ARCADIS

Appendix A

Level 1 Hydrology Protocol Results for A Drainage

Cover Sheet
Hydrology Protocol Use Attainability Analysis for an Ephemeral Stream[1]

Stream Name:	Basin:	8-digit HUC:
A-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.63755/-108.07108	32.62274/-108.08092
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4. _____ NMAC		A-9, A-10

Reach Evaluation (How homogeneity of reach hydrology was verified)	
Methods Used:	Aerial photos, "ground truthing", drainage profiles, reconnaissance
Reasoning:	Why is the stream homogeneous? See report section 4.2.1

Hydrology Protocol Results		Notes
A-9 (lat/long): 32.63755/-108.07108	☒ eph ☐ int ☐ per	Final score: 1, see field form and photos for additional information
A-10 (lat/long): 32.62274/-108.08092	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
☐ Additional location results attached.		

Hydroclimatic Conditions		If "yes" please describe.
Drought (SPI Value < -1.5)	☐ yes ☒ no	
Recent Rainfall (within 48 hours)	☐ yes ☒ no	
Gauge data available?	☐ yes ☒ no	
If yes for any of above, please explain why these conditions do not impact the UAA conclusion that *natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use*:		

Hydrologic and Other Modifications		If "yes" please describe.
Dam/diversion	☒ yes ☐ no	A-10 – is a natural drainage that was dredged and developed as part of the Whitewater Creek Diversion.
Channelization/roads	☒ yes ☐ no	A-9 – upgradient of dirt road crossing.
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ yes ☒ no	
Existing point source discharge	☐ yes ☒ no	

[1] This form is designed for the expedited UAA process for ephemeral waters described in Subsection C of 20.6.4.15 NMAC.

Hydrologic and Other Modifications		If "yes" please describe.
Planned point source discharge	☐ yes ☒ no	
Other modifications e.g., land use practices	☐ yes ☒ no	*Please explain hydrologic impact*
If yes for any of above, please explain why these modifications do not alter the uses supported by the natural flow regime: Through application of the HP and reconnaissance above, within, and below this diversion, it was established that an ephemeral designation applied to the whole reach.		

Current Uses Observed		If "yes" please describe.
Macroinvertebrates	☐ yes ☒ no	
Fish	☐ yes ☒ no	
Recreation (contact use)	☐ yes ☒ no	
If yes for any of the above, please explain why these observed uses are consistent with the UAA conclusion that 101(a)(2) aquatic life and recreational uses are not feasible:		

Additional Comments:

Two assessment units were identified within sub-watershed A (Figure A-1 below). Starting at the upstream end, these assessment units are identified as A-9 and A-10. The most upstream assessment unit (A-9) was selected due to its location immediately downstream from a larger tributary inflow in an area with more prominent vegetation. The lower downstream assessment unit (A-10) was selected to capture the entire basin drainage area and is a natural drainage that was historically dredged and developed as part of the Whitewater Creek Diversion.

As shown in the plan and profile plot presented below, the basin slope gradually decreases, as expected, in the downstream direction. The upstream reach of sub-watershed A (A-9) is densely vegetated with upland species including grasses and cat claw (Photos A9-1 and A9-3) whereas the downstream assessment unit (A-10) is a mixture of mostly cobble with unconsolidated sand (Photos A10-1 and A10-3), reflecting riverine processes. No dramatic compositional differences were observed between vegetation growing along the streambed and the adjacent upland areas in either of the A-drainage reaches. The scarcity of rooted plants within the A-10 reach was attributed to substrate limitations (e.g., unconsolidated granular sand lacking moisture) rather than flow. The weight of evidence clearly indicates that sub-watershed A is an ephemeral channel that flows only in direct response to significant rainfall events.

ATTACHMENTS:

- ☒ Map and Photos (required)
- ☒ Hydrology Protocol Field Sheets for all locations (required)
- ☐ Level 2 Analysis (optional)
- ☒ Additional sites and/or documentation (drainage profile and plan view)

CONCLUSION:

This UAA concludes that the stream reach identified above is ephemeral and that Clean Water Act Section 101(a)(2) aquatic life and recreational uses are neither existing nor attainable due to the factor identified in 40 CFR 131.10(g)(2): *natural, ephemeral, intermittent or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent.* Based on this conclusion, we recommend that the designated uses and criteria identified in 20.6.4.97 NMAC be

applied to this stream reach in accordance with the expedited UAA process set forth in Subsection C of 20.6.4.15 NMAC.

Submitted by: Signed: _____	Date: 10/31/2012
Surface Water Quality Bureau concurs with recommendation. ☐ Yes ☐ No *If no, see attached reasons.* Signed: _____	Date: _____
EPA Region 6 technical approval granted. ☐ Yes ☐ No *If no, see attached reasons.* Signed: _____	Date: _____

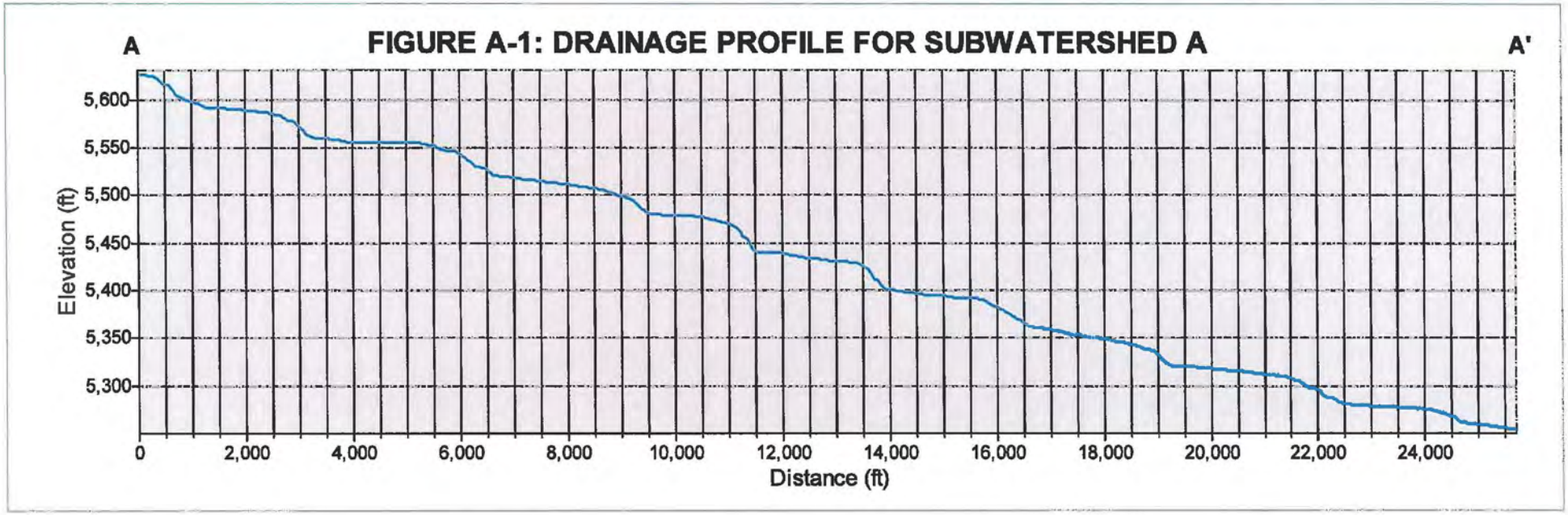

FIGURE A-1: DRAINAGE PROFILE FOR SUBWATERSHED A

A Drainage Photographs (A-9 Reach) – Total HP score of 1 (ephemeral stream)

A9-1: Photographic reference for indicators 1.1 through 1.6. Photograph of channel area. Typical densely rooted vegetation within the channel. No water or biotic indicators of water observed along survey reach. Indicator 1.6 scored as 0 - rooted upland plants prevalent in streambed.

A9-2: Photographic reference for indicator 1.5. Photograph of upslope and overbank area. Vegetation within, and adjacent to channel, occurred at slightly greater densities but was consistent with vegetation growing in adjacent upland areas (mostly bunch grass and cat claw).

A Drainage Photographs (A-9 Reach) – Total HP score of 1 (ephemeral stream)

A9-3: Photographic reference for indicators 1.5 and 1.6. Photographs of vegetation. Typical densely rooted vegetation within the channel. No compositional differences were observed between vegetation growing around the channel and adjacent uplands, but upland species did occur at greater densities within and around the channel.

A-Drainage Photographs (A-10 reach) – Total HP score of 2 (ephemeral stream)

A10-1: Photographic reference for indicators 1.1 through 1.6. Typical view of stream bed and banks. Indicators 1.1 through 1.4 scores of 0 - no water or biotic indicators of water observed along survey reach.

A10-2: Photographic reference for indicator 1.5. Photograph of typical stream bank and over bank vegetation (also observed in other photos provided). No significant compositional or density differences between bank and adjacent uplands and no riparian zone present. Indicator 1.5 score of 0 - no vegetative differences between banks and uplands.

A-Drainage Photographs (A-10 reach) – Total HP score of 2 (ephemeral stream)

A10-3: Photographic reference for indicator 1.6. Most of the streambed is relatively devoid of vegetation most likely as a result of flow regime and bed material (course sands, gravel and boulders). Indicator 1.6 scored as 2 -- a few upland rooted plants were observed growing within the channel (see below pictures), although they were mostly (but not entirely) absent presumably as a result of substrate limitations.

A-Drainage Photographs (A-10 reach) – Total HP score of 2 (ephemeral stream)

A10-4: Photographic reference for indicators 1.5 and 1.6. Photographs of in stream rooted plants and overbank/upland areas. Typical rooted vegetation noted within the channel. No significant compositional or density differences between bank and adjacent uplands.

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6/15/2011	**Stream Name: A-9**	**Latitude: N 32.63755**
Evaluator(s): Fulton/Donohoe	**Site ID: A-9**	**Longitude: W 108.07108**
TOTAL POINTS: 1 *Stream is at least intermittent if ≥ 2*	**Assessment Unit: A Drainage (A-9)**	**Drought Index (12-mo. SPI Value): -1.1**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES _X__ NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** _X__ YES ___ NO **Diversions** ___ YES __X_ NO **Discharges** ___ YES _X__ NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	1

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.	**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.	
	3	1.5	0	
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	1

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	1.5	0

1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are not found within the study reach.	
	Present = 3		Absent = 0	
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
			TOTAL POINTS (#1.1 – #1.12)	1

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. If the indicator is present record score below and tally with previous score to compute TOTAL.**

1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are not found within the study reach.
	Present = 1.5	Absent = 0
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are not found within the study reach.
	Present = 1.5	Absent = 0
		TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14) 1

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
A9-1	View downstream	
A9-2	View of upslope left bank	
A9-3	View of in stream rooted plants and overbank/upland areas	

NOTES:

Dirt road crossing below sample reach has resulted in slight impoundment of channel; upgradient of this road crossing, the channel is poorly defined.
The channel is densely vegetated with grass and cat claws – these species were observed in adjacent upland areas, but were observed in greater densities within and around channel.

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Date: 6/15/2011	**Stream Name: A-10**	**Latitude: N 32.62274**
Evaluator(s): Fulton/Donohoe	**Site ID: A-10**	**Longitude: W 108.08092**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: A Drainage (A-10)**	**Drought Index (12-mo. SPI Value): -1.1**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _X__ clear/sunny	**Has there been a heavy rain in the last 48 hours?** ___ YES _X__ NO **Field evaluations should be performed at least 48 hours after the last known major rainfall event. **OTHER:** **Stream Modifications** _X__ YES ___ NO **Diversions** __X_ YES ___ NO **Discharges** ___ YES _X__ NO **Explain in further detail in NOTES section

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.1. Water in Channel	Flow is evident throughout the reach. Moving water is seen in riffle areas but may not be as evident throughout the runs.	Water is present in the channel but flow is barely discernable in areas of greatest gradient change (i.e. riffles) or floating object is necessary to observe flow.	Dry channel with standing pools. There is some evidence of base flows (i.e. riparian vegetation growing along channel, saturated or moist sediment under rocks, etc)	Dry channel. No evidence of base flows was found.
	6	4	2	0
1.2. Fish	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Fish are not present.
	3	2	1	0
1.3. Benthic Macroinvertebrates	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Macroinvertebrates are not present.
	3	2	1	0
1.4. Filamentous Algae/Periphyton	Found easily and consistently throughout the reach.	Found with little difficulty but not consistently throughout the reach.	Takes 10 or more minutes of extensive searching to find.	Filamentous algae and/or periphyton are not present.
	3	2	1	0
1.5. Differences in Vegetation	Dramatic compositional differences in vegetation are present between the stream banks and the adjacent uplands. A distict riparian vegetation corridor exists along the entire reach – riparian, aquatic, or wetland species dominate the length of the reach.	A distinct riparian vegetation corridor exists along part of the reach. Riparian vegetation is interspersed with upland vegetation along the length of the reach.	Vegetation growing along the reach may occur in greater densities or grow more vigorously than vegetation in the adjacent uplands, but there are no dramatic compositional differences between the two.	No compositional or density differences in vegetation are present between the streambanks and the adjacent uplands.
	3	2	1	0
1.6. Absence of Rooted Upland Plants in Streambed	Rooted upland plants are absent within the streambed/thalweg.	There are a few rooted upland plants present within the streambed/thalweg.	Rooted upland plants are consistently dispersed throughout the streambed/thalweg	Rooted upland plants are prevalent within the streambed/thalweg.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.6)	**2**

If the stream being evaluated has a subtotal ≤ 2 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 18 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 2 and 18 continue the Level 1 Evaluation.

LEVEL 1 INDICATORS	STREAM CONDITION			
	Strong	Moderate	Weak	Poor
1.7. Sinuosity	**Ratio > 1.4.** Stream has numerous, closely-spaced bends, few straight sections.	**Ratio < 1.4.** Stream has good sinuosity with some straight sections.	**Ratio < 1.2.** Stream has very few bends and mostly straight sections.	**Ratio = 1.0.** Stream is completely straight with no bends.
	3	2	1	0
1.8. Floodplain and Channel Dimensions	**Ratio > 2.5.** Stream is minimally confined with a wide, active floodplain.	**Ratio between 1.2 and 2.5.** Stream is moderately confined. Floodplain is present, but may only be active during larger floods.	**Ratio < 1.2.** Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.	
	3	1.5	0	
1.9. In-Channel Structure: Riffle-Pool Sequence	Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.	Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.	Stream shows some flow but mostly has areas of pools or of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	2

If the stream being evaluated has a subtotal ≤ 5 at this juncture, the stream is determined to be EPHEMERAL.
If the stream being evaluated has a subtotal ≥ 21 at this point, the stream is determined to be PERENNIAL.
YOU MAY STOP THE EVALUATION AT THIS POINT. If the stream has a subtotal between 5 and 21 continue the Level 1 Evaluation.

1.10. Particle Size or Stream Substrate Sorting	Particle sizes in the channel are noticeably different from particle sizes in areas close to but not in the channel. There is a clear distribution of various sized substrates in the stream channel with finer particles accumulating in the pools, and larger particles accumulating in the riffles/runs.	Particle sizes in the channel are moderately similar to particle sizes in areas close to but not in the channel. Various sized substrates are present in the stream channel and are represented by a higher ratio of larger particles (gravel/cobble).	Particle sizes in the channel are similar or comparable to particle sizes in areas close to but not in the channel. Substrate sorting is not readily observed in the stream channel.
	3	1.5	0

1.11. Hydric Soils	Hydric soils are found within the study reach.		Hydric soils are not found within the study reach.	
	Present = 3		**Absent = 0**	
1.12. Sediment on Plants and Debris	Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.	Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.	Sediment is isolated in small amounts along the stream.	No sediment is present on plants or debris.
	1.5	1	0.5	0
			TOTAL POINTS (#1.1 – #1.12)	2

SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. If the indicator is present record score below and tally with previous score to compute TOTAL.		
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are not found within the study reach.
	Present = 1.5	**Absent = 0**
1.14. Iron Oxidizing Bacteria/Fungi	Iron-oxidizing bacteria and/or fungi are found within the study reach.	Iron-oxidizing bacteria and/or fungi are not found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	2

NMED Surface Water Quality Bureau – LEVEL 1 Hydrology Determination Field Sheet

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
A10-1	View upstream	
A10-2	View of upslope right bank	
A10-3	View downstream	
A10-4	View of in stream rooted plants and overbank/upland areas	

NOTES:

A-10 is in a natural drainage that has been dredged and developed as part of the Whitewater Creek
Diversion. The channel was mostly cobble with unconsolidated sand in dry pool area.
Tumble weeds were observed in the channel, and along the left and right bank.
Grass and mesquite were observed on the banks with tumble weed.