TULE WIND PROJECT

Major Use Permit

CEQA DRAINAGE STUDY

County of San Diego

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EXECUTIVE SUMMARY

The purpose of this drainage study is to investigate the hydrologic and hydraulic impacts of developing approximately 77 acres in eastern San Diego County. Results from hydrologic analysis will be included in the Tule Wind Major Use Permit (MUP) application to the County of San Diego. Analysis detail is appropriate for an MUP level hydrology study.

This report discusses the methodology and assumptions for the hydrologic and hydraulic analysis performed for the Project. Discussion and comparison of existing and proposed hydrologic conditions identifies qualitative and quantitative Project impacts on local hydrologic conditions.

The hydrologic analysis was completed per the June 2003 San Diego County Hydrology Manual. Existing conditions hydrologic modeling was completed. Proposed conditions were determined to be identical within the accuracy of hydrology calculations; therefore, no impacts were identified.

Hydrologic analysis and hydraulic computations were conducted on proposed road crossing locations in order to appropriately size at-grade crossings and to identify upstream limits of inundation. Hydraulic calculations were complete in accordance with the July 2005 San Diego County Drainage Design Manual.

Report analyses conclude that there are no impacts from local development on watershed runoff. Hydraulic analyses demonstrate drainage crossings will be constructed to meet the County of San Diego standards. Overall site development should have less than significant impact on the drainage patterns of the overall system and will be designed to meet all County of San Diego criteria.

1.0 PROJECT DESCRIPTION

The Tule Wind Project (Project) proposes to develop a wind turbine "farm" for power generation, in the County of San Diego, in the State of California. The Project area is located in the eastern portion of San Diego County, approximately 50 miles east of City of San Diego, 90 miles west of Arizona, and north of the community of Boulevard (see Figure 1). The area is accessible via Interstate 8 (I-8), State Route 94 (SR-94) and Ribbonwood Road junction, and McCain Valley Road off of Old Highway 80. The majority of the Project area lies in the In-Ko-Pah Mountains adjacent to the Tecate Divide, south of the Cleveland National Forest. The topography of the area is gently-to-steep sloping with an elevation ranging between about 3,500 and 5,800 feet above mean sea level. The Project area contains lands administered by the BLM, the Ewiiaapaayp Reservation, the Campo and Manzanita Reservations (access only), the California State Lands Commission (CSLC), and privately-owned parcels under the jurisdiction of the County of San Diego. This report will focus exclusively on the lands under the jurisdiction of the County of San Diego.

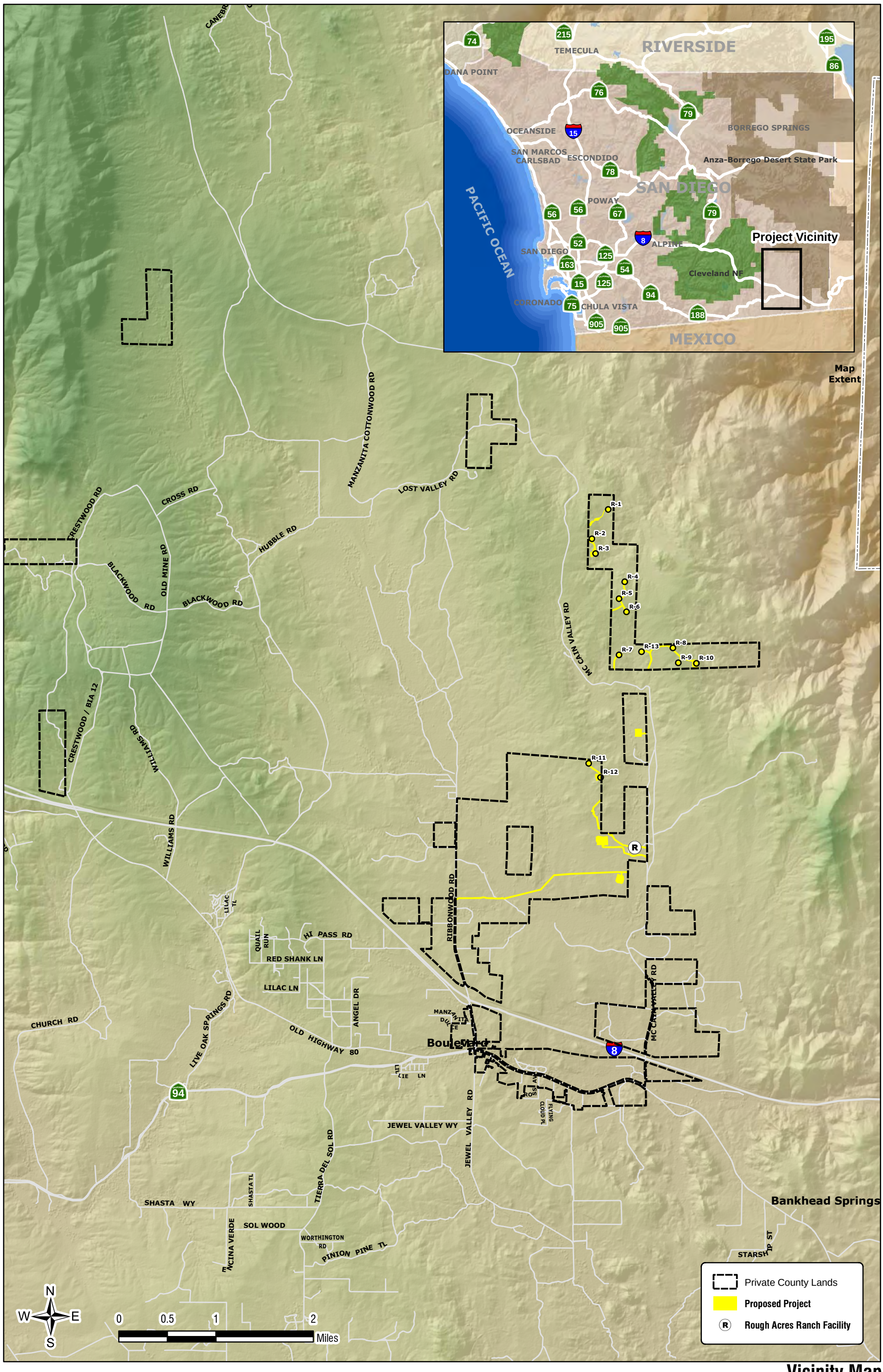
The Project area is not located within any FEMA designated floodplains. Firm panels 06073C1800F, 06073C1825F, 06073C2075F, and 06073C2100F collectively cover the Project site and indicate the Project site is Zone D, area of undetermined but possible flood hazards.

Total Project site area proposed on County of San Diego regulated lands is approximately 1,982 acres, which will permanently impact approximately 77 acres. Total disturbed areas, including temporary construction impacts (widened access roads, trenching, etc), are approximately 127 acres. From a drainage standpoint, all analysis and design addresses permanent impacts only, as additional temporary impacts will be returned to a naturally vegetated state upon completion of the Project.

Under existing conditions the Project site is mainly undeveloped naturally vegetated rocky hills. A number of existing access roads traverse the area, providing service routes to existing utility facilities, rural houses, agricultural facilities, and a landing strip. Naturally occurring native vegetation is predominant throughout the site, with periodic scattered unvegetated rock outcroppings.

Development within the jurisdiction of the County of San Diego will consist of up to 13 wind turbines, 34.5 kilovolt (kV) overhead and underground collector lines, a collector substation site, multiple operation and maintenance building sites, access roads between turbines, and improvements to existing roads to provide site access. A number of operation and maintenance building locations have been developed to provide Project flexibility, all of which were included in evaluations in order to conservatively account for all potential improvements.

Project development proposes up to 13 wind turbines, ranging in size between 328 feet in height to 492 feet in height. Turbines are constructed with a 48-foot diameter concrete foundation. Concrete foundations slope away from the centrally located turbine and will be buried greater than half a foot, so that exposed concrete foundations are approximately 6 inches to 8 inches thick and 18 feet to 20 feet in diameter. Turbines also include five-foot by nine-foot concrete pads for transformer foundations. Graded dirt pads around the turbines will be an approximately 200-foot radius.



Vicinity Map

FIGURE 1

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Access roads between turbines will be 36 feet wide to accommodate self propelled cranes and supply trucks, while access roads to the turbine strings will only need to be 24 feet wide, as the crane and other assembly equipment can be brought onsite in pieces. Thirty-six-foot access roads between turbines are intended to be temporary for construction activities and will be allowed to revegetate to a 24-foot width, pending construction completion. Proposed access road alignments will follow existing access roads to the maximum extent practicable to limit the amount of additional disturbed areas. New access roads will follow existing contours to maximum extent practicable to limit the amount of disturbed areas resulting from grading cuts.

Operation and maintenance facility pads and substation pads will be graded to allow for construction of the required facilities and the accompanying access and operation spaces. Impervious areas associated with these facilities will be minimal, limited to the structures themselves. All access and parking areas will be constructed of permeable materials. Additionally, there is the potential for detention basins attached to these graded pads, in order to adequately address water quality concerns.

Electrical collector lines for the Project will be a combination of overhead and buried, with a majority being buried. Overhead collector lines will be supported by single steel or wood poles; typically 60 feet to 80 feet in height. Foundation footprints for collector line poles will be similar to the diameter of the pole itself. Collector line temporary disturbed widths are assumed to be 24 feet to allow construction vehicle access and trenching or pole erection. After construction, native vegetation will be established over collector line access roads. All buried collector lines will be completely re-vegetated.

Project development will increase impervious areas by a very small amount. Each turbine pad represents approximately 360 square feet of impermeable area. Permanent Project impacts investigated for drainage are approximately 77 acres, which conservatively assumes development of all operation and maintenance siting alternatives. Overall Project development proposes to increase impervious area by approximately 23,669 square feet (0.7% of the 77 acres of permanently disturbed area) or .003% of the total basin area.

2.0 DRAINAGE PATTERNS

Existing and proposed drainage patterns for the Project site are defined below.

2.1 EXISTING DRAINAGE PATTERNS

A number of existing streams will convey flows generated by the Project. The Project drains to the east, ultimately discharging into the Salton Sea.

A northeastern ridgeline crosses the Project, dividing flows southwest into Tule Creek and northeast into Carrizo Wash, Bow Willow Creek, and Canebrake Wash. Approximately one third of the Project drains to Tule Creek via McCain Valley and Lark Canyon. Tule Creek flows are conveyed southeast into Tule Lake, which discharges into Tule Canyon, then converges with Carrizo Wash in Carrizo Gorge. All flows in Carrizo Wash are then conveyed into San Felipe Creek and the Salton Sea. The Salton Sea is a minimum of approximately 45 miles downstream of the Project. See Figure 2 below.

2.1.1 Tule Creek Basin

Tule Creek Basin containing the Project site includes an expansive upstream area draining approximately 18,250 acres and has an approximately 12.1 mile long flow path. The highest upstream point in the basin is at approximately 5,800 feet and the downstream most point is at approximately 3,475feet. Upper reaches of Tule Creek and its tributaries are generally fairly steep and confined to mountainous gullies. Tule Creek in the vicinity of the Project flattens out and takes on the form of a meandering stream in a wider valley with floodplains and flatter fields. See Exhibit A.

Runoff sheet flows across the ground surface until it encounters rivulets which then discharge into larger streams which ultimately discharge into Tule Creek. Precipitation that falls on typical access roads sheet flows off the side of the road where it is collected either in swales running parallel to the road or sheet flows across the surrounding terrain. Swales carry runoff to streams crossing the access road, where it is then conveyed to Tule Creek. There are no major improvements to the drainage features within the basin. However, a number of culverts have been installed on the northeast portion of the drainage basin to facilitate the construction of access roads across the smaller drainage features. An unnamed tributary to Tule Creek along the northeastern edge of the basin crosses a number of public and private roads via culverts just east of the landing strip. Crossings relevant to this Project include two 36-inch culverts for a private road and one 36-inch culvert for McCain Valley Road. Several access roads utilize a depressed on grade type crossing, where flows are conveyed across the top of the road, rather than constructing culverts to carry flows under the road. An existing access road crossing Tule Creek within the Project limits near the downstream half of the basin has this type of crossing.

Receiving Waters

FIGURE 2

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Drainage patterns are similar to the previously discussed basins; precipitation will sheet flow into small rivulets that will join with surrounding streams and eventually discharge into Carrizo Wash. Roads in the Unnamed Eastern Wash basin are primarily double track trails and do not have any associated drainage improvements.

2.1.3 Unnamed Southern Wash / System 1200

A portion of the Project site is located in an approximately 486 acre basin that drains to Carrizo Gorge. The drainage basin has a maximum flow path of 1.5 miles with a maximum elevation of 4,065 feet and a minimum elevation of 3,200 feet. A ridge divides the basin into a northern and southern portion, each draining into two respective streams. Both streams then join at a confluence at the bottom of the drainage basin, as shown on Exhibit A. Topography for System 1200 is mountainous with streams confined in steep gullies.

Generally, drainage is similar to the Unnamed Eastern Wash; rainfall sheet flows into rivulets and then into larger streams. Terrain is predominantly rocky and steep and will not provide substantial opportunity for infiltration. There are an extremely limited number of roads in the basin; most are single track trails. There are no existing improvements to the drainage features in the basin, given the limited amount of development in the basin.

2.2 PROPOSED DRAINAGE PATTERNS

Proposed Project improvements will aim to mimic existing drainage patterns and will minimize redirection of any flows. Improvements include graded pads, access roads, utility lines, and engineered crossings at each drainage feature. Project improvements propose minimal additional impervious areas. Any increase in runoff resulting from these impacts is determined to be negligible, from a flood impact standpoint, with water quality impacts addressed in the Storm Water Management Plan published under a separate cover by HDR.

2.2.1 Tule Creek Basin

Tule Creek Basin drainage patterns will not be altered significantly in proposed conditions. Almost all flow generated by the basin is from existing areas with proposed improvements taking up less than 0.3% of the area. Existing drainage patterns within the basin will be maintained.

Access roads will be improved or created throughout the basin connecting turbine pads. McCain Valley Road serves as a central corridor for this access, as well as improved roads aboard Rough Acres Ranch. Drainage of access roads will be facilitated by brow ditches/swales parallel to proposed roads, which will convey flows to existing surface drainage features. Construction of access roads will not create diversion of existing flows.

Precipitation falling on the exposed portions of the turbine pads will sheet flow off the proposed features and finished surfaces (a total of roughly 21,155 square feet impervious areas or 0.003% of basin total area). Impervious areas include the area of six turbine pads, three operational and maintenance (O&M) facilities, and one substation. Runoff from exposed turbine pads will drain through a layer of gravel surrounding each pad. Runoff will then be directed into the surrounding existing natural drainage features, with overall flow patterns intended to mimic existing drainage features.

2.1.2 Unnamed Eastern Wash

Eastern portions of the Project site lie within an approximately 734 acre basin that drains to an unnamed wash. Basin drainage has a maximum flow path of approximately 1.9 miles, with a maximum elevation of 4,125 feet and a minimum elevation of 3,620 feet. The Unnamed Eastern Wash basin drains to confined mountainous gullies that are steep and rocky. See Exhibit A.

Drainage patterns are similar to the previously discussed basins; precipitation will sheet flow into small rivulets that will join with surrounding streams and eventually discharge into Carrizo Wash. Roads in the Unnamed Eastern Wash basin are primarily double track trails and do not have any associated drainage improvements.

2.1.3 Unnamed Southern Wash / System 1200

A portion of the Project site is located in an approximately 486 acre basin that drains to Carrizo Gorge. The drainage basin has a maximum flow path of 1.5 miles with a maximum elevation of 4,065 feet and a minimum elevation of 3,200 feet. A ridge divides the basin into a northern and southern portion, each draining into two respective streams. Both streams then join at a confluence at the bottom of the drainage basin, as shown on Exhibit A. Topography for System 1200 is mountainous with streams confined in steep gullies.

Generally, drainage is similar to the Unnamed Eastern Wash; rainfall sheet flows into rivulets and then into larger streams. Terrain is predominantly rocky and steep and will not provide substantial opportunity for infiltration. There are an extremely limited number of roads in the basin; most are single track trails. There are no existing improvements to the drainage features in the basin, given the limited amount of development in the basin.

2.2 PROPOSED DRAINAGE PATTERNS

Proposed Project improvements will aim to mimic existing drainage patterns and will minimize redirection of any flows. Improvements include graded pads, access roads, utility lines, and engineered crossings at each drainage feature. Project improvements propose minimal additional impervious areas. Any increase in runoff resulting from these impacts is determined to be negligible, from a flood impact standpoint, with water quality impacts addressed in the Storm Water Management Plan published under a separate cover by HDR.

2.2.1 Tule Creek Basin

Tule Creek Basin drainage patterns will not be altered significantly in proposed conditions. Almost all flow generated by the basin is from existing areas with proposed improvements taking up less than 0.3% of the area. Existing drainage patterns within the basin will be maintained.

Access roads will be improved or created throughout the basin connecting turbine pads. McCain Valley Road serves as a central corridor for this access, as well as improved roads aboard Rough Acres Ranch. Drainage of access roads will be facilitated by brow ditches/swales parallel to

proposed roads, which will convey flows to existing surface drainage features. Construction of access roads will not create diversion of existing flows.

Precipitation falling on the exposed portions of the turbine pads will sheet flow off the proposed features and finished surfaces (a total of roughly 21,155 square feet impervious areas or 0.003% of basin total area). Impervious areas include the area of six turbine pads, three operational and maintenance (O&M) facilities, and one substation. Runoff from exposed turbine pads will drain through a layer of gravel surrounding each pad. Runoff will then be directed into the surrounding existing natural drainage features, with overall flow patterns intended to mimic existing drainage features.

Proposed collector lines will be located mainly in the northeastern corner of the basin. Minor effects on drainage patterns will only be prevalent during construction. Once the collector lines are either hung or buried the surrounding vegetation and grades will be restored to existing conditions. In the long term, existing drainage patterns within the basin will be maintained.

2.2.2 Unnamed Eastern Wash Basin

Unnamed Eastern Wash Drainage Basin drainage patterns will not be altered significantly in proposed conditions. Almost all flow generated by the basin is from existing areas with proposed improvements taking up less than 2.8% of the basin area. Existing drainage patterns within the basin will be substantially maintained.

Access roads connect two strings of turbines, located roughly in the center of the basin. These connect to McCain Valley Road. Drainage of access roads will be facilitated by brow ditches/swales parallel to proposed roads, which will convey flows to existing surface drainage features.

Precipitation falling on the exposed portions of the turbine pads will sheet flow off the proposed features and finished surfaces (a total of roughly 1,796 square feet impervious areas or 0.006% of basin total area) to surrounding brow ditches/swales. Impervious areas include the area of basin turbine pads. Runoff from exposed turbine pads will drain through a layer of gravel surrounding each pad. Runoff will then be directed into the surrounding existing natural drainage features, with overall flow patterns intended to mimic existing drainage features.

Proposed collector lines will be located in conjunction with the turbines. Transmission lines traverse the basin. Minor effects on drainage patterns will only be prevalent during construction. Once the collector lines are either hung or buried the surrounding vegetation and grades will be restored to existing conditions. In the long term, existing drainage patterns within the basin will be maintained.

2.2.3 Unnamed Southern Wash / System 1200

Unnamed Southern Wash drainage patterns will not be altered significantly in proposed conditions. Almost all flow generated by the basin is from existing areas with proposed improvements taking up less than 1.3% of the basin area. Existing drainage patterns within the basin will be substantially maintained.

A single access road connects one string of turbines located on the basin's northern boundary. Drainage of this access road will be facilitated by brow ditches/swales parallel to the proposed road, which will convey flows to existing surface drainage features.

Precipitation falling on the exposed portions of the turbine pads will sheet flow off the proposed features and finished surfaces (a total of roughly 718 square feet impervious areas or 0.003% of basin total area) to surrounding brow ditches/swales. Impervious areas include the area of two turbine pads. Runoff from exposed turbine pads will drain through a layer of gravel surrounding each pad. Runoff will then be directed into the surrounding existing natural drainage features, with overall flow patterns intended to mimic existing drainage features.

Proposed collector lines will be located in conjunction with the turbines. Minor effects on drainage patterns will only be prevalent during construction. Once the collector lines are either hung or buried the surrounding vegetation and grades will be restored to existing conditions. In the long term, existing drainage patterns within the basin will be maintained.

3.0 HYDROLOGY

Hydrologic analysis was completed for the entire project area in order to determine a baseline existing condition and to account for changes due to proposed development. The three distinct watersheds dividing the Project area were studied for existing and proposed conditions. Sub-basins formed by grading and requiring a hydraulically designed road crossing structure were analyzed under proposed conditions.

3.1 HYDROLOGY METHODOLOGY

Existing and proposed hydrology calculations were both completed per the *San Diego County Hydrology Manual*, June 2003 Rational Method criteria. A summary of the hydrology criteria is presented in Table 1. Appendix A contains *County of San Diego Hydrology Manual* runoff coefficient, rainfall intensity, and overland flow time of concentration figures used in calculations.

Table 1. Hydrology Methodology

Land Use:	SANDAG provided land use overlay dated 2009 and associated cover descriptions in Table 4-2 of 2003 *County of San Diego Hydrology Manual*
Precipitation Zone Number	Per PZN Map (Appendix C) of 2003 *County of San Diego Hydrology Manual*
Design Storm:	100 year
Rainfall Intensity:	Per Isopluvial Maps (Appendix B) of 2003 *County of San Diego Hydrology Manual*
Soil Data:	NRCS, SSURGO Database
Topographic Data:	2' Project Flown Contours 20' IFSAR Topo provided by SANDAG

Land use was defined based on data provided by SANDAG, which was then used to select the runoff coefficient from Table 4-2 of the *County of San Diego Hydrology Manual*. Soil type data was derived from the Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for California. Rainfall intensities and Precipitation Zone Numbers (PZN) were taken from Appendices B and C of the *County of San Diego Hydrology Manual*, respectively.

ArcMap 9.3.1 was utilized to process all geographic data and to determine appropriate inputs for hydrologic modeling. Existing and proposed drainage basins, flow paths and basin area centroids were all developed within ArcMap. The hydrologic modeling was completed through the use of Civil Design Hydrology software (CivilD) and the San Diego County specific module.

3.2 EXISTING CONDITIONS

3.2.1 Universal Unit Hydrograph

The Universal Unit Hydrograph Method was used to analyze all nodes with basins larger than 640 acres. Basin areas, flow path lengths and length to centroid values were all determined using ArcMap.

Area averaged rainfall intensities were determined for each individual basin for the 100-year 24-hour and 100-year 6-hour events. Precipitation zone numbers (PZN), important in San Diego County's method for curve number adjustment, were interpolated for each basin using the basin area centroid.

An area averaged composite runoff curve number (CN) was determined for each basin through tabulating data for combinations of land use and soil type. Land use information was matched to the cover descriptions assigned in the *County of San Diego Hydrology Manual*, Table 4-2 and were verified through site visits. Curve numbers were manually adjusted per Tables 4-6 and Table 4-10 of the *County of San Diego Hydrology Manual*, using the interpolated PZN values.

Basin lag time was entered into CivilD directly and calculated independently using the United States Army Corps of Engineers (Corps lag) empirical equation, as referenced in *County of San Diego Hydrology Manual*.

Separate hydrologic models were created for the 100-year 24-hour and 100-year 6-hour events, with the intent of determining the maximum peak discharge of the two.

3.2.2 Rational Method

The San Diego County 2003 Rational Method program within CivilD was utilized in calculating runoff for all basins smaller than 640 acres in size. Initial areas and basin subareas were developed within ArcMap per the *County of San Diego Hydrology Manual*.

The 6-hour and 24-hour rainfall intensities were determined through the interpolation of isopluvial information using the basin area centroid.

Land use development type was assumed to be low density residential, specifically, one density unit per acre or less, with an impervious fraction of 10%. Per the *County of San Diego Hydrology Manual* this is the land use type to be used for open undeveloped areas with a possibility for future development. Soil type data was again derived from the NRCS SSURGO Database and analyzed for each basin subarea for model input.

3.3 PROPOSED CONDITIONS

3.3.1 Universal Unit Hydrograph

Identical methods and assumptions were made for proposed conditions Unit Hydrograph analysis. Disturbed areas resulting from proposed conditions were assumed to be bare earth for the cover description. Composite curve numbers were recalculated to account for proposed conditions. It was determined that the PZN adjusted curve numbers for input into CivilD were within rounding error of the existing condition curve numbers and therefore proposed conditions results did not vary from existing conditions results (see Appendix D). As stated in the Section 1.0 Project Description, drainage analysis conservatively included the cumulative proposed impacts from multiple operation and maintenance building alternatives. This is a further indication that actual differences between existing and proposed conditions are even closer than the rounding errors determined in this study,

and again indicating that drainage patterns within the Project area will be maintained. See Appendices B and D to review existing and proposed summaries.

3.3.2 Rational Method

Identical methods and assumptions were made for proposed conditions Rational Method analysis. Existing conditions assumed a land use development type of low density residential, specifically, one density unit per acre or less, with an impervious fraction of 10%. Proposed conditions would not increase developed density or impervious fraction past the 10% threshold, and therefore proposed condition results would not vary from existing conditions results. Existing drainage patterns within the Project area will be maintained.

3.4 HYDROLOGY RESULTS

Existing condition hydrology results are summarized for each major drainage basin/system in Tables 2 and 3. Per County of San Diego Hydrology Manual methodology, inputs for modeling proposed conditions did not vary from existing conditions. As such, existing and proposed runoff was identical. See Appendix C for CivilD output.

Table 2. Existing Conditions Hydrology Results, Unit Hydrograph

Basin	Area (acres)	Adjusted PZN (>35yr)	Adjusted CN (>35yr)	Peak Flow (cfs)
Tule Creek	18250	2.58	82	12730
Unnamed Eastern Wash	734	2.45	85	808

Table 3. Existing Conditions Hydrology Results, Rational Method

Basin/System	Area (acres)	Effective C Value	Discharge (cfs)
1200	485.64	0.384	530.45

3.5 HYDROMODIFICATION

The County of San Diego requires a discussion on the proposed Hydromodification Plan (HMP) to be included in all drainage studies. Discussions with the County of San Diego Department of Public Works concluded the Project is outside of the Phase I NPDES permit jurisdiction and as such will not be required to complete a hydromodification analysis for the County. General Construction Permit post-construction BMPs are intended to address hydromodification for areas outside of Phase I and Phase II NPDES permits, which will apply to the Project. These post-construction BMP requirements will go into effect September 2012, and are expected to evolve over the upcoming implementation period. As the criteria currently stand, the Project will be required to complete a Water Balance Calculator summary to identify increases in flows of concern. Mitigation measures are included in the Water Balance Calculator and will be used to address any impacts from Project

development on the watersheds. Revisions to the Storm Water Management Plan (SWMP) during final engineering will clearly identify any needed mitigation features for the Project.

4.0 CROSSING HYDRAULICS

Hydraulic analysis was completed on all identified stream crossing locations in order to adequately size the facility. Hydrologic analysis was conducted at each location under proposed conditions in order to obtain a design flow. This is in addition to what is described in Section 3.0, but based on the same methodology.

4.1 CROSSING HYDROLOGY

Crossing hydrology calculations were per the *San Diego County Hydrology Manual*, June 2003 Rational Method criteria. A summary of the hydrology criteria is presented in Table 1. Appendix E contains County of San Diego Hydrology Manual runoff coefficient, rainfall intensity, and overland flow time of concentration figures used in calculations.

4.1.1 Unit Hydrograph Basins

The Universal Unit Hydrograph Method was used to analyze all crossings with associated basins larger than 640 acres. Three crossings were identified requiring a Unit Hydrograph analysis.

These basins were analyzed in a similar fashion to that of the existing and proposed Unit Hydrograph basins above in Section 3.0.

Separate hydrologic models were created for the 100-year 24-hour and 100-year 6-hour events, with the intent of determining the maximum peak discharge of the two. Table 4 provides a summary of the inputs and results.

Table 4. Unit Hydrograph Basin Summary

Basin/Crossing	Area (acres)	Rainfall Intensity 100Yr 6Hr	Rainfall Intensity 100Yr 24Hr	Adjusted CN (>35yr)	100 Year Peak Discharge (cfs)
Tule Creek	13851	3.47	6.69	81	10607
McCain 1	2186	3.00	5.07	83	1487
McCain 2	2256	3.00	5.07	83	1562

4.1.2 Rational Method Systems

There were 16 identified crossing in 15 systems of less than 640 acres in the Project site. The San Diego County 2003 Rational Method program within CivilD was utilized in calculations. Initial areas and basin subareas were developed within ArcMap per the *County of San Diego Hydrology Manual*.

The Project site is mainly located between two isopluvials for the 100-year 6-hour and 24-hour intensities. To be conservative, the highest intensities adjacent to the Project site were used, specifically 3.5 inches and 6 inches.

These systems were analyzed in a similar fashion to that of the Rational Method existing and proposed conditions analysis above in Section 3.0, with the exception of rainfall intensity. Table 5 provides a summary of the inputs and results.

Table 5. Rational Method System Summary

System/ Crossing	Area (acres)	Rainfall Intensity 100Yr 6Hr	Rainfall Intensity 100Yr 24Hr	Effective C Value	Discharge (cfs)
1.3	10.37	3.5	6	0.41	24.6
2.3	13.87	3.5	6	0.41	38.7
3.3	6.12	3.5	6	0.32	9.4
3.4	16.58	3.5	6	0.32	23.3
4.3	0.83	3.5	6	0.32	1.6
5.3	21.66	3.5	6	0.288	25.4
6.3	56.57	3.5	6	0.321	77.4
7.3	21.93	3.5	6	0.32	30.3
8.3	20.38	3.5	6	0.321	29.8
9.3	2.55	3.5	6	0.32	4.3
10.3	20.75	3.5	6	0.326	31.5
11.3	3.74	3.5	6	0.32	5.8
12.3	34.70	3.5	6	0.327	54.4
13.3	57.83	3.5	6	0.336	84.7
14.5	422.76	3.5	6	0.342	432.0
15.3	5.97	3.5	6	0.32	10.9

4.2 CROSSING HYDRAULICS

Hydraulic calculations were completed for each identified crossing for the peak 100-year design discharge. All proposed crossings are at-grade crossings with no low flow culverts and were sized to meet County of San Diego standards.

4.2.1 Crossing Geometry

Three parameters guided the geometry of crossing design. First, per County of San Diego Design Standard 14, low flow culverts are not required for at-grade crossings if the 10 year flow could be conveyed at 10 inches of depth or less over the crest of the crossing. All crossings were designed to ensure this standard was met. Second, specific grade requirements had to be met to facilitate the expected vehicular traffic. A maximum of 6 inches of elevation change could occur for every 50 feet of road. This resulted in gradual approaches into the crossing geometry. Finally, 1-foot of freeboard between the 100-year water surface elevation and the crest of the approach is required.

A standard crossing geometry was developed for use on the majority of the crossings. This crossing is 200 feet wide from approach to approach and is 3 feet deep at the invert. Again, no low flow culverts were used. The standard crossing will be constructed with articulated concrete blocks to provided stability during the design event. See Appendix F for crossing plates.

For larger design flows, specifically the Unit Hydrograph basins of Table 4 and Crossing 14.5 of Table 5, this standard geometry was widened at the invert to accommodate their respective design flows. Both approaches remain the same, but horizontal invert bottom width was added as needed. These crossing will be constructed out of reinforced concrete due to their large size.

Scour protection will be incorporated into the design of each crossing in order to guard against road embankment scour, flow contraction scour, and scour occurring immediately downstream of the crossing. Further development of the scour protection and design will be addressed during final engineering.

4.2.2 Hydraulic Calculations and Results

Hydraulic calculations were completed through the use of Bentley's Culvert Master v.3.1. The standard broad crested weir equation was used with weir coefficient based upon the County of San Diego Drainage Design Manual. Solving for the headwater depth, rating curves were developed for the standard crossing geometry utilized by most of the crossings and for each crossing requiring an expanded version of the typical geometry. These rating curves ultimately provided information to determine the upstream limits of inundation during the design 100-year event as well as ensured the County's hydraulic requirements were met.

All crossings in Table 6 allow for less than 10" of depth for the design 100-year flow, and therefore surpass County requirements. All crossings in Table 7 meet the 10 inches of depth for the 10-year flow. All crossings in the project area maintain 1-foot of freeboard for the design 100- year flows and meet the Project specific road grade restrictions.

Table 6. Standard Crossing Geometry Results

System	Node/Crossing	100 Year Design Flow (cfs)	Head Water Depth (ft)	Crossing Width (ft)
1	1.3	24.6	0.45	200
2	2.3	38.7	0.58	200
3	3.3	9.42	0.27	200
3	3.4	23.3	0.42	200
4	4.3	1.6	0.05	200
5	5.3	25.4	0.45	200
6	6.3	77.4	0.78	200
7	7.3	30.3	0.51	200
8	8.3	29.8	0.46	200
9	9.3	4.3	0.12	200
10	10.3	31.5	0.50	200
11	11.3	5.8	0.17	200
12	12.3	54.4	0.65	200
13	13.3	84.7	0.81	200
15	15.3	10.9	0.30	200

Table 7. Expanded Crossing Geometry Results

Basin/System	Crossing	Event	Design Flow (cfs)	Head Water Depth (ft)	Crossing Width
Tule	Tule	100 Yr	10607.4	1.80	1600
		10 Yr	3249.8	0.830	1600
McCain Valley 1	McCain Valley 1	100 Yr	1487	1.58	375
		10 Yr	487	0.80	375
McCain Valley 2	McCain Valley 2	100 Yr	1562	1.62	375
		10 Yr	498	0.81	375
System 14	14.5	100 Yr	432	0.98	300
		10 Yr	221	0.66	300

5.0 CONCLUSION

Based on a preliminary investigation of the proposed Project plan and the existing drainage patterns, impacts from proposed development are less than significant. Project development will not significantly affect existing drainage patterns and will result in no major flow diversions. Increases in runoff resulting from low frequency storm events associated with flooding will be less than significant, due to the limited amount of proposed impervious area.

Hydraulic analysis was completed for the Project to determine flow rates at specific locations within the studied basins in order to size proposed drainage facilities at road crossings. At-grade crossings were sized to meet County of San Diego requirements. Further hydraulic analysis and design modifications will be complete during final engineering.

APPENDIX A
Hydrology Exhibits

Exhibits A-1: Soils
Exhibits A-2: Land Use
Exhibits A-3: Precipitation

Legend

Flowpaths

Hydrologic Soil Group

A

B

C

D

Tule Creek

Unnamed Eastern Wash

System 1200

N

W E

S

0 1,000 2,000 4,000

Feet

| Path: G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\WaterQuality\Exhibits\ER EIS Exhibits 08312010\G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy 115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\WaterQuality\Exhibits\ER EIS Exhibits 09142010\Exhibit A1 Soils Map.mxd | Created by: SMurgolo | Last Updated: 09-01-10

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Soils Map

EXHIBIT A1

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study

Legend

- Flowpaths
- Existing_Basins_MUP

Landuse

- Airstrip
- Casino
- Communications and Utilities
- Elementary School
- Field Crops
- Fire/Police Station
- Freeway
- Hotel/Motel (Low-Rise)
- Junkyard/Dump/Landfill
- Lake/Reservoir/Large Pond
- Landscape Open Space
- Mobile Home Park
- Open Space Park or Preserve
- Other Group Quarters Facility
- Other Health Care
- Other Public Services
- Other Recreation - High
- Other Retail Trade and Strip
- Other Transportation
- Railroad Right of Way
- Religious Facility
- Residential Under Construction
- Road Right of Way
- Single Family Detached
- Single Family Residential Without Units
- Spaced Rural Residential
- Vacant and Undeveloped Land

Tule Creek

Unnamed Eastern Wash

System 1200

N
W E
S

0 1,000 2,000 4,000 Feet

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Landuse Map

EXHIBIT A2

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study

Path: G:\GIS_Production\Projects\IberdrolaRenew_424914\TuleWindEnergy_115965\14_00_GIS_MODELS\14_03_Map_Docs\14_03_04_mxd\WaterQuality\Exhibits\ER_EIS_Exhibits_09142010\Exhibit_A2_Landuse_Map.mxd | Created by: SMuppala | Last Updated : 09-14-10

Legend

- 10 Year 24 Hour
- 100 Year 6 Hour
- 100 Year 24 Hour
- Grading Limits
- Project Basins

6 inches
3.5 inches
6 inches
4 inches
3.5 inches
3 inches
5 inches
2.5 inches
2.75 inches
4 inches
4.5 inches
4 inches
5 inches
8 inches
3 inches

Tule Creek

Unnamed Eastern Wash

System 1200

Approximate Project Location:
Latitude: 32.6994
Longitude: -116.2628

N
W E
S

0 1,000 2,000 4,000
Feet

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Precipitation

EXHIBIT A3

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study

APPENDIX B
Existing Conditions Hydrology Summary Tables

Project: Tule Wind
Subject: Drainage Report
Task: 21
Job#: 115965

Existing Conditions, Unit Hydrograph

Watershed Loss

Watershed	A (mi^2)	A (ac)	CN (AMC II)	PZN	PZN (>35yr)	CN (>35yr)	Soil Type
Tule Creek	28.52	18250	74	3.42	2.58	82	2.1
Eastern Unnamed Wash	1.15	734	80	3.55	2.45	85	2.7

Watershed Lag Time

Watershed	Elev US (ft)	Elev DS (ft)	L (mi)	Lca (mi)	Slope (ft/mi)	Basin n	m	lag (hr)
Tule Creek	5802.5	3473	12.13	5.14	192	0.040	0.38	1.70
Eastern Unnamed Wash	4125	3620	1.91	0.74	265	0.040	0.38	0.38

Precipitation Data

Watershed	100Yr 6Hr	100Yr 24Hr
Tule Creek	3.36	6.31
Eastern Unnamed Wash	3.00	5.01

$$lag = 24n\left(\frac{L \bullet L_{ca}}{S^{0.5}}\right)^{m}$$

Hydrology Results (Civil D), cfs

Watershed	100Yr 6Hr	100Yr 24Hr
Tule Creek	8790.33	12729.94
Eastern Unnamed Wash	808.32	597.93

Existing Conditions, Rational Method

System	Leg (HDR Node to HDR Node)	Acres	Reach Length	US Elevation	DS Elevation	Soil Group	Soil Group Fraction	Precip 100Yr-6Hr	Precip 100Yr-24Hr	100 Year Runoff
	Initial Area	0.625771	307.19	4047.50	4025.00	B	1.00			1.25
	1200.2 to 1200.3	15.446776	1873.92	4025.00	3840.0	B	0.59			21.43
						D	0.41			
	1200.3 to 1200.4	77.940309	2095.45	3840.0	3606	B	0.19			110.44
						D	0.81			
	1200.4 to 1200.8	116.929537	3996.967	3606	3200	A	0.13			218.15
						B	0.03			
1200						D	0.84	3.00	5.05	
	Initial Area	0.604217	203.19	3965.00	3935.00	B	1.00			1.45
	1200.6 to 1200.7	51.378199	2829.61708	3935.00	3730.0	B	0.29			83.07
						D	0.71			
	1200.7 to 1200.8	223.611859	3560.76	3730.0	3200	A	0.052			374.84
						B	0.084			
						D	0.863			
	Total at Confluence	486.56								530.45

Project: **Tule Wind**
Subject:
Task:
Job#:

Unit Hydrograph Rainfall

100 Yr 6 Hour

FID	Watershed	Rainfall	Acres	Acres*Rainfall	Area Averaged Rainfall (in)
	Tule Creek	4	1518.463274	6074	
		3	6758.893749	20277	
		3.5	9972.741476	34905	
		Totals	18250.0985	61255	3.356427337
	Unnamed Eastern Wash	3	734.4312233	2203	
		Totals	734.4312233	2203	3

100 Yr 24 Hour

FID	Watershed	Rainfall	Acres	Acres*Rainfall	Area Averaged Rainfall (in)
	Tule Creek	10	309.1901693	3092	
		5	3912.209291	19561	
		8	4163.427072	33307	
		6	9865.271967	59192	
		Totals	18250.0985	115152	6.309664385
	Unnamed Eastern Wash	6	6.787032388	41	
		5	727.6441909	3638	
		Totals	734.4312233	3679	5.009241209

Unnamed Eastern Wash Existing Curve Number

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
	18250							**74**	**1346448**	**2.1**
Tule Creek	0.043088	1000	Spaced Rural Residential				A	50	2.15	1
Tule Creek	0.104102	1000	Spaced Rural Residential				A	50	5.21	1
Tule Creek	0.146983	1000	Spaced Rural Residential				A	50	7.35	1
Tule Creek	0.18566	1000	Spaced Rural Residential				A	50	9.28	1
Tule Creek	0.307448	1000	Spaced Rural Residential				A	50	15.37	1
Tule Creek	2.45739	1000	Spaced Rural Residential				A	50	122.87	1
Tule Creek	2.572043	1000	Spaced Rural Residential				A	50	128.60	1
Tule Creek	6.713096	1000	Spaced Rural Residential				A	50	335.65	1
Tule Creek	7.452114	1000	Spaced Rural Residential				A	50	372.61	1
Tule Creek	9.67432	1000	Spaced Rural Residential				A	50	483.72	1
Tule Creek	9.816206	1000	Spaced Rural Residential				A	50	490.81	1
Tule Creek	9.917752	1000	Spaced Rural Residential				A	50	495.89	1
Tule Creek	10.17541	1000	Spaced Rural Residential				A	50	508.77	1
Tule Creek	12.2153	1000	Spaced Rural Residential				A	50	610.77	1
Tule Creek	12.68086	1000	Spaced Rural Residential				A	50	634.04	1
Tule Creek	13.63845	1000	Spaced Rural Residential				A	50	681.92	1
Tule Creek	14.4015	1000	Spaced Rural Residential				A	50	720.08	1
Tule Creek	18.1944	1000	Spaced Rural Residential				A	50	909.72	1
Tule Creek	21.37183	1000	Spaced Rural Residential				A	50	1068.59	1
Tule Creek	25.76366	1000	Spaced Rural Residential				A	50	1288.18	1
Tule Creek	25.91156	1000	Spaced Rural Residential				A	50	1295.58	1
Tule Creek	27.33742	1000	Spaced Rural Residential				A	50	1366.87	1
Tule Creek	27.62886	1000	Spaced Rural Residential				A	50	1381.44	1
Tule Creek	29.43853	1000	Spaced Rural Residential				A	50	1471.93	1
Tule Creek	32.77032	1000	Spaced Rural Residential				A	50	1638.52	1
Tule Creek	42.71826	1000	Spaced Rural Residential				A	50	2135.91	1
Tule Creek	74.33333	1000	Spaced Rural Residential				A	50	3716.67	1
Tule Creek	78.14983	1000	Spaced Rural Residential				A	50	3907.49	1
Tule Creek	82.03509	1000	Spaced Rural Residential				A	50	4101.75	1
Tule Creek	173.7482	1000	Spaced Rural Residential				A	50	8687.41	1
Tule Creek	0.04751	1000	Spaced Rural Residential				B	69	3.28	2
Tule Creek	0.339073	1000	Spaced Rural Residential				B	69	23.40	2
Tule Creek	0.611627	1000	Spaced Rural Residential				B	69	42.20	2
Tule Creek	0.835743	1000	Spaced Rural Residential				B	69	57.67	2
Tule Creek	1.027563	1000	Spaced Rural Residential				B	69	70.90	2
Tule Creek	1.227552	1000	Spaced Rural Residential				B	69	84.70	2
Tule Creek	1.281048	1000	Spaced Rural Residential				B	69	88.39	2
Tule Creek	1.401359	1000	Spaced Rural Residential				B	69	96.69	2
Tule Creek	1.597418	1000	Spaced Rural Residential				B	69	110.22	2
Tule Creek	2.849452	1000	Spaced Rural Residential				B	69	196.61	2
Tule Creek	3.069729	1000	Spaced Rural Residential				B	69	211.81	2
Tule Creek	3.533041	1000	Spaced Rural Residential				B	69	243.78	2
Tule Creek	6.474168	1000	Spaced Rural Residential				B	69	446.72	2
Tule Creek	6.623204	1000	Spaced Rural Residential				B	69	457.00	2
Tule Creek	7.091565	1000	Spaced Rural Residential				B	69	489.32	2
Tule Creek	7.221005	1000	Spaced Rural Residential				B	69	498.25	2
Tule Creek	7.371222	1000	Spaced Rural Residential				B	69	508.61	2
Tule Creek	7.378903	1000	Spaced Rural Residential				B	69	509.14	2
Tule Creek	7.827621	1000	Spaced Rural Residential				B	69	540.11	2
Tule Creek	11.46181	1000	Spaced Rural Residential				B	69	790.87	2

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	13.53061	1000	Spaced Rural Residential				B	69	933.61	2
Tule Creek	15.1175	1000	Spaced Rural Residential				B	69	1043.11	2
Tule Creek	15.13929	1000	Spaced Rural Residential				B	69	1044.61	2
Tule Creek	15.82326	1000	Spaced Rural Residential				B	69	1091.81	2
Tule Creek	16.62028	1000	Spaced Rural Residential				B	69	1146.80	2
Tule Creek	18.05196	1000	Spaced Rural Residential				B	69	1245.58	2
Tule Creek	18.08603	1000	Spaced Rural Residential				B	69	1247.94	2
Tule Creek	19.03283	1000	Spaced Rural Residential				B	69	1313.27	2
Tule Creek	19.54646	1000	Spaced Rural Residential				B	69	1348.71	2
Tule Creek	20.07371	1000	Spaced Rural Residential				B	69	1385.09	2
Tule Creek	21.90675	1000	Spaced Rural Residential				B	69	1511.57	2
Tule Creek	22.15042	1000	Spaced Rural Residential				B	69	1528.38	2
Tule Creek	23.22073	1000	Spaced Rural Residential				B	69	1602.23	2
Tule Creek	26.59746	1000	Spaced Rural Residential				B	69	1835.22	2
Tule Creek	28.42616	1000	Spaced Rural Residential				B	69	1961.41	2
Tule Creek	31.39782	1000	Spaced Rural Residential				B	69	2166.45	2
Tule Creek	35.05085	1000	Spaced Rural Residential				B	69	2418.51	2
Tule Creek	37.09912	1000	Spaced Rural Residential				B	69	2559.84	2
Tule Creek	42.55808	1000	Spaced Rural Residential				B	69	2936.51	2
Tule Creek	42.91708	1000	Spaced Rural Residential				B	69	2961.28	2
Tule Creek	45.2962	1000	Spaced Rural Residential				B	69	3125.44	2
Tule Creek	46.92178	1000	Spaced Rural Residential				B	69	3237.60	2
Tule Creek	55.14837	1000	Spaced Rural Residential				B	69	3805.24	2
Tule Creek	56.61684	1000	Spaced Rural Residential				B	69	3906.56	2
Tule Creek	58.19453	1000	Spaced Rural Residential				B	69	4015.42	2
Tule Creek	58.66377	1000	Spaced Rural Residential				B	69	4047.80	2
Tule Creek	60.20803	1000	Spaced Rural Residential				B	69	4154.35	2
Tule Creek	76.90194	1000	Spaced Rural Residential				B	69	5306.23	2
Tule Creek	122.2435	1000	Spaced Rural Residential				B	69	8434.80	2
Tule Creek	266.9316	1000	Spaced Rural Residential				B	69	18418.28	2
Tule Creek	270.7531	1000	Spaced Rural Residential				B	69	18681.96	2
Tule Creek	277.8597	1000	Spaced Rural Residential				B	69	19172.32	2
Tule Creek	398.6731	1000	Spaced Rural Residential				B	69	27508.44	2
Tule Creek	428.184	1000	Spaced Rural Residential				B	69	29544.70	2
Tule Creek	474.9666	1000	Spaced Rural Residential				B	69	32772.69	2
Tule Creek	0.001115	1000	Spaced Rural Residential				C	79	0.09	3
Tule Creek	0.171429	1000	Spaced Rural Residential				C	79	13.54	3
Tule Creek	0.349768	1000	Spaced Rural Residential				C	79	27.63	3
Tule Creek	3.91536	1000	Spaced Rural Residential				C	79	309.31	3
Tule Creek	13.95372	1000	Spaced Rural Residential				C	79	1102.34	3
Tule Creek	15.43697	1000	Spaced Rural Residential				C	79	1219.52	3
Tule Creek	23.15	1000	Spaced Rural Residential				C	79	1828.85	3
Tule Creek	27.3161	1000	Spaced Rural Residential				C	79	2157.97	3
Tule Creek	41.93775	1000	Spaced Rural Residential				C	79	3313.08	3
Tule Creek	0.026043	1000	Spaced Rural Residential				D	84	2.19	4
Tule Creek	0.365483	1000	Spaced Rural Residential				D	84	30.70	4
Tule Creek	0.648487	1000	Spaced Rural Residential				D	84	54.47	4
Tule Creek	1.019984	1000	Spaced Rural Residential				D	84	85.68	4
Tule Creek	1.485547	1000	Spaced Rural Residential				D	84	124.79	4
Tule Creek	4.928847	1000	Spaced Rural Residential				D	84	414.02	4
Tule Creek	8.173902	1000	Spaced Rural Residential				D	84	686.61	4
Tule Creek	9.08764	1000	Spaced Rural Residential				D	84	763.36	4
Tule Creek	10.91547	1000	Spaced Rural Residential				D	84	916.90	4
Tule Creek	15.42996	1000	Spaced Rural Residential				D	84	1296.12	4
Tule Creek	15.71257	1000	Spaced Rural Residential				D	84	1319.86	4
Tule Creek	15.79647	1000	Spaced Rural Residential				D	84	1326.90	4
Tule Creek	16.80266	1000	Spaced Rural Residential				D	84	1411.42	4

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	25.60615	1000	Spaced Rural Residential				D	84	2150.92	4
Tule Creek	51.21879	1000	Spaced Rural Residential				D	84	4302.38	4
Tule Creek	83.55671	1000	Spaced Rural Residential				D	84	7018.76	4
Tule Creek	0.967946	1190	Single Family Residential Without Units				A	54	52.27	1
Tule Creek	0.364026	1190	Single Family Residential Without Units				B	70	25.48	2
Tule Creek	0.567625	1190	Single Family Residential Without Units				B	70	39.73	2
Tule Creek	6.729983	1409	Other Group Quarters Facility				A	81	545.13	1
Tule Creek	74.69883	1409	Other Group Quarters Facility				B	88	6573.50	2
Tule Creek	7.775003	1409	Other Group Quarters Facility				C	91	707.53	3
Tule Creek	8.552329	4104	Airstrip				B	86	735.50	2
Tule Creek	0.068954	4112	Freeway				B	98	6.76	2
Tule Creek	5.864552	4112	Freeway				B	98	574.73	2
Tule Creek	31.025	4112	Freeway				B	98	3040.45	2
Tule Creek	31.09615	4112	Freeway				B	98	3047.42	2
Tule Creek	0.006861	4112	Freeway				D	98	0.67	4
Tule Creek	0.433045	4118	Road Right of Way				A	74	32.05	1
Tule Creek	1.011059	4118	Road Right of Way				A	74	74.82	1
Tule Creek	1.282634	4118	Road Right of Way				A	74	94.91	1
Tule Creek	1.346657	4118	Road Right of Way				A	74	99.65	1
Tule Creek	1.538811	4118	Road Right of Way				A	74	113.87	1
Tule Creek	3.343863	4118	Road Right of Way				A	74	247.45	1
Tule Creek	0.133175	4118	Road Right of Way				B	84	11.19	2
Tule Creek	0.455323	4118	Road Right of Way				B	84	38.25	2
Tule Creek	1.085576	4118	Road Right of Way				B	84	91.19	2
Tule Creek	2.195245	4118	Road Right of Way				B	84	184.40	2
Tule Creek	3.307092	4118	Road Right of Way				B	84	277.80	2
Tule Creek	3.378014	4118	Road Right of Way				B	84	283.75	2
Tule Creek	4.184623	4118	Road Right of Way				B	84	351.51	2
Tule Creek	10.91398	4118	Road Right of Way				B	84	916.77	2
Tule Creek	0.559069	4118	Road Right of Way				C	90	50.32	3
Tule Creek	1.49493	4118	Road Right of Way				C	90	134.54	3
Tule Creek	1.214105	4118	Road Right of Way				D	92	111.70	4
Tule Creek	0.145578	7603	Open Space Park or Preserve				A	62	9.03	1
Tule Creek	0.666159	7603	Open Space Park or Preserve				A	62	41.30	1
Tule Creek	0.670833	7603	Open Space Park or Preserve				A	62	41.59	1
Tule Creek	1.291557	7603	Open Space Park or Preserve				A	62	80.08	1
Tule Creek	2.450693	7603	Open Space Park or Preserve				A	62	151.94	1
Tule Creek	6.445348	7603	Open Space Park or Preserve				A	62	399.61	1
Tule Creek	6.492338	7603	Open Space Park or Preserve				A	62	402.52	1
Tule Creek	6.690075	7603	Open Space Park or Preserve				A	62	414.78	1
Tule Creek	7.609108	7603	Open Space Park or Preserve				A	62	471.76	1
Tule Creek	10.63861	7603	Open Space Park or Preserve				A	62	659.59	1
Tule Creek	12.56999	7603	Open Space Park or Preserve				A	62	779.34	1
Tule Creek	15.49857	7603	Open Space Park or Preserve				A	62	960.91	1
Tule Creek	20.82638	7603	Open Space Park or Preserve				A	62	1291.24	1
Tule Creek	24.10463	7603	Open Space Park or Preserve				A	62	1494.49	1
Tule Creek	27.80123	7603	Open Space Park or Preserve				A	62	1723.68	1
Tule Creek	29.00798	7603	Open Space Park or Preserve				A	62	1798.49	1
Tule Creek	35.67334	7603	Open Space Park or Preserve				A	62	2211.75	1
Tule Creek	137.5071	7603	Open Space Park or Preserve				A	62	8525.44	1
Tule Creek	5.79E-06	7603	Open Space Park or Preserve				B	76	0.00	2
Tule Creek	0.001881	7603	Open Space Park or Preserve				B	76	0.14	2
Tule Creek	0.147796	7603	Open Space Park or Preserve				B	76	11.23	2
Tule Creek	0.161165	7603	Open Space Park or Preserve				B	76	12.25	2
Tule Creek	0.272252	7603	Open Space Park or Preserve				B	76	20.69	2
Tule Creek	1.063073	7603	Open Space Park or Preserve				B	76	80.79	2
Tule Creek	1.239796	7603	Open Space Park or Preserve				B	76	94.22	2

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	2.221254	7603	Open Space Park or Preserve				B	76	168.82	2
Tule Creek	2.550184	7603	Open Space Park or Preserve				B	76	193.81	2
Tule Creek	2.719127	7603	Open Space Park or Preserve				B	76	206.65	2
Tule Creek	3.076995	7603	Open Space Park or Preserve				B	76	233.85	2
Tule Creek	6.068157	7603	Open Space Park or Preserve				B	76	461.18	2
Tule Creek	8.725289	7603	Open Space Park or Preserve				B	76	663.12	2
Tule Creek	8.949577	7603	Open Space Park or Preserve				B	76	680.17	2
Tule Creek	9.60439	7603	Open Space Park or Preserve				B	76	729.93	2
Tule Creek	10.74992	7603	Open Space Park or Preserve				B	76	816.99	2
Tule Creek	13.69377	7603	Open Space Park or Preserve				B	76	1040.73	2
Tule Creek	17.32135	7603	Open Space Park or Preserve				B	76	1316.42	2
Tule Creek	18.56011	7603	Open Space Park or Preserve				B	76	1410.57	2
Tule Creek	19.18966	7603	Open Space Park or Preserve				B	76	1458.41	2
Tule Creek	20.83353	7603	Open Space Park or Preserve				B	76	1583.35	2
Tule Creek	26.21576	7603	Open Space Park or Preserve				B	76	1992.40	2
Tule Creek	29.76741	7603	Open Space Park or Preserve				B	76	2262.32	2
Tule Creek	31.46706	7603	Open Space Park or Preserve				B	76	2391.50	2
Tule Creek	55.98659	7603	Open Space Park or Preserve				B	76	4254.98	2
Tule Creek	63.39889	7603	Open Space Park or Preserve				B	76	4818.32	2
Tule Creek	116.9792	7603	Open Space Park or Preserve				B	76	8890.42	2
Tule Creek	131.7281	7603	Open Space Park or Preserve				B	76	10011.34	2
Tule Creek	206.513	7603	Open Space Park or Preserve				B	76	15694.98	2
Tule Creek	213.6675	7603	Open Space Park or Preserve				B	76	16238.73	2
Tule Creek	216.7183	7603	Open Space Park or Preserve				B	76	16470.59	2
Tule Creek	461.4077	7603	Open Space Park or Preserve				B	76	35066.98	2
Tule Creek	522.7041	7603	Open Space Park or Preserve				B	76	39725.51	2
Tule Creek	583.0646	7603	Open Space Park or Preserve				B	76	44312.91	2
Tule Creek	1841.024	7603	Open Space Park or Preserve				B	76	139917.83	2
Tule Creek	0.323417	7603	Open Space Park or Preserve				C	84	27.17	3
Tule Creek	1.426928	7603	Open Space Park or Preserve				C	84	119.86	3
Tule Creek	27.97772	7603	Open Space Park or Preserve				C	84	2350.13	3
Tule Creek	56.1561	7603	Open Space Park or Preserve				C	84	4717.11	3
Tule Creek	0.018809	7603	Open Space Park or Preserve				D	88	1.66	4
Tule Creek	1.990162	7603	Open Space Park or Preserve				D	88	175.13	4
Tule Creek	3.055979	7603	Open Space Park or Preserve				D	88	268.93	4
Tule Creek	4.786524	7603	Open Space Park or Preserve				D	88	421.21	4
Tule Creek	7.507363	7603	Open Space Park or Preserve				D	88	660.65	4
Tule Creek	9.004921	7603	Open Space Park or Preserve				D	88	792.43	4
Tule Creek	21.66482	7603	Open Space Park or Preserve				D	88	1906.50	4
Tule Creek	227.1604	7603	Open Space Park or Preserve				D	88	19990.11	4
Tule Creek	445.3321	7603	Open Space Park or Preserve				D	88	39189.23	4
Tule Creek	4.448867	8003	Field Crops				A	62	275.83	1
Tule Creek	21.15463	8003	Field Crops				A	62	1311.59	1
Tule Creek	27.18965	8003	Field Crops				A	62	1685.76	1
Tule Creek	66.0865	8003	Field Crops				A	62	4097.36	1
Tule Creek	0.341477	8003	Field Crops				B	76	25.95	2
Tule Creek	1.937761	8003	Field Crops				B	76	147.27	2
Tule Creek	3.40635	8003	Field Crops				B	76	258.88	2
Tule Creek	5.150237	8003	Field Crops				B	76	391.42	2
Tule Creek	10.60162	8003	Field Crops				B	76	805.72	2
Tule Creek	5.471035	8003	Field Crops				C	84	459.57	3
Tule Creek	0.039367	8003	Field Crops				D	88	3.46	4
Tule Creek	12.98185	8003	Field Crops				D	88	1142.40	4
Tule Creek	32.0698	8003	Field Crops				D	88	2822.14	4
Tule Creek	0.370491	9101	Vacant and Undeveloped Land				A	62	22.97	1
Tule Creek	0.562932	9101	Vacant and Undeveloped Land				A	62	34.90	1
Tule Creek	0.716577	9101	Vacant and Undeveloped Land				A	62	44.43	1

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	1.423269	9101	Vacant and Undeveloped Land				A	62	88.24	1
Tule Creek	1.479646	9101	Vacant and Undeveloped Land				A	62	91.74	1
Tule Creek	1.77126	9101	Vacant and Undeveloped Land				A	62	109.82	1
Tule Creek	1.795696	9101	Vacant and Undeveloped Land				A	62	111.33	1
Tule Creek	2.104207	9101	Vacant and Undeveloped Land				A	62	130.46	1
Tule Creek	2.38003	9101	Vacant and Undeveloped Land				A	62	147.56	1
Tule Creek	2.44524	9101	Vacant and Undeveloped Land				A	62	151.60	1
Tule Creek	2.78078	9101	Vacant and Undeveloped Land				A	62	172.41	1
Tule Creek	2.988145	9101	Vacant and Undeveloped Land				A	62	185.26	1
Tule Creek	3.702611	9101	Vacant and Undeveloped Land				A	62	229.56	1
Tule Creek	3.813949	9101	Vacant and Undeveloped Land				A	62	236.46	1
Tule Creek	4.302466	9101	Vacant and Undeveloped Land				A	62	266.75	1
Tule Creek	4.632554	9101	Vacant and Undeveloped Land				A	62	287.22	1
Tule Creek	4.742464	9101	Vacant and Undeveloped Land				A	62	294.03	1
Tule Creek	4.95382	9101	Vacant and Undeveloped Land				A	62	307.14	1
Tule Creek	5.398374	9101	Vacant and Undeveloped Land				A	62	334.70	1
Tule Creek	5.950607	9101	Vacant and Undeveloped Land				A	62	368.94	1
Tule Creek	6.035894	9101	Vacant and Undeveloped Land				A	62	374.23	1
Tule Creek	7.552085	9101	Vacant and Undeveloped Land				A	62	468.23	1
Tule Creek	7.770147	9101	Vacant and Undeveloped Land				A	62	481.75	1
Tule Creek	8.015163	9101	Vacant and Undeveloped Land				A	62	496.94	1
Tule Creek	8.178444	9101	Vacant and Undeveloped Land				A	62	507.06	1
Tule Creek	9.503046	9101	Vacant and Undeveloped Land				A	62	589.19	1
Tule Creek	10.1615	9101	Vacant and Undeveloped Land				A	62	630.01	1
Tule Creek	11.43993	9101	Vacant and Undeveloped Land				A	62	709.28	1
Tule Creek	13.19961	9101	Vacant and Undeveloped Land				A	62	818.38	1
Tule Creek	17.14286	9101	Vacant and Undeveloped Land				A	62	1062.86	1
Tule Creek	18.15904	9101	Vacant and Undeveloped Land				A	62	1125.86	1
Tule Creek	22.94393	9101	Vacant and Undeveloped Land				A	62	1422.52	1
Tule Creek	26.10498	9101	Vacant and Undeveloped Land				A	62	1618.51	1
Tule Creek	26.53566	9101	Vacant and Undeveloped Land				A	62	1645.21	1
Tule Creek	28.71079	9101	Vacant and Undeveloped Land				A	62	1780.07	1
Tule Creek	31.26606	9101	Vacant and Undeveloped Land				A	62	1938.50	1
Tule Creek	33.11955	9101	Vacant and Undeveloped Land				A	62	2053.41	1
Tule Creek	33.25553	9101	Vacant and Undeveloped Land				A	62	2061.84	1
Tule Creek	45.79989	9101	Vacant and Undeveloped Land				A	62	2839.59	1
Tule Creek	59.79589	9101	Vacant and Undeveloped Land				A	62	3707.34	1
Tule Creek	77.01624	9101	Vacant and Undeveloped Land				A	62	4775.01	1
Tule Creek	144.7928	9101	Vacant and Undeveloped Land				A	62	8977.16	1
Tule Creek	175.1536	9101	Vacant and Undeveloped Land				A	62	10859.52	1
Tule Creek	193.7297	9101	Vacant and Undeveloped Land				A	62	12011.24	1
Tule Creek	0.123272	9101	Vacant and Undeveloped Land				B	76	9.37	2
Tule Creek	0.126067	9101	Vacant and Undeveloped Land				B	76	9.58	2
Tule Creek	0.259348	9101	Vacant and Undeveloped Land				B	76	19.71	2
Tule Creek	0.439751	9101	Vacant and Undeveloped Land				B	76	33.42	2
Tule Creek	0.488141	9101	Vacant and Undeveloped Land				B	76	37.10	2
Tule Creek	0.555569	9101	Vacant and Undeveloped Land				B	76	42.22	2
Tule Creek	1.046957	9101	Vacant and Undeveloped Land				B	76	79.57	2
Tule Creek	1.506574	9101	Vacant and Undeveloped Land				B	76	114.50	2
Tule Creek	1.800695	9101	Vacant and Undeveloped Land				B	76	136.85	2
Tule Creek	1.872557	9101	Vacant and Undeveloped Land				B	76	142.31	2
Tule Creek	2.28992	9101	Vacant and Undeveloped Land				B	76	174.03	2
Tule Creek	2.524843	9101	Vacant and Undeveloped Land				B	76	191.89	2
Tule Creek	2.675733	9101	Vacant and Undeveloped Land				B	76	203.36	2
Tule Creek	2.678534	9101	Vacant and Undeveloped Land				B	76	203.57	2
Tule Creek	2.955549	9101	Vacant and Undeveloped Land				B	76	224.62	2
Tule Creek	3.082261	9101	Vacant and Undeveloped Land				B	76	234.25	2

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	3.08555	9101	Vacant and Undeveloped Land				B	76	234.50	2
Tule Creek	3.132324	9101	Vacant and Undeveloped Land				B	76	238.06	2
Tule Creek	4.209174	9101	Vacant and Undeveloped Land				B	76	319.90	2
Tule Creek	4.540735	9101	Vacant and Undeveloped Land				B	76	345.10	2
Tule Creek	5.008135	9101	Vacant and Undeveloped Land				B	76	380.62	2
Tule Creek	5.032916	9101	Vacant and Undeveloped Land				B	76	382.50	2
Tule Creek	5.716538	9101	Vacant and Undeveloped Land				B	76	434.46	2
Tule Creek	6.641984	9101	Vacant and Undeveloped Land				B	76	504.79	2
Tule Creek	6.663339	9101	Vacant and Undeveloped Land				B	76	506.41	2
Tule Creek	6.765094	9101	Vacant and Undeveloped Land				B	76	514.15	2
Tule Creek	7.185992	9101	Vacant and Undeveloped Land				B	76	546.14	2
Tule Creek	7.274901	9101	Vacant and Undeveloped Land				B	76	552.89	2
Tule Creek	8.068191	9101	Vacant and Undeveloped Land				B	76	613.18	2
Tule Creek	8.186121	9101	Vacant and Undeveloped Land				B	76	622.15	2
Tule Creek	8.987016	9101	Vacant and Undeveloped Land				B	76	683.01	2
Tule Creek	9.612152	9101	Vacant and Undeveloped Land				B	76	730.52	2
Tule Creek	11.87059	9101	Vacant and Undeveloped Land				B	76	902.17	2
Tule Creek	12.81692	9101	Vacant and Undeveloped Land				B	76	974.09	2
Tule Creek	13.56025	9101	Vacant and Undeveloped Land				B	76	1030.58	2
Tule Creek	14.1667	9101	Vacant and Undeveloped Land				B	76	1076.67	2
Tule Creek	14.51726	9101	Vacant and Undeveloped Land				B	76	1103.31	2
Tule Creek	15.05544	9101	Vacant and Undeveloped Land				B	76	1144.21	2
Tule Creek	19.61081	9101	Vacant and Undeveloped Land				B	76	1490.42	2
Tule Creek	21.16084	9101	Vacant and Undeveloped Land				B	76	1608.22	2
Tule Creek	21.31978	9101	Vacant and Undeveloped Land				B	76	1620.30	2
Tule Creek	21.32974	9101	Vacant and Undeveloped Land				B	76	1621.06	2
Tule Creek	22.34473	9101	Vacant and Undeveloped Land				B	76	1698.20	2
Tule Creek	23.62745	9101	Vacant and Undeveloped Land				B	76	1795.69	2
Tule Creek	23.78879	9101	Vacant and Undeveloped Land				B	76	1807.95	2
Tule Creek	23.8163	9101	Vacant and Undeveloped Land				B	76	1810.04	2
Tule Creek	28.61306	9101	Vacant and Undeveloped Land				B	76	2174.59	2
Tule Creek	32.99727	9101	Vacant and Undeveloped Land				B	76	2507.79	2
Tule Creek	35.74483	9101	Vacant and Undeveloped Land				B	76	2716.61	2
Tule Creek	38.10636	9101	Vacant and Undeveloped Land				B	76	2896.08	2
Tule Creek	44.96019	9101	Vacant and Undeveloped Land				B	76	3416.97	2
Tule Creek	52.76313	9101	Vacant and Undeveloped Land				B	76	4010.00	2
Tule Creek	53.25099	9101	Vacant and Undeveloped Land				B	76	4047.08	2
Tule Creek	55.98927	9101	Vacant and Undeveloped Land				B	76	4255.18	2
Tule Creek	57.37018	9101	Vacant and Undeveloped Land				B	76	4360.13	2
Tule Creek	58.2552	9101	Vacant and Undeveloped Land				B	76	4427.40	2
Tule Creek	59.81501	9101	Vacant and Undeveloped Land				B	76	4545.94	2
Tule Creek	60.3311	9101	Vacant and Undeveloped Land				B	76	4585.16	2
Tule Creek	60.9375	9101	Vacant and Undeveloped Land				B	76	4631.25	2
Tule Creek	79.18654	9101	Vacant and Undeveloped Land				B	76	6018.18	2
Tule Creek	80.80081	9101	Vacant and Undeveloped Land				B	76	6140.86	2
Tule Creek	94.08736	9101	Vacant and Undeveloped Land				B	76	7150.64	2
Tule Creek	95.02456	9101	Vacant and Undeveloped Land				B	76	7221.87	2
Tule Creek	108.8181	9101	Vacant and Undeveloped Land				B	76	8270.18	2
Tule Creek	138.4778	9101	Vacant and Undeveloped Land				B	76	10524.31	2
Tule Creek	173.0043	9101	Vacant and Undeveloped Land				B	76	13148.33	2
Tule Creek	174.746	9101	Vacant and Undeveloped Land				B	76	13280.70	2
Tule Creek	193.3544	9101	Vacant and Undeveloped Land				B	76	14694.94	2
Tule Creek	195.5124	9101	Vacant and Undeveloped Land				B	76	14858.94	2
Tule Creek	200.1965	9101	Vacant and Undeveloped Land				B	76	15214.93	2
Tule Creek	336.0086	9101	Vacant and Undeveloped Land				B	76	25536.66	2
Tule Creek	340.4604	9101	Vacant and Undeveloped Land				B	76	25874.99	2
Tule Creek	362.0771	9101	Vacant and Undeveloped Land				B	76	27517.86	2

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	414.3862	9101	Vacant and Undeveloped Land				B	76	31493.35	2
Tule Creek	845.9782	9101	Vacant and Undeveloped Land				B	76	64294.34	2
Tule Creek	873.8039	9101	Vacant and Undeveloped Land				B	76	66409.10	2
Tule Creek	0.823878	9101	Vacant and Undeveloped Land				C	84	69.21	3
Tule Creek	1.108125	9101	Vacant and Undeveloped Land				C	84	93.08	3
Tule Creek	1.819944	9101	Vacant and Undeveloped Land				C	84	152.88	3
Tule Creek	2.382064	9101	Vacant and Undeveloped Land				C	84	200.09	3
Tule Creek	10.95875	9101	Vacant and Undeveloped Land				C	84	920.53	3
Tule Creek	12.70656	9101	Vacant and Undeveloped Land				C	84	1067.35	3
Tule Creek	24.71978	9101	Vacant and Undeveloped Land				C	84	2076.46	3
Tule Creek	35.63375	9101	Vacant and Undeveloped Land				C	84	2993.24	3
Tule Creek	46.83882	9101	Vacant and Undeveloped Land				C	84	3934.46	3
Tule Creek	59.2223	9101	Vacant and Undeveloped Land				C	84	4974.67	3
Tule Creek	141.554	9101	Vacant and Undeveloped Land				C	84	11890.54	3
Tule Creek	1.754196	9101	Vacant and Undeveloped Land				D	88	154.37	4
Tule Creek	2.768979	9101	Vacant and Undeveloped Land				D	88	243.67	4
Tule Creek	3.07489	9101	Vacant and Undeveloped Land				D	88	270.59	4
Tule Creek	4.559222	9101	Vacant and Undeveloped Land				D	88	401.21	4
Tule Creek	5.128395	9101	Vacant and Undeveloped Land				D	88	451.30	4
Tule Creek	5.392338	9101	Vacant and Undeveloped Land				D	88	474.53	4
Tule Creek	6.6423	9101	Vacant and Undeveloped Land				D	88	584.52	4
Tule Creek	8.121478	9101	Vacant and Undeveloped Land				D	88	714.69	4
Tule Creek	8.617818	9101	Vacant and Undeveloped Land				D	88	758.37	4
Tule Creek	12.56787	9101	Vacant and Undeveloped Land				D	88	1105.97	4
Tule Creek	12.98788	9101	Vacant and Undeveloped Land				D	88	1142.93	4
Tule Creek	13.49973	9101	Vacant and Undeveloped Land				D	88	1187.98	4
Tule Creek	18.14519	9101	Vacant and Undeveloped Land				D	88	1596.78	4
Tule Creek	18.82047	9101	Vacant and Undeveloped Land				D	88	1656.20	4
Tule Creek	36.71697	9101	Vacant and Undeveloped Land				D	88	3231.09	4
Tule Creek	37.72841	9101	Vacant and Undeveloped Land				D	88	3320.10	4
Tule Creek	46.89635	9101	Vacant and Undeveloped Land				D	88	4126.88	4
Tule Creek	64.35243	9101	Vacant and Undeveloped Land				D	88	5663.01	4
Tule Creek	79.68585	9101	Vacant and Undeveloped Land				D	88	7012.35	4
Tule Creek	107.7435	9101	Vacant and Undeveloped Land				D	88	9481.42	4

Unnamed Eastern Wash Existing Curve Number

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
	734							**80**	**58551**	**2.7**
	24.41651	7603	Open Space Park or Preserve				A	62	1513.82	1
	0.004429	7603	Open Space Park or Preserve				B	76	0.34	2
	353.202	7603	Open Space Park or Preserve				B	76	26843.35	2
	0.020961	7603	Open Space Park or Preserve				D	88	1.84	4
Unnamed	0.354483	7603	Open Space Park or Preserve				D	88	31.19	4
Eastern Wash	14.22936	7603	Open Space Park or Preserve				D	88	1252.18	4
	120.2331	7603	Open Space Park or Preserve				D	88	10580.52	4
	100.4407	9101	Vacant and Undeveloped Land				B	76	7633.49	2
	0.003492	9101	Vacant and Undeveloped Land				D	88	0.31	4
	25.58334	9101	Vacant and Undeveloped Land				D	88	2251.33	4
	95.94275	9101	Vacant and Undeveloped Land				D	88	8442.96	4

APPENDIX C

Existing Conditions CivilD Output

Tule 100-Year 6-Hour
Tule 100-Year 24-Hour
Unnamed Eastern Wash 100-Year 6-Hour
Unnamed Eastern Wash 100-Year 24-Hour
System 1200

U N I T H Y D R O G R A P H A N A L Y S I S

Study date 08/30/10 File: tule100yr6hr.out

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Program License Serial Number 4055

Tule Wind Project
Tule Creek
Existing 100 Year 6 Hour
Aug 25, 2010

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Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
18250.00	3.36

Rainfall Distribution pattern used in study:
Type B for SCS (small dam) or San Diego 6 hour storms

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********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
18250.00	1.000	82.0	82.0	0.050	B

Area-averaged catchment SCS Curve Number AMC(2) = 81.960
Area-averaged Fm value using values listed = 0.050(In/Hr)

++
Direct entry of lag time by user
Watershed area =   18250.00(Ac.)
Catchment Lag time =   1.700 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 14.7059
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 81.960

Rainfall depth area reduction factors:
Using a total area of   18250.00(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 0.974
Rainfall entered for study =   3.360(In)
Adjusted rainfall =   3.272(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 73608.33 (CFS))

0.15	0.250	0.016	179.694	0.002
0.29	0.500	0.051	575.802	0.010
0.44	0.750	0.117	1315.646	0.028
0.59	1.000	0.256	2889.871	0.067
0.74	1.250	0.632	7133.846	0.164
0.88	1.500	0.934	10536.976	0.307
1.03	1.750	1.000	11283.813	0.461
1.18	2.000	0.830	9370.747	0.588
1.32	2.250	0.571	6441.859	0.676
1.47	2.500	0.453	5115.019	0.745
1.62	2.750	0.355	4007.166	0.800
1.76	3.000	0.283	3187.900	0.843
1.91	3.250	0.229	2582.427	0.878
2.06	3.500	0.187	2104.743	0.906
2.21	3.750	0.152	1711.233	0.930
2.35	4.000	0.124	1401.420	0.949
2.50	4.250	0.098	1107.826	0.964
2.65	4.500	0.077	868.940	0.976
2.79	4.750	0.060	671.923	0.985
2.94	5.000	0.043	484.343	0.991
3.09	5.250	0.033	375.400	0.996
3.24	5.500	0.018	198.006	0.999
3.38	5.750	0.006	63.670	1.000
3.53	6.000	0.000	0.061	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In)	Total SCS Runoff (In)	Rainfall Amount (In)	Runoff Amount (In)	Infiltr-ation (In)	Revised Runoff Min Loss Rate

	P	Q	dP	dQ	dP-dQ	
0.25	0.0573	0.0000	0.0573	0.0000	0.0573	--------
0.50	0.1145	0.0000	0.0573	0.0000	0.0573	--------
0.75	0.1914	0.0000	0.0769	0.0000	0.0769	--------
1.00	0.2683	0.0000	0.0769	0.0000	0.0769	--------
1.25	0.3632	0.0000	0.0949	0.0000	0.0949	--------
1.50	0.4581	0.0001	0.0949	0.0001	0.0948	--------
1.75	0.6054	0.0115	0.1473	0.0114	0.1359	--------
2.00	0.7527	0.0388	0.1473	0.0273	0.1200	--------
2.25	1.3580	0.2701	0.6054	0.2313	0.3741	--------
2.50	1.9634	0.6230	0.6054	0.3529	0.2525	--------
2.75	2.1271	0.7319	0.1636	0.1089	0.0547	--------
3.00	2.2907	0.8452	0.1636	0.1133	0.0503	--------
3.25	2.4232	0.9398	0.1325	0.0947	0.0379	--------
3.50	2.5557	1.0368	0.1325	0.0970	0.0356	--------
3.75	2.6441	1.1026	0.0884	0.0658	0.0225	--------
4.00	2.7325	1.1694	0.0884	0.0667	0.0216	--------
4.25	2.8061	1.2256	0.0736	0.0562	0.0174	--------
4.50	2.8797	1.2824	0.0736	0.0568	0.0168	--------
4.75	2.9501	1.3372	0.0704	0.0548	0.0156	--------
5.00	3.0204	1.3924	0.0704	0.0552	0.0151	--------
5.25	3.0810	1.4403	0.0605	0.0479	0.0127	--------
5.50	3.1415	1.4885	0.0605	0.0482	0.0124	--------
5.75	3.2070	1.5409	0.0654	0.0524	0.0130	--------
6.00	3.2724	1.5937	0.0654	0.0528	0.0127	--------

Total soil rain loss = 1.68(In)
Total effective runoff = 1.59(In)

Peak flow rate this hydrograph = 8790.33(CFS)
Total runoff volume this hydrograph = 105575794.9(Ft3)

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6 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2200.0	4400.0	6600.0	8800.0
0+15	0.0000	0.00	Q	|	|	|	|
0+30	0.0000	0.00	Q	|	|	|	|
0+45	0.0000	0.00	Q	|	|	|	|
1+ 0	0.0000	0.00	Q	|	|	|	|
1+15	0.0000	0.00	Q	|	|	|	|
1+30	0.0005	0.03	Q	|	|	|	|
1+45	0.0445	2.13	Q	|	|	|	|
2+ 0	0.2853	11.65	Q	|	|	|	|
2+15	1.7869	72.68	Q	|	|	|	|
2+30	7.2918	266.44	VQ	|	|	|	|
2+45	21.5208	688.68	V Q	|	|	|	|
3+ 0	53.1750	1532.06	V Q	|	|	|	|
3+15	121.6185	3312.66	| V | Q | | |
3+30	243.6367	5905.68	| V | | Q | |
3+45	407.9811	7954.27	| V | | | Q |
4+ 0	589.5995	8790.33	| V| | | | Q|
4+15	765.1249	8495.43	| V | | | Q |
4+30	928.5726	7910.87	| | V | | Q |
4+45	1083.1311	7480.63	| | V | | Q |
5+ 0	1226.9882	6962.68	| | V | Q |

5+15	1360.4103	6457.63	
5+30	1484.4980	6005.84	
5+45	1601.0315	5640.22	
6+ 0	1711.1007	5327.35	
6+15	1815.2382	5040.26	
6+30	1913.3419	4748.22	
6+45	2005.6635	4468.36	
7+ 0	2091.5144	4155.19	
7+15	2167.2394	3665.09	
7+30	2229.3862	3007.91	
7+45	2276.8745	2298.43	
8+ 0	2312.3371	1716.39	
8+15	2339.6758	1323.19	
8+30	2360.8722	1025.91	
8+45	2377.2859	794.42	
9+ 0	2389.9841	614.59	
9+15	2399.7394	472.15	
9+30	2407.1586	359.09	
9+45	2412.6999	268.20	
10+ 0	2416.7241	194.77	
10+15	2419.5508	136.81	
10+30	2421.4502	91.93	
10+45	2422.6451	57.83	
11+ 0	2423.3323	33.26	
11+15	2423.6172	13.79	
11+30	2423.6867	3.36	
11+45	2423.6868	0.00	

U N I T H Y D R O G R A P H A N A L Y S I S

Study date 08/30/10 File: tule100yr24hr.out

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Program License Serial Number 4055

Tule Wind Project
Tule Creek
Existing 100 Year 24 Hour
Aug 25, 2010

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Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
18250.00	6.41

Rainfall Distribution pattern used in study:
Type B for San Diego area of California

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********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
18250.00	1.000	82.0	82.0	0.050	B

Area-averaged catchment SCS Curve Number AMC(2) = 81.960
Area-averaged Fm value using values listed = 0.050(In/Hr)

++
Direct entry of lag time by user
Watershed area =   18250.00(Ac.)
Catchment Lag time =   1.700 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 14.7059
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 81.960

Rainfall depth area reduction factors:
Using a total area of   18250.00(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 0.974
Rainfall entered for study =   6.410(In)
Adjusted rainfall =   6.243(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 73608.33 (CFS))

0.15	0.250	0.016	179.694	0.002
0.29	0.500	0.051	575.802	0.010
0.44	0.750	0.117	1315.646	0.028
0.59	1.000	0.256	2889.871	0.067
0.74	1.250	0.632	7133.846	0.164
0.88	1.500	0.934	10536.976	0.307
1.03	1.750	1.000	11283.813	0.461
1.18	2.000	0.830	9370.747	0.588
1.32	2.250	0.571	6441.859	0.676
1.47	2.500	0.453	5115.019	0.745
1.62	2.750	0.355	4007.166	0.800
1.76	3.000	0.283	3187.900	0.843
1.91	3.250	0.229	2582.427	0.878
2.06	3.500	0.187	2104.743	0.906
2.21	3.750	0.152	1711.233	0.930
2.35	4.000	0.124	1401.420	0.949
2.50	4.250	0.098	1107.826	0.964
2.65	4.500	0.077	868.940	0.976
2.79	4.750	0.060	671.923	0.985
2.94	5.000	0.043	484.343	0.991
3.09	5.250	0.033	375.400	0.996
3.24	5.500	0.018	198.006	0.999
3.38	5.750	0.006	63.670	1.000
3.53	6.000	0.000	0.061	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In)	Total SCS Runoff (In)	Rainfall Amount (In)	Runoff Amount (In)	Infiltr-ation (In)	Revised Runoff Min Loss Rate

	P	Q	dP	dQ	dP-dQ	
0.25	0.0281	0.0000	0.0281	0.0000	0.0281	--------
0.50	0.0562	0.0000	0.0281	0.0000	0.0281	--------
0.75	0.0780	0.0000	0.0219	0.0000	0.0219	--------
1.00	0.0999	0.0000	0.0219	0.0000	0.0219	--------
1.25	0.1280	0.0000	0.0281	0.0000	0.0281	--------
1.50	0.1561	0.0000	0.0281	0.0000	0.0281	--------
1.75	0.1842	0.0000	0.0281	0.0000	0.0281	--------
2.00	0.2123	0.0000	0.0281	0.0000	0.0281	--------
2.25	0.2466	0.0000	0.0343	0.0000	0.0343	--------
2.50	0.2809	0.0000	0.0343	0.0000	0.0343	--------
2.75	0.3090	0.0000	0.0281	0.0000	0.0281	--------
3.00	0.3371	0.0000	0.0281	0.0000	0.0281	--------
3.25	0.3715	0.0000	0.0343	0.0000	0.0343	--------
3.50	0.4058	0.0000	0.0343	0.0000	0.0343	--------
3.75	0.4432	0.0000	0.0375	0.0000	0.0375	--------
4.00	0.4807	0.0007	0.0375	0.0007	0.0367	--------
4.25	0.5213	0.0029	0.0406	0.0021	0.0384	--------
4.50	0.5619	0.0064	0.0406	0.0035	0.0371	--------
4.75	0.6056	0.0116	0.0437	0.0052	0.0385	--------
5.00	0.6493	0.0181	0.0437	0.0066	0.0371	--------
5.25	0.6992	0.0273	0.0499	0.0091	0.0408	--------
5.50	0.7491	0.0380	0.0499	0.0108	0.0392	--------
5.75	0.8022	0.0511	0.0531	0.0131	0.0400	--------
6.00	0.8553	0.0659	0.0531	0.0147	0.0383	--------
6.25	0.9177	0.0851	0.0624	0.0193	0.0432	--------
6.50	0.9801	0.1064	0.0624	0.0212	0.0412	--------
6.75	1.0519	0.1330	0.0718	0.0267	0.0451	--------
7.00	1.1237	0.1620	0.0718	0.0289	0.0429	--------
7.25	1.2174	0.2028	0.0936	0.0408	0.0528	--------
7.50	1.3110	0.2468	0.0936	0.0441	0.0496	--------
7.75	1.4515	0.3183	0.1405	0.0715	0.0690	--------
8.00	1.5919	0.3956	0.1405	0.0773	0.0632	--------
8.25	1.8011	0.5199	0.2091	0.1243	0.0848	--------
8.50	2.0102	0.6536	0.2091	0.1337	0.0754	--------
8.75	2.2849	0.8411	0.2747	0.1875	0.0872	--------
9.00	2.5596	1.0396	0.2747	0.1986	0.0761	--------
9.25	2.8592	1.2666	0.2997	0.2269	0.0727	--------
9.50	3.1589	1.5024	0.2997	0.2358	0.0639	--------
9.75	3.4149	1.7096	0.2560	0.2073	0.0487	--------
10.00	3.6708	1.9215	0.2560	0.2118	0.0441	--------
10.25	3.7988	2.0289	0.1280	0.1074	0.0205	--------
10.50	3.9268	2.1373	0.1280	0.1084	0.0196	--------
10.75	4.0111	2.2091	0.0843	0.0718	0.0124	--------
11.00	4.0953	2.2813	0.0843	0.0722	0.0121	--------
11.25	4.1671	2.3431	0.0718	0.0618	0.0100	--------
11.50	4.2389	2.4051	0.0718	0.0620	0.0098	--------
11.75	4.3045	2.4619	0.0656	0.0568	0.0087	--------
12.00	4.3700	2.5190	0.0656	0.0570	0.0085	--------
12.25	4.4325	2.5734	0.0624	0.0545	0.0080	--------
12.50	4.4949	2.6280	0.0624	0.0546	0.0078	--------
12.75	4.5542	2.6801	0.0593	0.0520	0.0073	--------
13.00	4.6135	2.7322	0.0593	0.0522	0.0071	--------
13.25	4.6666	2.7790	0.0531	0.0468	0.0063	--------
13.50	4.7196	2.8259	0.0531	0.0469	0.0062	--------
13.75	4.7696	2.8701	0.0499	0.0442	0.0057	--------
14.00	4.8195	2.9145	0.0499	0.0443	0.0056	--------
14.25	4.8757	2.9644	0.0562	0.0500	0.0062	--------
14.50	4.9319	3.0145	0.0562	0.0501	0.0061	--------
14.75	4.9631	3.0423	0.0312	0.0279	0.0034	--------
15.00	4.9943	3.0702	0.0312	0.0279	0.0033	--------
15.25	5.0443	3.1149	0.0499	0.0447	0.0053	--------

15.50	5.0942	3.1596	0.0499	0.0448	0.0052
15.75	5.1410	3.2017	0.0468	0.0420	0.0048
16.00	5.1878	3.2438	0.0468	0.0421	0.0047
16.25	5.2315	3.2831	0.0437	0.0393	0.0044
16.50	5.2752	3.3225	0.0437	0.0394	0.0043
16.75	5.3221	3.3648	0.0468	0.0423	0.0046
17.00	5.3689	3.4071	0.0468	0.0423	0.0045
17.25	5.4063	3.4410	0.0375	0.0339	0.0036
17.50	5.4438	3.4750	0.0375	0.0339	0.0035
17.75	5.4844	3.5118	0.0406	0.0368	0.0038
18.00	5.5250	3.5486	0.0406	0.0369	0.0037
18.25	5.5562	3.5770	0.0312	0.0284	0.0028
18.50	5.5874	3.6054	0.0312	0.0284	0.0028
18.75	5.6186	3.6338	0.0312	0.0284	0.0028
19.00	5.6498	3.6623	0.0312	0.0284	0.0028
19.25	5.6779	3.6879	0.0281	0.0256	0.0025
19.50	5.7060	3.7135	0.0281	0.0256	0.0025
19.75	5.7372	3.7421	0.0312	0.0285	0.0027
20.00	5.7684	3.7706	0.0312	0.0285	0.0027
20.25	5.8028	3.8020	0.0343	0.0314	0.0029
20.50	5.8371	3.8334	0.0343	0.0314	0.0029
20.75	5.8683	3.8621	0.0312	0.0286	0.0026
21.00	5.8995	3.8907	0.0312	0.0286	0.0026
21.25	5.9276	3.9165	0.0281	0.0258	0.0023
21.50	5.9557	3.9423	0.0281	0.0258	0.0023
21.75	5.9838	3.9681	0.0281	0.0258	0.0023
22.00	6.0119	3.9939	0.0281	0.0258	0.0023
22.25	6.0400	4.0198	0.0281	0.0258	0.0022
22.50	6.0681	4.0456	0.0281	0.0259	0.0022
22.75	6.0962	4.0715	0.0281	0.0259	0.0022
23.00	6.1243	4.0974	0.0281	0.0259	0.0022
23.25	6.1555	4.1262	0.0312	0.0288	0.0024
23.50	6.1867	4.1550	0.0312	0.0288	0.0024
23.75	6.2148	4.1809	0.0281	0.0259	0.0021
24.00	6.2429	4.2069	0.0281	0.0260	0.0021

Total soil rain loss = 2.04(In)
Total effective runoff = 4.21(In)

Peak flow rate this hydrograph = 12729.94(CFS)
Total runoff volume this hydrograph = 278697131.9(Ft3)

24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	3200.0	6400.0	9600.0	12800.0
0+15	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				

3+ 0	0.0000	0.00	Q
3+15	0.0000	0.00	Q
3+30	0.0000	0.00	Q
3+45	0.0000	0.00	Q
4+ 0	0.0028	0.13	Q
4+15	0.0195	0.81	Q
4+30	0.0780	2.83	Q
4+45	0.2412	7.90	Q
5+ 0	0.6586	20.20	Q
5+15	1.5960	45.37	Q
5+30	3.3855	86.61	Q
5+45	6.3692	144.42	Q
6+ 0	10.8425	216.51	Q
6+15	17.1135	303.51	Q
6+30	25.4676	404.34	VQ
6+45	36.1834	518.64	VQ
7+ 0	49.5280	645.88	V Q
7+15	65.9163	793.20	V Q
7+30	85.8278	963.71	V Q
7+45	109.9483	1167.43	V Q
8+ 0	139.0896	1410.44	V Q
8+15	174.7255	1724.78	V Q
8+30	218.7898	2132.71	V Q
8+45	274.5783	2700.17	V Q
9+ 0	345.7514	3444.78	V Q
9+15	437.3751	4434.59	V Q
9+30	553.9603	5642.72	V Q
9+45	699.8940	7063.19	V Q
10+ 0	877.4999	8596.13	V Q
10+15	1086.0227	10092.50	V Q
10+30	1321.8367	11413.40	V Q
10+45	1576.2290	12312.59	V Q
11+ 0	1839.2444	12729.94	V Q
11+15	2096.2586	12439.49	V Q
11+30	2336.5239	11628.84	V Q
11+45	2554.1326	10532.26	V Q
12+ 0	2748.8195	9422.85	V Q
12+15	2924.2585	8491.25	V Q
12+30	3082.8764	7677.11	V Q
12+45	3227.7878	7013.71	V Q
13+ 0	3360.9639	6445.72	V Q
13+15	3484.2396	5966.54	V Q
13+30	3598.8847	5548.82	V Q
13+45	3706.0344	5186.05	V Q
14+ 0	3806.4028	4857.83	V Q
14+15	3900.5737	4557.87	V Q
14+30	3989.0939	4284.38	V Q
14+45	4072.5711	4040.30	V Q
15+ 0	4151.8703	3838.08	V Q
15+15	4228.1148	3690.23	V Q
15+30	4302.0655	3579.21	V Q
15+45	4372.8783	3427.34	V Q
16+ 0	4439.8259	3240.26	V Q
16+15	4503.9461	3103.42	V Q
16+30	4567.2598	3064.38	V Q
16+45	4631.1113	3090.42	V Q
17+ 0	4695.2077	3102.26	V Q
17+15	4758.7820	3077.00	V Q
17+30	4821.7003	3045.25	V Q
17+45	4884.1151	3020.87	V Q
18+ 0	4946.1050	3000.31	V Q
18+15	5007.1815	2956.10	V Q
18+30	5066.7635	2883.77	V Q

18+45	5124.7593	2807.00	Q | | | V |
19+ 0	5181.4172	2742.24	Q | | | V |
19+15	5236.5097	2666.48	Q | | | V |
19+30	5289.5151	2565.46	Q | | | V |
19+45	5340.2574	2455.93	Q | | | V |
20+ 0	5389.0775	2362.89	Q | | | V |
20+15	5436.3614	2288.54	Q | | | V |
20+30	5482.2650	2221.74	Q | | | V |
20+45	5527.2068	2175.19	Q | | | V |
21+ 0	5571.7227	2154.57	Q | | | V |
21+15	5616.3609	2160.49	Q | | | V |
21+30	5661.2815	2174.16	Q | | | V |
21+45	5706.2140	2174.73	Q | | | V |
22+ 0	5750.7873	2157.35	Q | | | V |
22+15	5794.5535	2118.29	Q | | | V |
22+30	5837.3825	2072.92	Q | | | V |
22+45	5879.3752	2032.45	Q | | | V |
23+ 0	5920.6972	1999.99	Q | | | V |
23+15	5961.5664	1978.07	Q | | | V |
23+30	6002.1275	1963.15	Q | | | V |
23+45	6042.5090	1954.46	Q | | | V |
24+ 0	6082.8470	1952.36	Q | | | V |
24+15	6123.2897	1957.43	Q | | | V |
24+30	6163.7649	1959.00	Q | | | V |
24+45	6203.6977	1932.75	Q | | | V |
25+ 0	6241.9407	1850.96	Q | | | V |
25+15	6276.0107	1648.99	Q | | | V |
25+30	6304.1245	1360.71	Q | | | V |
25+45	6325.9961	1058.59	Q | | | V |
26+ 0	6342.6965	808.30	Q | | | V |
26+15	6355.8389	636.09	Q | | | V |
26+30	6366.1678	499.92	Q | | | V |
26+45	6374.2965	393.43	Q | | | V |
27+ 0	6380.6774	308.83	Q | | | V |
27+15	6385.6401	240.20	Q | | | V |
27+30	6389.4444	184.13	Q | | | V |
27+45	6392.3067	138.53	Q | | | V |
28+ 0	6394.3956	101.10	Q | | | V |
28+15	6395.8735	71.53	Q | | | V |
28+30	6396.8689	48.18	Q | | | V |
28+45	6397.4858	29.85	Q | | | V |
29+ 0	6397.8312	16.72	Q | | | V |
29+15	6397.9716	6.79	Q | | | V |
29+30	6398.0058	1.65	Q | | | V |
29+45	6398.0058	0.00	Q | | | V |

U N I T H Y D R O G R A P H A N A L Y S I S

Study date 08/30/10 File: east100yr6hr.out

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Program License Serial Number 4055

Tule Wind Project
Unnamed Eastern Wash
Existing 100 Year 6 Hour
Aug 25, 2010

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Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
734.00	3.00

Rainfall Distribution pattern used in study:
Type B for SCS (small dam) or San Diego 6 hour storms

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********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
734.00	1.000	85.1	85.1	0.050	C

Area-averaged catchment SCS Curve Number AMC(2) = 85.130
Area-averaged Fm value using values listed = 0.050(In/Hr)

++
Direct entry of lag time by user
Watershed area =   734.00(Ac.)
Catchment Lag time =   0.380 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 21.9298
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 85.130

Rainfall depth area reduction factors:
Using a total area of   734.00(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =   3.000(In)
Adjusted rainfall =   3.000(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 8881.40 (CFS))

0.22	0.083	0.017	34.408	0.004
0.44	0.167	0.085	169.808	0.023
0.66	0.250	0.290	580.041	0.088
0.88	0.333	0.784	1566.642	0.265
1.10	0.417	1.000	1997.798	0.490
1.32	0.500	0.716	1430.728	0.651
1.54	0.583	0.467	933.347	0.756
1.75	0.667	0.329	656.341	0.830
1.97	0.750	0.237	473.266	0.883
2.19	0.833	0.175	348.921	0.922
2.41	0.917	0.129	256.962	0.951
2.63	1.000	0.091	181.388	0.972
2.85	1.083	0.062	124.326	0.986
3.07	1.167	0.040	80.165	0.995
3.29	1.250	0.020	40.797	0.999
3.51	1.333	0.003	6.463	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0175	0.0000	0.0175	0.0000	0.0175	--------
0.17	0.0350	0.0000	0.0175	0.0000	0.0175	--------
0.25	0.0525	0.0000	0.0175	0.0000	0.0175	--------
0.33	0.0700	0.0000	0.0175	0.0000	0.0175	--------
0.42	0.0875	0.0000	0.0175	0.0000	0.0175	--------
0.50	0.1050	0.0000	0.0175	0.0000	0.0175	--------

0.58	0.1285	0.0000	0.0235	0.0000	0.0235	--------
0.67	0.1520	0.0000	0.0235	0.0000	0.0235	--------
0.75	0.1755	0.0000	0.0235	0.0000	0.0235	--------
0.83	0.1990	0.0000	0.0235	0.0000	0.0235	--------
0.92	0.2225	0.0000	0.0235	0.0000	0.0235	--------
1.00	0.2460	0.0000	0.0235	0.0000	0.0235	--------
1.08	0.2750	0.0000	0.0290	0.0000	0.0290	--------
1.17	0.3040	0.0000	0.0290	0.0000	0.0290	--------
1.25	0.3330	0.0000	0.0290	0.0000	0.0290	--------
1.33	0.3620	0.0001	0.0290	0.0001	0.0289	--------
1.42	0.3910	0.0010	0.0290	0.0009	0.0281	--------
1.50	0.4200	0.0027	0.0290	0.0018	0.0272	--------
1.58	0.4650	0.0072	0.0450	0.0044	0.0406	--------
1.67	0.5100	0.0135	0.0450	0.0063	0.0387	--------
1.75	0.5550	0.0217	0.0450	0.0081	0.0369	--------
1.83	0.6000	0.0315	0.0450	0.0098	0.0352	--------
1.92	0.6450	0.0428	0.0450	0.0113	0.0337	--------
2.00	0.6900	0.0556	0.0450	0.0128	0.0322	--------
2.08	0.8750	0.1216	0.1850	0.0660	0.1190	--------
2.17	1.0600	0.2055	0.1850	0.0839	0.1011	--------
2.25	1.2450	0.3036	0.1850	0.0981	0.0869	--------
2.33	1.4300	0.4130	0.1850	0.1094	0.0756	--------
2.42	1.6150	0.5318	0.1850	0.1187	0.0663	--------
2.50	1.8000	0.6582	0.1850	0.1264	0.0586	--------
2.58	1.8500	0.6935	0.0500	0.0353	0.0147	--------
2.67	1.9000	0.7292	0.0500	0.0358	0.0142	--------
2.75	1.9500	0.7654	0.0500	0.0362	0.0138	--------
2.83	2.0000	0.8020	0.0500	0.0366	0.0134	--------
2.92	2.0500	0.8390	0.0500	0.0370	0.0130	--------
3.00	2.1000	0.8763	0.0500	0.0373	0.0127	--------
3.08	2.1405	0.9068	0.0405	0.0305	0.0100	--------
3.17	2.1810	0.9376	0.0405	0.0307	0.0098	--------
3.25	2.2215	0.9685	0.0405	0.0310	0.0095	--------
3.33	2.2620	0.9997	0.0405	0.0312	0.0093	--------
3.42	2.3025	1.0311	0.0405	0.0314	0.0091	--------
3.50	2.3430	1.0626	0.0405	0.0316	0.0089	--------
3.58	2.3700	1.0838	0.0270	0.0212	0.0058	--------
3.67	2.3970	1.1050	0.0270	0.0212	0.0058	--------
3.75	2.4240	1.1263	0.0270	0.0213	0.0057	--------
3.83	2.4510	1.1477	0.0270	0.0214	0.0056	--------
3.92	2.4780	1.1692	0.0270	0.0215	0.0055	--------
4.00	2.5050	1.1908	0.0270	0.0216	0.0054	--------
4.08	2.5275	1.2088	0.0225	0.0180	0.0045	--------
4.17	2.5500	1.2269	0.0225	0.0181	0.0044	--------
4.25	2.5725	1.2450	0.0225	0.0181	0.0044	--------
4.33	2.5950	1.2631	0.0225	0.0182	0.0043	--------
4.42	2.6175	1.2814	0.0225	0.0182	0.0043	--------
4.50	2.6400	1.2996	0.0225	0.0183	0.0042	--------
4.58	2.6615	1.3171	0.0215	0.0175	0.0040	--------
4.67	2.6830	1.3347	0.0215	0.0175	0.0040	--------
4.75	2.7045	1.3522	0.0215	0.0176	0.0039	--------
4.83	2.7260	1.3699	0.0215	0.0176	0.0039	--------
4.92	2.7475	1.3875	0.0215	0.0177	0.0038	--------
5.00	2.7690	1.4052	0.0215	0.0177	0.0038	--------
5.08	2.7875	1.4205	0.0185	0.0153	0.0032	--------
5.17	2.8060	1.4358	0.0185	0.0153	0.0032	--------
5.25	2.8245	1.4511	0.0185	0.0153	0.0032	--------
5.33	2.8430	1.4664	0.0185	0.0153	0.0032	--------
5.42	2.8615	1.4818	0.0185	0.0154	0.0031	--------
5.50	2.8800	1.4972	0.0185	0.0154	0.0031	--------
5.58	2.9000	1.5139	0.0200	0.0167	0.0033	--------
5.67	2.9200	1.5306	0.0200	0.0167	0.0033	--------
5.75	2.9400	1.5474	0.0200	0.0167	0.0033	--------

5.83	2.9600	1.5641	0.0200	0.0168	0.0032 --------
5.92	2.9800	1.5809	0.0200	0.0168	0.0032 --------
6.00	3.0000	1.5978	0.0200	0.0168	0.0032 --------

Total soil rain loss = 1.40(In)
Total effective runoff = 1.60(In)

Peak flow rate this hydrograph = 808.32(CFS)
Total runoff volume this hydrograph = 4257090.5(Ft3)

6 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 225.0 450.0 675.0 900.0
0+ 5	0.0000	0.00	Q
0+10	0.0000	0.00	Q
0+15	0.0000	0.00	Q
0+20	0.0000	0.00	Q
0+25	0.0000	0.00	Q
0+30	0.0000	0.00	Q
0+35	0.0000	0.00	Q
0+40	0.0000	0.00	Q
0+45	0.0000	0.00	Q
0+50	0.0000	0.00	Q
0+55	0.0000	0.00	Q
1+ 0	0.0000	0.00	Q
1+ 5	0.0000	0.00	Q
1+10	0.0000	0.00	Q
1+15	0.0000	0.00	Q
1+20	0.0000	0.00	Q
1+25	0.0003	0.05	Q
1+30	0.0021	0.26	Q
1+35	0.0098	1.11	Q
1+40	0.0343	3.56	Q
1+45	0.0935	8.60	Q
1+50	0.2123	17.24	Q
1+55	0.4120	29.00	VQ
2+ 0	0.7019	42.09	VQ
2+ 5	1.0975	57.45	V Q
2+10	1.6519	80.49	V Q
2+15	2.5289	127.34	V Q
2+20	4.1401	233.94	V Q
2+25	6.7974	385.85	V Q
2+30	10.4704	533.31	V Q
2+35	15.0279	661.76	V Q
2+40	20.2786	762.39	V Q
2+45	25.8455	808.32	V Q
2+50	30.9599	742.61	V Q
2+55	35.2026	616.05	V Q
3+ 0	38.8239	525.81	V Q
3+ 5	42.0612	470.06	V Q
3+10	45.0275	430.70	VQ
3+15	47.7741	398.81	Q V
3+20	50.2944	365.94	Q V
3+25	52.6021	335.08	Q V
3+30	54.7581	313.05	Q V
3+35	56.8108	298.06	Q V

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    3+40      58.7860    286.80  |          | Q        |   V      |          |
    3+45      60.6844    275.64  |          | Q        |   V      |          |
    3+50      62.4600    257.82  |          |Q         |    V     |          |
    3+55      64.0881    236.41  |         Q          |     V    |          |
    4+ 0      65.6120    221.27  |        Q|          |     V    |          |
    4+ 5      67.0686    211.49  |        Q|          |      V   |          |
    4+10      68.4758    204.33  |        Q|          |       V  |          |
    4+15      69.8381    197.81  |       Q |          |       V  |          |
    4+20      71.1412    189.20  |       Q |          |        V |          |
    4+25      72.3806    179.97  |      Q  |          |        V |          |
    4+30      73.5756    173.51  |      Q  |          |         V          |
    4+35      74.7419    169.35  |      Q  |          |         V          |
    4+40      75.8887    166.51  |      Q  |          |          |V        |
    4+45      77.0207    164.37  |      Q  |          |          |V        |
    4+50      78.1380    162.22  |      Q  |          |          |V        |
    4+55      79.2406    160.10  |      Q  |          |          | V       |
    5+ 0      80.3335    158.69  |      Q  |          |          | V       |
    5+ 5      81.4203    157.79  |      Q  |          |          |  V      |
    5+10      82.5010    156.93  |     Q   |          |          |  V      |
    5+15      83.5708    155.33  |     Q   |          |          |   V     |
    5+20      84.6142    151.50  |     Q   |          |          |   V     |
    5+25      85.6243    146.67  |     Q   |          |          |    V    |
    5+30      86.6111    143.29  |     Q   |          |          |    V    |
    5+35      87.5836    141.20  |     Q   |          |          |    V    |
    5+40      88.5478    140.00  |     Q   |          |          |     V   |
    5+45      89.5105    139.78  |     Q   |          |          |     V   |
    5+50      90.4825    141.13  |     Q   |          |          |      V  |
    5+55      91.4691    143.26  |     Q   |          |          |      V  |
    6+ 0      92.4667    144.86  |     Q   |          |          |      V  |
    6+ 5      93.4681    145.40  |     Q   |          |          |       V |
    6+10      94.4559    143.42  |     Q   |          |          |       V |
    6+15      95.3814    134.39  |    Q    |          |          |        V|
    6+20      96.1296    108.64  |   Q     |          |          |        V|
    6+25      96.6494     75.47  |  Q      |          |          |        V|
    6+30      97.0055     51.71  | Q       |          |          |        V|
    6+35      97.2549     36.22  |Q        |          |          |        V|
    6+40      97.4292     25.32  |Q        |          |          |        V|
    6+45      97.5493     17.43  Q         |          |          |        V|
    6+50      97.6291     11.59  Q         |          |          |        V|
    6+55      97.6792      7.28  Q         |          |          |        V|
    7+ 0      97.7084      4.23  Q         |          |          |        V|
    7+ 5      97.7231      2.14  Q         |          |          |        V|
    7+10      97.7286      0.80  Q         |          |          |        V|
    7+15      97.7294      0.11  Q         |          |          |        V|
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U N I T H Y D R O G R A P H A N A L Y S I S

Study date 08/30/10 File: east100yr24hr.out

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Program License Serial Number 4055

Tule Wind Project
Unnamed Eastern Wash
Existing 100 Year 24 Hour
Aug 25, 2010

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Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
734.00	5.40

Rainfall Distribution pattern used in study:
Type B for San Diego area of California

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********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
734.00	1.000	85.1	85.1	0.050	C

Area-averaged catchment SCS Curve Number AMC(2) = 85.130
Area-averaged Fm value using values listed = 0.050(In/Hr)

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Direct entry of lag time by user
Watershed area =   734.00(Ac.)
Catchment Lag time =   0.380 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 21.9298
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 85.130

Rainfall depth area reduction factors:
Using a total area of   734.00(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =   5.400(In)
Adjusted rainfall =   5.400(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 8881.40 (CFS))

0.22	0.083	0.017	34.408	0.004
0.44	0.167	0.085	169.808	0.023
0.66	0.250	0.290	580.041	0.088
0.88	0.333	0.784	1566.642	0.265
1.10	0.417	1.000	1997.798	0.490
1.32	0.500	0.716	1430.728	0.651
1.54	0.583	0.467	933.347	0.756
1.75	0.667	0.329	656.341	0.830
1.97	0.750	0.237	473.266	0.883
2.19	0.833	0.175	348.921	0.922
2.41	0.917	0.129	256.962	0.951
2.63	1.000	0.091	181.388	0.972
2.85	1.083	0.062	124.326	0.986
3.07	1.167	0.040	80.165	0.995
3.29	1.250	0.020	40.797	0.999
3.51	1.333	0.003	6.463	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0081	0.0000	0.0081	0.0000	0.0081	--------
0.17	0.0162	0.0000	0.0081	0.0000	0.0081	--------
0.25	0.0243	0.0000	0.0081	0.0000	0.0081	--------
0.33	0.0324	0.0000	0.0081	0.0000	0.0081	--------
0.42	0.0405	0.0000	0.0081	0.0000	0.0081	--------
0.50	0.0486	0.0000	0.0081	0.0000	0.0081	--------

0.58	0.0549	0.0000	0.0063	0.0000	0.0063	--------
0.67	0.0612	0.0000	0.0063	0.0000	0.0063	--------
0.75	0.0675	0.0000	0.0063	0.0000	0.0063	--------
0.83	0.0738	0.0000	0.0063	0.0000	0.0063	--------
0.92	0.0801	0.0000	0.0063	0.0000	0.0063	--------
1.00	0.0864	0.0000	0.0063	0.0000	0.0063	--------
1.08	0.0945	0.0000	0.0081	0.0000	0.0081	--------
1.17	0.1026	0.0000	0.0081	0.0000	0.0081	--------
1.25	0.1107	0.0000	0.0081	0.0000	0.0081	--------
1.33	0.1188	0.0000	0.0081	0.0000	0.0081	--------
1.42	0.1269	0.0000	0.0081	0.0000	0.0081	--------
1.50	0.1350	0.0000	0.0081	0.0000	0.0081	--------
1.58	0.1431	0.0000	0.0081	0.0000	0.0081	--------
1.67	0.1512	0.0000	0.0081	0.0000	0.0081	--------
1.75	0.1593	0.0000	0.0081	0.0000	0.0081	--------
1.83	0.1674	0.0000	0.0081	0.0000	0.0081	--------
1.92	0.1755	0.0000	0.0081	0.0000	0.0081	--------
2.00	0.1836	0.0000	0.0081	0.0000	0.0081	--------
2.08	0.1935	0.0000	0.0099	0.0000	0.0099	--------
2.17	0.2034	0.0000	0.0099	0.0000	0.0099	--------
2.25	0.2133	0.0000	0.0099	0.0000	0.0099	--------
2.33	0.2232	0.0000	0.0099	0.0000	0.0099	--------
2.42	0.2331	0.0000	0.0099	0.0000	0.0099	--------
2.50	0.2430	0.0000	0.0099	0.0000	0.0099	--------
2.58	0.2511	0.0000	0.0081	0.0000	0.0081	--------
2.67	0.2592	0.0000	0.0081	0.0000	0.0081	--------
2.75	0.2673	0.0000	0.0081	0.0000	0.0081	--------
2.83	0.2754	0.0000	0.0081	0.0000	0.0081	--------
2.92	0.2835	0.0000	0.0081	0.0000	0.0081	--------
3.00	0.2916	0.0000	0.0081	0.0000	0.0081	--------
3.08	0.3015	0.0000	0.0099	0.0000	0.0099	--------
3.17	0.3114	0.0000	0.0099	0.0000	0.0099	--------
3.25	0.3213	0.0000	0.0099	0.0000	0.0099	--------
3.33	0.3312	0.0000	0.0099	0.0000	0.0099	--------
3.42	0.3411	0.0000	0.0099	0.0000	0.0099	--------
3.50	0.3510	0.0000	0.0099	0.0000	0.0099	--------
3.58	0.3618	0.0001	0.0108	0.0001	0.0107	--------
3.67	0.3726	0.0003	0.0108	0.0002	0.0106	--------
3.75	0.3834	0.0007	0.0108	0.0003	0.0105	--------
3.83	0.3942	0.0011	0.0108	0.0005	0.0103	--------
3.92	0.4050	0.0017	0.0108	0.0006	0.0102	--------
4.00	0.4158	0.0024	0.0108	0.0007	0.0101	--------
4.08	0.4275	0.0033	0.0117	0.0009	0.0108	--------
4.17	0.4392	0.0044	0.0117	0.0010	0.0107	--------
4.25	0.4509	0.0056	0.0117	0.0012	0.0105	--------
4.33	0.4626	0.0069	0.0117	0.0013	0.0104	--------
4.42	0.4743	0.0083	0.0117	0.0014	0.0103	--------
4.50	0.4860	0.0099	0.0117	0.0016	0.0101	--------
4.58	0.4986	0.0117	0.0126	0.0018	0.0108	--------
4.67	0.5112	0.0137	0.0126	0.0020	0.0106	--------
4.75	0.5238	0.0158	0.0126	0.0021	0.0105	--------
4.83	0.5364	0.0181	0.0126	0.0023	0.0103	--------
4.92	0.5490	0.0205	0.0126	0.0024	0.0102	--------
5.00	0.5616	0.0230	0.0126	0.0025	0.0101	--------
5.08	0.5760	0.0260	0.0144	0.0030	0.0114	--------
5.17	0.5904	0.0292	0.0144	0.0032	0.0112	--------
5.25	0.6048	0.0326	0.0144	0.0034	0.0110	--------
5.33	0.6192	0.0361	0.0144	0.0035	0.0109	--------
5.42	0.6336	0.0398	0.0144	0.0037	0.0107	--------
5.50	0.6480	0.0436	0.0144	0.0038	0.0106	--------
5.58	0.6633	0.0478	0.0153	0.0042	0.0111	--------
5.67	0.6786	0.0522	0.0153	0.0044	0.0109	--------
5.75	0.6939	0.0568	0.0153	0.0045	0.0108	--------

5.83	0.7092	0.0615	0.0153	0.0047	0.0106	--------
5.92	0.7245	0.0663	0.0153	0.0049	0.0104	--------
6.00	0.7398	0.0713	0.0153	0.0050	0.0103	--------
6.08	0.7578	0.0774	0.0180	0.0061	0.0119	--------
6.17	0.7758	0.0837	0.0180	0.0063	0.0117	--------
6.25	0.7938	0.0902	0.0180	0.0065	0.0115	--------
6.33	0.8118	0.0968	0.0180	0.0067	0.0113	--------
6.42	0.8298	0.1036	0.0180	0.0068	0.0112	--------
6.50	0.8478	0.1107	0.0180	0.0070	0.0110	--------
6.58	0.8685	0.1189	0.0207	0.0083	0.0124	--------
6.67	0.8892	0.1275	0.0207	0.0085	0.0122	--------
6.75	0.9099	0.1362	0.0207	0.0087	0.0120	--------
6.83	0.9306	0.1451	0.0207	0.0089	0.0118	--------
6.92	0.9513	0.1543	0.0207	0.0091	0.0116	--------
7.00	0.9720	0.1636	0.0207	0.0094	0.0113	--------
7.08	0.9990	0.1761	0.0270	0.0125	0.0145	--------
7.17	1.0260	0.1889	0.0270	0.0128	0.0142	--------
7.25	1.0530	0.2021	0.0270	0.0131	0.0139	--------
7.33	1.0800	0.2155	0.0270	0.0134	0.0136	--------
7.42	1.1070	0.2292	0.0270	0.0137	0.0133	--------
7.50	1.1340	0.2432	0.0270	0.0140	0.0130	--------
7.58	1.1745	0.2647	0.0405	0.0215	0.0190	--------
7.67	1.2150	0.2868	0.0405	0.0221	0.0184	--------
7.75	1.2555	0.3095	0.0405	0.0227	0.0178	--------
7.83	1.2960	0.3327	0.0405	0.0232	0.0173	--------
7.92	1.3365	0.3564	0.0405	0.0237	0.0168	--------
8.00	1.3770	0.3806	0.0405	0.0242	0.0163	--------
8.08	1.4373	0.4176	0.0603	0.0369	0.0234	--------
8.17	1.4976	0.4554	0.0603	0.0379	0.0224	--------
8.25	1.5579	0.4942	0.0603	0.0388	0.0215	--------
8.33	1.6182	0.5339	0.0603	0.0397	0.0206	--------
8.42	1.6785	0.5744	0.0603	0.0405	0.0198	--------
8.50	1.7388	0.6156	0.0603	0.0412	0.0191	--------
8.58	1.8180	0.6708	0.0792	0.0552	0.0240	--------
8.67	1.8972	0.7272	0.0792	0.0564	0.0228	--------
8.75	1.9764	0.7847	0.0792	0.0575	0.0217	--------
8.83	2.0556	0.8431	0.0792	0.0585	0.0207	--------
8.92	2.1348	0.9025	0.0792	0.0594	0.0198	--------
9.00	2.2140	0.9628	0.0792	0.0603	0.0189	--------
9.08	2.3004	1.0294	0.0864	0.0667	0.0197	--------
9.17	2.3868	1.0970	0.0864	0.0676	0.0188	--------
9.25	2.4732	1.1654	0.0864	0.0684	0.0180	--------
9.33	2.5596	1.2346	0.0864	0.0692	0.0172	--------
9.42	2.6460	1.3045	0.0864	0.0699	0.0165	--------
9.50	2.7324	1.3751	0.0864	0.0706	0.0158	--------
9.58	2.8062	1.4359	0.0738	0.0608	0.0130	--------
9.67	2.8800	1.4972	0.0738	0.0613	0.0125	--------
9.75	2.9538	1.5589	0.0738	0.0617	0.0121	--------
9.83	3.0276	1.6210	0.0738	0.0621	0.0117	--------
9.92	3.1014	1.6835	0.0738	0.0625	0.0113	--------
10.00	3.1752	1.7464	0.0738	0.0629	0.0109	--------
10.08	3.2121	1.7779	0.0369	0.0316	0.0053	--------
10.17	3.2490	1.8096	0.0369	0.0316	0.0053	--------
10.25	3.2859	1.8413	0.0369	0.0317	0.0052	--------
10.33	3.3228	1.8731	0.0369	0.0318	0.0051	--------
10.42	3.3597	1.9050	0.0369	0.0319	0.0050	--------
10.50	3.3966	1.9370	0.0369	0.0320	0.0049	--------
10.58	3.4209	1.9580	0.0243	0.0211	0.0032	--------
10.67	3.4452	1.9792	0.0243	0.0211	0.0032	--------
10.75	3.4695	2.0003	0.0243	0.0212	0.0031	--------
10.83	3.4938	2.0215	0.0243	0.0212	0.0031	--------
10.92	3.5181	2.0427	0.0243	0.0212	0.0031	--------
11.00	3.5424	2.0640	0.0243	0.0212	0.0031	--------

11.08	3.5631	2.0821	0.0207	0.0181	0.0026	--------
11.17	3.5838	2.1002	0.0207	0.0181	0.0026	--------
11.25	3.6045	2.1184	0.0207	0.0182	0.0025	--------
11.33	3.6252	2.1366	0.0207	0.0182	0.0025	--------
11.42	3.6459	2.1548	0.0207	0.0182	0.0025	--------
11.50	3.6666	2.1730	0.0207	0.0182	0.0025	--------
11.58	3.6855	2.1897	0.0189	0.0167	0.0022	--------
11.67	3.7044	2.2064	0.0189	0.0167	0.0022	--------
11.75	3.7233	2.2230	0.0189	0.0167	0.0022	--------
11.83	3.7422	2.2398	0.0189	0.0167	0.0022	--------
11.92	3.7611	2.2565	0.0189	0.0167	0.0022	--------
12.00	3.7800	2.2732	0.0189	0.0167	0.0022	--------
12.08	3.7980	2.2892	0.0180	0.0160	0.0020	--------
12.17	3.8160	2.3052	0.0180	0.0160	0.0020	--------
12.25	3.8340	2.3211	0.0180	0.0160	0.0020	--------
12.33	3.8520	2.3371	0.0180	0.0160	0.0020	--------
12.42	3.8700	2.3532	0.0180	0.0160	0.0020	--------
12.50	3.8880	2.3692	0.0180	0.0160	0.0020	--------
12.58	3.9051	2.3844	0.0171	0.0152	0.0019	--------
12.67	3.9222	2.3997	0.0171	0.0153	0.0018	--------
12.75	3.9393	2.4149	0.0171	0.0153	0.0018	--------
12.83	3.9564	2.4302	0.0171	0.0153	0.0018	--------
12.92	3.9735	2.4455	0.0171	0.0153	0.0018	--------
13.00	3.9906	2.4608	0.0171	0.0153	0.0018	--------
13.08	4.0059	2.4745	0.0153	0.0137	0.0016	--------
13.17	4.0212	2.4882	0.0153	0.0137	0.0016	--------
13.25	4.0365	2.5019	0.0153	0.0137	0.0016	--------
13.33	4.0518	2.5156	0.0153	0.0137	0.0016	--------
13.42	4.0671	2.5294	0.0153	0.0137	0.0016	--------
13.50	4.0824	2.5431	0.0153	0.0137	0.0016	--------
13.58	4.0968	2.5560	0.0144	0.0129	0.0015	--------
13.67	4.1112	2.5690	0.0144	0.0129	0.0015	--------
13.75	4.1256	2.5819	0.0144	0.0130	0.0014	--------
13.83	4.1400	2.5949	0.0144	0.0130	0.0014	--------
13.92	4.1544	2.6079	0.0144	0.0130	0.0014	--------
14.00	4.1688	2.6209	0.0144	0.0130	0.0014	--------
14.08	4.1850	2.6355	0.0162	0.0146	0.0016	--------
14.17	4.2012	2.6501	0.0162	0.0146	0.0016	--------
14.25	4.2174	2.6647	0.0162	0.0146	0.0016	--------
14.33	4.2336	2.6794	0.0162	0.0146	0.0016	--------
14.42	4.2498	2.6940	0.0162	0.0146	0.0016	--------
14.50	4.2660	2.7087	0.0162	0.0147	0.0015	--------
14.58	4.2750	2.7168	0.0090	0.0081	0.0009	--------
14.67	4.2840	2.7249	0.0090	0.0081	0.0009	--------
14.75	4.2930	2.7331	0.0090	0.0082	0.0008	--------
14.83	4.3020	2.7412	0.0090	0.0082	0.0008	--------
14.92	4.3110	2.7494	0.0090	0.0082	0.0008	--------
15.00	4.3200	2.7576	0.0090	0.0082	0.0008	--------
15.08	4.3344	2.7706	0.0144	0.0131	0.0013	--------
15.17	4.3488	2.7837	0.0144	0.0131	0.0013	--------
15.25	4.3632	2.7968	0.0144	0.0131	0.0013	--------
15.33	4.3776	2.8098	0.0144	0.0131	0.0013	--------
15.42	4.3920	2.8229	0.0144	0.0131	0.0013	--------
15.50	4.4064	2.8360	0.0144	0.0131	0.0013	--------
15.58	4.4199	2.8483	0.0135	0.0123	0.0012	--------
15.67	4.4334	2.8606	0.0135	0.0123	0.0012	--------
15.75	4.4469	2.8729	0.0135	0.0123	0.0012	--------
15.83	4.4604	2.8852	0.0135	0.0123	0.0012	--------
15.92	4.4739	2.8975	0.0135	0.0123	0.0012	--------
16.00	4.4874	2.9098	0.0135	0.0123	0.0012	--------
16.08	4.5000	2.9213	0.0126	0.0115	0.0011	--------
16.17	4.5126	2.9328	0.0126	0.0115	0.0011	--------
16.25	4.5252	2.9443	0.0126	0.0115	0.0011	--------

16.33	4.5378	2.9558	0.0126	0.0115	0.0011	--------
16.42	4.5504	2.9673	0.0126	0.0115	0.0011	--------
16.50	4.5630	2.9788	0.0126	0.0115	0.0011	--------
16.58	4.5765	2.9912	0.0135	0.0123	0.0012	--------
16.67	4.5900	3.0035	0.0135	0.0123	0.0012	--------
16.75	4.6035	3.0159	0.0135	0.0124	0.0011	--------
16.83	4.6170	3.0282	0.0135	0.0124	0.0011	--------
16.92	4.6305	3.0406	0.0135	0.0124	0.0011	--------
17.00	4.6440	3.0529	0.0135	0.0124	0.0011	--------
17.08	4.6548	3.0628	0.0108	0.0099	0.0009	--------
17.17	4.6656	3.0727	0.0108	0.0099	0.0009	--------
17.25	4.6764	3.0827	0.0108	0.0099	0.0009	--------
17.33	4.6872	3.0926	0.0108	0.0099	0.0009	--------
17.42	4.6980	3.1025	0.0108	0.0099	0.0009	--------
17.50	4.7088	3.1124	0.0108	0.0099	0.0009	--------
17.58	4.7205	3.1231	0.0117	0.0107	0.0010	--------
17.67	4.7322	3.1339	0.0117	0.0107	0.0010	--------
17.75	4.7439	3.1446	0.0117	0.0108	0.0009	--------
17.83	4.7556	3.1554	0.0117	0.0108	0.0009	--------
17.92	4.7673	3.1661	0.0117	0.0108	0.0009	--------
18.00	4.7790	3.1769	0.0117	0.0108	0.0009	--------
18.08	4.7880	3.1852	0.0090	0.0083	0.0007	--------
18.17	4.7970	3.1935	0.0090	0.0083	0.0007	--------
18.25	4.8060	3.2018	0.0090	0.0083	0.0007	--------
18.33	4.8150	3.2100	0.0090	0.0083	0.0007	--------
18.42	4.8240	3.2183	0.0090	0.0083	0.0007	--------
18.50	4.8330	3.2266	0.0090	0.0083	0.0007	--------
18.58	4.8420	3.2349	0.0090	0.0083	0.0007	--------
18.67	4.8510	3.2432	0.0090	0.0083	0.0007	--------
18.75	4.8600	3.2515	0.0090	0.0083	0.0007	--------
18.83	4.8690	3.2598	0.0090	0.0083	0.0007	--------
18.92	4.8780	3.2681	0.0090	0.0083	0.0007	--------
19.00	4.8870	3.2764	0.0090	0.0083	0.0007	--------
19.08	4.8951	3.2839	0.0081	0.0075	0.0006	--------
19.17	4.9032	3.2914	0.0081	0.0075	0.0006	--------
19.25	4.9113	3.2988	0.0081	0.0075	0.0006	--------
19.33	4.9194	3.3063	0.0081	0.0075	0.0006	--------
19.42	4.9275	3.3138	0.0081	0.0075	0.0006	--------
19.50	4.9356	3.3213	0.0081	0.0075	0.0006	--------
19.58	4.9446	3.3296	0.0090	0.0083	0.0007	--------
19.67	4.9536	3.3379	0.0090	0.0083	0.0007	--------
19.75	4.9626	3.3462	0.0090	0.0083	0.0007	--------
19.83	4.9716	3.3546	0.0090	0.0083	0.0007	--------
19.92	4.9806	3.3629	0.0090	0.0083	0.0007	--------
20.00	4.9896	3.3712	0.0090	0.0083	0.0007	--------
20.08	4.9995	3.3804	0.0099	0.0092	0.0007	--------
20.17	5.0094	3.3895	0.0099	0.0092	0.0007	--------
20.25	5.0193	3.3987	0.0099	0.0092	0.0007	--------
20.33	5.0292	3.4079	0.0099	0.0092	0.0007	--------
20.42	5.0391	3.4170	0.0099	0.0092	0.0007	--------
20.50	5.0490	3.4262	0.0099	0.0092	0.0007	--------
20.58	5.0580	3.4346	0.0090	0.0083	0.0007	--------
20.67	5.0670	3.4429	0.0090	0.0083	0.0007	--------
20.75	5.0760	3.4512	0.0090	0.0083	0.0007	--------
20.83	5.0850	3.4596	0.0090	0.0083	0.0007	--------
20.92	5.0940	3.4679	0.0090	0.0083	0.0007	--------
21.00	5.1030	3.4763	0.0090	0.0083	0.0007	--------
21.08	5.1111	3.4838	0.0081	0.0075	0.0006	--------
21.17	5.1192	3.4913	0.0081	0.0075	0.0006	--------
21.25	5.1273	3.4988	0.0081	0.0075	0.0006	--------
21.33	5.1354	3.5064	0.0081	0.0075	0.0006	--------
21.42	5.1435	3.5139	0.0081	0.0075	0.0006	--------
21.50	5.1516	3.5214	0.0081	0.0075	0.0006	--------

21.58	5.1597	3.5289	0.0081	0.0075	0.0006	--------
21.67	5.1678	3.5365	0.0081	0.0075	0.0006	--------
21.75	5.1759	3.5440	0.0081	0.0075	0.0006	--------
21.83	5.1840	3.5515	0.0081	0.0075	0.0006	--------
21.92	5.1921	3.5590	0.0081	0.0075	0.0006	--------
22.00	5.2002	3.5666	0.0081	0.0075	0.0006	--------
22.08	5.2083	3.5741	0.0081	0.0075	0.0006	--------
22.17	5.2164	3.5816	0.0081	0.0075	0.0006	--------
22.25	5.2245	3.5892	0.0081	0.0075	0.0006	--------
22.33	5.2326	3.5967	0.0081	0.0075	0.0006	--------
22.42	5.2407	3.6042	0.0081	0.0075	0.0006	--------
22.50	5.2488	3.6118	0.0081	0.0075	0.0006	--------
22.58	5.2569	3.6193	0.0081	0.0075	0.0006	--------
22.67	5.2650	3.6269	0.0081	0.0075	0.0006	--------
22.75	5.2731	3.6344	0.0081	0.0075	0.0006	--------
22.83	5.2812	3.6420	0.0081	0.0075	0.0006	--------
22.92	5.2893	3.6495	0.0081	0.0075	0.0006	--------
23.00	5.2974	3.6571	0.0081	0.0075	0.0006	--------
23.08	5.3064	3.6654	0.0090	0.0084	0.0006	--------
23.17	5.3154	3.6738	0.0090	0.0084	0.0006	--------
23.25	5.3244	3.6822	0.0090	0.0084	0.0006	--------
23.33	5.3334	3.6906	0.0090	0.0084	0.0006	--------
23.42	5.3424	3.6990	0.0090	0.0084	0.0006	--------
23.50	5.3514	3.7074	0.0090	0.0084	0.0006	--------
23.58	5.3595	3.7150	0.0081	0.0076	0.0005	--------
23.67	5.3676	3.7225	0.0081	0.0076	0.0005	--------
23.75	5.3757	3.7301	0.0081	0.0076	0.0005	--------
23.83	5.3838	3.7376	0.0081	0.0076	0.0005	--------
23.92	5.3919	3.7452	0.0081	0.0076	0.0005	--------
24.00	5.4000	3.7528	0.0081	0.0076	0.0005	--------

Total soil rain loss = 1.65(In)
Total effective runoff = 3.75(In)

Peak flow rate this hydrograph = 597.93(CFS)
Total runoff volume this hydrograph = 9998969.3(Ft3)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	150.0	300.0	450.0	600.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				

1+25	0.0000	0.00	Q	|	|	|	|
1+30	0.0000	0.00	Q	|	|	|	|
1+35	0.0000	0.00	Q	|	|	|	|
1+40	0.0000	0.00	Q	|	|	|	|
1+45	0.0000	0.00	Q	|	|	|	|
1+50	0.0000	0.00	Q	|	|	|	|
1+55	0.0000	0.00	Q	|	|	|	|
2+ 0	0.0000	0.00	Q	|	|	|	|
2+ 5	0.0000	0.00	Q	|	|	|	|
2+10	0.0000	0.00	Q	|	|	|	|
2+15	0.0000	0.00	Q	|	|	|	|
2+20	0.0000	0.00	Q	|	|	|	|
2+25	0.0000	0.00	Q	|	|	|	|
2+30	0.0000	0.00	Q	|	|	|	|
2+35	0.0000	0.00	Q	|	|	|	|
2+40	0.0000	0.00	Q	|	|	|	|
2+45	0.0000	0.00	Q	|	|	|	|
2+50	0.0000	0.00	Q	|	|	|	|
2+55	0.0000	0.00	Q	|	|	|	|
3+ 0	0.0000	0.00	Q	|	|	|	|
3+ 5	0.0000	0.00	Q	|	|	|	|
3+10	0.0000	0.00	Q	|	|	|	|
3+15	0.0000	0.00	Q	|	|	|	|
3+20	0.0000	0.00	Q	|	|	|	|
3+25	0.0000	0.00	Q	|	|	|	|
3+30	0.0000	0.00	Q	|	|	|	|
3+35	0.0000	0.00	Q	|	|	|	|
3+40	0.0002	0.02	Q	|	|	|	|
3+45	0.0009	0.10	Q	|	|	|	|
3+50	0.0032	0.34	Q	|	|	|	|
3+55	0.0088	0.82	Q	|	|	|	|
4+ 0	0.0192	1.50	Q	|	|	|	|
4+ 5	0.0352	2.32	Q	|	|	|	|
4+10	0.0575	3.24	Q	|	|	|	|
4+15	0.0867	4.24	Q	|	|	|	|
4+20	0.1236	5.37	Q	|	|	|	|
4+25	0.1689	6.58	Q	|	|	|	|
4+30	0.2226	7.79	Q	|	|	|	|
4+35	0.2846	9.00	Q	|	|	|	|
4+40	0.3550	10.22	Q	|	|	|	|
4+45	0.4341	11.49	Q	|	|	|	|
4+50	0.5228	12.88	Q	|	|	|	|
4+55	0.6215	14.33	Q	|	|	|	|
5+ 0	0.7299	15.73	VQ	|	|	|	|
5+ 5	0.8475	17.08	VQ	|	|	|	|
5+10	0.9745	18.44	VQ	|	|	|	|
5+15	1.1117	19.93	VQ	|	|	|	|
5+20	1.2617	21.79	VQ	|	|	|	|
5+25	1.4260	23.84	VQ	|	|	|	|
5+30	1.6031	25.73	VQ	|	|	|	|
5+35	1.7922	27.45	VQ	|	|	|	|
5+40	1.9927	29.11	VQ	|	|	|	|
5+45	2.2048	30.79	V Q	|	|	|	|
5+50	2.4298	32.68	V Q	|	|	|	|
5+55	2.6684	34.65	V Q	|	|	|	|
6+ 0	2.9195	36.46	V Q	|	|	|	|
6+ 5	3.1823	38.16	V Q	|	|	|	|
6+10	3.4571	39.90	V Q	|	|	|	|
6+15	3.7459	41.94	V Q	|	|	|	|
6+20	4.0549	44.87	V Q	|	|	|	|
6+25	4.3871	48.23	V Q	|	|	|	|
6+30	4.7392	51.12	V Q	|	|	|	|
6+35	5.1085	53.63	V Q	|	|	|	|

6+40	5.4944	56.04	V Q
6+45	5.8988	58.72	V Q
6+50	6.3284	62.38	V Q
6+55	6.7863	66.48	V Q
7+ 0	7.2683	69.98	V Q
7+ 5	7.7712	73.03	V Q
7+10	8.2957	76.15	V Q
7+15	8.8483	80.25	V Q
7+20	9.4485	87.14	V Q
7+25	10.1053	95.38	V Q
7+30	10.8083	102.07	V Q
7+35	11.5495	107.62	V Q
7+40	12.3303	113.36	V Q
7+45	13.1674	121.55	V Q
7+50	14.1085	136.65	V Q
7+55	15.1763	155.05	V Q
8+ 0	16.3449	169.68	V Q
8+ 5	17.5936	181.30	V Q
8+10	18.9201	192.61	V Q
8+15	20.3500	207.62	V Q
8+20	21.9613	233.97	V Q
8+25	23.7907	265.62	V Q
8+30	25.7925	290.67	V Q
8+35	27.9284	310.14	V Q
8+40	30.1866	327.88	V Q
8+45	32.5874	348.61	V Q
8+50	35.2102	380.82	V Q
8+55	38.0897	418.10	V Q
9+ 0	41.1719	447.54	V Q
9+ 5	44.4096	470.11	V Q
9+10	47.7786	489.18	V Q
9+15	51.2735	507.45	V Q
9+20	54.9164	528.96	V Q
9+25	58.7142	551.43	V Q
9+30	62.6372	569.62	V Q
9+35	66.6571	583.69	V Q
9+40	70.7474	593.90	V Q
9+45	74.8653	597.93	V Q
9+50	78.9291	590.06	V Q
9+55	82.8994	576.49	V Q
10+ 0	86.8098	567.78	V Q
10+ 5	90.6827	562.34	V Q
10+10	94.5040	554.86	V Q
10+15	98.1935	535.72	V Q
10+20	101.5409	486.04	V Q
10+25	104.4543	423.02	V Q
10+30	107.0580	378.06	V Q
10+35	109.4587	348.58	V Q
10+40	111.7074	326.51	V Q
10+45	113.8144	305.92	V Q
10+50	115.7333	278.63	Q V
10+55	117.4511	249.42	Q V
11+ 0	119.0257	228.63	Q V
11+ 5	120.5055	214.87	Q V
11+10	121.9175	205.02	Q V
11+15	123.2748	197.08	Q V
11+20	124.5725	188.43	Q V
11+25	125.8094	179.60	Q V
11+30	127.0033	173.35	Q V
11+35	128.1687	169.22	Q V
11+40	129.3134	166.21	Q V
11+45	130.4398	163.55	Q V
11+50	131.5424	160.09	Q V

11+55	132.6187	156.28	Q V
12+ 0	133.6766	153.61	Q V
12+ 5	134.7226	151.87	Q V
12+10	135.7597	150.59	Q V
12+15	136.7887	149.40	Q| V
12+20	137.8060	147.72	Q| V
12+25	138.8106	145.86	Q| V
12+30	139.8062	144.56	Q| V
12+35	140.7960	143.73	Q| V
12+40	141.7813	143.07	Q| V
12+45	142.7612	142.28	Q| V
12+50	143.7313	140.86	Q| V
12+55	144.6898	139.17	Q| V
13+ 0	145.6402	137.99	Q| V
13+ 5	146.5851	137.20	Q| V
13+10	147.5247	136.44	Q| V
13+15	148.4559	135.20	Q| V
13+20	149.3684	132.49	Q | V
13+25	150.2580	129.17	Q | V
13+30	151.1313	126.81	Q | V
13+35	151.9940	125.26	Q | V
13+40	152.8486	124.09	Q | V
13+45	153.6950	122.91	Q | V
13+50	154.5294	121.15	Q | V
13+55	155.3503	119.20	Q | V
14+ 0	156.1618	117.82	Q | V
14+ 5	156.9675	116.99	Q | V
14+10	157.7711	116.68	Q | V
14+15	158.5785	117.24	Q | V
14+20	159.4020	119.56	Q | V
14+25	160.2468	122.67	Q | V
14+30	161.1071	124.92	Q | V
14+35	161.9761	126.18	Q | V
14+40	162.8450	126.16	Q | V
14+45	163.6934	123.19	Q | V
14+50	164.4758	113.61	Q | V
14+55	165.1719	101.07	Q | V
15+ 0	165.8061	92.09	Q | V
15+ 5	166.4013	86.42	Q | V
15+10	166.9739	83.14	Q | V|
15+15	167.5455	83.00	Q | V|
15+20	168.1545	88.44	Q | V|
15+25	168.8197	96.59	Q | V|
15+30	169.5254	102.46	Q | V|
15+35	170.2570	106.24	Q | V|
15+40	171.0066	108.84	Q | V|
15+45	171.7674	110.47	Q | V|
15+50	172.5313	110.91	Q | V
15+55	173.2929	110.59	Q | V
16+ 0	174.0529	110.35	Q | V
16+ 5	174.8120	110.22	Q | V
16+10	175.5695	109.99	Q | V
16+15	176.3228	109.38	Q | V
16+20	177.0658	107.88	Q | V
16+25	177.7964	106.08	Q | V
16+30	178.5182	104.80	Q | |V
16+35	179.2345	104.01	Q | |V
16+40	179.9479	103.59	Q | |V
16+45	180.6620	103.69	Q | |V
16+50	181.3833	104.73	Q | |V
16+55	182.1147	106.20	Q | |V
17+ 0	182.8535	107.27	Q | |V
17+ 5	183.5966	107.90	Q | |V

17+10	184.3404	108.00	Q		V	
17+15	185.0771	106.96	Q		V	
17+20	185.7893	103.41	Q		V	
17+25	186.4692	98.72	Q		V	
17+30	187.1259	95.36	Q		V	
17+35	187.7679	93.22	Q		V	
17+40	188.4004	91.83	Q		V	
17+45	189.0285	91.20	Q		V	
17+50	189.6598	91.67	Q		V	
17+55	190.2984	92.72	Q		V	
18+ 0	190.9422	93.48	Q		V	
18+ 5	191.5888	93.89	Q		V	
18+10	192.2352	93.85	Q		V	
18+15	192.8738	92.72	Q		V	
18+20	193.4876	89.13	Q		V	
18+25	194.0690	84.41	Q		V	
18+30	194.6271	81.03	Q		V	
18+35	195.1700	78.84	Q		V	
18+40	195.7023	77.29	Q		V	
18+45	196.2270	76.17	Q		V	
18+50	196.7458	75.33	Q		V	
18+55	197.2603	74.71	Q		V	
19+ 0	197.7719	74.28	Q		V	
19+ 5	198.2813	73.96	Q		V	
19+10	198.7884	73.64	Q		V	
19+15	199.2917	73.07	Q		V	
19+20	199.7860	71.77	Q		V	
19+25	200.2690	70.13	Q		V	
19+30	200.7439	68.96	Q		V	
19+35	201.2138	68.23	Q		V	
19+40	201.6810	67.84	Q		V	
19+45	202.1489	67.94	Q		V	
19+50	202.6239	68.97	Q		V	
19+55	203.1090	70.43	Q		V	
20+ 0	203.6014	71.49	Q		V	
20+ 5	204.0987	72.21	Q		V	
20+10	204.6004	72.84	Q		V	
20+15	205.1080	73.70	Q		V	
20+20	205.6266	75.31	Q		V	
20+25	206.1583	77.21	Q		V	
20+30	206.6994	78.57	Q		V	
20+35	207.2465	79.44	Q		V	
20+40	207.7970	79.93	Q		V	
20+45	208.3472	79.89	Q		V	
20+50	208.8906	78.90	Q		V	
20+55	209.4241	77.47	Q		V	
21+ 0	209.9506	76.44	Q		V	
21+ 5	210.4723	75.76	Q		V	
21+10	210.9899	75.15	Q		V	
21+15	211.5018	74.32	Q		V	
21+20	212.0028	72.74	Q		V	
21+25	212.4909	70.88	Q		V	
21+30	212.9699	69.55	Q		V	
21+35	213.4429	68.68	Q		V	
21+40	213.9117	68.08	Q		V	
21+45	214.3777	67.66	Q		V	
21+50	214.8417	67.38	Q		V	
21+55	215.3043	67.17	Q		V	
22+ 0	215.7660	67.04	Q		V	
22+ 5	216.2271	66.94	Q		V	
22+10	216.6877	66.89	Q		V	
22+15	217.1483	66.87	Q		V	
22+20	217.6088	66.88	Q		V	

22+25	218.0695	66.89		Q			V
22+30	218.5303	66.90		Q			V
22+35	218.9911	66.91		Q			V
22+40	219.4520	66.93		Q			V
22+45	219.9130	66.94		Q			V
22+50	220.3741	66.95		Q			V
22+55	220.8353	66.96		Q			V
23+ 0	221.2965	66.97		Q			V
23+ 5	221.7580	67.01		Q			V
23+10	222.2206	67.17		Q			V
23+15	222.6867	67.67		Q			V
23+20	223.1618	68.99		Q			V
23+25	223.6486	70.68		Q			V
23+30	224.1438	71.90		Q			V
23+35	224.6442	72.66		Q			V
23+40	225.1476	73.09		Q			V
23+45	225.6504	73.01		Q			V
23+50	226.1463	72.00		Q			V
23+55	226.6322	70.55		Q			V
24+ 0	227.1109	69.51		Q			V
24+ 5	227.5833	68.59		Q			V
24+10	228.0436	66.83		Q			V
24+15	228.4712	62.09		Q			V
24+20	228.8153	49.96		Q			V
24+25	229.0538	34.64		Q			V
24+30	229.2168	23.67		Q			V
24+35	229.3305	16.51		Q			V
24+40	229.4095	11.48		Q			V
24+45	229.4637	7.86		Q			V
24+50	229.4996	5.22		Q			V
24+55	229.5222	3.28		Q			V
25+ 0	229.5353	1.90		Q			V
25+ 5	229.5420	0.96		Q			V
25+10	229.5444	0.36		Q			V
25+15	229.5447	0.05		Q			V

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 09/10/10

Tule Wind Project
System 1200
Proposed Conditions 100 Year

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.000
24 hour precipitation(inches) = 5.050
P6/P24 = 59.4%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 1200.100 to Point/Station 1200.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 307.190(Ft.)
Highest elevation = 4047.500(Ft.)
Lowest elevation = 4025.000(Ft.)
Elevation difference = 22.500(Ft.) Slope = 7.324 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 7.32 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 7.23 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(100.000^.5)/(7.324^(1/3)]= 7.23
Rainfall intensity (I) = 6.231(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 1.248(CFS)
Total initial stream area = 0.626(Ac.)

++
Process from Point/Station 1200.200 to Point/Station 1200.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 4025.000(Ft.)
Downstream point elevation = 3840.000(Ft.)
Channel length thru subarea = 1873.920(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 11.382(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 11.382(CFS)
Depth of flow = 0.243(Ft.), Average velocity = 4.277(Ft/s)
Channel flow top width = 11.941(Ft.)
Flow Velocity = 4.28(Ft/s)
Travel time = 7.30 min.
Time of concentration = 14.53 min.
Critical depth = 0.328(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.590
Decimal fraction soil group C = 0.410
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.336
Rainfall intensity = 3.972(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.336 CA = 5.397
Subarea runoff = 20.186(CFS) for 15.447(Ac.)
Total runoff = 21.434(CFS) Total area = 16.073(Ac.)
Depth of flow = 0.351(Ft.), Average velocity = 5.353(Ft/s)
Critical depth = 0.488(Ft.)

++
Process from Point/Station 1200.300 to Point/Station 1200.400
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3840.000(Ft.)
Downstream point elevation = 3606.000(Ft.)
Channel length thru subarea = 2095.450(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 65.976(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 65.976(CFS)
Depth of flow = 0.645(Ft.), Average velocity = 8.128(Ft/s)
Channel flow top width = 15.161(Ft.)
Flow Velocity = 8.13(Ft/s)
Travel time = 4.30 min.
Time of concentration = 18.83 min.
Critical depth = 0.969(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.190
Decimal fraction soil group C = 0.810
Decimal fraction soil group D = 0.000

```
[LOW DENSITY RESIDENTIAL                        ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.352
Rainfall intensity =      3.361(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.350  CA =     32.863
Subarea runoff =     89.007(CFS) for     77.940(Ac.)
Total runoff =    110.442(CFS)  Total area =      94.013(Ac.)
Depth of flow =   0.860(Ft.), Average velocity =   9.562(Ft/s)
Critical depth =      1.297(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1200.400 to Point/Station     1200.800
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------------
Upstream point elevation =  3606.000(Ft.)
Downstream point elevation =  3200.000(Ft.)
Channel length thru subarea  =  3996.967(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =    164.331(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =    164.331(CFS)
Depth of flow =   1.095(Ft.), Average velocity =  10.436(Ft/s)
Channel flow top width =   18.760(Ft.)
Flow Velocity =   10.44(Ft/s)
Travel time  =    6.38 min.
Time of concentration =   25.21 min.
Critical depth =      1.625(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.130
Decimal fraction soil group B = 0.030
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.840
[LOW DENSITY RESIDENTIAL                        ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.389
Rainfall intensity =      2.784(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.371  CA =     78.360
Subarea runoff =    107.705(CFS) for    116.930(Ac.)
Total runoff =    218.146(CFS)  Total area =     210.943(Ac.)
Depth of flow =   1.274(Ft.), Average velocity =  11.344(Ft/s)
Critical depth =      1.906(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station     1200.400 to Point/Station     1200.800
**** CONFLUENCE OF MINOR STREAMS ****
------------------------------------------------------------------------------
Along Main Stream number: 1 in normal stream number 1
Stream flow area =    210.943(Ac.)
Runoff from this stream =    218.146(CFS)
Time of concentration =   25.21 min.
Rainfall intensity =     2.784(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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Process from Point/Station 1200.500 to Point/Station 1200.600
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 203.190(Ft.)
Highest elevation = 3965.000(Ft.)
Lowest elevation = 3935.000(Ft.)
Elevation difference = 30.000(Ft.) Slope = 14.765 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 14.77 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 5.72 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(100.000^.5)/(14.765^(1/3)]= 5.72
Rainfall intensity (I) = 7.245(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 1.451(CFS)
Total initial stream area = 0.626(Ac.)

++
Process from Point/Station 1200.600 to Point/Station 1200.700
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3935.000(Ft.)
Downstream point elevation = 3730.000(Ft.)
Channel length thru subarea = 2829.617(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 42.307(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 42.307(CFS)
Depth of flow = 0.567(Ft.), Average velocity = 6.080(Ft/s)
Channel flow top width = 14.537(Ft.)
Flow Velocity = 6.08(Ft/s)
Travel time = 7.76 min.
Time of concentration = 13.48 min.
Critical depth = 0.742(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.290
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.710
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.384
Rainfall intensity = 4.169(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.383 CA = 19.924
Subarea runoff = 81.616(CFS) for 51.378(Ac.)
Total runoff = 83.068(CFS) Total area = 52.004(Ac.)

Depth of flow = 0.828(Ft.), Average velocity = 7.540(Ft/s)
Critical depth = 1.109(Ft.)

++
Process from Point/Station 1200.700 to Point/Station 1200.800
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3730.000(Ft.)
Downstream point elevation = 3200.000(Ft.)
Channel length thru subarea = 3560.760(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 228.996(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 228.996(CFS)
Depth of flow = 1.181(Ft.), Average velocity = 13.171(Ft/s)
Channel flow top width = 19.447(Ft.)
Flow Velocity = 13.17(Ft/s)
Travel time = 4.51 min.
Time of concentration = 17.99 min.
Critical depth = 1.953(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.052
Decimal fraction soil group B = 0.084
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.864
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.395
Rainfall intensity = 3.462(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.393 CA = 108.287
Subarea runoff = 291.768(CFS) for 223.612(Ac.)
Total runoff = 374.835(CFS) Total area = 275.616(Ac.)
Depth of flow = 1.531(Ft.), Average velocity = 15.189(Ft/s)
Critical depth = 2.531(Ft.)

++
Process from Point/Station 1200.700 to Point/Station 1200.800
**** CONFLUENCE OF MINOR STREAMS ****

Along Main Stream number: 1 in normal stream number 2
Stream flow area = 275.616(Ac.)
Runoff from this stream = 374.835(CFS)
Time of concentration = 17.99 min.
Rainfall intensity = 3.462(In/Hr)
Summary of stream data:

Stream No.	Flow rate (CFS)	TC (min)	Rainfall Intensity (In/Hr)
1	218.146	25.21	2.784
2	374.835	17.99	3.462

Qmax(1) =
1.000 * 1.000 * 218.146) +
0.804 * 1.000 * 374.835) + = 519.605
Qmax(2) =

```
          1.000 *    0.713 *   218.146) +
          1.000 *    1.000 *   374.835) + =     530.454

Total of 2 streams to confluence:
Flow rates before confluence point:
     218.146     374.835
Maximum flow rates at confluence using above data:
      519.605      530.454
Area of streams before confluence:
      210.943      275.616
Results of confluence:
Total flow rate =    530.454(CFS)
Time of concentration =    17.986 min.
Effective stream area after confluence =    486.559(Ac.)
End of computations, total study area =         486.559 (Ac.)
```

APPENDIX D
Proposed Conditions Hydrology Summary

Project: Tule Wind
Subject: Drainage Report
Task: 21
Job#: 115965

Proposed Conditions, Unit Hydrograph

Watershed Loss

Watershed	A (mi^2)	A (ac)	CN (AMC II)	PZN	PZN (>35yr)	CN (>35yr)	Soil Type
Tule Creek	28.52	18250	74	3.42	2.58	82	2.1
Eastern Unnamed Wash	1.15	734	80	3.55	2.45	85	2.7

Watershed Lag

Watershed	Elev US (ft)	Elev DS (ft)	L (mi)	Lca (mi)	Slope (ft/mi)	Basin n	m	lag (hr)
Tule Creek	5802.5	3473	12.13	5.14	192	0.040	0.38	1.70
Eastern Unnamed Wash	4125	3620	1.91	0.74	265	0.040	0.38	0.38

$$lag = 24n\left(\frac{L \bullet L_{ca}}{S^{0.5}}\right)^{m}$$

Subwatershed Rainfall, Inches (SDC Hydrology Manual)

Watershed	100Yr 6Hr	100Yr 24Hr
Tule Creek	3.36	6.31
Eastern Unnamed Wash	3.00	5.01

Proposed Permanent Impact Summary

Watershed	Basin Area (acres)	Perm Impacted Area	% Impacted	Turbines	O&M	Substation	Total Impervious Area (sq ft)	Total Impervious Area (acres)	% Impervious
Tule Creek	18250.10	50.82	0.28%	6	3	1	21155	0.485651042	0.003%
Eastern Unnamed Wash	734.43	20.52	2.79%	5			1796	0.041225884	0.006%
1200	485.64	6.12	1.26%	2			718	0.016490354	0.003%
Totals	19470.17	77.46		13			23669	0.54336728	0.701%
									0.0028%

Project: Tule Wind
Subject: Drainage Report
Task: 21
Job#: 115965

Unit Hydrograph Basin Rainfall

100 Yr 6 Hour

FID	Watershed	Rainfall	Acres	Acres*Rainfall	Area Averaged Rainfall (in)
	Tule Creek	4	1518.463274	6074	
		3	6758.893749	20277	
		3.5	9972.741476	34905	
		Totals	18250.0985	61255	3.356427337
	Unnamed Eastern Wash	3	734.4312233	2203	
		Totals	734.4312233	2203	3

100 Yr 24 Hour

FID	Watershed	Rainfall	Acres	Acres*Rainfall	Area Averaged Rainfall (in)
	Tule Creek	10	309.1901693	3092	
		5	3912.209291	19561	
		8	4163.427072	33307	
		6	9865.271967	59192	
		Totals	18250.0985	115152	6.309664385
	Unnamed Eastern Wash	6	6.787032388	41	
		5	727.6441909	3638	
		Totals	734.4312233	3679	5.009241209

Project: Tule Wind
Subject: Drainage Report
Task: 21
Job#: 115965

Unit Hydrograph Basin Rainfall

100 Yr 6 Hour

FID	Watershed	Rainfall	Acres	Acres*Rainfall	Area Averaged Rainfall (in)
	Tule Creek	4	1518.463274	6074	
		3	6758.893749	20277	
		3.5	9972.741476	34905	
		Totals	18250.0985	61255	3.356427337
	Unnamed Eastern Wash	3	734.4312233	2203	
		Totals	734.4312233	2203	3

100 Yr 24 Hour

FID	Watershed	Rainfall	Acres	Acres*Rainfall	Area Averaged Rainfall (in)
	Tule Creek	10	309.1901693	3092	
		5	3912.209291	19561	
		8	4163.427072	33307	
		6	9865.271967	59192	
		Totals	18250.0985	115152	6.309664385
	Unnamed Eastern Wash	6	6.787032388	41	
		5	727.6441909	3638	
		Totals	734.4312233	3679	5.009241209

Project: Tule Wind
Subject: Drainage Report
Task: 21
Job#: 115965

Tule Creek Proposed Curve Number

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
	18250							73.86	1347895	2.07
Tule Creek	0.043088	1000	Spaced Rural Residential				A	50	2.15	1
Tule Creek	0.104102	1000	Spaced Rural Residential				A	50	5.21	1
Tule Creek	0.146983	1000	Spaced Rural Residential				A	50	7.35	1
Tule Creek	0.18566	1000	Spaced Rural Residential				A	50	9.28	1
Tule Creek	0.307448	1000	Spaced Rural Residential				A	50	15.37	1
Tule Creek	2.45739	1000	Spaced Rural Residential				A	50	122.87	1
Tule Creek	2.572043	1000	Spaced Rural Residential				A	50	128.60	1
Tule Creek	6.713096	1000	Spaced Rural Residential				A	50	335.65	1
Tule Creek	7.452114	1000	Spaced Rural Residential				A	50	372.61	1
Tule Creek	9.67432	1000	Spaced Rural Residential				A	50	483.72	1
Tule Creek	9.816206	1000	Spaced Rural Residential				A	50	490.81	1
Tule Creek	9.917752	1000	Spaced Rural Residential				A	50	495.89	1
Tule Creek	10.17541	1000	Spaced Rural Residential				A	50	508.77	1
Tule Creek	12.2153	1000	Spaced Rural Residential				A	50	610.77	1
Tule Creek	12.68086	1000	Spaced Rural Residential				A	50	634.04	1
Tule Creek	13.63845	1000	Spaced Rural Residential				A	50	681.92	1
Tule Creek	14.4015	1000	Spaced Rural Residential				A	50	720.08	1
Tule Creek	18.1944	1000	Spaced Rural Residential				A	50	909.72	1
Tule Creek	21.37183	1000	Spaced Rural Residential				A	50	1068.59	1
Tule Creek	25.76366	1000	Spaced Rural Residential				A	50	1288.18	1
Tule Creek	25.91156	1000	Spaced Rural Residential				A	50	1295.58	1
Tule Creek	27.33742	1000	Spaced Rural Residential				A	50	1366.87	1
Tule Creek	27.62886	1000	Spaced Rural Residential				A	50	1381.44	1
Tule Creek	29.31003	1000	Spaced Rural Residential				A	50	1465.50	1
Tule Creek	32.76803	1000	Spaced Rural Residential				A	50	1638.40	1
Tule Creek	42.71826	1000	Spaced Rural Residential				A	50	2135.91	1
Tule Creek	74.33333	1000	Spaced Rural Residential				A	50	3716.67	1
Tule Creek	78.14983	1000	Spaced Rural Residential				A	50	3907.49	1
Tule Creek	80.58518	1000	Spaced Rural Residential				A	50	4029.26	1
Tule Creek	173.7482	1000	Spaced Rural Residential				A	50	8687.41	1
Tule Creek	0.047511	1000	Spaced Rural Residential				B	69	3.28	2
Tule Creek	0.339073	1000	Spaced Rural Residential				B	69	23.40	2
Tule Creek	0.610479	1000	Spaced Rural Residential				B	69	42.12	2
Tule Creek	0.835743	1000	Spaced Rural Residential				B	69	57.67	2
Tule Creek	1.027563	1000	Spaced Rural Residential				B	69	70.90	2
Tule Creek	1.227552	1000	Spaced Rural Residential				B	69	84.70	2
Tule Creek	1.281048	1000	Spaced Rural Residential				B	69	88.39	2
Tule Creek	1.401359	1000	Spaced Rural Residential				B	69	96.69	2
Tule Creek	1.597418	1000	Spaced Rural Residential				B	69	110.22	2
Tule Creek	2.849452	1000	Spaced Rural Residential				B	69	196.61	2
Tule Creek	3.069729	1000	Spaced Rural Residential				B	69	211.81	2
Tule Creek	3.533041	1000	Spaced Rural Residential				B	69	243.78	2
Tule Creek	6.474168	1000	Spaced Rural Residential				B	69	446.72	2
Tule Creek	6.623204	1000	Spaced Rural Residential				B	69	457.00	2
Tule Creek	7.091565	1000	Spaced Rural Residential				B	69	489.32	2
Tule Creek	7.221005	1000	Spaced Rural Residential				B	69	498.25	2
Tule Creek	7.371222	1000	Spaced Rural Residential				B	69	508.61	2
Tule Creek	7.378903	1000	Spaced Rural Residential				B	69	509.14	2
Tule Creek	7.827621	1000	Spaced Rural Residential				B	69	540.11	2
Tule Creek	11.46181	1000	Spaced Rural Residential				B	69	790.87	2
Tule Creek	13.53061	1000	Spaced Rural Residential				B	69	933.61	2
Tule Creek	15.11635	1000	Spaced Rural Residential				B	69	1043.03	2
Tule Creek	15.13929	1000	Spaced Rural Residential				B	69	1044.61	2
Tule Creek	15.82326	1000	Spaced Rural Residential				B	69	1091.81	2
Tule Creek	16.62028	1000	Spaced Rural Residential				B	69	1146.80	2
Tule Creek	18.05196	1000	Spaced Rural Residential				B	69	1245.58	2
Tule Creek	18.08603	1000	Spaced Rural Residential				B	69	1247.94	2
Tule Creek	19.03283	1000	Spaced Rural Residential				B	69	1313.27	2

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	19.54646	1000	Spaced Rural Residential				B	69	1348.71	2
Tule Creek	20.07256	1000	Spaced Rural Residential				B	69	1385.01	2
Tule Creek	21.90675	1000	Spaced Rural Residential				B	69	1511.57	2
Tule Creek	22.15042	1000	Spaced Rural Residential				B	69	1528.38	2
Tule Creek	23.22073	1000	Spaced Rural Residential				B	69	1602.23	2
Tule Creek	26.59746	1000	Spaced Rural Residential				B	69	1835.22	2
Tule Creek	28.42616	1000	Spaced Rural Residential				B	69	1961.41	2
Tule Creek	31.39665	1000	Spaced Rural Residential				B	69	2166.37	2
Tule Creek	35.05085	1000	Spaced Rural Residential				B	69	2418.51	2
Tule Creek	36.19485	1000	Spaced Rural Residential				B	69	2497.44	2
Tule Creek	37.09682	1000	Spaced Rural Residential				B	69	2559.68	2
Tule Creek	42.55808	1000	Spaced Rural Residential				B	69	2936.51	2
Tule Creek	42.91708	1000	Spaced Rural Residential				B	69	2961.28	2
Tule Creek	45.79757	1000	Spaced Rural Residential				B	69	3160.03	2
Tule Creek	55.14837	1000	Spaced Rural Residential				B	69	3805.24	2
Tule Creek	56.61085	1000	Spaced Rural Residential				B	69	3906.15	2
Tule Creek	58.19453	1000	Spaced Rural Residential				B	69	4015.42	2
Tule Creek	58.66377	1000	Spaced Rural Residential				B	69	4047.80	2
Tule Creek	60.20803	1000	Spaced Rural Residential				B	69	4154.35	2
Tule Creek	75.67494	1000	Spaced Rural Residential				B	69	5221.57	2
Tule Creek	122.2435	1000	Spaced Rural Residential				B	69	8434.80	2
Tule Creek	266.9316	1000	Spaced Rural Residential				B	69	18418.28	2
Tule Creek	270.7531	1000	Spaced Rural Residential				B	69	18681.96	2
Tule Creek	277.8597	1000	Spaced Rural Residential				B	69	19172.32	2
Tule Creek	398.6731	1000	Spaced Rural Residential				B	69	27508.44	2
Tule Creek	428.184	1000	Spaced Rural Residential				B	69	29544.70	2
Tule Creek	474.5826	1000	Spaced Rural Residential				B	69	32746.20	2
Tule Creek	0.001115	1000	Spaced Rural Residential				C	79	0.09	3
Tule Creek	0.171429	1000	Spaced Rural Residential				C	79	13.54	3
Tule Creek	0.349768	1000	Spaced Rural Residential				C	79	27.63	3
Tule Creek	3.91536	1000	Spaced Rural Residential				C	79	309.31	3
Tule Creek	13.95372	1000	Spaced Rural Residential				C	79	1102.34	3
Tule Creek	15.43697	1000	Spaced Rural Residential				C	79	1219.52	3
Tule Creek	23.14885	1000	Spaced Rural Residential				C	79	1828.76	3
Tule Creek	27.3161	1000	Spaced Rural Residential				C	79	2157.97	3
Tule Creek	41.93775	1000	Spaced Rural Residential				C	79	3313.08	3
Tule Creek	0.026043	1000	Spaced Rural Residential				D	84	2.19	4
Tule Creek	0.365483	1000	Spaced Rural Residential				D	84	30.70	4
Tule Creek	0.648487	1000	Spaced Rural Residential				D	84	54.47	4
Tule Creek	1.019984	1000	Spaced Rural Residential				D	84	85.68	4
Tule Creek	1.485547	1000	Spaced Rural Residential				D	84	124.79	4
Tule Creek	4.928847	1000	Spaced Rural Residential				D	84	414.02	4
Tule Creek	8.173902	1000	Spaced Rural Residential				D	84	686.61	4
Tule Creek	9.08764	1000	Spaced Rural Residential				D	84	763.36	4
Tule Creek	10.91547	1000	Spaced Rural Residential				D	84	916.90	4
Tule Creek	15.42996	1000	Spaced Rural Residential				D	84	1296.12	4
Tule Creek	15.71257	1000	Spaced Rural Residential				D	84	1319.86	4
Tule Creek	15.79647	1000	Spaced Rural Residential				D	84	1326.90	4
Tule Creek	16.80266	1000	Spaced Rural Residential				D	84	1411.42	4
Tule Creek	25.60615	1000	Spaced Rural Residential				D	84	2150.92	4
Tule Creek	51.21879	1000	Spaced Rural Residential				D	84	4302.38	4
Tule Creek	83.55671	1000	Spaced Rural Residential				D	84	7018.76	4
Tule Creek	0.967946	1190	Single Family Residential Without Units				A	54	52.27	1
Tule Creek	0.364026	1190	Single Family Residential Without Units				B	70	25.48	2
Tule Creek	0.567625	1190	Single Family Residential Without Units				B	70	39.73	2
Tule Creek	6.729983	1409	Other Group Quarters Facility				A	81	545.13	1
Tule Creek	74.69883	1409	Other Group Quarters Facility				B	88	6573.50	2
Tule Creek	7.775003	1409	Other Group Quarters Facility				C	91	707.53	3
Tule Creek	6.907187	4104	Airstrip				B	86	594.02	2
Tule Creek	0.068954	4112	Freeway				B	98	6.76	2
Tule Creek	5.864552	4112	Freeway				B	98	574.73	2
Tule Creek	31.025	4112	Freeway				B	98	3040.45	2
Tule Creek	31.09615	4112	Freeway				B	98	3047.42	2
Tule Creek	0.006861	4112	Freeway				D	98	0.67	4
Tule Creek	0.001148	4117	Impacts				A	72	0.08	1

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	0.002298	4117	Impacts				A	72	0.17	1
Tule Creek	0.206868	4117	Impacts				A	72	14.89	1
Tule Creek	0.212409	4117	Impacts				A	72	15.29	1
Tule Creek	0.329749	4117	Impacts				A	72	23.74	1
Tule Creek	0.367846	4117	Impacts				A	72	26.48	1
Tule Creek	0.624498	4117	Impacts				A	72	44.96	1
Tule Creek	0.793344	4117	Impacts				A	72	57.12	1
Tule Creek	1.850883	4117	Impacts				A	72	133.26	1
Tule Creek	5.040098	4117	Impacts				A	72	362.89	1
Tule Creek	6.875633	4117	Impacts				A	72	495.05	1
Tule Creek	0.000349	4117	Impacts				B	82	0.03	2
Tule Creek	0.001148	4117	Impacts				B	82	0.09	2
Tule Creek	0.001148	4117	Impacts				B	82	0.09	2
Tule Creek	0.005995	4117	Impacts				B	82	0.49	2
Tule Creek	0.259838	4117	Impacts				B	82	21.31	2
Tule Creek	0.281823	4117	Impacts				B	82	23.11	2
Tule Creek	0.352984	4117	Impacts				B	82	28.94	2
Tule Creek	0.436816	4117	Impacts				B	82	35.82	2
Tule Creek	0.443356	4117	Impacts				B	82	36.36	2
Tule Creek	1.352088	4117	Impacts				B	82	110.87	2
Tule Creek	2.147759	4117	Impacts				B	82	176.12	2
Tule Creek	2.179399	4117	Impacts				B	82	178.71	2
Tule Creek	2.758698	4117	Impacts				B	82	226.21	2
Tule Creek	2.997167	4117	Impacts				B	82	245.77	2
Tule Creek	4.307296	4117	Impacts				B	82	353.20	2
Tule Creek	4.620158	4117	Impacts				B	82	378.85	2
Tule Creek	6.801421	4117	Impacts				B	82	557.72	2
Tule Creek	21.10186	4117	Impacts				B	82	1730.35	2
Tule Creek	21.15543	4117	Impacts				B	82	1734.75	2
Tule Creek	39.43635	4117	Impacts				B	82	3233.78	2
Tule Creek	88.94534	4117	Impacts				B	82	7293.52	2
Tule Creek	2.712069	4117	Impacts				C	87	235.95	3
Tule Creek	0.020028	4117	Impacts				D	89	1.78	4
Tule Creek	0.082071	4117	Impacts				D	89	7.30	4
Tule Creek	0.098335	4117	Impacts				D	89	8.75	4
Tule Creek	0.3336	4117	Impacts				D	89	29.69	4
Tule Creek	0.970867	4117	Impacts				D	89	86.41	4
Tule Creek	6.219915	4117	Impacts				D	89	553.57	4
Tule Creek	12.84793	4117	Impacts				D	89	1143.47	4
Tule Creek	0.433045	4118	Road Right of Way				A	74	32.05	1
Tule Creek	0.557935	4118	Road Right of Way				A	74	41.29	1
Tule Creek	0.870485	4118	Road Right of Way				A	74	64.42	1
Tule Creek	1.282634	4118	Road Right of Way				A	74	94.91	1
Tule Creek	1.538811	4118	Road Right of Way				A	74	113.87	1
Tule Creek	3.343863	4118	Road Right of Way				A	74	247.45	1
Tule Creek	0.133175	4118	Road Right of Way				B	84	11.19	2
Tule Creek	0.258242	4118	Road Right of Way				B	84	21.69	2
Tule Creek	0.578129	4118	Road Right of Way				B	84	48.56	2
Tule Creek	2.195245	4118	Road Right of Way				B	84	184.40	2
Tule Creek	3.187266	4118	Road Right of Way				B	84	267.73	2
Tule Creek	3.307092	4118	Road Right of Way				B	84	277.80	2
Tule Creek	4.184623	4118	Road Right of Way				B	84	351.51	2
Tule Creek	9.665824	4118	Road Right of Way				B	84	811.93	2
Tule Creek	0.559069	4118	Road Right of Way				C	90	50.32	3
Tule Creek	1.49493	4118	Road Right of Way				C	90	134.54	3
Tule Creek	1.214105	4118	Road Right of Way				D	92	111.70	4
Tule Creek	0.145578	7603	Open Space Park or Preserve				A	62	9.03	1
Tule Creek	0.666159	7603	Open Space Park or Preserve				A	62	41.30	1
Tule Creek	0.670833	7603	Open Space Park or Preserve				A	62	41.59	1
Tule Creek	1.291557	7603	Open Space Park or Preserve				A	62	80.08	1
Tule Creek	2.450693	7603	Open Space Park or Preserve				A	62	151.94	1
Tule Creek	6.445348	7603	Open Space Park or Preserve				A	62	399.61	1
Tule Creek	6.492338	7603	Open Space Park or Preserve				A	62	402.52	1
Tule Creek	6.690075	7603	Open Space Park or Preserve				A	62	414.78	1
Tule Creek	7.609108	7603	Open Space Park or Preserve				A	62	471.76	1

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	10.61757	7603	Open Space Park or Preserve				A	62	658.29	1
Tule Creek	12.56999	7603	Open Space Park or Preserve				A	62	779.34	1
Tule Creek	15.49857	7603	Open Space Park or Preserve				A	62	960.91	1
Tule Creek	20.82638	7603	Open Space Park or Preserve				A	62	1291.24	1
Tule Creek	24.10463	7603	Open Space Park or Preserve				A	62	1494.49	1
Tule Creek	27.80123	7603	Open Space Park or Preserve				A	62	1723.68	1
Tule Creek	28.28145	7603	Open Space Park or Preserve				A	62	1753.45	1
Tule Creek	35.04884	7603	Open Space Park or Preserve				A	62	2173.03	1
Tule Creek	133.5828	7603	Open Space Park or Preserve				A	62	8282.13	1
Tule Creek	5.79E-06	7603	Open Space Park or Preserve				B	76	0.00	2
Tule Creek	0.001532	7603	Open Space Park or Preserve				B	76	0.12	2
Tule Creek	0.147796	7603	Open Space Park or Preserve				B	76	11.23	2
Tule Creek	0.161165	7603	Open Space Park or Preserve				B	76	12.25	2
Tule Creek	0.191822	7603	Open Space Park or Preserve				B	76	14.58	2
Tule Creek	1.063073	7603	Open Space Park or Preserve				B	76	80.79	2
Tule Creek	1.239796	7603	Open Space Park or Preserve				B	76	94.22	2
Tule Creek	2.221254	7603	Open Space Park or Preserve				B	76	168.82	2
Tule Creek	2.550184	7603	Open Space Park or Preserve				B	76	193.81	2
Tule Creek	2.719127	7603	Open Space Park or Preserve				B	76	206.65	2
Tule Creek	3.014238	7603	Open Space Park or Preserve				B	76	229.08	2
Tule Creek	6.068157	7603	Open Space Park or Preserve				B	76	461.18	2
Tule Creek	8.725289	7603	Open Space Park or Preserve				B	76	663.12	2
Tule Creek	8.948429	7603	Open Space Park or Preserve				B	76	680.08	2
Tule Creek	9.60439	7603	Open Space Park or Preserve				B	76	729.93	2
Tule Creek	10.74877	7603	Open Space Park or Preserve				B	76	816.91	2
Tule Creek	13.69377	7603	Open Space Park or Preserve				B	76	1040.73	2
Tule Creek	14.32418	7603	Open Space Park or Preserve				B	76	1088.64	2
Tule Creek	18.20713	7603	Open Space Park or Preserve				B	76	1383.74	2
Tule Creek	19.02761	7603	Open Space Park or Preserve				B	76	1446.10	2
Tule Creek	20.83353	7603	Open Space Park or Preserve				B	76	1583.35	2
Tule Creek	26.21576	7603	Open Space Park or Preserve				B	76	1992.40	2
Tule Creek	26.8469	7603	Open Space Park or Preserve				B	76	2040.36	2
Tule Creek	29.76741	7603	Open Space Park or Preserve				B	76	2262.32	2
Tule Creek	55.98659	7603	Open Space Park or Preserve				B	76	4254.98	2
Tule Creek	63.39889	7603	Open Space Park or Preserve				B	76	4818.32	2
Tule Creek	116.7971	7603	Open Space Park or Preserve				B	76	8876.58	2
Tule Creek	131.2913	7603	Open Space Park or Preserve				B	76	9978.14	2
Tule Creek	198.0989	7603	Open Space Park or Preserve				B	76	15055.52	2
Tule Creek	206.8661	7603	Open Space Park or Preserve				B	76	15721.83	2
Tule Creek	212.795	7603	Open Space Park or Preserve				B	76	16172.42	2
Tule Creek	440.3058	7603	Open Space Park or Preserve				B	76	33463.24	2
Tule Creek	491.6818	7603	Open Space Park or Preserve				B	76	37367.82	2
Tule Creek	561.9367	7603	Open Space Park or Preserve				B	76	42707.19	2
Tule Creek	1796.067	7603	Open Space Park or Preserve				B	76	136501.10	2
Tule Creek	0.323417	7603	Open Space Park or Preserve				C	84	27.17	3
Tule Creek	1.426928	7603	Open Space Park or Preserve				C	84	119.86	3
Tule Creek	27.97658	7603	Open Space Park or Preserve				C	84	2350.03	3
Tule Creek	56.1561	7603	Open Space Park or Preserve				C	84	4717.11	3
Tule Creek	0.018809	7603	Open Space Park or Preserve				D	88	1.66	4
Tule Creek	1.990162	7603	Open Space Park or Preserve				D	88	175.13	4
Tule Creek	3.055979	7603	Open Space Park or Preserve				D	88	268.93	4
Tule Creek	4.786524	7603	Open Space Park or Preserve				D	88	421.21	4
Tule Creek	7.507363	7603	Open Space Park or Preserve				D	88	660.65	4
Tule Creek	9.004921	7603	Open Space Park or Preserve				D	88	792.43	4
Tule Creek	21.39379	7603	Open Space Park or Preserve				D	88	1882.65	4
Tule Creek	217.9231	7603	Open Space Park or Preserve				D	88	19177.24	4
Tule Creek	442.4383	7603	Open Space Park or Preserve				D	88	38934.57	4
Tule Creek	4.448867	8003	Field Crops				A	62	275.83	1
Tule Creek	16.13558	8003	Field Crops				A	62	1000.41	1
Tule Creek	27.18965	8003	Field Crops				A	62	1685.76	1
Tule Creek	65.95404	8003	Field Crops				A	62	4089.15	1
Tule Creek	0.341477	8003	Field Crops				B	76	25.95	2
Tule Creek	1.937761	8003	Field Crops				B	76	147.27	2
Tule Creek	3.40635	8003	Field Crops				B	76	258.88	2
Tule Creek	5.150237	8003	Field Crops				B	76	391.42	2

		Land Use				Soils		CN		
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Tule Creek	10.60162	8003	Field Crops				B	76	805.72	2
Tule Creek	5.471035	8003	Field Crops				C	84	459.57	3
Tule Creek	0.039367	8003	Field Crops				D	88	3.46	4
Tule Creek	12.98185	8003	Field Crops				D	88	1142.40	4
Tule Creek	32.0698	8003	Field Crops				D	88	2822.14	4
Tule Creek	0.370491	9101	Vacant and Undeveloped Land				A	62	22.97	1
Tule Creek	0.462587	9101	Vacant and Undeveloped Land				A	62	28.68	1
Tule Creek	0.716577	9101	Vacant and Undeveloped Land				A	62	44.43	1
Tule Creek	1.423269	9101	Vacant and Undeveloped Land				A	62	88.24	1
Tule Creek	1.479646	9101	Vacant and Undeveloped Land				A	62	91.74	1
Tule Creek	1.77126	9101	Vacant and Undeveloped Land				A	62	109.82	1
Tule Creek	1.795696	9101	Vacant and Undeveloped Land				A	62	111.33	1
Tule Creek	2.104207	9101	Vacant and Undeveloped Land				A	62	130.46	1
Tule Creek	2.255969	9101	Vacant and Undeveloped Land				A	62	139.87	1
Tule Creek	2.38003	9101	Vacant and Undeveloped Land				A	62	147.56	1
Tule Creek	2.78078	9101	Vacant and Undeveloped Land				A	62	172.41	1
Tule Creek	2.988145	9101	Vacant and Undeveloped Land				A	62	185.26	1
Tule Creek	3.702611	9101	Vacant and Undeveloped Land				A	62	229.56	1
Tule Creek	3.813949	9101	Vacant and Undeveloped Land				A	62	236.46	1
Tule Creek	4.095598	9101	Vacant and Undeveloped Land				A	62	253.93	1
Tule Creek	4.585974	9101	Vacant and Undeveloped Land				A	62	284.33	1
Tule Creek	4.632554	9101	Vacant and Undeveloped Land				A	62	287.22	1
Tule Creek	4.742464	9101	Vacant and Undeveloped Land				A	62	294.03	1
Tule Creek	5.398374	9101	Vacant and Undeveloped Land				A	62	334.70	1
Tule Creek	5.950607	9101	Vacant and Undeveloped Land				A	62	368.94	1
Tule Creek	6.035894	9101	Vacant and Undeveloped Land				A	62	374.23	1
Tule Creek	7.440398	9101	Vacant and Undeveloped Land				A	62	461.30	1
Tule Creek	7.550937	9101	Vacant and Undeveloped Land				A	62	468.16	1
Tule Creek	7.926843	9101	Vacant and Undeveloped Land				A	62	491.46	1
Tule Creek	8.178444	9101	Vacant and Undeveloped Land				A	62	507.06	1
Tule Creek	9.503046	9101	Vacant and Undeveloped Land				A	62	589.19	1
Tule Creek	10.1615	9101	Vacant and Undeveloped Land				A	62	630.01	1
Tule Creek	11.43993	9101	Vacant and Undeveloped Land				A	62	709.28	1
Tule Creek	13.19961	9101	Vacant and Undeveloped Land				A	62	818.38	1
Tule Creek	16.93045	9101	Vacant and Undeveloped Land				A	62	1049.69	1
Tule Creek	18.15904	9101	Vacant and Undeveloped Land				A	62	1125.86	1
Tule Creek	22.94393	9101	Vacant and Undeveloped Land				A	62	1422.52	1
Tule Creek	24.80073	9101	Vacant and Undeveloped Land				A	62	1537.65	1
Tule Creek	26.53566	9101	Vacant and Undeveloped Land				A	62	1645.21	1
Tule Creek	28.16416	9101	Vacant and Undeveloped Land				A	62	1746.18	1
Tule Creek	31.26606	9101	Vacant and Undeveloped Land				A	62	1938.50	1
Tule Creek	33.11955	9101	Vacant and Undeveloped Land				A	62	2053.41	1
Tule Creek	33.25553	9101	Vacant and Undeveloped Land				A	62	2061.84	1
Tule Creek	45.79989	9101	Vacant and Undeveloped Land				A	62	2839.59	1
Tule Creek	59.79589	9101	Vacant and Undeveloped Land				A	62	3707.34	1
Tule Creek	77.01624	9101	Vacant and Undeveloped Land				A	62	4775.01	1
Tule Creek	144.7928	9101	Vacant and Undeveloped Land				A	62	8977.16	1
Tule Creek	175.1536	9101	Vacant and Undeveloped Land				A	62	10859.52	1
Tule Creek	193.7297	9101	Vacant and Undeveloped Land				A	62	12011.24	1
Tule Creek	0.123272	9101	Vacant and Undeveloped Land				B	76	9.37	2
Tule Creek	0.126067	9101	Vacant and Undeveloped Land				B	76	9.58	2
Tule Creek	0.259348	9101	Vacant and Undeveloped Land				B	76	19.71	2
Tule Creek	0.439751	9101	Vacant and Undeveloped Land				B	76	33.42	2
Tule Creek	0.488141	9101	Vacant and Undeveloped Land				B	76	37.10	2
Tule Creek	0.555569	9101	Vacant and Undeveloped Land				B	76	42.22	2
Tule Creek	1.046957	9101	Vacant and Undeveloped Land				B	76	79.57	2
Tule Creek	1.506574	9101	Vacant and Undeveloped Land				B	76	114.50	2
Tule Creek	1.800695	9101	Vacant and Undeveloped Land				B	76	136.85	2
Tule Creek	1.872557	9101	Vacant and Undeveloped Land				B	76	142.31	2
Tule Creek	2.28992	9101	Vacant and Undeveloped Land				B	76	174.03	2
Tule Creek	2.39391	9101	Vacant and Undeveloped Land				B	76	181.94	2
Tule Creek	2.524843	9101	Vacant and Undeveloped Land				B	76	191.89	2
Tule Creek	2.678534	9101	Vacant and Undeveloped Land				B	76	203.57	2
Tule Creek	2.955549	9101	Vacant and Undeveloped Land				B	76	224.62	2
Tule Creek	3.082261	9101	Vacant and Undeveloped Land				B	76	234.25	2

		Land Use				Soils		CN		
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Tule Creek	3.08555	9101	Vacant and Undeveloped Land				B	76	234.50	2
Tule Creek	3.132324	9101	Vacant and Undeveloped Land				B	76	238.06	2
Tule Creek	4.209174	9101	Vacant and Undeveloped Land				B	76	319.90	2
Tule Creek	4.540735	9101	Vacant and Undeveloped Land				B	76	345.10	2
Tule Creek	5.008135	9101	Vacant and Undeveloped Land				B	76	380.62	2
Tule Creek	5.032916	9101	Vacant and Undeveloped Land				B	76	382.50	2
Tule Creek	5.716538	9101	Vacant and Undeveloped Land				B	76	434.46	2
Tule Creek	6.402167	9101	Vacant and Undeveloped Land				B	76	486.56	2
Tule Creek	6.640836	9101	Vacant and Undeveloped Land				B	76	504.70	2
Tule Creek	6.663339	9101	Vacant and Undeveloped Land				B	76	506.41	2
Tule Creek	7.185992	9101	Vacant and Undeveloped Land				B	76	546.14	2
Tule Creek	7.274901	9101	Vacant and Undeveloped Land				B	76	552.89	2
Tule Creek	7.883665	9101	Vacant and Undeveloped Land				B	76	599.16	2
Tule Creek	8.068191	9101	Vacant and Undeveloped Land				B	76	613.18	2
Tule Creek	8.987016	9101	Vacant and Undeveloped Land				B	76	683.01	2
Tule Creek	9.612152	9101	Vacant and Undeveloped Land				B	76	730.52	2
Tule Creek	11.87059	9101	Vacant and Undeveloped Land				B	76	902.17	2
Tule Creek	12.81692	9101	Vacant and Undeveloped Land				B	76	974.09	2
Tule Creek	13.56025	9101	Vacant and Undeveloped Land				B	76	1030.58	2
Tule Creek	14.1667	9101	Vacant and Undeveloped Land				B	76	1076.67	2
Tule Creek	14.51726	9101	Vacant and Undeveloped Land				B	76	1103.31	2
Tule Creek	15.05544	9101	Vacant and Undeveloped Land				B	76	1144.21	2
Tule Creek	19.61081	9101	Vacant and Undeveloped Land				B	76	1490.42	2
Tule Creek	21.07988	9101	Vacant and Undeveloped Land				B	76	1602.07	2
Tule Creek	21.10185	9101	Vacant and Undeveloped Land				B	76	1603.74	2
Tule Creek	21.31978	9101	Vacant and Undeveloped Land				B	76	1620.30	2
Tule Creek	22.34473	9101	Vacant and Undeveloped Land				B	76	1698.20	2
Tule Creek	23.62745	9101	Vacant and Undeveloped Land				B	76	1795.69	2
Tule Creek	23.78581	9101	Vacant and Undeveloped Land				B	76	1807.72	2
Tule Creek	23.8163	9101	Vacant and Undeveloped Land				B	76	1810.04	2
Tule Creek	28.61306	9101	Vacant and Undeveloped Land				B	76	2174.59	2
Tule Creek	32.99727	9101	Vacant and Undeveloped Land				B	76	2507.79	2
Tule Creek	35.74483	9101	Vacant and Undeveloped Land				B	76	2716.61	2
Tule Creek	38.07883	9101	Vacant and Undeveloped Land				B	76	2893.99	2
Tule Creek	44.96019	9101	Vacant and Undeveloped Land				B	76	3416.97	2
Tule Creek	52.76313	9101	Vacant and Undeveloped Land				B	76	4010.00	2
Tule Creek	53.25099	9101	Vacant and Undeveloped Land				B	76	4047.08	2
Tule Creek	55.83849	9101	Vacant and Undeveloped Land				B	76	4243.72	2
Tule Creek	55.98927	9101	Vacant and Undeveloped Land				B	76	4255.18	2
Tule Creek	57.6379	9101	Vacant and Undeveloped Land				B	76	4380.48	2
Tule Creek	58.25291	9101	Vacant and Undeveloped Land				B	76	4427.22	2
Tule Creek	60.3311	9101	Vacant and Undeveloped Land				B	76	4585.16	2
Tule Creek	60.9375	9101	Vacant and Undeveloped Land				B	76	4631.25	2
Tule Creek	79.18654	9101	Vacant and Undeveloped Land				B	76	6018.18	2
Tule Creek	80.80081	9101	Vacant and Undeveloped Land				B	76	6140.86	2
Tule Creek	94.08736	9101	Vacant and Undeveloped Land				B	76	7150.64	2
Tule Creek	95.02456	9101	Vacant and Undeveloped Land				B	76	7221.87	2
Tule Creek	108.8181	9101	Vacant and Undeveloped Land				B	76	8270.18	2
Tule Creek	127.1741	9101	Vacant and Undeveloped Land				B	76	9665.23	2
Tule Creek	173.0043	9101	Vacant and Undeveloped Land				B	76	13148.33	2
Tule Creek	174.746	9101	Vacant and Undeveloped Land				B	76	13280.70	2
Tule Creek	184.1736	9101	Vacant and Undeveloped Land				B	76	13997.19	2
Tule Creek	195.5124	9101	Vacant and Undeveloped Land				B	76	14858.94	2
Tule Creek	200.1965	9101	Vacant and Undeveloped Land				B	76	15214.93	2
Tule Creek	336.0086	9101	Vacant and Undeveloped Land				B	76	25536.66	2
Tule Creek	340.4604	9101	Vacant and Undeveloped Land				B	76	25874.99	2
Tule Creek	362.0771	9101	Vacant and Undeveloped Land				B	76	27517.86	2
Tule Creek	402.1661	9101	Vacant and Undeveloped Land				B	76	30564.62	2
Tule Creek	845.9782	9101	Vacant and Undeveloped Land				B	76	64294.34	2
Tule Creek	873.8039	9101	Vacant and Undeveloped Land				B	76	66409.10	2
Tule Creek	0.823878	9101	Vacant and Undeveloped Land				C	84	69.21	3
Tule Creek	1.108125	9101	Vacant and Undeveloped Land				C	84	93.08	3
Tule Creek	1.819944	9101	Vacant and Undeveloped Land				C	84	152.88	3
Tule Creek	2.382064	9101	Vacant and Undeveloped Land				C	84	200.09	3
Tule Creek	10.95875	9101	Vacant and Undeveloped Land				C	84	920.53	3

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
Tule Creek	12.52151	9101	Vacant and Undeveloped Land				C	84	1051.81	3
Tule Creek	24.71978	9101	Vacant and Undeveloped Land				C	84	2076.46	3
Tule Creek	34.91707	9101	Vacant and Undeveloped Land				C	84	2933.03	3
Tule Creek	46.83882	9101	Vacant and Undeveloped Land				C	84	3934.46	3
Tule Creek	57.41426	9101	Vacant and Undeveloped Land				C	84	4822.80	3
Tule Creek	141.554	9101	Vacant and Undeveloped Land				C	84	11890.54	3
Tule Creek	1.754196	9101	Vacant and Undeveloped Land				D	88	154.37	4
Tule Creek	2.670644	9101	Vacant and Undeveloped Land				D	88	235.02	4
Tule Creek	3.07489	9101	Vacant and Undeveloped Land				D	88	270.59	4
Tule Creek	4.539194	9101	Vacant and Undeveloped Land				D	88	399.45	4
Tule Creek	5.128395	9101	Vacant and Undeveloped Land				D	88	451.30	4
Tule Creek	5.392338	9101	Vacant and Undeveloped Land				D	88	474.53	4
Tule Creek	6.6423	9101	Vacant and Undeveloped Land				D	88	584.52	4
Tule Creek	8.121478	9101	Vacant and Undeveloped Land				D	88	714.69	4
Tule Creek	8.617818	9101	Vacant and Undeveloped Land				D	88	758.37	4
Tule Creek	12.23427	9101	Vacant and Undeveloped Land				D	88	1076.62	4
Tule Creek	12.98788	9101	Vacant and Undeveloped Land				D	88	1142.93	4
Tule Creek	13.49973	9101	Vacant and Undeveloped Land				D	88	1187.98	4
Tule Creek	18.14519	9101	Vacant and Undeveloped Land				D	88	1596.78	4
Tule Creek	18.7384	9101	Vacant and Undeveloped Land				D	88	1648.98	4
Tule Creek	33.39091	9101	Vacant and Undeveloped Land				D	88	2938.40	4
Tule Creek	37.60921	9101	Vacant and Undeveloped Land				D	88	3309.61	4
Tule Creek	46.89635	9101	Vacant and Undeveloped Land				D	88	4126.88	4
Tule Creek	63.77179	9101	Vacant and Undeveloped Land				D	88	5611.92	4
Tule Creek	76.07516	9101	Vacant and Undeveloped Land				D	88	6694.61	4
Tule Creek	107.7435	9101	Vacant and Undeveloped Land				D	88	9481.42	4

Unnamed Eastern Wash Proposed Curve Number

		Land Use				Soils		CN		
Name	Acres	Land Use Code	Land Use Description	Description	Percent Impervious	MUSYM	HydSoilGrp	CN	CN*A	Soil Group
	734							**79.829**	**58629**	**2.7**
	9.1382E-06	4117	Impacts				B	82	0.00	2
	11.44859229	4117	Impacts				B	82	938.78	2
	5.67858E-06	4117	Impacts				D	89	0.00	4
	0.653770822	4117	Impacts				D	89	58.19	4
	8.421768087	4117	Impacts				D	89	749.54	4
	24.41650518	7603	Open Space Park or Preserve				A	62	1513.82	1
Unnamed	0.004416701	7603	Open Space Park or Preserve				B	76	0.34	2
Eastern	349.0087525	7603	Open Space Park or Preserve				B	76	26524.67	2
Wash	0.020955468	7603	Open Space Park or Preserve				D	88	1.84	4
	0.354483367	7603	Open Space Park or Preserve				D	88	31.19	4
	14.05971799	7603	Open Space Park or Preserve				D	88	1237.26	4
	120.2331318	7603	Open Space Park or Preserve				D	88	10580.52	4
	93.1853517	9101	Vacant and Undeveloped Land				B	76	7082.09	2
	0.003492472	9101	Vacant and Undeveloped Land				D	88	0.31	4
	24.92957258	9101	Vacant and Undeveloped Land				D	88	2193.80	4
	87.69063242	9101	Vacant and Undeveloped Land				D	88	7716.78	4

APPENDIX E
Crossing Hydrology Summary Tables

Project: Tule Wind
Subject: Drainage Report
Task: 21
Job#: 115965

Unit Hydrograph Summary

Watershed Loss

Name	Watershed	A (mi^2)	A (ac)	CN (AMC II)	PZN	PZN (<35yr)	CN (<35yr)	PZN (>35yr)	CN (>35yr)	Soil Type
	Tule Creek	21.64	13851.04	73	3.42	1.79	69	2.58	81	2.0
	McCain Valley 1	3.41	2185.54	78	3.55	1.73	73	2.45	83	2.6
	McCain Valley 2	3.53	2256.19	78	3.55	1.73	73	2.45	83	2.5

Watershed Lag

Name	Watershed	Elev US (ft)	Elev DS (ft)	L (mi)	Lca (mi)	Slope (ft/mi)	Basin n	m	lag (hr)
	Tule	5802.5	3538	10.43	4.23	217	0.040	0.38	1.46
	McCain Valley 1	4112.5	3600	3.71	1.60	138	0.040	0.38	0.7411
	McCain Valley 2	4112.5	3592	3.83	1.70	136	0.040	0.38	0.7698

Watershed Rainfall, Inches (SDC Hydrology Manual)

Name	Watershed	100Yr 6Hr	100Yr 24Hr	10Yr 24Hr
	Tule Creek	3.47	6.69	4.47
	McCain Valley 1	3.00	5.07	3.50
	McCain Valley 2	3.00	5.07	3.50

Watershed Calculated Flow, cfs (CivilD)

Name	Watershed	100Yr 6Hr	100Yr 24Hr	10Yr 24Hr
	Tule Creek	7626	10607	3250
	McCain Valley 1	1487	1434	487
	McCain Valley 2	1562	1472	498

$$lag = 24n\left(\frac{L \bullet L_{ca}}{S^{0.5}}\right)^{m}$$

Project: Tule Wind
Subject: Drainage Report
Task: 21
Job#: 115965

Unit Hydrograph Rainfall

100 Yr 6 Hour

FID	Watershed	Rainfall	Acres	Acres*Rainfall	Area Averaged Rainfall (in)
	Tule Creek	4	1547.986013	6192	
		3.5	9834.300108	34420	
		3	2468.750611	7406	
		Totals	13851.03673	48018	3.466761889
	Northern	3	735.9643	2208	
		Totals	735.9643	2208	3
	McCain Valley 1	3	2186	6559	
		Totals	2186.435792	6559	3
	McCain Valley 2	3	2250	6751	
		Totals	2250.169791	6751	3

100 Yr 24 Hour

FID	Watershed	Rainfall	Acres	Acres*Rainfall	Area Averaged Rainfall (in)
	Tule Creek	10	303.744804	3037	
		8	4253.839575	34031	
		6	9157.798355	54947	
		5	33.299288	166	
		5	102.38491	512	
		Totals	13851.06693	92693	6.692146982
	Northern	6	12.411057	74	
		5	722.641609	3613	
		Totals	735.052666	3688	5.016884582
	McCain Valley 1	6	157.391384	944	
		5	2029.044409	10145	
		Totals	2186.435793	11090	5.071985367
	McCain Valley 2	6	157.391384	944	
		5	2092.778407	10464	
		Totals	2250.169791	11408	5.069946448

10 Yr 24 Hour

FID	Watershed	Rainfall	Acres	Acres*Rainfall	Area Averaged Rainfall (in)
	Tule Creek	6	1053.215147	6319	
		5	4923.38483	24617	
		4	6792.47866	27170	
		3.5	366.783471	1284	
		3.5	715.174823	2503	
		Totals	13851.03693	61893	4.468472939
	Northern	3.5	735.9643	2576	
		Totals	735.9643	2576	3.5
	McCain Valley 1	3.5	2186	7653	
		Totals	2186.435792	7653	3.5
	McCain Valley 2	3.5	2250	7876	
		Totals	2250.169791	7876	3.5

Project: Tule Wind
Subject: Drainage Report
Task: 21
Job#: 115965

Rational Method Summary

System	WPS Crossing Number	Leg (HDR Node to HDR Node)	Acres	Reach Length	US Elevation	DS Elevation	Soil Group	Soil Group Percent	100 Year Runoff	10 Year Runoff	System Effective C
1		Initial Area	0.234	184.12	3965.00	3953.0	D		0.74		
			10.132	709.83	3953.0	3926.00	D		24.65		
			10.366								
2		Initial Area	0.157	147.25	4068.00	4015.0	D		0.59		
			13.717	918.23	4015.0	3931.00	D		38.67		
			13.874								
3		Initial Area	0.042	72.89	4062.00	4058.0	B		0.09		
		3.2 to 3.3	6.119	1068.19	4058.0	3963.00	B		9.42		
		3.3 to 3.4	10.416791	482.37	3963.00	3933	B		23.31		
			16.577791								
4		Initial Area	0.2	84.85	3978.00	3970.0	B		0.49		
			0.625	295.28	3970.0	3943.00	B		1.61		
			0.825								
5		Initial Area	0.102	132.71	3908.00	3882.0	B		0.18		
			21.558	1743.68	3882.0	3715.00	A	0.65	25.37		
			21.66				B	0.35			
6		Initial Area	0.576	311.19	3910.00	3894.0	B		1.24		
			55.991	2700.48	3894.0	3750.00	B	0.99	77.38		
			56.567				D	0.00			
7		Initial Area	0.049038	92.07	3689.00	3685.0	B		0.12		
			21.878578	2100.79	3685.0	3585.00	B		30.34		
			21.927616								
8		Initial Area SG D	0.071	97.49	3720	3710.0	D		0.25		
			20.304059	2167.8	3710.0	3590.0	B	0.99	29.80		
			20.375059				D	0.01			
9		Initial Area	0.0727	88.12	3611.00	3606.0	B		0.16		
			2.478	411.1	3606.0	3592.0	B		4.29		
			2.5507								
10		Initial Area	0.106	103.135	3728.00	3715.0	D		0.38		
			20.645	2242.89	3715.0	3582.0	B	0.93	31.50		
			20.751				D	0.07			
11		Initial Area	0.073	92.72	3609.00	3606.0	B		0.14		
			3.736	694.44	3606.0	3530.0	B		5.85		
12		Initial Area	0.09	105.19	3712.00	3700.0	B	0.04	0.32		
							D	0.96			
			34.613	2438.64	3700.0	3556.0	B	0.92	54.40		
			34.703				D	0.08			
13		Initial Area	0.189	123.4	3822.00	3806.0	D		0.69		
			57.644	3804.3	3806.0	3554.0	A	0.04	84.68		
			57.833				B	0.76			
							D	0.20			
14		Initial Area	0.468	233.59	3994.00	3949.00	D		1.77		
		14.2 to 14.3	58.556	3533.69	3949.00	3743.0	B	0.86	90.16		
							D	0.14			
		14.3 to 14.4	264.517	3814.58	3743.0	3620	A	0.07	373.51		
							B	0.71			
							D	0.22			
		14.4 to 14.5	99.219	2848.9	3620	3542	A	0.17	431.99	221.2	
							B	0.25			
			422.76				D	0.58			
15		Initial Area	0.056514	59.59	3699.00	3694.0	B		0.14		
			5.911685	661.42	3694.0	3645.00	B		10.86		
			5.968199								

APPENDIX F

Crossing Hydrology CivilD Output

Tule Creek 10-Year 24-Hour
Tule Creek 100-Year 6-Hour
Tule Creek 100-Year 24-Hour
McCain 1 10-Year 24-Hour
McCain 1 100-Year 6-Hour
McCain 1 100-Year 24-Hour
McCain 2 10-Year 24-Hour
McCain 2 100-Year 6-Hour
McCain 2 100-Year 24-Hour
System 1 100-Year
System 2 100-Year
System 3 100-Year
System 4 100-Year
System 5 100-Year
System 6 100-Year
System 7 100-Year
System 8 100-Year
System 9 100-Year
System 10 100-Year
System 11 100-Year
System 12 100-Year
System 13 100-Year
System 14 100-Year
System 15 100-Year

U N I T H Y D R O G R A P H A N A L Y S I S

Study date 09/08/10 File: TULECREEK10YR24HR.out

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Program License Serial Number 4055

Tule Wind Project
Tule Creek Crossing
Proposed Conditions 10 Yr 24 Hr
Aug 18, 2010

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Storm Event Year = 10

Antecedent Moisture Condition = 2

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
13851.00	4.47

Rainfall Distribution pattern used in study:
Type B for San Diego area of California

++

********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
13851.00	1.000	69.0	69.0	0.050	B

Area-averaged catchment SCS Curve Number AMC(2) = 69.000
Area-averaged Fm value using values listed = 0.050(In/Hr)

++
Direct entry of lag time by user
Watershed area =   13851.00(Ac.)
Catchment Lag time =   1.460 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 17.1233
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 69.000

Rainfall depth area reduction factors:
Using a total area of   13851.00(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 0.983
Rainfall entered for study =   4.470(In)
Adjusted rainfall =   4.393(In)

++

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

++

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 55865.70 (CFS))

0.17	0.250	0.016	158.799	0.003
0.34	0.500	0.060	603.506	0.014
0.51	0.750	0.154	1549.023	0.041
0.68	1.000	0.418	4209.423	0.117
0.86	1.250	0.829	8356.072	0.266
1.03	1.500	1.000	10080.482	0.447
1.20	1.750	0.817	8237.636	0.594
1.37	2.000	0.547	5509.267	0.693
1.54	2.250	0.419	4219.133	0.768
1.71	2.500	0.314	3165.938	0.825
1.88	2.750	0.243	2450.565	0.869
2.05	3.000	0.192	1934.570	0.903
2.23	3.250	0.151	1525.672	0.931
2.40	3.500	0.120	1206.712	0.952
2.57	3.750	0.090	908.788	0.969
2.74	4.000	0.068	683.892	0.981
2.91	4.250	0.048	484.176	0.990
3.08	4.500	0.035	351.342	0.996
3.25	4.750	0.018	185.744	0.999
3.42	5.000	0.004	44.958	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltration (In) dP-dQ	Revised Runoff Min Loss Rate
0.25	0.0198	0.0000	0.0198	0.0000	0.0198	--------
0.50	0.0395	0.0000	0.0198	0.0000	0.0198	--------

0.75	0.0549	0.0000	0.0154	0.0000	0.0154	--------
1.00	0.0703	0.0000	0.0154	0.0000	0.0154	--------
1.25	0.0901	0.0000	0.0198	0.0000	0.0198	--------
1.50	0.1098	0.0000	0.0198	0.0000	0.0198	--------
1.75	0.1296	0.0000	0.0198	0.0000	0.0198	--------
2.00	0.1494	0.0000	0.0198	0.0000	0.0198	--------
2.25	0.1735	0.0000	0.0242	0.0000	0.0242	--------
2.50	0.1977	0.0000	0.0242	0.0000	0.0242	--------
2.75	0.2175	0.0000	0.0198	0.0000	0.0198	--------
3.00	0.2372	0.0000	0.0198	0.0000	0.0198	--------
3.25	0.2614	0.0000	0.0242	0.0000	0.0242	--------
3.50	0.2856	0.0000	0.0242	0.0000	0.0242	--------
3.75	0.3119	0.0000	0.0264	0.0000	0.0264	--------
4.00	0.3383	0.0000	0.0264	0.0000	0.0264	--------
4.25	0.3668	0.0000	0.0286	0.0000	0.0286	--------
4.50	0.3954	0.0000	0.0286	0.0000	0.0286	--------
4.75	0.4262	0.0000	0.0308	0.0000	0.0308	--------
5.00	0.4569	0.0000	0.0308	0.0000	0.0308	--------
5.25	0.4921	0.0000	0.0351	0.0000	0.0351	--------
5.50	0.5272	0.0000	0.0351	0.0000	0.0351	--------
5.75	0.5646	0.0000	0.0373	0.0000	0.0373	--------
6.00	0.6019	0.0000	0.0373	0.0000	0.0373	--------
6.25	0.6458	0.0000	0.0439	0.0000	0.0439	--------
6.50	0.6898	0.0000	0.0439	0.0000	0.0439	--------
6.75	0.7403	0.0000	0.0505	0.0000	0.0505	--------
7.00	0.7908	0.0000	0.0505	0.0000	0.0505	--------
7.25	0.8567	0.0000	0.0659	0.0000	0.0659	--------
7.50	0.9226	0.0001	0.0659	0.0001	0.0658	--------
7.75	1.0215	0.0033	0.0989	0.0031	0.0957	--------
8.00	1.1203	0.0104	0.0989	0.0072	0.0917	--------
8.25	1.2675	0.0280	0.1472	0.0176	0.1296	--------
8.50	1.4147	0.0532	0.1472	0.0252	0.1220	--------
8.75	1.6080	0.0967	0.1933	0.0436	0.1497	--------
9.00	1.8013	0.1510	0.1933	0.0543	0.1390	--------
9.25	2.0122	0.2212	0.2109	0.0702	0.1407	--------
9.50	2.2231	0.3016	0.2109	0.0804	0.1305	--------
9.75	2.4032	0.3775	0.1801	0.0759	0.1042	--------
10.00	2.5833	0.4595	0.1801	0.0820	0.0981	--------
10.25	2.6734	0.5026	0.0901	0.0431	0.0470	--------
10.50	2.7635	0.5470	0.0901	0.0444	0.0456	--------
10.75	2.8228	0.5770	0.0593	0.0300	0.0293	--------
11.00	2.8821	0.6075	0.0593	0.0305	0.0288	--------
11.25	2.9326	0.6339	0.0505	0.0264	0.0241	--------
11.50	2.9831	0.6607	0.0505	0.0268	0.0238	--------
11.75	3.0293	0.6854	0.0461	0.0248	0.0214	--------
12.00	3.0754	0.7105	0.0461	0.0251	0.0211	--------
12.25	3.1193	0.7346	0.0439	0.0241	0.0198	--------
12.50	3.1633	0.7590	0.0439	0.0244	0.0195	--------
12.75	3.2050	0.7824	0.0417	0.0234	0.0183	--------
13.00	3.2467	0.8060	0.0417	0.0236	0.0181	--------
13.25	3.2841	0.8273	0.0373	0.0213	0.0160	--------
13.50	3.3214	0.8488	0.0373	0.0215	0.0158	--------
13.75	3.3566	0.8692	0.0351	0.0204	0.0148	--------
14.00	3.3917	0.8898	0.0351	0.0205	0.0146	--------
14.25	3.4313	0.9130	0.0395	0.0233	0.0163	--------
14.50	3.4708	0.9365	0.0395	0.0235	0.0161	--------
14.75	3.4928	0.9496	0.0220	0.0131	0.0089	--------
15.00	3.5147	0.9628	0.0220	0.0132	0.0088	--------
15.25	3.5499	0.9840	0.0351	0.0212	0.0140	--------
15.50	3.5850	1.0053	0.0351	0.0213	0.0138	--------
15.75	3.6180	1.0254	0.0330	0.0201	0.0128	--------
16.00	3.6509	1.0456	0.0330	0.0202	0.0127	--------
16.25	3.6817	1.0646	0.0308	0.0190	0.0118	--------

16.50	3.7124	1.0837	0.0308	0.0191	0.0117
16.75	3.7454	1.1042	0.0330	0.0205	0.0124
17.00	3.7783	1.1249	0.0330	0.0207	0.0123
17.25	3.8047	1.1415	0.0264	0.0166	0.0098
17.50	3.8311	1.1582	0.0264	0.0167	0.0097
17.75	3.8596	1.1763	0.0286	0.0181	0.0104
18.00	3.8882	1.1945	0.0286	0.0182	0.0103
18.25	3.9101	1.2086	0.0220	0.0141	0.0079
18.50	3.9321	1.2227	0.0220	0.0141	0.0079
18.75	3.9541	1.2369	0.0220	0.0142	0.0078
19.00	3.9760	1.2511	0.0220	0.0142	0.0078
19.25	3.9958	1.2639	0.0198	0.0128	0.0069
19.50	4.0156	1.2768	0.0198	0.0129	0.0069
19.75	4.0375	1.2911	0.0220	0.0143	0.0076
20.00	4.0595	1.3055	0.0220	0.0144	0.0076
20.25	4.0837	1.3213	0.0242	0.0159	0.0083
20.50	4.1078	1.3372	0.0242	0.0159	0.0082
20.75	4.1298	1.3518	0.0220	0.0145	0.0075
21.00	4.1518	1.3663	0.0220	0.0146	0.0074
21.25	4.1715	1.3795	0.0198	0.0131	0.0066
21.50	4.1913	1.3926	0.0198	0.0132	0.0066
21.75	4.2111	1.4058	0.0198	0.0132	0.0066
22.00	4.2309	1.4191	0.0198	0.0132	0.0065
22.25	4.2506	1.4323	0.0198	0.0133	0.0065
22.50	4.2704	1.4456	0.0198	0.0133	0.0065
22.75	4.2902	1.4590	0.0198	0.0133	0.0064
23.00	4.3099	1.4723	0.0198	0.0134	0.0064
23.25	4.3319	1.4872	0.0220	0.0149	0.0071
23.50	4.3539	1.5022	0.0220	0.0149	0.0070
23.75	4.3736	1.5156	0.0198	0.0135	0.0063
24.00	4.3934	1.5291	0.0198	0.0135	0.0063

Total soil rain loss = 2.86(In)
Total effective runoff = 1.53(In)

Peak flow rate this hydrograph = 3249.76(CFS)
Total runoff volume this hydrograph = 76882871.3(Ft3)

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24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	825.0	1650.0	2475.0	3300.0
0+15	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				

4+ 0	0.0000	0.00	Q
4+15	0.0000	0.00	Q
4+30	0.0000	0.00	Q
4+45	0.0000	0.00	Q
5+ 0	0.0000	0.00	Q
5+15	0.0000	0.00	Q
5+30	0.0000	0.00	Q
5+45	0.0000	0.00	Q
6+ 0	0.0000	0.00	Q
6+15	0.0000	0.00	Q
6+30	0.0000	0.00	Q
6+45	0.0000	0.00	Q
7+ 0	0.0000	0.00	Q
7+15	0.0000	0.00	Q
7+30	0.0004	0.02	Q
7+45	0.0123	0.58	Q
8+ 0	0.0791	3.23	Q
8+15	0.3379	12.52	Q
8+30	1.1643	40.00	Q
8+45	3.3758	107.03	VQ
9+ 0	8.3437	240.45	V Q
9+15	17.9092	462.97	V Q
9+30	34.1686	786.95	V Q
9+45	59.2412	1213.52	V Q
10+ 0	94.7007	1716.24	V Q
10+15	141.1509	2248.19	V Q
10+30	197.5858	2731.45	V Q
10+45	261.4390	3090.49	V Q
11+ 0	328.5828	3249.76	V Q
11+15	394.1361	3172.78	V Q
11+30	454.8813	2940.07	V Q
11+45	509.9562	2665.63	V Q
12+ 0	560.0789	2425.94	V Q
12+15	605.8169	2213.72	V Q
12+30	648.0821	2045.64	V Q
12+45	687.3817	1902.10	V Q
13+ 0	724.2148	1782.72	V Q
13+15	758.9343	1680.42	V Q
13+30	791.8321	1592.26	V Q
13+45	823.1299	1514.81	Q V
14+ 0	852.9548	1443.52	Q V
14+15	881.4114	1377.30	Q V
14+30	908.6495	1318.32	Q V
14+45	934.9287	1271.91	Q V
15+ 0	960.5941	1242.21	Q V
15+15	985.9351	1226.50	Q V
15+30	1010.7409	1200.60	Q V
15+45	1034.2769	1139.14	Q V
16+ 0	1056.5139	1076.27	Q V
16+15	1078.4785	1063.09	Q V
16+30	1100.9420	1087.23	Q V
16+45	1123.7440	1103.62	Q V
17+ 0	1146.5528	1103.94	Q V
17+15	1169.2567	1098.87	Q V
17+30	1191.8532	1093.67	Q V
17+45	1214.4364	1093.02	Q V
18+ 0	1236.9246	1088.43	Q V
18+15	1258.9683	1066.91	Q V
18+30	1280.4095	1037.76	Q V
18+45	1301.4174	1016.78	Q V
19+ 0	1322.0152	996.93	Q V
19+15	1341.8882	961.85	Q V
19+30	1360.8860	919.49	Q V

19+45	1379.1471	883.84	
20+ 0	1396.8296	855.83	
20+15	1413.9597	829.10	
20+30	1430.6795	809.24	
20+45	1447.2624	802.61	
21+ 0	1463.9591	808.12	
21+15	1480.8841	819.17	
21+30	1497.9747	827.19	
21+45	1515.0390	825.91	
22+ 0	1531.8742	814.83	
22+15	1548.3773	798.75	
22+30	1564.5455	782.54	
22+45	1580.4593	770.23	
23+ 0	1596.2248	763.05	
23+15	1611.8946	758.42	
23+30	1627.5163	756.09	
23+45	1643.1374	756.06	
24+ 0	1658.8440	760.20	
24+15	1674.7019	767.52	
24+30	1690.5662	767.83	
24+45	1705.9959	746.80	
25+ 0	1720.1150	683.37	
25+15	1731.7875	564.95	
25+30	1740.5851	425.81	
25+45	1747.0404	312.43	
26+ 0	1751.9313	236.72	
26+15	1755.6257	178.81	
26+30	1758.4213	135.31	
26+45	1760.5193	101.54	
27+ 0	1762.0652	74.82	
27+15	1763.1752	53.72	
27+30	1763.9401	37.02	
27+45	1764.4435	24.37	
28+ 0	1764.7474	14.71	
28+15	1764.9110	7.92	
28+30	1764.9753	3.11	
28+45	1764.9879	0.61	

U N I T H Y D R O G R A P H A N A L Y S I S

Study date 09/08/10 File: tulecreek100yr6hr.out

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Program License Serial Number 4055

Tule Wind Project
Tule Creek Crossing
Proposed Conditions 100 Yr 6 Hr
Aug 18, 2010

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Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
13851.00	3.47

Rainfall Distribution pattern used in study:
Type B for SCS (small dam) or San Diego 6 hour storms

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********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
13851.00	1.000	81.0	81.0	0.050	B

Area-averaged catchment SCS Curve Number AMC(2) = 81.000
Area-averaged Fm value using values listed = 0.050(In/Hr)

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Direct entry of lag time by user
Watershed area =   13851.00(Ac.)
Catchment Lag time =   1.460 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 17.1233
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 81.000

Rainfall depth area reduction factors:
Using a total area of   13851.00(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 0.983
Rainfall entered for study =   3.470(In)
Adjusted rainfall =   3.411(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 55865.70 (CFS))

0.17	0.250	0.016	158.799	0.003
0.34	0.500	0.060	603.506	0.014
0.51	0.750	0.154	1549.023	0.041
0.68	1.000	0.418	4209.423	0.117
0.86	1.250	0.829	8356.072	0.266
1.03	1.500	1.000	10080.482	0.447
1.20	1.750	0.817	8237.636	0.594
1.37	2.000	0.547	5509.267	0.693
1.54	2.250	0.419	4219.133	0.768
1.71	2.500	0.314	3165.938	0.825
1.88	2.750	0.243	2450.565	0.869
2.05	3.000	0.192	1934.570	0.903
2.23	3.250	0.151	1525.672	0.931
2.40	3.500	0.120	1206.712	0.952
2.57	3.750	0.090	908.788	0.969
2.74	4.000	0.068	683.892	0.981
2.91	4.250	0.048	484.176	0.990
3.08	4.500	0.035	351.342	0.996
3.25	4.750	0.018	185.744	0.999
3.42	5.000	0.004	44.958	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltration (In) dP-dQ	Revised Runoff Min Loss Rate
0.25	0.0597	0.0000	0.0597	0.0000	0.0597	--------
0.50	0.1194	0.0000	0.0597	0.0000	0.0597	--------

0.75	0.1995	0.0000	0.0801	0.0000	0.0801
1.00	0.2797	0.0000	0.0801	0.0000	0.0801
1.25	0.3786	0.0000	0.0989	0.0000	0.0989
1.50	0.4775	0.0000	0.0989	0.0000	0.0989
1.75	0.6310	0.0104	0.1535	0.0104	0.1431
2.00	0.7844	0.0374	0.1535	0.0269	0.1266
2.25	1.4154	0.2720	0.6310	0.2346	0.3963
2.50	2.0463	0.6341	0.6310	0.3621	0.2688
2.75	2.2169	0.7462	0.1705	0.1121	0.0584
3.00	2.3874	0.8630	0.1705	0.1168	0.0538
3.25	2.5255	0.9606	0.1381	0.0976	0.0405
3.50	2.6636	1.0607	0.1381	0.1001	0.0380
3.75	2.7557	1.1287	0.0921	0.0680	0.0241
4.00	2.8478	1.1976	0.0921	0.0689	0.0232
4.25	2.9245	1.2558	0.0767	0.0581	0.0186
4.50	3.0013	1.3145	0.0767	0.0587	0.0180
4.75	3.0746	1.3711	0.0733	0.0566	0.0167
5.00	3.1479	1.4282	0.0733	0.0571	0.0162
5.25	3.2110	1.4777	0.0631	0.0495	0.0136
5.50	3.2741	1.5276	0.0631	0.0498	0.0132
5.75	3.3423	1.5818	0.0682	0.0542	0.0140
6.00	3.4105	1.6364	0.0682	0.0546	0.0136

Total soil rain loss = 1.77(In)
Total effective runoff = 1.64(In)

Peak flow rate this hydrograph = 7426.13(CFS)
Total runoff volume this hydrograph = 82277572.2(Ft3)

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6 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0 1875.0 3750.0 5625.0 7500.0
0+15	0.0000	0.00	Q
0+30	0.0000	0.00	Q
0+45	0.0000	0.00	Q
1+ 0	0.0000	0.00	Q
1+15	0.0000	0.00	Q
1+30	0.0001	0.00	Q
1+45	0.0346	1.67	Q
2+ 0	0.2537	10.60	Q
2+15	1.6950	69.76	Q
2+30	7.5809	284.88	VQ
2+45	24.1180	800.40	V Q
3+ 0	64.7152	1964.91	V Q
3+15	149.4630	4101.79	V Q
3+30	281.6504	6397.87	V Q
3+45	435.0828	7426.13	V Q
4+ 0	582.7276	7146.01	V Q
4+15	718.8769	6589.62	V Q
4+30	846.8591	6194.34	V Q
4+45	964.8719	5711.82	V Q
5+ 0	1073.2453	5245.27	V Q
5+15	1172.9581	4826.10	VQ
5+30	1265.6268	4485.17	Q V
5+45	1352.2573	4192.91	Q V
6+ 0	1433.6374	3938.80	Q V

6+15	1509.9643	3694.22	
6+30	1581.4456	3459.70	
6+45	1648.1422	3228.12	
7+ 0	1707.6832	2881.78	
7+15	1756.0619	2341.53	
7+30	1792.0872	1743.62	
7+45	1818.2862	1268.03	
8+ 0	1837.8915	948.90	
8+15	1852.5157	707.81	
8+30	1863.4641	529.90	
8+45	1871.6159	394.55	
9+ 0	1877.5871	289.00	
9+15	1881.8532	206.48	
9+30	1884.7750	141.41	
9+45	1886.6942	92.89	
10+ 0	1887.8716	56.99	
10+15	1888.5225	31.50	
10+30	1888.7824	12.58	
10+45	1888.8332	2.46	

U N I T H Y D R O G R A P H A N A L Y S I S

Study date 09/08/10 File: tulecreek100yr24hr.out

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Program License Serial Number 4055

Tule Wind Project
Tule Creek Crossing
Proposed Conditions 100 Yr 24 Hr
Aug 18, 2010

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Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
13851.00	6.69

Rainfall Distribution pattern used in study:
Type B for San Diego area of California

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********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
13851.00	1.000	81.0	81.0	0.050	B

Area-averaged catchment SCS Curve Number AMC(2) = 81.000
Area-averaged Fm value using values listed = 0.050(In/Hr)

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Direct entry of lag time by user
Watershed area =   13851.00(Ac.)
Catchment Lag time =   1.460 hours
Unit interval = 15.000 minutes
Unit interval percentage of lag time = 17.1233
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 81.000

Rainfall depth area reduction factors:
Using a total area of   13851.00(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 0.983
Rainfall entered for study =   6.690(In)
Adjusted rainfall =   6.575(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

0.17	0.250	0.016	158.799	0.003
0.34	0.500	0.060	603.506	0.014
0.51	0.750	0.154	1549.023	0.041
0.68	1.000	0.418	4209.423	0.117
0.86	1.250	0.829	8356.072	0.266
1.03	1.500	1.000	10080.482	0.447
1.20	1.750	0.817	8237.636	0.594
1.37	2.000	0.547	5509.267	0.693
1.54	2.250	0.419	4219.133	0.768
1.71	2.500	0.314	3165.938	0.825
1.88	2.750	0.243	2450.565	0.869
2.05	3.000	0.192	1934.570	0.903
2.23	3.250	0.151	1525.672	0.931
2.40	3.500	0.120	1206.712	0.952
2.57	3.750	0.090	908.788	0.969
2.74	4.000	0.068	683.892	0.981
2.91	4.250	0.048	484.176	0.990
3.08	4.500	0.035	351.342	0.996
3.25	4.750	0.018	185.744	0.999
3.42	5.000	0.004	44.958	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltration (In) dP-dQ	Revised Runoff Min Loss Rate
0.25	0.0296	0.0000	0.0296	0.0000	0.0296	--------
0.50	0.0592	0.0000	0.0296	0.0000	0.0296	--------

0.75	0.0822	0.0000	0.0230	0.0000	0.0230	--------
1.00	0.1052	0.0000	0.0230	0.0000	0.0230	--------
1.25	0.1348	0.0000	0.0296	0.0000	0.0296	--------
1.50	0.1644	0.0000	0.0296	0.0000	0.0296	--------
1.75	0.1940	0.0000	0.0296	0.0000	0.0296	--------
2.00	0.2236	0.0000	0.0296	0.0000	0.0296	--------
2.25	0.2597	0.0000	0.0362	0.0000	0.0362	--------
2.50	0.2959	0.0000	0.0362	0.0000	0.0362	--------
2.75	0.3255	0.0000	0.0296	0.0000	0.0296	--------
3.00	0.3551	0.0000	0.0296	0.0000	0.0296	--------
3.25	0.3912	0.0000	0.0362	0.0000	0.0362	--------
3.50	0.4274	0.0000	0.0362	0.0000	0.0362	--------
3.75	0.4669	0.0000	0.0395	0.0000	0.0395	--------
4.00	0.5063	0.0006	0.0395	0.0006	0.0389	--------
4.25	0.5490	0.0026	0.0427	0.0021	0.0407	--------
4.50	0.5918	0.0061	0.0427	0.0035	0.0393	--------
4.75	0.6378	0.0113	0.0460	0.0052	0.0408	--------
5.00	0.6838	0.0180	0.0460	0.0067	0.0393	--------
5.25	0.7364	0.0273	0.0526	0.0093	0.0433	--------
5.50	0.7890	0.0384	0.0526	0.0110	0.0416	--------
5.75	0.8449	0.0519	0.0559	0.0135	0.0424	--------
6.00	0.9008	0.0671	0.0559	0.0152	0.0407	--------
6.25	0.9666	0.0870	0.0658	0.0199	0.0458	--------
6.50	1.0323	0.1090	0.0658	0.0220	0.0437	--------
6.75	1.1079	0.1367	0.0756	0.0277	0.0479	--------
7.00	1.1836	0.1668	0.0756	0.0301	0.0456	--------
7.25	1.2822	0.2093	0.0986	0.0425	0.0561	--------
7.50	1.3808	0.2552	0.0986	0.0459	0.0527	--------
7.75	1.5288	0.3297	0.1479	0.0746	0.0734	--------
8.00	1.6767	0.4104	0.1479	0.0807	0.0673	--------
8.25	1.8970	0.5403	0.2203	0.1299	0.0904	--------
8.50	2.1173	0.6801	0.2203	0.1399	0.0804	--------
8.75	2.4066	0.8764	0.2893	0.1963	0.0931	--------
9.00	2.6959	1.0844	0.2893	0.2080	0.0813	--------
9.25	3.0115	1.3223	0.3156	0.2379	0.0777	--------
9.50	3.3271	1.5697	0.3156	0.2473	0.0683	--------
9.75	3.5967	1.7872	0.2696	0.2175	0.0521	--------
10.00	3.8663	2.0096	0.2696	0.2224	0.0472	--------
10.25	4.0011	2.1224	0.1348	0.1128	0.0220	--------
10.50	4.1359	2.2362	0.1348	0.1138	0.0210	--------
10.75	4.2247	2.3117	0.0888	0.0755	0.0133	--------
11.00	4.3134	2.3875	0.0888	0.0758	0.0129	--------
11.25	4.3891	2.4524	0.0756	0.0649	0.0107	--------
11.50	4.4647	2.5175	0.0756	0.0651	0.0105	--------
11.75	4.5337	2.5772	0.0690	0.0597	0.0093	--------
12.00	4.6028	2.6371	0.0690	0.0599	0.0091	--------
12.25	4.6685	2.6944	0.0658	0.0572	0.0085	--------
12.50	4.7343	2.7518	0.0658	0.0574	0.0084	--------
12.75	4.7967	2.8064	0.0625	0.0547	0.0078	--------
13.00	4.8592	2.8612	0.0625	0.0548	0.0076	--------
13.25	4.9151	2.9104	0.0559	0.0492	0.0067	--------
13.50	4.9710	2.9597	0.0559	0.0493	0.0066	--------
13.75	5.0236	3.0062	0.0526	0.0465	0.0061	--------
14.00	5.0762	3.0527	0.0526	0.0466	0.0060	--------
14.25	5.1354	3.1052	0.0592	0.0525	0.0067	--------
14.50	5.1945	3.1579	0.0592	0.0526	0.0066	--------
14.75	5.2274	3.1871	0.0329	0.0293	0.0036	--------
15.00	5.2603	3.2164	0.0329	0.0293	0.0036	--------
15.25	5.3129	3.2634	0.0526	0.0470	0.0056	--------
15.50	5.3655	3.3104	0.0526	0.0470	0.0056	--------
15.75	5.4148	3.3546	0.0493	0.0442	0.0051	--------
16.00	5.4641	3.3989	0.0493	0.0442	0.0051	--------
16.25	5.5102	3.4402	0.0460	0.0414	0.0047	--------

16.50	5.5562	3.4816	0.0460	0.0414	0.0046
16.75	5.6055	3.5261	0.0493	0.0444	0.0049
17.00	5.6548	3.5706	0.0493	0.0445	0.0048
17.25	5.6943	3.6062	0.0395	0.0356	0.0038
17.50	5.7337	3.6419	0.0395	0.0357	0.0038
17.75	5.7765	3.6806	0.0427	0.0387	0.0040
18.00	5.8192	3.7194	0.0427	0.0387	0.0040
18.25	5.8521	3.7492	0.0329	0.0298	0.0030
18.50	5.8850	3.7791	0.0329	0.0299	0.0030
18.75	5.9178	3.8089	0.0329	0.0299	0.0030
19.00	5.9507	3.8388	0.0329	0.0299	0.0030
19.25	5.9803	3.8658	0.0296	0.0269	0.0026
19.50	6.0099	3.8928	0.0296	0.0270	0.0026
19.75	6.0428	3.9227	0.0329	0.0300	0.0029
20.00	6.0756	3.9527	0.0329	0.0300	0.0029
20.25	6.1118	3.9858	0.0362	0.0330	0.0031
20.50	6.1480	4.0188	0.0362	0.0331	0.0031
20.75	6.1808	4.0489	0.0329	0.0301	0.0028
21.00	6.2137	4.0790	0.0329	0.0301	0.0028
21.25	6.2433	4.1061	0.0296	0.0271	0.0025
21.50	6.2729	4.1332	0.0296	0.0271	0.0025
21.75	6.3025	4.1604	0.0296	0.0271	0.0024
22.00	6.3321	4.1876	0.0296	0.0272	0.0024
22.25	6.3617	4.2147	0.0296	0.0272	0.0024
22.50	6.3913	4.2419	0.0296	0.0272	0.0024
22.75	6.4208	4.2692	0.0296	0.0272	0.0024
23.00	6.4504	4.2964	0.0296	0.0272	0.0024
23.25	6.4833	4.3267	0.0329	0.0303	0.0026
23.50	6.5162	4.3570	0.0329	0.0303	0.0026
23.75	6.5458	4.3843	0.0296	0.0273	0.0023
24.00	6.5754	4.4116	0.0296	0.0273	0.0023

Total soil rain loss = 2.16(In)
Total effective runoff = 4.41(In)

Peak flow rate this hydrograph = 10607.44(CFS)
Total runoff volume this hydrograph = 221809144.3(Ft3)

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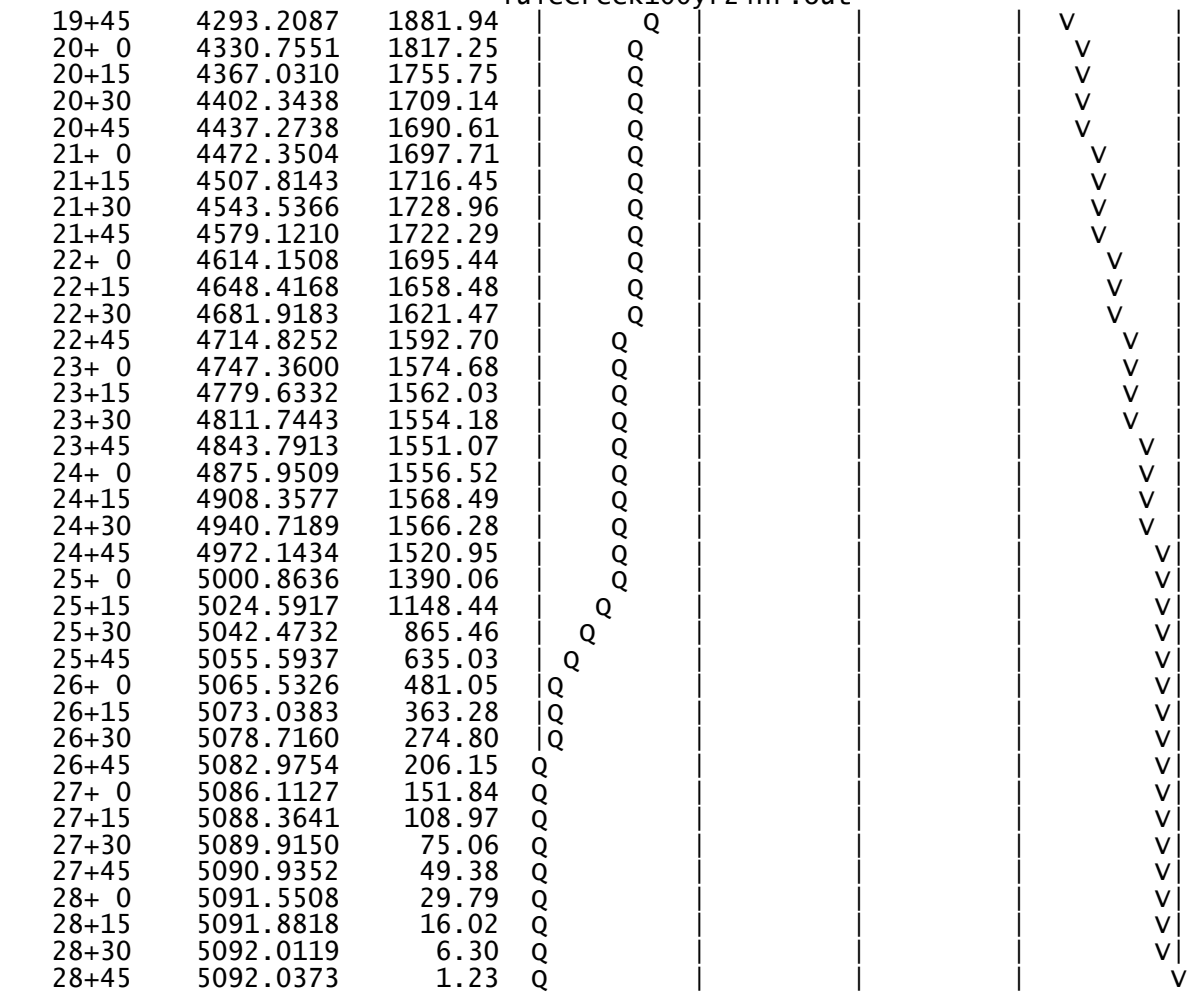
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 15 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	2675.0	5350.0	8025.0	10700.0
0+15	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				

4+ 0	0.0019	0.09	Q
4+15	0.0159	0.68	Q
4+30	0.0714	2.69	Q
4+45	0.2478	8.54	Q
5+ 0	0.7242	23.06	Q
5+15	1.7816	51.18	Q
5+30	3.7263	94.13	Q
5+45	6.8269	150.06	Q
6+ 0	11.3267	217.79	Q
6+15	17.4799	297.82	VQ
6+30	25.5125	388.78	VQ
6+45	35.6298	489.68	VQ
7+ 0	48.0926	603.20	V Q
7+15	63.3048	736.27	V Q
7+30	81.7247	891.52	V Q
7+45	103.9416	1075.30	V Q
8+ 0	130.8543	1302.57	V Q
8+15	163.9683	1602.72	V Q
8+30	205.5170	2010.96	V Q
8+45	258.6877	2573.46	V Q
9+ 0	327.3103	3321.34	V Q
9+15	415.8023	4283.01	V Q
9+30	528.0050	5430.61	V Q
9+45	666.9318	6724.06	V Q
10+ 0	832.9258	8034.11	V Q
10+15	1023.7679	9236.76	V Q
10+30	1233.2342	10138.17	V Q
10+45	1452.3962	10607.44	V Q
11+ 0	1669.6311	10514.17	V Q
11+15	1872.8736	9836.94	V Q
11+30	2055.2682	8827.90	V Q
11+45	2216.2191	7790.03	V Q
12+ 0	2359.0318	6912.14	V Q
12+15	2486.1796	6153.95	V Q
12+30	2600.8314	5549.15	Q
12+45	2704.9228	5038.03	Q V
13+ 0	2800.2662	4614.62	Q V
13+15	2888.2216	4257.04	Q V
13+30	2969.9323	3954.80	Q V
13+45	3046.3265	3697.48	Q V
14+ 0	3118.0403	3470.95	Q V
14+15	3185.6122	3270.48	Q V
14+30	3249.6132	3097.65	Q V
14+45	3310.8196	2962.39	Q V
15+ 0	3370.1471	2871.45	Q V
15+15	3428.3296	2816.03	Q V
15+30	3484.9482	2740.34	Q V
15+45	3538.4002	2587.08	Q V
16+ 0	3588.6542	2432.29	Q V
16+15	3638.0270	2389.64	Q V
16+30	3688.2523	2430.90	Q V
16+45	3738.9835	2455.39	Q V
17+ 0	3789.4956	2444.79	Q V
17+15	3839.5546	2422.86	Q V
17+30	3889.1643	2401.11	Q V
17+45	3938.5381	2389.69	Q V
18+ 0	3987.5111	2370.30	Q V
18+15	4035.3417	2315.00	Q V
18+30	4081.7030	2243.89	Q V
18+45	4126.9702	2190.93	Q V
19+ 0	4171.2077	2141.10	Q V
19+15	4213.7608	2059.57	Q V
19+30	4254.3256	1963.34	Q V



19+45	4293.2087	1881.94	
20+ 0	4330.7551	1817.25	
20+15	4367.0310	1755.75	
20+30	4402.3438	1709.14	
20+45	4437.2738	1690.61	
21+ 0	4472.3504	1697.71	
21+15	4507.8143	1716.45	
21+30	4543.5366	1728.96	
21+45	4579.1210	1722.29	
22+ 0	4614.1508	1695.44	
22+15	4648.4168	1658.48	
22+30	4681.9183	1621.47	
22+45	4714.8252	1592.70	
23+ 0	4747.3600	1574.68	
23+15	4779.6332	1562.03	
23+30	4811.7443	1554.18	
23+45	4843.7913	1551.07	
24+ 0	4875.9509	1556.52	
24+15	4908.3577	1568.49	
24+30	4940.7189	1566.28	
24+45	4972.1434	1520.95	
25+ 0	5000.8636	1390.06	
25+15	5024.5917	1148.44	
25+30	5042.4732	865.46	
25+45	5055.5937	635.03	
26+ 0	5065.5326	481.05	
26+15	5073.0383	363.28	
26+30	5078.7160	274.80	
26+45	5082.9754	206.15	
27+ 0	5086.1127	151.84	
27+15	5088.3641	108.97	
27+30	5089.9150	75.06	
27+45	5090.9352	49.38	
28+ 0	5091.5508	29.79	
28+15	5091.8818	16.02	
28+30	5092.0119	6.30	
28+45	5092.0373	1.23	

U N I T H Y D R O G R A P H A N A L Y S I S

Study date 09/08/10 File: mccain110yr24hr.out

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Program License Serial Number 4055

Tule Wind Project
McCain Valley Crossing 1
Proposed Conditions 10 Yr 24 Hr
Aug 18, 2010

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Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
2185.54	3.50

Rainfall Distribution pattern used in study:
Type B for San Diego area of California

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********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
2185.54	1.000	73.0	73.0	0.050	C

Area-averaged catchment SCS Curve Number AMC(2) = 73.000
Area-averaged Fm value using values listed = 0.050(In/Hr)

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Direct entry of lag time by user
Watershed area =   2185.54(Ac.)
Catchment Lag time =   0.740 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 11.2613
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 73.000

Rainfall depth area reduction factors:
Using a total area of   2185.54(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =   3.500(In)
Adjusted rainfall =   3.500(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 26445.03 (CFS))

0.11	0.083	0.015	49.436	0.002
0.23	0.167	0.036	114.819	0.006
0.34	0.250	0.081	261.213	0.016
0.45	0.333	0.138	445.451	0.033
0.56	0.417	0.243	781.573	0.062
0.68	0.500	0.565	1817.277	0.131
0.79	0.583	0.773	2488.816	0.225
0.90	0.667	1.000	3219.152	0.347
1.01	0.750	0.946	3044.634	0.462
1.13	0.833	0.843	2712.922	0.565
1.24	0.917	0.600	1930.560	0.638
1.35	1.000	0.502	1616.625	0.699
1.46	1.083	0.419	1350.100	0.750
1.58	1.167	0.342	1101.054	0.792
1.69	1.250	0.294	945.183	0.827
1.80	1.333	0.241	775.154	0.857
1.91	1.417	0.209	673.014	0.882
2.03	1.500	0.181	581.741	0.904
2.14	1.583	0.150	483.763	0.922
2.25	1.667	0.133	428.230	0.939
2.36	1.750	0.112	361.739	0.952
2.48	1.833	0.091	293.676	0.963
2.59	1.917	0.078	250.893	0.973
2.70	2.000	0.063	202.425	0.981
2.82	2.083	0.051	163.225	0.987
2.93	2.167	0.040	128.845	0.992
3.04	2.250	0.032	104.310	0.995
3.15	2.333	0.024	76.321	0.998
3.27	2.417	0.010	33.079	1.000
3.38	2.500	0.003	9.801	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0052	0.0000	0.0052	0.0000	0.0052	--------
0.17	0.0105	0.0000	0.0052	0.0000	0.0052	--------
0.25	0.0158	0.0000	0.0053	0.0000	0.0053	--------
0.33	0.0210	0.0000	0.0052	0.0000	0.0052	--------
0.42	0.0262	0.0000	0.0052	0.0000	0.0052	--------
0.50	0.0315	0.0000	0.0053	0.0000	0.0053	--------
0.58	0.0356	0.0000	0.0041	0.0000	0.0041	--------
0.67	0.0397	0.0000	0.0041	0.0000	0.0041	--------
0.75	0.0438	0.0000	0.0041	0.0000	0.0041	--------
0.83	0.0478	0.0000	0.0041	0.0000	0.0041	--------
0.92	0.0519	0.0000	0.0041	0.0000	0.0041	--------
1.00	0.0560	0.0000	0.0041	0.0000	0.0041	--------
1.08	0.0613	0.0000	0.0053	0.0000	0.0053	--------
1.17	0.0665	0.0000	0.0052	0.0000	0.0052	--------
1.25	0.0718	0.0000	0.0053	0.0000	0.0053	--------
1.33	0.0770	0.0000	0.0052	0.0000	0.0052	--------
1.42	0.0823	0.0000	0.0053	0.0000	0.0053	--------
1.50	0.0875	0.0000	0.0053	0.0000	0.0053	--------
1.58	0.0928	0.0000	0.0053	0.0000	0.0053	--------
1.67	0.0980	0.0000	0.0052	0.0000	0.0052	--------
1.75	0.1033	0.0000	0.0053	0.0000	0.0053	--------
1.83	0.1085	0.0000	0.0052	0.0000	0.0052	--------
1.92	0.1138	0.0000	0.0053	0.0000	0.0053	--------
2.00	0.1190	0.0000	0.0053	0.0000	0.0053	--------
2.08	0.1254	0.0000	0.0064	0.0000	0.0064	--------
2.17	0.1318	0.0000	0.0064	0.0000	0.0064	--------
2.25	0.1383	0.0000	0.0064	0.0000	0.0064	--------
2.33	0.1447	0.0000	0.0064	0.0000	0.0064	--------
2.42	0.1511	0.0000	0.0064	0.0000	0.0064	--------
2.50	0.1575	0.0000	0.0064	0.0000	0.0064	--------
2.58	0.1628	0.0000	0.0053	0.0000	0.0053	--------
2.67	0.1680	0.0000	0.0053	0.0000	0.0053	--------
2.75	0.1733	0.0000	0.0053	0.0000	0.0053	--------
2.83	0.1785	0.0000	0.0052	0.0000	0.0052	--------
2.92	0.1838	0.0000	0.0053	0.0000	0.0053	--------
3.00	0.1890	0.0000	0.0053	0.0000	0.0053	--------
3.08	0.1954	0.0000	0.0064	0.0000	0.0064	--------
3.17	0.2018	0.0000	0.0064	0.0000	0.0064	--------
3.25	0.2082	0.0000	0.0064	0.0000	0.0064	--------
3.33	0.2147	0.0000	0.0064	0.0000	0.0064	--------
3.42	0.2211	0.0000	0.0064	0.0000	0.0064	--------
3.50	0.2275	0.0000	0.0064	0.0000	0.0064	--------
3.58	0.2345	0.0000	0.0070	0.0000	0.0070	--------
3.67	0.2415	0.0000	0.0070	0.0000	0.0070	--------
3.75	0.2485	0.0000	0.0070	0.0000	0.0070	--------
3.83	0.2555	0.0000	0.0070	0.0000	0.0070	--------
3.92	0.2625	0.0000	0.0070	0.0000	0.0070	--------
4.00	0.2695	0.0000	0.0070	0.0000	0.0070	--------
4.08	0.2771	0.0000	0.0076	0.0000	0.0076	--------
4.17	0.2847	0.0000	0.0076	0.0000	0.0076	--------
4.25	0.2922	0.0000	0.0076	0.0000	0.0076	--------
4.33	0.2998	0.0000	0.0076	0.0000	0.0076	--------
4.42	0.3074	0.0000	0.0076	0.0000	0.0076	--------
4.50	0.3150	0.0000	0.0076	0.0000	0.0076	--------
4.58	0.3232	0.0000	0.0082	0.0000	0.0082	--------

4.67	0.3313	0.0000	0.0082	0.0000	0.0082	--------
4.75	0.3395	0.0000	0.0082	0.0000	0.0082	--------
4.83	0.3477	0.0000	0.0082	0.0000	0.0082	--------
4.92	0.3558	0.0000	0.0082	0.0000	0.0082	--------
5.00	0.3640	0.0000	0.0082	0.0000	0.0082	--------
5.08	0.3733	0.0000	0.0093	0.0000	0.0093	--------
5.17	0.3827	0.0000	0.0093	0.0000	0.0093	--------
5.25	0.3920	0.0000	0.0093	0.0000	0.0093	--------
5.33	0.4013	0.0000	0.0093	0.0000	0.0093	--------
5.42	0.4107	0.0000	0.0093	0.0000	0.0093	--------
5.50	0.4200	0.0000	0.0093	0.0000	0.0093	--------
5.58	0.4299	0.0000	0.0099	0.0000	0.0099	--------
5.67	0.4398	0.0000	0.0099	0.0000	0.0099	--------
5.75	0.4497	0.0000	0.0099	0.0000	0.0099	--------
5.83	0.4597	0.0000	0.0099	0.0000	0.0099	--------
5.92	0.4696	0.0000	0.0099	0.0000	0.0099	--------
6.00	0.4795	0.0000	0.0099	0.0000	0.0099	--------
6.08	0.4912	0.0000	0.0117	0.0000	0.0117	--------
6.17	0.5028	0.0000	0.0117	0.0000	0.0117	--------
6.25	0.5145	0.0000	0.0117	0.0000	0.0117	--------
6.33	0.5262	0.0000	0.0117	0.0000	0.0117	--------
6.42	0.5378	0.0000	0.0117	0.0000	0.0117	--------
6.50	0.5495	0.0000	0.0117	0.0000	0.0117	--------
6.58	0.5629	0.0000	0.0134	0.0000	0.0134	--------
6.67	0.5763	0.0000	0.0134	0.0000	0.0134	--------
6.75	0.5898	0.0000	0.0134	0.0000	0.0134	--------
6.83	0.6032	0.0000	0.0134	0.0000	0.0134	--------
6.92	0.6166	0.0000	0.0134	0.0000	0.0134	--------
7.00	0.6300	0.0000	0.0134	0.0000	0.0134	--------
7.08	0.6475	0.0000	0.0175	0.0000	0.0175	--------
7.17	0.6650	0.0000	0.0175	0.0000	0.0175	--------
7.25	0.6825	0.0000	0.0175	0.0000	0.0175	--------
7.33	0.7000	0.0000	0.0175	0.0000	0.0175	--------
7.42	0.7175	0.0000	0.0175	0.0000	0.0175	--------
7.50	0.7350	0.0000	0.0175	0.0000	0.0175	--------
7.58	0.7612	0.0001	0.0262	0.0001	0.0261	--------
7.67	0.7875	0.0006	0.0262	0.0005	0.0258	--------
7.75	0.8137	0.0015	0.0262	0.0008	0.0254	--------
7.83	0.8400	0.0026	0.0262	0.0012	0.0251	--------
7.92	0.8662	0.0042	0.0262	0.0015	0.0247	--------
8.00	0.8925	0.0061	0.0263	0.0019	0.0244	--------
8.08	0.9316	0.0095	0.0391	0.0034	0.0357	--------
8.17	0.9707	0.0136	0.0391	0.0041	0.0350	--------
8.25	1.0097	0.0184	0.0391	0.0048	0.0343	--------
8.33	1.0488	0.0238	0.0391	0.0055	0.0336	--------
8.42	1.0879	0.0300	0.0391	0.0061	0.0330	--------
8.50	1.1270	0.0367	0.0391	0.0067	0.0323	--------
8.58	1.1783	0.0465	0.0513	0.0098	0.0415	--------
8.67	1.2297	0.0573	0.0513	0.0108	0.0405	--------
8.75	1.2810	0.0691	0.0513	0.0118	0.0395	--------
8.83	1.3323	0.0818	0.0513	0.0127	0.0386	--------
8.92	1.3837	0.0955	0.0513	0.0136	0.0377	--------
9.00	1.4350	0.1100	0.0513	0.0145	0.0368	--------
9.08	1.4910	0.1268	0.0560	0.0168	0.0392	--------
9.17	1.5470	0.1446	0.0560	0.0178	0.0382	--------
9.25	1.6030	0.1634	0.0560	0.0187	0.0373	--------
9.33	1.6590	0.1830	0.0560	0.0196	0.0364	--------
9.42	1.7150	0.2035	0.0560	0.0205	0.0355	--------
9.50	1.7710	0.2249	0.0560	0.0213	0.0347	--------
9.58	1.8188	0.2437	0.0478	0.0189	0.0290	--------
9.67	1.8667	0.2632	0.0478	0.0195	0.0284	--------
9.75	1.9145	0.2832	0.0478	0.0200	0.0278	--------
9.83	1.9623	0.3037	0.0478	0.0205	0.0273	--------

9.92	2.0102	0.3248	0.0478	0.0211	0.0268	--------
10.00	2.0580	0.3464	0.0478	0.0216	0.0262	--------
10.08	2.0819	0.3574	0.0239	0.0110	0.0129	--------
10.17	2.1058	0.3685	0.0239	0.0111	0.0128	--------
10.25	2.1298	0.3797	0.0239	0.0112	0.0127	--------
10.33	2.1537	0.3910	0.0239	0.0113	0.0126	--------
10.42	2.1776	0.4025	0.0239	0.0115	0.0125	--------
10.50	2.2015	0.4141	0.0239	0.0116	0.0123	--------
10.58	2.2172	0.4218	0.0157	0.0077	0.0081	--------
10.67	2.2330	0.4295	0.0158	0.0077	0.0080	--------
10.75	2.2488	0.4373	0.0158	0.0078	0.0080	--------
10.83	2.2645	0.4451	0.0157	0.0078	0.0079	--------
10.92	2.2802	0.4530	0.0157	0.0079	0.0079	--------
11.00	2.2960	0.4609	0.0158	0.0079	0.0078	--------
11.08	2.3094	0.4677	0.0134	0.0068	0.0066	--------
11.17	2.3228	0.4745	0.0134	0.0068	0.0066	--------
11.25	2.3362	0.4814	0.0134	0.0069	0.0066	--------
11.33	2.3497	0.4882	0.0134	0.0069	0.0065	--------
11.42	2.3631	0.4952	0.0134	0.0069	0.0065	--------
11.50	2.3765	0.5021	0.0134	0.0070	0.0065	--------
11.58	2.3887	0.5085	0.0122	0.0064	0.0059	--------
11.67	2.4010	0.5149	0.0123	0.0064	0.0058	--------
11.75	2.4133	0.5213	0.0122	0.0064	0.0058	--------
11.83	2.4255	0.5278	0.0122	0.0065	0.0058	--------
11.92	2.4377	0.5343	0.0122	0.0065	0.0058	--------
12.00	2.4500	0.5408	0.0122	0.0065	0.0057	--------
12.08	2.4617	0.5470	0.0117	0.0062	0.0054	--------
12.17	2.4733	0.5533	0.0117	0.0062	0.0054	--------
12.25	2.4850	0.5595	0.0117	0.0063	0.0054	--------
12.33	2.4967	0.5658	0.0117	0.0063	0.0054	--------
12.42	2.5083	0.5721	0.0117	0.0063	0.0054	--------
12.50	2.5200	0.5785	0.0117	0.0063	0.0053	--------
12.58	2.5311	0.5845	0.0111	0.0060	0.0050	--------
12.67	2.5422	0.5906	0.0111	0.0061	0.0050	--------
12.75	2.5533	0.5967	0.0111	0.0061	0.0050	--------
12.83	2.5643	0.6028	0.0111	0.0061	0.0050	--------
12.92	2.5754	0.6089	0.0111	0.0061	0.0050	--------
13.00	2.5865	0.6150	0.0111	0.0061	0.0049	--------
13.08	2.5964	0.6205	0.0099	0.0055	0.0044	--------
13.17	2.6063	0.6261	0.0099	0.0055	0.0044	--------
13.25	2.6163	0.6316	0.0099	0.0055	0.0044	--------
13.33	2.6262	0.6372	0.0099	0.0056	0.0044	--------
13.42	2.6361	0.6427	0.0099	0.0056	0.0043	--------
13.50	2.6460	0.6483	0.0099	0.0056	0.0043	--------
13.58	2.6553	0.6536	0.0093	0.0053	0.0041	--------
13.67	2.6647	0.6589	0.0093	0.0053	0.0040	--------
13.75	2.6740	0.6642	0.0093	0.0053	0.0040	--------
13.83	2.6833	0.6695	0.0093	0.0053	0.0040	--------
13.92	2.6927	0.6749	0.0093	0.0053	0.0040	--------
14.00	2.7020	0.6802	0.0093	0.0053	0.0040	--------
14.08	2.7125	0.6862	0.0105	0.0060	0.0045	--------
14.17	2.7230	0.6923	0.0105	0.0060	0.0045	--------
14.25	2.7335	0.6983	0.0105	0.0061	0.0044	--------
14.33	2.7440	0.7044	0.0105	0.0061	0.0044	--------
14.42	2.7545	0.7105	0.0105	0.0061	0.0044	--------
14.50	2.7650	0.7166	0.0105	0.0061	0.0044	--------
14.58	2.7708	0.7200	0.0058	0.0034	0.0024	--------
14.67	2.7767	0.7234	0.0058	0.0034	0.0024	--------
14.75	2.7825	0.7268	0.0058	0.0034	0.0024	--------
14.83	2.7883	0.7302	0.0058	0.0034	0.0024	--------
14.92	2.7942	0.7336	0.0058	0.0034	0.0024	--------
15.00	2.8000	0.7371	0.0058	0.0034	0.0024	--------
15.08	2.8093	0.7426	0.0093	0.0055	0.0038	--------

15.17	2.8187	0.7481	0.0093	0.0055	0.0038	--------
15.25	2.8280	0.7536	0.0093	0.0055	0.0038	--------
15.33	2.8373	0.7591	0.0093	0.0055	0.0038	--------
15.42	2.8467	0.7646	0.0093	0.0055	0.0038	--------
15.50	2.8560	0.7702	0.0093	0.0056	0.0038	--------
15.58	2.8647	0.7754	0.0088	0.0052	0.0035	--------
15.67	2.8735	0.7806	0.0088	0.0052	0.0035	--------
15.75	2.8822	0.7859	0.0087	0.0052	0.0035	--------
15.83	2.8910	0.7911	0.0088	0.0052	0.0035	--------
15.92	2.8997	0.7964	0.0087	0.0053	0.0035	--------
16.00	2.9085	0.8016	0.0088	0.0053	0.0035	--------
16.08	2.9167	0.8066	0.0082	0.0049	0.0032	--------
16.17	2.9248	0.8115	0.0082	0.0049	0.0032	--------
16.25	2.9330	0.8165	0.0082	0.0049	0.0032	--------
16.33	2.9412	0.8214	0.0082	0.0050	0.0032	--------
16.42	2.9493	0.8264	0.0082	0.0050	0.0032	--------
16.50	2.9575	0.8313	0.0082	0.0050	0.0032	--------
16.58	2.9662	0.8367	0.0087	0.0053	0.0034	--------
16.67	2.9750	0.8420	0.0088	0.0053	0.0034	--------
16.75	2.9838	0.8474	0.0088	0.0054	0.0034	--------
16.83	2.9925	0.8527	0.0087	0.0054	0.0034	--------
16.92	3.0012	0.8581	0.0088	0.0054	0.0034	--------
17.00	3.0100	0.8635	0.0088	0.0054	0.0034	--------
17.08	3.0170	0.8678	0.0070	0.0043	0.0027	--------
17.17	3.0240	0.8721	0.0070	0.0043	0.0027	--------
17.25	3.0310	0.8765	0.0070	0.0043	0.0027	--------
17.33	3.0380	0.8808	0.0070	0.0043	0.0027	--------
17.42	3.0450	0.8851	0.0070	0.0043	0.0027	--------
17.50	3.0520	0.8895	0.0070	0.0043	0.0027	--------
17.58	3.0596	0.8942	0.0076	0.0047	0.0029	--------
17.67	3.0672	0.8989	0.0076	0.0047	0.0029	--------
17.75	3.0748	0.9037	0.0076	0.0047	0.0029	--------
17.83	3.0823	0.9084	0.0076	0.0047	0.0028	--------
17.92	3.0899	0.9131	0.0076	0.0047	0.0028	--------
18.00	3.0975	0.9179	0.0076	0.0048	0.0028	--------
18.08	3.1033	0.9215	0.0058	0.0037	0.0022	--------
18.17	3.1092	0.9252	0.0058	0.0037	0.0022	--------
18.25	3.1150	0.9289	0.0058	0.0037	0.0022	--------
18.33	3.1208	0.9326	0.0058	0.0037	0.0022	--------
18.42	3.1267	0.9362	0.0058	0.0037	0.0022	--------
18.50	3.1325	0.9399	0.0058	0.0037	0.0022	--------
18.58	3.1383	0.9436	0.0058	0.0037	0.0021	--------
18.67	3.1442	0.9473	0.0058	0.0037	0.0021	--------
18.75	3.1500	0.9510	0.0058	0.0037	0.0021	--------
18.83	3.1558	0.9547	0.0058	0.0037	0.0021	--------
18.92	3.1617	0.9584	0.0058	0.0037	0.0021	--------
19.00	3.1675	0.9621	0.0058	0.0037	0.0021	--------
19.08	3.1728	0.9654	0.0053	0.0033	0.0019	--------
19.17	3.1780	0.9688	0.0052	0.0033	0.0019	--------
19.25	3.1833	0.9721	0.0053	0.0033	0.0019	--------
19.33	3.1885	0.9755	0.0053	0.0033	0.0019	--------
19.42	3.1938	0.9788	0.0052	0.0034	0.0019	--------
19.50	3.1990	0.9822	0.0053	0.0034	0.0019	--------
19.58	3.2048	0.9859	0.0058	0.0037	0.0021	--------
19.67	3.2107	0.9896	0.0058	0.0037	0.0021	--------
19.75	3.2165	0.9934	0.0058	0.0037	0.0021	--------
19.83	3.2223	0.9971	0.0058	0.0037	0.0021	--------
19.92	3.2282	1.0009	0.0058	0.0037	0.0021	--------
20.00	3.2340	1.0046	0.0058	0.0038	0.0021	--------
20.08	3.2404	1.0087	0.0064	0.0041	0.0023	--------
20.17	3.2468	1.0129	0.0064	0.0041	0.0023	--------
20.25	3.2533	1.0170	0.0064	0.0041	0.0023	--------
20.33	3.2597	1.0212	0.0064	0.0041	0.0023	--------

20.42	3.2661	1.0253	0.0064	0.0041	0.0023 --------
20.50	3.2725	1.0295	0.0064	0.0042	0.0023 --------
20.58	3.2783	1.0332	0.0058	0.0038	0.0021 --------
20.67	3.2842	1.0370	0.0058	0.0038	0.0020 --------
20.75	3.2900	1.0408	0.0058	0.0038	0.0020 --------
20.83	3.2958	1.0446	0.0058	0.0038	0.0020 --------
20.92	3.3017	1.0484	0.0058	0.0038	0.0020 --------
21.00	3.3075	1.0522	0.0058	0.0038	0.0020 --------
21.08	3.3127	1.0556	0.0052	0.0034	0.0018 --------
21.17	3.3180	1.0590	0.0053	0.0034	0.0018 --------
21.25	3.3232	1.0625	0.0053	0.0034	0.0018 --------
21.33	3.3285	1.0659	0.0053	0.0034	0.0018 --------
21.42	3.3337	1.0693	0.0052	0.0034	0.0018 --------
21.50	3.3390	1.0728	0.0053	0.0034	0.0018 --------
21.58	3.3443	1.0762	0.0053	0.0034	0.0018 --------
21.67	3.3495	1.0797	0.0052	0.0034	0.0018 --------
21.75	3.3547	1.0831	0.0052	0.0034	0.0018 --------
21.83	3.3600	1.0866	0.0053	0.0034	0.0018 --------
21.92	3.3652	1.0900	0.0052	0.0035	0.0018 --------
22.00	3.3705	1.0935	0.0053	0.0035	0.0018 --------
22.08	3.3757	1.0969	0.0052	0.0035	0.0018 --------
22.17	3.3810	1.1004	0.0053	0.0035	0.0018 --------
22.25	3.3863	1.1038	0.0053	0.0035	0.0018 --------
22.33	3.3915	1.1073	0.0052	0.0035	0.0018 --------
22.42	3.3967	1.1108	0.0053	0.0035	0.0018 --------
22.50	3.4020	1.1143	0.0053	0.0035	0.0018 --------
22.58	3.4073	1.1177	0.0053	0.0035	0.0018 --------
22.67	3.4125	1.1212	0.0052	0.0035	0.0018 --------
22.75	3.4177	1.1247	0.0052	0.0035	0.0018 --------
22.83	3.4230	1.1282	0.0053	0.0035	0.0018 --------
22.92	3.4282	1.1317	0.0052	0.0035	0.0018 --------
23.00	3.4335	1.1352	0.0053	0.0035	0.0018 --------
23.08	3.4393	1.1390	0.0058	0.0039	0.0020 --------
23.17	3.4452	1.1429	0.0058	0.0039	0.0019 --------
23.25	3.4510	1.1468	0.0058	0.0039	0.0019 --------
23.33	3.4568	1.1507	0.0058	0.0039	0.0019 --------
23.42	3.4627	1.1546	0.0058	0.0039	0.0019 --------
23.50	3.4685	1.1585	0.0058	0.0039	0.0019 --------
23.58	3.4737	1.1620	0.0052	0.0035	0.0017 --------
23.67	3.4790	1.1655	0.0053	0.0035	0.0017 --------
23.75	3.4843	1.1691	0.0053	0.0035	0.0017 --------
23.83	3.4895	1.1726	0.0052	0.0035	0.0017 --------
23.92	3.4947	1.1761	0.0052	0.0035	0.0017 --------
24.00	3.5000	1.1796	0.0053	0.0035	0.0017 --------

Total soil rain loss = 2.32(In)
Total effective runoff = 1.18(In)

Peak flow rate this hydrograph = 487.34(CFS)
Total runoff volume this hydrograph = 9358600.9(Ft3)

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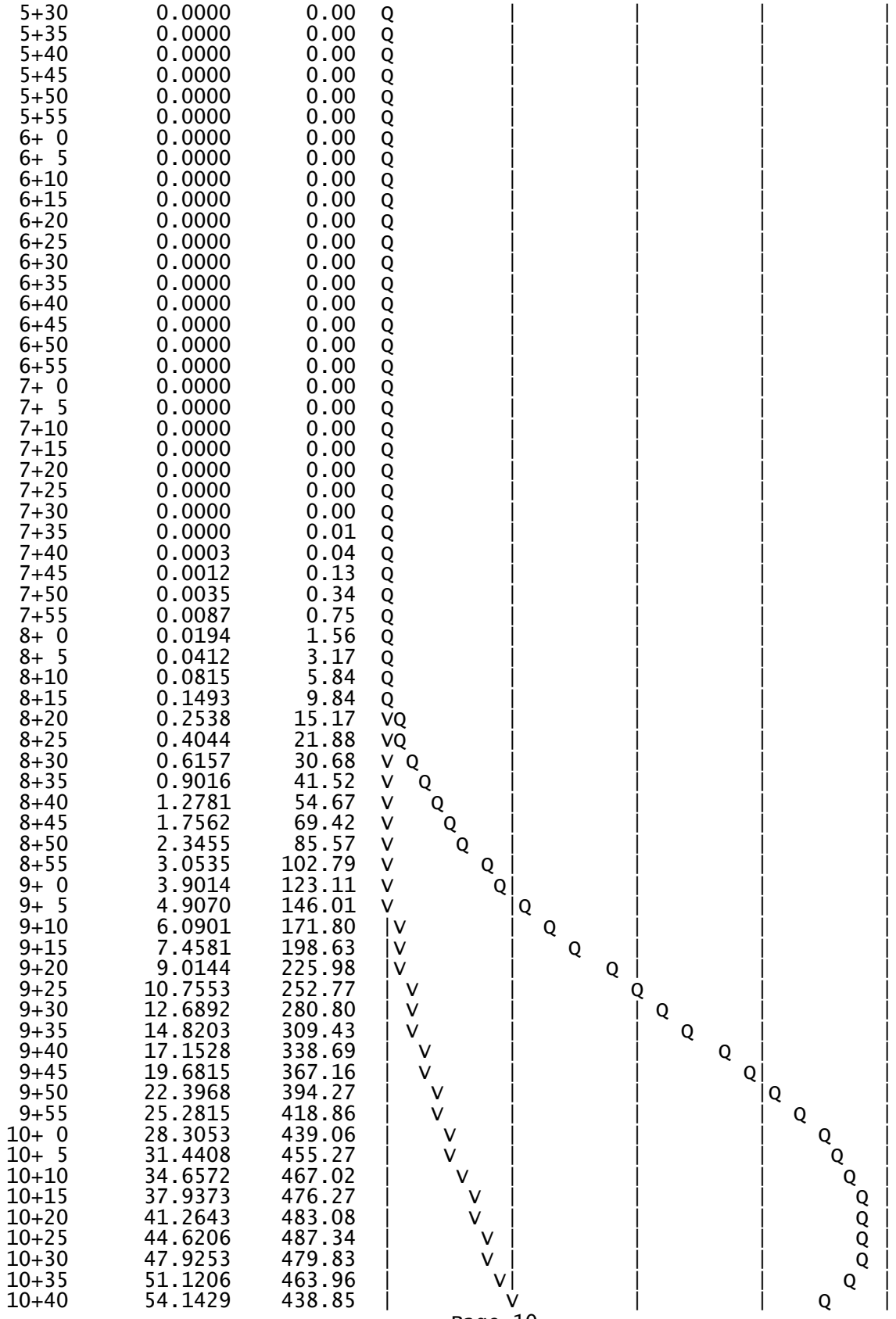
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	125.0	250.0	375.0	500.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0000	0.00	Q	|	|	|	|

0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				
5+25	0.0000	0.00	Q				



5+30	0.0000	0.00	Q
5+35	0.0000	0.00	Q
5+40	0.0000	0.00	Q
5+45	0.0000	0.00	Q
5+50	0.0000	0.00	Q
5+55	0.0000	0.00	Q
6+ 0	0.0000	0.00	Q
6+ 5	0.0000	0.00	Q
6+10	0.0000	0.00	Q
6+15	0.0000	0.00	Q
6+20	0.0000	0.00	Q
6+25	0.0000	0.00	Q
6+30	0.0000	0.00	Q
6+35	0.0000	0.00	Q
6+40	0.0000	0.00	Q
6+45	0.0000	0.00	Q
6+50	0.0000	0.00	Q
6+55	0.0000	0.00	Q
7+ 0	0.0000	0.00	Q
7+ 5	0.0000	0.00	Q
7+10	0.0000	0.00	Q
7+15	0.0000	0.00	Q
7+20	0.0000	0.00	Q
7+25	0.0000	0.00	Q
7+30	0.0000	0.00	Q
7+35	0.0000	0.01	Q
7+40	0.0003	0.04	Q
7+45	0.0012	0.13	Q
7+50	0.0035	0.34	Q
7+55	0.0087	0.75	Q
8+ 0	0.0194	1.56	Q
8+ 5	0.0412	3.17	Q
8+10	0.0815	5.84	Q
8+15	0.1493	9.84	Q
8+20	0.2538	15.17	VQ
8+25	0.4044	21.88	VQ
8+30	0.6157	30.68	V Q
8+35	0.9016	41.52	V Q
8+40	1.2781	54.67	V Q
8+45	1.7562	69.42	V Q
8+50	2.3455	85.57	V Q
8+55	3.0535	102.79	V Q
9+ 0	3.9014	123.11	V Q
9+ 5	4.9070	146.01	V Q
9+10	6.0901	171.80	V Q
9+15	7.4581	198.63	V Q
9+20	9.0144	225.98	V Q
9+25	10.7553	252.77	V Q
9+30	12.6892	280.80	V Q
9+35	14.8203	309.43	V Q
9+40	17.1528	338.69	V Q
9+45	19.6815	367.16	V Q
9+50	22.3968	394.27	V Q
9+55	25.2815	418.86	V Q
10+ 0	28.3053	439.06	V Q
10+ 5	31.4408	455.27	V Q
10+10	34.6572	467.02	V Q
10+15	37.9373	476.27	V Q
10+20	41.2643	483.08	V Q
10+25	44.6206	487.34	V Q
10+30	47.9253	479.83	V Q
10+35	51.1206	463.96	V Q
10+40	54.1429	438.85	V Q

10+45	56.9924	413.75	V Q
10+50	59.6813	390.42	V Q
10+55	62.2515	373.20	V Q
11+ 0	64.6923	354.40	V Q
11+ 5	66.9999	335.06	V Q
11+10	69.1672	314.70	V Q
11+15	71.2054	295.95	V Q
11+20	73.1314	279.66	V Q
11+25	74.9682	266.69	V Q
11+30	76.7201	254.38	V Q
11+35	78.3942	243.07	V Q
11+40	79.9932	232.19	V Q
11+45	81.5258	222.53	V Q
11+50	83.0022	214.38	V Q
11+55	84.4329	207.74	VQ
12+ 0	85.8215	201.62	VQ
12+ 5	87.1720	196.09	QV
12+10	88.4865	190.86	QV
12+15	89.7695	186.30	Q V
12+20	91.0268	182.56	Q V
12+25	92.2656	179.88	Q V
12+30	93.4886	177.58	Q V
12+35	94.6976	175.55	Q V
12+40	95.8931	173.59	Q V
12+45	97.0769	171.88	Q V
12+50	98.2510	170.48	Q V
12+55	99.4181	169.47	Q V
13+ 0	100.5781	168.43	Q V
13+ 5	101.7306	167.34	Q V
13+10	102.8746	166.11	Q V
13+15	104.0106	164.95	Q V
13+20	105.1393	163.88	Q V
13+25	106.2614	162.94	Q V
13+30	107.3736	161.49	Q V
13+35	108.4736	159.72	Q V
13+40	109.5588	157.56	Q V
13+45	110.6299	155.53	Q V
13+50	111.6887	153.73	Q V
13+55	112.7381	152.38	Q V
14+ 0	113.7776	150.93	Q V
14+ 5	114.8073	149.51	Q V
14+10	115.8270	148.07	Q V
14+15	116.8387	146.89	Q V
14+20	117.8448	146.08	Q V
14+25	118.8492	145.84	Q V
14+30	119.8580	146.48	Q V
14+35	120.8744	147.59	Q V
14+40	121.9016	149.15	Q V
14+45	122.9367	150.29	Q V
14+50	123.9755	150.83	Q V
14+55	125.0085	150.00	Q V
15+ 0	126.0154	146.20	Q V
15+ 5	126.9833	140.54	Q V
15+10	127.8983	132.87	Q V
15+15	128.7652	125.87	Q V
15+20	129.5921	120.06	Q V
15+25	130.3980	117.02	Q V
15+30	131.2032	116.92	Q V
15+35	132.0218	118.86	Q V
15+40	132.8685	122.94	Q V
15+45	133.7432	127.01	Q V
15+50	134.6438	130.77	Q V
15+55	135.5604	133.08	Q V

16+ 0	136.4875	134.61	Q V
16+ 5	137.4213	135.59	Q V
16+10	138.3572	135.90	Q V
16+15	139.2943	136.07	Q V
16+20	140.2317	136.10	Q V
16+25	141.1694	136.16	Q V
16+30	142.1052	135.88	Q V
16+35	143.0376	135.38	Q V
16+40	143.9653	134.70	Q V
16+45	144.8890	134.12	Q V
16+50	145.8098	133.71	Q V
16+55	146.7310	133.75	Q V
17+ 0	147.6557	134.27	Q V
17+ 5	148.5858	135.05	Q V
17+10	149.5228	136.05	Q V
17+15	150.4654	136.87	Q V
17+20	151.4116	137.39	Q V
17+25	152.3567	137.23	Q V
17+30	153.2923	135.84	Q V
17+35	154.2129	133.67	Q V
17+40	155.1129	130.67	Q V
17+45	155.9936	127.88	Q V
17+50	156.8577	125.47	Q V
17+55	157.7118	124.02	Q| V
18+ 0	158.5607	123.26	Q| V
18+ 5	159.4076	122.96	Q| V
18+10	160.2555	123.12	Q| V
18+15	161.1040	123.20	Q| V
18+20	161.9519	123.13	Q| V
18+25	162.7957	122.51	Q| V
18+30	163.6271	120.72	Q| V
18+35	164.4411	118.20	Q| V
18+40	165.2319	114.81	Q| V
18+45	166.0006	111.62	Q | V
18+50	166.7498	108.78	Q | |V
18+55	167.4853	106.79	Q | |V
19+ 0	168.2094	105.15	Q | |V
19+ 5	168.9242	103.78	Q | |V
19+10	169.6313	102.67	Q | |V
19+15	170.3316	101.68	Q | |V
19+20	171.0258	100.81	Q | |V
19+25	171.7142	99.95	Q | |V
19+30	172.3948	98.82	Q | | V
19+35	173.0666	97.55	Q | | V
19+40	173.7284	96.09	Q | | V
19+45	174.3813	94.80	Q | | V
19+50	175.0271	93.77	Q | | V
19+55	175.6688	93.18	Q | | V
20+ 0	176.3102	93.13	Q | | V
20+ 5	176.9541	93.50	Q | | V
20+10	177.6035	94.29	Q | | V
20+15	178.2589	95.16	Q | | V
20+20	178.9205	96.06	Q | | V
20+25	179.5878	96.89	Q | | V
20+30	180.2631	98.05	Q | | V
20+35	180.9477	99.40	Q | | V
20+40	181.6427	100.92	Q | | V
20+45	182.3472	102.29	Q | | V
20+50	183.0596	103.44	Q | | V
20+55	183.7768	104.14	Q | | V
21+ 0	184.4952	104.31	Q | | V
21+ 5	185.2121	104.09	Q | | V
21+10	185.9247	103.47	Q | | V

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21+15     186.6326    102.78  |        Q |          |          |    V     |
21+20     187.3355    102.07  |        Q |          |          |    V     |
21+25     188.0344    101.48  |        Q |          |          |     V    |
21+30     188.7271    100.57  |        Q |          |          |     V    |
21+35     189.4121     99.46  |       Q  |          |          |     V    |
21+40     190.0879     98.13  |       Q  |          |          |     V    |
21+45     190.7552     96.89  |       Q  |          |          |     V    |
21+50     191.4149     95.79  |       Q  |          |          |     V    |
21+55     192.0692     95.00  |       Q  |          |          |     V    |
22+ 0     192.7189     94.34  |       Q  |          |          |     V    |
22+ 5     193.3648     93.79  |       Q  |          |          |      V   |
22+10     194.0077     93.34  |       Q  |          |          |      V   |
22+15     194.6480     92.97  |       Q  |          |          |      V   |
22+20     195.2863     92.68  |       Q  |          |          |      V   |
22+25     195.9228     92.42  |       Q  |          |          |      V   |
22+30     196.5579     92.21  |       Q  |          |          |      V   |
22+35     197.1919     92.05  |       Q  |          |          |      V   |
22+40     197.8249     91.92  |       Q  |          |          |      V   |
22+45     198.4573     91.82  |       Q  |          |          |      V   |
22+50     199.0892     91.76  |       Q  |          |          |       V  |
22+55     199.7210     91.73  |       Q  |          |          |       V  |
23+ 0     200.3528     91.73  |       Q  |          |          |       V  |
23+ 5     200.9848     91.77  |       Q  |          |          |       V  |
23+10     201.6173     91.84  |       Q  |          |          |       V  |
23+15     202.2507     91.98  |       Q  |          |          |       V  |
23+20     202.8857     92.20  |       Q  |          |          |       V  |
23+25     203.5233     92.57  |       Q  |          |          |       V  |
23+30     204.1662     93.35  |       Q  |          |          |        V |
23+35     204.8162     94.38  |       Q  |          |          |        V |
23+40     205.4750     95.66  |       Q  |          |          |        V |
23+45     206.1419     96.83  |       Q  |          |          |        V |
23+50     206.8154     97.79  |       Q  |          |          |        V |
23+55     207.4925     98.32  |       Q  |          |          |        V |
24+ 0     208.1697     98.33  |       Q  |          |          |        V |
24+ 5     208.8432     97.79  |       Q  |          |          |        V |
24+10     209.5088     96.64  |       Q  |          |          |         V|
24+15     210.1629     94.98  |       Q  |          |          |         V|
24+20     210.8016     92.73  |       Q  |          |          |         V|
24+25     211.4184     89.56  |       Q  |          |          |         V|
24+30     211.9887     82.81  |      Q   |          |          |         V|
24+35     212.4966     73.76  |    Q     |          |          |         V|
24+40     212.9249     62.19  |   Q      |          |          |         V|
24+45     213.2780     51.27  |   Q      |          |          |         V|
24+50     213.5641     41.54  |  Q       |          |          |         V|
24+55     213.8024     34.60  | Q        |          |          |         V|
25+ 0     214.0006     28.77  | Q        |          |          |         V|
25+ 5     214.1652     23.90  |Q         |          |          |         V|
25+10     214.3024     19.92  |Q         |          |          |         V|
25+15     214.4160     16.50  |Q         |          |          |         V|
25+20     214.5103     13.69  |Q         |          |          |         V|
25+25     214.5878     11.24  Q          |          |          |         V|
25+30     214.6506      9.12  Q          |          |          |         V|
25+35     214.7013      7.36  Q          |          |          |         V|
25+40     214.7413      5.80  Q          |          |          |         V|
25+45     214.7722      4.49  Q          |          |          |         V|
25+50     214.7958      3.43  Q          |          |          |         V|
25+55     214.8133      2.53  Q          |          |          |         V|
26+ 0     214.8258      1.82  Q          |          |          |         V|
26+ 5     214.8343      1.24  Q          |          |          |         V|
26+10     214.8397      0.79  Q          |          |          |         V|
26+15     214.8426      0.42  Q          |          |          |         V|
26+20     214.8437      0.15  Q          |          |          |         V|
26+25     214.8439      0.03  Q          |          |          |         V|
```

U N I T H Y D R O G R A P H A N A L Y S I S

Study date 09/08/10 File: mccain1100yr6hr.out

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Program License Serial Number 4055

Tule Wind Project
McCain Valley Crossing 1
Proposed Conditions 100 Yr 6 Hr
Aug 18, 2010

++

Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
2185.54	3.00

Rainfall Distribution pattern used in study:
Type B for SCS (small dam) or San Diego 6 hour storms

++

********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
2185.54	1.000	83.0	83.0	0.050	C

Area-averaged catchment SCS Curve Number AMC(2) = 83.000
Area-averaged Fm value using values listed = 0.050(In/Hr)

++
Direct entry of lag time by user
Watershed area =   2185.54(Ac.)
Catchment Lag time =   0.741 hours
Unit interval = 10.000 minutes
Unit interval percentage of lag time = 22.4891
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 83.000

Rainfall depth area reduction factors:
Using a total area of   2185.54(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =   3.000(In)
Adjusted rainfall =   3.000(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 13222.52 (CFS))

0.22	0.167	0.018	53.297	0.004
0.45	0.333	0.090	269.647	0.024
0.67	0.500	0.317	951.082	0.096
0.90	0.667	0.830	2493.845	0.285
1.12	0.833	1.000	3004.378	0.512
1.35	1.000	0.683	2051.942	0.667
1.57	1.167	0.452	1356.495	0.770
1.80	1.333	0.314	943.597	0.841
2.02	1.500	0.226	677.512	0.893
2.25	1.667	0.165	495.581	0.930
2.47	1.833	0.121	362.569	0.957
2.70	2.000	0.083	250.591	0.976
2.92	2.167	0.055	165.696	0.989
3.15	2.333	0.035	104.329	0.997
3.37	2.500	0.013	39.231	1.000
3.60	2.667	0.001	2.725	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.17	0.0350	0.0000	0.0350	0.0000	0.0350	--------
0.33	0.0700	0.0000	0.0350	0.0000	0.0350	--------
0.50	0.1050	0.0000	0.0350	0.0000	0.0350	--------
0.67	0.1520	0.0000	0.0470	0.0000	0.0470	--------
0.83	0.1990	0.0000	0.0470	0.0000	0.0470	--------
1.00	0.2460	0.0000	0.0470	0.0000	0.0470	--------

1.17	0.3040	0.0000	0.0580	0.0000	0.0580
1.33	0.3620	0.0000	0.0580	0.0000	0.0580
1.50	0.4200	0.0001	0.0580	0.0001	0.0579
1.67	0.5100	0.0047	0.0900	0.0046	0.0854
1.83	0.6000	0.0162	0.0900	0.0115	0.0785
2.00	0.6900	0.0338	0.0900	0.0176	0.0724
2.17	1.0600	0.1567	0.3700	0.1230	0.2470
2.33	1.4300	0.3393	0.3700	0.1826	0.1874
2.50	1.8000	0.5622	0.3700	0.2229	0.1471
2.67	1.9000	0.6277	0.1000	0.0655	0.0345
2.83	2.0000	0.6951	0.1000	0.0674	0.0326
3.00	2.1000	0.7643	0.1000	0.0692	0.0308
3.17	2.1810	0.8215	0.0810	0.0572	0.0238
3.33	2.2620	0.8797	0.0810	0.0582	0.0228
3.50	2.3430	0.9388	0.0810	0.0591	0.0219
3.67	2.3970	0.9787	0.0540	0.0399	0.0141
3.83	2.4510	1.0190	0.0540	0.0403	0.0137
4.00	2.5050	1.0596	0.0540	0.0406	0.0134
4.17	2.5500	1.0937	0.0450	0.0341	0.0109
4.33	2.5950	1.1281	0.0450	0.0344	0.0106
4.50	2.6400	1.1627	0.0450	0.0346	0.0104
4.67	2.6830	1.1959	0.0430	0.0332	0.0098
4.83	2.7260	1.2293	0.0430	0.0334	0.0096
5.00	2.7690	1.2630	0.0430	0.0336	0.0094
5.17	2.8060	1.2920	0.0370	0.0291	0.0079
5.33	2.8430	1.3212	0.0370	0.0292	0.0078
5.50	2.8800	1.3506	0.0370	0.0293	0.0077
5.67	2.9200	1.3824	0.0400	0.0319	0.0081
5.83	2.9600	1.4144	0.0400	0.0320	0.0080
6.00	3.0000	1.4466	0.0400	0.0321	0.0079

Total soil rain loss = 1.55(In)
Total effective runoff = 1.45(In)

Peak flow rate this hydrograph = 1486.97(CFS)
Total runoff volume this hydrograph = 11476342.0(Ft3)

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6 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 10 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	375.0	750.0	1125.0	1500.0
0+10	0.0000	0.00	Q	|	|	|	|
0+20	0.0000	0.00	Q	|	|	|	|
0+30	0.0000	0.00	Q	|	|	|	|
0+40	0.0000	0.00	Q	|	|	|	|
0+50	0.0000	0.00	Q	|	|	|	|
1+ 0	0.0000	0.00	Q	|	|	|	|
1+10	0.0000	0.00	Q	|	|	|	|
1+20	0.0000	0.00	Q	|	|	|	|
1+30	0.0000	0.00	Q	|	|	|	|
1+40	0.0036	0.26	Q	|	|	|	|
1+50	0.0300	1.91	Q	|	|	|	|
2+ 0	0.1481	8.58	Q	|	|	|	|
2+10	0.6157	33.95	Q	|	|	|	|
2+20	2.0250	102.31	V Q	|	|	|	|
2+30	5.6891	266.02	V Q	|	|	|	|
2+40	14.3205	626.64	| V	| Q	|	|	|

2+50	29.6656	1114.06	
3+ 0	50.0334	1478.70	
3+10	70.5152	1486.97	
3+20	88.2786	1289.62	
3+30	104.1835	1154.70	
3+40	118.7296	1056.05	
3+50	132.1479	974.17	
4+ 0	144.6025	904.20	
4+10	155.8677	817.85	
4+20	165.8938	727.89	
4+30	174.9518	657.61	
4+40	183.1452	594.84	
4+50	190.6065	541.69	
5+ 0	197.6098	508.44	
5+10	204.3167	486.92	
5+20	210.7860	469.66	
5+30	217.0544	455.09	
5+40	223.0802	437.47	
5+50	228.8712	420.43	
6+ 0	234.5419	411.69	
6+10	240.1841	409.62	
6+20	245.7533	404.33	
6+30	250.9400	376.55	
6+40	255.0503	298.41	
6+50	257.8487	203.17	
7+ 0	259.7528	138.23	
7+10	261.0677	95.47	
7+20	261.9742	65.81	
7+30	262.5892	44.65	
7+40	262.9918	29.23	
7+50	263.2385	17.91	
8+ 0	263.3761	9.99	
8+10	263.4408	4.69	
8+20	263.4594	1.35	
8+30	263.4606	0.09	

U N I T H Y D R O G R A P H A N A L Y S I S

Study date 09/08/10 File: mccain1100yr24hr.out

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Program License Serial Number 4055

Tule Wind Project
McCain Valley Crossing 1
Proposed Conditions 100 Yr 24 Hr
Aug 18, 2010

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Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
2185.54	5.07

Rainfall Distribution pattern used in study:
Type B for San Diego area of California

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********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
2185.54	1.000	83.0	83.0	0.050	C

Area-averaged catchment SCS Curve Number AMC(2) = 83.000
Area-averaged Fm value using values listed = 0.050(In/Hr)

++
Direct entry of lag time by user
Watershed area =   2185.54(Ac.)
Catchment Lag time =   0.740 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 11.2613
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 83.000

Rainfall depth area reduction factors:
Using a total area of   2185.54(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =   5.070(In)
Adjusted rainfall =   5.070(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 26445.03 (CFS))

0.11	0.083	0.015	49.436	0.002
0.23	0.167	0.036	114.819	0.006
0.34	0.250	0.081	261.213	0.016
0.45	0.333	0.138	445.451	0.033
0.56	0.417	0.243	781.573	0.062
0.68	0.500	0.565	1817.277	0.131
0.79	0.583	0.773	2488.816	0.225
0.90	0.667	1.000	3219.152	0.347
1.01	0.750	0.946	3044.634	0.462
1.13	0.833	0.843	2712.922	0.565
1.24	0.917	0.600	1930.560	0.638
1.35	1.000	0.502	1616.625	0.699
1.46	1.083	0.419	1350.100	0.750
1.58	1.167	0.342	1101.054	0.792
1.69	1.250	0.294	945.183	0.827
1.80	1.333	0.241	775.154	0.857
1.91	1.417	0.209	673.014	0.882
2.03	1.500	0.181	581.741	0.904
2.14	1.583	0.150	483.763	0.922
2.25	1.667	0.133	428.230	0.939
2.36	1.750	0.112	361.739	0.952
2.48	1.833	0.091	293.676	0.963
2.59	1.917	0.078	250.893	0.973
2.70	2.000	0.063	202.425	0.981
2.82	2.083	0.051	163.225	0.987
2.93	2.167	0.040	128.845	0.992
3.04	2.250	0.032	104.310	0.995
3.15	2.333	0.024	76.321	0.998
3.27	2.417	0.010	33.079	1.000
3.38	2.500	0.003	9.801	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0076	0.0000	0.0076	0.0000	0.0076	--------
0.17	0.0152	0.0000	0.0076	0.0000	0.0076	--------
0.25	0.0228	0.0000	0.0076	0.0000	0.0076	--------
0.33	0.0304	0.0000	0.0076	0.0000	0.0076	--------
0.42	0.0380	0.0000	0.0076	0.0000	0.0076	--------
0.50	0.0456	0.0000	0.0076	0.0000	0.0076	--------
0.58	0.0515	0.0000	0.0059	0.0000	0.0059	--------
0.67	0.0575	0.0000	0.0059	0.0000	0.0059	--------
0.75	0.0634	0.0000	0.0059	0.0000	0.0059	--------
0.83	0.0693	0.0000	0.0059	0.0000	0.0059	--------
0.92	0.0752	0.0000	0.0059	0.0000	0.0059	--------
1.00	0.0811	0.0000	0.0059	0.0000	0.0059	--------
1.08	0.0887	0.0000	0.0076	0.0000	0.0076	--------
1.17	0.0963	0.0000	0.0076	0.0000	0.0076	--------
1.25	0.1039	0.0000	0.0076	0.0000	0.0076	--------
1.33	0.1115	0.0000	0.0076	0.0000	0.0076	--------
1.42	0.1191	0.0000	0.0076	0.0000	0.0076	--------
1.50	0.1268	0.0000	0.0076	0.0000	0.0076	--------
1.58	0.1344	0.0000	0.0076	0.0000	0.0076	--------
1.67	0.1420	0.0000	0.0076	0.0000	0.0076	--------
1.75	0.1496	0.0000	0.0076	0.0000	0.0076	--------
1.83	0.1572	0.0000	0.0076	0.0000	0.0076	--------
1.92	0.1648	0.0000	0.0076	0.0000	0.0076	--------
2.00	0.1724	0.0000	0.0076	0.0000	0.0076	--------
2.08	0.1817	0.0000	0.0093	0.0000	0.0093	--------
2.17	0.1910	0.0000	0.0093	0.0000	0.0093	--------
2.25	0.2003	0.0000	0.0093	0.0000	0.0093	--------
2.33	0.2096	0.0000	0.0093	0.0000	0.0093	--------
2.42	0.2189	0.0000	0.0093	0.0000	0.0093	--------
2.50	0.2281	0.0000	0.0093	0.0000	0.0093	--------
2.58	0.2358	0.0000	0.0076	0.0000	0.0076	--------
2.67	0.2434	0.0000	0.0076	0.0000	0.0076	--------
2.75	0.2510	0.0000	0.0076	0.0000	0.0076	--------
2.83	0.2586	0.0000	0.0076	0.0000	0.0076	--------
2.92	0.2662	0.0000	0.0076	0.0000	0.0076	--------
3.00	0.2738	0.0000	0.0076	0.0000	0.0076	--------
3.08	0.2831	0.0000	0.0093	0.0000	0.0093	--------
3.17	0.2924	0.0000	0.0093	0.0000	0.0093	--------
3.25	0.3017	0.0000	0.0093	0.0000	0.0093	--------
3.33	0.3110	0.0000	0.0093	0.0000	0.0093	--------
3.42	0.3203	0.0000	0.0093	0.0000	0.0093	--------
3.50	0.3296	0.0000	0.0093	0.0000	0.0093	--------
3.58	0.3397	0.0000	0.0101	0.0000	0.0101	--------
3.67	0.3498	0.0000	0.0101	0.0000	0.0101	--------
3.75	0.3600	0.0000	0.0101	0.0000	0.0101	--------
3.83	0.3701	0.0000	0.0101	0.0000	0.0101	--------
3.92	0.3803	0.0000	0.0101	0.0000	0.0101	--------
4.00	0.3904	0.0000	0.0101	0.0000	0.0101	--------
4.08	0.4014	0.0000	0.0110	0.0000	0.0110	--------
4.17	0.4124	0.0000	0.0110	0.0000	0.0110	--------
4.25	0.4233	0.0001	0.0110	0.0001	0.0109	--------
4.33	0.4343	0.0003	0.0110	0.0002	0.0108	--------
4.42	0.4453	0.0006	0.0110	0.0003	0.0107	--------
4.50	0.4563	0.0010	0.0110	0.0004	0.0106	--------
4.58	0.4681	0.0016	0.0118	0.0006	0.0112	--------

4.67	0.4800	0.0023	0.0118	0.0007	0.0111	--------
4.75	0.4918	0.0032	0.0118	0.0008	0.0110	--------
4.83	0.5036	0.0041	0.0118	0.0010	0.0109	--------
4.92	0.5154	0.0052	0.0118	0.0011	0.0108	--------
5.00	0.5273	0.0064	0.0118	0.0012	0.0106	--------
5.08	0.5408	0.0079	0.0135	0.0015	0.0120	--------
5.17	0.5543	0.0095	0.0135	0.0017	0.0119	--------
5.25	0.5678	0.0113	0.0135	0.0018	0.0117	--------
5.33	0.5814	0.0133	0.0135	0.0019	0.0116	--------
5.42	0.5949	0.0154	0.0135	0.0021	0.0114	--------
5.50	0.6084	0.0176	0.0135	0.0022	0.0113	--------
5.58	0.6228	0.0201	0.0144	0.0025	0.0119	--------
5.67	0.6371	0.0227	0.0144	0.0027	0.0117	--------
5.75	0.6515	0.0255	0.0144	0.0028	0.0116	--------
5.83	0.6659	0.0285	0.0144	0.0029	0.0114	--------
5.92	0.6802	0.0316	0.0144	0.0031	0.0113	--------
6.00	0.6946	0.0348	0.0144	0.0032	0.0111	--------
6.08	0.7115	0.0388	0.0169	0.0040	0.0129	--------
6.17	0.7284	0.0429	0.0169	0.0042	0.0127	--------
6.25	0.7453	0.0473	0.0169	0.0043	0.0126	--------
6.33	0.7622	0.0518	0.0169	0.0045	0.0124	--------
6.42	0.7791	0.0565	0.0169	0.0047	0.0122	--------
6.50	0.7960	0.0613	0.0169	0.0049	0.0120	--------
6.58	0.8154	0.0671	0.0194	0.0058	0.0136	--------
6.67	0.8349	0.0731	0.0194	0.0060	0.0134	--------
6.75	0.8543	0.0793	0.0194	0.0062	0.0132	--------
6.83	0.8737	0.0857	0.0194	0.0064	0.0130	--------
6.92	0.8932	0.0923	0.0194	0.0066	0.0128	--------
7.00	0.9126	0.0992	0.0194	0.0068	0.0126	--------
7.08	0.9380	0.1083	0.0254	0.0092	0.0162	--------
7.17	0.9633	0.1178	0.0253	0.0095	0.0159	--------
7.25	0.9887	0.1276	0.0254	0.0098	0.0156	--------
7.33	1.0140	0.1377	0.0253	0.0101	0.0153	--------
7.42	1.0394	0.1481	0.0253	0.0104	0.0150	--------
7.50	1.0647	0.1587	0.0253	0.0107	0.0147	--------
7.58	1.1027	0.1752	0.0380	0.0165	0.0215	--------
7.67	1.1408	0.1923	0.0380	0.0171	0.0209	--------
7.75	1.1788	0.2100	0.0380	0.0177	0.0204	--------
7.83	1.2168	0.2282	0.0380	0.0182	0.0198	--------
7.92	1.2548	0.2469	0.0380	0.0187	0.0193	--------
8.00	1.2929	0.2661	0.0380	0.0192	0.0188	--------
8.08	1.3495	0.2956	0.0566	0.0295	0.0271	--------
8.17	1.4061	0.3261	0.0566	0.0305	0.0261	--------
8.25	1.4627	0.3576	0.0566	0.0315	0.0252	--------
8.33	1.5193	0.3899	0.0566	0.0324	0.0243	--------
8.42	1.5759	0.4232	0.0566	0.0332	0.0234	--------
8.50	1.6325	0.4572	0.0566	0.0340	0.0226	--------
8.58	1.7069	0.5030	0.0744	0.0459	0.0285	--------
8.67	1.7813	0.5501	0.0744	0.0471	0.0273	--------
8.75	1.8556	0.5984	0.0744	0.0483	0.0261	--------
8.83	1.9300	0.6477	0.0744	0.0493	0.0250	--------
8.92	2.0043	0.6981	0.0744	0.0504	0.0240	--------
9.00	2.0787	0.7494	0.0744	0.0513	0.0230	--------
9.08	2.1598	0.8064	0.0811	0.0570	0.0241	--------
9.17	2.2409	0.8645	0.0811	0.0580	0.0231	--------
9.25	2.3221	0.9234	0.0811	0.0590	0.0221	--------
9.33	2.4032	0.9833	0.0811	0.0599	0.0213	--------
9.42	2.4843	1.0440	0.0811	0.0607	0.0204	--------
9.50	2.5654	1.1055	0.0811	0.0615	0.0196	--------
9.58	2.6347	1.1586	0.0693	0.0531	0.0162	--------
9.67	2.7040	1.2122	0.0693	0.0536	0.0157	--------
9.75	2.7733	1.2663	0.0693	0.0541	0.0152	--------
9.83	2.8426	1.3209	0.0693	0.0546	0.0147	--------

9.92	2.9119	1.3760	0.0693	0.0550	0.0143	--------
10.00	2.9812	1.4314	0.0693	0.0555	0.0138	--------
10.08	3.0158	1.4593	0.0346	0.0279	0.0068	--------
10.17	3.0505	1.4873	0.0346	0.0280	0.0067	--------
10.25	3.0851	1.5154	0.0346	0.0281	0.0066	--------
10.33	3.1197	1.5435	0.0346	0.0282	0.0065	--------
10.42	3.1544	1.5718	0.0346	0.0283	0.0064	--------
10.50	3.1890	1.6002	0.0346	0.0284	0.0063	--------
10.58	3.2118	1.6189	0.0228	0.0187	0.0041	--------
10.67	3.2347	1.6377	0.0228	0.0188	0.0040	--------
10.75	3.2575	1.6565	0.0228	0.0188	0.0040	--------
10.83	3.2803	1.6753	0.0228	0.0188	0.0040	--------
10.92	3.3031	1.6942	0.0228	0.0189	0.0039	--------
11.00	3.3259	1.7131	0.0228	0.0189	0.0039	--------
11.08	3.3454	1.7293	0.0194	0.0161	0.0033	--------
11.17	3.3648	1.7454	0.0194	0.0162	0.0033	--------
11.25	3.3842	1.7616	0.0194	0.0162	0.0032	--------
11.33	3.4037	1.7778	0.0194	0.0162	0.0032	--------
11.42	3.4231	1.7941	0.0194	0.0162	0.0032	--------
11.50	3.4425	1.8103	0.0194	0.0163	0.0032	--------
11.58	3.4603	1.8252	0.0177	0.0149	0.0029	--------
11.67	3.4780	1.8401	0.0177	0.0149	0.0029	--------
11.75	3.4958	1.8550	0.0177	0.0149	0.0028	--------
11.83	3.5135	1.8699	0.0177	0.0149	0.0028	--------
11.92	3.5313	1.8849	0.0177	0.0150	0.0028	--------
12.00	3.5490	1.8999	0.0177	0.0150	0.0028	--------
12.08	3.5659	1.9141	0.0169	0.0143	0.0026	--------
12.17	3.5828	1.9284	0.0169	0.0143	0.0026	--------
12.25	3.5997	1.9427	0.0169	0.0143	0.0026	--------
12.33	3.6166	1.9571	0.0169	0.0143	0.0026	--------
12.42	3.6335	1.9714	0.0169	0.0143	0.0026	--------
12.50	3.6504	1.9857	0.0169	0.0144	0.0025	--------
12.58	3.6665	1.9994	0.0161	0.0137	0.0024	--------
12.67	3.6825	2.0131	0.0161	0.0137	0.0024	--------
12.75	3.6986	2.0268	0.0161	0.0137	0.0024	--------
12.83	3.7146	2.0405	0.0161	0.0137	0.0024	--------
12.92	3.7307	2.0542	0.0161	0.0137	0.0023	--------
13.00	3.7467	2.0679	0.0161	0.0137	0.0023	--------
13.08	3.7611	2.0802	0.0144	0.0123	0.0021	--------
13.17	3.7755	2.0925	0.0144	0.0123	0.0021	--------
13.25	3.7898	2.1048	0.0144	0.0123	0.0021	--------
13.33	3.8042	2.1171	0.0144	0.0123	0.0020	--------
13.42	3.8186	2.1295	0.0144	0.0123	0.0020	--------
13.50	3.8329	2.1418	0.0144	0.0123	0.0020	--------
13.58	3.8464	2.1534	0.0135	0.0116	0.0019	--------
13.67	3.8600	2.1651	0.0135	0.0116	0.0019	--------
13.75	3.8735	2.1767	0.0135	0.0116	0.0019	--------
13.83	3.8870	2.1884	0.0135	0.0117	0.0019	--------
13.92	3.9005	2.2001	0.0135	0.0117	0.0019	--------
14.00	3.9140	2.2117	0.0135	0.0117	0.0018	--------
14.08	3.9293	2.2249	0.0152	0.0131	0.0021	--------
14.17	3.9445	2.2380	0.0152	0.0132	0.0021	--------
14.25	3.9597	2.2512	0.0152	0.0132	0.0020	--------
14.33	3.9749	2.2644	0.0152	0.0132	0.0020	--------
14.42	3.9901	2.2776	0.0152	0.0132	0.0020	--------
14.50	4.0053	2.2908	0.0152	0.0132	0.0020	--------
14.58	4.0138	2.2981	0.0085	0.0073	0.0011	--------
14.67	4.0222	2.3055	0.0084	0.0073	0.0011	--------
14.75	4.0307	2.3128	0.0084	0.0073	0.0011	--------
14.83	4.0391	2.3201	0.0084	0.0073	0.0011	--------
14.92	4.0476	2.3275	0.0084	0.0074	0.0011	--------
15.00	4.0560	2.3349	0.0084	0.0074	0.0011	--------
15.08	4.0695	2.3466	0.0135	0.0118	0.0017	--------

15.17	4.0830	2.3584	0.0135	0.0118	0.0017	--------
15.25	4.0966	2.3702	0.0135	0.0118	0.0017	--------
15.33	4.1101	2.3820	0.0135	0.0118	0.0017	--------
15.42	4.1236	2.3938	0.0135	0.0118	0.0017	--------
15.50	4.1371	2.4056	0.0135	0.0118	0.0017	--------
15.58	4.1498	2.4167	0.0127	0.0111	0.0016	--------
15.67	4.1625	2.4278	0.0127	0.0111	0.0016	--------
15.75	4.1751	2.4389	0.0127	0.0111	0.0016	--------
15.83	4.1878	2.4500	0.0127	0.0111	0.0016	--------
15.92	4.2005	2.4611	0.0127	0.0111	0.0016	--------
16.00	4.2132	2.4722	0.0127	0.0111	0.0016	--------
16.08	4.2250	2.4826	0.0118	0.0104	0.0014	--------
16.17	4.2368	2.4930	0.0118	0.0104	0.0014	--------
16.25	4.2487	2.5034	0.0118	0.0104	0.0014	--------
16.33	4.2605	2.5138	0.0118	0.0104	0.0014	--------
16.42	4.2723	2.5242	0.0118	0.0104	0.0014	--------
16.50	4.2842	2.5346	0.0118	0.0104	0.0014	--------
16.58	4.2968	2.5458	0.0127	0.0112	0.0015	--------
16.67	4.3095	2.5570	0.0127	0.0112	0.0015	--------
16.75	4.3222	2.5681	0.0127	0.0112	0.0015	--------
16.83	4.3349	2.5793	0.0127	0.0112	0.0015	--------
16.92	4.3475	2.5905	0.0127	0.0112	0.0015	--------
17.00	4.3602	2.6017	0.0127	0.0112	0.0015	--------
17.08	4.3703	2.6107	0.0101	0.0090	0.0012	--------
17.17	4.3805	2.6196	0.0101	0.0090	0.0012	--------
17.25	4.3906	2.6286	0.0101	0.0090	0.0012	--------
17.33	4.4008	2.6376	0.0101	0.0090	0.0012	--------
17.42	4.4109	2.6465	0.0101	0.0090	0.0012	--------
17.50	4.4210	2.6555	0.0101	0.0090	0.0012	--------
17.58	4.4320	2.6652	0.0110	0.0097	0.0013	--------
17.67	4.4430	2.6750	0.0110	0.0097	0.0012	--------
17.75	4.4540	2.6847	0.0110	0.0097	0.0012	--------
17.83	4.4650	2.6945	0.0110	0.0097	0.0012	--------
17.92	4.4760	2.7042	0.0110	0.0098	0.0012	--------
18.00	4.4870	2.7140	0.0110	0.0098	0.0012	--------
18.08	4.4954	2.7215	0.0084	0.0075	0.0009	--------
18.17	4.5038	2.7290	0.0084	0.0075	0.0009	--------
18.25	4.5123	2.7365	0.0085	0.0075	0.0009	--------
18.33	4.5208	2.7440	0.0084	0.0075	0.0009	--------
18.42	4.5292	2.7515	0.0084	0.0075	0.0009	--------
18.50	4.5377	2.7591	0.0084	0.0075	0.0009	--------
18.58	4.5461	2.7666	0.0085	0.0075	0.0009	--------
18.67	4.5545	2.7741	0.0084	0.0075	0.0009	--------
18.75	4.5630	2.7816	0.0085	0.0075	0.0009	--------
18.83	4.5715	2.7892	0.0084	0.0075	0.0009	--------
18.92	4.5799	2.7967	0.0084	0.0075	0.0009	--------
19.00	4.5884	2.8042	0.0084	0.0075	0.0009	--------
19.08	4.5960	2.8110	0.0076	0.0068	0.0008	--------
19.17	4.6036	2.8178	0.0076	0.0068	0.0008	--------
19.25	4.6112	2.8246	0.0076	0.0068	0.0008	--------
19.33	4.6188	2.8314	0.0076	0.0068	0.0008	--------
19.42	4.6264	2.8382	0.0076	0.0068	0.0008	--------
19.50	4.6340	2.8450	0.0076	0.0068	0.0008	--------
19.58	4.6424	2.8525	0.0085	0.0076	0.0009	--------
19.67	4.6509	2.8601	0.0084	0.0076	0.0009	--------
19.75	4.6593	2.8676	0.0085	0.0076	0.0009	--------
19.83	4.6678	2.8752	0.0084	0.0076	0.0009	--------
19.92	4.6762	2.8827	0.0084	0.0076	0.0009	--------
20.00	4.6847	2.8903	0.0084	0.0076	0.0009	--------
20.08	4.6940	2.8986	0.0093	0.0083	0.0010	--------
20.17	4.7033	2.9069	0.0093	0.0083	0.0010	--------
20.25	4.7126	2.9153	0.0093	0.0083	0.0010	--------
20.33	4.7219	2.9236	0.0093	0.0083	0.0010	--------

20.42	4.7312	2.9319	0.0093	0.0083	0.0010	--------
20.50	4.7405	2.9403	0.0093	0.0083	0.0010	--------
20.58	4.7489	2.9478	0.0084	0.0076	0.0009	--------
20.67	4.7574	2.9554	0.0084	0.0076	0.0009	--------
20.75	4.7658	2.9630	0.0084	0.0076	0.0009	--------
20.83	4.7743	2.9706	0.0085	0.0076	0.0009	--------
20.92	4.7827	2.9782	0.0084	0.0076	0.0009	--------
21.00	4.7912	2.9858	0.0084	0.0076	0.0009	--------
21.08	4.7988	2.9926	0.0076	0.0068	0.0008	--------
21.17	4.8064	2.9994	0.0076	0.0068	0.0008	--------
21.25	4.8140	3.0063	0.0076	0.0068	0.0008	--------
21.33	4.8216	3.0131	0.0076	0.0068	0.0008	--------
21.42	4.8292	3.0200	0.0076	0.0068	0.0008	--------
21.50	4.8368	3.0268	0.0076	0.0068	0.0008	--------
21.58	4.8444	3.0337	0.0076	0.0068	0.0008	--------
21.67	4.8520	3.0405	0.0076	0.0068	0.0008	--------
21.75	4.8596	3.0473	0.0076	0.0068	0.0008	--------
21.83	4.8672	3.0542	0.0076	0.0069	0.0008	--------
21.92	4.8748	3.0610	0.0076	0.0069	0.0008	--------
22.00	4.8824	3.0679	0.0076	0.0069	0.0008	--------
22.08	4.8900	3.0748	0.0076	0.0069	0.0007	--------
22.17	4.8976	3.0816	0.0076	0.0069	0.0007	--------
22.25	4.9052	3.0885	0.0076	0.0069	0.0007	--------
22.33	4.9128	3.0953	0.0076	0.0069	0.0007	--------
22.42	4.9204	3.1022	0.0076	0.0069	0.0007	--------
22.50	4.9280	3.1091	0.0076	0.0069	0.0007	--------
22.58	4.9356	3.1159	0.0076	0.0069	0.0007	--------
22.67	4.9432	3.1228	0.0076	0.0069	0.0007	--------
22.75	4.9509	3.1297	0.0076	0.0069	0.0007	--------
22.83	4.9585	3.1365	0.0076	0.0069	0.0007	--------
22.92	4.9661	3.1434	0.0076	0.0069	0.0007	--------
23.00	4.9737	3.1503	0.0076	0.0069	0.0007	--------
23.08	4.9821	3.1579	0.0084	0.0076	0.0008	--------
23.17	4.9906	3.1656	0.0084	0.0076	0.0008	--------
23.25	4.9990	3.1732	0.0084	0.0076	0.0008	--------
23.33	5.0075	3.1809	0.0085	0.0076	0.0008	--------
23.42	5.0159	3.1885	0.0084	0.0076	0.0008	--------
23.50	5.0244	3.1962	0.0084	0.0077	0.0008	--------
23.58	5.0320	3.2030	0.0076	0.0069	0.0007	--------
23.67	5.0396	3.2099	0.0076	0.0069	0.0007	--------
23.75	5.0472	3.2168	0.0076	0.0069	0.0007	--------
23.83	5.0548	3.2237	0.0076	0.0069	0.0007	--------
23.92	5.0624	3.2306	0.0076	0.0069	0.0007	--------
24.00	5.0700	3.2375	0.0076	0.0069	0.0007	--------

Total soil rain loss = 1.83(In)
Total effective runoff = 3.24(In)

Peak flow rate this hydrograph = 1434.10(CFS)
Total runoff volume this hydrograph = 25684768.1(Ft3)

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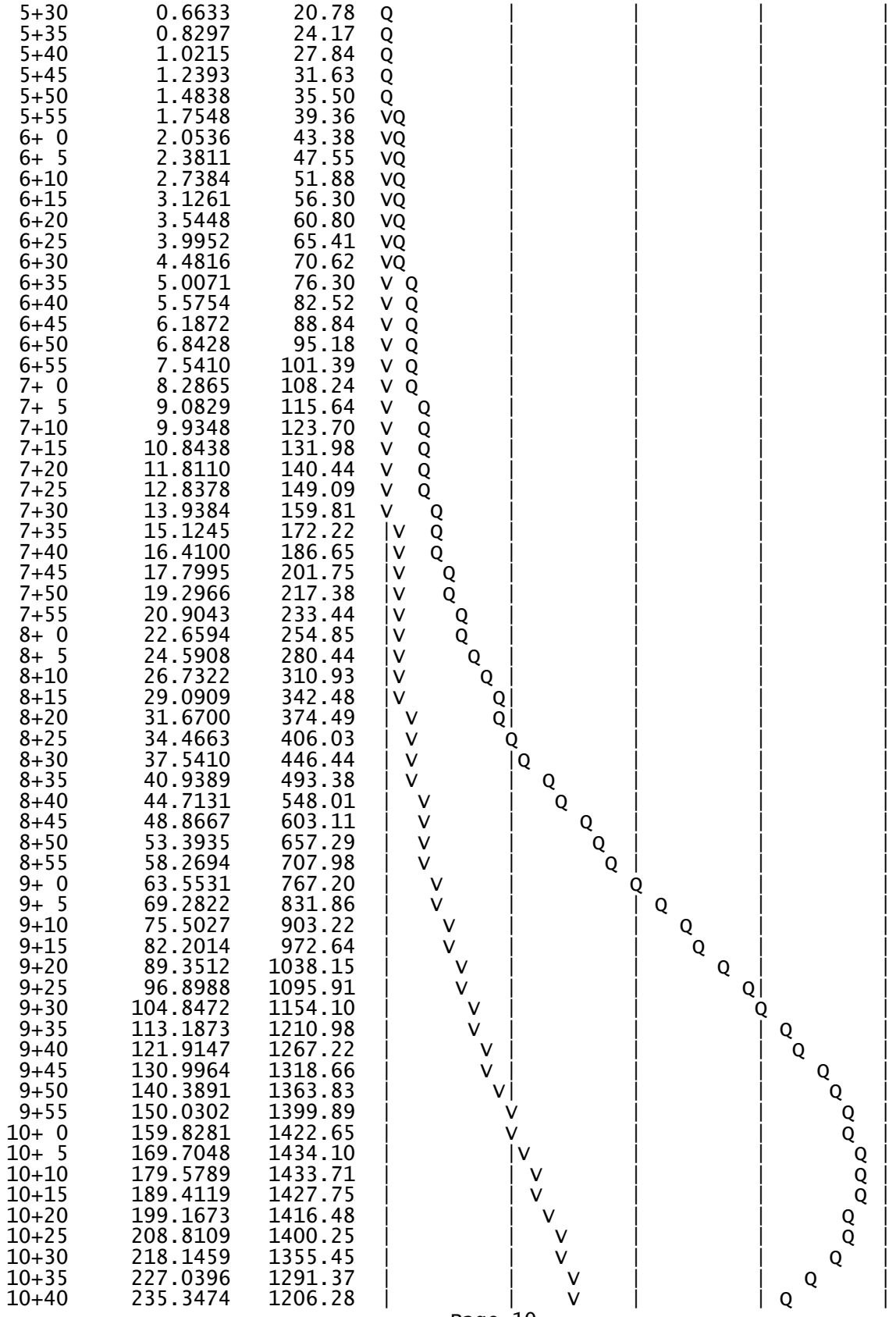
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

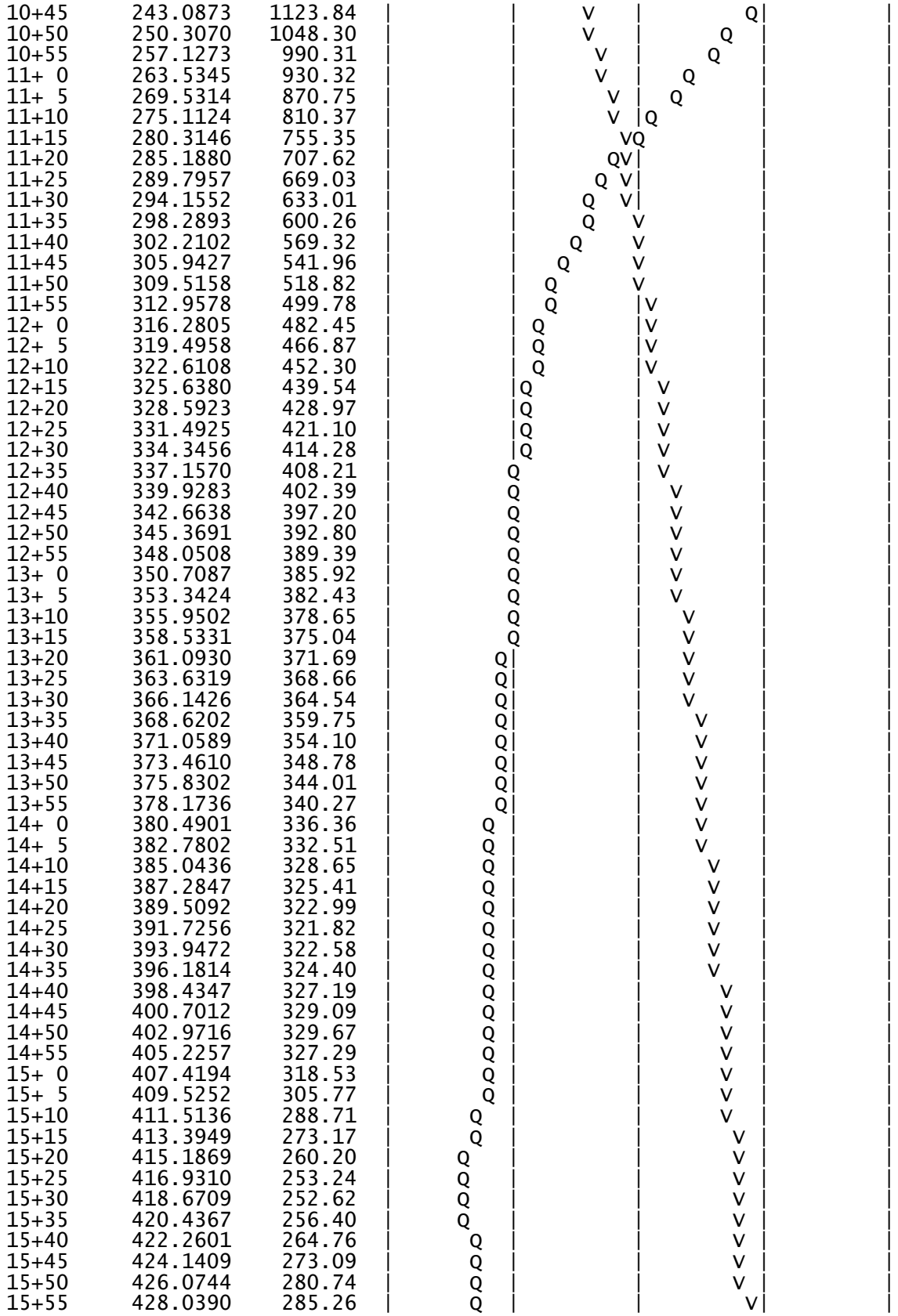
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	375.0	750.0	1125.0	1500.0
0+ 5	0.0000	0.00	Q	|	|	|	|
0+10	0.0000	0.00	Q	|	|	|	|

0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0002	0.02	Q				
4+25	0.0006	0.06	Q				
4+30	0.0017	0.15	Q				
4+35	0.0039	0.33	Q				
4+40	0.0086	0.68	Q				
4+45	0.0176	1.31	Q				
4+50	0.0335	2.30	Q				
4+55	0.0586	3.65	Q				
5+ 0	0.0956	5.37	Q				
5+ 5	0.1464	7.38	Q				
5+10	0.2130	9.66	Q				
5+15	0.2966	12.14	Q				
5+20	0.3986	14.81	Q				
5+25	0.5201	17.65	Q				



5+30	0.6633	20.78	Q
5+35	0.8297	24.17	Q
5+40	1.0215	27.84	Q
5+45	1.2393	31.63	Q
5+50	1.4838	35.50	Q
5+55	1.7548	39.36	VQ
6+ 0	2.0536	43.38	VQ
6+ 5	2.3811	47.55	VQ
6+10	2.7384	51.88	VQ
6+15	3.1261	56.30	VQ
6+20	3.5448	60.80	VQ
6+25	3.9952	65.41	VQ
6+30	4.4816	70.62	VQ
6+35	5.0071	76.30	V Q
6+40	5.5754	82.52	V Q
6+45	6.1872	88.84	V Q
6+50	6.8428	95.18	V Q
6+55	7.5410	101.39	V Q
7+ 0	8.2865	108.24	V Q
7+ 5	9.0829	115.64	V Q
7+10	9.9348	123.70	V Q
7+15	10.8438	131.98	V Q
7+20	11.8110	140.44	V Q
7+25	12.8378	149.09	V Q
7+30	13.9384	159.81	V Q
7+35	15.1245	172.22	V Q
7+40	16.4100	186.65	V Q
7+45	17.7995	201.75	V Q
7+50	19.2966	217.38	V Q
7+55	20.9043	233.44	V Q
8+ 0	22.6594	254.85	V Q
8+ 5	24.5908	280.44	V Q
8+10	26.7322	310.93	V Q
8+15	29.0909	342.48	V Q
8+20	31.6700	374.49	V Q
8+25	34.4663	406.03	V Q
8+30	37.5410	446.44	V Q
8+35	40.9389	493.38	V Q
8+40	44.7131	548.01	V Q
8+45	48.8667	603.11	V Q
8+50	53.3935	657.29	V Q
8+55	58.2694	707.98	V Q
9+ 0	63.5531	767.20	V Q
9+ 5	69.2822	831.86	V Q
9+10	75.5027	903.22	V Q
9+15	82.2014	972.64	V Q
9+20	89.3512	1038.15	V Q
9+25	96.8988	1095.91	V Q
9+30	104.8472	1154.10	V Q
9+35	113.1873	1210.98	V Q
9+40	121.9147	1267.22	V Q
9+45	130.9964	1318.66	V Q
9+50	140.3891	1363.83	V Q
9+55	150.0302	1399.89	V Q
10+ 0	159.8281	1422.65	V Q
10+ 5	169.7048	1434.10	V Q
10+10	179.5789	1433.71	V Q
10+15	189.4119	1427.75	V Q
10+20	199.1673	1416.48	V Q
10+25	208.8109	1400.25	V Q
10+30	218.1459	1355.45	V Q
10+35	227.0396	1291.37	V Q
10+40	235.3474	1206.28	V Q



10+45	243.0873	1123.84	V Q
10+50	250.3070	1048.30	V Q
10+55	257.1273	990.31	V Q
11+ 0	263.5345	930.32	V Q
11+ 5	269.5314	870.75	V Q
11+10	275.1124	810.37	V Q
11+15	280.3146	755.35	VQ
11+20	285.1880	707.62	QV
11+25	289.7957	669.03	Q V
11+30	294.1552	633.01	Q V
11+35	298.2893	600.26	Q V
11+40	302.2102	569.32	Q V
11+45	305.9427	541.96	Q V
11+50	309.5158	518.82	Q V
11+55	312.9578	499.78	Q V
12+ 0	316.2805	482.45	Q V
12+ 5	319.4958	466.87	Q V
12+10	322.6108	452.30	Q V
12+15	325.6380	439.54	Q V
12+20	328.5923	428.97	Q V
12+25	331.4925	421.10	Q V
12+30	334.3456	414.28	Q V
12+35	337.1570	408.21	Q V
12+40	339.9283	402.39	Q V
12+45	342.6638	397.20	Q V
12+50	345.3691	392.80	Q V
12+55	348.0508	389.39	Q V
13+ 0	350.7087	385.92	Q V
13+ 5	353.3424	382.43	Q V
13+10	355.9502	378.65	Q V
13+15	358.5331	375.04	Q V
13+20	361.0930	371.69	Q V
13+25	363.6319	368.66	Q V
13+30	366.1426	364.54	Q V
13+35	368.6202	359.75	Q V
13+40	371.0589	354.10	Q V
13+45	373.4610	348.78	Q V
13+50	375.8302	344.01	Q V
13+55	378.1736	340.27	Q V
14+ 0	380.4901	336.36	Q V
14+ 5	382.7802	332.51	Q V
14+10	385.0436	328.65	Q V
14+15	387.2847	325.41	Q V
14+20	389.5092	322.99	Q V
14+25	391.7256	321.82	Q V
14+30	393.9472	322.58	Q V
14+35	396.1814	324.40	Q V
14+40	398.4347	327.19	Q V
14+45	400.7012	329.09	Q V
14+50	402.9716	329.67	Q V
14+55	405.2257	327.29	Q V
15+ 0	407.4194	318.53	Q V
15+ 5	409.5252	305.77	Q V
15+10	411.5136	288.71	Q V
15+15	413.3949	273.17	Q V
15+20	415.1869	260.20	Q V
15+25	416.9310	253.24	Q V
15+30	418.6709	252.62	Q V
15+35	420.4367	256.40	Q V
15+40	422.2601	264.76	Q V
15+45	424.1409	273.09	Q V
15+50	426.0744	280.74	Q V
15+55	428.0390	285.26	Q V

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16+ 0     430.0233    288.12  |       Q  |          |         V|          |
16+ 5     432.0191    289.79  |       Q  |          |         V|          |
16+10     434.0167    290.06  |       Q  |          |         V|          |
16+15     436.0140    290.00  |       Q  |          |         V|          |
16+20     438.0089    289.66  |       Q  |          |         V|          |
16+25     440.0019    289.39  |       Q  |          |         V|          |
16+30     441.9883    288.42  |       Q  |          |         V|          |
16+35     443.9646    286.97  |       Q  |          |          V          |
16+40     445.9286    285.16  |       Q  |          |          V          |
16+45     447.8814    283.55  |       Q  |          |          V          |
16+50     449.8257    282.32  |       Q  |          |          V          |
16+55     451.7682    282.05  |       Q  |          |          V          |
17+ 0     453.7157    282.77  |       Q  |          |          V          |
17+ 5     455.6719    284.04  |       Q  |          |          V          |
17+10     457.6400    285.78  |       Q  |          |          |V         |
17+15     459.6174    287.11  |       Q  |          |          |V         |
17+20     461.5998    287.84  |       Q  |          |          |V         |
17+25     463.5774    287.15  |       Q  |          |          |V         |
17+30     465.5327    283.91  |       Q  |          |          |V         |
17+35     467.4546    279.05  |       Q  |          |          |V         |
17+40     469.3312    272.49  |       Q  |          |          |V         |
17+45     471.1657    266.36  |       Q  |          |          |V         |
17+50     472.9636    261.06  |      Q   |          |          | V        |
17+55     474.7386    257.74  |      Q   |          |          | V        |
18+ 0     476.5009    255.88  |      Q   |          |          | V        |
18+ 5     478.2569    254.97  |      Q   |          |          | V        |
18+10     480.0131    255.00  |      Q   |          |          | V        |
18+15     481.7685    254.89  |      Q   |          |          | V        |
18+20     483.5209    254.46  |      Q   |          |          | V        |
18+25     485.2628    252.92  |      Q   |          |          | V        |
18+30     486.9776    248.99  |      Q   |          |          |  V       |
18+35     488.6549    243.55  |      Q   |          |          |  V       |
18+40     490.2828    236.36  |      Q   |          |          |  V       |
18+45     491.8639    229.58  |      Q   |          |          |  V       |
18+50     493.4035    223.55  |     Q    |          |          |  V       |
18+55     494.9135    219.25  |     Q    |          |          |  V       |
19+ 0     496.3990    215.69  |     Q    |          |          |  V       |
19+ 5     497.8638    212.69  |     Q    |          |          |  V       |
19+10     499.3116    210.23  |     Q    |          |          |  V       |
19+15     500.7443    208.02  |     Q    |          |          |  V       |
19+20     502.1635    206.06  |     Q    |          |          |   V      |
19+25     503.5694    204.15  |     Q    |          |          |   V      |
19+30     504.9583    201.67  |     Q    |          |          |   V      |
19+35     506.3284    198.93  |     Q    |          |          |   V      |
19+40     507.6768    195.79  |     Q    |          |          |   V      |
19+45     509.0061    193.02  |     Q    |          |          |   V      |
19+50     510.3200    190.77  |     Q    |          |          |   V      |
19+55     511.6246    189.43  |     Q    |          |          |   V      |
20+ 0     512.9275    189.19  |     Q    |          |          |   V      |
20+ 5     514.2346    189.78  |     Q    |          |          |   V      |
20+10     515.5516    191.24  |     Q    |          |          |   V      |
20+15     516.8798    192.85  |     Q    |          |          |    V     |
20+20     518.2195    194.54  |     Q    |          |          |    V     |
20+25     519.5698    196.06  |     Q    |          |          |    V     |
20+30     520.9353    198.26  |     Q    |          |          |    V     |
20+35     522.3184    200.82  |     Q    |          |          |    V     |
20+40     523.7216    203.75  |     Q    |          |          |    V     |
20+45     525.1428    206.36  |     Q    |          |          |    V     |
20+50     526.5788    208.50  |     Q    |          |          |    V     |
20+55     528.0234    209.76  |     Q    |          |          |    V     |
21+ 0     529.4694    209.96  |     Q    |          |          |    V     |
21+ 5     530.9113    209.37  |     Q    |          |          |     V    |
21+10     532.3436    207.97  |     Q    |          |          |     V    |
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21+15     533.7654    206.44  |    Q    |         |         |     V   |
21+20     535.1762    204.86  |    Q    |         |         |     V   |
21+25     536.5780    203.54  |    Q    |         |         |     V   |
21+30     537.9663    201.58  |    Q    |         |         |     V   |
21+35     539.3384    199.22  |    Q    |         |         |     V   |
21+40     540.6911    196.42  |    Q    |         |         |     V   |
21+45     542.0258    193.80  |    Q    |         |         |     V   |
21+50     543.3446    191.49  |    Q    |         |         |     V   |
21+55     544.6517    189.78  |    Q    |         |         |     V   |
22+ 0     545.9487    188.33  |    Q    |         |         |      V  |
22+ 5     547.2374    187.11  |   Q     |         |         |      V  |
22+10     548.5191    186.10  |   Q     |         |         |      V  |
22+15     549.7948    185.24  |   Q     |         |         |      V  |
22+20     551.0657    184.53  |   Q     |         |         |      V  |
22+25     552.3323    183.91  |   Q     |         |         |      V  |
22+30     553.5952    183.37  |   Q     |         |         |      V  |
22+35     554.8550    182.93  |   Q     |         |         |      V  |
22+40     556.1122    182.55  |   Q     |         |         |      V  |
22+45     557.3674    182.24  |   Q     |         |         |      V  |
22+50     558.6209    182.01  |   Q     |         |         |      V  |
22+55     559.8732    181.84  |   Q     |         |         |      V  |
23+ 0     561.1248    181.73  |   Q     |         |         |       V |
23+ 5     562.3761    181.69  |   Q     |         |         |       V |
23+10     563.6276    181.72  |   Q     |         |         |       V |
23+15     564.8803    181.89  |   Q     |         |         |       V |
23+20     566.1353    182.22  |   Q     |         |         |       V |
23+25     567.3944    182.84  |   Q     |         |         |       V |
23+30     568.6635    184.26  |   Q     |         |         |       V |
23+35     569.9457    186.17  |   Q     |         |         |       V |
23+40     571.2445    188.59  |    Q    |         |         |       V |
23+45     572.5583    190.77  |    Q    |         |         |       V |
23+50     573.8844    192.55  |    Q    |         |         |       V |
23+55     575.2169    193.47  |    Q    |         |         |        V|
24+ 0     576.5486    193.37  |    Q    |         |         |        V|
24+ 5     577.8723    192.20  |    Q    |         |         |        V|
24+10     579.1798    189.84  |    Q    |         |         |        V|
24+15     580.4641    186.48  |   Q     |         |         |        V|
24+20     581.7173    181.97  |   Q     |         |         |        V|
24+25     582.9271    175.66  |   Q     |         |         |        V|
24+30     584.0454    162.38  |   Q     |         |         |        V|
24+35     585.0411    144.59  |  Q      |         |         |        V|
24+40     585.8807    121.91  |  Q      |         |         |        V|
24+45     586.5728    100.49  | Q       |         |         |        V|
24+50     587.1336     81.43  | Q       |         |         |        V|
24+55     587.6007     67.82  |Q        |         |         |        V|
25+ 0     587.9891     56.39  |Q        |         |         |        V|
25+ 5     588.3117     46.85  |Q        |         |         |        V|
25+10     588.5806     39.04  |Q        |         |         |        V|
25+15     588.8032     32.33  Q         |         |         |        V|
25+20     588.9880     26.83  Q         |         |         |        V|
25+25     589.1397     22.02  Q         |         |         |        V|
25+30     589.2627     17.87  Q         |         |         |        V|
25+35     589.3620     14.41  Q         |         |         |        V|
25+40     589.4403     11.36  Q         |         |         |        V|
25+45     589.5008      8.79  Q         |         |         |        V|
25+50     589.5470      6.71  Q         |         |         |        V|
25+55     589.5812      4.96  Q         |         |         |        V|
26+ 0     589.6056      3.55  Q         |         |         |        V|
26+ 5     589.6224      2.43  Q         |         |         |        V|
26+10     589.6330      1.54  Q         |         |         |        V|
26+15     589.6386      0.82  Q         |         |         |        V|
26+20     589.6407      0.30  Q         |         |         |        V|
26+25     589.6411      0.07  Q         |         |         |         V
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U N I T H Y D R O G R A P H A N A L Y S I S

Study date 09/08/10 File: mccain210yr24hr.out

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Program License Serial Number 4055

Tule Wind Project
McCain Valley Crossing 2
Proposed Conditions 10 Yr 24 Hr
Aug 18, 2010

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Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
2256.19	3.50

Rainfall Distribution pattern used in study:
Type B for San Diego area of California

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********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
2256.19	1.000	73.0	73.0	0.050	C

Area-averaged catchment SCS Curve Number AMC(2) = 73.000
Area-averaged Fm value using values listed = 0.050(In/Hr)

++
Direct entry of lag time by user
Watershed area =   2256.19(Ac.)
Catchment Lag time =   0.770 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 10.8225
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 73.000

Rainfall depth area reduction factors:
Using a total area of   2256.19(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =   3.500(In)
Adjusted rainfall =   3.500(In)

++

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

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Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 27299.90 (CFS))

0.11	0.083	0.016	49.046	0.002
0.22	0.167	0.035	109.219	0.006
0.32	0.250	0.080	251.132	0.015
0.43	0.333	0.126	398.128	0.030
0.54	0.417	0.231	727.738	0.056
0.65	0.500	0.487	1536.327	0.113
0.76	0.583	0.744	2347.940	0.199
0.87	0.667	0.970	3060.728	0.311
0.97	0.750	1.000	3155.005	0.426
1.08	0.833	0.889	2803.538	0.529
1.19	0.917	0.708	2234.582	0.611
1.30	1.000	0.541	1707.873	0.673
1.41	1.083	0.451	1421.553	0.725
1.52	1.167	0.397	1253.877	0.771
1.62	1.250	0.316	997.605	0.808
1.73	1.333	0.272	859.451	0.839
1.84	1.417	0.235	740.970	0.866
1.95	1.500	0.197	621.203	0.889
2.06	1.583	0.176	556.068	0.910
2.16	1.667	0.147	463.377	0.927
2.27	1.750	0.128	404.721	0.941
2.38	1.833	0.112	352.648	0.954
2.49	1.917	0.089	280.530	0.965
2.60	2.000	0.078	244.854	0.974
2.71	2.083	0.063	198.748	0.981
2.81	2.167	0.051	160.175	0.987
2.92	2.250	0.041	128.318	0.991
3.03	2.333	0.033	104.199	0.995
3.14	2.417	0.026	80.877	0.998
3.25	2.500	0.011	35.096	0.999
3.35	2.583	0.005	14.372	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the

revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0052	0.0000	0.0052	0.0000	0.0052	--------
0.17	0.0105	0.0000	0.0052	0.0000	0.0052	--------
0.25	0.0158	0.0000	0.0053	0.0000	0.0053	--------
0.33	0.0210	0.0000	0.0052	0.0000	0.0052	--------
0.42	0.0262	0.0000	0.0052	0.0000	0.0052	--------
0.50	0.0315	0.0000	0.0053	0.0000	0.0053	--------
0.58	0.0356	0.0000	0.0041	0.0000	0.0041	--------
0.67	0.0397	0.0000	0.0041	0.0000	0.0041	--------
0.75	0.0438	0.0000	0.0041	0.0000	0.0041	--------
0.83	0.0478	0.0000	0.0041	0.0000	0.0041	--------
0.92	0.0519	0.0000	0.0041	0.0000	0.0041	--------
1.00	0.0560	0.0000	0.0041	0.0000	0.0041	--------
1.08	0.0613	0.0000	0.0053	0.0000	0.0053	--------
1.17	0.0665	0.0000	0.0052	0.0000	0.0052	--------
1.25	0.0718	0.0000	0.0053	0.0000	0.0053	--------
1.33	0.0770	0.0000	0.0052	0.0000	0.0052	--------
1.42	0.0823	0.0000	0.0053	0.0000	0.0053	--------
1.50	0.0875	0.0000	0.0053	0.0000	0.0053	--------
1.58	0.0928	0.0000	0.0053	0.0000	0.0053	--------
1.67	0.0980	0.0000	0.0052	0.0000	0.0052	--------
1.75	0.1033	0.0000	0.0053	0.0000	0.0053	--------
1.83	0.1085	0.0000	0.0052	0.0000	0.0052	--------
1.92	0.1138	0.0000	0.0053	0.0000	0.0053	--------
2.00	0.1190	0.0000	0.0053	0.0000	0.0053	--------
2.08	0.1254	0.0000	0.0064	0.0000	0.0064	--------
2.17	0.1318	0.0000	0.0064	0.0000	0.0064	--------
2.25	0.1383	0.0000	0.0064	0.0000	0.0064	--------
2.33	0.1447	0.0000	0.0064	0.0000	0.0064	--------
2.42	0.1511	0.0000	0.0064	0.0000	0.0064	--------
2.50	0.1575	0.0000	0.0064	0.0000	0.0064	--------
2.58	0.1628	0.0000	0.0053	0.0000	0.0053	--------
2.67	0.1680	0.0000	0.0053	0.0000	0.0053	--------
2.75	0.1733	0.0000	0.0053	0.0000	0.0053	--------
2.83	0.1785	0.0000	0.0052	0.0000	0.0052	--------
2.92	0.1838	0.0000	0.0053	0.0000	0.0053	--------
3.00	0.1890	0.0000	0.0053	0.0000	0.0053	--------
3.08	0.1954	0.0000	0.0064	0.0000	0.0064	--------
3.17	0.2018	0.0000	0.0064	0.0000	0.0064	--------
3.25	0.2082	0.0000	0.0064	0.0000	0.0064	--------
3.33	0.2147	0.0000	0.0064	0.0000	0.0064	--------
3.42	0.2211	0.0000	0.0064	0.0000	0.0064	--------
3.50	0.2275	0.0000	0.0064	0.0000	0.0064	--------
3.58	0.2345	0.0000	0.0070	0.0000	0.0070	--------
3.67	0.2415	0.0000	0.0070	0.0000	0.0070	--------
3.75	0.2485	0.0000	0.0070	0.0000	0.0070	--------
3.83	0.2555	0.0000	0.0070	0.0000	0.0070	--------
3.92	0.2625	0.0000	0.0070	0.0000	0.0070	--------
4.00	0.2695	0.0000	0.0070	0.0000	0.0070	--------
4.08	0.2771	0.0000	0.0076	0.0000	0.0076	--------
4.17	0.2847	0.0000	0.0076	0.0000	0.0076	--------
4.25	0.2922	0.0000	0.0076	0.0000	0.0076	--------
4.33	0.2998	0.0000	0.0076	0.0000	0.0076	--------
4.42	0.3074	0.0000	0.0076	0.0000	0.0076	--------
4.50	0.3150	0.0000	0.0076	0.0000	0.0076	--------

4.58	0.3232	0.0000	0.0082	0.0000	0.0082	--------
4.67	0.3313	0.0000	0.0082	0.0000	0.0082	--------
4.75	0.3395	0.0000	0.0082	0.0000	0.0082	--------
4.83	0.3477	0.0000	0.0082	0.0000	0.0082	--------
4.92	0.3558	0.0000	0.0082	0.0000	0.0082	--------
5.00	0.3640	0.0000	0.0082	0.0000	0.0082	--------
5.08	0.3733	0.0000	0.0093	0.0000	0.0093	--------
5.17	0.3827	0.0000	0.0093	0.0000	0.0093	--------
5.25	0.3920	0.0000	0.0093	0.0000	0.0093	--------
5.33	0.4013	0.0000	0.0093	0.0000	0.0093	--------
5.42	0.4107	0.0000	0.0093	0.0000	0.0093	--------
5.50	0.4200	0.0000	0.0093	0.0000	0.0093	--------
5.58	0.4299	0.0000	0.0099	0.0000	0.0099	--------
5.67	0.4398	0.0000	0.0099	0.0000	0.0099	--------
5.75	0.4497	0.0000	0.0099	0.0000	0.0099	--------
5.83	0.4597	0.0000	0.0099	0.0000	0.0099	--------
5.92	0.4696	0.0000	0.0099	0.0000	0.0099	--------
6.00	0.4795	0.0000	0.0099	0.0000	0.0099	--------
6.08	0.4912	0.0000	0.0117	0.0000	0.0117	--------
6.17	0.5028	0.0000	0.0117	0.0000	0.0117	--------
6.25	0.5145	0.0000	0.0117	0.0000	0.0117	--------
6.33	0.5262	0.0000	0.0117	0.0000	0.0117	--------
6.42	0.5378	0.0000	0.0117	0.0000	0.0117	--------
6.50	0.5495	0.0000	0.0117	0.0000	0.0117	--------
6.58	0.5629	0.0000	0.0134	0.0000	0.0134	--------
6.67	0.5763	0.0000	0.0134	0.0000	0.0134	--------
6.75	0.5898	0.0000	0.0134	0.0000	0.0134	--------
6.83	0.6032	0.0000	0.0134	0.0000	0.0134	--------
6.92	0.6166	0.0000	0.0134	0.0000	0.0134	--------
7.00	0.6300	0.0000	0.0134	0.0000	0.0134	--------
7.08	0.6475	0.0000	0.0175	0.0000	0.0175	--------
7.17	0.6650	0.0000	0.0175	0.0000	0.0175	--------
7.25	0.6825	0.0000	0.0175	0.0000	0.0175	--------
7.33	0.7000	0.0000	0.0175	0.0000	0.0175	--------
7.42	0.7175	0.0000	0.0175	0.0000	0.0175	--------
7.50	0.7350	0.0000	0.0175	0.0000	0.0175	--------
7.58	0.7612	0.0001	0.0262	0.0001	0.0261	--------
7.67	0.7875	0.0006	0.0262	0.0005	0.0258	--------
7.75	0.8137	0.0015	0.0262	0.0008	0.0254	--------
7.83	0.8400	0.0026	0.0262	0.0012	0.0251	--------
7.92	0.8662	0.0042	0.0262	0.0015	0.0247	--------
8.00	0.8925	0.0061	0.0263	0.0019	0.0244	--------
8.08	0.9316	0.0095	0.0391	0.0034	0.0357	--------
8.17	0.9707	0.0136	0.0391	0.0041	0.0350	--------
8.25	1.0097	0.0184	0.0391	0.0048	0.0343	--------
8.33	1.0488	0.0238	0.0391	0.0055	0.0336	--------
8.42	1.0879	0.0300	0.0391	0.0061	0.0330	--------
8.50	1.1270	0.0367	0.0391	0.0067	0.0323	--------
8.58	1.1783	0.0465	0.0513	0.0098	0.0415	--------
8.67	1.2297	0.0573	0.0513	0.0108	0.0405	--------
8.75	1.2810	0.0691	0.0513	0.0118	0.0395	--------
8.83	1.3323	0.0818	0.0513	0.0127	0.0386	--------
8.92	1.3837	0.0955	0.0513	0.0136	0.0377	--------
9.00	1.4350	0.1100	0.0513	0.0145	0.0368	--------
9.08	1.4910	0.1268	0.0560	0.0168	0.0392	--------
9.17	1.5470	0.1446	0.0560	0.0178	0.0382	--------
9.25	1.6030	0.1634	0.0560	0.0187	0.0373	--------
9.33	1.6590	0.1830	0.0560	0.0196	0.0364	--------
9.42	1.7150	0.2035	0.0560	0.0205	0.0355	--------
9.50	1.7710	0.2249	0.0560	0.0213	0.0347	--------
9.58	1.8188	0.2437	0.0478	0.0189	0.0290	--------
9.67	1.8667	0.2632	0.0478	0.0195	0.0284	--------
9.75	1.9145	0.2832	0.0478	0.0200	0.0278	--------

9.83	1.9623	0.3037	0.0478	0.0205	0.0273	--------
9.92	2.0102	0.3248	0.0478	0.0211	0.0268	--------
10.00	2.0580	0.3464	0.0478	0.0216	0.0262	--------
10.08	2.0819	0.3574	0.0239	0.0110	0.0129	--------
10.17	2.1058	0.3685	0.0239	0.0111	0.0128	--------
10.25	2.1298	0.3797	0.0239	0.0112	0.0127	--------
10.33	2.1537	0.3910	0.0239	0.0113	0.0126	--------
10.42	2.1776	0.4025	0.0239	0.0115	0.0125	--------
10.50	2.2015	0.4141	0.0239	0.0116	0.0123	--------
10.58	2.2172	0.4218	0.0157	0.0077	0.0081	--------
10.67	2.2330	0.4295	0.0158	0.0077	0.0080	--------
10.75	2.2488	0.4373	0.0158	0.0078	0.0080	--------
10.83	2.2645	0.4451	0.0157	0.0078	0.0079	--------
10.92	2.2802	0.4530	0.0157	0.0079	0.0079	--------
11.00	2.2960	0.4609	0.0158	0.0079	0.0078	--------
11.08	2.3094	0.4677	0.0134	0.0068	0.0066	--------
11.17	2.3228	0.4745	0.0134	0.0068	0.0066	--------
11.25	2.3362	0.4814	0.0134	0.0069	0.0066	--------
11.33	2.3497	0.4882	0.0134	0.0069	0.0065	--------
11.42	2.3631	0.4952	0.0134	0.0069	0.0065	--------
11.50	2.3765	0.5021	0.0134	0.0070	0.0065	--------
11.58	2.3887	0.5085	0.0122	0.0064	0.0059	--------
11.67	2.4010	0.5149	0.0123	0.0064	0.0058	--------
11.75	2.4133	0.5213	0.0122	0.0064	0.0058	--------
11.83	2.4255	0.5278	0.0122	0.0065	0.0058	--------
11.92	2.4377	0.5343	0.0122	0.0065	0.0058	--------
12.00	2.4500	0.5408	0.0122	0.0065	0.0057	--------
12.08	2.4617	0.5470	0.0117	0.0062	0.0054	--------
12.17	2.4733	0.5533	0.0117	0.0062	0.0054	--------
12.25	2.4850	0.5595	0.0117	0.0063	0.0054	--------
12.33	2.4967	0.5658	0.0117	0.0063	0.0054	--------
12.42	2.5083	0.5721	0.0117	0.0063	0.0054	--------
12.50	2.5200	0.5785	0.0117	0.0063	0.0053	--------
12.58	2.5311	0.5845	0.0111	0.0060	0.0050	--------
12.67	2.5422	0.5906	0.0111	0.0061	0.0050	--------
12.75	2.5533	0.5967	0.0111	0.0061	0.0050	--------
12.83	2.5643	0.6028	0.0111	0.0061	0.0050	--------
12.92	2.5754	0.6089	0.0111	0.0061	0.0050	--------
13.00	2.5865	0.6150	0.0111	0.0061	0.0049	--------
13.08	2.5964	0.6205	0.0099	0.0055	0.0044	--------
13.17	2.6063	0.6261	0.0099	0.0055	0.0044	--------
13.25	2.6163	0.6316	0.0099	0.0055	0.0044	--------
13.33	2.6262	0.6372	0.0099	0.0056	0.0044	--------
13.42	2.6361	0.6427	0.0099	0.0056	0.0043	--------
13.50	2.6460	0.6483	0.0099	0.0056	0.0043	--------
13.58	2.6553	0.6536	0.0093	0.0053	0.0041	--------
13.67	2.6647	0.6589	0.0093	0.0053	0.0040	--------
13.75	2.6740	0.6642	0.0093	0.0053	0.0040	--------
13.83	2.6833	0.6695	0.0093	0.0053	0.0040	--------
13.92	2.6927	0.6749	0.0093	0.0053	0.0040	--------
14.00	2.7020	0.6802	0.0093	0.0053	0.0040	--------
14.08	2.7125	0.6862	0.0105	0.0060	0.0045	--------
14.17	2.7230	0.6923	0.0105	0.0060	0.0045	--------
14.25	2.7335	0.6983	0.0105	0.0061	0.0044	--------
14.33	2.7440	0.7044	0.0105	0.0061	0.0044	--------
14.42	2.7545	0.7105	0.0105	0.0061	0.0044	--------
14.50	2.7650	0.7166	0.0105	0.0061	0.0044	--------
14.58	2.7708	0.7200	0.0058	0.0034	0.0024	--------
14.67	2.7767	0.7234	0.0058	0.0034	0.0024	--------
14.75	2.7825	0.7268	0.0058	0.0034	0.0024	--------
14.83	2.7883	0.7302	0.0058	0.0034	0.0024	--------
14.92	2.7942	0.7336	0.0058	0.0034	0.0024	--------
15.00	2.8000	0.7371	0.0058	0.0034	0.0024	--------

15.08	2.8093	0.7426	0.0093	0.0055	0.0038	--------
15.17	2.8187	0.7481	0.0093	0.0055	0.0038	--------
15.25	2.8280	0.7536	0.0093	0.0055	0.0038	--------
15.33	2.8373	0.7591	0.0093	0.0055	0.0038	--------
15.42	2.8467	0.7646	0.0093	0.0055	0.0038	--------
15.50	2.8560	0.7702	0.0093	0.0056	0.0038	--------
15.58	2.8647	0.7754	0.0088	0.0052	0.0035	--------
15.67	2.8735	0.7806	0.0088	0.0052	0.0035	--------
15.75	2.8822	0.7859	0.0087	0.0052	0.0035	--------
15.83	2.8910	0.7911	0.0088	0.0052	0.0035	--------
15.92	2.8997	0.7964	0.0087	0.0053	0.0035	--------
16.00	2.9085	0.8016	0.0088	0.0053	0.0035	--------
16.08	2.9167	0.8066	0.0082	0.0049	0.0032	--------
16.17	2.9248	0.8115	0.0082	0.0049	0.0032	--------
16.25	2.9330	0.8165	0.0082	0.0049	0.0032	--------
16.33	2.9412	0.8214	0.0082	0.0050	0.0032	--------
16.42	2.9493	0.8264	0.0082	0.0050	0.0032	--------
16.50	2.9575	0.8313	0.0082	0.0050	0.0032	--------
16.58	2.9662	0.8367	0.0087	0.0053	0.0034	--------
16.67	2.9750	0.8420	0.0088	0.0053	0.0034	--------
16.75	2.9838	0.8474	0.0088	0.0054	0.0034	--------
16.83	2.9925	0.8527	0.0087	0.0054	0.0034	--------
16.92	3.0012	0.8581	0.0088	0.0054	0.0034	--------
17.00	3.0100	0.8635	0.0088	0.0054	0.0034	--------
17.08	3.0170	0.8678	0.0070	0.0043	0.0027	--------
17.17	3.0240	0.8721	0.0070	0.0043	0.0027	--------
17.25	3.0310	0.8765	0.0070	0.0043	0.0027	--------
17.33	3.0380	0.8808	0.0070	0.0043	0.0027	--------
17.42	3.0450	0.8851	0.0070	0.0043	0.0027	--------
17.50	3.0520	0.8895	0.0070	0.0043	0.0027	--------
17.58	3.0596	0.8942	0.0076	0.0047	0.0029	--------
17.67	3.0672	0.8989	0.0076	0.0047	0.0029	--------
17.75	3.0748	0.9037	0.0076	0.0047	0.0029	--------
17.83	3.0823	0.9084	0.0076	0.0047	0.0028	--------
17.92	3.0899	0.9131	0.0076	0.0047	0.0028	--------
18.00	3.0975	0.9179	0.0076	0.0048	0.0028	--------
18.08	3.1033	0.9215	0.0058	0.0037	0.0022	--------
18.17	3.1092	0.9252	0.0058	0.0037	0.0022	--------
18.25	3.1150	0.9289	0.0058	0.0037	0.0022	--------
18.33	3.1208	0.9326	0.0058	0.0037	0.0022	--------
18.42	3.1267	0.9362	0.0058	0.0037	0.0022	--------
18.50	3.1325	0.9399	0.0058	0.0037	0.0022	--------
18.58	3.1383	0.9436	0.0058	0.0037	0.0021	--------
18.67	3.1442	0.9473	0.0058	0.0037	0.0021	--------
18.75	3.1500	0.9510	0.0058	0.0037	0.0021	--------
18.83	3.1558	0.9547	0.0058	0.0037	0.0021	--------
18.92	3.1617	0.9584	0.0058	0.0037	0.0021	--------
19.00	3.1675	0.9621	0.0058	0.0037	0.0021	--------
19.08	3.1728	0.9654	0.0053	0.0033	0.0019	--------
19.17	3.1780	0.9688	0.0052	0.0033	0.0019	--------
19.25	3.1833	0.9721	0.0053	0.0033	0.0019	--------
19.33	3.1885	0.9755	0.0053	0.0033	0.0019	--------
19.42	3.1938	0.9788	0.0052	0.0034	0.0019	--------
19.50	3.1990	0.9822	0.0053	0.0034	0.0019	--------
19.58	3.2048	0.9859	0.0058	0.0037	0.0021	--------
19.67	3.2107	0.9896	0.0058	0.0037	0.0021	--------
19.75	3.2165	0.9934	0.0058	0.0037	0.0021	--------
19.83	3.2223	0.9971	0.0058	0.0037	0.0021	--------
19.92	3.2282	1.0009	0.0058	0.0037	0.0021	--------
20.00	3.2340	1.0046	0.0058	0.0038	0.0021	--------
20.08	3.2404	1.0087	0.0064	0.0041	0.0023	--------
20.17	3.2468	1.0129	0.0064	0.0041	0.0023	--------
20.25	3.2533	1.0170	0.0064	0.0041	0.0023	--------

20.33	3.2597	1.0212	0.0064	0.0041	0.0023
20.42	3.2661	1.0253	0.0064	0.0041	0.0023
20.50	3.2725	1.0295	0.0064	0.0042	0.0023
20.58	3.2783	1.0332	0.0058	0.0038	0.0021
20.67	3.2842	1.0370	0.0058	0.0038	0.0020
20.75	3.2900	1.0408	0.0058	0.0038	0.0020
20.83	3.2958	1.0446	0.0058	0.0038	0.0020
20.92	3.3017	1.0484	0.0058	0.0038	0.0020
21.00	3.3075	1.0522	0.0058	0.0038	0.0020
21.08	3.3127	1.0556	0.0052	0.0034	0.0018
21.17	3.3180	1.0590	0.0053	0.0034	0.0018
21.25	3.3232	1.0625	0.0053	0.0034	0.0018
21.33	3.3285	1.0659	0.0053	0.0034	0.0018
21.42	3.3337	1.0693	0.0052	0.0034	0.0018
21.50	3.3390	1.0728	0.0053	0.0034	0.0018
21.58	3.3443	1.0762	0.0053	0.0034	0.0018
21.67	3.3495	1.0797	0.0052	0.0034	0.0018
21.75	3.3547	1.0831	0.0052	0.0034	0.0018
21.83	3.3600	1.0866	0.0053	0.0034	0.0018
21.92	3.3652	1.0900	0.0052	0.0035	0.0018
22.00	3.3705	1.0935	0.0053	0.0035	0.0018
22.08	3.3757	1.0969	0.0052	0.0035	0.0018
22.17	3.3810	1.1004	0.0053	0.0035	0.0018
22.25	3.3863	1.1038	0.0053	0.0035	0.0018
22.33	3.3915	1.1073	0.0052	0.0035	0.0018
22.42	3.3967	1.1108	0.0053	0.0035	0.0018
22.50	3.4020	1.1143	0.0053	0.0035	0.0018
22.58	3.4073	1.1177	0.0053	0.0035	0.0018
22.67	3.4125	1.1212	0.0052	0.0035	0.0018
22.75	3.4177	1.1247	0.0052	0.0035	0.0018
22.83	3.4230	1.1282	0.0053	0.0035	0.0018
22.92	3.4282	1.1317	0.0052	0.0035	0.0018
23.00	3.4335	1.1352	0.0053	0.0035	0.0018
23.08	3.4393	1.1390	0.0058	0.0039	0.0020
23.17	3.4452	1.1429	0.0058	0.0039	0.0019
23.25	3.4510	1.1468	0.0058	0.0039	0.0019
23.33	3.4568	1.1507	0.0058	0.0039	0.0019
23.42	3.4627	1.1546	0.0058	0.0039	0.0019
23.50	3.4685	1.1585	0.0058	0.0039	0.0019
23.58	3.4737	1.1620	0.0052	0.0035	0.0017
23.67	3.4790	1.1655	0.0053	0.0035	0.0017
23.75	3.4843	1.1691	0.0053	0.0035	0.0017
23.83	3.4895	1.1726	0.0052	0.0035	0.0017
23.92	3.4947	1.1761	0.0052	0.0035	0.0017
24.00	3.5000	1.1796	0.0053	0.0035	0.0017

Total soil rain loss = 2.32(In)
Total effective runoff = 1.18(In)

Peak flow rate this hydrograph = 498.09(CFS)
Total runoff volume this hydrograph = 9661128.0(Ft3)

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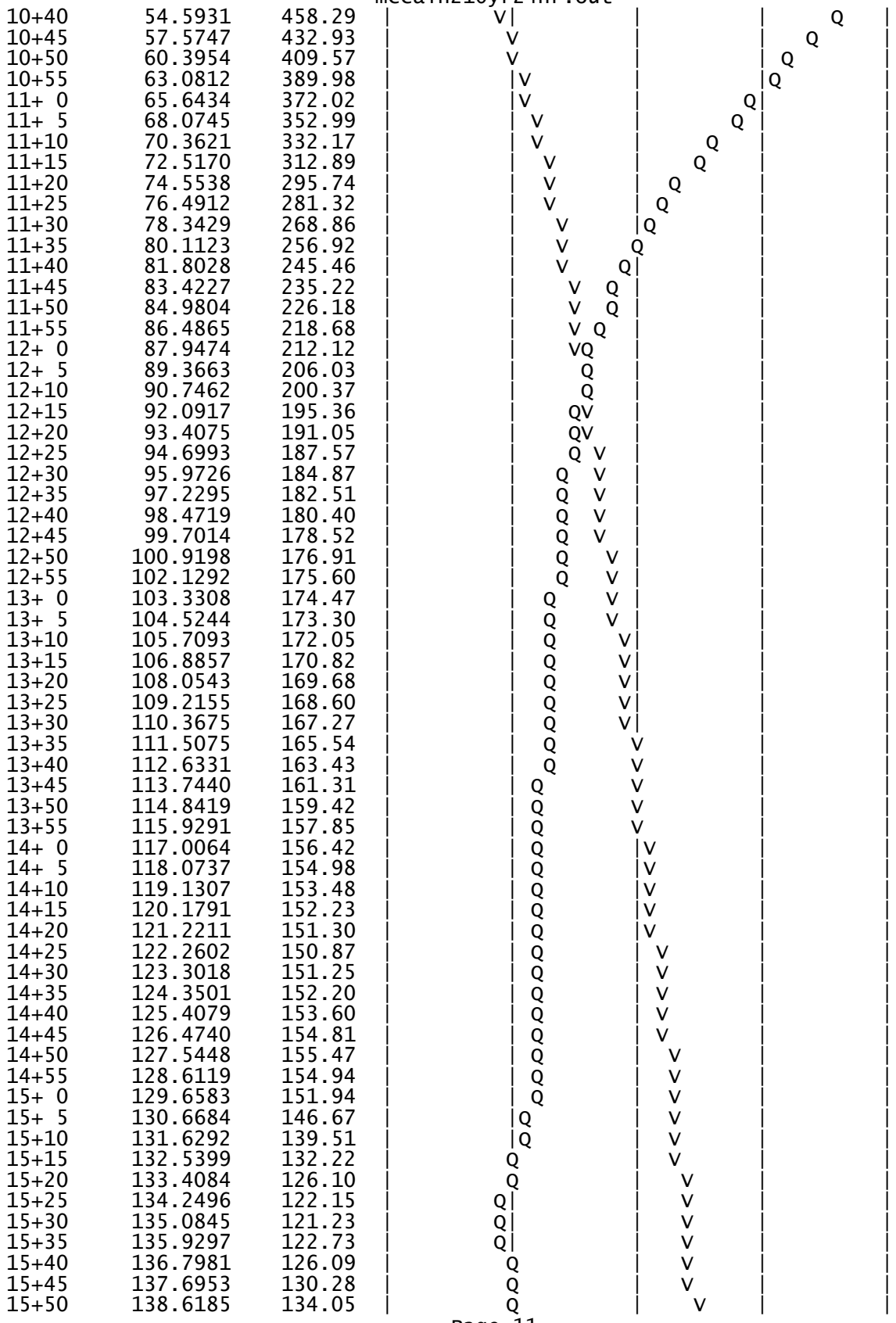
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	125.0	250.0	375.0	500.0
0+ 5	0.0000	0.00	Q	|	|	|	|

0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0000	0.00	Q				
4+25	0.0000	0.00	Q				
4+30	0.0000	0.00	Q				
4+35	0.0000	0.00	Q				
4+40	0.0000	0.00	Q				
4+45	0.0000	0.00	Q				
4+50	0.0000	0.00	Q				
4+55	0.0000	0.00	Q				
5+ 0	0.0000	0.00	Q				
5+ 5	0.0000	0.00	Q				
5+10	0.0000	0.00	Q				
5+15	0.0000	0.00	Q				
5+20	0.0000	0.00	Q				

```
 5+25       0.0000       0.00  Q          |          |          |          |
 5+30       0.0000       0.00  Q          |          |          |          |
 5+35       0.0000       0.00  Q          |          |          |          |
 5+40       0.0000       0.00  Q          |          |          |          |
 5+45       0.0000       0.00  Q          |          |          |          |
 5+50       0.0000       0.00  Q          |          |          |          |
 5+55       0.0000       0.00  Q          |          |          |          |
 6+ 0       0.0000       0.00  Q          |          |          |          |
 6+ 5       0.0000       0.00  Q          |          |          |          |
 6+10       0.0000       0.00  Q          |          |          |          |
 6+15       0.0000       0.00  Q          |          |          |          |
 6+20       0.0000       0.00  Q          |          |          |          |
 6+25       0.0000       0.00  Q          |          |          |          |
 6+30       0.0000       0.00  Q          |          |          |          |
 6+35       0.0000       0.00  Q          |          |          |          |
 6+40       0.0000       0.00  Q          |          |          |          |
 6+45       0.0000       0.00  Q          |          |          |          |
 6+50       0.0000       0.00  Q          |          |          |          |
 6+55       0.0000       0.00  Q          |          |          |          |
 7+ 0       0.0000       0.00  Q          |          |          |          |
 7+ 5       0.0000       0.00  Q          |          |          |          |
 7+10       0.0000       0.00  Q          |          |          |          |
 7+15       0.0000       0.00  Q          |          |          |          |
 7+20       0.0000       0.00  Q          |          |          |          |
 7+25       0.0000       0.00  Q          |          |          |          |
 7+30       0.0000       0.00  Q          |          |          |          |
 7+35       0.0000       0.01  Q          |          |          |          |
 7+40       0.0003       0.04  Q          |          |          |          |
 7+45       0.0012       0.13  Q          |          |          |          |
 7+50       0.0034       0.32  Q          |          |          |          |
 7+55       0.0082       0.70  Q          |          |          |          |
 8+ 0       0.0181       1.44  Q          |          |          |          |
 8+ 5       0.0380       2.88  Q          |          |          |          |
 8+10       0.0748       5.34  Q          |          |          |          |
 8+15       0.1374       9.10  Q          |          |          |          |
 8+20       0.2350      14.17  VQ         |          |          |          |
 8+25       0.3773      20.66  VQ         |          |          |          |
 8+30       0.5773      29.04  V Q        |          |          |          |
 8+35       0.8497      39.56  V  Q       |          |          |          |
 8+40       1.2101      52.33  V   Q      |          |          |          |
 8+45       1.6716      67.01  V    Q     |          |          |          |
 8+50       2.2434      83.04  V     Q    |          |          |          |
 8+55       2.9351     100.43  V      Q   |          |          |          |
 9+ 0       3.7631     120.23  V       Q  |          |          |          |
 9+ 5       4.7470     142.87  V        Q |          |          |          |
 9+10       5.9070     168.43  |V         |  Q       |          |          |
 9+15       7.2539     195.58  |V         |    Q     |          |          |
 9+20       8.7915     223.26  |V         |      Q   |          |          |
 9+25      10.5199     250.97  |V         |        Q |          |          |
 9+30      12.4427     279.19  | V        |          | Q        |          |
 9+35      14.5655     308.22  | V        |          |   Q      |          |
 9+40      16.8938     338.07  |  V       |          |     Q    |          |
 9+45      19.4237     367.35  |  V       |          |       Q  |          |
 9+50      22.1476     395.51  |  V       |          |         Q|          |
 9+55      25.0505     421.50  |   V      |          |          |  Q       |
10+ 0      28.1054     443.57  |    V     |          |          |    Q     |
10+ 5      31.2826     461.33  |    V     |          |          |     Q    |
10+10      34.5527     474.82  |     V    |          |          |      Q   |
10+15      37.8924     484.92  |     V    |          |          |       Q  |
10+20      41.2885     493.11  |      V   |          |          |        Q |
10+25      44.7188     498.09  |       V  |          |          |        Q |
10+30      48.1240     494.43  |       V  |          |          |        Q |
10+35      51.4368     481.02  |        V |          |          |       Q  |
```



10+40	54.5931	458.29	V Q
10+45	57.5747	432.93	V Q
10+50	60.3954	409.57	V Q
10+55	63.0812	389.98	V Q
11+ 0	65.6434	372.02	V Q
11+ 5	68.0745	352.99	V Q
11+10	70.3621	332.17	V Q
11+15	72.5170	312.89	V Q
11+20	74.5538	295.74	V Q
11+25	76.4912	281.32	V Q
11+30	78.3429	268.86	V Q
11+35	80.1123	256.92	V Q
11+40	81.8028	245.46	V Q
11+45	83.4227	235.22	V Q
11+50	84.9804	226.18	V Q
11+55	86.4865	218.68	V Q
12+ 0	87.9474	212.12	VQ
12+ 5	89.3663	206.03	Q
12+10	90.7462	200.37	Q
12+15	92.0917	195.36	QV
12+20	93.4075	191.05	QV
12+25	94.6993	187.57	Q V
12+30	95.9726	184.87	Q V
12+35	97.2295	182.51	Q V
12+40	98.4719	180.40	Q V
12+45	99.7014	178.52	Q V
12+50	100.9198	176.91	Q V
12+55	102.1292	175.60	Q V
13+ 0	103.3308	174.47	Q V
13+ 5	104.5244	173.30	Q V
13+10	105.7093	172.05	Q V
13+15	106.8857	170.82	Q V
13+20	108.0543	169.68	Q V
13+25	109.2155	168.60	Q V
13+30	110.3675	167.27	Q V
13+35	111.5075	165.54	Q V
13+40	112.6331	163.43	Q V
13+45	113.7440	161.31	Q V
13+50	114.8419	159.42	Q V
13+55	115.9291	157.85	Q V
14+ 0	117.0064	156.42	Q V
14+ 5	118.0737	154.98	Q V
14+10	119.1307	153.48	Q V
14+15	120.1791	152.23	Q V
14+20	121.2211	151.30	Q V
14+25	122.2602	150.87	Q V
14+30	123.3018	151.25	Q V
14+35	124.3501	152.20	Q V
14+40	125.4079	153.60	Q V
14+45	126.4740	154.81	Q V
14+50	127.5448	155.47	Q V
14+55	128.6119	154.94	Q V
15+ 0	129.6583	151.94	Q V
15+ 5	130.6684	146.67	Q V
15+10	131.6292	139.51	Q V
15+15	132.5399	132.22	Q V
15+20	133.4084	126.10	Q V
15+25	134.2496	122.15	Q V
15+30	135.0845	121.23	Q V
15+35	135.9297	122.73	Q V
15+40	136.7981	126.09	Q V
15+45	137.6953	130.28	Q V
15+50	138.6185	134.05	Q V

15+55	139.5608	136.83	| Q |	V	|	|
16+ 0	140.5151	138.56	| Q |	V	|	|
16+ 5	141.4764	139.57	| Q |	V	|	|
16+10	142.4419	140.19	| Q |	V	|	|
16+15	143.4084	140.34	| Q |	V	|	|
16+20	144.3753	140.39	| Q |	V	|	|
16+25	145.3427	140.47	| Q |	V	|	|
16+30	146.3086	140.25	| Q |	V	|	|
16+35	147.2717	139.85	| Q |	V	|	|
16+40	148.2302	139.17	| Q |	V	|	|
16+45	149.1844	138.56	| Q |	V	|	|
16+50	150.1357	138.12	| Q |	V	|	|
16+55	151.0858	137.96	| Q |	V	|	|
17+ 0	152.0387	138.36	| Q |	V	|	|
17+ 5	152.9965	139.08	| Q |	V	|	|
17+10	153.9610	140.04	| Q |	V	|	|
17+15	154.9315	140.92	| Q |	V	|	|
17+20	155.9063	141.54	| Q |	V	|	|
17+25	156.8817	141.63	| Q |	V	|	|
17+30	157.8501	140.61	| Q |	V	|	|
17+35	158.8047	138.62	| Q |	V	|	|
17+40	159.7402	135.83	| Q |	V	|	|
17+45	160.6556	132.92	| Q |	V	|	|
17+50	161.5537	130.40	| Q |	V	|	|
17+55	162.4394	128.61	| Q |	V	|	|
18+ 0	163.3185	127.65	| Q |	V	|	|
18+ 5	164.1949	127.24	| Q |	V	|	|
18+10	165.0708	127.19	| Q |	V	|	|
18+15	165.9474	127.28	| Q |	V	|	|
18+20	166.8236	127.22	| Q |	V	|	|
18+25	167.6962	126.70	| Q |	V	|	|
18+30	168.5586	125.23	| Q |	V	|	|
18+35	169.4045	122.82	| Q |	V	|	|
18+40	170.2285	119.65	| Q |	V	|	|
18+45	171.0296	116.32	| Q |	V	|	|
18+50	171.8104	113.37	| Q |	V	|	|
18+55	172.5753	111.06	| Q |	V	|	|
19+ 0	173.3281	109.30	| Q |	V	|	|
19+ 5	174.0709	107.86	| Q |	V	|	|
19+10	174.8048	106.57	| Q |	V	|	|
19+15	175.5315	105.52	| Q |	V	|	|
19+20	176.2517	104.57	| Q |	V	|	|
19+25	176.9653	103.62	| Q |	V	|	|
19+30	177.6715	102.54	| Q |	V	|	|
19+35	178.3689	101.25	| Q |	V	|	|
19+40	179.0563	99.82	| Q |	V	|	|
19+45	179.7344	98.46	| Q |	V	|	|
19+50	180.4047	97.32	| Q |	V	|	|
19+55	181.0699	96.59	| Q |	V	|	|
20+ 0	181.7336	96.37	| Q |	V	|	|
20+ 5	182.3991	96.63	| Q |	V	|	|
20+10	183.0690	97.27	| Q |	V	|	|
20+15	183.7448	98.13	| Q |	V	|	|
20+20	184.4266	99.00	| Q |	V	|	|
20+25	185.1143	99.84	| Q |	V	|	|
20+30	185.8091	100.90	| Q |	V	|	|
20+35	186.5128	102.17	| Q |	V	|	|
20+40	187.2269	103.69	| Q |	V	|	|
20+45	187.9508	105.11	| Q |	V	|	|
20+50	188.6830	106.32	| Q |	V	|	|
20+55	189.4211	107.17	| Q |	V	|	|
21+ 0	190.1614	107.49	| Q |	V	|	|
21+ 5	190.9008	107.37	| Q |	V	|	|

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21+10     191.6368    106.87  |        Q |          |          |   V      |
21+15     192.3680    106.17  |        Q |          |          |   V      |
21+20     193.0946    105.49  |        Q |          |          |   V      |
21+25     193.8165    104.83  |        Q |          |          |   V      |
21+30     194.5329    104.02  |        Q |          |          |    V     |
21+35     195.2421    102.97  |        Q |          |          |    V     |
21+40     195.9423    101.67  |        Q |          |          |    V     |
21+45     196.6338    100.40  |        Q |          |          |    V     |
21+50     197.3175     99.27  |       Q  |          |          |    V     |
21+55     197.9950     98.38  |       Q  |          |          |    V     |
22+ 0     198.6678     97.69  |       Q  |          |          |    V     |
22+ 5     199.3366     97.11  |       Q  |          |          |    V     |
22+10     200.0019     96.61  |       Q  |          |          |     V    |
22+15     200.6646     96.21  |       Q  |          |          |     V    |
22+20     201.3249     95.88  |       Q  |          |          |     V    |
22+25     201.9833     95.61  |       Q  |          |          |     V    |
22+30     202.6402     95.38  |       Q  |          |          |     V    |
22+35     203.2957     95.18  |       Q  |          |          |     V    |
22+40     203.9502     95.03  |       Q  |          |          |     V    |
22+45     204.6039     94.91  |       Q  |          |          |     V    |
22+50     205.2569     94.82  |       Q  |          |          |      V   |
22+55     205.9095     94.76  |       Q  |          |          |      V   |
23+ 0     206.5620     94.74  |       Q  |          |          |      V   |
23+ 5     207.2146     94.76  |       Q  |          |          |      V   |
23+10     207.8676     94.82  |       Q  |          |          |      V   |
23+15     208.5216     94.95  |       Q  |          |          |      V   |
23+20     209.1769     95.15  |       Q  |          |          |      V   |
23+25     209.8344     95.48  |       Q  |          |          |      V   |
23+30     210.4966     96.14  |       Q  |          |          |      V   |
23+35     211.1654     97.11  |       Q  |          |          |       V  |
23+40     211.8427     98.34  |       Q  |          |          |       V  |
23+45     212.5283     99.55  |       Q  |          |          |       V  |
23+50     213.2210    100.57  |        Q |          |          |       V  |
23+55     213.9183    101.25  |        Q |          |          |       V  |
24+ 0     214.6166    101.40  |        Q |          |          |       V  |
24+ 5     215.3118    100.95  |        Q |          |          |       V  |
24+10     216.0001     99.94  |       Q  |          |          |       V  |
24+15     216.6771     98.30  |       Q  |          |          |        V |
24+20     217.3398     96.22  |       Q  |          |          |        V |
24+25     217.9812     93.14  |       Q  |          |          |        V |
24+30     218.5830     87.37  |      Q   |          |          |        V |
24+35     219.1258     78.82  |      Q   |          |          |        V |
24+40     219.5925     67.77  |     Q    |          |          |        V |
24+45     219.9813     56.46  |    Q     |          |          |        V |
24+50     220.3010     46.41  |   Q      |          |          |        V |
24+55     220.5653     38.38  |   Q      |          |          |        V |
25+ 0     220.7873     32.24  |  Q       |          |          |        V |
25+ 5     220.9740     27.10  |  Q       |          |          |        V |
25+10     221.1295     22.58  |Q         |          |          |        V |
25+15     221.2601     18.97  |Q         |          |          |        V |
25+20     221.3693     15.86  |Q         |          |          |        V |
25+25     221.4601     13.18  |Q         |          |          |        V |
25+30     221.5352     10.91  Q          |          |          |        V |
25+35     221.5964      8.89  Q          |          |          |        V |
25+40     221.6460      7.19  Q          |          |          |        V |
25+45     221.6854      5.72  Q          |          |          |        V |
25+50     221.7160      4.44  Q          |          |          |        V |
25+55     221.7395      3.42  Q          |          |          |        V |
26+ 0     221.7571      2.55  Q          |          |          |        V |
26+ 5     221.7698      1.84  Q          |          |          |        V |
26+10     221.7786      1.28  Q          |          |          |        V |
26+15     221.7843      0.83  Q          |          |          |        V |
26+20     221.7874      0.46  Q          |          |          |        V |
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   26+25     221.7886      0.17  Q          |          |          |        V|
   26+30     221.7890      0.05  Q          |          |          |        V|
-----------------------------------------------------------------------------
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U N I T H Y D R O G R A P H A N A L Y S I S

Study date 09/08/10 File: mccain2100yr6hr.out

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Program License Serial Number 4055

Tule Wind Project
McCain Valley Crossing 2
Proposed Conditions 100 Yr 6 Hr
Aug 18, 2010

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Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
2256.19	3.00

Rainfall Distribution pattern used in study:
Type B for SCS (small dam) or San Diego 6 hour storms

++

********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
2256.19	1.000	83.0	83.0	0.050	C

Area-averaged catchment SCS Curve Number AMC(2) = 83.000
Area-averaged Fm value using values listed = 0.050(In/Hr)

++
Direct entry of lag time by user
Watershed area =   2256.19(Ac.)
Catchment Lag time =   0.770 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 10.8253
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 83.000

Rainfall depth area reduction factors:
Using a total area of   2256.19(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =   3.000(In)
Adjusted rainfall =   3.000(In)

++

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

++

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 27299.90 (CFS))

0.11	0.083	0.016	49.059	0.002
0.22	0.167	0.035	109.276	0.006
0.32	0.250	0.080	251.254	0.015
0.43	0.333	0.126	398.498	0.030
0.54	0.417	0.231	728.078	0.056
0.65	0.500	0.488	1538.696	0.113
0.76	0.583	0.745	2349.140	0.199
0.87	0.667	0.971	3062.629	0.311
0.97	0.750	1.000	3155.098	0.426
1.08	0.833	0.889	2803.873	0.529
1.19	0.917	0.708	2232.509	0.611
1.30	1.000	0.541	1707.891	0.673
1.41	1.083	0.450	1421.162	0.726
1.52	1.167	0.397	1253.337	0.771
1.62	1.250	0.316	997.457	0.808
1.73	1.333	0.272	858.813	0.839
1.84	1.417	0.235	740.901	0.867
1.95	1.500	0.197	620.919	0.889
2.06	1.583	0.176	555.773	0.910
2.17	1.667	0.147	463.293	0.927
2.27	1.750	0.128	404.340	0.941
2.38	1.833	0.112	352.530	0.954
2.49	1.917	0.089	280.262	0.965
2.60	2.000	0.078	244.633	0.974
2.71	2.083	0.063	198.665	0.981
2.81	2.167	0.051	159.816	0.987
2.92	2.250	0.041	128.263	0.991
3.03	2.333	0.033	104.089	0.995
3.14	2.417	0.026	80.548	0.998
3.25	2.500	0.011	34.958	0.999
3.36	2.583	0.004	14.138	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the

revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0175	0.0000	0.0175	0.0000	0.0175	--------
0.17	0.0350	0.0000	0.0175	0.0000	0.0175	--------
0.25	0.0525	0.0000	0.0175	0.0000	0.0175	--------
0.33	0.0700	0.0000	0.0175	0.0000	0.0175	--------
0.42	0.0875	0.0000	0.0175	0.0000	0.0175	--------
0.50	0.1050	0.0000	0.0175	0.0000	0.0175	--------
0.58	0.1285	0.0000	0.0235	0.0000	0.0235	--------
0.67	0.1520	0.0000	0.0235	0.0000	0.0235	--------
0.75	0.1755	0.0000	0.0235	0.0000	0.0235	--------
0.83	0.1990	0.0000	0.0235	0.0000	0.0235	--------
0.92	0.2225	0.0000	0.0235	0.0000	0.0235	--------
1.00	0.2460	0.0000	0.0235	0.0000	0.0235	--------
1.08	0.2750	0.0000	0.0290	0.0000	0.0290	--------
1.17	0.3040	0.0000	0.0290	0.0000	0.0290	--------
1.25	0.3330	0.0000	0.0290	0.0000	0.0290	--------
1.33	0.3620	0.0000	0.0290	0.0000	0.0290	--------
1.42	0.3910	0.0000	0.0290	0.0000	0.0290	--------
1.50	0.4200	0.0001	0.0290	0.0001	0.0289	--------
1.58	0.4650	0.0015	0.0450	0.0014	0.0436	--------
1.67	0.5100	0.0047	0.0450	0.0032	0.0418	--------
1.75	0.5550	0.0096	0.0450	0.0049	0.0401	--------
1.83	0.6000	0.0162	0.0450	0.0066	0.0384	--------
1.92	0.6450	0.0243	0.0450	0.0081	0.0369	--------
2.00	0.6900	0.0338	0.0450	0.0095	0.0355	--------
2.08	0.8750	0.0862	0.1850	0.0524	0.1326	--------
2.17	1.0600	0.1567	0.1850	0.0706	0.1144	--------
2.25	1.2450	0.2420	0.1850	0.0853	0.0997	--------
2.33	1.4300	0.3393	0.1850	0.0973	0.0877	--------
2.42	1.6150	0.4466	0.1850	0.1073	0.0777	--------
2.50	1.8000	0.5622	0.1850	0.1156	0.0694	--------
2.58	1.8500	0.5947	0.0500	0.0325	0.0175	--------
2.67	1.9000	0.6277	0.0500	0.0330	0.0170	--------
2.75	1.9500	0.6612	0.0500	0.0335	0.0165	--------
2.83	2.0000	0.6951	0.0500	0.0339	0.0161	--------
2.92	2.0500	0.7295	0.0500	0.0344	0.0156	--------
3.00	2.1000	0.7643	0.0500	0.0348	0.0152	--------
3.08	2.1405	0.7928	0.0405	0.0285	0.0120	--------
3.17	2.1810	0.8215	0.0405	0.0287	0.0118	--------
3.25	2.2215	0.8505	0.0405	0.0290	0.0115	--------
3.33	2.2620	0.8797	0.0405	0.0292	0.0113	--------
3.42	2.3025	0.9091	0.0405	0.0294	0.0111	--------
3.50	2.3430	0.9388	0.0405	0.0297	0.0108	--------
3.58	2.3700	0.9587	0.0270	0.0199	0.0071	--------
3.67	2.3970	0.9787	0.0270	0.0200	0.0070	--------
3.75	2.4240	0.9988	0.0270	0.0201	0.0069	--------
3.83	2.4510	1.0190	0.0270	0.0202	0.0068	--------
3.92	2.4780	1.0392	0.0270	0.0203	0.0067	--------
4.00	2.5050	1.0596	0.0270	0.0204	0.0066	--------
4.08	2.5275	1.0766	0.0225	0.0170	0.0055	--------
4.17	2.5500	1.0937	0.0225	0.0171	0.0054	--------
4.25	2.5725	1.1109	0.0225	0.0171	0.0054	--------
4.33	2.5950	1.1281	0.0225	0.0172	0.0053	--------
4.42	2.6175	1.1453	0.0225	0.0173	0.0052	--------
4.50	2.6400	1.1627	0.0225	0.0173	0.0052	--------

4.58	2.6615	1.1793	0.0215	0.0166	0.0049	--------
4.67	2.6830	1.1959	0.0215	0.0166	0.0049	--------
4.75	2.7045	1.2126	0.0215	0.0167	0.0048	--------
4.83	2.7260	1.2293	0.0215	0.0167	0.0048	--------
4.92	2.7475	1.2461	0.0215	0.0168	0.0047	--------
5.00	2.7690	1.2630	0.0215	0.0168	0.0047	--------
5.08	2.7875	1.2775	0.0185	0.0145	0.0040	--------
5.17	2.8060	1.2920	0.0185	0.0146	0.0039	--------
5.25	2.8245	1.3066	0.0185	0.0146	0.0039	--------
5.33	2.8430	1.3212	0.0185	0.0146	0.0039	--------
5.42	2.8615	1.3359	0.0185	0.0147	0.0038	--------
5.50	2.8800	1.3506	0.0185	0.0147	0.0038	--------
5.58	2.9000	1.3665	0.0200	0.0159	0.0041	--------
5.67	2.9200	1.3824	0.0200	0.0159	0.0041	--------
5.75	2.9400	1.3984	0.0200	0.0160	0.0040	--------
5.83	2.9600	1.4144	0.0200	0.0160	0.0040	--------
5.92	2.9800	1.4305	0.0200	0.0160	0.0040	--------
6.00	3.0000	1.4466	0.0200	0.0161	0.0039	--------

Total soil rain loss = 1.55(In)
Total effective runoff = 1.45(In)

Peak flow rate this hydrograph = 1561.68(CFS)
Total runoff volume this hydrograph = 11847327.4(Ft3)

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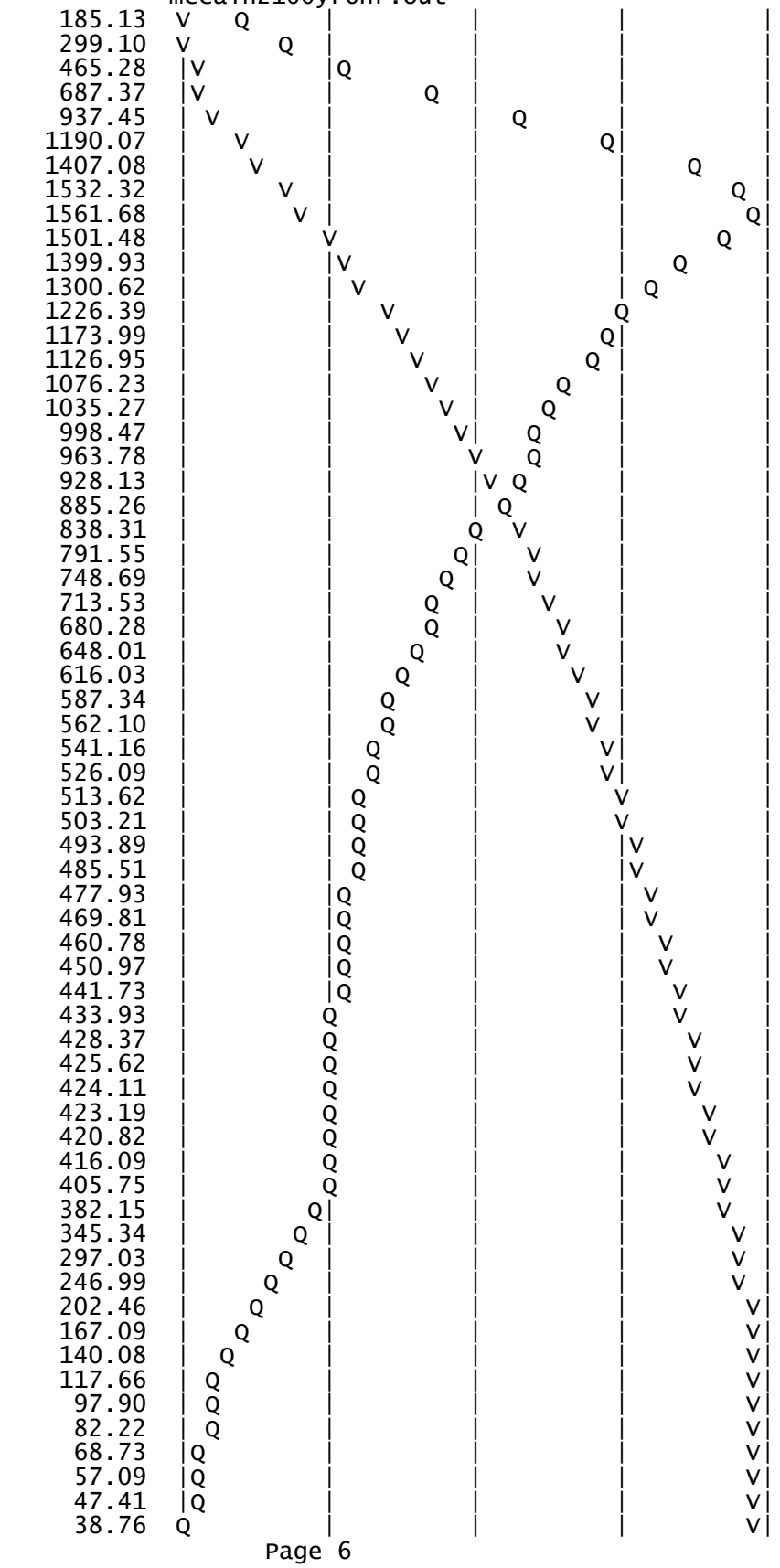
6 - H O U R S T O R M
R u n o f f H y d r o g r a p h

Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	400.0	800.0	1200.0	1600.0
0+ 5	0.0000	0.00	Q				
0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0005	0.07	Q				
1+40	0.0028	0.33	Q				
1+45	0.0094	0.97	Q				
1+50	0.0251	2.27	Q				
1+55	0.0578	4.75	Q				
2+ 0	0.1239	9.60	Q				
2+ 5	0.2636	20.28	Q				
2+10	0.5337	39.23	Q				
2+15	1.0220	70.90	VQ				
2+20	1.8267	116.83	V Q				

2+25	3.1017	185.13	
2+30	5.1615	299.10	
2+35	8.3660	465.28	
2+40	13.0999	687.37	
2+45	19.5562	937.45	
2+50	27.7523	1190.07	
2+55	37.4430	1407.08	
3+ 0	47.9961	1532.32	
3+ 5	58.7515	1561.68	
3+10	69.0923	1501.48	
3+15	78.7337	1399.93	
3+20	87.6911	1300.62	
3+25	96.1373	1226.39	
3+30	104.2226	1173.99	
3+35	111.9840	1126.95	
3+40	119.3960	1076.23	
3+45	126.5260	1035.27	
3+50	133.4025	998.47	
3+55	140.0401	963.78	
4+ 0	146.4322	928.13	
4+ 5	152.5290	885.26	
4+10	158.3024	838.31	
4+15	163.7539	791.55	
4+20	168.9101	748.69	
4+25	173.8242	713.53	
4+30	178.5094	680.28	
4+35	182.9723	648.01	
4+40	187.2149	616.03	
4+45	191.2600	587.34	
4+50	195.1312	562.10	
4+55	198.8582	541.16	
5+ 0	202.4814	526.09	
5+ 5	206.0187	513.62	
5+10	209.4844	503.21	
5+15	212.8858	493.89	
5+20	216.2295	485.51	
5+25	219.5211	477.93	
5+30	222.7567	469.81	
5+35	225.9301	460.78	
5+40	229.0360	450.97	
5+45	232.0782	441.73	
5+50	235.0667	433.93	
5+55	238.0168	428.37	
6+ 0	240.9481	425.62	
6+ 5	243.8690	424.11	
6+10	246.7835	423.19	
6+15	249.6817	420.82	
6+20	252.5473	416.09	
6+25	255.3417	405.75	
6+30	257.9736	382.15	
6+35	260.3519	345.34	
6+40	262.3976	297.03	
6+45	264.0986	246.99	
6+50	265.4929	202.46	
6+55	266.6437	167.09	
7+ 0	267.6084	140.08	
7+ 5	268.4188	117.66	
7+10	269.0930	97.90	
7+15	269.6593	82.22	
7+20	270.1327	68.73	
7+25	270.5258	57.09	
7+30	270.8524	47.41	
7+35	271.1193	38.76	

```
    7+40     271.3368     31.57  Q          |          |          |         V|
    7+45     271.5108     25.28  Q          |          |          |         V|
    7+50     271.6470     19.77  Q          |          |          |         V|
    7+55     271.7530     15.39  Q          |          |          |         V|
    8+ 0     271.8324     11.53  Q          |          |          |         V|
    8+ 5     271.8900      8.37  Q          |          |          |         V|
    8+10     271.9300      5.81  Q          |          |          |         V|
    8+15     271.9559      3.75  Q          |          |          |         V|
    8+20     271.9702      2.08  Q          |          |          |         V|
    8+25     271.9756      0.79  Q          |          |          |         V|
    8+30     271.9772      0.23  Q          |          |          |          V
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U N I T H Y D R O G R A P H A N A L Y S I S

Study date 09/08/10 File: mccain2100yr24hr.out

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Program License Serial Number 4055

Tule Wind Project
McCain Valley Crossing 2
Proposed Conditions 100 Yr 24 Hr
Aug 18, 2010

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Storm Event Year = 100

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

Area averaged rainfall isohyetal data:

Sub-Area(Ac.)	Rainfall (In)
2256.19	5.07

Rainfall Distribution pattern used in study:
Type B for San Diego area of California

++

********* Area-Averaged SCS Curve Number and Fm *********

Area (Ac.)	Area fract	SCS CN (AMC2)	SCS CN (AMC2)	Fm (In/Hr)	Soil Group
2256.19	1.000	83.0	83.0	0.050	C

Area-averaged catchment SCS Curve Number AMC(2) = 83.000
Area-averaged Fm value using values listed = 0.050(In/Hr)

++
Direct entry of lag time by user
Watershed area =   2256.19(Ac.)
Catchment Lag time =   0.770 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 10.8225
Hydrograph baseflow =   0.00(CFS)
Minimum watershed loss rate(Fm) = 0.000(In/Hr)
Average adjusted SCS Curve Number = 83.000

Rainfall depth area reduction factors:
Using a total area of   2256.19(Ac.) (Ref: SCS Sup A, Sec.4)

Pacific Coastal Climate ratio used
Areal factor ratio (rainfall reduction) = 1.000
Rainfall entered for study =   5.070(In)
Adjusted rainfall =   5.070(In)

The following unit hydrograph was developed using an S-Graph interpolated by time percentage of lag time vs. percentage of peak flow. The S-Graphs for Valley, Foothill, and Mountain were developed by the U.S. Army Corps of Engineers for use in the respective type of basins located in Southern California. (Hydrology San Gabrial River ... U.S. Engineer Office, Dec 1944, revised Jul 1946) The Desert S-Graph is from Report ... on ... Tahquitz Creek, California, same U.S. offfice, Corps of Engineers, June 1963. The Valley Developed S-Graph is used by Orange and San Bernardino counties in California to represent the characteristics of valley areas with a large amount of development. Because of the wide variety in topography in Southern California, these synthetic unit hydrographs were included for use as options in any geographic location.

The SCS(Soil Conservation Service Dimensionless S-Graph, SCS handbook, of 1972, applies to a broad cross section of geographic locations and hydrologic regions.

The User Defined hydrograph converts the user Q/Qp vs. T/Tp values into an S-Graph based on lag = Tp/0.9. Then, for the lag time used, the S-Graph in interpolated in time % of lag.

The following S-Graph or S-Graph combination is used in this study:

SAN DIEGO CO. HYDROGRAPH

San Deigo Co. Unit Hydrograph Data (III-A-2):
using a constant T/Tp step interval = 0.200

t/tp	q/qp	Sum q/qp
0.000	0.000	0.000
0.200	0.030	0.000
0.400	0.090	0.030
0.600	0.230	0.120
0.800	0.700	0.350
1.000	1.000	1.050
1.200	0.850	2.050
1.400	0.530	2.900
1.600	0.410	3.430
1.800	0.300	3.840
2.000	0.230	4.140
2.200	0.180	4.370
2.400	0.140	4.550
2.600	0.110	4.690
2.800	0.080	4.800
3.000	0.060	4.880
3.200	0.040	4.940
3.400	0.030	4.980
3.600	0.010	5.010
3.800	0.000	5.020

U N I T H Y D R O G R A P H

Time Ratio (t/Lag)	Time (hrs)	Discharge Ratios (Q/Qp)	Q (CFS)	Mass Curve Ratios (Qa/Q)

(K = 27299.90 (CFS))

0.11	0.083	0.016	49.046	0.002
0.22	0.167	0.035	109.219	0.006
0.32	0.250	0.080	251.132	0.015
0.43	0.333	0.126	398.128	0.030
0.54	0.417	0.231	727.738	0.056
0.65	0.500	0.487	1536.327	0.113
0.76	0.583	0.744	2347.940	0.199
0.87	0.667	0.970	3060.728	0.311
0.97	0.750	1.000	3155.005	0.426
1.08	0.833	0.889	2803.538	0.529
1.19	0.917	0.708	2234.582	0.611
1.30	1.000	0.541	1707.873	0.673
1.41	1.083	0.451	1421.553	0.725
1.52	1.167	0.397	1253.877	0.771
1.62	1.250	0.316	997.605	0.808
1.73	1.333	0.272	859.451	0.839
1.84	1.417	0.235	740.970	0.866
1.95	1.500	0.197	621.203	0.889
2.06	1.583	0.176	556.068	0.910
2.16	1.667	0.147	463.377	0.927
2.27	1.750	0.128	404.721	0.941
2.38	1.833	0.112	352.648	0.954
2.49	1.917	0.089	280.530	0.965
2.60	2.000	0.078	244.854	0.974
2.71	2.083	0.063	198.748	0.981
2.81	2.167	0.051	160.175	0.987
2.92	2.250	0.041	128.318	0.991
3.03	2.333	0.033	104.199	0.995
3.14	2.417	0.026	80.877	0.998
3.25	2.500	0.011	35.096	0.999
3.35	2.583	0.005	14.372	1.000

For each time interval of the 6 or 24 hour storm, the total rainfall up to that storm time is calculated. Then the Soil Conservation Service SCS (report 1972, 1975) area averaged Curve Number (CN) is used to determine the amount of direct runoff in (In) using the following equations:

$$Q = \frac{(P - Ia)^2}{P - Ia + S}$$

Where:
Q = direct runoff, P = depth of precipitation, Ia = Initial Abstraction and S is the watershed storage in inches. S and Ia are given by the following equations:

$$S = \frac{1000}{CN} - 10 \quad \text{and} \quad Ia = 0.2\ S$$

Note: If Metric (SI) Units are used, rainfall data is converted by the program internally into inches for these calculations.

Note: In the following printout, the revised runoff column is only used when the minimum soil loss rate, fm, exceeds the normal loss rate of delta P(dP) - delta Q(dQ) then the dP-dQ column equals fm = 0.000(In) (for time interval = 0.000(In)) and the

revised runoff is shown in the last column.

Time Period (hours)	Total Rainfall (In) P	Total SCS Runoff (In) Q	Rainfall Amount (In) dP	Runoff Amount (In) dQ	Infiltr-ation (In) dP-dQ	Revised Runoff Min Loss Rate
0.08	0.0076	0.0000	0.0076	0.0000	0.0076	--------
0.17	0.0152	0.0000	0.0076	0.0000	0.0076	--------
0.25	0.0228	0.0000	0.0076	0.0000	0.0076	--------
0.33	0.0304	0.0000	0.0076	0.0000	0.0076	--------
0.42	0.0380	0.0000	0.0076	0.0000	0.0076	--------
0.50	0.0456	0.0000	0.0076	0.0000	0.0076	--------
0.58	0.0515	0.0000	0.0059	0.0000	0.0059	--------
0.67	0.0575	0.0000	0.0059	0.0000	0.0059	--------
0.75	0.0634	0.0000	0.0059	0.0000	0.0059	--------
0.83	0.0693	0.0000	0.0059	0.0000	0.0059	--------
0.92	0.0752	0.0000	0.0059	0.0000	0.0059	--------
1.00	0.0811	0.0000	0.0059	0.0000	0.0059	--------
1.08	0.0887	0.0000	0.0076	0.0000	0.0076	--------
1.17	0.0963	0.0000	0.0076	0.0000	0.0076	--------
1.25	0.1039	0.0000	0.0076	0.0000	0.0076	--------
1.33	0.1115	0.0000	0.0076	0.0000	0.0076	--------
1.42	0.1191	0.0000	0.0076	0.0000	0.0076	--------
1.50	0.1268	0.0000	0.0076	0.0000	0.0076	--------
1.58	0.1344	0.0000	0.0076	0.0000	0.0076	--------
1.67	0.1420	0.0000	0.0076	0.0000	0.0076	--------
1.75	0.1496	0.0000	0.0076	0.0000	0.0076	--------
1.83	0.1572	0.0000	0.0076	0.0000	0.0076	--------
1.92	0.1648	0.0000	0.0076	0.0000	0.0076	--------
2.00	0.1724	0.0000	0.0076	0.0000	0.0076	--------
2.08	0.1817	0.0000	0.0093	0.0000	0.0093	--------
2.17	0.1910	0.0000	0.0093	0.0000	0.0093	--------
2.25	0.2003	0.0000	0.0093	0.0000	0.0093	--------
2.33	0.2096	0.0000	0.0093	0.0000	0.0093	--------
2.42	0.2189	0.0000	0.0093	0.0000	0.0093	--------
2.50	0.2281	0.0000	0.0093	0.0000	0.0093	--------
2.58	0.2358	0.0000	0.0076	0.0000	0.0076	--------
2.67	0.2434	0.0000	0.0076	0.0000	0.0076	--------
2.75	0.2510	0.0000	0.0076	0.0000	0.0076	--------
2.83	0.2586	0.0000	0.0076	0.0000	0.0076	--------
2.92	0.2662	0.0000	0.0076	0.0000	0.0076	--------
3.00	0.2738	0.0000	0.0076	0.0000	0.0076	--------
3.08	0.2831	0.0000	0.0093	0.0000	0.0093	--------
3.17	0.2924	0.0000	0.0093	0.0000	0.0093	--------
3.25	0.3017	0.0000	0.0093	0.0000	0.0093	--------
3.33	0.3110	0.0000	0.0093	0.0000	0.0093	--------
3.42	0.3203	0.0000	0.0093	0.0000	0.0093	--------
3.50	0.3296	0.0000	0.0093	0.0000	0.0093	--------
3.58	0.3397	0.0000	0.0101	0.0000	0.0101	--------
3.67	0.3498	0.0000	0.0101	0.0000	0.0101	--------
3.75	0.3600	0.0000	0.0101	0.0000	0.0101	--------
3.83	0.3701	0.0000	0.0101	0.0000	0.0101	--------
3.92	0.3803	0.0000	0.0101	0.0000	0.0101	--------
4.00	0.3904	0.0000	0.0101	0.0000	0.0101	--------
4.08	0.4014	0.0000	0.0110	0.0000	0.0110	--------
4.17	0.4124	0.0000	0.0110	0.0000	0.0110	--------
4.25	0.4233	0.0001	0.0110	0.0001	0.0109	--------
4.33	0.4343	0.0003	0.0110	0.0002	0.0108	--------
4.42	0.4453	0.0006	0.0110	0.0003	0.0107	--------
4.50	0.4563	0.0010	0.0110	0.0004	0.0106	--------

4.58	0.4681	0.0016	0.0118	0.0006	0.0112	--------
4.67	0.4800	0.0023	0.0118	0.0007	0.0111	--------
4.75	0.4918	0.0032	0.0118	0.0008	0.0110	--------
4.83	0.5036	0.0041	0.0118	0.0010	0.0109	--------
4.92	0.5154	0.0052	0.0118	0.0011	0.0108	--------
5.00	0.5273	0.0064	0.0118	0.0012	0.0106	--------
5.08	0.5408	0.0079	0.0135	0.0015	0.0120	--------
5.17	0.5543	0.0095	0.0135	0.0017	0.0119	--------
5.25	0.5678	0.0113	0.0135	0.0018	0.0117	--------
5.33	0.5814	0.0133	0.0135	0.0019	0.0116	--------
5.42	0.5949	0.0154	0.0135	0.0021	0.0114	--------
5.50	0.6084	0.0176	0.0135	0.0022	0.0113	--------
5.58	0.6228	0.0201	0.0144	0.0025	0.0119	--------
5.67	0.6371	0.0227	0.0144	0.0027	0.0117	--------
5.75	0.6515	0.0255	0.0144	0.0028	0.0116	--------
5.83	0.6659	0.0285	0.0144	0.0029	0.0114	--------
5.92	0.6802	0.0316	0.0144	0.0031	0.0113	--------
6.00	0.6946	0.0348	0.0144	0.0032	0.0111	--------
6.08	0.7115	0.0388	0.0169	0.0040	0.0129	--------
6.17	0.7284	0.0429	0.0169	0.0042	0.0127	--------
6.25	0.7453	0.0473	0.0169	0.0043	0.0126	--------
6.33	0.7622	0.0518	0.0169	0.0045	0.0124	--------
6.42	0.7791	0.0565	0.0169	0.0047	0.0122	--------
6.50	0.7960	0.0613	0.0169	0.0049	0.0120	--------
6.58	0.8154	0.0671	0.0194	0.0058	0.0136	--------
6.67	0.8349	0.0731	0.0194	0.0060	0.0134	--------
6.75	0.8543	0.0793	0.0194	0.0062	0.0132	--------
6.83	0.8737	0.0857	0.0194	0.0064	0.0130	--------
6.92	0.8932	0.0923	0.0194	0.0066	0.0128	--------
7.00	0.9126	0.0992	0.0194	0.0068	0.0126	--------
7.08	0.9380	0.1083	0.0254	0.0092	0.0162	--------
7.17	0.9633	0.1178	0.0253	0.0095	0.0159	--------
7.25	0.9887	0.1276	0.0254	0.0098	0.0156	--------
7.33	1.0140	0.1377	0.0253	0.0101	0.0153	--------
7.42	1.0394	0.1481	0.0253	0.0104	0.0150	--------
7.50	1.0647	0.1587	0.0253	0.0107	0.0147	--------
7.58	1.1027	0.1752	0.0380	0.0165	0.0215	--------
7.67	1.1408	0.1923	0.0380	0.0171	0.0209	--------
7.75	1.1788	0.2100	0.0380	0.0177	0.0204	--------
7.83	1.2168	0.2282	0.0380	0.0182	0.0198	--------
7.92	1.2548	0.2469	0.0380	0.0187	0.0193	--------
8.00	1.2929	0.2661	0.0380	0.0192	0.0188	--------
8.08	1.3495	0.2956	0.0566	0.0295	0.0271	--------
8.17	1.4061	0.3261	0.0566	0.0305	0.0261	--------
8.25	1.4627	0.3576	0.0566	0.0315	0.0252	--------
8.33	1.5193	0.3899	0.0566	0.0324	0.0243	--------
8.42	1.5759	0.4232	0.0566	0.0332	0.0234	--------
8.50	1.6325	0.4572	0.0566	0.0340	0.0226	--------
8.58	1.7069	0.5030	0.0744	0.0459	0.0285	--------
8.67	1.7813	0.5501	0.0744	0.0471	0.0273	--------
8.75	1.8556	0.5984	0.0744	0.0483	0.0261	--------
8.83	1.9300	0.6477	0.0744	0.0493	0.0250	--------
8.92	2.0043	0.6981	0.0744	0.0504	0.0240	--------
9.00	2.0787	0.7494	0.0744	0.0513	0.0230	--------
9.08	2.1598	0.8064	0.0811	0.0570	0.0241	--------
9.17	2.2409	0.8645	0.0811	0.0580	0.0231	--------
9.25	2.3221	0.9234	0.0811	0.0590	0.0221	--------
9.33	2.4032	0.9833	0.0811	0.0599	0.0213	--------
9.42	2.4843	1.0440	0.0811	0.0607	0.0204	--------
9.50	2.5654	1.1055	0.0811	0.0615	0.0196	--------
9.58	2.6347	1.1586	0.0693	0.0531	0.0162	--------
9.67	2.7040	1.2122	0.0693	0.0536	0.0157	--------
9.75	2.7733	1.2663	0.0693	0.0541	0.0152	--------

9.83	2.8426	1.3209	0.0693	0.0546	0.0147	--------
9.92	2.9119	1.3760	0.0693	0.0550	0.0143	--------
10.00	2.9812	1.4314	0.0693	0.0555	0.0138	--------
10.08	3.0158	1.4593	0.0346	0.0279	0.0068	--------
10.17	3.0505	1.4873	0.0346	0.0280	0.0067	--------
10.25	3.0851	1.5154	0.0346	0.0281	0.0066	--------
10.33	3.1197	1.5435	0.0346	0.0282	0.0065	--------
10.42	3.1544	1.5718	0.0346	0.0283	0.0064	--------
10.50	3.1890	1.6002	0.0346	0.0284	0.0063	--------
10.58	3.2118	1.6189	0.0228	0.0187	0.0041	--------
10.67	3.2347	1.6377	0.0228	0.0188	0.0040	--------
10.75	3.2575	1.6565	0.0228	0.0188	0.0040	--------
10.83	3.2803	1.6753	0.0228	0.0188	0.0040	--------
10.92	3.3031	1.6942	0.0228	0.0189	0.0039	--------
11.00	3.3259	1.7131	0.0228	0.0189	0.0039	--------
11.08	3.3454	1.7293	0.0194	0.0161	0.0033	--------
11.17	3.3648	1.7454	0.0194	0.0162	0.0033	--------
11.25	3.3842	1.7616	0.0194	0.0162	0.0032	--------
11.33	3.4037	1.7778	0.0194	0.0162	0.0032	--------
11.42	3.4231	1.7941	0.0194	0.0162	0.0032	--------
11.50	3.4425	1.8103	0.0194	0.0163	0.0032	--------
11.58	3.4603	1.8252	0.0177	0.0149	0.0029	--------
11.67	3.4780	1.8401	0.0177	0.0149	0.0029	--------
11.75	3.4958	1.8550	0.0177	0.0149	0.0028	--------
11.83	3.5135	1.8699	0.0177	0.0149	0.0028	--------
11.92	3.5313	1.8849	0.0177	0.0150	0.0028	--------
12.00	3.5490	1.8999	0.0177	0.0150	0.0028	--------
12.08	3.5659	1.9141	0.0169	0.0143	0.0026	--------
12.17	3.5828	1.9284	0.0169	0.0143	0.0026	--------
12.25	3.5997	1.9427	0.0169	0.0143	0.0026	--------
12.33	3.6166	1.9571	0.0169	0.0143	0.0026	--------
12.42	3.6335	1.9714	0.0169	0.0143	0.0026	--------
12.50	3.6504	1.9857	0.0169	0.0144	0.0025	--------
12.58	3.6665	1.9994	0.0161	0.0137	0.0024	--------
12.67	3.6825	2.0131	0.0161	0.0137	0.0024	--------
12.75	3.6986	2.0268	0.0161	0.0137	0.0024	--------
12.83	3.7146	2.0405	0.0161	0.0137	0.0024	--------
12.92	3.7307	2.0542	0.0161	0.0137	0.0023	--------
13.00	3.7467	2.0679	0.0161	0.0137	0.0023	--------
13.08	3.7611	2.0802	0.0144	0.0123	0.0021	--------
13.17	3.7755	2.0925	0.0144	0.0123	0.0021	--------
13.25	3.7898	2.1048	0.0144	0.0123	0.0021	--------
13.33	3.8042	2.1171	0.0144	0.0123	0.0020	--------
13.42	3.8186	2.1295	0.0144	0.0123	0.0020	--------
13.50	3.8329	2.1418	0.0144	0.0123	0.0020	--------
13.58	3.8464	2.1534	0.0135	0.0116	0.0019	--------
13.67	3.8600	2.1651	0.0135	0.0116	0.0019	--------
13.75	3.8735	2.1767	0.0135	0.0116	0.0019	--------
13.83	3.8870	2.1884	0.0135	0.0117	0.0019	--------
13.92	3.9005	2.2001	0.0135	0.0117	0.0019	--------
14.00	3.9140	2.2117	0.0135	0.0117	0.0018	--------
14.08	3.9293	2.2249	0.0152	0.0131	0.0021	--------
14.17	3.9445	2.2380	0.0152	0.0132	0.0021	--------
14.25	3.9597	2.2512	0.0152	0.0132	0.0020	--------
14.33	3.9749	2.2644	0.0152	0.0132	0.0020	--------
14.42	3.9901	2.2776	0.0152	0.0132	0.0020	--------
14.50	4.0053	2.2908	0.0152	0.0132	0.0020	--------
14.58	4.0138	2.2981	0.0085	0.0073	0.0011	--------
14.67	4.0222	2.3055	0.0084	0.0073	0.0011	--------
14.75	4.0307	2.3128	0.0084	0.0073	0.0011	--------
14.83	4.0391	2.3201	0.0084	0.0073	0.0011	--------
14.92	4.0476	2.3275	0.0084	0.0074	0.0011	--------
15.00	4.0560	2.3349	0.0084	0.0074	0.0011	--------

15.08	4.0695	2.3466	0.0135	0.0118	0.0017	--------
15.17	4.0830	2.3584	0.0135	0.0118	0.0017	--------
15.25	4.0966	2.3702	0.0135	0.0118	0.0017	--------
15.33	4.1101	2.3820	0.0135	0.0118	0.0017	--------
15.42	4.1236	2.3938	0.0135	0.0118	0.0017	--------
15.50	4.1371	2.4056	0.0135	0.0118	0.0017	--------
15.58	4.1498	2.4167	0.0127	0.0111	0.0016	--------
15.67	4.1625	2.4278	0.0127	0.0111	0.0016	--------
15.75	4.1751	2.4389	0.0127	0.0111	0.0016	--------
15.83	4.1878	2.4500	0.0127	0.0111	0.0016	--------
15.92	4.2005	2.4611	0.0127	0.0111	0.0016	--------
16.00	4.2132	2.4722	0.0127	0.0111	0.0016	--------
16.08	4.2250	2.4826	0.0118	0.0104	0.0014	--------
16.17	4.2368	2.4930	0.0118	0.0104	0.0014	--------
16.25	4.2487	2.5034	0.0118	0.0104	0.0014	--------
16.33	4.2605	2.5138	0.0118	0.0104	0.0014	--------
16.42	4.2723	2.5242	0.0118	0.0104	0.0014	--------
16.50	4.2842	2.5346	0.0118	0.0104	0.0014	--------
16.58	4.2968	2.5458	0.0127	0.0112	0.0015	--------
16.67	4.3095	2.5570	0.0127	0.0112	0.0015	--------
16.75	4.3222	2.5681	0.0127	0.0112	0.0015	--------
16.83	4.3349	2.5793	0.0127	0.0112	0.0015	--------
16.92	4.3475	2.5905	0.0127	0.0112	0.0015	--------
17.00	4.3602	2.6017	0.0127	0.0112	0.0015	--------
17.08	4.3703	2.6107	0.0101	0.0090	0.0012	--------
17.17	4.3805	2.6196	0.0101	0.0090	0.0012	--------
17.25	4.3906	2.6286	0.0101	0.0090	0.0012	--------
17.33	4.4008	2.6376	0.0101	0.0090	0.0012	--------
17.42	4.4109	2.6465	0.0101	0.0090	0.0012	--------
17.50	4.4210	2.6555	0.0101	0.0090	0.0012	--------
17.58	4.4320	2.6652	0.0110	0.0097	0.0013	--------
17.67	4.4430	2.6750	0.0110	0.0097	0.0012	--------
17.75	4.4540	2.6847	0.0110	0.0097	0.0012	--------
17.83	4.4650	2.6945	0.0110	0.0097	0.0012	--------
17.92	4.4760	2.7042	0.0110	0.0098	0.0012	--------
18.00	4.4870	2.7140	0.0110	0.0098	0.0012	--------
18.08	4.4954	2.7215	0.0084	0.0075	0.0009	--------
18.17	4.5038	2.7290	0.0084	0.0075	0.0009	--------
18.25	4.5123	2.7365	0.0085	0.0075	0.0009	--------
18.33	4.5208	2.7440	0.0084	0.0075	0.0009	--------
18.42	4.5292	2.7515	0.0084	0.0075	0.0009	--------
18.50	4.5377	2.7591	0.0084	0.0075	0.0009	--------
18.58	4.5461	2.7666	0.0085	0.0075	0.0009	--------
18.67	4.5545	2.7741	0.0084	0.0075	0.0009	--------
18.75	4.5630	2.7816	0.0085	0.0075	0.0009	--------
18.83	4.5715	2.7892	0.0084	0.0075	0.0009	--------
18.92	4.5799	2.7967	0.0084	0.0075	0.0009	--------
19.00	4.5884	2.8042	0.0084	0.0075	0.0009	--------
19.08	4.5960	2.8110	0.0076	0.0068	0.0008	--------
19.17	4.6036	2.8178	0.0076	0.0068	0.0008	--------
19.25	4.6112	2.8246	0.0076	0.0068	0.0008	--------
19.33	4.6188	2.8314	0.0076	0.0068	0.0008	--------
19.42	4.6264	2.8382	0.0076	0.0068	0.0008	--------
19.50	4.6340	2.8450	0.0076	0.0068	0.0008	--------
19.58	4.6424	2.8525	0.0085	0.0076	0.0009	--------
19.67	4.6509	2.8601	0.0084	0.0076	0.0009	--------
19.75	4.6593	2.8676	0.0085	0.0076	0.0009	--------
19.83	4.6678	2.8752	0.0084	0.0076	0.0009	--------
19.92	4.6762	2.8827	0.0084	0.0076	0.0009	--------
20.00	4.6847	2.8903	0.0084	0.0076	0.0009	--------
20.08	4.6940	2.8986	0.0093	0.0083	0.0010	--------
20.17	4.7033	2.9069	0.0093	0.0083	0.0010	--------
20.25	4.7126	2.9153	0.0093	0.0083	0.0010	--------

20.33	4.7219	2.9236	0.0093	0.0083	0.0010	--------
20.42	4.7312	2.9319	0.0093	0.0083	0.0010	--------
20.50	4.7405	2.9403	0.0093	0.0083	0.0010	--------
20.58	4.7489	2.9478	0.0084	0.0076	0.0009	--------
20.67	4.7574	2.9554	0.0084	0.0076	0.0009	--------
20.75	4.7658	2.9630	0.0084	0.0076	0.0009	--------
20.83	4.7743	2.9706	0.0085	0.0076	0.0009	--------
20.92	4.7827	2.9782	0.0084	0.0076	0.0009	--------
21.00	4.7912	2.9858	0.0084	0.0076	0.0009	--------
21.08	4.7988	2.9926	0.0076	0.0068	0.0008	--------
21.17	4.8064	2.9994	0.0076	0.0068	0.0008	--------
21.25	4.8140	3.0063	0.0076	0.0068	0.0008	--------
21.33	4.8216	3.0131	0.0076	0.0068	0.0008	--------
21.42	4.8292	3.0200	0.0076	0.0068	0.0008	--------
21.50	4.8368	3.0268	0.0076	0.0068	0.0008	--------
21.58	4.8444	3.0337	0.0076	0.0068	0.0008	--------
21.67	4.8520	3.0405	0.0076	0.0068	0.0008	--------
21.75	4.8596	3.0473	0.0076	0.0068	0.0008	--------
21.83	4.8672	3.0542	0.0076	0.0069	0.0008	--------
21.92	4.8748	3.0610	0.0076	0.0069	0.0008	--------
22.00	4.8824	3.0679	0.0076	0.0069	0.0008	--------
22.08	4.8900	3.0748	0.0076	0.0069	0.0007	--------
22.17	4.8976	3.0816	0.0076	0.0069	0.0007	--------
22.25	4.9052	3.0885	0.0076	0.0069	0.0007	--------
22.33	4.9128	3.0953	0.0076	0.0069	0.0007	--------
22.42	4.9204	3.1022	0.0076	0.0069	0.0007	--------
22.50	4.9280	3.1091	0.0076	0.0069	0.0007	--------
22.58	4.9356	3.1159	0.0076	0.0069	0.0007	--------
22.67	4.9432	3.1228	0.0076	0.0069	0.0007	--------
22.75	4.9509	3.1297	0.0076	0.0069	0.0007	--------
22.83	4.9585	3.1365	0.0076	0.0069	0.0007	--------
22.92	4.9661	3.1434	0.0076	0.0069	0.0007	--------
23.00	4.9737	3.1503	0.0076	0.0069	0.0007	--------
23.08	4.9821	3.1579	0.0084	0.0076	0.0008	--------
23.17	4.9906	3.1656	0.0084	0.0076	0.0008	--------
23.25	4.9990	3.1732	0.0084	0.0076	0.0008	--------
23.33	5.0075	3.1809	0.0085	0.0076	0.0008	--------
23.42	5.0159	3.1885	0.0084	0.0076	0.0008	--------
23.50	5.0244	3.1962	0.0084	0.0077	0.0008	--------
23.58	5.0320	3.2030	0.0076	0.0069	0.0007	--------
23.67	5.0396	3.2099	0.0076	0.0069	0.0007	--------
23.75	5.0472	3.2168	0.0076	0.0069	0.0007	--------
23.83	5.0548	3.2237	0.0076	0.0069	0.0007	--------
23.92	5.0624	3.2306	0.0076	0.0069	0.0007	--------
24.00	5.0700	3.2375	0.0076	0.0069	0.0007	--------

Total soil rain loss = 1.83(In)
Total effective runoff = 3.24(In)

Peak flow rate this hydrograph = 1472.48(CFS)
Total runoff volume this hydrograph = 26515056.7(Ft3)

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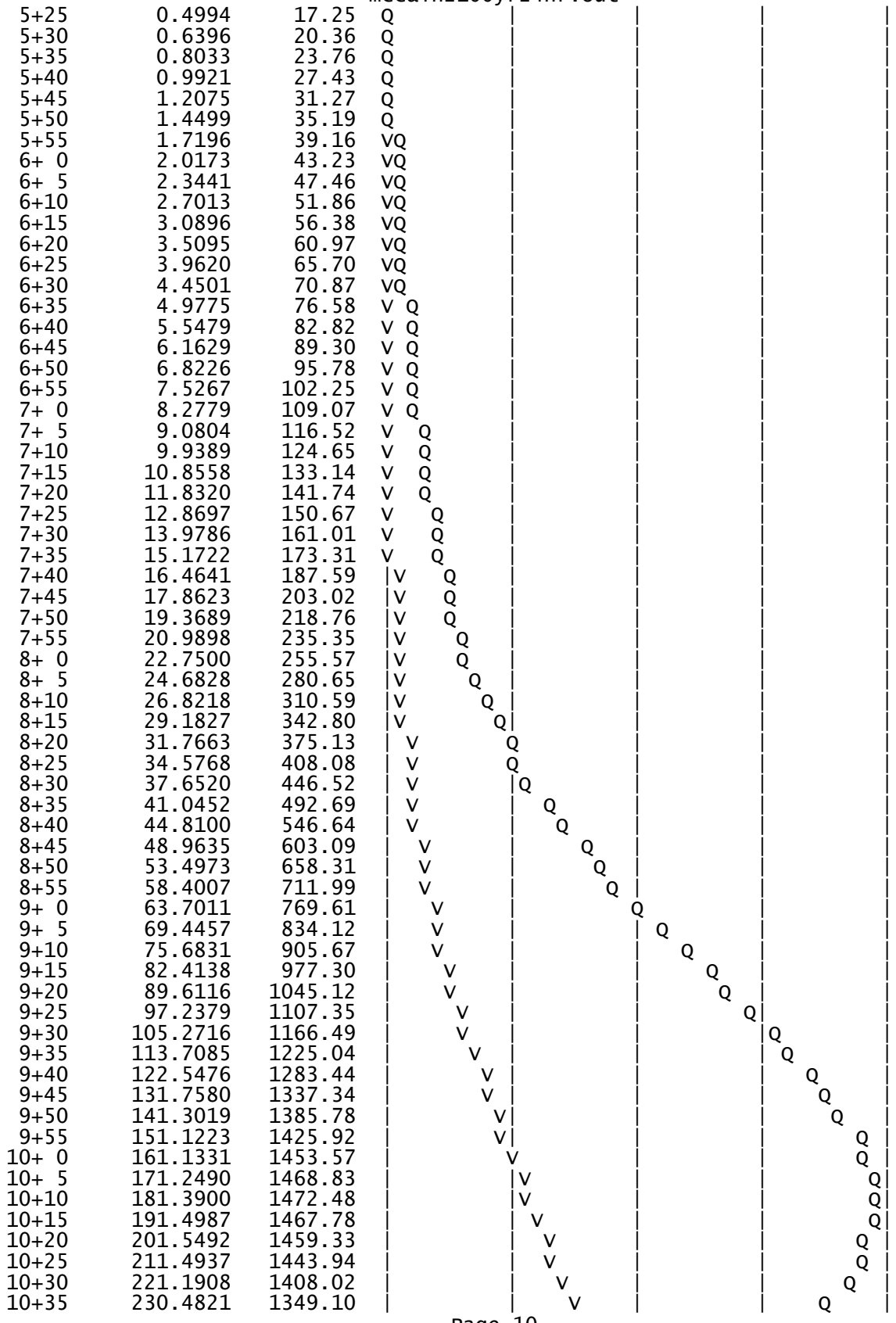
24 - H O U R S T O R M
R u n o f f H y d r o g r a p h

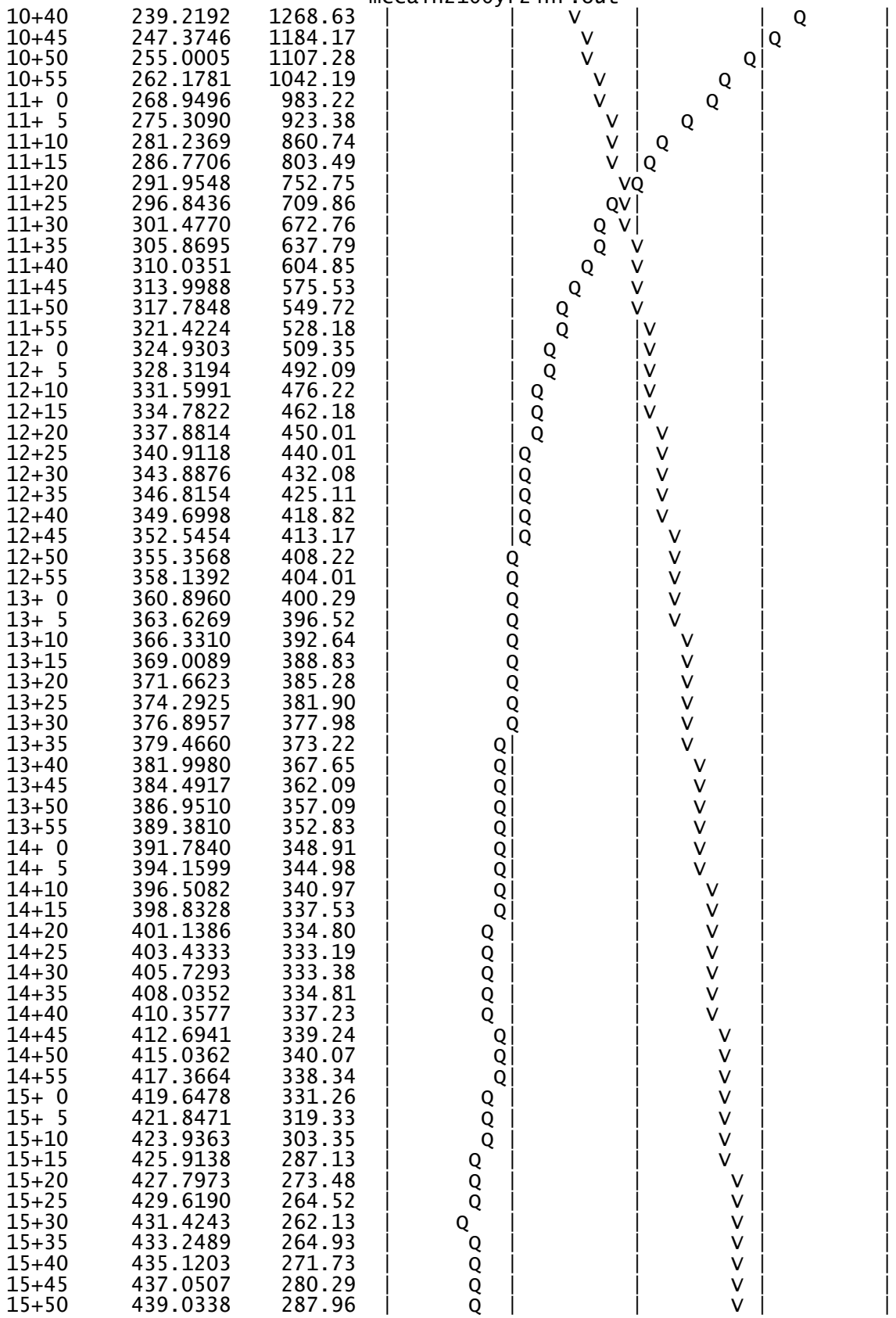
Hydrograph in 5 Minute intervals ((CFS))

Time(h+m)	Volume Ac.Ft	Q(CFS)	0	375.0	750.0	1125.0	1500.0
0+ 5	0.0000	0.00	Q	|	|	|	|

0+10	0.0000	0.00	Q				
0+15	0.0000	0.00	Q				
0+20	0.0000	0.00	Q				
0+25	0.0000	0.00	Q				
0+30	0.0000	0.00	Q				
0+35	0.0000	0.00	Q				
0+40	0.0000	0.00	Q				
0+45	0.0000	0.00	Q				
0+50	0.0000	0.00	Q				
0+55	0.0000	0.00	Q				
1+ 0	0.0000	0.00	Q				
1+ 5	0.0000	0.00	Q				
1+10	0.0000	0.00	Q				
1+15	0.0000	0.00	Q				
1+20	0.0000	0.00	Q				
1+25	0.0000	0.00	Q				
1+30	0.0000	0.00	Q				
1+35	0.0000	0.00	Q				
1+40	0.0000	0.00	Q				
1+45	0.0000	0.00	Q				
1+50	0.0000	0.00	Q				
1+55	0.0000	0.00	Q				
2+ 0	0.0000	0.00	Q				
2+ 5	0.0000	0.00	Q				
2+10	0.0000	0.00	Q				
2+15	0.0000	0.00	Q				
2+20	0.0000	0.00	Q				
2+25	0.0000	0.00	Q				
2+30	0.0000	0.00	Q				
2+35	0.0000	0.00	Q				
2+40	0.0000	0.00	Q				
2+45	0.0000	0.00	Q				
2+50	0.0000	0.00	Q				
2+55	0.0000	0.00	Q				
3+ 0	0.0000	0.00	Q				
3+ 5	0.0000	0.00	Q				
3+10	0.0000	0.00	Q				
3+15	0.0000	0.00	Q				
3+20	0.0000	0.00	Q				
3+25	0.0000	0.00	Q				
3+30	0.0000	0.00	Q				
3+35	0.0000	0.00	Q				
3+40	0.0000	0.00	Q				
3+45	0.0000	0.00	Q				
3+50	0.0000	0.00	Q				
3+55	0.0000	0.00	Q				
4+ 0	0.0000	0.00	Q				
4+ 5	0.0000	0.00	Q				
4+10	0.0000	0.00	Q				
4+15	0.0000	0.00	Q				
4+20	0.0002	0.02	Q				
4+25	0.0006	0.06	Q				
4+30	0.0016	0.14	Q				
4+35	0.0037	0.31	Q				
4+40	0.0080	0.62	Q				
4+45	0.0162	1.19	Q				
4+50	0.0307	2.10	Q				
4+55	0.0540	3.38	Q				
5+ 0	0.0887	5.03	Q				
5+ 5	0.1369	7.01	Q				
5+10	0.2006	9.25	Q				
5+15	0.2814	11.73	Q				
5+20	0.3806	14.40	Q				



5+25	0.4994	17.25	Q
5+30	0.6396	20.36	Q
5+35	0.8033	23.76	Q
5+40	0.9921	27.43	Q
5+45	1.2075	31.27	Q
5+50	1.4499	35.19	Q
5+55	1.7196	39.16	VQ
6+ 0	2.0173	43.23	VQ
6+ 5	2.3441	47.46	VQ
6+10	2.7013	51.86	VQ
6+15	3.0896	56.38	VQ
6+20	3.5095	60.97	VQ
6+25	3.9620	65.70	VQ
6+30	4.4501	70.87	VQ
6+35	4.9775	76.58	V Q
6+40	5.5479	82.82	V Q
6+45	6.1629	89.30	V Q
6+50	6.8226	95.78	V Q
6+55	7.5267	102.25	V Q
7+ 0	8.2779	109.07	V Q
7+ 5	9.0804	116.52	V Q
7+10	9.9389	124.65	V Q
7+15	10.8558	133.14	V Q
7+20	11.8320	141.74	V Q
7+25	12.8697	150.67	V Q
7+30	13.9786	161.01	V Q
7+35	15.1722	173.31	V Q
7+40	16.4641	187.59	|V Q
7+45	17.8623	203.02	|V Q
7+50	19.3689	218.76	|V Q
7+55	20.9898	235.35	|V Q
8+ 0	22.7500	255.57	|V Q
8+ 5	24.6828	280.65	|V Q
8+10	26.8218	310.59	|V Q
8+15	29.1827	342.80	|V Q|
8+20	31.7663	375.13	| V Q
8+25	34.5768	408.08	| V Q
8+30	37.6520	446.52	| V |Q
8+35	41.0452	492.69	| V | Q
8+40	44.8100	546.64	| V | Q
8+45	48.9635	603.09	| V | Q
8+50	53.4973	658.31	| V | Q
8+55	58.4007	711.99	| V | Q
9+ 0	63.7011	769.61	| V | Q
9+ 5	69.4457	834.12	| V | Q
9+10	75.6831	905.67	| V | Q
9+15	82.4138	977.30	| V | Q
9+20	89.6116	1045.12	| V | Q
9+25	97.2379	1107.35	| V | Q|
9+30	105.2716	1166.49	| V | |Q
9+35	113.7085	1225.04	| V | | Q
9+40	122.5476	1283.44	| V | | Q
9+45	131.7580	1337.34	| V | | Q
9+50	141.3019	1385.78	| V| | Q
9+55	151.1223	1425.92	| V| | Q
10+ 0	161.1331	1453.57	| V | Q
10+ 5	171.2490	1468.83	| |V | Q|
10+10	181.3900	1472.48	| |V | Q|
10+15	191.4987	1467.78	| | V | Q|
10+20	201.5492	1459.33	| | V | Q
10+25	211.4937	1443.94	| | V | Q
10+30	221.1908	1408.02	| | V | Q
10+35	230.4821	1349.10	| | V | Q



10+40	239.2192	1268.63	
10+45	247.3746	1184.17	
10+50	255.0005	1107.28	
10+55	262.1781	1042.19	
11+ 0	268.9496	983.22	
11+ 5	275.3090	923.38	
11+10	281.2369	860.74	
11+15	286.7706	803.49	
11+20	291.9548	752.75	
11+25	296.8436	709.86	
11+30	301.4770	672.76	
11+35	305.8695	637.79	
11+40	310.0351	604.85	
11+45	313.9988	575.53	
11+50	317.7848	549.72	
11+55	321.4224	528.18	
12+ 0	324.9303	509.35	
12+ 5	328.3194	492.09	
12+10	331.5991	476.22	
12+15	334.7822	462.18	
12+20	337.8814	450.01	
12+25	340.9118	440.01	
12+30	343.8876	432.08	
12+35	346.8154	425.11	
12+40	349.6998	418.82	
12+45	352.5454	413.17	
12+50	355.3568	408.22	
12+55	358.1392	404.01	
13+ 0	360.8960	400.29	
13+ 5	363.6269	396.52	
13+10	366.3310	392.64	
13+15	369.0089	388.83	
13+20	371.6623	385.28	
13+25	374.2925	381.90	
13+30	376.8957	377.98	
13+35	379.4660	373.22	
13+40	381.9980	367.65	
13+45	384.4917	362.09	
13+50	386.9510	357.09	
13+55	389.3810	352.83	
14+ 0	391.7840	348.91	
14+ 5	394.1599	344.98	
14+10	396.5082	340.97	
14+15	398.8328	337.53	
14+20	401.1386	334.80	
14+25	403.4333	333.19	
14+30	405.7293	333.38	
14+35	408.0352	334.81	
14+40	410.3577	337.23	
14+45	412.6941	339.24	
14+50	415.0362	340.07	
14+55	417.3664	338.34	
15+ 0	419.6478	331.26	
15+ 5	421.8471	319.33	
15+10	423.9363	303.35	
15+15	425.9138	287.13	
15+20	427.7973	273.48	
15+25	429.6190	264.52	
15+30	431.4243	262.13	
15+35	433.2489	264.93	
15+40	435.1203	271.73	
15+45	437.0507	280.29	
15+50	439.0338	287.96	

15+55	441.0550	293.48	Q			V	
16+ 0	443.0988	296.76	Q			V	
16+ 5	445.1545	298.48	Q			V	
16+10	447.2163	299.38	Q			V	
16+15	449.2775	299.27	Q			V	
16+20	451.3365	298.98	Q			V	
16+25	453.3938	298.72	Q			V	
16+30	455.4452	297.86	Q			V	
16+35	457.4879	296.60	Q			V	
16+40	459.5180	294.77	Q			V	
16+45	461.5365	293.09	Q			V	
16+50	463.5461	291.79	Q			V	
16+55	465.5507	291.07	Q			V	
17+ 0	467.5585	291.53	Q			V	
17+ 5	469.5740	292.66	Q			V	
17+10	471.6009	294.30	Q			V	
17+15	473.6380	295.78	Q			V	
17+20	475.6814	296.71	Q			V	
17+25	477.7235	296.51	Q			V	
17+30	479.7484	294.02	Q			V	
17+35	481.7423	289.52	Q			V	
17+40	483.6940	283.38	Q			V	
17+45	485.6016	276.99	Q			V	
17+50	487.4711	271.45	Q			V	
17+55	489.3128	267.41	Q			V	
18+ 0	491.1388	265.13	Q			V	
18+ 5	492.9568	263.97	Q			V	
18+10	494.7719	263.56	Q			V	
18+15	496.5864	263.46	Q			V	
18+20	498.3980	263.04	Q			V	
18+25	500.2002	261.69	Q			V	
18+30	501.9798	258.39	Q			V	
18+35	503.7234	253.18	Q			V	
18+40	505.4205	246.42	Q			V	
18+45	507.0690	239.35	Q			V	
18+50	508.6741	233.07	Q			V	
18+55	510.2452	228.12	Q			V	
19+ 0	511.7900	224.30	Q			V	
19+ 5	513.3129	221.13	Q			V	
19+10	514.8164	218.30	Q			V	
19+15	516.3037	215.96	Q			V	
19+20	517.7764	213.83	Q			V	
19+25	519.2345	211.72	Q			V	
19+30	520.6762	209.34	Q			V	
19+35	522.0987	206.55	Q			V	
19+40	523.5000	203.47	Q			V	
19+45	524.8811	200.53	Q			V	
19+50	526.2452	198.07	Q			V	
19+55	527.5980	196.43	Q			V	
20+ 0	528.9467	195.84	Q			V	
20+ 5	530.2980	196.20	Q			V	
20+10	531.6571	197.35	Q			V	
20+15	533.0273	198.94	Q			V	
20+20	534.4084	200.54	Q			V	
20+25	535.8003	202.10	Q			V	
20+30	537.2057	204.07	Q			V	
20+35	538.6278	206.49	Q			V	
20+40	540.0699	209.39	Q			V	
20+45	541.5307	212.10	Q			V	
20+50	543.0071	214.37	Q			V	
20+55	544.4942	215.93	Q			V	
21+ 0	545.9847	216.41	Q			V	
21+ 5	547.4724	216.01	Q			V	

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21+10     548.9521    214.86  |     Q     |           |           |      V    |
21+15     550.4212    213.31  |     Q     |           |           |      V    |
21+20     551.8798    211.79  |     Q     |           |           |      V    |
21+25     553.3282    210.32  |     Q     |           |           |      V    |
21+30     554.7645    208.55  |     Q     |           |           |      V    |
21+35     556.1854    206.31  |     Q     |           |           |      V    |
21+40     557.5874    203.57  |     Q     |           |           |      V    |
21+45     558.9709    200.88  |     Q     |           |           |      V    |
21+50     560.3380    198.51  |     Q     |           |           |      V    |
21+55     561.6919    196.58  |     Q     |           |           |      V    |
22+ 0     563.0354    195.08  |     Q     |           |           |      V    |
22+ 5     564.3700    193.79  |     Q     |           |           |       V   |
22+10     565.6969    192.66  |     Q     |           |           |       V   |
22+15     567.0175    191.75  |     Q     |           |           |       V   |
22+20     568.3326    190.96  |     Q     |           |           |       V   |
22+25     569.6432    190.30  |     Q     |           |           |       V   |
22+30     570.9498    189.72  |     Q     |           |           |       V   |
22+35     572.2528    189.20  |     Q     |           |           |       V   |
22+40     573.5530    188.78  |     Q     |           |           |       V   |
22+45     574.8507    188.42  |     Q     |           |           |       V   |
22+50     576.1463    188.13  |     Q     |           |           |       V   |
22+55     577.4404    187.90  |     Q     |           |           |       V   |
23+ 0     578.7334    187.74  |     Q     |           |           |        V  |
23+ 5     580.0258    187.66  |     Q     |           |           |        V  |
23+10     581.3183    187.67  |     Q     |           |           |        V  |
23+15     582.6117    187.81  |     Q     |           |           |        V  |
23+20     583.9071    188.08  |     Q     |           |           |        V  |
23+25     585.2062    188.63  |     Q     |           |           |        V  |
23+30     586.5135    189.82  |     Q     |           |           |        V  |
23+35     587.8331    191.61  |     Q     |           |           |        V  |
23+40     589.1686    193.92  |     Q     |           |           |        V  |
23+45     590.5198    196.19  |     Q     |           |           |        V  |
23+50     591.8839    198.07  |     Q     |           |           |        V  |
23+55     593.2563    199.28  |     Q     |           |           |        V  |
24+ 0     594.6300    199.46  |     Q     |           |           |         V |
24+ 5     595.9968    198.46  |     Q     |           |           |         V |
24+10     597.3492    196.37  |     Q     |           |           |         V |
24+15     598.6787    193.04  |     Q     |           |           |         V |
24+20     599.9793    188.85  |     Q     |           |           |         V |
24+25     601.2378    182.73  |    Q      |           |           |         V |
24+30     602.4179    171.35  |    Q      |           |           |         V |
24+35     603.4822    154.54  |    Q      |           |           |         V |
24+40     604.3972    132.86  |   Q       |           |           |         V |
24+45     605.1594    110.68  |  Q        |           |           |         V |
24+50     605.7860     90.98  |  Q        |           |           |         V |
24+55     606.3042     75.24  |  Q        |           |           |         V |
25+ 0     606.7394     63.19  |Q          |           |           |         V |
25+ 5     607.1053     53.13  |Q          |           |           |         V |
25+10     607.4101     44.26  |Q          |           |           |         V |
25+15     607.6661     37.18  Q           |           |           |         V |
25+20     607.8801     31.07  Q           |           |           |         V |
25+25     608.0579     25.81  Q           |           |           |         V |
25+30     608.2051     21.38  Q           |           |           |         V |
25+35     608.3250     17.40  Q           |           |           |         V |
25+40     608.4220     14.09  Q           |           |           |         V |
25+45     608.4992     11.20  Q           |           |           |         V |
25+50     608.5591      8.69  Q           |           |           |         V |
25+55     608.6052      6.70  Q           |           |           |         V |
26+ 0     608.6395      4.99  Q           |           |           |         V |
26+ 5     608.6644      3.61  Q           |           |           |         V |
26+10     608.6816      2.50  Q           |           |           |         V |
26+15     608.6927      1.62  Q           |           |           |         V |
26+20     608.6989      0.90  Q           |           |           |         V |
```

```
   26+25     608.7013      0.34  Q          |          |          |        V|
   26+30     608.7019      0.10  Q          |          |          |        V|
-----------------------------------------------------------------------------
```

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 09/09/10

Tule Wind Project
System 1
Proposed Conditions 100 Year

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 1.100 to Point/Station 1.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Initial subarea total flow distance = 184.120(Ft.)
Highest elevation = 3965.000(Ft.)
Lowest elevation = 3953.000(Ft.)
Elevation difference = 12.000(Ft.) Slope = 6.517 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 6.52 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 6.65 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4100)*(100.000^.5)/(6.517^(1/3)]= 6.65
Rainfall intensity (I) = 7.673(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff = 0.736(CFS)
Total initial stream area = 0.234(Ac.)

++
Process from Point/Station 1.200 to Point/Station 1.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3953.000(Ft.)
Downstream point elevation = 3926.000(Ft.)
Channel length thru subarea = 709.830(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 12.738(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 12.738(CFS)
Depth of flow = 0.342(Ft.), Average velocity = 3.272(Ft/s)
Channel flow top width = 12.739(Ft.)
Flow Velocity = 3.27(Ft/s)
Travel time = 3.62 min.
Time of concentration = 10.26 min.
Critical depth = 0.352(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Rainfall intensity = 5.799(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.410 CA = 4.250
Subarea runoff = 23.909(CFS) for 10.132(Ac.)
Total runoff = 24.645(CFS) Total area = 10.366(Ac.)
Depth of flow = 0.501(Ft.), Average velocity = 4.099(Ft/s)
Critical depth = 0.531(Ft.)
End of computations, total study area = 10.366 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/18/10

Tule Wind Project
System 2
Proposed 100 Yr 24 Hr
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 2.100 to Point/Station 2.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Initial subarea total flow distance = 147.250(Ft.)
Highest elevation = 4068.000(Ft.)
Lowest elevation = 4015.000(Ft.)
Elevation difference = 53.000(Ft.) Slope = 35.993 %
USER ENTRY OF INITIAL AREA TIME OF CONCENTRATION
Time of Concentration = 5.00 minutes
Rainfall intensity (I) = 9.222(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff = 0.594(CFS)
Total initial stream area = 0.157(Ac.)

++
Process from Point/Station 2.200 to Point/Station 2.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 4015.000(Ft.)
Downstream point elevation = 3931.000(Ft.)
Channel length thru subarea = 918.230(Ft.)

Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 19.681(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 19.681(CFS)
Depth of flow = 0.342(Ft.), Average velocity = 5.068(Ft/s)
Channel flow top width = 12.733(Ft.)
Flow Velocity = 5.07(Ft/s)
Travel time = 3.02 min.
Time of concentration = 8.02 min.
Critical depth = 0.461(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Rainfall intensity = 6.799(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.410 CA = 5.688
Subarea runoff = 38.084(CFS) for 13.717(Ac.)
Total runoff = 38.677(CFS) Total area = 13.874(Ac.)
Depth of flow = 0.504(Ft.), Average velocity = 6.382(Ft/s)
Critical depth = 0.703(Ft.)
End of computations, total study area = 13.874 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 09/08/10

Tule Wind Project
System 3
Proposed 100 Year
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 3.100 to Point/Station 3.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 72.890(Ft.)
Highest elevation = 4062.000(Ft.)
Lowest elevation = 4058.000(Ft.)
Elevation difference = 4.000(Ft.) Slope = 5.488 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 5.49 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 7.96 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(100.000^.5)/(5.488^(1/3)]= 7.96
Rainfall intensity (I) = 6.832(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 0.092(CFS)
Total initial stream area = 0.042(Ac.)

++

Process from Point/Station 3.200 to Point/Station 3.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 4058.000(Ft.)
Downstream point elevation = 3963.000(Ft.)
Channel length thru subarea = 1068.190(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 4.803(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 4.803(CFS)
Depth of flow = 0.150(Ft.), Average velocity = 3.013(Ft/s)
Channel flow top width = 11.203(Ft.)
Flow Velocity = 3.01(Ft/s)
Travel time = 5.91 min.
Time of concentration = 13.87 min.
Critical depth = 0.188(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Rainfall intensity = 4.776(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.320 CA = 1.972
Subarea runoff = 9.323(CFS) for 6.119(Ac.)
Total runoff = 9.415(CFS) Total area = 6.161(Ac.)
Depth of flow = 0.224(Ft.), Average velocity = 3.862(Ft/s)
Critical depth = 0.289(Ft.)

++
Process from Point/Station 3.300 to Point/Station 3.400
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3963.000(Ft.)
Downstream point elevation = 3933.000(Ft.)
Channel length thru subarea = 482.370(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 16.394(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 16.394(CFS)
Depth of flow = 0.344(Ft.), Average velocity = 4.194(Ft/s)
Channel flow top width = 12.749(Ft.)
Flow Velocity = 4.19(Ft/s)
Travel time = 1.92 min.
Time of concentration = 15.79 min.
Critical depth = 0.414(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]

```
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Rainfall intensity =      4.393(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.320  CA =      5.305
Subarea runoff =     13.890(CFS) for     10.417(Ac.)
Total runoff =     23.305(CFS)  Total area =      16.578(Ac.)
Depth of flow =   0.421(Ft.), Average velocity =   4.735(Ft/s)
Critical depth =      0.516(Ft.)
End of computations, total study area =          16.578 (Ac.)
```

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/16/10

Tule Wind Project
System 4
Proposed 100 Yr 24 Hr
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 4.100 to Point/Station 4.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 84.850(Ft.)
Highest elevation = 3978.000(Ft.)
Lowest elevation = 3970.000(Ft.)
Elevation difference = 8.000(Ft.) Slope = 9.428 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 9.43 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 6.65 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(100.000^.5)/(9.428^(1/3)]= 6.65
Rainfall intensity (I) = 7.675(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 0.491(CFS)
Total initial stream area = 0.200(Ac.)

++

Process from Point/Station 4.200 to Point/Station 4.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3970.000(Ft.)
Downstream point elevation = 3943.000(Ft.)
Channel length thru subarea = 295.280(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 1.079(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 1.079(CFS)
Depth of flow = 0.061(Ft.), Average velocity = 1.718(Ft/s)
Channel flow top width = 10.490(Ft.)
Flow Velocity = 1.72(Ft/s)
Travel time = 2.87 min.
Time of concentration = 9.51 min.
Critical depth = 0.070(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Rainfall intensity = 6.091(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.320 CA = 0.264
Subarea runoff = 1.117(CFS) for 0.625(Ac.)
Total runoff = 1.608(CFS) Total area = 0.825(Ac.)
Depth of flow = 0.078(Ft.), Average velocity = 2.005(Ft/s)
Critical depth = 0.092(Ft.)
End of computations, total study area = 0.825 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/16/10

Tule Wind Project
System 5
Proposed 100 Yr 24 Hr
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 5.100 to Point/Station 5.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 132.710(Ft.)
Highest elevation = 3908.000(Ft.)
Lowest elevation = 3882.000(Ft.)
Elevation difference = 26.000(Ft.) Slope = 19.592 %
Top of Initial Area Slope adjusted by User to 0.700 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 50.00 (Ft)
for the top area slope value of 0.70 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 11.18 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(50.000^.5)/(0.700^(1/3)]= 11.18
Rainfall intensity (I) = 5.487(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 0.179(CFS)
Total initial stream area = 0.102(Ac.)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        5.200 to Point/Station        5.300
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  3882.000(Ft.)
Downstream point elevation =  3715.000(Ft.)
Channel length thru subarea  =  1743.680(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =     12.817(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     12.817(CFS)
Depth of flow =   0.262(Ft.), Average velocity =   4.420(Ft/s)
Channel flow top width =   12.099(Ft.)
Flow Velocity =    4.42(Ft/s)
Travel time  =    6.57 min.
Time of concentration =   17.76 min.
Critical depth =      0.352(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.650
Decimal fraction soil group B = 0.350
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.287
Rainfall intensity =      4.072(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.288  CA =      6.231
Subarea runoff =     25.192(CFS) for     21.558(Ac.)
Total runoff =     25.371(CFS)  Total area =      21.660(Ac.)
Depth of flow =   0.391(Ft.), Average velocity =   5.618(Ft/s)
Critical depth =      0.539(Ft.)
End of computations, total study area =          21.660 (Ac.)
```

San Diego County Rational Hydrology Program

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Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/16/10

Tule Wind Project
System 6
Proposed 100 Yr 24 Hr
August 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++

Process from Point/Station 6.100 to Point/Station 6.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 311.190(Ft.)
Highest elevation = 3910.000(Ft.)
Lowest elevation = 3894.000(Ft.)
Elevation difference = 16.000(Ft.) Slope = 5.142 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 5.14 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 8.13 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(100.000^.5)/(5.142^(1/3)]= 8.13
Rainfall intensity (I) = 6.737(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 1.242(CFS)
Total initial stream area = 0.576(Ac.)

++

Process from Point/Station 6.200 to Point/Station 6.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3894.000(Ft.)
Downstream point elevation = 3750.000(Ft.)
Channel length thru subarea = 2700.480(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 39.338(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 39.338(CFS)
Depth of flow = 0.594(Ft.), Average velocity = 5.355(Ft/s)
Channel flow top width = 14.749(Ft.)
Flow Velocity = 5.35(Ft/s)
Travel time = 8.40 min.
Time of concentration = 16.54 min.
Critical depth = 0.711(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.990
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.010
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.321
Rainfall intensity = 4.263(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.321 CA = 18.152
Subarea runoff = 76.136(CFS) for 55.991(Ac.)
Total runoff = 77.378(CFS) Total area = 56.567(Ac.)
Depth of flow = 0.866(Ft.), Average velocity = 6.636(Ft/s)
Critical depth = 1.063(Ft.)
End of computations, total study area = 56.567 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 09/08/10

Tule Wind Project
System 7
Proposed 100 Year
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 7.100 to Point/Station 7.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 92.070(Ft.)
Highest elevation = 3689.000(Ft.)
Lowest elevation = 3685.000(Ft.)
Elevation difference = 4.000(Ft.) Slope = 4.345 %
Top of Initial Area Slope adjusted by User to 8.640 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 8.64 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 6.84 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(100.000^.5)/(8.640^(1/3)]= 6.84
Rainfall intensity (I) = 7.533(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 0.118(CFS)
Total initial stream area = 0.049(Ac.)

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station        7.200 to Point/Station        7.300
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  3685.000(Ft.)
Downstream point elevation =  3585.000(Ft.)
Channel length thru subarea  =  2100.790(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =     15.257(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     15.257(CFS)
Depth of flow =   0.356(Ft.), Average velocity =   3.749(Ft/s)
Channel flow top width =   12.850(Ft.)
Flow Velocity =    3.75(Ft/s)
Travel time  =    9.34 min.
Time of concentration =   16.18 min.
Critical depth =      0.395(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Rainfall intensity =      4.323(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.320  CA =      7.017
Subarea runoff =     30.219(CFS) for     21.879(Ac.)
Total runoff =     30.337(CFS)  Total area =      21.928(Ac.)
Depth of flow =   0.529(Ft.), Average velocity =   4.733(Ft/s)
Critical depth =      0.602(Ft.)
End of computations, total study area =          21.928 (Ac.)
```

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 09/08/10

Tule Wind Project
System 8
Proposed 100 Year
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 8.100 to Point/Station 8.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Initial subarea total flow distance = 97.490(Ft.)
Highest elevation = 3720.000(Ft.)
Lowest elevation = 3710.000(Ft.)
Elevation difference = 10.000(Ft.) Slope = 10.257 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 10.26 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 5.72 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4100)*(100.000^.5)/(10.257^(1/3)]= 5.72
Rainfall intensity (I) = 8.459(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff = 0.246(CFS)
Total initial stream area = 0.071(Ac.)

++

Process from Point/Station 8.200 to Point/Station 8.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3710.000(Ft.)
Downstream point elevation = 3590.000(Ft.)
Channel length thru subarea = 2167.800(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 15.053(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 15.053(CFS)
Depth of flow = 0.338(Ft.), Average velocity = 3.920(Ft/s)
Channel flow top width = 12.706(Ft.)
Flow Velocity = 3.92(Ft/s)
Travel time = 9.22 min.
Time of concentration = 14.93 min.
Critical depth = 0.391(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.990
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.010
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.321
Rainfall intensity = 4.553(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.321 CA = 6.545
Subarea runoff = 29.551(CFS) for 20.304(Ac.)
Total runoff = 29.797(CFS) Total area = 20.375(Ac.)
Depth of flow = 0.502(Ft.), Average velocity = 4.948(Ft/s)
Critical depth = 0.602(Ft.)
End of computations, total study area = 20.375 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/16/10

Tule Wind Project
System 9
Proposed 100 Yr 24 Hr
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++

Process from Point/Station 9.100 to Point/Station 9.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 88.120(Ft.)
Highest elevation = 3611.000(Ft.)
Lowest elevation = 3606.000(Ft.)
Elevation difference = 5.000(Ft.) Slope = 5.674 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 5.67 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 7.87 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(100.000^.5)/(5.674^(1/3)]= 7.87
Rainfall intensity (I) = 6.881(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 0.161(CFS)
Total initial stream area = 0.073(Ac.)

++

```
Process from Point/Station        9.200 to Point/Station        9.300
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =  3606.000(Ft.)
Downstream point elevation =  3592.000(Ft.)
Channel length thru subarea  =   411.100(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =      2.254(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      2.254(CFS)
Depth of flow =   0.128(Ft.), Average velocity =   1.680(Ft/s)
Channel flow top width =   11.021(Ft.)
Flow Velocity =    1.68(Ft/s)
Travel time  =    4.08 min.
Time of concentration =   11.95 min.
Critical depth =      0.115(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Rainfall intensity =      5.257(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.320  CA =      0.816
Subarea runoff =      4.131(CFS) for      2.478(Ac.)
Total runoff =      4.292(CFS)  Total area =       2.551(Ac.)
Depth of flow =   0.187(Ft.), Average velocity =   2.137(Ft/s)
Critical depth =      0.174(Ft.)
End of computations, total study area =           2.551 (Ac.)
```

San Diego County Rational Hydrology Program

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Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/16/10

Tule Wind Project
System 10
Proposed 100 Yr 24 Hr
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 10.100 to Point/Station 10.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Initial subarea total flow distance = 103.135(Ft.)
Highest elevation = 3728.000(Ft.)
Lowest elevation = 3715.000(Ft.)
Elevation difference = 13.000(Ft.) Slope = 12.605 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 12.61 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 5.34 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4100)*(100.000^.5)/(12.605^(1/3)]= 5.34
Rainfall intensity (I) = 8.842(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff = 0.384(CFS)
Total initial stream area = 0.106(Ac.)

++

Process from Point/Station 10.200 to Point/Station 10.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3715.000(Ft.)
Downstream point elevation = 3582.000(Ft.)
Channel length thru subarea = 2242.890(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 15.978(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 15.978(CFS)
Depth of flow = 0.343(Ft.), Average velocity = 4.093(Ft/s)
Channel flow top width = 12.746(Ft.)
Flow Velocity = 4.09(Ft/s)
Travel time = 9.13 min.
Time of concentration = 14.47 min.
Critical depth = 0.406(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.930
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.070
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.326
Rainfall intensity = 4.646(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.327 CA = 6.780
Subarea runoff = 31.118(CFS) for 20.645(Ac.)
Total runoff = 31.503(CFS) Total area = 20.751(Ac.)
Depth of flow = 0.508(Ft.), Average velocity = 5.158(Ft/s)
Critical depth = 0.617(Ft.)
End of computations, total study area = 20.751 (Ac.)

San Diego County Rational Hydrology Program

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Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/16/10

Tule Wind Project
System 11
Proposed 100 Yr 24 Hr
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++

Process from Point/Station 11.100 to Point/Station 11.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 92.720(Ft.)
Highest elevation = 3609.000(Ft.)
Lowest elevation = 3606.000(Ft.)
Elevation difference = 3.000(Ft.) Slope = 3.236 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 3.24 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 9.49 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(100.000^.5)/(3.236^(1/3)]= 9.49
Rainfall intensity (I) = 6.099(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 0.142(CFS)
Total initial stream area = 0.073(Ac.)

++

```
Process from Point/Station       11.200 to Point/Station       11.300
**** IMPROVED CHANNEL TRAVEL TIME ****
------------------------------------------------------------------------
Upstream point elevation =  3606.000(Ft.)
Downstream point elevation =  3530.000(Ft.)
Channel length thru subarea  =   694.440(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =      3.026(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =      3.026(CFS)
Depth of flow =   0.107(Ft.), Average velocity =   2.700(Ft/s)
Channel flow top width =   10.860(Ft.)
Flow Velocity =    2.70(Ft/s)
Travel time  =    4.29 min.
Time of concentration =   13.78 min.
Critical depth =      0.139(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL                    ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Rainfall intensity =      4.796(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.320  CA =      1.219
Subarea runoff =      5.703(CFS) for      3.736(Ac.)
Total runoff =      5.845(CFS)  Total area =       3.809(Ac.)
Depth of flow =   0.159(Ft.), Average velocity =   3.460(Ft/s)
Critical depth =      0.213(Ft.)
End of computations, total study area =           3.809 (Ac.)
```

San Diego County Rational Hydrology Program

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Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/16/10

Tule Wind Project
System 12
Proposed 100 Yr 24 Hr
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 12.100 to Point/Station 12.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.040
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.960
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.406
Initial subarea total flow distance = 105.190(Ft.)
Highest elevation = 3712.000(Ft.)
Lowest elevation = 3700.000(Ft.)
Elevation difference = 12.000(Ft.) Slope = 11.408 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 11.41 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 5.55 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4064)*(100.000^.5)/(11.408^(1/3)]= 5.55
Rainfall intensity (I) = 8.625(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.406
Subarea runoff = 0.315(CFS)
Total initial stream area = 0.090(Ac.)

++

Process from Point/Station 12.200 to Point/Station 12.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3700.000(Ft.)
Downstream point elevation = 3556.000(Ft.)
Channel length thru subarea = 2438.640(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 27.407(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 27.407(CFS)
Depth of flow = 0.469(Ft.), Average velocity = 4.916(Ft/s)
Channel flow top width = 13.755(Ft.)
Flow Velocity = 4.92(Ft/s)
Travel time = 8.27 min.
Time of concentration = 13.81 min.
Critical depth = 0.570(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.920
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.080
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.327
Rainfall intensity = 4.788(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.327 CA = 11.362
Subarea runoff = 54.086(CFS) for 34.613(Ac.)
Total runoff = 54.401(CFS) Total area = 34.703(Ac.)
Depth of flow = 0.692(Ft.), Average velocity = 6.153(Ft/s)
Critical depth = 0.859(Ft.)
End of computations, total study area = 34.703 (Ac.)

San Diego County Rational Hydrology Program

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Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/16/10

Tule Wind Project
Sytem 13
Proposed 100 Yr 24 Hr
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 13.100 to Point/Station 13.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Initial subarea total flow distance = 123.400(Ft.)
Highest elevation = 3822.000(Ft.)
Lowest elevation = 3806.000(Ft.)
Elevation difference = 16.000(Ft.) Slope = 12.966 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 12.97 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 5.29 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4100)*(100.000^.5)/(12.966^(1/3)]= 5.29
Rainfall intensity (I) = 8.896(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff = 0.689(CFS)
Total initial stream area = 0.189(Ac.)

++

Process from Point/Station 13.200 to Point/Station 13.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3806.000(Ft.)
Downstream point elevation = 3554.000(Ft.)
Channel length thru subarea = 3804.300(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 42.718(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 42.718(CFS)
Depth of flow = 0.585(Ft.), Average velocity = 5.918(Ft/s)
Channel flow top width = 14.680(Ft.)
Flow Velocity = 5.92(Ft/s)
Travel time = 10.71 min.
Time of concentration = 16.00 min.
Critical depth = 0.742(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.040
Decimal fraction soil group B = 0.760
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.200
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.336
Rainfall intensity = 4.355(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.336 CA = 19.446
Subarea runoff = 83.994(CFS) for 57.644(Ac.)
Total runoff = 84.684(CFS) Total area = 57.833(Ac.)
Depth of flow = 0.857(Ft.), Average velocity = 7.354(Ft/s)
Critical depth = 1.117(Ft.)
End of computations, total study area = 57.833 (Ac.)

San Diego County Rational Hydrology Program

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Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 08/18/10

Tule Wind Project
System 14
Proposed 100 Yr 24 Hr
Aug 16, 2010

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 14.100 to Point/Station 14.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.410
Initial subarea total flow distance = 233.590(Ft.)
Highest elevation = 3994.000(Ft.)
Lowest elevation = 3949.000(Ft.)
Elevation difference = 45.000(Ft.) Slope = 19.265 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 19.27 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 4.63 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.4100)*(100.000^.5)/(19.265^(1/3)]= 4.63
Calculated TC of 4.633 minutes is less than 5 minutes,
resetting TC to 5.0 minutes for rainfall intensity calculations
Rainfall intensity (I) = 9.222(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.410
Subarea runoff = 1.769(CFS)
Total initial stream area = 0.468(Ac.)

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.200 to Point/Station       14.300
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  3949.000(Ft.)
Downstream point elevation =  3743.000(Ft.)
Channel length thru subarea  =  3533.690(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =     45.997(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =     45.997(CFS)
Depth of flow =   0.632(Ft.), Average velocity =   5.806(Ft/s)
Channel flow top width =   15.059(Ft.)
Flow Velocity =    5.81(Ft/s)
Travel time  =   10.14 min.
Time of concentration =   14.78 min.
Critical depth =      0.781(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.860
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.140
[LOW DENSITY RESIDENTIAL                     ]
(1.0 DU/A or Less       )
Impervious value, Ai = 0.100
Sub-Area C Value = 0.333
Rainfall intensity =      4.584(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.333  CA =     19.668
Subarea runoff =     88.389(CFS) for     58.556(Ac.)
Total runoff =     90.158(CFS)  Total area =      59.024(Ac.)
Depth of flow =   0.919(Ft.), Average velocity =   7.172(Ft/s)
Critical depth =      1.156(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       14.300 to Point/Station       14.400
**** IMPROVED CHANNEL TRAVEL TIME ****
______________________________________________________________________________
Upstream point elevation =  3743.000(Ft.)
Downstream point elevation =  3620.000(Ft.)
Channel length thru subarea  =  3814.580(Ft.)
Channel base width      =   10.000(Ft.)
Slope or 'Z' of left channel bank =   4.000
Slope or 'Z' of right channel bank =   4.000
Estimated mean flow rate at midpoint of channel =    231.883(CFS)
Manning's 'N'    = 0.040
Maximum depth of channel  =    5.000(Ft.)
Flow(q) thru subarea =    231.883(CFS)
Depth of flow =   1.772(Ft.), Average velocity =   7.659(Ft/s)
Channel flow top width =   24.175(Ft.)
Flow Velocity =    7.66(Ft/s)
Travel time  =    8.30 min.
Time of concentration =   23.08 min.
Critical depth =      1.969(Ft.)
 Adding area flow to channel
Decimal fraction soil group A = 0.070
Decimal fraction soil group B = 0.710
Decimal fraction soil group C = 0.000
```

Decimal fraction soil group D = 0.220
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.336
Rainfall intensity = 3.439(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.336 CA = 108.625
Subarea runoff = 283.354(CFS) for 264.517(Ac.)
Total runoff = 373.512(CFS) Total area = 323.541(Ac.)
Depth of flow = 2.251(Ft.), Average velocity = 8.732(Ft/s)
Critical depth = 2.531(Ft.)

++
Process from Point/Station 14.400 to Point/Station 14.500
**** IMPROVED CHANNEL TRAVEL TIME ****
____
Upstream point elevation = 3620.000(Ft.)
Downstream point elevation = 3542.000(Ft.)
Channel length thru subarea = 2848.900(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 402.785(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 402.785(CFS)
Depth of flow = 2.432(Ft.), Average velocity = 8.396(Ft/s)
Channel flow top width = 29.455(Ft.)
Flow Velocity = 8.40(Ft/s)
Travel time = 5.66 min.
Time of concentration = 28.73 min.
Critical depth = 2.625(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.170
Decimal fraction soil group B = 0.250
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.580
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.364
Rainfall intensity = 2.985(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.342 CA = 144.710
Subarea runoff = 58.482(CFS) for 99.216(Ac.)
Total runoff = 431.994(CFS) Total area = 422.757(Ac.)
Depth of flow = 2.516(Ft.), Average velocity = 8.556(Ft/s)
Critical depth = 2.719(Ft.)
End of computations, total study area = 422.757 (Ac.)

San Diego County Rational Hydrology Program

CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2004 Version 7.4

Rational method hydrology program based on
San Diego County Flood Control Division 2003 hydrology manual
Rational Hydrology Study Date: 09/08/10

Tule Wind Project
System 15
Proposed Conditions 100 Year

********* Hydrology Study Control Information **********

Program License Serial Number 4055

Rational hydrology study storm event year is 100.0
English (in-lb) input data Units used

Map data precipitation entered:
6 hour, precipitation(inches) = 3.500
24 hour precipitation(inches) = 6.000
P6/P24 = 58.3%
San Diego hydrology manual 'C' values used

++
Process from Point/Station 15.100 to Point/Station 15.200
**** INITIAL AREA EVALUATION ****

Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Initial subarea total flow distance = 59.590(Ft.)
Highest elevation = 3699.000(Ft.)
Lowest elevation = 3694.000(Ft.)
Elevation difference = 5.000(Ft.) Slope = 8.391 %
INITIAL AREA TIME OF CONCENTRATION CALCULATIONS:
The maximum overland flow distance is 100.00 (Ft)
for the top area slope value of 8.39 %, in a development type of
1.0 DU/A or Less
In Accordance With Figure 3-3
Initial Area Time of Concentration = 6.91 minutes
TC = [1.8*(1.1-C)*distance(Ft.)^.5)/(% slope^(1/3)]
TC = [1.8*(1.1-0.3200)*(100.000^.5)/(8.391^(1/3)]= 6.91
Rainfall intensity (I) = 7.485(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.320
Subarea runoff = 0.144(CFS)
Total initial stream area = 0.060(Ac.)

++

Process from Point/Station 15.200 to Point/Station 15.300
**** IMPROVED CHANNEL TRAVEL TIME ****

Upstream point elevation = 3694.000(Ft.)
Downstream point elevation = 3645.000(Ft.)
Channel length thru subarea = 661.420(Ft.)
Channel base width = 10.000(Ft.)
Slope or 'Z' of left channel bank = 4.000
Slope or 'Z' of right channel bank = 4.000
Estimated mean flow rate at midpoint of channel = 5.541(CFS)
Manning's 'N' = 0.040
Maximum depth of channel = 5.000(Ft.)
Flow(q) thru subarea = 5.541(CFS)
Depth of flow = 0.173(Ft.), Average velocity = 3.001(Ft/s)
Channel flow top width = 11.382(Ft.)
Flow Velocity = 3.00(Ft/s)
Travel time = 3.67 min.
Time of concentration = 10.58 min.
Critical depth = 0.207(Ft.)
Adding area flow to channel
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 1.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
[LOW DENSITY RESIDENTIAL]
(1.0 DU/A or Less)
Impervious value, Ai = 0.100
Sub-Area C Value = 0.320
Rainfall intensity = 5.685(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for total area
(Q=KCIA) is C = 0.320 CA = 1.910
Subarea runoff = 10.718(CFS) for 5.910(Ac.)
Total runoff = 10.861(CFS) Total area = 5.970(Ac.)
Depth of flow = 0.257(Ft.), Average velocity = 3.836(Ft/s)
Critical depth = 0.316(Ft.)
End of computations, total study area = 5.970 (Ac.)

APPENDIX G
Standard Crossing Plate

Figure G-1: Standard Crossing Geometry

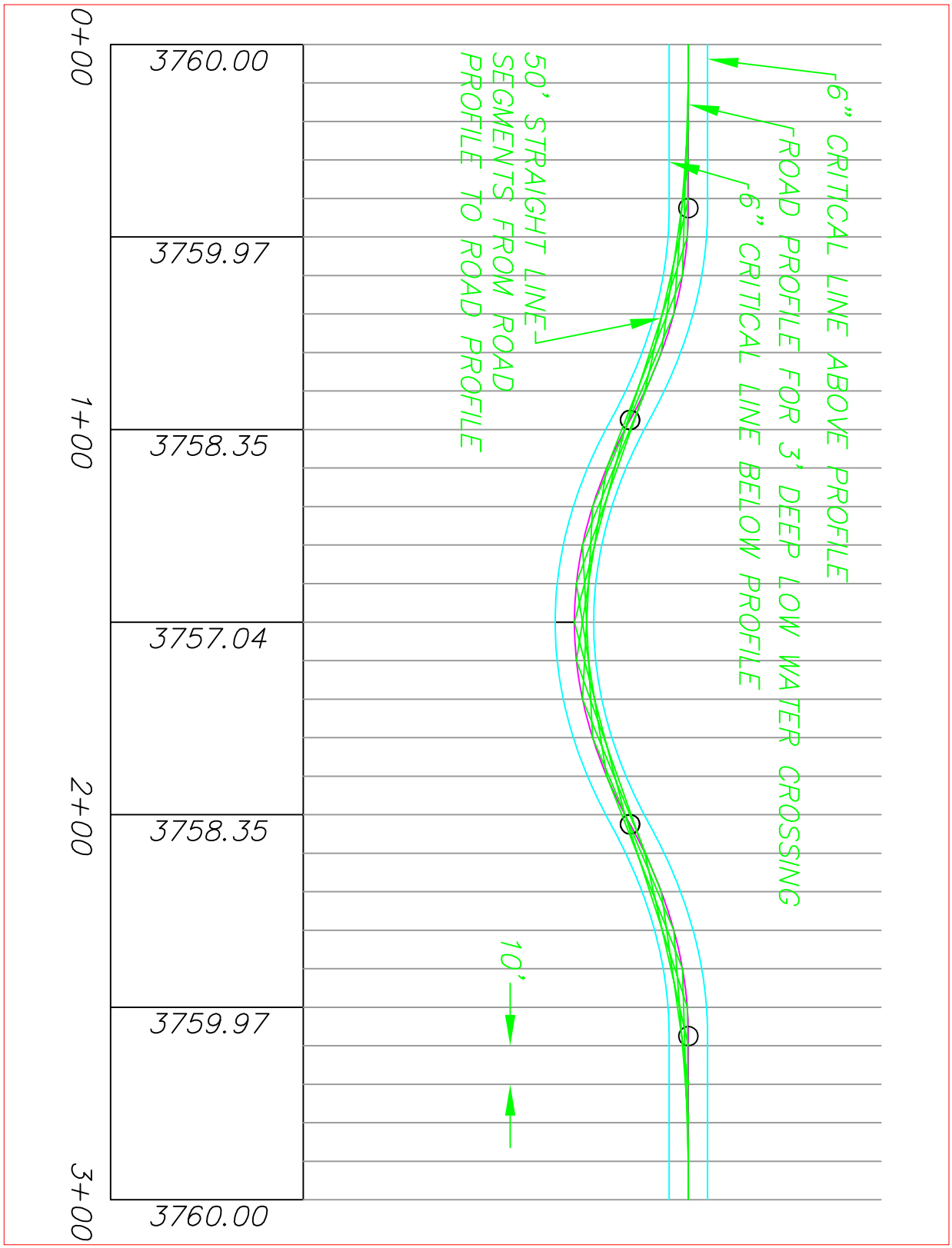


FIGURE G-1: STANDARD AT-GRADE CROSSING GEOMETRY

APPENDIX H
Crossing Hydraulics CulvertMaster Output

Rating Table Report
Overtopping

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	600.00	10.00 cfs

Discharge (cfs)	HW Elev. (ft)	TW Elev. (ft)
0.00	0.00	0.00
10.00	0.29	0.13
20.00	0.40	0.20
30.00	0.49	0.25
40.00	0.56	0.30
50.00	0.63	0.34
60.00	0.68	0.38
70.00	0.74	0.42
80.00	0.79	0.45
90.00	0.83	0.48
100.00	0.87	0.52
110.00	0.92	0.55
120.00	0.95	0.58
130.00	0.99	0.60
140.00	1.03	0.63
150.00	1.06	0.66
160.00	1.09	0.68
170.00	1.13	0.71
180.00	1.16	0.73
190.00	1.19	0.76
200.00	1.22	0.78
210.00	1.25	0.80
220.00	1.27	0.83
230.00	1.30	0.85
240.00	1.33	0.87
250.00	1.35	0.89
260.00	1.38	0.91
270.00	1.40	0.93
280.00	1.43	0.95
290.00	1.45	0.97
300.00	1.48	0.99
310.00	1.50	1.01
320.00	1.52	1.03
330.00	1.54	1.05
340.00	1.57	1.07
350.00	1.59	1.09
360.00	1.61	1.11
370.00	1.63	1.13
380.00	1.65	1.15
390.00	1.67	1.16
400.00	1.69	1.18
410.00	1.71	1.20
420.00	1.73	1.22
430.00	1.75	1.23
440.00	1.77	1.25
450.00	1.79	1.27
460.00	1.80	1.28
470.00	1.82	1.30
480.00	1.84	1.32
490.00	1.86	1.33
500.00	1.88	1.35

Rating Table Report
Overtopping

Discharge (cfs)	HW Elev. (ft)	TW Elev. (ft)
510.00	1.89	1.36
520.00	1.91	1.38
530.00	1.93	1.40
540.00	1.94	1.41
550.00	1.96	1.43
560.00	1.98	1.44
570.00	1.99	1.46
580.00	2.01	1.47
590.00	2.03	1.49
600.00	2.04	1.50

Rating Table Report
Overtopping

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	2,000.00	20.00 cfs

Discharge (cfs)	HW Elev. (ft)	TW Elev. (ft)
0.00	0.00	0.00
20.00	0.11	0.08
40.00	0.17	0.12
60.00	0.22	0.15
80.00	0.26	0.18
100.00	0.30	0.20
120.00	0.34	0.23
140.00	0.37	0.25
160.00	0.40	0.27
180.00	0.43	0.29
200.00	0.46	0.31
220.00	0.49	0.33
240.00	0.52	0.35
260.00	0.54	0.36
280.00	0.57	0.38
300.00	0.60	0.39
320.00	0.62	0.41
340.00	0.64	0.43
360.00	0.67	0.44
380.00	0.69	0.45
400.00	0.71	0.47
420.00	0.73	0.48
440.00	0.75	0.50
460.00	0.77	0.51
480.00	0.79	0.52
500.00	0.81	0.54
520.00	0.83	0.55
540.00	0.85	0.56
560.00	0.87	0.57
580.00	0.89	0.59
600.00	0.91	0.60
620.00	0.93	0.61
640.00	0.95	0.62
660.00	0.97	0.63
680.00	0.98	0.64
700.00	1.00	0.66
720.00	1.02	0.67
740.00	1.03	0.68
760.00	1.05	0.69
780.00	1.07	0.70
800.00	1.08	0.71
820.00	1.10	0.72
840.00	1.12	0.73
860.00	1.13	0.74
880.00	1.15	0.75
900.00	1.17	0.76
920.00	1.18	0.77
940.00	1.20	0.78
960.00	1.21	0.79
980.00	1.23	0.80
1,000.00	1.24	0.81

Rating Table Report
Overtopping

Discharge (cfs)	HW Elev. (ft)	TW Elev. (ft)
1,020.00	1.26	0.82
1,040.00	1.27	0.83
1,060.00	1.29	0.84
1,080.00	1.30	0.85
1,100.00	1.32	0.86
1,120.00	1.33	0.87
1,140.00	1.34	0.88
1,160.00	1.36	0.89
1,180.00	1.37	0.90
1,200.00	1.39	0.91
1,220.00	1.40	0.92
1,240.00	1.41	0.92
1,260.00	1.43	0.93
1,280.00	1.44	0.94
1,300.00	1.45	0.95
1,320.00	1.47	0.96
1,340.00	1.48	0.97
1,360.00	1.49	0.98
1,380.00	1.51	0.99
1,400.00	1.52	0.99
1,420.00	1.53	1.00
1,440.00	1.55	1.01
1,460.00	1.56	1.02
1,480.00	1.57	1.03
1,500.00	1.59	1.04
1,520.00	1.60	1.04
1,540.00	1.61	1.05
1,560.00	1.62	1.06
1,580.00	1.64	1.07
1,600.00	1.65	1.08
1,620.00	1.66	1.09
1,640.00	1.67	1.09
1,660.00	1.69	1.10
1,680.00	1.70	1.11
1,700.00	1.71	1.12
1,720.00	1.72	1.12
1,740.00	1.73	1.13
1,760.00	1.75	1.14
1,780.00	1.76	1.15
1,800.00	1.77	1.16
1,820.00	1.78	1.16
1,840.00	1.79	1.17
1,860.00	1.80	1.18
1,880.00	1.82	1.19
1,900.00	1.83	1.19
1,920.00	1.84	1.20
1,940.00	1.85	1.21
1,960.00	1.86	1.22
1,980.00	1.87	1.22
2,000.00	1.89	1.23

System 14 Crossing

Rating Table Report
Overtopping

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	600.00	10.00 cfs

Discharge (cfs)	HW Elev. (ft)	TW Elev. (ft)
0.00	0.00	0.00
10.00	0.14	0.13
20.00	0.21	0.20
30.00	0.27	0.25
40.00	0.32	0.30
50.00	0.37	0.34
60.00	0.41	0.38
70.00	0.45	0.42
80.00	0.48	0.45
90.00	0.52	0.48
100.00	0.55	0.52
110.00	0.58	0.55
120.00	0.62	0.58
130.00	0.65	0.60
140.00	0.68	0.63
150.00	0.70	0.66
160.00	0.73	0.68
170.00	0.76	0.71
180.00	0.78	0.73
190.00	0.81	0.76
200.00	0.83	0.78
210.00	0.86	0.80
220.00	0.88	0.83
230.00	0.90	0.85
240.00	0.93	0.87
250.00	0.95	0.89
260.00	0.97	0.91
270.00	0.99	0.93
280.00	1.02	0.95
290.00	1.03	0.97
300.00	1.05	0.99
310.00	1.07	1.01
320.00	1.10	1.03
330.00	1.12	1.05
340.00	1.14	1.07
350.00	1.16	1.09
360.00	1.17	1.11
370.00	1.19	1.13
380.00	1.21	1.15
390.00	1.23	1.16
400.00	1.25	1.18
410.00	1.27	1.20
420.00	1.28	1.22
430.00	1.30	1.23
440.00	1.32	1.25
450.00	1.34	1.27
460.00	1.35	1.28
470.00	1.37	1.30
480.00	1.39	1.32
490.00	1.40	1.33
500.00	1.42	1.35

Rating Table Report
Overtopping

Discharge (cfs)	HW Elev. (ft)	TW Elev. (ft)
510.00	1.44	1.36
520.00	1.46	1.38
530.00	1.47	1.40
540.00	1.49	1.41
550.00	1.50	1.43
560.00	1.52	1.44
570.00	1.53	1.46
580.00	1.55	1.47
590.00	1.56	1.49
600.00	1.58	1.50

Rating Table Report
Overtopping

Range Data:			
	Minimum	Maximum	Increment
Discharge	0.00	11,000.00	100.00 cfs

Discharge (cfs)	HW Elev. (ft)	TW Elev. (ft)
0.00	0.00	0.00
100.00	0.08	0.07
200.00	0.13	0.10
300.00	0.17	0.13
400.00	0.21	0.16
500.00	0.24	0.18
600.00	0.28	0.20
700.00	0.30	0.22
800.00	0.33	0.24
900.00	0.36	0.26
1,000.00	0.39	0.27
1,100.00	0.41	0.29
1,200.00	0.43	0.30
1,300.00	0.46	0.32
1,400.00	0.48	0.33
1,500.00	0.50	0.35
1,600.00	0.52	0.36
1,700.00	0.55	0.38
1,800.00	0.57	0.39
1,900.00	0.59	0.40
2,000.00	0.61	0.41
2,100.00	0.63	0.43
2,200.00	0.65	0.44
2,300.00	0.66	0.45
2,400.00	0.68	0.46
2,500.00	0.70	0.47
2,600.00	0.72	0.48
2,700.00	0.74	0.50
2,800.00	0.75	0.51
2,900.00	0.77	0.52
3,000.00	0.79	0.53
3,100.00	0.81	0.54
3,200.00	0.82	0.55
3,300.00	0.84	0.56
3,400.00	0.86	0.57
3,500.00	0.87	0.58
3,600.00	0.89	0.59
3,700.00	0.90	0.60
3,800.00	0.92	0.61
3,900.00	0.94	0.62
4,000.00	0.95	0.63
4,100.00	0.97	0.64
4,200.00	0.98	0.65
4,300.00	1.00	0.65
4,400.00	1.01	0.66
4,500.00	1.03	0.67
4,600.00	1.04	0.68
4,700.00	1.06	0.69
4,800.00	1.07	0.70
4,900.00	1.08	0.71
5,000.00	1.10	0.72

Rating Table Report
Overtopping

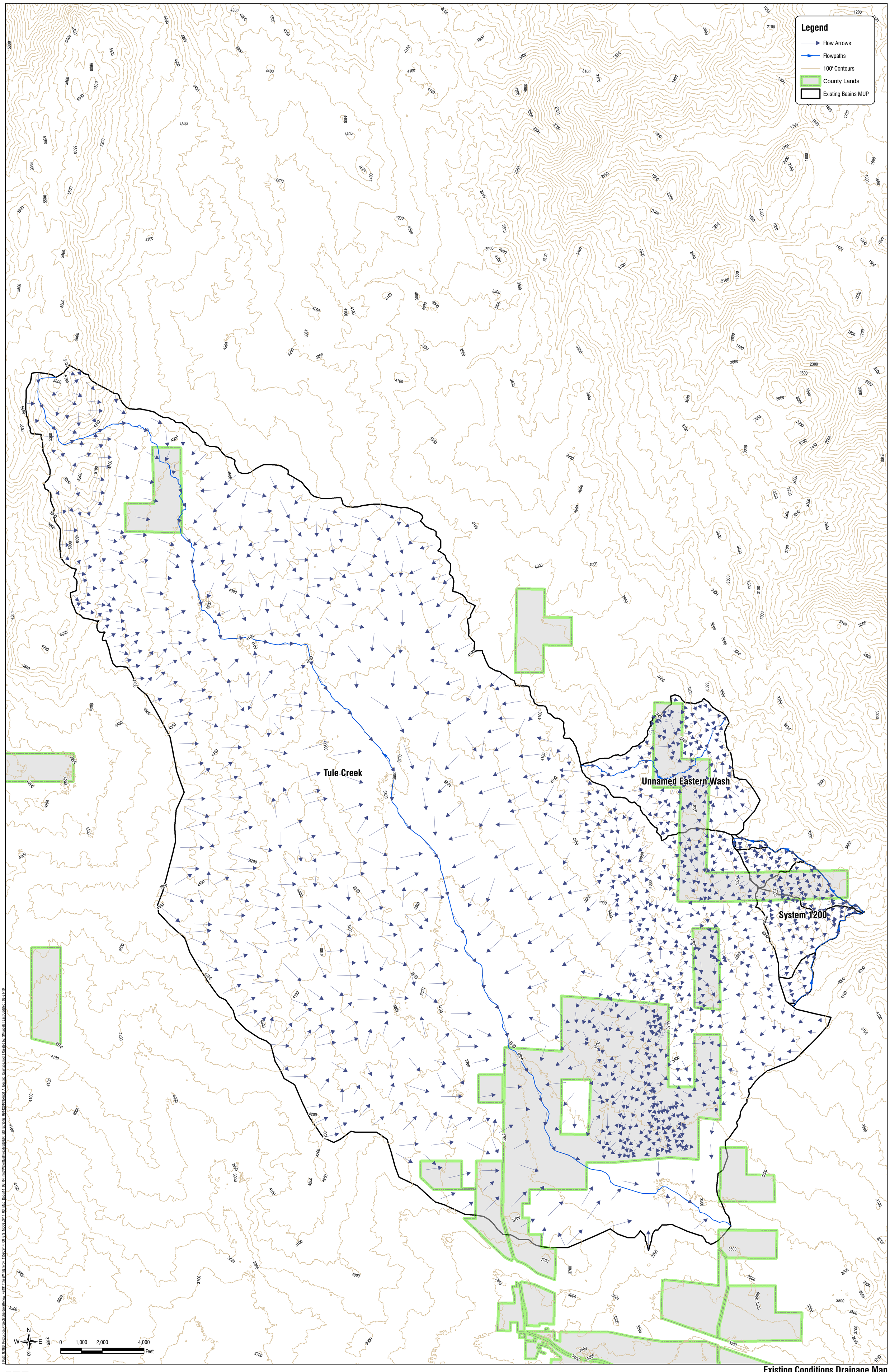
Discharge (cfs)	HW Elev. (ft)	TW Elev. (ft)
5,100.00	1.11	0.73
5,200.00	1.13	0.73
5,300.00	1.14	0.74
5,400.00	1.15	0.75
5,500.00	1.17	0.76
5,600.00	1.18	0.77
5,700.00	1.20	0.78
5,800.00	1.21	0.78
5,900.00	1.22	0.79
6,000.00	1.24	0.80
6,100.00	1.25	0.81
6,200.00	1.26	0.82
6,300.00	1.28	0.82
6,400.00	1.29	0.83
6,500.00	1.30	0.84
6,600.00	1.31	0.85
6,700.00	1.33	0.85
6,800.00	1.34	0.86
6,900.00	1.35	0.87
7,000.00	1.37	0.88
7,100.00	1.38	0.88
7,200.00	1.39	0.89
7,300.00	1.40	0.90
7,400.00	1.41	0.91
7,500.00	1.43	0.91
7,600.00	1.44	0.92
7,700.00	1.45	0.93
7,800.00	1.46	0.94
7,900.00	1.48	0.94
8,000.00	1.49	0.95
8,100.00	1.50	0.96
8,200.00	1.51	0.96
8,300.00	1.52	0.97
8,400.00	1.54	0.98
8,500.00	1.55	0.99
8,600.00	1.56	0.99
8,700.00	1.57	1.00
8,800.00	1.58	1.01
8,900.00	1.59	1.01
9,000.00	1.61	1.02
9,100.00	1.62	1.03
9,200.00	1.63	1.03
9,300.00	1.64	1.04
9,400.00	1.65	1.05
9,500.00	1.66	1.05
9,600.00	1.67	1.06
9,700.00	1.68	1.07
9,800.00	1.70	1.07
9,900.00	1.71	1.08
10,000.00	1.72	1.09
10,100.00	1.73	1.09
10,200.00	1.74	1.10
10,300.00	1.75	1.11
10,400.00	1.76	1.11
10,500.00	1.77	1.12

Rating Table Report
Overtopping

Discharge (cfs)	HW Elev. (ft)	TW Elev. (ft)
10,600.00	1.78	1.13
10,700.00	1.80	1.13
10,800.00	1.81	1.14
10,900.00	1.82	1.14
11,000.00	1.83	1.15

EXHIBITS

Exhibit A – Existing Conditions Drainage Map
Exhibit B – Proposed Conditions Drainage Map
Exhibit C – Tule Creek Drainage Map
Exhibit D – McCain Valley 1 Drainage Map
Exhibit E – McCain Valley 2 Drainage Map
Exhibit F – System 1-2 Drainage Map
Exhibit G – System 3-4 Drainage Map
Exhibit H – System 5 Drainage Map
Exhibit I – System 6 Drainage Map
Exhibit J – System 7 Drainage Map
Exhibit K – System 8-13 Drainage Map
Exhibit L – System 14 Drainage Map
Exhibit M – System 15 Drainage Map



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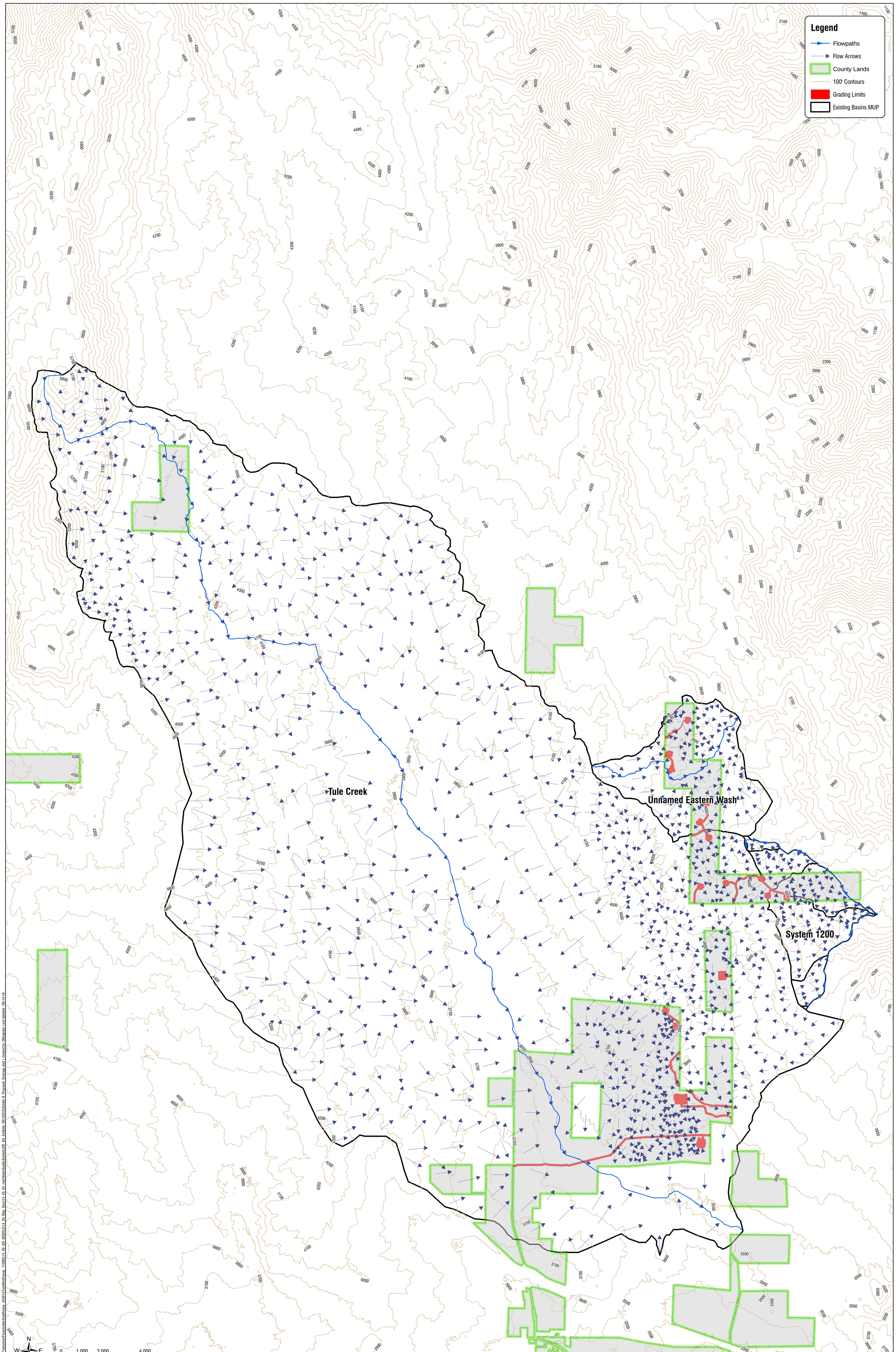
Existing Conditions Drainage Map

EXHIBIT A

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study



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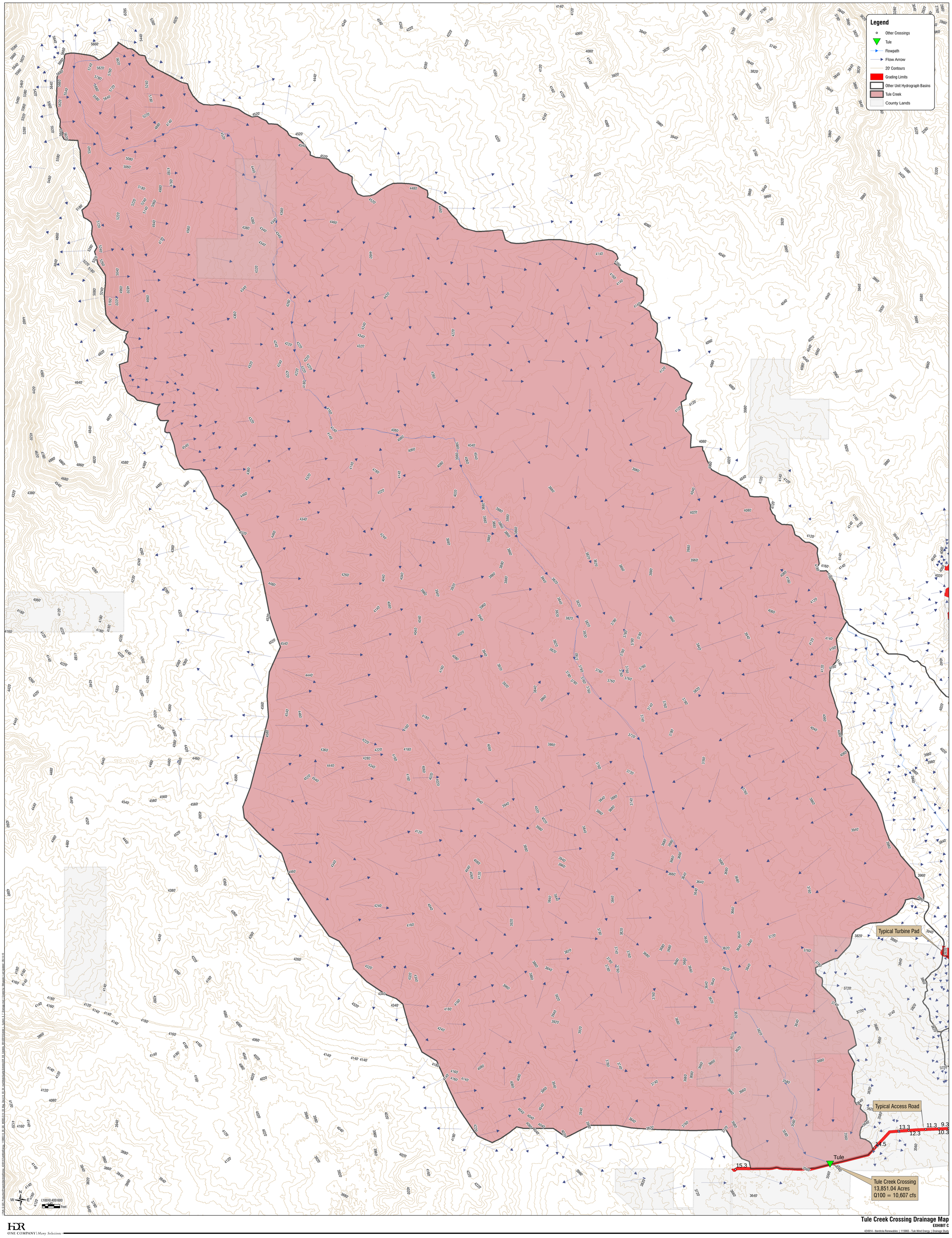
Proposed Conditions Drainage Map

EXHIBIT B

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study



Tule Creek Crossing Drainage Map

EXHIBIT C

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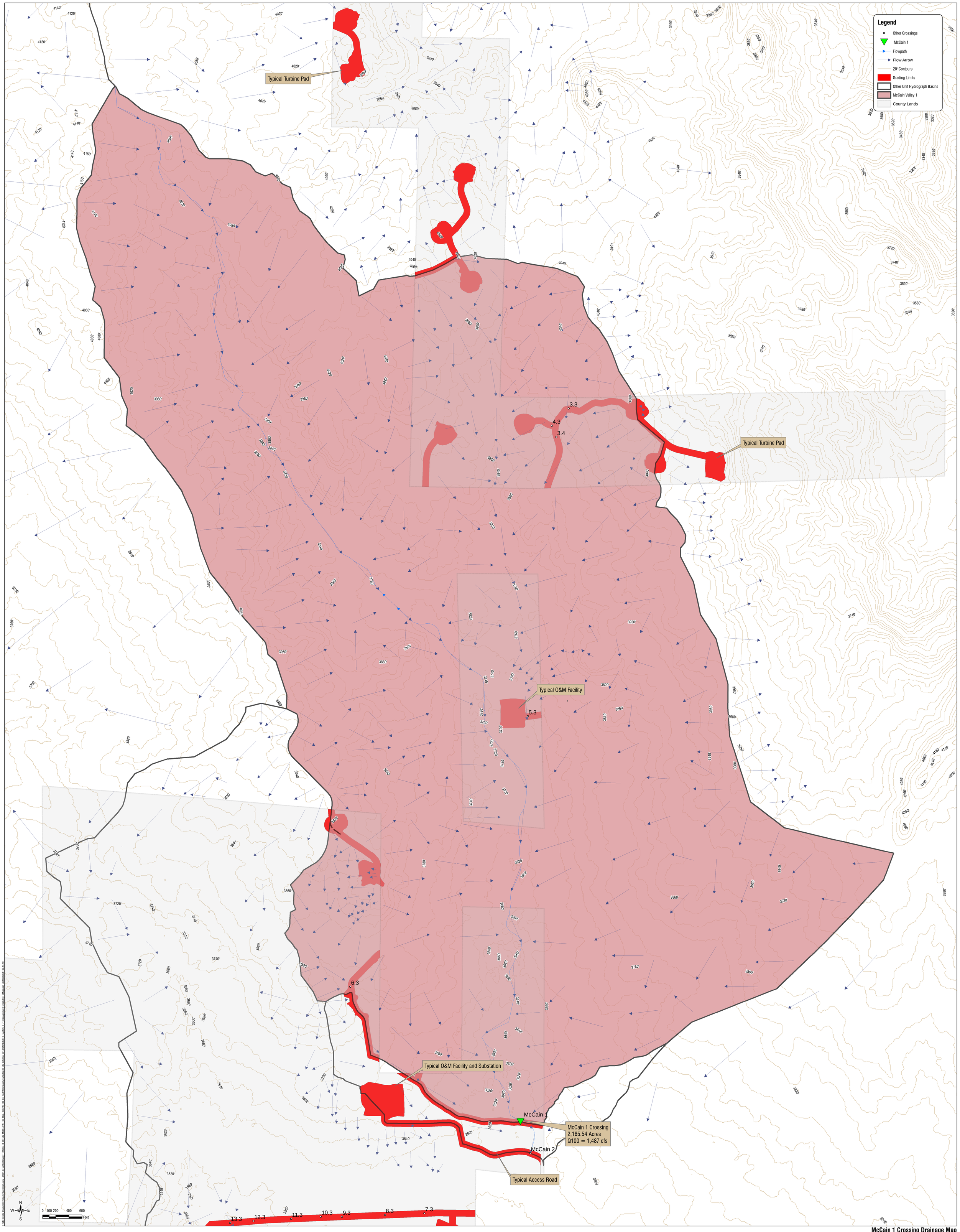

McCain 1 Crossing Drainage Map

EXHIBIT D

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Legend
- Other Crossings
- McCain 2
- Flowpath
- Flow Arrow
- 20' Contours
- Grading Limits
- Other Unit Hydrograph Basins
- McCain Valley 2
- County Lands

Typical Turbine Pad

3.3
4.3
3.4

Typical Turbine Pad

Typical O&M Facility

5.3

6.3

Typical O&M Facility and Substation

McCain 1

McCain 2

McCain 2 Crossing
2,256.19 Acres
Q100 = 1,562 cfs

Typical Access Road

13.3 12.3 11.3 10.3 9.3 8.3 7.3

N W E S

0 100 200 400 600 Feet

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McCain 2 Crossing Drainage Map

EXHIBIT E

Legend

- Road Crossings
- Nodes
- Flow Arrows
- Flowpaths
- 2' Contours
- Proposed Site Layout
- Proposed Site Grading 2' Contour
- Grading Limits
- County Lands

Basin

- System 1
- System 2
- Other Systems

System 1
0.2 Acres
0.7 cfs

System 1
10.1 Acres
24.6 cfs

System 2
0.2 Acres
0.6 cfs

System 2
13.7 Acres
38.7 cfs

1.1
1.2
1.3
2.2
2.3

Typical Turbine Pad

Typical Access Road

N
W E
S

0 40 80 160 Feet

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System 1-2 Drainage Map

EXHIBIT F

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study

Legend

- Road Crossings
- Nodes
- Flow Arrows
- Flowpaths
- 2' Contours
- Proposed Site Layout
- Proposed Site Grading 2' Contour
- Grading Limits
- County Lands

Basin

- Other Systems
- System 3
- System 4

System 1200
77.9 Acres
110.4 cfs

System 3
6.1 Acres
9.4 cfs

System 3
0 Acres
0.1 cfs

System 4
0.1 Acres
0.5 cfs

System 4
0.6 Acres
1.6 cfs

System 3
10.4 Acres
23.3 cfs

Typical Turbine Pad

Typical Turbine Pad

Typical Access Road

N W E S

40 0 80 160 Feet

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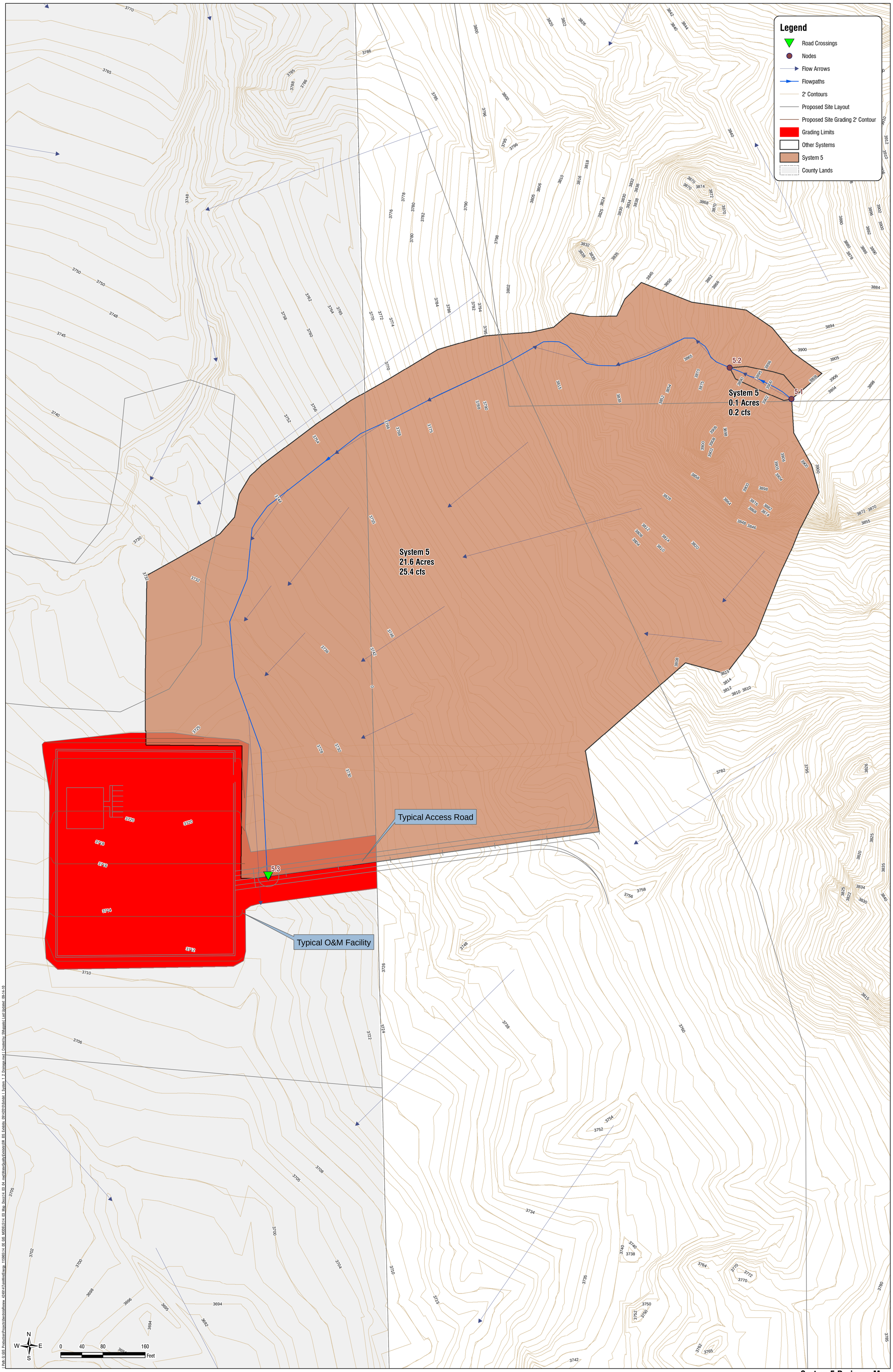
System 3-4 Drainage Map

EXHIBIT G

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study



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System 5 Drainage Map

EXHIBIT H

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study

Legend

- Road Crossings
- Nodes
- Flow Arrows
- Flowpaths
- 2' Contour
- Proposed Site Layout
- Proposed Site Grading 2' Contour
- Grading Limits
- County Lands

Basin

- Other Systems
- System 7

Typical Turbine Pad

Typical Access Ro

Typical Turbine Pad

6.1

6.2

6.3

13.1

13.2

System 6
0.6 Acres
1.2 cfs

System 14
264.5 Acres
373.5 cfs

System 6
56 Acres
77.4 cfs

System 13
0.2 Acres
0.7 cfs

System 13
57.6 Acres
84.7 cfs

System 14
432 cfs

N
W E
S

0 40 80 160 Feet

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System 6 Drainage Map

EXHIBIT I

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study

Legend

- Road Crossings
- Nodes
- Flow Arrows
- Flowpaths
- 2' Contour
- Proposed Site Layout
- Proposed Site Grading 2' Contour
- Grading Limits
- County Lands

Basin

- Other Systems
- System 7

Typical O&M Facility and Substation

Typical Access Road

Typical O&M Facility

8.2

7.1 System 7
0 Acres
0.1 cfs

7.2

System 10
20.8 Acres
31.5 cfs

System 8
20.3 Acres
29.8 cfs

System 7
21.9 Acres
30.3 cfs

9.1

System 9
0.1 Acres
0.2 cfs

9.2

System 9
2.5 Acres
4.3 cfs

8.3

7.3

N W E S

0 40 80 160 Feet

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System 7 Drainage Map

EXHIBIT J

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study

System 6
56 Acres
77.4 cfs

System 13
0.2 Acres
0.7 cfs

System 14
264.5 Acres
373.5 cfs

System 14
99.2 Acres
432 cfs

System 13
57.6 Acres
84.7 cfs

System 12
0.1 Acres
0.3 cfs

System 10
0.1 Acres
0.4 cfs

System 8
0.1 Acres
0.2 cfs

System 7
0 Acres
0.1 cfs

System 12
34.6 Acres
54.4 cfs

System 10
20.8 Acres
31.5 cfs

System 11
0.1 Acres
0.1 cfs

System 8
20.3 Acres
29.8 cfs

System 7
21.9 Acres
30.3 cfs

System 11
3.7 Acres
5.8 cfs

System 9
0.1 Acres
0.2 cfs

System 9
2.5 Acres
4.3 cfs

Typical O&M Facility and Substation

Typical Access Road

Typical Access Road

13.1
13.2
10.1
10.2
8.1
8.2
12.1
12.2
7.1
7.2
11.1
11.2
9.1
9.2
13.3
12.3
11.3
10.3
9.3
8.3

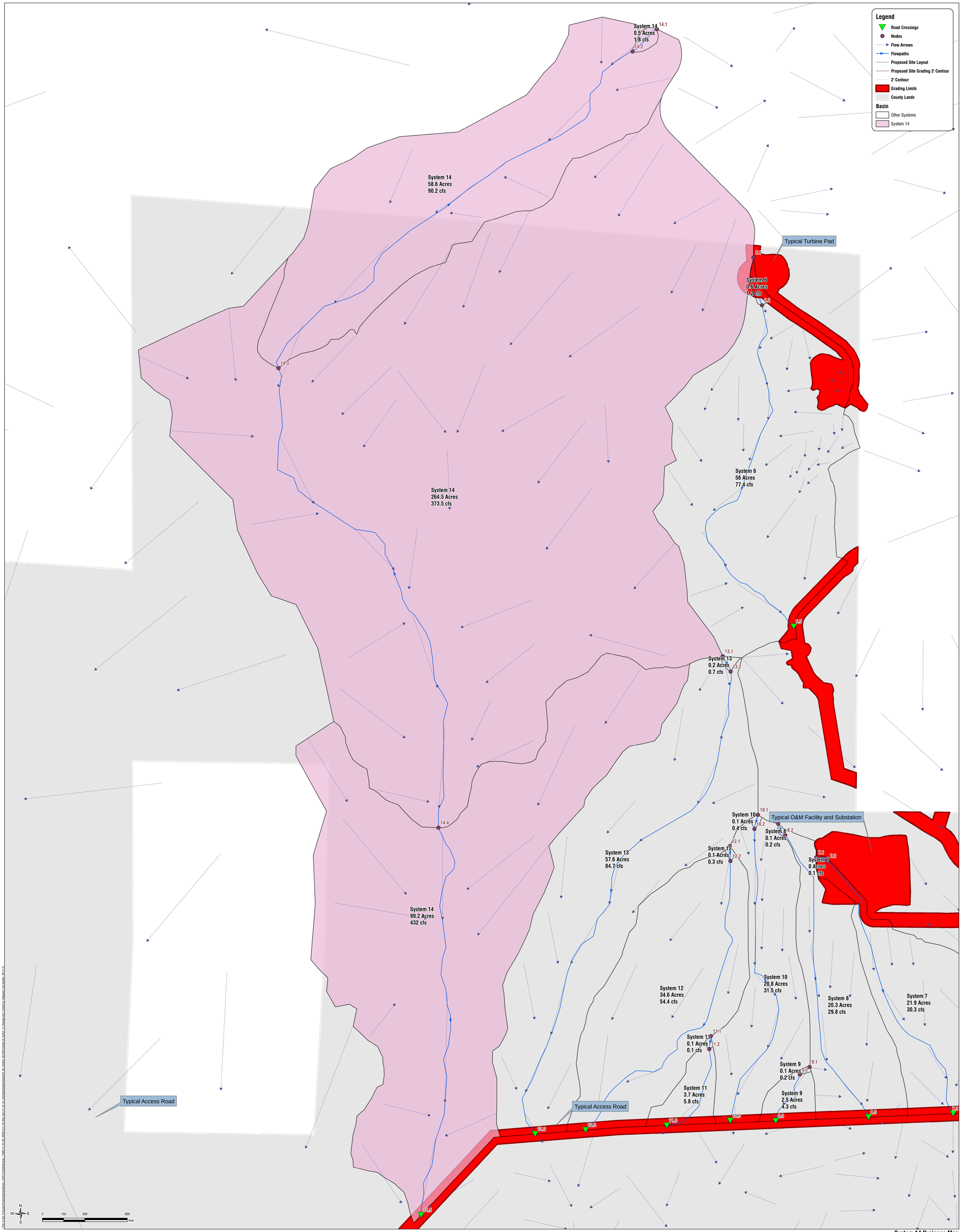
Legend

- Road Crossings
- Nodes
- Flow Arrows
- Proposed Site Layout
- Proposed Site Grading 2' Contour
- Flowpaths
- 2' Contour

Basin

- Other Systems
- System 10
- System 11
- System 12
- System 13
- System 8
- System 9
- Grading Limits
- County Lands

N W E S
0 60 120 240 Feet



System 14 Drainage Map

EXHIBIT L

Legend

- Road Crossings
- Nodes
- Flow Arrows
- Flowpaths
- 2' Contour
- Proposed Site Layout
- Proposed Site Grading 2' Contour
- Grading Limits
- County Lands

Basin

- Other Systems
- System 15

15.2

15.1

System 15
0.1 Acres
0.1 cfs

System 15
5.9 Acres
10.9 cfs

Typical Access Road

15.3

N
W E
S

0 40 80 160
Feet

Path: G:\GIS Production\Projects\IberdrolaRenew 424914\TuleWindEnergy_115965\14 00 GIS MODELS\14 03 Map Docs\14 03 04 mxd\WaterQuality\Exhibits\EIR EIS Exhibits 09142010\Exhibit I System 1 2 Drainage.mxd | Created by: SMiappala | Last Updated: 09-14-10

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System 15 Drainage Map

EXHIBIT M

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study

Legend

- Road Crossings
- Nodes
- Flow Arrows
- Flowpaths
- 2' Contour
- Proposed Site Layout
- Proposed Site Grading 2' Contour
- Grading Limits
- County Lands

Basin

- Other Systems
- System 15

15.2
15.1
System 15
0.1 Acres
0.1 cfs

System 15
5.9 Acres
10.9 cfs

15.3

Typical Access Road

N
W E
S

0 40 80 160
Feet

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System 15 Drainage Map

EXHIBIT N

424914 - Iberdrola Renewables | 115965 - Tule Wind Energy | Drainage Study