

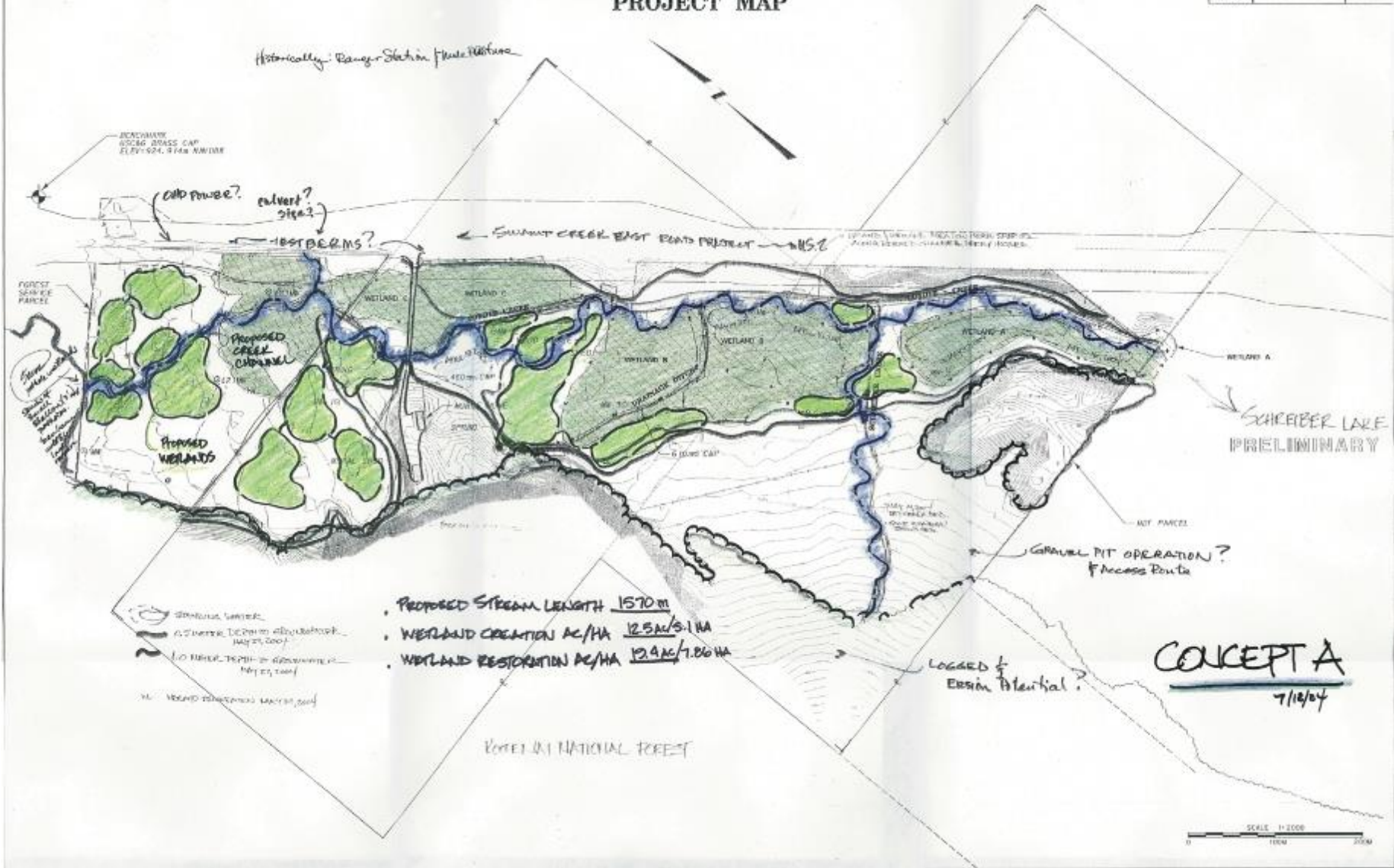
Phases of a Mitigation Project Design

- **Conceptual Design** – Initial ideas and concepts at the Feasibility phase for developing a mitigation project that involves selecting a “Preferred” concept that may or may not be moved into the last phases of Design.
- **Preliminary Design** – Beginning of engineering efforts in developing the plans and details of a mitigation project.
- **Final Design** – Final efforts to formalize the plans and specifications for contractor bidding and construction activities. Ready to build.

Conceptual Designs

- Initial ideas and concepts towards development of a mitigation plan.
- Simply pen to paper with little engineering or design components. A GIS exercise usually prepared on an aerial photograph or a topographic map.
- Development of several concepts that may result in the selection of “Preferred” or “Hybrid” concept to move into design.
- Need to know potential credit yields for the various types of mitigation.
- Determining costs/benefits of a project.

PROJECT MAP



One of six mitigation concept plans developed for the Schrieber Meadows mitigation site near Libby Montana. Project included wetland and stream restoration.



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Final constructed Schrieber Meadows mitigation site near Libby Montana. This was a “Hybrid” Design that incorporated designs from several concepts.



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Conceptual Designs

- Opportunity for Interagency Review Team (IRT) to review Concepts early. **Site visits a must.**
- Early coordination allows for early input from IRT.
- Need for IRT and Project proponents to sit down prior to a formal submission to flesh out concepts.
- Provides a decision point for a “Preferred”, “Hybrid” or “No Build” concept design.

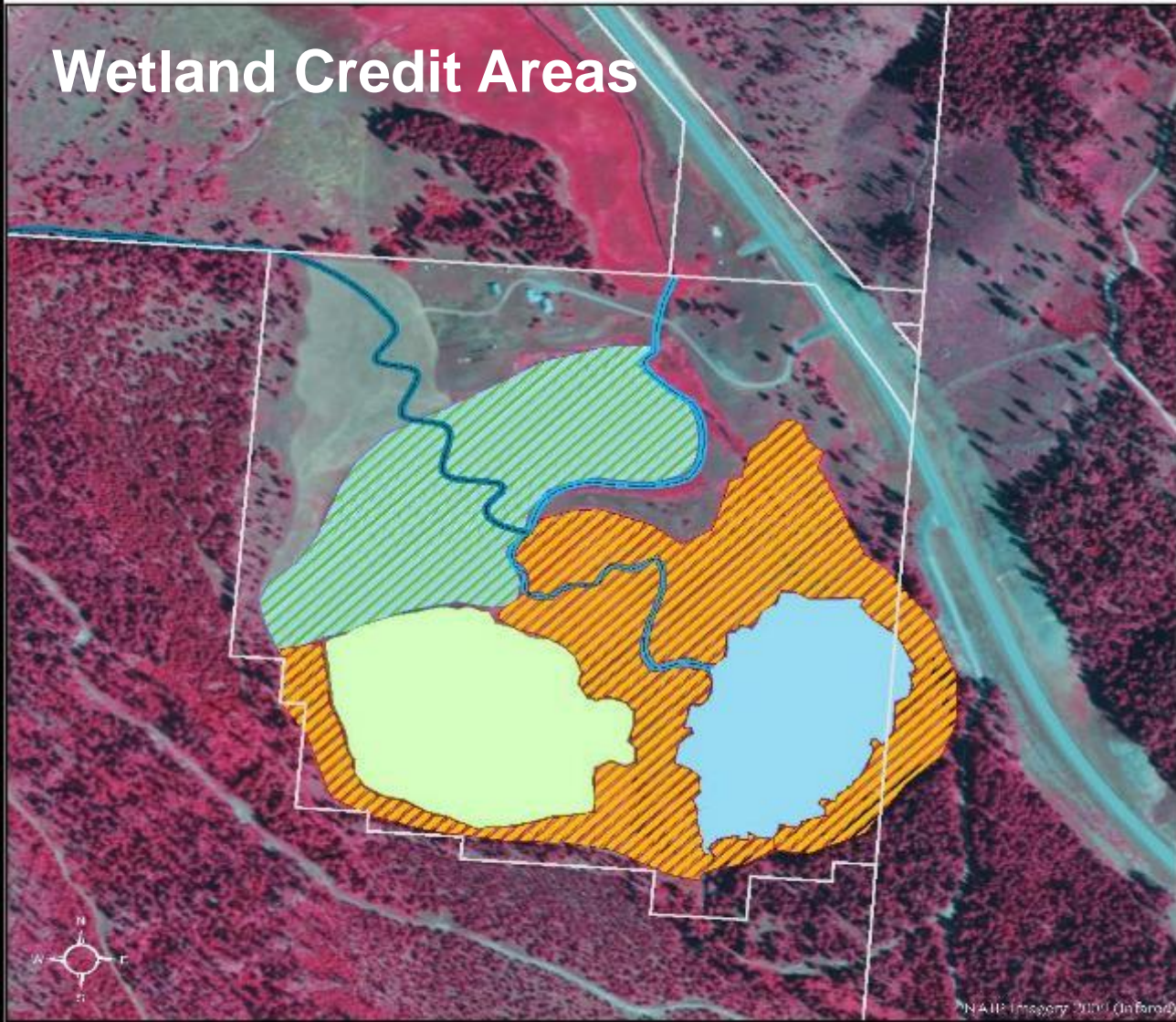


Parameters Needed for Conceptual Design

- Geomorphic / Topographic position of site.
- Type of Mitigation Project to be undertaken:
 - Establishment, Re-Establishment, Rehabilitation, Enhancement, Preservation, Stream Restoration
- Target Aquatic Resource Communities:
- Sources of Water and seasonality –
 - Groundwater, Surface Water, Irrigation
 - Water rights
 - Durations
 - Flood frequency
- USACE and IRT review and input on various concepts.

Wetland Credit Areas

Schrieber Lake Wetland Mitigation Site



AREA	Acres	Feet
Wetland Creation Area	13	
Preservation Area	10	
Restoration Area	19	
Schrieber Lake	8	
Coyote Creek (Proposed)		2488
Schrieber Creek (Proposed)		2317
TOTAL	50	4805

- Property Boundaries
- Preservation Area
- Schrieber Lake
- Restoration Area
- Wetland Creation Area Proposed*
- Schrieber Creek Proposed*
- Coyote Creek Proposed*

* Subject to change
 ~These figures were calculated from the NAIP imagery, has not been surveyed. Areas calculated in the Alltrac Table using 'CubicSpline Geometry' feature.



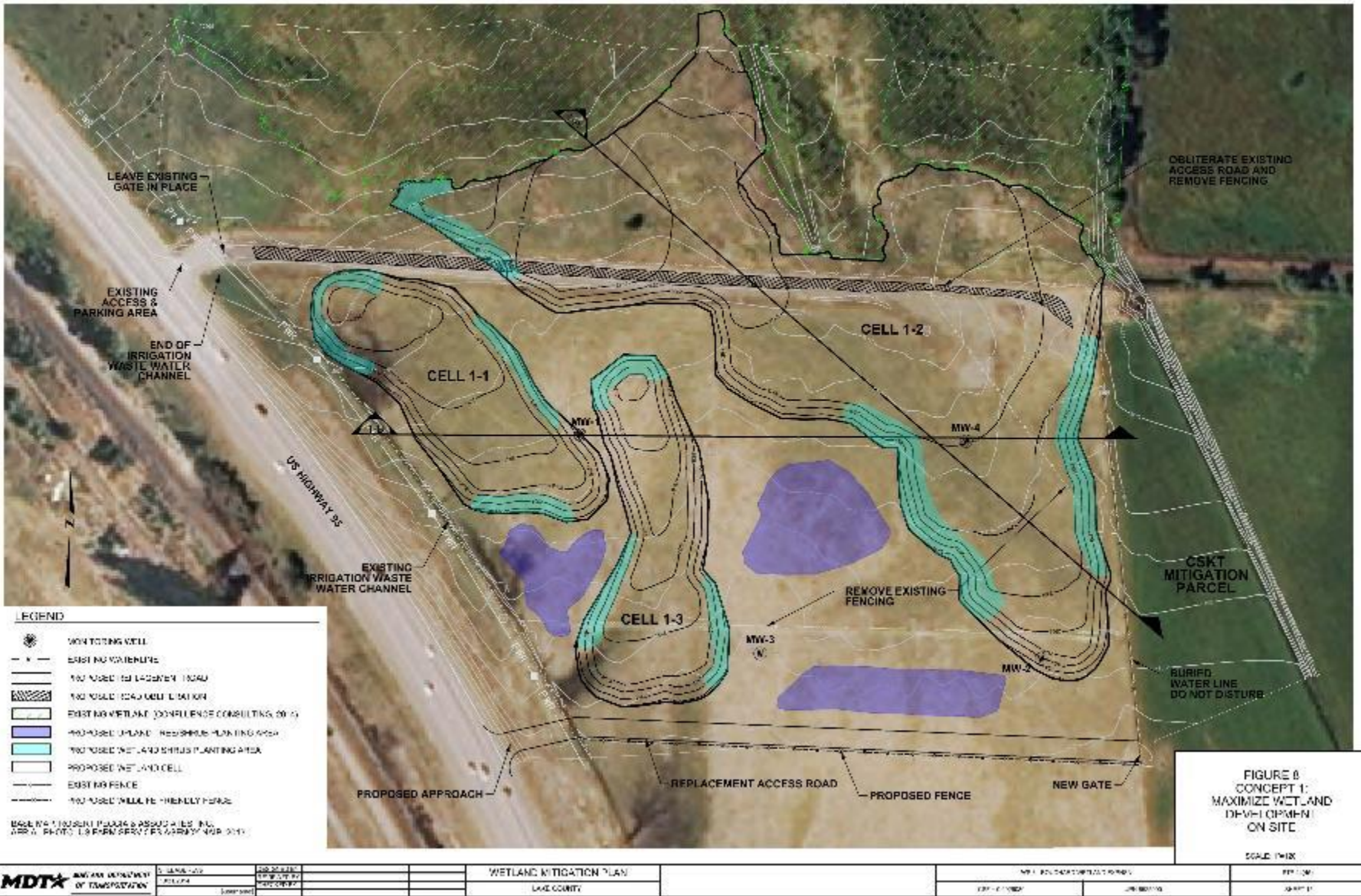
Early conceptual mitigation credit scheme developed for a proposed project involving stream and wetland restoration.



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Parameters Needed for Conceptual Design

- Credit development
 - How many acres of different mitigation types?
 - What are proposed vegetation communities?
 - How many acres of upland buffer?
- Constructability – What will it take to construct, or is it even feasible to construct?
- BUDGET\$\$
- COSTS of project:
 - Design
 - Right of Way or Land Costs
 - Construction Costs
- Cost/Benefit Analysis – What are the costs per wetland/stream credit?



- LEGEND**
- MONITORING WELL
 - EXISTING WATERLINE
 - NO USE TO ADJACENT ROAD
 - NO USE TO ADJACENT UTILITY
 - EXISTING WETLAND (CONFLICTS CONSULTING, 2019)
 - PROPOSED UPLAND RIPARIAN PLANTING AREA
 - NO USE WETLAND STRIP PLANTING AREA
 - PROPOSED WETLAND CELL
 - EXISTING FENCE
 - NO USE TO UTILITY FRIENDLY FENCE

BASE MAP COURTESY OF RPA & ASSOCIATES, INC.
 AERIAL PHOTO COURTESY OF RPA & ASSOCIATES, INC.

**FIGURE 8
 CONCEPT 1:
 MAXIMIZE WETLAND
 DEVELOPMENT
 ON SITE**
 SCALE: 1"=100'

3	MDTA	MONTANA DEPARTMENT OF TRANSPORTATION	DATE: 10/1/2024	PROJECT: 2024-001	DRAWN BY: J. PECCIA	CHECKED BY: J. PECCIA	WETLAND MITIGATION PLAN		MONTANA DEPARTMENT OF TRANSPORTATION		PROJECT NO:
							LAKE COUNTY		LAKE COUNTY		DATE: 10/1/2024

Example Concept # 1 of an Establishment conceptual design in Montana.



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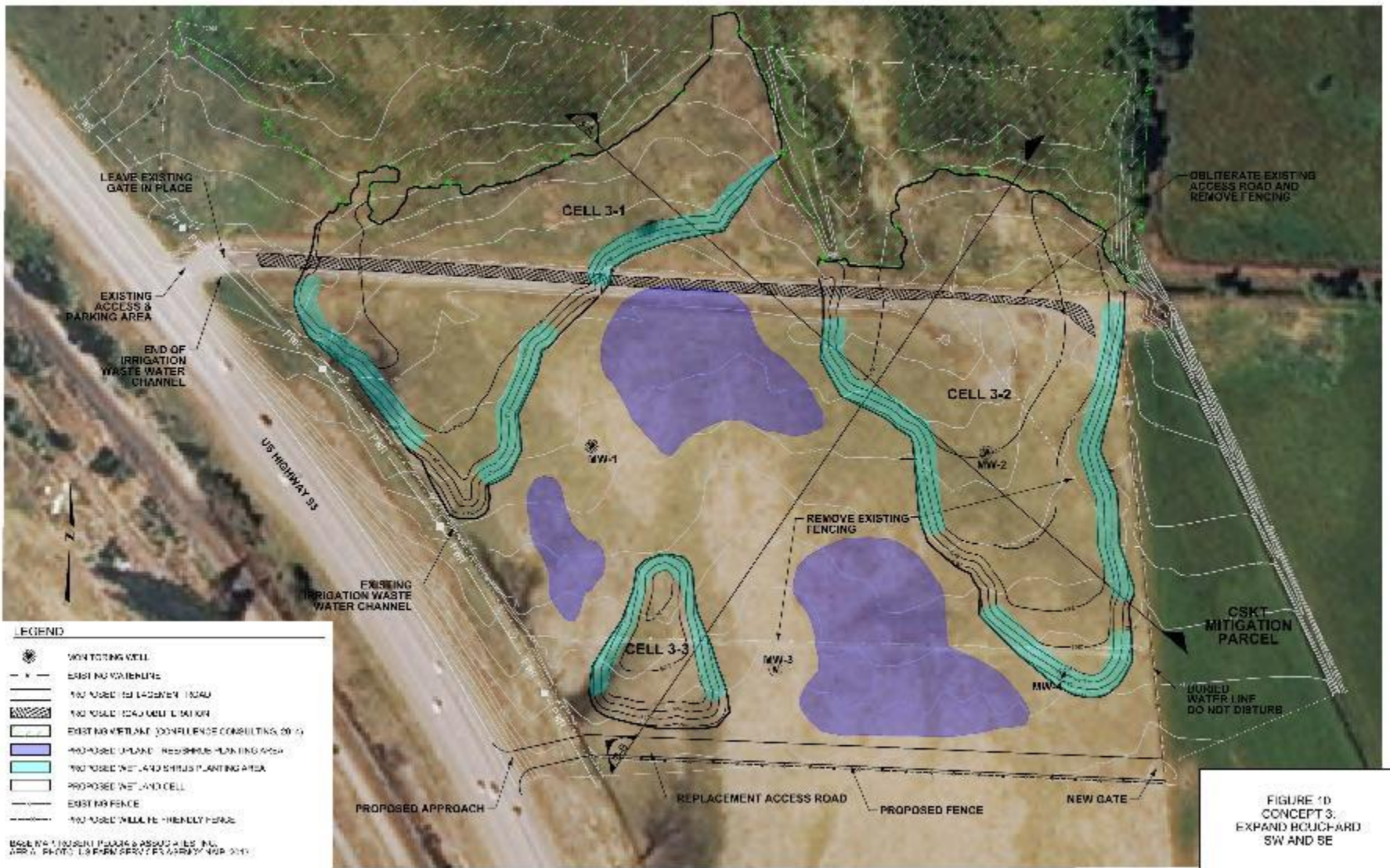


FIGURE 1D
 CONCEPT 3:
 EXPAND BOUCHARD
 SW AND SE
 SCALE: 1"=100'

1	MDTA	MONTANA DEPARTMENT OF TRANSPORTATION	DATE: 10/20/2021	BY: [Redacted]	WETLAND MITIGATION PLAN	PROJECT: [Redacted]	SHEET: 10 OF 10	DATE: 10/20/2021	BY: [Redacted]
			APP: [Redacted]	CHK: [Redacted]					
2					LAKE COUNTY				

Example Concept # 3 of an Establishment conceptual design in Montana.



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DECISION POINT

- Cost/benefit analysis prepared for each concept for selecting the “Preferred” or “Hybrid” concept.
 - Wetland credits per type and Concept
 - \$\$\$ per wetland credit acre / functional unit
- Comparison of costs between each Concept to determine the “Preferred” alternative.
- May result in a “Hybrid” version of the various Concepts.
- Decision point as to whether or not it is economically feasible to pursue a project before getting into Preliminary Design efforts.

6.0 SUMMARY OF WETLAND DEVELOPMENT CONCEPTS

Table 5 provides a brief comparison of the major components, targeted mitigation types, estimated construction costs, and potential credits for each development concept.

Table 5: Comparison of Wetland Development Concepts

Design Component	Wetland Development Concepts		
	Concept 1 - Maximize Wetland Development	Concept 2 – Expand Bouchard SE	Concept 3 – Expand Bouchard SW and SE
General Description	Excavate 3 wetland cells, wetland/upland planting and seeding	Excavate 2 wetland cells, wetland/upland planting and seeding	Excavate 3 wetland cells, wetland/upland planting and seeding
Excavated Area on Bouchard	3.18 acres	3.17 acres	2.77 acres
Excavated Area on Schlemmer	6.38 acres	4.82 acres	5.14 acres
Wetland Creation	9.57 acres	7.99 acres	7.91 acres
Upland Buffer	3.60 acres	2.81 acres	3.10 acres
Existing Approach and Parking Area for Bouchard Wetland Mitigation Site	<ul style="list-style-type: none"> Retain existing approach/parking area and gate east of US Hwy 93 at NE corner of Schlemmer property. Maintain room for parking inside highway R/W fence. 		
Schlemmer Access Road	<ul style="list-style-type: none"> Obliterate road along northern boundary of property. Reclaim roadway area outside of new wetland cells 		
Provide new US 93 Approach and Access Easement to CSKT Mitigation Parcel	<ul style="list-style-type: none"> Develop new approach at US Hwy 93 and provide new gate for access to Schlemmer Property. Develop access route/trail along southern boundary of Schlemmer property to maintain access easement provisions to adjoining CSKT property. Use salvaged material from site to build access roadway base. Add culverts beneath access road to transport irrigation runoff onto site. 		
Fencing Revisions	<ul style="list-style-type: none"> Remove and obliterate existing fence between Bouchard and Schlemmer properties. Retain highway R/W fence. Install new wildlife friendly farm fence along south and east boundary of Schlemmer Property. Remove existing E-W cross-fencing on Schlemmer property Install new dual tubular steel barrier gates at SW and SE corners of Schlemmer property for access easement to CSKT mitigation parcel 		
Utilities/Miscellaneous.	<ul style="list-style-type: none"> Remove or abandon buried PVC waterline along eastern fence-line of Schlemmer property. Consider retaining waterline and negotiating agreement with Schall to water planted woody shrubs for initial one or two seasons. 		
Estimated Construction Cost	\$257,817	\$213,239	\$204,907
Potential COE Credits	10.29	8.55	8.53
Potential CSKT Credits	4.09	3.37	3.41

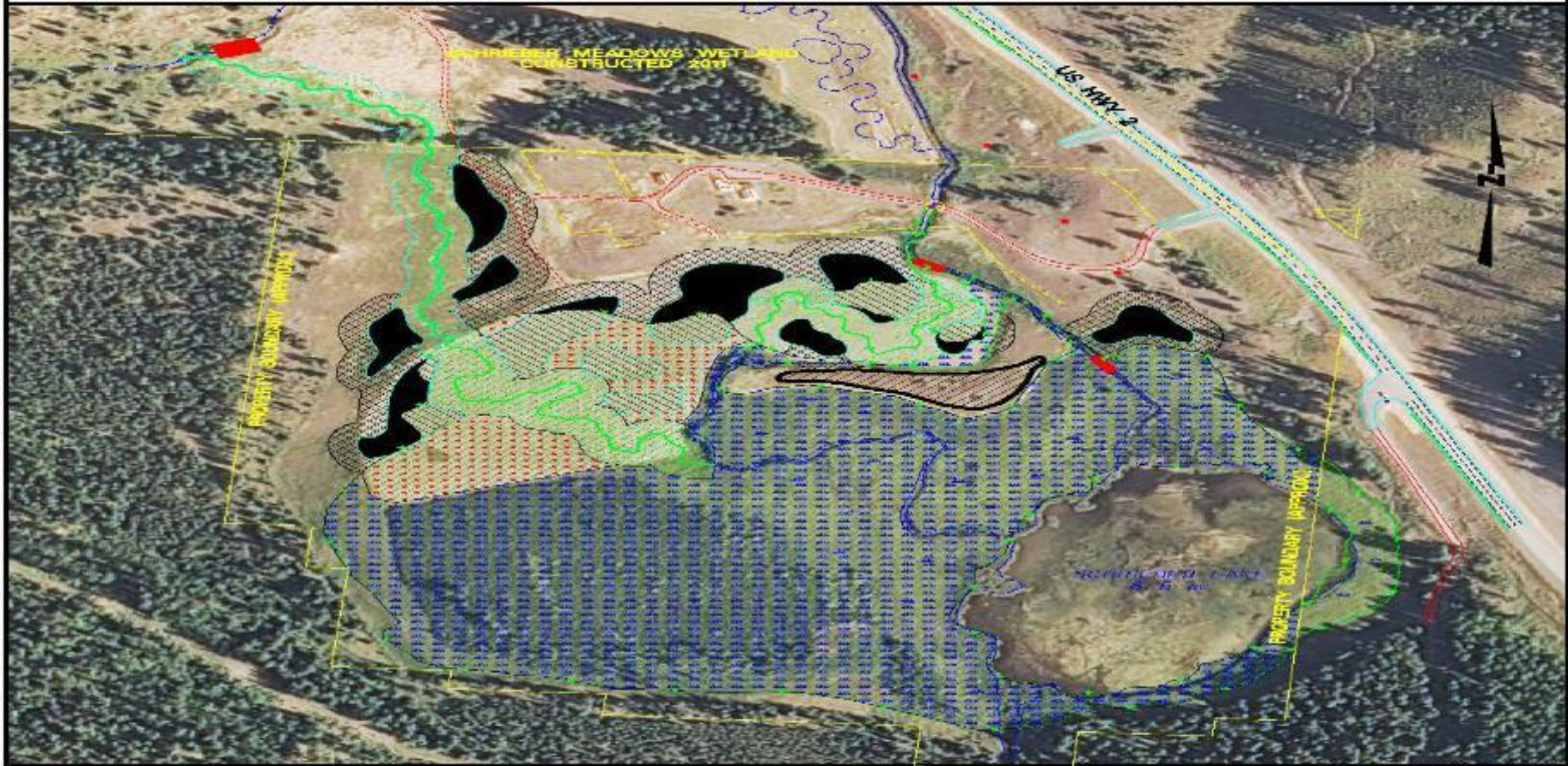
Proposed Credits

Attributes in all Concepts

Estimated Construction Costs



SCHRIEBER LAKE AQUATIC MITIGATION LINCOLN COUNTY MITIGATION CREDIT DESIGN



	WETLAND CREATION (1.131 HA = 2.79 AC)
	WETLAND RESTORATION (1.076 HA = 2.68 AC)
	WETLAND ENHANCEMENT (1.136 HA = 2.81 AC)
	WETLAND PRESERVATION (11.422 HA = 28.22 AC)
	UPLAND BUFFER (1.640 HA = 3.81 AC)
	RIPARIAN BUFFER (7.03 AC)
	EXISTING WETLAND

AERIAL PHOTOGRAPHY
NRIS 2011

PREPARED BY: W. SALYARDS, PE
MDT WETLAND ENGINEER
JANUARY 17, 2013

Schrieber Lake aquatic mitigation credit Hybrid design concept showing the modifications for proposed wetland mitigation types and stream locations after agency review and comments.



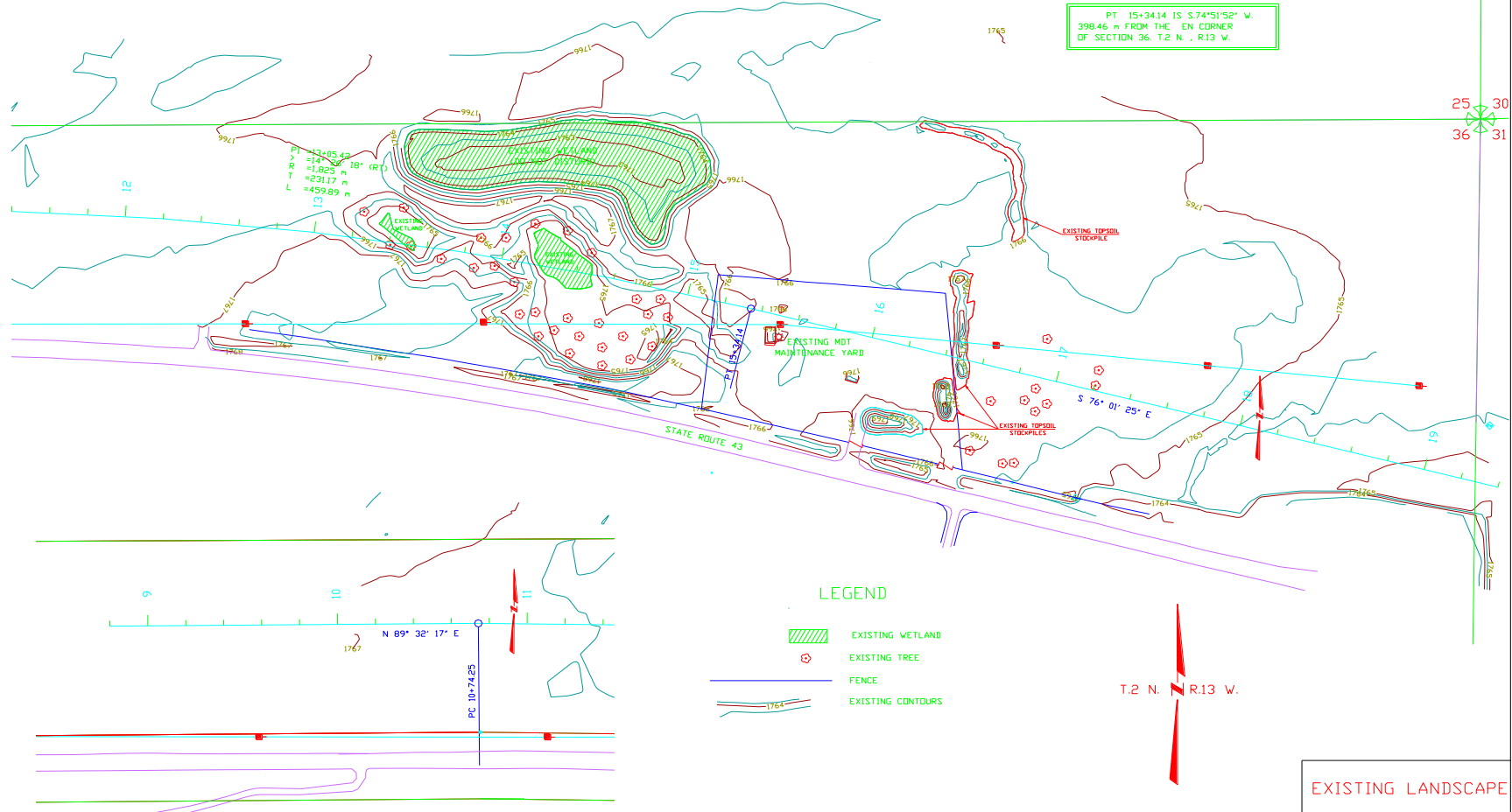
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Preliminary Design Plan Development

- Topographic surveys critically important for developing wetland designs at 6” to 1 foot contours.
- Hydraulic design analysis:
 - Direction of water flows through property
 - Groundwater elevations (GW Wells, depths, durations, seasonality)
 - Water budget for wetlands to evaluate sources of water for wetland
 - Quantities of consumptive water needed for water rights.
- Design parameters (slopes/depths/area), # of wetlands, islands, water control structures, berms, habitat structures, borrow/fill/material quantities, construction costs, etc.
- Cross-sections, typical details, erosion/control, and initial seeding/planting plans.







STATE	PROJECT NUMBER	SHEET NO.
MONTANA		



sesa
 SOUTHERN ENVIRONMENTAL SERVICES AND ARCHITECTURE
 1000 N. 10TH ST. SPOKANE, MT 59202
 TEL: 406.325.1234 FAX: 406.325.1235
 WWW.SESA-MT.COM

LEGEND

-  EXISTING WETLAND
-  EXISTING TREE
-  FENCE
-  EXISTING CONTOURS

T.2 N. R.13 W.

EXISTING LANDSCAPE

SCALE 1:1000

Drawing of Existing Topography

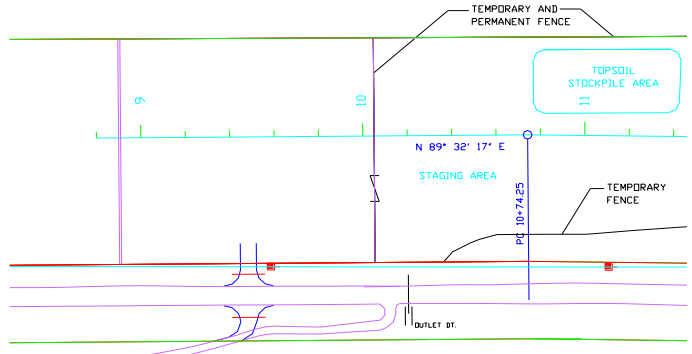
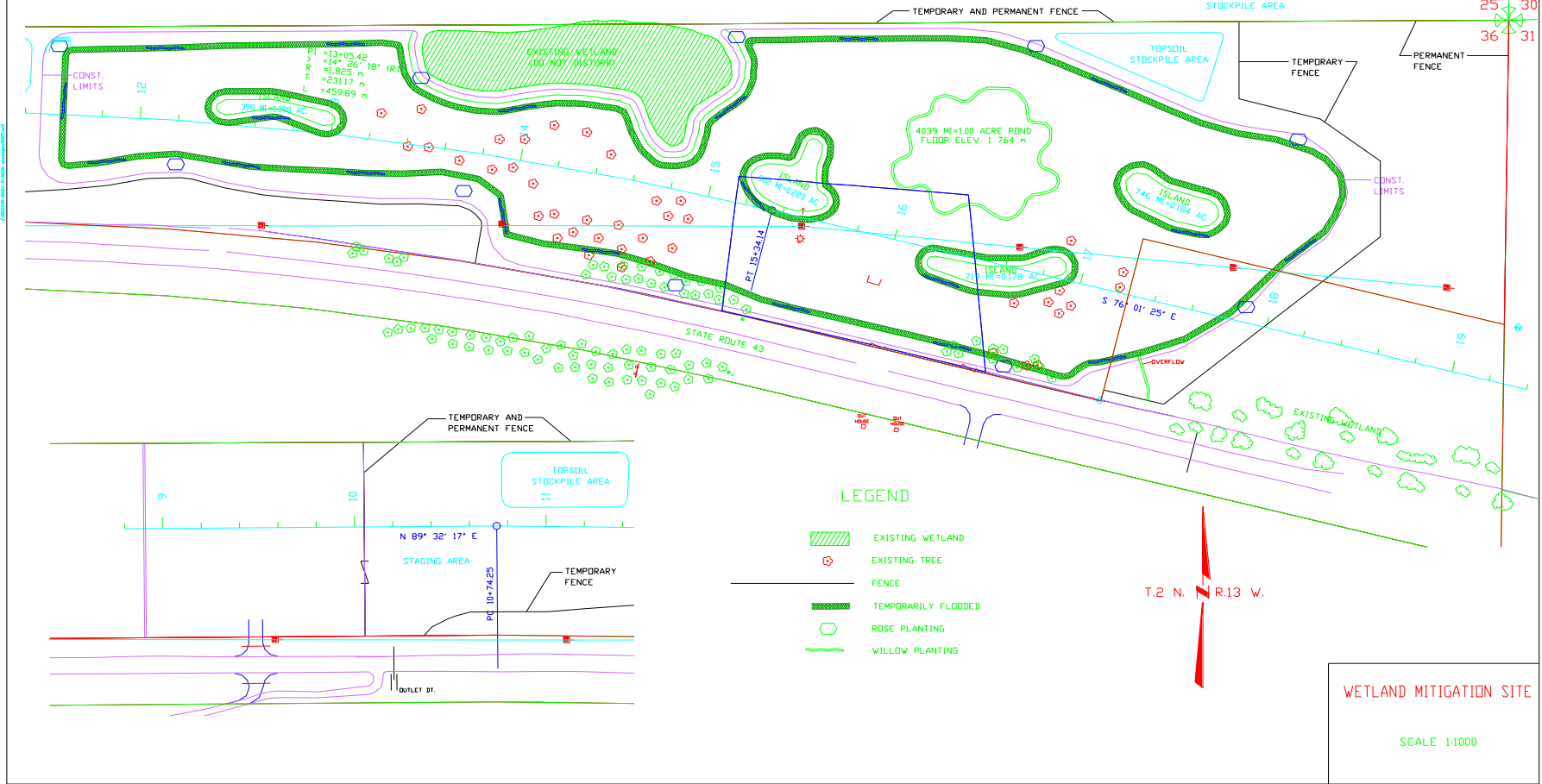


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PT. 15+34.14 IS S.74°51'52" W.
398.46 m FROM THE EN CORNER
OF SECTION 36, T.2 N., R.13 W.

NOTE-MOVE EXISTING TOPSOIL
STOCKPILES TO NEW
STOCKPILE AREA

25 30
36 31



LEGEND

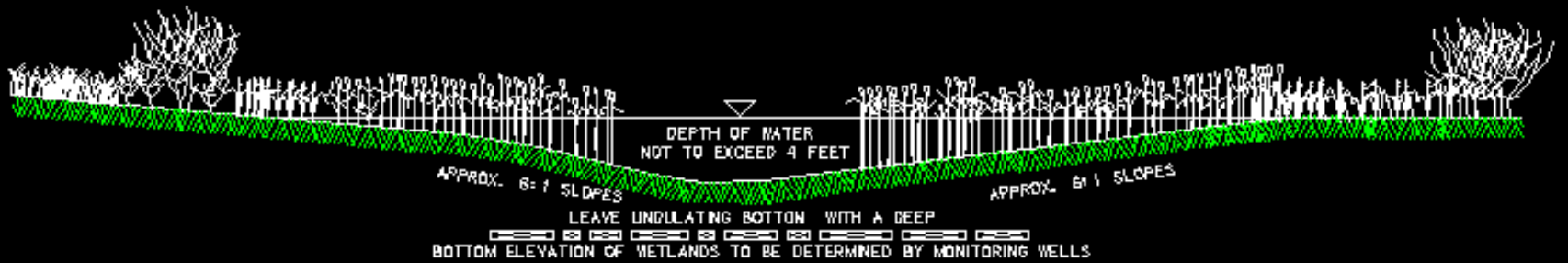
- EXISTING WETLAND
- EXISTING TREE
- FENCE
- TEMPORARILY FLOODED
- ROSE PLANTING
- WILLOW PLANTING

WETLAND MITIGATION SITE

SCALE 1:1000

Sportsman's Campground – Preliminary Design showing proposed excavated depressions, preserved wetlands and shrubs, and limits of borrow excavation.





NOTE: DRAWING NOT TO SCALE

TYPICAL
CROSS SECTIONS

PRELIMINARY

Development of Preliminary Typical Cross-Section designs for agency review and comment.



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Channels

Bighole River

PHOTO
DATE
5/20/13

C-39.124

Sportsman's Campground – Changes in Design made at concept level created channels around islands for low water refugia as seasonal groundwater recedes for aquatic organisms.



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Don't judge books by the Cover!!



View of flooded Sportsman's Campground mitigation site in June 2018. Seasonally inundated and emergent and woody scrub/shrub vegetation communities developing rapidly.



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Sportsman's Campground site in late August 2017, showing emergent and scrub/shrub habitat after water draws down from spring.



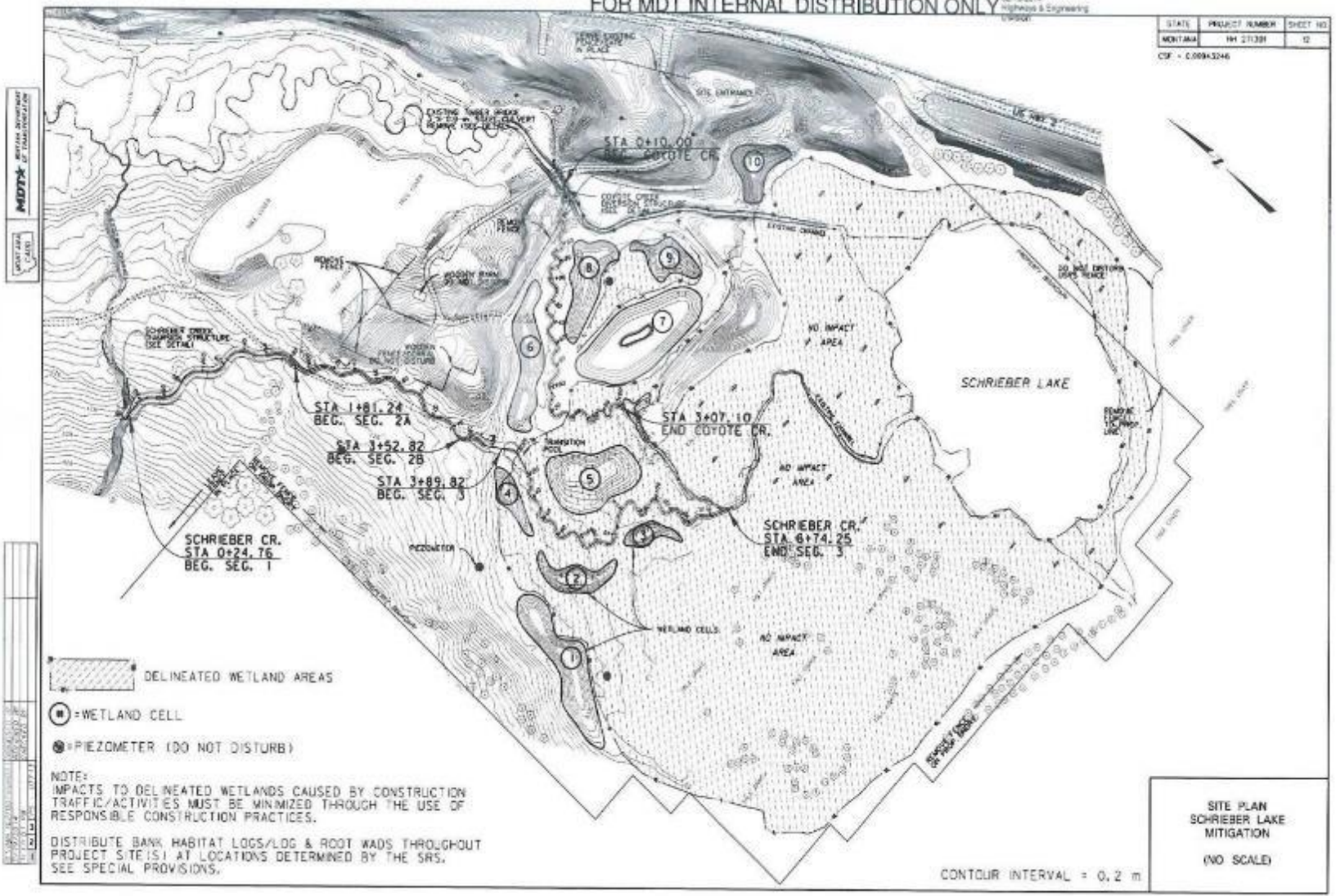
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Final Design

- Major components should include:
 - design plans
 - cross-sections
 - earthwork and material quantities
 - project plan details – water controls, habitat structures, etc.
 - special provisions
 - plan /site overview
 - planting/seeding plans
 - final crediting plan
- No major changes at this phase. If major changes are required, delays will occur to project schedule and construction windows.
- Review focus on plan details, coordinates, elevations, plan sheets, quantities, specifications, and construction cost estimates.



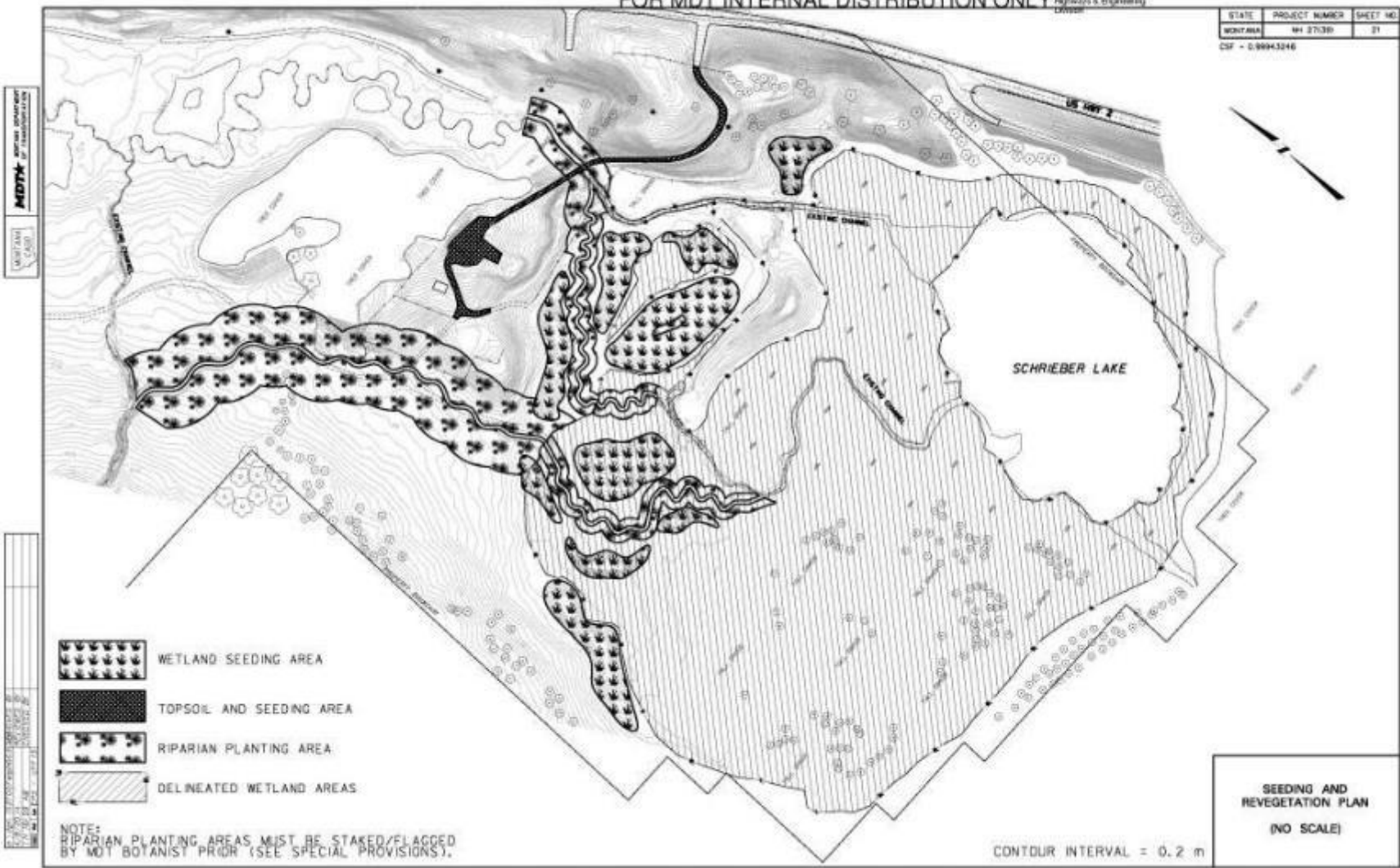
STATE	PROJECT NUMBER	SHEET NO.
MONTANA	191 271301	12
CSF - C009A-3246		



Final Mitigation Design overview drawing of the Schrieber Lake mitigation project.

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STATE	PROJECT NUMBER	SHEET NO.
MONTANA	MI 2733D	31
CSF - 0.98943246		



Proposed Seeding and Planting plans for contractor. May change after construction due to areas of disturbance.



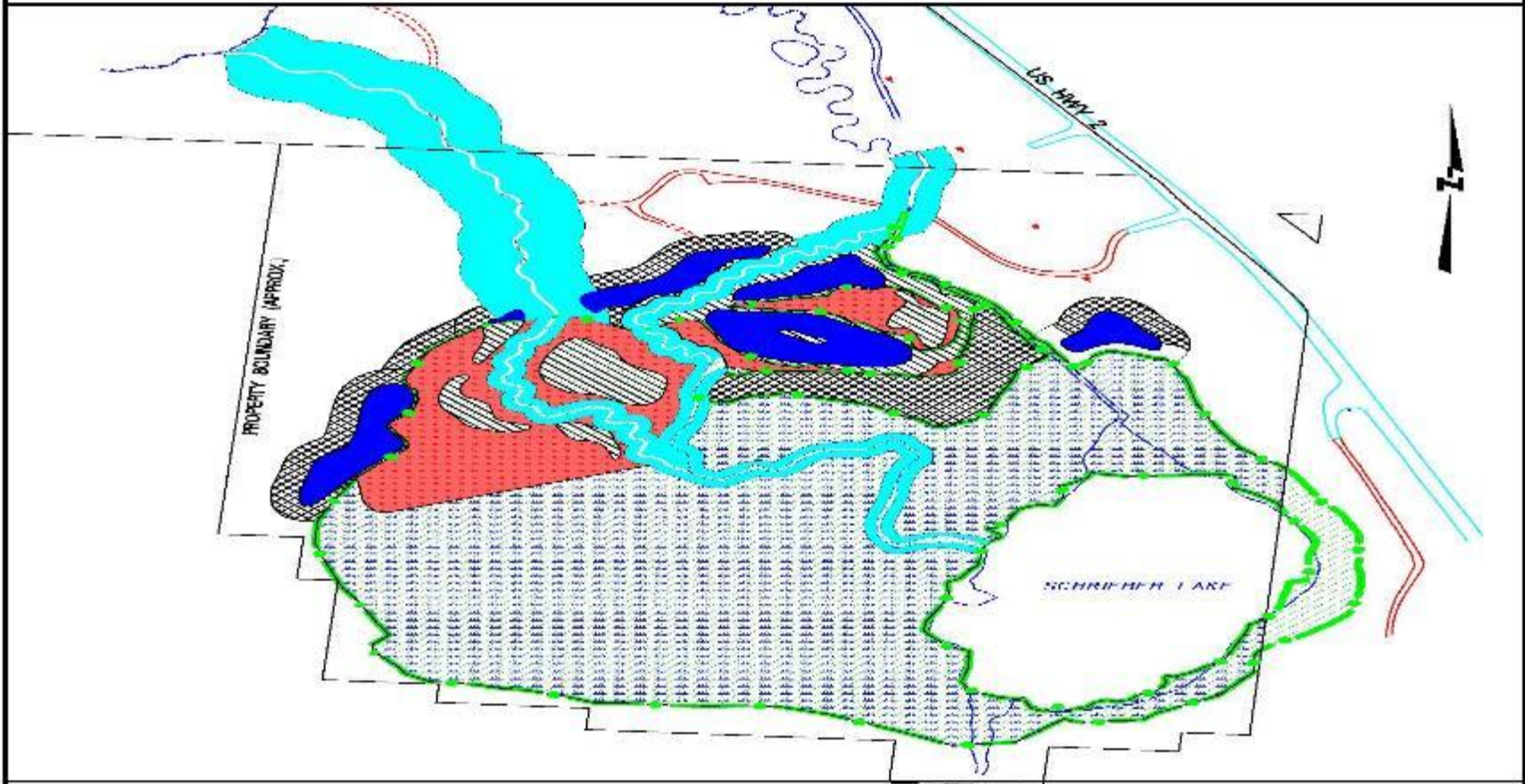
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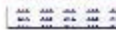
Final Design Continued

- Finalizing project plans and specifications for construction.
- Permit applications – Submission to regulatory agencies for approvals.
- Preparing final engineering estimates and quantities for bid package.
- Addition of Approved Permit conditions to specifications.
- Let to Bid for Construction.
- To Construction



SCHRIEBER LAKE AQUATIC MITIGATION LINCOLN COUNTY MITIGATION CREDIT DESIGN



- | | | | |
|---|---|---|--|
|  | WETLAND CREATION
(1.2401 HA - 3.094 AC) |  | UPLAND BUFFER
(1.5428 HA - 3.812 AC) |
|  | WETLAND RESTORATION
(1.0220 HA - 2.525 AC) |  | RIPARIAN BUFFER
(3.4499 HA - 8.525 AC) |
|  | WETLAND ENHANCEMENT
(1.6336 HA - 4.031 AC) |  | EXISTING WETLAND |
|  | WETLAND PRESERVATION
(10.3599 HA - 25.600 AC) | | |

PREPARED BY: W. BALLYARDS, PE
MDT WETLAND ENGINEER
JUNE 14, 2013

SCALE: 1" = 100 m

Final mitigation credit plan sheet for submission to USACE.



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Listing of Special Provisions for the project. Example:

15. REVEGETATION

A. DESCRIPTION. All disturbed areas associated with the completion of this project are to be seeded as specified below; including any and all haul roads, former homestead area and the former access road into the Schrieber Lake site.

B. MATERIALS. Use the following seed mixture and rates.

1) Use the following seed mixture and rates around the perimeter of all wetland cells.

WETLAND SEED MIXTURE

<u>Species</u>	<u>kgs of PLS per acre</u>
Tufted hairgrass	1.0
American sloughgrass	6.0
American mannagrass	3.0
Bromar Mountain brome	6.0

1. PROJECT DESCRIPTION [102]
2. CONTRACT TIME – COMPLETION DATE [103]
3. AUTHORIZATION TO DISCHARGE UNDER THE MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM (MPDES) [107] (Revised 5-27-10)
4. CLEAN WATER ACT : SECTION 404 PERMIT
5. STREAM PROTECTION ACT AUTHORIZATION 124
6. SITE PREPARATION
7. FENCE REMOVAL AND DISPOSAL
8. CONTROL OF SURFACE AND SUBSURFACE WATER
9. LOG & ROOT WAD
10. TRAFFIC CONTROL
11. PRE-BID INSPECTION
12. ACCESS ROAD
13. TOPSOIL SALVAGING AND PLACING
14. DESIGN CHANGES
15. REVEGETATION
16. TREE AND SHRUB PLANTING
17. CONSERVATION MEASURES FOR WORKING IN BEAR HABITAT
18. TEMPORARY EROSION CONTROL-LUMP SUM [208] (Revised 5-6-09)
19. PRE AND POST CONSTRUCTION MEETINGS
20. INCREASE IN TURBIDITY (318 Authorization) [107] (Revised 12-09-10)
21. STREAM RESTORATION SPECIALIST (SRS)
22. PREQUALIFIED STREAM RESTORATION CONTRACTORS
23. CHANNEL CONSTRUCTION
24. CHANNEL DIVERSION STRUCTURES
25. ROADSIDE BERM LEVELING & ACCESS ROAD MOUND
26. CONSTRUCTION SURVEYING AND LAYOUT - CONTRACTOR STAKING [105] (ADDED 2-17-11)



Special Provisions should include Permit information and quantities of materials needed for project.



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MONTANA DEPARTMENT OF TRANSPORTATION
SCHEDULE OF ITEMS

CONTRACT ID: 02714

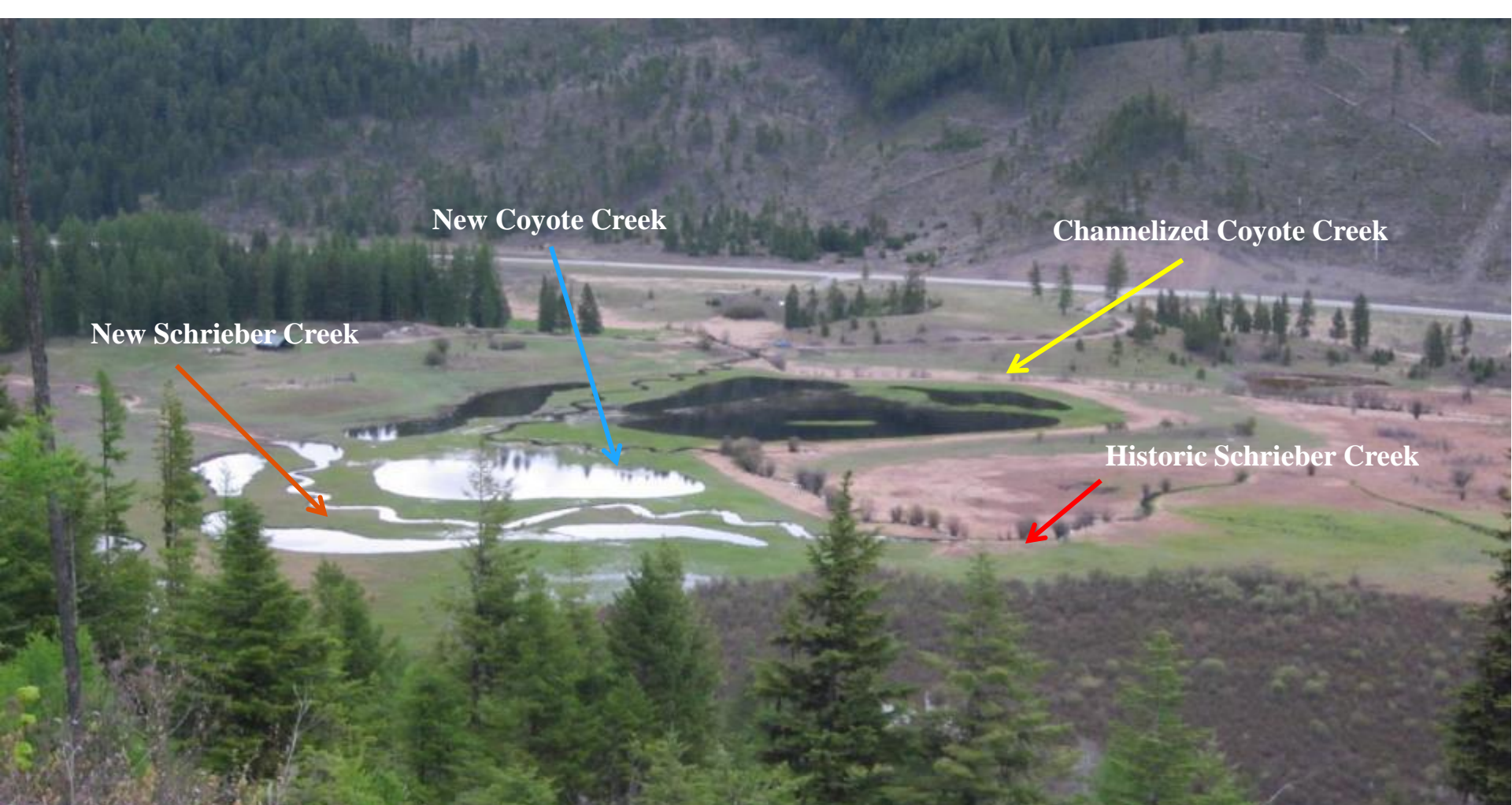
PROJECT : NH 27(39) (1027039000)
SCHRIEBER LAKE MITIGATION

PROP LINE NO.	ITEM NUMBER	ITEM DESCRIPTION	UNIT OF MEASURE	QUANTITY
SECTION 0001				
0010	104 100 000	MISCELLANEOUS WORK	UNIT	15,000.00
0020	105 100 500	CONSTRUCTION SURVEY AND LAYOUT	LSUM	1.00
0030	109 200 000	MOBILIZATION	LSUM	1.00
0040	201 310 000	CLEARING AND GRUBBING	HA	0.23
0050	202 011 000	REMOVE STRUCTURE	LSUM	1.00
0060	203 100 000	EXCAVATION-UNCLASSIFIED	M3	12,063.00
0070	203 140 000	EXCAVATION-UNCLASS CHANNEL	M3	2,430.50
0080	203 200 000	EXCAVATION-UNCLASS BORROW	M3	117.00
0090	203 500 000	TOPSOIL-SALVAGING AND PLACING	M3	760.00
0100	203 500 210	WETLAND SOD	M2	2,326.00
0110	208 040 001	BANK HABITAT LOG	EACH	145.00
0120	208 040 006	FASCINE	M	530.00
0130	208 100 000	TEMPORARY EROSION CONTROL	UNIT	500.00
0140	208 106 050	TEMPORARY EROSION CONTROL - LS	LSUM	1.00
0150	208 400 000	LOG AND ROOT WAD	EACH	105.00
0160	208 400 051	WEIR DROP, GRADE CONTROL	EACH	14.00
0170	208 505 000	STREAMBED MATERIAL	M3	91.10
0180	607 700 000	REMOVE FENCE	M	1,902.00
0190	610 100 001	WETLAND SEEDING - UPLAND	HA	0.35
0200	610 100 002	WETLAND SEEDING - WETLAND	HA	1.87
0210	610 405 010	NOXIOUS WEED CONTROL	UNIT	500.00
0220	610 550 010	EROSION CNTRL BLNKT-BIODEGRADE	M2	135.00
0230	613 000 100	RIFFLE MATERIAL	M3	212.00
0240	618 020 000	TRAFFIC CONTROL	LSUM	1.00
0250	622 010 010	COIR EROSION CONTROL NET	M2	2,045.00
0260	622 110 000	PERM EROSION CTRL-MOD SURV	M2	75.00
0270	624 020 000	COCONUT BLANKET	M2	2,045.00
0280	855 200 000	TREE AND SHRUB PLANTING	LSUM	1.00

Quantities for Construction Bid Items for the Schriever Lake Mitigation project (Note Metric measurements).



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New Coyote Creek

Channelized Coyote Creek

New Schrieber Creek

Historic Schrieber Creek

Completed Schrieber Lake Mitigation Site 8 months after construction,

- Restored two streams
- Created 10 shallow wetland cells
- Allows for flood inundation during spring runoff from adjacent streams.
- Preserved unique wetland communities on site.

04/29/2015 07:44



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Slide 32



Schrieber Lake mitigation site 3 years after completion August 2018.



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A man wearing a grey bucket hat, sunglasses, a light blue long-sleeved shirt, and khaki shorts is standing in a shallow river. He is holding a large rainbow trout with both hands. The river is surrounded by lush green and yellow vegetation on the banks. The water is clear and reflects the surrounding environment.

**Biological sampling of
restoration projects.**

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