Walsh
Environmental Scientists and Engineers, LLC
an ecology and environment company

December 29, 2010

Mr. Nick Mezei
U.S. Army Corps of Engineers
Sacramento District
Grand Junction Regulatory Office
400 Rood Avenue
Grand Junction, CO 81501-2520

Re: 2010 Monitoring Report for the Phase 1 Edwards Eagle River Restoration Project in Eagle County, Colorado, Corps File No. SPK-2008-00608-CW

Dear Mr. Mezei:

On behalf of the permit holder, the Eagle River Watershed Council (Council), Walsh Environmental Scientists and Engineers, LLC (Walsh) is submitting this letter report to fulfill wetland mitigation monitoring requirements for the Phase 1 Edwards Eagle River Restoration Project in Eagle County, Colorado. This letter documents current site conditions following the first runoff period and growing season.

Instream enhancements and riparian vegetation restoration on the Eagle River serve as mitigation for permitted impacts to jurisdictional waters of the U.S. under Nationwide #27 authorization (Corps File No. SPK-2008-00608-CW). All Phase 1 instream work was completed in the fall of 2009. Phase 1 vegetation installation was completed except for approximately 1,400 willow stakes and 1,400 upland native grass plugs.

Contact information for the project is provided below:

APPLICANT	**AGENT**
Eagle River Watershed Council Attn: Melissa Macdonald P.O. Box 7688 82 Benchmark Blvd., Suite 203 Avon, CO 81620 P.O. Box 7688	Jackie Blumberg, PE Walsh Environmental Scientists and Engineers, LLC 4888 Pearl East Circle, Suite 108 Boulder, CO 80301 Phone: (303) 443-3282 Fax: (303) 443-0367

SITE DESCRIPTION AND LOCATION

The project reach is approximately 1.6 miles long and is located in the community of Edwards in Eagle County, Colorado. The reach begins about ½-mile downstream of the Edwards Spur Road Bridge and ends at the Hillcrest Drive Bridge. (refer to *Figure 1 – Site Location Map*).

The downstream limits are at latitude 39 degrees, 39 minutes, and 16 seconds; longitude 106 degrees, 37 minutes, and 45 seconds. The upstream limits are at latitude 39 degrees, 39 minutes, and 03 seconds;

longitude 106 degrees, 36 minutes. Geographically, the project is located in Section 36, Township 4 South, Range 83 West; Section 31, Township 4 South, Range 82 West; and Sections 5 and 6, Township 5 South, Range 82 West. The property straddles the *Wolcott, Colorado* and *Edwards, Colorado* USGS 7.5 minute quadrangle maps in Eagle County, Colorado.

The project site is divided into five reaches. Instream and vegetation restoration in Phase 1 included work in Reaches 1 and 2 and the upper part of Reach 5. Additional vegetation was planted along Lake Creek, which is a tributary to the Eagle River (refer to *Figure 2 – Site Overview/Orientation Map*).

PROJECT BACKGROUND AND DESCRIPTION

A Nationwide Permit #27 was issued by the U.S. Army Corps of Engineers (USACE) on June 16, 2008 authorizing discharge of fill material in waters of the United States instream channel improvements and bank stabilization for Phase 1 of the Edwards Eagle River Restoration Project.

Instream Improvements

Implementation of instream improvements was initiated in September of 2008, with completion of all structures except bar 1-15 in December of 2008. Bar 1-15 was delayed due to ice-over in the river and was completed in November of 2009.

Instream channel improvements included 11 cobble bar installations, which are summarized in Table 1 below.

Table 1. Cobble Bar Treatments

TREATMENT NO.	REACH	BAR TYPE
1-1	5	Channel bar enhancement
1-2	5	Point bar enhancement
1-4	5	Point bar enhancement
1-5	5	Channel bar enhancement
1-6	5	Channel bar enhancement
1-8	5	Point bar enhancement
1-9	5	Point bar enhancement
1-15a & b	2	Point bar enhancement
1-17	2	Point bar enhancement
1-20	1 & 2	Point bar enhancement
1-22	2	Point bar enhancement

The cobble bars were engineered to meet multiple goals of long-term stability, improved aquatic health, and use of natural substrate. Boulders were installed as a stabilizing framework for the bars, allowing use of the smaller cobbles and gravels that are both appropriate to the system and more functional for aquatic habitat than expanses of large boulders.

Channel bars were located at strategic points for low flow concentration and associated with side channel features. Point bars were located in an alternating fashion, from right bank to left bank, to mimic naturally occurring depositional bars that form on the inside bend of riffle-pool systems. The bars rectify overly high width to depth ratios, functioning to increase flow depths and velocities under low flow

conditions, thereby reducing fine sedimentation and lowering critical high temperatures and low dissolved oxygen content in the summer. The bars in Reaches 1 and 2 also improve downstream water quality by enhancing effluent mixing with the receiving waters at the outfall of the Edwards Wastewater Treatment Plant.

Additional instream treatments included boulder/cobble toe treatments and bank enhancements for stability and improved vegetative conditions. These treatments are summarized in Table 2 below.

Table 2. Toe and Bank Treatments

TREATMENT NO.	**REACH**	**BAR TYPE**
1-3	5	Boulder/cobble toe
1-7	5	Boulder/cobble toe & bank enhancement
1-16	2	Boulder/cobble toe

In concert with the bar, toe, and bank treatments, aquatic health and function were improved through the strategic placement of habitat boulders, habitat logs, and log spurs throughout the reaches.

Restoration treatments for the Edwards project did not include alterations to channel invert elevations (i.e., no changes to the longitudinal profile).

Treatment numbers 1-18, 1-19, and 1-21 on the drawings were placeholders for treatments requiring only vegetative materials. These became integrated into the final plans for vegetation restoration and as such relabeled. Numbers falling in the gap between 1-9 and 1-15 are treatment areas that are outside of the Phase 1 project.

Vegetation Restoration

Vegetation restoration included plantings over a 5-acre area to increase currently lacking tree and shrub cover along the channel. Large trees and shrubs were installed to shade the river, and shrub plantings were located to stabilize banks and provide understory diversity and structure. Vegetation installation occurred between July and November of 2009 and consisted of approximately 9,300 nursery-grown containerized shrubs and 3,050 containerized trees.

MONITORING METHODOLOGY AND PERFORMANCE CRITERIA

Monitoring and documenting the success of the mitigation efforts is required under the Special Conditions section of the Section 404 Nationwide Permit. Annual reports are to be submitted to the USACE prior December 31st until the USACE determines that the restoration measures are self-sustaining.

Performance criteria stipulate that for the project to be successful, the mitigation area shall consist of at least 85 percent riparian vegetation coverage (determined by ocular estimate of herbaceous foliar cover) within the mitigation area, with less than 10 percent weed growth, and an 80 percent success rate for all planted trees and shrubs.

Annual monitoring reports for 2010 and beyond will include the following documentation:

- Permit number and project location.
- Assessments of plant establishment.

- A discussion of site conditions to include successes, failures, and problem areas, with documentation for any corrective or maintenance activities conducted since the previous report submission.
- Maps and drawings as needed for illustration.
- Photographs of the project areas taken from fixed photographic monitoring points.

Instream Improvements

The appearance, stability, and overall condition of instream features will be evaluated through annual site inspection and qualitative assessment. All enhancements will be evaluated to assess integrity and stability condition, state of river corridor's natural functions, and ability to support plant establishment.

Vegetation Restoration

The health and overall condition of native trees and shrubs planted along the Eagle River will be ascertained through annual site inspection and qualitative assessment of species density and diversity, and health and vigor of the plant material. The trees and shrubs will be inspected for signs of regeneration of the planted material and will include an examination for any signs of deterioration, stress or wildlife predation.

Due to an effort initiated this year to coordinate Section 404 monitoring with the Measureable Results Program of the Colorado Water Conservancy Board Healthy Rivers Fund Program, the approach to monitoring was modified slightly from that discussed in the 2009 monitoring report. Vegetation monitoring for Phase 1 will include:

- Assessment of bank conditions at established photo points.
- Establishment of four 6 foot-wide belt transects, parallel to the river, (with one transect per bank side for Reaches 1 and 2 and one per bank side for Reach 5) to measure presence of woody material on banks. Within each belt transect, the number of live stems will be counted and recorded by species. A visual estimate of canopy cover will also be made by species. The inside edge of the belt transect will begin at the edge of water.
- Establishment of four 6 foot-wide belt transects perpendicular to the river, (with one transect per bank side for Reaches 1 and 2 and one per bank side for Reach 5) to characterize native plant cover from bank to upland. Belt transects will extend from the bank to the outer edge of the planted area. Within each belt transect, the number of live stems will be counted and recorded by species, and a visual estimate of canopy cover will also be made by species.
- Representatives of the largest-sizes of narrowleaf cottonwood trees will be tagged, and height and crown diameter will be measured to track increases in shade cover.
- A qualitative assessment of the overall effect of all of the planted woody vegetation will be made, including cover, diversity, and general community structure.
- The location of significant populations of noxious weeds and/or other invasive plants adversely affecting establishment of the mitigation plantings will be identified and the size of the populations estimated.
- Locations and species of any woody plants that have failed and need to be replaced, or that may require maintenance will be noted.

Maintenance and Remediation

Concerns or problem areas (i.e., noxious weed recruitment, failing vegetation, signs of wildlife predation, etc.) identified during the monitoring surveys will be brought to the attention of the Council following the

site visit so that any problems can be rectified in a timely manner. Any remedial activities completed prior to report preparation will be documented in that year's report.

Photographic Documentation

During 2009, replicable photo points were established at key locations to provide optimum visual documentation of the instream and riparian vegetation enhancement efforts. Successive photographs taken each year will be used to document changes in channel enhancements or vegetative growth and patterns, and the photos will be referenced in the monitoring reports to clarify or support the information presented.

PHASE 1 - 2010 STATUS SUMMARY

Instream Improvements

The Eagle River experienced sustained high peak flows during the summer months of 2010. Discharges reported at the Avon gage upstream of the project reach exceeded 2,500 cfs for 10 days throughout May and June, and an annual peak of 4,460 was reported on June 6. Peak flows in 2010 not only greatly exceeded those in 2009, but also exceeded the 50-year discharge for the corridor. The Gypsum gage located downstream of the project reach measured its highest peak flow within its over 60 year period of record.

All cobble bars remained intact and no bank failure within the Phase 1 reaches was noted. Additionally, no dislodged or mobilized woody debris originating from Phase 1 treatments was observed in 2010. Overall, Phase 1 treatments performed well in 2010 and no maintenance of the cobble bars or banks is required.

Vegetation Restoration

Overview: Vegetation establishment over the entire project site is trending generally in a positive direction. There are areas where vegetation success is outstanding, and areas where it has been negatively impacted by various factors and re-planting will be necessary. These are summarized below:

PLANTING AREA	QUALITATIVE ESTIMATE OF PLANT SURVIVAL	COMMENTS
Reach 1 South Bank	Very Good	Stable banks but additional willow structure and diversity needed; especially at downstream end.
Reach 1 South Terrace	Good	Good tree species diversity, but additional cottonwood plantings are needed.
Reach 2 South Bank	Poor	Stable banks, but many willows and other shrubs were lost to high runoff flows and disease, especially at the upstream end. Will need additional willow and shrub plantings.
Reach 2 South Terrace	Poor to Good	High runoff flows buried many new trees and shrubs with debris. Cottonwoods lost to beaver should be re-planted as this is a good area to shade the river.
Reach 5 South Bank	Good to Very Good	Stable banks except for one area (approx. 60' long) in need of additional willows. Shrubs at far

		upstream end lost to poor maintenance early in the season.
Reach 5 South Terrace	Very Good	Excellent cottonwood and hawthorn success; but fewer shrubs than expected.
Reach 1 North Bank	Poor	Banks are stable due to predominance of boulders, but additional willow stakes are needed for habitat value.
Reach 1 North Terrace	Poor	Trees and shrubs were lost to poor maintenance early in the season.
Reach 2 North Bank	Poor to Excellent	Unvegetated banks at the downstream end are protected somewhat by the cobble bar, and are stable. Saline seeps have inhibited establishment of rooted and bare-root willows. Banks upstream of the boat launch are well-vegetated and stable.
Reach 2 North Terrace	Poor to Excellent	Cottonwood establishment downstream of the boat launch was hindered by saline seeps and beaver damage. Tree and shrub establishment and diversity upstream of boat launch has been excellent.
Reach 5 North Bank	Excellent	All banks are stable. Very good survival of containerized willows was supplemented by willow stakes.
Reach 5 North Terrace	Excellent	Excellent tree diversity and survival; very good shrub diversity and survival.

There were several factors that negatively impacted plant survival. Although the majority of the large cottonwood trees had wire sleeves protecting the trunks, some of the early versions of the wire sleeves installed by volunteers did not prevent beaver damage. These were corrected as soon as the problem was noticed. In Reaches 2 North and 2 South, the beaver also removed small trees that were less than 1/3" diameter. This had not been expected, and the maintenance contractor was unable to respond to the problem in a timely manner.

In the area of the boat launch, saline seeps that had previously been contained to one area expanded and became more severe. This affected all tree species that were planted, for a distance of approximately 350 linear feet downstream of the boat launch. It is not yet discernable if the sandbar willow shrubs will be affected.

There were two areas where woody debris deposited by high water overwhelmed new plantings: in the central part of Reach 2 South and at the upstream end of Reach 5 North. The debris was removed and future plantings will be located so that they will not be in the areas prone to debris accumulation.

The area experienced a drier than normal summer precipitation pattern. Although watering had been scheduled and budgeted for, it was difficult for the maintenance crews to keep enough water on the plants, especially in Reach 1 North. Some of the plants had already been stressed by lack of watering earlier in the summer by a maintenance contractor whose work was deficient and who was later removed from the project. Additionally, some of the nursery stock was diseased. These plants probably could have recovered in better conditions but once stressed, were not able to recover in the prolonged heat.

One shrub species that had been planted in 2009, twinberry honeysuckle (*Lonicera involucrata*), was not present this year in any project areas. It existed naturally on the site prior to this project; therefore, it is

assumed that the nearly total loss is due to poor nursery stock. In addition, the majority of nursery-grown shrub willows and red-twig dogwood (*Cornus sericea*) showed signs of blight in late spring. About half of the willows and less than one quarter of the dogwoods did recover over the course of the growing season.

A detailed assessment of vegetation establishment is described below for each reach on each side of the river. Recommendations for remedial planting and maintenance are also listed for each area.

Reach 1 South Bank and Terrace

Parallel Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Alnus incana	5	2%
Betula occidentalis	31	5%
Cornus sericea	3	<1%
Ribes aureum	19	5%
*Rosa woodsii**	53	5%
Salix monticola	5	<1%
Salix planifolia	12	5%

*The majority of Rosa woodsii were pre-existing

Perpendicular Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Betula occidentalis	1	<1%
Populus angustifolia	1	<1%
Prunus virginiana	3	<1%
Ribes aureum	9	<1%
Salix planifolia	7	<1%

Cottonwood tree measurements:
There was not a tree to measure.

Bank condition: Banks are vertical, but stable and protected by a cobble bar and cobbly soils in the lower area.

Summary and Recommendations for Reach 1 South: This area received heavy beaver damage, and additional cottonwood tree plantings are needed. Average survival of trees and shrubs on terraces is approximately 60%. Average survival of shrubs on banks is approximately 75%. Willow stakes should be planted in a dense pattern in the lowermost 70 feet of bank and scattered within the remaining 180 linear feet upstream. There has been a significant increase in cover of goosefoot (*Chenopodium spp*.) and this should be mown in the early part of the 2011 growing season and supplanted with grass seed.

Reach 2 South Bank and Terrace

Parallel Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Salix species	16	<1%

Perpendicular Belt Transect Results:

Perpendicular belt transect not established, due to lack of plants

Cottonwood tree measurements:
3.5' tall x 1.5' wide

Bank condition: All banks are stable at present, but the upper section of this reach is vulnerable.

Summary and Recommendations for Reach 2 South: All banks would benefit from additional willow and shrub plantings. (However, there are signs of saline seeps in the central and downstream sections of this reach.) Average survival of trees and shrubs on terraces ranges from 20% to 75%. Average survival of shrubs on banks is 20% to 50%. Additional cottonwood tree plantings are recommended, and the upper 300 linear feet of bank needs dense willow staking. There is a patch of white top (*Cardaria spp*.) approximately 50' x 50' in size on adjacent private property that should be controlled.

Reach 5 South Bank and Terrace

Parallel Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Alnus incana	1	<1%
Cornus sericea	9	5%
Crataegus douglassii	3	5%
Populus angustifolia	2	20%
Ribes aureum	1	<1%
Rosa woodsii	3	<1%
Salix species	25	10%

Perpendicular Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Populus angustifolia	2	10%
Populus angustifolia	47	20%

Cottonwood tree measurements:
8.5' tall x 5' wide
10' tall x 4' wide
11' tall x 6' wide

Bank condition: Stable and well-vegetated, except for one section approximately 60' long that worsened after this year's high flows.

Summary and Recommendations for Reach 5 South: Shrubs in the uppermost 100' of bank treatment were out-competed by yellow sweet clover and could not be seen by maintenance crews to be watered. Weed control and shrub replacements need to occur in this area. Survival of bank plantings is estimated at 80+%. Survival of riparian trees and shrubs on the terrace ranges from 50% to 90% in different areas. Cottonwood and hawthorn tree survival is very good overall, but the shrub understory is struggling in some areas. Dense willow stake plantings are needed in a 70' section, and should also be scattered along banks throughout the reach to supplement existing plantings. Control of Canada thistle, which has occurred for the past two years, should continue.

Reach 1 North Bank and Terrace

Parallel Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Cornus sericea	1	<1%
Prunus virginiana	5	<1%
Rosa woodsii	1	<1%
Salix exigua	1	<1%
Symphoricarpos oreo.	1	<1%

Perpendicular Belt Transect Results:
A perpendicular belt transect was not established for Reach 1 North.

Cottonwood tree measurements:
There was not a tree to measure.

Bank condition: Banks are nearly vertical, but stable.

Summary and Recommendations for Reach 1 North: Although sparsely vegetated, the bank is stable due to the presence of large cobbles and boulders. Additional willow stake plantings would improve habitat. Cottonwood trees did not survive, mainly as a result of lack of watering early in the growing season. It is recommended that cottonwood trees be re-planted.

Reach 2 North Bank and Terrace

Parallel Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Alnus incana	5	4%
Betula occidentalis	9	15%
Cornus sericea	6	<1%
Populus angustifolia	3	2%
Salix monticola	5	<1%
Salix planifolia	2	<1%

Perpendicular Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Alnus incana	1	<1%
Amelanchier alnifolia	6	2%
Cornus sericea	1	<1%
Ribes aureum	1	<1%
Ribes cereum	1	<1%
Prunus virginiana	1	<1%
Salix monticola	3	5%

Cottonwood tree measurements:
5.4' tall x 1.3' wide

Bank condition: Banks in the lower section, from the boat launch downstream, are barren. This is due mainly to the saline seeps in the area. Banks from the boat launch upstream are well-vegetated with pre-existing native grasses and shrub willows.

Summary and Recommendations for Reach 2 North: Overall plant survival upstream of the boat launch is 85%-95%. Below the boat launch, it is approximately 50%, with the upland plants showing the best establishment. Goosefoot is well-established on the terrace downstream of the boat launch, and should be addressed. It is recommended that trial plantings of different species be placed in the saline areas to determine which plants have the highest tolerance.

Reach 5 North Bank and Terrace

Parallel Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Cornus sericea	4	<1%
Populus angustifolia	37	30%
Ribes aureum	6	1%
Salix spp.	55	30%

Perpendicular Belt Transect Results:

Species	# Live Stems	Visual Estimate of Cover
Cornus sericea	2	<1%
Populus angustifolia	15	15%
Ribes aureum	5	1%
Salix spp.	2	1%

Bank condition: Banks are well-vegetated and stable.

Summary and Recommendations for Reach 5 North: Overall plant survival and vigor in this reach is the best of all planted areas and is estimated to be 85%-95%. No remedial action is recommended.

Maintenance and Remediation for Instream Treatments

No remedial activities are required at the end of 2010 for cobble bars or bank treatments.

Photographic Documentation

Photographic documentation in this report includes representative before and after photo pairs, with after photos taken at the end of the 2010 growing season. (Refer to *Photo Point Locations* and *Photographic Documentation*).

PHASE 1 FOLLOW-UP TASKS FOR 2011

A detailed map depicting locations and quantities for willow stake and cottonwood tree plantings, and priorities for weed control will be prepared for the Council to use for planning and budgeting purposes. The Council experienced good success with using volunteer labor for willow stake harvest and planting, and they plan to continue this approach in 2011. The Council will continue its efforts to secure grant funding for plant maintenance throughout the 2011 growing season. Weed control will commence in early spring, watering will resume in late spring, and grass mowing around plantings will occur in early summer to reduce competition to establishing shrubs.

Please contact Walsh if you have questions on the information provided in this letter report.

Sincerely,

Walsh Environmental Scientists and Engineers, LLC

Jackie Blumberg, PE
Water Resource Engineer

Cc: Melissa Macdonald, Eagle River Watershed Council

Attachments: Figure 1 – Site Location Map
Figure 2 – Site Overview/Orientation Map
Photo Point and Belt Transect Locations (2 sheets)
Photographic Documentation – Engineering Treatments
Photographic Documentation – Vegetation

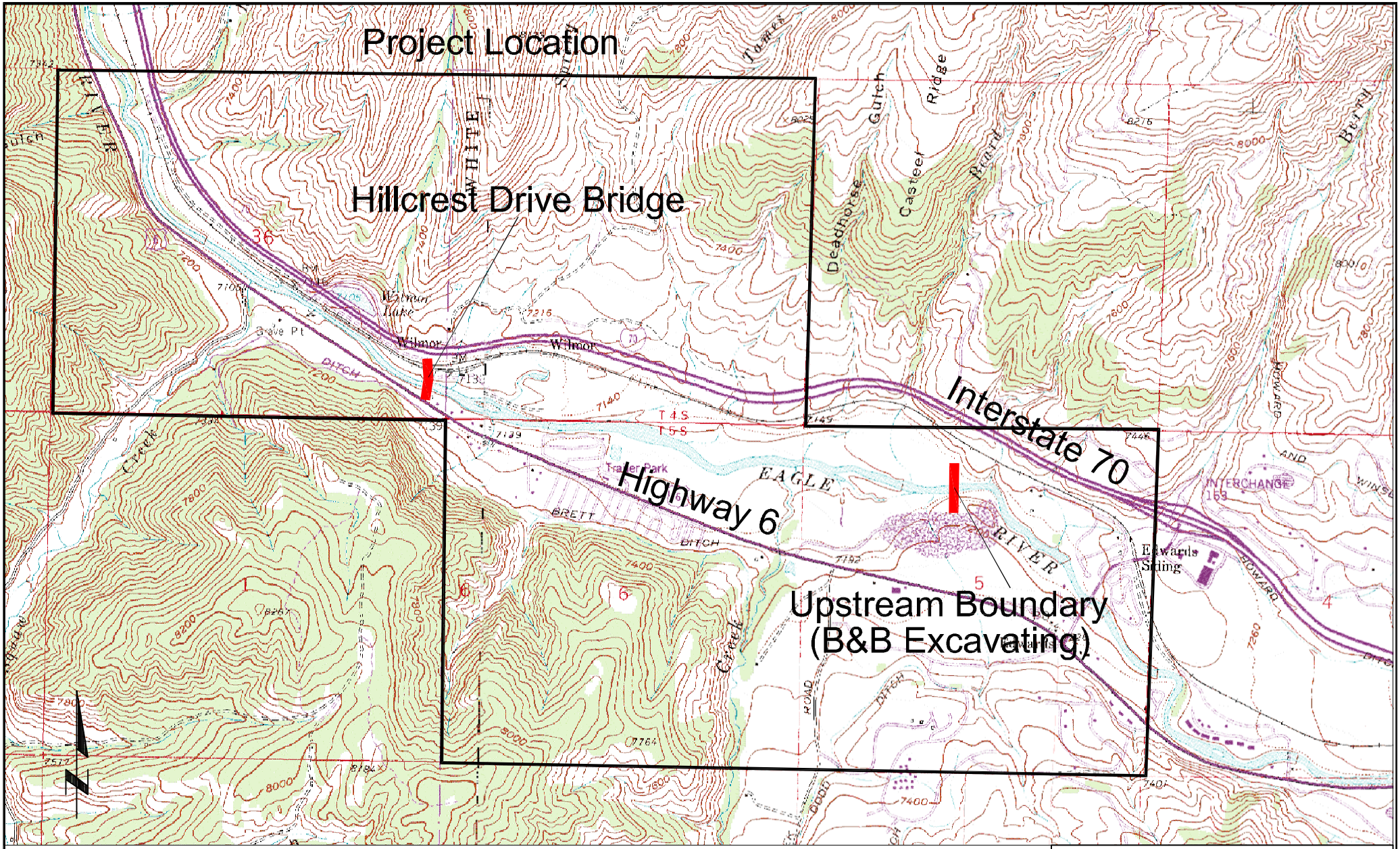
REFERENCES

U.S. Department of the Army, U.S. Army Corps of Engineers. 2008. Interim regional supplement to the Corps of Engineers wetland delineation manual: Western Mountains, Valleys, and Coast Region. Engineer Research and Development Center ERDC/EL TR-08-12.

U.S. Department of the Interior, Geological Survey. *Wolcott, Colorado* Quadrangle (7.5 minute Topographic Series). U.S. Geological Survey, Denver, Colorado.

U.S. Department of the Interior, Geological Survey. *Edwards, Colorado* Quadrangle (7.5 minute Topographic Series). U.S. Geological Survey, Denver, Colorado.

Weber, W.A., 1987. Colorado Flora: Western Slope. Colorado Associated University Press. Third Edition.



Hillcrest Drive Bridge located at Township 4 South and Range 83 West, Section 36 (Wolcott quadrangle)
lat: 39 deg 39 min 15 sec and long: 106 deg 37 min 41 sec

Source: USGS Wolcott
and Edwards quadrangles

SCALE: 1" = 2000'
2000 0 1000 2000

SITE LOCATION MAP

No.	Revisions	Date	By
#1			
#2			
#3			

Date:	January 5, 2008	Drawn By:	JB
Project No.	7403-030	Checked By:	
Drawing:	Figure 1	Sheet	1 of 1

Walsh
Environmental Scientists and Engineers, LLC

EDWARDS EAGLE RIVER RESTORATION - EAGLE RIVER WATERSHED COUNCIL

300 0 300 600

22 X 34" SCALE: 1" = 300'
11 X 17" SCALE: 1" = 600'

U:\ACAD\Wetland E&T Species\7403 - Edwards Eagle River Restoration\060 Phase III Veg Constr Support\As-Built\Lake Creek + Reach 5-S+ overview.dwg

Figure 2

NO.	DATE	REVISIONS	BY	CHK

PROJECT NO:
DRAWN:
DESIGNED:
CHECKED:
DATE: 12-30-09

Walsh
Environmental Scientists and Engineers, LLC
an ecology and environment company
303-443-3282 Contact: Susan Nordstrom

Eagle River Watershed Council
82 E. Beaver Creek Blvd.
P.O. Box 7688
Avon, Colorado 81657
970-827-5406 Contact: Melissa Macdonald

Eagle River Water & Sanitation District
846 Forest Road
Vail, Colorado 81657
970-476-7480 Contact: Andy Strehler

EDWARDS EAGLE RIVER RESTORATION PHASE 1

SITE OVERVIEW/ORIENTATION

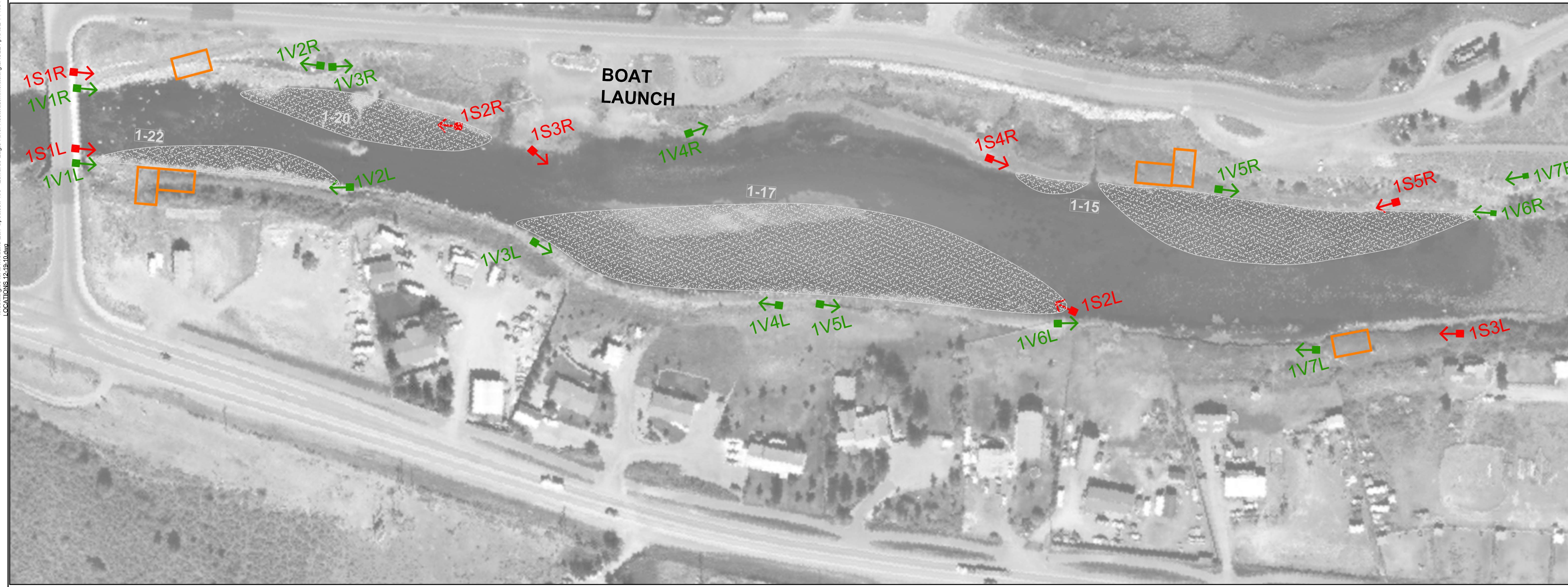


PHOTO POINT KEY

1V1R → PHASE 1, VEGETATION, POINT NUMBER, RIGHT/LEFT BANK

1S1R → PHASE 1, STREAM, POINT NUMBER, RIGHT/LEFT BANK

BELT TRANSECT

FOR THE EDWARDS REACH:
RIGHT BANK = NORTH BANK
LEFT BANK = SOUTH BANK

100 0 100 200

NO.	DATE	REVISIONS	BY	CHK

PROJECT NO: 7403-090
DRAWN: SN
DESIGNED:
CHECKED:
DATE: 12-29-10

Walsh
Environmental Scientists and Engineers, LLC
an ecology and environment company
303-443-3282 Contact: Julie Ash

Eagle River Watershed Council
82 E. Beaver Creek Blvd.
P.O. Box 7688
Avon, Colorado 81620
970-827-5406 Contact: Melissa Macdonald

Eagle River Water & Sanitation District
846 Forest Road
Vail, Colorado 81657
970-476-7480 Contact: Andy Strehler

EDWARDS EAGLE RIVER RESTORATION
PHOTO POINT AND TRANSECT LOCATIONS
REACHES 1 & 2

1 / 2

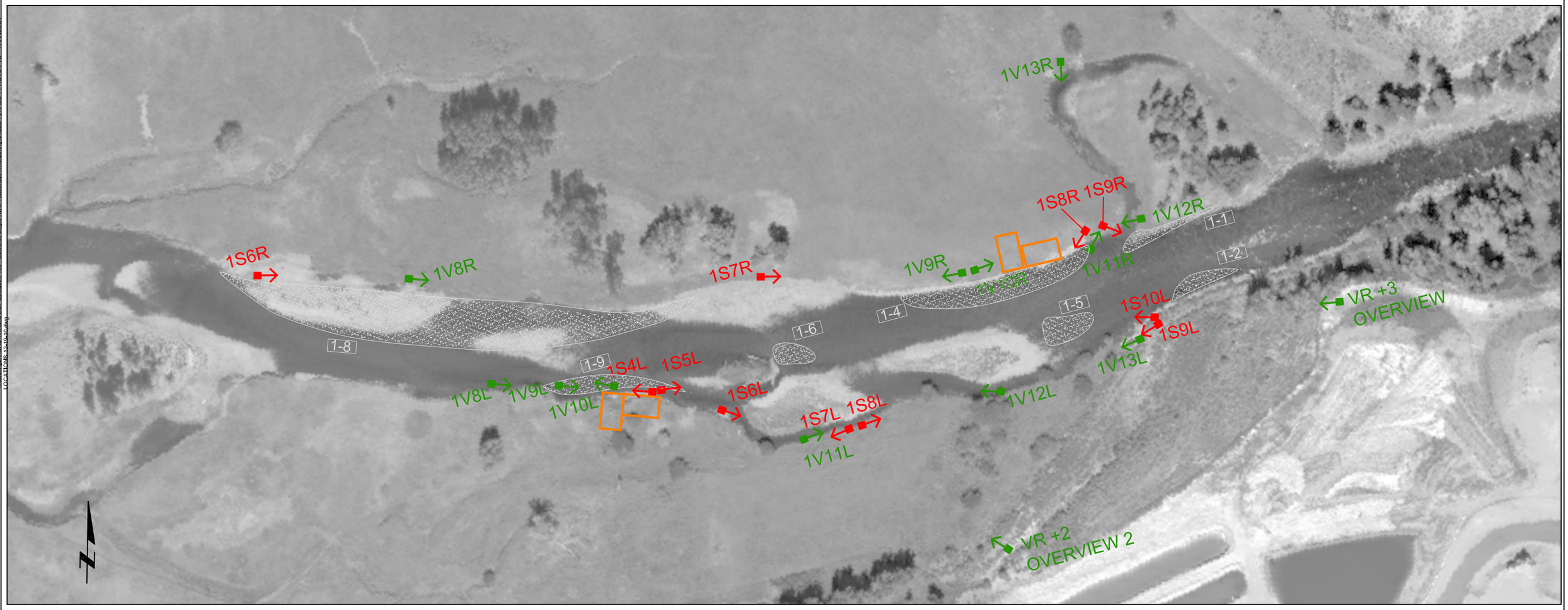


PHOTO POINT KEY

1V1R → PHASE 1, VEGETATION, POINT NUMBER, RIGHT/LEFT BANK

1S1R → PHASE 1, STREAM, POINT NUMBER, RIGHT/LEFT BANK

▭ BELT TRANSECT

FOR THE EDWARDS REACH:
RIGHT BANK = NORTH BANK
LEFT BANK = SOUTH BANK

100 0 100 200

N

NO.	DATE	REVISIONS	BY	CHK

PROJECT NO:	7403-090
DRAWN:	SN
DESIGNED:	
CHECKED:	
DATE:	12-29-10

Walsh
Environmental Scientists and Engineers, LLC
an ecology and environment company
303-443-3282 Contact: Julie Ash

Eagle River Watershed Council
82 E. Beaver Creek Blvd.
P.O. Box 7688
Avon, Colorado 81620
970-827-5406 Contact: Melissa Macdonald

Eagle River Water & Sanitation District
846 Forest Road
Vail, Colorado 81657
970-476-7480 Contact: Andy Strehler

EDWARDS EAGLE RIVER RESTORATION
PHOTO POINT AND TRANSECT LOCATIONS
REACH 5

EAGLE RIVER PHASE 1
2010 MONITORING REPORT
PHOTOGRAPHIC DOCUMENTATION
ENGINEERING TREATMENTS

Point 1S1L: October 2008

Point 1S1L: 9-3-10

Point 1S2L: November 2008 during construction, looking across the river at Bar 1-17 from right bank.

Point 1S2L: 10-5-10 Reach 2, left bank, looking downstream to Bar 1-17.

Point 1S3L: November 2006

Point 1S3L: 10-5-10 Reach 2, looking downstream along Boulder/cobble Toe Treatment 1-16.

Point 1S4L: June 2008

Point 1S4L: 10-13-10 Reach 5, left bank, looking downstream to Bar 1-9.

Point 1S5L: June 2008

Point 1S5L: 10-13-10 Reach 5, left bank, looking upstream to Plug 1-6.

Point 1S6L: June 2008

Point 1S6L: 10-13-10 Reach 5, left bank, looking upstream to existing grade control augmentation. Habitat logs are also visible.

Point 1S7L: June 2008

Point 1S7L: 10-13-10 Reach 5, side channel along left bank, looking downstream at side channel.

Point 1S8L: June 2008

Point 1S8L: 10-13-10 Reach 5, side channel along left bank, looking upstream at side channel.

Point 1S9L: September 2006

Point 1S9L: 10-13-10 Reach 5, left bank, looking downstream to Bar 1-5.

Point 1S10L: June 2008

Point 1S10L: 10-13-10 Reach 5, left bank, standing on bank near 1-9 looking up-stream.

Point 1S1R: December 2007

Point 1S1R: 9-3-10 Reach 1, right bank, looking upstream from Hillcrest Drive bridge, showing Bars 1-20 and 1-22.

Point 1S2R: September 2008

Point 1S2R: 9-3-10 Reach 1, right bank, looking downstream to Hillcrest Drive bridge, across Bar 1-20.

Point 1S3R: October 2008

Point 1S3R: 9-3-10 From the boat launch, looking across/up river toward Bar 1-17 (in background).

.

Point 1S4R: November 2006 Reach 2, right bank, looking upstream at Bar 1-15a.

Point 1S4R: 9-3-10 Reach 2, right bank, looking upstream at Bar 1-15a, with Bar 1-15 in the background.

.

Point 1S5R: November 2006

Point 1S5R: November 2009 Reach 2, right bank, looking downstream to Bar 1-15b.

Point 1S6R: November 2006

Point 1S6R: 10-5-10 Reach 5, right bank, looking upstream at Bar 1-8.

Point 1S7R: November 2006

Point 1S7R: 10-5-10 Reach 5, right bank, looking upstream at Bar 1-1.

Point 1S8R: November 2006

Point 1S8R: 10-5-10 Reach 5, right bank, looking downstream) to Bar 1-4.

Point 1S9R: November 2006

Point 1S9R: 10-5-10 Reach 5, right bank, looking upstream to oxbow confluence and Bar 1-1.

EAGLE RIVER PHASE 1
2010 MONITORING REPORT
PHOTOGRAPHIC DOCUMENTATION
VEGETATION

Point 1V1L: 6-12-09 Pre-planting, from Hillcrest Bridge looking upstream at cobble bar 1-22.

Point 1V1L: 9-3-10 Willows planted on the bank; cottonwoods and shrubs on the terrace, and transitional shrubs, spruce, and juniper interplanted into existing shrubs on the slope.

Point 1V2L: 10-30-08 Pre-planting, from Cobble Bar 1-22 looking downstream at riparian terrace.

Point 1V2L: 10-20-09 Willows planted on the bank; cottonwoods and shrubs on the terrace, and transitional shrubs, spruce, and juniper interplanted into existing shrubs on the slope. (2010 photo not available)

Point 1V3L: 10-30-08 Pre-planting, from Cobble Bar 1-22, looking upstream.

Point 1V3L: 10-5-10 Willows planted on the bank; with cottonwoods, alder, and birch on slope.

Point 1V4L: 10-30-08 Pre-planting, from Cobble Bar 1-17, looking downstream.

Point 1V4L: 10-5-10 Willows planted at the river edge; with cottonwoods and mixed shrubs behind.

Point 1V5L: 6-26-09 Pre-planting, adjacent to Cobble Bar 1-17, looking upstream.

Point 1V5L: 10-5-10 Willows planted at the river edge; with cottonwoods, mixed shrubs, and spruce behind.

Point 1V6L: 9-26-08 Pre-planting, at bank Treatment Area 1-16, looking upstream.

Point 1V6L: 10-5-10 Bank planted densely with willows; cottonwoods and mixed shrubs on riparian terrace, and upland shrubs on slope.

Point 1V7L: 10-30-08 Pre-planting, looking downstream toward Treatment Area 1-17.

Point 1V7L: 10-5-10 Bank planted with willows..

Point 1V8L: 6-25-09 Pre-planting, looking upstream at side channel.

Point 1V8L: 10-13-10 Willows on bank; narrowleaf cottonwood, hawthorn, and mixed shrubs behind.

Point 1V9L: 6-25-09 Pre-planting, looking upstream at side channel.

Point 1V9L: 10-13-10 Willows, dogwood, honeysuckle, and currant on bank; cottonwoods and mixed shrubs behind.

Point 1V10L: 6-25-09 Pre-planting, where side channel joins river, looking down-stream toward Cobble Bar 1-9.

Point 1V10L: 10-13-10 Willows on bank; cottonwoods and mixed shrubs behind.

Point 1V11L: 8-14-09 Pre-planting, at upstream end of side channel.

Point 1V11L: 10-13-10 Willows, dogwood, and currant on bank; cottonwoods, hawthorns, and mixed shrubs behind.

Point 1V12L: 6-3-08 Pre-planting, looking downstream.

Point 1V12L: 10-13-10 Willows, dogwood, honeysuckle, and currant on bank; hawthorns, and mixed shrubs behind.

Point 1V13L: 10-30-08 Pre-planting, looking downstream at recently-installed log-rock deflectors.

Point 1V13L: 8-21-09 Willows, dogwood, honeysuckle, and currant on bank; hawthorns, and mixed shrubs behind.

VR+3 Overview: 6-25-08 Pre-planting, looking downstream from upstream end of project area.

VR+3 Overview: 9-28-10 Looking downstream from upstream end of project area.

Overview 2: Photo not available for 2010.

Point 1V1R: 8-7-09 Pre-planting, looking upstream from the Hillcrest Bridge toward Cobble Bar 1-20.

Point 1V1R: 9-23-10

Point 1V2R: 7-14-09 Pre-planting, looking downstream from Cobble Bar 1-20 toward the Hillcrest Bridge.

Point 1V2R: 9-3-10

Point 1V3R: 7-14-09 Pre-planting, looking upstream from Cobble Bar 1-20 toward the boat launch.

Point 1V1R: 9-3-10

Point 1V4R: 8-7-09 Pre-planting, looking upstream from the boat launch.

Point 1V4R: 11-6-09 Willows, birch, alder, dogwood, honeysuckle, and currant near bank, with cottonwoods and mixed shrubs behind. (2010 Photo not available)

Point 1V5R: 11-09 Pre-planting, looking upstream from Cobble Bar 1-15.

Point 1V5R: 9-3-10 Looking upstream from Cobble Bar 1-15; willow and birch plantings in foreground.

Point 1V6R: 10-20-09 Pre-planting, looking downstream from Cobble Bar 1-15.

Point 1V6R: 9-3-10 Willows, birch, alder, dogwood, honeysuckle, and currant near bank, with cottonwoods and mixed shrubs behind. Silver buffaloberry, three-leaf sumac, wax currant, and big sage interplanted with existing shrubs on upper bank.

Point 1V7R: 10-20-09 Pre-planting, upland area above Cobble Bar 1-15.

Point 1V7R: 9-3-10 Silver buffaloberry, three-leaf sumac, wax currant, big sage, western serviceberry, Wood's rose, and Rocky Mountain juniper planted into existing crested wheatgrass.

Point 1V8R: 11-24-08 Pre-planting, looking upstream from Cobble Bar 1-8.

Point 1V8R: 10-5-10 Willows, dogwood, honeysuckle, and currant near bank, with cottonwoods, blue spruce, and mixed shrubs behind.

Point 1V9R: 11-24-08 Pre-planting, looking downstream from Cobble Bar 1-4.

Point 1V9R: 10-5-10

Point 1V10R: 11-24-08 Pre-planting, looking upstream from Cobble Bar 1-4.

Point 1V10R: 10-5-10 Willows, dogwood, honeysuckle, and currant near bank, with cottonwoods, blue spruce, and mixed shrubs behind.

Point 1V11R: 11-9-06 Pre-planting, at Treatment 1-3.

Point 1V11R: 10-5-10 Debris from unusually high spring runoff impacted some plantings in this area.

Point 1V12R: 11-18-08 Pre-planting, at Treatment 1-3 looking downstream.

Point 1V12R: 10-5-10 Sand and debris from unusually high spring runoff impacted some plantings in this area.

Point 1V13R: 9-29-09 Immediately post-planting, at apex of oxbow, looking south.

Point 1V13R: 10-5-10