RE: NEXT First Open Record Submittal (App DR 21-03; V 21-05 and CU 21-04) Email 2.B

Stephenson, Garrett H. <GStephenson@SCHWABE.com>

Wed 1/26/2022 5:41 PM

To: **ePermits - Planning <planning@columbiacountyor.gov>**; Jacyn Normine <Jacyn.Normine@columbiacountyor.gov>

Cc: 'Jesse Winterowd' <jesse@winterbrookplanning.com>; Robin McIntyre <Robin.McIntyre@columbiacountyor.gov>; Robert Wheeldon <Robert.Wheeldon@columbiacountyor.gov>; 'Brian Varricchione (BVarricchione@mcknze.com)' <BVarricchione@mcknze.com>

Here is the second of four sections of Mackenzie Exhibit B, noted below.

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Schwabe Williamson & Wyatt
Please visit our COVID-19 Resource page

From: Stephenson, Garrett H.
Sent: Wednesday, January 26, 2022 5:39 PM
To: 'planning@columbiacountyor.gov' <planning@columbiacountyor.gov>; 'Jacyn.Normine@columbiacountyor.gov' <Jacyn.Normine@columbiacountyor.gov>
Cc: 'Jesse Winterowd' <jesse@winterbrookplanning.com>; 'Robin McIntyre' <Robin.McIntyre@columbiacountyor.gov>; 'Robert Wheeldon' <Robert.Wheeldon@columbiacountyor.gov>; Brian Varricchione (BVarricchione@mcknze.com) <BVarricchione@mcknze.com>
Subject: RE: NEXT First Open Record Submittal (App DR 21-03; V 21-05 and CU 21-04) Email 2.A

To Whom it May Concern:

As you can see below, I attempted to send a large PDF file that enclosed NEXT's updated Stormwater Management Plan, which was Exhibit B to Mackenzie's letter submitted as part of our first open record submittal. In our third email, sent at 4:58 PM, we included a link to this document in case the file was too large. Indeed it was, and I have now received bounce back emails from the County (see attached). The County can nonetheless find that the document link is sufficient to submit the document prior to 5:00 PM.

Nonetheless, I understand that the County will accept documents until midnight because it did not indicate a time cutoff at the hearing. Therefore, we have reformatted the document and provide it in sections which are hopefully small enough to be accepted by the County's email server.

Please confirm that you have received this document and that it is part of the record under one or both methods of submittal discussed above.

Thanks!

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From: Stephenson, Garrett H.
Sent: Wednesday, January 26, 2022 4:54 PM
To: 'planning@columbiacountyor.gov' <planning@columbiacountyor.gov>; Jacyn.Normine@columbiacountyor.gov
Cc: 'Jesse Winterowd' <jesse@winterbrookplanning.com>; 'Robin McIntyre' <Robin.McIntyre@columbiacountyor.gov>; 'Robert Wheeldon' <Robert.Wheeldon@columbiacountyor.gov>; 'Christopher Efird' <chris@nextrenewables.com>; 'Brian Varricchione (BVarricchione@mcknze.com)' <BVarricchione@mcknze.com>; 'Gene Cotten' <gene@nextrenewables.com>; 'Laurie Parry' <Laurie@stewardshipsolutionsinc.com>
Subject: RE: NEXT First Open Record Submittal (App DR 21-03; V 21-05 and CU 21-04) Email 2

To Whom it may Concern:

Please find attached Exhibit B to the Mackenzie exhibit referenced in email one.

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Sent: Wednesday, January 26, 2022 4:41 PM
To: 'planning@columbiacountyor.gov' <planning@columbiacountyor.gov>
Cc: Jesse Winterowd <jesse@winterbrookplanning.com>; 'Robin McIntyre' <Robin.McIntyre@columbiacountyor.gov>; Robert Wheeldon <Robert.Wheeldon@columbiacountyor.gov>; 'Christopher Efird' <chris@nextrenewables.com>; Brian Varricchione (BVarricchione@mcknze.com) <BVarricchione@mcknze.com>; Gene Cotten <gene@nextrenewables.com>; Laurie Parry <Laurie@stewardshipsolutionsinc.com>
Subject: NEXT First Open Record Submittal (App DR 21-03; V 21-05 and CU 21-04) Email 1

To Whom it may Concern:

Please find attached NEXT's first open record submittal, which includes additional factual testimony. This is the first of a few emails, given the size of some of the files. Please confirm that you have received this, include this in the official record, and place it before the Board.

Thank you,

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

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 1:20,000.

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: Columbia County, Oregon
Survey Area Data: Version 17, Jun 11, 2020

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

Date(s) aerial images were photographed: Apr 16, 2015—Feb 12, 2017

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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
15	Crims silt loam, protected	1.0	0.8%
61	Udipsamments, nearly level, protected	104.1	83.4%
66	Wauna silt loam, protected	7.0	5.6%
68	Wauna-Locoda silt loams, protected	12.9	10.3%
Totals for Area of Interest		**124.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas.* Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Columbia County, Oregon

15—Crims silt loam, protected

Map Unit Setting

National map unit symbol: 21f3
Elevation: 0 to 20 feet
Mean annual precipitation: 50 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 165 to 210 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Crims, protected, and similar soils: 95 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Crims, Protected

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Partially decomposed herbaceous plant material over silty alluvium

Typical profile

H1 - 0 to 9 inches: silt loam
Oe - 9 to 40 inches: mucky peat
H3 - 40 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: RareNone
Frequency of ponding: Frequent
Available water capacity: Very high (about 22.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Locoda, protected

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Other vegetative classification: Very Poorly Drained (G001XY009OR)
Hydric soil rating: Yes

Wauna, protected

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G001XY008OR)
Hydric soil rating: Yes

61—Udipsamments, nearly level, protected

Map Unit Setting

National map unit symbol: 21h4
Elevation: 0 to 40 feet
Mean annual precipitation: 50 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 145 to 210 days
Farmland classification: Not prime farmland

Map Unit Composition

Udipsamments, protected, and similar soils: 85 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udipsamments, Protected

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy dredge spoils

Typical profile

H1 - 0 to 4 inches: loamy sand
H2 - 4 to 60 inches: fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: RareNone
Frequency of ponding: None
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: Yes

Minor Components

Wauna, protected

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Poorly Drained (G001XY008OR)
Hydric soil rating: Yes

Locoda, protected

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Very Poorly Drained (G001XY009OR)
Hydric soil rating: Yes

Crims, protected

Percent of map unit: 4 percent
Landform: Flood plains
Hydric soil rating: Yes

66—Wauna silt loam, protected

Map Unit Setting

National map unit symbol: 21h9
Elevation: 0 to 40 feet
Mean annual precipitation: 50 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 145 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wauna, protected, and similar soils: 90 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wauna, Protected

Setting

Landform: Flood plains

Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium derived from mixed sources

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: silt loam
H3 - 26 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 60 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Available water capacity: Very high (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Forage suitability group: Poorly Drained (G002XY006OR)
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Minor Components

Crims, protected

Percent of map unit: 3 percent
Landform: Flood plains
Hydric soil rating: Yes

Locoda, protected

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Very Poorly Drained (G001XY009OR)
Hydric soil rating: Yes

Udipsamments, protected

Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

68—Wauna-Locoda silt loams, protected

Map Unit Setting

National map unit symbol: 21hc
Elevation: 0 to 40 feet
Mean annual precipitation: 50 to 80 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 145 to 210 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Wauna, protected, and similar soils: 45 percent
Locoda, protected, and similar soils: 35 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wauna, Protected

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium derived from mixed sources

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 26 inches: silt loam
H3 - 26 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 24 to 60 inches
Frequency of flooding: NoneRare
Frequency of ponding: None
Available water capacity: Very high (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Forage suitability group: Poorly Drained (G002XY006OR)
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Description of Locoda, Protected

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium from mixed sources

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: RareNone
Frequency of ponding: Frequent
Available water capacity: Very high (about 12.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Forage suitability group: Poorly Drained (G002XY006OR)
Other vegetative classification: Poorly Drained (G002XY006OR)
Hydric soil rating: Yes

Minor Components

Udipsamments, protected

Percent of map unit: 7 percent
Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Crims, protected

Percent of map unit: 7 percent
Landform: Flood plains
Hydric soil rating: Yes

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX C

WATER QUALITY TREATMENT SWALE SIZING

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

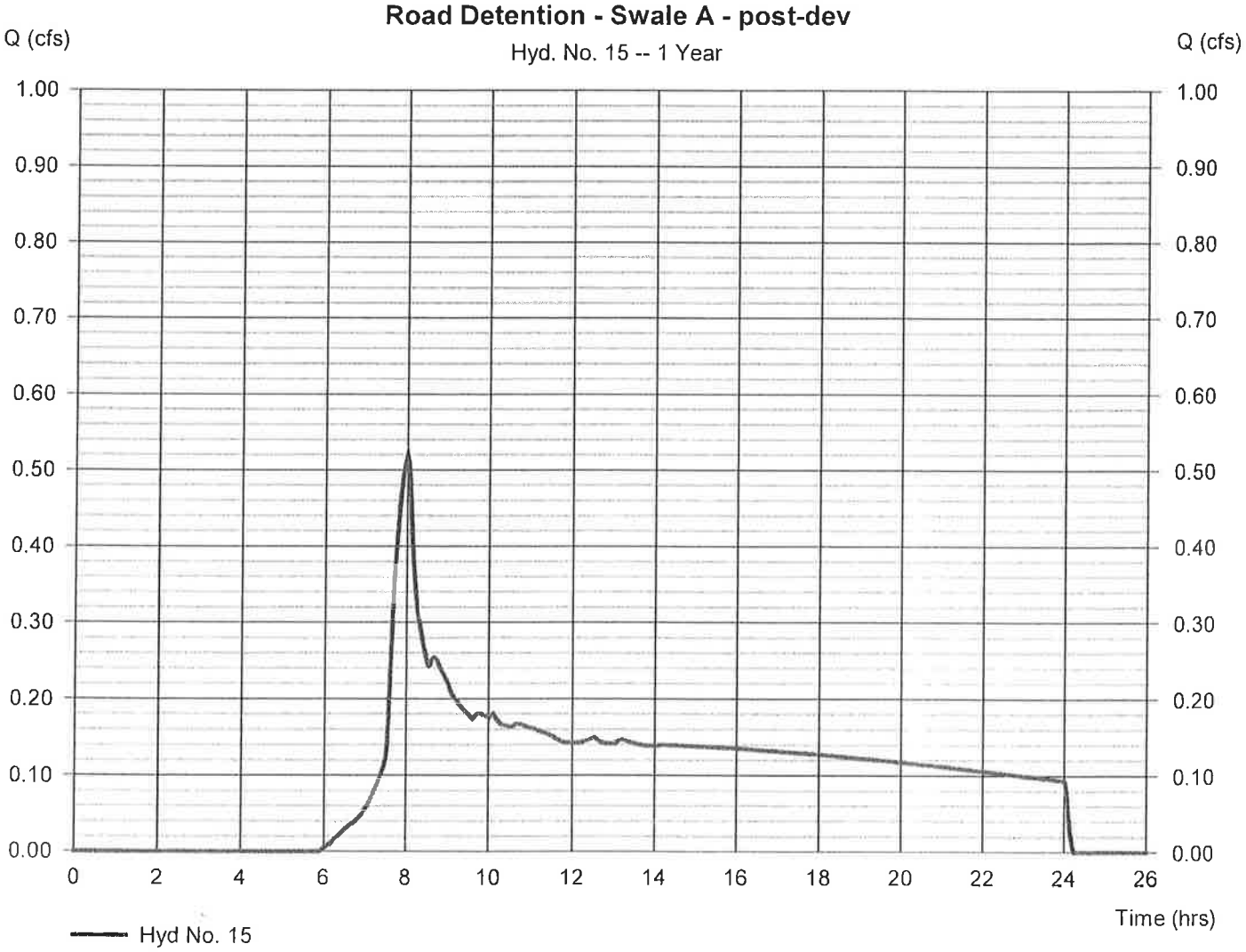
Monday, 07 / 12 / 2021

Hyd. No. 15

Road Detention - Swale A - post-dev

Hydrograph type	= SCS Runoff	Peak discharge	= 0.519 cfs
Storm frequency	= 1 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 9,222 cuft
Drainage area	= 4.980 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.00 min
Total precip.	= 1.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.890 x 98) + (2.360 x 92) + (1.730 x 78)] / 4.980



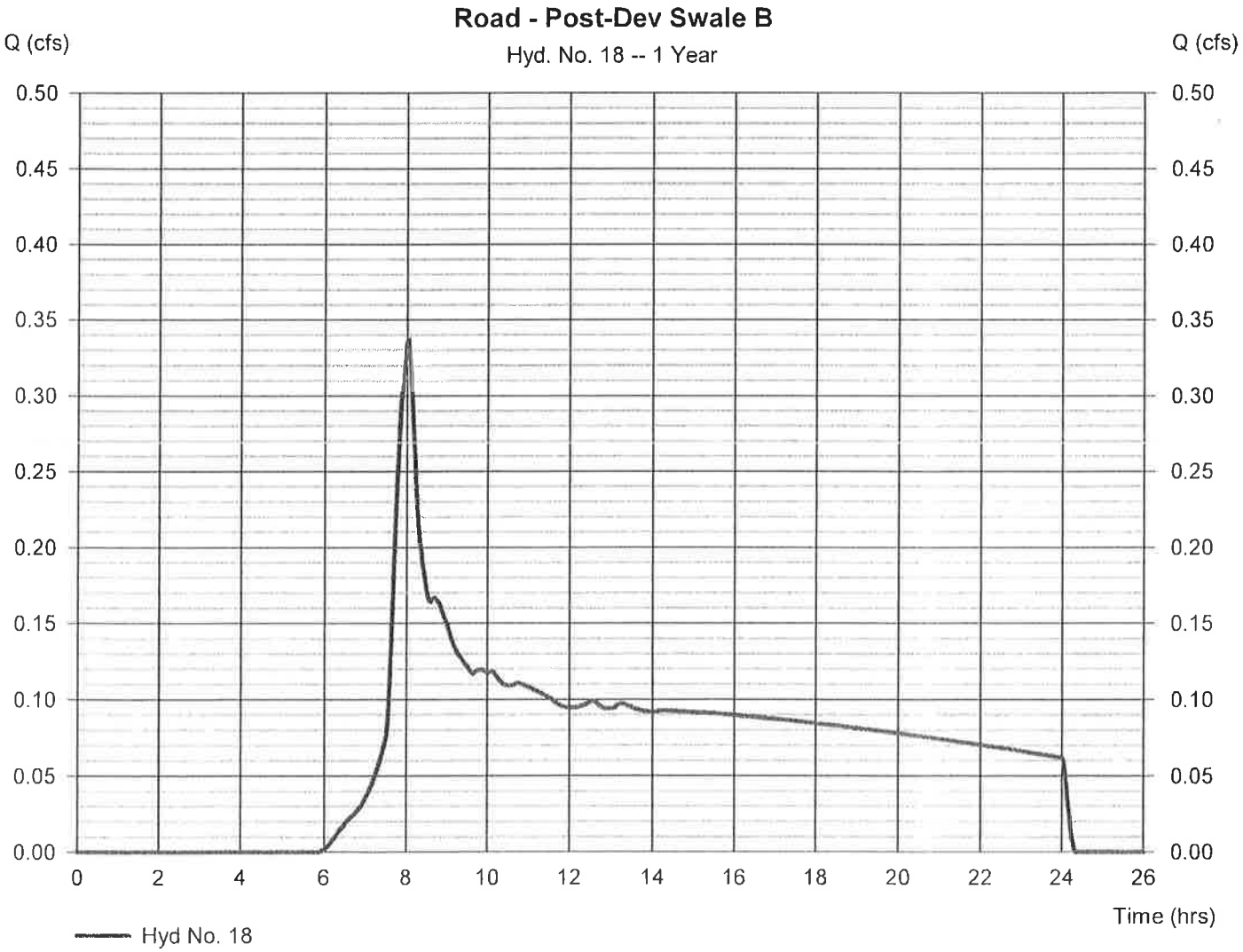
Hydrograph Report

Hyd. No. 18

Road - Post-Dev Swale B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.336 cfs
Storm frequency	= 1 yrs	Time to peak	= 8.03 hrs
Time interval	= 2 min	Hyd. volume	= 6,111 cuft
Drainage area	= 3.200 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.480 x 98) + (1.580 x 92) + (1.140 x 78)] / 3.200



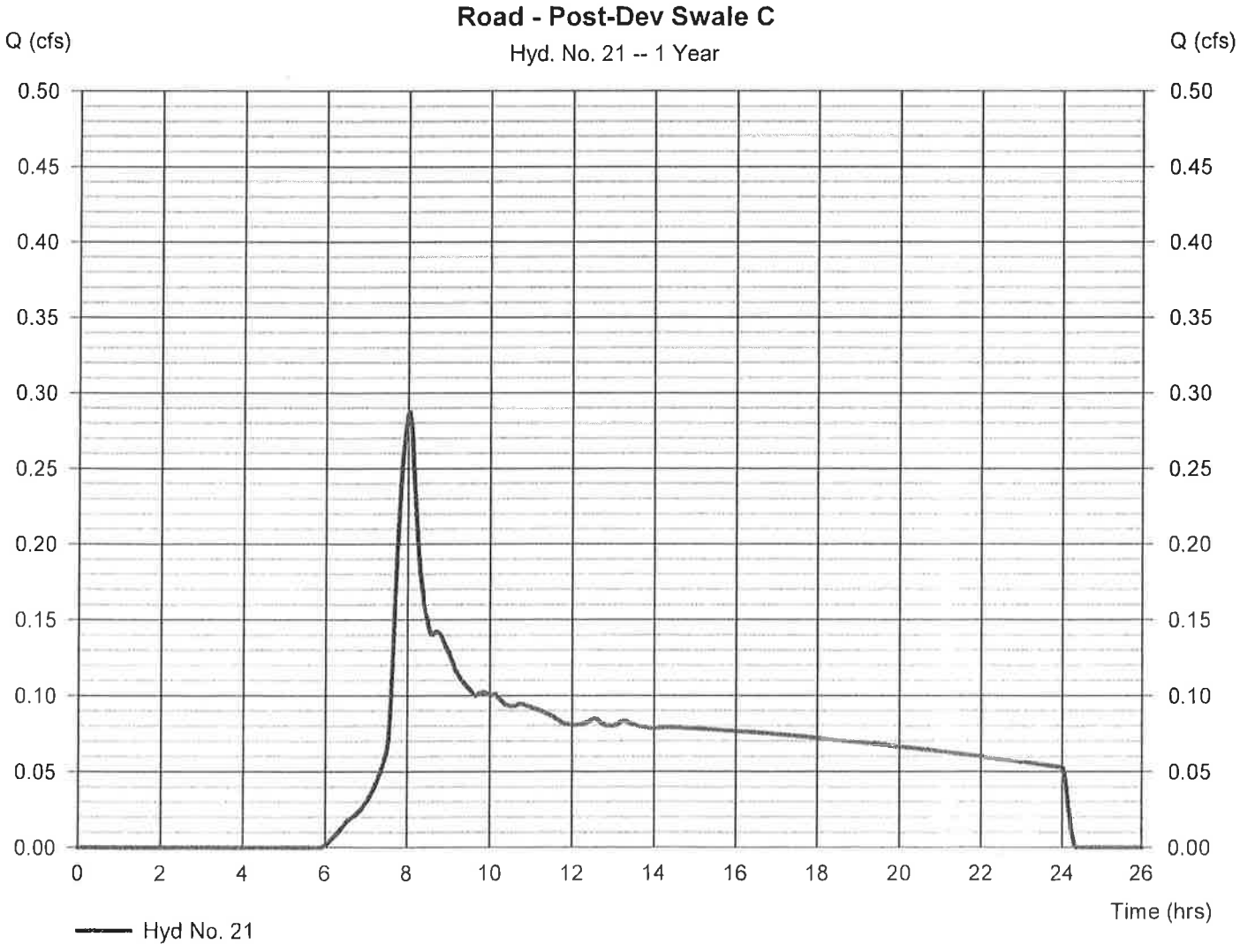
Hydrograph Report

Hyd. No. 21

Road - Post-Dev Swale C

Hydrograph type	= SCS Runoff	Peak discharge	= 0.286 cfs
Storm frequency	= 1 yrs	Time to peak	= 8.03 hrs
Time interval	= 2 min	Hyd. volume	= 5,214 cuft
Drainage area	= 2.730 ac	Curve number	= 88*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (1.340 x 92) + (0.980 x 78)] / 2.730



Hydrograph Report

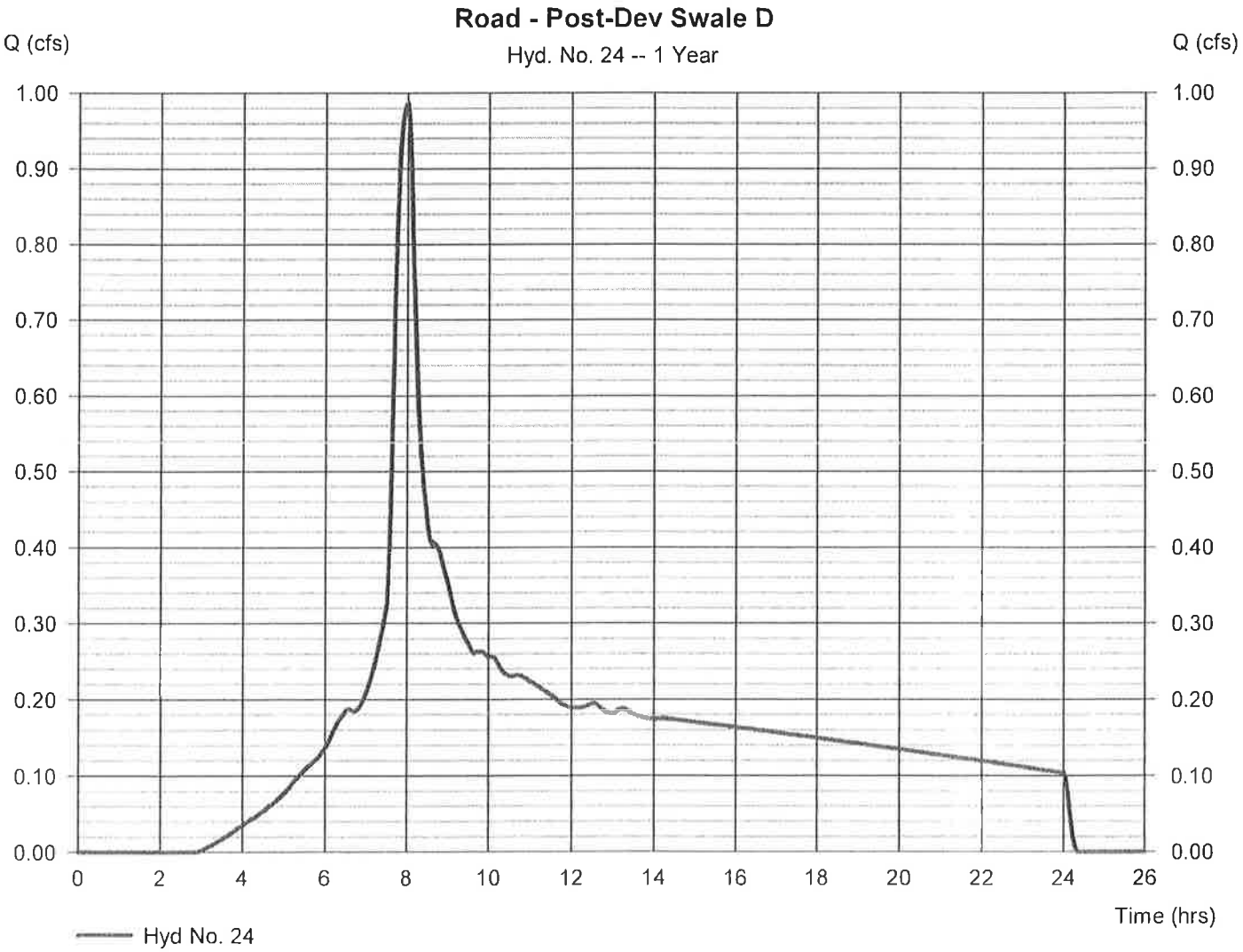
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 07 / 12 / 2021

Hyd. No. 24

Road - Post-Dev Swale D

Hydrograph type	= SCS Runoff	Peak discharge	= 0.985 cfs
Storm frequency	= 1 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 14,094 cuft
Drainage area	= 4.090 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.900 x 98) + (2.360 x 92) + (0.830 x 98)] / 4.090



Open Channel Design - Swales and Ditches

Project Name: NEXT Renewables Port Westward
Project No.: 2200315.01
Channel ID: Access Road drainage swales
Date: 7/12/2021
By: B. Nielsen

Channel Geometry

Left Side Slope:	3 H : 1V	Channel Lining:	Grass / Vegetation
Right Side Slope:	3 H : 1V	Manning's *n* Roughness:	0.24
Bottom Width:	4.0 ft	Channel Length:	300 ft
Flowline Slope:	0.012 ft / ft	Min. Freeboard Req'd:	1.0 ft

Uniform Flow Depth Summary

- Calculate flow characteristics using Manning's Equation assuming steady uniform flow: $Q = \frac{a}{n} A \cdot R^{2/3} \sqrt{S}$

Swale A: STA 1+30 to 13+30

Storm Event	Flow Rate (cfs)	Flow Depth (in)	Flow Velocity (ft/s)	Residence Time (min)
WQ	0.52	4.20	0.29	17.00
2-yr	2.03	8.84	0.44	11.20
10-yr	3.38	11.52	0.51	9.70
100-yr	5.27	14.39	0.58	8.60

Swale B: STA 13+30 to 20+30

Storm Event	Flow Rate (cfs)	Flow Depth (in)	Flow Velocity (ft/s)	Residence Time (min)
WQ	0.34	3.30	0.26	19.50
2-yr	1.34	7.09	0.39	12.70
10-yr	2.22	9.27	0.45	10.90
100-yr	3.47	11.67	0.52	9.60

Swale C: STA 20+30 to 26+30

Storm Event	Flow Rate (cfs)	Flow Depth (in)	Flow Velocity (ft/s)	Residence Time (min)
WQ	0.29	3.02	0.24	20.60
2-yr	1.14	6.49	0.37	13.30
10-yr	1.89	8.52	0.43	11.50
100-yr	2.96	10.76	0.49	10.10

Swale D: STA 26+30 to 39+40

Storm Event	Flow Rate (cfs)	Flow Depth (in)	Flow Velocity (ft/s)	Residence Time (min)
WQ	0.99	6.01	0.36	13.90
2-yr	2.47	9.80	0.47	10.60
10-yr	3.64	11.96	0.52	9.50
100-yr	5.22	14.33	0.58	8.60

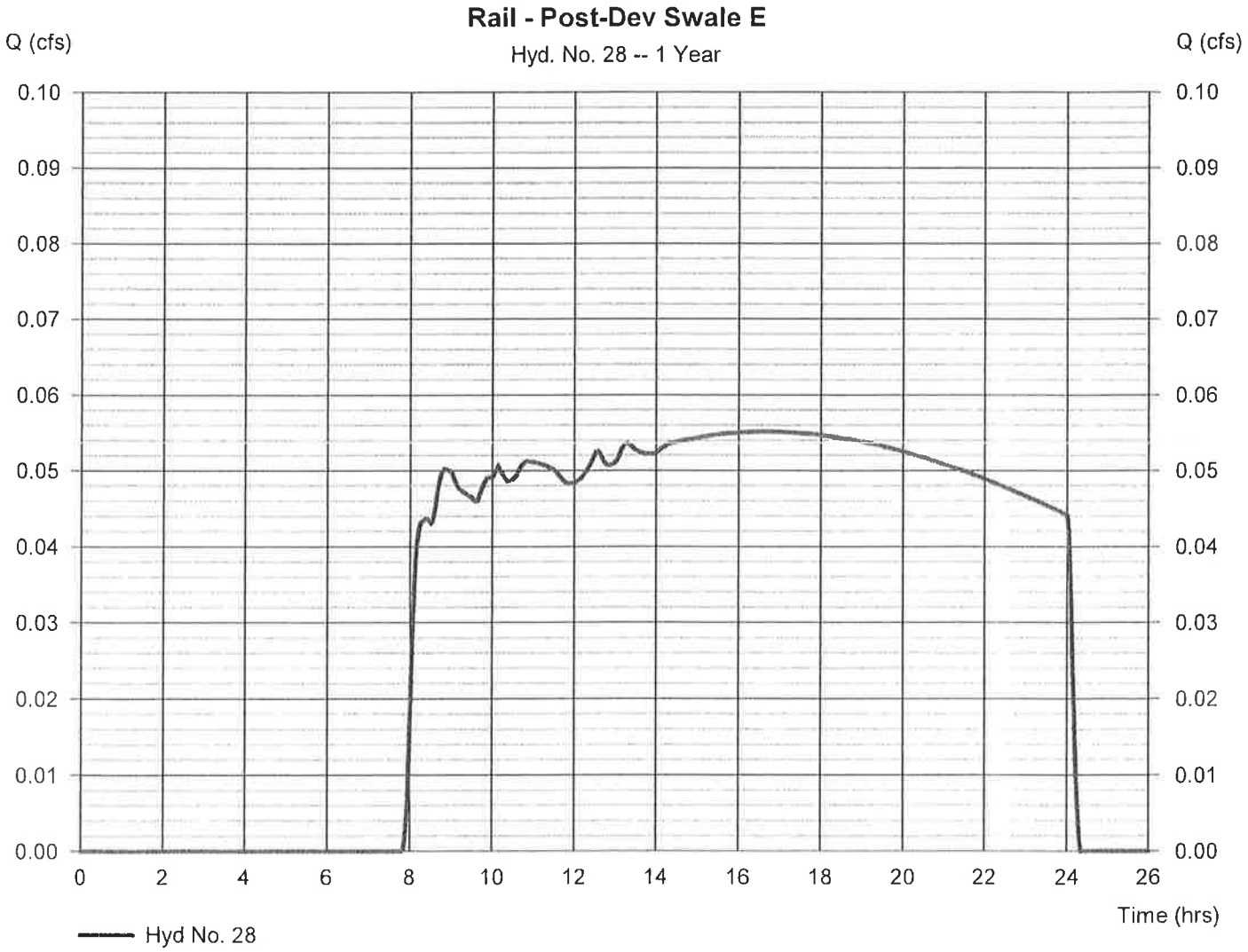
Hydrograph Report

Hyd. No. 28

Rail - Post-Dev Swale E

Hydrograph type	= SCS Runoff	Peak discharge	= 0.055 cfs
Storm frequency	= 1 yrs	Time to peak	= 16.63 hrs
Time interval	= 2 min	Hyd. volume	= 2,961 cuft
Drainage area	= 3.700 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = + (0.370 x 92) + (3.330 x 78)] / 3.700



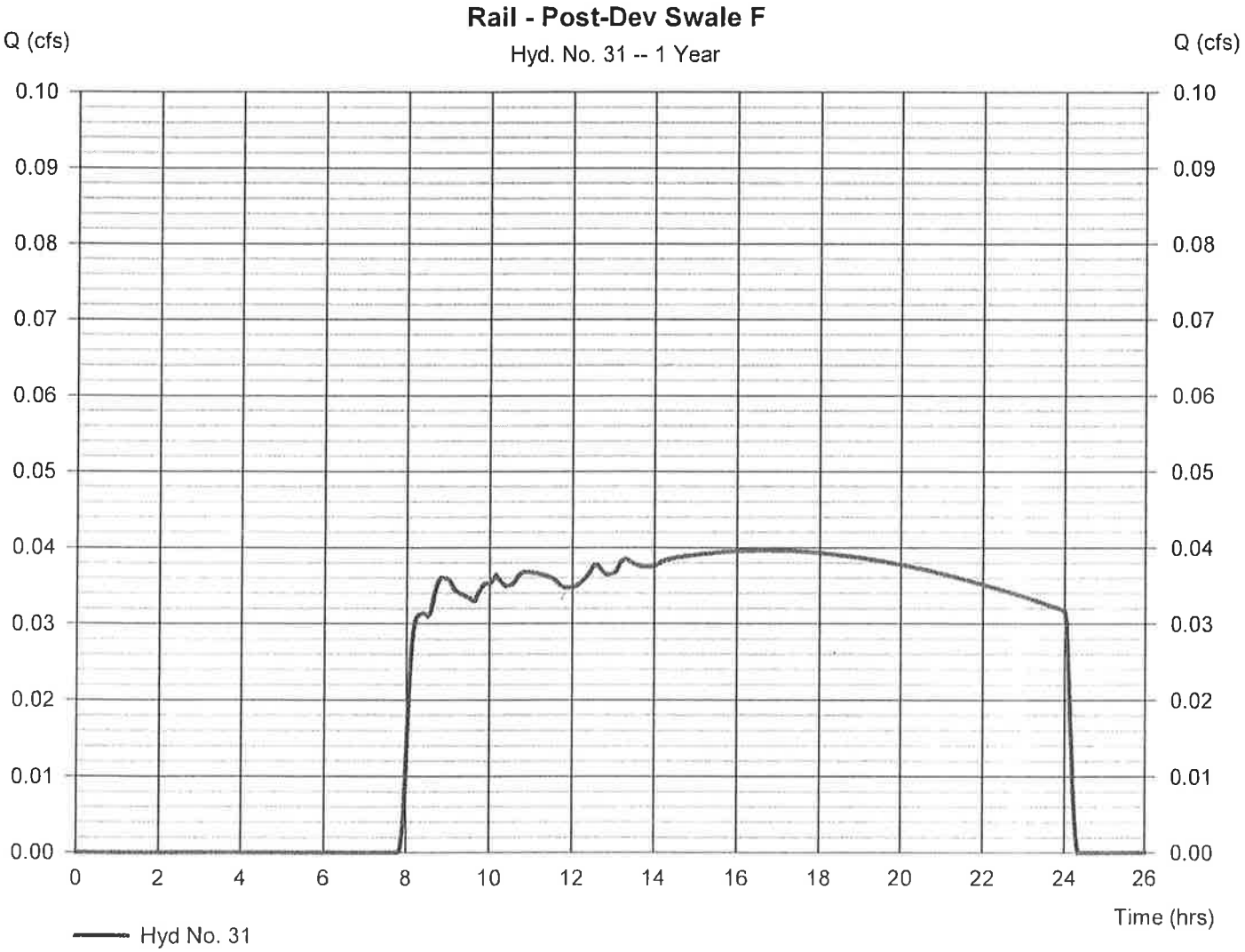
Hydrograph Report

Hyd. No. 31

Rail - Post-Dev Swale F

Hydrograph type	= SCS Runoff	Peak discharge	= 0.040 cfs
Storm frequency	= 1 yrs	Time to peak	= 16.63 hrs
Time interval	= 2 min	Hyd. volume	= 2,129 cuft
Drainage area	= 2.660 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = + (0.200 x 92) + (2.460 x 78)] / 2.660



Hydrograph Report

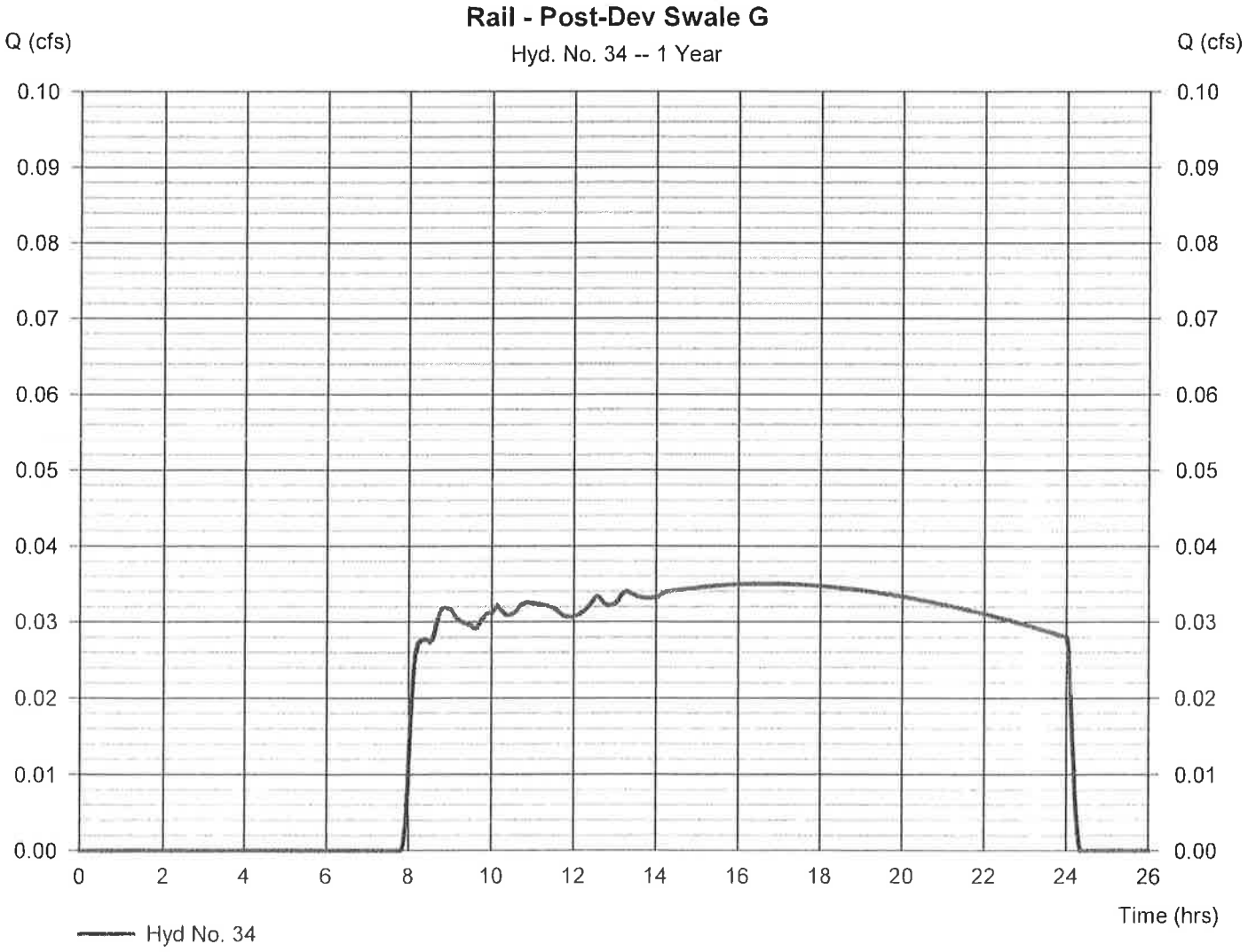
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 07 / 12 / 2021

Hyd. No. 34

Rail - Post-Dev Swale G

Hydrograph type	= SCS Runoff	Peak discharge	= 0.035 cfs
Storm frequency	= 1 yrs	Time to peak	= 16.63 hrs
Time interval	= 2 min	Hyd. volume	= 1,881 cuft
Drainage area	= 2.350 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = + (0.200 x 92) + (2.150 x 78)] / 2.350



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

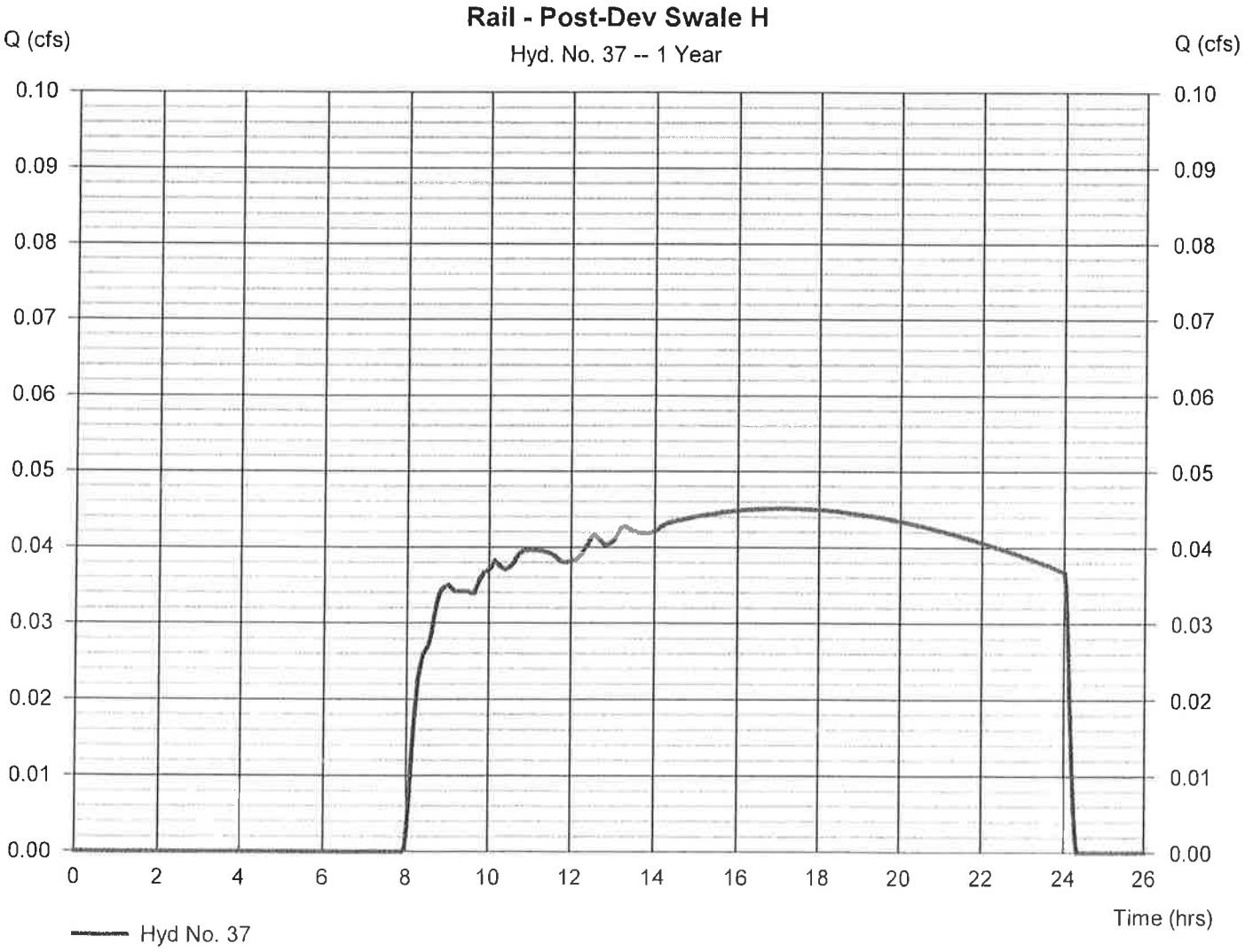
Monday, 07 / 12 / 2021

Hyd. No. 37

Rail - Post-Dev Swale H

Hydrograph type	= SCS Runoff	Peak discharge	= 0.045 cfs
Storm frequency	= 1 yrs	Time to peak	= 17.13 hrs
Time interval	= 2 min	Hyd. volume	= 2,354 cuft
Drainage area	= 3.290 ac	Curve number	= 78*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = + (0.160 x 92) + (3.130 x 78)] / 3.290



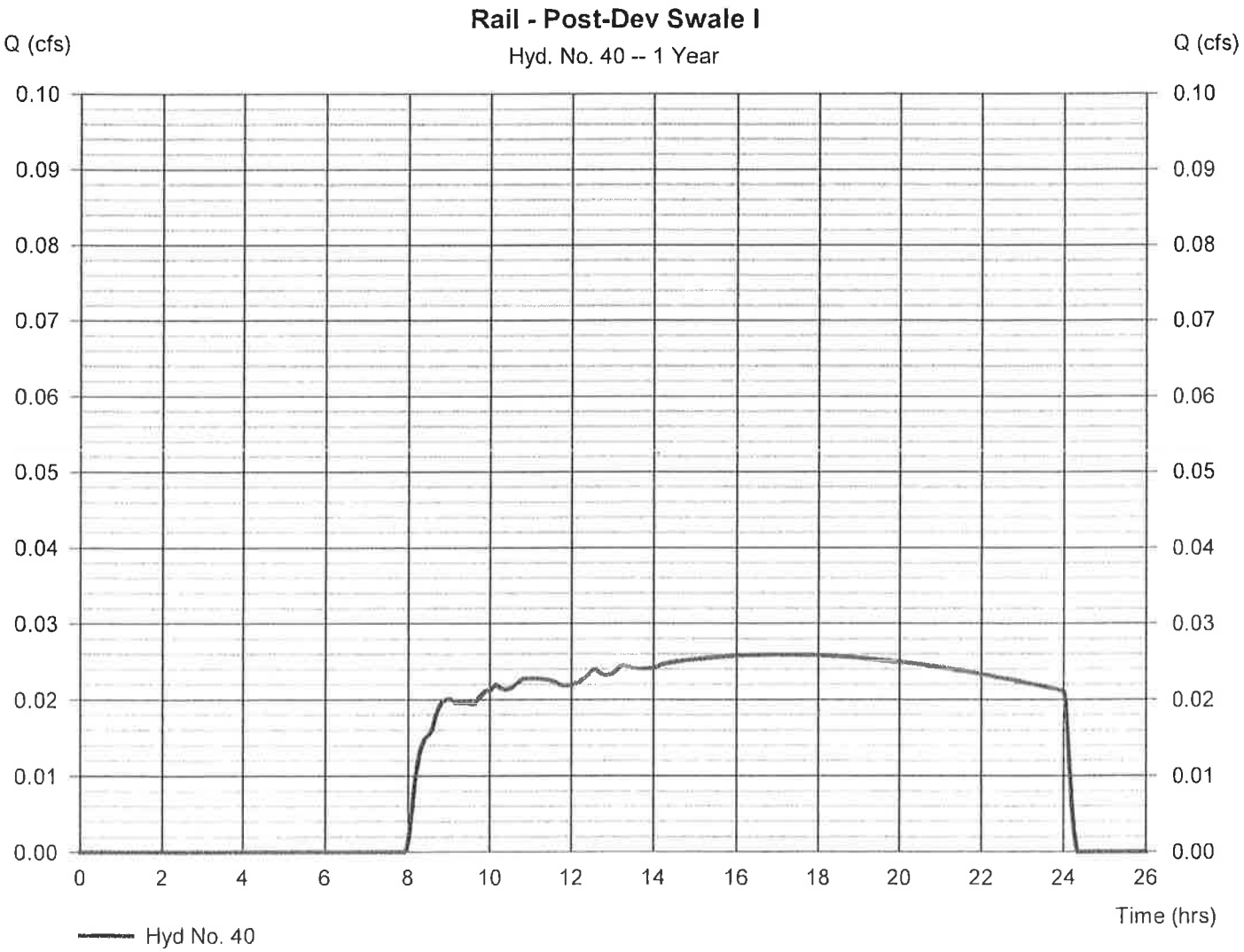
Hydrograph Report

Hyd. No. 40

Rail - Post-Dev Swale I

Hydrograph type	= SCS Runoff	Peak discharge	= 0.026 cfs
Storm frequency	= 1 yrs	Time to peak	= 17.13 hrs
Time interval	= 2 min	Hyd. volume	= 1,352 cuft
Drainage area	= 1.890 ac	Curve number	= 78*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 1.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = + (1.890 x 78)] / 1.890



Open Channel Design - Swales and Ditches

Project Name: NEXT Renewables Port Westward
Project No.: 2200315.01
Channel ID: Rail Yard drainage swales
Date: 7/12/2021
By: B. Nielsen

Channel Geometry

Left Side Slope:	3 H : 1V	Channel Lining:	Grass / Vegetation
Right Side Slope:	3 H : 1V	Manning's *n* Roughness:	0.24
Bottom Width:	2.0 ft	Channel Length:	300 ft
Flowline Slope:	0.012 ft / ft	Min. Freeboard Req'd:	1.0 ft

Uniform Flow Depth Summary

- Calculate flow characteristics using Manning's Equation assuming steady uniform flow: $Q = \frac{a}{n} A \cdot R^{2/3} \sqrt{S}$

Swale E:

Storm Event	Flow Rate (cfs)	Flow Depth (in)	Flow Velocity (ft/s)	Residence Time (min)
WQ	0.06	1.67	0.16	30.90
2-yr	0.81	7.09	0.36	13.80
10-yr	1.65	10.05	0.44	11.40
100-yr	2.96	13.17	0.51	9.80

Swale F:

Storm Event	Flow Rate (cfs)	Flow Depth (in)	Flow Velocity (ft/s)	Residence Time (min)
WQ	0.04	1.38	0.14	34.50
2-yr	0.58	6.01	0.33	15.10
10-yr	1.19	8.58	0.40	12.40
100-yr	2.13	11.31	0.47	10.70

Swale G:

Storm Event	Flow Rate (cfs)	Flow Depth (in)	Flow Velocity (ft/s)	Residence Time (min)
WQ	0.04	1.28	0.14	36.30
2-yr	0.51	5.64	0.32	15.60
10-yr	1.05	8.08	0.39	12.80
100-yr	1.88	10.67	0.45	11.00

Swale H:

Storm Event	Flow Rate (cfs)	Flow Depth (in)	Flow Velocity (ft/s)	Residence Time (min)
WQ	0.05	1.49	0.15	32.90
2-yr	0.66	6.40	0.34	14.60
10-yr	1.39	9.24	0.42	11.90
100-yr	2.53	12.26	0.49	10.20

Swale I:

Storm Event	Flow Rate (cfs)	Flow Depth (in)	Flow Velocity (ft/s)	Residence Time (min)
WQ	0.03	1.08	0.12	40.00
2-yr	0.38	4.81	0.29	17.00
10-yr	0.80	7.06	0.36	13.80
100-yr	1.45	9.45	0.42	11.80

APPENDIX D

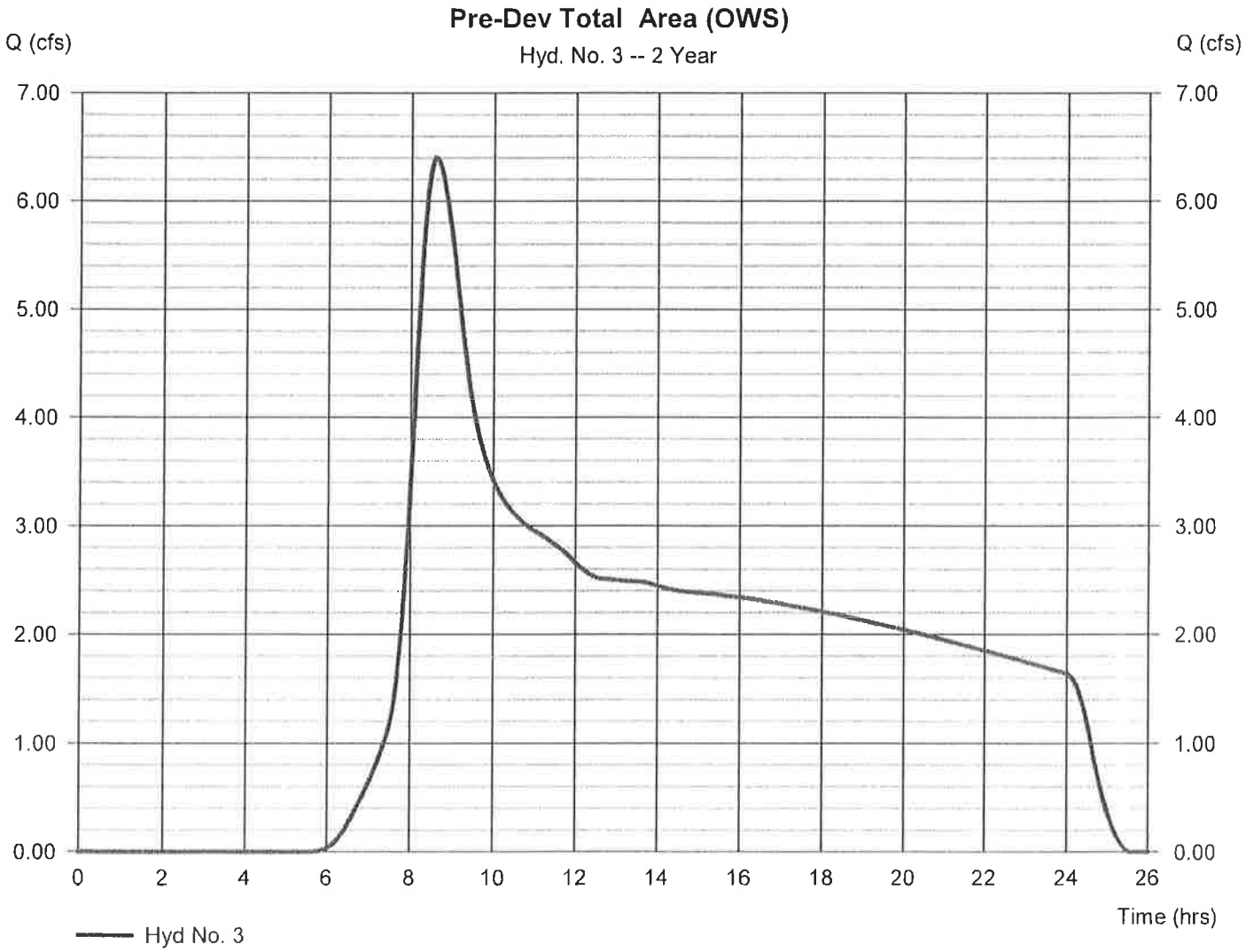
PRE-DEVELOPMENT AND DEVELOPED HYDROLOGY CALCULATIONS

Hydrograph Report

Hyd. No. 3

Pre-Dev Total Area (OWS)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.402 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.57 hrs
Time interval	= 2 min	Hyd. volume	= 161,143 cuft
Drainage area	= 40.280 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 60.00 min
Total precip.	= 2.80 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

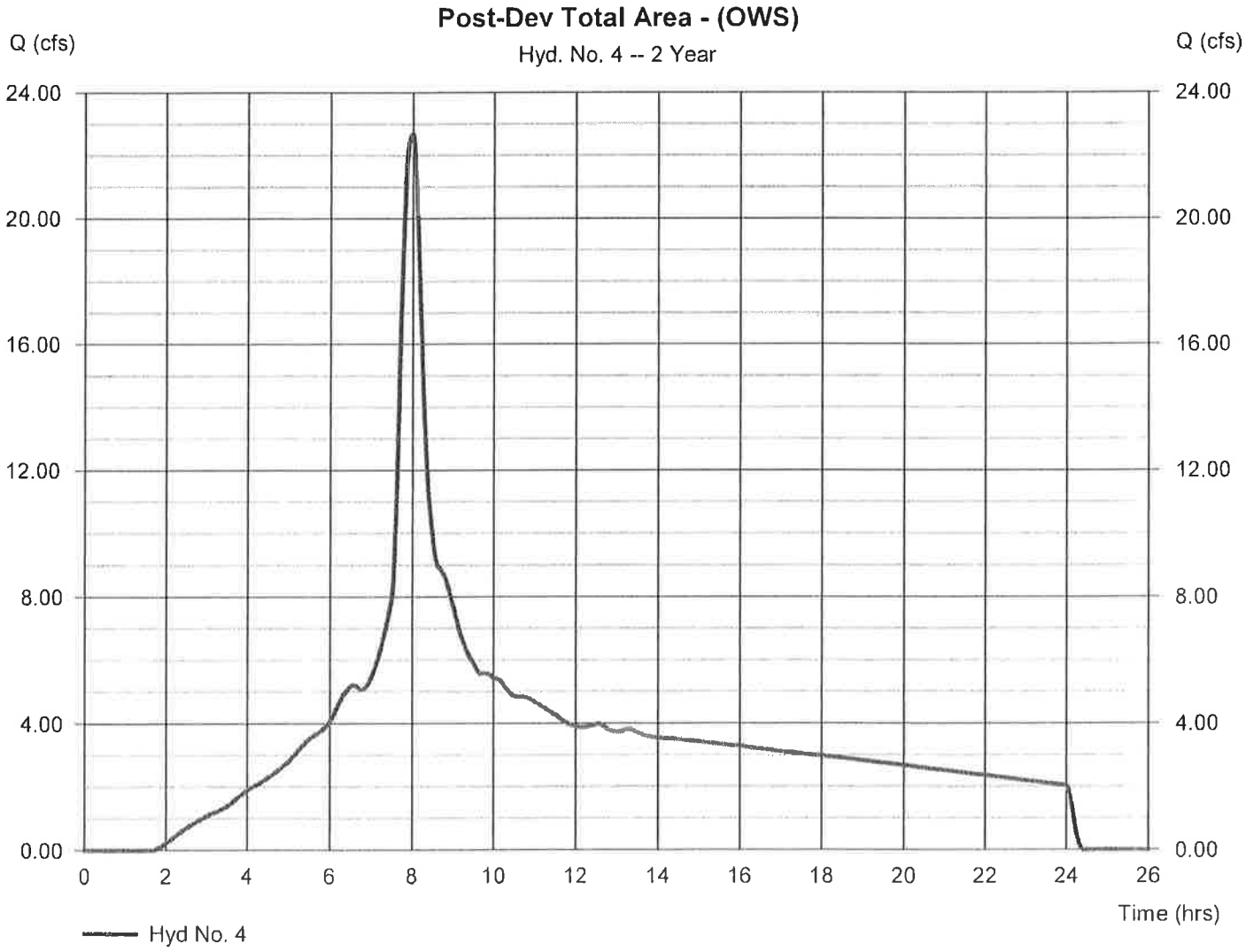
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 07 / 12 / 2021

Hyd. No. 4

Post-Dev Total Area - (OWS)

Hydrograph type	= SCS Runoff	Peak discharge	= 22.67 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 317,881 cuft
Drainage area	= 39.840 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.000 x 98) + (17.730 x 92) + (15.110 x 98)] / 39.840



Hydrograph Report

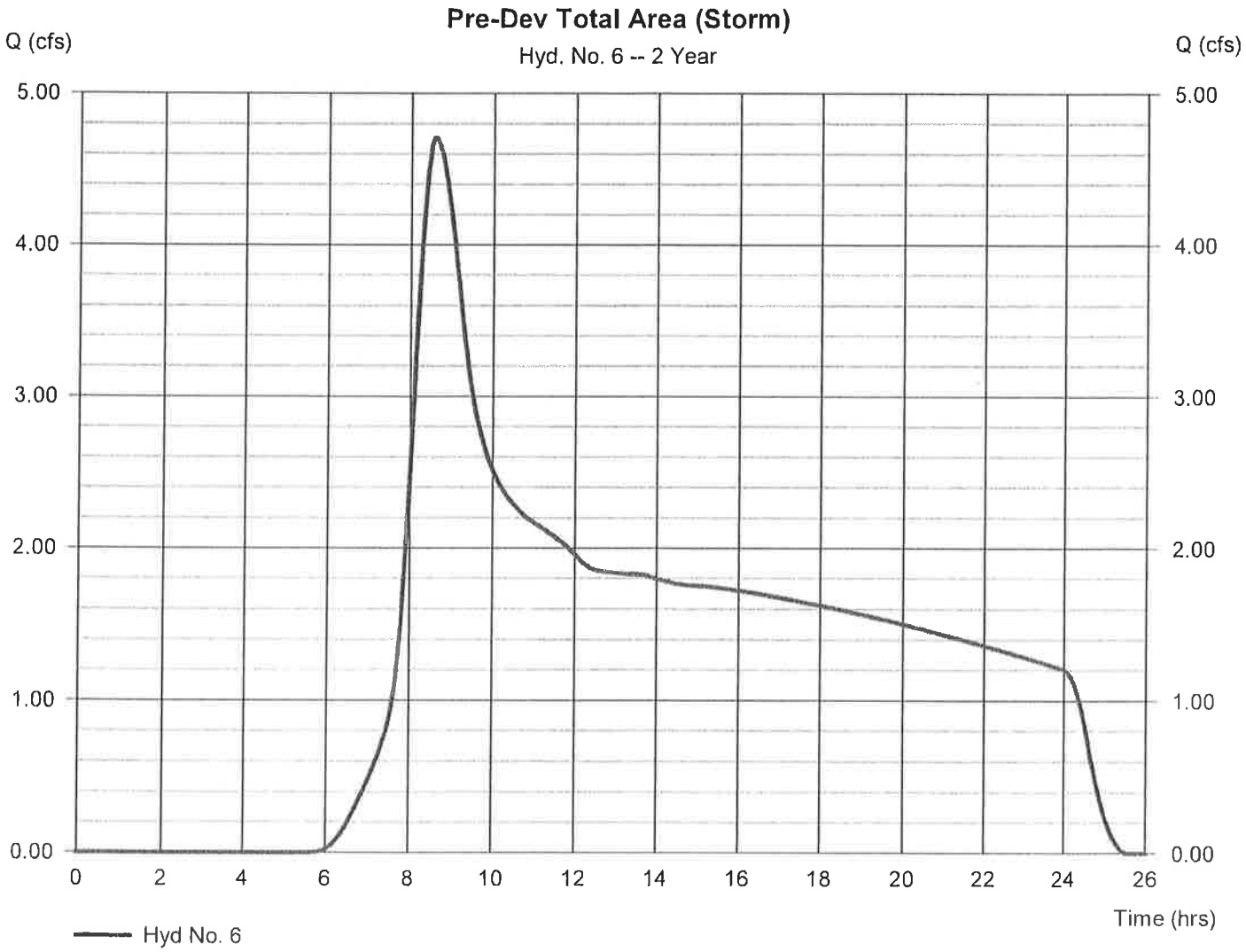
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Monday, 07 / 12 / 2021

Hyd. No. 6

Pre-Dev Total Area (Storm)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.708 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.57 hrs
Time interval	= 2 min	Hyd. volume	= 118,497 cuft
Drainage area	= 29.620 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 60.00 min
Total precip.	= 2.80 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

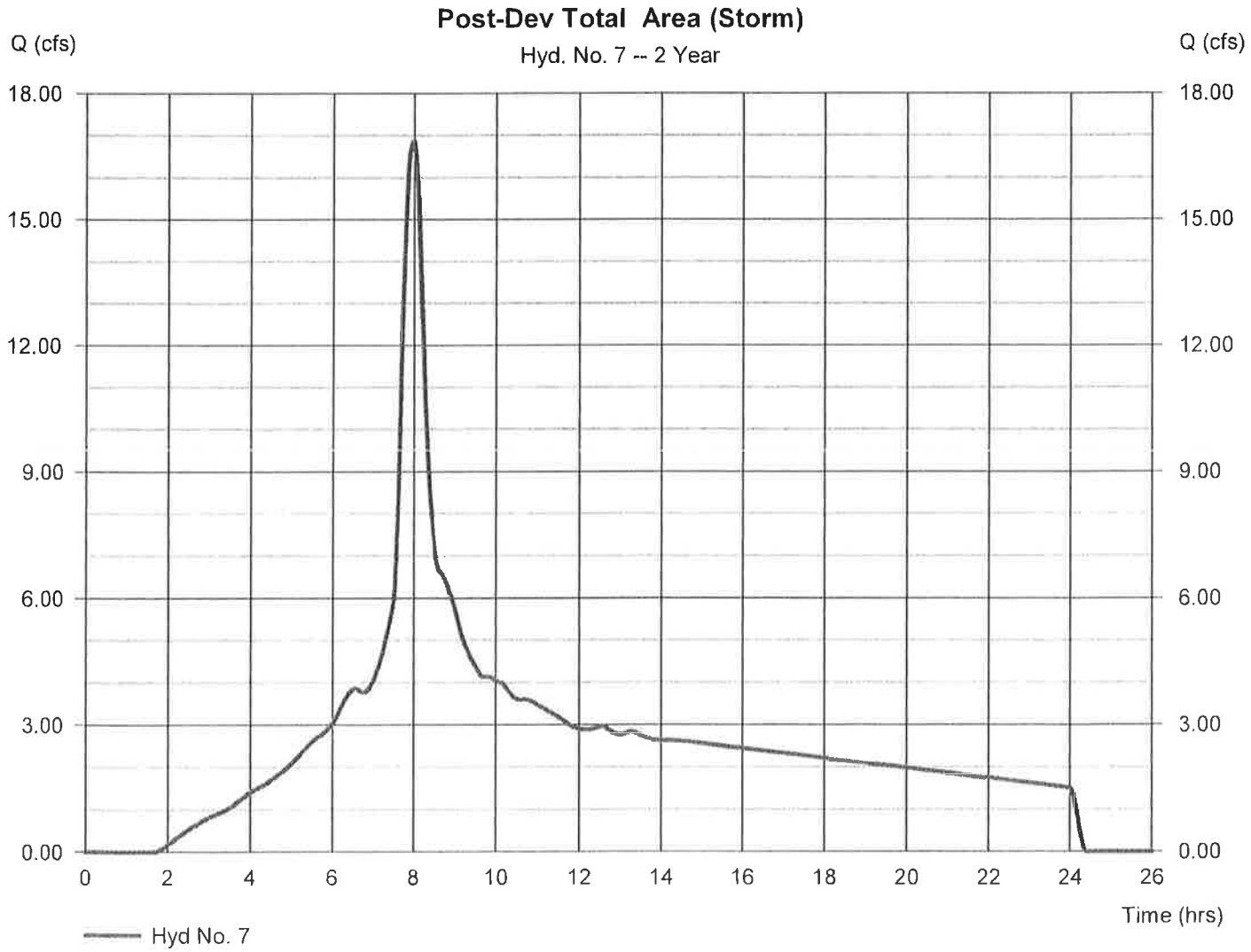
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 07 / 12 / 2021

Hyd. No. 7

Post-Dev Total Area (Storm)

Hydrograph type	= SCS Runoff	Peak discharge	= 16.85 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 236,337 cuft
Drainage area	= 29.620 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.850 x 98) + (8.840 x 92) + (2.840 x 98) + (1.090 x 78)] / 29.620

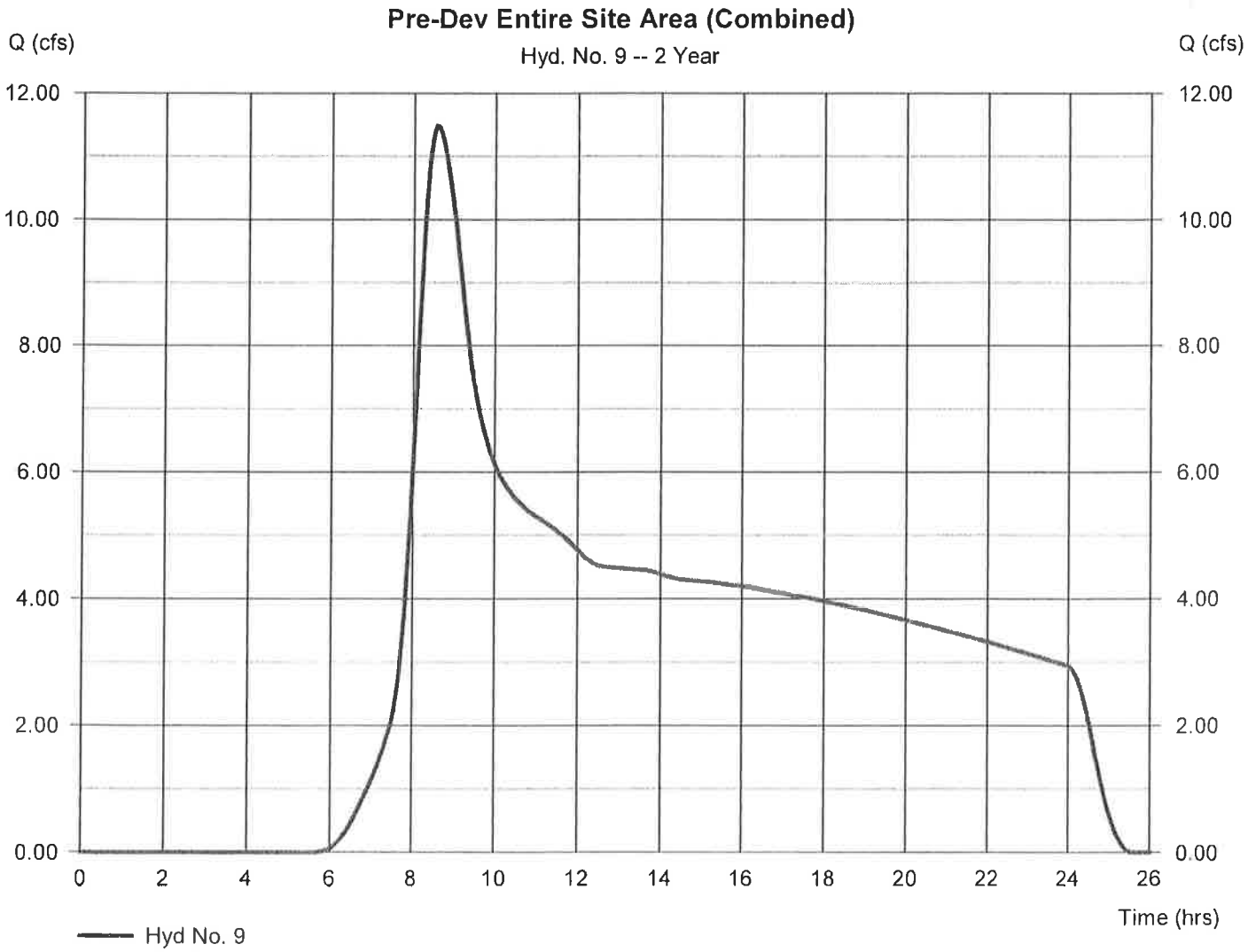


Hydrograph Report

Hyd. No. 9

Pre-Dev Entire Site Area (Combined)

Hydrograph type	= SCS Runoff	Peak discharge	= 11.48 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.57 hrs
Time interval	= 2 min	Hyd. volume	= 289,001 cuft
Drainage area	= 72.240 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 60.00 min
Total precip.	= 2.80 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

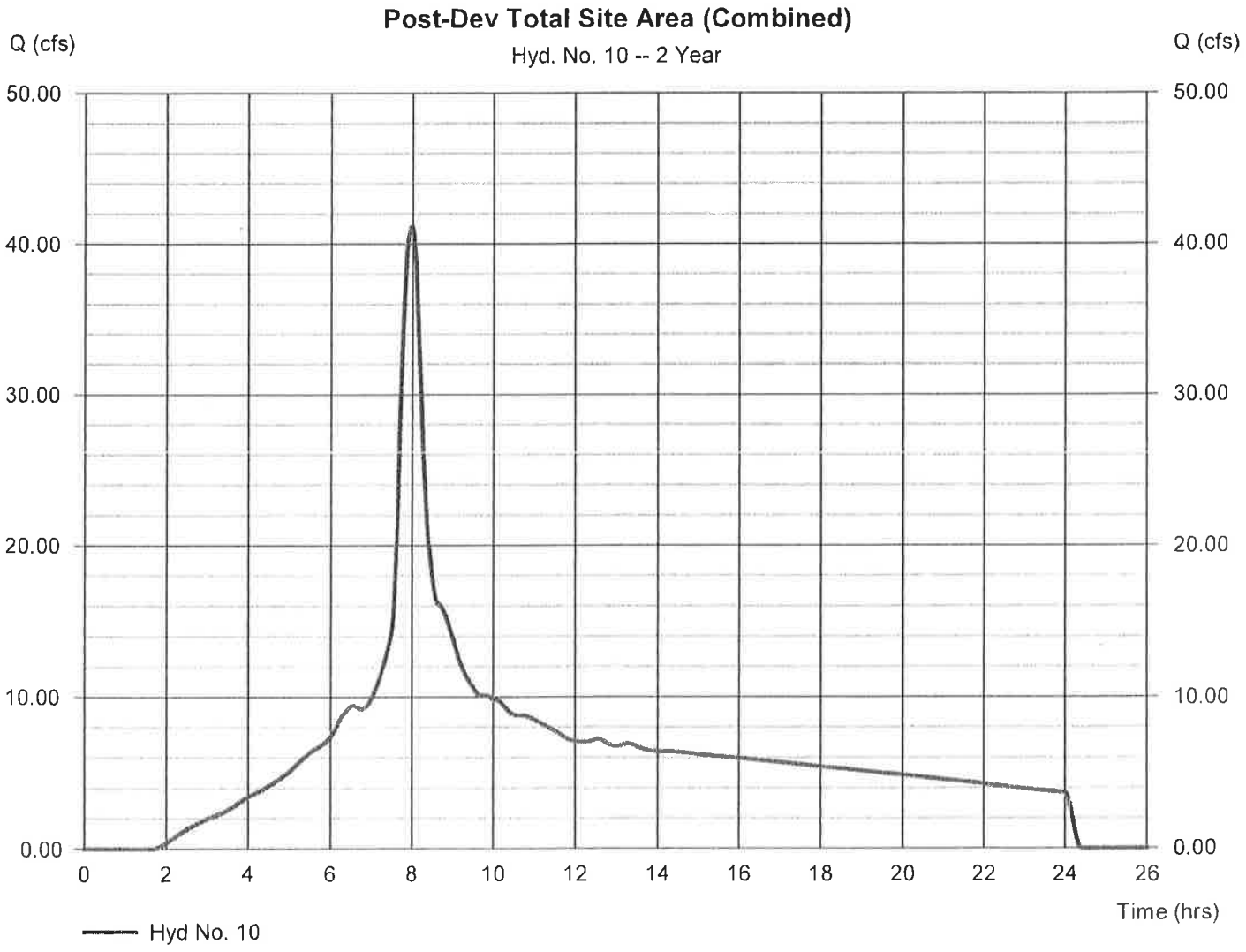
Monday, 07 / 12 / 2021

Hyd. No. 10

Post-Dev Total Site Area (Combined)

Hydrograph type	= SCS Runoff	Peak discharge	= 41.10 cfs
Storm frequency	= 2 yrs	Time to peak	= 8.00 hrs
Time interval	= 2 min	Hyd. volume	= 576,400 cuft
Drainage area	= 72.240 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(19.040 x 98) + (26.570 x 92) + (24.290 x 98) + (2.340 x 78)] / 72.240



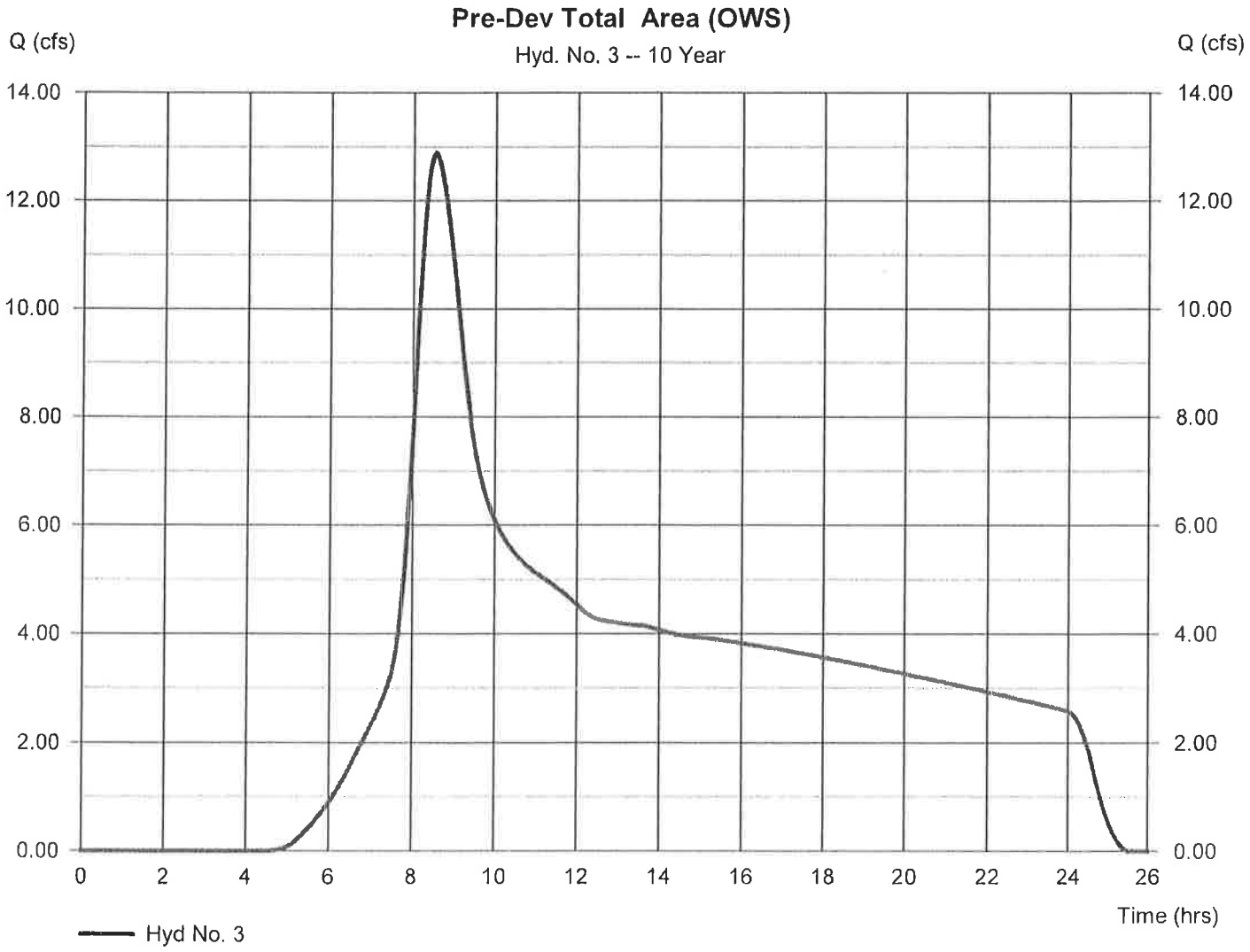
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 07 / 12 / 2021

Hyd. No. 3

Pre-Dev Total Area (OWS)

Hydrograph type	= SCS Runoff	Peak discharge	= 12.89 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.53 hrs
Time interval	= 2 min	Hyd. volume	= 286,485 cuft
Drainage area	= 40.280 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 60.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

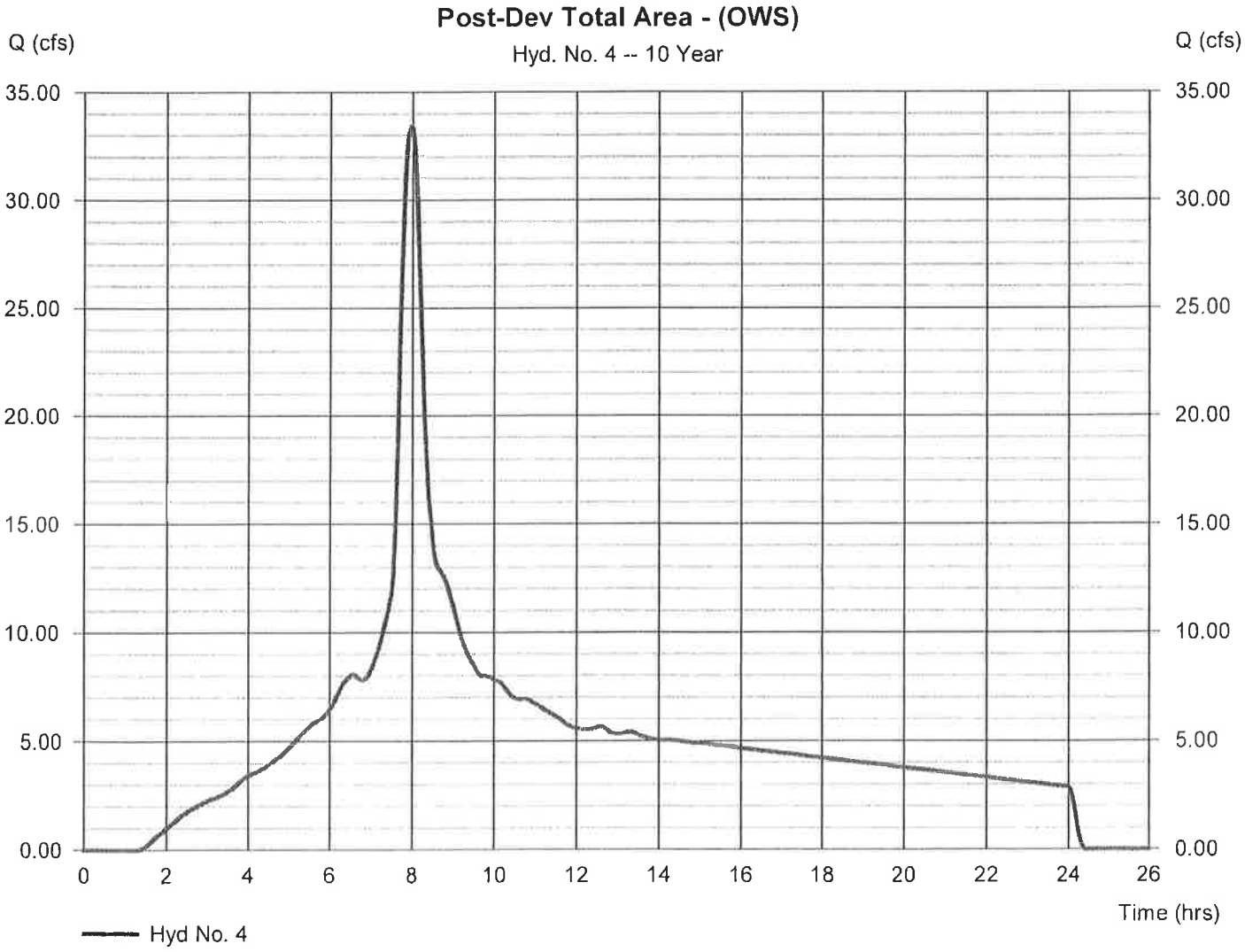
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 07 / 12 / 2021

Hyd. No. 4

Post-Dev Total Area - (OWS)

Hydrograph type	= SCS Runoff	Peak discharge	= 33.38 cfs
Storm frequency	= 10 yrs	Time to peak	= 7.97 hrs
Time interval	= 2 min	Hyd. volume	= 469,899 cuft
Drainage area	= 39.840 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(7.000 x 98) + (17.730 x 92) + (15.110 x 98)] / 39.840



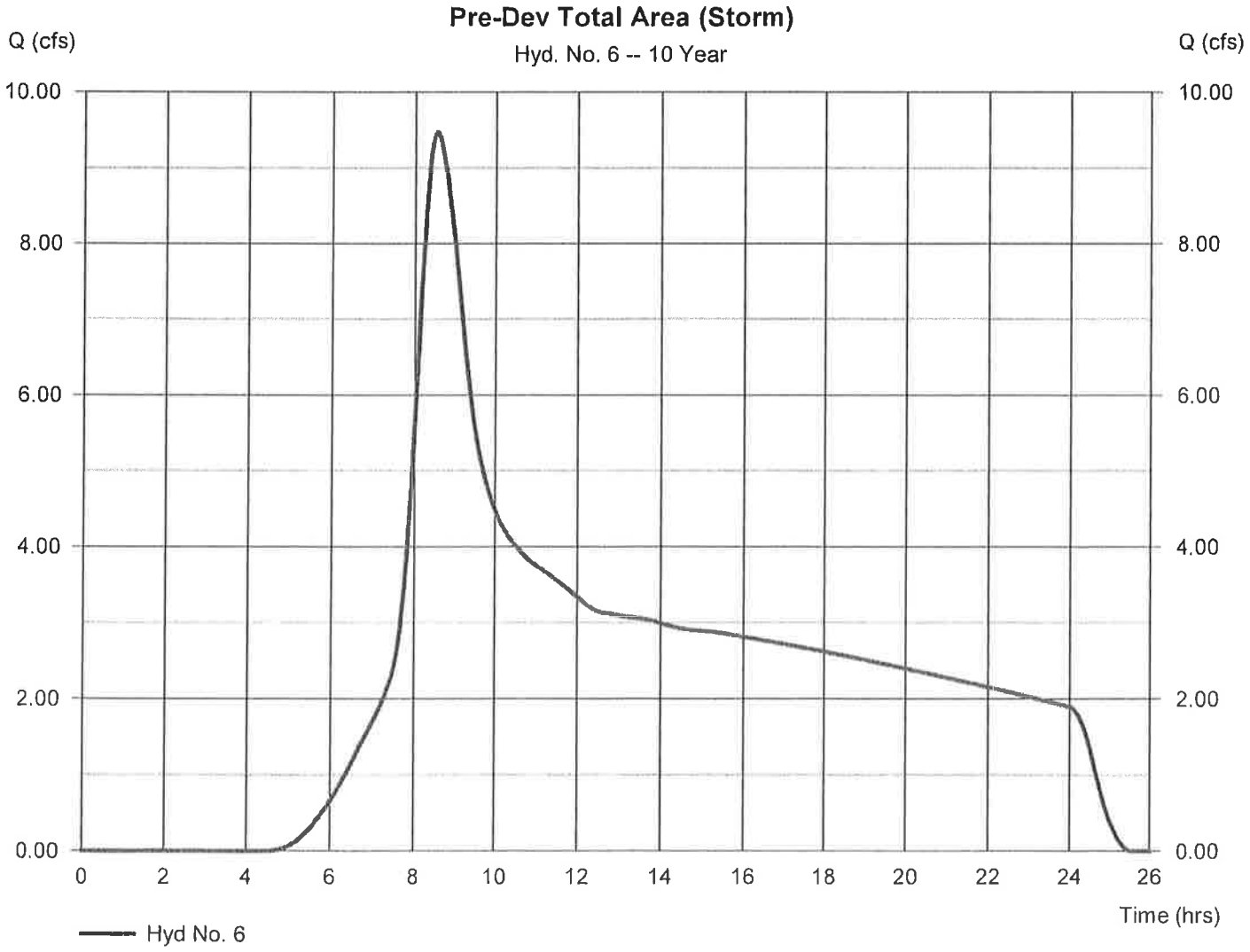
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 07 / 12 / 2021

Hyd. No. 6

Pre-Dev Total Area (Storm)

Hydrograph type	= SCS Runoff	Peak discharge	= 9.479 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.53 hrs
Time interval	= 2 min	Hyd. volume	= 210,668 cuft
Drainage area	= 29.620 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 60.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

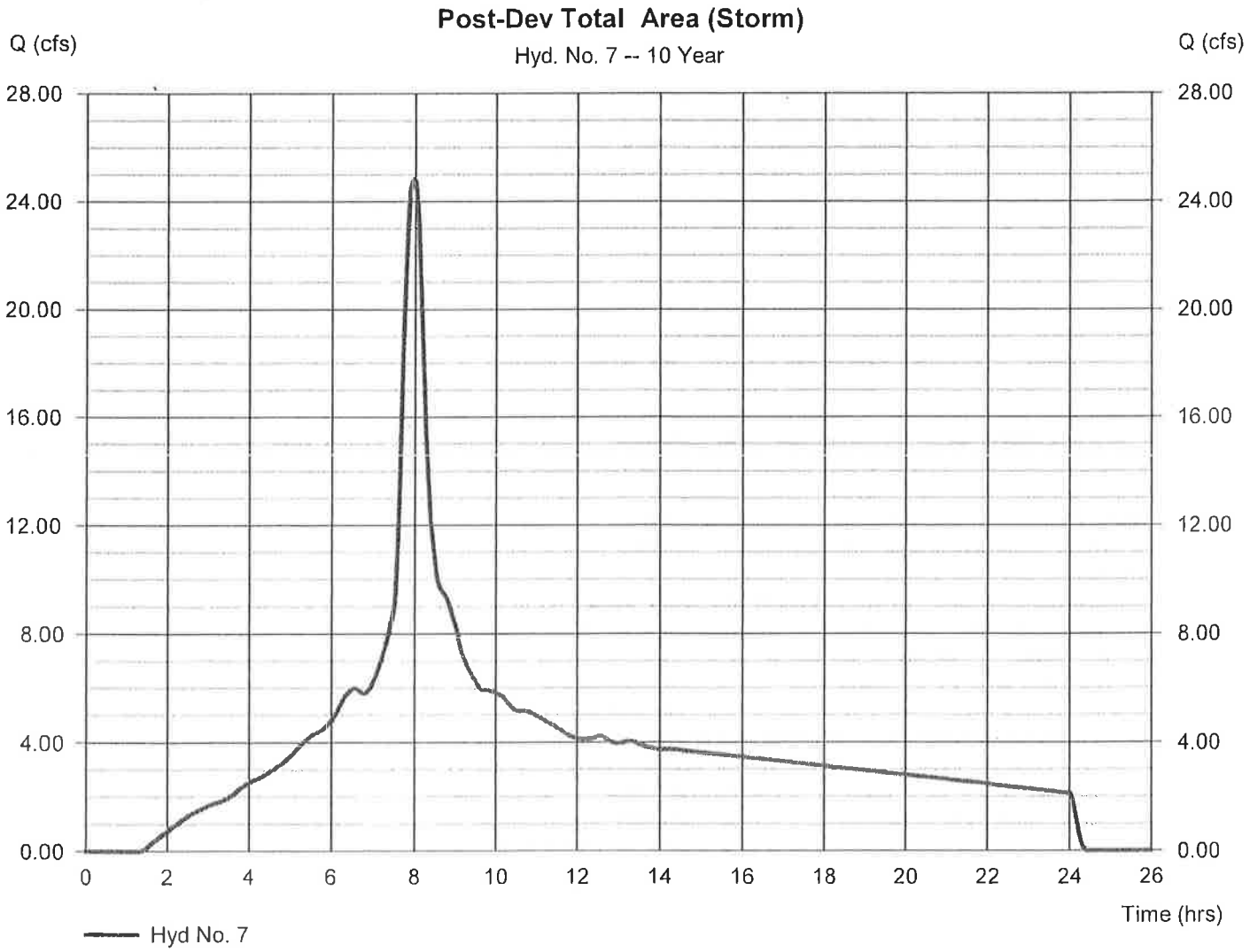
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 07 / 12 / 2021

Hyd. No. 7

Post-Dev Total Area (Storm)

Hydrograph type	= SCS Runoff	Peak discharge	= 24.82 cfs
Storm frequency	= 10 yrs	Time to peak	= 7.97 hrs
Time interval	= 2 min	Hyd. volume	= 349,357 cuft
Drainage area	= 29.620 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(16.850 x 98) + (8.840 x 92) + (2.840 x 98) + (1.090 x 78)] / 29.620



Hydrograph Report

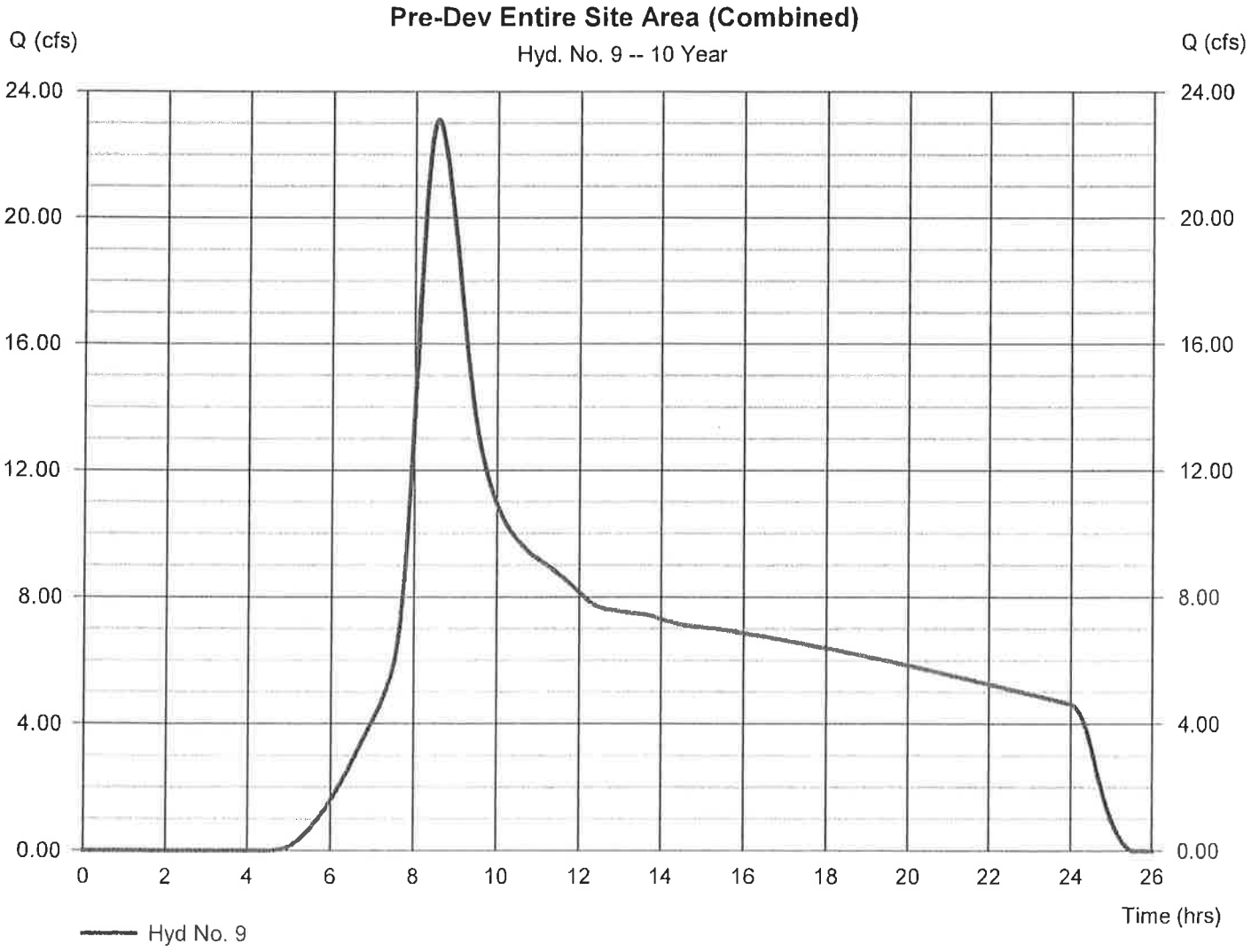
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021

Monday, 07 / 12 / 2021

Hyd. No. 9

Pre-Dev Entire Site Area (Combined)

Hydrograph type	= SCS Runoff	Peak discharge	= 23.12 cfs
Storm frequency	= 10 yrs	Time to peak	= 8.53 hrs
Time interval	= 2 min	Hyd. volume	= 513,795 cuft
Drainage area	= 72.240 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 60.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

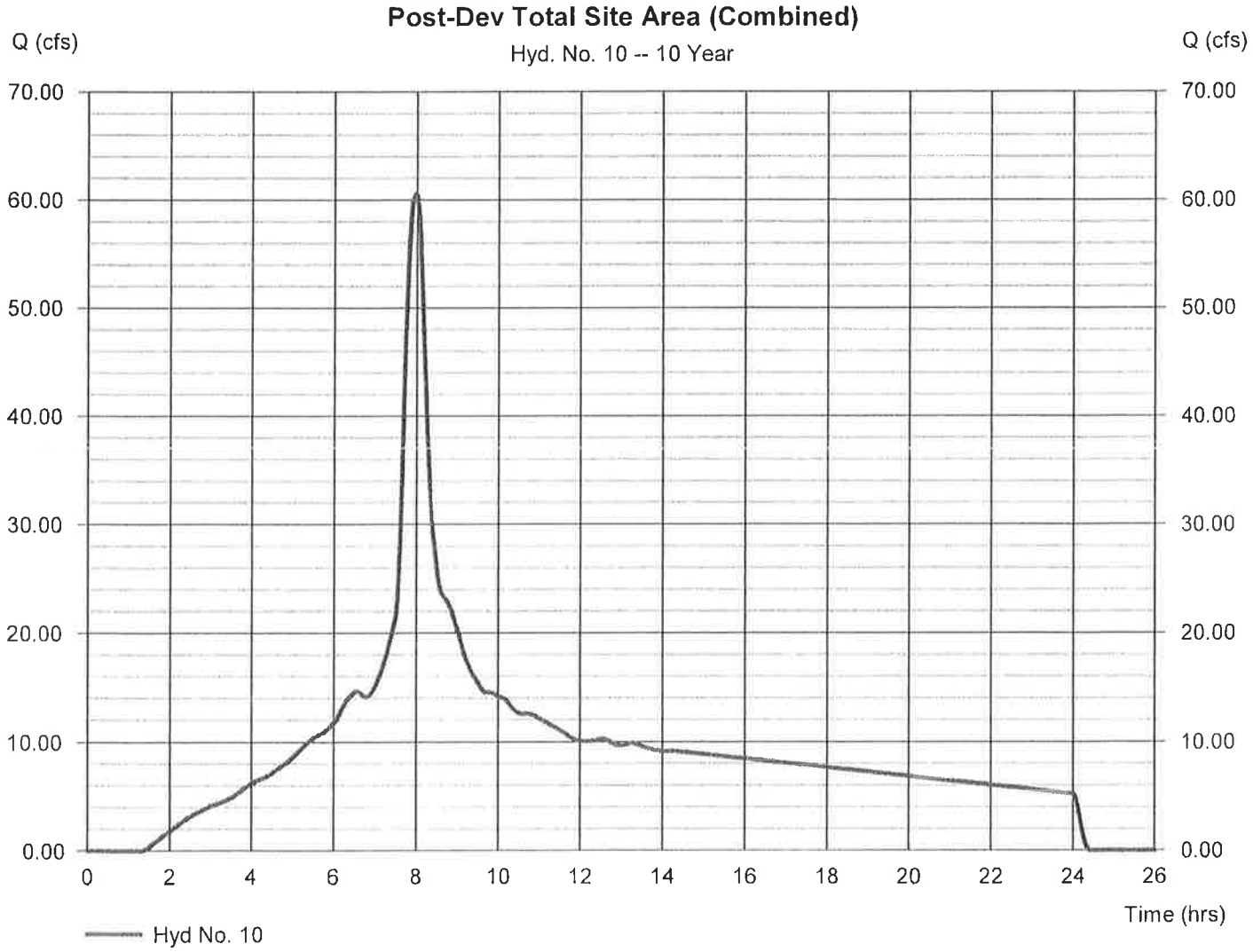
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 07 / 12 / 2021

Hyd. No. 10

Post-Dev Total Site Area (Combined)

Hydrograph type	= SCS Runoff	Peak discharge	= 60.53 cfs
Storm frequency	= 10 yrs	Time to peak	= 7.97 hrs
Time interval	= 2 min	Hyd. volume	= 852,044 cuft
Drainage area	= 72.240 ac	Curve number	= 95*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.90 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(19.040 x 98) + (26.570 x 92) + (24.290 x 98) + (2.340 x 78)] / 72.240



Hydrograph Report

Hyd. No. 3

Pre-Dev Total Area (OWS)

Hydrograph type	= SCS Runoff	Peak discharge	= 22.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.50 hrs
Time interval	= 2 min	Hyd. volume	= 474,413 cuft
Drainage area	= 40.280 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 60.00 min
Total precip.	= 5.40 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484