

SEE Engineering

P.O. Box 308 ~ Arcata, CA. 95518
Phone (707) 498-6315 Fax (707) 822-8703
www.seeengineering.com
PLANS * CONSTRUCTION * SPECIAL PROJECTS * SHORING * TEMPORARY SYSTEMS
Stanley Elcock, P.E. C41457

March 16, 2023

Client: Robert W. and Cindi L. Sutter
Project: Minor subdivision
Location: 1643 Azalea Ave
McKinleyville, CA.



County of Humboldt
3015 H St.
Eureka, CA. 95501

Attn: Public Works Department – Land Use

Re: Stormwater Mitigation

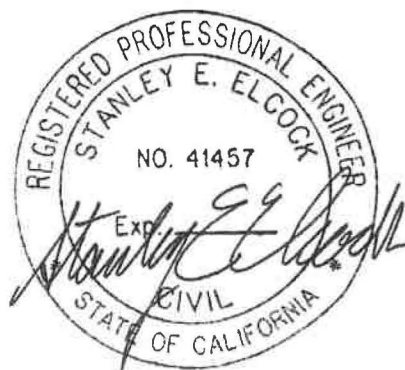
Brenda Howell, P.E.

Attached are calculations for retaining all stormwater onsite of the proposed parcels being created. The existing paved driveway will remain unchanged. Percolation tests were conducted on each parcel on November 17, 2022 and again on March 16, 2023. The percolation rates did not change between November and March. The results are incorporated in the calculations. Roof gutter water will be hard piped to 18" diameter perforated pipes in 2' wide x 3' deep x 75' to 100' long trenches. The exact locations will be determined by the owners at the time of construction.

If you have any questions, please do not hesitate to call or e-mail: stanelcock@gmail.com
Ph. (707) 498-6315

Sincerely,

Stanley Elcock, P.E.



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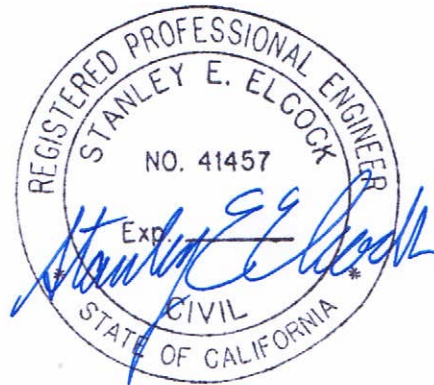
PLANS * CONSTRUCTION * SPECIAL PROJECTS * SHORING * TEMPORARY SYSTEMS
Stanley Elcock, P.E. C41457

Client: Robert W. and Cindi L. Sutter, Owners

Project: Stormwater Calculations

Location:

Sutter Subdivision
APN 509-321-018
McKinleyville, CA.



CALCULATIONS

References

Humboldt Low Impact Stormwater Manual

November 17, 2022

March 10, 2023

SEE Engineering

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Stanley Elcock, P.E. C41457

March 10, 2023

Client: Robert W. and Cindi L. Sutter

Project: Minor subdivision

Location: 1643 Azalea Ave

McKinleyville, CA.

County of Humboldt
3015 H St.
Eureka, CA. 95501

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Re: Stormwater Mitigation

Brenda Howell, P.E.

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If you have any questions, please do not hesitate to call or e-mail: stanelcock@gmail.com
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Sincerely,

Stanley Elcock, P.E.

STORMWATER CALCULATION

SUTTER SUBDIVISION McKinleyville, CA.

DRAINAGE AREA BREAK-DOWNS				AREA CALCS		RUNOFF COEFFICIENTS, C				PEAK FLOW RATES AT INDIVIDUAL SUB-AREAS															
										TIME OF CONCENTRATION, t_c CALCULATION						Q_2			Q_{10}			Q_{100}			
ZONE	SUB ZONE	COLL POINT	DESCRIPTION	AREA	AREA	PRE "C"	A*C _{PRE}	POST "C"	A*C _{POST}	L _{MAX}	L _{MAX}	ELEV _{MAX}	ELEV _{MIN}	ΔELEV	t_c	t_{c-MIN}	i_2	PRE	POST	i_{10}	PRE	POST	i_{100}	PRE	POST
				[SF]	[ACRES]					[FT]	[MILE]	[FT]	[FT]	[FT]	[MIN]	[MIN]		[CFS]	[CFS]		[CFS]	[CFS]		[CFS]	[CFS]
A			TOTAL AREA <E> RESIDENTIAL Parcel '1'	16,988	0.39	0.38	0.15	0.70	0.27	200	0.04	32.50	30.00	2.50	2.5	10.0									
			ZONE A TOTAL → ZONE As', is', Qs' →	Σ A →	0.39	Σ A * C →	0.15	Σ A * C →	0.27																
						C_{PRE-AVG} →	0.38	C_{PRE-AVG} →	0.70								1.29	0.19	0.35	2.04	0.30	0.56	3.03	0.45	0.83

Q100_{Pre} = 0.45 cfs

Percolation Rate
11/17/22 12.0 in/hr

Required Permeable/Non-Paved Area 1,616 SQFT Per Lot PRE

Q100_{Post} = 0.83 cfs

Percolation Rate
7/4/22 12.0 in/hr

Required Permeable/Non-Paved Area 2,976 SQFT Per Lot POST

Post Non-Paved Area = 10,388 SQFT Maximum Based On

Post Design is Adequate build out to setbacks

EUREKA IDF CURVES

EUREKA NWS IDF CURVE DATA								
FREQUENCY	5 MINUTE		24 HOUR				CALC'D	FORMULA
	i_n	LOG(i_n)	i_n	LOG(i_n)	m	b	i_n @ 1 hr	
	LOG ₁₀ (5 min)=	-1.0792	LOG ₁₀ (24 hr)=	1.3802				
2 YEAR	1.740	0.2405	0.111	-0.9547	-0.4860	-0.2839	0.5201	LOG ₁₀ (F _Y) = -0.2839 + -0.4860 * LOG ₁₀ (F _X)
10 YEAR	2.750	0.4393	0.176	-0.7545	-0.4854	-0.0845	0.8232	LOG ₁₀ (F _Y) = -0.0845 + -0.4854 * LOG ₁₀ (F _X)
25 YEAR	3.310	0.5198	0.213	-0.6716	-0.4844	-0.0030	0.9932	LOG ₁₀ (F _Y) = -0.0030 + -0.4844 * LOG ₁₀ (F _X)
50 YEAR	3.690	0.5670	0.236	-0.6271	-0.4855	0.0430	1.1042	LOG ₁₀ (F _Y) = 0.0430 + -0.4855 * LOG ₁₀ (F _X)
100 YEAR	4.070	0.6096	0.264	-0.5784	-0.4830	0.0883	1.2255	LOG ₁₀ (F _Y) = 0.0883 + -0.4830 * LOG ₁₀ (F _X)

EUREKA IDF CURVES

EUREKA NWS IDF CURVE DATA								
FREQUENCY	5 MINUTE		24 HOUR				CALC'D	FORMULA
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STORMWATER CALCULATION

SUTTER SUBDIVISION McKinleyville, CA.

DRAINAGE AREA BREAK-DOWNS				AREA CALCS		RUNOFF COEFFICIENTS, C				PEAK FLOW RATES AT INDIVIDUAL SUB-AREAS															
										TIME OF CONCENTRATION, t_c CALCULATION						Q_2			Q_{10}			Q_{100}			
ZONE	SUB ZONE	COLL POINT	DESCRIPTION	AREA	AREA	PRE "C"	A*C _{PRE}	POST "C"	A*C _{POST}	L _{MAX}	L _{MAX}	ELEV _{MAX}	ELEV _{MIN}	ΔELEV	t_c	t_{c-MIN}	i_2	PRE	POST	i_{10}	PRE	POST	i_{100}	PRE	POST
				[SF]	[ACRES]					[FT]	[MILE]	[FT]	[FT]	[FT]	[MIN]	[MIN]		[CFS]	[CFS]		[CFS]	[CFS]		[CFS]	[CFS]
A			TOTAL AREA <E> RESIDENTIAL Parcel '3'	11,761	0.27	0.38	0.10	0.70	0.19	200	0.04	32.50	30.00	2.50	2.5	10.0									
			ZONE A TOTAL →	Σ A →	0.27	Σ A * C →	0.10	Σ A * C →	0.19																
			ZONE As', is', Qs' →			C_{PRE-AVG} →	0.38	C_{PRE-AVG} →	0.70								1.29	0.13	0.24	2.04	0.21	0.39	3.03	0.31	0.57

Q100_{Pre} = 0.31 cfs

Percolation Rate 12.0 in/hr
11/17/22

Required Permeable/Non-Paved Area 1,119 SQFT Per Lot PRE

Q100_{Post} = 0.57 cfs

Percolation Rate 12.0 in/hr
7/4/22

Required Permeable/Non-Paved Area 2,061 SQFT Per Lot POST

Post Non-Paved Area = 6,961 SQFT Maximum Based On

Post Design is Adequate build out to setbacks

EUREKA IDF CURVES

EUREKA NWS IDF CURVE DATA								
FREQUENCY	5 MINUTE		24 HOUR				CALC'D	FORMULA
	i_n	LOG(i_n)	i_n	LOG(i_n)	m	b	i_n @ 1 hr	
	LOG ₁₀ (5 min)=	-1.0792	LOG ₁₀ (24 hr)=	1.3802				
2 YEAR	1.740	0.2405	0.111	-0.9547	-0.4860	-0.2839	0.5201	LOG ₁₀ (F _Y) = -0.2839 + -0.4860 * LOG ₁₀ (F _X)
10 YEAR	2.750	0.4393	0.176	-0.7545	-0.4854	-0.0845	0.8232	LOG ₁₀ (F _Y) = -0.0845 + -0.4854 * LOG ₁₀ (F _X)
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50 YEAR	3.690	0.5670	0.236	-0.6271	-0.4855	0.0430	1.1042	LOG ₁₀ (F _Y) = 0.0430 + -0.4855 * LOG ₁₀ (F _X)
100 YEAR	4.070	0.6096	0.264	-0.5784	-0.4830	0.0883	1.2255	LOG ₁₀ (F _Y) = 0.0883 + -0.4830 * LOG ₁₀ (F _X)

STORMWATER CALCULATION

SUTTER SUBDIVISION McKinleyville, CA.

DRAINAGE AREA BREAK-DOWNS				AREA CALCS		RUNOFF COEFFICIENTS, C				PEAK FLOW RATES AT INDIVIDUAL SUB-AREAS															
										TIME OF CONCENTRATION, t_c CALCULATION						Q_2			Q_{10}			Q_{100}			
ZONE	SUB ZONE	COLL POINT	DESCRIPTION	AREA	AREA	PRE "C"	A*C _{PRE}	POST "C"	A*C _{POST}	L _{MAX}	L _{MAX}	ELEV _{MAX}	ELEV _{MIN}	ΔELEV	t_c	t_{c-MIN}	i_2	PRE	POST	i_{10}	PRE	POST	i_{100}	PRE	POST
				[SF]	[ACRES]					[FT]	[MILE]	[FT]	[FT]	[FT]	[MIN]	[MIN]		[CFS]	[CFS]		[CFS]	[CFS]		[CFS]	[CFS]
A			TOTAL AREA <E> RESIDENTIAL Parcel '4'	10,019	0.23	0.38	0.09	0.70	0.16	200	0.04	32.50	30.00	2.50	2.5	10.0									
			ZONE A TOTAL →	Σ A →	0.23	Σ A * C →	0.09	Σ A * C →	0.16																
			ZONE As', is', Qs' →			C_{PRE-AVG} →	0.38	C_{PRE-AVG} →	0.70								1.29	0.11	0.21	2.04	0.18	0.33	3.03	0.26	0.49

Q100_{Pre} = 0.26 cfs

Percolation Rate
11/17/22 12.0 in/hr

Required Permeable/Non-Paved Area 953 SQFT Per Lot PRE

Q100_{Post} = 0.49 cfs

Percolation Rate
7/4/22 12.0 in/hr

Required Permeable/Non-Paved Area 1,755 SQFT Per Lot POST

Post Non-Paved Area = 6,019 SQFT Maximum Based On

Post Design is Adequate build out to setbacks

EUREKA IDF CURVES

EUREKA NWS IDF CURVE DATA								
FREQUENCY	5 MINUTE		24 HOUR				CALC'D	FORMULA
	i_n	LOG(i_n)	i_n	LOG(i_n)	m	b	i_n @ 1 hr	
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										TIME OF CONCENTRATION, t_c CALCULATION							Q_2			Q_{10}			Q_{100}		
ZONE	SUB ZONE	COLL POINT	DESCRIPTION	AREA	AREA	PRE "C"	A*C _{PRE}	POST "C"	A*C _{POST}	L _{MAX}	L _{MAX}	ELEV _{MAX}	ELEV _{MIN}	ΔELEV	t_c	t_{c-MIN}	i_2	PRE	POST	i_{10}	PRE	POST	i_{100}	PRE	POST
				[SF]	[ACRES]					[FT]	[MILE]	[FT]	[FT]	[FT]	[MIN]	[MIN]		[CFS]	[CFS]		[CFS]	[CFS]		[CFS]	[CFS]
A			TOTAL AREA <E> RESIDENTIAL Remainder Parcel	30,492	0.70	0.38	0.27	0.70	0.49	200	0.04	32.50	30.00	2.50	2.5	10.0									
			ZONE A TOTAL →	Σ A →	0.70	Σ A * C →	0.27	Σ A * C →	0.49																
			ZONE As', is', Qs' →			C_{PRE-AVG} →	0.38	C_{PRE-AVG} →	0.70								1.29	0.34	0.63	2.04	0.54	1.00	3.03	0.81	1.48

Q100_{Pre} = 0.81 cfs

Percolation Rate 12.0 in/hr
11/17/22

Required Permeable/Non-Paved Area 2,900 SQFT Per Lot PRE

Q100_{Post} = 1.48 cfs

Percolation Rate 12.0 in/hr
7/4/22

Required Permeable/Non-Paved Area 5,342 SQFT Per Lot POST

Post Non-Paved Area = **22,992 SQFT Maximum Based On**

Post Design is Adequate **build out to setbacks**

EUREKA IDF CURVES

EUREKA NWS IDF CURVE DATA								
FREQUENCY	5 MINUTE		24 HOUR				CALC'D	FORMULA
	i_n	LOG(i_n)	i_n	LOG(i_n)	m	b	i_n @ 1 hr	
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100 YEAR	4.070	0.6096	0.264	-0.5784	-0.4830	0.0883	1.2255	LOG ₁₀ (F _Y) = 0.0883 + -0.4830 * LOG ₁₀ (F _X)

GUTTER
SUBDIVISION

3-10-23

1/1

GUTTER DRAINS

ROOF AREA (E) HOUSE = 3500^{sq}'

USE 5000 SQFT ROOF AREA / PARCEL

$$Q_{10} = 0.95(2.04) \left(\frac{5000}{3500} \right)$$

$$= 0.22 \text{ cfs}$$

$$\frac{0.22 \text{ cfs} \times 3600 \frac{\text{s}}{\text{hr}}}{5} \left/ \left(\frac{12 \text{ in}}{\text{hr}} \right) \left(\frac{1 \text{ ft}}{12 \text{ in}} \right) \right. = 792 \text{ SQFT}$$

$$792 \text{ SQFT} / (3+2+3) = 99 \text{ LF}$$

⇒ Install 100LF OF 2' WIDE X 3' DEEP
TRENCH W/ 18" dia PERF PIPE W/ No. 3
ROCK AND FILTER FABRIC FOR HOUSE
GUTTER DRAINS

NOTE:

AT PARCEL 3 2' x 3' x 75' LONG TRENCH
ASSUMING ROOF AREA ≤ 3750 SQFT

Preliminary Stormwater Control Plan (CDP, CUP, and SP ≥ 5000 sf)

<p>For Office Use Only Application No. _____ Received By: _____</p>
--

Instructions

The following worksheet is used to demonstrate that for each and every lot, the intended use can be achieved with a design which disperses runoff from the roofs, driveways, sidewalks, streets and other impervious areas to self-retaining pervious areas. It is also used to demonstrate that drainage to treatment and/or flow control facilities is feasible and that the project is in overall compliance with the MS4 permit. Use this form to assist you in designing your project to comply with the design standards for Multi-Parcel Regulated projects. The completed, signed Preliminary SCP for Subdivision Projects, a site map, plus any additional applicable information, must be submitted with your application to the Planning Department.

Project Name: <u>Sutter Subdivision</u>
Physical Site Address: <u>APN 509-321-018</u>
Project Applicant: <u>Robert W. and Cindi L. Sutter</u>
Mailing Address: <u>P.O. Box 2663, McKinleyville, CA. 95519</u>
Phone: <u>(707) 499-1731</u>
Consultant's Information
Name: <u>Stanley Elcock</u>
Firm: <u>SEE ENGINEERING</u>
Address: <u>2865 Woodland Ct., Arcata, CA.</u>
Email: <u>stanelcock@gmail.com</u>
Phone: <u>707 498-6315</u>

A. Project Information

1a. Does Project create or replace 1-acre or more of impervious surface?	<input type="checkbox"/> Yes (see question below)	<input checked="" type="checkbox"/> No (skip question 1b.)
b. If 'Yes' to the above question than does project increase impervious surface from pre-project conditions?	<input type="checkbox"/> Yes (hydromodification requirements must be met)	<input type="checkbox"/> No (regulated project requirements must be met)
Total pre-project Impervious Surface (sf):	12448	
Total new or replaced Impervious Surface Area (square feet) <small>[Sum of impervious area that will be constructed as part of the project]</small>	14780 New	



Preliminary Stormwater Control Plan (CDP, CUP, and SP ≥ 5000 sf)

C. Preliminary Site Plan Checklist –items that must be include on the site plan

- Topographic lines (2 ft. contours)
- On-site waterways/drainages, vegetation and areas to be left undisturbed all shown with appropriate buffers
- DMAs clearly delineated and labeled with name and area (square feet)
- Location of site design measures used in worksheet 2
- Location, size, and name of Bioretention/Treatment Facility
- Flow direction that clearly demonstrates the ability of self-retaining areas, ~~infiltration site design measure~~, and treatment facilities to capture runoff from impervious surfaces
- Hydrologic soil class

D. Operation and Maintenance Plan Requirements

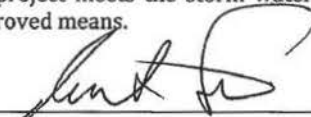
Each Bioretention facility or equivalent will be required to have an operation and maintenance plan attached to the final SCP and shall include all details found in Appendix 3, 4, and 5 of the LID Manual.

E. Additional Requirements

A detailed final Stormwater Control Plan with narrative sections will need to be submitted prior to issuance of a grading/building permit (see, Appendix 1. However, by completing the Preliminary SCP a more efficient and timely review of the final SCP is enabled.

F. Signature and Certification

I, the below signed, confirm that I have accurately described my project to the best of my ability, and that I have not purposely omitted any detail affecting my project’s classification for storm water regulation. I hereby certify that the site design measures and storm water flow treatment measures identified herein as being incorporated into my project have been designed in accordance with the approved BMP Fact Sheet or equivalent, and are included in the final site plans. I also hereby certify that my project meets the storm water runoff reduction criteria identified in Worksheet 2, or as determined through other approved means.



 Signature

4-8-2023

 Date

Robert Sutter

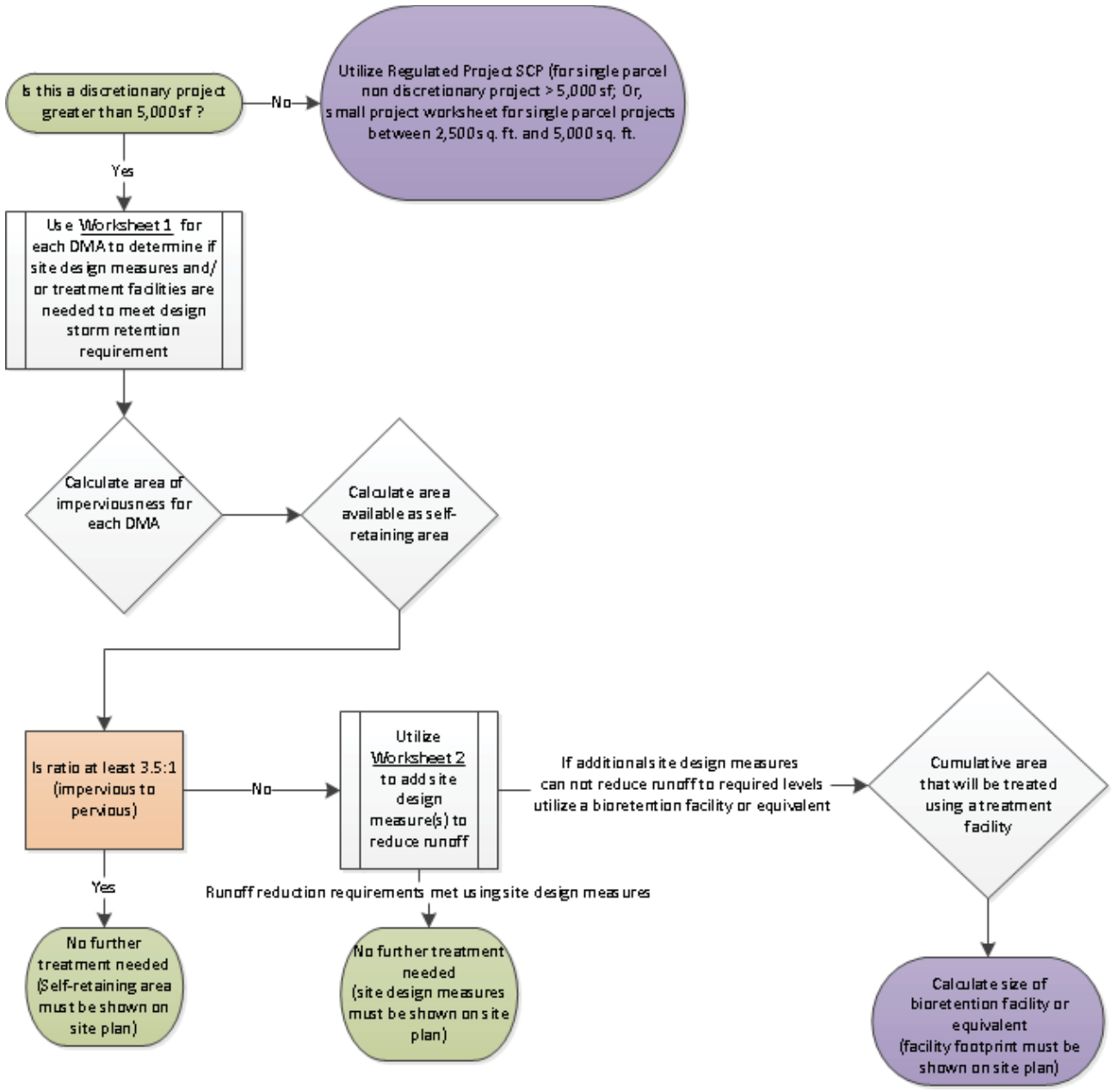
 Print Name

I am the:
 Property Owner Applicant Contractor



Preliminary Stormwater Control Plan (CDP, CUP, and SP ≥ 5000 sf)

The following example illustrates the elements necessary for evaluating a project for compliance with the MS4 permit only. Additional requirements will most likely be needed for compliance with other regulations please consult the full planning submission checklist to make certain all required elements are presented on the preliminary site plan.



Preliminary Stormwater Control Plan (CDP, CUP, and SP ≥ 5000 sf)

Worksheet 2: (Use one Worksheet for each DMA as applicable)

Regulated Projects Worksheet 2 Humboldt Low Impact Development Stormwater Manual																	
Project Information				Formulas/Notes													
DMA Name: Sutter Subdivision																	
Total Post-Project Impervious Surface Area (square feet)	27228	A		square feet													
24 hour - 85th Percentile Design Storm	0.65	B		inch	B = Select Design Storm Value (0.65-inch Humboldt Bay Area, 1.3-inch Shelter Cove)												
Impervious Surface Runoff Value (Potential Stormwater Runoff due to impervious surface area and design storm value)	10988	C		Gallons per 24 hours	C = A x B x 0.083 x 7.48												
Pervious Self-Retaining Area (SRA) Credit (if applicable, if none enter 0)																	
Self-Retaining Area (square feet)	73395		3.5	SRA Credit	square feet												
SRA Credit = Self-Retaining Area x Multiplier Select Multiplier (3.5 Humboldt Bay Area, 1.3 Shelter Cove)																	
Site Design Measure Credits																	
Tree Planting and Preservation																	
New Trees																	
100 square feet per deciduous tree	D	0	E	0	square feet												
E = D x 100																	
200 square feet per evergreen tree	F	0	G	0	square feet												
G = F x 200																	
Existing Trees (Credit for 50% of existing canopy area)																	
Canopy diameter (feet)																	
Tree #1	H ₁	0	J ₁	0	square feet												
J ₁ = 3.14 x (H ₁ /2) ² x 0.50																	
Tree #2	H ₂	0	J ₂	0	square feet												
J ₂ = 3.14 x (H ₂ /2) ² x 0.50																	
Tree #3	H ₃	0	J ₃	0	square feet												
J ₃ = 3.14 x (H ₃ /2) ² x 0.50																	
Rain Barrel or Cisterns (55 gallon minimum)																	
Square foot credit per gallon based on 24-hour, 85th Percentile Design Storm	K	0			K = Select square foot credit per gallon (2.48 Humboldt Bay Area, 1.24 Shelter Cove)												
Gallons																	
Rain Barrels	L	0	M	0	square feet												
M = L x K																	
Cisterns	N	0	O	0	square feet												
O = N x K																	
Infiltration Trench/Basin (55 gallon minimum - 21 ft³)																	
cubic feet																	
Volume (ft³) = length x width x depth	P		Q		square feet												
Q = P x R x K x 7.48																	
porosity (approximate %)	R			35%													
Subsurface Infiltrators (55 gallon minimum)																	
Proprietary units vary, insert estimated storage in ft ³																	
	S		T		square feet												
T = S x 7.48																	
Impervious Area Disconnection Credit per square foot of impervious area feeding into pervious area	U	27228			U = Enter square foot value												
Soil Quality Improvement																	
Credit per square foot of soil quality improvement	V	0			V = Enter square foot value												
Green Roof																	
Credit per square foot of green roof installation	W	0			W = Enter square foot value												
PPPP (Porous Asphalt, Pervious Concrete, Permeable Pavers)																	
Credit per square foot of PPPP	X	0			X = Enter square foot value												
Vegetated Swales																	
Credit per square foot of vegetated swale	Y	0			Y = Enter square foot value												
Stream Setbacks and Buffers																	
Credit per square foot of stream setback and buffer [#]	Z	0			Z = Enter square foot value												
Credits Total	AA	27228			square feet												
AA = SRA Credit + E + G + J ₁ + J ₂ + J ₃ + M + O + Q + T + U + V + W + X + Y + Z																	
Post-Project Impervious Surface Area minus Site Design Measure Credits	BB	0			square feet												
BB = A - AA																	
NEW Impervious Surface Runoff Value (Potential Stormwater Runoff due to impervious surface area and design storm after implementation of Site Design Measures)	CC	0			Gallons per 24 hours												
CC = BB x B x 0.083 x 7.48																	
Percent reduction in Impervious Surface Runoff Value*	DD	100			%												
DD = ((C - CC) / C) x %100																	
*If value for DD is not greater than or equal to %100 then bioretention is required for treating remaining runoff from impervious area indicated by value BB. Design and implement bioretention facility in accordance with Humboldt LID Stormwater Manual - Part C.																	
**Infiltration Trench/Basin calculations are based on porosity (35%). Increased trench dimensions (volume) are required to meet 55 gallon minimum capacity.																	
<table border="0"> <tr> <td>Green</td> <td>Fill In [Enter Value]</td> <td>Conversions Used:</td> </tr> <tr> <td>Red</td> <td>Calculated Value</td> <td>1 inch = 0.083 feet</td> </tr> <tr> <td>Black</td> <td>Fixed Value/Selectable Value</td> <td>1 cubic foot = 7.48 gallons</td> </tr> <tr> <td colspan="3"># check with agency with project area jurisdiction for requirements</td> </tr> </table>						Green	Fill In [Enter Value]	Conversions Used:	Red	Calculated Value	1 inch = 0.083 feet	Black	Fixed Value/Selectable Value	1 cubic foot = 7.48 gallons	# check with agency with project area jurisdiction for requirements		
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