Appendix G

Hydrology Study For Global Water Farms,

Pilot Project Site APN 731-170-001

Checklist for Identifying Projects Requiring a Project-Specific Water Quality Management Plan (WQMP) within the Whitewater River Region	
Project File No.	PAR Review #210142
Project Name:	Global Water Farms - Pilot Project Site
Project Location:	APN 731-170-001
Project Description:	Pilot Project for Desalination Plant

All applications for discretionary New Development and Redevelopment projects that fall into one of the Priority Development Project categories submitted to the local permitting authority on or after December 31, 2014 require preparation, approval, and implementation of a project-specific WQMP that complies with the WQMP Guidance document.

The eight Priority Development Project Categories are:	**Yes**	**No**
Single-family hillside residences that create 10,000 square feet or more of impervious area where the natural slope is 25% or greater;		✔
Single-family hillside residences that create 10,000 square feet of impervious area where the natural slope is 10% or greater where erosive soil conditions are known;		✔
Commercial and Industrial developments of 100,000 square feet or more;		✔
Automotive repair shops (Standard Industrial Classification (SIC) codes[1] 5013, 7532, 7533, 7534, 7537, 7538, and 7539)		✔
Retail gasoline outlets disturbing greater than 5,000 square feet;		✔
Restaurants disturbing greater than 5,000 square feet;		✔
Home subdivisions with 10 or more housing units; and,		✔
Parking lots of 5,000 square feet or more or with 25 or more parking spaces, and potentially exposed to Urban Runoff.		✔

[1] Descriptions of SIC codes can be found at http://www.osha.gov/pls/imis/sicsearch.html.

DETERMINATION: Check the box for applicable determination.

Any questions answered "YES"	☐	Project requires a project-specific WQMP. Electronic submittals are encouraged on CD and required for the approved documents.
All questions are answered "NO"	☑	Project requires incorporation of Site Design Best Management Practices (BMPs) and Source Control BMPs imposed through Conditions of Approval or permit conditions.

HYDROLOGY STUDY

FOR

GLOBAL WATER FARMS, PILOT PROJECT SITE
APN 731-170-001

Dated: January 6, 2022

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SECTION 1 – INTRODUCTION

1.1 BACKGROUND

Heptagon Seven has been retained by Global Water Farms to prepare site improvement plans for a pilot project desalination plant on an undeveloped parcel of land east of the Salton Sea and southwest of the Coachella Canal in unincorporated Riverside County. Global Water Farms will be constructing a 13,484 SF building for the purpose of a pilot project on the feasibility of desalination of brine water for a potable water source. The site will also consist of a minor parking area, trash area, porta potty and solar field to power the building and desalination process.

The site under evaluation within this Hydrology Report, a small portion in the northeast corner of APN 731-170-001, is currently vacant and undeveloped. Existing land cover consists of windblown sand with very sparse vegetation consisting of desert shrubs. The full undeveloped parcel is approximately 641.39, however the pilot project phase of site improvements will cover 2.4 acres.

1.2 FLOODPLAIN DEVELOPMENT

This study will only address the onsite storm flow conditions that are anticipated with the post-development of the note site improvements, needed to determine the sizing of the required on-site retention. The offsite storm water flow conditions are noted in the following:

> The site is mapped on FEMA FIRM Map Panel 06065C3600G Map Revised 8/28/2008. The site is situated entirely within "Zone D, Area of Undetermined Flood Hazard". The site is protected by the Coachella Canal and the levee on the north side of the canal. Additionally, the Coachella Canal Siphon #21 allows concentrated alluvial flow stormwater to cross the canal, which is located east of the subject property. This concentrated flow spreads out back into an alluvial flow condition and enters the subject property south of the proposed pilot project site. For the purpose of this report, due to the protection by the canal and levee, no offsite flows will be considered in this study.

1.3 OBJECTIVE

The objective of this study is to determine the 3, 6 and 24-hour onsite runoff discharges for both the 10 and 100-year stormwater events to ensure the proposed retention facility is adequate for the overall site development in accordance with the direction provided the Hydrology Manual.

SECTION 2 – HYDROLOGY

2.1 APPROACH AND METHODOLOGY

The hydrologic analysis described in this report was prepared in accordance with the direction provided in the Riverside County Flood Control and Water Conservation District's (RCFC) Hydrology Manual Dated April 1978, referred to herein as the "Hydrology Manual" or the "Manual".

The Hydrology Manual Soil Map Plate C-1.37 or C-1.38 does not cover this area of the County. The National Resource Conservation Service (NRCS) Soil Survey for Riverside County was consulted for Data. Utilizing the online "Web Soil Survey" application, soils data for this location was obtained and provided in Appendix B. As can be determined from Appendix B, the entire site is classified as "Carsitas gravelly sand" which is classified as a well-drained soil meeting the Manual Criteria for Classification as hydrologic soil type "A".

The proposed pilot project industrial site will consist of a 13,484 SF building containing a control room and 10,540 SF brine tank room, ground mounted solar field, parking area, and minor concrete pads for the porta potty, ADA parking stall / building access and storm water collection / conveyance. Given sparse development of the pilot project site and minimal impervious area, a conservative runoff coefficient "C" variable value of 0.80 was used for this industrial area.

2.2 RATIONAL METHOD HYDROLOGY RESULTS

The Rational Method peak 10-year and 100-year discharges were calculated utilizing the design aids in the Hydrology Manual, with detailed calculations attached in the Appendix E and F of this report. The isohyetal rainfall maps in the hydrology manual do not cover the area in question. Therefore, average rainfall data was obtained from the NOAA 14 Atlas, utilizing the online mapping tool for the purpose of running rational analysis for preliminary sizing of the conveyance structures, see Appendix C.

The building will harvest the stormwater runoff from the roof and route the collected water into the building's brine tanks for processing and reuse. For those instances where the rain event exceeds the capacity of the collection system, along with ground impervious areas, stormwater runoff will be conveyed to a retention basin area located on the south side of the building. Stormwater will be conveyed to this retention basin facility through a combination of sheet flow and swales, both natural and concrete.

Based on accurate site topography and utilizing the precise grading plan, one drainage area was developed for the initial developed portion of the site. The initial grading was based on maintaining compatible pad elevation with perimeter constraints and balancing the site for earthwork purposes, to the extent possible.

2.3 RETENTION FACILITY SIZING

The retention facility basin was sized to fully retain the largest volume resulting from the 100-year storm event generated by the 3, 6 and 24-hour design storms, with no adjustments made for the proposed rain harvesting system on the building. Per the direction in the Manual, the Synthetic Unit Hydrograph method was used to determine the design storm volumes, utilizing a proprietary spreadsheet developed in compliance with the procedures outlined in the Manual. The detailed calculations are attached in the Appendix of this document.

Soil percolation testing has not been performed on the site. Per the Manual, an infiltration rate can be estimated by using the site's runoff potential or runoff index (RI) as determined by the existing soil cover complex within the study area using Plate E-6.1. Then using Plate E-6.2, an estimated infiltration rate for pervious areas can be determined of the specific AMC condition RI value. For the subject site, the cover was determined to be natural open brush, with a quality of cover of fair and a soil group A, which provides a RI of 46. In addition, the site is determined to be in an AMC I condition. Using Plate E-6.2 with an RI of 46 and intercepting the vertical line with the AMC I curve provides an estimated infiltration rate of 0.78 inches/hour. This rate will be used for both the ground covert as well as a conservative estimate for basin infiltration. See Appendix D for Plate E-6.2.

SECTION 3 – HYDRAULICS

3.1 CONVEYANCE STRUCTURE SIZING

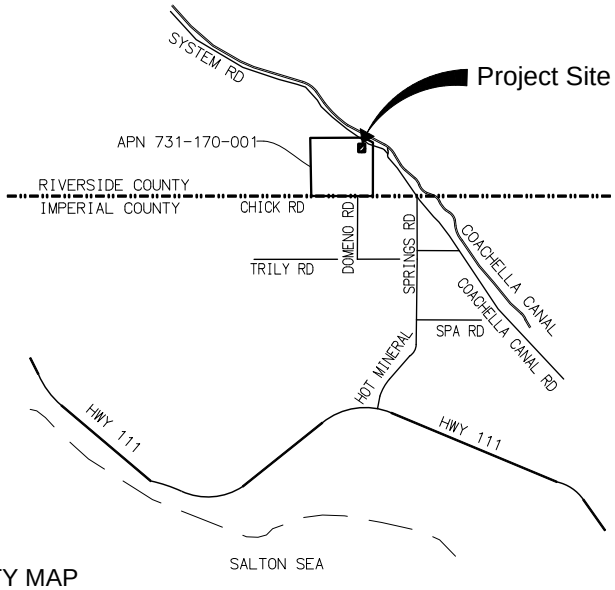
Since the proposed site stormwater runoff will be via sheet and minor swale flow, therefore, this report does not include any conveyance structure sizing.

SECTION 4 – CONCLUSION

The controlling stormwater runoff event for this site is the 3-hour, 100-year event, which will require stormwater retention volume of 5,867 Cu Ft. As designed, the available storage volume in the retention basin is 9,189 Cu Ft.

APPENDIX A

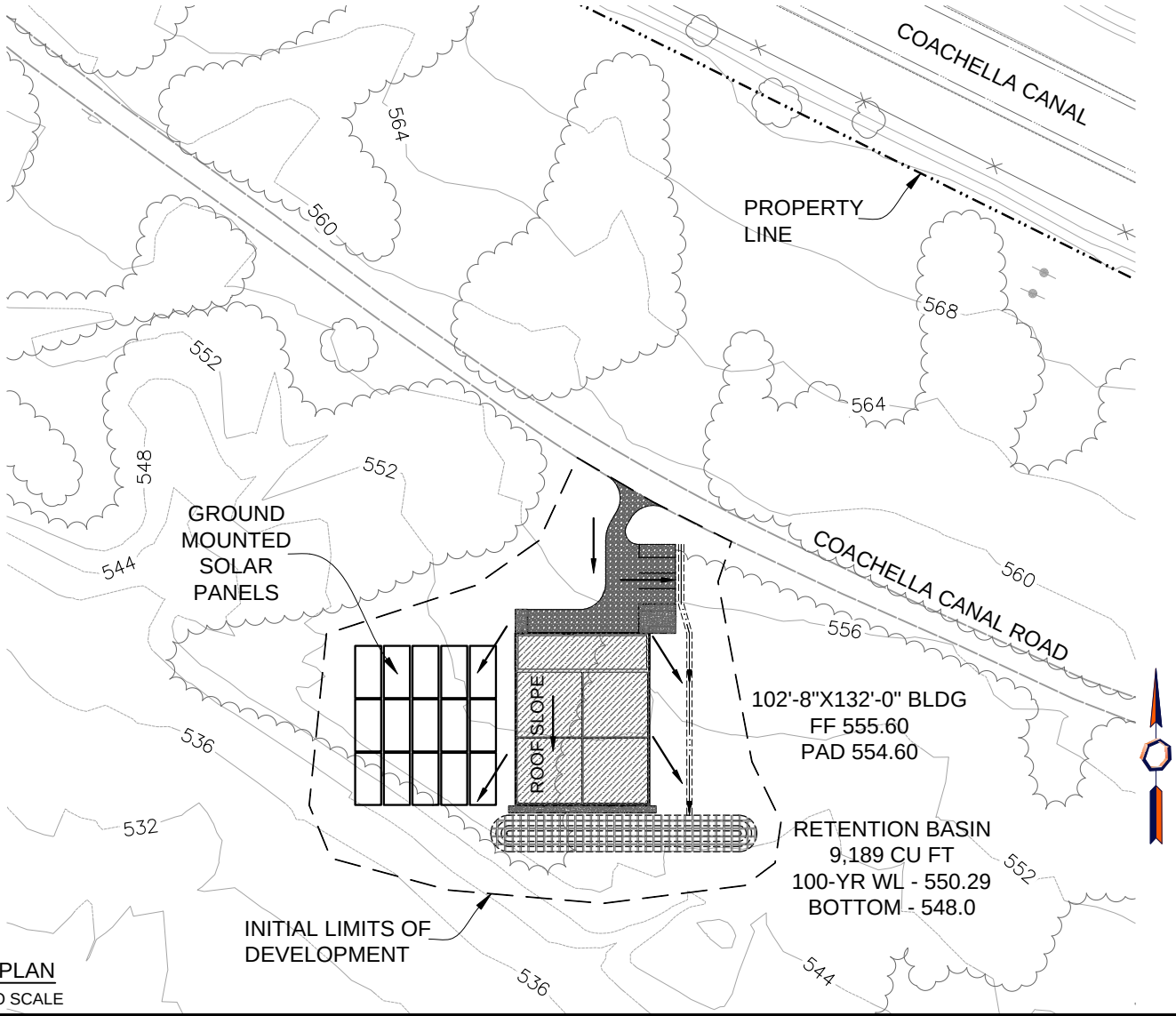
VICINITY MAP & SITE PLAN



VICINITY MAP
NOT TO SCALE

LEGEND

- AGGREGATE SURFACING
- CONCRETE SURFACE
- BUILDING
- RETENTION BASIN



SITE PLAN
NOT TO SCALE

HEPTAGON SEVEN
8413 E BASELINE ROAD
SUITE 106
MESA, AZ 85209
PHONE: 480.757.0997

IN THE UNINCORPORATE TERRORITY, COUNTY OF RIVERSIDE
GLOBAL WATER FARMS, PILOT PROJECT SITE

VICINITY MAP / SITE PLAN

VACANT LAND, APN 731-170-001
LOCATED IN A PORTION OF SECTION 34, TOWNSHIP 8 SOUTH, RANGE 12 EAST, SBM

SHEET NO.
1
OF 1 SHEETS

APPENDIX B

SOILS MAP

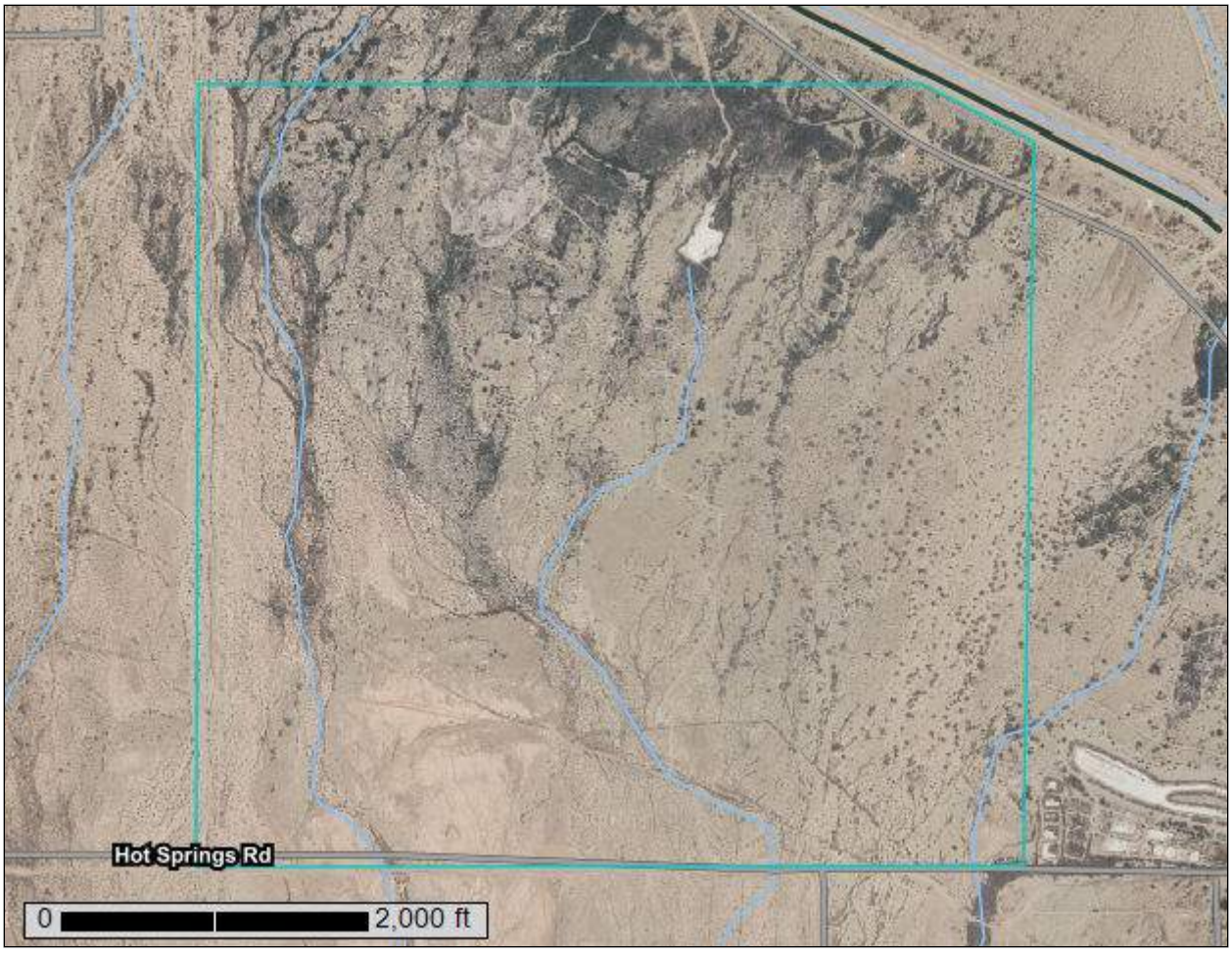
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Riverside County, Coachella Valley Area, California



January 4, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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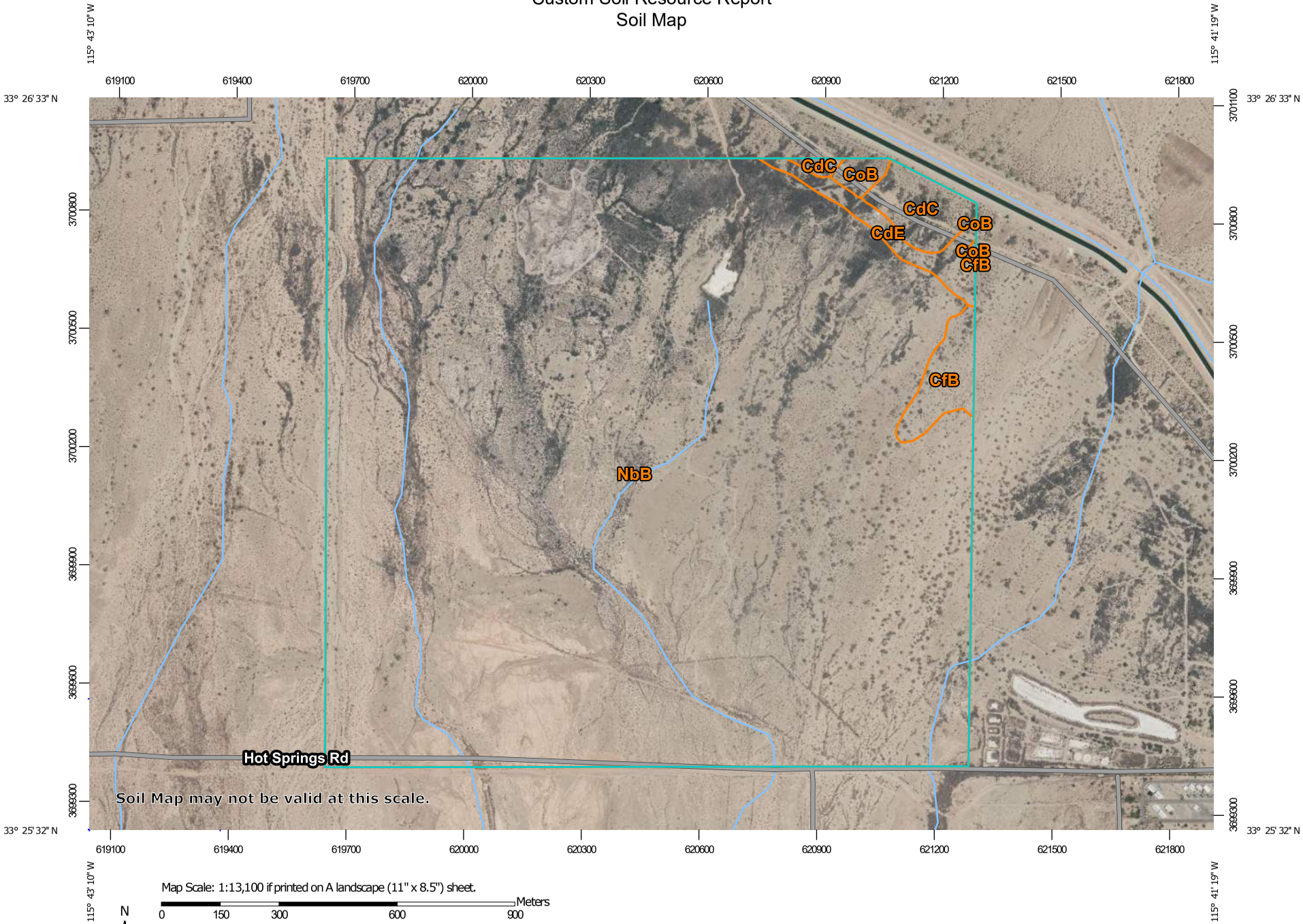
Contents

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



Map Scale: 1:13,100 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

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 1:24,000.

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: Riverside County, Coachella Valley Area, California
Survey Area Data: Version 13, Sep 15, 2021

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

Date(s) aerial images were photographed: Feb 6, 2021—May 29, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CdC	Carsitas gravelly sand, 0 to 9 percent slopes	10.5	1.7%
CdE	Carsitas gravelly sand, 9 to 30 percent slopes	8.5	1.4%
CfB	Carsitas sand, wet, 0 to 5 percent slopes	8.6	1.4%
CoB	Chuckawalla very gravelly sandy clay loam, 2 to 5 percent slopes	2.6	0.4%
NbB	Niland sand, wet, 2 to 5 percent slopes	598.1	95.2%
Totals for Area of Interest		**628.3**	**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.

Riverside County, Coachella Valley Area, California

CdC—Carsitas gravelly sand, 0 to 9 percent slopes

Map Unit Setting

National map unit symbol: hkv0
Elevation: 800 feet
Mean annual precipitation: 4 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 275 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Carsitas and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carsitas

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: gravelly sand
H2 - 10 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R031XY200CA - Rarely Flooded Fans
Hydric soil rating: No

Minor Components

Riverwash

Percent of map unit: 4 percent

Landform: Channels
Hydric soil rating: Yes

Carsitas
Percent of map unit: 4 percent
Hydric soil rating: No

Myoma
Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed, stony or gravelly
Percent of map unit: 3 percent
Hydric soil rating: No

CdE—Carsitas gravelly sand, 9 to 30 percent slopes

Map Unit Setting
National map unit symbol: hkv1
Elevation: 800 feet
Mean annual precipitation: 4 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 275 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition
Carsitas and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carsitas

Setting
Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly alluvium derived from granite

Typical profile
H1 - 0 to 10 inches: gravelly sand
H2 - 10 to 60 inches: gravelly sand

Properties and qualities
Slope: 9 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R031XY200CA - Rarely Flooded Fans
Hydric soil rating: No

Minor Components

Badland

Percent of map unit: 10 percent
Hydric soil rating: No

Carrizo

Percent of map unit: 2 percent
Hydric soil rating: No

Riverwash

Percent of map unit: 1 percent
Landform: Channels
Hydric soil rating: Yes

Myoma

Percent of map unit: 1 percent
Hydric soil rating: No

Unnamed, cobbles or stones

Percent of map unit: 1 percent
Hydric soil rating: No

CfB—Carsitas sand, wet, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: hkv2
Elevation: 800 feet
Mean annual precipitation: 4 inches
Mean annual air temperature: 72 to 73 degrees F
Frost-free period: 275 to 325 days
Farmland classification: Not prime farmland

Map Unit Composition

Carsitas and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Carsitas

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly alluvium derived from granite

Typical profile

H1 - 0 to 10 inches: sand
H2 - 10 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: R031XY200CA - Rarely Flooded Fans
Hydric soil rating: No

Minor Components

Myoma

Percent of map unit: 10 percent
Hydric soil rating: No

Niland

Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed, gravelly

Percent of map unit: 1 percent
Hydric soil rating: No

CoB—Chuckawalla very gravelly sandy clay loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: hkv9
Elevation: 400 to 1,000 feet
Mean annual precipitation: 4 inches
Mean annual air temperature: 72 degrees F
Frost-free period: 270 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Chuckawalla and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chuckawalla

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Gravelly alluvium

Typical profile

H1 - 0 to 12 inches: very gravelly sandy clay loam
H2 - 12 to 25 inches: very gravelly fine sandy loam
H3 - 25 to 60 inches: very gravelly sand

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: R031XY002CA - Desert Pavement 2-4" p.z.
Hydric soil rating: No

Minor Components

Alluvium or colluvium
Percent of map unit: 10 percent
Hydric soil rating: No

Carsitas
Percent of map unit: 3 percent
Hydric soil rating: No

Riverwash
Percent of map unit: 2 percent
Hydric soil rating: No

NbB—Niland sand, wet, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: hkw7
Elevation: 300 feet
Mean annual precipitation: 4 inches
Mean annual air temperature: 72 degrees F
Frost-free period: 270 to 320 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Niland and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Niland

Setting
Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile
H1 - 0 to 21 inches: sand
H2 - 21 to 60 inches: silty clay

Properties and qualities
Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Very slightly saline to strongly saline (2.0 to 16.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C/D
Ecological site: R031XY007CA - Lacustrine Basin and Large RIver Floodplain
Hydric soil rating: No

Minor Components

Rositas

Percent of map unit: 10 percent
Hydric soil rating: No

Carsitas

Percent of map unit: 2 percent
Hydric soil rating: No

Imperial

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Debris flows
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

NOAA PRECIPITATION FREQUENCY DATA

NOAA Atlas 14, Volume 6, Version 2
Location name: Mecca, California, USA*
Latitude: 33.4376°, Longitude: -115.6952°
Elevation: 34.73 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.074 (0.062-0.089)	0.116 (0.097-0.141)	0.178 (0.149-0.216)	0.234 (0.194-0.286)	0.320 (0.256-0.404)	0.394 (0.308-0.509)	0.478 (0.364-0.633)	0.574 (0.425-0.783)	0.723 (0.513-1.03)	0.855 (0.586-1.26)
10-min	0.106 (0.089-0.128)	0.167 (0.140-0.202)	0.256 (0.213-0.310)	0.336 (0.278-0.411)	0.458 (0.366-0.580)	0.565 (0.442-0.730)	0.685 (0.522-0.907)	0.823 (0.609-1.12)	1.04 (0.735-1.48)	1.23 (0.840-1.81)
15-min	0.129 (0.108-0.155)	0.202 (0.169-0.244)	0.309 (0.258-0.375)	0.406 (0.336-0.496)	0.554 (0.443-0.701)	0.683 (0.534-0.883)	0.828 (0.631-1.10)	0.995 (0.737-1.36)	1.25 (0.889-1.78)	1.48 (1.01-2.19)
30-min	0.180 (0.151-0.217)	0.283 (0.237-0.342)	0.433 (0.361-0.525)	0.569 (0.471-0.696)	0.777 (0.621-0.983)	0.957 (0.748-1.24)	1.16 (0.885-1.54)	1.40 (1.03-1.90)	1.76 (1.25-2.50)	2.08 (1.42-3.06)
60-min	0.249 (0.209-0.300)	0.391 (0.327-0.473)	0.599 (0.499-0.726)	0.787 (0.651-0.962)	1.07 (0.858-1.36)	1.32 (1.03-1.71)	1.60 (1.22-2.13)	1.93 (1.43-2.63)	2.43 (1.72-3.46)	2.87 (1.97-4.24)
2-hr	0.338 (0.283-0.408)	0.506 (0.423-0.611)	0.755 (0.629-0.914)	0.982 (0.811-1.20)	1.33 (1.06-1.68)	1.64 (1.28-2.11)	1.98 (1.51-2.62)	2.38 (1.76-3.24)	2.99 (2.12-4.26)	3.53 (2.42-5.21)
3-hr	0.392 (0.328-0.473)	0.577 (0.483-0.698)	0.853 (0.711-1.03)	1.11 (0.913-1.35)	1.49 (1.19-1.89)	1.84 (1.43-2.37)	2.22 (1.69-2.94)	2.67 (1.98-3.64)	3.36 (2.38-4.78)	3.97 (2.72-5.85)
6-hr	0.488 (0.409-0.589)	0.711 (0.595-0.859)	1.04 (0.869-1.26)	1.35 (1.11-1.65)	1.82 (1.45-2.30)	2.23 (1.74-2.88)	2.69 (2.05-3.57)	3.23 (2.39-4.40)	4.06 (2.88-5.78)	4.79 (3.28-7.07)
12-hr	0.576 (0.482-0.695)	0.851 (0.711-1.03)	1.26 (1.05-1.52)	1.62 (1.34-1.98)	2.19 (1.75-2.77)	2.68 (2.09-3.46)	3.23 (2.46-4.27)	3.85 (2.85-5.26)	4.81 (3.41-6.85)	5.65 (3.87-8.33)
24-hr	0.728 (0.644-0.840)	1.10 (0.971-1.27)	1.64 (1.44-1.90)	2.12 (1.86-2.48)	2.86 (2.42-3.44)	3.49 (2.90-4.29)	4.19 (3.40-5.27)	4.98 (3.94-6.43)	6.18 (4.70-8.30)	7.21 (5.31-10.0)
2-day	0.834 (0.738-0.962)	1.27 (1.12-1.47)	1.91 (1.68-2.21)	2.47 (2.16-2.88)	3.32 (2.82-4.00)	4.04 (3.36-4.96)	4.84 (3.93-6.08)	5.74 (4.54-7.40)	7.08 (5.38-9.50)	8.23 (6.05-11.4)
3-day	0.886 (0.783-1.02)	1.36 (1.20-1.56)	2.03 (1.79-2.35)	2.64 (2.31-3.08)	3.54 (3.00-4.26)	4.31 (3.58-5.29)	5.15 (4.18-6.47)	6.09 (4.82-7.86)	7.50 (5.70-10.1)	8.71 (6.40-12.1)
4-day	0.932 (0.824-1.08)	1.43 (1.26-1.65)	2.14 (1.89-2.48)	2.77 (2.42-3.23)	3.72 (3.15-4.48)	4.52 (3.76-5.55)	5.40 (4.39-6.79)	6.39 (5.05-8.25)	7.86 (5.98-10.6)	9.12 (6.71-12.6)
7-day	0.991 (0.877-1.14)	1.51 (1.33-1.74)	2.25 (1.98-2.61)	2.91 (2.55-3.40)	3.91 (3.31-4.70)	4.75 (3.95-5.83)	5.68 (4.61-7.13)	6.71 (5.31-8.66)	8.26 (6.28-11.1)	9.58 (7.05-13.3)
10-day	1.02 (0.906-1.18)	1.55 (1.37-1.79)	2.31 (2.04-2.68)	2.99 (2.62-3.49)	4.01 (3.40-4.83)	4.87 (4.05-5.98)	5.82 (4.73-7.31)	6.88 (5.44-8.88)	8.47 (6.44-11.4)	9.82 (7.22-13.6)
20-day	1.11 (0.981-1.28)	1.68 (1.49-1.94)	2.51 (2.21-2.91)	3.24 (2.84-3.78)	4.33 (3.67-5.21)	5.25 (4.36-6.45)	6.26 (5.08-7.87)	7.38 (5.84-9.53)	9.05 (6.88-12.1)	10.5 (7.70-14.5)
30-day	1.19 (1.05-1.37)	1.82 (1.61-2.10)	2.71 (2.39-3.14)	3.50 (3.06-4.09)	4.67 (3.96-5.63)	5.65 (4.70-6.94)	6.73 (5.46-8.45)	7.91 (6.26-10.2)	9.67 (7.35-13.0)	11.2 (8.20-15.5)
45-day	1.31 (1.16-1.51)	2.02 (1.79-2.33)	3.03 (2.67-3.51)	3.91 (3.42-4.56)	5.20 (4.41-6.27)	6.28 (5.22-7.71)	7.45 (6.05-9.37)	8.74 (6.91-11.3)	10.6 (8.08-14.3)	12.2 (8.99-17.0)
60-day	1.41 (1.25-1.63)	2.20 (1.94-2.54)	3.30 (2.91-3.82)	4.25 (3.72-4.96)	5.65 (4.79-6.80)	6.80 (5.65-8.35)	8.04 (6.53-10.1)	9.41 (7.44-12.1)	11.4 (8.67-15.3)	13.1 (9.62-18.1)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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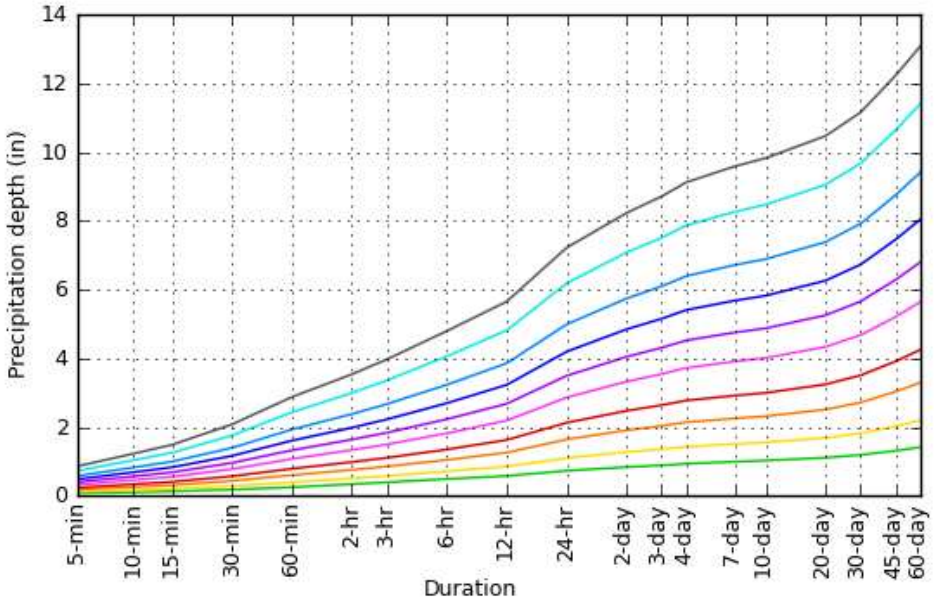
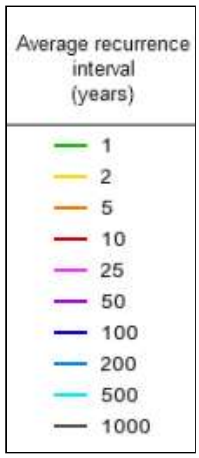
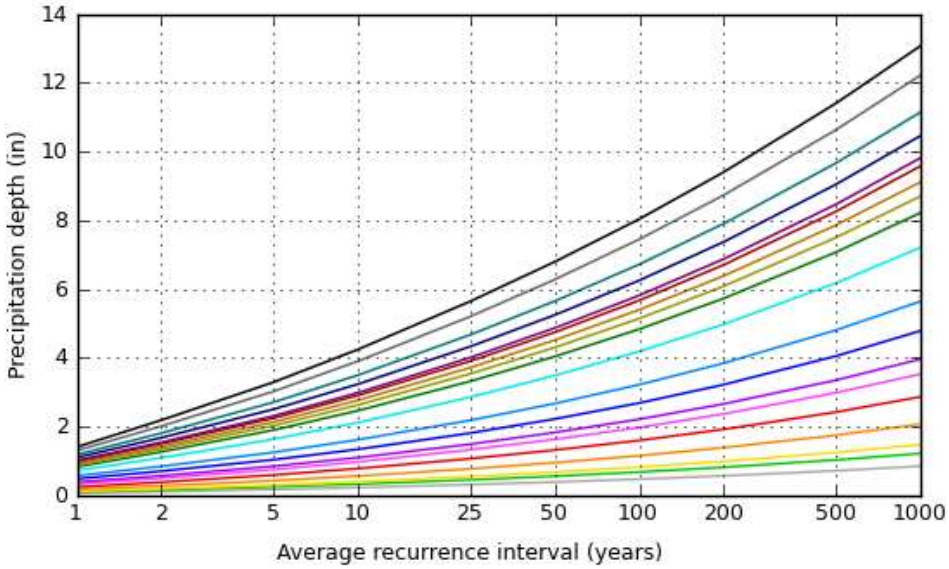
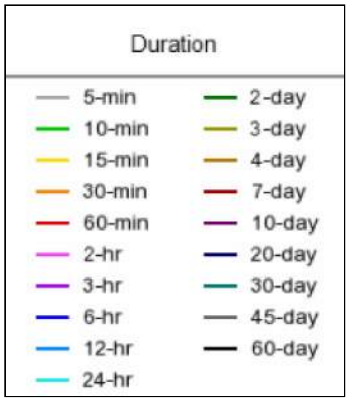
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 33.4376°, Longitude: -115.6952°









NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Tue Jan 4 22:57:13 2022

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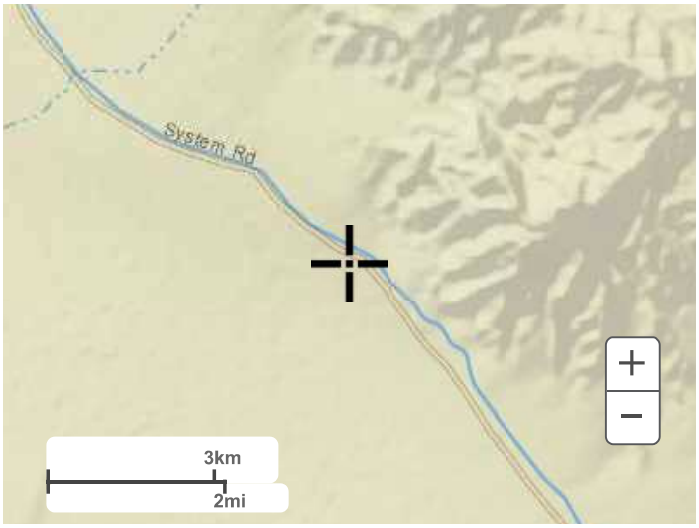
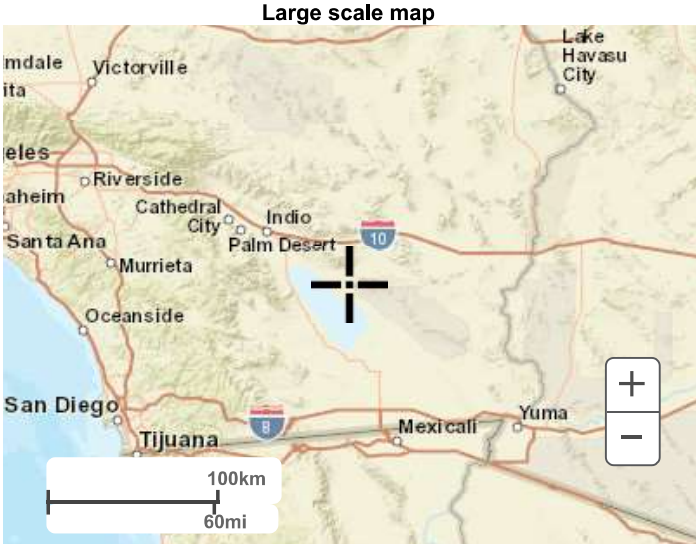
Maps & aerials

Small scale terrain

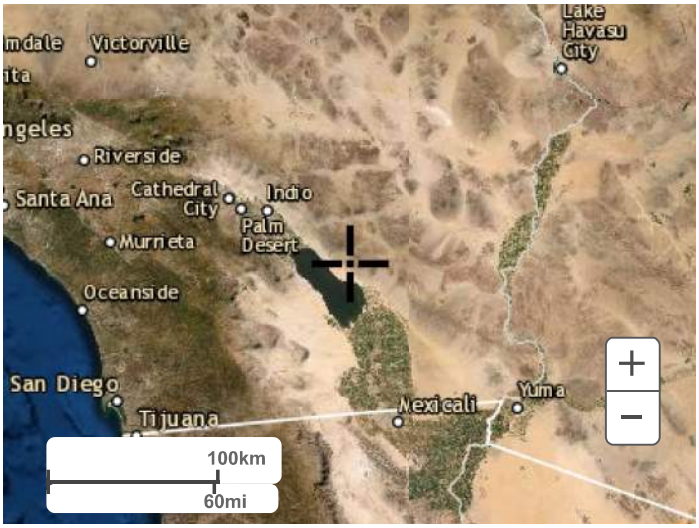


Large scale terrain

Large scale map



Large scale aerial



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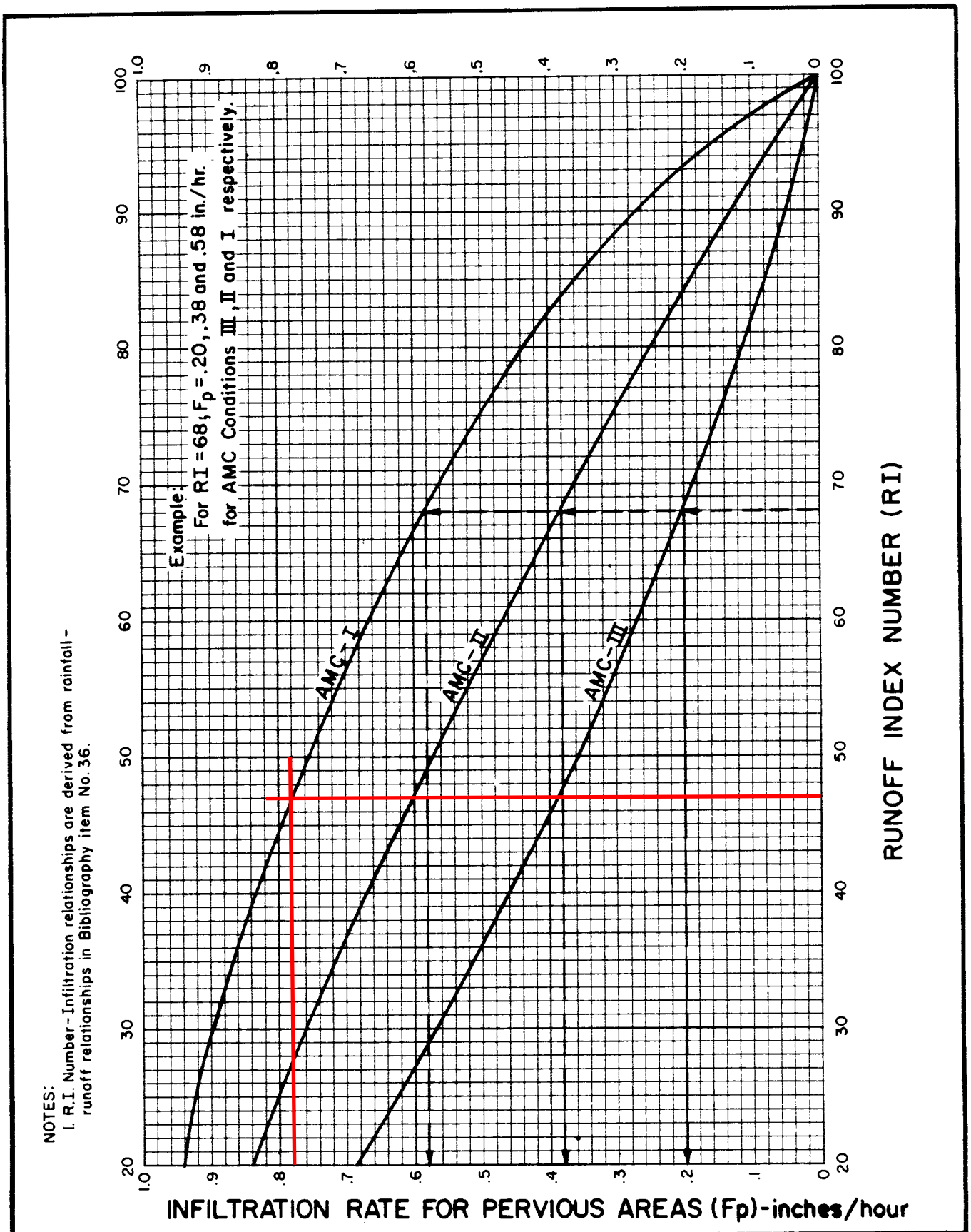
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

APPENDIX D

ESTIMATE INFILTRATION VALUE DATA



RCFC & WCD

HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS RUNOFF INDEX NUMBERS

PLATE E-6.2

APPENDIX E

SYNTHETIC UNIT HYDROGRAPH CALCULATION

10-YEAR EVENT

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**		**DATE**	12/28/2021
2	**DATA INPUT SHEET - 10 Year Rain Event**			
3				
4	WORKSHEET PREPARED BY:	B Donais		
5				
6	PROJECT NAME	Global Water Farms - Pilot Project Site		
7	Heptagon Seven PN	77-100163		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ONSITE FLOWS		
11				
12		Acres	Sq Ft	
13	TRIBUTARY AREAS	2.351	102,392	
14	AC MILLINGS/AGG BASE SURFACE	0.112	4,891	
15	COMMERCIAL	0.311	13,537	
16	PAVING/HARDSCAPE	0.031	1,342	
17	SF - 1 ACRE	0.000		
18	SF - 1/2 ACRE	0.000		
19	SF - 1/4 ACRE	0.000		
20	MF - CONDOMINIUMS	0.000		
21	MF - APARTMENTS	0.000		
22	MOBILE HOME PARK	0.000		
23	LANDSCAPING	1.766	76,910	
24	RETENTION BASIN	0.131	5,712	
25	GOLF COURSE	0.000		
26	MOUNTAINOUS	0.000		
27	LOW LOSS RATE (PERCENT)	90%		
28				
29	LENGTH OF WATERCOURSE (L)	300		
30	LENGTH TO POINT OPPOSITE CENTROID (Lca)	95		
31				
32	ELEVATION OF HEADWATER	558.7		
33	ELEVATION OF CONCENTRATION POINT	548.2		
34				
35	AVERAGE MANNINGS 'N' VALUE	0.02		
36				
37	STORM FREQUENCY (YEAR)	10		
38				
39	POINT RAIN			
40	3-HOUR	1.11		
41	6-HOUR	1.35		
42	24-HOUR	2.21		
43				
44	BASIN CHARACTERISTICS:	ELEVATION	AREA	
45		548	716	
46		549	2225	
47		550	3834	
48		551	5544	
49				
50				
51				
52				
53	PERCOLATION RATE (in/hr)	0.78		
54				
55	DRYWELL DATA			
56	NUMBER USED	0		
57	PERCOLATION RATE (cfs)	0.013		

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

BASIC DATA CALCULATION FORM

SHORTCUT METHOD

PROJECT: Global Water Farms - Pilot Project Site

H7 JOB# 77-100163

BY B Donais DATE 1/6/2022

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ONSITE FLOWS
[3] AREA - ACRES	2.351
[4] L-FEET	300
[5] L-MILES	0.057
[6] La-FEET	95.00
[7] La-MILES	0.018
[8] ELEVATION OF HEADWATER	558.7
[9] ELEVATION OF CONCENTRATION POINT	548.2
[10] H-FEET	10.5
[11] S-FEET/MILE	184.8
[12] S^0.5	13.59
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.8
[17] 100% OF LAG-MINUTES	0.8
[18] 200% OF LAG-MINUTES	1.6
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.01

RAINFALL DATA

[1] SOURCE

[2] FREQUENCY-YEARS 10

[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
1.11	2.351	1.00	1.11	1.35	2.351	1.00	1.35	2.21	2.351	1.00	2.21
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	2.35059688	SUM [7]	1.11	SUM [9]	2.35	SUM [11]	1.35	SUM [13]	2.35	SUM [15]	2.21
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			1.11				1.35				2.21

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.17	0.15	0.22
FLOOD VOLUME	(cu-ft)	1,487	1,281	1,886
	(acre-ft)	0.03	0.03	0.04
REQUIRED STORAGE	(cu-ft)	1,405	1,131	1,342
	(acre-ft)	0.03	0.03	0.03
PEAK FLOW	(cfs)	1.05	0.62	0.07
MAXIMUM WSEL	(ft)	548.96	548.77	548.91

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD								
					PROJECT	Global Water Farms - Pilot Project Site		
					CONCENTRATION POINT:	1		
					BY	B Donais	DATE	1/6/2022

AVERAGE ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
A	COMMERCIAL	32	0.00	90%	0.00	0.31	0.132	0.0000
A	PAVING/HARDSCAPE	32	0.00	100%	0.00	0.03	0.013	0.0000
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	32	0.78	0%	0.78	1.77	0.751	0.5859
A	RETENTION BASINS	32	0.78	0%	0.78	0.13	0.056	0.0435
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.00	0.000	0.0000
A	AS SURFACE	32	0.74	65%	0.31	0.11	0.048	0.0147
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					SUM	2.350596878	SUM	0.6441

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.322032903

C= 0.00596

Ft=C(24-(T/60))^1.55 = 0.00596 (24-(T/60))^1.55 + 0.32 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period,

T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
10 YEAR - 3 HOUR STORM EVENT

PROJECT: Global Water Farms - Pilot Project Site
CONCENTRATION POINT: 1

BY: B Donais DATE 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.35
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.78
UNIT TIME-PERCENT OF LAG	640.6
TOTAL ADJUSTED STORM RAIN-INCHES	1.11
CONSTANT LOSS RATE-in/hr	0.64
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.01 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.173	0.64	0.16	0.02	0.04	10.27
2	10	0.17	1.3	0.173	0.64	0.16	0.02	0.04	10.27
3	15	0.25	1.1	0.147	0.64	0.13	0.01	0.03	8.39
4	20	0.33	1.5	0.200	0.64	0.18	0.02	0.05	12.15
5	25	0.42	1.5	0.200	0.64	0.18	0.02	0.05	12.15
6	30	0.50	1.8	0.240	0.64	0.22	0.02	0.06	14.97
7	35	0.58	1.5	0.200	0.64	0.18	0.02	0.05	12.15
8	40	0.67	1.8	0.240	0.64	0.22	0.02	0.06	14.97
9	45	0.75	1.8	0.240	0.64	0.22	0.02	0.06	14.97
10	50	0.83	1.5	0.200	0.64	0.18	0.02	0.05	12.15
11	55	0.92	1.6	0.213	0.64	0.19	0.02	0.05	13.09
12	60	1.00	1.8	0.240	0.64	0.22	0.02	0.06	14.97
13	65	1.08	2.2	0.293	0.64	0.26	0.03	0.07	18.73
14	70	1.17	2.2	0.293	0.64	0.26	0.03	0.07	18.73
15	75	1.25	2.2	0.293	0.64	0.26	0.03	0.07	18.73
16	80	1.33	2.0	0.266	0.64	0.24	0.03	0.06	16.85
17	85	1.42	2.6	0.346	0.64	0.31	0.03	0.08	22.48
18	90	1.50	2.7	0.360	0.64	0.32	0.04	0.08	23.42
19	95	1.58	2.4	0.320	0.64	0.29	0.03	0.08	20.60
20	100	1.67	2.7	0.360	0.64	0.32	0.04	0.08	23.42
21	105	1.75	3.3	0.440	0.64	0.40	0.04	0.10	29.06
22	110	1.83	3.1	0.413	0.64	0.37	0.04	0.10	27.18
23	115	1.92	2.9	0.386	0.64	0.35	0.04	0.09	25.30
24	120	2.00	3.0	0.400	0.64	0.36	0.04	0.09	26.24
25	125	2.08	3.1	0.413	0.64	0.37	0.04	0.10	27.18
26	130	2.17	4.2	0.559	0.64	0.50	0.06	0.13	37.51
27	135	2.25	5.0	0.666	0.64	0.60	0.02	0.05	13.53
28	140	2.33	3.5	0.466	0.64	0.42	0.05	0.11	30.94
29	145	2.42	6.8	0.906	0.64	0.82	0.26	0.62	182.60
30	150	2.50	7.3	0.972	0.64	0.88	0.33	0.77	229.57
31	155	2.58	8.2	1.092	0.64	0.98	0.45	1.05	314.10
32	160	2.67	5.9	0.786	0.64	0.71	0.14	0.33	98.07
33	165	2.75	2.0	0.266	0.64	0.24	0.03	0.06	16.85
34	170	2.83	1.8	0.240	0.64	0.22	0.02	0.06	14.97
35	175	2.92	1.8	0.240	0.64	0.22	0.02	0.06	14.97
36	180	3.00	0.6	0.080	0.64	0.07	0.01	0.02	3.70

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.17
FLOOD VOLUME (acft)	0.03
FLOOD VOLUME (cuft)	1487.31
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1405.20
PEAK FLOW RATE (cfs)	1.05

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 10 YEAR - 6 HOUR STORM EVENT	PROJECT: Global Water Farms - Pilot Project Site CONCENTRATION POINT: 1 BY: B Donais DATE: 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.35		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.78		
UNIT TIME-PERCENT OF LAG	640.6		
TOTAL ADJUSTED STORM RAIN-INCHES	1.35		
CONSTANT LOSS RATE-in/hr	0.644		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.01 cfs

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
1	5	0.08	0.5	0.081	0.64	0.07	0.01	0.02	3.77
2	10	0.17	0.6	0.097	0.64	0.09	0.01	0.02	4.92
3	15	0.25	0.6	0.097	0.64	0.09	0.01	0.02	4.92
4	20	0.33	0.6	0.097	0.64	0.09	0.01	0.02	4.92
5	25	0.42	0.6	0.097	0.64	0.09	0.01	0.02	4.92
6	30	0.50	0.7	0.113	0.64	0.10	0.01	0.03	6.06
7	35	0.58	0.7	0.113	0.64	0.10	0.01	0.03	6.06
8	40	0.67	0.7	0.113	0.64	0.10	0.01	0.03	6.06
9	45	0.75	0.7	0.113	0.64	0.10	0.01	0.03	6.06
10	50	0.83	0.7	0.113	0.64	0.10	0.01	0.03	6.06
11	55	0.92	0.7	0.113	0.64	0.10	0.01	0.03	6.06
12	60	1.00	0.8	0.130	0.64	0.12	0.01	0.03	7.20
13	65	1.08	0.8	0.130	0.64	0.12	0.01	0.03	7.20
14	70	1.17	0.8	0.130	0.64	0.12	0.01	0.03	7.20
15	75	1.25	0.8	0.130	0.64	0.12	0.01	0.03	7.20
16	80	1.33	0.8	0.130	0.64	0.12	0.01	0.03	7.20
17	85	1.42	0.8	0.130	0.64	0.12	0.01	0.03	7.20
18	90	1.50	0.8	0.130	0.64	0.12	0.01	0.03	7.20
19	95	1.58	0.8	0.130	0.64	0.12	0.01	0.03	7.20
20	100	1.67	0.8	0.130	0.64	0.12	0.01	0.03	7.20
21	105	1.75	0.8	0.130	0.64	0.12	0.01	0.03	7.20
22	110	1.83	0.8	0.130	0.64	0.12	0.01	0.03	7.20
23	115	1.92	0.8	0.130	0.64	0.12	0.01	0.03	7.20
24	120	2.00	0.9	0.146	0.64	0.13	0.01	0.03	8.34
25	125	2.08	0.8	0.130	0.64	0.12	0.01	0.03	7.20
26	130	2.17	0.9	0.146	0.64	0.13	0.01	0.03	8.34
27	135	2.25	0.9	0.146	0.64	0.13	0.01	0.03	8.34
28	140	2.33	0.9	0.146	0.64	0.13	0.01	0.03	8.34
29	145	2.42	0.9	0.146	0.64	0.13	0.01	0.03	8.34
30	150	2.50	0.9	0.146	0.64	0.13	0.01	0.03	8.34
31	155	2.58	0.9	0.146	0.64	0.13	0.01	0.03	8.34
32	160	2.67	0.9	0.146	0.64	0.13	0.01	0.03	8.34
33	165	2.75	1.0	0.162	0.64	0.15	0.02	0.04	9.48
34	170	2.83	1.0	0.162	0.64	0.15	0.02	0.04	9.48
35	175	2.92	1.0	0.162	0.64	0.15	0.02	0.04	9.48
36	180	3.00	1.0	0.162	0.64	0.15	0.02	0.04	9.48
37	185	3.08	1.0	0.162	0.64	0.15	0.02	0.04	9.48
38	190	3.17	1.1	0.178	0.64	0.16	0.02	0.04	10.63
39	195	3.25	1.1	0.178	0.64	0.16	0.02	0.04	10.63
40	200	3.33	1.1	0.178	0.64	0.16	0.02	0.04	10.63
41	205	3.42	1.2	0.194	0.64	0.17	0.02	0.05	11.77
42	210	3.50	1.3	0.211	0.64	0.19	0.02	0.05	12.91
43	215	3.58	1.4	0.227	0.64	0.20	0.02	0.05	14.05
44	220	3.67	1.4	0.227	0.64	0.20	0.02	0.05	14.05
45	225	3.75	1.5	0.243	0.64	0.22	0.02	0.06	15.20
46	230	3.83	1.5	0.243	0.64	0.22	0.02	0.06	15.20
47	235	3.92	1.6	0.259	0.64	0.23	0.03	0.06	16.34
48	240	4.00	1.6	0.259	0.64	0.23	0.03	0.06	16.34
49	245	4.08	1.7	0.275	0.64	0.25	0.03	0.06	17.48
50	250	4.17	1.8	0.292	0.64	0.26	0.03	0.07	18.62
51	255	4.25	1.9	0.308	0.64	0.28	0.03	0.07	19.77
52	260	4.33	2.0	0.324	0.64	0.29	0.03	0.08	20.91
53	265	4.42	2.1	0.340	0.64	0.31	0.03	0.08	22.05
54	270	4.50	2.1	0.340	0.64	0.31	0.03	0.08	22.05
55	275	4.58	2.2	0.356	0.64	0.32	0.04	0.08	23.19
56	280	4.67	2.3	0.373	0.64	0.34	0.04	0.09	24.34

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 10 YEAR - 6 HOUR STORM EVENT	PROJECT: Global Water Farms - Pilot Project Site CONCENTRATION POINT: 1 BY: B Donais DATE: 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.35		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.78		
UNIT TIME-PERCENT OF LAG	640.6		
TOTAL ADJUSTED STORM RAIN-INCHES	1.35		
CONSTANT LOSS RATE-in/hr	0.644		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.01 cfs

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
57	285	4.75	2.4	0.389	0.64	0.35	0.04	0.09	25.48
58	290	4.83	2.4	0.389	0.64	0.35	0.04	0.09	25.48
59	295	4.92	2.5	0.405	0.64	0.36	0.04	0.10	26.62
60	300	5.00	2.6	0.421	0.64	0.38	0.04	0.10	27.76
61	305	5.08	3.1	0.502	0.64	0.45	0.05	0.12	33.47
62	310	5.17	3.6	0.583	0.64	0.52	0.06	0.14	39.19
63	315	5.25	3.9	0.632	0.64	0.57	0.06	0.15	42.61
64	320	5.33	4.2	0.680	0.64	0.61	0.04	0.09	23.68
65	325	5.42	4.7	0.761	0.64	0.69	0.12	0.28	80.80
66	330	5.50	5.6	0.907	0.64	0.82	0.26	0.62	183.62
67	335	5.58	1.9	0.308	0.64	0.28	0.03	0.07	19.77
68	340	5.67	0.9	0.146	0.64	0.13	0.01	0.03	8.34
69	345	5.75	0.6	0.097	0.64	0.09	0.01	0.02	4.92
70	350	5.83	0.5	0.081	0.64	0.07	0.01	0.02	3.77
71	355	5.92	0.3	0.049	0.64	0.04	0.00	0.01	1.49
72	360	6.00	0.2	0.032	0.64	0.03	0.00	0.01	0.35

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.15
FLOOD VOLUME (acft)	0.03
FLOOD VOLUME (cuft)	1281.26
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1131.04
PEAK FLOW RATE (cfs)	0.62

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 10 YEAR - 24 HOUR STORM EVENT		PROJECT: CONCENTRATION POINT: BY: B Donais	Global Water Farms - Pilot Project Site 1 DATE: 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.351	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.6441
LAG TIME - MINUTES	0.78	MINIMUM LOSS RATE (for var. loss) - in/hr	0.322
UNIT TIME-PERCENT OF LAG	1921.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.21	C	0.00596
		PERCOLATION RATE (cfs)	0.01

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
1	15	0.25	0.2	0.018	1.137	0.016	0.002	0.00	0.00
2	30	0.50	0.3	0.027	1.124	0.024	0.003	0.01	0.00
3	45	0.75	0.3	0.027	1.111	0.024	0.003	0.01	0.00
4	60	1.00	0.4	0.035	1.098	0.032	0.004	0.01	1.66
5	75	1.25	0.3	0.027	1.085	0.024	0.003	0.01	0.00
6	90	1.50	0.3	0.027	1.072	0.024	0.003	0.01	0.00
7	105	1.75	0.3	0.027	1.059	0.024	0.003	0.01	0.00
8	120	2.00	0.4	0.035	1.047	0.032	0.004	0.01	1.66
9	135	2.25	0.4	0.035	1.034	0.032	0.004	0.01	1.66
10	150	2.50	0.4	0.035	1.021	0.032	0.004	0.01	1.66
11	165	2.75	0.5	0.044	1.009	0.040	0.004	0.01	3.53
12	180	3.00	0.5	0.044	0.996	0.040	0.004	0.01	3.53
13	195	3.25	0.5	0.044	0.984	0.040	0.004	0.01	3.53
14	210	3.50	0.5	0.044	0.972	0.040	0.004	0.01	3.53
15	225	3.75	0.5	0.044	0.960	0.040	0.004	0.01	3.53
16	240	4.00	0.6	0.053	0.948	0.048	0.005	0.01	5.40
17	255	4.25	0.6	0.053	0.936	0.048	0.005	0.01	5.40
18	270	4.50	0.7	0.062	0.924	0.056	0.006	0.01	7.27
19	285	4.75	0.7	0.062	0.912	0.056	0.006	0.01	7.27
20	300	5.00	0.8	0.071	0.900	0.064	0.007	0.02	9.14
21	315	5.25	0.6	0.053	0.888	0.048	0.005	0.01	5.40
22	330	5.50	0.7	0.062	0.877	0.056	0.006	0.01	7.27
23	345	5.75	0.8	0.071	0.865	0.064	0.007	0.02	9.14
24	360	6.00	0.8	0.071	0.854	0.064	0.007	0.02	9.14
25	375	6.25	0.9	0.080	0.843	0.072	0.008	0.02	11.01
26	390	6.50	0.9	0.080	0.831	0.072	0.008	0.02	11.01
27	405	6.75	1.0	0.088	0.820	0.080	0.009	0.02	12.88
28	420	7.00	1.0	0.088	0.809	0.080	0.009	0.02	12.88
29	435	7.25	1.0	0.088	0.798	0.080	0.009	0.02	12.88
30	450	7.50	1.1	0.097	0.787	0.088	0.010	0.02	14.75
31	465	7.75	1.2	0.106	0.776	0.095	0.011	0.02	16.62
32	480	8.00	1.3	0.115	0.766	0.103	0.011	0.03	18.49
33	495	8.25	1.5	0.133	0.755	0.119	0.013	0.03	22.23
34	510	8.50	1.5	0.133	0.745	0.119	0.013	0.03	22.23
35	525	8.75	1.6	0.141	0.734	0.127	0.014	0.03	24.10
36	540	9.00	1.7	0.150	0.724	0.135	0.015	0.04	25.97
37	555	9.25	1.9	0.168	0.714	0.151	0.017	0.04	29.72
38	570	9.50	2.0	0.177	0.703	0.159	0.018	0.04	31.59
39	585	9.75	2.1	0.186	0.693	0.167	0.019	0.04	33.46
40	600	10.00	2.2	0.194	0.683	0.175	0.019	0.05	35.33
41	615	10.25	1.5	0.133	0.674	0.119	0.013	0.03	22.23
42	630	10.50	1.5	0.133	0.664	0.119	0.013	0.03	22.23
43	645	10.75	2.0	0.177	0.654	0.159	0.018	0.04	31.59
44	660	11.00	2.0	0.177	0.645	0.159	0.018	0.04	31.59
45	675	11.25	1.9	0.168	0.635	0.151	0.017	0.04	29.72
46	690	11.50	1.9	0.168	0.626	0.151	0.017	0.04	29.72
47	705	11.75	1.7	0.150	0.616	0.135	0.015	0.04	25.97
48	720	12.00	1.8	0.159	0.607	0.143	0.016	0.04	27.84
49	735	12.25	2.5	0.221	0.598	0.199	0.022	0.05	40.94
50	750	12.50	2.6	0.230	0.589	0.207	0.023	0.05	42.81
51	765	12.75	2.8	0.248	0.580	0.223	0.025	0.06	46.55
52	780	13.00	2.9	0.256	0.572	0.231	0.026	0.06	48.42
53	795	13.25	3.4	0.301	0.563	0.271	0.030	0.07	57.77
54	810	13.50	3.4	0.301	0.554	0.271	0.030	0.07	57.77
55	825	13.75	2.3	0.203	0.546	0.183	0.020	0.05	37.20
56	840	14.00	2.3	0.203	0.538	0.183	0.020	0.05	37.20
57	855	14.25	2.7	0.239	0.530	0.215	0.024	0.06	44.68
58	870	14.50	2.6	0.230	0.521	0.207	0.023	0.05	42.81
59	885	14.75	2.6	0.230	0.513	0.207	0.023	0.05	42.81
60	900	15.00	2.5	0.221	0.506	0.199	0.022	0.05	40.94
61	915	15.25	2.4	0.212	0.498	0.191	0.021	0.05	39.07

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 10 YEAR - 24 HOUR STORM EVENT	PROJECT: Global Water Farms - Pilot Project Site CONCENTRATION POINT: 1 BY: B Donais DATE: 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.351	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.6441
LAG TIME - MINUTES	0.78	MINIMUM LOSS RATE (for var. loss) - in/hr	0.322
UNIT TIME-PERCENT OF LAG	1921.9	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	2.21	C	0.00596
		PERCOLATION RATE (cfs)	0.01

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
62	930	15.50	2.3	0.203	0.490	0.183	0.020	0.05	37.20
63	945	15.75	1.9	0.168	0.483	0.151	0.017	0.04	29.72
64	960	16.00	1.9	0.168	0.475	0.151	0.017	0.04	29.72
65	975	16.25	0.4	0.035	0.468	0.032	0.004	0.01	1.66
66	990	16.50	0.4	0.035	0.461	0.032	0.004	0.01	1.66
67	1005	16.75	0.3	0.027	0.454	0.024	0.003	0.01	0.00
68	1020	17.00	0.3	0.027	0.447	0.024	0.003	0.01	0.00
69	1035	17.25	0.5	0.044	0.440	0.040	0.004	0.01	3.53
70	1050	17.50	0.5	0.044	0.434	0.040	0.004	0.01	3.53
71	1065	17.75	0.5	0.044	0.427	0.040	0.004	0.01	3.53
72	1080	18.00	0.4	0.035	0.421	0.032	0.004	0.01	1.66
73	1095	18.25	0.4	0.035	0.415	0.032	0.004	0.01	1.66
74	1110	18.50	0.4	0.035	0.409	0.032	0.004	0.01	1.66
75	1125	18.75	0.3	0.027	0.403	0.024	0.003	0.01	0.00
76	1140	19.00	0.2	0.018	0.397	0.016	0.002	0.00	0.00
77	1155	19.25	0.3	0.027	0.392	0.024	0.003	0.01	0.00
78	1170	19.50	0.4	0.035	0.386	0.032	0.004	0.01	1.66
79	1185	19.75	0.3	0.027	0.381	0.024	0.003	0.01	0.00
80	1200	20.00	0.2	0.018	0.376	0.016	0.002	0.00	0.00
81	1215	20.25	0.3	0.027	0.371	0.024	0.003	0.01	0.00
82	1230	20.50	0.3	0.027	0.366	0.024	0.003	0.01	0.00
83	1245	20.75	0.3	0.027	0.361	0.024	0.003	0.01	0.00
84	1260	21.00	0.2	0.018	0.357	0.016	0.002	0.00	0.00
85	1275	21.25	0.3	0.027	0.353	0.024	0.003	0.01	0.00
86	1290	21.50	0.2	0.018	0.349	0.016	0.002	0.00	0.00
87	1305	21.75	0.3	0.027	0.345	0.024	0.003	0.01	0.00
88	1320	22.00	0.2	0.018	0.341	0.016	0.002	0.00	0.00
89	1335	22.25	0.3	0.027	0.338	0.024	0.003	0.01	0.00
90	1350	22.50	0.2	0.018	0.335	0.016	0.002	0.00	0.00
91	1365	22.75	0.2	0.018	0.332	0.016	0.002	0.00	0.00
92	1380	23.00	0.2	0.018	0.329	0.016	0.002	0.00	0.00
93	1395	23.25	0.2	0.018	0.327	0.016	0.002	0.00	0.00
94	1410	23.50	0.2	0.018	0.325	0.016	0.002	0.00	0.00
95	1425	23.75	0.2	0.018	0.323	0.016	0.002	0.00	0.00
96	1440	24.00	0.2	0.018	0.322	0.016	0.002	0.00	0.00

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.22
FLOOD VOLUME (acft)	0.04
FLOOD VOLUME (cuft)	1885.73
REQUIRED STORAGE (acft)	0.03
REQUIRED STORAGE (cuft)	1341.97
PEAK FLOW (cfs)	0.07

APPENDIX F

SYNTHETIC UNIT HYDROGRAPH CALCULATION

100-YEAR EVENT

	A	B	C	D
1	**RCFCD SYNTHETIC UNIT HYDROGRAPH**		**DATE**	12/28/2021
2	**DATA INPUT SHEET - 100 Year Rain Event**			
3				
4	WORKSHEET PREPARED BY:	B Donais		
5				
6	PROJECT NAME	Global Water Farms - Pilot Project Site		
7	Heptagon Seven PN	77-100163		
8				
9	CONCENTRATION POINT DESIGNATION	1		
10	AREA DESIGNATION	ONSITE FLOWS		
11				
12		Acres	Sq Ft	
13	TRIBUTARY AREAS	2.351	102,392	
14	AC MILLINGS/AGG BASE SURFACE	0.112	4,891	
15	COMMERCIAL	0.311	13,537	
16	PAVING/HARDSCAPE	0.031	1,342	
17	SF - 1 ACRE	0.000		
18	SF - 1/2 ACRE	0.000		
19	SF - 1/4 ACRE	0.000		
20	MF - CONDOMINIUMS	0.000		
21	MF - APARTMENTS	0.000		
22	MOBILE HOME PARK	0.000		
23	LANDSCAPING	1.766	76,910	
24	RETENTION BASIN	0.131	5,712	
25	GOLF COURSE	0.000		
26	MOUNTAINOUS	0.000		
27	LOW LOSS RATE (PERCENT)	90%		
28				
29	LENGTH OF WATERCOURSE (L)	300		
30	LENGTH TO POINT OPPOSITE CENTROID (Lca)	95		
31				
32	ELEVATION OF HEADWATER	558.7		
33	ELEVATION OF CONCENTRATION POINT	545		
34				
35	AVERAGE MANNINGS 'N' VALUE	0.02		
36				
37	STORM FREQUENCY (YEAR)	100		
38				
39	POINT RAIN			
40	3-HOUR	2.22		
41	6-HOUR	2.69		
42	24-HOUR	4.19		
43				
44	BASIN CHARACTERISTICS:	ELEVATION	AREA	
45		548	716	
46		549	2225	
47		550	3834	
48		551	5544	
49				
50				
51				
52				
53	PERCOLATION RATE (in/hr)	0.78		
54				
55	DRYWELL DATA			
56	NUMBER USED	0		
57	PERCOLATION RATE (cfs)	0.013		

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

BASIC DATA CALCULATION FORM

SHORTCUT METHOD

PROJECT: Global Water Farms - Pilot Project Site

H7 JOB# 77-100163

BY B Donais DATE 1/6/2022

PHYSICAL DATA

[1] CONCENTRATION POINT	1
[2] AREA DESIGNATION	ONSITE FLOWS
[3] AREA - ACRES	2.351
[4] L-FEET	300
[5] L-MILES	0.057
[6] La-FEET	95.00
[7] La-MILES	0.018
[8] ELEVATION OF HEADWATER	558.7
[9] ELEVATION OF CONCENTRATION POINT	545
[10] H-FEET	13.7
[11] S-FEET/MILE	241.1
[12] S^0.5	15.53
[13] L*LCA/S^0.5	0.000
[14] AVERAGE MANNINGS 'N'	0.02
[15] LAG TIME-HOURS	0.01
[16] LAG TIME-MINUTES	0.7
[17] 100% OF LAG-MINUTES	0.7
[18] 200% OF LAG-MINUTES	1.5
[19] UNIT TIME-MINUTES (100%-200% OF LAG)	5
[24] TOTAL PERCOLATION RATE (cfs)	0.01

RAINFALL DATA

[1] SOURCE

[2] FREQUENCY-YEARS 100

[3] DURATION:

3-HOURS				6-HOURS				24-HOURS			
[4] POINT RAIN INCHES (Plate E-5.2)	[5] AREA	[6]	[7] AVERAGE POINT RAIN INCHES	[8] POINT RAIN INCHES (Plate E-5.4)	[9] AREA	[10]	[11] AVERAGE POINT RAIN INCHES	[12] POINT RAIN INCHES (Plate E-5.6)	[13] AREA	[14]	[15] AVERAGE POINT RAIN INCHES
2.22	2.351	1.00	2.22	2.69	2.351	1.00	2.69	4.19	2.351	1.00	4.19
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
		0.00	0.00			0.00	0.00			0.00	0.00
SUM [5]	2.35059688	SUM [7]	2.22	SUM [9]	2.35	SUM [11]	2.69	SUM [13]	2.35	SUM [15]	4.19
[16] AREA ADJ FACTOR			1.000				1.000				1.000
[17] ADJ AVG POINT RAIN			2.22				2.69				4.19

STORM EVENT SUMMARY

DURATION		3-HOUR	6-HOUR	24-HOUR
EFFECTIVE RAIN	(in)	0.70	0.57	0.40
FLOOD VOLUME	(cu-ft)	5,987	4,866	3,379
	(acre-ft)	0.14	0.11	0.08
REQUIRED STORAGE	(cu-ft)	5,868	4,687	2,793
	(acre-ft)	0.13	0.11	0.06
PEAK FLOW	(cfs)	3.62	2.74	0.11
MAXIMUM WSEL	(ft)	550.29	550.04	549.44

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD

PROJECT Global Water Farms - Pilot Project Site
CONCENTRATION POINT: 1
BY B Donais DATE 1/6/2022

AVERAGE ADJUSTED LOSS RATE

SOIL GROUP [Plate C-1]	LAND USE	RI NUMBER [Plate E-6.1]	PERVIOUS AREA INFILTRATION RATE (in/hr) [Plate E-6.2]	DECIMAL PERCENT OF AREA IMPERVIOUS [Plate E-6.3]	ADJUSTED INFILTRATION RATE (in/hr)	AREA		AVERAGE ADJUSTED INFILTRATION RATE (in/hr)
A	COMMERCIAL	32	0.00	100%	0.00	0.31	0.132	0.0000
A	PAVING/HARDSCAPE	32	0.00	100%	0.00	0.03	0.013	0.0000
A	SF - 1 ACRE	32	0.74	20%	0.61	0.00	0.000	0.0000
A	SF - 1/2 ACRE	32	0.74	40%	0.47	0.00	0.000	0.0000
A	SF - 1/4 ACRE	32	0.74	50%	0.41	0.00	0.000	0.0000
A	MF - COND0MINIUMS	32	0.74	65%	0.31	0.00	0.000	0.0000
A	MF - APARTMENTS	32	0.74	80%	0.21	0.00	0.000	0.0000
A	MOBILE HOME PARKS	32	0.74	75%	0.24	0.00	0.000	0.0000
A	LANDSCAPING	46	0.78	0%	0.78	1.77	0.751	0.5859
A	RETENTION BASINS	46	0.78	0%	0.78	0.13	0.056	0.0435
A	GOLF COURSE	32	0.74	0%	0.74	0.00	0.000	0.0000
D	MOUNTAINOUS	93	0.95	90%	0.18	0.00	0.000	0.0000
A	AB SURFACE	32	0.74	65%	0.31	0.11	0.048	0.0147
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
					0.00		0.000	0.0000
						SUM 2.350596878	SUM	0.6441

VARIABLE LOSS RATE CURVE (24-HOUR STORM ONLY)

Fm= 0.322032903

C= 0.00596

Ft=C(24-(T/60))^1.55 = 0.00596 (24-(T/60))^1.55 + 0.32 in/hr

LOW LOSS RATE (80-90 PERCENT) = 90%

Where:

T=Time in minutes. To get an average value for each unit time period, Use T=1/2 the unit time for the first time period,
T=1 1/2 unit time for the second period, etc.

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD
100 YEAR - 3 HOUR STORM EVENT

PROJECT: Global Water Farms - Pilot Project Site
CONCENTRATION POINT: 1

BY: B Donais DATE 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.35
UNIT TIME-MINUTES	5
LAG TIME - MINUTES	0.74
UNIT TIME-PERCENT OF LAG	673.8
TOTAL ADJUSTED STORM RAIN-INCHES	2.22
CONSTANT LOSS RATE-in/hr	0.64
LOW LOSS RATE - PERCENT	90%

TOTAL PERCOLATION RATE (cfs) 0.01 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
1	5	0.08	1.3	0.346	0.64	0.31	0.03	0.08	22.48
2	10	0.17	1.3	0.346	0.64	0.31	0.03	0.08	22.48
3	15	0.25	1.1	0.293	0.64	0.26	0.03	0.07	18.73
4	20	0.33	1.5	0.400	0.64	0.36	0.04	0.09	26.24
5	25	0.42	1.5	0.400	0.64	0.36	0.04	0.09	26.24
6	30	0.50	1.8	0.480	0.64	0.43	0.05	0.11	31.88
7	35	0.58	1.5	0.400	0.64	0.36	0.04	0.09	26.24
8	40	0.67	1.8	0.480	0.64	0.43	0.05	0.11	31.88
9	45	0.75	1.8	0.480	0.64	0.43	0.05	0.11	31.88
10	50	0.83	1.5	0.400	0.64	0.36	0.04	0.09	26.24
11	55	0.92	1.6	0.426	0.64	0.38	0.04	0.10	28.12
12	60	1.00	1.8	0.480	0.64	0.43	0.05	0.11	31.88
13	65	1.08	2.2	0.586	0.64	0.53	0.06	0.14	39.39
14	70	1.17	2.2	0.586	0.64	0.53	0.06	0.14	39.39
15	75	1.25	2.2	0.586	0.64	0.53	0.06	0.14	39.39
16	80	1.33	2.0	0.533	0.64	0.48	0.05	0.13	35.63
17	85	1.42	2.6	0.693	0.64	0.62	0.05	0.11	32.31
18	90	1.50	2.7	0.719	0.64	0.65	0.08	0.18	51.10
19	95	1.58	2.4	0.639	0.64	0.58	0.06	0.15	43.15
20	100	1.67	2.7	0.719	0.64	0.65	0.08	0.18	51.10
21	105	1.75	3.3	0.879	0.64	0.79	0.24	0.55	163.82
22	110	1.83	3.1	0.826	0.64	0.74	0.18	0.43	126.24
23	115	1.92	2.9	0.773	0.64	0.70	0.13	0.30	88.67
24	120	2.00	3.0	0.799	0.64	0.72	0.16	0.36	107.46
25	125	2.08	3.1	0.826	0.64	0.74	0.18	0.43	126.24
26	130	2.17	4.2	1.119	0.64	1.01	0.47	1.12	332.89
27	135	2.25	5.0	1.332	0.64	1.20	0.69	1.62	483.18
28	140	2.33	3.5	0.932	0.64	0.84	0.29	0.68	201.39
29	145	2.42	6.8	1.812	0.64	1.63	1.17	2.74	821.33
30	150	2.50	7.3	1.945	0.64	1.75	1.30	3.06	915.25
31	155	2.58	8.2	2.184	0.64	1.97	1.54	3.62	1084.33
32	160	2.67	5.9	1.572	0.64	1.41	0.93	2.18	652.25
33	165	2.75	2.0	0.533	0.64	0.48	0.05	0.13	35.63
34	170	2.83	1.8	0.480	0.64	0.43	0.05	0.11	31.88
35	175	2.92	1.8	0.480	0.64	0.43	0.05	0.11	31.88
36	180	3.00	0.6	0.160	0.64	0.14	0.02	0.04	9.33

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.70
FLOOD VOLUME (acft)	0.14
FLOOD VOLUME (cuft)	5986.81
REQUIRED STORAGE (acft)	0.13
REQUIRED STORAGE (cuft)	5867.50
PEAK FLOW RATE (cfs)	3.62

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: Global Water Farms - Pilot Project Site CONCENTRATION POINT: 1 BY: B Donais DATE: 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.35		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.74		
UNIT TIME-PERCENT OF LAG	673.8		
TOTAL ADJUSTED STORM RAIN-INCHES	2.69		
CONSTANT LOSS RATE-in/hr	0.644		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.01 cfs

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
1	5	0.08	0.5	0.161	0.64	0.15	0.02	0.04	9.44
2	10	0.17	0.6	0.194	0.64	0.17	0.02	0.05	11.72
3	15	0.25	0.6	0.194	0.64	0.17	0.02	0.05	11.72
4	20	0.33	0.6	0.194	0.64	0.17	0.02	0.05	11.72
5	25	0.42	0.6	0.194	0.64	0.17	0.02	0.05	11.72
6	30	0.50	0.7	0.226	0.64	0.20	0.02	0.05	14.00
7	35	0.58	0.7	0.226	0.64	0.20	0.02	0.05	14.00
8	40	0.67	0.7	0.226	0.64	0.20	0.02	0.05	14.00
9	45	0.75	0.7	0.226	0.64	0.20	0.02	0.05	14.00
10	50	0.83	0.7	0.226	0.64	0.20	0.02	0.05	14.00
11	55	0.92	0.7	0.226	0.64	0.20	0.02	0.05	14.00
12	60	1.00	0.8	0.258	0.64	0.23	0.03	0.06	16.27
13	65	1.08	0.8	0.258	0.64	0.23	0.03	0.06	16.27
14	70	1.17	0.8	0.258	0.64	0.23	0.03	0.06	16.27
15	75	1.25	0.8	0.258	0.64	0.23	0.03	0.06	16.27
16	80	1.33	0.8	0.258	0.64	0.23	0.03	0.06	16.27
17	85	1.42	0.8	0.258	0.64	0.23	0.03	0.06	16.27
18	90	1.50	0.8	0.258	0.64	0.23	0.03	0.06	16.27
19	95	1.58	0.8	0.258	0.64	0.23	0.03	0.06	16.27
20	100	1.67	0.8	0.258	0.64	0.23	0.03	0.06	16.27
21	105	1.75	0.8	0.258	0.64	0.23	0.03	0.06	16.27
22	110	1.83	0.8	0.258	0.64	0.23	0.03	0.06	16.27
23	115	1.92	0.8	0.258	0.64	0.23	0.03	0.06	16.27
24	120	2.00	0.9	0.291	0.64	0.26	0.03	0.07	18.55
25	125	2.08	0.8	0.258	0.64	0.23	0.03	0.06	16.27
26	130	2.17	0.9	0.291	0.64	0.26	0.03	0.07	18.55
27	135	2.25	0.9	0.291	0.64	0.26	0.03	0.07	18.55
28	140	2.33	0.9	0.291	0.64	0.26	0.03	0.07	18.55
29	145	2.42	0.9	0.291	0.64	0.26	0.03	0.07	18.55
30	150	2.50	0.9	0.291	0.64	0.26	0.03	0.07	18.55
31	155	2.58	0.9	0.291	0.64	0.26	0.03	0.07	18.55
32	160	2.67	0.9	0.291	0.64	0.26	0.03	0.07	18.55
33	165	2.75	1.0	0.323	0.64	0.29	0.03	0.08	20.82
34	170	2.83	1.0	0.323	0.64	0.29	0.03	0.08	20.82
35	175	2.92	1.0	0.323	0.64	0.29	0.03	0.08	20.82
36	180	3.00	1.0	0.323	0.64	0.29	0.03	0.08	20.82
37	185	3.08	1.0	0.323	0.64	0.29	0.03	0.08	20.82
38	190	3.17	1.1	0.355	0.64	0.32	0.04	0.08	23.10
39	195	3.25	1.1	0.355	0.64	0.32	0.04	0.08	23.10
40	200	3.33	1.1	0.355	0.64	0.32	0.04	0.08	23.10
41	205	3.42	1.2	0.387	0.64	0.35	0.04	0.09	25.38
42	210	3.50	1.3	0.420	0.64	0.38	0.04	0.10	27.65
43	215	3.58	1.4	0.452	0.64	0.41	0.05	0.11	29.93
44	220	3.67	1.4	0.452	0.64	0.41	0.05	0.11	29.93
45	225	3.75	1.5	0.484	0.64	0.44	0.05	0.11	32.21
46	230	3.83	1.5	0.484	0.64	0.44	0.05	0.11	32.21
47	235	3.92	1.6	0.516	0.64	0.46	0.05	0.12	34.48
48	240	4.00	1.6	0.516	0.64	0.46	0.05	0.12	34.48
49	245	4.08	1.7	0.549	0.64	0.49	0.05	0.13	36.76
50	250	4.17	1.8	0.581	0.64	0.52	0.06	0.14	39.03
51	255	4.25	1.9	0.613	0.64	0.55	0.06	0.14	41.31
52	260	4.33	2.0	0.646	0.64	0.58	0.00	0.00	0.00
53	265	4.42	2.1	0.678	0.64	0.61	0.03	0.08	21.91
54	270	4.50	2.1	0.678	0.64	0.61	0.03	0.08	21.91
55	275	4.58	2.2	0.710	0.64	0.64	0.07	0.16	44.67
56	280	4.67	2.3	0.742	0.64	0.67	0.10	0.23	67.43

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 6 HOUR STORM EVENT	PROJECT: Global Water Farms - Pilot Project Site CONCENTRATION POINT: 1 BY: B Donais DATE: 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.35		
UNIT TIME-MINUTES	5		
LAG TIME - MINUTES	0.74		
UNIT TIME-PERCENT OF LAG	673.8		
TOTAL ADJUSTED STORM RAIN-INCHES	2.69		
CONSTANT LOSS RATE-in/hr	0.644		
LOW LOSS RATE - PERCENT	90%	TOTAL PERCOLATION RATE (cfs)	0.01 cfs

Unit Time Period	Time Minutes	Time Hours	Pattern Percent (Plate E-5.9)	Storm Rain in/hr	Loss Rate in/hr Max	Loss Rate in/hr Low	Effective Rain in/hr	Flood Hydrograph Flow cfs	Required Storage cf
57	285	4.75	2.4	0.775	0.64	0.70	0.13	0.31	90.20
58	290	4.83	2.4	0.775	0.64	0.70	0.13	0.31	90.20
59	295	4.92	2.5	0.807	0.64	0.73	0.16	0.38	112.96
60	300	5.00	2.6	0.839	0.64	0.76	0.20	0.46	135.72
61	305	5.08	3.1	1.001	0.64	0.90	0.36	0.84	249.54
62	310	5.17	3.6	1.162	0.64	1.05	0.52	1.22	363.35
63	315	5.25	3.9	1.259	0.64	1.13	0.61	1.45	431.64
64	320	5.33	4.2	1.356	0.64	1.22	0.71	1.67	499.93
65	325	5.42	4.7	1.517	0.64	1.37	0.87	2.05	613.75
66	330	5.50	5.6	1.808	0.64	1.63	1.16	2.74	818.62
67	335	5.58	1.9	0.613	0.64	0.55	0.06	0.14	41.31
68	340	5.67	0.9	0.291	0.64	0.26	0.03	0.07	18.55
69	345	5.75	0.6	0.194	0.64	0.17	0.02	0.05	11.72
70	350	5.83	0.5	0.161	0.64	0.15	0.02	0.04	9.44
71	355	5.92	0.3	0.097	0.64	0.09	0.01	0.02	4.89
72	360	6.00	0.2	0.065	0.64	0.06	0.01	0.02	2.61

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY

EFFECTIVE RAIN (in)	0.57
FLOOD VOLUME (acft)	0.11
FLOOD VOLUME (cuft)	4866.32
REQUIRED STORAGE (acft)	0.11
REQUIRED STORAGE (cuft)	4687.33
PEAK FLOW RATE (cfs)	2.74

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: Global Water Farms - Pilot Project Site CONCENTRATION POINT: 1 BY: B Donais DATE: 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.351	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.6441
LAG TIME - MINUTES	0.74	MINIMUM LOSS RATE (for var. loss) - in/hr	0.322
UNIT TIME-PERCENT OF LAG	2021.5	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	4.19	C	0.00596
		PERCOLATION RATE (cfs)	0.01

Unit Time Period	Time		Pattern	Storm	Loss Rate		Effective	Flood	Required
	Minutes	Hours	Percent	Rain in/hr	in/hr		Rain	Hydrograph Flow	Storage
			(Plate E-5.9)		Max	Low	in/hr	cfs	cf
1	15	0.25	0.2	0.034	1.137	0.030	0.003	0.01	1.27
2	30	0.50	0.3	0.050	1.124	0.045	0.005	0.01	4.82
3	45	0.75	0.3	0.050	1.111	0.045	0.005	0.01	4.82
4	60	1.00	0.4	0.067	1.098	0.060	0.007	0.02	8.37
5	75	1.25	0.3	0.050	1.085	0.045	0.005	0.01	4.82
6	90	1.50	0.3	0.050	1.072	0.045	0.005	0.01	4.82
7	105	1.75	0.3	0.050	1.059	0.045	0.005	0.01	4.82
8	120	2.00	0.4	0.067	1.047	0.060	0.007	0.02	8.37
9	135	2.25	0.4	0.067	1.034	0.060	0.007	0.02	8.37
10	150	2.50	0.4	0.067	1.021	0.060	0.007	0.02	8.37
11	165	2.75	0.5	0.084	1.009	0.075	0.008	0.02	11.91
12	180	3.00	0.5	0.084	0.996	0.075	0.008	0.02	11.91
13	195	3.25	0.5	0.084	0.984	0.075	0.008	0.02	11.91
14	210	3.50	0.5	0.084	0.972	0.075	0.008	0.02	11.91
15	225	3.75	0.5	0.084	0.960	0.075	0.008	0.02	11.91
16	240	4.00	0.6	0.101	0.948	0.091	0.010	0.02	15.46
17	255	4.25	0.6	0.101	0.936	0.091	0.010	0.02	15.46
18	270	4.50	0.7	0.117	0.924	0.106	0.012	0.03	19.00
19	285	4.75	0.7	0.117	0.912	0.106	0.012	0.03	19.00
20	300	5.00	0.8	0.134	0.900	0.121	0.013	0.03	22.55
21	315	5.25	0.6	0.101	0.888	0.091	0.010	0.02	15.46
22	330	5.50	0.7	0.117	0.877	0.106	0.012	0.03	19.00
23	345	5.75	0.8	0.134	0.865	0.121	0.013	0.03	22.55
24	360	6.00	0.8	0.134	0.854	0.121	0.013	0.03	22.55
25	375	6.25	0.9	0.151	0.843	0.136	0.015	0.04	26.09
26	390	6.50	0.9	0.151	0.831	0.136	0.015	0.04	26.09
27	405	6.75	1.0	0.168	0.820	0.151	0.017	0.04	29.64
28	420	7.00	1.0	0.168	0.809	0.151	0.017	0.04	29.64
29	435	7.25	1.0	0.168	0.798	0.151	0.017	0.04	29.64
30	450	7.50	1.1	0.184	0.787	0.166	0.018	0.04	33.18
31	465	7.75	1.2	0.201	0.776	0.181	0.020	0.05	36.73
32	480	8.00	1.3	0.218	0.766	0.196	0.022	0.05	40.28
33	495	8.25	1.5	0.251	0.755	0.226	0.025	0.06	47.37
34	510	8.50	1.5	0.251	0.745	0.226	0.025	0.06	47.37
35	525	8.75	1.6	0.268	0.734	0.241	0.027	0.06	50.91
36	540	9.00	1.7	0.285	0.724	0.256	0.028	0.07	54.46
37	555	9.25	1.9	0.318	0.714	0.287	0.032	0.07	61.55
38	570	9.50	2.0	0.335	0.703	0.302	0.034	0.08	65.10
39	585	9.75	2.1	0.352	0.693	0.317	0.035	0.08	68.64
40	600	10.00	2.2	0.369	0.683	0.332	0.037	0.09	72.19
41	615	10.25	1.5	0.251	0.674	0.226	0.025	0.06	47.37
42	630	10.50	1.5	0.251	0.664	0.226	0.025	0.06	47.37
43	645	10.75	2.0	0.335	0.654	0.302	0.034	0.08	65.10
44	660	11.00	2.0	0.335	0.645	0.302	0.034	0.08	65.10
45	675	11.25	1.9	0.318	0.635	0.287	0.032	0.07	61.55
46	690	11.50	1.9	0.318	0.626	0.287	0.032	0.07	61.55
47	705	11.75	1.7	0.285	0.616	0.256	0.028	0.07	54.46
48	720	12.00	1.8	0.302	0.607	0.272	0.030	0.07	58.00
49	735	12.25	2.5	0.419	0.598	0.377	0.042	0.10	82.82
50	750	12.50	2.6	0.436	0.589	0.392	0.044	0.10	86.37
51	765	12.75	2.8	0.469	0.580	0.422	0.047	0.11	93.46
52	780	13.00	2.9	0.486	0.572	0.437	0.049	0.11	97.01
53	795	13.25	3.4	0.570	0.563	0.513	0.007	0.02	8.64
54	810	13.50	3.4	0.570	0.554	0.513	0.015	0.04	26.69
55	825	13.75	2.3	0.385	0.546	0.347	0.039	0.09	75.73
56	840	14.00	2.3	0.385	0.538	0.347	0.039	0.09	75.73
57	855	14.25	2.7	0.453	0.530	0.407	0.045	0.11	89.91
58	870	14.50	2.6	0.436	0.521	0.392	0.044	0.10	86.37
59	885	14.75	2.6	0.436	0.513	0.392	0.044	0.10	86.37
60	900	15.00	2.5	0.419	0.506	0.377	0.042	0.10	82.82
61	915	15.25	2.4	0.402	0.498	0.362	0.040	0.09	79.28

RCFCD SYNTHETIC UNIT HYDROGRAPH METHOD 100 YEAR - 24 HOUR STORM EVENT	PROJECT: Global Water Farms - Pilot Project Site CONCENTRATION POINT: 1 BY: B Donais DATE: 1/6/2022

EFFECTIVE RAIN CALCULATION FORM

DRAINAGE AREA-ACRES	2.351	CONSTANT LOSS RATE-in/hr	n/a
UNIT TIME-MINUTES	15	VARIABLE LOSS RATE (AVG) in/hr	0.6441
LAG TIME - MINUTES	0.74	MINIMUM LOSS RATE (for var. loss) - in/hr	0.322
UNIT TIME-PERCENT OF LAG	2021.5	LOW LOSS RATE - DECIMAL	0.90
TOTAL ADJUSTED STORM RAIN-INCHES	4.19	C	0.00596
		PERCOLATION RATE (cfs)	0.01

Unit Time Period	Time		Pattern Percent	Storm Rain in/hr	Loss Rate in/hr		Effective Rain	Flood Hydrograph Flow	Required Storage
	Minutes	Hours	(Plate E-5.9)		Max	Low	in/hr	cfs	cf
62	930	15.50	2.3	0.385	0.490	0.347	0.039	0.09	75.73
63	945	15.75	1.9	0.318	0.483	0.287	0.032	0.07	61.55
64	960	16.00	1.9	0.318	0.475	0.287	0.032	0.07	61.55
65	975	16.25	0.4	0.067	0.468	0.060	0.007	0.02	8.37
66	990	16.50	0.4	0.067	0.461	0.060	0.007	0.02	8.37
67	1005	16.75	0.3	0.050	0.454	0.045	0.005	0.01	4.82
68	1020	17.00	0.3	0.050	0.447	0.045	0.005	0.01	4.82
69	1035	17.25	0.5	0.084	0.440	0.075	0.008	0.02	11.91
70	1050	17.50	0.5	0.084	0.434	0.075	0.008	0.02	11.91
71	1065	17.75	0.5	0.084	0.427	0.075	0.008	0.02	11.91
72	1080	18.00	0.4	0.067	0.421	0.060	0.007	0.02	8.37
73	1095	18.25	0.4	0.067	0.415	0.060	0.007	0.02	8.37
74	1110	18.50	0.4	0.067	0.409	0.060	0.007	0.02	8.37
75	1125	18.75	0.3	0.050	0.403	0.045	0.005	0.01	4.82
76	1140	19.00	0.2	0.034	0.397	0.030	0.003	0.01	1.27
77	1155	19.25	0.3	0.050	0.392	0.045	0.005	0.01	4.82
78	1170	19.50	0.4	0.067	0.386	0.060	0.007	0.02	8.37
79	1185	19.75	0.3	0.050	0.381	0.045	0.005	0.01	4.82
80	1200	20.00	0.2	0.034	0.376	0.030	0.003	0.01	1.27
81	1215	20.25	0.3	0.050	0.371	0.045	0.005	0.01	4.82
82	1230	20.50	0.3	0.050	0.366	0.045	0.005	0.01	4.82
83	1245	20.75	0.3	0.050	0.361	0.045	0.005	0.01	4.82
84	1260	21.00	0.2	0.034	0.357	0.030	0.003	0.01	1.27
85	1275	21.25	0.3	0.050	0.353	0.045	0.005	0.01	4.82
86	1290	21.50	0.2	0.034	0.349	0.030	0.003	0.01	1.27
87	1305	21.75	0.3	0.050	0.345	0.045	0.005	0.01	4.82
88	1320	22.00	0.2	0.034	0.341	0.030	0.003	0.01	1.27
89	1335	22.25	0.3	0.050	0.338	0.045	0.005	0.01	4.82
90	1350	22.50	0.2	0.034	0.335	0.030	0.003	0.01	1.27
91	1365	22.75	0.2	0.034	0.332	0.030	0.003	0.01	1.27
92	1380	23.00	0.2	0.034	0.329	0.030	0.003	0.01	1.27
93	1395	23.25	0.2	0.034	0.327	0.030	0.003	0.01	1.27
94	1410	23.50	0.2	0.034	0.325	0.030	0.003	0.01	1.27
95	1425	23.75	0.2	0.034	0.323	0.030	0.003	0.01	1.27
96	1440	24.00	0.2	0.034	0.322	0.030	0.003	0.01	1.27

EFFECTIVE RAIN & FLOOD VOLUMES SUMMARY	
EFFECTIVE RAIN (in)	0.40
FLOOD VOLUME (acft)	0.08
FLOOD VOLUME (cuft)	3379.44
REQUIRED STORAGE (acft)	0.06
REQUIRED STORAGE (cuft)	2793.01
PEAK FLOW (cfs)	0.11

APPENDIX F

RETENTION BASIN STORAGE CALCULATIONS

PROJECT: Global Water Farms - Pilot Project Site
H7 JOB# 77-100163
1

BASIN CHARACTERISTICS

CONTOUR	DEPTH		AREA		VOLUME		
	INCR (ft)	TOTAL (ft)	INCR (sf)	TOTAL (sf)	INCR (cuft)	TOTAL (cuft)	(acre-ft)
548	0	0		716	0	0	0.00
549	1	1	1509	2225	1471	1471	0.03
550	1	2	1609	3834	3030	4500	0.10
551	1	3	1710	5544	4689	9189	0.21
0	0	3	0	0	0	9189	0.21
0	0	3	0	0	0	9189	0.21
0	0	0	0	0	0	9189	0.21

PERCOLATION CALCULATIONS

PERCOLATION RATE	0.78	in/hr	0.00646	cfs

MAXWELL IV DRYWELLS

NUMBER USED	0			
RATE/DRYWELL	0.013	cfs		
TOTAL DISSIPATED			0	cfs
TOTAL PERCOLATION RATE			0.01	cfs

1

H7 JOB# 77-100163

100 YEAR - 3 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.08	24	24	2	22	548.02	22	0.00
2	10	0.08	24	47	2	45	548.03	45	0.00
3	15	0.07	21	66	2	64	548.04	64	0.00
4	20	0.09	28	92	2	90	548.06	90	0.00
5	25	0.09	28	118	2	116	548.08	116	0.00
6	30	0.11	34	150	2	148	548.10	148	0.00
7	35	0.09	28	176	2	174	548.12	174	0.00
8	40	0.11	34	208	2	206	548.14	206	0.00
9	45	0.11	34	240	2	238	548.16	238	0.01
10	50	0.09	28	266	2	264	548.18	264	0.01
11	55	0.10	30	294	2	292	548.20	292	0.01
12	60	0.11	34	326	2	324	548.22	324	0.01
13	65	0.14	41	366	2	364	548.25	364	0.01
14	70	0.14	41	405	2	403	548.27	403	0.01
15	75	0.14	41	444	2	442	548.30	442	0.01
16	80	0.13	38	480	2	478	548.33	478	0.01
17	85	0.11	34	512	2	510	548.35	510	0.01
18	90	0.18	53	563	2	561	548.38	561	0.01
19	95	0.15	45	607	2	605	548.41	605	0.01
20	100	0.18	53	658	2	656	548.45	656	0.02
21	105	0.55	166	821	2	820	548.56	820	0.02
22	110	0.43	128	948	2	946	548.64	946	0.02
23	115	0.30	91	1,036	2	1,034	548.70	1,034	0.02
24	120	0.36	109	1,144	2	1,142	548.78	1,142	0.03
25	125	0.43	128	1,270	2	1,268	548.86	1,268	0.03
26	130	1.12	335	1,603	2	1,601	549.04	1,601	0.04
27	135	1.62	485	2,086	2	2,084	549.20	2,084	0.05
28	140	0.68	203	2,288	2	2,286	549.27	2,286	0.05
29	145	2.74	823	3,109	2	3,107	549.54	3,107	0.07
30	150	3.06	917	4,024	2	4,022	549.84	4,022	0.09
31	155	3.62	1,086	5,108	2	5,107	550.13	5,107	0.12
32	160	2.18	654	5,761	2	5,759	550.27	5,759	0.13
33	165	0.13	38	5,796	2	5,794	550.28	5,794	0.13
34	170	0.11	34	5,828	2	5,826	550.28	5,826	0.13
35	175	0.11	34	5,860	2	5,858	550.29	5,858	0.13
36	180	0.04	11	5,869	2	5,868	550.29	5,868	0.13

1

H7 JOB # 77-100163

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	5	0.04	11	11	2	9	548.01	9	0.00
2	10	0.05	14	23	2	21	548.01	21	0.00
3	15	0.05	14	35	2	33	548.02	33	0.00
4	20	0.05	14	47	2	45	548.03	45	0.00
5	25	0.05	14	58	2	56	548.04	56	0.00
6	30	0.05	16	72	2	70	548.05	70	0.00
7	35	0.05	16	86	2	84	548.06	84	0.00
8	40	0.05	16	100	2	98	548.07	98	0.00
9	45	0.05	16	114	2	112	548.08	112	0.00
10	50	0.05	16	128	2	126	548.09	126	0.00
11	55	0.05	16	142	2	140	548.10	140	0.00
12	60	0.06	18	158	2	157	548.11	157	0.00
13	65	0.06	18	175	2	173	548.12	173	0.00
14	70	0.06	18	191	2	189	548.13	189	0.00
15	75	0.06	18	207	2	205	548.14	205	0.00
16	80	0.06	18	224	2	222	548.15	222	0.01
17	85	0.06	18	240	2	238	548.16	238	0.01
18	90	0.06	18	256	2	254	548.17	254	0.01
19	95	0.06	18	272	2	270	548.18	270	0.01
20	100	0.06	18	289	2	287	548.19	287	0.01
21	105	0.06	18	305	2	303	548.21	303	0.01
22	110	0.06	18	321	2	319	548.22	319	0.01
23	115	0.06	18	337	2	336	548.23	336	0.01
24	120	0.07	20	356	2	354	548.24	354	0.01
25	125	0.06	18	372	2	370	548.25	370	0.01
26	130	0.07	20	391	2	389	548.26	389	0.01
27	135	0.07	20	409	2	407	548.28	407	0.01
28	140	0.07	20	428	2	426	548.29	426	0.01
29	145	0.07	20	446	2	445	548.30	445	0.01
30	150	0.07	20	465	2	463	548.31	463	0.01
31	155	0.07	20	484	2	482	548.33	482	0.01
32	160	0.07	20	502	2	500	548.34	500	0.01
33	165	0.08	23	523	2	521	548.35	521	0.01
34	170	0.08	23	544	2	542	548.37	542	0.01
35	175	0.08	23	565	2	563	548.38	563	0.01
36	180	0.08	23	585	2	583	548.40	583	0.01
37	185	0.08	23	606	2	604	548.41	604	0.01
38	190	0.08	25	629	2	627	548.43	627	0.01
39	195	0.08	25	652	2	651	548.44	651	0.01
40	200	0.08	25	676	2	674	548.46	674	0.02
41	205	0.09	27	701	2	699	548.48	699	0.02
42	210	0.10	30	729	2	727	548.49	727	0.02
43	215	0.11	32	759	2	757	548.51	757	0.02
44	220	0.11	32	788	2	787	548.53	787	0.02
45	225	0.11	34	821	2	819	548.56	819	0.02
46	230	0.11	34	853	2	851	548.58	851	0.02
47	235	0.12	36	887	2	885	548.60	885	0.02
48	240	0.12	36	922	2	920	548.63	920	0.02
49	245	0.13	39	959	2	957	548.65	957	0.02
50	250	0.14	41	998	2	996	548.68	996	0.02
51	255	0.14	43	1,039	2	1,037	548.71	1,037	0.02
52	260	0.00	1	1,038	2	1,036	548.70	1,036	0.02
53	265	0.08	24	1,060	2	1,058	548.72	1,058	0.02
54	270	0.08	24	1,082	2	1,080	548.73	1,080	0.02

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H7 JOB # 77-100163

100 YEAR - 6 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
55	275	0.16	47	1,127	2	1,125	548.76	1,125	0.03
56	280	0.23	69	1,194	2	1,192	548.81	1,192	0.03
57	285	0.31	92	1,284	2	1,282	548.87	1,282	0.03
58	290	0.31	92	1,374	2	1,372	548.93	1,372	0.03
59	295	0.38	115	1,487	2	1,485	549.00	1,485	0.03
60	300	0.46	138	1,623	2	1,621	549.05	1,621	0.04
61	305	0.84	251	1,873	2	1,871	549.13	1,871	0.04
62	310	1.22	365	2,236	2	2,234	549.25	2,234	0.05
63	315	1.45	434	2,668	2	2,666	549.39	2,666	0.06
64	320	1.67	502	3,168	2	3,166	549.56	3,166	0.07
65	325	2.05	616	3,781	2	3,779	549.76	3,779	0.09
66	330	2.74	821	4,600	2	4,598	550.02	4,598	0.11
67	335	0.14	43	4,641	2	4,639	550.03	4,639	0.11
68	340	0.07	20	4,660	2	4,658	550.03	4,658	0.11
69	345	0.05	14	4,671	2	4,670	550.04	4,670	0.11
70	350	0.04	11	4,681	2	4,679	550.04	4,679	0.11
71	355	0.02	7	4,686	2	4,684	550.04	4,684	0.11
72	360	0.02	5	4,688	2	4,686	550.04	4,686	0.11

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H7 JOB # 77-100163

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
1	15	0.01	7	7	6	1	548.00	1	0.00
2	30	0.01	11	12	6	6	548.00	6	0.00
3	45	0.01	11	17	6	11	548.01	11	0.00
4	60	0.02	14	25	6	19	548.01	19	0.00
5	75	0.01	11	30	6	24	548.02	24	0.00
6	90	0.01	11	35	6	29	548.02	29	0.00
7	105	0.01	11	40	6	34	548.02	34	0.00
8	120	0.02	14	48	6	42	548.03	42	0.00
9	135	0.02	14	56	6	50	548.03	50	0.00
10	150	0.02	14	65	6	59	548.04	59	0.00
11	165	0.02	18	77	6	71	548.05	71	0.00
12	180	0.02	18	88	6	83	548.06	83	0.00
13	195	0.02	18	100	6	95	548.06	95	0.00
14	210	0.02	18	112	6	106	548.07	106	0.00
15	225	0.02	18	124	6	118	548.08	118	0.00
16	240	0.02	21	140	6	134	548.09	134	0.00
17	255	0.02	21	155	6	149	548.10	149	0.00
18	270	0.03	25	174	6	168	548.11	168	0.00
19	285	0.03	25	193	6	187	548.13	187	0.00
20	300	0.03	28	216	6	210	548.14	210	0.00
21	315	0.02	21	231	6	225	548.15	225	0.01
22	330	0.03	25	250	6	244	548.17	244	0.01
23	345	0.03	28	273	6	267	548.18	267	0.01
24	360	0.03	28	295	6	289	548.20	289	0.01
25	375	0.04	32	321	6	315	548.21	315	0.01
26	390	0.04	32	347	6	342	548.23	342	0.01
27	405	0.04	35	377	6	371	548.25	371	0.01
28	420	0.04	35	407	6	401	548.27	401	0.01
29	435	0.04	35	436	6	431	548.29	431	0.01
30	450	0.04	39	470	6	464	548.32	464	0.01
31	465	0.05	43	506	6	500	548.34	500	0.01
32	480	0.05	46	547	6	541	548.37	541	0.01
33	495	0.06	53	594	6	588	548.40	588	0.01
34	510	0.06	53	641	6	635	548.43	635	0.01
35	525	0.06	57	692	6	686	548.47	686	0.02
36	540	0.07	60	747	6	741	548.50	741	0.02
37	555	0.07	67	808	6	802	548.55	802	0.02
38	570	0.08	71	873	6	867	548.59	867	0.02
39	585	0.08	74	942	6	936	548.64	936	0.02
40	600	0.09	78	1,014	6	1,008	548.69	1,008	0.02
41	615	0.06	53	1,061	6	1,056	548.72	1,056	0.02
42	630	0.06	53	1,109	6	1,103	548.75	1,103	0.03
43	645	0.08	71	1,174	6	1,168	548.79	1,168	0.03
44	660	0.08	71	1,239	6	1,233	548.84	1,233	0.03
45	675	0.07	67	1,301	6	1,295	548.88	1,295	0.03
46	690	0.07	67	1,362	6	1,356	548.92	1,356	0.03
47	705	0.07	60	1,417	6	1,411	548.96	1,411	0.03
48	720	0.07	64	1,475	6	1,469	549.00	1,469	0.03
49	735	0.10	89	1,557	6	1,552	549.03	1,552	0.04
50	750	0.10	92	1,644	6	1,638	549.06	1,638	0.04
51	765	0.11	99	1,737	6	1,731	549.09	1,731	0.04
52	780	0.11	103	1,834	6	1,828	549.12	1,828	0.04
53	795	0.02	14	1,843	6	1,837	549.12	1,837	0.04
54	810	0.04	33	1,870	6	1,864	549.13	1,864	0.04
55	825	0.09	82	1,945	6	1,939	549.15	1,939	0.04
56	840	0.09	82	2,021	6	2,015	549.18	2,015	0.05
57	855	0.11	96	2,111	6	2,105	549.21	2,105	0.05
58	870	0.10	92	2,197	6	2,191	549.24	2,191	0.05
59	885	0.10	92	2,284	6	2,278	549.27	2,278	0.05

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H7 JOB # 77-100163

100 YEAR - 24 HOUR STORM EVENT

TIME UNIT PERIOD	(min)	FLOW IN (cfs)	VOLUME IN (cuft)	TOTAL IN BASIN (cuft)	PERC OUT (cuft)	TOTAL IN BASIN (cuft)	BASIN DEPTH (ft)	BALANCE IN BASIN (cuft)	(acre-ft)
60	900	0.10	89	2,367	6	2,361	549.29	2,361	0.05
61	915	0.09	85	2,446	6	2,440	549.32	2,440	0.06
62	930	0.09	82	2,522	6	2,516	549.35	2,516	0.06
63	945	0.07	67	2,583	6	2,577	549.37	2,577	0.06
64	960	0.07	67	2,645	6	2,639	549.39	2,639	0.06
65	975	0.02	14	2,653	6	2,647	549.39	2,647	0.06
66	990	0.02	14	2,661	6	2,656	549.39	2,656	0.06
67	1005	0.01	11	2,666	6	2,660	549.39	2,660	0.06
68	1020	0.01	11	2,671	6	2,665	549.39	2,665	0.06
69	1035	0.02	18	2,683	6	2,677	549.40	2,677	0.06
70	1050	0.02	18	2,695	6	2,689	549.40	2,689	0.06
71	1065	0.02	18	2,707	6	2,701	549.41	2,701	0.06
72	1080	0.02	14	2,715	6	2,709	549.41	2,709	0.06
73	1095	0.02	14	2,723	6	2,718	549.41	2,718	0.06
74	1110	0.02	14	2,732	6	2,726	549.41	2,726	0.06
75	1125	0.01	11	2,737	6	2,731	549.42	2,731	0.06
76	1140	0.01	7	2,738	6	2,732	549.42	2,732	0.06
77	1155	0.01	11	2,743	6	2,737	549.42	2,737	0.06
78	1170	0.02	14	2,751	6	2,745	549.42	2,745	0.06
79	1185	0.01	11	2,756	6	2,750	549.42	2,750	0.06
80	1200	0.01	7	2,757	6	2,751	549.42	2,751	0.06
81	1215	0.01	11	2,762	6	2,756	549.42	2,756	0.06
82	1230	0.01	11	2,767	6	2,761	549.43	2,761	0.06
83	1245	0.01	11	2,772	6	2,766	549.43	2,766	0.06
84	1260	0.01	7	2,773	6	2,767	549.43	2,767	0.06
85	1275	0.01	11	2,778	6	2,772	549.43	2,772	0.06
86	1290	0.01	7	2,779	6	2,773	549.43	2,773	0.06
87	1305	0.01	11	2,784	6	2,778	549.43	2,778	0.06
88	1320	0.01	7	2,785	6	2,779	549.43	2,779	0.06
89	1335	0.01	11	2,790	6	2,784	549.43	2,784	0.06
90	1350	0.01	7	2,791	6	2,785	549.43	2,785	0.06
91	1365	0.01	7	2,792	6	2,787	549.43	2,787	0.06
92	1380	0.01	7	2,794	6	2,788	549.43	2,788	0.06
93	1395	0.01	7	2,795	6	2,789	549.44	2,789	0.06
94	1410	0.01	7	2,796	6	2,790	549.44	2,790	0.06
95	1425	0.01	7	2,798	6	2,792	549.44	2,792	0.06
96	1440	0.01	7	2,799	6	2,793	549.44	2,793	0.06