MONTANA DEPARTMENT OF TRANSPORTATION
STREAM MITIGATION MONITORING REPORT

Clark Fork River
Granite County, Montana

Prepared for:

2701 Prospect Ave
Helena, MT 59620-1001

Prepared by:

PO Box 1133
Bozeman, MT 59771-1133

December 2013

MONTANA DEPARTMENT OF TRANSPORTATION

STREAM MITIGATION MONITORING REPORT:

YEAR 2013

Clark Fork River
Granite County, Montana

Permit No.
MFWP: SPA MDT R2-14-2012
USACE: NWO-2012-00831-MTH

Prepared for:

MONTANA DEPARTMENT OF TRANSPORTATION
2701 Prospect Ave
Helena, MT 59620-1001

Prepared by:

Confluence Consulting, Inc.
P.O. Box 1133
Bozeman, MT 59771

December 2013

CCI Project No: MDT_.007

TABLE OF CONTENTS

FIGURES AND TABLES

APPENDICIES

Cover. View of Clark Fork River with rip rap and willow plantings looking West (downstream).

1.0 INTRODUCTION

This Clark Fork River Stream Mitigation 2013 Monitoring Report presents the first year monitoring results of a bank stabilization project along the Clark Fork River approximately 24 miles west of Drummond, Montana along Interstate 90. The Montana Department of Transportation (MDT) requested authorization for placement of approximately 200 cubic yards of rip rap along 150 linear feet of the Clark Fork River to protect Interstate 90 from bank erosion. This report evaluates the monitoring results in comparison to project performance standards as required by the U.S. Army Corps of Engineers (USACE).

The approved 404 permit outlines the following reporting requirements and performance standards for the Clark Fork River bank stabilization site:

1. Riprap must be covered with topsoil, seeded, and sprigged with willows above the ordinary high water mark.

2. Monitoring reports must be provided to the USACE by December 31 each year post construction, detailing the extent of revegetation efforts and survival rates of plantings.

3. Monitoring and reporting of revegetation efforts within the riparian zone will continue for three years post-construction, with a target of at least 80 percent survival of plantings three years after planting.

4. Photographs of the site prior to, during, and immediately following construction, as well as for three years post-construction, must be a part of the monitoring reports.

2.0 SITE LOCATION

The project site is located north of the westbound lane of Interstate 90 at mile post 137.8, 24 miles west of Drummond, Section 24, Township 11 North, Range 15 West, Granite County, Montana (Latitude: 46.170007°N; Longitude: -113.4392°W) (Figure 1).

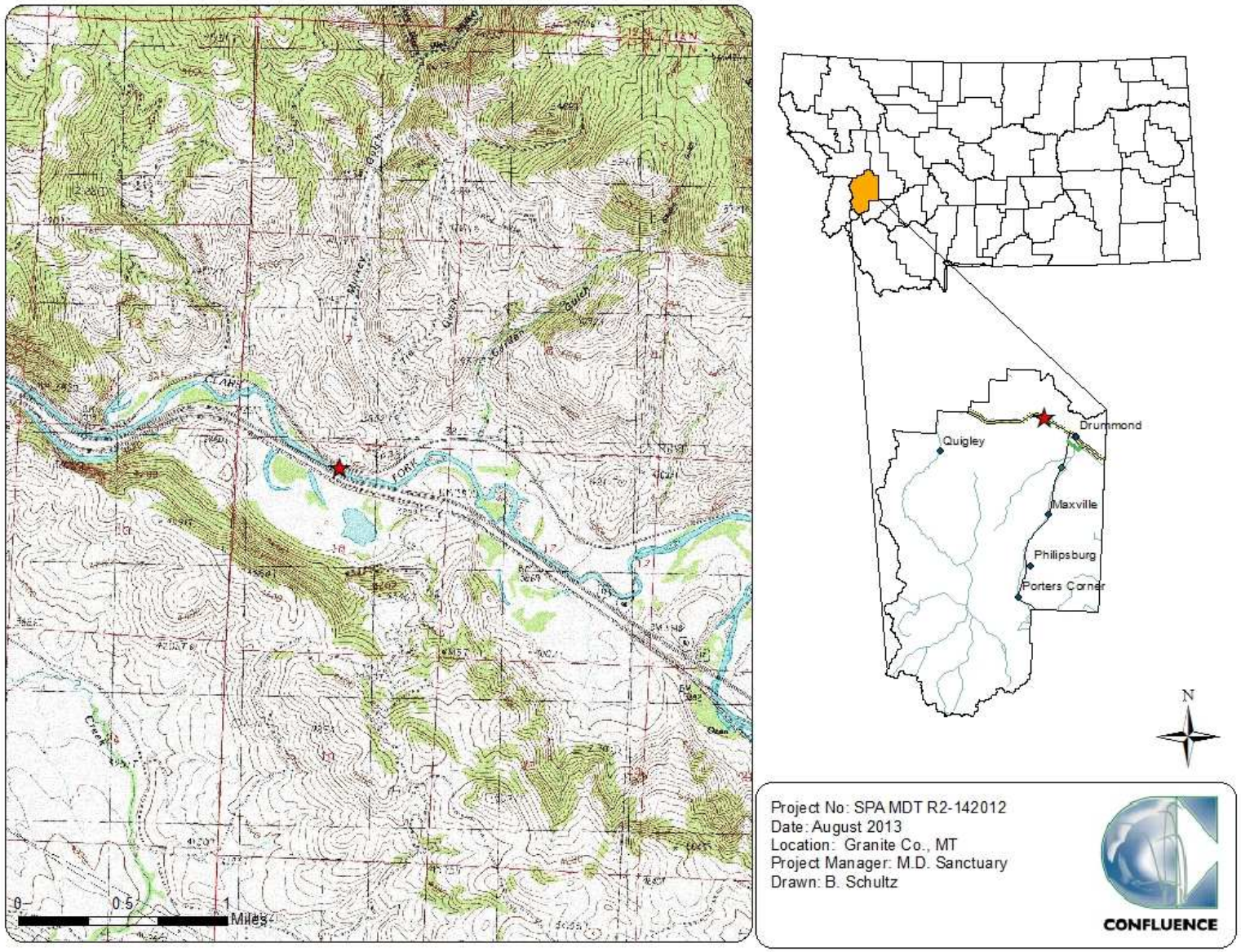

Figure 1. Project location of Clark Fork River bank stabilization site.

3.0 MONITORING METHODS

The stabilized river bank was inspected to determine survival rates of planted woody vegetation species (willows). Photos were taken upstream, downstream, and across the channel to document vegetation establishment at this site.

4.0 MONITORING RESULTS

Woody vegetation planting included sandbar willow cuttings placed behind the riprap. Live willows approximately 12" tall were observed growing along the top of the riprap bank just above the upper layer of rock. Plant survival success was 83%, with approximately 23 live, and 5 dead willow shoots per ten feet of bank (Table 1). No willows were observed growing out of the riprap below the top of the streambank.

Table 1. Number of live and dead woody plant species along the Clark Fork River stream mitigation site.

Total Plants Inspected	Surviving Plants	Plant Survival Rate
345	285	83%

Table 2 is a comprehensive list of vegetative species identified at the Clark Fork River site. In 2013, fourteen plant species were observed on site. Willows establishing behind the riprap included *Salix exigua* (Sandbar willow). *Cirsium arvense* (Canadian thistle) and *Tanacetum vulgare* (Common Tansy), each Montana state-listed priority 2B noxious weeds, were observed in trace amounts on site.

Table 2. Comprehensive list of plant species identified at the Clark Fork River site in 2013.

Scientific Name	Common Name
Agropyron cristatum	Crested Wheatgrass
Cirsium arvense	Canadian Thistle
Dasiphora fruiticosa	Shrubby Cinquefoil
Helianthus annuus	Common Sunflower
Hordeum jubatum	Foxtail Barley
Lactuca serriola	Prickly Lettuce
Panicum capillare	Whitchgrass
Pascopyrum smithii	Western Wheatgrass
Phalaris arundinacea	Reed Canary Grass
Poa pratensis	Kentucky Bluegrass
Populus trichocarpa	Black Cottonwood
Salix exigua	Sandbar Willow
Tanacetum vulgare	Common Tansy
Thlaspi arvense	Field Pennycress

Photographs were taken at the upstream and downstream extents of the project area in order to capture the installed bank protection measures, the extent of vegetation establishment along the riprap, and within the project staging area directly along the westbound lanes of Interstate 90. Photographs can be found in Appendix A.

5.0 COMPARISON OF RESULTS TO PERFORMANCE STANDARDS

The survival rate of woody species (willows) along the Clark Fork River bank stabilization project was 83%, which meets the target performance standard of 80% one year following installation.

6.0 MANAGEMENT RECOMMENDATIONS

The first year of vegetation monitoring at this site suggest good survival rates of willow sprigs above the top layer of rock. If willows continue to establish root systems beneath the riprap, it is hopeful they will extend additional stems through lower rock layers to provide the additional benefits of shade and vegetative cover near the bank toe.

An alternative willow installation technique that may improve willow establishment at the bank toe is described in a riparian revegetation manual offered by the NRCS (2007). This technique includes placing willow stems that extend through each layer of riprap. Willow stems may be placed at the toe of the bank up to approximately the 2-year water surface elevation to improve successful establishment of vegetative cover throughout the riprap.

The upper streambank area and project staging area contained a large amount of weedy and undesirable species and approximately 60% bare ground (Photo 12, Appendix A). Additional seeding of the site is suggested as soon as possible to prevent additional weed colonization.

Upstream of the project area is an eroding bank approximately ten to fifteen feet in length (Photo 7, Appendix A). This bank does not currently appear to threaten the project area; however the eroding streambank should continued to be monitored to determine if it is a threat to the stabilized streambank or the Interstate. If the bank continues to erode, placement of additional riprap is recommended to maintain protection of the highway. If necessary, the extent of additional riprap installation should be evaluated based on anticipated erosive activity, flow direction, bar formation, existing bank materials, and vegetative composition.

7.0 LITERATURE CITED

United States Department of Agriculture. 2007. Planting willow and cottonwood poles under riprap. Technical Note Plant Materials No.21. USDA Natural Resources Conservation Service, Boise Idaho.

Appendix A

Project Site Photos

MDT Stream Mitigation Monitoring
Clark Fork River
Granite County, Montana

PHOTO INFORMATION

PROJECT NAME: Clark Fork Stream Mitigation Site

DATE: July 25, 2013

CONFLUENCE

Photo 1
Description: View upstream looking at revetment.
Taken in 2013

Photo 4
Description: Willow growth at top of revetment.
Taken in 2013

Photo 2
Description: Toe of revetment looking upstream.
Taken in 2013

Photo 5
Description: Weedy streambank/work area.
Taken in 2013

Photo 3
Description: Middle of revetment looking upstream.
Taken in 2013

Photo 6
Description: Sandbar willow growth and bare ground.
Taken in 2013

PHOTO INFORMATION

PROJECT NAME: Clark Fork Stream Mitigation Site

DATE: July 25, 2013

Photo 7
Description: Eroding streambank at upstream extent.
Taken in 2013

Photo 10
Description: Close-up of sandbar willow growth.
Taken in 2013

Photo 8
Description: Middle of revetment looking downstream.
Taken in 2013

Photo 11
Description: Upstream extent of rip-raped streambank.
Taken in 2013

Photo 9
Description: Looking downstream at revetment.
Taken in 2013

Photo 12
Description: Weedy and bare re-sloped work area.
Taken in 2013

PHOTO INFORMATION

PROJECT NAME: Clark Fork Stream Mitigation Site

DATE: July 25, 2013

Photo 13
Description: Looking downstream at revetment.
Taken in 2013

Photo 14
Description: Looking downstream at revetment.
Taken in 2013