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For the Middle Cedar Watershed Management Authority

City of Vinton Stormwater Management Plan

Twin Box Culverts, Mud Creek Tributary at 10th Ave.

02.11.2020

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

The following stormwater management plan was developed as a component of the Middle Cedar Watershed Management Plan (MCWMP). The MCWMP was funded using federal funds from the U.S. Department of Housing and Urban Development pursuant to Title I of the Housing and Community Development Act of 1974. The Iowa Economic Development Authority (IEDA) was awarded a Community Development Block Grant National Disaster Resilience (CDBG-NDR) Federal award B-13-DS-19-0001 and awarded a portion of those funds to Benton County through grant 13-NDRI-006 to develop the MCWMP. This stormwater management plan was developed as a case study to address recent flooding within the City of Vinton.

To address the concerns of the city, a Storm Water Management Model ("SWMM") was built to simulate the city's drainage patterns and storm sewer system for the time period of 2004 through 2016—the same timeframe as the regional modeling performed for the MCWMP. Specific areas of concern were identified throughout the city including: along Hinkle Creek, downtown, and in a low lying area commonly referred to as "Frog Flats" in southern Vinton. The factors contributing to each area of concern were identified and ranged in scale from undersized pipes to backwater from Cedar River flooding.

As part of the process of vetting solutions for these areas, the benefits of agricultural best management practices (BMPs) were simulated in the upper watersheds of Hinkle Creek and Mud Creek. These practices were shown to reduce the frequency and duration of small and medium flood events. Based on the analyses performed in this study ten recommendations were identified that could help mitigate the flooding the city has experienced. The recommendations include policy updates to prevent exacerbation of existing flooding by new development, additional analysis to refine the recommendations, and structural projects ranging from minor pipe replacements to major bridge and levy projects.

PROJECT BACKGROUND

The City of Vinton is located on the Cedar River near the confluences with two of its tributaries, Hinkle Creek and Mud Creek, which join the Cedar River to the north and south of downtown Vinton, respectively (**Figure 1**). The city has experienced significant flooding in recent years due to high waters on the Cedar River and these tributaries. In fact, three of the top five flood events recorded at Vinton have occurred since 2008, including June 12, 2008 (1st), September 26, 2016 (2nd), and June 1, 2013 (5th).

These major flood events create numerous problems throughout the city. For example: along Hinkle Creek, flood waters have overtopped roads and bridges limiting access to the northwestern corner of the City; in Frog Flats, water tends to back up at road crossings and flood the surrounding neighborhood; and high water from the Cedar River causes flooding in downtown Vinton, inundating important service buildings including the Vinton City Electric Office and the Benton County Sheriff's Office. As part of the Iowa Watershed Approach, the City of Vinton sought recommendations to help prevent and/or mitigate these issues.

Figure 1. Vinton flooding overview (Source: Iowa Flood Center and Iowa DNR).

MODELING

Modeling Overview

To identify potential opportunities to reduce the impact of flooding on the city, a hydrologic/hydraulic watershed model was developed for Vinton and the immediate drainage areas of Hinkle Creek and Mud Creek. The model does not include/simulate the Cedar River, since that is outside the scope of this city-scale analysis. Instead, the model uses results from the regional model developed as a part of the MCWMP process as boundary conditions at the downstream end. Open SWMM software (ver. 5.1.912, CHI, 2018) was used to simulate flooding in the city and surrounding watersheds as a "continuous simulation." A continuous simulation uses real rainfall data over a period of years to replicate actual occurrences—as opposed to a "design event simulation" which only models individual, theoretical events such as the 100-year flood. The simulation period of 2004 through 2016 was chosen to coincide with the regional modeling of the Middle Cedar Watershed. The primary uses of the model were (1) to identify potential problems in the city's stormwater infrastructure that contribute to flooding and (2) to identify potential solutions to those problems. In addition, this model will provide a starting point from which to build future analyses.

Model Construction and Calibration (Existing Conditions)

The model components (e.g. subcatchments, channels, pipes) were delineated based on existing Agricultural Conservation Planning Framework (ACPF) (USDA, 2018) data, and further analysis was conducted using the Natural Resources Conservation Service (NRCS) GIS Engineering Tools (Peter Mead, 2018). The storm sewer network was based on City of Vinton storm sewer CAD data, which included relative locations and pipe diameters, but not the elevations of the storm sewer infrastructure. Therefore, a major assumption in the model is that the elevations of the pipes in the storm sewer network are two feet below the ground surface. The boundary conditions for the model included a streamflow time series for Hinkle Creek and Mud Creek, obtained from the regional model. The discharge was converted to stage with the use of a rating curve developed by the United States Geological Survey for stream gaging station number USGS05464315 (Cedar River at Vinton, IA). Estimated stage values were then translated throughout the length of the Cedar River by assuming a constant water profile slope. Additional meteorological/climatic, land use, soil and elevation data incorporated into the model included:

- NEXRAD radar-rainfall (for high spatial and temporal resolution precipitation data)
- Climate data from the nearest Iowa station (for estimation of evaporation)
- 2011 National Land Cover Dataset (NLCD; 30-meter resolution; for delineation of urban rural residential/farmstead, pasture and agricultural row-cropped areas)
- NRCS Soil Survey Geographic Database (SSURGO; high resolution soils data)
- 2-meter resolution Light Detection and Ranging (LiDAR) digital elevation data hydro-conditioned as part of the ACPF database (for determination of subcatchment slopes and channel/ditch slopes and cross-sectional geometries)

The resulting SWMM model schematic of the City of Vinton is shown in **Figure 2**.

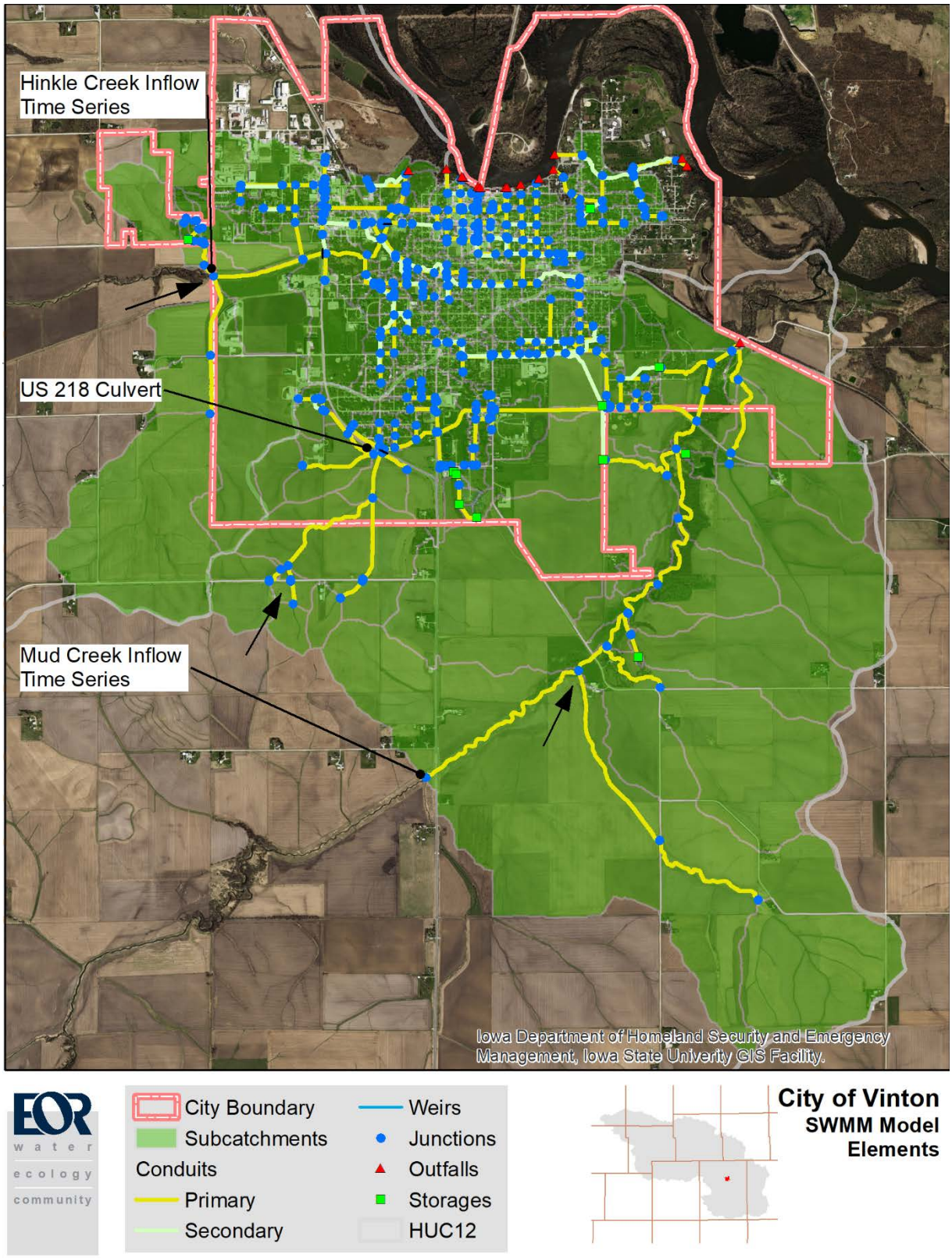

Figure 2. Schematic of the SWMM Model Elements for the City of Vinton.

The hydrologic parameters including flow length, depth of pervious storage, and infiltration variables were adjusted to improve the accuracy of runoff estimates from the large, predominantly agricultural subcatchments. These subcatchments are important for estimating flooding in Frog Flats because the unnamed tributary to Mud Creek did not have a calibrated inflow time series. Because discharge through the culvert at US 218 was not influenced by an inflow time series (i.e. the entire drainage area was simulated using SWMM), this location was chosen to compare to the discharge-to-precipitation ratio (aka "runoff coefficient") of the inflow time series from the regional model. To improve consistency with the regional model, the depth of pervious storage and flow length were reduced by 50 percent and the hydraulic conductivity was reduced by 75 percent. As a result of the calibrations made, the runoff coefficient became much more similar to the regional model's runoff coefficients for the area (**Table 1**).

Table 1. Discharge to precipitation ratio (aka "runoff coefficient") for Hinkle Creek, Mud Creek, and at US 218

Location	Source	Runoff Coefficient (2004-2016)
Hinkle Creek Inflow	Regional Model	0.54
Mud Creek Inflow	Regional Model	0.48
U.S. 218 Inlet	SWMM Model	0.51

Flooding Identification and Contributing Factors

Following model calibration, locations within the city that were predicted to flood during the simulation period were identified, along with the contributing factors. A model node (e.g. junction, manhole or catch basin) was flagged as a potential problem area if the predicted high-water level exceeded a specified reference elevation – typically a LiDAR-derived manhole rim elevation – by two feet or more. An overland flow route was flagged as a potential problem area if significant overland flow was observed in model simulations independent (i.e. disconnected) from inundation of the floodplain. These criteria were used to account for the uncertainty in the storm sewer elevations, LiDAR surface data, and storage volume not accounted for in the one-dimensional model. Including precise survey data into the model would dramatically improve the accuracy and the resulting recommendations from the model.

Figure 3 shows modeling results including flooded nodes (red dots), and their respective watershed areas. Problem areas included:

- Bridges across Hinkle Creek at E. 3rd St. and E. 4th St.
- The Frog Flats area upstream of 10th Avenue.
- Downtown Vinton, including the blocks between City Hall and the Cedar River.
- Local storm sewers along G Ave., W 8th St., E 6th St., and E 3rd St., and others.
- The Bridge across Mud Creek at E. 13th St.

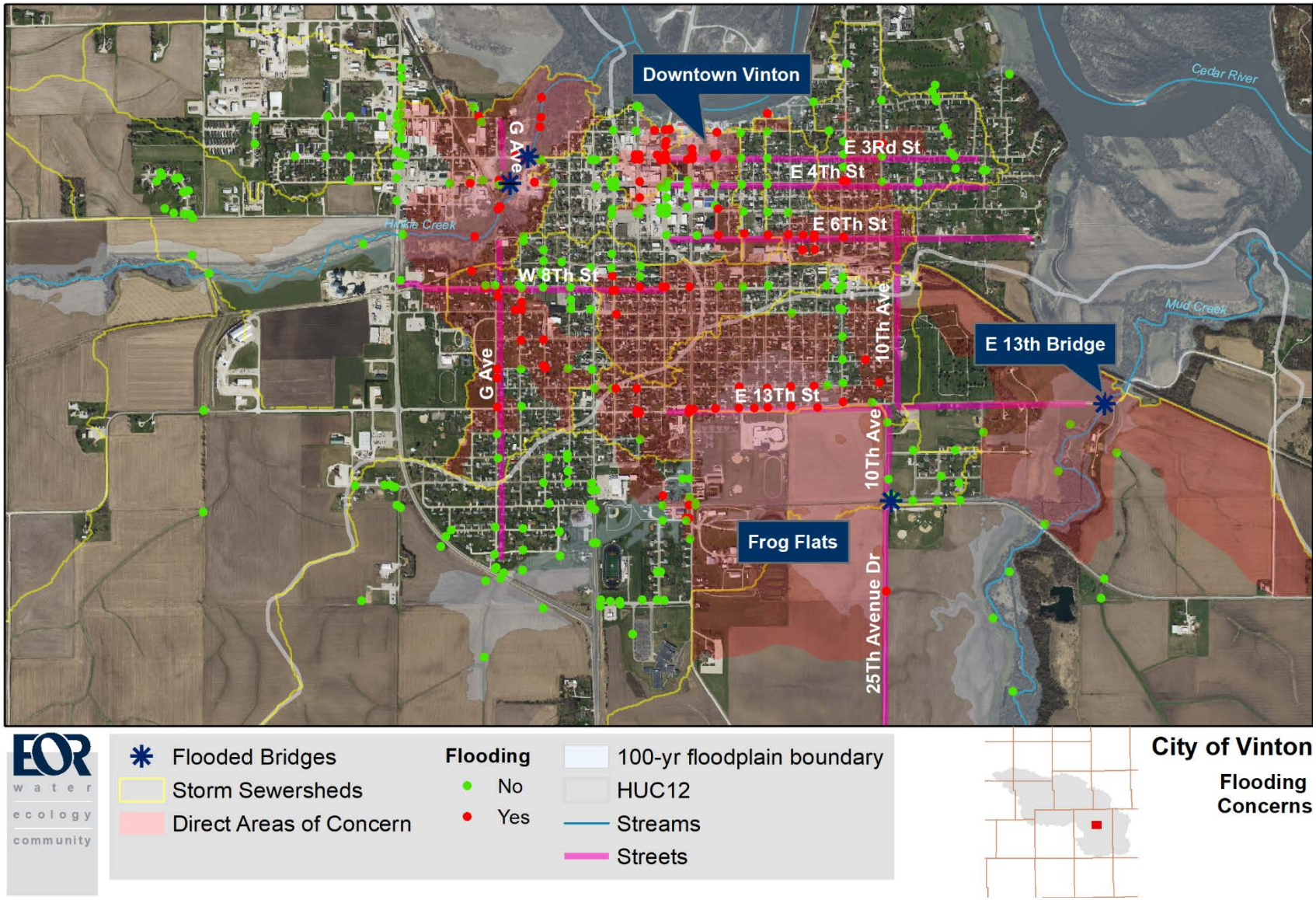

Figure 3. Areas of flooding concern within the City of Vinton.

The factors contributing to each problem area were also identified. First, to isolate flooding caused by problems within the city's stormwater infrastructure from flooding caused by high water levels in the Cedar River, an additional model scenario was created in which the Cedar River boundary conditions were replaced with free outfalls. The maximum flood elevations between the original Cedar River scenario and the free outfall scenario were compared, and previously flooded nodes that were no longer flooded in the free outfall scenario were flagged as being primarily influenced by the Cedar River.

Second, pipe capacity issues were identified by evaluating the total length of time that a conduit was indicated to be *capacity limited* – a condition in which a pipe is surcharged and the hydraulic grade line exceeds the pipe slope – during the simulation. For the purposes of this study, a conduit was flagged as potentially having insufficient capacity if the pipe was capacity limited for more than five days during the simulation.

Finally, the crossings along the unnamed tributary to Mud Creek were analyzed to determine their contribution to flooding. A crossing was flagged if the ponding upstream of the crossing was higher than the lowest point along the neighboring road. For this analysis, one key location was identified at the intersection of 10th Avenue and 25th Avenue Drive. The main factors contributing to each problem area are shown in **Figure 4**.

As expected, the areas along Hinkle Creek, Mud Creek, and low-lying areas of downtown Vinton experienced flooding that was caused primarily by the Cedar River. Interestingly, according to the model results, the Cedar River did not contribute to flooding along the tributary of Mud Creek. Rather, the North-South road network of 10th Avenue and 25th Avenue Drive restricted flow that contributed to flooding upstream. Several pipes in the upper reaches of the storm sewer networks were the primary causes of localized flooding within the city (**Figure 4**).

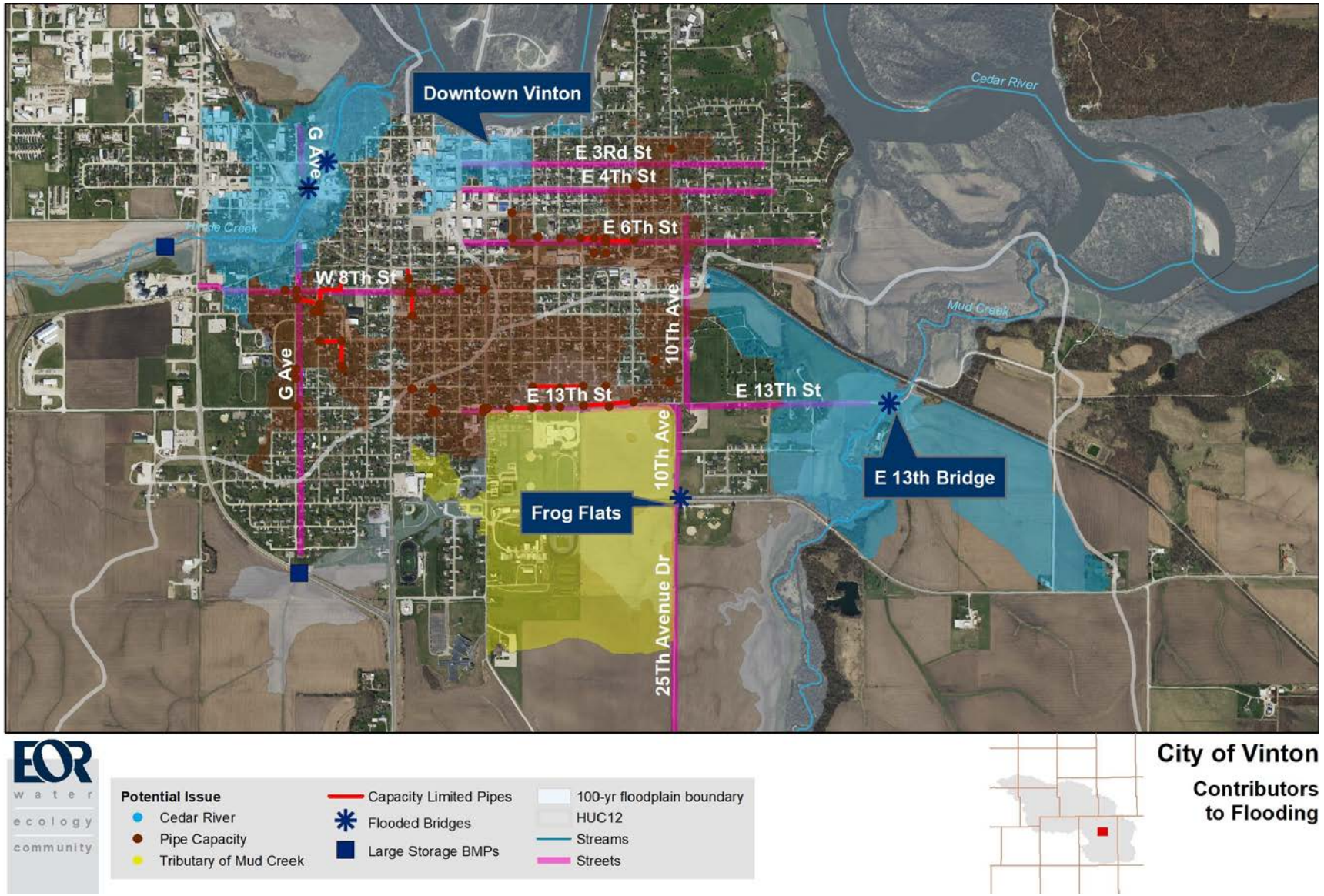

Figure 4. Potential problems within the City of Vinton that contribute to flooding.

Proposed Model Scenarios for Distributed Rural BMPs

Two different proposed strategies were investigated in this study. The first strategy investigated the benefit of large BMP structures (ponds) just upstream of the city. The second strategy investigated the benefits of a distributed network of BMPs in the watersheds.

Large Storage BMPs

The potential benefits of two large ponds just outside the city were investigated. The ponds were located just upstream of US 218 on the tributary to Mud Creek and on Hinkle Creek (shown in **Figure 4**). The available storage at these locations were approximated and outlet structures were adjusted until the volumes effectively reduced flooding, including the June 2008 flood magnitude, which was the maximum flood elevation at the Hinkle Creek site, and August 11, 2016, the maximum peak elevation at the tributary to Mud Creek.

At the tributary to Mud Creek the model predicted that storage along the tributary would reduce the peak elevations downstream during storm events. The exact magnitude of reductions would depend on the sizing of the pond. An impoundment wetland is currently being considered for this location which could reduce the flooding concerns downstream in Frog Flats.

At Hinkle Creek the model did not predict a decrease in flood elevations for the critical events. Instead, water from the Cedar River controls the flooding level during extreme events. Furthermore, a pond sized to control the flow of the Hinkle Creek would need to be prohibitively large because the drainage area is over 17,000 acres.

Smaller Distributed BMPs

To illustrate the benefits of implementing distributed BMPs in the upper Hinkle Creek and Mud Creek watersheds, three scenarios were created by incorporating the results of the Middle Cedar GHOST scenarios into the SWMM model. The three scenarios included:

- Small Distributed Storage (ponds): Simulating the impact of small retention ponds throughout the Hinkle Creek and Mud Creek drainage areas.
- Cover Crops and No-Till (CCNT): Simulating the impact of planting an additional cool season crop, e.g. winter rye, to prevent erosion during the typical fallow months of late fall to early spring followed by direct planting of cash crops into the undisturbed soil and crop residue from the previous season's crop.
- Native Vegetation (NV): Simulating the impact of changing all of the cultivated area into native prairie.

The results of these scenarios showed that implementation of BMPs in the subwatersheds reduce the frequency and severity of small and medium flood events as shown in **Figure 5**. In addition, native vegetation was predicted to reduce the duration of "exceedances" (occurrence of a flood event) (**Figure 5**). It is important to note that for large, watershed-scale flood events, the Cedar River was the main contributing factor to flooding at the outlets of Hinkle Creek and Mud Creek. The differences in the benefits of BMPs in the subwatersheds were minimal as all three scenarios (CCNT, NV, and ponds) reduce the number of exceedances during these events. Despite this, BMPs located within the

city could significantly mitigate localized flooding during even larger – but local – storm events. The primary distinction between these two types of flooding events is largely related to timing, wherein watershed-scale flooding happens during long wet periods (e.g. spring snowmelt) while localized flooding happens following intense rainfall events.

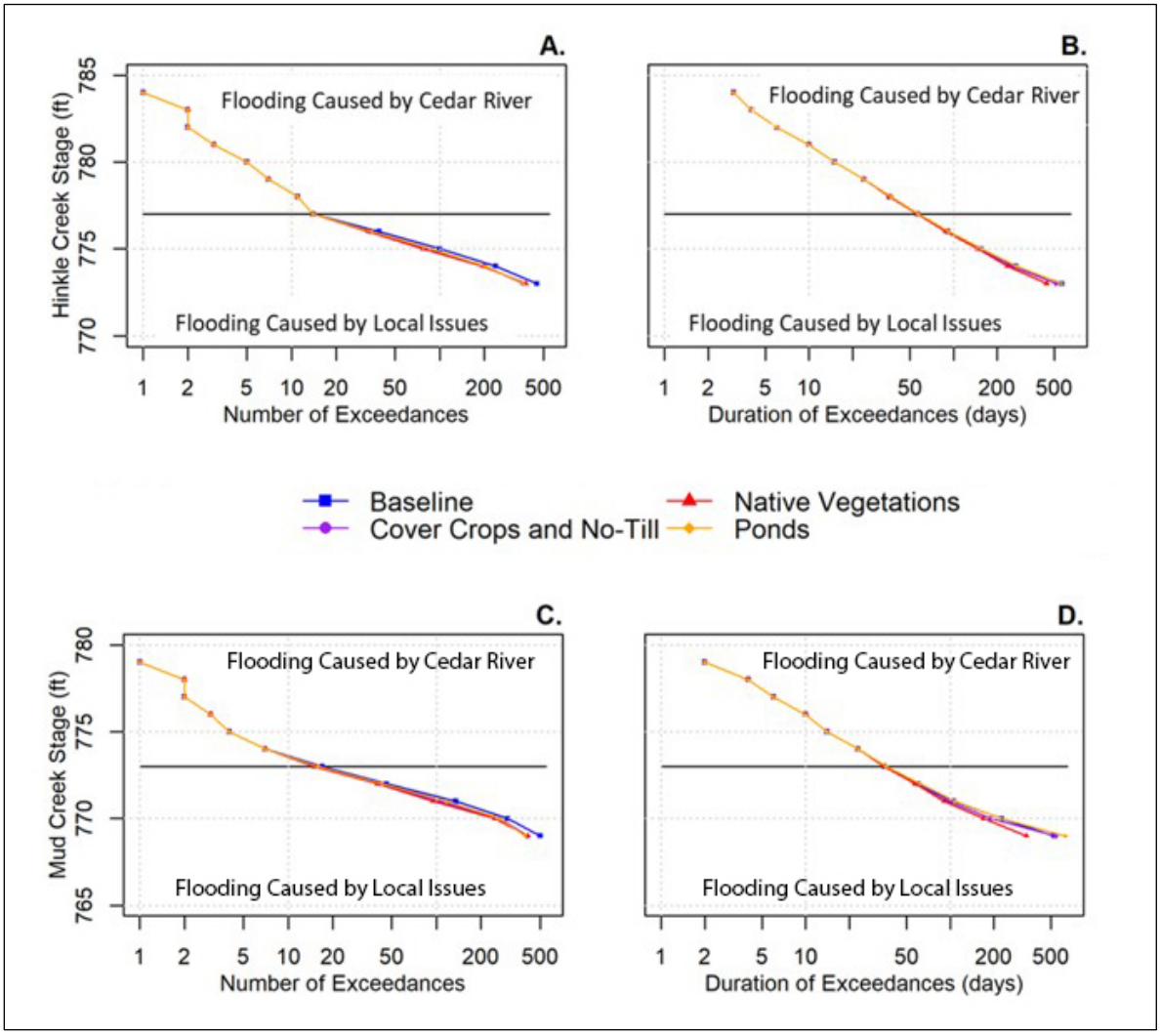

Figure 5. The impact of conservation efforts in the subwatersheds on flooding at the City Vinton.

A. the number of exceedances for Hinkle Creek; B. the duration of exceedances in days for Hinkle Creek; C. the number of exceedances at Mud Creek; and D. the duration of exceedances at Mud Creek. The horizontal line in each graph distinguishes Cedar River flooding from subwatershed flooding.

RECOMMENDATIONS

One of the main conclusions of this study is that the scale of the contributing factors to the flooding concerns in the city vary widely from local storm sewer pipes to large river flooding. To address these concerns, the recommendations and solutions to these issues must vary in scale as well.

Recommendation 1: Incorporate stormwater management ordinances for new construction in the city.
New development without effective stormwater management will worsen current flooding by increasing the amount of runoff that the city's existing infrastructure must convey. In addition, building in flood prone areas increases the risk of the new structures as well as downstream areas. A strictly enforced floodplain ordinance is needed to prevent improper floodplain development that unfairly impacts existing property owners. Potential new development areas in the city were identified by GIS analysis. As shown in **Figure 6**, many of these areas are located upstream of existing problem flooding areas. To prevent making existing flooding worse, the city should incorporate stormwater management into its development ordinances. An example ordinance that could be used to guide this discussion is included in **Appendix A**. More guidance on this topic can be found in the MCWMP.

Recommendation 2: Perform a detailed stormwater infrastructure survey.
The dimensions and elevations of infrastructure used in this analysis were approximated based on LiDAR ground surface data. To better analyze the local flooding concerns identified in this study a detailed storm sewer survey should be performed. This information will improve the model accuracy and the validity of recommendations for future enhancement. **Figure 4** shows the highest priority areas to start with, including the pipes determined to be "capacity limited".

Recommendation 3: Reevaluate stormwater infrastructure performance.
With accurate elevations from a detailed survey included in the model, the storm sewer system should be reevaluated, first to confirm that the pipes identified in this study are a problem, and second to prioritize future enhancements.

Recommendation 4: Investigate the feasibility of implementing a control structure and wetland impoundment west of US 218.
Upstream of US 218 would be an optimal location to create an impoundment wetland by incorporating a control structure on the tributary to Mud Creek (**Figure 7**). One reason for this is that upstream of 218 is not a regulated FEMA floodway, whereas downstream the regulations are more stringent. Increasing the volume of water stored upstream of US 218 and thus mitigating a portion of the flooding in Frog Flats is possible with a control structure and impoundment wetland. If amenable to the Iowa Department of Transportation (Iowa-DOT), a control structure could be retrofitted at the box culvert inlet. Otherwise, a structure could also be placed outside of the right-of-way; however, the land is currently in row crop production.

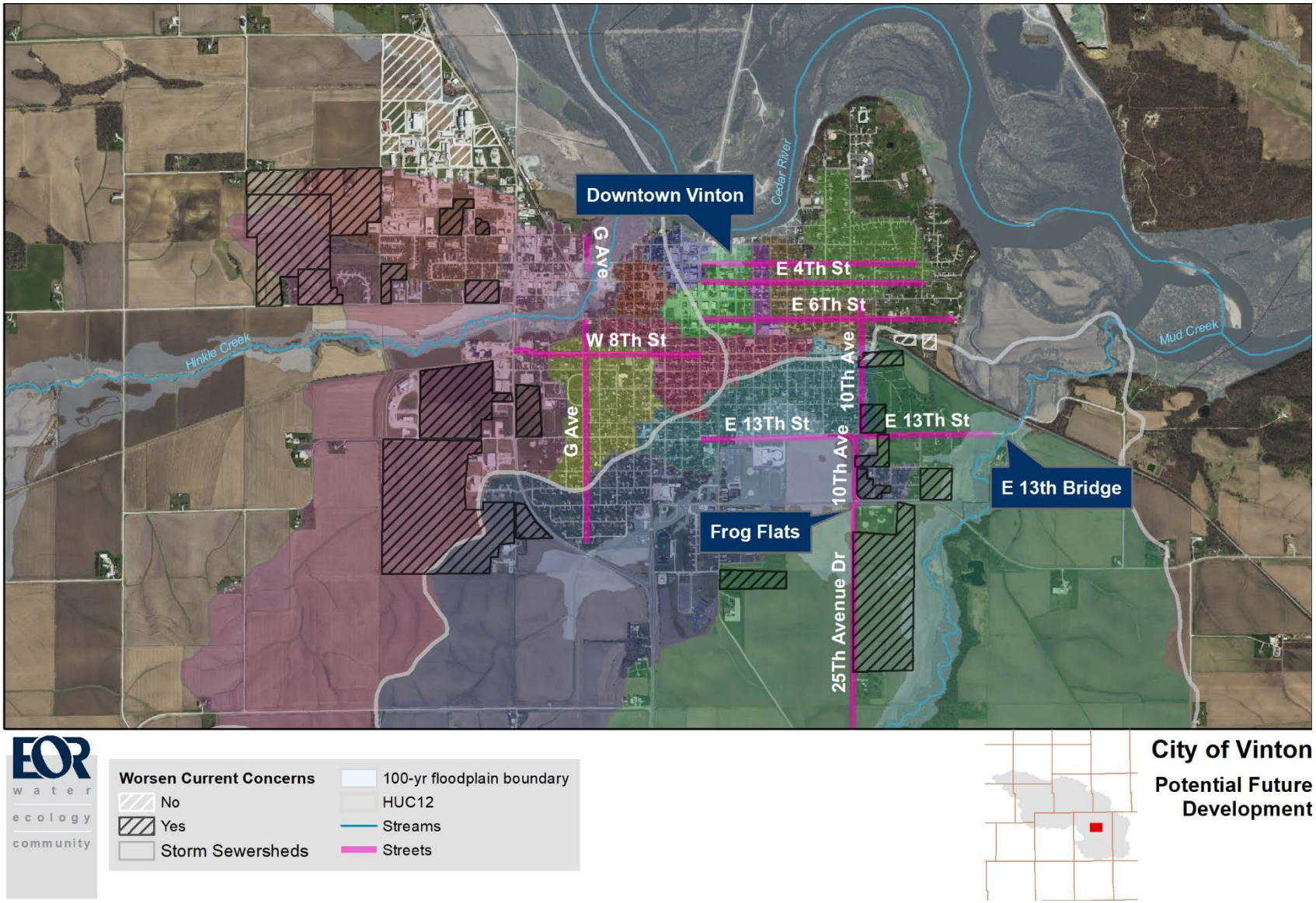

Figure 6. Areas of potential development that could make current flooding worse.

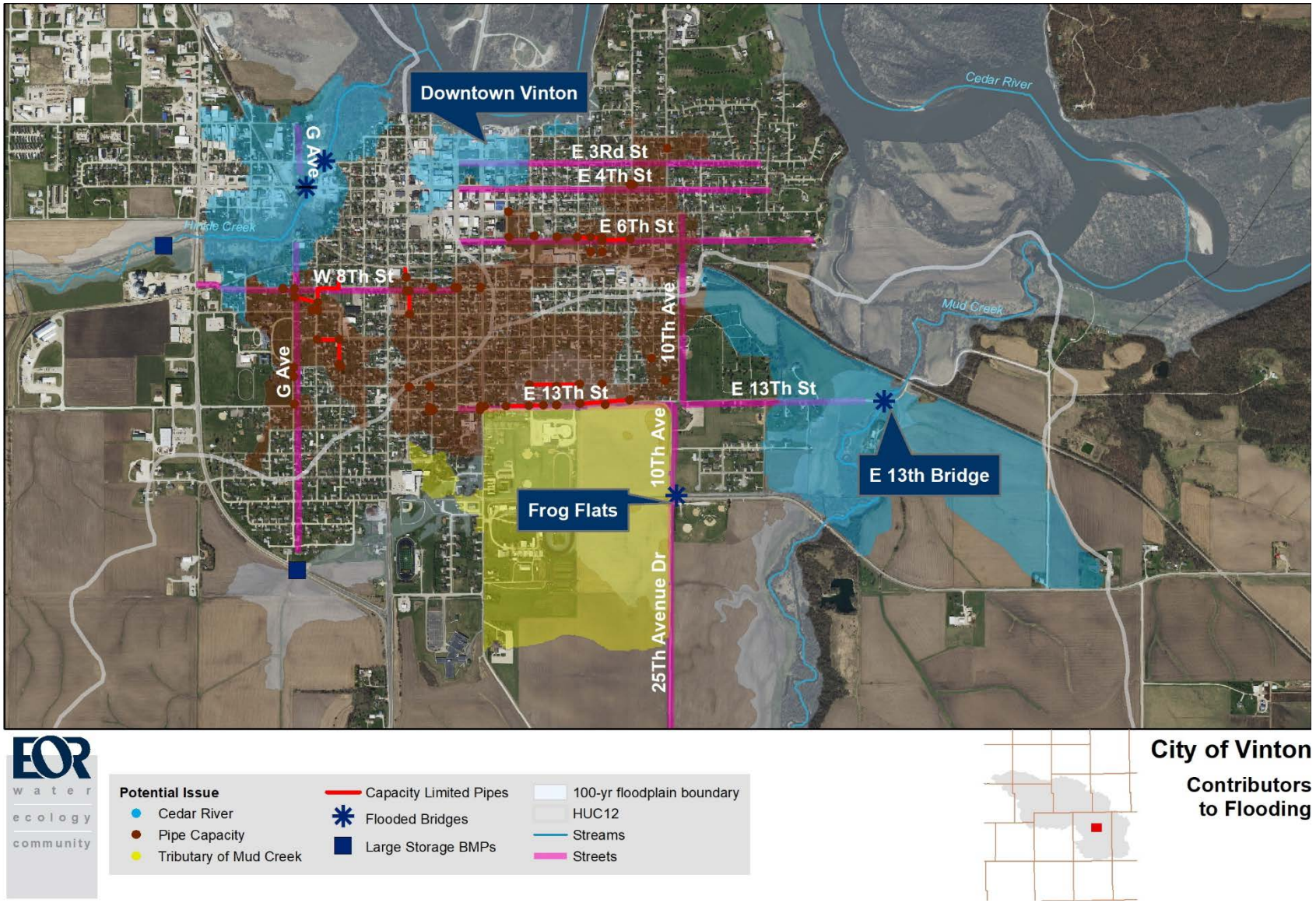

Figure 7. Potential green infrastructure opportunities within the City of Vinton.

Recommendation 5: Investigate the feasibility of constructing a wetland downstream of US 218.
Downstream of US 218 there is undeveloped agricultural land that could be used to construct a wetland (**Figure 7**). A constructed wetland would provide additional storage along the tributary to Mud Creek that would delay the peak flow and mitigate a portion of the flooding in Frog Flats. In addition to providing flood control, the wetland would also provide habitat for native species. The project would include topographic survey and design of the wetland to meet state and federal requirements for constructed wetlands and construction in a floodplain.

Recommendation 6: Investigate the feasibility of constructing a wetland upstream of 10th Avenue.
Upstream of 10th Avenue and 25th Avenue Drive exists two large agricultural fields with a ditch running down the middle (**Figure 7**). Similar to the site downstream of US 218, a constructed wetland in this area would provide much needed storage along the tributary to Mud Creek, upstream of an area that currently experiences flooding and has active development. In addition, a constructed wetland in the northern field could provide an opportunity to daylight the existing storm sewer network, mitigating the pipe capacity issues modeled at E 13th Street. The project would include a similar scope to *Recommendation 5*.

Recommendation 7: Investigate the feasibility of reducing pipe capacity overload along 10th Avenue.
From the modeling results the current pipe capacity along 10th Avenue is contributing to flooding in Frog Flats (**Figure 7**). To reduce flooding, the pipe capacity could be increased, online detention could be implemented, or the area draining to the pipe network could be reduced by re-routing the existing drainage paths. To increase the pipe capacity along this roadway the feasibility of replacing the pipes with pipes of larger diameters should be investigated. In addition, the study could include the potential of adding a third pipe to the box culvert on 10th Avenue that could allow a portion of water to flow through the historic flow path of the watershed. This project would include a detailed survey of the roads and culverts along with modeling to determine the proper size of the new culverts.

Recommendation 8: Investigate the feasibility of stormwater BMPs near 8th Street and G Avenue.
The modeling results indicated that the pipe capacity is limited along G Avenue and W 8th Street (**Figure 7**). To mitigate this problem, open, undeveloped spaces in the storm sewer's watershed could be used to construct retention practices that would provide storage capacity and slow runoff. This project would begin with an assessment of the availability of open sites and then design and construction of the BMPs.

Potential enhancements to improve limited pipe capacity include both improvements to the pipe network and construction of stormwater BMPs, which detain and reduce runoff and treat stormwater close to its source. As shown in **Figure 8**, some examples of stormwater BMPs include:

- Bioswales - Sloped channels with a series of check dams that slow runoff and allow infiltration while moving the water downstream (**Figure 8A**).
- Bioretention basins - Shallow depressions filled with sandy amended soil and planted with native vegetation, which temporarily store runoff and filter pollutants (**Figure 8B**). Bioretention basins can treat runoff from areas up to about two acres, including larger roadways, parking lots, and commercial buildings.

- Rain gardens - Small scale bioretention basins that typically treat runoff from small areas of imperviousness such as small roadway areas, residential rooftops, and driveways (**Figure 8C**).
- Underground storage tanks - Underground structures that temporarily store and slowly release runoff (**Figure 8D**). These are suitable for applications where large amounts of detention volume are needed, above ground real estate is not available, and replacing long sections of storm piping for additional capacity is cost prohibitive.

As shown in **Figure 7**, there are numerous opportunities for stormwater BMPs within the City of Vinton, including potential road improvements, where rain gardens, bioswales, and bioretention cells could be constructed along wide roadways; impervious retrofit locations, where pervious pavement and underground storage could be constructed; and potential above ground locations where large practices such as wet or dry retention basins could be implemented on unused lots. These amenities can be designed to provide multiple benefits in addition to stormwater management in certain settings, such as the aesthetic amenity of a wet detention pond in a new residential development (increased property value), improving abandoned lots with bioretention cells and rain gardens (curb appeal), and upgrading degraded parking lots with permeable pavements (redevelopment incentive).

Figure 8. Examples of green infrastructure.

A. Bioswale (Crown Street – Vancouver, BC, Photo Credit: Jonathan Helmus), B. Bioretention basin (Arlington-Pascal Stormwater Improvement Project - St. Paul, MN, Photo Credit: EOR), C. Raingarden (Arlington-Pascal Stormwater Improvement Project - St. Paul, MN, Photo Credit: EOR). D. Underground infiltration or storage tank (Bradshaw Celebration of Life Center, Photo Credit: EOR).

Recommendation 9: Investigate the feasibility of stormwater BMPs along E. 6th Street.

Another flooding concern identified from the modeling included pipe capacity issues along E. 6th Street (**Figure 7**). Similar to *Recommendation 8*, the City could investigate the implementation of various bioretention and detention BMPs along E. 6th Street that would offset the pipe capacity issues in the area. This project would have a similar scope to the previous recommendation.

Recommendation 10: Investigate the feasibility of a levy system to protect downtown Vinton.

This investigation would study the feasibility of a levy that extends along the banks of the Cedar River and Hinkle Creek (**Figure 7**). The study would involve an analysis on the change in flood elevations on the Cedar River and the impact on the current properties and land uses along the river.

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APPENDIX A. MODEL STORMWATER ORDINANCE

1) Authorization, Purpose, Scope, and Interpretation

A) **Statutory authorization**

1) This ordinance is adopted pursuant to the authorization and policies contained in Chapter 335 and Chapter 354 of the Code of Iowa, as amended.
2) This ordinance is intended to meet the construction site erosion and sediment control and post-construction stormwater management regulatory requirements for construction activity and small construction activity (NPDES Permit) as defined in 40 CFR 122.26(b)(14)(x) and (b)(15), respectively.

B) **Purpose**

1) The purpose of this ordinance is to establish regulatory requirements for land development and land disturbing activities aimed at minimizing the threats to public health, safety, public and private property and natural resources within the [Local Jurisdiction] from construction site erosion and post-construction stormwater runoff. Specifically, the ordinance establishes regulatory requirements that:
   (1) Assist in meeting NPDES/SDS Construction Stormwater General Permit requirements;
   (2) Assist in meeting Total Maximum Daily Load (TMDL) plan waste load allocations for impaired waters through quantification of load reductions;
   (3) Protect life and property from dangers associated with flooding;
   (4) Protect public and private property and natural resources from damage resulting from stormwater runoff and erosion;
   (5) Ensure site design minimizes the generation of stormwater runoff and maximizes pervious areas for stormwater treatment within the context of the allowable use;
   (6) Provide a single, consistent set of performance goals that apply to all developments;
   (7) Protect water quality from pollutant loadings of sediment, suspended solids, nutrients, heavy metals, toxics, debris, bacteria, pathogens, biological impairments, thermal stress and other pollutants;
   (8) Promote infiltration and groundwater recharge;
   (9) Provide vegetated corridors (buffers) to protect water resources from development;
   (10) Protect functional values of all types of natural waterbodies (e.g. rivers, streams, wetlands, lakes, seasonal ponds); and
   (11) Sustain or enhance biodiversity (native plant and animal habitat) and support riparian ecosystems.

C) **Scope**

1) Land shall not be developed for any use without providing erosion and sediment control measures prevent erosion and sedimentation, and stormwater management measures that reduce and treat stormwater runoff.

D) **Greater restrictions**

1) Relationship to other requirements - All stormwater management and erosion and sediment control activities shall comply with all applicable requirements of the relevant local, state, and federal authorities. In the case of conflict between provisions of this ordinance and other stormwater regulations, the strictest provisions shall apply.
2) Relationship to Existing Easements, Covenants, and Deed Restrictions – The provisions of this ordinance are not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance imposes greater restrictions the provisions of this ordinance shall prevail.

E) **Severability**

1) The provisions of this ordinance are severable, and if any provision of this ordinance, or application of any provision of this ordinance to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this ordinance shall not be affected thereby.

2) Applicability

A) **Erosion and Sediment Control Plan**

1) Unless otherwise exempted by this ordinance, an Erosion and Sediment Control Plan (ESCP) shall be required as part of any Grading or Building Permit which proposes land development or land disturbing activity that meets any of the criteria in a. through d. below:
   (1) Any project undertaking grading, filling, or other land disturbing activities that involves 100 cubic yards of earth;
   (2) Any project that disturbs greater than 10,000 square feet of land;
   (3) Any project with wetland impacts, grading within public waters, grading within buffers; or grading within 40-feet of the bluff line;
   (4) A land disturbing activity, regardless of size, that the [Local Jurisdiction] determines is likely to cause an adverse impact to an environmentally sensitive area or other property, or may violate any other erosion and sediment control standard.

B) **Stormwater Management Plan**

1) Unless otherwise exempted by this ordinance, an approved Stormwater Management Plan (SMP) shall be required prior to land development or land disturbing activity that meets any of the criteria in a. through e. immediately below:
   (1) Any project that creates or reconstructs 6,000 square feet or more of impervious surface.
   (2) All major and minor subdivisions or subdivision of land that is part of a common plan of development.
   (3) Projects adjacent to Designated Waters that create or add 500 square feet or greater of additional impervious surface to a site.
   (4) Any project requiring a variance from the current local impervious surface zoning requirements for the property.
   (5) Any land development activity, regardless of size, that the [Local Jurisdiction] determines is likely to cause an adverse impact to an environmentally sensitive area or other property.

2) All stormwater management plans shall include an Erosion and Sediment Control Plan (ESC Plan).

C) **Buffers**

1) A buffer of unmowed, natural vegetation shall be required upslope of wetlands, lakes and streams prior to the approval of any proposed land development requiring a subdivision, lot split, rezoning, special use permit, or variance, unless otherwise exempted in this ordinance.

D) **Exemptions**

1) The following activities shall be exempt from all of the requirements of this ordinance:
   (1) Emergency work necessary to protect life, limb, or property.
   (2) Routine agricultural activity such as tilling, planting, harvesting, and associated activities. Other agricultural activities are not exempt, including activities such as construction of structures.
   (3) Silviculture/forestry activity.

3) Definitions

1) Words or phrases used in this ordinance shall have the meanings as defined below.
2) If not defined in this ordinance, the words or phrases used in this ordinance shall be interpreted to have the meanings they have in Appendix B of the Iowa Construction Stormwater Permits.
3) Words or phrases used in this ordinance shall be interpreted so as to give this ordinance its most reasonable application.
4) For the purpose of this ordinance, the words "must", "shall", and "will" are mandatory and not permissive or discretionary.

Applicant. The owner of land submitting an application under the provisions of this ordinance for a Stormwater Management Permit (SMP) and/or Erosion and Sediment Control Plan (ESCP) to be issued by the community.

Best Management Practices (BMPs). The most effective and practicable means of erosion prevention and sediment control, and water quality management practices that are the most effective and practicable means to control, prevent, and minimize degradation of surface water, including avoidance of impacts, construction-phasing, minimizing the length of time soil areas are exposed, prohibitions, pollution prevention through good housekeeping, and other management practices published by state or designated area-wide planning agencies.

Better Site Design. The control and management of stormwater quantity and quality through the application of site design techniques as outlined in the current version of the Iowa Storm Water Manual. Better Site Design includes: preservation of natural areas; site reforestation; stream and shoreland buffers; open space design; disconnection of impervious cover; rooftop disconnection; grass channels; stormwater landscaping; compost and amended soils; impervious surface reduction; and trout stream protection.

Common Plan of Development or Sale. A contiguous area where multiple separate and distinct land disturbing activities may be taking place at different times, on different schedules, but under one proposed plan. One plan is broadly defined to include design, permit application, advertisement or physical demarcation indicating that land-disturbing activities may occur.

Construction Activity. Includes construction activity as defined in 40 CFR pt. 122.26(b)(14)(x) and small construction activity as defined in 40 CFR pt. 122.26(b)(15). This includes a disturbance to the land that results in a change in the topography, existing soil cover (both vegetative and non-vegetative), or the existing soil topography that may result in accelerated stormwater runoff, leading to soil erosion and movement of sediment into surface waters or drainage systems. Examples of construction activity may include clearing, grading, filling, and excavating. Construction activity includes the disturbance of less than one acre of total land area that is a part of a larger common plan of development or sale if the larger common plan will ultimately disturb one (1) acre or more. Construction activity does not include a disturbance to the land of less than five (5) acres for the purpose of routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. (NOTE – The community may wish to change this to a smaller disturbance area. A smaller area is more restrictive than the state/federal requirements, so it would be allowable for a local government.)

Development, New. Any development that results in the conversion of land that is currently prairie, agriculture, forest, or meadow and has less than 15 percent impervious surface. Land that was previously developed, but now razed and vacant, will not be considered new development.

Erosion and Sediment Control Plan (ESC Plan). A plan for projects disturbing less than one acre or meets the standards described in Section 2. The plan identifies erosion prevention and sediment control practices, locations, and timelines for installation of BMPs. The plan also includes responsible parties, best management installation timelines, and descriptions of inspection and maintenance activities.

Erosion Prevention. Measures employed to prevent erosion. Examples include, but are not limited to: soil stabilization practices, limited grading, mulch, temporary erosion protection, silt fences, stabilized entrances, permanent cover, and construction phasing.

Fully Reconstructed Impervious Surface. Areas where impervious surfaces have been removed down to the underlying soils. Activities such as structure renovation, mill and overlay projects, and pavement rehabilitation projects that do not alter underlying soil material beneath the structure, pavement, or activity are not considered fully reconstructed impervious surfaces. Reusing the entire existing building foundation and re-roofing of an existing building are not considered fully reconstructed.

Impervious Surface. A constructed hard surface that either prevents or retards the entry of water into the soil and causes water to run off the surface in greater quantities and at an increased rate of flow than prior to development. Examples include rooftops, sidewalks, patios, driveways, parking lots, storage areas, and concrete, asphalt, or gravel roads.

Land Disturbance. Any activity that results in a change or alteration of the existing ground cover (both vegetative and non-vegetative) or the existing topography. Land disturbing activities include, but are not limited to, development, redevelopment, demolition, construction, reconstruction, clearing, grading, filling, stockpiling, excavation, and borrow pits. Routine vegetation management, and mill and overlay/resurfacing activities that do not alter the soil material beneath the pavement base, are not considered land disturbance. In addition, other maintenance activities such as catch basin and pipe repair/replacement, lighting, and pedestrian ramp improvements shall not be considered land disturbance for the purposes of determining permanent stormwater management requirements.

Linear Project. Construction or reconstruction of roads, trails, sidewalks, and rail lines that are not part of a common plan of development or sale. Mill, overlay and other resurfacing projects are not considered to be reconstruction.

Major Subdivision. All subdivisions not classified as minor subdivisions including, but not limited to, subdivisions of four (4) or more lots, or any size subdivision requiring any new street or extension of an existing street.

Minor Subdivision. Any subdivision containing three (3) or less lots fronting on an existing street, not part of a common plan of development nor involving any new street or road or the extension of municipal facilities.

National Pollutant Discharge Elimination System (NPDES). The program for issuing, modifying, revoking, reissuing, terminating, monitoring, and enforcing permits under the Clean Water Act (Sections 301, 318, 402, and 405) and United States Code of Federal Regulations Title 33, Sections 1317, 1328, 1342, and 1345.

Owner. The person or party possessing the title of the land on which the construction activities will occur; or if the construction activity is for a lease, easement, or mineral rights license holder, the party or individual identified as the lessee, easement or mineral rights license holder; or the contracting government agency responsible for the construction activity.

Permanent Cover. Surface types that will prevent soil failure under erosive conditions. Examples include: gravel, asphalt, concrete, rip rap, roof tops, perennial vegetation, or other landscaped material that will permanently arrest soil erosion. Permanent cover does not include the practices listed under temporary erosion protection.

Permittee. A person or persons, firm, or governmental agency or other entity that signs the application submitted to the [Local Jurisdiction] and is responsible for compliance with the terms and conditions of the permit.

Predevelopment State. The rate and volume of stormwater is unchanged. The calculation of predevelopment is based on native soils and vegetation.

Public Waters. All water basins and watercourses that are described in Iowa Code subsection 455B.262(3).

Redevelopment. Any development that is not considered new development.

Retain. Manage stormwater on site using a Low Impact Development (LID) approach so that the rate and volume of predevelopment stormwater reaching receiving waters is unchanged.

Saturated Soil. The highest seasonal elevation in the soil that is in a reduced chemical state because of soil voids being filled with water. Saturated soil is evidenced by the presence of redoximorphic features or other information.

Sediment Control. Methods employed to prevent sediment from leaving the site. Sediment control practices include: silt fences, sediment traps, earth dikes, drainage swales, check dams, subsurface drains, bio rolls, rock logs, compost logs, storm drain inlet protection, and temporary or permanent sedimentation basins.

Stormwater Facility. A stationary and permanent BMP that is designed, constructed, and operated to prevent or reduce the discharge of pollutants in stormwater.

Small Construction Activity. As defined in 40 CFR part 122.26(b)(15). Small construction activities include clearing, grading, and excavating that result in land disturbance equal to or greater than one acre and less than five acres. Small construction activity includes the disturbance of less than one (1) acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one and less than five (5) acres.

Stabilized. Exposed ground surface covered by appropriate materials such as mulch, staked sod, riprap, erosion control blanket, mats, or other material that prevents soil erosion. Grass, agricultural crops, or other seeding alone is not stabilization. Mulch materials must achieve approximately 90 percent ground coverage (typically 2 ton/acre).

Stormwater. As defined by the Iowa Storm Water Management Manual, and includes precipitation runoff, stormwater runoff, snowmelt runoff, and any other surface runoff or drainage.

Stormwater Management Plan (SMP). A plan for stormwater discharge that includes temporary and permanent stormwater management systems that, when implemented, will reduce volumes and rates of stormwater discharge while also reducing the number and type of pollutants in stormwater discharges.

Surface Water(s). All streams, lakes, ponds, marshes, wetlands, reservoirs, springs, rivers, drainage systems, waterways, watercourses, and irrigation systems whether natural or artificial, public or private, except that surface waters do not include treatment basins or ponds that were constructed.

Temporary Erosion Protection. Methods employed to prevent erosion during development and land disturbing activities. Examples of temporary erosion protection include; straw, wood fiber blanket, wood chips, vegetation, mulch, and rolled erosion control products.

Underground Waters (Groundwater). Water contained below the surface of the earth in the saturated zone including, without limitation, all waters whether under confined, unconfined, or perched conditions, in near surface unconsolidated sediment or regolith, or in rock formations deeper underground. The term groundwater shall be synonymous with underground water.

Wetland(s). As defined in Iowa Code § 456B.1(5) and includes those areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. Constructed wetlands designed for wastewater treatment are not waters of the state. Wetlands must have the following attributes:

1) A predominance of hydric soils.
2) Inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in a saturated soil condition.
3) Under normal circumstances support a prevalence of such vegetation.

4) Permit Review Process

A) Pre-application meeting

At the discretion of the Zoning Administrator, the [Local Jurisdiction] shall facilitate a pre-application meeting with the Applicant, [Local Jurisdiction] staff (or its authorized representative), and staff of relevant partner agencies (e.g. Iowa DNR, etc.). The purposes of the meeting are to understand the general parameters of the proposed project and to convey the ordinance's requirements.

B) Application completeness review

The [Local Jurisdiction] shall make a determination regarding the completeness of a permit application and notify the Applicant in writing if the application is not complete, including the reasons the application was deemed incomplete.

C) Application review

The Applicant shall not commence any construction activity subject to this ordinance until a permit has been authorized by the [Local Jurisdiction].

D) Permit authorization

If the [Local Jurisdiction] determines that the application meets the requirements of this ordinance, the [Local Jurisdiction] may issue approval authorizing the project or activity. The approval shall be valid for one year from the date of approval.

E) Permit denial

If the [Local Jurisdiction] determines the application does not meet the requirements of this ordinance the application must be denied. If the application is denied, the Applicant will be notified in writing including reasons for the denial. Once denied, a new application must be submitted for approval before any activity may begin.

F) Plan information requirements

The minimum information requirements of the application shall be consistent with the requirements in the most recent version of the NPDES/SDS Construction Stormwater General Permit and any other applicable local, state, or federal performance standards.

G) Modification of permitted plans

If any of the following circumstances occur on a site with an approved ESCP or SMP, the Applicant shall apply for an amendment to the associated permit(s), submitting all updated materials, reflecting the needed changes; the review of the amended materials shall use the same process as a new submittal, as designated in this ordinance:

1) There is a change in design, construction, operation, maintenance, weather or seasonal conditions that has a significant effect on the discharge of pollutants to surface water or underground water.
2) Inspections or investigations by site operators, local, state, or federal officials indicate the plans are not effective in eliminating or significantly minimizing the discharge of pollutants to surface water or underground water or that the discharges are causing water quality standard exceedances.
3) The plan is not achieving the general objectives of erosion and sediment control or minimizing pollutants in stormwater discharges associated with development or land disturbing activity.

H) Permit completion

Before work under the permit is deemed complete, the permittee must submit as-builts, a long-term maintenance plan, and information demonstrating that the stormwater facilities conform to design specifications.

5) Site Design and MIDS Calculator

A) Better Site Design

Whenever possible, development projects shall be designed using site design techniques and other site design best practices provided by the current version of the Iowa Department of Natural Resources Storm Water Manual.[1]

B) Unified Sizing Criteria

Final site design and choice of permanent stormwater practices shall be based on outcomes of the calculations provided by the Unified Sizing Criteria in Iowa DNR's Storm Water Manual (or other model that shows the performance goal can be met) and shall meet the standards in Section 7 of this ordinance.

6) Stormwater Volume Reduction Performance Standards

Any Applicant for a Stormwater Management Plan as defined in Section 2 of this ordinance must meet all of the following performance standards:

A) New development volume control

For new, nonlinear developments on sites without restrictions, stormwater runoff volumes will be controlled and the post-construction runoff volume shall be retained on site for 1.25 inches of runoff from all impervious surfaces on the site.

B) Redevelopment volume control

Nonlinear redevelopment projects on sites without restrictions that create or fully reconstruct impervious surfaces shall capture and retain on site 1.25 inches of runoff from all new or fully reconstructed impervious surfaces.

C) Linear development volume control

1) Linear projects on sites without restrictions that create new or fully reconstructed impervious surfaces, shall capture and retain the larger of the following:
   (1) 0.63 inches of runoff from the new and fully reconstructed impervious surfaces on the site
   (2) 1.25 inches of runoff from the net increase in impervious area on the site.

D) Flexible treatment alternatives for sites with restrictions

Applicant shall attempt to comply fully with the appropriate performance standards described above. Alternatives considered and presented shall examine the merits of relocating project elements to address, varying soil conditions and other constraints across the site. Volume reduction techniques considered shall include infiltration, reuse & rainwater harvesting, canopy interception and evapotranspiration, or other proven techniques. First priority shall be given to BMPs that include volume reduction. Second priority is to employ filtration techniques, followed by rate control BMPs.

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[1] Available at http://www.iowadnr.gov/Environmental-Protection/Water-Quality/NPDES-Storm-Water/Storm-Water-Manual.

If full compliance is not possible due to any of the factors listed below, the Applicant must document the reason. Applicant shall document the flexible treatment alternatives sequence starting with Alternative #1. If Alternative #1 cannot be met, then Alternative #2 shall be analyzed. Applicants must document the specific reasons why Alternative #1 cannot be met based on the factors listed below. If Alternative #2 cannot be met then Alternative #3 shall be met. Applicants must document the specific reasons why Alternative #2 cannot be met based on the factors listed below. When all of the conditions are fulfilled within an alternative, the flexible treatment alternatives sequence is complete.

Factors to be considered for each alternative will include:

1) Karst geology;
2) Shallow bedrock;
3) High groundwater;
4) Hotspots or contaminated soils;
5) Proximity to public or private water supply systems;
6) Zoning, setbacks, or other land use requirements; or
7) Poor soils (infiltration rates that are too low or too high, problematic urban soils)

If site constraints or restrictions limit the full treatment goal, the following flexible treatment alternatives shall be used:

Alternative #1

Applicant attempts to comply with the following conditions:

1) Achieve at least 0.63" volume reduction from all impervious surfaces if the site is new development or from the new and/or fully reconstructed impervious surfaces for a redevelopment or linear development site.
2) Remove 75 percent of the annual total phosphorus (TP) load from all impervious surfaces if the site is new development or from the new and/or fully reconstructed impervious surfaces for a redevelopment site.
3) Options considered and presented shall examine the merits of relocating project elements to address, varying soil conditions and other constraints across the site.

Alternative #2

Applicant attempts to comply with the following conditions:

1) Achieve volume reduction to the maximum extent practicable.
2) Remove 60 percent of the annual TP load from all impervious surfaces if the site is new development or from the new and/or fully reconstructed impervious surfaces for a redevelopment site.
3) Options considered and presented shall examine the merits of relocating project elements to address, varying soil conditions and other constraints across the site.

Alternative #3 – Off-site Treatment

Mitigation equivalent to the performance of 1.1 inches of volume reduction for new development, linear development or redevelopment as described above in this section, (including banking or cash) can be performed off-site to protect the receiving water body. Offsite treatment shall be achieved in areas selected in the following order of preference:

1) Locations that yield benefits to the same receiving water that receives runoff from the original construction activity.
2) Locations within the same Department of Natural Resource (DNR) catchment area (Hydrologic Unit 08) as the original construction activity.
3) Locations within the next adjacent DNR catchment area upstream.
4) Locations anywhere within the [Local Jurisdiction]'s jurisdiction.

7) Stormwater Rate Control

A) For new development, redevelopment and linear development sites the site design shall provide on-site treatment during construction and post-construction to ensure no increase from existing conditions in offsite peak discharge for the 1-year, 2-year, 10- year, and 100-year, 24-hour storm events based on the standards defined by NOAA Atlas 14.

B) For single family residential building lots not part of a common plan of development site, rate control requirements do not apply.

8) Other Design Standards

A) All volume control and water quality and quantity BMP design specifications shall conform to the current version of the NPDES/SDS Construction Stormwater General Permit.

B) Site erosion and sediment control requirements: All erosion and sediment control requirements shall conform to the current requirements of NPDES/SDS Construction Stormwater General Permit.

C) Where applicable, a minimum of 20 feet shall be provided on all sides of all publicly owned stormwater facilities for facility access and maintenance.

D) A uniform perennial vegetative cover (e.g. evenly distributed, without large bare areas) with a density of 70 percent of the native background vegetative cover for the area must be established on all unpaved areas and areas not covered by permanent structures. Equivalent permanent stabilization measures may be used with the approval of the [Local Jurisdiction].

9) Inspections and Maintenance

A) Inspections and record keeping

1) Applicant responsibilities
2) The Applicant is responsible for inspections and record keeping during and after construction for all privately-owned stormwater treatment practices on the site.
3) [Local Jurisdiction] inspections.
4) The [Local Jurisdiction] reserves the right to conduct inspections on a regular basis to ensure that both temporary and permanent stormwater management and erosion and sediment control measures are properly installed and maintained prior to construction, during construction, and at the completion of the project.

B) Right of entry and inspection

1) **Powers** - The issuance of a permit constitutes a right-of-entry for the [Local Jurisdiction] or its authorized representative to enter upon the construction site. The Applicant shall allow, upon presentation of credentials, the [Local Jurisdiction] and its authorized representatives to:
   (1) Enter upon the permitted site for the purpose of obtaining information, examining records, and conducting investigations or surveys;

(2) Bring such equipment upon the permitted development as is necessary to conduct such surveys and investigations;
(3) Examine and copy any books, papers, records, or memoranda pertaining to activities or records required to be kept under the terms and conditions of the permit;
(4) Inspect the stormwater pollution control measures;
(5) Sample and monitor any items or activities pertaining to stormwater pollution control measures; and
(6) Correct deficiencies in stormwater and erosion and sediment control measures.

C) Fees

1) Fees will be applied per [Local Jurisdiction] Fee Schedule

D) Enforcement tools/stop work orders

1) The [Local Jurisdiction] reserves the right to issue construction stop work orders when cooperation with inspections is withheld, or when a violation has been identified that needs immediate attention to protect human health or the environment.
   (1) **Construction stop work order:** The [Local Jurisdiction] may issue construction stop work orders until stormwater management measures meet specifications and the Applicant repairs any damage caused by stormwater runoff. An inspection by the [Local Jurisdiction] must follow before the construction project work can resume.
   (2) **Other actions to ensure compliance:** The [Local Jurisdiction] can take any combination of the following actions in the event of a failure by Applicant to meet the terms of this ordinance:
      (a) Withhold inspections or issuance of certificates or approvals.
      (b) Revoke any permit issued by the [Local Jurisdiction] to the Applicant.
      (c) Conduct remedial or corrective action on the development site or adjacent site affected by the failure.
      (d) Charge Applicant for all costs associated with correcting the failure or remediating damage from the failure. If payment is not made within thirty days, payment will be made from the Applicant's financial securities.
      (e) Bring other actions against the Applicant to recover costs of remediation or meeting the terms of this ordinance.

E) Long term inspection and maintenance of stormwater facilities

1) Private stormwater facilities
   (1) **Maintenance Plan Required:** No private stormwater facilities may be approved unless a maintenance agreement is provided that defines who will conduct the maintenance, the type of maintenance necessary to ensure effective performance, and the maintenance intervals.
   (2) **Facility Access:** The Applicant shall obtain all necessary easements or other property interests to allow access to the facilities for inspection or maintenance for both the responsible party and the [Local Jurisdiction] or authorized representative.
   (3) **Removal of Settled Materials**: All settled materials including settled solids, shall be removed from ponds, sumps, grit chambers, and other devices as necessary and disposed of properly.

(4) **Inspections:** All stormwater facilities shall be inspected by the property owner at a frequency consistent with the maintenance plan and the performance goals for which the facility was originally designed. Inspection reports shall be provided to the [Local Jurisdiction] upon request.

2) Public stormwater facilities

(1) **Acceptance of Publicly Owned Facilities**: A final inspection shall be required before the [Local Jurisdiction] accepts ownership of the stormwater facilities. Before work under the permit is deemed complete; the permittee must submit as-builts demonstrating at the time of final stabilization that the stormwater facilities conform to design specifications and a Maintenance Plan.

(2) **Maintenance:** The [Local Jurisdiction] shall perform maintenance of publicly owned stormwater facilities in accordance with applicable stormwater management plans, maintenance plans, and other regulatory requirements.

10) Financial Securities

A) Amount

At its sole discretion, the [Local Jurisdiction] may require a Financial Security from the Applicant in an amount sufficient to cover the entirety of the estimated costs of permitted and remedial work based on the final design, as established in set financial security schedule determined by the [Local Jurisdiction].

B) Release

The Financial Security shall not be released until all permitted and remedial work is completed.

C) Use by [Local Jurisdiction]

The Financial Security may be used by the [Local Jurisdiction] to complete work not completed by the Applicant.

D) Form of security

The form of the Financial Security shall be one or a combination of the following, to be determined by the [Local Jurisdiction]:

1) **Cash deposit -** The cash will be held by [Local Jurisdiction] in a separate account.
2) **Security deposit -** Either with the [Local Jurisdiction], a responsible escrow agent, or trust company, at the option of the [Local Jurisdiction], either:
   (1) An irrevocable letter of credit, negotiable bonds of the kind approved for securing deposits of public money, or other instruments of credit from one or more financial institutions, subject to regulation by the state and federal government wherein the financial institution pledges funds are on deposit and guaranteed for payment.
   (2) Cash in U.S. currency.
   (3) Other forms and securities (e.g. disbursing agreement) as approved by the [Local Jurisdiction].

E) Indemnity

This Financial Security shall hold the [Local Jurisdiction] free and harmless from all suits or claims for damages resulting from the negligent grading, filling, removal, and placement or storage of rock, sand, gravel, soil or other like material within the [Local Jurisdiction].

F) Maintaining the financial security

If at any time during the course of the work the balance of the Financial Security falls below 50% of the total required deposit, the Applicant shall make another deposit in the amount necessary to restore the cash deposit to the required amount. If the Applicant does not bring the financial security back up to the required amount within seven (7) days after notification by the [Local Jurisdiction] that the amount has fallen below 50 percent of the required amount, the [Local Jurisdiction] may:

1) **Withhold inspections -** Withhold the scheduling of inspections and/or the issuance of a Certificate of Occupancy.
2) **Revoke permits -** Revoke any permit issued by the [Local Jurisdiction] to the Applicant for the site in question or any other of the Applicant's sites within the [Local Jurisdiction]'s jurisdiction.

G) Proportional reduction of the financial security

1) When more than one-third of the Applicant's maximum exposed soil area achieves final stabilization, the [Local Jurisdiction] can reduce the total required amount of the financial security by one-third of the initial amount. When more than two-thirds of the Applicant's maximum exposed soil area achieves final stabilization, the [Local Jurisdiction] can reduce the total required amount of the financial security to two-thirds of the initial amount. This reduction in financial security will be determined by the [Local Jurisdiction].

H) Returning the financial security

1) The Financial Security deposited with the [Local Jurisdiction] for faithful performance of the SMP or the ESCP and any related remedial work shall be released one full year after the completion of the installation of all stormwater pollution control measures, including vegetation establishment, as shown on the SMP or ESCP.

I) Action against the financial security

The [Local Jurisdiction] may access the Financial Security for emergency or remedial actions if any of the conditions listed below exist. The [Local Jurisdiction] shall use the Financial Security to pay for remedial work undertaken by the [Local Jurisdiction], or a private contractor under contract with the [Local Jurisdiction], or to reimburse the [Local Jurisdiction] for all costs incurred in the process of remedial work including, but not limited to, staff time and attorney's fees.

1) **Abandonment -** The Applicant ceases land disturbing activities and/or filling and abandons the work site prior to completion of the grading plan.
2) **Failure to implement the SWPPP or ESC Plan** - The Applicant fails to conform to the grading plan and/or the SWPPP as approved by the [Local Jurisdiction].
3) **Failure to perform -** The BMPs utilized on the project fail within one year of installation.
4) **Failure to reimburse [Local Jurisdiction]** - The Applicant fails to reimburse the **[Local Jurisdiction]** for corrective action taken.

J) Emergency action

If circumstances exist such that noncompliance with this ordinance poses an immediate danger to the public health, safety and welfare, as determined by the [Local Jurisdiction], the [Local Jurisdiction] may take emergency action. The [Local Jurisdiction] shall also take every reasonable action possible to contact and direct the Applicant to take any necessary action. Any cost to the

[Local Jurisdiction] for emergency action may be recovered from the Applicant's financial security.

11) Enforcement

A) Notification of Noncompliance with the Permit

1) The [Local Jurisdiction] shall notify the permit holder of noncompliance with the permit's requirements.
2) Initial Contact - The initial contact will be to the party or parties listed on the application and/or the SMP as contacts. Except during an emergency action, forty-eight (48) hours after notification by the [Local Jurisdiction] or seventy-two (72) hours after the failure of erosion and sediment control measures, whichever is less, the [Local Jurisdiction] at its discretion, may begin corrective work.
3) Notification should be in writing, but if it is verbal, a written notification must follow as quickly as practical. If after making a good-faith effort to notify the responsible party or parties, the [Local Jurisdiction] has been unable to establish contact, the [Local Jurisdiction] may proceed with corrective work. There are conditions when time is of the essence in controlling erosion. During such a condition the [Local Jurisdiction] may take immediate action, and then notify the Applicant as soon as possible.
4) Erosion Off-site - If erosion breaches the perimeter of the site, the Applicant shall immediately develop a cleanup and restoration plan, obtain the right-of-entry from the adjoining property owner, and implement the cleanup and restoration plan within forty-eight (48) hours of obtaining the adjoining property owner's permission. In no case, unless written approval is received from the [Local Jurisdiction], may more than seven (7) calendar days pass without corrective action being taken. If, in the discretion of the [Local Jurisdiction], the permit holder does not repair the damage caused by the erosion, the [Local Jurisdiction] may undertake the required remedial work. When restoration to wetlands and other resources are required, the Applicant shall be required to work with the appropriate agencies to ensure the work is done properly.
5) Erosion into Streets, Wetlands, or Water Bodies - If eroded soils (including tracked soils from construction activities) enter or appear likely to enter streets, wetlands, or other water bodies, cleanup and repair shall be immediate. The Applicant shall provide all traffic control and flagging required to protect the traveling public during the cleanup operations.
6) Failure to do Corrective Work - When an Applicant fails to conform to any provision of this ordinance within the time stipulated, the [Local Jurisdiction] may take the following actions.
   (1) Stop Work Order - Issue a stop work order, withhold the scheduling of inspections, and/or withhold the issuance of a Certificate of Occupancy.
   (2) Permit Revocation - Revoke any permit issued by the [Local Jurisdiction] to the Applicant for the site in question or any other of the Applicant's sites within the [Local Jurisdiction]'s jurisdiction.
   (3) Correction by [Local Jurisdiction] - Correct the deficiency or hire a contractor to correct the deficiency.

(a) The Applicant will be required to reimburse the [Local Jurisdiction] for all costs incurred in correcting ESCP or SMP deficiencies. If payment is not made within thirty (30) days after costs are incurred by the [Local Jurisdiction], payment will be made from the Applicant's financial securities as described above.

(b) If the amount available in the Applicant's financial securities is insufficient, the [Local Jurisdiction] may assess the remaining amount against the property.

B) Misdemeanor.

1) Any person, firm, agency, or corporation failing to comply with, or violating any provision of this ordinance, shall be deemed guilty of a misdemeanor and be subject to a fine or imprisonment, or both.
2) All land use and building permits may be suspended until the Applicant has corrected the violation.
3) Each day that a violation exists shall constitute a separate offense.