ROYAL KUNIA PHASE II
SEWER MASTER PLAN UPDATE

Ewa, Oahu, Hawaii

January 16, 2024

PREPARED FOR:

Haseko Royal Kunia LLC
91-1001 Kaimalie Street, #205
Ewa Beach, Hawaii 96706

R. M. TOWILL CORPORATION
SINCE 1930

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(RMTC Ref: 1-23345-00)

EXHIBIT E

ROYAL KUNIA PHASE II

SEWER MASTER PLAN UPDATE

January 16, 2024

Michael H Okamoto 4/30/2024

SIGNATURE EXPIRATION DATE OF LICENSE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.

Prepared by:

R. M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819
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Prepared for:

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Ewa Beach, Hawaii 96706

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1. GENERAL

1.1 Background

Royal Kunia Phase II (RKII) is an approximately 347-acre proposed master planned development and includes the following TMK's: 9-4-002:001, 070, 071, 078 and 079. The proposed development includes commercial and industrial uses, single family and multi-family housing, school, parks, roadways, and utility infrastructure. RKII will include a new sewer system that is intended to be dedicated to the City and County of Honolulu (City).

A Revised Sewer Master Plan for Royal Kunia (revised RKSMP) was prepared by Park Engineering Inc. in May 1996 (See Appendix B). This report updates the RKSMP for RKII.

The proposed sewer master plan for RKII is based on the existing downstream conditions and proposed RKII development plan by Haseko Royal Kunia LLC.

1.2 Objectives and Scope

The objective of this sewer master plan (SMP) is to describe the proposed wastewater improvements needed to support the RKII development.

The scope of this SMP includes RKII improvements within parcels 9-4-002:001, 070, 071, 078 and 079. Offsite developments include the State of Hawaii Department of Agriculture (DOA) 24 single family residential units near the northeast corner of the development, and the Robinson Kunia Land LLC development located east of RKII. The proposed infrastructure shall serve RKII and the offsite developments.

1.3 Project Location

RKII is located within the Ewa District on the island of Oahu and is approximately 1.3 miles north of the H-1 Freeway junction at Kunia Road. The project is located northeast of Kunia Road and north of Anoiki Street. The project site is bounded by agricultural land to the north, Waikele Gulch to the east, Anoiki Street and the Royal Kunia Phase I subdivision (RKI) and the Royal Kunia Country Club golf course to the south, and Kunia Road to the west. See ***Figure 1-1 and 1-2*** for the Regional and Location Map***.***

1.4 Proposed Development

The proposed RKII land uses include single family and multi-family residential, commercial, industrial, school, and parks. The proposed development contains up to 1850 homes, 123.7 acres of commercial and industrial use, 12 acres of schoolgrounds and at least 10 acres of park. See ***Figure 1-3*** for the proposed conceptual development plan.

1.5 Sustainable Communities Plan

The project is located within the City's Central Oahu Sustainable Communities Plan (SCP) boundary. The Central Oahu SCP, dated March 2021 section 4.3.1, indicates wastewater treatment shall follow the following general policies:

- *"All new developments in Central Oahu to be connected to a regional or municipal sewer service system."*
- *"Where feasible, use recycled water recovered from treated wastewater effluent as a source of non-potable water for irrigation and other uses where appropriate and approved by the Department of Health and Board of Water Supply."*
- *"Locate wastewater treatment plants in areas shown as planned for industrial use and away from residential areas shown on the Urban Land Use Map in Appendix A of the SCP"*
- *Use a City review and approval process which provides adequate public notice and input for any major new private wastewater treatment plant. Do not require such comprehensive review and approval for other system elements, such as pump stations and mains.*

The proposed RKII sewer system supports the City's Central Oahu SCP General Policies indicated above.

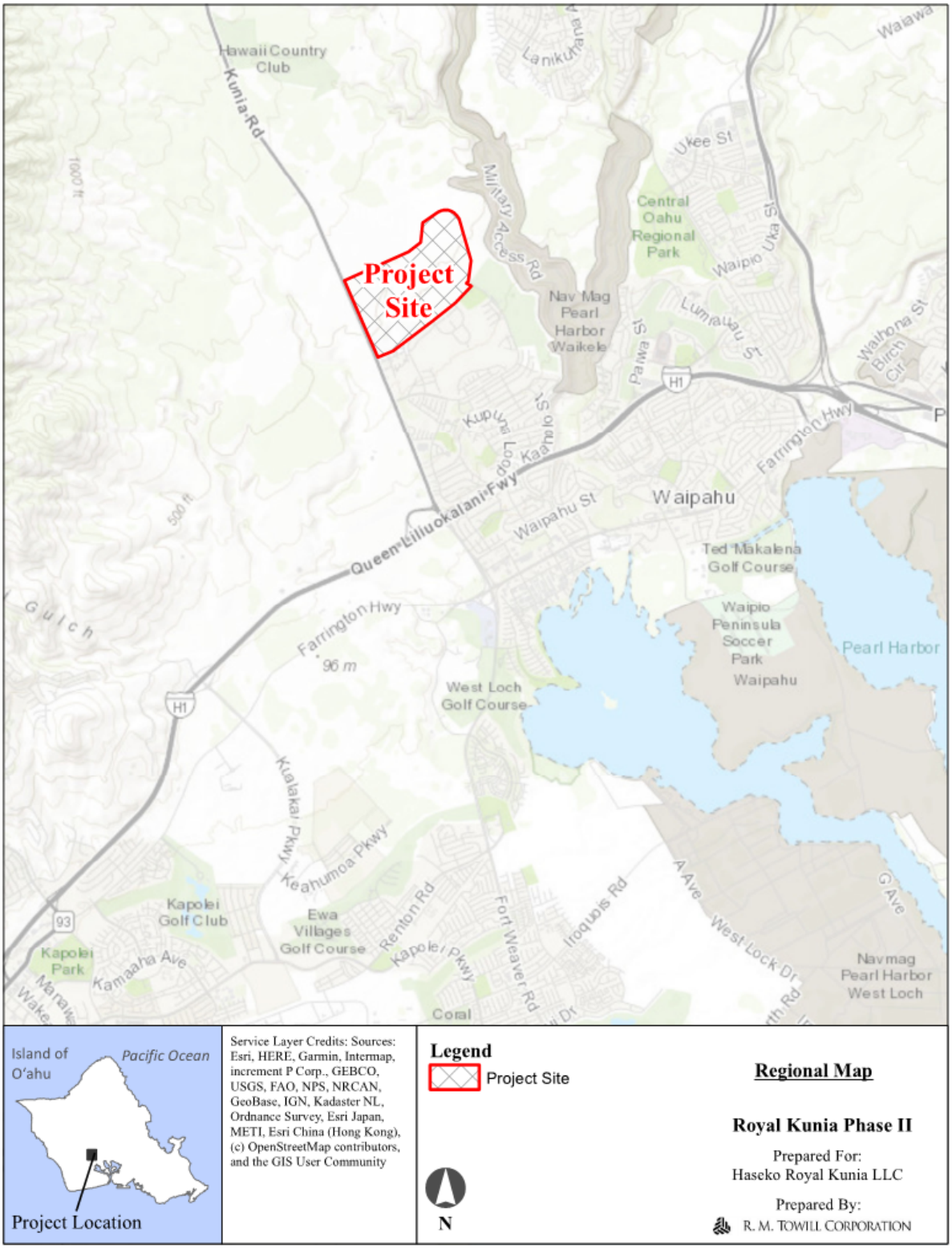


FIGURE 1-1 – Regional Map

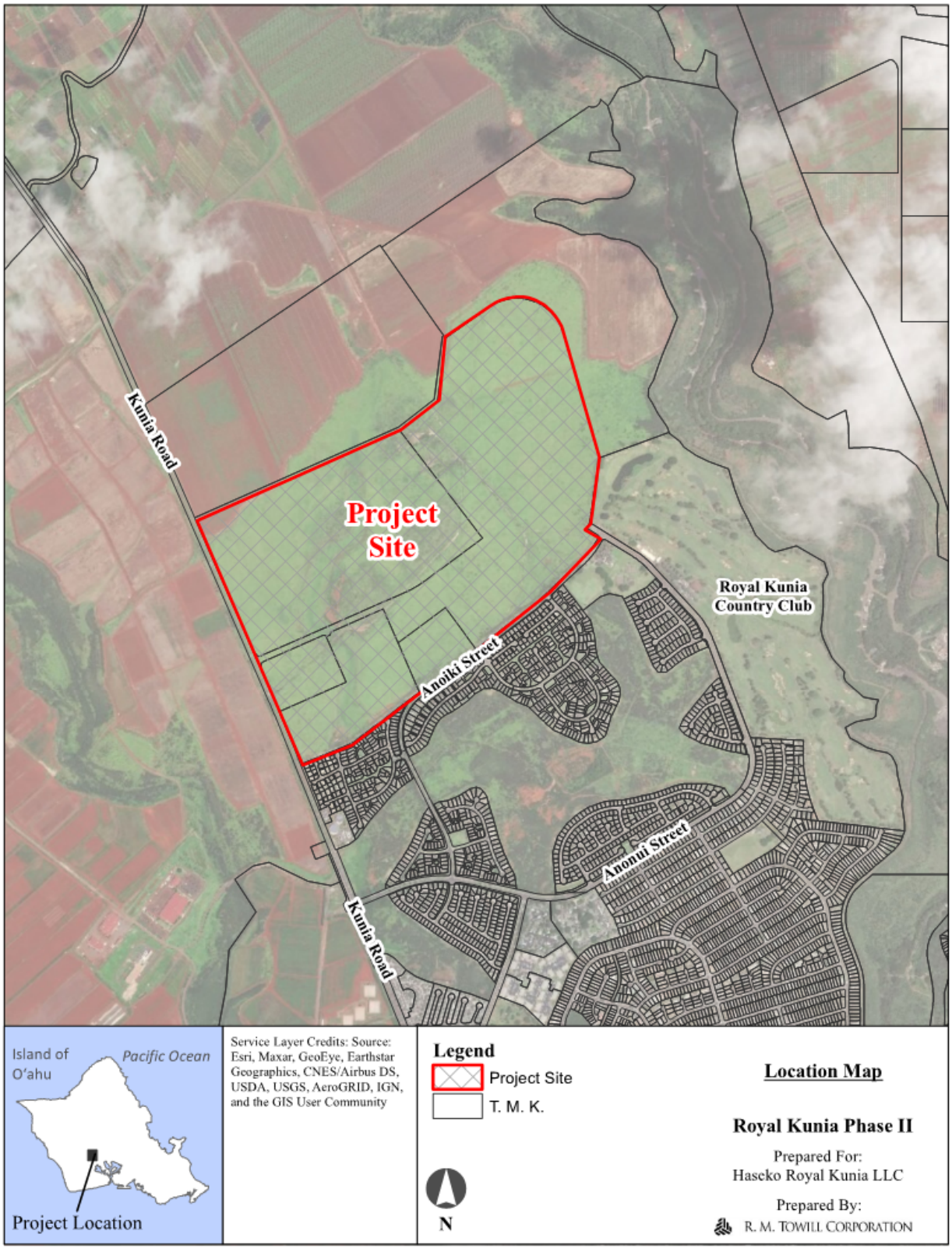
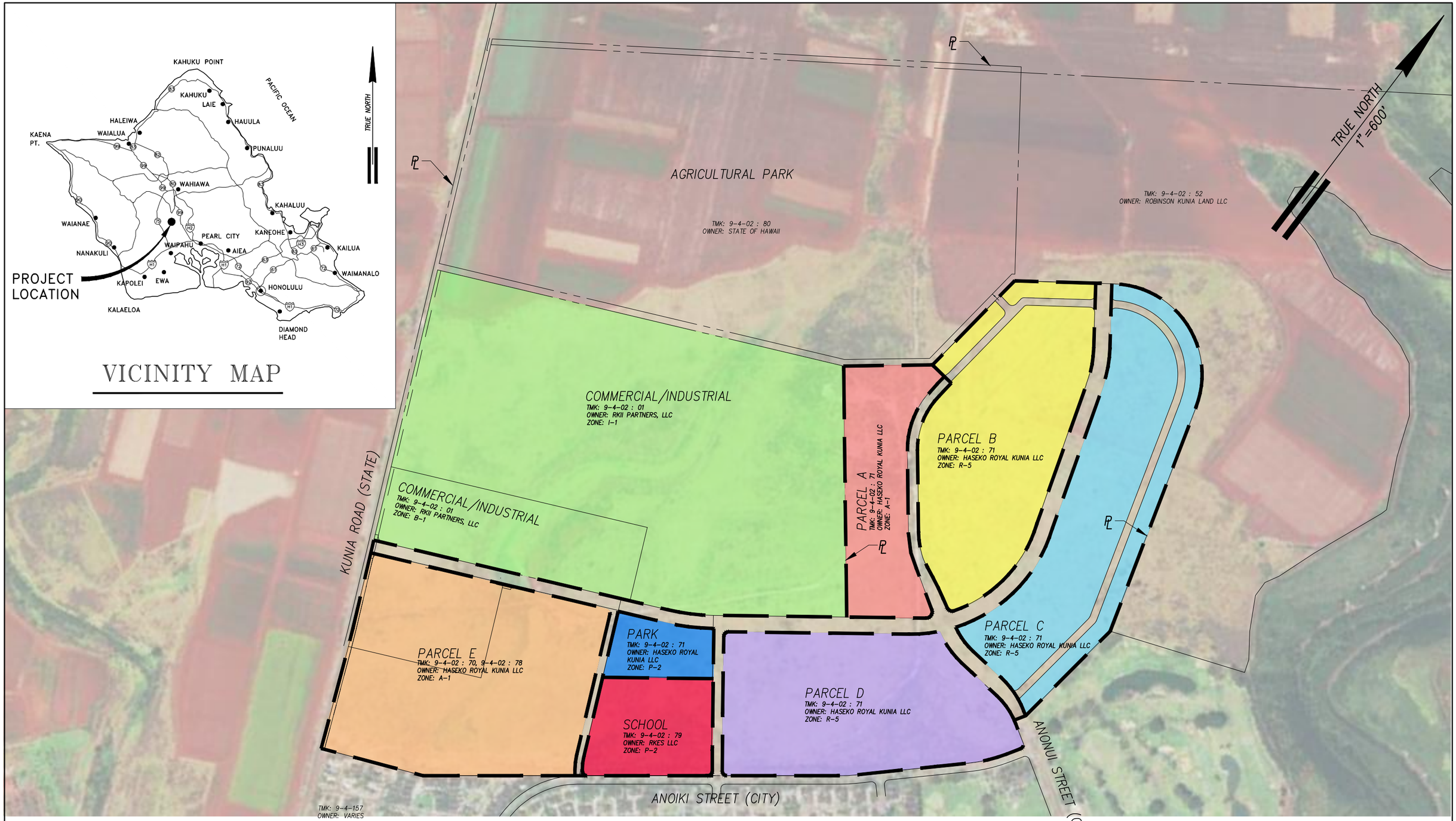


Figure 1-2 – Location Map

VICINITY MAP



Planning – Engineering – Environmental Services – Photogrammetry – Surveying – Construction Management
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600' 300' 0 600' 1200'

SCALE: 1" = 600'

ROYAL KUNIA PHASE II SEWER MASTER PLAN

PROPOSED CONCEPTUAL DEVELOPMENT PLAN

Figure 1-3

2. EXISTING CONDITIONS

2.1 Existing and Surrounding Uses

The existing site is unimproved with ground cover generally consisting of prairie grass, cane grass, and thin stand trees. Existing Improvements adjacent to the site include Kunia Road and the existing RKI subdivision. There are no existing sewer system improvements in the RKII Parcels.

2.2 Existing Topography

The overall terrain of the project site is sloping in the southward direction, with elevations varying from approximately 600 feet above mean sea level (MSL) at the north end of the site to 425 feet MSL at the south end of the site. Overall slopes generally vary between 3% to 5%, with steeper slopes of 30% or greater in the Gulch that runs through the western portion of the site.

2.3 Existing Wastewater Collection System

The existing RKI wastewater infrastructure is designed to accommodate the proposed RKII wastewater flows in accordance with the approved master plans. Three existing stubouts (15-inch, 18-inch and 8-inch) are located along Anoiki Street and one 18-inch stubout is located at Anonui Street. The locations of the stubouts are shown in **Figure 4-1**.

The existing regional wastewater system consisting of 18-inch to 24-inch pipes are designed to convey wastewater flows from RKII, RKI, Village Park, and the west side of Waipahu South to the Waipahu Wastewater Pump Station (Waipahu WWPS) located along Waipahu Depot Street. The Waipahu WWPS pumps collected wastewater southwest to the City's Honouliuli Wastewater Treatment Plant (HWWTP). The existing sewer system is shown in ***Figure 2-1***.

2.4 Existing Wastewater Treatment and Disposal

The HWWTP, located along Geiger in Ewa Beach, treats and disposes all of the wastewater generated by several communities in the Honouliuli sewer basin, including Royal Kunia. The locations of the HWWTP and surrounding WWPS are shown in ***Figure 2-2***. Per the City and County of Honolulu's "Central Oahu Sustainable Communities Plan", dated March 2021, HWWTP has an existing capacity of 38 million gallons per day (mgd).

The "Development Plan Land Use Amendment Application and Final Environmental Assessment for Royal Kunia, Phase II Increment 3" prepared by William E. Wanket, Inc., dated May 1996, indicates that wastewater generated by the project "is expected to be accommodated at the treatment facility [HWWTP] after its expansion is completed in 1997. Thus, the project should not result in a significant impact to wastewater facilities serving the area."

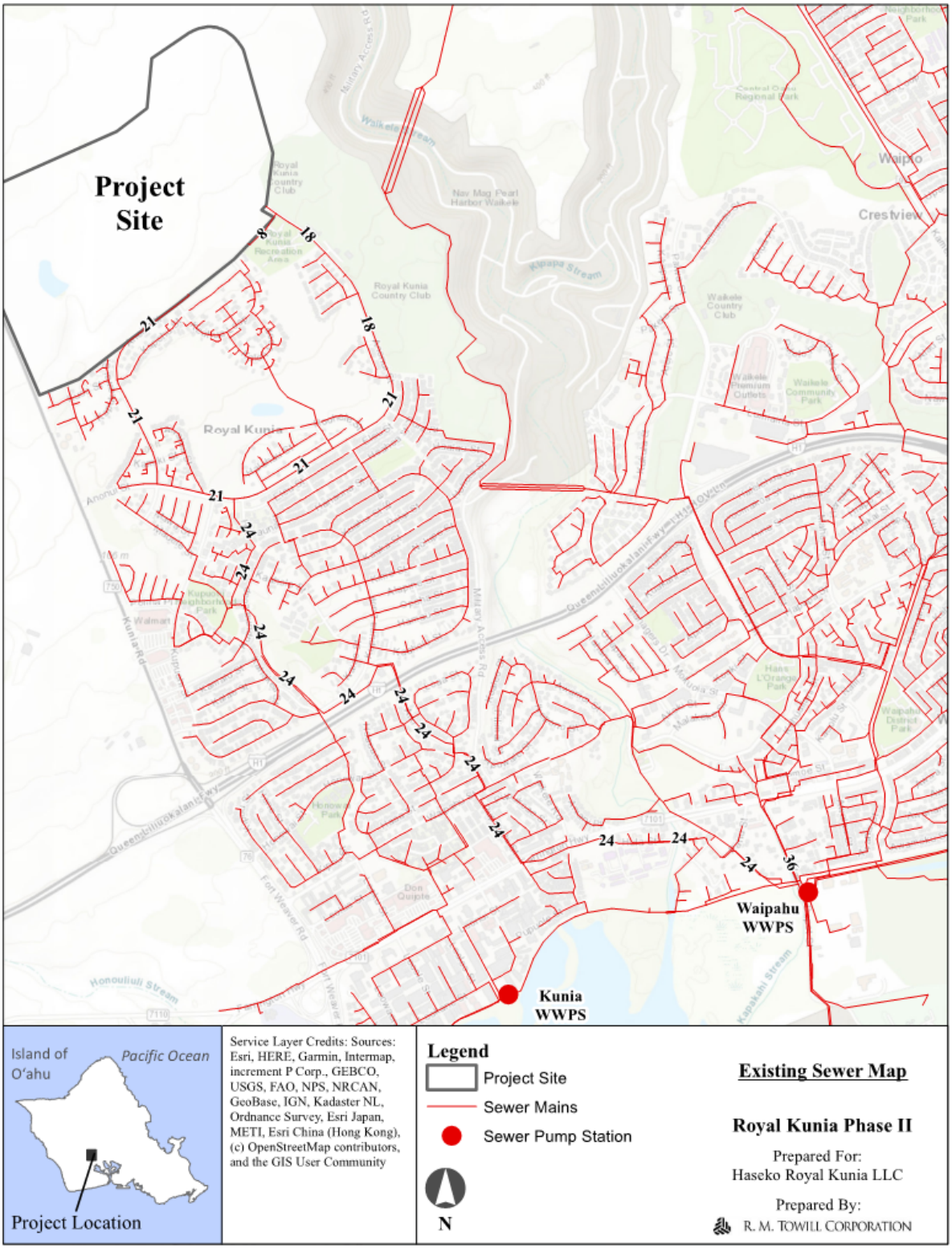

Figure 2-1 – Existing Sewer

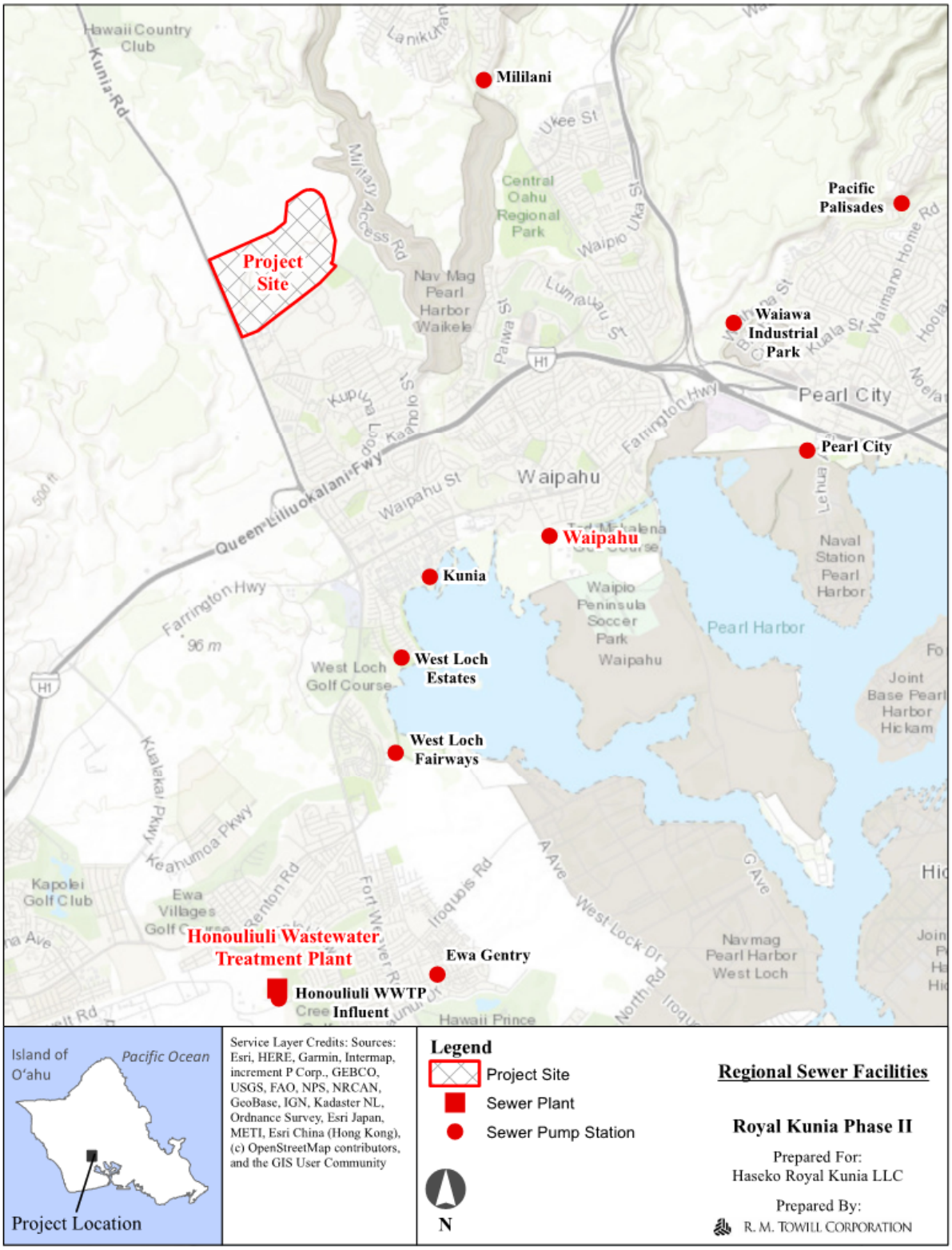

Figure 2-2 – Regional Sewer Facilities

3. CRITERIA AND METHODOLOGY

3.1 Wastewater Flow Criteria

The Royal Kunia Phase II wastewater flows are based on the proposed development plans for the Royal Kunia Phase II project by Haseko Roya Kunia LLC. Proposed wastewater flow estimates and sewer system design will conform with the City and County of Honolulu, Department of Environmental Services, Wastewater System Design Standards, July 2017.

Table 3-1 summarizes the wastewater flow criteria used to compute the wastewater design flows.

Table 3-1: Wastewater Flow Demand Criteria

Wastewater Generation Rates (for computing average daily flow)

Single-Family Residential……..	4 persons/home @ 70 gpcd
Multi-Family Residential…….	2.8 persons/unit @ 70 gpcd
Parks (w/Comfort Station)……..	5 cpa @ 70 gpcd *
Commercial/Industrial……..	100 cpa @ 70 gpcd
Schools……..	25 gpd per Student

* Sewer Demand Rates per Royal Kunia Revised Sewer Master Plan dated May 1996

(cpa = capita per acre)

(gpcd = gallon per capita per day)

Base Sanitary Flow (BSF)= Average daily per capita wastewater flow multiplied by equivalent population.

Peak Base Sanitary Flow (PBSF) = BSF x 2.5

Average Dry Weather Flow (ADWF) = BSF + groundwater infiltration rate

Groundwater Infiltration (GWI) = 35 gallons per capita per day (gpcd)

Peak Dry Weather Flow (PDWF) = PBSF + GWI

Wet Weather Infiltration/Inflow (I/I) = 3,000 gallons per acre per day (gpad)

Design Flow (Q_{DES}) = PDWF + I/I

3.2. Wastewater System Design Criteria

The sewer system will be designed to conform to City's Wastewater System Design Standards and is proposed to be dedicated to the City. Sizes were determined for Polyvinyl Chloride (PVC) C900 and C905 pipes. The criteria used in this master plan are summarized in ***Table 3-2***.

Table 3-2
Gravity Sewer Design Criteria

Minimum Pipe Slopes	
Pipe Diameter (inches)	Slope (ft/ft)
8 (upstream terminal)	0.0100
8	0.0052
10	0.0039
12	0.0031
16	0.0021
18	0.0018
>18	0.0016
Pipe Flow Velocities	
Velocity (Manning's Eq.)	$= \frac{(1.486)*(r^{2/3})*(s^{1/2})}{n}$
Minimum	2.5 ft/sec at full flow
Maximum	10 ft/sec
Minimum Size	
Mains and branch mains: 8-inches	
Lateral sewers: 6-inches	
Pipe Capacity	
Maximum [1]	± 85% of full pipe
Pipe Manning's "n" Values	
Pipe Diameter	"n" Value
All pipes	0.013

[1] Minimum excess pipe capacity of 15 percent of full flow capacity in consideration of potential future development.

3.3. Impacts to Wastewater Facilities

Wastewater flows for the proposed RKII project for full build-out conditions will be calculated to determine the sewer system sizing and to determine the impacts to the existing sewer system.

4. PROPOSED CONDITIONS

4.1 Proposed Development

The proposed RKII development contains up to 1850 single-family and multi-family residential homes, a minimum of 10 acres of park space, 123.7 acres of commercial and industrial use and 12 acres of school grounds within TMK:9-4-002: 001, 070, 071, 078 and 079.

See ***Figure 4-1*** for the proposed sewer master plan for RKII. A listing of the planned land uses for this development are provided in ***Table 4-1***.

Arterial, collector, sub-collector, and local subdivision roads are intended to be dedicated to the City. All utility infrastructure, roadway prisms, and landscape planting will be designed to meet City standards and the requirements of utility companies.

Table 4-1: Proposed Land Use				
	RESIDENTIAL		OTHER	
Land Use	Total	Units	Total	Units
Existing RKI Phase 1B (Per Sewer Master Plan)				
Single Family	1200	units		
Multi-Family	648	units		
Private Rec Center/Park			12.1	acres
Public Park			9.5	acres
Commercial (Walmart)			9	acres
Golf Course (Domestic)				
Proposed RKII				
PARCEL A				
Single Family	0	units		
Multi-Family	380	units		
SUBTOTAL PARCEL A	380	units		
PARCEL B				
Single Family	300	units		
Multi-Family	0	units		
SUBTOTAL PARCEL B	300	units		
PARCEL C				
Single Family	325	units		
Multi-Family	0	units		
Parks, Open Space			4.5	acres
SUBTOTAL PARCEL C	325	units		
PARCEL D				
Single Family	260	units		
Multi-Family	64	units		
SUBTOTAL PARCEL D	324	units		
PARCEL E				
Single Family	0	units		
Multi-Family Low Rise (East)	221	units		
Multi-Family Low Rise (West)	300	units		
Parks, Open Space			5.5	acres
SUBTOTAL PARCEL E	521	units		
School			800	students
Commercial/Industrial			123.7	acres
TOTAL RKII	1850	units		
OFFSITE				
DOA Single Family	24	units		
Robinson Kunia Land LLC	1,500	units		
TOTAL OFFSITE	1524	units		

4.2 Proposed Wastewater Demands and Pipe Sizing

The RKII project site will generate a wastewater design flow rate of approximately 6.77 MGD. The sewer pipe sizes shown on the proposed sewer master plan are based on a maximum of 85% of full pipe flow capacity. Hydraulic calculations for wastewater flows and pipe sizing are shown in Appendix A.

4.3 Comparison to the Park Engineering Sewer Master Plan

This sewer master plan is an update to the RKSMP prepared by Park Engineering Inc., dated August 1996. The RKSMP wastewater quantities are shown in comparison to the current estimates per this master plan in ***Table 4-2*** below.

Table 4-2: Sewer Master Plan Comparison

Existing Sewer Manhole	Park Engineering Sewer Master Plan dated May 1996	R.M. Towill Corp. Sewer Master Plan dated November 2023
SMH #7	4.16 MGD	3.844 MGD
SMH #18	2.95 MGD	2.929 MGD

4.4 Proposed Wastewater System

Wastewater flows from RKII will be collected by onsite gravity sewer pipes and conveyed generally south towards RKI. The RKII wastewater system will connect to the existing RKI system at 5 locations: Four along Anoiki Street and one at Anonui Street. The RKII wastewater will be conveyed by the existing RKI regional wastewater system to the Waipahu WWPS and ultimately the HWWTP in conformance with the revised RKSMP and City wastewater standards. The new RKII sewerage system is intended to be dedicated to the City.

Per the RKSMP dated May 1996, "*The remaining sewage from both Royal Kunia Phase I and Phase II will be transported to the Waipahu Sewage Pump Station located on Waipahu Depot Street via a 24" off-site trunk sewer. The new sewer line will serve the proposed Royal Kunia Subdivision, Phases I and II. It will begin within the Royal Kunia Subdivision and terminate at the existing Waipahu Sewage Pump Station on Depot Road. The sewer line design was divided into approximately six separate segments, but all segments was constructed concurrently."*

The proposed sewer lines to be dedicated to the City shall be located within existing and proposed City right-of-way. Where sewer lines cannot be located within City right-of-way, the sewer line shall be located in the center of easements with the following widths: 15 feet (8-inch to 16-inch diameter pipes, 25 feet (pipes larger than 16-inch diameter). An all-weather access road or gravel road (reviewed and approved by the City on a case-by-case basis) shall be provided along sewer easements for maintenance of the sewer system. The maximum sewer manhole spacing shall be 350 feet for pipes up to and including 36-inch diameter in roadways, 250 feet for pipes up to and including 18-inches in diameter in non-roadway areas, 350 feet for pipes larger than 18-inches and up to and including 36-inches in diameter in non-roadway areas in accordance with city wastewater design standards. Easements shall be designated for both sewer and access purposes. The site ground elevations are high enough that groundwater is not anticipated to be encountered in any of the proposed RKII sewers.

TMK: 9-4-002:080

ROBINSON CONN. NO. 1 (POR.) (FUTURE) 600 SFD

DEPT. OF AG. CONN. 24 SFD

STATE OF HAWAII DEPT. OF AG. 2.47 AC 24 SFD

PARCEL B CONN. 65 SFD

PARCEL B CONN. 15 SFD

PARCEL A CONN. 35 MFD

COMMERCIAL/INDUSTRIAL 123.71 AC 2.968 MGD TMK: 9-4-002:001

SEWER LINE B

PARCEL B CONN. 115 SFD

PARCEL B 49.572 AC 300 SFD

PARCEL C 39.056 AC 325 SFD

PARCEL C CONN. 157 SFD

ROBINSON TRUST LAND 161.02 AC 1500 SFD TMK: 9-4-002:052

PARCEL A 18.193 AC 380 MFD

ZONING: I-1 (103.70 AC)

KUNIA ROAD (STATE)

SEWER LINE A

PARCEL B CONN. 105 SFD

PARCEL A CONN. 345 MFD

TMK: 9-4-002:071

PARCEL C CONN. 84 SFD

SEWER LINE C

COMMERCIAL/INDUSTRIAL CONN. NO. 1 (POR.)

ZONING: B-1 (20.01 AC)

COMMERCIAL/INDUSTRIAL CONN. NO. 2 (POR.)

PARK CONN.

COMMERCIAL/INDUSTRIAL CONN. NO. 3 (POR.)

PARCEL C CONN. 84 SFD

ROBINSON CONN. NO. 2 (POR.) (FUTURE) 900 SFD

PARCEL E 49.96 AC 521 MFD TMK: 9-4-002:070

SEWER LINE E

PARCEL E CONN. 221 MFD

PARK 5.51 AC TMK: 7-4-002:079

PARCEL D 38.68 AC 260 SFD 64 MFD

SEWER LINE F

CONN. TO EXIST 18" SEWER

PARCEL E CONN. 300 MFD

TMK: 9-4-002:078

SEWER LINE D

SCHOOL 12.025 AC 800 STUDENTS

SCHOOL CONN.

E/SMH #13 E/SMH #18 E/SMH #12 E/SMH #11 E/SMH #10 E/SMH #9 E/SMH #8

ANOIKI STREET (CITY)

ANONUI STREET (CITY)

PARCEL D CONN. CONN. 1 (POR.) 195 SFD 64 MFD

PARCEL D CONN. CONN. 2 (POR.) 65 SFD

EXISTING SEWER LINE G

EXISTING SEWER LINE H

SEE INSET

TRUE NORTH 1"=600'

SEWER LINE D

SEWER LINE E

CONN. TO EXIST. 21" SEWER

E/SMH #7

INSET (NOT TO SCALE)

EXIST. SEWER LINE G

LEGEND AND ABBREVIATIONS:

- SEWER ZONE BOUNDARY
- DEVELOPMENT BOUNDARY
- PHASING BOUNDARY
- S16 — PROPOSED SEWER LINE AND SIZE (IN.)
- E/S21 — EXIST. SEWER LINE AND SIZE (IN.)
- C2 — SEWER NODE LOCATION AND LABEL
- PROPOSED ROAD

CITY ZONING LEGEND:

- A-1
- B-1
- AG-1
- I-1
- P-2
- R-5

600' 300' 0 600' 1200'

SCALE: 1" = 600'

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ROYAL KUNIA PHASE II SEWER MASTER PLAN

CONCEPTUAL SEWER MAP - PROPOSED

Figure 4-1

5. REFERENCES

1. *Wastewater System Design Standards, Volume 1*, Department of Environmental Services, City and County of Honolulu, July 2017

2. *Royal Kunia Revised Sewer Master Plan*, May 1996, Park Engineering Inc.

3. Central Oahu Sustainable Communities Plan, March 2021, Department of Planning and Permitting, City and county of Honolulu, Hawaii

4. Development Plan Land Use Amendment Application and Final Environmental Assessment for Royal Kunia, Phase II Increment 3

APPENDICES

APPENDIX A

Wastewater Quantities and Hydraulic Computations

Royal Kunia II
Sewer Calculations
11/30/2023

SEWER			TRIBUTARY (acres)		RESIDENTIAL					OTHER			TOTAL		WASTEWATER FLOW COMPUTATION																	
Point or SMH	Parcel	Land Use	Incr.	Total	Units per acre	Units	Inc. Cap. per unit	Capita	Total	Inc. Cap. per acre	Capita	Total	Incr. Capita	Total	Base Sanitary Flow BSF (MGD)	Flow Factor	Peak Base Sanitary Flow PBSF (MGD)	Ground-Water Infiltration Rate (gpcd)	Ground Water Infiltration GWI @ 35 gpcd (MGD)	Average Dry Weather Flow ADWF (MGD)	Peak Dry Weather Flow PDWF (MGD)	Wet Weather I/I Rate (gad)	Area Used for Wet Weather I/I Calculation	Wet Weather I/I @ 3000 gpad	Design Flow - QDES (MGD)	Pipe Dia. (in)	Min. Pipe Slope (ft./ft.)	Velocity at Full Pipe - V_{FULL} (fps)	Full Pipe Flow - Q_{FULL} (MGD)	Excess Cap. (mgd)	Excess %	Design Flow - Q_{DES}/Full Pipe Flow - Q_{FULL}	Velocity at Design Flow VDES (fps)
Sewerline A																																	
A6																																	
	DOA	Agriculture (AG-1)	2.47			24	4.0	96					96		0.007	2.5	0.017	35	0.003	0.010	0.020	3000	2.47	0.007	0.028							
	Parcel B	Single-Family (R-5)	6.60			65	4.0	260					260		0.018	2.5	0.046	35	0.009	0.027	0.055	3000	6.60	0.020	0.074							
		TOTAL		9.07		89			356					356	0.025	2.5	0.062	35	0.012	0.037	0.075	3000	9.07	0.027	0.102	8	0.0060	2.68	0.605	0.503	83	0.17	2.02
A5																																	
		Flow Carry Over (A6)	9.07			89		356					356		0.025	2.5	0.062	35	0.012	0.037	0.075	3000	9.07	0.027	0.102							
	Parcel A	Multi Family (A-1)	14.39			35	2.8	98					98		0.007	2.5	0.017	35	0.003	0.010	0.021	3000	14.39	0.043	0.064							
		TOTAL		23.46		124			454					454	0.032	2.5	0.079	35	0.016	0.048	0.095	3000	23.46	0.070	0.166	8	0.0060	2.68	0.605	0.439	73	0.27	2.31
A4																																	
		Flow Carry Over (A5)	23.46			124		454					454		0.032	2.5	0.079	35	0.016	0.048	0.095	3000	23.46	0.070	0.166							
	Parcel A	Multi-Family (A-1)	3.80			345	2.8	966					966		0.068	2.5	0.169	35	0.034	0.101	0.203	3000	3.80	0.011	0.214							
		TOTAL		27.26		469			1,420					1,420	0.099	2.5	0.249	35	0.050	0.149	0.298	3000	27.26	0.082	0.380	8	0.0060	2.68	0.605	0.225	37	0.63	2.86
A3																																	
		Flow Carry Over (A4)	27.26			469		1,420					1,420		0.099	2.5	0.249	35	0.050	0.149	0.298	3000	27.26	0.082	0.380							
		Flow Carry Over (B1)	107.98			835		3,340					3,340		0.234	2.5	0.585	35	0.117	0.351	0.701	3000	107.98	0.324	1.025							
		TOTAL		135.24		1,304			4,760					4,760	0.333	2.5	0.833	35	0.167	0.500	1.000	3000	135.24	0.406	1.405	12	0.0140	5.37	2.724	1.319	48	0.52	5.46
A2																																	
		Flow Carry Over (A3)	135.24			1,304		4,760					4,760		0.333	2.5	0.833	35	0.167	0.500	1.000	3000	135.24	0.406	1.405							
		Flow Carry Over (C1)	135.07			1,225		4,900					4,900		0.343	2.5	0.858	35	0.172	0.515	1.029	3000	135.07	0.405	1.434							
		TOTAL		270.31		2,529			9,660					9,660	0.676	2.5	1.691	35	0.338	1.014	2.029	3000	270.31	0.811	2.840	16	0.0100	5.50	4.959	2.119	43	0.57	5.71
A1																																	
		Flow Carry Over (A2)	270.31			2,529		9,660					9,660		0.676	2.5	1.691	35	0.338	1.014	2.029	3000	270.31	0.811	2.840							
		TOTAL		270.31		2,529			9,660					9,660	0.676	2.5	1.691	35	0.338	1.014	2.029	3000	270.31	0.811	2.840	18	0.0375	11.51	13.146	10.307	78	0.22	9.21
E/SM #18																																	
Sewerline B																																	
B4																																	
	Offsite	Single-Family - Robinson Conn. 1 (AG-1)	65.01			600	4.0	2,400					2,400		0.168	2.5	0.420	35	0.084	0.252	0.504	3000	65.01	0.195	0.699							
		TOTAL		65.01		600			2,400					2,400	0.168	2.5	0.420	35	0.084	0.252	0.504	3000	65.01	0.195	0.699	12	0.0060	3.51	1.784	1.085	61	0.39	3.35
B3																																	
		Flow Carry Over (B4)	65.01			600		2,400					2,400		0.168	2.5	0.420	35	0.084	0.252	0.504	3000	65.01	0.195	0.699							
	Parcel B	Single Family (R-5)	12.57			15	4.0	60					60		0.004	2.5	0.011	35	0.002	0.006	0.013	3000	12.57	0.038	0.050							
		TOTAL		77.58		615			2,460					2,460	0.172	2.5	0.431	35	0.086	0.258	0.517	3000	77.58	0.233	0.749	12	0.0060	3.51	1.784	1.034	58	0.42	3.38
B2																																	
		Flow Carry Over (B3)	77.58			615		2,460					2,460		0.172	2.5	0.431	35	0.086	0.258	0.517	3000	77.58	0.233	0.749							
	Parcel B	Single Family (R-5)	16.01			115	4.0	460					460		0.032	2.5	0.081	35	0.016	0.048	0.097	3000	16.01	0.048	0.145							
		TOTAL		93.59		730			2,920					2,920	0.204	2.5	0.511	35	0.102	0.307	0.613	3000	93.59	0.281	0.894	12	0.0080	4.06	2.059	1.165	57	0.43	3.92

Royal Kunia II
Sewer Calculations
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SEWER			TRIBUTARY (acres)		RESIDENTIAL					OTHER			TOTAL		WASTEWATER FLOW COMPUTATION																	
Point or SMH	Parcel	Land Use	Incr.	Total	Units per acre	Units	Inc. Cap. per unit	Capita	Total	Inc. Cap. per acre	Capita	Total	Incr. Capita	Total	Base Sanitary Flow BSF (MGD)	Flow Factor	Peak Base Sanitary Flow PBSF (MGD)	Ground-Water Infiltration Rate (gpcd)	Ground Water Infiltration GWI @ 35 gpcd (MGD)	Average Dry Weather Flow ADWF (MGD)	Peak Dry Weather Flow PDWF (MGD)	Wet Weather I/I Rate (gad)	Area Used for Wet Weather I/I Calculation	Wet Weather I/I @ 3000 gpad	Design Flow - QDES (MGD)	Pipe Dia. (in)	Min. Pipe Slope (ft./ft.)	Velocity at Full Pipe - V_{FULL} (fps)	Full Pipe Flow - Q_{FULL} (MGD)	Excess Cap. (mgd)	Excess %	Design Flow - Q_{DES}/Full Pipe Flow - Q_{FULL}	Velocity at Design Flow VDES (fps)
B1																																	
		Flow Carry Over (B2)	93.59			730		2,920					2,920		0.204	2.5	0.511	35	0.102	0.307	0.613	3000	93.59	0.281	0.894							
	Parcel B	Single Family (R-5)	14.39			105	4.0	420					420		0.029	2.5	0.074	35	0.015	0.044	0.088	3000	14.39	0.043	0.131							
		TOTAL		107.98		835			3,340					3,340	0.234	2.5	0.585	35	0.117	0.351	0.701	3000	107.98	0.324	1.025	12	0.0090	4.30	2.184	1.159	53	0.47	4.26
A3																																	
Sewerline C																																	
C3																																	
	Parcel C	Single Family (R-5)	19.02			157	4.0	628					628		0.044	2.5	0.110	35	0.022	0.066	0.132	3000	19.02	0.057	0.189							
		TOTAL		19.02		157			628					628	0.044	2.5	0.110	35	0.022	0.066	0.132	3000	19.02	0.057	0.189	8	0.0060	2.68	0.605	0.416	69	0.31	2.40
C2																																	
		Flow Carry Over (C3)	19.02			157		628					628		0.044	2.5	0.110	35	0.022	0.066	0.132	3000	19.02	0.057	0.189							
	Parcel C	Single Family (R-5)	10.08			84	4.0	336					336		0.024	2.5	0.059	35	0.012	0.035	0.071	3000	10.08	0.030	0.101							
		TOTAL		29.10		241			964					964	0.067	2.5	0.169	35	0.034	0.101	0.202	3000	29.10	0.087	0.290	8	0.0060	2.68	0.605	0.315	52	0.48	2.67
C1																																	
		Flow Carry Over (C2)	29.10			241		964					964		0.067	2.5	0.169	35	0.034	0.101	0.202	3000	29.10	0.087	0.290							
	Parcel C	Single Family (R-5)	9.96			84	4.0	336					336		0.024	2.5	0.059	35	0.012	0.035	0.071	3000	9.96	0.030	0.100							
	Offsite	Single-Family - Robinson Conn. 2 (AG-1)	96.01			900	4.0	3,600					3,600		0.252	2.5	0.630	35	0.126	0.378	0.756	3000	96.01	0.288	1.044							
		TOTAL		135.07		1,225			4,900					4,900	0.343	2.5	0.858	35	0.172	0.515	1.029	3000	135.07	0.405	1.434	12	0.0085	4.18	2.123	0.689	32	0.68	4.51
A2																																	
Sewerline D																																	
D3																																	
	Parcel E	Multi-Family (A-1)	27.98			300	2.8	840					840		0.059	2.5	0.147	35	0.029	0.088	0.176	3000	27.98	0.084	0.260							
		TOTAL		27.98		300			840					840	0.059	2.5	0.147	35	0.029	0.088	0.176	3000	27.98	0.084	0.260	8	0.0060	2.68	0.605	0.345	57	0.43	2.61
D2																																	
		Flow Carry Over (D3)	27.98			300		840					840		0.059	2.5	0.147	35	0.029	0.088	0.176	3000	27.98	0.084	0.260							
		TOTAL		27.98		300			840					840	0.059	2.5	0.147	35	0.029	0.088	0.176	3000	27.98	0.084	0.260	8	0.0060	2.68	0.605	0.345	57	0.43	2.61
D1																																	
		Flow Carry Over (D2)	27.98			300		840					840		0.059	2.5	0.147	35	0.029	0.088	0.176	3000	27.98	0.084	0.260							
		Flow Carry Over (E1)	95.14			221		619			6793		7,412		0.519	2.5	1.297	35	0.259	0.778	1.556	3000	95.14	0.285	1.842							
		TOTAL		123.12		521			1,459			6,793		8,252	0.578	2.5	1.444	35	0.289	0.866	1.733	3000	123.12	0.369	2.102	16	0.0040	3.48	3.136	1.034	33	0.67	3.76
G1																																	

Royal Kunia II
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12/19/2023

SEWER			TRIBUTARY (acres)		RESIDENTIAL					OTHER			TOTAL		WASTEWATER FLOW COMPUTATION																	
Point or SMH	Parcel	Land Use	Incr.	Total	Units per acre	Units	Inc. Cap. per unit	Capita	Total	Inc. Cap. per acre	Capita	Total	Incr. Capita	Total	Base Sanitary Flow BSF (MGD)	Flow Factor	Peak Base Sanitary Flow PBSF (MGD)	Ground-Water Infiltration Rate (gpcd)	Ground Water Infiltration GWI @ 35 gpcd (MGD)	Average Dry Weather Flow ADWF (MGD)	Peak Dry Weather Flow PDWF (MGD)	Wet Weather I/I Rate (gad)	Area Used for Wet Weather I/I Calculation	Wet Weather I/I @ 3000 gpad	Design Flow - QDES (MGD)	Pipe Dia. (in)	Min. Pipe Slope (ft./ft.)	Velocity at Full Pipe - V_{FULL} (fps)	Full Pipe Flow - Q_{FULL} (MGD)	Excess Cap. (mgd)	Excess %	Design Flow - Q_{DES}/Full Pipe Flow - Q_{FULL}	Velocity at Design Flow VDES (fps)
Sewerline E																																	
E3																																	
	Comm./Ind.	Commercial/Industrial Conn. 1 (I-1)	48.52							100	4852		4,852		0.340	2.5	0.849	35	0.170	0.509	1.019	3000	49	0.146	1.164							
	Comm./Ind.	Commercial/Industrial Conn. 1 (B-1)	10.03							100	1003		1,003		0.070	2.5	0.176	35	0.035	0.105	0.211	3000	10.03	0.030	0.241							
		TOTAL		58.55					5,855			5,855		5,855	0.410	2.5	1.025	35	0.205	0.615	1.230	3000	58.55	0.176	1.405	16	0.0030	3.01	2.716	1.311	48	0.52	3.03
E2																																	
		Carry over from E3	58.55								5855		5,855		0.410	2.5	1.025	35	0.205	0.615	1.230	3000	58.55	0.176	1.405							
	Comm./Ind.	Commercial/Industrial Conn. 2 (I-1+B-1)	9.10							100	910		910		0.064	2.5	0.159	35	0.032	0.096	0.191	3000	96.00	0.027	0.218							
	Park	Park (P-2)	5.51							5	28		28		0.002	2.5	0.005	35	0.001	0.003	0.006	3000	5.51	0.017	0.022							
		TOTAL		73.16					6,793			6,793		6,793	0.475	2.5	1.189	35	0.238	0.713	1.426	3000	73.16	0.219	1.646	16	0.0110	5.76	5.201	3.555	68	0.32	5.14
E1																																	
		Flow Carry Over (E2)	73.16								6793		6,793		0.475	2.5	1.189	35	0.238	0.713	1.426	3000	73.16	0.219	1.646							
	Parcel E	Multi-Family (A-1)	21.98			221	2.8	619					619		0.043	2.5	0.108	35	0.022	0.065	0.130	3000	21.98	0.066	0.196							
		TOTAL		95.14		221			619			6,793		7,412	0.519	2.5	1.297	35	0.259	0.778	1.556	3000	95.14	0.285	1.842	16	0.0130	6.27	5.654	3.812	67	0.33	5.65
D1																																	
Sewerline F																																	
F2																																	
	Comm./Ind.	Commercial/Industrial Conn. 3 (I-1)	56.06							100	5606		5,606		0.392	2.5	0.981	35	0.196	0.589	1.177	3000	56.06	0.168	1.345							
		TOTAL		56.06					5,606			5,606		5,606	0.392	2.5	0.981	35	0.196	0.589	1.177	3000	56.06	0.168	1.345	12	0.0060	3.51	1.784	0.438	25	0.75	3.89
F1																																	
		Flow Carry Over (F2)	56.06								5606		5,606		0.392	2.5	0.981	35	0.196	0.589	1.177	3000	56.06	0.168	1.345							
	Parcel D	Single-Family Conn. 1 (R-5)	23.40			195	4.0	780					780		0.055	2.5	0.137	35	0.027	0.082	0.164	3000	23.40	0.070	0.234							
	Parcel D	Multi-Family Conn. 1 (A-1)	3.60			64	2.8	180					180		0.013	2.5	0.032	35	0.006	0.019	0.038	3000	3.60	0.011	0.049							
		TOTAL		83.06		259			960			5,606		6,566	0.460	2.5	1.149	35	0.230	0.689	1.379	3000	83.06	0.249	1.628	12	0.0080	4.06	2.059	0.431	21	0.79	4.51
G2																																	
Exist. Sewerline G																																	
E/SMH #11																																	
		Not used																															
G2																																	
		Flow Carry Over (F1)	83.06			259		960			5606		6,566		0.460	2.5	1.149	35	0.230	0.689	1.379	3000	83.06	0.249	1.628							
		TOTAL		83.06		259			960			5,606		6,566	0.460	2.5	1.149	35	0.230	0.689	1.379	3000	83.06	0.249	1.628	21	0.0020	2.95	4.580	2.952	64	0.36	2.71
E/SMH #10																																	
		Flow Carry Over (G2)	83.06			259		960			5606		6,566		0.460	2.5	1.149	35	0.230	0.689	1.379	3000	83.06	0.249	1.628							
		TOTAL		83.06		259			960			5,606		6,566	0.460	2.5	1.149	35	0.230	0.689	1.379	3000	83.06	0.249	1.628	21	0.0020	2.95	4.580	2.952	64	0.36	2.71
E/SMH #9																																	
		Flow Carry Over (E/SMH #10)	83.06			259		960			5606		6,566		0.460	2.5	1.149	35	0.230	0.689	1.379	3000	83.06	0.249	1.628							
		TOTAL		83.06		259			960			5,606		6,566	0.460	2.5	1.149	35	0.230	0.689	1.379	3000	83.06	0.249	1.628	21	0.0140	7.79	12.116	10.488	87	0.13	5.51
E/SMH #8																																	
		Flow Carry Over (E/SMH #9)	83.06			259		960			5606		6,566		0.460	2.5	1.149	35	0.230	0.689	1.379	3000	83.06	0.249	1.628							
	School	School (P-2)	12.025								800		800		0.020	2.5	0.050	35	0.028	0.048	0.078	3000	12.03	0.036	0.114							
		TOTAL		95.09		259			960			6,406		7,366	0.480	2.5	1.199	35	0.258	0.737	1.457	3000	95.09	0.285	1.742	21	0.0019	2.87	4.464	2.721	61	0.39	2.73
G1																																	
		Flow Carry Over (E/SMH #8)	95.09			259		960			6406		7,366		0.480	2.5	1.199	35	0.258	0.737	1.457	3000	95.09	0.285	1.742							
		Flow Carry Over (D1)	123.12			521		1,459			6793		8,252		0.578	2.5	1.444	35	0.289	0.866	1.733	3000	123.12	0.369	2.102							
		TOTAL		218.21		780			2,419			13,199		15,618	1.057	2.5	2.643	35	0.547	1.604	3.190	3000	218.21	0.655	3.844	21	0.0030	3.61	5.609	1.764	31	0.69	3.91
E/SMH #7																																	

Royal Kunia II
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SEWER			TRIBUTARY (acres)		RESIDENTIAL					OTHER			TOTAL		WASTEWATER FLOW COMPUTATION																	
Point or SMH	Parcel	Land Use	Incr.	Total	Units per acre	Units	Inc. Cap. per unit	Capita	Total	Inc. Cap. per acre	Capita	Total	Incr. Capita	Total	Base Sanitary Flow BSF (MGD)	Flow Factor	Peak Base Sanitary Flow PBSF (MGD)	Ground-Water Infiltration Rate (gpcd)	Ground Water Infiltration GWI @ 35 gpcd (MGD)	Average Dry Weather Flow ADWF (MGD)	Peak Dry Weather Flow PDWF (MGD)	Wet Weather I/I Rate (gad)	Area Used for Wet Weather I/I Calculation	Wet Weather I/I @ 3000 gpad	Design Flow - QDES (MGD)	Pipe Dia. (in)	Min. Pipe Slope (ft./ft.)	Velocity at Full Pipe - V_{FULL} (fps)	Full Pipe Flow - Q_{FULL} (MGD)	Excess Cap. (mgd)	Excess %	Design Flow - Q_{DES}/Full Pipe Flow - Q_{FULL}	Velocity at Design Flow VDES (fps)
Exist. Sewerline H																															
E/SMH #12																															
	Parcel D	Single-Family Conn. 2 (R-5)	11.68			65	4.0	260					260		0.018	2.5	0.046	35	0.009	0.027	0.055	3000	11.68	0.035	0.090							
		TOTAL		11.68		65			260					260	0.018	2.5	0.046	35	0.009	0.027	0.055	3000	11.68	0.035	0.090	8	0.0050	2.45	0.552	0.463	84	0.16	1.82
E/SMH #13																															
		Flow Carry Over (E/SMH #12)	11.68			65		260					260		0.018	2.5	0.046	35	0.009	0.027	0.055	3000	11.68	0.035	0.090							
		TOTAL		11.68		65			260					260	0.018	2.5	0.046	35	0.009	0.027	0.055	3000	11.68	0.035	0.090	8	0.0050	2.45	0.552	0.463	84	0.16	1.82
E/SMH #18																															
		Flow Carry Over (E/SMH #13)	11.68			65		260					260		0.018	2.5	0.046	35	0.009	0.027	0.055	3000	11.68	0.035	0.090							
		Flow Carry Over (A1)	270.31			2,529		9,660					9,660		0.676	2.5	1.691	35	0.338	1.014	2.029	3000	270.31	0.811	2.840							
		TOTAL		281.99		2,594			9,920					9,920	0.694	2.5	1.736	35	0.347	1.042	2.083	3000	281.99	0.846	2.929	18	0.0375	11.51	13.146	10.217	78	0.22	9.29
E/S18																															
Sewer Stubs / Point of Connection																															
Dept. of Ag. Conn.																															
at A6	DOA	Agriculture (AG-1)	2.47			24	4.0	96					96		0.007	2.5	0.017	35	0.003	0.010	0.020	3000	2.47	0.007	0.028							
		TOTAL		2.47		24			96					96	0.007	2.5	0.017	35	0.003	0.010	0.020	3000	2.47	0.007	0.028	8	0.0060	2.68	0.605	0.577	95	0.05	1.36
Parcel B Conn.																															
at A6	Parcel B	Single-Family (R-5)	6.60			65	4.0	260					260		0.018	2.5	0.046	35	0.009	0.027	0.055	3000	6.60	0.020	0.074							
		TOTAL		6.60		65			260					260	0.018	2.5	0.046	35	0.009	0.027	0.055	3000	6.60	0.020	0.074	8	0.0060	2.68	0.605	0.531	88	0.12	1.84
Parcel A Conn.																															
at A5	Parcel A	Multi-Family (A-1)	14.39			35	2.8	98					98		0.007	2.5	0.017	35	0.003	0.010	0.021	3000	14.39	0.043	0.064							
		TOTAL		14.39		35			98					98	0.007	2.5	0.017	35	0.003	0.010	0.021	3000	14.39	0.043	0.064	8	0.0060	2.68	0.605	0.541	89	0.11	1.85
Parcel A Conn.																															
at A4	Parcel A	Multi-Family (A-1)	3.80			345	2.8	966					966		0.068	2.5	0.169	35	0.034	0.101	0.203	3000	3.80	0.011	0.214							
		TOTAL		3.80		345			966					966	0.068	2.5	0.169	35	0.034	0.101	0.203	3000	3.80	0.011	0.214	8	0.0060	2.68	0.605	0.391	65	0.35	2.46
Stub to Robinson																															
at B4	Offsite	Single-Family - Robinson Conn. 1 (AG-1)	65.01			600	4.0	2,400					2,400		0.168	2.5	0.420	35	0.084	0.252	0.504	3000	65.01	0.195	0.699							
		TOTAL		65.01		600			2,400					2,400	0.168	2.5	0.420	35	0.084	0.252	0.504	3000	65.01	0.195	0.699	12	0.0080	4.06	2.059	1.360	66	0.34	3.69
Parcel B Conn.																															
at B3	Parcel B	Single Family (R-5)	12.57			15	4.0	60					60		0.004	2.5	0.011	35	0.002	0.006	0.013	3000	12.57	0.038	0.050							
		TOTAL		12.57		15			60					60	0.004	2.5	0.011	35	0.002	0.006	0.013	3000	12.57	0.038	0.050	8	0.0060	2.68	0.605	0.555	92	0.08	1.69
Parcel B Conn.																															
at B2	Parcel B	Single Family (R-5)	16.01			115	4.0	460					460		0.032	2.5	0.081	35	0.016	0.048	0.097	3000	16.01	0.048	0.145							
		TOTAL		16.01		115			460					460	0.032	2.5	0.081	35	0.016	0.048	0.097	3000	16.01	0.048	0.145	8	0.0060	2.68	0.605	0.460	76	0.24	2.23

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SEWER			TRIBUTARY (acres)		RESIDENTIAL					OTHER			TOTAL		WASTEWATER FLOW COMPUTATION																	
Point or SMH	Parcel	Land Use	Incr.	Total	Units per acre	Units	Inc. Cap. per unit	Capita	Total	Inc. Cap. per acre	Capita	Total	Incr. Capita	Total	Base Sanitary Flow BSF (MGD)	Flow Factor	Peak Base Sanitary Flow PBSF (MGD)	Ground-Water Infiltration Rate (gpcd)	Ground Water Infiltration GWI @ 35 gpcd (MGD)	Average Dry Weather Flow ADWF (MGD)	Peak Dry Weather Flow PDWF (MGD)	Wet Weather I/I Rate (gad)	Area Used for Wet Weather I/I Calculation	Wet Weather I/I @ 3000 gpad	Design Flow - QDES (MGD)	Pipe Dia. (in)	Min. Pipe Slope (ft./ft.)	Velocity at Full Pipe - V_{FULL} (fps)	Full Pipe Flow - Q_{FULL} (MGD)	Excess Cap. (mgd)	Excess %	Design Flow - Q_{DES}/Full Pipe Flow - Q_{FULL}	Velocity at Design Flow VDES (fps)
Parcel B Conn.																																	
at B1	Parcel B	Single Family (R-5)	14.39			105	4.0	420					420		0.029	2.5	0.074	35	0.015	0.044	0.088	3000	14.39	0.043	0.131							
		TOTAL		14.39		105			420					420	0.029	2.5	0.074	35	0.015	0.044	0.088	3000	14.39	0.043	0.131	8	0.0060	2.68	0.605	0.474	78	0.22	2.16
Parcel C Conn.																																	
at C3	Parcel C	Single Family (R-5)	19.02			157	4.0	628					628		0.044	2.5	0.110	35	0.022	0.066	0.132	3000	19.02	0.057	0.189							
		TOTAL		19.02		157			628					628	0.044	2.5	0.110	35	0.022	0.066	0.132	3000	19.02	0.057	0.189	8	0.0060	2.68	0.605	0.416	69	0.31	2.40
Parcel C Conn.																																	
at C2	Parcel C	Single Family (R-5)	10.08			84	4.0	336					336		0.024	2.5	0.059	35	0.012	0.035	0.071	3000	10.08	0.030	0.101							
		TOTAL		10.08		84			336					336	0.024	2.5	0.059	35	0.012	0.035	0.071	3000	10.08	0.030	0.101	8	0.0060	2.68	0.605	0.504	83	0.17	2.00
Stub to Robinson																																	
at C1	Offsite	Single-Family - Robinson No. 2 (AG-1)	96.01			900	4.0	3,600					3,600		0.252	2.5	0.630	35	0.126	0.378	0.756	3000	96.01	0.288	1.044							
		TOTAL		96.01		900			3,600					3,600	0.252	2.5	0.630	35	0.126	0.378	0.756	3000	96.01	0.288	1.044	12	0.0080	4.06	2.059	1.015	49	0.51	4.11
Parcel C Conn.																																	
at C1	Parcel C	Single Family (R-5)	9.96			84	4.0	336					336		0.024	2.5	0.059	35	0.012	0.035	0.071	3000	9.96	0.030	0.100							
		TOTAL		9.96		84			336					336	0.024	2.5	0.059	35	0.012	0.035	0.071	3000	9.96	0.030	0.100	8	0.0060	2.68	0.605	0.504	83	0.17	1.99
Parcel D Conn 1																																	
at F1	Parcel D	Single-Family Conn. 1 (R-5)	23.40			195	4.0	780					780		0.055	2.5	0.137	35	0.027	0.082	0.164	3000	23.40	0.070	0.234							
	Parcel D	Multi-Family Conn. 1 (A-1)	3.60			64	2.8	180					180		0.013	2.5	0.032	35	0.006	0.019	0.038	3000	3.60	0.011	0.049							
		TOTAL		27.00		259			960					960	0.067	2.5	0.168	35	0.034	0.101	0.202	3000	27.00	0.081	0.283	12	0.0080	4.06	2.059	1.777	86	0.14	2.85
Parcel D Conn 2																																	
at E/SMH #12	Parcel D	Single-Family Conn. 2 (R-5)	11.68			65	4.0	260					260		0.018	2.5	0.046	35	0.009	0.027	0.055	3000	11.68	0.035	0.090							
		TOTAL		11.68		65			260					260	0.018	2.5	0.046	35	0.009	0.027	0.055	3000	11.68	0.035	0.090	8	0.0052	2.50	0.563	0.474	84	0.16	1.87
Parcel E Conn.																																	
at D3	Parcel E	Multi-Family (A-1)	27.98			300	2.8	840					840		0.059	2.5	0.147	35	0.029	0.088	0.176	3000	27.98	0.084	0.260							
		TOTAL		27.98		300			840					840	0.059	2.5	0.147	35	0.029	0.088	0.176	3000	27.98	0.084	0.260	8	0.0060	2.68	0.605	0.345	57	0.43	2.61
Park Conn.																																	
at E2	Park	Park (P-2)	5.51							5	28		28		0.002	2.5	0.005	35	0.001	0.003	0.006	3000	5.51	0.017	0.022							
		TOTAL		5.51								28		28	0.002	2.5	0.005	35	0.001	0.003	0.006	3000	5.51	0.017	0.022	8	0.0200	4.90	1.104	1.082	98	0.02	2.05
Parcel E Conn.																																	
at E1	Parcel E	Multi-Family (A-1)	21.98			221	2.8	619					619		0.043	2.5	0.108	35	0.022	0.065	0.130	3000	21.98	0.066	0.196							
		TOTAL		21.98		221			619					619	0.043	2.5	0.108	35	0.022	0.065	0.130	3000	21.98	0.066	0.196	8	0.0060	2.68	0.605	0.409	68	0.32	2.40
School Conn.																																	
at E/SMH #8	School	School (P-2)	12.025								800		800		0.020	2.5	0.050	35	0.028	0.048	0.078	3000	12.03	0.036	0.114							
		TOTAL		12.03								800		800	0.020	2.5	0.050	35	0.028	0.048	0.078	3000	12.03	0.036	0.114	15	0.0200	7.44	5.904	5.790	98	0.02	2.98
Comm./Ind. Conn. 1																																	
at E3	Comm./Ind.	Commercial/Industrial Conn. 1 (I-1)	48.52							100	4852		4,852		0.340	2.5	0.849	35	0.170	0.509	1.019	3000	48.52	0.146	1.164							
	Comm./Ind.	Commercial/Industrial Conn. 1 (B-1)	10.03							100	1003		1,003		0.070	2.5	0.176	35	0.035	0.105	0.211	3000	10.03	0.030	0.241							
		TOTAL		58.55								5,855		5,855	0.410	2.5	1.025	35	0.205	0.615	1.230	3000	58.55	0.176	1.405	16	0.0030	3.01	2.716	1.311	48	0.52	3.03
Comm./Ind. Conn. 2																																	
at E2	Comm./Ind.	Commercial/Industrial Conn. 2 (I-1+B-1)	9.10							100	910		910		0.064	2.5	0.159	35	0.032	0.096	0.191	3000	9.10	0.027	0.218							
		TOTAL		9.10								910		910	0.064	2.5	0.159	35	0.032	0.096	0.191	3000	9.10	0.027	0.218	8	0.0060	2.68	0.605	0.387	64	0.36	2.47
Comm./Ind. Conn. 3																																	
at F2	Comm./Ind.	Commercial/Industrial Conn. 3 (I-1)	56.06							100	5606		5,606		0.392	2.5	0.981	35	0.196	0.589	1.177	3000	56.06	0.168	1.345							
		TOTAL		56.06								5,606		5,606	0.392	2.5	0.981	35	0.196	0.589	1.177	3000	56.06	0.168	1.345	12	0.0080	4.06	2.059	0.714	35	0.65	4.36

APPENDIX B

Royal Kunia Revised Sewer Master Plan

(Prepared by Park Engineering, Inc. dated May 1996)

ROYAL KUNIA

REVISED SEWER MASTER PLAN

AT HOAEAE AND WAIKELE, EWA, OAHU, HAWAII

TAX MAP KEY: 9-4-02: POR 1, 46, 49, 50, 51, & 52

May 1996

PREPARED BY:

ParEn., Inc.

dba PARK ENGINEERING

ENGINEERS, SURVEYORS, PLANNERS

SUITE 300, KAWAIAHAO PLAZA

567 SOUTH KING STREET

HONOLULU, HAWAII 96813

Royal Kunia
Revised Sewer Master Plan

TABLE OF CONTENTS:

Bound together with this Report:

Exhibit A - Project Location Map

Exhibit B - Royal Kunia Sewer Master Plan Map

Exhibit C - Royal Kunia Sewer Master Plan Sanitary Sewage Computations

Exhibit D - Halekua Gardens I and 5.0 Acre Industrial Site Connections to Village Park Map

Exhibit E - Halekua Gardens I and 5.0 Acre Industrial Site Connections to Village Park Sanitary Sewage Computations

Royal Kunia
Revised Sewer Master Plan

LOCATION:

The property is located approximately 1 mile north of the Kunia Road - Waipahu Street Intersection. It is bounded by Kunia Road on the west, Waikele Stream on the east, and the existing Village Park subdivision on the south.

TOPOGRAPHY:

The property generally slopes toward the southeast at an average slope of 4%. Steeper gradients of 20% and greater can be found in the gully adjacent to Kunia Road.

SEWER MASTER PLAN:

This master plan accounts for the ultimate grading and drainage plans for the Royal Kunia Development. The plan, attached as Exhibit B, was developed according to the latest Land Use Map for the Royal Kunia Development. It involves connecting two sites, Halekua Gardens I and 5.0 Acres of an Industrial Site both located at the southwest corner of Royal Kunia Phase I, to the existing sewer system within the Village Park Subdivision. The accompanying plan and computations within Village Park are included as Exhibits D and E respectively. The remaining sewage from both Royal Kunia Phase I and Phase II will be transported to the Waipahu Sewage Pump Station located on Waipahu Depot Road via a 24" off-site trunk sewer. The new sewer line will serve the proposed Royal Kunia Subdivision, Phases I and II. It will begin within the Royal Kunia Subdivision and terminate at the existing Waipahu Sewage Pump Station on Depot Road. The sewer line design was divided into approximately six separate segments, but all segments was constructed concurrently. (See Exhibit A : Project Location Map.)

The design criteria for the project was extracted from the Design Standards of the Division of Wastewater Management, Volume 1, July, 1993. The criteria are as follows:

1. Approximate unit projections and developable acreages were obtained from a preliminary Land Use Map (Exhibit B) and used to determine flows in the sewer main.

2. Average daily per capita flow = 80 gal/capita/day.

3. Density:
   a. Single Family Dwelling (SFD) - 4 persons/unit
   b. Low Density Apartment Occupancy (LDA)
      - 85 capita/acre for areas where the number of units are unknown.
      - 2.8 capita/unit for areas where the number of units are known.
   c. Industrial - 100 capita/acre
   d. School - 1200 students
   e. Park/Ride - negligible
   f. Parks - 5 capita/acre
   g. Golf Course Club House - 1.0 Acre Club House @ 250 capita/acre

4. Factor for maximum rate of dry weather sewage flow is extracted from Babbit's curve:

$$Maximum\ Factor = \frac{5}{P^{0.2}}$$

where P = population in thousands

5. Normal Infiltration = 5 gal/capita/day
   Wet Infiltration = 1,250 gal/acre/day

6. Peak Flow = summation of Maximum flow plus Infiltration.

7. Manning's formula was used as the basis for the hydraulic design of the sewer:

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

where n = roughness coefficient
R = hydraulic radius
A = area of pipe flow
S = slope in ft/ft

8. Minimum Velocity = 2.0 ft/sec
   Maximum Velocity = 10.0 ft/sec

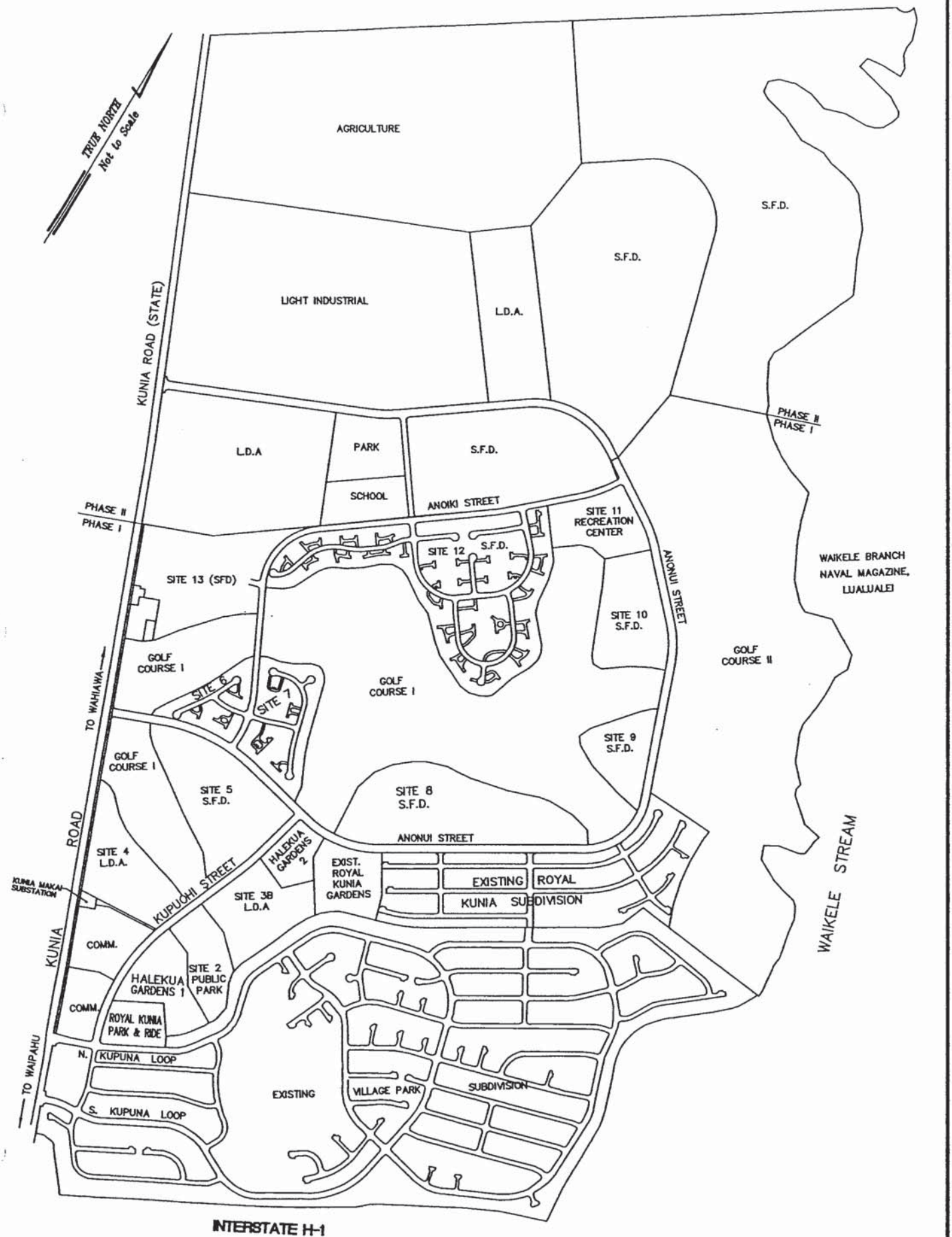

EXHIBIT A - LOCATION MAP

TRUE NORTH

Scale: 1" = 400'

PHASE II PARK-3

Q = 0.05 mgd
Area = 16.0 Acre(s)
Pop = 80
8 Inch @ 0.44 %

C30

Q = 0.17 mgd
Area = 18.7 Acre(s)
Pop = 384
8 Inch @ 0.44 %

C29

C28

Q = 0.25 mgd
Area = 22.9 Acre(s)
Pop = 546
8 Inch @ 0.44 %

S9

S18

C27

Q = 0.47 mgd
Area = 57.6 Acre(s)
Pop = 992
10 Inch @ 0.32 %

Q = 0.11 mgd
Area = 11.0 Acre(s)
Pop = 229
8 Inch @ 0.44 %

C26

S8

S10

C25

Q = 0.56 mgd
Area = 68.6 Acre(s)
Pop = 1,220
10 Inch @ 0.32 %

PHASE II PARK-2

Q = 0.19 mgd
Area = 19.6 Acre(s)
Pop = 400
8 Inch @ 0.44 %

C24

S9

Q = 0.03 mgd
Area = 10.2 Acre(s)
Pop = 50
8 Inch @ 0.44 %

C32

PHASE II S.F.D. - 2

SFD AG. LOTS
Q = 0.05 mgd
Area = 6.0 Acre(s)
Pop = 112
8 Inch @ 0.44 %

SFD
Q = 1.00 mgd
Area = 100.0 Acre(s)
Pop = 2,600
12 Inch @ 0.35 %

C43

C42

S9

S8

Q = 1.03 mgd
Area = 106.0 Acre(s)
Pop = 2,712
12 Inch @ 0.37 %

PHASE II L.D.A. -1 17.0 AC.

C41

S11

Q = 0.28 mgd
Area = 7.8 Acre(s)
Pop = 663
8 Inch @ 0.44 %

C40

S8

S12

Q = 1.22 mgd
Area = 113.8 Acre(s)
Pop = 3,375
12 Inch @ 0.50 %

C39

PHASE II LIGHT INDUSTRIAL 123.0 AC

Q = 0.08 mgd
Area = 9.1 Acre(s)
Pop = 176
8 Inch @ 0.44 %

C23

Q = 0.71 mgd
Area = 88.2 Acre(s)
Pop = 1,820
10 Inch @ 0.46 %

S18

S9

C31

C21

S12

S8

C22

Q = 0.14 mgd
Area = 15.6 Acre(s)
Pop = 308
8 Inch @ 0.44 %

Q = 0.15 mgd
Area = 14.4 Acre(s)
Pop = 316
8 Inch @ 0.44 %

C19

C20

Q = 0.90 mgd
Area = 123.1 Acre(s)
Pop = 2,154
12 Inch @ 0.28 %

Q = 1.01 mgd
Area = 137.5 Acre(s)
Pop = 2,470
12 Inch @ 0.35 %

C18

PHASE II PARK-1

C17

Q = 0.05 mgd
Area = 15.0 Acre(s)
Pop = 75
8 Inch @ 0.44 %

Q = 0.17 mgd
Area = 4.8 Acre(s)
Pop = 408
8 Inch @ 0.44 %

C38

Q = 1.33 mgd
Area = 118.6 Acre(s)
Pop = 3,783
15 Inch @ 0.20 %

C37

Q = 0.64 mgd
Area = 69.3 Acre(s)
Pop = 1,484
10 Inch @ 0.36 %

C34

Q = 0.19 mgd
Area = 4.5 Acre(s)
Pop = 383
8 Inch @ 0.44 %

C36

Q = 0.15 mgd
Area = 14.8 Acre(s)
Pop = 328
8 Inch @ 0.44 %

C16

Q = 1.05 mgd
Area = 152.5 Acre(s)
Pop = 2,545
12 Inch @ 0.38 %

C15

S16

C35

S15

C33

Q = 1.43 mgd
Area = 123.1 Acre(s)
Pop = 4,166
15 Inch @ 0.22 %

Q = 1.87 mgd
Area = 192.4 Acre(s)
Pop = 5,650
15 Inch @ 0.38 %

C14

Q = 1.15 mgd
Area = 167.3 Acre(s)
Pop = 2,873
12 Inch @ 0.46 %

S12

S16

C13

Q = 2.71 mgd
Area = 358.7 Acre(s)
Pop = 8,523
18 Inch @ 0.29 %

Q = 0.40 mgd
Area = 38.9 Acre(s)
Pop = 876
8 Inch @ 0.49 %

C12

S9

PHASE II S.F.D. - 1 38.9 AC 219 UNITS

Q = 2.95 mgd
Area = 398.6 Acre(s)
Pop = 9,398
18 Inch @ 0.35 %

C11

S18

KUNIA ROAD (STATE)

Q = 0.16 mgd
Area = 4.5 Acre(s)
Pop = 380
8 Inch @ 0.44 %

A30

S8

Q = 0.26 mgd
Area = 7.3 Acre(s)
Pop = 617
8 Inch @ 0.44 %

A29

Q = 0.42 mgd
Area = 11.7 Acre(s)
Pop = 987
10 Inch @ 0.32 %

A28

S10

PHASE II PARK 10.0 AC.

Q = 3.18 mgd
Area = 122.5 Acre(s)
Pop = 12,250
18 Inch @ 0.40 %

A33

S10

Q = 0.03 mgd
Area = 10.0 Acre(s)
Pop = 50
8 Inch @ 0.44 %

Q = 0.16 mgd
Area = 8.0 Acre(s)
Pop = 375
8 Inch @ 0.44 %

A32

S8

Q = 0.33 mgd
Area = 9.2 Acre(s)
Pop = 782
8 Inch @ 0.44 %

A27

S8

Q = 0.28 mgd
Area = 7.8 Acre(s)
Pop = 659
8 Inch @ 0.44 %

A26

Q = 0.14 mgd
Area = 3.9 Acre(s)
Pop = 335
8 Inch @ 0.44 %

A24

S8

S12

Q = 0.86 mgd
Area = 28.7 Acre(s)
Pop = 2,438
12 Inch @ 0.28 %

A25

Q = 0.29 mgd
Area = 8.2 Acre(s)
Pop = 694
8 Inch @ 0.44 %

A20

A18

S8

Q = 1.45 mgd
Area = 57.7 Acre(s)
Pop = 4,600
15 Inch @ 0.22 %

Q = 0.96 mgd
Area = 32.6 Acre(s)
Pop = 2,773
12 Inch @ 0.32 %

A23

A21

S16

S8

Q = 1.35 mgd
Area = 48.7 Acre(s)
Pop = 4,225
15 Inch @ 0.20 %

A19

S15

S16

A17

A31

S21

Q = 3.21 mgd
Area = 132.5 Acre(s)
Pop = 12,300
21 Inch @ 0.14 %

A22

S8

Q = 0.32 mgd
Area = 8.9 Acre(s)
Pop = 758
8 Inch @ 0.44 %

Q = 1.17 mgd
Area = 41.5 Acre(s)
Pop = 3,531
15 Inch @ 0.20 %

Q = 4.16 mgd
Area = 180.2 Acre(s)
Pop = 16,900
21 Inch @ 0.23 %

A16

S21

Q = 2.24 mgd
Area = 79.3 Acre(s)
Pop = 7,930
18 Inch @ 0.20 %

A35

S18

Q = 1.37 mgd
Area = 43.2 Acre(s)
Pop = 4,320
15 Inch @ 0.28 %

A34

S16

PHASE II

PHASE I

ANOIKI STREET

SITE 11 PRIVATE PARK 12.1 AC

Q = 0.04 mgd
Area = 12.10 Acre(s)
Pop = 61
8 Inch @ 0.44 %

C10

S8

C9

Q = 2.97 mgd
Area = 410.7 Acre(s)
Pop = 9,460
18 Inch @ 0.35 %

SITE 12 "B" S.F.D. 45.2 AC 291 UNITS

SITE 12 "A" S.F.D. 11.5 AC 75 UNITS

Q = 0.14 mgd
Area = 11.50 Acre(s)
Pop = 300
8 Inch @ 0.44 %

Q = 4.23 mgd
Area = 201.7 Acre(s)
Pop = 17,200
21 Inch @ 0.25 %

A15

A14

A13

S8

Q = 0.38 mgd
Area = 27.70 Acre(s)
Pop = 880
8 Inch @ 0.46 %

SITE 13 S.F.D. 27.7 AC 220 UNITS

Q = 0.02 mgd
Area = 1.90 Acre(s)
Pop = 48
8 Inch @ 0.44 %

C8

S8

C7

Q = 2.99 mgd
Area = 412.6 Acre(s)
Pop = 9,508
18 Inch @ 0.35 %

GOLF COURSE II CLUB HOUSE
Q = 0.10 mgd
Area = 1.00 Acre(s)
Pop = 250
8 Inch @ 0.44 %

C6

SITE 10 S.F.D. 14.8 AC 92 UNITS

Q = 0.14 mgd
Area = 12.90 Acre(s)
Pop = 312
8 Inch @ 0.44 %

C4

S8

C5

Q = 3.04 mgd
Area = 413.6 Acre(s)
Pop = 9,758
18 Inch @ 0.36 %

ROYAL KUNIA GOLF COURSE II 144.3 AC

GOLF COURSE I CLUB HOUSE
Q = 0.10 mgd
Area = 1.00 Acre(s)
Pop = 250
8 Inch @ 0.44 %

Q = 0.22 mgd
Area = 21.30 Acre(s)
Pop = 488
8 Inch @ 0.44 %

Q = 0.30 mgd
Area = 23.90 Acre(s)
Pop = 676
8 Inch @ 0.44 %

B11

S8

S8

B12

B9

A12

S21

Q = 4.43 mgd
Area = 229.4 Acre(s)
Pop = 18,080
21 Inch @ 0.28 %

BWS NITRATE REMOVAL FACILITY

A9A

Q = 0.25 mgd
Area = 2.0 Acre(s)
Pop = 615
8 Inch @ 0.44 %

TO WAHIAWA

Q = 0.02 mgd
Area = 1.60 Acre(s)
Pop = 52
8 Inch @ 0.44 %

ROYAL KUNIA GOLF COURSE I 18.6 AC

B10

S18

Q = 0.51 mgd
Area = 45.20 Acre(s)
Pop = 1,164
10 Inch @ 0.32 %

SITE 9 S.F.D. 9.8 AC 62 UNITS

Q = 0.11 mgd
Area = 9.80 Acre(s)
Pop = 236
8 Inch @ 0.44 %

C3

Q = 3.12 mgd
Area = 426.5 Acre(s)
Pop = 10,070
18 Inch @ 0.38 %

C2

S8

Q = 0.07 mgd
Area = 7.3 Acre(s)
Pop = 152
8 Inch @ 0.44 %

A9

SITE 6 S.F.D. 8.9 AC 48 UNITS

A11

S8

S21

A10

Q = 4.44 mgd
Area = 231.0 Acre(s)
Pop = 18,132
21 Inch @ 0.28 %

Q = 0.03 mgd
Area = 2.5 Acre(s)
Pop = 64
8 Inch @ 0.44 %

A7

S8

A5

Q = 0.14 mgd
Area = 13.5 Acre(s)
Pop = 316
8 Inch @ 0.44 %

Q = 0.02 mgd
Area = 1.30 Acre(s)
Pop = 48
8 Inch @ 0.44 %

Q = 0.59 mgd
Area = 46.20 Acre(s)
Pop = 1,414
10 Inch @ 0.32 %

B8

B7

S8

SITE 8 S.F.D. 32.6 AC 224 UNITS

Q = 0.03 mgd
Area = 2.70 Acre(s)
Pop = 76
8 Inch @ 0.44 %

Q = 0.10 mgd
Area = 4.25 Acre(s)
Pop = 244
8 Inch @ 0.44 %

B14

S8

Q = 3.19 mgd
Area = 436.3 Acre(s)
Pop = 10,328
21 Inch @ 0.13 %

C2

Q = 4.59 mgd
Area = 240.3 Acre(s)
Pop = 18,888
21 Inch @ 0.28 %

A8

S21

A6

Q = 4.61 mgd
Area = 242.8 Acre(s)
Pop = 18,963
21 Inch @ 0.28 %

Q = 4.68 mgd
Area = 256.3 Acre(s)
Pop = 19,278
21 Inch @ 0.30 %

Q = 0.61 mgd
Area = 47.5 Acre(s)
Pop = 1,462
10 Inch @ 0.40 %

B6

S8

B5

Q = 0.29 mgd
Area = 21.50 Acre(s)
Pop = 660
8 Inch @ 0.44 %

B2

Q = 0.63 mgd
Area = 50.2 Acre(s)
Pop = 1,538
10 Inch @ 0.40 %

B4

'ANONUI STREET

S21

A4

S21

B1

B3

Q = 3.24 mgd
Area = 440.6 Acre(s)
Pop = 10,550
21 Inch @ 0.14 %

S21

Q = 3.61 mgd
Area = 490.8 Acre(s)
Pop = 12,088
21 Inch @ 0.17 %

Q = 3.77 mgd
Area = 512.3 Acre(s)
Pop = 12,748
21 Inch @ 0.18 %

ROYAL KUNIA GARDENS L.D.A

EXISTING ROYAL KUNIA SUBDIVISION

WAIKELE BRANCH NAVAL MAGAZINE, LUALUALEI

SITE 5 S.F.D. 24.7 AC 180 UNITS

ROYAL KUNIA GOLF COURSE I 20.1 AC

SITE 4 M.F. 6.7 AC 100 UNITS

Q = 0.32 mgd
Area = 24.7 Acre(s)
Pop = 720
8 Inch @ 0.44 %

D8

S8

Q = 0.15 mgd
Area = 9.10 Acre(s)
Pop = 344
8 Inch @ 0.44 %

SITE 3 L.D.A 19.8 AC 316 UNITS

Q = 0.11 mgd
Area = 6.70 Acre(s)
Pop = 240
8 Inch @ 0.44 %

SITE 4 S.F.D. 9.1 AC 86 UNITS

Q = 0.28 mgd
Area = 15.70 Acre(s)
Pop = 584
8 Inch @ 0.44 %

D5B

D5A

KUPUOHI STREET

A3

S24

Q = 7.51 mgd
Area = 771.3 Acre(s)
Pop = 31,895
24 Inch @ 0.31 %

Q = 0.32 mgd
Area = 24.7 Acre(s)
Pop = 720
8 Inch @ 0.44 %

D7

S8

Q = 0.42 mgd
Area = 16.80 Acre(s)
Pop = 974
10 Inch @ 0.38 %

D6

S8

SEWER LINE "C" S24"

KUPUNA LOOP

KUNIA MAKAI SUBSTATION

D5

S8

SITE 2 PUBLIC PARK 10.3 AC

Q = 0.03 mgd
Area = 10.30 Acre(s)
Pop = 52
8 Inch @ 0.44 %

INDUSTRIAL 10.7 AC

Q = 0.44 mgd
Area = 10.70 Acre(s)
Pop = 1,070
8 Inch @ 0.59 %

D4

S8

SITE 1 HALEKUA GARDENS I L.D.A. 10.7 AC

Q = 0.64 mgd
Area = 26.4 Acre(s)
Pop = 1,854
12 Inch @ 0.28 %

D2

A2

Q = 7.84 mgd
Area = 895.8 Acre(s)
Pop = 33,589
24 Inch @ 0.35 %

Q = 0.67 mgd
Area = 36.7 Acre(s)
Pop = 1,706
12 Inch @ 0.28 %

D1

S24

INDUSTRIAL 5.0 AC

D3

ROYAL KUNIA PARK & RIDE

Kupuna Loop

Kamalo Street

Kalae Street

Kupuna Loop

Kupuohi Place

Kaima Place

Kupuohi Street

Kupuohi Street

Kahakea Street

A1

Q = 8.16 mgd
Area = 852.5 Acre(s)
Pop = 35,295
24 Inch @ 0.35 %

S24

ROYAL KUNIA OFF-SITE SEWER

SEWER LINE "C"

EXISTING VILLAGE PARK SUBDIVISION

SEWER LINE "A"

S24"

TO WAIPAHU SEWAGE PUMP STATION ON DEPOT ROAD

TO WAIPAHU — KUNIA ROAD

ROYAL KUNIA GARDENS L.D.A

INTERSTATE H-1

WAIKELE STREAM

NOTE:

Halekua Gardens I (Site 1) and the 5.0 Acre Industrial site sewer systems will both connect to the existing sewer system within Village Park Subdivision. See Exhibits D and E of this report for schematic connections and Sanitary Sewage Flow Computations.

DATE: JULY 2002 TSW

LEGEND:

(B3)	SEWER SEGMENT NUMBER
S.F.D.	SINGLE FAMILY DWELLING
L.D.A.	LOW-DENSITY APARTMENT
IND	INDUSTRIAL SITE
Ss	PROPOSED 8" SEWER
	PROPOSED TRUNK SEWER
	TRIBUTARY AREA "A"
	TRIBUTARY AREA "B"
	TRIBUTARY AREA "C"
	TRIBUTARY AREA "D"

EXHIBIT B
ROYAL KUNIA SEWER MASTER PLAN
PHASES I and II
TMK : 9-4-02

SEWER: ROYAL KUNIA SEWER MASTER PLAN (SITE 8PDH SUBDIVISION)
DISTRICT: WAIPAHU
REFERENCE MAPS: TMK : 9-4-02

EXHIBIT "C"

BY: TSS

Sheet: RKIIACT-SMP(SITE8)

Normal Infilt: 5 (gpcd) [USE 5 OR 35]
Wet Infilt: 1250 (gpad) [USE 1250 OR 2750]

DIST, ZONE, OR ST	POINT OR SEGMT	TRIB. AREA Increment	TRIB. AREA Total	TRIB. POP. Increment	TRIB. POP. Total	FLOW gpcd	AVE. FLOW (mgd)	MAX FLOW FACT.	MAX FLOW (mgd)	NORM DESIGN AVE INFIL (mgd)	NORM DESIGN AVE FLOW (mgd)	DESIGN HRLY FLOW (mgd)	WET INFILT. (mgd)	DESIGN PEAK FLOW (mgd)	Pipe Size (IN)	Slope (%)	Capacity (mgd)	Vel. (fps)	Qreq /Qall (%)
POR SITE 12 "A"	A15	11.5	11.5	300	300	80	0.0240	5.00	0.1200	0.0015	0.0255	0.1215	0.0144	0.1359	8	0.44	0.45	1.99	0.30
A15 + A16	A14		201.7		17,200	80	1.3760	2.83	3.8948	0.0860	1.4620	3.9808	0.2521	4.2330	21	0.25	5.11	3.29	0.83
SITE 13	A13	27.7	27.7	880	880	80	0.0704	5.00	0.3520	0.0044	0.0748	0.3564	0.0346	0.3910	8	0.46	0.46	2.04	0.85
A13 + A14 =	A12		229.4		18,080	80	1.4464	2.80	4.0535	0.0904	1.5368	4.1439	0.2867	4.4306	21	0.28	5.41	3.48	0.82
POR SITE 6	A11	1.6	1.6	52	52	80	0.0042	5.00	0.0208	0.0003	0.0044	0.0211	0.0020	0.0231	8	0.44	0.45	1.99	0.05
A11 + A12 =	A10		231.0		18,132	80	1.4506	2.80	4.0628	0.0907	1.5412	4.1534	0.2887	4.4422	21	0.28	5.41	3.48	0.82
BWS NITRATE REMOVAL	A9A	2.0	2.0	615	615	80	0.0492	5.00	0.2460	0.0031	0.0523	0.2491	0.0025	0.2516	8	0.44	0.45	1.99	0.56
POR SITE 6	A9	7.3	7.3	152	152	80	0.0122	5.00	0.0608	0.0008	0.0129	0.0616	0.0091	0.0707	8	0.44	0.45	1.99	0.16
A9A + A9 + A10 =	A8		240.3		18,899	80	1.5119	2.78	4.1997	0.0945	1.6064	4.2942	0.3004	4.5946	21	0.28	5.41	3.48	0.85

SEWER: ROYAL KUNIA SEWER MASTER PLAN (SITE 8PDH SUBDIVISION)
DISTRICT: WAIPAHU
REFERENCE MAPS: TMK : 9-4-02

EXHIBIT "C"

BY: TSS

Sheet: RKIIACT-SMP(SITE8)

Normal Infilt: 5 (gpcd) [USE 5 OR 35]
Wet Infilt: 1250 (gpad) [USE 1250 OR 2750]

DIST, ZONE, OR ST	POINT OR SEGMT	TRIB. AREA Increment	TRIB. AREA Total	TRIB. POP. Increment	TRIB. POP. Total	FLOW gpcd	AVE. FLOW (mgd)	MAX FLOW FACT.	MAX FLOW (mgd)	NORM DESIGN AVE INFIL (mgd)	NORM DESIGN AVE FLOW (mgd)	DESIGN HRLY FLOW (mgd)	WET INFILT. (mgd)	DESIGN PEAK FLOW (mgd)	Pipe Size (IN)	Slope (%)	Capacity (mgd)	Vel. (fps)	Qreq /Qall (%)
POR SITE 7	A7	2.5	2.5	64	64	80	0.0051	5.00	0.0256	0.0003	0.0054	0.0259	0.0031	0.0290	8	0.44	0.45	1.99	0.06
A7 + A8 =	A6		242.8		18,963	80	1.5171	2.78	4.2111	0.0948	1.6119	4.3059	0.3035	4.6094	21	0.28	5.41	3.48	0.85
POR SITE 7	A5	13.5	13.5	316	316	80	0.0253	5.00	0.1264	0.0016	0.0269	0.1280	0.0169	0.1449	8	0.44	0.45	1.99	0.32
A5 + A6 =	A4		256.3		19,279	80	1.5423	2.77	4.2671	0.0964	1.6387	4.3635	0.3204	4.6839	21	0.30	5.60	3.60	0.84
A4 + B1 =	A3		771.3		31,895	80	2.5516	2.50	6.3832	0.1595	2.7111	6.5426	0.9642	7.5068	24	0.31	8.12	4.00	0.92
A3 + D6 + D7 =	A2		815.8		33,589	80	2.6871	2.48	6.6530	0.1679	2.8551	6.8210	1.0198	7.8408	24	0.35	8.63	4.25	0.91
A2 + D1 =	A1		852.5		35,295	80	2.8236	2.45	6.9220	0.1765	3.0001	7.0985	1.0657	8.1641	24	0.35	8.65	4.26	0.94

SEWER: ROYAL KUNIA SEWER MASTER PLAN (SITE 8PDH SUBDIVISION)
DISTRICT: WAIPAHU
REFERENCE MAPS: TMK : 9-4-02

EXHIBIT "C"

BY: TSS

Sheet: RKIIACT-SMP(SITE8)

Normal Infilt: 5 (gpcd) [USE 5 OR 35]
Wet Infilt: 1250 (gpad) [USE 1250 OR 2750]

DIST, ZONE, OR ST	POINT OR SEGMT	TRIB. AREA Increment	TRIB. AREA Total	TRIB. POP. Increment	TRIB. POP. Total	FLOW gpcd	AVE. FLOW (mgd)	MAX FLOW FACT.	MAX FLOW (mgd)	NORM DESIGN AVE INFIL (mgd)	NORM DESIGN AVE FLOW (mgd)	DESIGN HRLY FLOW (mgd)	WET INFILT. (mgd)	DESIGN PEAK FLOW (mgd)	Pipe Size (IN)	Slope (%)	Capacity (mgd)	Vel. (fps)	Qreq /Qall (%)
TRIBUTARY AREA "B"																			
POR SITE 12 "B"	B12	23.9	23.9	676	676	80	0.0541	5.00	0.2704	0.0034	0.0575	0.2738	0.0299	0.3037	8	0.44	0.45	1.99	0.67
POR SITE 12 "B"	B11	21.3	21.3	488	488	80	0.0390	5.00	0.1952	0.0024	0.0415	0.1976	0.0267	0.2243	8	0.44	0.45	1.99	0.50
B11 + B12 =	B10		45.2		1,164	80	0.0931	4.85	0.4517	0.0058	0.0989	0.4575	0.0565	0.5140	10	0.32	0.70	1.97	0.74
GC I CLUB HOUSE	B9	1.0	1.0	250	250	80	0.0200	5.00	0.1000	0.0013	0.0213	0.1013	0.0013	0.1025	8	0.44	0.45	1.99	0.23
B9 + B10 =	B8		46.2		1,414	80	0.1131	4.67	0.5277	0.0071	0.1202	0.5348	0.0578	0.5926	10	0.32	0.70	1.97	0.85
POR SITE 8 (MIDDLE - 1)	B7	1.9	1.9	60	60	80	0.0048	5.00	0.0240	0.0003	0.0051	0.0243	0.0023	0.0266	8	0.44	0.45	1.99	0.06
B7+B8	B6		48.1		1,474	80	0.1179	4.63	0.5456	0.0074	0.1253	0.5529	0.0601	0.6130	10	0.40	0.78	2.21	0.79
POR SITE 8 (MIDDLE - 2)	B5	2.8	2.8	68	68	80	0.0054	5.00	0.0272	0.0003	0.0058	0.0275	0.0035	0.0310	8	0.44	0.45	1.99	0.07
B5+B6	B4		50.9		1,542	80	0.1234	4.59	0.5656	0.0077	0.1311	0.5733	0.0636	0.6369	10	0.40	0.78	2.21	0.82
POR SITE 8 (RIGHT)	B14	4.5	4.5	112	112	80	0.0090	5.00	0.0448	0.0006	0.0095	0.0454	0.0056	0.0509	8	0.44	0.45	1.99	0.11
TRIBUTARY AREA "C"	C1		436.3		10,306	80	0.8244	3.14	2.5853	0.0515	0.8760	2.6369	0.5454	3.1823	21	0.13	3.68	2.37	0.86
B14 + C1 =	B13		440.8		10,418	80	0.8334	3.13	2.6078	0.0521	0.8855	2.6599	0.5510	3.2108	21	0.14	3.82	2.46	0.84
B4 + B13 =	B3		491.6		11,960	80	0.9568	3.04	2.9123	0.0598	1.0166	2.9721	0.6145	3.5866	21	0.17	4.21	2.71	0.85
POR SITE 8 (LEFT)	B2	23.4	23.4	656	656	80	0.0525	5.00	0.2624	0.0033	0.0558	0.2657	0.0293	0.2949	8	0.44	0.45	1.99	0.66
B2 + B3 =	B1		515.0		12,616	80	1.0092	3.01	3.0394	0.0631	1.0723	3.1024	0.6438	3.7462	21	0.18	4.33	2.79	0.86

SEWER: ROYAL KUNIA SEWER MASTER PLAN (SITE 8PDH SUBDIVISION)
DISTRICT: WAIPAHU
REFERENCE MAPS: TMK : 9-4-02

EXHIBIT "C"

BY: TSS

Sheet: RKIIACT-SMP(SITE8)

Normal Infilt: 5 (gpcd) [USE 5 OR 35]
Wet Infilt: 1250 (gpad) [USE 1250 OR 2750]

DIST, ZONE, OR ST	POINT OR SEGMT	TRIB. AREA Increment	TRIB. AREA Total	TRIB. POP. Increment	TRIB. POP. Total	FLOW gpcd	AVE. FLOW (mgd)	MAX FLOW FACT.	MAX FLOW (mgd)	NORM DESIGN AVE INFIL (mgd)	NORM DESIGN AVE FLOW (mgd)	DESIGN HRLY FLOW (mgd)	WET INFILT. (mgd)	DESIGN PEAK FLOW (mgd)	Pipe Size (IN)	Slope (%)	Capacity (mgd)	Vel. (fps)	Qreq /Qall (%)
TRIBUTARY AREA "C"																			
SFD C, PH II	C43	100.0	100.0	2,600	2,600	80	0.2080	4.13	0.8591	0.0130	0.2210	0.8721	0.1250	0.9971	12	0.35	1.18	2.33	0.84
AG. LOTS	C42	6.0	6.0	112	112	80	0.0090	5.00	0.0448	0.0006	0.0095	0.0454	0.0075	0.0529	8	0.44	0.45	1.99	0.12
C42 + C43	C41		106.0		2,712	80	0.2170	4.10	0.8886	0.0136	0.2305	0.9021	0.1325	1.0346	12	0.37	1.22	2.40	0.85
LDA - 2 (C)	C40	7.8	7.8	663	663	80	0.0530	5.00	0.2652	0.0033	0.0564	0.2685	0.0098	0.2783	8	0.44	0.45	1.99	0.62
C40 + C41	C39		113.8		3,375	80	0.2700	3.92	1.0585	0.0169	0.2869	1.0753	0.1423	1.2176	12	0.50	1.41	2.79	0.86
LDA - 2 (B)	C38	4.8	4.8	408	408	80	0.0326	5.00	0.1632	0.0020	0.0347	0.1652	0.0060	0.1712	8	0.44	0.45	1.99	0.38
C38 + C39	C37		118.6		3,783	80	0.3026	3.83	1.1597	0.0189	0.3216	1.1786	0.1483	1.3268	15	0.20	1.62	2.04	0.82
LDA - 2 (A)	C36	4.5	4.5	383	383	80	0.0306	5.00	0.1530	0.0019	0.0325	0.1549	0.0056	0.1605	8	0.44	0.45	1.99	0.36
C36 + C37	C35		123.1		4,166	80	0.3332	3.76	1.2525	0.0208	0.3541	1.2734	0.1539	1.4272	15	0.22	1.70	2.14	0.84
SFD - 2 (I)	C34	69.3	69.3	1,484	1,484	80	0.1187	4.62	0.5485	0.0074	0.1261	0.5560	0.0866	0.6426	10	0.38	0.76	2.15	0.85
C34 + C35	C33		192.4		5,650	80	0.4520	3.54	1.5983	0.0282	0.4802	1.6266	0.2405	1.8671	15	0.38	2.24	2.82	0.84
PARK - 3	C30	16.0	16.0	80	80	80	0.0064	5.00	0.0320	0.0004	0.0068	0.0324	0.0200	0.0524	8	0.44	0.45	1.99	0.12
SFD - 2(H)	C29	18.7	18.7	364	364	80	0.0291	5.00	0.1456	0.0018	0.0309	0.1474	0.0234	0.1708	8	0.44	0.45	1.99	0.38
SFD - 2(G)	C28	22.9	22.9	548	548	80	0.0438	5.00	0.2192	0.0027	0.0466	0.2219	0.0286	0.2506	8	0.44	0.45	1.99	0.56
C28 + C29 + C30	C27		57.6		992	80	0.0794	5.00	0.3968	0.0050	0.0843	0.4018	0.0720	0.4738	10	0.32	0.70	1.97	0.68
SFD - 2(F)	C26	11.0	11.0	228	228	80	0.0182	5.00	0.0912	0.0011	0.0194	0.0923	0.0138	0.1061	8	0.44	0.45	1.99	0.24
C26 + C27	C25		68.6		1,220	80	0.0976	4.81	0.4690	0.0061	0.1037	0.4751	0.0858	0.5608	10	0.32	0.70	1.97	0.81
SFD - 2(E)	C24	19.6	19.6	400	400	80	0.0320	5.00	0.1600	0.0020	0.0340	0.1620	0.0245	0.1865	8	0.44	0.45	1.99	0.41
C24 + C25	C23		88.2		1,620	80	0.1296	4.54	0.5884	0.0081	0.1377	0.5965	0.1103	0.7067	10	0.46	0.83	2.37	0.85
SFD - 2(D)	C22	15.6	15.6	308	308	80	0.0246	5.00	0.1232	0.0015	0.0262	0.1247	0.0195	0.1442	8	0.44	0.45	1.99	0.32
C22 + C23	C21		103.8		1,928	80	0.1542	4.38	0.6763	0.0096	0.1639	0.6859	0.1298	0.8157	12	0.28	1.06	2.08	0.77
PARK - 2	C32	10.2	10.2	50	50	80	0.0040	5.00	0.0200	0.0003	0.0043	0.0203	0.0128	0.0330	8	0.44	0.45	1.99	0.07
SFD - 2(C)	C31	9.1	9.1	176	176	80	0.0141	5.00	0.0704	0.0009	0.0150	0.0713	0.0114	0.0827	8	0.44	0.45	1.99	0.18
C21 + C31 + C32	C20		123.1		2,154	80	0.1723	4.29	0.7390	0.0108	0.1831	0.7498	0.1539	0.9037	12	0.28	1.06	2.08	0.85
SFD - 2(B)	C19	14.4	14.4	316	316	80	0.0253	5.00	0.1264	0.0016	0.0269	0.1280	0.0180	0.1460	8	0.44	0.45	1.99	0.32
C19 + C20	C18		137.5		2,470	80	0.1976	4.17	0.8246	0.0124	0.2100	0.8369	0.1719	1.0088	12	0.35	1.18	2.33	0.85
PARK - 1	C17	15.0	15.0	75	75	80	0.0060	5.00	0.0300	0.0004	0.0064	0.0304	0.0188	0.0491	8	0.44	0.45	1.99	0.11
C17 + C18	C16		152.5		2,545	80	0.2036	4.15	0.8445	0.0127	0.2163	0.8572	0.1907	1.0479	12	0.38	1.23	2.43	0.85

SEWER: ROYAL KUNIA SEWER MASTER PLAN (SITE 8PDH SUBDIVISION)
DISTRICT: WAIPAHU
REFERENCE MAPS: TMK : 9-4-02

EXHIBIT "C"

BY: TSS

Sheet: RKIIACT-SMP(SITE8)

Normal Infilt: 5 (gpcd) [USE 5 OR 35]
Wet Infilt: 1250 (gpad) [USE 1250 OR 2750]

DIST, ZONE, OR ST	POINT OR SEGMT	TRIB. AREA Increment	TRIB. AREA Total	TRIB. POP. Increment	TRIB. POP. Total	FLOW gpcd	AVE. FLOW (mgd)	MAX FLOW FACT.	MAX FLOW (mgd)	NORM DESIGN AVE INFIL (mgd)	NORM DESIGN AVE FLOW (mgd)	DESIGN HRLY FLOW (mgd)	WET INFILT. (mgd)	DESIGN PEAK FLOW (mgd)	Pipe Size (IN)	Slope (%)	Capacity (mgd)	Vel. (fps)	Qreq /Qall (%)
SFD - 2 (A)	C15	14.8	14.8	328	328	80	0.0262	5.00	0.1312	0.0016	0.0279	0.1328	0.0185	0.1513	8	0.44	0.45	1.99	0.34
C15 + C16	C14		167.3		2,873	80	0.2298	4.05	0.9305	0.0144	0.2442	0.9449	0.2092	1.1540	12	0.46	1.36	2.67	0.85
C14 + C33	C13		359.7		8,523	80	0.6818	3.26	2.2208	0.0426	0.7244	2.2634	0.4497	2.7131	18	0.29	3.18	2.78	0.85
SFD - 1	C12	38.9	38.9	876	876	80	0.0701	5.00	0.3504	0.0044	0.0745	0.3548	0.0486	0.4034	8	0.49	0.47	2.10	0.85
C12 + C13 =	C11		398.6		9,399	80	0.7519	3.19	2.4016	0.0470	0.7989	2.4486	0.4983	2.9469	18	0.35	3.49	3.05	0.84
PRIVATE PARK	C10	12.1	12.1	61	61	80	0.0049	5.00	0.0244	0.0003	0.0052	0.0247	0.0151	0.0398	8	0.44	0.45	1.99	0.09
C10 + C11 =	C9		410.7		9,460	80	0.7568	3.19	2.4141	0.0473	0.8041	2.4614	0.5134	2.9748	18	0.35	3.49	3.05	0.85
SITE 10 (NORTH)	C8	1.9	1.9	48	48	80	0.0038	5.00	0.0192	0.0002	0.0041	0.0194	0.0024	0.0218	8	0.44	0.45	1.99	0.05
C8 + C9 =	C7		412.6		9,508	80	0.7606	3.19	2.4239	0.0475	0.8081	2.4714	0.5158	2.9872	18	0.35	3.49	3.05	0.86
GC II CLUB HOUSE	C6	1.0	1.0	250	250	80	0.0200	5.00	0.1000	0.0013	0.0213	0.1013	0.0013	0.1025	8	0.44	0.45	1.99	0.23
C6 + C7 =	C5		413.6		9,758	80	0.7806	3.17	2.4747	0.0488	0.8294	2.5235	0.5170	3.0406	18	0.36	3.54	3.10	0.86
SITE 10 (SOUTH)	C4	12.9	12.9	312	312	80	0.0250	5.00	0.1248	0.0016	0.0265	0.1264	0.0161	0.1425	8	0.44	0.45	1.99	0.32
C4 + C5 =	C3		426.5		10,070	80	0.8056	3.15	2.5379	0.0503	0.8559	2.5882	0.5332	3.1213	18	0.38	3.64	3.18	0.86
SITE 9	C2	9.8	9.8	236	236	80	0.0189	5.00	0.0944	0.0012	0.0201	0.0956	0.0123	0.1078	8	0.44	0.45	1.99	0.24
C2 + C3 =	C1		436.3		10,306	80	0.8244	3.14	2.5853	0.0515	0.8760	2.6369	0.5454	3.1823	21	0.13	3.68	2.37	0.86

SEWER: ROYAL KUNIA SEWER MASTER PLAN (SITE 8PDH SUBDIVISION)
DISTRICT: WAIPAHU
REFERENCE MAPS: TMK : 9-4-02

EXHIBIT "C"

BY: TSS

Sheet: RKIIACT-SMP(SITE8)

Normal Infilt: 5 (gpcd) [USE 5 OR 35]
Wet Infilt: 1250 (gpad) [USE 1250 OR 2750]

DIST, ZONE, OR ST	POINT OR SEGMT	TRIB. AREA Increment	TRIB. AREA Total	TRIB. POP. Increment	TRIB. POP. Total	FLOW gpcd	AVE. FLOW (mgd)	MAX FLOW FACT.	MAX FLOW (mgd)	NORM DESIGN AVE INFIL (mgd)	NORM DESIGN AVE FLOW (mgd)	DESIGN HRLY FLOW (mgd)	WET INFILT. (mgd)	DESIGN PEAK FLOW (mgd)	Pipe Size (IN)	Slope (%)	Capacity (mgd)	Vel. (fps)	Qreq /Qall (%)
TRIBUTARY AREA "D"																			
SITE 5	D8	24.7	24.7	720	720	80	0.0576	5.00	0.2880	0.0036	0.0612	0.2916	0.0309	0.3225	8	0.44	0.45	1.99	0.72
	D7		24.7		720	80	0.0576	5.00	0.2880	0.0036	0.0612	0.2916	0.0309	0.3225	8	0.44	0.45	1.99	0.72
HALEKUA GDNS II	D6	19.8	19.8	974	974	80	0.0780	5.00	0.3898	0.0049	0.0828	0.3946	0.0248	0.4194	8	0.53	0.49	2.19	0.85
SITE 4A (CPR)	D5A	9.1	9.1	344	344	80	0.0275	5.00	0.1376	0.0017	0.0292	0.1393	0.0113	0.1506	8	0.44	0.45	1.99	0.33
SITE 4B (CPR)	D5B	6.7	6.7	240	240	80	0.0192	5.00	0.0960	0.0012	0.0204	0.0972	0.0083	0.1055	8	0.44	0.45	1.99	0.23
D5A + D5B	D5		15.7		584	80	0.0467	5.00	0.2336	0.0029	0.0496	0.2365	0.0196	0.2561	8	0.44	0.45	1.99	0.57
INDUSTRIAL	D4	10.7	10.7	1,070	1,070	80	0.0856	4.93	0.4222	0.0054	0.0910	0.4276	0.0134	0.4410	8	0.59	0.52	2.31	0.85
D4 + D5 =	D3		26.4		1,654	80	0.1323	4.52	0.5983	0.0083	0.1406	0.6065	0.0330	0.6395	12	0.28	1.06	2.08	0.60
PUBLIC PARK	D2	10.3	10.3	52	52	80	0.0042	5.00	0.0208	0.0003	0.0044	0.0211	0.0129	0.0339	8	0.44	0.45	1.99	0.08
D2 + D3 =	D1		36.7		1,706	80	0.1365	4.49	0.6133	0.0085	0.1450	0.6218	0.0459	0.6677	12	0.28	1.06	2.08	0.63

TRUE NORTH
NO SCALE

GOLF
COURSE I
20.1 AC

SITE 5
S.F.D.
24.7 AC
142 UNITS

ROAD "D"

SITE 4
L.D.A.
17.3 AC
277 UNITS

SITE 3
HALEKUA
GARDENS II
L.D.A.
19.8 AC

KUPUOHI STREET

ROYAL KUNIA
VILLAGE PARK

INDUSTRIAL
10.7 AC

SITE 2
PUBLIC
PARK
10.3 AC

SITE 1
HALEKUA
GARDENS I
L.D.A.
10.7 AC
152 UNITS

PHASE 3

KUNIA ROAD

PHASE 16

ROYAL KUNIA
INDUSTRIAL
5.0 AC

ROYAL KUNIA
PARK & RIDE
5.7 AC

ADDITION TO EXISTING
VILLAGE PARK SEWER
Q = 0.19 mgd
Area = 10.7 AC
Pop = 428

ADDITION TO EXISTING
VILLAGE PARK SEWER
Q = 0.21 mgd
Area = 5.0 AC
Pop = 500

VILLAGE
PARK

SMH #1
SMH #2
SMH #3
SMH #4
SMH #5
SMH #6
SMH #7
SMH #8
SMH #9
SMH #10
SMH #11
SMH #12
SMH #13
SMH #14
SMH #15
SMH #16
SMH #17
SMH #18
SMH #19
SMH #20
SMH #21
SMH #22

Q = 0.11 mgd
Area = 8.8 AC
Pop = 256

Q = 0.32 mgd
Area = 21.6 AC
Pop = 726

Q = 0.02 mgd
Area = 2.1 AC
Pop = 44

Q = 0.32 mgd
Area = 15.3 AC
Pop = 732

Q = 0.58 mgd
Area = 36.9 AC
Pop = 1,456

Q = 0.28 mgd
Area = 12.2 AC
Pop = 610

Q = 0.79 mgd
Area = 49.1 AC
Pop = 2,068

Q = 0.28 mgd
Area = 13.7 AC
Pop = 410

Q = 0.92 mgd
Area = 62.8 AC
Pop = 2,478

Q = 1.08 mgd
Area = 86.7 AC
Pop = 2,978

Q = 0.23 mgd
Area = 23.9 AC
Pop = 500

Q = 0.16 mgd
Area = 21.1 AC
Pop = 336

Q = 1.19 mgd
Area = 107.8 AC
Pop = 3,314

KUPUNA LOOP

KAHAKEA STREET

KAMALO STREET

PHASE 1
136 UNITS

KALAE STREET

PHASE 1
PHASE 1
PHASE 2
PHASE 4

PHASES
14 and 15
120 UNITS

HOAEAE
SCHOOL

PARK

KUPUOHI STREET

VILLAGE PARK
INDUSTRIAL
3.7 AC

VILLAGE PARK
INDUSTRIAL
1.2 AC

KAUWEKE
PLACE

KUPUNA LOOP

PHASE 2
94 UNITS

PHASE 4
96 UNITS

KUPUOHI
PLACE

KAIMA
PLACE

PHASE 2
PHASE 4

KUPUOHI STREET

INTERSTATE H-1

TO HONOLULU

EXHIBIT D
HALEKUA GARDENS I and 5.0 Acre INDUSTRIAL CONNECTIONS TO VILLAGE PARK
TMK : 9-4-02

SEWER: HALEKUA GARDENS I & 5.0 AC INDUSTRIAL CONNECTIONS TO VILLAGE PARK
DISTRICT: WAIPAHU
REFERENCE MAPS: TMK : 9-4-02

EXHIBIT "E"

BY: TSS
FILE: VPIISMP.XLS

Normal Infilt: 5 (gpcd) [USE 5 OR 35]
Wet Infilt: 1250 (gpad) [USE 1250 OR 2750]

DIST, ZONE, OR ST	POINT OR SEGMT	TRIB. AREA Increment	TRIB. AREA Total	TRIB. POP. Increment	TRIB. POP. Total	FLOW gpcd	AVE. FLOW (mgd)	MAX FLOW FACT.	MAX FLOW (mgd)	NORM DESIGN AVE INFIL (mgd)	NORM DESIGN AVE FLOW (mgd)	DESIGN HRLY FLOW (mgd)	WET INFILT. (mgd)	DESIGN PEAK FLOW (mgd)	Pipe Size (IN)	Slope (%)	Capacity (mgd)	Vel. (fps)	Qreq /Qall (%)
HALEKUA I TO SMH #1		10.7	10.7	426	426	80	0.0341	5.00	0.1704	0.0021	0.0362	0.1725	0.0134	0.1859	8	1.00	0.68	3.01	0.27
SMH #1 to SMH #2			10.7		426	80	0.0341	5.00	0.1704	0.0021	0.0362	0.1725	0.0134	0.1859	8	40.00	4.29	19.01	0.04
SMH #2 to SMH #3			10.7		426	80	0.0341	5.00	0.1704	0.0021	0.0362	0.1725	0.0134	0.1859	8	2.00	0.96	4.25	0.19
SMH #3 to SMH #4		2.1	2.1	44	44	80	0.0035	5.00	0.0176	0.0002	0.0037	0.0178	0.0026	0.0204	8	1.60	0.86	3.80	0.02
SMH #3 to SMH #5		8.8	8.8	256	256	80	0.0205	5.00	0.1024	0.0013	0.0218	0.1037	0.0110	0.1147	8	1.00	0.68	3.01	0.17
SMH #3 to SMH #6			21.6		726	80	0.0581	5.00	0.2904	0.0036	0.0617	0.2940	0.0270	0.3210	8	1.00	0.68	3.01	0.47
SMH #6 to SMH #7			21.6		726	80	0.0581	5.00	0.2904	0.0036	0.0617	0.2940	0.0270	0.3210	8	3.00	1.18	5.21	0.27
SMH #7 to SMH #8			21.6		726	80	0.0581	5.00	0.2904	0.0036	0.0617	0.2940	0.0270	0.3210	8	3.80	1.32	5.86	0.24
SMH #8 to SMH #19		15.3	15.3	732	732	80	0.0586	5.00	0.2928	0.0037	0.0622	0.2965	0.0191	0.3156	8	2.90	1.16	5.12	0.27
SMH #8 to SMH #9			36.9		1,458	80	0.1166	4.64	0.5408	0.0073	0.1239	0.5481	0.0461	0.5943	8	6.30	1.70	7.55	0.35
SMH #9 to SMH #10			36.9		1,458	80	0.1166	4.64	0.5408	0.0073	0.1239	0.5481	0.0461	0.5943	8	5.26	1.56	6.90	0.38
SMH #10 to SMH #11			36.9		1,458	80	0.1166	4.64	0.5408	0.0073	0.1239	0.5481	0.0461	0.5943	8	8.47	1.97	8.75	0.30
SMH #11 to SMH #20		12.2	12.2	610	610	80	0.0488	5.00	0.2440	0.0031	0.0519	0.2471	0.0153	0.2623	8	2.90	1.16	5.12	0.23
SMH #11 to SMH #12			49.1		2,068	80	0.1654	4.32	0.7153	0.0103	0.1758	0.7257	0.0614	0.7870	8	7.04	1.80	7.98	0.44
SMH #12 to SMH #13			49.1		2,068	80	0.1654	4.32	0.7153	0.0103	0.1758	0.7257	0.0614	0.7870	8	4.26	1.40	6.21	0.56
SMH #13 to SMH #14			49.1		2,068	80	0.1654	4.32	0.7153	0.0103	0.1758	0.7257	0.0614	0.7870	8	4.52	1.44	6.39	0.55
SMH #14 to SMH #15			49.1		2,068	80	0.1654	4.32	0.7153	0.0103	0.1758	0.7257	0.0614	0.7870	8	7.14	1.81	8.03	0.43
SMH #15 to SMH #22		13.7	13.7	410	410	80	0.0328	5.00	0.1640	0.0021	0.0349	0.1661	0.0171	0.1832	8	7.08	1.81	8.00	0.10
SMH #15 to SMH #16			62.8		2,478	80	0.1982	4.17	0.8267	0.0124	0.2106	0.8391	0.0785	0.9176	8	4.00	1.36	6.01	0.68
SMH #16 to SMH #21		23.9	23.9	500	500	80	0.0400	5.00	0.2000	0.0025	0.0425	0.2025	0.0299	0.2324	8	0.44	0.45	1.99	0.52
SMH #16 to SMH #17			86.7		2,978	80	0.2382	4.02	0.9576	0.0149	0.2531	0.9725	0.1084	1.0809	12	0.50	1.41	2.79	0.76
SMH #17 to SMH #18			86.7		2,978	80	0.2382	4.02	0.9576	0.0149	0.2531	0.9725	0.1084	1.0809	12	0.50	1.41	2.79	0.76
VP 14-15 to SMH #18		21.1	21.1	336	336	80	0.0269	5.00	0.1344	0.0017	0.0286	0.1361	0.0264	0.1625	8	0.50	0.48	2.13	0.34
SMH #18 to OUTLET			107.8		3,314	80	0.2651	3.93	1.0431	0.0166	0.2817	1.0597	0.1348	1.1945	12	0.50	1.41	2.79	0.84