

Appendix L

Preliminary Hydrology Study for
Escondido Church

Preliminary Hydrology Study

For
Escondido Church

Prepared for
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February 6, 2025

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R.C.E. 92310

2/6/2025

Date

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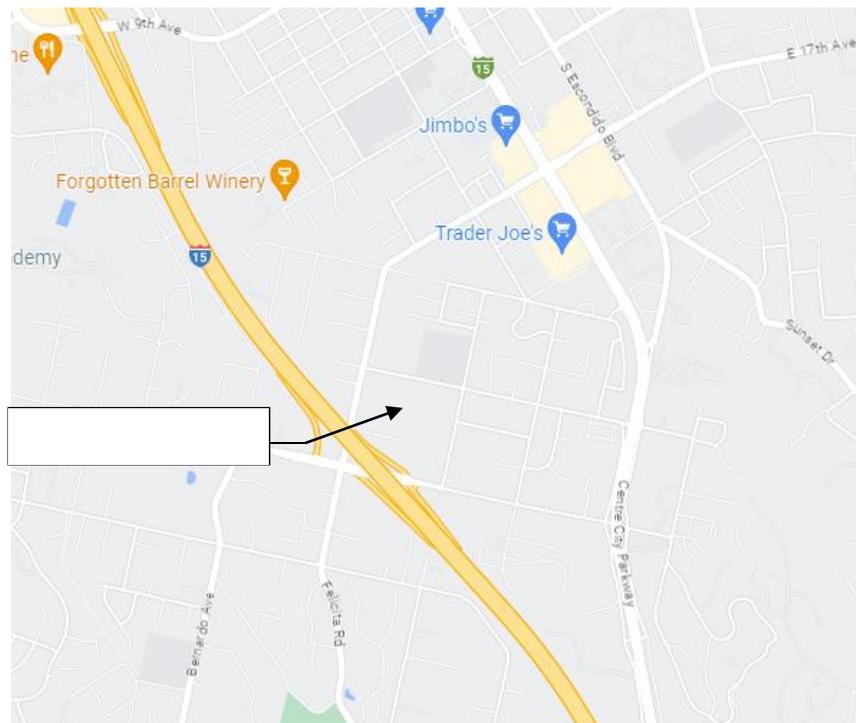
PURPOSE:

The purpose of this hydrology study is to show that the proposed Escondido Church project will not negatively impact existing hydrologic conditions. This report will calculate, analyze and compare storm water runoff for both the existing and proposed site conditions in order to ensure that the existing hydrologic regime is not negatively impacted by the project.

DESCRIPTION:

The Escondido Church project is located in the South east corner of Felicita Road and Brotherton Road, in the City of Escondido, California. This project proposes the construction of a new one-story church. The project will do a lot split on the existing property and be confined to an area encompassing approximately 6.7 acres. The general direction of the storm water flow for this site is shown on the attached hydrology exhibits (Existing Conditions and Proposed Conditions Exhibits).

VICINITY MAP



Source: Google Maps

EXISTING DRAINAGE:

The existing site encompasses approximately 6.73 acres and consists of 2 buildings, a surface parking lot, basketball court, and large open vegetated areas. The site is currently used as gathering spaces for the church.

The site is considered to be 3 basins. Basin 1 is approximately 0.99 acres and includes portion of a building, an asphalt parking lot, and natural vegetation. Basin 1 drains to the northeast, via surface flow, discharging onto Brotherton Road. Basin 2 is approximately 5.51 acres and includes 1 building, an asphalt parking lot, basketball court, and natural vegetation. Basin 2 drains towards the southern edge of the property, via surface flow, discharging onto the adjacent property to the south. Basin 3 is approximately 0.23 acres and includes an asphalt parking lot. Basin 3 drains to the west towards an existing drainage swale on the southwest corner of the asphalt parking lot and discharges to the adjacent property.

See **Appendix A – Existing Hydrologic Conditions Exhibit**, for further information.

PROPOSED DRAINAGE:

The proposed conditions on-site will split the site into 4 basins.

Basin 1A is the northwesterly corner of the property. This basin will include portion of the proposed building, an asphalt parking lot, concrete walkways, and landscaping. Basin 1A will drain, via surface flow, to the north into a Biofiltration Basin (BMP 1). BMP 1 will direct the storm water via a pipe to the north eastern corner of the property where the storm water will be discharged onto Brotherton Road via a curb outlet (POC 1).

Basin 1B is the northeasterly corner of the property. This basin will include portion of the proposed building, an asphalt parking lot, concrete walkways and landscaping. Basin 2 will drain, via surface flow, to the north into a Biofiltration Basin (BMP 2). BMP 2 will direct water into a catch basin that that will discharge the storm water onto Brotherton Road via a curb outlet (POC 2).

Basin 2 is the southern portion of the property. This basin will include portion of the proposed building, an asphalt parking lot, a gravel parking lot, concrete walkways, sport field, basketball court, and landscaping. Basin 3 will drain to the south via surface flow. 4 curb inlets are located on the south east corners of the asphalt parking lot that will direct water into a Biofiltration Basin (BMP 3). BMP 3 will direct water to a single outlet (POC 3) and discharge onto the southern adjacent property.

Basin 3 in the portion of the driveway in between BMP 1 and BMP 2. Basin 3 will drain directly into the curb and gutter on Brotherton Road. Basin 3 will not be treated directly. BMP 3 has been upsized to treat the amount of run off generate by Basin 3.

See **Appendix B – Proposed Hydrologic Conditions Exhibit**, for further information.

HYDROLOGY METHODOLOGY/DESIGN CRITERIA:

Storm water runoff for both the existing and proposed site conditions is calculated, analyzed and compared in order to ensure that the proposed conditions do not negatively affect the existing hydrologic regime. Runoff is calculated by utilizing methods outlined in the City of Escondido Design Standards and Standard Drawings. Topographical information has been obtained from Nasland. Hydrologic basin boundaries, landscape areas, and flow path characteristics such as change in elevation and length of flow are obtained from the Existing and Proposed Conditions Maps which are drafted in AutoCAD Civil 3D 2020 software. This information is utilized to determine the basin area, runoff coefficient and inlet time for each basin.

CALCULATIONS:

Calculations have been performed per Rational Method guidelines set forth in the City of Escondido Design Standards and Standard Drawings.

- Runoff Coefficients were determined per Figure 1 of the Design Standards.
 - For the existing conditions a Runoff Coefficient of 0.70 and 0.59 was used for Basins 1 and 2 respectively since the existing basins contained 2 different types of land uses, Rural – over ½ acre lots and Commercial. These coefficients were calculated as follows: $(\text{Rural Area} \times 0.45) + (\text{Commercial Area} \times 0.85) / \text{Total Basin Area}$
 - For the proposed conditions the land use was determined to be Multiple Units therefore a Runoff Coefficient of 0.70 was used for all 3 Basins.
- Time of concentration was calculated using Figure 2, Runoff Time Chart of the City's Design Standards.
 - Note that detention ponding was not accounted for in these calculations.
- The intensity values were calculated per Figure 1, Run-Off Intensity Duration Curve of the Design Standards.
- For hydrology calculations refer to the pages following. For attachments and references to the calculations see **Appendix C – Hydrology References**

Escondido Church - Existing & Proposed Time of Concentrations

Existing Site Conditions																	
Basin	¹ Urban Area Overland Flow T _i					² Gutter & Roadway Flow T _c					² Pipe Flow T _c					T _c	T _c
	High Point	Low Point	ΔE	Length	T _{overland}	High	Low	ΔE	Length	T _{gutter}	High	Low	ΔE	Length	T _{pipe}		
	(ft)	(ft)	(ft)	(mi)	(hrs)	(ft)	(ft)	(ft)	(mi)	(hrs)	(ft)	(ft)	(ft)	(mi)	(hrs)		
1	660.66	659.00	1.7	0.0189	0.022	659.00	652.60	6.4	0.05	0.040						0.062	5.0
2	660.82	659.60	1.2	0.0189	0.025	659.60	645.50	14.1	0.089	0.058						0.082	5.0
3	657.28	655.80	1.5	0.0246	0.031											0.031	5.0
Proposed Site Conditions																	
Basin	¹ Urban Area Overland Flow T _i					² Gutter & Roadway Flow T _c					² Pipe Flow T _c					T _c	T _c
	High Point	Low Point	ΔE	Length	T _{overland}	High	Low	ΔE	Length	T _{gutter}	High	Low	ΔE	Length	T _{pipe}		
	(ft)	(ft)	(ft)	(mi)	(hrs)	(ft)	(ft)	(ft)	(mi)	(hrs)	(ft)	(ft)	(ft)	(ft)	(min)		
1A	659.34	658.74	0.6	0.0178	0.030	658.74	655.87	2.9	0.056	0.062	652.87	649.10	3.8	0.0436	0.042	0.133	8.0
1B	658.80	657.81	1.0	0.0171	0.024						654.42	649.10	5.3	0.0313	0.025	0.049	5.0
2	659.34	658.74	0.6	0.0178	0.030	658.74	654.71	4.0	0.069	0.070	651.45	649.90	1.6	0.0233	0.029	0.128	7.7
3	656.00	652.00	4.0	0.0089	0.007											0.007	5.0

CONCLUSION:

The Outfall Summary shows that the proposed Escondido Church slightly increases the peak runoff discharge in a potential 50-year or 100-year storm event. Existing peak discharge is 16.49 cubic feet per second and the proposed peak discharge is 18.14 cubic feet per second. In a responsible effort to minimize the negative impact on the environment, it is evident that the Escondido Church project should not be seen as a detrimental impact to existing hydrologic basin and drainage system.

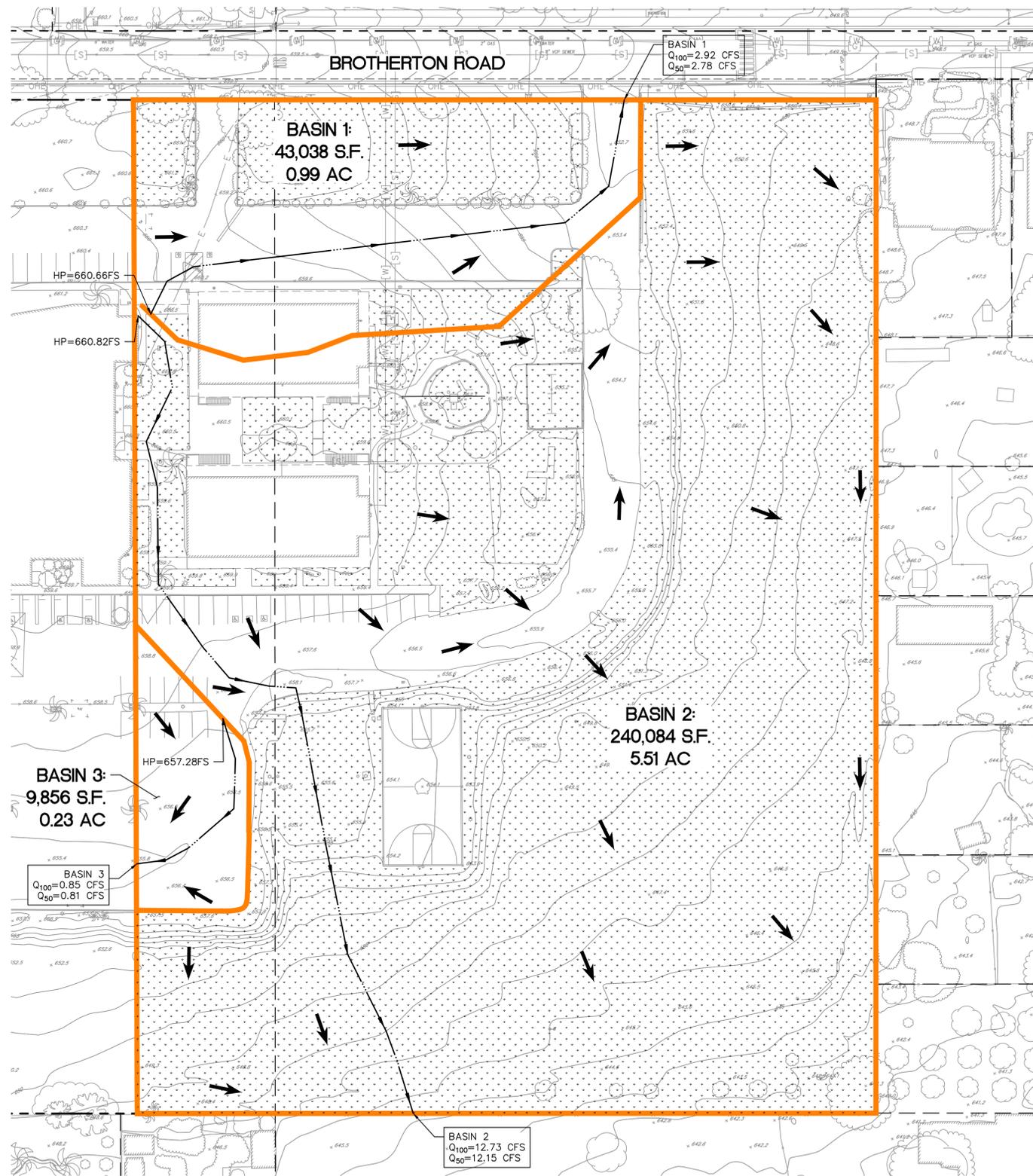
ENGINEER OF WORK:

This report was prepared under the supervision of Daniel Quinones, PE, Project Manager for Nasland Engineering.



Daniel Quinones • RCE 92130 • Expires 06-30-25

APPENDIX

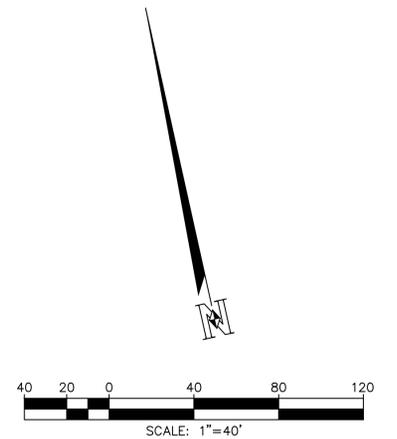


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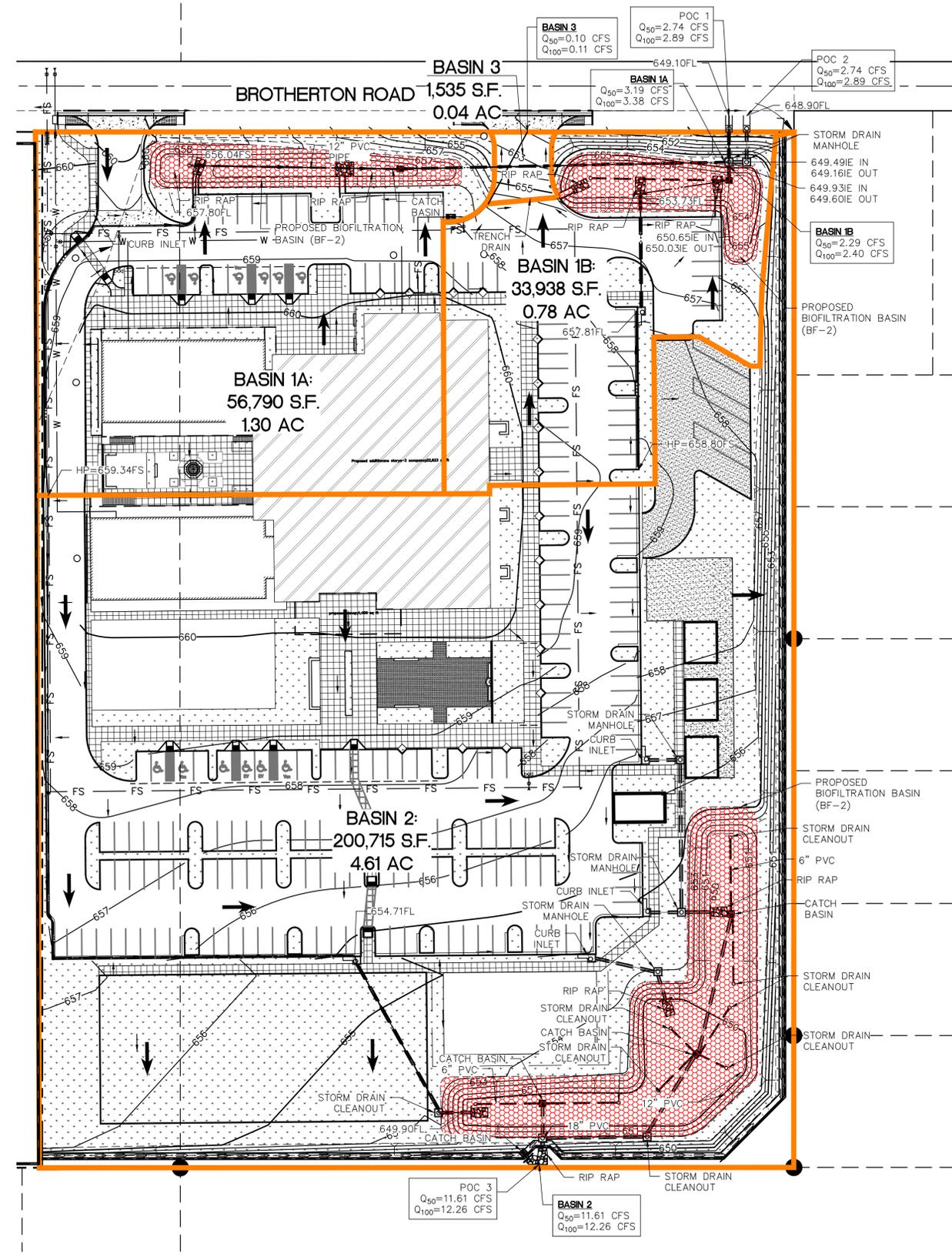
- BASIN LIMIT
- EXISTING PERVIOUS AREA

EXISTING CONDITIONS

TOTAL SITE AREA: 292,978 S.F.
 PERVIOUS AREA: 214,385 S.F. (72.8%)
 IMPERVIOUS AREA: 78,593 S.F. (27.2%)



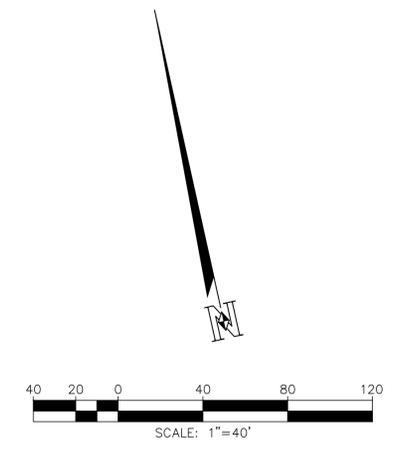
**BROTHERTON ROAD - ESCONDIDO
 EXISTING HYDROLOGY CONDITIONS**



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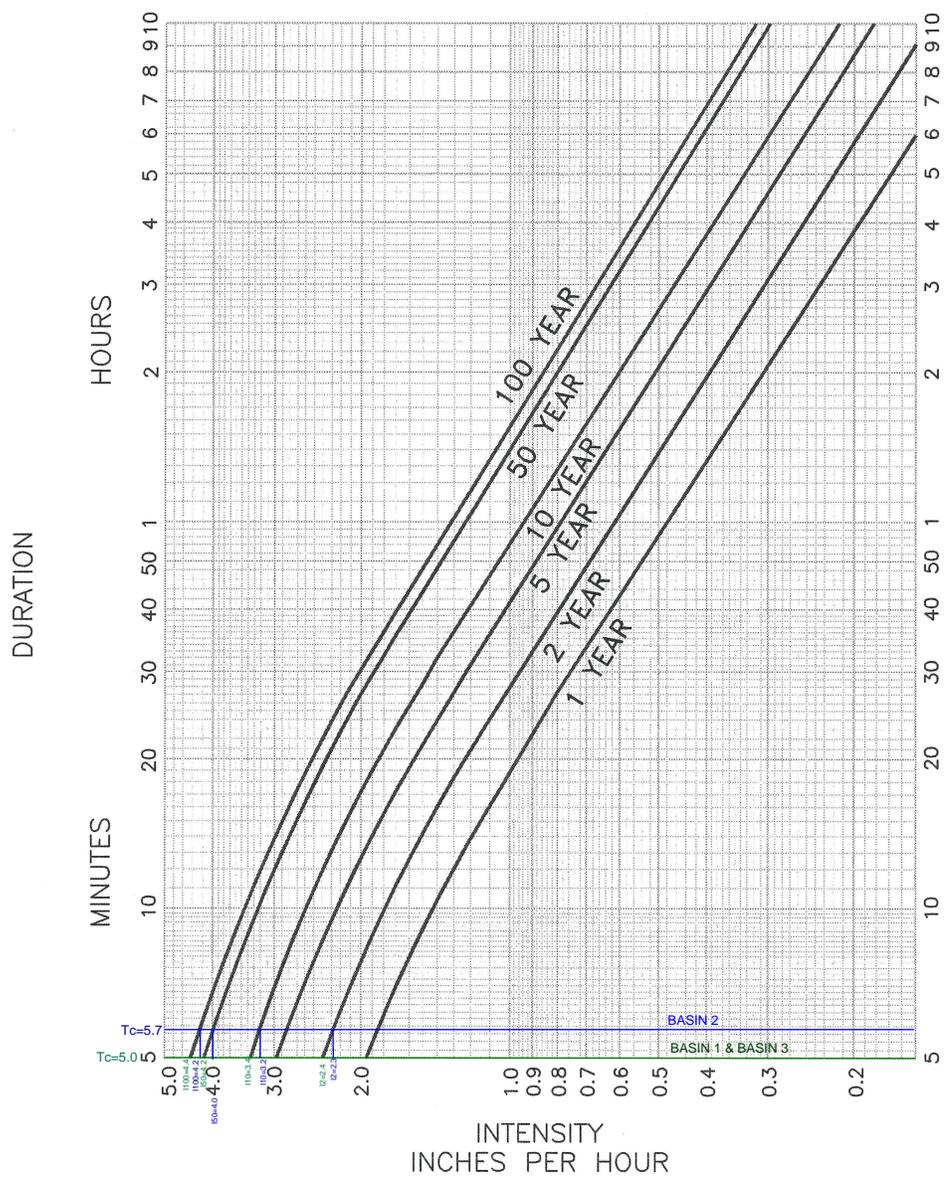
- BASIN LIMIT
- PROPOSED BIOFILTRATION BMP
- PROPOSED IMPERVIOUS AREA

PROPOSED CONDITIONS
 TOTAL SITE AREA: 292,978 S.F.
 PERVIOUS AREA: 113,301 S.F. (39.2%)
 IMPERVIOUS AREA: 178,142 S.F. (60.8%)



**BROTHERTON ROAD - ESCONDIDO
 PROPOSED HYDROLOGY CONDITIONS**

EXISTING
CONDITIONS

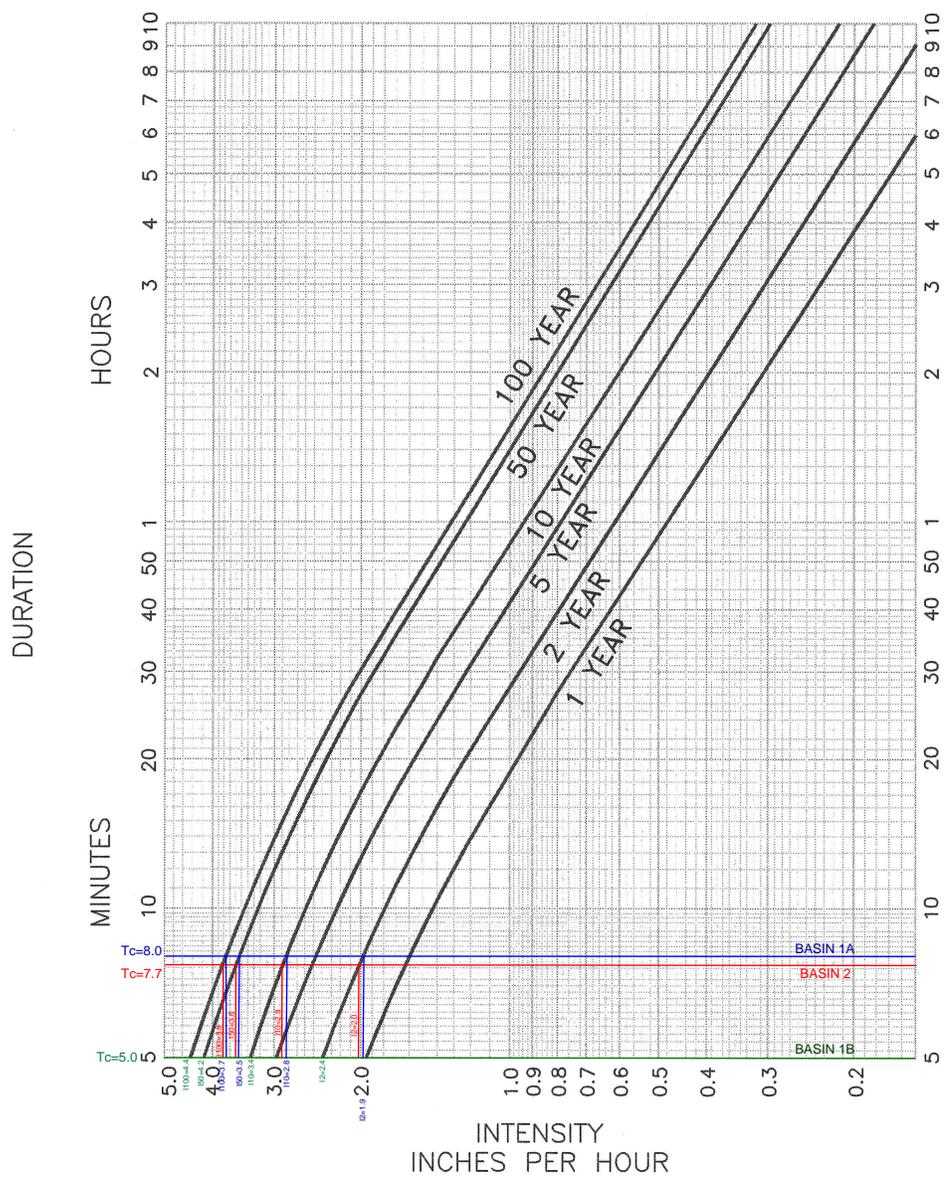


ESCONDIDO RUNOFF COEFFICIENTS

PARKS, GOLF COURSES, CEMETERIES.	.025
UNDEVELOPED LAND, OPEN SPACE.	.035
RURAL - OVER 1/2 ACRE LOTS.	.045
SINGLE FAMILY.	.055
MOBILE HOME.	.065
MULTIPLE UNITS.	.070
COMMERCIAL.	.085
INDUSTRIAL.	.095

APPROVED: <i>P. W. Director</i> P. W. DIRECTOR/CITY ENGINEER	DATE: 04-02-2014	CITY OF ESCONDIDO DEPARTMENT OF PUBLIC WORKS	SCALE: NOT TO SCALE
REVISOR	APPROVED		FIGURE NO. 1
RUN-OFF INTENSITY DURATION CURVE			

**PROPOSED
CONDITIONS**



ESCONDIDO RUNOFF COEFFICIENTS

PARKS, GOLF COURSES, CEMETERIES.	.025
UNDEVELOPED LAND, OPEN SPACE.	.035
RURAL - OVER 1/2 ACRE LOTS.	.045
SINGLE FAMILY.	.055
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REVISED	APPROVED	RUN-OFF INTENSITY DURATION CURVE	FIGURE NO. 1