

DEVELOPING A REFINED ENGAGEMENT STRATEGY FOR COASTAL NPS POLLUTION CONTROL PROGRAM RESOURCES

CMP CONTRACT #22-045-021-D726

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FINAL REPORT

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EXECUTIVE SUMMARY

This project served as a continuation of the efforts established through previous “work orders,” which are extension projects of the Clean Coast Texas program to enhance outreach and develop resources and materials to be utilized by the Clean Coast Texas program and its partners. The primary focus of this project included creating an engagement campaign to highlight the educational resources that are available on the Clean Coast Texas website, investigating a potential certification program on sustainable stormwater management designed specifically for the Texas Coastal Zone, and two new mapping products that display water quality and land cover changes over time.

As the Clean Coast Texas Collaborative continues to establish its program in coastal communities and develop relationships with new and existing partners, a suite of engagement strategies alongside interactive, customized, and communicative resources is needed. Through this project and working with communities, we recognized the need for a dynamic and timely response to community requests. This iterative and reflexive approach in forming an engagement strategy was made possible by the Texas General Land Office’s understanding and responsiveness to improving project deliverables.

Project tasks are described below with a completion date of 9/30/2023.

1 PROJECT TASKS

Task 1: Engagement Campaign to Highlight and Promote Educational Resources

TXSTATE has developed several online resources available for the target audience of cities, counties, planning groups, NGOs, COGs, BEPs staffers, and the general public to learn more about Clean Coast Texas and their efforts to promote sustainable practices on the Texas Coast and enhance awareness of threats to water quality. The resources (Modules, Story Maps, Website, etc.) have gone through numerous rounds of refining. In this project, TXSTATE will focus on promoting online resources through a thoughtful and effective outreach campaign that utilizes various platforms to reach existing contacts and broaden Clean Coast Texas’ audience.

TXSTATE will create regularly scheduled newsletters that will highlight one resource per newsletter (residential resources, county resources, technical guidance, and modules). TXSTATE will send the newsletters and press releases to the coastal contact list and post them to TXSTATE social media outlets. TXSTATE will make the newsletters and press

releases available to be shared via GLO social media outlets as well. The GLO will review, edit, and approve all newsletter and press release content prior to publishing.

TXSTATE will also create educational materials to be included in utility bill mail-outs in coastal communities. These educational materials will be brochure-style, one-page documents that can provide information such as stormwater awareness, FOGS (Fats, Oils, and Grease), as well as general water quality education. While these will be designed to meet the specific needs of the City of Rockport, they will also be general enough to be offered to other coastal communities in the future if requested. TXSTATE has sufficient funds in the project budget to cover the cost of printing the materials and sending them to the City of Rockport.

Deliverables:

- Documentation of approval from GLO on newsletters
- Draft and final monthly newsletters (4 total)
- Documentation of advertisement of newsletters (4 total)
- Draft Stormwater Awareness Mailout Campaign Materials (1 Total)
- Final Stormwater Awareness Mailout Campaign Materials (1 Total)
- Documentation of GLO approval of Stormwater Awareness Mailout Campaign Materials
- Documentation of coordination between TXSTATE and GLO

Task 2: Sustainable Stormwater Design Certification Program Phase I – Investigation

TXSTATE has created several resources available to industry professionals to implement the Guidance for Sustainable Stormwater Drainage on the Texas Coast manual (Sustainable Stormwater Manual). To tie all the resources together into one cohesive program, TXSTATE will investigate the development of a Sustainable Stormwater Design Certification Program for engineers, surveyors, planners, and consultants who work in coastal communities. It is anticipated that the development of this program will require multiple phases to ensure that the program delivers positive and tangible results for coastal communities. For this project, TXSTATE will focus on investigating existing programs and resources and engaging with local jurisdictions and engineering firms to understand their existing knowledge and priorities surrounding sustainable stormwater design. TXSTATE will also focus on determining what strategies can be used to incentivize local jurisdictions and engineering firms to implement the Sustainable Stormwater Manual into their practices.

TXSTATE will investigate and create a working database of existing programs and certifications available for engineers, planners, and consultants. TXSTATE will use the

database to determine if there is a need for a program focused on sustainable stormwater design on the Texas Coast. TXSTATE will also utilize the database to conduct a Content Analysis of the resources and programs currently being implemented.

TXSTATE will actively work with an engineer to assist in the development of a detailed program outline based on the Sustainable Stormwater Manual. TXSTATE will meet with local jurisdictions along the coast to gain their input on the potential program and learn what resources and types of programs would serve them best.

TXSTATE will develop a report based on the database, content analysis, engineering consultations, and meetings with local jurisdictions with recommendations for next steps in program development and potential funding sources for future phases of this task. The GLO will have the opportunity to review and approve all products derived from this task.

Deliverables:

- Creation of database of existing programs and certifications
- Draft and Final Content Analysis of existing programs and certifications
- Draft and Final Recommendation Report to include a review and analysis of existing certification programs, and recommended next steps
- Documentation of feedback and approval from GLO on Content Analysis, Program Outline, and Final Recommendation Report
- Documentation of coordination and consultation with engineer to determine feasibility of program and Program Outline
- Documentation on coordination with local jurisdictions via meetings, either in-person or virtually (3 meetings total)
- Documentation of coordination with the GLO and Coastal Resiliency Master Plan advisory committee

Task 3: Creating Map Products to Support Clean Coast Texas Programmatic Needs

TXSTATE has capable GIS technicians on staff who can produce maps, or similar products (StoryMaps, online interactive maps, etc.) to enhance messages about the Texas Coast that the Clean Coast Texas collaborative group (Collaborative) hopes to convey to key stakeholders including municipal staff, elected officials, community leaders and other members of the public.

In this project, TXSTATE will work with the Collaborative to produce two maps, or similar products, to tell a story of how coastal water quality has changed over time.

TXSTATE will coordinate with the Collaborative and the GLO to determine the data to be synthesized, the information displayed, and the potential map types, such as temporal changes, hotspot mapping, etc.

The Collaborative and the GLO will have an opportunity to review drafts of the products and provide feedback prior to finalization.

Deliverables:

- Documentation of coordination and consultation with Clean Coast Texas collaborative group
- Draft and final maps/mapping products (2 total)
- Documentation of feedback from Clean Coast Texas collaborative group on draft maps/mapping products
- Documentation of consultation and feedback from GLO on final design elements of products
- Documentation of coordination with the GLO and approval of final product

Task 4 – Retaining Engineering Services

TXSTATE and the Collaborative require consultation and guidance from an engineer to assist with the technical aspects of this project because of the technical nature of the program.

TXSTATE will issue a subgrant to retain engineering services for three months of the project period to support the technical aspects of this grant including investigation of a certification program. TXSTATE will oversee the engineer completing additional work, such as outreach and education support as well as ordinance and policy development for coastal communities.

Deliverables:

- Executed contract for engineering services
- Documentation of coordination with the General Land Office and Coastal Resiliency Master advisory committee

Task 5: Project Reporting

TXSTATE will maintain regular communication with GLO staff through phone, e-mail, meetings, and monthly reports. TXSTATE may schedule monthly status report meetings and occasional work group meetings with GLO and/or networked agencies. TXSTATE will inform

the GLO of its intent to communicate with agencies prior to doing so. The GLO will have the opportunity to participate in all meetings related to implementing the scope of work.

TXSTATE will submit all documents, data, and resources in an electronic format for draft and final deliverables unless otherwise approved by the GLO. TXSTATE will not use materials and resources developed under this contract for any other purpose without written consent and approval of the GLO.

TXSTATE is responsible for obtaining all documents, data, and resources needed to complete project tasks. TXSTATE will prepare and submit all reports, deliverables, and requests for reimbursement as required in the contract. Quarterly progress reports and requests for reimbursement are due to CMPTReceipts@GLO.TEXAS.GOV on the 10th day of every quarter of the year starting with January 10, 2023.

TXSTATE will prepare a Final Report at the completion of this project, which will include a summary of project deliverables, key findings, and recommend next steps.

Deliverables:

- Quarterly progress reports and reimbursement requests.
- Draft final report with an executive summary. (30 days prior to completion of contract)
- Final report

2 DELIVERABLES

2.1 Engagement Campaign

To help gain more website traffic and use of resources available on the Clean Coast Texas website, The Texas Coastal Connection newsletter (Figure 1) was created to synthesize and highlight the resources in a “bite-sized” package. Four iterations of the newsletter were created, each focusing on the different types of resources: Residential, Technical Guidance, City and County, and a project wrap-up sharing the newly created resources (described later in this report). The newsletter concluded by sharing upcoming coastal events and other ways to get

involved with water quality and conservation efforts.



Figure 1 The Texas Coastal Connection Newsletter branding

One newsletter was sent out during the project period, while the remaining three were recently approved (August 2023) by the GLO staff and will be scheduled to be sent after the project period ends. The delay in distribution is due in part to the fact that the Clean Coast Texas Collaborative (Years 3 & 4) also produces content for the same distribution list. Though the content differs, that is, The Collaborative provides quarterly program updates, and the email communications must be spaced out to avoid stakeholder engagement burnout or a reduction in readership due to information overload.

2.2 Rockport Mailout

After consulting with the City Manager for the City of Rockport, it was decided to create a brochure-style document (Figure 2) that could be printed and inserted with physical copies of utility bills that are sent to residents of the city. A crucial piece of information from these discussions was that most residents in Rockport still receive paper copies of their utility bills and pay them in person.

The content of the utility bill insert was focused on stormwater pollution awareness, including how common pollutants enter waterways and travel down to bays and estuaries and tips that residents can implement to reduce their household-scale impact. The tips were largely sourced from the City of Rockport's website and the design was personalized using the City of Rockport's color scheme and logo. The City Manager also wanted to emphasize that the insert's focus should not be on Little Bay but on all surrounding bays and water bodies.

In total, 8,000 inserts were ordered for printing and will be included in the monthly utility bill cycle for September 2023. This resource will also be available to other coastal communities and can be customizable to fit the community's messaging needs and branding guidelines. The City of Port Lavaca and La Marque have already expressed interest in printing these inserts for their community.



Figure 2 Two-sided stormwater educational slip for utility mailouts

2.4 Sustainable Stormwater Certification Course – Investigation

Doucet and Associates (“Doucet”) was contracted to assist in the creation of a report that explores the feasibility of creating and implementing a certification program designed

specifically for the Texas Coastal Zone that could increase the knowledge and implementation of sustainable stormwater practices.

Prior to Doucet's contract beginning, TXST staff conducted preliminary research to assist Doucet staff in their work. This work consisted of identifying programs throughout the nation that also promoted resources, education, and training on sustainable stormwater management and green stormwater infrastructure. These different examples were logged in a database with relevant information such as if the program is hyper-specific to a certain state, or a general region, whether it is incentive-based or not, what type of audience it is intended for, etc.

The beginning of Doucet's time on this task consisted of several brainstorming sessions with staff from Doucet to decide what the report should consist of, the research that should go into it, as well as other fine details such as who the audience of the potential program would be. The meetings concluded with the following: the final product from Doucet would consist of a feasibility study for the creation and implementation of a certification program designed specifically for the Texas Coastal Zone that could increase the knowledge and implementation of sustainable stormwater practices. The certification program could include participants from cities, counties, and/or private firms. The report would have relevant background information identifying the need for a program like this, analyzing the different programs from the database. Doucet took the database and evaluated the programs further based on a matrix that they developed (Appendix). Texas State staff also had the opportunity to score the programs based on the matrix.

Doucet conducted seven interviews to evaluate the needs and priorities of coastal communities regarding stormwater management and education. The individuals surveyed consisted of a city manager, a floodplain administrator, a mayor, and two from an engineering and consulting firm. This portion of the process proved to be the most valuable and insightful in determining the actual need, interest, and willingness of coastal communities to participate in a potential program. Like most issues, there is no one-size-fits-all solution; especially for a region as large and diverse as the Texas Coast. This portion also again showed the importance of meeting communities where they are, as there was a wide variety of needs and awareness around sustainable stormwater.

Using the database, matrix results, results from the stakeholder interviews, as well as background research on current policies and regulations within the Texas Coastal Zone, staff from Doucet created a report outlining the current need for a program such as this. The report also includes how the program may evolve as it matures, potential partners to assist in implementing and administering the program, and how to utilize the resources and materials that have already been created by Clean Coast Texas. The overall recommendations include:

- A need for water quality enhancement, as well as education on the subject.
- Starting small, and then growing the program.
- Marketing to promote the program.

- Further relationship development with key stakeholders.

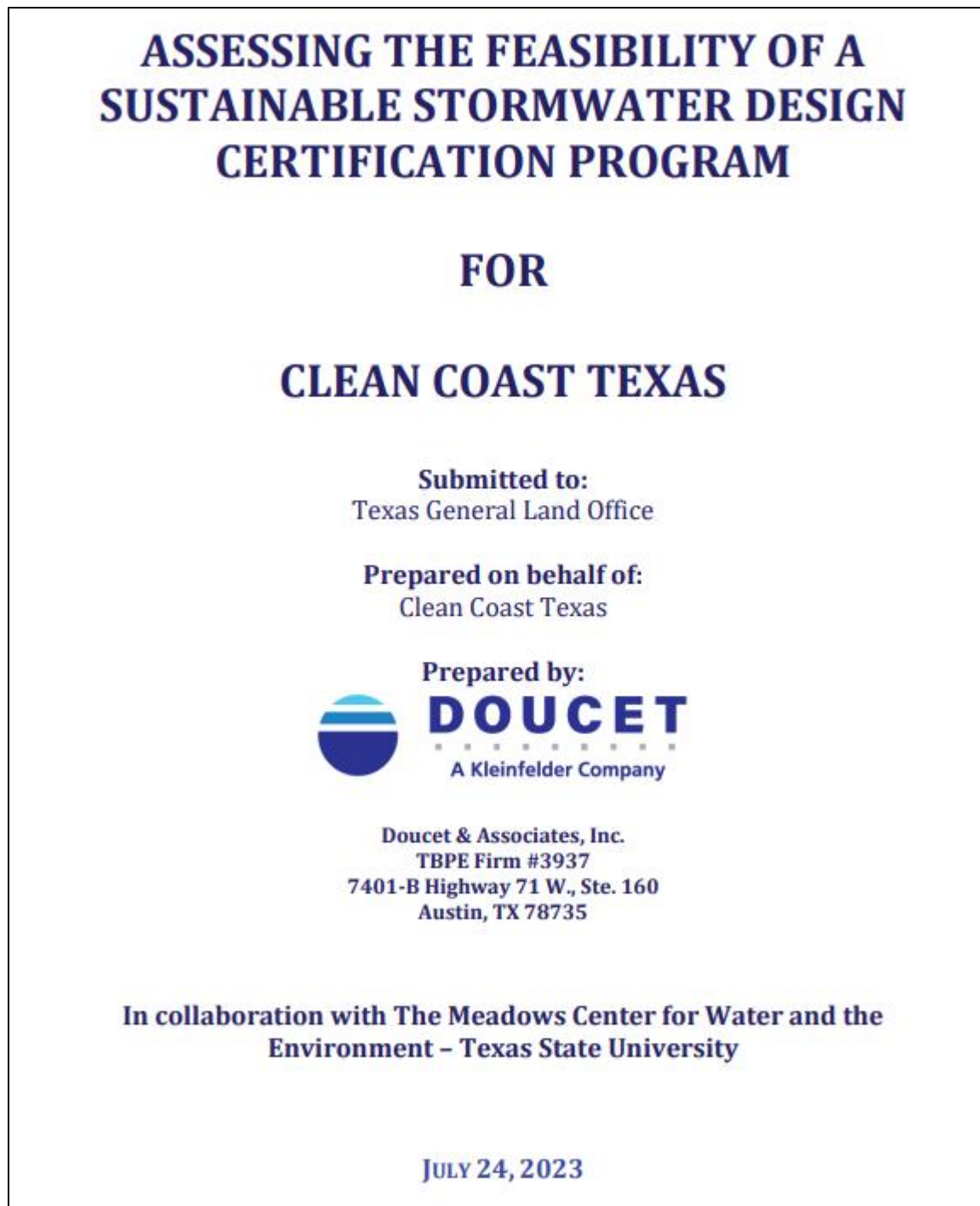


Figure 3 Title page of Doucet's Report, accessible in the appendix

2.3 Historic Beach Watch Dashboard

[Click Here](#) for Dashboard

Texas Beach Watch is a program of the Texas General Land Office that operates under the goal to “provide the public with information about water quality at selected recreational beaches along the Texas coast in Aransas, Brazoria, Cameron, Galveston, Harris, and Jefferson, Matagorda, Nueces, and San Patricio counties. The program monitors these Texas’ recreational beaches and when *Enterococcus* bacteria levels in the water exceed the acceptable standards established by the EPA, the GLO works with local governments to issue advisories warning the public not to swim in affected waters” (Texas Beach Watch).

Historic Texas Beach Watch data (spanning from 2009 to December 2022) was provided to Texas State staff to create an interactive dashboard for users to explore bacteria historic data and trends along the Texas Coast. This dashboard was meant to complement the current Texas Beach Watch dashboard, which is frequently updated with the most recent bacteria count. The original idea of this task was to create a time series tool that displayed the historical data in chronological order, and users would be able to scroll through the data and view trends.

This task eventually evolved into a more complex, and thoroughly interactive dashboard project with multiple points of interaction and opportunities to view water quality trends. Because of the effort that was being put into this product, as well as the GIS product below (Land Use/Land Cover Analysis), the third product—a mapping output to be determined by the Clean Coast Texas Collaborative—that was included in the original scope of work was removed. When this project was amended in May of 2023, changes occurred to this project task which included decreasing the amount of final mapping products from 3 to 2 due to the amount of work that was being put into the first two tasks. As a result, the task language “The Collaborative and the GLO will have an opportunity to review drafts of the products and provide feedback prior to finalization.” And the specific deliverable “Documentation of feedback from the Clean Coast Texas collaborative group on draft maps/mapping products.”. The collaborative in its entirety will still have the opportunity to review the products final to the project close date. Throughout the project period, staff from the GLO, TXSTATE, and Doucet & Associates (who are all members of the main collaborative), all had the opportunity to discuss the products and provide feedback on how to improve.

The final product is an interactive platform that shows Texas Beach Watch data in three forms:

1 – Observations. Observations are displayed by county and beach. Users can navigate to a geography of interest and see a summary of observations by bacteria count, which are color-coded to denote low, medium, high, and very high values.

2 – Charts. The charts tab allows further investigation of results by geographic area, showing summary statistics visually through pie charts and graphs. Data are color-coded for easy interpretation.

3 – Time slider. The slider feature shows data results across time. Like all other tabs, users can navigate to an area of interest and manually locate a time of interest, or increase the speed at which the slider moves.

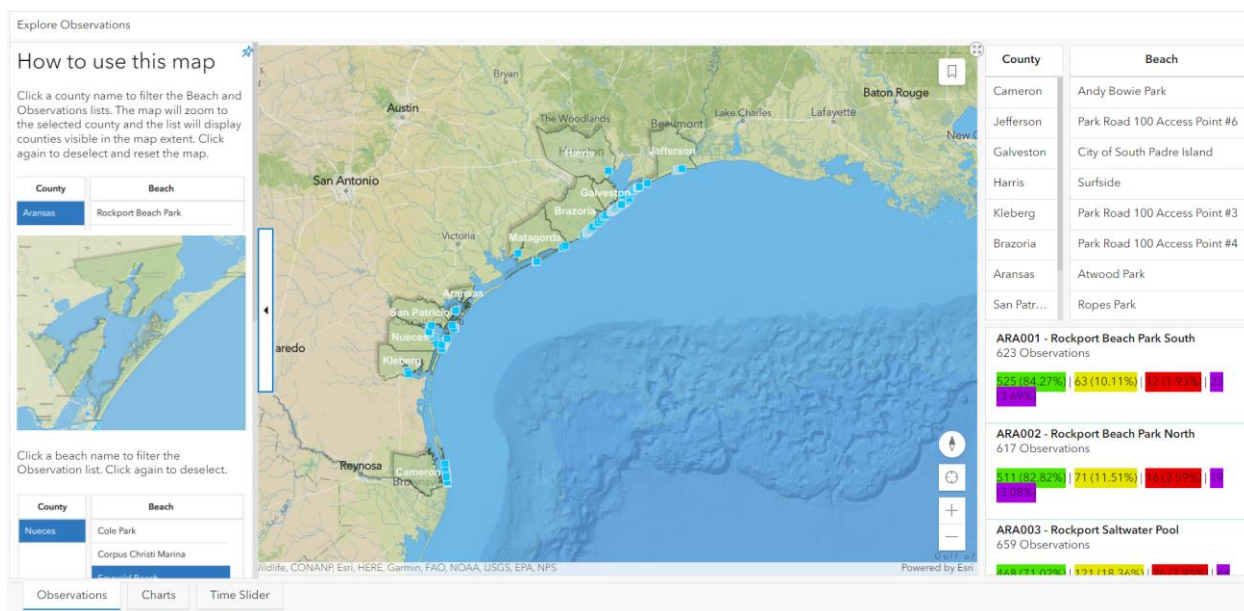


Figure 4 Overview of the dashboard with three tabs (bottom left) showing observations by county, charts detailing summary statistics, and a time slider showing changes in results across years.

2.5 Land Use/Land Cover Analysis

[Click here](#) for StoryMap

[Click here](#) for video

The topic of Land Cover change over time in the Texas Coastal Zone was also a point of interest for the GLO. A final product that shows different examples of land use changes and how they may relate to changes in water quality was requested.

Land Cover data for the state of Texas was collected from the National Land Cover Dataset from the years 2001, 2011, and 2019. All land cover data used in this project were sourced from the National Land Cover Database (NLCD). To calculate percent totals of land cover classifications within the Texas Coastal Zone, Texas-specific NLCD data was collected from the Texas Natural Resources Information System (TNRIS) data hub website. NLCD data from 2001, 2011, and 2019 were used.

After collecting the NLCD data, they were imported as raster shapefiles into ArcGIS Pro. First, the NLCD data was clipped to fit within the Texas Coastal Zone boundary to produce a Texas Coastal Zone Boundary land cover data layer. The source NLCD data was then clipped again to produce Aransas County and Jefferson County land cover data layers. To calculate the total acreage of each land cover classification for each of the clipped layers, the data was converted into a vector format so that the resulting cells' areas could be calculated. After calculating the cell areas in meters (default), it was converted to acres for purposes of public consumption.

This gave us the total acreages for each classification. To analyze the data, the acreages were imported into an Excel file and then sorted and labeled by year and classification.

A waffle chart was made in order to provide the viewer a visual representation of the land cover makeup of the Texas CZB. To make the waffle chart for the most recent land cover data (2019), the percentage total for each classification needed to be calculated. Within the sorted acreages in the Excel file, the “unclassified” and “open water” categories were removed, so that the total acreage would only include land-based classifications. To calculate the total acreage, the sum of each 2019 land-based classification was calculated. Then, the acreages for each land-based classification were calculated as a percentage of the total acreage of all classifications combined. To simplify the data for the StoryMap, “deciduous forest,” “evergreen forest,” and “mixed forest” were categorized simply as “forest.” The “pasture/hay” and “cultivated crops” classifications were categorized as “agriculture.” The “woody wetland” and “emergent herbaceous wetland” classifications were categorized as “wetland.” And lastly, the “developed, open Space,” “developed, low Intensity,” “developed, medium intensity,” and “developed, high intensity” classifications were categorized as “developed.” The percentages of each classification within a category were added to give an approximate category percentage. These are the percentages shown on the StoryMap.

Additionally, the amount of developed land acres was converted to the equal number of football fields. To do this the total acreage of Aransas County land was calculated by adding up all the land cover classification acreages for the year 2019, which came out to be around 171938 acres. The developed land acreage within Aransas County percentage was taken by calculating the percentage of the developed acreage out of the total acreage of Aransas County land. This number came out to be around 9.11%, which when taking the total acreage from this percent, came out to be around 15663 acres. This acreage was converted into football fields by multiplying the size of football fields by the size of the developed land acreage. The amount of developed land in Aransas county would amount to about 11,850 football fields. This data is located in the historical aerial comparison section, under Aransas County.

Most importantly, this StoryMap highlights temporal changes in land cover by utilizing historical aerial imagery comparisons between older and newer aerial imagery. Use of the swipe tool allows viewers to interactively see the changes in land cover. Historical aerial imagery comparisons are provided for the cities of Port Arthur, Clear Lake, Pasadena, Rockport, Corpus Christi, and Brownsville. Along with each aerial comparison is information about how land cover change and human activity have impacted the people, the region, and their environments.

Lastly, the StoryMap includes two sections that discuss how land cover change impacts the coastal fishing economy, and how land cover change impacts the ecotourism economy in Texas. It then links to resources on the CCT website that details how individuals can help improve water quality.



Figure 5 Opening visual of the Land use/land cover analysis Storymap



Figure 6 Storymap highlights changes in development by comparing historic and current imagery



Figure 7 Still image of the companion video

The purpose of the companion video is to provide the viewer with a visually appealing overview of the Texas Coastal Zone. Sounds of traffic, then ocean waves set the scene for development—or land use change—along the Texas coast. The video then takes the viewer back in time, showcasing a chronological sequence of historical aerial photos of Clear Lake’s changes over time. The video concludes with a prompt to view the StoryMap to learn more.

2.6 Retaining Engineering Services

This task’s purpose was to subcontract an engineering firm to assist with the technical aspects of this grant. We used sole source justification to work with Doucet & Associates using the justification below.

Doucet & Associates is an engineering firm with expertise in the Clean Coast Texas Collaborative; they have served as a founding member of the program and continue to be a partner in the Collaborative. Doucet & Associates will be hired as a subcontractor

to fulfill grant deliverables, namely to provide consultation for program development including technical expertise.

Doucet & Associates, as a key member of the Clean Coast Texas Collaborative, authored the "Guidance to Sustainable Stormwater Drainage on the Texas Coast," a document that promotes sustainable management of stormwater specific to the region. As the upcoming project deliverable to create a "Sustainable Stormwater Design Certification Program - Phase 1" is a reflection of the previous publication, Doucet & Associate's local and historical knowledge of the program and subject area expertise are required to successfully execute this grant deliverable. Doucet & Associate's publication contains unique and innovative concepts, as it contains novel methods and approaches, namely the Model Stormwater Ordinance for Texas communities.

Not only is Doucet & Associate's historical and technical knowledge necessary to complete the project goals, but their unique network of associates (other engineering firms, community decision-makers, etc.) in the Texas Coast will be crucial to program implementation by ensuring the reputability of the "Sustainable Stormwater Design Certification Program," which is a key deliverable for the project "Developing a Refined Engagement Strategy for Coastal Nonpoint Source Pollution Control Program Resources" (2022-2023).

3 DISCUSSION

3.1 Accomplishments

In this project, Texas State University and the Texas General Land Office created content and resources to improve the public's understanding of nonpoint source water quality issues in the Texas Coastal Zone. We were able to showcase large amounts of data (e.g., land use/land cover change and historic water quality data) using visually pleasing and interactive methods. Through the iterative process of community engagement, we were able to be responsive to community needs. That is, the experience of collaborating with the City of Rockport and developing the stormwater educational brochure stemmed from a sidebar conversation at the February 22, 2023, Clean Coast Texas Partner Communities Meeting. Sometimes, it is best to take a step back and see what a community needs to move the conversation forward. In this case, it was a simple Stormwater 101 infographic for the general public. Indeed, as we learned about the needs and goals of the City, and how most of the population receives information, we were able to provide more effective and immediate assistance.

In addition, Texas State, supported by Doucet & Associates determined there is indeed a need for a Sustainable Stormwater Certification Program (SSCP) — and the best place to start is education for municipal employees. Based on the feasibility report, the most effective SSCP should aim to evolve into a mature program with regulatory incentives (and potentially

regulatory authority) but should start small with potential online training in conjunction with the CCT Sustainable Stormwater Manual (SSM). By beginning with an overview training program, CCT can gain partners while educating stakeholders within the development sector. Launching a program in this way will decrease the concern about regulatory authority in order to gain traction and marketability. Further, it was recommended that a SSCP program should incorporate communication components into the content of the program. Increased marketing is vital to connecting the dots. Relationship development with local leaders and program champions should be considered paramount in this effort. Prior to final program design and implementation, due diligence should be completed to ensure the cooperation of carefully chosen individuals within each of the stakeholder groups identified in the above table. An outline for the evolution of the program would be beneficial, especially in investigating ways to incorporate the SSM into the regulatory environment. Without a regulatory hook, a program may be reflected in the results of the San Antonio River Authority Low Impact Development program and may slow the overall reach. Other recommendations include establishing partnerships first or foremost (in the Coastal Zone), increasing a marketing push on the front end, and finding a preliminary municipal partner that is well-positioned to implement water quality standards surrounding the manual.

4 LOOKING FORWARD

The following are recommended next steps to complete after the contract period ends, and should be completed by the Clean Coast Texas Collaborative:

1. Implement the recommended next steps from Doucet on how to proceed in the next stages of a potential Sustainable Stormwater Certification Program.
 - A potential program should aim to evolve into a mature program with regulator incentives.
 - The program should focus heavily on marketing and communications to promote it to the intended audience.
 - A heavy focus should also center on relationship development and finding a local “champion” to help promote the program to other communities.
2. Transfer ownership of the Historic Texas Beach Watch to the Texas General Land Office, after which their staff will be able to make any further adjustments, improvements, and updates as necessary.
3. Send the remaining three Texas Coastal Connection newsletters out to the mailing list, time appropriately to avoid stakeholder saturation/burnout.
4. Use the Stormwater 101 Utility Mailout insert as a template for other coastal communities.

- Port Lavaca and La Marque currently plan to distribute this to their residents as well.
5. Create a robust stormwater education program targeted at city and county staff, as well as engineers and consulting professionals.

APPENDIX - DOUCET REPORT

ASSESSING THE FEASIBILITY OF A SUSTAINABLE STORMWATER DESIGN CERTIFICATION PROGRAM

FOR

CLEAN COAST TEXAS

Submitted to:

Texas General Land Office

Prepared on behalf of:

Clean Coast Texas

Prepared by:

A large, empty rectangular box with a thin black border, intended for a signature or stamp.

Doucet & Associates, Inc.

TBPE Firm #3937

7401-B Highway 71 W., Ste. 160

Austin, TX 78735

**In collaboration with The Meadows Center for Water and the
Environment – Texas State University**

JULY 24, 2023

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ACRONYMS

BMP	Best Management Practices
CCTX	Clean Coast Texas
CE	Continuing Education
CEU	Continuing Education Units
CRS	Community Rating System
DOE	Department of Energy
Doucet	Doucet & Associates
EPA	Environmental Protection Agency
GLO	General Land Office
GSI	Green Stormwater Infrastructure
LID	Low Impact Development
MSR	Model Subdivision Regulations
NPDES	National Pollutant Discharge Elimination System
PD	Professional Development
SSD	Sustainable Stormwater Design
TCEQ	Texas Commission on Environmental Quality
TWDB	Texas Water Development Board
USACE	U.S. Army Corps of Engineers
WOTUS	Waters of the U.S.

I. EXECUTIVE SUMMARY

Clean Coast Texas (CCTX) is an initiative of the Texas Coastal Nonpoint Source Pollution program and is guided by the Texas General Land Office (GLO) Coastal Management Program. Given the magnitude and complexity of coastal water quality, GLO formed a collaborative team to assist in program implementation. The team includes Meadows Center for Water and the Environment at Texas State University (Meadows Center), Texas A&M AgriLife's Texas Community Watershed Partners, and Texas Sea Grant. This group brings a wide array of expertise to work with communities on the Texas Coastal Zone in an effort to ensure vibrant and sustainable fisheries, shellfish, and eco-tourism industries through planning, constructed improvements, environmental analysis, technical resources, and partnership activities that enhance water quality management (Clean Coast Texas, 2023).

The Meadows Center has engaged Doucet & Associates (Doucet) to investigate the feasibility of a Sustainable Stormwater Design Certification Program (SSD Certification Program) for engineers, surveyors, planners, and consultants who work in coastal communities. The conceptual feasibility of a SSD Certification Program will be assessed by the GLO, the CCTX Working Group and recommendations are provided for a Phase II evaluation. This report is intended to summarize the outcomes of program research, stakeholder surveys, and brainstorming sessions provided from April to June 2023.

A. Clean Coast Texas

The Texas Coastal Zone is experiencing significant population and economic growth; however, many small, rural communities are experiencing greater risk of flooding and water quality degradation as a result of increased development pressures. As these communities continue capitalizing on the current economic growth of the region, a balance must be found in the wise "use" of their natural resources and the environmental impacts in order to sustain the future of their communities. CCTX aims to support these coastal communities with technical assistance to reduce nonpoint source pollution and incorporate green infrastructure as part of an overall sustainable stormwater management plan.

In addition to technical assistance, education and outreach are a focal point of the CCTX program. High quality stormwater management creates tangible environmental benefits that can be translated along the region and improve communication, education, and networking opportunities to various stakeholders.

By implementing a SSD Certification Program, CCTX hopes to engage scientists, engineers, decisionmakers (municipalities, and rural communities), and the development industry professionals with comprehensive guidance in an integrated green infrastructure-based approach to natural resource protection. This program is guided by the Sustainable Stormwater Drainage Manual (Clean Coast Texas, 2021). Recommended stormwater management techniques described in this document can be implemented with the overall objective of increasing knowledge of green stormwater infrastructure (GSI) approaches and promote resilient designs.

A short, concise mission statement was adopted as part of the “Sustainable Stormwater Design Certification Program”. Because there is a vast array of “types” of programs assessed, the project partners created a guided mission statement:

“A report exploring the feasibility and connectivity of 4 Green Stormwater Infrastructure (GSI) certification programs to include feedback from 6 partnering participants or communities on the Texas Coastal Zone.”

Key findings of our research and sessions include:

1. There is an obvious lack of green stormwater infrastructure training and knowledge of its importance in the development realm on the Texas coast (and the state of Texas overall).
2. Programs that are incentive-based and that integrate multiple stakeholders in a “mature” program will be the most beneficial to the communities.
3. Key audiences should include municipalities. There is a significant lack of key knowledge about implementation of GSI in the public sector.
4. A successful program should start small and keep its reach local before evolving into a mature program where multiple stakeholders are involved.
5. A SSD Certification Program is feasible and greatly needed to educate the coastal community and could also act as a marketing and funding tool for CCTX.

II. CURRENT REGULATORY ENVIRONMENT

Implementing green stormwater infrastructure programs into communities are constrained by the regulatory framework governing them. In the state of Texas, counties have limited authority to enact development standards. Municipalities, on the other hand, have the right to impose impact fees, review development in extra-territorial jurisdictions and have mature planning and zoning regulations. Therefore, implementing stormwater regulations at the county level has been difficult for Texas. Conversely, federal authorities have the ability to regulate impacts to aquatic features and state permits for stormwater pollution regulation. These regulations are important to review for a certification program as well as to investigate the best route for implementation of any environmental program driving results at the regulatory level.

The regulatory framework outlined below should serve as a resource for the program while implementing GSI. Because municipalities have the greatest land use authorities, the public sector likely serves as the best pathway to implement these types of programs. Below is a summary of regulatory authorities governing stormwater or land use impacts at the local/state and federal levels.

A. Local:

1. County:

Section 232 of the Texas Local Government Code. Counties are given the right to review and regulate the subdivision of land through these standards including water supply, drainage, transportation infrastructure, environmental controls, and parkland dedication. Subdivision reviews are the most likely avenue to engage the counties in advancement of green stormwater infrastructure. In-lieu fees or any change in fee structure can be negotiated at the county level to drive low impact development. This same code also grants counties the ability to set and enforce water, wastewater, and stormwater runoff specifications.

Section 366 of the Health and Safety Code. Allows counties to regulate the design, location, and construction of on-site sewage disposal systems. Groundwater Districts have the abilities to certify wells and other subsurface drinking water under this code.

Title 13 of the Texas Local Government Code. Gives authority for certain counties and districts to regulate stormwater management. An example of implementation of this code includes Travis County (SB 1299) allows for higher levels of stormwater management due to the environmental sensitivity of the Edwards Aquifer.

Title 13 of the Texas Administrator Code (Part 10 Chapter 364) gives authority for the counties to utilize subdivision regulations through the Texas Water Development Board (TWDB) Model Subdivision Regulations (MSR).

2. Municipality:

Chapters 211-229 of the Texas Local Government Code. Gives land use authority for all municipal powers not otherwise inconsistent with the Texas Constitution. This authority is the best regulatory opportunity for regulating and implementing stormwater management via ordinances. Setting limits on impervious cover, use restrictions and buffer requirements (including setbacks) is within municipal authority.

B. State:

TCEQ General Permit [TXR150000](#). relating to discharges from construction activities

Section 26.040, [Chapter 26, General Permits](#). Water Quality Control, Water Administration, Texas Water Code

Title 30, Texas Administrative Code [Chapter 205](#). General Permits for Waste Discharges

[Section 305.44](#) **Title 30, Texas Administrative Code.** Signatories to Reports, Application for Permit or Post-closure Order.

[Section 305.128](#) **Title 30, Texas Administrative Code.** Signatories to Reports, Permit Characteristics and Conditions Rule.

[Section 305.541](#), **Title 30, Texas Administrative Code.** Effluent Guidelines and Standards for TPDES Permits.

[Section 122.2](#) of [Title 40, Code of Federal Regulations](#). Federal Definitions Applicable to NPDES Program.

[Section 122.26](#) of **Title 40, Code of Federal Regulations.** Federal Rules Applicable to State NPDES Storm Water Permits.

[Section 122.28](#) **Title 40, Code of Federal Regulations.** Federal Rules Applicable to State NPDES General Permits

[40 CFR Part 450](#) of **Title 40, Code of Federal Regulations.** Construction and Development Point Source Category

C. Federal:

Clean Water Act Section 402, Code of Federal Regulations, Title 33. National Pollutant Discharge Elimination System permits for the discharge of pollutants.

Clean Water Act Section 404. Code of Federal Regulations, Title 33. Permits required for the discharge of dredged or fill materials into all waters of the U.S. including wetlands.

Endangered Species Act. 16 U.S. C. 1531-1544. Establishes protection for fish, wildlife and plants listed as threatened or endangered.

Regulatory statutes governing stormwater already exist in some form. Using these listed regulations, CCTX can capitalize on potential legal framework by implementing cohesive programs based on already available local, state, or federal law. Most notably is the National Pollution Prevention Discharge Elimination System (NPDES). An example of this has been enacted by the City of Boerne, where a portion of a utility fee (where state MS4 permits are required) is diverted to local water quality programs. Other options exist for managing land use and can be implemented at the regional level include managing endangered species habitat through Habitat Conservation Plans (and thus protecting habitat), purchasing land via conservation easements, and implementing conservation subdivisions regulation.

By strategically partnering with agencies that govern these regulations, a certification program will carry more weight and is more likely to be implemented. Comparable programs exist that utilize the regulatory weight of agencies and Low Impact Development (LID) and GSI

development. Mimicking these partnerships could produce more tangible benefits for a program. (San Antonio River Authority, 2019).

III. COMPARABLE PROGRAMS

In the early phase of this program, information was collected to gain an understanding of the types of programs already in existence, the audiences they serve, and how their practices might be applicable in the Texas Coastal Zone. Although several programs likely have components similar in nature, the objectives of this program aim to solely focus on the unique characteristics and needs of the Texas Coastal Zone. Each comparable program that was reviewed by the working group is discussed below. Programs that contain elements vital to the CCTX program were highlighted for discussion and potential implementation.

A total of seventeen (17) programs were evaluated. These programs were then grouped into categories based on their target audience, nature of the program (regulatory based/voluntary/incentive based), geographic scope and program partners. Based on this evaluation four distinct program “types” were discovered, which are described below. These include Conceptual Training for Stormwater Management Professionals, Stormwater Pollution Prevention Plan (SWPPP) Training with a GSI Component, Technical Training for Professionals, and a “Mature Program” with multiple components including community collaborations. Details of each categorical type are provided below.

Conceptual Training for Stormwater Management Professionals: These programs offer training opportunities and certification programs to professionals. They are geared towards audiences that may have a general knowledge of stormwater and GSI but lack practical, applicable expertise. This type of program would be an overview of sustainable stormwater management and would lack the technical, detailed based aspects (as compared to the other three programs). This type of certification program would likely result in high volume participants, as the audience range is broad. Although the details of each program are distinct, they are all voluntary-based, national programs organized and administered for private groups.

Stormwater Pollution Prevention Plan (SWPPP) Training with a GSI Component: These types of programs are geared toward a trade or construction or environmental professional who is responsible for stormwater inspections and implementation. The program type is regulatory in nature and required for some state MS4 Permits. This type of certification program would likely result in greater increased number of sustainable stormwater techniques being applied to the Texas coast but may not result in direct tangible benefits.

Technical Training: These programs are the most numerous of those investigated. The audience is wide, but includes professionals engaged in stormwater design on the front end. They include LID training for engineers, designers, and municipal partners. Although most programs align with similar components these categories include more in-depth training and a higher level of stormwater knowledge beforehand. Continuing Education Credits are available for engineers. This type of training would likely result in more networking opportunities for stormwater professionals and municipalities.

Mature Program: Programs that have several layers of involvement with cities, professionals, and technical components. These are incentive-based programs and include a regulatory component intertwined with technical design and implementation. Several of these programs have differing levels of involvement, training, and certifications. This type of certification program is titled “mature” based on the nature of the stakeholder involvement. Although this type of program would be a larger undertaking by the GLO, it would be the most effective in implementing the core missions of the GLO non-point source pollution program.

A brief overview of each of the example programs reviewed are highlighted below. Components of each program that are favorable to a SSD Certification Program are summarized in the bullet points below.

A. Conceptual Training for Stormwater Management Professionals:

1. Stormwater ONE. <https://stormwaterone.com/texas-stormwater-management>

This course is designed to educate students on LID practices and concepts. The goals, tools, costs, methods Best Management Practices (BMPs), implementation, and maintenance of LID for stormwater management are covered. The program is focused on Texas and has no incentives or resource assistance. The target audience for this training program is landowners/construction permittees, environmental consultants, engineers, and municipal officials. The program is 1.5 hours in length and certificates are issued for 2 years. This appears to be a general overview training course with no direct outcome or incentive outside of general stormwater training. This appears to be a general overview training for stormwater management. Topics include regulatory overview, design techniques, and post-construction BMP implementation.

- This training can easily be mimicked by producing a fast-paced, open-ended training with a wide audience.
- If CCTX chooses an online training of the SSM for a wide range of audiences, this is a good match.
- Ease of implementation, large reach, revenue generator for the program.

1.

2. EnviroCert International, Inc. National Green Infrastructure Certification Program <https://ngicp.org/>

This program provides training for entry level workers to construct, inspect, and maintain green stormwater infrastructure. The target audience is mostly professional development at the entry level. This certification program has an online training and a computer-based exam. Incentives include adding your name to a list of GSI-trained professionals on their website. No other assistance or networking incentives were provided.

- This training can easily be mimicked by producing a fast-paced, open-ended training with a wide audience.

- If CCTX chooses an online training of the SSM for a wide range of audiences, this is a good match.
- Ease of implementation, large reach, revenue generator for the program. (Similar scope as Texas Stormwater One).

3. National Recreation and Park Association Green Infrastructure Certificate Program <https://learning.nrpa.org/products/green-stormwater-infrastructure-gsi-certificate-program>. Nine-course module for industry professionals, community partners, public works and planners. This is an entry level overview training course highlighting GSI. Continuing Education Units (CEU's) offered.

- This training can easily be mimicked by producing a fast-paced open-ended training for a wide audience.
- If CCTX chooses an online training of the SSM for a wide range of audiences, this is a good match.
- Ease of implementation, large reach, revenue generator for the program. (Similar scope as Texas Stormwater One and NGSI).

2.

4. Colorado Stormwater Center Introduction to Green Stormwater Infrastructure & Low Impact Development. <http://stormwatercenter.colostate.edu/courses-certifications/green-infrastructure-and-lid/>

This program is an overview for planning, designing, and evaluating (including construction and maintenance) GSI for stormwater professionals. Program offers inspection, checklist, maintenance, and permitting assistance through guided videos.

- Program is run through Colorado State University. This type of program could be run at the University level through Texas State University.

B. SWPPP Training with a GSI Component

1. Northwest Environmental Training Center: Stormwater Certification (CESCL) www.nwetc.org/stormwater This is a stormwater erosion and sediment control certification. Meets the state of Washington and Oregon's state water quality training required for implementation of construction stormwater inspections. This training is for inspectors of SWPPP measures.

- Although this is only a training for construction inspection—the fact that it meets a regulatory need for state regulators is a plus and stands out as a potential asset for a Clean Coast Program.

2. Stormwater ONE. <https://stormwaterone.com/texas-stormwater-management>

This program (mentioned above as well) has multiple components and includes various levels of training for SWPPP, sediment and erosion control, and inspector compliance training.

- Regulatory component for NPDES Permits and MS4 Requirements. CCTX could easily mimic a stormwater inspection course similar in nature, but specific to the Texas Coast.

C. Technical Training

1. Washington Stormwater Center Low Impact Development Training Certification <https://www.wastormwatercenter.org/low-impact-development/lid-training-programs/>

This program is online, self-paced training for professionals. CEU credits available, likely marketing to engineers. Course material is centered on design modules, operation and maintenance and rain garden design training.

- Appears technical in scope.
- Offered through Washington State University.
- Example of LID projects showcased.

2. Chesapeake Bay Landscape Professional Certification Program (CBLP) www.cblpro.org

This program offers certified training under two levels. The first level is conceptual in nature (see Conceptual Training for Stormwater Professionals) and the second level is advanced credentials for professionals experienced in design and/or installation of green infrastructure. There is an intensive seminar for residential design.

- A professional directory online showcases Certified Specialists.

3. Chesapeake Urban Stormwater Professionals (CUSP)
<https://chesapeakestormwater.net/chesapeake-urban-stormwater-professionals-cusp/>

Free, professional training program from the Chesapeake Stormwater Network. The program is a 14-part web-based curriculum discussing stormwater runoff and mitigation for urban watershed restoration practices.

- Custom library of watershed restoration manuals and reports available.

D. Mature Programs

1. Integrated Stormwater Management <https://iswm.nctcog.org/certification-guidance.html>

This program is part of the North Texas Council of Governments (NTCOG) based in Arlington, Texas. The program is for participating cities to “get certified” by bronze, silver or gold implementation statues. To be certified, the recipient city must document a minimum number of mandatory and recommended outcomes. Policy guidance is provided so that cities may update their ordinance language to meet the program requirements.

- This program has a huge incentive for local governments to adopt and implement stormwater management and to develop a comprehensive stormwater management program. There is a program board with tiered implementation process.
- The cities have an incentive to “get certified” because the program aids in developing practical expectations and 3-levels and offers technical and ordinance support.
- Long-term objectives of implementation that connects technical expertise to municipalities.
- City level assessment to develop a cohesive stormwater management program.
- Incentives include free training for city contractors, plaques and signage, annual banquet that highlights cities' participation, provide documents such as MS4 documents, adoptions of the manual (and certification) provide credits toward a lower FEMA Community Rating Systems (CRS) equating to reduced insurance rates.

2. Low Impact Development Certification at Lake George.
<https://lidcertification.org/certification>

The Low Impact Development (LID) Certification System at Lake George features a series of credits detailing LID practices a property owner, architect, designer, or developer can apply to their project, whether for new construction, improvement for an existing structure, or redevelopment of a site. LID Certification combines 32 individual credits across four categories: Protect, Build, Restore, and Maintain. With

up to six additional points possible for innovations contributing to LID goals, scores can total up to 100 points and are divided by certification level.

- Combines all aspects of the training (progressive).
- Protect, Build, Restore, Maintain.
- Offers a variety of points system. Likely a good exploration for the program.

3. San Antonio River Authority LID Training <https://www.sariverauthority.org/public-services/low-impact-development/lid-training-program> aiding in implementation of the San Antonio River Basin LID Technical Design Guidance Manual. Iterative training for common LID, Construction and Inspection and Annual Inspections and Maintenance.

- Easy to mimic based on the CCTX Sustainable Stormwater Manual.
- Coupled with a rebate program (minimum reimbursement of \$15,000). Rebate amount is based on unit volume and BMP type. Good Incentives
- Maps High Probability Areas and Interactive Maps for the Watershed.

4. Blue Flag Program <https://www.blueflag.global/>

This program certifies international “blue flag” coastal communities. It is aimed at connecting the public with their surroundings and encouraging them to learn more about their environment. A series of stringent environmental, educational, safety-related, and access-related criteria must be met and maintained by the community.

- Criteria for Beaches, Marinas and Tourism Boats
- High incentive to be “awarded.”
- Certifies Sites (including international safety for travelers)
- Inspections and Monitoring Component

5. Chesapeake Stormwater Network <https://chesapeakestormwater.net/>

Networking for Chesapeake Bay Stormwater Professionals. Webcasts and training on stormwater.

- 14-part webcast curriculum and urban watershed restoration practices.
- Basic prerequisites for stormwater professionals

6. H2OC Stormwater Program <https://h2oc.org/cities/> Orange County Specific Education and outreach organization to educate the public about stormwater and non-point source pollution.

Courses include Runoff 101 and resources for stormwater permits.

- Mostly an educational website

- Videos, but no real training or certifications
- Regulatory ordinances by cities are documented here.
- Somewhat ambiguous

7. Truckee Meadows Stormwater Permit Coordinating Committee
<https://tmstormwater.com/construction/>

Joint County Program required by NPDES permit for City of Reno, Sparks and Washoe County. Low Impact Development (LID). Program includes elements such as intergovernmental coordination, public outreach, municipal operations, stormwater discharge monitoring, land use planning, structural controls and LID, construction site discharge, illicit discharge detection and elimination, industrial program.

- Stormwater compliance and BMP's for construction sites

IV. VARIABLES TO CONSIDER

The CCTX Sustainable Stormwater Design Program “product” will result in a form of a training that represents the Sustainable Stormwater Manual and include general education on green stormwater infrastructure specifically for the Texas Coastal Zone. Because the program is currently in a conceptual phase, all the variables of each potential training type and their outcomes were evaluated. Variables that were considered in the overall comparable program evaluation include: Target Audience, Regulatory and Voluntary Incentives, Geographic Scope, Program Partners, Ease of Creation and Implementation, Organization Responsible for Administration, Benefit to Technical Professionals, Participating Communities and Developers. These variables are elaborated on below.

A. Target Audience

The target audience refers to the intended group of consumers targeted for a product. Deciding on a target audience will have the biggest impact on how the program will be created and how it will evolve. Key audiences to consider include public (constituents of a geographic area), industry professionals (stormwater professionals, engineers, etc.), government officials, cities, and developers. It will take multiple regional stakeholders and multiple target audiences to improve stormwater management, however each audience has advantages and disadvantages for marketing a program to each. Target audiences were also interviewed to gain an understanding of their needs and outlooks for engaging in a certification program. They are discussed below.

Public: The general public is likely relatively uneducated about stormwater and its impact on the local environment. Education of the public is certainly a hallmark of CCTX, however, does not seem to be a main driving force of the Stormwater Design Certification Program. Although there is a need for general education, using the public as the target audience for this program could detract from the overall impact and the technical approach mission statement. However, if marketing the CCTX brand and its presence in the Texas Coastal Zone is a high priority for the GLO then gearing a program that also benefits the general public may be warranted.

Industry Professionals: Industry Professionals come from different backgrounds but are the main driving force for implementation of the technical aspects of sustainable stormwater practices. Using industry professionals as a target audience will aid in creating a stronger network of stormwater professionals in the Coast and has the added benefit of incorporating sustainable practices into designs and on the ground implementation.

Government Officials/Stakeholder Groups and Cities: This target audience is typically where regulatory requirements and initiatives take hold. This target audience will create value in direct results and facilitate communication among communities and could potentially lead to increased ordinance development. Providing a program that is geared towards community leaders with regulatory authority is a “top-down” approach, in which may be met with hesitancy or backlash from constituents. If this is the target audience the GLO would like to target, greater detail should go into the application and engagement phase.

Developers: Targeting this audience will have the greatest value in implementation for the greatest result, however, will be a harder approach. With that said, developers have the likely greatest need for education. Implementing low impact development and green stormwater practices at the pre-development phase will directly result in reducing the harmful impacts of urban runoff. However, developers typically hesitate in supporting the implementation of initiatives due to perceived higher upfront costs, and view ordinance implementation in a negative light.

B. Regulatory and Voluntary Incentives

Encouraging green stormwater infrastructure and low impact development can be incentivized voluntarily or in a regulatory approach. Incentives can provide an avenue for regulators to implement much needed authority and provide an opportunity for developers. According to the U.S. EPA (and discussed further by the San Antonio River Authority in their LID manual) four common incentive mechanisms are typically used at the local level are fee discounts or credits, development incentives, BMP installation subsidies, and awards and recognition programs (U.S. Environmental Protection Agency, 2012). The EPA has a municipal handbook of incentive mechanisms that should be reviewed for its application to the program (U.S. Environmental Protection Agency, 2023). Examples of incentives include reduced stormwater and permit fees by municipalities, expedited permit processes, opportunities to apply for grants, matching funds, tax credits or reimbursements and marketing and recognizing GSI projects, developers, and communities. Voluntary incentives may include networking events, increased training for companies and awards, and recognition programs. Incentives, whether voluntary or regulatory in nature should be promoted in any certification program as it increases participation and increases utilization of the program at all levels.

C. Geographic Scope

Each comparable program is located in a distinct geographic region. Geographic scopes were divided into local, regional, or national. We found no programs that exist that specifically target the Texas Coastal Zone highlighting a need for this type of program.

Programs that are national or regional in a different state still hold value but will need to be evaluated in their application to the coastal communities.

D. Program Partners

Each program that was reviewed has partnerships with various entities and organizations. These were evaluated within each comparable program. Some of the current program partners include the EPA, Water Development Boards, Council of Governments, non-profits, federal partnerships (EPA, Department of Energy (DOE)), etc. The potential program partners for a CCTX Program are listed in Section V.

E. Difficulty to Create and Implement.

These variables were assessed as a nominal value with 1 being the least difficult (to create and to implement) and 5 being the most difficult. Each of the comparable programs have different platforms. Depending on the methods for training that will be utilized (online, in-person training, municipality, county) the ease to create will vary. Based on the programs we reviewed, the Conceptual Training type of program will be the easiest to administer. The material would be introduced as an overview rather than technical and lacks the detail for implementation that a technical or mature program would entail.

F. Organization Responsible for Administration

This category represents the administrator of the program. Typically, these are seen as the entity engaged in training. These are non-profits, Universities, private for-profit businesses, municipalities, etc. CCTX represents a mixture of stakeholders and deciding who will be the organization responsible for administering the program should be taken into consideration. Based on the bandwidth each of our collaborative teams may have internally will direct this variable.

G. Benefits

These variables were assessed as a nominal value with 1 being the least beneficial and 5 being the most beneficial. The benefit to each entity will be different based on the type of program. It is worth taking into consideration which platform is most important to engage with from the GLO and CCTX perspective.

1. Benefit to CCTX
2. Benefit to Engineering Firms
3. Benefit to Participating Communities
4. Benefit to Developers

H. Cost

These variables were assessed as a nominal value with 1 being the least costly and 5 being the most costly.

I. Adaptability

These variables were assessed as a nominal value with 1 being the least adaptable and 5 being the most adaptable.

J. Difficulty

The level of difficulty to create and administer were assessed as nominal values with 1 being the least difficult and 5 being the most difficult to create and administer.

V. EVALUATION OF PROGRAMS

As discussed in Sections III and IV, each program was categorized and then evaluated based on a set of pre-determined variables. Members of the working group evaluated the programs and scored each according to variables described above. The scores were nominal in values with and increasing numerical value with an increasing asset to a Clean Coast Program. Based on the average the results between working group members, the final values are highlighted below.

The results of this evaluation indicate that a mature program (as described above) would hold the greatest value to coastal communities. The programs that were incentive-based and targeted towards municipalities ranked highest. The larger take-away that persists among the research shows that there is a lack of programs specific to coastal environments and a need exists in this region for some type of GSI stormwater program. Detailed results are available in matrix form and are found in a separate spreadsheet entitled 2023-07-24 W05 Final Matrix. xls .

Table 1. Summary Results of the Matrix for the Evaluation of Programs

Program Type	Program Type	Audience	Regulatory, Voluntary, or Incentive-based	Final Matrix Score
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LID Certification System at Lake George	Mature Program	Municipalities	Incentive Based	28
North Texas COG - Integrated Stormwater Management (iSWM)	Mature Program	Municipalities	Incentive Based	27
National Recreation and Park Association - GSI Certificate Program	Conceptual Training for Stormwater Management Professionals	Municipal Engineers/Professionals	Voluntary	26
Washington Stormwater Center - LID Training Programs	Technical Design Training	Professionals, Property Owners, Engineers, Architects, Third Party Enforcers/Inspection Personnel	Voluntary, Incentive	25
Colorado Stormwater Center - Green Infrastructure and LID Training	Conceptual Training for Stormwater Management Professionals	Govt (city/county/school), MSF managers, engineers, contractors, inspectors, property managers.	Voluntary	24
Stormwater Compliance and SWPPP	Mature Program	SWPPP Professionnels, NPDES/MS4 professionnels	Incentive Based	23
San Antonio River Authority - LID Training Program	Mature Program	County	Voluntary	23
Stormwater ONE - Texas Stormwater Management	Conceptual Training for Stormwater Management Professionals	Consultants, Students, Engineers, Municipal and GSI Professionals	Voluntary	22
EnviroCert International, Inc. - National Green Infrastructure Certification Program	Conceptual Training for Stormwater Management Professionals	Construction Workers	Voluntary	21
Truckee Meadows Stormwater Permit	SWPPP Certs/GSI Inspections	Truckee River	Incentive Based.	21

Coordinating Committee				
Northwest Environmental Training Program - Stormwater Certification	SWPPP Certs/GSI Inspections	Courses for Engineers, Regulatory Individuals, Govts.	Required by State for Permits	21
H2OC Cities	Mature Program	Orange County Cities Only	Voluntary	19
Blue Flag Program	Technical Design Training	Coastal Communities	Voluntary	17
Chesapeake Stormwater Network	Technical Design Training	Available in DC, MD, PA, VA, DE, NY, WV	Voluntary, Incentive	16
Chesapeake Bay Landscape Professional Certification Program	Technical Design Training	Available in DC, MD, PA, VA	Voluntary, Incentive	16

VI. POTENTIAL STAKEHOLDERS AND PARTNERSHIPS

The list of potential stakeholders and partnerships for a sustainable stormwater certification program for the Texas Coastal Zone is vast and will ultimately be determined by the geographic and contextual scope of the program selected for implementation. The information provided below should not be considered comprehensive but represents a list of entities/groups that should be considered top priority collaborators.

Table 2. List of Potential Stakeholder Types and Details of Applicable Resources

Entity/Group	Details
State of Texas Regulatory Agencies (Texas General Land Office, Texas Commission on Environmental Quality, Texas State Soil and Water Conservation Board, others)	Coordination of efforts and information sharing. Potential for program administration. Avoid duplication of efforts. Identify and maintain specified liaisons from each agency for consistent communication.

Regional Entities (Councils of Government, River Authorities)	Resources for dissemination of information and administration of programs. Coordination with existing programs.
Higher Education and Research Institutions (Universities, AgriLife, Sea Grant, Harte Research Institute, Meadows Center)	Consultation with experts with vast knowledge base and shared education/research goals. Resources for information transfer and administration of programs. Locally-based technicians and educators. May provide CEUs.
Nonprofit Organizations (Galveston Bay Foundation, Coastal Bend Bays and Estuaries Program)	Resources for dissemination of information and promotion of program. Promote with active membership in local communities.
Local Government (cities and counties)	Critical to program design, implementation, and incentives. Ultimately a program must be accepted and/or adopted by local governments to achieve full implementation goals. Program must address community needs/challenges. Promote program to the public and municipal staff.
Staff and Administrators of Similar Programs	Many existing programs and resources available. Utilize knowledge base of existing program staff and administrators to refine Texas Coastal Zone program components, delivery, and administration. Easier to expand, duplicate, or refine existing programs than to build a new program from the ground up.
Professional Organizations and Trade Groups (Texas Society of Professional Engineers, American Society of Landscape Architects - Texas, etc.)	Promote within the organization. May provide CEUs.
Engineering, Architecture, and Construction Firms	Local engineering, architecture, and construction firms work directly with developers and city/county governments to design projects, overcome stormwater challenges, and build critical infrastructure. Programs should meet the professional development goals and bottom-line demands of these firms to ensure a high level of program participation.
Developers	Commercial and residential developers should be made aware of potential programs and implication. Feedback from developers should be sought to ensure program value and practical applications.

A variety of partnerships already exist within the Clean Coast Texas and can be utilized to ensure a successful program. The CCTX program has been monumental in building relationships with

local communities. A list of established relationships for the program is provided below. A portion of these partners were surveyed for their interest in supporting a program as well as their knowledge of GSI.

Table 3. Current Stakeholders and Likely Participants or Collaborators for a Stormwater Certification Program

Entity Group	Program Partners
State of Texas Regulatory Agencies	Texas General Land Office
	Texas Commission on Environmental Quality
	Texas State Soil and Water Conservation Board
Regional Entities	Nueces River Authority*
	Houston Galveston Area Council
	Costal Bend Council of Governments
Higher Education and Research Institutions	The Meadows Center for Water and the Environment – Texas State University
	Sea Grant
	Texas A&M AgriLife
	Harte Research Center
	Texas A&M University-Corpus Christi
Nonprofit Organizations and Advisory Groups	Galveston Bay Foundation
	Coastal Bend Bays and Estuaries Program
	Coastal Bend Alliance for Sustainable Stormwater (CBASS)
	Coastal Bend Mayors Coalition
	Research of Applied Technology Education and Service Council (RATE)
Local Government	City of Rockport*
	Aransas County
	Town of Fulton
	Aransas County Navigation District

	Nueces County*
	City of Port Lavaca
	City of La Marque
	Ingleside on the Bay
Technical Firms	Doucet & Associates
	Halff Associates*
	Anchor QEA

*Entities surveyed.

Prior to final program design and implementation, due diligence should be completed to ensure the cooperation of carefully chosen individuals within each of the stakeholder groups identified in Table 1 and Table 2, above.

VI. COASTAL COMMUNITIES AND SURVEY RESULTS

As part of this assessment, one-on-one surveys were conducted in June 2023 with representatives from communities and other key stakeholder groups to identify general stormwater management needs and goals for the Texas Coastal Zone. Regardless of the program type and geographic scope, the key to a successful program rollout begins with effective stakeholder engagement. Relationship development with local leaders and program champions should be considered paramount in this effort.

Survey participants included elected officials, a floodplain manager, a civil engineer, and a certified planner. Results indicated a broad range of views on the survey questions. Additional education and improved drainage were the most common needs identified by survey participants. The need for improved policies and the education of policymakers were the strongest themes in survey responses. Notably, survey respondents identified that many urban settings with a younger population demographic displayed more acceptance of green stormwater infrastructure, with small, rural communities still lacking understanding of GSI concepts and hesitancy towards implementation. Survey responses further indicated that the type of entity best suited to implement a SSD Certification Program hinged on the geographic scope such a program would incorporate.

Table 4. Coastal Stakeholder Stormwater Management Survey Summary

Survey Question	Consolidation of responses
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What needs, if any, does your community have related to stormwater management?	<p>Primary focus has been on drainage and flooding. Need for better understanding of overall stormwater management with effective regional coordination. Education efforts should work to inform overall flood masterplans.</p> <p><u>Top Quote</u></p> <p><i>"There are no jurisdictional boundaries on flooding and stormwater."</i> – Mayor Cathy Skurow, City of Portland</p>
How might green stormwater infrastructure be incorporated into your stormwater management approach?	<p>RFQs for services related to stormwater and flood planning should incorporate language on GSI especially in the selection of engineering firms.</p> <p>Communities open to GSI concepts and understand need for additional treatment structures but availability of land and understanding cost/funding of implementation remain key hurdles.</p>
What, if any, changes have you seen in your community's approach to the utilization of green stormwater infrastructure for water quality, flood control, resilience, etc.?	<p>Strongest trend in all survey responses. Significant move toward GSI acceptance in younger, more urban demographics with greater holdout among older and more rural demographics. This includes citizens and elected officials. Harris County was mentioned by multiple respondents as having taken strides toward GSI post Harvey.</p> <p>Protection of green (open) spaces is a desirable political approach and key to stormwater management. A win-win for elected officials.</p>
What entity would be the best suited to implement regulatory and/or incentive programs related to green stormwater infrastructure in your community? (State, County, COG)	<p><u>Regional Approach</u></p> <p>Nueces River Authority focusing on regional flood management and has already signed up 5 counties for a mutual agreement on floodplain management. Council of Government also mentioned.</p> <p>Harte Research has local presence and has hired a watershed manager that could potentially support effort</p> <p><u>Local Approach</u></p> <p><i>"From perspective of a smaller county, the city or county government would be best suited."</i> Mayor Tim Jayroe, City of Rockport</p>
What types of regulatory or incentive programs would be most effective for encouraging greater utilization of green stormwater infrastructure?	<p>Ordinances are key considerations for cities. Clear with SARA LID program and others that regulations should be in place to expedite implementation of GSI programs.</p> <p>Counties have funding to develop flood plans but critical that they support and enforce plans. Development of a workforce around flooding/stormwater management is critical. Counties can hire floodplain administrators, but this work often falls on the County</p>

	Judge. River Authorities can support but counties need local experts.
Which of these categories (4 types of programs) would be most beneficial for your community? and why?	Elected officials trended toward a comprehensive, “mature program” while technical experts and educators skewed toward “conceptual training for stormwater management professionals” with an understanding that the best program would have to be designed to match the geographic scope of the key audience.

“A program should be based on the types of people involved. Some folks would be interested in more technical information, but still a big need for basic information. Meeting people where they are is important. They need to see it, touch it, feel it.” – Mayor Tim Jayroe, City of Rockport.

Additionally, the co-author of The San Antonio River Authority (SARA) LID Program was surveyed to gain insight into why their LID Manual was created, how it was launched, goals for the program, and to summarize their goals as well as suggestions for improvement upon implementing a CCTX program. The SARA not only created a similar manual to the SSM, but has incorporated a LID program to supplement training around it. Although this program was not in the top tier of programs surveyed, it holds immense value to possibly mimic based on its reach and because of its somewhat long-established history (created in 2012).

The SARA LID Program includes training and partnerships in Bexar County for the site planning, design, construction inspection, and maintenance of LID permanent on-site stormwater BMP's. It is comprised of four courses, each offering an optional credential component with Continuing Education (CE) and Professional Development (PD) hours. The program was created to encourage the adoption of LID based on the deterioration of water quality in the region. The program was launched with initial outreach to communities and publishing of the LID Manual. Original goals included a need for the greater adoption of LID, education, and outreach to public decision makers. The program has evolved over time, but voluntary adoption of the manual has been slow. According to our survey respondent, significant challenges to this program are the lack of a regulatory requirement and insufficient community support. Nevertheless, several successes were highlighted, including the City of San Marcos and the City of Boerne adoption of the LID manual. Both of these cities now require LID in new developments and local stormwater ordinances have been developed. In 2021, the City of Boerne also passed a stormwater utility fee.

Suggestions from this survey include trying to keep the program simple and drawing a distinguished line between what designers/engineers need with what scientists' think is best for the environment. Survey results are available in a separate spreadsheet entitled 2023-07-24 W05 Final Matrix. xls

VII. FUNDING

A funding mechanism should be considered a key component for the long-term sustainability of an SSD Certification Program. Once established, it is our recommendation for the SSD Certification Program to begin its life using a fee-based structure, offering different tiers of training that provide varying levels of certification. The value proposition for certification levels should be consistent with the participant's investment.

There are several ways to go about doing this, but the goal should be to develop a self-funding program, or even a program that contributes to the funds available to CCTX. If the program or trainings were to be offered for "free" (or funded solely by the GLO), the perceived importance of the effort could be diminished or perhaps viewed as a marketing/education push only.

Some stakeholders have recently considered the potential to develop a drainage district with some taxing or fee collection authority. If municipalities or partner communities were to adopt ordinances to implement the manual or potential stormwater utility fees for developments, this could benefit the SSD Certification Program immensely and should be investigated further. There is also a need for continuing education credits for professionals that could be capitalized on where professionals pay for training. The funding from this could be used to engage further partnerships or evolve the program.

Other sources for development or start-up funding could come from diverting new/existing grant funds to local communities. GLO's Resilient Communities grant program is being utilized by numerous communities throughout the Texas Coastal Zone to develop stormwater management plans among other resiliency-focused efforts. Engagement with communities participating in this grant program toward the purpose of incorporating a GSI component, specifically the participation in an SSD Certification Program could yield rapid results and incentivize these communities to adopt a variety of GSI efforts moving forward.

Utilizing key aspects and maintaining the general structure of the applicable programs investigated for this report will create a sense of cohesion both within the CCTX as well as the professionals seeking this SSD Certification Program. Below are the top three programs from the matrix detailing the sources of funding they receive on a yearly basis. Some of this information is available on the various websites through auditing programs from the federal level:

- **LID Certification System at Lake George** – This is controlled by the Lake George Association ([About the LGA | Lake George Association](#)), a non-profit organization, which has funding from over 100 businesses from across the watershed that partner with the association, as well as New York state and voluntary donations.
- **North Texas COG - Integrated Stormwater Management (iSWM)** – The program receives funding from each of the associations involved in the NCTCOG: over 230 member governments including 16 counties, numerous cities, school districts, and special districts.
- **National Recreation and Park Association (NRPA)** - a non-profit organization with a funding structure similar to other non-profits, including member dues, grant from federal sources, voluntary contributions from businesses and individuals, publications and investments. The program itself has a payment structure which helps fund those certifications.

VIII. EVOLUTION OF PROGRAM

A. PROCESS FLOW

Because of the nature of the stormwater industry in general (and as discussed in comparable programs above), a CCTX Certification Program is likely best served in a step wise progression. There are many components of the “types” of programs we evaluated that are considered beneficial to a CCTX training program. By incorporating a process flow, we can outline different phases that could be employed as resources are available and as community interest grows. These are broken down by phase:

1. Phase I: Assess the Feasibility. This is the current phase to review external sources and existing programs and evaluate the need for this type of training within the Coast. This includes engaging stakeholders and assessing their level of interest.
2. Phase II: Compile documentation and marketing materials to outline a pilot program, assess funding opportunities at greater depth and obtain commitments from stakeholders and partners in the community. An overview training program would be most appropriate at this level.
3. Phase III: Evolve and “mature” the program. Incorporate more technical components (SWPPP and engineering design and regulatory incentives) and include a “projects based” program where development projects are certified in addition to professional and city officials. Outline a pathway to mature the program into the government and/or development realm that includes some type of regulatory “hook”.

B. INCORPORATING MODULES AND THE SUSTAINABLE STORMWATER MANUAL

The Texas Stormwater Manual is a comprehensive guide to stormwater management in Texas. It is designed to help landowners, developers and engineers comply with the state’s regulations around stormwater. Portions of the manual (and its coupled modules) that are beneficial to incorporate into the program and support the mission statement are highlighted here. Incorporating the modules and/or the Sustainable Stormwater Manual will be different if the client wishes to take an “overview approach” or a “technical approach”. Portion of the manual have been highlighted below to include in a program based on the approach chosen by the client.

1. OVERVIEW TRAINING

CCTX has developed a series of modules based on the Guidance for Sustainable Stormwater Drainage on the Texas Coastal Zone Manual. These interactive modules include videos, case studies, links to additional resources, and quizzes to test the user’s knowledge of the content. The modules are designed to satisfy continuing education requirements for professional licenses and a variety of other programs. (Clean Coast Texas, 2023). The online modules represent the best training material available for CCTX to initiate an overview type of pilot program should include:

Module 1: Clean Coast Texas at Work

Module 2: Design-Build for a Resilient Texas Coastal Zone

Module 3: Retrofit Guide

Other topics that can be easily modified for training material on LID and GSI at a Phase II level (overview training) should include:

Introduction to Water Quality and Resiliency in the Texas Coastal Zone, Stormwater Basics, Benefits of Sustainable and Resilient Design, Design Principles, What are BMP's, Examples of GSI and LID, How to incorporate GSI and LID into Design Principles, Demonstration Projects, Introduction to Retrofits, Stormwater Inspections Basics, How to engage your community (including applicable resources), Model ordinance, Funding Resources.

1. TECHNICAL TRAINING

A second phase of a pilot program could include a more technical approach focused on the Guidance for Sustainable Stormwater Manual and/or a SWPPP training program.

CCTX could approach this effort with invitations to specific cities, counties, and/or engineering/consulting firms to nominate participants to the program with an agreement to provide an evaluation at the conclusion in lieu of a fee to participate in the training. This could be limited to a small group of technical professionals, perhaps twelve individuals participating in once-per-month trainings over six-months. Training sessions should be limited to two hours in length to avoid excessive work disruption to the participants but long enough to encourage feedback and conversations. The evaluations could be used to modify the program, and if positive, utilized to market the success of the initial effort.

The individuals that complete the program should receive some type of certification or certificate of completion. Further, participants should be engaged by CCTX regularly (individual and group emails) with potential opportunities and speaking invitations. Individuals that complete the program will be more likely to reengage with CCTX and/or utilize their training if they feel a sense of accomplishment both individually and as a group. Much care should be taken by CCTX in both selecting a trainer or trainers for this phase as well as developing a team building strategy for the participants.

Portions of the manual to incorporate for an overview training are highlighted below for discussion.

Introduction to Water Quality and Resiliency in the Texas Coastal Zone. This includes such topics as stormwater runoff basics, surface water quality in the Coastal Zone, stormwater controls and treatments, benefits of sustainable and resilient designs.

Guidance for Sustainable and Resilient Development Design. This includes such topics as introductory sustainable site designs, preservation of natural features, hazard mitigation, conservation design, reduction and disconnection of impervious cover.

Erosion and Sediment Control Practices. This includes such topics as construction phase erosion and sediment control planning, spill prevention and control.

Recommended Performance Standards and Design Approach. This includes such topics as implementing buffer zones for critical environmental features, water quality, structural practice maintenance, incorporating standards into typical development projects.

Structural Practices for Sustainable Drainage Design. This includes such topics as design guidelines, typical GIS (vegetated swales, filter strips, porous pavement, enhanced detention, bioretention, infiltration facilities, rainwater harvesting), natural area preservation, disconnection of rooftop runoff, soil amendments, dealing with stormwater credits.

Incorporating Practices into Existing Development. This includes topics related to retrofit planning including existing detention basins, re-development, restoration and enhancement of streams and wetlands, etc.

Floodplain Management and Hazard Mitigation. This topic is specifically important for communities experiencing enhanced flooding and includes National Flood Insurance Program, Riverine and Coastal Flooding, FEMA Floodplain map modifications, floodplain fill and protection measures, design and permitting.

Regardless of the topics chosen for a training program, it is likely important to incorporate a database of professionals who have taken the training. This allows a network of professionals to continue to engage in the conversation with likeminded individuals as well as pulling together resources for communities and stakeholders to utilize.

Secondarily, as the program matures setting standards to certify projects, cities and firms that have substantially and successfully designed and incorporated GSI and LID into their communities should be incorporated.

IX. CONCLUSIONS AND RECOMMENDATIONS

As reiterated above, a common theme of this feasibility assessment is a lack of example programs specifically catered towards the Texas Coastal Zone. A need certainly exists not only for water quality and enhancement of the environment as a driving force, but also the lack of education around the subject (especially among public servants) and the increased development in the region. The program should aim to evolve into a mature program with regulatory incentives (and potentially regulatory authority) but should start small with potential online training in conjunction with the

SSM. By starting small with an overview training program CCTX can gain partners while educating players within the development sector. Launching a program in this way will decrease the concern about regulatory authority in order to gain traction and marketability.

A program should incorporate communication components into the content of the program. Increased marketing is vital to connecting the dots. Relationship development with local leaders and program champions should be considered paramount in this effort. Prior to final program design and implementation, due diligence should be completed to ensure the cooperation of carefully chosen individuals within each of the stakeholder groups identified in the above table. An outline for the evolution of the program would be beneficial especially investigating ways to incorporate the SSM into the regulatory environment. Without a regulatory hook, a program may be reflected in the results of the SARA LID program and may slow the overall reach.

Other recommendations include establishing partnerships first or foremost (in the Coastal Zone), increasing a marketing push on the front end and finding a preliminary municipal partner that is well positioned to implement water quality standards surrounding the manual.

A program of respectable caliber should incorporate at least these elements:

- Increased marketing
- Communication elements aimed at a particular audience,
- Relationship development,
- Specificity with regard to professionals taking the program (conceptual vs technical aspects)