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Application of the Hydrology Protocol to STSIU Drainages

Chino Mines, Vanadium, New Mexico

October 2014

SWQB Exhibit 31

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Acronyms and Abbreviations

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
cfs	cubic feet per second
Chino	Freeport-McMoRan Chino Mines Company
CPP	Continuing Planning Process
CWA	Clean Water Act
ERA	Ecological Risk Assessment
EPA	Environmental Protection Agency
FS	Feasibility Study
GWQB	Ground Water Quality Bureau
HP	Hydrology Protocol
IU	Investigation Unit
NDMC	National Drought Mitigation Center
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
OPCZ	Open Pit Capture Zone
RAC	Remedial Action Criteria
RI	Remedial Investigation
SPI	Standardized Precipitation Index
STSIU	Smelter Tailings Soil Investigation Unit
SWQB	Surface Water Quality Bureau
UAA	Use Attainability Analysis
USGS	United States Geological Survey
WP	Workplan
WQMP	Water Quality Management Plan
WRCC	Western Regional Climate Center

1. Introduction and Background

On December 23, 1994 Freeport-McMoRan Chino Mines Company (Chino) and the New Mexico Environment Department (NMED) entered into an Administrative Order on Consent (AOC) to address the possible environmental impacts within the Chino Mine Investigation Area, Grant County, New Mexico (the Site). The Smelter Tailing Soils Investigation Unit (STSIU) is one of the investigation units addressed under the AOC. Surface water in STSIU has been determined to be a media of concern for consideration under the Feasibility Study (FS). NMED selected the Pre-FS Remedial Action Criteria (RAC) for surface water based upon the State of New Mexico Standards for Interstate and Intrastate Surface Waters (§20.6.4 NMAC) for risk to aquatic life. The Pre-FS RAC for all constituents are based on §20.6.4 NMAC, including all approaches and tools listed in the Code which provide options for site-specific application. These pre-FS RAC are considered as Applicable or Relevant and Appropriate Requirements (ARARs) for the purposes of the FS and subsequent remedial actions for the Site, subject to adjustment in the Record of Decision.

Surface water drainages in STSIU are not included in a classified Water Quality Standards segment (§20.6.4.101-899 NMAC) and are therefore considered unclassified waters of the State (§20.6.4.98 NMAC) with the following presumed designated uses: livestock watering, wildlife habitat, marginal warmwater aquatic life, and primary contact. Because water quality standards for unclassified waters vary depending on hydrology, it is important to determine the correct hydrologic regime (e.g., ephemeral, intermittent or perennial) to assure that the appropriate uses and corresponding use-specific criteria are applied to a particular water body.

To facilitate evaluations of hydrologic regime for the purpose of supporting Use Attainability Analyses (UAA), NMED's Surface Water Quality Bureau (SWQB) developed a Hydrology Protocol (HP) (NMED, (2011). The HP was approved as an appendix to NMED's Water Quality Management Plan and Continuing Planning Process (WQMP/CPP) by the New Mexico Water Quality Control Commission on May 10, 2011. The WQMP/CPP, including the HP, was submitted to the Environmental Protection Agency (EPA) for review and approval, and EPA's approval was issued on December 23, 2011.

ARCADIS, on behalf of Chino, prepared a work plan (WP) titled *Application of the Hydrology Protocol to Smelter Tailings Soils Investigation Unit Drainages* that was submitted to NMED with a letter dated May 20, 2011. The WP described a study plan for application of the HP to STSIU sub-drainages. Chino received NMED comments to this WP on June 8, 2011, and submitted a revised WP that incorporated these comments in July 2011. Results from the application of this WP are described herein.

2. Purpose and Objectives

This report describes results from the Level 1 application of NMED HP as described in the above referenced WP. Information obtained from this effort is intended to support determinations regarding the appropriate hydrologic classification of surface waters and associated designated uses through an UAA process, as described in section §20.6.4.15 (2) NMAC.

As unclassified surface waters of the state (i.e., not identified in 20.6.4.101 through 20.6.4.899), the STSIU surface waters evaluated in this study are presumed to support the uses specified in Section 101(a)(2) of the federal Clean Water Act (the "fishable and swimmable" uses), and therefore subject to 20.6.4.98 NMAC if non-perennial or subject to 20.6.4.99 NMAC if perennial. Accordingly, the purpose of this study is to perform a UAA to assess whether attainment of Section 101(a)(2) CWA uses are feasible in STSIU drainages based on their natural hydrology. That is, the 40 CFR 131.10(g) factor evaluated in this UAA study as affecting use-attainment is: *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 discharges without violating State water conservation requirements to enable uses to be met.*

Specific objectives of this study include:

1. Determine appropriate hydrologic regime for STSIU surface waters based on application of the HP;

2. Propose hydrologic classifications through a UAA for STSIU drainages where sufficient information supports a hydrologic classification and associated designated use classification.

3. Site Setting

The STSIU area is located in an arid region of southwestern New Mexico, with a climate that is characterized by low humidity and wide ranges in daily and annual temperatures (NMED 2008; Chino 2008). The average annual precipitation is 17.5 inches per year (WRCC, 2004), with most of the rainfall occurring during the monsoon season (July through September) as brief thunderstorms, sometimes of high intensity. Annual potential evaporation is estimated to range from 53 to 70 inches per year (DBS&A, 1996, Golder, 2008). Annual evaporation that exceeds precipitation is the predominant hydrologic characteristic of this semi-arid region and is the primary factor that accounts for widespread non-perennial surface water systems throughout the region.

Portions of STSIU are relatively flat with a lower elevation of approximately 5,700 feet above sea level. The STSIU is partially located within the San Vicente Basin, a sub-drainage within the Mimbres watershed. The San Vicente basin is a broad lowland area characterized by dry washes and gullies with sandy bottoms (NMED 2008). The San Vicente Arroyo, a prominent drainage feature in the San Vicente basin located approximately 3.5 miles from the western side of the STSIU area, was recently approved for inclusion in 20.6.4.97 C.NMAC as an ephemeral water based on application of the HP (NMED, 2013; EPA, 2013). Areas east of Whitewater Creek, also within the San Vicente basin, increase in topographic relief, rising to an elevation of approximately 7,000 feet above sea level. Numerous high-gradient drainages originate within this mountainous area and flow into Whitewater Creek or Lampbright Draw. Previous Site investigations have concluded that the majority of STSIU surface waters are ephemeral based on direct observations of water persistence and lack of aquatic habitat within STSIU drainages (Newfields 2006, Newfields 2008, ARCADIS and SRK 2008). Consequently, aquatic communities in these drainages are limited, and typical of ephemeral aquatic habitats in the desert southwest (Newfields, 2008). Therefore, as described in Section 2, the hydrology of STSIU drainages evaluated in this study likely is the factor that limits that attainment of full aquatic life uses.

The STSIU is one of several IUs designated under the Chino Site AOC, and is generally centered around the former copper smelter, ancillary facilities, tailings disposal facilities, and includes land potentially affected by historical smelter emissions and wind-blown tailing. The STSIU does not include areas located in the Hurley Soils IU, Hanover and Whitewater Creek IU (i.e., does not include the Hanover/Whitewater Creek drainage), Lampbright IU, or any mine operational areas (Newfields 2007).

The majority of Chino-owned land in the STSIU is currently leased for livestock grazing (Golder, 2008). The STSIU conceptual site model identified historical smelter stack and fugitive dust emissions from historical mineral processing activities as the primary source of potential contamination to the STSIU area (SRK, 2008). Smelter operations were shut down permanently in 2001 and the smelter facility was demolished and the site reclaimed in 2007 (SRK, 2008). All historical and non-operational tailing impoundments were also closed and reclaimed by 2014 (Chino 2014). Potential water quality impacts to STSIU surface waters are being addressed under other investigations, including ecological risk assessments (ERA) (Newfields 2006; Newfields 2008); an RI study (SRK 2008), and an ongoing feasibility study. No reclamation or remediation activities have been performed to date in the STSIU that could have an impact on the natural hydrologic regime of the drainages evaluated in this study. The potential influence of current or historical mining activities on the natural hydrologic regime of STSIU drainages is discussed in more detail below (Section 4.1.5).

4. Overview of Study

Application of the HP was conducted in accordance with the approved WP and NMED guidance (NMED 2011). As described by NMED (2011), the protocol is comprised of hydrological, geomorphic, and biological indicators of the persistence of water and is organized into two levels of evaluations. This study employed the Level 1 evaluation that is required for the UAA process described in 20.6.4.15.C NMAC. Level 1 evaluations include office procedures and field application of the HP. Office procedures were conducted during the first quarter of 2011, and field work was conducted from June 12 – 15, 2011.

The original HP results summary report was submitted to NMED in February 2012. NMED comments regarding the original HP report were received by Chino in April 2012. Additional office based assessment was conducted during the second quarter of 2012 in response to the NMED comments, and Chino submitted a response to comments on August 17, 2012. Chino submitted a draft UAA HP report to NMED in November 2012 which was revised in response to these comments. In accordance with Subsection C, Section 20.6.4.15 NMAC, NMED released the report for a 30-day public review period, which ended on February 14, 2013. NMED staff from the Ground Water Quality Bureau (GWQB) Silver City Field Office conducted field reconnaissance of select STSIU drainage areas in September and November 2012; and March 2013. Based on observations made during reconnaissance, NMED recommended additional reaches be excluded from an ephemeral classification. A summary of these observations and a revised description of ephemeral and non-ephemeral drainage areas based on NMED recommendations are provided in this final HP UAA report in Section 6.

4.1 Level 1 Office Procedures

Level 1 office procedures were conducted prior to initiating field evaluations with the objective to gather as much physical and geographic information about the drainages and region prior to beginning field work. Many of these reviews were discussed in the WP and are presented in this report, including:

- Aerial photographs for each sub-watershed are presented in Appendices A through G. These were used to aid in sample reach selection by evaluating any potential differences in topographic or landscape features within a sub-watershed, vegetation gradients along drainage channels, location of tributaries, and channel sinuosity.

- Drainage profiles for each sub-watershed are presented in Appendices A through G. These were also used to aid in sample reach selection by evaluating changes in basin slope for each channel. Many sample reaches were placed immediately downstream of significant changes in basin slope where there is a greater potential for seeps or pools.

- Previous Site investigations were reviewed for information that could be pertinent to this study, including historical observations of aquatic habitat and hydrologic conditions within the STSIU area and potential mining-related impacts to STSIU hydrology.

- Flow gages are not available for STSIU drainages. However, the nearest United States Geological Survey (USGS) flow gage was evaluated as an additional source of information to interpret regional drought and stream flow conditions during the field application of the HP.

- Precipitation data from nearby precipitation gages were used to assess drought conditions. Additionally, the 12-month Standardized Precipitation Index (SPI) was used as the primary basis to interpret local drought conditions, based on recommendations in the NMED HP (NMED, 2011). The 12-month SPI was assessed immediately prior to beginning the field work; this information is discussed in Section 4.1.2.

4.1.1 Sample Reach Selection

The above information, in conjunction with knowledge about geomorphic, hydrologic and mine operation features from local environmental staff at Chino and ARCADIS consultants, was used to target general locations of sample reaches, as described in the referenced WP. In addition, the NMED review and comments received on the WP was utilized in the identification of appropriate survey locations. As noted above, NMED also conducted field reconnaissance of select STSIU drainage areas as well. In total, 21 locations in nine subwatershed drainages were identified for HP application in the revised WP. Three additional locations were added to select drainages during field application of the HP based on observations made in the field for a total of 24 locations assessed in this study (**Table 1**). Decisions to add sample locations in the field are documented in the HP field forms, and included observations of a channel diversion in Sub-watershed B (Appendix B), observations of pools in Rustler Canyon (Appendix G), and observations of pools in the western tributary of Rustler Canyon (Appendix G).The number of individual reaches within a particular drainage varied according to drainage length and local watershed features to capture potential geomorphic or hydrologic gradients within drainages.

4.1.2 Drought Conditions

Local weather and precipitation data were reviewed to assure severe drought conditions were not occurring during field application of the HP. As described in the NMED HP guidance, "the 12-month SPI was chosen for use in the Hydrology Protocol because SPIs of this time-scale can be linked to groundwater-surface water fluctuations and reservoir storage, it can provide an early warning of drought, and it can help assess drought severity" (NMED 2011). For HP purposes, drought conditions are defined as any time the SPI is less than -1.5, indicating severely to extremely dry conditions (National Drought Mitigation Center [NDMC] 1995 as cited in NMED 2011). The SPI is "an index based on the probability of recording a given amount of precipitation, and the probabilities are standardized so that an index of zero indicates the median precipitation amount" (cited from http://lwf.ncdc.noaa.gov/oa/climate/research/prelim/drought/spi.html).

During the field application of the HP (June 2011), the 12-month SPI value for the Site area was -1.1 (**Figure 1**), indicating dry conditions but within the SPI range recommended by NMED (2011) for HP application (i.e., the SPI was not less than -1.5). Figure 1 presents two sources of information on SPI conditions: the NDMC and the Western Regional Climate Center (WRCC). The regional 12-month SPI map presented in Figure 1 was obtained from the NDMC (available at http://drought.unl.edu/MonitoringTools/DailyGriddedSPI.aspx). Based on the location of Chino Mines Site shown on the map presented in Figure 1, the 12-month SPI score was 0 to -1, indicating the 12-month SPI score was within the recommended range specified in the HP guidance (NMED 2011) for conducting Level 1 field evaluations. Furthermore, the NDMC 12-month SPI score was less than -1.5 for only one 12-month period (6/1/2005 – 5/31/2006) during the past 9 years (i.e., since 2003, which is the earliest 12-month SPI record available from NDMC at the time of this revised report). This finding provides an indication that longer-term drought conditions did not persist for the near decade period preceding this study.

Using SPI data published by the WRCC (available at http://www.wrcc.dri.edu/cgi-bin/spiFmap.pl?spi12), a specific 12-month SPI score of -1.1 was obtained for the 12-month period preceding Level 1 field application of the HP. These data are shown in the graph of SPI scores versus time presented in Figure 1. The 12-month SPI value of -1.1 was obtained by accessing the above website, selecting the climate division that includes the Site area (i.e., the Southwestern Mountains Division, New Mexico, Climate Division 04), and selecting the "tabular data" option associated with the graph of SPI scores versus time. This result also demonstrates the 12-month SPI score was within the HP guidance-recommended range. Therefore, the HP Level 1 field evaluations presented in this report are considered reliable and within the appropriate drought-condition range.

Additional review of precipitation at the Fort Bayard climatic station (USC00293265) was also conducted to assess the long-term historical precipitation conditions and the potential implication on the hydrologic regimes of the STISU drainage basins being assessed. The Fort Bayard station is located approximately 5 miles from STISU drainage basins, and monthly precipitation data are available on a near continuous basis from the late 1800s through early 2011 (**Figure 2**). This long-term precipitation data was initially assessed to aid interpretation of historical reference to the area from Paige (1916) because the Fort Bayard station included precipitation data from the early 1900's. This precipitation station is also the closest to the STSIU area from other available stations, and therefore provides relevant information about historical precipitation trends, despite the termination of this station in April 2011 (two months prior to the application of the HP).

It should be noted from **Figure 2** that the recent period since about 1980 has had generally greater than average precipitation compared to the period of record at the climatic station, and it has had significantly greater precipitation than the middle decades of the 20th century. The 12-month period preceding the development of the HP had lower than average precipitation, but precipitation remained greater than 35 percent of the other years on record for the station. Therefore, the precipitation and flow regime observations made at the time of the HP assessment in 2011 are at least representative of the general precipitation conditions observed over the last century. These conditions are also possibly reflective of wetter conditions considering that base flows and regional groundwater conditions are impacted by multi-year precipitation trends.

4.1.3 Recent Precipitation at the Time of the Study

Prior to initiating field evaluations, ARCADIS verified with local Chino staff and through precipitation records that no major rainfall events occurred within at least 48 hours.

4.1.4 Flow Gauges

Historical and recent flow data from a regional USGS flow gauge, located on the Mimbres River in Grant County, NM approximately 20 km northeast of the STSIU watersheds, was evaluated to provide additional background information on regional flow and drought conditions during field surveys. Although the STSIU drainage basins being assessed in the HP do not flow directly to this gaging station, it is the only source of USGS flow monitoring data in the Mimbres River basin (the basin that includes the STSIU area). Because of its proximity to the STSIU study area, flow records from this station are relevant to assessing drought conditions for this HP study, considering that the 12-month SPI scores presented above encompass the location of this station and the Site area.

During field evaluations in June 2011, the average daily flow on the Mimbres River was 3.5 cubic feet per second (cfs). This flow rate falls within lower flow ranges historically observed. In particular, 15% of average daily flows from 1978 to present were less than 3.5 cfs, and 85% of average daily flows during this timeframe were greater than 3.5 cfs (**Figure 3**). Thus, while baseflow conditions were low during the field survey, they were not historically anomalous, and are consistent with the precipitation findings described in Section 4.2.1.

4.1.5 Mine Influence on Hydrologic Regimes

The potential for influence from mining activities on the hydrologic regime of the STSIU drainages was investigated and concluded that the existing hydrologic characteristics of the drainages are representative of the historic conditions and not the result of mining activities. The possible exception to this conclusion is Rustler Canyon as described below.

Mine Pit Groundwater Influence

The nature and extent of the shallow groundwater system and the deep regional aquifer associated with the OPCZ, and the direction of groundwater flow around the Santa Rita Pit have been studied extensively to support closure planning and reclamation activities at Chino Mines Site, under Discharge Permit 1340. The Santa Rita open pit groundwater capture zone (OPCZ) was clearly delineated as part of Chino Mines Stage 1 Abatement Investigations under New Mexico Discharge Permit 1340 (Golder 2005; Golder 2008). The OPCZ delineation is the result of an extensive hydrogeologic investigation and has been previously accepted by NMED. A review of the OPCZ is provided below to demonstrate the lack of influence of the pit on the hydrology of the STSIU drainages evaluated in this study that are proposed for ephemeral classification. A comprehensive description of the groundwater data and modeling approach used to develop the OPCZ is provided in other studies (Golder 2005, 2008).

As described by Golder (2008), the OPCZ is defined as the area over which groundwater recharged from the land surface flows towards and discharges into the pit. The lateral extent of the OPCZ was determined from an analysis of the groundwater flow modeling results and empirical groundwater-elevation data collected from monitoring wells near the pit (Golder 2008). The model was developed using an upgraded version of Modflow software (Modflow-Surfact); calibration of the model was performed following American Society of Testing and Materials (ASTM) guidelines. Groundwater-elevation data from over 150 wells were incorporated into that calibration (Golder 2005).

The area modeled to develop the OPCZ is centered around the Santa Rita pit, but extends a sufficient distance away from the pit to determine the lateral extent that groundwater is no longer influenced by the pit drawdown. Groundwater-elevation data from wells located within and outside of the OPCZ provide empirical evidence of the extent of the OPCZ. For example, groundwater-elevation data presented in Golder

(2008) shows that groundwater elevations south of the OPCZ (towards the direction of STSIU drainages) are lower than groundwater elevations to the north within the OPCZ.

Separate and distinct from the deeper regional aquifer and the associated OPCZ is the shallow groundwater flow system, which overlays the deeper system. This shallow system is observed in the STSIU drainages including Rustler Canyon, Martin Canyon, the upper reaches of Lampbright Draw as well as the C and D series drainages. Shallow groundwater flow in this area is dominated by local, small groundwater flow systems that coincide with the local surface watersheds. Within these surface watersheds, groundwater recharges along the upland margins (ridges), and discharges to the local drainages. In effect, they function as independent hydrologic cells, or independent hydrologic systems where all of the recharge remains within the cells, discharging only to the respective drainages and in the downstream direction. The dominance of local shallow groundwater flow systems is clearly demonstrated by the numerous monitoring wells outside of the OPCZ. Groundwater elevations measured in the monitoring wells show that groundwater elevations are highest beneath the local ridges and lowest along the local drainages.

Figure 4 presents a map that depicts this open pit capture zone and the delineated subwatershed drainages that were assessed as part of the Chino STSIU HP study. As indicated by the OPCZ boundary and subwatershed boundaries shown in **Figure 4**, Rustler Canyon is the only STSIU subwatershed that could be influenced by the pit groundwater capture. This HP study, however, is not recommending a formal classification or re-classification for Rustler Canyon drainages as explained in Section 5.1 of this report. In addition, this HP study is not recommending a formal classification or re-classification for Martin Canyon, the next-closest STSIU subwatershed to the OPCZ.

Outside of the OPCZ, groundwater flow is controlled by the natural hydrogeological characteristics of the area. Golder (2005) stated that, because of the relatively steep, low-permeability mountainous terrain of the area, groundwater-flow directions outside the OPCZ largely follow surface topography and subwatershed divides. Modeled shallow groundwater contours at distance from the pit from Golder (2008) closely mirror the surface topography of local watersheds and indicate that the groundwater divides between the localized shallow groundwater flow systems remain closely aligned with boundaries of the surface watersheds (**Figure 5**). The modeled groundwater velocity vectors shown on Figure 5 (from Golder 2008) indicate the direction of shallow groundwater flow and demonstrate that at these distances from the pit, shallow groundwater is unaffected by the pit and is still dominated by local recharge and discharge systems that coincide with the local surface watersheds. Consequently, the groundwater balance of the subject watersheds are shown by the modeling results to be unaffected by the open pit.

The finding that groundwater associated with STSIU drainages is not influenced outside of the OPCZ is important when considering potential mine influences on STSIU hydrology, because baseflow in a stream is derived from groundwater recharge. Therefore, the delineated open pit capture zone provides evidence that the hydrology of the drainages outside of Rustler Canyon is not impacted by mining activities because the Santa Rita Pit represents the primary source of potential historical or active mining impacts that could affect the natural hydrologic regime of STSIU drainages. The STSIU drainages evaluated in this study and proposed for an ephemeral classification (Section 6) are predominately located in a natural landscape where the primary land-use is cattle grazing and is without mining-related impacts. Importantly, except for groundwater-sustained baseflow, flow sources to a stream can include storm and/or snowmelt runoff, discharge contributions from upstream tributaries, contributions from point-source discharges, and irrigation return flows (NMED, 2011). Land-use or drainage modifications that could affect snowmelt and/or storm-flow runoff to STSIU drainages are not present in the STSIU subwatersheds. Additionally, point-source discharge sources or irrigation return flows capable of supporting intermittent flow in the naturally ephemeral drainages do not exist in STSIU drainages. Aerial maps and photographs of STSIU drainages provided in Appendices A through G also document the lack of mining influence on STSIU hydrology.

Regional Springs

Historic references of springs in both the STSIU drainage basins and the surrounding area were reviewed to further assess possible influence from mining activities on the local groundwater (**Figure 4**), which could indicate hydrologic influence from mining in the STSIU drainages. Recent observations of springs and review of historical references from Paige (1916) and Sivinski and Tonne (2011), do not indicate that mining activities have influenced the presence or disappearance of springs in the STSIU drainages. Springs have been observed presently and historically in STSIU drainages including Drainage D (Brown Spring), Drainage C (Bolton Spring) and Drainage B (Ash Spring), and continue to express water indicating they have not been impacted by mining activities. Additionally, annually-reoccurring pools of water in Martin Canyon and Rustler Canyon likely indicate the presence of seeps or springs, indicating these drainage areas have not been impacted by mining activities. Because of the lack of mine influence on STSIU hydrology described above (i.e., the finding that the pit groundwater capture zone does not impact groundwater in STSIU drainages and other potential sources of mining influence are absent in the STSIU drainages), springs located in the STSIU area are unaffected by mining activities.

The springs referenced by Sivinski and Tonne (2011) (Apache Tejo Spring, Cold Spring, Kennecott Warm Spring, and Kennecott Cold Spring) are not located within STSIU drainages that were assessed in this HP study. Cold Spring is a well, locally referred to as Cold Spring 2 well, and is located within the 2C cattle ranch near Faywood Hot Springs, approximately 6 miles south of the STSIU area. Kennecott Warm Spring is located approximately 5 miles south of the STSIU area (**Figure 4**). Apache Tejo Warm Spring is located within the STSIU area but is outside of any STSIU drainages assessed during the HP study (**Figure 4**). All hydrologic designations proposed based on the results of this HP study apply to drainages that are at a significantly higher elevation and that are not hydrologically connected to these springs. Springs are, by definition, isolated areas of groundwater emergence and are not characteristic of regional groundwater conditions, especially the groundwater conditions at distances of miles away from the springs themselves. However, STSIU drainages containing Brown Spring, Bolton Spring, and Ash Spring are not proposed in this report for ephemeral classification.

4.2 Level 1 Field Evaluations

ARCADIS applied the HP to STSIU drainages during June 12 – 15, 2011, following NMED review and comments on the WP. NMED recommendations, including additional survey locations, were incorporated into a revised WP and into Level 1 field evaluations. This field evaluation timeframe is consistent with NMED recommendations and was selected to avoid the monsoonal season, which typically occurs during mid - July through early September in this region.

The HP was applied to STSIU drainages by field crews consisting of a minimum of two staff members. Staff from NMED also participated in field evaluations at sample reaches located in Rustler Canyon. Additionally, Chino staff provided navigational assistance for accessing drainages and Site knowledge regarding local watershed features, recent weather and historical presence of water. In total, the HP was applied to 24 sample reaches across 9 sub-watersheds (**Figure 4**). As described in the work plan, and in Section 5.1.3 below, the field crew performed one field replicate at a pre-determined reach location, consistent with recommendations in NMED SWQB's Quality Assurance Project Plan.

4.2.1 Sample Reach Selection

Before selecting a reach for the survey, local watershed features were noted while driving to the site to verify that the selected reach was representative of the drainage being characterized. This provided an overview of the collective watershed and potential geomorphic or hydrologic gradients within the drainage. This information aided in determining how uniform, or representative, reaches were of the collective watershed.

After arriving to each of the 21 pre-determined reach locations, the field crew walked a distance of the channel generally greater than, or equal to, 300 meters to confirm that significant geomorphic or hydrologic gradients do not occur in order to meet the hydrology protocol requirements for representative sample reaches (i.e., 40 times the average stream width or 150 meters, whichever is larger). Prior to applying the HP at each sample reach, reach homogeneity was verified by evaluating basin slope, presence of significant tributary inflows, potential changes in substrate type (e.g., sand, gravel, cobble, boulders and bedrock), compositional shifts in vegetation, gradients in vegetation density, anthropogenic influences such as road crossings or diversions, and various biological indicators included in the field form. Overall, locations selected *a priori* were judged as adequately representative of the corresponding drainages. As described above, however, three additional locations (one in Sub-watershed B and two in Rustler Canyon) were added in the field based on observations, as described in Section 4.1.1.

5. Results

Documentation for Level 1 HP Evaluations consists of a Cover Sheet, Drainage Profile and Plan View, Field Sheet and photographs for each sample reach evaluated. These are provided in Appendices A - G, and are organized by each sub-watershed evaluated. A brief description of each level of documentation is provided below.

1. *Cover Sheet*: Contains documentation of information collected through application of the HP. As described by NMED (2011), "the cover sheet is necessary for the UAA process and is designed to explain how the supporting documentation from the Level 1 Evaluation is consistent with the UAA conclusion, namely that the stream is ephemeral and the attainment of Clean Water Act Section 101(a)(2) aquatic life and recreational uses is not feasible 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." For this assessment, all reaches within an identified sub-watershed are included in a single cover sheet and appendix.

2. *Drainage Profile and Plan View*: Aerial photographs of each drainage depicting the location of each sample reach, delineation of sub-watershed boundaries, and drainage profiles.

3. *Hydrology Determination Field Sheet:* Contains scores for each attribute (or indicator) and a total numeric score for each sample reach evaluated. Other general information including date, project, evaluators, Site, assessment unit, 12-month SPI value, and field coordinates of the sample reach is also recorded on Field Sheets. NMED guidance provides a four-tiered weighted scale for evaluating and scoring each attribute; general definitions, as provided in NMED (2011), are described below:

   Strong: The characteristic is easily observable (i.e., observed within less than one minute of searching).

   Moderate: The characteristic is present and observable with minimal (i.e., one or two minutes) searching.

   Weak: The characteristic is present but you have to search intensely (i.e., ten or more minutes) to find it.

   Poor: The characteristic is not observed.

4. *Photo-Documentation:* Photographs of each sample reach and watershed were taken, as appropriate, to document the rationale behind scoring of attributes and subsequent hydrologic determinations.

5.1 Summary of Level 1 Field Evaluation Scoring

The drainages evaluated during Level 1 field evaluations were scored as ephemeral (except Rustler Canyon, as described below) based on the HP indicators, including the absence of water, lack of aquatic habitat and evidence of prolonged dryness, as determined by the NMED HP scoring criteria used to assess hydrology (Appendices A-G). **Table 2** provides a summary of all HP scoring attributes for the drainages evaluated.

Rustler Canyon Reaches

Drainages within Rustler Canyon were the only STSIU reaches where water and aquatic life uses were observed during field application of the HP. Although the majority of streambeds within Rustler Canyon did not contain water, and flow was not observed, water was present as isolated pools in portions of the bedrock channels. Periphyton, filamentous algae and riparian vegetation (e.g., cat tails) were observed in these pools along with macroinvertebrates (e.g., snails) and minnows (between RC-14B and RC-15), indicating a hydrologic classification of at least intermittent according to NMED (2011). These isolated pools, and associated aquatic life uses, were not observed in all Rustler Canyon reaches, as described in Appendix G, reflecting the localized persistence of water within this sub-watershed. This is reflected by an HP score of 2 in an upper reach of the west fork of Rustler (RC2-22; **Figure 4**). Given the extent of water observed during the dry season, coupled with the hydrologic and biological indicators described above, it appears that these pools persist for extended periods of time consistent with an intermittent classification. Based on these observations, formal classification and/or re-classification of surface water reaches in Rustler Canyon are not proposed at this time.

5.1.1 Sub-Watershed Drainages Scored as Ephemeral during Level 1 Field Evaluations

During field application of the HP, an ephemeral classification was reached for most drainages after scoring the first 6 indicators (water in channel, fish, benthic macroinvertebrates, filamentous algae/periphyton, differences in vegetation and absence of rooted upland plants in streambed). In accordance with NMED (2011), if the evaluated drainage has a score of less than or equal to 2 after the first six indicators are scored, the drainage is determined to be ephemeral, therefore, further evaluation of additional indicators is unnecessary. Of the 24 reaches evaluated, 17 reaches were determined as ephemeral after the first six indicators were evaluated and scored (three additional reaches were determined as ephemeral based on evaluation and scoring of all Level 1 HP indicators). The following provides a general description of how these 6 indicators were evaluated during field application of the HP.

Indicator 1.1 – Water in Channel

With the exception of reaches in Rustler Canyon, as described above, water was not observed in channels during field evaluations. As described by NMED (2011), a good rule of thumb for differentiating between ephemeral and intermittent is if they have any water in them during the dry season or during a drought. No evidence of recent base flows or high flows (e.g., sediment/soil moisture or drift lines in the bank or floodplain) or standing pools of water were observed in drainages (except Rustler Canyon). Areas of depressions within channels, typically associated with pool habitats, were devoid of water in all drainages except Rustler.

Indicator 1.2 – Fish

Fish were not observed in any sample reach evaluated but were observed in a pool between sample reaches RC-14B and RC-15 in Rustler Canyon.

Indicator 1.3 – Benthic Macroinvertebrates

With the exception of reaches in Rustler Canyon, benthic macroinvertebrates, or physical evidence of benthic macroinvertebrates, were not observed during HP application. The dry channels were searched for potential mussels and aquatic snail shells (in sandy channel margins), caddisfly casings (under cobbles [when cobble was present]) and mayfly or stonefly casings (on cobble and channel-side vegetation). During macroinvertebrate searches, it was also noted that soil/sediment moisture was absent with the exception of select reaches in Rustler Canyon. Benthic macroinvertebrates were observed, however, in surface water pools within Drainage C during the NMED September and November 2012 field reconnaissance, which occurred following the recent monsoon season.

Indicator 1.4 – Presence of Filamentous Algae and Periphyton

Similar to the above indicators, filamentous algae and periphyton were not observed in drainages outside of Rustler Canyon during HP application. This includes no observations of desiccated periphyton or algae outside of Rustler Canyon. However, desiccated algae/periphyton was observed in Drainage C during the NMED September and November 2012 field reconnaissance following the recent monsoon season.

Indicator 1.5 – Differences in Vegetation

Differences in vegetation were generally attributed to vegetation densities rather than compositional differences in vegetation, with the exception of Rustler Canyon where a few compositional differences were observed. Species of oak, cat claw, juniper, bunch grass, mesquite, agave, prickly pear cactus and cholla cactus were occasionally observed in greater densities on, and around, banks of some reaches relative to surrounding upland areas. Vegetation species growing in upland areas of surveyed watersheds were noted and compared to species growing along the banks and within channels to determine potential compositional differences. Additionally, NMED observed slight vegetation differences in Bolton Canyon during their September and November field reconnaissance; one small strand of cattails and willow trees were observed in Bolton Canyon.

Indicator 1.6 – Absence of Rooted Upland Plants in Streambed

As described by NMED (2011), the absence of rooted plants in a streambed can be related to flow regime since flow can deter plant establishment by scouring available substrate and removing seeds or preventing aeration to roots. However, NMED (2011) also notes that the presence of rooted vegetation in a streambed can be limited by local watershed features such as high gradient sand bedded streams located within flashy watersheds. In these flashy systems, rooted vegetation may be limited by highly erosive flows and/or depth of scour in response to substantial rainfall events (NMED 2011). Such conditions distinguished the majority of STSIU drainages. In addition, bedrock- and boulder-dominated streambeds were routinely observed in upper reaches of drainages. This streambed type can also limit the presence of rooted plants as a result of a lack of substrate necessary for plant growth. These limitations were considered when scoring Indicator 1.6 during field evaluations, and are described in Appendices A – G through field notes and photo-documentation.

5.1.2 Other Scoring Considerations

It was determined, after visiting a number of bedrock and boulder formed channels, that the application and evaluation of the "entrenchment ratio" was inappropriate at such locations. In channels flowing through material that is transported by the river itself, the channel geometry can be viewed as self-formed. That is, sediment transport in alluvial rivers builds and maintains a dynamically stable channel geometry and floodplain that reflects both the quantity and timing of water and the volume and caliber of sediment delivered from the watershed (Leopold et al. 1964; Emmett and Wolman 2001). Accordingly, Leopold (1994) describes alluvial rivers as the architect of their own geometry. In these alluvial situations the measurement of an "entrenchment ratio" is reflective of the relative supply and magnitude of the sediments from upstream versus the capacity of the channel to transport that sediment.

In many situations observed during the application of the HP, however, the channel was not an alluvial river and the bed and banks were not formed of sediments supplied and transport under the current hydrologic environment but rather were composed of bedrock and large boulders. In bedrock and boulder formed channels where it was necessary to proceed beyond Indicators 1.1 to 1.6, the "entrenchment ratio" indicator was not included in the total score.

5.1.3 Quality Control (QC)

Consistent with recommendations in SWQB's Quality Assurance Project Plan, one field replicate was included in the current study to evaluate potential variability in HP evaluations conducted by different field crew. The field replicate was applied at a pre-determined study reach (D1-2) by different field crew at separate times. Overall, scores for each HP indicator were identical between the two evaluations, indicating consistency in the interpretation of HP scoring criteria.

5.2 Critical Habitat Considerations

Critical habitat for the Chiricahua leopard frog (CLF) has been officially designated or has been observed in some of the drainages that scored as ephemeral during the Level 1 field observations described above. Based on these habitat observations, formal classification and/or re-classification of these surface water reaches are not proposed at this time. This includes portions of Subwatershed D, Subwatershed C, Subwatershed B, and all of Martin Canyon.

5.2.1 Subwatershed B and Subwatershed C Exclusions

Bolton Spring (Subwatershed C) and Ash Spring (Subwatershed B) and the associated migration pathway between them (**Figure 4**) have been designated as critical habitat for the Chiricahua leopard frog (CLF) by the USFWS (Federal Register Vol. 77, No. 54, Tuesday, March 20, 2012). As described by the USFWS, the primary constituent elements of CLF critical habitat consist of breeding, habitats, and dispersal habitats (USFWS 2012).

Based on the USFWS description of CLF critical habitat and observations, it is appropriate to exclude Bolton and Ash Springs from an ephemeral designation because these areas are designated as breeding habitat that typically hold areas of isolated surface water and thus function as potential breeding habitat.

An ephemeral designation for drainage areas that are not hydrologically connected to Bolton or Ash Springs outside of storm events could be appropriate for the non-breeding dispersal habitat based on the USFWS description. Specifically, USFWS states the dispersal and non-breeding habitat can consist of upland or ephemeral areas that can provide a corridor for movement of frogs between breeding sites (i.e., the two springs). Accordingly, designation of a section of drainage as critical habitat does not preclude an ephemeral designation because the critical habitat can, by definition, consist of ephemeral drainage channels.

As described below in Section 5.3, NMED staff conducted field reconnaissance of select STSIU drainage areas (including the designated CLF critical habitat) following application of the Level I HP and after the official designation of critical habitat. Observations made by NMED during these reconnaissance trips supplemented results from the June 2011 HP study and were considered for final hydrologic classifications described below in Section 6.

5.2.2 Martin Canyon

Based on comments received from NMED, CLF tadpoles have been historically documented in pools along portions of the Martin Canyon drainage, although no official USFWS habitat designation has been made for any portion of Martin Canyon, and CLF frogs have not been documented in any portion of Martin Canyon during more recent surveys (Jennings, 2007). Evidence of pools were not observed during the Level 1 field evaluation; however, based on comments received from NMED regarding historic observations of CLF in Martin Canyon, a formal classification or re-classification of Martin Canyon is not currently proposed.

5.3 NMED Field Reconnaissance

NMED staff conducted field reconnaissance of select STSIU drainage areas during September and November 2012 and during March 2013. The field reconnaissance consisted of visual observations and some photo-documentation of drainage areas in Subwatersheds C and D. Application of the HP was not performed during any of the field reconnaissance trips. Based on observations made by NMED during these site visits (e.g., isolated pools, aquatic invertebrates and tadpoles), a formal classification and/or re-classification of drainage areas within and upgradient to the CLF critical habitat transect shown in **Figure 4** is not proposed at this time. This includes reaches upstream of the CLF critical habitat in Bolton Canyon north of Bolton Springs, the unnamed tributary northeast of Bolton Canyon, the tributary on CLF critical habitat transect line, and drainage areas upstream of the tributary on the transect (**Figure 4**).

NMED additionally observed water in Brown Spring and evidence of water pooling (indicated by staining on the rocks) in the southeastern branch of Subwatershed drainage D1 that contains Brown Spring (**Figure 4**). Although this area has not been designated by USFWS as CLF critical habitat, an ephemeral designation is not currently proposed for this reach based on NMED observations made during field reconnaissance.

6. Conclusions and Hydrologic Classification Recommendations

Based on the Level 1 hydrology determinations described above and in Appendices A – G and information from NMED field reconnaissance, adequate information is available to support ephemeral hydrologic classifications for most of the STSIU drainages evaluated, with the exception of Rustler Canyon (and tributaries), Martin Canyon (and tributaries), and portions of Subwatersheds B and C and D.

Presently, an ephemeral classification is not supported for the Rustler Canyon drainages due to the presence of water and associated aquatic life uses observed during the Level 1 field evaluations. Based on NMED comments and observations from reconnaissance, an ephemeral classification is not proposed at this time for the following reaches (in addition to all of Rustler Canyon):

- All of Martin Canyon and tributaries thereof;
- The southeast tributary of Drainage D1 that contains Brown Springs;
- Upper portions of Subwatershed C that include CLF critical habitat in Bolton Canyon drainage from below the HP site C-4 (confluence) and upstream on the main north tributary (Bolton Canyon); from C-4 upstream on the northeast tributary to above HP site C-19; all CLF critical habitat transect on drainage areas and the upstream tributary to the drainage on transect (see **Figure 4**);
- The northwest tributary in the upper portion of Subwatershed B that contains Ash Springs.

In drainages outside of those areas described above, an ephemeral hydrologic classification was determined by the Level 1 HP procedures, which are based on evaluating the hydrologic, geomorphic, and biological indicators of water persistence, as well the absence of impact of mining activities on the natural hydrologic regime of the drainages. It can be concluded from these results that flow only occurs in these STSIU drainages in direct response to significant precipitation events. This finding is consistent with direct observations reported by other site investigations (Section 3). Accordingly, an ephemeral classification reflects the hydrologic regime of these drainages and corresponds to the limited aquatic life uses that can be expected to occur during short periods of water persistence. This report also finds that significant hydrologic alterations are not present that could impact the natural hydrologic regime of these ephemeral drainages.

As indicated in **Figure 4**, the STISU drainages where an ephemeral classification is appropriate include:

- Subwatershed Drainage A and tributaries thereof;
- Subwatershed Drainage B and tributaries thereof (excluding the northwest tributary containing Ash Spring);Subwatershed Drainage C and tributaries thereof (excluding reaches containing Bolton Spring, the CLF critical habitat transect, and all reaches in Subwatershed C that are upstream of the CLF critical habitat);
- Subwatershed Drainage D and tributaries thereof (Drainages D-1, D-2 and D-3, excluding the southeast tributary in drainage D1 that contains Brown Spring);
- Subwatershed Drainage E and tributaries thereof (Drainages E-1, E-2 and E-3).

As indicated in **Figure 4**, ephemeral designations determined for these STSIU drainages also apply to associated tributary drainages (except exclusion areas described above) because reaches assessed during the HP study were determined to be representative of the collective subwatershed. As described in the approved WP, the primary drainage channel within each subwatershed was selected for the HP assessment, which provides a strong indication of hydrologic conditions of lower order, hydrologically-connected tributary drainages that have the same or less flow persistence as the downgradient primary drainage channel given the absence of springs.

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Tables

TABLE 1
Summary of Sample Locations by Sub-Watershed

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO
SMELTER/TAILING SOILS IU HYDROLOGY PROTOCOL

Sub -Watershed	Number of Sample locations	Rationale
Sub-Watershed C	4	Upstream sample location placed at change in basin slope near the 4,600 feet downstream maker. Second sample location placed at change in basin slop immediately downstream from tributary inflow. Third sample location placed downstream from second large tributary inflow. Downstream sample placed to capture entire basin drainage area.
Martin Canyon	3	Upstream sample location placed at change in basin slope near the headwaters at 2,900 feet downstream marker. Middle sample location placed in flatter gradient section with more prominent vegetation. Downstream sample placed to capture entire basin drainage area.
Sub-Watershed A	2	Upstream sample location placed immediately downstream from larger tributary inflow at location with more prominent vegetation. Downstream sample placed to capture entire basin drainage area. No significant variation in basin slope.
Sub-Watershed B	3	Upstream sample location placed downgradient of change in average basin slope. Middle sample location placed downstream of channel diversion (observed during field survey). Downstream sample placed to capture entire basin drainage area.
Sub-Watershed D1	2	Upstream sample location placed downgradient of change in average basin slope. Downstream sample placed to capture entire basin drainage area.
Rustler Canyon	3	Upstream sample location placed downgradient of change in average basin slope and immediately downstream from large tributary inflow. Middle sample location selected to capture pools observed during field survey. Downstream sample placed to capture entire basin drainage area.
Rustler Canyon 2	2	Upstream sample location placed in un-named tributary west of Rustler Canyon at the 7,000 feet downstream marker. Downstream sample location selected in field based on observations of standing water.
Sub-Watershed D2	1	Sample location placed at downstream end of basin to capture entire watershed. Also placed near change in average basin slope.
Sub-Watershed D3	1	Sample location placed at downstream end of basin to capture entire watershed. Also placed near change in average basin slope.
Sub-Watershed E1	1	Average basin slope consistent throughout reach. Sample location placed at northern end of basin near Hurley and areas of interest.
Sub-Watershed E2	1	Average basin slope consistent throughout reach. Sample location placed at northern end of basin near Hurley and areas of interest. Also located downstream from tributary inflow.
Sub-Watershed E3	1	Average basin slope consistent throughout reach. Sample location placed at northern end of basin near Hurley and areas of interest.

TABLE 2
LEVEL 1 HYDROLOGY PROTOCOL TOTAL SCORES

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO
SMELTER/TAILING SOILS IU HYDROLOGY PROTOCOL

	Level 1 Indicators															Supplemental Indicators		
HP Sample Locations	1.1 Water in Channel	1.2 Fish	1.3 Benthic Macroinvertebrates	1.4 Filamentous Algae/ Periphyton	1.5 Differences in Vegetation	1.6 Absence of Rooted Upland Plants in Streambed	Subtotal (#1.1 - #1.6)	1.7 Sinuosity	1.8 Floodplain and Channel Dimensions	1.9 In-Channel Structure: Riffle-Pool Sequence	Subtotal (#1.1 - #1.9)	1.10 Particle Size or Stream Substate Sorting	1.11 Hydric Soils	1.12 Sediment on Plants and Debris	Total Point (#1.1 - #1.12)	1.13 Seeps and Springs	1.14 Iron Oxidizing Bacteria/Fungi	Total plus Supplemental Points (#1.1 - #1.14)
A-Drainage (A-10)	0	0	0	0	0	2	2	--	--	--	2	--	--	--	2	--	--	2
A-Drainage (A-9)	0	0	0	0	1	0	1	--	--	--	1	--	--	--	1	--	--	1
B-Drainage (B-7)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
B-Drainage (B-7-DS)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
B-Drainage (B-8)	0	0	0	0	1	2	3	1	1.5	0	5.5	1.5	Absent = 0	0	7	Absent = 0	Absent = 0	7
C-Drainage (HC-19)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
C-Drainage (HC-4)	0	0	0	0	1	2	3	0	1.5	0	4.5	1.5	Absent = 0	0	6	Absent = 0	Absent = 0	6
C-Drainage (HC-5)	0	0	0	0	0	2	2	--	--	--	2	--	--	--	2	--	--	2
C-Drainage (HC-6)	0	0	0	0	1	2	3	1	1.5	0	6.5	1.5	Absent = 0	0	7	Absent = 0	Absent = 0	7
D1-Drainage (D1-1)	0	0	0	0	0	1	1	--	--	--	1	--	--	--	1	--	--	1
D1-Drainage (D1-2)	0	0	0	0	1	0	1	--	--	--	1	--	--	--	1	--	--	1
D2-Drainage (D2-3)	0	0	0	0	0	2	2	--	--	--	2	--	--	--	2	--	--	2
D3-Drainage (D3-23)	0	0	0	0	0	2	2	--	--	--	2	--	--	--	2	--	--	2
E1-Drainage (E1-16)	0	0	0	0	0	0	0	--	--	--	0	--	--	--	0	--	--	0
E2 Drainage (E2-17)	0	0	0	0	0	1	1	--	--	--	1	--	--	--	1	--	--	1
E3-Drainage (E3-18)	0	0	0	0	0	0	0	--	--	--	0	--	--	--	0	--	--	0
Martin Canyon (MC-11)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
Martin Canyon (MC-12)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
Martin Canyon (MC-13)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
Rustler Canyon (HRC-14A)	2	0	1	1	1	2	7	0	N.A.	1	8	0	Present = 3	0	11	Present = 1.5	Absent = 0	12.5
Rustler Canyon (HRC-14B)	2	0	2	2	2	2	10	0	N.A.	1	11	0	Present = 3	0	14	Present = 1.5	Absent = 0	15.5
Rustler Canyon (HRC2-22)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
Rustler Canyon (HRC2-22B)	2	0	2	2	0	2	8	1	N.A.	0	9	0	Absent = 0	0	9	Absent = 0	Absent = 0	9
Rustler Canyon (HRC-15)	0	0	0	1	2	2	5	1	1.5	1	8.5	3	Absent = 0	0.5	12	Absent = 0	Absent = 0	12

Notes
-- indicators not scored based on subtotal

<u>Freeport-McMoRan Chino Mines Company – Administrative Order on Consent Response to USEPA Region 6 Technical Support Document (USEPA June 2014), Technical Review of Use Attainability Analyses Supporting Amendments to the New Mexico's Standards for Interstate and Intrastate Surface Waters 20.6.4 NMAC</u>

<u>Freeport-McMoRan Chino Mines Company</u>
<u>Smelter Tailings Soils Investigation Unit (STSIU) Drainages</u>
<u>October 2014</u>

This document presents Freeport-McMoRan Chino Mines Company's (Chino) response to comments (RTCs) from the Environmental Protection Agency (USEPA) Region 6 on the Application of the Hydrology Protocol (HP) to Smelter/Tailing Soils Investigation Unit (STSIU) Drainages, as presented in USEPA's Technical Support Document (TSD) (USEPA Region 6, June 2014). The HP report was prepared to support determinations regarding the appropriate hydrologic classification of STSIU surface waters through a Use-Attainability Analysis (UAA) process, as described in section 20.6.4.15 (2) of New Mexico's Administrative Code (NMAC). This letter is organized to present a response to each comment received from EPA Region 6 (reproduced below in **bold text**). Comments and responses are organized by report section (report sections are listed in *italicized text* below).

Summary of the State's Findings and Submission to Region 6

<u>USEPA Region 6 comment:</u> Initial findings in the Chino report concluded that CWA §101(a)(2) uses were attainable in Rustler Canyon and Martin Canyon drainages and their tributaries, and the remaining 5 subwatershed drainages that were assessed.

<u>Chino Response:</u> The USEPA Region 6 comment implies that all reaches evaluated in the May 2013 Chino HP study were determined to be non-ephemeral, which is incorrect. Section 6 of the Chino report states that ephemeral classifications are not proposed for Rustler Canyon, Martin Canyon, and reaches containing springs or Chiricahua Leopard Frog (CLF) critical habitat. However, drainages in five watersheds (Subwatersheds A, B, C, D, and E) are proposed for ephemeral classification (excluding reaches that contain springs or CLF critical habitat).

<u>USEPA Region 6 comment:</u> The Chino report's findings were modified based on input from the SWQB, GWQB and NMDGF. The SWQB concluded based on the Chino report that CWA §101(a)(2) uses could be attained in a number of waters that were initial determined to be ephemeral. These include Rustler Canyon and Martin Canyon drainages and their tributaries, the upper portions of Subwatershed C that includes critical habitat for endangered species in the Bolton Canyon drainage, the southeast tributary of Drainage D1 that contains Brown Spring and the northwest tributary in the upper portion of Subwatershed B that contains Ash Spring.

<u>Chino Response:</u> Contrary to the above comment, Rustler Canyon was initially determined to be non-ephemeral and therefore was never proposed for ephemeral classification. Chino did agree to exclude portions of Subwatersheds B, C, and D that are associated with the CLF critical habitat and/or that contain springs; and to exclude drainages with historic CLF populations such as Martin Canyon. However, the presence of an isolated spring or the delineation of CLF critical

habitat or historic populations does not necessarily preclude an ephemeral designation of a tributary reach because by definition, CLF critical habitat can consist of ephemeral drainage channels (USFWS 2012).

1. *Introduction and Background*

<u>USEPA Region 6 comment:</u> The Chino report refers to the ongoing mining, enforcement and corrective actions at the mine site, but does not provides a clear explanation of what these actions are, to the point of failing to identify all the acronyms used. This type of information is important to and understanding of the Chino Mines site and should be part of the Chino report, but the lack of detail makes it difficult to understand the activities at the site and if they may or may not affect use attainment in individual waters in the STSIU drainages.

<u>Chino Response:</u> Remedial Action Criteria (RAC) is now defined in the first paragraph of this section in the revised report. A glossary of acronyms and abbreviations has also been added to the Table of Contents of the revised report. Further discussion about the potential for mining and/or remedial activities to affect the natural hydrologic regime of the STSIU drainages evaluated in this study is included in Sections 3 and 4.1.5 of the report. Summaries of mining activities and/or remedial actions that are not relevant to the hydrologic regime of the STSIU drainages have not been included in the revised report.

<u>USEPA Region 6 comment:</u> The Chino report refers to an undated and unreferenced 303(d)/305(b) Integrated Report that suggests Whitewater Creek, the receiving stream for most STSIU drainages is ephemeral. Based on a word search of New Mexico's 2006-2008, 2008-2010, 2010-2012 and 2012-2014 Integrated Reports, no specific reference to the assessment of Whitewater Creek was found.

<u>Chino Response:</u> The above reference to a 303(d)/305(b) Integrated Report that suggests Whitewater Creek is ephemeral has been omitted from the revised report. The intended reference was the Final 2008 - 2010 State of New Mexico CWA 303(d)/305(b) Integrated Report for Hanover Creek (dated August 11, 2008) ("Whitewater Creek to headwaters"), the portion of the Hanover/Whitewater Creek drainage that is upstream of Bayard, New Mexico and adjacent to the northern STSIU boundary, which indicated this drainage section is likely ephemeral. The suggestion that this drainage segment is ephemeral is relevant to the HP study because Hanover Creek is a higher-order stream adjacent to the STSIU study area, indicating that ephemeral determinations for smaller headwater tributaries in STSIU is not inconsistent with knowledge about hydrologic regime of regional streams. Additionally, the USEPA Region 6 recently approved ephemeral classification of San Vicente Arroyo, a neighboring drainage also within the San Vicente basin has been added to Section 3 (Site Setting) of the report (NMED 2013; USEPA Region 6 2013a).

<u>USEPA Region 6 comment:</u> The Chino report also refers to previous site investigations that concluded that the majority of STSIU surface waters are likely ephemeral based on

observations of water persistence and lack of aquatic habitat within drainages (NewFields 2006 and NewFields 2007). However, EPA has reported data in its 305(b) Assessed Waterbody History Report (2006) that Whitewater Creek (Mimbres River to headwaters) is perennial. In addition, the United States Fish and Wildlife Service (USFWS) preassessment screen for Chino Mine site describes Whitewater Creek as an intermittent stream; draining both the north and south mine areas (USFWS, 2003).

Chino Response: The Whitewater Creek drainage is not considered part of this STSIU HP study because it is a separate IU (i.e., the Hanover/Whitewater Creek IU) under the Chino Administrative Order on Consent (AOC). The NewFields (2006 and 2007) reference specifically pertains to the STSIU area evaluated in this study and not Hanover/Whitewater Creek IU. For additional background information about this, further description of the various IUs and distinction between Hanover/Whitewater Creek IU and STSIU drainages is provided in Section 3 of the revised report. In addition, reference to observations documented during previous site investigations has been moved from the Introduction (Section 1) to the Site Setting (Section 3) of the report. This study did not assess the Hanover/Whitewater Creek hydrology, and therefore is not proposing any changes to the hydrologic classification to either Hanover or Whitewater Creeks.

USEPA Region 6 comment: The preassessment document also notes that tailings from concentrators at the mine site are deposited in Whitewater Creek. The Chino report does not speak to these tailings or their possible effect on water quality in the STSIU waters although groundwater has been identified as a media of concern at Chino Mines.

Chino Response: Per the Chino response to the previous USEPA Region 6 comment, the reference of the pre-assessment document about tailings from the concentrator being deposited in Whitewater Creek is beyond the scope of the HP study because the hydrology of Whitewater Creek is not assessed in this STSIU HP study. Also, the potential impact of mining activities to surface water quality (including tailing deposition in drainages) is not being assessed in this STSIU UAA study. This UAA specifically assesses whether the natural hydrology limits aquatic life uses in STSIU drainages – not whether water quality impacts limit use-attainment. However, as described in more detail below, potential water quality impacts to aquatic life in STSIU drainages are being addressed under separate site investigations and regulatory programs.

Although the Chino Mines site is not a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (i.e., Superfund) site, the intent of the Chino AOC is to produce CERCLA-like investigations and remedies (NewFields 2006). Therefore, any potential adverse impacts to STSIU water quality associated with mining activities are being addressed under separate regulatory programs and investigations, and are beyond the scope and purpose of this HP study. This study is solely assessing whether the natural hydrologic regime of STSIU drainages may affect aquatic life use attainment.

2. Purpose and Objectives

USEPA Region 6 comment: The Chino report also states that the intent is to support determinations regarding the appropriate hydrologic classification of surface waters

through an “expedited” UAA process as described in section §20.6.4.15 (2) NMAC. There is no reference to an “expedited” UAA in §20.6.4.15 (2) NMAC.

<u>Chino Response:</u> The USEPA-approved Statewide Water Quality Management Plan (WQMP) for New Mexico refers to a HP-based UAA as an expedited UAA process for listing waters as ephemeral in 20.6.4.97 NMAC (NMED 2011). This was the basis for using “expedited” in the report. However, the term “expedited” has been omitted from the revised report.

A paragraph describing that hydrology is the 40 CFR 131.10(g) factor assessed for the unclassified STSIU drainages in this study has been added to the *Purpose and Objectives* section of the report (Section 2).

3. Site Setting

<u>USEPA Region 6 comment:</u> The Chino report provides a general regional level description of the STSIU area that broadly touches on climate, topographic relief, tending to focus on soils. It does not provide any details or discussion related individual STSIU drainages themselves and what uses the individual waters may or may not be capable of attaining and why.

<u>Chino Response:</u> This report evaluates whether full aquatic life uses are attainable based on the natural hydrology of STSIU drainages, in accordance with HP guidance. The additions to the *Purpose and Objectives* Section of the revised report, discussed in the above response, include further discussion about hydrology being the 40 CFR 131.10 (g) factor evaluated in this study to assess use-attainment. Observations documented during other investigations (NewFields 2006, 2008; ARCADIS and SRK, 2008) that pertain to the ephemeral nature of the STSIU drainages and corresponding limited aquatic life were added to this section in the revised report, because they provide additional information about the STSIU drainages that is relevant to the uses these drainages may or may not be capable of supporting based on their hydrology.

Additional background information about the different Investigation Units (IUs) at Chino has been added to this section in the revised report to clarify that some areas (including Hanover/Whitewater Creek) are not part of the STSIU and therefore were not assessed in this HP study. Other additions to this section include: a description that livestock grazing is the primary land-use in the STSIU; a summary of the conceptual site model describing historical sources of contamination to the STSIU area (i.e., smelter stack and fugitive dust emissions from mineral processing activities); key reclamation activities conducted to date; and the regulatory processes that are in place to address potential environmental impacts. These additions provide an overview of past mining impacts, regulatory programs and reclamation activities in response to the USEPA Region 6 comment to the *Introduction and Background Section* that this information is useful for review.

<u>USEPA Region 6 Comment:</u> However, this section does refer to the average annual precipitation of 17.5” per year (WRCC, 2004), which reports that most of the rainfall occurring during the monsoon season of July – September. This annual average rainfall data is of limited value since the Level 1 field evaluations were carried out in June 2011. Summer precipitation during 2011 was the second lowest on record (behind 1980); near

the end of June, 48 percent of New Mexico was in exceptional drought, the worst drought category possible (NWS, 2011), which included the area surrounding Chino Mines.

Chino Response: Average annual precipitation amounts and trends (i.e., most precipitation occurs during monsoon season) are relevant to conducting a hydrology-based study. The relatively limited average annual precipitation, most of which occurs during the monsoon season, provides an indication of the arid nature of the area, which in conjunction with the distinct seasonal monsoon precipitation trend, is directly related to the natural hydrologic regime of regional surface waters. Annual potential evaporation estimates referenced by other investigations have been added to this section of the revised report to further demonstrate that annual evaporation exceeds annual precipitation. This is a key characteristic of arid regions in which widespread non-perennial surface waters are common. Precipitation and drought conditions recorded during the time of the HP survey, as well as historical precipitation records, are discussed in more detail in Section 4.1.2 of the revised report.

4. Overview of Study

4.1 Level 1 Office Procedures

USEPA Region 6 Comment: The Chino report indicates that Level 1 reviews rely on evaluations of physical and geographic information about the drainages prior to actual field work. It also notes that many of the reviews of physical and geographic information about the drainages were discussed in the workplan. The exclusion of this type of detail throughout this report is problematic, leaving the reviewer with no clear indication of what decisions were made and why.

Chino Response: Aerial photographs, maps, drainage profiles, and information from previous site investigations were assessed prior to field work to aid in sample reach selection. In addition to discussing this information in the work plan (WP), this information is also presented in the report (aerial photographs and drainage profiles for each subwatershed assessed are listed in Appendices A through G). Revisions now include additional discussion and references to sections of the report that contain these various sources of information.

4.1.1 Sample Reach Selection

USEPA Region 6 Comment: The discussion notes that this physical and geographic information was used with "Site knowledge" to target general sample reaches locations. However, it's unclear what is meant by "Site knowledge" and which, if any actual locations that "might be modified during field evaluations depending on the geomorphic or hydrologic features" were actually modified prior to actual field work. The Chino report again refers to the tentative selection of sample locations prior to field application and possible modification of locations during field evaluations depending on local geomorphic or hydrologic features. The discussion does not clearly indicate if any of the original site selections were actually modified based on these factors. Then it notes the selection of 21 locations in 12 sub-drainages that were identified for HP application, referring to Table 1. It's unclear if these were "tentative" or actual assessment sites.

Chino Response: The term "Site knowledge" has been revised to "knowledge about geomorphic, hydrologic and mine operation features from local environmental staff at Chino and

ARCADIS consultants". Chino worked with NMED SWQB staff to identify a total of 21 sample reaches located in nine subwatersheds in the WP based on the physical and geographic information described in the above response, including previous observations made by ARCADIS staff, Chino staff and NMED staff throughout the STSIU area during previous Site investigations. The HP was applied to all 21 reaches identified in the WP. Three additional reaches were added in the field for a total of 24 locations assessed in this study. Table 1 of the revised report has been updated to reflect the number of HP reaches assessed in the field (note that Chino previously worked with the NMED SWQB in May 2013 to revise this table to show the total number of reaches that were surveyed). Rationale behind adding three additional locations was provided in the HP field forms listed in the appendices; however, this section of the revised report has been updated to include a description of why additional reaches were added during field assessments, which included observations of a channel diversion in Subwatershed B (Appendix B) and observations of pools in drainages in the Rustler Canyon Subwatershed (Appendix G).

4.1.2 Drought Conditions

USEPA Region 6 Comment: The Chino report refers to the 12-month Standardized Precipitation Index (SPI), which can be used as a gauge of drought conditions, noting that drought conditions exist any time the SPI is less than -1.5, indicating severely to extremely dry conditions. The Chino report refers to Figure 1, which shows a 12-month SPI value for the site area during field application of the HP (June 2011) was -1.1, indicating that dry conditions existed during sampling but that conditions were within the SPI range recommended in the SWQB's HP guidance.

However, Figure 1 actually consists of two different graphics, the 12-month SPI (6/1/10 to 5/31/11) map based on "provisional data" and a 72-month SPI graph. Neither of these refer to any of the individual streams being evaluated as required by the SWQB's guidance. The data record for both the map and graph in Figure 1 end before the June 2011 date the HP sampling took place. The 12-month SPI map is small but appears to show the Chino Mine site to be in the 0.0 to -1.0, and possibly within -1.0 to -1.5. It is unclear how a precise reading of -1.1 could be drawn from this map alone. The 72-month SPI graph indicates a downward trend from just below 0.0 into the negative range near the end of the record but does not approach an SPI of -1.1.

Chino Response: The revised report contains the appropriate documentation for the referenced SPI information. The two graphics presented in Figure 1 contain SPI data from two sources, as described below and in the revised report.

The regional 12-month SPI map was obtained from the National Drought Mitigation Center (NDMC) website (http://drought.unl.edu/MonitoringTools/DailyGriddedSPI.aspx). In the revised report, the map presented in Figure 1 has been updated to show the location of Chino within Grant County, New Mexico (indicated as "Site Location", with an arrow pointing to a small box inside Grant County. Based on this map, the 12-month SPI was between 0 and -1.0, which is within the range recommended in the HP guidance for conducting Level 1 field evaluations.

The second graph presented in Figure 1 was obtained from the Western Regional Climate Center (WRCC) website (http://www.wrcc.dri.edu/cgi-bin/spiFmap.pl?spi12) and shows the SPI values versus time. As described in the revised report, a specific 12-month SPI score of -1.1 was obtained by accessing the WRCC website, selecting the climate division that includes the Chino Mines site (i.e., the Southwestern Mountains Division, New Mexico, Climate Division 04), and selecting the “tabular data” option associated with the graph of SPI values versus time. This additional evaluation of SPI conditions was conducted before the Level 1 field evaluations to confirm that severe drought conditions were not occurring and that conditions were appropriate for applying the HP. The two sources of 12-month SPI conditions confirmed this. As an additional indication of long-term drought conditions, the revised report describes that the NDMC 12-month SPI score was less than -1.5 for only one 12-month period (6/1/2005 – 5/31/2006) during the past 9 years (i.e., since 2003, which is the earliest 12-month SPI record available from NDMC at the time of this revised report). Figures 1a through 1i of this RTC document presents the NDMC 12-month SPI maps for this 9-year period. This finding provides an indication that longer-term drought conditions did not persist for the near decade period preceding this study, which is consistent with the NMED (2013) finding of long-term drought conditions assessed for the San Vicente Arroyo HP UAA approved by USEPA Region 6.

The USEPA Region 6 comment suggests that a 12-month SPI value for a specific STSIU drainage is required by the HP guidance. However, this would require that precipitation and snowpack data be recorded at a specific STSIU drainage because as noted in the HP guidance, “SPI calculation… is based on 10 climate regions of New Mexico and long-term precipitation records (both rainfall and snowpack).” These data, however, are not available for the specific STSIU drainages. Furthermore, to Chino’s knowledge, none of the HP-based UAAs conducted by the SWQB and approved by USEPA Region 6 (http://www.nmenv.state.nm.us/swqb/UAA/index.html) incorporated a stream-specific 12-month SPI value. Instead, the approved HP-based UAAs appear to have similarly used 12-month SPI values for the region containing the assessed streams (see discussion in the following paragraph). The Chino report includes precipitation data from the nearest gage to the Chino Mines Site, discussed in more detail below, and is consistent with the results of the SPI.

In the Chino HP study, the SPI was applied for the 12-month period before the application of the HP field procedure during June 12 to 15, 2011 (i.e., June 1, 2010 to May 31, 2011). The above comment notes that the map and the graph in Figure 1 end before June 2011, when the HP sampling occurred. However, Chino believes that it is appropriate to use the 12-month period immediately preceding field evaluations instead of using a 12-month period that would include additional days past when the HP study was performed. This approach is also consistent with other HP-based UAAs recently approved by USEPA Region 6. For example, the HP-based UAAs applied to Aqua Chiquita, Grindstone Creek, San Andres Canyon, and San Vicente Arroyo by NMED SWQB (NMED 2013) and approved by USEPA Region 6 (USEPA Region 6, 2013a) utilized the 12-month period immediately preceding field evaluations for the 12-month SPI statistic. In addition, it also appears that HP-UAAs conducted for unclassified non-perennial watercourses with NPDES permitted facilities (NMED 2012) and approved by USEPA Region 6 (USEPA Region 6, 2013b) utilized the 12-month period immediately preceding field evaluations for the 12-month SPI statistic. Furthermore, the NMED (2013) HP study also used NDMC 12-month SPI maps to assess drought conditions, as was done in the Chino HP study (discussed in the second paragraph of this response to USEPA Region 6 comment).

<u>USEPA Region 6 Comment</u>: The Chino report also includes a link to the National Oceanographic and Atmospheric Administration (NOAA) 24-month SPI map, running from May 2011 to April 2013. This map also appears to indicate a discrepancy with the reported -1.1 value. While the scale makes it difficult to see, it appears that for the 24-month time frame specified, the SPI was either in the range of -0.80 to -1.29 or extremely dry at -1.99 to -1.60 for the area around Chino Mines. Again, even if the Chino Mine falls

in the area that was in the range of -0.80 to -1.29, it's unclear how a specific value of -1.1 was derived.

Chino Response: The NOAA link was provided in the report as the citation for the SPI definition: The SPI is "an index based on the probability of recording a given amount of precipitation, and the probabilities are standardized so that an index of zero indicates the median precipitation amount". To clarify this, quotation marks have been added to the revised report as well as an indication that this SPI definition was cited from the NOAA link. As noted in the above comment, the SPI maps listed on the NOAA link include data from May 2011 to April 2013, which is nearly 2 years after the HP study. Therefore, interpretation of SPI conditions from these maps is inappropriate for assessing drought conditions during the time of the HP field evaluations (June 2011).

USEPA Region 6 Comment: Because of the possibility of misreading the graphics in Figure 1, particularly the SPI map, a quick search yielded Palmer Z Index Short-Term Conditions for June 2011 (NOAA). The time frame for this NOAA map coincides with the HP sampling. However, it shows that the area around Chino Mines was either in severe, -2.0 to -2.74 or possibly extreme drought at -2.75 and below. Taken together, the SPI and Palmer Z Index data suggest that the area including Chino Mines may have been in drought conditions, potentially well outside of SPI range recommended in the SWQB's HP guidance, meaning that the conclusions based on Level 1 sampling may not be reliable.

Chino Response: Clarification provided above about the 12-month SPI conditions clearly shows that drought conditions were acceptable for applying the HP, based on the specific recommendation about drought-index acceptability in the NMED HP guidance. Chino disagrees with the suggested use of other drought indices that are beyond the NMED HP recommendations.

4.1.3 Precipitation

USEPA Region 6 Comment: In the preceding section, the Chino report refers to long-term historic precipitation data (Figure 2) from the nearby Fort Bayard climatic station. The Chino report indicates greater than average precipitation during the assessment period and that these conditions were representative of the general precipitation conditions. It also noted that precipitation and flow regime observations made at the time of the HP assessment in 2011 were at least representative of the general precipitation conditions observed over the last century, and possibly reflective of wetter conditions. Given that the data reported in Figure 2 ends in 2008 and no data around the June 2011 time frame of the HP evaluations were reported, the conclusion that general precipitation conditions were at least representative as those observed over the last century are not substantiated.

Chino Response: Figure 2 of the Report included precipitation data from 1900 through 2010. This figure was developed in response to a NMED comment (by letter dated April 30, 2012), and it was intended to provide historical perspective of the precipitation conditions over the last century in comparison to the recent precipitation trends that led up to the completion of the field work supporting the development of the HP. As a result of the number of years summarized in the figure, the x-axis of the graph was labeled 2008 while the last data points shown were from 2009 and 2010 (i.e., there are two data points to the right of the gridline labeled 2008).

Figure 2 has been revised in response to the USEPA Region 6 comment. Data collected from the Fort Bayard climatic station ended in April 2010, approximately a month and a half before the field surveys were completed. The data collected from January through April 2011 has been included in the revised Figure 2. Additionally, the precipitation summation period was modified from the summation of the calendar year precipitation to the summation of the precipitation from June 1 through May 31, which was the period for the SPI calculation utilized to assess a potential drought condition before the field surveys.

Figure 2 shows that the precipitation totals for the 12-month period before the field work (13.7 inches[1]) was slightly less than the average annual precipitation of 16.0 inches measured at the Fort Bayard climatic station over the period of record. However, the total precipitation from the 12-months before the field survey were not anomalous and would not be representative of what may be considered historically low levels of precipitation. For example, of the 111 years of data assessed, 9 years (8%) had annual precipitation totals less than 10.0 inches, and 39 (35%) years had precipitation totals less than the 13.7 inches recorded for the 12-month period before the field surveys. Thus, the precipitation from the Fort Bayard data support the SPI index results that conditions were drier than normal, but the conditions were not representative of more extreme years of drought observed during the preceding 110 years of data.

It may also be appropriate to consider a period greater than 12 months in the assessment of stream base-flow conditions. This multi-year perspective of precipitation data is not necessarily relevant to the analysis of a drought, which principally affects vegetation and peak stream flows; but review of multiple years of data may be relevant to assessing the groundwater conditions that were contributing to stream base-flows of the area during the field surveys. Base flows are groundwater driven and impacted by precipitation; but due to groundwater storage capacity, groundwater elevations and thus stream base flows will tend to have a response lag and will diminish in response to multiple years of drought rather than necessarily an individual year. For the period of greater than 5 years before the field surveys, the 3-year moving average of the precipitation totals indicates generally greater precipitation than the average conditions over the previous century. Therefore, it is reasonable to conclude that the groundwater conditions potentially contributing to base flow of the assessed streams was at least representative of the general conditions over the last century and possibly wetter.

4.1.4 Flow Gages

[1] It should be noted that the 12-month precipitation total used for the period preceding the field survey conservatively assumes that there was no precipitation during the month of May (i.e., 0.0 inches was used in the calculation).

<u>USEPA Region 6 Comment:</u> **The Chino report indicates that historical and recent flow data came from a single regional United States Geologic Survey (USGS) flow gauge located on the Mimbres River, approximately 20 km – approximately 12.4 miles northeast of the STSIU watersheds. The location and proximity of the USGS gauge station to the STSIU waters is important to note. The STSIU drainages C, D and E generally flow in a southerly direction to the Hanover-Whitewater Creek watersheds. Rustler Canyon and Martin Canyon drainages flow southeasterly before their confluence with the upper end of Lampbright Draw, which flows south/southwesterly, eventually to the Mimbres River (Figure 4).**

In its Upper Mimbres Water Master District, Water Master Field Manual (March 2006), the New Mexico Office of the State Engineer (NMOSE) describes the Mimbres River Stream System as formed by the snow pack and runoff from 184 square miles of watershed to the northeast (of the gauge), running through part of Grant County into Luna County where it ends. The Manual states that the Mimbres River has one gauging station, USGS gauge 08477110, located between the Kenly #2 and the Heuchling #1 ditches and that there are nine ditches upstream of this gauging station. The physical location northeast of the Chino Mine site and the affect these ditches may have on the measured flow in this portion of the Mimbres raises significant the questions of the validity of using flow data from this USGS gauge station in determining the conditions and use attainment in these waters.

<u>Chino Response:</u> The USGS Mimbres River gauging station (USGS gauge 08477110) does not receive flow directly from the STSIU drainages; however, as indicated in the comment, there are no other gauging stations located within the Mimbres watershed. It should be noted that as a result of the desert environment of the area, the Mimbres River watershed is a naturally dry basin regardless of anthropogenic influences, and Mimbres flow has historically ceased upstream of what is now the Town of Deming.

It would be inappropriate to relate specific flows and flow patterns between the gauging station and the STSIU drainages. But considering the geographic proximity of the gauging station to the STSIU study area (approximately 12 miles), it may be appropriate to use the flow data as a secondary source for indication of potential drought conditions to assess the validity of the primary drought metric of the 12-month SPI as required by NMED. Although micro-climates are a predominant weather condition in the area resulting in isolated areas of precipitation, the close proximity of the gauging station to the STSIU drainages provides a general indication of the overall climatic and hydrologic conditions in the region. In general, years of increased precipitation observed at the Fort Bayard climatic station and higher SPIs correlate to increased stream flows and vice versa.

Stream diversions and return flows from and to the Mimbres River may have an impact on the flows recorded at the gauging station (daily records exist from 1978 to present), but considering the lack of other available flow data records it remains valid to consider the data in the assessment of general hydrologic conditions of the area and validation of the SPI. Stream flows of less than 1 cfs, considerably less than the flows observed during the HP survey, occurred in

1978, 1979, 1980, 1981, 1982, 1990, 1994, 2000, 2002, 2004, and 2006. These reduced flows also correspond to periods of lower than average precipitation, indicating that there is a response between stream flow and regional precipitation regardless of withdrawals or inputs to the Mimbres. The Mimbres River is also outside the influence of the Chino mine, as indicated by the open pit capture zone (OPCZ) and the greater than 4-miles distance from the limits of the OPCZ and the river. Additionally all tributaries that contribute to flow to the gauging station are outside of the delineated OPCZ influence.

The relationship between precipitation and stream flow, especially base flows, is an indication of drought, but the groundwater storage capacity for precipitation may impact stream flows for several years. Thus there is a lag between periods of reduced precipitation and when a reduced stream base flow may be observed. Likewise, stream base flows may be stable or increase for several years following extended periods of increased precipitation, as excess groundwater storage is slowly released to surface waters during base flow. Review of regional stream flow data, when available, is therefore a reasonable approach for assessing the predominant regional groundwater conditions affecting stream hydrology that may not necessarily be reflected in precipitation and drought indices alone. It is notable that although the 12-month SPI for the period immediately before the field survey indicated slightly drier than normal precipitation conditions, the 2 years prior were wetter than normal, which may have had a continuing influence on base flows.

The flow data reviewed for the Mimbres gauging station support the conclusion from the 12-month SPI that the region was experiencing drier than normal conditions over the year before the field survey, but the conditions were within a normal range and not indicative of a severe annual or sustained drought that would significantly impact stream base flow conditions during the field survey.

4.1.5 Mine Influence on Hydrologic Regimes

Mine Pit Groundwater Influence

USEPA Region 6 Comments: This subsection refers to the delineation of the Santa Rita pit groundwater capture zone as part of the Site-Wide Stage 1 Abatement Final Investigation Report (Golder 2008) and Figure 4. The Chino report states that Rustler Canyon is the only STSIU subwatershed that could be influenced by the pit groundwater capture. The Chino report also states that delineating the pit capture zone provides evidence that the hydrology of the drainages outside of Rustler Canyon are not impacted by mining activities because the Santa Rita pit represents the only source of potential historical mining impacts that could have affected the natural STSIU hydrology. The Chino report states but does not explain what evidence the delineation of the pit capture zone provides to show that the hydrology of the drainages outside of Rustler Canyon are not impacted by mining activities.

Chino Response: The nature and extent of the shallow groundwater system and the deep regional aquifer associated with the OPCZ, and the direction of groundwater flow around the Santa Rita Pit have been studied extensively to support closure planning and reclamation activities at Chino Mines Site, under Discharge Permit 1340. A comprehensive description of the OPCZ and hydrogeology of the site is beyond the scope of the HP study; however, the key concepts of the groundwater system conceptual model and the approach used to model the OPCZ are summarized below, based on information provided in previous groundwater studies (Golder 2005, Birch et al 2006, Golder 2007, Golder 2008). Chino believes that additional information provided about the OPCZ associated with the deep regional aquifer and shallow groundwater system provides necessary evidence to show that hydrology of the STSIU drainages proposed for ephemeral classification is not impacted by mining activities, when considered in the context of the lack of other potential mining activities that could affect these drainages.

The OPCZ is defined as the area over which groundwater recharged from the land surface flows toward and discharges into the pit; groundwater within the OPCZ is contained and used for process water supply purposes (Golder 2007). A combination of groundwater flow modeling results and empirical groundwater elevation data from more than 150 wells was used to calibrate the model and delineate the OPCZ. As described by Birch et al (2006), a steady-state model was constructed to represent the groundwater system because of the relatively constant water level elevations in most of the wells (i.e., seasonal fluctuations of groundwater elevation data were generally no more than a few meters).

The model was developed using an upgraded version of Modflow software (Modflow-Surfact) and the model was calibrated according to American Society for Testing and Materials (ASTM) guidelines. Groundwater elevation data from more than 150 wells were used in the calibration. The area modeled centers around the Santa Rita Pit (Chino Mines), but extends a sufficient distance away from the pit to determine the lateral extent that groundwater is no longer influenced by the pit drawdown. In total, the numerical model covers a large region around the mine totaling 95 mi^2. For context, the current diameter of the pit is approximately 2 miles (Birch et al 2006). Figure 2-1 from Golder (2005), attached to this document, shows the geographic area modeled to develop the OPCZ.

Calibration and sensitivity analyses were conducted to assure accurate delineation of the OPCZ. Model calibration was accomplished by adjusting hydraulic conductivity and other model input parameters until a reasonable match was obtained between the model-calculated and the observed groundwater elevations. Calibration was evaluated by the overall shape of the groundwater-elevation contours, the match of the simulated hydraulic heads to observed hydraulic heads at the calibration targets, and model-calculated water budget components (Golder 2005). Consistent with standard practice, calibration error was evaluated by three common methods: the mean error (ME), the mean absolute error (MAE), and the root mean squared error between the measured and simulated water levels (Anderson and Woessner 1992 as cited in Golder 2005). Table 8-3 from Golder (2005) lists the observed and computed water-elevation data for the 152 wells used for model calibration as well as the calibration statistics results. Figure 8-2 from Golder (2005) is also attached to this document to graphically depict the relationship between observed and simulated water elevations. Based on the calibration and sensitivity analyses, some of the key conclusions about the groundwater model as listed by Golder (2005), included:

- Calibrated model parameters are consistent with expected values based on field measurements and professional judgment;
- A reasonably good match was obtained between simulated and observed values of hydraulic head at the calibration targets; and
- The overall expressions of water-depth contours in the model are consistent with the internal hydraulic boundaries of divides, topographic highs and lows, and the pit.

In addition to the OPCZ model, empirical groundwater-elevation data are available from wells surrounding the pit. Importantly, the groundwater-elevation data provide empirical evidence of the extent of the pit drawdown and the direction of groundwater flow. Figure 7-1 from Golder (2008) is provided as an attachment to this document, which shows groundwater-elevation contours, direction of groundwater flow, and groundwater elevation-data from local wells. Based on the groundwater-elevation data presented in the attached Figure 7-1 (Golder 2008), groundwater elevations south of the OPCZ (towards the STSIU drainages) are at a lower elevation than groundwater levels to the north of the OPCZ boundary.

Separate and distinct from the deeper regional aquifer and the associated OPCZ is the shallow groundwater flow system, which overlays the deeper system. This shallow system is observed in the STSIU drainages including Rustler Canyon, Martin Canyon, the upper reaches of Lampbright Draw as well as the C and D series drainages. Shallow groundwater flow in this area is dominated by local, small groundwater flow systems that coincide with the local surface watersheds. Within these surface watersheds, groundwater recharges along the upland margins (ridges), and discharges to the local drainages. In effect, they function as independent hydrologic cells, or independent hydrologic systems where all of the recharge remains within the cells, discharging only to the respective drainages and in the downstream direction. The dominance of local shallow groundwater flow systems is clearly demonstrated by the numerous monitoring wells outside of the OPCZ. Groundwater elevations measured in the monitoring wells show that groundwater elevations are highest beneath the local ridges and lowest along the local drainages. In addition, strong vertical upward hydraulic gradients exist beneath the drainages (e.g., Tributaries 1 and 2, Santa Rita Creek, Hanover Creek and Whitewater Creek), demonstrating that the drainages serve as groundwater discharge areas for the local shallow groundwater flow systems.

Modeled shallow groundwater contours at distance from the pit from Golder (2008) closely mirror the surface topography of local watersheds and indicate that the groundwater divides between the localized shallow groundwater flow systems remain closely aligned with boundaries of the surface watersheds, as shown on Figure 5 of the revised report. The modeled groundwater velocity vectors shown on Figure 5 (from Golder 2008) indicate the direction of shallow groundwater flow and demonstrate that at these distances from the pit, shallow groundwater is unaffected by the pit and is still dominated by local recharge and discharge systems that coincide with the local surface watersheds. Consequently, the groundwater balance of the subject watersheds are shown by the modeling results to be unaffected by the open pit.

As noted in the Chino HP report, Rustler Canyon and Martin Canyon (the STSIU subwatersheds closest to the Santa Rita Pit) are not proposed for ephemeral classification. Additionally, Lucky Bill Canyon (the subwatershed located southwest of the pit) was not evaluated in this study and therefore is not proposed for a hydrologic classification. The STSIU drainages proposed for ephemeral classification in this study are approximately 2 miles (Subwatershed D) to approximately 5 miles (Subwatershed E) away from the southern OPCZ boundary, and are separated from the OPCZ by multiple topographic and hydrologic divides. As described above and by Golder (2007), outside of the OPCZ, groundwater flow conforms to the surface topography in this mountainous region, which consists of bedrock typified by low hydraulic conductivity. As a result, groundwater in this area is recharged along the ridges and flows towards areas of lower elevation.

For further reference, maps depicting groundwater flow directions from Golder (2007) are attached to this document (Figures 6-1, 7-1, and 8-1 from Golder 2007). Additionally, Figure 7-1 from Golder (2005) depicts surface-water and groundwater divides. Of note, the STSIU Subwatersheds A, B, C, D and E that are proposed for ephemeral classifications are separated hydrologically from the pit area, and therefore are not impacted by pit drawdown (or by potentially impacted groundwater).

<u>USEPA Region 6 Comment:</u> The drawdown of groundwater and its discharge to Whitewater Creek is not the only concern that should be addressed here. The Final Groundwater Restoration Plan for the Chino, Cobre, and Tyrone Mine Facilities (2012) states that hazardous substances from sources at mine sites can be transported to groundwater from infiltration of contaminated surface runoff; seepage from the walls of open pits and underground workings, waste rock, stockpiles, tailings, leach piles, stormwater, or process water reservoirs can injure groundwater. Injured groundwater can then expose downgradient biologic, geologic, and surface water resources to impacts. The Plan also reports that the areal extent of injured alluvial and regional groundwater covers 13,935 acres. Figure 3.2 of the Plan shows the areal extent of injured alluvial and regional groundwater at the Chino Mine, which overlaps/is larger than the area delineated for the pit capture zone, suggesting that Rustler Canyon may not be the only drainage affected by the Santa Rita pit and leachate from surrounding stockpiles. Although this Chino report is not recommending a re-classification for the Rustler Canyon drainages, the state is obligated to not only ensure that the appropriate designated uses and criteria are in place for these waters, but to ensure that its water quality standards provide for the attainment and maintenance of downstream waters consistent with 40 CFR 131.10(b). In this instance, it means showing that water quality in the Rustler Canyon or other drainages are not affected by the Santa Rita Pits and that anything moving through these drainages is not affecting Subwatershed G drainages and Lamplighter Draw downstream.

Chino Response: As stated previously, the focus of this HP study is on the hydrology of STSIU drainages, not potential impacts to surface or groundwater quality. Those potential water quality impacts are being addressed under separate regulatory and enforcement programs, including CERCLA-type investigations described above.

This HP study is not proposing changes to designated uses of Rustler Canyon, Lampbright Draw, Subwatershed G drainages, or any waters downstream of the STSIU drainages. Again, potential impacts to water quality in these drainages, as well as the STSIU drainages proposed for ephemeral classification in this study, are being evaluated through other regulatory and enforcement programs, not this HP-UAA study. However, determining what uses are attainable in the STSIU drainages based on the natural hydrologic condition of these drainages ensures appropriate water quality criteria are used for ongoing regulatory programs.

The conceptual site model developed for STSIU by SRK (2008) identified historic smelter stack and fugitive dust emissions from historical mineral processing activities and the tailings areas as the primary potential sources of contamination to STSIU. Re-expression of potentially impacted subsurface alluvial water is a secondary source of contamination to STSIU surface water (ARCADIS 2011). However, regional groundwater expression to STSIU drainages has not been identified as a source of contamination to STSIU drainages.

Regional Springs

USEPA Region 6 Comment: **The Chino report states that both recent observations and historical references don't indicate that mining activities have influenced the presence or disappearance of springs in the STSIU drainages. The discussion refers to present and historical observations of Brown Spring, Bolton Spring and Ash Spring specifically – although Figure 4 only shows the location of Brown Spring. There is no indication that the "recent" or "present" observations were made during the 2011 time frame for this UAA or in other unrelated investigations. Although the "historical" observations may refer to dated findings by Paige (1916) and findings by Sivinski and Tonne (2011), there is no discussion of flow volume from these springs other than that they continue to express water and no mention of water quality. There has not been anything presented that clearly supports the conclusion that the flow in these springs has not been impacted by mining activities. Although annually-reoccurring pools in Martin Canyon and Rustler Canyon may indicate the presence of seeps or springs, with no data showing consistency in volume or water quality, there is no support for the statement that these seeps or springs have not been impacted by mining activities.**

In addition, it's unclear why the springs referenced by Sivinski and Tonne (2011); Apache Tejo Spring, Cold Spring, Kennecott Warm Spring, and Kennecott Cold Spring are mentioned and included in Figure 4 since they are not considered within STSIU drainages that were assessed in this HP study.

Chino Response: As stated in Section 6 and shown on Figure 4 of the HP report, STSIU tributaries containing the referenced springs are excluded from ephemeral classifications, and therefore do not require further evaluation of flow rates in this HP study.

The finding that groundwater in Subwatersheds B, C, and D (i.e., subwatersehds containing Ash Spring, Bolton Spring, and Brown Spring) is unaffected by the pit drawdown described in response to the above USEPA Region 6 comment provides a reasonable and appropriate basis to conclude that flow in these springs has not been impacted by mining activities. Drainages containing these springs have not been developed or modified from their natural condition, and no wells or other mining related influences are located in the vicinity of these springs or within the respective drainage basins to impact their natural flow and persistence.

The locations of Ash Spring and Bolton Spring were shown on the original Figure 4 as green and yellow triangles associated with the CLF critical habitat transect (the labels for these springs were contained in the Figure legend). In the revised Figure 4, the symbols have been modified to blue circles for springs within the STSIU and blue squares for springs outside of the STSIU, with labels displayed on the map for all springs.

References to springs described by Paige (1916) and Sivinski and Tonne (2011) were incorporated into the Chino HP report in response to SWQB comments (by letter dated April 30, 2012). However, those springs outside of the STSIU study area are now distinguished as blue squares in the revised Figure 4.

4.2 Level 1 Field Evaluations

USEPA Region 6 Comment: **This paragraph indicates that the field crew performed one field replicate at pre-determined reach locations as described in the project work plan and consistent with recommendations in NMED SWQB's Quality Assurance Project Plan (QAPP). It also states that three reaches not identified in the workplan were selected in the field to capture localized watershed features. However, the report does not identify these reaches or explain what these features were and why there was need to deviate from the work plan and/or QAPP.**

Chino Response: Information about the field replicate applied at reach D1-2 is provided in Section 5.1.3 (Quality Control).

Additional details about the three reaches not identified in the WP that were selected in the field to capture localized watershed features were added to Section 4.1.1 of the revised report because that section refers to the total number of reaches evaluated in the study.

4.2.1 Sample Reach Selection

USEPA Region 6 Comment: **This subparagraph primarily repeats hydrology protocol requirements, but does say that most sites that were selected were representative of the corresponding drainages. It's unclear if this means that those identified in the previous paragraph are being referred to here.**

Chino Response: Slight revisions were made to the second paragraph of this section to clarify the number of pre-determined reaches and that three additional locations (one in Subwatershed B and two in Rustler Canyon) were added in the field based on observations described in Section 4.1.1.

5. Results

5.1 Summary of Level 1 Field Evaluation Scoring

USEPA Region 6 Comment: This subsection provides a general summary of the results of the Level 1 evaluations indicating that all of the waters evaluated scored as ephemeral, but provides no details with the exception of the discussion of the intermittent finding for Rustler Canyon.

Chino Response: As stated in the report, details associated with the Level 1 Field Evaluation Scoring are summarized in Table 2, and are provided in Appendices A through G, which include the HP Cover Sheets, the HP field forms, aerial photographs, and photo-documentation for the drainages evaluated. Additionally, because the majority of ephemeral reaches were scored as ephemeral after evaluating the first six HP indicators, the subsequent subsections in the report provide discussions of those indicators, as observed throughout STSIU drainages.

5.1.1 Sub-Watershed Drainages Scored as Ephemeral during Level 1 Field Evaluations

USEPA Region 6 Comment: This paragraph notes that during field application of the HP, an ephemeral classification was reached for most of the drainages after scoring the first 6 indicators. The discussion notes that of the 24 reaches evaluated, 17 reaches were determined as ephemeral after the first six indicators were evaluated and scored, and that three additional reaches were determined as ephemeral based on evaluation and scoring of all Level 1 HP indicators.

USEPA Region 6 Comment: See comments provided under section 4.1 Level 1 Office Procedures and its subsections.

Chino Response: See Chino responses provided under Section 4.1 Level 1 Office Procedures and its subsections.

6. Conclusions and Hydrologic Classification Recommendations

USEPA Region 6 Comment: The report states that the ephemeral classifications for the remaining waters are based on Level 1 hydrology determinations consistent with "observations and suggestions from previous Site investigations." In referring to Figure 4, this section also states that the ephemeral designation for the identified STSIU drainages also applies to their associated tributaries because the unnamed reaches assessed during the HP study were "determined to be representative of the collective subwatershed." The basis for this presumption is unclear since there were no sampling sites in these tributaries. This is of particular concern since waters and tributaries in Rustler Canyon, Martin Canyon, drainage C-4 and C-19 were initially determined to be ephemeral but were later found to have flow present after further investigation prompted by NMED. A defensible UAA relies on current findings, not "suggestions" from previous site investigations.

Chino Response: As described in the HP report (but not referenced in the above comment), primary drainage channels were assessed in each subwatershed. The hydrologic conditions observed in these primary drainage channels provides a strong indication of hydrologic conditions of lower order, hydrologically-connected tributary drainages that have the same or less flow persistence as the downgradient primary drainage channel given the absence of springs in those tributary drainages. All tributaries containing springs were excluded from ephemeral classification in this study. Referring to the yellow ephemeral drainage channels shown in Figure 4 of the HP report, only minor tributaries were not evaluated during field HP application. However, HP reaches were evaluated within close proximity and downgradient to these minor tributaries. Therefore, in the absence of springs, and given the consistency of stream characteristics within headwater drainage basins, there is considerable rationale to conclude that a similar hydrologic regime exists in these smaller drainage basins.

The above comment, "this is of particular concern since waters and tributaries in Rustler Canyon, Martin Canyon, drainage C-4 and C-19 were initially determined to be ephemeral but were later found to have flow present after further investigation prompted by NMED" is inaccurate.

- Rustler Canyon was scored as non-ephemeral by ARCADIS field staff and as a result was never proposed for ephemeral classification. Therefore, further investigations for Rustler Canyon were not performed.
- Martin Canyon was scored as ephemeral during Level 1 Field Evaluations (see Appendix F for HP field forms and photo-documentation that support an initial ephemeral score for Martin Canyon based on HP application), but was not proposed for an ephemeral classification in the May 2013 report based on historical observations of CLFs. The CLFs have not been documented in Martin Canyon since 1998. Further investigations for Martin Canyon were not performed and NMED did not document flows.
- Although reaches C-4 and C-19 were scored as ephemeral reaches during HP field evaluations (see Appendix C for HP field forms and photo-documentation that support an initial ephemeral score for these reaches based on HP application), these two reaches were not proposed for ephemeral classification in the May 2013 HP report. This was due to proximity to the CLF critical habitat transect and subsequent observations made by NMED of isolated pools, or potential pools, located in other reaches of Subwatershed C. Please note that Chino was present at and participated in these field observations with NMED. Based on the three field reconnaissance surveys and resulting photos and field notes, Chino further responds as follows:
    - Flow was not documented by NMED at the C-4 and C-19 reaches. Marginal flow from Bolton Spring was observed, which was not proposed for an ephemeral designation.
    - Additionally, HP reach C-4 was not re-surveyed or assessed to have any isolated or potential pools. Two small pools were noted approximately 1,000 feet upstream of C-4. Pools were not encountered upstream again for another 3,000 feet approximately.
    - NMED field notes and photo of a location which coincides with HP reach C-19 documents that this site loses bedrock pool characteristics and was completely dry.
    - Significant reaches of dry channels containing vegetation types that do not require significant water were also noted during the NMED reconnaissance. In isolated pools, limited aquatic life was noted.
    - Based on NMED reconnaissance notes, ARCADIS's observations and HP application, and NMED HP guidance, a gradient of ephemeral to intermittent reaches possibly occurs throughout upper Subwatershed C. As a result, and considering the CLF critical habitat, the May 2013 draft HP report did not propose an ephemeral designation for any reaches in upper Subwatershed C.

Chino believes that, based on the HP study results, the comments provided herein, and the revisions made to the HP report, that ephemeral classifications proposed are defensible and reflective of the natural hydrologic regime in those STSIU drainages. In response to the USEPA Region 6 comment that a '*defensible UAA relies on current findings, not "suggestions" from previous site investigations',* the third paragraph of Section 6 has been modified in the revised HP report to state that ephemeral determinations were based on the application of the Level 1 HP procedure, and the finding that mining activities do not impact the natural hydrologic regime of the drainages proposed for ephemeral classification.

The wording "observations and suggestions from previous site investigations" has been modified in the revised HP report to state that classification of the ephemeral drainages in STSIU is consistent with direct observations reported by other site investigators. Multiple, direct observations of the STSIU hydrology recorded by different environmental professionals during different times are relevant to this study. Inclusion of that type of information is listed as an option in "*Other information that may be considered"* in NMED (2011) for Level 2 Office Procedures.

USEPA Region 6 Comment: In its technical review, Region 6 found that although the Chino Mines report touched on a number of important points, it lacked adequate detailed discussion and used generalized data to support the conclusion that the state's limited aquatic life use designation is appropriate for the subset of waters identified. The Introduction of the Chino report refers to a number of what apparently are regulatory, enforcement and/or remedial actions. These actions may be important to understanding the mine site, particularly given the potential influence on surface and groundwater, but the Chino report fails to explain how they relate to determining the appropriate uses in the STSIU waters.

Chino Response: The ephemeral designations proposed for the subset of drainages described in Section 6 of the report were determined by applying the HP according to NMED (2011) guidance and in many instances provided data and supporting evidence beyond the NMED guidance. Chino believes the responses provided in this document and the revisions made to the Chino HP report clarify details about application of the HP and sufficiently address comments from USEPA Region 6.

The revised report provides an overview of ongoing regulatory programs at Chino Mine Site, including studies conducted as part of the Chino Mines AOC and groundwater discharge permits. As described in these responses, no enforcement or corrective actions have been conducted that impact the natural hydrologic regime of the STSIU drainages proposed for an ephemeral designation. Because this HP-UAA study is solely evaluating whether the natural hydrology limits aquatic life uses in STSIU drainages, a comprehensive review of these actions is beyond the scope of this study, except for information required to determine that these actions have not affected the natural hydrologic regime of STSIU drainages.

USEPA Region 6 Comment: The Level 1 assessments in Appendix A suggest that a subset of the STSIU waters may be predominately ephemeral. However, several sections of the Chino Mines report that touch on or directly address climatic conditions (drought, precipitation and flow), authors appear to have relied on data sources that were not temporally related to the June 2011 field evaluations which is inconsistent with the guidance for UAA's relying on the SWQB's Hydrologic Protocol. The Region found and cited climate data that indicate significant drought conditions prevailed during the HP field assessments. The inconsistencies between the sources cited in the Chino Mines

report and those found by the Region lead to significant questions concerning the validity of the Level 1 assessments and the conclusions about designated uses that were drawn from them.

Chino Response: Clarification about data sources used to assess climatic conditions are provided in the above responses and summarized below:

- Drought conditions were assessed consistent with the methods described in the NMED (2011) HP guidance, and consistent with methods used in other USEPA Region 6-approved HP UAAs. Two sources of information (NDMC and WRCC) indicated the 12-month SPI was within the NMED (2011) drought-index acceptability range. As a result, ephemeral determinations made for the subset of drainages described in Section 6 of this report are considered reliable and acceptable when interpreted based on the HP guidance. Other climate evaluations were included in the Chino report in response to NMED comments about historical conditions (precipitation records) and/or as an additional source of information (flow gage data), as described below.
- The long-term precipitation record from the Fort Bayard climactic station was assessed in response to an NMED comment about conditions during the early 1900s (Paige, 1916). Chino located precipitation records that dated back to this period from a station approximately 5 miles away from the STSIU area. Despite the precipitation record ending about a month and a half before the HP field work, these data are relevant to assessing how the drought conditions leading up to the time of the survey compare to the long-term record (note that the HP-recommended drought index utilizes the preceding 12-month period, and the Fort Bayard weather station contains local precipitation data for 10 and a half of these months and conservatively assumes that there was no precipitation for the period when no data were collected). Based on this evaluation, precipitation recorded adjacent to the STSIU area during the months preceding field evaluation was not considered historically anomalous. Similar to the precipitation record, flow data from a gage located approximately 12 miles away from STSIU were included in the report as an additional source of information to assess drought conditions. While this flow gage is not located downstream of the STSIU drainages, its geographic proximity to STSIU and being located within the larger Mimbres River watershed provides an overall indication of regional drought and hydrologic conditions.
- Taken together, the precipitation and flow data provide secondary sources that further validate the primary drought metric (the 12-month SPI) used for NMED HP evaluations. As described by NMED (2011), the HP and scoring mechanisms have been designed with redundancy (i.e., multiple indicators) to allow for satisfactory ratings even after recent rainfall or during drought conditions. For example, indicators such as riparian vegetation characteristics (or lack thereof) and rooted upland plants growing in the streambed provide strong indications of long-term hydrologic conditions.

USEPA Region 6 Comment: Region 6 believes that determining the appropriate designated uses for the STSIU drainages depends on understanding the natural hydrology and climate conditions as well as the effect of mining activities, remediation, permitted discharges, surface diversions and alterations in surface and groundwater flow may have on use attainment in these waters. Based on the concerns outlined in this TSD, Region 6 has determined that it cannot technically approve the Chino report. This technical review does not constitute a final action under §303(c) of the Clean Water Act (CWA), but is an interim action utilizing previously approved performance-based provisions (*See* 65 FR 24647, 24648 ((April 27, 2000)).

Chino Response: Permitted stormwater discharges to drainages are managed under the National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit (MSGP) #NMR05GD16 at Chino Mines. During the time of the HP study, permitted stormwater outfalls were located in Whitewater Creek, Hanover Creek, Lampbright Draw, and Lucky Bill Canyon – none of which are STSIU drainages evaluated in the HP study. These permitted discharges occur only during storm flow events, and pursuant to NPDES MSGP #NMR05GD16, best management practices and containment structures are in place to control and contain any stormwater runoff that is potentially impacted by industrial activities. Therefore, these permitted stormwater discharges do not contribute sustained flow that could alter the natural hydrology of these drainages. In addition, a permitted stormwater discharge located in the headwater reach of Rustler Canyon is fully contained on site and thus does not contribute storm flow into Rustler Canyon. Since the time of the Chino HP survey, additional stormwater discharges have been permitted in Subwatershed E (the drainage west of Hurley) along a haul road that connects Highway 180 to the Chino Limestone Quarry located in Cameron Creek Watershed (the watershed adjacent to the western boundary of Subwatershed E). Stormwater outfalls located along the haul road are equipped with berms and rock check dams to reduce sedimentation into nearby drainages. However, because these are stormwater discharges, they do not alter the hydrology of Subwatershed E drainages (i.e., they discharge only in direct response to precipitation events).

In response to the above USEPA Region 6 comment, potential alterations in groundwater flow were further assessed through searches of well permit data recorded by the New Mexico Office of the State Engineer. The New Mexico Office of the State Engineer maintains records of well permits and details including well construction, well use, depth to groundwater, extraction information, and location coordinates. Of primary importance for determining potential impacts to surface water flows are the location, the depth to groundwater and diversion information. There are no recorded wells used for extraction located within the drainage basins where ephemeral designation is being considered except for Subwatershed Drainage E. Three wells located within Subwatershed Drainage E, in the vicinity of the Silver City airport, are used for extraction for municipality and private (non-mine site) purposes. Total withdrawals listed on the permits are less than 30 acre feet per year and the depth to ground water for two of the wells is 70 and 145 feet below ground surface. Depth to groundwater information is not available for the third well. A monitoring well located to the north of the drainage, however, has a depth to groundwater of 165 feet also supporting the deep depth to groundwater of this drainage. Based on the depth to groundwater in addition to the field conditions observed, groundwater is not at an elevation to contribute to the surface water flow of the Subwatershed Drainages E regardless of the withdrawals. Additionally the results of the well records reviewed over the entire study area indicate that there are no extraction wells in other drainages for which an ephemeral classification is being considered that would likely impact stream hydrology.

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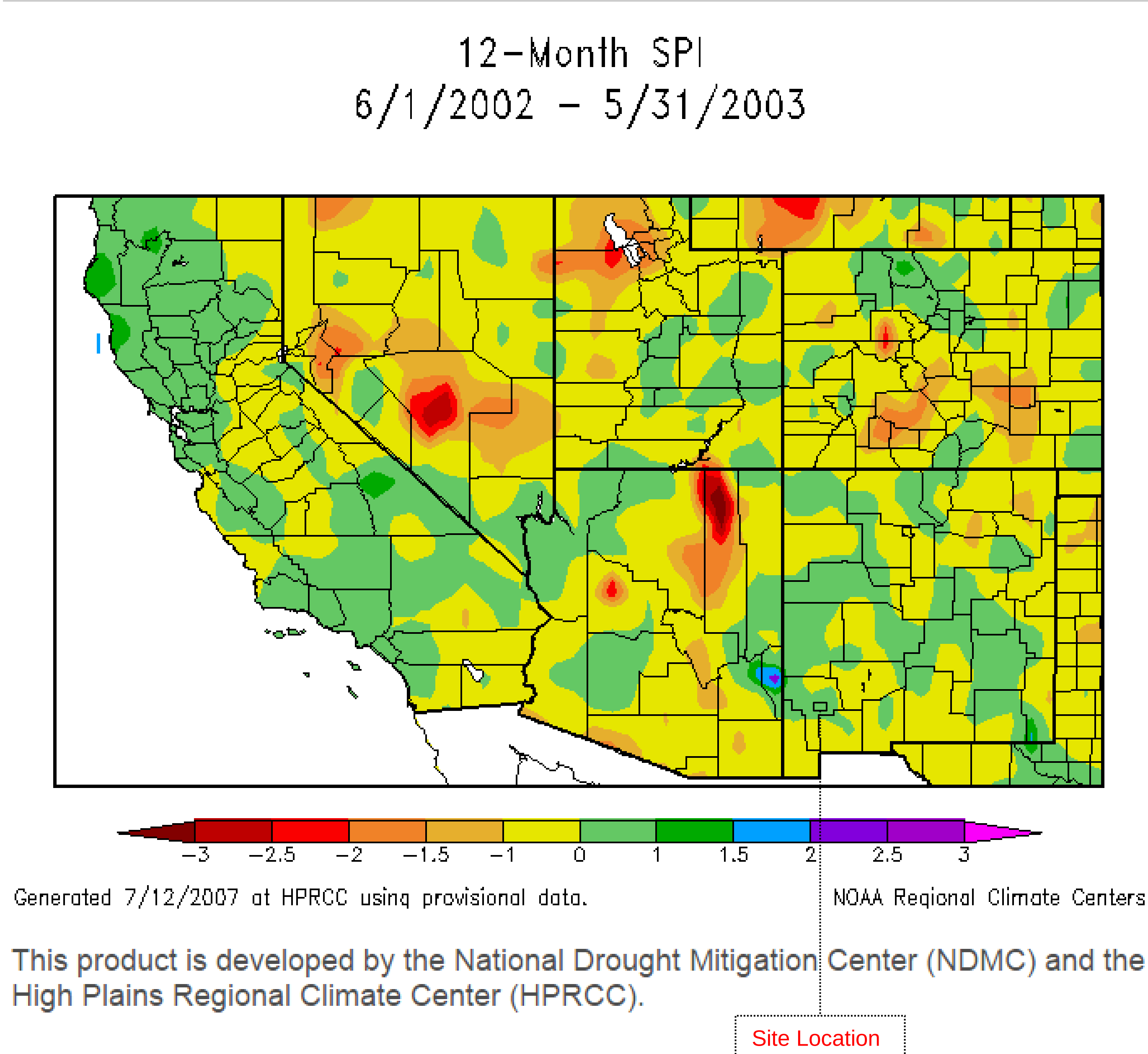


Figure 1a. 12-month SPI for 2002 - 2003

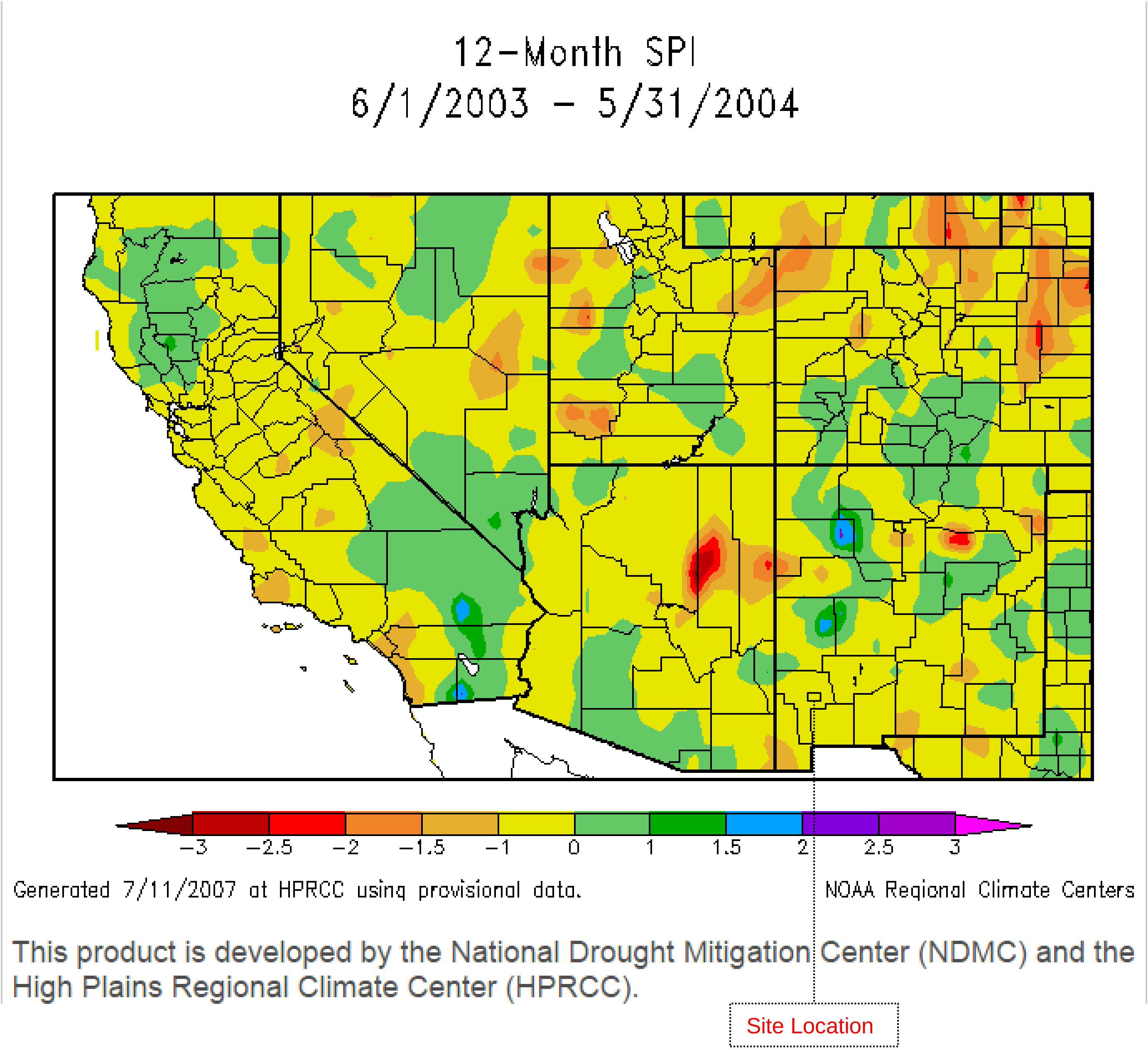


Figure 1b. 12-month SPI for 2003 - 2004

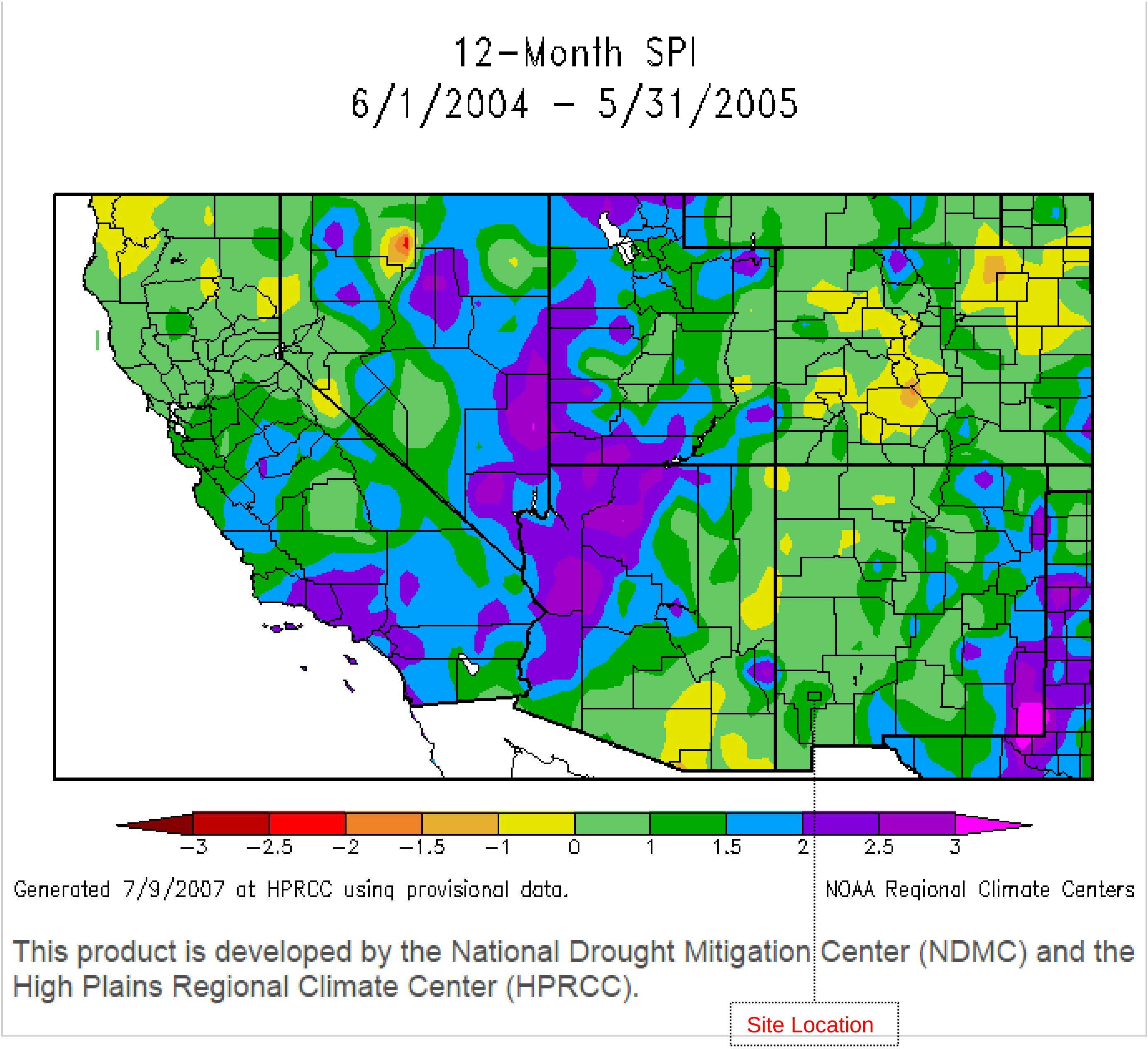


Figure 1c. 12-month SPI for 2004 - 2005

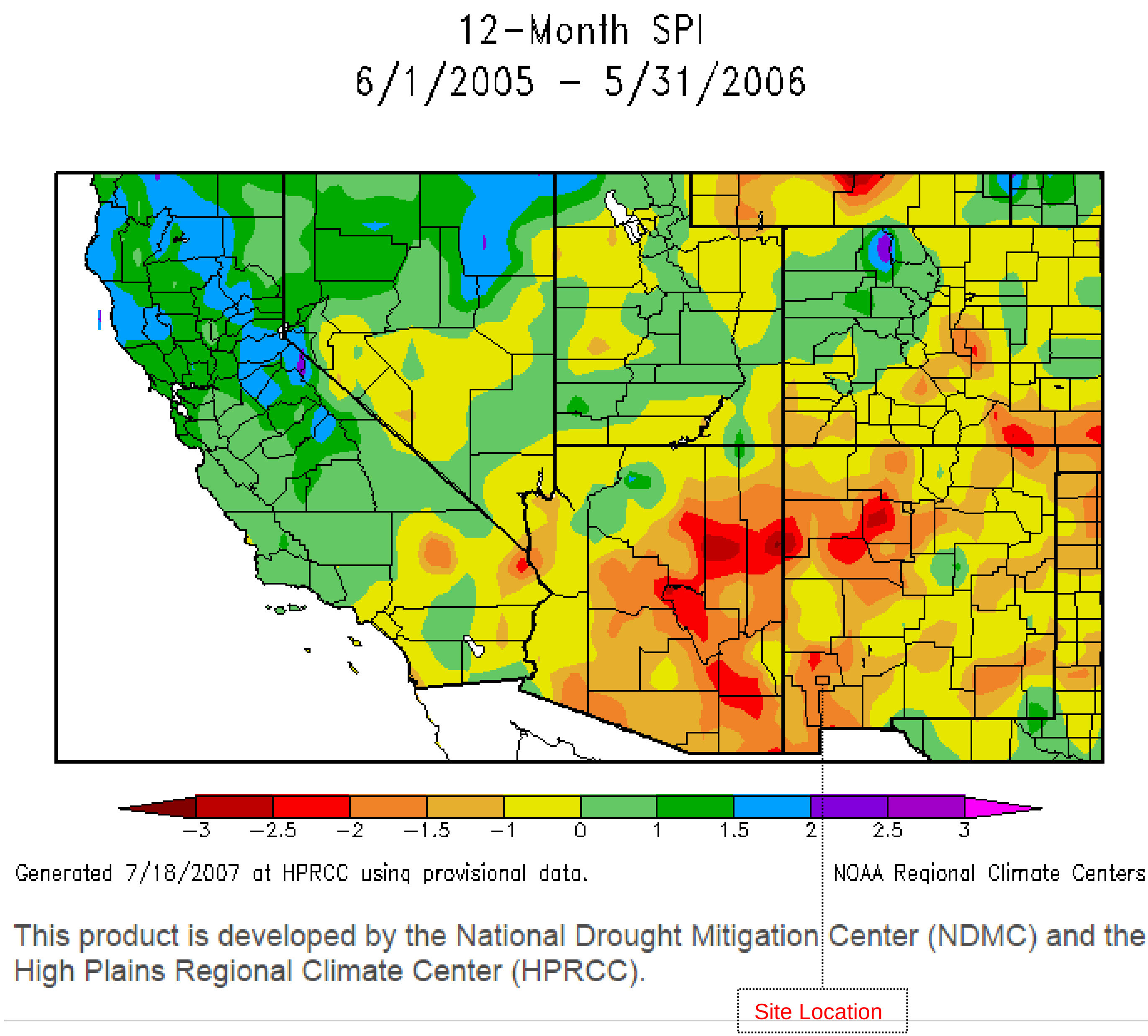


Figure 1d. 12-month SPI for 2005 - 2006

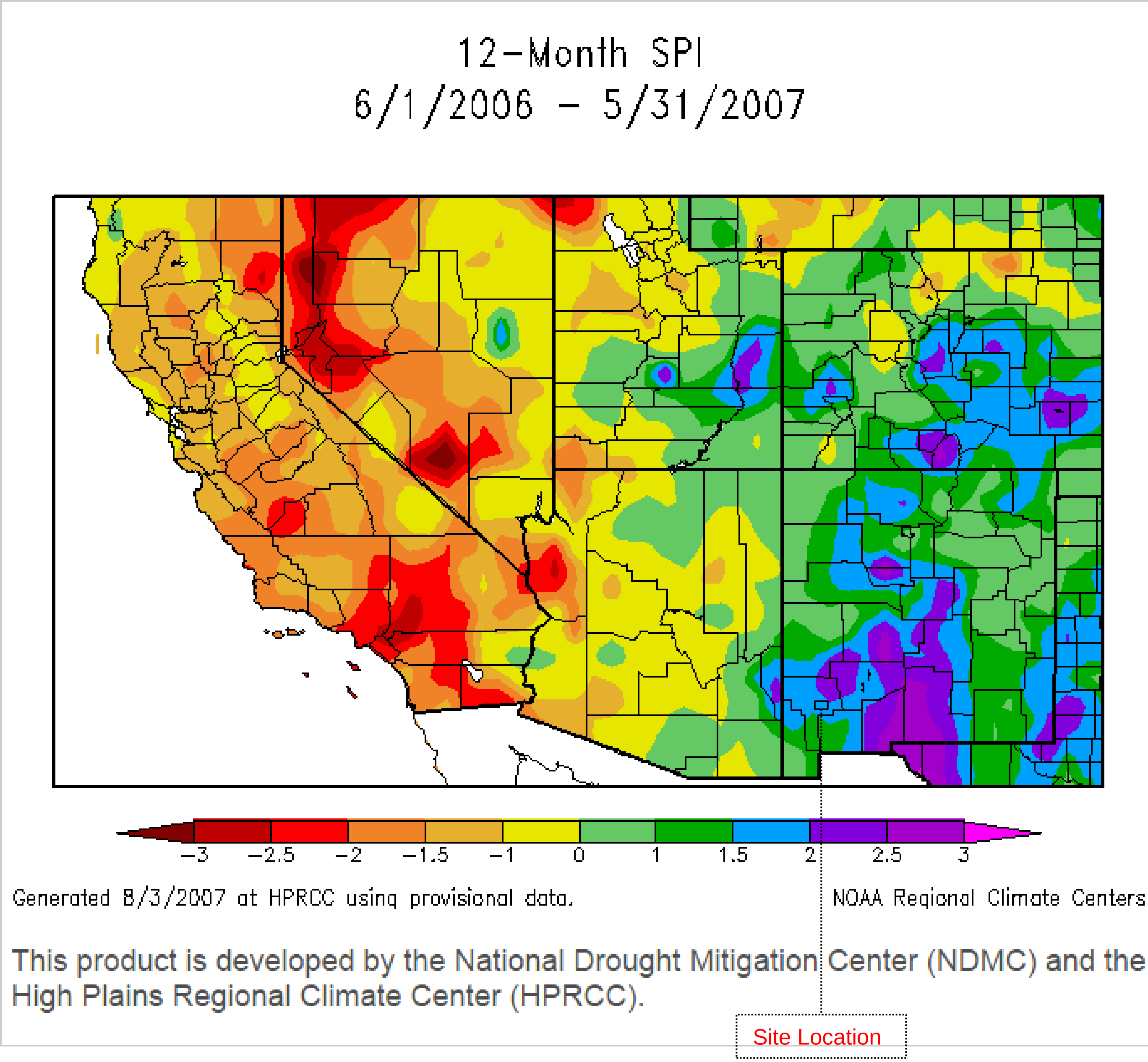


Figure 1e. 12-month SPI for 2006 - 2007

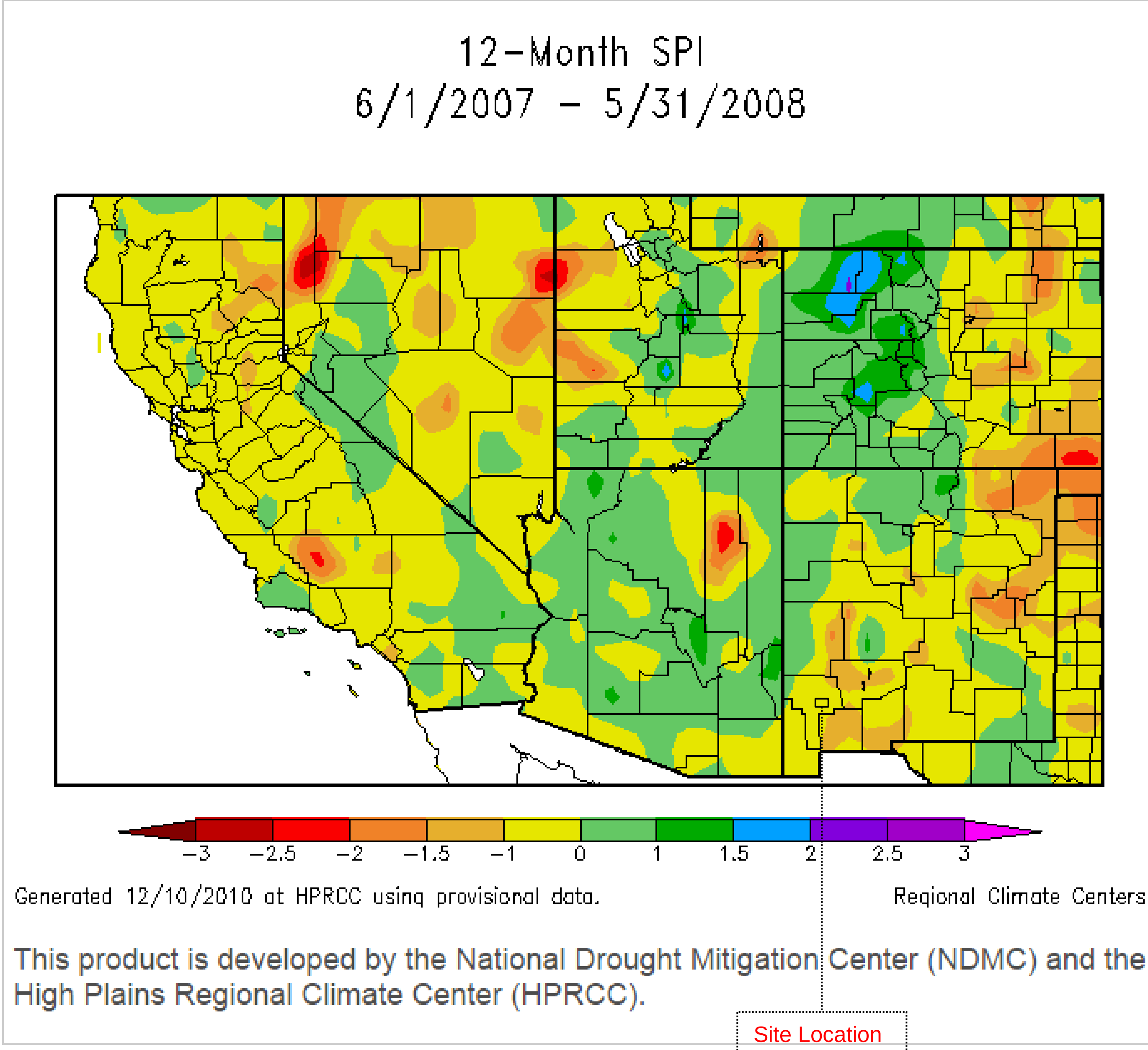


Figure 1f. 12-month SPI for 2007 - 2008

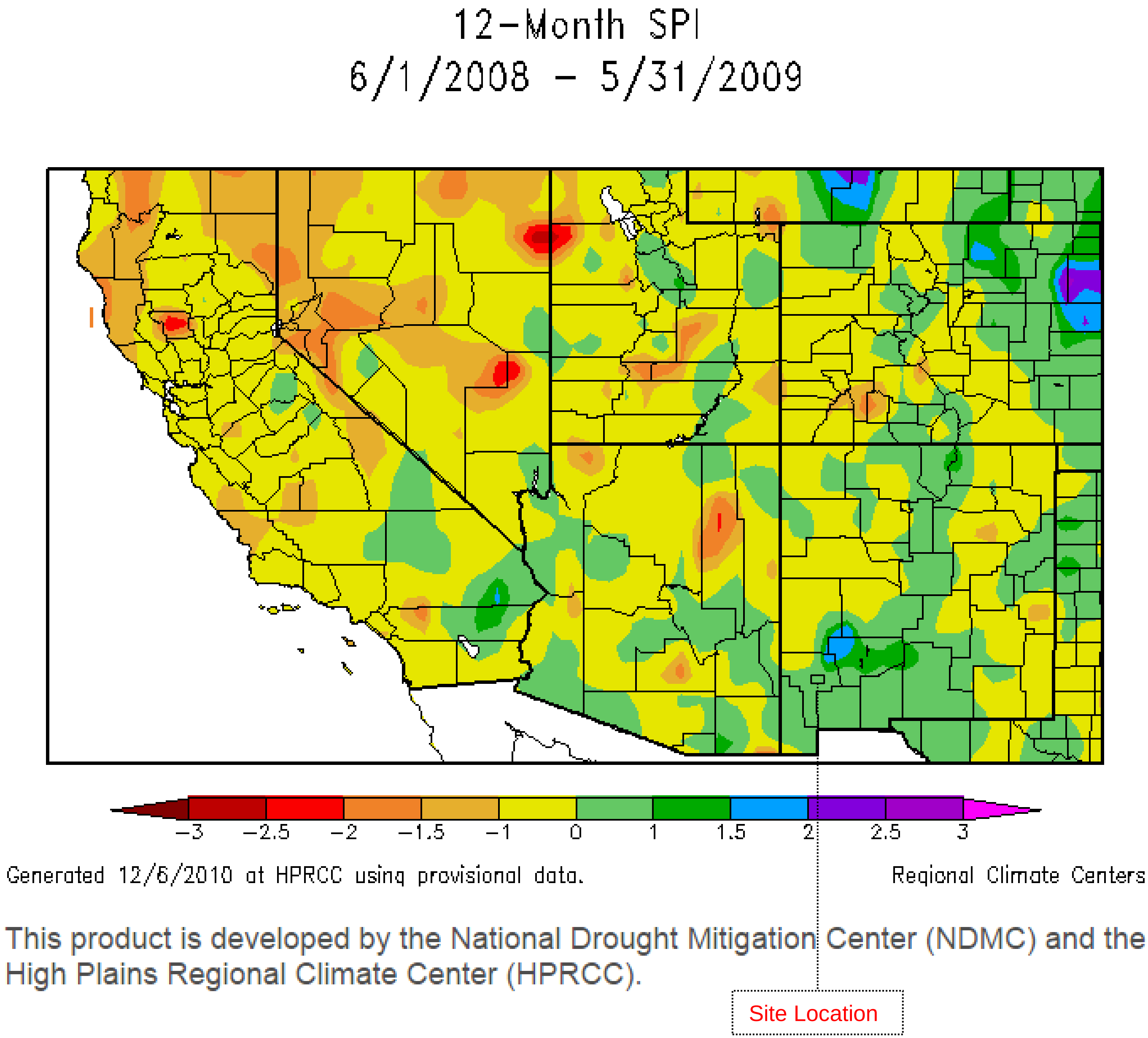


Figure 1g. 12-month SPI for 2008 - 2009

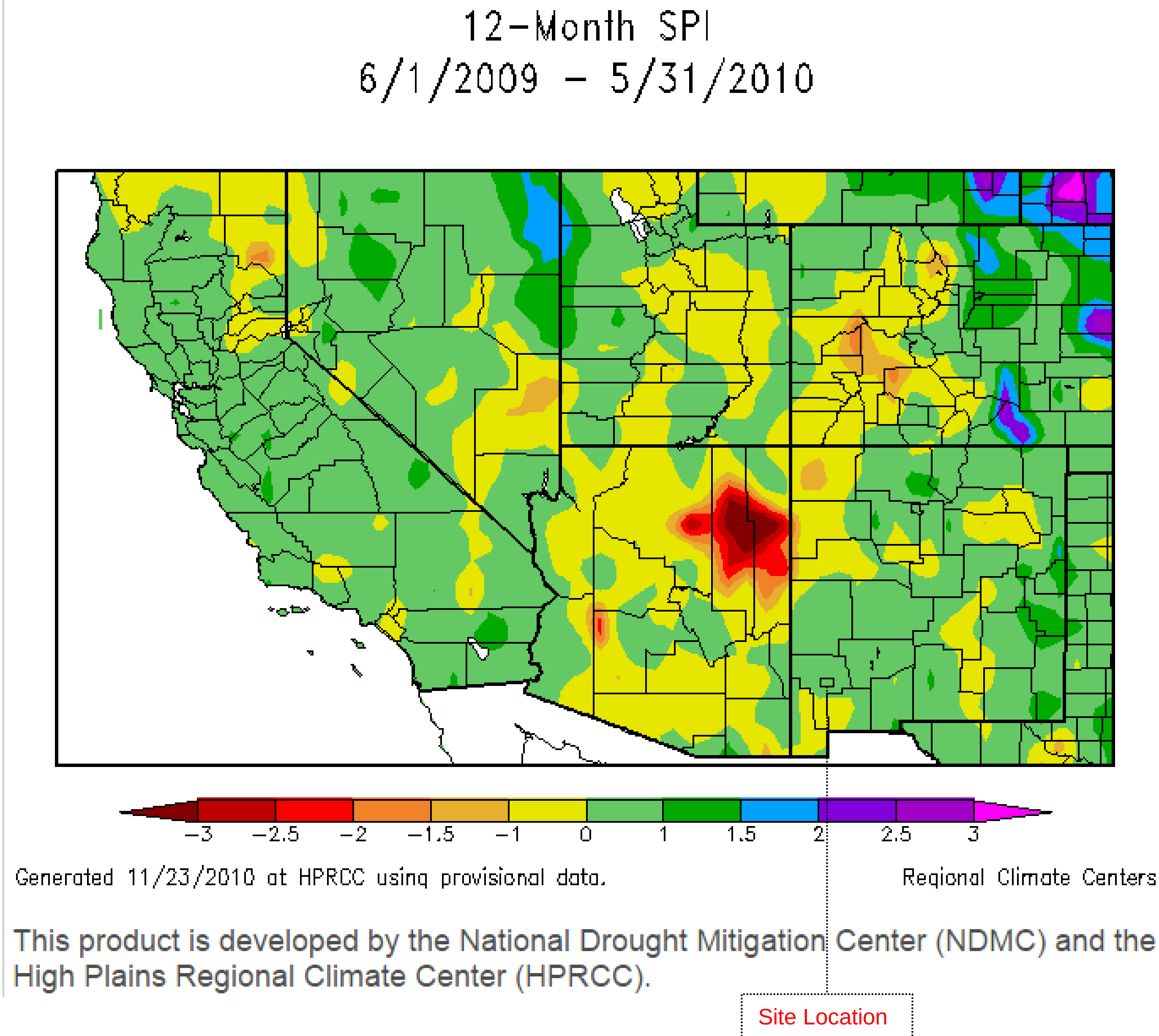


Figure 1h. 12-month SPI for 2009 - 2010

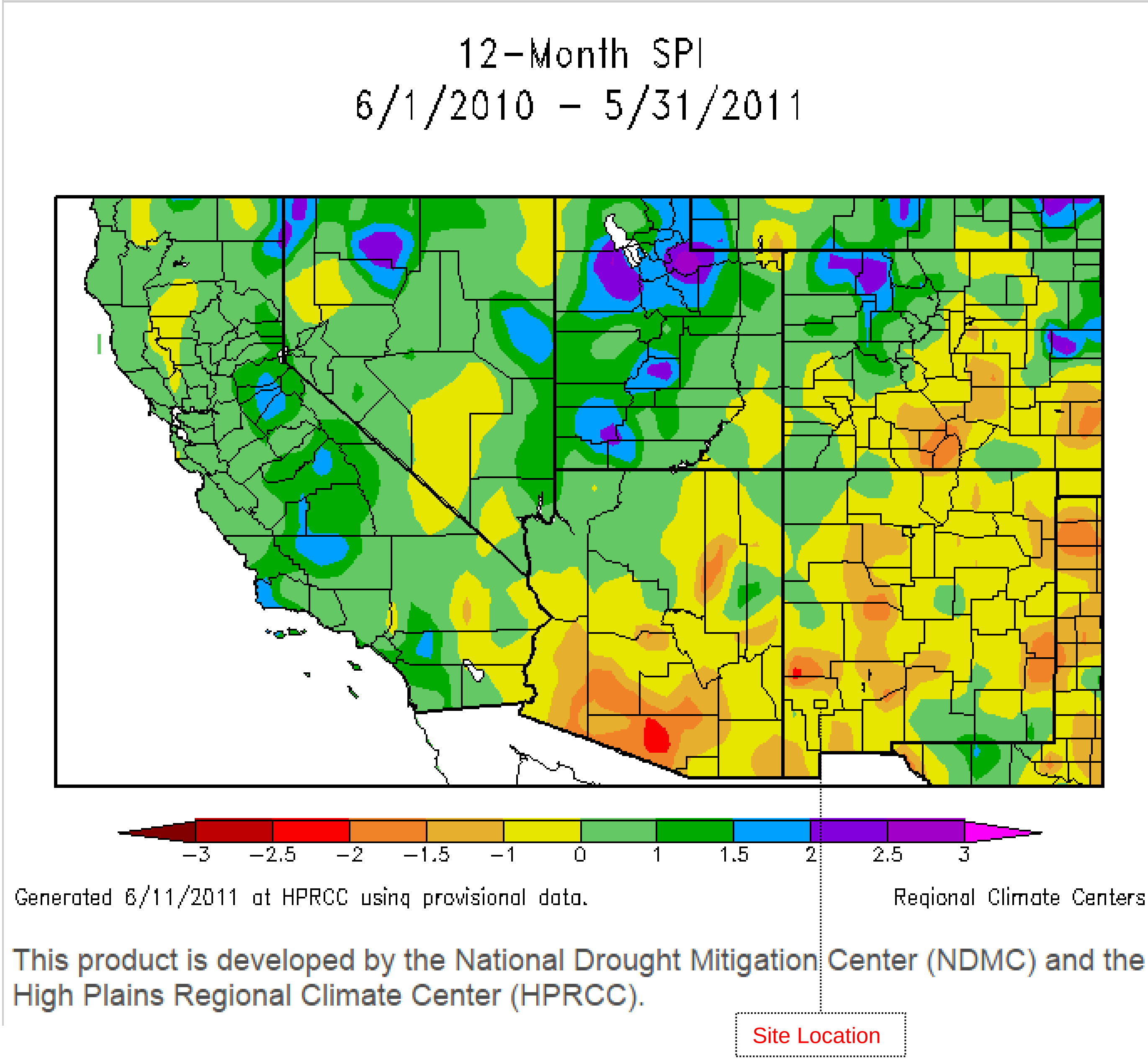
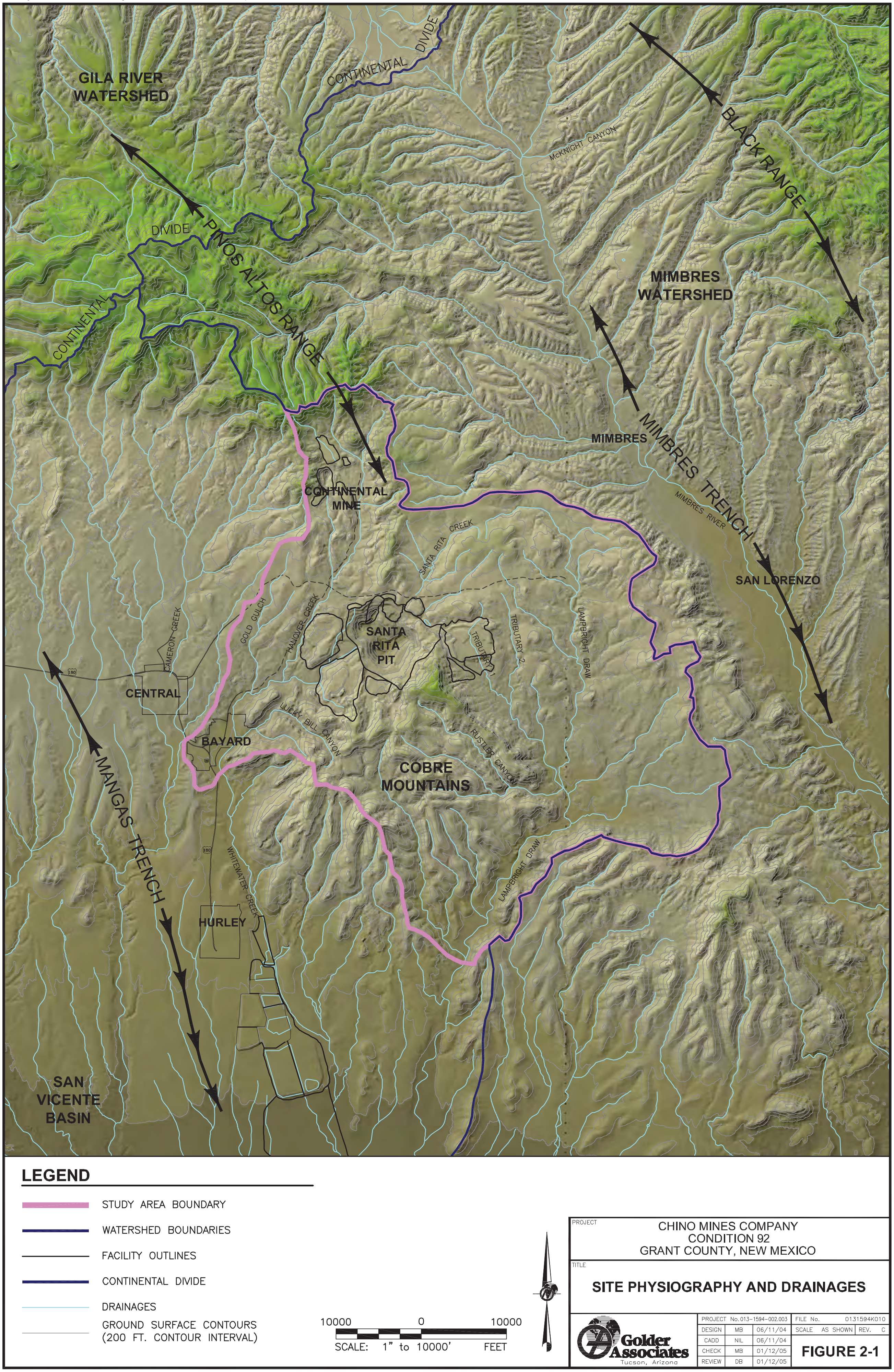


Figure 1i. 12-month SPI for 2010 - 2011

Drawing file: 0131594K010.dwg Jan 12, 2005 - 3:34pm



PROJECT
CHINO MINES COMPANY
CONDITION 92
GRANT COUNTY, NEW MEXICO

TITLE
SITE PHYSIOGRAPHY AND DRAINAGES

PROJECT No. 013-1594-002.003			FILE No.	0131594K010
DESIGN	MB	06/11/04	SCALE AS SHOWN	REV. C
CADD	NIL	06/11/04		
CHECK	MB	01/12/05	FIGURE 2-1	
REVIEW	DB	01/12/05		

Golder Associates
Tucson, Arizona

Figure 2-1 from Golder (2005)

Table 8-3 from Golder (2005)

TABLE 8-3
CALIBRATION RESULTS FOR THE NORTH AREA MODEL

Name	X	Y	Layer	Observed	Computed	Residual
Trauger4	69911.89	40431.29	2	5598.3	5629.473515	-31.2
Trauger5	74454.29	48335.96	1	5725	5776.219754	-51.2
Trauger7	33781.74	39746.89	2	5780	5815.177188	-35.2
Trauger8	33710.91	39711.52	2	5780	5815.458891	-35.5
Trauger9	32651.41	43809.85	2	5824	5868.455314	-44.5
Trauger10	69234.98	50473.33	2	5840	5873.536708	-33.5
Trauger11	69106.63	60175.85	2	5895.9	5936.574647	-40.7
526-99-07	36868.54	49681.99	2	5929.99	6007.025272	-77.04
I-2	37795.26	51082.45	1	5939.12	6020.111659	-80.99
I-4	37659.6	50992.16	1	5962.11	6013.531702	-51.42
MW-1	37541.92	50722.26	1	5965.74	6014.545494	-48.81
Trauger12	75779.58	64753.8	4	5966	6213.678421	-247.7
MW-2	37524.71	50726.38	2	5967.78	6034.278033	-66.50
526-97-2B	38858.91	50675.06	2	5981.3	6069.353975	-88.1
526-97-3	38872.62	50664.71	1	5997.24	6048.047816	-50.81
B-54	39854.89	50768.71	1	6013.66	6078.195288	-64.54
CB-10L	37924.18	51988.05	1	6030.04	6067.350014	-37.31
B-55	40371.51	50942.53	2	6031.3	6108.62246	-77.3
CB-10D	37532.92	52354.98	2	6033.97	6099.363256	-65.39
WD-10	38001.01	52004.8	1	6035.6	6076.263186	-40.7
USGS1	67638.53	65601.32	2	6037.25	6133.669181	-96.4
Trauger13	67351.79	66099.42	2	6041.2	6145.828298	-104.6
Trauger14	39279.85	51245.3	2	6046	6076.090638	-30.1
213-99-01	39923.18	51650.43	3	6048.89	6098.742687	-49.85
CB-9A	36959.82	53438.3	1	6061.18	6081.033168	-19.85
CB-9B	37378.61	53255.59	1	6061.33	6123.547898	-62.22
WD-9D	37232.32	53489.33	3	6065.01	6121.156004	-56.1
B-57R	39484.14	52457.06	1	6069.04	6128.477564	-59.44
CB-8A	36785.85	54784.34	2	6073.83	6113.880519	-40.05
LB5	59309.81	59306.77	1	6075.95	6112.257151	-36.31
LB3	59086.38	59439.11	1	6079.53	6109.370671	-29.84
Spring1	61038.03	61052.89	1	6080	6078.881525	1.1
CB-8C	36837.81	54864.16	2	6081.08	6114.022943	-32.94
LB4	59100.53	59311.91	1	6081.35	6122.200312	-40.85
WD-8D	36865.68	54937.34	2	6083.69	6114.693669	-31.0
LB2	59018.34	59569.05	1	6083.8	6120.030909	-36.2
CB-8B	36583.35	55240.82	1	6087.87	6137.423315	-49.55
LB1	58912.95	59728.51	1	6091.52	6132.006108	-40.49
LB7S	58861.11	59742.72	1	6094.03	6132.270207	-38.24
LB7D	58850.63	59737.33	1	6097.69	6132.65318	-34.96
Trauger16	31319.33	51876.55	2	6100	6153.564981	-53.6
WD-11	39306.4	60427.24	3	6105.02	6314.006694	-209.0
526-98-01	36510.38	56424.62	1	6115.99	6158.704113	-42.71
Trauger17	37855.89	47953.05	2	6120	6116.395987	3.6
WD-6D	36559.11	57155.49	2	6131.28	6201.854518	-70.6
WD-6S	36635.37	57234.52	2	6132.6	6214.408028	-81.8
TLB34	58236.66	59552.86	2	6135.56	6192.566853	-57.01
CB-6D	36684.53	57434.17	2	6146.14	6222.469426	-76.33
TLB17	57582.85	59698.12	2	6180.89	6243.35095	-62.46
TLB28	58954.85	61487.39	2	6182.96	6266.09122	-83.13
WD-4	41196.05	55763.16	1	6183.36	6197.758239	-14.4
Trauger18	36592.2	59590.72	2	6210	6291.917949	-81.9
Trauger19	36477.17	60051.73	2	6233	6288.802925	-55.8
TLB23	56955.82	60225.64	2	6248.21	6269.38479	-21.17
TLB33A	56985.19	59321.69	2	6262.32	6313.23588	-50.92
Trauger20	37255.86	62228.44	3	6265	6326.97089	-62.0
Trauger21	29626.21	51600.66	2	6270	6214.483591	55.5
Trauger22	63232.84	74565.37	2	6283.6	6369.152807	-85.6
Trauger23	63264.16	74607.09	1	6283.7	6294.472454	-10.8
Trauger24	36679.44	62682.99	2	6298	6335.947218	-37.9
Trauger25	29285.13	52031.65	2	6300	6223.829689	76.2
Trauger26	37513.29	62329.03	2	6300	6324.474376	-24.5
WD-5	37827.29	58927.25	2	6304.66	6341.606919	-36.9
Trauger27	35250.63	61630.88	2	6305	6358.797706	-53.8
Trauger28	35710.42	59332.12	2	6310	6315.050286	-5.1
LB10	56776.31	65243.77	2	6310.44	6413.26632	-102.83
591-97-03	48502.04	64076.09	2	6326.69	6483.122787	-156.43
Trauger29	35405.69	61585.31	2	6330	6351.019748	-21.0
526-96-11	44295.08	47896.01	4	6339.75	6494.445713	-154.70
Spring2	58482.69	66621.49	1	6340	6353.316035	-13.3
Trauger30	70043.5	72086.93	3	6341.7	6385.375205	-43.7
Trauger32	37574.77	66077.17	2	6350	6382.085655	-32.1
459-98-05	47338.39	63206.56	1	6354.97	6398.071365	-43.10
Trauger33	37591.48	65931.69	2	6360	6387.218682	-27.2

Table 8-3 from Golder (2005)

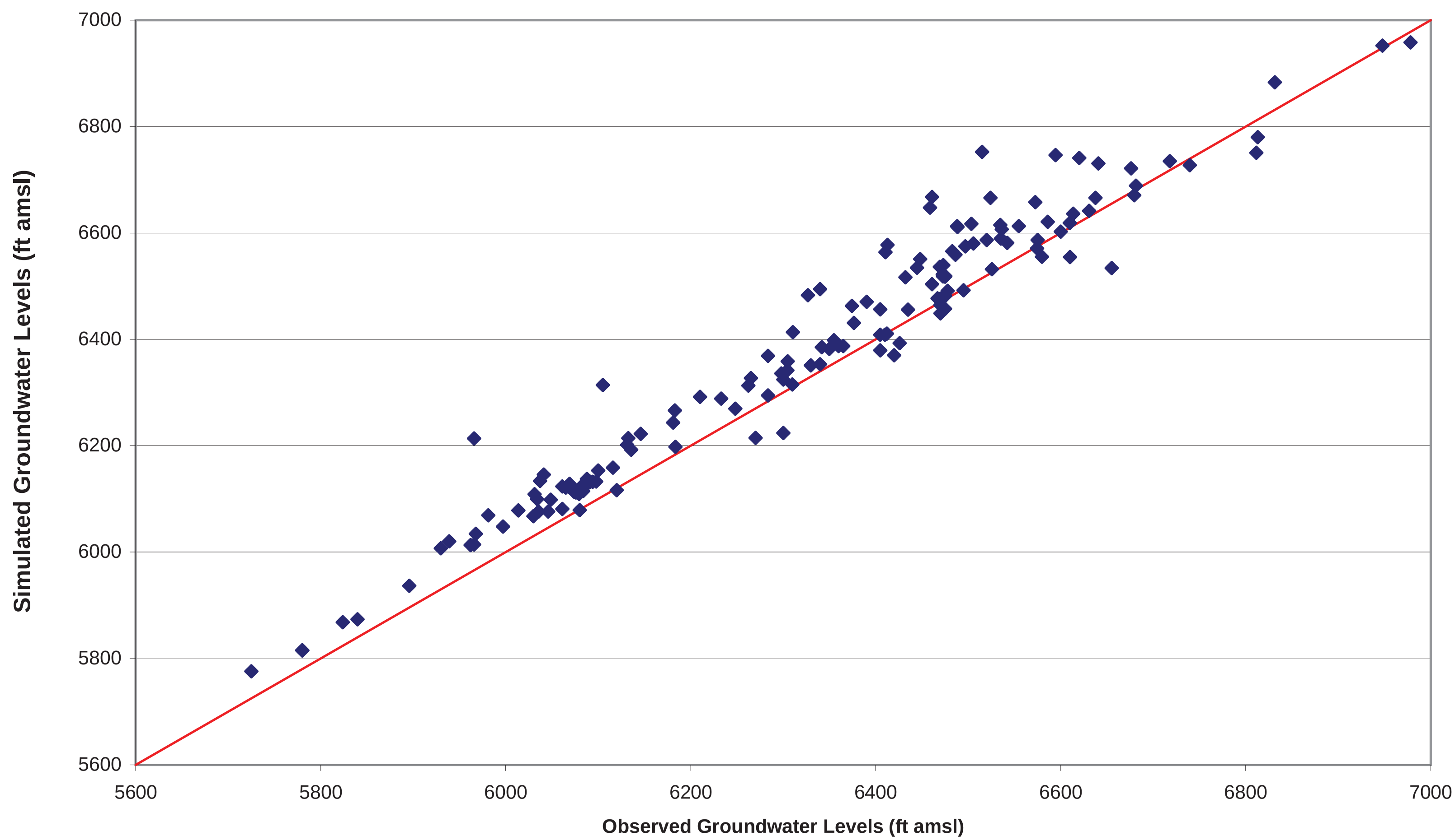
TABLE 8-3
CALIBRATION RESULTS FOR THE NORTH AREA MODEL

Name	X	Y	Layer	Observed	Computed	Residual
Trauger34	37541.06	65808.62	2	6365	6387.36192	-22.4
WD-1	42086.95	49198.9	1	6374.16	6462.830587	-88.7
PZ-14	45060.44	63116.1	1	6376.61	6431	-54.39
TLB32	56029.78	58744.51	2	6390.21	6470.303276	-80.09
Trauger35	59548.97	70368.15	2	6404.9	6456.339382	-51.4
Trauger36	30687.44	59497.74	2	6405	6408.532251	-3.5
Trauger37	38127.78	66967.14	2	6405	6379.115352	25.9
Trauger38	37582.99	67870.3	2	6410	6408.462605	1.5
SX-6	49935.16	65678.27	2	6410.39	6563.769123	-153.38
Trauger39	37577.43	67937.44	2	6412	6410.821199	1.2
Trauger40	56613.07	72642.4	3	6412.8	6577.30924	-164.5
591-97-04	48190.64	63394.33	1	6419.87	6370	49.87
TLB29	57923.91	63580.46	2	6425.87	6393.049137	32.82
376-97-05	52626.35	65075.77	1	6432.24	6516.79347	-84.55
376-97-06	56578.75	67126.48	1	6434.9	6456.025264	-21.1
459-99-01	46845.47	65716.28	2	6444.78	6534.434537	-89.65
526-96-12	44614.13	48815.88	3	6447.96	6550.656228	-102.70
Trauger41	45501.48	68958.83	2	6458.6	6647.627292	-189.0
Trauger42	45746.78	68382.63	5	6460.8	6503.702099	-42.9
Trauger43	53709.32	70131.4	2	6461	6667.805825	-206.8
SXIW-6	49972.66	63739.46	2	6466.76	6477.298212	-10.54
376-97-02	55637.48	66774.11	1	6469.19	6536.014954	-66.82
SXIW-2	50382.22	63812.06	2	6469.83	6448.587291	21.24
Trauger44	31453.67	61390.06	2	6470	6464.443166	5.6
Trauger45	33571.41	63075.09	2	6470	6476.600907	-6.6
376-00-04	55187.32	66722.74	2	6472.54	6522.122755	-49.58
376-00-03	55300.3	66633.93	2	6472.65	6518.215688	-45.57
376-00-07	55201.4	66593.84	2	6472.66	6519.841189	-47.18
376-00-06	55185.82	66628.52	2	6472.77	6520.708779	-47.94
376-00-08	55206.05	66553.71	2	6472.94	6519.145965	-46.21
376-97-04	55061.1	66478.72	1	6473.18	6539.570232	-66.39
376-00-02S	55265.44	66527.85	2	6474.91	6517.599733	-42.69
Trauger46	33543.49	63187.01	2	6475	6481.27767	-6.3
Trauger47	37074.36	69865.73	2	6475	6457.237876	17.8
GB001	51692.5	64687.36	1	6475.3	6518.890808	-43.6
376-97-03	51475.78	63992.13	2	6477.93	6491.30986	-13.38
376-00-10S	54241.62	67145.95	2	6482.9	6565.637851	-82.7
Trauger48	58119.03	72589.81	2	6486.2	6558.949499	-72.7
591-97-02	50438.97	67343.68	2	6488.24	6612.872673	-124.63
Trauger49	56691.31	72616.27	2	6488.4	6611.002363	-122.6
Trauger50	33375.75	63438.87	2	6495	6492.126829	2.9
Trauger51	56764.42	72783.17	3	6496.9	6575.050291	-78.2
526-96-16	56045.83	52696.18	2	6503.5	6617.164392	-113.7
MW-12	36246.92	71004.32	2	6505.72	6580.105634	-74.39
526-96-18	51048.54	50096.71	3	6515.09	6752.313777	-237.22
Trauger52	57314.08	80092.25	2	6519.9	6586.824607	-66.9
3A-7	47975.44	52306.76	2	6524.03	6666.215428	-142.19
Trauger53	57256.71	80128.79	1	6525.6	6531.699148	-6.1
MW-3	34294.51	73777.34	2	6534.72	6615.232201	-80.51
Trauger54	57178.49	80181	2	6535.2	6589.352005	-54.2
Trauger55	53320.18	69717.65	3	6536.2	6606.701801	-70.5
SX-2D	50968.98	65521.75	2	6542.05	6581.233693	-39.18
MW-4A	33936.01	68868.23	2	6554.62	6612.936646	-58.32
SX-2S	50968.98	65521.75	1	6572.43	6657.80586	-85.38
Trauger56	56858.29	72725.74	3	6574.4	6571.047463	3.4
Trauger57	38531.34	70944.34	2	6575	6586.620531	-11.6
459-96-03	45186.01	65219.51	2	6579.87	6555.393445	24.48
Trauger58	49796.82	67759.95	2	6586	6620.922708	-34.9
Trauger59	44852.18	71556.18	2	6594.3	6746.226014	-151.9
Trauger60	31117.39	64142.06	1	6600	6602.219535	-2.2
3A-5	45915.44	52200.87	2	6609.8	6618.816204	-9.0
Trauger62	53251.29	69849.47	4	6610	6554.932712	55.1
376-97-01	53380.26	68410.38	2	6613.39	6636.233252	-22.84
MW-2	31928.7	74900.46	2	6620.12	6740.870513	-120.75
MW-10	34699.42	75942.47	2	6630.56	6641.624961	-11.06
526-96-15	50115.85	53078.93	2	6637.46	6666.112676	-28.65
MW-5	31049.95	69404.06	2	6640.85	6730.395832	-89.55
Trauger64	32316.57	63986.22	2	6655	6533.989675	121.0
MW-24	32128.2	75005.08	2	6675.89	6721.323863	-45.43
MW-22	33033.63	69490.4	2	6679.6	6670.866304	8.7
MW-25	33228.97	75555.07	2	6681.32	6688.905057	-7.59
MW-20	32008.67	70612.37	2	6718.09	6735.210093	-17.12
MW-19	32486.06	77319.24	2	6739.63	6727.509613	12.12
MW-5A	30294.1	70064.4	2	6811.57	6751	60.57

Table 8-3 from Golder (2005)

TABLE 8-3
CALIBRATION RESULTS FOR THE NORTH AREA MODEL

Name	X	Y	Layer	Observed	Computed	Residual
MW-21	31342.59	71176.55	2	6812.93	6780.017628	32.91
MW-8	30846.23	77725.18	2	6831.58	6883.097156	-51.52
MW-1A	31183.8	80760.72	2	6947.9	6952.329725	-4.4
MW-7	27895.46	77207.04	2	6978.25	6957.988988	20.26
Sum						-7361.3
N						152.0
Range						1380.0
	Calculated For All Targets		Calculated Without Seepage Cells			
ME	-48.4		-40.7			
MAE	56.8		60.6			
RMS	73.3		82.0			
%RMS	5.3		10.5			



Golder Associates	Tucson, Arizona	TITLE: Hydraulic Conductivity Testing Results				
CLIENT/PROJECT: CHINO MINES COMPANY CONDITION 92 GRANT COUNTY, NEW MEXICO		DRAWN	mm	DATE	Jan-05	JOB NO. 013-1594-
		CHECKED	mb	SCALE	na	DWG. NO. na
		REVIEWED	db	FILE NO.	Figure_B-1.xls	FIGURE NO. 8-2

Figure 8-2 from Golder (2005)

2,500 0 2,500

SCALE 1:14,000 FEET

LEGEND

- Well with Groundwater Elevation (most recent value)
- * Deep Well
- ** Possibly Perched Well
- Well drilled for Site Wide Abatement Investigation

Groundwater Elevation Contours
(Dashed Where Inferred)

- 100 ft Contour
- 10 ft Contour
- Groundwater Flow Direction
- Open Pit Capture Zone (Golder, 2007c)
- Interceptor Well

REFERENCE

1) Projection: Transverse Mercator Datum: NAD 83 Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet.
2) 2005 New Mexico Digital Orthophotograph Provided by Earth Data Analysis Center (EDAC), In UTM NAD 83 Projection, 1 Meter Resolution.
3) Most recent groundwater elevation value from July 2007 to June 2008 shown on map.

PROJECT
CHINO MINES COMPANY
SITE WIDE STAGE 1 ABATEMENT
FINAL INVESTIGATION REPORT

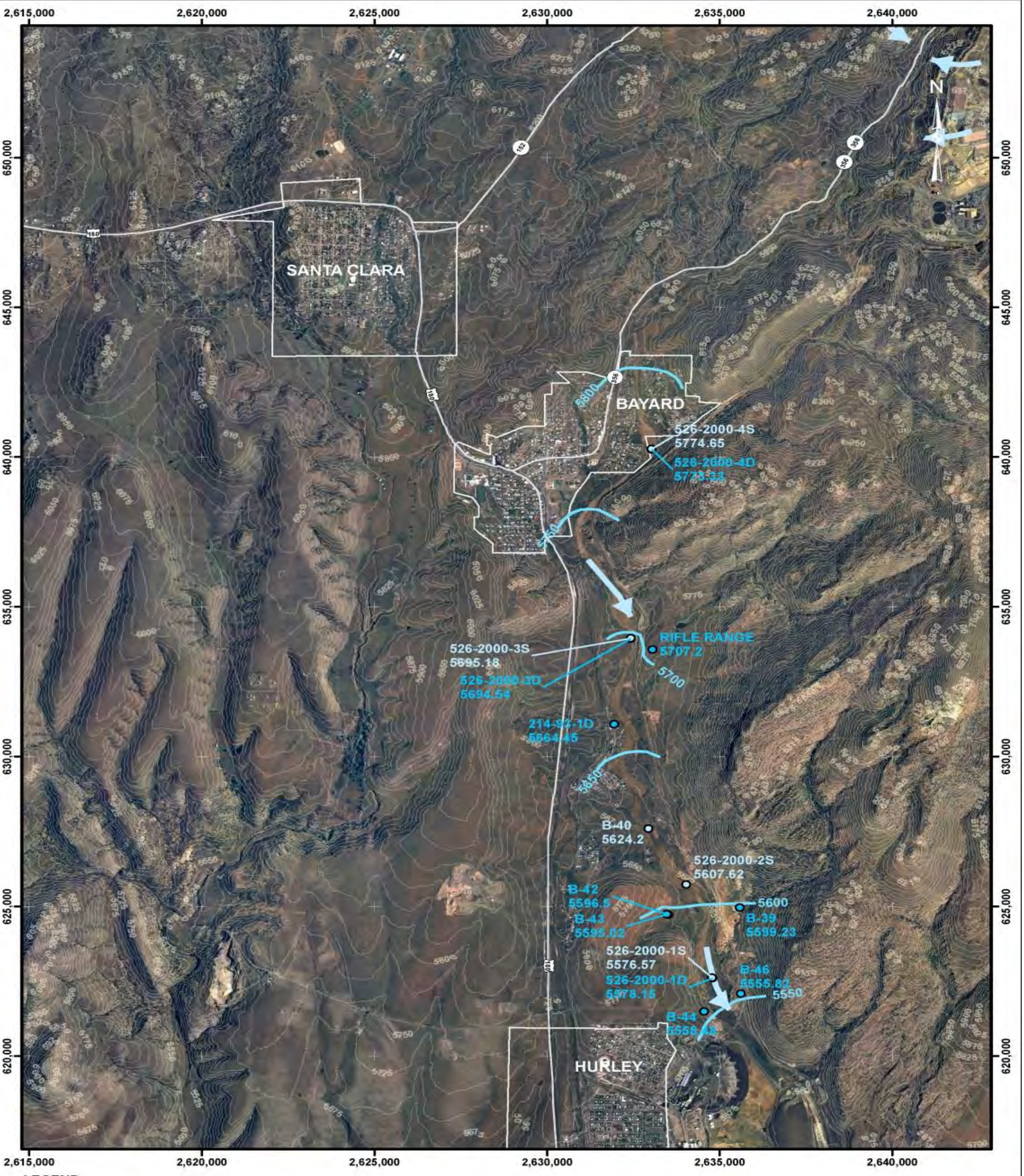
TITLE
GROUNDWATER ELEVATIONS AND FLOW DIRECTIONS
NORTH MINE AREA

Golder Associates
Tucson, Arizona

PROJECT No. 043-2551-002			SCALE AS SHOWN	REV. 0
DESIGN	---	---	FIGURE: 7-1	
GIS	TA	7/03/2008		
CHECK	MM	7/17/2008		
REVIEW	MB	7/17/2008		

Figure 7-1 from Golder (2008)

Figure 6-1 from Golder (2007)



LEGEND

Well with Groundwater Elevation (most recent 2007 or 2006 value)

- Alluvial Well
- Bedrock Well
- 50 ft Groundwater Elevation Contour
- Groundwater Flow Direction

5,000 0 5,000

SCALE 1:35,000 FEET

Figure 7-1 from Golder (2007)

REFERENCE

1) Projection: Transverse Mercator Datum: NAD 83 Coordinate System: NAD 1983 State Plane New Mexico West FIPS 3003 Feet
2) 2005 New Mexico Digital Orthophotograph Provided by Earth Data Analysis Center (EDAC), In UTM NAD 83 Projection, 1 Meter Resolution.
3) Surface Topographic Contours created from compilation of 1979 - 2006 Digital Elevation Models (DEMs) provided by EDAC.
4) Town boundaries from EDAC digitalization of US Census Bureau 1994 TIGER/Line Files for NM.

PROJECT

CHINO MINES COMPANY
DP-1340 CONDITION 83 - HYDROLOGIC STUDY

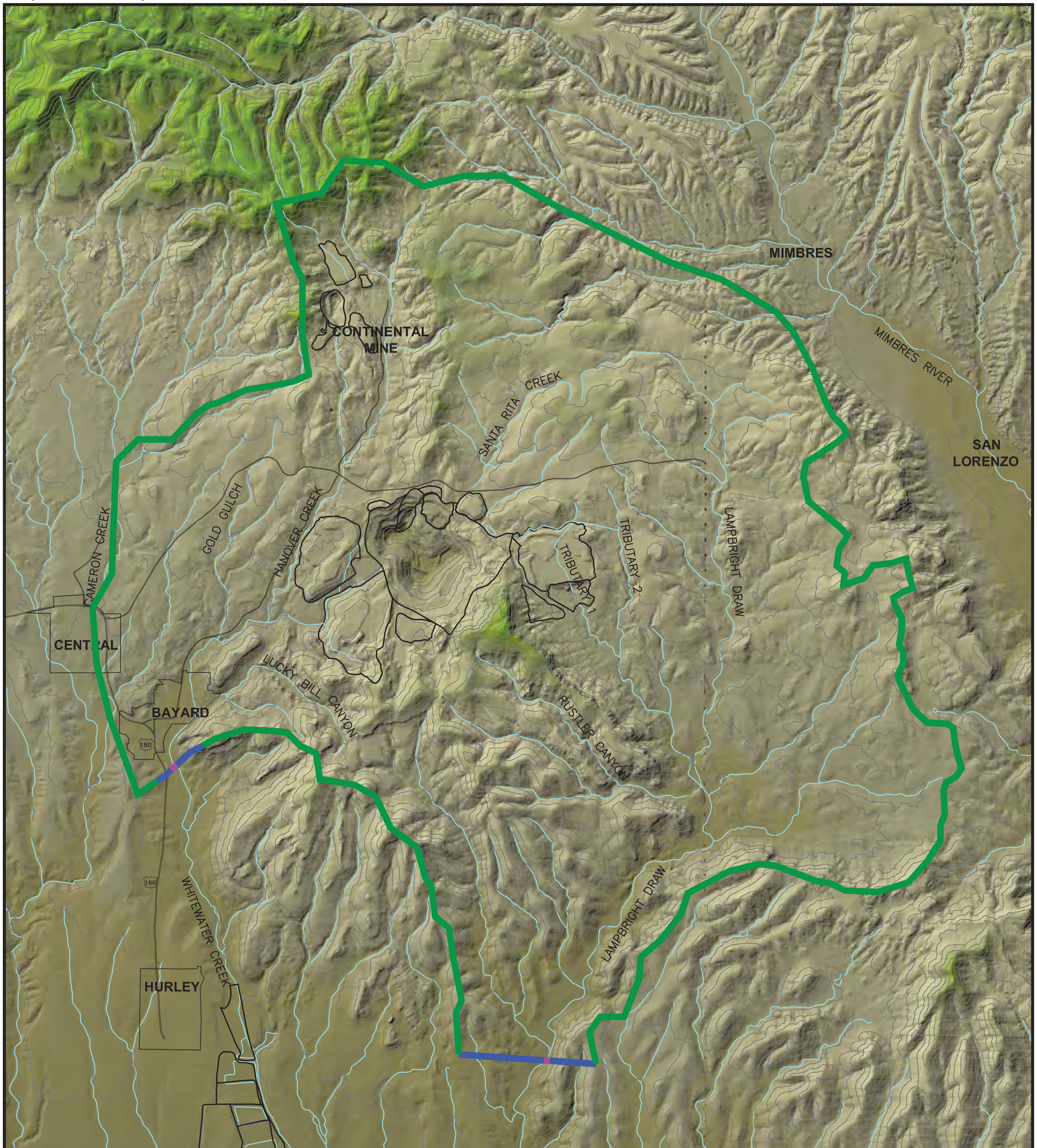
TITLE

GROUNDWATER ELEVATIONS AND FLOW DIRECTIONS MIDDLE WHITEWATER CREEK AREA

Golder Associates
Tucson, Arizona

PROJECT No. 043-2580.004			SCALE AS SHOWN	REV. 0
DESIGN	---	---	**FIGURE: 7-1**	
GIS	MCM	6/15/2007		
CHECK	MB	6/15/2007		
REVIEW	DB	6/25/2007		

Figure 8-1 from Golder (2007)



LEGEND

- FACILITY OUTLINES
- GROUND SURFACE CONTOURS (200 FT. CONTOUR INTERVAL)
- EXISTING DRAINAGE
- SURFACE WATER/GROUNDWATER DIVIDE
- GROUNDWATER FLOW LINE
- CONSTANT FLUX OR HEAD

Figure 7-1 from Golder (2005)

7500 0 7500
SCALE: 1" to 7500' FEET

PROJECT	CHINO MINES COMPANY CONDITION 92 GRANT COUNTY, NEW MEXICO				
TITLE	MODEL AREA AND BOUNDARIES				
Golder Associates, Tucson, Arizona	PROJECT No. 013-1594-002.003			FILE No. 0131594K011	
	DESIGN	MB	06/11/04	SCALE AS SHOWN	REV. C
	CADD	NIL	06/11/04	FIGURE 7-1	
	CHECK	MB	01/12/05		
	REVIEW	DB	01/12/05		

Imagine the result

Freeport-McMoRan Chino Mines Company

Application of the Hydrology Protocol to STSIU Drainages

Chino Mines, Vanadium, New Mexico

October 2014

Application of Hydrology Protocol to STSIU Drainages

Chino Mines, Vanadium, New Mexico

Anne Thatcher
Vice President

Barry Fulton
Senior Scientist

Prepared for:
Freeport-McMoRan Chino Mines Company

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Our Ref.:
B0063543.0000

Date:
October 2014

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Appendices

Acronyms and Abbreviations

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
cfs	cubic feet per second
Chino	Freeport-McMoRan Chino Mines Company
CPP	Continuing Planning Process
CWA	Clean Water Act
ERA	Ecological Risk Assessment
EPA	Environmental Protection Agency
FS	Feasibility Study
GWQB	Ground Water Quality Bureau
HP	Hydrology Protocol
IU	Investigation Unit
NDMC	National Drought Mitigation Center
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
OPCZ	Open Pit Capture Zone
RAC	Remedial Action Criteria
RI	Remedial Investigation
SPI	Standardized Precipitation Index
STSIU	Smelter Tailings Soil Investigation Unit
SWQB	Surface Water Quality Bureau
UAA	Use Attainability Analysis
USGS	United States Geological Survey
WP	Workplan
WQMP	Water Quality Management Plan
WRCC	Western Regional Climate Center

1. Introduction and Background

On December 23, 1994 Freeport-McMoRan Chino Mines Company (Chino) and the New Mexico Environment Department (NMED) entered into an Administrative Order on Consent (AOC) to address the possible environmental impacts within the Chino Mine Investigation Area, Grant County, New Mexico (the Site). The Smelter Tailing Soils Investigation Unit (STSIU) is one of the investigation units addressed under the AOC. Surface water in STSIU has been determined to be a media of concern for consideration under the Feasibility Study (FS). NMED selected the Pre-FS Remedial Action Criteria (RAC) for surface water based upon the State of New Mexico Standards for Interstate and Intrastate Surface Waters (§20.6.4 NMAC) for risk to aquatic life. The Pre-FS RAC for all constituents are based on §20.6.4 NMAC, including all approaches and tools listed in the Code which provide options for site-specific application. These pre-FS RAC are considered as Applicable or Relevant and Appropriate Requirements (ARARs) for the purposes of the FS and subsequent remedial actions for the Site, subject to adjustment in the Record of Decision.

Surface water drainages in STSIU are not included in a classified Water Quality Standards segment (§20.6.4.101-899 NMAC) and are therefore considered unclassified waters of the State (§20.6.4.98 NMAC) with the following presumed designated uses: livestock watering, wildlife habitat, marginal warmwater aquatic life, and primary contact. Because water quality standards for unclassified waters vary depending on hydrology, it is important to determine the correct hydrologic regime (e.g., ephemeral, intermittent or perennial) to assure that the appropriate uses and corresponding use-specific criteria are applied to a particular water body.

To facilitate evaluations of hydrologic regime for the purpose of supporting Use Attainability Analyses (UAA), NMED's Surface Water Quality Bureau (SWQB) developed a Hydrology Protocol (HP) (NMED, (2011). The HP was approved as an appendix to NMED's Water Quality Management Plan and Continuing Planning Process (WQMP/CPP) by the New Mexico Water Quality Control Commission on May 10, 2011. The WQMP/CPP, including the HP, was submitted to the Environmental Protection Agency (EPA) for review and approval, and EPA's approval was issued on December 23, 2011.

ARCADIS, on behalf of Chino, prepared a work plan (WP) titled *Application of the Hydrology Protocol to Smelter Tailings Soils Investigation Unit Drainages* that was submitted to NMED with a letter dated May 20, 2011. The WP described a study plan for application of the HP to STSIU sub-drainages. Chino received NMED comments to this WP on June 8, 2011, and submitted a revised WP that incorporated these comments in July 2011. Results from the application of this WP are described herein.

2. Purpose and Objectives

This report describes results from the Level 1 application of NMED HP as described in the above referenced WP. Information obtained from this effort is intended to support determinations regarding the appropriate hydrologic classification of surface waters and associated designated uses through an UAA process, as described in section §20.6.4.15 (2) NMAC.

As unclassified surface waters of the state (i.e., not identified in 20.6.4.101 through 20.6.4.899), the STSIU surface waters evaluated in this study are presumed to support the uses specified in Section 101(a)(2) of the federal Clean Water Act (the “fishable and swimmable” uses), and therefore subject to 20.6.4.98 NMAC if non-perennial or subject to 20.6.4.99 NMAC if perennial. Accordingly, the purpose of this study is to perform a UAA to assess whether attainment of Section 101(a)(2) CWA uses are feasible in STSIU drainages based on their natural hydrology. That is, the 40 CFR 131.10(g) factor evaluated in this UAA study as affecting use-attainment is: *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 discharges without violating State water conservation requirements to enable uses to be met.*

Specific objectives of this study include:

1. Determine appropriate hydrologic regime for STSIU surface waters based on application of the HP;

2. Propose hydrologic classifications through a UAA for STSIU drainages where sufficient information supports a hydrologic classification and associated designated use classification.

3. Site Setting

The STSIU area is located in an arid region of southwestern New Mexico, with a climate that is characterized by low humidity and wide ranges in daily and annual temperatures (NMED 2008; Chino 2008). The average annual precipitation is 17.5 inches per year (WRCC, 2004), with most of the rainfall occurring during the monsoon season (July through September) as brief thunderstorms, sometimes of high intensity. Annual potential evaporation is estimated to range from 53 to 70 inches per year (DBS&A, 1996, Golder, 2008). Annual evaporation that exceeds precipitation is the predominant hydrologic characteristic of this semi-arid region and is the primary factor that accounts for widespread non-perennial surface water systems throughout the region.

Portions of STSIU are relatively flat with a lower elevation of approximately 5,700 feet above sea level. The STSIU is partially located within the San Vicente Basin, a sub-drainage within the Mimbres watershed. The San Vicente basin is a broad lowland area characterized by dry washes and gullies with sandy bottoms (NMED 2008). The San Vicente Arroyo, a prominent drainage feature in the San Vicente basin located approximately 3.5 miles from the western side of the STSIU area, was recently approved for inclusion in 20.6.4.97 C.NMAC as an ephemeral water based on application of the HP (NMED, 2013; EPA, 2013). Areas east of Whitewater Creek, also within the San Vicente basin, increase in topographic relief, rising to an elevation of approximately 7,000 feet above sea level. Numerous high-gradient drainages originate within this mountainous area and flow into Whitewater Creek or Lampbright Draw. Previous Site investigations have concluded that the majority of STSIU surface waters are ephemeral based on direct observations of water persistence and lack of aquatic habitat within STSIU drainages (Newfields 2006, Newfields 2008, ARCADIS and SRK 2008). Consequently, aquatic communities in these drainages are limited, and typical of ephemeral aquatic habitats in the desert southwest (Newfields, 2008). Therefore, as described in Section 2, the hydrology of STSIU drainages evaluated in this study likely is the factor that limits that attainment of full aquatic life uses.

The STSIU is one of several IUs designated under the Chino Site AOC, and is generally centered around the former copper smelter, ancillary facilities, tailings disposal facilities, and includes land potentially affected by historical smelter emissions and wind-blown tailing. The STSIU does not include areas located in the Hurley Soils IU, Hanover and Whitewater Creek IU (i.e., does not include the Hanover/Whitewater Creek drainage), Lampbright IU, or any mine operational areas (Newfields 2007).

The majority of Chino-owned land in the STSIU is currently leased for livestock grazing (Golder, 2008). The STSIU conceptual site model identified historical smelter stack and fugitive dust emissions from historical mineral processing activities as the primary source of potential contamination to the STSIU area (SRK, 2008). Smelter operations were shut down permanently in 2001 and the smelter facility was demolished and the site reclaimed in 2007 (SRK, 2008). All historical and non-operational tailing impoundments were also closed and reclaimed by 2014 (Chino 2014). Potential water quality impacts to STSIU surface waters are being addressed under other investigations, including ecological risk assessments (ERA) (Newfields 2006; Newfields 2008); an RI study (SRK 2008), and an ongoing feasibility study. No reclamation or remediation activities have been performed to date in the STSIU that could have an impact on the natural hydrologic regime of the drainages evaluated in this study. The potential influence of current or historical mining activities on the natural hydrologic regime of STSIU drainages is discussed in more detail below (Section 4.1.5).

4. Overview of Study

Application of the HP was conducted in accordance with the approved WP and NMED guidance (NMED 2011). As described by NMED (2011), the protocol is comprised of hydrological, geomorphic, and biological indicators of the persistence of water and is organized into two levels of evaluations. This study employed the Level 1 evaluation that is required for the UAA process described in 20.6.4.15.C NMAC. Level 1 evaluations include office procedures and field application of the HP. Office procedures were conducted during the first quarter of 2011, and field work was conducted from June 12 – 15, 2011.

The original HP results summary report was submitted to NMED in February 2012. NMED comments regarding the original HP report were received by Chino in April 2012. Additional office based assessment was conducted during the second quarter of 2012 in response to the NMED comments, and Chino submitted a response to comments on August 17, 2012. Chino submitted a draft UAA HP report to NMED in November 2012 which was revised in response to these comments. In accordance with Subsection C, Section 20.6.4.15 NMAC, NMED released the report for a 30-day public review period, which ended on February 14, 2013. NMED staff from the Ground Water Quality Bureau (GWQB) Silver City Field Office conducted field reconnaissance of select STSIU drainage areas in September and November 2012; and March 2013. Based on observations made during reconnaissance, NMED recommended additional reaches be excluded from an ephemeral classification. A summary of these observations and a revised description of ephemeral and non-ephemeral drainage areas based on NMED recommendations are provided in this final HP UAA report in Section 6.

4.1 Level 1 Office Procedures

Level 1 office procedures were conducted prior to initiating field evaluations with the objective to gather as much physical and geographic information about the drainages and region prior to beginning field work. Many of these reviews were discussed in the WP and are presented in this report, including:

- Aerial photographs for each sub-watershed are presented in Appendices A through G. These were used to aid in sample reach selection by evaluating any potential differences in topographic or landscape features within a sub-watershed, vegetation gradients along drainage channels, location of tributaries, and channel sinuosity.

- Drainage profiles for each sub-watershed are presented in Appendices A through G. These were also used to aid in sample reach selection by evaluating changes in basin slope for each channel. Many sample reaches were placed immediately downstream of significant changes in basin slope where there is a greater potential for seeps or pools.

- Previous Site investigations were reviewed for information that could be pertinent to this study, including historical observations of aquatic habitat and hydrologic conditions within the STSIU area and potential mining-related impacts to STSIU hydrology.

- Flow gages are not available for STSIU drainages. However, the nearest United States Geological Survey (USGS) flow gage was evaluated as an additional source of information to interpret regional drought and stream flow conditions during the field application of the HP.

- Precipitation data from nearby precipitation gages were used to assess drought conditions. Additionally, the 12-month Standardized Precipitation Index (SPI) was used as the primary basis to interpret local drought conditions, based on recommendations in the NMED HP (NMED, 2011). The 12-month SPI was assessed immediately prior to beginning the field work; this information is discussed in Section 4.1.2.

4.1.1 Sample Reach Selection

The above information, in conjunction with knowledge about geomorphic, hydrologic and mine operation features from local environmental staff at Chino and ARCADIS consultants, was used to target general locations of sample reaches, as described in the referenced WP. In addition, the NMED review and comments received on the WP was utilized in the identification of appropriate survey locations. As noted above, NMED also conducted field reconnaissance of select STSIU drainage areas as well. In total, 21 locations in nine subwatershed drainages were identified for HP application in the revised WP. Three additional locations were added to select drainages during field application of the HP based on observations made in the field for a total of 24 locations assessed in this study (**Table 1**). Decisions to add sample locations in the field are documented in the HP field forms, and included observations of a channel diversion in Sub-watershed B (Appendix B), observations of pools in Rustler Canyon (Appendix G), and observations of pools in the western tributary of Rustler Canyon (Appendix G).The number of individual reaches within a particular drainage varied according to drainage length and local watershed features to capture potential geomorphic or hydrologic gradients within drainages.

4.1.2 Drought Conditions

Local weather and precipitation data were reviewed to assure severe drought conditions were not occurring during field application of the HP. As described in the NMED HP guidance, “the 12-month SPI was chosen for use in the Hydrology Protocol because SPIs of this time-scale can be linked to groundwater-surface water fluctuations and reservoir storage, it can provide an early warning of drought, and it can help assess drought severity” (NMED 2011). For HP purposes, drought conditions are defined as any time the SPI is less than -1.5, indicating severely to extremely dry conditions (National Drought Mitigation Center [NDMC] 1995 as cited in NMED 2011). The SPI is “an index based on the probability of recording a given amount of precipitation, and the probabilities are standardized so that an index of zero indicates the median precipitation amount” (cited from http://lwf.ncdc.noaa.gov/oa/climate/research/prelim/drought/spi.html).

During the field application of the HP (June 2011), the 12-month SPI value for the Site area was -1.1 (**Figure 1**), indicating dry conditions but within the SPI range recommended by NMED (2011) for HP application (i.e., the SPI was not less than -1.5). Figure 1 presents two sources of information on SPI conditions: the NDMC and the Western Regional Climate Center (WRCC). The regional 12-month SPI map presented in Figure 1 was obtained from the NDMC (available at http://drought.unl.edu/MonitoringTools/DailyGriddedSPI.aspx). Based on the location of Chino Mines Site shown on the map presented in Figure 1, the 12-month SPI score was 0 to -1, indicating the 12-month SPI score was within the recommended range specified in the HP guidance (NMED 2011) for conducting Level 1 field evaluations. Furthermore, the NDMC 12-month SPI score was less than -1.5 for only one 12-month period (6/1/2005 – 5/31/2006) during the past 9 years (i.e., since 2003, which is the earliest 12-month SPI record available from NDMC at the time of this revised report). This finding provides an indication that longer-term drought conditions did not persist for the near decade period preceding this study.

Using SPI data published by the WRCC (available at http://www.wrcc.dri.edu/cgi-bin/spiFmap.pl?spi12), a specific 12-month SPI score of -1.1 was obtained for the 12-month period preceding Level 1 field application of the HP. These data are shown in the graph of SPI scores versus time presented in Figure 1. The 12-month SPI value of -1.1 was obtained by accessing the above website, selecting the climate division that includes the Site area (i.e., the Southwestern Mountains Division, New Mexico, Climate Division 04), and selecting the "tabular data" option associated with the graph of SPI scores versus time. This result also demonstrates the 12-month SPI score was within the HP guidance-recommended range. Therefore, the HP Level 1 field evaluations presented in this report are considered reliable and within the appropriate drought-condition range.

Additional review of precipitation at the Fort Bayard climatic station (USC00293265) was also conducted to assess the long-term historical precipitation conditions and the potential implication on the hydrologic regimes of the STISU drainage basins being assessed. The Fort Bayard station is located approximately 5 miles from STISU drainage basins, and monthly precipitation data are available on a near continuous basis from the late 1800s through early 2011 (**Figure 2**). This long-term precipitation data was initially assessed to aid interpretation of historical reference to the area from Paige (1916) because the Fort Bayard station included precipitation data from the early 1900's. This precipitation station is also the closest to the STSIU area from other available stations, and therefore provides relevant information about historical precipitation trends, despite the termination of this station in April 2011 (two months prior to the application of the HP).

It should be noted from **Figure 2** that the recent period since about 1980 has had generally greater than average precipitation compared to the period of record at the climatic station, and it has had significantly greater precipitation than the middle decades of the 20th century. The 12-month period preceding the development of the HP had lower than average precipitation, but precipitation remained greater than 35 percent of the other years on record for the station. Therefore, the precipitation and flow regime observations made at the time of the HP assessment in 2011 are at least representative of the general precipitation conditions observed over the last century. These conditions are also possibly reflective of wetter conditions considering that base flows and regional groundwater conditions are impacted by multi-year precipitation trends.

4.1.3 Recent Precipitation at the Time of the Study

Prior to initiating field evaluations, ARCADIS verified with local Chino staff and through precipitation records that no major rainfall events occurred within at least 48 hours.

4.1.4 Flow Gauges

Historical and recent flow data from a regional USGS flow gauge, located on the Mimbres River in Grant County, NM approximately 20 km northeast of the STSIU watersheds, was evaluated to provide additional background information on regional flow and drought conditions during field surveys. Although the STSIU drainage basins being assessed in the HP do not flow directly to this gaging station, it is the only source of USGS flow monitoring data in the Mimbres River basin (the basin that includes the STSIU area). Because of its proximity to the STSIU study area, flow records from this station are relevant to assessing drought conditions for this HP study, considering that the 12-month SPI scores presented above encompass the location of this station and the Site area.

During field evaluations in June 2011, the average daily flow on the Mimbres River was 3.5 cubic feet per second (cfs). This flow rate falls within lower flow ranges historically observed. In particular, 15% of average daily flows from 1978 to present were less than 3.5 cfs, and 85% of average daily flows during this timeframe were greater than 3.5 cfs (**Figure 3**). Thus, while baseflow conditions were low during the field survey, they were not historically anomalous, and are consistent with the precipitation findings described in Section 4.2.1.

4.1.5 Mine Influence on Hydrologic Regimes

The potential for influence from mining activities on the hydrologic regime of the STSIU drainages was investigated and concluded that the existing hydrologic characteristics of the drainages are representative of the historic conditions and not the result of mining activities. The possible exception to this conclusion is Rustler Canyon as described below.

Mine Pit Groundwater Influence

The nature and extent of the shallow groundwater system and the deep regional aquifer associated with the OPCZ, and the direction of groundwater flow around the Santa Rita Pit have been studied extensively to support closure planning and reclamation activities at Chino Mines Site, under Discharge Permit 1340. The Santa Rita open pit groundwater capture zone (OPCZ) was clearly delineated as part of Chino Mines Stage 1 Abatement Investigations under New Mexico Discharge Permit 1340 (Golder 2005; Golder 2008). The OPCZ delineation is the result of an extensive hydrogeologic investigation and has been previously accepted by NMED. A review of the OPCZ is provided below to demonstrate the lack of influence of the pit on the hydrology of the STSIU drainages evaluated in this study that are proposed for ephemeral classification. A comprehensive description of the groundwater data and modeling approach used to develop the OPCZ is provided in other studies (Golder 2005, 2008).

As described by Golder (2008), the OPCZ is defined as the area over which groundwater recharged from the land surface flows towards and discharges into the pit. The lateral extent of the OPCZ was determined from an analysis of the groundwater flow modeling results and empirical groundwater-elevation data collected from monitoring wells near the pit (Golder 2008). The model was developed using an upgraded version of Modflow software (Modflow-Surfact); calibration of the model was performed following American Society of Testing and Materials (ASTM) guidelines. Groundwater-elevation data from over 150 wells were incorporated into that calibration (Golder 2005).

The area modeled to develop the OPCZ is centered around the Santa Rita pit, but extends a sufficient distance away from the pit to determine the lateral extent that groundwater is no longer influenced by the pit drawdown. Groundwater-elevation data from wells located within and outside of the OPCZ provide empirical evidence of the extent of the OPCZ. For example, groundwater-elevation data presented in Golder

(2008) shows that groundwater elevations south of the OPCZ (towards the direction of STSIU drainages) are lower than groundwater elevations to the north within the OPCZ.

Separate and distinct from the deeper regional aquifer and the associated OPCZ is the shallow groundwater flow system, which overlays the deeper system. This shallow system is observed in the STSIU drainages including Rustler Canyon, Martin Canyon, the upper reaches of Lampbright Draw as well as the C and D series drainages. Shallow groundwater flow in this area is dominated by local, small groundwater flow systems that coincide with the local surface watersheds. Within these surface watersheds, groundwater recharges along the upland margins (ridges), and discharges to the local drainages. In effect, they function as independent hydrologic cells, or independent hydrologic systems where all of the recharge remains within the cells, discharging only to the respective drainages and in the downstream direction. The dominance of local shallow groundwater flow systems is clearly demonstrated by the numerous monitoring wells outside of the OPCZ. Groundwater elevations measured in the monitoring wells show that groundwater elevations are highest beneath the local ridges and lowest along the local drainages.

Figure 4 presents a map that depicts this open pit capture zone and the delineated subwatershed drainages that were assessed as part of the Chino STSIU HP study. As indicated by the OPCZ boundary and subwatershed boundaries shown in **Figure 4**, Rustler Canyon is the only STSIU subwatershed that could be influenced by the pit groundwater capture. This HP study, however, is not recommending a formal classification or re-classification for Rustler Canyon drainages as explained in Section 5.1 of this report. In addition, this HP study is not recommending a formal classification or re-classification for Martin Canyon, the next-closest STSIU subwatershed to the OPCZ.

Outside of the OPCZ, groundwater flow is controlled by the natural hydrogeological characteristics of the area. Golder (2005) stated that, because of the relatively steep, low-permeability mountainous terrain of the area, groundwater-flow directions outside the OPCZ largely follow surface topography and subwatershed divides. Modeled shallow groundwater contours at distance from the pit from Golder (2008) closely mirror the surface topography of local watersheds and indicate that the groundwater divides between the localized shallow groundwater flow systems remain closely aligned with boundaries of the surface watersheds (**Figure 5**). The modeled groundwater velocity vectors shown on Figure 5 (from Golder 2008) indicate the direction of shallow groundwater flow and demonstrate that at these distances from the pit, shallow groundwater is unaffected by the pit and is still dominated by local recharge and discharge systems that coincide with the local surface watersheds. Consequently, the groundwater balance of the subject watersheds are shown by the modeling results to be unaffected by the open pit.

The finding that groundwater associated with STSIU drainages is not influenced outside of the OPCZ is important when considering potential mine influences on STSIU hydrology, because baseflow in a stream is derived from groundwater recharge. Therefore, the delineated open pit capture zone provides evidence that the hydrology of the drainages outside of Rustler Canyon is not impacted by mining activities because the Santa Rita Pit represents the primary source of potential historical or active mining impacts that could affect the natural hydrologic regime of STSIU drainages. The STSIU drainages evaluated in this study and proposed for an ephemeral classification (Section 6) are predominately located in a natural landscape where the primary land-use is cattle grazing and is without mining-related impacts. Importantly, except for groundwater-sustained baseflow, flow sources to a stream can include storm and/or snowmelt runoff, discharge contributions from upstream tributaries, contributions from point-source discharges, and irrigation return flows (NMED, 2011). Land-use or drainage modifications that could affect snowmelt and/or storm-flow runoff to STSIU drainages are not present in the STSIU subwatersheds. Additionally, point-source discharge sources or irrigation return flows capable of supporting intermittent flow in the naturally ephemeral drainages do not exist in STSIU drainages. Aerial maps and photographs of STSIU drainages provided in Appendices A through G also document the lack of mining influence on STSIU hydrology.

Regional Springs

Historic references of springs in both the STSIU drainage basins and the surrounding area were reviewed to further assess possible influence from mining activities on the local groundwater (**Figure 4**), which could indicate hydrologic influence from mining in the STSIU drainages. Recent observations of springs and review of historical references from Paige (1916) and Sivinski and Tonne (2011), do not indicate that mining activities have influenced the presence or disappearance of springs in the STSIU drainages. Springs have been observed presently and historically in STSIU drainages including Drainage D (Brown Spring), Drainage C (Bolton Spring) and Drainage B (Ash Spring), and continue to express water indicating they have not been impacted by mining activities. Additionally, annually-reoccurring pools of water in Martin Canyon and Rustler Canyon likely indicate the presence of seeps or springs, indicating these drainage areas have not been impacted by mining activities. Because of the lack of mine influence on STSIU hydrology described above (i.e., the finding that the pit groundwater capture zone does not impact groundwater in STSIU drainages and other potential sources of mining influence are absent in the STSIU drainages), springs located in the STSIU area are unaffected by mining activities.

The springs referenced by Sivinski and Tonne (2011) (Apache Tejo Spring, Cold Spring, Kennecott Warm Spring, and Kennecott Cold Spring) are not located within STSIU drainages that were assessed in this HP study. Cold Spring is a well, locally referred to as Cold Spring 2 well, and is located within the 2C cattle ranch near Faywood Hot Springs, approximately 6 miles south of the STSIU area. Kennecott Warm Spring is located approximately 5 miles south of the STSIU area (**Figure 4**). Apache Tejo Warm Spring is located within the STSIU area but is outside of any STSIU drainages assessed during the HP study (**Figure 4**). All hydrologic designations proposed based on the results of this HP study apply to drainages that are at a significantly higher elevation and that are not hydrologically connected to these springs. Springs are, by definition, isolated areas of groundwater emergence and are not characteristic of regional groundwater conditions, especially the groundwater conditions at distances of miles away from the springs themselves. However, STSIU drainages containing Brown Spring, Bolton Spring, and Ash Spring are not proposed in this report for ephemeral classification.

4.2 Level 1 Field Evaluations

ARCADIS applied the HP to STSIU drainages during June 12 – 15, 2011, following NMED review and comments on the WP. NMED recommendations, including additional survey locations, were incorporated into a revised WP and into Level 1 field evaluations. This field evaluation timeframe is consistent with NMED recommendations and was selected to avoid the monsoonal season, which typically occurs during mid - July through early September in this region.

The HP was applied to STSIU drainages by field crews consisting of a minimum of two staff members. Staff from NMED also participated in field evaluations at sample reaches located in Rustler Canyon. Additionally, Chino staff provided navigational assistance for accessing drainages and Site knowledge regarding local watershed features, recent weather and historical presence of water. In total, the HP was applied to 24 sample reaches across 9 sub-watersheds (**Figure 4**). As described in the work plan, and in Section 5.1.3 below, the field crew performed one field replicate at a pre-determined reach location, consistent with recommendations in NMED SWQB's Quality Assurance Project Plan.

4.2.1 Sample Reach Selection

Before selecting a reach for the survey, local watershed features were noted while driving to the site to verify that the selected reach was representative of the drainage being characterized. This provided an overview of the collective watershed and potential geomorphic or hydrologic gradients within the drainage. This information aided in determining how uniform, or representative, reaches were of the collective watershed.

After arriving to each of the 21 pre-determined reach locations, the field crew walked a distance of the channel generally greater than, or equal to, 300 meters to confirm that significant geomorphic or hydrologic gradients do not occur in order to meet the hydrology protocol requirements for representative sample reaches (i.e., 40 times the average stream width or 150 meters, whichever is larger). Prior to applying the HP at each sample reach, reach homogeneity was verified by evaluating basin slope, presence of significant tributary inflows, potential changes in substrate type (e.g., sand, gravel, cobble, boulders and bedrock), compositional shifts in vegetation, gradients in vegetation density, anthropogenic influences such as road crossings or diversions, and various biological indicators included in the field form. Overall, locations selected *a priori* were judged as adequately representative of the corresponding drainages. As described above, however, three additional locations (one in Sub-watershed B and two in Rustler Canyon) were added in the field based on observations, as described in Section 4.1.1.

5. Results

Documentation for Level 1 HP Evaluations consists of a Cover Sheet, Drainage Profile and Plan View, Field Sheet and photographs for each sample reach evaluated. These are provided in Appendices A - G, and are organized by each sub-watershed evaluated. A brief description of each level of documentation is provided below.

1. *Cover Sheet*: Contains documentation of information collected through application of the HP. As described by NMED (2011), “the cover sheet is necessary for the UAA process and is designed to explain how the supporting documentation from the Level 1 Evaluation is consistent with the UAA conclusion, namely that the stream is ephemeral and the attainment of Clean Water Act Section 101(a)(2) aquatic life and recreational uses is not feasible 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." For this assessment, all reaches within an identified sub-watershed are included in a single cover sheet and appendix.

2. *Drainage Profile and Plan View*: Aerial photographs of each drainage depicting the location of each sample reach, delineation of sub-watershed boundaries, and drainage profiles.

3. *Hydrology Determination Field Sheet:* Contains scores for each attribute (or indicator) and a total numeric score for each sample reach evaluated. Other general information including date, project, evaluators, Site, assessment unit, 12-month SPI value, and field coordinates of the sample reach is also recorded on Field Sheets. NMED guidance provides a four-tiered weighted scale for evaluating and scoring each attribute; general definitions, as provided in NMED (2011), are described below:

   Strong: The characteristic is easily observable (i.e., observed within less than one minute of searching).

   Moderate: The characteristic is present and observable with minimal (i.e., one or two minutes) searching.

   Weak: The characteristic is present but you have to search intensely (i.e., ten or more minutes) to find it.

   Poor: The characteristic is not observed.

4. *Photo-Documentation:* Photographs of each sample reach and watershed were taken, as appropriate, to document the rationale behind scoring of attributes and subsequent hydrologic determinations.

5.1 Summary of Level 1 Field Evaluation Scoring

The drainages evaluated during Level 1 field evaluations were scored as ephemeral (except Rustler Canyon, as described below) based on the HP indicators, including the absence of water, lack of aquatic habitat and evidence of prolonged dryness, as determined by the NMED HP scoring criteria used to assess hydrology (Appendices A-G). **Table 2** provides a summary of all HP scoring attributes for the drainages evaluated.

Rustler Canyon Reaches

Drainages within Rustler Canyon were the only STSIU reaches where water and aquatic life uses were observed during field application of the HP. Although the majority of streambeds within Rustler Canyon did not contain water, and flow was not observed, water was present as isolated pools in portions of the bedrock channels. Periphyton, filamentous algae and riparian vegetation (e.g., cat tails) were observed in these pools along with macroinvertebrates (e.g., snails) and minnows (between RC-14B and RC-15), indicating a hydrologic classification of at least intermittent according to NMED (2011). These isolated pools, and associated aquatic life uses, were not observed in all Rustler Canyon reaches, as described in Appendix G, reflecting the localized persistence of water within this sub-watershed. This is reflected by an HP score of 2 in an upper reach of the west fork of Rustler (RC2-22; **Figure 4**). Given the extent of water observed during the dry season, coupled with the hydrologic and biological indicators described above, it appears that these pools persist for extended periods of time consistent with an intermittent classification. Based on these observations, formal classification and/or re-classification of surface water reaches in Rustler Canyon are not proposed at this time.

5.1.1 Sub-Watershed Drainages Scored as Ephemeral during Level 1 Field Evaluations

During field application of the HP, an ephemeral classification was reached for most drainages after scoring the first 6 indicators (water in channel, fish, benthic macroinvertebrates, filamentous algae/periphyton, differences in vegetation and absence of rooted upland plants in streambed). In accordance with NMED (2011), if the evaluated drainage has a score of less than or equal to 2 after the first six indicators are scored, the drainage is determined to be ephemeral, therefore, further evaluation of additional indicators is unnecessary. Of the 24 reaches evaluated, 17 reaches were determined as ephemeral after the first six indicators were evaluated and scored (three additional reaches were determined as ephemeral based on evaluation and scoring of all Level 1 HP indicators). The following provides a general description of how these 6 indicators were evaluated during field application of the HP.

Indicator 1.1 – Water in Channel

With the exception of reaches in Rustler Canyon, as described above, water was not observed in channels during field evaluations. As described by NMED (2011), a good rule of thumb for differentiating between ephemeral and intermittent is if they have any water in them during the dry season or during a drought. No evidence of recent base flows or high flows (e.g., sediment/soil moisture or drift lines in the bank or floodplain) or standing pools of water were observed in drainages (except Rustler Canyon). Areas of depressions within channels, typically associated with pool habitats, were devoid of water in all drainages except Rustler.

Indicator 1.2 – Fish

Fish were not observed in any sample reach evaluated but were observed in a pool between sample reaches RC-14B and RC-15 in Rustler Canyon.

Indicator 1.3 – Benthic Macroinvertebrates

With the exception of reaches in Rustler Canyon, benthic macroinvertebrates, or physical evidence of benthic macroinvertebrates, were not observed during HP application. The dry channels were searched for potential mussels and aquatic snail shells (in sandy channel margins), caddisfly casings (under cobbles [when cobble was present]) and mayfly or stonefly casings (on cobble and channel-side vegetation). During macroinvertebrate searches, it was also noted that soil/sediment moisture was absent with the exception of select reaches in Rustler Canyon. Benthic macroinvertebrates were observed, however, in surface water pools within Drainage C during the NMED September and November 2012 field reconnaissance, which occurred following the recent monsoon season.

Indicator 1.4 – Presence of Filamentous Algae and Periphyton

Similar to the above indicators, filamentous algae and periphyton were not observed in drainages outside of Rustler Canyon during HP application. This includes no observations of desiccated periphyton or algae outside of Rustler Canyon. However, desiccated algae/periphyton was observed in Drainage C during the NMED September and November 2012 field reconnaissance following the recent monsoon season.

Indicator 1.5 – Differences in Vegetation

Differences in vegetation were generally attributed to vegetation densities rather than compositional differences in vegetation, with the exception of Rustler Canyon where a few compositional differences were observed. Species of oak, cat claw, juniper, bunch grass, mesquite, agave, prickly pear cactus and cholla cactus were occasionally observed in greater densities on, and around, banks of some reaches relative to surrounding upland areas. Vegetation species growing in upland areas of surveyed watersheds were noted and compared to species growing along the banks and within channels to determine potential compositional differences. Additionally, NMED observed slight vegetation differences in Bolton Canyon during their September and November field reconnaissance; one small strand of cattails and willow trees were observed in Bolton Canyon.

Indicator 1.6 – Absence of Rooted Upland Plants in Streambed

As described by NMED (2011), the absence of rooted plants in a streambed can be related to flow regime since flow can deter plant establishment by scouring available substrate and removing seeds or preventing aeration to roots. However, NMED (2011) also notes that the presence of rooted vegetation in a streambed can be limited by local watershed features such as high gradient sand bedded streams located within flashy watersheds. In these flashy systems, rooted vegetation may be limited by highly erosive flows and/or depth of scour in response to substantial rainfall events (NMED 2011). Such conditions distinguished the majority of STSIU drainages. In addition, bedrock- and boulder-dominated streambeds were routinely observed in upper reaches of drainages. This streambed type can also limit the presence of rooted plants as a result of a lack of substrate necessary for plant growth. These limitations were considered when scoring Indicator 1.6 during field evaluations, and are described in Appendices A – G through field notes and photo-documentation.

5.1.2 Other Scoring Considerations

It was determined, after visiting a number of bedrock and boulder formed channels, that the application and evaluation of the “entrenchment ratio” was inappropriate at such locations. In channels flowing through material that is transported by the river itself, the channel geometry can be viewed as self-formed. That is, sediment transport in alluvial rivers builds and maintains a dynamically stable channel geometry and floodplain that reflects both the quantity and timing of water and the volume and caliber of sediment delivered from the watershed (Leopold et al. 1964; Emmett and Wolman 2001). Accordingly, Leopold (1994) describes alluvial rivers as the architect of their own geometry. In these alluvial situations the measurement of an “entrenchment ratio” is reflective of the relative supply and magnitude of the sediments from upstream versus the capacity of the channel to transport that sediment.

In many situations observed during the application of the HP, however, the channel was not an alluvial river and the bed and banks were not formed of sediments supplied and transport under the current hydrologic environment but rather were composed of bedrock and large boulders. In bedrock and boulder formed channels where it was necessary to proceed beyond Indicators 1.1 to 1.6, the “entrenchment ratio” indicator was not included in the total score.

5.1.3 Quality Control (QC)

Consistent with recommendations in SWQB’s Quality Assurance Project Plan, one field replicate was included in the current study to evaluate potential variability in HP evaluations conducted by different field crew. The field replicate was applied at a pre-determined study reach (D1-2) by different field crew at separate times. Overall, scores for each HP indicator were identical between the two evaluations, indicating consistency in the interpretation of HP scoring criteria.

5.2 Critical Habitat Considerations

Critical habitat for the Chiricahua leopard frog (CLF) has been officially designated or has been observed in some of the drainages that scored as ephemeral during the Level 1 field observations described above. Based on these habitat observations, formal classification and/or re-classification of these surface water reaches are not proposed at this time. This includes portions of Subwatershed D, Subwatershed C, Subwatershed B, and all of Martin Canyon.

5.2.1 Subwatershed B and Subwatershed C Exclusions

Bolton Spring (Subwatershed C) and Ash Spring (Subwatershed B) and the associated migration pathway between them (**Figure 4**) have been designated as critical habitat for the Chiricahua leopard frog (CLF) by the USFWS (Federal Register Vol. 77, No. 54, Tuesday, March 20, 2012). As described by the USFWS, the primary constituent elements of CLF critical habitat consist of breeding, habitats, and dispersal habitats (USFWS 2012).

Based on the USFWS description of CLF critical habitat and observations, it is appropriate to exclude Bolton and Ash Springs from an ephemeral designation because these areas are designated as breeding habitat that typically hold areas of isolated surface water and thus function as potential breeding habitat.

An ephemeral designation for drainage areas that are not hydrologically connected to Bolton or Ash Springs outside of storm events could be appropriate for the non-breeding dispersal habitat based on the USFWS description. Specifically, USFWS states the dispersal and non-breeding habitat can consist of upland or ephemeral areas that can provide a corridor for movement of frogs between breeding sites (i.e., the two springs). Accordingly, designation of a section of drainage as critical habitat does not preclude an ephemeral designation because the critical habitat can, by definition, consist of ephemeral drainage channels.

As described below in Section 5.3, NMED staff conducted field reconnaissance of select STSIU drainage areas (including the designated CLF critical habitat) following application of the Level I HP and after the official designation of critical habitat. Observations made by NMED during these reconnaissance trips supplemented results from the June 2011 HP study and were considered for final hydrologic classifications described below in Section 6.

5.2.2 Martin Canyon

Based on comments received from NMED, CLF tadpoles have been historically documented in pools along portions of the Martin Canyon drainage, although no official USFWS habitat designation has been made for any portion of Martin Canyon, and CLF frogs have not been documented in any portion of Martin Canyon during more recent surveys (Jennings, 2007). Evidence of pools were not observed during the Level 1 field evaluation; however, based on comments received from NMED regarding historic observations of CLF in Martin Canyon, a formal classification or re-classification of Martin Canyon is not currently proposed.

5.3 NMED Field Reconnaissance

NMED staff conducted field reconnaissance of select STSIU drainage areas during September and November 2012 and during March 2013. The field reconnaissance consisted of visual observations and some photo-documentation of drainage areas in Subwatersheds C and D. Application of the HP was not performed during any of the field reconnaissance trips. Based on observations made by NMED during these site visits (e.g., isolated pools, aquatic invertebrates and tadpoles), a formal classification and/or re-classification of drainage areas within and upgradient to the CLF critical habitat transect shown in **Figure 4** is not proposed at this time. This includes reaches upstream of the CLF critical habitat in Bolton Canyon north of Bolton Springs, the unnamed tributary northeast of Bolton Canyon, the tributary on CLF critical habitat transect line, and drainage areas upstream of the tributary on the transect (**Figure 4**).

NMED additionally observed water in Brown Spring and evidence of water pooling (indicated by staining on the rocks) in the southeastern branch of Subwatershed drainage D1 that contains Brown Spring **(Figure 4**). Although this area has not been designated by USFWS as CLF critical habitat, an ephemeral designation is not currently proposed for this reach based on NMED observations made during field reconnaissance.

6. Conclusions and Hydrologic Classification Recommendations

Based on the Level 1 hydrology determinations described above and in Appendices A – G and information from NMED field reconnaissance, adequate information is available to support ephemeral hydrologic classifications for most of the STSIU drainages evaluated, with the exception of Rustler Canyon (and tributaries), Martin Canyon (and tributaries), and portions of Subwatersheds B and C and D.

Presently, an ephemeral classification is not supported for the Rustler Canyon drainages due to the presence of water and associated aquatic life uses observed during the Level 1 field evaluations. Based on NMED comments and observations from reconnaissance, an ephemeral classification is not proposed at this time for the following reaches (in addition to all of Rustler Canyon):

- All of Martin Canyon and tributaries thereof;
- The southeast tributary of Drainage D1 that contains Brown Springs;
- Upper portions of Subwatershed C that include CLF critical habitat in Bolton Canyon drainage from below the HP site C-4 (confluence) and upstream on the main north tributary (Bolton Canyon); from C-4 upstream on the northeast tributary to above HP site C-19; all CLF critical habitat transect on drainage areas and the upstream tributary to the drainage on transect (see **Figure 4**);
- The northwest tributary in the upper portion of Subwatershed B that contains Ash Springs.

In drainages outside of those areas described above, an ephemeral hydrologic classification was determined by the Level 1 HP procedures, which are based on evaluating the hydrologic, geomorphic, and biological indicators of water persistence, as well the absence of impact of mining activities on the natural hydrologic regime of the drainages. It can be concluded from these results that flow only occurs in these STSIU drainages in direct response to significant precipitation events. This finding is consistent with direct observations reported by other site investigations (Section 3). Accordingly, an ephemeral classification reflects the hydrologic regime of these drainages and corresponds to the limited aquatic life uses that can be expected to occur during short periods of water persistence. This report also finds that significant hydrologic alterations are not present that could impact the natural hydrologic regime of these ephemeral drainages.

As indicated in **Figure 4**, the STISU drainages where an ephemeral classification is appropriate include:

- Subwatershed Drainage A and tributaries thereof;
- Subwatershed Drainage B and tributaries thereof (excluding the northwest tributary containing Ash Spring);Subwatershed Drainage C and tributaries thereof (excluding reaches containing Bolton Spring, the CLF critical habitat transect, and all reaches in Subwatershed C that are upstream of the CLF critical habitat);
- Subwatershed Drainage D and tributaries thereof (Drainages D-1, D-2 and D-3, excluding the southeast tributary in drainage D1 that contains Brown Spring);
- Subwatershed Drainage E and tributaries thereof (Drainages E-1, E-2 and E-3).

As indicated in **Figure 4**, ephemeral designations determined for these STSIU drainages also apply to associated tributary drainages (except exclusion areas described above) because reaches assessed during the HP study were determined to be representative of the collective subwatershed. As described in the approved WP, the primary drainage channel within each subwatershed was selected for the HP assessment, which provides a strong indication of hydrologic conditions of lower order, hydrologically-connected tributary drainages that have the same or less flow persistence as the downgradient primary drainage channel given the absence of springs.

7. References

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TABLE 1
Summary of Sample Locations by Sub-Watershed

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO
SMELTER/TAILING SOILS IU HYDROLOGY PROTOCOL

Sub -Watershed	Number of Sample locations	Rationale
Sub-Watershed C	4	Upstream sample location placed at change in basin slope near the 4,600 feet downstream maker. Second sample location placed at change in basin slop immediately downstream from tributary inflow. Third sample location placed downstream from second large tributary inflow. Downstream sample placed to capture entire basin drainage area.
Martin Canyon	3	Upstream sample location placed at change in basin slope near the headwaters at 2,900 feet downstream marker. Middle sample location placed in flatter gradient section with more prominent vegetation. Downstream sample placed to capture entire basin drainage area.
Sub-Watershed A	2	Upstream sample location placed immediately downstream from larger tributary inflow at location with more prominent vegetation. Downstream sample placed to capture entire basin drainage area. No significant variation in basin slope.
Sub-Watershed B	3	Upstream sample location placed downgradient of change in average basin slope. Middle sample location placed downstream of channel diversion (observed during field survey). Downstream sample placed to capture entire basin drainage area.
Sub-Watershed D1	2	Upstream sample location placed downgradient of change in average basin slope. Downstream sample placed to capture entire basin drainage area.
Rustler Canyon	3	Upstream sample location placed downgradient of change in average basin slope and immediately downstream from large tributary inflow. Middle sample location selected to capture pools observed during field survey. Downstream sample placed to capture entire basin drainage area.
Rustler Canyon 2	2	Upstream sample location placed in un-named tributary west of Rustler Canyon at the 7,000 feet downstream marker. Downstream sample location selected in field based on observations of standing water.
Sub-Watershed D2	1	Sample location placed at downstream end of basin to capture entire watershed. Also placed near change in average basin slope.
Sub-Watershed D3	1	Sample location placed at downstream end of basin to capture entire watershed. Also placed near change in average basin slope.
Sub-Watershed E1	1	Average basin slope consistent throughout reach. Sample location placed at northern end of basin near Hurley and areas of interest.
Sub-Watershed E2	1	Average basin slope consistent throughout reach. Sample location placed at northern end of basin near Hurley and areas of interest. Also located downstream from tributary inflow.
Sub-Watershed E3	1	Average basin slope consistent throughout reach. Sample location placed at northern end of basin near Hurley and areas of interest.

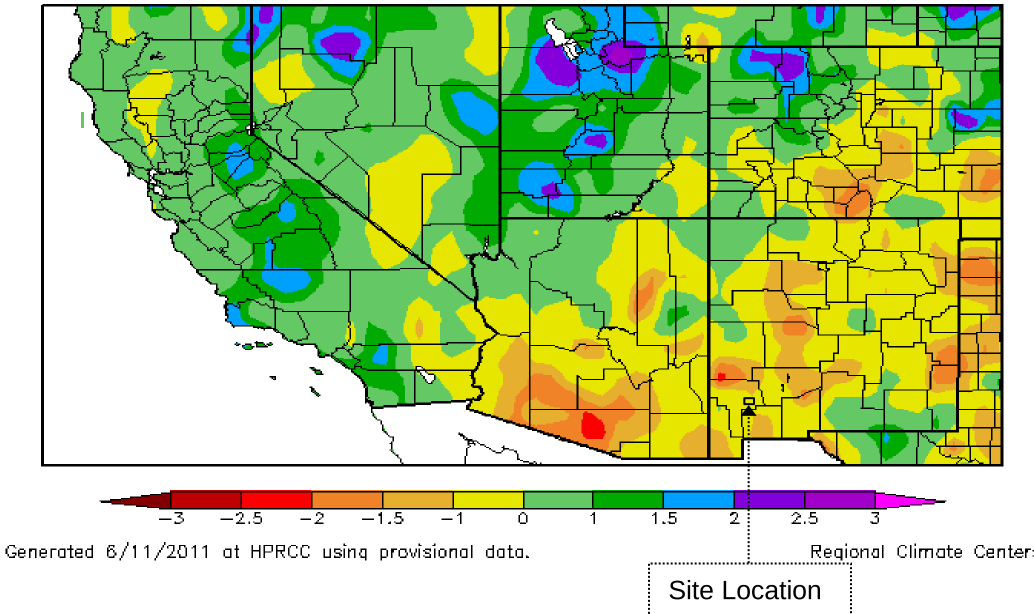
TABLE 2
LEVEL 1 HYDROLOGY PROTOCOL TOTAL SCORES

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NEW MEXICO
SMELTER/TAILING SOILS IU HYDROLOGY PROTOCOL

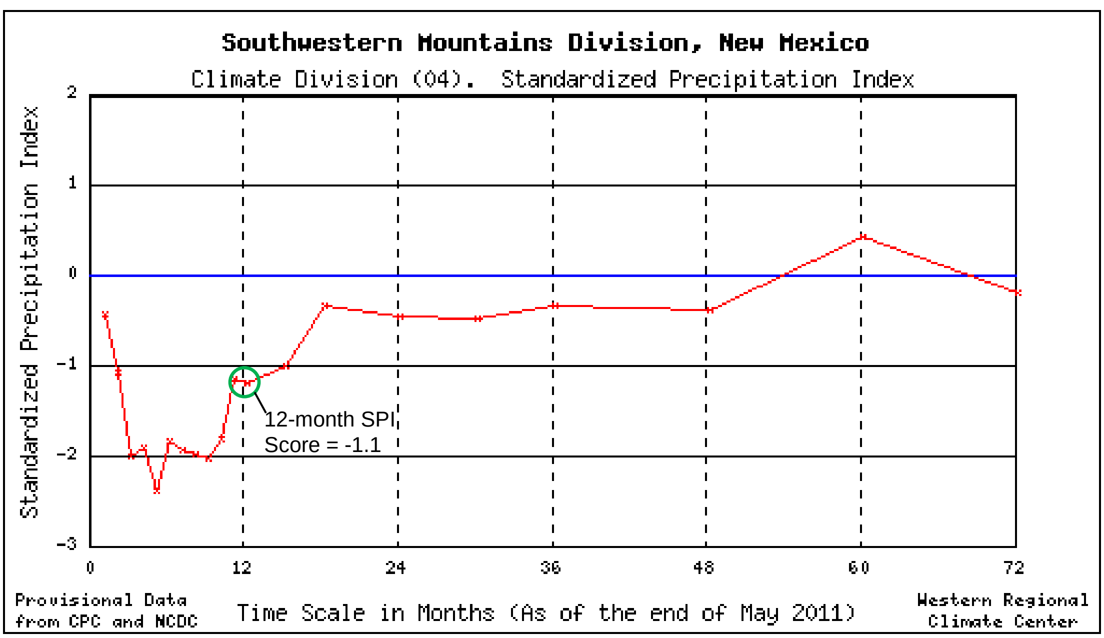
	Level 1 Indicators															Supplemental Indicators		
HP Sample Locations	1.1 Water in Channel	1.2 Fish	1.3 Benthic Macroinvertebrates	1.4 Filamentous Algae/ Periphyton	1.5 Differences in Vegetation	1.6 Absence of Rooted Upland Plants in Streambed	Subtotal (#1.1 - #1.6)	1.7 Sinuosity	1.8 Floodplain and Channel Dimensions	1.9 In-Channel Structure: Riffle-Pool Sequence	Subtotal (#1.1 - #1.9)	1.10 Particle Size or Stream Substate Sorting	1.11 Hydric Soils	1.12 Sediment on Plants and Debris	Total Point (#1.1 - #1.12)	1.13 Seeps and Springs	1.14 Iron Oxidizing Bacteria/Fungi	Total plus Supplemental Points (#1.1 - #1.14)
A-Drainage (A-10)	0	0	0	0	0	2	2	--	--	--	2	--	--	--	2	--	--	2
A-Drainage (A-9)	0	0	0	0	1	0	1	--	--	--	1	--	--	--	1	--	--	1
B-Drainage (B-7)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
B-Drainage (B-7-DS)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
B-Drainage (B-8)	0	0	0	0	1	2	3	1	1.5	0	5.5	1.5	Absent = 0	0	7	Absent = 0	Absent = 0	7
C-Drainage (HC-19)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
C-Drainage (HC-4)	0	0	0	0	1	2	3	0	1.5	0	4.5	1.5	Absent = 0	0	6	Absent = 0	Absent = 0	6
C-Drainage (HC-5)	0	0	0	0	0	2	2	--	--	--	2	--	--	--	2	--	--	2
C-Drainage (HC-6)	0	0	0	0	1	2	3	1	1.5	0	5.5	1.5	Absent = 0	0	7	Absent = 0	Absent = 0	7
D1-Drainage (D1-1)	0	0	0	0	0	1	1	--	--	--	1	--	--	--	1	--	--	1
D1-Drainage (D1-2)	0	0	0	0	1	0	1	--	--	--	1	--	--	--	1	--	--	1
D2-Drainage (D2-3)	0	0	0	0	0	2	2	--	--	--	2	--	--	--	2	--	--	2
D3-Drainage (D3-23)	0	0	0	0	0	2	2	--	--	--	2	--	--	--	2	--	--	2
E1-Drainage (E1-16)	0	0	0	0	0	0	0	--	--	--	0	--	--	--	0	--	--	0
E2 Drainage (E2-17)	0	0	0	0	0	1	1	--	--	--	1	--	--	--	1	--	--	1
E3-Drainage (E3-18)	0	0	0	0	0	0	0	--	--	--	0	--	--	--	0	--	--	0
Martin Canyon (MC-11)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
Martin Canyon (MC-12)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
Martin Canyon (MC-13)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
Rustler Canyon (HRC-14A)	2	0	1	1	1	2	7	0	N.A.	1	8	0	Present = 3	0	11	Present = 1.5	Absent = 0	12.5
Rustler Canyon (HRC-14B)	2	0	2	2	2	2	10	0	N.A.	1	11	0	Present = 3	0	14	Present = 1.5	Absent = 0	15.5
Rustler Canyon (HRC2-22)	0	0	0	0	1	1	2	--	--	--	2	--	--	--	2	--	--	2
Rustler Canyon (HRC2-22B)	2	0	2	2	0	2	8	1	N.A.	0	9	0	Absent = 0	0	9	Absent = 0	Absent = 0	9
Rustler Canyon (HRC-15)	0	0	0	1	2	2	5	1	1.5	1	8.5	3	Absent = 0	0.5	12	Absent = 0	Absent = 0	12

Notes
-- indicators not scored based on subtotal

12-Month SPI: 6/1/2010 – 5/31/2011



12-month SPI Map Source: National Drought Mitigation Center (NDMC) website available at:
http://drought.unl.edu/MonitoringTools/DailyGriddedSPI.aspx



Source: Western Regional Climate Center (WRCC) website available at: http://www.wrcc.dri.edu/spi-products/

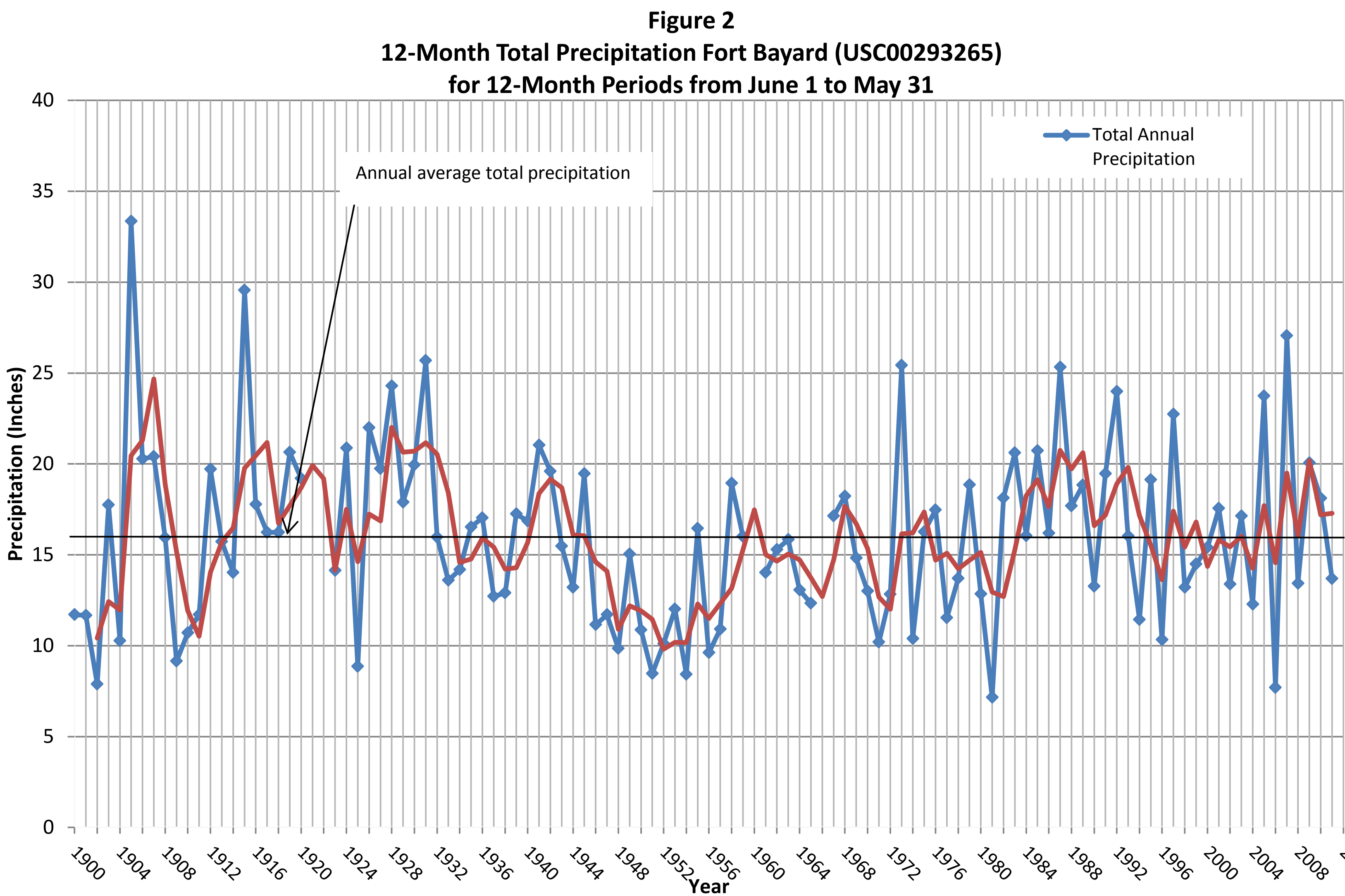
Notes: Each point on the graph represents the SPI for the Southwestern Mountains Division, New Mexico (Climate Division 4) for the number of months shown on the horizontal axis. For example, the value at 12 indicates the SPI for the past 12 months (i.e., the 12-month SPI).

FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NM
Application of Hydrology Protocol to STSIU Drainages

12-MONTH STANDARDIZED PRECIPITATION INDEX (SPI) OBSERVED DURING HP APPLICATION

ARCADIS

FIGURE
1



FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NM

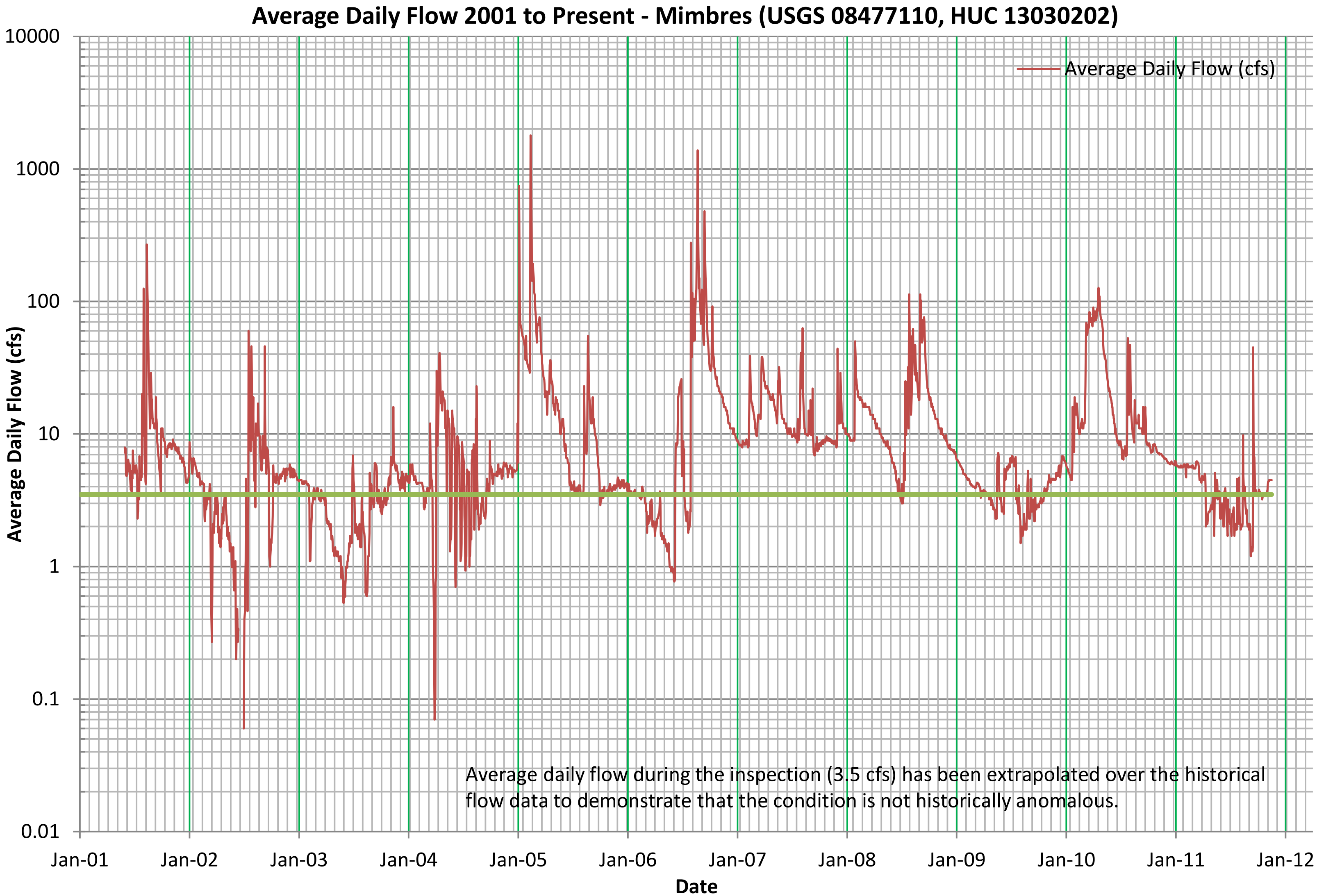
Application of Hydrology Protocol to STSIU Drainages

HISTORICAL ANNUAL AVERAGE PRECIPITATION MEASURED AT FORT BAYARD, NM CLIMACTIC STATION

ARCADIS

FIGURE

2



FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NM

Application of Hydrology Protocol to STSIU Drainages

HISTORICAL AVERAGE DAILY FLOW FOR MIMBRES RIVER IN MIMBRES, NM

ARCADIS

FIGURE
3

CITY: Lakewood DIV/GROUP: IM DB: MLM LD: PIC: PM: TM: TR:
Project #63524.001
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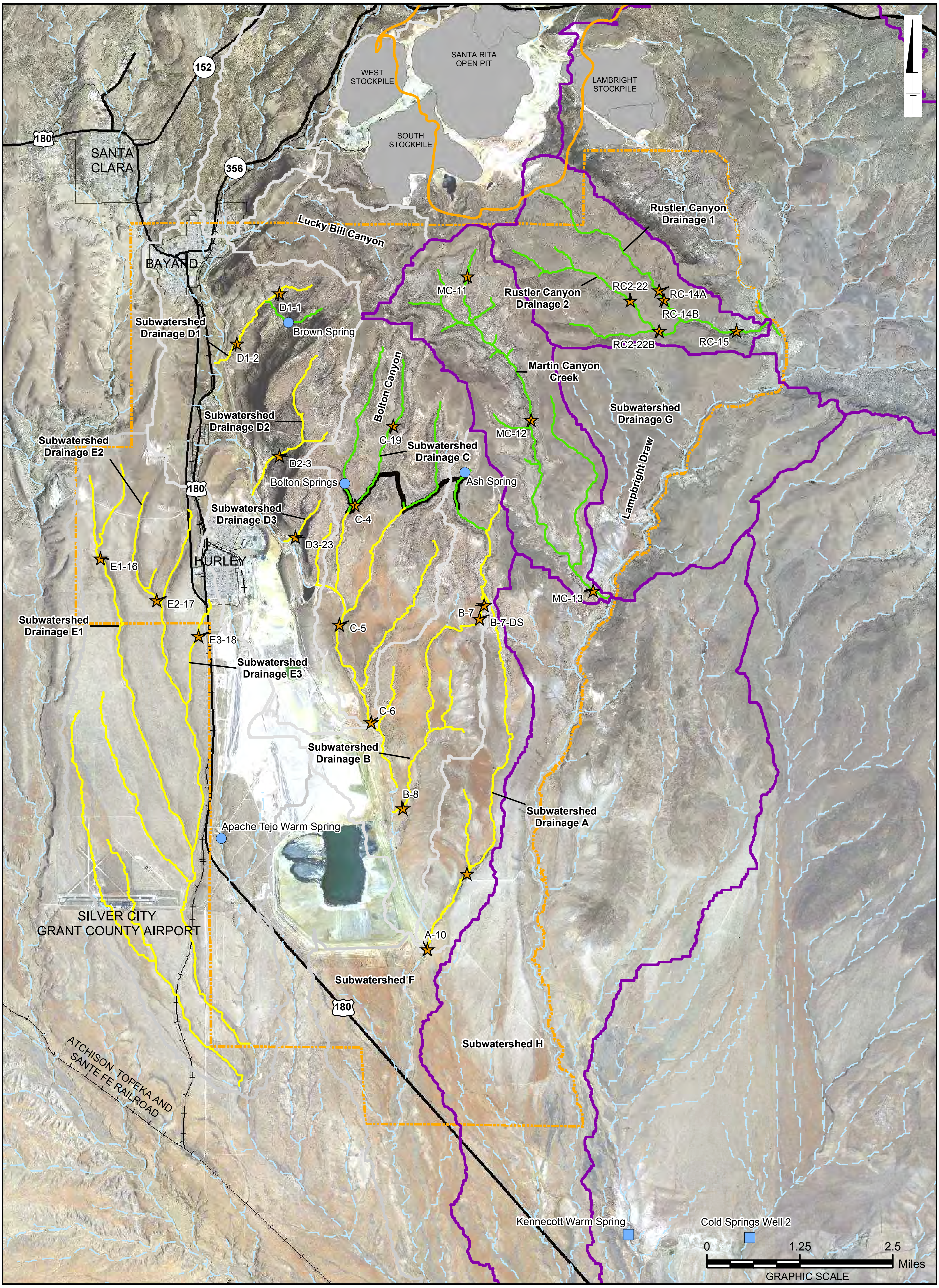

LEGEND:

- 2011 Hydrology Protocol Sample Location
- Pit Capture Zone from Golder (2008)
- Ephemeral Drainages
- Non-Ephemeral Drainages
- Other Drainages
- USFWS Critical Habitat Transect
- Lampbright Subwatershed Boundaries
- Hanover-Whitewater Subwatershed Boundaries
- STSIU Study Boundary
- Stockpiles
- Highway
- Railroad
- Town Roads
- Springs Inside STSIU Area
- Springs Outside STSIU Area

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VANADIUM, NEW MEXICO

SMELTER/TAILINGS SOILS IU

HYDROLOGY PROTOCOL SAMPLE LOCATIONS

ARCADIS

FIGURE 4

Service Layer Credits: APFO

CITY: Lakewood DIV/GROUP: IM DB: MLM LD: PIC: PM: TM: TR:
Project #63524.001
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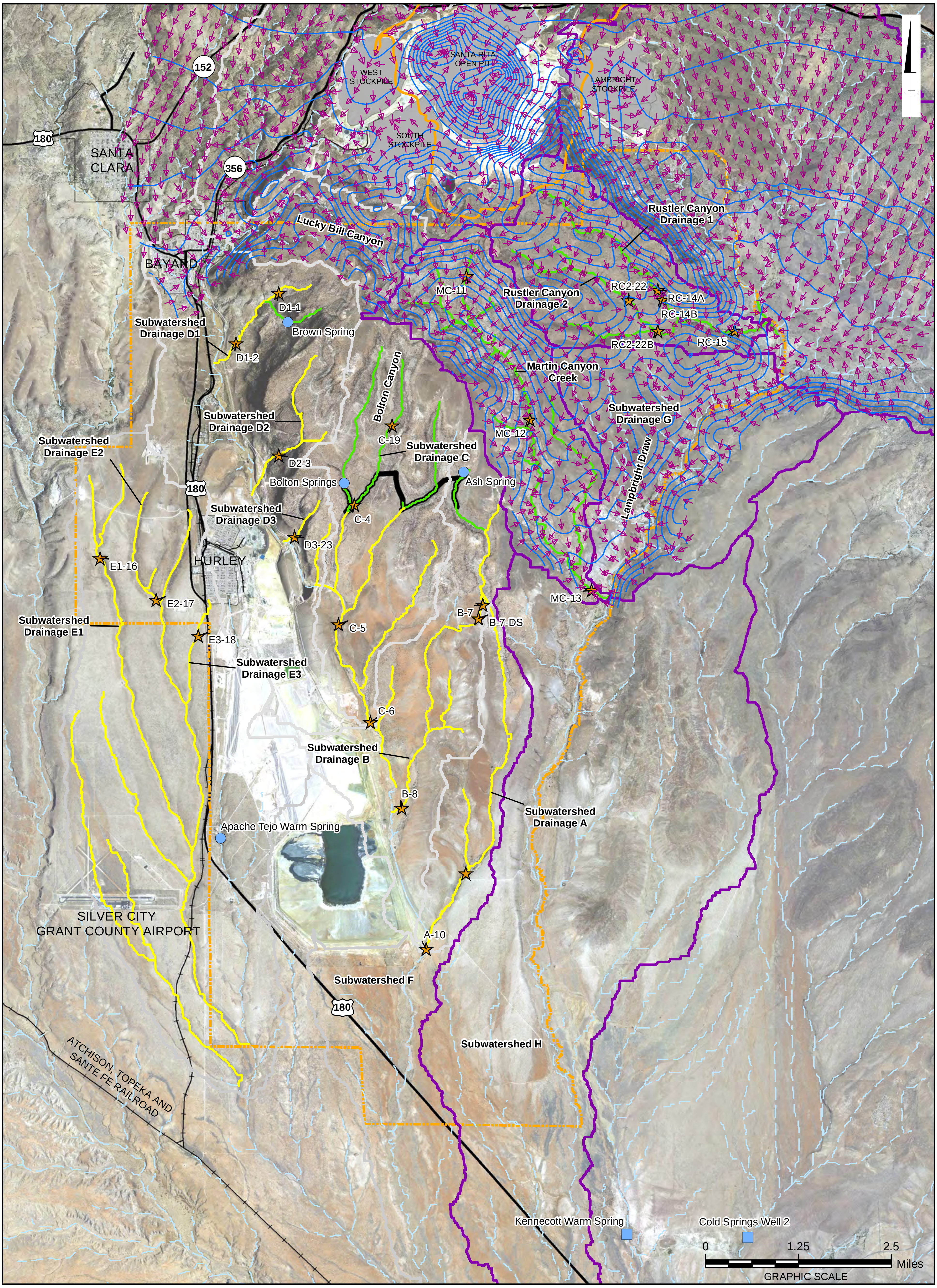

LEGEND:

- 2011 Hydrology Protocol Sample Location
- Pit Capture Zone from Golder (2008)
- Ephemeral Drainages
- Non-Ephemeral Drainages
- Other Drainages
- USFWS Critical Habitat Transect
- Lampbright Subwatershed Boundaries
- Hanover-Whitewater Subwatershed Boundaries
- STSIU Study Boundary
- Stockpiles
- Highway
- Railroad
- Town Roads
- Springs Inside STSIU Area
- Springs Outside STSIU Area
- Velocity Vectors (modeled)
- Groundwater Elevation (modeled)

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SMELTER/TAILINGS SOILS IU

2008 CHINO NORTH AREA MODEL SHALLOW GROUNDWATER CONTOURS AND VELOCITY VECTORS (FROM GOLDER 2008)

ARCADIS

FIGURE
5

Service Layer Credits: APFO

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:

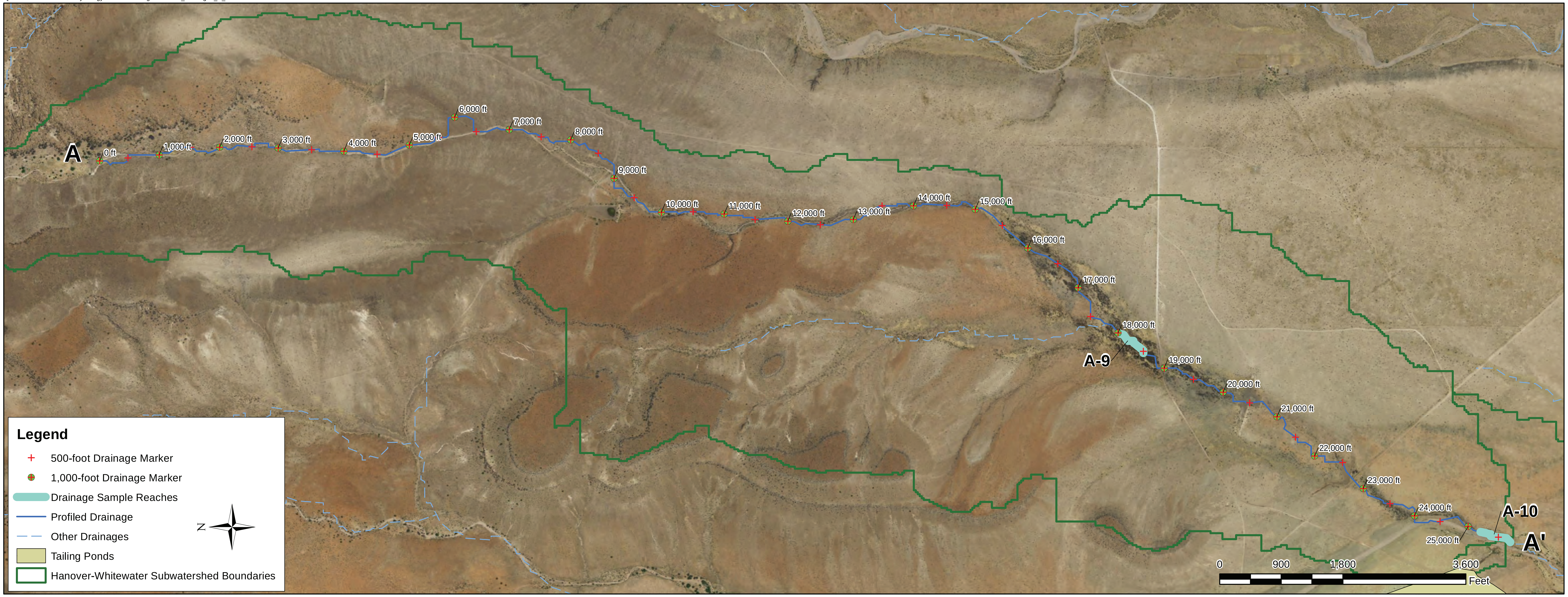
☒ Map and Photos (required)
☒ Hydrology Protocol Field Sheets for all locations (required)
☐ Level 2 Analysis (optional)
☒ Additional sites and/or documentation (drainage profile and plan view)

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: Barry Fulton	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: ______________

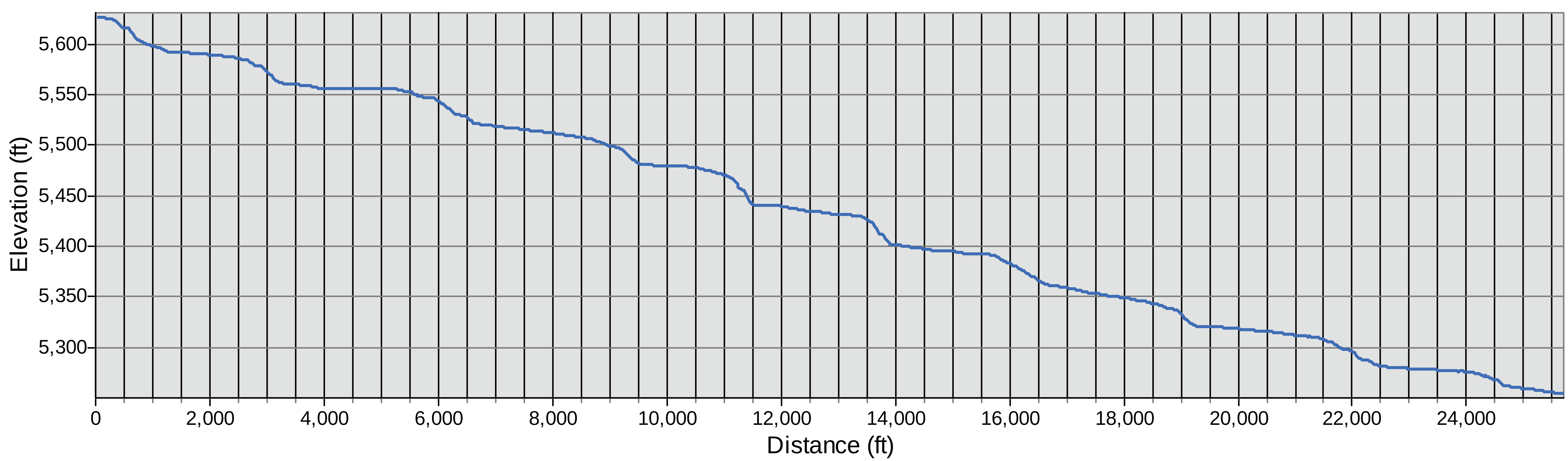
Q:\FCX\Chino\2011\MXD\HydrologyProtocol\FinalFigures\Profile_DrainageA_C_v3.mxd



A

FIGURE A-1: DRAINAGE PROFILE FOR SUBWATERSHED A

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 ≥ 12*	**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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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.

Appendix B

Level 1 Hydrology Protocol Results for B Drainage

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

Stream Name:	**Basin:**	**8-digit HUC:**
B-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.690012/-108.067308	32.65044/-108.08595
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4. _____ NMAC		B-7, B-7 DS, B-8

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**
B-7 (lat/long): 32.690012/-108.067308	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
B-7 DS (lat/long): 32.68733/-108.0683	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
B-8 (lat/long): 32.65044/-108.08595	☒ eph ☐ int ☐ per	Final score: 7, 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	B-7 has a cut across and part of the stream now drains into A Drainage.
Channelization/roads	☐ yes ☒ no	
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ 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.
Existing point source discharge	☐ yes ☒ no	
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 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:
Three assessment units were identified within sub-watershed B (Figure B-1 below). Starting at the upstream end, these assessment units are identified as B-7, B-7 DS and B-8. The most upstream assessment unit (B-7) was selected due to its location downgradient of change in the average basin slope. During HP application, a diversion was observed adjacent to the B-7 assessment unit that diverts water from the upper reaches of the B-drainage into the adjacent A-drainage. Reconnaissance was done above, within, and below this diversion and it was established that an ephemeral designation applied to this section. To determine hydrologic conditions downgradient of this diversion, an additional assessment unit (B-7 DS) was established downstream of this diversion. The lower downstream assessment unit (B-8) was selected to capture the entire basin drainage area. As shown in the plan and profile plot presented below, the basin slope gradually decreases, as expected, in the downstream direction beginning at the 6,000 ft marker. At all the assessment units, we observed that rooted upland plants occurred, with varying degrees of density, throughout the stream channel. The upstream reaches of sub-watershed B (B-7 and B-7 DS) are predominately cobble and unconsolidated sand with infrequent boulders (Photos B7-1, B7-3, B7 DS-1 and B7 DS-3) whereas the downstream assessment unit (B-8) is mostly unconsolidated sand (Photos B8-1, B8-2, and B8-3). This likely reflects a transition from colluvial to alluvial processes. As a result, differences in the extent of vegetation growing within the channel varied, with greater densities observed in the upstream reaches and sparse in-stream vegetation within the downstream, reach likely a result of the substrate limitations (e.g., unconsolidated, dry sand). The weight of evidence clearly indicates that sub-watershed B 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: ______________

Q:\FCX\Chino\2011\MXD\HydrologyProtocol\FinalFigures\Profile_DrainageB_C_v3.mxd

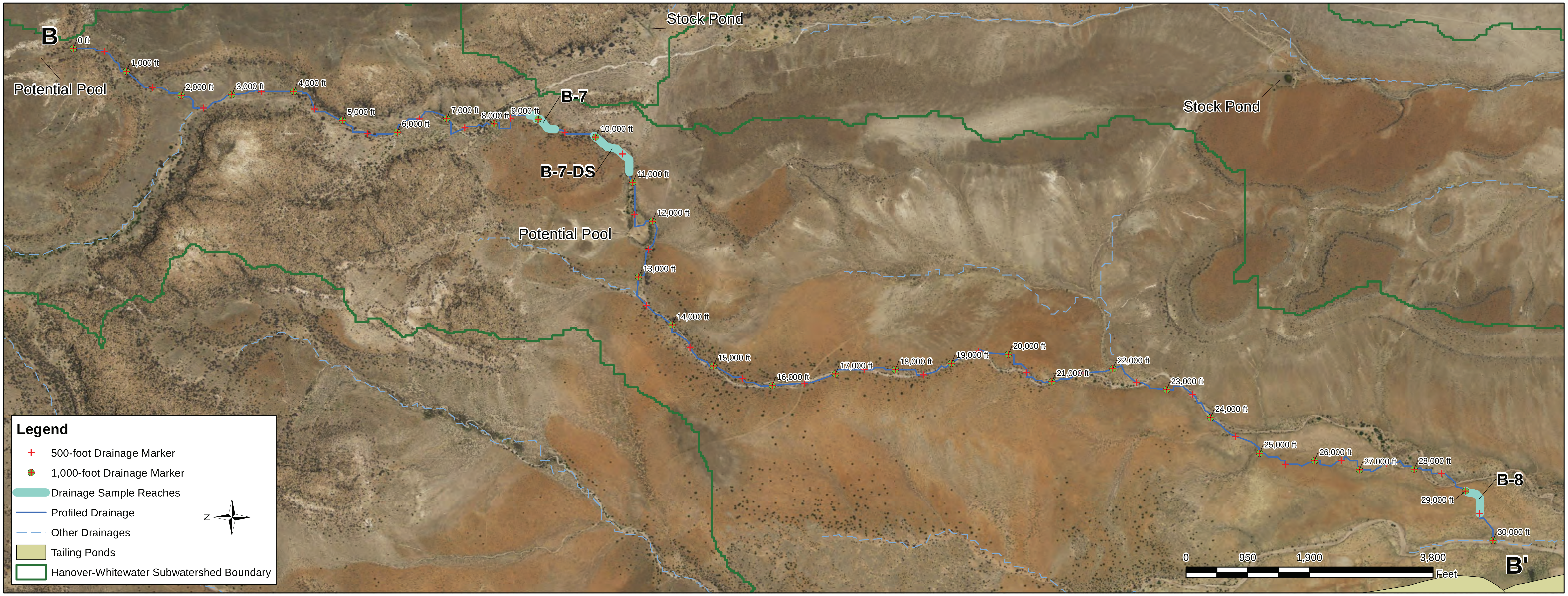
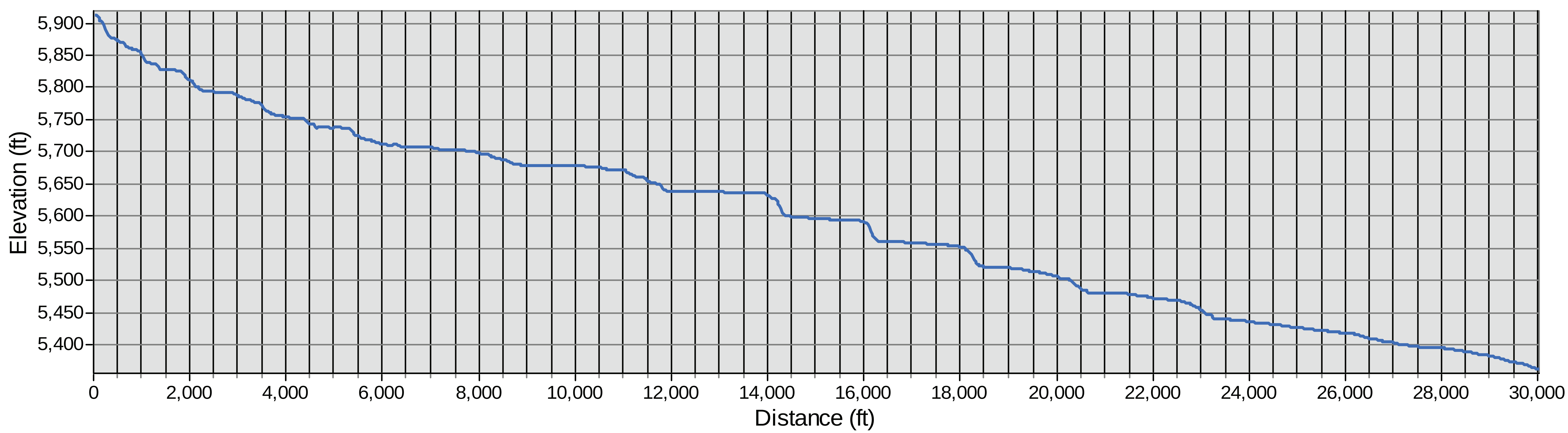


FIGURE B-1: DRAINAGE PROFILE FOR SUBWATERSHED B



B-Drainage Photographs (B-7 Reach) – Total HP score of 2 (ephemeral stream)

B7-1: Photographic reference for indicators 1.1 through 1.6. Photograph of stream bed. Typical rooted vegetation across channel and banks relatively consistently dispersed throughout channel length. Indicator 1.6 scored as 1 - rooted upland plants consistently dispersed in streambed. No water or biotic indicators of water observed along survey reach.

B7-2: Photographic reference for indicator 1.5. Photograph of bank and upland area. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

B-Drainage Photographs (B-7 Reach) – Total HP score of 2 (ephemeral stream)

B7-3: Photographic reference for indicators 1.5 and 1.6.   Photographs of bank/upland area and rooted in channel vegetation. There is a variation in vegetative density but no dramatic difference in composition. Rooted vegetation consistent across channel and banks.

B Drainage Photographs Downstream (B-7-DS Reach) – Total HP score of 2 (ephemeral stream)

B7 DS-1: Photographic reference for indicator 1.1 through 1.6. Indicator 1.6 scored as 1 - rooted vegetation along the stream bed is consistently dispersed. No water or biotic indicators of water observed along survey reach.

B7 DS-2: Photographic reference for indicator 1.5. Photograph of the overbank area and uplands. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

B Drainage Photographs Downstream (B-7-DS Reach) – Total HP score of 2 (ephemeral stream)

B7 DS-3: Photographic reference for indicators 1.5 and 1.6. Photographs of in stream rooted plants and overbank/upland areas. Evident variation in vegetative density but no dramatic difference in composition and rooted vegetation along the stream bed is consistently dispersed.

B-Drainage Photographs (B-8 Reach) – Total HP score of 7 (ephemeral stream)

B8-1: Photographic reference for indicator 1.1 through 1.6. Photograph of typical channel bed and channel banks. Indicator 1.6 scored as 2 - rooted vegetation inconsistently present in stream bed. No water or biotic indicators of water observed along survey reach.

B8-2: Photographic reference for indicator 1.5. Photograph of bank and upland area. No dramatic differences between channel bank vegetation and upland vegetation. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone present.

B-Drainage Photographs (B-8 Reach) – Total HP score of 7 (ephemeral stream)

B8-3: Photographic reference for indicator 1.6 and 1.9. Portions of the stream bed along the reach are devoid of vegetation while other portions are vegetated (see previous photograph). Lack of vegetation is likely the result of the flow regime and the bed material rather than an indicator of water persistence. Indicator 1.6 scored as 2 - few rooted upland plants present along streambed.

Indicator 1.9 scored as 0 - no riffle-pool sequence observable.

B-Drainage Photographs (B-8 Reach) – Total HP score of 7 (ephemeral stream)

B8-4: Photographic reference for indicator 1.8 and 1.10. Photograph of the cross-section for measurement of the floodplain and channel dimensions. Indicator 1.8 scored 1.5 based on measurements taken - moderate confinement and presence of inactive floodplain.

Indicator 1.10 scored as 1.5. Channel bed material is medium to course sand, which is consistent but noticeably courser than the bank and over bank area. Little to no substrate sorting is observable.

B-Drainage Photographs (B-8 Reach) – Total HP score of 7 (ephemeral stream)

B8-5: Photographic reference for indicators 1.5 and 1.6. Photographs of bank/upland area and rooted in channel vegetation. There is a variation in vegetative density but no dramatic difference in composition. Rooted vegetation inconsistent across channel and banks.

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

Date: 6/14/2011	**Stream Name: B-7**	**Latitude: N 32.69021**
Evaluator(s): Fulton/Donohoe	**Site ID: B-7**	**Longitude: W 108.06734**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: B Drainage (B-7)**	**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** ___ YES _X__ 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.

<table>
<tr><th rowspan="2">LEVEL 1 INDICATORS</th><th colspan="12">STREAM CONDITION</th></tr>
<tr><th colspan="3">Strong</th><th colspan="3">Moderate</th><th colspan="3">Weak</th><th colspan="3">Poor</th></tr>
<tr><td rowspan="2">1.7. Sinuosity</td><td colspan="3">Ratio > 1.4. Stream has numerous, closely-spaced bends, few straight sections.</td><td colspan="3">Ratio < 1.4. Stream has good sinuosity with some straight sections.</td><td colspan="3">Ratio < 1.2. Stream has very few bends and mostly straight sections.</td><td colspan="3">Ratio = 1.0. Stream is completely straight with no bends.</td></tr>
<tr><td colspan="3">3</td><td colspan="3">2</td><td colspan="3">1</td><td colspan="3">0</td></tr>
<tr><td rowspan="2">1.8. Floodplain and Channel Dimensions</td><td colspan="4">Ratio > 2.5. Stream is minimally confined with a wide, active floodplain.</td><td colspan="4">Ratio between 1.2 and 2.5. Stream is moderately confined. Floodplain is present, but may only be active during larger floods.</td><td colspan="4">Ratio < 1.2. Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.</td></tr>
<tr><td colspan="4">3</td><td colspan="4">1.5</td><td colspan="4">0</td></tr>
<tr><td rowspan="2">1.9. In-Channel Structure: Riffle-Pool Sequence</td><td colspan="3">Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.</td><td colspan="3">Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.</td><td colspan="3">Stream shows some flow but mostly has areas of pools <u>or</u> of riffles.</td><td colspan="3">There is no sequence exhibited.</td></tr>
<tr><td colspan="3">3</td><td colspan="3">2</td><td colspan="3">1</td><td colspan="3">0</td></tr>
<tr><td colspan="10">SUBTOTAL (#1.1 – #1.9)</td><td colspan="3">2</td></tr>
<tr><td colspan="13">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.</td></tr>
<tr><td rowspan="2">1.10. Particle Size or Stream Substrate Sorting</td><td colspan="4">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.</td><td colspan="4">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).</td><td colspan="4">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.</td></tr>
<tr><td colspan="4">3</td><td colspan="4">1.5</td><td colspan="4">0</td></tr>
<tr><td rowspan="2">1.11. Hydric Soils</td><td colspan="6">Hydric soils are found within the study reach.</td><td colspan="6">Hydric soils are <u>not</u> found within the study reach.</td></tr>
<tr><td colspan="6">Present = 3</td><td colspan="6">Absent = 0</td></tr>
<tr><td rowspan="2">1.12. Sediment on Plants and Debris</td><td colspan="3">Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.</td><td colspan="3">Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.</td><td colspan="3">Sediment is isolated in small amounts along the stream.</td><td colspan="3">No sediment is present on plants or debris.</td></tr>
<tr><td colspan="3">1.5</td><td colspan="3">1</td><td colspan="3">0.5</td><td colspan="3">0</td></tr>
<tr><td colspan="10">TOTAL POINTS (#1.1 – #1.12)</td><td colspan="3">2</td></tr>
</table>

<table>
<tr><td colspan="3">SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> record score below and tally with previous score to compute TOTAL.</td></tr>
<tr><td rowspan="2">1.13. Seeps and Springs</td><td>Seeps and springs are found within the study reach.</td><td>Seeps and springs are <u>not</u> found within the study reach.</td></tr>
<tr><td>Present = 1.5</td><td>Absent = 0</td></tr>
<tr><td rowspan="2">1.14. Iron Oxidizing Bacteria/Fungi</td><td>Iron-oxidizing bacteria and/or fungi are found within the study reach.</td><td>Iron-oxidizing bacteria and/or fungi are <u>not</u> found within the study reach.</td></tr>
<tr><td>Present = 1.5</td><td>Absent = 0</td></tr>
<tr><td colspan="2">TOTAL plus SUPPLEMENTAL POINTS (#1.1 – #1.14)</td><td>2</td></tr>
</table>

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
B7-1	View downstream	
B7-2	View of upslope left bank	
B7-3	View of in stream rooted plants and overbank/upland areas	

NOTES:

Scoring metric 1.5 HP
Observed trees in greater densities along stream corridor. The only compositional difference
observed was a willow growing in the channel but not in the upland area.
Therefore we did not consider that a dramatic compositional difference.

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

Date: 6/14/2011	**Stream Name: B-7 DS**	**Latitude: N 32.68575**
Evaluator(s): Fulton/Donohoe	**Site ID: B-7 DS**	**Longitude: W 108.07005**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** **B Drainage (B-7-DS)**	**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** ___ **YES** _X__ **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)	**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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
B7 DS-1	View downstream	
B7 DS-2	View of upslope right bank	
B7 DS-3	View of in stream rooted plants and overbank/upland areas	

NOTES:

The channel was predominately unconsolidated sand with cobble.
In stream vegetation observed was primarily grass with occasional oak species.
Riparian vegetation was primarily yucca, juniper and oak. Willow species were not observed in the stream bed.

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

Date: 6/13/2011	**Stream Name: B-8**	**Latitude: N 32.65222**
Evaluator(s): Barry	**Site ID: B-8**	**Longitude: W 108.08502**
TOTAL POINTS: 7 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: B Drainage (B-8)**	**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 ___ YES _X__ 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)	3

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 <u>or</u> of riffles.	There is no sequence exhibited.
	3	**2**	**1**	**0**
			SUBTOTAL (#1.1 – #1.9)	**5.5**

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.

	Strong	Moderate	Weak	Poor
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 <u>not</u> 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)	**7**

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	**7**

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
B8-1	View upstream extent of assessment unit looking downstream	
B8-2	View downstream along assessment unit at left bank riparian vegetation	
B8-3	View of lower portion of assessment unit – note lack of in channel vegetation	
B8-4	View of entrenchment survey transect	
B8-5	View of in stream rooted plants and overbank/upland areas	

NOTES:

Appendix C

Level 1 Hydrology Protocol Results for C Drainage

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

Stream Name:	**Basin:**	**8-digit HUC:**
C-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.72488/-108.0883	32.66566/-108.0928
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4._____ NMAC		C-19, C-4, C-5, C-6,

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**
C-19 (lat/long): 32.72488/-108.0883	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
C-4 (lat/long): 32.70919/-108.0975	☒ eph ☐ int ☐ per	Final score: 6, see field form and photos for additional information
C-5 (lat/long): 32.68615/-108.10046	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
C-6 (lat/long): 32.66566/-108.0928	☒ eph ☐ int ☐ per	Final score: 7, 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	
Channelization/roads	☐ 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.
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ yes ☒ no	
Existing point source discharge	☐ yes ☒ no	
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:		

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:
Four assessment units were identified within sub-watershed C (Figure C-1 below). Starting at the upstream end, these assessment units are identified as C-19, C-4, C-5, and C-6. The most upstream assessment unit (C-19) was selected to represent the headwater portions of this, and other, sub-watersheds within this portion of the AOC. Assessment unit C-4 was located at a significant change in basin slope downstream of tributary inflow. The lower two assessment units (C-5 and C-6) are located within the downstream portions of sub-watershed C intended to represent hydrologic processes of larger watersheds within this portion of the AOC. As shown in the plan and profile plots presented below the basin slope progressively decreases, as expected, in the downstream direction. Similarly, the degree of valley confinement decreases in the downstream direction. These trends in channel slope and confinement are typical and represent the relative dominance of colluvial versus alluvial channel forming processes and are reflected in the composition of the channel bed itself. That is, the upstream reaches of sub-watershed C (C-19 and C-4) are bedrock and cobble dominated stream channels indicative hill slope processes (Photos C19-1 and C4-2) whereas the downstream assessment units (C-5 and C-6) are a mixture of sand/gravel/cobble (Photos C5-1 and C6-3) and reflect the dominance of riverine processes. However, despite the influence of riverine processes within the lower assessment units we find throughout sub-watershed C that the channel is dominated by sand, cobbles and bedrock with very little difference between the "riparian" and upland vegetation. Furthermore, at all assessment units we observed that rooted upland plants occurred, with varying degrees of density, throughout the stream channel. The weight of evidence clearly indicates that sub-watershed C 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:

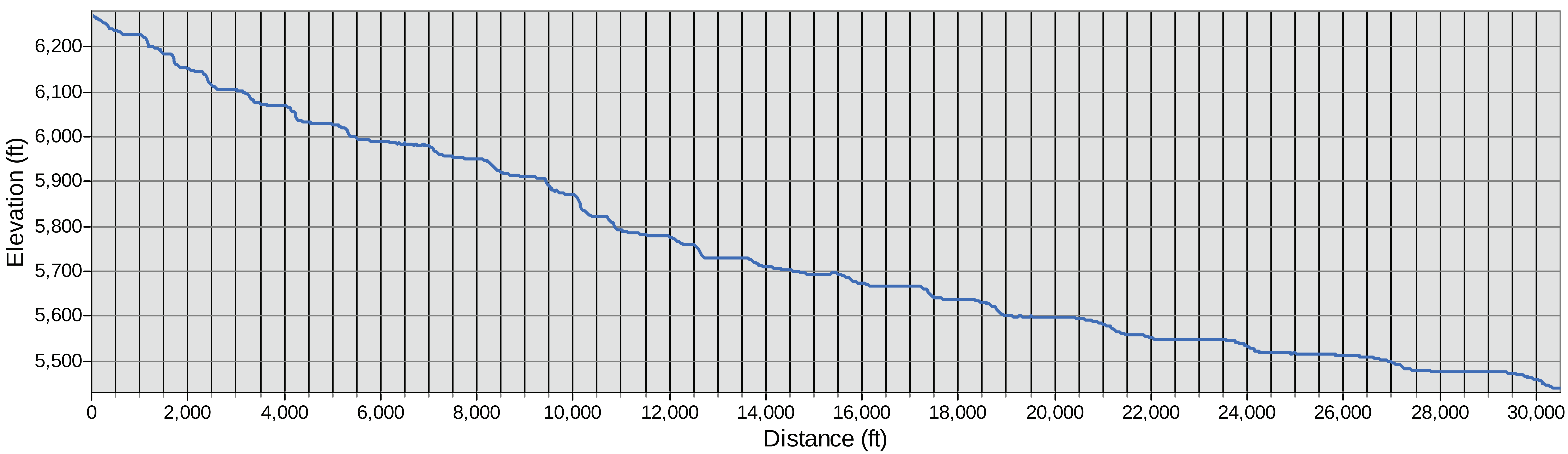
This UAA concludes that the stream reach identified above is ephemeral and that Clean Water Act Section 101(a)(2) aquatic life and recreational uses are neither existing nor attainable due to the factor identified in 40 CFR 131.10(g)(2): *natural, ephemeral, intermittent or low flow conditions or water 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: Barry Fulton	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: ______

Q:\FCX\Chino\2011\MXD\HydrologyProtocol\FinalFigures\Profile_DrainageC_C_v4.mxd

C — C

FIGURE C-1: DRAINAGE PROFILE FOR SUBWATERSHED C



C Drainage Photographs (C-19 Reach) – Total HP score of 2 (ephemeral stream)

C19-1: Photographic reference to representative channel bottom characteristics.

C19-2: Photographic reference for indicators 1.1 through 1.6. Photograph from upper extent of survey reach facing downstream. Rooted vegetation present in channel is present but inconsistent (see subsequent photograph). No water or biotic indicators of water observed along survey reach.

C Drainage Photographs (C-19 Reach) – Total HP score of 2 (ephemeral stream)

C19-3: Photographic reference for indicator 1.6. Portions of the survey reach devoid of vegetation as a result of bed material and lack of moisture rather than an indicator of persistence of flow. Indicator 1.6 scored as 1 – few rooted plants present in streambed.

C Drainage Photographs (C-19 Reach) – Total HP score of 2 (ephemeral stream)

C19-4: Photographic reference for indicator 1.5. Photograph of upland area and upland vegetation. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

C19-5: Photographic reference for indicators 1.5 and 1.6. There is a variation in vegetative density but no dramatic difference in composition. Portions of the survey reach few rooted plants present in streambed as a result of bed rock in channel.

C Drainage Photographs (C-4 Reach) – Total HP score of 6 (ephemeral stream)

C4-1: Photographic reference for indicator 1.1 to 1.6. Streambed is predominantly bedrock. Vegetation present where deposition has occurred. No water or biotic indicators of water observed along survey reach.

C4-2: Photographic reference for indicator 1.6. Indicator 1.6 scored as 2 – few rooted upland plants present in streambed. Lack of vegetation present in streambed likely result of flow regime and presence of bedrock rather than result of persistent water.

C Drainage Photographs (C-4 Reach) – Total HP score of 6 (ephemeral stream)

C4-3: Photographic reference for indicator 1.5. Photograph of bank and upland vegetation. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

C Drainage Photographs (C-4 Reach) – Total HP score of 6 (ephemeral stream)

C4-4: Photographic reference for indicators 1.8 through 1.10. Photograph of the entrenchment transect location. Indicator 1.8 scored as 1.5 - stream is somewhat confined with an inactive floodplain.

Indicator 1.9 scored as 0 - no riffle-pool sequence observed (also refer to other photos).

Indicator 1.10 scored as 1.5 - particle sizes within the channel are similar to upland material but are noticeably larger (primarily sands and gravels where bedrock is not present).

C Drainage Photographs (C-4 Reach) – Total HP score of 6 (ephemeral stream)

C4-5: Photographic reference for indicator 1.5. Photographs of bank and upland vegetation. Evident variation in vegetative density but no dramatic difference in composition. There is no distinct riparian vegetation corridor.

C Drainage Photographs (C-5 Reach) – Total HP score of 2 (ephemeral stream)

C5-1: Photographic reference for indicators 1.1 through 1.6. Indicator 1.6 scored as 2 – few rooted plants in the streambed. Lack of rooted plants is likely the result of the flow regime and granular bed material present rather than persistence of flow. No water or biotic indicators of water observed.

C5-2: Photographic reference for indicator 1.5. Indicator 1.5 scored as 0. Vegetation along streambank and uplands is sparse but consistent with no compositional or density differences between the two areas observed. Also refer to previous photograph.

C Drainage Photographs (C-5 Reach) – Total HP score of 2 (ephemeral stream)

C5-3: Photographic reference for indicator 1.6. Few rooted plants in the streambed. Lack of rooted plants is likely the result of granular bed material present.

C Drainage Photographs (C-6 Reach) – Total HP Score of 7 (ephemeral stream)

C6-1: Photographic reference for indicators 1.1 through 1.6. Indicator 1.6 scored as 2. Few rooted plants present in the streambed but inconsistently present. Lack of rooted plants is likely the result of the flow regime and granular bed material present rather than persistence of flow. No water or biotic indicators of water observed along survey reach.

C6-2: Photographic reference for indicator 1.5. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

C Drainage Photographs (C-6 Reach) – Total HP Score of 7 (ephemeral stream)

C6-3: Photographic reference for indicator 1.8. Location of transect shown. Indicator 1.8 scored as 1.5. Stream is somewhat confined with an inactive floodplain.

C6-4: Photographic reference for indicator 1.9 and 1.10. Indicator 1.9 scored as 0 - riffle-pool sequence not observable along survey reach. Indicator 1.10 scored as 1.5 - particle sizes of the channel bed material is primarily course sand and gravel which is similar to but courser than the material of the upland area. Substrate sorting not evident.

C Drainage Photographs (C-6 Reach) – Total HP Score of 7 (ephemeral stream)

C6-5: Photographic reference for indicator 1.6. Few rooted plants present in the streambed but inconsistently present. Lack of rooted plants is likely the result of granular bed material present.

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

Date: 6/12/2011	**Stream Name: C Drainage**	**Latitude: N 32.72488**
Evaluator(s): Clifton, Barry, Durham	**Site ID: C-19**	**Longitude: W 108.0883**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: C Drainage (C-19)**	**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** __ **YES** _X_ **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)	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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
C19-1	View of representative channel bottom characteristics	
C19-2	View upstream extent of assessment unit looking downstream - Note – lack of water in channel and presence of rooted vegetation in channel	
C19-3	View near downstream end of assessment unit – Note – area of no vegetation transitioning to prevalent vegetation. Lake of vegetation due to lack of moisture not duration of flow.	
C19-4	View of riparian and upland vegetation. No distinct riparian vegetation corridor	
C19-5	View of in stream rooted plants and overbank/upland areas.	

NOTES:

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

Date: 6/12/2011	**Stream Name: C Drainage**	**Latitude: N 32.70919**
Evaluator(s): Barry	**Site ID: C-4**	**Longitude: W 108.0975**
TOTAL POINTS: 6 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: C Drainage (C-4)**	**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** __ **YES** _X_ **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)	3

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)	**4.5**

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)	**6.0**

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)	**6**

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
C4-1	View from upstream extent of assessment unit looking downstream much of this unit – and this reach- is dominated by bedrock channel bottom	
C4-2	View from downstream extent of assessment unit looking upstream. Note large sand deposit and then bedrock channel further upstream. Lack of vegetation due to lack of water not consistency of flow	
C4-3	View of riparian and upland vegetation. No distinct riparian vegetation corridor	
C4-4	View of entrenchment transect location	
C4-5	View of in stream rooted plants and overbank/upland areas	

NOTES:

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

Date: 6/12/2011	**Stream Name: C Drainage**	**Latitude: N 32.68615**
Evaluator(s): Barry	**Site ID: C-5**	**Longitude: W 108.10046**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: E Drainage (C-5)**	**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** __ **YES** _X_ **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)	**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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
C5-1	View of lack of rooted plants in streambed	
C5-2	View of vegetation along streambank and uplands	
C5-3	View of in stream rooted plants and overbank/upland areas	

NOTES:

C-5 reflects the portion of Bolton that was dredged/cleared and widened for the White Water Creek
Diversion purposes.

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

Date: 6/12/2011	**Stream Name: C Drainage**	**Latitude: N 32.66566**
Evaluator(s): Barry	**Site ID: C-6**	**Longitude: W 108.0928**
TOTAL POINTS: 7 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: C Drainage (C-6)**	**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** __ **YES** _X_ **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)	3

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 <u>or</u> of riffles.	There is no sequence exhibited.
	3	**2**	**1**	**0**
			SUBTOTAL (#1.1 – #1.9)	**5.5**

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 <u>not</u> 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)	**7.0**

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	**7**

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
C6-1	View upstream extent of assessment unit looking downstream	
C6-2	View downstream extent of assessment unit looking upstream	
C6-3	View of entrenchment survey location	
C6-4	View lack of pool – riffle sequence	
C6-5	View of in stream rooted plants and overbank/upland areas	

NOTES:

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Appendix D

Level 1 Hydrology Protocol Results
for D Drainage

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

Stream Name:	**Basin:**	**8-digit HUC:**
D1-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.7506/-108.11491	32.74073/-108.12476
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4._____ NMAC		D1-1, D1-2

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**
D1-1 (lat/long): 32.7506/-108.11491	☒ eph ☐ int ☐ per	Final score: 1, see field form and photos for additional information
D1-2 (lat/long): 32.74073/-108.12476	☒ eph ☐ int ☐ per	Final score: 1, 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	
Channelization/roads	☐ yes ☒ no	
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:		

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 D1 (Figure D1-1). Starting at the upstream end, these assessment units are identified as D1-1 and D1-2. The most upstream assessment unit (D1-1) was selected to represent the headwater portions of this sub-watershed but also placed downgradient of a significant reduction in basin slope. The downstream assessment unit (D1-2) was located near the outlet of sub-watershed D1 as representative of the hydrologic processes of the entire drainage area.

As shown in the plan and profile plots for sub-watershed D1 (Figure D1-1) the basin slope progressively decreases, as expected, in the downstream direction. Similarly, the degree of valley confinement decreases in the downstream direction. These trends in channel slope and confinement are typical and represent the relative dominance of colluvial versus alluvial channel forming processes and are reflected in the composition of the channel bed itself. That is, the upstream reaches of sub-watershed D1 (D1-1) are bedrock and cobble dominated stream channels indicative hill slope processes (Photos D1-1 and D1-2) whereas the downstream assessment unit (D1-2) are a mixture of sand/gravel/cobble (Photos D1-2-1 and D1-2-2) and reflect the dominance of riverine processes. However, despite the influence of riverine processes within the lower assessment unit we observed very little difference between the "riparian" and upland vegetation. Furthermore, at both assessment units we observed that rooted upland plants occurred, with varying degrees of density, throughout the stream channel. The weight of evidence clearly indicates that sub-watershed D1 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: Barry Fulton	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: ______________

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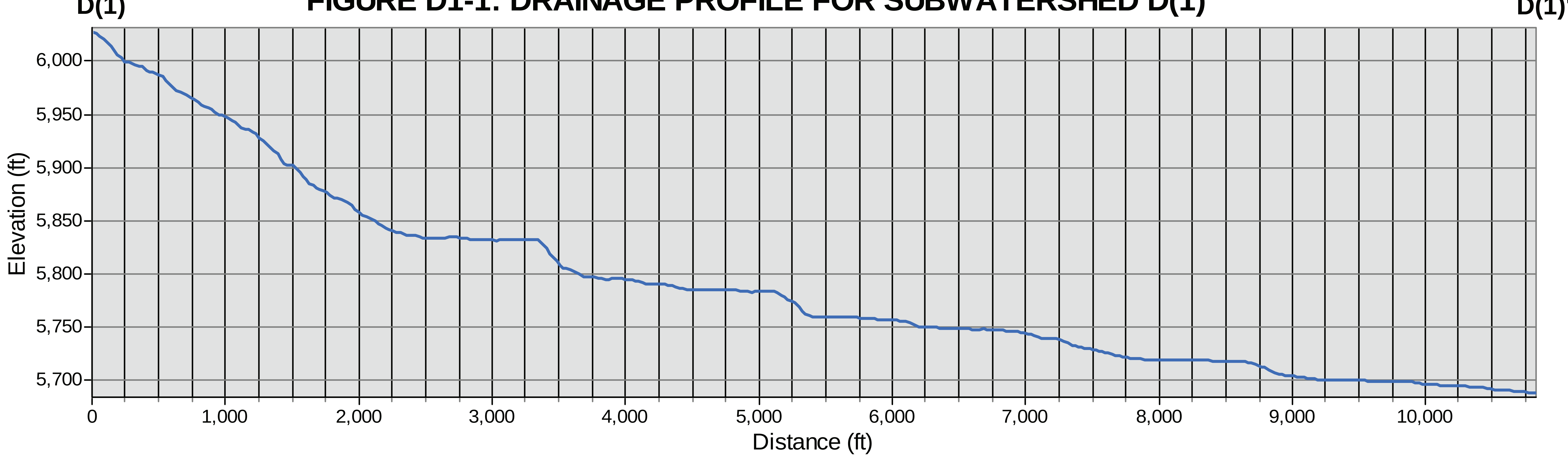
FIGURE D1-1: DRAINAGE PROFILE FOR SUBWATERSHED D(1)



D1 Drainage Photographs (D1-1 Reach) – Total HP Score of 1 (ephemeral stream)

D1-1: Photographic reference of representative channel bottom characteristics. Note large boulders and cobbles in stream channel, similar to those observed on hillside.

D1-2: Photographic reference of representative channel bottom characteristics. Note large boulders and cobbles in stream channel, similar to those observed on hillside.

D1 Drainage Photographs (D1-1 Reach) – Total HP Score of 1 (ephemeral stream)

D1-3 Photographic reference for indicator 1.1 through 1.6. Typical view of stream bed and banks. Indicator 1.6 scored as 1 - rooted plants are prevalent and consistently dispersed in the streambed. No water or biotic indicators of water observed along survey reach.

D1-4: Photographic reference for indicator 1.5. Photograph of typical vegetation in the upland region of the survey reach. Indicator 1.5 scored as 0. Upland vegetation composition and density similar to stream and stream banks shown in previous photograph.

D1 Drainage Photographs (D1-1 Reach) – Total HP Score of 1 (ephemeral stream)

D1-5: Photographic reference for indicators 1.5 and 1.6. Photographs of stream bed, the bank/upland area and rooted in channel vegetation. Upland vegetation composition and density similar to stream and stream banks. Rooted plants are prevalent and consistently dispersed in the streambed.

D1 Drainage Photographs (D1-2 Reach) – Total HP Score of 1 (ephemeral stream)

D1-2-1: Photographic reference for indicator 1.1 through 1.6. Indicator 1.6 scored as 0. Rooted plants present in the channel bed and are prevalent at similar density as the upslope area. No water or biotic indicators of water observed along survey reach.

D1-2-2: Photographic reference of representative channel bottom characteristics. Note sand/gravel channel bottom with prevalent rooted upland plants throughout.

D1 Drainage Photographs (D1-2 Reach) – Total HP Score of 1 (ephemeral stream)

D1-2-3: Photographic reference for indicator 1.5. Photograph of the overbank and upland area. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

D1 Drainage Photographs (D1-2 Reach) – Total HP Score of 1 (ephemeral stream)

D1-2-4: Photographic reference for indicators 1.5 and 1.6.   Photographs of stream bed, the bank/upland area and rooted in channel vegetation. There is an evident variation in vegetative density but no dramatic difference in composition. Rooted plants present in the channel bed and are prevalent at similar density as the upslope area.

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

Date: 6/13/2011	**Stream Name: D1**	**Latitude: N 32.75060**
Evaluator(s): Fulton/Barry	**Site ID: D-1**	**Longitude: W 108.11491**
TOTAL POINTS: 1 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: D Drainage (D-1)**	**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** ___ **YES** _X__ **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**

LEVEL 1 INDICATORS	Strong	Moderate	Poor
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**

LEVEL 1 INDICATORS	Strong	Moderate	Weak	Poor
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 <u>or</u> 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.

LEVEL 1 INDICATORS	Strong	Moderate	Poor
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**

LEVEL 1 INDICATORS		
1.11. Hydric Soils	Hydric soils are found within the study reach.	Hydric soils are <u>not</u> found within the study reach.
	Present = 3	**Absent = 0**

LEVEL 1 INDICATORS	Strong	Moderate	Weak	Poor
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. <u>If the indicator is present</u> record score below and tally with previous score to compute TOTAL.**

SUPPLEMENTAL INDICATORS		
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are <u>not</u> 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 <u>not</u> 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
D1-1	View of representative channel bottom characteristics. Note large boulders and cobbles in stream channel, similar to those observed on hillside.	
D1-2	View of representative channel bottom characteristics. Note large boulders and cobbles in stream channel, similar to those observed on hillside.	
D1-3	View middle of assessment unit looking upstream – note in channel vegetation	
D1-4	View middle of assessment unit looking at right overbank/upland vegetation – note lack of compositional difference	
D1-5	View of in stream rooted plants and overbank/upland areas.	

NOTES:

D1-1 and D1-2 Stock tanks were present within the drainage but not within the reaches surveyed.

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

Date: 6/13/2011	**Stream Name: D1**	**Latitude: N 32.74073**
Evaluator(s): Barry	**Site ID: D1-2**	**Longitude: W 108.12476**
TOTAL POINTS: 1 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: D Drainage (D1-2)**	**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** ___ YES _ X_ 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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
D1-2-1	View upstream extent of assessment unit looking downstream – note prevalent in channel vegetation	
D1-2-2	View of representative channel bottom characteristics. Note sand/gravel channel bottom with prevalent rooted upland plants throughout.	
D1-2-3	View from downstream extent of assessment unit looking to right overbank	
D1-2-4	View of in stream rooted plants and overbank/upland areas.	

NOTES:

D1-1 and D1-2 Stock tanks were present within the drainage but not within the reaches surveyed.

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

Date: 6/13/2011	**Stream Name: D1**	**Latitude: N 32.74073**
Evaluator(s): Fulton	**Site ID: D1-2 replicate**	**Longitude: W 108.12476**
TOTAL POINTS: 1 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: D Drainage (D1-2)**	**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 ___ YES _ X_ 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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
D1-2-1	View upstream extent of assessment unit looking downstream – note prevalent in channel vegetation	
D1-2-2	View of representative channel bottom characteristics. Note sand/gravel channel bottom with prevalent rooted upland plants throughout.	
D1-2-3	View from downstream extent of assessment unit looking to right overbank	
D1-2-4	View of in stream rooted plants and overbank/upland areas.	

NOTES:

D1-1 and D1-2 Stock tanks were present within the drainage but not within the reaches surveyed.

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

Stream Name:	Basin:	8-digit HUC:
D2-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.71882/-108.11478	32.71835/-108.11639
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4. _____ NMAC		D2-3

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**
D2-3 (lat/long): 32.71882/-108.11478	☒ 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	
Channelization/roads	☐ yes ☒ no	
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ yes ☒ no	
Existing point source discharge	☐ yes ☒ no	
Planned point source discharge	☐ yes ☒ no	
Other modifications e.g., land use practices	☐ yes ☒ no	*Please explain hydrologic impact*

[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.
If yes for any of above, please explain why these modifications do not alter the uses supported by the natural flow regime:	

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:

A single assessment unit was identified within sub-watershed D2 (D2-3) (Figure D2-1). Assessment unit D2-3 was placed near the outlet of sub-watershed D2 downgradient of a significant reduction in basin slope as representative of the hydrologic processes of the entire drainage area. Average basin slope of sub-watershed D2 is relatively steep (approximately 10%) and highly confined with hill slopes in direct contact with the channel and very little riparian or floodplain areas (Photos D2-1and D2-2). Sub-watershed D2 is dominated by colluvial processes with very little difference between vegetation composition and density between the stream banks and hillsides. Furthermore, we observed only a few occurrences of rooted upland plants within the channel bottom; however, this is the result of lack of moisture and deep mineral sandy soils within the stream bottom (Photo D2-5) rather than duration of flowing water. The weight of evidence clearly indicates that sub-watershed D2 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: [signature] 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: ______________	

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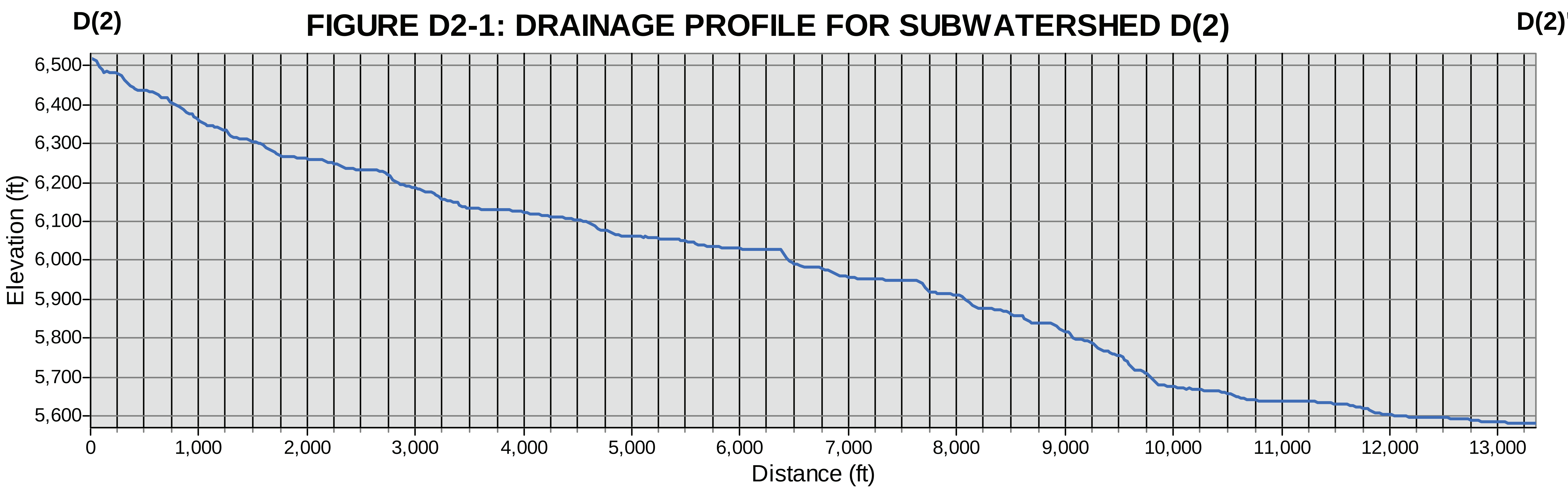
FIGURE D2-1: DRAINAGE PROFILE FOR SUBWATERSHED D(2)



D2 Drainage Photographs (D2-3 Reach) – Total HP score of 2 (ephemeral stream)

D2-1: Photographic reference of representative channel bottom characteristics. Note large boulders and cobbles in stream channel, similar to those observed on hillside. Note confining nature of hillsides.

D2-2: Photographic reference of representative channel bottom characteristics. Note large boulders and cobbles in stream channel, similar to those observed on hillside. Note confining nature of hillsides.

D2 Drainage Photographs (D2-3 Reach) – Total HP score of 2 (ephemeral stream)

D2-3: Photographic reference for indicators 1.1 though 1.6. Indicator 1.6 scored as 2 – few rooted plants present in the streambed. Lack of instream vegetation most likely a result of the bed material present (boulders) rather than an indicator of flow persistence. No water or biotic indicators of water observed along survey reach.

D2 Drainage Photographs (D2-3 Reach) – Total HP score of 2 (ephemeral stream)

D2-4: Photographic reference for indicator 1.5. Photograph of bank vegetation (also observable in previous photograph) and the upland vegetation. Indicator 1.5 scored as 0. No vegetative compositional or density differences observed between the banks and the upland area.

D2-5: Photographic reference for indicator 1.6. Lack of instream vegetation indicative of coarse mineral sediments and complete lack of moisture. Assessment unit representative of channel bottom characteristics. Note dry material sand sediments within channel.

D2 Drainage Photographs (D2-3 Reach) – Total HP score of 2 (ephemeral stream)

D2-6: Photographic reference for indicator 1.5. Photographs of stream bed, the bank/upland area and rooted in channel vegetation. There is no composition difference in vegetation between the bank and the upland area.

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

Date: 6/13/2011	**Stream Name: D2**	**Latitude: N 32.71882**
Evaluator(s): Fulton/Barry	**Site ID: D2-3**	**Longitude: W 108.11478**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: D Drainage (D2-3)**	**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 __ YES _X_ 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)				**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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
D2-1	View of representative channel bottom characteristics. Note large boulders and cobbles in stream channel.	
D2-2	View of representative channel bottom characteristics. Note large boulders and cobbles in stream channel.	
D2-3	View upstream within assessment unit	
D2-4	View of left bank upslope vegetation	
D2-5	View of representative channel bottom, lack of in stream vegetation. Note dry material sand sediments within channel.	
D2-6	View of in stream rooted plants and overbank/upland areas.	

NOTES:

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

Stream Name:	**Basin:**	**8-digit HUC:**
D3-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.70307/-108.11088	32.702662/-108.111866
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4. _____ NMAC		D3-23

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**
D3-23 (lat/long): 32.70307/-108.11088	☒ 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	
Channelization/roads	☐ yes ☒ no	
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ yes ☒ no	
Existing point source discharge	☐ yes ☒ no	
Planned 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.
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:		

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:
A single assessment unit was identified within sub-watershed D3 (D3-23) (Figure D3-1). Assessment unit D3-23 was placed near the outlet of sub-watershed 3 downgradient of a significant reduction in basin slope as representative of the hydrologic processes of the entire drainage area. Similar to sub-watershed D2, average basin slope of sub-watershed D3 is relatively steep (approximately 6%) and highly confined with hill slopes in direct contact with the channel and very little riparian or floodplain areas (Photos D3-1 and D3-2). As with sub-watershed D2, sub-watershed D3 is dominated by colluvial processes with very little difference between vegetation composition and density between the stream banks and hillsides. Furthermore, we observed only a few occurrences of rooted upland plants within the channel bottom; however, this is the result of lack of moisture and deep mineral sandy soils within the stream bottom (Photo D3-3) rather than duration of flowing water. The weight of evidence clearly indicates that sub-watershed D3 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: ____________________

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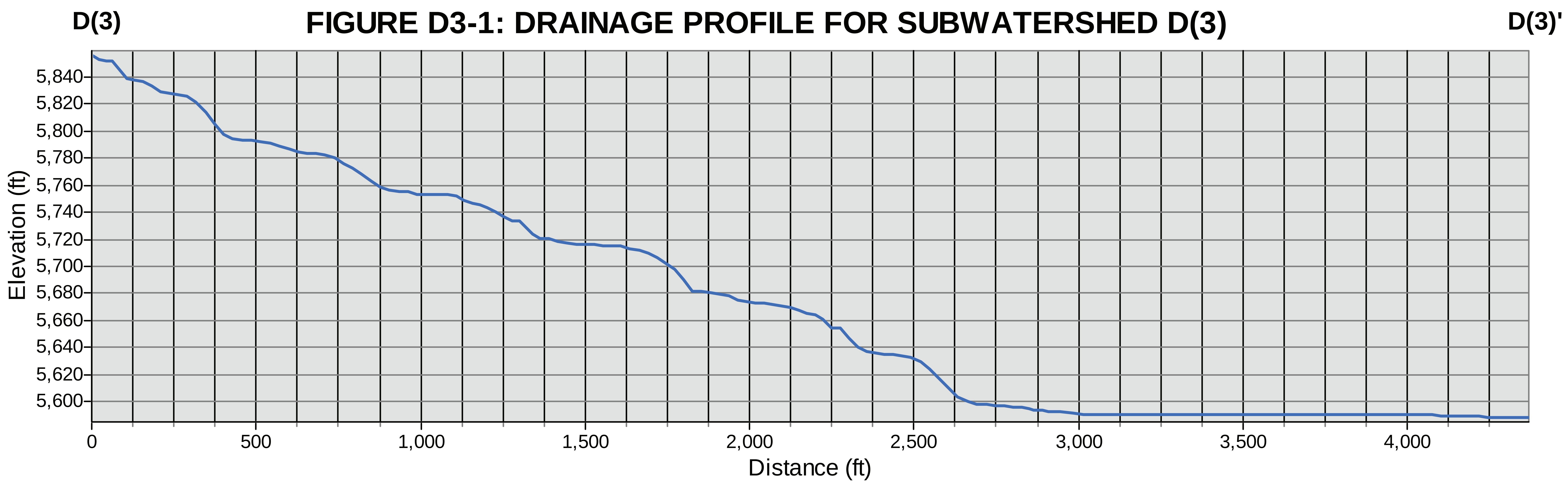
FIGURE D3-1: DRAINAGE PROFILE FOR SUBWATERSHED D(3)



D3 Drainage Photographs (D3-23 Reach) – Total HP score of 2 (ephemeral stream)

D3-1: Photographic reference of representative channel bottom characteristics. Note large boulders and cobbles in stream channel, similar to those observed on hillside. Note confining nature of hillside.

D3-2: Photographic reference for indicator 1.1 through1.6. Photograph of stream bed. Indicator 1.6 scored as 2 – few rooted plants present in the streambed. Lack of instream vegetation most likely a result of the bed material present (boulders) rather than an indicator of flow persistence. No water or biotic indicators of water observed along survey reach.

D3 Drainage Photographs (D3-23 Reach) – Total HP score of 2 (ephemeral stream)

D3-3: Photographic reference for indicator 1.6. Photograph of 7 inch hole excavated in-channel. There is a complete lack of soil structure and moisture. Assessment unit is representative of channel bottom characteristics. Note dry mineral, sand sediments within channel.

D3-4: Photographic reference for indicator 1.5. Photographs of stream bank and upland vegetation. Indicator 1.5 scored as 0. No vegetative compositional or density differences observed between the banks and the upland area.

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

Date: 6/13/2011	**Stream Name: D3**	**Latitude: N 32.70307**
Evaluator(s): Fulton/Barry	**Site ID: D3-23**	**Longitude: W 108.11088**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: D Drainage (D3-23)**	**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** __ **YES** _X_ **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)	**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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
D3-1	View of representative channel bottom characteristics. Note large boulders and cobbles in stream channel similar to those observed on hillside.	
D3-2	View downstream extent of assessment unit looking upstream	
D3-3	View of 7 inch hole excavated in channel. There is a complete lack of soil structure and moisture.	
D3-4	View of left bank riparian and upland vegetation	

NOTES:

Appendix E

Level 1 Hydrology Protocol Results for E Drainage

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

Stream Name:	Basin:	8-digit HUC:
E1-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.6991/-108.15656	32.6988/-108.15609
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4. _____ NMAC		E1-16

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
E1-16 (lat/long): 32.6991/-108.15656	☒ eph ☐ int ☐ per	Final score: 0, 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	
Channelization/roads	☐ yes ☒ no	
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ yes ☒ no	
Existing point source discharge	☐ yes ☒ no	
Planned point source discharge	☐ yes ☒ no	
Other modifications e.g., land use practices	☐ yes ☒ no	*Please explain hydrologic impact*

[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.
If yes for any of above, please explain why these modifications do not alter the uses supported by the natural flow regime:	

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:
A single assessment unit (E1-16) was identified within sub-watershed E1 (Figure E-1 below). As shown in the plan and profile plots presented below (Figure E-1) both the basin slope (approximately 1%) and degree of valley confinement is relatively constant along its entire length. The constant valley slope and complete lack of compositional or density differences between the stream banks and uplands (Photos E1-1 and E1-2) suggest that fluvial processes, including sediment sorting and channel construction, are extremely rare within sub-watershed E1 and that this drainage is appropriately classified as an ephemeral channel.

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: Barry Fulton	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: ____________________

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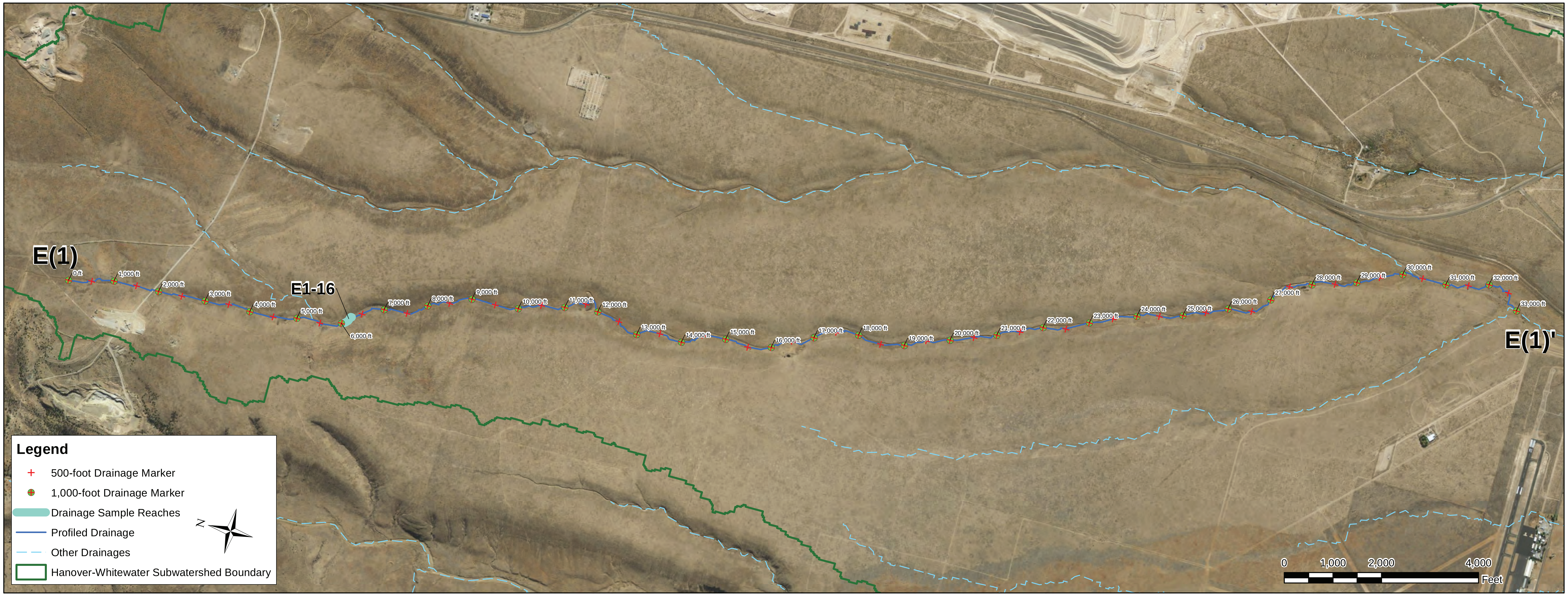
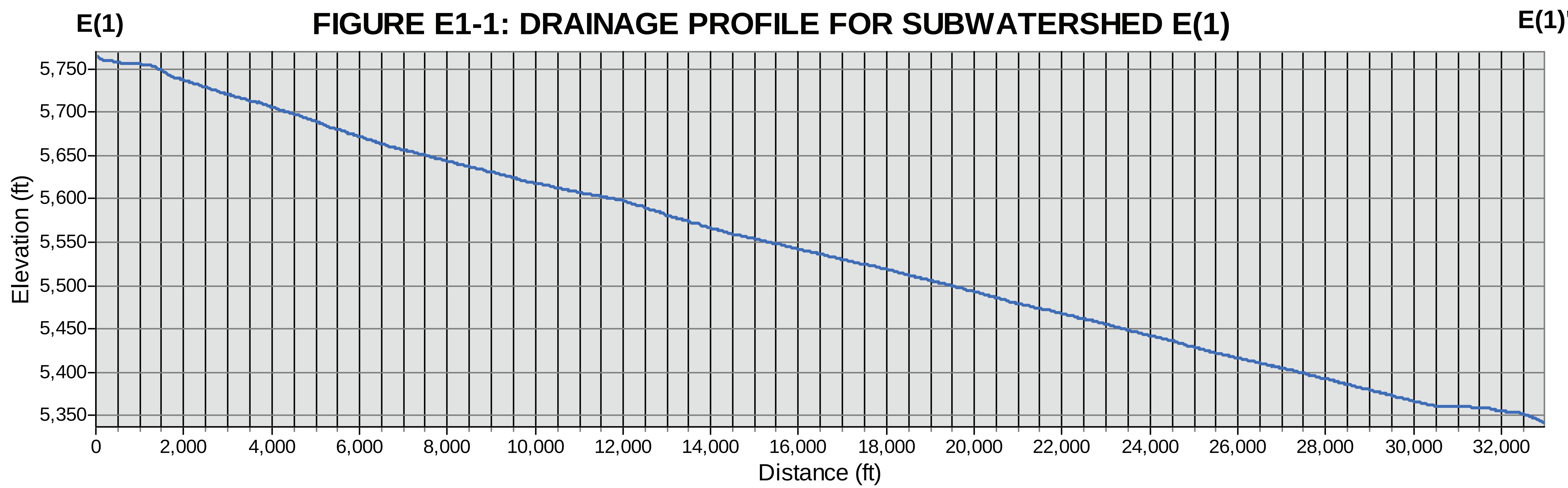


FIGURE E1-1: DRAINAGE PROFILE FOR SUBWATERSHED E(1)



E1 Drainage Photographs (E1-16 Reach) – Total HP score of 0 (ephemeral stream)

E1-1: Photographic reference of representative channel bottom and vegetation characteristics.

E1-2: Photographic reference for indicators 1.1 through1.6. Photograph of stream bed. Indicator 1.6 scored as 0 - vegetation in stream bed is prevalent and consistent with bank and upslope areas. No water or biotic indicators of water observed along survey reach.

E1 Drainage Photographs (E1-16 Reach) – Total HP score of 0 (ephemeral stream)

E1-3: Photographic reference for indicator 1.5. Photograph of the stream bank and upland areas. Indicator 1.5 scored as 0 - no vegetative compositional or density differences observed between the banks and the upland area.

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

Date: 6/13/2011	**Stream Name: E1**	**Latitude: N 32.69910**
Evaluator(s): Fulton/Barry	**Site ID: E1-16**	**Longitude: W 108.15656**
TOTAL POINTS: 0 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: E Drainage (E1-16)**	**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** __ **YES** _X_ **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)	**0**

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)				**0**

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)				**0**

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)		**0**

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
E1-1	View of representative channel bottom and vegetation characteristics.	
E1-2	View upstream extent of assessment unit looking downstream	
E1-3	View upstream extent of assessment unit looking to left overbank	

NOTES:

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

Stream Name:	**Basin:**	**8-digit HUC:**
E2-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.69114/-108.14323	32.689800/-108.142860
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC	☐ Classified 20.6.4._____ NMAC	E2-17

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**
E2-17 (lat/long): 32.69114/-108.14323	☒ eph ☐ int ☐ per	Final score: 1, 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	
Channelization/roads	☐ yes ☒ no	
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ yes ☒ no	
Existing point source discharge	☐ yes ☒ no	
Planned point source discharge	☐ yes ☒ no	
Other modifications e.g., land use practices	☐ yes ☒ no	*Please explain hydrologic impact*

[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.
If yes for any of above, please explain why these modifications do not alter the uses supported by the natural flow regime:	

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:
Similar to sub-watershed E1, a single assessment unit (E2-17) was identified within sub-watershed E2 (Figure E2-1). As shown in the plan and profile plots presented below (Figure E2-1) both the basin slope (approximately 1.5%) and degree of valley confinement is relatively constant along its entire length. Unlike sub-watersheds E1 and E3, a distinct channel bed can be observed within this assessment unit (Photo E2-1), however, no distinct compositional or density difference was observed between the stream bank and upland vegetation characteristics (Photos E2-1 and E2-2) and rooted vegetation was observed consistently within the channel bottom throughout this assessment unit (Photos E2-3 and E2-4). Based on the observed characteristics of this representative assessment unit, fluvial processes within sub-watershed E2 occur in direct response to rainfall events with enough frequency to have constructed a definable channel bottom and banks but without the necessary duration or magnitude to maintain or construct a complex stream channel free of rooted vegetation. Sub-watershed E2 is appropriately classified as an ephemeral channel.

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: Barry Fulton 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: ____________________

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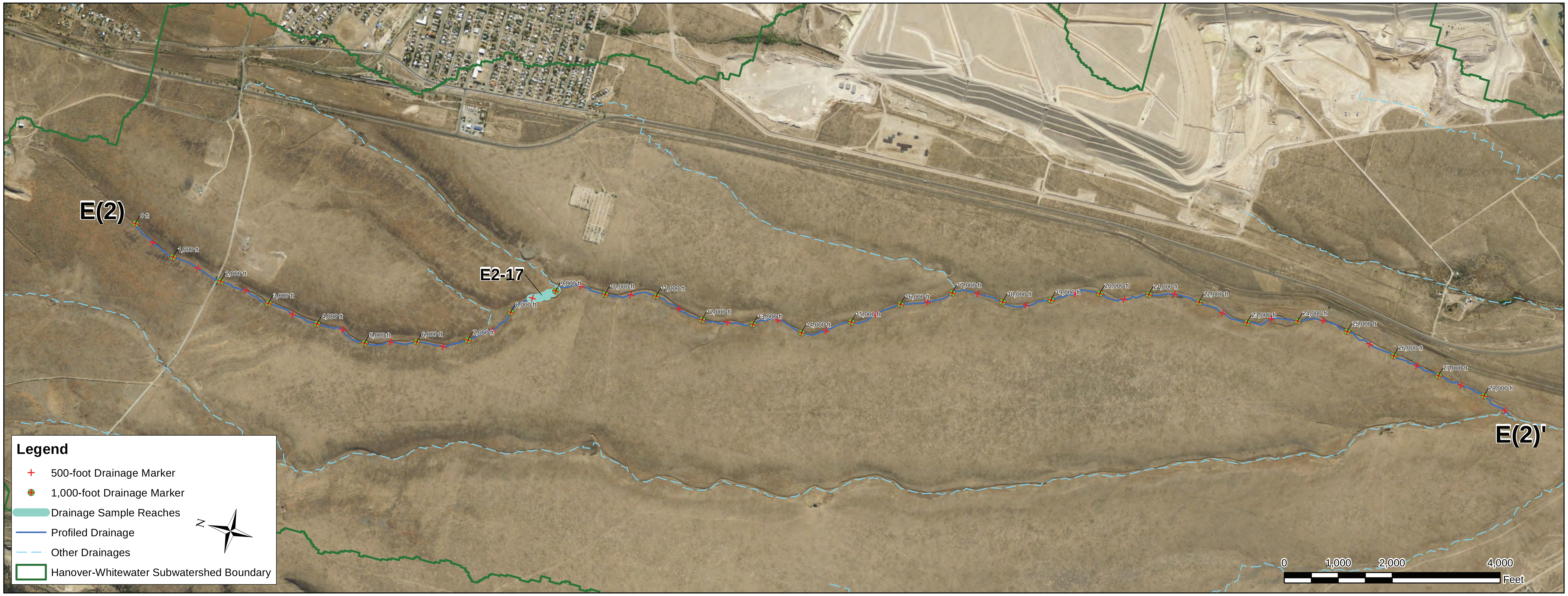
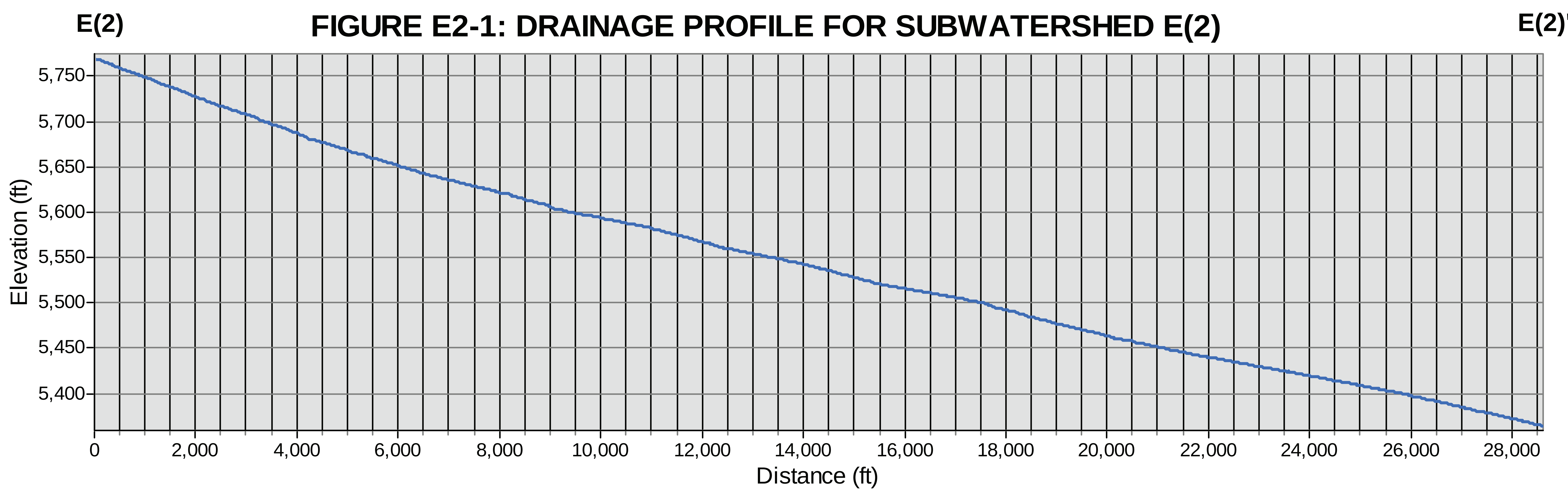


FIGURE E2-1: DRAINAGE PROFILE FOR SUBWATERSHED E(2)



E2 Drainage Photographs (E2-17 Reach) – Total HP score of 1 (ephemeral stream)

E2-1: Photographic reference for indicator 1.1 through 1.6. Photograph of the stream channel and the bank and upland areas. Indicator 1.5 scored as 0 - no vegetative compositional or density differences observed between the banks and the upland area. No water or biotic indicators of water observed along survey reach.

E2-2: Photographic reference of channel bed and bank.

E2 Drainage Photographs (E2-17 Reach) – Total HP score of 1 (ephemeral stream)

E2-3: Photographic reference of in-channel vegetation.

E2-4: Photographic reference for indicator 1.6. Indicator 1.6 scored as 1. Rooted upland plants (grasses) are preset in the streambed and consistently dispersed but are not prevalent throughout the channel.

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

Date: 6/13/2011	**Stream Name: E2**	**Latitude: N 32.69114**
Evaluator(s): Fulton/Barry	**Site ID: E2-17**	**Longitude: W 108.14323**
TOTAL POINTS: 1 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: E Drainage (E2-17)**	**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** __ **YES** _X_ **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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
E2-1	View upstream extent of assessment unit looking downstream	
E2-2	View of channel bed and bank	
E2-3	View of in channel vegetation	
E2-4	View of in channel vegetation	

NOTES:

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

Stream Name:	**Basin:**	**8-digit HUC:**
E3-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.68408/-108.13315	32.682821/-108.133684
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4. _____ NMAC		E3-18

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**
E3-18 (lat/long): 32.68408/-108.13315	☒ eph ☐ int ☐ per	Final score: 0, 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	
Channelization/roads	☐ yes ☒ no	
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ yes ☒ no	
Existing point source discharge	☐ yes ☒ no	
Planned point source discharge	☐ yes ☒ no	
Other modifications e.g., land use practices	☐ yes ☒ no	*Please explain hydrologic impact*

[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.
If yes for any of above, please explain why these modifications do not alter the uses supported by the natural flow regime:	

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:
A single assessment unit (E3-18) was identified within sub-watershed E3 (Figure E3-1). The longitudinal profile of sub-watershed E3 shows slightly more variation than either E1 or E2; however much of this variability is in response to impacts associated with the road crossing. Within this assessment unit no defined channel was observed with very little, if any, evidence of fluvial processes (Photos E3-1 and E3-2). This drainage is appropriately classified as an ephemeral channel.

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: Barry Fulton 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: ______________

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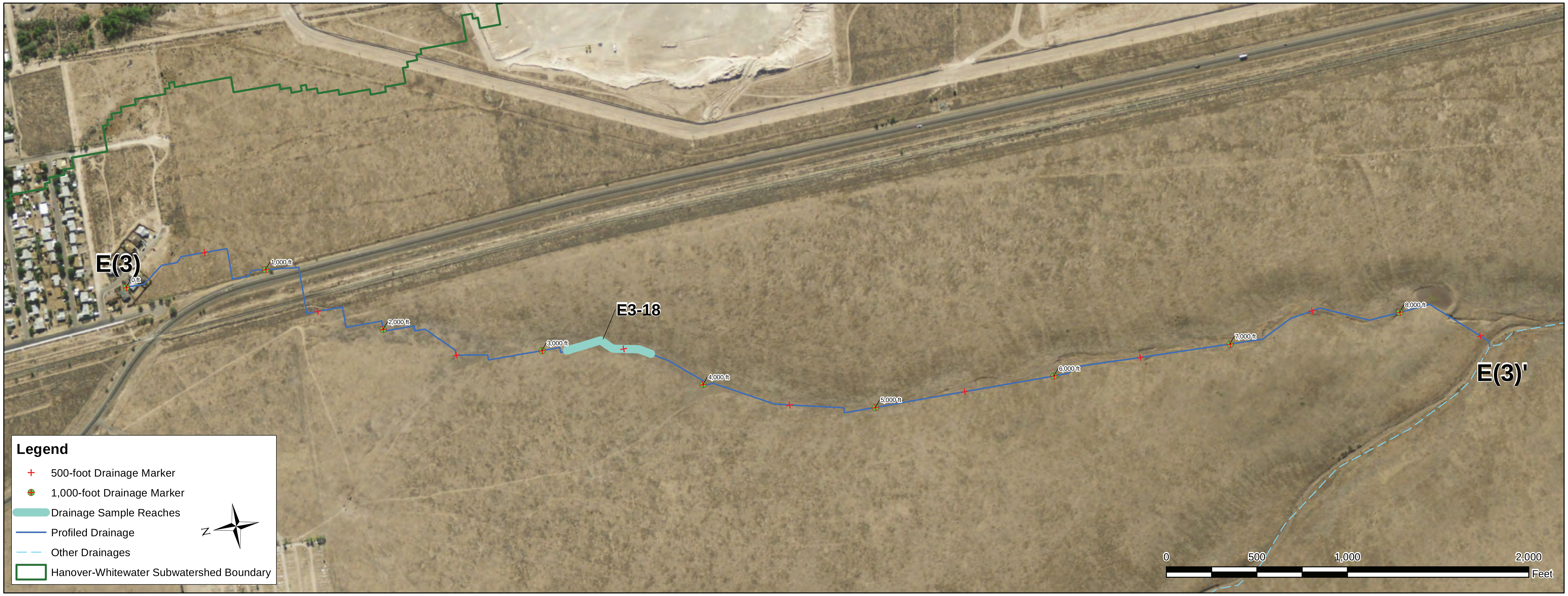
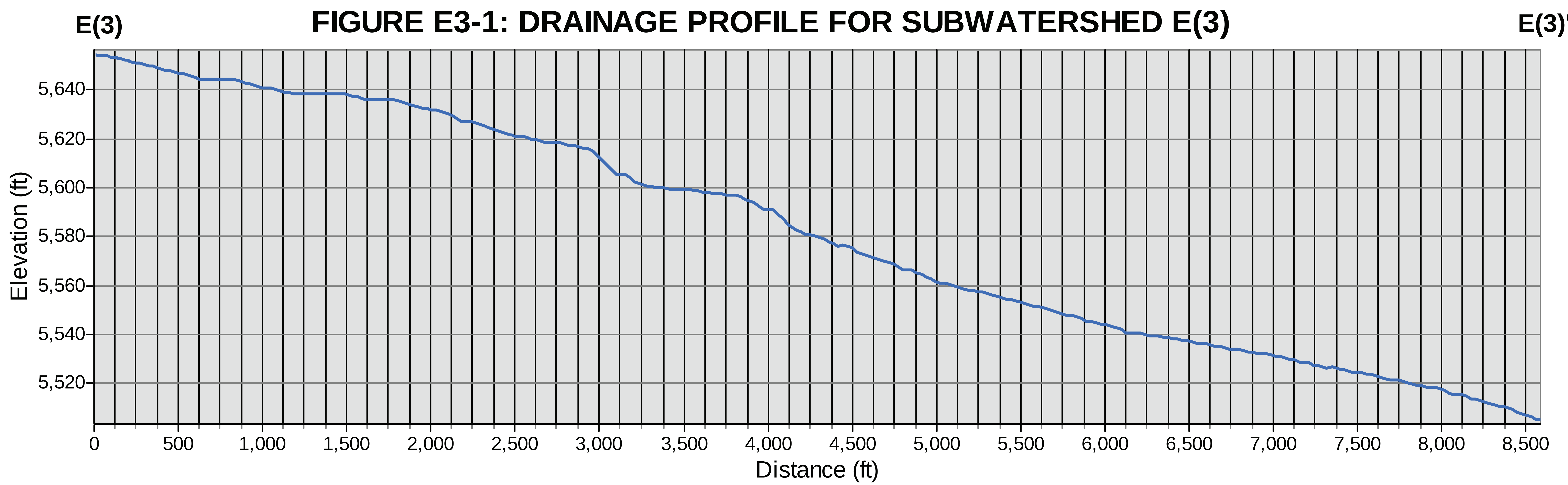


FIGURE E3-1: DRAINAGE PROFILE FOR SUBWATERSHED E(3)



E3 Drainage Photographs (E3-18 Reach) – Total HP score of 0 (ephemeral stream)

E3-1: Photographic reference for indicator 1.1 through 1.6. Photograph of the stream channel/lowland area and the bank and upland areas. Indicator 1.5 scored as 0 - no vegetative compositional or density differences observed between the banks and the upland area. No water or biotic indicators of water observed along survey reach.

E3-2: Photographic reference for indicator 1.5. Photograph of the stream bank and upland area. Indicator 1.6 scored as 0 - vegetation in stream bed is prevalent and consistent with bank and upslope areas.

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

Date: 6/13/2011	**Stream Name: E3**	**Latitude: N 32.68408**
Evaluator(s): Fulton/Barry	**Site ID: E3-18**	**Longitude: W 108.13315**
TOTAL POINTS: 0 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: E Drainage (E3-18)**	**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 __ YES _X_ 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)	**0**

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**

Indicator			
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**

Indicator				
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 <u>or</u> of riffles.	There is no sequence exhibited.
	3	**2**	**1**	**0**
SUBTOTAL (#1.1 – #1.9)				**0**

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.

Indicator			
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**

Indicator		
1.11. Hydric Soils	Hydric soils are found within the study reach.	Hydric soils are <u>not</u> found within the study reach.
	Present = 3	**Absent = 0**

Indicator				
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)				**0**

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

Indicator		
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are <u>not</u> 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 <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)		**0**

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
E3-1	View upstream extent of assessment unit looking downstream	
E3-2	View upstream extent of assessment unit looking toward right overbank	

NOTES:

ARCADIS

Appendix F

Level 1 Hydrology Protocol Results
for Martin Canyon Drainage

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

Stream Name:	**Basin:**	**8-digit HUC:**
Martin Canyon-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.75402/-108.07157	32.69267/-108.04256
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4. _____ NMAC		MC-11, MC-12, MC-13

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**
MC-11 (lat/long): 32.75402/-108.07157	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
MC-12 (lat/long): 32.72621/-108.05658	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
MC-13 (lat/long): 32.69267/-108.04256	☒ 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	
Channelization/roads	☐ yes ☒ no	
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ 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.
Existing point source discharge	☐ yes ☒ no	
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:		

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:

Three assessment units were identified within the Martin Canyon sub-watershed (Figure F-1 below). Starting at the upstream end, these assessment units are identified as MC-11, MC-12 and MC-13. The most upstream assessment unit (MC-11) was selected to represent the headwater portions of this sub-watershed. Assessment unit (MC-12) was located in a flatter gradient section with more prominent vegetation. The lower downstream assessment unit (MC-12) was selected to capture the entire basin drainage area.

As shown in the plan and profile plot presented below the basin slope progressively decreases, as expected, in the downstream direction. The upstream reaches of the Martin Canyon sub-watershed (MC-11) is a bedrock and cobble dominated stream channel (Photos MC11-1 and MC11-3) whereas the middle assessment unit (MC-12) is predominantly boulders, gravel, and sand (Photos MC12-1 and MC12-3) and the downstream assessment unit (MC-13) is a mixture of cobble and unconsolidated sand (Photos MC13-1 and MC13-3). The downstream assessment units reflect riverine processes. However, despite the influence of riverine processes within the lower assessment units seen throughout the Martin Canyon sub-watershed the channel is dominated by sand and cobble with very little difference between the “riparian” and upland vegetation. At all the assessment units we observed that rooted upland plants occurred, with varying degrees of density, throughout the stream channel. The weight of evidence clearly indicates that the Martin Canyon sub-watershed is an ephemeral channel that flows only in direct response to significant rainfall events.

Based on comments received from NMED, Chiricahua Leopard Frog (CLF) tadpoles have been historically documented in pools along portions of the Martin Canyon drainage, although no official USFWS habitat designation has been made for any portion of Martin Canyon, and CLF frogs have not been documented in any portion of Martin Canyon during more recent surveys (Jennings, 2007). Evidence of pools were not observed during the Level 1 field evaluation; however, based on comments received from NMED regarding historic observations of CLF in Martin Canyon, a formal classification or re-classification of Martin Canyon is not currently proposed

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:

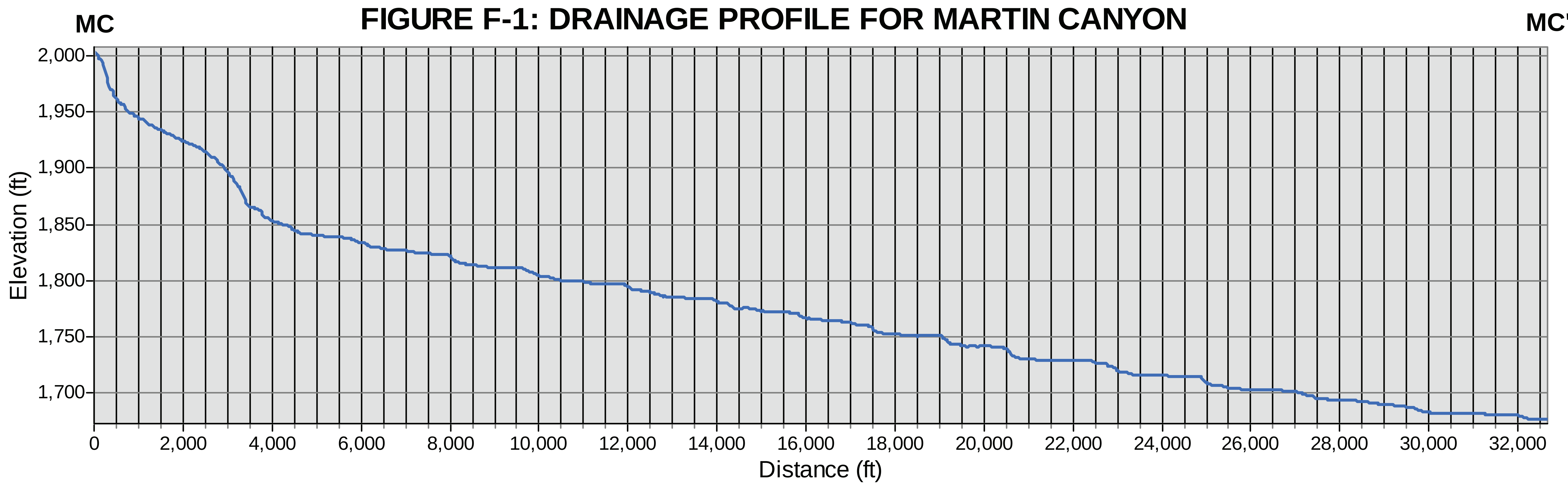
This UAA concludes that the stream reach identified above is ephemeral and that Clean Water Act Section 101(a)(2) aquatic life and recreational uses are neither existing nor attainable due to the factor identified in 40 CFR 131.10(g)(2): *natural, ephemeral, intermittent or low flow conditions or water 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: ______________
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: ______________

* Ephemeral classification is not proposed at this time in Martin Canyon because of potential Chiricahua Leopard Frog (CLF) breeding habitat based on comments received from NMED, as described in the additional comments section of this cover letter.

Q:\FCX\Chino\2011\MXD\HydrologyProtocol\FinalFigures\Profile_Martin_Canyon_C_v3.mxd

FIGURE F-1: DRAINAGE PROFILE FOR MARTIN CANYON



Martin Canyon Photographs (MC-11 Reach) – Total HP score of 2 (ephemeral stream)

MC11-1: Photographic reference for indicators 1.1 through 1.6. Indicator 1.6 scored as 1. Vegetation in the channel bed is consistently dispersed throughout the streambed between the boulders and where deposition of finer grained material has occurred. No water or biotic indicators of water observed along survey reach.

MC11-2: Photographic reference for indicator 1.5. Photograph of the bank and upland area. Indicator 1.5 scored as 1. Vegetation is similar in composition with some slight variation in density between the bank and the upland area.

Martin Canyon Photographs (MC-11 Reach) – Total HP score of 2 (ephemeral stream)

MC11-3: Photographic reference for indicators 1.5 and1.6. Photographs of the bank/upland area and rooted in channel vegetation. Vegetation is similar in composition between the bank and the upland area. Vegetation is consistently dispersed throughout the channel.

Martin Canyon Photographs (MC-12 Reach) – Total HP score of 2 (ephemeral stream)

MC12-1: Photographic reference for indicators 1.1 through 1.6. No water or biotic indicators of water observed along survey reach. Channel bed material is predominantly boulders and sand and gravel.

MC12-2: Photographic reference for indicator 1.6. Instream and bank vegetation shown. Indicator 1.6 scored as 1. Vegetation in channel is predominantly grasses and shrub species and are consistently dispersed throughout the channel.

Martin Canyon Photographs (MC-12 Reach) – Total HP score of 2 (ephemeral stream)

MC12-3: Photographic reference for indicator 1.5. Indicator 1.5 scored as 1. Upland vegetation is similar to what is observable along the banks and within the streambed (previous photograph). Density decrease slightly with distance from the stream but composition is similar.

Martin Canyon Photographs (MC-12 Reach) – Total HP score of 2 (ephemeral stream)

MC12-4: Photographic reference for indicators 1.5 and 1.6. Photographs of the bank/upland area and rooted in channel vegetation. Vegetation is similar in composition between the bank and the upland area. Vegetation is consistently dispersed throughout the channel.

Martin Canyon Photographs (MC-13 Reach) – Total HP score of 2 (ephemeral stream)

MC13-1: Photographic reference for indicator 1.1 through 1.6. Indicator 1.6 scored as 1. Rooted vegetation within the channel consists of grasses which are dispersed throughout the streambed. No water or biotic indicators of water observed along survey reach.

MC13-2: Photographic reference for indicator 1.5. Photograph of the overbank and upslope area. Indicator 1.5 scored as 1. Vegetation in the upslope area is similar to the vegetation along the banks and within the channel observed in the previous photograph. Minimal differences in density are observable. No distinct riparian zone exists.

Martin Canyon Photographs (MC-13 Reach) – Total HP score of 2 (ephemeral stream)

MC13-3: Photographic reference for indicators 1.5 and 1.6. Photographs of the bank/upland area and rooted in channel vegetation. Vegetation is similar in composition between the bank and the upland area. Vegetation is consistently dispersed throughout the channel.

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

Date: 6/14/2011	**Stream Name: Martin Canyon**	**Latitude: N 32.75572**
Evaluator(s): Fulton/Donohoe	**Site ID: MC-11**	**Longitude: W 108.07136**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** **Martin Canyon Drainage (MC-11)**	**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** ___ **YES** _X__ **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)	**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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
MC11-1	View downstream	
MC11-2	View of upslope right bank	
MC11-3	View of in stream rooted plants and overbank/upland areas.	

NOTES:

The channel was predominately bedrock and dry pools.
Vegetation was considered slightly more dense along the channel but primarily composed of upland species including juniper, agave, and grasses.
Scoring 1.6 – vegetation consistently spread out throughout dry pools but not on bedrock
Scoring 1.5 – didn't observe any hydrophilic plant species in or near (around) stream channel just
upland species at greater densities.

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

Date: 6/14/2011	**Stream Name: Martin Canyon**	**Latitude: N 32.72621**
Evaluator(s): Fulton/Donohoe	**Site ID: MC-12**	**Longitude: W 108.05658**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** **Martin Canyon Drainage (MC-12)**	**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)	**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
MC12-1	View downstream extent	
MC12-2	View of in stream vegetation	
MC12-3	View of upslope right bank	
MC12-4	View of in stream rooted plants and overbank/upland areas.	

NOTES:

Scoring metric 1.5 – Observed trees in great densities along stream corridor. The only compositional
difference we saw was a willow going in the channel but not in upland area. Therefore, we did not
consider that a dramatic compositional difference.

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

Date: 6/14/2011	**Stream Name: Martin Canyon**	**Latitude: N 32.69267**
Evaluator(s): Fulton/Donohoe	**Site ID: MC-13**	**Longitude: W 108.04256**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** **Martin Canyon Drainage (MC-13)**	**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** _ __ **YES** _X__ **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)	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.

<table>
<tr><th rowspan="2">LEVEL 1 INDICATORS</th><th colspan="12">STREAM CONDITION</th></tr>
<tr><th colspan="3">Strong</th><th colspan="3">Moderate</th><th colspan="3">Weak</th><th colspan="3">Poor</th></tr>
<tr><td rowspan="2">1.7. Sinuosity</td><td colspan="3">Ratio > 1.4. Stream has numerous, closely-spaced bends, few straight sections.</td><td colspan="3">Ratio < 1.4. Stream has good sinuosity with some straight sections.</td><td colspan="3">Ratio < 1.2. Stream has very few bends and mostly straight sections.</td><td colspan="3">Ratio = 1.0. Stream is completely straight with no bends.</td></tr>
<tr><td colspan="3">3</td><td colspan="3">2</td><td colspan="3">1</td><td colspan="3">0</td></tr>
<tr><td rowspan="2">1.8. Floodplain and Channel Dimensions</td><td colspan="4">Ratio > 2.5. Stream is minimally confined with a wide, active floodplain.</td><td colspan="4">Ratio between 1.2 and 2.5. Stream is moderately confined. Floodplain is present, but may only be active during larger floods.</td><td colspan="4">Ratio < 1.2. Stream is incised with a noticeably confined channel. Floodplain is narrow or absent and typically disconnected from the channel.</td></tr>
<tr><td colspan="4">3</td><td colspan="4">1.5</td><td colspan="4">0</td></tr>
<tr><td rowspan="2">1.9. In-Channel Structure: Riffle-Pool Sequence</td><td colspan="3">Demonstrated by a frequent number of riffles followed by pools along the entire reach. There is an obvious transition between riffles and pools.</td><td colspan="3">Represented by a less frequent number of riffles and pools. Distinguishing the transition between riffles and pools is difficult.</td><td colspan="3">Stream shows some flow but mostly has areas of pools <u>or</u> of riffles.</td><td colspan="3">There is no sequence exhibited.</td></tr>
<tr><td colspan="3">3</td><td colspan="3">2</td><td colspan="3">1</td><td colspan="3">0</td></tr>
<tr><td colspan="10">SUBTOTAL (#1.1 – #1.9)</td><td colspan="3">2</td></tr>
<tr><td colspan="13">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.</td></tr>
<tr><td rowspan="2">1.10. Particle Size or Stream Substrate Sorting</td><td colspan="4">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.</td><td colspan="4">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).</td><td colspan="4">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.</td></tr>
<tr><td colspan="4">3</td><td colspan="4">1.5</td><td colspan="4">0</td></tr>
<tr><td rowspan="2">1.11. Hydric Soils</td><td colspan="6">Hydric soils are found within the study reach.</td><td colspan="6">Hydric soils are <u>not</u> found within the study reach.</td></tr>
<tr><td colspan="6">Present = 3</td><td colspan="6">Absent = 0</td></tr>
<tr><td rowspan="2">1.12. Sediment on Plants and Debris</td><td colspan="3">Sediment found readily on plants and debris within the stream channel, on the streambank, and within the floodplain throughout the length of the stream.</td><td colspan="3">Sediment found on plants or debris within the stream channel although it is not prevalent along the stream. Mostly accumulating in pools.</td><td colspan="3">Sediment is isolated in small amounts along the stream.</td><td colspan="3">No sediment is present on plants or debris.</td></tr>
<tr><td colspan="3">1.5</td><td colspan="3">1</td><td colspan="3">0.5</td><td colspan="3">0</td></tr>
<tr><td colspan="10">TOTAL POINTS (#1.1 – #1.12)</td><td colspan="3">2</td></tr>
</table>

<table>
<tr><td colspan="3">SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> record score below and tally with previous score to compute TOTAL.</td></tr>
<tr><td rowspan="2">1.13. Seeps and Springs</td><td>Seeps and springs are found within the study reach.</td><td>Seeps and springs are <u>not</u> found within the study reach.</td></tr>
<tr><td>Present = 1.5</td><td>Absent = 0</td></tr>
<tr><td rowspan="2">1.14. Iron Oxidizing Bacteria/Fungi</td><td>Iron-oxidizing bacteria and/or fungi are found within the study reach.</td><td>Iron-oxidizing bacteria and/or fungi are <u>not</u> found within the study reach.</td></tr>
<tr><td>Present = 1.5</td><td>Absent = 0</td></tr>
<tr><td colspan="2">TOTAL plus SUPPLEMENTAL POINTS (#1.1 – #1.14)</td><td>2</td></tr>
</table>

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
MC13-1	View downstream	
MC13-2	View upslope right bank	
MC13-3	View of in stream rooted plants and overbank/upland areas.	

NOTES:

Left overbank was primarily a flat open valley. The right overbank had a small bedrock outcropping.
Average substrate throughout sample reach was primarily cobble 8%, 15% unconsolidated dirt, and 5% boulders. The 15% unconsolidated dirt was entirely dry after digging a few inches down and the texture was sandy.
Scoring metric 1.5 – Observed trees in great densities along stream corridor. The only compositional difference we saw was a willow going in the channel but not in upland area. Therefore we did not consider that a dramatic compositional difference.

ARCADIS

Appendix G

Level 1 Hydrology Protocol Results
for Rustler Canyon Drainage

Presently, an ephemeral classification is not supported for the Rustler Canyon drainages due to the presence of water and associated aquatic life uses observed during the Level 1 field evaluations.

Stream Name: Rustler Canyon-Drainage

Basin: Mimbres

Upstream lat/long: 32.75136/-108.02737

Downstream lat/long: 32.74339/-108.0093

Assessment Unit ID: RC-14A, RC-14B, RC-15

Hydrology Protocol Results		
RC-14A (lat/long): 32.75136/-108.02737	Intermittent	Final score: 12.5, see field form and photos for additional information
RC-14B (lat/long): 32.74923/-108.02615	Intermittent	Final score: 15.5, see field form and photos for additional information
RC-15 (lat/long): 32.74339/-108.0093	Intermittent	Final score: 12, see field form and photos for additional information

Macroinvertebrates: RC14A (snails, striders) and RC14B (beetles, boatman, and striders)

Additional Comments:

Three assessment units were identified along the mainstem of Rustler Canyon (RC-14A, RC-14B and RC15) (Figure G-1) and two assessment units were identified within the West Branch of Rustler Canyon (RC2-22 and RC2-22B) (Figure G-2).

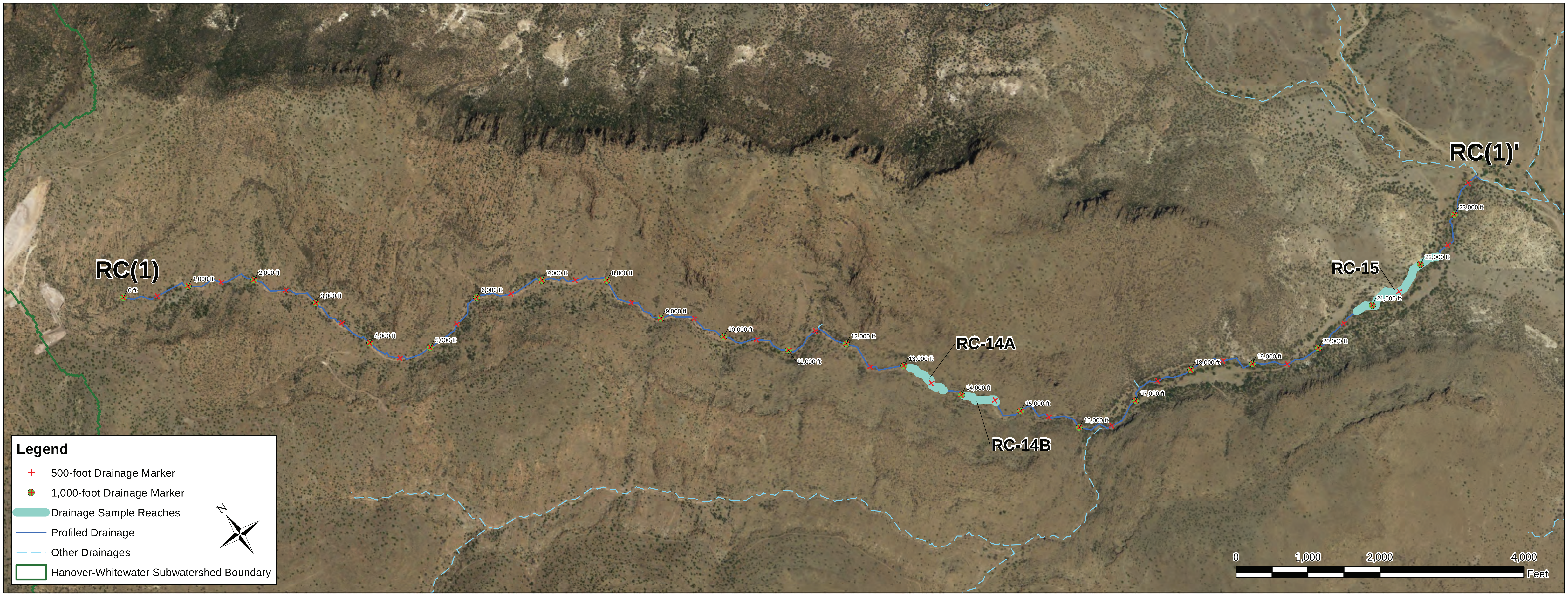
Starting at the upstream end within Rustler Canyon, these assessment units are identified as RC-14A, RC-14B and RC 15. The most upstream assessment unit (RC-14A) was selected to represent the headwater portions of Rustler Canyon. Assessment unit RC-14B was located up gradient from the confluence West Rustler and Rustler Canyon and selected to capture an observed spring and a series of large pools near this location. The lower most assessment unit within Rustler Canyon (RC-15) is located near the confluence with Lampbright Draw and is representative of the hydrologic processes within the entire drainage basin.

As shown in the plan and profile plots for Rustler Canyon (Figure G-1 and G-2) the basin slope progressively decreases, as expected, in the downstream direction. Similarly, the degree of valley confinement decreases in the downstream direction. These trends in channel slope and confinement are typical and represent the relative dominance of colluvial versus alluvial channel forming processes and are reflected in the composition of the channel bed itself. That is, the upstream reaches of Rustler Canyon (RC-14A and RC-14B) are bedrock and cobble dominated stream channels indicative hill slope processes (Photos RC14A-1 and RC14B-4) whereas the downstream assessment unit (RC-15) is a mixture of sand/gravel/cobble (Photo RC15-1) and reflect the dominance of fluvial processes. Filamentous algae was observed within all three Rustler Canyon assessment units and benthic macro-invertebrates were observed near the pools of standing water near the pools of standing water within assessment units RC-14A and RC-14B, see Photos RC14A-5 and RC14B-5, respectively. Due to the lack of flowing water, or even standing water, throughout the assessment units and the lack of fish all three assessment units within Rustler Canyon can be classified as intermittent. However, upstream of assessment unit RC-15 but downstream of the confluence with West Branch Rustler Canyon we did identify a single pool of standing water that contained fish. The actual score of assessment unit RC-15 was 12, if the scoring criteria were adjusted to account for the presence of a single pool (i.e., Indicator 1.1 – Water in Channel equal to 2 and Indicator 1.2 – Fish equal to 1) the total score of assessment unit RC-15 would increase to 15 which is still indicative of an intermittent stream channel. The weight of evidence across the three assessment units clearly indicate that Rustler Canyon is correctly classified as an intermittent stream channel.

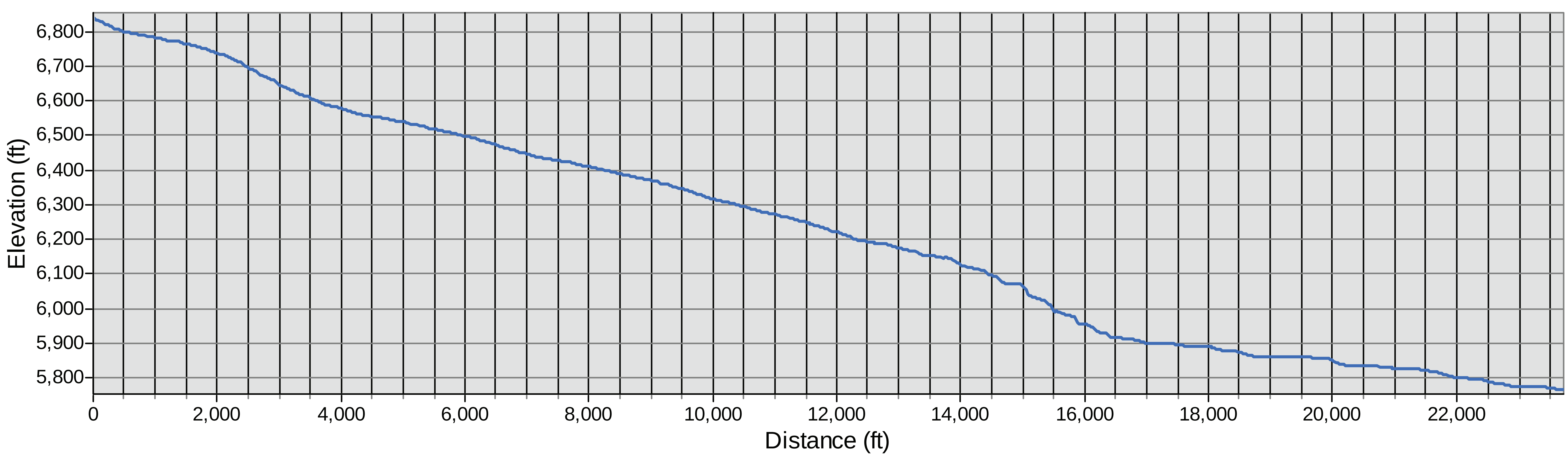
Both assessment units within West Branch Rustler Canyon (RC-22 and RC-22B) represent bedrock controlled stream channels (Photos RC2-22-3 and RC2-22B-4, respectively); however, the location of the downstream assessment unit (RC-22B) was selected to include a number of large standing pools of water (Photos RC2-22B-5 and RC2-22B-6). Based on the presence of standing water and the observed benthic macro-invertebrates within the downstream assessment unit (RC-22B) (Photo RC2-22B-7) the West Branch Rustler Canyon hydrologic classification is indeterminate, assumed to be intermittent until further study indicates ephemeral.

Attachments: Map and photos, hydrology protocol field sheets for all locations, and additional sites and/or documentation (drainage profile and plan view)

Q:\FCX\Chino\2011\MXD\HydrologyProtocol\FinalFigures\Profile_Rustler_Canyon1_C_v2.mxd



RC(1) **FIGURE G-1: DRAINAGE PROFILE FOR RUSTLER CANYON DRAINAGE 1** RC(1)'



Rustler Canyon Photographs (RC-14A Reach) – Total HP score of 12.5 (intermittent stream)

RC14A-1: Photographic reference for indicators 1.1 through 1.6 and 1.9. Water and biotic indicators of water were observed along the reach (see subsequent photos). Channel bed is predominantly bedrock. Note the small dry pool area located in the center right of photograph.

Indicator 1.9 scored as 1 - channel is partially confined with an inactive floodplain.

Rustler Canyon Photographs (RC-14A Reach) – Total HP score of 12.5 (intermittent stream)

RC14A-2: Photographic reference for indicator 1.5. Indicator 1.5 scored as 1. Vegetation along the reach is compositionally consistent between the bank and the upland area with some differences in density observed. Distinct riparian zone not present.

RC14A-3: Photographic reference for indicator 1.6. Indicator 1.6 scored as 2. A few rooted grasses are present in the streambed but are generally not present because of the bedrock present.

Rustler Canyon Photographs (RC-14A Reach) – Total HP score of 12.5 (intermittent stream)

RC14A-4: Channel is primarily dry with small pools and standing water observed along the stream stretch. Indicator 1.1 scored as 2. No fish were present in the pools but benthic macroinvertebrates and filamentous algae/periphyton were observed after extensive searching. Both indicators 1.3 and 1.4 scored as 1. Seeps were observed to feed the pools; however, the pools are isolated.

Rustler Canyon Photographs (RC-14A Reach) – Total HP score of 12.5 (intermittent stream)

RC14A-5: Channel is primarily dry with small pools and standing water observed along the stream stretch. Filamentous algae/periphyton were observed after extensive searching**.**

Rustler Canyon Photographs (RC-14B Reach) – Total HP score of 15.5 (intermittent stream)

RC14B-1: Photographic reference for indicators 1.1 through 1.6 and 1.9. Biotic indicators of water and water were observed along the reach (see subsequent photos). Multiple isolated pools present along the stretch and springs/seeps observed. Biotic indicators of water found with little difficulty.

Indicator 1.5 scored as 2 - distinct riparian corridor present for parts of the stretch near pools as bank and upland vegetation is noticeably lush.

Indicator 1.9 scored as 1 – pool sequences likely but difficult to discern. Stream morphology is dominated by bedrock features.

Rustler Canyon Photographs (RC-14B Reach) – Total HP score of 15.5 (intermittent stream)

RC14B-2: Photographic reference for indicator 1.5. Photograph is of channel, bank, and upland area. Indicator 1.5 scored as 2 - distinct riparian zone not evident along portions of stream where pools are not present. Area shown in photograph is noticeably lacking riparian vegetation. Indicates that water is only persistent in areas where pools are maintained by bedrock springs.

RC14B-3: Photographic reference for indicator 1.6. Indicator 1.6 scored as 2. Rooted vegetation present in the streambed, but limited by bedrock rather than persistence of flow.

Rustler Canyon Photographs (RC-14B Reach) – Total HP score of 15.5 (intermittent stream)

RC14B-4: Photographic reference of representative channel bottom characteristics.

RC14B-5: Photographic reference of algae and benthic macro-invertebrates located near standing water.

Rustler Canyon Photographs (RC-14B Reach) – Total HP score of 15.5 (intermittent stream)

RC14B-6: Photographic reference for indicators 1.1 through 1.6. Filamentous algae/periphyton was observed along the reach. Multiple isolated pools present along the stretch. Biotic indicators of water found with little difficulty.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)

RC15-1: Photographic reference of representative channel bottom characteristics.

RC15-2: Photographic reference for indicators 1.1 through 1.6. No water observed over survey reach. Indicator 1.6 scored as 2 - few rooted plants along streambed. Vegetation limited by streambed material which is primarily course grain material and boulders.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)

RC15-3: Photographic reference for indicator 1.4. Indicator 1.4 scored as 1. Algae is present in stream but is very isolated.

RC15-4: Photographic reference for indicator 1.5. Photograph of stream bank and upland area. Indicator 1.5 scored as 2. Distinct riparian corridor exists over portions of the reach but are not consistent over the entirety of the reach.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)

RC15-5: Photographic reference for indicator 1.8. Photograph of the general proximity of the stream cross-section transect. Indicator 1.8 scored as 1.5. Stream is moderately confined with an inactive flood plain based on vegetative growth.

RC15-6: Photographic reference for indicator 1.9. Relatively deep pool shown in photograph. Indicator 1.9 scored as 1. Some pools are observable over the extent of the survey reach, but a riffle pool sequence is not evident.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)

RC15-7: Photographic reference for indicator 1.10. Photograph is example of soil in the floodplain. Indicator 1.10 scored as 3. Distinct differences observed between soil outside of the streambed and the soil within the streambed. Streambed distribution of substrate material evident where finer material drops in pools and areas of lower velocity flow, while other portions of the steam bed are courser materials.

Rustler Canyon Photographs (RC-15 Reach) – Total HP score of 12 (intermittent stream)

RC15-8: Photographic reference for indicators 1.5 and 1.6. Photographs of the bank/upland area and rooted in channel vegetation. Distinct riparian corridor exists over portions of the reach. Vegetation is inconsistently dispersed throughout the channel.

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

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.75136**
Evaluator(s): Barry	**Site ID: RC-14A**	**Longitude: W 108.02737**
TOTAL POINTS: 12.5 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: Rustler Canyon Drainage (RC-14A)**	**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** __ YES _X _ 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)	**7**

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**

LEVEL 1 INDICATORS	Strong	Moderate	Weak / Poor
1.8. Floodplain and Channel Dimensions (N/A)	**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**

LEVEL 1 INDICATORS	Strong	Moderate	Weak	Poor
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 <u>or</u> of riffles.	There is no sequence exhibited.
	3	**2**	**1**	**0**
			SUBTOTAL (#1.1 – #1.9)	**8**

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.

LEVEL 1 INDICATORS	Strong	Moderate	Weak / Poor
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**

LEVEL 1 INDICATORS	Present	Absent
1.11. Hydric Soils	Hydric soils are found within the study reach.	Hydric soils are <u>not</u> found within the study reach.
	Present = 3	**Absent = 0**

LEVEL 1 INDICATORS	Strong	Moderate	Weak	Poor
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)	**11**

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

SUPPLEMENTAL INDICATORS	Present	Absent
1.13. Seeps and Springs	Seeps and springs are found within the study reach.	Seeps and springs are <u>not</u> 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 <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	**12.5**

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
RC14A-1	**View from upstream extent of assessment unit looking downstream**	
RC14A-2	**View of vegetation along the reach is compositionally consistent between the bank and the upland area with some differences in density observed.**	
RC14A-3	**View of in channel vegetation**	
RC14A-4	**View of primarily dry channels with small pools and standing water observed along the stream stretch.**	
RC14A-5	**View of primarily dry channel with small pools and standing water observed along the stream stretch.**	

NOTES:

Based on further review of field notes and site photograph the scores identified on the field forms were revised. This generally resulted in higher total scores.
It was determined, after visiting a number of bedrock and boulder formed channels, that the application and evaluation of the "entrenchment ratio" was inappropriate at such locations. In channels flowing through material that is transport by the river itself the channel geometry can be viewed as self-formed. That is, sediment transport in alluvial rivers builds and maintains a dynamically stable channel geometry and floodplain that reflects both the quantity and timing of water and the volume and caliber of sediment delivered from the watershed (Leopold et al. 1964; Emmett and Wolman 2001). Accordingly, Leopold (1994) describes alluvial rivers as the architect of their own geometry. In these alluvial situations the measurement of an "entrenchment ratio" is reflective of the relative supply and magnitude of the sediments from upstream versus the capacity of the channel to transport that sediment.
However, in many situations observed during the application of the Hydrology Protocol, the channel was not an alluvial river and the bed and banks were not formed of sediments supplied and transport under the current hydrologic environment but rather were composed of bedrock and large boulders. In bedrock and boulder formed channels where it was necessary to proceed beyond Indicators 1.1 to 1.6 the "entrenchment ratio" indicator was not included in the total score.

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

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.74923**
Evaluator(s): Barry	**Site ID: RC-14B**	**Longitude: W 108.02615**
TOTAL POINTS: 15.5 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: Rustler Canyon Drainage (RC-14B)**	**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** __ YES _X _ 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)	**10**

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 (N/A)	**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 <u>or</u> of riffles.	There is no sequence exhibited.
	3	**2**	**1**	**0**
			SUBTOTAL (#1.1 – #1.9)	**11**

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 <u>not</u> 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)	**14**

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)		**15.5**

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
RC14B-1	View of middle of assessment unit looking downstream	
RC14B-2	View of channel, bank, and upland area.	
RC14B-3	View of rooted vegetation present in the streambed, but limited by bedrock rather than persistence of flow.	
RC14B-4	View of representative channel bottom characteristics	
RC14B-5	View of algae and benthic macro-invertebrates located near standing water.	
RC14B-6	View of Filamentous algae/periphyton along the reach. Multiple isolated pools present along the stretch.	

NOTES:

Based on further review of field notes and site photograph the scores identified on the field forms were revised. This generally resulted in higher total scores.
It was determined, after visiting a number of bedrock and boulder formed channels, that the application and evaluation of the “entrenchment ratio” was inappropriate at such locations. In channels flowing through material that is transport by the river itself the channel geometry can be viewed as self-formed. That is, sediment transport in alluvial rivers builds and maintains a dynamically stable channel geometry and floodplain that reflects both the quantity and timing of water and the volume and caliber of sediment delivered from the watershed (Leopold et al. 1964; Emmett and Wolman 2001). Accordingly, Leopold (1994) describes alluvial rivers as the architect of their own geometry. In these alluvial situations the measurement of an “entrenchment ratio” is reflective of the relative supply and magnitude of the sediments from upstream versus the capacity of the channel to transport that sediment.
However, in many situations observed during the application of the Hydrology Protocol, the channel was not an alluvial river and the bed and banks were not formed of sediments supplied and transport under the current hydrologic environment but rather were composed of bedrock and large boulders. In bedrock and boulder formed channels where it was necessary to proceed beyond Indicators 1.1 to 1.6 the “entrenchment ratio” indicator was not included in the total score.

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

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.74329**
Evaluator(s): Barry	**Site ID: RC-15**	**Longitude: W 108.02727**
TOTAL POINTS: 12 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: Rustler Canyon Drainage (RC-15)**	**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** __ **YES** _**X** _ **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)	**5**

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 <u>or</u> of riffles.	There is no sequence exhibited.
	3	2	1	0
SUBTOTAL (#1.1 – #1.9)				8.5

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 <u>not</u> 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)				12

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)		12

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
RC15-1	View of representative channel bottom characteristics	
RC15-2	View of few rooted plants along streambed. Vegetation limited by streambed material which is primarily course grain material and boulders.	
RC15-3	View of algae in stream but is very isolated	
RC15-4	View of stream bank and upland area	
RC15-5	View of general proximity of the stream cross-section transect	
RC15-6	View of Relatively deep pool	
RC15-7	View of soil in the floodplain.	
RC15-8	View of bank/upland area and rooted in channel vegetation.	

NOTES:

Presently, an ephemeral classification is not supported for the Rustler Canyon drainages due to the presence of water and associated aquatic life uses observed during the Level 1 field evaluations.

Stream Name: Rustler Canyon 2-Drainage

Basin: Mimbres

Upstream lat/long: 32.74936/-108.03393

Downstream lat/long: 32.74339/-108.0093

Assessment Unit ID: RC2-22, RC2-22B

Hydrology Protocol Results		
RC2-22 (lat/long): 32.74936/-108.03393	Ephemeral	Final score: 2, see field form and photos for additional information
RC2-22B (lat/long): 32.74329/-108.02727	Intermittent	Final score: 9, see field form and photos for additional information

Macroinvertebrates: RC22B (snails)

Additional Comments:

Three assessment units were identified along the mainstem of Rustler Canyon (RC-14A, RC-14B and RC15) (Figure G-1) and two assessment units were identified within the West Branch of Rustler Canyon (RC2-22 and RC2-22B) (Figure G-2).

Starting at the upstream end within Rustler Canyon, these assessment units are identified as RC-14A, RC-14B and RC 15. The most upstream assessment unit (RC-14A) was selected to represent the headwater portions of Rustler Canyon. Assessment unit RC-14B was located up gradient from the confluence West Rustler and Rustler Canyon and selected to capture an observed spring and a series of large pools near this location. The lower most assessment unit within Rustler Canyon (RC-15) is located near the confluence with Lampbright Draw and is representative of the hydrologic processes within the entire drainage basin.

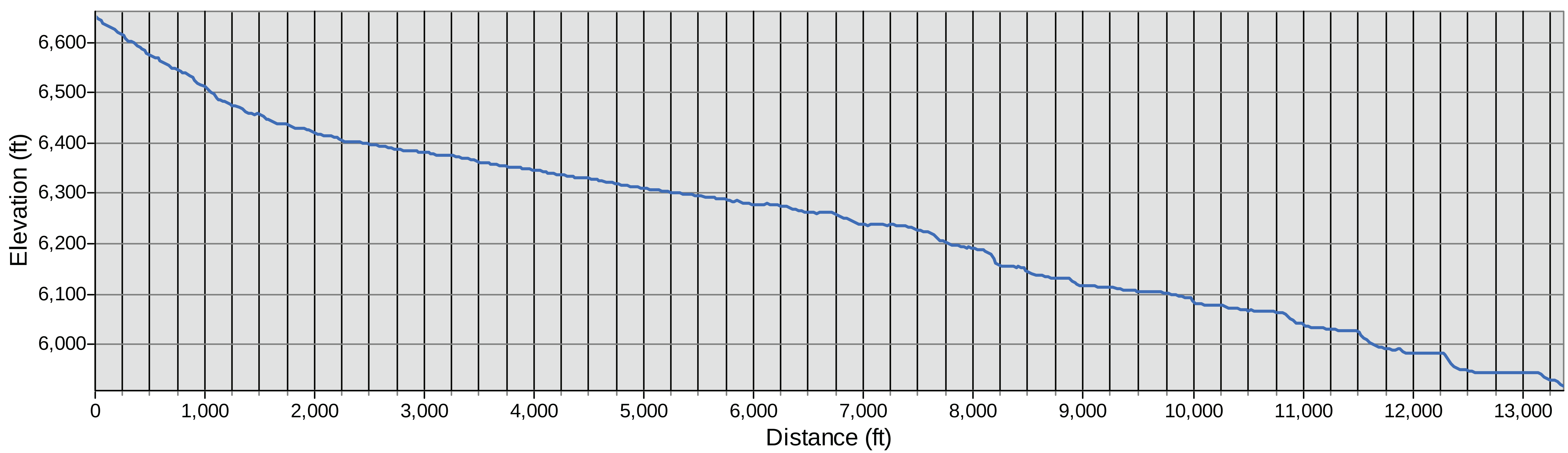
As shown in the plan and profile plots for Rustler Canyon (Figure G-1 and G-2) the basin slope progressively decreases, as expected, in the downstream direction. Similarly, the degree of valley confinement decreases in the downstream direction. These trends in channel slope and confinement are typical and represent the relative dominance of colluvial versus alluvial channel forming processes and are reflected in the composition of the channel bed itself. That is, the upstream reaches of Rustler Canyon (RC-14A and RC-14B) are bedrock and cobble dominated stream channels indicative hill slope processes (Photos RC14A-1 and RC14B-4) whereas the downstream assessment unit (RC-15) is a mixture of sand/gravel/cobble (Photo RC15-1) and reflect the dominance of fluvial processes. Filamentous algae was observed within all three Rustler Canyon assessment units and benthic macro-invertebrates were observed near the pools of standing water near the pools of standing water within assessment units RC-14A and RC-14B, see Photos RC14A-5 and RC14B-5, respectively. Due to the lack of flowing water, or even standing water, throughout the assessment units and the lack of fish all three assessment units within Rustler Canyon can be classified as intermittent. However, upstream of assessment unit RC-15 but downstream of the confluence with West Branch Rustler Canyon we did identify a single pool of standing water that contained fish. The actual score of assessment unit RC-15 was 12, if the scoring criteria were adjusted to account for the presence of a single pool (i.e., Indicator 1.1 – Water in Channel equal to 2 and Indicator 1.2 – Fish equal to 1) the total score of assessment unit RC-15 would increase to 15 which is still indicative of an intermittent stream channel. The weight of evidence across the three assessment units clearly indicate that Rustler Canyon is correctly classified as an intermittent stream channel.

Both assessment units within West Branch Rustler Canyon (RC-22 and RC-22B) represent bedrock controlled stream channels (Photos RC2-22-3 and RC2-22B-4, respectively); however, the location of the downstream assessment unit (RC-22B) was selected to include a number of large standing pools of water (Photos RC2-22B-5 and RC2-22B-6). Based on the presence of standing water and the observed benthic macro-invertebrates within the downstream assessment unit (RC-22B) (Photo RC2-22B-7) the West Branch Rustler Canyon hydrologic classification is indeterminate, assumed to be intermittent until further study indicates ephemeral.

Attachments: Map and photos, hydrology protocol field sheets for all locations, and additional sites and/or documentation (drainage profile and plan view)

Q:\FCX\Chino\2011\MXD\HydrologyProtocol\FinalFigures\Profile_Rustler_Canyon2_C_v3.mxd

RC(2) **FIGURE G-2: DRAINAGE PROFILE FOR RUSTLER CANYON DRAINAGE 2** RC(2)'



Rustler Canyon Photographs (RC2-22 Reach) – Total HP score of 2 (ephemeral stream)

RC2-22-1: Photographic reference for indicators 1.1 through 1.6. Indicator 1.6 scored as 1 – rooted upland plants consistently dispersed throughout streambed. Channel bed is primarily gravel and boulders. No water or biotic indicators of water observed along survey reach.

RC2-22-2: Photographic reference for indicator 1.5. Indicator 1.5 scored as 1. Vegetation along banks of the reach is similar in composition as vegetation in the upland areas. Some density differences were evident.

Rustler Canyon Photographs (RC2-22 Reach) – Total HP score of 2 (ephemeral stream)

RC2-22-3: Photographic reference of bedrock controlled channel.

Rustler Canyon Photographs (RC2-22 Reach) – Total HP score of 2 (ephemeral stream)

RC2-22-4: Photographic reference for indicators 1.5 and 1.6. Photographs of the bank/upland area and rooted in channel vegetation. Vegetation is similar in composition between the bank and the upland area. Vegetation is consistently dispersed throughout the channel.

Rustler Canyon Photographs (RC2-22B Reach) – Total HP score of 9 (intermittent stream)

RC2-22B-1: Photographic reference for indicator 1.1 through 1.5. Small isolated pools are located along the sample reach. Seeps or springs were not observed along the reach. Biotic indicators of persistent water located with little effort but are not consistent throughout the reach. Indicators 1.1, 1.3, and 1.4 scored as 2.

RC2-22B-2: Photographic reference for indicator 1.6. Streambed and geomorphology is dominated by bedrock. Indicator 1.6 scored as 2. Rooted vegetation is present along some portions of the stream reach, but is inconsistent.

Rustler Canyon Photographs (RC2-22B Reach) – Total HP score of 9 (intermittent stream)

RC2-22B-3: Photographic reference for indicator 1.5. Indicator 1.5 scored as 0 - compositional and density differences in vegetation between stream bank and upland area not evident. No distinct riparian zone present.

RC2-22B-4: Photographic reference of bedrock controlled channel.

Rustler Canyon Photographs (RC2-22B Reach) – Total HP score of 9 (intermittent stream)

RC2-22B-5: Photographic reference of standing pool within downstream West Branch Rustler Canyon assessment unit.

RC2-22B-6: Photographic reference of standing pool within downstream West Branch Rustler Canyon assessment unit.

Rustler Canyon Photographs (RC2-22B Reach) – Total HP score of 9 (intermittent stream)

RC2-22B-7: Photographic reference of algae and benthic macro-invertebrates within downstream West Branch Rustler Canyon assessment unit.

RC2-22B-8: Photographic reference for indicators 1.1 through 1.6. Filamentous algae/periphyton was observed along the reach. Multiple isolated pools present along the stretch. Biotic indicators of water found with little difficulty. Vegetation is inconsistently dispersed throughout the channel.

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

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.74936**
Evaluator(s): Fulton	**Site ID: RC2-22**	**Longitude: W 108.03393**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit:** **Rustler Canyon Drainage (RC2-22)**	**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** ___ **YES** _ **X**__ **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)	**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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
RC2-22-1	**View of rooted upland plants consistently dispersed throughout streambed.**	
RC2-22-2	**View of vegetation along banks of the reach is similar in composition as vegetation in the upland areas.**	
RC2-22-3	**View of bedrock controlled channel**	
RC2-22-4	**View of bank/upland area and rooted in channel vegetation. Vegetation is similar in composition between the bank and the upland area. Vegetation is consistently dispersed throughout the channel.**	

NOTES:

Based on further review of field notes and site photograph the scores identified on the field forms were revised. This generally resulted in higher total scores.

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

Date: 6/14/2011	**Stream Name: Rustler Canyon**	**Latitude: N 32.74329**
Evaluator(s): Barry	**Site ID: RC2-22B**	**Longitude: W 108.02727**
TOTAL POINTS: 9 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: Rustler Canyon Drainage (RC2-22B)**	**Drought Index (12-mo. SPI Value): -1.1**

WEATHER CONDITIONS	**NOW:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _ __ clear/sunny	**PAST 48 HOURS:** ___ storm (heavy rain) ___ rain (steady rain) ___ showers (intermittent) ___ %cloud cover _ __ 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 __ YES _X_ 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)	**8**

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 (N/A)	**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 <u>or</u> of riffles.	There is no sequence exhibited.
	3	**2**	**1**	**0**
SUBTOTAL (#1.1 – #1.9)				**9**
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 <u>not</u> 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)				**9**

SUPPLEMENTAL INDICATORS: **The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)		**9**

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
RC2-22B-1	**View of small isolated pools are located along the sample reach**	
RC2-22B-2	**View of rooted vegetation is present along some portions of the stream reach, but is inconsistent.**	
RC2-22B-3	**View of compositional and density differences in vegetation between stream bank and upland area not evident.**	
RC2-22B-4	**View of bedrock controlled channel.**	
RC2-22B-5	**View of standing pool within downstream West Branch Rustler Canyon assessment unit.**	
RC2-22B-6	**View of standing pool within downstream West Branch Rustler Canyon assessment unit.**	
RC2-22B-7	**View of algae and benthic macro-invertebrates within downstream West Branch Rustler Canyon assessment unit.**	
RC2-22B-8	**View of Filamentous algae/periphyton was observed along the reach. Multiple isolated pools present along the stretch. Biotic indicators of water found with little difficulty.**	

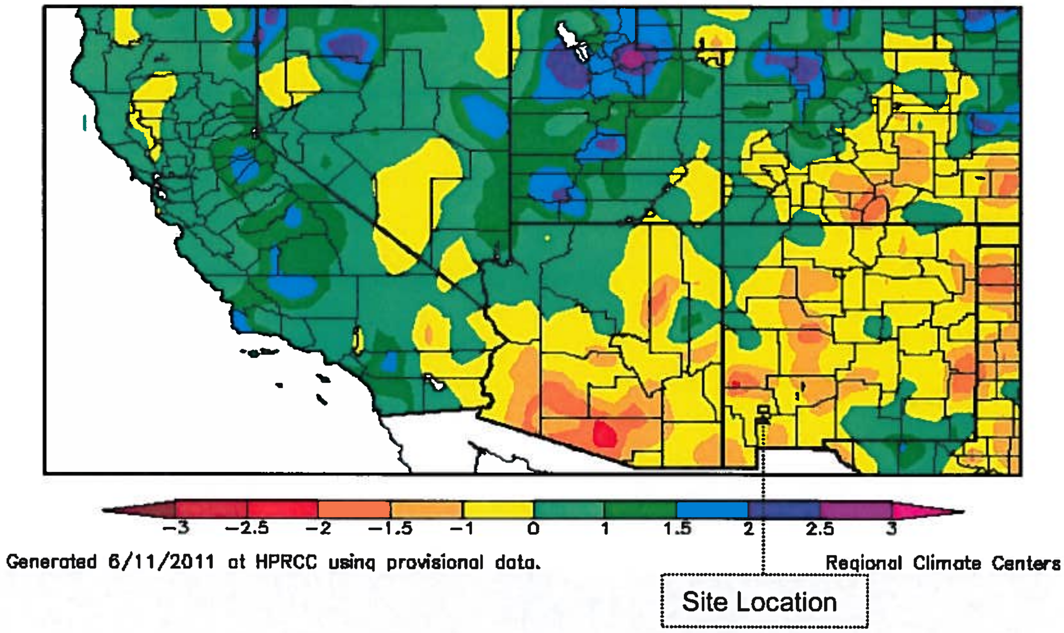
NOTES:

Based on further review of field notes and site photograph the scores identified on the field forms were revised. This generally resulted in higher total scores.
It was determined, after visiting a number of bedrock and boulder formed channels, that the application and evaluation of the "entrenchment ratio" was inappropriate at such locations. In channels flowing through material that is transport by the river itself the channel geometry can be viewed as self-formed. That is, sediment transport in alluvial rivers builds and maintains a dynamically stable channel geometry and floodplain that reflects both the quantity and timing of water and the volume and caliber of sediment delivered from the watershed (Leopold et al. 1964; Emmett and Wolman 2001). Accordingly, Leopold (1994) describes alluvial rivers as the architect of their own geometry. In these alluvial situations the measurement of an "entrenchment ratio" is reflective of the relative supply and magnitude of the sediments from upstream versus the capacity of the channel to transport that sediment.
However, in many situations observed during the application of the Hydrology Protocol, the channel was not an alluvial river and the bed and banks were not formed of sediments supplied and transport under the current hydrologic environment but rather were composed of bedrock and large boulders. In bedrock and boulder formed channels where it was necessary to proceed beyond Indicators 1.1 to 1.6 the "entrenchment ratio" indicator was not included in the total score.

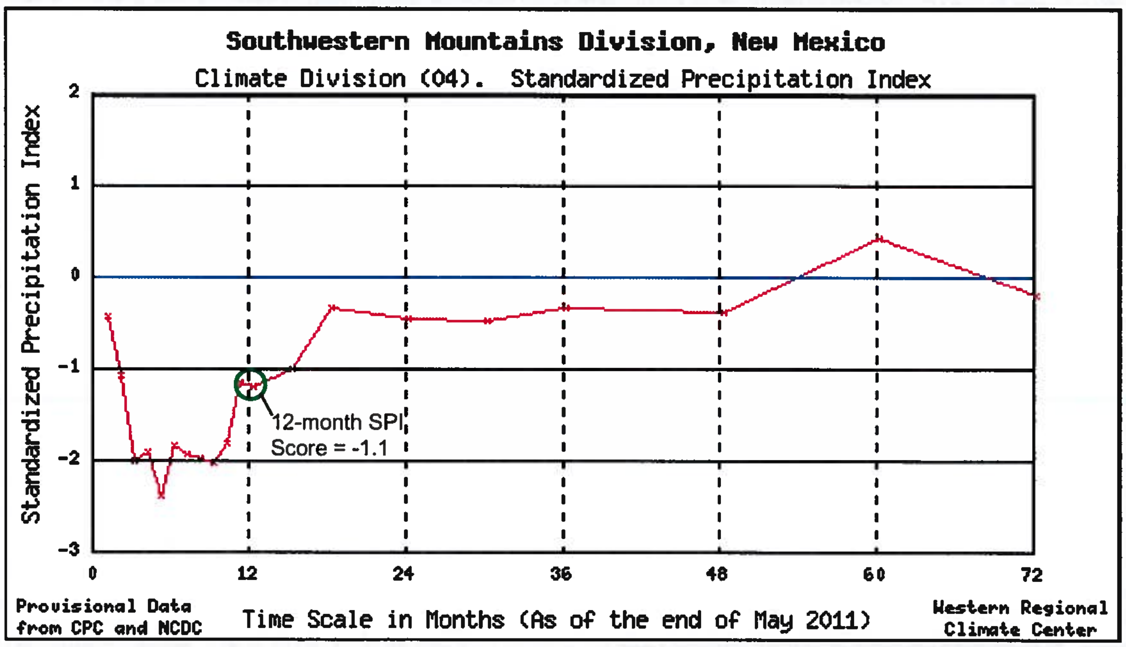
ARCADIS

Figures

12-Month SPI: 6/1/2010 – 5/31/2011



12-month SPI Map Source: National Drought Mitigation Center (NDMC) website available at: http://drought.unl.edu/MonitoringTools/DailyGriddedSPI.aspx



Source: Western Regional Climate Center (WRCC) website available at: http://www.wrcc.dri.edu/spi-products/

Notes: Each point on the graph represents the SPI for the Southwestern Mountains Division, New Mexico (Climate Division 4) for the number of months shown on the horizontal axis. For example, the value at 12 indicates the SPI for the past 12 months (i.e., the 12-month SPI).

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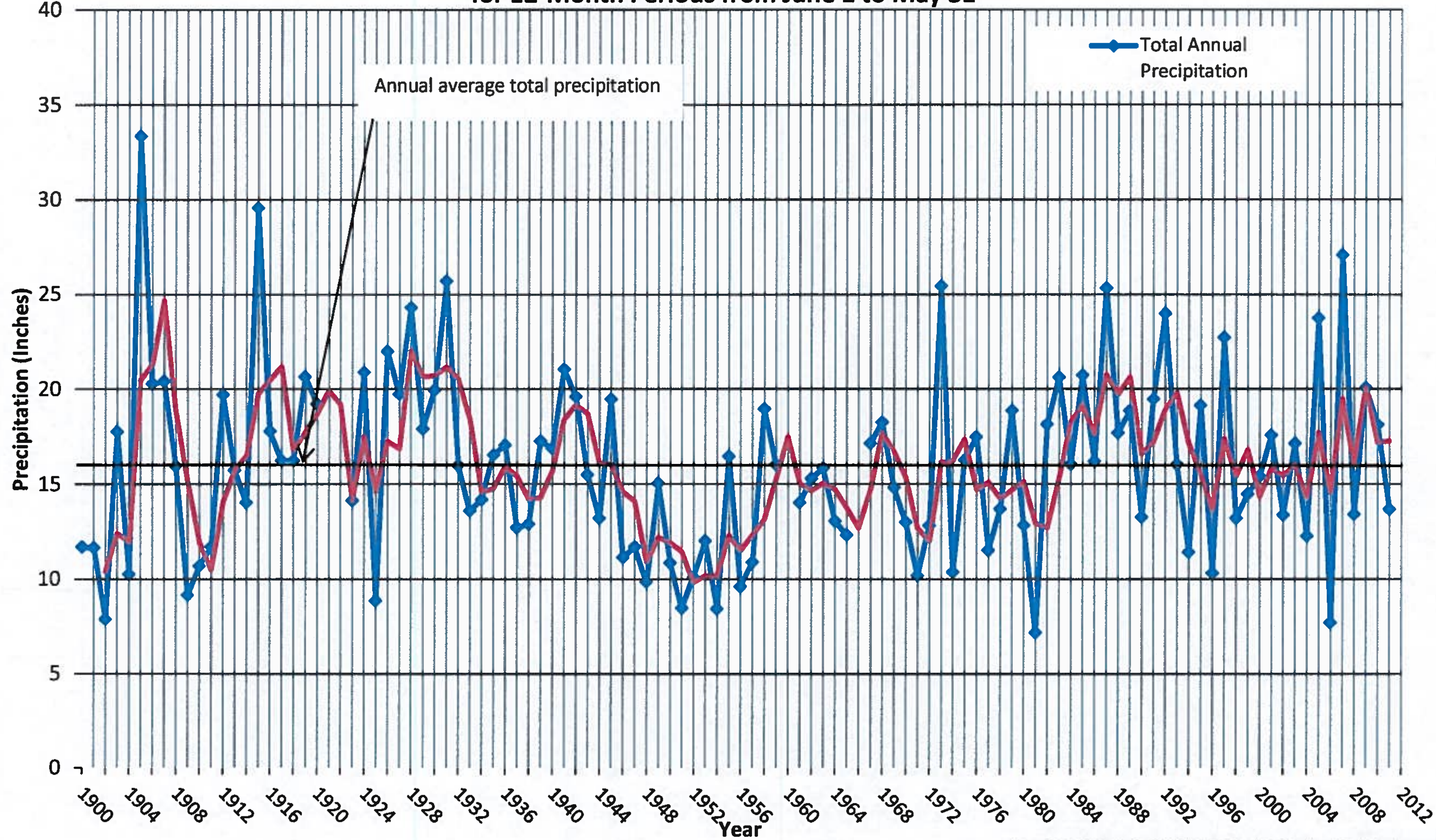
VANADIUM, NM
Application of Hydrology Protocol to STSIU Drainages

12-MONTH STANDARDIZED PRECIPITATION INDEX (SPI) OBSERVED DURING HP APPLICATION

ARCADIS

FIGURE
1

Figure 2
12-Month Total Precipitation Fort Bayard (USC00293265)
for 12-Month Periods from June 1 to May 31

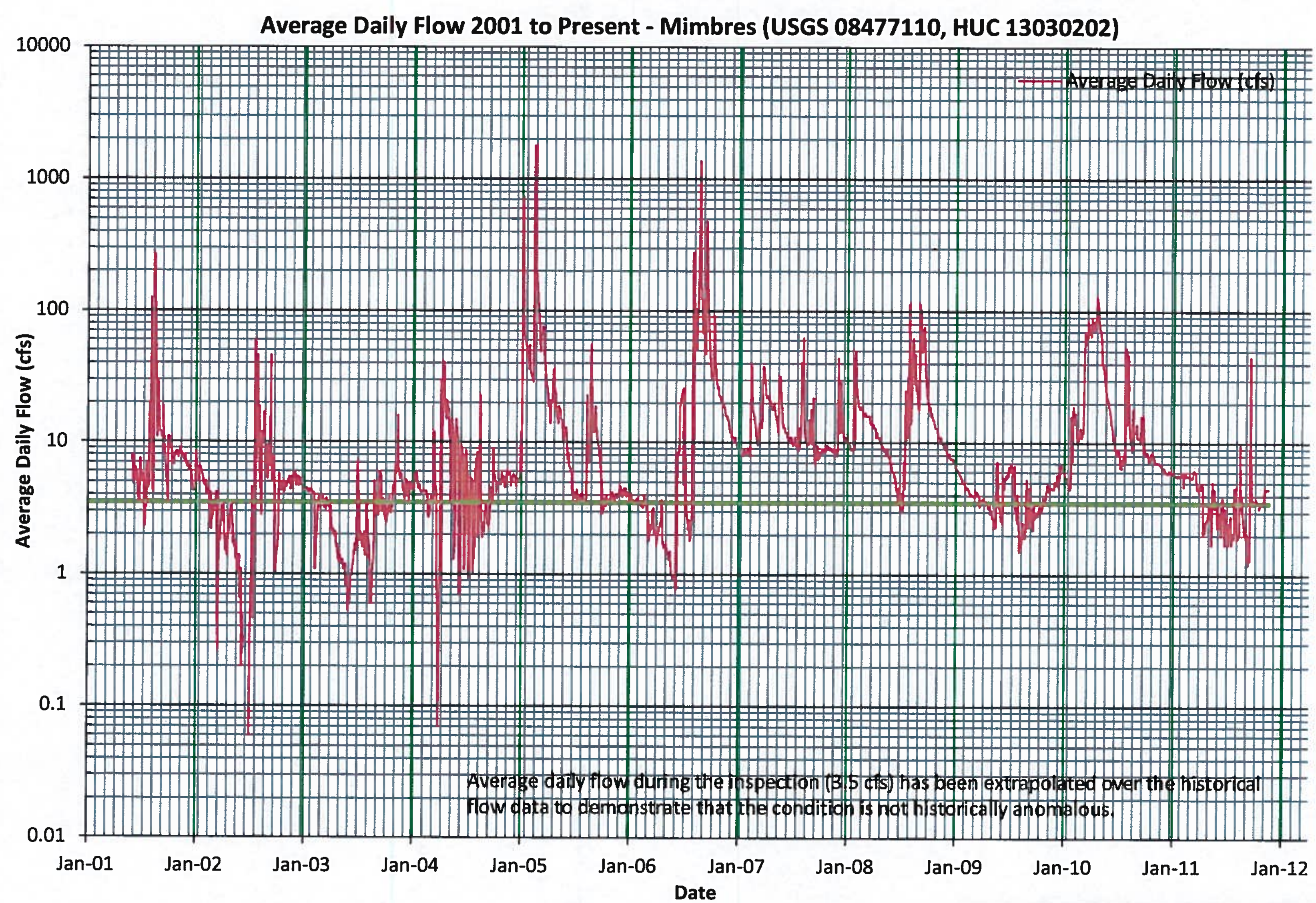


FREEPORT-MCMORAN CHINO MINES COMPANY
VANADIUM, NM
Application of Hydrology Protocol to STSIU Drainages

HISTORICAL ANNUAL AVERAGE PRECIPITATION MEASURED AT FORT BAYARD, NM CLIMACTIC STATION

ARCADIS

FIGURE
2



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VANADIUM, NM
Application of Hydrology Protocol to STSIU Drainages

HISTORICAL AVERAGE DAILY FLOW FOR MIMBRES RIVER IN MIMBRES, NM

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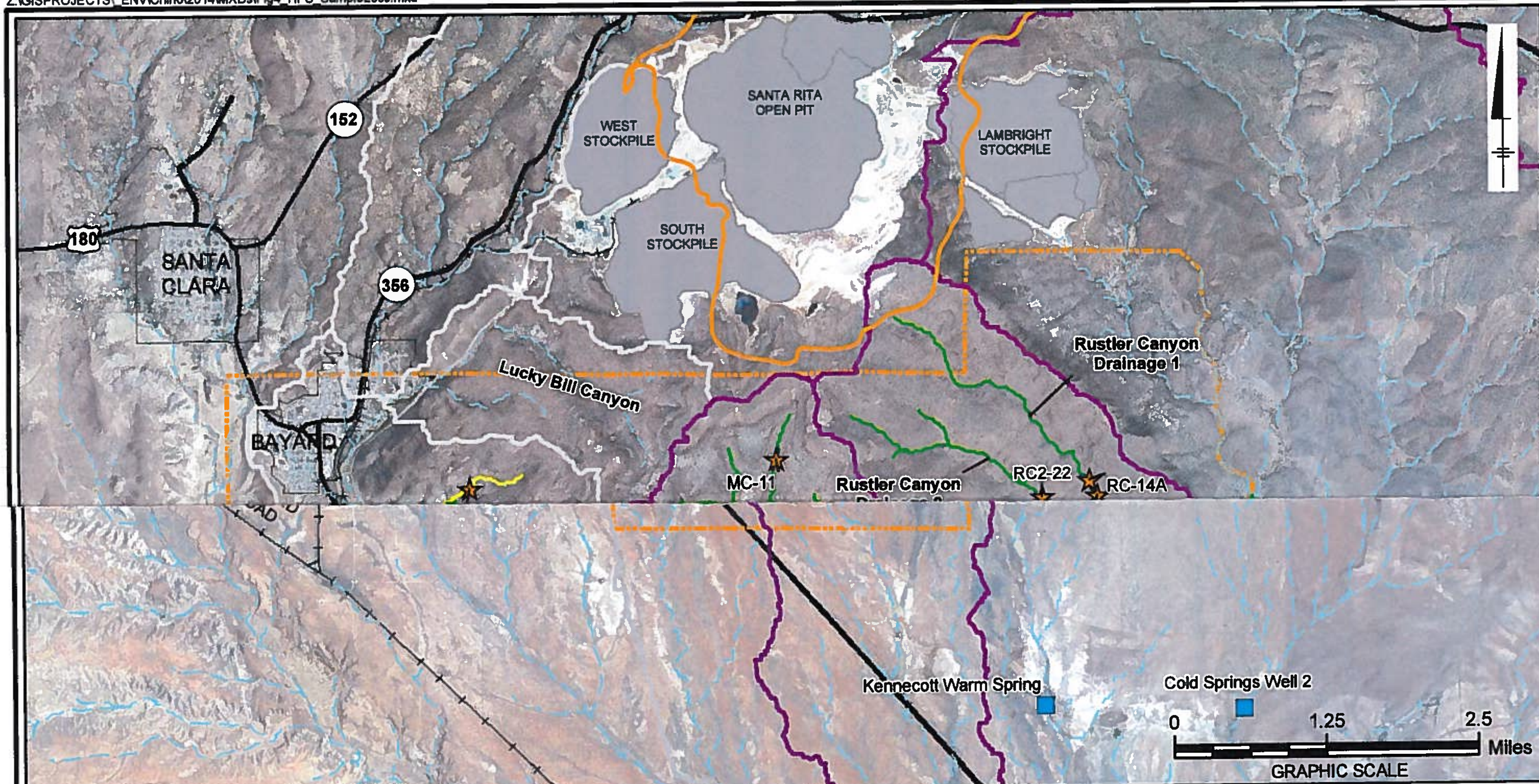
FIGURE
3

CITY: Lakewood DIV/GROUP: IM DB: MLM LD: PIC: PM: TM: TR:
Project #63524.001
Z:\GISPROJECTS_ENV\Chino\2014\MXDs\Fig4_HPS_SampleLocs.mxd



LEGEND:

- 2011 Hydrology Protocol Sample Location
- Pit Capture Zone from Golder (2008)
- Ephemeral Drainages
- Non-Ephemeral Drainages
- Other Drainages
- USFWS Critical Habitat Transect
- Lampbright Subwatershed Boundaries
- Hanover-Whitewater Subwatershed Boundaries
- STSIU Study Boundary
- Stockpiles
- Highway
- Railroad
- Town Roads
- Springs Inside STSIU Area
- Springs Outside STSIU Area

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VANADIUM, NEW MEXICO

SMELTER/TAILINGS SOILS IU

HYDROLOGY PROTOCOL SAMPLE LOCATIONS

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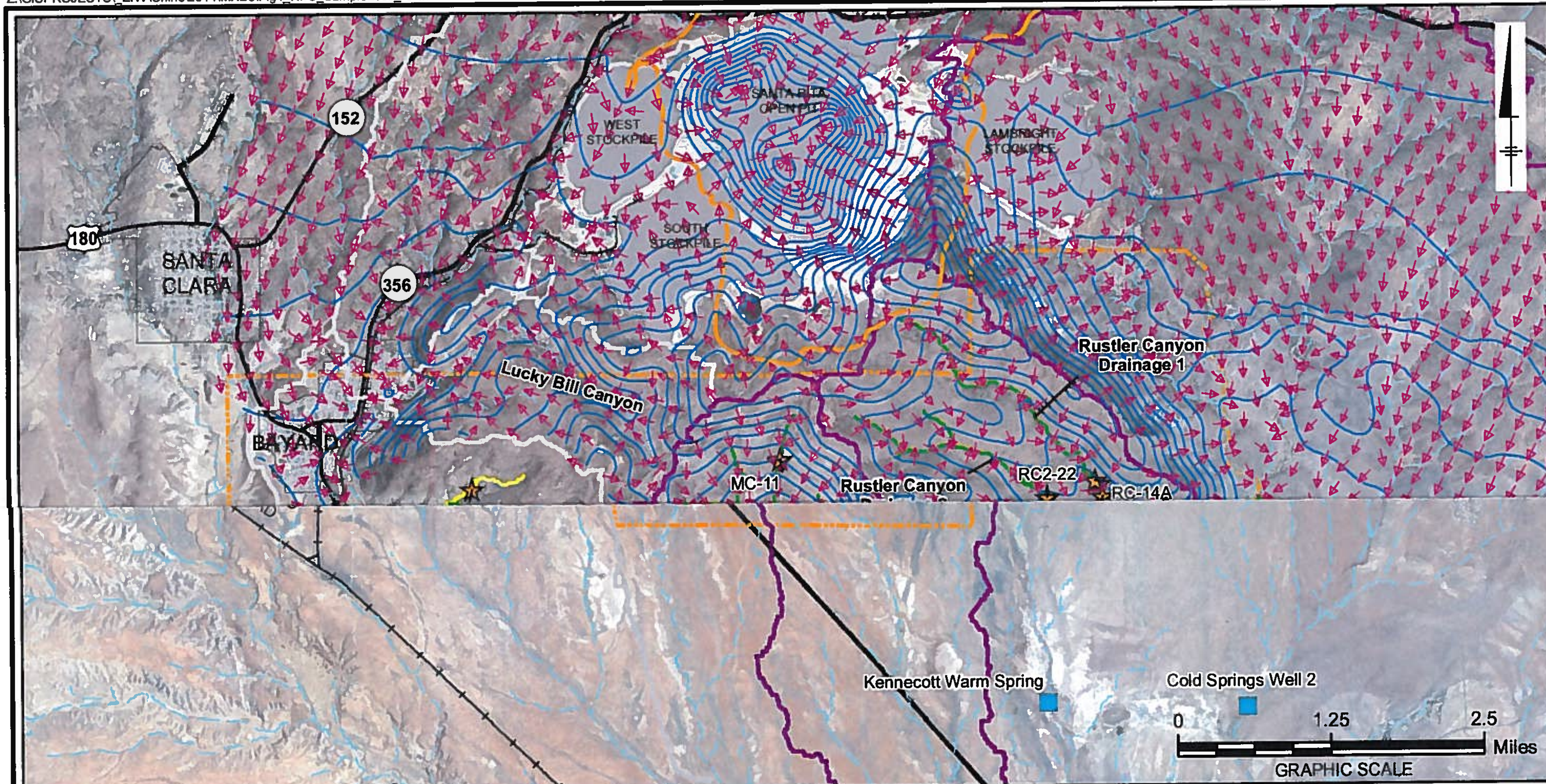
FIGURE **4**

Service Layer Credits: APFO

CITY: Lakewood DIV/GROUP: IM DB: MLM LD: PIC: PM: TM: TR:
Project #63524.001
Z:\GISPROJECTS_ENV\Chino\2014\MXDs\Fig4_HPS_SampleLocs_rev2.mxd



LEGEND:

- 2011 Hydrology Protocol Sample Location
- Pit Capture Zone from Golder (2008)
- Ephemeral Drainages
- Non-Ephemeral Drainages
- Other Drainages
- USFWS Critical Habitat Transect
- Lampbright Subwatershed Boundaries
- Hanover-Whitewater Subwatershed Boundaries
- STSIU Study Boundary
- Stockpiles
- Highway
- Railroad
- Town Roads
- Springs Inside STSIU Area
- Springs Outside STSIU Area
- Velocity Vectors (modeled)
- Groundwater Elevation (modeled)

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SMELTER/TAILINGS SOILS IU

2008 CHINO NORTH AREA MODEL SHALLOW GROUNDWATER CONTOURS AND VELOCITY VECTORS (FROM GOLDER 2008)

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FIGURE **5**

Service Layer Credits: APFO

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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:

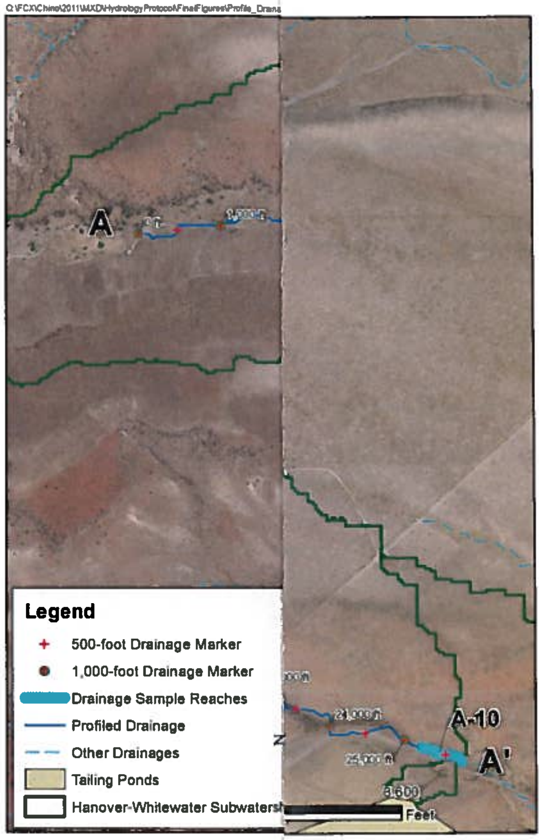
☒ Map and Photos (required)
☒ Hydrology Protocol Field Sheets for all locations (required)
☐ Level 2 Analysis (optional)
☒ Additional sites and/or documentation (drainage profile and plan view)

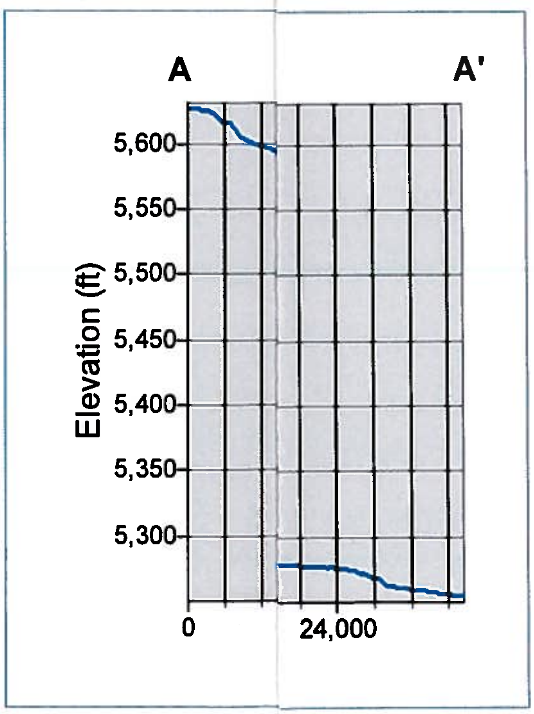
CONCLUSION:

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:	Barry Fulton	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:	

Q:\FCX\Chino\2011\MXD\HydrologyProtocol\FinalFigures\Profile_Drai





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 ≥ 12*	**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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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 ≥ 19*	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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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.

ARCADIS

Appendix B

Level 1 Hydrology Protocol Results
for B Drainage

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

Stream Name:	**Basin:**	**8-digit HUC:**
B-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.690012/-108.067308	32.65044/-108.08595
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC	☐ Classified 20.6.4._____ NMAC	B-7, B-7 DS, B-8

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**
B-7 (lat/long): 32.690012/-108.067308	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
B-7 DS (lat/long): 32.68733/-108.0683	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
B-8 (lat/long): 32.65044/-108.08595	☒ eph ☐ int ☐ per	Final score: 7, 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	B-7 has a cut across and part of the stream now drains into A Drainage.
Channelization/roads	☐ yes ☒ no	
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ 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.
Existing point source discharge	☐ yes ☒ no	
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 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:

Three assessment units were identified within sub-watershed B (Figure B-1 below). Starting at the upstream end, these assessment units are identified as B-7, B-7 DS and B-8. The most upstream assessment unit (B-7) was selected due to its location downgradient of change in the average basin slope. During HP application, a diversion was observed adjacent to the B-7 assessment unit that diverts water from the upper reaches of the B-drainage into the adjacent A-drainage. Reconnaissance was done above, within, and below this diversion and it was established that an ephemeral designation applied to this section. To determine hydrologic conditions downgradient of this diversion, an additional assessment unit (B-7 DS) was established downstream of this diversion. The lower downstream assessment unit (B-8) was selected to capture the entire basin drainage area.

As shown in the plan and profile plot presented below, the basin slope gradually decreases, as expected, in the downstream direction beginning at the 6,000 ft marker. At all the assessment units, we observed that rooted upland plants occurred, with varying degrees of density, throughout the stream channel. The upstream reaches of sub-watershed B (B-7 and B-7 DS) are predominately cobble and unconsolidated sand with infrequent boulders (Photos B7-1, B7-3, B7 DS-1 and B7 DS-3) whereas the downstream assessment unit (B-8) is mostly unconsolidated sand (Photos B8-1, B8-2, and B8-3). This likely reflects a transition from colluvial to alluvial processes. As a result, differences in the extent of vegetation growing within the channel varied, with greater densities observed in the upstream reaches and sparse in-stream vegetation within the downstream, reach likely a result of the substrate limitations (e.g., unconsolidated, dry sand). The weight of evidence clearly indicates that sub-watershed B 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: ______

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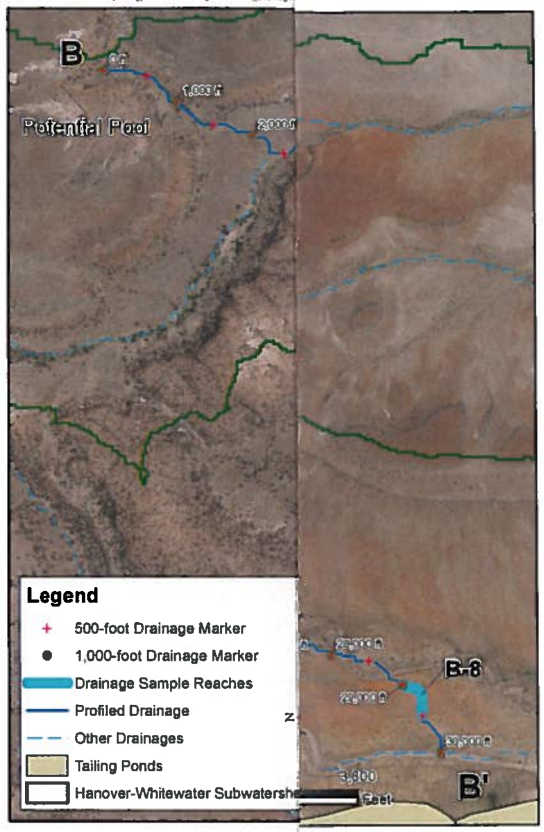
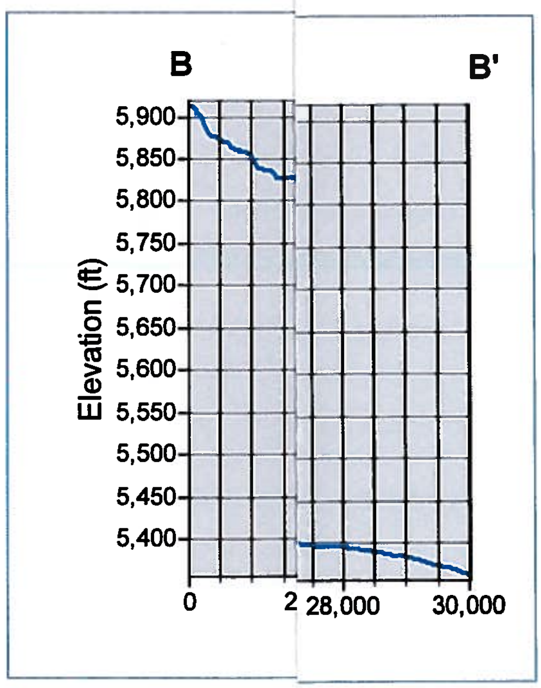


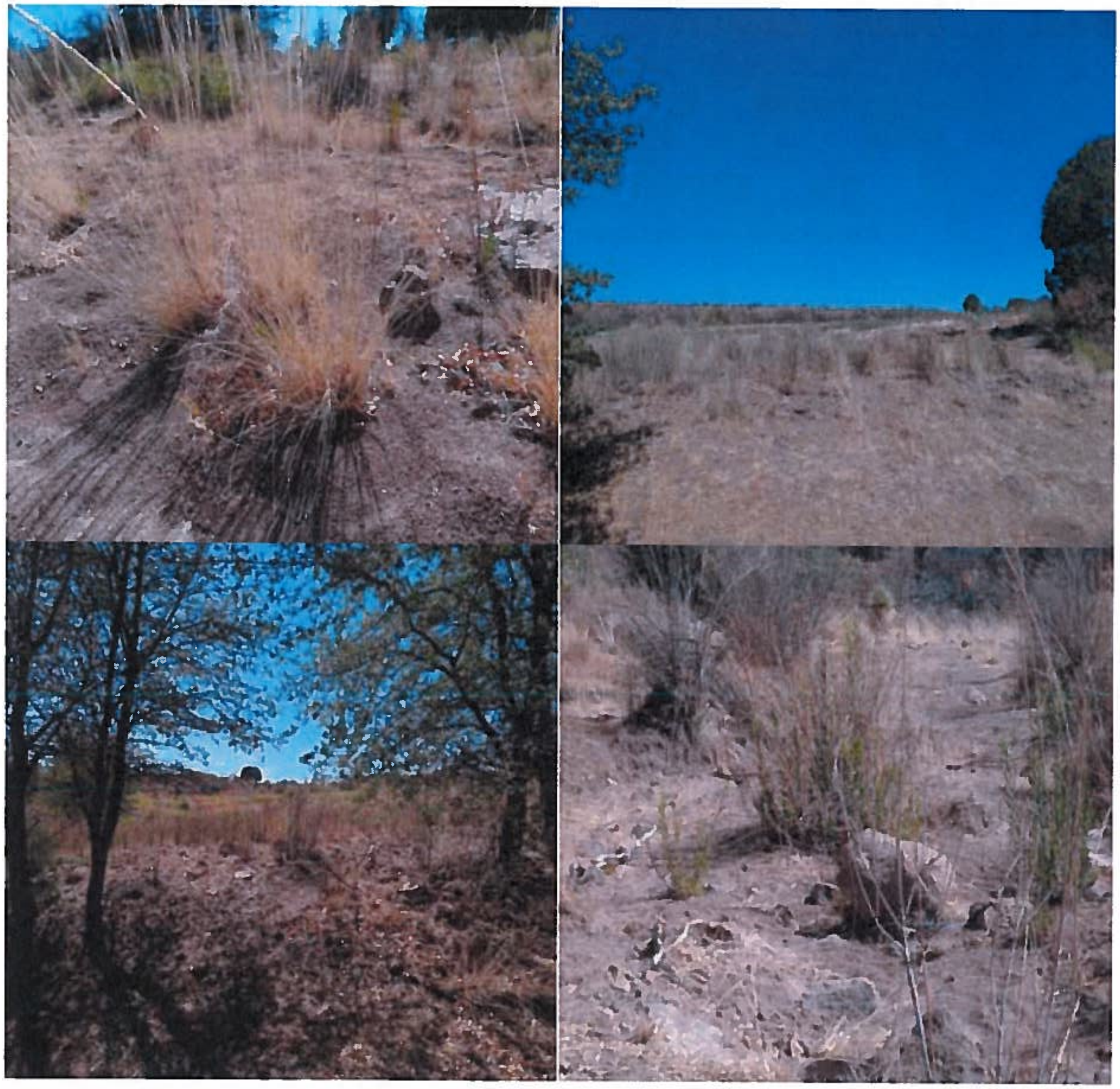


B-Drainage Photographs (B-7 Reach) – Total HP score of 2 (ephemeral stream)

B7-1: Photographic reference for indicators 1.1 through 1.6. Photograph of stream bed. Typical rooted vegetation across channel and banks relatively consistently dispersed throughout channel length. Indicator 1.6 scored as 1 - rooted upland plants consistently dispersed in streambed. No water or biotic indicators of water observed along survey reach.

B7-2: Photographic reference for indicator 1.5. Photograph of bank and upland area. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

B-Drainage Photographs (B-7 Reach) – Total HP score of 2 (ephemeral stream)



B7-3: Photographic reference for indicators 1.5 and 1.6. Photographs of bank/upland area and rooted in channel vegetation. There is a variation in vegetative density but no dramatic difference in composition. Rooted vegetation consistent across channel and banks.

B Drainage Photographs Downstream (B-7-DS Reach) – Total HP score of 2 (ephemeral stream)

B7 DS-1: Photographic reference for indicator 1.1 through 1.6. Indicator 1.6 scored as 1 - rooted vegetation along the stream bed is consistently dispersed. No water or biotic indicators of water observed along survey reach.

B7 DS-2: Photographic reference for indicator 1.5. Photograph of the overbank area and uplands. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

B Drainage Photographs Downstream (B-7-DS Reach) – Total HP score of 2 (ephemeral stream)

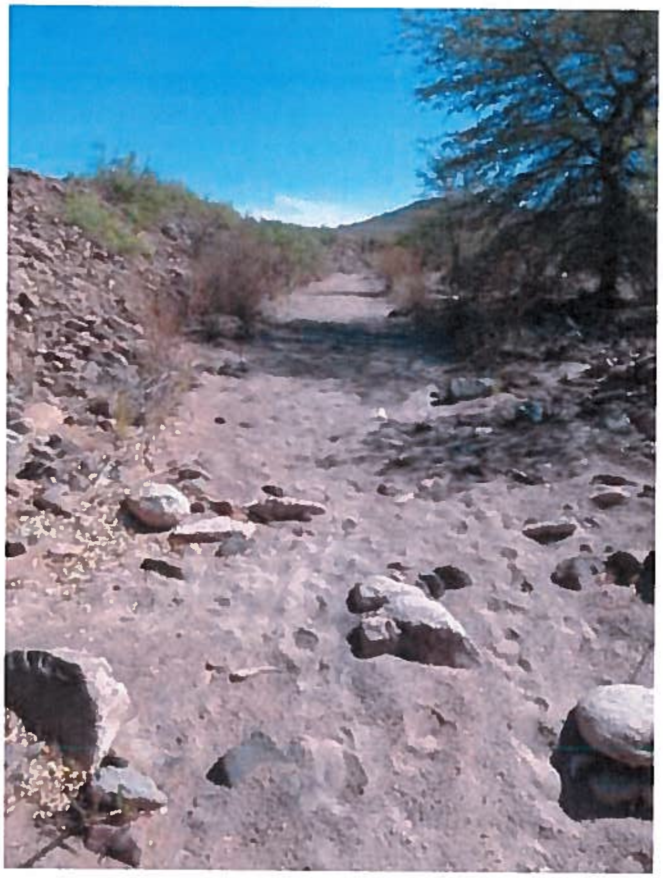
B7 DS-3: Photographic reference for indicators 1.5 and 1.6. Photographs of in stream rooted plants and overbank/upland areas. Evident variation in vegetative density but no dramatic difference in composition and rooted vegetation along the stream bed is consistently dispersed.

B-Drainage Photographs (B-8 Reach) – Total HP score of 7 (ephemeral stream)

B8-1: Photographic reference for indicator 1.1 through 1.6. Photograph of typical channel bed and channel banks. Indicator 1.6 scored as 2 - rooted vegetation inconsistently present in stream bed. No water or biotic indicators of water observed along survey reach.

B8-2: Photographic reference for indicator 1.5. Photograph of bank and upland area. No dramatic differences between channel bank vegetation and upland vegetation. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone present.

B-Drainage Photographs (B-8 Reach) – Total HP score of 7 (ephemeral stream)



B8-3: Photographic reference for indicator 1.6 and 1.9. Portions of the stream bed along the reach are devoid of vegetation while other portions are vegetated (see previous photograph). Lack of vegetation is likely the result of the flow regime and the bed material rather than an indicator of water persistence. Indicator 1.6 scored as 2 - few rooted upland plants present along streambed.

Indicator 1.9 scored as 0 - no riffle-pool sequence observable.

B-Drainage Photographs (B-8 Reach) – Total HP score of 7 (ephemeral stream)

B8-4: Photographic reference for indicator 1.8 and 1.10. Photograph of the cross-section for measurement of the floodplain and channel dimensions. Indicator 1.8 scored 1.5 based on measurements taken - moderate confinement and presence of inactive floodplain.

Indicator 1.10 scored as 1.5. Channel bed material is medium to course sand, which is consistent but noticeably courser than the bank and over bank area. Little to no substrate sorting is observable.

B-Drainage Photographs (B-8 Reach) – Total HP score of 7 (ephemeral stream)

B8-5: Photographic reference for indicators 1.5 and 1.6. Photographs of bank/upland area and rooted in channel vegetation. There is a variation in vegetative density but no dramatic difference in composition. Rooted vegetation inconsistent across channel and banks.

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

Date: 6/14/2011	**Stream Name: B-7**	**Latitude: N 32.69021**
Evaluator(s): Fulton/Donohoe	**Site ID: B-7**	**Longitude: W 108.06734**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: B Drainage (B-7)**	**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 <u>at least</u> 48 hours after the last known major rainfall event. **<u>OTHER</u>:** **Stream Modifications** ___ YES _X__ 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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
B7-1	View downstream	
B7-2	View of upslope left bank	
B7-3	View of in stream rooted plants and overbank/upland areas	

NOTES:

Scoring metric 1.5 HP
Observed trees in greater densities along stream corridor. The only compositional difference
observed was a willow growing in the channel but not in the upland area.
Therefore we did not consider that a dramatic compositional difference.

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

Date: 6/14/2011	Stream Name: B-7 DS	Latitude: N 32.68575
Evaluator(s): Fulton/Donohoe	Site ID: B-7 DS	Longitude: W 108.07005
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	Assessment Unit: B Drainage (B-7-DS)	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 <u>at least</u> 48 hours after the last known major rainfall event. **OTHER:** Stream Modifications ___ YES _X__ 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)	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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
B7 DS-1	View downstream	
B7 DS-2	View of upslope right bank	
B7 DS-3	View of in stream rooted plants and overbank/upland areas	

NOTES:

The channel was predominately unconsolidated sand with cobble.
In stream vegetation observed was primarily grass with occasional oak species.
Riparian vegetation was primarily yucca, juniper and oak. Willow species were not observed in the stream bed.

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

Date: 6/13/2011	Stream Name: B-8	Latitude: N 32.65222
Evaluator(s): Barry	Site ID: B-8	Longitude: W 108.08502
TOTAL POINTS: 7 *Stream is at least intermittent if ≥ 12*	Assessment Unit: B Drainage (B-8)	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 ___ YES _X__ 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)	3

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 <u>or</u> of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	5.5

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 <u>not</u> 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)	7

SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	7

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
B8-1	View upstream extent of assessment unit looking downstream	
B8-2	View downstream along assessment unit at left bank riparian vegetation	
B8-3	View of lower portion of assessment unit – note lack of in channel vegetation	
B8-4	View of entrenchment survey transect	
B8-5	View of in stream rooted plants and overbank/upland areas	

NOTES:

ARCADIS

Appendix C

Level 1 Hydrology Protocol Results for C Drainage

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

Stream Name:	Basin:	8-digit HUC:
C-Drainage	Mimbres	13030202
Reach Description:	**Upstream lat/long:**	**Downstream lat/long:**
See additional comments section	32.72488/-108.0883	32.66566/-108.0928
Current WQS		**Assessment Unit ID:**
☒ Unclassified 20.6.4.98 or 99 NMAC ☐ Classified 20.6.4.____ NMAC		C-19, C-4, C-5, C-6,

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
C-19 (lat/long): 32.72488/-108.0883	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
C-4 (lat/long): 32.70919/-108.0975	☒ eph ☐ int ☐ per	Final score: 6, see field form and photos for additional information
C-5 (lat/long): 32.68615/-108.10046	☒ eph ☐ int ☐ per	Final score: 2, see field form and photos for additional information
C-6 (lat/long): 32.66566/-108.0928	☒ eph ☐ int ☐ per	Final score: 7, 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	
Channelization/roads	☐ 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.
Groundwater pumping	☐ yes ☒ no	
Agricultural return flows	☐ yes ☒ no	
Existing point source discharge	☐ yes ☒ no	
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:		

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:

Four assessment units were identified within sub-watershed C (Figure C-1 below). Starting at the upstream end, these assessment units are identified as C-19, C-4, C-5, and C-6. The most upstream assessment unit (C-19) was selected to represent the headwater portions of this, and other, sub-watersheds within this portion of the AOC. Assessment unit C-4 was located at a significant change in basin slope downstream of tributary inflow. The lower two assessment units (C-5 and C-6) are located within the downstream portions of sub-watershed C intended to represent hydrologic processes of larger watersheds within this portion of the AOC.

As shown in the plan and profile plots presented below the basin slope progressively decreases, as expected, in the downstream direction. Similarly, the degree of valley confinement decreases in the downstream direction. These trends in channel slope and confinement are typical and represent the relative dominance of colluvial versus alluvial channel forming processes and are reflected in the composition of the channel bed itself. That is, the upstream reaches of sub-watershed C (C-19 and C-4) are bedrock and cobble dominated stream channels indicative hill slope processes (Photos C19-1 and C4-2) whereas the downstream assessment units (C-5 and C-6) are a mixture of sand/gravel/cobble (Photos C5-1 and C6-3) and reflect the dominance of riverine processes. However, despite the influence of riverine processes within the lower assessment units we find throughout sub-watershed C that the channel is dominated by sand, cobbles and bedrock with very little difference between the "riparian" and upland vegetation. Furthermore, at all assessment units we observed that rooted upland plants occurred, with varying degrees of density, throughout the stream channel. The weight of evidence clearly indicates that sub-watershed C is an ephemeral channel that flows only in direct response to significant rainfall events.

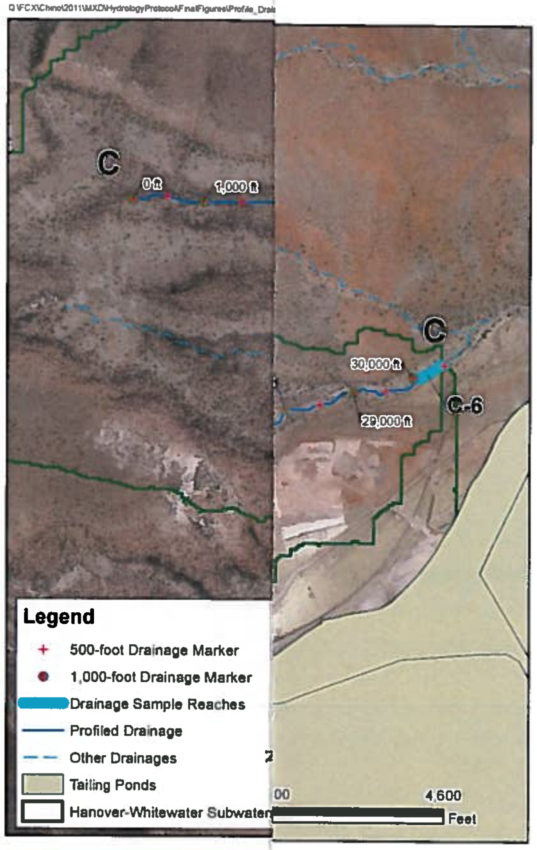
ATTACHMENTS:

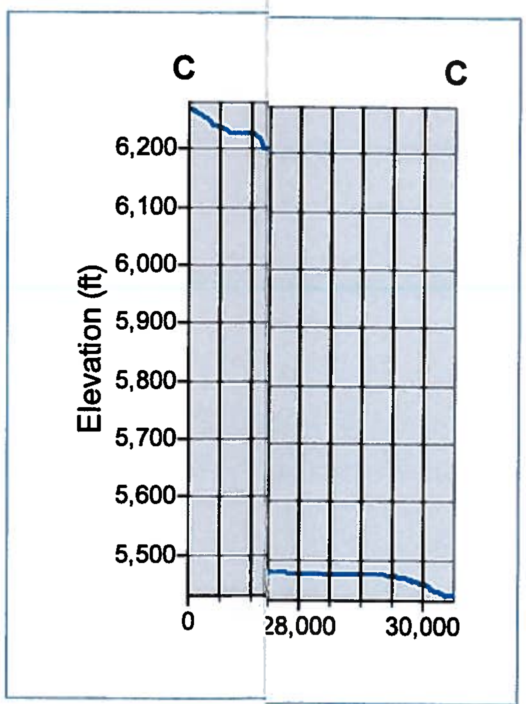
☒ Map and Photos (required)
☒ Hydrology Protocol Field Sheets for all locations (required)
☐ Level 2 Analysis (optional)
☒ Additional sites and/or documentation (drainage profile and plan view)

CONCLUSION:

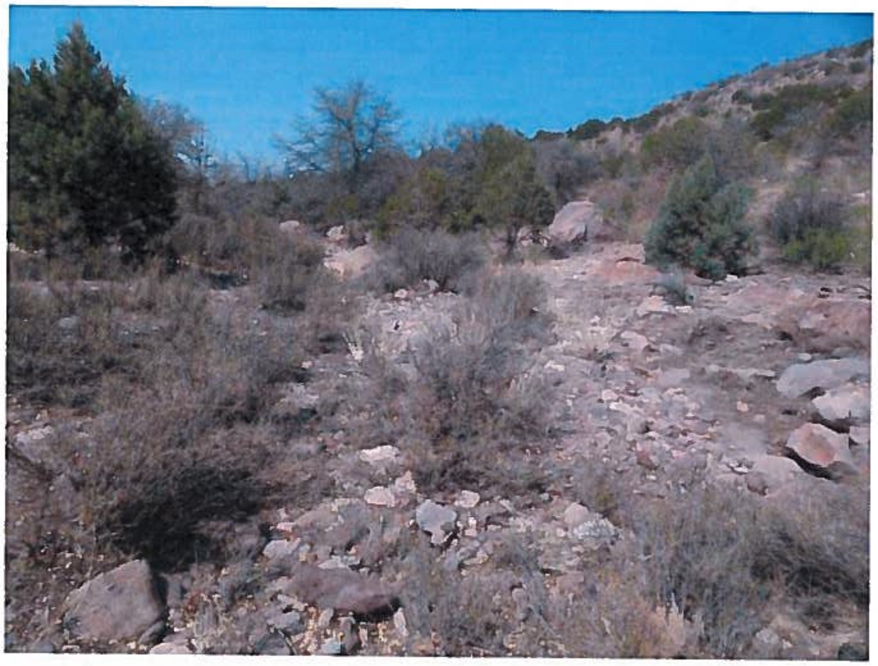
This UAA concludes that the stream reach identified above is ephemeral and that Clean Water Act Section 101(a)(2) aquatic life and recreational uses are neither existing nor attainable due to the factor identified in 40 CFR 131.10(g)(2): *natural, ephemeral, intermittent or low flow conditions or water 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: Barry Fulton	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: ______

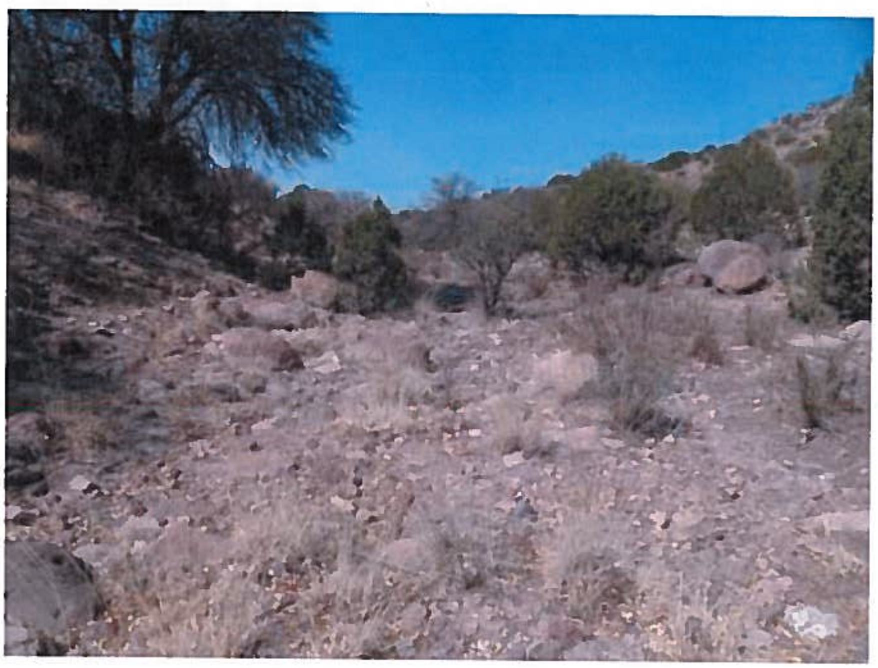

C
0 ft
1,000 ft
C
30,000 ft
29,000 ft
C-6
Legend
500-foot Drainage Marker
1,000-foot Drainage Marker
Drainage Sample Reaches
Profiled Drainage
Other Drainages
Tailing Ponds
Hanover-Whitewater Subwater
00
4,600
Feet


C
C
Elevation (ft)
6,200
6,100
6,000
5,900
5,800
5,700
5,600
5,500
0
28,000
30,000

C Drainage Photographs (C-19 Reach) – Total HP score of 2 (ephemeral stream)



C19-1: Photographic reference to representative channel bottom characteristics.



C19-2: Photographic reference for indicators 1.1 through 1.6. Photograph from upper extent of survey reach facing downstream. Rooted vegetation present in channel is present but inconsistent (see subsequent photograph). No water or biotic indicators of water observed along survey reach.

C Drainage Photographs (C-19 Reach) – Total HP score of 2 (ephemeral stream)

C19-3: Photographic reference for indicator 1.6. Portions of the survey reach devoid of vegetation as a result of bed material and lack of moisture rather than an indicator of persistence of flow. Indicator 1.6 scored as 1 – few rooted plants present in streambed.

C Drainage Photographs (C-19 Reach) – Total HP score of 2 (ephemeral stream)

C19-4: Photographic reference for indicator 1.5. Photograph of upland area and upland vegetation. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

C19-5: Photographic reference for indicators 1.5 and 1.6. There is a variation in vegetative density but no dramatic difference in composition. Portions of the survey reach few rooted plants present in streambed as a result of bed rock in channel.

C Drainage Photographs (C-4 Reach) – Total HP score of 6 (ephemeral stream)

C4-1: Photographic reference for indicator 1.1 to 1.6. Streambed is predominantly bedrock. Vegetation present where deposition has occurred. No water or biotic indicators of water observed along survey reach.

C4-2: Photographic reference for indicator 1.6. Indicator 1.6 scored as 2 – few rooted upland plants present in streambed. Lack of vegetation present in streambed likely result of flow regime and presence of bedrock rather than result of persistent water.

C Drainage Photographs (C-4 Reach) – Total HP score of 6 (ephemeral stream)

C4-3: Photographic reference for indicator 1.5. Photograph of bank and upland vegetation. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

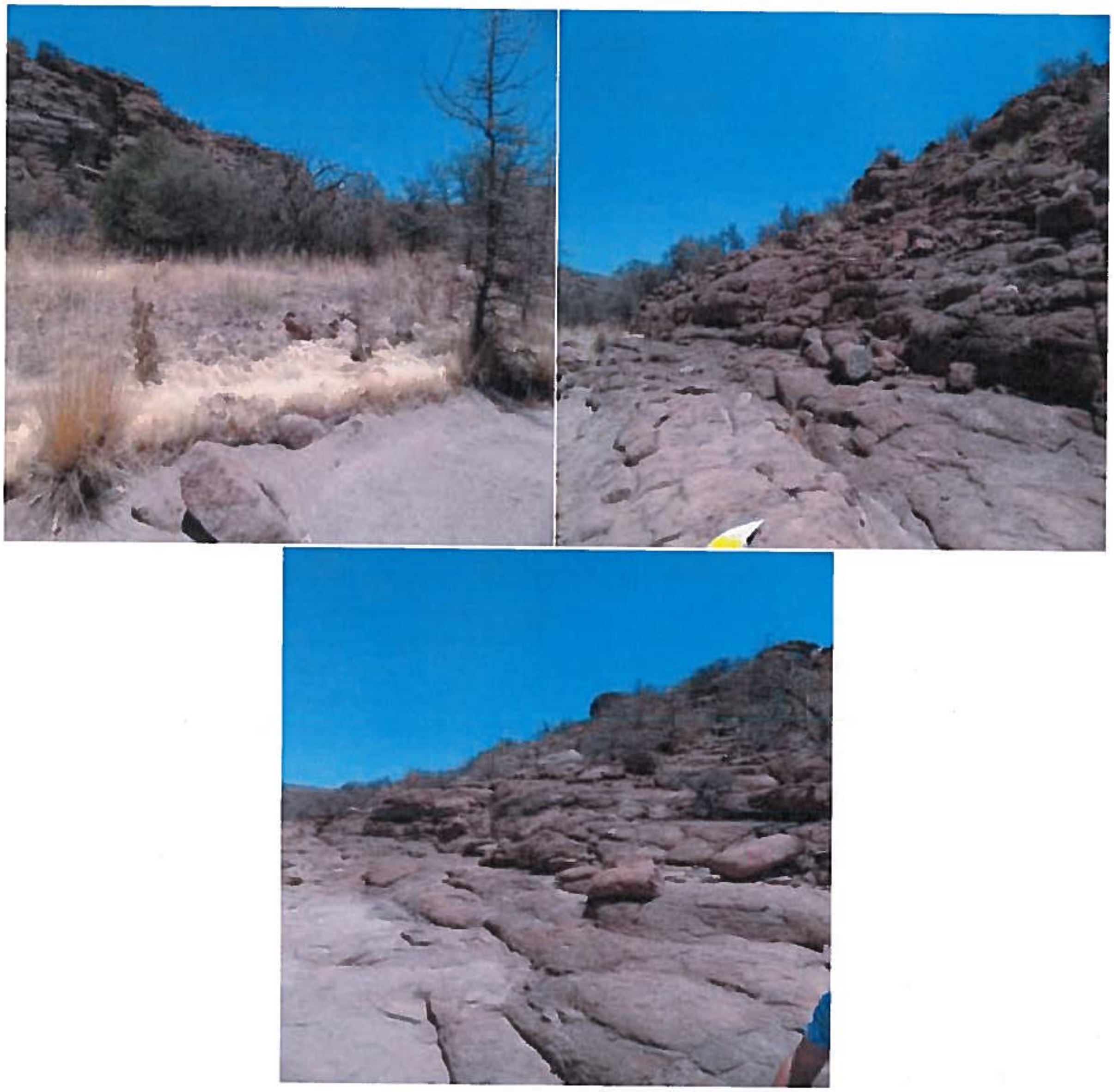
C Drainage Photographs (C-4 Reach) – Total HP score of 6 (ephemeral stream)

C4-4: Photographic reference for indicators 1.8 through 1.10. Photograph of the entrenchment transect location. Indicator 1.8 scored as 1.5 - stream is somewhat confined with an inactive floodplain.

Indicator 1.9 scored as 0 - no riffle-pool sequence observed (also refer to other photos).

Indicator 1.10 scored as 1.5 - particle sizes within the channel are similar to upland material but are noticeably larger (primarily sands and gravels where bedrock is not present).

C Drainage Photographs (C-4 Reach) – Total HP score of 6 (ephemeral stream)



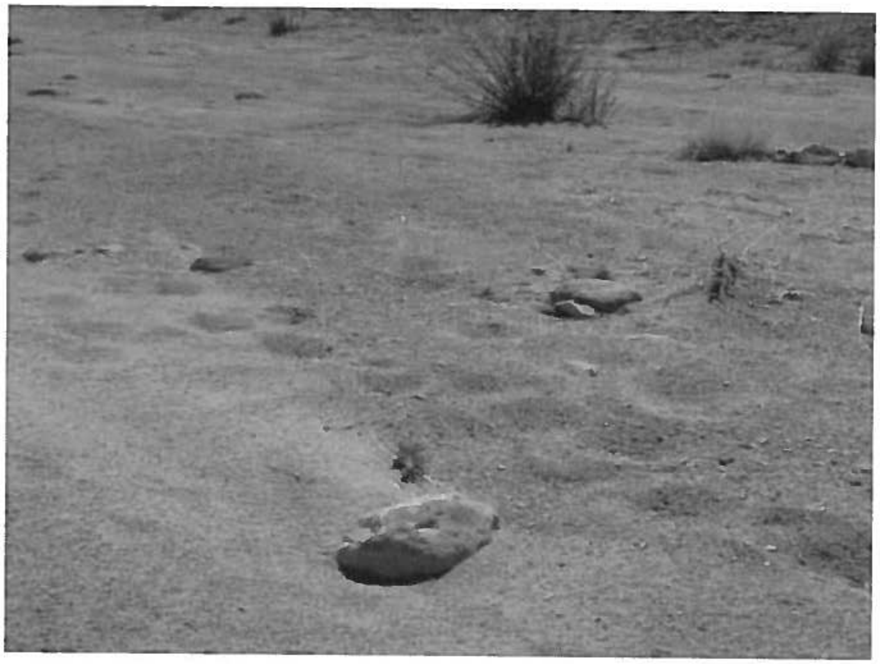
C4-5: Photographic reference for indicator 1.5. Photographs of bank and upland vegetation. Evident variation in vegetative density but no dramatic difference in composition. There is no distinct riparian vegetation corridor.

C Drainage Photographs (C-5 Reach) – Total HP score of 2 (ephemeral stream)

C5-1: Photographic reference for indicators 1.1 through 1.6. Indicator 1.6 scored as 2 – few rooted plants in the streambed. Lack of rooted plants is likely the result of the flow regime and granular bed material present rather than persistence of flow. No water or biotic indicators of water observed.

C5-2: Photographic reference for indicator 1.5. Indicator 1.5 scored as 0. Vegetation along streambank and uplands is sparse but consistent with no compositional or density differences between the two areas observed. Also refer to previous photograph.

C Drainage Photographs (C-5 Reach) – Total HP score of 2 (ephemeral stream)



C5-3: Photographic reference for indicator 1.6. Few rooted plants in the streambed. Lack of rooted plants is likely the result of granular bed material present.

C Drainage Photographs (C-6 Reach) – Total HP Score of 7 (ephemeral stream)

C6-1: Photographic reference for indicators 1.1 through 1.6. Indicator 1.6 scored as 2. Few rooted plants present in the streambed but inconsistently present. Lack of rooted plants is likely the result of the flow regime and granular bed material present rather than persistence of flow. No water or biotic indicators of water observed along survey reach.

C6-2: Photographic reference for indicator 1.5. Indicator 1.5 scored as 1 - evident variation in vegetative density but no dramatic difference in composition. No distinct riparian zone observed.

C Drainage Photographs (C-6 Reach) – Total HP Score of 7 (ephemeral stream)

C6-3: Photographic reference for indicator 1.8. Location of transect shown. Indicator 1.8 scored as 1.5. Stream is somewhat confined with an inactive floodplain.

C6-4: Photographic reference for indicator 1.9 and 1.10. Indicator 1.9 scored as 0 - riffle-pool sequence not observable along survey reach. Indicator 1.10 scored as 1.5 - particle sizes of the channel bed material is primarily course sand and gravel which is similar to but courser than the material of the upland area. Substrate sorting not evident.

C Drainage Photographs (C-6 Reach) – Total HP Score of 7 (ephemeral stream)

C6-5: Photographic reference for indicator 1.6. Few rooted plants present in the streambed but inconsistently present. Lack of rooted plants is likely the result of granular bed material present.

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

Date: 6/12/2011	**Stream Name: C Drainage**	**Latitude: N 32.72488**
Evaluator(s): Clifton, Barry, Durham	**Site ID: C-19**	**Longitude: W 108.0883**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: C Drainage (C-19)**	**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** __ YES _X_ 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)	**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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
C19-1	View of representative channel bottom characteristics	
C19-2	View upstream extent of assessment unit looking downstream - Note – lack of water in channel and presence of rooted vegetation in channel	
C19-3	View near downstream end of assessment unit – Note – area of no vegetation transitioning to prevalent vegetation. Lake of vegetation due to lack of moisture not duration of flow.	
C19-4	View of riparian and upland vegetation. No distinct riparian vegetation corridor	
C19-5	View of in stream rooted plants and overbank/upland areas.	

NOTES:

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

Date: 6/12/2011	**Stream Name: C Drainage**	**Latitude: N 32.70919**
Evaluator(s): Barry	**Site ID: C-4**	**Longitude: W 108.0975**
TOTAL POINTS: 6 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: C Drainage (C-4)**	**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** __ YES _X_ 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)	3

**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 <u>or</u> of riffles.	There is no sequence exhibited.
	3	2	1	0
			SUBTOTAL (#1.1 – #1.9)	**4.5**

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 <u>not</u> 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)	**6.0**

SUPPLEMENTAL INDICATORS: The following indicators do not occur consistently throughout New Mexico but may be useful in the determination of perenniality. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> found within the study reach.
	Present = 1.5	**Absent = 0**
	TOTAL *plus* SUPPLEMENTAL POINTS (#1.1 – #1.14)	**6**

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
C4-1	View from upstream extent of assessment unit looking downstream much of this unit – and this reach- is dominated by bedrock channel bottom	
C4-2	View from downstream extent of assessment unit looking upstream. Note large sand deposit and then bedrock channel further upstream. Lack of vegetation due to lack of water not consistency of flow	
C4-3	View of riparian and upland vegetation. No distinct riparian vegetation corridor	
C4-4	View of entrenchment transect location	
C4-5	View of in stream rooted plants and overbank/upland areas	

NOTES:

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

Date: 6/12/2011	**Stream Name: C Drainage**	**Latitude: N 32.68615**
Evaluator(s): Barry	**Site ID: C-5**	**Longitude: W 108.10046**
TOTAL POINTS: 2 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: E Drainage (C-5)**	**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** __ YES _X_ 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)	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 <u>or</u> 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 <u>not</u> 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. <u>If the indicator is present</u> 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 <u>not</u> 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 <u>not</u> 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
C5-1	View of lack of rooted plants in streambed	
C5-2	View of vegetation along streambank and uplands	
C5-3	View of in stream rooted plants and overbank/upland areas	

NOTES:

C-5 reflects the portion of Bolton that was dredged/cleared and widened for the White Water Creek Diversion purposes.

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

Date: 6/12/2011	**Stream Name: C Drainage**	**Latitude: N 32.66566**
Evaluator(s): Barry	**Site ID: C-6**	**Longitude: W 108.0928**
TOTAL POINTS: 7 *Stream is at least intermittent if ≥ 12*	**Assessment Unit: C Drainage (C-6)**	**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** __ YES _X_ 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)	3

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)	5.5

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)	7.0

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)	7

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

Photo Descriptions and NOTES

Photo #	Description (US, DS, LB, RB, etc.)	Notes
C6-1	View upstream extent of assessment unit looking downstream	
C6-2	View downstream extent of assessment unit looking upstream	
C6-3	View of entrenchment survey location	
C6-4	View lack of pool – riffle sequence	
C6-5	View of in stream rooted plants and overbank/upland areas	

NOTES:
