Antioch Mine
Permit ID 200500358-gjd

2015 Annual Report

Section 404 Permittee: Solar Sources, Inc.

Facility Name: Antioch Mine #S-355

ACOE Permit ID: 200500358-gjd

Project Description:

The Antioch Mine #S-355 is a surface coal mine located in Daviess County, Indiana. This mine will excavate a portion of the approved surface coal mine permit area and mine multiple coal seams. The permitted area contains 24,745 linear feet of streams, all of which is intermittent. Also, a total of 5.806 acres of wetlands is present. All economically feasible coal in the 1,275 acre mine site will be extracted, processed, and sold. The area will be returned to approximate original contours, covered with soil, revegetated, and returned to an approved post-mine land use provided in the approved #S-355 permit.

USACE Permit 200500358-gjd Special Conditions

a. The permittee shall adhere to the stream and wet land mitigation plans as outlined in the Department of the Army application, submitted on behalf of the applicant by Wetland Services, Inc. and Buckridge Environmental, dated 11 November 2005, amended 27 November 2005. These special conditions add or clarify the success criteria to be met. Upon completion of the mitigation construction, as-built plans documenting the final post-mining conditions of the streams and wetlands shall be submitted to this office for review and approval.

b. As part of the annual monitoring reports, the ap plicant shall complete an assessment of the stream mitigation sites to allow comparison to the baseline assessments. These post-construction assessments shall be utilized as one factor in determining mitigation success. Permanent photo stations shall be set at a minimum interval of 1 station per 500 linear feet of stream and 1 per 3 acres of wetland. Additional photos may be necessary to illustrate the site conditions on an as needed basis.

c. Prior to planting of the wetland and riparian zo nes, a proposed species planting list shall be submitted to this office for final approval. The riparian zone shall be at a minimum 50 feet wide. Riparian tree plantings shall be seeded at a rate of 450 seedlings per/acre. Wetland tree plantings shall be from 2-3 gallon root production method container tree stocks and at a rate of 60 trees/acre. The planted riparian species must show an 80% survival rating at the end of the 5 year monitoring period, with no one species making up more than 25 % of that inventory. The planted wetland tree species must show a 90% survival rating at the end of the 5 year monitoring period, with no one species making up more than 25% of that inventory. All herbaceous plantings must provide 70% ground cover at the end of monitoring.

d. The monitoring reports shall include annual samp ling data for the mitigation streams' surface water in the same format and for the same parameters as demonstrated in the applicant's application and mitigation proposal dated 11 November 2005, amended 27 November 2005, under section 2.I.A.2.b "Watershed/Landscape Context."

e. A permanent protective conservation easement sha ll be recorded on the property deed record for the wetland and stream mitigation sites within 60 days after the final release of the wetland and stream mitigation. Prior to recording, a copy of the proposed easement shall be submitted to this office for final approval.

f. All in-stream sediment basins shall be removed a nd a natural stream channel reestablished in the impacted area following release of SMCRA bonding and prior to mitigation release.

g. To comply with historic properties regulations, the applicant shall comply with Special Condition 11 of the IDNR-SMCRA permit S-355.

Schedule of Mining Operations and Section 404 Project Mitigation

Solar Sources, Inc. operates a surface coal mine located in Sections 7, 8, 9, 16, 17, and 18 of T3N, R6W. The Antioch Mine operation has been an active mine site since 2008. Solar Sources, Inc. acquired the mine in 2011 and is still in operation to date. Reclamation of the disturbed areas is an ongoing process at the Antioch Mine. Reclamation and seeding reports are submitted to IDNR Division of Reclamation.

Through the availability of maps and other informa tion, Solar Sources, Inc. has compiled a data set that provides the estimated linear footage of stream disturbed by year.

2008	2009	2010	2011	2012	2013	2014	2015	Total
1710	7754	128	1038	669	4071	1751	0	17121

A total of 17,121 linear feet of stream and 5.73 acres of wetland have been disturbed.

Interstate 69 ACOE permit overlaps the Solar Sources, Inc. ACOE permit in the northwest corner. As a result, I 69 construction impacted approximately 200 feet of the 4,400 feet of Stream 4 permitted under Solar Sources, Inc.

As of Fall 2015, 5,050 linear feet of stream has been restored and a total of 1,900 linear feet has been avoided to date.

Status of Antioch Mine Special Conditions and Section 404 Mitigation:

Solar Sources, Inc. is aware of the special conditions stated in the permit and strives to make sure they adhere to all of them. Engineering staff at Solar is in direct contact with pit and reclamation foremen to ensure they comply with the approved ACOE and SMCRA permits.

Status/Summary of Antioch Mine Mitigation Site Investigations and Maps:

One stream at the Antioch Mine has been created and reestablished to date. This is Stream 5, which has 5,050 linear feet mitigated. The remainder 390 feet has yet to be built due to the stream running through Sediment Pond 6 as per SMCRA permit requirements. The mitigation of Stream 5 was completed before Solar Sources, Inc. assumed responsibilities for the 200500358-gjd permit. A RPB evaluation and Rosgen assessments were done for the stream.

During the summer of 2014, a variety of wood and rock structure was added to the stream and floodplain. The floodplain was seeded with permanent native grasses and sedges. During the Fall of 2014, # 3 RPM trees were planted. The trees include the following, Black Cherry, Overcup Oak, Pin Oak, Nutall Oak, Red Oak, and Swamp White Oak. A revised species list was submitted in the 2014 annual report to reflect these species and to be more consistent with our other ACOE authorizations.

The wetland mitigation at the Antioch Mine is approaching final grading activities. In 2016, permanent native warm season grasses and sedges will be broadcast seeded, and then by fall, a variety of hard mast #3 RPM trees can be planted.

Conclusions of Antioch Mine 2015 Report:

Solar Sources, Inc. is reclaiming the site in a ti mely manner as they move forward in mining the permitted area. They have generally stayed within compliance with the approved permits. Solar has also complied with all state and federal regulatory staff in the mining and reclamation processes.

Solar Sources, Inc. Antioch Mine, #S-355 USACE ID No. 200500358-gjd
Authorized June 2, 2006
Solar Sources, Inc. Accepted Responsibility of Perm it September 28, 2011

Permitted 404 Restored Stream ID – Stream 5

Proposed Flow Regime	Proposed Length and Riparian	Type
Stream Reach 0+00 to 54+40 (Int.)	0+00 to 54+40(100	ft. Wooded Riparian Buffer)

Time Line for Stream Restoration Work

0+00 to 3+90 Not Constructed as of 2013
Stream Terminates into Sediment Pond 6
3+90 to 54+40 Stream Channel Constructed Summer 2010
Riffle and Rock Structure added Summer 2010
Wood and Rock Structure added Summer 2014
Native Warm Season Grasses Seeded Summer 2014
3 RPM Trees Planted Fall 2014

Stream 5 Stream Assessments

Summer 2013 Entire Reach from 3+90 to 51+90 photogr aphic documentation taken by Solar Sources, Inc. on July 12, 2013.

Spring 2014 Entire Reach from 3+90 to 51+90 photogr aphic documentation taken by Solar Sources, Inc. on April 16, 2014.

Fall 2014 Entire Reach from 3+90 to 54+40 photographic documentation taken by Solar Sources, Inc. on September 29, 2014.

Spring 2015 Entire Reach from 3+90 to 54+40 photogr aphic documentation taken by Solar Sources, Inc. on April 17, 2015.

Fall 2015 Entire Reach from 3+90 to 54+40 photographic documentation taken by Solar Sources, Inc. on October 12, 2015.

Solar Sources, Inc. **Antioch Mine** **Permit S-355**

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT ST REAMS (Front)

STREAM NAME **Stream 5**	LOCATION **Antioch Mine**
STATION #_____ RIVERMILE	STREAM CLASS **Intermittent**
LAT LONG	RIVER BASIN
STORET #	AGENCY **Private – Solar Sources, Inc., Antioch Mine**
INVESTIGATORS **Aaron Cornelius**	
FORM COMPLETED BY **Aaron Cornelius**	DATE **April 17, 2015** **October 12, 2015** TIME / REASON FOR SURVEY **Monitor Stream Mitigation Success**

Parameters to be evaluated in sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).	30 - 50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10 - 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE 13	20 19 18 17 16	15 14 **13** 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Pool Substrate Charac-terization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present..	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE 13	20 19 18 17 16	15 14 **13** 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE 14	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE 16	20 19 18 17 **16**	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE 14	20 19 18 17 16	15 **14** 13 12 11	10 9 8 7 6	5 4 3 2 1 0

70 - Front Total Score

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT ST REAMS (Back)

Parameters to be evaluated broader than sampling reach

Habitat Parameter	Condition Category: Optimal	Suboptimal	Marginal	Poor
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE 18	20 19 **18** 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE 11	20 19 18 17 16	15 14 13 12 **11**	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank) Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5 - 30% of bank in reach has areas of erosion.	Moderately unstable; 30 - 60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 9 (LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 9 (LB)	Left Bank 10 **9**	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 6(LB)	Left Bank 10 9	8 7 **6**	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank 10 **9**	8 7 6	5 4 3	2 1 0

80 Back Total Score

70 Front Total Score

150 Stream Reach Total Score

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (Front)

STREAM NAME **Stream 5**	LOCATION **Antioch Mine**
STATION #_____ RIVERMILE	STREAM CLASS **Intermittent**
LAT LONG	RIVER BASIN
STORET #	AGENCY **Private – Solar Sources, Inc., Antioch Mine**
INVESTIGATORS **Aaron Cornelius**	
FORM COMPLETED BY **Aaron Cornelius**	DATE **April 17, 2015** **October 12, 2015** TIME
REASON FOR SURVEY **Monitor Stream Mitigation Success**	

WEATHER CONDITIONS	**Now**	**Past 24 Hours**	**Has there been a heavy rain in the last 7 days?**
	_____ Storm (heavy rain)	_____	____ Yes ____ No
	_____ Rain (steady rain)	_____	Air Temperature ____ deg. F.
	_____ Showers (intermittent)	_____	
	_____ % Cloud Cover	_____	Other _____
	_____ Clear/sunny	_____	

SITE LOCATION MAP

Draw a map of the site and indicate the areas sampled (or attach a photograph)

See Mitigation Map for Stream Reach Location.

Spring	Fall
S5-1 150417Image_09 - View upstream	S5-1 151012Image_09 - View upstream
S5-2 150417Image_08 - View upstream	S5-2 151012Image_08 - View upstream
S5-3 150417Image_07 - View upstream	S5-3 151012Image_07 - View upstream
S5-4 150417Image_06 - View upstream	S5-4 151012Image_06 - View upstream
S5-5 150417Image_05 - View upstream	S5-5 151012Image_05 - View upstream
S5-6 150417Image_04 - View upstream	S5-6 151012Image_04 - View upstream
S5-7 150417Image_03 - View upstream	S5-7 151012Image_03 - View upstream
S5-8 150417Image_02 - View upstream	S5-8 151012Image_02 - View upstream
S5-9 150417Image_01 - View upstream	S5-9 151012Image_01 - View upstream

Stream Subsystem

____ Perennial XX Intermittent ____ Tidal ____ Ephemeral

Stream Origin

___ Glacial ___ Spring -fed
___ Non-glacial montane XX Mixture of Origins
___ Swamp & Bog ___ Other

Stream Type

_____ Coldwater XX Warmwater

Catchment Area NA acres
All water is diverted around the stream

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET (Back)

WATERSHED FEATURES

Predominant Surrounding Land Use

__ Forest _____ Commercial
__ Field/Pasture _____ Industrial
__XX__ Agricultural _____ Other
_____ Residential

Local Watershed NPS Pollution

____ No Evidence __XX__ Some Potential Sources
_____ Obvious Sources

Local Watershed Erosion

_____ None __XX__ Moderate _____ Heavy

RIPARIAN VEGETATION (18 Meter Buffer)

Indicate the dominant type and record the dominant species present

____ Trees ____ Shrubs __XX__ Grasses __XX__ Herbaceous
dominant species present **Native Warm Season Grasses, Sedges, and Rushes**

INSTREAM FEATURES

Estimated Reach Length __ m.
Estimated Stream Width __m.
Sampling Reach Area __ sq. m.
Reach Area __sq. km
Estimated Stream Depth ___m.
Surface Velocity (at thalweg) __ m/sec.

Canopy Cover
__XX__ Totally Open ___Partly Shaded ___ Shaded
High Water Mark __NA__m.
Proportions of Reach Represented by Stream Morphology Types
Riffle % __10__ Pool % **50** Run % **40**
Channelized **XX** Yes __ No
Dam Present _____ Yes __XX__ No

Large Woody Debris

Large Woody Debris **No Large Woody Debris Present** sq. m

Density of Large Woody Debris **N/A** sq. m / sq. km (LWD/reach area)

Aquatic Vegetation

Indicate the dominant type and record the dominant species present
____ Rooted Emergent ____ Rooted Submergent ____ Rooted Floating ____ Free Floating
XX Floating Algae _____ Attached Algae
Dominant species present **None Present**
Portions of reach with aquatic vegetation **0 %**

Water Quality

Temperature __NA__ deg C
Specific Conductance __NA__ umhos
Dissolved Oxygen __NA__ mg/l
pH __NA__ standard units
Turbidity **NA**
WQ Instrument Used
_____

Water Odors
__XX__ Normal/None ____ Sewerage ____ Petroleum
____ Chemical ____ Fishy Other _____
Water Surface Oils
____ Slick ____ Sheen ____ Globs
____ Flecks __XX__ None Other _____
Turbidity (if not measured)
XX Clear ___ Slightly turbid ___ Turbid
____ Opaque ____ Stained Other _____

Sediment /Substrate

Odors
__XX__ Normal/None ____ Sewerage ____ Petroleum
____ Chemical ____ Anerobic Other _____
Oils
__XX__ Absent ____ Slight ____ Moderate
____ Profuse Other _____

Deposits
____ Sludge ____ Sawdust ____ Paper fiber
____ Sand ____ Relict Shells Other _____
Looking at stones which are not deeply embedded are the undersides black in color?
____ Yes __ No __XX__

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	**Diameter**	**% Composition in Sampling Reach**	**Substrate Type**	**Characteristic**	**% Composition in Sampling Area**
Bedrock			Detritus	Sticks, wood, coarse plant materials (CPOM)	**90 %**
Boulder	>256 mm (10")				
Cobble	64-256 mm (2.5-10")	**15 %**	Muck-Mud Black, very fine organic (FPOM)		**10 %**
Gravel	2-64 mm (0.1"-2.5")	**20 %**			
Sand	0.006-2mm (gritty)		Marl	Grey shell fragments	**0 %**
Silt	0.0004-0.06 mm	**10 %**			
Clay	<0.004 mm (Slick)	**55 %**			

Stream Assessment Work Sheet

Stream ID -		Level II - Stream Morphological Description: Measured Dimensions									Rosgen Level II					Calculated Stream Values					Rosgen Level III - Stream "State or Condition"									
Assessment Location	Stream S-5	Wbottom	Wbkf (OHWM)	Wfpa	d max at Wbkf	Left High Bank Max Height	Right High Bank Max Height	Left High Bank from THALWEG	Right High Bank from THALWEG		Dbkf	Entrenchment Ratio	Width/Depth Ratio	Level II Stream Type		Channel Area at OHWM	Flood-prone Area at Twice OHWM	Est. Floodplain Area at "High Bank"	EPA RBP Score		(1) Riparian Vegetation	(2) Streamflow Regime	(3) Stream Size	(4) Depositional Features	(5) Meander Patterns	(6) Stream Channel Debris/Blockage	(7) Streambank Erosion Potential	(8) Stream Aggradation/ degration Potential	(9) Channel Stability Rating	(10) Altered Channel Materials
	(Image File ID)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)	(feet)		(feet)					(sq ft)	(sq ft)	(sq ft)												
0+00		Stream Starts at Sediment Pond 6 (Not Permanent Will Connect to Undisturbed Stream)																												
3+90																														
8+80		3.1	6.5	12.3	0.9	2.4	8.3	2.6	9.0		0.63	1.9	10.4	B6		4.08	12.1	19.8	150		5b	I-2	S-3	None	M1	D2	Low	Stable	Good	CH
8+80		S5-1																												
13+74		3.4	4.9	9.5	0.5	2.5	8.6	2.1	6.8		0.38	2.0	12.7	B6		1.86	5.1	19.8	150		5b	I-2	S-3	None	M1	D2	Low	Stable	Good	CH
13+74		S5-2																												
18+59		2.8	4.8	8.0	0.7	2.7	8.4	2.4	6.7		0.51	1.7	9.3	G6		2.44	6.6	18.6	150		5b	I-2	S-3	None	M1	D2	Low	Stable	Good	CH
18+59		S5-3																												
23+50		2.4	4.1	6.8	0.6	2.6	7.0	2.8	9.3		0.43	1.7	9.5	G6		1.77	4.8	18.9	150		5b	I-2	S-3	None	M1	D2	Low	Stable	Good	CH
23+50		S5-4																												
28+39		3.8	7.1	11.1	0.8	2.3	10.5	3.7	8.9		0.61	1.6	11.6	B6		4.34	11.6	19.3	150		5b	I-2	S-3	None	M1	D2	Low	Stable	Good	CH
28+39		S5-5																												
33+30		2.2	4.7	10.5	1.1	2.9	6.7	2.9	6.7		0.81	2.3	5.7	E6		3.77	12.1	19.1	150		5b	I-2	S-3	None	M1	D2	Low	Stable	Good	CH
33+30		S5-6																												
38+19		3.1	5.2	7.7	0.5	2.4	10.4	2.4	7.1		0.40	1.5	13.0	B6		2.07	5.3	17.3	150		5b	I-2	S-3	None	M1	D2	Low	Stable	Good	CH
38+19		S5-7																												
43+10		2.4	5.6	11.8	0.6	2.1	8.4	1.7	7.4		0.43	2.1	13.0	C6		2.37	7.6	16.9	150		5b	I-2	S-3	None	M1	D2	Low	Stable	Good	CH
43+10		S5-8																												
48+46		2.8	4.5	6.9	0.5	2.2	6.3	2.9	7.1		0.40	1.5	11.2	B6		1.81	4.7	14.7	150		5b	I-2	S-3	None	M1	D2	Low	Stable	Good	CH
48+46		S5-9																												
54+40		End of Constructed Stream																												
		*Note: Correction made to show actual assessment bcation. Length of stream built has not changed.																												
Average Stream Dimension		2.9	5.2	9.4	0.7	2.4	8.3	2.6	7.6		0.52	1.8	10.2	B6		2.70	7.6	18.5												

Typical Stream Description

Restored Channel 3+90 - 54+40 **5050** 5.2 Avg. Width (ft.) 0.608 (Ac.) Stream Area at OHWM **Intermittent**

Total **5050** 0.608 Acres Restored Stream

Wfpa = Rosgen Width of Flood-prone Area
Wbkf = Rosgen Bankfull Surface Width
Wbottom = Width at Bottom of Stream
dmbkf = Bankfull Maximum Depth (same as "OHWM")
Dbkf = Bankfull Mean Depth
Entrenchment Ratio = Wfpa / Wbkf
Width/Depth Ratio = Wbkf /Dbkf
"OHWM" - Height (in feet) of Ordinary High Water Mark

"High Bank" is maximum bank height above OHWM

"High Bank" from THALWEG is Horizontal distance from stream THALWEG

"N.A." - No significant "High Bank"

DEFAULT VIEW is looking upstream for images and determining right and left bank

From methods described in "Applied River Morphology" by Dave Rosgen, 1996, Second Edition

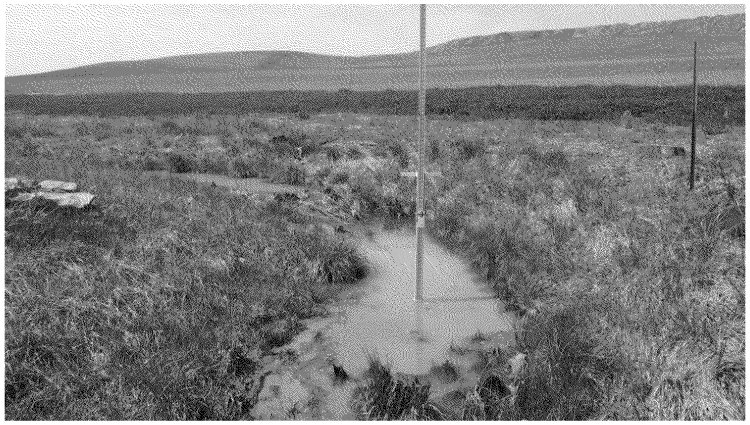
Altered Channel Descriptions
RC = Road Culvert
CH = Channelized
RSD = Road Side Ditch
RSS = Road Side Stream
MNG= Previously Disturbed by Mining
SCS = Rip-rap or other "Control Structure"
GW= Grassed Waterway

USACE ID No. LRL-200500358-gjd

Stream 5 Spring Assessment Photos

Upstream S5-1 150417Image_09

Upstream S5-2 150417Image_08



Upstream S5-3 150417Image_07

Upstream S5-4 150417Image_06

USACE ID No. LRL-200500358-gjd

Stream 5 Spring Assessment Photos

Upstream S5-5 150417Image_05

Upstream S5-6 150417Image_04

Upstream S5-7 150417Image_03

Upstream S5-8 150417Image_02

USACE ID No. LRL-200500358-gjd

Stream 5 Spring Assessment Photos

Upstream S5-9 150417Image_01

Northwest Corner of Antioch Wetland 150417Image_2015_Spring

USACE ID No. LRL-200500358-gjd

Stream 5 Fall Assessment Photos

Upstream S5-1 151012Image_09

Upstream S5-2 151012Image_08

Upstream S5-3 151012Image_07

Upstream S5-4 151012Image_06

USACE ID No. LRL-200500358-gjd

Stream 5 Fall Assessment Photos

Upstream S5-5 151012Image_05

Upstream S5-6 151012Image_04

Upstream S5-7 151012Image_03

Upstream S5-8 151012Image_02

USACE ID No. LRL-200500358-gjd

Stream 5 Fall Assessment Photos

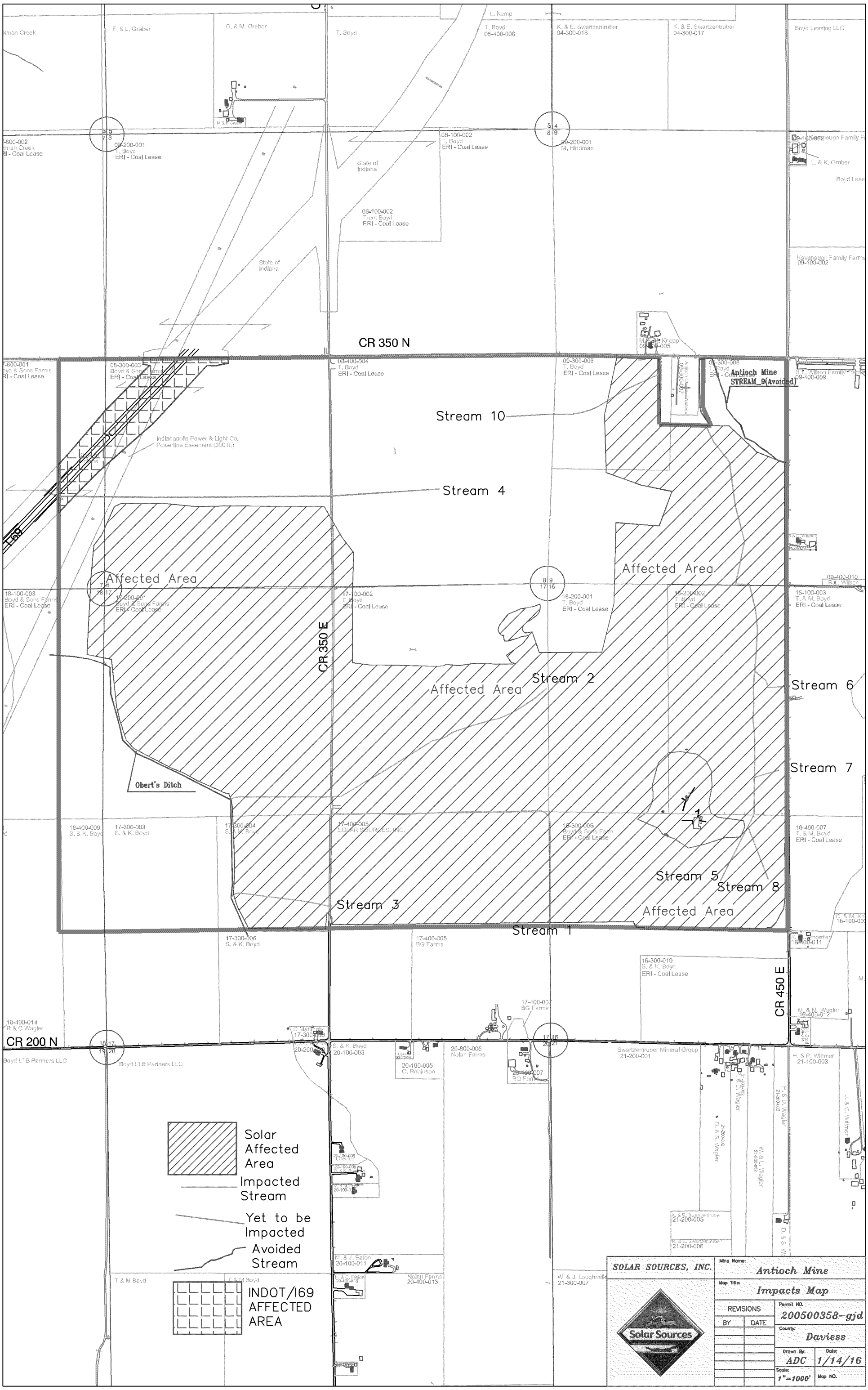
Upstream S5-9 151012Image_01

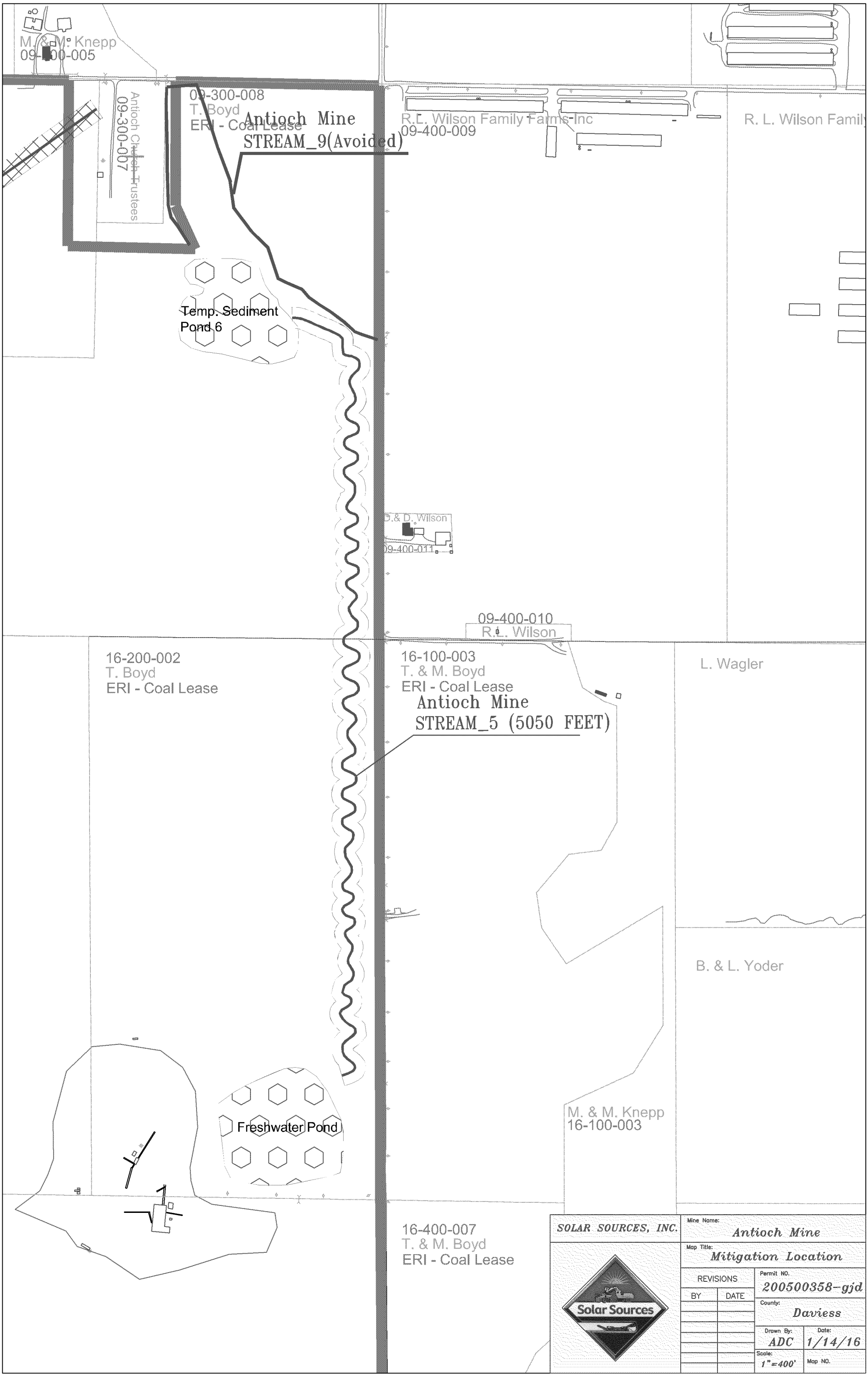
S-5 Planted Species

10/12/2015

Tree Species: Riparian						
Species	**Common Name**	**Strata**	**Indicator**	**Planted**	**Alive**	**% Alive**
Prunus serotina	Black Cherry	Tree	FAC-FACW	73	3	4.109589
Quercus lyrata	Overcup Oak	Tree	FACW	74	54	72.97297
Quercus palustris	Pin Oak	Tree	FACW	73	64	87.67123
Quercus texana	Nutall Oak	Tree	FACW	73	30	41.09589
Quercus rubra	Red Oak	Tree	FACU	73	50	68.49315
Qeurcus bicolor	Swamp White Oak	Tree	OBL	74	36	48.64865
#3 RPMs were planted			**Total**	440	237	53.86364
*Possibly due to particularly harsh winters, tree survival is low. Trees will be replanted, if needed, when wetland gets planted.						

Herbaceous Species: Alluvial Valley, and Stream Banks				
Species	**Common Name**	**Propagule/Rate**	**Strata**	**Indicator**
Panicum virgatum	Switchgrass	4lb/ac	Herbaceous	FACW
Scirpus atrovirens	Green Bulrush	4oz/ac	Herbaceous	FACW-OBL
Dichanthelium clandestinum	Deer Tongue Grass	6oz/ac	Herbaceous	FAC
Elymus canadensis	Canada Wild Rye	2lb/ac	Herbaceous	FAC-FACW
Elymus virginicus	Virginia Wild Rye	2lb/ac	Herbaceous	FAC-FACW
Carex crinita	Fringed (Nodding) Sedge	1-12oz/ac	Herbaceous	FACW-OBL
Carex vulpinoidea	Fox Sedge	1-12oz/ac	Herbaceous	FACW-OBL
Cereal Rye planted as a cover crop				


CR 350 N
CR 350 E
CR 450 E
CR 200 N
I-69
Stream 10
Stream 4
Stream 2
Stream 6
Stream 7
Stream 5
Stream 8
Stream 3
Stream 1
Affected Area
Antioch Mine
STREAM_9(Avoided)
Obert's Ditch
Indianapolis Power & Light Co.
Powerline Easement (200 ft.)
State of Indiana
Solar Affected Area
Impacted Stream
Yet to be Impacted
Avoided Stream
INDOT/169 AFFECTED AREA
SOLAR SOURCES, INC.
Solar Sources
Mine Name:
Antioch Mine
Map Title:
Impacts Map
REVISIONS
BY
DATE
Permit NO.
200500358-gjd
County:
Daviess
Drawn By:
ADC
Date:
1/14/16
Scale:
1"=1000'
Map NO.


M. & M. Knepp
09-300-005
Antioch Church Trustees
09-300-007
09-300-008
T. Boyd
ERI - Coal Lease
Antioch Mine
STREAM_9(Avoided)
R.L. Wilson Family Farms Inc
09-400-009
R. L. Wilson Family
Temp. Sediment
Pond 6
D.& D. Wilson
09-400-011
09-400-010
R.L. Wilson
16-200-002
T. Boyd
ERI - Coal Lease
16-100-003
T. & M. Boyd
ERI - Coal Lease
Antioch Mine
STREAM_5 (5050 FEET)
L. Wagler
B. & L. Yoder
M. & M. Knepp
16-100-003
Freshwater Pond
16-400-007
T. & M. Boyd
ERI - Coal Lease
SOLAR SOURCES, INC.
Solar Sources
Mine Name:
Antioch Mine
Map Title:
Mitigation Location
REVISIONS
BY
DATE
Permit NO.
200500358-gjd
County:
Daviess
Drawn By:
ADC
Date:
1/14/16
Scale:
1"=400'
Map NO.