STORMWATER DRAINAGE REPORT

EAGLE CREEK VILLAS

Prepared for:

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Prepared by:

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Olsson Project No. 020-2467

olsson

TABLE OF CONTENTS

I. GENERAL INFORMATION

This report is being submitted as a summary of the stormwater drainage design for Eagle Creek Villas, located west of the intersection of SW Pryor Road and SW Eagle View Drive in the City of Lee's Summit, Jackson County, Missouri in the existing Eagle Creek subdivision. This area was previously included with the Eagle Creek Development Plan, prepared in 2001, and was planned for patio homes along with townhomes. With the development plan in 2001, a stormwater study was completed and approved by the city of Lee's Summit, Missouri encompassing this area. The previously approved study determined detention requirements for the development should be waived due to the proximity of the floodplain. This report will review the previously approved 2001 layout compared to the 2022 updated layout and potential impacts to the overall drainage areas. During the pre-applicants call, the city requested treatment for the local 90% mean annual event, or water quality storm event (1.37" for a 24-hour rainfall event), to be considered.

II. EAGLE CREEK VILLAS

A. Site Description

The Eagle Creek Villas project will be constructed on 29.04 acres of the existing Eagle Creek development and includes 96 villa style single family homes on 1/5 acre lots, tracts for open space along with the public infrastructure to support those lots. The Eagle Creek development plan assumed the impervious area of the Eagle Creek Villas area would be 40% and be used for 4-unit townhomes. This proposed layout will be single family homes on 1/5 acre lots with large open space tracts. The impervious area percentage of the proposed villas layout is 35%, a 5% reduction from the approved development plan, thus reducing the runoff for the site. Further analysis of the water quality treatment is detailed below.

B. Water Quality Treatment

Per the approved storm study, detention requirements were waived; however, since the development plan was approved, water quality requirements have been adopted by the city. The city has requested with this updated development plan, consideration of a water quality basin be reviewed. In review of the layout, a water quality basin is being proposed south of SW Eagle View Drive, on the western end of the site. This basin will treat stormwater prior to discharging into the existing stream. The water quality volume required is 27,028 cubic feet. The proposed water quality basin volume shown is 28,703 cubic feet and has 14.89 acres tributary to it. The water quality volume will be held in the pond for 40 hours past the peak time. The release rate from the pond will be controlled by a 3" x 3" square orifice cut into a steel plate on the outlet control structure.

For the area north of SW Eagle View Drive, no water quality basin is proposed. The impervious area has decreased for this area due to the planned use changing from townhomes to single family villa lots, which will improve stormwater runoff. Along with the decrease of impervious area, this area has limited space and is restricted by the existing development west of the site. Placement of a water quality basin would ideally be in the western open space tract, which is adjacent to existing townhomes. The drainage areas planned for the existing storm sewer would increase if we try to get the proposed roadway area to a water quality basin located in the open space tract. The basin would discharge to an existing field inlet west of the tract causing capacity concerns in the existing storm line the basin would drain to. Taking into account the existing storm sewer impact and the basin overflow from larger rain events being contracted at the existing townhome yards, placing a basin in the tract would have a negative impact on the existing development.

Since the impervious area has decreased from the previously approved layout, the proposed layout is in compliance with the previously approved storm drainage study. We are recommending no water quality treatment for the north area, to avoid a potential negative impact on existing homeowners.

III. CONCLUSIONS AND RECOMMENDATIONS

The proposed site layout reduces the impervious area when compared to the Eagle Creek development plan and will a positive impact on drainage in the area. Due to the approved storm study for the Eagle Creek development waiving detention requirements for the site, only the water quality storm event will be detained prior to releasing into the existing creek. Based on the information provided, Olsson requests approval of this stormwater drainage report for the proposed development of Eagle Creek Villas.

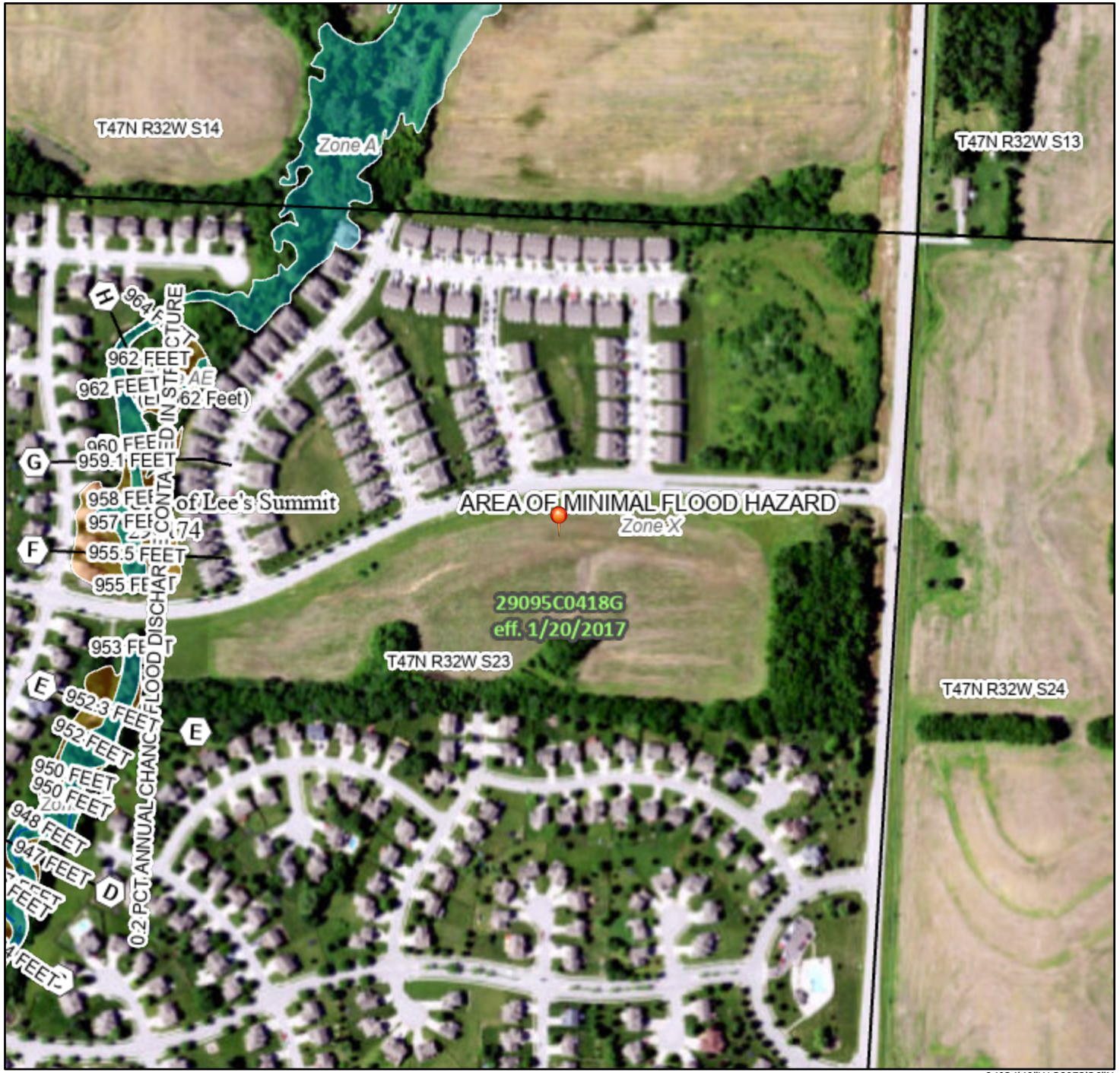
APPENDIX A

Exhibits and Calculations

National Flood Hazard Layer FIRMette

FEMA

94°25'26"W 38°53'4"N



94°24'49"W 38°52'36"N

Feet

0 250 500 1,000 1,500 2,000

1:6,000

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/12/2022 at 3:35 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Map Scale: 1:1,840 if printed on D landscape (34" x 22") sheet.

Meters: 0, 25, 50, 100, 150

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 23, Sep 1, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 6, 2019—Nov 16, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
10000	Arisburg silt loam, 1 to 5 percent slopes	C	21.9	10.6%
10024	Greenton-Urban land complex, 5 to 9 percent slopes	D	6.6	3.2%
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	C	15.9	7.7%
10117	Sampsel silty clay loam, 5 to 9 percent slopes	C/D	34.9	16.8%
10120	Sharpsburg silt loam, 2 to 5 percent slopes	C	38.8	18.7%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	D	33.5	16.1%
10181	Udarents-Urban land-Sampsel complex, 5 to 9 percent slopes	C	33.6	16.2%
30080	Greenton silty clay loam, 5 to 9 percent slopes	C/D	22.3	10.8%
Totals for Area of Interest			**207.3**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Worksheet: Water Quality Sizing

Project :	Eagle Creek Villas		
Location:	Lee's Summit, Missouri		
By:	BMW	Date:	4/22/2022
Checked:		Date:	

Water Quality Volume (WQv)

Water Quality Basin South

Tributary Drainage Area to Pond (acres) =	14.89
Impervious Area (acres) =	5.21

WQv= P x Rv x A

Rv = 0.05 + 0.009(i)

i = Percent Impervious

P (in)=	1.37
i (%) =	35
Rv =	0.365

WQv (ac-ft) =	0.62
WQv (cu-ft) =	27028

Basin Volume				
	ELEVATION (FT)	**AREA (SF)**	**(A1+A2)/2**	**VOL SUM (CF)**
Basin	954	3,088.00	0.00	0.00
	955	4,081.00	3,584.50	3,584.50
	956	5,131.00	4,606.00	8,190.50
	957	6,237.00	5,684.00	13,874.50
	958	7,400.00	6,818.50	20,693.00
	959	8,619.00	8,009.50	28,702.50

Multi-Hydrograph Plot

Hyd. No. 1

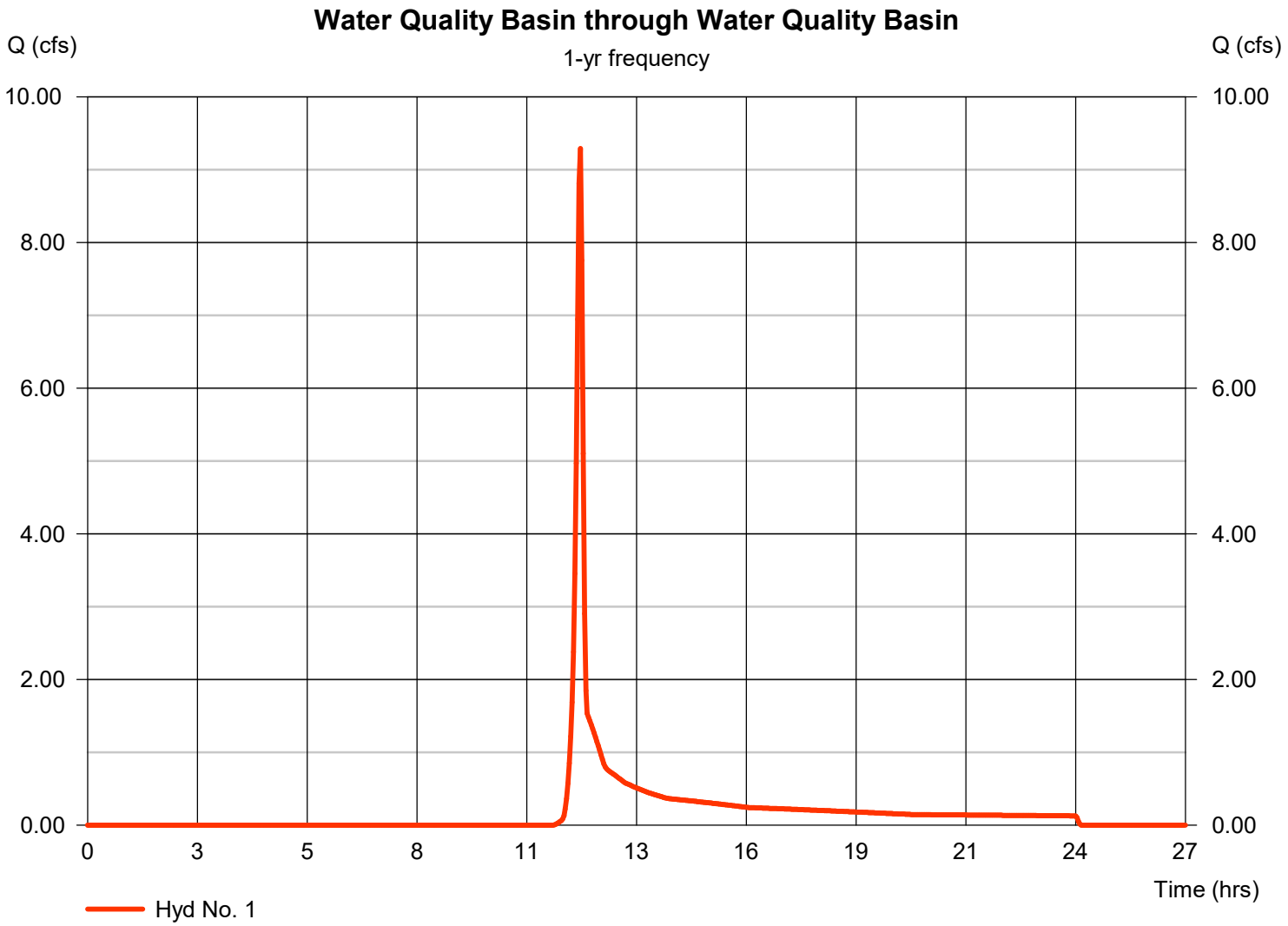
Water Quality Basin

Hydrograph type	=	SCS Runoff
Peak discharge	=	9.291 cfs
Time to peak	=	11.97 hrs
Hyd. Volume	=	18,843 cuft

Hyd. No. 1

Water Quality Basin

Hydrograph type	=	SCS Runoff
Peak discharge	=	9.29 cfs
Time to peak	=	11.97 hrs
Hyd. Volume	=	18,843 cuft



Hydrograph Report

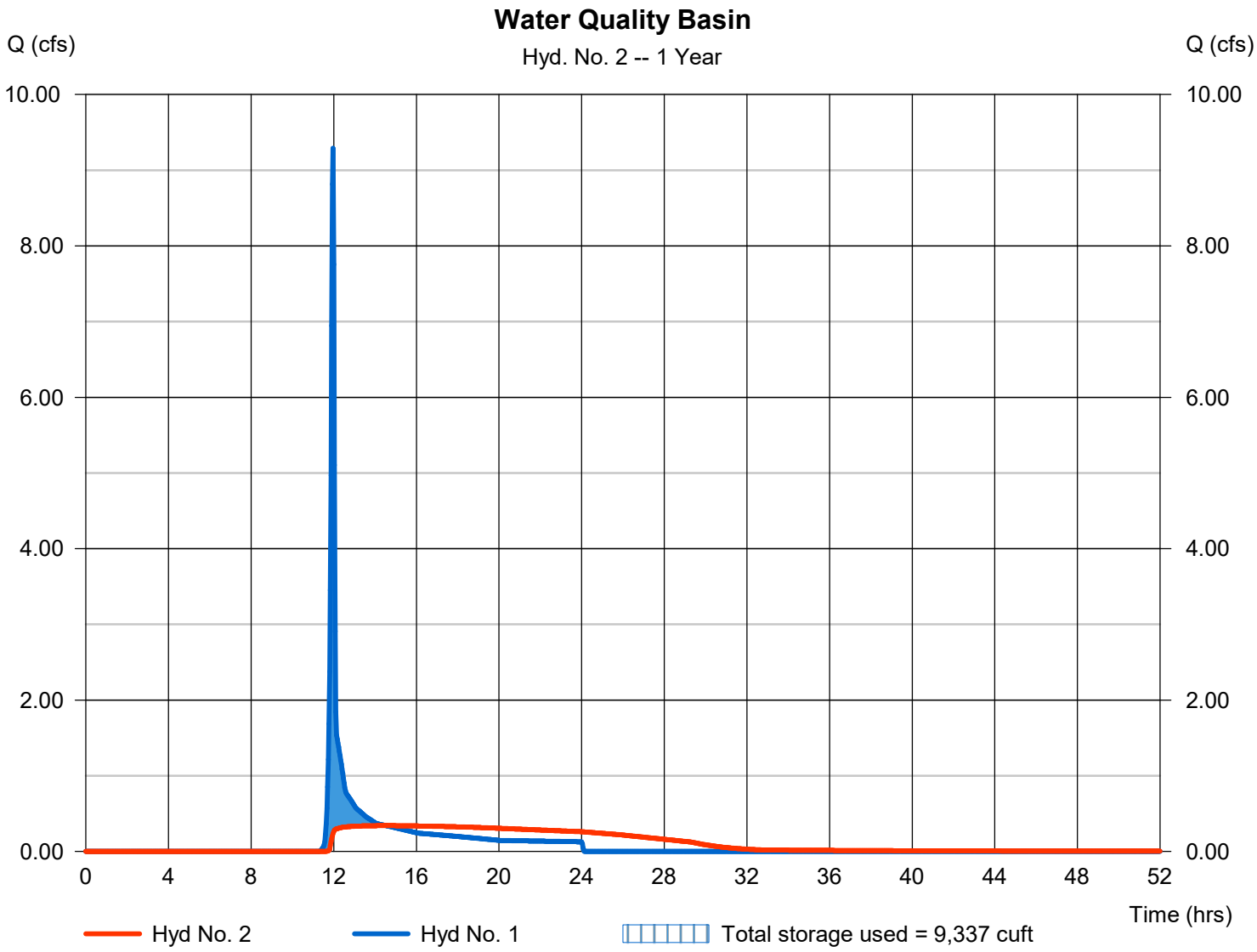
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 Wednesday, 04 / 20 / 2022

Hyd. No. 2

Water Quality Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.341 cfs
Storm frequency	= 1 yrs	Time to peak	= 14.53 hrs
Time interval	= 2 min	Hyd. volume	= 18,800 cuft
Inflow hyd. No.	= 1 - Water Quality Basin	Max. Elevation	= 956.20 ft
Reservoir name	= Water Quality Basin	Max. Storage	= 9,337 cuft

Storage Indication method used.



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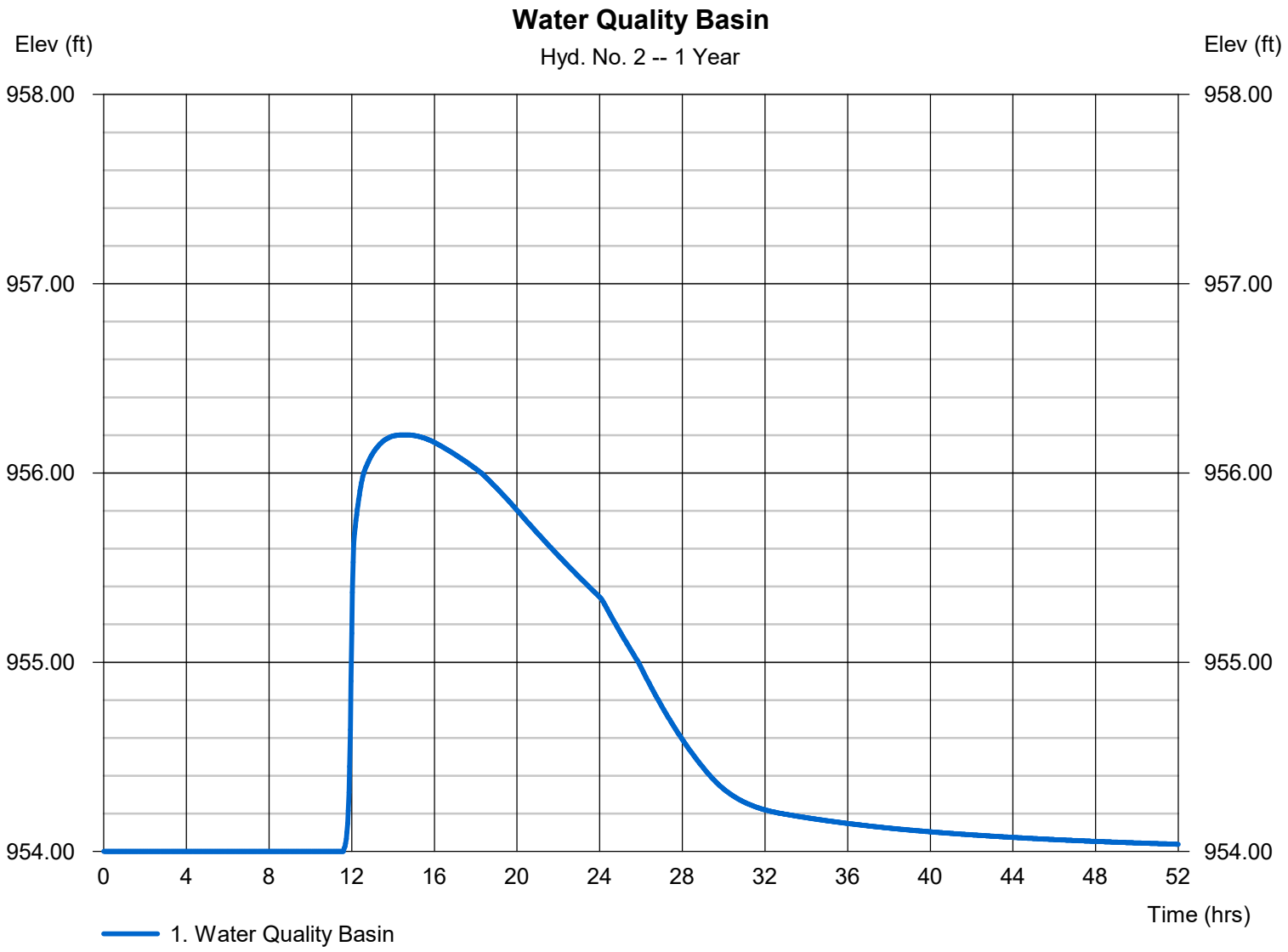


Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2022 — Wednesday, 04 / 20 / 2022

Pond No. 1 - Water Quality Basin

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 954.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	954.00	3,088	0	0
1.00	955.00	4,081	3,585	3,585
2.00	956.00	5,131	4,606	8,191
3.00	957.00	6,237	5,684	13,875
4.00	958.00	7,400	6,819	20,693
5.00	959.00	8,619	8,010	28,703

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 3.00	Inactive	Inactive	Inactive
Span (in)	= 3.00	0.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 954.00	0.00	0.00	0.00
Length (ft)	= 0.25	0.00	0.00	0.00
Slope (%)	= 2.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

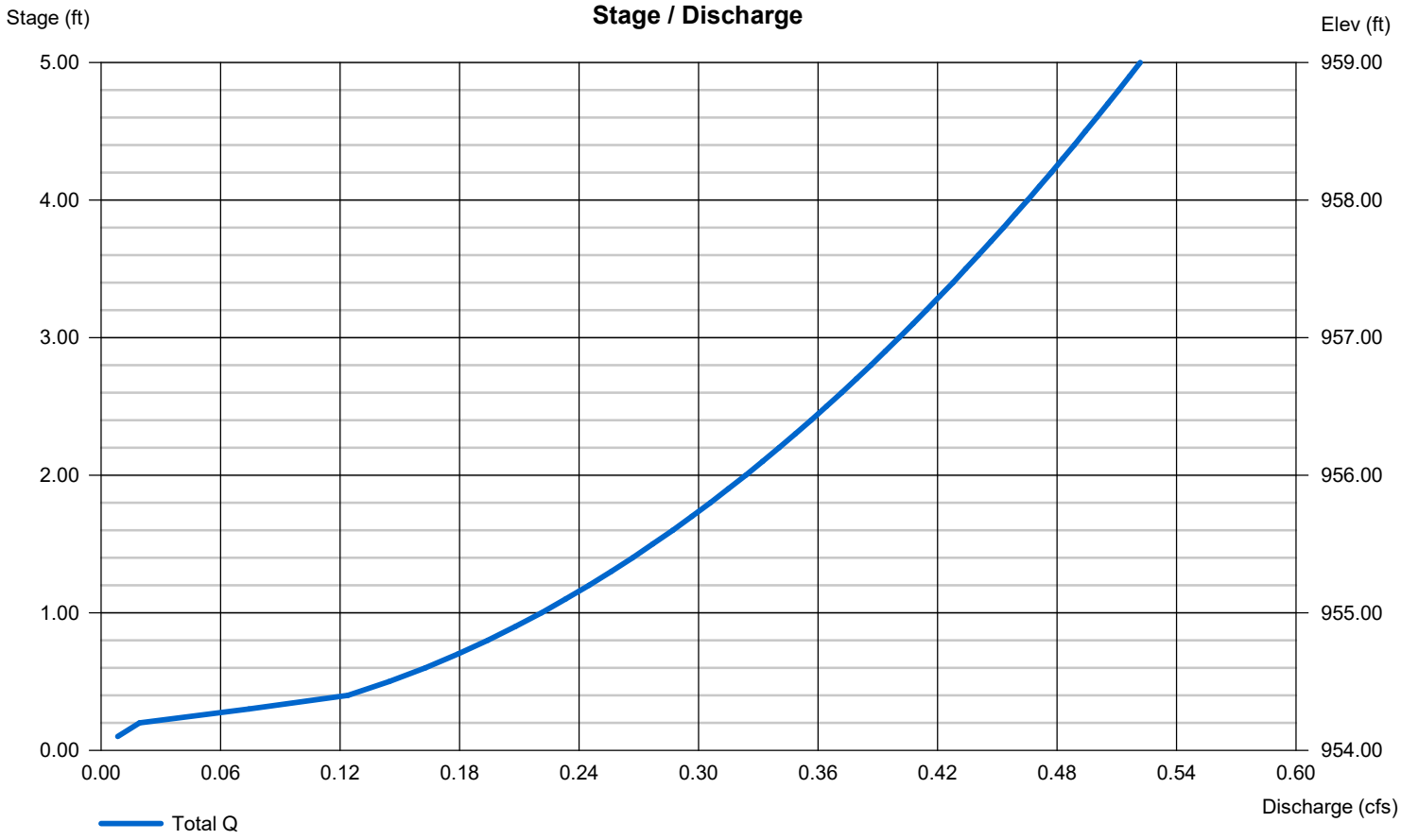
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 58.00	Inactive	Inactive	Inactive
Crest El. (ft)	= 959.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

Note: Culvert/Orifice outflows are analyzed under inlet (ic) and outlet (oc) control. Weir risers checked for orifice conditions (ic) and submergence (s).



EAGLE CREEK VILLAS

Lee’s Summit, MO

April 2022

Olsson Project No. 020-2467