Client:	*General Electric/United Nuclear Corporation*	**Sheet:**	*1* **of** *11*
Project:	*NECR 95% Design*	**Date:**	*09/16/2017*
Description:	*Estimation of Flood Flows For Design of Interim and Final Surface Water Controls for the Removal Action at the Northeast Church Rock Mine and Church Rock Mill Site*	**Job No:**	*10508639*

ATTACHMENT I.1: ESTIMATION OF FLOOD FLOWS FOR DESIGN OF INTERIM AND FINAL SURFACE WATER CONTROLS FOR THE REMOVAL ACTION AT THE NORTHEAST CHURCH ROCK MINE SITE AND CHURCH ROCK MILL SITE

Revisioning

Rev.	Date	Description	By	Checked	Date
0	*5/27/2015*	*Preliminary (30%) Design*	*A. Edstrom*	*Z. Elliot*	*4/15/2016*
1	*9/16/2017*	*95% Design*	*A. Edstrom*	*N. Haws*	*9/27/2017*
2	*10/2/2019*	*LAR Response to RAI's*	*S. Murphy*	*J. Erickson*	*10/2/2019*
3	*3/4/2020*	*Response to NRC comments*	*S. Murphy*	*N. Haws*	*3/20/2020*

Revisions

Issue Date	Description
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Location and Format

Electronic copies of these calculations are located in the project team site.

The following calculations were generated using the following software:

- United States Army Corps of Engineers (USACE) Hydrologic Engineering Center's – Hydrologic Modeling System (HEC-HMS) version 4.2.1, build 28
- AutoCAD Civil 3D 2017
- ESRI ArcMAP 10.3.1
- Microsoft Excel 2013

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Objective

The objective of these calculations is to estimate flood flows used to produce hydraulic evaluations of design elements located within Appendix C, D, F, and I. These design elements include:

- The North Diversion Channel (see Appendix I.2)
- Various Mill Site Stormwater Controls (see Appendices I.3 and I.4)
- Stabilization alternatives for the Pipeline Arroyo in the vicinity of the Jetty and “nickpoint” (see Appendices I.5, and I.7)
- The Alluvial Fan area located north of the Mill Site (see Appendix I.6)
- Temporary stormwater management of the Mine Site during construction activity (see Appendix C)
- Temporary stormwater management around temporary haul roads (see Appendix D)
- Designs to evaluate and improve the Mine Site Outlet Channel (MSOC) and water entering Unnamed Arroyo No. 1 and the Pipeline Arroyo West Fork (see Appendix F)

A summary of these flow locations, their design purpose, and the corresponding calculation brief are also given in Table 1. The locations are shown on multiple figures including Figure 1 (Mill Site, Post-RA), Figure 2 (Pipeline Arroyo and Mine Site, Post-RA), and Figure 3 (Temporary Stormwater Control Points). In addition to the appendices referenced above, relevant engineering drawings are located in drawing sections 3, 6, and 9.

Background

The Selected Remedy under the Administrative Settlement Agreement and Order on Consent (AOC) requires that NECR Mine Site waste that contain concentrations of uranium and Ra-226 in excess of Action Levels be excavated and transported to a Repository. Excavation at the Mine Site will continue until confirmation sample results from excavated areas are below the Action Levels. The Selected Remedy further requires design of a repository at the Mill Site to contain mine waste from the Mine Site.

Surface water channels protecting the TDA are designed to prevent erosion or overtopping of the channels during the design storm. Included in the RA is an evaluation of the buried jetty and design of improvements to protect the TDA from flows in the Pipeline Arroyo during the design storm event. The design storm event for the surface water channels for the Mill Site, including the Pipeline Arroyo, is the Probable Maximum Flood (PMF). These calculations also estimate the peak flows for lesser floods (2-year, 5-year, 10-year, 100-year, 200-year, 1,000-year, and 10,000-year) for use in analysis of hydraulics and design of sediment control measures.

The engineered channel protecting the unnamed arroyo at the outlet of the Mine Site was designed to have capacity and erosional stability for the 100-year flood event. These calculations estimate the 100-year flood flow entering and leaving the engineered channel under post-RA conditions to evaluate the as-built channel performance. The calculations also estimate 2-year peak flows at the Mine Site locations shown in Figure 3 for Phase 3 removal. Phase 3 removal provides the maximum peak flow and volume to each control structure during soil and waste removal from the Mine Site.

Finally, stormwater controls for temporary support facilities, including temporary haul roads, were designed for the 10-year flood. These design elements include roadside ditches, culverts, and stormwater ponds shown in Attachment D.

Stantec developed five hydrological models to facilitate estimation of flood flows at the various locations and conditions:

1. Pipeline Arroyo Watershed Model for Existing Conditions (Pipeline Arroyo Existing Condition Model)
2. Pipeline Arroyo Watershed Model for Post-RA Conditions (Pipeline Arroyo Post-RA Model)
3. Mill Site Sub-Catchments Model for Post-RA Conditions (Mill Site Model)
4. Mine Site Sub-Catchments Model for Construction Phases (Mine Site Model)
5. Haul Road Sub-Catchment Model for Construction Phases (Haul Road Model)

Applicable Codes and Standards

The calculation methods are consistent with the following codes and standards:

- Administrative Settlement Agreement and Order on Consent for Design and Cost Recovery, United Nuclear Corporation Superfund Site and Northeast Church Rock Mine Removal Site (AOC; USEPA, 2015)
- Design of Erosion Protection for Long-Term Stabilization (Johnson, 2002)
- Hydraulic Analysis for Dams (NMOSE, 2008)

Methods

Analysis Model

United States Army Corps of Engineers (USACE) Hydrologic Engineering Center's – Hydrologic Modeling System (HEC-HMS) version 4.2.1, build 28.

Watershed Delineations and Model Element Construction

Watershed delineations and the model element construction within HEC-HMS for the five hydrologic models are shown in Attachment A of this calculation brief. Subbasin delineations capture the major hydrologic features in each watershed while maintaining consistent subbasin sizes where possible.

Hyetograph Development

Frequency-Based Storms

Stantec developed the precipitation hyetographs for frequency-based storms using the center-peaking alternative block technique with the depth-duration frequency curves built from the National Oceanic and Atmospheric Association (NOAA) Precipitation Data Frequency Server (PDFS) (Bonnin et al, 2011).

The PDFS provides storm depths for return periods ranging from 1-year to 1,000-years and for storm durations of 5-minutes to 60-days. Table 2 shows the PDFS annual maximum series, median confidence interval storm depths for a point located at the south side of the Mill Site (35.6455˚ latitude and -108.5056˚ longitude). 10,000-year rainfall depths are not given by NOAA and were extrapolated from the available data using Gumbel distributions for storm durations between 5-minutes and 1-day. 10,000-year storm depths are also presented in Table 2.

Stantec fit the depth values given in the PDFS to the analytical intensity-duration-frequency (IDF) shown in Equation 1 (Chow et al. 1988):

$$i = \frac{c}{T_d^e + f} \qquad \text{[Eq.1]}$$

Where:

i = The design rainfall intensity (mm/hr)
T_d = The storm duration of the specific return period (15 minutes to 4320 minutes)
c, e, f = Fitting parameters

Table 3 gives the fitting parameters for the IDF curve, and Figure 4 shows the analytical IDF curves with the PDFS depth-duration points.

Finally, Stantec constructed the alternating block hyetograph from the analytical IDF curves. Figure 5 shows cumulative hyetographs for different frequency-based storms. Fitting and rounding errors typically produced cumulative 24-hour rainfall depths greater than reported in the NOAA PDFS. As a result, the cumulative hyetographs were truncated at the 24-hour depth reported by NOAA.

Probable Maximum Precipitation Storm

Stantec developed the PMP storm depths and distributions using the Arizona Department of Water Resources (ADWR) PMP Evaluation Tool (ADWR, 2013). The PMP evaluation tool, completed in 2013, was developed to supersede Hydrometeorological Report (HMR) 49. The ADWR PMP study used a similar approach to the HMRs, but adds more data and improved analytical techniques. The tool produces gridded PMP values using a grid spacing of approximately 2.5 square miles to allow site-specific estimation of precipitation depths. The Pipeline Arroyo watershed, including the Mine Site and Mill Site, is within the ADWR PMP study boundaries (Figure 6).

The PMP tool provides PMP depths and distributions for three different storm types: (1) local convective storms, (2) remnant tropical storms, and (3) general frontal storms. These calculations use local convective storms because they produce the most intense rainfall of the three storm types, and will generate the peak flood flows for design of surface water controls. The PMP tool provides PMP depths for the local convective storm PMP (hereafter referred to as PMP), depths at 1-hour intervals for storm durations between 1 hour and 6 hours. Stantec computed area-weighted PMP depths for the Pipeline Arroyo Watershed model and for the Mill Site Sub-Catchments model from the gridded PMP depths. These area-weighted averages are shown in Table 3.

The ADWR PMP study also developed a standard hyetograph for the 6-hour PMP on 10-minute time steps. The hyetograph was developed using a center-peaking distribution, similar to the development of the frequency-based storm hyetographs described above and which is an accepted storm distribution method given by the New Mexico Office of the State Engineer for the hydrologic analysis of dams (NMOSE, 2008). Because the response times for the Mill Site and Pipeline Arroyo watersheds are estimated to be much less than 6 hours, a 6-hour storm distribution may not produce peak runoff compared to shorter, more intense PMP durations. Consequently, Stantec developed distributions for 1-hour to 5-hour storms from the 6-hour PMP storm by scaling the relative intensities for the most intense period of the 6-hour PMP distribution to the ratio of the total 6-hour PMP depth and the total depth of the other storm durations. Figure 7 shows the cumulative hyetographs of storms of durations between 1 hour and 6 hours.

PMP depths and distributions for the Pipeline Arroyo Watershed were slightly different than for the Mill Site watershed, owing to the difference in watershed areas and averaging of the PMP tool grid cells (Figure 8).

The PMP and frequency-based storm hyetographs are presented in Attachment B of this calculation brief.

Rainfall Losses

The hydrologic models compute rainfall losses from depression storage and infiltration (Green-Ampt). Final values for rainfall loss parameters for each catchment in the models are provided in Attachment C of this calculation brief.

Depression Storage

Stantec specified a depression storage value of 0.15 inches for all areas excluding the tailings disposal area and mine waste repository. This value is mid-range of the values recommended for alluvial plains near Albuquerque, New Mexico (Sabol et al., 1982a). Stantec specified a depression storage value of 0.05 inches for the TDA, including the repository area, to account for lower storage that is expected on the engineered cover compared to the native alluvial plains. A value of 0.20 was applied for the Mine Site construction phase model to estimate roughness produced by roughening the surface of the RA impacted areas. For the Haul Road model, no depression storage was assumed.

Infiltration Losses

The hydrologic models use the Green and Ampt (1911) method to simulate losses due to infiltration. Stantec specified Green and Ampt parameters for individual catchments based on information in the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) gridded Soil Survey Geographic (gSSURGO) database for the state of New Mexico, with adjustments made for vegetation coverage. The gSSURGO database shows three general groups of soils within the Pipeline Arroyo watershed: (1) upland mesas composed of shallow sandy clay loam to loamy soils with medium to high runoff potential, (2) steep transition zones dominated with rock outcrops and limited soil cover consisting of sandy clays, and (3) alluvium valley floors with primarily deep fine sand with mixed silty clay layers overlying sedimentary bedrock. The gSSURGO database further maps soils into 20 soils groups (excluding a “Uranium Mined Land” group). Stantec assigned representative bare ground saturated hydraulic conductivity (Ksat) values to each of the 20 groups by approximating a harmonic average of the soil horizons within the upper 30 centimeters. The assigned bare ground Ksat values are listed in Table 5 and the bare ground Ksat distribution for the Pipeline Arroyo Watershed is shown in Figure 9. Stantec compared these assigned values to measured values for similar New Mexico soils (Sabol et al., 1982a, 1982b) and found them consistent. Stantec assigned Ksat values for “Uranium Mined Lands” based on visual observations and previous site characterization reports (Canonie, 1991; MWH, 2014a and 2014b).

After determining the individual soil unit polygon bare ground Ksat values; Stantec computed the catchment-composite bare ground Ksat using the area-weighted logarithmic expression shown in Equation 2:

$$\overline{K}_{S,BG} = 10^{\wedge}\left(\frac{\sum_i^n A_i * \log(K_{S,BG,i})}{A_t}\right) \quad \textbf{[Eq.2]}$$

Where:

$\overline{K}_{S,BG}$	=	The composite bare ground saturated hydraulic conductivity for each soil map unit
$K_{S,BG,i}$	=	The soil subarea bare ground saturated hydraulic conductivity that intersects the watershed
A_i	=	The subarea
A_i	=	The size of the watershed (composite) area

Stantec adjusted the bare ground Ksat values to account for impacts of vegetation using the conductivity ratio calculated in Equation 3 (ADWR, 2007):

$$V_c \geq 10;\;\; C_k = \frac{(V_c - 10)}{90} + 1.0$$ **[Eq.3]**

$$V_c < 10;\;\; C_k = 1.0$$

Where:

C_k = Conductivity ratio of vegetated to bare ground Ksat
V_c = Vegetation cover (%)

Stantec approximated vegetation coverage using the 2011 National Land Cover Database (NLCD; see Homer et al., 2015) from the USDA-NRCS Geospatial Data Gateway website. Vegetation across the Pipeline Arroyo Watershed is shown on Figure 10.

Stantec only considered the regions coded as Evergreen Forest to determine the percentage of vegetation cover. The percent vegetation coverage for the individual watersheds of the existing condition Pipeline Arroyo are shown on Figure 11.

Stantec adjusted the percent vegetation coverage from the listed NCLD values for the Mine Site model and for the post RA Mill Site area. For the Mine Site model, Stantec set the vegetation percentage to zero for areas selected for soil removal during the RA. Stantec specified a 25 percent vegetation cover for the watersheds located on the TDA and just outside of the TDA.

Stantec used the relationship shown on Figure 12 to relate the composite bare ground Ksat values to soil moisture deficit and soil suction values.

Hydrograph Transform

The hydrologic model uses the synthetic Clark Unit Hydrograph (UH) to transform rainfall excess to a runoff hydrograph at a catchment outlet. The Clark UH requires estimation of two parameters: the time of concentration, Tc, and the storage coefficient, R, which represent the time translation and attenuation of a flood wave within a watershed.

Time of Concentration

Tc values were estimated using two different methods: (1) the empirically based Sabol (1993) Tc equation, and (2) the velocity-based method (McCuen et al., 2002). These approaches are described in following sections, and worksheets for the calculation of the Tc and R values are provided in Attachment D of this calculation brief. Stantec used two different Tc methods because each method is more appropriate for different types of catchments. The Sabol (1993) time of concentration method is more appropriate for native catchments. The velocity-based time of concentration method (McCuen et al., 2002) is more appropriate for catchments with drainage dominated by engineered channels or where engineered practices have modified runoff slopes (i.e., the catchments containing the lower Mine Site and the tailings repository).

As presented below, the Sabol Tc method produces a Tc value that is constant for all storms; whereas, the velocity-based method produces a Tc that varies with the peak storm intensity. Also note that, that Tc is an input to calculating R. Therefore, for the velocity-based method, Tc and R both vary with the design storm intensity.

Sabol Tc Method

The Sabol (1993) time of concentration, developed specifically for the desert southwest, is calculated as shown in Equation 4:

$$T_c = 2.4 * A^{0.1} * L^{0.25} * \ L_{ca}{}^{0.25} * S^{-0.2} \qquad \textbf{[Eq.4]}$$

Where:

T_c	=	Time of concentration (hours)
A	=	Area (square miles)
L	=	Hydraulically most distant length (miles)
L_{ca}	=	Length along the longest flow path from centroid (miles)
S	=	Slope along the longest flow path (ft/mile)

Velocity-Based Method

The velocity-based method computes the Tc as the sum of (1) the sheet flow travel time, (2) shallow concentrated flow travel time, and (3) open channel flow travel time, shown by Equation 5 (McCuen et al., 2002):

$$T_c = \ T_{sf} + T_{sc} + T_{oc} \qquad \textbf{[Eq.5]}$$

Where:

T_c	=	Time of concentration (hours)
T_{sf}	=	Sheet flow travel time (hours)
T_{sc}	=	Shallow concentrated flow travel time (hours)
T_{oc}	=	Open channel flow travel time (hours)

The following subsections describe methods used to estimate sheet flow, shallow concentrated flow, and open channel flow parameters.

Sheet Flow Travel Time, T_{sf}

The sheet flow travel time, T_{sf}, was calculated using Equation 6 (McCuen et al., 2002):

$$T_{sf} = \frac{0.93}{i^{0.4}}\left(\frac{nL}{\sqrt{S_{sf}}}\right)^{0.6} \ / \ 60 \qquad \textbf{[Eq.6]}$$

Where:

T_{sf}	=	Sheet flow travel time (hours)
i	=	Rainfall intensity for storm of Tc duration (inches/hour)
n	=	Manning's roughness coefficient
S_{sf}	=	Surface slope along the flow path length (feet/feet)
L_{sf}	=	Flow path length (feet) with a maximum distance of 100 feet or nL/S^0.5
60	=	Conversion from minutes to hours

Stantec estimated values for L_{sf} and S from available site topography. Manning's n values were estimated from roughness coefficients presented by McCuen et al. (2002, Table 2.1). The roughness values used in the hydrologic analysis are shown in Table 6.

The sheet flow calculation uses iterative computations to solve for storm intensity and the sheet flow travel time. Stantec related storm intensities to travel time using the analytical IDF relationships developed for frequency-based storms. Stantec also developed an analytical IDF relationship for the 1-hour PMP storm.

Shallow Concentrated Flow Travel Time, T_{sc}

The shallow concentrated flow travel time, T_{sc}, was calculated using Equation 7 and Equation 8 (McCuen et al., 2002):

$$T_{sc} = \frac{L_{sc}}{V_{sc} * 3600} \quad \textbf{[Eq.7]}$$

Where:

T_{sc}	=	Time of concentration (hours)
L_{sc}	=	Shallow concentrated flow path length (feet)
V_{sc}	=	Shallow concentrated flow velocity (feet per second)
3600	=	Conversion from seconds to hours

$$V_{sc} = 33 * k * \sqrt{S_{sc}} \quad \textbf{[Eq.8]}$$

Where:

V_{sc}	=	Shallow concentrated flow velocity (feet per second)
k	=	Velocity-slope relationship constant
S_{sc}	=	Surface slope along the flow path length (feet/feet)

Stantec estimated values for L_{sc} and S from the available site topography and then computed the shallow concentrated flow coefficient, k, using McCuen (2002, Table 2.2). The values selected for hydrologic analysis are shown in Table 7.

Open Channel (Concentrated Flow) Travel Time, T_{oc}

The open channel flow travel time, T_{oc}, was calculated Equation 9:

$$T_{oc} = \frac{L_{oc}}{V_{oc} * 3600} \quad \textbf{[Eq.9]}$$

Where:

T_{oc}	=	Open channel travel time (hours)
V_{oc}	=	Open channel flow velocity (feet per second)
3600	=	Conversion from seconds to hours (seconds/hour)

Open channel flow velocity is calculated using Manning's equation as given in Equation 10:

$$V_{oc} = \frac{1.486}{n} * Rh^{2/3} * S_{oc}{}^{0.5} \quad \textbf{[Eq.10]}$$

Where:

V_{oc}	=	Open channel flow velocity (feet per second)
n	=	Manning's roughness coefficient

Rh = Hydraulic radius of the cross sectional flow area (feet)
S_{oc} = Surface slope along the flow path length (feet/feet)

Values for L_{sc} and S were estimated from the available site topography. Manning's roughness coefficient values, n, were determined from (Chow et al., 1988). The values selected for hydrologic analysis are shown in Table 8.

Manning's equation was solved iteratively to find a flow depth (and hydraulic radius) that satisfied the overall Tc. The representative flow used to compute the depth in the equations was 2/3 of the simulated peak flow at catchment outlet (NMDOT, 1995).

Clark Unit Hydrograph Storage Coefficient (R Parameter)

The Clark UH R parameter was computed using the Sabol (1993) equation as shown in Equation 11:

$$R = 0.37 * T_c^{1.11} * L^{0.80} * A^{-0.57} \quad \textbf{[Eq.11]}$$

Where:
R = Clark UH storage coefficient (hours)
T_c = Time of concentration as calculated in Section 5.1 or 5.2 (hours)
L = Length of the longest hydraulic flow path (miles)
A = Area (square miles)

Channel Routing

The hydrologic models use the Muskingum-Cunge method to simulate routing through natural and engineered channels between catchment outlet points. The Muskingum-Cunge method couples the Manning formula and the convective-diffusion equation to compute the hydrograph travel time and hydrograph peak attenuation through a channel reach. No additional losses were applied to the channel reaches; therefore, only minor attenuation of the peak flows were observed, indicating that channel reach specifications have a limited impact on the modeled peak flows.

For completeness, channel dimensions were estimated using aerial survey data or using the design topography for the RA. These channel dimensions are simplified versions of the actual channel geometry (which again, have limited impact on the estimated peak flow values). Channel roughness of 0.04 were assigned to most reaches; however, the North Diversion Channel segment ND02, ND04, and ND05 were adjusted to correspond more closely with the HEC-RAS model described in Attachment I.2. Routing parameters for the Pipeline Arroyo watershed model, Mill Site model, and Mine Site model are listed in Attachment E of this calculation brief.

Reservoir Routing

The models route stormwater through the Mine Site ponds (for the Mine Site model) using the Modified Puls (level-pool) routing method. Stantec computed the stage-area curve relationships using site topographic files and the average-end-area method. Stage-area-storage values for existing Mine Site Pond 1, Pond 2, Pond 3, Pond 4, and Pond 5 are provided in Attachment F of this calculation brief. With the exception of Pond 3, none of the existing ponds have controlled outlets. Pond 3 has an existing box culvert that acts as an emergency overflow. Otherwise, as the volume of the ponds is exceeded, flow passes downstream by overflowing the pond embankment. Table 9 shows how overflows were simulated in HEC-HMS. Stantec also developed a stage-area-storage relationship for the temporary channel "plug" proposed for the Mine Site construction RA phases (see Section 3 Drawings). This stage-area-storage relationship is also given in Attachment F. The model assumes that the plug retains water up to an elevation of 7,088 ft above mean sea level (amsl) and then overtops as a broad-crested weir. The design parameters for the broad-crested weir are given in Table 9.

Assumptions

Assumptions used in these calculations are described with the explanation of methods.

Calculations

Input parameters for the hydrologic models are provided in Attachments.

Results

The simulated peak flows locations shown on Figures 1, 2, and 3 are listed in Table 10. Tables in Attachment G list runoff drainage areas, peak flows, and total runoff volumes for all model elements shown in Attachment A.

Conclusions

Results shown in Table 10 are for use in design of channels and other stormwater controls for the Northeast Church Rock RA.

Attachments

- Attachment A – Watershed Delineation Maps, HEC-HMS Element Construction, Watershed Area Tables
- Attachment B – Storm Hyetograph Tables
- Attachment C – Rainfall Loss Parameters Tables
- Attachment D – Clark Unit Hydrograph Parameter Calculation Tables
- Attachment E – Channel Routing Parameters Tables
- Attachment F – Reservoir Stage-Area-Storage Tables
- Attachment G – HEC-HMS Model Results

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TABLES

Table 1: Flow Calculation Points and Design Purposes

Flow Calculation Locations	Design/Evaluation Element Purpose	Corresponding Calculation Brief
Pipeline Arroyo at the location of the “nickpoint” rock outcrop and upstream of the tailings disposal area (TDA) after removal action (RA) is complete (post-RA conditions).	Design of riprap chute for Pipeline Arroyo Stabilization	Attachments I.7, I.8
Pipeline Arroyo above the TDA	Hydraulic simulations for the Upper Pipeline Arroyo	Attachment I.6
North Diversion Channel at locations in the south and east reaches	North Diversion Channel	Attachment I.5
Several locations within the existing and proposed repository channels and tributary channels (Swale B and proposed Dilco Hill channels), and the Runoff Control Ditch under post-RA conditions.	Repository drainage channels	Attachments I.2, I.3, I.4
In the engineered channel protecting the unnamed arroyo at the outfall of the Mine Site under post-RA conditions.	Mine Site Outlet Channel	Attachment F.1
Various locations within the NECR Mine Site relevant to stormwater controls during implementation of the RA (during construction).	Stormwater controls for Mine Site removal construction phasing.	Appendix C
Various locations along the temporary haul road route and construction support facilities	Stormwater controls for haul roads and construction support facilities	Attachment D.1

Table 2: NOAA PDFS Depth-Duration Values for 2-; 5-; 10-; 100-; 200-; 1,000-; and 10,000-year Return Interval Storms

Duration (Minute)	Depth (inches)						
	2-year storm	5-year storm	10-year storm	100-year storm	200-year storm	1,000-year storm	10,000-year storm[1]
5	0.21	0.3	0.37	0.61	0.69	0.89	1.21
10	0.31	0.46	0.56	0.92	1.04	1.36	1.86
15	0.39	0.57	0.69	1.14	1.29	1.69	2.31
30	0.52	0.76	0.93	1.54	1.75	2.27	3.09
60	0.65	0.94	1.15	1.91	2.16	2.81	3.84
120	0.77	1.11	1.36	2.28	2.60	3.44	4.82
180	0.83	1.17	1.42	2.35	2.67	3.52	4.93
300	0.95	1.31	1.57	2.50	2.81	3.63	4.92
720	1.10	1.5	1.77	2.69	3.00	3.82	5.05
1440	1.17	1.6	1.91	2.99	3.34	4.21	5.54

1. 10,000-year values were extrapolated from Gumbel distributions of 2- to 1000-year storms for each storm duration.

Table 3: Fitting Parameters for the 2-, 5-, 100-, 200-, 1000-, and 10000-year Return Interval Storms

Storm	c	e	f
2-year, 24-hour	22.77	0.831	5.26
5-year, 24-hour	42.23	0.884	7.59
10-year, 24-hour	47.37	0.867	6.65
100-year, 24-hour	78.29	0.867	6.70
200-year, 24-hour	88.53	0.867	6.70
1,000-year, 24-hour	124.15	0.880	7.53
10,000-year, 24-hour	171.00	0.880	7.69

Table 4: Area-Weighted Averaged PMP Depths for the Pipeline Arroyo Watershed and Mill Site Sub-Catchments Models

Storm Duration (hour)	Total Depth (inches)	
	Mill Site	Pipeline Arroyo
1	6.18	6.14
2	6.49	6.45
3	6.51	6.46
4	6.51	6.46
5	6.51	6.46
6	6.51	6.54

Note: The small incremental difference been the 1-hour and 6-hour PMP is correctly derived from the Arizona Department of Water Resources PMP Evaluation Tool.

Table 5: Assigned Bare Ground Saturated Hydraulic Conductivity Values

Name	MUKEY[1]	State	Runoff Class	$K_{S,BG}$ (in/hr)
Sparank-San Mateo-Zia Complex 0-3 percent slopes	57984	AZ	Medium	1.12
Sparank-San Mateo-Zia Complex 0-3 percent slopes	57234	NM	Medium	1.12
Toldohn-Vessilla-Rock Outcrop Complex 8-to-35% Slope	57987	AZ	Very High	0.46
Toldohn-Vessilla-Rock Outcrop Complex 8-to-35% Slope	57260	NM	Very High	0.46
Evpark_Arabrab complex, 2 to 6 percent slopes	58103	AZ	High	0.41
Evpark_Arabrab complex, 2 to 6 percent slopes	57255	NM	High	0.41
Buckle fine sandy loam, 1 to 8 percent	57322	NM	Low	1.65
Doakum fine sandy loam, 2 to 8 percent slopes	58071	AZ	Low	1.65
Vessilla-Rock Outcrop complex, 2 to 15 percent slopes	57269	NM	Medium	1.21
Rock outcrop-Eagleye-Teesto family complex, 35 to 70 percent slopes	58091	AZ	High	0.24
Rock outcrop-Eagleye-Atchee complex, 35 to 70 percent slopes	57332	NM	High	0.24
Rock outcrop-Techado-Stozuni complex, 5 to 60 percent slopes	57281	NM	High	0.24
Parkelei sandy loam, 1 to 8 percent slopes	57248	NM	Low	1.44
Mentmore loam, 1 to 8 percent slopes	57328	NM	Medium	1.00
Parkelei family-Evpark complex, 2 to 8 percent slopes	58065	AZ	High	0.50
Parkelei-Evpark fine sandy loams, 2 to 8 percent slopes	57313	NM	High	0.50
Parkelei family-Fraguni complex, 1 to 8 percent slopes	58066	AZ	Very Low	2.15
Parkelei-Fraguni complex, 1 to 8 percent slopes	57253	NM	Very Low	2.15
Parkelei family-Hosta complex, 3 to 8 percent slopes	57986	AZ	High	0.50
Uranium mined lands	57239	NM	<null>	<varies>

1. MUKEY (map unit key): ID number used to define unique soils in the NRCS SSURGO Database.

Table 6: Sheet Flow Roughness Values

n	McCuen Description	NECR Land Surface
0.015 [1]	Roughened asphalt	Asphalt surface
0.05	Fallow (no residue)	Bare/roughened dirt surface
0.06	Cultivated; Residue cover <= 20%	Surface with limited vegetation
0.13	Range (natural)	Vegetated surface or expected vegetation

1. Estimated from available table values presented by McCuen et al. (2002).

Table 7: Shallow Concentrated Flow Coefficients

k	McCuen Description	NECR Land Surface
0.213	Short grass pasture (overland flow)	Vegetated surface or expected vegetation
0.305	Nearly bare and untilled (overland flow); alluvial fans in western mountain regions	Little vegetation, gradual slope
0.491	Unpaved (shallow concentrated flow)	Little vegetation, steep slope

Table 8: Manning Coefficients Selected for Open Channel Flow

n	Description
0.03	Clean, straight stream
0.04	Clean, winding stream
0.05	Light brush and weeds
0.07	Dense brush

Table 9: Pond Outlets Specified for Hydrologic Modeling

Pond	Structure	HEC-HMS Inputs Specified
Pond 1	Dam Top	Elevation: 7123 feet; Length: 20 feet; Coefficient: 2.64; Top Elevation: 7124 feet
Pond 2	Dam Top	Elevation: 7123 feet; Length: 40 feet; Coefficient: 2.64; Top Elevation: 7124 feet
Pond 3	Culvert	Shape: Box; Chart 10; Scale 1; Length: 40 feet; Rise: 4 feet; Span: 10 feet; Entrance Coefficient: 0.8; Outlet Elevation: 7077 feet; Exit Coefficient: 0.8; Manning's n: 0.004; Top Elevation: 7084 feet
	Dam Top	Elevation: 7123 feet; Length: 20 feet; Coefficient 2.64
Pond 4	Dam Top	Elevation: 7054 feet; Length: 40 feet; Coefficient 2.64; Top Elevation: 7056 feet
Pond 5	Dam Top	Elevation: 7050 feet; Length: 40 feet; Coefficient 2.64; Top Elevation: 7052 feet
Temporary Plug	Broad Crested Weir Spillway	Elevation: 7088 feet; Length: 4 feet; Coefficient 1.5; Top Elevation 7089 feet

Table 10: Simulated Peak Flows at Locations of Interest for the Remedial Design

Report Section	Design Element	Watershed Model	HEC-HMS Element	Design Event	Peak Flow (cfs)
I.2	North Diversion Channel - Lower	Mill Site (Post-RA)	J-ND02ds	PMF; 1hr PMP	2,861
I.2	North Diversion Channel - Middle	Mill Site (Post-RA)	J-ND02us	PMF; 1hr PMP	2,788
I.2	North Diversion Channel - Upper	Mill Site (Post-RA)	J-ND04us	PMF; 1hr PMP	982
I.3	East Repository Channel STA 00+00 to 18+50	Mill Site (Post-RA)	6	PMF; 1hr PMP	98
I.3	East Repository Channel STA 18+50 to 28+30	Mill Site (Post-RA)	J-SCds	PMF; 1hr PMP	140
I.3	East Repository Channel STA 28+30 to 34+60	Mill Site (Post-RA)	J-RC04ds	PMF; 1hr PMP	228
I.3	East Repository Channel STA 34+60 to 41+39	Mill Site (Post-RA)	J-RC03ds	PMF; 1hr PMP	274
I.3	Dilco Hill Channel A	Mill Site (Post-RA)	2	PMF; 1hr PMP	14
I.3	Dilco Hill Channel B	Mill Site (Post-RA)	1	PMF; 1hr PMP	8.5
I.3	Branch Swale H	Pipeline Arroyo (Post-RA)	44	PMF; 1hr PMP	120
I.3	Runoff Control Ditch	Mill Site (Post-RA)	5	PMF; 1hr PMP	143
I.3	North Cell Drainage Channel	Mill Site (Post-RA)	J-RC01ds	PMF; 1hr PMP	361
I.4	East Repository Channel STA 34+60 to 41+39	Mill Site (Post-RA)	J-RC03ds	10yr	22.1
I.4	East Repository Channel STA 34+60 to 41+39	Mill Site (Post-RA)	J-RC03ds	2yr	3.9
I.4	Dilco Hill Channel A	Mill Site (Post-RA)	2	10yr	1.3
I.4	Dilco Hill Channel A	Mill Site (Post-RA)	2	2yr	0.1
I.4	Dilco Hill Channel B	Mill Site (Post-RA)	1	10yr	0.6
I.4	Dilco Hill Channel B	Mill Site (Post-RA)	1	2yr	0.03

Report Section	Design Element	Watershed Model	HEC-HMS Element	Design Event	Peak Flow (cfs)
I.5	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	PMF; 1hr PMP	27,502
I.5	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	10000yr	17,411
I.5	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	1000yr	10,425
I.5	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	200yr	6,397
I.5	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	100yr	4,932
I.5	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	5yr	298
I.6	Northern Flow into Alluvial Fan Area	Pipeline Arroyo (Post-RA)	J-R12us	PMF; 1hr PMP	25,704
I.6	Northern Flow into Alluvial Fan Area	Pipeline Arroyo (Post-RA)	J-R12us	100yr	4612
I.6	Northern Flow into Alluvial Fan Area	Pipeline Arroyo (Post-RA)	J-R12us	5yr	261
I.6	Eastern Flow into Alluvial Fan Area	Pipeline Arroyo (Post-RA)	J-R11us	PMF; 1hr PMP	2,616
I.6	Eastern Flow into Alluvial Fan Area	Pipeline Arroyo (Post-RA)	J-R11us	100yr	623
I.6	Eastern Flow into Alluvial Fan Area	Pipeline Arroyo (Post-RA)	J-R11us	5yr	46
I.7	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	PMF; 1hr PMP	27,502
I.7	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	10000yr	17,411
I.7	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	1000yr	10,425
I.7	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	200yr	6,397
I.7	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	100yr	4,932
I.7	Pipeline Arroyo	Pipeline Arroyo (Post-RA)	Outlet/R15ds	5yr	298
I.7	Pipeline Arroyo	Pipeline (Existing)	Outlet/R15ds	PMF; 1hr PMP	26,759

Report Section	Design Element	Watershed Model	HEC-HMS Element	Design Event	Peak Flow (cfs)
I.7	Pipeline Arroyo	Pipeline (Existing)	Outlet/R15ds	100yr	4,766
I.7	Pipeline Arroyo	Pipeline (Existing)	Outlet/R15ds	2yr	3.2
C	Diversion Berm Upstream of Pond 3, RA-Phase 3	Mine Site (Construction Phase 3)	R-J3ds/Berm1	2yr	0
C	Diversion Berm Near Haul Road, RA-Phase 3	Mine Site (Construction Phase 3)	J-Berm2	2yr	0
C	Diversion Berm/Attenuation Pond Near Haul Road, RA-Phase 3	Mine Site (Construction Phase 3)	Const_Pond	2yr	0
C	Pond 3 Diversion Plug	Mine Site (Construction Phase 3)	R-J3ds/Berm1	2yr	0
D	Temporary Culvert 1	Haul Road	C01	10yr	13.2
D	Temporary Culvert 2	Haul Road	C02	10yr	52.4
D	Temporary Culvert 3	Haul Road	C03	10yr	2.9
D	Temporary Culvert 4	Haul Road	C04	10yr	5.3
D	Temporary Culvert 5	Haul Road	C05	10yr	8.2
D	Temporary Culvert 6	Haul Road	C06	10yr	8
D	Temporary Culvert 7	Haul Road	C07	10yr	8.9
D	Temporary Culvert 8	Haul Road	C08	10yr	19.5
D	Temporary Culvert 9	Haul Road	C09	10yr	72.8
D	Temporary Culvert 10	Haul Road	C10	10yr	16.3
D	Temporary Culvert 11	Pipeline Arroyo (Post-RA)	J-R12ds	5yr	283
D	Temporary Culvert 12	Mill Site (Post-RA)	J-RC01ds	10yr	32.4
D	Temporary Culvert 13	Mill Site (Post-RA)	J-SCds	10yr	13.1
D	Temporary Culvert 14	Mill Site (Post-RA)	J-RC05ds	10yr	5.5
D	Temporary Culvert 15	Mill Site (Post-RA)	J-ND04us	10yr	38.7
D	Temporary Culvert 16	Mill Site (Post-RA)	J-RC03ds	10yr	22.1
D	Temporary Sump 1	Haul Road	S01	10yr	9.7
D	Temporary Sump 2	Haul Road	S02	10yr	5.6

Report Section	Design Element	Watershed Model	HEC-HMS Element	Design Event	Peak Flow (cfs)
D	Temporary Sump 3	Haul Road	S03	10yr	3.1
D	Temporary Sump 4	Haul Road	S04	10yr	2.4
D	Temporary Sump 5	Haul Road	S05	10yr	2.7
D	Temporary Sump 6	Haul Road	S06	10yr	3
D	Temporary Sump 7	Haul Road	S07	10yr	7.7
D	Temporary Sump 8	Haul Road	S08	10yr	3.5
D	Temporary Sump 9	Haul Road	S09	10yr	4.5
D	Temporary Sump 10	Haul Road	S10	10yr	2.1
D	Temporary Sump 11	Haul Road	S11	10yr	3.6
F	Mine outlet channel	Pipeline Arroyo (Post-RA)	31	100yr	206
F	Mine outlet channel at Unnamed Arroyo	Pipeline Arroyo (Post-RA)	J-R16ds	100yr	211

FIGURES

Replace with PDFs of Figure 1, 2, and 3

Hydrology Model Outlet Locations

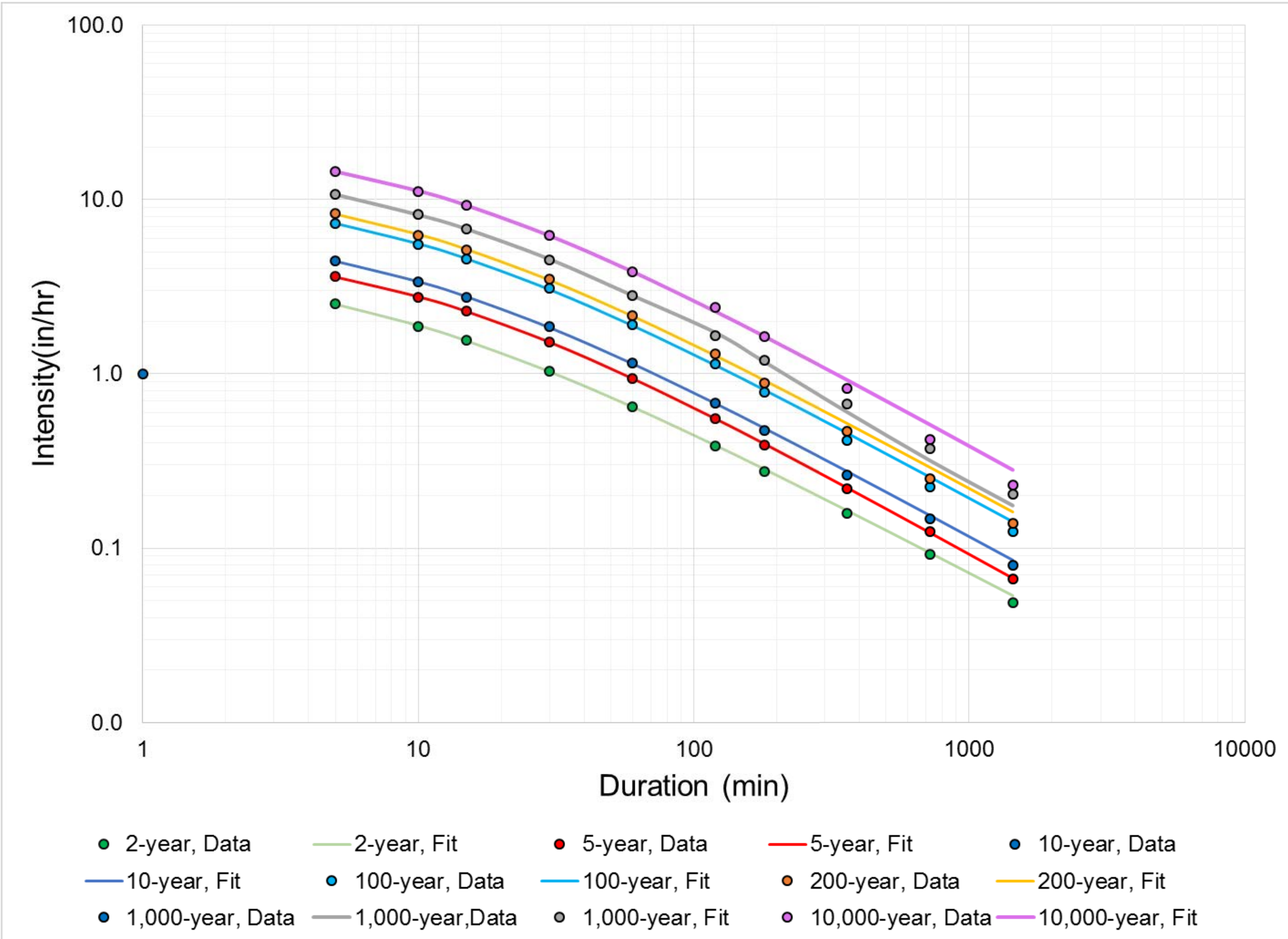

Figure 4: Analytical (fit) Depth-Duration-Frequency Curves Compared to NOAA PDFS Values for 10000-, 1000-, 200-, 100-, 5- and 2-Year Return Intervals

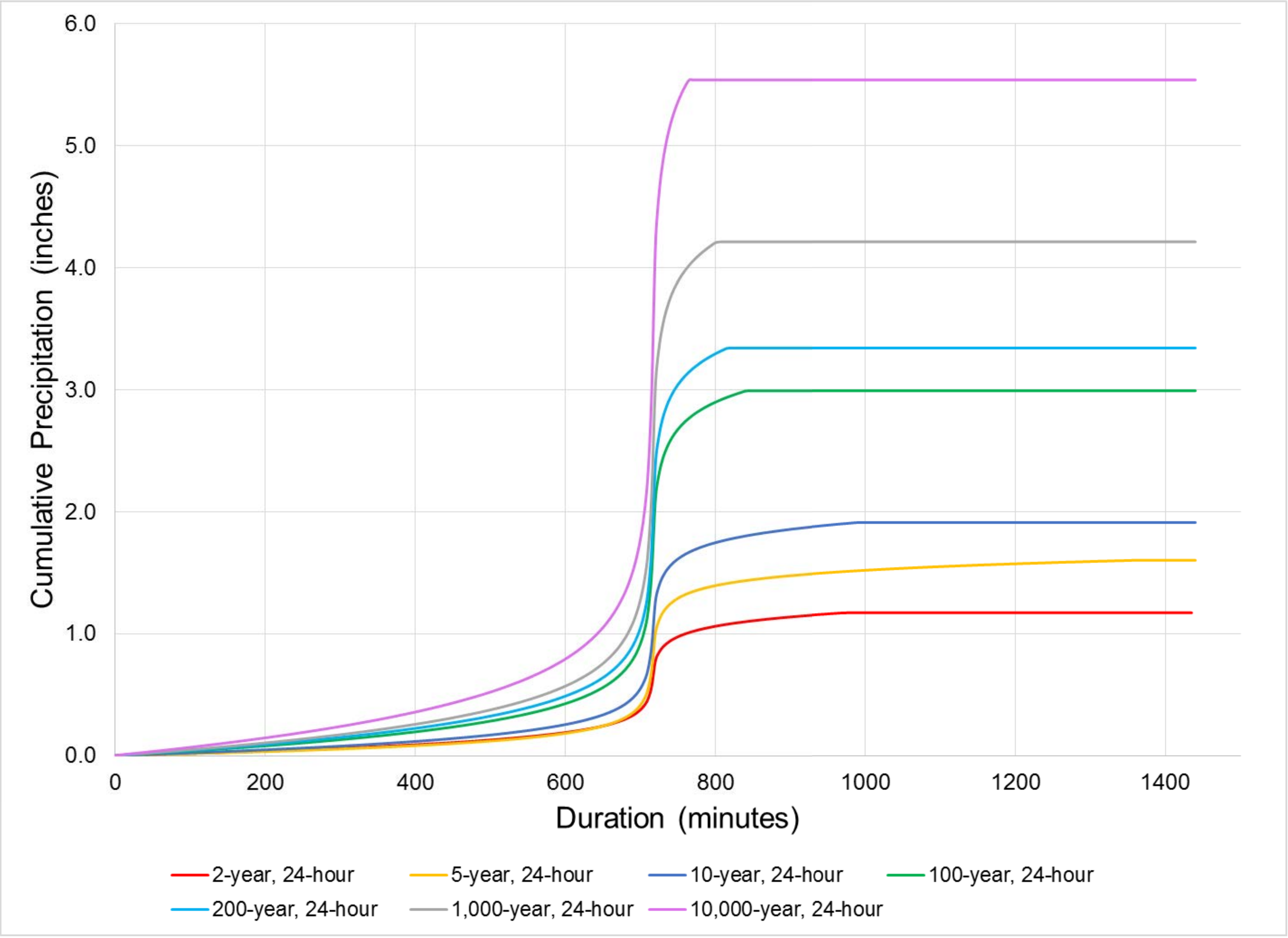

Figure 5: Cumulative Hyetographs for 10000-, 1000-, 200-, 100-, 5- and 2-Year Storm Events

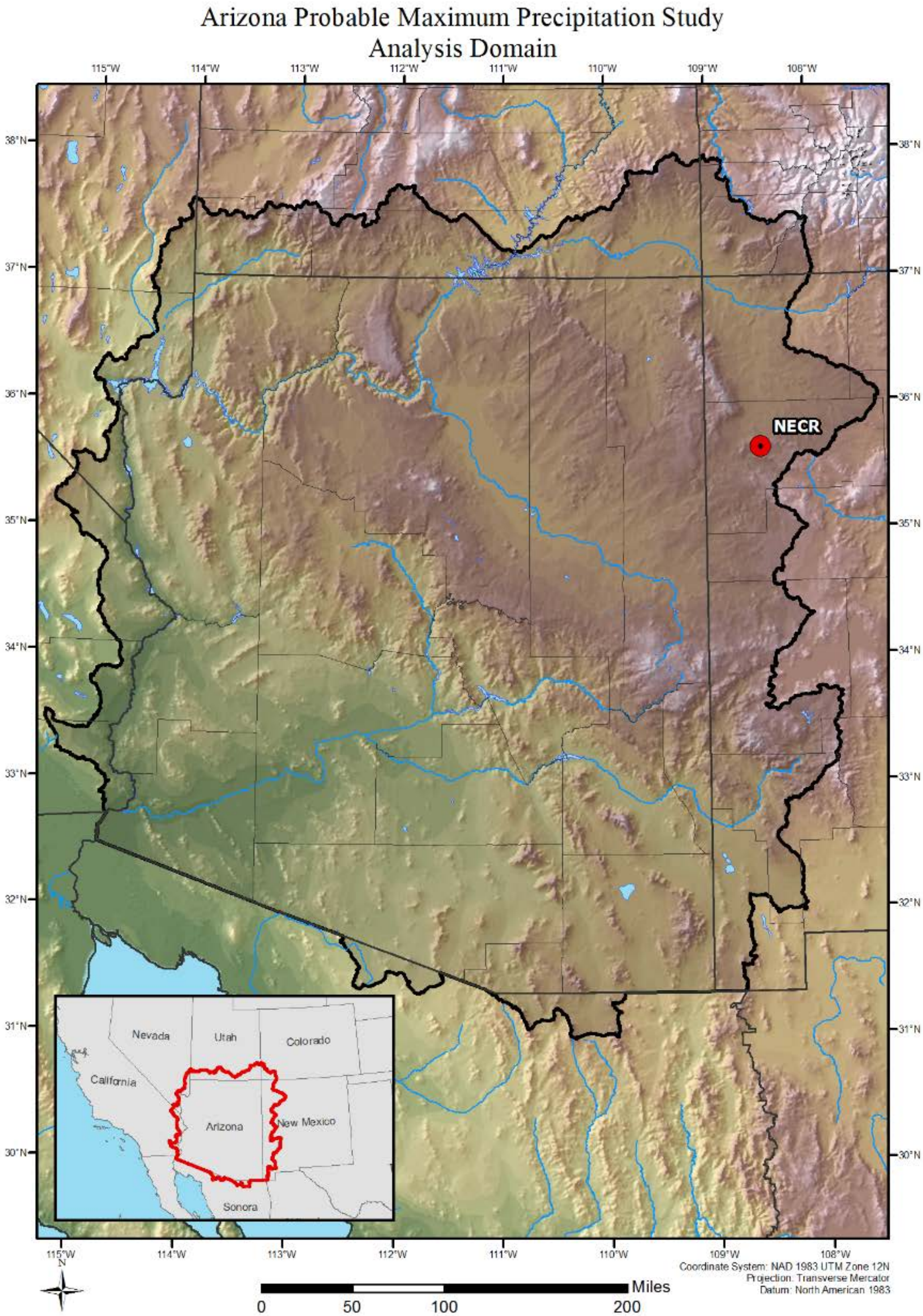

Figure 6: Location of Northeast Church Rock mine in Relation to the Arizona PMP Study Domain

(Source: Applied Weather Associates)

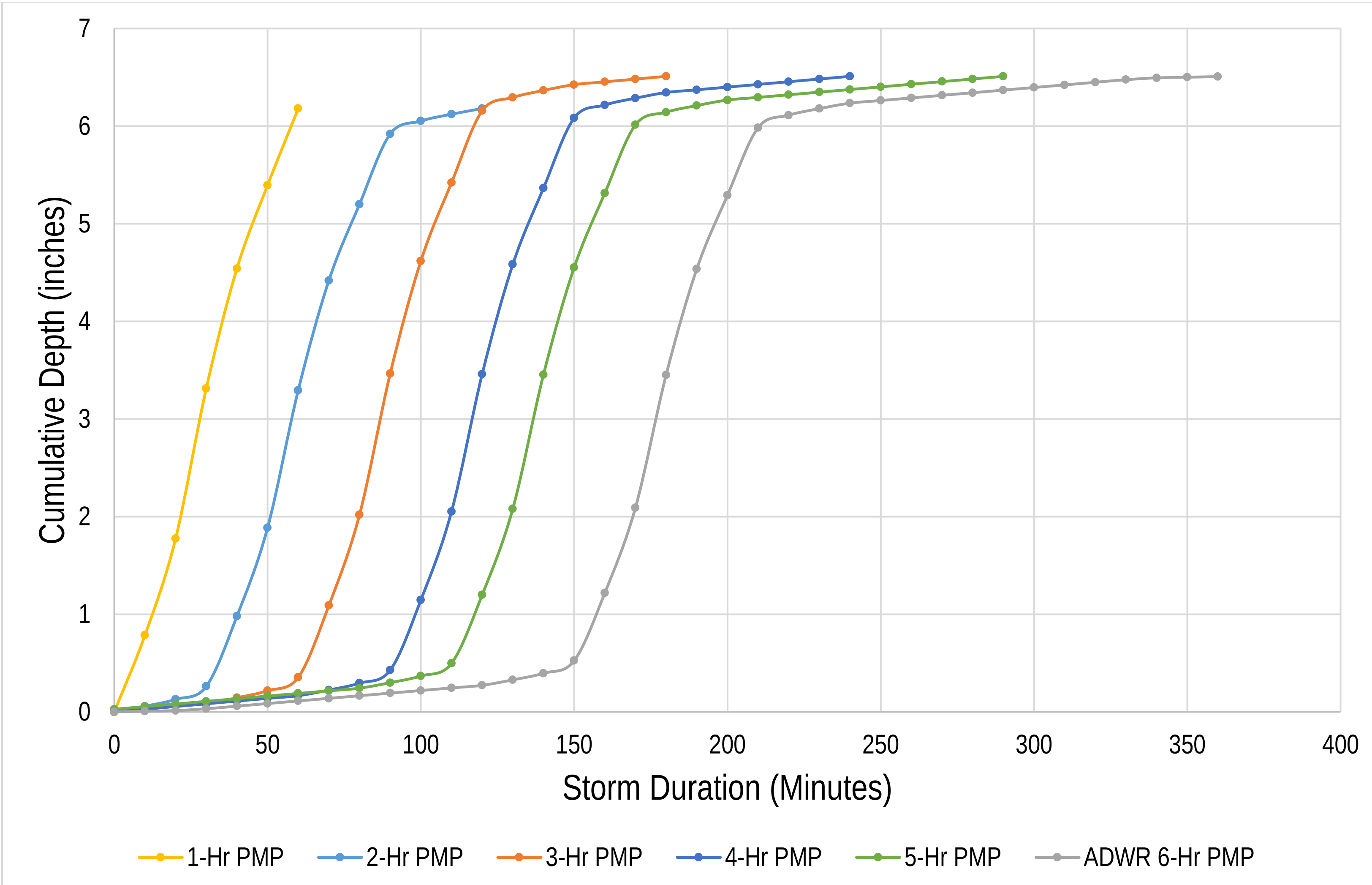

Figure 7: PMP storms for Durations of 1-Hour to 6-Hour PMP for the Pipeline Arroyo Watershed

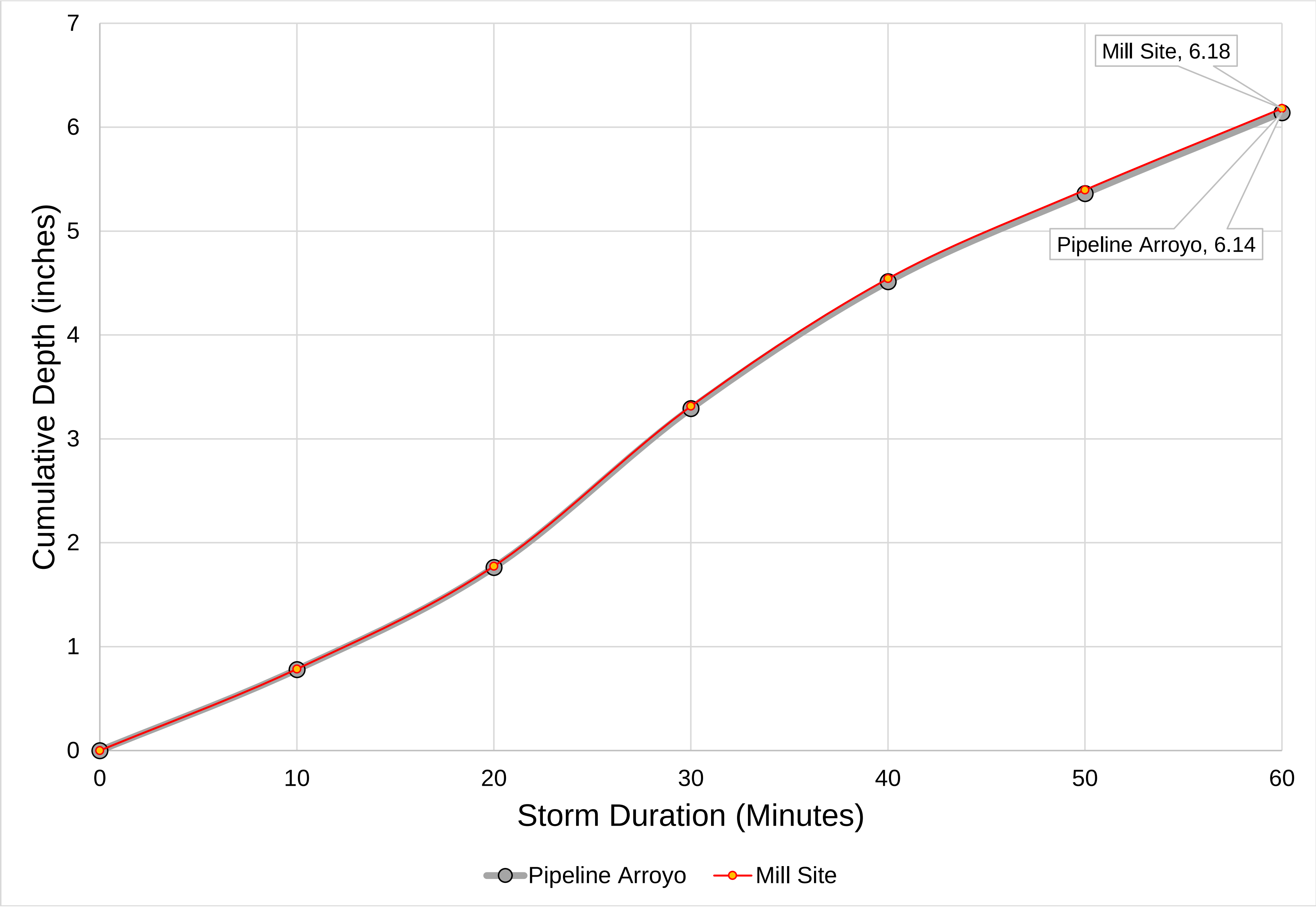

Figure 8: 1-Hour PMP Distributions for the Pipeline Arroyo and Mill Site PMFs

Figure 9: Bare Ground Saturated Hydraulic Conductivities

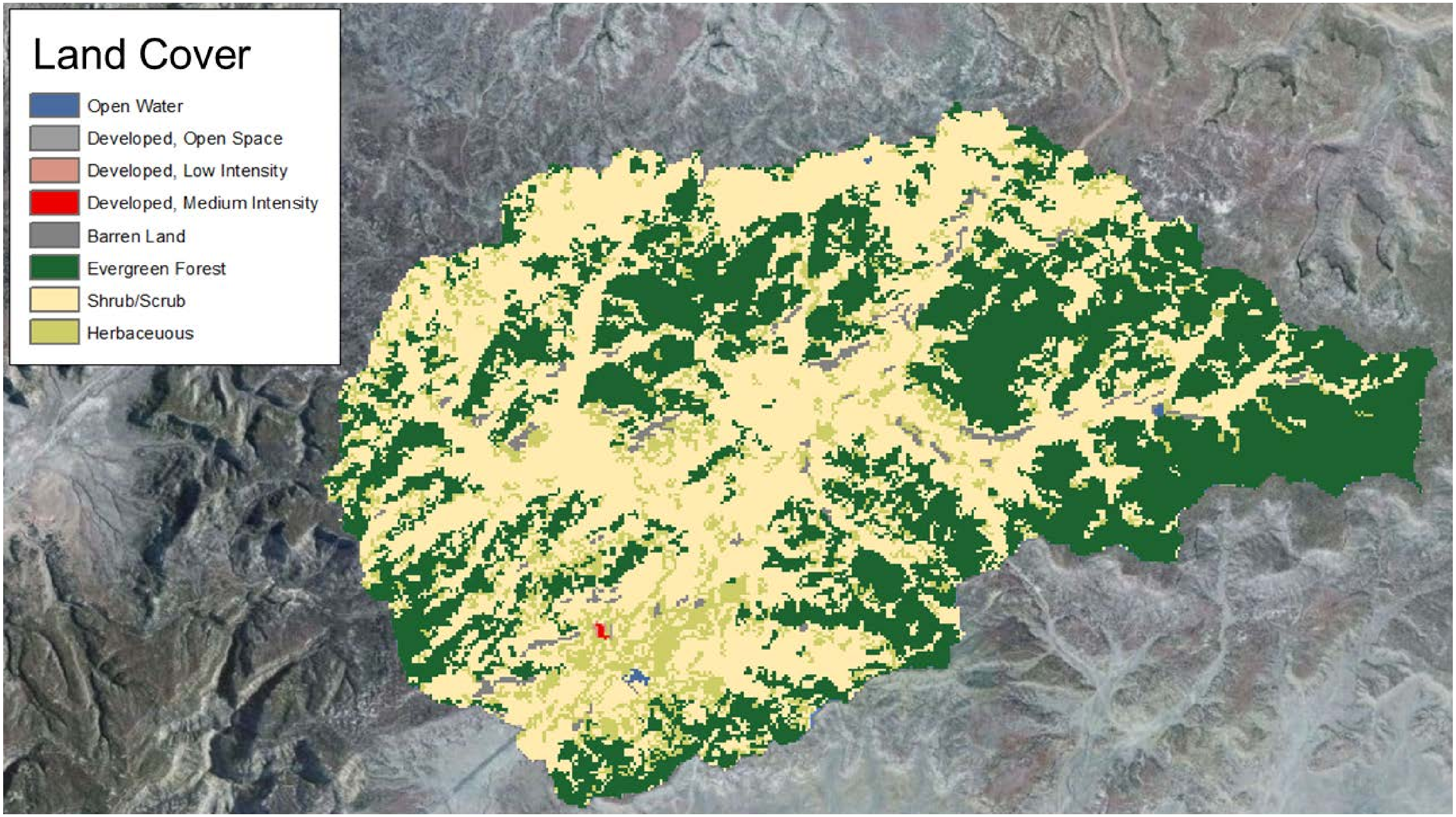

Figure 10: 2011 National Land Cover Database for the Pipeline Arroyo Watershed

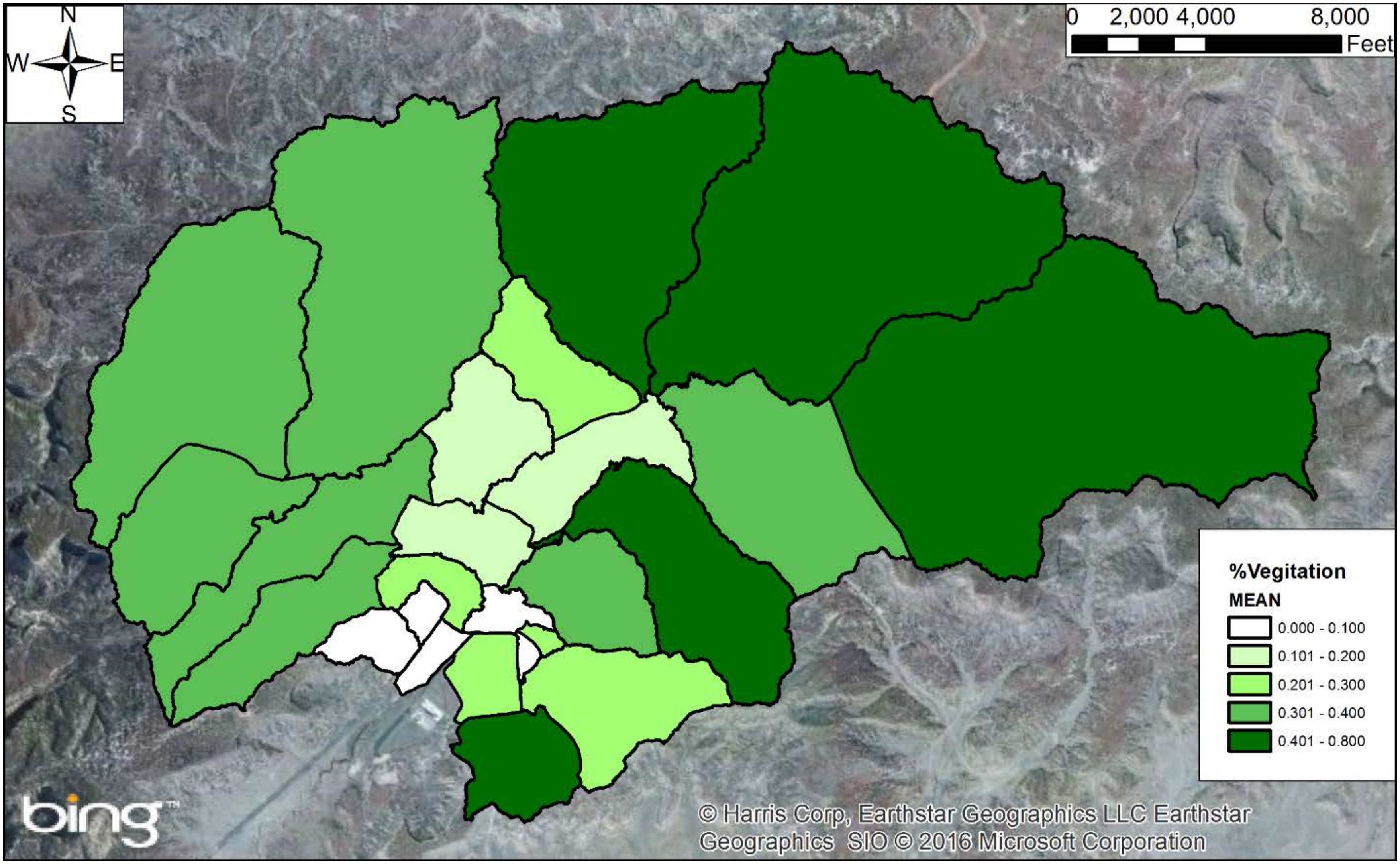

Figure 11: Percent Vegetation Coverage for the Existing Pipeline Arroyo Watersheds

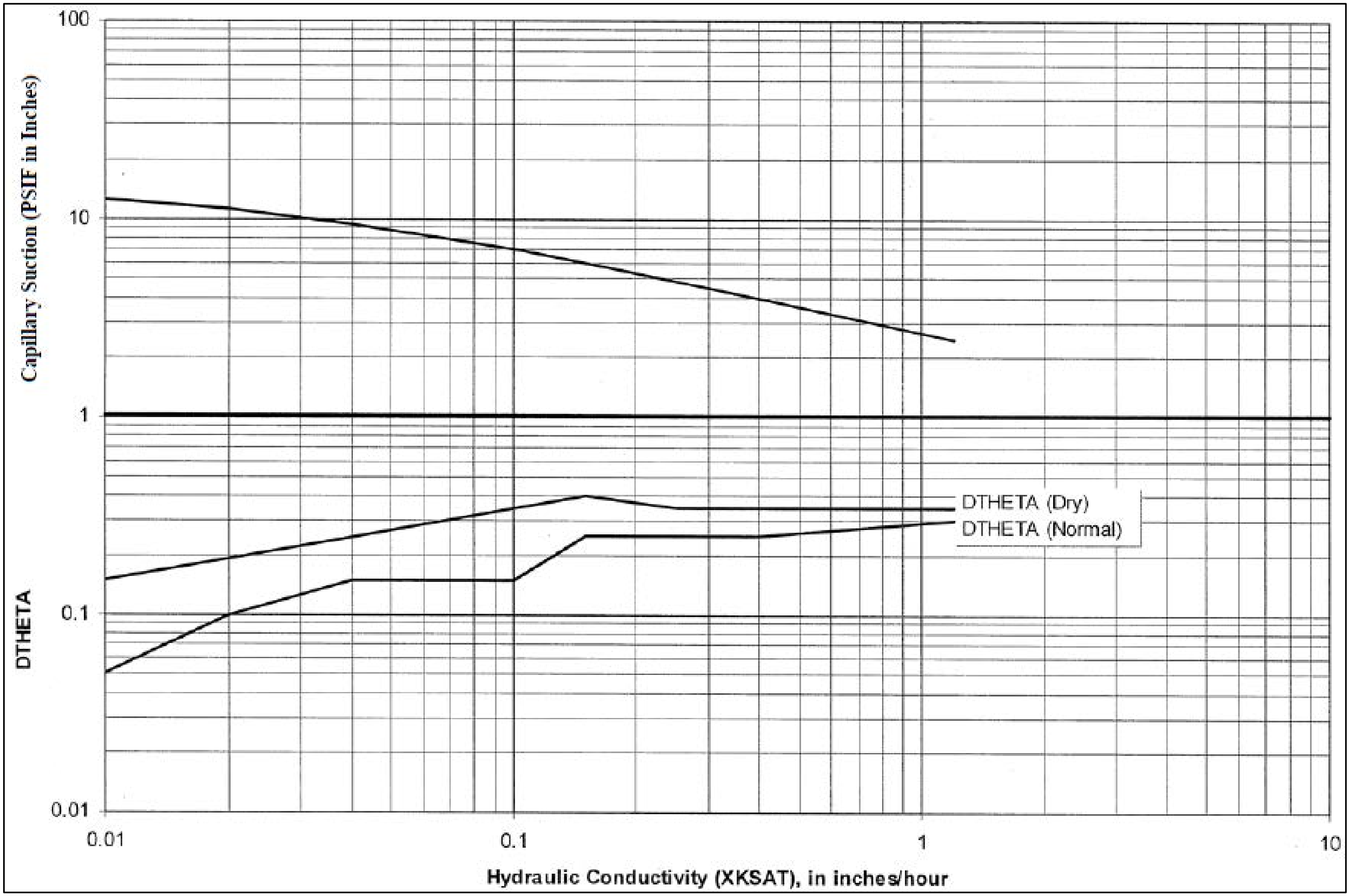

Figure 12: Relationship between Saturated Hydraulic Conductivity, Soil Moisture Deficit, and Soil Suction (from ADWR, 2007)

ATTACHMENT A

TABLES OF WATERSHED AREAS AND FIGURES OF WATERSHED DELINEATIONS AND MODEL ELEMENTS

Table A1: Pipeline Arroyo, Existing Condition Watershed Areas

Watershed ID	Area (mi^2)
0	0.607268
1	0.138530
2	0.252849
3	0.037395
4	0.146419
5	0.073367
9	0.336413
10	0.544192
16	0.055649
17	0.397469
18	0.863512
19	0.393805
20	0.668204
21	0.390948
22	3.212219
23	1.541179
24	1.561185
25	2.747083
26	2.063947
27	0.162332
31	0.335478
32	0.078264
33	0.023686
34	0.008757
35	0.026925
36	0.010058
37	0.023734
38	0.025865
39	0.086768
42	0.359253
43	0.990445
44	0.020123

Table A2: Pipeline Arroyo, Post-RA Condition Watershed Areas

Watershed ID	Area (mi^2)
0	0.607268
1	0.138530
2	0.252849
3	0.037395
4	0.146419
5	0.073367
9	0.336413
10	0.544192
16	0.055649
17	0.397469
18	0.863512
19	0.393805
20	0.668204
21	0.390948
22	3.212219
23	1.541179
24	1.561185
25	2.747083
26	2.063947
27	0.142264
31	0.483168
37	0.023735
38	0.025865
39	0.086768
42	0.359253
43	0.990445
44	0.029626

Table A3: Mill Site, Post-RA Condition Watershed Areas

Watershed ID	Area (mi^2)
0	0.004857
1	0.002526
2	0.004111
3	0.007433
4	0.019797
5	0.037054
6	0.032685
7	0.013431
12	0.013278
14	0.007294
16	0.006010
32	0.055148
33	0.288123
34	0.230045
35	0.256070
36	0.025987
37	0.023734
38	0.025865
39	0.086768
40	0.005180
41	0.025233
44	0.030964

Table A4: Mine Site, RA-Phase 3 Construction Watershed Areas

Watershed ID	Area (mi^2)
2	0.001978
3	0.003633
19	0.081415
20	0.144731
22	0.010027
23	0.041932
24	0.008757
25	0.034857
26	0.026925
27	0.037482
28	0.010058
29	0.054403
30	0.026967

Table A5: Watersheds to size Temporary Haul Road stormwater controls

Watershed ID	Area (mi^2)
00	0.001635
01a	0.010471
01b	0.041663
02	0.00517
03	0.002341
04	0.002793
05	0.004242
06	0.000731
07	0.002221
08	0.001523
09	0.006546
10	0.001925
11	0.001569
12	0.000461
13	0.006399
14	0.003524
15	0.001565
16	0.006073
17	0.001287
18	0.001197
19	0.000761
20	0.007287
21	0.005932
22	0.001686
23	0.002501
24	0.005872
25	0.001156
26	0.006506
27	0.001926
28	0.096676

<INSERT WATERSHED DELINEATION FIGURES – 20 TOTAL>

ATTACHMENT B

STORM HYETOGRAPH TABLES

Table B1: 1-hour PMP Hyetographs for Pipeline Arroyo and Mill Site

Storm Duration (Ending Timestep)	Pipeline Arroyo		Mill Site	
	Incremental Depth (in)	Total Depth (in)	Incremental Depth (in)	Total Depth (in)
10	0.78	0.78	0.78	0.78
20	0.98	1.76	0.99	1.77
30	1.53	3.29	1.54	3.31
40	1.22	4.51	1.23	4.54
50	0.85	5.36	0.85	5.39
60	0.78	6.14	0.78	6.18

Table B2: Incremental Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000-year
0	00	00	00	00	00	00	00
5	08	07	0.0010	0.0017	0.0019	0.0022	0.0031
10	08	07	0.0010	0.0017	0.0020	0.0022	0.0031
15	08	07	0.0010	0.0017	0.0020	0.0022	0.0031
20	08	07	0.0010	0.0017	0.0020	0.0023	0.0031
25	08	07	0.0010	0.0017	0.0020	0.0023	0.0032
30	08	07	0.0011	0.0018	0.0020	0.0023	0.0032
35	08	07	0.0011	0.0018	0.0020	0.0023	0.0032
40	08	07	0.0011	0.0018	0.0020	0.0023	0.0032
45	08	07	0.0011	0.0018	0.0021	0.0023	0.0032
50	08	08	0.0011	0.0018	0.0021	0.0024	0.0033
55	09	08	0.0011	0.0018	0.0021	0.0024	0.0033
60	09	08	0.0011	0.0018	0.0021	0.0024	0.0033
65	09	08	0.0011	0.0018	0.0021	0.0024	0.0033
70	09	08	0.0011	0.0019	0.0021	0.0024	0.0034
75	09	08	0.0011	0.0019	0.0021	0.0024	0.0034
80	09	08	0.0011	0.0019	0.0022	0.0025	0.0034
85	09	08	0.0011	0.0019	0.0022	0.0025	0.0034
90	09	08	0.0011	0.0019	0.0022	0.0025	0.0035
95	09	08	0.0012	0.0019	0.0022	0.0025	0.0035
100	09	08	0.0012	0.0019	0.0022	0.0025	0.0035
105	09	08	0.0012	0.0020	0.0022	0.0026	0.0035
110	09	08	0.0012	0.0020	0.0023	0.0026	0.0036
115	09	08	0.0012	0.0020	0.0023	0.0026	0.0036
120	09	08	0.0012	0.0020	0.0023	0.0026	0.0036
125	09	08	0.0012	0.0020	0.0023	0.0026	0.0037
130	09	08	0.0012	0.0020	0.0023	0.0027	0.0037
135	0.0010	09	0.0012	0.0020	0.0023	0.0027	0.0037
140	0.0010	09	0.0012	0.0021	0.0024	0.0027	0.0037
145	0.0010	09	0.0012	0.0021	0.0024	0.0027	0.0038

Table B2: Incremental Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000-year
150	0.0010	09	0.0013	0.0021	0.0024	0.0027	0.0038
155	0.0010	09	0.0013	0.0021	0.0024	0.0028	0.0038
160	0.0010	09	0.0013	0.0021	0.0024	0.0028	0.0039
165	0.0010	09	0.0013	0.0021	0.0025	0.0028	0.0039
170	0.0010	09	0.0013	0.0022	0.0025	0.0028	0.0039
175	0.0010	09	0.0013	0.0022	0.0025	0.0029	0.0040
180	0.0010	09	0.0013	0.0022	0.0025	0.0029	0.0040
185	0.0010	09	0.0013	0.0022	0.0025	0.0029	0.0040
190	0.0010	09	0.0013	0.0022	0.0026	0.0029	0.0041
195	0.0010	09	0.0014	0.0023	0.0026	0.0030	0.0041
200	0.0011	0.0010	0.0014	0.0023	0.0026	0.0030	0.0042
205	0.0011	0.0010	0.0014	0.0023	0.0026	0.0030	0.0042
210	0.0011	0.0010	0.0014	0.0023	0.0027	0.0030	0.0042
215	0.0011	0.0010	0.0014	0.0023	0.0027	0.0031	0.0043
220	0.0011	0.0010	0.0014	0.0024	0.0027	0.0031	0.0043
225	0.0011	0.0010	0.0014	0.0024	0.0027	0.0031	0.0044
230	0.0011	0.0010	0.0014	0.0024	0.0028	0.0032	0.0044
235	0.0011	0.0010	0.0015	0.0024	0.0028	0.0032	0.0044
240	0.0011	0.0010	0.0015	0.0025	0.0028	0.0032	0.0045
245	0.0011	0.0010	0.0015	0.0025	0.0028	0.0033	0.0045
250	0.0012	0.0011	0.0015	0.0025	0.0029	0.0033	0.0046
255	0.0012	0.0011	0.0015	0.0025	0.0029	0.0033	0.0046
260	0.0012	0.0011	0.0015	0.0026	0.0029	0.0034	0.0047
265	0.0012	0.0011	0.0015	0.0026	0.0030	0.0034	0.0047
270	0.0012	0.0011	0.0016	0.0026	0.0030	0.0034	0.0048
275	0.0012	0.0011	0.0016	0.0026	0.0030	0.0035	0.0048
280	0.0012	0.0011	0.0016	0.0027	0.0030	0.0035	0.0049
285	0.0012	0.0011	0.0016	0.0027	0.0031	0.0035	0.0049
290	0.0012	0.0011	0.0016	0.0027	0.0031	0.0036	0.0050
295	0.0013	0.0012	0.0016	0.0027	0.0031	0.0036	0.0050
300	0.0013	0.0012	0.0017	0.0028	0.0032	0.0037	0.0051
305	0.0013	0.0012	0.0017	0.0028	0.0032	0.0037	0.0052
310	0.0013	0.0012	0.0017	0.0028	0.0033	0.0038	0.0052
315	0.0013	0.0012	0.0017	0.0029	0.0033	0.0038	0.0053
320	0.0013	0.0012	0.0017	0.0029	0.0033	0.0038	0.0053
325	0.0013	0.0012	0.0018	0.0029	0.0034	0.0039	0.0054
330	0.0014	0.0013	0.0018	0.0030	0.0034	0.0039	0.0055
335	0.0014	0.0013	0.0018	0.0030	0.0035	0.0040	0.0055
340	0.0014	0.0013	0.0018	0.0031	0.0035	0.0040	0.0056

Table B2: Incremental Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000-year
345	0.0014	0.0013	0.0019	0.0031	0.0035	0.0041	0.0057
350	0.0014	0.0013	0.0019	0.0031	0.0036	0.0041	0.0058
355	0.0014	0.0013	0.0019	0.0032	0.0036	0.0042	0.0058
360	0.0015	0.0014	0.0019	0.0032	0.0037	0.0043	0.0059
365	0.0015	0.0014	0.0020	0.0033	0.0037	0.0043	0.0060
370	0.0015	0.0014	0.0020	0.0033	0.0038	0.0044	0.0061
375	0.0015	0.0014	0.0020	0.0033	0.0038	0.0044	0.0062
380	0.0015	0.0014	0.0020	0.0034	0.0039	0.0045	0.0063
385	0.0015	0.0015	0.0021	0.0034	0.0039	0.0046	0.0063
390	0.0016	0.0015	0.0021	0.0035	0.0040	0.0046	0.0064
395	0.0016	0.0015	0.0021	0.0035	0.0041	0.0047	0.0065
400	0.0016	0.0015	0.0022	0.0036	0.0041	0.0048	0.0066
405	0.0016	0.0016	0.0022	0.0036	0.0042	0.0049	0.0067
410	0.0017	0.0016	0.0022	0.0037	0.0042	0.0049	0.0068
415	0.0017	0.0016	0.0023	0.0038	0.0043	0.0050	0.0070
420	0.0017	0.0016	0.0023	0.0038	0.0044	0.0051	0.0071
425	0.0017	0.0017	0.0023	0.0039	0.0044	0.0052	0.0072
430	0.0018	0.0017	0.0024	0.0039	0.0045	0.0053	0.0073
435	0.0018	0.0017	0.0024	0.0040	0.0046	0.0054	0.0074
440	0.0018	0.0018	0.0024	0.0041	0.0047	0.0054	0.0076
445	0.0018	0.0018	0.0025	0.0042	0.0047	0.0055	0.0077
450	0.0019	0.0018	0.0025	0.0042	0.0048	0.0056	0.0078
455	0.0019	0.0019	0.0026	0.0043	0.0049	0.0058	0.0080
460	0.0019	0.0019	0.0026	0.0044	0.0050	0.0059	0.0081
465	0.0020	0.0019	0.0027	0.0045	0.0051	0.0060	0.0083
470	0.0020	0.0020	0.0027	0.0045	0.0052	0.0061	0.0085
475	0.0020	0.0020	0.0028	0.0046	0.0053	0.0062	0.0086
480	0.0021	0.0020	0.0028	0.0047	0.0054	0.0063	0.0088
485	0.0021	0.0021	0.0029	0.0048	0.0055	0.0065	0.0090
490	0.0022	0.0021	0.0030	0.0049	0.0056	0.0066	0.0092
495	0.0022	0.0022	0.0030	0.0050	0.0058	0.0068	0.0094
500	0.0023	0.0022	0.0031	0.0051	0.0059	0.0069	0.0096
505	0.0023	0.0023	0.0032	0.0053	0.0060	0.0071	0.0099
510	0.0023	0.0023	0.0032	0.0054	0.0062	0.0073	0.0101
515	0.0024	0.0024	0.0033	0.0055	0.0063	0.0074	0.0103
520	0.0025	0.0025	0.0034	0.0056	0.0065	0.0076	0.0106
525	0.0025	0.0025	0.0035	0.0058	0.0066	0.0078	0.0109
530	0.0026	0.0026	0.0036	0.0059	0.0068	0.0080	0.0112
535	0.0026	0.0027	0.0036	0.0061	0.0070	0.0082	0.0115

Table B2: Incremental Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000-year
540	0.0027	0.0027	0.0037	0.0063	0.0072	0.0085	0.0118
545	0.0028	0.0028	0.0039	0.0064	0.0074	0.0087	0.0121
550	0.0028	0.0029	0.0040	0.0066	0.0076	0.0090	0.0125
555	0.0029	0.0030	0.0041	0.0068	0.0078	0.0093	0.0129
560	0.0030	0.0031	0.0042	0.0070	0.0080	0.0096	0.0133
565	0.0031	0.0032	0.0043	0.0072	0.0083	0.0099	0.0137
570	0.0032	0.0033	0.0045	0.0075	0.0086	0.0102	0.0142
575	0.0033	0.0034	0.0046	0.0077	0.0088	0.0106	0.0147
580	0.0034	0.0035	0.0048	0.0080	0.0092	0.0110	0.0153
585	0.0035	0.0037	0.0050	0.0083	0.0095	0.0114	0.0158
590	0.0036	0.0038	0.0052	0.0086	0.0099	0.0118	0.0165
595	0.0038	0.0040	0.0054	0.0090	0.0103	0.0123	0.0172
600	0.0039	0.0042	0.0056	0.0093	0.0107	0.0129	0.0179
605	0.0041	0.0044	0.0058	0.0098	0.0111	0.0135	0.0187
610	0.0042	0.0046	0.0061	0.0102	0.0117	0.0141	0.0196
615	0.0044	0.0048	0.0064	0.0107	0.0122	0.0148	0.0206
620	0.0046	0.0051	0.0067	0.0112	0.0128	0.0156	0.0217
625	0.0048	0.0053	0.0071	0.0118	0.0135	0.0164	0.0229
630	0.0051	0.0056	0.0075	0.0125	0.0143	0.0174	0.0242
635	0.0054	0.0060	0.0079	0.0132	0.0151	0.0185	0.0257
640	0.0057	0.0064	0.0084	0.0141	0.0161	0.0197	0.0274
645	0.0060	0.0069	0.0090	0.0150	0.0172	0.0211	0.0293
650	0.0064	0.0074	0.0097	0.0161	0.0184	0.0227	0.0316
655	0.0069	0.0080	0.0104	0.0174	0.0198	0.0245	0.0341
660	0.0074	0.0087	0.0113	0.0188	0.0215	0.0267	0.0372
665	0.0080	0.0096	0.0124	0.0206	0.0235	0.0293	0.0408
670	0.0088	0.0106	0.0136	0.0227	0.0259	0.0324	0.0451
675	0.0097	0.0118	0.0151	0.0252	0.0288	0.0362	0.0504
680	0.0108	0.0134	0.0171	0.0284	0.0324	0.0409	0.0570
685	0.0122	0.0154	0.0195	0.0325	0.0370	0.0470	0.0654
690	0.0140	0.0181	0.0227	0.0378	0.0431	0.0550	0.0766
695	0.0165	0.0218	0.0271	0.0451	0.0514	0.0661	0.0919
700	0.0199	0.0271	0.0334	0.0556	0.0633	0.0820	0.1140
705	0.0253	0.0354	0.0432	0.0718	0.0818	0.1067	0.1482
710	0.0343	0.0496	0.0600	0.0997	0.1133	0.1492	0.2069
715	0.0525	0.0787	0.0943	0.1564	0.1776	0.2356	0.3256
720	0.1061	0.1617	0.1939	0.3205	0.3632	0.4807	0.6594
725	0.2092	0.2998	0.3692	0.6080	0.6875	0.8880	1.2065
730	0.0706	0.1074	0.1284	0.2127	0.2413	0.3205	0.4417

Table B2: Incremental Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000-year
735	0.0415	0.0612	0.0737	0.1223	0.1390	0.1837	0.2544
740	0.0291	0.0414	0.0503	0.0837	0.0952	0.1248	0.1732
745	0.0223	0.0307	0.0377	0.0628	0.0714	0.0929	0.1291
750	0.0180	0.0242	0.0299	0.0498	0.0568	0.0733	0.1019
755	0.0151	0.0198	0.0247	0.0412	0.0469	0.0601	0.0836
760	0.0130	0.0167	0.0210	0.0349	0.0398	0.0507	0.0706
765	0.0114	0.0144	0.0182	0.0303	0.0346	0.0438	0.0609
770	0.0102	0.0126	0.0160	0.0267	0.0305	0.0384	0.0472
775	0.0092	0.0112	0.0143	0.0239	0.0273	0.0342	00
780	0.0084	0.0101	0.0130	0.0216	0.0246	0.0308	00
785	0.0077	0.0091	0.0118	0.0197	0.0225	0.0279	00
790	0.0071	0.0083	0.0108	0.0181	0.0206	0.0256	00
795	0.0067	0.0077	0.0100	0.0167	0.0191	0.0236	00
800	0.0062	0.0071	0.0093	0.0155	0.0178	0.0219	00
805	0.0059	0.0066	0.0087	0.0145	0.0166	0.0204	00
810	0.0055	0.0062	0.0082	0.0136	0.0156	0.0064	00
815	0.0052	0.0058	0.0077	0.0128	0.0147	00	00
820	0.0050	0.0055	0.0073	0.0121	0.0139	00	00
825	0.0047	0.0052	0.0069	0.0115	0.0022	00	00
830	0.0045	0.0049	0.0066	0.0109	00	00	00
835	0.0043	0.0047	0.0063	0.0104	00	00	00
840	0.0041	0.0045	0.0060	0.0100	00	00	00
845	0.0040	0.0043	0.0057	0.0095	00	00	00
850	0.0038	0.0041	0.0055	0.0021	00	00	00
855	0.0037	0.0039	0.0053	00	00	00	00
860	0.0036	0.0038	0.0051	00	00	00	00
865	0.0035	0.0036	0.0049	00	00	00	00
870	0.0033	0.0035	0.0047	00	00	00	00
875	0.0032	0.0034	0.0046	00	00	00	00
880	0.0031	0.0032	0.0044	00	00	00	00
885	0.0030	0.0031	0.0043	00	00	00	00
890	0.0030	0.0030	0.0041	00	00	00	00
895	0.0029	0.0029	0.0040	00	00	00	00
900	0.0028	0.0029	0.0039	00	00	00	00
905	0.0027	0.0028	0.0038	00	00	00	00
910	0.0027	0.0027	0.0037	00	00	00	00
915	0.0026	0.0026	0.0036	00	00	00	00
920	0.0025	0.0026	0.0035	00	00	00	00
925	0.0025	0.0025	0.0034	00	00	00	00

Table B2: Incremental Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000-year
930	0.0024	0.0024	0.0033	00	00	00	00
935	0.0024	0.0024	0.0033	00	00	00	00
940	0.0023	0.0023	0.0032	00	00	00	00
945	0.0023	0.0023	0.0031	00	00	00	00
950	0.0022	0.0022	0.0030	00	00	00	00
955	0.0022	0.0022	0.0030	00	00	00	00
960	0.0021	0.0021	0.0029	00	00	00	00
965	0.0021	0.0021	0.0029	00	00	00	00
970	0.0021	0.0020	0.0028	00	00	00	00
975	0.0020	0.0020	0.0028	00	00	00	00
980	06	0.0019	0.0027	00	00	00	00
985	00	0.0019	0.0026	00	00	00	00
990	00	0.0019	0.0026	00	00	00	00
995	00	0.0018	0.0025	00	00	00	00
1000	00	0.0018	00	00	00	00	00
1005	00	0.0018	00	00	00	00	00
1010	00	0.0017	00	00	00	00	00
1015	00	0.0017	00	00	00	00	00
1020	00	0.0017	00	00	00	00	00
1025	00	0.0016	00	00	00	00	00
1030	00	0.0016	00	00	00	00	00
1035	00	0.0016	00	00	00	00	00
1040	00	0.0016	00	00	00	00	00
1045	00	0.0015	00	00	00	00	00
1050	00	0.0015	00	00	00	00	00
1055	00	0.0015	00	00	00	00	00
1060	00	0.0015	00	00	00	00	00
1065	00	0.0015	00	00	00	00	00
1070	00	0.0014	00	00	00	00	00
1075	00	0.0014	00	00	00	00	00
1080	00	0.0014	00	00	00	00	00
1085	00	0.0014	00	00	00	00	00
1090	00	0.0014	00	00	00	00	00
1095	00	0.0013	00	00	00	00	00
1100	00	0.0013	00	00	00	00	00
1105	00	0.0013	00	00	00	00	00
1110	00	0.0013	00	00	00	00	00
1115	00	0.0013	00	00	00	00	00
1120	00	0.0013	00	00	00	00	00

Table B2: Incremental Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000-year
1125	00	0.0012	00	00	00	00	00
1130	00	0.0012	00	00	00	00	00
1135	00	0.0012	00	00	00	00	00
1140	00	0.0012	00	00	00	00	00
1145	00	0.0012	00	00	00	00	00
1150	00	0.0012	00	00	00	00	00
1155	00	0.0012	00	00	00	00	00
1160	00	0.0011	00	00	00	00	00
1165	00	0.0011	00	00	00	00	00
1170	00	0.0011	00	00	00	00	00
1175	00	0.0011	00	00	00	00	00
1180	00	0.0011	00	00	00	00	00
1185	00	0.0011	00	00	00	00	00
1190	00	0.0011	00	00	00	00	00
1195	00	0.0011	00	00	00	00	00
1200	00	0.0010	00	00	00	00	00
1205	00	0.0010	00	00	00	00	00
1210	00	0.0010	00	00	00	00	00
1215	00	0.0010	00	00	00	00	00
1220	00	0.0010	00	00	00	00	00
1225	00	0.0010	00	00	00	00	00
1230	00	0.0010	00	00	00	00	00
1235	00	0.0010	00	00	00	00	00
1240	00	0.0010	00	00	00	00	00
1245	00	0.0010	00	00	00	00	00
1250	00	0.0010	00	00	00	00	00
1255	00	09	00	00	00	00	00
1260	00	09	00	00	00	00	00
1265	00	09	00	00	00	00	00
1270	00	09	00	00	00	00	00
1275	00	09	00	00	00	00	00
1280	00	09	00	00	00	00	00
1285	00	09	00	00	00	00	00
1290	00	09	00	00	00	00	00
1295	00	09	00	00	00	00	00
1300	00	09	00	00	00	00	00
1305	00	09	00	00	00	00	00
1310	00	09	00	00	00	00	00
1315	00	09	00	00	00	00	00

Table B2: Incremental Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000-year
1320	00	08	00	00	00	00	00
1325	00	08	00	00	00	00	00
1330	00	08	00	00	00	00	00
1335	00	08	00	00	00	00	00
1340	00	08	00	00	00	00	00
1345	00	08	00	00	00	00	00
1350	00	08	00	00	00	00	00
1355	00	08	00	00	00	00	00
1360	00	08	00	00	00	00	00
1365	00	06	00	00	00	00	00
1370	00	00	00	00	00	00	00
1375	00	00	00	00	00	00	00
1380	00	00	00	00	00	00	00
1385	00	00	00	00	00	00	00
1390	00	00	00	00	00	00	00
1395	00	00	00	00	00	00	00
1400	00	00	00	00	00	00	00
1405	00	00	00	00	00	00	00
1410	00	00	00	00	00	00	00
1415	00	00	00	00	00	00	00
1420	00	00	00	00	00	00	00
1425	00	00	00	00	00	00	00
1430	00	00	00	00	00	00	00
1435	00	00	00	00	00	00	00
1440	00	00	00	00	00	00	00

Table B3: Cumulative Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000yr
0	0.001	0.001	0.001	0.002	0.002	0.002	0.003
5	0.002	0.001	0.002	0.003	0.004	0.004	0.006
10	0.002	0.002	0.003	0.005	0.006	0.007	0.009
15	0.003	0.003	0.004	0.007	0.008	0.009	0.012
20	0.004	0.004	0.005	0.009	0.010	0.011	0.016
25	0.005	0.004	0.006	0.010	0.012	0.014	0.019
30	0.006	0.005	0.007	0.012	0.014	0.016	0.022
35	0.007	0.006	0.008	0.014	0.016	0.018	0.025
40	0.007	0.007	0.009	0.016	0.018	0.020	0.028
45	0.008	0.007	0.010	0.018	0.020	0.023	0.032
50	0.009	0.008	0.012	0.019	0.022	0.025	0.035
55	0.010	0.009	0.013	0.021	0.024	0.028	0.038
60	0.011	0.010	0.014	0.023	0.026	0.030	0.042
65	0.012	0.010	0.015	0.025	0.028	0.032	0.045
70	0.013	0.011	0.016	0.027	0.031	0.035	0.048
75	0.013	0.012	0.017	0.029	0.033	0.037	0.052
80	0.014	0.013	0.018	0.031	0.035	0.040	0.055
85	0.015	0.014	0.019	0.032	0.037	0.042	0.059
90	0.016	0.014	0.021	0.034	0.039	0.045	0.062
95	0.017	0.015	0.022	0.036	0.042	0.047	0.066
100	0.018	0.016	0.023	0.038	0.044	0.050	0.069
105	0.019	0.017	0.024	0.040	0.046	0.052	0.073
110	0.020	0.018	0.025	0.042	0.048	0.055	0.076
115	0.021	0.018	0.026	0.044	0.051	0.058	0.080
120	0.022	0.019	0.028	0.046	0.053	0.060	0.084
125	0.023	0.020	0.029	0.048	0.055	0.063	0.087
130	0.024	0.021	0.030	0.050	0.058	0.066	0.091
135	0.024	0.022	0.031	0.052	0.060	0.068	0.095
140	0.025	0.023	0.033	0.054	0.062	0.071	0.099
145	0.026	0.024	0.034	0.056	0.065	0.074	0.102
150	0.027	0.024	0.035	0.059	0.067	0.077	0.106
155	0.028	0.025	0.036	0.061	0.070	0.079	0.110
160	0.029	0.026	0.038	0.063	0.072	0.082	0.114
165	0.030	0.027	0.039	0.065	0.075	0.085	0.118
170	0.031	0.028	0.040	0.067	0.077	0.088	0.122
175	0.032	0.029	0.042	0.069	0.080	0.091	0.126
180	0.033	0.030	0.043	0.072	0.082	0.094	0.130
185	0.034	0.031	0.044	0.074	0.085	0.097	0.134
190	0.036	0.032	0.046	0.076	0.087	0.100	0.138
195	0.037	0.033	0.047	0.078	0.090	0.103	0.142

Table B3: Cumulative Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000yr
200	0.038	0.034	0.048	0.081	0.092	0.106	0.147
205	0.039	0.035	0.050	0.083	0.095	0.109	0.151
210	0.040	0.036	0.051	0.085	0.098	0.112	0.155
215	0.041	0.037	0.053	0.088	0.101	0.115	0.159
220	0.042	0.038	0.054	0.090	0.103	0.118	0.164
225	0.043	0.039	0.055	0.093	0.106	0.121	0.168
230	0.044	0.040	0.057	0.095	0.109	0.124	0.173
235	0.045	0.041	0.058	0.097	0.112	0.128	0.177
240	0.046	0.042	0.060	0.100	0.114	0.131	0.182
245	0.048	0.043	0.061	0.102	0.117	0.134	0.186
250	0.049	0.044	0.063	0.105	0.120	0.137	0.191
255	0.050	0.045	0.064	0.107	0.123	0.141	0.195
260	0.051	0.046	0.066	0.110	0.126	0.144	0.200
265	0.052	0.047	0.067	0.113	0.129	0.148	0.205
270	0.054	0.048	0.069	0.115	0.132	0.151	0.210
275	0.055	0.049	0.071	0.118	0.135	0.155	0.215
280	0.056	0.051	0.072	0.121	0.138	0.158	0.220
285	0.057	0.052	0.074	0.123	0.141	0.162	0.225
290	0.058	0.053	0.076	0.126	0.144	0.165	0.230
295	0.060	0.054	0.077	0.129	0.148	0.169	0.235
300	0.061	0.055	0.079	0.132	0.151	0.173	0.240
305	0.062	0.056	0.081	0.135	0.154	0.176	0.245
310	0.064	0.058	0.082	0.137	0.157	0.180	0.250
315	0.065	0.059	0.084	0.140	0.161	0.184	0.256
320	0.066	0.060	0.086	0.143	0.164	0.188	0.261
325	0.068	0.061	0.088	0.146	0.168	0.192	0.267
330	0.069	0.063	0.089	0.149	0.171	0.196	0.272
335	0.070	0.064	0.091	0.152	0.174	0.200	0.278
340	0.072	0.065	0.093	0.155	0.178	0.204	0.283
345	0.073	0.067	0.095	0.159	0.182	0.208	0.289
350	0.075	0.068	0.097	0.162	0.185	0.212	0.295
355	0.076	0.069	0.099	0.165	0.189	0.217	0.301
360	0.078	0.071	0.101	0.168	0.193	0.221	0.307
365	0.079	0.072	0.103	0.172	0.196	0.225	0.313
370	0.081	0.074	0.105	0.175	0.200	0.230	0.319
375	0.082	0.075	0.107	0.178	0.204	0.234	0.325
380	0.084	0.076	0.109	0.182	0.208	0.239	0.332
385	0.085	0.078	0.111	0.185	0.212	0.244	0.338
390	0.087	0.079	0.113	0.189	0.216	0.248	0.345
395	0.088	0.081	0.115	0.192	0.220	0.253	0.351

Table B3: Cumulative Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000yr
400	0.090	0.083	0.117	0.196	0.224	0.258	0.358
405	0.092	0.084	0.120	0.200	0.229	0.263	0.365
410	0.093	0.086	0.122	0.203	0.233	0.268	0.372
415	0.095	0.087	0.124	0.207	0.237	0.273	0.379
420	0.097	0.089	0.126	0.211	0.242	0.278	0.386
425	0.099	0.091	0.129	0.215	0.246	0.283	0.394
430	0.100	0.092	0.131	0.219	0.251	0.289	0.401
435	0.102	0.094	0.134	0.223	0.256	0.294	0.409
440	0.104	0.096	0.136	0.227	0.260	0.300	0.416
445	0.106	0.098	0.139	0.232	0.265	0.305	0.424
450	0.108	0.100	0.141	0.236	0.270	0.311	0.432
455	0.110	0.102	0.144	0.240	0.275	0.317	0.440
460	0.112	0.103	0.147	0.245	0.280	0.323	0.449
465	0.114	0.105	0.149	0.249	0.285	0.329	0.457
470	0.116	0.107	0.152	0.254	0.291	0.335	0.466
475	0.118	0.110	0.155	0.259	0.296	0.342	0.475
480	0.120	0.112	0.158	0.263	0.302	0.348	0.484
485	0.122	0.114	0.161	0.268	0.307	0.355	0.493
490	0.124	0.116	0.164	0.273	0.313	0.362	0.502
495	0.127	0.118	0.167	0.279	0.319	0.368	0.512
500	0.129	0.120	0.170	0.284	0.325	0.376	0.522
505	0.131	0.123	0.173	0.289	0.331	0.383	0.532
510	0.134	0.125	0.177	0.295	0.337	0.390	0.542
515	0.136	0.128	0.180	0.300	0.344	0.398	0.553
520	0.139	0.130	0.183	0.306	0.350	0.406	0.564
525	0.141	0.133	0.187	0.312	0.357	0.414	0.575
530	0.144	0.135	0.191	0.318	0.364	0.422	0.586
535	0.147	0.138	0.194	0.324	0.371	0.430	0.598
540	0.149	0.141	0.198	0.331	0.379	0.439	0.610
545	0.152	0.144	0.202	0.337	0.386	0.448	0.623
550	0.155	0.147	0.206	0.344	0.394	0.457	0.635
555	0.158	0.150	0.210	0.351	0.402	0.467	0.649
560	0.161	0.153	0.215	0.359	0.410	0.477	0.663
565	0.164	0.156	0.219	0.366	0.419	0.487	0.677
570	0.168	0.160	0.224	0.374	0.428	0.498	0.691
575	0.171	0.163	0.229	0.382	0.437	0.509	0.707
580	0.175	0.167	0.234	0.390	0.446	0.520	0.723
585	0.178	0.171	0.239	0.399	0.456	0.532	0.739
590	0.182	0.175	0.244	0.408	0.467	0.544	0.756
595	0.186	0.179	0.250	0.417	0.477	0.557	0.774

Table B3: Cumulative Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000yr
600	0.190	0.183	0.256	0.427	0.488	0.571	0.793
605	0.194	0.188	0.262	0.437	0.500	0.585	0.812
610	0.199	0.193	0.268	0.448	0.512	0.599	0.833
615	0.203	0.198	0.275	0.459	0.525	0.615	0.855
620	0.208	0.203	0.282	0.471	0.539	0.631	0.878
625	0.213	0.209	0.290	0.483	0.553	0.649	0.902
630	0.219	0.215	0.297	0.496	0.568	0.667	0.927
635	0.224	0.221	0.306	0.510	0.584	0.687	0.955
640	0.230	0.228	0.315	0.526	0.601	0.708	0.984
645	0.237	0.235	0.325	0.542	0.620	0.731	1.016
650	0.244	0.243	0.335	0.559	0.639	0.755	1.050
655	0.251	0.252	0.346	0.578	0.661	0.782	1.087
660	0.259	0.262	0.359	0.598	0.684	0.811	1.128
665	0.268	0.272	0.372	0.621	0.710	0.844	1.173
670	0.278	0.284	0.387	0.646	0.739	0.880	1.223
675	0.288	0.298	0.404	0.675	0.771	0.921	1.280
680	0.301	0.313	0.424	0.707	0.809	0.968	1.346
685	0.315	0.331	0.447	0.745	0.852	1.023	1.422
690	0.331	0.353	0.474	0.790	0.903	1.089	1.514
695	0.351	0.380	0.507	0.846	0.966	1.171	1.628
700	0.376	0.415	0.550	0.918	1.048	1.278	1.776
705	0.410	0.465	0.610	1.017	1.161	1.427	1.983
710	0.463	0.544	0.705	1.174	1.339	1.662	2.309
715	0.569	0.705	0.899	1.494	1.702	2.143	2.968
720	0.778	1.005	1.268	2.102	2.390	3.031	4.175
725	0.849	1.113	1.396	2.315	2.631	3.352	4.616
730	0.890	1.174	1.470	2.437	2.770	3.535	4.871
735	0.919	1.215	1.520	2.521	2.865	3.660	5.044
740	0.942	1.246	1.558	2.584	2.937	3.753	5.173
745	0.960	1.270	1.588	2.634	2.993	3.826	5.275
750	0.975	1.290	1.613	2.675	3.040	3.886	5.358
755	0.988	1.307	1.634	2.710	3.080	3.937	5.429
760	0.999	1.321	1.652	2.740	3.115	3.981	5.490
765	1.010	1.334	1.668	2.767	3.145	4.019	5.537
770	1.019	1.345	1.682	2.791	3.173	4.054	5.537
775	1.027	1.355	1.695	2.812	3.197	4.084	5.537
780	1.035	1.364	1.707	2.832	3.220	4.112	5.537
785	1.042	1.372	1.718	2.850	3.240	4.138	5.537
790	1.049	1.380	1.728	2.867	3.259	4.161	5.537
795	1.055	1.387	1.737	2.882	3.277	4.183	5.537

Table B3: Cumulative Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000yr
800	1.061	1.394	1.746	2.897	3.294	4.204	5.537
805	1.066	1.400	1.754	2.911	3.309	4.210	5.537
810	1.072	1.406	1.762	2.923	3.324	4.210	5.537
815	1.077	1.411	1.769	2.936	3.338	4.210	5.537
820	1.081	1.416	1.776	2.947	3.340	4.210	5.537
825	1.086	1.421	1.783	2.958	3.340	4.210	5.537
830	1.090	1.426	1.789	2.968	3.340	4.210	5.537
835	1.094	1.431	1.795	2.978	3.340	4.210	5.537
840	1.098	1.435	1.800	2.988	3.340	4.210	5.537
845	1.102	1.439	1.806	2.990	3.340	4.210	5.537
850	1.106	1.443	1.811	2.990	3.340	4.210	5.537
855	1.109	1.447	1.816	2.990	3.340	4.210	5.537
860	1.113	1.450	1.821	2.990	3.340	4.210	5.537
865	1.116	1.454	1.826	2.990	3.340	4.210	5.537
870	1.119	1.457	1.830	2.990	3.340	4.210	5.537
875	1.122	1.460	1.835	2.990	3.340	4.210	5.537
880	1.126	1.463	1.839	2.990	3.340	4.210	5.537
885	1.129	1.466	1.843	2.990	3.340	4.210	5.537
890	1.131	1.469	1.847	2.990	3.340	4.210	5.537
895	1.134	1.472	1.851	2.990	3.340	4.210	5.537
900	1.137	1.475	1.855	2.990	3.340	4.210	5.537
905	1.140	1.478	1.859	2.990	3.340	4.210	5.537
910	1.142	1.480	1.862	2.990	3.340	4.210	5.537
915	1.145	1.483	1.866	2.990	3.340	4.210	5.537
920	1.147	1.485	1.869	2.990	3.340	4.210	5.537
925	1.150	1.488	1.873	2.990	3.340	4.210	5.537
930	1.152	1.490	1.876	2.990	3.340	4.210	5.537
935	1.154	1.492	1.879	2.990	3.340	4.210	5.537
940	1.157	1.495	1.882	2.990	3.340	4.210	5.537
945	1.159	1.497	1.885	2.990	3.340	4.210	5.537
950	1.161	1.499	1.888	2.990	3.340	4.210	5.537
955	1.163	1.501	1.891	2.990	3.340	4.210	5.537
960	1.165	1.503	1.894	2.990	3.340	4.210	5.537
965	1.167	1.505	1.897	2.990	3.340	4.210	5.537
970	1.169	1.507	1.900	2.990	3.340	4.210	5.537
975	1.170	1.509	1.902	2.990	3.340	4.210	5.537
980	1.170	1.511	1.905	2.990	3.340	4.210	5.537
985	1.170	1.513	1.908	2.990	3.340	4.210	5.537
990	1.170	1.515	1.910	2.990	3.340	4.210	5.537
995	1.170	1.517	1.910	2.990	3.340	4.210	5.537

Table B3: Cumulative Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000yr
1000	1.170	1.518	1.910	2.990	3.340	4.210	5.537
1005	1.170	1.520	1.910	2.990	3.340	4.210	5.537
1010	1.170	1.522	1.910	2.990	3.340	4.210	5.537
1015	1.170	1.523	1.910	2.990	3.340	4.210	5.537
1020	1.170	1.525	1.910	2.990	3.340	4.210	5.537
1025	1.170	1.527	1.910	2.990	3.340	4.210	5.537
1030	1.170	1.528	1.910	2.990	3.340	4.210	5.537
1035	1.170	1.530	1.910	2.990	3.340	4.210	5.537
1040	1.170	1.531	1.910	2.990	3.340	4.210	5.537
1045	1.170	1.533	1.910	2.990	3.340	4.210	5.537
1050	1.170	1.534	1.910	2.990	3.340	4.210	5.537
1055	1.170	1.536	1.910	2.990	3.340	4.210	5.537
1060	1.170	1.537	1.910	2.990	3.340	4.210	5.537
1065	1.170	1.539	1.910	2.990	3.340	4.210	5.537
1070	1.170	1.540	1.910	2.990	3.340	4.210	5.537
1075	1.170	1.542	1.910	2.990	3.340	4.210	5.537
1080	1.170	1.543	1.910	2.990	3.340	4.210	5.537
1085	1.170	1.544	1.910	2.990	3.340	4.210	5.537
1090	1.170	1.546	1.910	2.990	3.340	4.210	5.537
1095	1.170	1.547	1.910	2.990	3.340	4.210	5.537
1100	1.170	1.548	1.910	2.990	3.340	4.210	5.537
1105	1.170	1.550	1.910	2.990	3.340	4.210	5.537
1110	1.170	1.551	1.910	2.990	3.340	4.210	5.537
1115	1.170	1.552	1.910	2.990	3.340	4.210	5.537
1120	1.170	1.553	1.910	2.990	3.340	4.210	5.537
1125	1.170	1.555	1.910	2.990	3.340	4.210	5.537
1130	1.170	1.556	1.910	2.990	3.340	4.210	5.537
1135	1.170	1.557	1.910	2.990	3.340	4.210	5.537
1140	1.170	1.558	1.910	2.990	3.340	4.210	5.537
1145	1.170	1.559	1.910	2.990	3.340	4.210	5.537
1150	1.170	1.561	1.910	2.990	3.340	4.210	5.537
1155	1.170	1.562	1.910	2.990	3.340	4.210	5.537
1160	1.170	1.563	1.910	2.990	3.340	4.210	5.537
1165	1.170	1.564	1.910	2.990	3.340	4.210	5.537
1170	1.170	1.565	1.910	2.990	3.340	4.210	5.537
1175	1.170	1.566	1.910	2.990	3.340	4.210	5.537
1180	1.170	1.567	1.910	2.990	3.340	4.210	5.537
1185	1.170	1.568	1.910	2.990	3.340	4.210	5.537
1190	1.170	1.569	1.910	2.990	3.340	4.210	5.537
1195	1.170	1.570	1.910	2.990	3.340	4.210	5.537

Table B3: Cumulative Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000yr
1200	1.170	1.571	1.910	2.990	3.340	4.210	5.537
1205	1.170	1.573	1.910	2.990	3.340	4.210	5.537
1210	1.170	1.574	1.910	2.990	3.340	4.210	5.537
1215	1.170	1.575	1.910	2.990	3.340	4.210	5.537
1220	1.170	1.576	1.910	2.990	3.340	4.210	5.537
1225	1.170	1.577	1.910	2.990	3.340	4.210	5.537
1230	1.170	1.577	1.910	2.990	3.340	4.210	5.537
1235	1.170	1.578	1.910	2.990	3.340	4.210	5.537
1240	1.170	1.579	1.910	2.990	3.340	4.210	5.537
1245	1.170	1.580	1.910	2.990	3.340	4.210	5.537
1250	1.170	1.581	1.910	2.990	3.340	4.210	5.537
1255	1.170	1.582	1.910	2.990	3.340	4.210	5.537
1260	1.170	1.583	1.910	2.990	3.340	4.210	5.537
1265	1.170	1.584	1.910	2.990	3.340	4.210	5.537
1270	1.170	1.585	1.910	2.990	3.340	4.210	5.537
1275	1.170	1.586	1.910	2.990	3.340	4.210	5.537
1280	1.170	1.587	1.910	2.990	3.340	4.210	5.537
1285	1.170	1.588	1.910	2.990	3.340	4.210	5.537
1290	1.170	1.589	1.910	2.990	3.340	4.210	5.537
1295	1.170	1.589	1.910	2.990	3.340	4.210	5.537
1300	1.170	1.590	1.910	2.990	3.340	4.210	5.537
1305	1.170	1.591	1.910	2.990	3.340	4.210	5.537
1310	1.170	1.592	1.910	2.990	3.340	4.210	5.537
1315	1.170	1.593	1.910	2.990	3.340	4.210	5.537
1320	1.170	1.594	1.910	2.990	3.340	4.210	5.537
1325	1.170	1.595	1.910	2.990	3.340	4.210	5.537
1330	1.170	1.595	1.910	2.990	3.340	4.210	5.537
1335	1.170	1.596	1.910	2.990	3.340	4.210	5.537
1340	1.170	1.597	1.910	2.990	3.340	4.210	5.537
1345	1.170	1.598	1.910	2.990	3.340	4.210	5.537
1350	1.170	1.599	1.910	2.990	3.340	4.210	5.537
1355	1.170	1.599	1.910	2.990	3.340	4.210	5.537
1360	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1365	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1370	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1375	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1380	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1385	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1390	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1395	1.170	1.600	1.910	2.990	3.340	4.210	5.537

Table B3: Cumulative Hyetographs for 10000-, 1000-, 200-, 100-, 10-, 5-, and 2-year Storms

Time (min)	2-Year	5-year	10-year	100-Year	200-Year	1,000-year	10,000yr
1400	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1405	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1410	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1415	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1420	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1425	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1430	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1435	1.170	1.600	1.910	2.990	3.340	4.210	5.537
1440	1.170	1.600	1.910	2.990	3.340	4.210	5.537

ATTACHMENT C

GREEN-AMPT RAINFALL LOSS INPUT PARAMETERS

Table C1: Pipeline Arroyo, Existing Condition Rainfall Loss Parameters

Watershed ID	Depression Storage		Green And Ampt Losses				
	Initial Storage (%)	Max Storage (in)	Initial Content	Saturated Content	Suction (in)	Conductivity (in/hr)	Impervious (%)
00	0	0.15	0.241	0.5	3.184	0.779	0.0
01	0	0.15	0.250	0.5	3.845	0.411	0.0
02	0	0.15	0.222	0.5	2.852	0.832	0.0
03	0	0.15	0.222	0.5	2.855	0.832	0.0
04	0	0.15	0.243	0.5	3.319	0.666	0.0
05	0	0.15	0.242	0.5	3.295	0.551	0.0
09	0	0.15	0.240	0.5	3.198	0.849	0.0
10	0	0.15	0.250	0.5	3.456	0.574	0.0
16	0	0.15	0.250	0.5	3.756	0.429	0.0
17	0	0.15	0.232	0.5	2.950	0.947	0.0
18	0	0.15	0.241	0.5	3.195	0.851	0.0
19	0	0.15	0.234	0.5	3.022	0.726	0.0
20	0	0.15	0.243	0.5	3.338	0.668	0.0
21	0	0.15	0.250	0.5	3.798	0.457	0.0
22	0	0.15	0.235	0.5	3.047	1.179	0.0
23	0	0.15	0.250	0.5	3.692	0.549	0.0
24	0	0.15	0.250	0.5	3.435	0.666	0.0
25	0	0.15	0.241	0.5	3.211	0.797	0.0
26	0	0.15	0.250	0.5	3.643	0.592	0.0
27	0	0.05	0.250	0.5	4.626	0.289	0.0
31	0	0.15	0.244	0.5	3.457	0.678	0.0
32	0	0.15	0.250	0.5	3.475	0.589	0.0
33	0	0.15	0.250	0.5	3.600	0.460	0.0
34	0	0.15	0.241	0.5	3.141	0.917	0.0
35	0	0.15	0.238	0.5	3.078	0.948	0.0
36	0	0.15	0.250	0.5	3.600	0.460	0.0
37	0	0.15	0.250	0.5	3.550	0.470	0.0
38	0	0.15	0.250	0.5	3.430	0.603	0.0
39	0	0.15	0.217	0.5	2.591	0.954	0.0
42	0	0.15	0.241	0.5	3.169	0.660	0.0
43	0	0.15	0.236	0.5	2.958	0.885	0.0
44	0	0.05	0.250	0.5	4.956	0.257	0.0

Table C2: Pipeline Arroyo, Post-RA Condition Rainfall Loss Parameters

Watershed ID	Depression Storage		Green And Ampt Losses				
	Initial Storage (%)	Max Storage (in)	Initial Content	Saturated Content	Suction (in)	Conductivity (in/hr)	Impervious (%)
00	0	0.15	0.241	0.500	3.180	0.779	0.0
01	0	0.15	0.250	0.500	3.845	0.411	0.0
02	0	0.15	0.222	0.500	2.859	0.832	0.0
03	0	0.15	0.222	0.500	2.859	0.608	0.0
04	0	0.15	0.243	0.500	3.319	0.666	0.0
05	0	0.15	0.242	0.500	3.295	0.551	0.0
09	0	0.15	0.240	0.500	3.198	0.849	0.0
10	0	0.15	0.250	0.500	3.456	0.574	0.0
16	0	0.15	0.250	0.500	3.756	0.429	0.0
17	0	0.15	0.232	0.500	2.950	0.947	0.0
18	0	0.15	0.241	0.500	3.195	0.851	0.0
19	0	0.15	0.234	0.500	3.022	0.726	0.0
20	0	0.15	0.243	0.500	3.338	0.668	0.0
21	0	0.15	0.250	0.500	3.798	0.457	0.0
22	0	0.15	0.235	0.500	3.047	1.179	0.0
23	0	0.15	0.250	0.500	3.692	0.549	0.0
24	0	0.15	0.250	0.500	3.435	0.666	0.0
25	0	0.15	0.241	0.500	3.211	0.797	0.0
26	0	0.15	0.250	0.500	3.643	0.592	0.0
27	0	0.05	0.250	0.500	4.626	0.288	0.0
31	0	0.15	0.244	0.500	3.457	0.661	0.0
37	0	0.15	0.250	0.500	3.550	0.470	0.0
38	0	0.15	0.250	0.500	3.430	0.603	0.0
39	0	0.15	0.217	0.500	2.591	0.954	0.0
42	0	0.15	0.241	0.500	3.169	0.660	0.0
43	0	0.15	0.236	0.500	2.958	0.885	0.0
44	0	0.05	0.250	0.500	4.956	0.257	0.0

Table C3: Mill Site, Post-RA Condition Rainfall Loss Parameters

Watershed ID	Depression Storage		Green And Ampt Losses				
	Initial Storage (%)	Max Storage (in)	Initial Content	Saturated Content	Suction (in)	Conductivity (in/hr)	Impervious (%)
00	0	0.05	0.250	0.5	4.659	0.286	0.0
01	0	0.05	0.250	0.5	3.645	0.526	0.0
02	0	0.05	0.250	0.5	3.607	0.535	0.0
03	0	0.05	0.250	0.5	3.763	0.443	0.0
04	0	0.05	0.250	0.5	4.672	0.285	0.0
05	0	0.05	0.250	0.5	4.956	0.257	0.0
06	0	0.05	0.250	0.5	4.951	0.258	0.0
07	0	0.05	0.250	0.5	4.960	0.257	0.0
08	0	0.05	0.250	0.5	4.960	0.257	0.0
12	0	0.05	0.250	0.5	4.764	0.297	0.0
14	0	0.05	0.250	0.5	3.846	0.479	0.0
16	0	0.05	0.250	0.5	4.745	0.300	0.0
32	0	0.15	0.217	0.5	2.783	1.226	0.0
33	0	0.15	0.243	0.5	3.316	0.520	0.0
34	0	0.15	0.241	0.5	3.171	0.858	0.0
35	0	0.15	0.250	0.5	3.742	0.514	0.0
36	0	0.15	0.250	0.5	3.600	0.460	0.0
37	0	0.15	0.250	0.5	3.550	0.470	0.0
38	0	0.15	0.250	0.5	3.430	0.602	0.0
39	0	0.15	0.217	0.5	2.591	0.954	0.0
40	0	0.05	0.250	0.5	4.814	0.271	0.0
41	0	0.15	0.250	0.5	3.600	0.675	0.0

Table C4: Mine Site, RA-Phase 3 Construction Rainfall Loss Parameters

Watershed ID	Depression Storage		Green And Ampt Losses				
	Initial Storage (%)	Max Storage (in)	Initial Content	Saturated Content	Suction (in)	Conductivity (in/hr)	Impervious (%)
02	0	0.2	0.250	0.5	3.600	0.460	0.0
03	0	0.2	0.250	0.5	3.600	0.460	0.0
19	0	0.15	0.242	0.5	3.296	0.724	0.0
20	0	0.15	0.244	0.5	3.381	0.792	0.0
22	0	0.2	0.250	0.5	3.600	0.460	0.0
23	0	0.2	0.250	0.5	3.600	0.460	0.0
24	0	0.2	0.241	0.5	3.141	0.590	0.0
25	0	0.2	0.250	0.5	3.600	0.460	0.0
26	0	0.2	0.238	0.5	3.078	0.641	0.0
27	0	0.15	0.250	0.5	3.600	0.476	0.0
28	0	0.2	0.250	0.5	3.600	0.460	0.0
29	0	0.2	0.250	0.5	3.418	0.583	0.0
30	0	0.2	0.250	0.5	3.600	0.460	0.0

Table C5: Temporary Haul Road, Rainfall Loss Parameters

Watershed ID	Depression Storage		Green And Ampt Losses				
	Initial Storage (%)	Max Storage (in)	Initial Content	Saturated Content	Suction (in)	Conductivity (in/hr)	Impervious (%)
00	0	0	0.250	0.5	3.600	0.460	43.56
01a	0	0	0.250	0.5	3.600	0.460	0.02
01b	0	0	0.250	0.5	3.600	0.460	0.00
02	0	0	0.250	0.5	3.600	0.460	21.96
03	0	0	0.250	0.5	3.600	0.460	0.02
04	0	0	0.250	0.5	4.720	0.240	21.82
05	0	0	0.250	0.5	3.600	0.460	0.00
06	0	0	0.250	0.5	5.200	0.200	49.57
07	0	0	0.250	0.5	3.600	0.460	21.33
08	0	0	0.250	0.5	3.600	0.460	47.17
09	0	0	0.250	0.5	3.600	0.460	0.06
10	0	0	0.250	0.5	3.600	0.460	20.98
11	0	0	0.250	0.5	3.600	0.460	20.55
12	0	0	0.350	0.5	7.000	0.100	47.31
13	0	0	0.250	0.5	3.600	0.460	0.00
14	0	0	0.250	0.5	4.720	0.240	0.06
15	0	0	0.250	0.5	5.200	0.200	31.04
16	0	0	0.250	0.5	4.720	0.240	0.00
17	0	0	0.250	0.5	4.400	0.300	36.92
18	0	0	0.250	0.5	3.600	0.460	0.00
19	0	0	0.250	0.5	4.400	0.300	32.01
20	0	0	0.250	0.5	4.720	0.240	0.00
21	0	0	0.250	0.5	4.720	0.240	0.00
22	0	0	0.250	0.5	3.600	0.460	0.00
23	0	0	0.250	0.5	3.600	0.460	10.47
24	0	0	0.250	0.5	4.720	0.240	3.57
25	0	0	0.386	0.5	6.03	0.075	60.90
26	0	0	0.250	0.5	3.600	0.460	1.09
27	0	0	0.45	0.5	11	0.01	99.55
28	0	0	0.250	0.5	4.720	0.240	0.00

ATTACHMENT D

CLARK UNIT HYDROGRAPH PARAMETERS CALCULATION TABLES

Table D1: Pipeline Arroyo, Existing Condition Clark Unit Hydrograph Parameters

Subbasin	Tc Calculation Procedure	Tc Varies?	1hr PMP		100yr		2yr	
			Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)
0	Sabol Equation	No	1.08053	1.19066	1.08053	1.19066	1.08053	1.19066
1	Velocity Method	Yes	0.19626	0.14017	0.21983	0.15898	0.88287	0.74399
2	Sabol Equation	No	0.68535	0.57152	0.68535	0.57152	0.68535	0.57152
3	Velocity Method	Yes	0.20322	0.2041	0.27126	0.28123	0.99802	1.19413
4	Velocity Method	Yes	0.36465	0.41942	0.44529	0.52354	1.58909	2.149
5	Velocity Method	Yes	0.38303	0.34807	0.46326	0.42987	1.51603	1.60272
9	Sabol Equation	No	0.4903	0.27191	0.4903	0.27191	0.4903	0.27191
10	Sabol Equation	No	0.67344	0.42827	0.67344	0.42827	0.67344	0.42827
16	Velocity Method	Yes	0.23022	0.19222	0.27922	0.23815	1.14287	1.13818
17	Sabol Equation	No	0.77272	0.61071	0.77272	0.61071	0.77272	0.61071
18	Sabol Equation	No	1.14837	0.9813	1.14837	0.9813	1.14837	0.9813
19	Sabol Equation	No	0.84318	0.571	0.84318	0.571	0.84318	0.571
20	Sabol Equation	No	0.74284	0.45624	0.74284	0.45624	0.74284	0.45624
21	Sabol Equation	No	0.67698	0.49254	0.67698	0.49254	0.67698	0.49254
22	Sabol Equation	No	1.40214	0.74134	1.40214	0.74134	1.40214	0.74134
23	Sabol Equation	No	1.09292	0.56285	1.09292	0.56285	1.09292	0.56285
24	Sabol Equation	No	1.46097	0.98051	1.46097	0.98051	1.46097	0.98051
25	Sabol Equation	No	1.61244	0.94462	1.61244	0.94462	1.61244	0.94462
26	Sabol Equation	No	1.35871	0.77956	1.35871	0.77956	1.35871	0.77956
27	Velocity Method	Yes	0.84749	0.92134	1.0595	1.18047	2.16905	2.61488
31	Sabol Equation	No	0.69014	0.5945	0.69014	0.5945	0.69014	0.5945
32	Velocity Method	Yes	0.20245	0.15199	0.25464	0.19606	1.32967	1.22791
33	Velocity Method	Yes	0.09311	0.06471	0.1018	0.07145	0.2697	0.2107
34	Velocity Method	Yes	0.06522	0.0573	0.07467	0.06658	0.18121	0.17815
35	Velocity Method	Yes	0.06656	0.03465	0.07292	0.03834	0.18021	0.10468
36	Velocity Method	Yes	0.1035	0.10941	0.1144	0.12226	0.1988	0.22579
37	Velocity Method	Yes	0.25936	0.32659	0.30595	0.39231	0.66104	0.9226
38	Sabol Equation	No	0.23437	0.25095	0.23437	0.25095	0.23437	0.25095
39	Velocity Method	Yes	0.44047	0.4085	0.54909	0.52173	1.47216	1.55909
42	Sabol Equation	No	0.71338	0.61318	0.71338	0.61318	0.71338	0.61318
43	Sabol Equation	No	0.98427	0.60524	0.98427	0.60524	0.98427	0.60524
44	Velocity Method	Yes	0.32165	0.24868	0.35796	0.28003	0.51421	0.41861

Note: Green Cells Indicate Sabol Equation for Tc

Table D2: Pipeline Arroyo, Post-RA Condition Clark Unit Hydrograph Parameters

Sub-basin	Tc Calc. Method	Tc Varies?	1hr PMP		10,000yr		1,000yr		200yr		100yr		10yr		5yr		2yr	
			Tc	R	Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)
0	Sabol	No	1.08053	1.19066	1.08053	1.19066	1.08053	1.19066	1.08053	1.19066	1.08053	1.19066	1.08053	1.19066	1.08053	1.19066	1.08053	1.19066
1	Velocity	Yes	0.19626	0.14017	0.19626	0.14017	0.19980	0.14299	0.21239	0.15302	0.21983	0.15898	0.26770	0.19784	0.30633	0.22977	0.88412	0.74516
2	Sabol	No	0.68535	0.57152	0.68535	0.57152	0.68535	0.57152	0.68535	0.57152	0.68535	0.57152	0.68535	0.57152	0.68535	0.57152	0.68535	0.57152
3	Velocity	Yes	0.20127	0.20193	0.20127	0.20193	0.21466	0.21689	0.24159	0.24730	0.25984	0.26812	0.39568	0.42762	0.60080	0.67982	0.99942	1.19597
4	Velocity	Yes	0.36465	0.41942	0.36465	0.41942	0.39241	0.45501	0.42437	0.49631	0.44529	0.52354	0.59708	0.72503	0.89425	1.13522	1.59024	2.15073
5	Velocity	Yes	0.38303	0.34807	0.38303	0.34807	0.41392	0.37936	0.44373	0.40980	0.46326	0.42987	0.60772	0.58101	0.79743	0.78551	1.51706	1.60393
9	Sabol	No	0.49030	0.27191	0.49030	0.27191	0.49030	0.27191	0.49030	0.27191	0.49030	0.27191	0.49030	0.27191	0.49030	0.27191	0.49030	0.27191
10	Sabol	No	0.67344	0.42827	0.67344	0.42827	0.67344	0.42827	0.67344	0.42827	0.67344	0.42827	0.67344	0.42827	0.67344	0.42827	0.67344	0.42827
16	Velocity	Yes	0.23022	0.19222	0.23022	0.19222	0.24189	0.20307	0.26506	0.22477	0.27922	0.23815	0.37942	0.33470	0.48256	0.43709	1.14351	1.13889
17	Sabol	No	0.77272	0.61071	0.77272	0.61071	0.77272	0.61071	0.77272	0.61071	0.77272	0.61071	0.77272	0.61071	0.77272	0.61071	0.77272	0.61071
18	Sabol	No	1.14837	0.98130	1.14837	0.98130	1.14837	0.98130	1.14837	0.98130	1.14837	0.98130	1.14837	0.98130	1.14837	0.98130	1.14837	0.98130
19	Sabol	No	0.84318	0.57100	0.84318	0.57100	0.84318	0.57100	0.84318	0.57100	0.84318	0.57100	0.84318	0.57100	0.84318	0.57100	0.84318	0.57100
20	Sabol	No	0.74284	0.45624	0.74284	0.45624	0.74284	0.45624	0.74284	0.45624	0.74284	0.45624	0.74284	0.45624	0.74284	0.45624	0.74284	0.45624
21	Sabol	No	0.67698	0.49254	0.67698	0.49254	0.67698	0.49254	0.67698	0.49254	0.67698	0.49254	0.67698	0.49254	0.67698	0.49254	0.67698	0.49254
22	Sabol	No	1.40214	0.74134	1.40214	0.74134	1.40214	0.74134	1.40214	0.74134	1.40214	0.74134	1.40214	0.74134	1.40214	0.74134	1.40214	0.74134
23	Sabol	No	1.09292	0.56285	1.09292	0.56285	1.09292	0.56285	1.09292	0.56285	1.09292	0.56285	1.09292	0.56285	1.09292	0.56285	1.09292	0.56285
24	Sabol	No	1.46097	0.98051	1.46097	0.98051	1.46097	0.98051	1.46097	0.98051	1.46097	0.98051	1.46097	0.98051	1.46097	0.98051	1.46097	0.98051
25	Sabol	No	1.61244	0.94462	1.61244	0.94462	1.61244	0.94462	1.61244	0.94462	1.61244	0.94462	1.61244	0.94462	1.61244	0.94462	1.61244	0.94462
26	Sabol	No	1.35871	0.77956	1.35871	0.77956	1.35871	0.77956	1.35871	0.77956	1.35871	0.77956	1.35871	0.77956	1.35871	0.77956	1.35871	0.77956
27	Velocity	Yes	0.86958	1.02210	0.86958	1.02210	0.97670	1.16277	1.05426	1.26570	1.10067	1.32770	1.38202	1.70935	1.59502	2.00415	2.12887	2.51954
31	Sabol	No	0.81504	0.69580	0.81504	0.69580	0.81504	0.69580	0.81504	0.69580	0.81504	0.69580	0.81504	0.69580	0.81504	0.69580	0.81504	0.69580
37	Velocity	Yes	0.25936	0.32659	0.25936	0.32659	0.26905	0.34016	0.29243	0.37312	0.30595	0.39231	0.38963	0.51309	0.45871	0.61499	0.66113	0.92274
38	Sabol	No	0.23437	0.25095														
39	Velocity	Yes	0.44047	0.40850	0.44047	0.40850	0.47673	0.44599	0.52054	0.49171	0.54909	0.52173	0.80332	0.79592	1.19280	1.23434	1.47315	1.56025
42	Sabol	No	0.71338	0.61318	0.71338	0.61318	0.71338	0.61318	0.71338	0.61318	0.71338	0.61318	0.71338	0.61318	0.71338	0.61318	0.71338	0.61318
43	Sabol	No	0.98427	0.60524	0.98427	0.60524	0.98427	0.60524	0.98427	0.60524	0.98427	0.60524	0.98427	0.60524	0.98427	0.60524	0.98427	0.60524
44	Velocity Method	Yes	0.26619	0.20826	0.26619	0.20826	0.26749	0.20939	0.28317	0.22305	0.32974	0.20506	0.33275	0.26681	0.35499	0.28667	0.44085	0.28305

Note: Green Cells indicate Sabol Equation for Tc

Table D3: Mill Site, Post-RA Condition Clark Unit Hydrograph Parameters

Subbasin	Tc Calculation Procedure	Tc Varies?	1hr PMP		10yr		2yr	
			Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)	Tc (hrs)	R (hrs)
0	Velocity Method	Yes	0.11580	0.14210	0.19115	0.24786	0.33437	0.46109
1	Velocity Method	Yes	0.14949	0.32630	0.32276	0.76676	0.85353	2.25660
2	Velocity Method	Yes	0.16181	0.29308	0.27980	0.53827	0.56714	1.17922
3	Velocity Method	Yes	0.12637	0.12448	0.18602	0.19119	0.27877	0.29955
4	Velocity Method	Yes	0.33112	0.38433	0.41530	0.49420	0.52369	0.63929
5	Velocity Method	Yes	0.29129	0.24058	0.38432	0.32725	0.56059	0.61347
6	Velocity Method	Yes	0.33670	0.47863	0.75819	1.17844	1.70244	2.89230
7	Velocity Method	Yes	0.17353	0.11154	0.22825	0.15120	0.28992	0.19717
12	Velocity Method	Yes	0.30666	0.47647	0.63311	1.06534	1.40169	2.57415
14	Velocity Method	Yes	0.17183	0.28441	0.23978	0.41168	0.34608	0.61869
16	Velocity Method	Yes	0.17705	0.28640	0.33441	0.58016	0.69785	1.31273
32	Sabol Equation	No	0.32368	0.32666	0.32368	0.32666	0.32368	0.32666
33	Sabol Equation	No	0.49875	0.28830	0.49875	0.28830	0.49875	0.28830
34	Sabol Equation	No	0.49783	0.33100	0.49783	0.33100	0.49783	0.33100
35	Sabol Equation	No	0.44462	0.27039	0.44462	0.27039	0.44462	0.27039
36	Velocity Method	Yes	0.31159	0.42326	0.62541	0.91722	1.18960	1.87252
37	Velocity Method	Yes	0.26309	0.34384	0.45250	0.62775	0.82935	1.22985
38	Sabol Equation	No	0.23427	0.25036	0.23427	0.25036	0.23427	0.25036
39	Velocity Method	Yes	0.48753	0.47121	1.24255	1.33113	2.28036	2.61166
40	Velocity Method	Yes	0.29879	0.73000	0.72554	1.95434	1.67067	4.93260
41	Velocity Method	Yes	0.22193	0.19497	0.35001	0.32331	0.62617	0.61660

Note: Green Cells indicate Sabol Equation for Tc

Table D4: Mine Site, RA-Phase 3 Construction Clark Unit Hydrograph Parameters

Subbasin	Tc Calc. Method	Tc Varies?	2yr	
			Tc (hrs)	R (hrs)
2	Velocity	Yes	0.77945	3.99196
3	Velocity	Yes	0.77945	2.82274
19	Sabol	No	0.33914	0.32630
20	Sabol	No	0.46383	0.40772
22	Velocity	Yes	0.26753	0.33553
23	Velocity	Yes	0.26979	0.15218
24	Velocity	Yes	0.13021	0.12343
25	Velocity	Yes	0.51695	0.65720
26	Velocity	Yes	0.14264	0.08075
27	Velocity	Yes	0.30976	0.37691
28	Sabol	No	0.26500	0.31072
29	Velocity	Yes	0.61481	0.64172
30	Velocity	Yes	0.55194	0.65948

Note: Green Cells indicate Sabol Equation for Tc

Table D5: Temporary Haul Road Stormwater Management; Clark Unit Hydrograph Parameters

Subbasin	Tc Calc. Method	Tc Varies?	10yr	
			Tc (hrs)	R (hrs)
00	Assigned*		0.08333	0.08333
01a	Assigned*		0.08333	0.08333
01b	Assigned*		0.08333	0.08333
02	Assigned*		0.08333	0.08333
03	Assigned*		0.08333	0.08333
04	Assigned*		0.08333	0.08333
05	Assigned*		0.08333	0.08333
06	Assigned*		0.08333	0.08333
07	Assigned*		0.08333	0.08333
08	Assigned*		0.08333	0.08333
09	Assigned*		0.08333	0.08333
10	Assigned*		0.08333	0.08333
11	Assigned*		0.08333	0.08333
12	Assigned*		0.08333	0.08333
13	Assigned*		0.08333	0.08333
14	Assigned*		0.08333	0.08333
15	Assigned*		0.08333	0.08333
16	Assigned*		0.08333	0.08333
17	Assigned*		0.08333	0.08333
18	Assigned*		0.08333	0.08333
19	Assigned*		0.08333	0.08333
20	Assigned*		0.08333	0.08333
21	Assigned*		0.08333	0.08333
22	Assigned*		0.08333	0.08333
23	Assigned*		0.08333	0.08333
24	Assigned*		0.08333	0.08333
25	Assigned*		0.08333	0.08333
26	Assigned*		0.08333	0.08333
27	Assigned*		0.08333	0.08333
28	Velocity	Yes	0.28317	0.26563

***Assigned Tc/R values of 5 minutes**

ATTACHMENT E

CHANNEL ROUTING PARAMETERS TABLES

Table E1: Channel Routing Parameters for Pipeline Arroyo, Existing Condition Model

Reach	Time Step Method	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
R01	Automatic Adaption	2293	0.0313	0.04	Triangle		2.5
R02	Automatic Adaption	1518	0.0105	0.04	Triangle		2.5
R03	Automatic Adaption	2736	0.0113	0.04	Trapezoid	15	2.5
R04	Automatic Adaption	1771	0.0079	0.04	Trapezoid	20	2.5
R05	Automatic Adaption	2915	0.0163	0.04	Trapezoid	20	2.5
R06	Automatic Adaption	6919	0.0114	0.04	Triangle		2.5
R07	Automatic Adaption	6441	0.0138	0.04	Triangle		2.5
R08	Automatic Adaption	1696	0.0083	0.04	Trapezoid	10	2.5
R09	Automatic Adaption	876	0.0034	0.04	Trapezoid	10	2.5
R10	Automatic Adaption	1669	0.0216	0.04	Trapezoid	5.0	2
R11	Automatic Adaption	2002	0.0055	0.04	Trapezoid	25	2.5
R12	Automatic Adaption	1763	0.0040	0.04	Trapezoid	25	2.5
R13	Automatic Adaption	1337	0.0322	0.04	Triangle		2
R14	Automatic Adaption	1184	0.0312	0.04	Triangle		2.5
R15	Automatic Adaption	3021	0.0056	0.04	Trapezoid	12.5	2
R16	Automatic Adaption	1919	0.0323	0.04	Trapezoid	20	2.5

Table E2: Channel Routing Parameters for Pipeline Arroyo, Post-RA Condition Model

Reach	Time Step Method	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
R01	Automatic Adaption	2293	0.0313	0.04	Triangle	-	2.5
R02	Automatic Adaption	1518	0.0105	0.04	Triangle	-	2.5
R03	Automatic Adaption	2736	0.0113	0.04	Trapezoid	15	2.5
R04	Automatic Adaption	1771	0.0079	0.04	Trapezoid	20	2.5
R05	Automatic Adaption	2915	0.0163	0.04	Trapezoid	20	2.5
R06	Automatic Adaption	6919	0.0114	0.04	Triangle	-	2.5
R07	Automatic Adaption	6441	0.0138	0.04	Triangle	-	2.5
R08	Automatic Adaption	1696	0.0083	0.04	Trapezoid	10	2.5
R09	Automatic Adaption	876	0.0034	0.04	Trapezoid	10	2.5
R10	Automatic Adaption	1669	0.0216	0.04	Trapezoid	5.0	2
R11	Automatic Adaption	2002	0.0055	0.04	Trapezoid	25	2.5
R12	Automatic Adaption	1763	0.0040	0.04	Trapezoid	25	2.5
R13	Automatic Adaption	1337	0.0322	0.04	Triangle	-	2
R14	Automatic Adaption	1184	0.0312	0.04	Triangle	-	2.5
R15	Automatic Adaption	3021	0.0056	0.04	Trapezoid	12.5	2
R16	Automatic Adaption	1919	0.0323	0.04	Trapezoid	20	2.5

Table E3: Channel Routing Parameters for Mill Site, Post-RA Condition Model

Reach	Time Step Method	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
ND01	Automatic Adaption	2001	0.0055	0.04	Trapezoid	10	2.5
ND02	Automatic Adaption	1665	0.0216	0.03	Trapezoid	10	2.5
ND03	Automatic Adaption	2701	0.0344	0.04	Triangle	-	2
ND04	Automatic Adaption	871.7	0.0023	0.04	Trapezoid	10	2.5
ND05	Automatic Adaption	2050	0.0054	0.035	Trapezoid	10	2.5
RC01	Automatic Adaption	926	0.01	0.04	Trapezoid	10	2.5
RC02	Automatic Adaption	326	0.0095	0.04	Trapezoid	10	2.5
RC03	Automatic Adaption	515	0.0117	0.04	Trapezoid	10	2.5
RC04	Automatic Adaption	643	0.021	0.04	Trapezoid	10	2.5
RC05	Automatic Adaption	1431	0.01	0.04	Trapezoid	10	2.5
R-Swale C	Automatic Adaption	945	0.0042	0.04	Trapezoid	10	3

Table E4: Channel Routing Parameters for Mine Site, RA-Phase 3 Construction Model

Reach	Time Step Method	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
R1	Automatic Adaption	734	0.0231	0.04	Trapezoid	1	3
R2	Automatic Adaption	1328	0.0293	0.04	Trapezoid	1	2.5
R3	Automatic Adaption	841	0.0273	0.04	Trapezoid	2	2.5
R4	Automatic Adaption	700	0.016	0.04	Triangle	-	2
R5	Automatic Adaption	896	0.04	0.04	Triangle		5

ATTACHMENT F

RESERVOIR STAGE-AREA-STORAGE TABLES

Table F1: Stage-Area-Storage for Pond 1

Elevation (ft)	Area (ft^2)	Area (acres)	Storage (cf)	Storage (ac-ft)
7098	823	0.01889	0	0
7099	2,748	0.06310	1,786	0.04099
7100	4,743	0.10889	5,531	0.12699
7101	6,159	0.14140	10,983	0.25213
7102	7,345	0.16862	17,735	0.40714
7103	8,257	0.18956	25,536	0.58623
7104	9,171	0.21053	34,250	0.78627
7105	10,070	0.23117	43,870	1.00712
7106	10,941	0.25118	54,376	1.24829
7107	11,766	0.27011	65,729	1.50894
7108	12,563	0.28841	77,894	1.7882
7109	13,317	0.30571	90,834	2.08526
7110	14,094	0.32356	104,539	2.39989
7111	14,878	0.34155	119,025	2.73245
7112	15,643	0.35910	134,286	3.08278
7113	16,423	0.37702	150,319	3.45084
7114	17,239	0.39575	167,150	3.83723
7115	18,148	0.41661	184,843	4.24341
7116	19,255	0.44203	203,544	4.67274
7117	20,634	0.47369	223,489	5.1306
7118	21,798	0.50042	244,705	5.61765
7119	22,968	0.52727	267,088	6.1315
7120	24,168	0.55482	290,656	6.67254
7121	25,396	0.58301	315,438	7.24146
7122	26,713	0.61324	341,492	7.83959
7123	28,246	0.64845	368,972	8.47043
7124	32,678	0.75018	399,434	9.16974

Table F2: Stage-Area-Storage for Pond 2

Elevation (ft)	Area (ft^2)	Area (acres)	Storage (cf)	Storage (ac-ft)
7102	192	0.00441	0	0
7103	7,207	0.16544	3,699	0.08493
7104	14,861	0.34116	14,733	0.33823
7105	26,134	0.59995	35,230	0.80878
7106	33,582	0.77095	65,089	1.49423
7107	36,258	0.83237	100,009	2.29588
7108	40,772	0.93599	138,523	3.18006
7109	46,246	1.06167	182,032	4.17889
7110	51,335	1.17849	230,823	5.29897
7111	56,271	1.29181	284,626	6.53412
7112	61,136	1.40350	343,330	7.88177
7113	65,668	1.50753	406,732	9.33728
7114	70,122	1.60979	474,627	10.89594
7115	75,116	1.72443	547,247	12.56305
7116	79,732	1.83039	624,671	14.34047
7117	84,269	1.93456	706,671	16.22294
7118	88,546	2.03273	793,079	18.20658
7119	92,601	2.12582	883,652	20.28586
7120	96,764	2.22140	978,334	22.45947
7121	101,870	2.33860	1,077,651	24.73947
7122	108,382	2.48812	1,182,777	27.15283
7123	114,961	2.63915	1,294,449	29.71646
7124	124,390	2.85559	1,414,125	32.46383

Table F3: Stage-Area-Storage for Pond 3

Elevation (ft)	Area (ft^2)	Area (acres)	Storage (cf)	Storage (ac-ft)
7056	7	017	0	0
7057	10,088	0.23159	5,048	0.11588
7058	20,253	0.46494	20,218	0.46414
7059	29,582	0.67912	45,136	1.03617
7060	37,178	0.85350	78,516	1.80248
7061	48,477	1.11289	121,344	2.78567
7062	57,695	1.32449	174,430	4.00436
7063	65,686	1.50795	236,121	5.42058
7064	73,013	1.67615	305,470	7.01263
7065	80,537	1.84888	382,245	8.77515
7066	87,525	2.00930	466,277	10.70424
7067	94,360	2.16620	557,219	12.79199
7068	101,184	2.32286	654,991	15.03652
7069	107,912	2.47733	759,539	17.43661
7070	114,583	2.63046	870,786	19.9905
7071	120,999	2.77775	988,577	22.69461
7072	127,389	2.92445	1,112,771	25.54571
7073	133,919	3.07435	1,243,425	28.54511
7074	140,512	3.22572	1,380,640	31.69514
7075	146,562	3.36460	1,524,178	34.9903
7076	152,407	3.49878	1,673,662	38.42199
7077	157,954	3.62612	1,828,842	41.98444
7078	163,281	3.74841	1,989,459	45.6717
7079	169,178	3.88379	2,155,689	49.48781
7080	174,998	4.01740	2,327,777	53.4384
7081	200,643	4.60612	2,515,597	57.75017
7082	209,664	4.81322	2,720,751	62.45984
7083	218,764	5.02212	2,934,964	67.37751
7084	227,166	5.21502	3,157,929	72.49608

Table F4: Stage-Area-Storage for Pond 4

Elevation (ft)	Area (ft^2)	Area (acres)	Storage (cf)	Storage (ac-ft)
7044	514	0.01180	0	0
7046	4,446	0.10207	4,960	0.11387
7048	8,665	0.19892	18,071	0.41486
7050	13,010	0.29867	39,746	0.91245
7052	16,305	0.37432	69,062	1.58544
7054	21,850	0.50160	107,216	2.46135
7056	27,810	0.63844	156,877	3.60139

Table F5: Stage-Area-Storage for Pond 5

Elevation (ft)	Area (ft^2)	Area (acres)	Storage (cf)	Storage (ac-ft)
7044	992	0.02276	0	0
7046	2,873	0.06596	3,865	0.08873
7048	4,404	0.10111	11,143	0.2558
7050	7,320	0.16805	22,868	0.52497
7052	11,684	0.26822	41,872	0.96124

Table F6: Stage-Area-Storage for Temporary Plug at Pond 3

Elevation (ft)	Area (ft^2)	Area (acres)	Storage (cf)	Storage (ac-ft)
7080	10	0.000220	0	0
7081	73	0.001672	41	0.00095
7082	338	0.007754	205	0.00471
7083	686	0.015756	512	0.01176
7084	1022	0.023473	854	0.01961
7085	1301	0.029859	1162	0.02667
7086	1606	0.036876	1453	0.03337
7087	1943	0.044616	1775	0.04075
7088	2353	0.054010	2148	0.04931
7089	2950	0.067732	2652	0.06087

ATTACHMENT G

HEC-HMS MODEL RESULTS

Table G1: HEC-HMS Model Results for Pipeline Arroyo, Existing Condition 1-Hour PMP

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
D1	0.0101	45.7	2.6
J-R01ds	3.6051	6816.9	877.7
J-R01us	1.5412	3376.7	378.1
J-R03ds	4.8806	9031.2	1176.4
J-R04ds	5.3089	9844.5	1338.2
J-R04us	4.9180	9125.5	1238.8
J-R05ds	5.5618	10245.9	1396.2
J-R05us	5.3089	9844.5	1338.2
J-R06ds	4.2027	6281.2	870.1
J-R06us	3.2122	4746.1	647.0
J-R07ds	9.2640	13354.6	2049.0
J-R07us	8.8702	12827.0	1953.3
J-R08ds	10.1275	14567.0	2243.2
J-R08us	10.1275	14590.1	2242.6
J-R09ds	0.8806	2483.1	208.7
J-R09us	0.3364	1041.2	75.4
J-R10ds	0.9043	2544.6	214.9
J-R10us	0.8806	2483.1	208.7
J-R11ds	0.9302	2584.6	221.5
J-R11us	0.9302	2616.1	221.1
J-R12ds	17.1037	26310.6	3967.3
J-R12us	16.0868	24976.1	3726.2
J-R15us	17.4125	26757.1	4046.0
J-R16ds	0.0374	351.8	62.4
J-R16us	00	352.9	53.8
J-R2ds	0.6682	1696.6	158.6
J-R2us	0.6682	1711.4	158.6
J-R3us	4.8806	9040.9	1175.8
Outlet/R15ds	17.6800	26758.5	4114.7
Pond 1	0.0088	0.0	0.0
Pond 2	0.0269	0.0	0.0
Pond 4	0.0237	0.0	0.0
Pond 5	00	0.0	0.0
Pond3	0.4238	0.0	0.0
R01	1.5412	3361.8	378.2
R02	0.6682	1696.6	158.6
R03	4.8806	9031.2	1176.4
R04	4.9180	9100.9	1239.4
R05	5.3089	9803.1	1338.9
R06	3.2122	4718.7	649.0
R07	8.8702	12792.0	1956.7
R08	10.1275	14567.0	2243.2
R09	0.3364	1031.4	75.4
R10	0.8806	2476.0	208.8
R11	0.9302	2584.6	221.5
R12	16.0868	24924.8	3726.7
R13	0.0556	219.7	14.2
R14	0.1385	590.5	35.6
R15	17.4125	26682.1	4046.7
R16	00	351.1	54.0
0	0.6073	849.2	139.5
1	0.1385	598.1	35.6
2	0.2528	569.3	57.3
3	0.0374	133.9	8.5
4	0.1464	411.5	34.8

Table G1: HEC-HMS Model Results for Pipeline Arroyo, Existing Condition 1-Hour PMP

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
5	0.0734	229.2	18.1
9	0.3364	1041.2	75.4
10	0.5442	1488.0	133.3
16	0.0556	220.8	14.2
17	0.3975	821.7	86.8
18	0.8635	1304.7	193.5
19	0.3938	882.1	92.3
20	0.6682	1711.4	158.6
21	0.3909	1037.8	98.8
22	3.2122	4746.1	647.0
23	1.5412	3376.7	378.1
24	1.5612	2323.0	370.7
25	2.7471	3857.9	626.5
26	2.0639	3586.1	499.5
27	0.1623	321.8	43.9
31	0.3355	765.8	79.1
32	0.0783	320.0	19.1
33	0.0237	116.0	6.0
34	0.0088	40.8	1.9
35	0.0269	130.3	5.9
36	0.0101	45.7	2.6
37	0.0237	78.6	6.0
38	0.0259	91.4	6.3
39	0.0868	229.4	19.1
42	0.3593	812.7	85.9
43	0.9904	1987.5	221.1
44	0.0201	76.2	5.5

Table G2: HEC-HMS Model Results for Pipeline Arroyo, Existing Condition 100-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
D1	0.0101	21.0	0.5
J-R01ds	3.6051	1421.9	165.9
J-R01us	1.5412	731.4	72.7
J-R03ds	4.8806	1842.1	218.7
J-R04ds	5.3089	1985.1	240.6
J-R04us	4.9180	1845.6	220.1
J-R05ds	5.5618	2042.2	250.6
J-R05us	5.3089	1985.1	240.6
J-R06ds	4.2027	937.9	126.8
J-R06us	3.2122	705.5	90.1
J-R07ds	9.2640	2206.4	332.4
J-R07us	8.8702	2129.1	314.7
J-R08ds	10.1275	2409.0	364.2
J-R08us	10.1275	2414.6	364.1
J-R09ds	0.8806	597.0	37.8
J-R09us	0.3364	256.8	12.4
J-R10ds	0.9043	609.9	39.0
J-R10us	0.8806	597.0	37.8
J-R11ds	0.9302	612.2	40.4
J-R11us	0.9302	621.6	40.2
J-R12ds	17.1037	4676.5	672.3
J-R12us	16.0868	4450.1	628.3
J-R15us	17.4125	4771.1	689.3
J-R16ds	0.0374	34.3	1.4
J-R16us	00	0.0	0.0
J-R2ds	0.6682	378.4	28.5
J-R2us	0.6682	384.7	28.5
J-R3us	4.8806	1843.2	218.3
Outlet/R15ds	17.6800	4765.7	704.4
Pond 1	0.0088	0.0	0.0
Pond 2	0.0269	0.0	0.0
Pond 4	0.0237	0.0	0.0
Pond 5	00	0.0	0.0
Pond3	0.4238	0.0	0.0
R01	1.5412	728.1	72.7
R02	0.6682	378.4	28.5
R03	4.8806	1842.1	218.7
R04	4.9180	1837.8	220.4
R05	5.3089	1978.7	241.0
R06	3.2122	702.8	90.9
R07	8.8702	2124.7	316.2
R08	10.1275	2409.0	364.2
R09	0.3364	251.9	12.4
R10	0.8806	594.8	37.8
R11	0.9302	612.2	40.4
R12	16.0868	4422.6	628.8
R13	0.0556	72.4	3.0
R14	0.1385	226.4	7.5
R15	17.4125	4747.0	690.4
R16	00	0.0	0.0
0	0.6073	159.8	23.8
1	0.1385	240.0	7.5
2	0.2528	118.5	9.6
3	0.0374	34.3	1.4
4	0.1464	91.3	6.3
5	0.0734	56.7	3.5

Table G2: HEC-HMS Model Results for Pipeline Arroyo, Existing Condition 100-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
9	0.3364	256.8	12.4
10	0.5442	365.9	25.4
16	0.0556	73.3	3.0
17	0.3975	154.4	13.5
18	0.8635	235.2	31.7
19	0.3938	185.0	16.2
20	0.6682	384.7	28.5
21	0.3909	266.6	20.1
22	3.2122	705.5	90.1
23	1.5412	731.4	72.7
24	1.5612	444.7	66.7
25	2.7471	686.1	105.7
26	2.0639	722.7	93.2
27	0.1623	71.7	10.7
31	0.3355	169.7	14.1
32	0.0783	105.7	3.6
33	0.0237	60.3	1.2
34	0.0088	18.5	0.3
35	0.0269	59.7	0.9
36	0.0101	21.0	0.5
37	0.0237	22.9	1.2
38	0.0259	30.5	1.2
39	0.0868	42.3	3.0
42	0.3593	181.9	15.6
43	0.9904	369.0	35.9
44	0.0201	28.0	1.4

Table G3: HEC-HMS Model Results for Pipeline Arroyo, Existing Condition 2-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
D1	0.0101	0.0	0.0
J-R01ds	3.6051	0.0	0.0
J-R01us	1.5412	0.0	0.0
J-R03ds	4.8806	0.0	0.0
J-R04ds	5.3089	0.0	0.0
J-R04us	4.9180	0.0	0.0
J-R05ds	5.5618	0.0	0.0
J-R05us	5.3089	0.0	0.0
J-R06ds	4.2027	0.0	0.0
J-R06us	3.2122	0.0	0.0
J-R07ds	9.2640	0.0	0.0
J-R07us	8.8702	0.0	0.0
J-R08ds	10.1275	0.0	0.0
J-R08us	10.1275	0.0	0.0
J-R09ds	0.8806	0.0	0.0
J-R09us	0.3364	0.0	0.0
J-R10ds	0.9043	0.0	0.0
J-R10us	0.8806	0.0	0.0
J-R11ds	0.9302	0.0	0.0
J-R11us	0.9302	0.0	0.0
J-R12ds	17.1037	0.0	0.0
J-R12us	16.0868	0.0	0.0
J-R15us	17.4125	3.2	1.0
J-R16ds	0.0374	0.0	0.0
J-R16us	00	0.0	0.0
J-R2ds	0.6682	0.0	0.0
J-R2us	0.6682	0.0	0.0
J-R3us	4.8806	0.0	0.0
Outlet/R15ds	17.6800	3.2	1.0
Pond 1	0.0088	0.0	0.0
Pond 2	0.0269	0.0	0.0
Pond 4	0.0237	0.0	0.0
Pond 5	00	0.0	0.0
Pond3	0.4238	0.0	0.0
R01	1.5412	0.0	0.0
R02	0.6682	0.0	0.0
R03	4.8806	0.0	0.0
R04	4.9180	0.0	0.0
R05	5.3089	0.0	0.0
R06	3.2122	0.0	0.0
R07	8.8702	0.0	0.0
R08	10.1275	0.0	0.0
R09	0.3364	0.0	0.0
R10	0.8806	0.0	0.0
R11	0.9302	0.0	0.0
R12	16.0868	0.0	0.0
R13	0.0556	0.0	0.0
R14	0.1385	0.0	0.0
R15	17.4125	3.2	1.0
R16	00	0.0	0.0
0	0.6073	0.0	0.0
1	0.1385	0.0	0.0
2	0.2528	0.0	0.0
3	0.0374	0.0	0.0
4	0.1464	0.0	0.0
5	0.0734	0.0	0.0

Table G3: HEC-HMS Model Results for Pipeline Arroyo, Existing Condition 2-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
9	0.3364	0.0	0.0
10	0.5442	0.0	0.0
16	0.0556	0.0	0.0
17	0.3975	0.0	0.0
18	0.8635	0.0	0.0
19	0.3938	0.0	0.0
20	0.6682	0.0	0.0
21	0.3909	0.0	0.0
22	3.2122	0.0	0.0
23	1.5412	0.0	0.0
24	1.5612	0.0	0.0
25	2.7471	0.0	0.0
26	2.0639	0.0	0.0
27	0.1623	3.2	1.0
31	0.3355	0.0	0.0
32	0.0783	0.0	0.0
33	0.0237	0.0	0.0
34	0.0088	0.0	0.0
35	0.0269	0.0	0.0
36	0.0101	0.0	0.0
37	0.0237	0.0	0.0
38	0.0259	0.0	0.0
39	0.0868	0.0	0.0
42	0.3593	0.0	0.0
43	0.9904	0.0	0.0
44	0.0201	2.4	0.1

Table G4: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 1-Hour PMP

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-R01ds	3.6051	6816.9	877.7
J-R01us	1.5412	3376.7	378.1
J-R03ds	4.8806	9031.3	1176.4
J-R04ds	5.7921	10713.4	1397.9
J-R04us	5.4012	9962.8	1298.7
J-R05ds	6.0450	11144.4	1455.9
J-R05us	5.7921	10713.4	1397.9
J-R06ds	4.2027	6281.3	870.1
J-R06us	3.2122	4746.1	647.0
J-R07ds	9.2640	13354.8	2049.0
J-R07us	8.8702	12827.0	1953.3
J-R08ds	10.1275	14566.2	2243.2
J-R08us	10.1275	14590.2	2242.6
J-R09ds	0.8806	2483.2	208.7
J-R09us	0.3364	1041.2	75.4
J-R10ds	0.9043	2544.6	214.9
J-R10us	0.8806	2483.2	208.7
J-R11ds	0.9302	2584.5	221.5
J-R11us	0.9302	2616.0	221.1
J-R12ds	17.5869	27152.4	4027.3
J-R12us	16.5699	25703.6	3785.8
J-R15us	17.8756	27553.0	4100.6
J-R16ds	0.5206	1026.1	122.3
J-R16us	0.4832	984.9	113.0
J-R2ds	0.6682	1696.6	158.6
J-R2us	0.6682	1711.4	158.6
J-R3us	4.8806	9041.0	1175.9
Outlet/R15ds	18.1431	27502.4	4170.1
R01	1.5412	3361.8	378.2
R02	0.6682	1696.6	158.6
R03	4.8806	9031.3	1176.4
R04	5.4012	9940.1	1299.0
R05	5.7921	10693.8	1398.5
R06	3.2122	4718.7	649.0
R07	8.8702	12792.0	1956.7
R08	10.1275	14566.2	2243.2
R09	0.3364	1031.1	75.4
R10	0.8806	2475.9	208.8
R11	0.9302	2584.5	221.5
R12	16.5699	25650.0	3786.7
R13	0.0556	219.7	14.2
R14	0.1385	590.5	35.6
R15	17.8756	27421.3	4102.1
R16	0.4832	981.9	113.2
0	0.6073	849.3	139.5
1	0.1385	598.1	35.6
2	0.2528	569.2	57.3

Table G4: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 1-Hour PMP

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
3	0.0374	141.5	9.1
4	0.1464	411.5	34.8
5	0.0734	229.2	18.1
9	0.3364	1041.2	75.4
10	0.5442	1488.0	133.3
16	0.0556	220.8	14.2
17	0.3975	821.7	86.8
18	0.8635	1304.7	193.5
19	0.3938	882.1	92.3
20	0.6682	1711.4	158.6
21	0.3909	1037.8	98.8
22	3.2122	4746.1	647.0
23	1.5412	3376.7	378.1
24	1.5612	2323.0	370.7
25	2.7471	3857.9	626.5
26	2.0639	3586.1	499.5
27	0.1423	263.8	38.5
31	0.4832	984.9	113.0
37	0.0237	78.6	6.0
38	0.0259	91.4	6.3
39	0.0868	229.4	19.1
42	0.3593	812.7	85.9
43	0.9904	1987.5	221.1
44	0.0296	119.6	8.1

Table G5: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 10,000-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-R01ds	3.6051	4579.3	550.6
J-R01us	1.5412	2321.9	238.4
J-R03ds	4.8806	6003.0	733.1
J-R04ds	5.7921	7091.3	872.5
J-R04us	5.4012	6604.4	808.0
J-R05ds	6.0450	7355.5	907.5
J-R05us	5.7921	7091.3	872.5
J-R06ds	4.2027	3825.2	507.7
J-R06us	3.2122	2909.3	374.3
J-R07ds	9.2640	8249.4	1226.1
J-R07us	8.8702	7937.4	1166.2
J-R08ds	10.1275	9015.1	1342.0
J-R08us	10.1275	9022.4	1341.8
J-R09ds	0.8806	1901.8	128.7
J-R09us	0.3364	864.0	45.1
J-R10ds	0.9043	1934.0	132.7
J-R10us	0.8806	1901.8	128.7
J-R11ds	0.9302	1954.6	137.1
J-R11us	0.9302	1974.5	136.6
J-R12ds	17.5869	17179.9	2450.0
J-R12us	16.5699	16333.8	2300.7
J-R15us	17.8756	17438.6	2497.8
J-R16ds	0.5206	701.1	75.0
J-R16us	0.4832	686.2	69.1
J-R2ds	0.6682	1231.1	97.6
J-R2us	0.6682	1245.6	97.6
J-R3us	4.8806	6008.8	732.5
Outlet/R15ds	18.1431	17410.8	2542.3
R01	1.5412	2304.4	238.5
R02	0.6682	1231.1	97.6
R03	4.8806	6003.0	733.1
R04	5.4012	6598.4	808.7
R05	5.7921	7090.5	873.2
R06	3.2122	2898.7	376.3
R07	8.8702	7927.5	1169.9
R08	10.1275	9015.1	1342.0
R09	0.3364	843.4	45.1
R10	0.8806	1890.7	128.9
R11	0.9302	1954.6	137.1
R12	16.5699	16271.3	2301.7
R13	0.0556	210.7	9.3
R14	0.1385	619.1	23.3
R15	17.8756	17354.1	2498.2
R16	0.4832	677.6	69.3
0	0.6073	554.3	84.2
1	0.1385	622.8	23.3
2	0.2528	405.5	34.3
3	0.0374	142.2	5.7
4	0.1464	339.1	21.4
5	0.0734	194.1	11.4
9	0.3364	864.0	45.1
10	0.5442	1121.3	83.6
16	0.0556	222.5	9.3
17	0.3975	562.9	51.2
18	0.8635	842.1	115.7

Table G5: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 10,000-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
19	0.3938	615.1	56.2
20	0.6682	1245.6	97.6
21	0.3909	777.2	63.8
22	3.2122	2909.3	374.3
23	1.5412	2321.9	238.4
24	1.5612	1500.6	228.1
25	2.7471	2425.0	377.4
26	2.0639	2373.3	312.1
27	0.1423	191.9	26.4
31	0.4832	686.2	69.1
37	0.0237	70.3	3.9
38	0.0259	86.7	3.9
39	0.0868	182.9	11.2
42	0.3593	584.7	52.9
43	0.9904	1322.8	131.5
44	0.0296	116.5	5.6

Table G6: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 1,000-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-R01ds	3.6051	2833.1	334.9
J-R01us	1.5412	1445.9	145.4
J-R03ds	4.8806	3699.9	444.5
J-R04ds	5.7921	4367.0	529.3
J-R04us	5.4012	4067.9	489.6
J-R05ds	6.0450	4519.6	550.2
J-R05us	5.7921	4367.0	529.3
J-R06ds	4.2027	2192.1	291.7
J-R06us	3.2122	1661.8	212.8
J-R07ds	9.2640	4844.0	721.1
J-R07us	8.8702	4667.1	685.2
J-R08ds	10.1275	5295.7	789.7
J-R08us	10.1275	5304.4	789.4
J-R09ds	0.8806	1190.3	77.6
J-R09us	0.3364	535.9	26.6
J-R10ds	0.9043	1216.7	80.1
J-R10us	0.8806	1190.3	77.6
J-R11ds	0.9302	1214.3	82.7
J-R11us	0.9302	1241.1	82.4
J-R12ds	17.5869	10267.6	1460.0
J-R12us	16.5699	9764.5	1370.0
J-R15us	17.8756	10433.6	1489.9
J-R16ds	0.5206	429.6	45.1
J-R16us	0.4832	421.7	41.5
J-R2ds	0.6682	764.7	58.9
J-R2us	0.6682	776.7	58.9
J-R3us	4.8806	3702.9	443.9
Outlet/R15ds	18.1431	10425.4	1519.8
R01	1.5412	1436.5	145.6
R02	0.6682	764.7	58.9
R03	4.8806	3699.9	444.5
R04	5.4012	4062.7	489.8
R05	5.7921	4363.1	529.9
R06	3.2122	1657.7	214.1
R07	8.8702	4663.1	687.3
R08	10.1275	5295.7	789.7
R09	0.3364	523.5	26.6
R10	0.8806	1188.7	77.7
R11	0.9302	1214.3	82.7
R12	16.5699	9742.3	1370.6
R13	0.0556	139.2	5.8
R14	0.1385	422.5	14.5
R15	17.8756	10396.9	1492.5
R16	0.4832	416.6	41.6
0	0.6073	333.7	50.1
1	0.1385	428.5	14.5
2	0.2528	247.4	20.3
3	0.0374	90.9	3.5
4	0.1464	205.0	12.9
5	0.0734	120.3	7.0
9	0.3364	535.9	26.6
10	0.5442	712.6	51.0
16	0.0556	146.6	5.7
17	0.3975	337.2	30.0
18	0.8635	503.3	68.3

Table G6: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 1,000-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
19	0.3938	378.4	33.7
20	0.6682	776.7	58.9
21	0.3909	502.1	39.4
22	3.2122	1661.8	212.8
23	1.5412	1445.9	145.4
24	1.5612	913.4	137.7
25	2.7471	1446.8	223.7
26	2.0639	1457.9	189.3
27	0.1423	113.9	17.0
31	0.4832	421.7	41.5
37	0.0237	45.8	2.4
38	0.0259	57.0	2.4
39	0.0868	103.6	6.6
42	0.3593	365.3	32.0
43	0.9904	792.3	77.6
44	0.0296	81.2	3.6

Table G7: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 200-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-R01ds	3.6051	1806.8	211.6
J-R01us	1.5412	925.5	92.2
J-R03ds	4.8806	2346.6	279.4
J-R04ds	5.7921	2768.4	332.9
J-R04us	5.4012	2578.4	307.3
J-R05ds	6.0450	2855.1	346.7
J-R05us	5.7921	2768.4	332.9
J-R06ds	4.2027	1261.7	169.3
J-R06us	3.2122	949.8	121.4
J-R07ds	9.2640	2895.6	434.2
J-R07us	8.8702	2793.9	411.6
J-R08ds	10.1275	3163.9	475.7
J-R08us	10.1275	3172.9	475.6
J-R09ds	0.8806	758.7	48.4
J-R09us	0.3364	332.2	16.1
J-R10ds	0.9043	775.9	50.0
J-R10us	0.8806	758.7	48.4
J-R11ds	0.9302	777.4	51.8
J-R11us	0.9302	791.0	51.5
J-R12ds	17.5869	6282.7	896.8
J-R12us	16.5699	5980.6	840.4
J-R15us	17.8756	6393.4	916.4
J-R16ds	0.5206	269.9	27.9
J-R16us	0.4832	263.8	25.6
J-R2ds	0.6682	483.6	36.7
J-R2us	0.6682	492.6	36.7
J-R3us	4.8806	2348.0	278.9
Outlet/R15ds	18.1431	6396.6	936.3
R01	1.5412	920.9	92.3
R02	0.6682	483.6	36.7
R03	4.8806	2346.6	279.4
R04	5.4012	2572.6	307.5
R05	5.7921	2760.1	334.3
R06	3.2122	946.5	122.3
R07	8.8702	2790.6	413.3
R08	10.1275	3163.9	475.7
R09	0.3364	325.0	16.1
R10	0.8806	757.1	48.5
R11	0.9302	777.4	51.8
R12	16.5699	5965.1	841.0
R13	0.0556	92.4	3.7
R14	0.1385	284.2	9.4
R15	17.8756	6375.6	918.6
R16	0.4832	261.1	25.7
0	0.6073	205.2	30.6
1	0.1385	295.7	9.4
2	0.2528	152.6	12.4
3	0.0374	55.7	2.2
4	0.1464	123.3	8.1
5	0.0734	74.6	4.5
9	0.3364	332.2	16.1
10	0.5442	462.0	32.3
16	0.0556	93.5	3.7
17	0.3975	204.2	18.0
18	0.8635	306.4	41.4
19	0.3938	236.9	20.9

Table G7: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 200-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
20	0.6682	492.6	36.7
21	0.3909	332.9	25.4
22	3.2122	949.8	121.4
23	1.5412	925.5	92.2
24	1.5612	571.9	85.9
25	2.7471	884.7	136.5
26	2.0639	924.1	119.4
27	0.1423	72.9	11.5
31	0.4832	263.8	25.6
37	0.0237	29.3	1.5
38	0.0259	38.1	1.5
39	0.0868	59.2	4.0
42	0.3593	232.7	20.1
43	0.9904	482.0	47.0
44	0.0296	55.6	2.5

Table G8: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 100-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-R01ds	3.6051	1421.9	165.9
J-R01us	1.5412	731.4	72.7
J-R03ds	4.8806	1842.2	218.7
J-R04ds	5.7921	2172.6	260.9
J-R04us	5.4012	2024.4	240.5
J-R05ds	6.0450	2236.9	270.9
J-R05us	5.7921	2172.6	260.9
J-R06ds	4.2027	938.0	126.8
J-R06us	3.2122	705.5	90.1
J-R07ds	9.2640	2206.4	332.4
J-R07us	8.8702	2129.1	314.7
J-R08ds	10.1275	2409.0	364.2
J-R08us	10.1275	2414.7	364.1
J-R09ds	0.8806	597.0	37.8
J-R09us	0.3364	256.8	12.4
J-R10ds	0.9043	609.9	39.0
J-R10us	0.8806	597.0	37.8
J-R11ds	0.9302	612.2	40.4
J-R11us	0.9302	621.5	40.2
J-R12ds	17.5869	4848.5	692.6
J-R12us	16.5699	4611.6	648.7
J-R15us	17.8756	4931.5	708.3
J-R16ds	0.5206	211.3	21.7
J-R16us	0.4832	205.8	19.9
J-R2ds	0.6682	378.4	28.5
J-R2us	0.6682	384.7	28.5
J-R3us	4.8806	1843.2	218.3
Outlet/R15ds	18.1431	4932.3	724.4
R01	1.5412	728.1	72.7
R02	0.6682	378.4	28.5
R03	4.8806	1842.2	218.7
R04	5.4012	2018.1	240.8
R05	5.7921	2163.5	261.4
R06	3.2122	702.8	90.9
R07	8.8702	2124.7	316.2
R08	10.1275	2409.0	364.2
R09	0.3364	251.7	12.4
R10	0.8806	594.8	37.8
R11	0.9302	612.2	40.4
R12	16.5699	4594.6	649.2
R13	0.0556	72.4	3.0
R14	0.1385	226.4	7.5
R15	17.8756	4913.6	710.4
R16	0.4832	204.0	20.0
0	0.6073	159.9	23.8
1	0.1385	240.0	7.5
2	0.2528	118.5	9.6
3	0.0374	41.5	1.7
4	0.1464	91.3	6.3
5	0.0734	56.7	3.5
9	0.3364	256.8	12.4
10	0.5442	365.9	25.4
16	0.0556	73.3	3.0
17	0.3975	154.4	13.5
18	0.8635	235.2	31.7
19	0.3938	185.0	16.2

Table G8: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 100-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
20	0.6682	384.7	28.5
21	0.3909	266.6	20.1
22	3.2122	705.5	90.1
23	1.5412	731.4	72.7
24	1.5612	444.7	66.7
25	2.7471	686.1	105.7
26	2.0639	722.7	93.2
27	0.1423	57.4	9.4
31	0.4832	205.8	19.9
37	0.0237	22.9	1.2
38	0.0259	30.5	1.2
39	0.0868	42.3	3.0
42	0.3593	181.9	15.6
43	0.9904	369.0	35.9
44	0.0296	46.3	2.0

Table G9: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 10-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-R01ds	3.6051	406.0	46.8
J-R01us	1.5412	211.4	20.8
J-R03ds	4.8806	509.9	59.9
J-R04ds	5.7921	597.0	71.7
J-R04us	5.4012	557.0	65.3
J-R05ds	6.0450	609.6	74.1
J-R05us	5.7921	597.0	71.7
J-R06ds	4.2027	98.2	14.1
J-R06us	3.2122	55.8	7.1
J-R07ds	9.2640	396.0	63.0
J-R07us	8.8702	378.3	58.5
J-R08ds	10.1275	434.1	69.3
J-R08us	10.1275	434.4	69.2
J-R09ds	0.8806	153.8	9.7
J-R09us	0.3364	51.0	2.4
J-R10ds	0.9043	155.3	10.1
J-R10us	0.8806	153.8	9.7
J-R11ds	0.9302	156.6	10.6
J-R11us	0.9302	158.6	10.4
J-R12ds	17.5869	1105.9	157.3
J-R12us	16.5699	1039.1	145.6
J-R15us	17.8756	1133.2	162.8
J-R16ds	0.5206	54.5	5.4
J-R16us	0.4832	50.8	4.9
J-R2ds	0.6682	100.8	7.5
J-R2us	0.6682	101.7	7.4
J-R3us	4.8806	511.0	59.5
Outlet/R15ds	18.1431	1137.2	167.7
R01	1.5412	211.0	20.9
R02	0.6682	100.8	7.5
R03	4.8806	509.9	59.9
R04	5.4012	555.4	65.5
R05	5.7921	596.5	72.1
R06	3.2122	55.5	7.3
R07	8.8702	377.8	59.0
R08	10.1275	434.1	69.3
R09	0.3364	49.6	2.4
R10	0.8806	150.5	9.7
R11	0.9302	156.6	10.6
R12	16.5699	1034.5	146.2
R13	0.0556	19.2	1.0
R14	0.1385	72.9	2.4
R15	17.8756	1128.7	163.3
R16	0.4832	50.7	4.9
0	0.6073	36.1	5.3
1	0.1385	73.2	2.4
2	0.2528	25.1	2.0
3	0.0374	8.8	0.5
4	0.1464	18.6	1.6
5	0.0734	13.4	1.0
9	0.3364	51.0	2.4
10	0.5442	106.7	7.3
16	0.0556	19.7	1.0
17	0.3975	26.5	2.3
18	0.8635	45.6	6.1
19	0.3938	46.4	4.0

Table G9: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 10-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
20	0.6682	101.7	7.4
21	0.3909	84.4	6.2
22	3.2122	55.8	7.1
23	1.5412	211.4	20.8
24	1.5612	116.6	17.4
25	2.7471	148.2	22.8
26	2.0639	201.4	25.9
27	0.1423	18.8	3.8
31	0.4832	50.8	4.9
37	0.0237	6.0	0.4
38	0.0259	9.2	0.3
39	0.0868	5.2	0.5
42	0.3593	49.6	4.2
43	0.9904	70.4	6.8
44	0.0296	19.8	0.8

Table G10: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 5-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-R01ds	3.6051	150.7	17.1
J-R01us	1.5412	83.7	8.2
J-R03ds	4.8806	174.8	20.1
J-R04ds	5.7921	203.0	24.6
J-R04us	5.4012	185.6	21.4
J-R05ds	6.0450	203.4	25.0
J-R05us	5.7921	203.0	24.6
J-R06ds	4.2027	1.6	0.2
J-R06us	3.2122	0.0	0.0
J-R07ds	9.2640	59.9	9.9
J-R07us	8.8702	56.2	8.8
J-R08ds	10.1275	61.1	10.2
J-R08us	10.1275	61.2	10.1
J-R09ds	0.8806	43.5	2.9
J-R09us	0.3364	1.8	0.1
J-R10ds	0.9043	45.5	3.1
J-R10us	0.8806	43.5	2.9
J-R11ds	0.9302	45.7	3.4
J-R11us	0.9302	46.3	3.3
J-R12ds	17.5869	282.7	38.8
J-R12us	16.5699	261.5	35.2
J-R15us	17.8756	294.7	41.7
J-R16ds	0.5206	12.6	1.3
J-R16us	0.4832	11.2	1.1
J-R2ds	0.6682	27.5	2.0
J-R2us	0.6682	27.7	2.0
J-R3us	4.8806	175.3	20.0
Outlet/R15ds	18.1431	297.8	44.1
R01	1.5412	83.6	8.3
R02	0.6682	27.5	2.0
R03	4.8806	174.8	20.1
R04	5.4012	185.1	21.6
R05	5.7921	202.3	24.8
R06	3.2122	0.0	0.0
R07	8.8702	56.1	8.9
R08	10.1275	61.1	10.2
R09	0.3364	1.7	0.1
R10	0.8806	43.4	3.0
R11	0.9302	45.7	3.4
R12	16.5699	260.5	35.4
R13	0.0556	7.8	0.5
R14	0.1385	32.1	1.2
R15	17.8756	293.7	42.0
R16	0.4832	11.1	1.1
0	0.6073	5.4	0.8
1	0.1385	34.4	1.2
2	0.2528	2.3	0.2
3	0.0374	2.2	0.2
4	0.1464	3.4	0.5
5	0.0734	4.3	0.4
9	0.3364	1.8	0.1
10	0.5442	41.9	2.8
16	0.0556	7.9	0.5
17	0.3975	0.0	0.0
18	0.8635	1.6	0.2
19	0.3938	11.0	1.0

Table G10: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 5-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
20	0.6682	27.7	2.0
21	0.3909	41.1	3.0
22	3.2122	0.0	0.0
23	1.5412	83.7	8.2
24	1.5612	31.9	4.8
25	2.7471	17.0	2.6
26	2.0639	69.0	8.9
27	0.1423	10.2	2.4
31	0.4832	11.2	1.1
37	0.0237	2.5	0.2
38	0.0259	3.4	0.1
39	0.0868	0.0	0.0
42	0.3593	14.8	1.2
43	0.9904	1.6	0.2
44	0.0296	12.2	0.5

Table G11: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 2-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-R01ds	3.6051	0.0	0.0
J-R01us	1.5412	0.0	0.0
J-R03ds	4.8806	0.0	0.0
J-R04ds	5.7921	0.0	0.0
J-R04us	5.4012	0.0	0.0
J-R05ds	6.0450	0.0	0.0
J-R05us	5.7921	0.0	0.0
J-R06ds	4.2027	0.0	0.0
J-R06us	3.2122	0.0	0.0
J-R07ds	9.2640	0.0	0.0
J-R07us	8.8702	0.0	0.0
J-R08ds	10.1275	0.0	0.0
J-R08us	10.1275	0.0	0.0
J-R09ds	0.8806	0.0	0.0
J-R09us	0.3364	0.0	0.0
J-R10ds	0.9043	0.0	0.0
J-R10us	0.8806	0.0	0.0
J-R11ds	0.9302	0.0	0.0
J-R11us	0.9302	0.0	0.0
J-R12ds	17.5869	0.0	0.0
J-R12us	16.5699	0.0	0.0
J-R15us	17.8756	2.9	0.9
J-R16ds	0.5206	0.0	0.0
J-R16us	0.4832	0.0	0.0
J-R2ds	0.6682	0.0	0.0
J-R2us	0.6682	0.0	0.0
J-R3us	4.8806	0.0	0.0
Outlet/R15ds	18.1431	2.9	0.9
R01	1.5412	0.0	0.0
R02	0.6682	0.0	0.0
R03	4.8806	0.0	0.0
R04	5.4012	0.0	0.0
R05	5.7921	0.0	0.0
R06	3.2122	0.0	0.0
R07	8.8702	0.0	0.0
R08	10.1275	0.0	0.0
R09	0.3364	0.0	0.0
R10	0.8806	0.0	0.0
R11	0.9302	0.0	0.0
R12	16.5699	0.0	0.0
R13	0.0556	0.0	0.0
R14	0.1385	0.0	0.0
R15	17.8756	2.9	0.9
R16	0.4832	0.0	0.0
0	0.6073	0.0	0.0
1	0.1385	0.0	0.0
2	0.2528	0.0	0.0
3	0.0374	0.0	0.0
4	0.1464	0.0	0.0
5	0.0734	0.0	0.0
9	0.3364	0.0	0.0
10	0.5442	0.0	0.0
16	0.0556	0.0	0.0
17	0.3975	0.0	0.0
18	0.8635	0.0	0.0
19	0.3938	0.0	0.0

Table G11: HEC-HMS Model Results for Pipeline Arroyo, Post-RA Condition 2-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
20	0.6682	0.0	0.0
21	0.3909	0.0	0.0
22	3.2122	0.0	0.0
23	1.5412	0.0	0.0
24	1.5612	0.0	0.0
25	2.7471	0.0	0.0
26	2.0639	0.0	0.0
27	0.1423	2.9	0.9
31	0.4832	0.0	0.0
37	0.0237	0.0	0.0
38	0.0259	0.0	0.0
39	0.0868	0.0	0.0
42	0.3593	0.0	0.0
43	0.9904	0.0	0.0
44	0.0296	4.6	0.2

Table G12: HEC-HMS Model Results for Mill Site, Post-RA Condition 1-Hour PMP

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-ND01ds	1.0170	3130.4	244.0
J-ND01us	0.9302	2939.6	224.6
J-ND02ds	0.9043	2860.6	218.3
J-ND02us	0.8806	2788.5	212.0
J-ND03ds	0.5442	1826.1	136.4
J-ND03us	0.2561	874.3	63.9
J-ND04us	0.3364	981.9	75.6
J-ND05ds	0.0512	171.1	12.7
J-ND05us	0.0252	94.9	6.0
J-RC01ds	0.1166	361.1	31.7
J-RC01us	0.0968	298.3	26.3
J-RC02ds	0.0968	298.3	26.3
J-RC02us	0.0895	274.2	24.4
J-RC03ds	0.0895	274.2	24.4
J-RC03us	0.0821	249.8	22.4
J-RC04ds	0.0754	227.7	20.7
J-RC04us	0.0706	211.9	19.3
J-RC05ds	0.0245	72.7	6.7
J-RC05us	0.0112	33.3	3.0
J-SCds	0.0461	140.2	12.7
J-SCus	0.0327	97.7	9.0
ND01	0.9302	2914.6	224.8
ND02	0.8806	2787.4	212.2
ND03	0.2561	867.0	64.0
ND04	0.3364	971.1	75.5
ND05	0.0252	94.1	6.0
Outlet	1.1706	3611.3	285.8
RC01	0.0968	296.6	26.3
RC02	0.0895	273.3	24.4
RC03	0.0821	248.8	22.4
RC04	0.0706	211.8	19.4
RC05	0.0112	33.3	3.1
R-Swale C	0.0327	97.5	9.0
0	0.0049	21.7	1.3
1	0.0025	8.5	0.6
2	0.0041	14.3	1.0
3	0.0074	33.1	1.9
4	0.0198	64.4	5.4
5	0.0371	143.2	10.2
6	0.0327	97.7	9.0
7	0.0134	62.6	3.7
12	0.0133	39.4	3.6
14	0.0073	25.9	1.9
16	0.0060	22.1	1.6
32	0.0551	150.8	11.1
33	0.2881	959.1	72.4
34	0.2300	669.4	51.9
35	0.2561	874.3	63.9
36	0.0260	77.8	6.6
37	0.0237	77.7	6.0
38	0.0259	92.3	6.3
39	0.0868	215.8	19.2
40	0.0052	12.6	1.4
41	0.0252	94.9	6.0

Table G13: HEC-HMS Model Results for Mill Site, Post-RA Condition 10-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-ND01ds	1.017	201.9	11.93
J-ND01us	0.930	204.9	11.41
J-ND02ds	0.904	200.4	11.09
J-ND02us	0.881	203.1	10.33
J-ND03ds	0.544	168.6	8.13
J-ND03us	0.256	82.4	3.69
J-ND04us	0.336	38.7	2.33
J-ND05ds	0.051	9.5	0.71
J-ND05us	0.025	5.9	0.27
J-RC01ds	0.117	32.4	3.11
J-RC01us	0.097	24.5	2.58
J-RC02ds	0.097	24.5	2.58
J-RC02us	0.090	22.1	2.39
J-RC03ds	0.090	22.1	2.39
J-RC03us	0.082	18.3	2.23
J-RC04ds	0.075	16.4	2.09
J-RC04us	0.071	14.2	1.96
J-RC05ds	0.024	5.5	0.67
J-RC05us	0.011	2.7	0.30
J-SCds	0.046	13.1	1.30
J-SCus	0.033	6.8	0.91
ND01	0.930	199.9	11.41
ND02	0.881	195.4	10.33
ND03	0.256	81.7	3.69
ND04	0.336	37.3	2.51
ND05	0.025	5.6	0.28
Outlet	1.171	238.7	16.23
RC01	0.097	24.0	2.58
RC02	0.090	21.6	2.39
RC03	0.082	18.2	2.23
RC04	0.071	13.4	1.96
RC05	0.011	2.6	0.32
R-Swale C	0.033	6.7	0.92
0	0.005	3.6	0.13
1	0.003	0.6	0.05
2	0.004	1.3	0.08
3	0.007	5.4	0.16
4	0.020	8.4	0.54
5	0.037	20.8	1.05
6	0.033	6.8	0.91
7	0.013	13.0	0.38
12	0.013	2.9	0.35
14	0.007	2.9	0.15
16	0.006	2.3	0.16
32	0.055	2.4	0.12
33	0.288	87.0	4.30
34	0.230	30.8	1.59
35	0.256	82.4	3.69
36	0.026	4.0	0.42
37	0.024	5.0	0.38
38	0.026	9.3	0.33
39	0.087	3.2	0.56
40	0.005	0.7	0.14
41	0.025	5.9	0.27

Table G14: HEC-HMS Model Results for Mill Site, Post-RA Condition 2-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
J-ND01ds	1.0170	0.0	0.0
J-ND01us	0.9302	0.0	0.0
J-ND02ds	0.9043	0.0	0.0
J-ND02us	0.8806	0.0	0.0
J-ND03ds	0.5442	0.0	0.0
J-ND03us	0.2561	0.0	0.0
J-ND04us	0.3364	0.0	0.0
J-ND05ds	0.0512	0.0	0.0
J-ND05us	0.0252	0.0	0.0
J-RC01ds	0.1166	5.5	0.7
J-RC01us	0.0968	4.0	0.6
J-RC02ds	0.0968	4.0	0.6
J-RC02us	0.0895	3.9	0.6
J-RC03ds	0.0895	3.9	0.6
J-RC03us	0.0821	3.4	0.5
J-RC04ds	0.0754	3.4	0.5
J-RC04us	0.0706	2.8	0.5
J-RC05ds	0.0245	0.5	0.1
J-RC05us	0.0112	0.3	0.1
J-SCds	0.0461	2.8	0.3
J-SCus	0.0327	0.7	0.2
ND01	0.9302	0.0	0.0
ND02	0.8806	0.0	0.0
ND03	0.2561	0.0	0.0
ND04	0.3364	0.0	0.0
ND05	0.0252	0.0	0.0
Outlet	1.1706	8.8	1.0
RC01	0.0968	3.9	0.6
RC02	0.0895	3.7	0.6
RC03	0.0821	3.4	0.5
RC04	0.0706	2.8	0.5
RC05	0.0112	0.3	0.1
R-Swale C	0.0327	0.7	0.2
0	0.0049	0.5	0.0
1	0.0025	0.0	0.0
2	0.0041	0.1	0.0
3	0.0074	0.7	0.0
4	0.0198	1.6	0.1
5	0.0371	3.3	0.3
6	0.0327	0.7	0.2
7	0.0134	2.8	0.1
12	0.0133	0.3	0.1
14	0.0073	0.3	0.0
16	0.0060	0.2	0.0
32	0.0551	0.0	0.0
33	0.2881	0.0	0.0
34	0.2300	0.0	0.0
35	0.2561	0.0	0.0
36	0.0260	0.0	0.0
37	0.0237	0.0	0.0
38	0.0259	0.0	0.0
39	0.0868	0.0	0.0
40	0.0052	0.1	0.0
41	0.0252	0.0	0.0

Table G15: HEC-HMS Model Results for Mine Site, RA-Phase 3 Construction 2-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
Const_Pond	0.0020	0	0
J-Berm2	0.0036	0	0
J-R1ds	0.1447	0	0
J-R1us	0.1447	0	0
J-R2ds	0.0270	0	0
J-R2us	0.2261	0	0
J-R3us	0.0644	0	0
J-R4ds	0.1774	0	0
J-R4us	0.1674	0	0
J-R5ds	0.2194	0	0
J-R5us	0.1774	0	0
Outlet	0.2194	0	0
Plug	0.1093	0	0
Pond 1	0.0088	0	0
Pond 2	0.0269	0	0
Pond3	0.0580	0	0
R-J3ds/Berm1	0.1093	0	0
R1	0.1447	0	0
R2	0.0000	0	0
R3	0.0644	0	0
R4	0.1674	0	0
R5	0.1774	0	0
2	0.0020	0	0
3	0.0036	0	0
19	0.0814	0	0
20	0.1447	0	0
22	0.0100	0	0
23	0.0419	0	0
24	0.0088	0	0
25	0.0349	0	0
26	0.0269	0	0
27	0.0375	0	0
28	0.0101	0	0
29	0.0544	0	0
30	0.0270	0	0

Table G16: HEC-HMS Model Results for the Temporary Haul Road Stormwater Controls 10-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
C01	0.0105	13.2	0.3
C02	0.0417	52.4	1.0
C03	0.0023	2.9	0.1
C04	0.0042	5.3	0.1
C05	0.0065	8.2	0.2
C06	0.0064	8.0	0.2
C07	0.0061	8.9	0.2
C08	0.0132	19.5	0.4
C09	0.0984	72.8	3.2
C10	0.0129	16.3	0.3
J-Div1	0.0105	13.2	0.3
J-Div2	0.0073	10.7	0.2
J-28-Channel	0.0967	72.5	3.1
Outlet	0.0188	25.0	0.5
R00	0.0016	2.5	0.1
R02	0.0052	7.2	0.2
R03	0.0028	4.4	0.1
R04	0.0007	1.2	0.0
S01	0.0068	9.7	0.3
S02	0.0035	5.6	0.2
S03	0.0022	3.1	0.1
S04	0.0015	2.4	0.1
S05	0.0019	2.7	0.1
S06	0.0020	3.0	0.1
S07	0.0051	7.7	0.2
S08	0.0025	3.5	0.1
S09	0.0033	4.5	0.1
S10	0.0012	2.1	0.1
S11	0.0019	3.6	0.2
0	0.0016	2.5	0.1
01a	0.0105	13.2	0.3
01b	0.0417	52.4	1.0
2	0.0052	7.2	0.2
3	0.0023	2.9	0.1
4	0.0028	4.4	0.1
5	0.0042	5.3	0.1
6	0.0007	1.2	0.0
7	0.0022	3.1	0.1
8	0.0015	2.4	0.1
9	0.0065	8.2	0.2
10	0.0019	2.7	0.1
11	0.0016	2.2	0.1
12	0.0005	0.8	0.0
13	0.0064	8.0	0.2
14	0.0035	5.2	0.1
15	0.0016	2.5	0.1
16	0.0061	8.9	0.2
17	0.0013	2.0	0.1
18	0.0012	1.5	0.0
19	0.0008	1.2	0.0
20	0.0073	10.7	0.2
21	0.0059	8.7	0.2
22	0.0017	2.1	0.0
23	0.0025	3.3	0.1
24	0.0059	8.7	0.2
25	0.0012	2.1	0.1

Table G16: HEC-HMS Model Results for the Temporary Haul Road Stormwater Controls 10-Year, 24-Hour Storm

Element	Drainage Area (mi^2)	Peak Discharge (cfs)	Runoff Volume (acre-ft)
26	0.0065	8.2	0.2
27	0.0019	3.6	0.2
28	0.0967	72.5	3.1