TP limits. West Branch's AWW flow is close to 1.0 MGD. AWW flows of 1.0 MGD or greater trigger TN and TP limits to be issued by IDNR. Based on conversation with IDNR, there is reasonable potential that nutrient limits could be issued to West Branch in the future.

ALTERNATIVE NO. 7: ENHANCED TREATMENT AERATED LAGOON WITH SUBMERGED ATTACHED GROWTH REACTOR (SAGR)

This alternative consists of a Submerged Attached Growth Reactor (SAGR) being constructed at the existing lagoon site. The SAGR system will allow the City to comply with their new, more stringent ammonia limits. For this alternative, the existing lagoon infrastructure would be retained for primary and secondary treatment. No screening or grit removal is required for this alternative. UV disinfection facilities would also be constructed to ensure compliance with bacteria limits. An additional aerated lagoon, aeration equipment, SAGR media, baffle replacement and a UV disinfection system would be added as part of this alternative. A schematic of this alternative is shown in Figure 6.

This alternative is considered one of the less degrading of the alternatives found to be reasonable due to the following factors:

1. Effluent mass loads from this process for $CBOD_5$, TSS, and ammonia are expected to be lower than other reasonable treatment process alternatives (similar to mechanical treatment).

2. The SAGR Process has indicated its ability to incorporate provisions for biological nutrient removal in the future if required.

Alternative No. 7 provides sufficient treatment to meet the effluent limits listed in the newly received NPDES permit. Evaluation of Alternative No. 7 indicated it has the lowest

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SAGR SITE PLAN
WEST BRANCH, IOWA
FIGURE 6

20-year present worth cost. However, if greater than anticipated growth occurs in the future, this system cannot be easily expanded on the existing site to accommodate greater flows.

ALTERNATIVE NO. 8: ENHANCED TREATMENT AERATED LAGOON WITH NITROX

This alternative consists of a NitrOx system being constructed at the existing lagoon site. The NitrOx system will allow the City to comply with their new, more stringent ammonia limits. For this alternative, the existing lagoon infrastructure would be retained for primary and secondary treatment. After the aerated lagoon cells, wastewater would be sent to the NitrOx reactors for ammonia removal and then to the quiescent cell for settling. No screening or grit removal is required for this alternative. UV disinfection facilities would also be constructed to ensure compliance with bacteria limits. An additional aerated lagoon, MARS aeration equipment, NitrOx equipment and basins, NitrOx media, natural gas water heater, quiescent cell berm and a UV disinfection system would be added as part of this alternative. A schematic of this alternative is shown in Figure 7.

This alternative is considered one of the less degrading of the alternatives found to be reasonable due to the following factors:

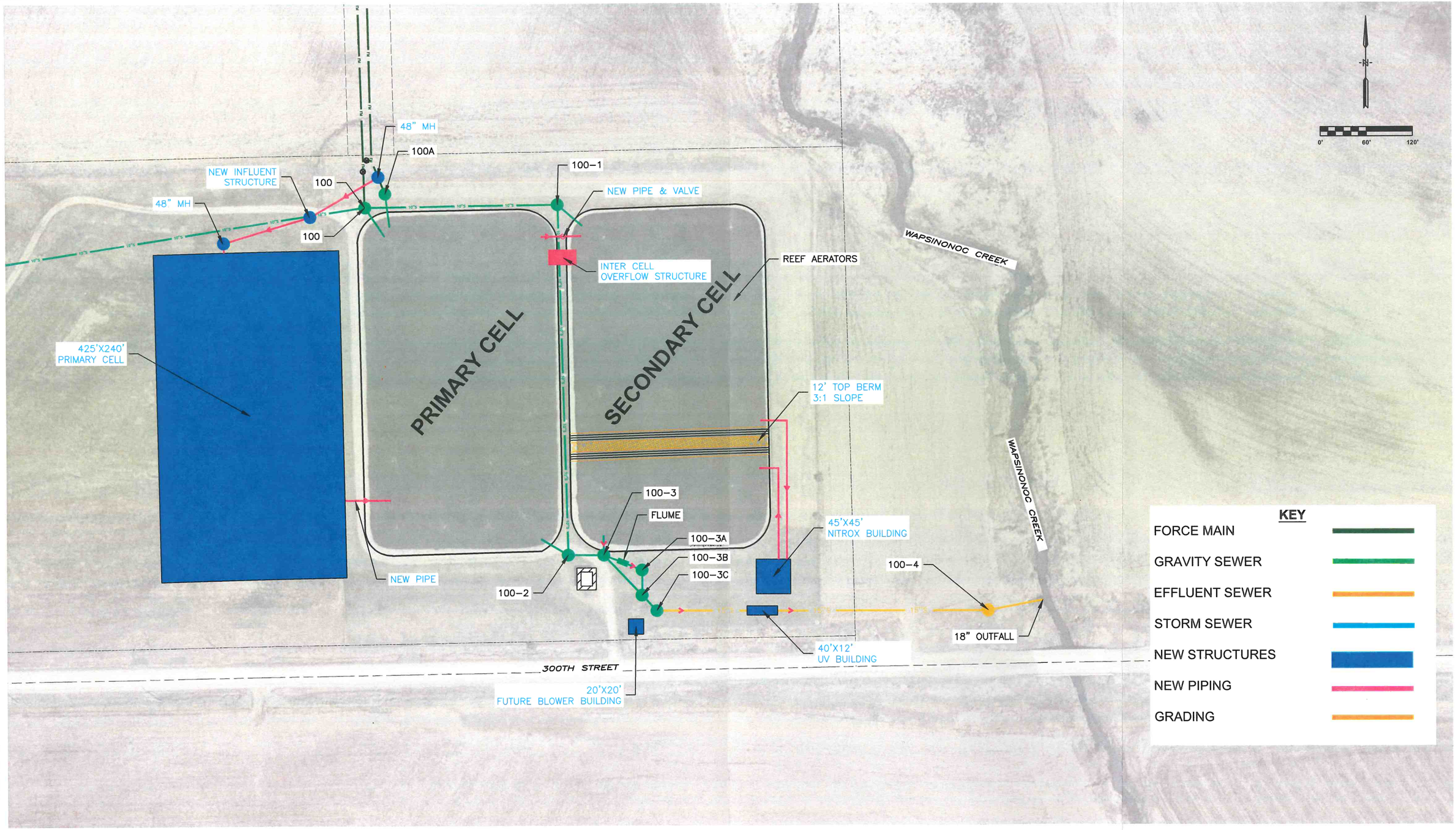
1. Effluent mass loads from this process for $CBOD_5$, TSS, and ammonia are expected to be lower than other reasonable treatment process alternatives (similar to mechanical treatment).

2. The NitrOx Process has indicated its ability to incorporate provisions for biological nutrient removal in the future if required.

Alternative No. 8 provides sufficient treatment to meet the effluent limits listed in the newly received NPDES permit. Evaluation of Alternative No. 8 indicated it has the fourth highest 20-year present worth cost. However, if greater than anticipated growth occurs in the future, this system cannot be easily expanded on the existing site to accommodate greater flows.

ALTERNATIVE NO. 9: ENHANCED TREATMENT AERATED LAGOON WITH LEMTEC™ BIOLOGICAL TREATMENT PROCESS

This alternative consists of a Lemtec™ system being constructed at the existing lagoon site. The Lemtec™ system will allow the City to comply with their new, more stringent ammonia limits. UV disinfection facilities would also be constructed to ensure compliance with bacteria limits. The LemTec™ Biological Treatment Process requires preliminary treatment in the form of screening, but not grit removal. The proposed design for West Branch utilizes three aerated lagoon cells (two of them already existing) in parallel. Each LemTec lagoon will be divided into four cells. The first three cells in each



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VEENSTRA & KIMM, INC.

NITROX SITE PLAN
WEST BRANCH, IOWA
FIGURE 7

lagoon will be a partially mixed cell. The fourth cell in each lagoon will be a settling zone. All the cells in the proposed design will be covered by Lemna's LemTec™ Modular Insulated Covers which prevent algae growth, improve clarification and encourage nitrification. After the settling cells, water proceeds to the polishing reactor for additional ammonia removal. After the polishing reactor, water will flow through a UV disinfection chamber. A new headworks facility including screens, Lemna equipment, a small package lift station and a UV disinfection system would be added as part of this alternative. A schematic of this alternative is shown in Figure 8.

This alternative is considered one of the less degrading of the alternatives found to be reasonable due to the following factors:

3. Effluent mass loads from this process for $CBOD_5$, TSS, and ammonia are expected to be lower than other reasonable treatment process alternatives (similar to mechanical treatment).

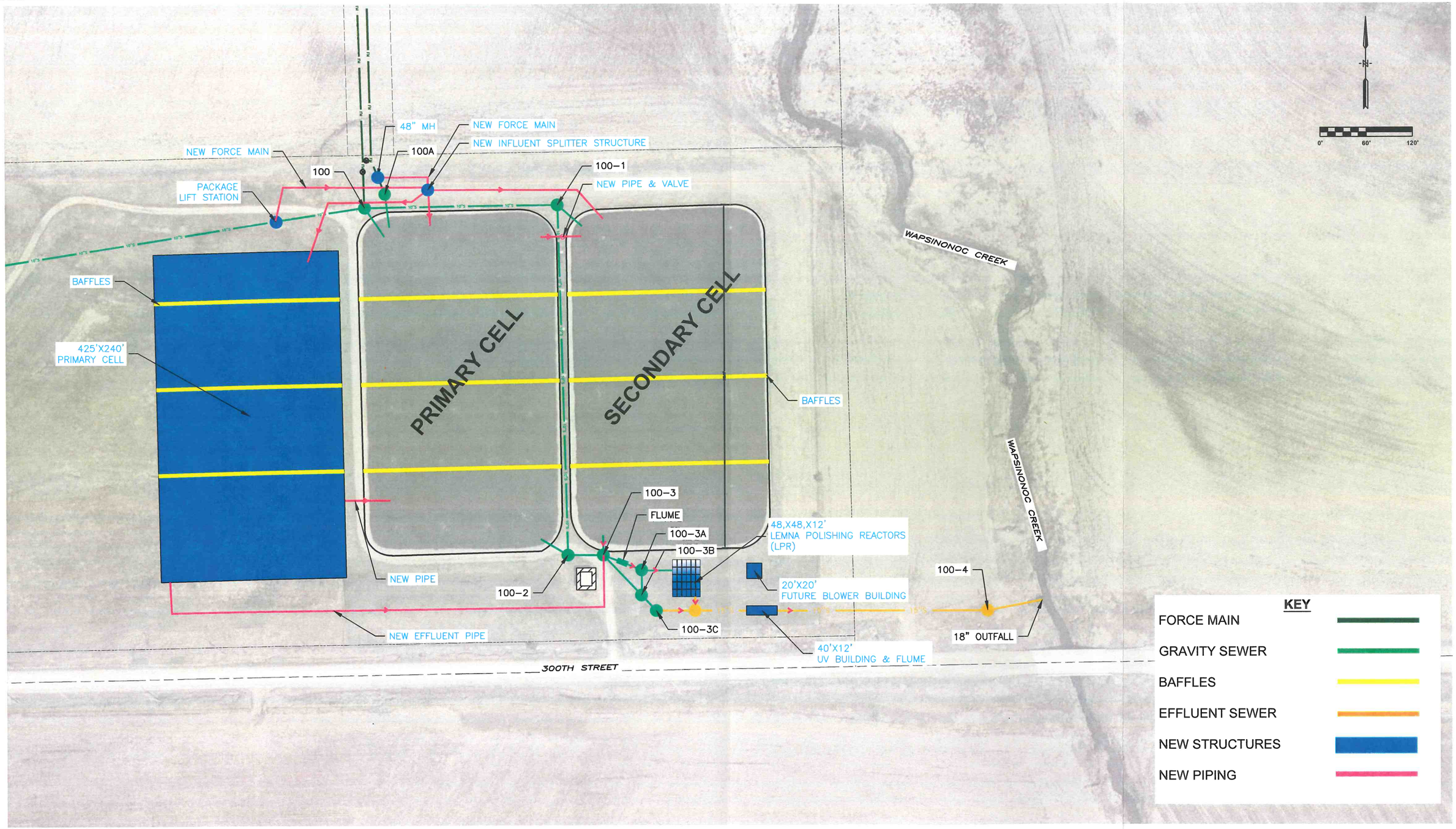
4. The Lemtec™ Biological Treatment Process has indicated its ability to incorporate provisions for biological nutrient removal in the future if required.

Alternative No. 9 provides sufficient treatment to meet the effluent limits listed in the newly received NPDES permit. Evaluation of Alternative No. 9 indicated it has the third lowest 20-year present worth cost and is similar in cost to the SBR mechanical system. However, if greater than anticipated growth occurs in the future, this system cannot be easily expanded on the existing site to accommodate greater flows.

ALTERNATIVE NO. 10: REVOLVING ALGAL BIOFILM SYSTEM BY GROSS-WEN

This alternative consists of a revolving algal biofilm (RAB) system being constructed at the existing lagoon site. The RAB system will allow the City to comply with their new, more stringent ammonia limits. UV disinfection facilities would also be constructed to ensure compliance with bacteria limits. The RAB system by Gross-Wen Technologies requires preliminary treatment in the form of screening and grit removal as well as flow EQ. After preliminary treatment, water flows to the RAB units for ammonia removal. The RAB units are housed in commercial greenhouses to allow for sufficient algae growth during the cold winter months. Following the RAB system, water then flows to the aerated lagoons for further BOD removal and to the quiescent cell for polishing. Algae waste from the RAB system will be harvest and utilized as a revenue stream for the City of West Branch.

A new headworks facility including screens and grit, an additional aerated lagoon, MARS aeration equipment, RAB equipment, commercial greenhouse, baffle replacement and a UV disinfection system would be added as part of this alternative. A schematic of this alternative is shown in Figure 9.



V&K

VEENSTRA & KIMM, INC.

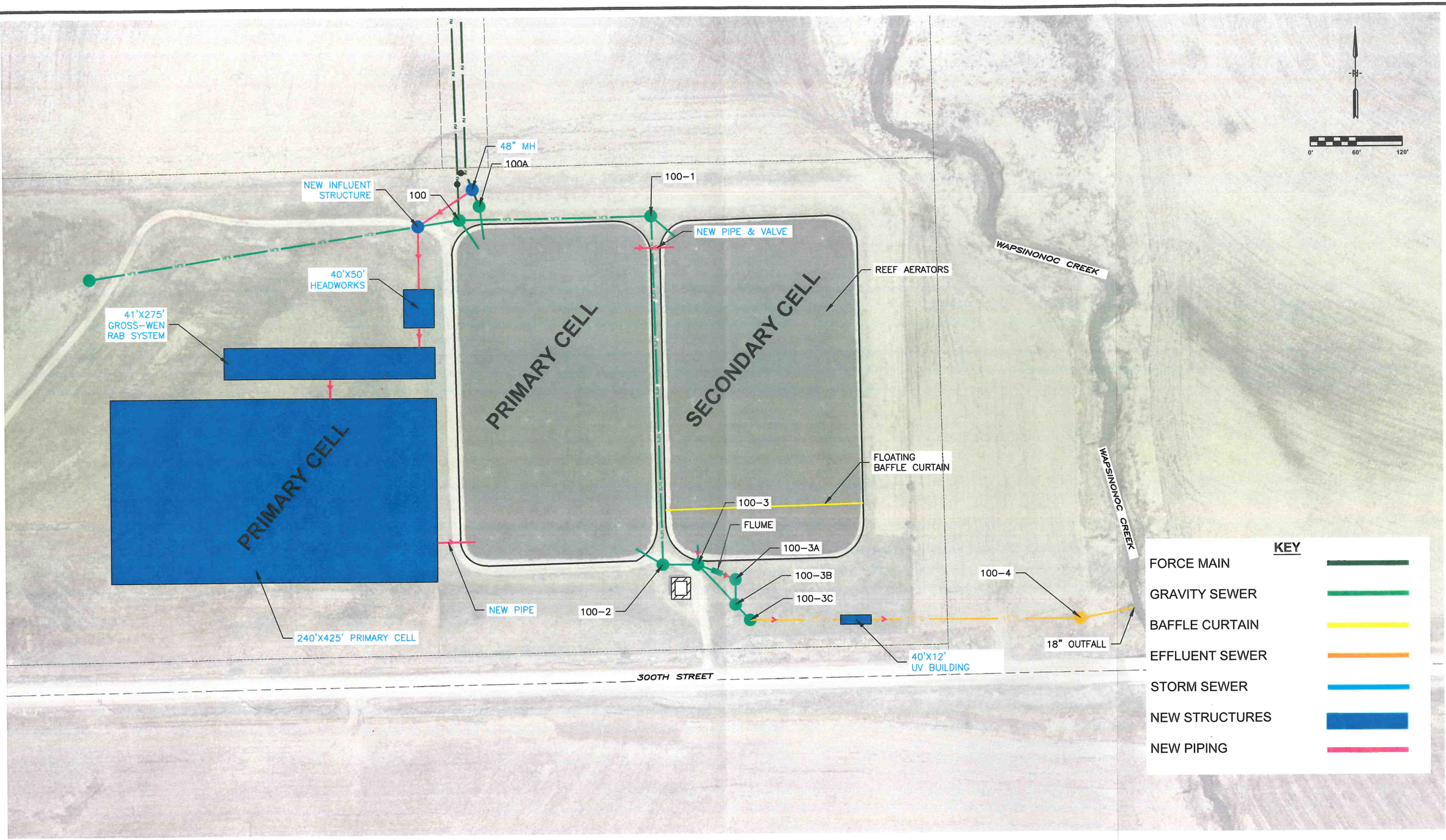
LEMNA SITE PLAN
WEST BRANCH, IOWA
FIGURE 8

This alternative is considered one of the less degrading of the alternatives found to be reasonable due to the following factors:

1. Effluent mass loads from this process for $CBOD_5$, TSS, and ammonia are expected to be lower than other reasonable treatment process alternatives (similar to mechanical treatment).

2. The RAB process would incorporate provisions for biological nutrient removal in the design.

Alternative No. 10 provides sufficient treatment to meet the effluent limits listed in the newly received NPDES permit. This treatment alternative could be expanded on the existing lagoon site if future growth is greater than anticipated. If the City is issued TN and TP limits, the RAB system would allow the City to comply with the more stringent nutrient limits. Evaluation of Alternative No. 10 indicated the second highest 20-year present worth cost. Although the RAB system is approved for use by the DNR, it does not have any full-scale plants currently in operation.



V&K

VEENSTRA & KIMM, INC.

GROSS-WEN SITE PLAN
WEST BRANCH, IOWA
FIGURE 9

ALTERNATIVES SUMMARY

Table 9 summarizes the alternatives identified for wastewater treatment.

Table 9: Alternatives Project Costs

Alt. No.	Description	Present Day Cost
1.	Recycle/Reuse	N/A
2.	Land Application	$13,903,000*
3.	Regional Treatment	$16,353,000*
4.	Mechanical Treatment – SBR	$8,405,000
5.	Mechanical Treatment – Aer-Mod SEQUOX	$10,484,000
6.	Mechanical Treatment – Biolac	$9,464,000
7.	E.T.A.L.: SAGR (BPCA)	$7,266,000
8.	E.T.A.L.: NitrOx	$9,358,000
9.	E.T.A.L.: Lemtec	$8,519,000
10.	Revolving Algal Biofilm	$9,911,000

*Alt. No. 2 and 3 - The cost for a SAGR system (i.e. the BPCA) to treat currently permitted flows was added to the cost of the alternative. A SAGR system to meet currently permitted flows is estimated to be $5,728,000.

Table 10 summarizes the evaluation of alternatives with respect to classification as non-degrading, less degrading or the base pollution control alternative as well as the practicability, economic efficiency and affordability of each alternative.

Table 10: Alternative Classification and Evaluation

Alt. No.	BPCA, NDA or LDA?	Is the Alternative Reasonable?					
		Practicable?	Economically Efficient?	% of BPCA	Affordable?[1]	% of MHI[2]	Reasonable?
1.	NDA	No	N/A	-	N/A	-	No
2.	NDA	No	No	-	N/A	-	No
3.	NDA	No	No	-	N/A	-	No
4.	LDA	Yes	Yes	116	Yes	0.73%	Yes
5.	LDA	Yes	Yes	144	Yes	0.91%	Yes
6.	LDA	Yes	Yes	130	Yes	0.83%	Yes
7.	BPCA	Yes	Yes	100	Yes	0.64%	Yes
8.	LDA	Yes	Yes	129	Yes	0.79%	Yes
9.	LDA	Yes	Yes	117	Yes	0.76%	Yes
10.	LDA	Yes	Yes	136	Yes	0.88%	Yes

1. Based on financial capability indicators described in EPA's 1995 Interim Economic Guidance for Water Quality Standards Workbook and 1997 CSO Guidance for Financial Capability Assessment and Schedule Development document, all of the alternatives deemed reasonable are characterized as "medium burden" based on primary and secondary tests. For purposes of this Alternatives Analysis, no attempt has been made to thoroughly evaluate far-reaching and serious socioeconomic impacts and all of the practicable and economically efficient alternatives have been deemed affordable based on the primary and secondary tests alone. According to the scheduling boundaries established in the EPA CSO financial capability document, an implementation period of up to 10 years for the proposed improvements may be appropriate. However, due to the City's historic and projected growth rate, it is anticipated that a shorter schedule will be necessary to keep pace with development. Any additional time requested beyond that required for adequate planning, design and construction would be utilized to attempt to secure additional funding to alleviate the financial burden on residents resulting from the project.

2. % of MHI = Total annual cost of proposed treatment/MHI, assuming 1,085 households, a median household income of $62,083, no grant funding and financing the project with a 20-year SRF loan at an effective annual interest rate of 2.00%. Number of households and MHI source: https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml?src=bkmk

PREFERRED ALTERNATIVE

Alternative No. 7, installing an enhanced treatment aerated lagoon SAGR system, is the preferred reasonable treatment alternative based on anticipated treatment performance and financial concerns. Table 11 summarizes evaluation of the reasonable alternatives on a pollutant-by-pollutant basis.

Table 11: Reasonable Alternatives Degradation Comparison

Pollutant of Concern	Potential Degradation? Alternative No.							Comments
	4	5	6	7	8	9	10	
$CBOD_5$	No	No	No	No	No	No	No	Anticipated removal efficiencies are expected to increase for Alternatives 4, 5, 6, 7, 8, 9 and 10 as compared to existing. For Alternatives 4, 5, 6, 7, 8, 9 and 10 it is anticipated the mass loading would be at or below the current level.
TSS	No	No	No	No	No	No	No	Anticipated removal efficiencies are expected to increase for Alternatives 4, 5, 6, 7, 8, 9 and 10 as compared to existing. For Alternatives 4, 5, 6, 7, 8, 9 and 10 it is anticipated the mass loading would be at or below the current level.
Ammonia-Nitrogen	No[1]	No[1]	No[1]	No[1]	No	No	No[1]	Anticipated removal efficiencies are expected to increase for Alternatives 4, 5, 6, 7, 8, 9 and 10 as compared to existing. For Alternatives 4, 5, 6, 7, 8, 9 and 10 it is anticipated the mass loading would be at or below the current level.
E. coli	No	No	No	No	No	No	No	The existing facility does not disinfect. The addition of UV disinfection for all of the discharging alternatives will decrease the bacteria discharged to the receiving stream.
TRC	No	No	No	No	No	No	No	Applicable only if chlorine is used to disinfect. Chlorine disinfection is not proposed.
Total Nitrogen	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Alternatives 4, 5, 6, 7, 8, 9 and 10 can incorporate TN removal capabilities.
Phosphorus	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Alternatives 4, 5, 6, 7, 8, 9 and 10 can incorporate phosphorus removal capabilities.
Priority Pollutants[2]	Yes	Yes	Yes	Yes	Yes	Yes	Yes	See Note 2 below.

1. Based on more stringent effluent limitations listed in new NPDES permit.

2. 567 IAC 61 lists a total of 88 priority pollutants, some of which may reasonably be expected to be present in a treated municipal effluent absent significant industrial contributors. For example, lead and copper may be present in the treated effluent (and the drinking water supply) due to plumbing corrosion. To date the existing treatment facility has not been required to test for any priority pollutants due to lack of significant contributing industries that discharge any of the constituents to the sanitary sewer system and

associated lack of reasonable potential to violate water quality standards criteria for these constituents. The concentrations of priority pollutants are not expected to increase as the result of additional wastewater flows and loadings. However, in as much as these constituents may be present in the effluent and the proposed treatment system is not designed to remove them, the total mass discharged to the receiving stream may increase.

JUSTIFICATION OF DEGRADATION

The preferred treatment alternative will result in attainment of all secondary and WQBELs, and will also result in improved water quality with respect to a number of pollutants. The proposed treatment facility will reduce stream pollutant loadings for BOD, TSS, ammonia, E. coli and nutrients.

In addition, the mass of micro constituents (i.e. priority pollutants) are expected to increase in proportion to City growth. It should be noted that at this time the levels of these pollutants in the existing plant influent and effluent are unknown, or based on limited monitoring or absence of industrial contributors, have been deemed to meet applicable water quality standards. It should also be noted that treatment to remove these pollutants is, as a general rule, not feasible where they are part of a combined municipal wastewater stream. Such pollutants are best addressed through source reduction efforts.

As described above, it has been determined that degradation for some POCs will result from the projected growth of the community and implementation of the preferred treatment alternative. Since Iowa's Antidegradation Implementation Procedures apply to net mass pollutant increases irrespective of effluent or receiving stream pollutant concentrations, and because they do not exempt POCs that are not feasible to remove absent source reduction efforts, the Social and Economic Importance (SEI) of the project must be demonstrated.

PROJECT SOCIAL AND ECONOMIC IMPORTANCE

1. Identify the affected community:

   The affected community is the City of West Branch. The project is a municipally owned public treatment works. The entire population of the community will benefit from (and bear the costs of) the project.

2. Identify relevant factors that characterize the social and economic conditions of the affected community:

   Table 12 lists relevant economic statistics for the City.

   Community services currently include electricity provided by Alliant and Linn County REC, natural gas provided by Alliant Energy, water and sewer provided by

the City, and telecommunications services through Liberty Communications, Mediacom, Centurylink, DirectTV and Dish Network. The City is part of the West Branch Community School District with all schools in the school district being located in the City of West Branch. Cultural and recreational facilities include a number of public parks, a library, the Herbert Hoover Presidential Library and other recreational facilities within or surrounding the community. There are no known potential public health, safety or environmental problems.

Table 12: West Branch, IA SEI Factors

Factor	Status	Notes	Source	State Average
Rate of Employment	Not Available	Population 16 years and over in civilian labor force	2	67.5%
Rate of Unemployment[1]	2.3%	Population 16 years and over in civilian labor force	3	2.6%
Median Household Income	$62,083	2018 Estimate	4, 2	$56,570
Poverty Level	7.3%	Individuals below poverty level in 2015	4, 2	10.7%
Population Trends	+7.5%	Approximate increase from 2010 to 2018	5, 4	+3.6%

[1] Cedar County Average

[2] https://www.census.gov/quickfacts/IA

[3] https://www.iowaworkforcedevelopment.gov/local-area-unemployment-statistics

[4] https://datausa.io/profile/geo/west-branch-ia/

[5] Engineer's Facility Plan

3. Describe the important social and economic development associated with the project:

   The proposed project is necessary to meet new effluent permit limits and maintain adequate sewage treatment for the City. Due to more stringent effluent limits, the community requires both expansion of treatment capacity and improvement of treatment.

   The project is not expected to directly affect community employment rates, income levels, population trends or housing starts. However, it will have indirect impacts on some of these factors. The existing and proposed infrastructure will be funded through municipal sewer revenues and will have a number of economic and non-economic impacts including:

a. Sewer utility bills will need to be increased. Although total wastewater conveyance and treatment costs as a percentage of MHI will be below what EPA considers a "high burden" the significant increase in utility bills will require a greater portion of household income to be directed toward wastewater services. It is possible that the project may result in slower community growth rates if future potential residents deem the rates unaffordable and locate elsewhere to avoid this cost.

b. By increasing the treatment capacity and degree of treatment provided, the project will benefit the receiving stream as well as the aquatic and recreational beneficial uses associated with it.

c. By increasing the treatment capacity, the project will allow for continued growth of the community.

PUBLIC NOTIFICATION

A public notice was published in the West Branch Times on August 15, 2019. The notice was also posted at City Hall. The notice was sent to the US EPA Region VII, US Fish and Wildlife Service, Iowa Environmental Council, Environmental Law & Policy Center, Iowa League of Cities, IDNR Field Office No. 6, and Cedar County Public Health. No comments were received during the public comment period.

APPENDIX A

NPDES PERMIT

IOWA DEPARTMENT OF NATURAL RESOURCES

National Pollutant Discharge Elimination System (NPDES) Permit

OWNER NAME & ADDRESS

CITY OF WEST BRANCH
CITY CLERK, CITY HALL
P.O. BOX 218
WEST BRANCH, IA 52358

FACILITY NAME & ADDRESS

WEST BRANCH CITY OF STP
OFF OF FAWCETT DR., SOUTH SIDE
OF TOWN
WEST BRANCH, IA 52358

Section 8, T79N, R04W
Cedar County

IOWA NPDES PERMIT NUMBER: 1694001
DATE OF ISSUANCE: 09/01/2017
DATE OF EXPIRATION: 8/31/2022

YOU ARE REQUIRED TO FILE FOR RENEWAL OF THIS PERMIT BY: 03/01/2022
EPA NUMBER: IA0032859

This permit is issued pursuant to the authority of section 402(b) of the Clean Water Act (33 U.S.C 1342(b)), Iowa Code section 455B.174, and rule 567-64.3, Iowa Administrative Code. You are authorized to operate the disposal system and to discharge the pollutants specified in this permit in accordance with the effluent limitations, monitoring requirements and other terms set forth in this permit.

You may appeal any condition of this permit by filing a written notice of appeal and request for administrative hearing with the director of this department within 30 days of your receipt of this permit.

Any existing unexpired Iowa operation permit or Iowa NPDES permit previously issued by the department for the facility identified above is revoked by the issuance of this permit. This provision does not apply to any authorization to discharge under the terms and conditions of a general permit issued by the department or to any permit issued exclusively for the discharge of stormwater.

FOR THE DEPARTMENT OF NATURAL RESOURCES

By _____

Libby Atwater
NPDES Section
ENVIRONMENTAL SERVICES DIVISION

Facility Name: WEST BRANCH CITY OF STP

Permit Number: 1694001

Outfall No.: 001 DISCHARGE FROM A THREE CELL AERATED LAGOON

Receiving Stream: WEST BRANCH WAPSINONOC CREEK

Route of Flow: WEST BRANCH WAPSINONOC CREEK

Class A2 waters are secondary contact recreational use waters in which recreational or other uses may result in contact with the water that is either incidental or accidental. During the recreational use, the probability of ingesting appreciable quantities of water is minimal. Class A2 uses include fishing, commercial and recreational boating, any limited contact incidental to shoreline activities and activities in which users do not swim or float in the water body while on a boating activity.

Waters designated Class B(WW2) are those in which flow or other physical characteristics are capable of supporting a resident aquatic community that includes a variety of native nongame fish and invertebrate species. The flow and other physical characteristics limit the maintenance of warm water game fish populations. These waters generally consist of small perennially flowing streams.

Bypasses from any portion of a treatment facility or from a sanitary sewer collection system designed to carry only sewage are prohibited.

Facility Name: WEST BRANCH CITY OF STP
Permit Number: 1694001

Effluent Limitations:

You are prohibited from discharging pollutants except in compliance with the following effluent limitations:

001 DISCHARGE FROM A THREE CELL AERATED LAGOON

Outfall: 001 Effective Dates: 09/01/2017 to 8/31/2022			
Parameter	**Season**	**Limit Type**	**Limits**
CBOD5			**85% Removal Required**
	Yearly	7 Day Average	40 MG/L 264 LBS/DAY
	Yearly	30 Day Average	25 MG/L 165 LBS/DAY
TOTAL SUSPENDED SOLIDS			
	Yearly	7 Day Average	120 MG/L 792 LBS/DAY
	Yearly	30 Day Average	80 MG/L 528 LBS/DAY
DISSOLVED OXYGEN			
	Yearly	Minimum	5.0 MG/L
PH			
	Yearly	Daily Maximum	9.0 STD UNITS
	Yearly	Minimum	6.5 STD UNITS

Facility Name: WEST BRANCH CITY OF STP

Permit Number: 1694001

Outfall: 001 Effective Dates: 09/01/2017 to 12/31/2021			
Parameter	**Season**	**Limit Type**	**Limits**
AMMONIA NITROGEN (N)			
	JAN	30 Day Average	29.6 MG/L 79 LBS/DAY
	JAN	Daily Maximum	55.2 MG/L 163 LBS/DAY
	FEB	30 Day Average	32 MG/L 87 LBS/DAY
	FEB	Daily Maximum	63.7 MG/L 190 LBS/DAY
	MAR	30 Day Average	27.3 MG/L 72 LBS/DAY
	MAR	Daily Maximum	47.9 MG/L 139 LBS/DAY
	APR	30 Day Average	14.2 MG/L 34 LBS/DAY
	APR	Daily Maximum	32 MG/L 93 LBS/DAY
	MAY	30 Day Average	13.2 MG/L 31 LBS/DAY
	MAY	Daily Maximum	20.1 MG/L 93 LBS/DAY
	JUN	30 Day Average	11.4 MG/L 25 LBS/DAY
	JUN	Daily Maximum	15.5 MG/L 93 LBS/DAY
	JUL	30 Day Average	12.2 MG/L 24 LBS/DAY
	JUL	Daily Maximum	13.3 MG/L 88 LBS/DAY
	AUG	30 Day Average	11 MG/L 23 LBS/DAY
	AUG	Daily Maximum	11 MG/L 73 LBS/DAY
	SEP	30 Day Average	11.9 MG/L 27 LBS/DAY
	SEP	Daily Maximum	13.2 MG/L 87 LBS/DAY
	OCT	30 Day Average	16.8 MG/L 43 LBS/DAY
	OCT	Daily Maximum	18.9 MG/L 110 LBS/DAY
	NOV	30 Day Average	23.2 MG/L 58 LBS/DAY
	NOV	Daily Maximum	25.2 MG/L 100 LBS/DAY
	DEC	30 Day Average	25.2 MG/L 65 LBS/DAY
	DEC	Daily Maximum	41.5 MG/L 118 LBS/DAY

Facility Name: WEST BRANCH CITY OF STP

Permit Number: 1694001

Outfall: 001 Effective Dates: 01/01/2022 to 08/31/2022			
Parameter	**Season**	**Limit Type**	**Limits**
AMMONIA NITROGEN (N)			
	JAN	30 Day Average	5.2 MG/L 34.1 LBS/DAY
	JAN	Daily Maximum	19.9 MG/L 131.4 LBS/DAY
	FEB	30 Day Average	5.8 MG/L 38.4 LBS/DAY
	FEB	Daily Maximum	8.4 MG/L 55.5 LBS/DAY
	MAR	30 Day Average	3.9 MG/L 25.6 LBS/DAY
	MAR	Daily Maximum	3.9 MG/L 25.6 LBS/DAY
	APR	30 Day Average	2.1 MG/L 13.9 LBS/DAY
	APR	Daily Maximum	4.7 MG/L 31.1 LBS/DAY
	MAY	30 Day Average	1.8 MG/L 12.1 LBS/DAY
	MAY	Daily Maximum	3.2 MG/L 21.2 LBS/DAY
	JUN	30 Day Average	1.3 MG/L 8.9 LBS/DAY
	JUN	Daily Maximum	3.2 MG/L 21.2 LBS/DAY
	JUL	30 Day Average	1.1 MG/L 7.1 LBS/DAY
	JUL	Daily Maximum	3.2 MG/L 21.2 LBS/DAY
	AUG	30 Day Average	1.0 MG/L 6.5 LBS/DAY
	AUG	Daily Maximum	2.7 MG/L 17.5 LBS/DAY
	SEP	30 Day Average	1.5 MG/L 9.8 LBS/DAY
	SEP	Daily Maximum	2.7 MG/L 17.5 LBS/DAY
	OCT	30 Day Average	2.7 MG/L 17.5 LBS/DAY
	OCT	Daily Maximum	2.7 MG/L 17.5 LBS/DAY
	NOV	30 Day Average	2.7 MG/L 17.5 LBS/DAY
	NOV	Daily Maximum	2.7 MG/L 17.5 LBS/DAY
	DEC	30 Day Average	3.9 MG/L 25.6 LBS/DAY
	DEC	Daily Maximum	3.9 MG/L 25.6 LBS/DAY

Facility Name: WEST BRANCH CITY OF STP

Permit Number: 1694001

Outfall: 001 Effective Dates: 01/01/2022 to 08/31/2022			
Parameter	**Season**	**Limit Type**	**Limits**
E. COLI			
	MAR	Geometric Mean	630 #/100 ML
	APR	Geometric Mean	630 #/100 ML
	MAY	Geometric Mean	630 #/100 ML
	JUN	Geometric Mean	630 #/100 ML
	JUL	Geometric Mean	630 #/100 ML
	AUG	Geometric Mean	630 #/100 ML
	SEP	Geometric Mean	630 #/100 ML
	OCT	Geometric Mean	630 #/100 ML
	NOV	Geometric Mean	630 #/100 ML

Facility Name: WEST BRANCH CITY OF STP
Permit Number: 1694001

Monitoring and Reporting Requirements

(a) Samples and measurements taken shall be representative of the volume and nature of the monitored wastewater.

(b) Analytical and sampling methods specified in 40 CFR Part 136 or other methods approved in writing by the department shall be utilized. Samples collected for operational testing need not be analyzed by approved analytical methods; however, commonly accepted test methods should be used.

(c) You are required to report all data including calculated results needed to determine compliance with the limitations contained in this permit. The results of any monitoring not specified in this permit performed at the compliance monitoring point and analyzed according to 40 CFR Part 136 shall be included in the calculation and reporting of any data submitted in accordance with this permit. This includes daily maximums and minimums and 30-day and 7-day averages for all parameters that have concentration (mg/l) and mass (lbs/day) limits. In addition, flow data shall be reported in million gallons per day (MGD).

(d) Results of all monitoring shall be recorded on forms provided by, or approved by, the department, and shall be submitted to the appropriate regional field office of the department by the fifteenth day following the close of the reporting period. Your reporting period is on a MONTHLY basis, ending on the last day of each reporting period.

(e) Any records of monitoring activities and results shall include for all samples: the date, exact place and time of the sampling; the dates the analyses were performed; who performed the analyses; the analytical techniques or methods used; and the results of such analyses.

(f) Chapter 63 of the Iowa Administrative Code contains further explanation of these monitoring requirements.

Facility Name: WEST BRANCH CITY OF STP

Permit Number: 1694001

Outfall	Wastewater Parameter	Sample Frequency	Sample Type	Monitoring Location
The following monitoring requirements shall be in effect from 09/01/2017 to 08/31/2022				
001	BIOCHEMICAL OXYGEN DEMAND (BOD5)	2 TIMES PER WEEK	24 HOUR COMPOSITE	RAW WASTE
001	FLOW	7/WEEK OR DAILY	24 HOUR TOTAL	RAW WASTE
001	NITROGEN, TOTAL KJELDAHL (AS N)	1 EVERY MONTH	24 HOUR COMPOSITE	RAW WASTE
001	PH	2 TIMES PER WEEK	GRAB	RAW WASTE
001	TEMPERATURE	2 TIMES PER WEEK	GRAB	RAW WASTE
001	TOTAL SUSPENDED SOLIDS	1 TIME PER WEEK	24 HOUR COMPOSITE	RAW WASTE
001	CBOD5	2 TIMES PER WEEK	GRAB	EFFLUENT PRIOR TO DISINFECTION
001	TOTAL SUSPENDED SOLIDS	1 TIME PER WEEK	GRAB	EFFLUENT PRIOR TO DISINFECTION
001	AMMONIA NITROGEN (N)	2 TIMES PER WEEK	GRAB	EFFLUENT AFTER DISINFECTION
001	DISSOLVED OXYGEN	2 TIMES PER WEEK	GRAB	EFFLUENT AFTER DISINFECTION
001	NITROGEN, TOTAL (AS N)	1 EVERY 3 MONTHS	GRAB	EFFLUENT AFTER DISINFECTION
001	PH	2 TIMES PER WEEK	GRAB	EFFLUENT AFTER DISINFECTION
001	PHOSPHORUS, TOTAL (AS P)	1 EVERY 3 MONTHS	GRAB	EFFLUENT AFTER DISINFECTION
001	TEMPERATURE	2 TIMES PER WEEK	GRAB	EFFLUENT AFTER DISINFECTION
The following monitoring requirements shall be in effect from 01/01/2022 to 08/31/2022				
001	E. COLI	GEO. MEAN 1/3 MONTHS	GRAB	EFFLUENT AFTER DISINFECTION

Facility Name: WEST BRANCH CITY OF STP
Permit Number: 1694001

Special Monitoring Requirements

Outfall #	Description
001	AMMONIA NITROGEN (N)

Ammonia shall be sampled and analyzed using an EPA approved method specified in 40 CFR 136 or using the Timberline Method Ammonia-001 alternative test procedure.

NITROGEN, TOTAL (AS N)

Total Nitrogen is to be calculated as Total Kjeldahl Nitrogen (TKN) + Nitrate+ Nitrite (as N). TKN and Nitrate+ Nitrite (as N) analysis must be conducted per the methods specified in 40 CFR 136.

E. COLI

The limit for E. coli of 630 org/100 ml specified in the limits section of this permit for outfall 001 is a geometric mean. The disinfection season is established in the Iowa Administrative Code, Subparagraph 567 IAC 61.3(3)"a"(1), and is in effect from March 15 to November 15. Any disinfection system (chlorine, UV light, etc.) shall be operated to comply with the limit during the entire disinfection season whenever wastewater is being discharged from outfall 001.
The facility must collect and analyze a minimum of five samples in one calendar month during each 3-month period from March 15 to November 15. The 3-month periods are March – May, June – August, and September – November. The collection of five samples in each 3-month period will result in a minimum of 15 samples being collected during a calendar year. For example, for the first 3-month period, the operator may choose April as the calendar month to collect the 5 individual E. coli samples to determine compliance with the limits. The operator may also choose the months of March or May as well, as long as each of the 5 samples is collected during a single calendar month. The same principle applies to the other two 3-month periods during the disinfection season. The following requirements apply to the individual samples collected in one calendar month:
Samples must be spaced over one calendar month.
No more than one sample can be collected on any one day.
There must be a minimum of two days between each sample.
No more than two samples may be collected in a period of seven consecutive days.

If the effluent has been disinfected using chlorine, ultraviolet light (UV), or any other process intended to disrupt the biological integrity of the E. coli, the samples shall be analyzed using the Most Probable Number method found in Standard Method 9223B (Colilert® or Colilert-18® made by IDEXX Laboratories, Inc.). If the effluent has not been disinfected the samples may be analyzed using either the MPN method above or EPA Method 1603: Escherichia coli (E. coli) in water by membrane filtration using modified membrane-thermotolerant E. coli agar (modified mTEC) or mColiBlue-24® made by the Hach Company.

The geometric mean must be calculated using all valid sample results collected during a month. The geometric mean formula is as follows: Geometric Mean = (Sample one * Sample two * Sample three * Sample four *Sample five…Sample N)^(1/N), which is the Nth root of the result of the multiplication of all of the sample results where N = the number of samples. If a sample result is a less than value, the value reported by the lab without the less than sign should be used in the geometric mean calculation.

E.COLI CONTINUED

The geometric mean can be calculated in one of the following ways:
Use a scientific calculator that can calculate the powers of numbers.
Enter the samples in Microsoft Excel and use the function "GEOMEAN" to perform the calculation.
Use the geometric mean calculator on the Iowa DNR webpage at: http://www.iowadnr.gov/Environmental-Protection/Water-Quality/NPDES-Wastewater-Permitting/NPDES-Operator-Information/Bacteria-Sampling

Facility Name: WEST BRANCH CITY OF STP
Permit Number: 1694001

Design Capacity

Design: 1

The design capacity for the treatment works is specified in Construction Permit Number 87-207-S, issued Monday, March 25, 2002.
The treatment plant is designed to treat:
* An average dry weather (ADW) flow of 0.2420 Million Gallons Per Day (MGD).
* An average wet weather (AWW) flow of 0.7920 Million Gallons Per Day (MGD).
* A maximum wet weather (MWW) flow of 1.4400 Million Gallons Per Day (MGD).
* A design 5-day biochemical oxygen demand (BOD5) load of 544 lbs/day.

Operator Certification Type/Grade: WL/I

Wastes in such volumes or quantities as to exceed the design capacity of the treatment works or reduce the effluent quality below that specified in the operation permit of the treatment works are considered to be a waste which interferes with the operation or performance of the treatment works and are prohibited by rule IAC 567-62.1(7).

Facility Name: WEST BRANCH CITY OF STP

Permit Number: 1694001

SEWAGE SLUDGE HANDLING AND DISPOSAL REQUIREMENTS

"Sewage sludge" is solid, semisolid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge does not include the grit and screenings generated during preliminary treatment.

1. The permittee shall comply with all existing Federal and State laws and regulations that apply to the use and disposal of sewage sludge and with technical standards developed pursuant to Section 405(d) of the Clean Water Act when such standards are promulgated. If an applicable numerical limit or management practice for pollutants in sewage sludge is promulgated after issuance of this permit that is more stringent than a sludge pollutant limit or management practice specified in existing Federal or State laws or regulations, this permit shall be modified, or revoked and reissued, to conform to the regulations promulgated under Section 405(d) of the Clean Water Act. The permittee shall comply with the limitation no later than the compliance deadline specified in the applicable regulations.

2. The permittee shall provide written notice to the Department of Natural Resources prior to any planned changes in sludge disposal practices.

3. Land application of sewage sludge shall be conducted in accordance with criteria established in rule IAC 567--67.1 through 67.11 (455B).

Facility Name: WEST BRANCH CITY OF STP
Permit Number: 1694001

MAJOR CONTRIBUTING INDUSTRIES LIMITATIONS, MONITORING AND REPORTING REQUIREMENTS

1. You are required to notify the department, in writing, of any of the following:
(a) 180 days prior to the introduction of pollutants to your facility from a significant industrial user. A significant industrial user means an industrial user of a treatment works that:
(1) Discharges an average of 25,000 gallons per day or more of process wastewater excluding sanitary, noncontact cooling and boiler blowdown wastewater;
(2) Contributes a process waste stream which makes up five percent or more of the average dry weather hydraulic or organic capacity of the publicly-owned treatment works:
(3) Is subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; or
(4) Is designated by the department as a significant industrial user on the basis that the contributing industry, either singly or in combination with other contributing industries, has a reasonable potential for adversely affecting the operation of or effluent quality from the publicly-owned treatment works or for violating any pretreatment standards or requirements.

(b) 60 days prior to a proposed expansion, production increase or process modification that may result in the discharge of a new pollutant or a discharge in excess of limitations stated in the existing treatment agreement.

(c) 10 days prior to any commitment by you to accept waste from any new significant industrial user. Your written notification must include a new or revised treatment agreement in accordance with rule 64.3(5)(455B).

2. You shall require all users of your facility to comply with Sections 204(b), 307 and 308 of the Clean Water Act.

Section 204(b) requires that all users of the treatment works constructed with funds provided under Sections 201(g) or 601 of the Act to pay their proportionate share of the costs of operation, maintenance and replacement of the treatment works.

Section 307 of the Act requires users to comply with pretreatment standards promulgated by EPA for pollutants that would cause interference with the treatment process or would pass through the treatment works.

Section 308 of the Act requires users to allow access at reasonable times to state and EPA inspectors for the purpose of sampling the discharge and reviewing and copying records.

3. You shall limit and monitor pollutants for each significant industrial user as required elsewhere in this permit, and submit sample results to the department monthly. Your report shall be submitted by the fifteenth day of the following month.

Revised: June 16, 2009 CAC

Facility Name: WEST BRANCH CITY OF STP
Permit Number: 1694001

Ammonia Nitrogen and *E. coli* Compliance Schedule

1. The facility shall make necessary improvements to meet ammonia nitrogen and *E. coli* limits according to the following schedule:

- Complete a Self-Assessment Matrix and submit a Work Record Request form to DNR's Wastewater Engineering Section by*12/1/2017*. The forms and instructions are available on the DNR website at http://www.iowadnr.gov/InsideDNR/RegulatoryWater/WastewaterConstruction.aspx. Questions on the forms should be directed to either Terry Kirschenman at 515/725-8422 or Emy Liu at 515/725-8421.
- Submit progress report by *9/1/2018.*
- Submit a Facility Plan by *12/1/2018.* The Facility Plan shall be in accordance with Chapter 11.2 of the Iowa Wastewater Facilities Design Standards adopted April 25, 1979.
- Submit progress report by *9/1/2019.*
- Submit final plans and specifications by *3/1/2020.*
- Award contract for construction of wastewater treatment improvements by *8/1/2020.*
- Submit progress report by *5/1/2021.*
- Complete construction of wastewater treatment improvements by *12/1/2021.*
- Achieve compliance with all final ammonia nitrogen and *E. coli* limits by *1/1/2022.*

Within fourteen (14) days following all dates of compliance, the permittee shall provide written notice of compliance with the scheduled event. All written notices and progress reports shall be sent to the following address:

Iowa Department of Natural Resources
Environmental Services Division
Regional Office # 6
1023 West Madison
Washington, IA 52353

STANDARD CONDITIONS

1. **ADMINISTRATIVE RULES**
Rules of this Department that govern the operation of your facility in connection with this permit are published in Part 567 of the Iowa Administrative Code (IAC) in Chapters 60-65, 67, and 121. Reference to the term "rule" in this permit means the designated provision of Part 567 of the IAC. Reference to the term "CFR" means the Code of Federal Regulations.

2. **DEFINITIONS**
(a) 7 day average means the sum of the total daily discharges by mass, volume, or concentration during a 7 consecutive day period, divided by the total number of days during the period that measurements were made. Four 7 consecutive day periods shall be used each month to calculate the 7-day average. The first 7-day period shall begin with the first day of the month.
(b) 30 day average means the sum of the total daily discharges by mass, volume, or concentration during a calendar month, divided by the total number of days during the month that measurements were made.
(c) Daily maximum means the total discharge by mass, volume, or concentration during a twenty-four hour period.

3. **DUTY TO PROVIDE INFORMATION**
You must furnish to the Director, within a reasonable time, any information the Director may request to determine compliance with this permit or determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, in accordance with 567 IAC 64.3(11)"*c*". You must also furnish to the Director, upon request, copies of any records required to be kept by this permit.

4. **MONITORING AND RECORDS OF OPERATION**
(a) Maintenance of records. You shall retain for a minimum of three years all paper and electronic records of monitoring activities and results including all original strip chart recordings for continuous monitoring instrumentation and calibration and maintenance records. ***{See 567 IAC 63.2(3)}***
(b) Any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years, or both. ***{See 40 CFR 122.41(j)(5)}***

5. **SIGNATORY REQUIREMENTS**
Applications, reports or other information submitted to the Department in connection with this permit must be signed and certified in accordance with 567 IAC 64.3(8).

6. **OTHER INFORMATION**
Where you become aware that you failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, you must promptly submit such facts or information. Where you become aware that you failed to submit any relevant facts in the submission of in any report to the director, including records of operation, you shall promptly submit such facts or information. ***{See 567 IAC 60.4(2)"a" and 567 IAC 63.7}***

7. **TRANSFER OF TITLE OR OWNER ADDRESS CHANGE**
If title to your facility, or any part of it, is transferred the new owner shall be subject to this permit. You are required to notify the new owner of the requirements of this permit in writing prior to any transfer of title. The Director shall be notified in writing within 30 days of the transfer. No transfer of the authorization to discharge from the facility represented by the permit shall take place prior to notifying the department of the transfer of title. Whenever the address of the owner is changed, the department shall be notified in writing within 30 days of the address change. Electronic notification is not sufficient; all title transfers or address changes must be reported to the department by mail. ***{See 567 IAC 64.14}***

8. **PROPER OPERATION AND MAINTENANCE**
All facilities and control systems shall be operated as efficiently as possible and maintained in good working order. A sufficient number of staff, adequately trained and knowledgeable in the operation of your facility shall be retained at all times and adequate laboratory controls and appropriate quality assurance procedures shall be provided to maintain compliance with the conditions of this permit.
{See 40 CFR 122.41(e) and 567 IAC 64.7(7)"f"}

9. **PERMIT MODIFICATION, SUSPENSION OR REVOCATION**
(a) This permit may be modified, suspended, or revoked and reissued for cause including but not limited to those specified in 567 IAC 64.3(11).
(b) This permit may be modified due to conditions or information on which this permit is based, including any new standard the department may adopt that would change the required effluent limits. ***{See 567 IAC 64.3(11)}***
(c) If a toxic pollutant is present in your discharge and more stringent standards for toxic pollutants are established under Section 307(a) of the Clean Water Act, this permit will be modified in accordance with the new standards.
{See 40 CFR 122.62(a)(6) and 567 IAC 64.7(7)"g"}
The filing of a request for a permit modification, revocation or suspension, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

10. **DUTY TO REAPPLY AND PERMIT CONTINUATION**
If you wish to continue to discharge after the expiration date of this permit, you must file a complete application for reissuance at least 180 days prior to the expiration date of this permit. If a timely and sufficient application is submitted, this permit will remain in effect until the Department makes a final determination on the permit application. ***{See 567 IAC 64.8(1) and Iowa Code 17A.18}***

11. **DUTY TO COMPLY**
You must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. Issuance of this permit does not relieve you of the responsibility to comply with all local, state and federal laws, ordinances, regulations or other legal requirements applying to the operation of your facility. ***{See 40 CFR 122.41(a) and 567 IAC 64.7(4)"e"}***

STANDARD CONDITIONS

12. DUTY TO MITIGATE

You shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. ***{See 40 CFR 122.41(d) and 567 IAC 64.7(7)"i"}***

13. TWENTY-FOUR HOUR REPORTING

You shall report any noncompliance that may endanger human health or the environment, including, but not limited to, violations of maximum daily limits for any toxic pollutant (listed as toxic under 307(a)(1) of the Clean Water Act) or hazardous substance (as designated in 40 CFR Part 116 pursuant to 311 of the Clean Water Act). Information shall be provided orally within 24 hours from the time you become aware of the circumstances. A written submission that includes a description of noncompliance and its cause; the period of noncompliance including exact dates and times, whether the noncompliance has been corrected or the anticipated time it is expected to continue; and the steps taken or planned to reduce, eliminate, and prevent a reoccurrence of the noncompliance must be provided within 5 days of the occurrence. ***{See 567 IAC 63.12}***

14. OTHER NONCOMPLIANCE

You shall report all instances of noncompliance not reported under Condition #13 at the time monitoring reports are submitted. You shall give advance notice to the appropriate regional field office of the department of any planned activity which may result in noncompliance with permit requirements. ***{See 567 IAC 63.14}***

15. INSPECTION OF PREMISES, RECORDS, EQUIPMENT, METHODS AND DISCHARGES

You are required to permit authorized personnel to:

(a) Enter upon the premises where a regulated facility or activity is located or conducted or where records are kept under conditions of this permit;

(b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(c) Inspect, at reasonable times, any facilities, equipment, practices or operations regulated or required under this permit; and

(d) Sample or monitor, at reasonable times, to assure compliance or as otherwise authorized by the Clean Water Act.

16. FAILURE TO SUBMIT FEES

This permit may be revoked, in whole or in part, if the appropriate permit fees are not submitted within thirty (30) days of the date of notification that such fees are due. ***{See 567 IAC 64.16(1)}***

17. NEED TO HALT OR REDUCE ACTIVITY

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit. ***{See 40 CFR 122.41(c) and 567 IAC 64.7(7)"j"}***

18. NOTICE OF CHANGED CONDITIONS

You are required to notify the director of any changes in existing conditions or information on which this permit is based. This includes, but is not limited to, the following:

(a) If your facility is a publicly owned treatment works (POTW) or otherwise may accept waste for treatment from an indirect discharger or industrial contributor (See 567 IAC 64.3(5) for further notice requirements).

(b) If your facility is a POTW and there is any substantial change in the volume or character of pollutants being introduced to the POTW by a source introducing pollutants into the POTW at the time of issuance of the permit. ***{See 40 CFR 122.42(b)}***

(c) As soon as you know or have reason to believe that any activity has occurred or will occur which would result in the discharge of any toxic pollutant which is not limited in this permit. ***{See 40 CFR 122.42(a)}***

(d) If you have begun or will begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the permit application.

19. PLANNED CHANGES

The permittee shall give notice to the appropriate regional field office of the department 30 days prior to any planned physical alterations or additions to the permitted facility. Notice is required only when:

(a) Notice has not been given to any other section of the department. (Note: Facility expansions, production increases, or process modifications which may result in new or increased discharges of pollutants must be reported to the Director in advance. If such discharges will exceed effluent limitations, your report must include an application for a new permit. If any modification of, addition to, or construction of a disposal system is to be made, you must first obtain a written permit from this Department. In addition, no construction activity that will result in disturbance of one acre or more shall be initiated without first obtaining coverage under NPDES General Permit No. 2 for "Storm water discharge associated with construction activity.") ***{See 567 IAC 64.7(7)"a" and 64.2}***

(b) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source as defined in 567 IAC 60.2;

(c) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices; or

(d) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in the permit. ***{See 567 IAC 63.13 and 63.14}***

20. USE OF CERTIFIED LABORATORIES

Analyses of wastewater, groundwater or sewage sludge that are required to be submitted to the department as a result of this permit must be performed by a laboratory certified by the State of Iowa. Routine, on-site monitoring for pH, temperature, dissolved oxygen, total residual chlorine and other pollutants that must be analyzed immediately upon sample collection, settleable solids, physical measurements, and operational monitoring tests specified in 567 IAC 63.3(4) are excluded from this requirement.

STANDARD CONDITIONS

21. BYPASSES

(a) Definition. "Bypass" means the diversion of waste streams from any portion of a treatment facility or collection system. A bypass does not include internal operational waste stream diversions that are part of the design of the treatment facility, maintenance diversions where redundancy is provided, diversions of wastewater from one point in a collection system to another point in a collection system, or wastewater backups into buildings that are caused in the building lateral or private sewer line.

(b) Prohibitions.

i. Bypasses from any portion of a treatment facility or from a sanitary sewer collection system designed to carry only sewage are prohibited.

ii. Bypass is prohibited and the department may not assess a civil penalty against a permittee for bypass if the permittee has complied with all of the following:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage; and

(2) There were no feasible alternatives to the bypass such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate backup equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

(3) The permittee submitted notices as required by paragraph (d) of this section.

(c) The Director may approve an anticipated bypass after considering its adverse effects if the Director determines that it will meet the three conditions listed above and a request for bypass has been submitted to the Department in accordance with 567 IAC 63.6(2).

(d) Reporting bypasses. Bypasses shall be reported in accordance with 567 IAC 63.6.

22. UPSET PROVISION

(a) Definition. "Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

(b) Effect of an upset. An upset constitutes an affirmative defense in an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph *"c"* of this condition are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

(c) Conditions necessary for demonstration of an upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate through properly signed operating logs or other relevant evidence that;

i. An upset occurred and that the permittee can identify the cause(s) of the upset;

ii. The permitted facility was at the time being properly operated;

iii. The permittee submitted notice of the upset to the Department in accordance with 567 IAC 63.6(3); and

iv. The permittee complied with any remedial measures required in accordance with 567 IAC 63.6(6)"*b*".

(d) Burden of Proof. In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

23. PROPERTY RIGHTS

This permit does not convey any property rights of any sort or any exclusive privilege. ***{See 567 IAC 64.4(3)"b"}***

24. EFFECT OF A PERMIT

Compliance with a permit during its term constitutes compliance, for purposes of enforcement, with Sections 301, 302, 306, 307, 318, 403 and 405(a)-(b) of the Clean Water Act, and equivalent limitations and standards set out in 567 IAC Chapters 61 and 62. ***{See 567 IAC 64.4(3)"a"}***

25. SEVERABILITY

The provisions of this permit are severable and if any provision or application of any provision to any circumstance is found to be invalid by this department or a court of law, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected by such finding.

APPENDIX B

WASTELOAD ALLOCATIONS

City of West Branch

(Proposed Design Flow Increase)

(Please do not microfiche this document.)

This Package Contains

WASTELOAD ALLOCATION CALCULATIONS & NOTES

Please Do Not Separate

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: West Branch, City of STP — Sewage File Number: 6-16-94-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 001	**ADW = 0.334 mgd & AWW = 0.924 mgd**			
CBOD5	Secondary Treatment Levels Will Not Violate WQS			
Total D.O.	Minimum Concentration (mg/l)			
January - December	5.0			
Ammonia - Nitrogen				
January	3.4	19.9	26.2	153.3
February	4.0	8.4	30.5	64.8
March	3.4	3.9	26.2	29.9
April	1.5	4.7	11.7	36.3
May	1.7	3.2	13.4	24.7
June	1.3	3.2	10.1	24.7
July	1.0	3.2	7.7	24.7
August	1.0	2.7	7.4	20.4
September	1.1	2.7	8.1	20.4
October	1.6	2.7	12.0	20.4
November	2.3	2.7	17.9	20.4
December	2.5	3.9	19.1	29.9
Bacteria	Geometric Mean (#org./100 ml)		March 15th – November 15th	
E. coli	630			
Chloride	389	629	2,995	4,846
Sulfate	1,514	1,514	11,665	11,665
TRC*	0.009	0.019	0.066	0.146
pH	6.5 to 9.0 Standard Units			

Stream Network/Classification of Receiving Stream: West Branch Wapsinonoc Creek (A2, B(WW-2))

Annual critical low flows in West Branch Wapsinonoc Creek at the outfall:
1Q10 flow 0.0 cfs, 7Q10 flow 0.0 cfs, 30Q10 flow 0.0 cfs

Excel spreadsheet calculations [X] Qual II E model [ ] Qual II E modeling date [ ]

Performed by: Alex Martin

*Only required if chlorine is used for disinfection.

Antidegradation Review Requirement

A tier II antidegradation review is required. See Section 2 for details.

Please note that the antidegradation review conducted in this wasteload allocation is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.

WLAs/Permit Limits for the City of West Branch's Aerated Facultative Lagoon

These wasteload allocations and water quality based permit limitations are for the City of West Branch's wastewater discharge. The wasteload allocations/permit limits are based on the Water Quality Standards (IAC 567.61) and 'Iowa Wasteload Allocation (WLA) Procedure', February 21, 2018. The chloride allocation/permit limits are based on the criteria that became effective on November 11, 2009.

The water quality based limits in this WLA are calculated to meet the surface water quality criteria to protect downstream uses. There could be technology based limits applicable to this facility that are more stringent than the water quality based limits shown in this WLA. The technology based limits could be derived from either federal guidelines based on different industrial categories or permit writer's judgment.

1. BACKGROUND:

The City of West Branch discharges treated domestic wastewater from an aerated facultative lagoon into West Branch Wapsinonoc Creek (at 41° 39' 25" N, 91° 19' 52" W). This WLA is for the purpose of increasing the design flows.

Route of flow and use designations:

West Branch Wapsinonoc Creek is an A2, B(WW-2) designated use waterbody. The designations have been adopted in Iowa's state rule described in the rule referenced document of Surface Water Classification effective on June 17, 2015. Based on the pollutants of concern, the use designations of waterbodies further downstream will not impact the resulting limits for this facility.

Critical low flow determination:

The annual critical low flows in West Branch Wapsinonoc Creek at the outfall are estimated based on the Regional Regression Equations (RRE) from 'Methods for estimating selected low-flow frequency statistics and harmonic mean flows for streams in Iowa', 2012 (revised 2013).

Table 1: Annual Critical Low Flows

Location	D.A. (mi^2)	1Q10 (cfs)	7Q10 (cfs)	30Q10 (cfs)
West Branch Wapsinonoc Creek at the Outfall	8.3	0.0	0.0	0.0

2. ANTIDEGRADATION REVIEW:

According to the Iowa Antidegradation Implementation Procedure, effective February 17, 2010 (IAC 567-61.2(2).e), all new or expanded regulated activities (with limited exceptions, such as unsewered communities) are subject to antidegradation review requirements.

Table 2: Antidegradation Review Analysis

Item #	Factor or Scenario	Antidegradation Determination	Analysis/Comments
1	Design Capacity Increase	Yes ☒, No ☐, or Not Applicable ☐	1: Proposed design capacity shown on the request form.
2	Significant Industrial Users (SIU) Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	
3	New Process Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	
4	Less Stringent Water Quality Based Limits?	Yes ☐, No ☒, or Not Applicable ☐	
5	Outfall Location Change	Yes ☐, No ☒, or Not Applicable ☐	
Conclusion and discussion: Due to Item 1, a tier II antidegradation review is required. Please note that the antidegradation review conducted in this WLA is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.			

3. TOTAL MAXIMUM DAILY LOAD (TMDL) LIMITATIONS:

The following waterbodies in the discharge route are on the 2016 impaired waters list:

- Cedar River for bacteria (indicator bacteria – *E. coli*) and pH
- Iowa River for bacteria (indicator bacteria – *E. coli*)
- Mississippi River for metals (aluminum)

Two TMDLs along the discharge route have been completed for *E. coli*, one for the Iowa River and one for the Cedar River. West Branch was given a TMDL WLA in the Cedar River TMDL. However, it is not applicable as West Branch is downstream of the last segment addressed by the TMDL. The Iowa River *E. coli* TMDL addresses impaired segments below the mouth of the Cedar River. However, it does not apply limits to facilities in the Cedar River watershed.

There are no other approved or scheduled TMDLs in the discharge route at this time.

Please note that the results presented in this report are wasteload allocations based on meeting the State's current water quality standards in the receiving waterbody. Additional and/or more stringent effluent limits may be applicable to this discharge based on approved TMDLs for impaired waterbodies, which may provide watershed based wasteload allocations. Information on impaired streams in Iowa and approved TMDLs can be found at the following website: http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Improvement/Impaired-Waters.

4. CALCULATIONS:

The WLAs/permit limits for this outfall are calculated based on the facility's Average Dry Weather (ADW) design flow of 0.334 mgd and its Average Wet Weather (AWW) design flow of 0.924 mgd.

Please note that only wasteload allocations/permit limits (water quality based effluent limits) calculated using DNR approved design flows can be applied in NPDES permits. Water quality based effluent limits

calculated using proposed flows that have not been approved by the DNR for permitting and compliance may be used for informational purposes only.

The water quality based permit concentration limits are derived using the allowed stream flow and the ADW design flow, while the loading limits are derived using the allowed stream flow and the AWW design flow.

TRC:
The TRC wasteload allocations will consider the procedures included in the 2000 revised WQS and the 2007 chemical criteria. Important to TRC is the use of the 1Q10 stream flow in association with the acute wasteload allocation calculation. The chronic WLA will continue to use the 7Q10 stream flow in its calculations. Since the annual critical low flows in the receiving stream at the outfall are estimated to be all zero, the criteria apply at "end-of-pipe" instead of the end of the Mixing Zone (MZ) and the Zone of Initial Dilution (ZID).

Please note that the TRC limits are based on a sampling frequency of 3/week, based on a design population equivalent (PE) of 3749.

Ammonia Nitrogen:
Standard stream background pH, temperatures, and concentrations of NH3-N are mixed with the discharge from the facility's effluent pH and temperature values to calculate the applicable instream criteria for the protection of West Branch Wapsinonoc Creek.

Since the annual critical low flows in the receiving stream at the outfall are all zero, the criteria apply at "end-of-pipe" instead of the end of the MZ and the ZID. West Branch Wapsinonoc Creek is a B(WW-2) stream; therefore, early life protection will begin in April and run through September.

The monthly background pH, temperatures, and NH3-N concentrations shown in Table 3 are used for the wasteload allocation/permit limits calculations based on the Year 2000 ammonia nitrogen criteria. Table 4 shows the statewide monthly effluent pH and temperature values for aerated facultative lagoons. Table 5 shows the calculated ammonia nitrogen wasteload allocations for this facility.

Table 3: Background pH, Temperatures, and NH3-N Concentrations
For Use with Year 2000 Ammonia Nitrogen Criteria

Months	pH	Temperature (°C)	NH_3-N (mg/l)
January	8.1	0.3	0.02
February	8.0	0.1	0.08
March	8.1	1.5	0.12
April	8.3	9.3	0.03
May	8.2	15.0	0.03
June	8.2	19.4	0.02
July	8.2	23.5	0.02
August	8.2	24.3	0.02
September	8.3	20.2	0.02
October	8.3	14.2	0.02
November	8.3	8.0	0.02
December	8.3	0.8	0.03

Table 4: Standard Effluent pH & Temperature Values for Aerated Facultative Lagoon Facilities

Months	pH	Temperature (°C)
January	7.5	4.5
February	8.0	8.1
March	8.4	8.7
April	8.3	14.6
May	8.5	18.8
June	8.5	22.8
July	8.5	25.3
August	8.6	25.3
September	8.6	22.2
October	8.6	16.6
November	8.6	12.4
December	8.4	8.4

Table 5: Wasteload Allocations for Ammonia Nitrogen for the Protection of Aquatic Life

Months	ADW-Based*		AWW-Based**	
	Acute (mg/l)	Chronic (mg/l)	Acute (mg/l)	Chronic (mg/l)
January	19.9	3.4	19.9	3.4
February	8.4	4.0	8.4	4.0
March	3.9	3.4	3.9	3.4
April	4.7	1.5	4.7	1.5
May	3.2	1.7	3.2	1.7
June	3.2	1.3	3.2	1.3
July	3.2	1.0	3.2	1.0
August	2.7	1.0	2.7	1.0
September	2.7	1.1	2.7	1.1
October	2.7	1.6	2.7	1.6
November	2.7	2.3	2.7	2.3
December	3.9	2.5	3.9	2.5

*: bases for concentration limits; **: bases for mass loading limits

CBOD5/Total Dissolved Oxygen:
Streeter-Phelps DO Sag Model is used to simulate the decay of CBOD and dispersion of total Dissolved Oxygen (DO) in the receiving water downstream from the outfall. The criterion is that the discharge cannot cause the DO level in the receiving stream (warm water) to be below 5.0 mg/l.

The parameter values used in the modeling are listed below:

Background:
The temperature and ammonia nitrogen levels are shown in Table 3. The ultimate CBOD and DO levels are assumed to be 6.0 mg/l and 6.0 mg/l, respectively.

Effluent:
The temperatures are shown in Table 4. The CBOD5 level used in the modeling is 40 mg/l, which is the technology based maximum limit for standard secondary treatment. The ammonia nitrogen values used in the modeling are the calculated acute wasteload allocations shown in Table 5. Both ADW and AWW flows and the ammonia nitrogen limits associated with them are used in the modeling.

Receiving stream parameters:
There is an average water channel slope of 0.001295 (the water channel elevation changes from 690 ft to 674 ft over a distance of approximately 12,350 ft, estimated based on the GIS LiDAR 2-ft contour coverage).

Field Use Attainability Assessment (UAA) had 3 sites along West Branch Wapsinonoc Creek. Two observations of stream width, average depth, and velocity were made at each site. Based on these UAA data, stream width, depth, and velocity at 7Q10 + ADW and 7Q10 + AWW conditions are estimated and are shown in Table 6.

Table 6: Stream Width, Depth, and Velocity

Flow Condition	Flow (cfs)	Width (ft)	Depth (ft)	Velocity (fps)
7Q10 + ADW	0.52	8.4	0.30	0.21
7Q10 + AWW	1.43	9.5	0.47	0.32

Reaeration:
The USGS Pool-riffle method (Melching and Flores 1999) was used as West Branch Wapsinonoc Creek has low flows and some meanders.

Discussion and conclusion:
The modeling results show that the effluent, which could have an allowed maximum effluent CBOD5 level of 40 mg/l (technology based limits for secondary treatment), ammonia nitrogen levels as shown in Table 5, and a minimum DO level of 5.0 mg/l, will not cause the DO level in the receiving stream to be below 5.0 mg/l at any time.

***E. coli*:**
This facility discharges into a Class A2 waterbody. The water quality standard for *E. coli* in a Class A2 waterbody is a geometric mean of 630 org./100 ml and a sample maximum of 2,880 org./100 ml from March 15th through November 15th. The criteria apply at "end-of-pipe".

The first Class (A1) water body is over 11 miles downstream from the outfall of this facility. *E. coli* decay in the A2 segment is taken into consideration. A first order decay model with a decay rate of 1.0 per day at 20°C and an estimated velocity of 0.32 fps in the general use reach are used to estimate the decay.

However, 567 IAC 62.8(2) states that "the daily sample maximum criteria for *E. coli* set forth in 567 – Chapter 61 shall not be used as an end-of-pipe permit limitation." Therefore, only the geometric mean limit of 630 org./100 ml applies.

Chloride and Sulfate:
The chloride and sulfate criteria became effective on Nov. 11, 2009. The default hardness for background and effluent is 200 mg/l.

Chloride criteria are functions of hardness and sulfate concentration, shown as follows:

$$\text{Acute criteria} = 287.8*(\text{Hardness})^{0.205797}*(\text{Sulfate})^{-0.07452}$$
$$\text{Chronic criteria} = 177.87*(\text{Hardness})^{0.205797}*(\text{Sulfate})^{-0.07452}$$

The criteria apply to all Class B waters.

Sulfate criteria, shown in Table 7, are functions of hardness and chloride concentration.

Table 7: Sulfate Criteria

Hardness (mg/l as CaCO3)	Sulfate Criteria (mg/l)		
	Chloride < 5 mg/l	5 mg/l <= Chloride < 25 mg/l	25 mg/l <= Chloride < 500 mg/l
< 100	500	500	500
100<=H<=500	500	(-57.478+5.79*H+54.163*Cl)*0.65	(1276.7+5.508*H-1.457*Cl)*0.65
H> 500	500	2,000	2,000

The criteria defined in Table 7 serve as both acute and chronic criteria and apply to all Class B waters.

The acute criteria apply at the end of the ZID, and the chronic criteria apply at the end of the MZ. In this case, since the annual critical low flows in the receiving stream at the outfall are all zero, the criteria apply at "end-of-pipe" instead of the boundaries of the MZ and the ZID.

The default chloride concentration for both background water and effluent is 34 mg/l, while the default sulfate concentration for both background water and effluent is 63 mg/l. The limits are calculated based on an assumed sampling frequency of 1/week.

pH:
Iowa Water Quality Standards (IAC 567.61.3.(3).a.(2) and IAC 567.61.3.(3).b.(2)) require that pH in Class A or Class B waters "Shall not be less than 6.5 nor greater than 9.0". The criteria apply at the end of the MZ, which in this case is not available since the annual critical low flows in the receiving stream at the outfall are all zero. Thus, the criteria will apply at "end-of-pipe".

TDS:
Effective Nov. 11, 2009, the site-specific TDS approach is no longer applicable; instead the new chloride and sulfate criteria became applicable. However, the TDS level should be controlled to a level such that the narrative criteria stated in IAC 567.61.3 are fulfilled.

5. PERMIT LIMITATIONS:
- *Based on the Year 2006 Water Quality Standards & 2002 Permit Derivation Procedure.*

The acute and chronic WLAs are used as the values for input into the current permit derivation procedure. Under the 2002 permit derivation procedure, only for toxic parameters is the monitoring frequency considered in the calculation of final limits. The water quality based limits are shown on Page 1 of this report.

City of West Branch

(Proposed SAGR Addition and Design Flow Increase)

(Please do not microfiche this document.)

This Package Contains

WASTELOAD ALLOCATION CALCULATIONS & NOTES

Please Do Not Separate

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: West Branch, City of STP — Sewage File Number: 6-16-94-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 001	**ADW = 0.334 mgd & AWW = 0.924 mgd**			
CBOD5	Secondary Treatment Levels Will Not Violate WQS			
Total D.O.	Minimum Concentration (mg/l)			
January - December	5.0			
Ammonia - Nitrogen				
January	3.4	6.9	26.2	53.5
February	4.0	8.4	30.5	64.8
March	3.4	8.4	26.2	64.8
April	1.5	8.4	11.7	64.8
May	1.7	8.4	13.4	64.8
June	1.3	6.9	10.1	53.5
July	1.0	6.9	7.7	53.5
August	1.0	6.9	7.4	53.5
September	1.1	8.4	8.1	64.8
October	1.6	6.9	12.0	53.5
November	2.3	5.7	17.9	44.1
December	2.5	6.9	19.1	53.5
Bacteria	Geometric Mean (#org./100 ml)		March 15th – November 15th	
E. coli	630			
Chloride	389	629	2,995	4,846
Sulfate	1,514	1,514	11,665	11,665
TRC*	0.009	0.019	0.066	0.146
pH	6.5 to 9.0 Standard Units			

Stream Network/Classification of Receiving Stream: West Branch Wapsinonoc Creek (A2, B(WW-2))

Annual critical low flows in West Branch Wapsinonoc Creek at the outfall:
1Q10 flow 0.0 cfs, 7Q10 flow 0.0 cfs, 30Q10 flow 0.0 cfs

Excel spreadsheet calculations [X] Qual II E model [ ] Qual II E modeling date [ ]

Performed by: Alex Martin

*Only required if chlorine is used for disinfection.

Antidegradation Review Requirement

A tier II antidegradation review is required. See Section 2 for details.

Please note that the antidegradation review conducted in this wasteload allocation is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.

WLAs/Permit Limits for the City of West Branch's Aerated Lagoon with Submerged Attached Growth Reactor (SAGR)

These wasteload allocations and water quality based permit limitations are for the City of West Branch's wastewater discharge. The wasteload allocations/permit limits are based on the Water Quality Standards (IAC 567.61) and 'Iowa Wasteload Allocation (WLA) Procedure', February 21, 2018. The chloride allocation/permit limits are based on the criteria that became effective on November 11, 2009.

The water quality based limits in this WLA are calculated to meet the surface water quality criteria to protect downstream uses. There could be technology based limits applicable to this facility that are more stringent than the water quality based limits shown in this WLA. The technology based limits could be derived from either federal guidelines based on different industrial categories or permit writer's judgment.

1. BACKGROUND:

The City of West Branch proposes discharging treated domestic wastewater from an aerated facultative lagoon with a submerged attached growth reactor (SAGR) into West Branch Wapsinonoc Creek (at 41° 39' 25" N, 91° 19' 52" W). This WLA is for the purpose of increasing the design flows and adding a SAGR. Currently the facility uses an aerated facultative lagoon.

Route of flow and use designations:

West Branch Wapsinonoc Creek is an A2, B(WW-2) designated use waterbody. The designations have been adopted in Iowa's state rule described in the rule referenced document of Surface Water Classification effective on June 17, 2015. Based on the pollutants of concern, the use designations of waterbodies further downstream will not impact the resulting limits for this facility.

Critical low flow determination:

The annual critical low flows in West Branch Wapsinonoc Creek at the outfall are estimated based on the Regional Regression Equations (RRE) from 'Methods for estimating selected low-flow frequency statistics and harmonic mean flows for streams in Iowa', 2012 (revised 2013).

Table 1: Annual Critical Low Flows

Location	D.A. (mi^2)	1Q10 (cfs)	7Q10 (cfs)	30Q10 (cfs)
West Branch Wapsinonoc Creek at the Outfall	8.3	0.0	0.0	0.0

2. ANTIDEGRADATION REVIEW:

According to the Iowa Antidegradation Implementation Procedure, effective February 17, 2010 (IAC 567-61.2(2).e), all new or expanded regulated activities (with limited exceptions, such as unsewered communities) are subject to antidegradation review requirements.

Table 2: Antidegradation Review Analysis

Item #	Factor or Scenario	Antidegradation Determination	Analysis/Comments
1	Design Capacity Increase	Yes ☒, No ☐, or Not Applicable ☐	1: Proposed design capacity shown on the request form.
2	Significant Industrial Users (SIU) Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	
3	New Process Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	
4	Less Stringent Water Quality Based Limits?	Yes ☐, No ☒, or Not Applicable ☐	
5	Outfall Location Change	Yes ☐, No ☒, or Not Applicable ☐	
Conclusion and discussion: Due to Item 1, a tier II antidegradation review is required. Please note that the antidegradation review conducted in this WLA is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.			

3. TOTAL MAXIMUM DAILY LOAD (TMDL) LIMITATIONS:

The following waterbodies in the discharge route are on the 2016 impaired waters list:

- Cedar River for bacteria (indicator bacteria – *E. coli*) and pH
- Iowa River for bacteria (indicator bacteria – *E. coli*)
- Mississippi River for metals (aluminum)

Two TMDLs along the discharge route have been completed for *E. coli*, one for the Iowa River and one for the Cedar River. West Branch was given a TMDL WLA in the Cedar River TMDL. However, it is not applicable as West Branch is downstream of the last segment addressed by the TMDL. The Iowa River *E. coli* TMDL addresses impaired segments below the mouth of the Cedar River. However, it does not apply limits to facilities in the Cedar River watershed.

There are no other approved or scheduled TMDLs in the discharge route at this time.

Please note that the results presented in this report are wasteload allocations based on meeting the State's current water quality standards in the receiving waterbody. Additional and/or more stringent effluent limits may be applicable to this discharge based on approved TMDLs for impaired waterbodies, which may provide watershed based wasteload allocations. Information on impaired streams in Iowa and approved TMDLs can be found at the following website: http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Improvement/Impaired-Waters.

4. CALCULATIONS:

The WLAs/permit limits for this outfall are calculated based on the facility's Average Dry Weather (ADW) design flow of 0.334 mgd and its Average Wet Weather (AWW) design flow of 0.924 mgd.

Please note that only wasteload allocations/permit limits (water quality based effluent limits) calculated using DNR approved design flows can be applied in NPDES permits. Water quality based effluent limits

calculated using proposed flows that have not been approved by the DNR for permitting and compliance may be used for informational purposes only.

The water quality based permit concentration limits are derived using the allowed stream flow and the ADW design flow, while the loading limits are derived using the allowed stream flow and the AWW design flow.

TRC:
The TRC wasteload allocations will consider the procedures included in the 2000 revised WQS and the 2007 chemical criteria. Important to TRC is the use of the 1Q10 stream flow in association with the acute wasteload allocation calculation. The chronic WLA will continue to use the 7Q10 stream flow in its calculations. Since the annual critical low flows in the receiving stream at the outfall are estimated to be all zero, the criteria apply at "end-of-pipe" instead of the end of the Mixing Zone (MZ) and the Zone of Initial Dilution (ZID).

Please note that the TRC limits are based on a sampling frequency of 3/week, based on a design population equivalent (PE) of 3749.

Ammonia Nitrogen:
Standard stream background pH, temperatures, and concentrations of NH3-N are mixed with the discharge from the facility's effluent pH and temperature values to calculate the applicable instream criteria for the protection of West Branch Wapsinonoc Creek.

Since the annual critical low flows in the receiving stream at the outfall are all zero, the criteria apply at "end-of-pipe" instead of the end of the MZ and the ZID. West Branch Wapsinonoc Creek is a B(WW-2) stream; therefore, early life protection will begin in April and run through September.

The monthly background pH, temperatures, and NH3-N concentrations shown in Table 3 are used for the wasteload allocation/permit limits calculations based on the Year 2000 ammonia nitrogen criteria. Table 4 shows the statewide monthly effluent pH and temperature values for aerated facultative lagoons with SAGR. Table 5 shows the calculated ammonia nitrogen wasteload allocations for this facility.

Table 3: Background pH, Temperatures, and NH3-N Concentrations
For Use with Year 2000 Ammonia Nitrogen Criteria

Months	pH	Temperature (°C)	NH_3-N (mg/l)
January	8.1	0.3	0.02
February	8.0	0.1	0.08
March	8.1	1.5	0.12
April	8.3	9.3	0.03
May	8.2	15.0	0.03
June	8.2	19.4	0.02
July	8.2	23.5	0.02
August	8.2	24.3	0.02
September	8.3	20.2	0.02
October	8.3	14.2	0.02
November	8.3	8.0	0.02
December	8.3	0.8	0.03

Table 4: Standard Effluent pH & Temperature Values for Aerated Lagoon + SAGR Facilities

Months	pH	Temperature (°C)
January	8.1	3.1
February	8.0	2.8
March	8.0	5.6
April	8.0	11.3
May	8.0	15.6
June	8.1	22.0
July	8.1	24.2
August	8.1	23.9
September	8.0	21.4
October	8.1	16.1
November	8.2	10.8
December	8.1	4.8

Table 5: Wasteload Allocations for Ammonia Nitrogen for the Protection of Aquatic Life

Months	ADW-Based*		AWW-Based**	
	Acute (mg/l)	Chronic (mg/l)	Acute (mg/l)	Chronic (mg/l)
January	6.9	3.4	6.9	3.4
February	8.4	4.0	8.4	4.0
March	8.4	3.4	8.4	3.4
April	8.4	1.5	8.4	1.5
May	8.4	1.7	8.4	1.7
June	6.9	1.3	6.9	1.3
July	6.9	1.0	6.9	1.0
August	6.9	1.0	6.9	1.0
September	8.4	1.1	8.4	1.1
October	6.9	1.6	6.9	1.6
November	5.7	2.3	5.7	2.3
December	6.9	2.5	6.9	2.5

*: bases for concentration limits; **: bases for mass loading limits

CBOD5/Total Dissolved Oxygen:
Streeter-Phelps DO Sag Model is used to simulate the decay of CBOD and dispersion of total Dissolved Oxygen (DO) in the receiving water downstream from the outfall. The criterion is that the discharge cannot cause the DO level in the receiving stream (warm water) to be below 5.0 mg/l.

The parameter values used in the modeling are listed below:

Background:
The temperature and ammonia nitrogen levels are shown in Table 3. The ultimate CBOD and DO levels are assumed to be 6.0 mg/l and 6.0 mg/l, respectively.

Effluent:
The temperatures are shown in Table 4. The CBOD5 level used in the modeling is 40 mg/l, which is the technology based maximum limit for standard secondary treatment. The ammonia nitrogen values used in the modeling are the calculated acute wasteload allocations shown in Table 5. Both ADW and AWW flows and the ammonia nitrogen limits associated with them are used in the modeling.

Receiving stream parameters:
There is an average water channel slope of 0.001295 (the water channel elevation changes from 690 ft to 674 ft over a distance of approximately 12,350 ft, estimated based on the GIS LiDAR 2-ft contour coverage).

Field Use Attainability Assessment (UAA) had 3 sites along West Branch Wapsinonoc Creek. Two observations of stream width, average depth, and velocity were made at each site. Based on these UAA data, stream width, depth, and velocity at 7Q10 + ADW and 7Q10 + AWW conditions are estimated and are shown in Table 6.

Table 6: Stream Width, Depth, and Velocity

Flow Condition	Flow (cfs)	Width (ft)	Depth (ft)	Velocity (fps)
7Q10 + ADW	0.52	8.4	0.30	0.21
7Q10 + AWW	1.43	9.5	0.47	0.32

Reaeration:
The USGS Pool-riffle method (Melching and Flores 1999) was used as West Branch Wapsinonoc Creek has low flows and some meanders.

Discussion and conclusion:
The modeling results show that the effluent, which could have an allowed maximum effluent CBOD5 level of 40 mg/l (technology based limits for secondary treatment), ammonia nitrogen levels as shown in Table 5, and a minimum DO level of 5.0 mg/l, will not cause the DO level in the receiving stream to be below 5.0 mg/l at any time.

***E. coli*:**
This facility discharges into a Class A2 waterbody. The water quality standard for *E. coli* in a Class A2 waterbody is a geometric mean of 630 org./100 ml and a sample maximum of 2,880 org./100 ml from March 15th through November 15th. The criteria apply at "end-of-pipe".

The first Class (A1) water body is over 11 miles downstream from the outfall of this facility. *E. coli* decay in the A2 segment is taken into consideration. A first order decay model with a decay rate of 1.0 per day at 20°C and an estimated velocity of 0.32 fps in the general use reach are used to estimate the decay.

However, 567 IAC 62.8(2) states that "the daily sample maximum criteria for *E. coli* set forth in 567 – Chapter 61 shall not be used as an end-of-pipe permit limitation." Therefore, only the geometric mean limit of 630 org./100 ml applies.

Chloride and Sulfate:
The chloride and sulfate criteria became effective on Nov. 11, 2009. The default hardness for background and effluent is 200 mg/l.

Chloride criteria are functions of hardness and sulfate concentration, shown as follows:

$$\text{Acute criteria} = 287.8*(\text{Hardness})^{0.205797} *(\text{Sulfate})^{-0.07452}$$
$$\text{Chronic criteria} = 177.87*(\text{Hardness})^{0.205797} *(\text{Sulfate})^{-0.07452}$$

The criteria apply to all Class B waters.

Sulfate criteria, shown in Table 7, are functions of hardness and chloride concentration.

Table 7: Sulfate Criteria

Hardness (mg/l as CaCO3)	Sulfate Criteria (mg/l)		
	Chloride < 5 mg/l	5 mg/l <= Chloride < 25 mg/l	25 mg/l <= Chloride < 500 mg/l
< 100	500	500	500
100<=H<=500	500	(-57.478+5.79*H+54.163*Cl)*0.65	(1276.7+5.508*H-1.457*Cl)*0.65
H> 500	500	2,000	2,000

The criteria defined in Table 7 serve as both acute and chronic criteria and apply to all Class B waters.

The acute criteria apply at the end of the ZID, and the chronic criteria apply at the end of the MZ. In this case, since the annual critical low flows in the receiving stream at the outfall are all zero, the criteria apply at "end-of-pipe" instead of the boundaries of the MZ and the ZID.

The default chloride concentration for both background water and effluent is 34 mg/l, while the default sulfate concentration for both background water and effluent is 63 mg/l. The limits are calculated based on an assumed sampling frequency of 1/week.

pH:
Iowa Water Quality Standards (IAC 567.61.3.(3).a.(2) and IAC 567.61.3.(3).b.(2)) require that pH in Class A or Class B waters "Shall not be less than 6.5 nor greater than 9.0". The criteria apply at the end of the MZ, which in this case is not available since the annual critical low flows in the receiving stream at the outfall are all zero. Thus, the criteria will apply at "end-of-pipe".

TDS:
Effective Nov. 11, 2009, the site-specific TDS approach is no longer applicable; instead the new chloride and sulfate criteria became applicable. However, the TDS level should be controlled to a level such that the narrative criteria stated in IAC 567.61.3 are fulfilled.

5. PERMIT LIMITATIONS:
- *Based on the Year 2006 Water Quality Standards & 2002 Permit Derivation Procedure.*

The acute and chronic WLAs are used as the values for input into the current permit derivation procedure. Under the 2002 permit derivation procedure, only for toxic parameters is the monitoring frequency considered in the calculation of final limits. The water quality based limits are shown on Page 1 of this report.

City of West Branch

(Proposed Mechanical Facility and Design Capacity Increase)

(Please do not microfiche this document.)

This Package Contains

WASTELOAD ALLOCATION CALCULATIONS & NOTES

Please Do Not Separate

ENVIRONMENTAL SERVICES DIVISION
WATER QUALITY BASED PERMIT LIMITS

SECTION VI: WATER QUALITY-BASED PERMIT LIMITS

Facility Name: West Branch, City of STP — Sewage File Number: 6-16-94-0-01

Parameters	Ave. Conc. (mg/l)	Max. Conc. (mg/l)	Ave. Mass (lbs/d)	Max. Mass (lbs/d)
Outfall No. 001	**ADW = 0.334 mgd & AWW = 0.924 mgd**			
CBOD5	Secondary Treatment Levels Will Not Violate WQS			
Total D.O.	Minimum Concentration (mg/l)			
January - December	5.0			
Ammonia – Nitrogen*				
January	3.4	15.2	26.2	117.0
February	4.0	14.2	30.5	109.4
March	3.4	14.7	26.2	113.2
April	1.5	15.7	11.7	121.0
May	1.7	15.2	13.4	117.0
June	1.3	14.4	10.1	111.3
July	1.0	**11.4**	7.7	**84.0**
August	1.0	**10.9**	7.4	**80.1**
September	1.1	**13.8**	8.1	**102.5**
October	1.6	15.7	12.0	121.0
November	2.3	14.7	17.9	113.2
December	2.5	16.0	19.1	123.0
Bacteria	Geometric Mean (#org./100 ml)		March 15th – November 15th	
E. coli	630			
Chloride	389	629	2,995	4,846
Sulfate	1,514	1,514	11,665	11,665
TRC**	0.009	0.019	0.066	0.146
pH	6.5-9.0 Standard Units			

Stream Network/Classification of Receiving Stream: West Branch Wapsinonoc Creek (A2, B(WW-2))

Annual critical low flows in West Branch Wapsinonoc Creek at the outfall:
1Q10 flow 0.0 cfs, 7Q10 flow 0.0 cfs, 30Q10 flow 0.0 cfs

Excel spreadsheet calculations [X] Qual II E model [ ] Qual II E modeling date [ ]

Performed by: Alex Martin

* The **bold** values are based on the CBOD/DO modeling; the remaining values are ammonia nitrogen toxicity based.
**Only required if chlorine is used for disinfection.

Antidegradation Review Requirement

A tier II antidegradation review is required. See Section 2 for details.

Please note that the antidegradation review conducted in this wasteload allocation is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.

WLAs/Permit Limits for the City of West Branch's Mechanical Plant

These wasteload allocations and water quality based permit limitations are for the City of West Branch's wastewater discharge. The wasteload allocations/permit limits are based on the Water Quality Standards (IAC 567.61) and 'Iowa Wasteload Allocation (WLA) Procedure', February 21, 2018. The chloride allocation/permit limits are based on the criteria that became effective on November 11, 2009.

The water quality based limits in this WLA are calculated to meet the surface water quality criteria to protect downstream uses. There could be technology based limits applicable to this facility that are more stringent than the water quality based limits shown in this WLA. The technology based limits could be derived from either federal guidelines based on different industrial categories or permit writer's judgment.

1. BACKGROUND:

The City of West Branch proposes discharging treated domestic wastewater from a mechanical wastewater treatment facility into West Branch Wapsinonoc Creek (at 41° 39' 25" N, 91° 19' 52" W). This WLA is for the purpose of increasing the design flows and changing treatment to a mechanical facility. Currently the facility uses an aerated facultative lagoon.

Route of flow and use designations:

West Branch Wapsinonoc Creek is an A2, B(WW-2) designated use waterbody. The designations have been adopted in Iowa's state rule described in the rule referenced document of Surface Water Classification effective on June 17, 2015. Based on the pollutants of concern, the use designations of waterbodies further downstream will not impact the resulting limits for this facility.

Critical low flow determination:

The annual critical low flows in West Branch Wapsinonoc Creek at the outfall are estimated based on the Regional Regression Equations (RRE) from 'Methods for estimating selected low-flow frequency statistics and harmonic mean flows for streams in Iowa', 2012 (revised 2013).

Table 1: Annual Critical Low Flows

Location	D.A. (mi^2)	1Q10 (cfs)	7Q10 (cfs)	30Q10 (cfs)
West Branch Wapsinonoc Creek at the Outfall	8.3	0.0	0.0	0.0

2. ANTIDEGRADATION REVIEW:

According to the Iowa Antidegradation Implementation Procedure, effective February 17, 2010 (IAC 567-61.2(2).e), all new or expanded regulated activities (with limited exceptions, such as unsewered communities) are subject to antidegradation review requirements.

Table 2: Antidegradation Review Analysis

Item #	Factor or Scenario	Antidegradation Determination	Analysis/Comments
1	Design Capacity Increase	Yes ☒, No ☐, or Not Applicable ☐	1: Proposed design capacity shown on the request form.
2	Significant Industrial Users (SIU) Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	
3	New Process Contributing New Pollutant of Concern (POC)	Yes ☐, No ☐, or Not Applicable ☒	
4	Less Stringent Water Quality Based Limits?	Yes ☒, No ☐, or Not Applicable ☐	1: Less stringent ammonia nitrogen limits will trigger an antidegradation review.
5	Outfall Location Change	Yes ☐, No ☒, or Not Applicable ☐	
Conclusion and discussion: Due to Items 1 and 4, a tier II antidegradation review is required. Please note that the antidegradation review conducted in this WLA is based on the current information available. Antidegradation could also be triggered during the NPDES permitting process based on new information.			

3. TOTAL MAXIMUM DAILY LOAD (TMDL) LIMITATIONS:

The following waterbodies in the discharge route are on the 2016 impaired waters list:

- Cedar River for bacteria (indicator bacteria – *E. coli*) and pH
- Iowa River for bacteria (indicator bacteria – *E. coli*)
- Mississippi River for metals (aluminum)

Two TMDLs along the discharge route have been completed for *E. coli*, one for the Iowa River and one for the Cedar River. West Branch was given a TMDL WLA in the Cedar River TMDL. However, it is not applicable as West Branch is downstream of the last segment addressed by the TMDL. The Iowa River *E. coli* TMDL addresses impaired segments below the mouth of the Cedar River. However, it does not apply limits to facilities in the Cedar River watershed.

There are no other approved or scheduled TMDLs in the discharge route at this time.

Please note that the results presented in this report are wasteload allocations based on meeting the State's current water quality standards in the receiving waterbody. Additional and/or more stringent effluent limits may be applicable to this discharge based on approved TMDLs for impaired waterbodies, which may provide watershed based wasteload allocations. Information on impaired streams in Iowa and approved TMDLs can be found at the following website: http://www.iowadnr.gov/Environmental-Protection/Water-Quality/Watershed-Improvement/Impaired-Waters.

4. CALCULATIONS:

The WLAs/permit limits for this outfall are calculated based on the facility's Average Dry Weather (ADW) design flow of 0.334 mgd and its Average Wet Weather (AWW) design flow of 0.924 mgd.

Please note that only wasteload allocations/permit limits (water quality based effluent limits) calculated using DNR approved design flows can be applied in NPDES permits. Water quality based effluent limits

calculated using proposed flows that have not been approved by the DNR for permitting and compliance may be used for informational purposes only.

The water quality based permit concentration limits are derived using the allowed stream flow and the ADW design flow, while the loading limits are derived using the allowed stream flow and the AWW design flow.

TRC:
The TRC wasteload allocations will consider the procedures included in the 2000 revised WQS and the 2007 chemical criteria. Important to TRC is the use of the 1Q10 stream flow in association with the acute wasteload allocation calculation. The chronic WLA will continue to use the 7Q10 stream flow in its calculations. Since the annual critical low flows in the receiving stream at the outfall are estimated to be all zero, the criteria apply at "end-of-pipe" instead of the end of the Mixing Zone (MZ) and the Zone of Initial Dilution (ZID).

Please note that the TRC limits are based on a sampling frequency of 3/week, based on a design population equivalent (PE) of 3749.

Ammonia Nitrogen:
Standard stream background pH, temperatures, and concentrations of NH3-N are mixed with the discharge from the facility's effluent pH and temperature values to calculate the applicable instream criteria for the protection of West Branch Wapsinonoc Creek.

Since the annual critical low flows in the receiving stream at the outfall are all zero, the criteria apply at "end-of-pipe" instead of the end of the MZ and the ZID. West Branch Wapsinonoc Creek is a B(WW-2) stream; therefore, early life protection will begin in April and run through September.

The monthly background pH, temperatures, and NH3-N concentrations shown in Table 3 are used for the wasteload allocation/permit limits calculations based on the Year 2000 ammonia nitrogen criteria. Table 4 shows the statewide monthly effluent pH and temperature values for mechanical facilities. Table 5 shows the calculated ammonia nitrogen wasteload allocations for this facility.

Table 3: Background pH, Temperatures, and NH3-N Concentrations
For Use with Year 2000 Ammonia Nitrogen Criteria

Months	pH	Temperature (°C)	NH_3-N (mg/l)
January	8.1	0.3	0.02
February	8.0	0.1	0.08
March	8.1	1.5	0.12
April	8.3	9.3	0.03
May	8.2	15.0	0.03
June	8.2	19.4	0.02
July	8.2	23.5	0.02
August	8.2	24.3	0.02
September	8.3	20.2	0.02
October	8.3	14.2	0.02
November	8.3	8.0	0.02
December	8.3	0.8	0.03

Table 4: Standard Effluent pH & Temperature Values for Mechanical Facilities

Months	pH	Temperature (°C)
January	7.67	12.4
February	7.71	11.3
March	7.69	13.1
April	7.65	16.2
May	7.67	19.3
June	7.70	22.1
July	7.58	24.1
August	7.63	24.4
September	7.62	22.8
October	7.65	20.2
November	7.69	17.1
December	7.64	14.1

Table 5: Wasteload Allocations for Ammonia Nitrogen for the Protection of Aquatic Life

Months	ADW-Based*		AWW-Based**	
	Acute (mg/l)	Chronic (mg/l)	Acute (mg/l)	Chronic (mg/l)
January	15.2	3.4	15.2	3.4
February	14.2	4.0	14.2	4.0
March	14.7	3.4	14.7	3.4
April	15.7	1.5	15.7	1.5
May	15.2	1.7	15.2	1.7
June	14.4	1.3	14.4	1.3
July	17.6	1.0	17.6	1.0
August	16.2	1.0	16.2	1.0
September	16.5	1.1	16.5	1.1
October	15.7	1.6	15.7	1.6
November	14.7	2.3	14.7	2.3
December	16.0	2.5	16.0	2.5

*: bases for concentration limits; **: bases for mass loading limits

CBOD5/Total Dissolved Oxygen:
Streeter-Phelps DO Sag Model is used to simulate the decay of CBOD and dispersion of total Dissolved Oxygen (DO) in the receiving water downstream from the outfall. The criterion is that the discharge cannot cause the DO level in the receiving stream (warm water) to be below 5.0 mg/l.

The parameter values used in the modeling are listed below:

Background:
The temperature and ammonia nitrogen levels are shown in Table 3. The ultimate CBOD and DO levels are assumed to be 6.0 mg/l and 6.0 mg/l, respectively.

Effluent:
The temperatures are shown in Table 4. The CBOD5 level used in the modeling is 40 mg/l, which is the technology based maximum limit for standard secondary treatment. The ammonia nitrogen values used in the modeling are the calculated acute wasteload allocations shown in Table 5. Both ADW and AWW flows and the ammonia nitrogen limits associated with them are used in the modeling.

Receiving stream parameters:
There is an average water channel slope of 0.001295 (the water channel elevation changes from 690 ft to 674 ft over a distance of approximately 12,350 ft, estimated based on the GIS LiDAR 2-ft contour coverage).

Field Use Attainability Assessment (UAA) had 3 sites along West Branch Wapsinonoc Creek. Two observations of stream width, average depth, and velocity were made at each site. Based on these UAA data, stream width, depth, and velocity at 7Q10 + ADW and 7Q10 + AWW conditions are estimated and are shown in Table 6.

Table 6: Stream Width, Depth, and Velocity

Flow Condition	Flow (cfs)	Width (ft)	Depth (ft)	Velocity (fps)
7Q10 + ADW	0.52	8.4	0.30	0.21
7Q10 + AWW	1.43	9.5	0.47	0.32

Reaeration:
The USGS Pool-riffle method (Melching and Flores 1999) was used as West Branch Wapsinonoc Creek has low flows and some meanders.

Discussion and conclusion:
The modeling results show that the effluent, which could have an allowed maximum effluent CBOD5 level of 40 mg/l (technology based limits for secondary treatment) and a minimum DO level of 5.0 mg/l, will not cause the DO level in the receiving stream to be below 5.0 mg/l at any time; however, some of the calculated water quality based ammonia nitrogen wasteload allocations, as shown in Table 5, need to be reduced. The final ammonia nitrogen limits are shown on Page 1 of this report.

***E. coli*:**
This facility discharges into a Class A2 waterbody. The water quality standard for *E. coli* in a Class A2 waterbody is a geometric mean of 630 org./100 ml and a sample maximum of 2,880 org./100 ml from March 15th through November 15th. The criteria apply at "end-of-pipe".

The first Class (A1) water body is over 11 miles downstream from the outfall of this facility. *E. coli* decay in the A2 segment is taken into consideration. A first order decay model with a decay rate of 1.0 per day at 20°C and an estimated velocity of 0.32 fps in the general use reach are used to estimate the decay.

However, 567 IAC 62.8(2) states that "the daily sample maximum criteria for *E. coli* set forth in 567 – Chapter 61 shall not be used as an end-of-pipe permit limitation." Therefore, only the geometric mean limit of 630 org./100 ml applies.

Chloride and Sulfate:
The chloride and sulfate criteria became effective on Nov. 11, 2009. The default hardness for background and effluent is 200 mg/l.

Chloride criteria are functions of hardness and sulfate concentration, shown as follows:

$$\text{Acute criteria} = 287.8*(\text{Hardness})^{0.205797} *(\text{Sulfate})^{-0.07452}$$
$$\text{Chronic criteria} = 177.87*(\text{Hardness})^{0.205797} *(\text{Sulfate})^{-0.07452}$$

The criteria apply to all Class B waters.

Sulfate criteria, shown in Table 7, are functions of hardness and chloride concentration.

Table 7: Sulfate Criteria

Hardness (mg/l as CaCO3)	Sulfate Criteria (mg/l)		
	Chloride < 5 mg/l	5 mg/l <= Chloride < 25 mg/l	25 mg/l <= Chloride < 500 mg/l
< 100	500	500	500
100<=H<=500	500	(-57.478+5.79*H+54.163*Cl)*0.65	(1276.7+5.508*H-1.457*Cl)*0.65
H> 500	500	2,000	2,000

The criteria defined in Table 7 serve as both acute and chronic criteria and apply to all Class B waters.

The acute criteria apply at the end of the ZID, and the chronic criteria apply at the end of the MZ. In this case, since the annual critical low flows in the receiving stream at the outfall are all zero, the criteria apply at "end-of-pipe" instead of the boundaries of the MZ and the ZID.

The default chloride concentration for both background water and effluent is 34 mg/l, while the default sulfate concentration for both background water and effluent is 63 mg/l. The limits are calculated based on an assumed sampling frequency of 1/week.

pH:
Iowa Water Quality Standards (IAC 567.61.3.(3).a.(2) and IAC 567.61.3.(3).b.(2)) require that pH in Class A or Class B waters "Shall not be less than 6.5 nor greater than 9.0". The criteria apply at the end of the MZ, which in this case is not available since the annual critical low flows in the receiving stream at the outfall are all zero. Thus, the criteria will apply at "end-of-pipe".

TDS:
Effective Nov. 11, 2009, the site-specific TDS approach is no longer applicable; instead the new chloride and sulfate criteria became applicable. However, the TDS level should be controlled to a level such that the narrative criteria stated in IAC 567.61.3 are fulfilled.

5. PERMIT LIMITATIONS:
- *Based on the Year 2006 Water Quality Standards & 2002 Permit Derivation Procedure.*

The acute and chronic WLAs are used as the values for input into the current permit derivation procedure. Under the 2002 permit derivation procedure, only for toxic parameters is the monitoring frequency considered in the calculation of final limits. The water quality based limits are shown on Page 1 of this report.

APPENDIX C

DEFINITIONS

(FROM IOWA DNR EXHIBIT 9A

PRELIMINARY REVIEW OF ANTIDEGRADATION ALTERNATIVES ANALYSIS)

Definitions

"Affordability" is an evaluation of the applicant's ability to pay for a given alternative as described in Section 3.2 of the Iowa Antidegradation Implementation Procedure. *Alternatives identified as practicable and economically efficient are considered affordable if the applicant does not provide an affordability analysis.*

"Base Pollution Control Alternative" means the most cost-effective alternative necessary to meet the more stringent of technology-based state/federal effluent guidelines or water quality-based limits.

"Detailed Evaluation" or "Evaluated in Detail" as used in this document means an analysis of a pollution control alternative in terms of its practicability (including anticipated treatment/pollutant removal capability vs. anticipated effluent limitations, if applicable), economic efficiency and affordability.

"Economic Efficiency" is an evaluation of pollution control costs as described in Section 3.2 of the Iowa Antidegradation Implementation Procedure.

"Practicability" is the evaluation of a given alternative's effectiveness, reliability and potential environmental impacts as described in Section 3.2 of the Iowa Antidegradation Implementation Procedure.

"Reasonable" means practicable, economically efficient and affordable.

"Screening Analysis" as used in this document means analysis of multiple pollution control alternatives that may include their practicability (including anticipated treatment/pollutant removal capability vs. anticipated effluent limitations, if applicable), economic efficiency and affordability. If the alternative is found not to be practicable then the analysis may exclude determinations of economic efficiency and affordability. Likewise, if the alternative is found to be practicable but not economically efficient, the analysis may exclude determination of affordability.

Acronyms

BPCA: The Base Pollution Control Alternative as defined above

LDA: Less-Degrading Alternative as defined in the Iowa Antidegradation Implementation Procedure

NDA: Non-Degrading Alternative as defined in the Iowa Antidegradation Implementation Procedure

POC: Pollutants of Concern as defined in the Iowa Antidegradation Implementation Procedure