

IOWA STATE UNIVERSITY

MUNICIPAL SEPARATE STORM SEWER SYSTEM
2019 ANNUAL REPORT

Permit Number 85-03-0-04

March 2020

Prepared by
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and
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INTRODUCTION

The *2019 Annual Storm Water Report* for Iowa State University (ISU) was prepared by Environmental Health and Safety (EH&S) in accordance with Part III of the facility's Municipal Separate Storm Water System (MS4) permit, number 85-03-0-04. This report summarizes storm water compliance activities within the boundaries of ISU and outlying farm properties, including Central Campus, North Campus, South Campus, Applied Science Complex, Arboretum, Southwest Athletic Complex, College of Veterinary Medicine, Dairy Teaching Farm, and the BioCentury Research Farm.

1. STATUS OF IMPLEMENTING THE COMPONENTS OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT

ISU was issued a National Pollutant Discharge Elimination System (NPDES) permit on February 6, 2004. The permit was renewed in 2009, 2014, and 2019. The current permit expires on January 31, 2024. Modifications to the permit requested by ISU and approved by the Department included eliminating the requirement to publish quarterly the telephone number for the storm water hotline. This number is posted on the EH&S web page.

A. Public Education and Outreach on Storm Water Impacts

Storm Water Web Page. The storm water web page consists of storm water facts and information, Storm Water Management Policy statements, storm water hotline telephone number, publications and forms, links to pre- and post-construction activities, and a storm water survey. In 2019, the storm water web page was viewed 639 times.

1. General Storm Water Education Fact Sheet, and
2. Storm Water Pollution Prevention web page, both available at:
<https://www.ehs.iastate.edu/services/environmental/stormwater>
3. Education Program for Faculty and Staff. EH&S and FP&M staff participated in monthly storm water lunch and learn webinar series, provided through the Iowa Storm Water Education Partnership.

B. Public Involvement and Participation

1. The Storm Water Hotline, (515) 294-7229, received no calls requiring a response during 2019.
2. Storm Water Management Team. In 2019, ISU's Storm Water Management Committee met each semester and once during the summer. Further communications between individual team members occurred regularly, concerning storm water policies and project sites. In addition, EH&S Staff and FP&M staff met in March 2019 to discuss storm water management

practices on ISU construction projects. The team continues to discuss strategies to mandate or incentivize green infrastructure features during the design phase of new projects.

3. Public Notice Requirements. For each construction permit, a Notice of Intent was completed which includes submitting a Public Notice to the Iowa State Daily (using DNR Form 542-8117). A notarized copy of the notice that ran in the Daily is retained. Also, when the University renewed this MS4 permit for 2019, the notice was posted at the City of Ames Public Library, City Hall, and the Iowa State University Library, inviting public comment.

C. Illicit Discharge Detection and Elimination

1. Illicit Discharge Prohibition Policy Statement, available at:
<https://www.ehs.iastate.edu/publications/policies/swpolicy.pdf>
2. EH&S conducted annual dry flow inspections of MS4 campus storm water outfalls throughout 2019. EH&S staff visually inspected storm water outfalls to public waterways and dry land with no illicit discharges detected during the inspections. A review of the annual outfall inspection process was conducted; no changes were made to the inspection program. In December 2019, ISU FP&M identified an illicit discharge to storm water at the Iowa State Center CY Stephens lower level west machine room. The illicit discharge was identified when ISU FP&M staff noticed steam arising from a storm sewer service entrance hole. ISU FP&M have obtained 2 preliminary estimates to remediate the situation to sanitary sewer. Cost estimates range from \$182,000 to \$247,500. Construction will occur during the 2020 calendar year.

D. Construction Site Storm Water Runoff Control

1. Construction Site Runoff Control Policy Statement, available at:
<https://www.ehs.iastate.edu/publications/policies/swpolicy.pdf>
2. Standard Operating Procedures for NPDES Construction Permits. A summary process flow diagram is available at:
<https://www.ehs.iastate.edu/sites/default/files/uploads/publications/reports/Stormwater%20Construction%20Permit%20Flow%20Chart.pdf>
3. Construction Site Inspection Program. EH&S completed 349 storm water inspections at 12 construction sites covering a total of 88.5 acres. Construction teams implemented erosion prevention and sediment control practices that prevented 17 tons (that's 120 wheelbarrow loads) of soil from entering our waterways. Keeping soil on site and out of our local creeks and streams improves water quality.

4. Pollution Prevention Plan Review Procedures. In addition to the stormwater construction permit flow chart ISU developed to accompany the SOP, each capital project includes contract language that requires compliance with good engineering practices for stormwater management and a template for on-site best management practices for sediment and erosion control. These are available to contractors through the Centric Project Management file sharing application.



Polyethylene retention cells installed under the roadway help slow the release of surface runoff to local waterways.

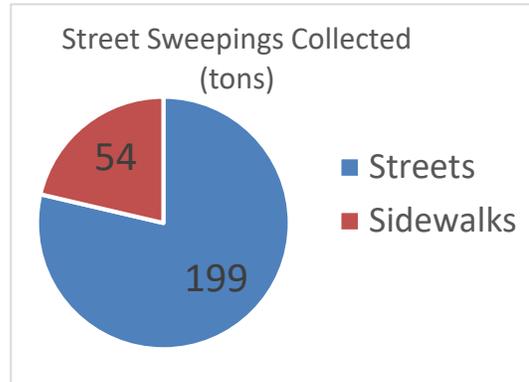
E. Post-Construction Storm Water Management

1. Post-Construction Site Runoff Control Policy Statement, available at: <https://www.ehs.iastate.edu/publications/policies/swpolicy.pdf>
2. Site Plan Review Procedures. The University follows the Iowa Stormwater Management Manual and Statewide Urban Design and Specifications (SUDAS) manual where practical, including storm water detention, retention, infiltration, quality, and quantity considerations. These post-construction requirements are included in the contract language for capital projects. ISU does not close out a permit until the site meets all contract requirements, including stormwater management obligations.
3. Re-Pavement and Storm Water Repair Retrofit Evaluation Program. ISU evaluates re-pavement and repair projects as needed to minimize runoff from streets and parking lots.

F. Pollution Prevention / Good Housekeeping

1. Educational Programs for ISU Staff. EH&S staff trained 206 employees during calendar year 2019. Training topics included storm water regulatory compliance, construction site BMPs, storm water hotline, NPDES General Permit No 2, and SWPPP compliance and review.
2. Pesticide and Fertilizer Maintenance Program. ISU employs certified pesticide applicators, trains them in Integrative Pest Management strategies, and monitors fertilizer and pesticide applications on campus.

3. Street and Parking Lot Sweeping Program. In 2019, Iowa State University collected 253 tons of sweepings from 69 miles of streets, sidewalks, and bike paths, and 178 acres of parking lots.



4. Inspection and Maintenance Program – Mike Murray, PE, Chief Mechanical Engineer

There are approximately 2,100 manhole structures (junctions and intakes) covered under the ISU MS4 permit. These structures are labelled on the ISU Campus utility maps based on map grid and a sequential number. To date, the exact location of approximately 1,340 of structures are confirmed on utility maps utilizing a global positioning system surveying device. ISU Utilities will continue to survey service entry covers to improve map accuracy, and inspect each manhole every five years, averaging 450 inspections per year.



Since 2013, ISU Utilities have visually inspected the entire system, concluding the 5-year inspection process with 509 inspections completed in calendar year 2019. Additionally, ISU Utilities televise lines where needed to verify cleaning or investigate sewer backups. In 2019, five areas representing approximately 1,200 feet were televised. A typical photo still from a video is shown.

ISU Utilities employs a facilities management program (FAMIS) to store all maintenance records, including dates, location of maintenance, assigned staff, descriptions of repairs and maintenance, cleaning, associated cost, and materials. FAMIS works well to capture metrics and document maintenance and repair activities.

To document that the University is inspecting each manhole once every 5 years, ISU Utilities has implemented a separate data collection process. Utility crews systematically inspect the MS4 system based on campus map grid sheets. The data are kept on paper forms recording manhole number, date, person inspecting, method of inspection, and observation. The paper forms are scanned and maintained in electronic format. This combination of systematic inspections and digitized record keeping ensures that ISU Utilities satisfies MS4 permit requirements. In addition, Utilities is prototyping new methods to collect and store information electronically to evaluate cost effective choices for the MS4 system.

The primary maintenance item identified thru 2019 inspections was removing built up debris by vacuum truck and excavation and repair of an 8" line near Helser Hall. Five other storm manholes were grouted, tops rebuilt, or other modifications made as a result of these regular inspections

2. SUMMARY OF THE MONITORING DATA ON STORM WATER QUALITY IMPROVEMENTS

ISU is investigating new options for monitoring stream water quality. The discontinuation of the IOWATER program has temporarily eliminated this resource for tracking water chemistry and ecological health. Historic records are still available, but a source of new data and a mechanism for collecting it has not yet been identified.

Student Capstone Water Erosion Prediction Project

Environmental Health and Safety (EH&S) had the opportunity this year to partner with students enrolled in Technology Systems Management and offer them a capstone project. This project supported their educational goals, met one of their academic requirements for graduation, and enhanced ISU's storm water management efforts. Fourth-year student Mattea Contreras accepted the challenge. The project included an evaluation of the variables used in the Revised Universal Soil Loss Equation, version 2 (RUSLE2), which ISU has used for decades to estimate soil erosion from construction sites.

Ms. Contreras focused her initial efforts on a highly visible campus construction project, the South East Recreational Fields Improvement project. This 58-acre construction site adjacent to a floodway was an ideal test of the conventional model used to estimate soil loss, RUSLE2, and a new soil erosion model, the Water Erosion Prediction Project (WEPP.) Although both measure soil erosion, RUSLE2 is typically used for average annual soil erosion estimates, while WEPP can measure soil erosion during specific events.

During her investigation of soil types and rainfall factors in Story County, Ms. Contreras immediately recommended refinements to the values used in the RUSLE2 model. Rainfall values were updated to 175 from 110, reflecting changes in precipitation rates in recent years. These values were further adjusted proportionally, based on the duration of the project. A 12-month project, for example, would use an R-value of 175, but a six-month project would use half this value, or 87.5.

Next, Ms. Contreras adjusted the soil factor, using the specific soil types prevalent along the Squaw Creek floodway. US Department of Agriculture Web Soil Survey data showed that for this site, a K-factor of 0.32 was appropriate. Because most of the site consists of level terrain suitable for recreational fields, the previous LS-value of 0.17 for level ground is still appropriate.

Cover management, variable C, was obtained from the USLE-Erosion Prediction Table Ivf. This table is primarily used for meadow land planted with legumes or grass. For these recreational fields, the C-value of 0.004 was used, suitable for meadow-grass turf. This variable is an order of magnitude less than previous factors and significantly changes soil loss estimates. The P-factors for these remained unchanged, as this variable is least sensitive, and the recreational fields will remain flat and sod-covered.

Using the original variables generalized across the entire campus, the annual estimated soil loss per acre is 0.48 tons (A= 0.48 tons/ac*yr, R=110, K=.43, LS=.17, C=.06, P=1.) For a 58-acre construction site, ISU

had previously estimated that 28 tons of soil per year were lost from this site. The updated equations (R=175; K=0.28; LS=0.17, C=0.004, P=1.) show an average soil loss value of only 0.381 tons/ac*yr, or 2.2 tons of soil lost. Because of these refinements in the modeling calculations, Ms. Contreras has demonstrated that ISU is significantly better at retaining soil from construction sites than previous estimates indicated. Using her updated variables, EH&S can now report much more accurate estimates of soil loss. In addition, Ms. Contreras has documented an easy-to-use methodology for tailoring soil erosion estimates for specific construction sites. At the conclusion of her project, she will also provide EH&S with the ability to compare RUSLE2 estimates with the new WEPP model.

3. AN ESTIMATE OF THE PREVIOUS FISCAL YEAR EXPENDITURES FOR IMPLEMENTATION OF THE MANAGEMENT PROGRAM AND THE BUDGET FOR THE CURRENT FISCAL YEAR

The storm water management budget for calendar year 2019 was funded “as needed” by several campus entities:

- EH&S dedicated ½ fulltime equivalent (FTE) staff time to storm water activities, that included regular inspections of all permitted construction sites. EH&S conducted 349 weekly site inspections in 2019 at a total expenditure of \$40,135.
- EH&S staff maintained the storm water website, managed quarterly storm water hotline advertisements in the student newspaper, attended storm water training, and developed ISU staff training programs, at an estimated expenditure of \$65,000 in salary and benefits.



- Construction of new storm water management projects and design fees associated with capital site, parking and building projects is estimated at \$1,200,000.
- FP&M expenditures associated with storm water project design/BMPs, project support, implementation, maintenance, MS4 televising and cleaning, and seeding/sodding were approximately \$1,400,000.
- FP&M maintains 45 lane miles of paved institutional roads, 15 lane miles of gravel roads, 191 acres of parking lots, and 51 miles of sidewalks and bike paths throughout campus. To ensure safe passage of all vehicles, sweeping of pedestrian and cyclist roadways, parking lots, and bike paths resulted in an expenditure of \$142,439. The 253 tons of sweepings included 199 tons from streets and 54 tons from sidewalks.

Total estimated storm water management expenditures were \$2,847,574. No annual amounts are appropriated by ISU, as storm water expenses are funded on a per-project basis.

4. SUMMARY DESCRIBING THE NUMBER AND NATURE OF INSPECTIONS, ENFORCEMENT ACTIONS AND PUBLIC EDUCATION PROGRAMS CONDUCTED DURING THE REPORTING PERIOD

IDNR Inspections

The IDNR conducted a MS4 inspection on June 6, 2019. The scope of the inspection included an evaluation of the permit requirements, general discussions pertaining to the University’s storm water program and on-site visits to GP2 sites, vehicle, chemical and salt storage facilities.

Permitted Site Inspections by ISU Staff

349 inspections were conducted by Environmental Health and Safety on all Iowa State University construction sites requiring a National Pollutant Discharge Elimination System General Permit Number 2. The inspections evaluated contractor compliance with BMPs as described on the site-specific Storm Water Pollution Prevention Plan (SWPPP). EH&S and FP&M staff coordinated mitigation efforts with site contractors when deficiencies were noted.

Active and Discontinued Construction Sites

During the 2019 calendar year, 12 construction sites operated under NPDES General Permit No. 2 authorizations. The status of these permits is summarized in Table 1.

TABLE 1. STATUS OF CONSTRUCTION PERMITS

<u>Facility</u>	<u>Permit</u>	<u>Status</u>
Gerdin Addition	IA-34443-34122	Active
I Road Union Drive Reconstruction	IA-32363-32071	Discontinued 10/9/2019
Iowa State Center Steam Supple Replacement	IA-34873-34528	Active
North Coal Pile Restoration	IA-34329-34014	Discontinued 5/15/2019
Parking Lots 2019	IA-34874-34529	Discontinued 9/25/2019
Poultry Farm Teaching Research Facility	IA-34872-34527	Active
Recreation Services East Of University Boulevard	IA-35197-34867	Active
Reiman Gardens SW Corner Improvements	IA-30651-30379	Active
Sports Performance Center & Jack Trice Stadium	IA-35214-34883	Active
Student Innovation Center	IA-30467-30197	Active
Utilities West Campus Chilled Water	IA-32354-32061	Discontinued 9/25/2019
Vet Med Field Services Building Expansion	IA-36393-36050	Active

Four sites reached final stabilization, as defined in the permits, and Notices of Discontinuation were submitted to the Iowa Department of Natural Resources (IDNR). Eight permitted sites were still active as of December 31, 2019 (See Attachments A).

Notices of Discontinuation

Eight construction projects reached final stabilization as defined in General Permit. (Refer to Active and Discontinued Sites, Table 1).

Reported Spills and Releases

On July 18, 2019, several thousand gallons of chilled water were released to the storm sewer system during construction activities in the vicinity of Beyer Hall.

Community and Public Education Programs

Members of the Storm Water Committee, Environmental Health and Safety, and Facilities Planning and Management's Design and Operations group participated in programs to improve storm water management knowledge. Iowa State University public education and outreach activities included:

- Partnering with the Iowa Stormwater Education Partnership to provide stormwater inspector training to students in Civil Construction and Environmental Engineering.
- Clay Miller presented a lecture to first-year undergraduate environmental biology students on campus stormwater management efforts.
- Clay Miller is President of the Board of Directors of the Iowa Storm Water Education Partnership.

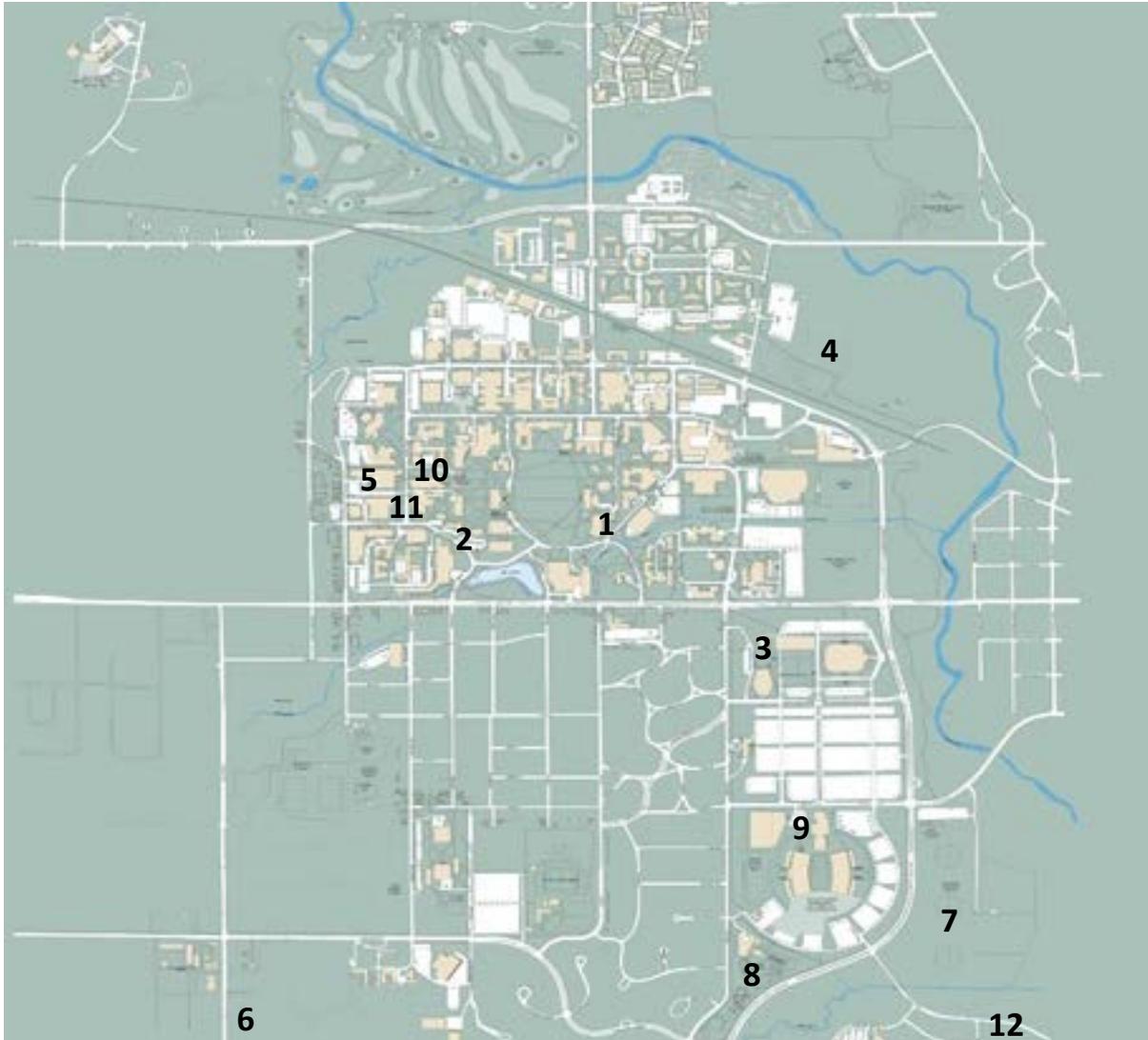
Campus Volunteer Activities - Merry Rankin, Director of Sustainability

On June 15, 2019, 60 volunteers including 20 interns from the George Washington Carver summer research program in the College of Agriculture and Life Sciences removed nearly 800 pounds of trash from College Creek during the annual clean-up event.

Trash included three bicycles, a shovel, trash can lid, more than 20 tennis balls, metal landscape edging, a knurled nest of chicken wire and more than 20 garbage bags of trash.



Attachment A
NPDES-Permitted Construction Sites on ISU Campus



Key:

- | | |
|---|----------------|
| 1. Gerdin Addition | IA-34443-34122 |
| 2. I Road Union Drive Reconstruction | IA-32363-32071 |
| 3. Iowa State Center Steam Supple Replacement | IA-34873-34528 |
| 4. North Coal Pile Restoration | IA-34329-34014 |
| 5. Parking Lots 2019 | IA-34874-34529 |
| 6. Poultry Farm Teaching Research Facility | IA-34872-34527 |
| 7. Recreation Services East Of University Boulevard | IA-35197-34867 |
| 8. Reiman Gardens SW Corner Improvements | IA-30651-30379 |
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| 10. Student Innovation Center | IA-30467-30197 |
| 11. Utilities West Campus Chilled Water | IA-32354-32061 |
| 12. Vet Med Field Services Building Expansion | IA-36393-36050 |

Attachment B

Campus Storm Water Management Projects

