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## **HYDROLOGY STUDY**

In the County of Riverside, City of San Jacinto
Parcels 1, 2. 8 and 9
Parcel Map 20795

JOB NUMBER: 17-08

March 6, 2018

WARREN D. TUTTLE R.C.E. 30171

#### INTRODUCTION

This project is located in the City of San Jacinto. It involves the development of the four Northerly parcels, Parcels 1, 2, 8 and 9 of Parcel Map 20795, County of Riverside. The location of the project is shown in Attachment 1. The four parcels will be altered slightly by lot line adjustment so that the predominate activity of each parcel will be confined within the boundaries of that parcel as indicated in Attachment 2. The Northwest parcel will be improved as a retail center, the Southwest parcel will contain a retail center along with a fast food restaurant, the Northeast parcel will consist of a service station along with a car wash and the Southeast parcel will be the location of another fast food restaurant. The overall site is bounded on the North by East Main Street, on the East by Ramona Expressway and on the South by Donna Way. To the West is a housing development, Tract 31036, which is separated from the proposed development by a masonry wall.

Currently, all four parcels are unimproved and virtually flat, sloping only slightly downward to the West. The size of the development is 9.46 acres. All storm runoff sheet flows Westerly to a concrete drainage channel which lies just East of the West masonry wall. This drainage swale is the only improvement on the property and flows North to Main Street at a very shallow grade of 0.3%. This concrete channel is the only exit for storm runoff to leave the site following development; therefore, it is essential to reduce the ultimate runoff of the developed reaching this channel to below that of the existing discharge.

The type of soil on the entire site is identified as Type "A". This type of soil is very pervious resulting in very little discharge reaching the outlet channel. Following development, most of the site will be converted to commercial type activity which is far more impervious resulting in much greater storm runoff. In order to comply with historical runoff standards, this post development runoff must be reduced to that of predevelopment. Because of the nature of the anticipated development, there will be little opportunity to dissipate the storm discharge by surface methods. Instead, the proposed storm runoff control method used in this project will direct all discharge to underground collection chambers until a combination of storm dissipation and soil infiltration reduces the site discharge below historical values.

## LIMITATIONS

The purpose of this effort is limited to defining the configuration of the collection system on each Parcel and the size of the underground detention system required to achieve discharge reduction equal to or less than those shown above. The size of the conveyance devices required to maintain a hydraulic gradient below the rim elevation of any catch basin within the system will be addressed in the Hydraulic Study prepared for this project.

## SITE SPECIFIC HYDROLOGY DATA

The primary document used to provide the input parameters in this analysis is the Riverside County Hydrology Manual. These parameters include the 100year, 1-hour storm/dissipation rate shown in Plate D-4.1(5 of 6) and the soil group shown in the, Plate C-1.32. These values depict a point precipitation of 1.20 inches and a soil group A to be used in this analysis. Also, to calculate the volume capture requirement of the 85<sup>th</sup> percentile, the isohyetal Map prepared by the Riverside County Flood Control and Water Conservation District in July 2011, identifies that 85<sup>th</sup> percentile for San Jacinto to be 0.70 inches. All volume and discharge quantities from these site-specific parameters were determined using Santa Ana Watershed, VBMP and QBMP Worksheets. Of specific concern is the 85<sup>th</sup> percentile volume of runoff that must be retained as shown in Table 1, below. Because this value is roughly half that necessary to dissipate the storm to historic levels, this requirement is essentially mute.

#### TABLE 1 85<sup>th</sup> PERCENTILE CAPTUE

Parcel 1 - 5663 cf

Parcel 2 - 5200 cf

Parcel 8 - 4221 cf

Parcel 9 - 2557 cf

#### RUNOFF MANAGEMENT OBJECTIVE

The overriding goal of this construction effort is to insure all storm runoff leaving the site is free of any contaminates created by the proposed activity and is reduced in discharge quantity to a level equal to or below that experienced prior to that of the improvement. Currently, the overall project, Parcels 1, 2, 8 and 9 of PM 2075, is relatively flat with only the most Northeasterly corner rising abruptly to meet the intersection of East Main Street and Ramona Expressway. This small departure from the general terrain topography will not be considered in determining the storm runoff characteristics of the existing site. The predominate characteristics reflect a generally flat terrain, sloping gently to the West at a grade of less than 1%. All runoff within the project area flows to the concrete channel, identified above, and thence to an under sidewalk drain at East Main Street. Although this project defines each Parcel as an individual drainage area, the aggregate discharge of these improved drainage areas must not exceed the existing discharge into this concrete swale.

Each parcel will direct its storm discharge to underground chambers located on the specific parcel generating the runoff. There it will be treated by filtration and reduced in discharge volume to that currently attributed to that parcel. The amount of runoff originating on each parcel in its current configuration is considered the historical runoff produced by each parcel and is summarized in the following Table 2, below.

#### **TABLE 2 HISTORICAL RUNOFF**

Parcel 1 - 0.23 cfs

Parcel 2 - 0.23 cfs

Parcel 8 – 0.15 cfs

Parcel 9 – 0.10 cfs

## PROCDURAL APPROACH

The site will be designed so that the predominate storm runoff falling on each parcel will captured by catch basins and directed to an underground collection system located on that parcel. This underground system will be comprised of a series of chambers; the first, the isolator chamber, will receive all site runoff. The isolator chamber will rest on nine inches of crushed rock having 40% voids and overlain by a commercial filter fabric. Storm discharge entering this isolator chamber will be completely filtered before it is transferred to adjacent chambers through this crushed rock conduit. The inlet structure to the isolation chamber will be will be constructed to allow periodic maintenance including removal of the floatables and non-floatables retained on the floor of the chamber. Consequently, the chamber will function as large filtration device which will provide all water quality management requirements for that particular parcel, i.e. drainage area (DA). To assist in defining the performance of this underground collection system, a Schematic Diagram that is applicable to all four parcels in shown in Attachment 3. In this diagram, the travel of storm runoff falling on the site is traced from the time it enters a catch basin on the site, through its discharge into the underground chamber where it is treated and reduced in volume, to its eventual discharge into the perimeter concrete channel.

The first diagram in Attachment 3 shows the overall drainage layout typical of any of the four parcels. It shows the initial onsite surface flow collecting at the upstream catch basin, point A, then being transferred though an underground pipe conduit to the catch basin for another collection area in the system, point B, and then to the clean out structure for the isolation chamber of the system, point C. The isolation chamber collects all the untreated raw storm runoff from the site and is equipped with a filter on the floor of the chamber. This filter removes undesirable elements from the discharge before passing through the crush rock pads underlying the isolation chamber and into the downstream collection chambers at point D. These collection chambers are also underlain by this pad of crushed rock and are connected by 12" diameter HDPE manifold which allows them to fill at near the same rate as the isolator chamber. This filling process of the isolation chamber and the connected collection chambers is the primary method of reducing the discharge rate to historical values through normal, defined storm dissipation.

When all the chambers are full, the treated discharge will have been reduced to a historical discharge rates for that particular parcel, as shown in Table 2, and will enter the discharge conduit. It will be transported to a manhole in the common outlet system for all four parcels, point E. At that point it will join the discharge from the other three parcels which has also been treated and reduced to historical discharge rates. From there, the combined runoff from all four parcels will flow to a discharge structure adjacent to the outflow channel on the West boundary of the site, point F, and eventually into this perimeter channel. The second diagram of Attachment 3 is a profile view of this schematic which further illustrates the collection process.

Storm runoff from all four parcels will be managed in the same manner. The only difference will be the size of the individual systems located on each parcel. The third diagram of Attachment 3 is a schematic of the proposed method of handling the runoff from all the parcels. It details a common outlet pipe whose total discharge quantity is the aggregate of the discharge from the individual parcels. The outlet discharge value of 0.71 cfs is equal to that experience during rain events at predeveloped site.

#### SURFACE COLLECTION SYSTEM

Attachment 4 shows the overall site, all four parcels, broken down in to proposed tributary area comprised of hardscape and landscape elements, all draining to defined catch basins. The hardscape area is identified by the same nomenclature as the associated catch basin and the contributing landscape areas are identified by the receiving catch basin number followed by L1, L2, etc. The total hardscape and landscape tributary area for each catch basin, along with the anticipated discharge directed to the receiving catch basin, using the VBMP and QBMP Worksheet, is shown in Attachment 5. The defined discharge value may be reduced somewhat by BMP's employed in the landscape areas; however, it is assumed that these reduction values will be minimal when compared to the overall tributary area discharge. Therefore, any reduction attributed to these actions will be disregarded in determining the volume of the retention chambers needed to reduce the discharge to historical values.

### UNDERGROUND SYSTEM DESIGN

All runoff on each of the four parcels will be directed to an underground chamber system which will be designed to reduce the ultimate discharge of the contributing parcel to levels at or below those experienced by the undeveloped site. The discharge quantity entering each chamber system is the aggregate of quantities originating on the associated parcel as summarized in Table 3, below.

#### **TABLE 3 PROPOSED RUNOFF**

Parcel 1 – 2.67 cfs

Parcel 2 – 2.46 cfs

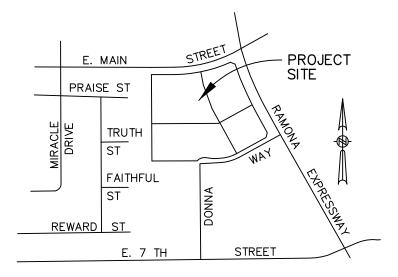
Parcel 8 - 1.99 cfs

Parcel 9 – 1.21 cfs

It is quite evident that there is a substantial increase in runoff when the site is developed. The actual discharge rate leaving the chamber is greatly impacted by the length of time required to completely fill it to capacity. Storm runoff dissipation occurs at an anticipated rate. Therefore, the discharge entering the chamber, as identified above, are maximum values which will decrease as the chamber fills to capacity. Once the chamber is full, the actual discharge amount will be decreased considerably. Attachment 6 is a worksheet developed to calculate the expected maximum discharge leaving the chamber when the system is full. It determines the volume of runoff entering the chamber at the storm onset and, depending on the storm duration intensity slope for that particular location, at particular segments of time after the onset of the storm. This worksheet then integrates these periodic fill volumes until the system volume is reached. The storm discharge rate at the time the underground chamber is full, less the constant infiltration rate created through the underlying crushed rock pad, must be equal or less that the historical discharge rate for that Parcel.

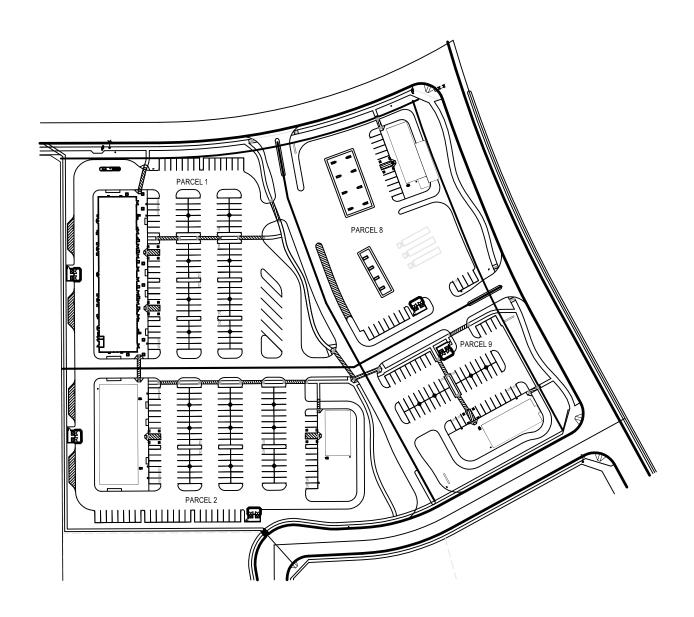
Also included in Attachment 6 is the design of the chamber system itself. It shows the number of chambers in each row, the number of rows (including the isolation row) and the separation between the collector rows. This design arrangement the amount leaving is determined through manual iteration until historical discharge values are not exceeded.

- 1. Vicinity Map
- 2 Developed Parcels
- 3. Schematic Diagram of Subsurface Collection Process
- 4. Site Runoff Tributary Areas
- 5. Calculator Flow Rate and Volume Output Data
- 6. Chamber System Volume Determination Work Sheet

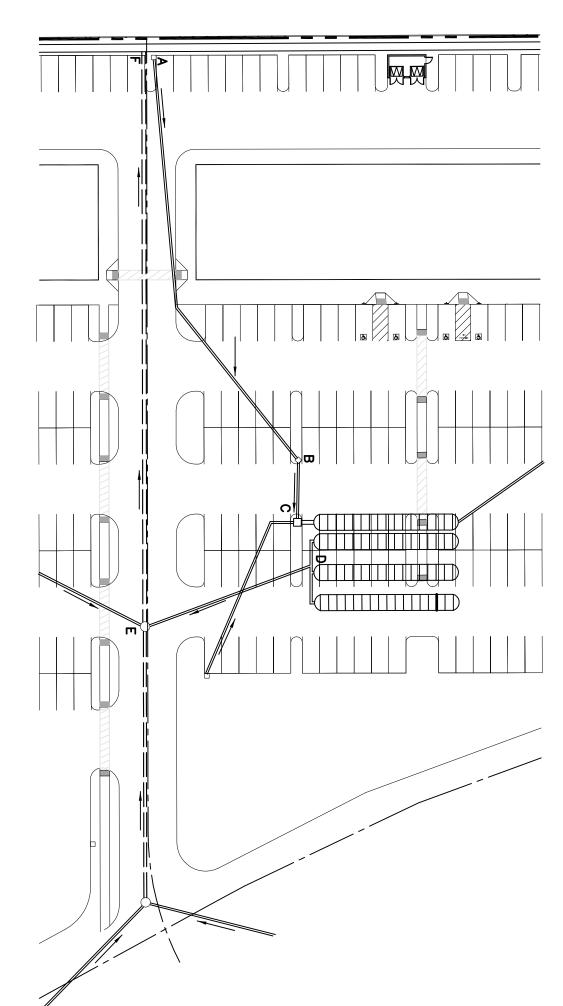


VICINITY MAP NO SCALE

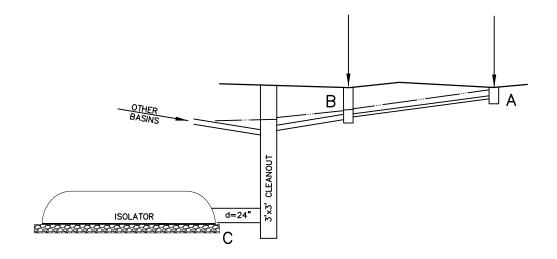
ATTACHMENT 1

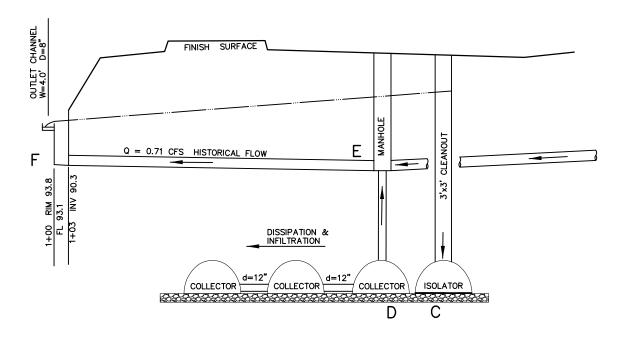


ATTACHMENT 2



TYPICAL SITE RUNOFF COLLECTION SYSTEM





SCHEMATIC PROFILE OF SITE RUNOFF COLLECTION SYSTEM

OUTLET CHANNEL W=4.0' D=8" RIM 93.8 FL 93.1 FL 93.1 INV 90.3 COMMON SITE OUTLET SYSTEM MANHOLE MANHOLE Q= 0.15cfs Q= 0.10cfs

SITE RUNOFF TRIBUTARY AREAS

ATTACHMENT 4
SHEET 1

LU	JISENO VILL	AGE DRAII	NAGE ARE	AS					
		Parcel 1							
CATCH BASIN	HARDSCAPE sf			LANDSCAPE sf					
1A									
1B	39294	1BL1 1BL2	2257 1813	6103					
		1BL3 1BL4							
1C	11917			0					
1D	34513	1DL1 1DL2 1DL3	847 1076 784	2707					
1E	5932	1EL1		5251					
TOTAL	107084			14061					

LL	JISENO VILI	LAGE DRAI	nage are	AS
		Parcel 2		
CATCH BASIN	HARDSCAPE sf			LANDSCAPE sf
2A	9142			0
2B	33652	2BL1 2BL2	1076 424	1500
2C	23127	2CL1 2CL2	538 212	750
2D	20727	2DL2		1076
		2EL1	538	
2E	8402	2EL2	3311	11277
		2EL3	1106	
2F	2738	2FL1		2739
TOTAL	97789			17341

LL	JISENO VILL	AGE DRAII	NAGE ARE	AS
		Parcel 8		
CATCH BASIN	HARDSCAPE sf			LANDSCAPE sf
8A	26752	8AL1		2820
8B	45202	8BL1 8BL2	6527 2088	8615
8C	2753	8CL1		3511
8D	4997			
TOTAL	79703			14946

LU	JISENO VILL	AGE DRAII	NAGE ARE	AS							
		Parcel 9									
CATCH BASIN	HARDSCAPE sf			LANDSCAPE sf							
9A	9A 2633 9AL1 2820										
9B	27248	9BL1 9BL2	1213 4918	8615							
		9BL3 9BL4	2477 359	3511							
9C	11207	9CL1		1927							
9D	5529	9DL1		7409							
TOTAL	46617			20350							

ATTACHMENT 4 SHEET 2

CALCULATOR FLOW RATE AND VOLUME OUTPUT DATA

SHEET SET 1

**EXISTING FLOW RATE** 

5	Santa A	na Water	shed - BMP I	Design Flo	w Rate.	Onym	т 1		Required En	tries
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				tion						
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Design 1	Rainfall In	tensity					I =	1.20	in/hr	
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	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I <sub>f</sub>	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)	
	1	132337	Natural (A Soil)	0.03	0.06	8276.5				

Type/ID (square feet) (use pull-down men Type/ID) (use pull-down men Typ

Proposed Volume must be greater than the Design Capture Volume

Notes:

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				ВМР	Identificat	ion				
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	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I <sub>f</sub>	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)	
	2	131742	Natural (A Soil)	0.03	0.06	8239.3				

DMAs

Proposed Volume must be greater than the Design Capture Volume

Total

8239.3

1.20

0.23

Notes:

131742

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	8	87370	Natural (A Soil)	0.03	0.06	5464.2			
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Proposed Volume must be greater than the Design Capture Volume

Total

5464.2

1.20

0.15

Notes:

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	9	60605	Natural (A Soil)	0.03	0.06	3790.3			
DMAs									
		60605		Total		3790.3	1.20	0.1	

SHEET SET 2

POST DEVELOPMENT VOLUME

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	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I <sub>f</sub>	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture Volume, <b>V</b> <sub>BMP</sub> (cubic feet)	Proposed Volume on Plans (cubic feet)	
	1L	14061	Ornamental	0.1	0.11	1553.1	-7 ( )	(1111)	3	
	1H	107084	Landscaping Concrete or Asphalt	1	0.89	95518.9				
					0.00	000000				
		121145	7	otal		97072	0.70	5662.5		
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	2L	17341	Ornamental Landscaping	0.1	0.11	1915.5			
l	2H	97789	Concrete or Asphalt	1	0.89	87227.8			
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	8L	14946	Ornamental Landscaping	0.1	0.11	1650.9	poi: (m)	(11.0.0) 300)	,000
	8H	79703	Concrete or Asphalt	1	0.89	71095.1			
		94649	7	otal		72746	0.70	4243.5	
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	Santa	Ana Wat	ershed - BMP	Design Vo	olume, <b>V</b>	ВМР	Legend:		Required Entrie
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		Number/Nam	e		Luiseno V	illage '			
	11 E / E	D 10 D		BMP I	dentificati	on			
BMP N	AME / ID	Parcel 9 - Po	st Development  Musi	t match Nam	ne/ID used o	on BMP Design	Calculation	Sheet	
				Design l	Rainfall D	epth			
		4-hour Rainfa Map in Hand	ll Depth, lbook Appendix E				D <sub>85</sub> =	0.70	inches
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		In	sert additional rows i	f needed to d	accommodo	ate all DMAs dr	aining to th	е ВМР	
	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I <sub>f</sub>	DMA Runoff Factor	DMA Areas x Runoff Factor	Design Storm Depth (in)	Design Capture  Volume, V <sub>BMP</sub> (cubic feet)	Proposed Volume on Plans (cubic feet)
	9L	20350	Ornamental Landscaping	0.1	0.11	2247.8		(11111)	3-19
	9H	46617	Concrete or Asphalt	1	0.89	41582.4			
			·						
		66967	7	otal		43830.2	0.70	2556.8	
ſ			Proposed Volume	must be ar	oator than	the Design Ca	enturo Volu	ımo	
<u>.</u>			1 Toposed Volume	must be gr	cater triail	the pesign of	prure voiu	iiiie	
Notes:									

SHEET SET 2

POST DEVELOPMENT FLOW RATE

<u>S</u>	Santa A	na Water	rshed - BMP I (Rev. 10-2011)	Design Flo	w Rate,	$Q_{BMP}$	Legend:		Required Entri Calculated Cel		
			eet shall <u>only</u> be used	l in conjunctio	on with BMI	P designs from th	e <u>LID BMP</u>	-	<u>ok</u> )		
ompan esigne	y Name	Tuttle Engin	eering				Date Case No				
		Number/Nam	e		Luiseno V	Village					
				BMP	Identifica	tion					
MP NA	AME / ID	Parcel 1 - Po	st Development								
				t match Nan	ne/ID used	on BMP Design	Calculatio	n Sheet			
				Design	Rainfall I	Depth					
sign F	Rainfall In	ntensity					I =	1.20	in/hr		
			Drai	nage Manag	gement Ar	ea Tabulation					
		Inse	ert additional rows	if needed to	ассоттос	date all DMAs a	raining to t	the BMP			
	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I <sub>f</sub>	DMA Runoff Factor	DMA Areas x Runoff Factor	Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)		
Ī	1L	14061	Ornamental Landscaping	0.1	0.11	1553.1					
ľ	1H	107084	Concrete or Asphalt	1	0.892	95518.9					
			Aspirart								
ŀ											
ŀ											
.											
DMAs											
_											
ŀ											
ŀ											
-											
-											
		121145		Total		97072	1.20	2.67			
_											
			Proposed Volume	e must be g	reater thar	the Design C	apture Volu	ume			
tes:											
Notes:											

5	Santa A	na Water	shed - BMP I	Design Flo	w Rate,	$Q_{BMP}$	Legend:		Required Entri
			(Rev. 10-2011)						Calculated Cel
esigne	ny Name d by	Tuttle Engin			Luiseno V		<u>LID BMP</u>	<u>Design Handboo</u> Date Case No	
				BMP	Identificat	ion			
IP N.	AME / ID	Parcel 2 - Po	st Development						
				t match Nan	ne/ID used	on BMP Desigr	Calculatio	n Sheet	
				Design	Rainfall [	Depth			
sign l	Rainfall In	itensity					I =	1.20	in/hr
			Drai	nage Manag	gement Ar	ea Tabulation			
		Inse	ert additional rows	if needed to	ассоттос	late all DMAs d	raining to t	he BMP	
	DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type (use pull-down menu)	Effective Imperivous Fraction, I <sub>f</sub>	DMA Runoff Factor	DMA Areas x Runoff Factor	Rainfall Intensity (in/hr)	Design Flow Rate (cfs)	Proposed Flow Rate (cfs)
	2L	17341	Ornamental Landscaping	0.1	0.11	1915.5			
	2Н	97789	Concrete or Asphalt	1	0.892	87227.8			
As									
DMAs									
		115130		Total		89143.3	1.20	2.456	
			Proposed Volume	e must be gi	reater than	the Design C	apture Volu	ıme	
tes:									

5	Santa A	na Water	rshed - BMP I	Design Flo	w Rate,	$\mathbf{Q}_{\mathrm{BMP}}$	Legend:		Required Entr
			(Rev. 10-2011)						Calculated Ce
omnor	(Nay Name	<i>lote this workshe</i> Tuttle Engin	eet shall <u>only</u> be used	d in conjunctio	on with BMF	P designs from th	e <u>LID BMP</u>	Design Handboo Date	
ompar esigne	•	Tuttle Eligili	eering					Case No	
		Number/Nam	e		Luiseno V	/illage			
				D) (D)	T1 .'C'				
				ВМР	Identificat	ion			
MP N.	AME / ID	Parcel 8 - Po	st Development		//5	01400 :	0 1 1		
			Mus	st match Nan	ne/ID used	on BMP Design	n Calculatio	n Sheet	
				Design	Rainfall I	Depth			
esign l	Rainfall In	itensity					I =	1.20	in/hr
			Droi	nogo Mono	romant Ar	ea Tabulation			
		Insc	ert additional rows				Irainina to 1	ho DMD	
ĺ		11156				iate all DiviAs a	Design	THE DIVIP	
	DMA	DMA Area	Post-Project Surface Type	Effective Imperivous	DMA Runoff	DMA Areas x	Rainfall Intensity	Design Flow	Proposed Flow Rate
	Type/ID	(square feet)	(use pull-down menu)	Fraction, I <sub>f</sub>	Factor	Runoff Factor	(in/hr)	Rate (cfs)	(cfs)
	8L	14946	Ornamental Landscaping	0.1	0.11	1650.9			
	8H	79703	Concrete or	1	0.892	71095.1			1
	011	75705	Asphalt	-	0.032	71033.1			1
									1
									1
									1
									1
									1
									1
DMAs									1
									1
									1
									1
									1
									1
									1
									1
				T					
		94649		Total		72746	1.20	2	
ı			Drawage d Valor	a manat ha	ve eten th	the Design O	amtuus Mat		
			Proposed Volume	e must be g	reater than	i the Design C	apture voll	ume	
otes:									

(Note this worksheet shall only be used in conjunction with BMP designs from the Design Handbook)  Company Name Tuttle Engineering Date Case No  Company Project Number/Name Luiseno Village  BMP Identification  BMP NAME / ID Parcel 9 - Post Development  Must match Name/ID used on BMP Design Calculation Sheet  Design Rainfall Depth  Design Rainfall Intensity I = 1.20 in/hr  Drainage Management Area Tabulation  Insert additional rows if needed to accommodate all DMAs draining to the BMP  DMA DMA Area Type   DMA Area Type   DMA Factor   DMA Runoff Factor	
Design Rainfall Intensity    Drainage Management Area Tabulation	
BMP Identification  MP NAME / ID Parcel 9 - Post Development  Must match Name/ID used on BMP Design Calculation Sheet  Design Rainfall Depth  Design Rainfall Intensity  I = 1.20 in/hr  Drainage Management Area Tabulation  Insert additional rows if needed to accommodate all DMAs draining to the BMP  DMA DMA Area Surface Type Imperivous Runoff Fraction, Ir Factor Runoff Factor (in/hr)  Proposed Flow Rate (cfs)  JMA Area Concrete or 1 0.892 41582.4	
MP NAME / ID  Parcel 9 - Post Development  Must match Name/ID used on BMP Design Calculation Sheet  Design Rainfall Depth  esign Rainfall Intensity  I = 1.20 in/hr  Drainage Management Area Tabulation  Insert additional rows if needed to accommodate all DMAs draining to the BMP  DMA DMA Area Surface Type Imperivous Runoff Type/ID (square feet) (use pull-down menu) Fraction, I <sub>f</sub> Factor Runoff Factor (in/hr) Rate (cfs)  9L 20350 Ornamental Landscaping 0.1 0.11 2247.8  9H 46617 Concrete or 1 0.892 41582.4	
MP NAME / ID  Parcel 9 - Post Development  Must match Name/ID used on BMP Design Calculation Sheet  Design Rainfall Depth  esign Rainfall Intensity  I = 1.20 in/hr  Drainage Management Area Tabulation  Insert additional rows if needed to accommodate all DMAs draining to the BMP  DMA DMA Area Surface Type Imperivous Runoff Type/ID (square feet) (use pull-down menu) Fraction, I <sub>f</sub> Factor Runoff Factor (in/hr) Rate (cfs) (cfs)  9L 20350 Ornamental Landscaping 0.1 0.11 2247.8  9H 46617 Concrete or 1 0.892 41582.4	
Design Rainfall Depth  Pesign Rainfall Intensity  Drainage Management Area Tabulation  Insert additional rows if needed to accommodate all DMAs draining to the BMP  DMA DMA Area Surface Type Type/ID (square feet) (use pull-down menu) Fraction, I <sub>f</sub> Factor Runoff Factor (in/hr) Rate (cfs) (cfs)  PH 46617 Concrete or 1 0.892 41582.4	
Drainage Management Area Tabulation  Insert additional rows if needed to accommodate all DMAs draining to the BMP    DMA	
Drainage Management Area Tabulation  Insert additional rows if needed to accommodate all DMAs draining to the BMP  DMA DMA Area Surface Type Imperivous Runoff Square feet) (use pull-down menu) Fraction, I <sub>f</sub> Factor Runoff Factor (in/hr) Rate (cfs) (cfs)  9L 20350 Ornamental Landscaping 0.1 0.11 2247.8  9H 46617 Concrete or 1 0.892 41582.4	
Insert additional rows if needed to accommodate all DMAs draining to the BMP    DMA	
DMA DMA Area Surface Type Imperivous Fraction, If Factor Runoff Factor (in/hr) Rate (cfs)  9L 20350 Ornamental Landscaping Concrete or 1 0.892 41582.4	
DMA DMA Area Surface Type Imperivous Fraction, If Factor Surface Type (use pull-down menu)  9L 20350  Ornamental Landscaping  Occurrete or Concrete or	
9L 20350 Ornamental 0.1 0.11 2247.8  9H 46617 Concrete or 1 0.892 41582.4	
9H 46617 Concrete or 1 0.892 41582.4	
Fighton 1	
g	
66967 Total 43830.2 1.20 1.21	.0000000
66967 Total 43830.2 1.20 1.21	

								ATTACH	MENT 7			
				Ca	Ca		CIS	CIS	π.		1113	
				8 ea	7 ea	4.50 ft	0.23 cfs	-0.02 cfs	85 ft	65 ft	9.69 hrs	
						•	Ŭ					
				Number of Units in Row	Number of Rows	Row Separation	Historical Discharge	Req Addn Reduction	Pad Width	Pad Length	Hours to Drain	
				N		HAMBER S			ND RESULT	S		
		,										
ctual Basin Vo		су	451	(Vary Row 24	until D32= D3	5)	I					-
ischarge at De		cfs	0.56	IIIS	3.41							
lasin Volume a lapsed Time to	at Design Target Discharge	cy min	451 208.00	(Determined the	nrough iteratio 3.47	n by combining	ıncremental v	olumes up to t	arget discharge	e)		
i V-I	A Danima Tananah Diankanan		454	(Datamain add				-1		- )		
ncremental Bas	sin Runoff Volume	су	9.89	14.69	18.53	68.92	75.97	57.16	47.94	65.69	56.62	35.85
ntensity at Elap	asin Catch Point	in per hr cfs	4.16 3.58	3.51 3.03	2.94 2.53	1.86 1.60	1.31 1.13	1.07 0.92	0.93 0.80	0.79 0.68	0.69 0.60	0.64 0.56
lapsed Time	1.7	min	5.00	7.00	10.00	25.00	50.00	75.00	100.00	140.00	180.00	208.0
	<b>y</b> -					, , , , , , , , , , , , , , , , , , ,						-
	Discharge	cfs	0.56	(Product of Are								
	Intensity	in per hr	0.64	(Calculated fro		me)						-
	nent by Iteration Elapsed Time	min	208.00	(Determine by	Iteration)							
ea Hulloll Col	demolent Constant (k)		0.00	(Hallo of Fear	Discharge at	basiii check po	Jili Willi Fak i	Discriarge inter	risity)			
eak Discharge	e Intensity pefficient Constant (k)	in per hr	3.10 0.86			determined from						
	1				. 5: 1		<u> </u>					
eak Discharge	e Time	min	9.00	(Time of Conc	entration; L =	250, H = 1.0, c	of longest entry	run)				
	e at Basin Check Point	cfs	2.67	(Post-develop	ment from Site	e, no basin, per	WQMP Work	sheet)				
Tiour too real	ir interiorty	iii pei iii	1.20	(Tilverside Ool	unity rhydrology	/ Wandan Talu	D-4.1 (3 01 0))					
Duration Intensi Hour 100 Year		in per hr	0.50 1.20	(Riverside Col	unty Hydrology	Manual Platd Manual Platd	D-4.1 (5 of 6))					
	: 0		0.50	(D) 11 0			D 4 4 (5 (0))					

WORKSHEET	TO DETERMINE STORM	DISSIPATION IN B	ASIN DESIG	N 100 YEAR S	TORM							
	Parcel	2										
lischarge quan arying the time	porates the formula Q=CIA tities of "Q" is a direct funct of concentration at the bacapacities of individual time	ion of the intensity sin exit point until th	"I" and their va	alues can be det harge value of t	ermined at any he site bounda	, point and time try is reached.	e during storm The capacity o	dissipation. T	his worksheet	evaluates the q	uantity leaving	the site by
S	. Ol		0.50	(Discountiel - O -		. Managed Distri	D 44 (F -( 0))					
Duration Intens 1 Hour 100 Yea	Ity Slope	in nor hr	0.50 1.20	(Riverside Co	unty Hydrology	/ Manual Plata	D-4.1 (5 of 6)) D-4.1 (5 of 6))					
Hour 100 Yea	ar intensity	in per hr	1.20	(Riverside Co	unity Hydrology	/ Manual Plato	D-4.1 (5 01 6))					
Poak Discharge	e at Basin Check Point	cfs	2.46	(Post-develor	ment from Site	no basin ne	r WQMP Work	shoot)				
Peak Discharge		min	9.00				of longest entry					
can Discharge	7 11110	111111	9.00	(Time or Conc	onitation, L=	200, 11 = 1.0,	or longest entry	, 1011)				
Peak Discharge	e Intensity	in per hr	3.10	(Intensity at P	eak Discharge	determined from	om the storm o	lissipation form	nula)			
	pefficient Constant (k)	po	0.79	(Ratio of Peak	Discharge at	basin check p	oint with Peak	Discharge Inte	nsitv)			
	(,			(**************************************	l - 10 cm an go an							
Basin Requiren	nent by Iteration											
	Elapsed Time	min	193.00	(Determine by	(Iteration)							
	Intensity	in per hr	0.67	(Calculated from	om Elapsed Ti	me)						
	Discharge	cfs	0.53	(Product of Ar	ea Constant a	nd Intensity)						
	<u> </u>			,								
Elapsed Time		min	5.00	7.00	10.00	25.00	50.00	75.00	100.00	140.00	160.00	193.00
Intensity at Elap		in per hr	4.16	3.51	2.94	1.86	1.31	1.07	0.93	0.79	0.73	0.67
Discharge at Ba	asin Catch Point	cfs	3.30	2.79	2.33	1.48	1.04	0.85	0.74	0.62	0.58	0.53
Incremental Ba	sin Runoff Volume	су	9.11	13.53	17.08	63.50	69.99	52.66	44.17	60.52	26.83	40.87
Basin Volume a	at Design Target Discharge	су	398	(Determined t	hrough iteratio	n by combining	g incremental v	olumes up to t	arget discharg	e)		
Elapsed Time to		min	193.00	hrs		,,			J	ĺ		
Discharge at De		cfs	0.53									
Actual Basin Vo		су	398	(Vary Row 24	until D32= D3	5)						
-					С	HAMBER S	YSTEM VA	RIABLES A	ND RESULT	S		
				Number of	Number of	Row	Historical	Reg Addn	D 1140' '''	B 11	Hours to	
				Units in Row	Rows	Separation	Discharge	Reduction	Pad Width	Pad Length	Drain	
							Ĭ				-	
				7	7	4.50	0.23	-0.01	85	58	9.59	
				ea	ea	ft	cfs	cfs	ft	ft	hrs	
								ATTACH	HMENT 7			
			1			1		DAD	CEL 2			· ·

				10	4	4.50	0.15	-0.01	52	80	9.94	
				Units in Row	Rows	Separation	Discharge	Reduction	Pad Width	Pad Length	Drain	
				Number of	Number of	HAMBER S	Historical	RIABLES A Reg Addn			Hours to	
						LIAMBER O	VOTERA VA	DIADLEC A	ND DEOL!!	-		
ctual Basin V	olume	су	348	(Vary Row 24	until D32= D3	5)						
Discharge at D	esign Volume	cfs	0.40									
	o Design Elev	min	220.00	hrs	3.67	2, 00			got aloonary			
Basin Volume	at Design Target Discharge	су	348	(Determined t	hrough iteratio	n by combining	g incremental v	volumes up to t	arget discharg	e)		
ioremental Be	Sirritanon volume	Oy .	7.07	10.00	10.01	01.00	00.02	42.00	00.70	71.20	20.00	07.07
_	sin Runoff Volume	су	7.37	10.95	13.81	51.36	56.62	42.60	35.73	71.26	20.38	37.67
	asin Catch Point	cfs	2.67	2.26	1.89	1.19	0.84	0.69	0.60	0.47	0.44	0.40
ntensity at Ela	nsed Time	min in per hr	4.16	3.51	2.94	1.86	1.31	1.07	0.93	0.73	0.69	0.63
Elapsed Time		min	5.00	7.00	10.00	25.00	50.00	75.00	100.00	160.00	180.00	220.0
	Discharge	cfs	0.40		ea Constant a							
	Intensity	in per hr	0.63		om Elapsed Ti	me)						
asııı i teyullel	Elapsed Time	min	220.00	(Determine by	Iteration)							
asin Requirer	nent by Iteration											
rea Runoff Co	pefficient Constant (k)		0.64	(Ratio of Peak	Discharge at	basin check po	oint with Peak	Discharge Inte	nsity)			
eak Discharg		in per hr	3.10				om the storm of					
J												
Peak Discharg		min	9.00	(Time of Cond								
eak Dischard	e at Basin Check Point	cfs	1,99	(Post-develop	ment from Site	e. no basin, per	r WQMP Work	sheet)				
Hour 100 Yea	ar intensity	in per hr	1.20	(Riverside Co	unty Hydrology	Manual Plata	D-4.1 (5 01 6))					
Duration Intens			0.50	(Riverside Co								

								ATTACH	HMENT 7			
					- Ou		0.0			.,	0	
				6 ea	4 ea	4.50 ft	0.10 cfs	-0.02 cfs	85 ft	65 ft	9.69 hrs	
						•	0.40			0.5		
				Number of Units in Row	Number of Rows	Row Separation	Historical Discharge	Req Addn Reduction	Pad Width	Pad Length	Hours to Drain	
				Nivershau - f			YSTEM VAI		ND RESULT	S	I levine te	
ctual Basin Vo		су	216	(Vary Row 24	until D32= D35	5)						
ischarge at De		cfs	0.24	1113	0.02							
lapsed Time to	at Design Target Discharge o Design Flev	cy min	229.00	(Determined to	nrough iteration	n by combining	incremental v	olumes up to t	arger discriargi	e)		
asia Valuma a	at Decign Target Discharge	OV.	216	(Dotormined th	brough iteration	n by combining	inoromontal v	olumos un to t	arget discharg	0)		
cremental Bas	sin Runoff Volume	су	4.48	6.66	8.40	21.77	44.17	25.90	21.73	36.63	30.73	16.00
	asin Catch Point	in per hr cfs	4.16 1.62	1.37	1.15	2.08 0.81	1.31 0.51	0.42	0.93 0.36	0.76 0.30	0.66 0.26	0.61 0.24
lapsed Time	and Time	min	5.00	7.00 3.51	10.00 2.94	20.00	50.00	75.00 1.07	100.00	150.00	200.00	229.0
	· <b>y</b> -					37						-
	Discharge	cfs	0.24		ea Constant ar							-
	Intensity	in per hr	0.61		om Elapsed Tir	me)						
	nent by Iteration Elapsed Time	min	229.00	(Determine by	(Iteration)							
Sa Harion Ook	Johnstoni Goriotani (it)		0.00	, auto or r ear	District go at	Daoin Griook pe	Jin Willin Can I	Siconarge inter	iony)			
	e intensity pefficient Constant (k)	in per hr	0.39				oint with Peak I					
eak Discharge	- laterality	in new bu	3.10	(Internality at D	aali Diaabanaa	datawasin ad fu	m the storm d	inniunation forms				
eak Discharge	e Time	min	9.00	(Time of Conc	entration; L =	250, H = 1.0, 0	of longest entry	run)				
	e at Basin Check Point	cfs	1.21	(Post-develop	ment from Site	, no basin, per	WQMP Work	sheet)				
11001 100 100	a menony	III per III	1.20	(Tilverside Col	unity mydrology	- Wandari Tata	D 4.1 (0 01 0))					
Ouration Intensi Hour 100 Year		in per hr	0.50 1.20	(Riverside Cou	unty Hydrology unty Hydrology	/ Manual Platd	D-4.1 (5 01 6))					
\	!+ . Ol		0.50	/Disconside Oss		Managed District	D 4.4 (F -f 0))					