

STERLING RANCH MDDP AMENDMENT NO. 2 & PRELIMINARY DRAINAGE REPORT FOR STERLING RANCH EAST PRELIMINARY PLAN NO. 1

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Job No. 1183.22

PCD Project No. SKP-22-004 / SP-22-004



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Basin SC-1 (Q₅ = 2 cfs, Q_{100} = 6 cfs) is a small basin due west of the elementary school site that consists of mainly the eastern slope of the Sand Creek channel. No impervious development is proposed other than the required maintenance access road/trail as presented on the Sand Creek channel plans. At this time, this area is not anticipated to be captured and routed to a formal stormwater quality facility. However, given the minimal unconnected impervious area and sizeable receiving pervious are within this basin, the WQCV reduction = 100% with 0 untreated WQCV. (See Appendix)

After development of the Sterling Ranch East Preliminary Plan No. 1, the majority of the upstream tributary area of Basins EX-9, EX-9A and EX-10A is routed to proposed treatment facilities (Pond FSD-14A, Pond FSD-14B and FSD- 11B). The remaining portion of **Basin EX-9 (Q**₅ = 2 cfs, $Q_{100} = 9$ cfs) is a small basin of 6.0 ac. that will remain undeveloped and continue to sheet flow in a southerly direction and exit along the south boundary at Design Point 6. These minor flows will combine with the previously described release from Pond FSD-14B through a proposed level spreader structure. The final design and construction timing of this facility will be detailed in a future Final Drainage Report for this area.

Flow does not match summary table

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The remaining portion of **Basin EX-9A** ($Q_5 = 4 \text{ cfs}$, $Q_{100} = 11 \text{ cfs}$) is a basin of 12.7 ac. that will remain undeveloped and continue to sheet flow in a southerly direction and exit along the south boundary at Design Point 6A. The pre-development flow at this location **Design Point 6A** ($Q_5 = 7 \text{ cfs}$, $Q_{100} = 19 \text{ cfs}$). Thus, the downstream corridor will continue to adequately handle these off-site flows.

The remaining portion of **Basin EX-10A** ($Q_5 = 18 \text{ cfs}$, $Q_{100} = 50 \text{ cfs}$) is a basin of 60.4 ac. that will remain undeveloped and continue to sheet flow in a southerly direction and exit along the south boundary at Design Point 7. The pre-development flow at this location **Design Point 7** ($Q_5 = 110 \text{ cfs}$, $Q_{100} = 249 \text{ cfs}$). Thus, the downstream corridor will continue to adequately handle these off-site flows.



STERLING RANCH EAST PRELIMINARY PLAN NO. 1

Flow Comparison along South Boundary

	This Report (SWMM 5.1) Pre-Dev. Conditions		
Design Point (South Bndy.)	Peak Runoff 5 yr. (CFS)	Peak Runoff 100 yr. (CFS)	
4	46	105	
4A	1	5	
5	5	23	
5A	2	9	
6	59	122	
6A	7	19	
7	110	249	
56	60	160	

Peak Runoff	Peak Runoff
5 yr.	100 yr.
(CFS)	(CFS)
0.5	3.5
0.5	3.5
4	10
2	7
2.0	48.9
4	11
18	50
60	160

Peak Runoff	Peak Runoff
5 yr.	100 yr.
(CFS)	(CFS)
21.5	107.4
1.7	20.5
23.9	125.2
57.1	277.9
42.5	202.9

Include discussion on DP's where developed 5-year flow is large than 2018 MDDP 5-year flows

FLOODPLAIN STATEMENT

Portions of this site are located within a floodplain as determined by the Flood Insurance Rate Maps (F.I.R.M.) Map Numbers 08041C 0533G and 08041C 0535G with effective dates of December 7, 2018 and the previously mentioned LOMR 08-08-0541P with an effective date of July 23, 2009. (See Appendix). JR Engineering, LLC is coordinating a CLOMR/LOMR for this stretch of Sand Creek that is adjacent to the site and defined as Reach SC-8 (south of Briargate Pkwy.) and SC-9 north of Briargate Pkwy.)

DRAINAGE AND BRIDGE FEES

This site lies entirely within the Sand Creek Drainage Basin boundaries.

Fees are calculated using the following impervious acreage method approved by El Paso County. The final fee estimate will be included in the Final Drainage Report(s), however, the following represent fee estimates based on the Sterling Ranch East Preliminary Plan No. 1 submittal with a total area of 321.37 acres with the following different land uses proposed:



DETENTION BASIN OUTLET STRUCTURE DESIGN MHFD-Detention, Version 4.06 (July 2022 Project: STERLING RANCH EAST PRELIMINARY PLAN NO. 1 Basin ID: POND FSD-14B Estimated Estimated Stage (ft) Volume (ac-ft) Outlet Type VOLUME EURY WQC Zone 1 (WQCV) 2.87 1.242 Orifice Plate 100-YEAF Zone 2 (EURV) 5.31 3.352 Orifice Plate ZONE 1 AND 2 Zone 3 (100-year) 6.74 2.380 Weir&Pipe (Restrict) Example Zone Configuration (Retention Pond) Total (all zones) 6.974 User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP) Calculated Parameters for Underdrain ft (distance below the filtration media surface) Underdrain Orifice Area Underdrain Orifice Invert Depth = N/A N/A ft² Underdrain Orifice Diameter = N/A inches Underdrain Orifice Centroid = N/A feet User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP) Calculated Parameters for Plate Centroid of Lowest Orifice = ft (relative to basin bottom at Stage = 0 ft) WO Orifice Area per Row = 0.00 N/A lft² Depth at top of Zone using Orifice Plate = 5.50 ft (relative to basin bottom at Stage = 0 ft) Elliptical Half-Width = feet N/A Orifice Plate: Orifice Vertical Spacing = 16.50 inches Elliptical Slot Centroid = N/A feet Orifice Plate: Orifice Area per Row = Elliptical Slot Area = ft² N/A sq. inches N/A User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest) Row 1 (required) Row 2 (optional) Row 3 (optional) Row 4 (optional) Row 5 (optional) Row 6 (optional) Row 7 (optional) Row 8 (optional) 1.40 Stage of Orifice Centroid (ft) 0.00 4.20 2.80 Orifice Area (sq. inches) 5.00 5.00 16.00 16.00 Row 9 (optional) Row 10 (optional) Row 11 (optional) Row 12 (optional) Row 13 (optional) Row 14 (optional) Row 15 (optional) Row 16 (optional) Stage of Orifice Centroid (ft) Orifice Area (sg. inches) User Input: Vertical Orifice (Circular or Rectangular) Calculated Parameters for Vertical Orifice Not Selected Not Selected Not Selected Not Selected ft² Invert of Vertical Orifice = N/A N/A ft (relative to basin bottom at Stage = 0 ft) Vertical Orifice Area N/A N/A Depth at top of Zone using Vertical Orifice = ft (relative to basin bottom at Stage = 0 ft) Vertical Orifice Centroid = N/A N/A N/A N/A feet Vertical Orifice Diameter = N/A N/A inches User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe) Calculated Parameters for Overflow Weir Zone 3 Weir Not Selected Zone 3 Weir Not Selected Overflow Weir Front Edge Height, Ho = 5.50 ft (relative to basin bottom at Stage = 0 ft) Height of Grate Upper Edge, H_t = N/A 5.50 N/A feet Overflow Weir Front Edge Length = 12.00 N/A feet Overflow Weir Slope Length = 4.00 N/A feet Overflow Weir Grate Slope = 0.00 H:V Grate Open Area / 100-yr Orifice Area = 6.11 N/A N/A Horiz. Length of Weir Sides = Overflow Grate Open Area w/o Debris = 33.41 ft² 4.00 N/A feet N/A Overflow Grate Open Area w/ Debris = Overflow Grate Type = Type C Grate N/A 16.70 N/A fť Debris Clogging % = 50% N/A % User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice) Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate Zone 3 Restrictor Not Selected Zone 3 Restrictor Not Selected Outlet Orifice Area = ft² Depth to Invert of Outlet Pipe = 2.50 N/A ft (distance below basin bottom at Stage = 0 ft) 5.47 N/A Outlet Pipe Diameter = 36.00 N/A Outlet Orifice Centroid : 1.20 N/A feet inches Restrictor Plate Height Above Pipe Invert = 26.00 . inches Half-Central Angle of Restrictor Plate on Pipe = 2.03 N/A radians User Input: Emergency Spillway (Rectangular or Trapezoidal) Calculated Parameters for Spillway Spillway Invert Stage= 6.50 ft (relative to basin bottom at Stage = 0 ft) Spillway Design Flow Depth= 0.90 feet Spillway Crest Length = 70.00 feet Stage at Top of Freeboard = 8.40 feet Spillway End Slopes = 3.00 H:V Basin Area at Top of Freeboard 1.92 acres Freeboard above Max Water Surface = 1.00 feet Basin Volume at Top of Freeboard = 10.01 acre-ft Routed Hydrograph Results in the Inflow H ohs tab ns W throu The user can override the o ina new v EURV Design Storm Return Period : WQCV 2 Year 5 Year 10 Year 25 Year 50 Year 100 Year 500 Year One-Hour Rainfall Depth (in) = 1.50 N/A N/A 1.19 1.75 2.00 2.25 2.52 3.48 9.024 13.911 CUHP Runoff Volume (acre-ft) 1.242 4.594 3.357 4.422 5.279 6.449 7.604 Inflow Hydrograph Volume (acre-ft) = N/A N/A 3.357 4.422 5.279 6.449 7.604 9.024 13.911 CUHP Predevelopment Peak Q (cfs) = N/A N/A 29.9 48.9 0.6 1.2 1.6 15.1 110.3 OPTIONAL Override Predevelopment Peak Q (cfs) = N/A N/A Predevelopment Unit Peak Flow, g (cfs/acre) = N/A N/A 0.01 0.02 0.03 0.24 0.47 0.78 1.75 Peak Inflow Q (cfs) 97.1 287.4 125.5 151.1 N/A N/A 62.8 186.4 82.7 Peak Outflow Q (cfs) : 0.6 2.0 2.6 25.1 48.9 148.6 12.3 2.1 1.5 Ratio Peak Outflow to Predevelopment Q = N/A N/A N/A 0.8 0.8 1.0 Structure Controlling Flow : Plate Plate Plate Plate Overflow Weir 1 Overflow Weir 1 Overflow Weir 1 Overflow Weir Spillway Max Velocity through Grate 1 (fps) = N/A N/A N/A N/A 0.0 0.3 0.7 1.4 Max Velocity through Grate 2 (fps) N/A N/A N/A N/A N/A N/A N/A N/A N/A 68 Time to Drain 97% of Inflow Volume (hours) = 48 61 68 72 75 Time to Drain 99% of Inflow Volume (hours) = 51 79 73 79 83 83 82 81 77 Maximum Ponding Depth (ft) : 2.87 5.31 4.38 5.03 5.54 5.83 6.08 6.43 6.99 Area at Maximum Ponding Depth (acres) 1.59 1.49 1.61 1.67 1.70 1.76 0.96 1.56 1.64 4 1 4 3 5.439 Maximum Volume Stored (acre-ft) = 1 242

Outflow ratio needs to be closer to 1.0

or fill these in based on 139 Ac. historic contributing 11/10/2022, 2:30 PM area. Add a note to this sheet either way.



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STERLING RANCH EAST PRELIMINARY PLAN NO. 1 Developed Surface Routing

	Peak Runoff	Peak Runoff
Design Point	5 yr.	100 yr.
(On-Site)	(CFS)	(CFS)
DP-1	112	219
DP-2	53	103
DP-3	41	80
DP-4	218	379
DP-5	53	102
DP-6	55	108
DP-7	20	39
DP-8	68	133
DP-9	88	173
DP-10	223	441
DP-11	10	21
DP-12	63	123
DP-13	41	80
DP-14	97	189
DP-15	85	166
DP-16	34	69
Pond FSD-11B	115	227
Pond FSD-14A	234	486
Pond FSD-14B	97	189
Pond FSD-16 (Ultimate)	323	499
Pond FSD-16 (Interim)	197	410

UNPLATTED NO DEVELOPMENT



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ubcatchment EX-10	Area (Ac.)	SWMM Imperv. (%)	Peak Runoff 5 yr.	Peak Runof 100 yr.
ubcatchment EX-10	Area (Ac.)	Imperv. (%)	5 yr.	100 yr.
EX-10	(Ac.)	(%)		
EX-10		1	(CFS)	(CFS)
	265.9	7%	105	222
EX10A	153.5	5%	46	103
EX-11 *	214.3	4%	54	129
X-13 *	94.8	6%	36	85
EX-4A	44.2	8%	19	50
EX-5	26.2	8%	12	32
EX-7	152.8	5%	46	105
EX-7A	2.4	2%	1	5
EX-8	32.2	2%	5	23
EX-8A	6.6	2%	2	9
EX-9	139.3	8%	59	122
EX-9A	21.8	5%	7	19
FR-12 *	4.7	5%	2	9
rr-20 *	23.2	7%	10	32
TR-4 *	4.4	5%	2	9
TR-5 *	13.7	5%	5	17
TR-6 *	1.5	5%	1	4
TR-7 *	2.6	5%	1	5
	EX-5 EX-7 EX-7 EX-7 EX-7 EX-8 EX-8 EX-8 EX-9 EX-9 EX-9 EX-9 EX-9 EX-9 EX-9 EX-9 EX-9 EX-9 EX-7 EX-8 EX-8 EX-8 EX-9 EX-7	EX-5 26.2 EX-7 152.8 EX-7A 2.4 EX-8 32.2 EX-8A 6.6 EX-9 139.3 EX-9A 21.8 IR-12 * 4.7 IR-20 * 23.2 IR-4 * 4.4 IR-5 * 13.7 IR-6 * 1.5 IR-7 * 2.6	EX-5 26.2 8% EX-7 152.8 5% EX-7A 2.4 2% EX-8 32.2 2% EX-8A 6.6 2% EX-9 139.3 8% EX-9A 21.8 5% IR-12 * 4.7 5% IR-20 * 23.2 7% IR-4 * 4.4 5% IR-5 * 13.7 5% IR-6 * 1.5 5%	EX-5 26.2 8% 12 EX-7 152.8 5% 46 EX-7A 2.4 2% 1 EX-8 32.2 2% 5 EX-9 139.3 8% 59 EX-9A 21.8 5% 7 IR-12 * 4.7 5% 2 IR-20 * 23.2 7% 10 IR-4 * 4.4 5% 2 IR-5 * 13.7 5% 1 IR-6 * 1.5 5% 1

CONSULTING

TÈMPORARY SEDIMENT BASIN PRIOR TO FUTURE DEVELOPMENT IN THIS AREA. EXACT LOCATION AND SIZING WITH FINAL DRAINAGE REPORTS.

POND FSD-16 WILL OUTFALL DIRECTLY INTO 48" RCP PIPE SYSTEM CONSTRUCTED WITH BRIARGATE PKWY. EXTENSION. (REFERENCE JR ENG. STREET/STORM PLANS FOR BRIARGATE PKWY. AND STERLING RANCH RD. FOR

> POND FSD-16 (EDB _ (PRELIM. PLAN 1 & FOURSQUARE PUD DEVELOPMENTS ONLY BASINS P1-B & P1-F UNDEVELOPED)

TRIB. AREA = 220.9 AC. -WQCV = 2.55 AC.-FT.EURV = 3.04 AC.-FT.100 YR. = 5.92 AC. - FT.TOTAL = 11.51 AC.-FT.INFLOW: (SWWM MODEL) _Q5 = 197 CFS Q100 = 410 CFS

OUTFLOW: (MHFD-DETENTION) $Q5 = 2.5 \ CFS$ Q100 = 66.0 CFS



(FUTURE STERLING RANCH Residential use NOT PART OF THIS PLANY

NO DEVELOPMENT PROPOSED IN THIS BASIN AT THIS TIME

STERLING RANCH EAST PRELIMINARY PLAN NO. 1 Pond FSD-14B Tributary Area

Subcatchment	Area (Ac.)	Avg. Lot size (AC)	Effective Imperv. (%)
P4-A	37.3	6,500	60%
P4-B	25.8	6,500	60%
TOTAL	63.1		60%
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100 YR. = 7.54 AC.-FT. TOTAL = 18.82 AC.-FT.INFLOW: (SWWM MODEL) Q100 = 117.4 CFS



POND FSD-16 (EDB) (FULL BUILD-OUT) TRIB. AREA = 220.9 AC. WQCV = 3.60 AC.-FTEURV = 7.68 AC.-FT

205 = 323 CFSQ100 = 499 CFSOUTFLOW: (MHFD-DETENTION) $Q5 = 3.6 \ CFS$

42"-48" RCP STORM OUTFALL SYSTEM FOR FUTURE BASIN P1-B



UNPLATTÉD

(FUTURE STERLING RANCH

residential use NOT PART OF THIS PLAN)-

SEE SHEET 4

OUTFALL DESIGN)

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Pre-Developed Subcatchment Runoff					
Subcatchment	Area	SWMM Imperv.	Peak Runoff 5 yr.	Peak Runoff 100 yr.	
	(Ac.)	(%)	(CFS)	(CFS)	
EX-10	265.9	7%	105	222	
EX10A	153.5	5%	46	103	
EX-11 *	214.3	4%	54	129	
EX-13 *	94.8	6%	36	85	
EX-4A	44.2	8%	19	50	
EX-5	26.2	8%	12	32	
EX-7	152.8	5%	46	105	
EX-7A	2.4	2%	1	5	
EX-8	32.2	2%	5	23	
EX-8A	6.6	2%	2	9	
EX-9	139.3	8%	59	122	
EX-9A	21.8	5%	7	19	
TR-12 *	4.7	5%	2	9	
TR-20 *	23.2	7%	10	32	
TR-4 *	4.4	5%	2	9	
TR-5 *	13.7	5%	5	17	
TR-6 *	1.5	5%	1	4	
TD_7 *	26	5%	1	5	



Pond FSD-16 Tributary Area (Full Build Out)

Subcatchment Area Lot size Imperv. (Ac.) **P1-A** 12.7 N/A 15% **P1-B** 35.5 7,500 55% P1-C 8.9 N/A 70% P1-D 31.4 6,500 60% P1-E1 30.4 8,500 50% **P1-E2** 21.8 7,500 55% **P1-F** 76.7 12,500 35%

TR-V 2.1 17,500 27%

TR-W 1.4 13,500 32% TOTAL 220.9

STERLING RANCH EAST PRELIMINARY PLAN NO. 1