

Corkscrew Watershed Initiative

Deliverable 6.2: Initial Project Matrix Technical Memorandum

Prepared for
South Florida Water Management District



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Prepared by
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Abbreviations and Acronyms

CREW	Corkscrew Regional Ecosystem Watershed
CWI	Corkscrew Watershed Initiative
O&M	Operation and Maintenance
PDT	Project Development Team
SFWMD	South Florida Water Management District
T&E	Threatened and Endangered Species
TWG	Technical Working Group

1.0 Background/Introduction

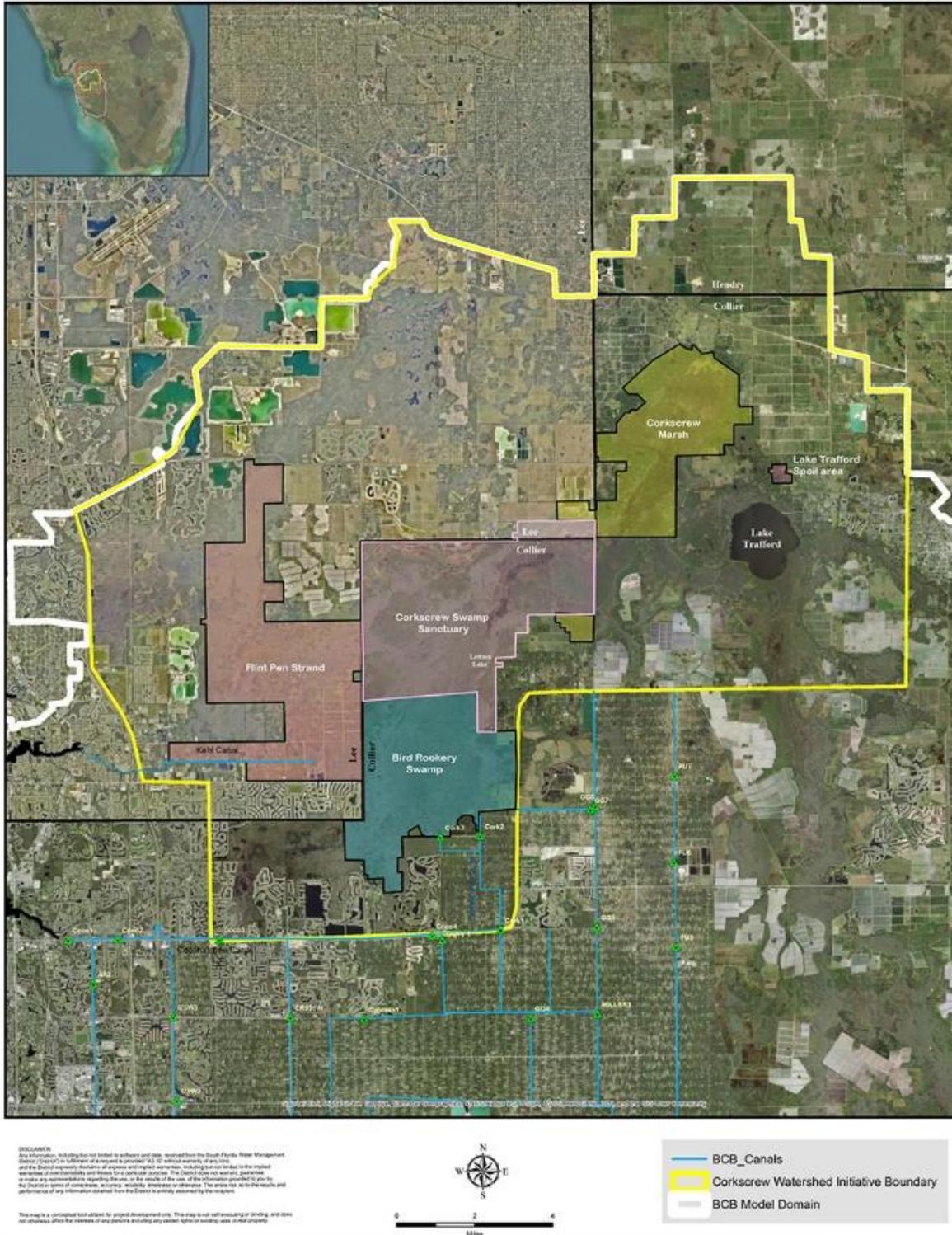
The objective of the Corkscrew Watershed Initiative (CWI) Project is to develop a comprehensive strategy to achieve ecological restoration of the Corkscrew Watershed by improving wetland hydroperiods and natural flows, while reducing flood risk in nearby flood-prone areas and without adversely impacting the water supply and water management needs of the Corkscrew Watershed. The objective is being accomplished through a public planning process that engages and involves key partners, stakeholders, and the public. The project aims to identify viable short-term and long-term strategies to achieve the CWI Project goals. The proposed restoration alternatives will be cost-effective, feasible, and resilient. The CWI Project will consider population growth, land development, and climate change including sea level rise and future rainfall. This project aligns with the mission of the South Florida Water Management District's (SFWMD) Big Cypress Basin 2023–2028 Strategic Plan and will contribute to the resiliency of the Big Cypress Watershed.

The CWI Project boundary encompasses southwestern Hendry County, northern Collier County, and southern Lee County as shown in Figure 1. The CWI Project area is comprised of rivers (Imperial and Estero), creeks (Halfway and Spring), and wetland sloughs/swamps (Flint Pen Strand and Upper Corkscrew Swamp) within the Estero Bay Basin Watershed in southern Lee County and the Cocohatchee Canal/River Basin and Golden Gate/Naples Bay Watershed in northern Collier County. The initial project planning area was broadened beyond what may be considered an effective area to ensure thorough consideration of vulnerable communities and ecosystems.

Previous studies and monitoring documented reduced hydroperiods and increased water level recession rates in Audubon's Corkscrew Swamp Sanctuary (owned and managed by National Audubon Society), a critically important ecosystem, within the past 60 years. This 3-year planning CWI Project (2024–2027) is funded by the Big Cypress Basin Board and builds on previous efforts to determine potential causes of the shortened hydroperiod documented at the Corkscrew Swamp Sanctuary. The Technical Working Group (TWG) is serving as the project planning team and is comprised of SFWMD staff, representatives of local governments in the region, and others with responsibility for the management of the Corkscrew Watershed. TWG participants are those with expertise in the Corkscrew Watershed and the ability to fund and implement projects in the CWI Project area. Collectively, representatives of the City of Bonita Springs, Collier County, Audubon Florida/Corkscrew Swamp Sanctuary, Corkscrew Regional Ecosystem Watershed (CREW) Land and Water Trust, Lee County, SFWMD, and Village of Estero make up the TWG. The TWG is providing guidance to the SFWMD Project Manager responsible for administering the contract and acting as the liaison between the TWG, CWI Project Consultant (J-Tech), and SFWMD Project Development Team (PDT).

The previously submitted performance measures and metrics (J-Tech, 2025a) defined more specific objectives of the project and how proposed restoration alternatives would be evaluated. Over the past several months, J-Tech has been working with the SFWMD Project Manager, TWG, and SFWMD PDT to develop nine conceptual restoration projects to achieve these objectives. These projects were then combined with others to formulate five overall comprehensive CWI alternatives for further examination. An initial evaluation of the projects and alternatives formulation was presented in Deliverable 6.1 Final CWI Short- and Long-Term Restoration Projects Technical Memorandum (J-Tech, 2025b). Per the CWI Work Plan, the Project Matrix outlined in this document will be used to refine the five restoration alternatives to three alternatives that best meet the project objectives. These three alternatives will be evaluated using modeling and based on the modeling results along with a comprehensive assessment of project benefits, cost, regulatory requirements, public input, constraints, the highest ranked projects will be included in the final CWI Public Planning Project Report for implementation.

The memorandum presents an initial screening evaluation of the proposed alternatives. Evaluation criteria used in this screening are consistent with CWI Project goals and performance measures and metrics.



	<p>BIG CYPRESS BASIN SFWMD 2660 Horseshoe Dr. N. Naples, Florida 34104 239-263-7615</p>	<p>Corkscrew Watershed Initiative Project Boundary</p> <p>UPDATED Dec 2023</p>	
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Figure 1. Corkscrew Watershed Initiative Project Area

2.0 CWI Projects And Alternatives

High level summaries of the nine projects are presented below. Additional details for the projects are included within Deliverable 6.1 Final CWI Short- and Long-Term Restoration Projects Technical Memorandum (J-Tech, 2025b). The general location of the projects are shown on Figure 2.

Project 1. Washout Road Culvert Improvements: Re-establish more natural flows from Corkscrew Marsh to Corkscrew Swamp. The project will improve conveyance under the road and replace culverts with adjustable weir structures to provide the ability to manage flow and upstream stages.

Project 2. Restoration of Former Fish Farm: Restore the area of the former fish farm to establish more natural flows through this area. The project involves degrading berms, regrading to create variable depth wading bird foraging habitat, plugging channels, and installing culverts equipped with adjustable weirs.

Project 3. Culvert Improvements Along Bird Rookery Trail: Slow down water as it moves through Corkscrew Swamp Sanctuary and Bird Rookery Swamp, providing the ability to place water in storage for controlled release into the dry season. Culverts beneath existing Bird Rookery Trail will be retrofitted with adjustable weirs to provide ability to manage flows and upstream stages.

Project 4. Shady Hollow Boulevard Berm Repair and Gate Installation: Reduce the over drainage occurring along Shady Hollow Boulevard. The project involves repair of the existing berm, installation of collection ditches to promote uniform collection of sheet flow, and installation of variable weir structures for management of flows and stages.

Project 5. Corkscrew Canal Gate and Berm: Reduce the over drainage at the north end of the Corkscrew Canal. The project involves installation of variable weir structures for management of flow and stages and a limited berm.

Project 6. Former Agricultural Area Restoration: Improve vegetation and restore sheet flow through the former agricultural area located north of Shady Hollow Boulevard. The project involves degrading berms, plugging ditches, and removing invasive and nuisance vegetation.

Project 7. Kehl Canal Berm Repair: Reduce over drainage to Kehl Canal. The project will involve repair of the existing berm and installation of a series of collection ditches and variable weir structures to manage stages and flows. A culvert at the Radio Tower Road crossing will also be improved.

Project 8. Corkscrew Road Culvert Improvements: Re-establish more natural flows from the Airport Mitigation Park to Flint Pen Strand. The project will improve conveyance under Corkscrew Road and the adjacent access roads as well as replace culverts with adjustable weir structures to provide the ability to manage flows and upstream stages.

Project 9. Kiker Preserve Berm Extension: Extend the proposed Kiker Preserve berm with an additional 8.9 miles of berm resulting in a continuous berm around the western and southern sides of the CWI Project area.

There is some uncertainty regarding the role of groundwater in the overall water balance of the CWI natural areas. The need for subsurface barriers to reduce groundwater discharge associated with berm improvements included in Projects 3, 4, and 5 will be evaluated through modeling.

Each project addresses a specific concern, often within a localized area. However, the benefits are enhanced when projects are implemented in conjunction with each other. Therefore, projects were combined to formulate comprehensive, Corkscrew system-wide restoration alternatives for consideration. Per the CWI Work Plan, five initial restoration alternatives were identified. Projects included in each alternative are presented in Table 1 and summarized below. Projects have been identified as being either short- or long-term. Whereas projects identified as short-term are considered readily implementable in the near future (within approximately 5 years), long-term projects will require more time to develop. In general, projects located entirely on publicly owned lands, expected

to have minimal impacts to adjacent private properties, and involving more easily implemented project features are considered short-term projects.

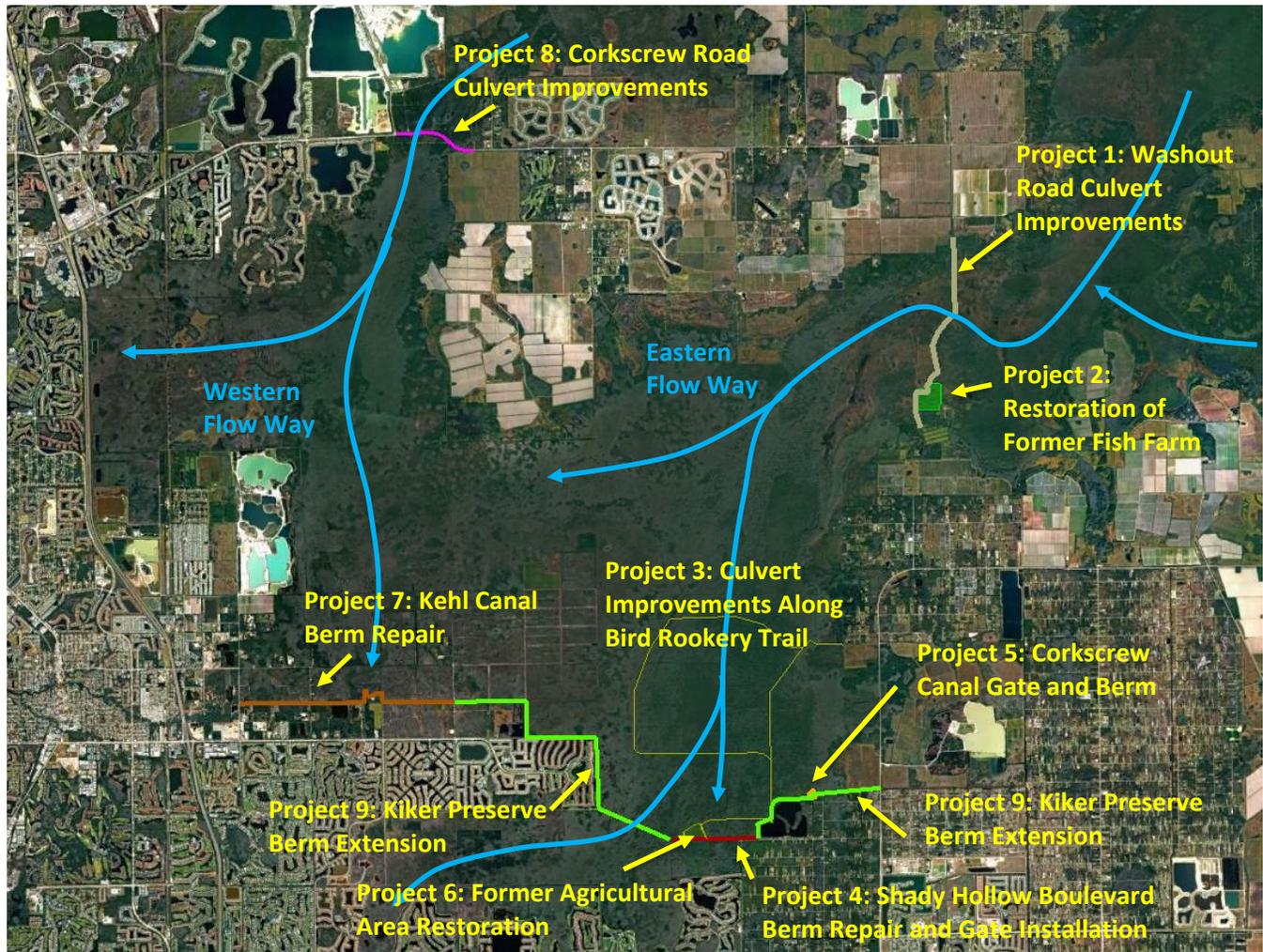


Figure 2. Corkscrew Watershed Initiative Project Locations

Alternative 1 focuses on the Eastern Flow Way with improvements to better control water movement from Corkscrew Marsh at Washout Road and the Former Fish Farm (Projects 1 and 2), slow down water as it moves through Corkscrew Swamp Sanctuary and Bird Rookery Swamp (Project 3), and decreasing over drainage along Shady Hollow Boulevard and the Corkscrew Canal (Projects 4 and 5).

Alternative 2 combines Alternative 1 with restoration of the former agricultural area (Project 6).

Alternative 3 includes the Kiker Preserve Berm Extension (Project 9), improving control of water flow from Corkscrew Marsh through the Former Fish Farm (Project 2), projects along Shady Hollow Boulevard and Corkscrew Canal (Projects 4 and 5), as well as improvements to slow down water moving through Corkscrew Swamp Sanctuary and Bird Rookery Swamp (Project 3).

Alternative 4 includes projects addressing both the Eastern and Western Flow Ways without the Kiker Preserve Berm Extension (Projects 1 through 8).

Alternative 5 examines benefits of all projects combined (Projects 1 through 9).

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Table 1. CWI Restoration Alternatives

Projects	Timing	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Project 1: Washout Road Culvert Improvements	Short-term	X	X		X	X
Project 2: Restoration of Former Fish Farm	Short-term	X	X	X	X	X
Project 3: Culvert Improvements along Bird Rookery Trail	Short-term	X	X	X	X	X
Project 4: Shady Hollow Boulevard Berm Repair and Gate Installation	Long-term	X	X	X	X	X
Project 5: Corkscrew Canal Gate and Berm	Long-term	X	X	X	X	X
Project 6: Former Agricultural Area Restoration	Short-term		X		X	X
Project 7: Kehl Canal Berm Repair	Short-term				X	X
Project 8: Corkscrew Road Culvert Improvements	Long-term				X	X
Project 9: Kiker Preserve Berm Extension	Long-term			X		X

Note: Evaluation of subsurface barriers on Projects 3, 4, and 5 will be conducted during modeling of the alternatives, based on results.

3.0 Development of the Initial Alternatives Screening Matrix

For the initial alternatives screening, factors evaluated were defined to be generally consistent with overall CWI Project goals within Deliverable 3.2 Final Project Performance Measures and Metrics (J-Tech 2025a). The performance measures and metrics identified require more quantitative analysis based on modeling results. At this stage and in lieu of modeling results, professional judgment was used to assess how each project would contribute to the overall project goals. Additional factors considered important at this initial phase, such as wildlife use/threatened and endangered species (T&E) benefit, as well as several related to implementation including construction cost, real estate/ownership, operation and maintenance (O&M) cost, and permitting complexity were used to refine the analysis.

The sections that follow summarize the evaluation factors used in the analysis. For each factor, a scoring and weighting factor were assigned to reflect the relative importance of the factor in the overall evaluation. Scores were assigned as 2, 1, or 0 with a higher score meaning that alternative best meets the factor objective. Weights were assigned as 3, 2, or 1 with a higher weight meaning the factor is more important to achieving CWI Project objectives. An overall alternative score was then calculated as the sum of the products of the score and the weighting factor. The alternatives with the highest scores were selected for modeling.

3.1 Factors Evaluated

3.1.1 Hydrologic Restoration of Wetlands

The wetlands in the CWI Project area have been impacted by changes in hydrology due to modifications in water flows from development, regional drainage infrastructure, and increased groundwater pumping. To restore wetland hydrology, measures were included to create more natural sheet flow patterns, modify water depths to more closely match historical depths, establish hydroperiods that are more similar to historical conditions, improve dry season water levels for wetland communities, and evaluate potential impacts for saltwater intrusion. Improving the system hydrology is a key first step in achieving other project goals such as habitat restoration and wildlife use.

Weighting: Since ecological restoration is a main focus of the CWI Project and a primary means of achieving ecological restoration is hydrological restoration, this factor was assigned the highest weight of 3.

Scoring: Scoring assigned for hydrologic restoration is shown in Table 2.

Table 2. Hydrologic Restoration Scoring Criteria

Score	Criteria
2	Alternative has the potential to achieve a high degree of hydrologic restoration.
1	Alternative has the potential to achieve a moderate degree of hydrologic restoration.
0	Alternative has limited potential to achieve hydrologic restoration.

3.1.2 Habitat Restoration

The CWI Project area includes habitat for multiple species, including those that are T&E. To improve and restore habitat, measures were included that restore hydrologic conditions to those more suitable for preferred habitats, remove invasive exotic vegetation and replant with native species, and improve connectivity of habitats for wildlife use.

Weighting: Since habitat restoration is a main focus of the CWI Project, this factor was assigned the highest weighting of 3.

Scoring: Scoring assigned for habitat restoration is shown in Table 3.

Table 3. Habitat Restoration Scoring Criteria

Score	Criteria
2	Alternative has the potential to achieve a high degree of habitat restoration.
1	Alternative has the potential to achieve a moderate degree of habitat restoration.
0	Alternative has limited potential to achieve habitat restoration.

3.1.3 Wildlife Use/T&E Benefit

One of the primary objectives of the restoration activities is to improve wildlife use. The Corkscrew Watershed is the home to several wildlife species including T&E species, which should benefit from hydrologic and habitat restoration activities. This evaluation factor primarily considers benefits to wading birds and panthers, and the alternatives cannot adversely impact any listed species. In addition, the alternatives cannot over-inundate the wintering sparrow fields in Bird Rookery Swamp.

Weighting: The previous factors of improving the hydrology and habitat would have the greatest benefits to wildlife use and T&E species in the CWI Project area. Therefore, this factor receives a weighting factor of 2.

Scoring: Scoring assigned for wildlife use/T&E benefit is shown in Table 4.

Table 4. Wildlife Use/T&E Benefit Scoring Criteria

Score	Criteria
2	Alternative has the potential to achieve a high degree of enhanced wildlife use/T&E benefit.
1	Alternative has the potential to achieve a moderate degree of enhanced wildlife use/T&E benefit.
0	Alternative has limited potential for enhanced wildlife use/T&E benefit.

3.1.4 Flood Protection

In recent years, there has been an increase in development near the CWI Project area and additional development is planned. Therefore, it is important that the CWI Project elements do not negatively affect the flood protection level of service for that development. In addition, alternatives that benefit flood protection are preferred.

Weighting: Flood protection is not the main focus of CWI, although alternatives that enhance flood protection are generally favored. Therefore, this factor receives a weighting of 1. Importantly, in no case can the proposed alternative cause a reduction in flood protection. Alternatives that may have an adverse impact on flood protection will be eliminated from further consideration regardless of scoring in other categories.

Scoring: Scoring assigned for flood protection is shown in Table 5.

Table 5. Flood Protection Scoring Criteria

Score	Criteria
2	Alternative has the potential to enhance flood protection.
1	Alternative does not change flood protection.
Eliminate	Alternative may have an adverse effect on flood protection.

3.1.5 Water Supply

The urban developments and agricultural properties near the CWI Project area are considered existing legal users of water. Therefore, it is important that the CWI Project elements do not negatively affect the water supply level of service for these permitted users. In addition, alternatives that increase water storage and aquifer recharge and thereby improve water supplies are preferred.

Weighting: Water supply is not the main focus of CWI, although alternatives that enhance water supply are generally favored. Therefore, this factor receives a weighting of 1. Importantly, in no case can the proposed alternative cause a reduction in water supply. Alternatives that may have an adverse impact on water supply will be eliminated from further consideration regardless of scoring in other categories.

Scoring: Scoring assigned for water supply is shown in Table 6.

Table 6. Water Supply Scoring Criteria

Score	Criteria
2	Alternative has the potential to enhance water supply.
1	Alternative does not change water supply.
Eliminate	Alternative may have an adverse effect on water supply.

3.1.6 Construction Cost

It is important that construction costs are reasonable relative to benefits provided. For purposes of this initial screening, alternatives were evaluated based on the overall magnitude of cost without consideration of the benefits. Consideration of benefits is not possible until modeling is completed, and benefits can be quantified.

Weighting: Construction cost received a weighting factor of 2 to reflect its importance in the evaluation.

Scoring: Scoring assigned for construction cost is shown in Table 7.

Table 7. Construction Cost Scoring Criteria

Score	Criteria
2	Construction costs are low.
1	Construction costs are moderate.
0	Construction costs are high.

3.1.7 Real Estate/Ownership

Acquisition of real estate or easements can be complicated, often taking a long time and at significant cost. For this reason, alternatives that do not require real estate acquisition or easements are favored. For purposes of this initial screening, alternatives were evaluated based on the magnitude of land acquisition needed, without consideration of the benefits. Consideration of benefits is not possible until modeling is completed, and the benefits can be quantified.

Weighting: Real estate/ownership received a weighting factor of 2 to reflect its importance in the evaluation.

Scoring: Scoring assigned for real estate/ownership is shown in Table 8.

Table 8. Real Estate Ownership Scoring Criteria

Score	Criteria
2	No real estate acquisition or easements are required.
1	Moderate level of real estate acquisition or easements are required.
0	Extensive real estate acquisition or easements are required.

3.1.8 O&M Cost and Complexity

It is important that O&M costs are reasonable relative to benefits provided. In addition, alternatives should be relatively simple to operate. It is important that the entity responsible for operation devote the skilled manpower and resources needed to maximize the chances of success. For purposes of this initial screening, alternatives were evaluated based on the overall O&M cost magnitude without consideration of the benefit provided. Consideration of benefits is not possible until modeling is completed, and benefits can be quantified.

Weighting: O&M costs and complexity received a weighting factor of 2 to reflect its importance in the evaluation.

Scoring: Scoring assigned for O&M costs and complexity is shown in Table 9.

Table 9. O&M Cost and Complexity Scoring Criteria

Score	Criteria
2	O&M cost and complexity are low.
1	O&M cost and complexity are moderate.
0	O&M cost and complexity are high.

3.1.9 Permitting Complexity

Complicated permitting can delay or make implementation more difficult. Whereas permitting simple alternatives may be straightforward, more complicated alternatives may take years to obtain the required permits. Minimizing wetland impacts to the extent practicable is an important goal for all of the alternatives.

Weighting: Permitting complexity received a weighting factor of 1.

Scoring: Scoring assigned for permitting complexity is summarized in Table 10.

Table 10. Permitting Complexity Scoring Criteria

Score	Criteria
2	Alternative involves a low level of permitting complexity.
1	Alternative involves a moderate level of permitting complexity.
0	Alternative involves a high level of permitting complexity.

3.2 Scoring and Ranking of Alternatives

As described above, each alternative was assigned a score based on professional judgement. Scores were then multiplied by weighting factors and summed to result in an alternative score. The results of this scoring are presented on Table 11. The following summarizes the rationale used to assign scores for each factor.

Hydrologic Restoration – Alternatives 3, 4, and 5 include projects that address both the Eastern and Western Flow Ways and are therefore assigned the highest score. Alternatives 1 and 2 only address the Eastern Flow Way and therefore receive a moderate score.

Habitat Restoration – The means of habitat restoration is primarily through hydrologic restoration. Alternatives 3, 4, and 5 include projects that address both the Eastern and Western Flow Ways and are therefore assigned the highest score. Alternatives 1 and 2 only address the Eastern Flow Way and therefore receive a moderate score. Although Alternative 2 includes an additional project resulting directly in habitat restoration, the affected area of this project is relatively small.

Wildlife Use/ T&E Benefit – Wildlife use and T&E benefit scoring is generally similar to habitat restoration pending further evaluation of T&E species.

Flood Protection – Alternatives 3 and 5 include a continuous berm along the western and southern boundaries of the CWI Project area. This will provide opportunities for flood storage and therefore these alternatives receive the highest score. Although Alternatives 1, 2, and 4 may provide some benefit through the implemented water control structures, their use for flood control will be limited without a continuous berm.

Water Supply – Slowing water as it moves through the CWI Project area and placing it in storage should result in greater opportunity for aquifer recharge and therefore benefit water supply. In this regard, Alternatives 3 and 5 offer the greatest level of storage with a continuous berm to the west and south. Other alternatives may provide similar benefit but on a smaller, localized scale.

Construction Cost – Alternative 1 includes five, relatively straightforward projects and will likely be the least expensive. Alternative 1 therefore receives the highest score. Alternative 5 includes all projects and will likely be the most expensive. Alternative 5 therefore receives the lowest score. Costs for the remaining three will vary between Alternative 1 and Alternative 5 and therefore receive moderate scores.

Real Estate/ Ownership Score – Alternatives 1 and 2 do not require extensive real estate acquisition and therefore receive the highest score. Alternatives 3, 4, and 5 require real estate acquisition, in particular properties north of Kehl Canal. Alternatives 3, 4, and 5 receive the lowest score.

O&M Cost/Complexity – Alternatives 3 and 5 will involve O&M of a relatively long length of berm as well as several structures and therefore receive the lowest score. Alternative 4 does not include the extensive berm requiring O&M; however, there are a number of structures as well as berm improvements along Shady Hollow Boulevard and Kehl Canal, which will require O&M. Alternative 4 receives a moderate score. Alternative 1 and 2 include relatively fewer structures and lesser berm length requiring maintenance and therefore receive the highest score.

Permitting Complexity – Culvert repair and replacement is considered a maintenance activity and should qualify for state regulatory exemptions and/or federal nationwide permits. Environmental restoration the size and scope proposed for Projects 2 and 6 generally qualify for state general permits and federal nationwide permits. Therefore, Alternatives 1 and 2 received the highest score, although installation of adjustable weir gates and new weirs may require a higher level of permitting depending on the size and scope. An individual Environmental Resource Permit may be required to reduce impacts to neighboring properties. A federal Section 404 permit may be required based on the total acreage of wetland impacts. In addition, for alternatives involving work along Kehl Canal, a Section 408 authorization may be required from the U.S. Army Corps of Engineers, as a portion of this project overlaps with the Southern CREW Restoration Comprehensive Everglades Restoration Plan project. Accordingly, Alternatives 3, 4, and 5 received a score of 1.

Based on the analysis described above, Alternatives 1, 3, and 4 are recommended for more detailed analysis through modeling (see Table 11).

4.0 References

J-Tech. 2025a. Corkscrew Watershed Initiative - Deliverable 3.2: Final Project Performance Measures and Metrics Technical Memorandum. Prepared for the South Florida Water Management District.

J-Tech. 2025b. Corkscrew Watershed Initiative - Deliverable 6.1: Final CWI Short- and Long-Term Restoration Projects Technical Memorandum. Prepared for the South Florida Water Management District.

Table 11. Alternative Scoring

Alternative	Alternative Short Term vs. Long Term Components	Hydrologic Restoration	Hydrologic Restoration Score	Habitat Restoration	Habitat Restoration Score	Wildlife Use/T&E Benefits	Wildlife Use/T&E Benefits Score	Flood Protection	Flood Protection Score	Water Supply	Water Supply Score	Construction Cost	Construction Cost Score	Real Estate/Ownership	Real Estate/Ownership Score	O&M Cost/Complexity	O&M Cost Score	Permitting Complexity	Permitting Complexity Score	Total Score	Rank (Lower is Better)
Weight	-	-	3	-	3	-	2	-	1	-	1	-	2	-	2	-	2	-	1	-	-
Alt 1	Project 1 (short-term), Project 2 (short-term), Project 3 (short-term), Project 4 (long-term), Project 5 (long-term)	Moderate	1	Moderate	1	Moderate	1	No change	1	Increase	1	Low	2	Land Owned	2	Low	2	Low	2	24	1
Alt 2	Project 1 (short-term), Project 2 (short-term), Project 3 (short-term), Project 4 (long-term), Project 5 (long-term), Project 6 (short-term)	Moderate	1	Moderate	1	Moderate	1	No change	1	No change	1	Moderate	1	Land Owned	2	Low	2	Low	2	22	4
Alt 3	Project 2 (short-term), Project 3 (short-term), Project 4 (long-term), Project 5 (long-term), Project 9 (long-term)	High	2	High	2	High	2	Increase	2	Increase	2	Moderate	1	Extensive Acquisition	0	High	0	Moderate	1	23	2
Alt 4	Project 1 (short-term), Project 2 (short-term), Project 3 (short-term), Project 4 (long-term), Project 5 (long-term), Project 6 (short-term), Project 7 (short-term), Project 8 (long-term)	High	2	High	2	High	2	No change	1	No change	1	Moderate	1	Extensive Acquisition	0	Moderate	1	Moderate	1	23	2
Alt 5	Project 1 (short-term), Project 2 (short-term), Project 3 (short-term), Project 4 (long-term), Project 5 (long-term), Project 6 (short-term), Project 7 (short-term), Project 8 (long-term), Project 9 (long-term)	High	2	High	2	High	2	Increase	2	Increase	2	High	0	Extensive Acquisition	0	High	0	Moderate	1	21	5