SEWER ANALYSIS FOR

HOKUA PLACE

TMK (4) 4-3-003:001 (PORTION)

February 2021

PROJECT DESCRIPTION

Hokua Place (formerly known as Kapaa Highlands II) is a proposed subdivision in the Kawaihau District of Wailua, Kauai and will include a mixture of single-family and multi-family residential lots at market rate and affordable prices. The portion of the parcel designated for the subdivision is about 97 acres, with an anticipated 683 multi-family units and 86 single family lots. The project will also have open green spaces, a 3.1 acre park and community pool, and 1.4 acres for commercial use.

The following analysis will reference the "Preliminary Engineering Report, Wastewater Improvements, Kapaa Highlands – Phase II" prepared by Honua Engineering, Inc. which was Exhibit G of the "HoKua Place Section 343-5e HRS Final Environmental Impact Statement (FEIS)" dated November 2019. This report will hereinafter be referred to as the *PER*. (Areas stated above were taken directly from the FEIS. Due to adjustments in layout and section boundaries since the finalization of the FEIS, areas used in this analysis will marginally differ.)

The County of Kauai Sewer Design Standards, June 1973 1st Edition, hereby referred to as the *Kauai Sewer Standards*, as well as the 2009 Uniform Plumbing Code (UPC) will be used for the subsequent analyses of the proposed sewer system.

SEWER DESIGN FLOWS

Kauai Sewer Standards

Kauai Sewer Standards suggests 2.5 persons per apartment unit (Multi-Family Homes), 4 persons per home (Single Family Homes), and 4,000 gallons per acre per day for neighborhood commercial areas to calculate daily flow rates.

Number of units and the total area in the following Table 1 were used to calculate sewer design flows.

Table 1 – Summary of Proposed Units and Areas

Type	Units	Total Area (acres)
Multi-Family 1	683	29.31
Multi-Family 2		17.09
Single Family 1	86	18.25
Single Family 2		4.70
Greenbelt 1	N/A	6.14
Greenbelt 2		3.95
Greenbelt 3		4.04
Neighborhood Commercial	N/A	1.81
Park/Pool	N/A	2.46
Roadway 1	N/A	3.18
Roadway 2		0.56
Total		**91.49***

*Total Area does not include areas near the stream or adjacent roadways considered too steep to be buildable.

Average Daily Flow Rate (ADF):
(2.5 persons/unit* x 683 units) + (4 persons/unit* x 86 units) = 2,052 persons
(100 gpd/capita* x 2,052 persons) + (4,000 gallons/acre/day x 1.81 acres) = 212,440 gpd = 0.2124 MGD

Maximum Daily Flow (MDF) = 5 x ADF = 1,062,200 gpd = 1.062 MGD

Peak Daily Flow (PDF) = MDF + (2750 gad*)(91.49 acres) = 1,313,797.5 gpd = 1.3138 MGD = 2.0327 cfs

*Per Kauai Sewer Design Standards, June 1973 1st Edition

Existing Sewer System

Sewer Lines

Based on as-built drawings of the "Kapaa Sewerage System Phase I" prepared by ParEn, Inc. dba Park Engineering dated May 15, 1991, the approximate invert at the connection points to the main 21-inch sewer line in Kukui Street is (-)1.43 ft. The maximum capacity and existing flow of the 21-inch main sewer line is 3.23 MGD and 1.82 MGD, respectively.

The contributing flow from this project to the 21-inch main sewer line is 1.31 MGD. The total flow that will run through the main sewer line post-construction will be 3.13 MGD, which is 97% of the maximum capacity of the existing sewer line.

Wastewater Treatment Plant

Per correspondence with DPW Wastewater Management Division (1/28/2021), prior to the COVID-19 pandemic, the Wailua Wastewater Treatment Plant (WWTP) to which this sewer line is routed was treating approximately 0.6 MGD daily average flow. The plant's current treatment capacity is 1.0 MGD average daily flow, and has been identified as the limiting factor of the County system in servicing wastewater flows from Hokua Place. Other major projects that will contribute wastewater to the WWTP are in the building permit process. To accept the full flow of the Hokua development, the Wailua WWTP will need to undergo CIP projects to increase its design capacity. The developer plans to work with DPW to schedule construction to coincide with the WWTP improvements.

SEWER LINE DESIGN

Per Kauai Standards, sewer design should be based on the Manning Formula, with "n" value of 0.015 for all pipes up to and including 18 inches in diameter.

Minimum sizes permitted for sewers are:

- 8-inch diameter for mains and branch mains in roadway areas
- 6-inch diameter for laterals

An 18-inch diameter pipe is recommended for the main sewer line that runs the onsite flow to the offsite connection point in Kukui Street.

See attached Hydraflow Report for pipe analysis. Analyses were performed using the minimum design slope required by the Kauai Standards (0.0016 ft/ft for an 18-inch line). Therefore, during the design phase, the sewer line diameter may be lessened based on the design slope. A profile of the proposed sewer line will be analyzed to determine whether an onsite pump station will be required to route the sewer flows to the existing county sewer system.

The proposed 18-inch sewer line has a maximum capacity of 3.64 cfs and thus has adequate capacity to accommodate the flows from the Hokua Place project.

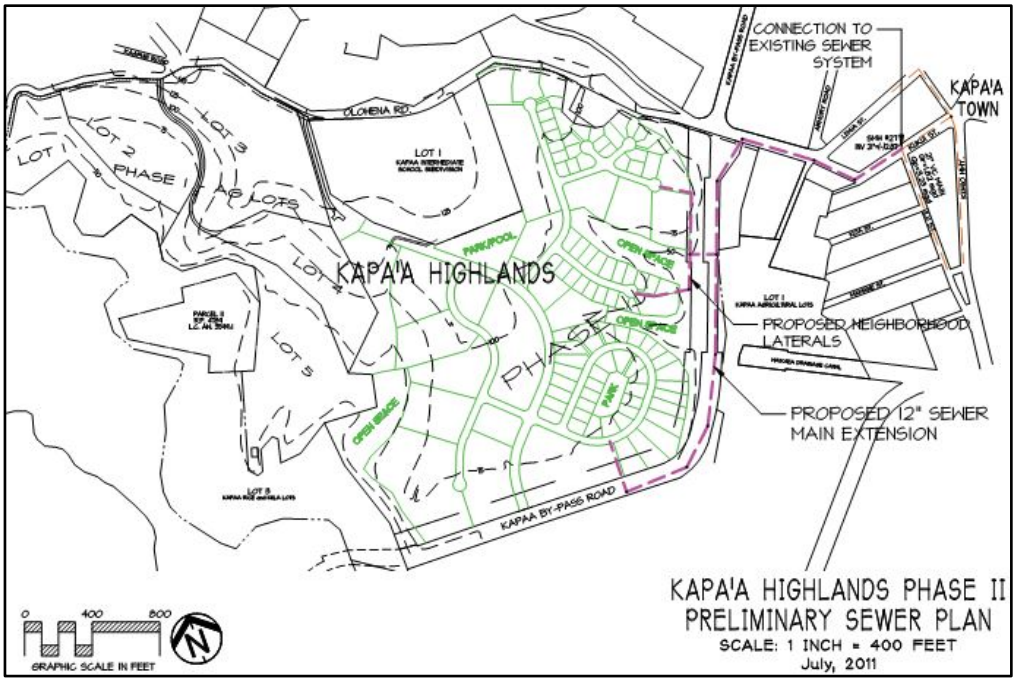


Figure 1 – Sewer Plan from PER

The lots and sewer line shown in Figure 1 are outdated and were not used in the current sewer analysis.

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Feb 8 2021

Proposed 18-inch Onsite Sewer Line

Circular

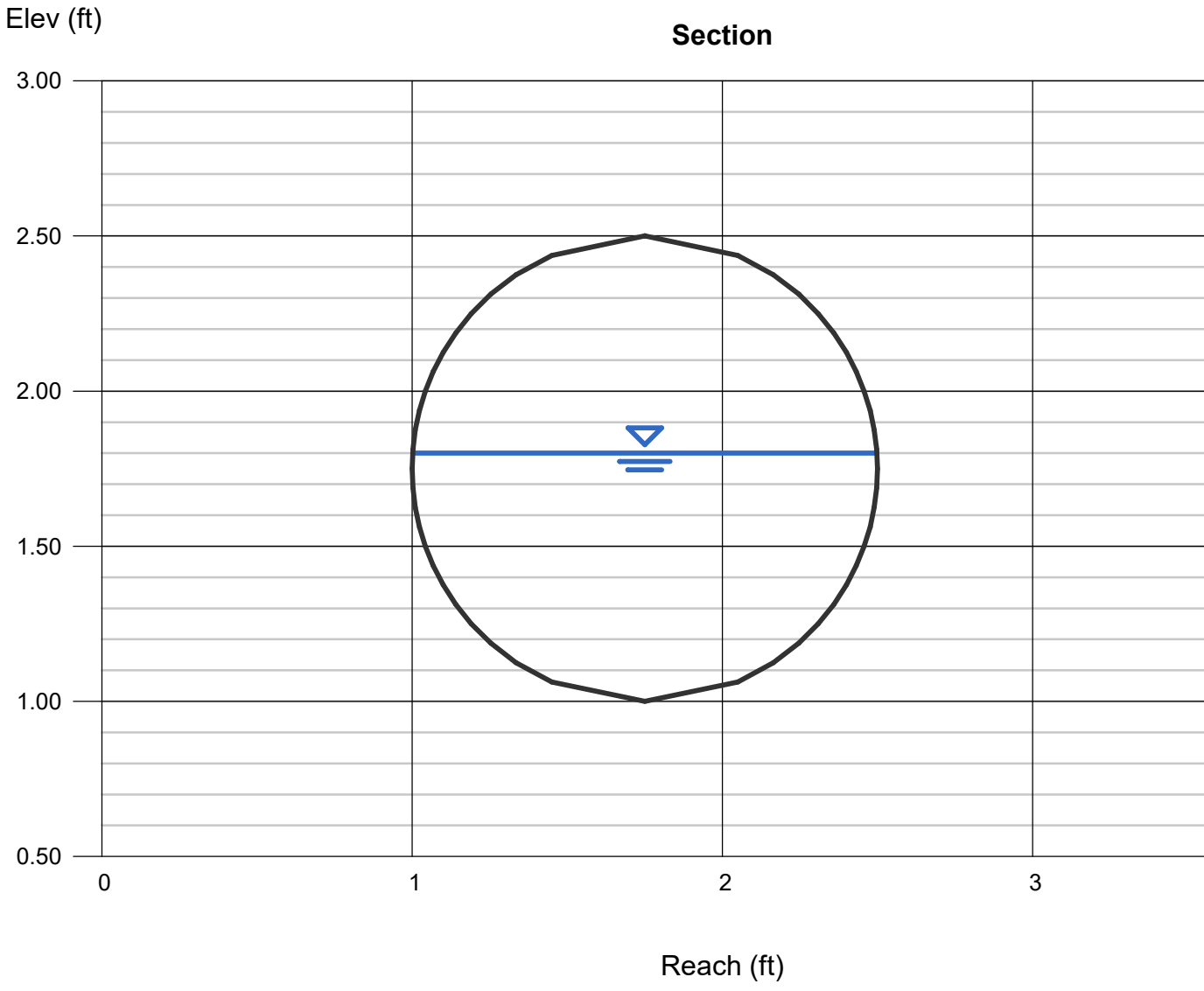
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.16
N-Value	= 0.015

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.03

Highlighted

Depth (ft)	= 0.80
Q (cfs)	= 2.033
Area (sqft)	= 0.96
Velocity (ft/s)	= 2.11
Wetted Perim (ft)	= 2.46
Crit Depth, Yc (ft)	= 0.54
Top Width (ft)	= 1.50
EGL (ft)	= 0.87



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Tuesday, Dec 22 2020

Proposed 18-inch Onsite Sewer Line Max. Capacity

Circular

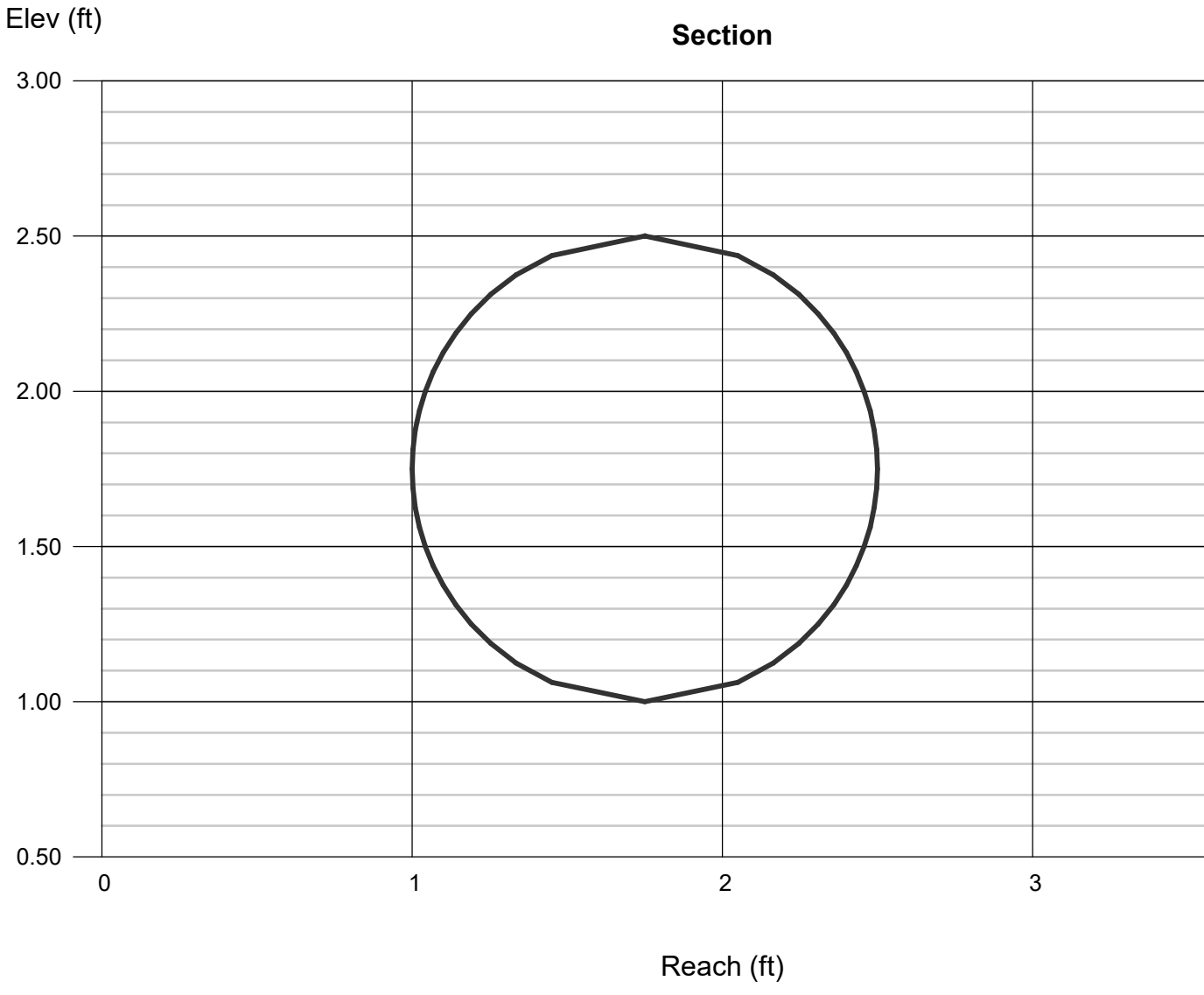
Diameter (ft)	= 1.50
Invert Elev (ft)	= 1.00
Slope (%)	= 0.16
N-Value	= 0.015

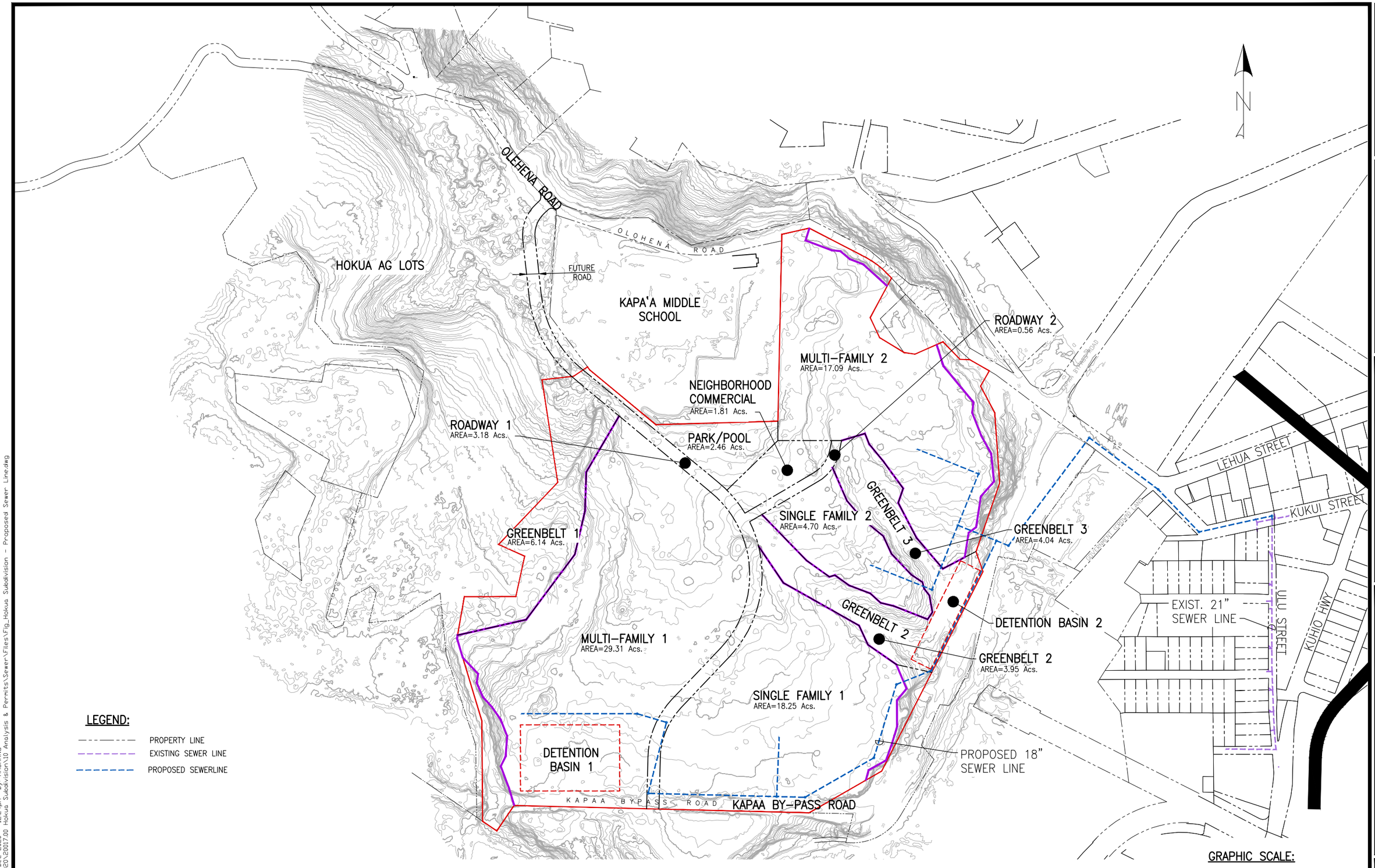
Calculations

Compute by:	Known Depth
Known Depth (ft)	= 1.50

Highlighted

Depth (ft)	= 1.50
Q (cfs)	= 3.640
Area (sqft)	= 1.77
Velocity (ft/s)	= 2.06
Wetted Perim (ft)	= 4.71
Crit Depth, Yc (ft)	= 0.73
Top Width (ft)	= 0.00
EGL (ft)	= 1.57





HOKUA PLACE CONCEPT PROPOSED SEWER MAP

SCALE: 1" = 400'

SYMBOL	DESCRIPTION	DATE

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HOKUA PLACE AG SUBDIVISION
Kapaa, Kaua'i, Hawai'i

CONCEPT PROPOSED SEWER MAP

Designed by: DT
Checked by: EL
Drawn by: DT
Approved by: WB
Date: June 2016
Scale: AS NOTED
T.M.K. 4-3-003:001

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

SIGNATURE 4/30/18 EXPIRATION DATE OF THE LICENSE

FIG. 2

Plotted: Tue, 22 Dec 2020 - 12:24pm By: MMCHANG
File Name: H:\FY2020\20017.00 Hokua Subdivision\10 Analysis & Permits\Sewer\Files\Fig_Hokua Subdivision - Proposed Sewer Line.dwg