Geomorphology Appendix

Appendix A – Cross Sections Profiles and Photos Appendix B – BEHI Profiles and Photos Appendix C – Photo Points Appendix D – GPS Locations Appendix E – As Built Drawings

APPENDIX A CROSS-SECTION PROFILES AND PHOTOS



CROSS-SECTION 1

Figure A 1: Channel cross-section 1 summary graph.



Figure A 2: Channel cross-section 1 baseline photo taken April 2009.



Figure A 3: Channel cross-section 1 photo taken September 2009.



Figure A 4: Channel cross-section 1 photo taken October 2010



Figure A 5: Channel cross-section 1 photo taken September 2011

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Figure A 6: Channel cross-section 1 photo taken September 2012

Sediment has accumulated upstream from the willow in the channel, especially since the flood of last year.



CROSS-SECTION 2

Figure A 7: Channel cross-section 2 summary graph.



Figure A 8: Channel cross-section 2 baseline photo taken April 2009.



Figure A 9: Channel cross-section 2 photo taken September 2009.



Figure A 10: Channel cross-section 2 photo taken October 2010. *Note the flood debris piled against the trees on the right bank is from the January flood.*



Figure A 11: Channel cross-section 2 photo taken September 2011.



Figure A 12: Channel cross-section 2 photo taken September 2012.



Figure A 13: Channel cross-section 3 summary graph.



Figure A 14: Channel cross-section 3 baseline photo taken April 2009.



Figure A 15: Channel cross-section 3 photo taken September 2009.



Figure A 16: Channel cross-section 3 photo taken October 2010.



Figure A 17: Channel cross-section 3 photo taken September 2011.



Figure A 18: Channel cross-section 3 photo taken September 2012.



CROSS-SECTION 4

Figure A 19: Channel cross-section 4 summary graph.



Figure A 20: Channel Cross-Section 4 baseline photo taken in April 2009.



Figure A 21: Channel cross-section 4 photo taken September 2009.



Figure A 22: Channel cross-section 4 photo taken October 2010.



Figure A 23: Channel cross-section 4 photo taken September 2011.



Figure A 24: Channel cross-section 4 photo taken September 2012.



Figure A 25: Channel cross-section 5 summary graph.



Figure A 26: Channel cross-section 5 baseline photo taken April 2009.



Figure A 27: Channel cross-section 5 photo taken September 2009.



Figure A 28: Channel cross-section 5 photo taken October 2010. *Erosion on the right bank can't be seen in the photos due to the density of the willows.*



Figure A 29: Channel cross-section 5 photo taken September 2011.



Figure A 30: Channel cross-section 5 photo taken September 2012.

There were large numbers of cottonwood seedlings that sprouted this past year. If only periodic flows occur over the next several years, the cottonwoods should be manually removed from the channel bed to prevent blockage and potential bank scour.



Cross-Section 6

Figure A 31: Channel cross-section 6 summary graph.



Figure A 32: Channel cross-section 6 photo taken September 2011.



Figure A 33: Channel cross-section 6 photo taken September 2012.

APPENDIX **B BEHI** PROFILES AND PHOTOS



BEHI 1



Left pin was bent was bent over.



Figure B 2: BEHI 1 photo taken April 2009.



Figure B 3: BEHI 1 photo taken September 2009.



Figure B 4: BEHI 1 photo taken October 2010.



Figure B 5: BEHI 1 photo taken September 2011.



Figure B 6: BEHI 1 photo taken September 2012.



Cross section for 2012 does not line up correctly due to missing pin on right bank. No apparent erosion has occurred at this bank. BEHI Values are still valid.



Figure B 8: BEHI 2 photo taken April 2009.



Figure B 9: BEHI 2 photo taken September 2009.



Figure B 10: BEHI 2 photo taken October 2010.

There has been minor erosion on the bank between willows along with aggradation along the toe of the bank. Overall this bank is responded well to the revegetation and stabilization efforts. The channel at this BEHI location is no longer the main channel, but acts as an overflow channel conveying flood waters.



Figure B 11: BEHI 2 photo taken September 2011.

Lower flows in 2011 have removed some of the fine sediment from the bed as seen in the 2010 photo.



Figure B 12 BEHI 2 photo taken September 2012.





Figure B 13: BEHI 3 bank profile summary graph.



Figure B 14: BEHI 3b, October 2010.



Figure B 15: BEHI 3b, September 2011.



Figure B 16: BEHI 3b, September 2012.



BEHI 4

Figure B 17: BEHI 4 bank profile summary graph.



Figure B 18: BEHI 4 bank photo, April 2009



Figure B 19: BEHI 4 photo taken September 2009.



Figure B 20: BEHI 4, October 2010

There has been some channel bed adjustment as the finer bed material gets removed by the higher flows.



Figure B 21: BEHI 4 September 2011.

Vegetation in general is less dense this year due to drought conditions.



Figure B 22: BEHI 4 September 2012.



BEHI 5

Figure B 23: BEHI 5 bank profile summary graph.



Figure B 24: BEHI 5 bank, April 2009.



Figure B 25: BEHI 5 photo taken September 2009.



Figure B 26: BEHI 5 photo taken October 2010.

The channel bed has adjusted a little at this location as the finer bed material gets removed by higher flows. There should be little further adjustment as the channel evolves.



Figure B 27: BEHI 5 photo taken September 2011.

Vegetation is lying over due to previous weeks flow.



Figure B 28: BEHI 5 photo taken September 2012.



BEHI 6

Figure B 29: BEHI 6 bank profile summary graph.



Figure B 30: BEHI 6 bank profile post-construction April 2009.



Figure B 31: BEHI 6 photo October 2010.



Figure B 32: BEHI 6 photo taken September 2011.



Figure B 33: BEHI 6 photo taken September 2012.

Coir log at toe of bank has been replaced.

APPENDIX C PHOTO POINTS

PHOTO POINT 1: UPSTREAM VIEW



Figure C 1: Upstream from PP-1, Reach 1 taken April 2009.



Figure C 2: Upstream from PP-1, Reach 1 taken September 2009.



Figure C 3: Upstream from PP-1, Reach 1 taken October 2010. *Willow growth on the near bank will eventually obscure the view from this photo point.*



Figure C 4: Upstream view from PP-1, Reach 1 taken September 2011.



Figure C 5: Upstream view from PP-1, Reach 1 taken September 2012.

PHOTO POINT 1: DOWNSTREAM VIEW



Figure C 6: Downstream from PP-1, Reach 1, taken April 2009.



Figure C 7: Downstream from PP-1, Reach 1 taken September 2009.



Figure C 8: Downstream from PP-1, Reach 1 taken October 2010. *River channel now flows to the right, as opposed to the center as seen in Figure C6.*



Figure C 9: Downstream from PP-1, Reach 1 taken September 2011.



Figure C 10: Downstream from PP-1, Reach 1 taken September 2012.

PHOTO POINT 2: UPSTREAM VIEW



Figure C 11: Upstream from PP-2, Reach 1 taken April 2009.



Figure C 12: Upstream from PP-2, Reach 1 taken September 2009.



Figure C 13: Upstream from PP-2, Reach 1 taken October 2010.

This channel is no longer the main channel, but flows at above bankfull events.



Figure C 14: Upstream from PP-2, Reach 1 taken September 2011.



Figure C 15 Upstream from PP-2, Reach 1 taken September 2012.

PHOTO POINT 2: DOWNSTREAM VIEW



Figure C 16: Looking downstream from PP-2 taken April 2009.



Figure C 17: Looking downstream from PP-2 taken September 2009.



Figure C 18: Looking downstream from PP2, taken October 2010. Again, establishing vegetation is obscuring the channel.



Figure C 19: Looking downstream from PP2, taken September 2011.

Sunflowers were not as prevalent as last year.



Figure C 20: Looking downstream from PP2, taken September 2012.

PHOTO POINT 3: UPSTREAM VIEW



Figure C 21: Looking upstream from PP-3 taken April 2009.



Figure C 22: Looking upstream from PP-3 taken September 2009.



Figure C 23: Looking upstream from PP-3 taken October 2010.



Figure C 24: Looking upstream from PP-3, taken September 2011.



Figure C 25 Looking upstream from PP-3, taken September 2012.

PHOTO POINT 3: DOWNSTREAM VIEW



Figure C 26: Looking downstream from PP-3 taken April 2009.



Figure C 27: Looking downstream from PP-3 taken September 2009.



Figure C 28: Looking downstream from PP-3, taken October 2010.

The downstream end of the rock was removed by high flows in January, 2010.



Figure C 29: Looking downstream from PP-3, taken September 2011.



Figure C 30: Looking downstream from PP-3, taken September 2012.

PHOTO POINT 4: LOOKING DOWNSTREAM



Figure C 31: Looking downstream into Wetland 2 from PP-4 taken April 2009.



Figure C 32: Looking downstream into Wetland 2 from PP-4 taken September 2009.



Figure C 33: Looking downstream into Wetland 2 from PP-4 taken October 2010



Figure C 34: Looking downstream into Wetland 2 from PP-4, taken September 2011.



Figure C 35: Looking downstream into Wetland 2 from PP-4, taken September 2012.

PHOTO POINT 5: LOOKING SOUTH



Figure C 36: Looking south from PP-5 taken April 2009.



Figure C 37: Looking south from PP-5 taken September 2009.



Figure C 38: Looking south from PP-5 taken October 2010.

High flows in January deposited sediment through here, erasing the construction scars.



Figure C 39: Looking south from PP-5, taken September 2011.

Several planted cottonwood trees can be seen growing in these photos.



Figure C 40: Looking south from PP-5, taken September 2012.

PHOTO POINT 6: UPSTREAM VIEW



Figure C 41: Looking upstream from PP-6 taken April 2009.



Figure C 42: Looking upstream from PP-6 taken September 2009.



Figure C 43: Looking upstream from PP-6 taken October 2010.



Figure C 44: Looking upstream from PP-6 taken September 2011.



Figure C 45: Looking upstream from PP-6 taken September 2012. Vegetation obscures the channel in these photos.

PHOTO POINT 6: DOWNSTREAM VIEW



Figure C 46: Looking downstream from PP-6 taken 2009.



Figure C 47: Looking downstream from PP-6 taken September 2009.



Figure C 48: Looking downstream from PP-6 taken October 2010.



Figure C 49: Looking downstream from PP-6, taken September 2011.

This bank was re-sloped in 2010, after the previous photo was taken. The bank is now closer to the photo point.



Figure C 50: Looking downstream from PP-6, taken September 2012.

ΡΗΟΤΟ ΡΟΙΝΤ 7



Figure C 51: Wetland 3 from PP-7 taken April 2009.



Figure C 52: Wetland 3 from PP-7 taken September 2009.



Figure C 53: Wetland 3 from PP-7, taken October 2010.

The planted cottonwoods can be seen in the recent photo, to the left of the person in the photo.



Figure C 54: Wetland 3 from PP-7, taken September 2011. Cottonwood plantings have begun to take off.



Figure C 55: Wetland 3 from PP-7, taken September 2012.

PHOTO POINT 8



Figure C 56: Looking upstream from PP-8 taken April 2009.



Figure C 57: Looking upstream from PP-8 taken September 2009.



Figure C 58: Looking upstream from PP-8, taken October 2010.



Figure C 59: Looking upstream from PP-8, taken September 2011.



Figure C 60: Looking upstream from PP-8, taken September 2012.

PHOTO POINT 9



Figure C 61: Wetland 4 from PP-9 taken April 2009.



Figure C 62: Wetland 4 from PP-9 taken September 2009.



Figure C 63: Wetland 4 from PP-9 taken October 2010.



Figure C 64: Wetland 4 from PP-9 taken September 2011.



Figure C 65: Wetland 4 from PP-9 taken September 2012.

РНОТО РОІМТ 10



Figure C 66: Reach 4 from PP-10 taken April 2009.



Figure C 67: Reach 4 from PP-10 taken September 2009.



Figure C 68: Reach 4 from PP-10 taken October 2010.

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Figure C 69: Reach 4 from PP-10 taken September 2011.



Figure C 70: Reach 4 from PP-10 taken September 2012.

РНОТО РОІМТ 11



Figure C 71: Wetland 6 from PP-11 taken April 2009.



Figure C 72: Wetland 6 from PP-11 taken September 2009.



Figure C 73: Wetland 6 from PP-11 taken October 2010.



Figure C 74: Wetland 6 taken from PP-11, September 2011.

Planted cottonwoods are beginning to fill in.



Figure C 75: Wetland 6 taken from PP-11, September 2012.

APPENDIX D GPS LOCATIONS

Table 1. Groundwater monitoring well locations

Well ID	Longitude	Latitude	Creek Stationing beginning US (ft)	Approx. Distance from Creek (ft)	Reach
6	-112.4361214	34.56827909	1282	500 (east)	1
5	-112.4338077	34.57140789	2463	200 (east)	2
7	-112.4350629	34.5724456	2600	300 (west)	2
8	-112.4328308	34.57311325	3237	100 (west)	3
4	-112.4312568	34.57314637	3571	150 (east)	3
3	-112.4311246	34.57525303	4717	200 (east)	3
2	-112.4295459	34.57656429	5265	350 (east)	4
1	-112.4276345	34.57787934	6100	600 (east)	4

Table 2.Stream channel cross-section locations.

Datum: NAD83, State Plane AZ Central FIPS.

	Left Pin		Right Pin	
XS #	Latitude	Longitude	Latitude	Longitude
1	N34.56937	W112.43752	N34.56926	W112.43755
2	N34.57003	W112.43606	N34.56992	W112.43584
3	N34.57385	W112.43203	N34.57389	W112.43182
4	N34.57605	W112.43123	N34.57696	W112.43106
5	N34.57814	W112.42942	N34.57808	W112.42931
6	N34.56927	W112.43816	N34.56907	W112.43793

Table 3. BEHI Locations

Datum: NAD83, State Plane AZ Central FIPS.

BEHI	Left Pin		Right Pin	
#	Latitude	Longitude	Latitude	Longitude
1	N34.56875	W112.43924	N34.56871	W112.43907
2	N34.56946	W112.43850	N34.56926	W112.43840
3	N34.57032	W112.43593	N34.57029	W112.43571
4	N34.57283	W112.43227	N34.57272	W112.43219
5	N34.57671	W112.43078	N34.57653	W112.43063
6	N34.57714	W112.42978	N34.57702	W112.42957

PP#	Latitude	Longitude
1	34.56825	112.43925
2	34.56940	112.43846
3	34.57040	112.43590
4	34.57340	112.43352
5	34.57310	112.43285
6	34.57295	112.43179
7	34.57431	112.43176
8	34.57556	112.43023
9	34.57573	112.43001
10	34.57616	112.43071
11	34.57782	112.42730

Table 3. Photo point locations. Datum: NAD83, State Plane AZ Central FIPS