Midwest Glacial Lakes Fish Habitat Partnership

2025 Lake Conservation Grant Application

Contact information

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Project title

Acre-for-acre Restoration of Lake Hydrology and Pike Spawning Habitat for the 1,075-acre Cedar Lake (Iosco/Alcona Counties, MI)

Project summary

Cedar Lake is a 1,050-acre, glacial lake situated north of Saginaw Bay in Alcona and Iosco Counties. This 5-mile long, 0.5-mile wide, shallow (<5ft average depth) lake is connected to nearby Lake Huron by an intermittent stream through an outlet structure at the north end of the lake. To the northwest, the 3,300-acre watershed is adjacent to only 30% of the shoreline; the remainder of the lake's shoreline loses water year-round. Only two small drainage pathways intermittently deliver surface water to the lake from this watershed; Sherman Creek to the south, and Jones Ditch to the north.

Comprised mostly of wetlands, watershed connections were disrupted in the 1970s with roadway drainage infrastructure. Since good record-keeping began in 2004, documented lake levels have dropped as much as 28 inches in late summer months because of these historic modifications. Comprehensive lake level and watershed hydrology monitoring since 2004 has shown that these hydrology disruptions with the watershed subject the lake to significant evaporative losses, particularly during dry summers when surface flows are limited. These are now targeted in a 2011 Watershed Management Plan; Sherman Creek efforts are complete; Jones Ditch is targeted here.

Michigan Department of Natural Resources (MDNR) fisheries studies in 1970, 1982, 1990 1999, and 2011 indicate that the Cedar Lake fishery is comprised of a diverse panfish community with a predator population of bass, walleye, and northern pike, and an unprolific population of non-game fish. MDNR concluded that although diverse, the fisheries of Cedar Lake are limited by water depth, warm summer temperatures, and isolation from historically connected adjacent wetlands (Cwalinski, 2020).

Geographic location

Lake Name	State	Lake MGLP ID*	Latitude (decimal degrees)	Longitude (decimal degrees)
Cedar Lake	*MI*	*North: MIlnocq83358* *South: MIlnocq83359*	*44.522648*	*-83.334223*

*MGLP IDs for most lakes are available at the MGLP Conservation Planner. For eligible lakes without an MGLP ID, this field can be skipped.

Ceded Territory

Not Applicable

Relevant State, Tribal, or Federal agencies

☐ 1854 Treaty Authority	☐ Ohio Department of Natural Resources
☐ 1855 Treaty Authority	☐ South Dakota Game, Fish and Parks
☐ Illinois Department of Natural Resources	☐ Wisconsin Department of Natural Resources
☐ Indiana Department of Natural Resources	☐ U.S. Fish and Wildlife Service
☐ Inter-Tribal Council of Michigan	☐ U.S. Forest Service
☐ Iowa Department of Natural Resources	☐ U.S. Park Service
☐ Great Lakes Indian Fish and Wildlife Commission	☐ U.S. Bureau of Reclamation
☒ Michigan Department of Natural Resources	☐ U.S. Bureau of Land Management
☐ Minnesota Department of Natural Resources	☐ Other tribal management: (Please list)
☐ North Dakota Game & Fish Department	

Sponsoring biologist

Name:	Matthew M. Klungle
Telephone:	Senior Fisheries Biologist, Northern Lake Huron Management Unit, MDNR
Email:	klunglem1@michigan.gov

Statement of need

Perhaps one of the most extensively monitored inland lakes in Michigan, Cedar Lake suffers from shallow water, historic hydraulic diversions from the watershed, and dramatic lake level fluctuations as a result. Monitoring has identified that relatively small but impactful culvert placement and modifications have dramatically impaired lake level stability. Such studies have also identified simple restoration options to fully

restore wetland hydrology with the lake. For the two inflowing streams, Sherman Creek, has been completed; Jones Ditch remains with no spawning habitat access to nearly 1,019 wetland acres that otherwise have limited connectivity to the lake.

Ecological restoration objectives for Jones Ditch require: 1) channel restoration of 200 lineal feet at the terminus of the ditch to the lake, and; replacement of two upstream culverts along an active rail line that splits 1,305 acres of the Jones Ditch drainage to Cedar Lake. Funding is requested herein for Phase I and II (Phase I downstream channel habitat connectivity and Phase II conceptual plan development for railroad culvert improvements). The latter would be a separately funded Phase III. Work on active rail lines is often considered an intractable barrier to stream and wetlands hydraulic restoration was well as for re-establishing ecological connectedness.

This perceived barrier is highly relevant. It is estimated that over 94,000 road-related aquatic barriers exist throughout the state of Michigan; only 3,606 such culverts have been inventoried (SARP, n.d). A smaller proportion (0.3%) of inventoried culverts are associated with railroad crossings, despite there being over 2,000 railroad-stream crossings throughout the state (Esri, 2023). These estimations not only display a lack of culvert inventory throughout the state, but also the need for access associated with railroad culvert restoration. This project will collaboratively work with the railroad to determine how barriers can be strategically overcome at Cedar Lake and beyond.

Proposed benefits

- Phase I will provide 200 lineal feet of restored Jones Ditch channel including pools/riffles, grade structures and removal of lake access encumbrances (beaver dams) accommodating high flow, spring-time velocities of <3 ft/second
- Phase I channel restoration will provide ecological connection, principally targeting pike spawning access, to 473 wetland acres within the 525 acres of Jones Ditch drainage between W. Cedar Lake Road and the LSRC rail line to the west
- Associated Phase I flow enhancements will naturalize drainage pathways and help stabilize lake levels to protect shallow lake habitat during late-summer/early fall conditions
- Phase II collaboration with LSRC will produce conceptual designs that when constructed (requiring additional funding), will open up another 546 acres of connected wetland habitat west of the railroad line which now precludes connectivity and free flow of accumulated rainfall to the lake
- A Phase II process to work with active railway authorities to more easily assess and eliminate fish passage barriers in the region along transportation corridors that otherwise get dismissed because of access restrictions and potential construction challenges
- Monitor fish passage, restored channel velocity, flow improvements and lake levels before and after construction by utilizing a complex array of existing lake level gauging in the lake and watershed, along with spawning season fish passage observations, and detailed aquatic vegetation surveys of the lake
- Increased property values, recreational fishing interests, stabilized lake levels for increased recreation and tourism are expected to benefit the local economy
- Potential avoidance of multi-million $ augmentation wells to help maintain lake levels

Public fishing access

☐ Provides new or increased public access

☐ Intermittent or occasional public access

X Maintains current public access

☐ Does not provide public access

Brief description of public access

Along the eastern shoreline of Cedar Lake, there is one public boat launch. The boat launch is located at the terminus of Lake-To-Lake Road and is maintained and operated by the Michigan Department of Natural Resources (MDNR). The launch consists of a hard-surfaced ramp and skid pier. There are no posted limitations to size or type of watercraft that users can put in at the launch, although MDNR warns that limited water depths may complicate the retrieval of larger watercraft. The parking area is unpaved and has the capacity for 26 parked vehicles. To maintain the integrity of the boat ramp, MDNR has posted signs prohibiting power loading and requiring idle boat speeds when approaching the site. There is also a posted factsheet warning lake users to avoid contact with foam, which may contain the harmful contaminant per- and poly-fluoroalkyl substances (PFAS). There are two unimproved public road ends used to launch boats on the east side of the lake.

Brief description of recreational and/or subsistence fishing opportunities

Recreational fishing is popular among Cedar Lake residents and the general public who can access the lake via a boat launch operated by the MDNR. The lake supports a diverse warm-water fishery that is dominated by bluegill (*Lepomis macrochirus)*, rock bass (*Ambloplites rupestris),* and yellow perch (*Perca flavescens*). Cedar Lake is routinely stocked with walleye (*Sander vitreus*) by MDNR, making walleye, along with native northern Pike (*Esox Lucius*), the dominant predatory species of the fish community. Maintaining a healthy and sustainable fish population is of high priority for the Cedar Lake Improvement Board (CLIB) under the EPA-approved 2011 Watershed Management Plan (WMP) (www.cedarlakewmp.net). The Board has regularly funded surveys to characterize and document the condition of the aquatic plant community, and periodically for the fishery. In 2008, Aquest Corp. and Superior Environmental and Aquatic Services, LLC (SEAS) conducted a creel census under contract with the Lake Board. Results from the angler surveys indicated that most fishing occurs north of the causeway, which supports better aquatic vegetative structure. The report additionally concluded that anglers caught an average of 2.5 fish/hour and angling selectivity for fish species was generally evenly distributed. While recreational fishing on Cedar Lake is common, angling pressure remains low, with the capacity to support more anglers if the diverse gamefish community continues to be conserved and restored.

Species targeted for conservation

- Northern pike (*Esox lucius*)
- Largemouth bass (*Micropterus salmoides salmoides*)
- Yellow perch (*Perca flavescens*)

Each species has historically been found in Cedar Lake and are known to utilize wetlands for food source, spawning grounds, and nurseries with pike using wetlands as refuge even in mature life stages (NOAA, 2001).

Other species benefitting from conservation

- Yellow bullhead (*Ameiurus natalis*)
- Bluegill (*Lepomis macrochirus)*

While not frequent, both species have been known to utilize wetlands for food source, spawning grounds, and nurseries (NOAA, 2001).

State the problem and the specific cause of the problem to be addressed by the project

One-third of the Cedar Lake watershed surface flows associated with Jones Ditch have been impeded by historic infrastructure changes and thus, do not provide responsive hydrological and ecological needs for the lake. A recent Road Commission culvert replacement under W. Cedar Lake Road on Jones Ditch revealed how dramatic hydrology improvements can be with full restoration. Wet weather drainage flows are now nearly three orders of magnitude greater than with the previous smaller, perched road culvert.

The culvert replacement provided hydrologic reconnection with 525 acres of the 1,305 Jones Creek drainage (with 473 of these reconnected acres being contiguous wetlands). It provided nothing, however, for habitat connectivity between these upstream wetlands and the lake because of the remaining degraded condition of Jones Creek at the Cedar Lake shoreline. This highly-incised channel causes spring-time channel velocities to exceed 5 ft/second, creating a physical barrier to pike passage.

Moreover, two drainage culverts under and active railroad line owned by Lake State Railway Company (LSRC) remain major barriers to flow from the remaining 780 acres of the 1,305-acre Jones Ditch drainage west of these tracks. The dilapidated, 50+ year-old railroad culverts also prevent fish migration opportunities to reach the other 546 acres of contiguous wetlands west of the tracks. Spring-time velocities through these railroad culverts are estimated at >5 ft/second.

Restoring full hydrologic connectively of these 1,305 acres of Jones Ditch drainage is necessary to stabilize summer-time water levels for recreation and fish habitat.

State the objective(s) of the project with reference to the problem

The objectives of this project are as follows (in SMART format):

Specific - Restore natural wetland water levels and downstream channel morphology that will allow pike spawning habitat connection to upstream wetlands. Downstream channel restoration will include physical implementation of Rosgen in-stream grade structures for pools and riffles, native riparian vegetation, fallen tree obstruction removal, and removal of tailwater impediments created by beavers. Recent W. Cedar Lake Road Culvert replacement restored some Jones Ditch flows, and reduced spring-time velocities under the roadway back below <3 ft/second. This makes downstream channel restoration essential for any upstream ecological reconnections.

Measurable - Two specific approaches will be used to measure direct improvements and outcomes associated with the project: 1) We will utilize the existing network of wetland level loggers to compare pre/post implementation conditions with wetland water elevations and flows to Cedar Lake, and; 2) we will conduct

instream pre/post implementation monitoring to document observed improvements and outcomes associated with retention and survival of fry during the entire spring season.

Attainable - Based upon feasibility studies conducted during the EPA-approved WMP process, subsequent monitoring, and critical land purchases by the CLIB, these efforts are attainable and will result in further progress toward goals set forth by local units of government and local residents that participated in the WMP process.

Realistic - The efforts proposed herein are part of an EPA-approved WMP and reflect the desires of the Cedar Lake watershed community and local regulators.

Time bound - These efforts can be accomplished within an 18-month period because all topographic information and/or boundary surveys have been completed for the Jones Ditch wetland and CLIB property.

State the methods used to accomplish the objective(s)

The project will be implemented through the following Tasks 1-8 as follows:

1. Phase I Site Design, Permitting, Bidding, Construction, & Oversight
Methods to accomplish this task will include engineering and ecological planning, design, and physical implementation to protect, rehabilitate, and improve fish passage and naturalized Jones Ditch flows at its terminus. Engineering and hydraulics modeling by K&A will underpin designs to ensure necessary flow and habitat conditions. All efforts will require CLIB reviews, and EGLE permitting. We expect opportunities to work with and share early Jones Ditch designs with MNDR fisheries staff. Construction will be overseen by K&A.

2. Phase II Conceptual Design, CLIB/LSRC Coordination
CLIB and K&A staff will work with the LSRC to identify legal access needs to inspect the two culverts in the drainage. Joint field inspections will be conducted. K&A engineers will work with LSRC staff to discuss culvert conditions, maintenance operations, capital improvement schedules, potential design options and workable replacement schedules given active rail use. We anticipate up to six in-person/remote work sessions.

3. Fisheries Monitoring, Data Analysis and DNR Collaboration
Successful accomplishment of stated project objectives will include pre- and post-implementation monitoring of fish habitat and water level conditions associated with Task 1 efforts. Pre/post-implementation monitoring of pike spawning conditions will be conducted by K&A. Efforts associated with Jones Ditch passage will follow those conducted previously by former MDNR staffer, Mr. Steve Sendek in his 2018 report to the CLIB. Methods will also reflect those of the SEAS 2008 pike spawning studies; both previous efforts for Sherman Creek.

4. Lake and Wetland Habitat Monitoring/Analysis/Controls
Pre/post surface water levels will be examined using the existing network of wetland level loggers, collecting hourly data to compare pre/post implementation conditions of wetland water elevations and flows to Cedar Lake. Lake water levels will also be recorded along with local precipitation. Options will include new wetland water level measurement instrumentation at the railroad culverts as part of the broader CLIB network. Loggers continuously monitor groundwater/surface water levels; data are collected and analyzed annually by K&A. Aquatic vegetation monitoring results will be reviewed to examine in-like habitat conditions in anticipated response to improved fish passage at Jones Ditch.

5. Railroad Crossing Coordination Protocol
Discussion of access requirements will be approached with various considerations and constraints for future interactions. Discussions will focus on 1.5 miles of railroad through the Jones Ditch drainage, recognizing that LSRC maintains over 340 miles of railway in Michigan. LSRC has committed to support these project efforts. K&A will develop a scalable protocol for other watershed managers to remove fears of approaching seemingly unapproachable transportation entities.

6. WMP Updates and Outreach
Actions taken under this project will have significant interplay with the 2011 WMP currently being updated. Expected outcomes will importantly identify whether a multi-million $ lake level augmentation project will be necessary to help stabilize late summer later levels. A steering committee for the ongoing updates will be engaged in project meetings at the local level.

7. Lake Association Annual In-person Planning Meetings
K&A will present project findings to the Alcona/Iosco Cedar Lake Association annual meetings during the course of the project. The association involves direct riparian engagement, vs. a 5-member lake improvement board. Interest is expected to be monumental amongst the over 700 lake residents.

8. Final Project Reporting and Closeout.
We expect that project implementation will result in clear and quantifiable outcomes to demonstrate the direct effects of improvements. Reporting efforts will reflect these quantifiable outcomes and identify potential future O&M needs.

Conservation actions taken Choose all that apply.

- x Reconnect aquatic habitat
- ☐ Reduce nutrient loading
- ☐ Reduce sediment loading
- ☐ Rehabilitate or restore sediment transport
- x Remove fish barrier(s)
- x Protect healthy habitat
- x Rehabilitate or restore natural variability in river and stream flows
- x Rehabilitate or restore natural variability in water surface elevations in natural lakes
- ☐ Control/eradicate invasive species
- x Protect, rehabilitate or improve physical fish habitat (woody habitat, lunker structures, etc.)
- x Outreach and education to 700 (please estimate total audience size)
- ☐ Conservation planning assessment
- x Other, explain: protocol development to assist other conservation agencies in successfully engaging active railroad owners/agencies to collaborate on identifying/improving fish passage barriers

MGLP Strategic Plan objectives.

- *Objective:* 1. Implement fish habitat conservation projects.
    - 1.1 Protect watersheds to protect Midwest glacial lake fish habitats in member states
        - *Outcome 1.1.1.* Maintain production, diversity, and resilience of glacial lake fish populations in one lake watershed
    - 1.2. Restore Midwest glacial lake fish habitats in member states
        - *Output 1.2.2*. Improve the condition of one lake by restoring at least one ecosystem process within a lake to an intact condition within each member state.
            - *Outcome 1.2.3*. Improve production, diversity, and resilience of glacial lake fish populations in one lake.
- *Objective:* 2. Conduct ecological assessments of Midwest glacial lake habitats
    - 2.5. Improve understanding of fish – habitat relationships in Midwest Glacial lakes
        - *Output 2.5.7*. Evaluate habitat conservation project impacts to fish production, diversity, and resilience.

Explain how the project aligns with the relevant lake management plan(s) or the management guidelines provided by the MGLP Conservation Planner (if no lake management plans exist)

This project closely aligns with multiple goals set forth in the EPA-approved Cedar Lake Watershed Management Plan (WMP) (K&A, 2011). The first goal in the WMP calls for restoration and protection of the warm-water fishery, which will be addressed through the hydrologic restoration and reconnection to 1,019 acres of contiguous wetland area. This reconnection will increase the habitat availability for a variety of glacial lake species that rely on wetland ecosystem services for food sources, nurseries, spawning grounds, and refuge. This reconnection additionally aligns with WMP goals 2 and 7 which call for maintenance of balanced aquatic plant and wildlife communities, and the conservation and restoration of wetland habitat for ecosystem function and service, respectively.

Not only will the proposed project benefit the aquatic plant and wildlife communities of Cedar Lake, the enhanced culverts will also eventually improve and naturalize 1,305 acres of drainage to the lake, which will in-turn help stabilize lake levels. This aspect of the project aligns with WMP goal 6 which calls for the maintenance of the legal lake level by protecting recharge sources and surface water inputs.

Other conservation plans

Not Applicable

National Fish Habitat Partnership National Conservation Priorities addressed

X	Conserve waters and habitats where all processes and functions are operating within their expected range or natural variation
X	Conserve hydrologic conditions for fish.
X	Conserve physical and living habitats and features that support viable and sustainable species and/or populations in impacted or at-risk systems.
X	Reconnect fragmented fish habitats.

☐	Conserve water quality for fish.
☐	Support the structure and function of Fish Habitat Partnerships.
X	Enhance recreational, commercial, subsistence, and traditional fishing opportunities when conducting projects that conserve fish habitat.

How long are the benefits of the project expected to last and how will those benefits be sustained over time?

The CLIB purchased the 12-acre Jones Ditch channel/wetland property in 2022. This ownership addresses a critical need to steward channel improvements necessary to ecologically connect over 1,000 acres of wetland habitat to the lake. A 10-year SAD initiated in 2020 by the CLIB will serve to safeguard needs for post-construction stabilization and riparian naturalization. A CLIB 5-year contract with K&A extending to 2027 across the period of project performance and beyond will provide continuity for monitoring and maintenance needs identification. The contractor ultimately hired to conduct lakeshore channel restoration will be required to warranty work for 1-year post-construction.

Will the project address the effects of climate change on inland lakes and if so, how does it resist, adapt, or direct change within the lake?

This project enables species in Cedar Lake to resist the impacts of climate change. Cedar Lake ranges from medium to high climate vulnerability, which threatens to limit habitat availability for fish populations, including northern pike (*Esox Lucius*). Reconnecting over 1,300 acres of wetland drainage offers a summer resupply of cool water, effectively safeguarding aquatic communities from negative impacts associated with increasing water temperatures. The reconnection will also maintain higher and less variable water levels which will ensure the sustainable longevity of native plant and fish communities that may otherwise experience reductions in suitable habitat due to water level fluctuations.

Project completion Can this project be completed within two years of a contract being initiated?

Yes. The proposed schedule is as follows.

	2025										2026								
Task	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**
1. Phase I Site Design, Permitting, Bidding, Construction, & Oversight																			
2. Phase II Conceptual Design, CLIB/LSRC coordination																			
3. Fisheries Monitoring, Data Analysis and DNR Collaboration	*	*	*										*	*	*				
4. Lake and Wetland Habitat Monitoring/Analysis/Controls																			
5. Railroad Crossing Coordination Protocol																			
6. WMP updates and outreach																			
7. Lake Association Annual In-person Planning Meetings																			
8. Final Project Reporting and Closeout																			
*** Spring pipe spawn monitoring**																			

Project metrics Please complete the metrics table the Excel document available on the MGLP website.

(See separate budget template)

Expected outcomes

We highlight here, the high level expectations with this project:

- Aquatic connectivity removing the Jones Ditch lower channel barrier to over 1,000 potential acres of wetlands (enhancing habitat availability for minimally 473 wetland acres immediately upstream of W. Cedar Lake Road with the potential connection to more with railroad culvert replacement)
- All riparian areas adjacent to the 200 feet of Jones Ditch reconstruction will receive native seeding
- Development of a volunteer fish passage monitoring program, supplemented with remote observation monitoring
- Other project accomplishments will include a new protocol for other watershed managers to engage with active railroad operations for access and potential fish passage improvements through collaborative exchange and protocol testing with the LSRC

Monitoring and evaluation

Methods for documenting pike spawning conditions under Task 3 will include direct monitoring of the critical fish passage over existing conditions. This would include volunteer monitoring to record pike passage in March over a 24-hour period, and stationary video monitoring with infrared capabilities for extended periods. Similar observations would begin in May. These efforts would be conducted in early 2025 before Jones Ditch reconstruction, then again in 2026 post-construction. If pike ingress is observed, up to three monitoring stations moving into the wetlands will be established for volunteer monitoring.

Pre/post surface water levels will be examined (collecting hourly data) using the existing network of wetland level loggers. Lake and wetland water levels, as well as temperature will be recorded along with local precipitation from late winter through summer conditions in the wetlands to better understand these physical conditions and potential changes with improved hydrology.

Evaluation of these monitoring efforts toward stated objectives will be based on:

- Quantifying changes in pike utilizing this habitat for spawning based on consistent, seasonally appropriate fisheries monitoring
- Quantifying changes in surface and groundwater levels in Jones Ditch and the adjacent wetland habitat based on constant, automated water level monitoring
- Regular internal audits to assure progress toward objectives within the specified budget and timeframe
- Local economic benefits (increased property values, recreational fishing interests, stabilized lake levels for increased recreation and tourism), also to be part of the long-term evaluation of implementation projects via future Cedar Lake WMP update processes

Timeline for monitoring and evaluation

Annually, K&A produces for the CLIB aquatic vegetation assessment reports, and a hydrology report. The Jones Ditch project efforts will be documented in a Technical Memorandum and included in the annual hydrology report (Task 5) for 2025, that typically becomes publicly available by March of the following year. That would mean Jones Ditch restoration documentation will be available by early 2026. A stand-alone Technical Memorandum for Task 3 monitoring would be available by July of 2026. The railroad access protocol (Task 5) would be completed and distributed by September 2026 coinciding with the Closeout Report (Task 8).

Metrics Please add one or more project accomplishment metrics to the Project Metrics tab of the Budget and Monitoring Template (available on the MGLP website).

(See separate budget template)

Adaptive management strategies

If project objectives are not being met based on monitoring, there are multiple forms of adaptive management that will be considered to ensure timely project modifications and course correction. For Jones Ditch, if monitoring indicates that fish are not using the improved connection after ditch restoration, data on velocity, flow, potential blockages, and water depth through and above the project area will be surveyed and documented. Based on these data, potential causes of sub-optimal conditions will be identified, and engineered modifications to the channel design developed and implemented. Experience and methods used for other creek enhancements in the area can be drawn upon to ensure that the project design meets management objectives. Throughout the project timeline, communication efforts between the project engineer and contractor will remain a high priority to ensure project designs are implemented accurately before any alterations need to occur.

Phase II assumes both railway culverts may need replacement to meet objectives. If planned monitoring does not clearly define these needs, modeling analyses will supplement these considerations to determine if, e.g., one culvert replacement can meet project objectives. The robust hydrological data routinely taken at Cedar Lake, routine lake vegetation surveying, and the proposed monitoring strategies presented in this proposal will allow for early identification of project needs that are not being met, which will allow for rapid project adaption at any stage.

Education and outreach

Public engagement will include, but not be limited to:

- Post-construction site tours for agency staff
- Public invitation for volunteer fish passage monitoring
- Post-construction joint ribbon cutting ceremony with the CLIB, partners and participating local and state agencies as a media splash
- Contractor-required project signage during and after construction

Education information and related efforts will target:

- Educational pamphlets for the AICLA
- Up to two lay updates in their monthly newsletter
- AICLA-only invitations for pre- and post-construction site visits (though with limited numbers)

Such timing for this AICLA engagement will be excellent with the expected WMP update being completed in 2025, and high expectations by riparians to see tangible progress on targeted/new management strategies.

Some caution is deemed appropriate around outreach for on-site promotions that could lead to poaching during spring pike runs. This consideration will be discussed with MDNR for strategic outreach. We anticipate enhanced communications opportunities here through MDNR participation on the reconstituted WMP steering committee in 2024 and 2025.

Results dissemination

Information gathered during this project will be synthesized into various report formats and documentation as laid out with tasks in the Methods section of this proposal. All technical reports by CLIB consultants including results, analyses and documentation are posted on the lake's website, www.cedarlakewmp.net. Project documentation will be posted here as well. Such information on recent Sherman Creek projects are fully accessible in this manner including design documents. Portions of video documentation of fish passage will be made web available, though size will likely be limiting for full posting. Drone documentation of Jones Ditch improvements will be considered.

K&A also periodically presents at the annual Michigan Lakes and Streams conference. Last year's joint presentation was with CLIB chair, Rex Vaughn on historic Cedar Lake management actions. A lay article for the companion Riparian magazine will be drafted and submitted for consideration. This venue and other Midwest conference opportunities will be considered for similar dissemination.

The railroad access protocol with be jointly disseminated with LSRC if they so desire. We would expect this product to be promoted through the MWGLP, state agencies and watershed organizations.

Project team.

Rex Vaughn, Chair, Cedar Lake Improvement Board since 2013. Rex is a retired engineer with a Bachelor's Degree from the University of Michigan. He is intimately familiar with the workings of the Improvement Board, and serves on the Board of Michigan Lakes & Streams. Rex owns on cottage on the lake, and engages in all technical activities.

Mark Kieser, Senior Scientist (BS, MS); 19 years on Cedar Lake: Role-Project Director. Mr. Kieser has 40 years of water resources management experience in the Great Lakes. He is Project Director for all K&A activities on Cedar Lake. He has published and presented on challenges and successes through his years of technical management on the lake.

John Jacobson, PE, Senior Engineer (BS, MA); 6 years on Cedar Lake: Role-Lead Engineer. John has overseen and implemented designs for all engineered structures on Cedar Lake and others since joining K&A in 2018. He has over 40 year of civil and engineering design experience. John has an intimidate practical knowledge of infrastructure hydraulics.

Mike Foster, Environmental Engineer (BS, MS), 6 years on Cedar Lake: Role-Hydraulics Engineer. Mike has conducted extensive analyses and modeling of Cedar Lake hydrology. He has greatly advanced our understanding of the key factors driving lake level fluctuations by sorting through fact versus conjecture.

Doug Pullman, Senior Ecological Advisor (BA, MS, PhD); 24 years on Cedar Lake: Role-Ecological Advisor. Doug has served as the Lake Manager through his Aquest Corporation till he joined K&A in 2023. Doug supervises all ecological and plant management applications on Cedar Lake and co-led the 2008 SEAS monitoring of pike spawning in Sherman Creek. He has been a leader in aquatic plant management throughout the U.S. for 40 years.

Necessary authorizations

A local Soil & Erosion control permit for the Jones Ditch efforts, along with a EGLE wetlands joint permit application are necessary. The railroad will require a signed access agreement to be on their railroad property. A

trapping permit will also be needed for any removals near the lakeshore. A permit from the Road Commission will be secured for channel work in their right-of-way.

Funding request

MGLP Funding Request:		**$84,310**
Total Partner Match:	**In-kind**	**$10,000**
	Funding	**$116,778**
Project Total (including match): $		**$211,088**

If the project is scalable, please state the minimum amount of funding that you would be able to accept and still complete a substantially similar project.

For all aspects of the currently proposed project including match, $210,000. Without Tasks 2 and 5 regarding railroad engagement, $195,000.

Budget

See Budget Template, and the following narrative.

Notably, the CLIB is not seeking any remuneration for the administration of, and participation in this project. Though Mr. Vaughn's support time will not be trivial, the CLIB is otherwise providing matching funds through their currently contracted and anticipated payment of services to K&A and lake applicator. Such services will directly support project objectives for fish habitat connectivity, naturalizing flows, and protecting in-lake habitat through AIS controls. This matching fund commitment is specific to anticipated work during the project period. K&A is also committing $10,000 for innovative fisheries monitoring applications that will bolster Task 3 outcomes.

These match contributions by proposed task as follows. They include corresponding annual cost commitments representing specific 5-year contract K&A work scope elements for both Lake Manager (aquatic vegetation management consulting) and Engineering Consulting (lake and watershed hydrology). Approximately 40% of the annual CLIB investment in AIS controls (i.e., $18,000) for SOLitude Lake Management (as the applicator) is included here under the Task 4 match for the project period.

	Match		
Task Description	**CLIB**	**K&A**	**Line Item Subtotals**
1. Phase I Site Design, Permitting, Bidding, Construction, & Oversight	$ 34,166		$ 34,166
2. Phase II Conceptual Design, CLIB/LSRC coordination			$ -
3. Fisheries Monitoring, Data Analysis and DNR Collaboration (partial match)	$ 15,959	$ 10,000	$ 25,959
4. Lake and Wetland Habitat Monitoring/Analysis/Controls (match)	$ 61,357		$ 61,357
5. Railroad Crossing Coordination Protocol			$ -
6. WMP updates and outreach (match)	$ 5,296		$ 5,296
7. Lake Association Annual In-person Planning Meetings (match)			$ -
8. Final Project Reporting and Closeout			$ -
Subtotals/**TOTAL**	$ 116,778	$ 10,000	**$ 126,778**

The following table is a breakout of anticipated grant-funded costs for K&A efforts by task, including the Jones Ditch channel construction estimate, and ancillary direct costs for K&A travel to and from Cedar Lake from Kalamazoo.

	K&A Staff Time															
	Senior Scientist		Senior Engineer, P.E.		Envir. Engineer		Senior Ecological Adv.		Project Scientist IV		Field Technician				Estimated Phase I	
Task Description	Hours	($210/hr)	Hours	($165/hr)	Hours	($115/hr)	Hours	($110/hr)	Hours	($75/hr)	Hours	($60/hr)	Staff Total $s	Direct Costs ($)	Construction Costs ($)	Grant Subtotals ($)
1. Phase I Site Design, Permitting, Bidding, Construction, & Oversight	8.0	1,680	32.0	5,280	12.0	1,380	6.0	660	36.0	2,700	16.0	960	12,660	1,600	42,600	56,860
2. Phase II Conceptual Design, CLIB/LSRC coordination	4.0	840	24.0	3,960	12.0	1,380	0.0	0	0.0	0	0.0	0	6,180			6,180
3. Fisheries Monitoring, Data Analysis and DNR Collaboration	4.0	840	4.0	660	8.0	920	4.0	440	80.0	6,000	40.0	2,400	11,260	1,200		12,460
4. Lake and Wetland Habitat Monitoring/Analysis/Controls	0.0	0	0.0	0	4.0	460	0.0	0	8.0	600	0.0	0	1,060			1,060
5. Railroad Crossing Coordination Protocol	8.0	1,680	8.0	1,320	8.0	920	0.0	0	24.0	1,800	0.0	0	5,720			5,720
6. WMP updates and outreach	0.0	0	0.0	0	0.0	0	0.0	0	12.0	900	0.0	0	900			900
7. Lake Association Annual In-person Planning Meetings	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0			0
8. Final Project Reporting and Closeout	2.0	420	2.0	330	2.0	230	0.0	0	2.0	150	0.0	0	1,130			1,130
Subtotals/TOTAL	26.0	5,460	70.0	11,550	46.0	5,290	10.0	1,100	162.0	12,150	56.0	3,360	38,910	2,800	42,600	84,310

Though Phase III construction of railroad culvert replacements is not included in this proposal, we note here our engineer's current estimate for replacing just one of the two culverts for perspective.

Cedar Lake - Probable Construction cost to replace one railroad culvert			
Mobilization and logistics		LS	$ 15,000.00
Rail removal and work area preparation		LS	$ 5,000.00
Shoring and Cofferdam installation and removal		LS	$ 40,000.00
Dewatering of excavation (local pumping)		LS	$ 10,000.00
Culvert installation and backfill (50' of 36" estimates)		LS	$ 37,500.00
Rail bed replacement and refurbishment		LS	$ 10,000.00
Rail replacement and site cleanup		LS	$ 8,000.00
		Subtotal=	$ 125,500.00
	15%	Contingency=	$ 18,825.00
		Permits=	$ 15,000.00
		Engineering and Coordination=	$ 28,678.50
		Probable Project Costs=	$ 188,003.50

Contributing partners

Partner name	**Partner location** (City, State)	**Partner description** (Non-profit, For-profit, Tribal, Local, State, or Federal government, or Other)	**Status** (Secured, applied for, or intend to apply)	**Federal or federally tied funds** (Yes/No)	**Cash**	**In-kind**	**Total**
Cedar Lake Improvement Board – Project Administration, Technical Participation, Outreach	*Greenbush Township, MI*	*Local Unit of Government*	*Secured*	*No*	*$116,778*		*$116,778*
Kieser & Associates, LLC -	*Kalamazoo, MI*	*For-profit*	*Secured*	*No*		*$10,000*	*$10,000*

permitting, construction plans/specs, contractor bids, construction oversight, grant admin/reporting, project mngt							
Construction Contractor (TBD) - Rosgen instream grade control structures, fish passage structures and fish habitat structures for Jones Ditch	*TBD*	*For-profit*	*N/A*				
Lake State Railway Company	*Saginaw, MI*	*For-profit*	*(See separate letter of commit-ment)*				
Total						$10,000	$126,778

Note: Please try to account for all proposed partners and their cash and in-kind contributions. Remember, in-kind contributions can add a significant amount to partner match and make your project more competitive, so please consider all contributions made to the project effort and convert those into in-kind matching dollars.

Photographs of project area

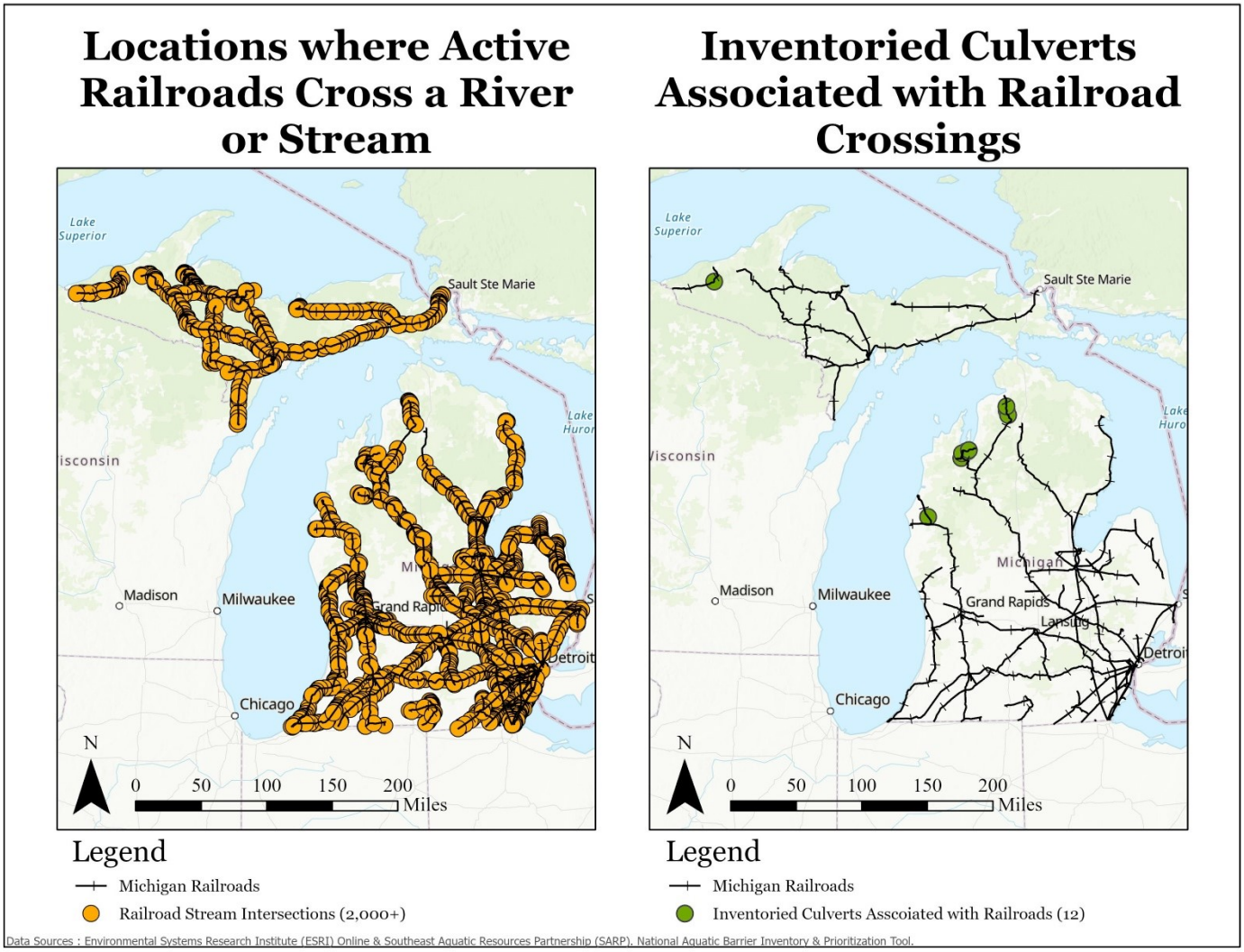
(Provided as separate files with the submission email.)

☒ **The applicants give the MGLP permission to use the files listed below in communications and reporting (required).**

File name	Credit
Acre-for-Acre Cedar Lake Jones Creek Ditch looking upstream from lake	John Jacobson, K&A
Acre-for-Acre Cedar Lake W Cedar Lk Rd Culvert - east end	John Jacobson, K&A
Acre-for-Acre Cedar Lake W Cedar Lk Rd Culvert - west end	John Jacobson, K&A
Acre-for-Acre Cedar Lake Site Map	Mike Foster, K&A

Optional State any additional information describing the importance of this project.

Barriers working with railroad corridors are replete in the literature. In Michigan, it is clear from the following K&A data compilation, that addressing associated hydrological and ecological connectivity is, and may remain illusive. We find this a compelling opportunity to engage a private railway company with over 340 miles of rail in southern Michigan to discover how to overcome real or perceived barriers with this transportation sector. The Lake State Railway Company is committed to working with the CLIB team on this project. Thus, it would behoove us as potential grant recipients, to share learnings.



SUPPLEMENTAL INFORMATION

K&A provides the following information to supplement this grant submission. Figure 1 below identifies the areas flown for a drone topographic survey of the Jones Ditch wetlands in late 2022. (Pink lines are 5-foot contours.) This mapping provides us with finite details to carefully assess hydrologic responses and subsequent wetland habitat conditions as replacement of culverts in Phase II are considered.

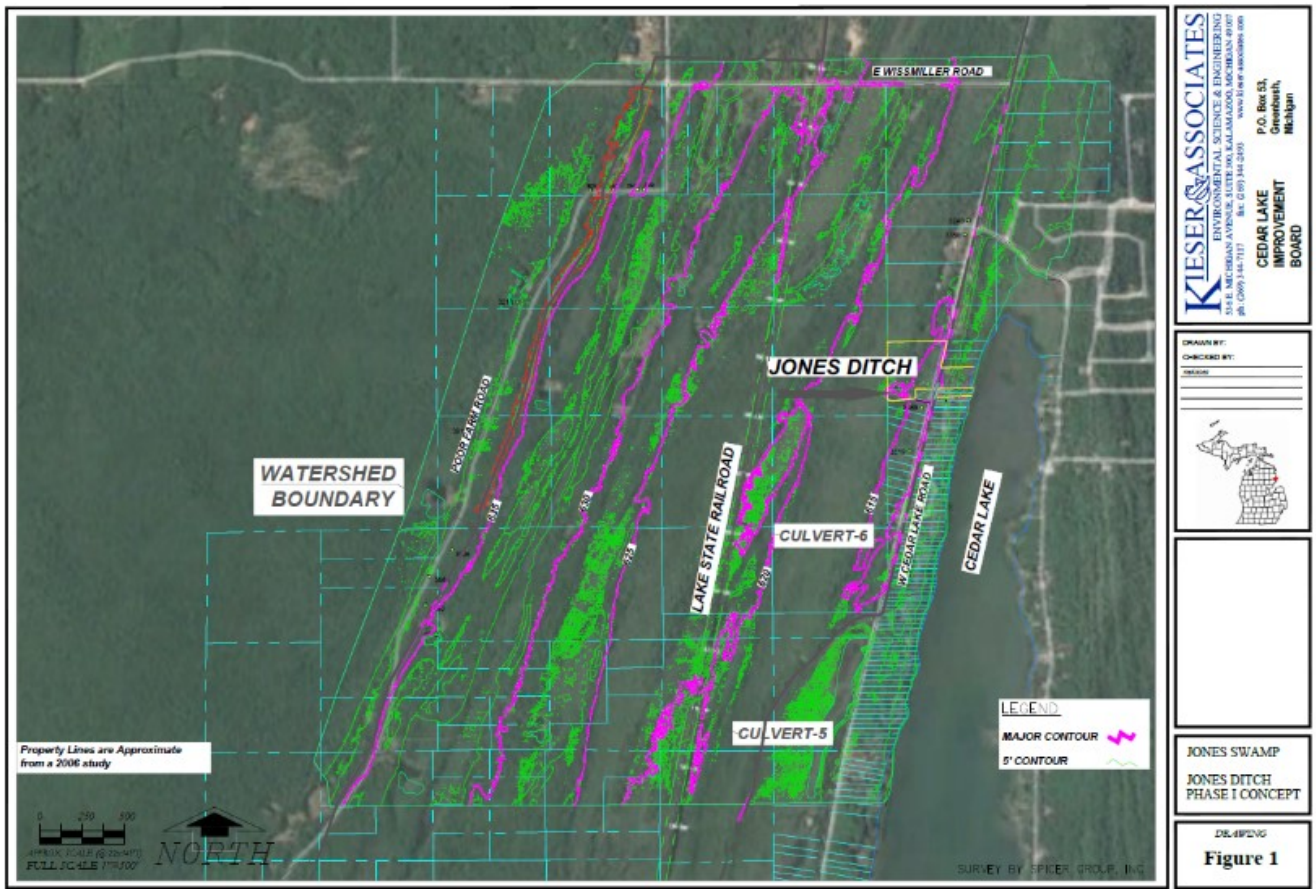
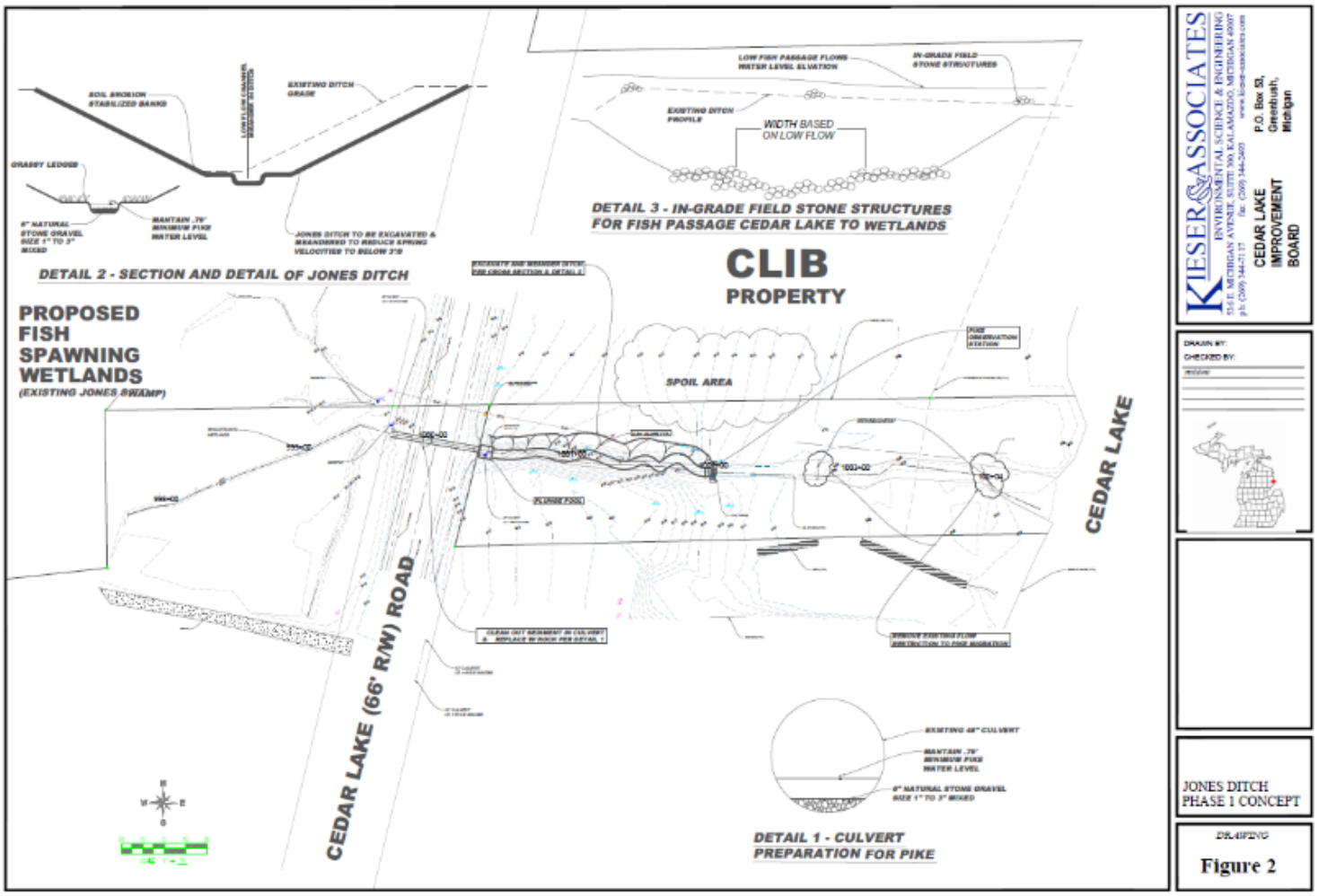


Figure 2 below, is a preliminary site design drawing for the Jones Ditch channel reconstruction effort. This was compiled by John Jacobson of K&A to ensure sufficient site characteristics to reconstruct the channel to meet project objectives. This will advance final design considerations and permit application needs considering agency reviews if the project is awarded funds. These efforts confirm that the project is constructible on the CLIB Jones Ditch property.



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