RICHARD T. BISSEN, JR.
Mayor

KATE L. K. BLYSTONE
Director

ANA LILLIS
Deputy Director

DEPARTMENT OF PLANNING
COUNTY OF MAUI
ONE MAIN PLAZA
2200 MAIN STREET, SUITE 315
WAILUKU, MAUI, HAWAIʻI 96793

February 28, 2025

Ms. Mary Alice Evans, Director
State of Hawaiʻi
Office of Planning and Sustainable Development
Environmental Review Program
235 South Beretania Street, Suite 702
Honolulu, Hawaiʻi 96813

Dear Ms. Evans:

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE FOR THE PROPOSED HOʻONANI VILLAGE MIXED-USE DEVELOPMENT PROJECT AT KAHULUI, MAUI, HAWAIʻI; TMK: (2) 3-8-006:004

With this letter, the County of Maui Department of Planning (Department) hereby transmits the Environmental Impact Statement Preparation Notice (EISPN) for the subject proposed Hoʻonani Village project for publication in the next available edition of the Environmental Notice.

The Department has determined that an Environmental Impact Statement (EIS) is required for the above-referenced project. The determination was made in accordance with Hawaiʻi Revised Statutes Section 343-5(e), and Hawaiʻi Administrative Rules Section 11-200.1-14(d)(2) which state that an approving agency may authorize an Applicant to prepare an EIS rather than an Environmental Assessment if, through its judgement and experience, it determines that an EIS is likely to be required.

We hereby transmit this determination that an EIS is required for the subject project. We are providing this EISPN electronically via the "Submittal Form for HRS Chapter 343 Publications in the Periodic Bulletin."

If you have any questions, please contact the Planning Director, Kate Blystone, at planning@mauicounty.gov or at (808) 270-7735.

Sincerely,

KATE L. K. BLYSTONE
Director

cc: Danny A. Dias, Planning Program Administrator, Maui County (PDF)
Kurt Wollenhaupt, Staff Planner, Maui County (PDF)
Mary Alice Evans, Director, ERP (PDF)
Tom Eisen, Senior Planner, ERP, (PDF)
Environmental Review Program, (PDF)
Tyler Christian Campbell, PDG Hawaii, Consultant, (PDF)
Greg Sado, Alpha Hawaii, Applicant, (PDF)

S:\ALL\KURT W\Ho'onani Villgae EISPN to ERP Trans Letter from County.docx

From: webmaster@hawaii.gov
To: DBEDT OPSD Environmental Review Program
Subject: New online submission for The Environmental Notice
Date: Friday, February 28, 2025 12:26:42 PM

Action Name

Ho'onani Village EISPN

Type of Document/Determination

Environmental impact statement preparation notice (EISPN)

HRS §343-5(a) Trigger(s)

- (1) Propose the use of state or county lands or the use of state or county funds
- (6) Propose any amendments to existing county general plans where the amendment would result in designations other than agriculture, conservation, or preservation

Judicial district

Wailuku, Maui

Tax Map Key(s) (TMK(s))

(2) 3-8-006:004

Action type

Applicant

Other required permits and approvals

General plan amendment, State Land Use District Boundary Amendment, Change in Zoning, Community Plan Amendment, Subdivision

Discretionary consent required

County of Maui Planning Department

Agency jurisdiction

County of Maui

Approving agency

County Of Maui Planning Department / Planning Commission

Agency contact name

Kate Blystone

Agency contact email (for info about the action)

planning@mauicounty.gov

Email address for receiving comments

tccampbell@pdg-hawaii.com

Agency contact phone

(808) 270-8205

Agency address

2200 Main Street
6th Floor
Wailuku, Hawaii 96793
United States
Map It

Public Scoping Meeting information

Thursday, March 27, 2025, 6:00 pm Above the Wave, 400 Hana Hwy., Suite B1, Kahului, HI 96732

Accepting authority

County of Maui Planning Department

Applicant

Ho'onani Development LLC

Applicant contact name

Greg Sado

Applicant contact email

greg@alphahawaii.com

Applicant contact phone

(808) 873-3883

Applicant address

21 Hansen Road
Kahului, HI 96732
United States
Map It

Is there a consultant for this action?

Yes

Consultant

Pioneer Design Group - Hawaii, LLC.

Consultant contact name

T.C. Campbell

Consultant contact email

tccampbell@pdg-hawaii.com

Consultant contact phone

(808) 400-5959

Consultant address

711 Kapiolani Blvd., Suite 1450
Honolulu, Hawaii 96813
United States
Map It

Action summary

The proposed action is a mixed-use development called Ho'onani Village. The development would feature a mixture of affordable and market-rate multi-family low-rise residential housing rental units, along with a blend of commercial office space, retail, restaurant dining areas, and industrial uses, all situated makai of Hansen Road.

Attached documents (signed agency letter & EA/EIS)

- Hoonani-Village-EISPN_0217251.pdf
- Hoʻonani-Village-EISPN-to-ERP-Trans-Letter-from-County.pdf

ADA Compliance certification

- This is to certify that documents submitted are ADA accessible.

Action location map

- Hoonani-Village-Action-Area1.zip

Authorized individual

Tyler Christian Campbell

Authorization

- The above named authorized individual hereby certifies that he/she has the authority to make this submission.

Environmental Impact Statement Preparation Notice

Hoʻonani Village
Mixed-Use Development

TMK: (2) 3-8-006:004

Prepared for:
Hoʻonani Development, LLC.

Accepting Authority:
Maui Planning Commission / County of Maui Planning Department

February 2025

Prepared by:
Pioneer Design Group – Hawaiʻi, LLC.

Land Use Planning • Civil Engineering • Construction Management
711 Kapiolani Blvd., Suite 1450 • Honolulu, Hawaii 96813 • 808.400.5959
www.pdg-hawaii.com

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APPENDIX ‘C’ – Flora and Fauna Survey
APPENDIX ‘D’ – Retail Demand Report
APPENDIX ‘E’ – Scoping Meeting Invite Packet

List of Acronyms

ALISH	Agricultural Lands of Importance to the State of Hawai‘i
AMI	Area Median Income
AMSL	Above Mean Sea Level
BMP	Best Management Practices
CFS	Cubic Feet per Second
CIA	Cultural Impact Assessment
CIZ	Change of Zoning
CPA	Community Plan Amendment
CZM	Coastal Zone Management
DA	Department of the Army
DBA	District Boundary Amendment
DOE	Department of Education
DWS	Department of Water Supply
EaA	Ewa Silty Clay Loam, 0 to 3 percent slopes
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
ERP	Environmental Review Program
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GHG	Greenhouse Gases
GPD	Gallons Per Day
HAR	Hawai‘i Administrative Rules
HCZMP	Hawai‘i Coastal Zone Management Program
HRS	Hawai‘i Revised Statutes
IAL	Important Agricultural Lands
LSB	Land Study Bureau
MCC	Maui County Code
MIP	Maui Island Plan
MPD	Maui Police Department
MPH	Miles per Hour

MuB	Molokai Silty Clay Loam, 3 to 7 percent Slopes
NPDES	National Pollutant Discharge Elimination System
OHA	Office of Hawaiian Affairs
PEDR	Preliminary Engineering and Drainage Report
SHPD	State Historic Preservation Division
SLUC	State Land Use Commission
SMA	Special Management Area
TIA	Traffic Impact Assessment
TMK	Tax Map Key
UGB	Urban Growth Boundary
UHMC	University of Hawaiʻi Maui College
USACE	U.S. Army Corps of Engineers
WWRF	Wastewater Reclamation Facility

EXECUTIVE SUMMARY

Project Name: Hoʻonani Village Mixed Use Development

Type of Document: Environmental Impact Statement (EIS) Preparation Notice

Legal Authority: Chapter 343, Hawai‘i Revised Statutes (HRS) Title 11,
Chapter 00.1, Hawai‘i Administrative Rules (HAR)

Applicable Chapter 343, HRS "Triggers":
Use of State/County Lands
State Land Use Boundary Amendment
Community Plan Amendment
County Initiated Change in Zoning

Location:
Kahului, Maui Island
TMK No. (2) 3-8-006:004
Lot 2-C-4-C-1-E-1 (Lot E-1) of the Preliminary Subdivision
Plat for the First Assembly of God Subdivision

Currently addressed as 21 Hansen Road,
Kahului, HI 96732

Landowners: Maui Economic Opportunity Condo - Master

Applicant:
Hoʻonani Development LLC
21 Hansen Road
Kahului, Hawai‘i 96732
Contact: Greg Sado
Telephone No.: (808) 873-3883
Email: greg@alphahawaii.com

Accepting Authority:
Maui Planning Commission / County of Maui
Department of Planning
2200 Main Street, Suite 315
Wailuku, Hawai‘i 96793
Contact: TBD
Telephone No.: (808) 270-8250
Email: planning@mauicounty.gov

Consultant:

Pioneer Design Group, Hawaiʻi, LLC.
711 Kapiolani Blvd., Suite 1450
Honolulu, HI. 96813
Contact: TC Campbell, P.E.
Phone: (808) 400-5959
Email: TCCampbell@pdg-hawaii.com

Project Summary:

The Applicant proposes the development of Hoʻonani Village, a high-density, master-planned, mixed-use community in the Kahului area of Central Maui. Hoʻonani Village (also referred to as “the project,” “the proposed project,” “the proposed action,” “the plan,” or “the land plan”) will feature a mixture of affordable and market-rate multi-family low-rise residential housing rental units, along with a blend of commercial office space, retail, restaurant dining areas, and industrial uses, all situated makai of Hansen Road.

Hoʻonani Village will include an entrance open space area off of Pulehu Road, community gathering places in the form of a central community promenade space, an Amphitheater event space, parks, sports fields, a multi-use pathway system, and a botanical trail to support connectivity. Access to the project area will be provided from Pulehu Road, Hansen Road and future connection of Pakaula Street with an internal roadway network connecting to the individual uses within the land plan. Improvements to Pulehu Road and Hansen Road as well as to proposed internal roadways are anticipated as part of the proposed project.

The preliminary conceptual land plan anticipates a total of approximately 1,600 residential apartment units, inclusive of about 50% workforce housing units, located across the approximately 166.512-acre site. The units will have a mix of studios, 1-, 2- and 3-bedroom units. The project will meet all of the residential workforce housing requirements pursuant to Chapter 2.96, Maui County Code.

Required Permits & Approvals:

In order for the proposed project to be implemented, a subdivision application has been submitted to the County of Maui to subdivide Lot 2-C-4-C-1-E of the First Assembly of God Subdivision into five (5) lots. The subdivision application was submitted by Austin Tsutsumi & Associates Inc., in September 2024. The lot that will be referred to as the project site is lot 2-C-4-C-1-E-1, and the lot that will be referred to as the County site is lot 2-C-4-C-1-E-4.

Following the subdivision of the current lot, amendments to the urban growth boundary described in the Maui Island Plan's Directed Growth plan, and the State Land Use District Boundary are needed. See Figures 3 and 8 for the Site's Directed Growth Map and the State Land Use District Boundary Map.

Additionally, the applicant is working with the County of Maui to pursue a County initiated Zone Change to change the zoning of lot E-1 and E-4 to Zone M-1 for Light Industrial. See Figure 9 for County of Maui Zoning Map.

Along with the County Initiated Change in Zoning, a Community Plan Amendment may be required to change the use of the site from Agricultural and Heavy Industrial to Light Industrial to match the new County Zoning.

There are no Special Management Area (SMA) Use Permit(s) that must be obtained as the project site is outside of the County of Maui's SMA. The property is also outside of the Shoreline Setback area.

After the subdivision is completed, the amendments are made to the Maui Island Plan and State Land Use Maps, and the zoning of the lots are changed as needed, the applicant will begin to apply for the various permits associated with the construction of the project including well permits, grading permits and building permits, etc. A list of anticipated required permits and approvals is provided in Chapter VI.

Determination:

Environmental Impact Statement (EIS) is to be prepared.

The Hoʻonani Village land plan spans approximately 166.51 acres and includes a proposal for approximately 1,600 new multi-family low-rise units as well as commercial office buildings, light industrial buildings, and a large central commercial space for retail, dining and entertainment on land that was previously designated for agricultural use. Given the scale of the project, the anticipated changes to the area's natural environment, the scope of potential impacts to be evaluated, and the relevant significance criteria, it is expected that the proposed development may have a considerable environmental impact. The County of Maui Department of Planning has determined through its judgment and experience that an EIS is likely to be required and has authorized the Applicant to initiate its environmental review through the preparation of an EIS Preparation Notice (EISPN).

This EISPN has been prepared in accordance with HRS Chapter 343 and HAR Chapter 11-200.1. Pursuant to HAR Section 11-200.1-7(c), the Maui Planning Department shall have final authority to accept the EIS due to the first discretionary permit/approval being a Subdivision Application from the County of Maui's Planning Department.

Once completed, the Final EIS will act as a technical supporting document for the above-referenced Subdivision application and subsequent land use entitlement applications for the project.

EISPN Scoping Meeting: A public scoping meeting for the project (as required by HAR 11-200.1-23) will be held on Thursday, March 27, 2025, at 6:00 p.m. at the meeting room at Above the Wave located at 400 Hana Hwy., Suite B1, Honolulu, Hawaiʻi 96732. See Chapter VII.

I. PROJECT OVERVIEW

A. Background – Kahului Land Use Designations

Hoʻonani Village (referred to herein as "Hoʻonani Village", "the project", "the proposed project", "the proposed action" "the plan" or "the land plan"), is located in the Kahului area in the Central Maui Region., within the ahupuaʻa of Wailuku. The site is just makai of the ahupuaʻas of ʻŌmaʻopio, Kalialinui, Aʻapueo and Makaʻehu. The site lies in the moku of Pūʻali Komohana. The local area consists of various uses including agriculture lands, low-density residential lots, commercial mixed use shopping centers and light industrial uses. Generally, multi-family residential development in the immediate vicinity is very limited. There are a variety of public/quasi-public and recreational uses within the Wailuku-Kahului District including but not limited to Kanaha Beach, Kanaha Pond State Wildlife Sanctuary, Keopuolani Regional Park, Kahului Community Center Park, The Dunes at Maui Lani Golf course and the Central Maui Regional Sports Complex. See Figures 1 and 2 for the Regional Location Map and the Property Location Map.

FIGURE 1

REGIONAL LOCATION MAP

SOURCE: COUNTY OF MAUI QPUBLIC GIS POWERED BY ESRI.

Project
HOONANI VILLAGE
No.
H109-001

Designed by TCC Date 08/2024
Drawn by TCC Date 08/2024
Horiz. Scale: Vert. Scale:
Type PLANNING

PIONEER DESIGN GROUP – HAWAII LLC
CIVIL ENGINEERING · LAND USE PLANNING
CONSTRUCTION MANAGEMENT
HONOLULU, HAWAII PH: 808.400.5959
WWW.PD-GRP.COM

Sheet
1
of
1

FIGURE 2

PROPERTY LOCATION MAP

SOURCE: COUNTY OF MAUI QPUBLIC GIS POWERED BY ESRI.

Project HOONANI VILLAGE	Designed by	TCC	Date	08/2024	PIONEER DESIGN GROUP – HAWAII LLC CIVIL ENGINEERING · LAND USE PLANNING CONSTRUCTION MANAGEMENT HONOLULU, HAWAII PH: 808.400.5959 WWW.PD-GRP.COM	**Sheet** 1 of 1
No. H109-001	Drawn by	TCC	Date	08/2024		
	Horiz. Scale:		Vert. Scale:			
			Type	PLANNING		

Hoʻonani Village is proposed as a mixed-use master-planned community that incorporates workforce housing affordable and market rate multi-family low-rise residential housing units, commercial retail, dining, office campus and industrial uses accompanied by recreational and open space uses including a central promenade, trail network, botanical trail, outdoor amphitheater entertainment space, community gathering places and park areas in addition to sports fields. The total land area within Hoʻonani Village (hereafter referred to as the "project area") is approximately 166.512 acres and is in the Puʻunene area in Kahului, adjacent to Pulehu Road and Hansen Road.

A summary of the past land use plans for the Puʻunene & Kahului area follows.

The Maui County General Plan is a long-term, comprehensive blueprint for the physical, economic, environmental development and cultural identity of the county. The first General Plan for Maui County was developed in 1962 with a second general plan being completed in 1972. Additional updates were made in 1980 and 1990 as well. The current County Policy Plan was adopted on March 24, 2010, and includes elements from the earlier general plans. The Countywide Policy Plan, also referred to as the 2030 General Plan, acts as an over-arching statement of values and provides a policy framework for the Maui Island Plan and Community Plans. The Countywide Policy Plan provides broad goals, objectives, policies, and implementing actions that portray the desired direction of the County's future for all three of the islands that are a part of the County, Maui, Molokaʻi and Lānaʻi. Through the preparation of the Countywide Policy Plan several primary concerns were identified including access to quality education, access to affordable housing, environmental and natural resource protection, cultural resource protection, economic stability through sustainable practices, community cohesiveness and the loss of scenic resources.

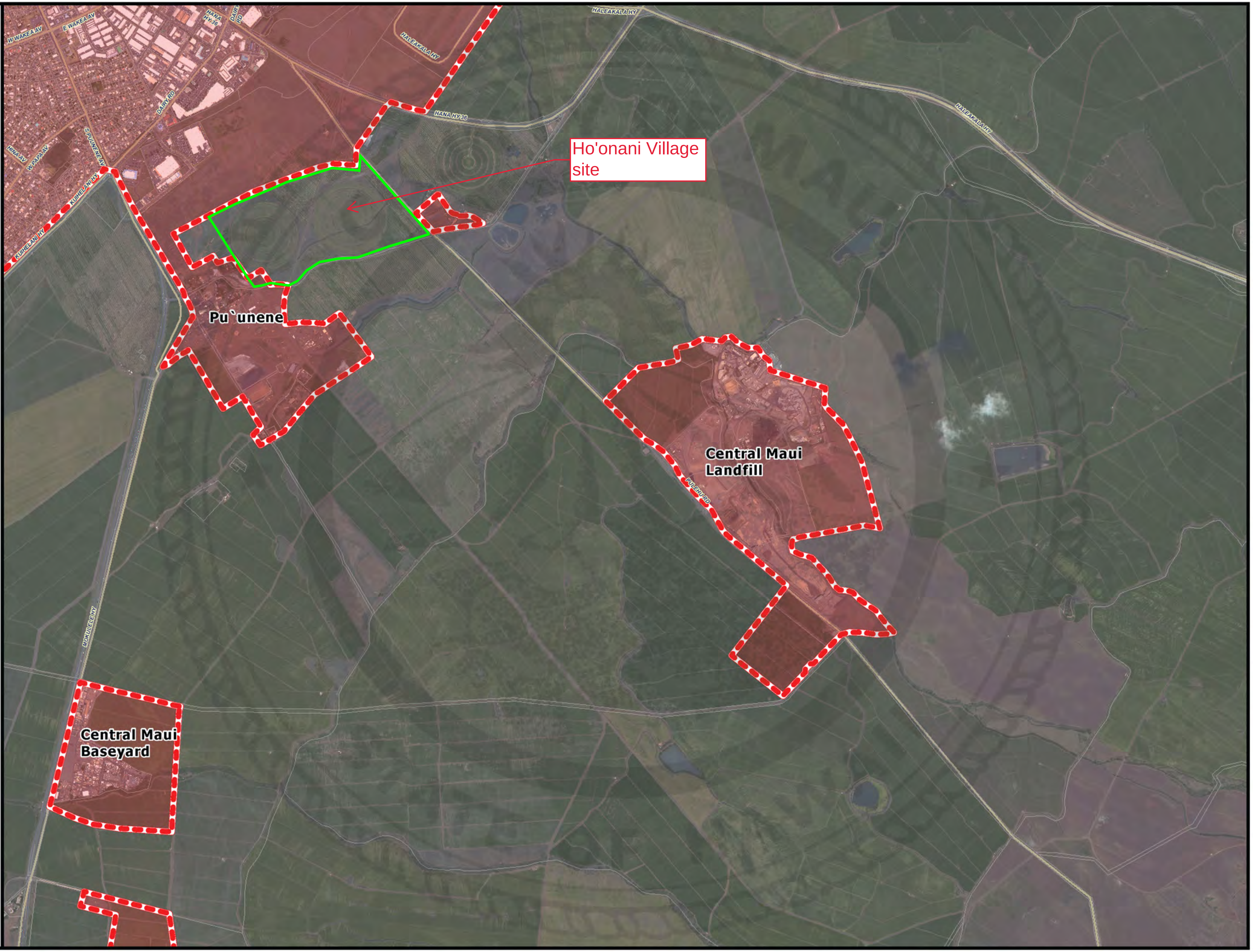
The history of the land use plans in the Kahului area ties back to the shift in the culture on the island that came about from opening of the plantations. The first sugar mill was built in 1828 and led to the boom of the plantation industry on Maui with sugar cane and pineapple being the main crops produced. Later, following World War II, the rise of the tourism industry began. The first master plan for the land near Kahului Harbor was written by Harland Bartholomew in 1947 called "Dream City." The growth in both the local population and the tourism industry led to the first General Plan in 1962.

The County of Maui planning framework today starts with the Countywide Policy Plan, then gets more specific with the Maui Island Plan, and then breaks up into the most specific Community Plan documents. The Maui Island plan, adopted on December 28, 2012, describes the Central Maui area, made up of the Wailuku and Kahului areas, as the main area of urban development. The area has a wide variety of uses including residential, commercial, industrial, recreational and agricultural etc. The County of Maui's Civic center, the Kahului Airport, the harbor, the primary business district, and many acres of sugarcane fields make up this area. From the MIP, it is anticipated that the Wailuku-Kahului area will grow faster than other parts of Maui as former sugarcane lands are developed into various uses such as residential subdivisions.

As part of the MIP, the County of Maui developed their Directed Growth Map to show what areas in the County fall under the Urban, Small Town, and Rural Growth Boundaries. The boundaries for the various growth areas change with amendments and updates to the MIP. The Urban Growth Boundary (UGB) denotes areas that support urban-density development that require a full range of services. The UGB is described as a long-range planning tool to be used to evaluate development proposals. Urban areas are noted as containing a greater variety of land use types, including various housing types and densities, commercial, retail, industrial uses, and resort destination areas. The Hoʻonani Village site has a portion of the southwest corner of the site within the UGB, with most of the site currently outside of the UGB in the MIP. The site is adjacent to the UGB to the north, west and east. See Figure 3 – Maui Island Plan Directed Growth Map. The proposed uses on the site directly align with the goals of the MIP to increase affordable housing, create outdoor active and passive open spaces for the community, provide additional local commercial retail and restaurant spaces, and provide light industrial areas to match the existing uses around the site.

Maui Island - Directed Growth Map C5

County of Maui



Maui Island Plan Directed Growth Map

Pulehu Road

C5

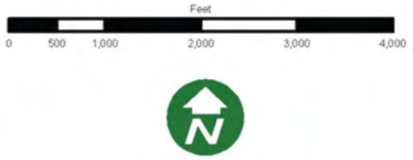
Legend

Growth Boundaries

🟥 Urban
🟨 Small Town
🟦 Rural

Reference

☐ 2011 Parcels
— Primary Roads



Product Code: M-CET_20121210-D2

Copyright © December 10, 2012

Background Image: Worldview 2 - 2010

This is not a zoning map. Please contact the Planning Department for Zoning confirmation.

PREPARED BY:

Long Range Planning Division
Department of Planning
County of Maui
250 South High Street
Wailuku, Hawaii 96793

To complete the Hoʻonani Village land plan and to ensure consistency with the UGB, land use entitlement changes will be needed for the proposed improvements. Further details on these specific land use entitlement changes to be sought are provided in Section E below.

The first Wailuku-Kahului community plan was created as a product of the General Plan in 1980 and was adopted with Ordinance No. 1674 in 1987. The community plan was updated in 1992 by the Citizens Advisory Committee (CAC) for the area, and that led to the current version adopted in June 2002. The past community plans and the current community plan have the majority of the project site called out for the Agriculture (AC) land use category, with a small section of the southwest corner being in the Heavy Industrial Category. See Figure 4 – Wailuku and Kahului Community Plan Map (2002). The community plan identifies several problems facing the region including:

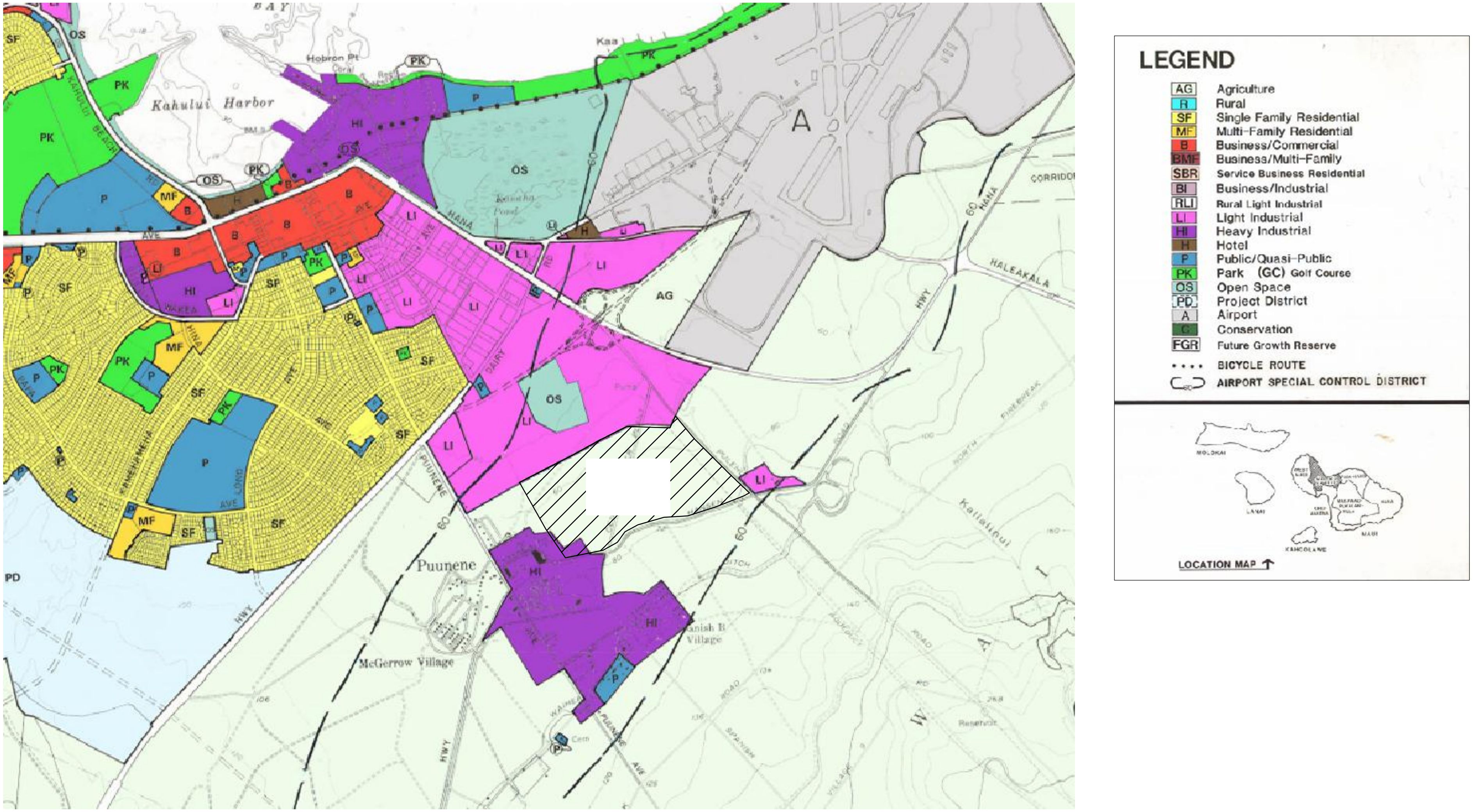
1. Public Infrastructure
2. Circulation, Parking, & Access for the elderly, people with disabilities, pedestrians, and bicyclists
3. Recreational and Community Facilities
4. Lack of Affordable Housing
5. Water

These problems in the region can be addressed with various development opportunities and strategies in the community plan area. The Hoʻonani Village project land plan was developed to affect the community planning area of Wailuku-Kahului in a helpful way by addressing some of the immediate needs in the area while not affecting the existing public utilities and infrastructure.

The project site is located adjacent to the rapidly growing commercial area and shopping centers that are located off of Hoʻokele Street and Pakaula Street. Under the existing State Land Use, the Wailuku-Kahului Community Plan and County zoning designations, the Hoʻonani Village project site is zoned as Agricultural or Agricultural and Heavy Industrial. The Hoʻonani Village land plan has been designed to seamlessly flow into the existing developments to the north and the existing agricultural lands to the south. The land use entitlements the applicant will pursue are discussed in more detail in Section E below.

FIGURE 4

WAILUKU-KAHULUI COMMUNITY PLAN MAP (2002)



SOURCE: COUNTY OF MAUI, COMMUNITY PLAN MAPS

Project HOONANI VILLAGE	Designed by TCC	Date 08/2024	**Sheet** 1 of 1
No. H109-001	Drawn by TCC	Date 08/2024	
	Horiz. Scale: NTS	Vert. Scale: NTS	
		Type PLANNING	

PIONEER DESIGN GROUP – HAWAII LLC
CIVIL ENGINEERING · LAND USE PLANNING
CONSTRUCTION MANAGEMENT
HONOLULU, HAWAII PH: 808.400.5959
WWW.PD-GRP.COM

B. Summary of Proposed Action

Hoʻonani Village is a high-density master-planned multi-use community that will offer both affordable workforce housing and market rate multi-family rental units, commercial retail, office and restaurant spaces, and an area for light industrial uses that blend into the existing uses adjacent to the site. The master plan for the approximate 166.5 AC site is located at the Northwest Corner of Hansen Road and Pulehu Road in Kahului, Maui. The development is bisected by the extension of Pakaula Street that will connect to Pulehu Road. The site is divided into six distinct planning areas – Multi-Family low-rise Residential, Retail, Office, Casual Dining, Light Industrial and Open Spaces. The project is organized by a large central "commons" area that features boutique retail uses featuring local tenants, a large event lawn & amphitheater, food truck parking, open space for seasonal/weekend farmers market space and botanical walkways highlighted by natural water features. Anchoring the "commons" will be a food hall that will feature local food / beverage offerings set in a park setting.

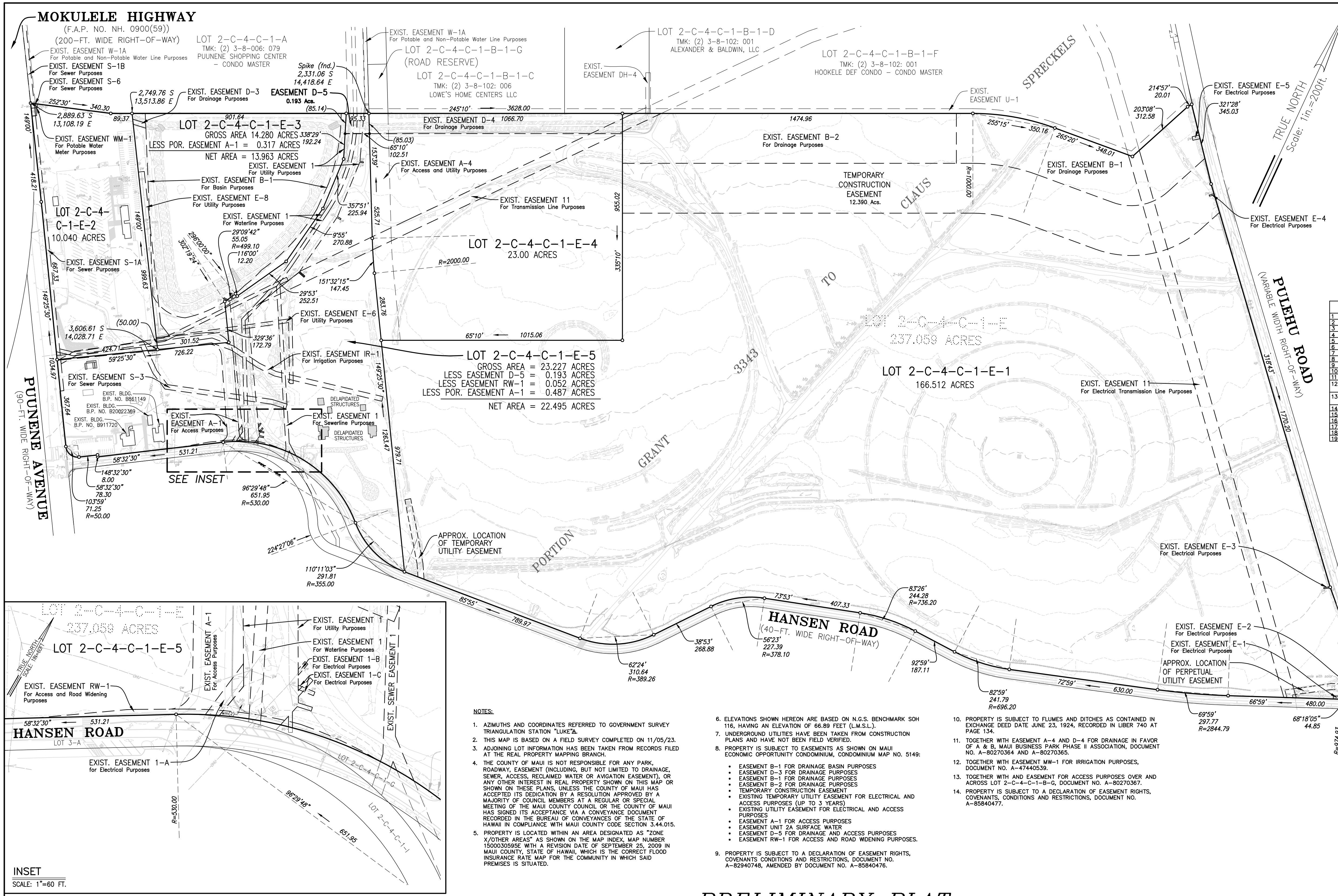
The architecture will derive aesthetic queues from the architecture of Main Street Lahaina. The retail will promote pedestrian frontages and offer traffic calming angled parking along the perimeter of the "commons" to establish a walkable environment. The intent is to connect each of the residential planning areas to the central commons via well-defined pedestrian walkway and bicycle connections. Considerable care is given to reduce vehicular traffic even further by the placement of strategic traffic roundabouts at each end of the central park commons to reduce the idling of automobiles.

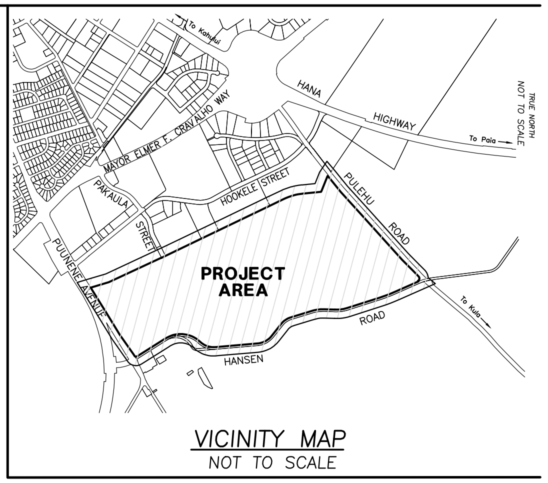
The proposed action's purpose is to help address existing problems within the community plan area while blending into existing uses adjacent to the project site. The applicant's vision is to provide approximately 1,600 units of additional rental housing for the Kahului community, and to create gathering spaces to bolster the community by providing new commercial restaurant and retail spaces, active and passive open spaces, and entertainment spaces throughout the site. Additionally, the new office and industrial spaces will provide additional jobs for the community as well. The goal is to design a plan that benefits the community in multiple ways, blends into the adjacent uses surrounding the site, celebrates the history of the site and preserves the deep cultural roots of Kahului.

C. Proposed Land Plan Development Components

The Hoʻonani Village land plan is proposed to be developed on Lot 2-C-4-C-1-E-1 (Lot E-1) of the submitted Preliminary Plat for the First Assembly of God Subdivision. See Figure 5 – Preliminary Subdivision Plat. Future development of the future subdivided Lot 2-C-4-C-1-E-4 (Lot E-4) that will be owned by the County of Maui will be developed separately but referred to in this report. The total acreage of the project area is 166.512 acres. The adjacent lot E-4 is 22.99 acres in size.

The land plan will have approximately 1,600 low-rise multi-family units proposed on 82.77 acres. This equates to approximately 19 units per acre. The remaining area of 83.742 acres will contain other uses as noted below. See Figure 6 – Preliminary Master Site Plan and Table 1 below for the preliminary land use breakdown of the site.





VICINITY MAP
NOT TO SCALE

EXISTING EASEMENTS

	EASEMENT	PURPOSE	IN FAVOR OF	DOCUMENT
1	EASEMENT 1	UTILITY	MAUI ELECTRIC CO. LTD.	L.16383 P.392
2	EASEMENT 1	WATER PIPELINE	COUNTY OF MAUI	L.19066 P.747
3	EASEMENT 1	SEWERLINE		DOC.NO. 2008-010966
4	MECO EASEMENT (BLANKET)	UTILITY	MAUI ELECTRIC CO. LTD.	DOC. NO 2011-053742
5	EASEMENT E-1	ELECTRICAL		SUB FILE NO. 3.2208
6	EASEMENT E-2	ELECTRICAL		SUB FILE NO. 3.2208
7	EASEMENT E-3	ELECTRICAL		SUB FIEL NO. 3.2208
8	EASEMENT E-4	ELECTRICAL		SUB FILE NO. 3.2208
9	EASEMENT E-5	ELECTRICAL		SUB FILE NO. 3.2208
10	EASEMENT IR-1	IRRIGATION	A&B, LLC.	DOC. NO. A-47440534
11	EASEMENT S-1A	SEWER	A&B, LLC.	DOC. NO. A-47440535
12	EASEMENT S-1B	SEWER	TMK(2)3-8-006: 01&03 AND LOT 2-C-4-C-1-E	DOC. NO. A-47440536
13	EASEMENT S-6	SEWER	TMK(2)3-8-006: 01&03 AND LOT 2-C-4-C-1-E	DOC NO. A-47440537
14	EASEMENT S-3		A&B, LLC.	DOC. NO. A-47440538
15	EASEMENT WM-1	WATER METER	M.B.P. PH. II ASSOC.	DOC. NO. A-47440540
16	EASEMENT S-6	SEWER	M.E.O. INC.	DOC. NO A-47440545
17	EASEMENT E-6 & E-8	UTILITY	MAUI ELECTRIC CO., LTD.	DOC. NO. A-82310960
18	EASEMENT 1-A, 1-B & 1-C	ELECTRICAL	MAUI ELECTRIC CO., LTD.	DOC. NO. A-83710533
19	EASEMENT 11	ELECTRICAL	MAUI ELECTRIC CO., LTD.	DOC. NO. 96-170196

GRAPHIC SCALE
200 0 100 200 400 800
(IN FEET)
1 inch = 200 ft.

NOTES:

1. AZIMUTHS AND COORDINATES REFERRED TO GOVERNMENT SURVEY TRIANGULATION STATION "LUKE"△.
2. THIS MAP IS BASED ON A FIELD SURVEY COMPLETED ON 11/05/23.
3. ADJOINING LOT INFORMATION HAS BEEN TAKEN FROM RECORDS FILED AT THE REAL PROPERTY MAPPING BRANCH.
4. THE COUNTY OF MAUI IS NOT RESPONSIBLE FOR ANY PARK, ROADWAY, EASEMENT (INCLUDING, BUT NOT LIMITED TO DRAINAGE, SEWER, ACCESS, RECLAIMED WATER OR AVIGATION EASEMENT), OR ANY OTHER INTEREST IN REAL PROPERTY SHOWN ON THIS MAP OR SHOWN ON THESE PLANS, UNLESS THE COUNTY OF MAUI HAS ACCEPTED ITS DEDICATION BY A RESOLUTION APPROVED BY A MAJORITY OF COUNCIL MEMBERS AT A REGULAR OR SPECIAL MEETING OF THE MAUI COUNTY COUNCIL OR THE COUNTY OF MAUI HAS SIGNED ITS ACCEPTANCE VIA A CONVEYANCE DOCUMENT RECORDED IN THE BUREAU OF CONVEYANCES OF THE STATE OF HAWAII IN COMPLIANCE WITH MAUI COUNTY CODE SECTION 3.44.015.
5. PROPERTY IS LOCATED WITHIN AN AREA DESIGNATED AS "ZONE X/OTHER AREAS" AS SHOWN ON THE MAP INDEX, MAP NUMBER 1500030595E WITH A REVISION DATE OF SEPTEMBER 25, 2009 IN MAUI COUNTY, STATE OF HAWAII, WHICH IS THE CORRECT FLOOD INSURANCE RATE MAP FOR THE COMMUNITY IN WHICH SAID PREMISES IS SITUATED.
6. ELEVATIONS SHOWN HEREON ARE BASED ON N.G.S. BENCHMARK SOH 116, HAVING AN ELEVATION OF 66.89 FEET (L.M.S.L.).
7. UNDERGROUND UTILITIES HAVE BEEN TAKEN FROM CONSTRUCTION PLANS AND HAVE NOT BEEN FIELD VERIFIED.
8. PROPERTY IS SUBJECT TO EASEMENTS AS SHOWN ON MAUI ECONOMIC OPPORTUNITY CONDOMINIUM, CONDOMINIUM MAP NO. 5149:
   - EASEMENT B-1 FOR DRAINAGE BASIN PURPOSES
   - EASEMENT D-3 FOR DRAINAGE PURPOSES
   - EASEMENT B-1 FOR DRAINAGE PURPOSES
   - EASEMENT B-2 FOR DRAINAGE PURPOSES
   - TEMPORARY CONSTRUCTION EASEMENT
   - EXISTING TEMPORARY UTILITY EASEMENT FOR ELECTRICAL AND ACCESS PURPOSES (UP TO 3 YEARS)
   - EXISTING UTILITY EASEMENT FOR ELECTRICAL AND ACCESS PURPOSES
   - EASEMENT A-1 FOR ACCESS PURPOSES
   - EASEMENT UNIT 2A SURFACE WATER
   - EASEMENT D-5 FOR DRAINAGE AND ACCESS PURPOSES
   - EASEMENT RW-1 FOR ACCESS AND ROAD WIDENING PURPOSES.
9. PROPERTY IS SUBJECT TO A DECLARATION OF EASEMENT RIGHTS, COVENANTS CONDITIONS AND RESTRICTIONS, DOCUMENT NO. A-82940748, AMENDED BY DOCUMENT NO. A-85840476.
10. PROPERTY IS SUBJECT TO FLUMES AND DITCHES AS CONTAINED IN EXCHANGE DEED DATE JUNE 23, 1924, RECORDED IN LIBER 740 AT PAGE 134.
11. TOGETHER WITH EASEMENT A-4 AND D-4 FOR DRAINAGE IN FAVOR OF A & B, MAUI BUSINESS PARK PHASE II ASSOCIATION, DOCUMENT NO. A-80270364 AND A-80270365.
12. TOGETHER WITH EASEMENT MW-1 FOR IRRIGATION PURPOSES, DOCUMENT NO. A-47440539.
13. TOGETHER WITH AND EASEMENT FOR ACCESS PURPOSES OVER AND ACROSS LOT 2-C-4-C-1-B-G, DOCUMENT NO. A-80270367.
14. PROPERTY IS SUBJECT TO A DECLARATION OF EASEMENT RIGHTS, COVENANTS, CONDITIONS AND RESTRICTIONS, DOCUMENT NO. A-85840477.

JUSTIN H. LAPP
LICENSED PROFESSIONAL LAND SURVEYOR
No. 12964
HAWAII, U.S.A.

THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION.

JUSTIN H. LAPP
LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 12964
EXP. DATE 04/2024

LEGEND

bfp	back flow preventer
cabx	cable television box
di	drain inlet
ebx	electric box
fh	fire hydrant
gen	generator
gw	guy wire
lp	lamp post
ohu	overhead utility lines
pbx	power box
pp	power pole
sdmh	storm drain manhole
sicmh	signal corp manhole
sl	street light
smh	sewer manhole
tebx	telephone box
trans	transformer
up	utility pole
wbx	water box
wv	water valve
wmh	water manhole

OWNERS: MAUI ECONOMIC OPPORTUNITY, INC.
COUNTY OF MAUI
ALEXANDER & BALDWIN, LLC.
AX HOLDING, LLC.
PUUNENE INDUSTRIAL PARK, LLC.

PRELIMINARY PLAT
FIRST ASSEMBLY OF GOD SUBDIVISION
SUBDIVISION OF LOT 2-C-4-C-1-E OF THE FIRST ASSEMBLY OF GOD SUBDIVISION INTO LOTS 2-C-4-C-1-E-1, 2-C-4-C-1-E-2, 2-C-4-C-1-E-3, 2-C-4-C-1-E-4 AND 2-C-4-C-1-E-5
BEING A PORTION OF GRANT 3343 TO CLAUS SPRECKELS
SITUATED AT PUUNENE, WAILUKU, MAUI, HAWAII

FIGURE 5: PRELIMINARY SUBDIVISION PLAT

TMK: (2) 3-8-006: 004

Z:\2023\23-526 MBP MEO SUBDIVISION\SURVEY\DWG\23526PP.DWG

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS * SURVEYORS
1871 WILI PA LOOP SUITE A * WAILUKU, MAUI, HAWAII 96793

24" X 36" = 6 SQ. FT.

SEPTEMBER 17, 2024
JOB NO.: 23-526

Ho'onani
Development

PROPOSED MASTER SITE PLAN

Kahului, Maui, Hawaii

Concept Site Plan Study
Proposed Land Use Plan - Option 11

AO Architecture. Design. Relationships.

1

Scale 1'=300'
Job No. 2023-0690
Date 2024-10-07

FIGURE 6: PRELIMINARY MASTER SITE PLAN

Table 1: Land Plan Area Breakdown

Land Plan Area Breakdown	
Multi-Family Residential	82.77 ac
Commercial Office Campus	10.30 ac
Light Industrial Park	18.42 ac
Commercial Space	4.10 ac
Future Commercial Space	3.24 ac
Central Commons	25.35 ac
Detention Ponds	14.23 ac
Entry Open Space	6.05 ac
Wastewater Treatment Plant	1.70 ac
Site Total	166.15 ac

The project area is located at the northwest corner of the intersection of Pulehu Road and Hansen Road. Pulehu Road runs adjacent to the project site along the entire eastern boundary, and Hansen Road runs adjacent to the site along the southern boundary. The existing southern terminus of Pakaula Street stubs into the northern boundary of the site. This road will be extended into the site for access. Access to the project area will be provided from these three existing streets that lead to an internal roadway network surrounding the central “commons” area. The local roadway network will result in the entire site being connected for vehicular, bicycle and pedestrian circulation. Half-street improvements to existing roads adjacent to the site are anticipated as part of the proposed action. Within the project site, renters of the future units will be encouraged to use alternative means of transportation throughout the community. As such, walking and bicycling mixed-use paths are planned as part of the project. Additionally, ride share pick-up, and drop-off locations are being incorporated into the design to create easy locations for the public that lives outside of the project to get in and out without having to consider parking.

The six (6) components of the land plan besides the open space areas are described below. Further details on the project components will be included and discussed in the Draft Environmental Impact Statement (Draft EIS).

1. Multi-Family Low-Rise Residential Units

Approximately 1,600 multi-family low-rise rental units will be constructed. The units will be a mixture of studios, 1-, 2- and 3-bedroom units. The units will be at least 50% workforce housing rental units, and the proposed plan will meet the applicable affordable housing code requirements. The residential portion of the plan will be approximately 82.77 acres. Parking will be provided in excess of the minimum requirement in private parking lots within individual blocks. Access to the parking lots will be from the internal street network to limit access points on the main exterior streets. The unit mix and the total number of units are subject to change throughout the design timeline.

2. Commercial Office Campus

A commercial office campus is proposed to the southeast of the central commons and food hall area. The office campus building will be a low-rise style office building, approximately 100,000 square feet in size. The overall block for the campus is approximately 10.3 acres in size. Parking for the workers on the campus will be provided in the campus block. Three access points to the commercial office campus are proposed from the internal street network.

3. Commercial Retail & Restaurant Space

There are two commercial areas and one future commercial area that are planned outside of the central commons area. These areas are 1.61, 2.49 and 3.24 acres in size and will be for various retail and restaurant uses. The 1.61 acres has a building footprint of approximately 5,850 SF. The 2.49 acres has a building footprint of approximately 7,418 SF. The 3.24 acres does not have a building footprint proposed at this time. Parking for the workers and customers of these areas will be provided in the individual area and/or on the nearby streets.

4. Light Industrial Park

The industrial park is about 18.42 acres in size with eight (8) buildings proposed. The sizes and number of buildings are subject to change throughout the design process. The buildings have an approximate footprint of 198,100 SF. The industrial park is proposed in the southeast corner of the site just outside of the office campus to transition from the project site to the adjacent industrial and agricultural uses adjacent to the site to the south and east. Parking for the industrial workers will be provided within the blocks.

5. Central Commons

The site is organized around a large central “commons” area. This area is approximately 25.35 acres in size and is the focal point of the development in the center of the residential, commercial and industrial uses. The goal of the central area is to create a gathering place for the entire community to come together to eat with their friends and family, to shop at locally owned boutique shops, and to gather for various types of entertainment. The area includes active and passive open space areas with pedestrian trails, water features, park areas, and walkable promenade style gathering areas. The open space areas are designed for opportunities allowing farmers markets and food truck style events as well. The central commons also include an entertainment area with a proposed amphitheater. The building spaces within this area are for commercial retail and restaurant use. The current proposal includes 79,800 square feet of commercial retail and restaurant space to go along with a 7,400 square foot food hall area. The food hall would feature multiple smaller food / beverage tenants that share a large dining area that can open to adjacent outside areas. Often that separation is via large overhead doors that can be opened to offer inside / outside environments. The food hall is designed to enhance this setting and generate unique gathering spaces.

The central commons are bordered by the two main internal roads. These streets are designed with angular parking to act as traffic calming and allow drivers to get in and out of stalls with relative ease. To promote ride share access, drop off and pick up locations have been designed around the commons area. Additionally, three parking lot areas are proposed to provide off-street parking for visitors coming to the Commons area. Roundabouts are proposed at either end of the central commons to reduce vehicles idling and wait times by promoting the yield access intersections.

The design of the central commons is subject to change, but the goal of the design will remain the same.

6. Wastewater Treatment Plant

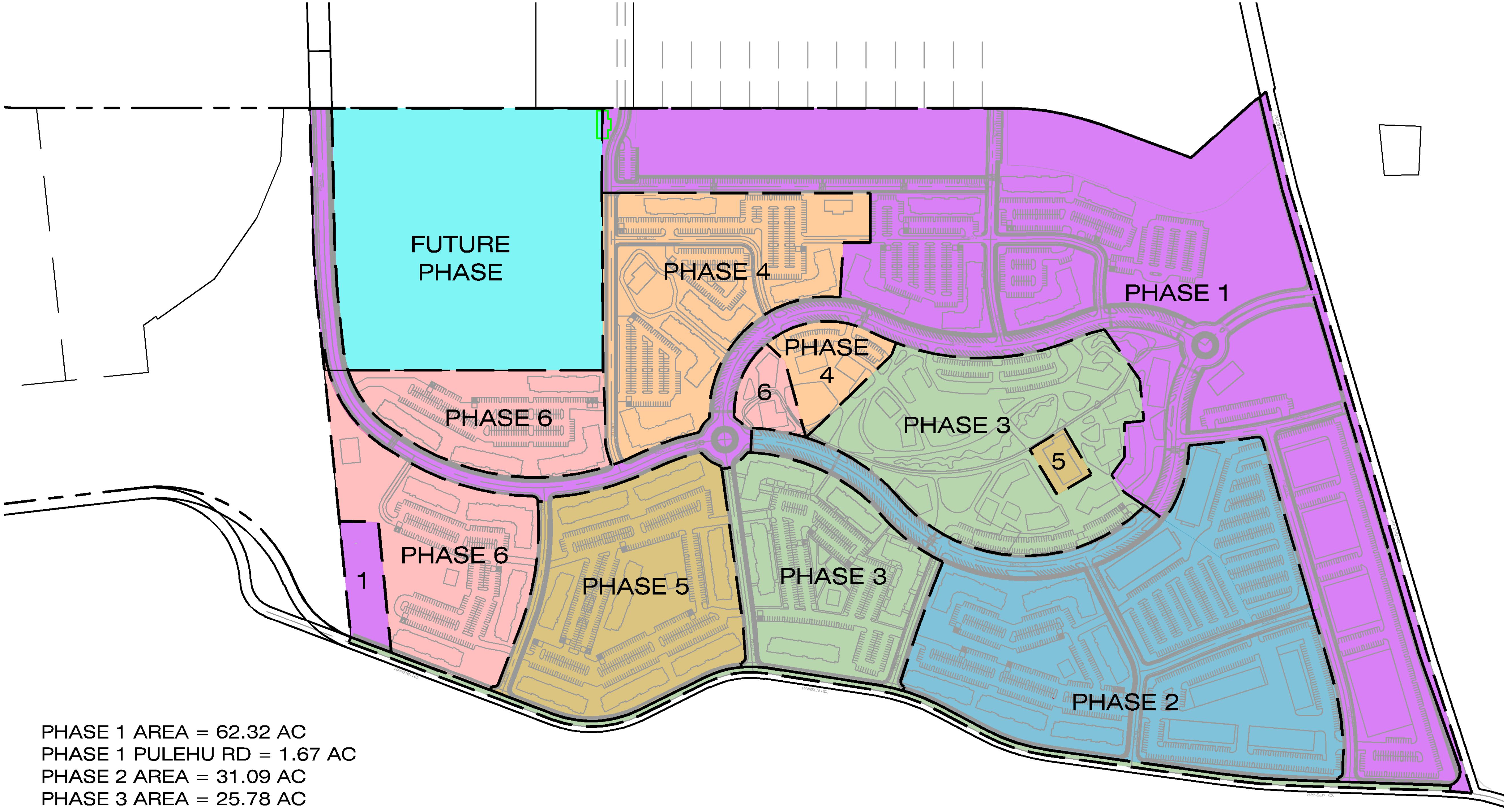
The southwest corner of the project site is the location of the proposed wastewater treatment plant. This area is approximately 1.7 acres in size. The wastewater will be pumped to the wastewater treatment plant to be processed, and the plant will produce reuseable water that will potentially be used for irrigation around the site. The treatment plant is proposed in this area to blend into the existing agricultural uses to the west and south. Various alternative designs are being considered for the treatment of wastewater including various locations for the treatment plant, and additional sources of wastewater. The wastewater treatment plant is discussed in further detail below in section II.D Infrastructure.

Phasing Plan

The Land Plan for Hoʻonani Village will be developed as a phased development. See Figure 7 – Preliminary Phasing Plan. The preliminary phasing plan is broken down into six (6) phases with a future phase for the County owned future lot, E-4. See Table 2 below for the breakdown of the acreage for each phase.

FIGURE 7: PRELIMINARY PHASING PLAN

HOONANI VILLAGE



PHASE 1 AREA = 62.32 AC
PHASE 1 PULEHU RD = 1.67 AC
PHASE 2 AREA = 31.09 AC
PHASE 3 AREA = 25.78 AC
PHASE 3 HANSEN RD = 1.94 AC
PHASE 4 AREA = 16.1 AC
PHASE 5 AREA = 15.03 AC
PHASE 6 AREA = 16.76 AC
FUTURE PHASE =22.07 AC
TOTAL AREA = 192.76 AC

SCALE
400 0 200 400
1 INCH = 400 FEET

PIONEER DESIGN GROUP – HAWAII LLC
CIVIL ENGINEERING · LAND USE PLANNING
CONSTRUCTION MANAGEMENT
HONOLULU, HAWAII PH: 808.400.5959
WWW.PD-GRP.COM

Designed by AO **Date** 10/2024
Drawn by ENH **Date** 10/2024
Reviewed by TCC **Date** 10/2024
Project No. H109-001 **REF.**
Horiz. Scale: 1"=400'
Vert. Scale:

PRELIMINARY PHASING PLAN

Project
HOONANI VILLAGE
No.
H109-001
Type
ENGINEERING
Sheet
1 of **1**

B:\Projects\PDGHAWAII\H109-001\Engineerng\Exhibits\PRELIMINARY PHASING PLAN.dwg 12/2/2024 4:11:29 PM

Table 2: Preliminary Phasing Plan Area Breakdown

Preliminary Phasing Plan Area Breakdown	
Phase 1	62.32 ac
Phase 1 – Pulehu Rd.	1.67 ac
Phase 2	31.09 ac
Phase 3	25.78 ac
Phase 3 – Hansen Rd.	1.94 ac
Phase 4	16.10 ac
Phase 5	15.03 ac
Phase 6	16.76 ac
Future Phase	22.07 ac
Site Total	192.76 ac

Phase 1 will install the initial access points and roads for the site including the extension of Pakaula St. into the site, the half-street improvements and road widening of Pulehu Road, and a few of the interior streets and roundabouts. A portion of the extension of Pakaula Street will be completed on the property that is owned by the County of Maui. Phase 1 will have residential, commercial and industrial uses constructed. In phase 1, the essential utilities to serve the site have to be installed, which include the items listed below:

- Pump station and wastewater treatment plant
- 1st phase of gravity wastewater systems
- Entire pressure pipe wastewater system from Pump station to WWTP
- Off-site water source and storage reservoirs
- Off-site water distribution system
- 1st Phase of on-site water line system
- Regrading and updates to the detention basins
- 1st Phase of storm conveyance system
- Electrical & telecommunication conduits
- Street lighting
- Natural gas lines if decided by applicant

Phase 2 will include the commercial office campus, the remaining industrial area, and another phase of low-rise multi-family residential units along with the associated street and utility improvements.

Phase 3 will include the majority of the central commons area, another phase of low-rise multi-family residential units along with the associated street and utility improvements, and the half-street improvements and road widening of Hansen Road.

Phase 4 will include a small section of the central commons area, and another phase of low-rise multi-family residential units along with the associated street and utility improvements.

Phase 5 will include a single building in the central commons area, and another phase of low-rise multi-family residential units along with the associated street and utility improvements. All street improvements will be completed with Phase 5.

Lastly, Phase 6 will include a small section of the central commons area including the proposed amphitheater entertainment space, and the last phase of low-rise multi-family residential units along with the associated utility improvements.

The phasing plan is preliminary and is subject to change through the design process. The final phasing plan will be completed with the construction plans for the project.

D. Chapter 343, Hawaii Revised Statutes Compliance

The County of Maui Department of Planning, based on its judgment and experience, has determined that an Environmental Impact Statement (EIS) is likely necessary and has authorized the Applicant to begin the environmental review process by preparing an Environmental Impact Statement Preparation Notice (EISPN). This EISPN has been prepared in compliance with Chapter 343 of the Hawaiʻi Revised Statutes (HRS) and Chapter 200.1 of Title 11 of the Department of Health Administrative Rules (HAR), which governs the EIS process. In accordance with §11-200.1-7(c), HAR, the Maui Planning Commission holds the final authority to accept the EIS, as the first discretionary permit or approval for the project will involve a Special Management Area (SMA) Use Permit, as described further below.

This Environmental Impact Statement Preparation Notice (EISPN) serves to inform the public about the proposed project and to gather input on the scope of impacts to be addressed in the Draft Environmental Impact Statement (EIS). Public comments on the contents of the Draft EIS will be solicited through this EISPN and during a public scoping meeting. As defined in HAR §11-200.1-2, an "EIS public scoping meeting" is a forum where agencies, citizen groups, and the public collaborate with the proposing agency or applicant to determine the range of actions, alternatives, impacts, and mitigation measures to be included in the Draft

EIS, and to identify significant issues for in-depth analysis. Details regarding the public scoping meeting can be found in Chapter VII.

The Draft EIS will provide a more refined and detailed description of the proposed project. It will analyze the potential environmental consequences of the project and will provide a discussion of alternatives to the project. The Draft EIS will disclose significant short-term, long-term, and cumulative impacts on the human, natural, and built environment. The following resource categories have been tentatively identified for consideration in the Draft EIS:

- Existing and Surrounding Land Uses
- Climate
- Topography and Soil Characteristics
- Agriculture
- Groundwater Resources
- Streams and Wetlands
- Flood Hazards
- Flora and Fauna
- Air Quality
- Greenhouse Gas Emissions
- Noise
- Scenic and Open Space Resources
- Archaeological and Historic Resources
- Cultural Resources
- Chemical and Fertilizer Use
- Regional Setting
- Population, Demography, and Social Impacts
- Economy and Labor Force
- Police and Fire Protection
- Medical Facilities
- Educational Facilities
- Recreational Facilities
- Solid Waste Collection
- Roadways/Circulation
- Water System
- Wastewater System
- Drainage System
- Electrical, Telephone, and Cable Television/Internet Systems
- Cumulative and Secondary Impacts

It is anticipated that the following site-specific environmental studies analysis and reports for the project will be addressed in and appended to the Draft EIS, as applicable:

- Air Quality & Greenhouse Gas Report
- Retail Demand Study
- Acoustic Impact Report
- Archaeological Impact Study
- Traffic Impact Analysis
- Shared Parking Analysis
- Geotechnical Report and Infiltration Analysis
- Water Resource Impact Study
- Environmental Phase 1 and 2
- Agricultural Impact Assessment
- Cultural Impact Analysis
- Flora and Fauna Report
- Preliminary Engineering and Drainage Report
- Sustainability Report
- View Analysis

The Draft Environmental Impact Statement (EIS) will be prepared and submitted to the Department of Planning for review. It will be published in the Environmental Notice bulletin by the Office of Planning and Sustainable Development's Environmental Review Program (ERP) and made available for a 45-day public review and comment period. Additionally, the Draft EIS will be presented to the Maui Planning Commission, the EIS Accepting Authority, at a public meeting for further review. After this process, the Applicant will prepare a Final EIS that addresses the comments received on the Draft EIS. The Final EIS will then be reviewed by the Maui Planning Commission at another meeting to determine the acceptability of the document.

E. Land Use Entitlements Required

1. Subdivision Application of Lot 2-C-4-C-1-E

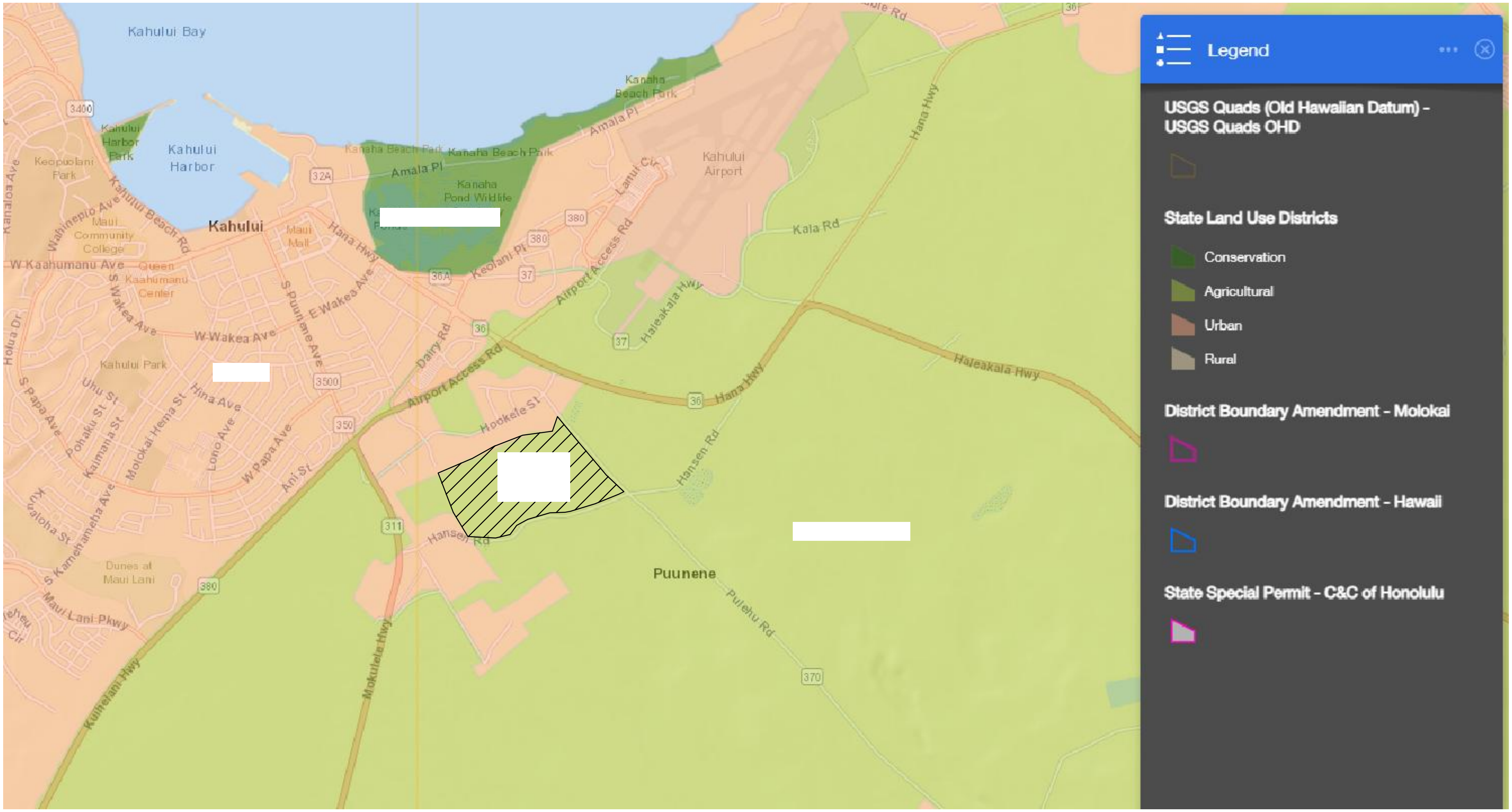
The current TMK is (2) 3-8-006:004 and notated as Lot 2-C-4-C-1-E. A subdivision application has been filed to subdivide the existing parcel into five lots (E-1 through E-5). The subdivision application has been filed by Austin Tsutsumi & Associates, and is named First Assembly of God Subdivision of Lot 2-C-4-C-1-E. The subdivision will create the new lot E-1 where the Hoʻonani Village project is proposed to be developed, and also lot E-4 which will be owned by the County of Maui and will be proposed for future development. This process will be first to create the lot that the rest of the entitlements will apply to. This process will be accepted and reviewed by the County of Maui's Planning Department, and thus they will also be the receiving agency for the EISPN.

2. District Boundary Amendment

The MIP Directed Growth Map shows the southwest corner of lot E-1 to be within the Urban Growth Boundary, but most of lot E-1 and the entire lot E-4 are outside of the current UGB. See Figure 3 – Maui Island Plan Directed Growth Map. Additionally, the project site is adjacent to the UGB to the north and to the southeast. Bringing the site into the UGB would match with the existing uses adjacent to the site. The State Land Use District Boundary Map currently has the site in the agricultural district. See Figure 8 – State Land Use District Boundary Map. As such, approval from the SLUC of a District Boundary Amendment (DBA) petition will be needed to bring these lands within the "Urban" district. From the Applicant's perspective, the Urban District designation would match the existing uses adjacent to the site and would not create a new break between the growth boundaries. SLUC classification of the project site will be sought after the subdivision of the existing lot. A Community Plan Amendment application (as discussed below) will be needed prior to processing the DBA petition to ensure conformity of the County comprehensive land use plans.

FIGURE 8

STATE LAND USE DISTRICT BOUNDARY MAP



SOURCE: STATE LAND USE COMMISSION MAPS

Project
HOONANI VILLAGE
No.
H109-001

Designed by TCC Date 08/2024
Drawn by TCC Date 08/2024
Horiz. Scale: NTS Vert. Scale: NTS
Type PLANNING

PIONEER DESIGN GROUP – HAWAII LLC
CIVIL ENGINEERING · LAND USE PLANNING
CONSTRUCTION MANAGEMENT
HONOLULU, HAWAII PH: 808.400.5959
WWW.PD-GRP.COM

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3. Community Plan Amendment

As mentioned previously, a portion of the lot E-1 is classified as Heavy Industrial by the Wailuku-Kahului Community Plan (2002). Refer to Figure 4. The lands immediately adjacent to the site to the north and to the southeast are classified as Light Industrial by the Community Plan. It is anticipated that lots E-1 and E-4 will have their County Zoning and Community Plan Classifications redesignated to ensure land use consistency with the proposed State Land Use and County zoning designations. As such, as noted above, prior to the DBA petition for reclassification, an application for a Community Plan Amendment (CPA) may be prepared and filed with the Department of Planning for review and action by the Maui County Council. There is a possibility that the Wailuku-Kahului Community Plan Map could be updated prior to the filing of the CPA, in which case a CPA may not be required for the development of the project. The goal of the CPA is to have the classification match the future zoning of the lot as discussed in Section 4 below for the Change in Zoning.

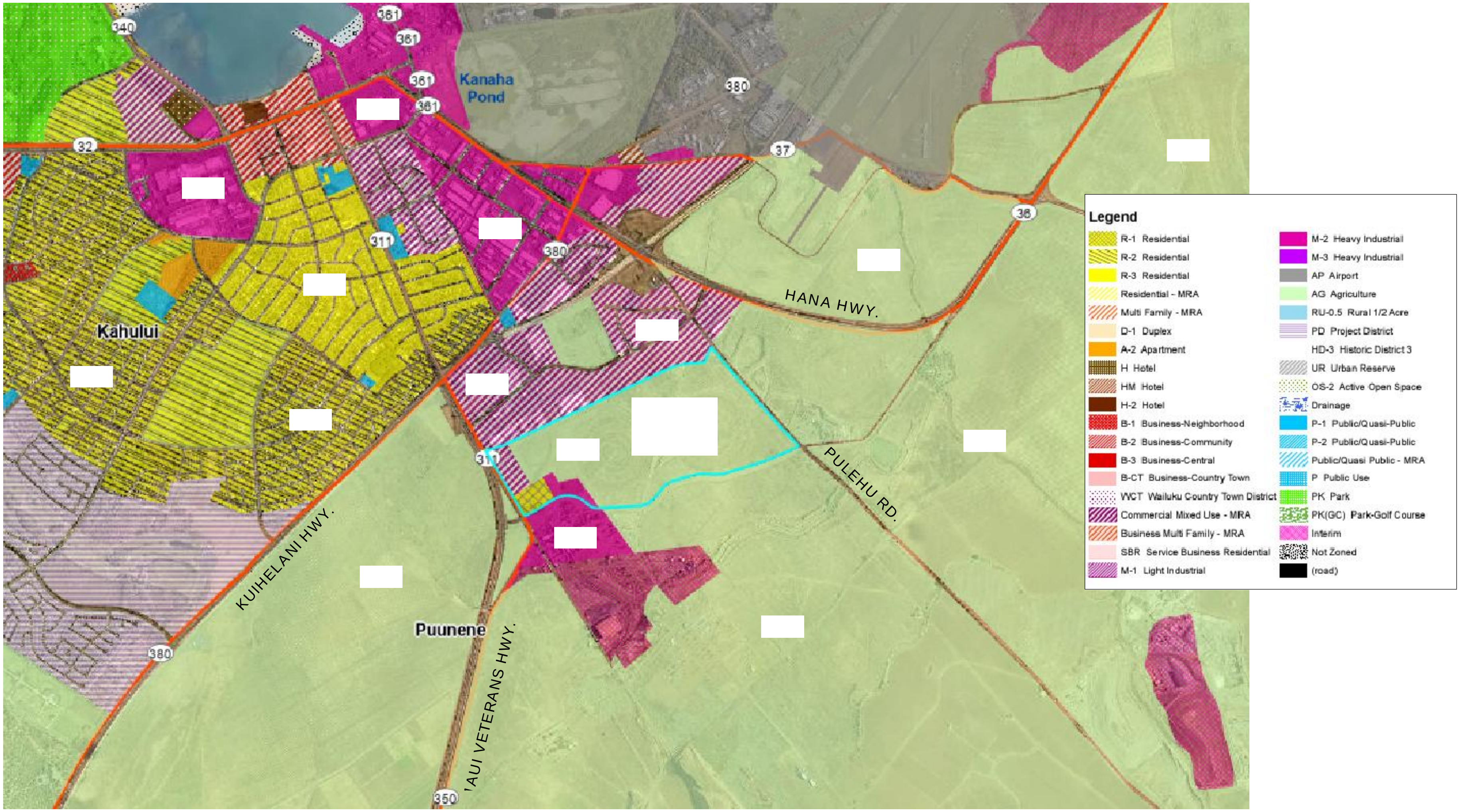
4. Change of Zoning

The project site, Lot E-1, and the County owned lot E-4 are currently zoned for Agricultural Use in the County of Maui. Refer to Figure 9 – Maui County Zoning Map. The project site will need to be re-zoned to allow for uses proposed by the site plan. As lot E-4 of the subdivision will be owned by the County of Maui, the applicant is working with the County of Maui to pursue a County Initiated Change of Zoning (CIZ) to change the zoning of lot E-1 and E-4 to M-1 Light Industrial. This zone change would allow all of the proposed uses in the Hoʻonani Village land plan. The CIZ process will be coordinated directly with the County of Maui.

Further information regarding the proposed land use entitlement changes for the project will be provided in the Draft EIS.

FIGURE 9

MAUI COUNTY ZONING MAP



SOURCE: MAUI COUNTY GIS

Project
HOONANI VILLAGE
No.
H109-001

Designed by TCC Date 08/2024
Drawn by TCC Date 08/2024
Horiz. Scale: NTS Vert. Scale: NTS
Type PLANNING

PIONEER DESIGN GROUP – HAWAII LLC
CIVIL ENGINEERING LAND USE PLANNING
CONSTRUCTION MANAGEMENT
HONOLULU, HAWAII PH: 808.400.5959
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II. DESCRIPTION OF THE EXISTING ENVIRONMENT AND SCOPING OF POTENTIAL IMPACTS

A. PHYSICAL SETTING

1. Existing and Surrounding Land Uses

The project area is located adjacent to the Wailuku-Kahului Community Plan Area within the Central Maui region. The surrounding area contains a variety of uses. Northwest of the site, the uses are primarily commercial in nature including both large “big box” retail such as Target and Lowe’s Home Improvement Store, and smaller retail shops and restaurants. The airport is north/northeast of the site separated from it by agricultural lands. South and east of the site the area is primarily designated Agricultural. West and southwest of the site contain both Agricultural and Heavy Industrial land designations as well as public/quasi-public and recreational uses. Refer to Figure 4 – Wailuku and Kahului Community Plan Map.

2. Climate

Maui has a semi-tropical climate with numerous distinct microclimates. The average annual temperature near sea level is around 75 degrees Fahrenheit. Most of the island's rainfall occurs on its northeast-facing shores, while the south and southwest coastal areas remain relatively dry.

Kahului experiences consistently warm temperatures throughout the year, with minimal seasonal fluctuations. Annual temperatures in the region average in the upper 70s to mid-80’s. July through September are historically the warmer months of the year, while the cooler months are December through February. During the summer months, average daily temperatures in Kahului are slightly higher than in winter and typically range from the low to the mid 80’s.

Average rainfall distribution in this region varies from 10 inches to 20 inches per year in the higher elevations. Rainfall in the Central Maui region is highly seasonal, with most of the precipitation occurring in the winter months from strong storm systems.

The northeast trade winds dominate about 80 to 85 percent of the time, typically averaging 10 to 15 miles per hour in the afternoons. Mornings and nights generally bring calmer or lighter winds. From

October to April, southerly winds associated with Kona storms may also occur.

Replacing vegetative surfaces with hardscapes such as roadways, paved parking areas, and buildings can slightly increase ambient air temperatures, creating a "heat island" effect. To mitigate this, the project will incorporate proposed landscaping and landscape buffers. The landscape design and planting plan aim to provide shading to help reduce the "heat island" effect. More details about the proposed landscaping plan will be included in the Draft EIS.

3. Topography and Soil Characteristics

The project area slopes in a southeast to northwest direction with low points near the adjacent Target store and the most northerly corner of the site along Pulehu Road.

The project area is underlain by the Pulehu-Ewa Jaucas Association. See Figure 10 – Soil Association Map. The Soil Survey of the Islands of Kauaʻi, Oʻahu, Maui, Molokaʻi and Lānaʻi, State of Hawaiʻi characterizes the soils of the Kahului/Puʻnene soil association as deep, nearly level to moderately sloping, well-drained and excessively drained soils that have a moderately fine textured to coarse-textured subsoil or underlying material; on alluvial fans and in basins.

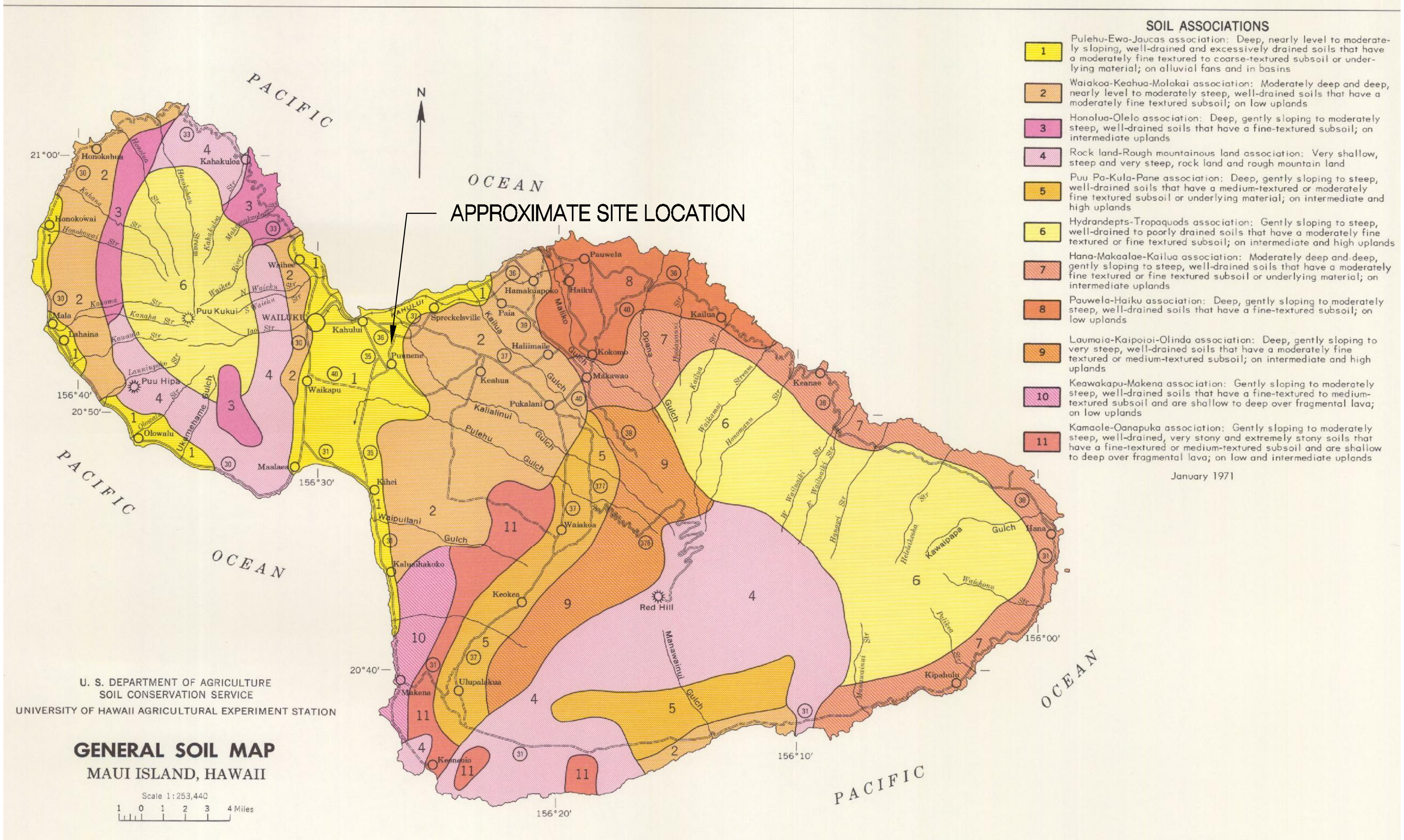
The site is generally blanketed by a layer of agriculturally disturbed soil underlain by alluvial (water deposited) soil.

The Natural Resources Conservation Service Map classifies existing soil on site as (EaA) Ewa Silty Clay loam. See Figure 11 – Soil Classification Map. This series is characterized by well drained soils in basins and alluvial fans. These soils developed in alluvium derived from basic igneous rock. They are nearly level to moderately sloping.

The site was recently used for the cultivation of sugar cane. The cultivation process left the entire site with approximately 12 to 30 inches of agriculturally disturbed soil. The agriculturally disturbed clayey silt consisted of low plasticity clayey silt with varying percentages of sand, typically classified as ML under the USCS. In addition to the agriculturally disturbed clayey silt, several areas of agriculturally disturbed silty sand, typically classified as SM under the USCS, were encountered across the site. The depth of bedrock is deeper than 5 feet.

FIGURE 10

SOIL ASSOCIATION MAP



SOIL ASSOCIATIONS

1	Pulehu-Ewa-Jaucas association: Deep, nearly level to moderately sloping, well-drained and excessively drained soils that have a moderately fine textured to coarse-textured subsoil or underlying material; on alluvial fans and in basins
2	Waiakoa-Keahua-Molokai association: Moderately deep and deep, nearly level to moderately steep, well-drained soils that have a moderately fine textured subsoil; on low uplands
3	Honolua-Olelo association: Deep, gently sloping to moderately steep, well-drained soils that have a fine-textured subsoil; on intermediate uplands
4	Rock land-Rough mountainous land association: Very shallow, steep and very steep, rock land and rough mountain land
5	Puu Pa-Kula-Pane association: Deep, gently sloping to steep, well-drained soils that have a medium-textured or moderately fine textured subsoil or underlying material; on intermediate and high uplands
6	Hydrandepts-Tropaquods association: Gently sloping to steep, well-drained to poorly drained soils that have a moderately fine textured or fine textured subsoil; on intermediate and high uplands
7	Hana-Makaalae-Kailua association: Moderately deep and deep, gently sloping to steep, well-drained soils that have a moderately fine textured or fine textured subsoil or underlying material; on intermediate uplands
8	Pauwela-Haiku association: Deep, gently sloping to moderately steep, well-drained soils that have a fine-textured subsoil; on low uplands
9	Laumaia-Kaipoioi-Olinda association: Deep, gently sloping to very steep, well-drained soils that have a moderately fine textured or medium-textured subsoil; on intermediate and high uplands
10	Keawakapu-Makena association: Gently sloping to moderately steep, well-drained soils that have a fine-textured to medium-textured subsoil and are shallow to deep over fragmental lava; on low uplands
11	Kamaole-Oanapuka association: Gently sloping to moderately steep, well-drained, very stony and extremely stony soils that have a fine-textured or medium-textured subsoil and are shallow to deep over fragmental lava; on low and intermediate uplands

January 1971

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNIVERSITY OF HAWAII AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP

MAUI ISLAND, HAWAII

Scale 1:253,440

1 0 1 2 3 4 Miles

SOURCE: U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, GENERAL SOIL MAP

Project
HOONANI VILLAGE
No.
H109-001

Designed by TCC
Date 08/2024
Drawn by TCC
Date 08/2024
Horiz. Scale: NTS
Vert. Scale: NTS
Type PLANNING

PIONEER DESIGN GROUP – HAWAII LLC
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FIGURE 11

HYDROLOGIC SOIL GROUP CLASSIFICATION MAP

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EaA	Ewa silty clay loam, 0 to 3 percent slopes, MLRA 158	B	190.7	99.6%
MuB	Molokai silty clay loam, 3 to 7 percent slopes, MLRA 158	C	0.7	0.4%
Totals for Area of Interest			**191.4**	**100.0%**

SOURCE: U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, SOIL MAP

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4. Agriculture

On the island of Maui approximately 235,770 acres have been designated as “Agricultural” by the SLUC, representing just over 50 percent of the island.

The State Department of Agriculture created a classification system in 1977 identifying Agricultural Lands of Importance to the State of Hawaiʻi (ALISH). This system is based mainly, though not solely, on the soil characteristics of the land. ALISH divides the land into three categories: "Prime," "Unique," and "Other Important" agricultural land, with any remaining areas classified as "Unclassified."

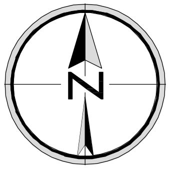
"Prime" agricultural lands have the soil quality, growing season, and moisture supply necessary to economically produce sustained crop yields when combined with modern farming techniques. "Unique" agricultural lands are capable of producing sustained high yields of specific crops due to their favorable combination of soil quality, growing season, and moisture supply. "Other Important" agricultural lands, while not classified as "Prime" or "Unique," are still considered significant for agricultural use at the state or local level.

Approximately 62,000 acres, or 26 percent, of Maui’s 235,770 acres of SLUC designated “Agricultural” lands are characterized as “Prime” lands by the ALISH system. The project area is classified by the ALISH system. See Figure 12 – Agricultural Lands of Importance to the State of Hawaiʻi Map.

FIGURE 12

AGRICULTURAL LANDS OF INTEREST OF THE STATE OF HAWAII (ALISH) MAP

SOURCE: STATE OF HAWAII GIS (POWERED BY GEOPORTAL)



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The University of Hawai‘i’s Land Study Bureau (LSB) created the Overall Productivity Rating system, which categorizes soils into five levels. Soils rated “A” have the highest productivity, while those rated “E” have the lowest. Numbers following these letters provide additional details about the soil, such as its texture, drainage capacity, and stoniness. These ratings are determined based on various factors like soil characteristics, topography, and climate. On Maui, approximately 21 percent of the island’s SLUC “Agricultural” lands are classified as LSB “A” and “B” soils, indicating high productivity. The project area is within the State Agricultural District and, therefore, is provided a classification of A by the LSB. Refer to Figure 13 – Land Study Bureau Map.

Chapter 205, Hawai’i Revised Statutes (HRS), declared that the people of Hawai’i have a substantial interest in conserving the agricultural resources of the State. The State calls for the identification of Important Agricultural Lands (IAL) to identify and plan for the maintenance of a strategic agricultural land resource base that can support a diversity of agricultural activities and opportunities that expand agricultural income. The project area is not an IAL.

An Agricultural Impact Assessment will be prepared as part of the EIS process to assess the potential impact of the proposed project on the availability of productive agricultural lands on Maui. A copy of the Agricultural Impact Assessment will be included and discussed in the Draft EIS.

FIGURE 13

LAND STUDY BUREAU MAP

SOURCE: STATE OF HAWAII GIS PROGRAM, LAND STUDY BUREAU'S CLASS LOCATOR

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5. Groundwater Resources

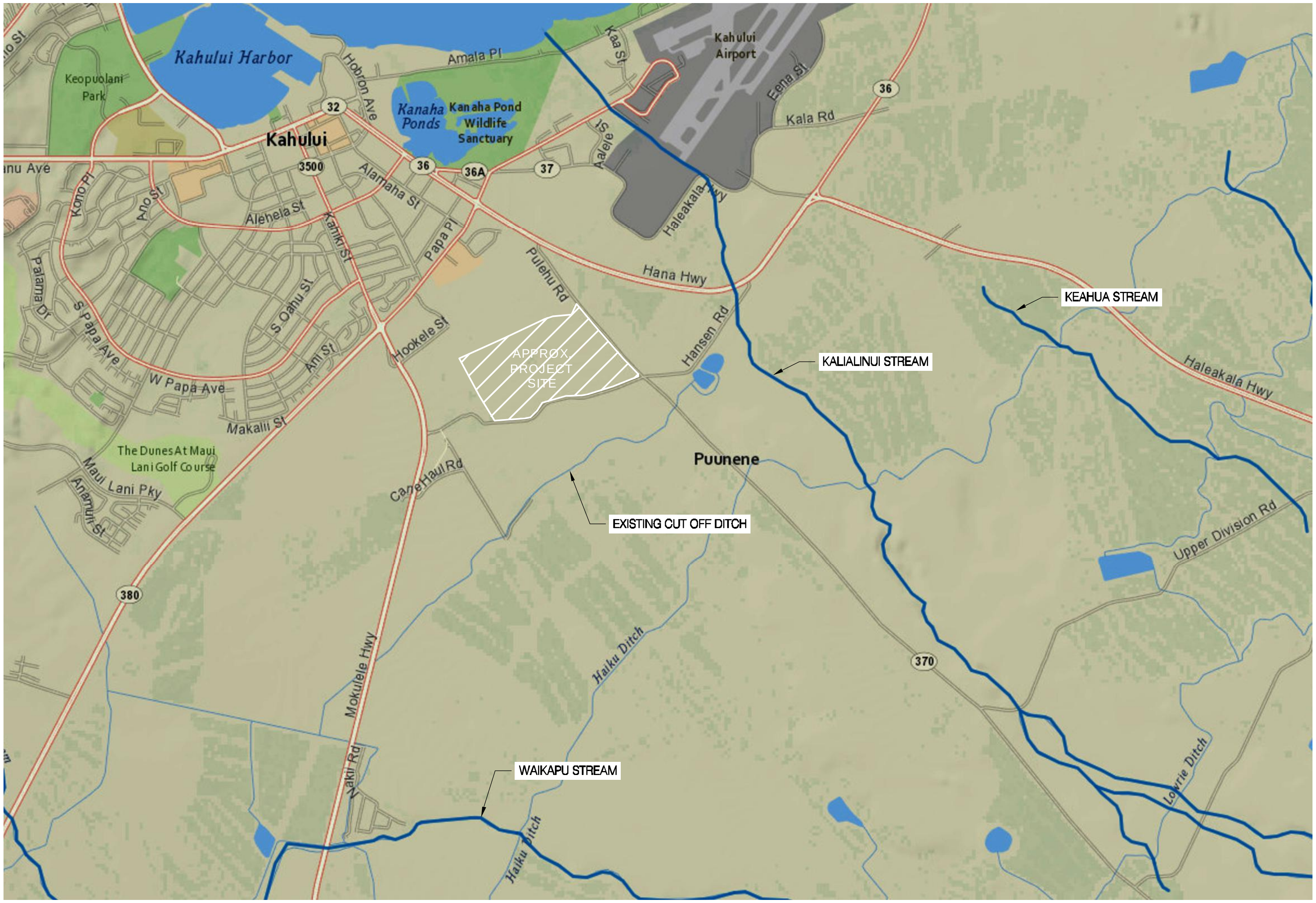
A Groundwater Resource Assessment will be conducted to assess potential impacts on local groundwater resulting from the proposed project, including the possible development of one or more wells and a reverse osmosis facility. The findings of this report will be included and analyzed in the draft Environmental Impact Statement (EIS).

6. Streams and Wetlands

There are no drainageways crossing the property nor are there any identified wetlands. As such, the project proposes no impact to these types of resources. See Figure 14 – Existing Streams Map and Figure 15 – Existing Wetlands Map below. A Preliminary Engineering and Drainage Report (PEDR) has been developed for the project to evaluate the hydrological conditions influencing drainage patterns within the project area. The PEDR is included as Appendix A.

FIGURE 14

EXISTING STREAMS MAP



SOURCE: STATE OF HAWAII GIS PROGRAM, HAWAII STREAMS FROM DLNR, DIVISION OF AQUATIC RESOURCES, 2008.

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FIGURE 15

EXISTING WETLANDS MAP

SOURCE: STATE OF HAWAII GIS PROGRAM, WETLANDS OF THE STATE OF HAWAII, USFWS, AUGUST 2019.

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7. Flood and Tsunami Hazards

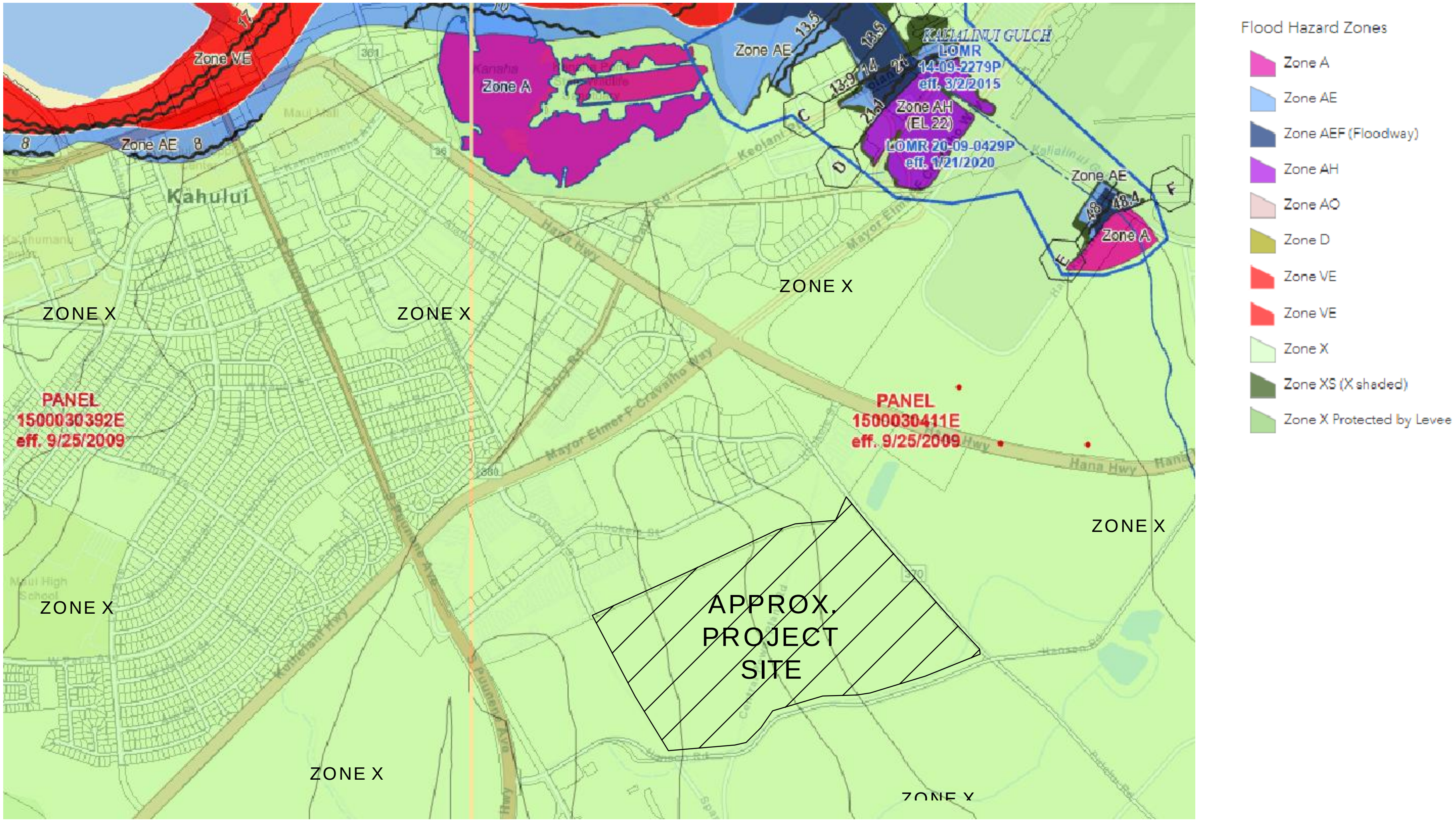
The entirety of the project site is in Flood Zone X as shown on The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map. As such, there is not a source of flooding that would affect the project site. Refer to Figure 16 – Flood Insurance Rate Map.

The updated Tsunami Evacuation maps from the County of Maui identify three zones: 1) Safe Zone, marked in green, which indicates areas where people should evacuate to during a tsunami event; 2) Extreme Evacuation Zone, shown in yellow, which highlights areas that must be evacuated during an Extreme Tsunami Warning; and 3) Tsunami Evacuation Zone, shown in orange, designating areas to be evacuated under any Tsunami Warning. During a Tsunami Warning, destructive waves could inundate all coastlines, while during an Extreme Tsunami Warning, waves may reach significantly farther inland. According to the Tsunami Evacuation Map, the project is located within and near the boundary of the Extreme Evacuation Zone, adjacent to a Safe Zone that follows the alignment of Hansen Road. Refer to Figure 17 – Tsunami Evacuation Zone Map.

There are no restrictions on development associated with the Flood Zone X designation covering the site. Structures will be sited in the Extreme Evacuation Zone however the safe zone is adjacent to and mauka of the project site.

FIGURE 16

FLOOD INSURANCE RATE MAP



SOURCE: STATE OF HAWAII DLNR FLOOD HAZARD ASSESSMENT TOOL

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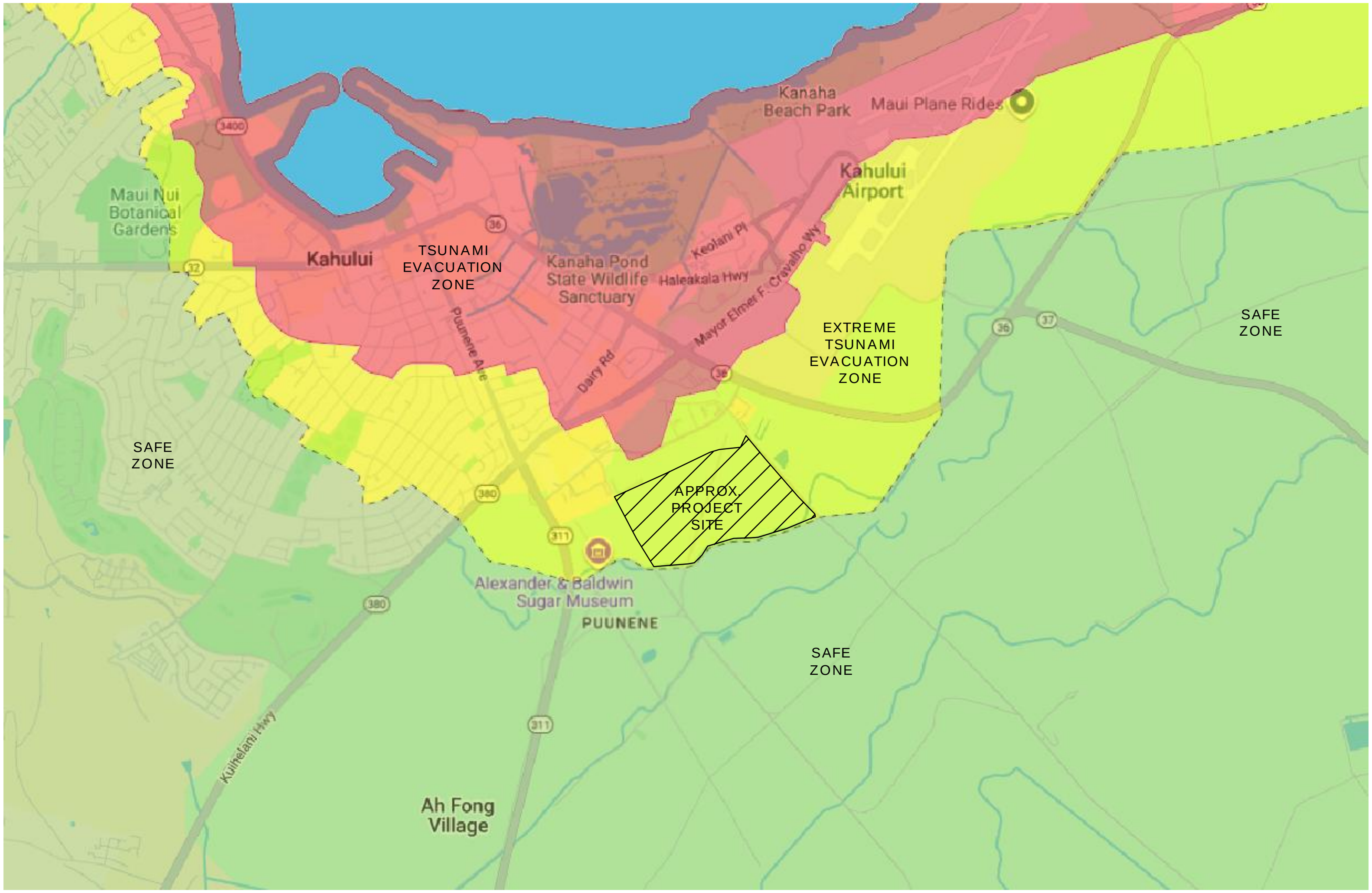
FIGURE 17

TSUNAMI EVACUATION ZONE MAP



LEGEND

🟥 -TSUNAMI EVACUATION ZONE

🟨 -EXTREME TSUNAMI EVACUATION ZONE

🟩 -SAFE ZONE

SOURCE: TSUNAMI EVACUATION MAPS, NOAA, TSUNAMI.COAST.NOAA.GOV

Project HOONANI VILLAGE	Designed by	TCC	Date	08/2024	PIONEER DESIGN GROUP – HAWAII LLC CIVIL ENGINEERING · LAND USE PLANNING CONSTRUCTION MANAGEMENT HONOLULU, HAWAII PH: 808.400.5959 WWW.PD-GRP.COM	**Sheet** 1 of 1
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			Type	PLANNING		

8. Flora and Fauna

A Flora and Fauna review of the site has been completed, and the final report is submitted with this EISPN in Appendix C.

"The main project site and the lower reaches of the pipeline corridor are dominated by non-native grasses, mostly Guinea grass (Megathyrsus maximus) and buffel grass (Cenchrus ciliaris). In areas where grasses are thin, other aggressive non-native plants dominate, especially spiny amaranth (Amaranthus spinosus), lion's tail (Leonotis nepetifolia), golden crown-beard (Verbesina encelioides), and tumbleweed (Salsola tragus). Clumps of shrubby non-native fleabane (Pluchea spp.) also dot the fields of grass.

There are very few trees in the main project area. Most prevalent are hundreds of non -native tree tobacco (Nicotiana glauca). Other trees in the project area include groves of large haole koa (Leucaena leucocephala). A few monkey pods (Samanea saman). And a row of giant, mostly dead, elephant's ear pod (Enterolobium cyclocarpum) along Pulehu Rd. There are also scattered small kiawe (Prosopis pallida), Manila tamarind (Pithecellobium dulce), silky oak (Grevillea robusta), and date palms (Phoenix sp.). And at the well site and upper reaches of the pipeline corridor, there is an active citrus farm growing lime trees (Citrus aurantifolia).

The only native plant found on the main site was the common shrub ʻuhaloa (Waltheria indica). ʻUhaloa was also abundant at the well site and in the pipeline corridor, along with scattered vines of the native pāʻū o Hiʻiaka (Jacquemontia sandwicense)

Dedicated surveys for Hawaiian Hoary Bats (Aeorestes semotus) were not done, but bats are known to transit over broad areas and may forage at the site at times. Most of the trees at the project site are less than 15 ft. tall, though some are taller. Hawaiian Hoary Bats roost and give birth to their young in tall trees. While tree trimming activities are not incompatible with bats, they have the potential to impact juvenile bats unable to fly away from a tree that is cut during the summer pupping season. For this reason, the FWS suggests that trimming woody plants more than 15 ft. tall should not occur between June 1 and September 15.

The only non-native mammals observed at the site were a few dozen Axis Deer (Axis axis) at the main site and a herd of cows (Bos taurus) in the lower reaches of the pipeline corridor. Additionally, high levels of browsing, scat, game trails, digging, and rubbing were observed. Non-native mammals that were not observed but likely occur in the project area at times include pigs

(Sus scrofa), rats (Rattus spp.), mice (Mus domesticus), cats (Felis domesticus), dogs (Canis familiaris), and mongooses (Herpestes auropunctatus).

There were very few birds at the site. The bulk of the birds encountered during the survey were common non-native species. The birds were mostly transiting through the site, roosting in trees, and loafing on the ground. Birds were most common near the edges of the property, in areas that are lusher and have more structural diversity. Most abundant were Common Mynah (Acridotheres tristis) and Zebra Doves (Geopelia striata). No Hawaiian Geese or Nēnē were encountered on the site, though they are known from the general area."

9. Air Quality

The area typically does not experience significant air quality issues. Local sources of air contaminants primarily include vehicle emissions and occasional events such as volcanic eruptions on Hawaiʻi Island and range fires.

Construction activities for the project are expected to generate short-term dust impacts. Site work, including clearing, grubbing, grading, and utility and roadway installation, will produce windblown particulates. A Best Management Practices (BMP) plan will be implemented during construction to mitigate these impacts. Dust control measures outlined in the BMP may include regular watering, the use of sprinklers, installation of dust screens, and prompt revegetation of disturbed areas.

Post-construction, vehicle traffic generated by the project will contribute to automotive emissions. To reduce these emissions, residents and employees will be encouraged to use alternative transportation methods. The project includes proposed walking and bicycle pathways to promote ease of access and reduce airborne emissions from short trips.

An Air Quality Assessment will be prepared as part of the environmental review process, a copy will be included in the Draft EIS.

10. Greenhouse Gas Emissions

The Central Maui Area includes a variety of uses including residential, Commercial, Industrial and Airport. The areas near the site include commercial activities to the north/northwest and agricultural uses to the south/southeast. The site itself is agricultural in nature with sugar cane being the most recent mass-produced crop on the site. Generally agricultural uses of this type are not considered to be a substantial contributor of Greenhouse Gas (GHG) emissions. Development of the area into commercial and residential uses will increase levels of GHG through sources such as vehicular emissions and commercial and residential electricity needs. Constructing a "complete community" will help reduce GHG impacts through decreased out of area trips and increased multi-modal transportation opportunities.

An Air Quality Assessment will be prepared as part of the environmental review process for the project. It will also include a discussion relating to GHG emissions. The assessment will be included and discussed within the Draft EIS.

11. Noise

Existing background traffic traversing through the area to the north/northwest of the site is the principal contributor of local noise.

Ambient noise levels will be temporarily affected by construction activities, with heavy machinery and construction work being the primary sources of noise. To mitigate the impact on local noise conditions, equipment maintenance, mufflers, and other noise-reducing devices will be employed during construction. Construction noise will be limited to daylight hours, reducing the duration of noise disturbances. Contractors will adhere to the maximum allowable noise levels for stationary equipment as outlined in Hawaiʻi Administrative Rules (HAR), Chapter 11-46, "Community Noise Control." If required, a community noise permit will be obtained before construction begins.

As part of the environmental review process, a Noise Study will be conducted, and its findings will be included and discussed in the Draft Environmental Impact Statement (EIS).

12. Scenic and Open Space Resources

The potential impacts of the proposed project on scenic and open space resources, as well as scenic view corridors, will be assessed and discussed in the Draft (EIS).

13. Archaeological and Historical Resources

An Archaeological Impact Study will be prepared for the project area in coordination with the State Historic Preservation Division. The findings of the study will be assessed and discussed in the Draft EIS.

14. Cultural Resources

In terms of traditional Hawaiian perspectives of the island, the project area is situated within the moku (traditional land district) of Pūʻali Komohana. The site lies within the ahupuaʻa of Wailuku, just makai of the ahupuaʻas of ʻŌmaʻopio, Kalialinui, Aʻapueo and Makaʻehu. The Pūʻali Komohana moku stretches from about the center of the West Maui Mountains to the northwestern slopes of Haleakalā. The site sits on the base of Haleakalā as the slopes flatten out towards the Kahului area. The project site was in the heart of the plantation industry boom in the early 1800s, with Puʻunene Sugar Mill being located just to the west of the site. Sugar cane and pineapple fields covered most of the area around the site, with the main harbor and business area growing to the Northwest in Kahului.

Existing wetland areas were located throughout the coastline in Kahului before the area's development. Kanahā Pond was one of the twin ponds of Kapiʻioho, which were constructed over 200 years ago by the Chief of Maui at the time, Kapiʻiohoʻokalani. These were utilized for growing and storing fish for the local community. In the early 1900s, half of the fishpond was filled with material from the dredging of the nearby harbor. Kanahā pond exists today as a wildlife sanctuary.

The site’s history of agricultural uses and the nearby ocean resources lead to massive growth within the moku. A Cultural Impact Assessment (CIA) study for the project area will be prepared as part of the environmental review process. A copy of the CIA report will be included and its findings discussed in the Draft EIS.

15. Use of Chemicals and Fertilizers

The project area is currently vacant and recently burned. The vegetation consists of primarily non-native species such as Guinea grass and Buffel grass. In areas where grasses are thin, other aggressive non-native plants dominate, including spiny amaranth, lion's tail, golden crown-beard, and tumbleweed. Clumps of shrubby non-native fleabane also dot the fields of grass. Pre-contact, the area would have likely supported a diverse, native dry forest and grassland habitat. The diversity has been greatly reduced by past sugar cane production. Chemicals and Fertilizers typical for sugar cane agricultural activities were likely used on the project site but none since production ceased on the property.

Landscaping for the project will be designed in a manner that reduces the need for herbicides, pesticides and fertilizers. A low maintenance approach will be taken to limit impacts to the site and surrounding areas. During the establishment period for new plantings, fertilizers may be used to ensure survivability. Herbicides and pesticides may also be used in limited situations for landscape maintenance.

The project will also include a comprehensive drainage system to retain stormwater due to increased run-off rates of impervious surfaces. Water quality of the runoff will provide treatment to prevent impacts to downstream properties. A more detailed description and discussion of the drainage system for the project will be included in the Draft EIS.

B. SOCIO-ECONOMIC ENVIRONMENT

1. Regional Setting

From a regional perspective, the project area lies within the Wailuku-Kahului Community Plan region, which is described as the Central Maui region. The region touches the West Maui region to the west, the Kihei-Makena region to the south, and the Paia and Pukalani regions to the east and southeast. This area showcases a wide range of physical and socio-economic environments. Due to the region's growth in the commercial retail and restaurant industries, the proximity to the airport, the shoreline, and Haleakalā, the number of local residents and visitors in the area has consistently grown over the years. Kahului and Wailuku serve as the commercial, industrial and residential hub of the region based around the Kahului airport and harbor. The Kahului and Wailuku area has more permanent residents than visitors. Visitors tend to stay at the resort locations of south and west Maui. The region has planned development areas that start at the edges of the current development and stretch south.

The proposed project aims to create affordable multi-family rental units to provide additional housing for the local community while also creating a central commercial gathering area to bring the community together. The industrial uses will provide for a smooth transition to the existing agricultural and industrial uses adjacent to the site. The design will incorporate architectural and landscape thematic concepts to maintain consistency with the area's built environment.

2. Population, Demography, and Social Impacts

Maui County's population has experienced moderate growth over the past ten years. According to Decennial Census data, the population increased from 154,834 in 2010 to 164,754 in 2020, representing a 6.41% growth over the decade.

The proposed project is located south of the Kahului Airport in the Central Maui Region. The Census Designated places nearby include Kahului, Wailuku, Waikapu and Waiheʻe – Waiehu. These census areas have also grown within the 10-year time frame between 2010 and 2020. In 2010 the population of the four census areas that make up Central Maui was 50,002. In 2020 the population had expanded to 58,587 for an increase of 14.6%.

With a substantial amount of apartment housing being proposed in this mixed-use development, tenants are likely to be primarily local residents used as full-time residency.

An economic and Fiscal Impact Assessment will likely be prepared and submitted in the Draft EIS.

3. Economy and Labor Force

Kahului, located on the island of Maui in Hawaii, is primarily dependent on the tourism industry. As a central hub for transportation and commerce on the island, Kahului hosts Maui's main airport (Kahului Airport) and its largest harbor, making it a key entry point for visitors. Tourism drives much of the local economy, with visitors coming for the island’s beaches, resorts, and attractions like Haleakalā National Park.

In addition to tourism, the Central Maui Region, most notably the Kahului and Wailuku area has a strong presence in retail and transportation. Agriculture also had a strong presence particularly in historical industries like sugarcane and pineapple cultivation, though agriculture has declined in recent decades. The retail and transportation industries provide service support for the tourism industry.

For the calendar year 2023, total spending by visitors on Maui was $5.80 billion (-0.5%) and daily spending was $287 per person (+17.5%). In comparison, total visitor spending on Maui was $5.82 billion and daily spending was $244 per person in 2022. (Hawaiʻi Tourism Authority, 2023)

This reflects the significant contribution of tourism to the local economy, with spending on accommodations, dining, activities, and retail being key areas of expenditure.

Hawaiʻi's economy was strong through 2019, with record-breaking visitor arrivals and low unemployment rates. However, the COVID-19 pandemic had widespread impacts on Maui's economy. Stay-at-home orders and travel quarantines implemented to contain the virus led many businesses to close or significantly scale back operations, resulting in a sharp rise in unemployment claims. By May 2020, the statewide unemployment rate soared to 23.4%, up from just 2.7% in February 2020. As businesses gradually reopened, unemployment rates steadily declined. By December 2023, the unemployment rate had dropped to 2.9%, an improvement from 3.5% in December 2022 (Department of Business, Economic Development and Tourism, 2024).

An Economic and Fiscal Impact Assessment will likely be included in the Draft EIS.

C. Public Services

1. Police and Fire Protection

The Maui County Police Department Headquarters (MPD) are located at the Wailuku Station. There are several patrol, support, administrative and investigative divisions that service the Hana, Lanai, Lahaina, Molokai, Wailuku and Kihei regions. The MPD's Wailuku Station covers the subject region operating out of the main station on Mahalani Street approximately 4 miles from the project site.

Fire prevention, protection and suppression services are provided by the County of Maui, Department of Fire and Public Safety. The Kahului Fire Station, which services the site area is located on Dairy Road near its intersection with Mayor Elmer F. Cravalho Way. The station is approximately 0.5 miles west of the project site.

The proposed project will support police and fire protection services through the real property tax revenues it is expected to generate. Projections of these tax revenues will be detailed in the Economic and Fiscal Impact Assessment, which will likely be included in the Draft EIS.

2. Medical Facilities

Maui Memorial Medical Center is the only major medical facility on the island of Maui. This facility has 219 beds and provides general, acute and emergency care services.

Within the Wailuku and Kahului area, there are doctor's offices and clinics throughout. These offer fewer medical services. These clinics include Maui Medical Group, Paradise Medical Services, Maui Medical, Maui Family Medicine, Minit Medical Urgent Care, Maui VA Clinic, Champs Pediatric and Kaiser Permanente to name a few.

3. Education Facilities

The Hawaii Department of Education (DOE) operates nine (9) schools within the Kahului/Wailuku area. Puʻu Kukui, Pomaikaʻi, Kahului, Lihikai and Wailuku elementary schools serve kindergarten through 5th grade. Iao and Maui Waena intermediate schools serve grades 6th through 8th and Maui and Baldwin High Schools serve grades 9th through 12th. Approximate enrollment figures for these schools are located in Table 2 below.

Table 3 – Wailuku – Kahului Public School Enrollment

School	Actual Enrollment		
	SY 21-22	SY 22-23	SY 23-24
Puʻu Kukui Elem.	685	683	709
Pomaikaʻi Elem.	539	510	578
Kahului Elem.	835	832	799
Lihikai Elem.	758	717	691
Wailuku Elem.	585	559	550
Iao Int.	818	780	950
Maui Waena Int.	1140	1044	1126
Baldwin High	1350	1338	1345

Maui High	2058	1999	1908
Total	8768	8462	8656

Maui College is a branch of the University of Hawaii (UHMC) located in Kahului. Maui College is the primary higher education institution providing service on Maui.

The majority of the residents at the project are expected to be full-time residents and would have children enrolled in local public schools. The future County owned lot, E-4, is a potential location for a future public elementary school. The applicant will comply with applicable DOE school impact fee requirements for the project.

4. Recreational Facilities

Many diverse opportunities exist in the Central Maui Community Plan Region. Shoreline activities such as fishing, surfing, jogging, camping, picnicking, snorkeling, swimming, kite surfing and windsurfing are the primary recreation activities in the area.

Popular local beaches include Kanaha Beach, VOR Beach, Hoʻaloha Park, Spreckelsville, Baby, Sugar Cane, Hoʻokipa, Kaulahao and Pāʻia Secret Beach.

Various public park facilities are also located nearby including War Memorial Sports Complex, Keopuolani Regional Park, Maui Lani Regional Park, Kahului Community Center Park, Kahului Park and Lihikai Park while golfing activities exist at Waiehu Municipal Golf Course and The Dunes at Maui Lani. There are also 2 private golf clubs in the local area.

Additional recreational resources include Maui Zip Line Company, Kanaha Pond State Wildlife Sanctuary, Lao Valley, Maui Nui Botanical Gardens and the Central Maui Regional Sports Complex.

The proposed plan, with its implementation will provide additional recreational facilities including a potential future County of Maui community center, and active and passive open space areas such as parks, trails, greenspace, and multi-modal pathways to promote recreational activities in the area. These improvements will reduce impacts to existing park facilities nearby. The applicant will coordinate with the Department of Parks and Recreation to address compliance with County parks and playground assessment requirements for the project pursuant to Section 18.16.320 of the Maui County Code.

5. Solid Waste Collection

There are no single-family residential uses proposed in the project which would require collection service provided by the County of Maui. On Maui, waste is collected and disposed at the County's Central Maui Landfill Facility approximately 1.35 miles southeast of the project site. The Central Maui Landfill also accepts commercial waste from private collection companies. A County supported green waste recycling facility is also located at the Central County Landfill.

Solid waste collection is being implemented into the design of the various buildings on site to provide various options for efficient waste disposal and removal from the site. The low-rise residential buildings will be designed with either a solid waste collection room to combine all the waste into one area to be taken off site, or a designated covered trash area in the nearby parking lot. The various commercial buildings will have designated solid waste areas, and a regular collection schedule. The solid waste design is subject to change through the design process.

During the construction phase of the project, waste and recyclable materials will be transported to appropriate processing facilities. Due to the mix of uses and product types and variety of construction materials involved, an exact quantification of construction waste to be generated is hard to provide at this stage of the project. As part of the sustainability objectives for the project, a construction waste management plan will be developed by the Application to ensure waste is properly disposed of and to identify efficiency opportunities during construction.

After construction is complete, the proposed project will be served by private waste collection companies. The project will not affect the service capabilities of the County of Maui's residential solid waste collection.

D. Infrastructure

1. Roadways

The internal streets proposed within the project area will be accessed via Pulehu Road, Hansen Road and the future extension of Pakaula Street. Hansen Road connects west to Maui Veterans Highway and northeast to Pulehu Road. Both Pulehu Road and Pakaula Street connect north to

Hoʻokele Street which connects to Hana Highway to the northeast and Maui Veteran's Highway to the west.

Pulehu and Hansen Roads are Major collectors and run adjacent to the site to the east and south respectively. The applicant is proposing to complete half-street improvements and pavement widening on these streets to incorporate the access points to the development and accommodate the additional traffic. The applicant is proposing 36 feet of right of way from centerline on both streets, which would be about an 8-foot ROW dedication on Pulehu road (actual dedication width varies), and a 16-foot ROW dedication on Hansen Road. The streets are being proposed to have 24 feet of paved width from the centerline with curb, gutter and sidewalk. This preliminary section is being proposed to accommodate a center turn lane to allow vehicles to make turns into the development.

Pakaula Street north of the site has a paved width of about 54 feet and has a travel lane and a lane for on-street parking on both sides, and a center turn lane. The applicant is proposing to connect to the end of the existing improvements and extend the street into the site. The extension of Pakaula is proposed to narrow the pavement to a width of 38 feet with a sidewalk on one side and a 14-foot-wide bicycle & pedestrian path on the other. The extension of Pakaula is referred to as Road A for the Hoʻonani Village land plan.

Both Hansen and Pulehu are posted for a 30 mile per hour speed limit. The south end of Hansen is posted for a 20 mile per hour speed limit approaching Maui Veterans Highway. Pakaula Street is posted 25 miles per hour near its intersection with Hoʻokele Street. All existing intersections along Hansen and Pulehu Roads are unsignalized.

A Traffic Impact Analysis will be completed and submitted with the Draft EIS to update the proposed street sections for the widening of the existing streets, and the extension of Pakaula based on the traffic analysis.

The interior street system is oriented around the "Central Commons" area with Road A to the south and Road B to the north. These streets are connected on the west and east side of the commons with roundabouts. These are proposed to reduce vehicle queueing around the site and to promote a more continuous flow through the development. These streets adjacent to the central commons are proposed with angled street parking to allow visitors to be able to get in and out of parking stalls with relative ease. Additionally, off-street parking spaces are proposed in adjacent parking lots. These streets are proposed with 30 feet of pavement and a standard sidewalk on one side and a 14-foot-wide bicycle & pedestrian path on the other. The multi-use path is to promote bicycle and pedestrian access to the site, while keeping the users safe by separating them from the main flow of traffic. These streets are designed with pull out areas for ride sharing drop-off and pick-up locations to make it easier for the outside community to gain access to the various retail and restaurant uses on site.

The remaining local streets on site have two different proposed sections and streetscapes. Roads C, D and E are in the light industrial area where we would be expecting larger vehicles utilizing the streets and less pedestrian and bicycle traffic. To accommodate these vehicles, the project proposes a 30-foot paved width with 5-foot planter strips and 5-foot sidewalks on either side. The remaining minor local streets in the residential areas are currently proposed with 24 feet of pavement to slow vehicle speeds on these roads. These roads will all have sidewalks on at least one side with a few of the roads having a 14-foot-wide multiuse path to provide additional space for bicycle and pedestrian circulation.

A Traffic Impact Analysis (TIA) for the build-out of the proposed project will be prepared as a part of the environmental review process to assess the potential traffic impacts associated with the proposed development and uses. A copy of the TIA will be included and discussed in the Draft EIS.

2. Water System

The existing site is vacant and does not have any water systems located on site for domestic or agricultural purposes. As the site was once used for agricultural purposes, it is assumed that at one time there was an irrigation system across the site to provide water to the crops on site. This system has since been removed. There are no existing water systems or structures in Pulehu Road or Hansen Road that are adjacent to the site. The nearest existing water system is located in Hoʻokele Street and Pakaula Street to the north. The existing development adjacent to the site to the north uses this system for both domestic and fire uses. The nearest existing fire hydrant is located near the terminus of Pakaula Street. The site does not plan to connect to the existing water system and will not affect the system.

A PEDR for the proposed development has been prepared as part of the EIS process to assess water needs for the proposed development. See Appendix A – Preliminary Engineering and Drainage Report for the complete analysis of the proposed water system.

Due to the lack of existing infrastructure, the development plans on creating a new water source, water storage & pump site, and distribution system will be designed and constructed to provide water for domestic uses, irrigation and fire suppression. The intent of this new system is for the system to be initially owned and maintained privately but will be constructed to Department of Water Supply standards so that in the future there could be an opportunity to turn the system over to the County of Maui.

The water system on site will be constructed with various sizes of ductile iron pipe, and will be located within the streets, parking lots, and open spaces to serve the various uses on site. Separate water services, meters, pressure reducers and backflow preventers etc. will be installed throughout the site to serve the various residential, commercial and industrial buildings, and open space areas. Fire hydrants will be spaced every 250 feet as required by the Department of Water Supply for fire suppression. Additionally, the buildings will have FDC's and other fire suppression measures that will be addressed in the future.

At this time water for irrigation use of the open space areas could come from the new water system, or from reusable R-1 water from the proposed wastewater treatment plant on site. To err on the side of caution, irrigation consumption has been added to the water system calculations below. Irrigation meters and backflow preventers will be installed as necessary to irrigate the open space and landscape amenities on site.

The new system will have an average daily demand of approximately 1,145,744 gallons. Below in Table 4 is the breakdown of the preliminary water system demand calculations.

Table 4: Preliminary Water System Sizing Calculations

Preliminary Water System Sizing Calculations				
Type of Use	Unit	Quantity of unit	Average Daily Demand (gpd)	Max Daily Demand (gpd) (1.5 x ADD)
Multi-family Low-Rise Residential	400 gal/unit	1,599 units	639,600	959,400
Commercial Space	140 gal/1,000 SF bldg. area	165,196 sf	23,127	34,691
Light Industrial Area	140 gal/1,000 SF bldg. area	198,100 sf	27,734	41,601

Park Open Space	1,700 gal/acre	33.13 acres	56,321	84,482
WWTP Site	140 gal/1,000 SF bldg. area	9,000 sf	1,260	1,890
Future Residential Space (County)	400 gal/unit	440 units	176,000	264,000
Future Commercial Space (County)	400 gal/unit	275 units	110,000	165,000
Future Commercial Space (bldg. sq. ft.)	140 gal/1,000 SF bldg. area	53,880 sf	7,543	11,315
Project Total	-	-	1,145,744 (Increased by 10% for unmetered losses)	1,718,616

Alternatives for the proposed water system are limited. There is an existing private water source on the adjacent property just makai of the site that will serve the Maui Business Park development. The issue with this is that the source is at a lower elevation from this development and there would likely not be enough pressure to serve the site at the higher elevations. The other alternative would be connecting to the existing public system and public water source in the nearby area to serve the site. Water availability for domestic use is an ongoing issue for the island of Maui. The proposed development has a very large domestic water demand. A demand of that size would put a massive burden on the existing system. For this reason, the applicant is proposing to create a separate private water source and distribution system to serve the development.

3. Wastewater System

The future lot that is being subdivided for the Ho‘onani Village development does not have any existing wastewater lines or structures on it. According to the County of Maui’s GIS for the Wastewater Infrastructure, the existing lot has some private wastewater lines and structures on the western side towards the existing Sugar Museum. Additionally, private wastewater lines are located in Ho‘okele Street and Pakaula street to serve the existing users just makai of the project site. The private system in these streets connects to the public system owned and operated by the County of Maui that flows to the Wailuku/Kahului Wastewater refuse facility. The proposed development will not connect to an existing private or public wastewater system. These existing systems will not be affected by the development.

The applicant plans to install a private wastewater system on-site to serve the development. This system will likely be privately owned and maintained for its entire lifespan.

The proposed system will consist of a network of gravity sanitary sewer main lines directing wastewater to a pump station at the site's lower end. Each building will connect to this gravity system through individual sanitary service laterals. The pump station will then transfer the wastewater via a pressure line system to a proposed wastewater treatment plant situated on the western end of the project site. The treatment plant is designed to process wastewater and produce R-1 reusable water for irrigation purposes across as much of the site as possible. The R-1 water will be distributed through a non-potable purple pipe system or an equivalent approved system. Various routes and alignments are possible for the proposed pipe network to optimize efficiency, and the location of the proposed mains may change. The slopes, sizes of the main lines, and the proposed structures will be designed in accordance with the requirements of the County of Maui Wastewater Reclamation Division. See Appendix A – Preliminary Engineering and Drainage Report for the complete analysis of the proposed wastewater system.

The wastewater daily flow volume from the project was designed per the estimated rates by various uses from the County of Maui Wastewater Reclamation Division. The project will have an average daily flow of approximately 1,021,943 gallons per day. The wastewater treatment plant was sized to add an additional 25% for a factor of safety and will be approximately 1.3 million gallons in size. While the storage and treatment portions of the system are sized with the average daily flow, the size of the wastewater main lines is sized using the peak flow. The mains on site will be sized to flow at less than 50% full for the peak flow rate of the contributing wastewater basin. Below in Table 5 is the breakdown of the preliminary wastewater system flow volume calculations.

As the project moves forward, the location of the wastewater treatment plant is subject to change, which could include locating the plant on an adjacent TMK. Additionally, at this time no off-site wastewater is expected to be conveyed to the WWTP, but there is a possibility that the plant could serve adjacent parcels. The final WWTP design will include all proposed wastewater sources in the final sizing calculations.

Table 5: Preliminary Wastewater System Sizing Calculations

Preliminary Wastewater System Sizing Calculations				
Type of Use	Unit	Quantity of unit	Average Daily Flow (gpd)	Average Flow Rate (cfs)
Residential multi-family low-rise	255 gal/unit	1,599 units	407,745	0.631
Commercial Restaurant	60% useable space, 1 seat per 20 SF useable space, 80 gal. per seat	56, 100 sf = 1,683 seats	134,640	0.208
Commercial Retail	1 employee per 350 SF bldg. area, 15 gal per employee	56, 100 sf = 160 employees	2,400	0.004
Commercial Office	1 employee per 200 SF bldg. area, 20 gal per employee	100,000 sf = 500 employees	10,000	0.015
Light Industrial	1 employee per 500 SF bldg. area, 25 gal per employee	198,100 sf = 396 employees	9,900	0.015
Future Commercial (On-site) (Restaurant)	60% useable space, 1 seat per 20 SF useable space, 80 gal. per seat	26,940 SF = 808 seats	64,640	0.100
Future Commercial (On-site) (Retail)	1 employee per 350 SF bldg. area, 15 gal per employee	26,940 SF = 77 employees	1,155	0.002
Future Residential (County Site)	255 gal/unit	440	112,200	0.174
Future Commercial (County Site) (Modeled as Residential)	300 gal/unit	275	82,500	0.128
Dry Weather Infiltration/Inflow	5 gal/capita/day	9940	49,700	0.077
Wet Weather Infiltration/Inflow	1,250 gal/acre/day	117.65 acres	147,063	0.228
Project Total Wastewater Flow	-	-	1,021,943	1.581
Min. WWTP Volume	(Additional 25% factor of Safety)	-	1,277,428	1.977
Project Peak Wastewater Flow	(2.0 Peaking factor multiplied to Project Total Wastewater Flow)	-	2,043,885	3.163

Due to the substantial wastewater flow generated by the development, connecting to the adjacent sanitary system is not feasible. The current system was not designed to handle the additional wastewater flow from the site and would require significant and impractical upgrades.

Another option is to connect to the new wastewater treatment plant (WWTP) planned for Central Maui. However, there are several reasons why this is impractical. The Central Maui WWTP is over 3.5 miles southwest of the proposed development, necessitating a very long pipeline. Additionally, the project's timing and the availability of sewer service are problematic; the Central Maui WWTP would need to be operational before the first phase of Hoʻonani Village is completed to serve the site. These factors make this alternative unsuitable.

The current plan allows the applicant to control the timing of the wastewater system, ensuring service availability as the site is developed. Furthermore, the plan includes providing R-1 water from the WWTP for irrigation of open spaces and landscape features, promoting a green site design. Since the WWTP will be located on-site, there will be no need for an extensive pipeline to convey sewage from the pump station to the WWTP. For disposing of R-1 water, four alternatives are considered: on-site irrigation, off-site irrigation by supplying water to Maui Business Park to replace their current irrigation supply, off-site irrigation by providing water to Mahi Pono for their crops or using an injection well/soil aquifer treatment system. The final use of R-1 water will be determined later in the design process.

4. Drainage System

The site including lots E1 and E4 is 189.511 acres in size with the existing runoff on site flowing down the slopes of Haleakalā from the south to the north. Per the County of Maui's Title MC-15, Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui, the site will be analyzed using the 100-year, 24-hour storm event. According to 15-04-05 (d), the Natural Resources Conservation Service (NRCS) hydrography method will be utilized to quantify the flow rates and flow volume for the site. From the NOAA Rainfall Data for the site, an approximate depth of 9.17 inches was used for this storm event. The complete analysis of the existing drainage conditions can be found in the PEDR in Appendix 'A'.

The project site was broken up into 8 existing drainage basins. Table 6 below shows the pre-developed drainage basin analysis for the on-site basins. The existing site has a pre-developed flow of about 261 cfs.

Table 6: Pre-Developed On-Site Basin Analysis

Pre-Developed On-Site Basin Analysis				
Pre-Developed Basin #	Basin Area (AC)	Pre-Developed Flow Rate (cfs.)	Pre-Developed Volume (Ac-ft.)	Type of Flow
1	49.060	61.26	16.291	Channel flow from irrigation ditch to Pulehu Rd.
2	37.666	52.23	12.509	Channel flow from irrigation ditch to Pulehu Rd.
3	5.767	10.74	1.916	Shallow concentrated flow along existing farm road
4	60.369	82.40	20.844	Shallow concentrated flow along existing farm road
5	21.335	31.78	7.083	Sheet flow from south to north
6	12.618	18.80	4.191	Sheet flow from south to north
7	0.663	1.24	0.219	Sheet flow from south to north
8	2.044	2.55	0.677	Channel flow in existing drainage ditch
TOTAL	189.511	261.00	63.73	

The overall runoff in the area has been analyzed multiple times since 2010 for the various phases of the Maui Business Park. These past projects created multiple regional stormwater detention basins to manage the runoff. Downstream of Hoʻokele Street is a regional pond noted as Basin A, and to the west of the project site on future lot E3 is another regional basin noted as Basin B-1. These two large ponds are currently constructed and stabilized. Maui Business Park Phase 2 is located adjacent to the project site to the north. This development proposes to install two detention basins on the Hoʻonani Village site to manage the runoff from the upstream basins, which includes the project site. These basins are noted as Basin B2A and B2B. These basins have not been constructed but are in the design process with the County of Maui.

For the Hoʻonani Village project, there are 3 upstream basins that would flow to existing basins B1, B2A and B2B, and they are noted as O1-O3. Upstream basins O1 and O2 are designed to flow to basins B2A and B2B with an approximate flow of 164.67 cfs. Upstream Basin O3 flows to detention basin B1 with a flow rate of about 243.67 cfs. See Table 7 below for the breakdown of the upstream basin.

Table 7: Pre-Developed Upstream Basin Analysis

Pre-Developed Upstream Basin Analysis				
Upstream Basin	Basin Area (AC)	Pre-Developed Flow Rate (cfs.)	Pre-Developed Volume (ac-ft)	Type of Flow
O1	141.42	153.38	41.100	Sheet flow to Hansen Road
O2	6.65	11.29	2.280	Sheet flow to Pulehu Roadside ditch to be discharged by pipe in existing basin B2B.
O3	140.68	243.67	67.23	Channel flow to existing detention basin, B1.
TOTAL	288.75	408.34	110.61	

The existing detention basin B1, and the currently designed basins B2A and B2B are adequately designed to manage the current flows that are upstream of them. Existing basin B1 has an approximate available storage volume of 87.6 acre-ft, and Basins B2A and B2B have a combined available storage volume of 100.20 acre-ft. See Table 8 below for the breakdown of the existing and designed detention basins.

Table 8: Pre-Developed Existing & Designed Detention Basins Analysis

Pre-Developed Existing & Designed Detention Basins Analysis				
Basin Label	Available Storage (Ac-ft.)	Pre-Developed Flow Rate (cfs.)	Pre-Developed Volume (Ac-ft)	Available Volume (Ac-ft)
Basin B2A & B2B	100.20	425.67	107.11	2.03
Basin B1	87.60	243.67	67.23	20.37
TOTAL	196.74	669.34	174.34	

In the Developed condition, the Hoʻonani Village site plan is divided into 37 basins including a basin for the County owned parcel. The basins were all analyzed individually utilizing their approximate impervious areas and time of concentration to calculate the associated flow rate. The site has an approximate total flow rate of 1022.19 cfs and an associated flow volume of 111 acre-ft. See Table 9 below for the breakdown of the developed basins.

Table 9: Developed Basins Analysis

Developed Basin Analysis					
Basin #	Basin Area (AC)	Composite Runoff Curve	Approx. Dev. T.O.C. (min.)	Developed Flow Rate (cfs.)	Developed Volume (Ac-ft.)
P1	3.44	90.6	8.22	20.95	2.236
P2	2.14	90.6	17.78	10.22	1.395
P3	8.63	92.45	7.44	53.85	5.669
P4	1.52	90.6	12.39	8.31	0.989
P5	7.38	92.45	8.37	45.14	4.85
P6	0.76	90.6	8.10	4.64	0.494
P7	8.40	92.45	8.77	50.89	5.52
P8	0.82	90.60	9.44	4.85	0.533
P9	9.62	83.20	10.00	50.68	5.623
P10	0.55	90.60	7.94	3.37	0.358
P11	9.39	83.20	8.42	51.57	5.487
P12	0.82	90.60	9.31	4.86	0.533
P13	13.22	83.20	9.61	70.40	7.726
P14	0.82	90.60	9.17	4.87	0.533
P15	11.31	83.20	10.10	59.59	6.61
P16	0.68	90.60	8.33	4.13	0.442
P17	3.81	75.80	6.67	19.16	1.973
P18	1.19	90.60	6.81	7.47	0.773

P19	4.59	90.60	9.72	26.94	2.985
P20	3.07	90.60	12.22	16.87	1.998
P21	1.71	90.60	9.86	9.98	1.112
P22	21.21	79.50	9.22	108.62	11.806
P23	4.04	90.60	7.50	24.93	2.626
P24	3.11	64.70	7.22	11.77	1.259
P25	5.21	83.20	6.11	30.15	3.043
P26	0.59	90.60	7.92	3.62	0.384
P27	2.15	83.20	6.56	12.29	1.256
P28	0.97	90.60	8.83	5.82	0.631
P29	10.12	83.20	8.67	55.17	5.914
P30	2.79	90.60	10.00	16.25	1.815
P31	0.60	90.60	8.67	3.61	0.39
P32	6.96	83.20	7.56	38.95	4.066
P33	1.14	90.60	10.33	6.58	0.742
P34	6.76	83.20	9.44	36.19	3.951
P35	21.29	74.00	10.21	84.12	10.602
P36	5.11	64.70	5.00	20.33	2.069
P37	7.17	61.00	5.00	25.05	2.605
TOTAL	193.09	-	-	1022.19	111.00

The flows from various portions of the site and the upstream basins will be conveyed to detention basins B1, B2A and B2B to be detained and infiltrated into the existing soil. These basins will be redesigned to manage the additional runoff that is being proposed to be conveyed to them. Basin B1 is proposed to have an additional 7 feet dug out of the bottom to increase the volume from 87.6 acre-feet to 119.54 acre-feet. Basins B2A and B2B are proposed to have the bottom of the pond lowered by 4 feet to increase their combined volume from 100.20 acre-feet to 116.62 acre-feet.

All of these basins are designed with emergency overflow outlets to release runoff in a safe manner to prevent any harm from downstream structures.

Percolation tests were completed by Hawaii Geotechnical to test the ability of the existing soil to accept runoff. These rates were utilized in HydroCAD software to analyze the Developed Conditions for the detention basins. The basins were designed using the NRCS hydrograph method for the 100-year 24-hr storm event. See Tables 10 and 11 for the Developed Condition of the detention basins. See Appendix A for the complete HydroCAD analysis and sizing for the Detention ponds. These ponds will be designed to meet the County of Maui’s Rules for the Design of Storm Drainage Facilities, and the Rules for the Design of Storm Water Treatment Best Management Practices.

Table 10: Developed Condition: Detention Basin B1

Developed Condition: Detention Basin B1	
Detention Basin Bottom Elev. (ft.)	30.0 ft.
100-year, 24- hr. storm Elev. (ft.)	38.92 ft.
Top of Pond Elev. (ft.)	45.0 ft.
Amount of Freeboard (ft.)	6.0 ft.
Total Available Volume (Ac.-ft.)	119.543 ac.-ft.
Total Flow Volume (Ac.-ft.)	122.521 ac.-ft.
Total Storage Volume (Ac.-ft.)	66.616 ac.-ft.

Table 11: Developed Condition: Detention Basins B2A and B2B

Developed Condition: Detention Basins B2A & B2B	
Detention Basin Bottom Elev. (ft.)	28.0 ft.
100-year, 24- hr. storm Elev. (ft.)	38.47 ft.
Top of Pond Elev. (ft.)	46.0 ft.
Amount of Freeboard (ft.)	7.53 ft.
Total Available Volume (Ac.-ft.)	116.623 ac.-ft.
Total Flow Volume (Ac.-ft.)	101.137 ac.-ft.
Total Storage Volume (Ac.-ft.)	54.950 ac.-ft.

The design of the storm drainage system is one element of the Hoʻonani Village that could change greatly as the project moves forward. Below is a list of potential alternatives that could be used to address water quantity detention and water quality control for the project site and upstream basins. The final storm drainage system might include other alternatives that are not listed, but these are the main alternatives that are being considered.

1) Street-side swales, planters or rain gardens: Open conveyance options along the street frontages to manage runoff from the public and private streets could be incorporated into the design.

2) Sub-surface detention: In the future it could be more feasible to manage some of the drainage basins within the basin itself underground in sub-surface detention measure such as chambers or large perforated pipes.

3) Bio-retention basins, planters or landscaping: Currently the final landscaping vision and design that the project would like to achieve is not finalized. There is potential for runoff from roof drains of the proposed buildings to be directed to bio-retention or flow through BMP for treatment, detention or infiltration.

4) Infiltration structures: Smaller basins could be infiltrated separately into other types of infiltration structures such as dry wells, or open bottom catch basins etc.

5) Other detention basins: The large site provides other areas that could be used for detention/infiltration basins to manage stormwater. Items like internal and external water features and other potential landscape elements could be used to manage stormwater.

5. Electrical, Telephone, and Cable Television/Internet

Electrical power, telephone, and cable television/internet services in the region are provided by Maui Electric Company, Hawaiian Telcom, and Spectrum, respectively. There are existing overhead powerlines and communication lines that run along the western side of Pulehu Road, and the southern side of Hansen Road for the entire length of the project site. The project proposes to connect to the existing power system to serve the site. Telephone and cable television/internet services will be installed, but the Utility Company that will provide the service will be selected at a later time. Outside of these services Natural gas lines may be incorporated into the design.

> The utility infrastructure for the proposed project will be placed underground within the development. To reduce overall energy use, energy conservation and efficiency measures will be incorporated into the project design in line with the County of Maui's efforts to emphasize sustainability and Ordinance 3613 requirements. The applicant plans on potentially utilizing solar and other renewable energy sources to minimize the project's impact on the existing power system.

E. Cumulative and Secondary Impacts

HAR Section 11-200.1-2 defines Cumulative impacts as:

> *[T]he impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.*

A complete analysis and assessment of potential cumulative impacts from the Ho'onani Village project will be included in the Draft EIS. Potential cumulative impacts to existing resources (natural, cultural, agricultural, water etc.) and lands, existing adjacent land uses, existing utility and transportation infrastructure systems and public services will be analyzed for both short term and long term within the reasonably foreseeable future.

HAR Section 11-200.1-2 defines Secondary impacts as:

> *[A]n effect that is caused by the action and is later in time or farther removed in distance, but is still reasonably foreseeable. An indirect effect may include growth-inducing effect and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air, water, and other natural systems, including ecosystems.*

Secondary Impacts are viewed as indirect effects that occur later in time or further in the reasonably foreseeable future because of the project being constructed. They are also referred to as future actions of others because of the presence of the completed project. A completed analysis and assessment of secondary impacts to existing resources, land use plans & districts, utility systems and transportation infrastructure will be included in the Draft EIS.

III. RELATIONSHIP TO GOVERNMENTAL PLANS, POLICIES, AND CONTROLS

As required by HAR Section 11-200.1-24, the Draft EIS will provide a summary of the proposed action's compatibility with existing land use plans and policies. Additionally, the Draft EIS will describe the relationship between the proposed action and the land use, natural, or cultural resource plans, policies, and regulations applicable to the affected area. It will also assess how the proposed action aligns with or potentially conflicts with the objectives and specific terms of approved land use and resource plans, policies, and controls, if any, for the area. A preliminary list of the land use plans and policies anticipated for discussion in the Draft EIS is outlined below, though this list may be updated based on feedback received during the EISPN scoping period.

- State Land Use Law, HRS Chapter 205
- Hawaiʻi State Plan, HRS Chapter 226
- State Functional Plans
- General Plan of Maui including Countywide Policy Plan, Maui Island Plan and 2002 Wailuku-Kahului Community Plan
- Maui County Zoning, Maui County Code, Title 19

IV. ALTERNATIVES TO THE PROPOSED ACTION

As required under HAR Section 11-200.1-24, the Draft EIS will contain a section discussing the alternative of no action as well as reasonable alternatives that could attain the objectives of the Hoʻonani Village Land Plan.

The analysis will rigorously explore and objectively evaluate the environmental impacts of all alternative actions, placing special emphasis on alternatives that could enhance environmental quality or mitigate, reduce, or avoid some or all of the adverse environmental effects, costs, and risks associated with the current proposal for Hoʻonani Village.

The Draft EIS is expected to present a range of alternatives, including the no-action alternative, which entails not developing any components of the project. Other potential alternatives to be considered and detailed in the Draft EIS may involve projects with different densities, land use types (commercial, industrial etc.), and potentially different residential product types as well.

V. SIGNIFICANCE CRITERIA ASSESSMENT

Since Act 172 was enacted in 2012, approving agencies have the authority, based on their judgment and experience, to determine if an Environmental Impact Statement (EIS) is likely required. If the agency concludes that an EIS is necessary, it can permit the applicant to forgo preparing an environmental assessment and instead start with an EIS, beginning with the preparation of an Environmental Impact Statement Preparation Notice (EISPN). See Hawaii Revised Statutes (HRS) Section 343-5(e) and see Hawaiʻi Administrative Rules (HAR) Section 11-200.1-14(d)(2). Determining whether a proposed action might significantly impact the environment involves evaluating the total potential effects on environmental quality according to the significance criteria outlined in HAR Section 11-200.1-13. Typically, if an action could result in one or more of the effects listed under the significance criteria in HAR Section 11-200.1-13(b)(1) – (13), it is likely to have a significant impact on the environment, thus necessitating an Environmental Impact Statement (EIS).

The significance criteria under HAR Section 11-200.1-13(b)(1) – (13) are:

(1) Irrevocably commit a natural, cultural, or historic resource;
(2) Curtail the range of beneficial uses of the environment;
(3) Conflict with the State's environmental policies or long-term environmental goals established by law;
(4) Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State;
(5) Have a substantial adverse effect on public health;
(6) Involve adverse secondary impacts, such as population changes or effects on public facilities;
(7) Involve a substantial degradation of environmental quality;
(8) Be individually limited but cumulatively have substantial adverse effect upon the environment or involves a commitment for larger actions;
(9) Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat;
(10) Have a substantial adverse effect on air or water quality or ambient noise levels;
(11) Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters;
(12) Have a substantial adverse effect on scenic vistas and view planes, during day or night, identified in county or state plans or studies; or
(13) Require substantial energy consumption or emit substantial greenhouse gases.

The Hoʻonani Village land plan includes 166 acres in the Kahului are and would include approximately 1,600 low-rise multi-family residential units, a light industrial park, a commercial office building, active and passive open space areas, and other commercial spaces for restaurant and retail uses. Due to the large size of the project, the proposed change to the UGB, the proposed change in zoning, and the proposed change to the existing conditions of this area, the various potential impacts need to be assessed. Given the established significance criteria, it is anticipated that the proposed action may significantly affect the environment.

A preliminary assessment of the significance criteria in relation to the proposed project is presented below:

1. Irrevocably commit a natural, cultural, or historic resource.

Archaeological documentation and Cultural Impact Assessment reports will be prepared for the project area. Copies of these studies and any necessary mitigation measures will be included and discussed in the Draft EIS.

Consultation with the State Historic Preservation Division (SHPD) and the Office of Hawaiian Affairs (OHA) will ensure that historic, archaeological, and cultural concerns are addressed, and appropriate mitigation measures are identified.

The potential impact of the proposed project on natural and cultural resources, along with any necessary mitigation measures, will be assessed through the preparation of relevant studies, including preliminary engineering and environmental studies, which will be included in the Draft EIS.

2. Curtail the range of beneficial uses of the environment.

Technical studies will be conducted and incorporated into the Draft EIS, aiding the environmental review process. A drainage assessment has been completed to evaluate potential impacts and identify appropriate mitigation measures to preserve the beneficial uses of the environment. The drainage analysis is attached to this EISPN in Appendix A. Additional technical studies will be completed to assess other aspects of the project and will be included in the Draft EIS.

3. Conflict with the State's environmental policies or long-term environmental goals established by law.

HRS Chapter 344 addresses the State's Environmental Policy. An assessment of the project relative to the State's environmental policies and guidelines will be completed after receiving the remaining technical reports. This assessment will be included with the Draft EIS document.

4. Have a substantial adverse effect on the economic welfare, social welfare, or cultural practices of the community and State.

The project will greatly benefit the local economy by creating jobs related to the construction associated with the development, the industrial park, the commercial office spaces, the retail and restaurant spaces. Additionally, the development of affordable and market price residential low-rise rental units will help with the desperate need for rental units, and the economic and social welfare of Maui. The wide variety of proposed uses will provide benefits to multiple areas of the Maui economy. A more detailed analysis of the potential impacts of the project on economic welfare, social welfare, and cultural practices in the community will be presented in the Draft EIS. A Fiscal and Economic Impact Assessment and Cultural Impact Assessment (CIA) will be conducted for the project, with copies included and discussed in the Draft EIS.

5. Have a substantial adverse effect on public health.

Technical studies addressing health-related issues, such as air quality, noise emissions, and water quality will be prepared and discussed in the Draft EIS.

6. Involve adverse secondary impacts, such as population changes or effects on public facilities.

The Preliminary Engineering and Drainage Report is attached in Appendix A. Any additional technical studies addressing public infrastructure and services will be included in the Draft EIS. Coordination will be undertaken during the environmental review process with State and County agencies, as well as with utility service providers, to address services and facilities required for the project.

7. Involve a substantial degradation of environmental quality.

A comprehensive set of technical studies will be conducted in preparation for the Draft EIS to identify potential impacts and suggest suitable mitigation measures to minimize environmental degradation. The PEDR analyzes the potential drainage options to mitigate adverse effects on downstream and neighboring properties. Archaeological, cultural, and biological investigations will ensure that valuable historical, cultural, and biological resources are appropriately managed. Copies of these studies will be included and discussed in the Draft EIS.

8. Be individually limited but cumulatively have substantial adverse effects upon the environment or involves a commitment for larger actions.

The majority of the site is immediately adjacent to the Urban Growth Boundary of the Maui Island Plan, with the southwest corner of the site being inside of the UGB. The adjacent parcels to the north have been developed with various commercial uses and the proposed development would blend into the existing uses around it with the proposed adjustment to the UGB. An analysis of the project's potential cumulative and secondary impacts will be included in the Draft EIS.

9. Have a substantial adverse effect on a rare, threatened, or endangered species, or its habitat.

A Flora/Fauna Survey has been conducted within the project area to assess the existence of rare, threatened, or endangered species or habitats. A copy of the Flora/Fauna Study report is included with this EISPN in Appendix 'C'. A full assessment of the project's effect on rare, threatened, or endangered species or their habitat will be included with the Draft EIS.

10. Have a substantial adverse effect on air or water quality or ambient noise levels.

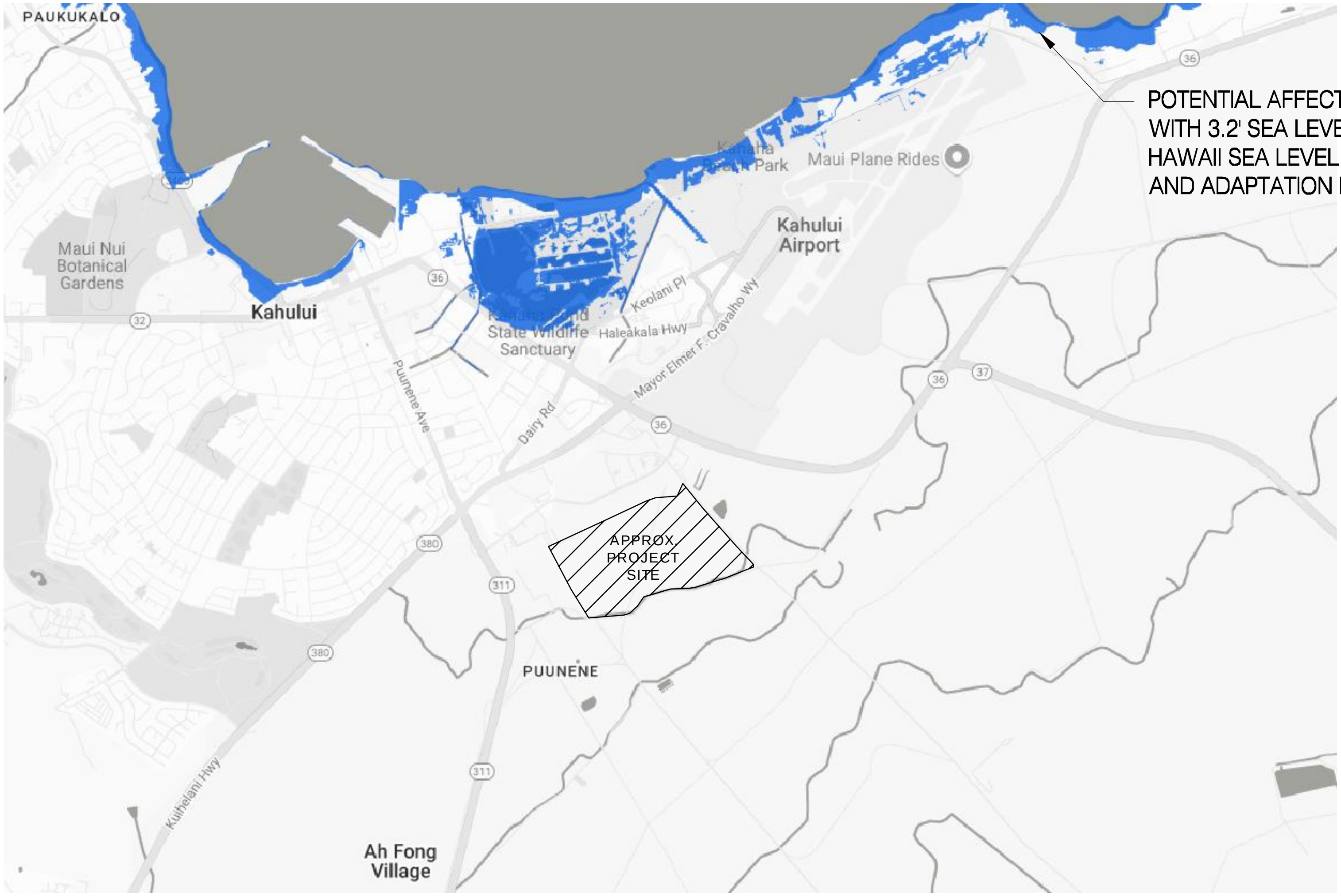
Construction activities may lead to short-term impacts on noise, air, and water quality in the area. To mitigate these effects, appropriate control measures will be implemented, such as maintaining construction equipment, applying dust control methods (e.g., regular watering, sprinkling, and installing dust fences), and implementing erosion control measures during grading and construction. Compliance with State and County regulations, including the Department of Health's HAR, Title 11, Chapter 46, "Community Noise Control," will be ensured. Necessary permits, such as a noise permit and a National Pollutant Discharge Elimination Permit System (NPDES) permit, will be obtained prior to commencing any construction activities. Potential impacts on noise, air, and water quality from the project will be evaluated in technical studies, which will be included and discussed in the Draft EIS.

11. Have a substantial adverse effect on or be likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, sea level rise exposure area, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

Evaluations of environmentally sensitive areas, their impacts, and potential mitigation measures will be conducted and included in the Draft EIS. The project site is located in Flood Hazard Zone X. See Figure 16 – Flood Insurance Rate Map. Additionally, the project site is located in the Extreme Tsunami Zone areas. See Figure 17 – Tsunami Evacuation Zone Map. There are no portions of the project site that are within the projected 3.2-foot sea level rise exposure area. See Figure 18 – Sea Level Rise Map.

FIGURE 18

SEA LEVEL RISE MAP - +3.2 FT.



POTENTIAL AFFECTED AREA
WITH 3.2' SEA LEVEL RISE PER
HAWAII SEA LEVEL RISE
AND ADAPTATION REPORT, 2017.

SOURCE: STATE OF HAWAII SEA LEVEL RISE TOOL, UNIVERSITY OF HAWAII SYSTEM

Project
HOONANI VILLAGE
No.
H109-001

Designed by TCC Date 08/2024
Drawn by TCC Date 08/2024
Horiz. Scale: NTS Vert. Scale: NTS
Type PLANNING

PIONEER DESIGN GROUP – HAWAII LLC
CIVIL ENGINEERING · LAND USE PLANNING
CONSTRUCTION MANAGEMENT
HONOLULU, HAWAII PH: 808.400.5959
WWW.PD-GRP.COM

Sheet
1
of
1

12. Have a substantial adverse effect on scenic vistas and view planes, during day or night, identified in county or state plans or studies.

The potential impact of the proposed project on scenic and open space resources, as well as scenic view corridors, will be thoroughly evaluated and discussed in the Draft EIS.

13. Require substantial energy consumption or emit substantial greenhouse gases.

The project will require fuel for construction equipment, vehicles, and machinery during both construction and maintenance phases. Coordination with Hawaiian Electric Company (HECO) will take place during the preparation of the Draft EIS to ensure proper planning for any potential power supply issues. Sustainability measures aimed at reducing overall energy consumption and greenhouse gas emissions associated with the project will also be discussed in the Draft EIS.

Based on the foregoing and as discussed in Chapter I, the County of Maui Department of Planning has determined that an EIS is warranted for the project pursuant to Chapter 343, HRS, and HAR Section 11-200.1-14(d)(2).

VI. LIST OF PERMITS AND APPROVALS

The following is a preliminary list the permits and approvals that are anticipated to be required for implementation of the proposed project:

Federal:

None anticipated at this time.

State of Hawaiʻi:

1. Chapter 343, Hawai'i Revised Statutes (HRS), Environmental Impact Statement
2. Chapter 6E, HRS, Historic Preservation Compliance
3. State Land Use Commission District Boundary Amendment
4. National Pollutant Discharge Elimination System (NPDES) Permit
5. Noise Permit, as applicable
6. Section 401 Water Quality Certification, as applicable (if DA permit required)
7. Well Permit for off-site water source
8. Wastewater Permit with the Department of Health for the WWTP.

County of Maui:

1. Subdivision Approval (large lot subdivision)
2. District Boundary Amendment
3. Community Plan Amendment
4. County Initiated Zoning Change
5. Building Permits
6. Other Construction Permits (i.e., grading, electrical, plumbing)
7. Potential future subdivision Approval

VII. EIS PUBLIC SCOPING MEETING

A public scoping meeting for the project, as required by Chapter 11-200.1-23, Hawaiʻi Administrative Rules will be held on Thursday, March 27, 2025, at 6:00 p.m. at the meeting room at Above the Wave located at 400 Hana Hwy., Suite B1, Kahului, HI 96732. Invitees will be able to attend the meeting virtually should they not be able to attend in person. Comments from all attendees and interested parties will be sent to the applicant following the 30 day comment period.

VIII. EIS CONSULTATION

A. PARTIES TO BE CONSULTED DURING THE PREPARATION OF THE DRAFT EIS

A copy of this EISPN will be sent to the required reviewing agencies, organizations, and individuals for review. Agency, organization, and individual comments received, and responses to substantive comments will be included in the DEIS.

FEDERAL AGENCIES

1. National Marine Fisheries Service Pacific Islands Regional Office Department of Commerce 1845 Wasp Blvd., Building 176 Honolulu HI 96818	2. Linda Speerstra, Chief U.S. Department of the Army, Regulatory Branch U.S. Army Engineer District, Honolulu CEPOH-RO@usace.army.mil
3. Gerald Gregory District Conservationist Natural Resources Conservation Service U.S. Department of Agriculture 77 Hoʻokele Street, Suite 202 Kahului, HI 96732	4. Chelsie Javar-Salas, Acting Island Team Leader U.S. Fish and Wildlife Service 300 Ala Moana Blvd., Rm. 3-122 Honolulu HI 96850
5. Kay Zukeran NOAA Inouye Regional Center NMFS/PIRO 1845 Wasp Blvd., Building 176 Honolulu HI 96818	6. Ryan Okahara Field Office Director U. S. Department of Housing and Urban Development 1132 Bishop Street, Suite 1400 Honolulu HI 96813-4918
7. U.S. Environmental Protection Agency Region IX Pacific Islands Office P.O. Box 50003 Honolulu HI 96850	

STATE AGENCIES

8. Heidi Meeker State of Hawai'i Department of Education Office of Business Services 3633 Waialae Avenue, Room C-209 Honolulu HI 96816	9. Laura McIntyre, AICP State of Hawaiʻi Department of Health Environmental Planning Office P.O. Box 3378 Honolulu HI 96801-3378

10. Keith Regan, Comptroller
State of Hawaiʻi
Department of Accounting and General Services
1151 Punchbowl Street, #426
Honolulu HI 96813

11. Patti Kitkowski State of Hawaiʻi
Department of Health
Maui Sanitation Branch
54 South High Street, Room 300
Wailuku HI 96793

12. Sharon Hurd, Chair
State of Hawaiʻi
Department of Agriculture
1428 South King Street
Honolulu HI 96814-2512

13. Dawn Chang, Chairperson
State of Hawaiʻi
Department of Land and Natural Resources
P. O. Box 621
Honolulu HI 96809

14. Major General Kenneth Hara
Adjutant General
State of Hawaiʻi
Department of Defense
3949 Diamond Head Road
Honolulu HI 96816

15. Ed Sniffen, Director State of Hawaiʻi
Department of Transportation
869 Punchbowl Street
Honolulu HI 96813

16. Keith Hayashi, Superintendent
State of Hawaiʻi
Department of Education
P.O. Box 2360
Honolulu HI 96804

17. Denise Iseri-Matsubara, Executive Director
State of Hawaiʻi
Hawaiʻi Housing Finance and Development Corporation
677 Queen Street
Honolulu HI 96813

18. Kali Watson, Chairman
State of Hawaiʻi
Department of Hawaiian Homelands
P.O. Box 1879
Honolulu HI 96805

19. Sylvia Hussey, Chief Executive Officer
State of Hawai'i
Office of Hawaiian Affairs
560 N. Nimitz Highway, Suite 200
Honolulu HI 96817

20. Alec Wong, P.E., Chief State of Hawaiʻi
Department of Health
Clean Water Branch
Hale Ola, Room 225
2827 Waimano Home Road
Pearl City HI 96782

21. Scott Glenn, Director
State of Hawaiʻi
Office of Planning and Sustainable Development
P. O. Box 2359
Honolulu HI 96804

22. State of Hawaiʻi
Department of Health
Environmental Health Administration
P.O. Box 3378
Honolulu HI 96801

23. Dan Orodenker, Executive Officer
State of Hawaiʻi
State Land Use Commission
P.O. Box 2359
Honolulu HI 96804

COUNTY AGENCIES

24. Shayne Agawa, Director County of Maui Department of Environmental Management 2050 Main Street, Suite 2B Wailuku HI 96793	25. Richard Bissen, Mayor County of Maui Office of the Mayor 200 South High Street Wailuku HI 96793
26. Brad Ventura, Chief County of Maui Department of Fire and Public Safety 200 Dairy Road Kahului HI 96732	27. John Pelletier, Chief County of Maui Police Department 55 Mahalani Street Wailuku HI 96793
28. Lori Tsuhako, Director County of Maui Department of Housing and Human Concerns 2200 Main Street, Suite 546 Wailuku HI 96793	29. Yuki Lei Sugimura Maui County Council 200 South High Street Wailuku HI 96793
30. Patrick McCall, Director County of Maui Department of Parks and Recreation 700 Halia Nakoa Street, Unit 2F Wailuku HI 96793	31. Keani Rawlins-Fernandez Council Vice Chair Maui County Council 200 South High Street Wailuku HI 96793
32. Kate Blystone, Director County of Maui Department of Planning 2200 Main Street, Suite 315 Wailuku HI 96793	33. Tasha Kama Council Chair Maui County Council 200 South High Street Wailuku HI 96793
34. Jordan Molina, Director County of Maui Department of Public Works 200 South High Street Wailuku HI 96793	35. Gabe Johnson Maui County Council 200 South High Street Wailuku HI 96793
36. Marc Takamori, Director County of Maui Department of Transportation David Trask Building, Suite 102 2145 Kaohu Street Wailuku HI 96793	37. Alice Lee Maui County Council 200 South High Street Wailuku HI 96793
38. John Stufflebean, Director County of Maui Department of Water Supply 200 South High Street, 5th Floor Wailuku HI 96793	39. Tom Cook Maui County Council 200 South High Street Wailuku HI 96793

40. Amos Lonokailua-Hewett, Emergency
Management Officer
County of Maui
Emergency Management Agency
200 South High Street
Wailuku HI 96793

41. Nohelani U‘u-Hodgkins
Maui County Council
200 South High Street
Wailuku HI 96793

42. County of Maui
Maui County Cultural Resources
Commission
2200 Main Street, Room 315
Wailuku HI 96793

43. Tamara Paltin
Maui County Council
200 South High Street
Wailuku HI 96793

44. Luana Mahi, Director
County of Maui
Office of Economic Development
2200 Main Street, Suite 305
Wailuku HI 96793

45. Shane Sinenci
Maui County Council
200 South High Street
Wailuku HI 96793

OTHER ORGANIZATIONS, ADJACENT OWNERS (500’ RADIUS), OTHER INDIVIDUALS

46. ‘Aha Moku O Maui Inc.

47. ‘Aha Moku Honua‘ula Moku

48. Hawaiian Telecom
60 South Church Street
Wailuku HI 96793

49. Hookele DEF Condo - Condo Master
Alexander & Baldwin LLC
822 Bishop St
Honolulu, HI 96813

50. Michael Grider, Manager, Engineering
Hawaiian Electric
P.O. Box 398
Kahului HI 9673

51. Lowe's Home Centers LLC
Attn: Legal Dept-Real Estate
1000 Lowe's Blvd
Mooresville, NC 28117

52. Maui Hotel & Lodging Association
85 North Church Street
Wailuku HI 96793

53. Maui Economic Opportunity Inc
99 Mahalani St
Wailuku, HI 96793

54. Spectrum
158 Ma‘a Street
Kahului HI 96732

55. Maui Electric Company Ltd
PO Box 398
Kahului, HI 96733

56. State of Hawaii Department of Education
Hawai‘i State Library
Hawai‘i Documents Center
478 S. King Street
Honolulu, HI 96813

57. McGerrow Condominium - Condo Master
Alexander & Baldwin LLC
11 S Puunene Ave
Kahului, HI 96732

58. AB Maui Quarries LLC
Attn: Nan, Inc
636 Laumaka St

59. MP Central B LLC
Attn: Carlsmith Ball LLP - One Main
2200 Main St Ste 400

Honolulu, HI 96819

Wailuku, HI 96793

60. ABP Puunene LLC
822 Bishop St
Honolulu, HI 96813

61. MP CPR LLC
PO Box 1104
Puunene, HI 96784

62. Alexander & Baldwin LLC
11 S Puunene Ave
Kahului, HI 96732

63. MP West LLC
PO Box 565
Puunene, HI 96784

64. Alexander & Baldwin LLC
822 Bishop St
Honolulu, HI 96813

65. Puunene Industrial Park LLC
636 Laumaka St
Honolulu, HI 96819

66. Aloha Pacific Federal Credit Union
832 S Hotel St
Honolulu, HI 96813

67. Puunene Mill Condominium - Condo
Alexander & Baldwin LLC
11 S Puunene Ave
Kahului, HI 96732

68. AX Holdings LLC
PO Box 330449
Kahului, HI 96733

69. Puunene Shopping Center - Condo
Property Development Center LLC
5918 Stoneridge Mall Rd
Pleasanton, CA 94588

70. Chick-Fil-A Inc
Attn: Legal Dept - Real Estate
5200 Buffington Rd
Atlanta, GA 30349

71. Safeway Inc
Attn: Paradigm Tax Group
PO Box 800729
Dallas, TX 75380

72. County of Maui
200 S High St
Wailuku, HI 96793

73. Target Corporation
Property Tax Dept T-2660
PO Box 9456
Minneapolis, MN 55440

74. Hansen Road Condominium - Condo
C/O Alexander & Baldwin LLC
PO Box 156
Kahului, HI 96733

75. TJ Gomes Trucking Co Inc
500 Waiale Rd Ste B
Wailuku, HI 96793

76. Hawaii State Federal Credit Union
333 Queen St
Honolulu, HI 96813

77. HC&D Condominium - Condo Master
Alexander & Baldwin LLC
PO Box 156
Kahului, HI 96733

78. HC&D LLC
2344 Pahounui Dr
Honolulu, HI 96819

IX. REFERENCES

1. County of Maui, Department of Planning, County of Maui 2030 General Plan Countywide Policy Plan, March 2010.

2. County of Maui, Maui Island Plan, December 28, 2012.

3. County of Maui, Department of Planning, Wailuku and Kahului Community Plan, 2002.

4. County of Maui, Department of Planning, Wailuku and Kahului Community Plan, 1992.

5. County of Maui. (n.d.). *Code of Ordinances*.

6. State of Hawai‘i, Chapter 226, Hawai’i State Plan, Hawai’i Revised Statutes.

7. State of Hawaii. (n.d.). *HiStateGIS: Land Survey Bureau*.

8. Hawaii State Department of Education. (n.d.). *School Reports*.

9. U.S. Department of Agriculture, Natural Resources Conservation Service. (n.d.). *Web Soil Survey*.

10. Pacific Islands Ocean Observing System (PacIOOS). (n.d.). *Sea Level Rise in Hawaii*.

11. Hawaii State Department of Human Services. (n.d.). *Family Health Assessment Tool (FHAT)*

12. State of Hawaii. (n.d.). *HiStateGIS: Agricultural Lands of Importance to the State of Hawaii (ALISH)*.
13. State of Hawaii. (n.d.). *HiStateGIS: Wetlands*.

14. State of Hawaii, Land Use Commission. (n.d.). *State of Hawaii Land Use District Boundaries Map*.

15. State of Hawaii. (n.d.). *HiStateGIS: Streams*.

16. European Commission, Joint Research Centre. (n.d.). *United States Soil Map*.

17. National Oceanic and Atmospheric Administration (NOAA). (n.d.). *Tsunami Coastal Portal*.

APPENDIX 'A' – PRELIMINARY ENGINEERING AND DRAINAGE REPORT

PIONEER DESIGN GROUP-HAWAIʻI

PIONEER DESIGN GROUP-HAWAI'I

EXPERIENCED • INNOVATIVE • COMMITTED

Preliminary Engineering Report
Hoʻonani Village

Kahului, Maui, Hawaii

Applicant:
Hoʻonani Development LLC
21 Hansen Rd
Kahului, Hawaii 96732

TYLER C G K CAMPBELL
No. 18481-C

Civil Engineer:
Pioneer Design Group – Hawaii LLC.
711 Kapiolani Blvd. Suite 1450
Honolulu, Hawaii 96813
808.400.5959

Date: October 31, 2024
Prepared by: T.C. Campbell, P.E.
PDG-HI Job No. H109-001

TABLE OF CONTENTS

TECHNICAL APPENDICES

1.0 INTRODUCTION

The purpose of this Preliminary Engineering Report is to provide an overview of the existing conditions and propose preliminary design options for the site drainage, water system and wastewater systems for the Hoʻonani Village project. This study determines the anticipated water demand and wastewater flows and presents proposed water system and wastewater system designs. In addition, this report analyzes the existing drainage patterns at the project site and provides a concept drainage design for the proposed project that will meet the "Rules for the Design of Storm Drainage Facilities in the County of Maui".

2.0 SITE DESCRIPTION AND LOCATION

The proposed development includes the construction of multi-family residential low-rise buildings, commercial office buildings, light industrial buildings, a central plaza for shopping and walking, outdoor open spaces, an amphitheater, parking facilities, and landscape design. The project site is made up of tax map key (2) 3-8-006:004 within the County of Maui. The site will be called the Hoʻonani Village and is currently addressed as 21 Hansen Rd, Kahului HI 96732. It is located adjacent to Lowe's and Target and is also near the Alexander and Baldwin Sugar Museum in Puʻunene. The site is bordered by Hansen Road to the south, Puʻunene Avenue to the west, Hoʻokele Street to the north, and Pulehu Road to the east. The existing site is 237 acres in size and is zoned Agricultural AG-1 by the County of Maui. The site is surrounded by other agricultural properties to the east and south and commercial properties to the north.

The TMK is currently in the subdivision process with the County of Maui and is being subdivided into five new lots. The name of the subdivision plat is the First Assembly of God Subdivision. The proposed development will be located on Lot 2-C-4-C-1-E-1 on the attached Preliminary Plat that is under review. A portion of the street improvements will be located on Lot 2-C-4-C-1-E-4 to connect the development to the terminus of the existing street Pakaula Street. This lot will be owned by the County of Maui. A portion of the drainage improvements are proposed on Lot 2-C-4-C-1-E-3. This lot contains an existing detention basin referenced as B-1.

Additionally, the site is currently zoned as AG-1, but the applicant is actively working with the County of Maui to move forward with a County Initiated Zone Change to change the zoning of the site to M-1 Light Industrial. The proposed project will only be completed following the zone change when the proposed uses are allowed in the zoning category.

3.0 EXISTING SITE CONDITIONS

The project site has been used for agricultural uses for many years. The Puʻunene area has a rich history deeply intertwined with the sugar industry. The property was once part of the Hawaiian Commercial & Sugar Company's (HC&S) sprawling sugar plantation, which operated for over a century until its closure in 2016. The Puʻunene Sugar Mill, built in 1901, is located adjacent to the project site to the southwest. After the mill's closure, the land transitioned to new agricultural ventures, including a 40-acre potato field planted by Mahi Pono in 2019, aiming to boost local food production. The project site is currently vacant with no existing structures. A few existing gravel and asphalt farming roads exist on site. Existing culverts span these roads to allow the irrigation ditches to convey water across the site. There are no existing wastewater lines or water mains on site for domestic or agricultural purposes. There are existing overhead power lines on site that are used to provide power to users on both the mauka and makai sides of the site. Existing powerline easements exist on site that will be vacated and relocated to continue to serve all users in the area.

3.1 Site Topography

The project site is located on the gradual slopes of Haleakalā. The existing topography on site slopes from the southeast to the northwest. Grades on site are gentle, generally ranging from 1-2% with areas of occasionally steeper slopes. The site has a relative high point at approximately 78 feet at the southeastern corner of the site, and a relative low point along the north property line with an elevation of approximately 33 feet.

3.2 Soil Type

The predominant soils found throughout the site are Ewa Silty Clay Loam (99.5% of the site), which has a corresponding hydrologic soil group (HSG) B designation, as shown on the attached Natural Resources Conservation Service (NRCS) soil survey. Soils classified as Group B have moderate infiltration rates when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission. A very small portion of the site has Molokai Silty Clay Loam, which has a corresponding hydrologic soil group (HSG) C designation.

A geotechnical investigation was completed on site by Hawaii Geotechnical Consulting to investigate the existing soil conditions. For more information, see geotechnical report dated August 11, 2024, that will be submitted separately from this report. Two percolation tests were conducted on site to determine the existing soil's ability to percolate runoff. On the east side of the site, the test resulted in 11.41 minutes per inch of water drop, which is approximately 5.25 inches per hour. On the west side of the site, the test resulted in 5.93 minutes per inch of water drop, which is approximately 10.1 inches per hour.

3.3 Flood and Tsunami Zone

The project site lies in FEMA Zone X and does not contain any FEMA designated Special Flood Hazard Areas (SFHAs). The Flood Zone Mapp is attached in Appendix A and was generated using the State of Hawaii, DLNR, Flood Hazard Assessment Tool. This zone designates the site as an area outside the 0.2% annual change floodplain. The site is located within the Extreme Tsunami evacuation zone.

4.0 EXISTING DRAINAGE CONDITIONS

The project site is 189.511 acres in size with the existing runoff on site flowing down the slopes of Haleakalā from the south to the north. Per the County of Maui's Title MC-15, Chapter 4, Rules for the Design of Storm Drainage Facilities in the County of Maui, the site will be analyzed using the 100-year, 24-hour storm event. According to 15-04-05 (d), the Natural Resources Conservation Service (NRCS) hydrography method will be utilized to quantify the flow rates and flow volume for the site. From the NOAA Rainfall Data for the site, an approximate depth of 9.17 inches was used for this storm event. Hydrocad software was used to model the hydrographs for the various existing basins and to quantify the flow rates and volumes. The complete analysis of the existing drainage conditions can be found in Appendix 'B'.

The project site has divided into eight (8) existing drainage basins notated as E1-E8. Each of these basins corresponds with the existing discharge points. See the Discharge Analysis below for additional details. The attached Pre-Developed Basin Map shows the boundaries, sizes, and flow paths for the existing basins on site. Additionally, there are three upstream basins that currently flow towards the site contributing to the existing drainage flows and volumes. These basins are notated as O1-O3. The attached Upstream Basin Map shows the boundaries, sizes, and flow paths for these basins.

A runoff curve number of 58 corresponding to a ground cover type Meadows for B soils was used in the SCS TR-20 Method. As the percentage of C soil was insignificant, the runoff curve number for C soil was not utilized for the existing ground coverage of the site. The flow paths for all the existing basins can be found on the Pre-Developed Basin map. The time of concentration for each basin was calculated utilizing Plate 1 for Overland flow from the Rules for the Design of Storm Drainage facilities. The Plate 1 diagrams for all existing basins are attached to this report for more details.

Utilizing sizes, cover type, and time of concentrations for each basin, a pre-developed flow rate was calculated in Hydrocad for the 100-year, 24-hr storm event. The basins on site, E1-E8, have a cumulative pre-developed flow rate of 261 cfs and a flow volume of 63.73 acre-feet. Below is table 4-1 for the breakdown of the flows to the various discharge points on site.

Table 4-1: Pre-Developed On-Site Discharge Point Analysis				
Discharge Point #	Basin Area (AC)	Pre-Developed Flow Rate (cfs.)	Pre-Developed Volume (Ac-ft.)	Type of Flow
1	49.060	61.26	16.291	Channel flow from irrigation ditch to Pulehu Rd.
2	37.666	52.23	12.509	Channel flow from irrigation ditch to Pulehu Rd.
3	5.767	10.74	1.916	Shallow concentrated flow along existing farm road
4	60.369	82.40	20.844	Shallow concentrated flow along existing farm road
5	21.335	31.78	7.083	Sheet flow from south to north
6	12.618	18.80	4.191	Sheet flow from south to north
7	0.663	1.24	0.219	Sheet flow from south to north
8	2.044	2.55	0.677	Channel flow in existing drainage ditch
TOTAL	189.511	261.00	63.73	

The three upstream basins have a total basin area of 288.75 acres. These basins contribute a total flow rate of 408.34 cfs and flow volume of 110.61 acre-feet to the project site and the adjacent future lots.

Table 4-2: Pre-Developed Upstream Basin Analysis				
Discharge Point #	Basin Area (AC)	Pre-Developed Flow Rate (cfs.)	Pre-Developed Volume (ac-ft)	Type of Flow
Hansen Road	141.42	153.38	41.100	Sheet flow to Hansen Road
Basin B2A & B2B	6.65	11.29	2.280	Sheet flow to Pulehu Roadside ditch to be discharged by pipe in existing basin B2B.
Basin B1	140.68	243.67	67.23	Channel flow to existing detention basin, B1.
TOTAL	288.75	408.34	110.61	

The existing drainage condition in the area including the project site and the upstream basin has been analyzed in several different storm drainage reports. The most recent of the reports was for the Maui Business Park Development that is located just makai of the Hoʻonani Village project site. Three detention basins were described and designed with the Maui Business Park development on the TMK where Hoʻonani Village is currently subdividing. The first basin is notated as Basin B1. This basin is existing and is located just mauka of Target in Kahului. This basin has currently about 87.6 acre-feet in available volume. Upstream Basin O3 flows to this existing detention basin with a volume of about 67.23 acre-feet. The existing basin has a large slope on the high side of the basin in the southwest corner. This slope runs from the 62-foot elevation down to the pond bottom of about the 37-foot elevation. The lower side of the pond shows the actual active pond storage depth. The top of the berm is at the 45-foot elevation which makes the detention basin have an active storage depth of 8 feet. The detention basin B1 has two outlets. One outlet flows to the northeast to an open ditch that discharges at Discharge point 8. The other outlet allows flows to escape the basin to the northwest. This basin has existing access roads in place for access and maintenance.

On the Hoʻonani Village project site there are currently no existing detention basins. Existing runoff flows down the mountain towards the northern property line. The Maui Business Park development has designed detention basins B2A in a drainage easement on the Hoʻonani Village site. These basins have not been constructed yet. These basins are designed to manage the pre-development flow for the Hoʻonani Village site and upstream basins, O1 & O2. These basins are currently designed to function in series together with a 60-inch drain line connecting the two basins to function as one larger basin. These basins are currently designed to have a volume of about 109.14 acre-feet of storage and a pre-developed volume of 107.11 acre-feet. Both basins were designed with the same top and bottom elevations. The top of the basins are at the 46-foot elevation and the bottom of the basins are at the 32-foot elevation. See table 4-3 below for additional flow details.

Table 4-3: Pre-Developed Existing & Designed Detention Basins

Basin Label	Available Storage (Ac-ft.)	Pre-Developed Flow Rate	Pre-Developed Volume	Available Volume (Ac-ft)
Basin B2A & B2B	109.14	425.67	107.11	2.03
Basin B1	87.60	243.67	67.23	20.37
TOTAL	196.74	669.34	174.34	

5.0 EXISTING WATER SYSTEM

The existing site is vacant and does not have any water systems located on site for domestic or agricultural purposes. As the site was once used for agricultural purposes, it is assumed that at one time there was an irrigation system across the site to provide water to the crops on site. This system has since been removed. There are no existing water systems or structures in Pulehu Road or Hansen Road that are adjacent to the site. The nearest existing water system is located in Hoʻokele Street and Pakaula Street to the north. The existing development adjacent to the site to the north uses this system for both domestic and fire uses. The nearest existing fire hydrant is located near the terminus of Pakaula Street. The site does not plan to connect to the existing water system and will not affect the system.

6.0 EXISTING WASTEWATER SYSTEM

The future lot that is being subdivided for the Hoʻonani Village development does not have any existing wastewater lines or structures on it. According to the County of Maui's GIS for the Wastewater Infrastructure, the existing lot has some private wastewater lines and structures on the western side towards the existing Sugar Museum. Additionally, private wastewater lines are located in Hoʻokele Street and Pakaula street to serve the existing users just makai of the project site. The private system in these streets connects to the public system owned and operated by the County of Maui that flows to the Wailuku/Kahului Wastewater refuse facility. The proposed development will not connect to an existing private or public wastewater system. These existing systems will not be affected by the development. See attached Existing Wastewater System Map for more information.

7.0 PROPOSED DRAINAGE SYSTEM

The project will be constructing new impervious surfaces from the construction of the proposed streets, buildings, parking areas, sidewalks and central promenade area. These improvements will increase the amount runoff from the site and will be managed for water quantity control per the County of Maui's Rules for the Design of Storm Drainage Facilities, Title MC-15, Chapter 4. These improvements will also bring elements to the site that increase the chance of pollutants entering the existing drainage conveyance systems nearby including our streams and oceans. The runoff from the site will be managed for water quality treatment to meet the Rules for the Design of Storm Water Treatment Best Management Practices, Chapter 15-111. The complete analysis of the proposed drainage system and the upstream basins can be found in Appendices 'C' and 'D'.

The proposed site has been divided into 37 drainage basins in the developed condition, notated as P1-P37. Upstream Basins O1-O3 continue to flow towards the site and will be managed in the proposed system. The attached Developed Basin Map details the boundaries of these proposed drainage basins.

The site is made up of soil group B rated soils and will have future cover types for impervious areas and open space lawn areas. These cover types have associated runoff curve numbers of 98 for impervious areas and 61 for open space lawn areas. The future site plan is made up of several different uses including residential low-rise apartments areas, light industrial

& business office area, street right-of-way areas, neighborhood commercial areas, and open space areas. Within these various areas, the amount of impervious areas was estimated by percentages to help calculate the composite runoff curve number for the site. The residential area was estimated at 60% impervious, the light industrial & business area at 85%, the street ROW area at 80% and the neighborhood commercial area at 50%. The last piece of the runoff analysis for the developed basins was the time of concentration for each basin. For each basin a catchment time of five minutes was used, and the longest potential run of drain line was utilized with a velocity of 3 ft/sec. of flow in the pipe. The run of pipe was estimated in the respective basin to overestimate the developed flow rates and volumes to err on the safer side with the design.

The developed basin sizes, composite runoff curve numbers and developed time of concentrations were inputted into HydroCAD to model the developed hydrographs for the 100-year, 24-hour storm events for each basin. The NOAA rainfall data for the area was utilized to estimate the rainfall depth for the site for this storm event. The attached Proposed Drainage Condition Analysis breaks down the developed flow rate (cfs) and flow volume (ac-ft) for the all the separate 37 on site basins and the 3 off site basins. Table 7-1 below breaks down the developed drainage basins and their associated flows and volumes.

Table 7-1: Developed Basin Analysis

Basin #	Basin Area (AC)	Composite Runoff Curve	Approx. Dev. T.O.C. (min.)	Developed Flow Rate (cfs.)	Developed Volume (Ac-ft.)
P1	3.44	90.6	8.22	20.95	2.236
P2	2.14	90.6	17.78	10.22	1.395
P3	8.63	92.45	7.44	53.85	5.669
P4	1.52	90.6	12.39	8.31	0.989
P5	7.38	92.45	8.37	45.14	4.85
P6	0.76	90.6	8.10	4.64	0.494
P7	8.40	92.45	8.77	50.89	5.52
P8	0.82	90.60	9.44	4.85	0.533
P9	9.62	83.20	10.00	50.68	5.623
P10	0.55	90.60	7.94	3.37	0.358
P11	9.39	83.20	8.42	51.57	5.487
P12	0.82	90.60	9.31	4.86	0.533

P13	13.22	83.20	9.61	70.40	7.726
P14	0.82	90.60	9.17	4.87	0.533
P15	11.31	83.20	10.10	59.59	6.61
P16	0.68	90.60	8.33	4.13	0.442
P17	3.81	75.80	6.67	19.16	1.973
P18	1.19	90.60	6.81	7.47	0.773
P19	4.59	90.60	9.72	26.94	2.985
P20	3.07	90.60	12.22	16.87	1.998
P21	1.71	90.60	9.86	9.98	1.112
P22	21.21	79.50	9.22	108.62	11.806
P23	4.04	90.60	7.50	24.93	2.626
P24	3.11	64.70	7.22	11.77	1.259
P25	5.21	83.20	6.11	30.15	3.043
P26	0.59	90.60	7.92	3.62	0.384
P27	2.15	83.20	6.56	12.29	1.256
P28	0.97	90.60	8.83	5.82	0.631
P29	10.12	83.20	8.67	55.17	5.914
P30	2.79	90.60	10.00	16.25	1.815
P31	0.60	90.60	8.67	3.61	0.39
P32	6.96	83.20	7.56	38.95	4.066
P33	1.14	90.60	10.33	6.58	0.742
P34	6.76	83.20	9.44	36.19	3.951
P35	21.29	74.00	10.21	84.12	10.602
P36	5.11	64.70	5.00	20.33	2.069
P37	7.17	61.00	5.00	25.05	2.605
TOTAL	193.09	-	-	1022.19	111.00

The on-site basins have a total flow rate of 1022.19 cfs and a total flow volume of 111.0 acre-feet (see the attached HydroCAD report for the developed conditions for additional information). The site had a pre-developed flow rate of 261.0 cfs and a flow volume of 63.73 acre-feet. The flow rate increased by 761.19 cfs and the flow volume increased by 47.27 acre-feet. With the development the flow rates and flow volume from the upstream basins O1-O3 did not change. The increase in flow will be detained meeting the County of Maui's Rules for the Design of Storm Drainage Facilities.

The proposed storm drainage system on site will incorporate a mixture of open conveyance and closed conveyance measures to direct the runoff to its discharge location to be detained and infiltrated. The storm drainage design for the site is subject to change throughout the design process. This report represents the currently proposed alternative as well as a few additional possible alternatives that could be utilized as the project design moves forward.

7.1 STORMWATER QUANTITY CONTROL - ALTERNATIVE 1

The current design to manage the increased runoff from the new improvements is to utilize the existing detention basin B1, and to redesign the detention basins B2A and B2B. Curb inlets, area drains, manholes and an underground storm drain line system will convey runoff from the on-site and upstream basins to these three detention basins. Runoff from the site will be separated between basin B1 and basins B2A & B2B based on the elevation and location of the basin to provide enough vertical fall to convey the water to the final detention basin. The only developed basins that have flows splitting between detention basins are P1 and O1 as they stretch the entire south property line of the site. These basins were split into A and B sub-basins. See the attached Developed Condition Analysis for the sizes, flow rates and flow volumes of these sub-basins. Sub-basins P1A and O1A are towards the east side of Hansen Road and will be conveyed to Basins B2A & B2B while sub-basins P1B and O1B on the west side of Hansen Road will be conveyed to Basin B1.

In the developed condition, existing Basin B1 is designed to have basins O1B, O3, P1B, P12-15, P20-21, and P34-35 discharged to it. To accommodate for these additional flows, we are proposing to deepen this basin and dig out the bottom of the basin to the 30-foot elevation. This would be an additional 7 feet of depth with the top of the basin remaining at the 45-foot elevation. This would increase the volume of the basin from 87.6 acre-feet to 119.54 acre-feet. The basin would have a developed volume of 122.13 acre-feet of total flow. The developed runoff hydrograph for the 100-year, 24-hour storm event was modeled in HydroCAD utilizing a 5 in./hr. infiltration rate. The infiltration rate used is less than half of the 10.1 in./hr. that resulted from the percolation tests done by Hawaii Geotechnical Consulting on the west side of the site. Using this as the only method of release for the runoff, the peak elevation was 38.92 feet, which allows for an additional 6 feet of available storage. The existing outlet that released water from the basin to the northeast to the drainage ditch would be removed with the development. Emergency overflow from the basin will remain in place to the northwest through the existing outlet. This basin is adequately designed to manage the developed runoff for these basins.

Table 7-2: Detention Basin B1	
Detention Basin Bottom Elev. (ft.)	30.0 ft.
100-year, 24- hr. storm Elev. (ft.)	38.92 ft.
Top of Pond Elev. (ft.)	45.0 ft.
Amount of Freeboard (ft.)	6.0 ft.
Total Available Volume (Ac.-ft.)	119.543 ac.-ft.
Total Flow Volume (Ac.-ft.)	122.521 ac.-ft.
Total Storage Volume (Ac.-ft.)	66.616 ac.-ft.

In the developed condition, designed basins B2A and B2b are designed to have basins O1A, O2, P1A, P2-11, P16-19, P22-33 and P36-37 discharged to them. To accommodate for these additional flows, we are proposing to redesign these basins to lower the bottom of the basins to the 28-foot elevation. This would be an additional 4 feet of depth with the top of the basin remaining at the 46-foot elevation. This would give the basins a total depth of 18 feet. This would increase the volume of the basins from a combined 100.20 acre-feet to 116.36 acre-feet. The basins would receive a developed volume of 99.475 acre-feet of total flow. The developed runoff hydrograph for the 100-year, 24-hour storm event was modeled in HydroCAD utilizing a 5 in./hr. infiltration rate. The infiltration rate used is less than the actual rate of 5.25 in./hr. that resulted from the percolation test done by Hawaii Geotechnical Consulting on the east side of the site. Using this as the only method of release for the runoff, the peak elevation was 38.47 feet, which allows for an additional 7.53 feet of available storage. The existing design of these basins has an emergency overflow outlet at the western end of basin B2A that will connect to the end of the designed storm system in the Maui Business Park. Should this be installed by the Maui Business Park development, the outlet will be relocated as necessary to continue to allow the emergency overflow to be conveyed north to the MBP system. These basins are adequately designed to manage the developed runoff for these basins.

Table 7-3: Detention Basins B2A & B2B	
Detention Basin Bottom Elev. (ft.)	28.0 ft.
100-year, 24- hr. storm Elev. (ft.)	38.47 ft.
Top of Pond Elev. (ft.)	46.0 ft.
Amount of Freeboard (ft.)	7.53 ft.
Total Available Volume (Ac.-ft.)	116.623 ac.-ft.
Total Flow Volume (Ac.-ft.)	101.137 ac.-ft.
Total Storage Volume (Ac.-ft.)	54.950 ac.-ft.

Along with these three detention basins, the proposed catch basins, area drains and drain lines will be designed to convey the 100-year, 24-hour storm event to meet the Rules for the Design of Storm Drainage Facilities in the County of Maui. The conveyance system will be designed so that the flooded widths of the streets will be less than the required 8 feet, and so that the Hydraulic Grade Lines within the system is further than 1 foot from the rim elevations of the proposed structures or the finished ground elevation. The final drainage report for the project will address the catch basin & inlet capacity calculations, the flooded road widths, and the hydraulic grade line calculations. The HGL calculations will also be shown on the drain line profiles on the final construction plans.

The on-site drainage system will be privately owned and maintained by the applicant until the system is turned over to the Association that is created to manage the development. The final O&M plan will be added to the final storm drainage report.

7.2 Stormwater Quality Treatment

The proposed detention basins B1, B2A and B2b are designed to function as infiltration basins. These basins have been designed to meet the *Rules for the Design of Storm Water Treatment Best Management Practices, Chapter 15-111*. The detention basins have more than enough available storage volume for the water quality storms associated with the proposed drainage basins as they are much smaller than the 9.17 inches associated with the 100-year, 24-hour storm event. The detention basins allow the rainfall from smaller rain events to infiltrate into the bottom of the basins by not having any pond outlets outside of the emergency overflow outlets. This allows solids to filter out and are not conveyed into any downstream storm systems or streams. The basins have sufficient infiltration rates to allow the stormwater to be filtered through the vegetation and soil. The basins will be maintained monthly or following large rain events to remove any large debris and to keep the basins functioning properly.

It is our opinion that the basins will function well as water quality treatment BMPs and will more than sufficiently treat the runoff from the site and upstream basins. The proposed project will not adversely affect the downstream drainage areas with any contaminants or debris.

7.3 Potential Alternatives

The design of the storm drainage system is one element of the Hoʻonani Village that could change greatly as the project moves forward. With the ever-changing costs of construction materials and the nature of storm drainage design having more room for flexibility and creativity than other systems like water or wastewater, the current proposed design could change. Below is a list of potential alternatives that could be used to address water quantity detention and water quality control for the project site and upstream basins. The final storm drainage system might include other alternatives that are not listed, but these are the main alternatives that are being considered.

1) Street-side swales, planters or rain gardens: Open conveyance options along the street frontages to manage runoff from the public and private streets could be incorporated into the design.

2) Sub-surface detention: In the future it could be more feasible to manage some of the drainage basins within the basin itself underground in sub-surface detention measure such as chambers or large perforated pipes.

3) Bio-retention basins, planters or landscaping: Currently the final landscaping vision and design that the project would like to achieve is not finalized. There is potential for runoff from roof drains of the proposed buildings to be directed to bio-retention or flow through BMP for treatment, detention or infiltration.

4) Infiltration structures: Smaller basins could be infiltrated separately into other types of infiltration structures such as dry wells, or open bottom catch basins etc.

5) Other detention basins: The large site provides other areas that could be used for detention/infiltration basins to manage stormwater. Items like internal and external water features and other potential landscape elements could be used to manage stormwater.

8.0 PROPOSED WATER SYSTEM

The proposed development has no potential opportunity to connect to an existing County of Maui Department of Water Supply public water system. Due to the lack of existing infrastructure, the development plans on creating a new water source, water storage & pump site, and distribution system will be designed and constructed to provide water for domestic uses, irrigation and fire suppression. The intent of this new system is for the system to be initially owned and maintained privately but will be constructed to Department of Water Supply standards so that in the future there could be an opportunity to turn the system over to the County of Maui.

The water system on site will be constructed with various sizes of ductile iron pipe, and will be located within the streets, parking lots, and open spaces to serve the various uses on site. Separate water services, meters, pressure reducers and backflow preventers etc. will be installed throughout the site to serve the various residential, commercial and industrial buildings, and open space areas. Fire hydrants will be spaced out every 250 feet as required by the Department of Water Supply for fire suppression. Additionally, the buildings will have FDC's and other fire suppression measures that will be addressed in the future.

At this time water for irrigation use of the open space areas could come from the new water system, or from reusable R-1 water from the proposed wastewater treatment plant on site. To err on the side of caution, the irrigation consumption has been added to the water system calculations below. Irrigation meters and backflow preventers will be installed as necessary to irrigate the open space and landscape amenities on site.

The complete analysis of the proposed water system and the plans for the preliminary water master plan can be found in Appendix ‘E’.

8.1 Water System Preliminary Calculations

The project site is mixed-use in nature including multi-family low rise residential, mixed commercial spaces, commercial office space, light industrial and landscaping. The County of Maui Department of Water Supply’s requirements for water system sizing were used to size the proposed system. The Domestic Consumption Guidelines and the Fire Flow Requirements were utilized in the attached calculations and in the water system demand table below.

For the residential portion of the site, the current site plan reflects 1,599 units that vary between 1-, 2- and 3-bedroom units. The total number of units and the mix of unit type is subject to change through the design process. The proposed units are all low-rise multi-family units, and the private system will be designed with these units having a domestic consumption unit of 400 gal/unit. The approximate residential average daily demand for 1,599 units is 639,600 gallons per day. The commercial and industrial spaces were broken down into the actual square footage of the buildings. The commercial and industrial building spaces were modeled at the required 140 gallons per 1,000 square feet. The total average daily demand for the commercial areas was 23,127 gpd, and the total for the industrial areas was 27,734 gpd. The open space areas on site were modeled at 1,700 gallons per acre and had a total average daily demand of 56,321 gpd. The wastewater treatment plant will also contribute to the daily water consumption and overestimated to have a building square footage of 9,000 square feet. Utilizing the commercial rate of 140 gallons per 1,000 square feet, the total consumption from the WWTP totaled 1,260 gpd.

There are a few areas within the site with the ability to develop in the future and need to be modeled to size the water source and storage. The County owns the parcel that is 22.99 acres and is mauka of the existing Lowe’s Home Improvement store. This parcel has the potential for both commercial and residential uses in the future but could even end up as a public school. To provide additional capacity in the system the potential commercial area was modeled as 275 residential units, and the residential portion was estimated at 440 residential units. The residential units have a consumption unit of 400 gal/unit and average daily demands of 110,000 and 176,000 gpd respectively. The total average daily demand for this parcel could be around 286,000 gpd. This parcel will not be developed as a part of the Hoʻonani Village project but will be included in the sizing of the water system.

There are areas within the site where future commercial uses could be added in the future for potential retail or restaurant space. The potential future commercial buildings have an approximate square footage of 53,880. The buildings were modeled at 140 gallons per 1,000 square feet of building area for a total average daily demand of 7,543 gpd.

The table below summarizes the breakdown of the various uses on site. The current plan for Hoʻonani Village has an approximate average daily demand of 748,042 gpd. The potential future developments on the County site and the Hoʻonani Village site could produce an average daily demand of 293,543 gpd. The total Average daily demand for the system is approximately 1,041,586 gpd. This was increased by 10% to account for unmetered losses in the system to total Design A.D.D. of 1,145,744 gpd. Utilizing a factor of 1.5, the Max Daily Demand was calculated to be 1,718,616 gpd.

Table 8-1: Water System Sizing Calculations

Type of Use	Unit	Quantity of unit	Average Daily Demand (gpd)	Max Daily Demand (gpd) (1.5 x ADD)
Multi-family Low-Rise Residential	400 gal/unit	1,599 units	639,600	959,400
Commercial Space	140 gal/1,000 SF bldg. area	165,196 sf	23,127	34,691
Light Industrial Area	140 gal/1,000 SF bldg. area	198,100 sf	27,734	41,601
Park Open Space	1,700 gal/acre	33.13 acres	56,321	84,482
WWTP Site	140 gal/1,000 SF bldg. area	9,000 sf	1,260	1,890
Future Residential Space (County)	400 gal/unit	440 units	176,000	264,000
Future Commercial Space (County)	400 gal/unit	275 units	110,000	165,000
Future Commercial Space (bldg. sq. ft.)	140 gal/1,000 SF bldg. area	53,880 sf	7,543	11,315
Project Total	-	-	1,145,744 (Increased by 10% for unmetered losses)	1,718,616

8.2 Water Main System & Water Storage Sizing

With the total approximate average daily demand and max daily demand understood, the water mains on site and off site were sized based on fire flows and domestic flows. The main distribution line from the off-site water source will carry the domestic flows for the entire site. The peak hour flow rate of 2,387 gallons per minute was used to analyze this line. During peak flow for the domestic flows the max velocity in the water mains has to be less than 5 ft./sec. This criterion requires this main distribution line to be a minimum of 14 inches in size. Within the project site, the separate branches of the water system only supply flows to the uses around it, which indicates that the fire flow rate will likely control the sizing of these mains. Commercial uses in the County of Maui have to be able to supply a fire flow rate of 2,000 gpm for two hours. Based on this flow rate, the water mains on site must be a minimum of 12 inches in size.

The future water reservoir that serves the development is sized based on the larger requirement between the maximum day consumption, and max day consumption flow plus fire flow for the duration of the fire (2 hr.). During the two-hour period of a potential fire, a ¾ full reservoir would have to hold 383,218 gallons, which would make the reservoir have a size of at least 510,957 gallons. This is significantly less than the maximum day consumption of 1,718,616 gallons, which would control the size of the reservoir. As the proposed water tanks will likely be approximately 500,000 gallons in size, a combination of water tanks will be utilized to have a combined volume greater than the maximum day consumption.

8.3 Water Source and Water Tank Site

The development will have to create a new water source to provide water for the site. Multiple wells will have to be drilled to produce the new water source. The applicant has been working with the owners of TMK (2) 2-5-001:016 to work out an agreement to utilize this TMK as the site for the new wells and water tanks. The site will likely include multiple wells, water tanks, treatment system, and a pump station. Approximately 23,000 LF of ductile iron pipe will be used to bring the water from the well site, down Pulehu Road, and to the site. See the attached Preliminary Off-site Distribution System for the approximate location of the water source and water tanks. Well permits will be pulled by Alpha Inc. prior to the drilling of the proposed wells.

8.4 Water System Alternatives

Alternatives for the proposed water system are limited. There is an existing private water source on the adjacent property just makai of the site that will serve the Maui Business Park development. The issue with this is that the source is at a lower elevation from our development and there would likely not be enough pressure to serve the site at the higher elevations. The other alternative would be connecting to the existing public system and public water source in the nearby area to serve the site. Water availability for domestic use is an ongoing issue for the island of Maui. The proposed development has a very large domestic water demand. A demand of that size would put a massive burden on the existing system. For this reason, the applicant is proposing to create a separate private water source and distribution system to serve the development.

9.0 PROPOSED WASTEWATER SYSTEM

The proposed development does not have any public wastewater lines adjacent to the site to connect to. The closest existing system is a private system that connects to the downstream public wastewater system. The public wastewater system in the area currently conveys wastewater to the Wailuku/Kahului Wastewater Treatment Plant. The existing wastewater system does not have the capacity to manage the additional wastewater that the project site would create. Thus, the applicant is proposing to install a private wastewater system on site to serve the development. The system is currently proposed to be privately owned and maintained for the lifetime of the system.

The proposed system will be made up of a network of gravity sanitary sewer main lines that convey wastewater to a pump station at the low end of the site. Each building on site will be connected to the gravity system by individual sanitary service laterals. The pump station will then pump the waste in a pressure line system to the proposed wastewater treatment plant that will be located on the western end of the project site. The wastewater treatment plant is planned to be designed to treat wastewater and produce R-1 reusable water that can be utilized for irrigation of as much of the site as possible. The R-1 water would be pumped to irrigate the site in a non-potable purple pipe system for recycled water or an approved equal. A preliminary master plan for the wastewater pipe network is attached in Appendix ‘F’. There are many different routes and alignments that could be utilized for the proposed pipe network to make it as efficient as possible. The location of the proposed mains is subject to change. The proposed slopes of the main lines, the line sizes and the proposed structures will be designed to meet the requirements of the County of Maui Wastewater Reclamation Division.

9.1 Wastewater Sizing Calculations

The proposed sanitary sewer system will be made up of various sizes of PVC or HDPE pipe. The individual sanitary sewer laterals will likely be a minimum size of 6 inches per the County of Maui code for the Wastewater Reclamation Division. The approximate wastewater flow rates for the mixed-use site were broken up by use type and follow the Wastewater Flow Standards of the Wastewater Reclamation Division. The site plan for the residential units, commercial spaces and industrial spaces is subject to change through the design process, and the calculations below represent the current land use concept plan at the time of this report.

The existing plan for the residential buildings has a total of 1,599 units with a mixture of 1-, 2- and 3-bedroom type units. These units were estimated at 255 gals/unit. The approximate total residential wastewater flow is 407,745 gpd. The commercial areas were divided into an approximate breakdown between retail, restaurants, and the commercial office buildings because each of the uses have different estimated wastewater flow rates. As the tenants in the commercial spaces in the center mixed-use area of the site will change over time, we had to estimate the breakdown within those spaces. To err on the high side, we estimated that 50% of that space will be used for restaurants and 50% would be retail. The commercial restaurant wastewater flow was estimated by useable area, which is approximately 60% of the total square footage. It was assumed 1 restaurant seat per 20 square foot of useable area and 80 gals/seat. For an area of 56,100 sf, it was calculated that 1,683 seats would generate 134,640 gpd. The retail area was estimated at 1 employee per 350 square feet and 15 gallons per employee. For 56,100 square feet of retail area, it was calculated that 160 employees would generate 2,400 gpd. The office spaces were estimated assuming 1 employee per 200 square feet of building area and 20 gallons per employee. For 100,000 square feet of office space, it was calculated that 500 employees would generate 10,000 gpd. The total commercial average daily flow was estimated to be 147,040 gallons per day. The wastewater flow from the industrial area was estimated to be 1 employee per 500 square feet of building area and 25 gallons per employee. The total average daily flow from the 198,100 square feet of industrial area is estimated for 396 employees generating 9,900 gpd. The current Hoʻonani Village site has an average daily flow volume of 564,685 gallons per day.

There are a few areas on site where future development is planned or possible, including an area for commercial development within the project site, and the potential future development of the 23-acre parcel that is owned by the County of Maui. To ensure that the system has the capacity for the future County site, this area was assumed to potentially have both residential and commercial uses, even though the area could be a public school in the future as well. The commercial space on the site was modeled as a residential development with 275 units and a flow rate of 300 gal/unit to create an additional factor of safety. This area has an approximate flow of 82,500 gpd. The possible residential area was modeled to have 440 units and calculated at 255 gals/unit. The future potential residential development of the County's 23-acre site would produce a flow of 112,200 gpd. The potential wastewater flow from the County site that we are using to size the wastewater system is approximately 194,700 gpd.

The future commercial area on the Hoʻonani Village site was analyzed at the same ratio for retail and restaurants as the planned commercial development area. The future commercial area has a total building square footage of 53,880 and would produce a flow of 65,795 gpd. This total is the sum of 64,640 gpd of flow for the potential future restaurant area and 1,155 gpd of flow for the potential future retail area.

The mixed-use site was modeled to overestimate the wastewater flow of the site, and some of the future uses are subject to change. The average wastewater flow for the proposed system was calculated to be 825,180 gallons per day. The complete breakdown of the Wastewater System Calculations can be found in Appendix 'F'.

The next step in sizing the system was to include the dry weather and wet weather infiltration and inflow that could be added to the system. The number of people that would be on site per day was estimated to be 9,940 people per day and was broken down in Appendix ʻFʻ. During dry and wet weather conditions there is water underground that could infiltrate the wastewater pipes and structures. These conditions were analyzed for wastewater lines laid above the normal ground water table. Dry weather infiltration/inflow is calculated at 5 gallons per capita per day, which is a total of 49,700 gallons per day for the site. The wet weather infiltration/inflow is calculated at 1,250 gallons per acre per day. The area on site that has wastewater lines present is approximately 117.65 acres, which is a total of 147,063 gallons per day of flow for the site.

The Total Average Wastewater Flow was calculated by taking the average wastewater flow plus dry & wet weather infiltration/inflow and was calculated to be 1,021,943 gpd. To calculate the minimum volume that the Wastewater treatment plant would be designed to, we took this number and increased it by a 25% factor of safety to get a WWTP min. volume of 1,277,428 gallons per day. The final wastewater treatment plant will be designed by others at a later time and will be designed with sufficient volume to meet all of the County of Maui wastewater flow requirements. The site Peak wastewater flow was calculated by taking a peaking factor of 2 to the Total Average daily site wastewater flow and was found to be 2,043,885 gpd. This has an associated flow rate of 3.163 cfs, which will be used to design the flow within the wastewater lines.

Table 8-2: Wastewater System Sizing Calculations

Type of Use	Unit	Quantity of unit	Average Daily Flow (gpd)	Average Flow Rate (cfs)
Residential multi-family low-rise	255 gal/unit	1,599 units	407,745	0.631
Commercial Restaurant	60% useable space, 1 seat per 20 SF useable space, 80 gal. per seat	56, 100 sf = 1,683 seats	134,640	0.208
Commercial Retail	1 employee per 350 SF bldg. area, 15 gal per employee	56, 100 sf = 160 employees	2,400	0.004
Commercial Office	1 employee per 200 SF bldg. area, 20 gal per employee	100,000 sf = 500 employees	10,000	0.015
Light Industrial	1 employee per 500 SF bldg. area, 25 gal per employee	198,100 sf = 396 employees	9,900	0.015
Future Commercial (On-site) (Restaurant)	60% useable space, 1 seat per 20 SF useable space, 80 gal. per seat	26,940 SF = 808 seats	64,640	0.100

Future Commercial (On-site) (Retail)	1 employee per 350 SF bldg. area, 15 gal per employee	26,940 SF = 77 employees	1,155	0.002
Future Residential (County Site)	255 gal/unit	440	112,200	0.174
Future Commercial (County Site) (Modeled as Residential)	300 gal/unit	275	82,500	0.128
Dry Weather Infiltration/Inflow	5 gal/capita/day	9940	49,700	0.077
Wet Weather Infiltration/Inflow	1,250 gal/acre/day	117.65 acres	147,063	0.228
Project Total Wastewater Flow	-	-	1,021,943	1.581
Min. WWTP Volume	(Additional 25% factor of Safety)	-	1,277,428	1.977
Project Peak Wastewater Flow	(2.0 Peaking factor multiplied to Project Total Wastewater Flow)	-	2,043,885	3.163

The complete analysis of the proposed wastewater system and the plans for the preliminary wastewater master plan can be found in Appendix ‘F’.

The proposed sanitary sewer system will be made up of various sizes of PVC or HDPE pipe. The pipe sizes will range from 6-inch to 18-inch mains as you get to the pump station. The entire proposed system was sized to flow at 50% full. With the design peak flow rate of the site being 3.163 cfs, an 18-inch PVC pipe would be needed to convey the flow at 50% full.

The proposed pump station and wastewater treatment plant will be designed by others at a later time and will be designed to meet all of the Hawaii Department of Health and the County of Maui requirements. A pressure pipe system will convey the wastewater from the pump station back up the site to the proposed wastewater treatment plant site. The WWTP will be designed to treat the waste to produce R-1 reuseable water. The various alternatives for how the plant will get rid of the R-1 water are discussed below. The current plan is for the R-1 water will be utilized to irrigate portions of the site. A non-potable waterline system will be designed and approved to utilize the R-1 water.

9.2 Wastewater System Alternatives

The wastewater system does not have many alternatives. The nearest existing system to the development is the private system just north of the site at the terminus of Pakaula Street. This system connects to the County of Maui public wastewater system that conveys the wastewater to the Wailuku/Kahului Wastewater Treatment Plant. Due to the large wastewater flow generated by the development, connecting to the adjacent sanitary system isn't a feasible solution. The existing system was not designed to convey the additional wastewater flow from the site and thus would need major upgrades in size and would be impractical and infeasible.

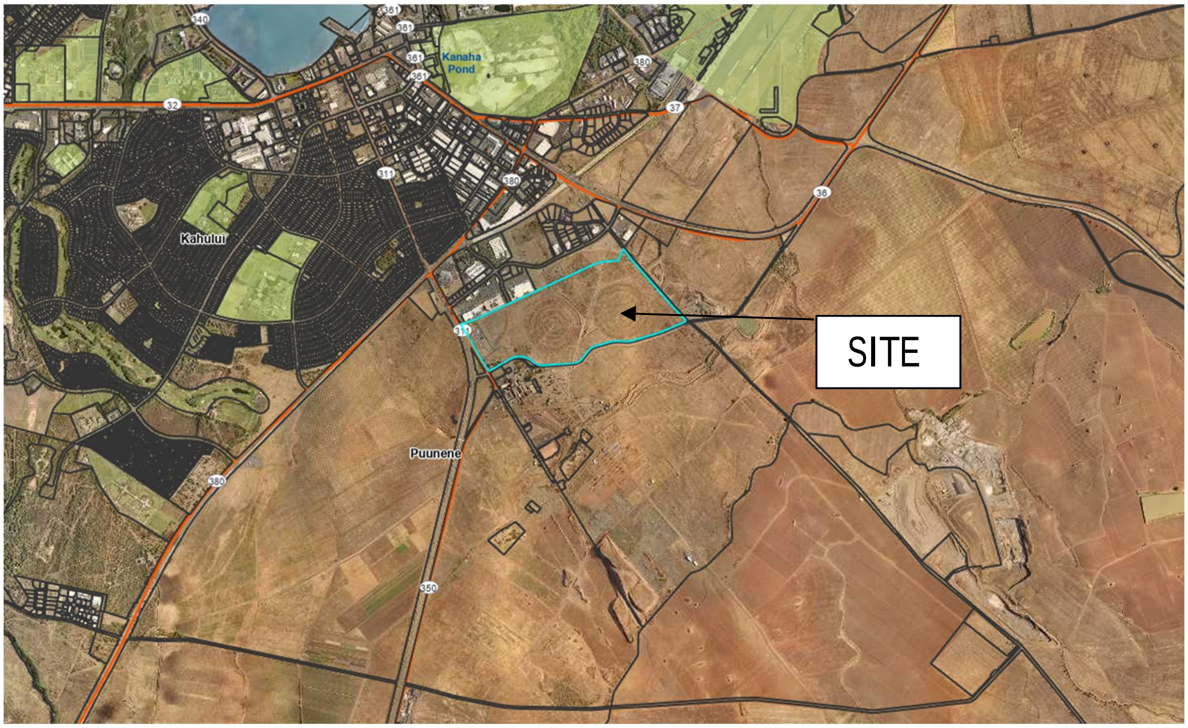
Additionally, a new wastewater treatment plant in Central Maui is being planned. An alternative could be to connect to this new WWTP. There are several factors to why this is impractical. First, the Central Maui WWTP is over 3.5 miles to the southwest of the proposed development. This would require an extremely long run of pipe to connect to the site. Another issue comes down to the timing of the project and when sewer service would be available for the development. The Central Maui WWTP would have to be in service prior to the first phase of the Hoʻonani Village being completed to be a potential source to serve the site. Due to these factors this alternative is not the chosen design path.

The current selection allows the applicant to control the timing of the wastewater system to ensure that service is available as it would be developed with the site. Additionally, the current plan provides R-1 water from the WWTP to be utilized for irrigation of the open space and landscape features on site and promotes a green site design. The location of the WWTP would also be on site, so there would not be the need for a long run of pipe to convey the sewage from the pump station to the WWTP. For the disposal of the R-1 water there are four different alternatives, which includes the use for onsite irrigation, the use for offsite irrigation by providing the water to Maui Business Park to replace their current irrigation water supply, the use for offsite irrigation by providing the water to Mahi Pono for irrigation of their crops, and lastly an injection well/soil aquifer treatment system. The final use of the R-1 water will be determined later in the design process.

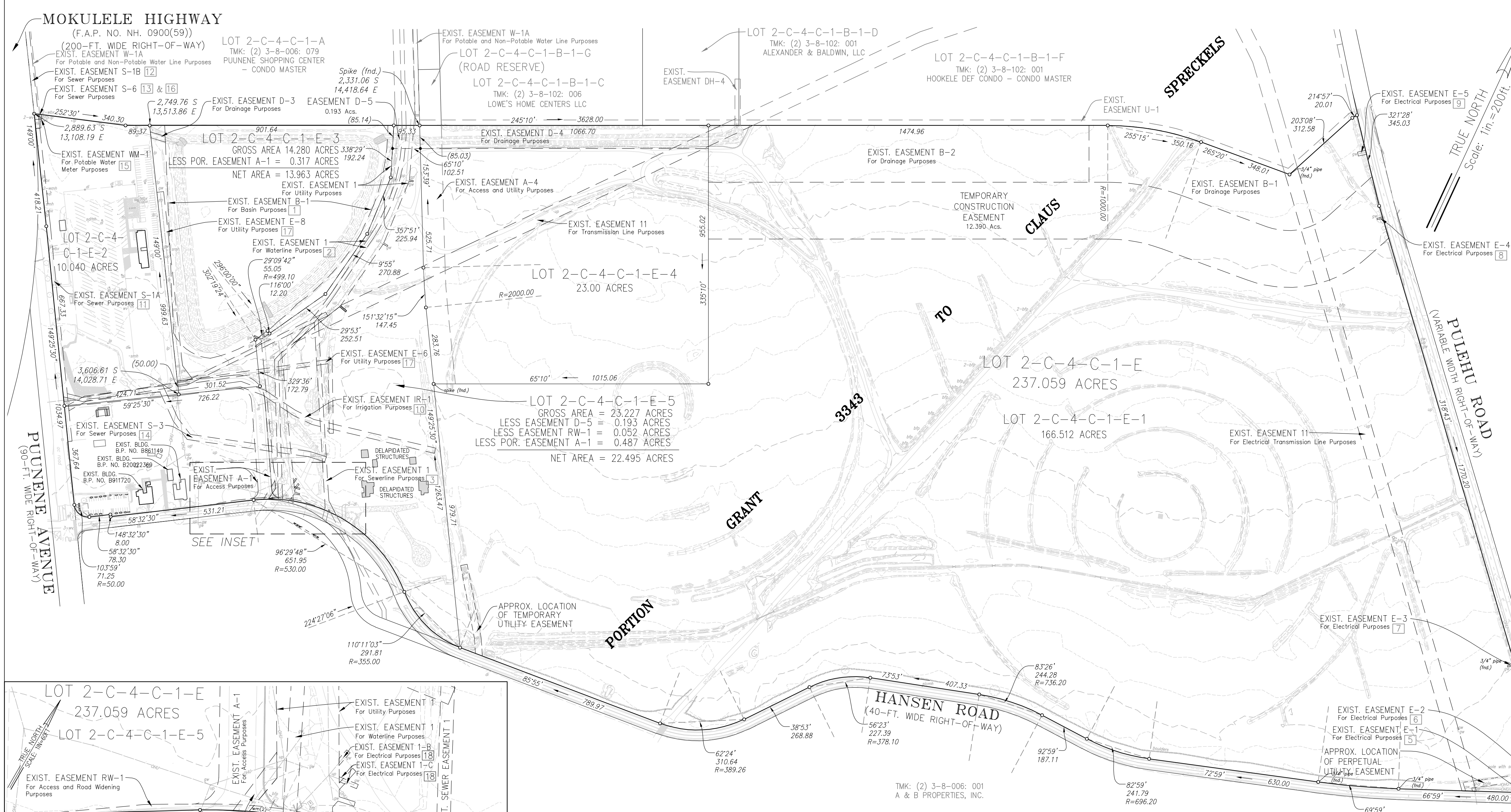
10.0 CONCLUSION

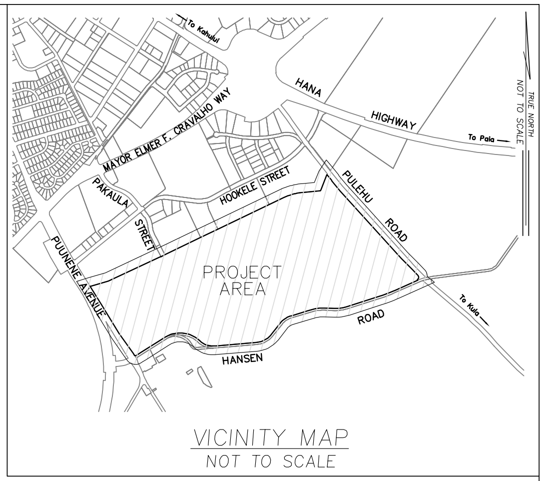
Based on the supporting stormwater calculations and attached analysis, it is the opinion of Pioneer Design Group-Hawaiʻi, LLC. that the development of the Hoʻonani Village will not adversely affect the existing downstream drainage system or adjacent property owners. Water quantity control meeting the Drainage standards for the County of Maui Title MC-15, Chapter 4, and water quality treatment meeting the Maui County Chapter 15-111 "Rules for the Design of Storm Water Treatment Best Management Practices" will be provided by the on-site detention basins or an alternative design. The water and wastewater systems will be designed to efficiently serve the site, to meet all the associated requirements, and to limit disturbances to the adjacent parcels. All the infrastructure associated with the project will be fully designed for construction plan review and will be approved prior to construction.

11.0 VICINITY MAP



APPENDIX 'A' – EXISTING SUBDIVISION PRELIMINARY PLAT, SITE MAPS AND SOIL INFORMATION





VICINITY MAP
NOT TO SCALE

EXISTING EASEMENTS

	EASEMENT	PURPOSE	IN FAVOR OF	DOCUMENT
1	EASEMENT 1	UTILITY	MAUI ELECTRIC CO. LTD.	L.16383 P.392
2	EASEMENT 1	WATER PIPELINE	COUNTY OF MAUI	L.19066 P.747
3	EASEMENT 1	SEWERLINE		DOC.NO. 2008-010966
4	MECO EASEMENT (BLANKET)	UTILITY	MAUI ELECTRIC CO. LTD.	DOC. NO 2011-053742
5	EASEMENT E-1	ELECTRICAL		SUB FILE NO. 3.2208
6	EASEMENT E-2	ELECTRICAL		SUB FILE NO. 3.2208
7	EASEMENT E-3	ELECTRICAL		SUB FIEL NO. 3.2208
8	EASEMENT E-4	ELECTRICAL		SUB FILE NO. 3.2208
9	EASEMENT E-5	ELECTRICAL		SUB FILE NO. 3.2208
10	EASEMENT IR-1	IRRIGATION	A&B, LLC.	DOC. NO. A-47440534
11	EASEMENT S-1A	SEWER	A&B, LLC.	DOC. NO. A-47440535
12	EASEMENT S-1B	SEWER	TMK(2)3-8-006: 01&03 AND LOT 2-C-4-C-1-E	DOC. NO. A-47440536
13	EASEMENT S-6	SEWER	TMK(2)3-8-006: 01&03 AND LOT 2-C-4-C-1-E	DOC NO. A-47440537
14	EASEMENT S-3		A&B, LLC.	DOC. NO. A-47440538
15	EASEMENT WM-1	WATER METER	M.B.P. PH. II ASSOC.	DOC. NO. A-47440540
16	EASEMENT S-6	SEWER	M.E.O. INC.	DOC. NO A-47440545
17	EASEMENT E-6 & E-8	UTILITY	MAUI ELECTRIC CO., LTD.	DOC. NO. A-82310960
18	EASEMENT 1-A, 1-B & 1-C	ELECTRICAL	MAUI ELECTRIC CO., LTD.	DOC. NO. A-83710533
19	EASEMENT 11	ELECTRICAL	MAUI ELECTRIC CO., LTD.	DOC. NO. 96-170196

GRAPHIC SCALE

200 0 100 200 400 800

(IN FEET)
1 inch = 200 ft.

NOTES:

1. AZIMUTHS AND COORDINATES REFERRED TO GOVERNMENT SURVEY TRIANGULATION STATION "LUKE"△.
2. THIS MAP IS BASED ON A FIELD SURVEY COMPLETED ON 11/05/23.
3. ADJOINING LOT INFORMATION HAS BEEN TAKEN FROM RECORDS FILED AT THE REAL PROPERTY MAPPING BRANCH.
4. THE COUNTY OF MAUI IS NOT RESPONSIBLE FOR ANY PARK, ROADWAY, EASEMENT (INCLUDING, BUT NOT LIMITED TO DRAINAGE, SEWER, ACCESS, RECLAIMED WATER OR AVIGATION EASEMENT), OR ANY OTHER INTEREST IN REAL PROPERTY SHOWN ON THIS MAP OR SHOWN ON THESE PLANS, UNLESS THE COUNTY OF MAUI HAS ACCEPTED ITS DEDICATION BY A RESOLUTION APPROVED BY A MAJORITY OF COUNCIL MEMBERS AT A REGULAR OR SPECIAL MEETING OF THE MAUI COUNTY COUNCIL OR THE COUNTY OF MAUI HAS SIGNED ITS ACCEPTANCE VIA A CONVEYANCE DOCUMENT RECORDED IN THE BUREAU OF CONVEYANCES OF THE STATE OF HAWAII IN COMPLIANCE WITH MAUI COUNTY CODE SECTION 3.44.015.
5. PROPERTY IS LOCATED WITHIN AN AREA DESIGNATED AS "ZONE X/OTHER AREAS" AS SHOWN ON THE MAP INDEX, MAP NUMBER 1500030595E WITH A REVISION DATE OF SEPTEMBER 25, 2009 IN MAUI COUNTY, STATE OF HAWAII, WHICH IS THE CORRECT FLOOD INSURANCE RATE MAP FOR THE COMMUNITY IN WHICH SAID PREMISES IS SITUATED.
6. ELEVATIONS SHOWN HEREON ARE BASED ON N.G.S. BENCHMARK SOH 116, HAVING AN ELEVATION OF 66.89 FEET (L.M.S.L.).
7. UNDERGROUND UTILITIES HAVE BEEN TAKEN FROM CONSTRUCTION PLANS AND HAVE NOT BEEN FIELD VERIFIED.
8. PROPERTY IS SUBJECT TO EASEMENTS AS SHOWN ON MAUI ECONOMIC OPPORTUNITY CONDOMINIUM, CONDOMINIUM MAP NO. 5149:
    - EASEMENT B-1 FOR DRAINAGE BASIN PURPOSES
    - EASEMENT D-3 FOR DRAINAGE PURPOSES
    - EASEMENT B-1 FOR DRAINAGE PURPOSES
    - EASEMENT B-2 FOR DRAINAGE PURPOSES
    - TEMPORARY CONSTRUCTION EASEMENT
    - EXISTING TEMPORARY UTILITY EASEMENT FOR ELECTRICAL AND ACCESS PURPOSES (UP TO 3 YEARS)
    - EXISTING UTILITY EASEMENT FOR ELECTRICAL AND ACCESS PURPOSES
    - EASEMENT A-1 FOR ACCESS PURPOSES
    - EASEMENT UNIT 2A SURFACE WATER
    - EASEMENT D-5 FOR DRAINAGE AND ACCESS PURPOSES
    - EASEMENT RW-1 FOR ACCESS AND ROAD WIDENING PURPOSES.
9. PROPERTY IS SUBJECT TO A DECLARATION OF EASEMENT RIGHTS, COVENANTS CONDITIONS AND RESTRICTIONS, DOCUMENT NO. A-82940748, AMENDED BY DOCUMENT NO. A-85840476.
10. PROPERTY IS SUBJECT TO FLUMES AND DITCHES AS CONTAINED IN EXCHANGE DEED DATE JUNE 23, 1924, RECORDED IN LIBER 740 AT PAGE 134.
11. TOGETHER WITH EASEMENT A-4 AND D-4 FOR DRAINAGE IN FAVOR OF A & B, MAUI BUSINESS PARK PHASE II ASSOCIATION, DOCUMENT NO. A-80270364 AND A-80270365.
12. TOGETHER WITH EASEMENT MW-1 FOR IRRIGATION PURPOSES, DOCUMENT NO. A-47440539.
13. TOGETHER WITH AND EASEMENT FOR ACCESS PURPOSES OVER AND ACROSS LOT 2-C-4-C-1-B-G, DOCUMENT NO. A-80270367.
14. PROPERTY IS SUBJECT TO A DECLARATION OF EASEMENT RIGHTS, COVENANTS, CONDITIONS AND RESTRICTIONS, DOCUMENT NO. A-85840477.

THIS WORK WAS PREPARED BY ME
OR UNDER MY SUPERVISION.

PRELIMINARY
SUBJECT TO CHANGE

JUSTIN H. LAPP
LICENSED PROFESSIONAL LAND SURVEYOR
CERTIFICATE No. 12964
EXP. DATE 04/2026

LEGEND

bfp	back flow preventer
cabx	cable television box
di	drain inlet
ebx	electric box
fh	fire hydrant
gen	generator
gw	guy wire
lp	lamp post
ohu	overhead utility lines
pbx	power box
pp	power pole
sdmh	storm drain manhole
sicmh	signal corp manhole
sl	street light
smh	sewer manhole
tebx	telephone box
trans	transformer
up	utility pole
wbx	water box
wv	water valve
wmh	water manhole

PRELIMINARY PLAT
FIRST ASSEMBLY OF GOD SUBDIVISION
SUBDIVISION OF LOT 2-C-4-C-1-E
INTO LOTS 2-C-4-C-1-E-1, 2-C-4-C-1-E-2, 2-C-4-C-1-E-3, 2-C-4-C-1-E-4 AND 2-C-4-C-1-E-5
BEING A PORTION OF GRANT 3343 TO CLAUS SPRECKELS
SITUATED AT PUUNENE, WAILUKU, MAUI, HAWAII

OWNERS: MAUI ECONOMIC OPPORTUNITY, INC.
COUNTY OF MAUI
ALEXANDER & BALDWIN, LLC.
AX HOLDING, LLC.
PUUNENE INDUSTRIAL PARK, LLC.

TMK: (2) 3-8-006: 004

JUNE 21, 2024

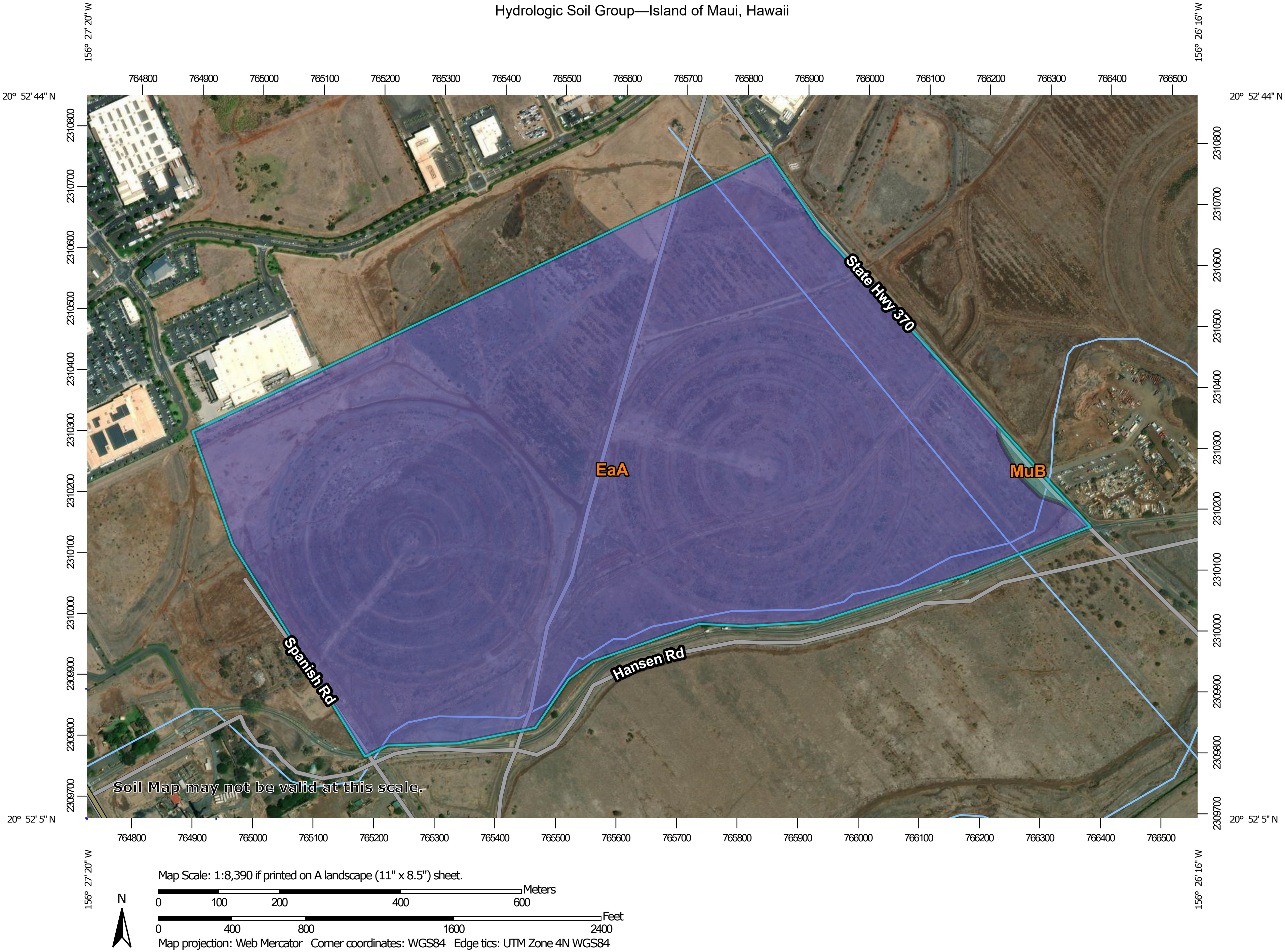
B:\PROJECTS\PDGHAWAII\H109-001\SUBS\ATA SURVEYING\23526PP TO ALPHA.DWG

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
1871 WILI PA LOOP SUITE A • WAILUKU, MAUI, HAWAII 96793

24" X 36" = 6 SQ. FT.

JOB NO.: 23-526

Hydrologic Soil Group—Island of Maui, Hawaii



Map Scale: 1:8,390 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 4N WGS84

MAP LEGEND

Area of Interest (AOI)

- ⬜ Area of Interest (AOI)

Soils

Soil Rating Polygons

- 🟪 A
- 🟩 A/D
- 🟦 B
- 🟫 B/D
- 🟦 C
- 🟨 C/D
- 🟥 D
- ⬜ Not rated or not available

Soil Rating Lines

- 〰 A
- 〰 A/D
- 〰 B
- 〰 B/D
- 〰 C
- 〰 C/D
- 〰 D
- 〰 Not rated or not available

Soil Rating Points

- ■ A
- ■ A/D
- ■ B
- ■ B/D
- ■ C
- ■ C/D
- ■ D
- ■ Not rated or not available

Water Features

- 〰 Streams and Canals

Transportation

- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background

- ▨ Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Island of Maui, Hawaii
Survey Area Data: Version 21, Sep 8, 2023

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

Date(s) aerial images were photographed: Jan 29, 2017—Oct 11, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EaA	Ewa silty clay loam, 0 to 3 percent slopes, MLRA 158	B	193.8	99.5%
MuB	Molokai silty clay loam, 3 to 7 percent slopes, MLRA 158	C	0.9	0.5%
Totals for Area of Interest			**194.7**	**100.0%**

Description

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

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

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

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

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

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

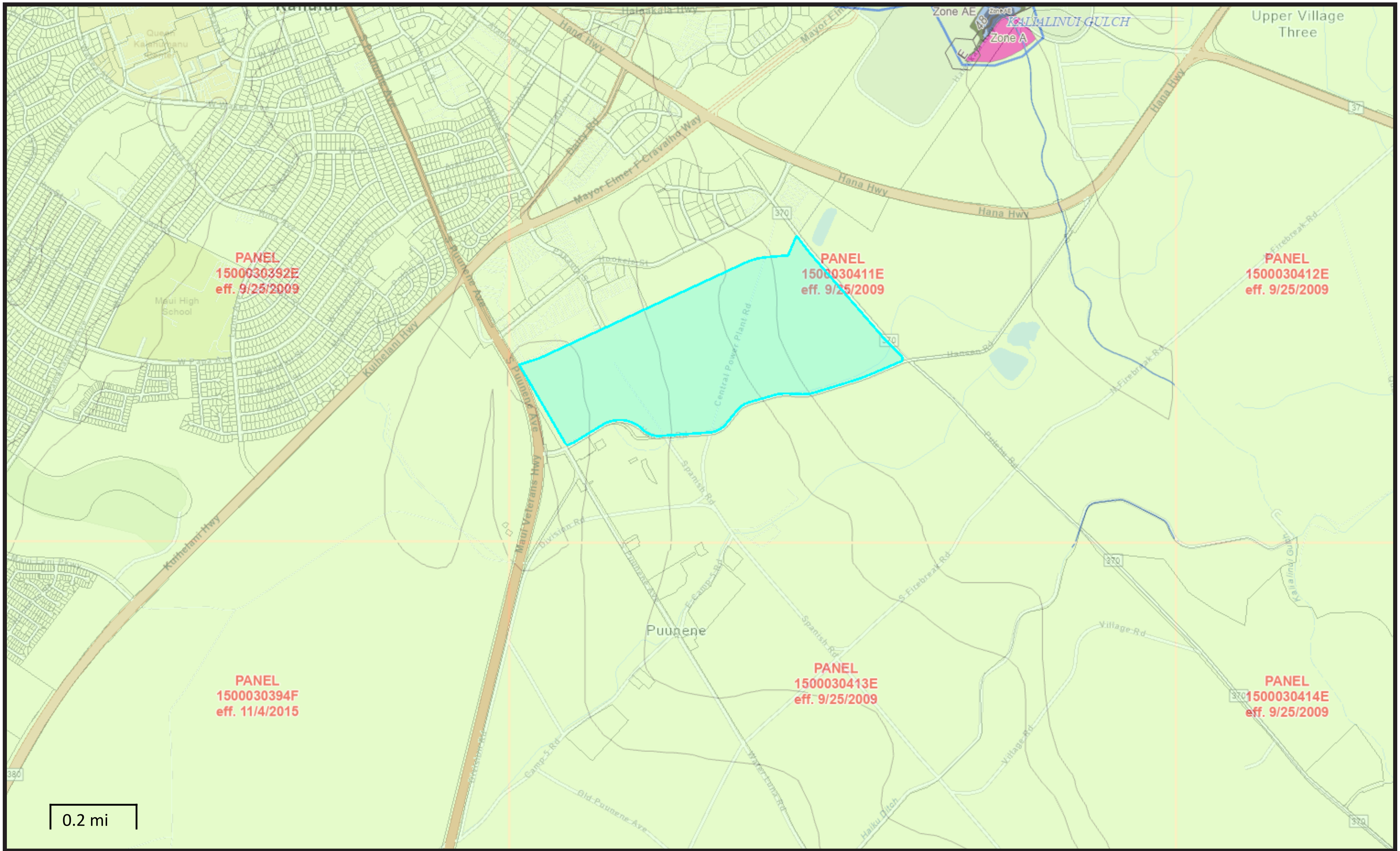
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher



Flood Hazard Map

Title: Hoonani Village Flood Hazard Map

Notes: Flood Zone X

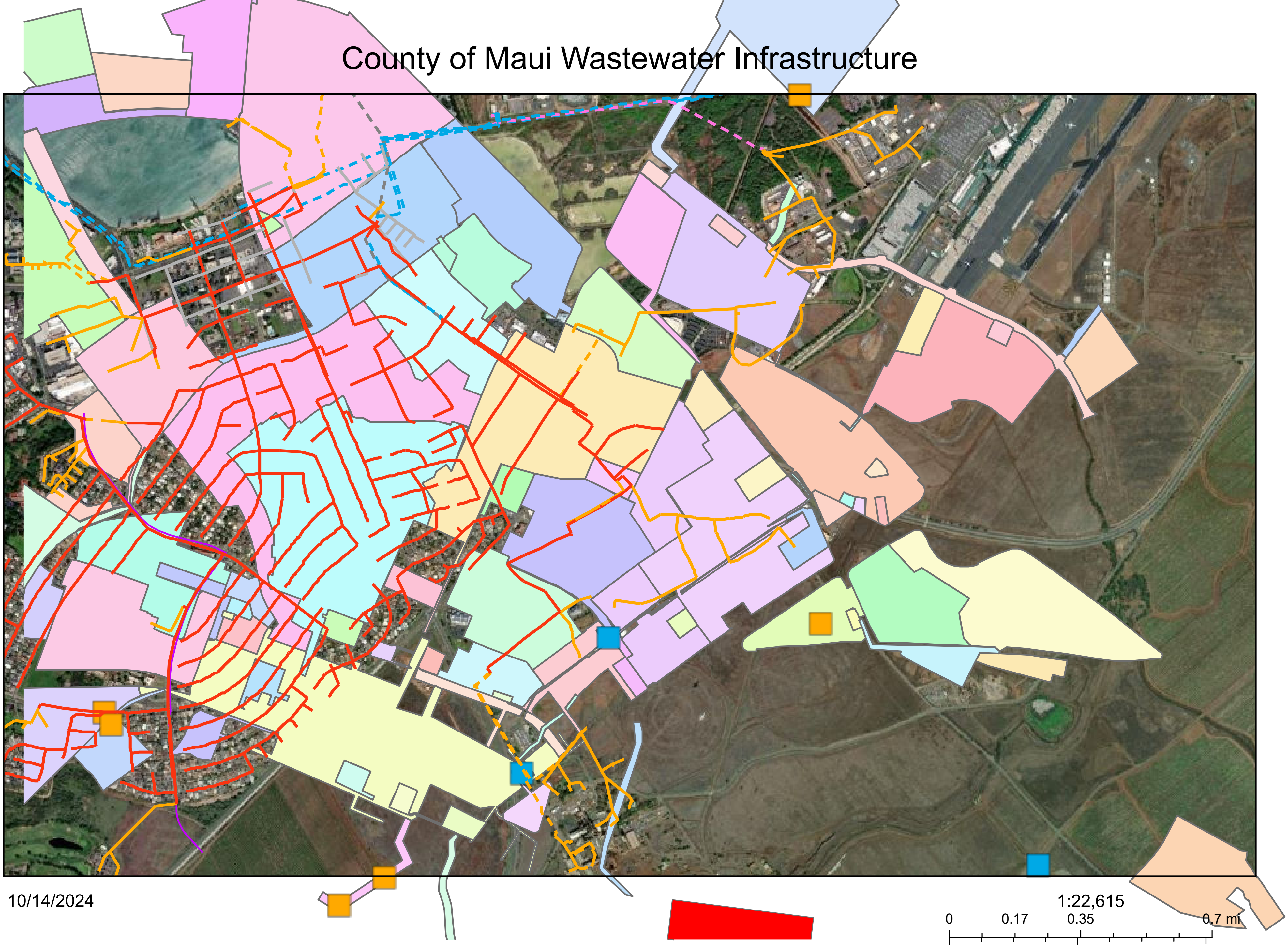
Map generated on 10/11/2024

N

Map Legend

Disclaimer: The Hawaii Department of Land and Natural Resources (DLNR) assumes no responsibility arising from the use, accuracy, completeness, and timeliness of any information contained in this report. Viewers/Users are responsible for verifying the accuracy of the information and agree to indemnify the DLNR, its officers, and employees from any liability which may arise from its use of its data or information.

County of Maui Wastewater Infrastructure



10/14/2024

1:22,615

Resource Mapping Hawaii, Maxar, Eagleview, 2023, Eagleview, 2023.

APPENDIX 'B' – PRE-DEVELOPED CONDITION DRAINAGE ANALYSIS

NOAA Atlas 14, Volume 4, Version 3
Location name: Kahului, Hawaii, USA*
Latitude: 20.8729°, Longitude: -156.4473°
Elevation: 66 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

S. Perica, D. Martin, B. Lin, T. Parzybok, D. Riley, M. Yekta, L. Hiner, L.-C. Chen, D. Brewer, F. Yan, K. Maitaria, C. Trypaluk, G. M. Bonnin

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	**0.219** (0.189-0.250)	**0.293** (0.253-0.342)	**0.399** (0.342-0.466)	**0.483** (0.409-0.567)	**0.601** (0.502-0.713)	**0.698** (0.572-0.837)	**0.797** (0.641-0.968)	**0.905** (0.710-1.12)	**1.05** (0.796-1.33)	**1.18** (0.860-1.51)
10-min	**0.325** (0.280-0.370)	**0.434** (0.375-0.507)	**0.592** (0.508-0.691)	**0.716** (0.607-0.840)	**0.891** (0.744-1.06)	**1.04** (0.848-1.24)	**1.18** (0.950-1.44)	**1.34** (1.05-1.66)	**1.56** (1.18-1.97)	**1.75** (1.28-2.24)
15-min	**0.408** (0.352-0.465)	**0.545** (0.471-0.637)	**0.744** (0.638-0.868)	**0.900** (0.762-1.06)	**1.12** (0.934-1.33)	**1.30** (1.06-1.56)	**1.48** (1.19-1.80)	**1.68** (1.32-2.08)	**1.96** (1.48-2.47)	**2.20** (1.60-2.81)
30-min	**0.575** (0.496-0.654)	**0.768** (0.663-0.896)	**1.05** (0.898-1.22)	**1.27** (1.07-1.48)	**1.57** (1.32-1.87)	**1.83** (1.50-2.19)	**2.09** (1.68-2.54)	**2.37** (1.86-2.92)	**2.76** (2.08-3.48)	**3.09** (2.25-3.96)
60-min	**0.756** (0.652-0.861)	**1.01** (0.873-1.18)	**1.38** (1.18-1.61)	**1.67** (1.41-1.95)	**2.07** (1.73-2.46)	**2.41** (1.97-2.88)	**2.75** (2.21-3.34)	**3.12** (2.45-3.85)	**3.64** (2.74-4.58)	**4.06** (2.96-5.21)
2-hr	**1.03** (0.902-1.19)	**1.40** (1.21-1.64)	**1.92** (1.64-2.24)	**2.31** (1.97-2.72)	**2.87** (2.40-3.41)	**3.31** (2.72-3.97)	**3.76** (3.02-4.57)	**4.24** (3.33-5.22)	**4.90** (3.70-6.17)	**5.44** (3.96-6.97)
3-hr	**1.16** (1.02-1.34)	**1.61** (1.39-1.87)	**2.20** (1.89-2.57)	**2.66** (2.26-3.13)	**3.31** (2.76-3.93)	**3.82** (3.13-4.59)	**4.35** (3.49-5.28)	**4.90** (3.84-6.04)	**5.67** (4.27-7.14)	**6.29** (4.58-8.06)
6-hr	**1.47** (1.28-1.70)	**2.01** (1.73-2.35)	**2.77** (2.38-3.25)	**3.38** (2.87-3.98)	**4.21** (3.52-5.02)	**4.88** (4.01-5.87)	**5.57** (4.48-6.77)	**6.30** (4.94-7.77)	**7.30** (5.50-9.21)	**8.11** (5.90-10.4)
12-hr	**1.84** (1.59-2.12)	**2.52** (2.16-2.93)	**3.48** (2.98-4.07)	**4.26** (3.61-5.00)	**5.35** (4.46-6.35)	**6.23** (5.11-7.48)	**7.16** (5.74-8.69)	**8.14** (6.37-10.0)	**9.52** (7.16-12.0)	**10.6** (7.73-13.6)
24-hr	**2.28** (1.99-2.62)	**3.13** (2.73-3.59)	**4.35** (3.79-5.00)	**5.34** (4.63-6.15)	**6.77** (5.82-7.83)	**7.93** (6.76-9.22)	**9.17** (7.74-10.7)	**10.5** (8.77-12.4)	**12.4** (10.2-14.7)	**14.0** (11.3-16.7)
2-day	**2.79** (2.48-3.16)	**3.86** (3.42-4.37)	**5.40** (4.78-6.14)	**6.67** (5.87-7.60)	**8.50** (7.41-9.72)	**10.0** (8.65-11.5)	**11.6** (9.93-13.4)	**13.4** (11.3-15.6)	**15.9** (13.2-18.7)	**18.0** (14.6-21.3)
3-day	**2.95** (2.63-3.34)	**4.08** (3.63-4.63)	**5.72** (5.06-6.49)	**7.06** (6.21-8.04)	**8.98** (7.84-10.3)	**10.6** (9.13-12.1)	**12.3** (10.5-14.2)	**14.1** (11.9-16.4)	**16.7** (13.8-19.6)	**18.9** (15.4-22.4)
4-day	**3.12** (2.78-3.53)	**4.32** (3.83-4.89)	**6.03** (5.34-6.84)	**7.45** (6.55-8.48)	**9.47** (8.26-10.8)	**11.1** (9.62-12.8)	**12.9** (11.0-14.9)	**14.8** (12.5-17.2)	**17.6** (14.5-20.6)	**19.8** (16.1-23.4)
7-day	**3.52** (3.13-3.98)	**4.86** (4.32-5.51)	**6.78** (5.99-7.69)	**8.32** (7.32-9.47)	**10.5** (9.15-12.0)	**12.3** (10.6-14.1)	**14.1** (12.1-16.3)	**16.1** (13.6-18.7)	**19.0** (15.7-22.2)	**21.3** (17.3-25.1)
10-day	**3.86** (3.43-4.37)	**5.33** (4.72-6.04)	**7.38** (6.52-8.39)	**9.04** (7.94-10.3)	**11.3** (9.86-13.0)	**13.2** (11.4-15.2)	**15.1** (12.9-17.4)	**17.1** (14.4-19.9)	**20.0** (16.5-23.5)	**22.3** (18.1-26.3)
20-day	**4.87** (4.33-5.52)	**6.69** (5.93-7.57)	**9.16** (8.10-10.4)	**11.1** (9.75-12.6)	**13.7** (12.0-15.7)	**15.8** (13.6-18.1)	**17.9** (15.3-20.7)	**20.1** (16.9-23.3)	**23.0** (19.0-27.0)	**25.3** (20.6-30.0)
30-day	**5.63** (5.01-6.37)	**7.71** (6.84-8.73)	**10.5** (9.33-12.0)	**12.7** (11.2-14.5)	**15.7** (13.7-18.0)	**18.1** (15.6-20.7)	**20.4** (17.5-23.6)	**22.9** (19.3-26.6)	**26.2** (21.7-30.7)	**28.8** (23.4-34.0)
45-day	**6.88** (6.12-7.78)	**9.43** (8.37-10.7)	**12.9** (11.4-14.6)	**15.5** (13.6-17.6)	**19.0** (16.5-21.7)	**21.6** (18.7-24.9)	**24.3** (20.8-28.1)	**27.1** (22.8-31.4)	**30.7** (25.4-36.0)	**33.5** (27.2-39.6)
60-day	**7.74** (6.88-8.76)	**10.6** (9.38-12.0)	**14.3** (12.7-16.2)	**17.1** (15.1-19.5)	**20.9** (18.2-23.9)	**23.8** (20.5-27.3)	**26.6** (22.7-30.7)	**29.5** (24.9-34.2)	**33.3** (27.5-39.0)	**36.1** (29.3-42.7)

[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.

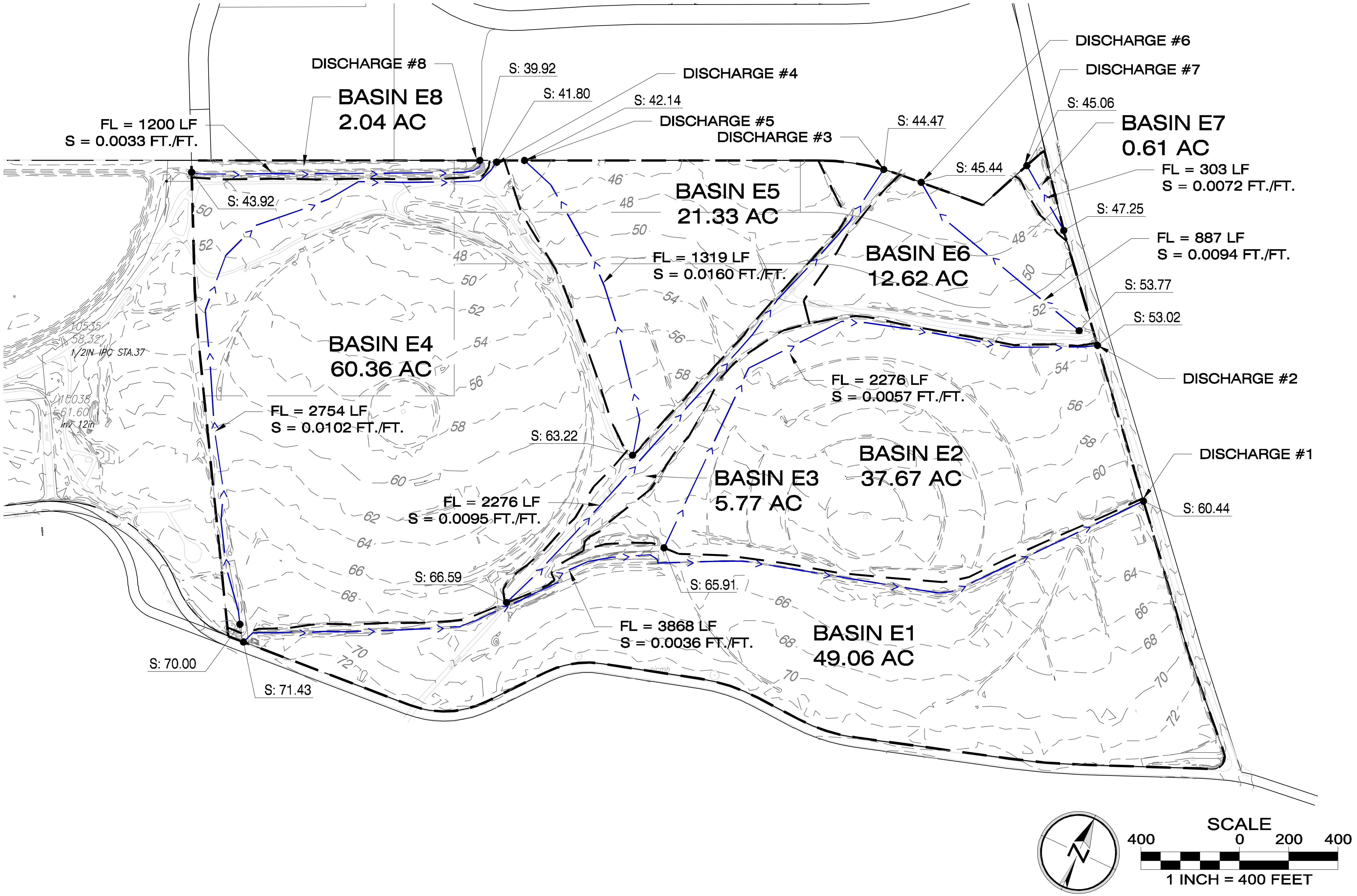
Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

PRE-DEVELOPED BASIN MAP

HOONANI VILLAGE



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PIONEER DESIGN GROUP – HAWAII LLC
CIVIL ENGINEERING · LAND USE PLANNING
CONSTRUCTION MANAGEMENT
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Designed by	TCC	Date	09/2024
Drawn by	TCC	Date	09/2024
Reviewed by	TCC	Date	09/024
Project No.	H109-001	REF.	
Horiz. Scale:	1"=400'		
Vert. Scale:			

Project
HOONANI VILLAGE

No.
H109-001

Type
ENGINEERING

Sheet
1 of 1

UPSTREAM BASIN MAP

HOONANI VILLAGE

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Designed by	TCC	Date	09/2024
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Horiz. Scale:			
Vert. Scale:			

Project
HOONANI VILLAGE

No.
H109-001

Type
ENGINEERING

Sheet
1 of 1

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RUNOFF CURVE NUMBERS (TR55)

Table 2-2a: Runoff curve numbers for urban areas[1]

Cover description		**CN for hydrologic soil group**			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover <50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover >75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]	77	86	91	94	
Idle lands (CNs are determined using cover types similar to those in table 2-2c)					

1: Average runoff condition, and $I_a = 0.2S$.

2: The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas hava a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3: CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4: Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5: Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

RUNOFF CURVE NUMBERS (TR55)

Table 2-2c: Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range -- continuous forage for grazing					
<50% ground cover or heavily grazed with no mulch.	Poor	68	79	86	89
50% to 75% ground cover and not heavily grazed.	Fair	49	69	79	84
>75% ground cover and lightly or only occasionally grazed.	Good	39	61	74	80
Meadow -- continuous grass, protected from grazing and generally mowed for hay	--	30	58	71	78
Brush – weed-grass mixture with brush as the major element					
<50% ground cover	Poor	48	67	77	83
50% to 75% ground cover	Fair	35	56	70	77
>75% ground cover	Good	30 [2]	48	65	73
Woods – grass combination (orchard or tree farm) [3]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods					
Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.	Poor	45	66	77	83
Woods are grazed but not burned, and some forest litter covers the soil.	Fair	36	60	73	79
Woods are protected from grazing, and litter and brush adequately cover the soil.	Good	30 [2]	55	70	77
Farmsteads -- buildings, lanes, driveways, and surrounding lots	--	59	74	82	86

1: Average runoff condition, and $I_a = 0.2S$.

2: Actual curve number is less than 30; use CN = 30 for runoff computations.

3: CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

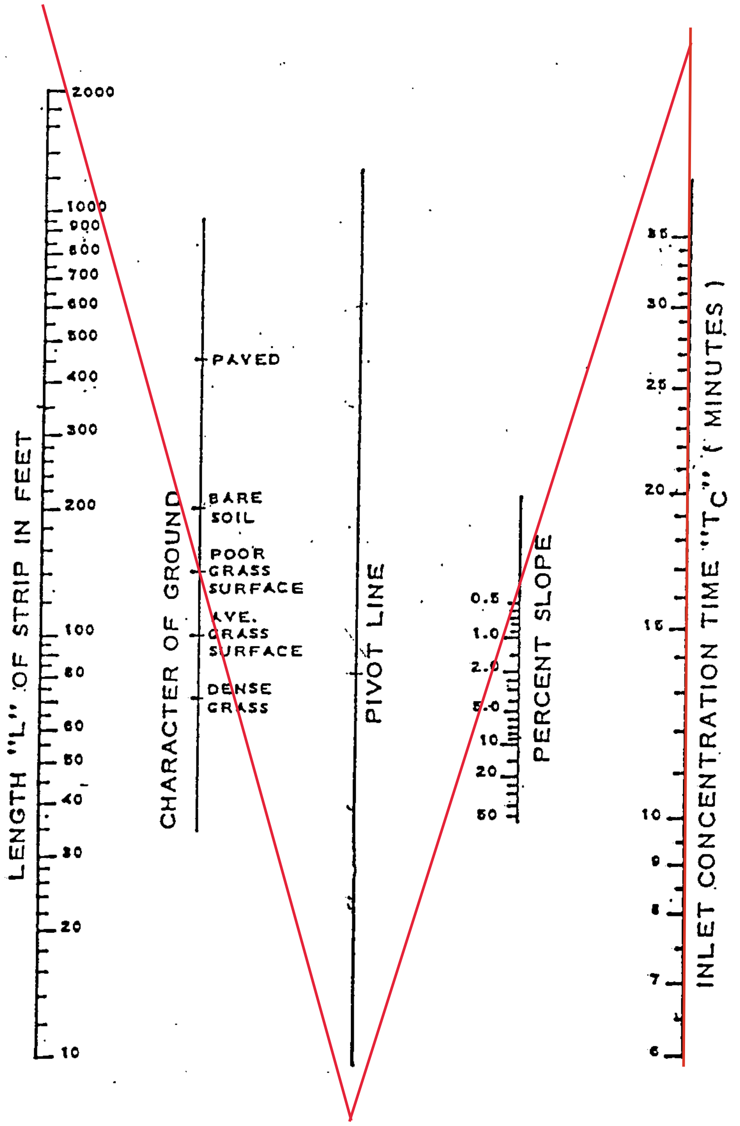
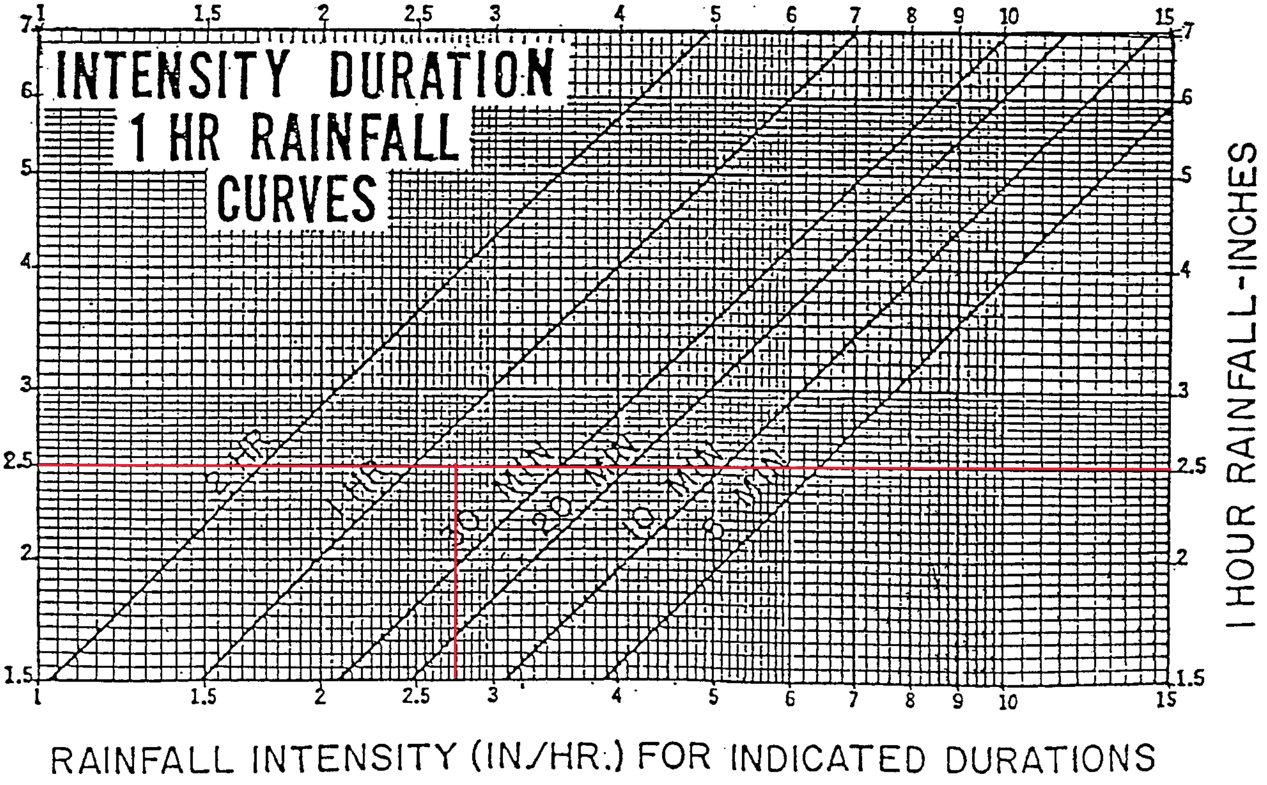


Plate 1

Overland Flow Chart

Plate 2



BASIN 1 PRE-DEVELOPMENT

Plate 1

Overland Flow Chart

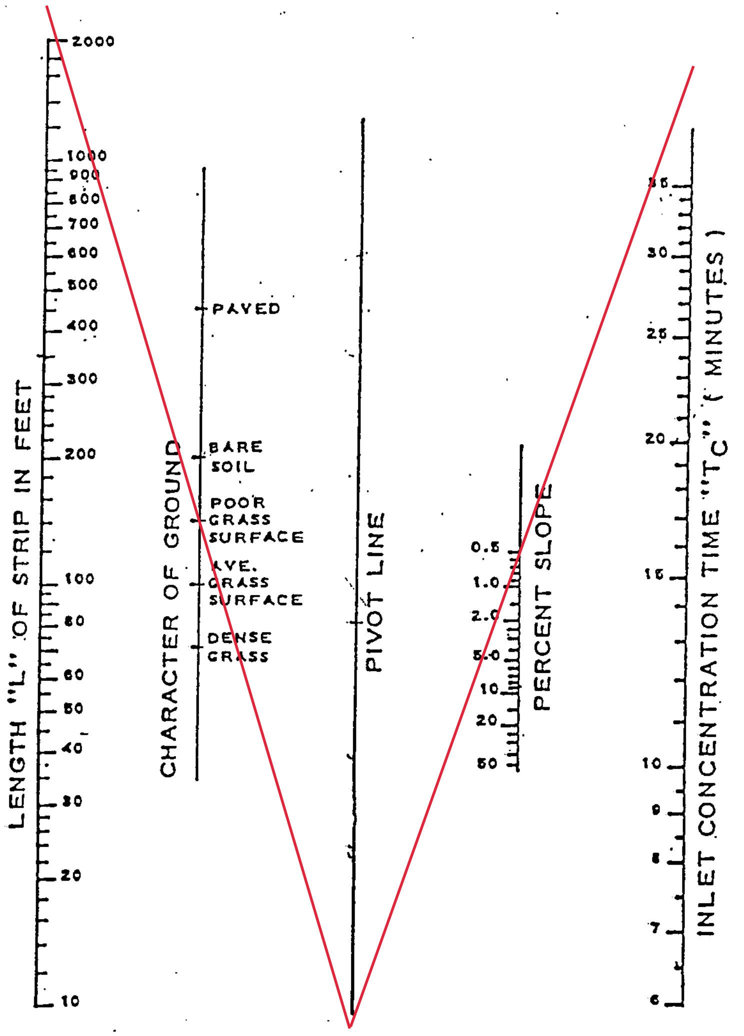
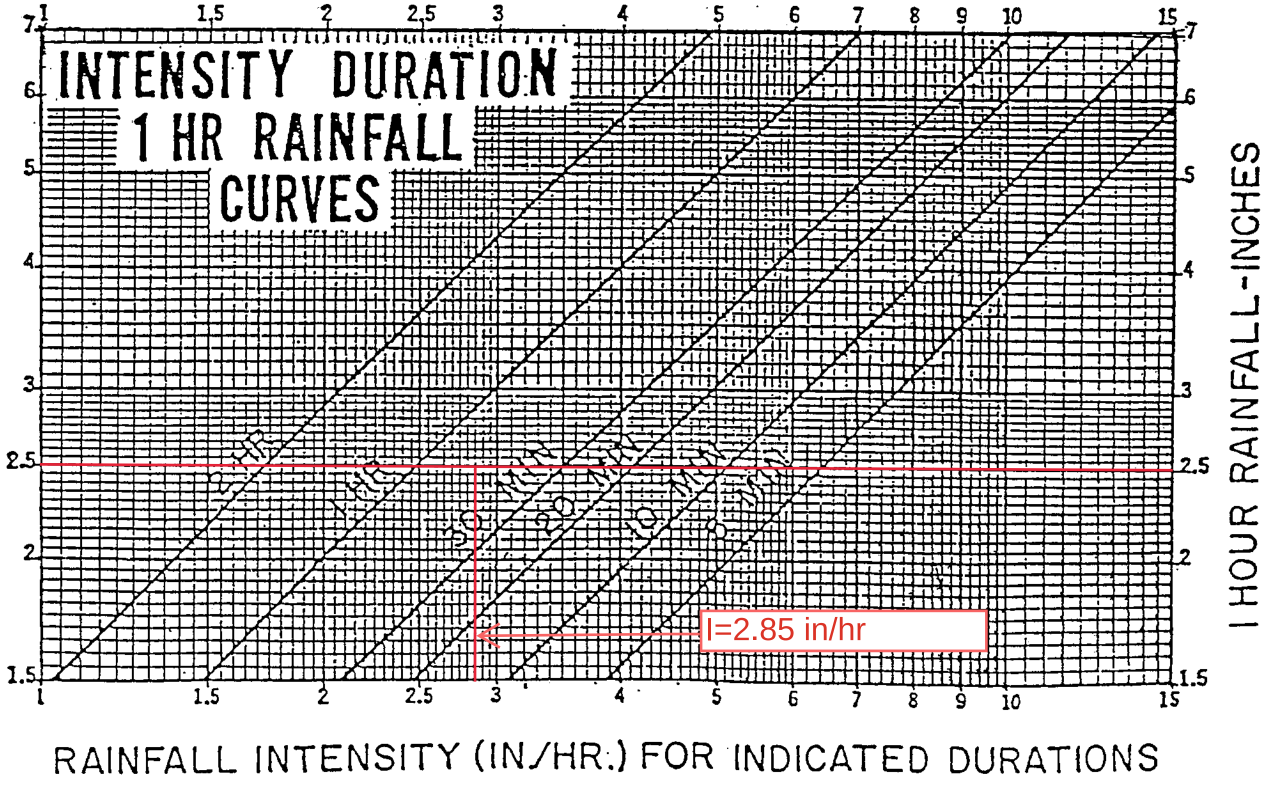


Plate 2



BASIN 2 PRE-DEVELOPMENT

BASIN 3 PRE-DEVELOPMENT
Plate 7 = 2.5 inches
Tc = 25 min.
Intensity = 3.75 in./hr.

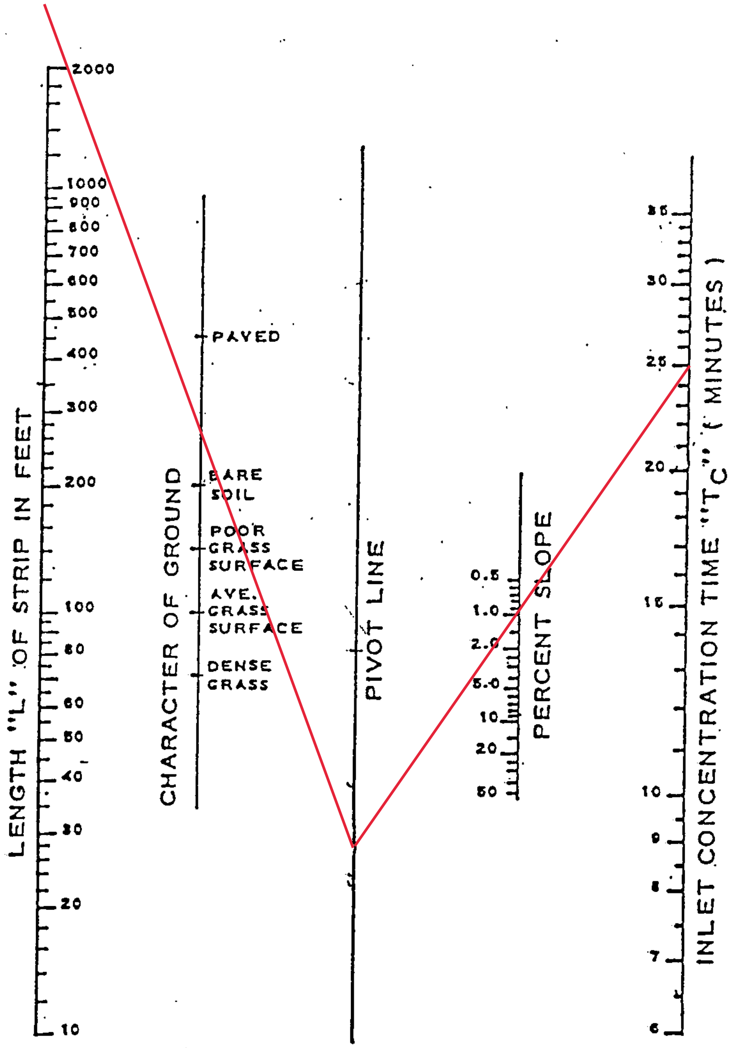
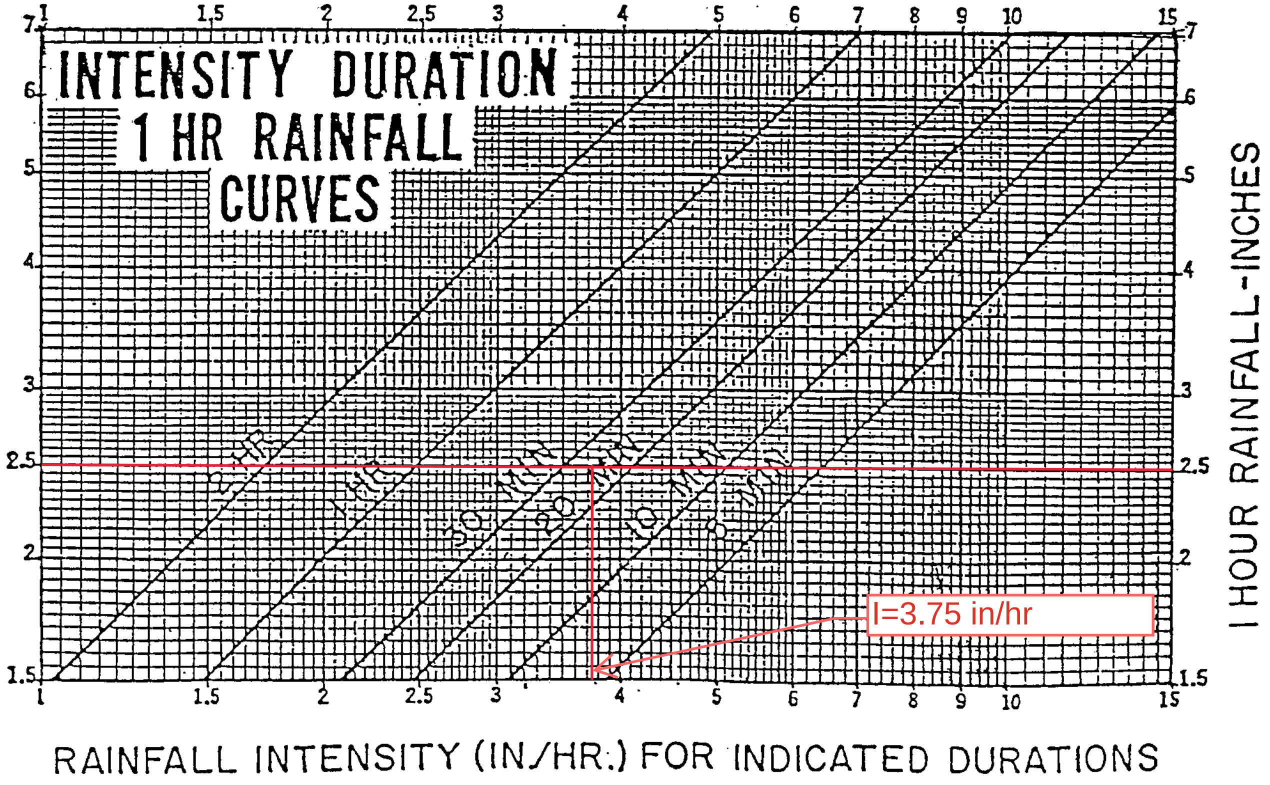


Plate 1

Overland Flow Chart

Plate 2

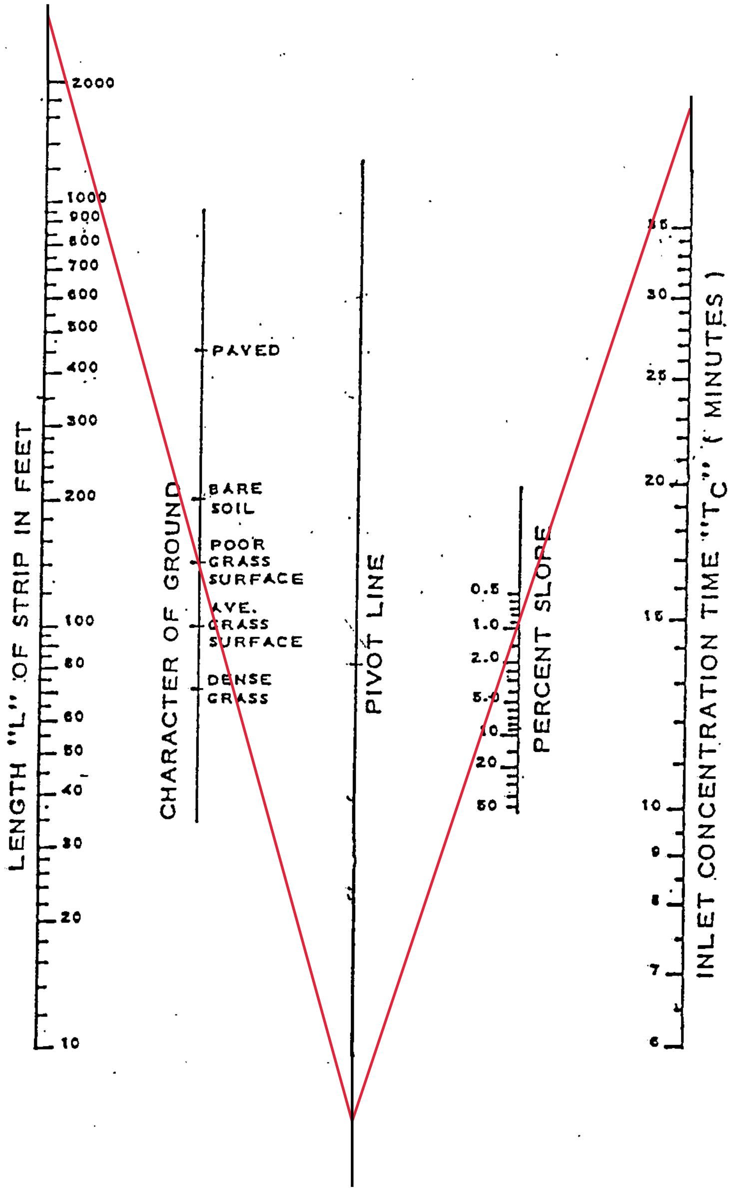


I=3.75 in/hr

BASIN 4 PRE-DEVELOPMENT
Plate 7 = 2.5 inches
Tc = 43 min.
Intensity = 2.9 in./hr.

Plate 1

Overland Flow Chart



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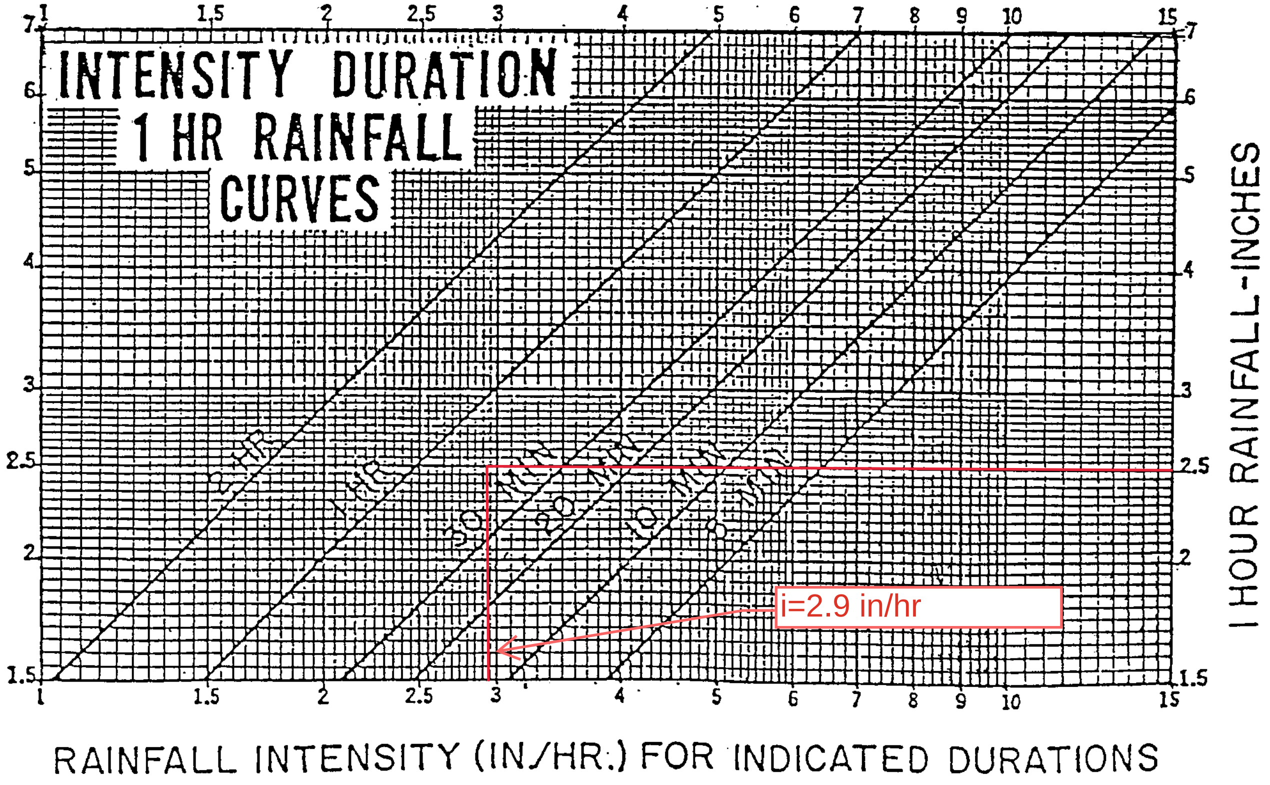


BASIN 5 PRE-DEVELOPMENT
Plate 7 = 2.5 inches
Tc = 37 min.
Intensity = 3.25 in./hr.

Plate 1

Overland Flow Chart

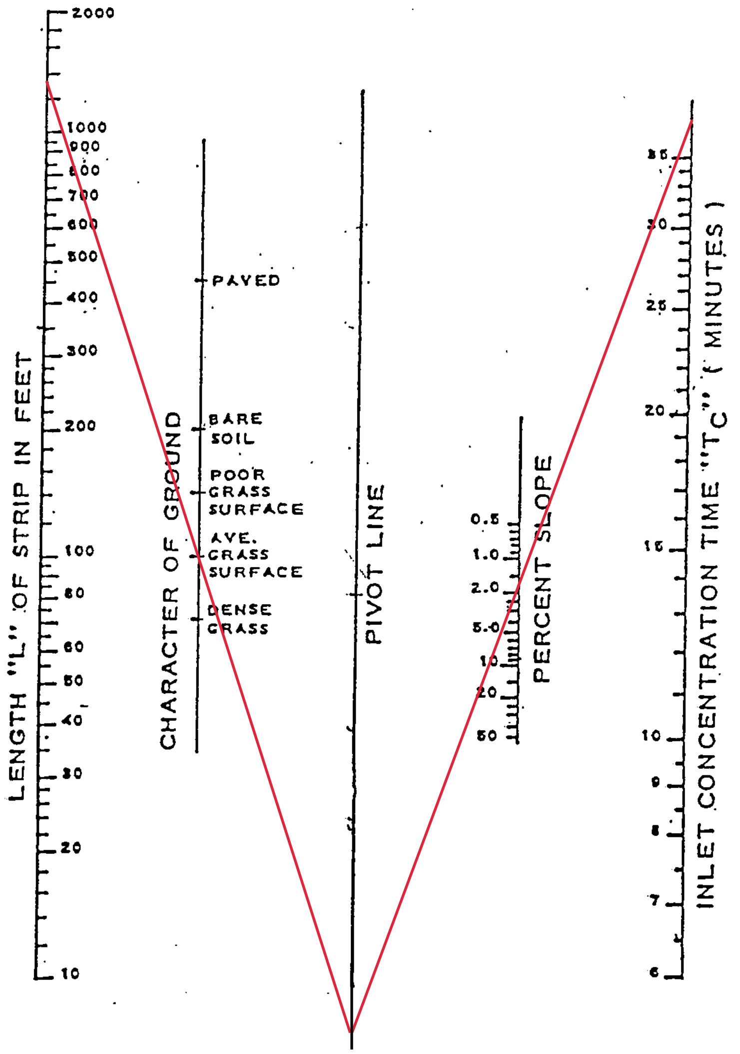
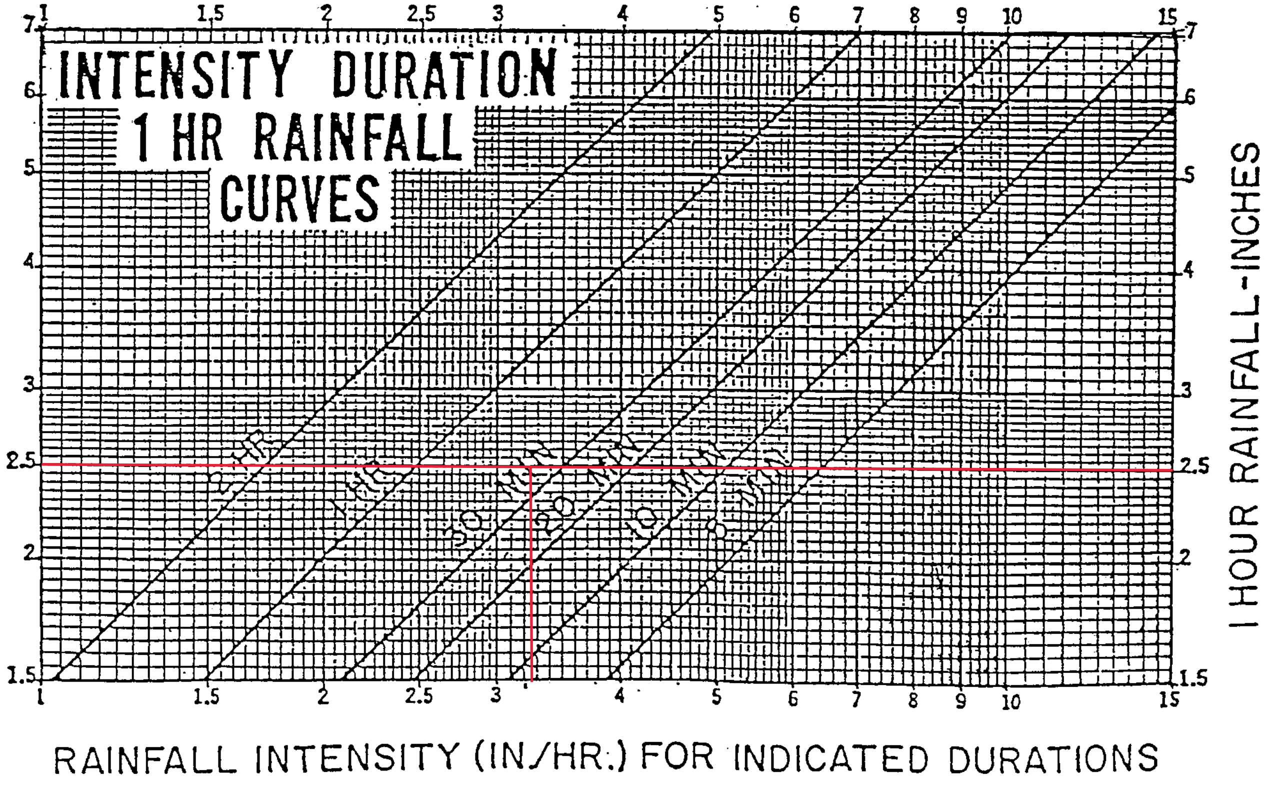


Plate 2



BASIN 6 PRE-DEVELOPMENT
Plate 7 = 2.5 inches
Tc = 37 min.
Intensity = 3.25 in./hr.

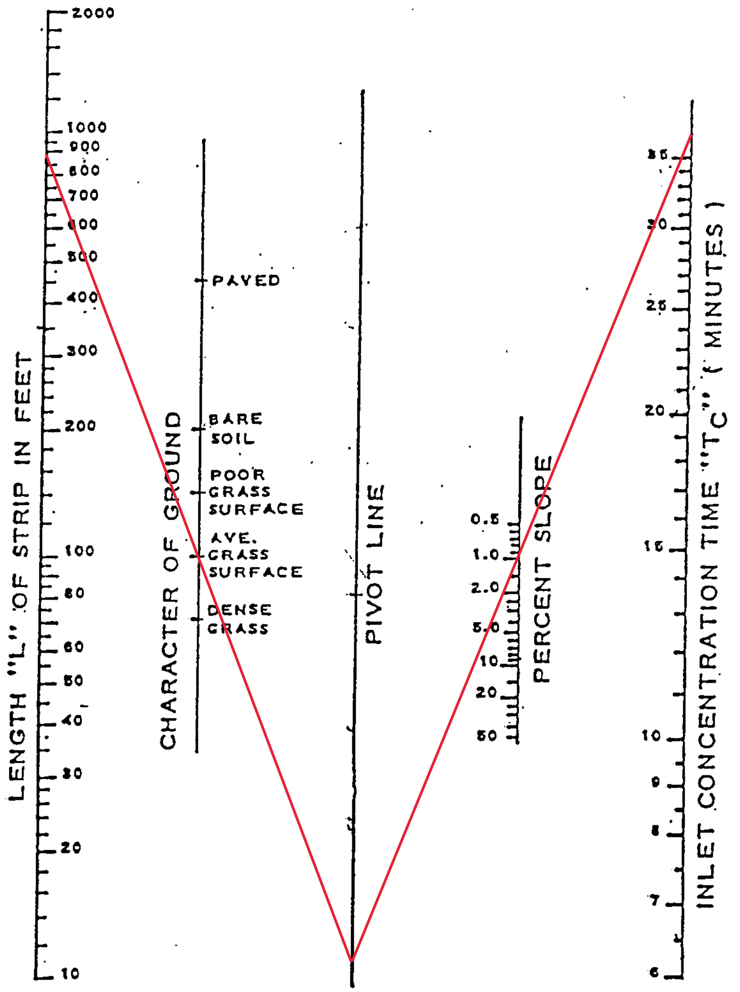
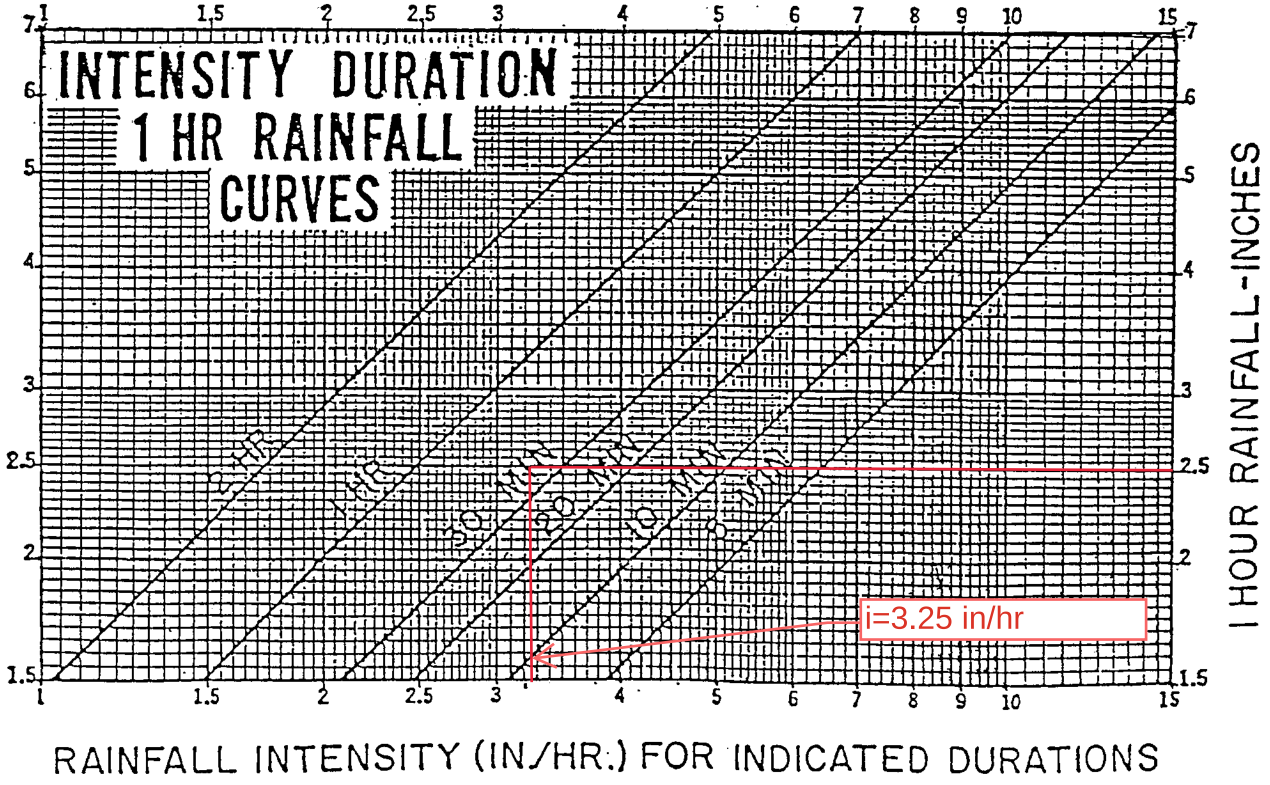


Plate 1

Overland Flow Chart

Plate 2



BASIN 7 PRE-DEVELOPMENT
Plate 7 = 2.5 inches
Tc = 24.5 min.
Intensity = 3.9 in./hr.

Plate 1

Overland Flow Chart

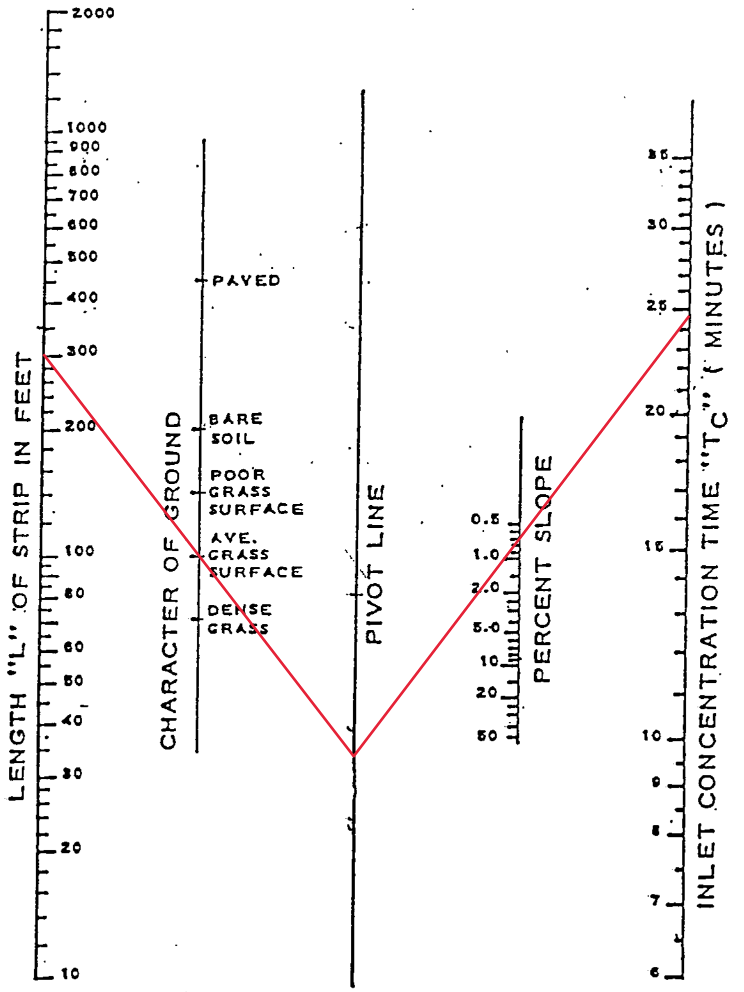
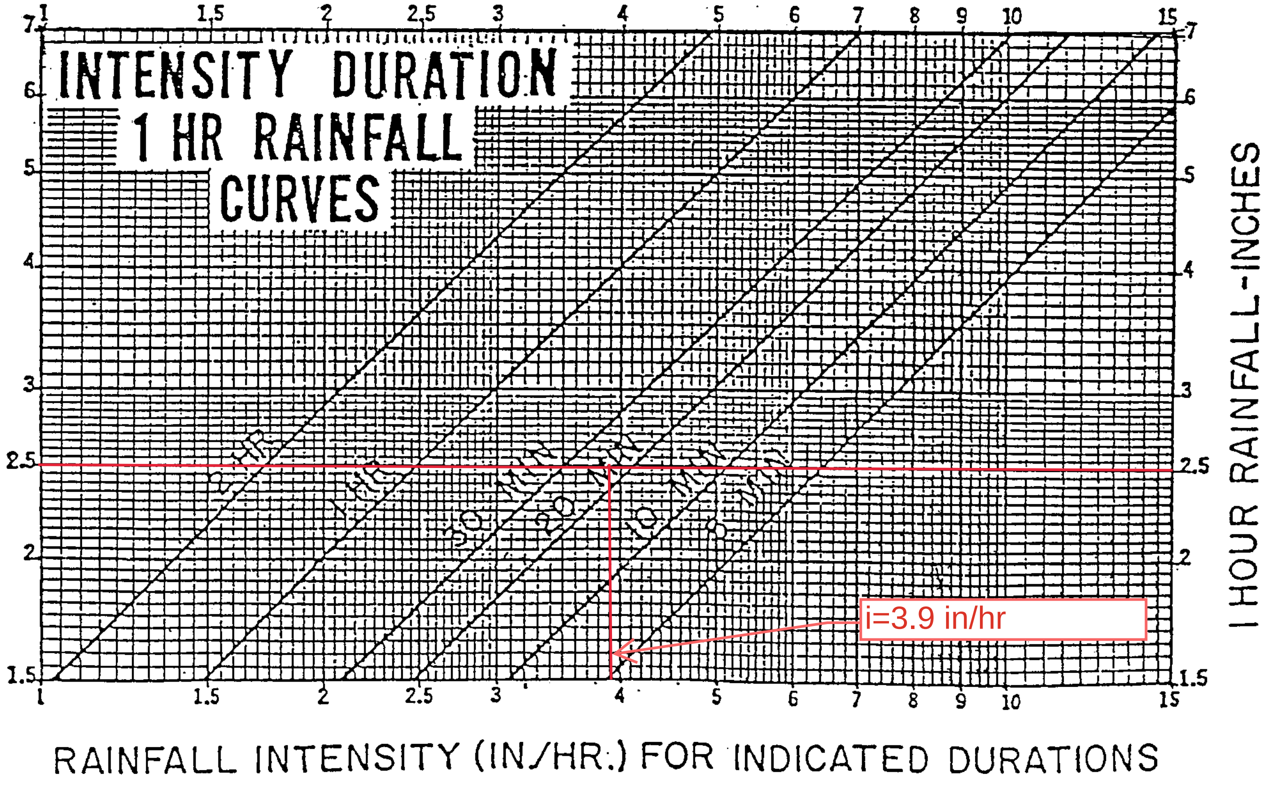


Plate 2



BASIN 8 PRE-DEVELOPMENT
Plate 7 = 2.5 inches
Tc = 50.0 min.
Intensity = 2.75 in./hr.

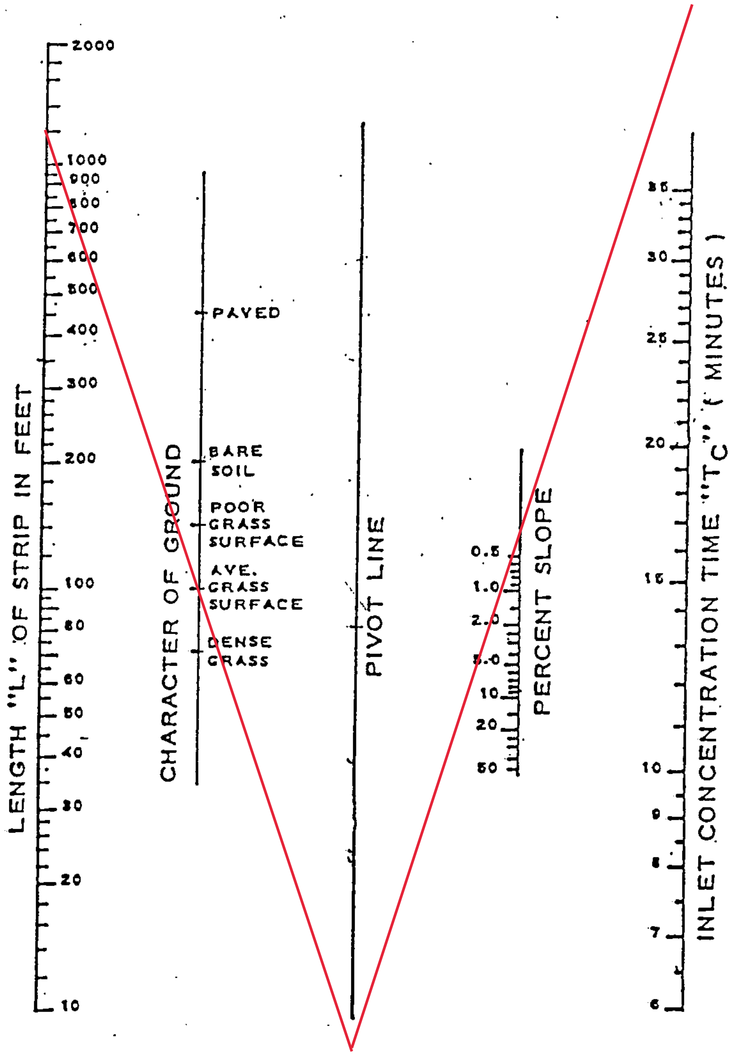
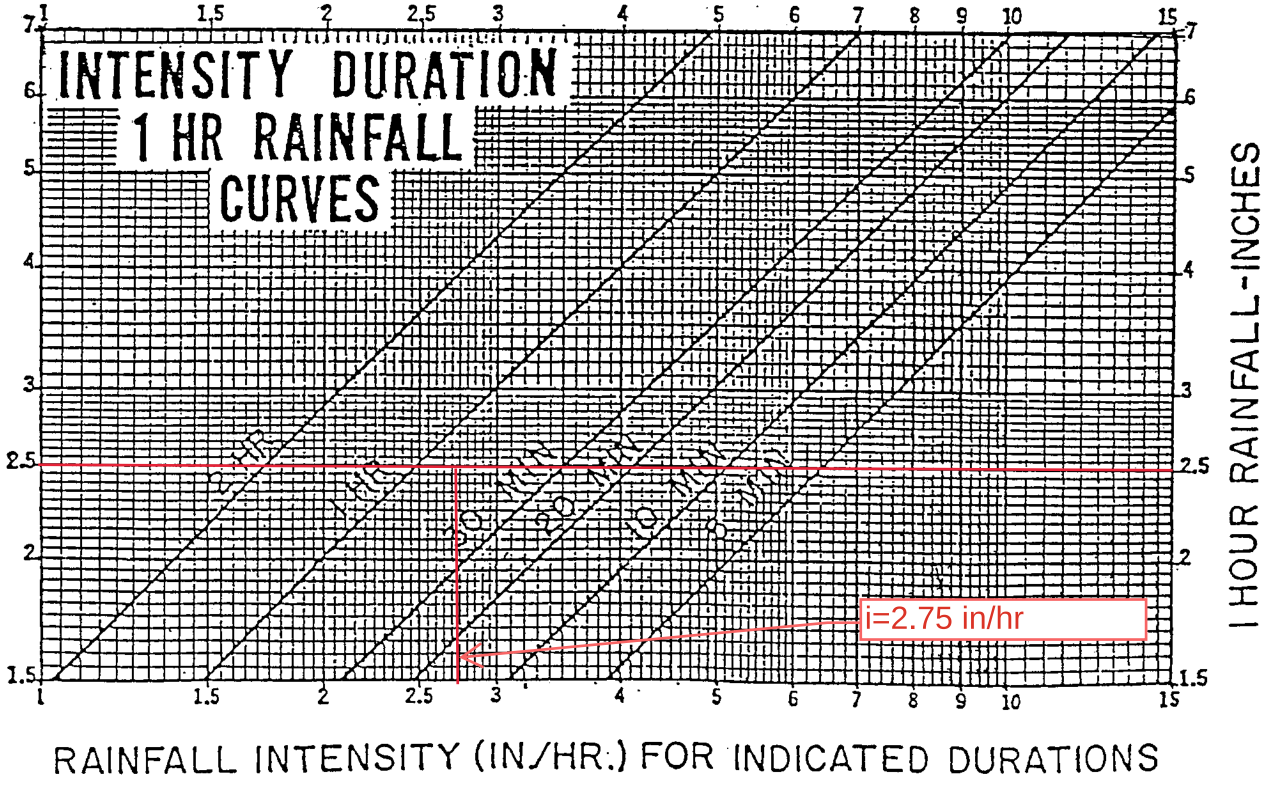


Plate 1

Overland Flow Chart

Plate 2



PIONEER DESIGN GROUP-HAWAI'I

PREDEVELOPED BASIN & DISCHARGE POINT ANALYSIS
(100 YEAR, 24 HR STORM EVENT)

JOB NUMBER: H109-001
PROJECT: Hoonani Village
FILE: H1091_PER Hydro

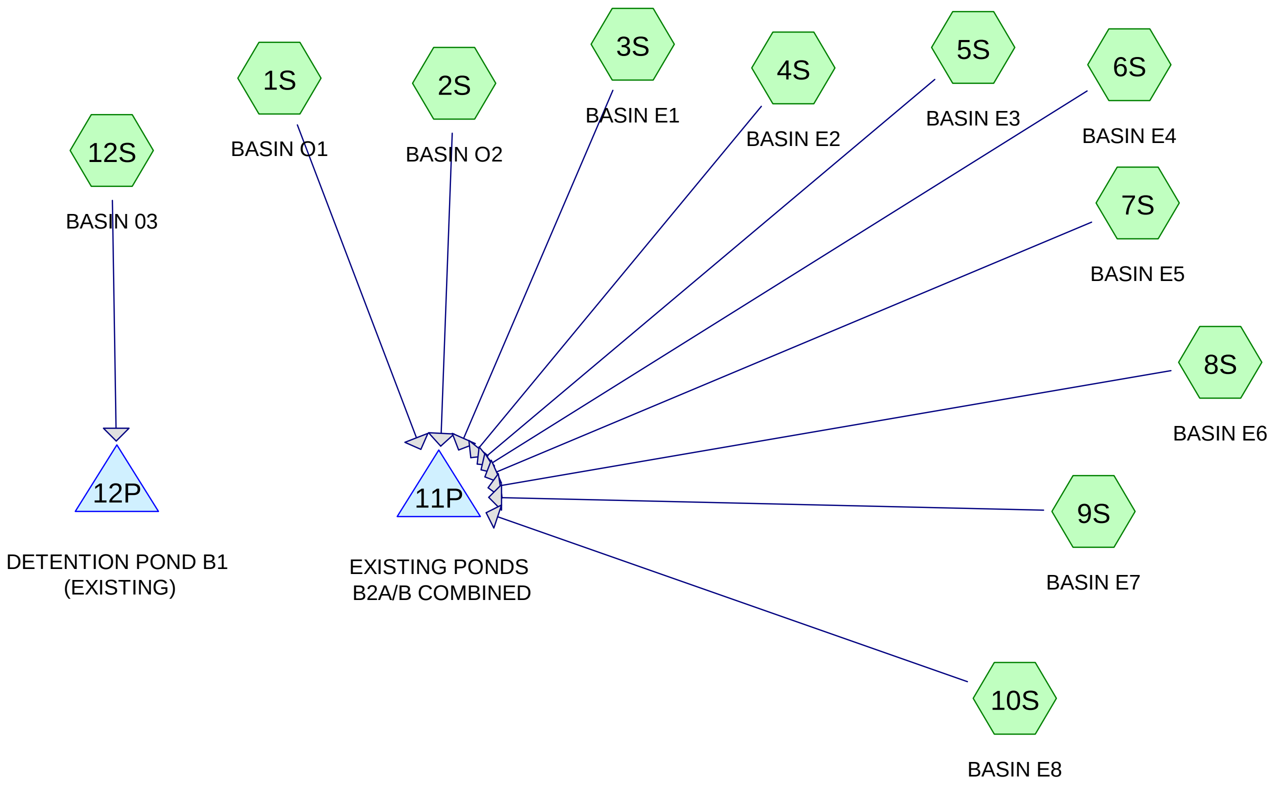
PRE-DEVELOPED ON-SITE ANALYSIS					
DISCHARGE POINT #	**CONTRIBUTING BASINS**	**BASIN AREA (AC)**	**PREDEVELOPED FLOW RATE (CFS)**	**PREDEVELOPED VOL. (AC-FT)**	**TYPE OF FLOW**
1	E1	49.060	61.26	16.291	Channel Flow from existing cutoff/irrigation ditch that outfalls to Pulehu Road.
2	E2	37.666	52.23	12.509	Channel Flow from existing cutoff/irrigation ditch that outfalls to Pulehu Road.
3	E3	5.767	10.74	1.916	Shallow concentrated flow that flows along the existing farm road
4	E4	60.359	82.40	20.844	Shallow concentrated flow that flows along the existing farm road
5	E5	21.335	31.78	7.083	Sheetflow from south to north
6	E6	12.618	18.80	4.191	Sheetflow from south to north
7	E7	0.663	1.24	0.219	Sheetflow from south to north
8	E8	2.044	2.55	0.677	Channel flow in existing drainage ditch
	ALL BASINS ON SITE	**189.511**	**261.00**	**63.73**	

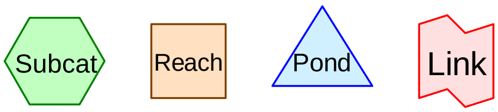
PRE-DEVELOPED UPSTREAM BASIN ANALYSIS

DISCHARGE POINT #	CONTRIBUTING BASINS	BASIN AREA (AC)	PREDEVELOPED FLOW RATE (CFS)	PREDEVELOPED VOL. (AC-FT)	TYPE OF FLOW
HANSEN ROAD	O1	141.420	153.38	41.100	Upstream sheet flow towards Hansen Road. Flow to be collected in new storm system on Hansen Road and conveyed to a detention pond.
BASIN B2A & B2B	O2	6.650	11.29	2.280	Upstream sheet flow towards Pulehu Road. Flow to be collected in an area drain along Pulehu Road and discharged by a pipe into a detention pond, B2B.
BASIN B1	O3	140.680	243.67	67.230	Channel flow to existing detention basin B1. Flow does not change in the developed condition.
	UPSTREAM BASINS	**288.750**	**408.34**	**110.61**	

PRE-DEVELOPED EXISTING & DESIGNED DETENTION BASIN ANALYSIS

BASIN LABEL	CONTRIBUTING BASINS	AVAILABLE STORAGE (AC-FT)	PREDEVELOPED FLOW RATE (CFS)	PREDEVELOPED VOL. (AC-FT)	AVAILABLE VOLUME (AC-FT)
BASIN B1	O3	87.600	243.67	67.230	20.37
BASIN B2A & B2B	O1, O2, E1-8	100.200	425.67	107.11	-6.91
		187.800	**669.34**	**174.34**	





Routing Diagram for PRELIM PREDEVELOPED HYDRO
Prepared by Pioneer Design Group, Printed 10/1/2024
HydroCAD® 10.20-4b s/n 09255 © 2023 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
189.510	58	(3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S)
140.680	72	(12S)
141.420	54	UPSTREAM BASIN O1 (1S)
6.650	59	UPSTREAM BASIN O2 (2S)
478.260	**61**	**TOTAL AREA**

Time span=5.00-30.00 hrs, dt=0.05 hrs, 501 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: BASIN O1 Runoff Area=141.420 ac 0.00% Impervious Runoff Depth=3.49"
Tc=46.5 min CN=54 Runoff=153.38 cfs 41.099 af

Subcatchment 2S: BASIN O2 Runoff Area=6.650 ac 0.00% Impervious Runoff Depth=4.11"
Tc=31.7 min CN=59 Runoff=11.29 cfs 2.277 af

Subcatchment 3S: BASIN E1 Runoff Area=49.060 ac 0.00% Impervious Runoff Depth=3.98"
Tc=50.0 min CN=58 Runoff=61.26 cfs 16.291 af

Subcatchment 4S: BASIN E2 Runoff Area=37.670 ac 0.00% Impervious Runoff Depth=3.98"
Tc=42.0 min CN=58 Runoff=52.23 cfs 12.509 af

Subcatchment 5S: BASIN E3 Runoff Area=5.770 ac 0.00% Impervious Runoff Depth=3.98"
Tc=25.0 min CN=58 Runoff=10.74 cfs 1.916 af

Subcatchment 6S: BASIN E4 Runoff Area=60.360 ac 0.00% Impervious Runoff Depth=3.98"
Tc=43.0 min CN=58 Runoff=82.40 cfs 20.044 af

Subcatchment 7S: BASIN E5 Runoff Area=21.330 ac 0.00% Impervious Runoff Depth=3.98"
Tc=37.0 min CN=58 Runoff=31.78 cfs 7.083 af

Subcatchment 8S: BASIN E6 Runoff Area=12.620 ac 0.00% Impervious Runoff Depth=3.98"
Tc=37.0 min CN=58 Runoff=18.80 cfs 4.191 af

Subcatchment 9S: BASIN E7 Runoff Area=0.660 ac 0.00% Impervious Runoff Depth=3.98"
Tc=24.5 min CN=58 Runoff=1.24 cfs 0.219 af

Subcatchment 10S: BASIN E8 Runoff Area=2.040 ac 0.00% Impervious Runoff Depth=3.98"
Tc=50.0 min CN=58 Runoff=2.55 cfs 0.677 af

Subcatchment 12S: BASIN 03 Runoff Area=140.680 ac 0.00% Impervious Runoff Depth>5.73"
Tc=62.2 min CN=72 Runoff=243.67 cfs 67.230 af

Pond 11P: EXISTING PONDS B2A/B Peak Elev=37.80' Storage=35.580 af Inflow=413.32 cfs 106.306 af
Outflow=69.77 cfs 106.305 af

Pond 12P: DETENTION POND B1 (EXISTING) Peak Elev=39.90' Storage=23.573 af Inflow=243.67 cfs 67.230 af
Outflow=42.20 cfs 67.230 af

Total Runoff Area = 478.260 ac Runoff Volume = 173.536 af Average Runoff Depth = 4.35"
100.00% Pervious = 478.260 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: BASIN O1

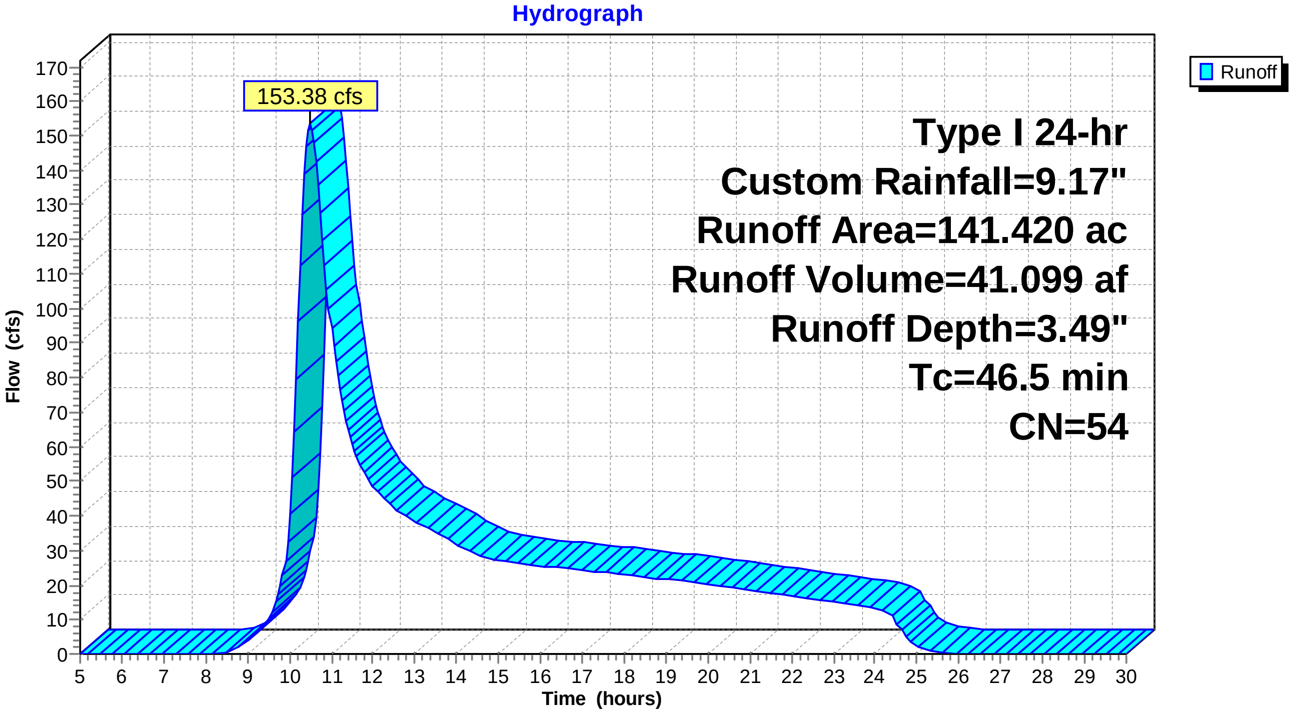
Runoff = 153.38 cfs @ 10.50 hrs, Volume= 41.099 af, Depth= 3.49"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	141.420	54	UPSTREAM BASIN O1
	141.420		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.5					**Direct Entry, PREDEV TOC**

Subcatchment 1S: BASIN O1



Summary for Subcatchment 2S: BASIN O2

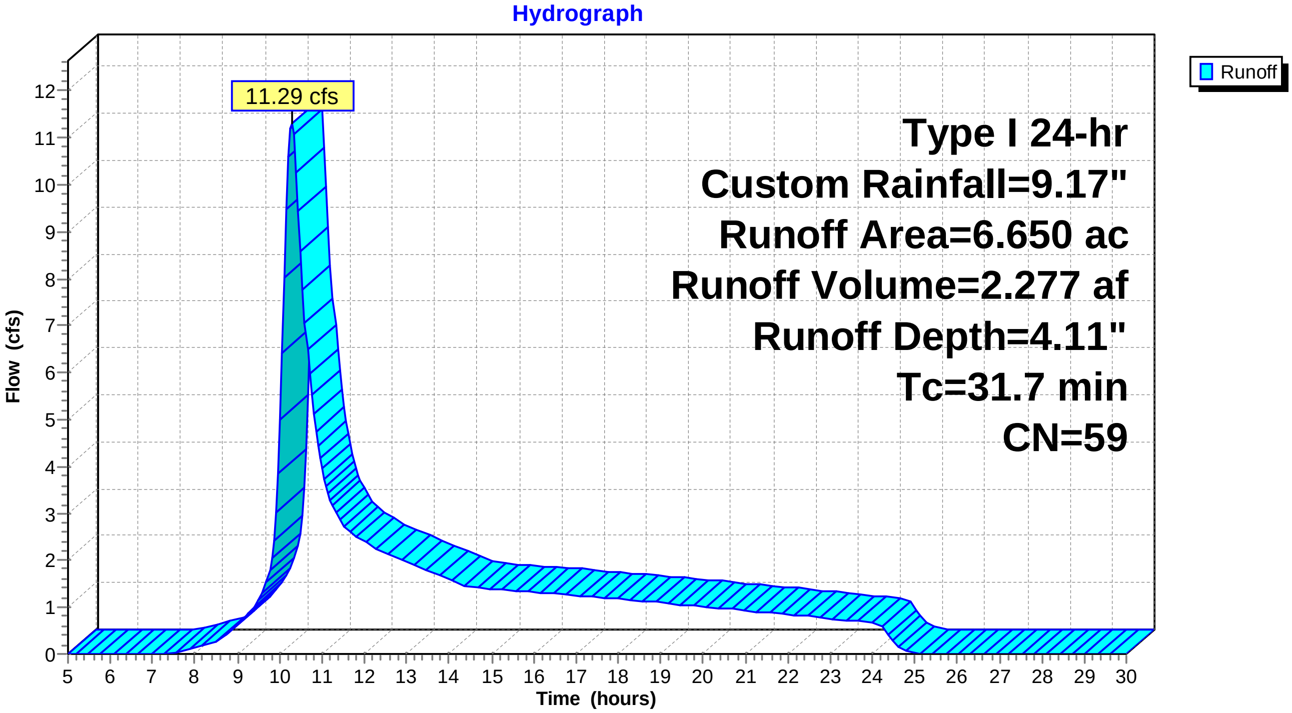
Runoff = 11.29 cfs @ 10.28 hrs, Volume= 2.277 af, Depth= 4.11"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	6.650	59	UPSTREAM BASIN O2
	6.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry,**

Subcatchment 2S: BASIN O2



Summary for Subcatchment 3S: BASIN E1

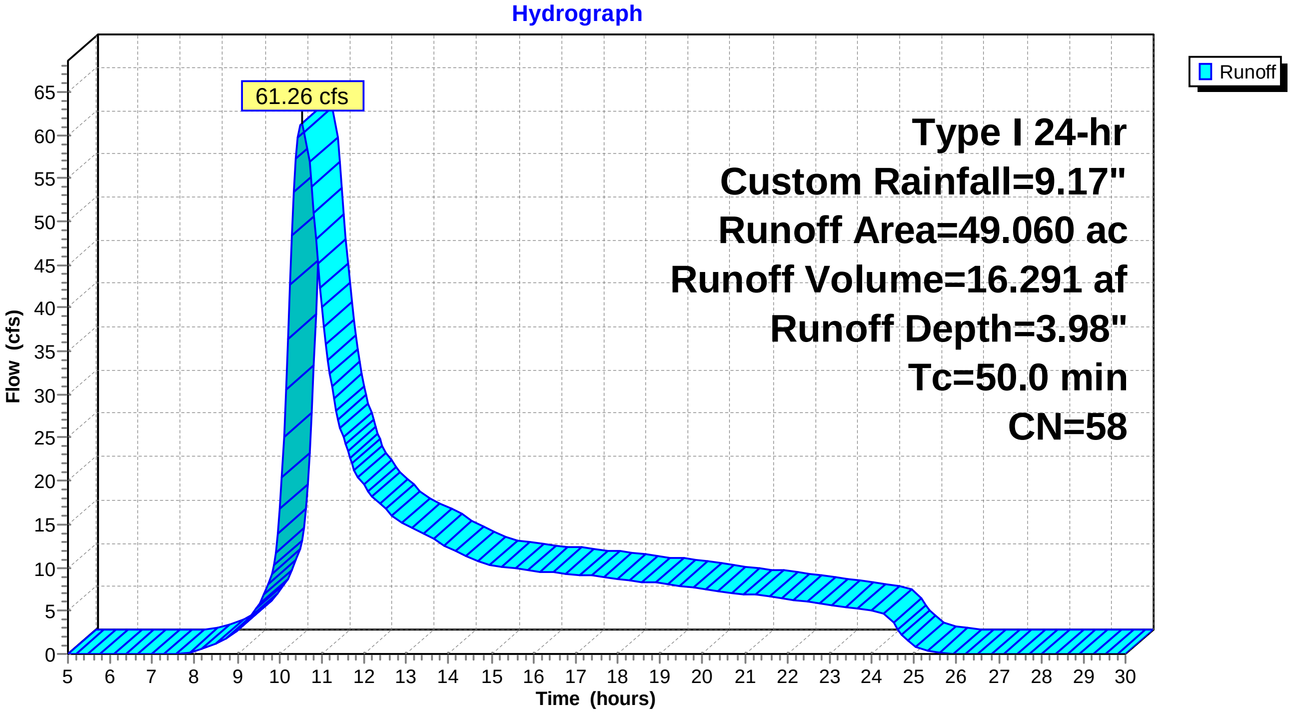
Runoff = 61.26 cfs @ 10.53 hrs, Volume= 16.291 af, Depth= 3.98"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	49.060	58	
	49.060		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.0					**Direct Entry,**

Subcatchment 3S: BASIN E1



Summary for Subcatchment 4S: BASIN E2

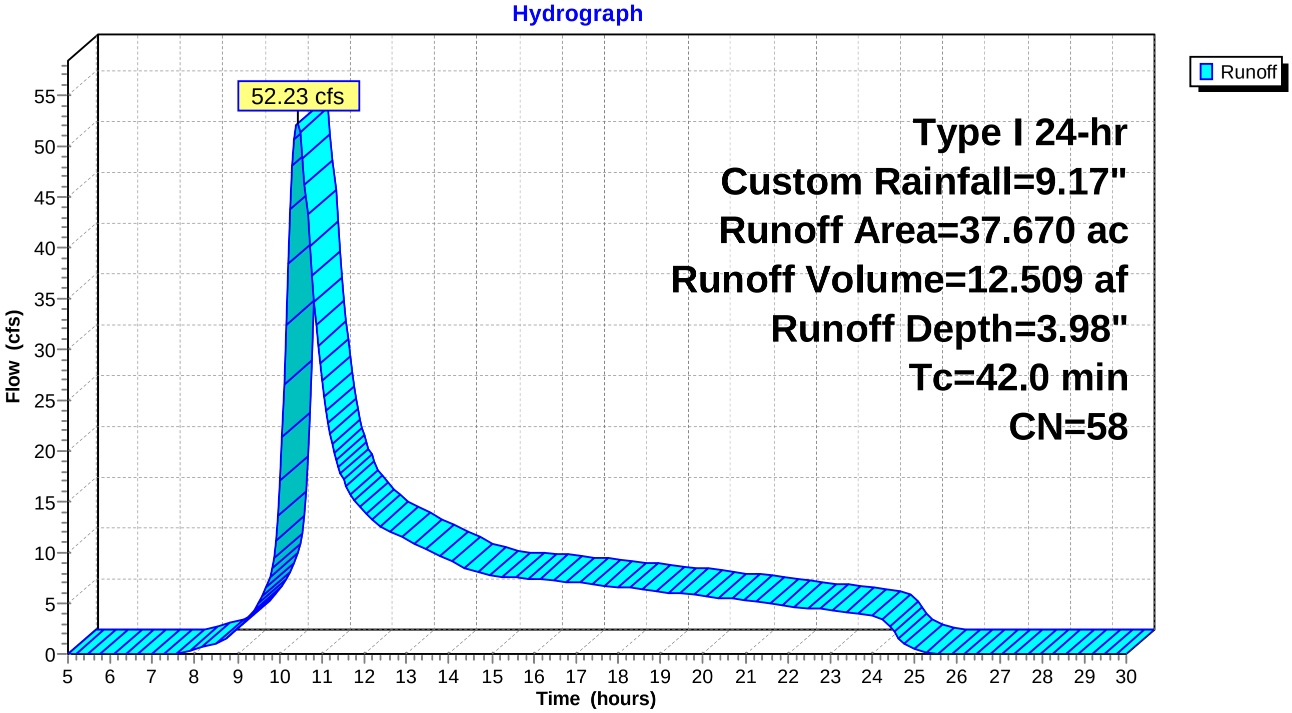
Runoff = 52.23 cfs @ 10.42 hrs, Volume= 12.509 af, Depth= 3.98"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	37.670	58	
	37.670		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
42.0					**Direct Entry,**

Subcatchment 4S: BASIN E2



Summary for Subcatchment 5S: BASIN E3

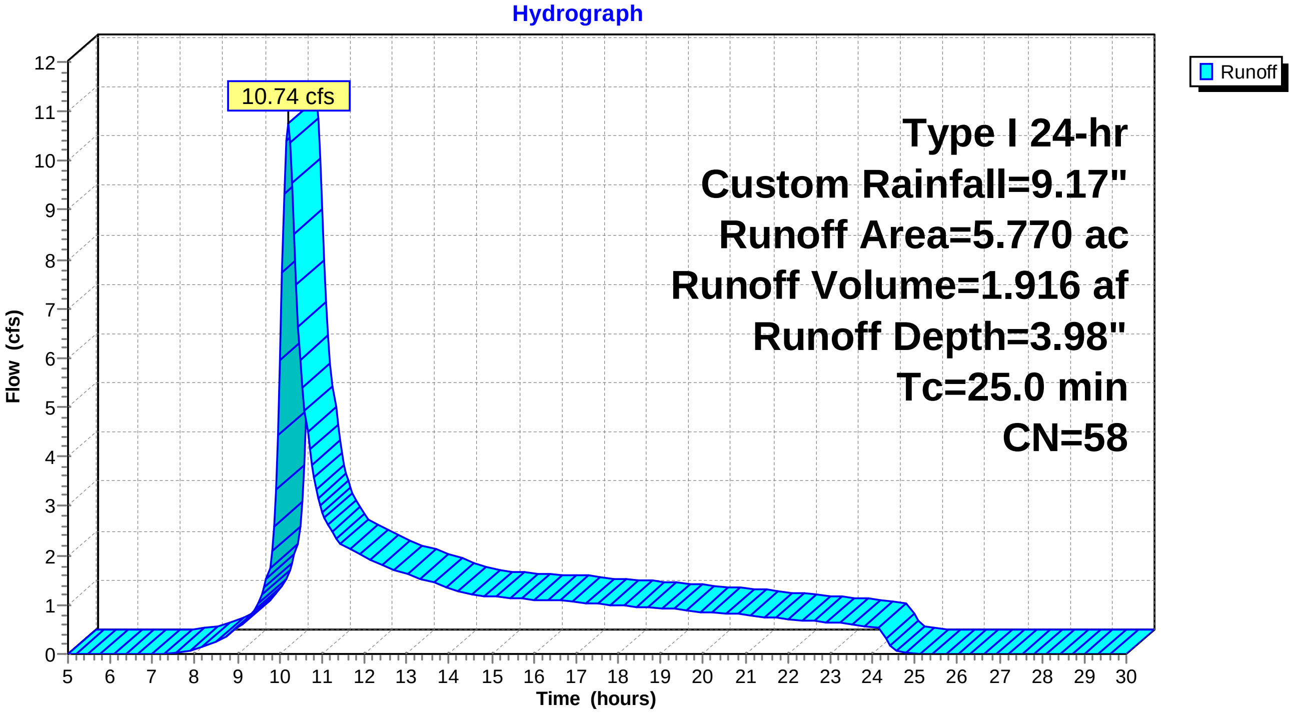
Runoff = 10.74 cfs @ 10.20 hrs, Volume= 1.916 af, Depth= 3.98"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	5.770	58	
	5.770		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
25.0					**Direct Entry,**

Subcatchment 5S: BASIN E3



Summary for Subcatchment 6S: BASIN E4

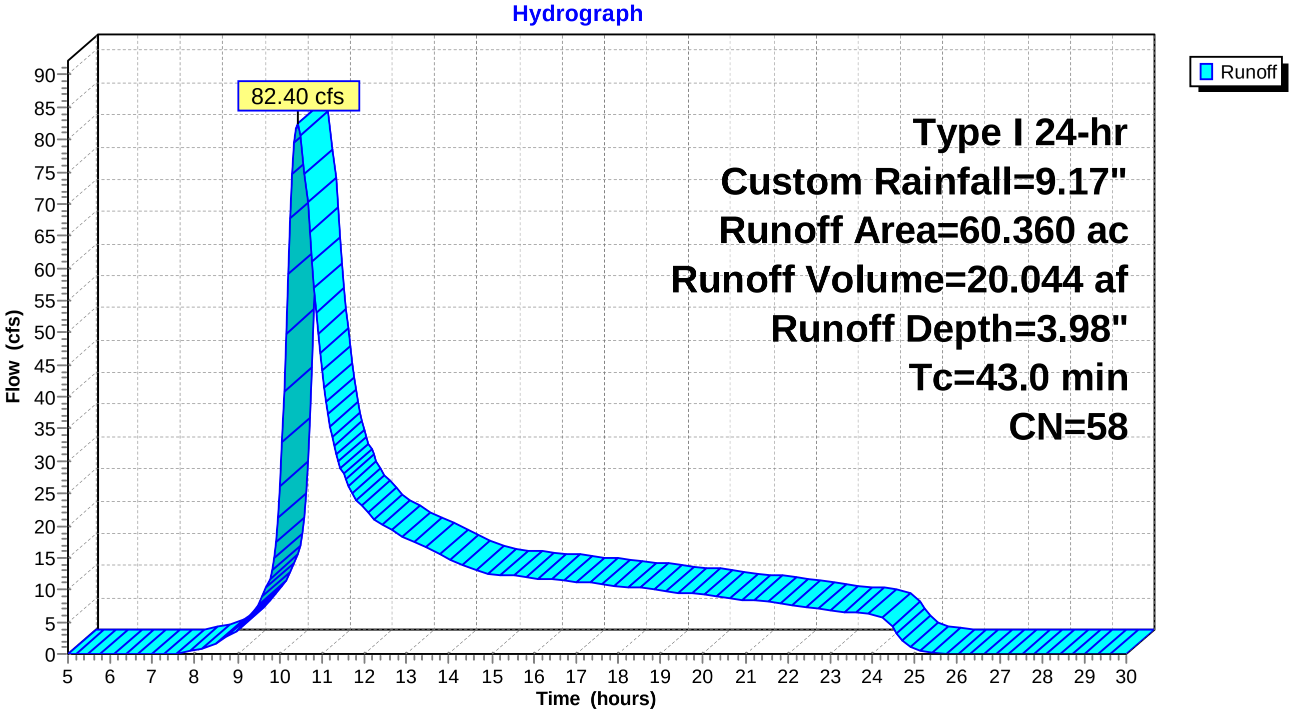
Runoff = 82.40 cfs @ 10.44 hrs, Volume= 20.044 af, Depth= 3.98"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	60.360	58	
	60.360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
43.0					**Direct Entry,**

Subcatchment 6S: BASIN E4



Summary for Subcatchment 7S: BASIN E5

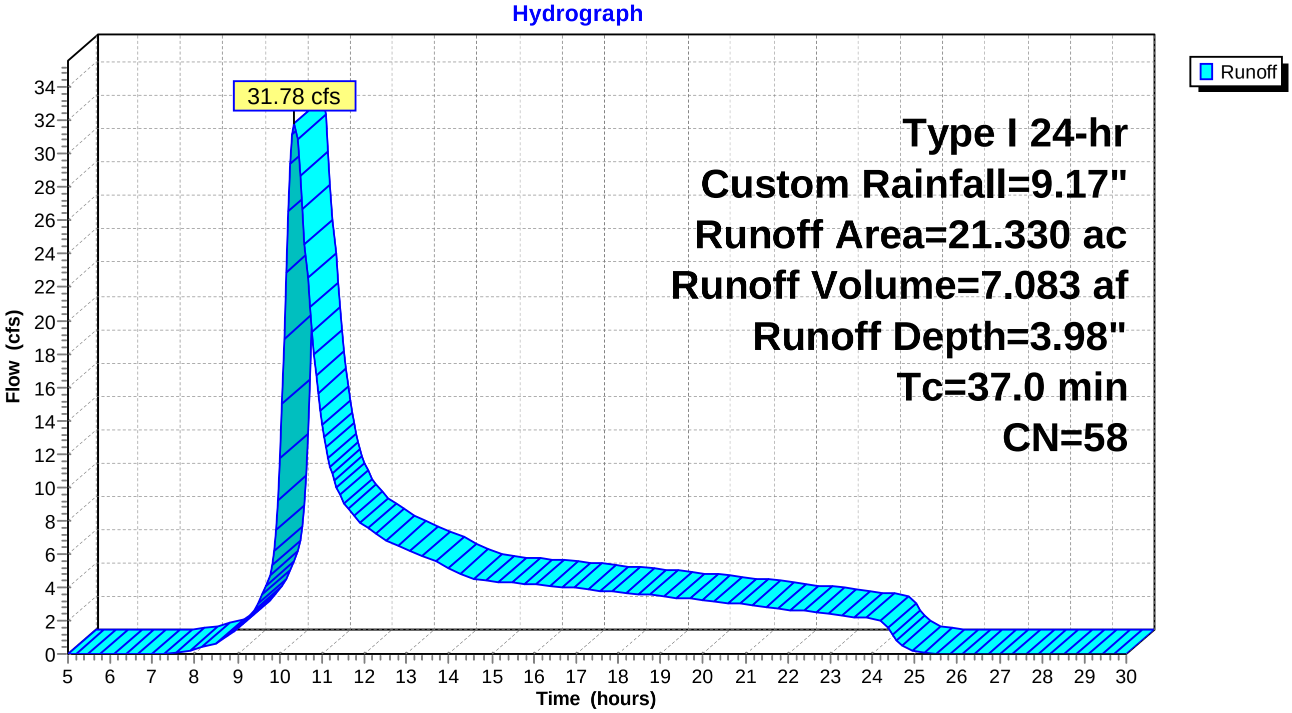
Runoff = 31.78 cfs @ 10.36 hrs, Volume= 7.083 af, Depth= 3.98"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	21.330	58	
	21.330		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.0					**Direct Entry,**

Subcatchment 7S: BASIN E5



Summary for Subcatchment 8S: BASIN E6

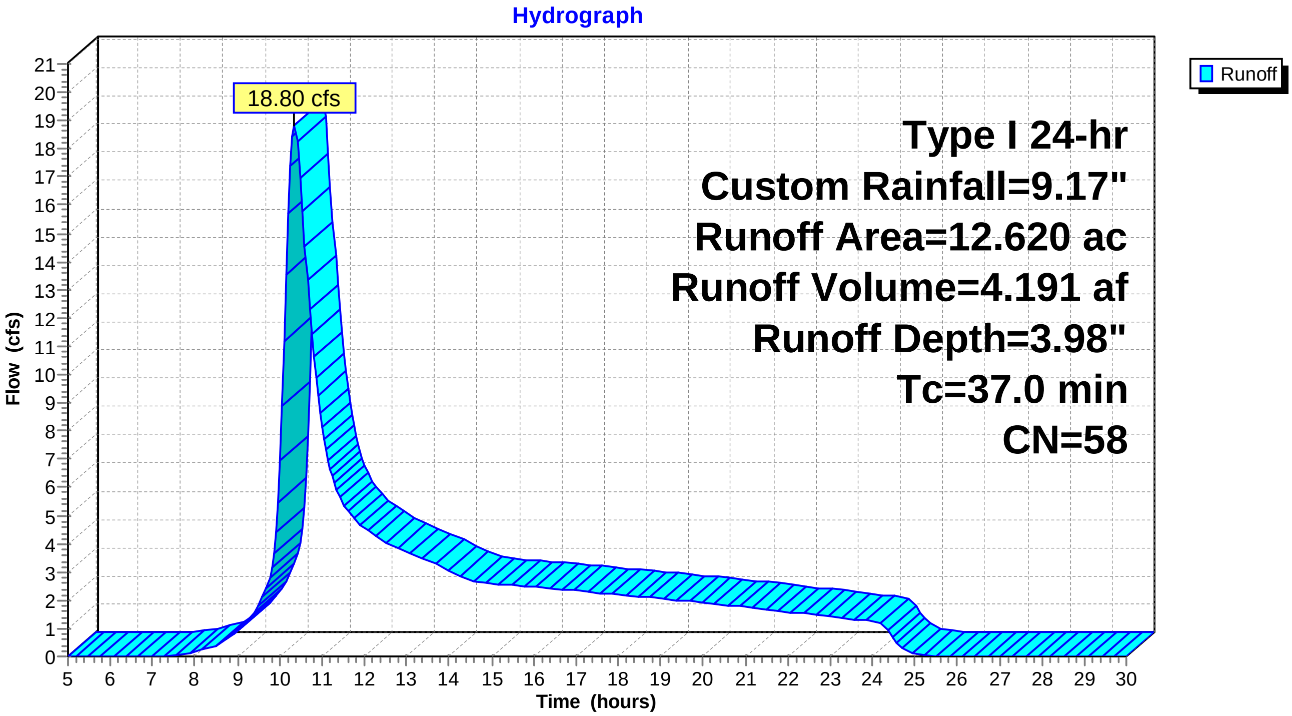
Runoff = 18.80 cfs @ 10.36 hrs, Volume= 4.191 af, Depth= 3.98"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	12.620	58	
	12.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
37.0					**Direct Entry,**

Subcatchment 8S: BASIN E6



Summary for Subcatchment 9S: BASIN E7

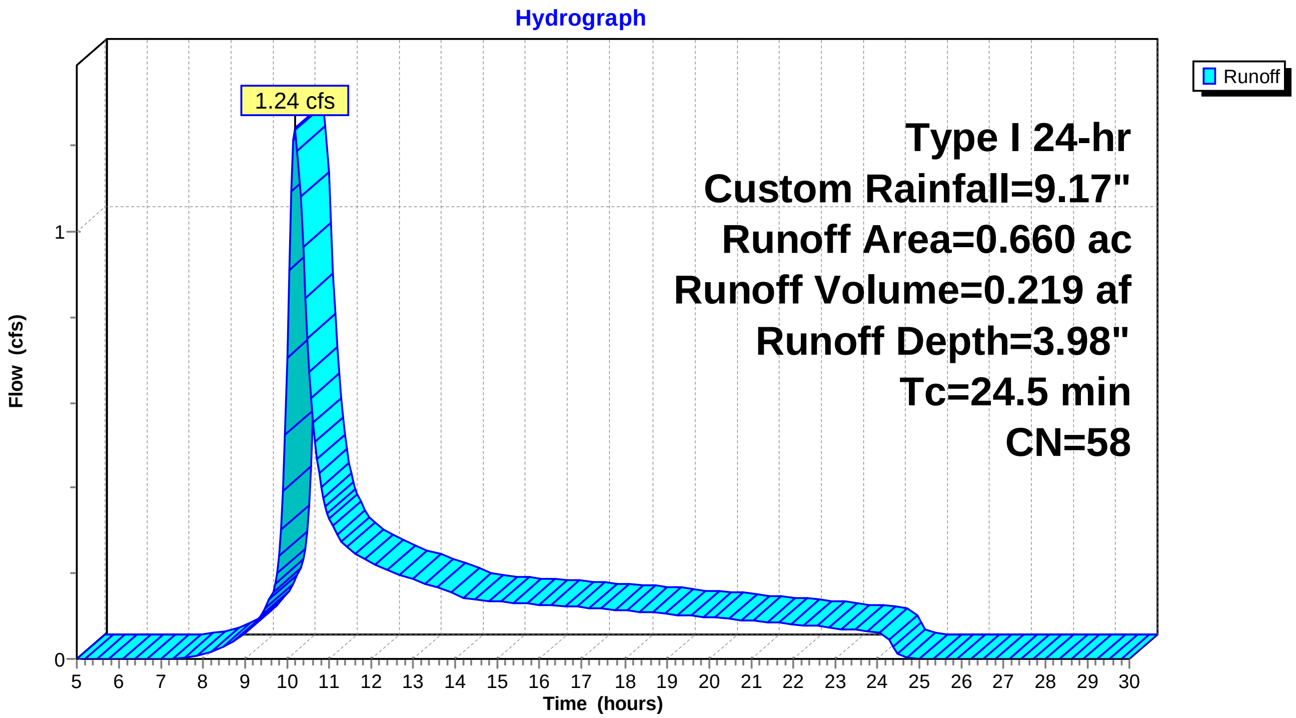
Runoff = 1.24 cfs @ 10.19 hrs, Volume= 0.219 af, Depth= 3.98"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.660	58	
	0.660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
24.5					**Direct Entry,**

Subcatchment 9S: BASIN E7



Summary for Subcatchment 10S: BASIN E8

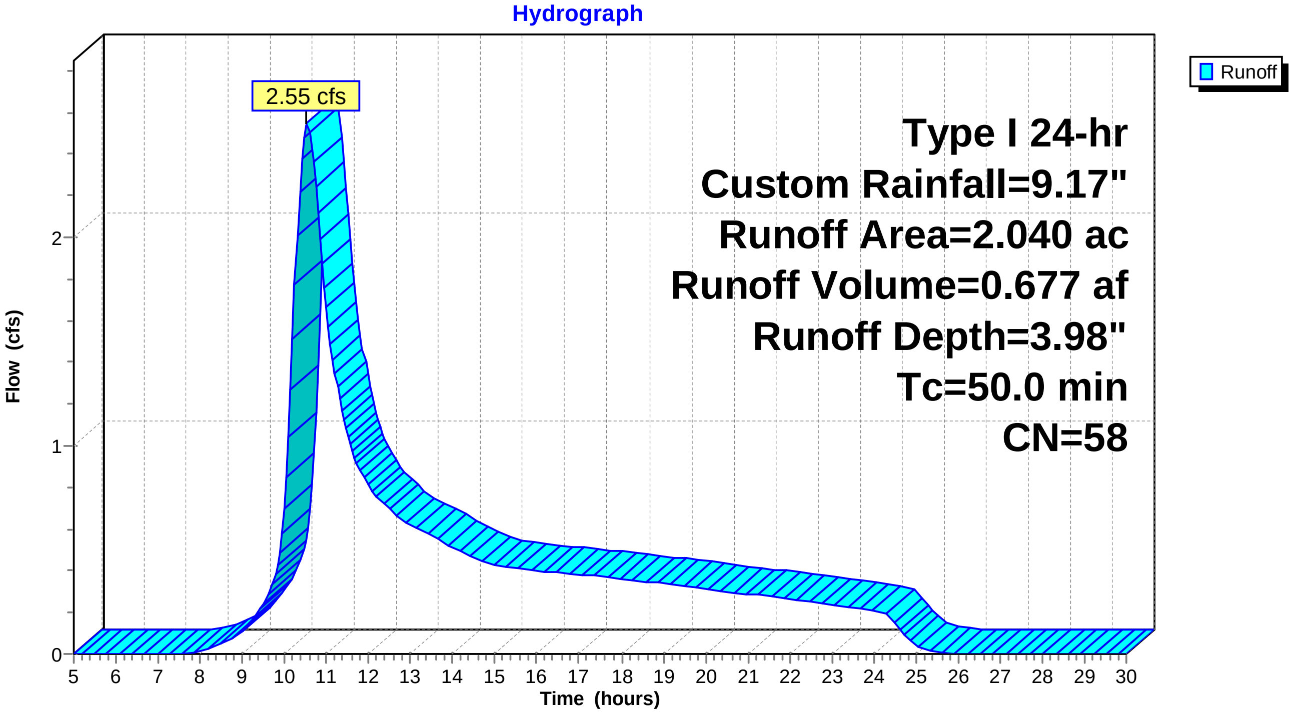
Runoff = 2.55 cfs @ 10.53 hrs, Volume= 0.677 af, Depth= 3.98"
Routed to Pond 11P : EXISTING PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	2.040	58	
	2.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
50.0					**Direct Entry,**

Subcatchment 10S: BASIN E8



Summary for Subcatchment 12S: BASIN 03

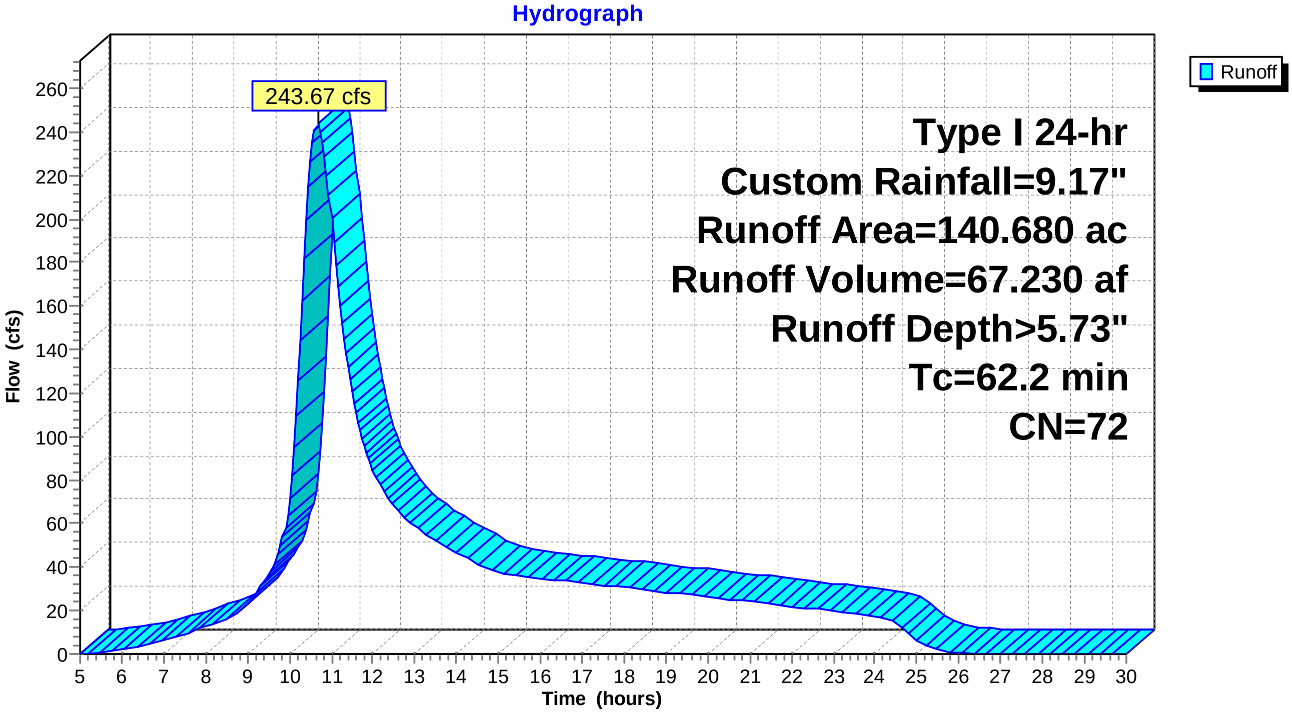
Runoff = 243.67 cfs @ 10.68 hrs, Volume= 67.230 af, Depth> 5.73"
Routed to Pond 12P : DETENTION POND B1 (EXISTING)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	140.680	72	
	140.680		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.2					**Direct Entry,**

Subcatchment 12S: BASIN 03



Summary for Pond 11P: EXISTING PONDS B2A/B COMBINED

Inflow Area = 337.580 ac, 0.00% Impervious, Inflow Depth = 3.78" for Custom event
Inflow = 413.32 cfs @ 10.45 hrs, Volume= 106.306 af
Outflow = 69.77 cfs @ 14.69 hrs, Volume= 106.305 af, Atten= 83%, Lag= 254.0 min
Discarded = 69.77 cfs @ 14.69 hrs, Volume= 106.305 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 37.80' @ 14.69 hrs Surf.Area= 6.901 ac Storage= 35.580 af

Plug-Flow detention time= 272.3 min calculated for 106.093 af (100% of inflow)
Center-of-Mass det. time= 272.3 min (1,140.7 - 868.5)

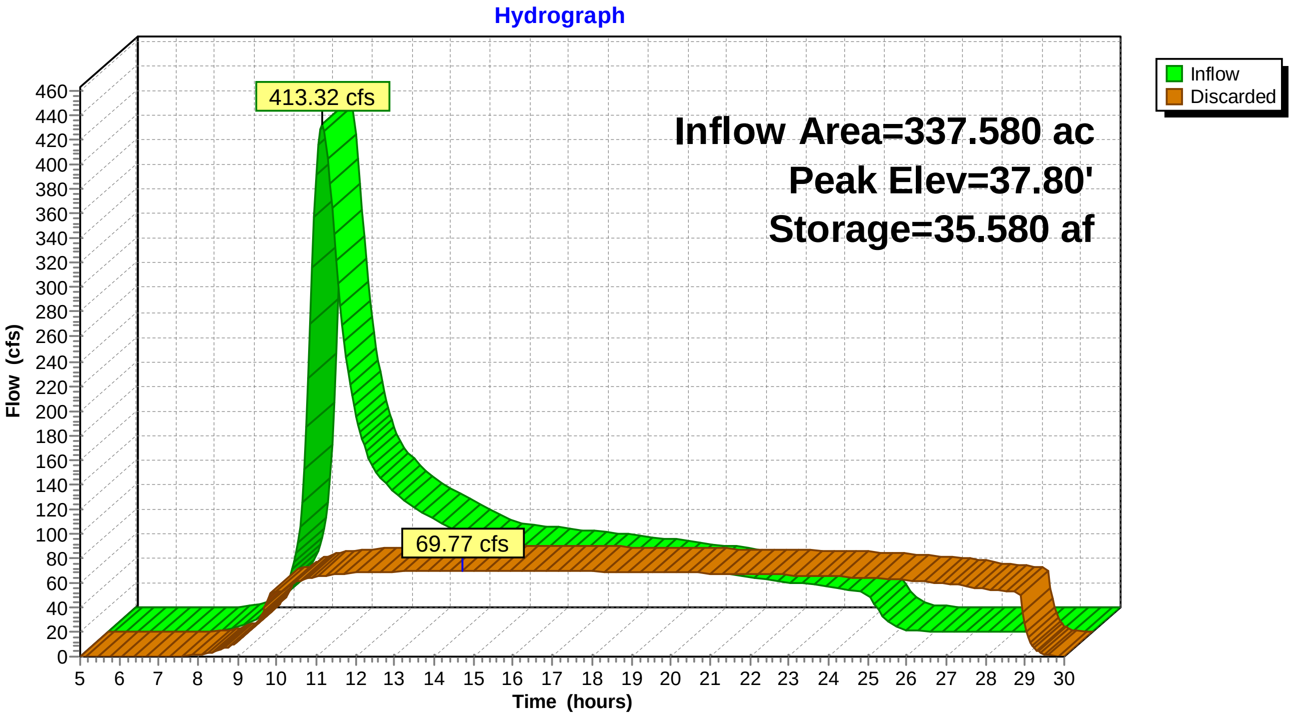
Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	109.140 af	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
32.00	5.063	0.000	0.000	5.063
34.00	6.001	11.051	11.051	6.004
36.00	6.472	12.470	23.521	6.483
38.00	6.949	13.418	36.939	6.968
40.00	7.425	14.371	51.310	7.453
42.00	7.903	15.326	66.636	7.940
44.00	8.382	16.283	82.918	8.429
46.00	8.862	17.242	100.160	8.919
47.00	9.099	8.980	109.140	9.161

Device	Routing	Invert	Outlet Devices
#1	Discarded	32.00'	**10.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=69.77 cfs @ 14.69 hrs HW=37.80' (Free Discharge)
↰—**1=Exfiltration** (Exfiltration Controls 69.77 cfs)

Pond 11P: EXISTING PONDS B2A/B COMBINED



Summary for Pond 12P: DETENTION POND B1 (EXISTING)

```
Inflow Area =      140.680 ac,   0.00% Impervious,  Inflow Depth >   5.73"    for  Custom event
Inflow      =      243.67 cfs @   10.68 hrs,  Volume=           67.230 af
Outflow     =       42.20 cfs @   14.45 hrs,  Volume=           67.230 af,  Atten= 83%,  Lag= 225.9 min
Discarded  =        42.20 cfs @   14.45 hrs,  Volume=           67.230 af
```

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 39.90' @ 14.45 hrs Surf.Area= 8.369 ac Storage= 23.573 af

Plug-Flow detention time= 263.4 min calculated for 67.229 af (100% of inflow)
Center-of-Mass det. time= 263.3 min (1,098.7 - 835.3)

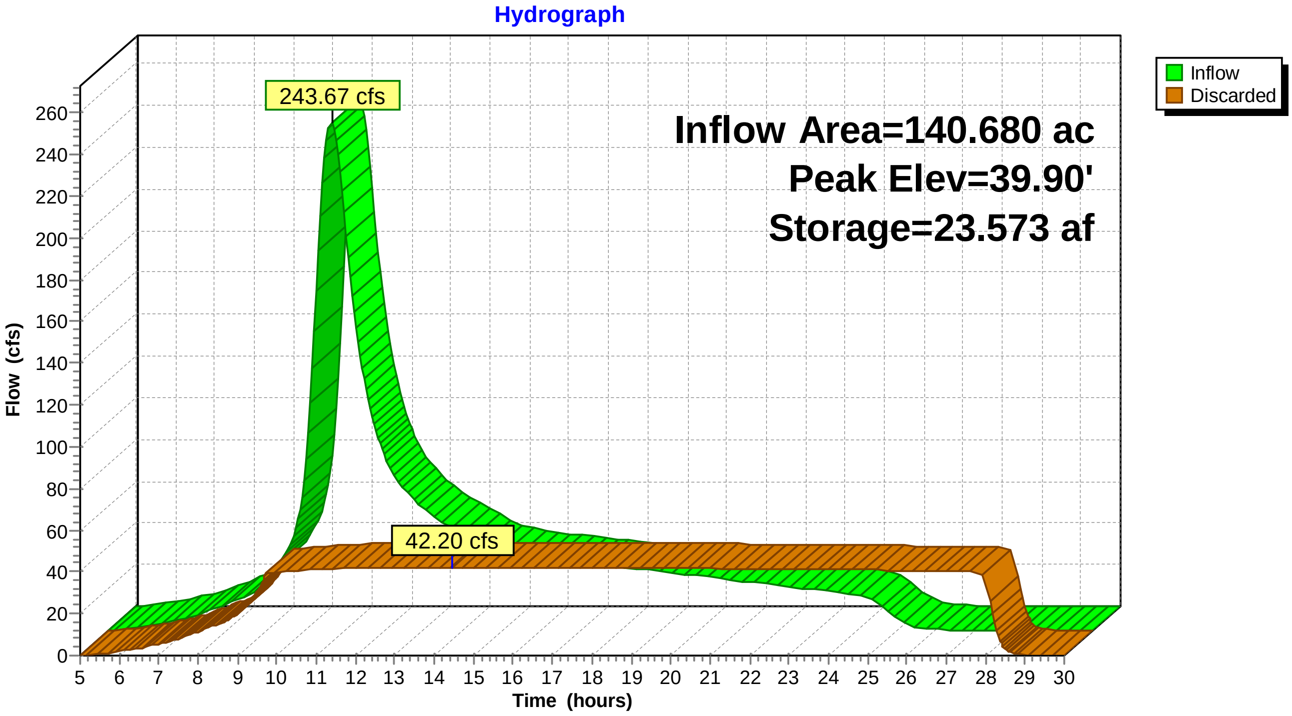
Volume	Invert	Avail.Storage	Storage Description
#1	37.00'	68.432 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
37.00	7.882	0.000	0.000
45.00	9.226	68.432	68.432

Device	Routing	Invert	Outlet Devices
#1	Discarded	37.00'	**5.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=42.20 cfs @ 14.45 hrs HW=39.90' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 42.20 cfs)

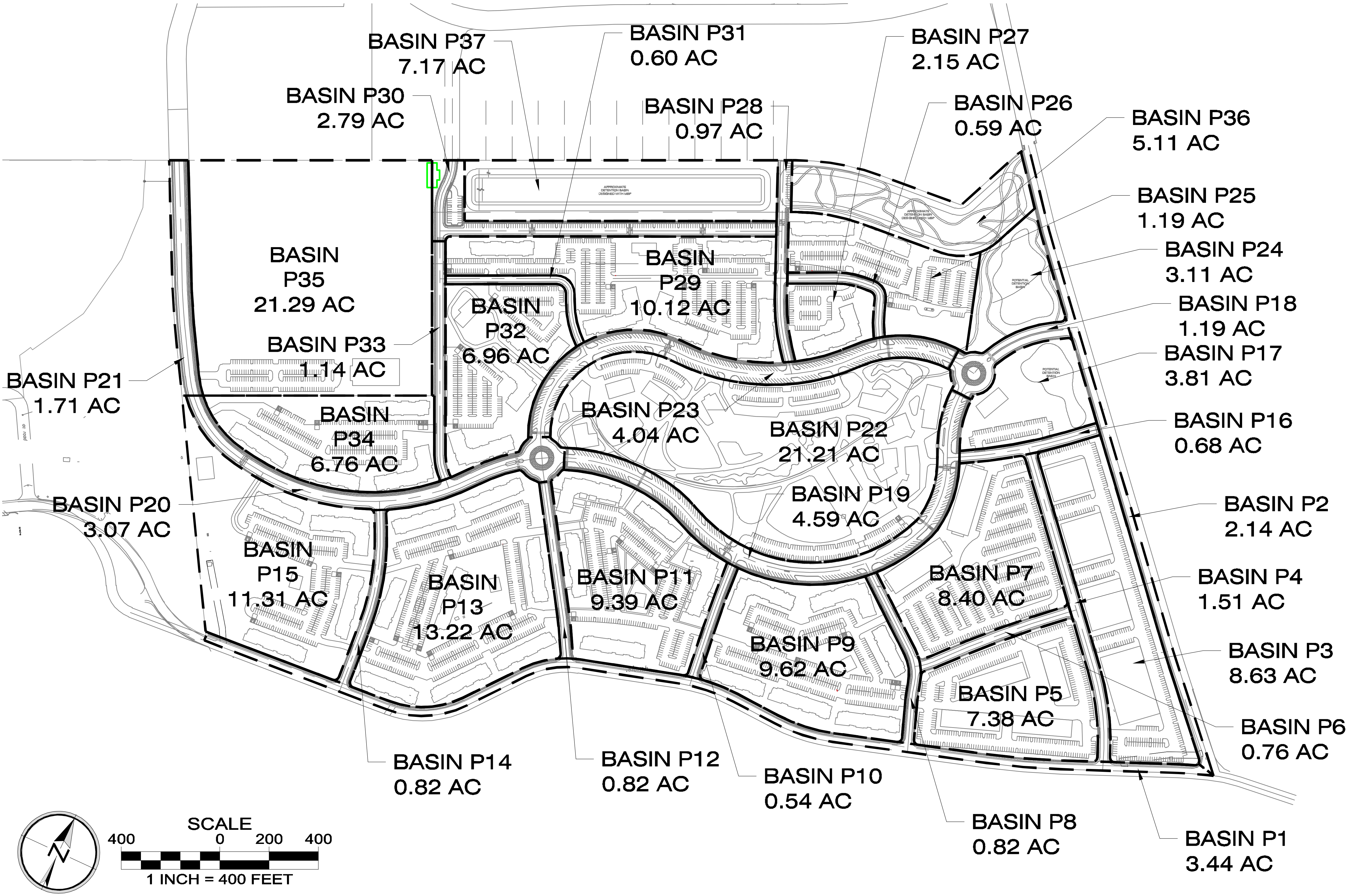
Pond 12P: DETENTION POND B1 (EXISTING)



APPENDIX 'C' – DEVELOPED CONDITION DRAINAGE ANALYSIS

DEVELOPED BASIN MAP

HOONANI VILLAGE



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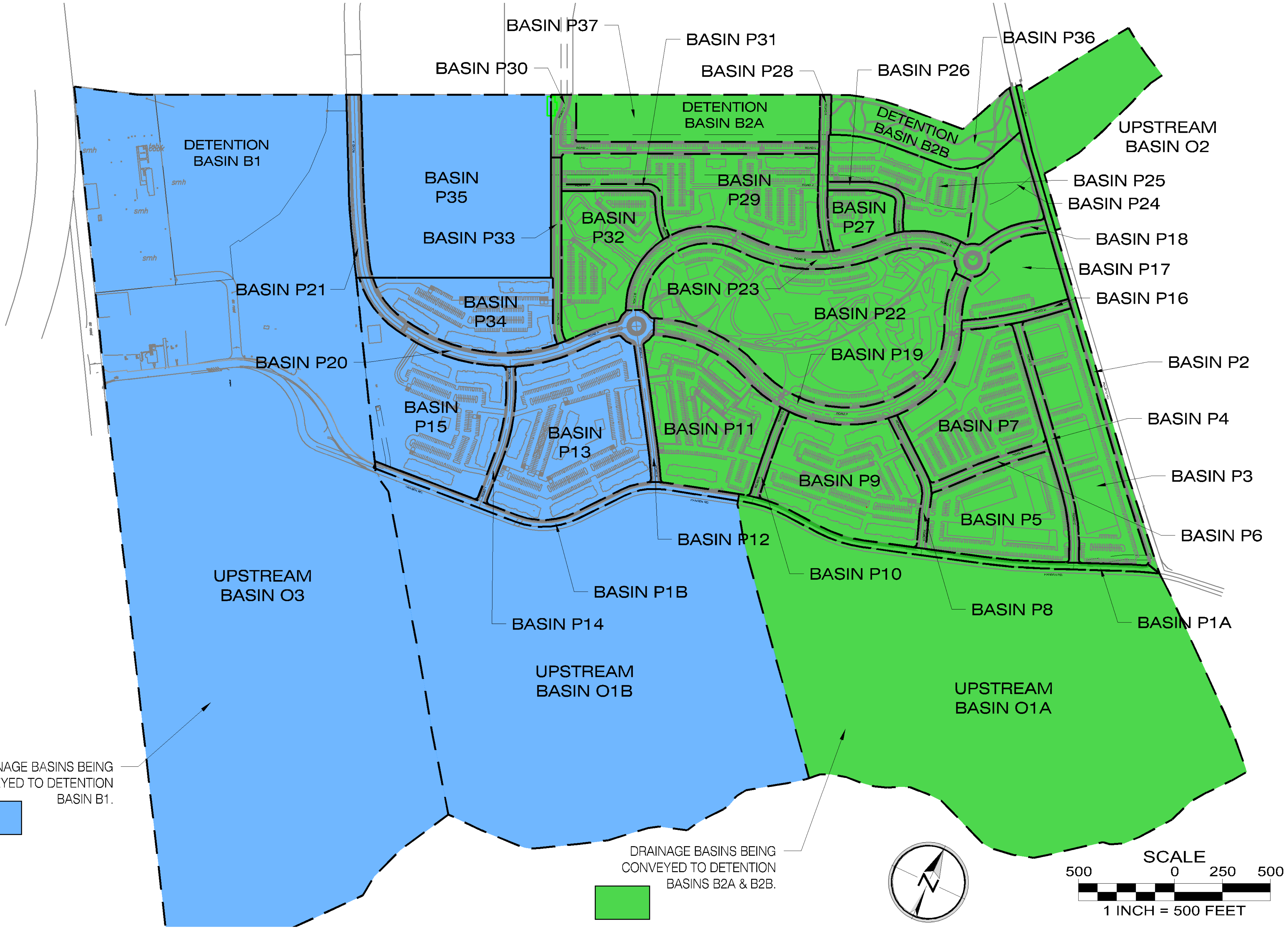
Drawn by TCC Date 09/2024
Reviewed by TCC Date 09/024
Project No. H109-001 REF.
Horiz. Scale: 1"=400'
Vert. Scale:

Project
HOONANI VILLAGE
No.
H109-001
Type
ENGINEERING
Sheet
1 of 1

DETENTION BASIN MAP



🟦 DRAINAGE BASINS BEING CONVEYED TO DETENTION BASIN B1.

🟩 DRAINAGE BASINS BEING CONVEYED TO DETENTION BASINS B2A & B2B.

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Designed by TCC **Date** 09/2024
Drawn by TCC **Date** 09/2024
Reviewed by TCC **Date** 09/024
Project No. H109-001 **REF.**
Horiz. Scale: 1"=500'
Vert. Scale:

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HOONANI VILLAGE
No.
H109-001
Type
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1 of 1

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PRELIMINARY STORM DRAINAGE MASTER PLAN

OVERALL MASTER PLAN

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Drawn by	TCC	Date	10/2024
Reviewed by	TCC	Date	10/2024
Project No.	H109-001	REF.	
Horiz. Scale:	1"=400'		
Vert. Scale:			

Project
HOONANI VILLAGE

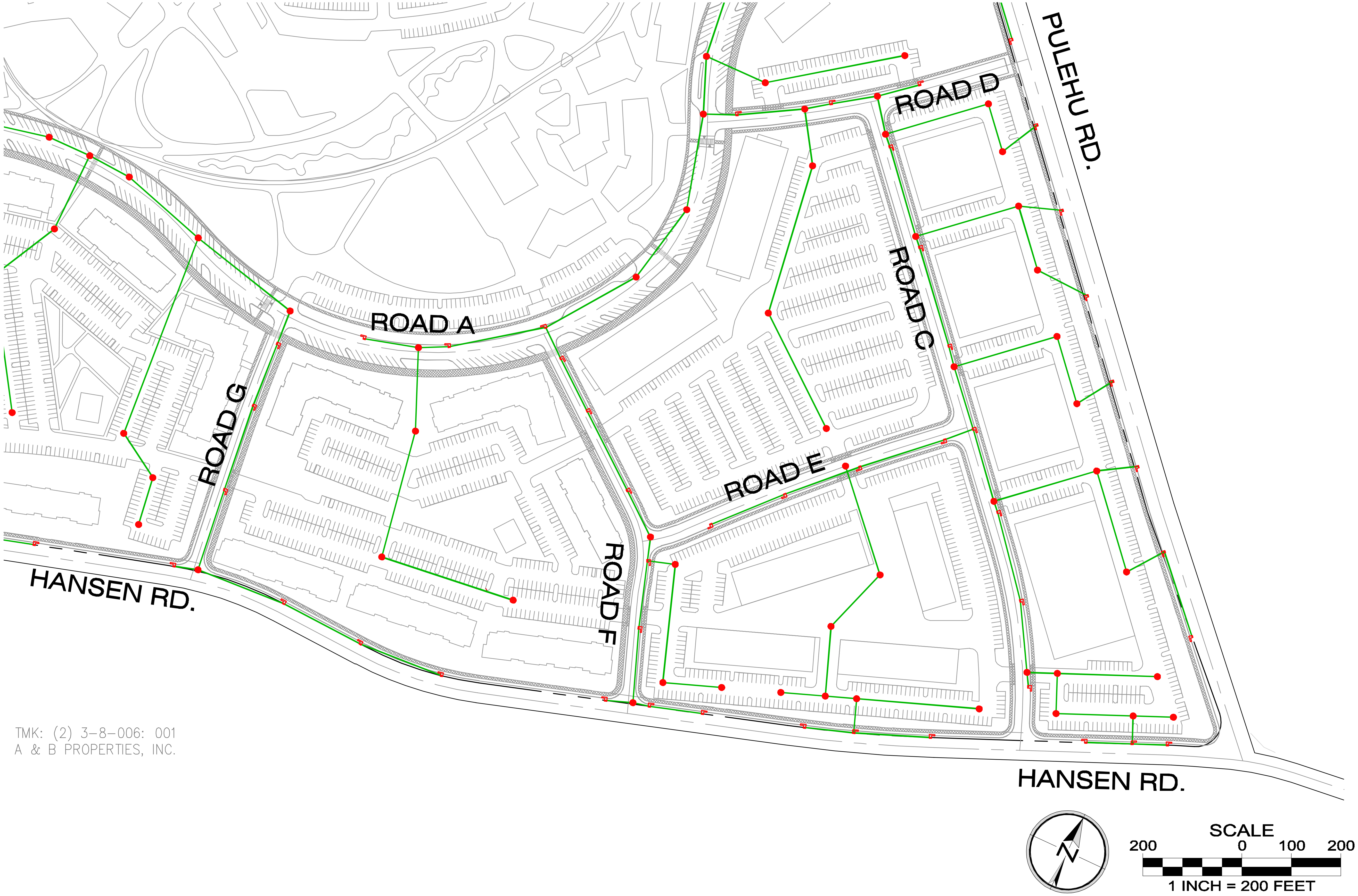
No.
H109-001

Type
ENGINEERING

Sheet
1 of 5

PRELIMINARY STORM DRAINAGE MASTER PLAN

SOUTHEAST



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Drawn by TCC Date 10/2024
Reviewed by TCC Date 10/2024
Project No. H109-001 REF.
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Project
HOONANI VILLAGE

No.
H109-001

Type
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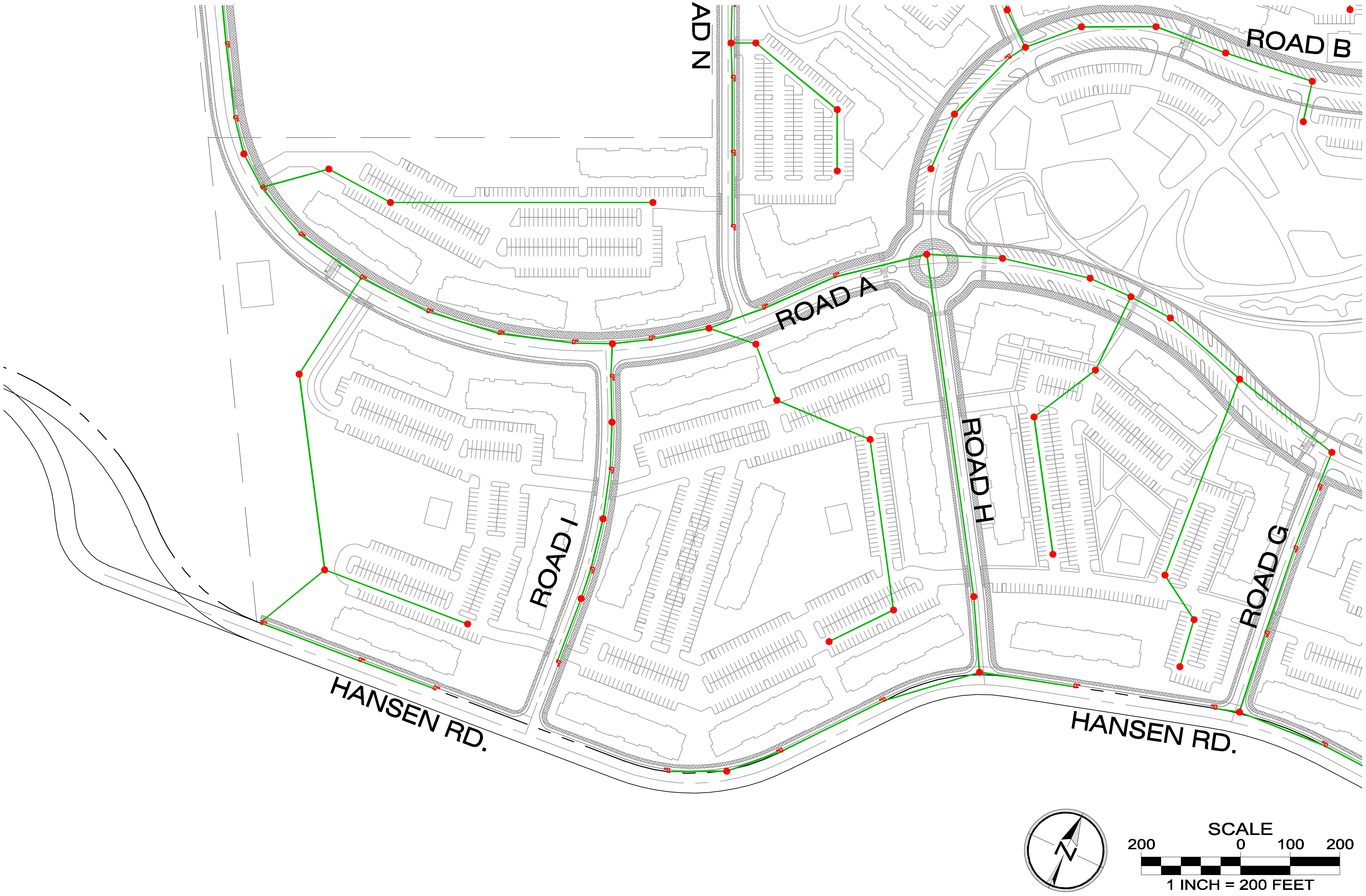
PRELIMINARY STORM DRAINAGE MASTER PLAN

SOUTHWEST



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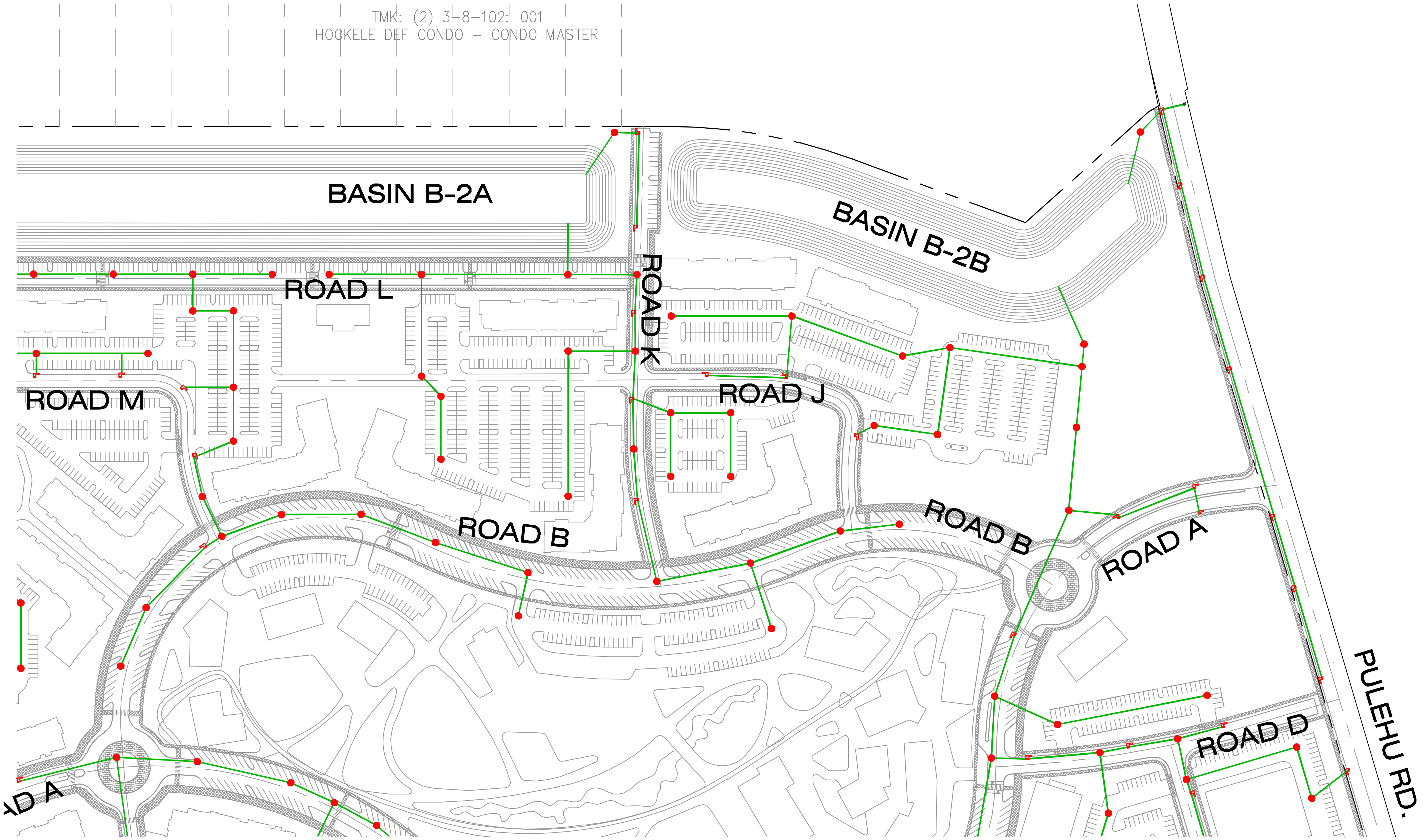
Designed by TCC Date 10/2024
Drawn by TCC Date 10/2024
Reviewed by TCC Date 10/2024
Project No. H109-001 REF.
Horiz. Scale: 1"=200'
Vert. Scale:

Project
HOONANI VILLAGE
No.
H109-001
Type
ENGINEERING
Sheet
3 of 5

PRELIMINARY STORM DRAINAGE MASTER PLAN

NORTHEAST



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CONSTRUCTION MANAGEMENT
HONOLULU, HAWAII PH: 808.400.5959
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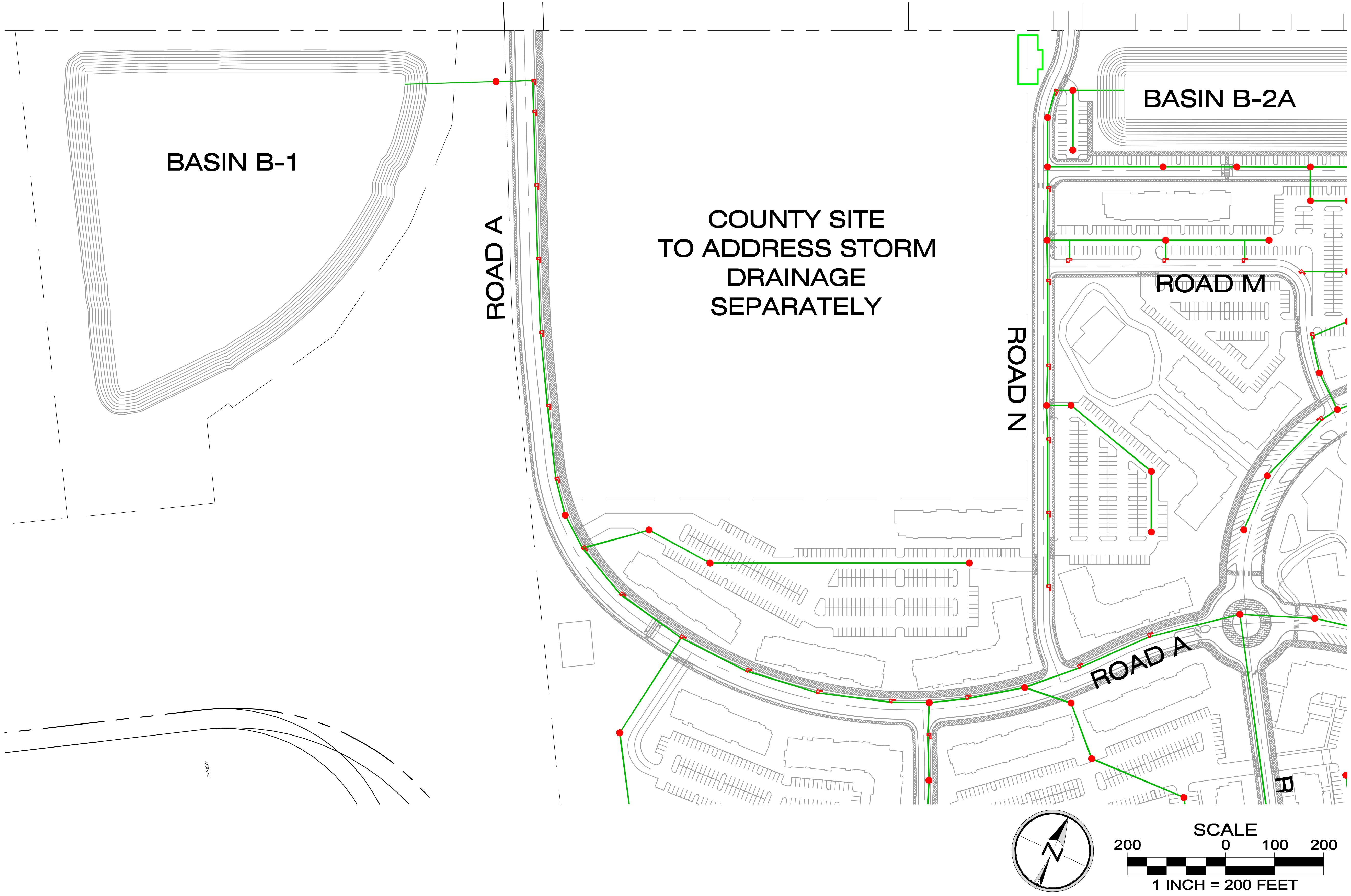
Designed by TCC Date 10/2024
Drawn by TCC Date 10/2024
Reviewed by TCC Date 10/2024
Project No. H109-001 REF.
Horiz. Scale: 1"=200'
Vert. Scale:

Project
HOONANI VILLAGE
No.
H109-001
Type
ENGINEERING
Sheet
4 of 5

PRELIMINARY STORM DRAINAGE MASTER PLAN

NORTHWEST



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PROPOSED DRAINAGE CONDITION ANALYSIS

(100 YEAR, 24 HOUR STORM EVENT)

JOB NUMBER: H109-001
PROJECT: Hoonani Village
FILE: H1091_PER Hydro

RUNOFF CURVE NUMBERS

IMPERVIOUS AREAS (B SOILS) =	98
OPEN SPACES (B SOILS) =	61
RESIDENTIAL APARTMENT =	60% IMPERVIOUS
LIGHT INDUSTRIAL & BUSINESS AREA =	85% IMPERVIOUS
STREET ROW AREA =	80% IMPERVIOUS
NEIGHBORHOOD COMMERCIAL AREA =	50% IMPERVIOUS
TIME OF CONCENTRATION (MIN.) =	5 min. + Time in Pipe (min.)
CATCHMENT TIME	5 min.
VELOCITY IN PIPE	3 ft/s
TIME IN PIPE	LENGTH / VEL. s

FLOW RATE (Q) CALCULATED IN HYDROCAD (SEE ATTACHED HYDROCAD REPORT)

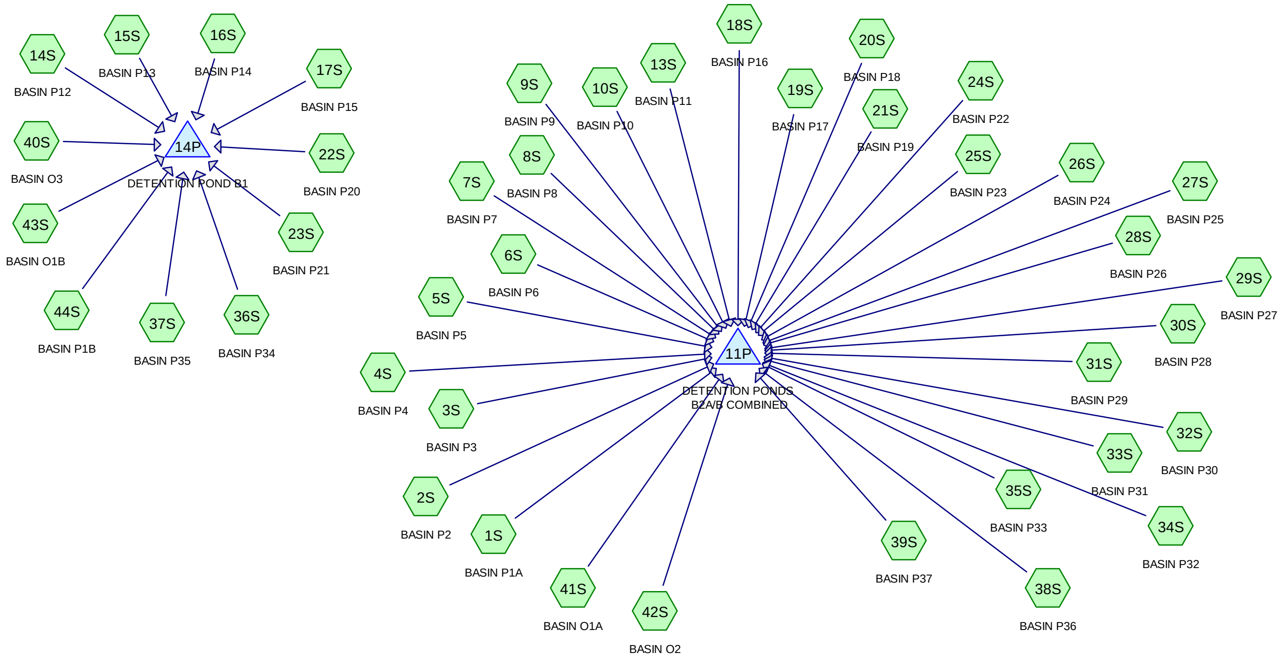
DRAINAGE BASIN LABEL	AREA	(SF)	AREA (AC)		ESTIMATED PERCENT IMPERVIOUS	COMPOSITE RUNOFF CURVE NUMBER	LONGEST RUN OF PIPE (LF)	APPROX. DEV. TOC. (MIN.)	FLOW RATE (Q) CFS	FLOW VOL. (AC-FT)
BASIN P1	149,893.00	ft^2	**3.44**	**ac**	80%	90.60	580	8.22	20.95	2.236
BASIN P2	93,269.00	ft^2	**2.14**	**ac**	80%	90.60	2300	17.78	10.22	1.395
BASIN P3	375,735.00	ft^2	**8.63**	**ac**	85%	92.45	440	7.44	53.85	5.669
BASIN P4	66,168.00	ft^2	**1.52**	**ac**	80%	90.60	1330	12.39	8.31	0.989
BASIN P5	321,635.00	ft^2	**7.38**	**ac**	85%	92.45	606	8.37	45.14	4.85
BASIN P6	33,323.00	ft^2	**0.76**	**ac**	80%	90.60	558	8.10	4.64	0.494
BASIN P7	366,056.00	ft^2	**8.40**	**ac**	85%	92.45	678	8.77	50.89	5.52
BASIN P8	35,831.00	ft^2	**0.82**	**ac**	80%	90.60	800	9.44	4.85	0.533
BASIN P9	419,061.00	ft^2	**9.62**	**ac**	60%	83.20	900	10.00	50.68	5.623
BASIN P10	23,772.00	ft^2	**0.55**	**ac**	80%	90.60	530	7.94	3.37	0.358
BASIN P11	408,930.00	ft^2	**9.39**	**ac**	60%	83.20	615	8.42	51.57	5.487
BASIN P12	35,512.00	ft^2	**0.82**	**ac**	80%	90.60	775	9.31	4.86	0.533
BASIN P13	576,065.00	ft^2	**13.22**	**ac**	60%	83.20	830	9.61	70.4	7.726
BASIN P14	35,900.00	ft^2	**0.82**	**ac**	80%	90.60	750	9.17	4.87	0.533
BASIN P15	492,530.00	ft^2	**11.31**	**ac**	60%	83.20	900	10.00	59.59	6.61
BASIN P16	29,430.00	ft^2	**0.68**	**ac**	80%	90.60	600	8.33	4.13	0.442
BASIN P17	166,153.00	ft^2	**3.81**	**ac**	40%	75.80	300	6.67	19.16	1.973
BASIN P18	51,667.00	ft^2	**1.19**	**ac**	80%	90.60	325	6.81	7.47	0.773
BASIN P19	199,740.00	ft^2	**4.59**	**ac**	80%	90.60	850	9.72	26.94	2.985
BASIN P20	133,750.00	ft^2	**3.07**	**ac**	80%	90.60	1300	12.22	16.87	1.998
BASIN P21	74,409.00	ft^2	**1.71**	**ac**	80%	90.60	875	9.86	9.98	1.112
BASIN P22	924,101.00	ft^2	**21.21**	**ac**	50%	79.50	760	9.22	108.62	11.806
BASIN P23	175,824.00	ft^2	**4.04**	**ac**	80%	90.60	450	7.50	24.93	2.626
BASIN P24	135,568.00	ft^2	**3.11**	**ac**	10%	64.70	400	7.22	11.77	1.259

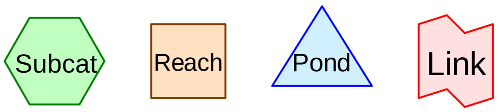
BASIN P25	227,068.00	ft^2	**5.21**	**ac**	60%	83.20	200	6.11	30.15	3.043
BASIN P26	25,771.00	ft^2	**0.59**	**ac**	80%	90.60	525	7.92	3.62	0.384
BASIN P27	93,502.00	ft^2	**2.15**	**ac**	60%	83.20	280	6.56	12.29	1.256
BASIN P28	42,266.00	ft^2	**0.97**	**ac**	80%	90.60	690	8.83	5.82	0.631
BASIN P29	440,771.00	ft^2	**10.12**	**ac**	60%	83.20	660	8.67	55.17	5.914
BASIN P30	121,625.00	ft^2	**2.79**	**ac**	80%	90.60	900	10.00	16.25	1.815
BASIN P31	26,252.00	ft^2	**0.60**	**ac**	80%	90.60	660	8.67	3.61	0.39
BASIN P32	303,206.00	ft^2	**6.96**	**ac**	60%	83.20	460	7.56	38.95	4.066
BASIN P33	49,618.00	ft^2	**1.14**	**ac**	80%	90.60	960	10.33	6.58	0.742
BASIN P34	294,312.00	ft^2	**6.76**	**ac**	60%	83.20	800	9.44	36.19	3.951
BASIN P35	927,479.00	ft^2	**21.29**	**ac**	0%	74.00	937	10.21	94.12	10.602
BASIN P36	222,453.00	ft^2	**5.11**	**ac**	10%	64.70	0	5.00	20.33	2.069
BASIN P37	312,360.00	ft^2	**7.17**	**ac**	0%	61.00	0	5.00	25.05	2.605
BASIN P1A	79,011.00	ft^2	**1.81**	**ac**	80%	90.60	580	8.22	11.05	1.222
(SUB-BASIN NOT IN TOTALS)										
BASIN P1B	70,882.00	ft^2	**1.63**	**ac**	80%	90.60	580	8.22	9.91	1.096
(SUB-BASIN NOT IN TOTALS)										
	TOTAL DRAINAGE AREA (SF)		**TOTAL DRAINAGE AREA (ac)**						**TOTAL Q FLOW (cfs)**	**TOTAL VOLUME (AC-FT)**
PROPOSED DRAINAGE CONDITION	**8,411,005.00**	**ft^2**	**193.09**	ac					**1022.19**	**111.00**

UPSTREAM BASIN LABEL	**TOTAL DRAINAGE AREA (SF)**		**TOTAL DRAINAGE AREA (ac)**			**COMPOSITE RUNOFF CURVE NUMBER**		**APPROX. DEV. TOC. (MIN.)**	**TOTAL Q FLOW (cfs)**	**TOTAL VOLUME (AC-FT)**
BASIN O1	6,160,420.00	ft^2	**141.42**	**ac**		53.80		46.5	**153.38**	**41.10**
BASIN O1A	3,052,128.00	ft^2	**70.07**	**ac**		53.80		46.5	**76.00**	**20.36**
(SUB-BASIN NOT IN TOTALS)										
BASIN O1B	3,108,292.00	ft^2	**71.36**	**ac**		53.80		46.5	**77.38**	**20.74**
(SUB-BASIN NOT IN TOTALS)										
BASIN O2	289,835.00	ft^2	**6.65**	**ac**		58.50		31.7	**11.29**	**2.28**
BASIN O3	6,128,207.00	ft^2	**140.68**	**ac**		72.20		62.23	**243.67**	**67.23**

DEVELOPED DETENTION BASIN ANALYSIS

BASIN LABEL	**CONTRIBUTING BASINS**	**AVAILABLE STORAGE (AC-FT)**	**DEVELOPED FLOW RATE (CFS)**	**DEVELOPED VOL. (AC-FT)**	**AVAILABLE VOLUME (AC-FT)**
BASIN B1	O1B, O3, P1B, P12-15, P20-21, P34-35	119.540	627.84	122.13	-2.589
BASIN B2A & B2B	O1A, O2, P1A, P2-111, P16-19, P22-33, P36-37	116.360	802.69	99.475	16.89
		235.900	**1430.530**	**221.60**	**14.30**





Routing Diagram for PRELIM HYDRO_DEVELOPED
Prepared by Pioneer Design Group, Printed 10/7/2024
HydroCAD® 10.20-4b s/n 09255 © 2023 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
24.410	92	(3S, 5S, 7S)
28.287	91	(4S, 6S, 8S, 10S, 14S, 16S, 18S, 20S, 21S, 22S, 23S, 25S, 28S, 30S, 32S, 33S, 35S, 44S)
74.740	83	(9S, 13S, 15S, 17S, 27S, 29S, 31S, 34S, 36S)
3.810	76	(19S)
21.210	80	(24S)
8.220	65	(26S, 38S)
21.290	74	(37S)
7.170	61	(39S)
140.684	72	(40S)
141.430	54	(41S, 43S)
6.650	59	(42S)
1.814	91	HANSEN ROAD (1S)
2.140	91	PULEHU ROAD (2S)
481.855	**71**	**TOTAL AREA**

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: BASIN P1A Runoff Area=79,011 sf 0.00% Impervious Runoff Depth=8.08"
Tc=8.2 min CN=91 Runoff=11.05 cfs 1.222 af

Subcatchment 2S: BASIN P2 Runoff Area=2.140 ac 0.00% Impervious Runoff Depth=8.08"
Tc=17.8 min CN=91 Runoff=10.22 cfs 1.441 af

Subcatchment 3S: BASIN P3 Runoff Area=8.630 ac 0.00% Impervious Runoff Depth=8.20"
Tc=7.4 min CN=92 Runoff=53.85 cfs 5.899 af

Subcatchment 4S: BASIN P4 Runoff Area=1.520 ac 0.00% Impervious Runoff Depth=8.08"
Tc=12.4 min CN=91 Runoff=8.31 cfs 1.024 af

Subcatchment 5S: BASIN P5 Runoff Area=7.380 ac 0.00% Impervious Runoff Depth=8.20"
Tc=8.4 min CN=92 Runoff=45.14 cfs 5.045 af

Subcatchment 6S: BASIN P6 Runoff Area=0.760 ac 0.00% Impervious Runoff Depth=8.08"
Tc=8.1 min CN=91 Runoff=4.64 cfs 0.512 af

Subcatchment 7S: BASIN P7 Runoff Area=8.400 ac 0.00% Impervious Runoff Depth=8.20"
Tc=8.8 min CN=92 Runoff=50.89 cfs 5.742 af

Subcatchment 8S: BASIN P8 Runoff Area=0.820 ac 0.00% Impervious Runoff Depth=8.08"
Tc=9.4 min CN=91 Runoff=4.85 cfs 0.552 af

Subcatchment 9S: BASIN P9 Runoff Area=9.620 ac 0.00% Impervious Runoff Depth=7.10"
Tc=10.0 min CN=83 Runoff=50.68 cfs 5.692 af

Subcatchment 10S: BASIN P10 Runoff Area=0.550 ac 0.00% Impervious Runoff Depth=8.08"
Tc=7.9 min CN=91 Runoff=3.37 cfs 0.370 af

Subcatchment 13S: BASIN P11 Runoff Area=9.390 ac 0.00% Impervious Runoff Depth=7.10"
Tc=8.4 min CN=83 Runoff=51.57 cfs 5.556 af

Subcatchment 14S: BASIN P12 Runoff Area=0.820 ac 0.00% Impervious Runoff Depth=8.08"
Tc=9.3 min CN=91 Runoff=4.86 cfs 0.552 af

Subcatchment 15S: BASIN P13 Runoff Area=13.220 ac 0.00% Impervious Runoff Depth=7.10"
Tc=9.6 min CN=83 Runoff=70.40 cfs 7.822 af

Subcatchment 16S: BASIN P14 Runoff Area=0.820 ac 0.00% Impervious Runoff Depth=8.08"
Tc=9.2 min CN=91 Runoff=4.87 cfs 0.552 af

Subcatchment 17S: BASIN P15 Runoff Area=11.310 ac 0.00% Impervious Runoff Depth=7.10"
Tc=10.0 min CN=83 Runoff=59.59 cfs 6.692 af

Subcatchment 18S: BASIN P16 Runoff Area=0.680 ac 0.00% Impervious Runoff Depth=8.08"
Tc=8.3 min CN=91 Runoff=4.13 cfs 0.458 af

Subcatchment 19S: BASIN P17	Runoff Area=3.810 ac 0.00% Impervious Runoff Depth=6.23" Tc=6.7 min CN=76 Runoff=19.16 cfs 1.979 af
Subcatchment 20S: BASIN P18	Runoff Area=1.190 ac 0.00% Impervious Runoff Depth=8.08" Tc=6.8 min CN=91 Runoff=7.47 cfs 0.801 af
Subcatchment 21S: BASIN P19	Runoff Area=4.590 ac 0.00% Impervious Runoff Depth=8.08" Tc=9.7 min CN=91 Runoff=26.94 cfs 3.091 af
Subcatchment 22S: BASIN P20	Runoff Area=3.070 ac 0.00% Impervious Runoff Depth=8.08" Tc=12.2 min CN=91 Runoff=16.87 cfs 2.067 af
Subcatchment 23S: BASIN P21	Runoff Area=1.710 ac 0.00% Impervious Runoff Depth=8.08" Tc=9.9 min CN=91 Runoff=9.98 cfs 1.152 af
Subcatchment 24S: BASIN P22	Runoff Area=21.210 ac 0.00% Impervious Runoff Depth=6.73" Tc=9.2 min CN=80 Runoff=108.62 cfs 11.894 af
Subcatchment 25S: BASIN P23	Runoff Area=4.040 ac 0.00% Impervious Runoff Depth=8.08" Tc=7.5 min CN=91 Runoff=24.93 cfs 2.721 af
Subcatchment 26S: BASIN P24	Runoff Area=3.110 ac 0.00% Impervious Runoff Depth=4.86" Tc=7.2 min CN=65 Runoff=11.77 cfs 1.259 af
Subcatchment 27S: BASIN P25	Runoff Area=5.210 ac 0.00% Impervious Runoff Depth=7.10" Tc=6.1 min CN=83 Runoff=30.15 cfs 3.083 af
Subcatchment 28S: BASIN P26	Runoff Area=0.590 ac 0.00% Impervious Runoff Depth=8.08" Tc=7.9 min CN=91 Runoff=3.62 cfs 0.397 af
Subcatchment 29S: BASIN P27	Runoff Area=2.150 ac 0.00% Impervious Runoff Depth=7.10" Tc=6.6 min CN=83 Runoff=12.29 cfs 1.272 af
Subcatchment 30S: BASIN P28	Runoff Area=0.970 ac 0.00% Impervious Runoff Depth=8.08" Tc=8.8 min CN=91 Runoff=5.82 cfs 0.653 af
Subcatchment 31S: BASIN P29	Runoff Area=10.120 ac 0.00% Impervious Runoff Depth=7.10" Tc=8.7 min CN=83 Runoff=55.17 cfs 5.988 af
Subcatchment 32S: BASIN P30	Runoff Area=2.790 ac 0.00% Impervious Runoff Depth=8.08" Tc=10.0 min CN=91 Runoff=16.25 cfs 1.879 af
Subcatchment 33S: BASIN P31	Runoff Area=0.600 ac 0.00% Impervious Runoff Depth=8.08" Tc=8.7 min CN=91 Runoff=3.61 cfs 0.404 af
Subcatchment 34S: BASIN P32	Runoff Area=6.960 ac 0.00% Impervious Runoff Depth=7.10" Tc=7.6 min CN=83 Runoff=38.95 cfs 4.118 af
Subcatchment 35S: BASIN P33	Runoff Area=1.140 ac 0.00% Impervious Runoff Depth=8.08" Tc=10.3 min CN=91 Runoff=6.58 cfs 0.768 af

Subcatchment 36S: BASIN P34 Runoff Area=6.760 ac 0.00% Impervious Runoff Depth=7.10"
Tc=9.4 min CN=83 Runoff=36.19 cfs 4.000 af

Subcatchment 37S: BASIN P35 Runoff Area=21.290 ac 0.00% Impervious Runoff Depth=5.98"
Tc=10.2 min CN=74 Runoff=94.12 cfs 10.617 af

Subcatchment 38S: BASIN P36 Runoff Area=5.110 ac 0.00% Impervious Runoff Depth=4.86"
Tc=5.0 min CN=65 Runoff=20.33 cfs 2.069 af

Subcatchment 39S: BASIN P37 Runoff Area=7.170 ac 0.00% Impervious Runoff Depth=4.36"
Tc=5.0 min CN=61 Runoff=25.05 cfs 2.605 af

Subcatchment 40S: BASIN O3 Runoff Area=6,128,207 sf 0.00% Impervious Runoff Depth=5.73"
Tc=62.2 min CN=72 Runoff=243.68 cfs 67.233 af

Subcatchment 41S: BASIN O1A Runoff Area=70.070 ac 0.00% Impervious Runoff Depth=3.49"
Tc=46.5 min CN=54 Runoff=76.00 cfs 20.364 af

Subcatchment 42S: BASIN O2 Runoff Area=6.650 ac 0.00% Impervious Runoff Depth=4.11"
Tc=31.7 min CN=59 Runoff=11.29 cfs 2.277 af

Subcatchment 43S: BASIN O1B Runoff Area=71.360 ac 0.00% Impervious Runoff Depth=3.49"
Tc=46.5 min CN=54 Runoff=77.40 cfs 20.738 af

Subcatchment 44S: BASIN P1B Runoff Area=70,882 sf 0.00% Impervious Runoff Depth=8.08"
Tc=8.2 min CN=91 Runoff=9.91 cfs 1.096 af

Pond 11P: DETENTION PONDS B2A/B Peak Elev=38.47' Storage=54.950 af Inflow=729.92 cfs 101.137 af
Outflow=34.69 cfs 100.105 af

Pond 14P: DETENTION POND B1 Peak Elev=38.92' Storage=66.616 af Inflow=401.68 cfs 122.521 af
Outflow=41.58 cfs 122.521 af

Total Runoff Area = 481.855 ac Runoff Volume = 223.658 af Average Runoff Depth = 5.57"
100.00% Pervious = 481.855 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: BASIN P1A

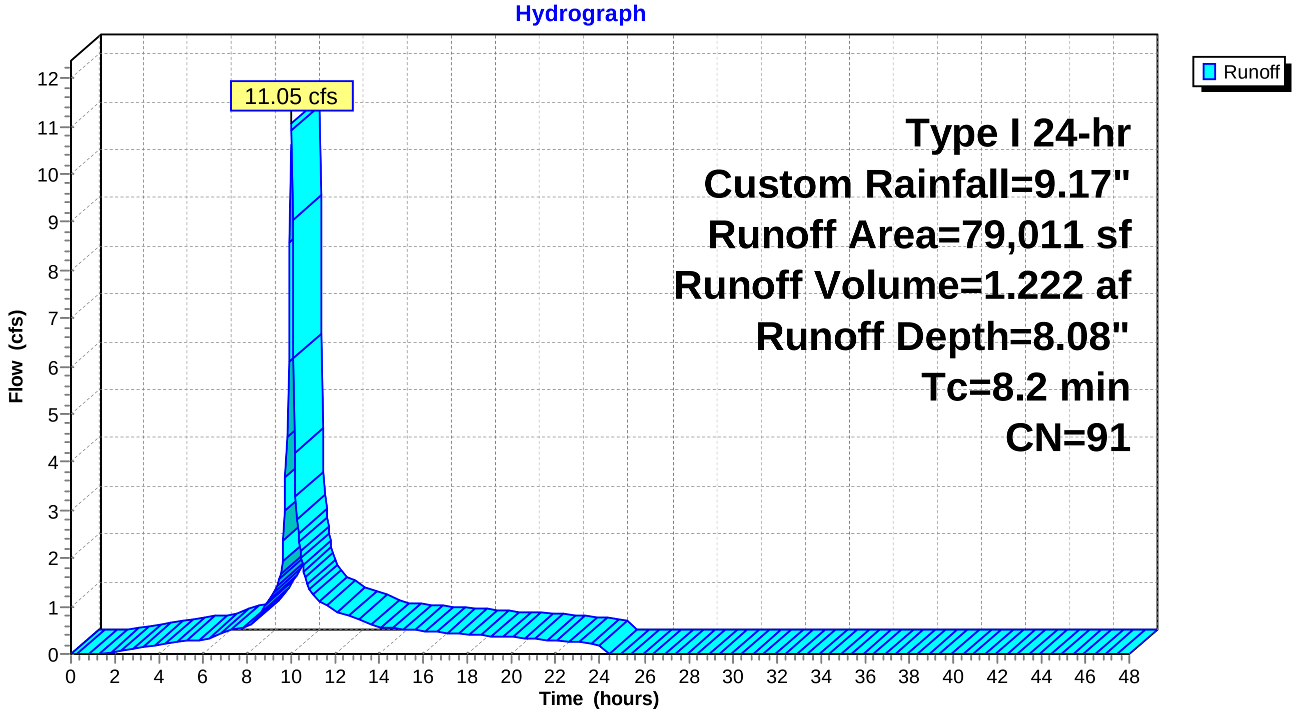
Runoff = 11.05 cfs @ 9.98 hrs, Volume= 1.222 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (sf)	CN	Description
*	79,011	91	HANSEN ROAD
	79,011		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2					**Direct Entry, PREDEV TOC**

Subcatchment 1S: BASIN P1A



Summary for Subcatchment 2S: BASIN P2

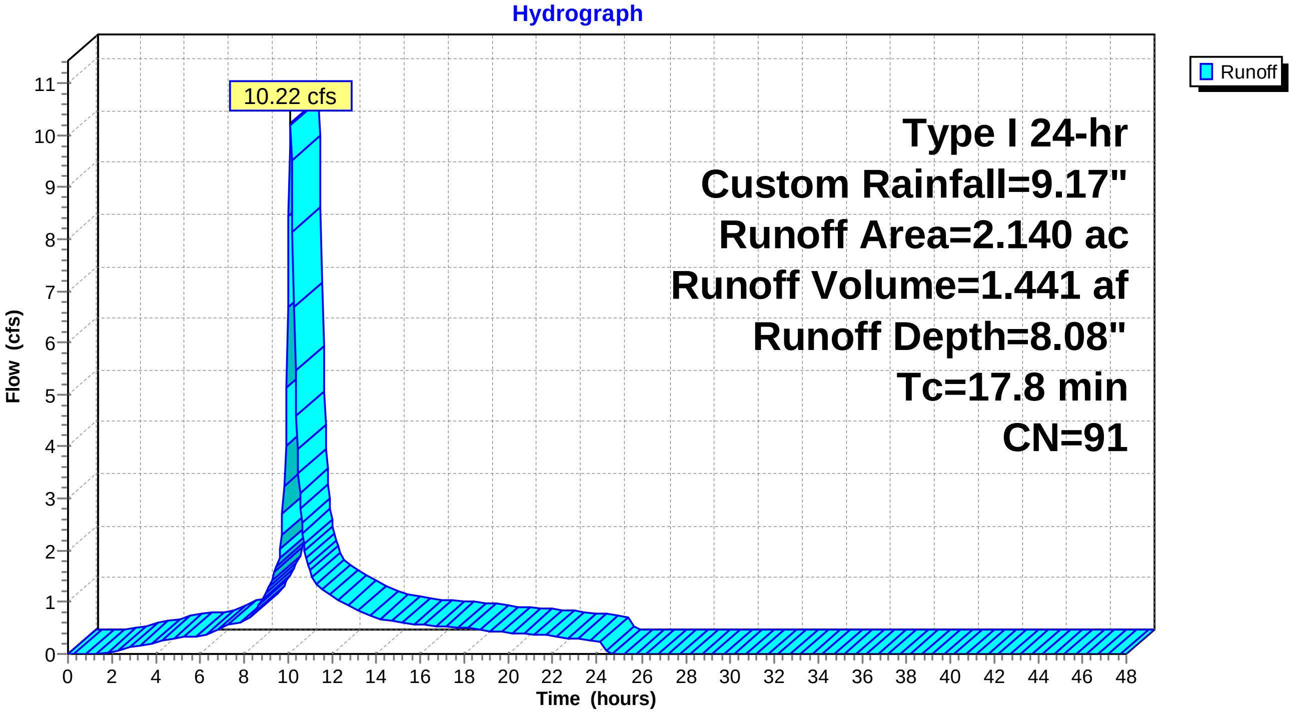
Runoff = 10.22 cfs @ 10.09 hrs, Volume= 1.441 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	2.140	91	PULEHU ROAD
	2.140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.8					**Direct Entry,**

Subcatchment 2S: BASIN P2



Summary for Subcatchment 3S: BASIN P3

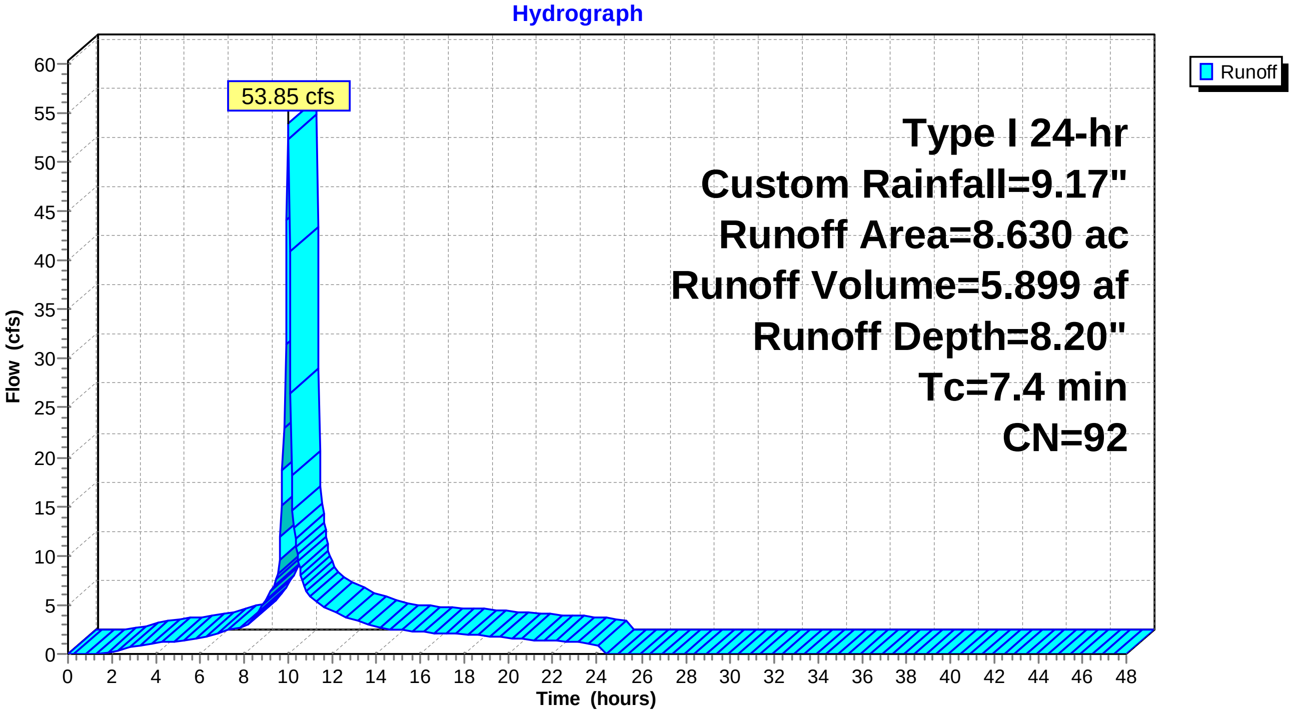
Runoff = 53.85 cfs @ 9.97 hrs, Volume= 5.899 af, Depth= 8.20"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	8.630	92	
	8.630		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4					**Direct Entry,**

Subcatchment 3S: BASIN P3



Summary for Subcatchment 4S: BASIN P4

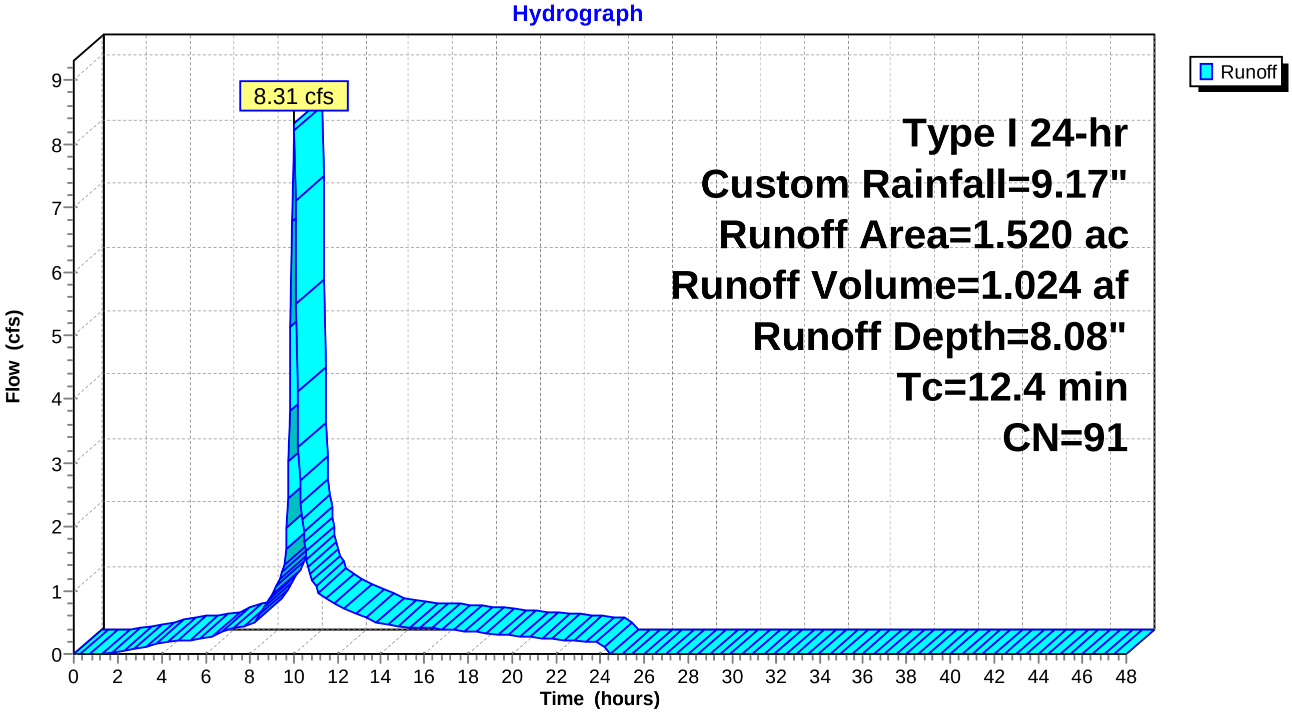
Runoff = 8.31 cfs @ 10.03 hrs, Volume= 1.024 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	1.520	91	
	1.520		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.4					**Direct Entry,**

Subcatchment 4S: BASIN P4



Summary for Subcatchment 5S: BASIN P5

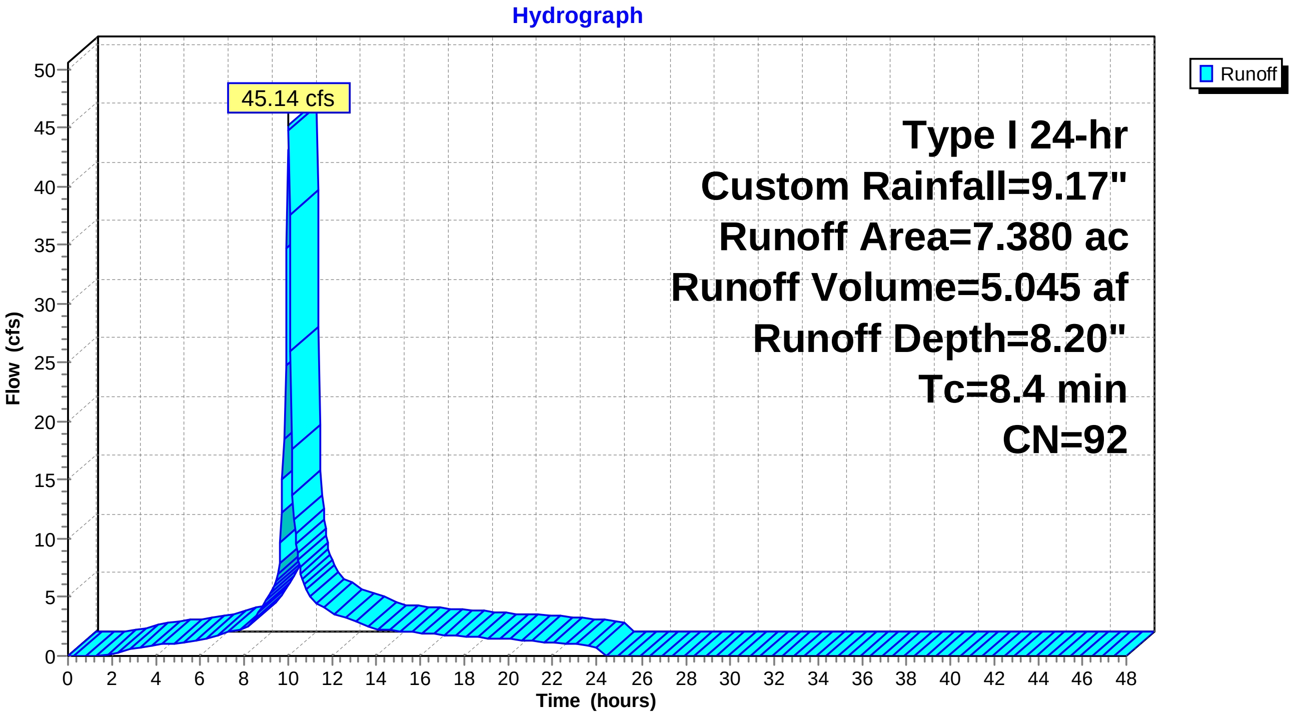
Runoff = 45.14 cfs @ 9.98 hrs, Volume= 5.045 af, Depth= 8.20"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	7.380	92	
	7.380		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4					**Direct Entry,**

Subcatchment 5S: BASIN P5



Summary for Subcatchment 6S: BASIN P6

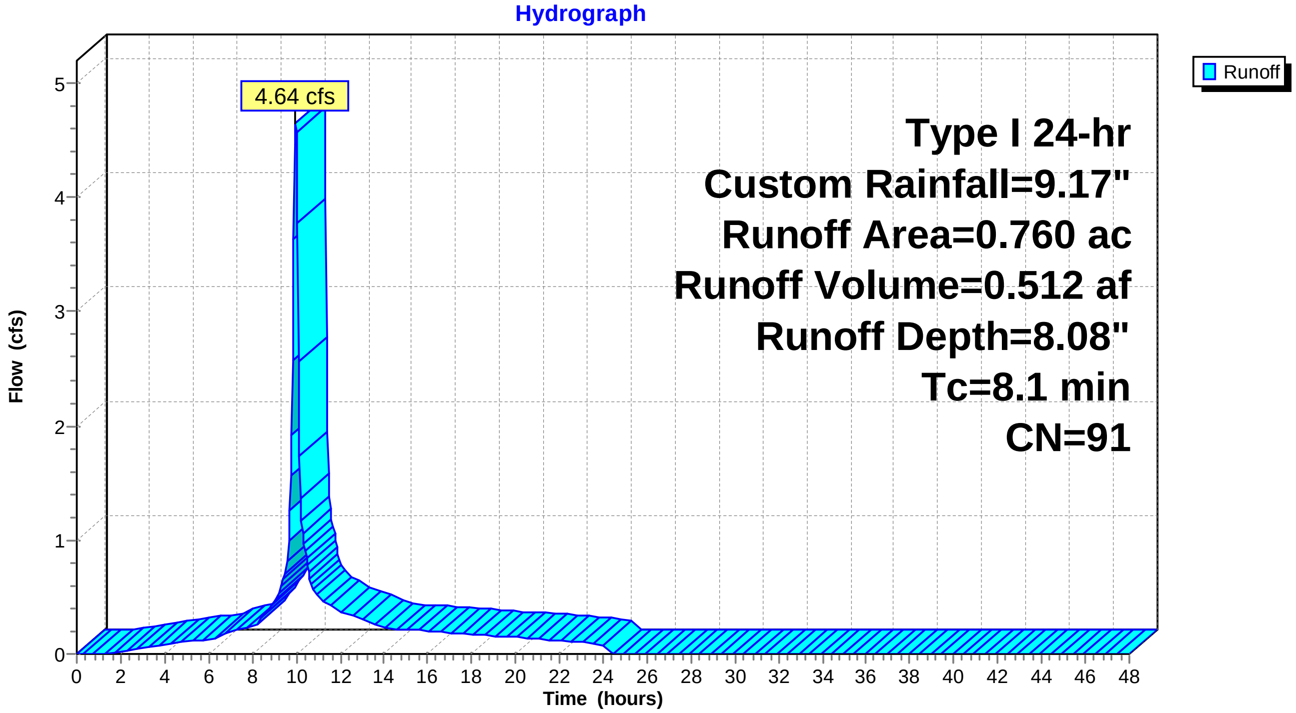
Runoff = 4.64 cfs @ 9.98 hrs, Volume= 0.512 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.760	91	
	0.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1					**Direct Entry,**

Subcatchment 6S: BASIN P6



Summary for Subcatchment 7S: BASIN P7

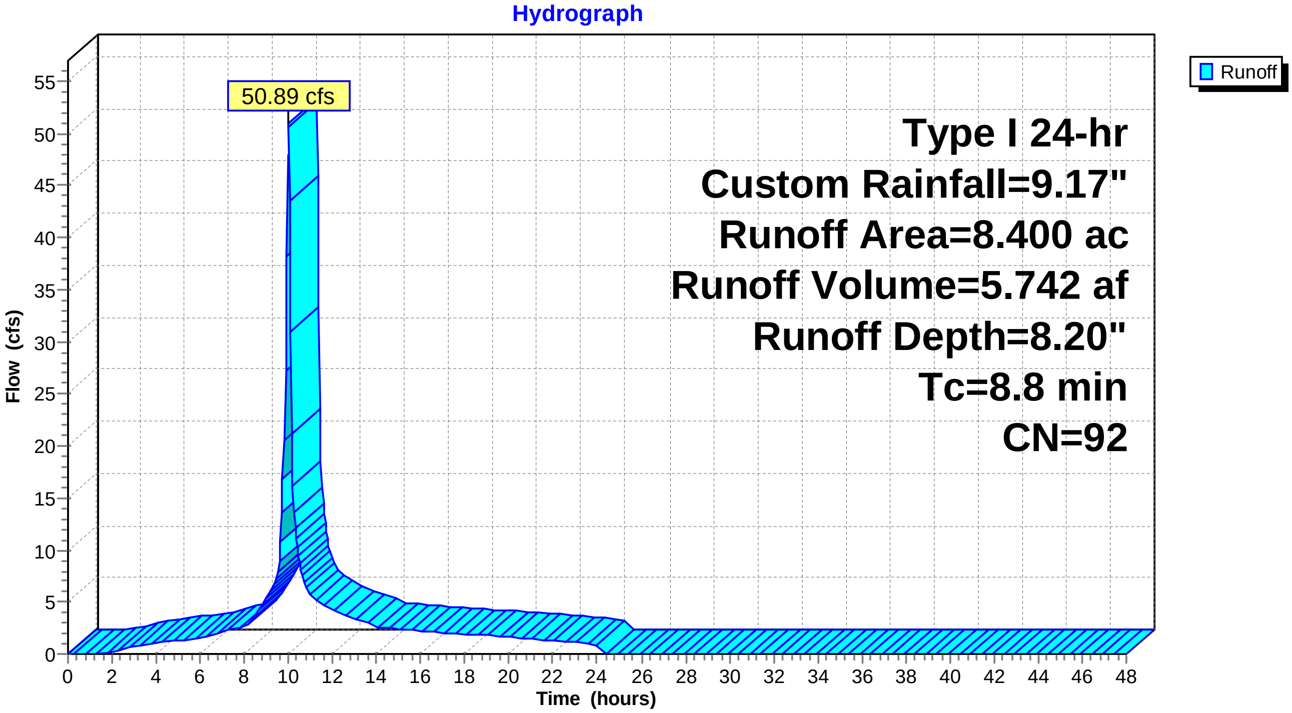
Runoff = 50.89 cfs @ 9.99 hrs, Volume= 5.742 af, Depth= 8.20"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	8.400	92	
	8.400		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry,**

Subcatchment 7S: BASIN P7



Summary for Subcatchment 8S: BASIN P8

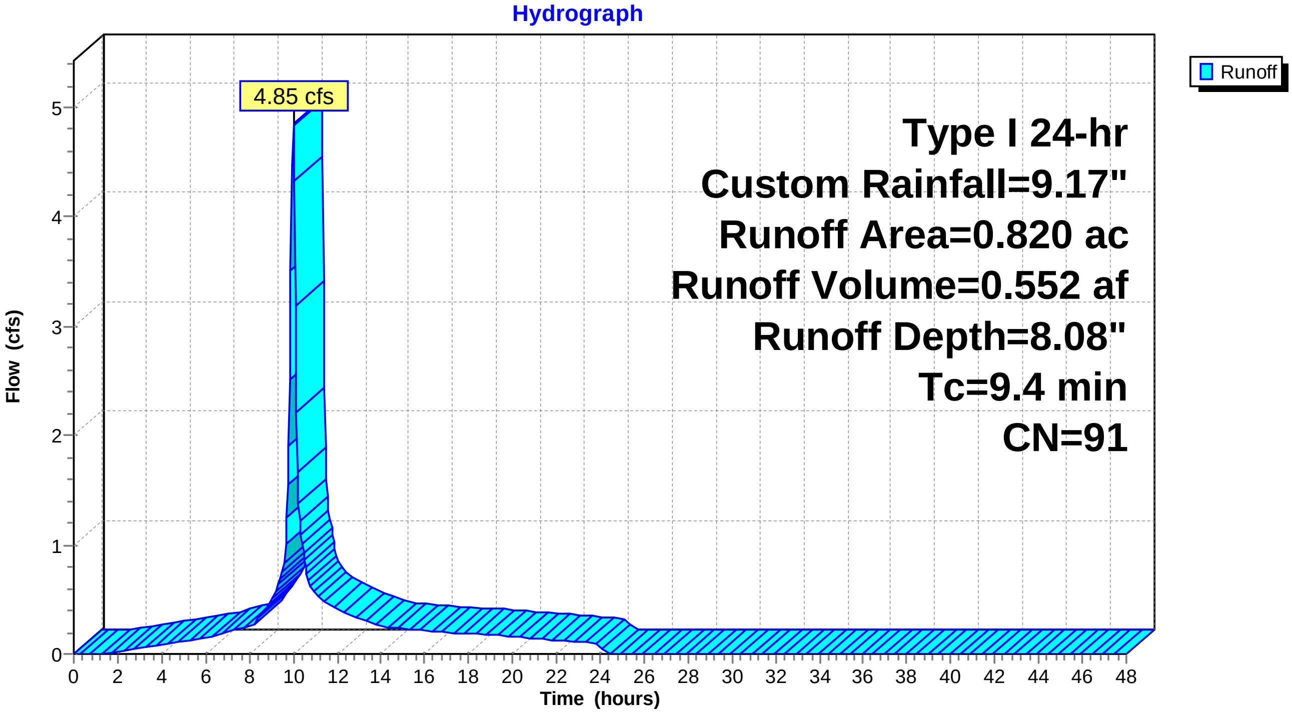
Runoff = 4.85 cfs @ 10.00 hrs, Volume= 0.552 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.820	91	
	0.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4					**Direct Entry,**

Subcatchment 8S: BASIN P8



Summary for Subcatchment 9S: BASIN P9

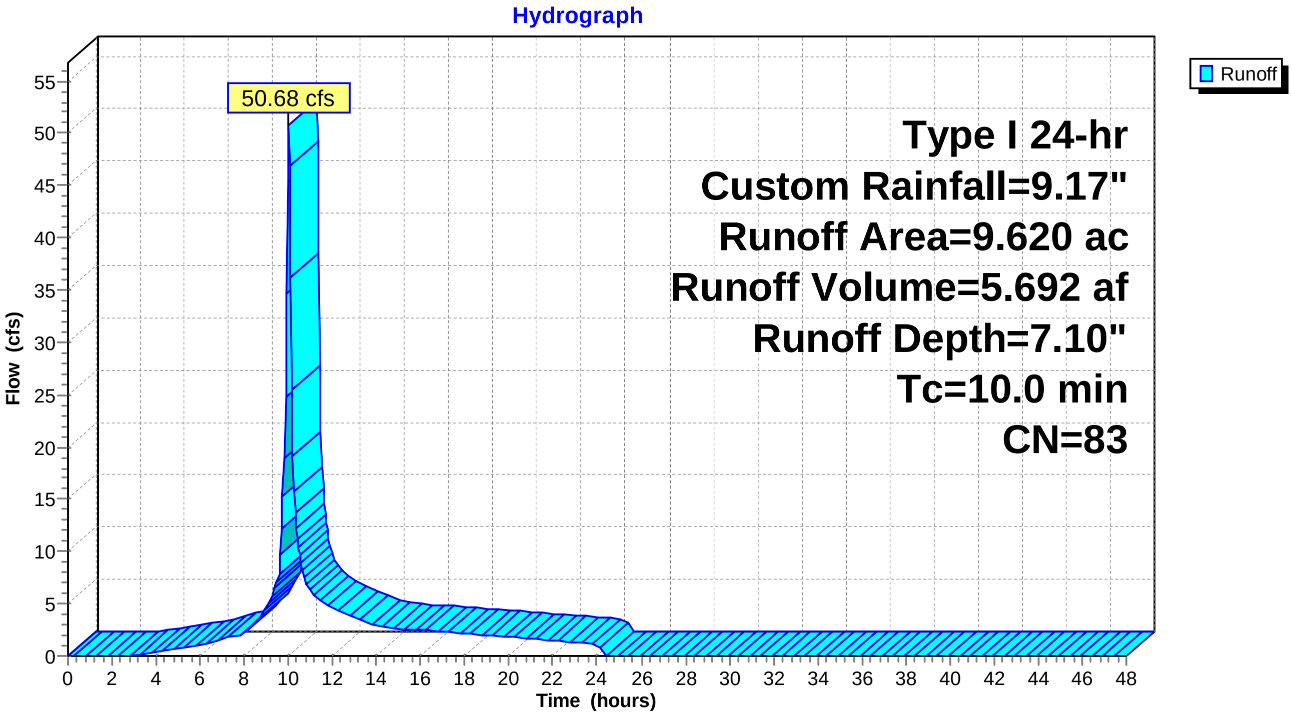
Runoff = 50.68 cfs @ 10.00 hrs, Volume= 5.692 af, Depth= 7.10"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	9.620	83	
	9.620		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 9S: BASIN P9



Summary for Subcatchment 10S: BASIN P10

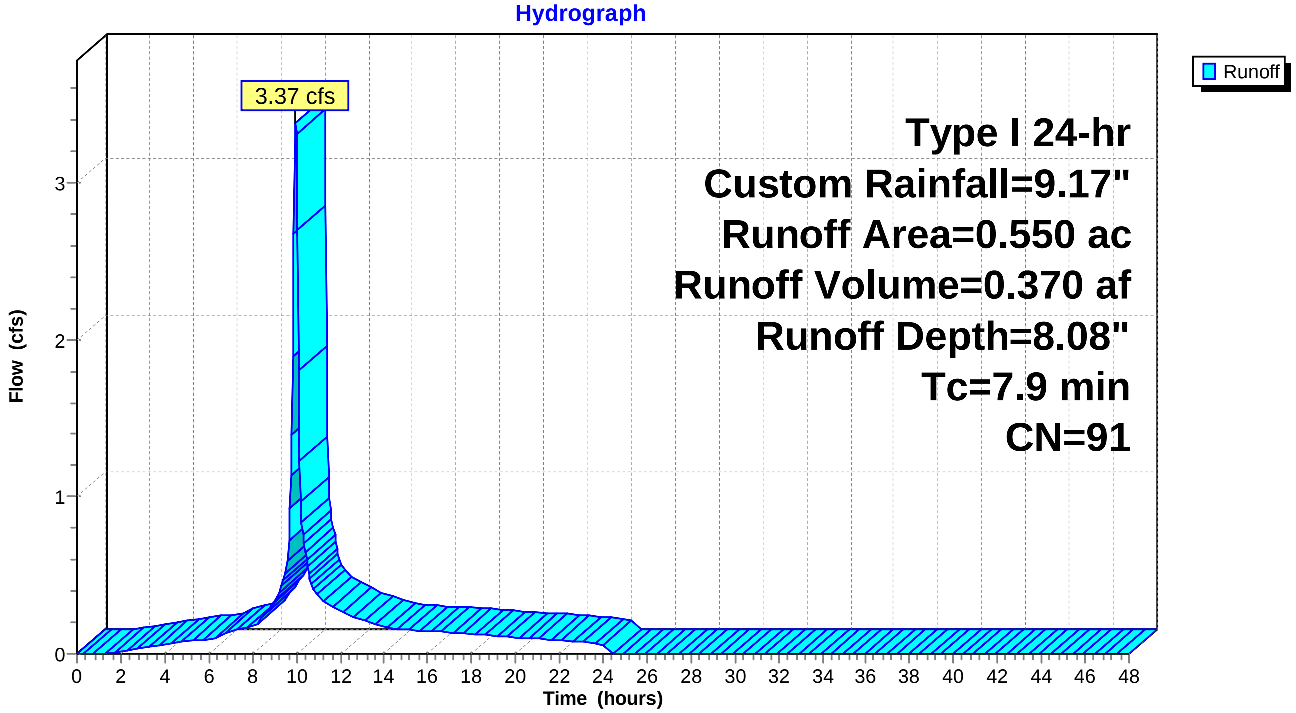
Runoff = 3.37 cfs @ 9.98 hrs, Volume= 0.370 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.550	91	
	0.550		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9					**Direct Entry,**

Subcatchment 10S: BASIN P10



Summary for Subcatchment 13S: BASIN P11

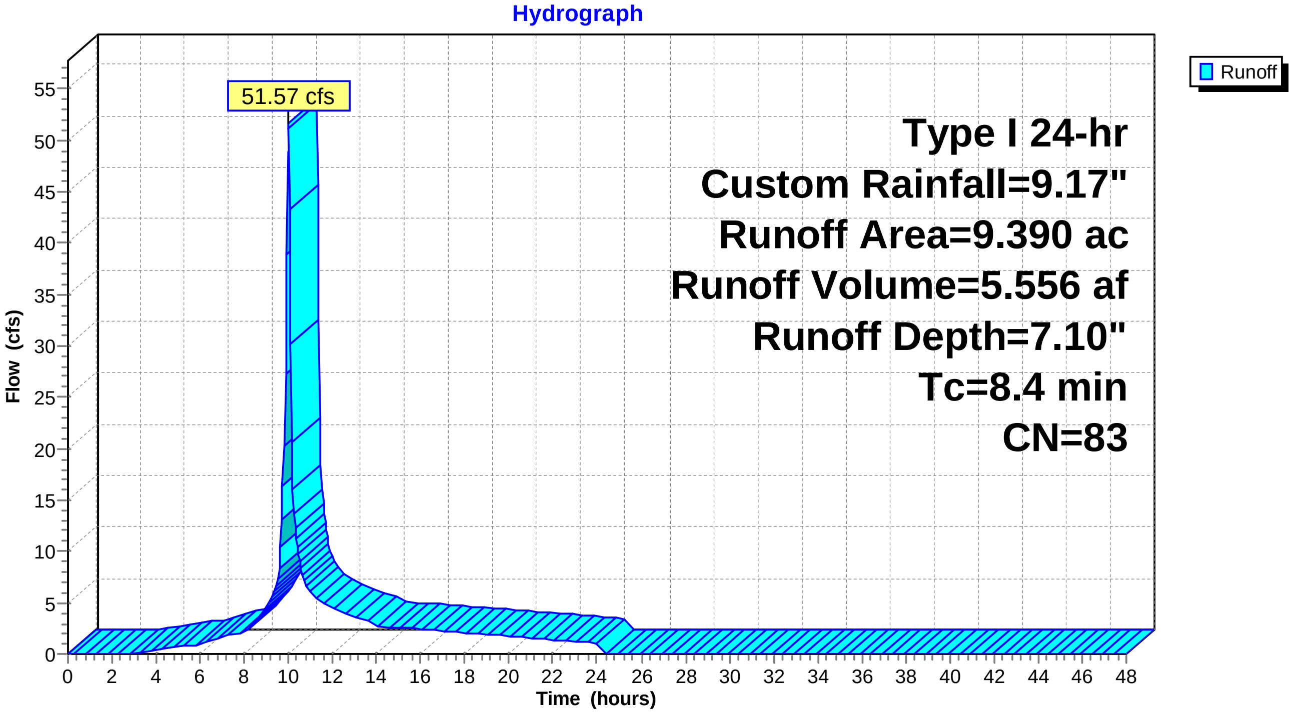
Runoff = 51.57 cfs @ 9.99 hrs, Volume= 5.556 af, Depth= 7.10"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	9.390	83	
	9.390		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4					**Direct Entry,**

Subcatchment 13S: BASIN P11



Summary for Subcatchment 14S: BASIN P12

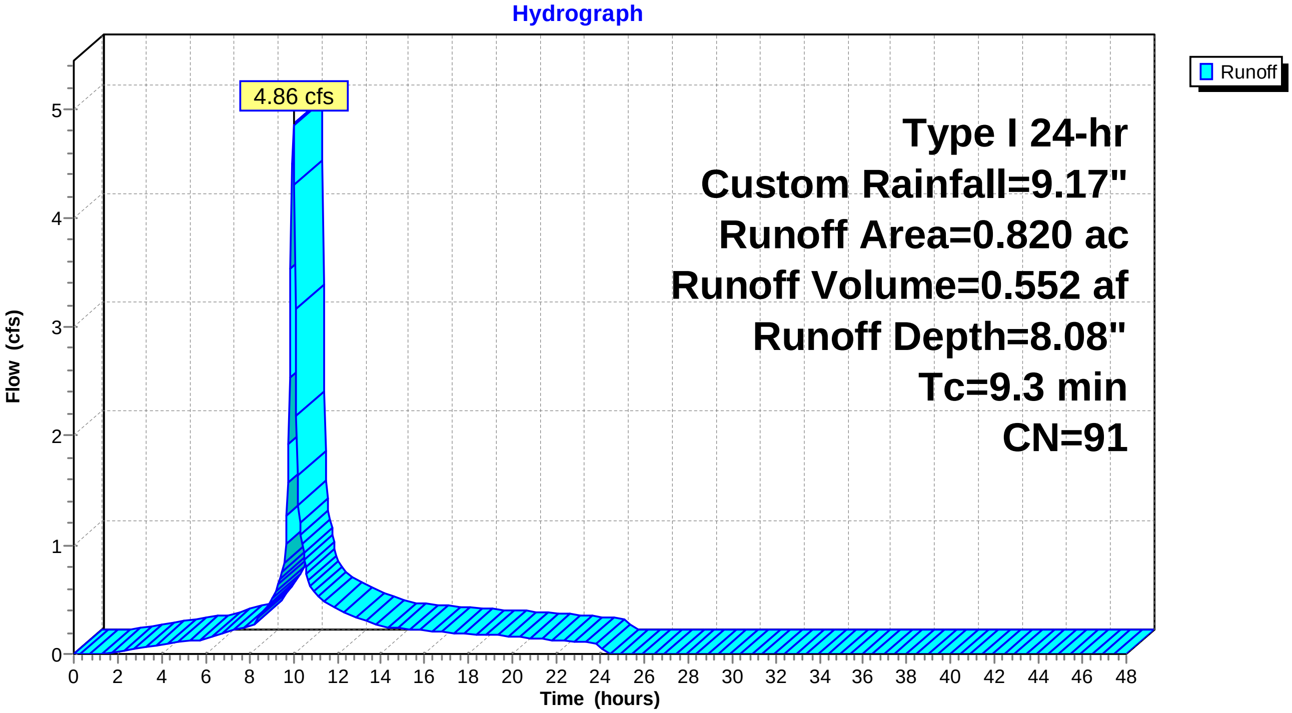
Runoff = 4.86 cfs @ 9.99 hrs, Volume= 0.552 af, Depth= 8.08"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.820	91	
	0.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3					**Direct Entry,**

Subcatchment 14S: BASIN P12



Summary for Subcatchment 15S: BASIN P13

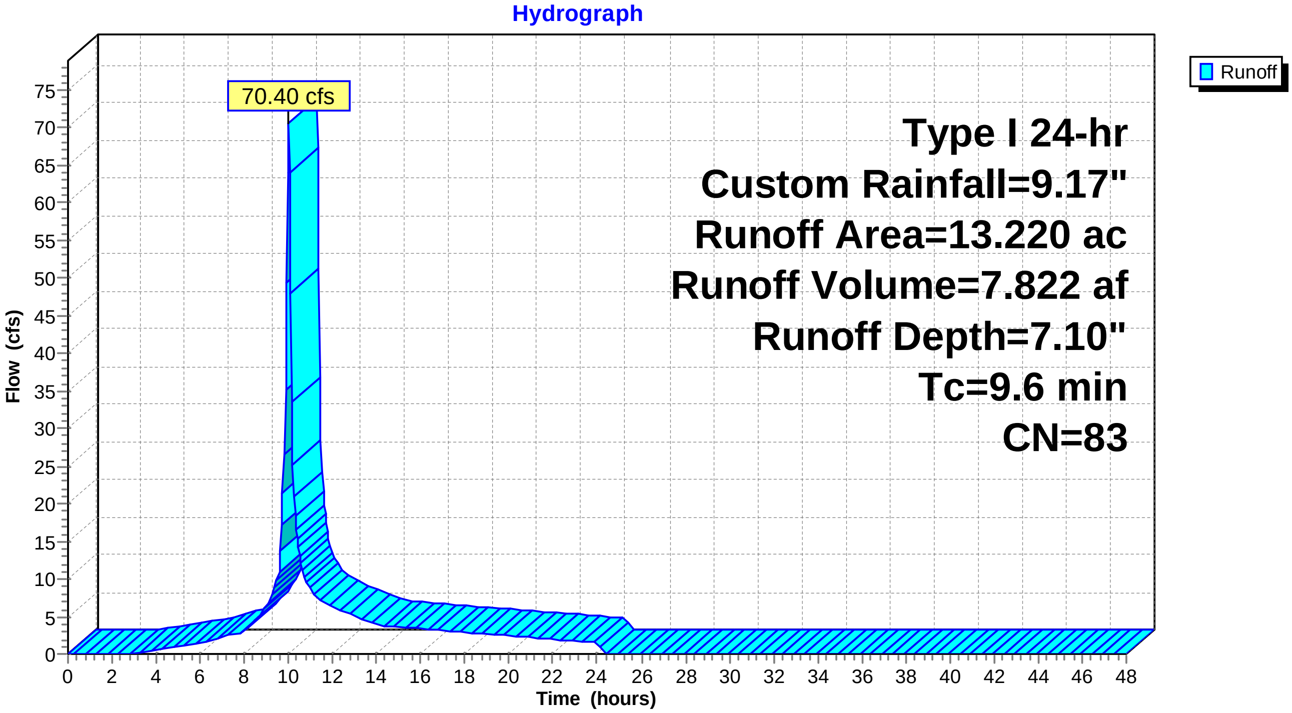
Runoff = 70.40 cfs @ 10.00 hrs, Volume= 7.822 af, Depth= 7.10"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	13.220	83	
	13.220		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.6					**Direct Entry,**

Subcatchment 15S: BASIN P13



Summary for Subcatchment 16S: BASIN P14

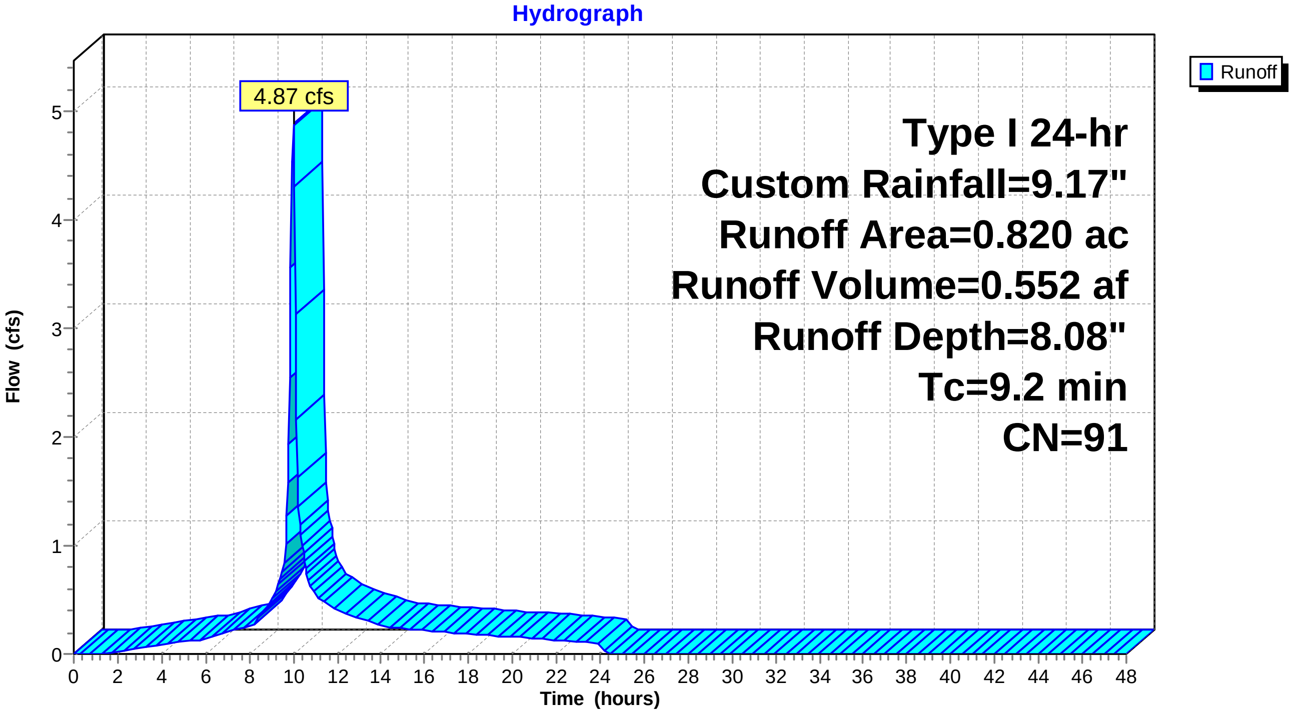
Runoff = 4.87 cfs @ 9.99 hrs, Volume= 0.552 af, Depth= 8.08"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.820	91	
	0.820		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2					**Direct Entry,**

Subcatchment 16S: BASIN P14



Summary for Subcatchment 17S: BASIN P15

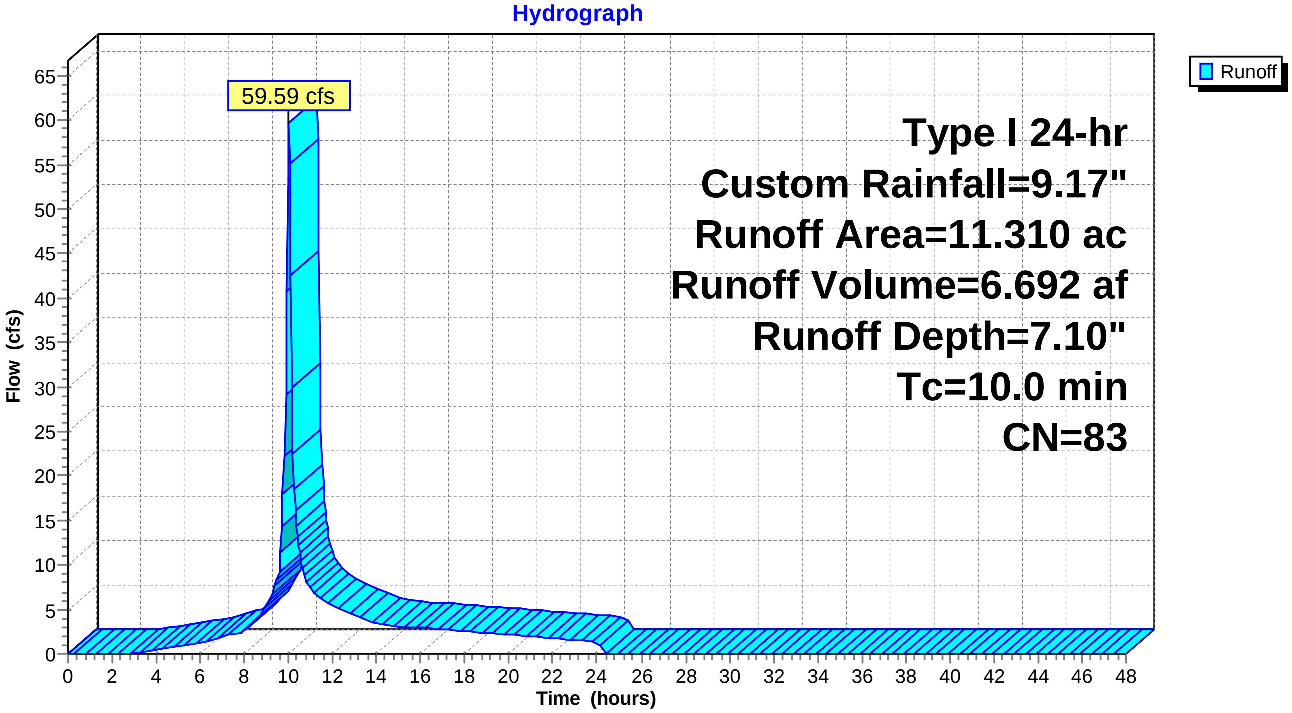
Runoff = 59.59 cfs @ 10.00 hrs, Volume= 6.692 af, Depth= 7.10"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	11.310	83	
	11.310		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 17S: BASIN P15



Summary for Subcatchment 18S: BASIN P16

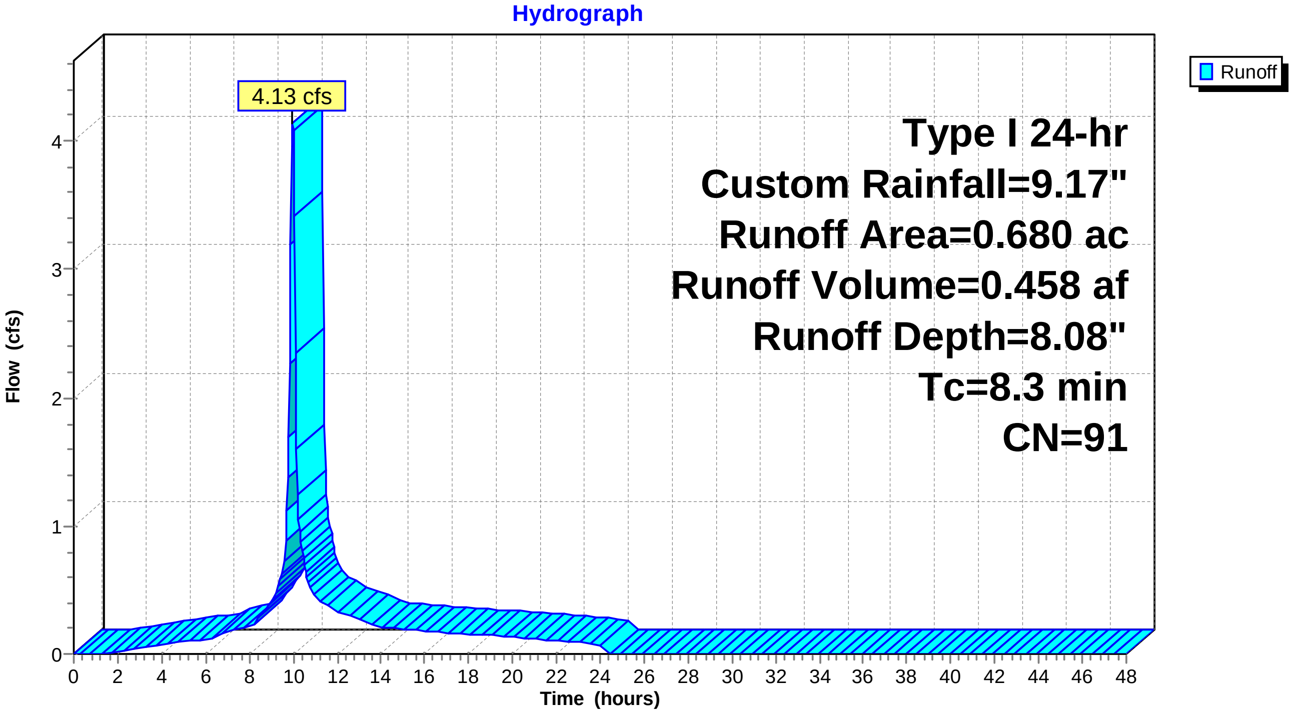
Runoff = 4.13 cfs @ 9.98 hrs, Volume= 0.458 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.680	91	
	0.680		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.3					**Direct Entry,**

Subcatchment 18S: BASIN P16



Summary for Subcatchment 19S: BASIN P17

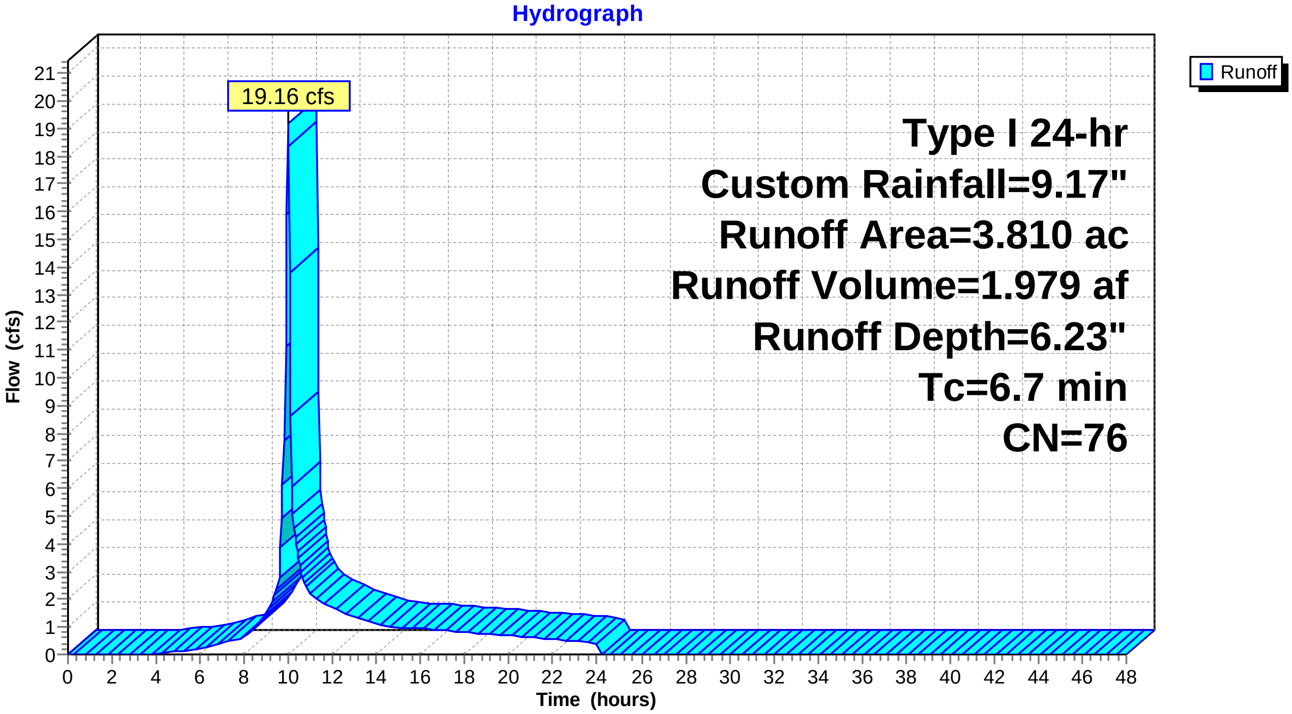
Runoff = 19.16 cfs @ 9.97 hrs, Volume= 1.979 af, Depth= 6.23"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	3.810	76	
	3.810		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.7					**Direct Entry,**

Subcatchment 19S: BASIN P17



Summary for Subcatchment 20S: BASIN P18

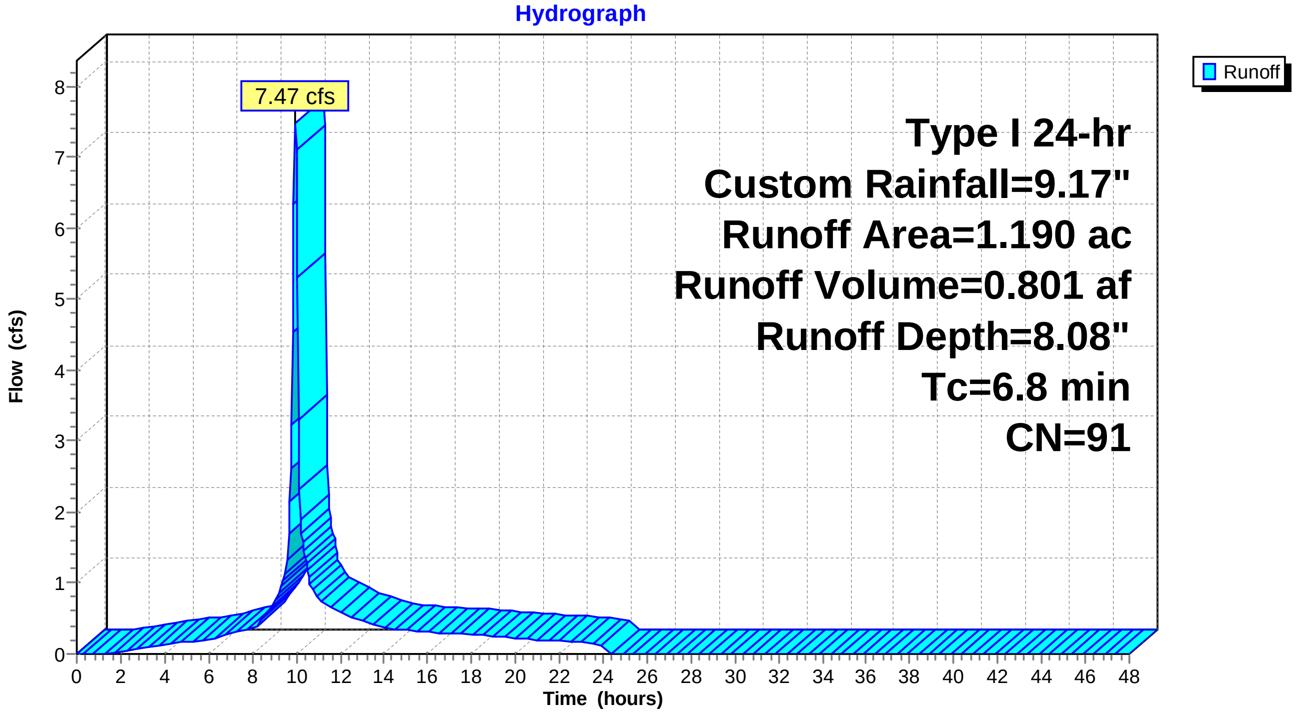
Runoff = 7.47 cfs @ 9.96 hrs, Volume= 0.801 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	1.190	91	
	1.190		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8					**Direct Entry,**

Subcatchment 20S: BASIN P18



Summary for Subcatchment 21S: BASIN P19

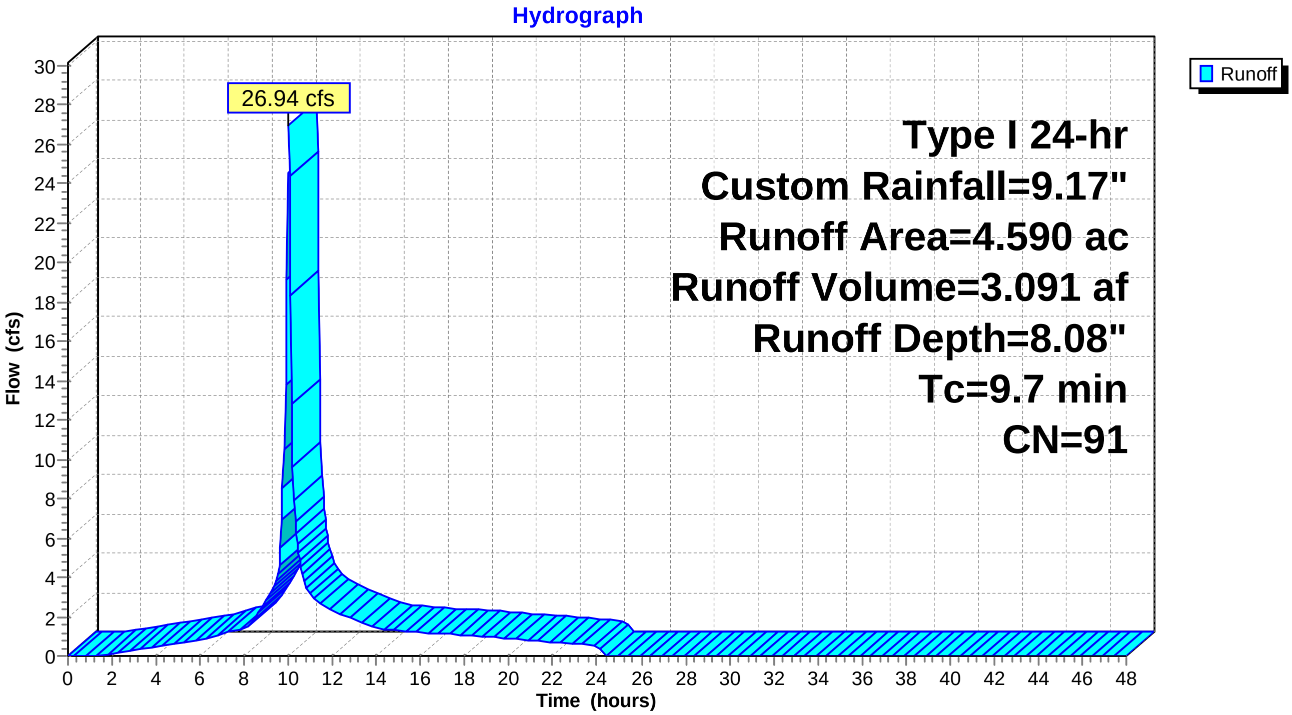
Runoff = 26.94 cfs @ 10.00 hrs, Volume= 3.091 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	4.590	91	
	4.590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.7					**Direct Entry,**

Subcatchment 21S: BASIN P19



Summary for Subcatchment 22S: BASIN P20

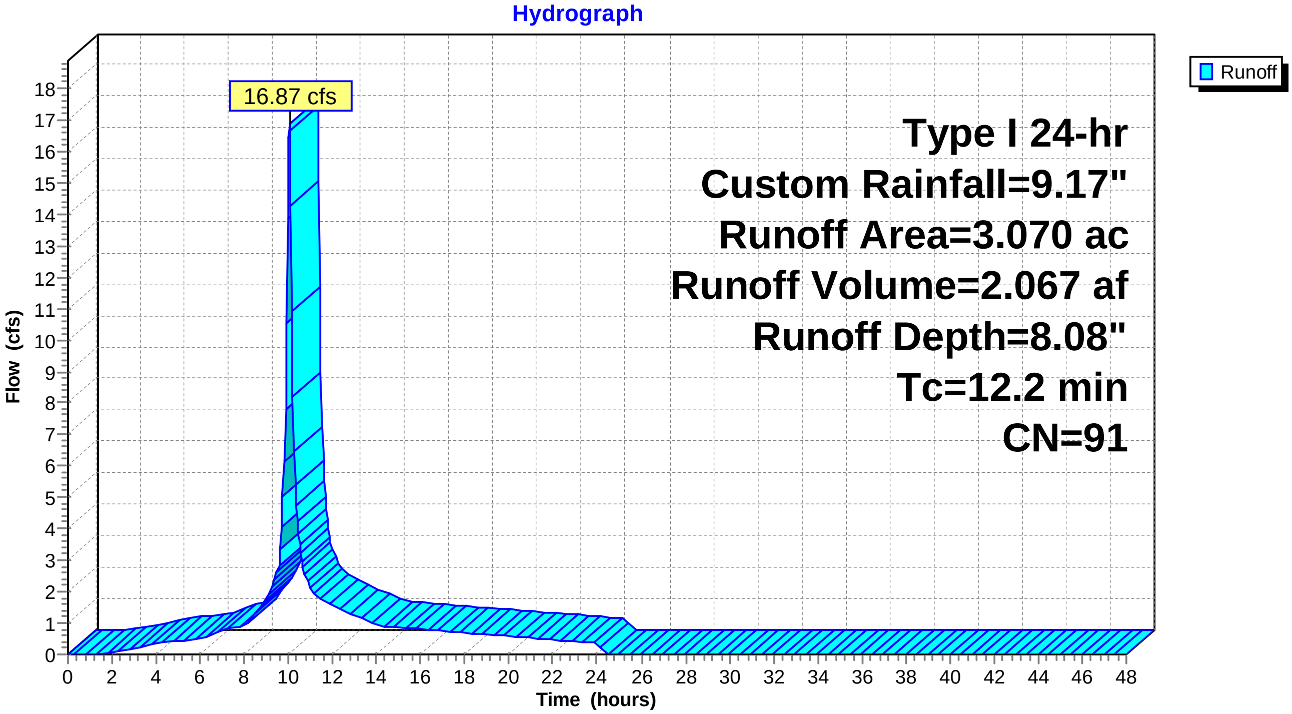
Runoff = 16.87 cfs @ 10.03 hrs, Volume= 2.067 af, Depth= 8.08"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	3.070	91	
	3.070		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.2					**Direct Entry,**

Subcatchment 22S: BASIN P20



Summary for Subcatchment 23S: BASIN P21

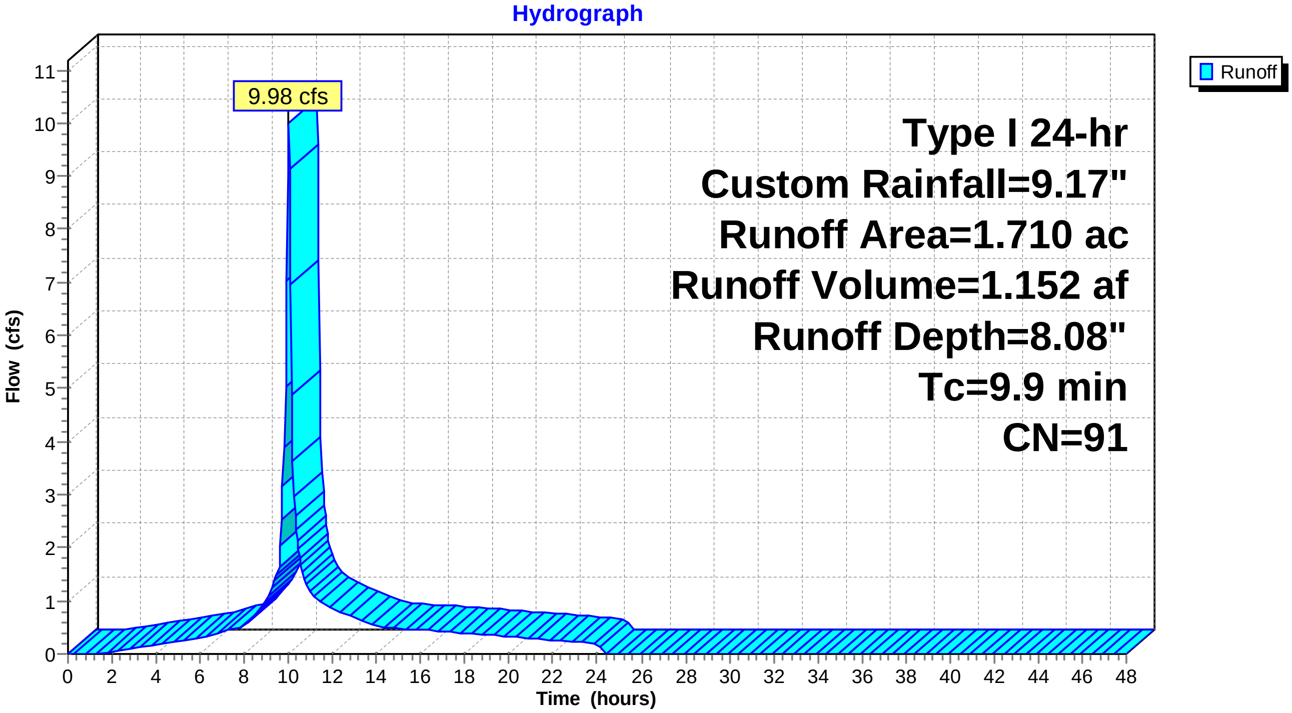
Runoff = 9.98 cfs @ 10.00 hrs, Volume= 1.152 af, Depth= 8.08"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	1.710	91	
	1.710		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9					**Direct Entry,**

Subcatchment 23S: BASIN P21



Summary for Subcatchment 24S: BASIN P22

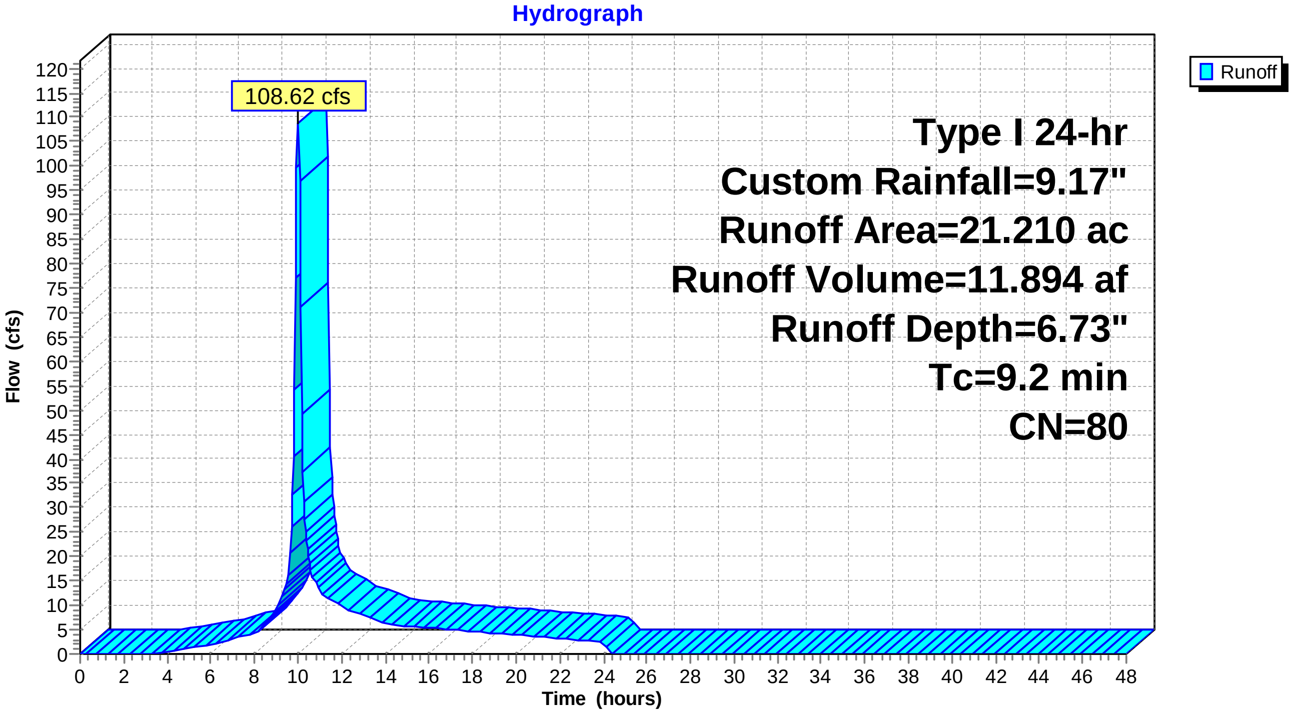
Runoff = 108.62 cfs @ 10.00 hrs, Volume= 11.894 af, Depth= 6.73"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	21.210	80	
	21.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.2					**Direct Entry,**

Subcatchment 24S: BASIN P22



Summary for Subcatchment 25S: BASIN P23

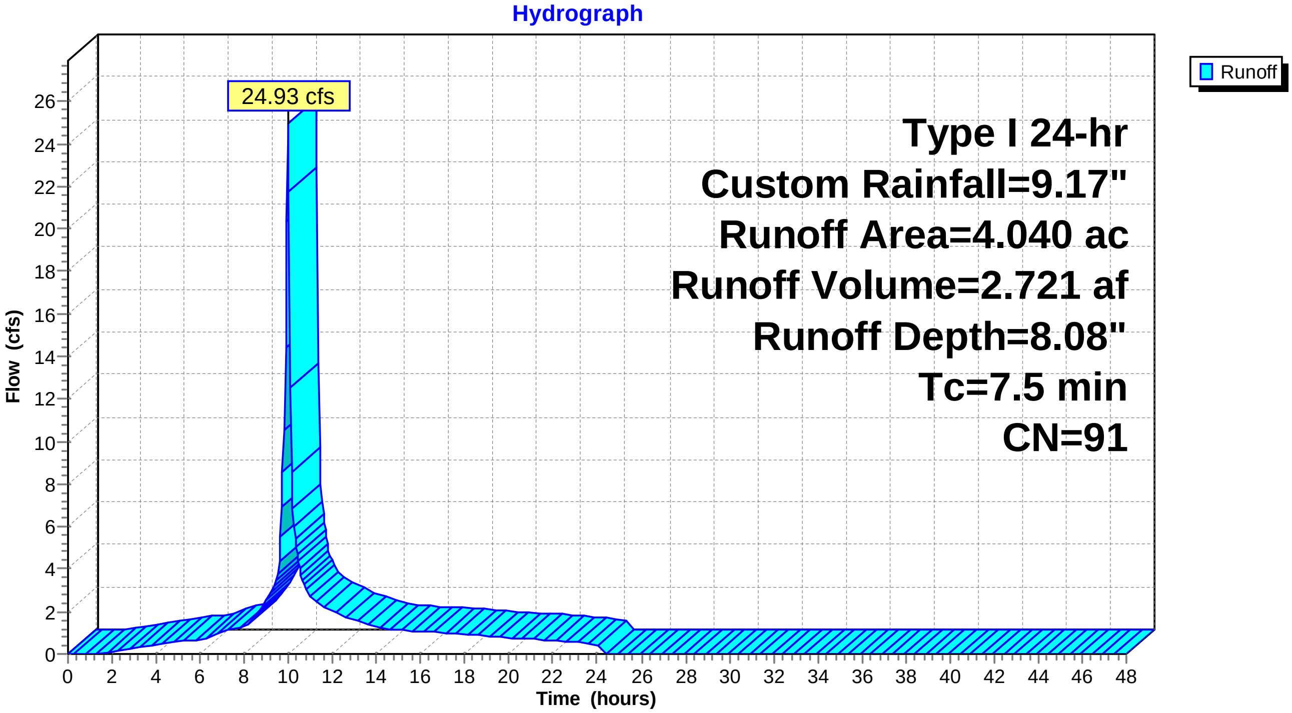
Runoff = 24.93 cfs @ 9.97 hrs, Volume= 2.721 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	4.040	91	
	4.040		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5					**Direct Entry,**

Subcatchment 25S: BASIN P23



Summary for Subcatchment 26S: BASIN P24

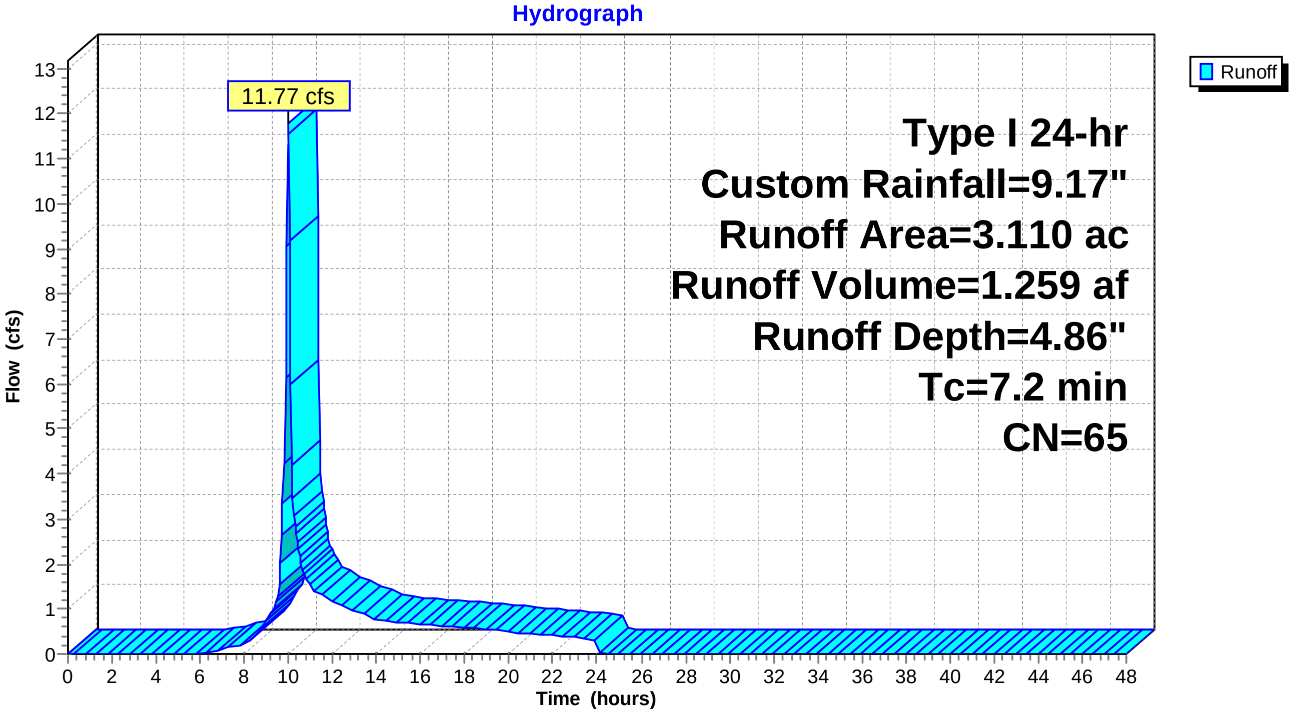
Runoff = 11.77 cfs @ 9.98 hrs, Volume= 1.259 af, Depth= 4.86"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	3.110	65	
	3.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.2					**Direct Entry,**

Subcatchment 26S: BASIN P24



Summary for Subcatchment 27S: BASIN P25

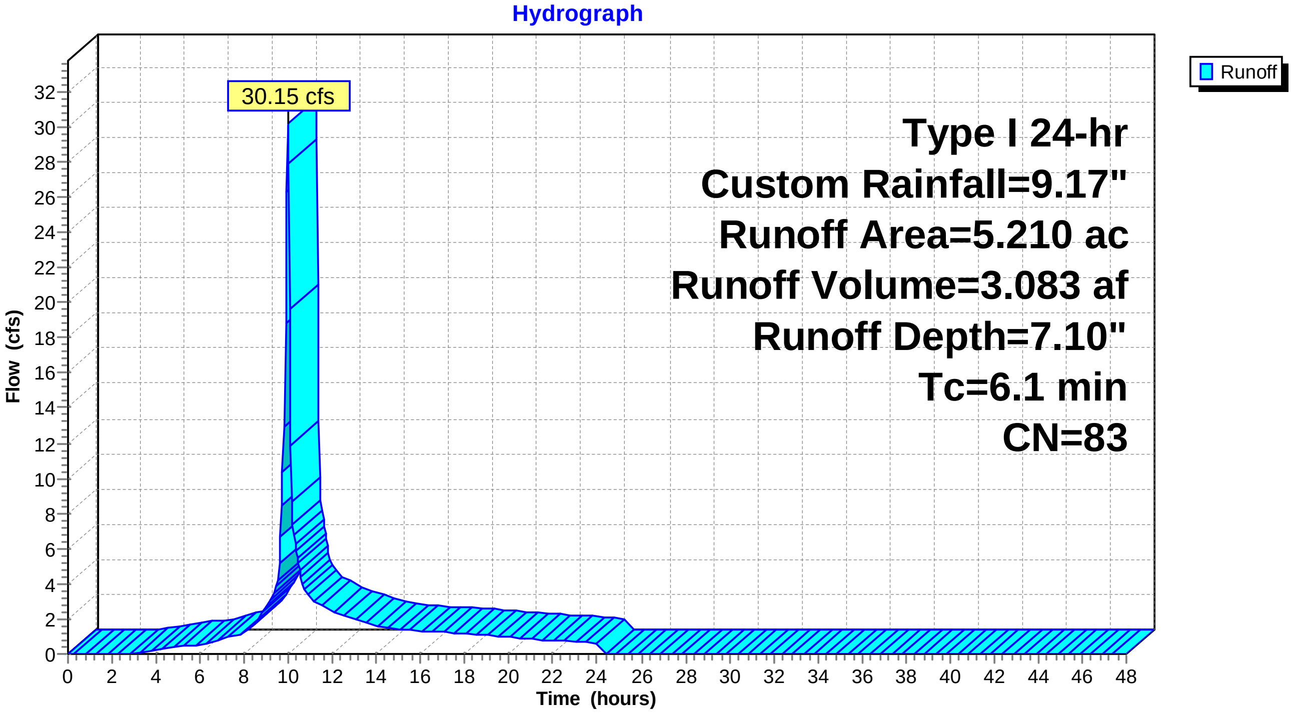
Runoff = 30.15 cfs @ 9.96 hrs, Volume= 3.083 af, Depth= 7.10"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	5.210	83	
	5.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1					**Direct Entry,**

Subcatchment 27S: BASIN P25



Summary for Subcatchment 28S: BASIN P26

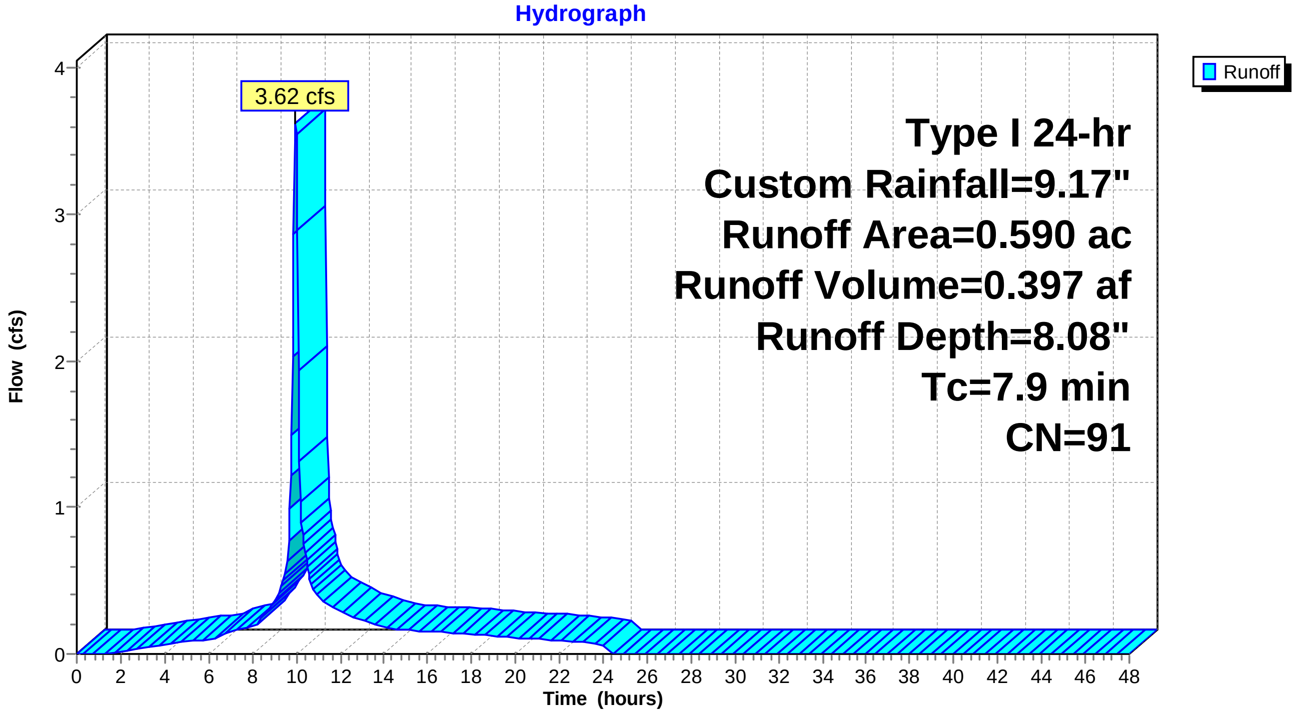
Runoff = 3.62 cfs @ 9.98 hrs, Volume= 0.397 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.590	91	
	0.590		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9					**Direct Entry,**

Subcatchment 28S: BASIN P26



Summary for Subcatchment 29S: BASIN P27

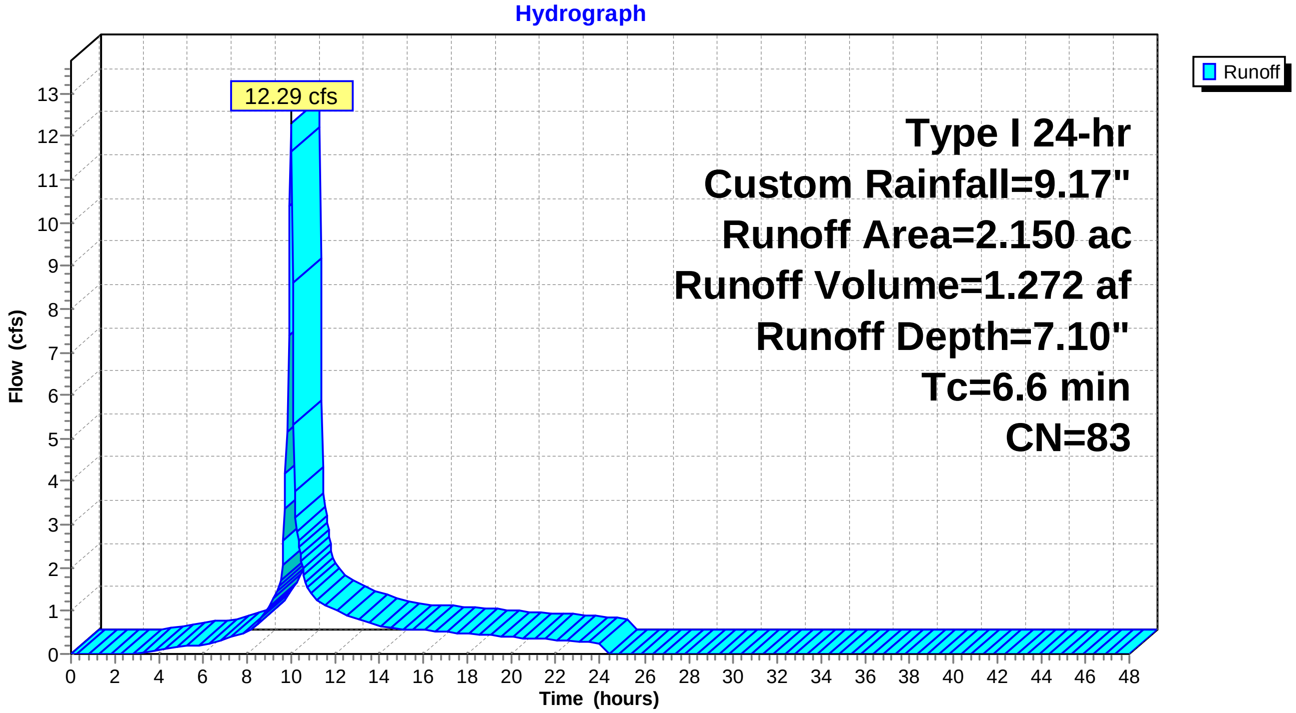
Runoff = 12.29 cfs @ 9.96 hrs, Volume= 1.272 af, Depth= 7.10"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	2.150	83	
	2.150		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6					**Direct Entry,**

Subcatchment 29S: BASIN P27



Summary for Subcatchment 30S: BASIN P28

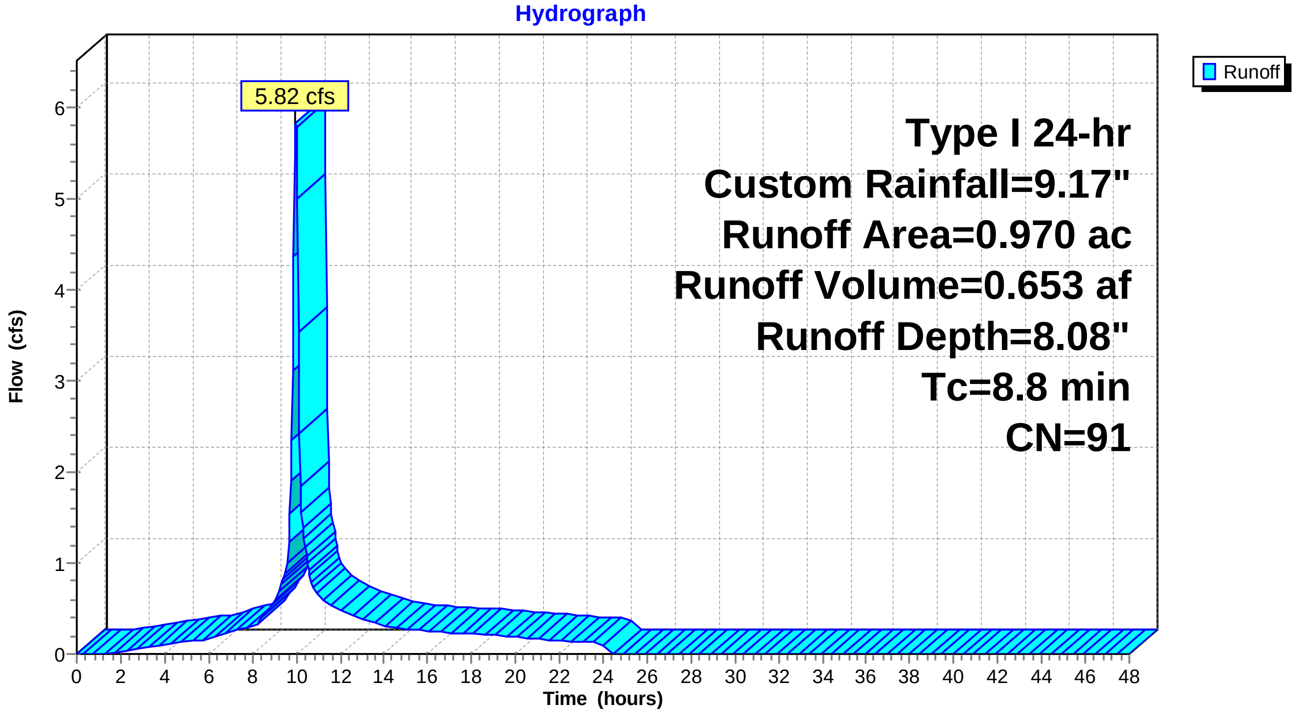
Runoff = 5.82 cfs @ 9.99 hrs, Volume= 0.653 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.970	91	
	0.970		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.8					**Direct Entry,**

Subcatchment 30S: BASIN P28



Summary for Subcatchment 31S: BASIN P29

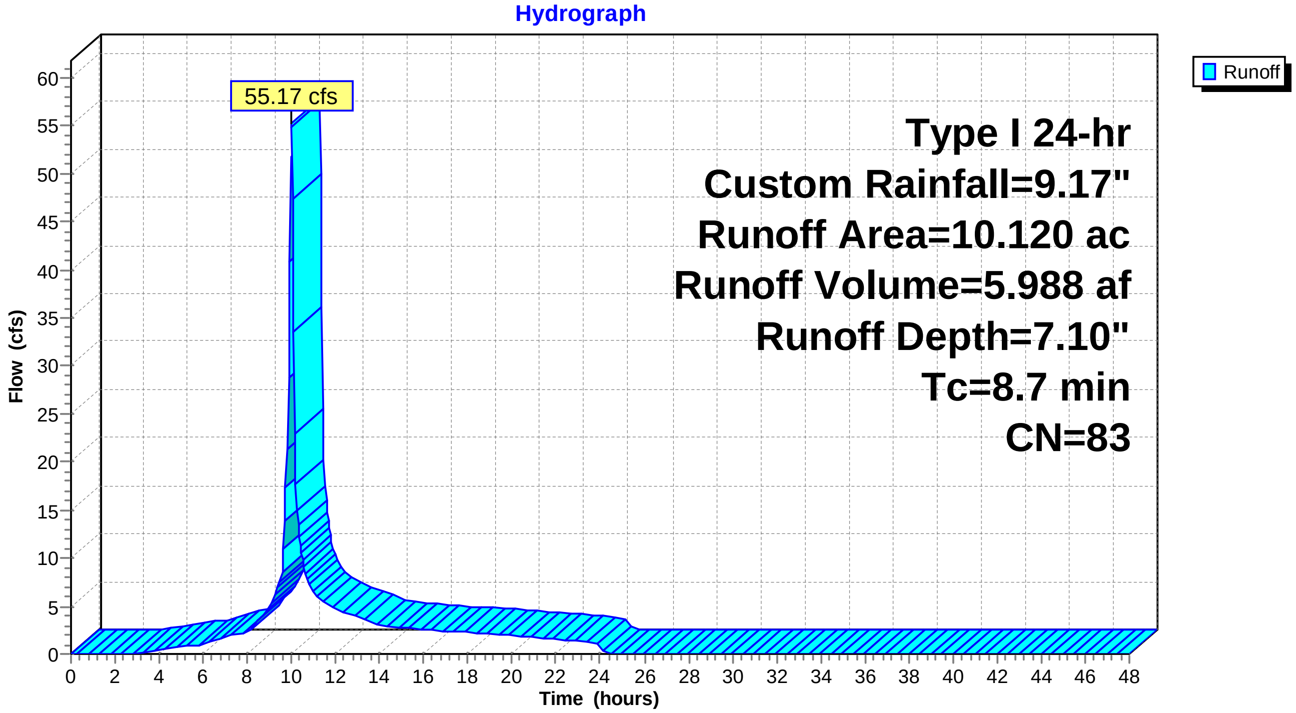
Runoff = 55.17 cfs @ 9.99 hrs, Volume= 5.988 af, Depth= 7.10"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	10.120	83	
	10.120		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7					**Direct Entry,**

Subcatchment 31S: BASIN P29



Summary for Subcatchment 32S: BASIN P30

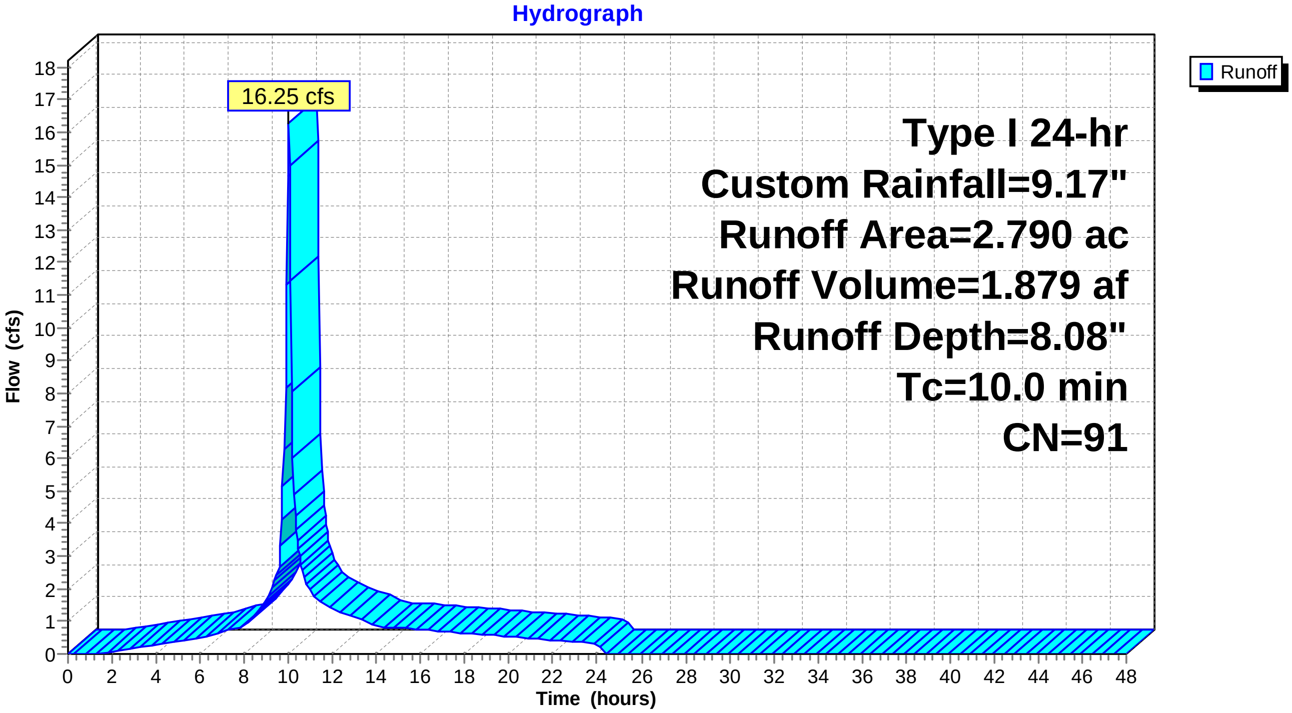
Runoff = 16.25 cfs @ 10.00 hrs, Volume= 1.879 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	2.790	91	
	2.790		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					**Direct Entry,**

Subcatchment 32S: BASIN P30



Summary for Subcatchment 33S: BASIN P31

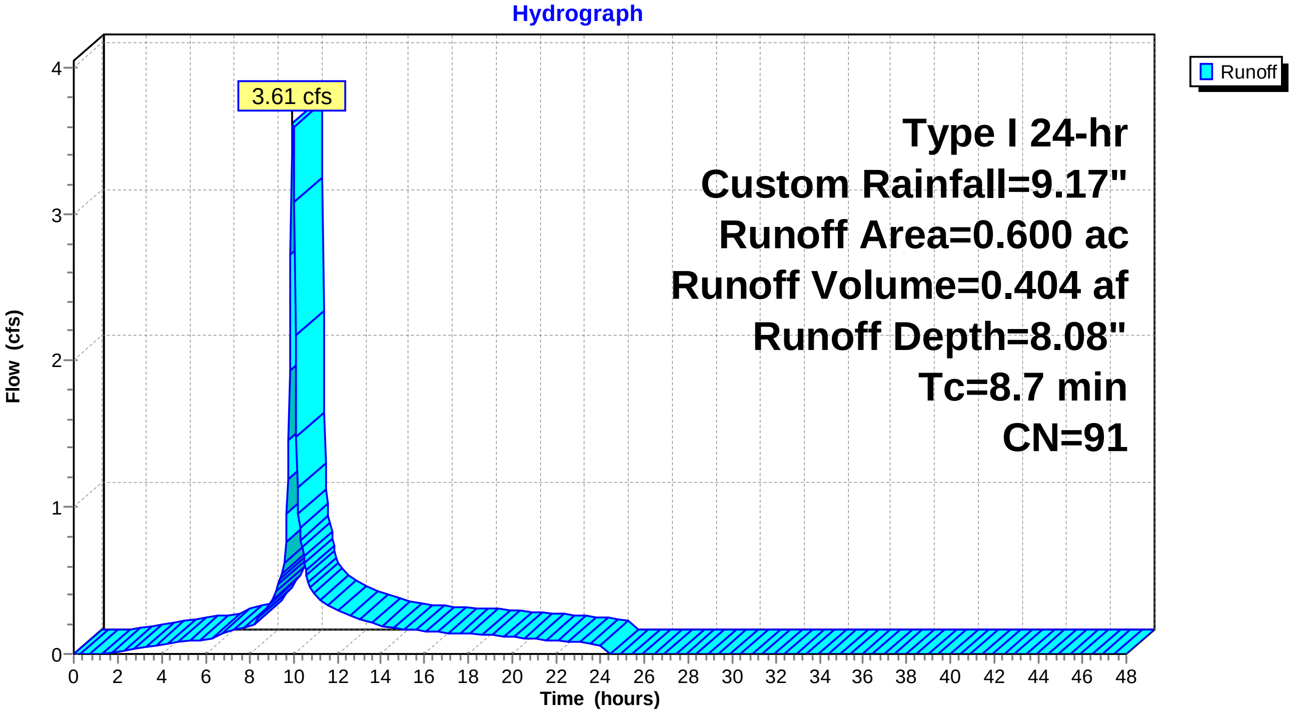
Runoff = 3.61 cfs @ 9.99 hrs, Volume= 0.404 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	0.600	91	
	0.600		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7					**Direct Entry,**

Subcatchment 33S: BASIN P31



Summary for Subcatchment 34S: BASIN P32

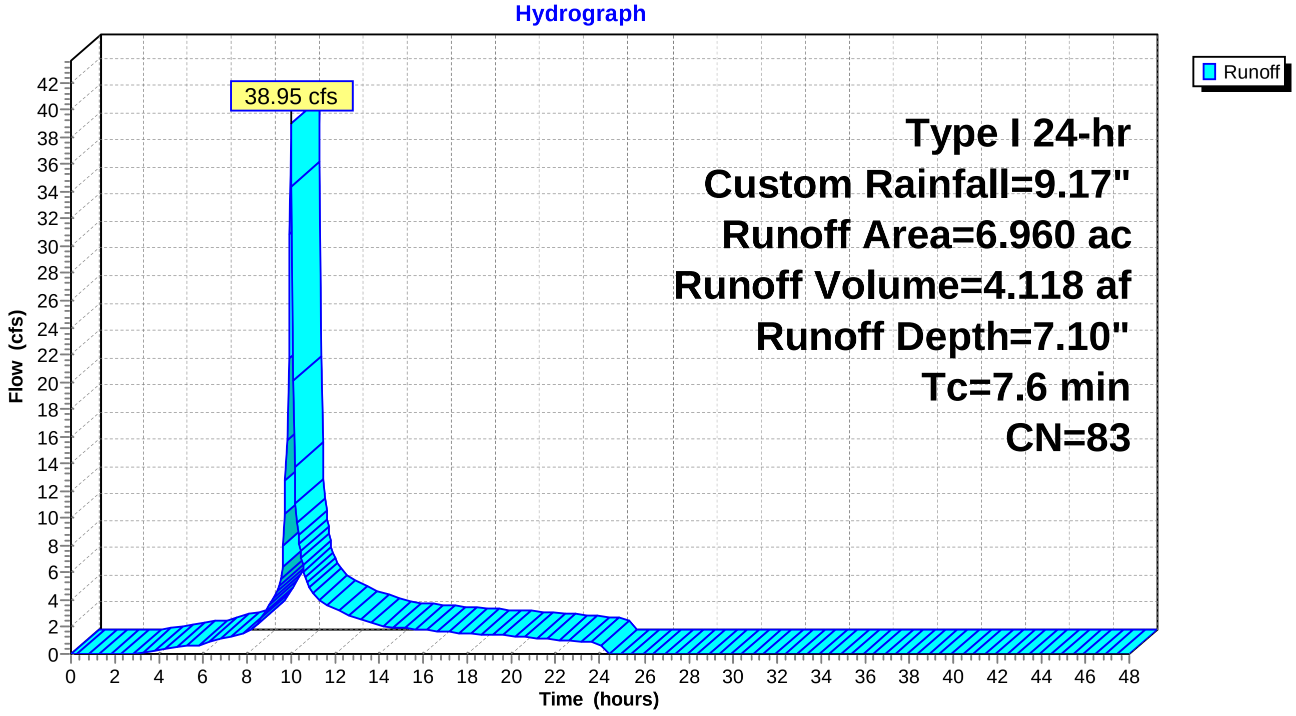
Runoff = 38.95 cfs @ 9.98 hrs, Volume= 4.118 af, Depth= 7.10"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	6.960	83	
	6.960		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.6					**Direct Entry,**

Subcatchment 34S: BASIN P32



Summary for Subcatchment 35S: BASIN P33

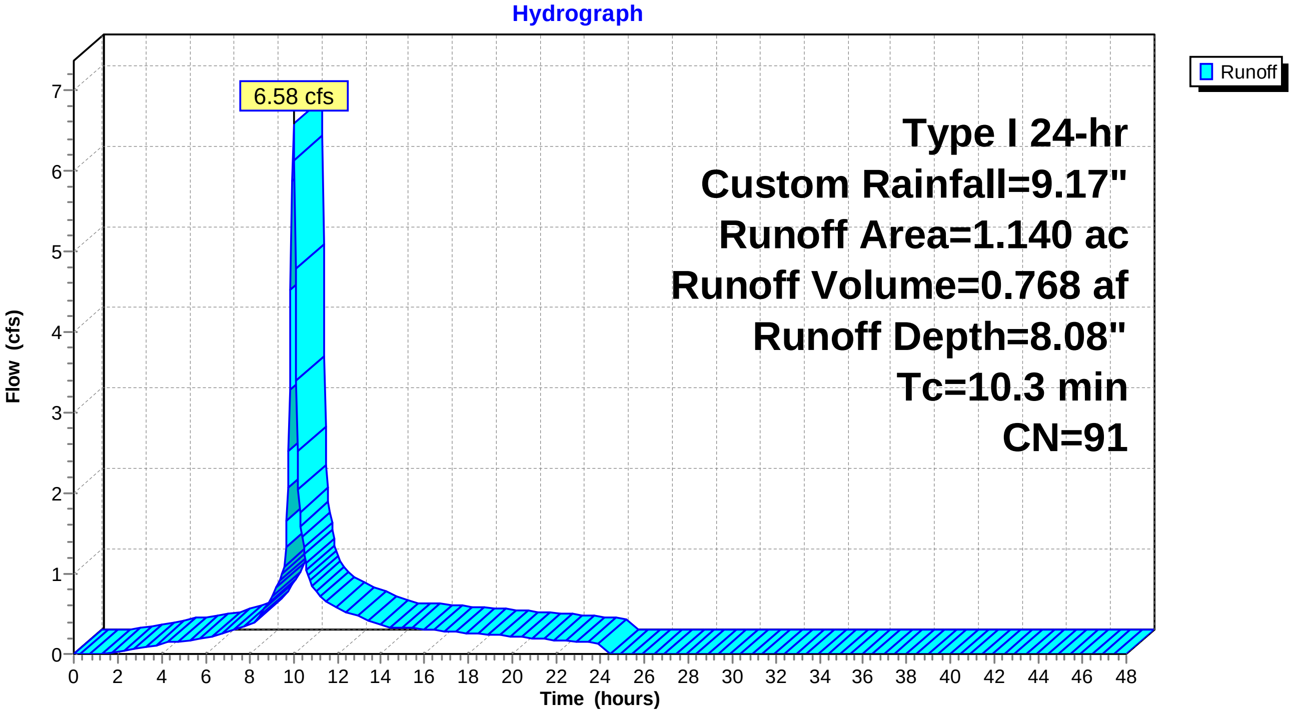
Runoff = 6.58 cfs @ 10.01 hrs, Volume= 0.768 af, Depth= 8.08"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	1.140	91	
	1.140		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.3					**Direct Entry,**

Subcatchment 35S: BASIN P33



Summary for Subcatchment 36S: BASIN P34

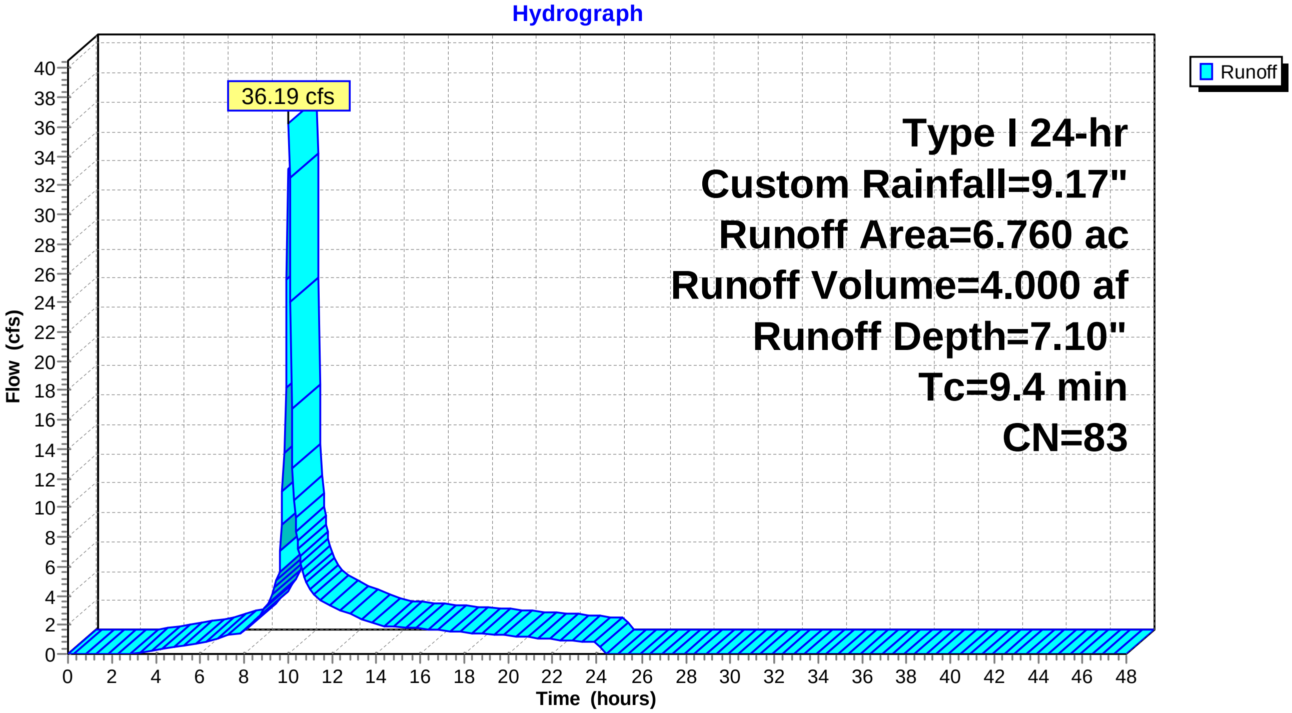
Runoff = 36.19 cfs @ 10.00 hrs, Volume= 4.000 af, Depth= 7.10"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	6.760	83	
	6.760		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4					**Direct Entry,**

Subcatchment 36S: BASIN P34



Summary for Subcatchment 37S: BASIN P35

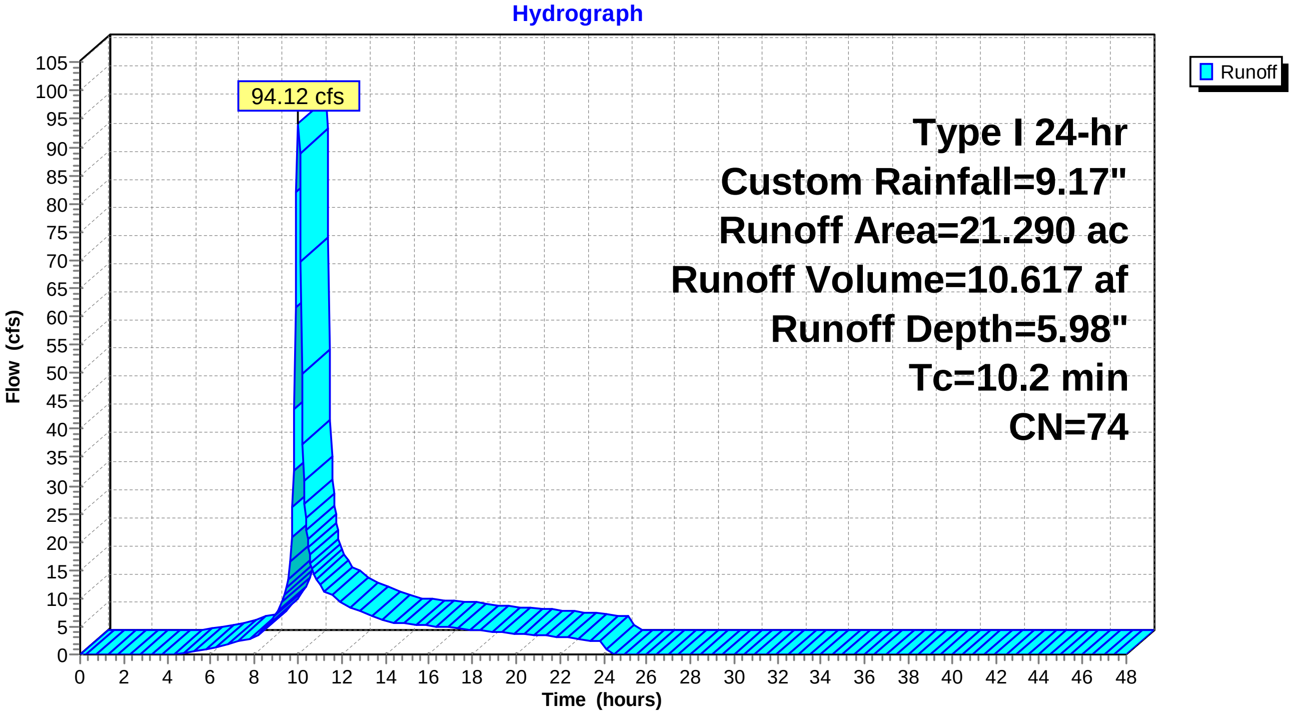
Runoff = 94.12 cfs @ 10.01 hrs, Volume= 10.617 af, Depth= 5.98"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	21.290	74	
	21.290		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2					**Direct Entry,**

Subcatchment 37S: BASIN P35



Summary for Subcatchment 38S: BASIN P36

[49] Hint: Tc<2dt may require smaller dt

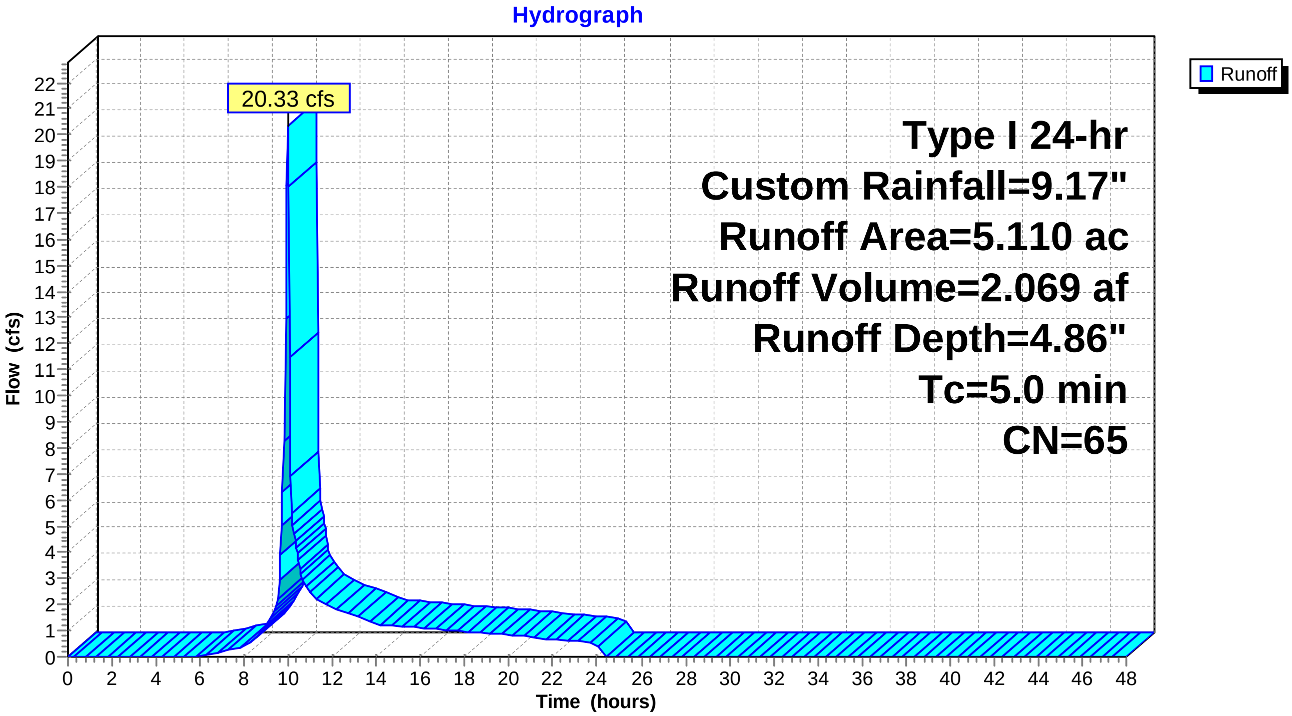
Runoff = 20.33 cfs @ 9.95 hrs, Volume= 2.069 af, Depth= 4.86"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	5.110	65	
	5.110		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 38S: BASIN P36



Summary for Subcatchment 39S: BASIN P37

[49] Hint: Tc<2dt may require smaller dt

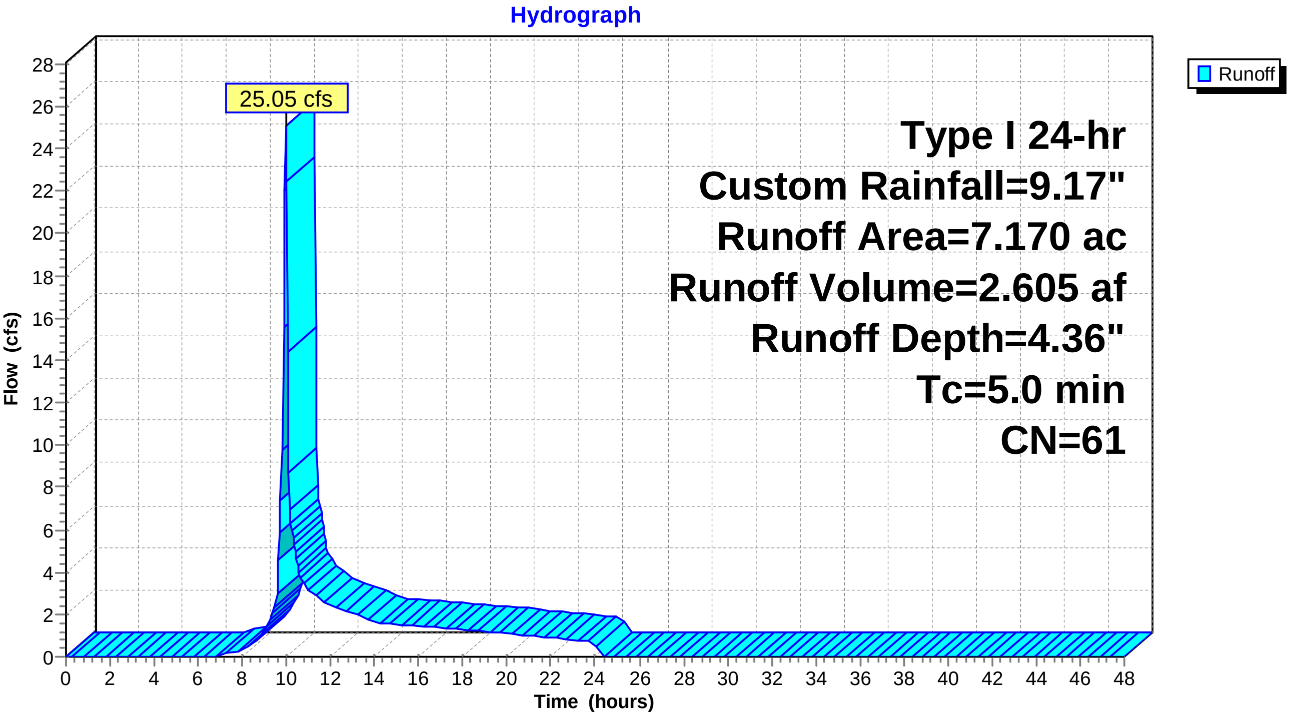
Runoff = 25.05 cfs @ 9.95 hrs, Volume= 2.605 af, Depth= 4.36"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	7.170	61	
	7.170		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 39S: BASIN P37



Summary for Subcatchment 40S: BASIN O3

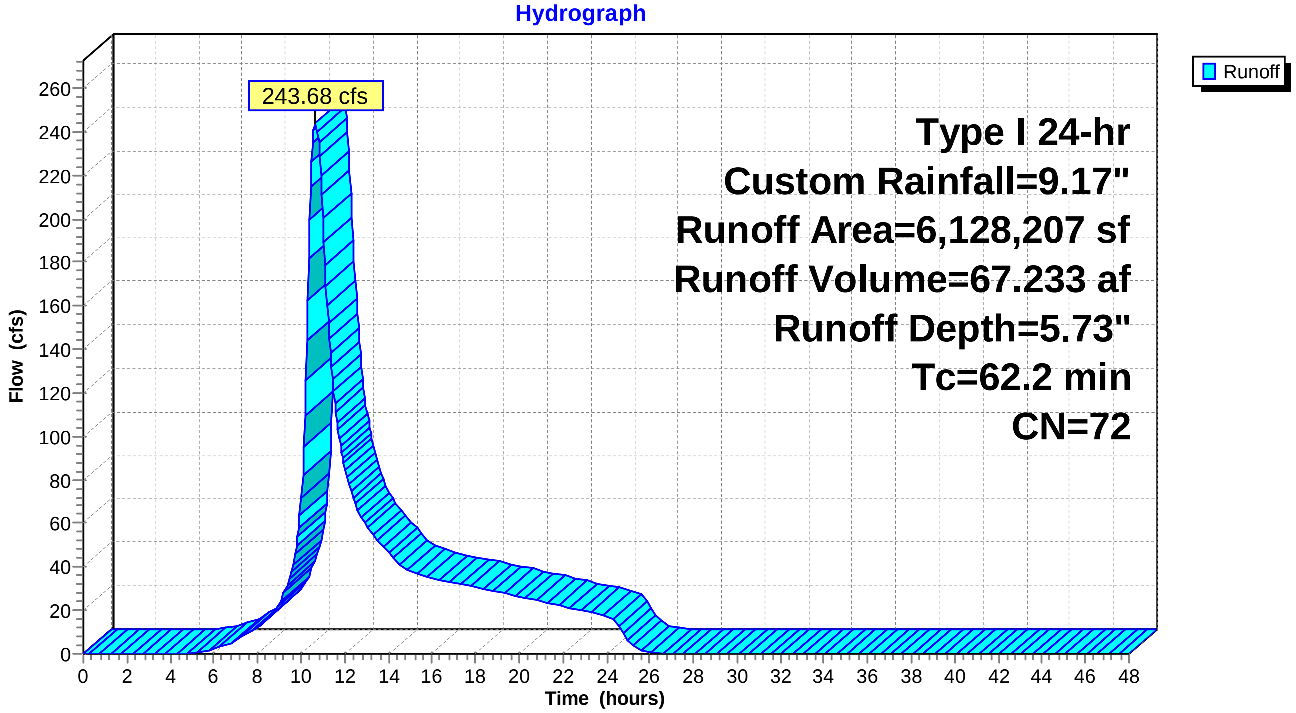
Runoff = 243.68 cfs @ 10.68 hrs, Volume= 67.233 af, Depth= 5.73"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (sf)	CN	Description
*	6,128,207	72	
	6,128,207		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.2					**Direct Entry,**

Subcatchment 40S: BASIN O3



Summary for Subcatchment 41S: BASIN O1A

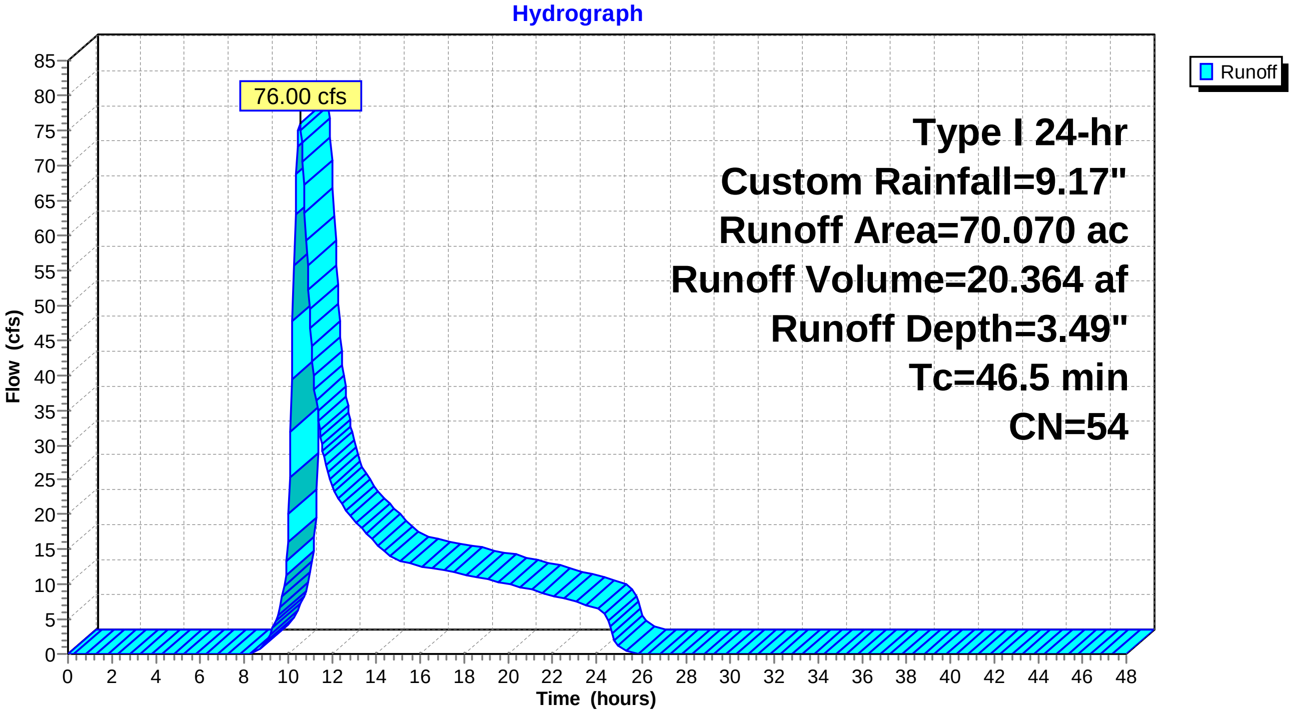
Runoff = 76.00 cfs @ 10.50 hrs, Volume= 20.364 af, Depth= 3.49"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	70.070	54	
	70.070		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.5					**Direct Entry,**

Subcatchment 41S: BASIN O1A



Summary for Subcatchment 42S: BASIN O2

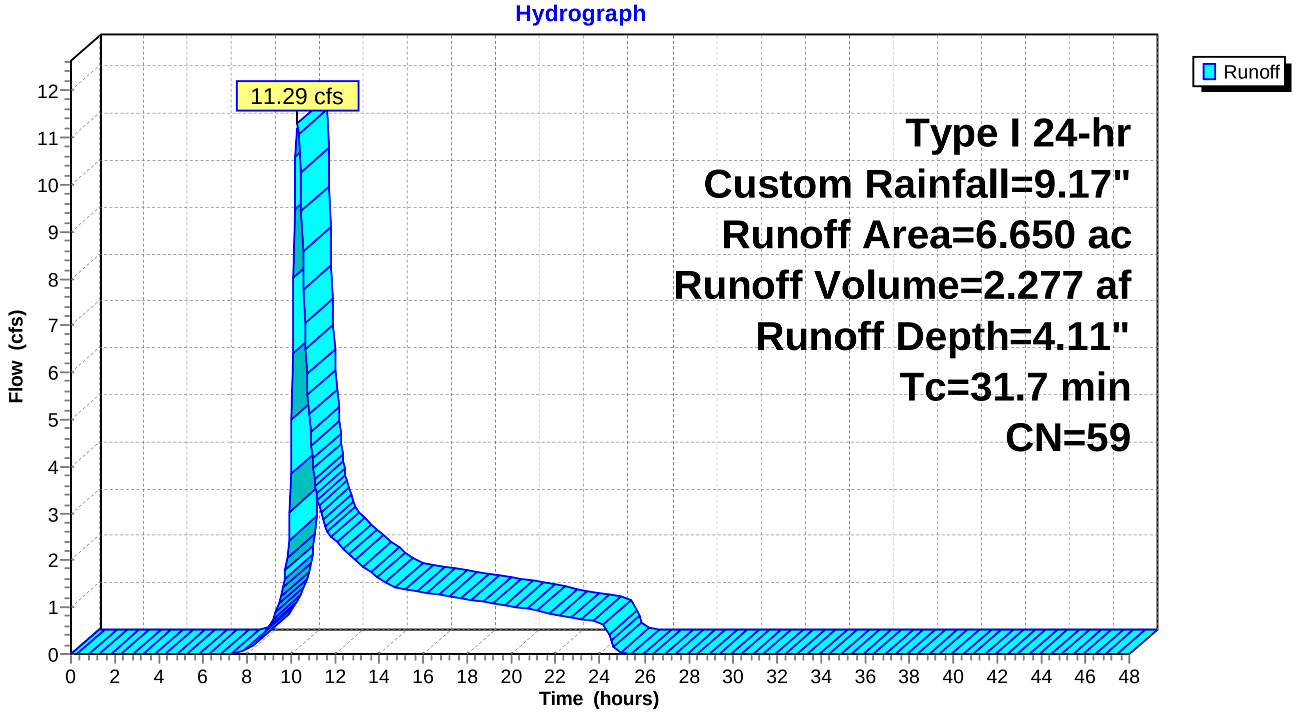
Runoff = 11.29 cfs @ 10.28 hrs, Volume= 2.277 af, Depth= 4.11"
Routed to Pond 11P : DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	6.650	59	
	6.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry,**

Subcatchment 42S: BASIN O2



Summary for Subcatchment 43S: BASIN O1B

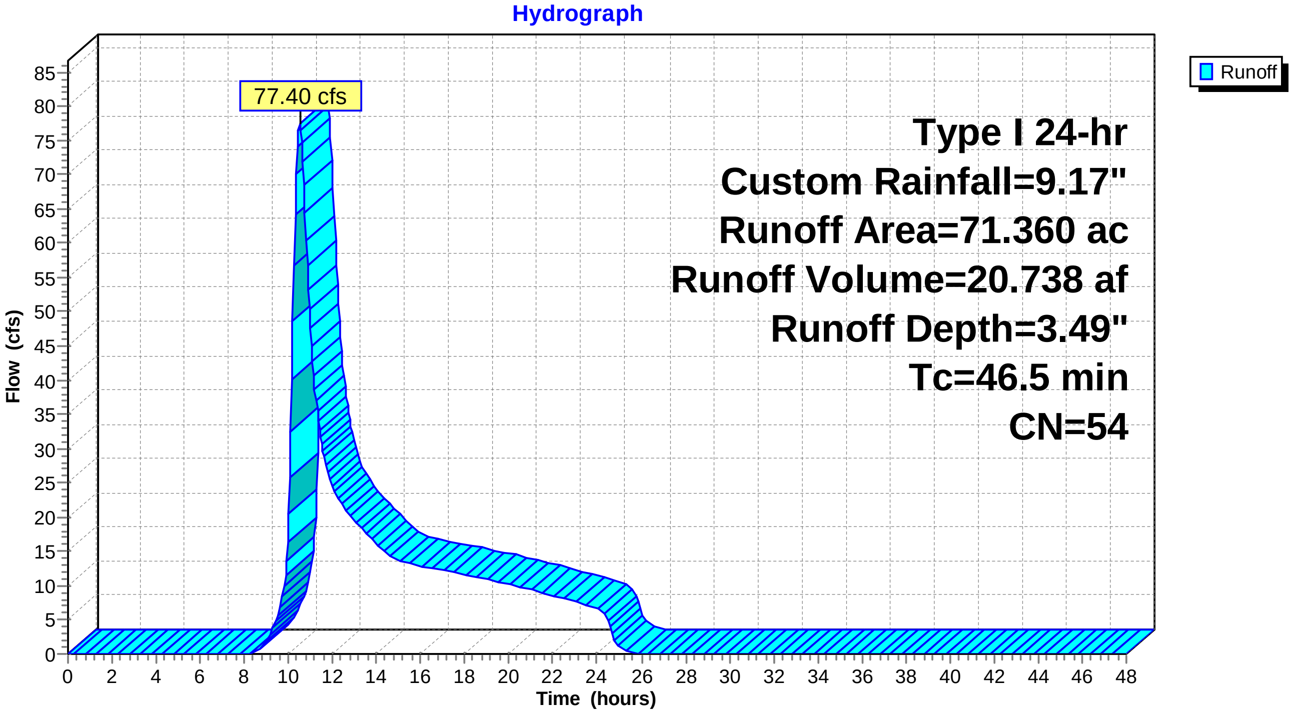
Runoff = 77.40 cfs @ 10.50 hrs, Volume= 20.738 af, Depth= 3.49"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	71.360	54	
	71.360		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.5					**Direct Entry,**

Subcatchment 43S: BASIN O1B



Summary for Subcatchment 44S: BASIN P1B

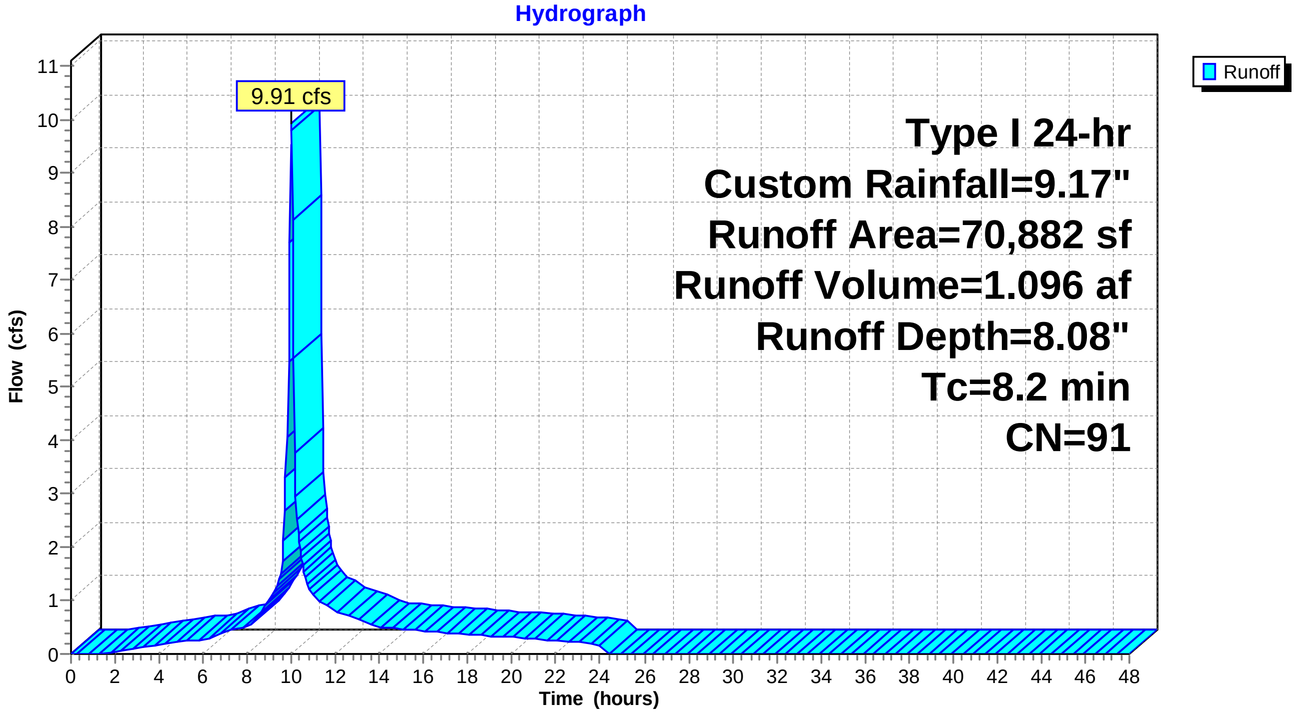
Runoff = 9.91 cfs @ 9.98 hrs, Volume= 1.096 af, Depth= 8.08"
Routed to Pond 14P : DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (sf)	CN	Description
*	70,882	91	
	70,882		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2					**Direct Entry,**

Subcatchment 44S: BASIN P1B



Summary for Pond 11P: DETENTION PONDS B2A/B COMBINED

```
Inflow Area =      209.184 ac,    0.00% Impervious,  Inflow Depth =   5.80"    for  Custom event
Inflow      =     729.92 cfs @    9.99 hrs,  Volume=         101.137 af
Outflow     =      34.69 cfs @   20.32 hrs,  Volume=         100.105 af,  Atten= 95%,  Lag= 620.2 min
Discarded   =      34.69 cfs @   20.32 hrs,  Volume=         100.105 af
```

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 38.47' @ 20.32 hrs Surf.Area= 6.854 ac Storage= 54.950 af

Plug-Flow detention time= 771.8 min calculated for 100.105 af (99% of inflow)
Center-of-Mass det. time= 764.9 min (1,538.6 - 773.7)

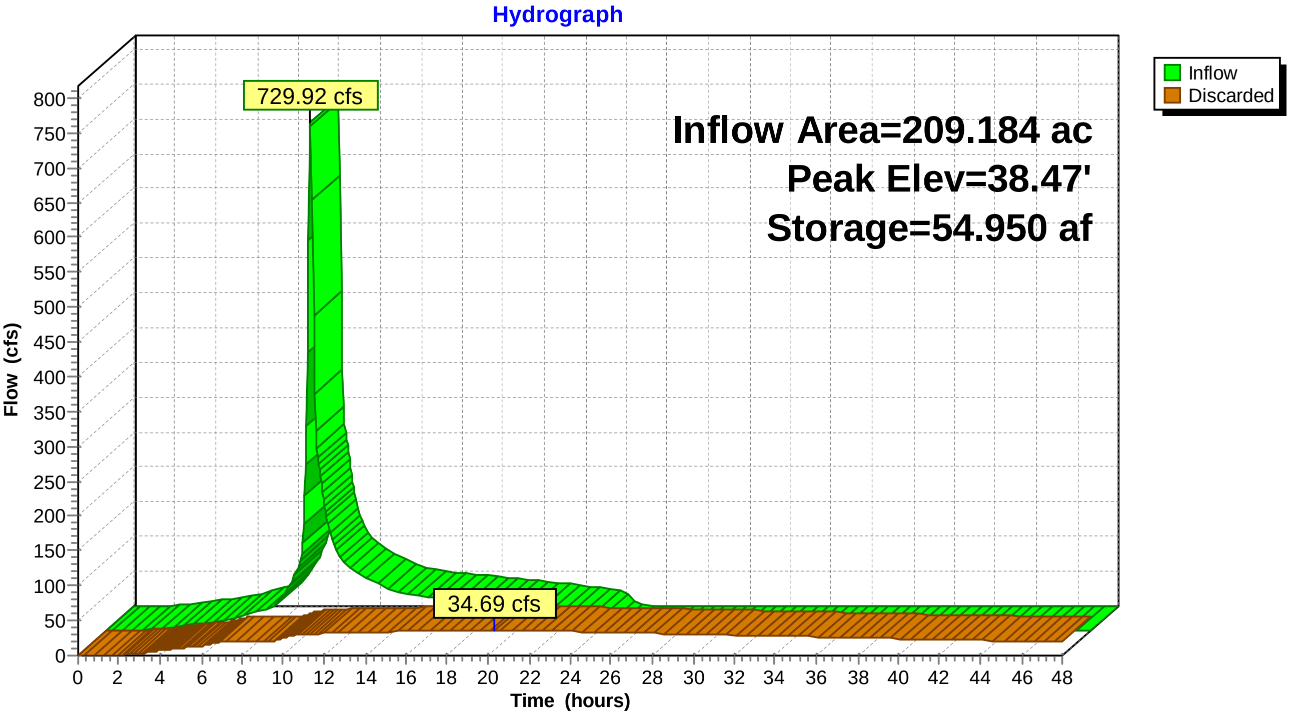
Volume	Invert	Avail.Storage	Storage Description
#1	28.00'	116.623 af	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
28.00	3.789	0.000	0.000	3.789
46.00	9.613	116.623	116.623	9.664

Device	Routing	Invert	Outlet Devices
#1	Discarded	28.00'	**5.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=34.69 cfs @ 20.32 hrs HW=38.47' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 34.69 cfs)

Pond 11P: DETENTION PONDS B2A/B COMBINED



Summary for Pond 14P: DETENTION POND B1

```
Inflow Area =      272.672 ac,   0.00% Impervious,  Inflow Depth =   5.39"    for  Custom event
Inflow      =     401.68 cfs @   10.02 hrs,  Volume=        122.521 af
Outflow     =      41.58 cfs @   21.54 hrs,  Volume=        122.521 af,  Atten= 90%,  Lag= 691.4 min
Discarded   =      41.58 cfs @   21.54 hrs,  Volume=        122.521 af
```

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 38.92' @ 21.54 hrs Surf.Area= 8.187 ac Storage= 66.616 af

Plug-Flow detention time= 741.8 min calculated for 122.521 af (100% of inflow)
Center-of-Mass det. time= 741.8 min (1,562.2 - 820.5)

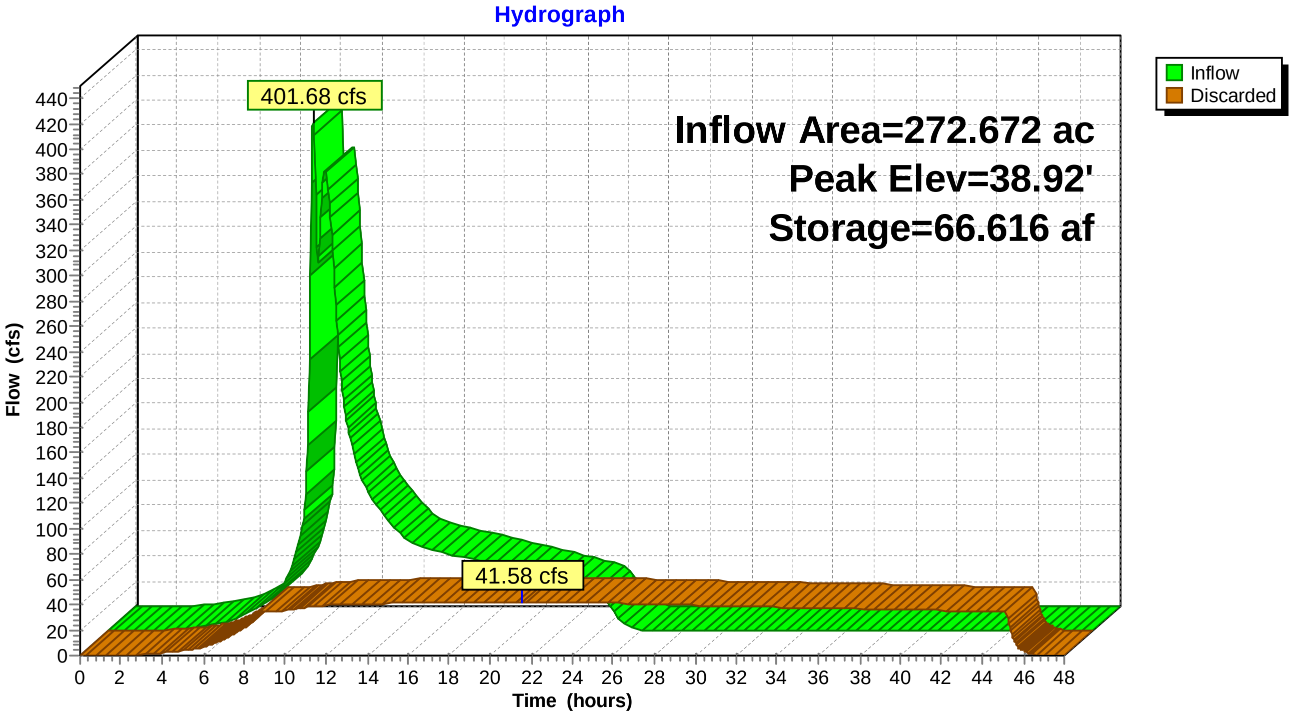
Volume	Invert	Avail.Storage	Storage Description
#1	30.00'	119.543 af	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
30.00	6.776	0.000	0.000	6.776
45.00	9.226	119.543	119.543	9.329

Device	Routing	Invert	Outlet Devices
#1	Discarded	30.00'	**5.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=41.58 cfs @ 21.54 hrs HW=38.92' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 41.58 cfs)

Pond 14P: DETENTION POND B1



APPENDIX 'D' – UPSTREAM BASIN DRAINAGE ANALYSIS

UPSTREAM BASIN MAP

HOONANI VILLAGE

B:\Projects\PDGHAWAII\H109-001\Engineering\Hydro\PER\H1091-UPSTREAM BASIN MAP 2.dwg 9/25/2024 2:14:36 PM

PIONEER DESIGN GROUP – HAWAII LLC
CIVIL ENGINEERING · LAND USE PLANNING
CONSTRUCTION MANAGEMENT
HONOLULU, HAWAII PH: 808.400.5959
WWW.PD-GRP.COM

Designed by TCC Date 09/2024
Drawn by TCC Date 09/2024
Reviewed by TCC Date 09/2024
Project No. H109-001 REF.
Horiz. Scale:
Vert. Scale:

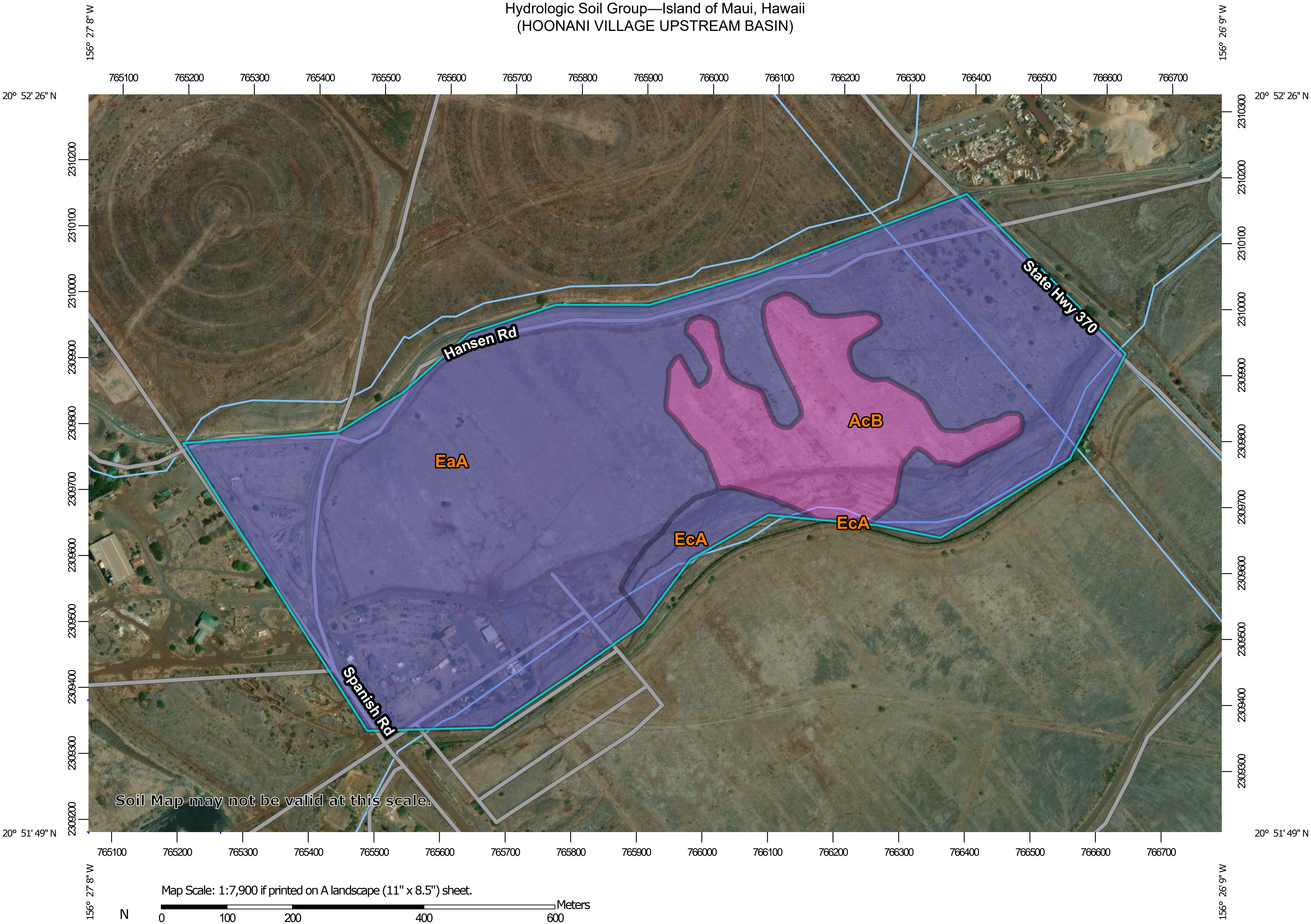
Project
HOONANI VILLAGE

No.
H109-001

Type
ENGINEERING

Sheet
1 of 1

Hydrologic Soil Group—Island of Maui, Hawaii
(HOONANI VILLAGE UPSTREAM BASIN)



Map Scale: 1:7,900 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 4N WGS84

MAP LEGEND

Area of Interest (AOI)

▭ Area of Interest (AOI)

Soils

Soil Rating Polygons

🟪 A

🟩 A/D

🟦 B

🟫 B/D

🟦 C

🟨 C/D

🟥 D

⬜ Not rated or not available

Soil Rating Lines

〰 A

〰 A/D

〰 B

〰 B/D

〰 C

〰 C/D

〰 D

〰 Not rated or not available

Soil Rating Points

■ A

■ A/D

■ B

■ B/D

■ C

■ C/D

■ D

□ Not rated or not available

Water Features

〰 Streams and Canals

Transportation

┼┼┼ Rails

〰 Interstate Highways

〰 US Routes

〰 Major Roads

〰 Local Roads

Background

▨ Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Island of Maui, Hawaii
Survey Area Data: Version 21, Sep 8, 2023

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

Date(s) aerial images were photographed: Jan 29, 2017—Oct 11, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AcB	Alae cobbly sandy loam, 3 to 7 percent slopes, MLRA 158	A	21.5	15.0%
EaA	Ewa silty clay loam, 0 to 3 percent slopes, MLRA 158	B	117.2	81.8%
EcA	Ewa cobbly silty clay loam, 0 to 3 percent slopes, MLRA 158	B	4.5	3.1%
Totals for Area of Interest			**143.2**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group—Island of Maui, Hawaii

Map Scale: 1:2,000 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 4N WGS84

MAP LEGEND

Area of Interest (AOI)

- ⬜ Area of Interest (AOI)

Soils

Soil Rating Polygons

- 🟪 A
- 🟩 A/D
- 🟦 B
- 🟫 B/D
- 🟦 C
- 🟨 C/D
- 🟥 D
- ⬜ Not rated or not available

Soil Rating Lines

- 〰 A
- 〰 A/D
- 〰 B
- 〰 B/D
- 〰 C
- 〰 C/D
- 〰 D
- 〰 Not rated or not available

Soil Rating Points

- ■ A
- ■ A/D
- ■ B
- ■ B/D
- ■ C
- ■ C/D
- ■ D
- ▣ Not rated or not available

Water Features

- 〰 Streams and Canals

Transportation

- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background

- ▨ Aerial Photography

MAP INFORMATION

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

> Warning: Soil Map may not be valid at this scale.
>
> Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Island of Maui, Hawaii
Survey Area Data: Version 21, Sep 8, 2023

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

Date(s) aerial images were photographed: Jan 29, 2017—Oct 11, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EaA	Ewa silty clay loam, 0 to 3 percent slopes, MLRA 158	B	4.1	60.3%
MuB	Molokai silty clay loam, 3 to 7 percent slopes, MLRA 158	C	0.2	3.6%
W	Water > 40 acres		2.5	36.0%
Totals for Area of Interest			**6.8**	**100.0%**

Description

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

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

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

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

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

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

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

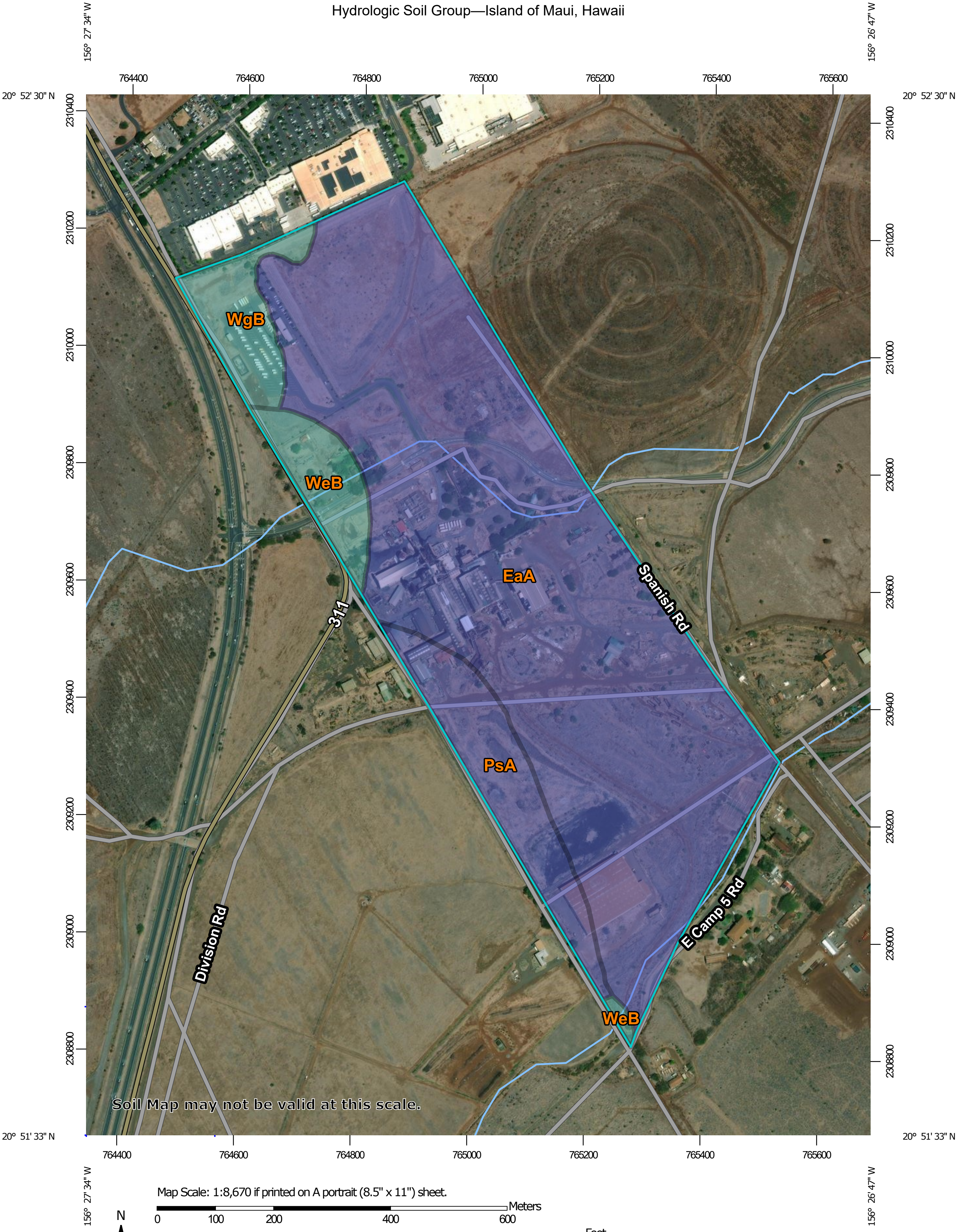
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group—Island of Maui, Hawaii



Map Scale: 1:8,670 if printed on A portrait (8.5" x 11") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 4N WGS84

MAP LEGEND

Area of Interest (AOI)

- ▭ Area of Interest (AOI)

Soils

Soil Rating Polygons

- ■ A
- ■ A/D
- ■ B
- ■ B/D
- ■ C
- ■ C/D
- ■ D
- □ Not rated or not available

Soil Rating Lines

- 〰 A
- 〰 A/D
- 〰 B
- 〰 B/D
- 〰 C
- 〰 C/D
- 〰 D
- 〰 Not rated or not available

Soil Rating Points

- ■ A
- ■ A/D
- ■ B
- ■ B/D
- ■ C
- ■ C/D
- ■ D
- □ Not rated or not available

Water Features

- 〰 Streams and Canals

Transportation

- ┼┼┼ Rails
- 〰 Interstate Highways
- 〰 US Routes
- 〰 Major Roads
- 〰 Local Roads

Background

- ■ Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Island of Maui, Hawaii
Survey Area Data: Version 21, Sep 8, 2023

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

Date(s) aerial images were photographed: Jan 29, 2017—Oct 11, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
EaA	Ewa silty clay loam, 0 to 3 percent slopes, MLRA 158	B	117.2	80.3%
PsA	Pulehu clay loam, 0 to 3 percent slopes , MLRA 163	B	13.5	9.3%
WeB	Waiakoa silty clay loam, 3 to 7 percent slopes	C	7.4	5.1%
WgB	Waiakoa very stony silty clay loam, 3 to 7 percent slopes, MLRA 158	C	7.8	5.3%
Totals for Area of Interest			**145.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

RUNOFF CURVE NUMBERS (TR55)

Table 2-2a: Runoff curve numbers for urban areas [1]

Cover description		CN for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3]:					
Poor condition (grass cover <50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover >75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]	77	86	91	94	
Idle lands (CNs are determined using cover types similar to those in table 2-2c)					

1: Average runoff condition, and $I_a = 0.2S$.

2: The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas hava a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3: CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4: Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5: Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

RUNOFF CURVE NUMBERS (TR55)

Table 2-2c: Runoff curve numbers for other agricultural lands [1]

Cover description		**Curve numbers for hydrologic soil group**			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range -- continuous forage for grazing					
<50% ground cover or heavily grazed with no mulch.	Poor	68	79	86	89
50% to 75% ground cover and not heavily grazed.	Fair	49	69	79	84
>75% ground cover and lightly or only occasionally grazed.	Good	39	61	74	80
Meadow -- continuous grass, protected from grazing and generally mowed for hay	--	30	58	71	78
Brush – weed-grass mixture with brush as the major element					
<50% ground cover	Poor	48	67	77	83
50% to 75% ground cover	Fair	35	56	70	77
>75% ground cover	Good	30 [2]	48	65	73
Woods – grass combination (orchard or tree farm) [3]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods					
Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.	Poor	45	66	77	83
Woods are grazed but not burned, and some forest litter covers the soil.	Fair	36	60	73	79
Woods are protected from grazing, and litter and brush adequately cover the soil.	Good	30 [2]	55	70	77
Farmsteads -- buildings, lanes, driveways, and surrounding lots	--	59	74	82	86

1: Average runoff condition, and $I_a = 0.2S$.

2: Actual curve number is less than 30; use CN = 30 for runoff computations.

3: CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

MANNING'S "n" VALUES

SHEET FLOW EQUATION MANNING'S VALUES	n_s
Smooth Surfaces (concrete, asphault, gravel, or bare hand packed soil)	0.011
Fallow Fields or loose soil surface (no residue)	0.05
Cultivated soil with residue cover ($\leq$ 20%)	0.06
Cultivated soil with residue cover (> 20%)	0.17
Short prairie grass and lawns	0.15
Dense grasses	0.24
Bermuda grasses	0.41
Range (natural)	0.13
Woods or forrest with light underbrush	0.40
Woods or forrest with dense underbrush	0.80

SHALLOW CONCENTRATED FLOW (after initial 300 ft of sheet flow, R = 0.1)	k_s
Forrest with heavy ground litter and meadows (n = 0.010)	3
Brushy ground with some trees (n = 0.060)	5
Fallow or minimum tillage cultivation (n = 0.040)	8
High grass (n = 0.035)	9
Short grass, pasture and lawns (n = 0.030)	11
Nearly bare ground (n = 0.25)	13
Paved and gravel areas (n = 0.012)	27

CHANNEL FLOW (Intermittent) (At the beginning of all visible channels, R = 0.2)	k_c
Forested swale with heavy ground cover (n = 0.10)	5
Forested drainage course/ravine with defined channel bed (n = 0.050)	10
Rock-lined waterway (n = 0.035)	15
Grassed waterway (n = 0.030)	17
Earth-lined waterway (n = 0.025)	20
CMP pipe (n = 0.024)	21
Concrete pipe (n = 0.012)	42
Other waterways and pipe 0.508/n	

CHANNEL FLOW (continuous stream, R = 0.4)	k_c
Meandering stream (n = 0.040)	20
Rock-lined stream (n = 0.035)	23
Grass-lined stream (n = 0.030)	27
Other streams, man-made channels and pipe (n = 0.807/n)	

PIONEER DESIGN GROUP

EXISTING CONDITIONS - COMPOSITE CURVE NUMBERS

(UPSTREAM BASIN O1)

JOB NUMBER: H109-001
PROJECT: HOONANI VILLAGE
FILE: H1091-PRELIM UPSTREAM HYDRO

TOTAL AREA= 6,160,420 SF

EXISTING CONDITIONS

COVER TYPE	SOIL TYPE	AREA (SF)	SOIL GRADE	CURVE NUMBER
MEADOWS	Ewa Silty Clay Loam	5,039,224	B	58
	Ewa Cobbly Silty Clay Loam	197,133		
MEADOWS	Alae Cobbly Sandy Loam	924,063	A	30

EXISTING COMPOSITE CN = $\frac{(5,236,357 \times 58) + (924,063 \times 30)}{6,160,420}$ = **53.8**

PIONEER DESIGN GROUP

EXISTING CONDITIONS - COMPOSITE CURVE NUMBERS

(UPSTREAM BASIN O2)

JOB NUMBER: H109-001
PROJECT: HOONANI VILLAGE
FILE: H1091-PRELIM UPSTREAM HYDRO

TOTAL AREA= 289,835 SF

EXISTING CONDITIONS

COVER TYPE	SOIL TYPE	AREA (SF)	SOIL GRADE	CURVE NUMBER
MEADOWS	Ewa Silty Clay Loam	279,401	B	58
MEADOWS	Molokai Silty Clay Loam	10,434	C	71

EXISTING COMPOSITE CN = $\frac{(279,4017 \times 58) + (10,434 \times 71)}{289,835}$ = **58.5**

EXISTING CONDITIONS - COMPOSITE CURVE NUMBERS

(UPSTREAM BASIN O3)

JOB NUMBER:	H109-001
PROJECT:	HOONANI VILLAGE
FILE:	H1091-PRELIM UPSTREAM HYDRO

TOTAL AREA= 6,128,207 SF

EXISTING CONDITIONS

COVER TYPE	SOIL TYPE	AREA (SF)	SOIL GRADE	CURVE NUMBER
MEADOWS	Ewa Silty Clay Loam Pulehu Clay Loam	3,173,135	B	58
	Waiakoa Silty Clay Loam Waiakoa Very Stony silty clay loam	234,857	C	71
INDUSTRIAL	Ewa Silty Clay Loam Pulehu Clay Loam	2,166,121	B	88
	Waiakoa Silty Clay Loam	87,549	C	91
COMMERCIAL	Ewa Silty Clay Loam Pulehu Clay Loam	237,530	B	92
	Waiakoa Silty Clay Loam Waiakoa Very Stony silty clay loam	229,015	C	94

EXISTING COMPOSITE CN =

$$\frac{(3{,}173{,}135 \text{ x } 58) + (234{,}857 \text{ x } 71) + (2{,}166{,}121 \text{ x } 88) + (87{,}549 \text{ x } 91) + (237{,}530 \text{ x } 92) + (229{,}015 \text{ x } 94)}{6{,}128{,}207} = \boxed{72.2}$$

PIONEER DESIGN GROUP

PREDEVELOPED TIME OF CONCENTRATION

(UPSTREAM BASIN O1)

JOB NUMBER:	H109-001
PROJECT:	HOONANI VILLAGE
FILE:	H1091-PRELIM UPSTREAM HYDRO

LAG ONE: SHEET FLOW (FIRST 300 FEET)				Accum. Tc	
Tt = Travel time					
Manning's "n " =	0.15				
Flow Length, L =	300	ft	(300 ft. max.)		
P = 2-year, 24hr storm =	2.5	in			
Slope, S_0 =	0.013	ft/ft			
$T_T = \frac{(0.42)(n*L)^{0.8}}{(P)^{0.5}(S_0)^{0.4}}$	31.43	min.		31.43	min.

LAG TWO: SHALLOW CONCENTRATED FLOW (NEXT 1165 FEET)				
Tc Velocity factor, k=	11			
Slope, S_0 =	0.014	ft/ft		
$V = k\sqrt{S_0}$	1.29	ft/s		
Flow Length, L =	1165	ft		
$T = \frac{L}{(60)(V)}$	15.08	min.	46.51	min.

TOTAL PREDEVELOPED TIME OF CONCENTRATION (Tc) = 46.51 min.

PREDEVELOPED TIME OF CONCENTRATION

(UPSTREAM BASIN O2)

JOB NUMBER: H109-001
PROJECT: HOONANI VILLAGE
FILE: H1091-PRELIM UPSTREAM HYDRO

Accum. Tc

LAG ONE: SHEET FLOW (FIRST 300 FEET)
Tt = Travel time
Manning's "n " = 0.15
Flow Length, L = 300 ft (300 ft. max.)

P = 2-year, 24hr storm = 2.5 in
Slope, S_0 = 0.027 ft/ft

$$T_T = \frac{(0.42)(n * L)^{0.8}}{(P)^{0.5}(S_0)^{0.4}}$$ 23.82 min. 23.82 min.

LAG TWO: SHALLOW CONCENTRATED FLOW (NEXT 369 FEET)
Tc Velocity factor, k= 11
Slope, S_0 = 0.005 ft/ft
$V = k\sqrt{S_0}$ 0.78 ft/s
Flow Length, L = 369 ft
$T = \frac{L}{(60)(V)}$ 7.91 min. 31.72 min.

TOTAL PREDEVELOPED TIME OF CONCENTRATION (Tc) = 31.72 min.

PIONEER DESIGN GROUP

PREDEVELOPED TIME OF CONCENTRATION

(UPSTREAM BASIN O3)

JOB NUMBER: H109-001
PROJECT: HOONANI VILLAGE
FILE: H1091-PRELIM UPSTREAM HYDRO

LAG ONE: SHEET FLOW (FIRST 300 FEET)

				Accum. Tc	
Tt = Travel time					
Manning's "n " =	0.15				
Flow Length, L =	300	ft	(300 ft. max.)		
P = 2-year, 24hr storm =	2.5	in			
Slope, S_0 =	0.013	ft/ft			
$T_T = \frac{(0.42)(n*L)^{0.8}}{(P)^{0.5}(S_0)^{0.4}}$	31.40	min.		31.40	min.

LAG TWO: SHALLOW CONCENTRATED FLOW (NEXT 1556 FEET)

Tc Velocity factor, k=	13			
Slope, S_0 =	0.012	ft/ft		
$V = k\sqrt{S_0}$	1.44	ft/s		
Flow Length, L =	1556	ft		
$T = \frac{L}{(60)(V)}$	18.05	min.	49.45	min.

LAG THREE: CONCENTRATED FLOW (NEXT 1414 FEET)

Tc Velocity factor, k=	20			
Slope, S_0 =	0.009	ft/ft		
$V = k\sqrt{S_0}$	1.84	ft/s		
Flow Length, L =	1414	ft		
$T = \frac{L}{(60)(V)}$	12.78	min.	62.23	min.

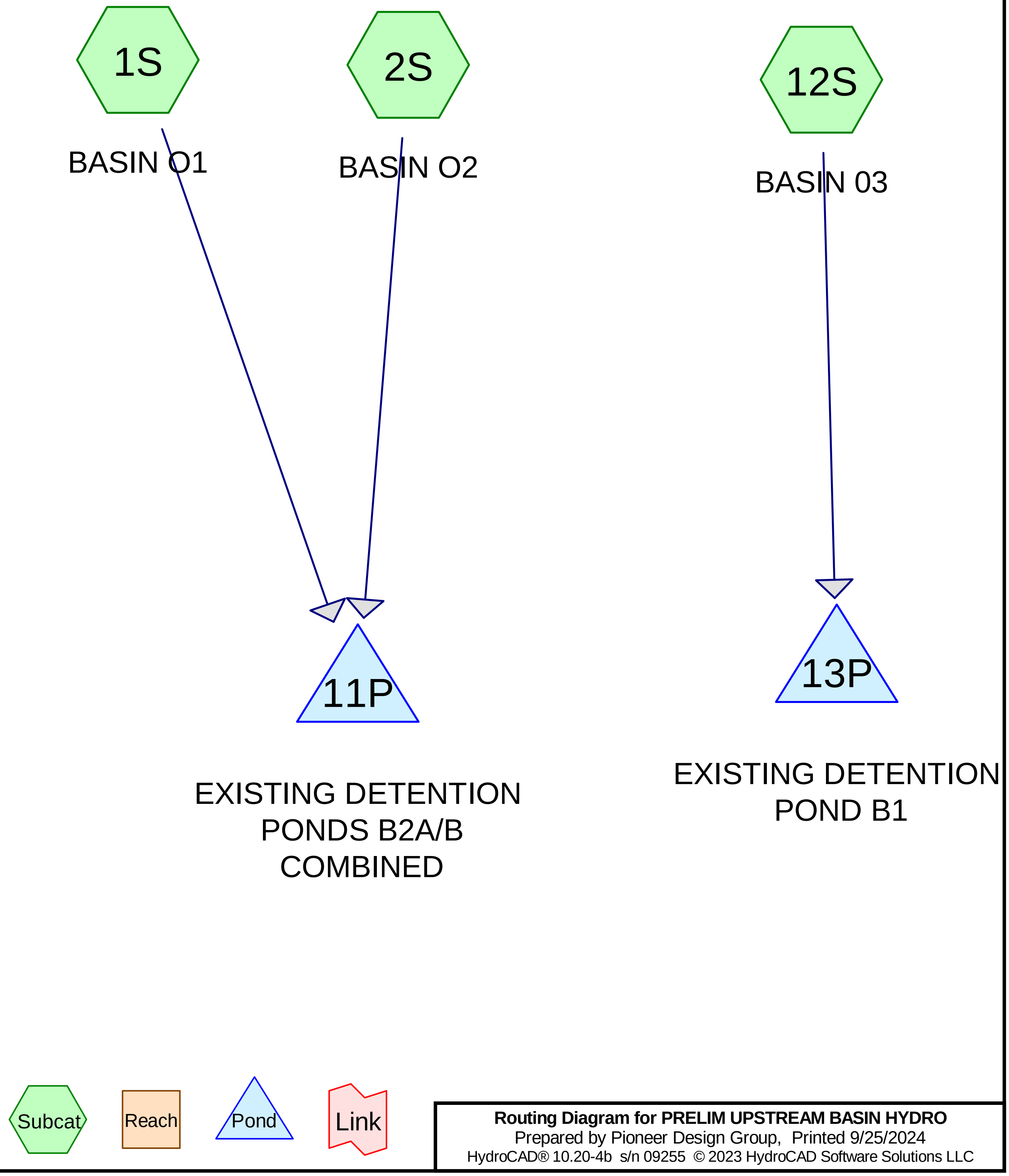
TOTAL PREDEVELOPED TIME OF CONCENTRATION (Tc) = 62.23 min.

UPSTREAM BASIN ANALYSIS

(100-YEAR, 24 HR. STORM EVENT)

JOB NUMBER:	H109-001
PROJECT:	Hoonani Village
FILE:	H1091_PER Hydro

DRAINAGE BASIN LABEL	AREA (SF)		AREA (AC)		COMPOSITE RUNOFF CN	Tc (min.)	Q FLOW (cfs)	FLOW VOLUME (AC-FT)
BASIN O1	6,160,420.00	ft^2	**141.42**	**ac**	53.8	46.5	**153.38**	**41.10**
BASIN O2	289,835.00	ft^2	**6.65**	**ac**	58.5	31.7	**11.29**	**2.28**
BASIN O3	6,128,207.00	ft^2	**140.68**	**ac**	72.2	62.23	**243.67**	**67.23**
	TOTAL DRAINAGE AREA (SF)		**TOTAL DRAINAGE AREA (ac)**				**TOTAL Q FLOW (cfs)**	**TOTAL FLOW VOLUME (AC-FT)**
UPSTREAM DRAINAGE CONDITION	**12,578,462.00**	**ft^2**	**288.76**	**ac**			**408.34**	**110.61**



Routing Diagram for PRELIM UPSTREAM BASIN HYDRO
Prepared by Pioneer Design Group, Printed 9/25/2024
HydroCAD® 10.20-4b s/n 09255 © 2023 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
141.420	54	UPSTREAM BASIN O1 (1S)
6.650	59	UPSTREAM BASIN O2 (2S)
140.680	72	UPSTREAM BASIN O3 (12S)
288.750	**63**	**TOTAL AREA**

```
                    Time span=5.00-30.00 hrs, dt=0.05 hrs, 501 points
                    Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
          Reach routing by Stor-Ind+Trans method  -  Pond routing by Stor-Ind method

Subcatchment 1S: BASIN O1                Runoff Area=141.420 ac   0.00% Impervious   Runoff Depth=3.49"
                                                   Tc=46.5 min   CN=54   Runoff=153.38 cfs  41.099 af

Subcatchment 2S: BASIN O2                  Runoff Area=6.650 ac   0.00% Impervious   Runoff Depth=4.11"
                                                    Tc=31.7 min   CN=59   Runoff=11.29 cfs  2.277 af

Subcatchment 12S: BASIN 03               Runoff Area=140.680 ac   0.00% Impervious   Runoff Depth>5.73"
                                                   Tc=62.2 min   CN=72   Runoff=243.67 cfs  67.230 af

Pond 11P: EXISTING DETENTION PONDS     Peak Elev=33.36'  Storage=7.292 af   Inflow=162.06 cfs  43.376 af
                                                                            Outflow=57.40 cfs  43.376 af

Pond 13P: EXISTING DETENTION POND B1  Peak Elev=39.46'  Storage=23.826 af   Inflow=243.67 cfs  67.230 af
                                                                            Outflow=42.14 cfs  67.229 af

         Total Runoff Area = 288.750 ac   Runoff Volume = 110.606 af   Average Runoff Depth = 4.60"
                                      100.00% Pervious = 288.750 ac     0.00% Impervious = 0.000 ac
```

Summary for Subcatchment 1S: BASIN O1

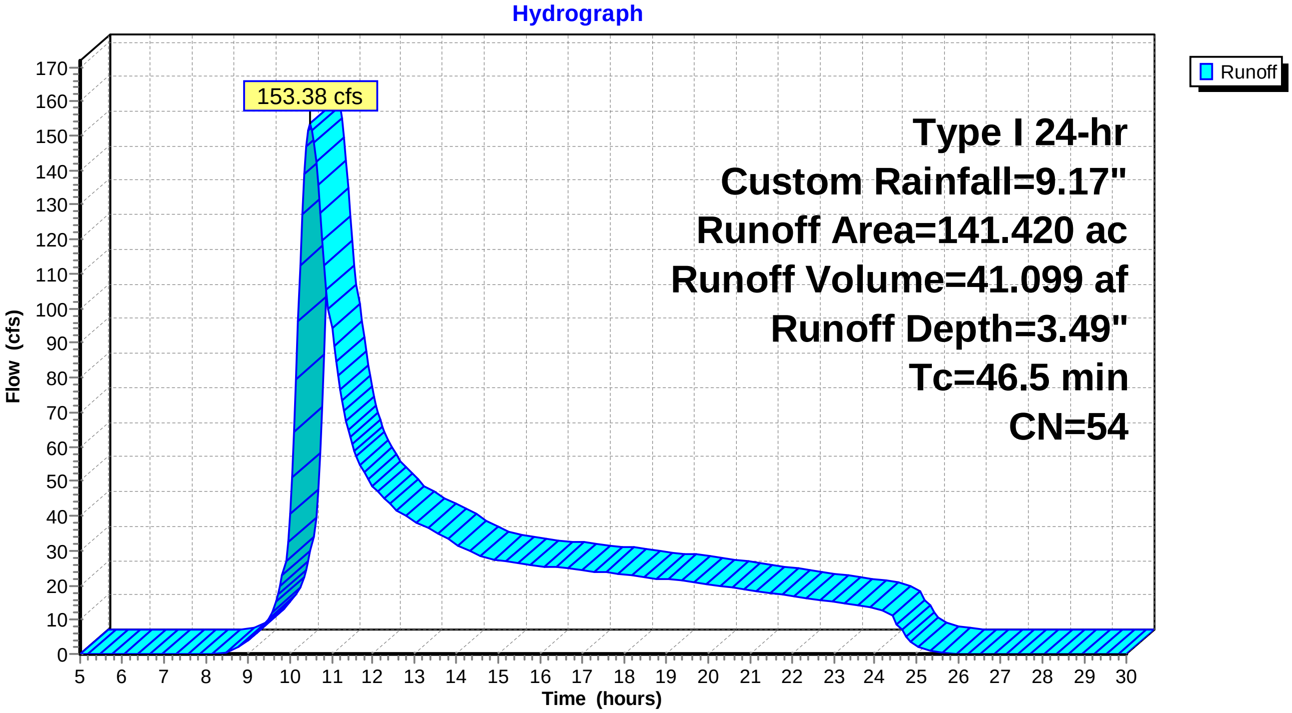
Runoff = 153.38 cfs @ 10.50 hrs, Volume= 41.099 af, Depth= 3.49"
Routed to Pond 11P : EXISTING DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	141.420	54	UPSTREAM BASIN O1
	141.420		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.5					**Direct Entry, PREDEV TOC**

Subcatchment 1S: BASIN O1



Summary for Subcatchment 2S: BASIN O2

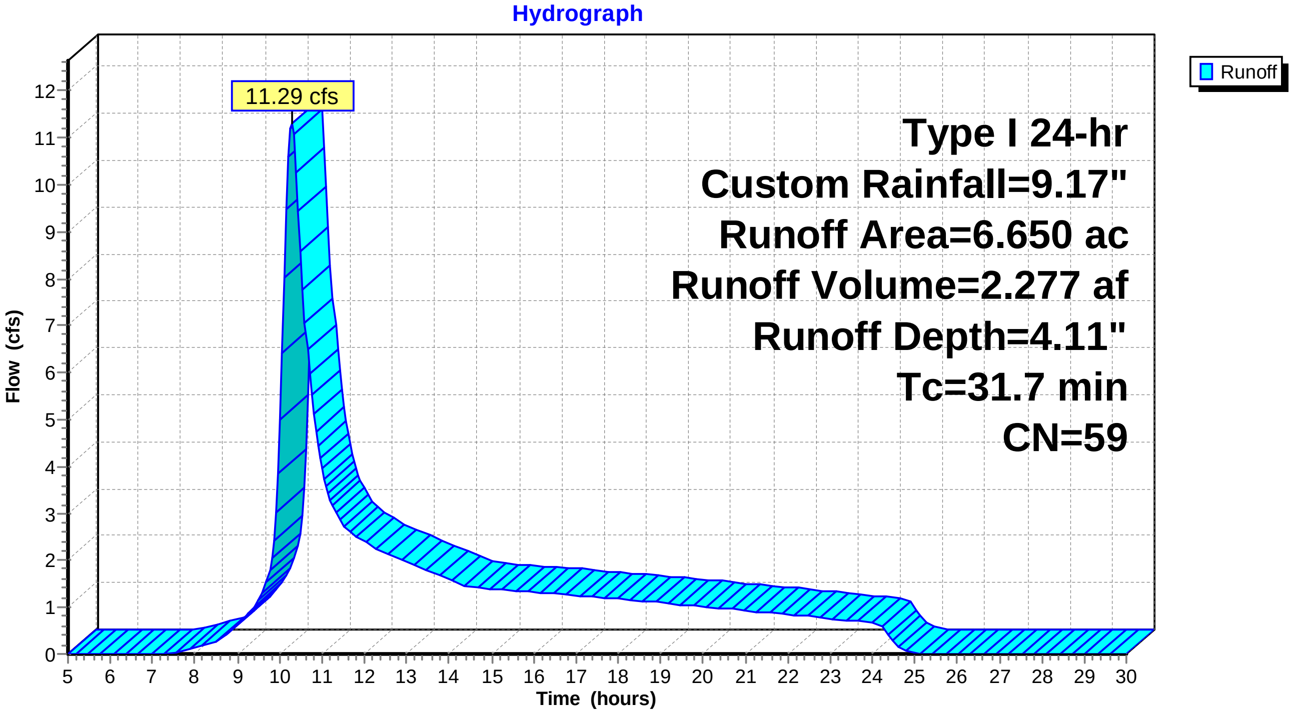
Runoff = 11.29 cfs @ 10.28 hrs, Volume= 2.277 af, Depth= 4.11"
Routed to Pond 11P : EXISTING DETENTION PONDS B2A/B COMBINED

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	6.650	59	UPSTREAM BASIN O2
	6.650		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
31.7					**Direct Entry,**

Subcatchment 2S: BASIN O2



Summary for Subcatchment 12S: BASIN 03

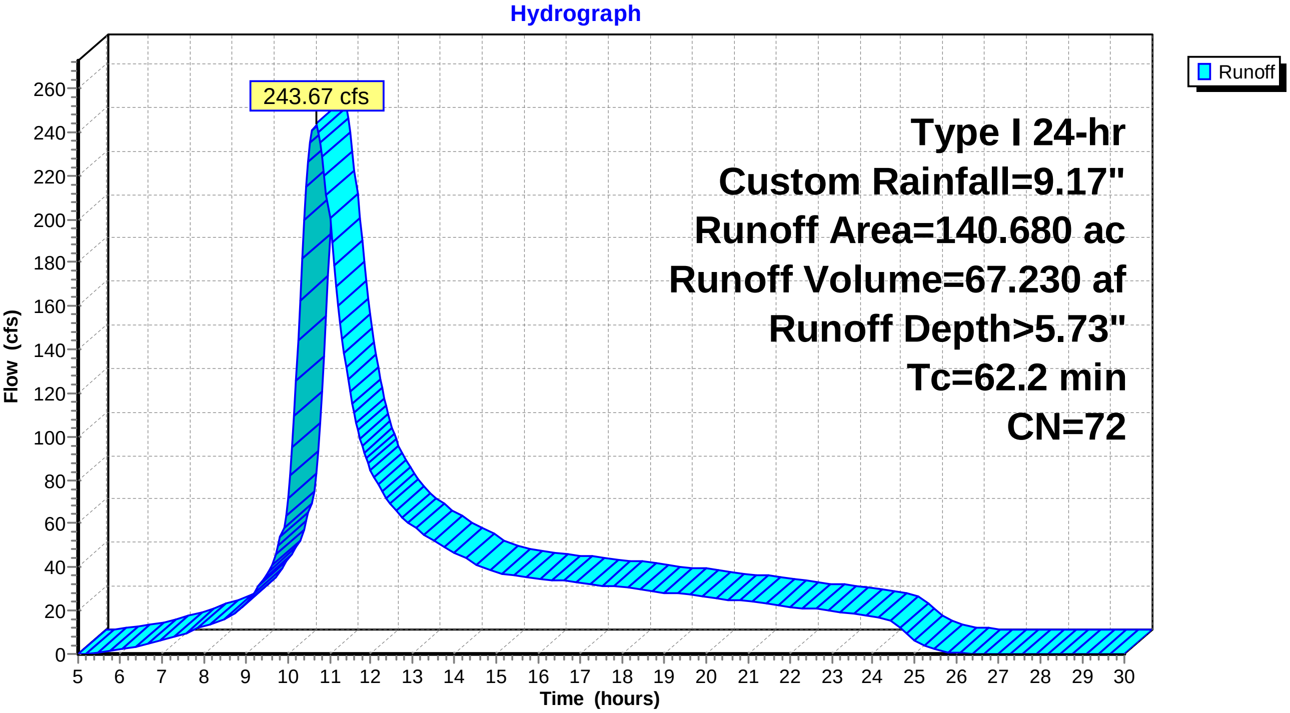
Runoff = 243.67 cfs @ 10.68 hrs, Volume= 67.230 af, Depth> 5.73"
Routed to Pond 13P : EXISTING DETENTION POND B1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type I 24-hr Custom Rainfall=9.17"

	Area (ac)	CN	Description
*	140.680	72	UPSTREAM BASIN O3
	140.680		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
62.2					**Direct Entry,**

Subcatchment 12S: BASIN 03



Summary for Pond 11P: EXISTING DETENTION PONDS B2A/B COMBINED

Inflow Area = 148.070 ac, 0.00% Impervious, Inflow Depth = 3.52" for Custom event
Inflow = 162.06 cfs @ 10.49 hrs, Volume= 43.376 af
Outflow = 57.40 cfs @ 11.68 hrs, Volume= 43.376 af, Atten= 65%, Lag= 71.7 min
Discarded = 57.40 cfs @ 11.68 hrs, Volume= 43.376 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 33.36' @ 11.68 hrs Surf.Area= 5.691 ac Storage= 7.292 af

Plug-Flow detention time= 42.7 min calculated for 43.290 af (100% of inflow)
Center-of-Mass det. time= 42.6 min (920.5 - 877.8)

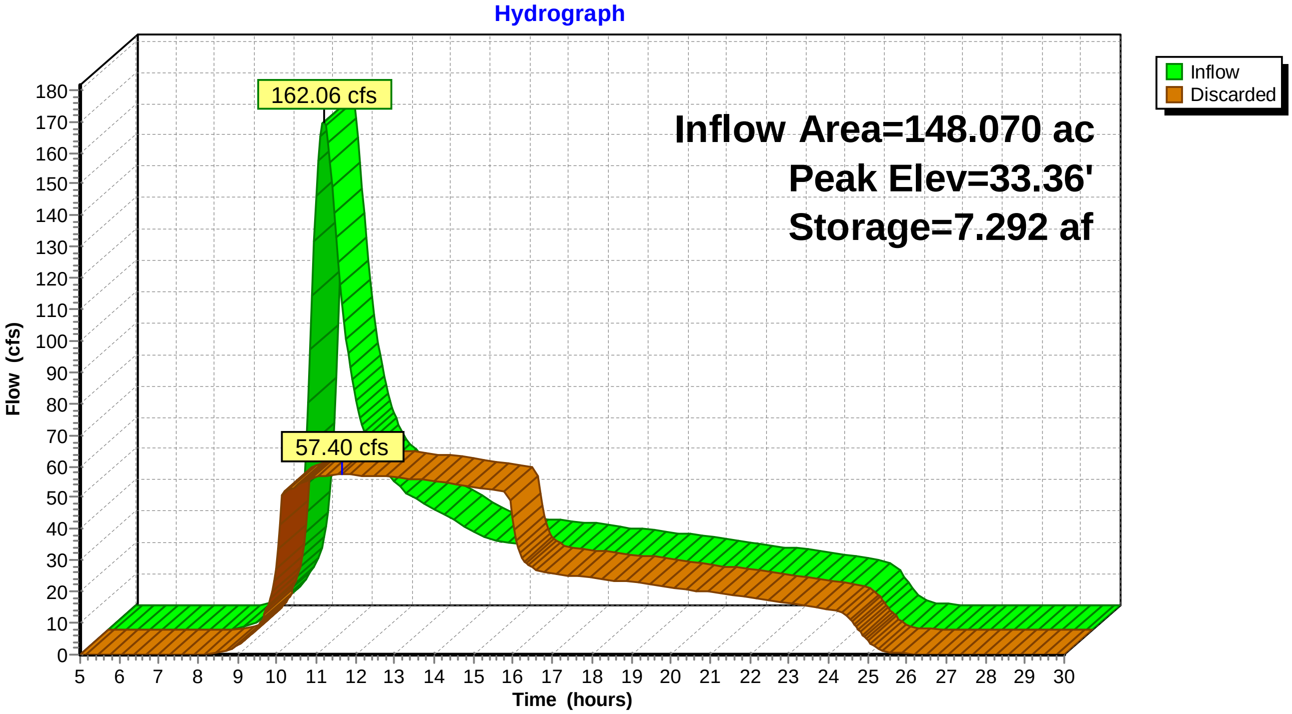
Volume	Invert	Avail.Storage	Storage Description
#1	32.00'	109.142 af	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
32.00	5.063	0.000	0.000	5.063
34.00	6.001	11.051	11.051	6.004
36.00	6.472	12.470	23.521	6.483
38.00	6.949	13.418	36.939	6.968
40.00	7.425	14.371	51.311	7.453
42.00	7.903	15.326	66.637	7.940
44.00	8.382	16.283	82.920	8.428
46.00	8.862	17.242	100.161	8.919
47.00	9.099	8.980	109.142	9.161

Device	Routing	Invert	Outlet Devices
#1	Discarded	32.00'	**10.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=57.40 cfs @ 11.68 hrs HW=33.36' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 57.40 cfs)

Pond 11P: EXISTING DETENTION PONDS B2A/B COMBINED



Summary for Pond 13P: EXISTING DETENTION POND B1

```
Inflow Area =      140.680 ac,    0.00% Impervious,  Inflow Depth >   5.73"    for  Custom event
Inflow      =     243.67 cfs @   10.68 hrs,  Volume=          67.230 af
Outflow     =      42.14 cfs @   14.45 hrs,  Volume=          67.229 af,  Atten= 83%,  Lag= 226.2 min
Discarded  =      42.14 cfs @   14.45 hrs,  Volume=          67.229 af
```

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 39.46' @ 14.45 hrs Surf.Area= 8.343 ac Storage= 23.826 af

Plug-Flow detention time= 268.8 min calculated for 67.229 af (100% of inflow)
Center-of-Mass det. time= 268.8 min (1,104.1 - 835.3)

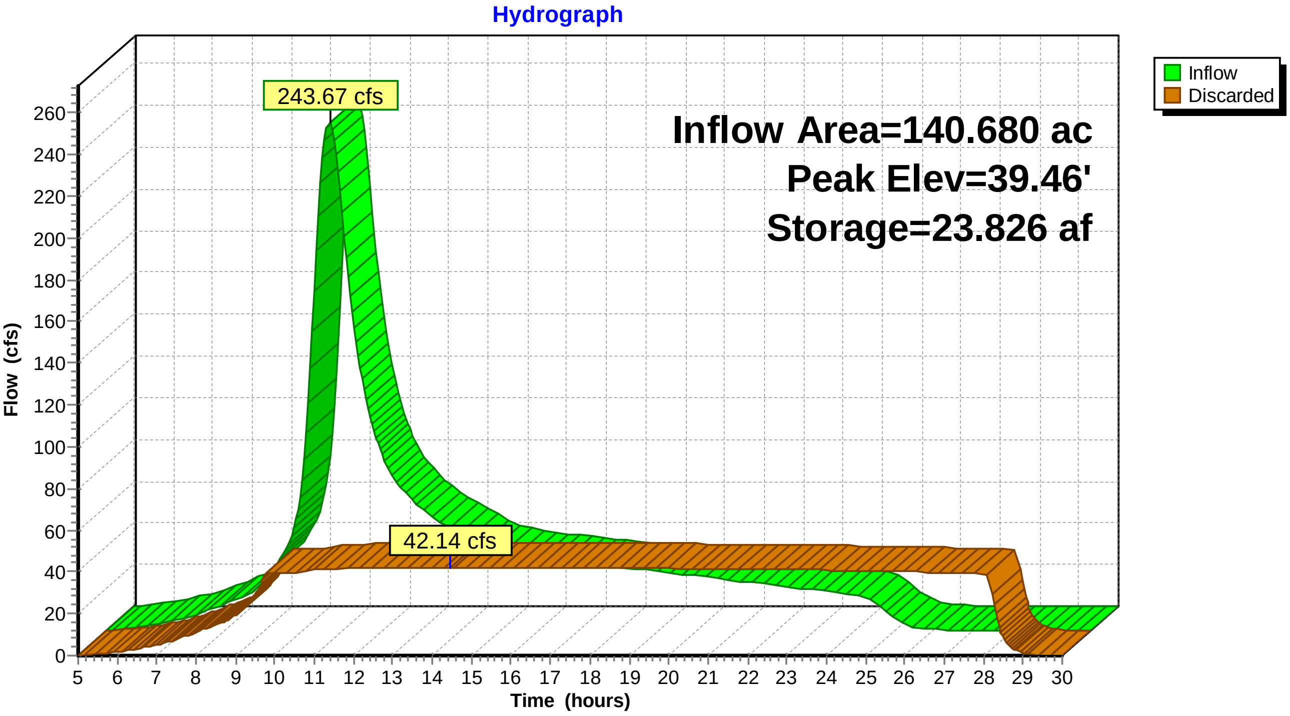
Volume	Invert	Avail.Storage	Storage Description
#1	36.50'	92.770 af	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)	Wet.Area (acres)
36.50	7.739	0.000	0.000	7.739
47.00	9.979	92.770	92.770	10.040

Device	Routing	Invert	Outlet Devices
#1	Discarded	36.50'	**5.000 in/hr Exfiltration over Wetted area**

Discarded OutFlow Max=42.14 cfs @ 14.45 hrs HW=39.46' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 42.14 cfs)

Pond 13P: EXISTING DETENTION POND B1



APPENDIX 'E' – PRELIMINARY WATER SYSTEM CALCULATIONS AND PLANS

PRELIMINARY WATER MASTER PLAN

OVERALL MASTER PLAN

PIONEER DESIGN GROUP – HAWAII LLC
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Vert. Scale:			

Project
HOONANI VILLAGE

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H109-001

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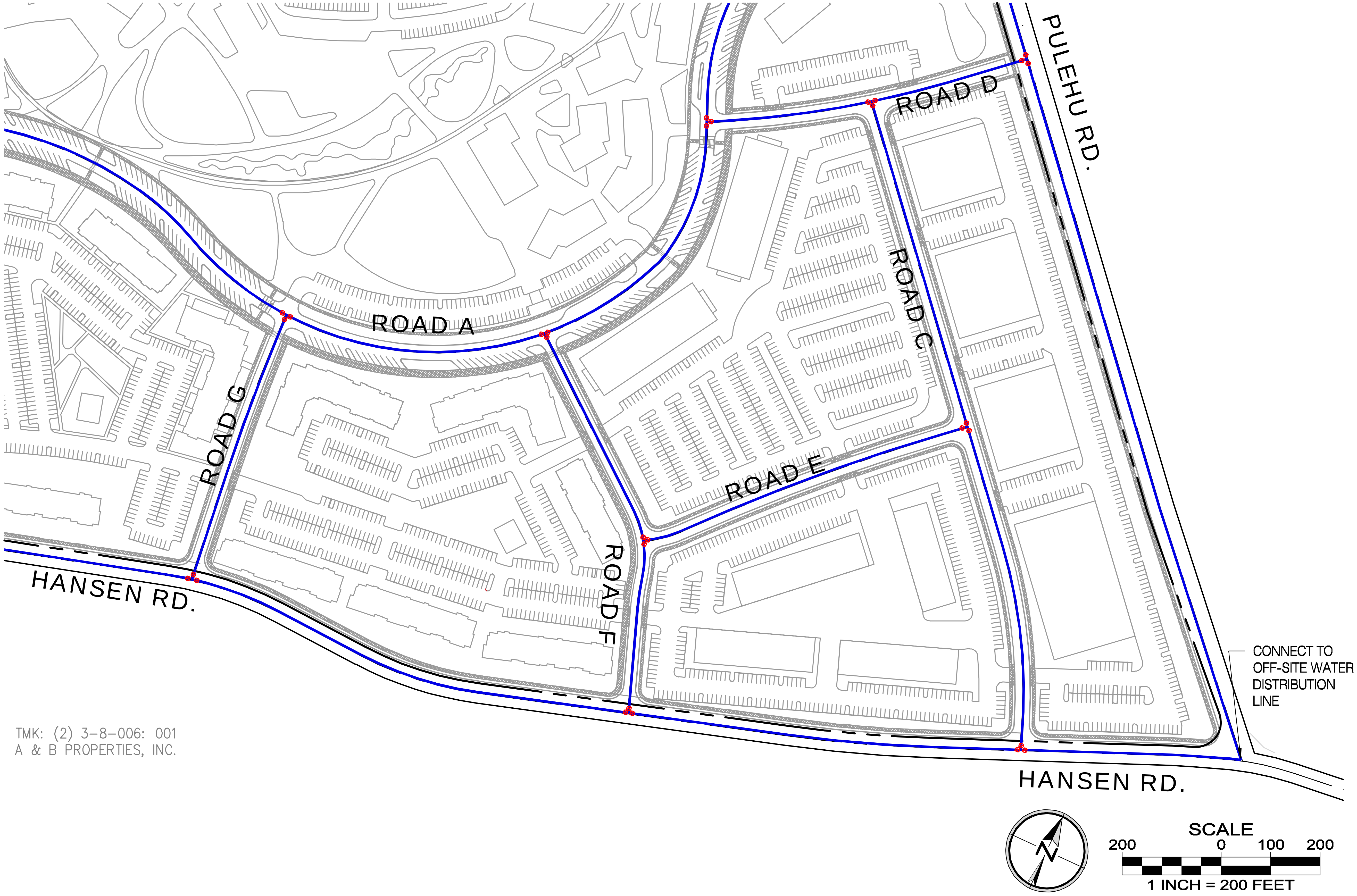
PRELIMINARY WATER MASTER PLAN

SOUTHEAST



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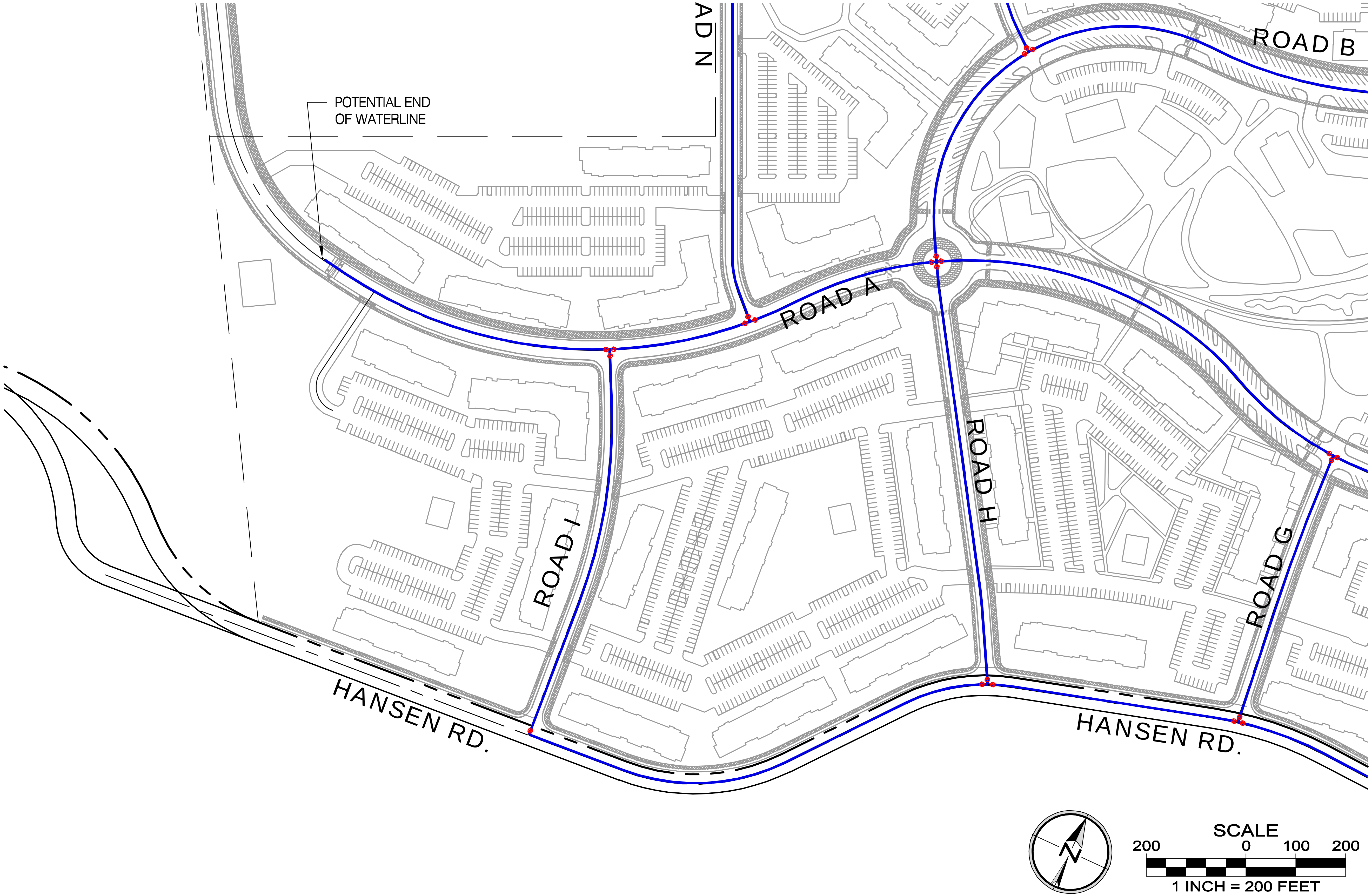
PRELIMINARY WATER MASTER PLAN

SOUTHWEST



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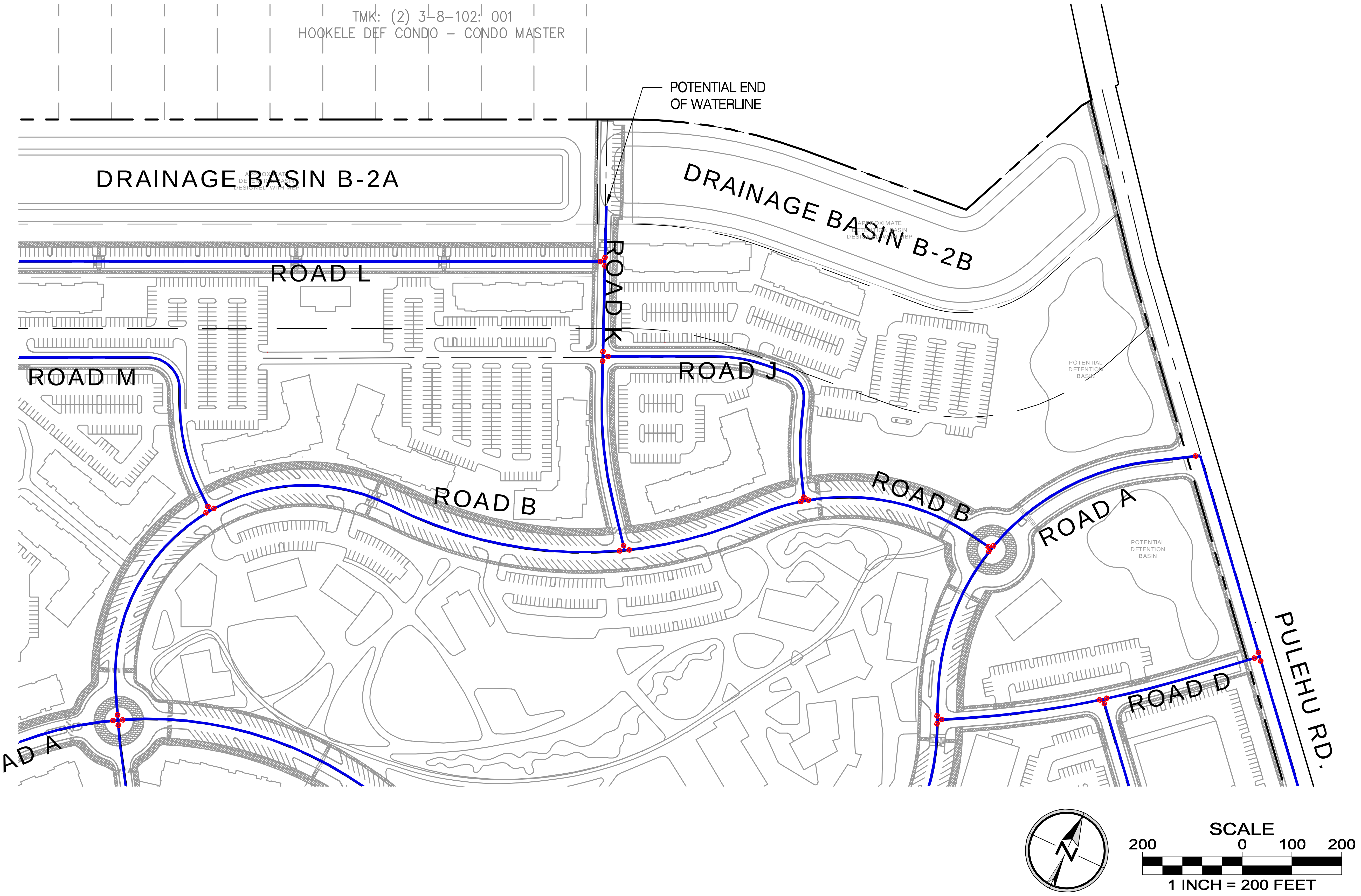
PRELIMINARY WATER MASTER PLAN

NORTHEAST



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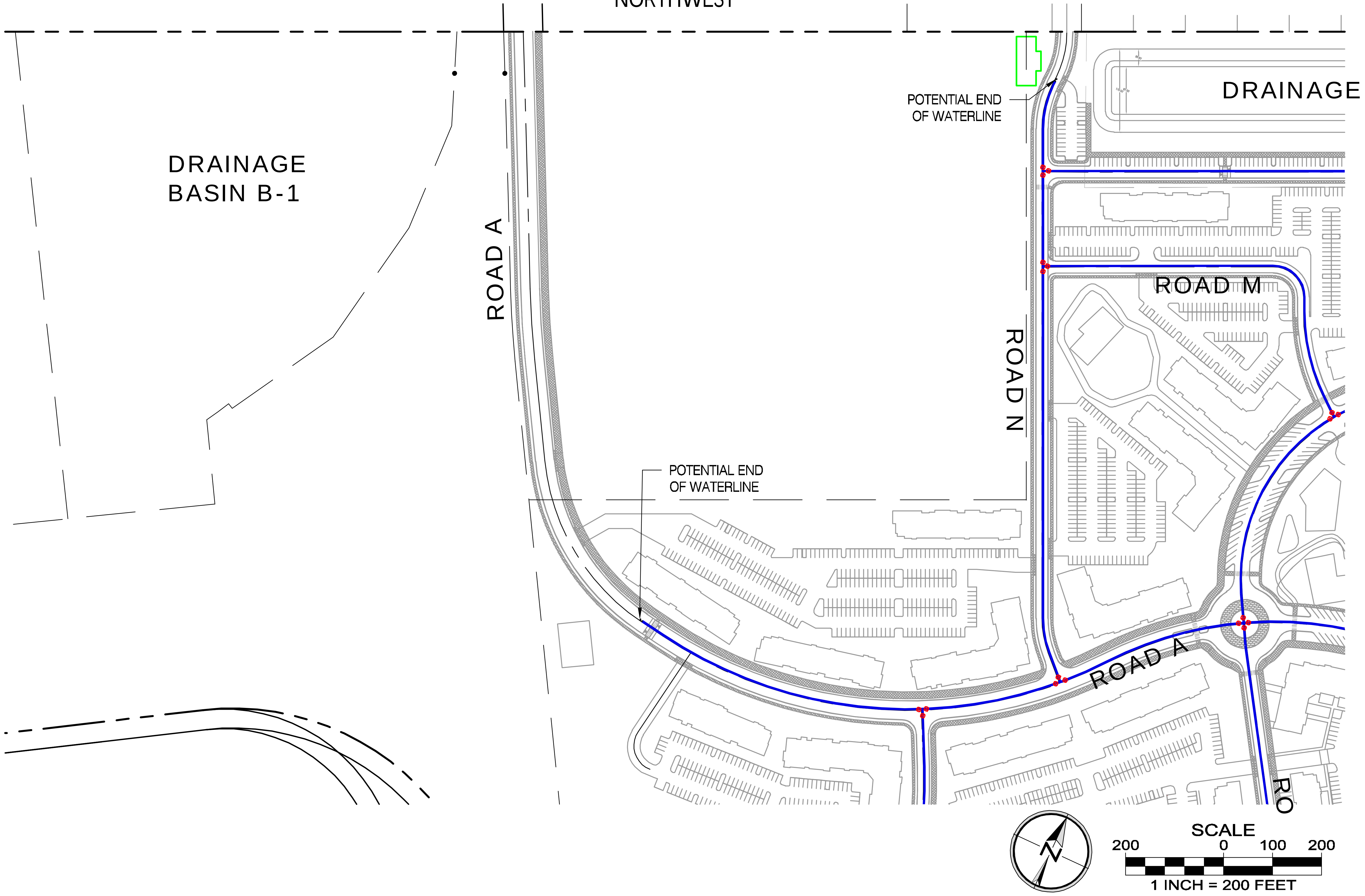
PRELIMINARY WATER MASTER PLAN

NORTHWEST



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PRELIMINARY WATER MASTER PLAN

OFF-SITE WATER DISTRIBUTION SYSTEM

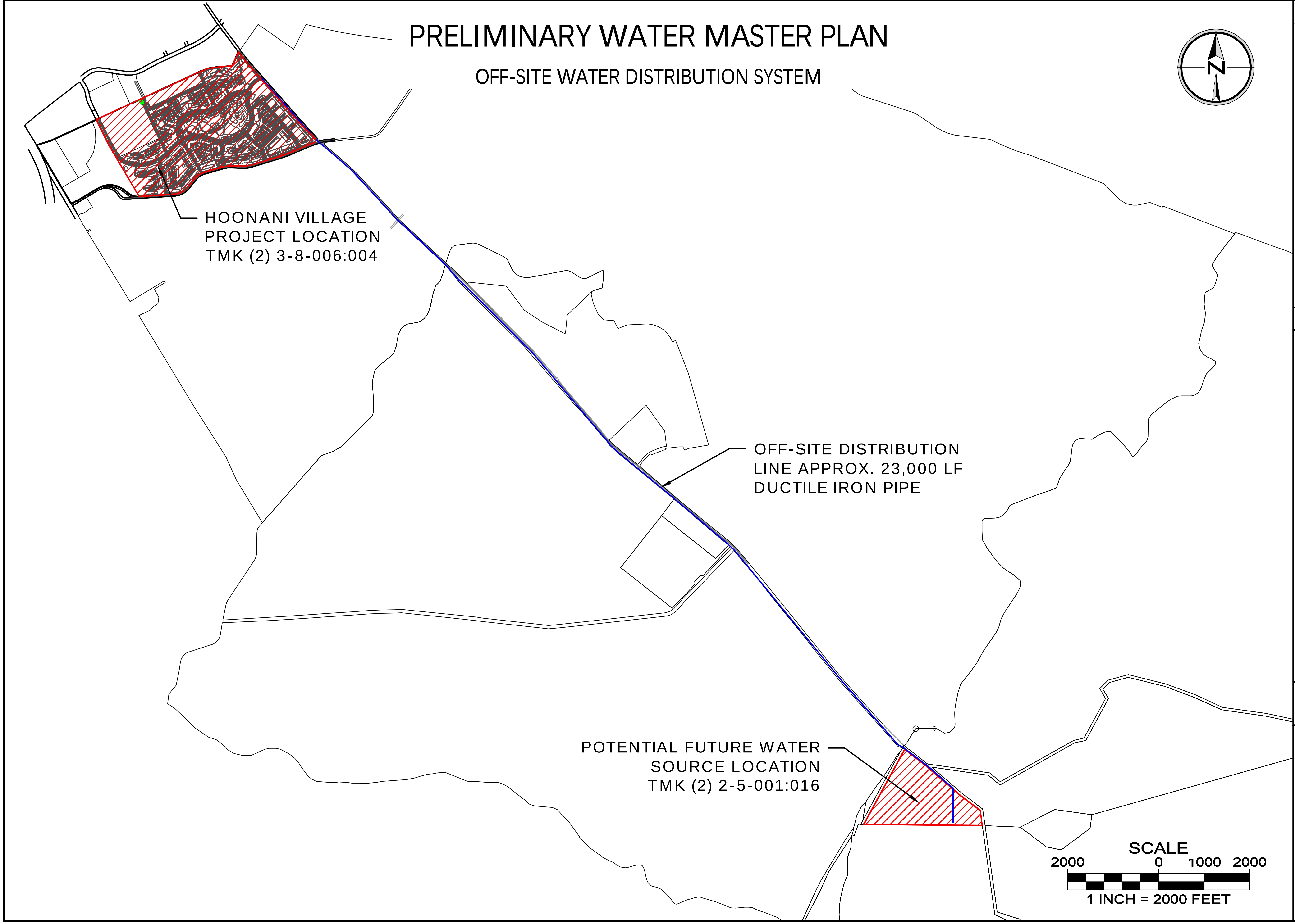

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Table 100-18 - DOMESTIC CONSUMPTION GUIDELINES

AVERAGE DAILY DEMAND*

ZONING DESIGNATION	HAWAII	KAUAI	MAUI	OAHU
RESIDENTIAL:				
Single Family or Duplex	400 gals/unit	500 gals/unit	600 gals/unit or 3000 gals/acre	500 gals/unit or 2500 gals/acre
Multi-Family Low Rise	400 gals/unit	350 gals/unit	560 gals/unit or 5000 gals/acre	400 gals/unit or 4000 gals/acre
Multi-Family High Rise	400 gals/unit	350 gals/unit	560 gals/unit	300 gals/unit
COMMERCIAL:				
Commercial Only	3000 gals/acre	3000 gals/acre	6000 gals/acre	3000 gals/acre
Commercial/Industrial Mix	--	5000 gals/acre	140 gals/1000 sq. ft.	100 gals/1000 sq. ft.
Commercial/Residential Mix	--	3000 gals/acre	140 gals/1000 sq. ft.	120 gals/1000 sq. ft.
RESORT (To include hotel for Maui only)	400 gals/unit (1)	350 gals/unit	350 gals/unit or 17000 gals/acre	350 gals/unit or 4000 gals/acre
LIGHT INDUSTRY:	4000 gals/acre	4000 gals/acre	6000 gals/acre	4000 gals/acre
SCHOOLS, PARKS:	4000 gals/acre or 60 gals/student	4000 gals/acre or 60 gals/student	1700 gals/acre ~~or 60 gals/student~~	4000 gals/acre or 60 gals/student
AGRICULTURE:		2,500 gals/acre	~~5000 gals/acre~~	4000 gals/acre

* - Where two or more figures are listed for the same zoning, the daily demand resulting in higher consumption use shall govern the design unless specified otherwise.

(1) - Subject to special review and control by the Manager.

Table 100-19 - FIRE FLOW REQUIREMENTS

LAND USE	FLOW (GPM)/DURATION (HRS)/FIRE HYDRANT SPACING (FT.)			
	HAWAII	KAUAI	MAUI	OAHU
Agriculture	500/0.5/600 (1)	250/1/500	500/2/500	1000/0.5/700
Rural			1000/2/500	
Single Family	(2)	(4)	1000/2/350	1000/1/350
Duplex	1500/1/300	(4)	1250/2/350	1000/1/350
PUD Townhouse and Low Rise Apartments	1500/1/300	(4)	(5)	1500/1/250
Schools, Neighborhood Businesses, Small Shopping Centers, Hotels (except Maui), and High Rise Apartments	2000/2/300	2000/2/350	2000/2/250	2000/2/250
Light Industry, Downtown Business, Large Shopping Center, and Hospitals	2,000/2/300	3000/3/350	2000/2/250	4000/3/250
Heavy Industry, Hotels	2,000/2/300	3000/3/350	2,500/2/ 250	(3)

(1) - Applies to one acre lot size or less
(2) - 10,000 sq. ft. or larger lot size = 500/2/600; Less than 10,000 sq. ft. lot size = 1000/1/600
(3) - Subject to special review and control by Manager
(4) - R-2 = 500/1/500 R-4 = 750/2/500 R-6 = 1000/2/500 R-10 = 1250/2/350
R-20 = 1500/2/350 RR-10 = 1500/2/350 RR-20 = 2000/2/350
(5) - A-1 = 1500/2/250 A-2 = 2000/2/250

<u>Note:</u>

1. On dead end streets, the last F.H. shall be located at one half the spacing distance for F.H.s from the last house/unit (frontage property line or to the driveway/access for the property).
2. Spacing of fire hydrant shall be measured along the roadway.

PIONEER DESIGN GROUP-HAWAI'I

PRIVATE WATER SYSTEM CALCULATIONS

JOB NUMBER: H109-001
PROJECT: Hoonani Development
FILE: Private Water System Calculations.xlsx

Project Residential Calculations:

Number of Multi-Family Low Rise Units =	1599	units
Average Daily Demand (A.D.D.) =	400	gal/unit
A.D.D. =	639,600	gal/day
Max Daily Demand (1.5*ADD) =	959,400	gal/day
Average Daily Flow (GPM) =	444.17	GPM
Max Day Flow (GPM) =	666.25	GPM
Residential Peak Hour Flow (3.0*ADF) =	1,333	GPM

Project Commercial Space Calculations:

Commercial Space Area (AC) =	23.90	AC
Building Area (Sq. Ft)=	165,196	Sq. Ft.
Average Daily Demand (A.D.D.) =	140	gal/1000 bldg. sq. ft.
Commercial Space ADD	23,127	gal/day
C.S. Max Daily Demand (1.5*ADD) =	34,691	gal/day
C.S. Average Daily Flow (GPM) =	16.06	GPM
C.S. Max Day Flow (GPM) =	24.09	GPM
C.S. Peak Hour Flow (3.0*ADF) =	48.18	GPM

Project WWTP Space Calculations:

WWTP Approx. Building Area (SF)	9,000	SF
Average Daily Demand (A.D.D.) =	140	gal/1000 bldg. sq. ft.
WWTP ADD	1,260	gal/day
C.S. Max Daily Demand (1.5*ADD) =	1,890	gal/day
C.S. Average Daily Flow (GPM) =	0.88	GPM
C.S. Max Day Flow (GPM) =	1.31	GPM
C.S. Peak Hour Flow (3.0*ADF) =	2.63	GPM

Project Park Space Calculations

Park Space Area (AC) =	33.13	AC
Average Daily Demand (A.D.D.) =	1700	gal/acre
Industrial Space ADD	56,321	gal/day
C.S. Max Daily Demand (1.5*ADD) =	84,482	gal/day
C.S. Average Daily Flow (GPM) =	39.11	GPM
C.S. Max Day Flow (GPM) =	58.67	GPM
C.S. Peak Hour Flow (3.0*ADF) =	117.34	GPM

Project Industrial Space Calculations

Industrial Space Area (AC) =	18.42	AC
Building Area (Sq. Ft)=	198,100	Sq. Ft.
Average Daily Demand (A.D.D.) =	140	gal/1000 bldg. sq. ft.
Industrial Space ADD	27,734	gal/day
C.S. Max Daily Demand (1.5*ADD) =	41,601	gal/day
C.S. Average Daily Flow (GPM) =	19.26	GPM
C.S. Max Day Flow (GPM) =	28.89	GPM
C.S. Peak Hour Flow (3.0*ADF) =	57.78	GPM

Potential Future Commercial Space Calculations (County Site):

(Modeled as Residential for additional factor of safety)

Potential number of units =	275.00	units
Average Daily Demand (A.D.D.) =	400	gal/unit
Future Commercial Space A.D.D.	110,000	gal/day
C.S. Max Daily Demand (1.5*ADD) =	165,000	gal/day
C.S. Average Daily Flow (GPM) =	76.39	GPM
C.S. Max Day Flow (GPM) =	114.58	GPM
C.S. Peak Hour Flow (3.0*ADF) =	229.17	GPM

Potential Future Residential Calculations (County Site):

Number of Multi-Family Low Rise Units = 440 units

Average Daily Demand (A.D.D.) = 400 gal/unit

A.D.D. = 176,000 gal/day

Max Daily Demand (1.5*ADD) = 264,000 gal/day

Average Daily Flow (GPM) = 122.22 GPM

Max Day Flow (GPM) = 183.33 GPM

Residential Peak Hour Flow (3.0*ADF) = 367 GPM

Potential Future Commercial Space Calculations:

Future Potential Commercial Space (Bldg Sq. Ft.) 53,880 Sq. Ft.

Average Daily Demand (A.D.D.) = 140 gal/1000 bldg. sq. ft.

Future Commercial Space A.D.D. 7,543 gal/day

C.S. Max Daily Demand (1.5*ADD) = 11,315 gal/day

C.S. Average Daily Flow (GPM) = 5.24 GPM

C.S. Max Day Flow (GPM) = 7.86 GPM

C.S. Peak Hour Flow (3.0*ADF) = 15.72 GPM

Project Total Calculations:

(Totals are increased by 10% for unmetered uses and losses)

Total Project Site Average Daily Demand (GPD) 748,042 gal/day

Total Potential Future Average Daily Demand (GPD) 293,543 gal/day

Total Average Daily Demand (GPD) 1,041,586 gal/day

Design Average Daily Demand (GPD) * 1.10 1,145,744 gal/day

Total Max Daily Demand (1.5*Design ADD) = 1,718,616 gal/day

Total Average Daily Flow (GPM) = 796 GPM

Total Max Day Flow (GPM) = 1193 GPM

Total Peak Hour Flow (3.0*Design ADF) = 2387 GPM

Fire Flow Criteria & Water Line Sizing:

1. For Commercial use: 2000 GPM / 2 hours
2. Max velocity in main line = 10 ft./sec.

Flow Rate (gpm) = 2000 gpm

Flow Rate (cfs) = 4.456 cfs

Area of 12 inch pipe (sf) = 0.785 sf

Velocity in 12 inch pipe (ft/s) = 5.67 ft/sec.

Water mains to be 12 inches in size.

Domestic Flow Criteria & Water Distribution Line Sizing:

1. For domestic use during Peak Hour Flow: 2387 GPM
2. Max velocity in main line = 5 ft./sec.

Flow Rate (gpm) = 2387 gpm

Flow Rate (cfs) = 5.318 cfs

Area of 14 inch pipe (sf) = 1.069 sf

Velocity in 14 inch pipe (ft/s) = 4.97 ft/sec.

Offsite Water distribution mains to be 14 inches in size.

Reservoir Capacity Sizing Criteria:

1. Meet Maximum Day consumption:

From above, reservoir must be larger than 1,718,616 gallons.

2. Meet Max Day plus fire flow for duration of fire. Reservoir 3/4 full at start of fire.
(Ignoring pump input credits for factor of safety)

Max Day Flow for 2 hours (Gal) = 143218 gal

Fire Flow Rate for 2 hours (gal) = 240000 gal

Total Volume Needed at 3/4 full (gal) = 383218 gal

Total Reservoir volume (gal) = 510957 gal

Total Reservoir storage will be over 1,718,616 gallons.

APPENDIX 'F' – PRELIMINARY WASTEWATER SYSTEM CALCULATIONS AND PLANS

PRELIMINARY SANITARY SEWER MASTER PLAN

OVERALL MASTER PLAN

PIONEER DESIGN GROUP – HAWAII LLC
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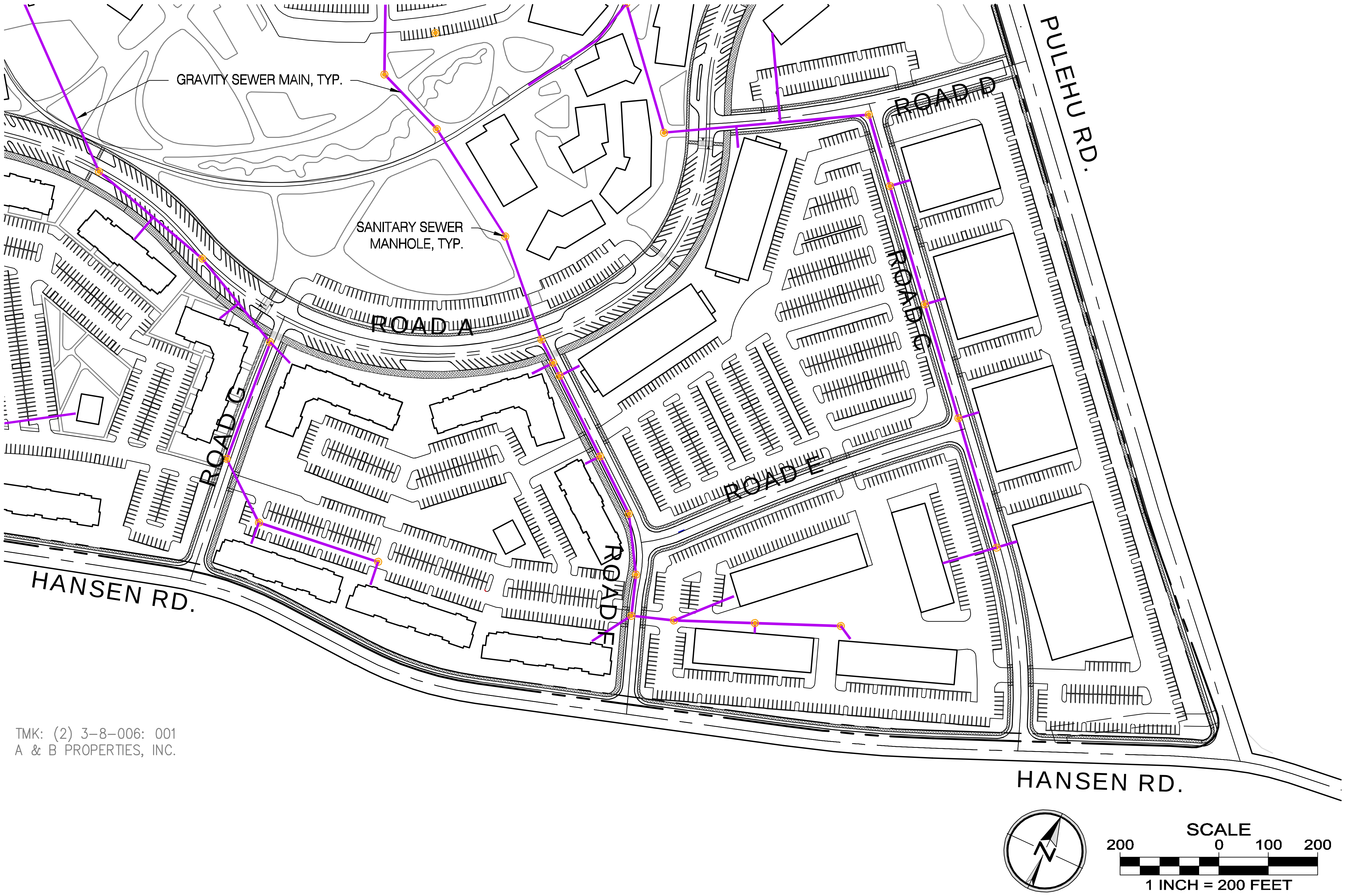
PRELIMINARY SANITARY SEWER MASTER PLAN

SOUTHEAST



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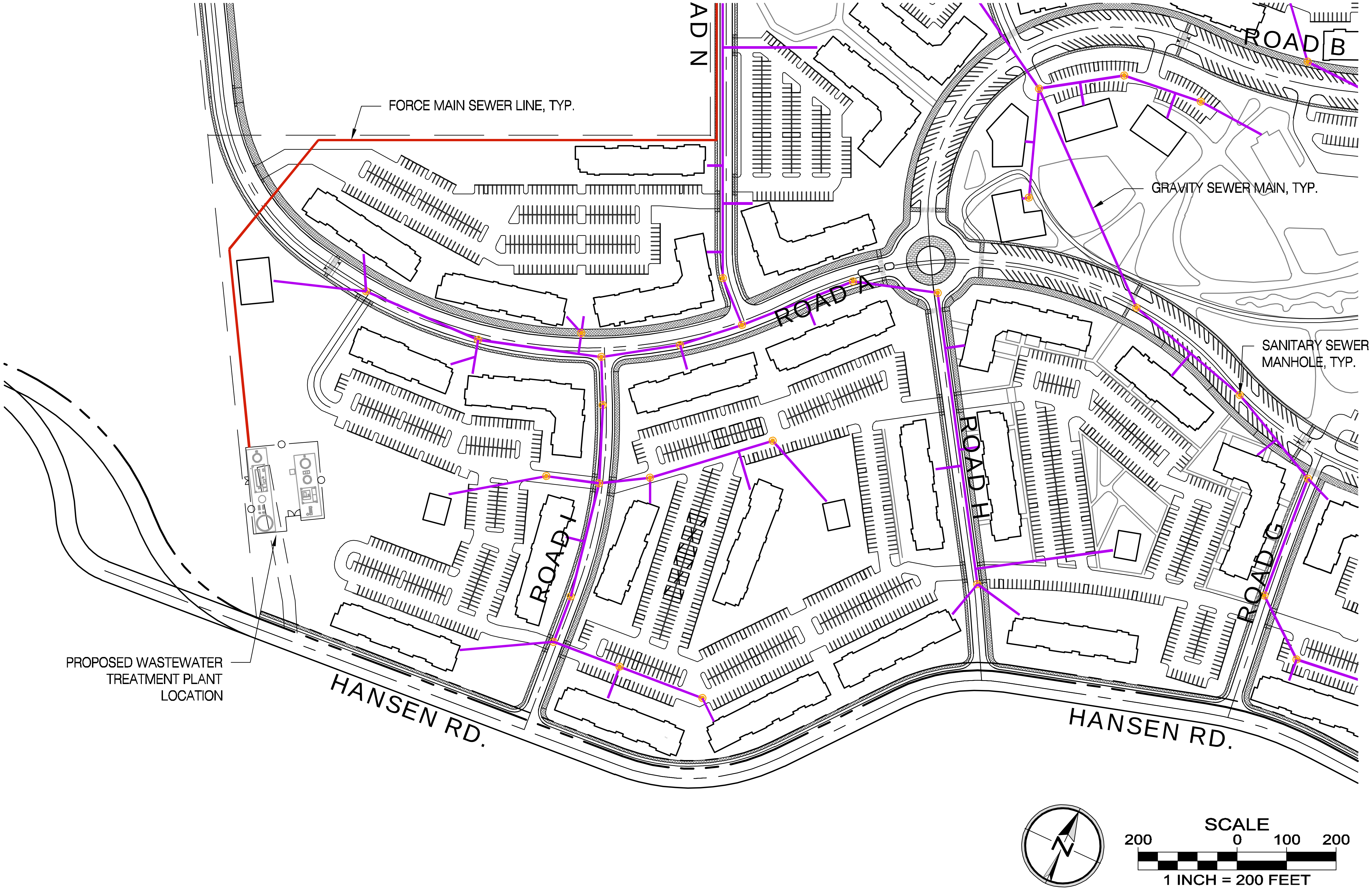
PRELIMINARY SANITARY SEWER MASTER PLAN

SOUTHWEST



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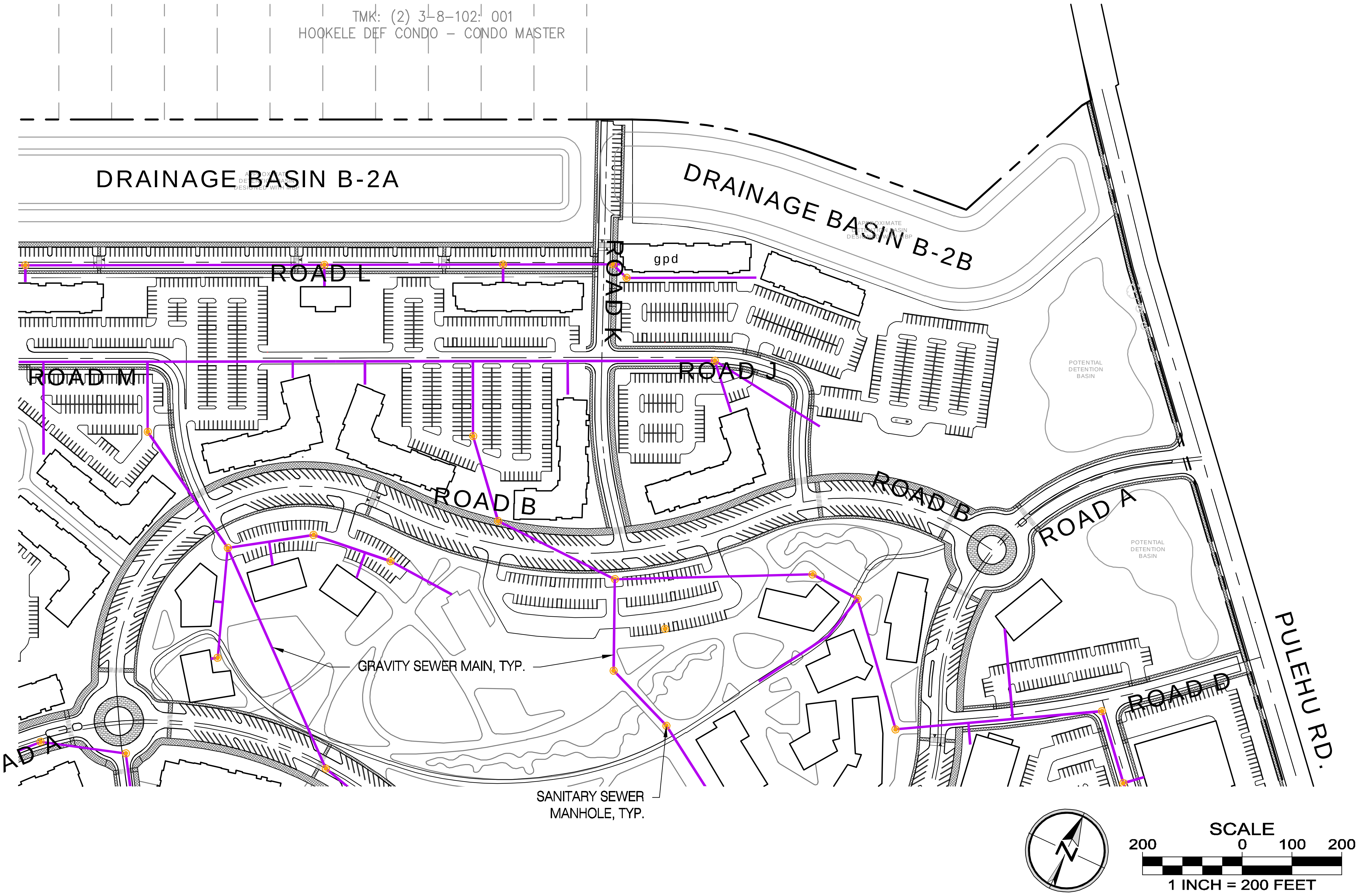
PRELIMINARY SANITARY SEWER MASTER PLAN

NORTHEAST



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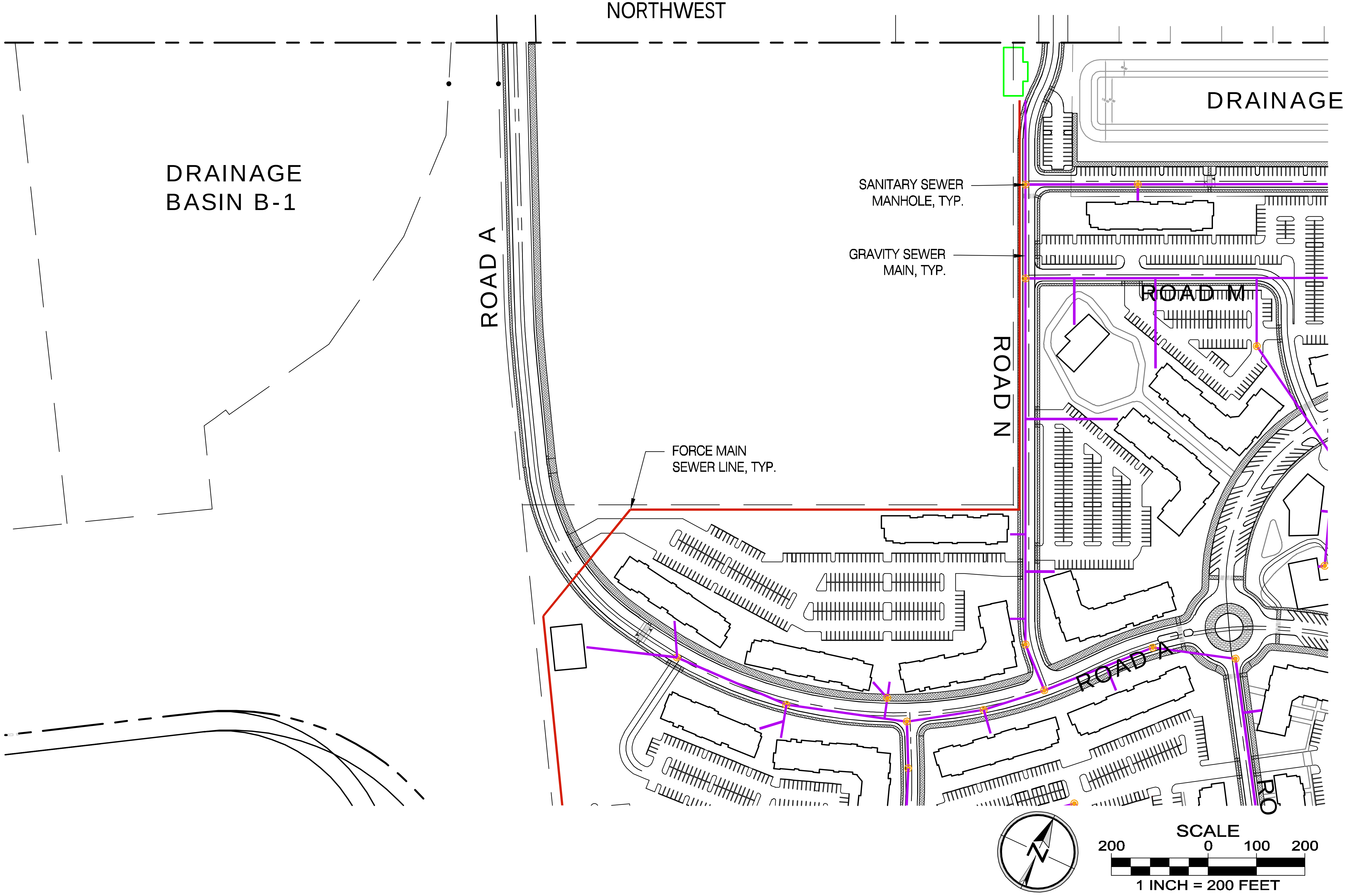
PRELIMINARY SANITARY SEWER MASTER PLAN

NORTHWEST



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WASTEWATER SYSTEM CALCULATIONS

(Preliminary Sanitary Sewer Analysis for Hoonani Village)

JOB:	H109-001
PROJECT:	Hoonani Village
FILE:	Hoonani Village Sanitary Sewer Capacity Calculations
Manning's n=	0.013

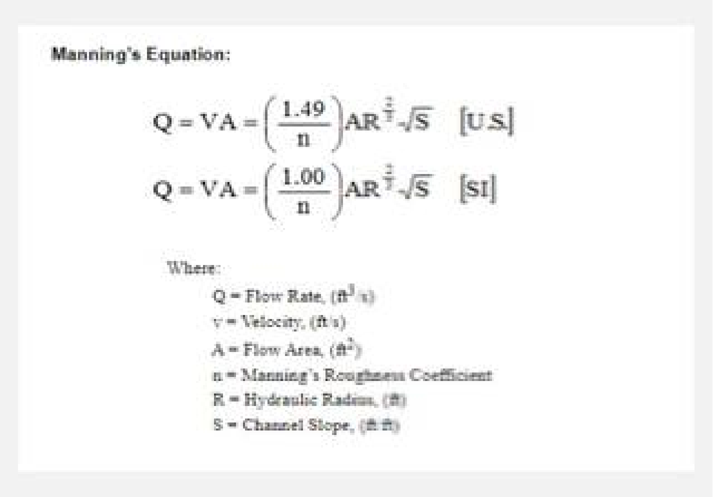
TYPE OF USE	UNIT	QUANTITY OF UNIT	AVERAGE DAILY FLOW VOLUME (GPD)	AVERAGE FLOW RATE (CFS)
Residential Multi-Family Low-rise Apartments	255 gals/unit	1599 units	407,745	0.631
Commercial Restaurant (60% usable space for customers)	1 seat per 20 SF useable area, 80 gal per seat	56,100 sf = 1683 seats	134,640	0.208
Commercial Retail	1employee per 350 SF bldg area, 15 gal per employee	56,100 sf = 160 employees	2,400	0.004
Commercial Office Space	1employee per 200 SF bldg area, 20 gal per employee	100,000 sf = 500 employees	10,000	0.015
Light Industrial	1employee per 500 SF bldg area, 25 gal per employee	198,100 sf = 396 employees	9,900	0.015
Total Site Average Wastewater Flow			**564,685**	**0.874**
County Site - Potential Future Commercial Space (Modeled as Residential for higher flow)	300 gal/unit	275 units	82,500	0.128
County Site - Potential Future Residential - Modeled as Residential for higher flow. Potentially a School site.)	255 gals/unit	440 units	112,200	0.174
Future Restaurant (60% usable space for customers)	1 seat per 20 SF useable area, 80 gal per seat	26,940 sf = 808 seats	64,640	0.100
Future Retail	1employee per 350 SF bldg area, 15 gal per employee	26,940 sf = 77 employees	1,155	0.002
Total Potential Future Wastewater Flow			**260,495**	**0.403**
Total Average Wastewater Flow			**825,180**	**1.277**

Dry Weather Infiltration/Inflow	5 gal/capita/day	9940	**49,700**	0.077
Wet Weather Infiltration/Inflow (Area with sanitary lines)	1250 Gal./acre/day	117.654	**147,063**	0.228
Total Average Daily Site Wastewater Flow	Average Daily Flow plus Dry and Wet Weather Infiltration/inflow rate		**1,021,943**	**1.581**
Total Wastewater Flow Volume for WWTP	Additional 25% factor of safety for volume of WWTP		**1,277,428**	1.977
Total Site Peak Wastewater Flow (2.0 Peaking Factor)	(Peak flow rate (cfs) utilized for wastewater line sizing)		**2,043,885**	**3.163**

VERIFYING FLOW OF VARIOUS SIZES OF MAIN LINE AT 1/2 FULL

For y/do= 0.5 (50% full pipe)

Manning's n =	0.013	
A/(d0^2) =	0.3927	(see table 10.1 below)
AR ^ (2/3) / (d0 ^ 8/3) =	0.1558	(see table 10.1 below)
S (ft./ft.)	0.005	ft./ft.
S^(1/2) =	0.0707	



Manning's Equation:

$$Q = VA = \left(\frac{1.49}{n}\right) AR^{\frac{2}{3}} \sqrt{S} \quad [U.S.]$$

$$Q = VA = \left(\frac{1.00}{n}\right) AR^{\frac{2}{3}} \sqrt{S} \quad [SI]$$

Where:

Q = Flow Rate, (ft³/s)
v = Velocity, (ft/s)
A = Flow Area, (ft²)
n = Manning's Roughness Coefficient
R = Hydraulic Radius, (ft)
S = Channel Slope, (ft/ft)

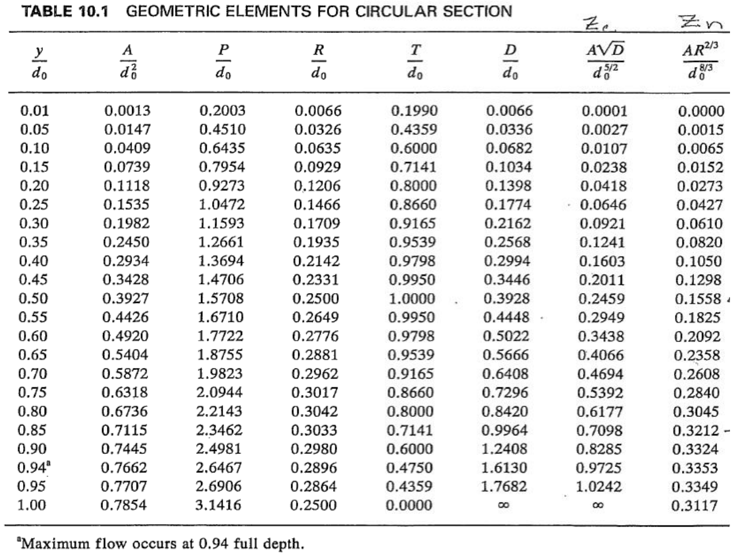


TABLE 10.1 GEOMETRIC ELEMENTS FOR CIRCULAR SECTION

						Zc	Zn
$\frac{y}{d_0}$	$\frac{A}{d_0^2}$	$\frac{P}{d_0}$	$\frac{R}{d_0}$	$\frac{T}{d_0}$	$\frac{D}{d_0}$	$\frac{A\sqrt{D}}{d_0^{5/2}}$	$\frac{AR^{2/3}}{d_0^{8/3}}$
0.01	0.0013	0.2003	0.0066	0.1990	0.0066	0.0001	0.0000
0.05	0.0147	0.4510	0.0326	0.4359	0.0336	0.0027	0.0015
0.10	0.0409	0.6435	0.0635	0.6000	0.0682	0.0107	0.0065
0.15	0.0739	0.7954	0.0929	0.7141	0.1034	0.0238	0.0152
0.20	0.1118	0.9273	0.1206	0.8000	0.1398	0.0418	0.0273
0.25	0.1535	1.0472	0.1466	0.8660	0.1774	0.0646	0.0427
0.30	0.1982	1.1593	0.1709	0.9165	0.2162	0.0921	0.0610
0.35	0.2450	1.2661	0.1935	0.9539	0.2568	0.1241	0.0820
0.40	0.2934	1.3694	0.2142	0.9798	0.2994	0.1603	0.1050
0.45	0.3428	1.4706	0.2331	0.9950	0.3446	0.2011	0.1298
0.50	0.3927	1.5708	0.2500	1.0000	0.3928	0.2459	0.1558
0.55	0.4426	1.6710	0.2649	0.9950	0.4448	0.2949	0.1825
0.60	0.4920	1.7722	0.2776	0.9798	0.5022	0.3438	0.2092
0.65	0.5404	1.8755	0.2881	0.9539	0.5666	0.4066	0.2358
0.70	0.5872	1.9823	0.2962	0.9165	0.6408	0.4694	0.2608
0.75	0.6318	2.0944	0.3017	0.8660	0.7296	0.5392	0.2840
0.80	0.6736	2.2143	0.3042	0.8000	0.8420	0.6177	0.3045
0.85	0.7115	2.3462	0.3033	0.7141	0.9964	0.7098	0.3212
0.90	0.7445	2.4981	0.2980	0.6000	1.2408	0.8285	0.3324
0.94[a]	0.7662	2.6467	0.2896	0.4750	1.6130	0.9725	0.3353
0.95	0.7707	2.6906	0.2864	0.4359	1.7682	1.0242	0.3349
1.00	0.7854	3.1416	0.2500	0.0000	∞	∞	0.3117

[a] Maximum flow occurs at 0.94 full depth.

PIPE MAIN SIZE	do (ft)	AR ^ (2/3)	FLOW RATE (Q)			
6" Sewer Main	0.50	0.0245	**0.20 cfs**	<	1.581	cfs
8" Sewer Main	0.67	0.0528	**0.43 cfs**	<	1.581	cfs
10" Sewer Main	0.83	0.0958	**0.78 cfs**	<	1.581	cfs
12" Sewer Main	1.00	0.1558	**1.26 cfs**	<	1.581	cfs
15" Sewer Main	1.25	0.2825	**2.29 cfs**	<	1.581	cfs
15" PIPE AT 0.5% MIN. SLOPE CAN CONVEY HALF OF THE WASTEWATER FLOW FROM HOONANI VILLAGE						
18" Sewer Main	1.50	0.4594	**3.72 cfs**	<	3.163	cfs
18" PIPE AT 0.5% MIN. SLOPE FLOWING HALF FULL CAN CONVEY THE ENTIRE WASTEWATER FLOW FROM HOONANI VILLAGE						

TYPE OF USE	**UNIT**	**QUANTITY OF UNIT**	**TOTAL CAPITA**
Residential Multi-Family Low-rise Apartments	2.5 Occupants per Unit	1599	3998
Commercial Restaurant (Customers)	60% useable space, 1 seat per 20 SF	56100	1683
Commercial Restaurant (Front of house staff)	1 staff member per 20 customers	1683	84
Commercial Restaurant (Back of house staff)	4 staff member per 50 customers	1683	135
Commercial Retail	1employee per 350 SF bldg area	56100	160
Commercial Office Space	1employee per 200 SF bldg area	100000	500
Light Industrial	1employee per 500 SF bldg area	198,100	396
Potential Future Commercial Space (Estimated at Hotel for higher flow)	2.25 Occupants per Unit + 1 Employee per room	275	894

County Site - Future Residential - Modeled as Residential (440 units) for higher flow. Potentially a School site.)	2.5 Occupants per Unit	440	1,100
Future Restaurant (Customers)	60% useable space, 1 seat per 20 SF	26,940	808
Future Restaurant (Front of house staff)	1 staff member per 20 customers	808	40
Future Restaurant (Back of house staff)	4 staff member per 50 customers	808	65
Future Retail	1employee per 350 SF bldg area	26,940	77
TOTAL ESTIMATED CAPITA			**9940**

County of Maui
Wastewater Reclamation Division

2200 Main Street Suite 610 ● Wailuku, HI 96793 ● (808) 270-7417 ● 270-7425 fax

Wastewater Flow Standards

The following wastewater flow contributions are to be utilized for projecting wastewater flows for the following types of uses, unless other supporting data is provided to show differently.

Type of use	Unit	Contribution (Gal/Unit/Day)
Apartment/Condo	Unit	255
Bar	Seat	15
Church, large	Seat	6
Church, small	Seat	4
Cottage or Ohana (600 S.F. max)	Unit	180
Day-care Center	Child	10
Factory	Employee	30
Golf Clubhouse	Golf Rounds	25
Hotel, resort with laundry	Room	350
Hotel, average with laundry	Room	300
Hotel, average without laundry	Room	250
Hospital	Bed	200
Industrial Shop	Employee	25
Laundry (coin operated)	Machine	300
Office	Employee	20
Residence, subdivision	Home	350
Restaurant, average	Seat	80
Restaurant, fast food	Seat	100
Rest Home	Patient	100
Retail Store	Employee	15
School, elementary	Student	15
School, high	Student	25
Storage, w/ offices	Employee	15
Storage w/ offices and showers	Employee	30
Store Customer bathroom usage	Use	5
Theater	Seat	5

The following standards will be used as necessary to compute the number of units required to make wastewater calculations:

Residential Occupancy	4 persons per unit
Apartment/Condo Occupancy	2.5 persons per unit
Hotel Occupancy	2.25 persons per unit
Hotel Employees	1 per hotel room
Office Employees	1 per 200 square feet of floor area
Retail Warehouse Employees	1 per 350 square feet of floor area
Storage/ Industrial Employees	1 per 500 square feet of floor area

Average Wastewater Flow: The average wastewater flow is the sum of the applicable wastewater flows listed above.

Maximum Wastewater Flow: The maximum wastewater flow is obtained by multiplying the average flow by a flow factor. The flow factor shall be obtained utilizing the Babbit formula or other rationale method.

Dry Weather Infiltration/Inflow: The following rates shall be used in the design of wastewater transmission lines:

a. 35 gpcd* - Wastewater lines laid below the normal ground water table.

b. 5 gpcd - Wastewater lines laid above the normal ground water table.

* gpcd = Gallons per Capita Day

Wet Weather Infiltration/Inflow: The following rates shall be used in the design of wastewater transmission lines:

a 2,750 gad* - Wastewater lines laid below the normal ground water table.

b. 1,250 gad - Wastewater lines laid above the normal ground water table.

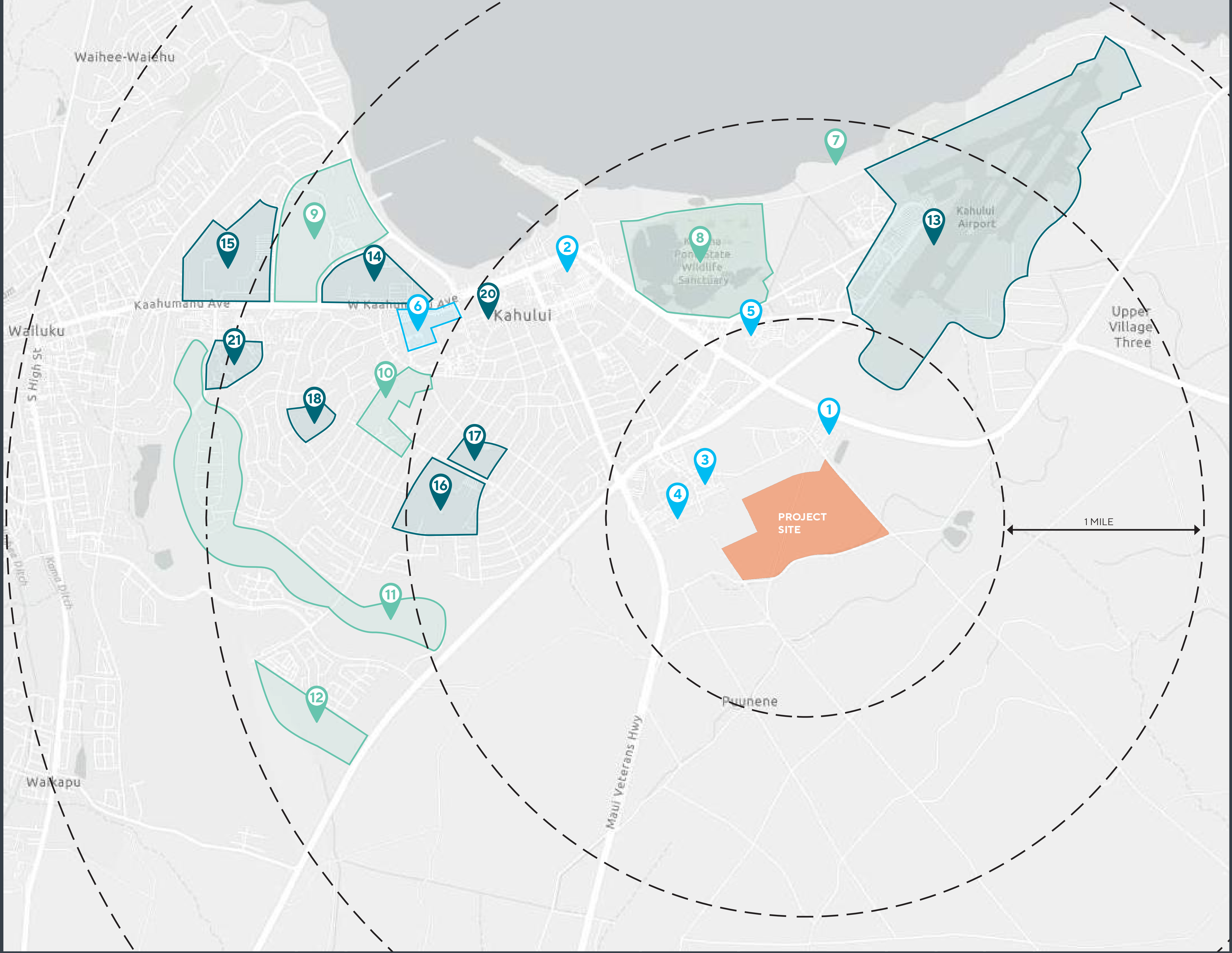
* gad = Gallons per Acre per Day

Design Average Flow: The design average flow is the sum of the average wastewater flow and the applicable dry weather infiltration/inflow rate.

Design Maximum Flow: The design maximum flow is the sum of the maximum flow and the applicable dry weather infiltration/inflow rate.

Design Peak Flow: The design peak flow of wastewater is the sum of design maximum flow and the wet weather infiltration/inflow

APPENDIX ‘G’ – PRELIMINARY LAND USE CONCEPT PLAN AND SITE PLAN



MAP LEGEND

RETAIL

1. COSTCO
2. WHOLE FOODS MARKET
3. WALMART
4. TAGET
5. SAFEWAY
6. QUEEN KALAHUMANU CENTER

POINTS OF INTEREST

7. KANAHA BEACH
8. KANAHA POND STATE WILDLIFE SANCTUARY
9. KEOPUOLANI REGIONAL PARK
10. KAHULUI COMMUNITY CENTER PARK
11. THE DUNES AT MAUI LANI GOLF COURSE
12. CENTRAL MAUI REGIONAL SPORTS COMPLEX

PUBLIC AMENITIES

13. KAHULUI AIRPORT
14. UNIVERSITY OF HAWAII MAUI COLLEGE
15. BALDWIN HIGH SCHOOL
16. MAUI HIGH SCHOOL
17. KAHULUI ELEMENTARY SCHOOL
18. LIHIKAI ELEMENTARY SCHOOL
19. POMAIKA'I ELEMENTARY SCHOOL
20. KAHULUI PUBLIC LIBRARY
21. MAUI MEMORIAL MEDICAL CENTER

Ho'onani
Development

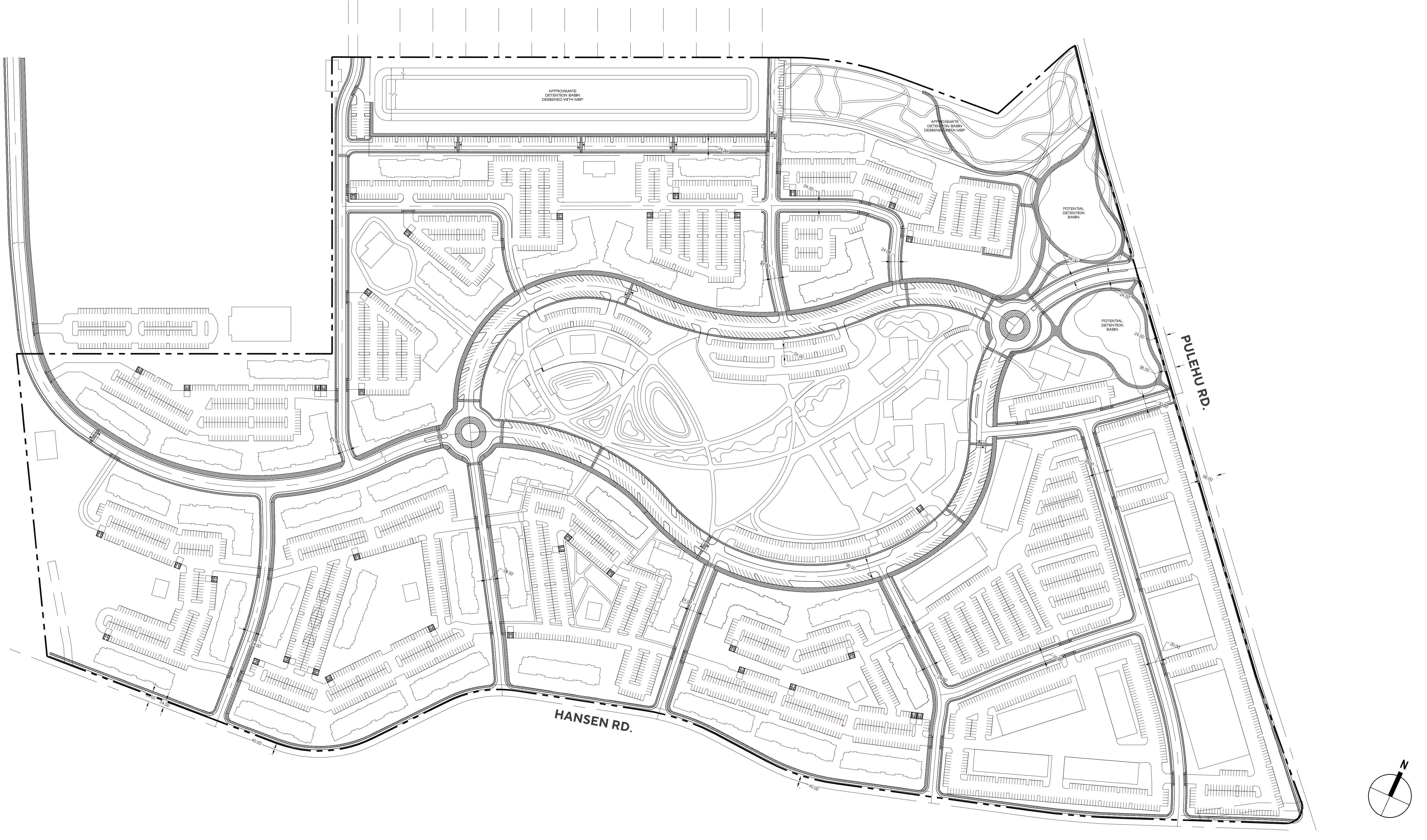
PROPOSED MASTER SITE PLAN

Kahului, Maui, Hawaii

Vicinity Map

Architecture.
Design.
Relationships.

Scale 1'=300'
Job No. 2023-0690
Date 2024-06-17



Ho'onani
Development

PROPOSED MASTER SITE PLAN

Kahului, Maui, Hawaii

Concept Site Plan Study
Proposed Master Site Plan - Option 11

Architecture.
Design.
Relationships.

Scale 1'=300'
Job No. 2023-0690
Date 2024-10-07

Commercial parcels to be developed concurrently with Multi-family Phase 1 or later.

Ho'onani
Development

PROPOSED MASTER SITE PLAN

Kahului, Maui, Hawaii

Concept Site Plan Study
Proposed Land Use Plan - Option 11

AO Architecture. Design. Relationships.

Scale	1'=300'
Job No.	2023-0690
Date	2024-10-07

	Land Use Description	Land Area (Acres)	Walk-up Unit	Modular Unit	D.U. / Acre (Range)	Commercial (Up To) GSF	Total Dwelling Units / Floor Area (SQ. FT.)	Parking Required	Parking Provided
1	Grand Entry Open Space	6.05	N/A	N/A	N/A	N/A	N/A	0	0
2A	Open Space Park (R)	25.35	N/A	N/A	N/A	N/A	N/A	628	725
2B	Food Hall		N/A	N/A	N/A	13,000	13,000		
2D	Commercial / Retail/ Restaurant		N/A	N/A	N/A	79,800	79,800		
2E	Entertainment space		N/A	N/A	N/A	7,400	7,400		
3	Future Commercial	3.24	N/A	N/A	N/A	TBD	N/A	TBD	172
4	Multi-Family	6.55	45	84	20 DU/AC	N/A	129	201	265
5	Multi-Family	21.45	270	84	17 DU/AC	N/A	354	606	847
6	Multi-Family	7.85	129	42	22 DU/AC	N/A	171	249	278
7	Multi-Family	9.23	75	84	17 DU/AC	N/A	159	252	313
8	Multi-Family	15.03	156	168	22 DU/AC	N/A	324	453	578
9	Multi-Family	11.30	120	84	18 DU/AC	N/A	204	333	393
10	Multi-Family	11.36	120	126	22 DU/AC	N/A	246	393	424
11	Office Campus	10.30	N/A	N/A	N/A	100,000	100,000	200	601
12	Commercial / Retail/ Restaurant	2.49	N/A	N/A	N/A	7,418	7,418	74	63
13	Industrial Park	18.42	N/A	N/A	N/A	198,100	198,100	330	645
14	Commercial / Retail/ Restaurant	1.61	N/A	N/A	N/A	5,850	5,850	59	0
15	Sports Complex	9.33	N/A	N/A	N/A	N/A	152,755	100	116
16	Sports Complex	4.90	N/A	N/A	N/A	N/A	N/A	0	19
17	Waste Water Treatment Plant	1.70	N/A	N/A	N/A	N/A	N/A	0	0
18	**Not A Part - County Land**	22.99	N/A	N/A	N/A	N/A	N/A	0.0	0.0
TOTAL		**189.15**	**915**	**672**		**411,568**	**1,587 uits; 442,000 sq. ft.**	**3878**	**5439**

Ho'onani
Development

PROPOSED MASTER SITE PLAN

Kahului, Maui, Hawaii

Concept Site Plan Study
Proposed Master Site Plan Option 11 - **Site Tabulation**

Architecture.
Design.
Relationships.

Scale 1'=300'
Job No. 2023-0690
Date 2024-10-07

	Land Use Description	Land Area (Acres)	Walk-up Unit	Modular Unit	D.U. / Acre (Range)	Commercial (Up To) GSF	Total Dwelling Units / Floor Area (SQ. FT.)	Parking Required	Parking Provided
1	Grand Entry Open Space	6.05	N/A	N/A	N/A	N/A	N/A	0	0
2A	Open Space Park (R)	25.35	N/A	N/A	N/A	N/A	N/A	628	725
2B	Food Hall		N/A	N/A	N/A	13,000	13,000		
2D	Commercial / Retail/ Restaurant		N/A	N/A	N/A	79,800	79,800		
2E	Entertainment space		N/A	N/A	N/A	7,400	7,400		
3	Future Commercial	3.24	N/A	N/A	N/A	TBD	N/A	TBD	172
4	Multi-Family	6.55	45	84	20 DU/AC	N/A	129	201	265
5	Multi-Family	21.45	270	84	17 DU/AC	N/A	354	606	847
6	Multi-Family	7.85	129	42	22 DU/AC	N/A	171	249	278
7	Multi-Family	9.23	75	84	17 DU/AC	N/A	159	252	313
8	Multi-Family	15.03	156	168	22 DU/AC	N/A	324	453	578
9	Multi-Family	11.30	120	84	18 DU/AC	N/A	204	333	393
10	Multi-Family	11.36	120	126	22 DU/AC	N/A	246	393	424
11	Office Campus	10.30	N/A	N/A	N/A	100,000	100,000	200	601
12	Commercial / Retail/ Restaurant	2.49	N/A	N/A	N/A	7,418	7,418	74	63
13	Industrial Park	18.42	N/A	N/A	N/A	198,100	198,100	330	645
14	Commercial / Retail/ Restaurant	1.61	N/A	N/A	N/A	5,850	5,850	59	0
15	Sports Complex	9.33	N/A	N/A	N/A	N/A	152,755	100	116
16	Sports Complex	4.90	N/A	N/A	N/A	N/A	N/A	0	19
17	Waste Water Treatment Plant	1.70	N/A	N/A	N/A	N/A	N/A	0	0
18	**Not A Part - County Land**	22.99	N/A	N/A	N/A	N/A	N/A	0.0	0.0
TOTAL		**189.15**	**915**	**672**		**411,568**	**1,587 uits; 442,000 sq. ft.**	**3878**	**5439**

APPENDIX ‘H’ – PERCOLATION TEST RESULTS

DEPARTMENT OF HEALTH – WASTEWATER BRANCH
INDIVIDUAL WASTEWATER SYSTEM (IWS) – SITE EVALUATION/PERCOLATION TEST
(PERCOLATION TEST NO. 1 - EAST)

Date/Time: July 29, 2024

Test Performed by: Hawaii Geotechnical Consulting, Inc.

Owner: Ho'onani Development, LLC

TMK: --

Elevation: Unknown Feet

Depth to Groundwater Table: >10 feet below grade

Depth to Bedrock (if observed): Unknown feet below grade

Diameter of Hole: 9.0 inches

Depth to Hole Bottom: 36 inches below grade

Depth, inches below grade	Soil Profile (color, texture, other)
0-18	Brown Clayey Silt with some Sand, Soft
18-108	Orange Brown Silt with some Sand, Hard

PERCOLATION READINGS:

Time 12 inches of water to seep away: 101 minutes

Time 12 inches of water to seep away: 47 minutes

Check one:

☐ Percolation tests in sandy soils, recorded time intervals and water drops at least every 10 minutes for at least 1 hour.

☒ Percolation tests in non-sandy soils, presoaked the test hole for at least 4 hours. Recorded time intervals and water drops at least every 10 minutes for 1 hour of time for the first 6 inches to seep away in greater than 30 minutes recorded time intervals and water drops at least every 30 minutes for 4 hours or until 2 successive drops do not vary by more than 1/16 inch.

Time Interval (min)	Drop in Inches	Time Interval (min)	Drop in Inches	Time Interval (min)	Drop in Inches
30	2-5/8	30	2-5/8		
30	2-3/16	30			
30	2-1/2				
30	2-5/8				

Percolation Rate (time/final water level drop): 11.41 minute/inch

As the engineer responsible for gathering and providing site information and percolation test results, I attest to the fact that above site information is accurate and that the site evaluation was conducted in accordance with the provisions of Chapter 11-62, "Wastewater Systems" and the results were acceptable. I also attest that three feet of suitable soil exists between the bottom of the soil absorption system and the groundwater table or any other limiting layer.

ROBERT M. GIBBENS
No. 10094-C

Engineer's Signature/Stamp

July 29, 2024

License Expires 04/30/2026

DEPARTMENT OF HEALTH – WASTEWATER BRANCH
INDIVIDUAL WASTEWATER SYSTEM (IWS) – SITE EVALUATION/PERCOLATION TEST
(PERCOLATION TEST NO. 2 - WEST)

Date/Time: July 29, 2024

Test Performed by: Hawaii Geotechnical Consulting, Inc.

Owner: Ho'onani Development, LLC

TMK: --

Elevation: Unknown Feet

Depth to Groundwater Table: >10 feet below grade

Depth to Bedrock (if observed): Unknown feet below grade

Diameter of Hole: 9.0 inches

Depth to Hole Bottom: 36 inches below grade

Depth, inches below grade	Soil Profile (color, texture, other)
0-18	Brown Clayey Silt with some Sand, Soft
18-108	Orange Brown Silt with some Sand, Hard

PERCOLATION READINGS:

Time 12 inches of water to seep away: 136 minutes

Time 12 inches of water to seep away: 100 minutes

Check one:

______ Percolation tests in sandy soils, recorded time intervals and water drops at least every 10 minutes for at least 1 hour.

X Percolation tests in non-sandy soils, presoaked the test hole for at least 4 hours. Recorded time intervals and water drops at least every 10 minutes for 1 hour of time for the first 6 inches to seep away in greater than 30 minutes recorded time intervals and water drops at least every 30 minutes for 4 hours or until 2 successive drops do not vary by more than 1/16 inch.

Time Interval (min)	Drop in Inches	Time Interval (min)	Drop in Inches	Time Interval (min)	Drop in Inches
30	4-15/16	30	5-1/16		
30	5-1/4				
30	5				
30	5-1/16				

Percolation Rate (time/final water level drop): 5.93 minute/inch

As the engineer responsible for gathering and providing site information and percolation test results, I attest to the fact that above site information is accurate and that the site evaluation was conducted in accordance with the provisions of Chapter 11-62, "Wastewater Systems" and the results were acceptable. I also attest that three feet of suitable soil exists between the bottom of the soil absorption system and the groundwater table or any other limiting layer.

Engineer's Signature/Stamp

ROBERT M. GIBBENS
No. 10094-C

July 29, 2024

License Expires 04/30/2026

APPENDIX ‘B’ – GEOTECHNICAL REPORT

PIONEER DESIGN GROUP-HAWAIʻI

GEOTECHNICAL INVESTIGATION REPORT
HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

A report by:
HAWAII GEOTECHNICAL CONSULTING, INC.

August 11, 2024

ROBERT M. GIBBENS
No. 10094-C

THIS WORK WAS PREPARED BY
ME OR UNDER MY SUPERVISION

SIGNATURE

04/30/2026
EXPIRATION DATE
OF LICENSE

Hawaii Geotechnical Consulting
- Incorporated -
P.O. Box 331223 • Kahului, Hawaii 96733 • Phone (808) 205-1727

August 11, 2024
File No. 24024.01

Mr. Greg Sado
Ho'onani Development, LLC
Kahului, Maui, Hawaii 96793

Subject: **GEOTECHNICAL INVESTIGATION REPORT FOR HOONANI VILLAGE KAHULUI, MAUI, HAWAII**

Dear Mr. Sado:

We are pleased to submit our Geotechnical Investigation Report for the Hoonani Village project in Kahului, Maui, Hawaii. The enclosed report describes our subsurface investigation and presents our geotechnical recommendations for earthwork, foundations, retaining walls, pavements, utilities and percolation rates.

We appreciate the opportunity to work with you on this project. If you should have any questions or require additional information, please contact us.

Sincerely,

HAWAII GEOTECHNICAL CONSULTING, INC.

Robert M. Gibbens, P.E.
Senior Geotechnical Engineer

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LIST OF APPENDICES

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1. INTRODUCTION

1.1 Authorization

Hawaii Geotechnical Consulting, Inc. (HGC) was retained by Hoonani Development, LLC to conduct a geotechnical investigation for the Hoonani Village project in Kahului, Maui, Hawaii. The scope of our services was outlined in our May 5, 2024 proposal No. P-780.

Authorization to proceed was received via a May 6, 2024 proposal signed by Mr. Greg Sato. The June 17, 2024 Concept Site Plan Study by AO Architecture was used during our investigation.

1.2 Purpose and Scope

The purpose of this geotechnical investigation was to explore and evaluate the proposed site's subsurface conditions in order to provide geotechnical recommendations for the project's mass grading, foundations, retaining walls, pavements, utilities and percolation rates. In addition to evaluating the subsurface soil conditions, the site's groundwater conditions and construction considerations were addressed. A description of the scope of work is presented below:

Phase 1 – Test Pit Field Investigation. A total of 42 test pits were excavated across the site with a CAT 328D excavator equipped with a 4.5-foot-wide bucket. Each test pit was excavated to an initial depth of 4 to 5 feet below the existing ground surface. The cut face of each test pit was then hand logged and relatively undisturbed drive and disturbed grab and bulk samples were obtained where appropriate. After initial logging and sample collection, each test pit was extended further. During the additional excavation, the disturbed soil cuttings were sampled when visual changes were observed.

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The test pits were excavated to depths ranging from 4 to 9 feet below the existing ground surface. An engineer with HGC observed and directed the test pit investigation, maintained a log of the subsurface soils encountered and collected relatively undisturbed drive and disturbed grab and bulk samples for laboratory testing. A description of the field investigation, the Logs of Test Pits, and a Unified Soil Classification System (USCS) chart are presented in Appendix A. The test pit locations are presented on the Test Pit Location Plan, Figure 1.

Phase 2 – Laboratory Testing. Laboratory tests were performed on relatively undisturbed drive and disturbed grab and bulk samples obtained during the field investigation. Laboratory tests were selected to verify field classifications and provide geotechnical parameters for use in design. Testing consisted of in-place dry density and moisture content, gradation, Atterberg limit and California Bearing Ratio (CBR) tests. The laboratory test methods and results are described and presented graphically in Appendix B and tabulated on the Logs of Test Pits in Appendix A, where applicable.

Phase 3 – Percolation Test. A total of two percolation tests were performed within the proposed WWTP leach field area. The percolation tests were performed at depths of 36 inches below the existing ground surface following the State of Hawaii Department of Health – Wastewater Branch testing method. The percolation test method and result are described and presented in Appendix C.

Phase 4 – Geotechnical Analysis. Our field observations and laboratory test results were analyzed in combination with the plans. We evaluated a shallow foundation system for support of the proposed project structures. Our analysis focused on the suitability of the sites in-place soils. We also analyzed the existing subsurface conditions as they relate to general site earthwork, foundations, retaining walls, pavement design and percolation rates. Design recommendations for use with standard IBC seismic criteria are also provided.

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Phase 5 – Geotechnical Report. This report was prepared to present our findings, conclusions, and recommendations regarding the geotechnical feasibility for site earthwork, foundations, retaining walls, pavement design and percolation rates. Discussions and recommendations regarding foundation types, bearing capacity, settlements and pavement design are presented.

1.3 Site Location

The proposed site is located along the valley area between Haleakala and the West Maui Mountains in Kahului, Maui, Hawaii. The site is bounded by Hansen Road to the south, by Pulehu Road to the east, existing commercial buildings and Hookele Street to the north and by vacant land to the west.

1.4 Site Description and Conditions

No topographic plans were available for the site. The site is relatively level. Unimproved soil and asphaltic paved roads were observed across the site. Signs of previous sugar cane cultivation were observed across the site including watering systems and plastic piping.

The site is currently vacant, having been most recently used for sugarcane cultivation. The sites surface varies from lightly vegetated to thickly overgrown, with thick brush and weeds observed.

END OF INTRODUCTION

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2. PROJECT DESIGN CONSIDERATIONS

2.1 Proposed Project/Development Plans

We understand that the project is a strategically planned mixed-use development located on a 165-acre site along Pulehu Road in southern Kahului. The following sections describe our understanding of the overall project scope.

2.1.1 Residential

The project will include 1,600 individual residential apartments across multiple structures. The apartment structures will consist of 1 to 4 story buildings constructed of wood with concrete slab on grade lower floors. In addition to the structures, various pools will be constructed across the site as well as stormwater detention basins along the site's northern region.

In addition to the residential structures, onsite driveways and parking lots as well as entranceways off Hansen Road, Pulehu Road and Hookele Street will be constructed. Buried utilities including water, sewer, drain and electrical are also planned.

We understand that retaining walls may be required across the site in order to support grade changes. We have assumed that retaining walls will include either CMU or concrete cantilevered walls with unknow heights.

2.1.2 WWTP

A wastewater treatment plant is planned for the site's western region. The WWTP will include an underground septic system, holding tanks and prefabricated metal buildings. In addition, a sewer pump station is planned for the site's northern region.

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2.1.3 Well Site

A new well site is planned up Pulehu Road. The well site will include new wells and additional water holding tanks.

2.1.4 Community Recreational Facilities

Recreational amenities including an amphitheater, pickleball/basketball courts, multiple sports fields and a dog park are planned.

2.1.5 Commercial/Industrial

In addition to the residential component, multiple commercial ventures are proposed within the development. Two 125-150 room hotels are planned within the development. The hotel structures will likely be wood framed with concrete slab-on-grade lower floors. We understand that 100,000 square feet of commercial space is planned along with 200,000 square feet of industrial space. The commercial and industrial structures will likely be constructed of wood or steel with concrete slab on grade lower floors.

2.1.6 County School/Community Facilities

We understand that the 23-acre site at the projects northwest corner may, in the future, be developed into a grade school as well as a community facility. It appears that the grade school project will include a main school building along with parking lots and other structures. A community facility may be constructed just south of the school facility. The community facility will include a single structure with a parking lot.

2.2 Grading

Although no grading plans were made available, we have assumed that mass grading across the relatively level site will likely include cuts and fills on the order of 1 to 3 feet. Deeper cuts will be required along the site's detention basins and buried utilities.

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2.3 Pavements

We have assumed that all onsite paving will consist of asphaltic concrete (AC), with Portland Cement Concrete Pavement (PCCP) possibly used at heavily loaded or tight turning areas, such as trash enclosures as well as within the commercial and industrial areas. No traffic information was made available at this time. We have assumed traffic within the proposed residential project will include primarily passenger and light truck traffic, with assumed traffic within the proposed commercial and industrial projects will include primarily passenger and light to heavy truck traffic.

END OF PROJECT DESIGN CONSIDERATIONS

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3. SUBSURFACE INVESTIGATION

3.1 Test Pits

A total of 42 test pits were excavated across the proposed site. The test pits were excavated with a CAT 328D excavator equipped with a straight bar 4.5-foot-wide bucket. Each test pit was excavated to an initial depth of 4 to 5 feet below the existing ground surface. The cut face of each test pit was hand logged and relatively undisturbed drive and disturbed grab and bulk samples were obtained where appropriate. After initial logging and sample collection, each test pit was extended further. During the additional excavation, the disturbed soil cuttings were sampled when visual changes were observed.

The test pits were excavated to depths ranging from 4 to 9 feet below the existing ground surface. An engineer with HGC observed and directed the test pit investigation, maintained a log of the subsurface soils encountered and collected relatively undisturbed drive and disturbed grab and bulk samples for laboratory testing. A description of the field exploration, the Logs of Test Pits, and a USCS chart are presented in Appendix A. The Logs of Test Pits are presented as Figures A2 through A43. A USCS soil classification chart is presented as Figure A1. The test pit locations and percolation test locations are presented on the Test Pit Location Plan, Figure 1.

3.2 Laboratory Testing

Laboratory tests were performed on relatively undisturbed drive and disturbed grab and bulk samples obtained during the field investigation. Laboratory tests were selected to verify field classifications and provide geotechnical parameters for use in design. Testing consisted of in-place dry density and moisture content, gradation, Atterberg limit, CBR and Proctor tests. The laboratory test methods and results are described and presented graphically in Appendix B and tabulated on the Logs of Test Pits in Appendix A, where applicable.

3.3 Percolation Testing

A total of two percolation tests were performed within the proposed WWTP leach field area, one along its east end and one along its west end. The percolation tests were performed at a depth of 36 inches following the State of Hawaii Department of Health – Wastewater Branch testing method.

Approximately 1 inch of clean ¾-inch gravel was placed at the bottom of a 9-inch diameter, 36-inch-deep hand excavated hole. Step D of the procedure for other type (non-granular) soils was used to perform the percolation tests, as a 12 inch head of water did not seep away in under 10 minutes, twice. After a minimum of 4 hours of presoaking, maintaining a 12-inch head, the hole was allowed to swell for at least 12 hours. After swelling, water was then added to 6 inches above the gravel and allowed to percolate. The water drop was recorded every 30-minute time interval for 4 hours. The final drop used to calculate the percolation rates.

A senior engineer with HGC performed the percolation test and maintained a log of the time and water drop intervals. The percolation test result is presented in Appendix C.

END OF SUBSURFACE INVESTIGATION

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4. SUBSURFACE CONDITIONS

4.1 General

The site is generally blanketed by a layer of agriculturally disturbed soil underlain by alluvial (water deposited) soil to the maximum depth of our explorations. A detailed description of the underlying soils is presented below.

Map 104 of the August 1972 *United States Department of Agriculture Soil Conservation Service Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii* indicates that the proposed site is within the (EaA) Ewa series. This series is characterized by well drained soils in basins and on alluvial fans on the islands of Maui and Oahu. These soils developed in alluvium derived from basic igneous rock. They are nearly level to moderately sloping. These soils are used for sugarcane, truck crops, and pasture. The depth to bedrock is deeper than 5 feet. The Unified Soil Classification is ML-MH.

4.2 Agriculturally Disturbed Soil

The site was recently used for the cultivation of cane sugar. The cultivation process left the entire site with approximately 12 to 30 inches of agriculturally disturbed soil. Roots and black irrigation plastic were encountered within the agriculturally disturbed soils to depths between 6 and 12 inches.

The agriculturally disturbed clayey silt consisted of low plasticity clayey silt with varying percentages of sand, typically classified as ML under the USCS. The clayey silt was generally soft and dry, with measured in-place dry densities ranging from 68 to 75 pounds per cubic foot (pcf) and measured in-place moisture contents ranging from 11 to 21 percent, with a single measured moisture content as high as 38 percent. Atterberg limit tests on the low plasticity agriculturally disturbed clayey silts indicated they possess low- to low-moderate plasticity, with Plasticity Index (PI) values ranging from 14 to 22.

In addition to the agriculturally disturbed clayey silt, several areas of agriculturally disturbed silty sand, typically classified as SM under the USCS, were encountered across the site. The silty sand was encountered from the ground surface to depths of 12 to 24 inches. The silty sand was generally loose and dry, with measured in-place dry densities ranging from 93 to 101 pcf and measured in-place moisture contents ranging from 8 to 17 percent.

4.3 Alluvial Soil

Low plasticity alluvial orange-brown silts were encountered below the upper agriculturally disturbed clayey silts. The alluvial silts were encountered from a depth of 12 to 30 inches to the maximum depth of our explorations at 9 feet. The alluvial silts were typically classified as ML under the USCS. The silts were generally hard and damp to moist, with measured in-place dry densities ranging from 72 to 82 pcf and measured in-place moisture contents ranging from 12 to 33 percent. Atterberg limit tests on the low plasticity silts indicated they possess a low- to low-moderate plasticity, with Plasticity Index (PI) values ranging from 9 to 24. The alluvial silt along the WWTP region, in the area of the proposed leach field, possessed percolation rates ranging from of 5.9 minutes per inch (west) to 11.4 minutes per inch (east).

In addition to the alluvial silts, several areas of alluvial silty sand and silty gravel, typically classified as SM and GM under the USCS, respectively, were encountered across the site. The silty sand and silty gravel was encountered from depths of 6.0 to 7.5 feet to the maximum depth of our explorations at 9 feet. The silty sand and silty gravel was generally dense and damp to moist, with measured in-place moisture contents ranging from 10 to 27 percent.

4.4 Undocumented Fill

Limited areas of undocumented fill were encountered along the sites southwestern corner (Test Pit Nos. 22 and 25). The undocumented fill consisted

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of soft clayey silt and loose silty sand. The fill was encountered from the ground surface to depths of 1 foot. A 1.5-inch asphaltic pavement section was encountered below the undocumented fill in Test Pit No. 25.

The clayey silt fill is typically classified as ML under the USCS. The clayey silt was generally soft and dry, with a measured in-place dry density of 70 pcf and a measured moisture content of 14 percent. The silty sand fill is typically classified as SM under the USCS. The silty sand was generally loose and dry, with a measured in-place dry density of 93 pcf and a measured moisture content of 8 percent.

4.5 Groundwater Conditions

No free water or groundwater was encountered during our field investigation and is not expected to impact construction. Groundwater levels within the project areas may vary depending on seasonal rainfall and runoff conditions not apparent at the time of our field investigation. Therefore, groundwater levels may vary from those presented above at the time of construction.

END OF SUBSURFACE CONDITIONS

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5. DISCUSSION AND ANALYSIS

5.1 General

Based on the results of our field exploration, laboratory testing, and geotechnical analysis, we believe that it is geotechnically feasible to construct the proposed mixed-use project, provided the recommendations of this report are closely followed. The primary geotechnical concern regarding the proposed construction is the presence of soft and loose agriculturally disturbed soils across the site as well as the presence undocumented fill along the sites southwest corner. A more detailed discussion regarding these as well as other concerns is presented below.

5.2 Agriculturally Disturbed Soils

Between 12 and 30 inches of the sites upper soils have been agriculturally disturbed by the past sugar cane cultivation. The disturbed soils are generally soft or loose and dry, possessing the potential for future settlement if not remediated. The agriculturally disturbed soils will need to be removed down to within 12 inches of the bottom of the agriculturally disturbed soils within all fill areas, foundations or roadways. The final in-place 12 inches of agriculturally disturbed soils should be scarified and moisture conditioned in-place prior to being compacted to no less than 90 percent of the soils maximum dry density at a moisture content within 3 percent of its optimum moisture content in accordance with ASTM D1557.

The removed agriculturally disturbed soils can then be placed and compacted back to their original level or to finished grade. The recompacted agriculturally disturbed soils should be placed in accordance with Section 6.7.4 Engineered Fill.

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5.3 Undocumented Fill

Undocumented fill was encountered within Test Pit Nos. 22 and 25 at the sites southwest corner. The undocumented fill was encountered in a soft to loose state from the ground surface to a depth of 12 inches.

We recommend that the soils at the sites southwest corner be proof rolled in order to detect any additional undocumented fill, if it exists. We recommend that the proof rolling be performed with a minimum of a 12-ton vibratory smooth drum roller. The proof rolling should be observed by HGC personnel. All undocumented fill should be removed and recompacted in-place to no less than 90 percent of the soils maximum dry density at a moisture content within 3 percent of its optimum moisture content in accordance with ASTM D1557.

5.4 County School/Community Facility Site

We understand that the sites northwest corner may be developed into a grade school and community facility sometime in the future. The scope of our investigation did not include test pits within the school and community facility site. Based on the overall site’s consistent subsurface conditions, we believe that the soils beneath the school and community facility will likely consist of an upper layer of agriculturally disturbed clayey silt underlain by alluvial silt.

These soil conditions are generally suitable for support of foundations and pavements for projects with similar scopes to the potential future school and community facility. We recommend that a full geotechnical investigation be performed at the school and community facility prior to its development.

END OF DISCUSSION AND ANALYSIS

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6. ENGINEERING RECOMMENDATIONS

6.1 General

Site grading design can be developed in accordance with the following recommendations. Unless stated otherwise, the maximum dry density (MDD) and optimum moisture content (OMC) of all engineered fill referenced within this report is based on Laboratory Test Method ASTM D1557.

6.2 Seismic Design Considerations

The following sections address what we believe to be the project's major seismic design considerations.

6.2.1 Ground Shaking

The proposed development is located in an area with some seismic activity and the proposed structures will likely be subjected to seismic shaking during their design life. The primary potential seismic hazard is ground shaking. We recommend that the proposed development be designed in accordance with the requirements of the latest (2018) edition of the International Building Code (IBC). According to Table 1613.52 of the 2018 IBC, the project site can be characterized by a Site Class of C.

6.2.2 Liquefaction

Liquefaction occurs in loose, saturated sands that are subjected to earthquake type motions. In sands where constant volume conditions are maintained during shaking (i.e., where no immediate drainage path exists), excess pore water pressures build quickly and as a result, soil strength is rapidly reduced and settlement occurs. Neither loose sands nor a shallow groundwater table underlie the site. Therefore no liquefaction-induced settlements are likely.

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6.2.3 Other Seismic Considerations

The site is not located within an Earthquake Fault Zone. Therefore the likelihood of the ground surface rupturing due to faulting is considered to be low. Based on the materials encountered and the existing and planned topographic conditions, we do not expect seismic slope instability to be a concern. Due to the site's elevation, we do not believe that tsunamis are a potential threat.

6.3 Foundations

The residential, commercial and industrial structures may be founded on shallow continuous strip or spread footings provided the recommendations for site preparation are followed. We recommend that all foundations founded in recompacted previously agriculturally disturbed clayey silt, native alluvial silt, or granular engineered fill be placed a minimum depth of 12 inches below the lowest adjacent grade for both interior and exterior footings. These embedment depths should provide bearing surfaces consisting of either fine grained clayey silt or coarse grained granular engineered fil.

For a shallow foundation system designed with the recommendations presented above, an allowable bearing pressure of 3,050 pounds per square foot (psf) may be used. This bearing value is for total dead plus sustained live loads and may be increased by one-third for transient loads such as wind or seismic. We estimate that total and differential settlements should be less than ½-inch for foundations designed as described above.

The bottom of all foundations should be cleaned of loose material and all uncompacted agriculturally disturbed soils should be compacted to no less than 90 percent of the soils MDD at a moisture content within 3 percent of its OMC. The subgrade soil should also be compacted to at least 90 percent of the materials MDD at a moisture content within 3 percent of its OMC. Footings located near adjacent slopes should be embedded such that a minimum

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horizontal distance of 5 feet is maintained between the footing's bottom edge and the exposed slope face.

Lateral resistance may be derived from passive resistance along the footing sides and friction along the footing bottoms. An allowable passive earth pressure of 250 psf per foot of depth may be used for footings founded in either compacted previously agriculturally disturbed soil, alluvial soil or engineered fill. We recommend that the lateral earth pressure of any footing be neglected for the upper 12-inches unless the surface around the footing is protected from erosion or disturbance by a slab, pavement, or some other form of confinement.

A coefficient of friction value of 0.45 may be used between the bottom of concrete footings and the underlying compacted previously agriculturally disturbed soil, alluvial soil or engineered fill. Sliding resistance should be calculated based on the dead load only.

6.4 Slab-on Grade Floors

Concrete slab-on-grade floors bearing on compacted previously agriculturally disturbed soil, alluvial soil or engineered fill can be used for the residential, commercial or industrial structures. If reducing the passage of water vapor through the slab is desired, we recommend that a vapor barrier be placed beneath the slab.

For exterior slabs and slabs designed as rigid pavements, the water vapor barrier can be replaced by 6 inches of Aggregate for Untreated Base (UTB). The UTB should conform to Section 703.06 of the 2005 Hawaii Standard Specifications for Road, Bridge, and Public Works Construction (Standard Specifications). The UTB should be compacted to at least 95 percent of its MDD.

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Lateral resistance may be derived from passive resistance along the footing sides and friction along the footing bottoms. An allowable passive earth pressure of 250 psf per foot of depth may be used for footings founded in either compacted previously agriculturally disturbed soil, alluvial soil or engineered fill. We recommend that the lateral earth pressure of any footing be neglected for the upper 12-inches unless the surface around the footing is protected from erosion or disturbance by a slab, pavement, or some other form of confinement.

A coefficient of friction value of 0.45 may be used between the bottom of concrete footings and the underlying compacted previously agriculturally disturbed soil, alluvial soil or engineered fill. Sliding resistance should be calculated based on the dead load only.

6.5 Retaining Walls

We understand that the yielding free-standing retaining walls may be used to support site grade changes across the site. We have assumed that site walls will be CMU or concrete within unknown heights, but likely with heights less than 6 feet. We have assumed that most wall backfill will be level onsite soil.

Unrestrained walls that are free to rotation at the top should be designed with active lateral earth pressures. For yielding CMU or concrete walls with level backfill, we recommend that an active lateral earth pressure equivalent to a fluid weighing **45 pcf** be used in design.

Lateral resistance may be derived from passive resistance along the wall footing sides and friction along the footing bottoms. An allowable passive earth pressure of 250 psf per foot of depth may be used for design. We recommend that the lateral earth pressure of any footing be neglected for the upper 12-inches unless the surface around the footing is protected from erosion or disturbance by a slab, pavement, or some other form of confinement.

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A coefficient of friction value of 0.45 may be used between the bottom of the concrete footings and the previously agriculturally disturbed soil, alluvial soil or engineered fill. Sliding resistance should be calculated based on the dead load only.

These pressures are given in terms of equivalent fluid pressure for unrestrained walls and do not include compaction-induced, surcharge, foundation, or hydrostatic loads, which must be added where appropriate.

Wall backfill should be placed and compacted in accordance with the engineered fill recommendations. Wall backfill compaction should not exceed 95 percent relative compaction to minimize lateral wall pressures. Heavy construction equipment should be maintained a distance of at least three feet away from the walls while the backfill soils are being placed. Hand operated compaction equipment should be used to compact the wall backfill within a three foot zone adjacent to the walls.

Adequate wall drainage should be provided.

6.6 Pavement Design

Detailed vehicular load and frequency information was not made available to us. We have assumed traffic within the proposed residential project will include passenger and light truck traffic while assumed traffic within the proposed commercial/industrial project will include passenger and light to heavy truck traffic.

6.6.1 Flexible Pavement

The sites upper agriculturally disturbed soils will likely be used for support of the sites pavements, including entranceways, driveways, parking lots and roadways. A California Bearing Ratio (CBR) test on the sites upper clayey silt soils indicate

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a CBR value of 18. Based on a CBR of 18, and the assumed traffic, we believe that a pavement section consisting of 2.5 inches of Asphaltic Concrete over 6.0 inches of UTB should be sufficient for the residential passenger and light truck traffic while a pavement section consisting of 3.0 inches of Asphaltic Concrete over 8.0 inches of UTB should be sufficient for the commercial/industrial passenger and light to heavy truck traffic.

The UTB should conform to Sections 703.06 of the 2005 Standard Specifications and should be compacted to at least 95 percent of the materials MDD at a moisture content between optimum and 3 percent wet of the soils OMC. All pavement subgrades should be sloped to drain. All pavement subgrades should be compacted to at least 90 percent of their MDD at a moisture content at least 2 percent wet of their OMC for a depth of at least 12 inches.

6.6.2 Rigid Pavement

Portland cement concrete pavements (PCCP) may be desirable at entry points and other locations where tight-turning heavy vehicles are expected. For residential usage, we recommend a 6-inch thick rigid concrete pavement over 6 inches of UTB. For commercial/industrial usage, we recommend a 6-inch thick rigid concrete pavement over 8 inches of UTB.

The UTB should conform to Section 703.06 of the Standard Specifications and should be compacted to at least 95 percent of the materials MDD. The subgrade should be compacted to at least 90 percent of its MDD at a moisture content within 3 percent of its OMC for a depth of at least 12 inches.

6.6.3 Construction Considerations

After completion of site grading, we recommend that the final subgrade soils be tested for their CBR value to confirm the values assumed in design. Modified

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pavement sections may be required if subgrade conditions vary from those assumed in design.

In the event unstable (pumping) subgrades are encountered within the planned pavement areas, we recommend that a heavy rubber tired vehicle (typically a loaded water truck) be used to test the load/deflection characteristics of the finished subgrade. If the tested surface shows a visible deflection, corrective measures should be implemented.

6.7 Construction Considerations

The following recommendations are provided for geotechnical earthwork design. All site preparation and earthwork operations should be performed in accordance with the Standard Specifications.

6.7.1 Stripping and Grubbing

Prior to commencement of site grading, the site should be cleared and grubbed to remove all organics, vegetation, and other deleterious materials in accordance with the Standard Specifications. We anticipate stripping and grubbing will include surface vegetation and the removal of all irrigation plastic. We believe the stripping and grubbing to depths of 6 inches will be required. Organic material should not be mixed with the underlying native soils that may be later used as fill or backfill. Material with organic matter in excess of about 4 percent should not be used as fill or backfill.

The stripping and grubbing work should include the removal or recompaction of all agriculturally disturbed soils that, in the judgment of the geotechnical engineer, is uncertified, compressible, collapsible, or contains significant voids. The voids caused by the removal of subsurface features, if encountered, must also be processed and backfilled in accordance with the recommendations presented in this report.

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6.7.2 Site Preparation

Based on our interpretation of the geotechnical subsurface profile, we anticipate that the soils exposed during construction will consist primarily of fine-grained clayey silts. All areas to receive fill should be stripped and grubbed to expose a firm, non-yielding subgrade, free of large voids, organics, and deleterious materials. The exposed subgrade soils should be moisture conditioned to within 3 percent of the soils OMC for a depth of at least 12 inches prior to being compacted to at least 90 percent of the soils MDD.

6.7.3 Excavation Characteristics

We anticipate that cuts of less than 3 feet may be required for mass grading with cuts of as much as 10 to 15 feet required for the installation of detention basins and buried utilities. We believe that conventional earth moving construction equipment should be capable of performing the anticipated excavations. Areas with limited excavation widths, such as utility trenches, may encountered boulders that may be difficult to remove without the assistance of some form of hard rock removal technique.

6.7.4 Engineered Fill

The onsite soils are generally suitable for use as engineered fill provided all organics and rocks or clods larger than 6 inches in diameter are removed and the fill is placed to within 3 percent of the soils OMC. If imported fill is required it should consist of coarse-grained material with a maximum particle size of 3 inches. Additionally, all imported fill should possess a PI less than 20 and should qualify as SW, SP, GP, GM or SM in accordance with the USCS.

All fill should be placed in successive horizontal lifts of not more than 12 inches in loose thickness for the full width of the area being filled. The fill should be moisture conditioned to within 3 percent the materials OMC prior to being compacted to at least 90 percent of its MDD.

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Ground surfaces to receive fill with slopes in excess of 5H:1V should be benched with a series of horizontal terraces prior to fill placement. The benches should extend through any disturbed slope materials into the native alluvial or alluvial soils.

6.8 Utilities

All utility installations should be performed in accordance with the Standard Specifications. The following recommendations are meant to supplement the Standard Specifications.

We recommend that the minimum excavated width for any utility trench be such that at least 14 inches of clearance exists between the edge of the utility pipe and the excavated trench sidewall prior to utility pipe placement. Insufficient space between the utility pipe and trench sidewall could lead to inadequate backfill compaction and potential pipe failure.

All utility backfills should be placed in horizontal lifts for the full width of the utility trench prior to compaction. In overwidened trenches, such as trenches excavated in hard rock, arching or shaping of the initial bedding lifts should not be allowed.

Shallow temporary utility trench excavations are anticipated for installation of the required utility lines. All vertical or steeply sided trench excavations deeper than 5 feet should be braced and shored in accordance with good construction practices and all applicable safety ordinances and codes.

6.9 Site Drainage

The ground surface should slope away from pavement areas, toward appropriate drop inlets or other surface drainage devices. These grades should be maintained for the life of the project.

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7. ADDITIONAL SERVICES

We recommend that a thorough review of the project plans and specifications be conducted before they are finalized to verify that our geotechnical recommendations have been properly interpreted and implemented during the design. If we are not accorded this review, we can assume no responsibility for misinterpretation of our recommendations. The review can be completed on a time-and-expense basis in accordance with our current Fee Schedule.

The construction process is an integral design component with respect to the geotechnical aspects of a project. Because geotechnical engineering is an inexact science due to the variability of natural processes and because we sample only a small portion of the soils affecting the performance of the proposed structures, unanticipated or changed conditions can be disclosed during grading. Proper geotechnical observation and testing during construction is imperative to allow the geotechnical engineer the opportunity to verify assumptions made during the design. Therefore, we recommend that Hawaii Geotechnical Consulting, Inc. be kept apprised of design modifications and construction schedules for the proposed development so that design changes can be made if subsurface field conditions warrant.

END OF ADDITIONAL SERVICES

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8. LIMITATIONS

This report has been prepared for the exclusive use of Ho’onani Development, LLC and their agents for specific application to the proposed Hoonani Village project in Kahului, Maui, Hawaii.

The findings, conclusions, and recommendations presented in this report were prepared in accordance with generally accepted geotechnical engineering practice as it exists in the site area at the time of our study. No warranty is expressed or implied. The recommendations provided in this report are based on the assumption that our firm will conduct an adequate program of tests and observations during the construction phase in order to evaluate compliance with our recommendations. If the scope of the proposed construction, including the proposed loads, grades, or structural locations change from that described in this report, our recommendations should also be reviewed. We have not reviewed a final grading or building plan for the project.

Hazardous materials may have been discovered during the course of Hawaii Geotechnical Consulting, Inc.’s services. Hawaii Geotechnical Consulting, Inc. will assume no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury that results from pre-existing hazardous materials being encountered or present on the project site, or from the discovery of such hazardous materials.

Nothing contained in this scope of work should be construed or interpreted as requiring Hawaii Geotechnical Consulting, Inc. to assume the status of an owner, operator, generator, or person who arranges for disposal, transport, storage, or treatment of hazardous materials within the meaning of any governmental statute, regulation, or order.

The client has the responsibility to see that all parties to the project, including the designer, contractor, subcontractor, etc., are made aware of this report in its entirety. This report contains information that may be useful in the preparation of contract specifications. However, the report is not designed as a specification document and may not contain sufficient information for this use without proper modification.

The recommendations contained in this report are based on our field observations and our present knowledge of the proposed construction. It is possible that soil conditions could vary between or beyond the areas observed. If soil conditions are encountered during construction which differ from those described herein, we should be notified immediately in order that a review may be made and any supplemental recommendations provided.

This report may be used only by the client and only for the purpose stated, within a reasonable time from its issuance. Land use, site conditions (both onsite and offsite) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Hawaii Geotechnical Consulting, Inc. of such intended use. Based on the intended use of this report, Hawaii Geotechnical Consulting, Inc. may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Hawaii Geotechnical Consulting, Inc. from any liability resulting from the use of this report by any unauthorized party.

END OF LIMITATIONS

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FIGURES

PROPOSED MASTER SITE PLAN

Kahului, Maui, Hawaii

HAWAII GEOTECHNICAL CONSULTING, INC.

TEST PIT LOCATION PLAN

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

24024.01	**AUGUST 2024**

FIGURE 1

Concept Site Plan Study
oposed Master Site Plan - **Option 10**

Architecture.
Design.
Relationships.

01

Scale 1'=300'
Job No. 2023-0690
Date 2024-06-17

APPENDIX A

Field Exploration

APPENDIX A
FIELD EXPLORATION

The subsurface exploration program for the Hoonani Village project included excavating and logging a total of 42 test pits. The test pits were excavated to depths ranging from 4 to 9 feet below the existing ground surface.

The Logs of Test Pits are presented as Figures A2 through A43. A USCS soil classification chart is presented as Figure A1. The Logs of Test Pits describe the materials encountered, samples obtained, and show field and laboratory tests performed. The logs also show the test pit number, excavation date, name of the logger and excavation subcontractor, and the groundwater level. A senior geotechnical engineer logged the materials encountered in accordance with the USCS. The boundaries between soil types shown on the logs are approximate because the transition between different soil layers may be gradual.

The test pits were excavated with a CAT 328D excavator equipped with a straight bar 4.5-foot-wide bucket. Each test pit was excavated to an initial depth of 4 to 5 feet below the existing ground surface, where possible. The cut face of each test pit was then hand logged and disturbed grab and bulk samples and relatively undisturbed drive samples were obtained where appropriate. After initial logging and sample collection, each excavatable test pit was extended further, where possible. During the additional excavation, the disturbed soil cuttings were observed and sampled when visual changes were observed.

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COARSE GRAINED SOILS MORE THAN HALF OF THE MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS MORE THAN HALF OF COURSE FRACTION IS LARGER THAN NO. 4 SIEVE SIZE	CLEAN GRAVELS (LITTLE OR NO FINES)	**GW**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNTS OF FINES)	**GM**	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF OF COURSE FRACTION IS SMALLER THAN NO. 4 SIEVE SIZE	CLEAN SANDS (LITTLE OR NO FINES)	**SW**	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNTS OF FINES)	**SM**	SILTY SANDS, SAND-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN HALF OF THE MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		**ML**	INORGANIC SILTSAND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS

USCS SOIL CLASSIFICATION CHART

FIGURE
A1

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand (roots/irrigation plastic to 6-in.)	brown	soft		1.25	70	13	Gravel = 0% Sand = 20% Silt/Clay = 80% LL = 46 PI = 18
2			AGRICULTURALLY DISTURBED			dry				
3	■	2	SILT (ML) with some Sand and trace Gravel and Cobble	orange brown gray	hard		4.00	78	16	Gravel = 1% Sand = 16% Silt/Clay = 83%
4			ALLUVIUM							
5			Refusal on Cobbles and Boulders at 4.0 feet No free water observed Test pit backfilled with excavated materials							
6										
7										
8										
9										
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 1

FIGURE
A2

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) and Sand (roots/irrigation plastic to 12-in.)	brown	soft	dry	1.25	71	17	Gravel = 0% Sand = 35% Silt/Clay = 65%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (MH) with Sand	orange brown	hard	dry	4.00	80	21	Gravel = 0% Sand = 23% Silt/Clay = 77% LL = 57 PI = 24
5	■	3	SILT (ML) with Sand				4.00	81	21	Gravel = 0% Sand = 21% Silt/Clay = 79%
8	■	4	SILT (ML) with some Sand				--	--	22	Gravel = 0% Sand = 11% Silt/Clay = 89%
9			ALLUVIUM							
10			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							

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HOONANI VILLAGE
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LOG OF TEST PIT 2

FIGURE A3

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	SILTY SAND (SM) (roots/irrigation plastic to 12-in.)	brown	loose	dry	1.00	101	17	Gravel = 0% Sand = 53% Silt/Clay = 47%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with Sand				4.00	78	18	Gravel = 0% Sand = 26% Silt/Clay = 74%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	--	16	Gravel = 0% Sand = 11% Silt/Clay = 89%
6										
7										
8	■	4	SILT (ML) with trace Sand				--	--	18	Gravel = 0% Sand = 8% Silt/Clay = 92%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 3

FIGURE
A4

Date Completed:	06/21/2024	Water Depth:	Not Encountered
Drilled By:	Alpha Construction	Elevation:	--
Drilling Method:	Excavator	Location:	--
Logged By:	R.M. Gibbens, P.E.	Symbols:	☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) and Sand (roots/irrigation plastic to 12-in.)	brown	soft	dry	1.25	75	15	Gravel = 0% Sand = 33% Silt/Clay = 67%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) and Sand				4.00	80	22	Gravel = 0% Sand = 32% Silt/Clay = 68%
4										
5	■	3	SILT (ML) with Gravel and some Sand	orange brown	hard	dry	--	79	17	Gravel = 24% Sand = 14% Silt/Clay = 62%
6										
7										
8	■	4	SILT (ML) with some Sand and trace Gravel				--	--	21	Gravel = 2% Sand = 17% Silt/Clay = 81%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 4

FIGURE
A5

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 12-in.)	brown	soft	dry	1.25	70	14	Gravel = 0% Sand = 19% Silt/Clay = 81%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with trace Sand				4.00	80	19	Gravel = 0% Sand = 26% Silt/Clay = 74%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	--	20	Gravel = 0% Sand = 65% Silt/Clay = 35%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	20	Gravel = 0% Sand = 37% Silt/Clay = 63%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 5

FIGURE
A6

Date Completed: 06/21/2024

Drilled By: Alpha Construction

Drilling Method: Excavator

Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered

Elevation: --

Location: --

Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.25	74	16	Gravel = 0% Sand = 14% Silt/Clay = 86%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand				4.00	79	27	Gravel = 0% Sand = 11% Silt/Clay = 89%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	--	25	Gravel = 0% Sand = 12% Silt/Clay = 88%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	22	Gravel = 0% Sand = 13% Silt/Clay = 87%
9			ALLUVIUM							
10										

Bottom of Excavation at 9.0 feet
No free water observed
Test pit backfilled with excavated materials

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HOONANI VILLAGE
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LOG OF TEST PIT 6

FIGURE
A7

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.
Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	70	16	Gravel = 0% Sand = 17% Silt/Clay = 83% LL = 53 PI = 22
2										
			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand				4.00	76	24	Gravel = 0% Sand = 12% Silt/Clay = 88%
4										
5	■	3	SILT (ML) with Sand	orange brown	hard	dry	4.00	--	26	Gravel = 0% Sand = 23% Silt/Clay = 77%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	21	Gravel = 0% Sand = 11% Silt/Clay = 89%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 7

FIGURE
A8

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 12-in.)	brown	soft	dry	1.25	72	15	Gravel = 0% Sand = 11% Silt/Clay = 89%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with trace Sand				4.00	80	25	Gravel = 0% Sand = 0% Silt/Clay = 100%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	82	21	Gravel = 0% Sand = 4% Silt/Clay = 96%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	25	Gravel = 0% Sand = 7% Silt/Clay = 93%
9			ALLUVIUM Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 8

FIGURE
A9

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand and trace Gravel (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.25	72	18	Gravel = 4% Sand = 24% Silt/Clay = 72% LL = 43 PI = 17
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand				4.00	81	22	Gravel = 0% Sand = 19% Silt/Clay = 81%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	79	20	Gravel = 0% Sand = 12% Silt/Clay = 88%
6										
7										
8	■	4	SILT (ML) and Sand				--	--	18	Gravel = 0% Sand = 46% Silt/Clay = 54%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 9

FIGURE
A10

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand and with Gravel (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.25	73	15	Gravel = 22% Sand = 23% Silt/Clay = 55% LL = 45 PI = 15
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) and Sand	orange brown	hard	dry	4.00	79	25	Gravel = 0% Sand = 37% Silt/Clay = 63% LL = 44 PI = 13
4										
5	■	3	SILT (ML) with Sand				4.00	--	20	Gravel = 2% Sand = 22% Silt/Clay = 76%
6										
7										
8	■	4	SILT (ML) with Sand ALLUVIUM				--	--	20	Gravel = 0% Sand = 27% Silt/Clay = 73%
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 10

FIGURE
A11

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	73	21	Gravel = 0% Sand = 14% Silt/Clay = 86% LL = 40 PI = 17
			AGRICULTURALLY DISTURBED							
2										
3	■	2	SILT (ML) and Sand				4.00	77	20	Gravel = 0% Sand = 35% Silt/Clay = 65%
4										
5	■	3	SILT (ML) and Sand	orange brown	hard	dry	4.00	--	19	Gravel = 0% Sand = 45% Silt/Clay = 55%
6										
7										
8	■	4	SILT (ML) and Sand				--	--	19	Gravel = 0% Sand = 30% Silt/Clay = 70%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 11

FIGURE
A12

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	--	16	Gravel = 0% Sand = 23% Silt/Clay = 77%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with Sand				4.00	79	21	Gravel = 0% Sand = 22% Silt/Clay = 78%
4										
5	■	3	SILT (ML) with Sand	orange brown	hard	damp	4.00	--	22	Gravel = 0% Sand = 21% Silt/Clay = 79%
6										
7										
8	■	4	SILT (ML) and Sand				--	--	19	Gravel = 10% Sand = 31% Silt/Clay = 59%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 12

FIGURE
A13

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	70	16	Gravel = 0% Sand = 12% Silt/Clay = 88%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with Sand	orange brown	hard	damp	4.00	79	19	Gravel = 0-% Sand = 22% Silt/Clay = 78%
4										
5	■	3	SILT (ML) with Sand				4.00	81	20	Gravel = 0% Sand = 20% Silt/Clay = 80%
6										
7										
8	■	4	SILT (ML) and Sand				--	--	22	Gravel = 0% Sand = 48% Silt/Clay = 52%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 13

FIGURE
A14

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	71	17	Gravel = 0% Sand = 20% Silt/Clay = 80% LL = 48 PI = 19
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with Sand	orange brown	hard	damp	4.00	79	22	Gravel = 0% Sand = 21% Silt/Clay = 79%
4										
5	■	3	SILT (ML) with some Sand				4.00	79	19	Gravel = 0% Sand = 17% Silt/Clay = 83%
6										
7										
8	■	4	SILT (ML) and Sand				--	--	18	Gravel = 0% Sand = 35% Silt/Clay = 65%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

Hawaii Geotechnical Consulting, Inc.

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 14

FIGURE
A15

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.
Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) and Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.25	73	15	Gravel = 0% Sand = 34% Silt/Clay = 66%
			AGRICULTURALLY DISTURBED							
2										
3	■	2	SILT (ML) with Sand				4.00	77	17	Gravel = 0% Sand = 26% Silt/Clay = 74%
4										
5	■	3	SILT (ML) with Sand	orange brown	hard	damp	4.00	--	18	Gravel = 0% Sand = 25% Silt/Clay = 75% LL = 37 PI = 12
6										
7										
8	■	4	SILT (ML) and Sand				--	--	18	Gravel = 0% Sand = 40% Silt/Clay = 60%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 15

FIGURE
A16

Date Completed:	06/20/2024	Water Depth:	Not Encountered
Drilled By:	Alpha Construction	Elevation:	--
Drilling Method:	Excavator	Location:	--
Logged By:	R.M. Gibbens, P.E.	Symbols:	☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.25	69	12	Gravel = 7% Sand = 21% Silt/Clay = 72% LL = 41 PI = 16
			AGRICULTURALLY DISTURBED							
2										
3	■	2	SILT (ML) with trace Sand				4.00	79	18	Gravel = 0% Sand = 9% Silt/Clay = 91%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	--	17	Gravel = 0% Sand = 10% Silt/Clay = 90%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	18	Gravel = 0% Sand = 15% Silt/Clay = 85%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

Hawaii Geotechnical Consulting, Inc.

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 16

FIGURE
A17

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.25	71	17	Gravel = 0% Sand = 22% Silt/Clay = 78%
3			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand	orange brown	hard	damp	4.00	79	20	Gravel = 0% Sand = 12% Silt/Clay = 88%
5	■	3	SILT (ML) with Sand				4.00	--	19	Gravel = 0% Sand = 27% Silt/Clay = 73%
8	■	4	SILT (ML) with some Sand				--	--	19	Gravel = 0% Sand = 16% Silt/Clay = 84%
9			ALLUVIUM							
10			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 17

FIGURE
A18

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand and trace Gravel (roots to 30-in.)	brown	soft	dry	1.25	70	17	Gravel = 2% Sand = 27% Silt/Clay = 70%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand				4.00	77	19	Gravel = 0% Sand = 12% Silt/Clay = 88%
4			with Cobble from 4.0 ft.							
5	■	3	SILT (ML) with some Sand and, with Cobble and trace Boulders	orange brown	hard	dry	4.00	--	20	Gravel = 0% Sand = 11% Silt/Clay = 89%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	20	Gravel = 0% Sand = 12% Silt/Clay = 88%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 18

FIGURE
A19

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 12-in.)	brown	soft	dry	1.25	74	11	Gravel = 0% Sand = 12% Silt/Clay = 88%
2			AGRICULTURALLY DISTURBED							
	■	2	SILT (ML) with Sand				4.00	79	18	Gravel = 0% Sand = 23% Silt/Clay = 77%
	■	3	SILT (ML) with Sand	orange brown	hard	damp	4.00	--	19	Gravel = 0% Sand = 20% Silt/Clay = 80%
	■	4	SILT (ML) with Sand				--	--	21	Gravel = 0% Sand = 22% Silt/Clay = 78%
9			ALLUVIUM							

Bottom of Excavation at 9.0 feet
No free water observed
Test pit backfilled with excavated materials

Hawaii Geotechnical Consulting, Inc.

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 19

FIGURE
A20

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand and trace Gravel (irrigation plastic to 6-in.)	brown	soft	dry	1.00	71	18	Gravel = 1% Sand = 15% Silt/Clay = 84% CBR = 18 Swell = 0.3% Proctor: 96 pcf @ 29
2	☒	A								
3			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with Sand				4.00	80	19	Gravel = 0% Sand = 22% Silt/Clay = 78%
4										
5	■	3	SILT (ML) with Sand				4.00	79	17	Gravel = 0% Sand = 20% Silt/Clay = 80%
6				orange brown	hard	dry				
7										
8	■	4	SILT (ML) with Sand				--	--	19	Gravel = 0% Sand = 20% Silt/Clay = 80%
9			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 20

FIGURE
A21

Date Completed:	06/20/2024	Water Depth:	Not Encountered
Drilled By:	Alpha Construction	Elevation:	--
Drilling Method:	Excavator	Location:	--
Logged By:	R.M. Gibbens, P.E.	Symbols:	☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with trace Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	71	20	Gravel = 0% Sand = 4% Silt/Clay = 96%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand	orange brown	hard	damp	4.00	77	18	Gravel = 0% Sand = 18% Silt/Clay = 82%
5	■	3	SILT (ML) with some Sand				4.00	--	19	Gravel = 0% Sand = 19% Silt/Clay = 81%
8	■	4	SILT (ML) with some Sand				--	--	18	Gravel = 0% Sand = 15% Silt/Clay = 85%
9			ALLUVIUM							
10			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 21

FIGURE
A22

Date Completed: 06/20/2024

Drilled By: Alpha Construction

Drilling Method: Excavator

Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered

Elevation: --

Location: --

Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
	■	1	SILTY SAND (SM) with some Gravel (roots to 6-in.) FILL	brown	loose	dry	--	93	8	Gravel = 17% Sand = 53% Silt/Clay = 30%
1										
2										
3	■	2	SILT (ML) with Sand				4.00	80	17	Gravel = 0% Sand = 25% Silt/Clay = 75%
4										
5	■	3	SILT (ML) and Sand	orange brown	hard	damp	4.00	77	18	Gravel = 0% Sand = 32% Silt/Clay = 68%
6										
7										
8	■	4	SILT (ML) and Sand ALLUVIUM				--	--	18	Gravel = 0% Sand = 32% Silt/Clay = 68%
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

Hawaii Geotechnical Consulting, Inc.

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 22

FIGURE
A23

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand	brown	soft	dry	1.25	70	17	Gravel = 0% Sand = 20% Silt/Clay = 80% LL = 47 PI = 16
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) and Sand	orange brown	hard	dry	4.00	78	18	Gravel = 0% Sand = 42% Silt/Clay = 58%
4										
5	■	3	SILT (ML) with Sand				4.00	--	19	Gravel = 0% Sand = 27% Silt/Clay = 73%
6										
7										
8	■	4	SILT (ML) with Sand				--	--	18	Gravel = 0% Sand = 28% Silt/Clay = 72%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

Hawaii Geotechnical Consulting, Inc.

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 23

FIGURE
A24

Date Completed:	06/20/2024	Water Depth:	Not Encountered
Drilled By:	Alpha Construction	Elevation:	--
Drilling Method:	Excavator	Location:	--
Logged By:	R.M. Gibbens, P.E.	Symbols:	☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand and trace gravel (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.25	71	18	Gravel = 4% Sand = 24% Silt/Clay = 72%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) and Sand			moist	4.00	79	25	Gravel = 0% Sand = 34% Silt/Clay = 66%
4					hard					
5	■	3	SILT (ML) with Sand and some Gravel	orange brown			4.00	--	20	Gravel = 17% Sand = 29% Silt/Clay = 54%
6			ALLUVIUM							
7					dense	damp				
8	■	4	SILTY SAND (SM) with some Gravel				--	--	20	Gravel = 16% Sand = 50% Silt/Clay = 34%
9			ALLUVIUM							
10			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 24

FIGURE
A25

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots to 6-in.) FILL	brown	soft	dry	1.00	70	14	Gravel = 0% Sand = 14% Silt/Clay = 86%
			1.5-in. Asphaltic Pavement							
2										
3	■	2	SILT (ML) with Sand				4.00	79	19	Gravel = 0% Sand = 21% Silt/Clay = 79%
4										
5	■	3	SILT (ML) and Sand	orange brown	hard	dry	4.00	79	23	Gravel = 0% Sand = 49% Silt/Clay = 51%
6										
7										
8	■	4	SILT (ML) and Sand ALLUVIUM				--	--	21	Gravel = 0% Sand = 44% Silt/Clay = 56% LL = 37 PI = 9
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 25

FIGURE
A26

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	70	20	Gravel = 0% Sand = 11% Silt/Clay = 89%
2										
3			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand	orange brown	hard	dry	4.00	77	21	Gravel = 0% Sand = 16% Silt/Clay = 84%
4										
5	■	3	SILT (ML) with some Sand				4.00	79	19	Gravel = 0% Sand = 17% Silt/Clay = 83%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	21	Gravel = 0% Sand = 14% Silt/Clay = 86%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 26

FIGURE
A27

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots to 1.5 ft. and irrigation plastic to 0.5-ft.)	brown	soft	dry	1.25	71	18	Gravel = 0% Sand = 14% Silt/Clay = 86%
2										
3			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with trace Sand	orange brown	hard	dry	4.00	72	21	Gravel = 0% Sand = 1% Silt/Clay = 99% LL = 37 PI = 10
4										
5	■	3	SILT (ML) with some Sand				4.00	--	19	Gravel = 0% Sand = 14% Silt/Clay = 86%
6										
7										
8	■	4	SILT (ML) and Sand with some Gravel				--	--	17	Gravel = 15% Sand = 35% Silt/Clay = 51%
9			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 27

FIGURE
A28

Date Completed: 06/20/2024

Drilled By: Alpha Construction

Drilling Method: Excavator

Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered

Elevation: --

Location: --

Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots to 1.5 ft. and irrigation plastic to 0.5-ft.)	brown	soft	dry	1.00	70	19	Gravel = 0% Sand = 10% Silt/Clay = 90% LL = 46 PI = 16
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand	orange brown	hard	damp	4.00	79	17	Gravel = 0% Sand = 19% Silt/Clay = 81%
4										
5	■	3	SILT (ML) with some Sand				4.00	--	19	Gravel = 0% Sand = 15% Silt/Clay = 85%
6										
7										
8	■	4	SILT (ML) with some Sand and trace Boulders ALLUVIUM				--	--	19	Gravel = 0% Sand = 15% Silt/Clay = 85% LL = 37 PI = 9
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 28

FIGURE

A29

Date Completed:	06/20/2024	Water Depth:	Not Encountered
Drilled By:	Alpha Construction	Elevation:	--
Drilling Method:	Excavator	Location:	--
Logged By:	R.M. Gibbens, P.E.	Symbols:	☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
	■	1	CLAYEY SILT (ML) with Sand (roots/irrigation plastic to 24-in.)	brown	soft	dry	1.25	73	17	Gravel = 0% Sand = 22% Silt/Clay = 78%
3			AGRICULTURALLY DISTURBED							
	■	2	SILT (ML) with some Sand	orange brown	hard		4.00	78	17	Gravel = 0% Sand = 11% Silt/Clay = 89%
	■	3	SILT (ML) with Sand			damp	4.00	--	19	Gravel = 0% Sand = 27% Silt/Clay = 73%
	■	4	SILT (ML) with Sand				--	--	20	Gravel = 0% Sand = 22% Silt/Clay = 78%
9			ALLUVIUM							

Bottom of Excavation at 9.0 feet
No free water observed
Test pit backfilled with excavated materials

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 29

FIGURE
A30

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	71	18	Gravel = 0% Sand = 2% Silt/Clay = 98%
2										
3			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand	orange brown	hard	damp	4.00	79	22	Gravel = 0% Sand = 13% Silt/Clay = 87%
4										
5	■	3	SILT (ML) with Sand				4.00	80	22	Gravel = 0% Sand = 20% Silt/Clay = 80%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	22	Gravel = 0% Sand = 14% Silt/Clay = 86%
9			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 30

FIGURE
A31

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 12-in.) AGRICULTURALLY DISTURBED	brown	soft	dry	1.00	73	15	Gravel = 0% Sand = 17% Silt/Clay = 83% LL = 48 PI = 16
2										
3	■	2	SILT (ML) with some Sand				4.00	80	21	Gravel = 0% Sand = 11% Silt/Clay = 89%
4										
5	■	3	SILT (ML) with Sand	orange brown	hard	damp	4.00	--	20	Gravel = 0% Sand = 25% Silt/Clay = 75%
6										
7										
8	■	4	SILT (ML) and Sand ALLUVIUM				--	--	21	Gravel = 0% Sand = 34% Silt/Clay = 66%
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 31

FIGURE
A32

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 12-in.)	brown	soft	dry	1.25	68	14	Gravel = 0% Sand = 15% Silt/Clay = 85%
1			AGRICULTURALLY DISTURBED							
2										
3	■	2	SILT (ML) with some Sand				4.00	79	21	Gravel = 0% Sand = 15% Silt/Clay = 85%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	damp	4.00	77	19	Gravel = 0% Sand = 17% Silt/Clay = 83%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	19	Gravel = 0% Sand = 18% Silt/Clay = 82%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 32

FIGURE
A33

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand (roots/irrigation plastic to 6-in.)	brown	soft	moist	1.25	70	38	Gravel = 0% Sand = 20% Silt/Clay = 80%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with somee Sand				4.00	80	24	Gravel = 0% Sand = 15% Silt/Clay = 85%
4										
5	■	3	SILT (ML) and Sand	orange brown	hard	moist	4.00	--	32	Gravel = 0% Sand = 36% Silt/Clay = 64%
6										
7			ALLUVIUM							
8	■	4	SILTY SAND (SM)		dense		--	--	27	Gravel = 0% Sand = 59% Silt/Clay = 41%
9			ALLUVIUM							
10										

Bottom of Excavation at 9.0 feet
No free water observed
Test pit backfilled with excavated materials

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 33

FIGURE
A34

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand (roots/irrigation plastic to 12-in.)	brown	soft	dry	1.25	70	17	Gravel = 0% Sand = 23% Silt/Clay = 77%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with trace Sand				4.00	79	19	Gravel = 0% Sand = 29% Silt/Clay = 71%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	81	18	Gravel = 0% Sand = 40% Silt/Clay = 60%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	18	Gravel = 0% Sand = 23% Silt/Clay = 77%
9			ALLUVIUM							
10			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 34

FIGURE
A35

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 18-in.)	brown	soft	dry	1.25	73	15	Gravel = 0% Sand = 18% Silt/Clay = 82% LL = 46 PI = 15
			AGRICULTURALLY DISTURBED							
2										
3	■	2	SILT (ML) with some Sand				4.00	79	19	Gravel = 0% Sand = 18% Silt/Clay = 82%
4										
5	■	3	SILT (ML) and Sand	orange brown	hard	dry	4.00	--	19	Gravel = 0% Sand = 37% Silt/Clay = 63%
6										
7										
8	■	4	SILT (ML) with some Sand and trace Boulders				--	--	24	Gravel = 0% Sand = 14% Silt/Clay = 86%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 35

FIGURE
A36

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	70	14	Gravel = 0% Sand = 26% Silt/Clay = 74% LL = 47 PI = 16
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand			damp	4.00	79	20	Gravel = 0% Sand = 17% Silt/Clay = 83%
5	■	3	SILT (ML) with some Sand	orange brown	hard	moist	4.00	79	24	Gravel = 0% Sand = 10% Silt/Clay = 90%
8	■	4	SILT (ML) and Sand				--	--	33	Gravel = 0% Sand = 36% Silt/Clay = 64%
9			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 36

FIGURE
A37

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.00	72	14	Gravel = 0% Sand = 17% Silt/Clay = 83%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand				4.00	80	21	Gravel = 0% Sand = 14% Silt/Clay = 86%
4										
5	■	3	SILT (ML) with Sand	orange brown	hard	dry	4.00	--	30	Gravel = 0% Sand = 29% Silt/Clay = 71%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	20	Gravel = 0% Sand = 13% Silt/Clay = 87%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 37

FIGURE
A38

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with Sand (roots/irrigation plastic to 12-in.)	brown	soft	dry	1.00	71	17	Gravel = 0% Sand = 24% Silt/Clay = 76% LL = 43 PI = 14
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand				4.00	80	19	Gravel = 0% Sand = 15% Silt/Clay = 85%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	--	22	Gravel = 0% Sand = 14% Silt/Clay = 86%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	29	Gravel = 0% Sand = 15% Silt/Clay = 85%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 38

FIGURE
A39

Date Completed:	06/21/2024	Water Depth:	Not Encountered
Drilled By:	Alpha Construction	Elevation:	--
Drilling Method:	Excavator	Location:	--
Logged By:	R.M. Gibbens, P.E.	Symbols:	☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.25	--	17	Gravel = 0% Sand = 13% Silt/Clay = 87%
2			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with somee Sand				4.00	80	20	Gravel = 0% Sand = 11% Silt/Clay = 89%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	--	23	Gravel = 0% Sand = 11% Silt/Clay = 89%
6										
7										
8	■	4	SILT (ML) and Sand				--	--	27	Gravel = 0% Sand = 34% Silt/Clay = 66%
9			ALLUVIUM							
			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 39

FIGURE

A40

Date Completed: 06/21/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft		1.25	70	14	Gravel = 0% Sand = 18% Silt/Clay = 82%
2						dry				
			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with some Sand				4.00	--	12	Gravel = 0% Sand = 13% Silt/Clay = 87%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard		4.00	80	23	Gravel = 0% Sand = 11% Silt/Clay = 89%
6						moist				
7										
8	■	4	SILT (ML) and Sand				--	--	31	Gravel = 0% Sand = 30% Silt/Clay = 70%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 40

FIGURE
A41

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	dry	1.25	73	12	Gravel = 7% Sand = 21% Silt/Clay = 72%
			AGRICULTURALLY DISTURBED							
2										
3	■	2	SILT (ML) with trace Sand				4.00	79	18	Gravel = 0% Sand = 9% Silt/Clay = 91%
4										
5	■	3	SILT (ML) with some Sand	orange brown	hard	dry	4.00	--	17	Gravel = 0% Sand = 10% Silt/Clay = 90%
6										
7										
8	■	4	SILT (ML) with some Sand				--	--	18	Gravel = 0% Sand = 15% Silt/Clay = 85%
			ALLUVIUM							
9			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							
10										

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KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 41

FIGURE
A42

Date Completed: 06/20/2024
Drilled By: Alpha Construction
Drilling Method: Excavator
Logged By: R.M. Gibbens, P.E.

Water Depth: Not Encountered
Elevation: --
Location: --
Symbols: ☒ Bulk Sample ■ Drive/Grab Sample

Depth (feet)	Sample Type	Sample No.	GEOTECHNICAL DESCRIPTION AND CLASSIFICATION	Color	Consistency	Moisture	Penetrometer (tsf)	Dry Density (pcf)	Moisture Content (%)	Additional Tests
1	■	1	CLAYEY SILT (ML) with some Sand (roots/irrigation plastic to 6-in.)	brown	soft	damp	1.00	72	19	Gravel = 0% Sand = 16% Silt/Clay = 84%
2										
			AGRICULTURALLY DISTURBED							
3	■	2	SILT (ML) with Sand	orange brown	hard		4.00	80	20	Gravel = 0% Sand = 29% Silt/Clay = 71%
4										
5	■	3	SILT (ML) and Sand with trace Cobble				4.00	--	19	Gravel = 0% Sand = 35% Silt/Clay = 65%
6			ALLUVIUM							
7										
8	■	4	SILTY GRAVEL (GM) with some Sand and some Cobble		dense		--	--	10	Gravel = 70% Sand = 18% Silt/Clay = 12%
9			ALLUVIUM							
10			Bottom of Excavation at 9.0 feet No free water observed Test pit backfilled with excavated materials							

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HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

LOG OF TEST PIT 42

FIGURE
A43

APPENDIX B

Laboratory Testing

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed on selected grab, bulk, and drive samples to estimate their pertinent engineering characteristics. Testing was performed in accordance with ASTM Standards for Soil Testing, latest revision.

MOISTURE CONTENT AND DRY DENSITY

Natural moisture content and dry density tests were performed on multiple samples in accordance with ASTM D2216 and D2937, respectively. The results of these tests are presented on the Logs of Test Pits in Appendix A.

PLASTICITY

Atterberg limits tests were performed in accordance with ASTM D4318. The results of the tests are presented on the Logs of Test Pits in Appendix A and graphically in Appendix B.

GRAIN SIZE

Grain size analyses were performed on select samples in accordance with ASTM D2487. The results are presented on the Logs of Test Pits in Appendix A.

CALIFORNIA BEARING RATIO (CBR)

Two CBR tests were performed on a representative sample of the site's predominant near surface soils in accordance with ASTM D1883. The result is presented graphically in Appendix B and presented on the Logs of Test Pits in Appendix A.

COMPACTION

The optimum moisture content and maximum dry density of a soil sample was determined in accordance with ASTM D1557. The result is presented graphically in Appendix B and presented on the Logs of Test Pits in Appendix A.

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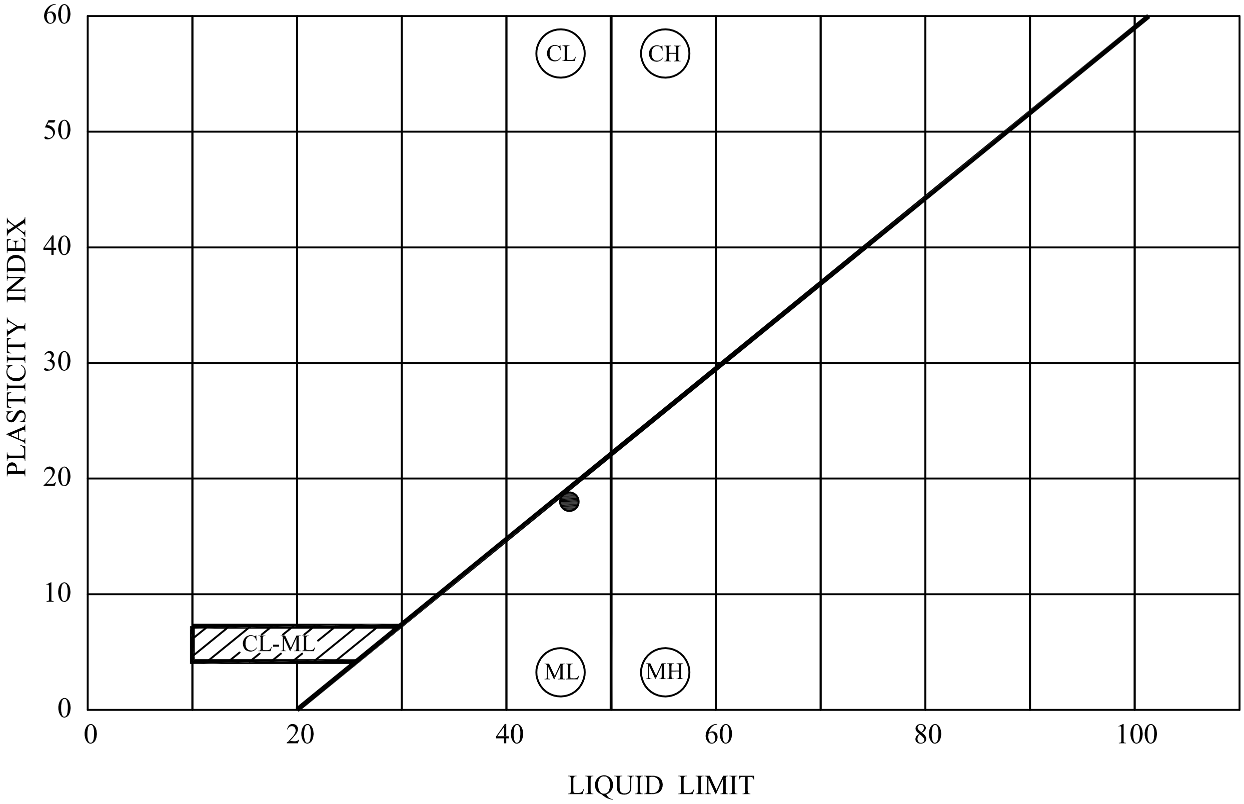

	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	1-1	1.0	46	28	18	Brown Clayey SILT (ML) with Sand

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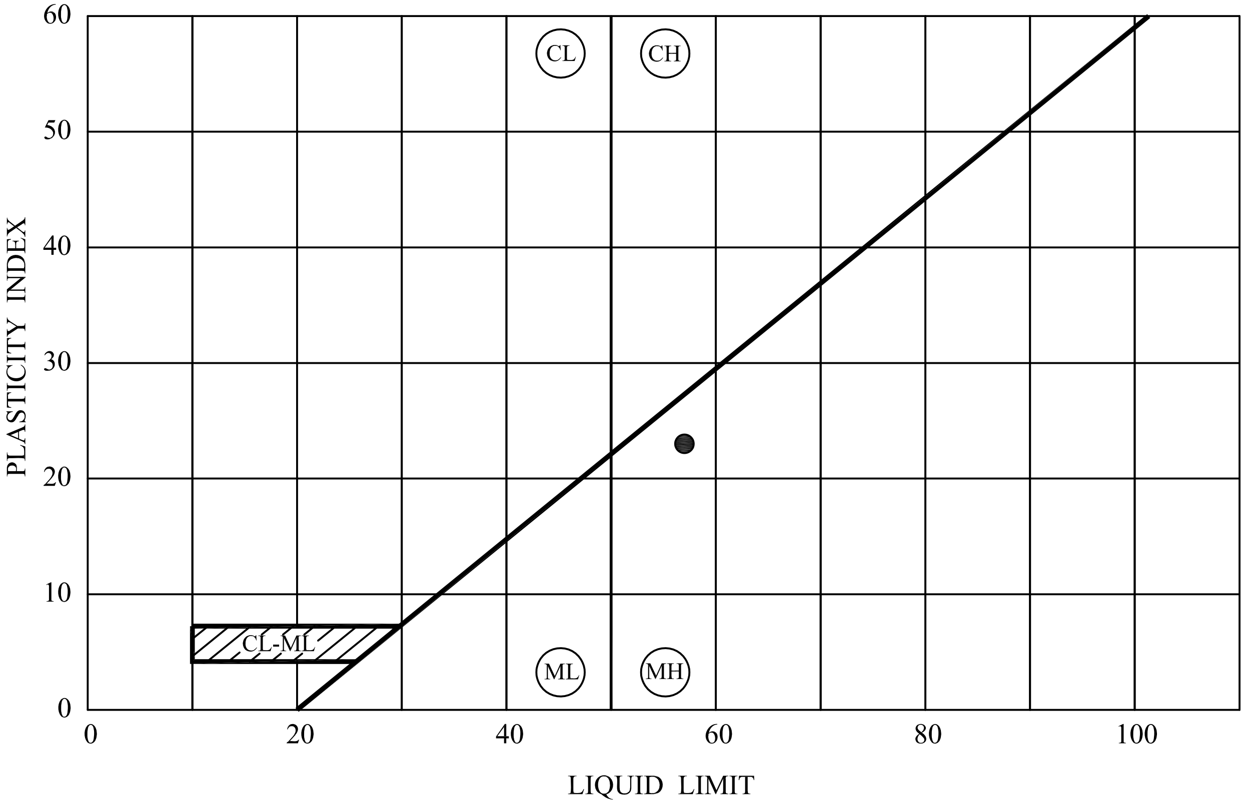
HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE

B1



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	2-2	3.0	57	34	23	Orange Brown SILT (MH) with Sand

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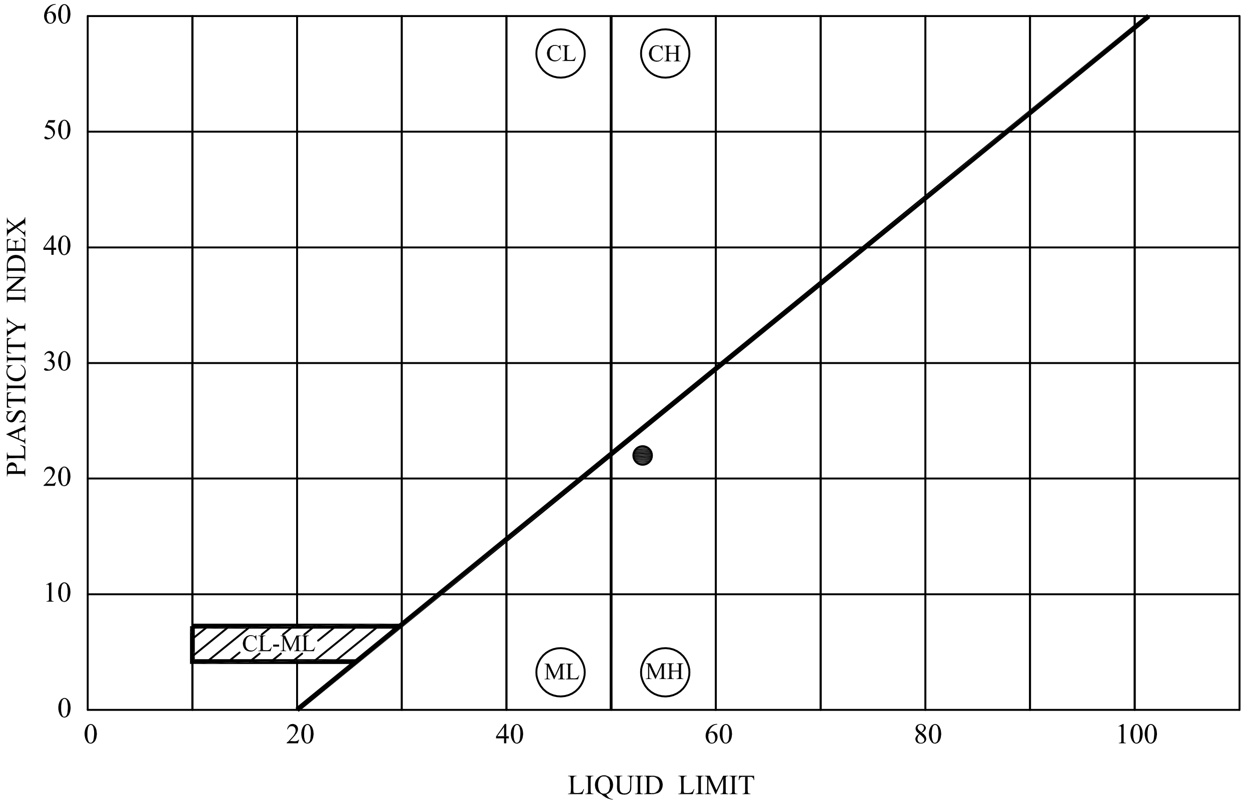
FIGURE
B2



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	7-1	1.0	53	31	22	Brown Clayey SILT (MH) with some Sand

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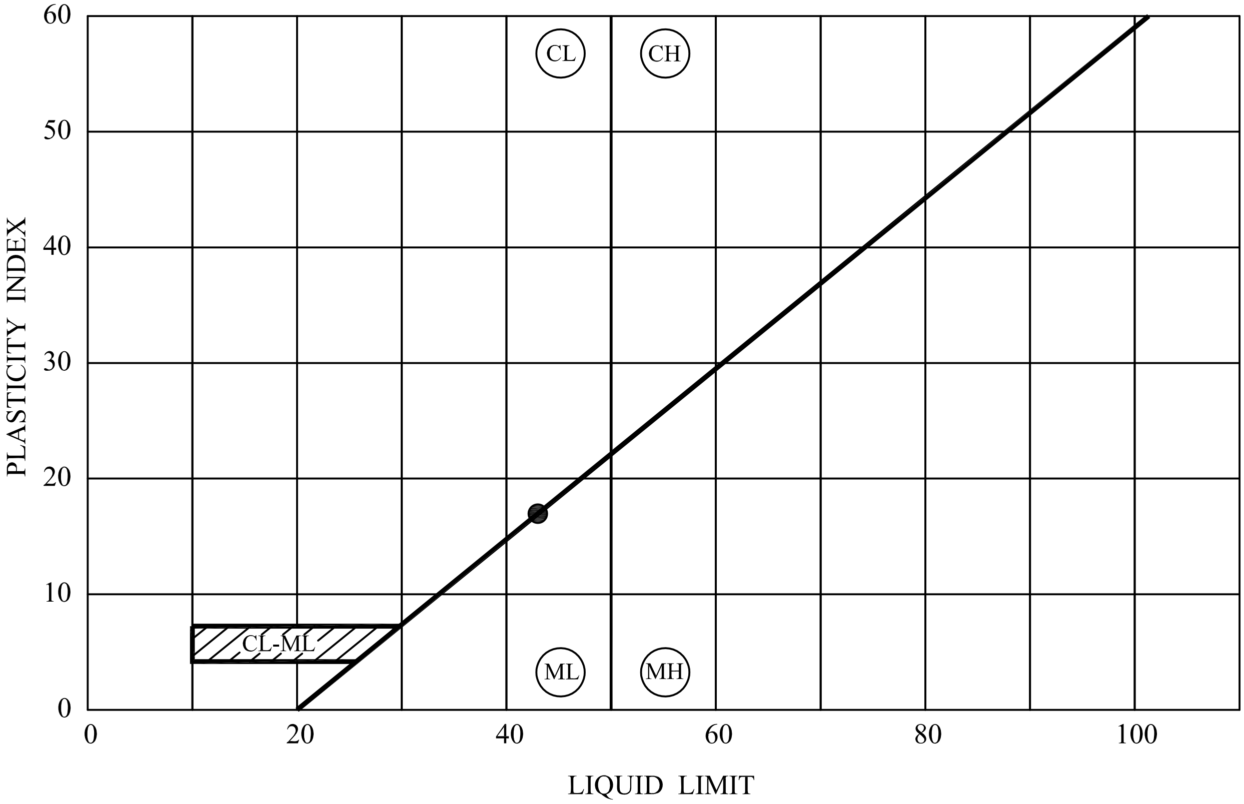
PLASTICITY INDEX

FIGURE

B3



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	9-1	1.0	43	26	17	Brown Clayey SILT (ML) with Sand and trace Gravel

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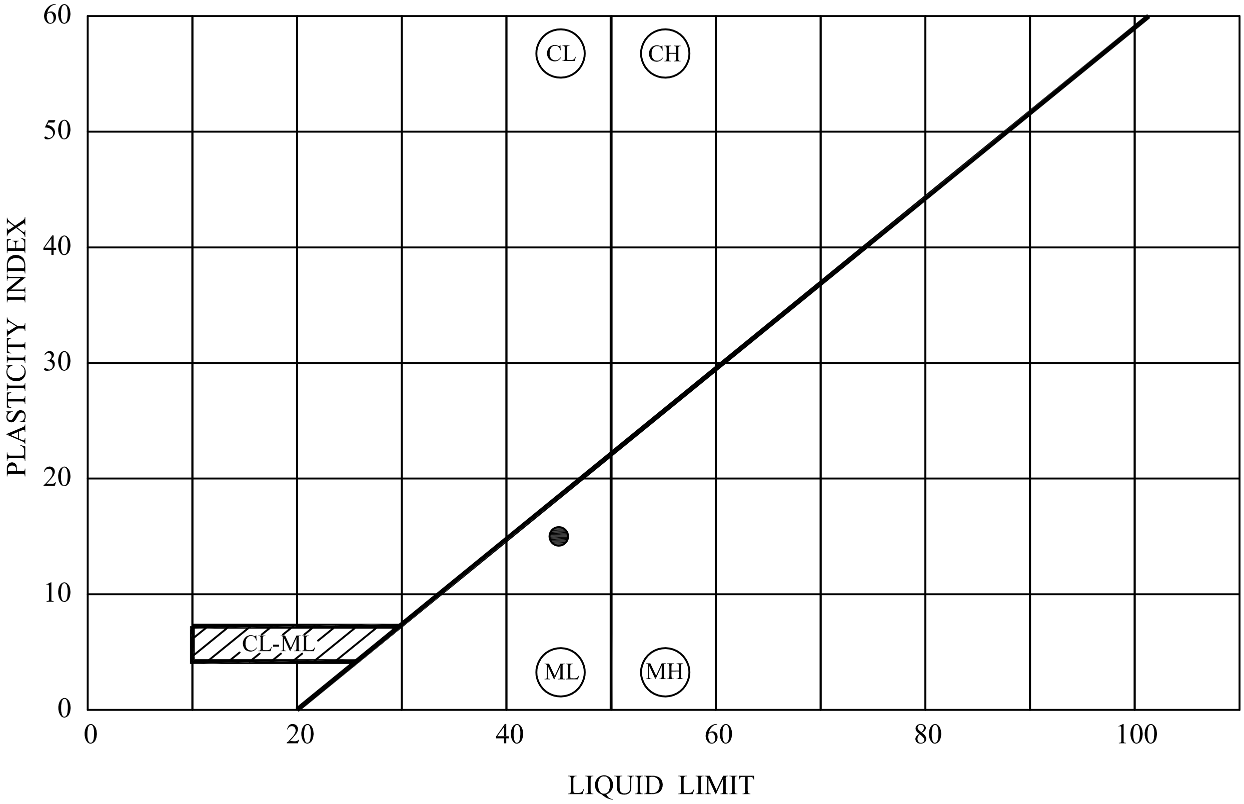
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE

B4



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	10-1	1.0	45	30	15	Brown CLAYEY SILT (ML) with Sand and with Gravel

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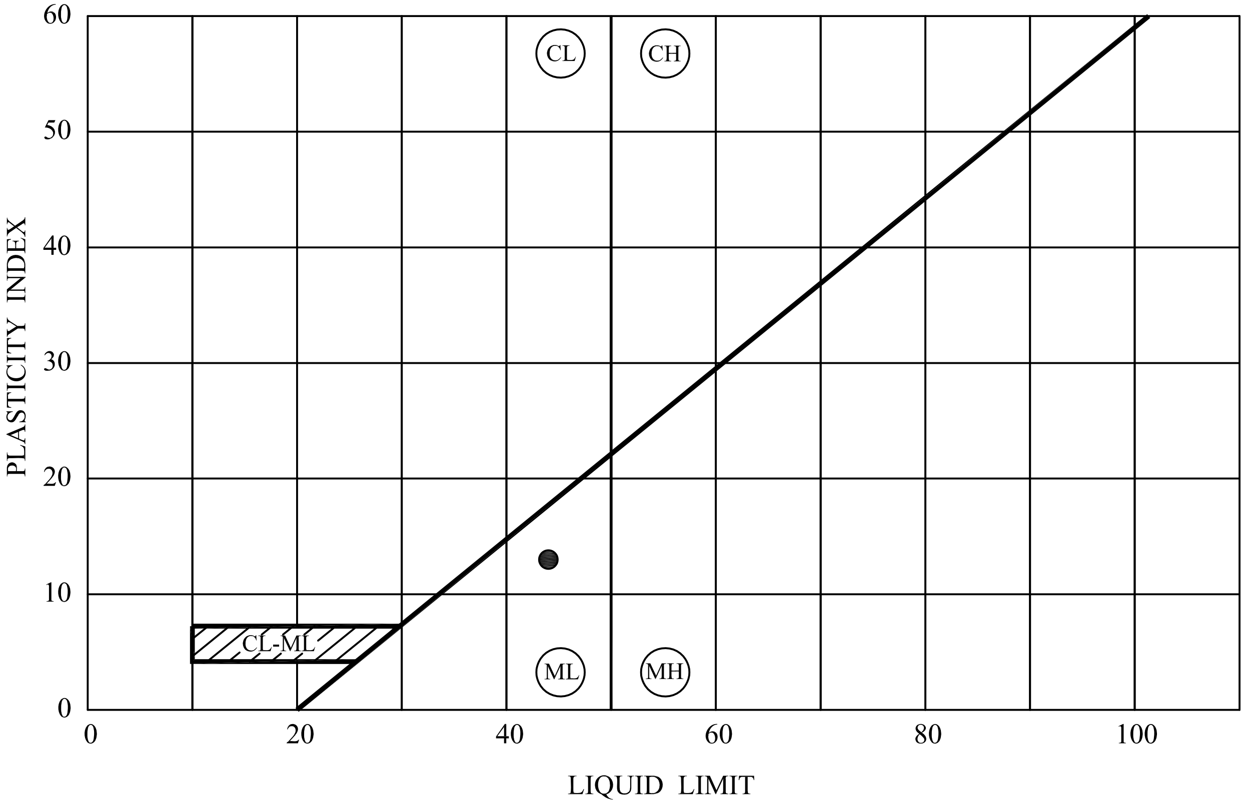
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE
B5



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	10-2	3.0	44	31	13	Orange Brown SILT (ML) and Sand

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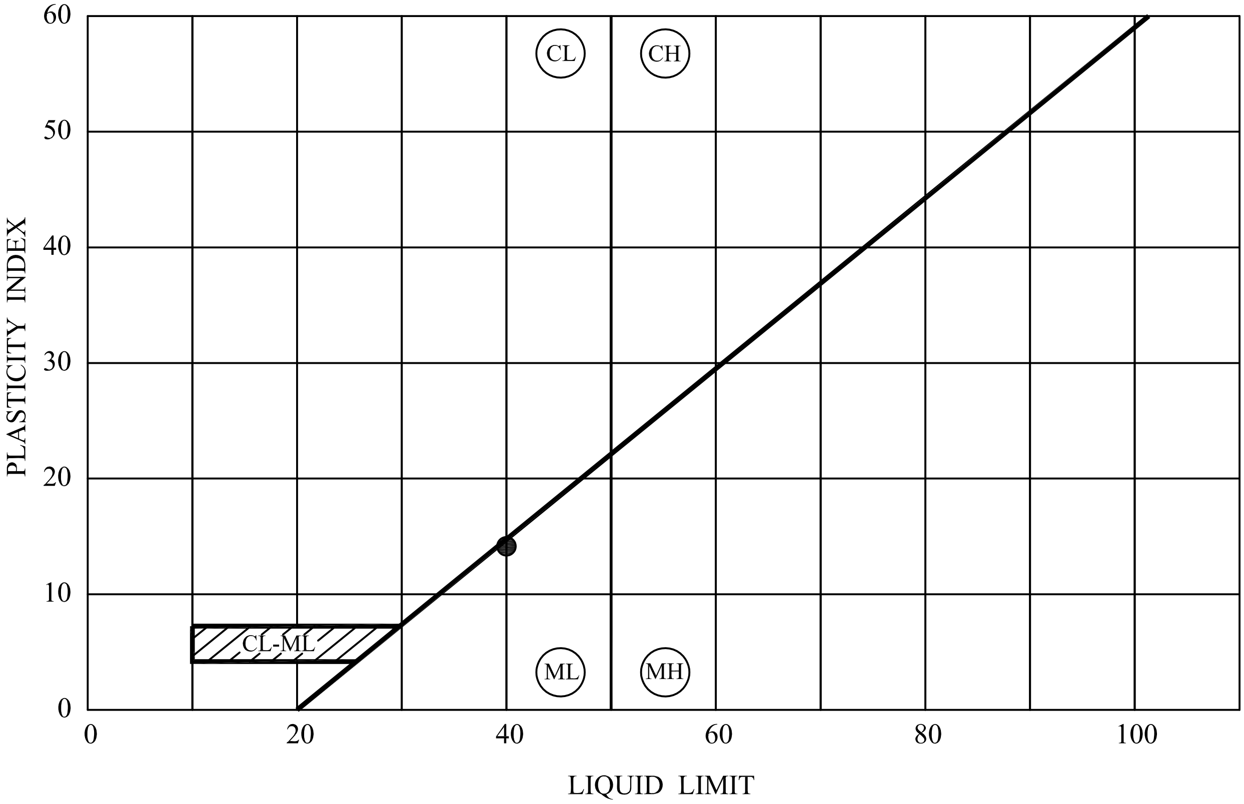
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE

B6



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	11-1	1.0	40	26	14	Brown Clayey SILT (MH) with some Sand

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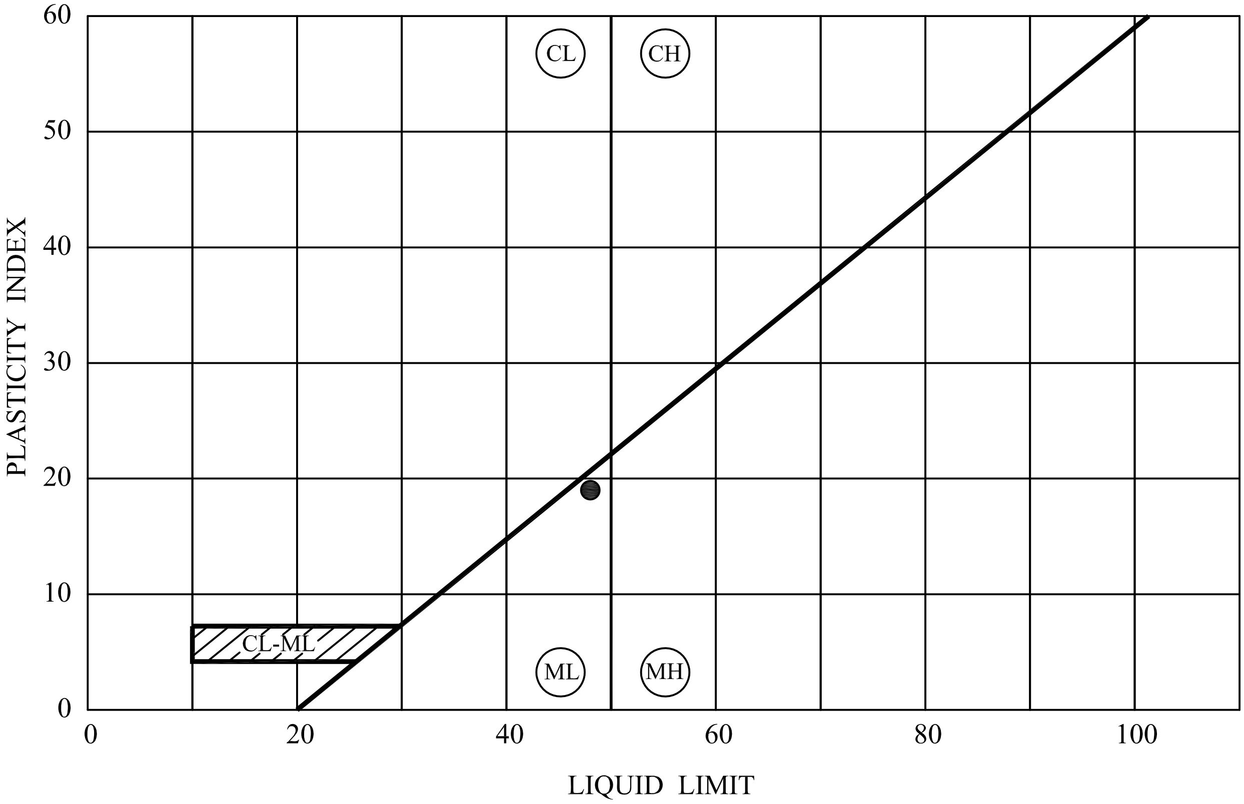
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE
B7



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	14-1	1.0	48	29	19	Brown CLAYEY SILT (ML) with Sand

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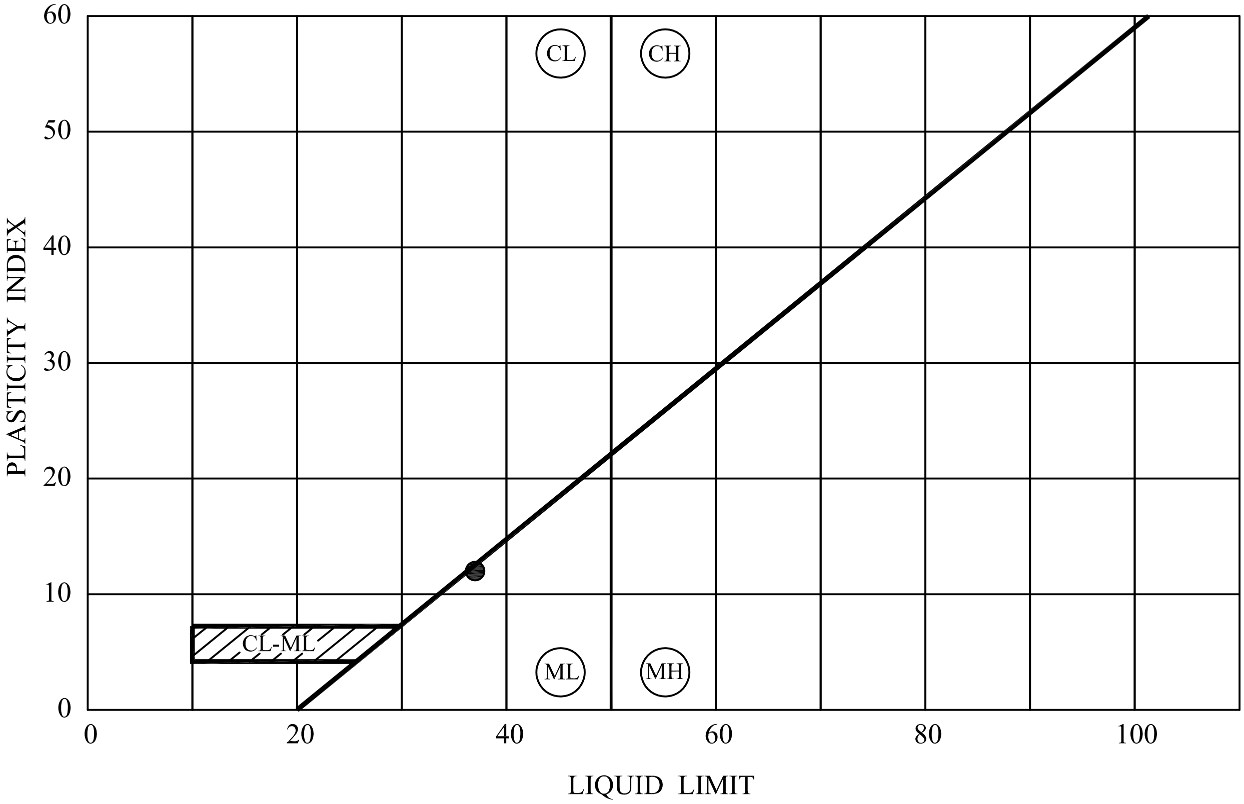
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE
B8



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	15-3	5.0	37	25	12	Orange Brown SILT (ML) with Sand

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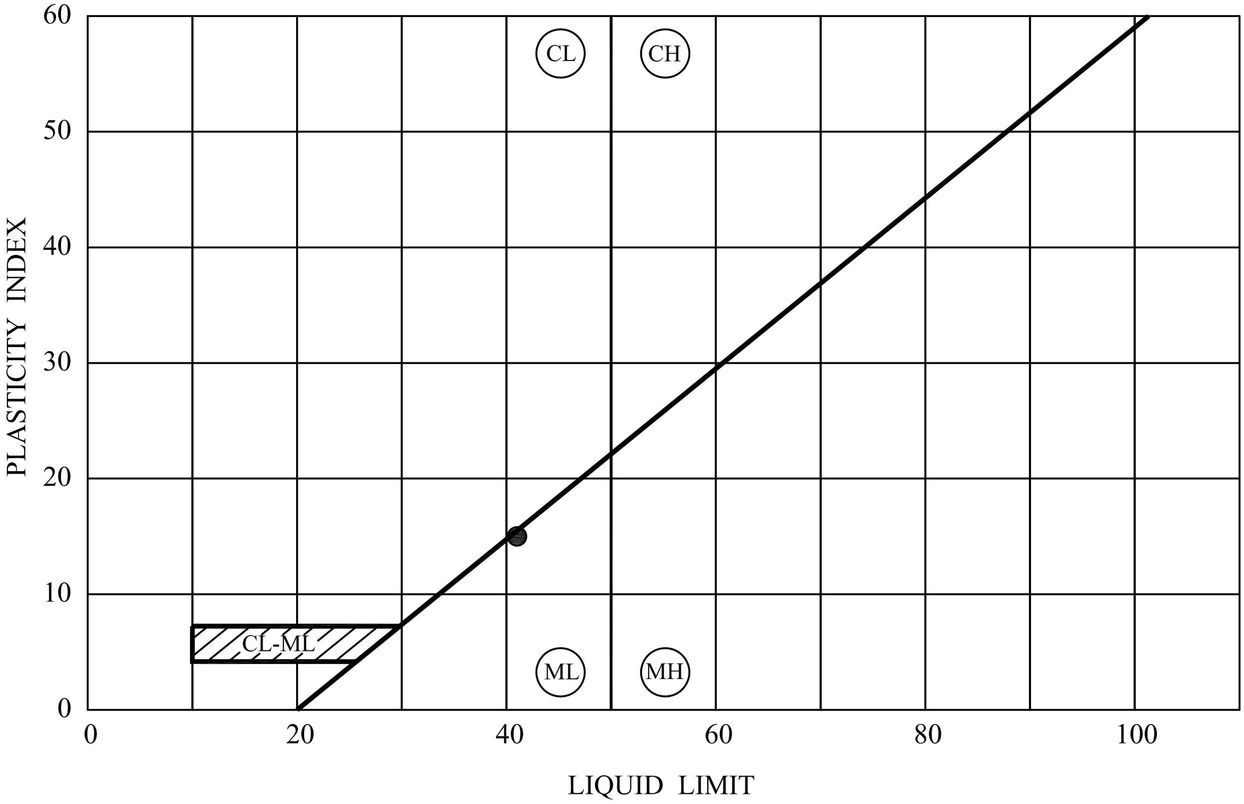
PLASTICITY INDEX

FIGURE

B9



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	16-1	1.0	41	25	16	Brown Clayey SILT (ML) with some Sand

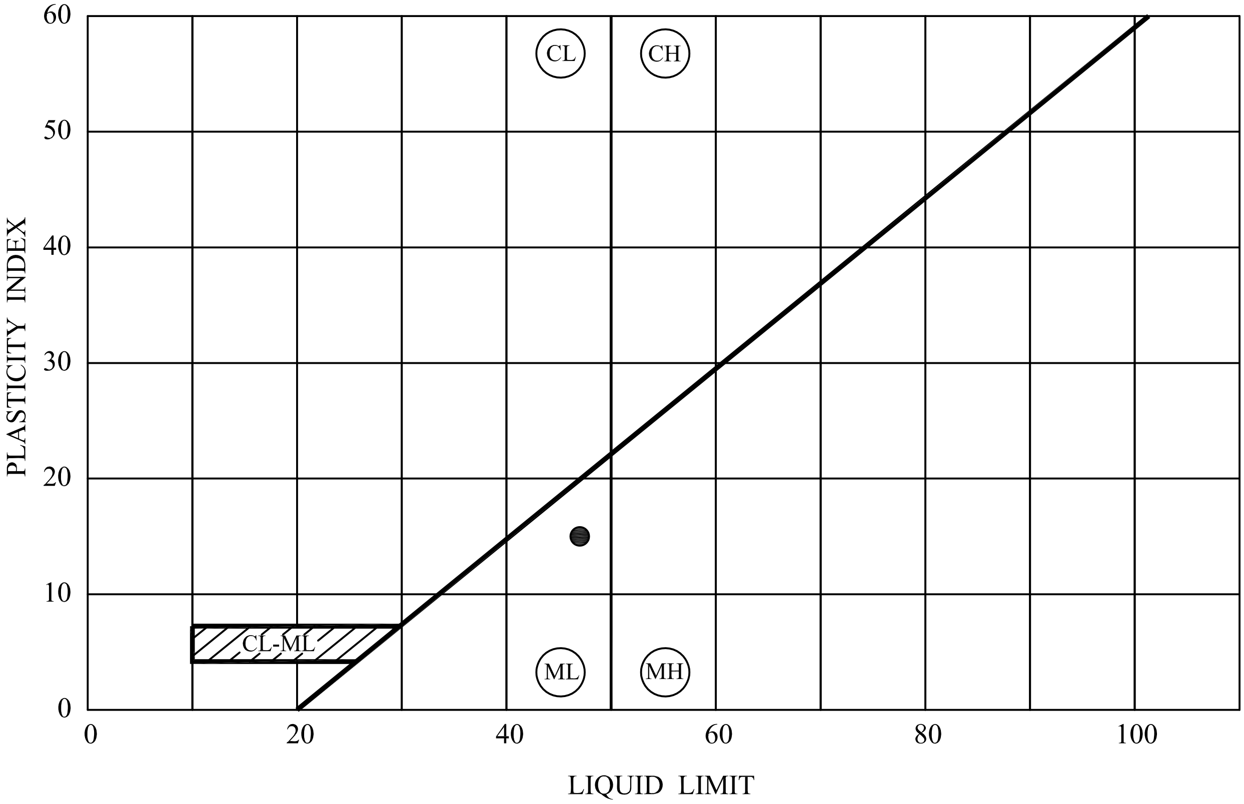
Hawaii Geotechnical Consulting, Inc.

PROJECT NO. 24024.01
DATE 06/23/2024

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE
B10



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	23-1	1.0	47	32	15	Brown CLAYEY SILT (ML) with Sand

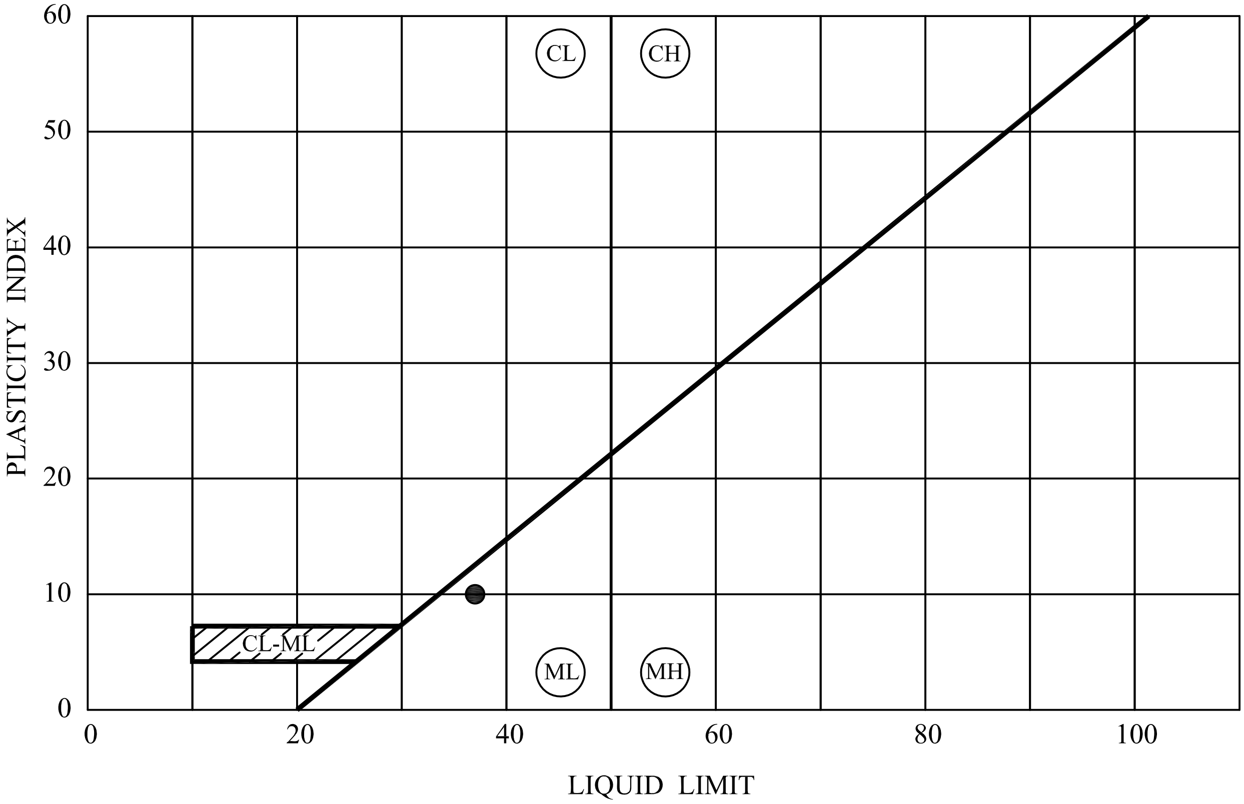
Hawaii Geotechnical Consulting, Inc.

PROJECT NO. 24024.01
DATE 07/21/2024

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE
B11



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	27-2	3.0	37	27	10	Orange Brown SILT (ML) with trace Sand

Hawaii Geotechnical Consulting, Inc.

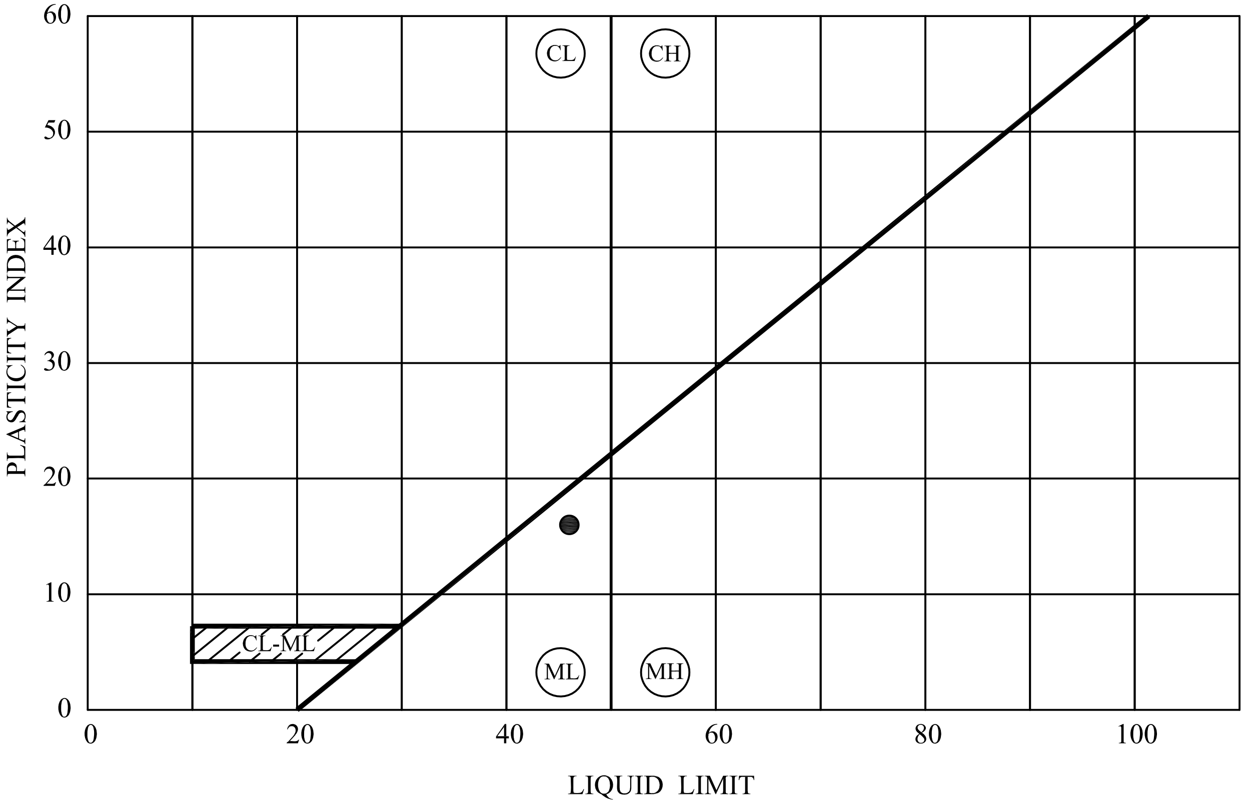
PROJECT NO. 24024.01
DATE 06/29/2024

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE

B12



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	28-1	1.0	46	30	16	Brown Clayey SILT (ML) with some Sand

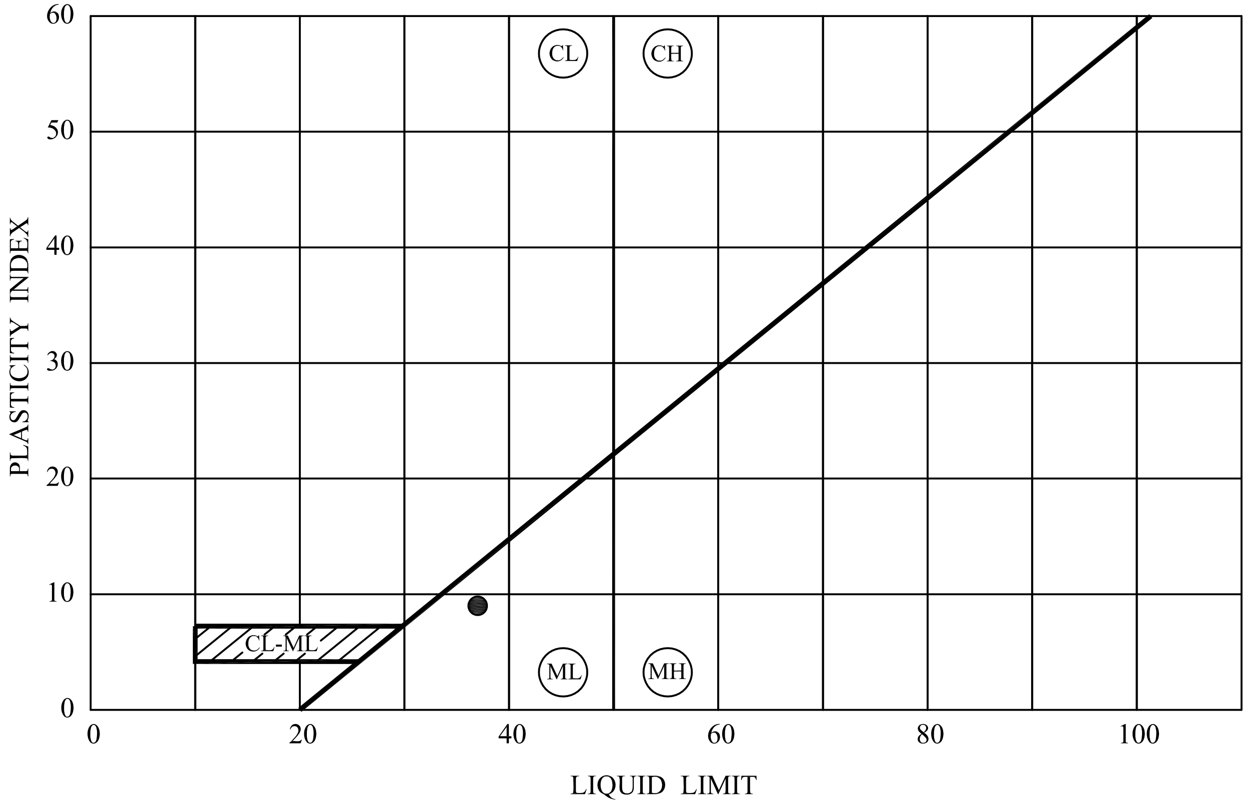
Hawaii Geotechnical Consulting, Inc.

PROJECT NO. 24024.01
DATE 06/23/2024

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE
B13



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	25-4	8.0	37	28	9	Orange Brown SILT (ML) and Sand

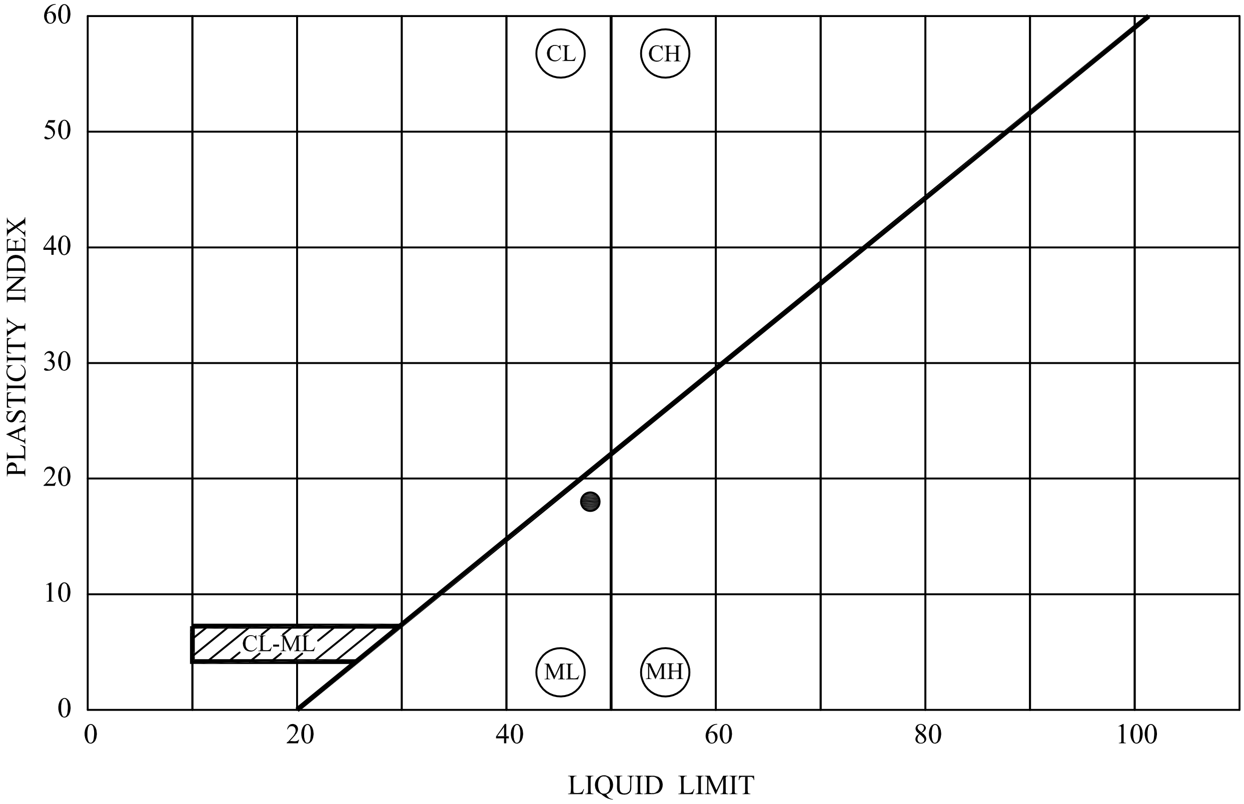
Hawaii Geotechnical Consulting, Inc.

PROJECT NO. 24024.01
DATE 06/29/2024

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE
B14



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	31-1	1.0	48	32	16	Brown CLAYEY SILT (ML) with some Sand

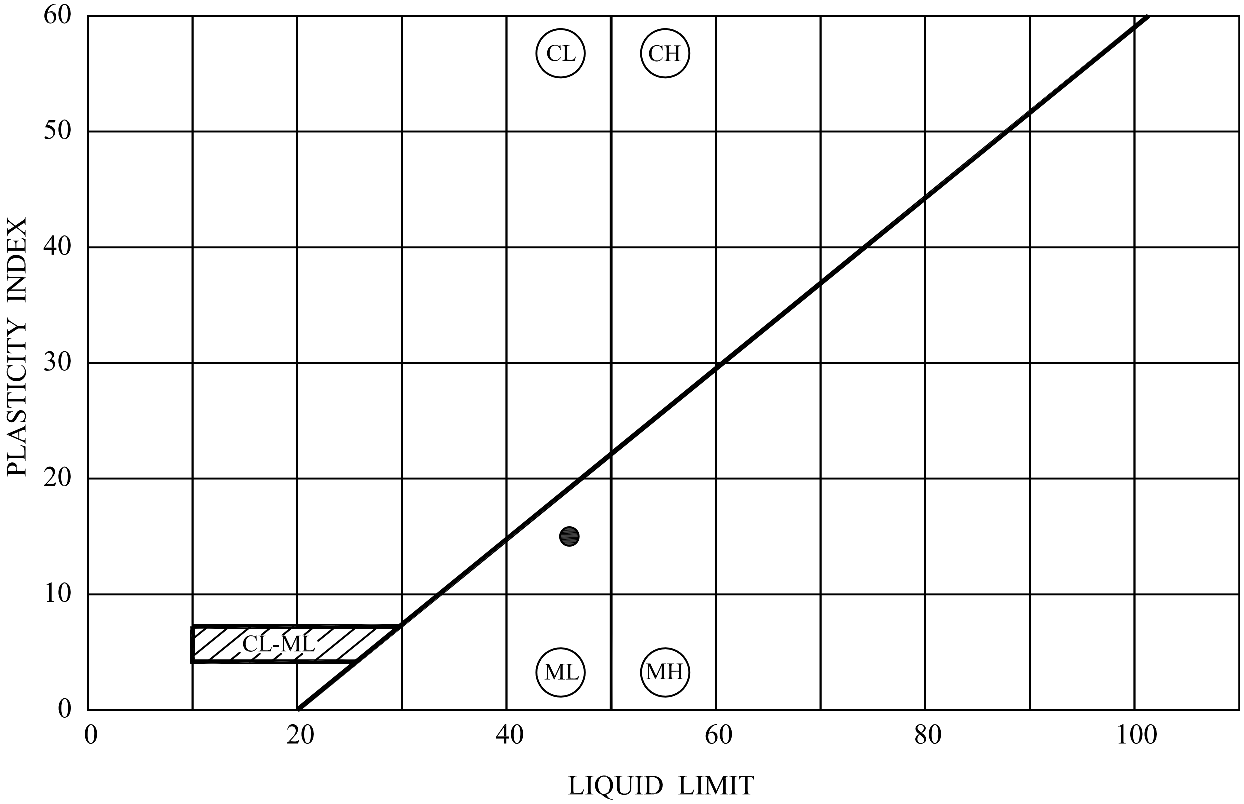
Hawaii Geotechnical Consulting, Inc.

PROJECT NO. 24024.01
DATE 07/16/2024

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE
B15



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	35-1	1.0	46	31	15	Brown CLAYEY SILT (ML) with some Sand

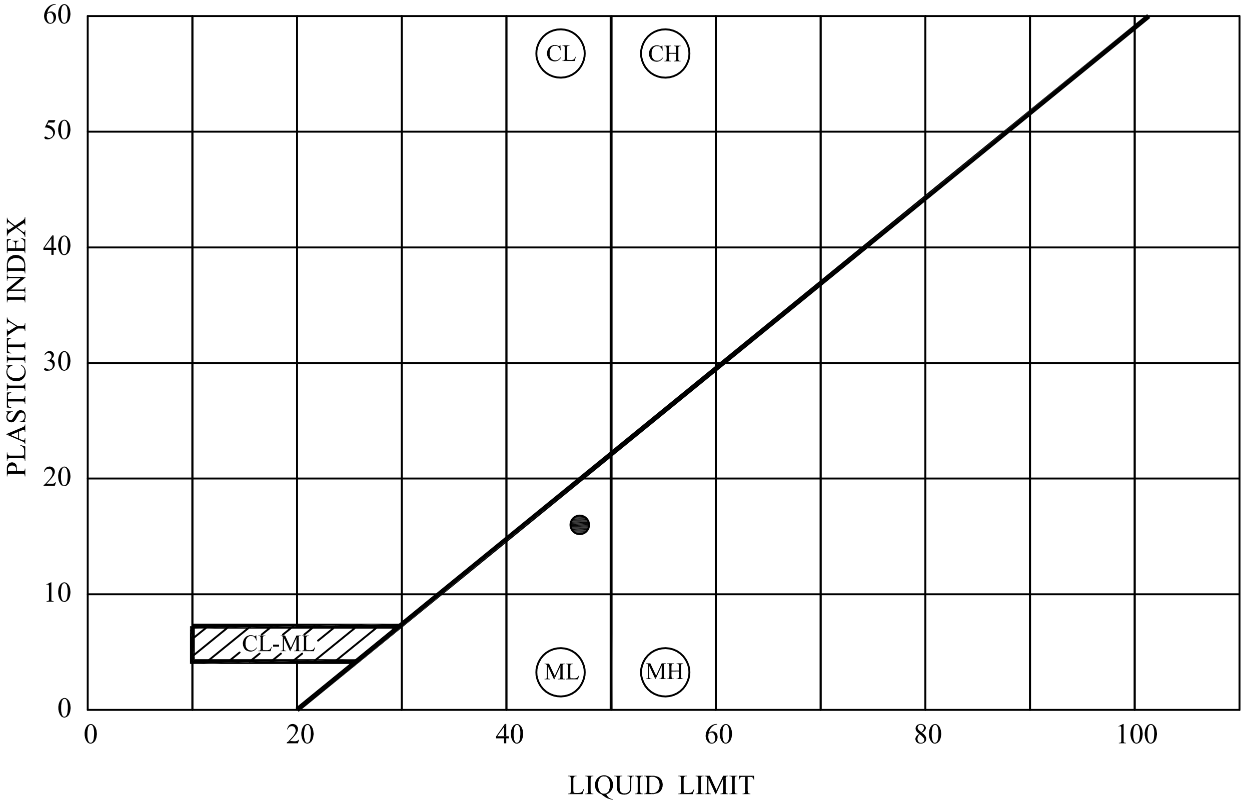
Hawaii Geotechnical Consulting, Inc.

PROJECT NO. 24024.01
DATE 07/16/2024

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE
B16



	Sample ID	Depth (ft)	LL	PL	PI	Classification
●	36-1	1.0	47	31	16	Brown CLAYEY SILT (ML) with Sand

Hawaii Geotechnical Consulting, Inc.

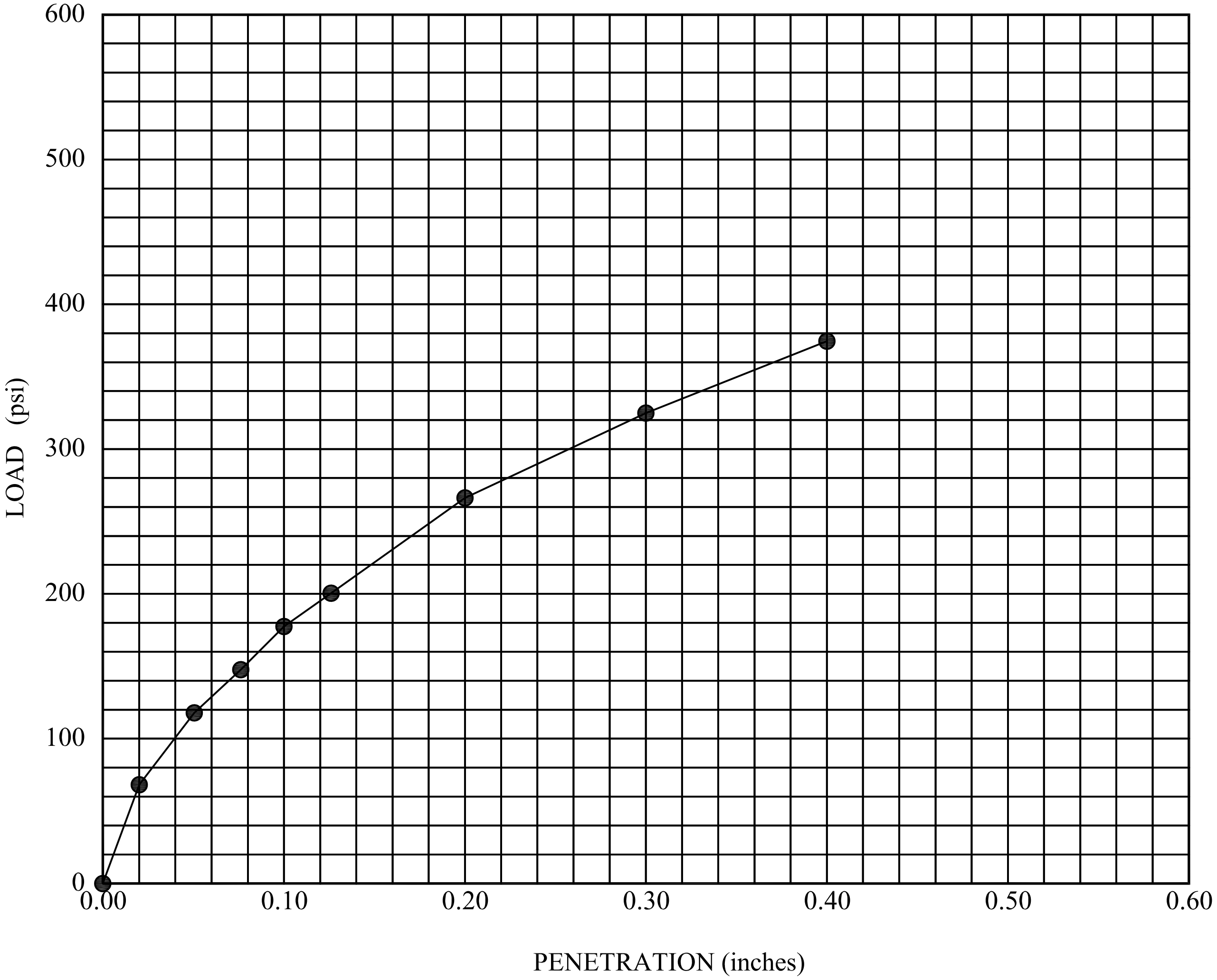
PROJECT NO. 24024.01
DATE 07/29/2024

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

PLASTICITY INDEX

FIGURE

B17



	Sample Identification	Classification	CBR	% Comp.	Opt. Den.	Opt. % MC	% Swell	LL	PI
●	A	Brown CLAYEY SILT (ML)with some Sand	18	98	96	29	0.3	47	16

Hawaii Geotechnical Consulting, Inc.

PROJECT NO. 24024.01
DATE 08/06/2024

HOONANI VILLAGE
KAHULUI, MAUI, HAWAII

COMPACTION CURVE

FIGURE
B18

APPENDIX C

Percolation Testing

APPENDIX C
PERCOLATION TESTING

A total of two percolation tests were performed within the proposed WWTP system leach field site. The percolation tests were performed at depths of 36 inches following the State of Hawaii Department of Health – Wastewater Branch testing method.

Approximately 1 inch of clean ¾-inch gravel was placed at the bottom of an 9-inch diameter, 36 inch deep hand excavated hole. Step D of the procedure for other type (non-granular) soils was used to perform the percolation test, as a 12 inch head of water did not seep away in under 10 minutes twice. After a minimum of 4 hours of presoaking, maintaining a 12-inch head, the hole was allowed to swell for at least 12 hours. After swelling, water was then added to 6 inches above the gravel and allowed to percolate. The water drop was recorded every 30-minute time interval for 4 hours. The final drop used to calculate the percolation rates.

A senior engineer with HGC performed the percolation test and maintained a log of the time and water drop intervals.

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DEPARTMENT OF HEALTH – WASTEWATER BRANCH
INDIVIDUAL WASTEWATER SYSTEM (IWS) – SITE EVALUATION/PERCOLATION TEST
(PERCOLATION TEST NO. 1 - EAST)

Date/Time: July 29, 2024

Test Performed by: Hawaii Geotechnical Consulting, Inc.

Owner: Ho’onani Development, LLC

TMK: --

Elevation: Unknown Feet

Depth to Groundwater Table: >10 feet below grade

Depth to Bedrock (if observed): Unknown feet below grade

Diameter of Hole: 9.0 inches

Depth to Hole Bottom: 36 inches below grade

Depth, inches below grade	Soil Profile (color, texture, other)
0-18	Brown Clayey Silt with some Sand, Soft
18-108	Orange Brown Silt with some Sand, Hard

PERCOLATION READINGS:

Time 12 inches of water to seep away: 101 minutes

Time 12 inches of water to seep away: 47 minutes

Check one:

______ Percolation tests in sandy soils, recorded time intervals and water drops at least every 10 minutes for at least 1 hour.

X Percolation tests in non-sandy soils, presoaked the test hole for at least 4 hours. Recorded time intervals and water drops at least every 10 minutes for 1 hour of time for the first 6 inches to seep away in greater than 30 minutes recorded time intervals and water drops at least every 30 minutes for 4 hours or until 2 successive drops do not vary by more than 1/16 inch.

Time Interval (min)	Drop in Inches	Time Interval (min)	Drop in Inches	Time Interval (min)	Drop in Inches
30	2-5/8	30	2-5/8		
30	2-3/16	30			
30	2-1/2				
30	2-5/8				

Percolation Rate (time/final water level drop): 11.41 minute/inch

As the engineer responsible for gathering and providing site information and percolation test results, I attest to the fact that above site information is accurate and that the site evaluation was conducted in accordance with the provisions of Chapter 11-62, “Wastewater Systems” and the results were acceptable. I also attest that three feet of suitable soil exists between the bottom of the soil absorption system and the groundwater table or any other limiting layer.

Engineer’s Signature/Stamp

ROBERT M. GIBBENS
No. 10094-C

July 29, 2024

License Expires 04/30/2026

DEPARTMENT OF HEALTH – WASTEWATER BRANCH
INDIVIDUAL WASTEWATER SYSTEM (IWS) – SITE EVALUATION/PERCOLATION TEST
(PERCOLATION TEST NO. 2 - WEST)

Date/Time: July 29, 2024

Test Performed by: Hawaii Geotechnical Consulting, Inc.

Owner: Ho’onani Development, LLC

TMK: --

Elevation: Unknown Feet

Depth to Groundwater Table: >10 feet below grade

Depth to Bedrock (if observed): Unknown feet below grade

Diameter of Hole: 9.0 inches

Depth to Hole Bottom: 36 inches below grade

Depth, inches below grade	Soil Profile (color, texture, other)
0-18	Brown Clayey Silt with some Sand, Soft
18-108	Orange Brown Silt with some Sand, Hard

PERCOLATION READINGS:

Time 12 inches of water to seep away: 136 minutes

Time 12 inches of water to seep away: 100 minutes

Check one:

☐ Percolation tests in sandy soils, recorded time intervals and water drops at least every 10 minutes for at least 1 hour.

☒ Percolation tests in non-sandy soils, presoaked the test hole for at least 4 hours. Recorded time intervals and water drops at least every 10 minutes for 1 hour of time for the first 6 inches to seep away in greater than 30 minutes recorded time intervals and water drops at least every 30 minutes for 4 hours or until 2 successive drops do not vary by more than 1/16 inch.

Time Interval (min)	Drop in Inches	Time Interval (min)	Drop in Inches	Time Interval (min)	Drop in Inches
30	4-15/16	30	5-1/16		
30	5-1/4				
30	5				
30	5-1/16				

Percolation Rate (time/final water level drop): 5.93 minute/inch

As the engineer responsible for gathering and providing site information and percolation test results, I attest to the fact that above site information is accurate and that the site evaluation was conducted in accordance with the provisions of Chapter 11-62, “Wastewater Systems” and the results were acceptable. I also attest that three feet of suitable soil exists between the bottom of the soil absorption system and the groundwater table or any other limiting layer.

Engineer’s Signature/Stamp

ROBERT M. GIBBENS
LICENSED PROFESSIONAL ENGINEER
No. 10094-C

July 29, 2024

License Expires 04/30/2026

APPENDIX ‘C’ – FLORA AND FAUNA SURVEY

FLORA AND FAUNA SURVEY
FIRST ASSEMBLY OF GOD SUBDIVISION
KAHULUI, MAUI

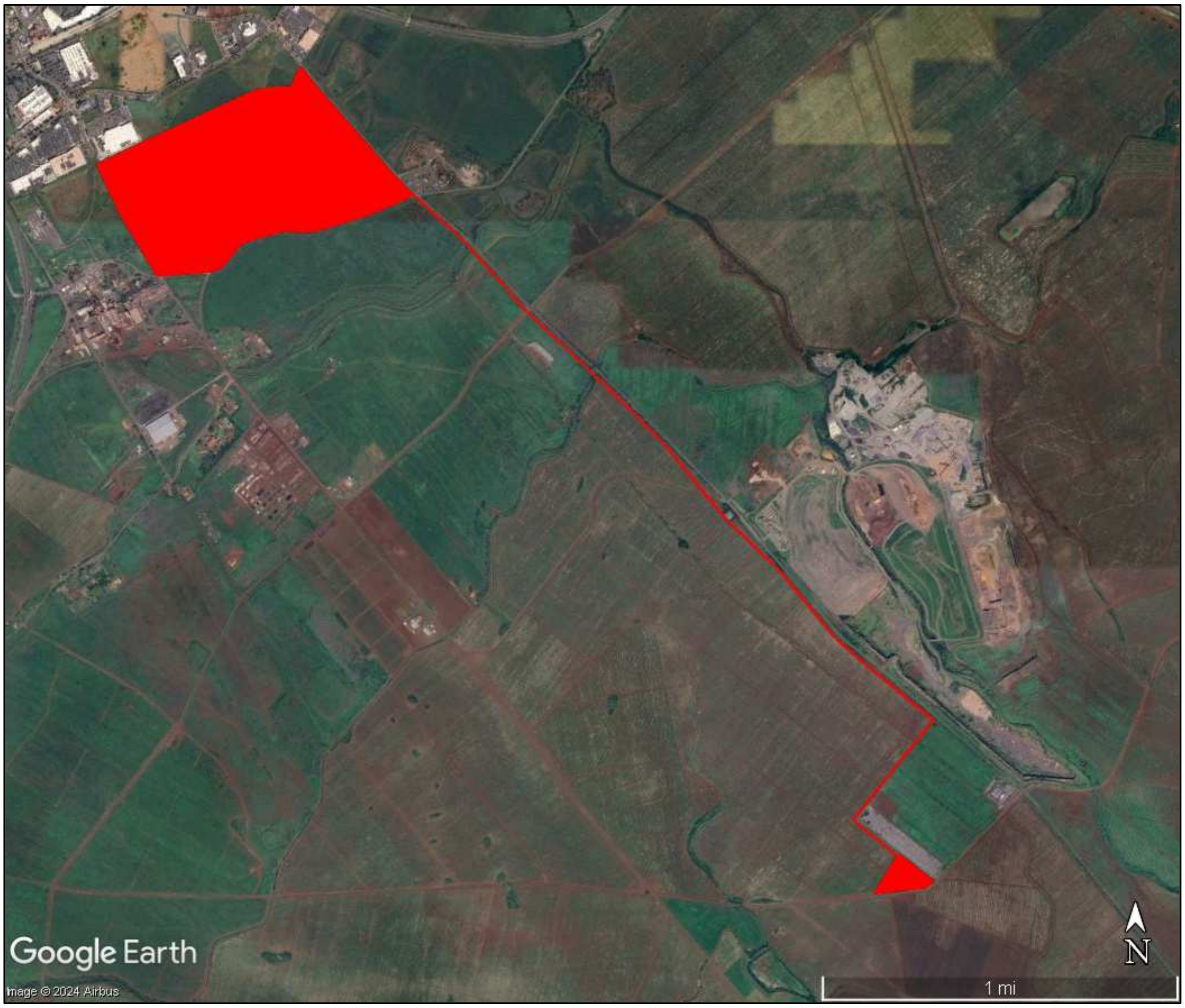
Prepared By:
FOREST & KIM STARR
STARR ENVIRONMENTAL

Prepared For:
LEHUA BUILDERS, INC.

2024

INTRODUCTION

Lehua Builders, Inc. is gathering information for construction of a proposed subdivision on about 190 acres, with an approximately 6 acre well and tank site, connected by a 2.6 mile water line in Kahului, Maui. This report focuses on the flora and fauna within the project site.



Project site.

SITE DESCRIPTION

The main project site is located in the dry isthmus of East Maui, at an elevation of about 50-80 ft. The terrain is relatively flat and was previously cultivated in sugar cane. The vegetation is mostly non-native grasses, shrubs, and small trees. The site is currently sitting idle. Most of the site has burned in the recent past.

The pipeline section, which runs from about 80-350 ft. elevation is similar to the main project site in the lower reaches, and is an active citrus field in the upper reaches. The well site, at about 350 ft. elevation, is also an active citrus field.

Terrain and vegetation at main project site.

Terrain and vegetation in lower reaches of pipeline corridor.

Terrain and vegetation in upper reaches of pipeline corridor and well site.

SURVEY OBJECTIVES

The objectives of the survey were to:

- Document what plant and animal species occur on the site or may likely occur in the habitat.
- Determine the presence or likely occurrence of any native flora and fauna, particularly any that are Federally listed as Threatened or Endangered. If such occur, identify what features of the habitat may be essential for these species.

SURVEY METHODS

The bulk of the main project area was surveyed in May 2024. An additional parcel in the main area, the well site, and the corridor pipeline connecting the two were surveyed in July 2024.

A walk-through survey method was used. Notes were made on plant and animal species encountered. Extra emphasis was made to look for species of conservation concern.

Taking notes on vegetation.

FLORA

The main project site and the lower reaches of the pipeline corridor are dominated by non-native grasses, mostly Guinea grass (*Megathyrsus maximus*) and buffel grass (*Cenchrus ciliaris*). In areas where grasses are thin, other aggressive non-native plants dominate, especially spiny amaranth (*Amaranthus spinosus*), lion's tail (*Leonotis nepetifolia*), golden crown-beard (*Verbesina encelioides*), and tumbleweed (*Salsola tragus*). Clumps of shrubby non-native fleabane (*Pluchea* spp.) also dot the fields of grass.

There are very few trees in the main project area. Most prevelant are hundreds of non -native tree tobacco (*Nicotiana glauca*). Though weedy and non-native, these small trees / large shrubs are potential host plants for the endangered Blackburn's Sphinx Moth (*Manduca blackburni*). There is more discussion about this in the insect section.

Other trees in the project area include groves of large haole koa (*Leucaena leucocephala*). A few monkey pods (*Samanea saman*). And a row of giant, mostly dead, elephant's ear pod (*Enterolobium cyclocarpum*) along Pulehu Rd. There are also scattered small kiawe (*Prosopis pallida*), Manila tamarind (*Pithecellobium dulce*), silky oak (*Grevillea robusta*), and date palms (*Phoenix* sp.). And at the well site and upper reaches of the pipeline corridor, there is an active citrus farm growing lime trees (*Citrus aurantifolia*).

The only native plant found on the main site was the common shrub ʻuhaloa (*Waltheria indica*). ʻUhaloa was also abundant at the well site and in the pipeline corridor, along with scattered vines of the native pāʻū o Hiʻiaka (*Jacquemontia sandwicense*).

The main site, mostly non-native grasses, especially Guinea grass (*Megathyrsus maximus*).

The lower reaches of the pipeline corridor, with large dead elephant's earpod trees (*Enterolobium cyclocarpum*) and an understory of non-native grasses and weeds.

Active citrus farm (*Citrus aurantifolia*) at well site and upper reaches of pipeline corridor.

Abandoned road in main site being colonized by tumbleweed (*Salsola tragus*).

Thickets of lion's tail (*Leonotis nepetifolia*) are common in areas with sparse grass cover.

One of a handful of monkey pod trees (*Samanea saman*) along Hansen Road.

Small Manila tamarind trees (*Pithecellobium dulce*) are scattered about the site.

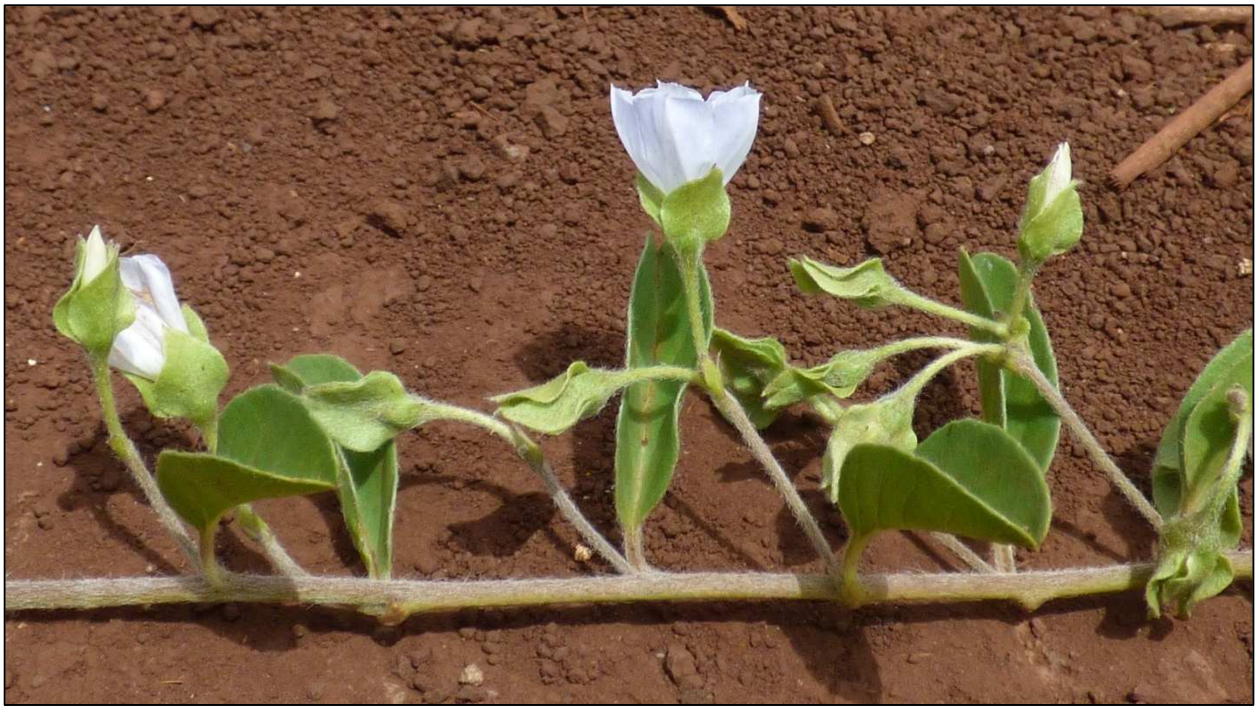
Kiawe (*Prosopis pallida*) with understory of golden crown-beard (*Verbesina encelioides*).

Tree tobacco (*Nicotiana glauca*) is abundant at the main site.

Non-native Mexican poppy (*Argemone mexicana*) is locally common in the main site

Native ‘uhaloa (*Waltheria indica*) is present in the main site and pipeline corridor, and abundant in the rows between citrus trees.

Non-native obscure morning glory (*Ipomoea obscura*) is common in the citrus groves.



The native morning glory pāʻū o Hiʻiaka (*Jacquemontia sandwicense*) is also present.

Citrus farm (*Citrus aurantifolia*) at well site and upper reaches of pipeline corridor.

Cultivated lime (*Citrus aurantifolia*).

Plant Checklist

List of plants encountered during the survey.

Scientific Name	**Common name**	**Nativity**
Abutilon grandifolium	Hairy abutilon	Non-native
Alternanthera pungens	Khaki weed	Non-native
Amaranthus spinosus	Spiny amaranth	Non-native
Argemone mexicana	Mexican poppy	Non-native
Atriplex muelleri	Saltbush	Non-native
Bidens Pilosa	Beggarstick	Non-native
Boerhavia coccinea	Scarlet boerhavia	Non-native
Calotropis procera	Small crown flower	Non-native
Canavalia cathartica	Maunaloa	Non-native
Cenchrus ciliaris	Buffel grass	Non-native
Chamaecrista nictitans	Partridge pea	Non-native
Chenopodium murale	Lamb's quarters	Non-native
Chloris barbata	Fingergrass	Non-native
Citrus sp.	Citrus tree	Non-native
Coffea arabica	Coffee	Non-native
Crotalaria assamica	Rattle pod	Non-native
Cucumis dipsaceus	Wild cucumber	Non-native
Cynodon dactylon	Bermuda grass	Non-native
Cyperus rotundus	Nut-sedge	Non-native
Datura stramonium	Jimson weed	Non-native
Desmanthus pernambucanus	Slender mimosa	Non-native
Eleusine indica	Wire grass	Non-native
Enterolobium cyclocarpum	Elephant's earpod	Non-native
Eragrostis cilianensis	Stink grass	Non-native
Eragrostis pectinacea	Carolina love grass	Non-native
Grevillea robusta	Silky oak	Non-native
Heliotropium procumbens	Fourspike heliotrope	Non-native
Heterotheca grandiflora	Telegraph weed	Non-native
Indigofera suffruticosa	Upright indigo	Non-native
Ipomoea obscura	Obscure morning glory	Non-native
Jacquemontia sandwicense	Pāʻū o Hiʻiaka	Native
Leonotis nepetifolia	Lion's tail	Non-native
Lepidium sp.	Pepperweed	Non-native
Leucaena leucocephala	Haole koa	Non-native
Ludwigia octovalvis	Primrose willow	Non-native
Macroptilium atropurpureum	Vining cow pea	Non-native

Scientific Name	**Common name**	**Nativity**
Macroptilium lathyroides	Erect cow pea	Non-native
Malva parviflora	Cheeseweed	Non-native
Malvastrum coromandelianum	False mallow	Non-native
Megathyrsus maximus	Guinea grass	Non-native
Momordica charantia	Bitter melon	Non-native
Moringa oleifera	Drumstick tree	Non-native
Nicandra physalodes	Apple of Peru	Non-native
Nicotiana glauca	Tree tobacco	Non-native
Parthenium hysterophorus	Santa Maria	Non-native
Paspalum sp.	Paspalum	Non-native
Phoenix sp.	Date palm	Non-native
Pithecellobium dulce	Opiuma	Non-native
Pluchea carolinensis	Sourbush	Non-native
Pluchea indica	Indian fleabane	Non-native
Prosopis pallida	Kiawe	Non-native
Ricinus communis	Castor bean	Non-native
Salsola tragus	Tumble weed	Non-native
Samanea saman	Monkey pod	Non-native
Schinus terebinthifolius	Christmas berry	Non-native
Senna occidentalis	Coffee senna	Non-native
Setaria verticillata	Bristly fox-tail	Non-native
Sida ciliaris	Red sida	Non-native
Sida spinosa	Prickly sida	Non-native
Solanum lycopersicum	Wild tomato	Non-native
Syzygium cumini	Java plum	Non-native
Tridax procumbens	Coat buttons	Non-native
Vachellia farnesiana	Klu	Non-native
Verbesina encelioides	Golden crown-beard	Non-native
Waltheria indica	‘Uhaloa	Native

FAUNA

Below is a discussion of our findings and steps the U.S. Fish and Wildlife Service (FWS) recommends to prevent harm to rare native species that could occur within the project area.

BATS

Dedicated surveys for Hawaiian Hoary Bats (*Aeorestes semotus*) were not done, but bats are known to transit over broad areas and may forage at the site at times. Most of the trees at the project site are less than 15 ft. tall, though some are taller.

Hawaiian Hoary Bats roost and give birth to their young in tall trees. While tree trimming activities are not incompatible with bats, they have the potential to impact juvenile bats unable to fly away from a tree that is cut during the summer pupping season. For this reason, the FWS suggests that trimming woody plants more than 15 ft. tall should not occur between June 1 and September 15. Use of barbed wire is also discouraged, as it can entangle and kill bats.

NON-NATIVE MAMMALS

The only non-native mammals observed at the site were a few dozen Axis Deer (*Axis axis*) at the main site and a herd of cows (*Bos taurus*) in the lower reaches of the pipeline corridor. Additionally, high levels of browsing, scat, game trails, digging, and rubbing were observed.

Non-native mammals that were not observed but likely occur in the project area at times include pigs (*Sus scrofa*), rats (*Rattus* spp.), mice (*Mus domesticus*), cats (*Felis domesticus*), dogs (*Canis familiaris*), and mongooses (*Herpestes auropunctatus*).

Herd of Axis Deer (*Axis axis*) in tree tobacco thicket at main site.

Axis Deer (*Axis axis*) rubbing on tree tobacco.

Fresh Axis Deer (*Axis axis*) scat.

Cows (*Bos taurus*) in lower reaches of pipeline corridor.

BIRDS

There were very few birds at the site. The bulk of the birds encountered during the survey were common non-native species. The birds were mostly transiting through the site, roosting in trees, and loafing on the ground. Birds were most common near the edges of the property, in areas that are lusher and have more structural diversity. Most abundant were Common Mynah (*Acridotheres tristis*) and Zebra Doves (*Geopelia striata*). A nest of non-native Black Francolin (*Francolinus francolinus*) was found at the base of a grass clump.

Dedicated seabird surveys were not done, and the habitat would likely be inhospitable to them. A lone Frigatebird or ‘Iwa (*Fregata minor*) was observed riding thermals above the site and gliding to the south. Seabirds could also transit over the site at night. The FWS recommends using downward facing lights to minimize disorienting these night flying birds, and avoiding nighttime construction during September 15 through December 15 when young seabirds are fledging.

No Hawaiian Geese or Nēnē were encountered on the site, though they are known from the general area. The FWS recommends that folks do not approach, feed, or disturb Nēnē. If Nēnē start to become regularly observed on the project site, contact FWS for further guidance.

Bird Checklist

List of birds encountered during the survey.

Scientific Name	**Common name**	**Nativity**
Francolinus francolinus	Black Francolin	Non-native
Bubulcus ibis	Cattle Egret	Non-native
Acridotheres tristis	Common Mynah	Non-native
Ortygornis pondicerianus	Gray Francolin	Non-native
Passer domesticus	House Sparrow	Non-native
Fregata minor	‘Iwa, Frigatebird	Native
Spilopelia chinensis	Lace-necked Dove	Non-native
Cardinalis cardinalis	Northern Cardinal	Non-native
Lonchura sp.	Rice Birds	Non-native
Geopelia striata	Zebra Dove	Non-native

Frigatebird or ‘Iwa (*Fregata minor*) gliding on thermals above main site.

Looking and listening for birds.

Black francolin (*Francolinus francolinus*) eggs at base of grass tussock.

INSECTS

A survey of all the insects on the site was beyond the scope of this project. Conspicuous insects were noted, and insects of conservation concern were looked for.

The insects observed at the site were all common non-native insects one would expect in this habitat. Most conspicuous are numerous butterfly species including Monarch Butterfly (*Danaus plexippus*), Sleepy Orange Butterfly (*Eurema nicippe*), Bean Butterfly (*Lampides boeticus*) Western Pygmy Blue Butterfly (*Brephidium exilis*), and Citrus Swallowtail Butterfly (*Papilio xuthus*). Honey bees (*Apis mellifera*) were also buzzing about, and glaber ants (*Ochetellus glaber*) were present on many plants.

Of note, the main site has hundreds of tree tobacco (*Nicotiana glauca*) plants, virtually all of which are greater than three feet tall and nearing the end of their life cycle. Though non-native, this species can be a host for the endangered Blackburn's Sphinx Moth (*Manduca blackburni*). All the tree tobacco encountered were broadly scanned for obvious feeding damage and large larvae. About a hundred of the tree tobacco were more closely surveyed for eggs, small larvae, and frass. No signs of Blackburn's Sphinx Moth were encountered.

FWS recommends not allowing tree tobacco to grow greater than three feet tall in the project area, to minimize attraction of Blackburn's Sphinx Moth. Additionally, FWS requests they be contacted when tree tobacco greater than three feet tall is found on a site that is to be developed, so they can provide additional guidance to avoid impacts to the Blackburn's Sphinx Moth.

Painted Lady Butterfly (*Vanessa cardui*) sipping nectar from fleabane (*Pluchea*) flowers.

Citrus Swallowtail Butterfly (*Papilio xuthus*) ovipositing on citrus leaf.

Citrus Swallowtail Butterfly (*Papilio xuthus*) egg on citrus leaf.

One of the denser and healthier patches of tree tobacco (*Nicotiana glauca*) on the site.

Another patch of tree tobacco (*Nicotiana glauca*) that is mostly just dead stems.

Looking for signs of Blackburn's Sphinx Moth (*Manduca blackburni*) on tree tobacco.

Looking for signs of Blackburn's Sphinx Moth (*Manduca blackburni*) on tree tobacco.

Omnivorous leafroller moth (*Platynota stultana*) eggs on tree tobacco.

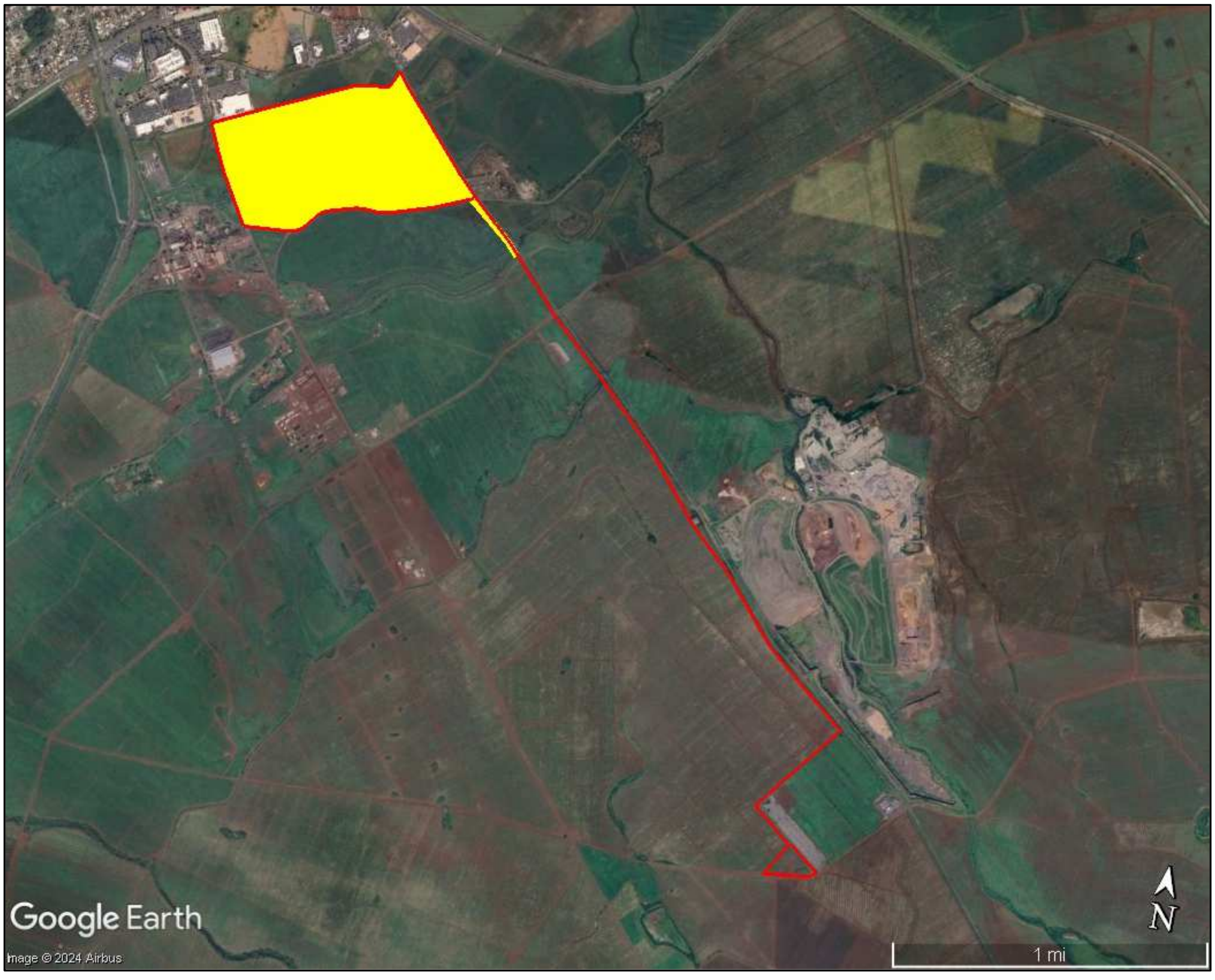
Omnivorous leafroller moth (*Platynota stultana*) larva on tree tobacco.

Spider, likely *Cheiracanthium*, in silked over tree tobacco leaf.

Soft scale (*Pulvinaria*) and armored scales (Diaspididae) feeding on tree tobacco.

Glaber ants (*Ochetellus glaber*) tending treehoppers (*Vanduzea segmentata*) on tree tobacco.

Tree tobacco (*Nicotiana glauca*) flowers, green fruit, and leaves.



Areas in yellow where tree tobacco (*Nicotiana glauca*) was observed. The bulk of the tree tobacco was observed in the eastern portion of the main site. Scattered individuals were also observed elsewhere in the main site and in the pipeline corridor up to the Haiku Ditch. No tree tobacco were observed in the rest of the pipeline corridor or at the well site.

Insect Checklist

List of insects encountered during the survey.

Order	Family	Scientific Name	Common name	Nativity
Araneae	Cheiracanthiidae	*Cheiracanthium*	Yellow sac spider	Non-native
Hemiptera	Coccidae	*Pulvinaria sp.*	Soft scale	Non-native
Hemiptera	Diaspididae	*Unknown*	Armored scale	Non-native
Hemiptera	Membracidae	*Vanduzea segmentata*	Treehopper	Non-native
Hymenoptera	Ampulicidae	*Ampulex compressa*	Emerald cockroach wasp	Non-native
Hymenoptera	Apidae	*Apis mellifera*	Honey bee	Non-native
Hymenoptera	Formicidae	*Ochetellus glaber*	Black household ant	Non-native
Lepidoptera	Crambidae	*Spoladea recurvalis*	Beet webworm	Non-native
Lepidoptera	Lycaenidae	*Brephidium exilis*	Western pygmy blue	Non-native
Lepidoptera	Lycaenidae	*Lampides boeticus*	Bean butterfly	Non-native
Lepidoptera	Nymphalidae	*Danaus plexippus*	Monarch butterfly	Non-native
Lepidoptera	Nymphalidae	*Vanessa cardui*	Painted Lady	Non-native
Lepidoptera	Papilionidae	*Papilio xuthus*	Citrus swallowtail	Non-native
Lepidoptera	Pieridae	*Eurema nicippe*	Sleepy orange butterfly	Non-native
Lepidoptera	Pieridae	*Pieris rapae*	Cabbage butterfly	Non-native
Lepidoptera	Tortricidae	*Platynota stultana*	Omnivorous leafroller moth	Non-native
Mantodea	Mantidae	*Unknown*	Preying mantis	Non-native
Orthoptera	Acrididae	*Schistocerca nitens*	Grasshopper	Non-native

Honey bee (*Apis mellifera*) foraging in purple crown flower (*Calotropis procera*).

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Nishida, G. M. 2002. Hawai‘i Arthropod Checklist Fourth Edition. Bishop Museum Technical Report 22: iv+313 pp.

Pyle, R.L., and P. Pyle. 2009. The Birds of the Hawaiian Islands: Occurrence, History, Distribution, and Status. B.P. Bishop Museum, Honolulu, HI, U.S.A.

Wagner, W. L., D. R. Herbst, and S. H. Sohmer. 1999. Manual of the Flowering Plants of Hawai‘i. Univ. of Hawai‘i Press and Bishop Museum Press, Honolulu, HI.

Artistic rendering of site.

"E mālama ‘oe i ka ‘āina, e mālama ka ‘āina ia ‘oe."
Take care of the land, and the land will take care of you.

APPENDIX ‘D’ – RETAIL DEMAND REPORT

PIONEER DESIGN GROUP-HAWAIʻI

Ho’onani Village

Retail Demand Analysis

May 2024

Prepared For - Seaview Investors, LLC.

STREETSENSE

Table of Contents

Methodology

For the purposes of this assessment, the following tasks were undertaken to evaluate the retail opportunity at Ho’onani Village.

Competition Analysis

Assess existing retail competition on both a local and regional scale and determine their level of impact on Ho’onani Village’s ability to capture customers and retail demand.

Trade Area Analysis

Determine boundaries for primary (PTA), secondary (STA), and tertiary (TTA) trade areas. Trade areas are impacted by existing competition, drive times, site accessibility, and physical and psychological barriers. Analyze customer demographics and population projection for each trade area.

Retail Spending

Evaluate total retail spending of each demand generating population, including trade area residents, employees, and visitors. Assess distribution and spending patterns based on industry standard retail categories to determine total gross demand.

Capture Rates

Apply capture rates to total gross retail spending for each population, to determine how much of total expenditures the project will able to attract. Capture rates are set by evaluating the amount, accessibility, and quality of existing and proposed retail development on the study area’s ability to draw customer expenditures within the context of the larger market.

Projected Retail Demand

Translate capturable expenditures into retail square feet using average sales per square foot by retail category and tenant type, resulting in the projected estimated retail demand for the project currently and projected for the next 5 and 10 years.

Retail Terminology

A healthy, vibrant retail place has all four components

Retail Uses
(considered in quantitative assessment)

Non-Retail Uses
(not considered in quantitative assessment)

GROCERY & SERVICES

Grocery Store
Neighborhood Market
Pharmacy/Drug Store
Dry Cleaner/Laundromat
Tailor/Seamstress
Nail/Hair Salon/Spa
Barber Shop
Fitness

FOOD & BEVERAGE (F&B)

Sit-Down Restaurant
Full-Service Restaurant
Fast-Casual Restaurant
Fast food Restaurant
Carry-out Restaurant
Ice Cream Shop
Coffee Shop
Cafe

GENERAL MERCHANDISE

Home Goods & Improvement
Furniture Store
Clothing Store
Electronics Store
Pet Store
Sports Store
Book Store
Music Store

NON-RETAIL USES

Given their extraordinary nuance, ancillary tenants (e.g. financial, educational, religious, governmental institutions, etc.) and entertainment establishments (e.g. arcades, movie theaters, bowling alleys, pickle ball, escape rooms, etc.) are considered to be non retail uses and are not factored into the quantitative retail demand model or included in retail demand calculations.

Project Understanding

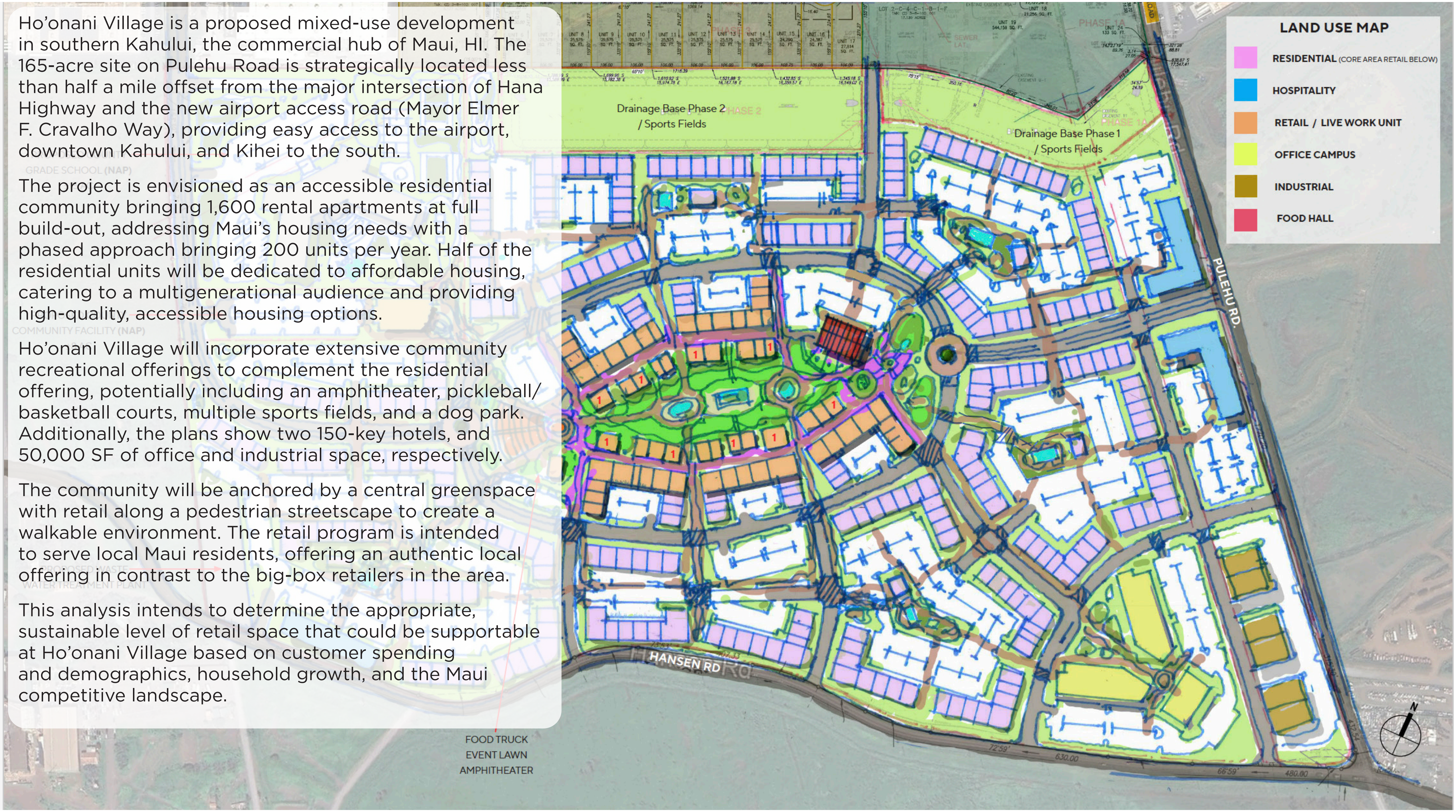
Ho’onani Village is a proposed mixed-use development in southern Kahului, the commercial hub of Maui, HI. The 165-acre site on Pulehu Road is strategically located less than half a mile offset from the major intersection of Hana Highway and the new airport access road (Mayor Elmer F. Cravalho Way), providing easy access to the airport, downtown Kahului, and Kihei to the south.

The project is envisioned as an accessible residential community bringing 1,600 rental apartments at full build-out, addressing Maui’s housing needs with a phased approach bringing 200 units per year. Half of the residential units will be dedicated to affordable housing, catering to a multigenerational audience and providing high-quality, accessible housing options.

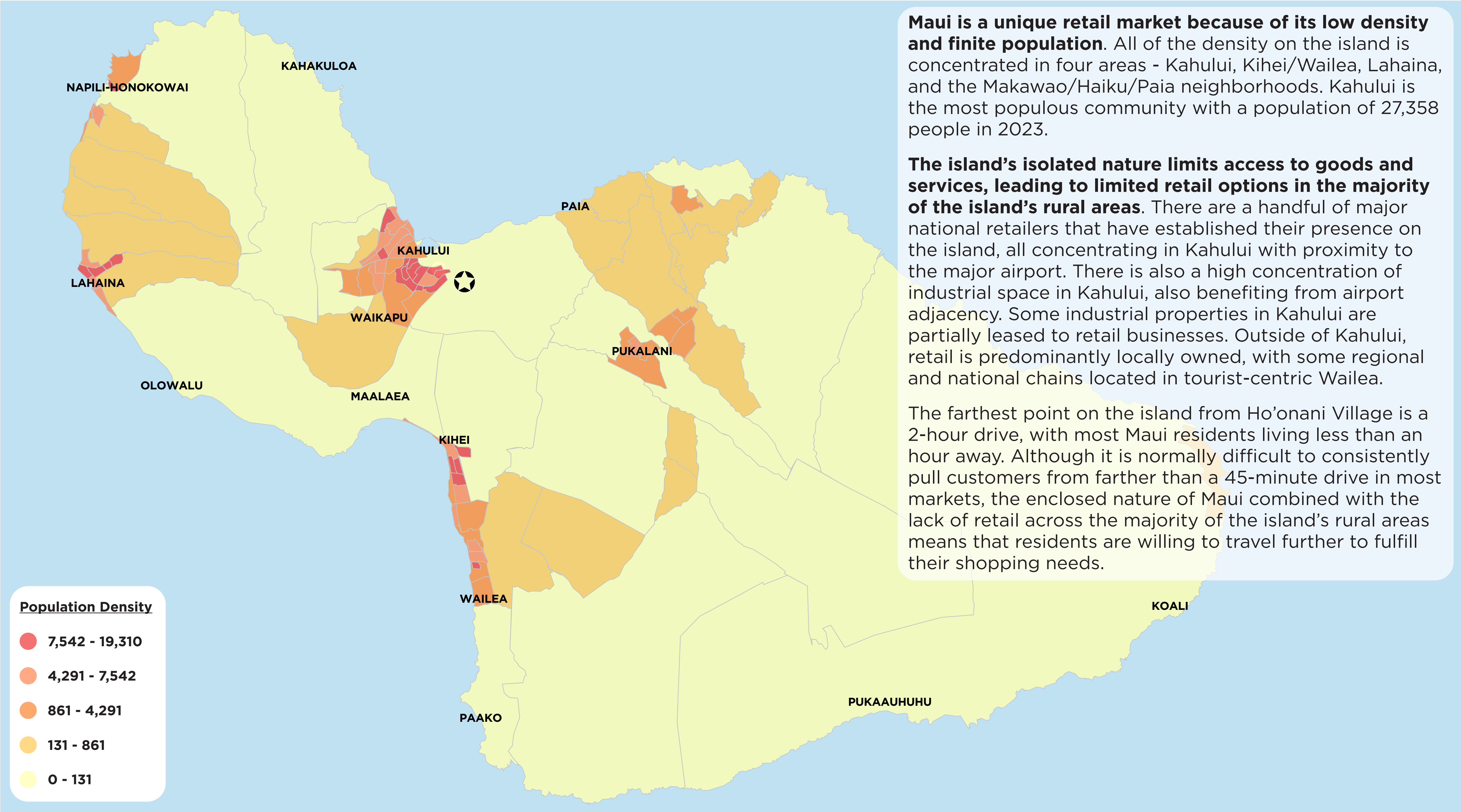
Ho’onani Village will incorporate extensive community recreational offerings to complement the residential offering, potentially including an amphitheater, pickleball/basketball courts, multiple sports fields, and a dog park. Additionally, the plans show two 150-key hotels, and 50,000 SF of office and industrial space, respectively.

The community will be anchored by a central greenspace with retail along a pedestrian streetscape to create a walkable environment. The retail program is intended to serve local Maui residents, offering an authentic local offering in contrast to the big-box retailers in the area.

This analysis intends to determine the appropriate, sustainable level of retail space that could be supportable at Ho’onani Village based on customer spending and demographics, household growth, and the Maui competitive landscape.



Maui Market Context



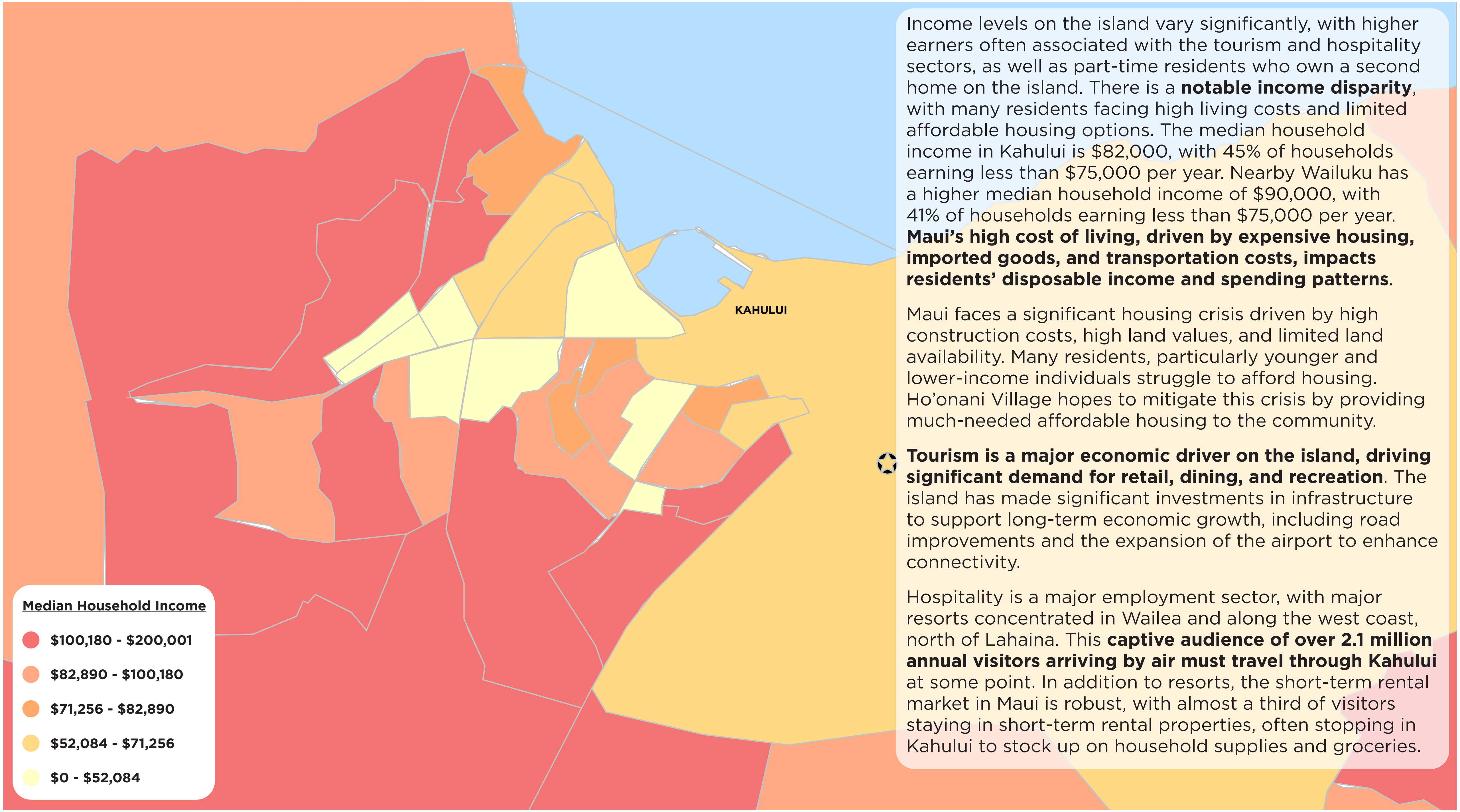
Maui is a unique retail market because of its low density and finite population. All of the density on the island is concentrated in four areas - Kahului, Kihei/Wailea, Lahaina, and the Makawao/Haiku/Paia neighborhoods. Kahului is the most populous community with a population of 27,358 people in 2023.

The island's isolated nature limits access to goods and services, leading to limited retail options in the majority of the island's rural areas. There are a handful of major national retailers that have established their presence on the island, all concentrating in Kahului with proximity to the major airport. There is also a high concentration of industrial space in Kahului, also benefiting from airport adjacency. Some industrial properties in Kahului are partially leased to retail businesses. Outside of Kahului, retail is predominantly locally owned, with some regional and national chains located in tourist-centric Wailea.

The farthest point on the island from Ho'onani Village is a 2-hour drive, with most Maui residents living less than an hour away. Although it is normally difficult to consistently pull customers from farther than a 45-minute drive in most markets, the enclosed nature of Maui combined with the lack of retail across the majority of the island's rural areas means that residents are willing to travel further to fulfill their shopping needs.

SOURCES: ESRI, US Census 2023, Hawaii Tourism Authority

Economic & Market Context



Income levels on the island vary significantly, with higher earners often associated with the tourism and hospitality sectors, as well as part-time residents who own a second home on the island. There is a **notable income disparity**, with many residents facing high living costs and limited affordable housing options. The median household income in Kahului is $82,000, with 45% of households earning less than $75,000 per year. Nearby Wailuku has a higher median household income of $90,000, with 41% of households earning less than $75,000 per year. **Maui's high cost of living, driven by expensive housing, imported goods, and transportation costs, impacts residents' disposable income and spending patterns**.

Maui faces a significant housing crisis driven by high construction costs, high land values, and limited land availability. Many residents, particularly younger and lower-income individuals struggle to afford housing. Ho'onani Village hopes to mitigate this crisis by providing much-needed affordable housing to the community.

Tourism is a major economic driver on the island, driving significant demand for retail, dining, and recreation. The island has made significant investments in infrastructure to support long-term economic growth, including road improvements and the expansion of the airport to enhance connectivity.

Hospitality is a major employment sector, with major resorts concentrated in Wailea and along the west coast, north of Lahaina. This **captive audience of over 2.1 million annual visitors arriving by air must travel through Kahului** at some point. In addition to resorts, the short-term rental market in Maui is robust, with almost a third of visitors staying in short-term rental properties, often stopping in Kahului to stock up on household supplies and groceries.

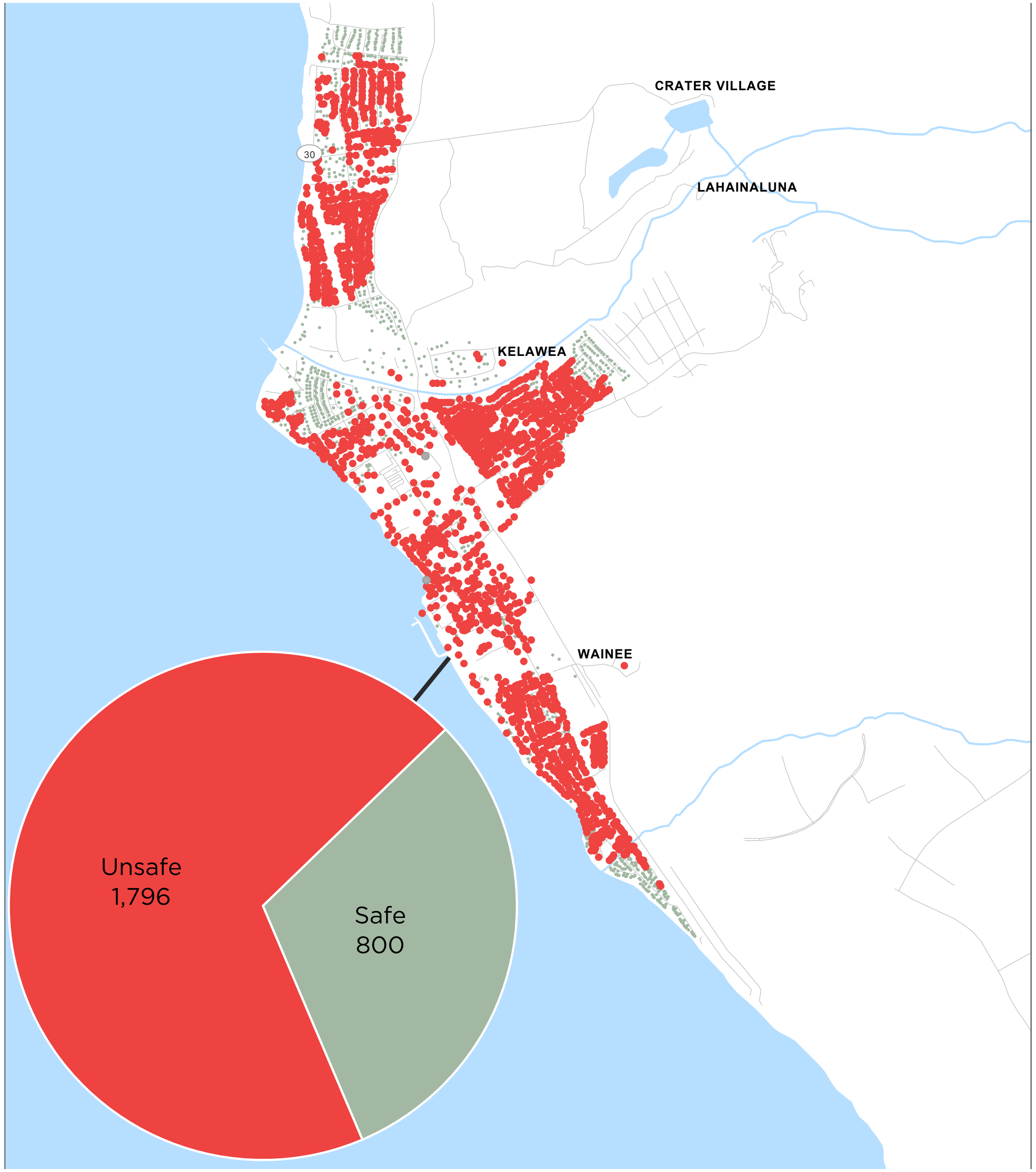
SOURCES: ESRI, US Census 2023, Hawaii Tourism Authority

Lahaina Fire impacts

The Lahaina fire in August 2023 dramatically impacted Lahaina and Maui overall. The third largest community on the island after Kihei and Kahului, Lahaina had a population of about 12,000 before the fire, the majority being displaced. **About 80% of the community was destroyed by the fire, which included 550,000 SF of retail space in downtown Lahaina**. Before the fire, Lahaina had one of the strongest retail environments on the island, with a walkable downtown along Front Street, a food truck park, the Wharf Cinema Center, and the Old Lahaina Shopping Center.

Two neighborhood-serving shopping centers in northern Lahaina, the Lahaina Cannery Mall, and Lahaina Gateway, survived the fire, reopening in Q1 2024. With the majority of retail space destroyed, residents living in the Lahaina region must travel to other retail nodes on the island to shop and fulfill daily needs.

As of the writing of this report, 95% of residential and 82% of commercial owners of properties affected by the fire have submitted right-of-entry applications. This is a positive indicator that the majority of property owners are committed to returning to their properties when they are able. However, the **recovery is still in an early stage**, with cleanup underway. **At this stage, it is not possible to determine what a revitalized Lahaina will look like, or the exact timeline for rebuilding**. However, it is unlikely that the retail that was destroyed will be fully rebuilt within the ten-year time horizon of this analysis.



SOURCES: CoStar, Maui Recovers

Retail Demand Assessment

Competitive Analysis Process

Due to the complexity and unique aspects of the Maui retail market, Streetsense took a layered approach for the competition analysis. Our analysis starts by looking at the retail environment in Kahului more granularly, as competition adjacent to Ho'onani Village will have the greatest impact on capturable demand. The analysis will then consider the retail landscape on the island as a whole beyond Kahului, and then will assess competition among nontraditional retail operators.

Regional and Local

Local Kahului Retail Landscape

Assessment of retail centers in Kahului that will directly compete with Ho'onani Village for both local customer spending as well as Maui-wide customer dollars, that are drawn to the area because of the density of retail.

Grocery

Local Kahului Grocery Environment

The local grocery environment will be highlighted separately and will consider both smaller local operators and big-box national chains. These competitive sites will have the strongest impact on Ho'onani Village's ability to attract grocery spending from across the island.

Regional and Local

Regional Competition - Outside of Kahului

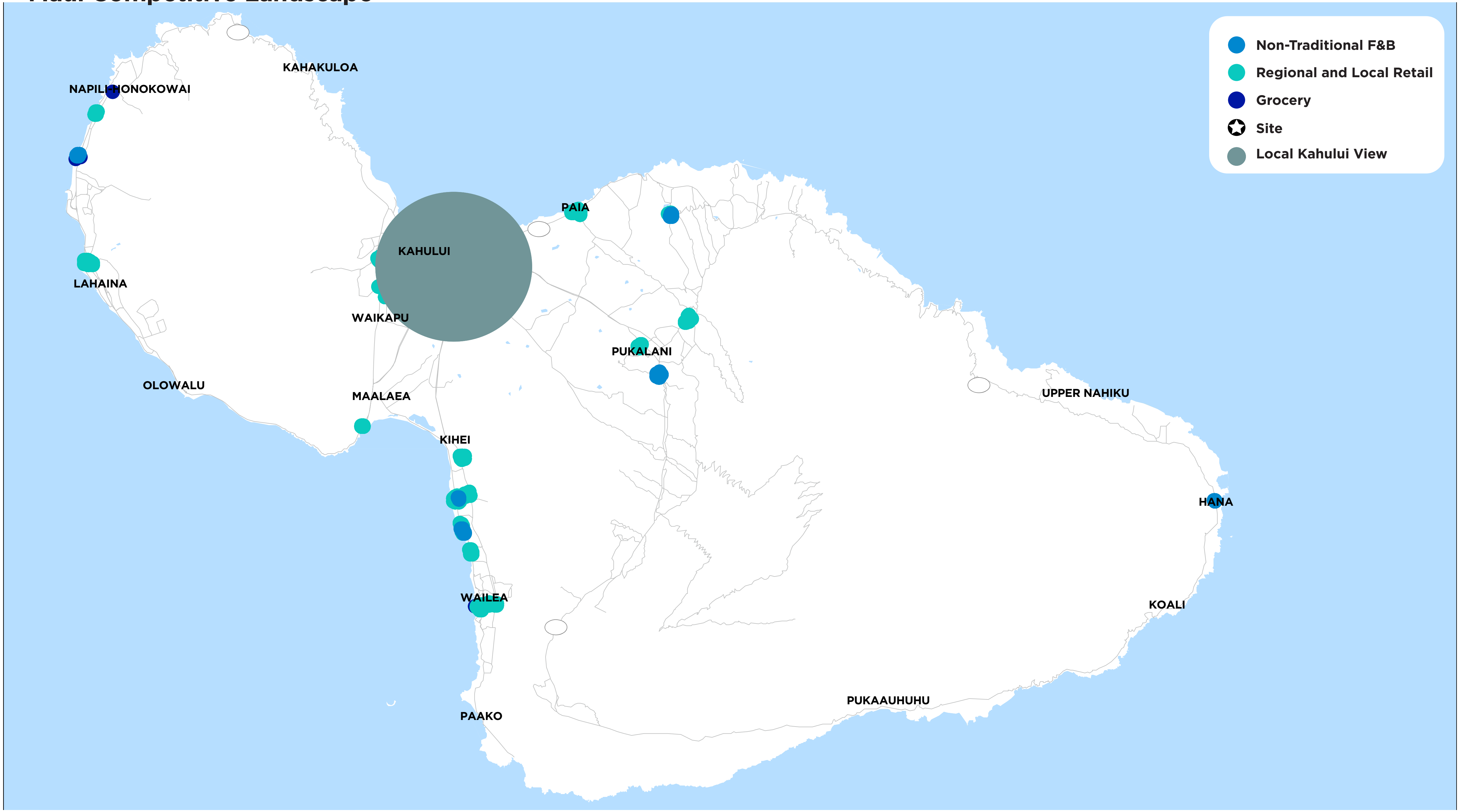
This section will account for traditional retail environments that are outside of Kahului, including centers and downtown environments. The quality and positioning of these sites will inform how trade areas outside of Kahului are formed.

Non-Traditional Retail

Non-Traditional Retail Environments

Nontraditional retail environments include food halls, food trucks, and farmer's markets. These environments often have an outsized customer draw due to their unique offerings or periodic operating schedules. Food truck parks will be highlighted in particular due to their prevalence across the island.

Maui Competitive Landscape



Kahului Retail Landscape

Competition in Kahului predominantly consists of big box retailers and power centers that serve populations across the island, attracted to the density of offerings. Retail in Kahului also benefits from its location next to the airport, attracting visitors as they arrive on the island.

Puunene Shopping Center is the newest on the island, delivering in 2015-2017. Anchored by Target, the center offers generic mass market retailers like Ulta Beauty, Planet Fitness, and Chick-fil-A, adjacent to Home Depot, Lowes, and Walmart centers. The center has experienced some vacancy, currently with a vacant 25,000 SF junior anchor.

Maui Marketplace is anchored by a Barnes & Noble and Office Max. The center has suffered elevated vacancy since the delivery of Puunene, totaling 136,000 SF available for lease. Plans are being implemented to revitalize the center, and specialty grocer Seafood City recently signed a deal for one of the anchor spaces.

Maui Mall Village stands out as a walkable environment with a central square, benches, and wayfinding signage. However, the Village's last major renovation was in 1995, with 18,000 SF total available for lease.

Queen Ka'ahumanu Center is an aging mall that has had difficulty attracting visitor traffic due to its distance from the airport. The mall has high vacancy, with 26% of retail space marketed as available, including a 77,000 SF Sears anchor. The mall also has multiple office tenants such as accountants and recruitment centers, indicating difficulty attracting retail tenants to fill space.

SOURCES: CoStar, Streetsense Research

Kahului Retail Landscape

Lack of strong retail environments in Kahului:

- Retail competition in Kahului is dense, but there is a lack of cohesive, inviting environments
- Puunene Village has island-wide customer draw but is a generic power center
- Kahului lacks a truly walkable downtown
- Adjacency to the airport is critical to driving foot traffic and visitation
- New airport access road improved airport connectivity and shifted retail landscape, leading to the relocation and expansion of Walmart followed by several other retailers
- Increased vacancy among spaces located off the main arteries
- Maui Mall Village and the Queen Ka’ahumanu Mall are aging and have elevated vacancy
- Stronger environments exist outside of Kahului but their tenanting and positioning is geared towards serving visitors over residents

While the dense competition takes away from the retail opportunity at Ho’onani Village, it will benefit from the already high visitation to the area. The poor quality of the retail offerings and environments leaves opportunity for smaller-scale complementary retail with a strong sense of place.


Maui Mall Village


Queen Ka’ahumanu Center

2014 delivery of the highly anticipated shopping center along Mokulele Highway and Hookele Street

Puunene Shopping Center

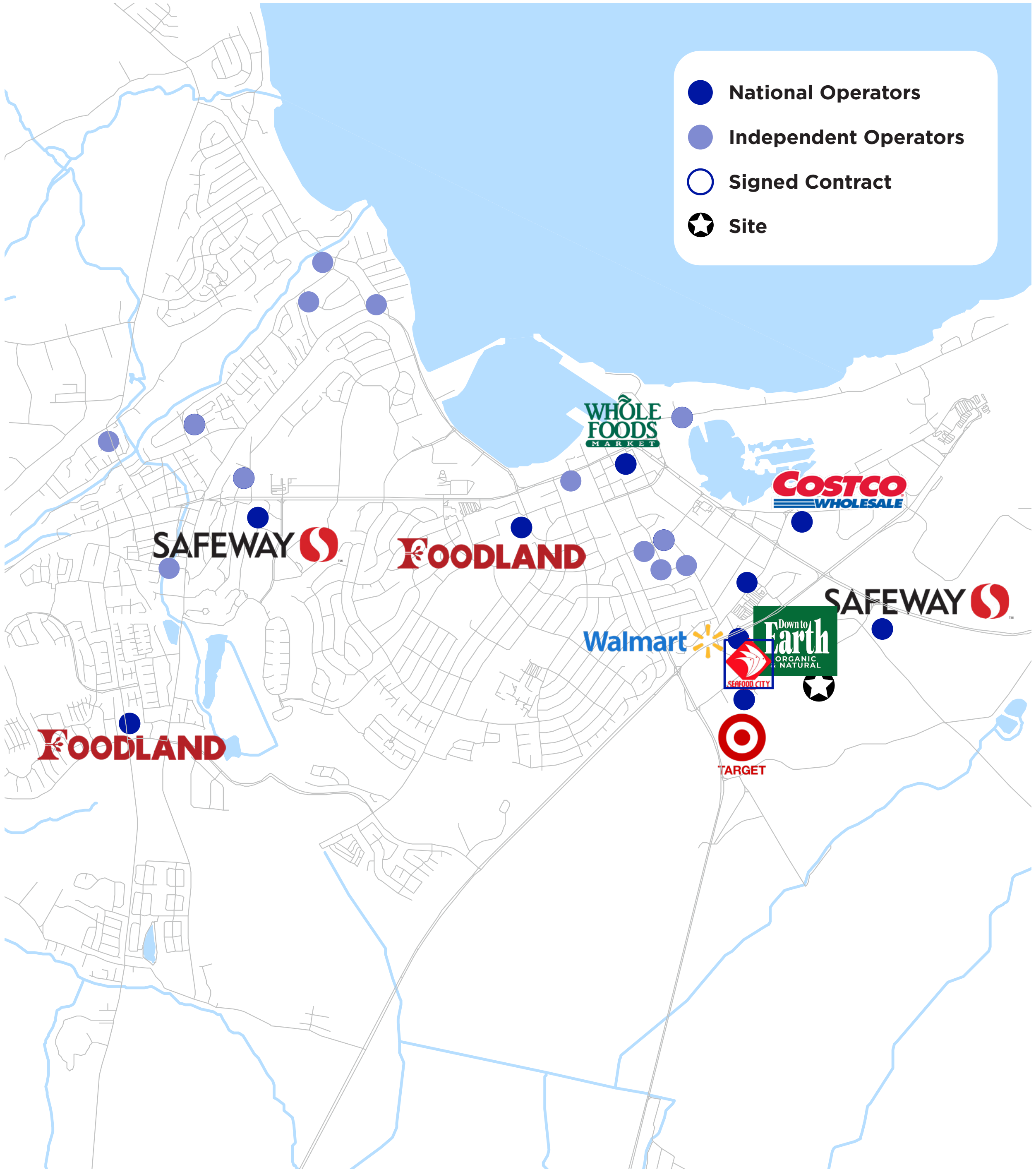
Images Sourced from Costar

Kahului Grocery Landscape

Saturated Grocery Market:

- Maui grocery competition is dense and highly varied, representing an array of operators from budget options to a Whole Foods, as well as 12 independent local operators
- Target, Walmart and Safeway (delivering in 2019 directly northeast of the site) surround and are directly adjacent to Ho'onani Village, satisfying a range of island residents' grocery needs
- Costco's position near the airport ideally places it to attract visitors for a pre-vacation grocery run
- Whole Foods will be difficult to outcompete for a high-end organic food market, coupled with local chain Down to Earth, and the two open-air markets
- Seafood City will make the immediate grocery environment even more crowded, adding a fifth grocery option within less than a five-minute drive

These factors combine to make it unlikely that Ho'onani Village can pull away enough spending from the competition to support even a smaller-format grocer.



SOURCES: CoStar, Streetsense Research

Regional Competition - Outside of Kahalui

Downtown retail offerings, like in Paia and Makwao, are known for their local boutiques and galleries, with limited F&B and grocery options, forcing those residents to travel to Kahului to fulfill their need for grocery and services.

Downtown Wailuku, Paia and Makawao

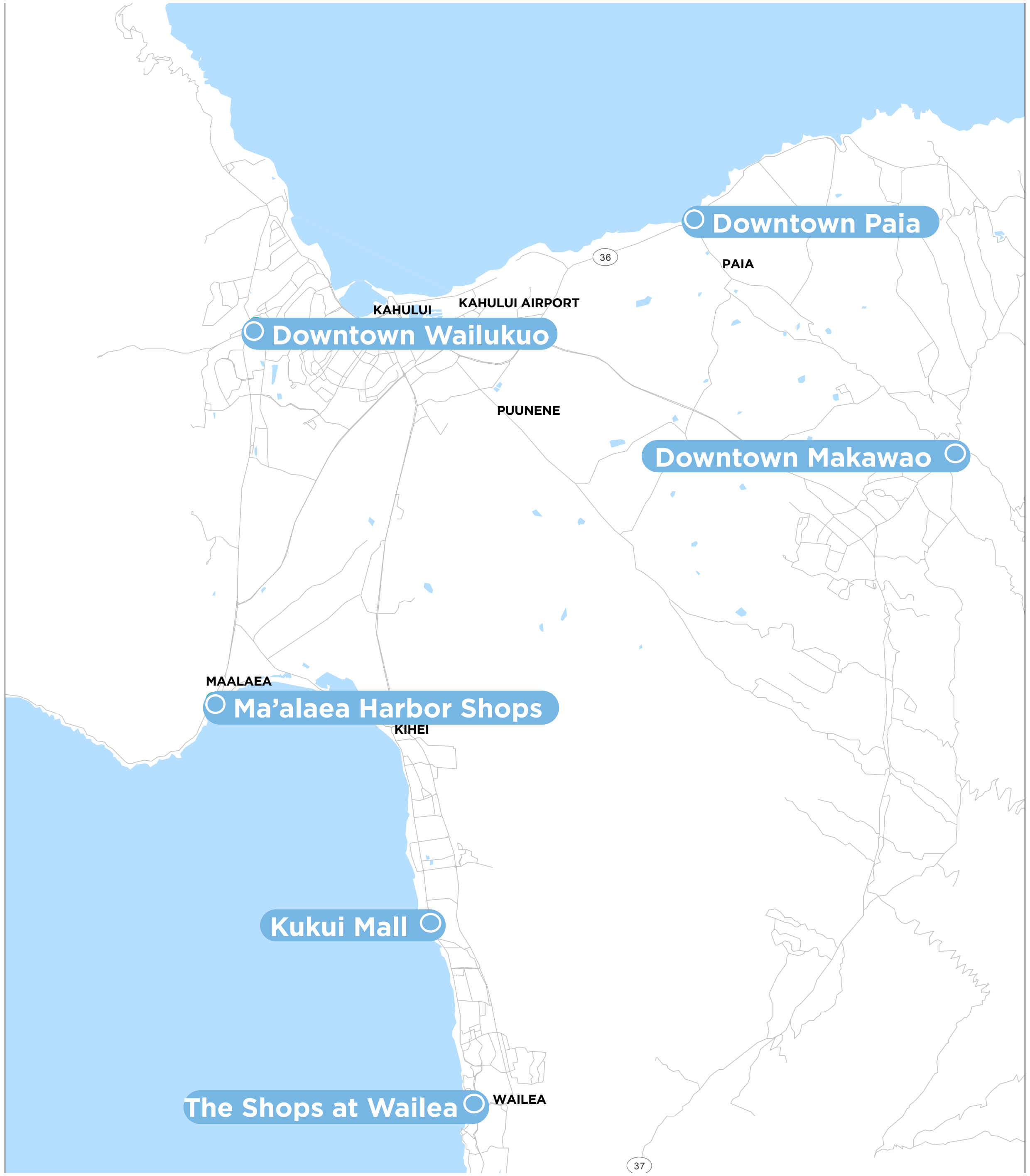
- Dominated by local businesses
- 50%+ businesses are general merchandise
- Prevalence of women's apparel and art galleries
- F&B and grocery options are limited
- High vacancy - Paia 11%

Lahaina area residents have lost significant retail due to the fires. Although a handful of grocery-anchored retail centers have reopened in north Lahaina, residents living on the west coast of Maui are traveling to Kahului periodically for larger shopping trips.

Tourist-serving retail

Ma'alaea Harbor Shops and The Shops at Wailea primarily serve tourists, offering luxury shopping, resort-wear and upscale dining. These environments are well-tenanted and walkable, but do not adequately fulfill the needs of the local community.

The devastating destruction of Lahaina's downtown retail has left a major void on the island for a walkable, place-based retail environment. By curating an authentic and locally-tenanted retail program that resonates with all underserved Maui residents, Ho'onani Village has the opportunity to become the island's community gather hub.



SOURCES: CoStar, Streetsense Research

Non-Traditional F&B Environments

Maui hosts numerous non-traditional retail environments, including food truck parks, farmer's markets, and other open-air markets. These are some of the island's most active retail offerings celebrating the island's diverse cuisines and serving as community hubs, while offering flexibility to local operators.

Food Trucks

Food truck culture is particularly strong, with numerous small food truck parks scattered across the island. There are five notable larger food truck parks that host at least five trucks, two of which are in Kahului, serving as direct F&B competition to Ho'onani Village.

Plate Lunch Marketplace is the more established of the two and includes some amenities like picnic tables and a large central tent. The **Costco food truck park** was established at the Costco parking lot in 2021, benefitting from the high foot traffic. That increased traffic is appealing to operators, attracting several popular Maui food truck operators to expand their operations, opening second trucks at the Costco location. Although much smaller and offering no amenities or infrastructure, there is also **a small food truck park active within the Home Depot parking lot**.

All of these locations are well-situated in highly trafficked locations, attracting both visitors flying into the island and locals shopping at existing retail. This indicates the importance of a steady flow of foot traffic to support the success of local entrepreneurs.

Similarly, the **Honoapiilani Food Truck Park** is well-positioned near resort hotels and has also seen an influx of patrons from Lahaina since the fire. **Kihei has two major food truck parks**, the larger and newer of which is at South Maui Gardens.

SOURCES: CoStar, Streetsense Research, GITNUX

Non-Traditional Retail Market

Farmer’s Markets & Open Air Markets

Kahului hosts **two farmer’s/open-air markets** that are each active on Saturdays and Sundays, respectively. These markets give local vendors the opportunity to sell fresh produce, handmade crafts, and local delicacies that resonate with locals, but also attract visitors looking for an authentic Maui experience. Retailers that are beloved by locals often appeal to visitors, expanding the customer base and driving success to business owners.

Both markets are conveniently located near the waterfront, with the Maui Swap meet being directly adjacent to The University of Hawaii Maui College, serving yet another customer base.

Hotel & Resort F&B

Hotels and resorts on the island often incorporate some level of retail catering to the captive tourist customer base, often offering a restaurant program, depending on the size and scale of the hotel or resort. Most full-service dining offerings in Maui are located within a hotel or resort, with limited standalone dining concepts. Larger resorts often supplement the offering with a mix of luxury boutiques, gift shops, and specialty shops.

Food Halls

There are no operating food halls on Maui, creating the opportunity to build upon and complement the existing food truck scene and foster entrepreneurship on the island. The growing popularity of food halls has spread to Hawaii’s island of Oahu, with numerous food halls throughout Honolulu.

There are numerous operating models for food halls, some of which serve as incubators, offering low barriers to entry for local operators. Food halls in the continental US average 10,000 to 12,000 SF, encompassing both operator stalls and common areas. A food hall of this scale typically generates $8 million in total annual sales. There are no true food halls on Maui that will compete with Ho’onani Village, which provides the opportunity to support one onsite.

Maui Swap Meet

The Restaurant at Hotel Wailea

Images Sourced from Afar Media and Hotel Wailea

F&B Market Considerations

Opportunity for F&B in both brick-and-mortar and food truck formats:

- Brick-and-mortar restaurants in Kahului are frequently located in industrial properties or generic strip centers, which can detract from the customer experience.
- Existing downtown environments are very focused on general merchandise rather than F&B, requiring local residents to travel for diverse food options.
- Kahului hosts two of the island's largest food truck parks, benefitting from foot traffic to Costco but lacking a cohesive and comfortable dining environment.
- Despite their popularity, food truck parks mainly offer quick-service options and do not entirely fulfill the need for sit-down restaurants or fool halls.

Development Potential:

- Unique Dining Experience: Ho'onani Village presents an opportunity to create a unique, first-to-market food hall restaurant program to fill the void on the island.
- Purpose-Built Food Truck Area: There is potential to attract food trucks to a dedicated, purpose-built area within Ho'onani Village, providing a more structured and appealing environment compared to existing locations like Home Depot parking lot.
- A food hall with a central commissary kitchen creates additional opportunity to support the island's strong entrepreneurial spirit, offering new and existing small operators the opportunity to grow in a brick-and-mortar space, expand their existing food truck business, and/or provide catering services to diversify their revenue base.

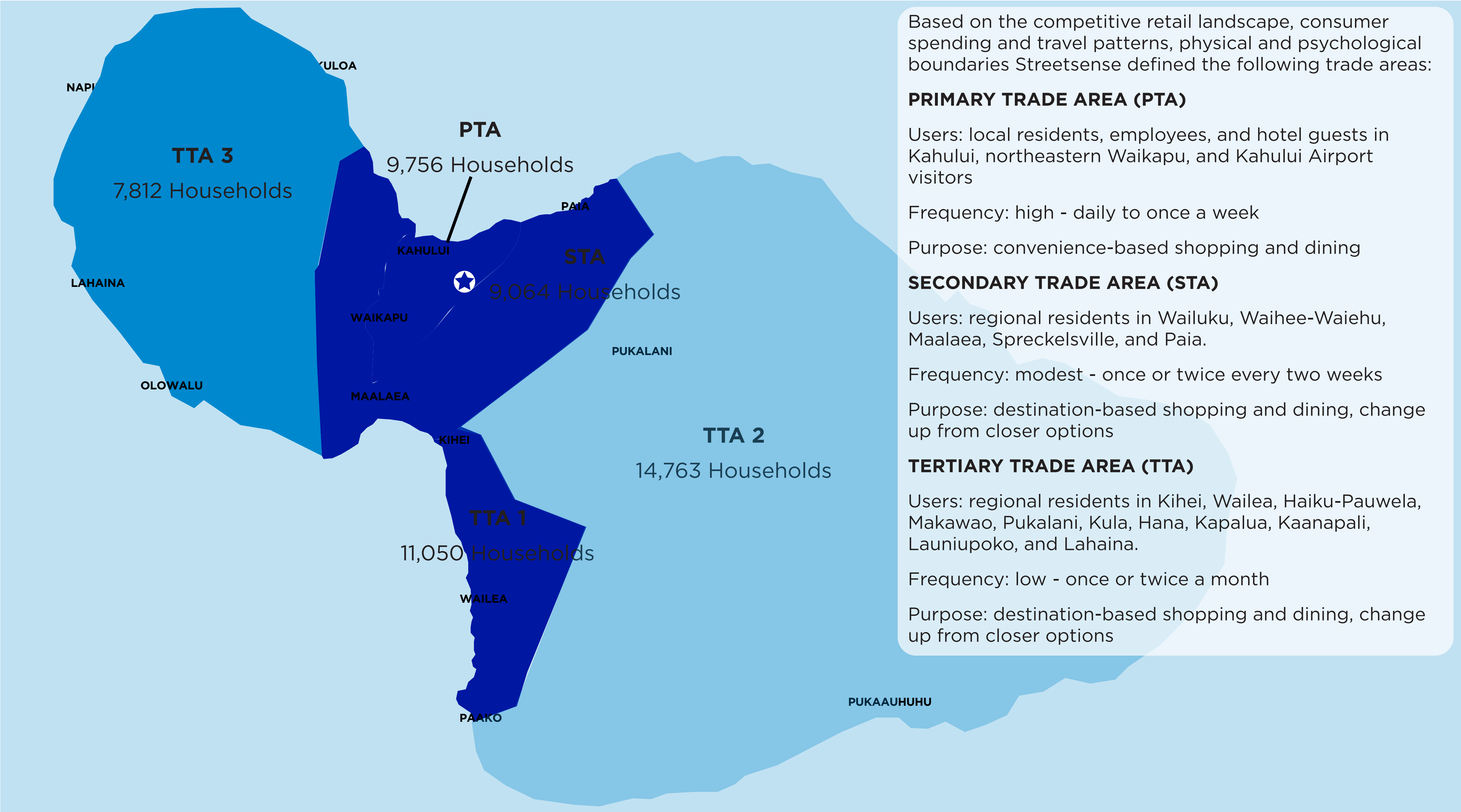
Jack's Inn Restaurant

© The Hawaii Vacation Guide

Place Lunch Marketplace

Images Sourced from Costar and The Hawaii Vacation Guide

Retail Trade Areas



Based on the competitive retail landscape, consumer spending and travel patterns, physical and psychological boundaries Streetsense defined the following trade areas:

PRIMARY TRADE AREA (PTA)

Users: local residents, employees, and hotel guests in Kahului, northeastern Waikapu, and Kahului Airport visitors

Frequency: high - daily to once a week

Purpose: convenience-based shopping and dining

SECONDARY TRADE AREA (STA)

Users: regional residents in Wailuku, Waihee-Waiehu, Maalaea, Spreckelsville, and Paia.

Frequency: modest - once or twice every two weeks

Purpose: destination-based shopping and dining, change up from closer options

TERTIARY TRADE AREA (TTA)

Users: regional residents in Kihei, Wailea, Haiku-Pauwela, Makawao, Pukalani, Kula, Hana, Kapalua, Kaanapali, Launiupoko, and Lahaina.

Frequency: low - once or twice a month

Purpose: destination-based shopping and dining, change up from closer options

Customer Profile

Understanding the demographic and psychographic profile of customers within the trade areas dictates the type of retail that would resonate with Ho'onani Village's customer base. Ultimately, retail spending levels among these customer groups drive retail demand on the site.

Trade Area / Statistic	PTA	STA	TTA 1	TTA 2	TTA 3
Households	9,756	9,064	11,050	14,763	7,812
Median Age	41	41	45	44	43
Average Household Size	3.4	3.1	2.5	2.8	3.0
Households with Children	34%	32%	24%	28%	26%
Median Household Income	$82,908	$91,497	$82,875	$89,215	$84,746
Average Household Retail Spending	$24,501	$24,794	$25,614	$26,246	$26,301

Key Takeaway

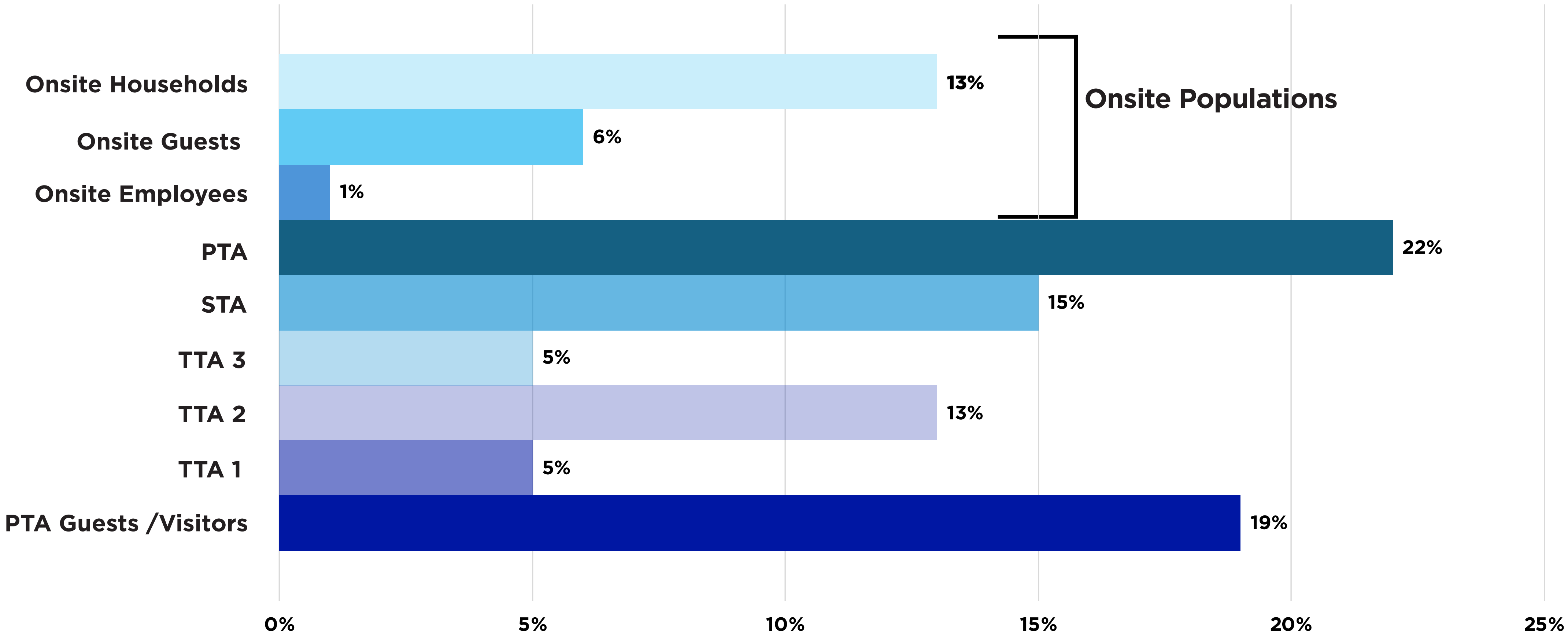
Household density is low island-wide, which limits total retail spending from locals. Residents also tend to be older, with median ages across the trade areas higher than the US median age of 39. Family households are in the majority and there is a high proportion of children. This is especially the case within the PTA and STA, which indicates the opportunity for family-friendly offerings and children's apparel. Median household incomes across the trade areas are relatively higher than the US median of $74,580, with the STA and TTA2 achieving the highest incomes. However, retail spending is restricted by the high cost of living on the island. Although the STA has the highest median household income, it has the second lowest average household retail spending, after the PTA.

SOURCES: Sitewise, US Census

2034 **Customer Segmentation**

The most successful retail environments appeal to a spectrum of users, serving a diverse customer base that creates consistent daypart activity to the community driving the success of businesses. It is important to identify the entire customer spectrum, analyzing each customer segment's wants and needs and prioritizing in a way that yields an experience equally magnetic to all users (albeit for different reasons). This approach will maximize Ho'onani Vilage's appeal and subsequent productivity.

2034 Demand Generator Breakdown



Key Takeaway

Rather than being primarily driven by one customer segment, capturable retail demand at Ho'onani Village comes from multiple populations. The largest tranche of demand (22%) is driven by PTA residents, however hotel guests within the PTA and island visitors drive significant sales potential, contributing 19% of the total retail demand. It is critical to create a place that first and foremost serves the local Maui community by making the retail accessible and inviting so that it becomes a local staple on the island. By creating a welcoming and authentic retail environment that serves both locals and visitors, local operators will thrive, driving long-term economic growth for the asset and the Maui community overall.

SOURCES: Sitewise, Streetsense Research

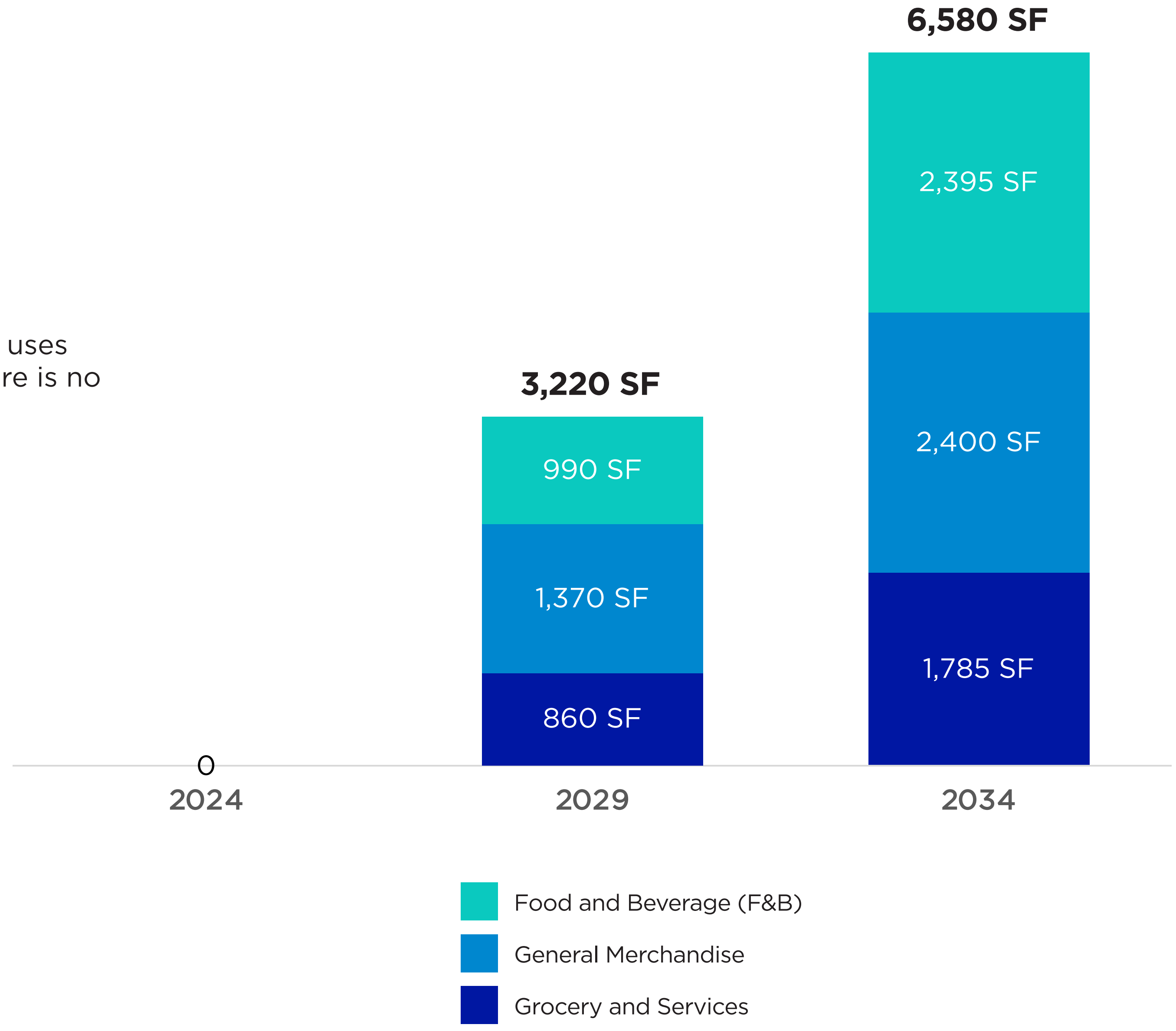
Demand from Onsite Populations

The proposed onsite development program at Ho’onani Village consists of the following program by 2034.

- 1,600 residential units
- 50,000 SF of office
- 50,000 SF of industrial and
- 300 hotel keys

For the purposes of this analysis, it is assumed that half of the proposed uses will be delivered by 2029. Because the site is currently undeveloped, there is no onsite demand in 2024.

Onsite Retail Demand (SF)



Key Takeaway

Because onsite residents will be Ho’onani Village’s most immediate customers, onsite residents have the highest level of spending capture. However, even the significant development program that is in place units only generates 6,580 SF of total retail demand at full build-out.

To achieve a robust retail program and highly vibrant and active environment, Ho’onani Village needs to attract spending from island residents living outside the Village and visitors to Maui.

SOURCES: Sitewise, Streetsense Research

Retail Scenarios

Streetsense assessed two development scenarios to understand the retail opportunity at Ho’onani Village.

Scenario 1 is based on the current plans showing retail located in the center of the residential community, creating a greater barrier for customers outside of the development to shop and dine.

In **Scenario 2**, greater emphasis is placed on attracting Maui residents as well as vacationers. An important factor for retail to thrive in a mixed-use environment include a strong sense of arrival and tenant visibility, which will be more difficult to achieve if retail is more centrally located in the development. By placing retail closer to Pulehu Road, Ho’onani Village’s offerings will feel less “walled in” and more open to the community beyond the development itself. This will also assist with tenant attraction, as tenants frequently demand a degree of roadside visibility. By shifting the retail core, the site will be better positioned to attract and retain both customers and tenants without sacrificing the envisioned mixed-use, pedestrian only environment.

Retail Scenarios

As part of our analysis, Streetsense considered two potential scenarios.

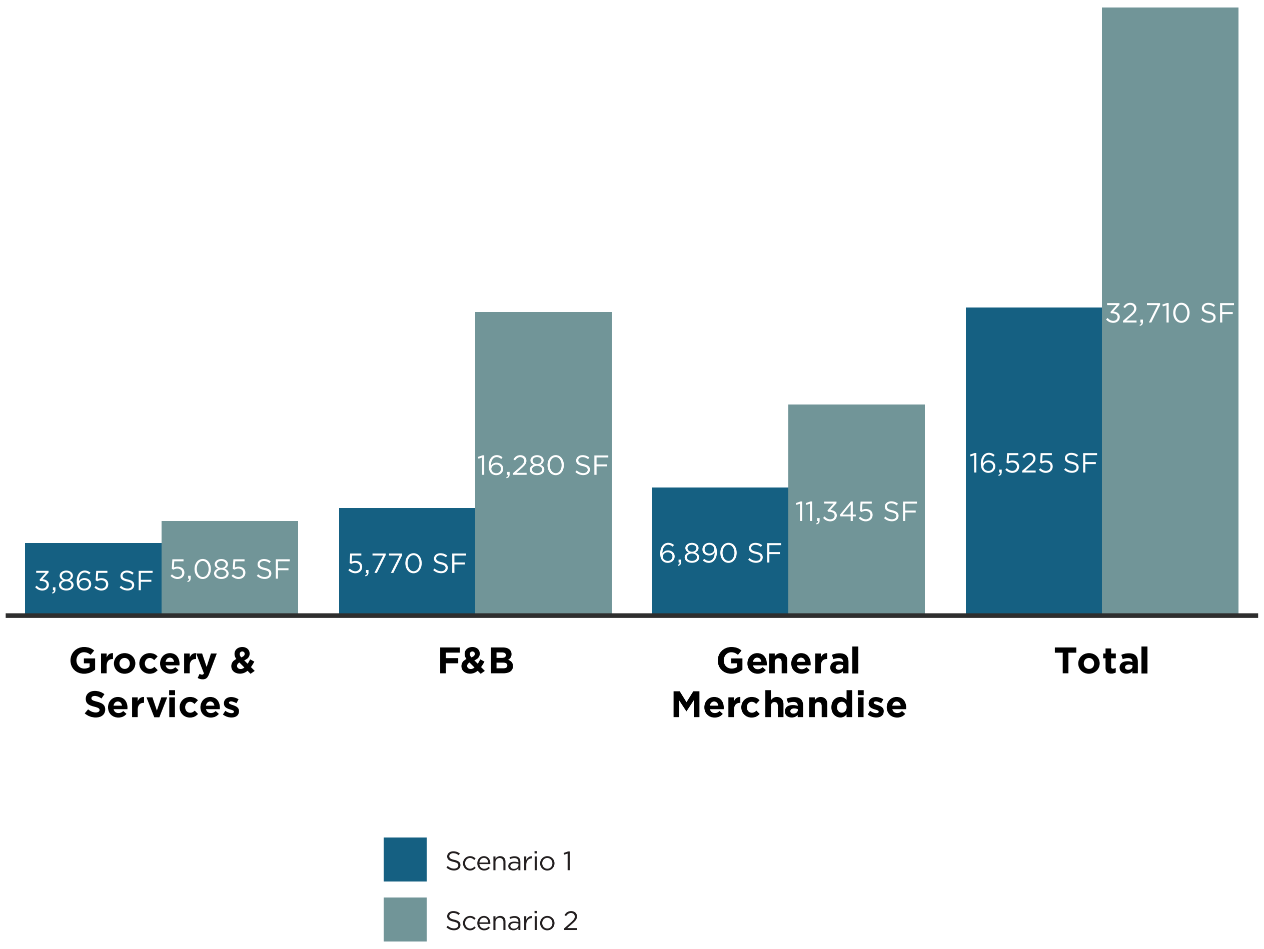
In **Scenario 1**, Streetsense assumed that the final build-out of Ho'onani Village would be similar to the plans depicted on page 5 of this document, with retail centrally located within the residential community. In this scenario retail at Ho'onani Village primarily serves onsite and Kahului residents, with less emphasis on attracting patronage from vacationers or residents living further out on the island, thereby capturing a smaller audience base and ultimately less retail demand, amounting to a total 16,525 SF in 2034.

Scenario 2 is reflected in the 32,710 SF of total capturable demand by 2034 presented in the Total Demand Projections. This scenario assumes that the walkable retail environment is placed closer to and facing Ho'okele Street or Pulehu Road. **Streetsense does not recommend placing retail directly on the street - rather the planned pedestrian-only environment should be shifted closer to the site's access points to facilitate customer draw and tenant visibility.**

Key Takeaway

Total demand in 2034 will be reduced by 16,185 SF in Scenario 1. F&B and General Merchandise are the most heavily impacted categories, with F&B demand being cut down by nearly two-thirds.

2034 Demand Scenario Comparison



SOURCES: Sitewise, Streetsense Research

Total Retail Demand Projections: Scenario 2

The site can currently support 23,985 SF of retail, growing to 32,710 SF over the next 10 years due to household growth on the island and the delivery of the onsite residential program bringing 1,600 additional captive households.

Based on consumer spending, local and regional retail competition, and projected household growth, the site can support the following:

$21,957,214 total captured annual expenditures

This translates to **32,710 SF total retail demand**

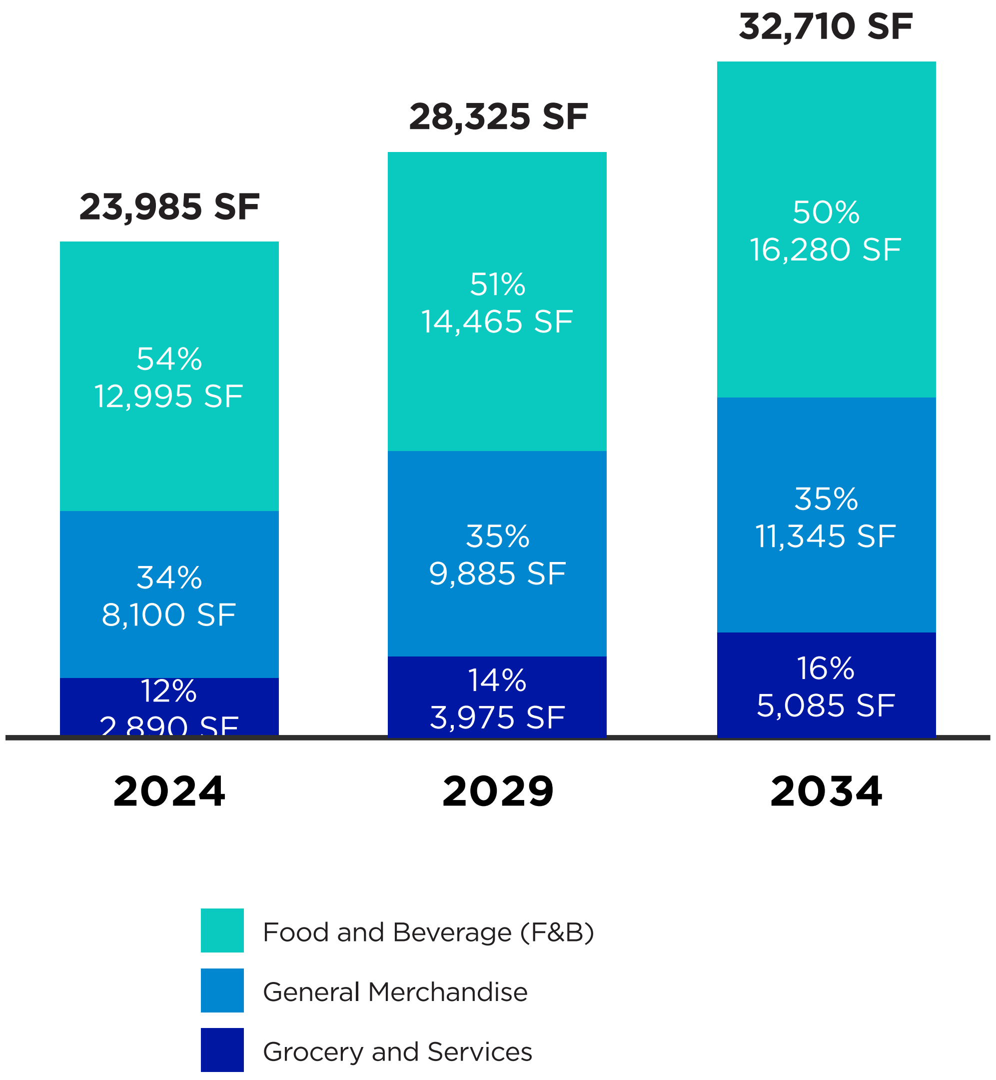
Grocery & Services Opportunity - 5,085 SF

Grocery & Services demand is limited by the density of a variety of grocery competition, despite the shortfalls of individual competitive sites. With this level of demand, a full-service grocery store or larger-format pharmacy is not supportable onsite. However, there is sufficient demand for a small convenience store, as well as personal services that serve as an amenity to future onsite residents, driving value to the residential program.

General Merchandise Opportunity - 11,345 SF

General Merchandise demand is more substantial, although is still limited by the density of competition within Kahului. There is sufficient demand for a moderate program primarily consisting of apparel and home furnishings. However, due to the site's direct adjacency to big-box retailers, local and specialty operators should be targeted in order to stand out from the more generic offerings provided by Target, Lowes, Home Depot and Walmart.

Total Demand Projections



SOURCES: Sitewise, Streetsense Research, CBRE

F&B Opportunity & Recommendations: Scenario 2

There is total $12.3 million in capturable F&B spending, this roughly equates to 16,280 SF of F&B demand. Given the nontraditional operations and footprints of food halls and food trucks, some of the recommendations are based on capturable sales volumes, while brick and mortar restaurant recommendations are expressed in square footage.

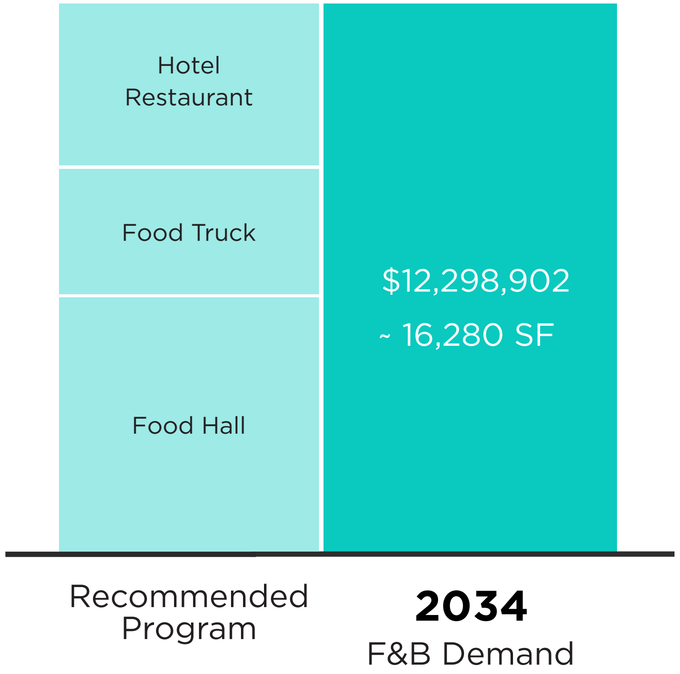
The following represent Streetsense recommendations for a potential F&B program based on the identified demand, conversations with local brokers, hospitality consultants and former operators, and our understanding of the market dynamics. These recommendations are not prescriptive, leaving flexibility based on the ongoing evolution of the site plan and market trajectory. Ultimately, our recommendations show a balance between

- Brick and mortar hotel restaurant
- Food truck
- Food hall

Brick And Mortar Recommendations

In order to support onsite hotel guests, **Streetsense recommends that 3,500 - 4,000 SF of F&B demand goes towards brick-and-mortal sit-down restaurant within the proposed hotels**. We do not recommend stand-alone brick-and-mortar restaurants beyond the hotel offering - remaining F&B demand will be met by the food truck park and food hall.

Food & Beverage Total Capturable Retail Spending



SOURCES: Sitewise, Streetsense Research, CBRE

F&B Opportunity & Recommendations

Food Truck Recommendations

According to CBRE research, some of the highest-performing food trucks on the island draw in $360,000 in net sales per year, with moderately performing trucks generating $250,000 in sales. **Streetsense recommends an initial program of 8 food trucks with flexibility to expand the park as the site establishes itself in the community, growing demand over time**.

There is an opportunity to pull food trucks away from the Home Depot and Lowes parking lots, which currently host four trucks collectively. Although these trucks have direct access to customers currently, they are not in an attractive, place-based environment that Ho'onani Village could foster. There is also opportunity to relocated food trucks that previously operated in the Lahiana Food Truck Park, formerly one of the island's largest and most successful food truck locations that has since been displaced by the fire.

The inclusion of an amphitheater will also help drive customers to both the food hall and food truck park. However, even high-performing Live Nation venues generally host 30 events per year, so amphitheater events should not be relied on too heavily as a source of F&B spending.

SOURCES: Sitewise, Streetsense Research, CBRE

F&B Opportunity & Recommendations

Food Hall Recommendations

This opportunity assumes the client’s current operating plans, which follows a revenue share model, with a larger shared commercial kitchen and smaller prep areas within each stall, and shared seating. A shared commercial kitchen is a great advantage, because it can be used by food truck operators as well.

Streetsense recommends an average-sized food hall consisting of 9 food stalls, with each stall 400 - 600 SF, equating to approximately 3,600 - 4,500 SF for stalls total.

It is important to note that generally food halls’ performance is driven by alcohol sales, with food sales on their own taking years to break even in many cases. As such, **we recommend a central bar serving the entire food hall that supplements the operator’s revenue share**.

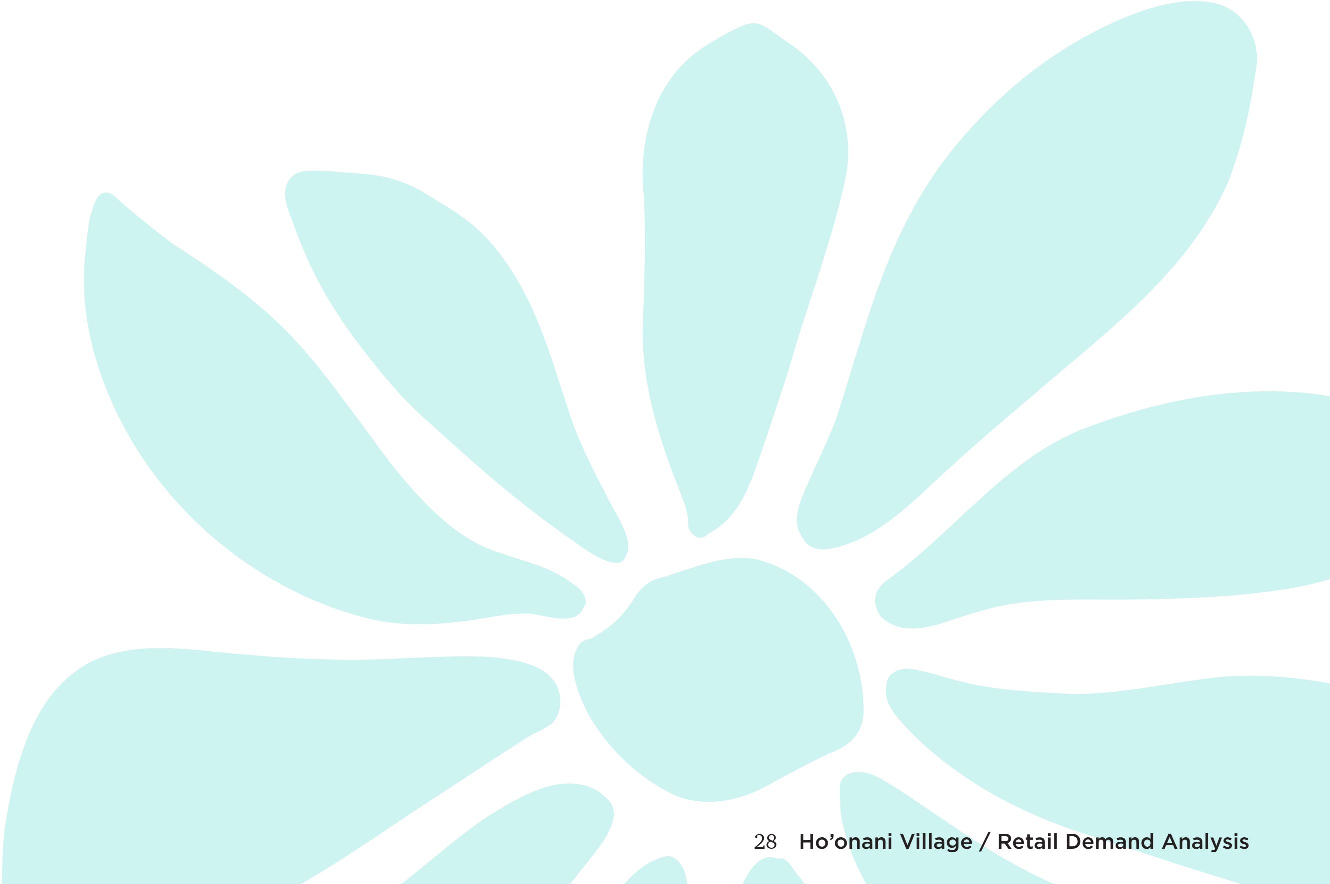
Spacial recommendations for the seating area and shared commercial kitchen vary drastically depending on the specifics of the operations, and will need to be assessed in a more nuanced approach. However, the typical shared kitchen occupies between 2,500 - 5,000 SF, depending on the specifics of the operating models.

The **development can be flexible with limited indoor seating areas by leveraging the adjacent food truck park and creating more outdoor seating areas. Operable storefront/garage doors can help maximize seating capacity with a lower development risk**. This also creates a comfortable indoor-outdoor flow for customers access and are recommended for this project.

Potential Operators

There are numerous very successful food truck operators on the island that could also be attracted to opening additional locations onsite to benefit from access to the food halls’ shared kitchen, creating opportunities to diversify their revenue streams by offering catering services or occupying a food hall stall at a fixed location onsite.

There is also opportunity to pull former Lahaina operators that have been displaced by the fires, providing them with operating and kitchen spaces while recovery efforts are ongoing. This will also serve to attract Lahaina customers who have lost their favorite local spots.



SOURCES: Sitewise, Streetsense Research, CBRE

Thank You

STREETSENSE

APPENDIX ‘E’ – SCOPING MEETING NOTICE PACKET

PIONEER DESIGN GROUP - HAWAIʻI

LEHUA
BUILDERS

February 14, 2025

RE: NOTICE OF A PUBLIC SCOPING MEETING FOR ENVIRONMENTAL IMPACT STATEMENT REVIEW PROCESS

PROPOSED DEVELOPMENT: Hoʻonani Village Mixed Use Development

To Whom It May Concern:

Lehua Builders is representing the developer, Hoʻonani Village LLC., who will be submitting an Environmental Impact Statement Preparation Notice (EISPN) to the County of Maui for the proposed Hoʻonani Village Development. The project site is currently addressed as 21 Hansen Road, Kahului, HI 96732 and is a portion of existing TMK (2) 3-8-006:004. Hoʻonani Village LLC. is seeking early involvement and consultation with Federal, State, and Local government agencies, and the local community of nearby landowners.

You are invited to attend a public scoping meeting at which the preliminary plan for the proposed development will be discussed. The purpose of this meeting is to provide a forum for the applicant and the interested parties to review the proposal and have a discussion regarding any comments or concerns that they may have. Notices of the public scoping meeting will also be published in The Environmental Notice that is released twice a month.

For your convenience, the scoping meeting will be held at the following location:

March 27, 2025
Above The Wave
400 Hana Hwy, Ste B1
Kahului, HI 96732
6:00pm - 8:00pm

We request notification whether you plan to attend the meeting in person so we can plan the conference space accordingly. Please respond to **Krysti Bukoski at 808-669-1122 by March 20, 2025,** and indicate the number of people who plan to attend.

Enclosed is a Scoping document that briefly describes the proposed project. Please note that these plans are preliminary and are subject to change throughout the review process. Also enclosed for your use is a comment form if you are unable to attend. Written comments and recommendations may be sent to the following address or via email by close of business on **April 28, 2025.**

Krysti Bukoski / Lehua Builders

395 Dairy Road, Suite E
Kahului, HI 96732
Email: krysti@lehuabuilders.com

If you have any questions regarding the EIS scoping process, please contact T.C. Campbell with Pioneer Design Group – Hawaiʻi at 808-400-5959 or tccampbell@pdg-hawaii.com.

Sincerely,

Sandy Duvauchelle

Sandra Duvauchelle of Lehua Builders

PUBLIC COMMENT FORM

Ho’onani Village Development

Please use the space below to give us your thoughts on the Ho’onani Village Development Project and EIS Review. All written comments should be received by Lehua Builders by close of business on April 28, 2025. Thank you for your interest and assistance with this important community project.

Date___________________________________

Name__________________________________

Address__________________________________

City, State, Zip__________________________________

FIGURE 6: PRELIMINARY MASTER SITE PLAN

Commercial parcels to be developed concurrently with Multi-family Phase 1 or later.

Ho'onani
Development

PROPOSED MASTER SITE PLAN

Kahului, Maui, Hawaii

Concept Site Plan Study
Proposed Land Use Plan - Option 11

AO Architecture. Design. Relationships.

Scale 1"=300'
Job No. 2023-0690
Date 2024-10-07

FIGURE 2
PROPERTY LOCATION MAP

SOURCE: COUNTY OF MAUI QPUBLIC GIS POWERED BY ESRI.

N

Project
HOONANI VILLAGE
No.
H109-001

Designed by TCC Date 08/2024
Drawn by TCC Date 08/2024
Horiz. Scale: Vert. Scale:
Type PLANNING

PDG
PIONEER DESIGN GROUP – HAWAII LLC
CIVIL ENGINEERING · LAND USE PLANNING
CONSTRUCTION MANAGEMENT
HONOLULU, HAWAII PH: 808.400.5959
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