Evaluating the Effectiveness of the Central Iowa Water Quality Infrastructure Project Framework

Agricultural Drainage Management Coalition

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Background

The core idea behind the Central Iowa Water Quality Infrastructure Project (CIWQIP) was to accelerate adoption of saturated buffers and bioreactors in Polk County Iowa by addressing as many barriers to adoption as possible while working within the confines of existing financial and technical assistance programs. The project envisioned a new framework to scale up adoption of saturated buffers and bioreactors with lower costs and landowner hassle. It was a systematic approach to modernizing agricultural drainage infrastructure. The first phase of the new pilot program has exceeded expectations as 51 edge of field practices, outpacing the original goal of 25 sites, are scheduled for installation in Polk and Dallas County during the summer of 2021. The 51 new edge of field practices increases the count of bioreactors and saturated buffers in Iowa from 115 installed over the past decade to 166 in only 18 additional months. The success of the initial CIWQIP has generated the need to increase capacity and expand the framework moving forward.

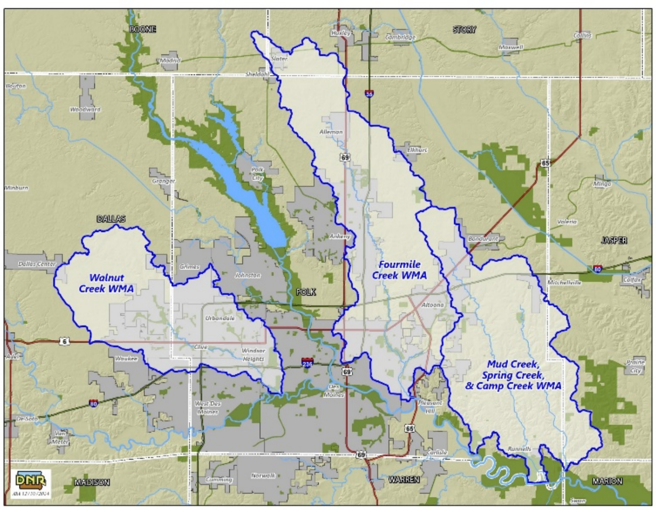

Figure 1 Watersheds selected within round one of the Central Iowa Water Quality Initiative Project.

Framework

The Agricultural Drainage Management Coaltion (ADMC), Polk Soil and Water Conservation District, and Polk County core project team realized the building edge of field infrastructure required a different approach than traditional in-field conservation practice delivery due to the following barriers to adoption:

- Lack of landowner awareness
- Lack of economic incentive to landowner
- Not a priority for agencies
- Expensive design process
- Lack of contractor interest

The core CIWQIP team utilized a systematic approach to develop a vision and framework that would address the barriers to give the project the highest likelihood of success. That framework included the following key elements:

- Prioritize watersheds that had a high occurrence of Agricultural Conservation Planning Framework tool (ACPF) identified edge of field practice sites
- Direct outreach campaign by project coordinators that targeted key landowners identified by the ACPF output
- Recruit landowners/farmers to install multiple sites
- Create demand by incentivizing landowner participation through a simplified funding structure including a temporary construction easement payment
- Streamline the process for survey, design, and installation
- Utilize an innovative fiscal agent model to bundle multiple sites into geographically based bid-packages

Funding Structure

Traditional conservation programs utilize a cost share program which requires landowners to navigate programs, enroll, hire and pay contractors, and apply for reimbursement. While this model has proved successful for practices that provide direct benefits of erosion control and soil health for individual landowners, it has proven difficult when applied to scaling up edge of field practices that mainly have downstream benefits. The Central Iowa Water Quality Infrastructure Project developed a fiscal agent model to efficiently scale up the management of watershed wide implementation *in lieu* of the traditional individual landowner focus. Figure 2 displays the traditional funding model in which landowners are required to have agreements with multiple funding agencies, and each landowner then has a contract with a contractor. This model was common in Iowa as landowners often sought to leverage multiple programs to reduce the expense of edge of field practices. In the traditional model the contractor must invoice the landowner, the landowner needs to show payment to the contractor, and then the landowner applies for reimbursement from the funding agency. Cash flow could be a concern for the landowner while they await reimbursement from the funding agencies and there could be tax liabilities put on the landowner depending on the funding source. The model discouraged the landowner from installing multiple sites due to the required capital outlay. The traditional approach added enough complexity and risk to the landowner to dissuade them from wanting to invest in the practices. In addition to adding complexity for the landowner, contractors were hesitant to install individual edge of field practices as it often came at an opportunity cost due to the planning and mobilization effort needed for a relatively low-cost project. A project coordinator also would need to devote time to track invoices and payments. This is manageable if there were only 3-5 sites being built in a year, however; scaling up to the needed 25-50 sites in a year would become an over-consuming time commitment which could prevent the coordinator from promoting different practices such as cover crops and nutrient management planning.

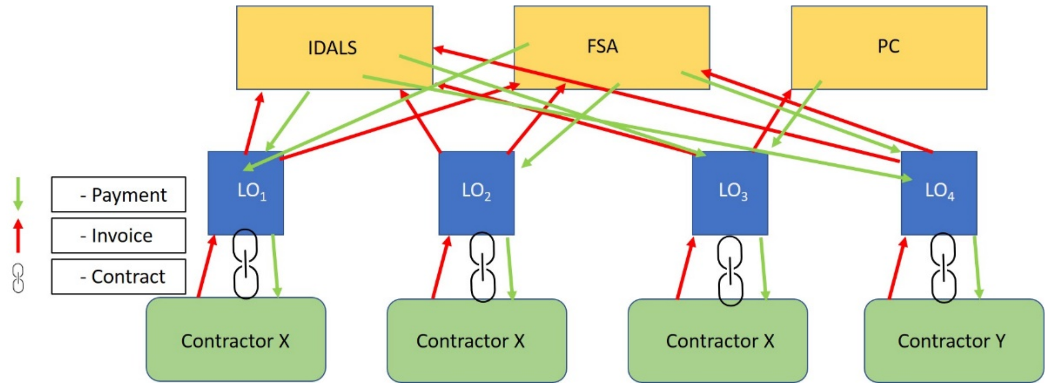

Figure 2 Traditional edge of field funding models.

Figure 3 displays the innovative funding model which the CIWQIP partners developed to streamline practice administration expenses, reduce landonwer burden, and to increase contractor interest. Each of the funding agencies had agreements with the fiscal agent, or the landowners could complete assign payment forms to the fiscal agent. In the CIWQIP, Polk County was the fiscal agent since they had the capacity to manage public infrastructure bid packages. Iowa legislative code 28E allows for public entities to enter into an agreement to cooperate for mutual advantage. In the instance of the CIWQIP a 28E agreement was establisched between IDALS, Polk County, Polk SWCD, and the Dallas County SWCD. The 28E agreement established the breakdown of cost share that Polk County would adminster on behalf of IDALS as well as how the local SWCDs would be responsible for managing the maintenance agreements.

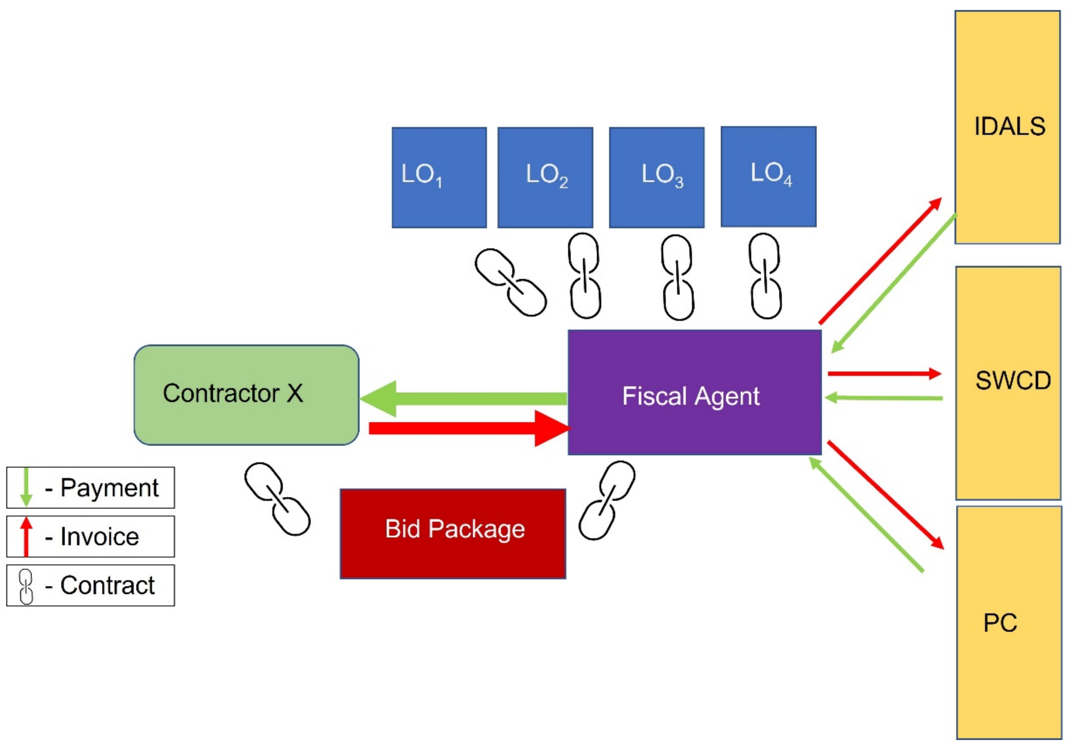

Figure 3 Central Iowa Water Quality Improvement Project fiscal agent funding model.

Through this new model Polk County managed funding and hired contractors in partnership with landowners through a temporary construction easement process. This easement allowed a publicly hired contractor to access private lands and ensure that the landowner and funding agencies expectations are met. The easement payment not only benefitted the landowner by incentivizing their participation, it benefitted the project funders by generating enough interest to realize cost efficiencies of scale and removed the need to have agreements with each individual landowner.

Polk County established agreements outside of the 28E agreement to generate the needed funding. Agreements with Polk County outside of the 28E for funding included the NRCS through a CPA-1236 assignment of payment, City of Des Moines, ADMC, and the Polk SWCD. The Polk SWCD's responsibilities in the 28E only outlined maintenance agreements not funding.

Funding Partners

- IDALS
- Polk County
- NRCS
- City of Des Moines
- ADMC
- Polk Soil and Water Conservation District

Cost Effectiveness

The CIWQIP not only wanted to increase the speed of saturated buffer installation, but it wanted to do so in a more cost-effective manner. The project team predicted that both installation and design costs would be reduced by creating enough interest in the project to be able to bundle sites in groupings rather than one-off designs and installations. IDALS provided average installation costs of the 29 saturated buffers and 42 bioreactors that have went through the state FARMS system for financial assistance in the past, as well as the average private engineering costs that IDALS has paid for previous designs. Table 1 shows that IDALS has had an average installation cost of $5,804 for saturated buffers and $15,028 for bioreactors. The design costs when utilizing private consultants has average $5,704 for saturated buffers and $5,934 for bioreactors.

Table 1 Historic average practice costs based on Iowa Department of Agriculture and Land Stewardship records.

	Historic Average Practice Installation Cost, $	**Historic Average Practice Engineering Cost, $**
Saturated Buffer (29 sites)	$5,804	$5,704
Bioreactor (42 sites)	$15,028	$5,934

Table 2 shows the difference between the cost of the traditional method of coordinating installation and designs for individual landowners and the centralized planning model that the CIWQIP utilized. The traditional installation costs are based off the historic average installation prices multiplied by the 40 saturated buffers and 11 bioreactors that will be installed because of the CIWQIP. The CIWQIP model installation costs are based on the estimates provided by the contractor bid documents. The installation cost estimate for the CIWQIP in Table 2 is less the amount of planting a new buffer as well as the additional expenses for automated structures which are being evaluated. Traditional control structures could have been utilized but there are additional research studies evaluating the effectiveness of automated structures in a saturated buffer setting utilizing the sites generated in Polk County. It should also be noted that the 2021 CIWQIP sites were all designed by a NRCS CET, but the project team received bids from engineering firms for sites that will be installed in 2022 utilizing the same CIWQIP model.

The cost savings for practice installation was $22,863. Even though the amount saved for installation may not appear significant, the contractor interest in the project improved from traditional saturated buffer installations, as the bid package was large enough to make installations a priority. Often saturated buffers are installed only when the contractor has a need to fill in 1–2-day window between larger jobs. Project coordinators have often had to wait over a year from when a site has been designed to when they are installed. Construction of the CIWQIP sites started within a month of the bid being secured.

Table 2 Cost savings of utilizing the CIWQIP approach vs the traditional approach.

	Installation Cost	Temporary Construction Easement	Engineering*	Total
Traditional	$397,588	$0	$294,434	$691,022
CIWQIP Model	$374,725**	$51,000	$149,532	$575,257
Difference	***$22,863***	***-$51,000***	***$143,902***	***$115,765***

The temporary construction easement was an expense unique to the CIWQIP model, so the difference was $51,000 greater for the CIWQIP model. The reasoning of the easement was to justify allowing a public entity like Polk County to manage a contractor on private land, as well as to incentivize participation to bring overall project costs down by shortening the window to recruit participation. The engineering cost savings were the most significant as the CIWQIP model would have saved an estimated $143,902 had private engineering been needed. The engineering estimates were made with the bids that the project team received from firms for sites that will be grouped and installed in 2022 in the same fashion as the sites were managed in 2021. The estimated design cost per practice was $2,932 which is roughly only 49% of the previous private engineering cost IDALS has incurred. Engineering firms expressed preference for grouping sites in bundles of 25 to realize cost savings by being able to complete more site visits in a single trip. Overall, the CIWQIP was estimated to be $115,765 less expensive than the traditional model to design and install 40 saturated buffers and 11 bioreactors assuming 100% cost share. If the traditional installation cost were reduced by 25% ($99,397) to reflect a traditional 75% public to 25% landowner cost share model, the CIWQIP would still be $16,368 less expensive than the traditional model. Increasing the landowner contributions to 50% ($198,794) of the installation cost in the traditional model, the CIWQIP would be $83,029 more expensive to public funding. However, based on previous efforts to install edge of field practices, it would likely take 5-10 years to install 51 practices using the traditional model. The additional years add to project and administrative expenses, subjects the project to uncertainty, and comes at an opportunity cost of not having a full 51 sites remove nitrogen until 5-10 years in the future.

Replication

The CIWQIP was designed to be replicable. ADMC and partners welcome additional interest to utilize the framework in other geographic locations. The CIWQIP has already expanded to neighboring Story County Iowa in year two. There is also group in the planning stages of utilizing the framework in the Middle Cedar River Watershed in east-central Iowa. Project leads credit the project success to five keys: (1) local buy in from the agencies, cities, or county; (2) local proactive, project/watershed coordinator with established farmer relationships; (3) access to local, state, and federal funding sources; (4) intentional project management with an established timeline; and (5) experienced public-private leadership to proactively address future bottlenecks.

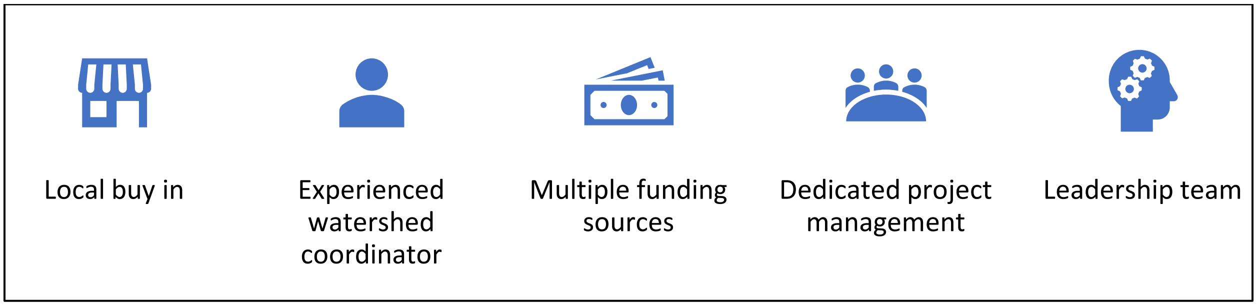

Figure 4 Keys to success.

Appendix A contains the framework utilized in CIWQIP. It outlines the 9 stages of the project with defined actions of each stage, paperwork that is needed, time frames, and additional notes to make the project successful.

Building on success

Even though the CIWQIP was considered successful by many, there are areas for improvement. The use of federal cost share programs were difficult to utilize within the new framework. Although EQIP and RCPP payments can be assigned from a landowner to a 3rd party fiscal agent, EQIP and RCPP funds are not allowable in land enrolled in CRP according to section 530.402 of the NRCS Working Lands Conservation Program Manual. Many of the areas enrolled in the CRP program CP21 are well suited for saturated buffers but cannot utilize the large EQIP or RCPP funding sources to implement. CRP does offer financial assistance for saturated buffers and bioreactors and initially the project was going to utilize this funding as FSA had done a similar assignment of payment program with the Iowa DNR for the Iowa Habitat Accessibility Program, but changes to the rules based on the 2018 Farm Bill ended up preventing the use of the funding pool. If either the EQIP or CRP funding rules could be made to better work with a fiscal agent model, local partners could leverage these resources to scale up saturated buffer and bioreactor adoption in the future. The use of federal funding sources is important as many areas will not have city or county funding sources that will be able to contribute. The federal funding sources could make up for the absence of city and county funding.

Survey of non-participants

ADMC mailed surveys to landowners who chose not to participate with the CIWQIP to gain insight on how to improve practice delivery. Surveys were sent out to 17 landowners, but only 2 responded. Survey participants were asked to rank on a scale of 1 – 5 how much each statement resonated with them. 1 being not relevant and 5 being extremely relevant. The number in parenthesis represents the average of the responses.

Statement

1. Water quality is not enough of a resource concern of mine to justify installing a structural practice. **(3)**
2. I would rather treat water quality concerns with a practice other than saturated buffers even if my costs were greater. **(2)**
3. The process of going through the Polk County Saturated Buffer Project seemed too complicated. **(4.5)**
4. The project would have demanded too much of my time. **(4.5)**

5. I preferred to see how the project went for neighbors before joining the project and would consider it in the future. **(4.5)**
6. The full cost share plus $1,000 temporary construction easement payment was not enough incentive to participate. **(3.5)**
7. I am hesitant to participate in state or federal cost share programs. **(2)**
8. I did not have enough information to make an informed decision. **(3.5)**
9. The long-term management of saturated buffers concerned me or did not fit with the plans for the land. **(4.5)**

It is difficult to come to conclusions based on low response rates, but questions 3-5 and 9 ranked out to being the most relevant reasons these landowners chose not to participate. Meaning that even though efforts were made to simplify the process for landowners, some were still concerned with how complicated the process appeared and were hesitant to dedicate the needed time to the project. The long-term management of a structural practice was also indicated as a barrier that kept them from participating. The long-term management concerns are also compounded in the Polk County area as there is a tremendous amount of urban development within the watersheds. The project team tried to focus on areas that would not be prime for development within the next 10 years, but landowners in the area were still hesitant to invest in structural practices with development looming. The respondents did indicate that they were interested in seeing how the project went for their neighbors and would consider enrolling in the future.

Conclusion

The framework developed for the CIWQIP proved to be exceedingly successful in delivering edge of field projects in Polk County Iowa. In the 18 months that the project team has been working towards implementation, it has been able to deliver 51 practices that will be installed in the summer of 2021. To put this into perspective, prior to the CIWQIP only 115 saturated buffers and bioreactors have been installed statewide despite nearly a decade of efforts. Not only has the project team delivered the highest amount of edge of field practices in the nation but were also able to do so in a more cost-effective model with estimated costs being approximately $115,000 cheaper than if the sites would have been installed with the traditional model. The bundling of project sites has also made the practices more attractive to drainage contractors and design consultants as the bid packages were large enough to warrant prioritization.

Moving forward, the CIWQIP framework can be replicated in areas that have local buy-in, an experienced watershed coordinator, multiple funding sources, dedicated project management, and a leadership team willing to address potential bottlenecks. The CIWQIP team has generated much of the paperwork needed that can be utilized in other areas of the Midwest. The original project had the advantage of county and municipal funding partners that will not be available everywhere. Therefore, it is important to continue to work through the bottlenecks of utilizing NRCS and FSA funding, so they can supplement projects lacking in local resources.

Appendix A

Stage	Actions	Paperwork	Time	Notes
1. Planning	• Prioritize areas of focus • Identify funding sources • Local coordinator availability • Project coordinator • ACPF outputs • Identify fiscal agents	• Develop project proposal • Agreements among partners	• August - December	• Set target watersheds • Establish number of targeted sites
2. Outreach	• Targeted Letters • Follow up phone call • **Gain Permission to Survey**	• 1 page flyer on project/practice description • Formal letter addressed to landowner • Maps identifying fields of interest	• 2-3 weeks • February-March	
3. Survey	• Find and name outlet • Obtain tile grade, main size, and material • Documented soil cores • Topographic survey to verify LiDAR • Stream cross sections and verify stream bank stability		• 60 minutes to find all outlets in field • 30-45 minutes per outlet to survey • 10 a day goal • Target late May or early June completion	• After snow melt and prior to crop growth • May need NRCS soil scientists to verify sites if sand is found • Identify all outlets first and name upstream to downstream • Try to eliminate

				outlets that are not feasible
4. Initial Design and Conservation Planning	• Import survey to CAD and overlay with LiDAR • NRCS design spreadsheet (determines if practice can meet specs) • Determine drainage area • CAD drawings • Update conservation plan • Provide map of CP21 vs CP21s or CP21b		• Bioreactor outlet (3-4 hrs per) • Saturated buffer outlet 1-2 hrs • 4-6 hours if it is unknown and evaluate for SB then go to a bioreactor	• Grade along buffer • Tile grade • If a bioreactor, get a CAD drawing, saturated buffers didn't need a CAD drawing
5. Preview with Landowner	• Discuss Initial Designs • Notify FSA of conversion if enrolled in CRP	• Signed landowner letter with intent to convert CRP contract • Sent letter with updated planning layers	• August goal (prior to harvest and may catch fall batching date)	Areas of disturbance, map of CP21s
6. Final Design/Permitting	• CAD information into fillable NRCS standard drawings (detailed views) • Develop cost estimate and quantities/per field • Cover sheet • Plan view • Specs • Seeding plans • NRCS design checklist*	• NRCS approved designed plan	• 4-6 hours per bioreactor • 4-5 hours per saturated buffer	*Drainage area map *Design spreadsheets *Survey map *Soil report *Design overview report

7. Enrollment & Funding	• Funding Agreements (28E) • Landowner Enrollment • Create and solicit bid documents	• Maintenance Agreement • W9 • Right of Entry • POA if dealing with land manager • Updated conservation plan • LOI (may consider step 5) • CRP-1 if needed • Legal entity • Temporary construction easement		• IDALS draft agreement have been created • Agreements to receive funding from partners • Board/council to approve easements
8. Construction	• Construction funding • Construction Inspection	• As-built certifications	• Target summer construction	• Designer needs to meet regularly with contractor during construction • As-builts housed with NRCS