PRELIMINARY PRIORITY RANKING

FOR

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
WASTEWATER DIVISION

ISLAND OF HAWAI‘I, HAWAI‘I

County of Hawai‘i
Department of Environmental Management
Wastewater Division
345 Kekūanāo‘a, Suite 41
Hilo, Hawai‘i 96720

JULY 2024

Table of Contents

Preliminary Priority Ranking

The County of Hawai'i Department of Environmental Management Wastewater Division (DEM-WWD) in partnership with the United States Environmental Protection Agency (EPA) and PG Environmental collaboratively identified critical wastewater capital improvement projects and developed a tool to prioritize the completion of the critical projects. The prioritization incorporated staff's institutional knowledge, and results from comprehensive condition assessments conducted by EPA and PG Environmental which are included in Appendix B & C. Using a Technical Assistance Grant from the EPA, PG Environmental worked collaboratively with DEM-WWD to create a CIP prioritization tool. DEM-WWD and PG Environmental implemented the *County of Hawai'i Capital Improvement Program Scoring Matrix User Guide & 2023 Results* included as Appendix A. The prioritization tool was used to create the initial CIP project priority list. After the execution of Administrative Order on Consent Docket No. CWA-309(a)-24-003 (Countywide AOC) the CIP list was revised to align with the requirements of the Countywide AOC. The most recent iteration of the CIP list aligns the CIP priority projects with all current executed enforcement documents.

1. List of Capital Projects and Major Studies

Table 1: Capital Improvement Projects identifies projects DEM-WWD has deemed priority based on the results of capital improvement prioritization process detailed in Appendix A.

Table 1: Capital Improvement Projects

Priority Ranking	Project	Capital Cost Est. per COH ($Thousand)	Comments
1	Pāhala Wastewater System	$47,000	AOC Deadline to Close LCC by 1/22/2027 Docket No. SDWA-UIC-AOC-2017-0002
2	Nāʻālehu Wastewater System	$103,500	AOC Deadline to Close LCC by 12/31/2027 Docket No. SDWA-UIC-AOC-2017-0002
3&4	Hilo WWTP Rehabilitation and Replacement Phase I & II *(COH Hilo WWTP Upgrades)*	$355,925	AOC Deadline to Complete Construction by 6/2035 Docket No. CWA-309(a)-24-003
5	Kealakehe WWTP Headworks *(COH – Kealakehe WWTP Rehabilitation and Replacement)*	$57,500	AOC Deadline to Complete Construction by 6/2028 Docket No. CWA-309(a)-24-003
6	Pua Sewer Pump Station and Force Main Replacement	$46,000	AOC Deadline to Complete Construction by 6/2035 Docket No. CWA-309(a)-24-003
7	Kula'imano WWTP Rehabilitation and Replacement *(COH – Kulaʻimano and Pāpaʻikou Dewatering and Barminutor Replacement)*	$9,700	AOC Deadline to Complete Construction by 6/2030 Docket No. CWA-309(a)-24-003
8	Pāpaikou WWTP Rehabilitation and Replacement *(COH – Kulaʻimano and Pāpaikou Dewatering and Barminutor Replacement)*	$9,700	AOC Deadline to Complete Construction by 6/2031 Docket No. CWA-309(a)-24-003
9	Hale Hālāwai FM *(COH – Hale Halawai SPS Renovation & Force Main Replacement)*	$3,680	AOC Deadline to Complete Construction by 6/2027 Docket No. CWA-309(a)-24-003
10	Kealakehe SPS and FM Replacement *(COH – Kealakehe SPS Renovation and Force Main Replacement)*	$1,785	AOC Deadline to Complete Design by 7/2025 - Docket No. CWA-309(a)-24-003
	Subtotal	**$634,790**	

The Countywide AOC identified several pertinent studies that need to be completed according to a negotiated compliance schedule. DEM-WWD has completed two of the necessary studies (Asset Management System Implementation Plan & Spill Response Plan for Force Mains). In addition to the completed studies, DEM-WWD has initiated three other studies that includes the County Integrated Wastewater Master Plan, Interim Financial Plan for Critical CIP Projects, and a sewer rate study.

Table 2: Summary of Project Studies

Project Studies	Activity	Comments
County of Hawaiʻi Department of Environmental Management Wastewater Division Risk Assessment Report – Vertical Assets	Completed	EPA efforts conducted by PG Environmental Consultant in March 2019
County of Hawaiʻi Department of Environmental Management Wastewater Division Risk Assessment Report – Horizontal Assets	Completed	EPA efforts conducted by PG Environmental Consultant in March 2019
CIP Criteria as provided in Appendix A (Objective Scoring Criteria)	Completed	EPA efforts conducted by PG Environmental Consultant 4/12/2024
Preliminary Priority Ranking*	***Completed***	***AOC by 7/30/2024****
Asset Management Program		
County Integrated Wastewater Master Plan	In Progress	Countywide AOC Compliance Date 1/31/2027
Detailed Condition Assessment		Countywide AOC Compliance Date 12/31/2026
Final Priority Ranking		Countywide AOC Compliance Date 12/31/2026
Critical Projects Implementation		Countywide AOC Compliance Date 6/30/2027
Annual Assessment and Report		Countywide AOC Compliance Date Yearly
Interim Financial Plan for Critical CIP Projects	In Progress	Countywide AOC Compliance Date 6/30/2027
Wastewater Sewer Service Connection Expansion Program		Countywide AOC Compliance Date by 12/31/2026
Financial Plan	In Progress	Countywide AOC Compliance Date 06/30/2024
Asset Management System Implementation Plan	*Completed*	Countywide AOC Compliance Date *6/30/2024*
Annual Report for Operations & Maintenance		Countywide AOC Compliance Date Yearly
Spill Response Plan for Force Mains	*Completed*	Countywide AOC Compliance Date *7/1/2024*

Project Studies	Activity	Comments
Sewer Line Operations & Maintenance Preventative Maintenance Program Plan		Countywide AOC Compliance Date 7/1/2025
Initial Condition Assessment (Gravity Sewer Lines)	In Progress	Countywide AOC Compliance Date 10/1/2028

Per this document

2. Ranking Criteria

CIP scoring uses the criteria identified in the *County of Hawai'i Capital Improvement Program Scoring Matrix User Guide & 2023 Results, Wastewater Infrastructure Planning and Utility Management* dated April 12, 2024 included in Appendix A. The report identifies three overall goals for wastewater capital improvement projects that aligned with the COH's priorities and Department of Environmental Management's (DEM) core values:

Goal 1: Protect and improve public health/safety and improve community livability.

Goal 2: Enable safer and more efficient operations and maintenance (O&M).

Goal 3: Build a self-sustaining wastewater system.

Table 3 – Ranking Criteria

Goal 1	Protect and improve public health/safety and improve community livability.	Criteria	Criteria Weight
Objective 1.1	Conserve natural resources, and promote sustainability	Improve efficiency of natural resources consumption	9
Objective 1.2	Improve quality of state waters	Reduce potential discharges of untreated wastewater to streams, wetlands, or coastline	7
Objective 1.3	Increase capacity of the wastewater system	Account for future population growth and addition of existing cesspool users to the wastewater collection system	10
Objective 1.4	Improve conditions for disadvantaged communities	Provide equitable service to disadvantaged communities	4
Objective 1.5	Maintain/achieve regulatory compliance	Reduce number of regulatory violations per year	10
Objective 1.6	Improve socio-economic conditions in the community	Minimize long term socio-economic impacts associated with projects	5
Goal 2	**Enable safer and more efficient operations and maintenance (O&M).**	**Criteria**	**Criteria Weight**

Objective 2.1	Improve wastewater system efficiency	Reduce the magnitude of required O&M	7
Objective 2.2	Improve safety in the work environment	Reduce exposure of COH personnel to health and safety hazards	9
Objective 2.3	Improve operation stability and resilience	Increase system reliability	10
Goal 3	**Build a self-sustaining wastewater system.**	**Criteria**	**Criteria Weight**
Objective 3.1	Achieve timely project implementation	Prioritize projects with shorter design and construction timelines	4
Objective 3.2	Increase utility revenue	Increase revenue through addition of customers	9

Additional factors considered are identified below: Mandated by law or court action;

- Protects public health and/or safety;
- Prioritized in the General Plan or a Community Development Plan
- Infrastructure projects that support affordable housing;
- Achievable within time and resource constraints.

The County will annually re-evaluate the ranking criteria for both current and prospective projects to ensure alignment with its core values and administrative priorities. Additionally, the scoring methodology will be reviewed each year to verify that it supports the County's objectives in maintaining a high performing and environmentally sustainable wastewater collection and treatment system.

3. Project Justification & Project Prioritization

Table 4 – Project Justification & Prioritization

Priority Ranking	Project	Justification
1	Pāhala Wastewater System	The County is the current owner and/or operator of two (2) large capacity cesspools (LCC), that serve approximately 109 private residences in the Pāhala Community. LCCs are not an EPA-approved wastewater disposal method. The facilities are in violation and continue to violate the Safe Drinking Water Act. Under the 2024 Revised AOC, SDWA-UIC-AOC-2017-0002, The final deadline for the County to close the large capacity cesspools is January 22, 2027.
2	Nāʻālehu Wastewater System	The County is the current owner and/or operator of three (3) large capacity cesspools (LCC), that serve approximately 164 private residences in the Nāʻālehu Community. LCCs are not an EPA approved wastewater disposal method. The facilities are in violation and continue to violate the Safe Drinking Water Act. The final deadline for the County to close the large capacity cesspools is December 31, 2027.
3&4	Hilo WWTP Rehabilitation and Replacement Phase I & II *(COH Hilo WWTP Upgrades)*	The Hilo WWTP serves the sewered areas of the Hilo community. The WWTP was constructed in the early 1990s and was originally designed to provide secondary treatment of wastewater for an average dry weather and peak wet weather wastewater flow of 5.0 mgd. Current dry weather flows are approximately 2.7 -2.8 mgd. Recent condition assessments and a resulting master plan have identified a range of critical system deficiencies within the WWTP which threaten reliable treatment and the ability to provide a safe working environment for operations and maintenance staff. These deficiencies include severe concrete deterioration, malfunctioning equipment, and safety hazards. In addition, influent five-day biochemical oxygen demand (BOD) and total suspended solids (TSS) concentrations are greater than those which served as the basis of the original plant design. Moreover, the existing condition of the facility poses a threat to the safe and normalized operations of the WWTP. As the Hilo WWTP is the only wastewater facility that serves the region, it is a critical facility. The proposed project will restore the original capacity of 5.0 mgd average dry weather flow.
5	Kealakehe WWTP Headworks *(COH – Kealakehe WWTP Rehabilitation and Replacement)*	The KWWTP was initially constructed in 1993 to replace the original activated sludge-based Kailua Wastewater Treatment Plant (WWTP). The facility is currently permitted to treat 5.3 million gallons per day (mgd) to secondary treatment levels. The KWWTP unit processes consist of a Septage Receiving Station (SRS), a

Priority Ranking	Project	Justification
		Headworks Facility, which includes screenings and grit removal, Aerated Lagoons, and an Effluent Pump Station. Support facilities include the emergency power system, an Administration Building, and an Operations Building. Several necessary improvements/repairs have been identified for the headworks facility, septage receiving facility.
6	Pua Sewer Pump Station and Force Main Replacement	The project proposes to rehabilitate the existing 24-inch force main from the Pua Sewage Pump Station (SPS) to the Hilo Wastewater Treatment Plant. The County did experience a break of the existing force main back in 2011. During that repair, it was discovered that the liner in the pipe was starting to peel away from the inner wall causing potential blockage.
7	Kula'imano WWTP Rehabilitation and Replacement *(COH – Kulaʻimano and* Pāpaʻikou *Dewatering and Barminutor Replacement)*	The existing influent barminutor systems at Kulaʻimano WWTPs are at the end of their useful life and are proposed to be replaced with rotary screens. The existing grinders are installed within a concrete channel in the headworks building with limited area for improvements.
8	Pāpaikou WWTP Rehabilitation and Replacement *(COH – Kulaʻimano and* Pāpaʻikou *Dewatering and Barminutor Replacement)*	The existing influent barminutor systems at Pāpaʻikou WWTPs are at the end of their useful life and are proposed to be replaced with rotary screens. The existing grinders are installed within a concrete channel in the headworks building with limited area for improvements.
9	Hale Hālāwai FM (COH – Hale Hālāwai SPS Renovation & Force Main Replacement	The existing 12-inch in diameter, 900 linear foot long cast iron force main was originally constructed in 1971. Replacement is needed due to the age and condition of the force main. The cast iron pipe material has deteriorated from both internal and external corrosion. The consequences of failure for the Hale Hālāwai force main are substantial, due to its proximity to valuable coastal shoreline and the area is heavily used by pedestrians. Failure of the force main would result in closure of the popular tourist destination of Kailua Bay.
10	Kealakehe SPS and FM Replacement *(COH – Kealakehe SPS Renovation and Force Main Replacement)*	***Design Phase Only –*** The existing 9,300 linear foot, 24" ductile iron force main from the Kealakehe Sewer Pump Station to the Kealakehe WWTP was installed in the early 1990s. The force main is identified as a single point of failure and previously operators have observed portions of the internal lining separating from the internal pipe. The project proposes to complete the design for a redundant 24" force main for installation in parallel with the existing force main.

4. **Technical project scope for the construction and completion timeframe**

Table 5 – Construction Scope and Timeframe

COH – DEM Priority Ranking	Project	Description	Estimated Implementation Timeline
1	Pāhala Wastewater System	Construct a new WWTP and collection system, incorporating site improvements for the secondary wastewater treatment process disinfection, solids management, and effluent disposal methods. Close existing LCCs.	AOC Deadline to Close LCC by 1/22/2027 Docket No. SDWA-UIC-AOC-2017-0002
2	Nāʻālehu Wastewater System	Construct a new WWTP and collection system, incorporating site improvements for the secondary wastewater treatment process disinfection, solids management, and effluent disposal methods. Close existing LCCs.	AOC Deadline to Close LCC by 12/31/2027 Docket No. SDWA-UIC-AOC-2017-0002
3	Hilo WWTP Rehabilitation and Replacement Phase I	Replacement of existing headworks and digester. New odor control system, sludge blend tank, and gas conditioning system, with rehabilitation of primary sedimentation tank common channel. Rehabilitate solids handling, solids dewatering, and clarifier scum/drainage pit isolation valves.	AOC by 6/2035 Docket No. CWA-309(a)-24-003
4	Hilo WWTP Rehabilitation and Replacement Phase II	Upgrade the secondary treatment process to conventional activated sludge including new aeration chambers.	AOC by 6/2035 Docket No. CWA-309(a)-24-003
5	Kealakehe WWTP Headworks	Installation of a redundant 30" parallel influent pipe, rehabilitation of the two existing vortex grit chambers, new foul air piping, new FM influent stub, rehabilitation of the existing influent box, a small pump station for the existing bathroom in the administration building, removal of existing equipment no longer in use, and repair/replacement of concrete T-lock lining throughout the headworks concrete channels or within existing manholes.	AOC by 6/2028 Docket No. CWA-309(a)-24-003
6	Pua SPS and FM	Installation of a second FM and rehabilitation of the existing FM.	AOC by 6/2035 Docket No. CWA-309(a)-24-003

COH – DEM Priority Ranking	Project	Description	Estimated Implementation Timeline
7	Kula‘imano WWTP Rehabilitation and Replacement	Improvements to the Kula‘imano WWTP will include rehabilitation of the headworks, as well as replacement of air diffusers and piping in the aeration basins.	AOC by 6/2030 Docket No. CWA-309(a)-24-003
8	Pāpa‘ikou WWTP Rehabilitation and Replacement	Improvements to the Pāpa‘ikou WWTP will include rehabilitation of the headworks, replacement of air diffusers and piping in the aeration basins, and new drives and catwalks on the secondary clarifiers.	AOC by 6/2031 Docket No. CWA-309(a)-24-003
13	Hale Hālāwai FM	Replace approximately 900 LF of existing deteriorated cast-iron FM which was installed in 1971. Install a new discharge manhole at the terminus of the FM and a flow meter within the existing discharge manifold piping.	AOC by 6/2027 Docket No. CWA-309(a)-24-003
16	Kealakehe SPS and FM Replacement	The project proposes to complete the design of approximately 9,300 linear feet of 24” force main for installation in parallel with the existing force main.	AOC by 7/2025 - Design Only Docket No. CWA-309(a)-24-003

5. Projections for a 5-year timeframe and 20-year planning timeframe

The following table provides a Six Year Capital Improvement Program that was adopted by the County of Hawai'i's Mayor and Council by Ordinance No. 24-33 Effective July 1, 2024. This serves as our five-year capital improvement plan. Currently our 20-year capital improvement plan is within Table 5 as shown above which consists of the deadlines established within the Countywide AOC and will incorporate any critical/necessary projects identified by the Countywide Integrated Wastewater Master Plan, future facility plans, and *EPA/PG Environmental effort dated April 12, 2024, County of Hawai'i Capital Improvement Program Scoring Matrix User Guide & 2023 Results* included in Appendix A.

Table 6 – Six Year Capital Improvement Program

	2024-25 FY FUNDING (in thousands)	FUNDING FORECAST BY FISCAL YEAR (in thousands)								TOTAL ESTIMATED PROJECT COST
PROJECT	County G.O. Bond	Prior Funds Allotted	**This Request 2024-25**	2025-26	2026-27	2027-28	2028-29	2029-30	Beyond 6 years	
Pahala Wastewater System	42,000	9,785	42,000							51,785
Naalehu Wastewater System (reappr.)	11,500	2,034	11,500	94,500						108,034
Hilo WWTP Rehabilitation and Replacement	110,000	27,066	110,000							137,066
Kealakehe WWTP Rehabilitation and Replacement	52,500		52,500							52,500
Repair/Replacement of Wastewater Facilities	10,000	7,736	10,000	10,000	10,000	10,000	10,000	10,000		67,736
Pua Sewer Pump Station Force Main Replacement		3,930			40,000					43,930
Kulaimano & Papaikou Dewatering and Barminuter Replacement		300			8,000	8,000				16,300
Wailoa SPS Renovation & Dual Force Mains						2,000		20,000		22,000
Kaumana Gardens Collector Sewer						600		6,000		6,600
Pua SPS Renovation		2,873					32,000			34,873
Ainako Aina Nani Collector Sewer							250	10,000		10,250
Ainako Interceptor Sewer Phase 2							200		10,000	10,200
Paukaa SPS New Force Main							800	8,000		8,800
North Kona SPS, FM, Hina Lani Gravity Sewer, West Hawaii Business Park Gravity Sewer		2,701					1,000	20,000		23,701
Onekahakaha SPS Renovation and Dual Force Mains								12,000		12,000
Kolea SPS Renovation and Dual Force Mains									10,000	10,000
Kealakehe Wastewater Treatment Plant R-1 Upgrade		13,689							40,000	53,689
Kalanianaole Collector Sewer Phase II									12,000	12,000
Kulaimano WWTP Upgrade									37,000	37,000
Papaikou WWTP Upgrade									20,000	20,000
Wailuku Force Main and Gravity Sewer Replacement									16,000	16,000
Keopu FM Replacement/SPS Renovation and Relocation									2,000	2,000
Kealakehe SPS Renovation and Force Main Replacement									15,000	15,000
Puueo Gravity Sewer Replacement									8,800	8,800
Lanihau SPS Upgrade									3,000	3,000
TOTAL	226,000	70,114	226,000	104,500	58,000	20,600	44,250	86,000	173,800	783,264

6. Classification, itemization and explanation for project expenditures including workforce/staffing needs

Table 7 - Project Phase, Expenditures, Roles & Responsibilities

Priority	Project Name	Project Phase	Subtotal Cost	Cost per Project	Staffing Roles & Responsibilities
1	**Pāhala Wastewater System**				In-house COH Project Management Duties
		Environmental	$0		COH staff & Consultant
		Design	$7,000,000		COH staff & Consultant
		Bid Advertise	$0		In-house COH Staff
		Construction	$40,000,000	**$47,000,000***	Private Contractor with COH Construction Engineering & Inspections, Consultant, and County Hired Construction Manager
2	**Nāʻālehu Wastewater System**				In-house COH Project Management Duties
		Environmental	$0		COH staff & Consultant
		Design	$13,500,000		COH staff & Consultant
		Bid Advertise	$0		In-house COH Staff
		Construction	$90,000,000	**$103,500,000***	Private Contractor with COH Construction Engineering & Inspections, Consultant, and County Hired Construction Manager
3 & 4	**Hilo WWTP Rehabilitation and Replacement Phase I & II**				In-house COH Project Management Duties
		Environmental	$15,475,000		COH staff & Consultant Engineer, Completed
		Design	$30,950,000		COH staff & Consultant Engineer - Completed
		Bid Advertise	$0		In-house COH staff- Advertised

Priority	Project Name	Project Phase	Subtotal Cost	Cost per Project	Staffing Roles & Responsibilities
		Construction	$309,500,000	**$355,925,000***	Private Contractor with COH staff – Start Construction 2025 Construction Engineering & Inspections, , Consultant, and County Hired Construction Manager
5	**Kealakehe WWTP Rehabilitation and Replacement**				In-house COH Project Management Duties
		Environmental	$2,500,000		COH staff & Consultant Engineer
		Design	$5,000,000		COH staff & Consultant Engineer
		Bid Advertise	$0		In-house COH staff
		Construction	$50,000,000	**$57,500,000***	Private Contractor with COH Construction Engineering & Inspections, Consultant, and County Hired Construction Manager
6	**Pua SPS Force Main Replacement**				In-house COH Project Management Duties
		Environmental	$2,000,000		COH staff & Consultant Engineer
		Design	$4,000,000		COH staff & Consultant Engineer
		Bid Advertise	$0		In-house COH staff
		Construction	$40,000,000	**$46,000,000***	Private Contractor with COH Construction Engineering & Inspections, Consultant, and County Hired Construction Manager
7	**Kulaʻimano WWTP Rehabilitation and Replacement**				In-house COH Project Management Duties
		Environmental	$400,000		COH staff & Consultant Engineer
		Design	$1,300,000		COH staff & Consultant Engineer

Priority	Project Name	Project Phase	Subtotal Cost	Cost per Project	Staffing Roles & Responsibilities
		Bid Advertise	$0		In-house COH staff
		Construction	$8,000,000	**$9,700,000***	Private Contractor with COH Construction Engineering & Inspections, Consultant, and County Hired Construction Manager
8	**Pāpaʻikou WWTP Rehabilitation and Replacement**				In-house COH Project Management Duties
		Environmental	$400,000		COH staff & Consultant Engineer
		Design	$1,300,000		COH staff & Consultant Engineer
		Bid Advertise	$0		In-house COH staff
		Construction	$8,000,000	**$9,700,000***	Private Contractor with COH Construction Engineering & Inspections, Consultant, and County Hired Construction Manager
13	**Hale Hālāwai SPS Force Main Replacement**				In-house COH Project Management Duties
		Environmental	$160,000		COH staff & Consultant Engineer
		Design	$320,000		COH staff & Consultant Engineer
		Bid Advertise	$0		In-house COH staff
		Construction	$3,200,000	**$3,680,000***	Private Contractor with COH Construction Engineering & Inspections, Consultant, and County Hired Construction Manager
16	**Kealakehe SPS Force Main Replacement**				In-house COH Project Management Duties
		Environmental	$85,000		COH staff & Consultant Engineer
		Design	$1,700,000	**$1,785,000***	COH staff & Consultant Engineer
			Total	**$634,790,000**	

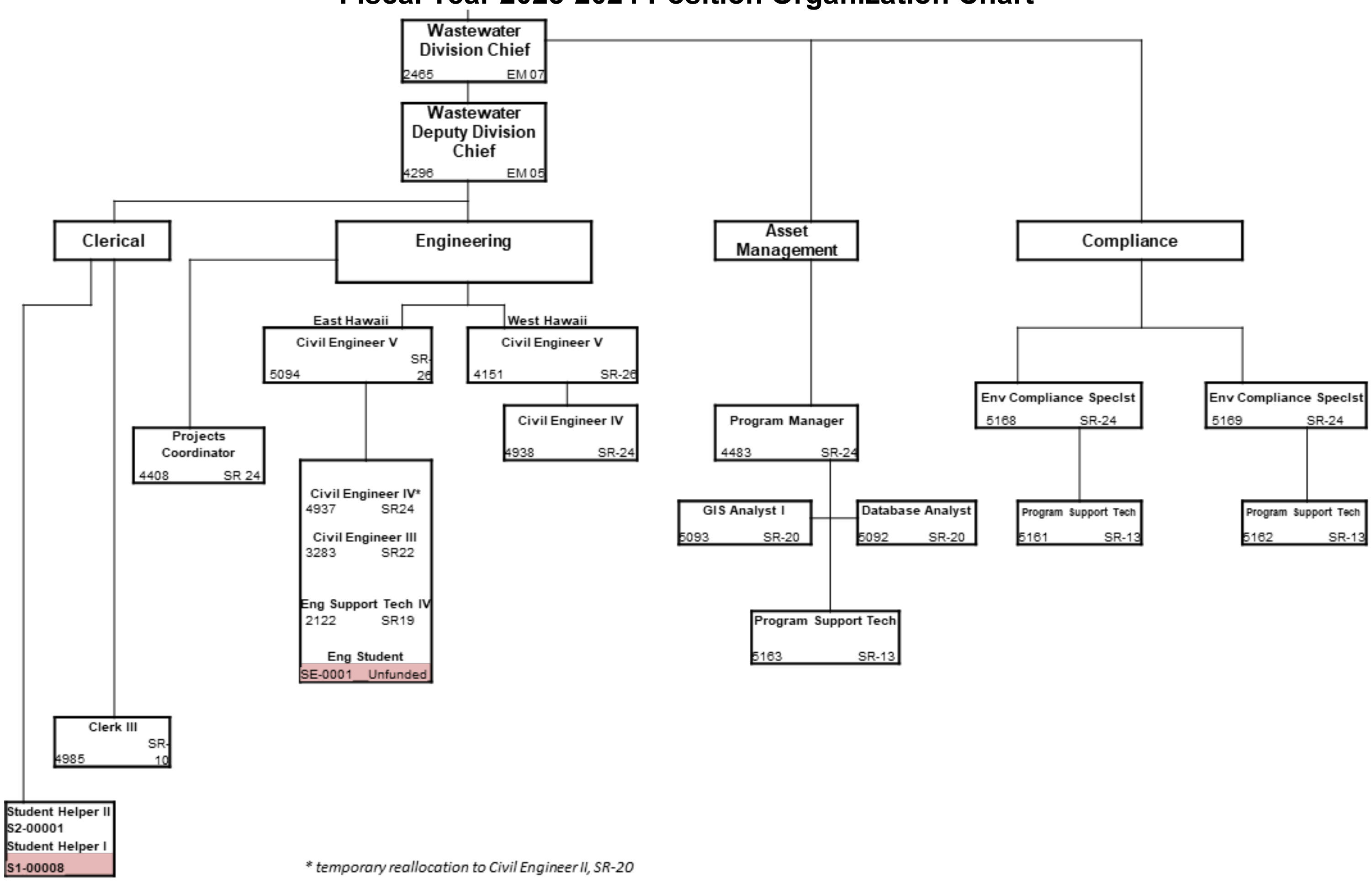
Previous allotted funding, expended and future funding included

Wastewater Division Responsibilities

To protect public health and the environment, respect the community while spending public funds appropriately, and nurture responsibility and professionalism in the Wastewater Division workplace. The Wastewater Division is responsible for the operation and maintenance of 120 miles of sewer mains, 16 pump stations, 7 treatment facilities, and the closure of the large capacity cesspools in Pāhala and Nāʻālehu.

The Wastewater Division accepts approximately 5 million gallons of wastewater for treatment per day, cleans and inspects approximately 20 miles of sewer lines each year.

Wastewater-Division Administration
Fiscal Year 2023-2024 Position Organization Chart



** temporary reallocation to Civil Engineer II, SR-20*

Currently, DEM-WWD staff are managing multiple projects and programs. As projects or programs advance into different phases DEM-WWD will adjust staffing levels. DEM-WWD will leverage consultants through professional service contracts or hire internal staff based on the permanence of our needs. In situations where large amounts of staffing support is needed for a short duration of time, the DEM-WWD will likely leverage professional services contracts and in other situations where new programs are created then DEM-WWD will choose to add new staff positions. This will support the County in supporting capital improvement projects or the start of regulatory programs necessitated by the changing regulatory environment.

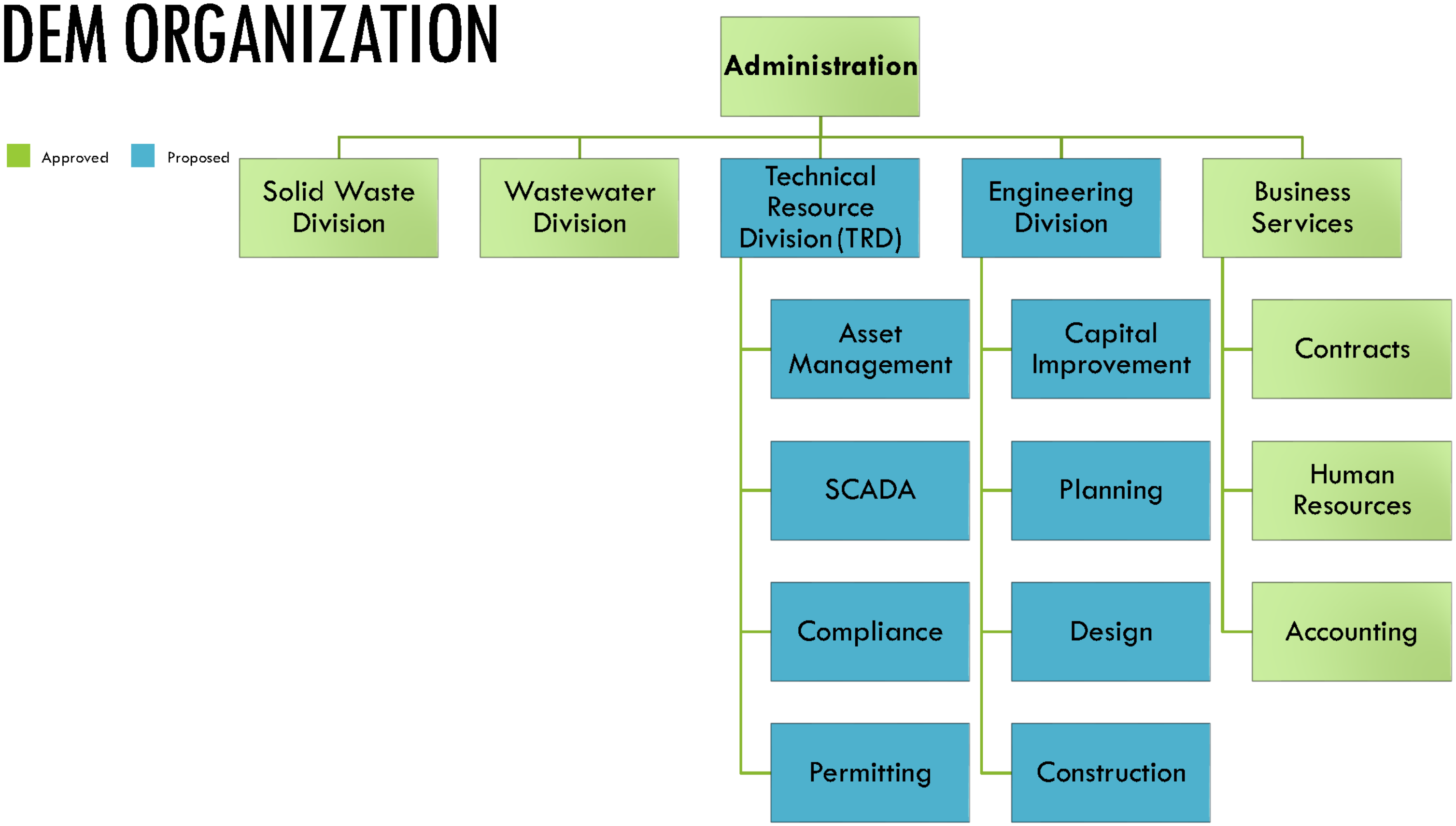
Draft Reorganization and Staffing Needs

The Department of Environmental Management (DEM) is currently facing a critical staffing shortage, with eighty-six vacant positions, including twenty-six within the Wastewater Division. To ensure compliance with the Administrative Order on Consent (AOC), DEM has prioritized filling these vacancies and creating additional positions to address increased workload demands.

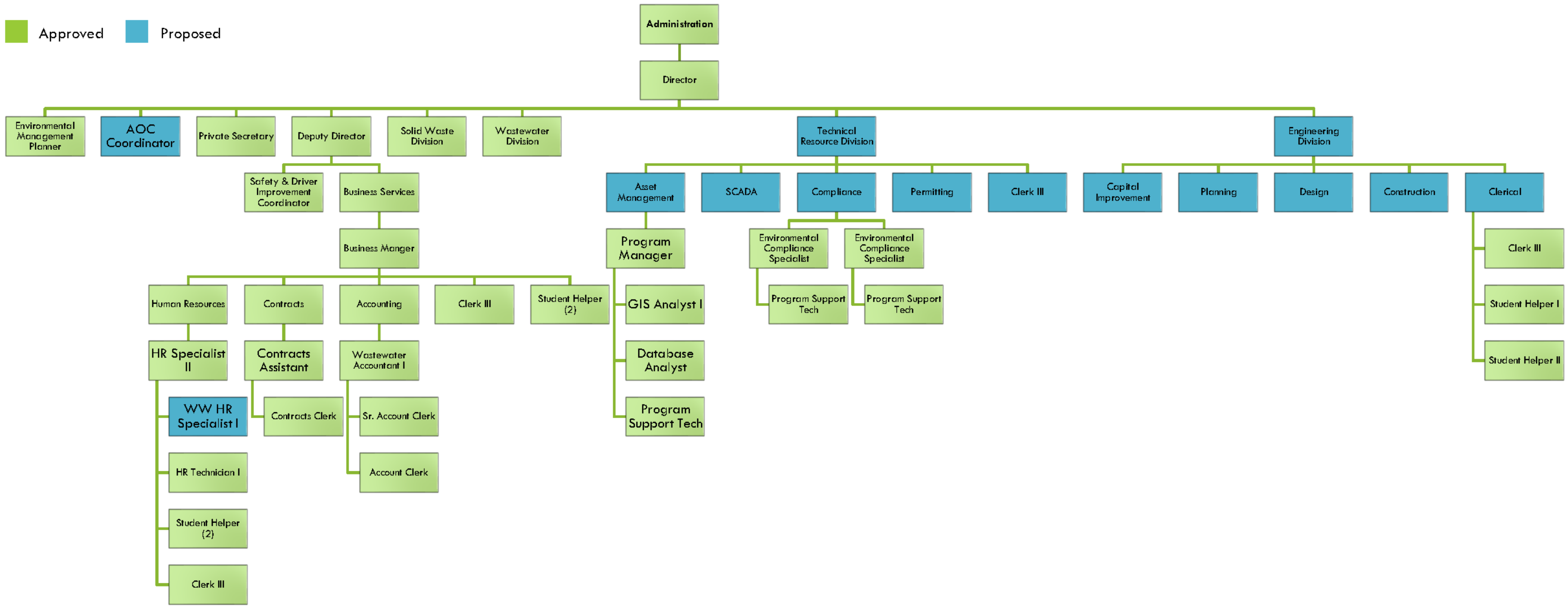
Concurrently, DEM is developing a draft reorganization plan, as outlined in the charts on the following pages. This plan is still subject to review by the County of Hawaiʻi Department of Human Resources, the United Public Workers (UPW) and the Hawaiʻi Government Employees Association (HGEA) for approval and implementation.

To meet the AOC Appendix 1 Planning and Reporting requirement (section II.9.g) for an organizational chart demonstrating staffing needs, DEM will submit the draft reorganization to the aforementioned entities prior to the January 31, 2027 deadline. Benchmarking wastewater administration and operations in other municipalities, DEM is confident that this reorganization will enhance efficiency, accountability, and redundancy to meet AOC deliverables within budget and timeline constraints. The final submittal will provide detailed information on position reallocations and new roles.

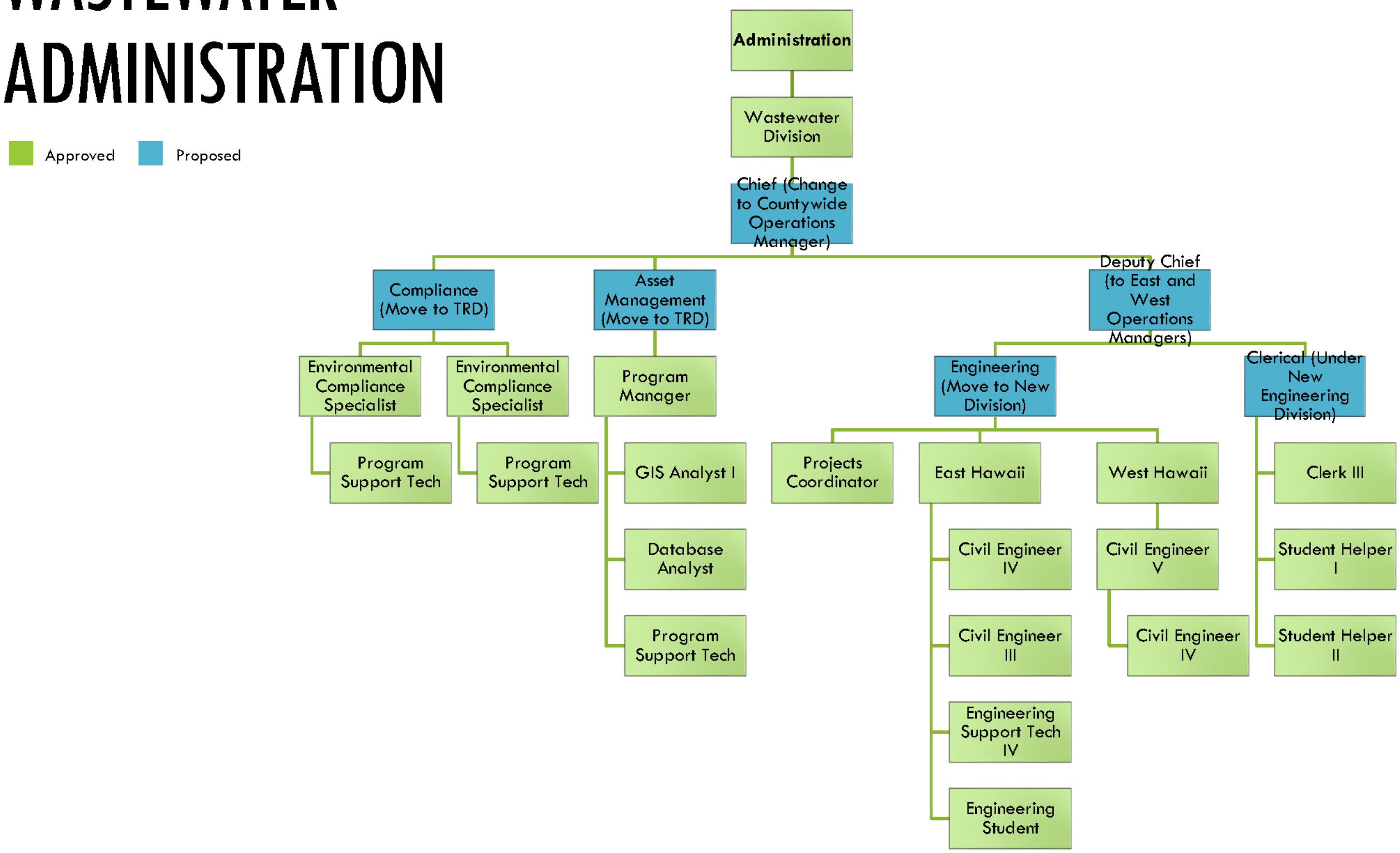
DEM ORGANIZATION



DEM ADMINISTRATION

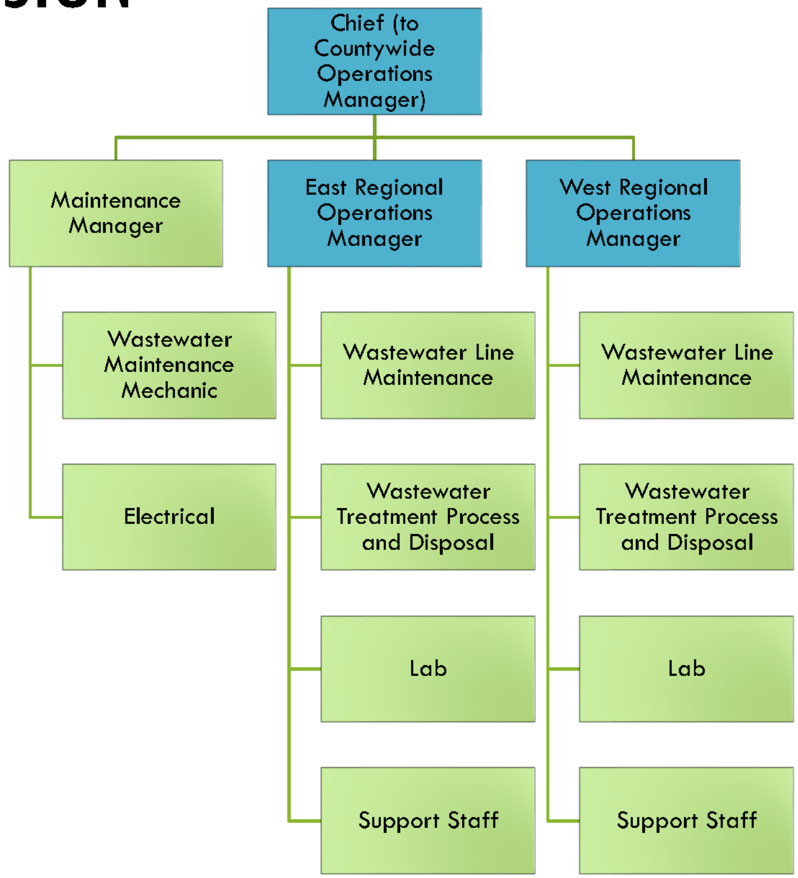


WASTEWATER ADMINISTRATION



WASTEWATER DIVISION OPERATIONS

Approved Proposed



7. Estimated operations and maintenance costs for each project.

At this time COH DEM WW Division has an overall cost associated with the operations and maintenance of the existing facilities. The recently approved Mayor and Council adopted budget for Fiscal Year 2024-2025 was estimated at $26,919,005. The fiscal year starts July 1 and ends June 30 of the following year. The expenses are allocated for day-to-day operational activities, such as:

1. **Utilities**: Costs related to electricity, water, and gas used in the treatment process.
2. **Maintenance and Repairs**: Expenses for maintaining equipment, pipelines, and infrastructure.
3. **Chemicals and Consumables**: Costs associated with chemicals (e.g., disinfectants, coagulants) and other consumables.
4. **Labor**: Salaries and wages for administrative staff, operators, and maintenance personnel.
5. **Administrative Costs**: Overhead expenses, office supplies, and administrative staff salaries.
6. **Contract Services**: Payments to external contractors for specialized services (e.g., laboratory testing, equipment calibration).
7. **Insurance and Licenses**: Costs related to insurance coverage and regulatory licenses.
8. **Miscellaneous Expenses**: Any other relevant costs not covered by the above categories.

Wastewater Expenditures	Estimated FY2024-25
Wastewater Salaries & Wages	$7,576,309
Wastewater Other Current Expenses (OCE)	$12,054,974
Wastewater Equipment	$2,101,900
Operator Training Facility	$16,100
Employee Benefits	$3,438,824
Workers Comp & Compensation Adjustment	$200,000
Miscellaneous - Replacement Reserve Account	$1,503,215
Miscellaneous - Training	$27,683
Total	**$26,919,005**

The current operation includes the maintenance of 120 miles of sewer main, 16 pump stations, 7 treatment facilities. Table 8 below summarizes the total operational costs of administration, sewer collection system maintenance, and treatment facility maintenance per gallon of wastewater treated. In addition, when Pāhala and Nāʻālehu WWTP are completed and operational costs will be increased to address the necessary operations and maintenance. Estimates are currently unavailable because the overall system designs are not completed at this time.

Table 8 – Operating & Maintenance Costs Associated

Treatment Facility	Effluent Discharge (MGD)	O&M Costs
Hilo WWTP	3.2	$18,362,996.38
Kealakehe WWTP	1.2	$6,886,123.64
Pāpaʻikou WWTP	0.105 (105,000 gal/day)	$602,535.82
Kulaʻimano WWTP	0.101 (101,000 gal/day)	$579,582.07
Honokaʻa WWTP	0.04 (40,000 gal/day)	$229,537.45
Kaloko WWTP	0.025 (25,000 gal/day)	$143,460.91

Kāpeku WWTP	0.02 (20,000 gal/day)	$114,768.73
Total	**4.691**	**$26,919,005.00**

8. Evaluation of current AMP and CIP efforts.

Recently the County submitted the Asset Management Implementation Plan to the EPA in conformance with the Countywide AOC. In March of 2019 PG Environmental provided condition and risk assessment reports for use by DEM-WWD. These reports included data from an initial condition assessment of vertical and horizontal wastewater assets. The data has since been incorporated into our asset management system for use in prioritizing capital improvement projects. Capital improvement projects are differentiated between vertical/facility projects and horizontal/collection system projects. Asset management does provide DEM-WWD a report that identifies all NASSCO level 4 & 5 defects for collection system or horizontal assets repair prioritization. DEM-WWD leverages this report to determine if the defect will be corrected internally by our own O&M staff or incorporated into a CIP project for implementation. Asset management is building the necessary database of condition scores for critical vertical components for use by DEM-WWD. This will be completed early next year and we will be leveraging the information for use in our CIP program.

APPENDIX A

County of Hawaii

Capital Improvement Program Scoring Matrix User Guide & 2023 Results

Wastewater Infrastructure Planning and Utility Management

Prepared for:

County of Hawaii, Wastewater Division
108 Railroad Ave.
Hilo, HI 96720

Prepared by:

PG Environmental
1113 Washington, Ave.
Golden, CO 80401

USEPA Region 9
75 Hawthorne Street
San Francisco, CA 94105

April 12, 2024
Final Report
Contract 68HE0922A0007
Order 68HE0923F0001

CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

In coordination with the United States Environmental Protection Agency (EPA) Region 9 and EPA's contractor, PG Environmental, the County of Hawaii (located on the Big Island of Hawaii; COH) Department of Environmental Management (DEM), Wastewater Division (WWD) has developed a Capital Improvement Program (CIP) Scoring Matrix for ranking proposed wastewater CIP projects based on their projected costs and community and wastewater system benefits. The CIP Scoring Matrix is an *Excel*-based spreadsheet tool titled *COH CIP_Scoring_Matrix*. This document accompanies the spreadsheet file and contains:

- Background information about COH's CIP and development of the CIP Scoring Matrix,
- Instructions for using and updating the CIP Scoring Matrix, and
- Results and discussion from the initial (2023) round of scoring.

PG and WWD team members developed the CIP Scoring Matrix and scored 17 proposed CIP projects. This initial round of scoring helped to calibrate and refine the CIP Scoring Matrix while ranking the projects based on their projected costs and benefits. The 17 projects range in scope from collection system improvements, such as rehabilitating sewer pump stations (SPSs) and installing new pipelines, to rehabilitation and construction of wastewater treatment plants (WWTPs). The projects were chosen as the most critical among dozens of needed wastewater infrastructure improvements on the island. Many of the projects also have implementation deadlines dictated by an EPA-issued administrative order on consent (AOC). The CIP projects and their 2023 CIP Scoring Matrix rankings (based on total score) are presented in **Table 1***, below. The CIP Scoring Matrix also ranks projects by their cost benefit (presented in*

Table *4*). Section 4 of this report provides further information and discussion about the 2023 CIP Scoring Results.

Table 1. 2023 CIP Scoring Matrix Rankings Based on Total Score

Priority Rank	Project
1	Hilo WWTP Rehabilitation and Replacement Phase I
2	Hilo WWTP Rehabilitation and Replacement Phase II
3	Naalehu Wastewater System (WWTP option)
4	Kealakehe WWTP Headworks
5	Pahala Wastewater System (WWTP option)
6	Upgrade Kōlea SPS and Force Main (FM)
7	Kula'imano WWTP Rehabilitation and Replacement
8	Keōpū SPS and FM
9	Pāpaʻikou WWTP Rehabilitation and Replacement
10	Pua SPS and FM
11	Upgrade Paukaʻa SPS and FM
12	Upgrade Project 19 SPS and FM
13	Upgrade Onekahakaha SPS and FM
14	Hale Hālāwai FM
15	Upgrade Wailuku Gravity Main
16	Kealakehe SPS and FM Replacement
17	Kalanianaole Collector Sewer Phase 2 Installation

1. INTRODUCTION

COH funds wastewater CIP projects primarily through County general obligation bonds and federal/state government grant and loan programs. Projects totaling less than $50,000 are not considered by COH to be "capital improvements" and can therefore be funded through user fees and other revenue sources. As a result, the County's capital improvement program must accommodate projects that range from tens of thousands of dollars in capital costs (e.g., new pumping equipment) to hundreds of millions of dollars in capital costs (e.g., wastewater treatment plant rehabilitation).

The CIP Scoring Matrix uses EPA's Augmented Alternatives Analysis (AAA) process, which gives water utilities a systematic and objective approach for prioritizing water and wastewater infrastructure capital investments based on community-specific needs and goals. The AAA process uses a scoring system to rank proposed "alternatives" based on their estimated costs and projected performance in a framework of Goals, Objectives, Criteria, and Metrics. Community decision-makers are then able to allocate available funding and resources for the alternatives based on the rankings from the AAA.

In 2023, concurrent with the development of the CIP Scoring Matrix, the WWD/PG Environmental Team used the CIP Scoring Matrix to score and rank 17 of COH's most critical proposed capital improvement projects. These projects were chosen for the initial round of scoring from a backlog of over 100 needed wastewater system capital improvement investments. The WWD/PG team ranked the projects based on Total Score, which represents the overall benefit of implementing each project as determined in the Goal, Objectives, Criteria, and Metrics, as well as by Capital Cost Benefit Score, which measures the benefit of implementing each project against each dollar spent in capital cost.

COH is subject to an EPA-issued AOC that contains implementation deadlines for many critical wastewater capital improvement projects. Therefore, the 2023 CIP Scoring Matrix rankings were driven by COH's obligation and commitment to regulatory compliance, but future rankings may rely more heavily on other COH goals once compliance with the AOC is achieved.

Each year, WWD will update the CIP Scoring Matrix with new projects and evaluate and update the Goals, Objectives, Criteria, and Metrics. New projects may come from the existing backlog or may be newly proposed based on evolving system needs. At the time that the COH CIP Scoring Matrix was being developed, WWD was in the process of implementing an asset management program, supported by the NEXGEN software platform, which includes procedures for collecting asset condition and performance data. Appendix A provides additional details on how asset risk and criticality scores are calculated based on asset condition and used within the asset management system. As more asset data becomes available in the future, WWD should utilize this data in the CIP Scoring Matrix.

The CIP Scoring Matrix is best suited for comparing projects of similar scales and costs, so WWD may consider multiple cost tiers of CIP scoring in the future. For example, projects totaling less than $1 million in capital cost could be evaluated in one version of the CIP Scoring Matrix, while projects totaling $1 million or more in capital costs could be evaluated in another version. This may provide a more useful cost-benefit assessment in which larger scale projects are not deprioritized simply because they are drastically more expensive to implement. The 2023 CIP Scoring Matrix has been used to score 17 of COH's most critical projects, which are all estimated to be multimillion dollar investments, so multiple tiers of scoring were not necessary. **Table 2** on the next page, presents estimated implementation deadlines and brief descriptions of each of the 17 projects.

Table 2. 2023 CIP Project Descriptions

Project	Description	Estimated Implementation Timeline[1]
Pāpaʻikou WWTP Rehabilitation and Replacement	Improvements to the Pāpaʻikou WWTP will include rehabilitation of the headworks, replacement of air diffusers and piping in the aeration basins, and new drives and catwalks on the secondary clarifiers.	2-3 years
Kalanianaole Collector Sewer Phase 2 Installation	Install approximately 2,600 LF of 12" gravity sewer on Nene St. Install approximately 2,500 LF of 8" Gravity Sewer along connector roadways between Nene St. and Kalanianaole St. between Lokoaka St & Uwau St. Resurface existing roadways.	2-3 years
Hilo WWTP Rehabilitation and Replacement Phase I	Replacement of existing headworks and digestor. New odor control system, sludge blend tank, and gas conditioning system, with rehabilitation of primary sedimentation tank common channel. Rehabilitate solids handling, solids dewatering, and clarifier scum/drainage pit isolation valves.	5-6 years
Hilo WWTP Rehabilitation and Replacement Phase II	Upgrade the secondary treatment process to conventional activated sludge including new aeration chambers.	4-5 years
Kula'imano WWTP Rehabilitation and Replacement	Improvements to the Kula'imano WWTP will include rehabilitation of the headworks, as well as replacement of air diffusers and piping in the aeration basins.	2-3 years
Kealakehe WWTP Headworks	Installation of a redundant 30" parallel influent pipe, rehabilitation of the two existing vortex grit chambers, new foul air piping, new FM influent stub, rehabilitation of the existing influent box, a small pump for an existing bathroom, removal of existing equipment no longer in use, and repair/removal of concrete T-lock lining.	3-4 years
Pua SPS and FM	Installation of a second FM and rehabilitation of the existing FM.	2-3 years
Hale Hālāwai FM	Replace approximately 900 LF of existing deteriorated cast-iron FM which was installed in 1971. Install a new manhole at the terminus of the FM and a flow meter within the existing discharge manifold piping.	1-2 years
Keōpū SPS and FM	Upgrade and relocate SPS and FM.	3-4 years
Upgrade Project 19 SPS and FM	Replace pump station; replace and reroute FM.	2-3 years

[1] For the purposes of the 2023 CIP Scoring Matrix, "implementation timeline" was defined as the amount of time to complete the design and construction phases of the project. The "implementation timeline" of a project does not include any planning and pre-design activities, such as environmental assessments and regulatory approvals.

Project	Description	Estimated Implementation Timeline[1]
Upgrade Wailuku Gravity Main	Replace approximately 600 LF of suspended 12” ductile iron sewer pipe with cleanout beneath bridge. Rehabilitate existing manholes adjacent to each abutment. On Hawaii DOT Right of Way, specialty equipment required.	3-4 years
Upgrade Onekahakaha SPS and FM	Renovate/replace existing wet/dry pump station. Install one new FM and rehabilitate existing FM (approximately 1,100 feet).	2-3 years
Upgrade Kōlea SPS and FM	Renovate/replace existing wet/dry pump station. Install one new FM and rehabilitate existing FM (approximately 1,700 feet).	2-3 years
Upgrade Pauka‘a SPS and FM	Upgrade pump station, relocate electrical controls above pump station, replace FM.	5-6 years
Pahala Wastewater System (WWTP option)	Construct a new package plant and rehabilitate/replace collection system in Pahala. Disconnect residents from the existing large capacity cesspool.	3-4 years
Naalehu Wastewater System (WWTP option)	Construct a new package plant and rehabilitate/replace collection system in Naalehu. Disconnect residents from the existing large capacity cesspool.	3-4 years
Kealakehe SPS and FM Replacement	South portion: Install approximately 9,300 LF of 24” PVC FM parallel to existing ductile iron FM. Install combination air release valves as necessary. Connect to existing pipe stub outside of WWTP fence line. In addition to the PVC FM, install approximately 8,330 LF of 16” PVC reclaimed water distribution piping within same easement. North portion: R1 (reuse water) distribution line north of Kealakehe WWTP, with some gravity sewer line (not included as part of this project).	4-5 years

2. CIP SCORING MATRIX OVERVIEW

The CIP Scoring Matrix spreadsheet is organized into tabs that are linked to each other using formulas. The following subsections describe the organization and function of each tab.

2.1 Goal-Objective-Criteria-Metric

The organization of Goals, Objectives, Criteria, and Metrics is referred to as the "Goal-Objective-Criterion-Metric framework." Each Goal is broken into several discrete Objectives. Each Objective has at least one Criterion by which a project's contribution toward achieving the Objective will be measured. Each Criterion has at least one quantitative or qualitative Metric, as well as a weighting value (scale of 1 to 10) that reflects the relative importance of the Criteria, with 10 being most important. Each Metric also has a Performance Range, which defines the point scale for rating each project, and Scoring Guidance, which provides the user with instructions and tips for determining the Metric score for each project.

The 'Goal-Objective-Criteria-Metric' tab lists the Goals, Objectives, Criteria, and Metrics by which the projects are evaluated. **Figure 1** shows an image of the Goal-Objective-Criteria-Metric' tab in the 2023 CIP Scoring Matrix. There are no formulas on the 'Goal-Objective-Criteria-Metric' tab. However, formulas on the other tabs reference the cells on the 'Goal-Objective-Criteria-Metric' tab. Each column in the Goal-Objective-Criteria-Metric' tab is described in more detail below.

Goals:
Goals are at the top of the Goal-Objective-Criteria-Metric framework and represent high-level programmatic missions. Goals should be broadly stated and should align with community-level initiatives. For the 2023 CIP Scoring, WWD identified three high-level Goals for wastewater capital improvement projects that aligned with the COH Mayor's administration priorities and DEM's core values:

Goal 1: Protect and improve public health/safety and improve community livability.
Goal 2: Enable safer and more efficient operations and maintenance (O&M).
Goal 3: Build a self-sustaining wastewater system.

Objectives:
Objectives are more specific than Goals, and multiple Objectives can contribute to a common Goal. In the 2023 CIP Scoring Matrix, six Objectives contribute to Goal 1: "Protect and improve public health/safety and improve community livability." The first Objective within Goal 1 (denoted Objective 1.1) is "conserve natural resources and promote sustainability."

Criteria:
Criteria are indicators by which progress towards the Objectives can be measured. Multiple Criteria can be used to measure progress towards a single Objective. However, all but one of the Objectives in the 2023 CIP Scoring Matrix used only a single Criterion. For example, Objective 1.1 contains a single Criterion (denoted "Criterion 1.1.1), "Improve efficiency of natural resources consumption."

Criteria Weightings:
Each Criterion is assigned a weighting value between 1 and 10 that reflects the relative importance of the Criteria, with 10 being most important. Multiple Criteria may have the same weighting value and it is not necessary to have Criteria with weighting values at each integer between 1 and 10. For example, three Criteria may have a weighting value of 10 while no Criteria have a weighting value of 9.

Metrics:
Metrics are quantitative or qualitative project attributes, ideally backed up by scientific data, which are expressed in a numeric point system. Multiple Metrics can be used to score a single Criterion. However, it is not recommended to use more than three Metrics per Criterion, because the mathematical influence of each Metric on the project Total Score is diminished by each additional Metric used to score a given Criterion (refer to Equations 1 and 2). The 2023 CIP Scoring Matrix employs a -5-to-+5-point scale. Some Metrics utilize the entire range of the scale, while others utilize only the positive or negative side of the scale.

Performance Ranges:
Each Metric must have a performance range that identifies what numeric or qualitative attributes correspond with each possible score. Some Metrics may not need to utilize the full point scale. For example, in the 2023 CIP Scoring Matrix, Metric 1.2.1.1, "proximity of the project to streams wetlands, or coastline" is scored on a scale of 0 to +5 because it is not possible for a project to be located a negative distance from something. When setting performance ranges, it is important to remember that negative scores will decrease a project's Total Score, and positive scores will increase its Total Score.

For Metrics that do not have available scientific data to define performance ranges, qualitative descriptions may be used. In the 2023 CIP Scoring Matrix, most Metrics used quantitative performance ranges such as a scale from "increases net O&M labor demand by 2.5 [full time equivalents] FTEs" (-5 points) to "decreases net O&M labor demand by 2.5 FTEs" (5 points). However, other Metrics for which data was not readily available have performance ranges such as scaling from "no/neutral impact" (0 points) to "high net positive impact" (5 points).

Scoring Guidance:
The Scoring Guidance for each Metric provides instruction to the user on how to score projects accurately, fairly, and objectively. Scoring Guidance should identify any applicable data sources as well as procedures for collecting and interpreting the data and may include instructions for scoring different types of projects.

When developing the Goals, Objectives, Criteria, and Metrics by which to evaluate projects, it is important to focus on technical attributes of projects, rather than attributes that could be subjective or otherwise result in unintended advantages for some projects over others. For example, when developing the 2023 CIP Scoring Matrix, the WWD/PG team considered using a Criterion that awarded points to projects that already had some or all their needed funding secured. This Criterion would have contributed to a Goal identified by WWD to implement projects in a timely manner, since projects with committed funding could theoretically be shovel-ready faster than projects with unsecured funding. However, this Criterion was ultimately omitted to preserve an objective comparison of projects based on their technical merits; the current funding status of the projects may have been influenced by preferences of individual decision makers or other subjective circumstances and as such should not be used to avoid inducing bias into the scoring.

Goal 1:	Protect and improve public health/safety and improve community livability	Criteria	Criteria Weightings	Metrics	Performance Ranges	Scoring Guidance
Objective 1.1: *Cotributes to COH's goal of of protecting public health and/or safety.*	Conserve natural resources and promote sustainability.	Improve efficiency of natural resources consumption	8	Net impact to consumption of potable water	5 points: Reduces potable water consumption by 1 MG/year or more 4 points: Reduces potable water consumption by between 0.75 to 0.99 MG/year 3 points: Reduces potable water consumption by between 0.50 to 0.74 MG/year 2 points: Reduces potable water consumption by between 0.25 and 0.49 MG/year 1 point: Reduces potable water consumption by between >0 and 0.24 MG/year 0 points: No impact to annual water consumption -1 points: Increases potable water consumption by between >0 and 0.24 MG/year -2 points: Increases potable water consumption by between 0.25 and 0.49 MG/year -3 points: Increases potable water consumption by between 0.50 to 0.74 MG/year -4 points Increases potable water consumption by between 0.75 to 0.99 MG/year -5 points: Increases potable water consumption by 1 MG/year or more	Projects involving new pipelines will require potable water use for routine cleaning. Include public and private water sources.
				Net impact to landfill disposal of solid waste	5 points: High reduction to amount of solid waste landfilled annually 3 points: Moderate reduction to amount of solid waste landfilled annually 1 point: Low reduction to amount of solid waste landfilled annually 0 points: No impact to amount of solid waste landfilled annually -1 points: Low increase to amount of solid waste landfilled annually -3 points: Moderate increase to amount of solid waste landfilled annually -5 points: High increase to amount of solid waste landfilled annually	Examples: biosolid reuse/land application, digestion
				Net impact to consumption of electricity	5 points: Reduces consumption of electricity by 1,000 kWh/year or more 4 points: Reduces consumption of electricity by between 500 and 750 kWh/year 3 points: Reduces consumption of electricity by between 350 and 500 kWh/year 2 points: Reduces consumption of electricity by between 250 and 350 kWh/year 1 point: Reduces consumption of electricity by between 1 and 250 kWh/year 0 points: No impact to amount of annual electricity consumption -1 point: Increases consumption of electricity by between 1 and 250 kWh/year -2 points: Increases consumption of electricity by between 250 and 350 kWh/year -3 points: Increases consumption of electricity by between 350 and 500 kWh/year -4 points: Increases consumption of electricity by between 500 and 750 kWh/year -5 point: Increases consumption of electricity by 1,000 kWh/year or more	For conveyance projects, consider electricity saved on pumping if I/I into the collection system is reduced. Solar should count as a credit, green energy consideration for funding. Reduction of fossil fuel/grid energy, switching to a green energy is given credit.
Objective 1.2: *Cotributes to COH's goal of of protecting public health and/or safety.*	Improve quality of state waters	Reduce potential discharges of untreated wastewater to streams, wetlands, or coastline	9	Proximity of the project to streams, wetlands, or coastline	5 points: Repair/replace/rehab of infrastructure within 200 feet of streams, wetlands, or coastline 4 points: Repair/replace/rehab of infrastructure 201-400 feet from streams, wetlands, or coastline 3 points: Repair/replace/rehab of infrastructure 401-600 feet from streams, wetlands, or coastline 2 points: Repair/replace/rehab of infrastructure 601-800 feet from streams, wetlands, or coastline 1 point: Repair/replace/rehab of infrastructure 801-999 feet from streams, wetlands, or coastline 0 points: No streams, wetlands, or coastline within 1,000 feet of infrastructure	Consider closest point of project infrastructure to receiving waters. WWTPs receive a 5 due to the outfall going directly to receiving waters DOH state water maps: https://health.hawaii.gov/cwb/clean-water-branch-home-page/water-quality-standards/ "Streams, wetlands and coastline" per Cesspool Conversion Report pg. 16
Objective 1.3: *Contributes to COH's goals of protecting public health and/or*	Increase capacity of the wastewater system	Account for future population growth and addition of existing cesspool	8	Change in MGD of conveyance and/or	5 points: Increases treatment and/or conveyance capacity by 2.01 MGD or more 4 points: Increases treatment and/or conveyance capacity by between 1.51 and 2.0 MGD 3 points: Increases treatment and/or conveyance capacity by between 1.01 and 1.5 MGD 2 points: Increases treatment and/or conveyance capacity by between 0.51 and 1.0 MGD 1 point: Increases treatment and/or conveyance capacity by between 0.01 and 0.5 MGD	Calculate the expected total amount of treatment and conveyance capacity that the project adds to COH wastewater systems.

Read Me | Goal-Objective-Criteria-Metric | Project Scoreboard | Project 1 Score Form | Project 2 Score Form | Project 3 Score Form | Project 4 Score Form | Project 5 Score Form | Project 6 Score Form | Project 7 Score Form | Pro

Figure 1. Image of the 2023 CIP Scoring Matrix 'Goal-Objective-Criteria-Metric' tab. Note that only the first three Objectives within Goal 1 are shown in this example. The rest of the Goals and Metrics are accessed by scrolling down on this tab.

2.2 Project Scoreboard

The Project Scoreboard calculates and displays the scores for each project based on the inputs in the 'Goal-Objective-Criteria-Metric' tab and the Project Scoring Forms, including Capital Cost, Capital Cost Benefit Score, Annual O&M Cost Benefit Score, Total Score, and individual Criteria and Metric scores. The Project Scoreboard references cells from the 'Goal-Objective-Criteria-Metric' tab and Project Scoring Form sheets. The Project Scoreboard is shown in **Figure *2***.

Project Score Form #	Project Title	CAPITAL COST	CAPITAL COST BENEFIT SCORE	ANNUAL O&M COST BENEFIT SCORE	TOTAL SCORE	Goal 1: Protect and improve public health/safe				
						Objective 1.1: Conserve natural resources and promote sustainability.				
						Criteria 1.1.1 Weighted Score	Criteria 1.1.1 Raw Score	Metric 1.1.1.1 Score	Metric 1.1.1.2 Score	Metric 1.1.1.3 Score
1	Pāpa'ikou WWTP Rehabilitation and Replacement	$ 9,700,000	17.7	22.9	172	16	2.00	1	0	5
2	Kalanianaole Collector Sewer Phase 2 Installation	$ 3,700,000	23.1	#DIV/0!	85	-3	-0.33	-1	0	0
3	HWWTP Rehabilitation and Replacement Phase I	$ 265,900,000	0.8	#DIV/0!	224	0	0.00	0	0	0
4	HWWTP Rehabilitation and Replacement Phase II	$ 43,500,000	5.1	#DIV/0!	220	-8	-1.00	-1	-1	-1
5	Kula'imano WWTP Rehabilitation and Replacement	$ 9,700,000	18.7	#DIV/0!	181	16	2.00	1	0	5
6	Kealakehe WWTP Headworks	$ 57,500,000	3.4	#DIV/0!	197	-5	-0.67	0	-1	-1
7	Pua SPS and Force Main	$ 46,000,000	3.2	#DIV/0!	149	-3	-0.33	-1	0	0
8	Hale Hālāwai Force Main	$ 3,680,000	26.8	#DIV/0!	99	0	0.00	0	0	0
9	Keōpū SPS and Force Main	$ 4,500,000	39.8	#DIV/0!	179	3	0.33	0	0	1
10	Upgrade Project 19 SPS and FM	$ 4,000,000	30.0	#DIV/0!	120	3	0.33	0	0	1
11	Upgrade Wailuku Gravity Main	$ 1,650,000	57.3	#DIV/0!	95	0	0.00	0	0	0
12	Upgrade Onekahakaha SPS and Force Main	$ 11,050,000	10.7	#DIV/0!	119	3	0.33	0	0	1
13	Upgrade Kōlea SPS and Force Main	$ 11,050,000	16.4	#DIV/0!	182	3	0.33	0	0	1
14	Upgrade Pauka'a SPS and FM	$ 14,000,000	9.8	#DIV/0!	138	3	0.33	0	0	1
15	Pahala Wastewater System (WWTP option)	$ 47,000,000	4.0	2.8	187	-24	-3.00	-1	-3	-5
16	Naalehu Wastewater System (WWTP option)	$ 84,300,000	2.4	2.3	204	-24	-3.00	-1	-3	-5
17	Kealakehe SPS FM Replacement	$ 6,250,000	13.7	#DIV/0!	86	13	1.67	5	0	0
18										

Read Me | Goal-Objective-Criteria-Metric | Project Scoreboard | Project 1 Score Form | Project 2 Score Form | Project 3 Score Form | Project 4 Score Form | Project 5 Score Form | Project 6 Score Form | Project 7 Score Form | Project 8 Score Form | Prc ...

Figure 2. Image of the 2023 CIP Scoring Matrix 'Project Scoreboard' tab. Note that only the scores for the first Objective within Goal 1 are shown in this example. The rest of the scores are accessed by scrolling right on this tab. O&M Cost Benefit Scores in column E show an error "#DIV/0!" where O&M costs were not known because the project was not far enough into the design process for O&M costs to be accurately estimated.

2.3 Calculating Project Scores

The "Total Score" for each project represents the cumulative projected performance of the project within the Goal-Objective-Criteria-Metric framework, as expressed by Equation 1:

$$\boldsymbol{TS = \sum_i C_i * W_i} \qquad [1]$$

Where:

TS	=	Total Score
C_i	=	Raw score for Criterion *i*
W_i	=	Weighting value for Criterion *i*

The raw score for each Criterion, C_i, is calculated using Equation 2:

$$\boldsymbol{C_i = \bar{m}} \qquad [2]$$

Where:

$\bar{m}$	=	The average of scores for all Criterion *i* Metrics

The Capital Cost Benefit Score for each project is calculated using Equation 3:

$$\boldsymbol{CCBS = \frac{TS}{CC} * 10^{-6}} \qquad [3]*$$

Where:

$CCBS$	=	Capital Cost Benefit Score
TS	=	Total Score [see Equation 1]
CC	=	Capital Cost

The O&M Cost Benefit Score for each project is calculated using Equation 4:

$$\boldsymbol{OMCBS = \frac{TS}{OMC} * 10^{4}} \qquad [4]*$$

Where:

$OMCBS$	=	O&M Cost Benefit Score
TS	=	Total Score [see Equation 1]
OMC	=	O&M Cost

*The factors of 10^{-6} and 10^{4} in Equations 3 and 4 are applied so that the capital and O&M cost benefit scores can be expressed in similar scales. However, it is important to note that the total score, the capital cost benefit score, and the O&M benefit score are *not* evaluated on a common mathematical scale. For example, the 4.0 capital cost benefit score of one project is not better than its 2.8 O&M cost benefit score; the capital cost benefit score of a project should only be compared against the capital cost benefit scores of the other projects. Sorting each score column in descending order gives the ranking order for that scoring category.

2.4 Project Score Forms

Each project to be evaluated in the scoring process needs to have a fully filled out 'Project Score Form' tab in the CIP Scoring Matrix spreadsheet. This is where details about the project, including the project name, description, estimated costs, and individual Metric scores are stored for reference by the 'Project Scoreboard' tab. When scoring a project, select a score for each Metric and provide a brief rationale for the selected score. Scoring input cells are identified with white fill. An example Project Score Form from the 2023 CIP Scoring Matrix is shown in **Figure 3**.

If changes to the Goal-Objective-Criteria-Metric framework are made, the 'Project Score Forms' will need to be updated accordingly. Section 3 contains additional instructions for updating the CIP Scoring Matrix.

Costs:
The 2023 CIP Scoring Matrix used overall project cost. However, if comparing projects that have partial funding from a source or sources outside COH (e.g., state revolving fund or grants), projects could be compared based on the net cost to the County. This would mean subtracting any funding that is being born by other entities and thereby improving the cost benefit score of those projects.

It may be advantageous to distribute the project scoring process by Metric among multiple staff, such that each staff member's contribution corresponds with their day-to-day responsibilities. For example, engineering staff could assign scores for Metrics that pertain to construction timelines, project locations, and system-wide impacts. Similarly, operations staff could be tasked with assigning scores for Metrics that pertain to O&M demands and occupational safety. This sort of distributed approach will add efficiency and consistency to the scoring process. No matter the exact approach, it is important to involve as many staff as possible in the scoring process to achieve project scores that are as objective as possible.

County of Hawaii Wastewater Division CIP Project Scoring Form	Completed by: COH/PG Team Date: 2023

Instructions: Enter project title, description, and estimated costs below. Using the provided scoring guidance and performance references to assign the project a score for each metric. Final project score and cost benefit will automatically be calculated at the end of the form.]

Project Title:	Pāpa'ikou WWTP Rehabilitation and Replacement
Description:	Improvements to the Pāpa'ikou WWTP will include rehabilitation of the headworks, replacement of air diffusers and piping in the aeration basins, and new drives and catwalks on the secondary clarifiers.

Estimated Capital Cost:	$ 9,700,000	**Estimated Annual O&M Cost:**	$ 75,000.00

Goal 1:	**Protect and improve public health/safety and improve community livability**
Objective 1.1:	**Conserve natural resources, and promote sustainability.**
Criteria 1.1.1:	Improve efficiency of natural resources consumption

Metric 1.1.1.1: Net impact to consumption of potable water

5 points: Reduces potable water consumption by 1 MG/year or more
4 points: Reduces potable water consumption by between 0.75 to 0.99 MG/year
3 points: Reduces potable water consumption by between 0.50 to 0.74 MG/year
2 points: Reduces potable water consumption by between 0.25 and 0.49 MG/year
1 point: Reduces potable water consumption by between >0 and 0.24 MG/year
0 points: No impact to annual water consumption
-1 points: Increases potable water consumption by between >0 and 0.24 MG/year
-2 points: Increases potable water consumption by between 0.25 and 0.49 MG/year
-3 points: Increases potable water consumption by between 0.50 to 0.74 MG/year
-4 points Increases potable water consumption by between 0.75 to 0.99 MG/year
-5 points: Increases potable water consumption by 1 MG/year or more

Projects involving new pipelines will require potable water use for routine cleaning. Include public and private water sources.

Score: 1

Rationale: Negligible impact to water consuption

Metric 1.1.1.2: Net impact to landfill disposal of solid waste

5 points: High reduction to amount of solid waste landfilled annually
3 points: Moderate reduction to amount of solid waste landfilled annually
1 point: Low reduction to amount of solid waste landfilled annually
0 points: No impact to amount of solid waste landfilled annually
-1 points: Low increase to amount of solid waste landfilled annually
-3 points: Moderate increase to amount of solid waste landfilled annually
-5 points: High increase to amount of solid waste landfilled annually

Examples: biosolid reuse/land application, digestion

Score: 0

No net change. solids that went to Hilo first are now going to be sent directly to the landfill

Project Scoreboard | Project 1 Score Form | Goal-Objective-Criteria-Metric | Project 2 Score Form | Project 3

Figure 3. Image of a 2023 Scoring Matrix 'Project Score Form' tab. Note that only the project details and scores for the first two metrics are shown in this example. The rest of the scores are accessed by scrolling down on this tab.

3. UPDATING THE CIP SCORING MATRIX

The steps to updating the CIP Scoring Matrix are described below.

Step 1: Revise the 'Goal-Objective-Criteria-Metric' tab to reflect COH's current wastewater infrastructure initiatives and priorities.

This process should involve holding meetings with COH leadership and stakeholders. If wastewater infrastructure needs and priorities have recently been determined as part of other COH planning efforts, they can also be used to update the 'Goal-Objective-Criteria-Metric' tab. For the 2023 CIP Project Scoring, the PG/WWD team utilized public input about wastewater goals, as well as information about cesspools in COH that was collected by the Cesspool Conversion Working Group. When updating the 'Goal-Objective-Criteria-Metric' tab, rows may be added or deleted, and cells combined, to change the new framework Goal-Objective-Criteria-Metric by which projects are evaluated. There are no formulas to update on the 'Goal-Objective-Criteria-Metric' tab. However, formulas on the other tabs reference the cells on the 'Goal-Objective-Criteria-Metric' tab.

When considering new or revised ways to score Metrics (e.g., using asset management system data), update the scoring guidance (column G) for each Metric accordingly. Division or Department meetings should be held to ensure consensus on the 'Goal-Objective-Criteria-Metric' framework, including the weighting values that are applied to each Criterion.

Once the 'Goal-Objective-Criteria-Metric' tab has been revised, the next step is to update the Project Scoring Forms to reflect the new framework. The 'Project Score Forms' must be adjusted such that each Goal has a section broken out by Objective, then by Criterion, and then by Metric (refer to **Figure 1**). Each Metric must have a cell to enter a numeric score, as well as a cell to record the rationale for the score (refer to **Figure 3**). In the 2023 CIP Scoring Matrix, drop down menus were used for selecting the numeric scores. Ensure that the blue and grey cells are referencing the appropriate cells on the 'Goal-Objective-Criteria-Metric' tab. It is easiest to make these changes to a single 'Project Score Form' and then copy that form into new tabs for each subsequent project.

Step 2: Edit the 'Project Scoreboard' tab to reflect the revised 'Goal-Objective-Criteria-Metric' framework and to appropriately reference the 'Project Score Forms'.

As shown in **Figure *2***, each Criterion needs to have a column for a raw score as well as a column for a weighted score. Additionally, each Metric under the Criterion needs to have a column to the right of the Criterion score columns. The raw and weighted scores for each Criterion are computed with *Excel* formulas using Equation 2. The Total Score for each project is the sum of the weighted score for each of the Criteria (refer to Equation 1). The cost benefit scores are calculated by dividing the Totals Score by the project's estimated Capital and O&M Costs (refer to Equations 3 and 4, respectively). Ensure that each project being evaluated has a row on the Project Scoreboard, and that each cell in the Metric columns is referencing the appropriate cell on that project's 'Project Score Form'.

Step 3: Project Scoring.

Once updates from Steps 1 and 2 have been made to the CIP Scoring Matrix, project scoring can commence. This involves reviewing the available data and information for each project (including project costs and descriptions), selecting scores for each Metric, and entering a written rationale for each score. As scores are entered into the 'Project Score Forms,' the 'Project Scoreboard' should populate with the scores for each Metric and compute the Criteria scores, Total Score, and Cost Benefit Scores.

4. 2023 SCORING RESULTS

The 2023 CIP Scoring Matrix evaluated 17 of COH's most critical proposed wastewater infrastructure CIP projects. The projects were scored as a collaborative process between WWD and PG Environmental team members. Scores were determined based on information in preliminary engineering reports, other project-specific documents, publicly available EPA mapping tools, WWD data and documentation, as well as institutional knowledge and best professional judgment. **Error! Reference source not found.** presents the 2023 CIP Total Scores and Rankings. **Error! Reference source not found.** presents the 2023 CIP Capital Cost Benefit Scores and Rankings.

Table 3. 2023 CIP Total Scores and Rankings

Total Score Priority Rank	Project	Total Score	Capital Cost
1	Hilo WWTP Rehabilitation and Replacement Phase I	**224**	$265,900,000
2	Hilo WWTP Rehabilitation and Replacement Phase II	**220**	$43,500,000
3	Naalehu Wastewater System (WWTP option)	**204**	$84,300,000
4	Kealakehe WWTP Headworks	**197**	$57,500,000
5	Pahala Wastewater System (WWTP option)	**187**	$47,000,000
6	Upgrade Kōlea SPS and FM	**182**	$11,050,000
7	Kula'imano WWTP Rehabilitation and Replacement	**181**	$9,700,000
8	Keōpū SPS and FM	**179**	$4,500,000
9	Pāpaʻikou WWTP Rehabilitation and Replacement	**172**	$9,700,000
10	Pua SPS and FM	**149**	$46,000,000
11	Upgrade Paukaʻa SPS and FM	**138**	$14,000,000
12	Upgrade Project 19 SPS and FM	**120**	$4,000,000
13	Upgrade Onekahakaha SPS and FM	**119**	$11,050,000
14	Hale Hālāwai FM	**99**	$3,680,000
15	Upgrade Wailuku Gravity Main	**95**	$1,650,000
16	Kealakehe SPS and FM Replacement	**86**	$6,250,000
17	Kalanianaole Collector Sewer Phase 2 Installation	**85**	$3,700,000

Table 4. 2023 CIP Capital Cost Benefit Scores and Rankings

CCBS Priority Rank	Project	CCBS	Capital Cost
1	Upgrade Wailuku Gravity Main	**57.3**	$1,650,000
2	Keōpū SPS and FM	**39.8**	$4,500,000
3	Upgrade Project 19 SPS and FM	**30.0**	$4,000,000
4	Hale Hālāwai FM	**26.8**	$3,680,000
5	Kalanianaole Collector Sewer Phase 2 Installation	**23.1**	$3,700,000
6	Kula'imano WWTP Rehabilitation and Replacement	**18.7**	$9,700,000
7	Pāpaʻikou WWTP Rehabilitation and Replacement	**17.7**	$9,700,000
8	Upgrade Kōlea SPS and FM	**16.4**	$11,050,000
9	Kealakehe SPS and FM Replacement	**13.7**	$6,250,000
10	Upgrade Onekahakaha SPS and FM	**10.7**	$11,050,000
11	Upgrade Paukaʻa SPS and FM	**9.8**	$14,000,000
12	Hilo WWTP Rehabilitation and Replacement Phase II	**5.1**	$43,500,000
13	Pahala Wastewater System (WWTP option)	**4.0**	$47,000,000
14	Kealakehe WWTP Headworks	**3.4**	$57,500,000
15	Pua SPS and FM	**3.2**	$46,000,000
16	Naalehu Wastewater System (WWTP option)	**2.4**	$84,300,000
17	Hilo WWTP Rehabilitation and Replacement Phase I	**0.8**	$265,900,000

The 2023 CIP Scoring Results do not include an evaluation of projects according to O&M Cost Benefit Score. Most of the 17 projects were not far enough into the project design process for O&M costs to be accurately estimated. However, if needed, O&M Cost Benefit Score project rankings may be generated using the CIP Scoring Matrix once O&M costs estimates are known. O&M Cost Benefit Score project rankings may be useful if the CIP planning process is being driven by annual budgeting priorities more than capital budgeting priorities.

As seen in **Table 3**, Phase 1 of the Hilo WWTP Rehabilitation and Replacement project scored the highest Total Score of the 17 projects, but also carries the highest capital cost. The estimated capital cost for Phase 1 of the Hilo WWTP Rehabilitation and Replacement project is approximately three times greater than the next most expensive project (Naalehu Wastewater System). Despite having the highest Total Score, Phase 1 of the Hilo WWTP Rehabilitation and Replacement project ranks last among the 17 projects when evaluated by Capital Cost Benefit Score.

The 17 CIP Projects fall into two distinct categories: 7 WWTP projects and 10 collection system projects. Some notable trends present themselves when comparing the project rankings within the two project categories.

Figure 4 compares 2023 CIP Total Scores and Ranking and Capital Costs Benefit Scores and Rankings for just the WWTP projects. Note that the Pahala and Naalehu wastewater system projects involve constructing new WWTPs and new collection systems. In general, WWTP projects are more costly and result in greater benefits than collection system projects, so the Pahala and Naalehu projects have been categorized as WWTP projects for the purposes of this comparison.

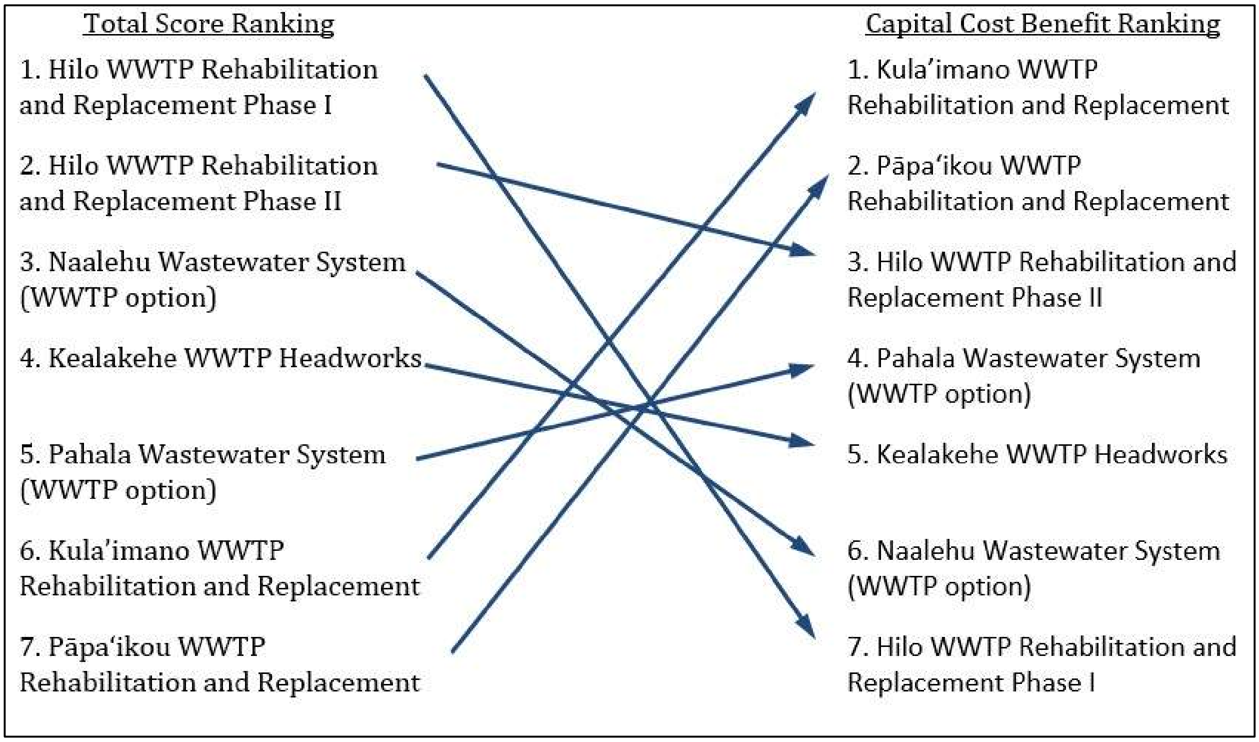


Figure 4. Comparison of WWTP Projects' Total Score Ranking and Capital Cost Benefit Ranking.

Figure 4. Comparison of WWTP Projects' Total Score Ranking and Capital Cost Benefit RankingFigure 4 shows that the Total Score Rankings and Capital Cost Benefit Rankings are essentially reversed for WWTP projects, with the highest Total Score Ranking also having the lowest Capital Cost Benefit Score Rankings, and vis versa. Note that the Hilo WWTP Rehabilitation and Replacement Phase II project does not follow this trend, ranking as the second highest Total Score and the third highest Capital Cost Benefit Score. The Hilo WWTP Rehabilitation and Replacement Phase II project is also unique in that it relies on the prior implementation of one of the other projects (Hilo WWTP Rehabilitation and Replacement Phase I).

Figure 5 compares the 2023 CIP Total Score Rankings and Capital Costs Benefit Rankings for just the collection system projects.

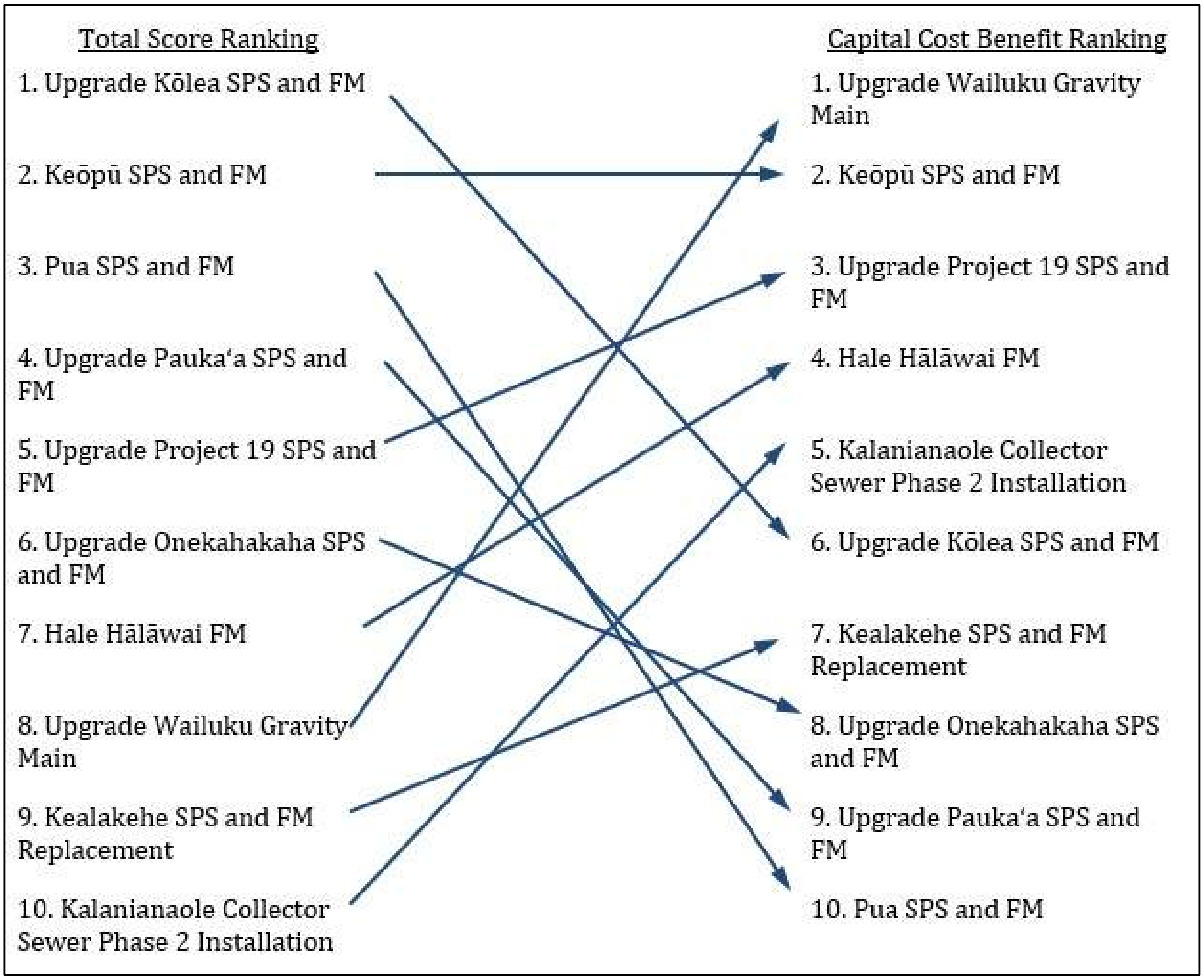


Figure 5. Comparison of Collection System Projects' Total Score Ranking and Capital Cost Benefit Ranking.

Much like the comparison of the WWTP projects' Total Score Ranking and Capital Cost Benefit Ranking, the Total Score Rankings and Capital Cost Benefit Rankings have an inverse relationship; most of the collection system projects with the highest Total Score Rankings also having the lowest Capital Cost Benefit Score Rankings, and vis versa. However, the Keōpū and Project 19 projects stand out as having favorable rankings in both Total Score and Capital Cost Benefit Score.

5. CONCLUSION

The CIP Scoring Matrix provides WWD with a formalized objective process for ranking proposed wastewater infrastructure capital investments based on their technical merits and estimated implementation costs. The CIP Scoring Matrix's Goal-Objective-Criteria-Metric framework can be modified to reflect the priorities and initiatives of COH decision makers as they evolve from year to year. As projects are started and completed, new projects can be proposed and added to the CIP Scoring Matrix to be scored and ranked against the existing projects.

The 2023 CIP Scoring Results show an inverse relationship between projects' Total Scores and their Capital Cost Benefit Scores. In general, projects with the highest Total Scores also had the highest capital costs and the lowest Capital Cost Benefit scores. Projects that did not follow this trend and scored well in Total Score and Cost Benefit Score included Phase 2 of the Hilo WWTP Rehabilitation and Replacement Project, the Keōpū SPS and FM project, and the Project 19 SPS and FM upgrades.

Among the collection system projects, the Kōlea SPS and FM project ranked highest according to Total Score and the Wailuku Gravity Main project ranked highest according to Capital Cost Benefit Score. Among the WWTP projects, Phase 1 of the Hilo WWTP Rehabilitation and Replacement Project ranked highest according to Total Score and the Kula'imano WWTP Rehabilitation and Replacement project ranked highest according to Capital Cost Benefit Score.

Section 3 of this report contains instructions for annually updating the CIP Scoring Matrix. Depending on the magnitude of changes being made, updates to the CIP Scoring Matrix could be time-consuming. It is recommended that, if possible, the same staff member(s) make changes to the CIP Scoring Matrix spreadsheet from year to year so that efficiency can be gained in the updating process.

At the time of the 2023 CIP Project Scoring, WWD was also in the process of implementing an asset management program, supported by the NEXGEN software platform. As the asset management system is further integrated into WWD operations and asset data are obtained, the CIP Scoring Matrix should be updated to incorporate that data. Specifically, asset condition and criticality scores will be essential for maximizing the utility of the CIP Scoring Matrix.

APPENDIX A: IMPLEMENTING ASSET RISK/CRITICALITY SCORING

Introduction:

This document expands on asset risk/criticality scoring within Asset Management System (AMS) implementation, referencing the existing AMS documentation, and providing practical guidance based on best practices for your WWTP. By implementing a systematic approach to this scoring system and condition assessment, the WWD can achieve the following benefits as outlined in the EPA's Administrative Order of Consent (AOC):

- **Prioritize Maintenance Efforts vs. CIP Projects:** Allocate resources effectively towards maintaining critical assets and deferring unnecessary capital improvement projects (CIPs).
- **Optimize Resource Allocation:** Focus resources on assets with the highest potential impact on operations in case of failure.
- **Make Data-Driven Decisions:** Use objective data to guide repair, replacement, and long-term planning for WWTP assets.

Asset Risk/Criticality Score:

The asset risk/criticality score is a numerical value representing the potential consequences of an asset failure on the WWTP's operations.

Calculation:

Risk Score = Probability of Failure (POF) x Consequence of Failure (COF)

Details on integrating this score into your AMS can be found in the existing AMS implementation documentation.

Probability of Failure (POF):

Definition: The chance of an asset experiencing a functional failure within a specific timeframe (e.g., next year).

Scoring System:

Develop a scoring system that assigns points to factors influencing POF. Higher scores indicate a greater chance of failure. Here's a simplified approach to get you started:

- **1 Point:** Minimal impact on factors like maintenance history, industry benchmarks, operating conditions, and condition assessment.
- **2 Points:** Moderate impact on any of the factors mentioned above.
- **3 Points:** Significant impact on any of the factors mentioned above.

Weighting System (Optional):

For a more nuanced approach, consider assigning weights to each factor based on its relative importance to POF in your specific WWTP.

Calculation:

The total POF score is the sum of the weighted scores from each influencing factor.

Assessment Factors:

- **Maintenance History:**
  - Lower scores for assets with consistent preventive maintenance programs.
  - Higher scores for assets with frequent breakdowns, neglected maintenance, or a history of exceeding recommended maintenance intervals.
- **Industry Benchmarks:**
  - Consider factors like asset age, remaining useful life, and typical failure rates for similar equipment based on industry data. Assets nearing the end of their expected lifespan might receive higher scores.
- **Operating Conditions:**
  - Higher scores for assets operating at or exceeding capacity or exposed to harsh chemicals (e.g., strong acids/bases).
  - Lower scores for assets under less stress.
- **Condition Assessment:**
  - Integrate the overall condition assessment score (discussed later) into the POF calculation. Assets in poor condition with significant deterioration are more likely to fail.

Asset Failure Types:

Consider these four primary types of asset failure when assessing POF:

- **Mortality:** The asset physically fails or ceases to perform its intended function altogether.
- **Financial Inefficiency:** The asset becomes too expensive to operate and maintain, making its replacement more economical.
- **Capacity:** The asset remains operational but can no longer handle the required treatment volume.
- **Level of Service:** The asset functions but fails to meet the desired level of service in areas like safety, water quality, recreation, habitat, or biodiversity.

Condition Scoring:

Assessment:

Both the parent asset (e.g., primary clarifier) and its individual components (e.g., scraper mechanism) should be assessed.

Scoring System:

Choose a system that suits your needs:

- **Simple 1-to-5 Scale:**
  - 1: Needs Immediate Attention

  - 2: Poor
  - 3: Fair
  - 4: Good
  - 5: Excellent
- **Weighted System:** Assign values to different condition categories (e.g., structural integrity, functionality, remaining useful life) with weights reflecting their relative importance.

Interpretation:

Define clear interpretations for each score level. Ensure the scoring system aligns with your AMS for consistency.

Condition Assessment Standard Operating Procedure (SOP):

Develop an SOP outlining roles and responsibilities for condition assessment:

- **Operations:** Identify immediate issues through the AMS, such as subtle changes in performance, sound, or operating parameters. Reroute work orders with their assessment to the Maintenance team.
- **Maintenance:** Conduct physical inspections to identify signs of wear and tear. Diagnose and repair mechanical problems. Reroute work orders with their assessment to the Engineering team if needed.
- **Engineering:** Utilize engineering principles and analyze data to identify underlying causes of problems.

Asset Risk/Criticality Score

The asset risk/criticality score is a numerical value that represents the potential impact of an asset failure on the WWTP's operations. It's calculated by multiplying the **probability of failure (POF)** rating by the **consequence of failure (COF)** rating. Refer to the AMS implementation documentation for details on integrating this score into the AMS.

Probability of Failure (POF) Definition, Scoring, and Assessment

POF refers to the likelihood of an asset failing within a specific timeframe (e.g., next year). Here's a breakdown of how POF is defined, scored, calculated, and assessed:

- **Definition:** The chance of an asset experiencing a functional failure that disrupts its intended operation.
- **Scoring:** A scoring system is developed to assign points to factors influencing POF. Higher scores indicate a greater chance of failure.
- **Calculation:** The total POF score is the sum of the weighted scores from each influencing factor.
- **Assessment:** Factors impacting POF include:
  - **Maintenance History:** Assets with consistent preventive maintenance receive lower scores, while those with frequent breakdowns or neglected maintenance get higher scores.

    - **Industry Benchmarks:** Consider factors like asset age, remaining useful life, and typical failure rates for similar equipment based on industry data.
    - **Operating Conditions:** Assets operating at or exceeding capacity or exposed to harsh chemicals receive higher scores due to increased stress. Assets under less stress receive lower scores.
    - **Condition:** The overall condition assessment score (discussed later) must also be factored into the POF.

Asset Failure Types

There are four primary types of asset failure to consider when assessing POF:

- **Mortality:** The asset physically fails or ceases to perform its intended function altogether.
- **Financial Inefficiency:** The asset becomes too expensive to operate and maintain, making its replacement more economical.
- **Capacity:** The asset remains operational but can no longer handle the required treatment volume.
- **Level of Service:** The asset functions but fails to meet the desired level of service in areas like safety, water quality, recreation, habitat, or biodiversity.

Condition Scoring

The condition assessment of an asset plays a crucial role in determining POF. Here's a breakdown of condition scoring:

- Both the parent asset and its individual components (child assets) should be assessed.
- **Scoring System:** Choose a 1-to-5 scale or a more detailed weighted system that assigns values to different condition categories.
- **Interpretation:** Define clear interpretations for each score level. Here's an example using a 1-to-5 scale:
    - **1: (Needs Immediate Attention):** The asset is in critical condition and requires immediate repair or replacement to avoid failure.
    - **2: (Poor):** The asset shows significant signs of wear and tear and may need attention soon.
    - **3: (Fair):** The asset is in average condition with some minor issues, but it is still functional.
    - **4: (Good):** The asset is in good condition and functioning well, with minimal signs of wear.
    - **5: (Excellent):** The asset is in top condition and performing at its best.

Condition Assessment Standard Operating Procedure (SOP)

- **Operations:** Operators are responsible for identifying immediate issues like subtle changes in performance, sound, or operating parameters through the AMS. They should reroute work orders with their assessment to the Maintenance team.

- **Maintenance:** Mechanics identify signs of wear and tear through physical inspection. They diagnose and repair mechanical problems and/or reroute work orders with their assessment to the Engineering team.
- **Engineering:** Engineers focus on design, optimization, and long-term planning for the treatment plant. They utilize engineering principles and analyze data to identify underlying causes of problems. They also assess how different components work together and the impact of equipment failure on the entire treatment process.

APPENDIX B

Southwest Environmental Finance Center / PG Environmental under EPA Contract No. EP-R9-16-02
March 2019

Summary

Under contract from the United States Environmental Protection Agency (EPA) Region 9, staff from PG Environmental and the Southwest Environmental Center (collectively, the PG Team) worked in coordination with staff from WWD to develop a framework and establish a standard operating procedure (SOP) for assessing the potential of failure (POF) and consequence of failure (COF) for the County of Hawai'i Department of Environmental Management Wastewater Division's (WWD's) vertical wastewater assets[1]. The resulting framework/SOP describes a 1 to 5 scale for both POF and COF as well as the process and different criteria to be used in determining how an asset should be ranked.

To collect the information necessary to determine risk for vertical assets, the PG Team, along with WWD staff, visited each pump station and wastewater treatment plant on both sides of the island (east and west) and directly viewed each asset (when safely visible). Asset information was collected, and ratings were given for POF and COF, along with condition and useful life (additional attributes to be used to inform decision-making). The operator and technical support staff's knowledge of each asset's performance, failure history, and maintenance history, as well as visual observations and any other performance-related information were taken into consideration for determining POF and COF.

Once all data was collected, it was downloaded into an *Excel* spreadsheet to allow for further analysis. In all, the PG Team evaluated 1,026 separate vertical assets and found **about 50%** of the utility's vertical assets are in the **low risk** category, **36%** are in the **medium** category, **9%** are in the **medium-high** category, and **5%** are in the **high-risk** category.

The PG Team's analysis showed **the majority of WWD's high-risk assets are located at the Hilo WWTP, with 36 of the 51 total high-risk assets at that facility** (see Table A3 in Appendix A for additional details specific to the Hilo WWTP assets).

The overall risk analysis demonstrates that while there are assets classified as high risk and medium-high risk, most of the assets are not in these categories. These results show WWD can take a prioritized approach to reducing overall risk that may not be as onerous as previously thought.

[1] Included in the document, *County of Hawai'i Department of Environmental Management Wastewater Division: Asset Criticality SOP and Framework*.

Introduction

An asset management program includes five core components:

- current state of the assets;
- level of service;
- criticality / risk;
- life cycle costing; and
- long-term funding.

The criticality component of asset management, also referred to as risk, is a fundamental component that helps inform decision-making in determining the most advantageous way to spend scarce resources – both personnel and financial. While all portions of asset management are important, understanding criticality and using it in decision-making can have some of the most dramatic effects on the overall operation of the organization.

Criticality is based on the idea that some assets are more critical to the sustained operations of the facility than others. Knowing which assets are more critical to an operation, or pose the most risk if they become inoperable, can aid in determining how to spend funds, where to deploy personnel resources, how to manage an individual asset or collection of assets over time, and how to plan for capital improvements. Two major components contribute to determining criticality. The first is probability of failure (POF), or how likely an individual asset is to fail. The second is consequence of failure (COF), or how significant are the impacts if the asset does fail. These two factors are ranked and then multiplied together to indicate an overall risk score.

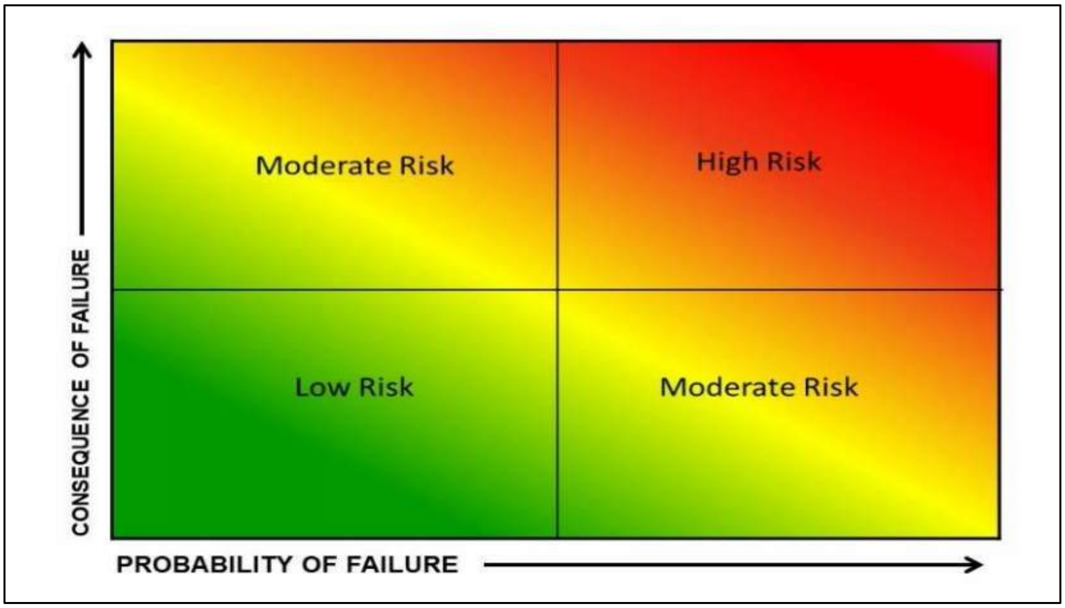
POF X COF = Risk

POF and COF can be scored on any scale a utility chooses, based on the desired level of detail and complexity. Scales of 1 to 5 or 1 to 10 are typical, which will result in risk scores of 1 to 25 or 1 to 100 respectively, with the lowest outcomes being the lowest risk and the highest number being the highest risk. A rank of "0" is never used because no asset is completely without any risk of failure or consequence.

Asset risk scores can be used to evaluate assets in various ways. Assets can be examined individually, as contributing to the risk assessment of an entire facility (e.g., pump station or treatment plant) or portion of a facility (e.g., headworks, primary treatment, etc.), or they can be used to show overall risk for the entire utility. The data included in this report can be used for any one of these analyses.

Visualizing Risk

Risk can be depicted in a variety of ways. Figure 1 provides an example visual representation of how risk scores are distributed based on POF and COF. Visualizing risk allows a utility operator to quickly identify assets needing immediate or near-immediate attention (i.e., high risk). This also functions as a useful tool to quickly inform decision-makers on which assets to prioritize for more-thorough analysis to mitigate overall risk.



[redacted]

High Risk

In the example above, assets that are highly likely to fail and would cause serious consequences if they did (i.e., high POF and COF) would be considered "high risk" assets and would fall within the red box in the upper right-hand corner.

Moderate Risk

Assets with 1) high probability of failure but a low consequence, 2) with a low probability of failure but a high consequence, or 3) those with a moderate probability of both would be considered "moderate risk" and appear in the boxes at the bottom right and top left, or near the center of the chart.

Low Risk

Assets with a low probability of failure and a low consequence of failure would be considered "low risk" and fall within the box in the lower left-hand corner.

Tables 1 through 3 provide additional examples of asset risk visualizations based on real-world examples. In the first example, each asset at the Banyan Sewage Pump Station (SPS) is listed in Table 1, in the order of its risk score. High-risk scores are highlighted in red, medium-high risk scores are highlighted in orange (Note: The Banyan SPS had no assets in this range), medium-risk assets are highlighted in yellow, and low-risk assets are highlighted in green.

Table 1. Banyan SPS Asset Risks in Order of Risk Score

Equipment	Condition	POF	COF	Risk Score
BAN0014 - PUMP #1 - CONTROLLER	Fair	4	5	20
BAN0012 - PROPANE EMERGENCY BACK UP MOTOR	Fair	2	5	10
BAN0015 - PUMP #2 - MOTOR	Fair	3	3	9
BAN0015 - PUMP #2 - PUMP	Good	3	3	9
BAN0014 - PUMP #1 - MOTOR	Fair	3	2	6
BAN0014 - PUMP #1 - PUMP	Good	3	2	6
BAN0015 - PUMP #2 - CHECK VALVE	Average	2	3	6
BAN0026 - VALVE	Fair	2	3	6
BAN0027 - VALVE	Fair	2	3	6
BAN0028 - VALVE	Fair	2	3	6
BAN0029 - VALVE	Fair	2	3	6
BAN0005 - AIR RELIEF VALVE #1	Average	2	2	4
BAN0006 - AIR RELIEF VALVE #2	Average	2	2	4
BAN0014 - PUMP #1 - CHECK VALVE	Average	2	2	4

Table 2 is another tabular representation that depicts the number and percentage of assets within each risk score.

Table 2. Banyan SPS Asset Risks by Risk Score

Consequence of Failure	5	0	1 (7%)	0	1 (7%)	0
	4	0	0	0	0	0
	3	0	5 (36%)	2 (14%)	0	0
	2	0	3 (21%)	2 (14%)	0	0
	1	0	0	0	0	0
Total number of assets: 14		1	2	3	4	5
		Probability of Failure				

Table 3 provides another example, this time for the Hilo WWTP, which shows greater distribution of risk scores than for the Banyan SPS.

Table 3. Hilo WWTP Asset Risks by Risk Score

Consequence of Failure	5	1 (0.2%)	3 (0.8%)	22 (6%)	9 (2%)	6 (2%)
	4	2 (0.5%)	11 (3%)	41 (11%)	15 (4%)	21 (6%)
	3	2 (0.5%)	29 (8%)	60 (17%)	30 (8%)	14 (4%)
	2	1 (0.2%)	16 (4%)	75 (21%)	2 (0.5%)	0
	1	2 (0.5%)	0	1 (0.2%)	0	0
Total number of assets: 363		1	2	3	4	5
		Probability of Failure				

The third example of risk visualization, a quad chart, is shown in Table 4. The highest risk assets are shown in the upper right and the lowest risk assets are shown in the lower left corner.

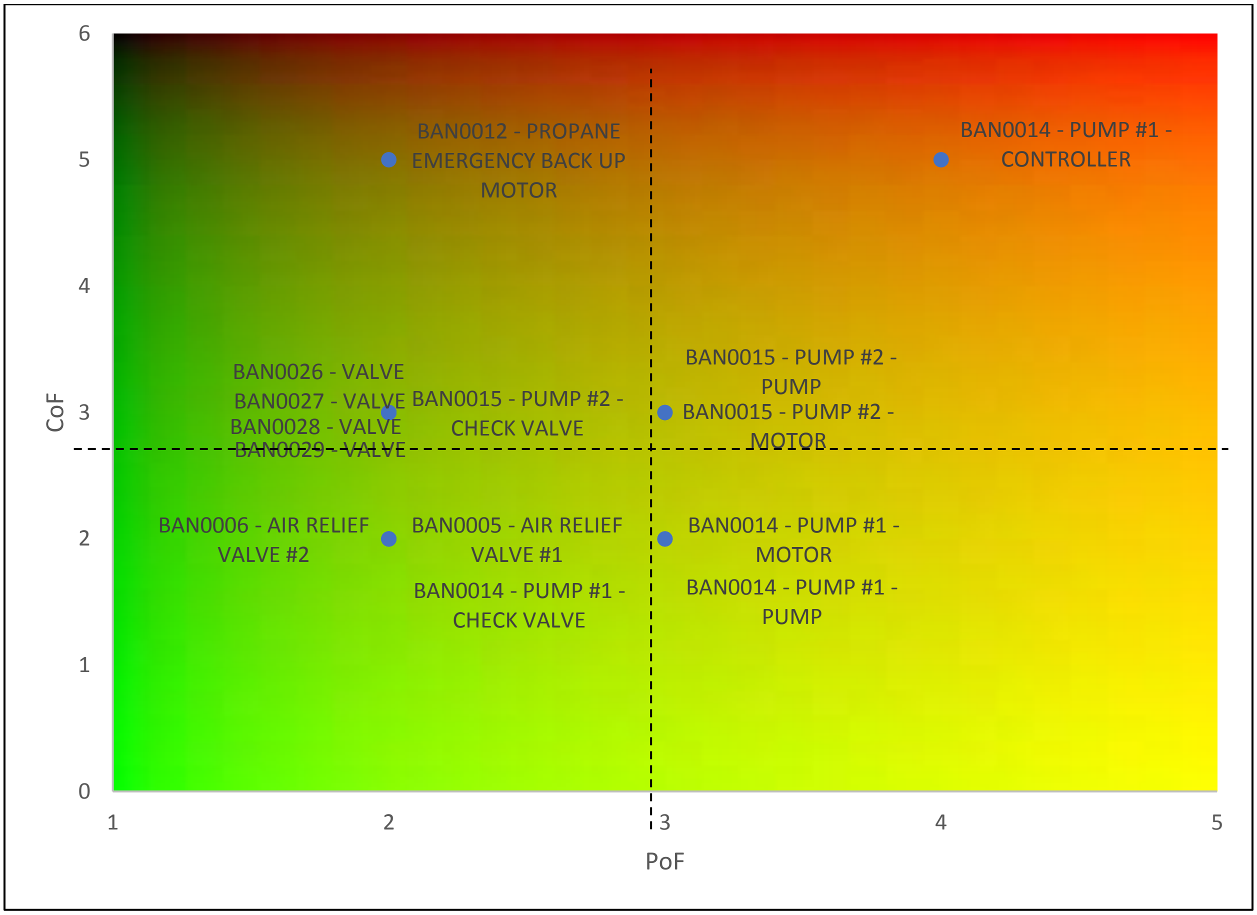


Figure 2. Banyan SPS asset risk.

Determining Risk for Vertical Assets[2]

The PG Team and staff from the Wastewater Division (WWD) worked together to develop a framework and establish a standard operating procedure (SOP) for assessing POF and COF of vertical assets. For this project, vertical assets have been defined as those components that are primarily above ground and located within treatment facilities and pump stations. The framework describes a 1 to 5 scale for both POF and COF as well as different criteria to be used in determining how an asset should be ranked.

To collect the information necessary to determine risk for vertical assets, the PG Team, along with WWD staff, visited each pump station and treatment plant on both sides of the island (east and west) and directly viewed each asset (except for submersible pumps). Asset information was collected, and ratings were given for POF and COF, along with condition and useful life (additional attributes to be used to inform decision-making). The operator and technical support staff's knowledge of each asset's performance, failure history, and maintenance history, as well as visual observations and any other performance-related information were taken into consideration for determining POF and COF.

[2] This report focuses solely on vertical assets. The risk assessment of horizontal assets necessitated a slightly different approach, which is described in a separate document.

Probability of Failure (POF) Factors

Table 4 describes the criteria for assessing the POF of an asset, which is included in more detail in WWD's *Asset Criticality SOP and Framework*. The document also describes the four basic ways an asset can fail (i.e., failure modes), which include:

- **Mortality:** Complete loss of use of an asset (e.g., collapsed pipe, fractured pump drive, etc.).
- **Level of service**: The asset's performance level no longer meets the needs of the customer or the utility. This can be caused by the declining functionality of an asset or increased performance demands from the utility of its customers.
- **Financial inefficiency**: Maintaining or repairing an asset would be costlier than replacing it. For example, it may be financially more favorable to replace an older motor with a new, more energy-efficient motor that will provide operational savings over time, even though upfront costs would be greater.
- **Capacity:** The asset no longer performs at or provides sufficient capacity. For example, even if a pipe is in good condition, it may no longer provide enough capacity to meet volume demands.

In collecting data, a failure mode code can be entered to indicate the predominant mode of failure. In many cases, the expected mode will be Mortality, but it is important to consider the other three.

Table 4. Probability of Failure Criteria

POF Factor	Criteria	Comments
1	Asset is brand new or like new.	Failure not anticipated within the foreseeable future.
2	Asset is not brand new but shows no more than cosmetic signs of wear and tear.	Failure is not anticipated in the near future (generally, not within the next 10 years or so).
3	Asset shows signs of operational or physical decline but has not yet entered a potential failure state. Asset may show light to moderate rust, some light to moderate wear and tear, be nearing but not at physical capacity.	Asset's normal maintenance frequency needs to be reviewed to see if an increase is needed to sustain a factor of 3 and prevent a condition of 4 or 5.
4	Asset is in potential failure—showing signs of failure, such as cracks, root intrusions, I/I, vibration, noise, excessive rust—but is still delivering all or most of the required service (i.e., not in functional failure mode). Functional failure not expected within the next year, but within the next few years.	The potential failure issues will need to be addressed to prevent a functional failure. Functional failure occurs when the asset is in one of the four failure modes described above.
5	Asset is already in failure mode (see failure mode definitions above) or expected to fail within 1 year.	A failure mode code can be added to note the means of failure (Level of Service, Mortality, Financial, Capacity)

Consequence of Failure (COF) Factors

Table 5 describes the criteria developed for assessing the COF of an asset, which are included in more detail in the *Asset Criticality SOP and Framework*. The document also describes factoring in the ability to use redundant systems when considering COF.

Table 5. Consequence of Failure Criteria

COF Factor	Criteria
1	No identifiable consequences. Less than $10,000 in repair costs.
2	$10,000 to $49,999 in repair costs. Short term disruption to traffic or business or operations (less than 4 hours). Bypassing (without violating permit) for less than 3 days.
3	$50,000 to $99,999 in repair costs. Disruption to businesses. Disruption to traffic. Disruption to septic haulers. Disruption to staff or regular operations. Bypassing (without violating permit) for more than 3 days.
4	Damage to other assets and/or private property. Potential to negatively harm the environment; potential to cause impacts to endangered species. $100,000 or more in costs related to repair. May make some minor news report.
5	Health and safety of employees and/or public at risk. Exceedance of permit limits. Politically problematic/becomes a major news story.

Data Analysis and Results

Once all data was collected, utilizing the *Fulcrum* data collection application, it was downloaded into an *Excel* spreadsheet to allow for further analysis. Several steps were taken to prepare the raw data to be used for risk assessment purposes, including consolidating entries into a more useful format, deleting duplicate entries and entries for assets that are no longer in operation (i.e., reconciling WWD's pre-existing inventory data with more-recent data generated in the field during this effort), and reviewing data quality to identify and correct any apparent errors.

The PG Team collected data on 1,026 separate vertical assets[3]. The inventory was completed by identifying the assets at each pump station and treatment plant within the WWD utility. There are assets from seven (7) wastewater treatment plants (WWTPs) and 16 pump stations included in the risk assessment.

[3] Note that the vertical asset inventory shows over 1,400 assets. Parent assets that were broken into child assets were not evaluated at the parent level, but are included as separate in the inventory to show the relationship of the associated child assets; risk for the parent assets in these cases can be evaluated by analyzing the risk of all the child components.

Data analysis was compiled for each facility – each pump station and WWTP – as well as for the entire system (all pump stations and treatment plants on both sides of the island). Data for each individual facility is presented in Appendix A. A summary of the overall risk is provided is subsequent sections.

Overall Risk

As can be seen in Table 6, **about 50%** of the utility's vertical assets are in the **low risk** category, **36%** are in the **medium** category, **9%** are in the **medium-high** category, and **5%** are in the **high-risk** category. Table 7 shows the total number of WWTP assets in each risk category and Table 8 shows the same for pump station assets. The analysis also showed the majority of WWD's high-risk assets are located at the Hilo WWTP (see Appendix A for additional details specific to the Hilo WWTP assets).

The overall risk analysis demonstrates that while there are assets classified as high risk and medium-high risk, most of the assets are not in these categories. These results show WWD can take a prioritized approach to reducing overall risk that may not be as onerous as previously thought.

Table 6. Summary of Risk for All WWD Vertical Assets

Risk Level	Risk Score Range*	Number of Vertical Assets at Each Risk Level	Percentage of Vertical Assets at Each Risk Level
High	20 – 25	51	5%
Medium - High	15 – 16	92	9%
Medium	8 – 12	366	36%
Low	1 – 6	517	50%
	Totals	**1,026**	**100%**

* Note that the range values only represent the possible outcomes from multiplying POF x COF.

Table 7. Summary of Risk for WWTP Assets

Risk Level	Risk Score Range*	Number of Vertical Assets at Each Risk Level	Percentage of Vertical Assets at Each Risk Level
High	20 – 25	42	6%
Medium - High	15 – 16	66	9%
Medium	8 – 12	269	37%
Low	1 – 6	346	48%
	Totals	**723**	**100%**

* Note that the range values only represent the possible outcomes from multiplying POF x COF.

Table 8. Summary of Risk for Pump Station Assets

Risk Level	Risk Score Range*	Number of Vertical Assets at Each Risk Level	Percentage of Vertical Assets at Each Risk Level
High	20 – 25	9	3%
Medium - High	15 – 16	26	9%
Medium	8 – 12	97	32%
Low	1 – 6	171	56%
	Totals	**303**	**100%**

* Note that the range values only represent the possible outcomes from multiplying POF x COF.

Tables 9 and 10 on the following pages show the total number of vertical assets with each risk score and the facilities where those assets are located. Figures 3 through 6 show the percentage of WWTP assets in each risk category relative to all WWTPs, and Figures 7 through 10 show the same for pump station assets.

Table 9. Risk Assessment Visualization: Total Number of Assets in Each Category

Consequence of Failure	**5**	**9 Assets** 1 Hilo; 1 Kealakehe SPS; 3 Kealakehe WWTP; 1 Pua; 3 Wailuku	**22 Assets** 1 Banyan; 3 Hilo; 1 Kealakehe SPS; 6 Kulaimano; 7 Papaikou; 2 Paukaa; 2 Waiaha	**37 Assets** 22 Hilo; 1 Kealakehe SPS; 1 Kealakehe WWTP; 1 Kulaimano; 1 Mill Pond; 1 Onekahakaha; 7 Pua; 1 Waiaha; 1 Wailoa; 1 Wailuku	**13 Assets** 1 Banyan, 9 Hilo; 2 Kolea, 1 Papaikou	**7 Assets** 6 Hilo; 1 Wailoa
	4	**16 Assets** 2 Hilo; 2 Honoka'a; 1 Kaloko; 7 Kealakehe WWTP; 1 Kolea; 1 Kulaimano; 2 Pua	**37 Assets** 11 Hilo; 3 Holualoa; 3 Honoka'a; 5 Kaloko; 1 Kealakehe WWTP; 3 Kulaimano; 1 Onekahakaha; 1 Pahoehoe; 2 Pua; 4 Waiaha; 2 Wailoa	**90 Assets** 41 Hilo; 3 Holualoa, 2 Honoka'a; 6 Kaloko' 2 Kealakehe SPS; 11 Kealakehe WWTP; 1 Keopa; 2 Kulaimano; 4 Onekahakaha; 4 Pahoehoe; 2 Papaikou; 3 Project 19 SPS; 3 Pua; 5 Waiaha; 1 Wailuku	**29 Assets** 1 Hale Halawai; 15 Hilo; 3 Kealakehe SPS; 4 Kealakehe WWTP; 3 Paukaa; 3 Pua	**31 Assets** (21 Hilo; 1 Holualoa; 1 Kealakehe SPS; 4 Kealakehe WWTP; 1 Kulaimano; 1 Onekahakaha; 1 Pua, 1 Wailoa)
	3	**14 Assets** 2 Hilo; 1 Kulaimano; 3 Paukaa; 7 Wailoa; 1 Wailuku	**153 Assets** 5 Banyan; 4 Hale Halawai; 29 Hilo; 2 Holualoa; 9 Honoka'a; 9 Kaloko; 2 Kealakehe WWTP; 4 Keopa; 11 Kulaimano; 10 Lanihau; 6 Mill Pond; 10 Onekahakaha; 5 Pahoehoe; 34 Papaikou; 1 Paukaa; 2 Pua; 9 Wailoa; 1 Wailuku	**131 Assets** 2 Banyan; 5 Hale Halawai; 60 Hilo; 4 Holualoa; 1 Honoka'a; 3 Kaloko; 2 Kapehu; 4 Kealakehe SPS; 11 Kealakehe WWTP; 6 Keopa; 5 Kulaimano; 2 Lanihau; 2 Mill Pond; 2 Onekahakaha; 1 Pahoehoe; 14 Papaikou; 1 Pua; 1 Waiaha; 4 Wailoa	**53 Assets** 30 Hilo; 3 Kaloko; 2 Kapehu; 2 Kealakehe SPS; 5 Kealakehe WWTP; 2 Keopa; 3 Kolea; 2 Kulaimano; 4 Papaikou	**26 Assets** 14 Hilo; 3 Kealakehe WWTP; 6 Kulaimano; 1 Lanihau; 2 Pua
	2	**34 Assets** 1 Hilo; 2 Honoka'a; 1 Kaloko; 10 Kealakehe WWTP; 3 Kolea; 1 Papaikou; 11 Pua; 2 Wailoa; 3 Wailuku	**103 Assets** 3 Banyan; 16 Hilo; 1 Holualoa; 1 Honoka'a; 9 Kapehu; 1 Kealakehe SPS; 4 Kealakehe WWTP; 3 Kolea; 43 Kulaimano; 4 Mill Pond; 2 Pahoehoe; 9 Papaikou; 1 Project 19; 3 Wailoa; 2 Wailuku	**164 Assets** 2 Banyan; 75 Hilo; 8 Holualoa; 3 Honoka'a; 3 Kealakehe SPS; 5 Kealakehe WWTP; 1 Keopa; 2 Kolea; 19 Kulaimano; 1 Lanihau; 10 Pahoehoe; 20 Papaikou; 6 Project 19; 8 Waiaha; 1 Wailoa	**21 Assets** 1 Hale Halawai; 2 Hilo; 3 Honoka'a; 2 Kealakehe SPS; 3 Kealakehe WWTP; 10 Papaikou	**13 Assets** 1 Hale Halawai; 1 Holualoa; 1 Honoka'a; 1 Kealakehe SPS; 2 Kealakehe WWTP; 1 Kulaimano; 2 Papaikou; 1 Project 19; 3 Waiaha
	1	**10 Assets** 2 Hilo; 2 Kealakehe WWTP; 6 Wailoa	**3 Assets** 2 Kulaimano; 1 Wailoa	**6 Assets** 1 Hilo; 1 Kapehu; 1 Kealakehe WWTP; 1 Kulaimano; 1 Wailoa; 1 Wailuku	**0 Assets**	**4 Assets** 1 Kealakehe WWTP; 2 Papaikou; 1 Waiaha
Total Number of Assets: 1,026		**1**	**2**	**3**	**4**	**5**
		Probability of Failure				

Table 10. Risk Assessment Visualization: Percentage of Assets in Each Category

Consequence of Failure					
5	0.9%	2.2%	3.6%	1.3%	0.7%
4	1.6%	3.6%	8.8%	2.8%	3.0%
3	1.4%	15%	13%	5.2%	2.5%
2	3.3%	10%	16%	2.0%	1.3%
1	1.0%	0.3%	0.5%	0%	0.4%
Total Number of Assets: 1,026	1	2	3	4	5
	Probability of Failure				

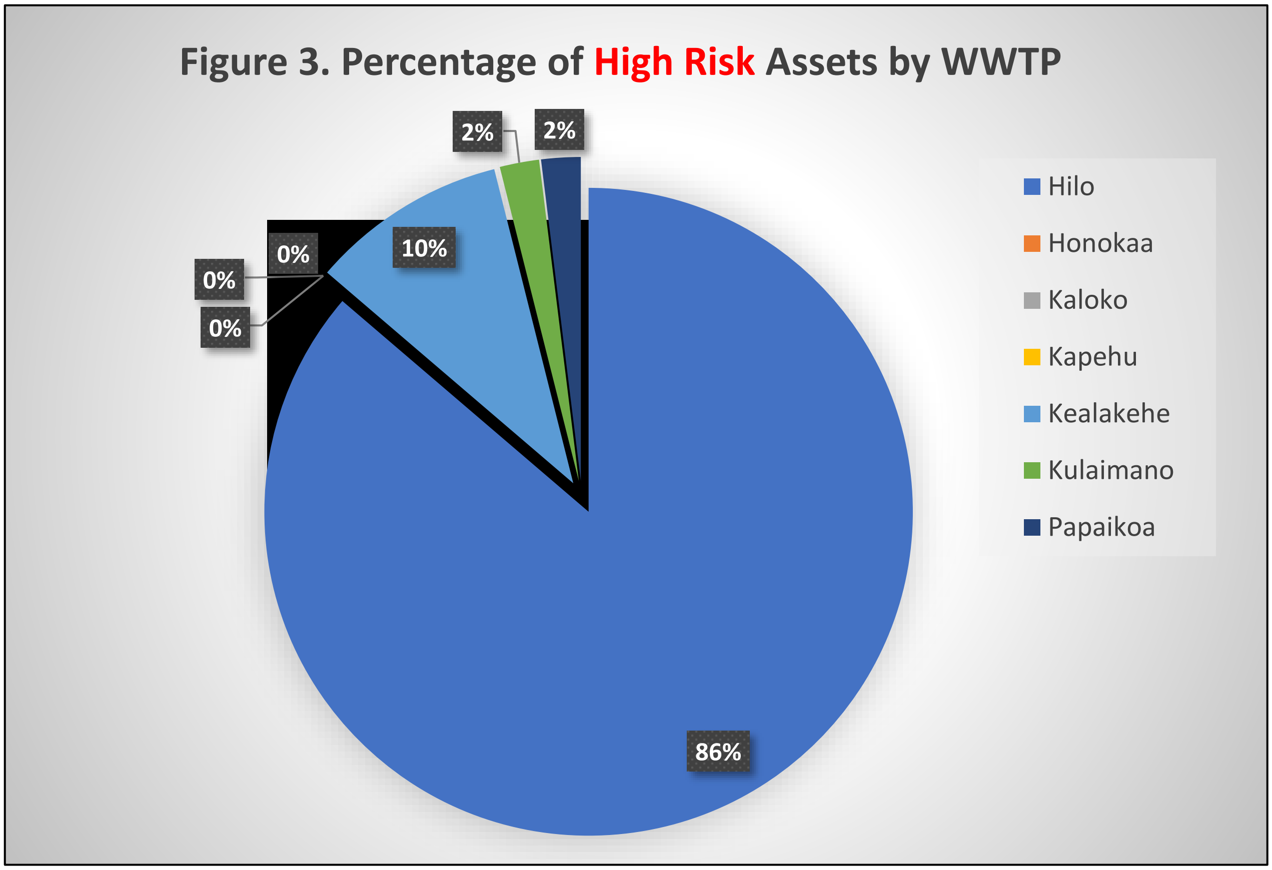


Figure 3. Percentage of High Risk Assets by WWTP

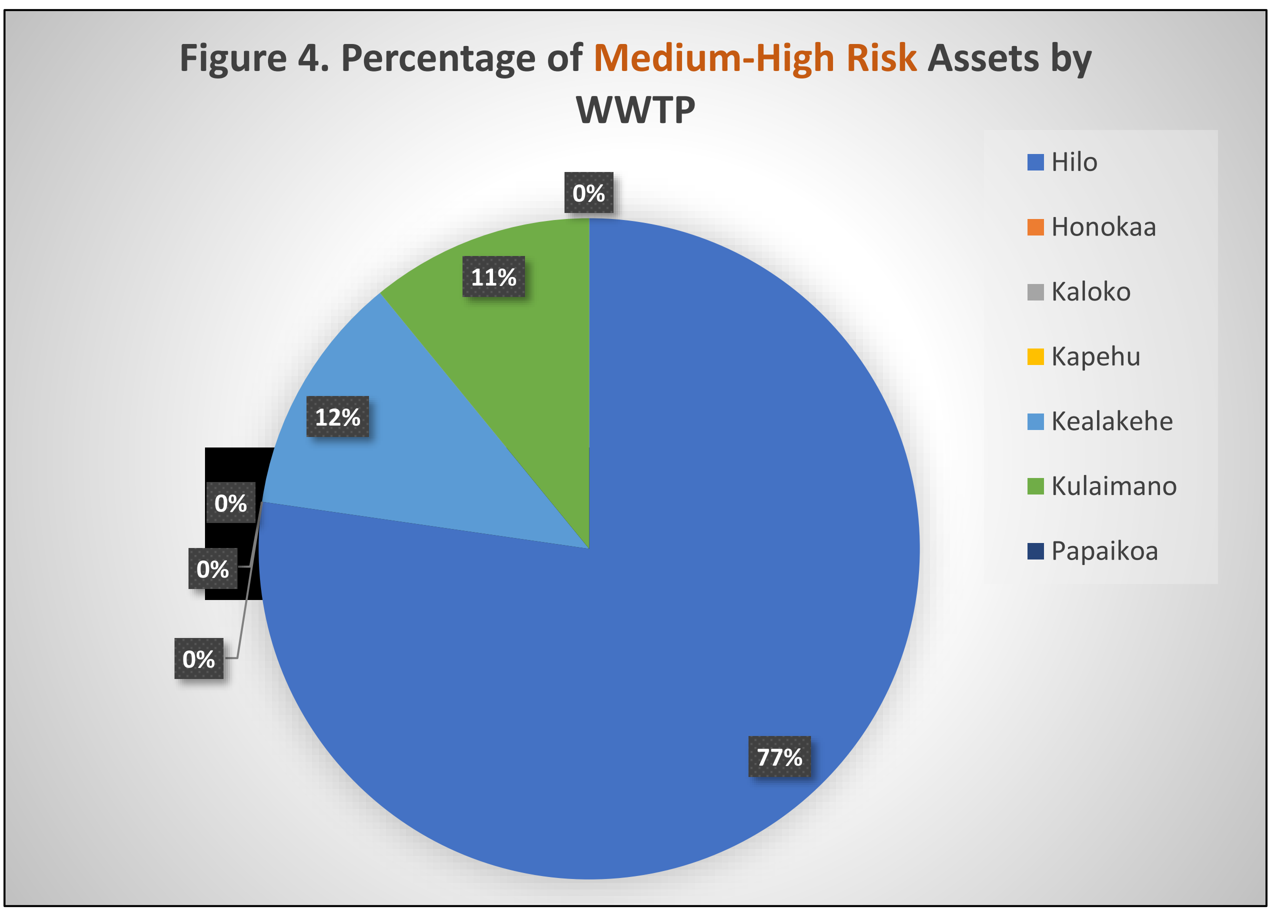


Figure 4. Percentage of Medium-High Risk Assets by WWTP

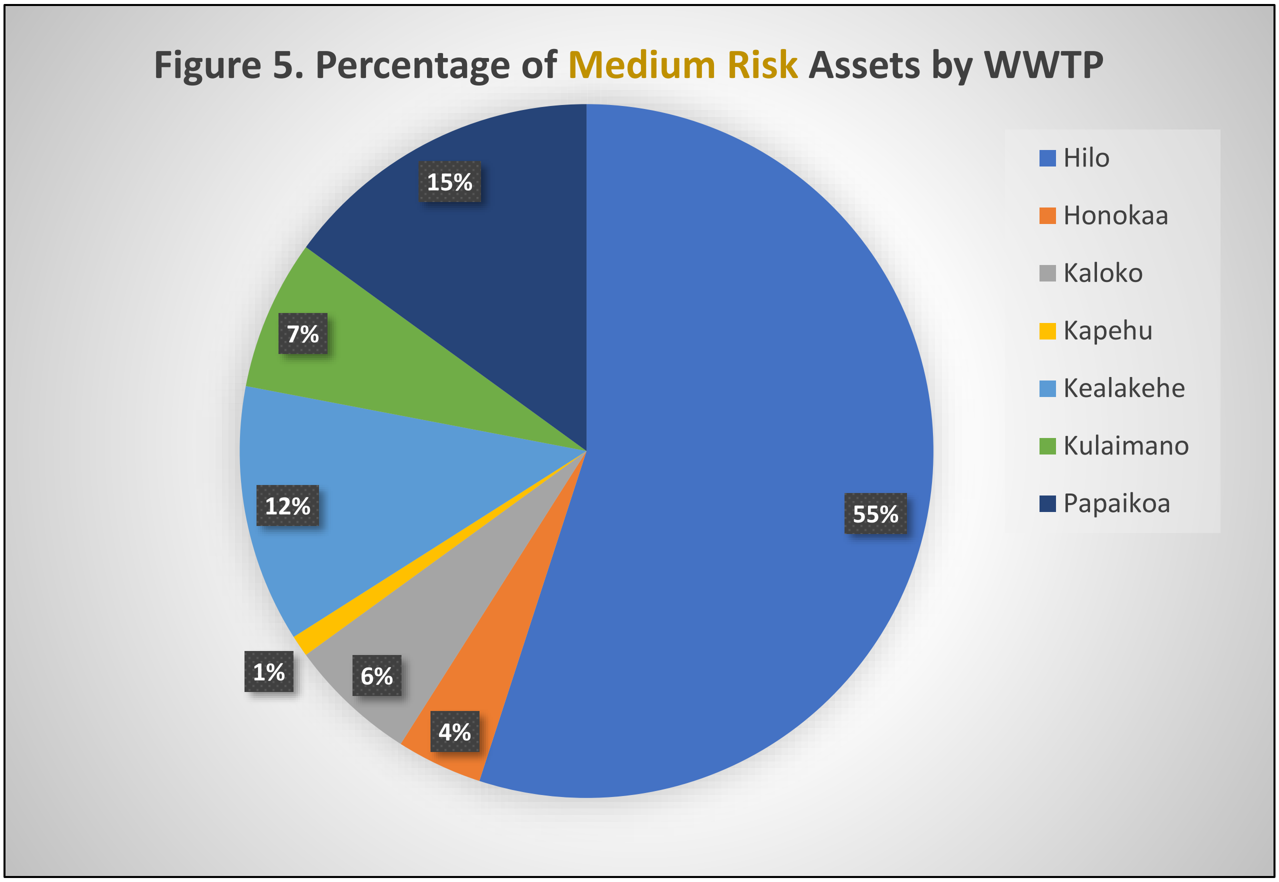


Figure 5. Percentage of Medium Risk Assets by WWTP
15%
7%
12%
1%
6%
4%
55%
Hilo
Honokaa
Kaloko
Kapehu
Kealakehe
Kulaimano
Papaikoa

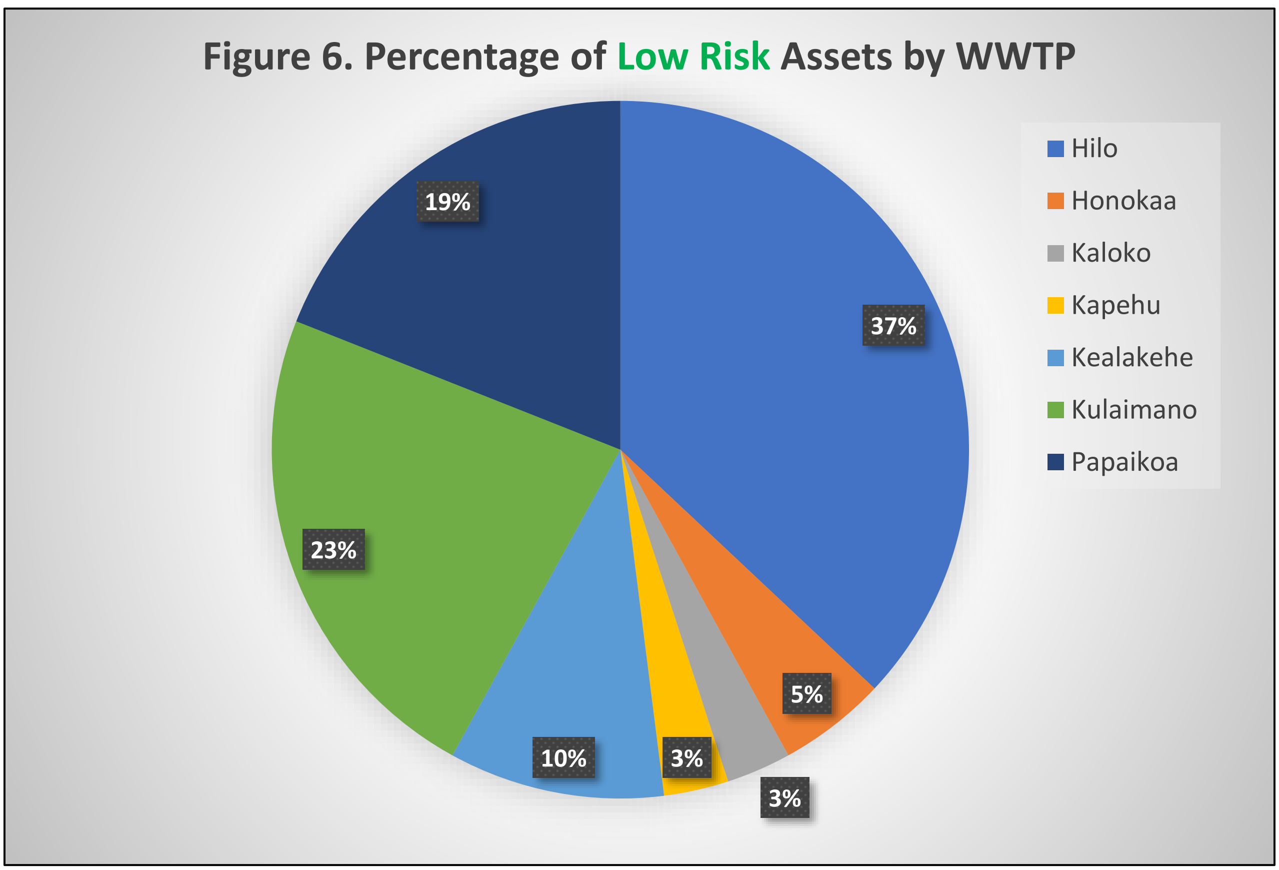


Figure 6. Percentage of Low Risk Assets by WWTP
19%
37%
23%
5%
10%
3%
3%
Hilo
Honokaa
Kaloko
Kapehu
Kealakehe
Kulaimano
Papaikoa

Figure 7. Percentage of High Risk Assets by Pump Station

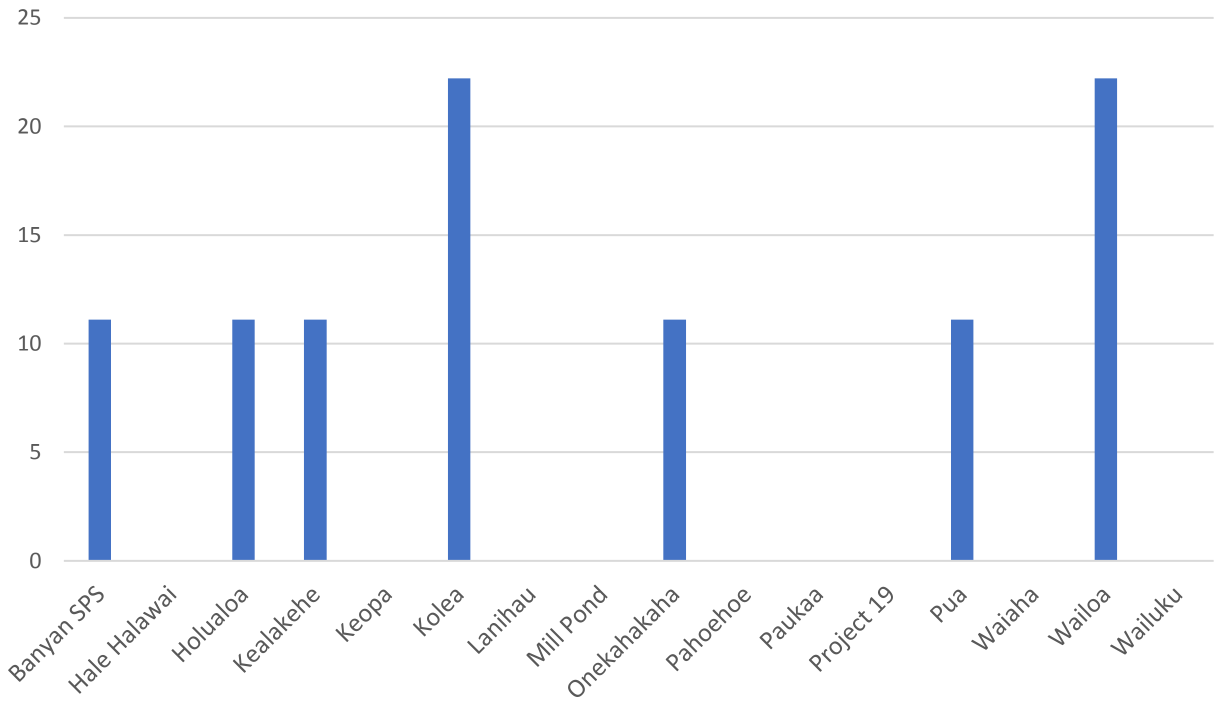


Figure 8. Percentage of Medium-High Risk Assets by Pump Station

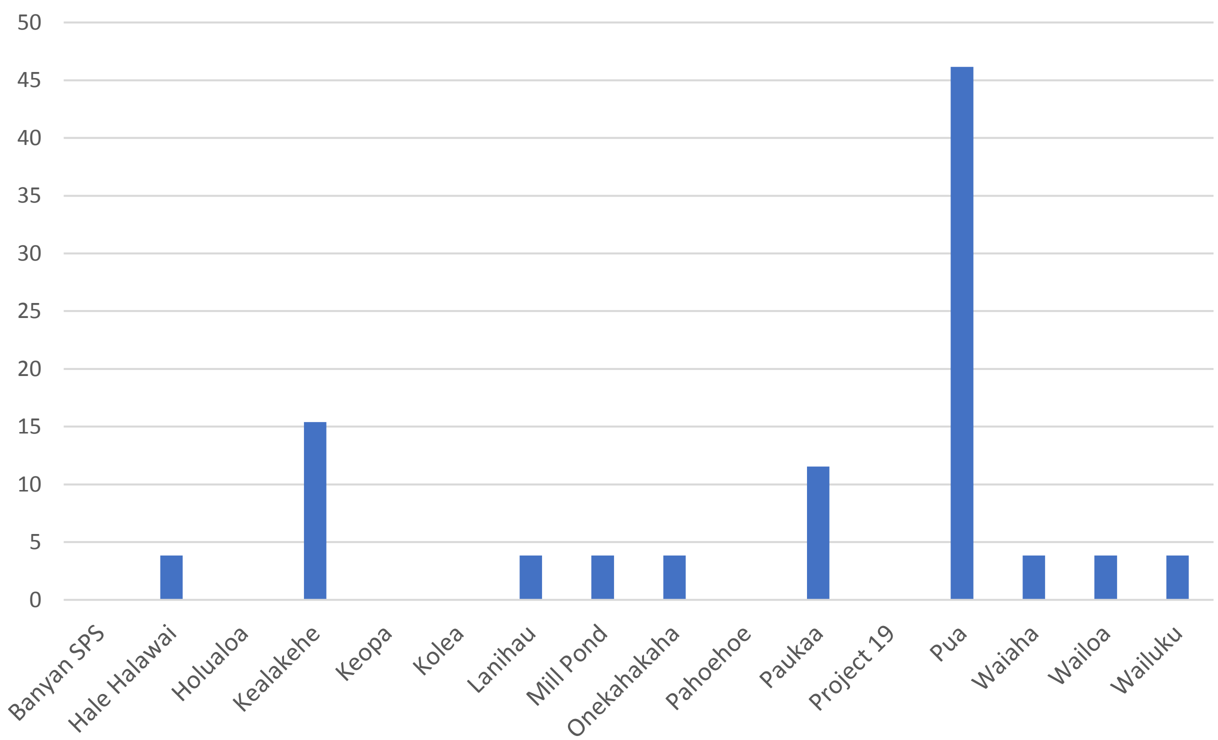


Figure 9. Percentage of Medium Risk Assets by Pump Station

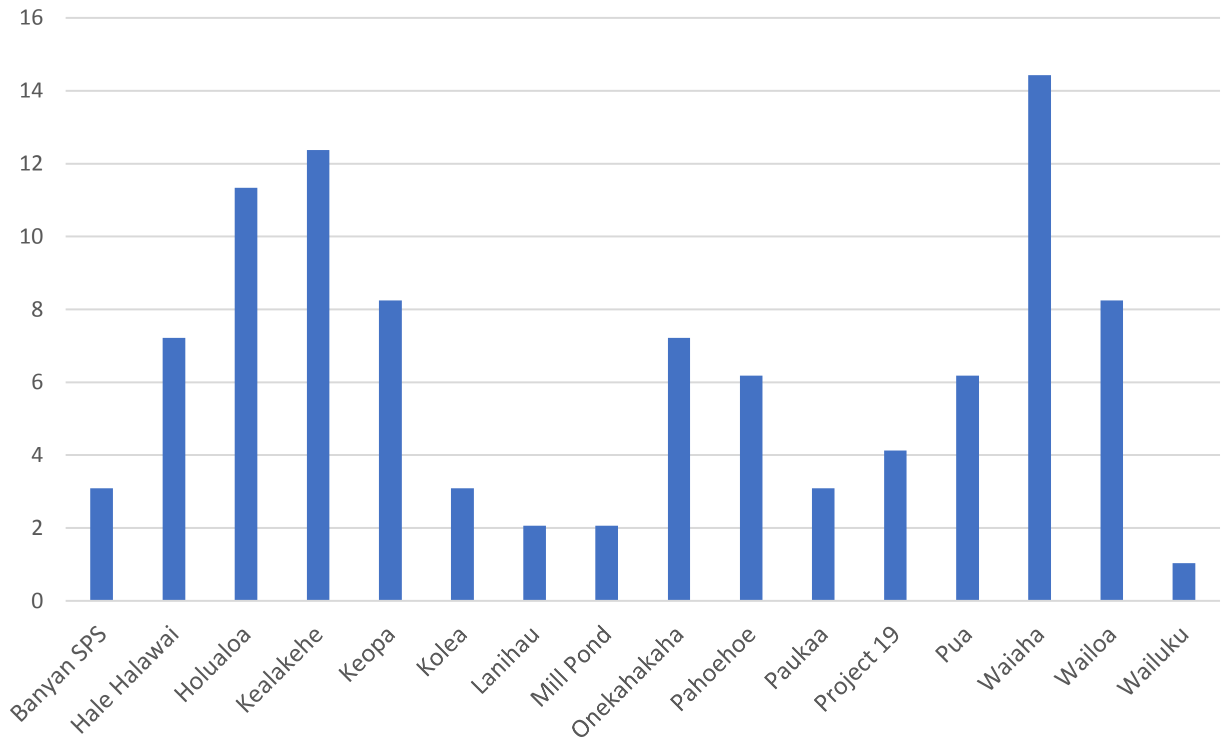
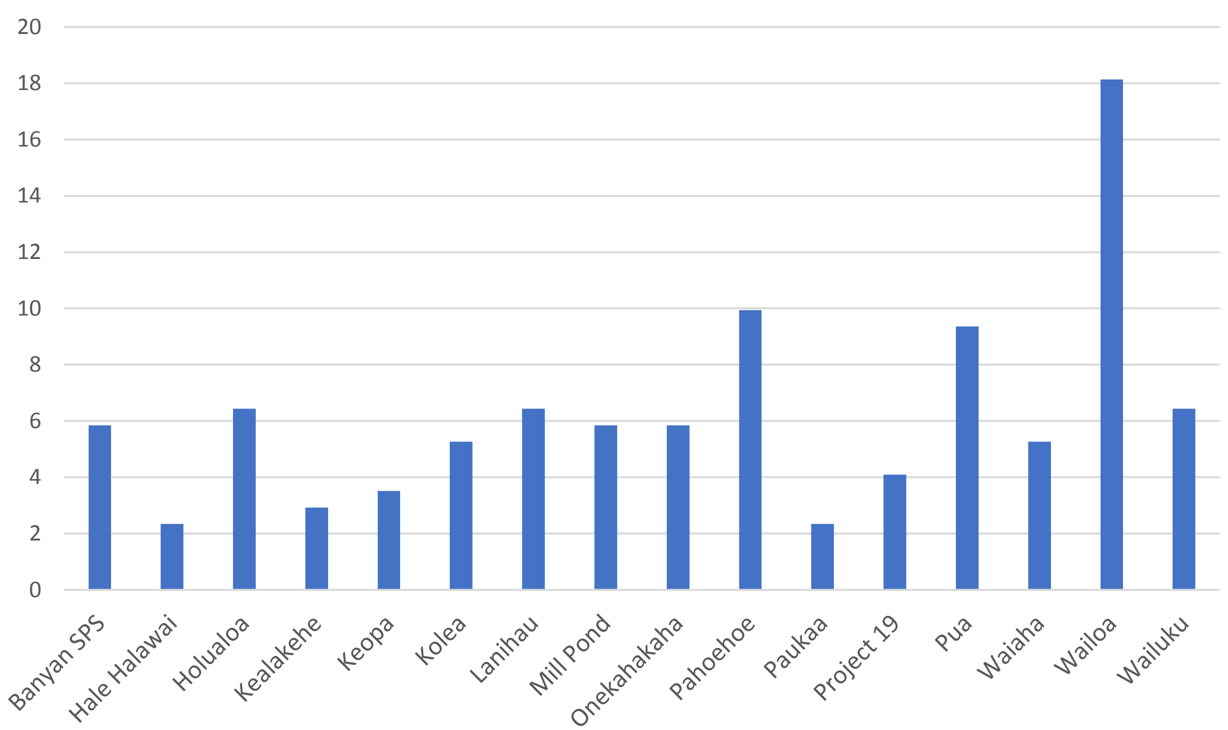


Figure 10. Percentage of Low Risk Assets by Pump Station



Addressing High-Risk Assets

There are multiple ways to address high-risk assets. These assets can be repaired, rehabilitated, or replaced. Further, the utility can act to reduce the consequences of failure in addition to or instead of actions to reduce the probability of failure. Determining which approach to take depends on many factors:

- **Underlying integrity of the asset**: Assets with a high degree of underlying integrity, can be repaired because after the repair, the asset will still have sufficient life to make the repair investment worthwhile.
- **Cost**: The cost of a repair versus rehabilitation versus replacement is a major factor, and there are a variety of scenarios to consider when deciding. For example, if the cost of replacement is much higher than rehabilitation, and rehabilitation will provide almost as much overall asset life as the replacement would, it is likely that rehabilitation is the best-case scenario. Additionally, if repair is very inexpensive and may result in a few years of extra life while the utility seeks funding for replacement, or if the repair will provide many more years of asset life (as described in the case above), repair may be a reasonable option. Further, if the additional asset life gained by replacement makes up for any additional cost of replacement, the asset should be replaced.
- **Ability to tolerate failure**: If the consequence of failure is so grave that failure cannot be tolerated, then the asset should probably be replaced or at least rehabilitated to reduce the overall risk. In these cases, repairing the asset may not be sufficient in reducing the risk.
- **Level of service impacts**: If continuing to repair the asset negatively impacts the utilities desired level of service, the asset may need to be rehabilitated or replaced. For example, if a pump failure causes backups in the sewer and repairs reduce but do not eliminate backups, a replacement that eliminates the backups (at least for the foreseeable future) may be more desirable from a customer perspective.
- **Remaining useful life**: The remaining useful life of the asset based on a repair, rehabilitation, and replacement should be considered in determining which option is best. For example, if the repair would provide two (2) years of remaining useful life, rehabilitation 50, and repair 65, rehabilitation may provide the most risk reduction at a reasonable cost. If the repair provides five (5) to 10 years of remaining useful life and greatly reduces the probability of failure, while the rehabilitation would provide 25, and the replacement would provide 40 years, the repair option may be the most favorable if cost of the other options is too high or the funding is not available.
- **Reduction in consequence of failure**: In addition to actions that can be taken to reduce the probability of failure (repair, rehabilitate, replace), actions can be taken to reduce the consequence of failure. These can include installing or increasing redundancy, having spare parts on hand, or providing specialized training to staff to make repairs easier and faster (i.e., being able to respond before a serious consequence has occurred).

The factors discussed previously are just some that need to be considered in the decision-making; there is not always one “correct” response for each situation. Each case must be considered individually to determine the most favorable outcome for the given scenario. Specific actions for WWD will be evaluated and discussed with the utility before including them in the Condition Based Assessment report.

Using Risk Data to Inform Program Implementation

Risk data can be used by utilities to inform modifications in program implementation with the goal of reducing risk of an asset, group of assets, or facility. For example, if pumps are typically showing up as high-risk assets, perhaps the utility's maintenance program is insufficient to keep the pumps from failing prematurely. If this were to be the case, the maintenance program should be thoroughly evaluated to see if additional activities need to be done or if the frequency of the activities needs to change. To determine effectiveness, the pump life can be examined over time to see if it is increasing or to see if failures are decreasing due to the program adjustments.

Risk data can also be used to help calibrate the anticipated useful life of a specific type of asset and inform long-term planning. For example, a utility may expect its pumps to last 20 years. However, the pumps may operate very well for 10 years but then increase in failures in years 11 through 15 until it is very difficult and financially inefficient to continue to keep the pumps running. In this case, the time horizon for pump replacement should be shortened.

Next Steps

While it is very important to assess the risk of the individual assets, it is also important to look at the risk in two additional ways:

- Risk related to subsystems of the overall facility or utility (i.e., the risk of an individual pump station failing or the headworks of a treatment facility failing).
- Risk related to the utility (i.e., the entire WWD utility, all assets on both the east and west sides of the island).

Risk data for individual assets is not sufficient, by itself, to assess the risk of a system or subsystem. Additional considerations must be brought into the analysis to perform this type of risk assessment. This additional information would include:

- Type of redundancy for the overall system (e.g., can a pump station handle the load if another pump station is shut down).
- Consequences that happen if that subsystem is completely shut down.
- Other than asset failure, what could cause the pump station or WWTP to fail (e.g., flooding, tsunami, electricity failure).
- Damage that may occur to other subsystems based on the failure of that subsystem.
- Possibility of environmental damage due to the subsystem failure.
- Possibility of public health or employee harm.

The PG Team will continue to work with WWD to review and verify the information contained in this report and use the data in addressing the items above. This more holistic analysis will be considered and included in the Condition Based Assessment report.

Recommended Additional Step

As a recommended next step, WWD could evaluate system risk as a whole. This evaluation would involve looking at the utility's overall resiliency and incorporating entirely different factors than those evaluated for this effort, such as the ability of the entire system to withstand natural disasters – hurricanes, tsunamis, volcanic eruptions, fires – as well as other types of emergencies – pandemics, vandalism, mass employee turnover.

This would be an opportunity for the utility to consider how the utility has withstood these types of events in the past as well as the ability to withstand them in the future. This risk relies on and builds upon the risk assessments of individual assets and sub-systems. For example, if a tsunami were most likely to knock out "Pump Station A" and "Pump Station A" is highly critical as identified in the analysis of risk related to subsystems, it would be very problematic. If "Pump Station A" also includes numerous assets with high risk, the potential for serious impacts would be even greater. This expanded risk analysis also attempts to consider the potential for events that the utility has not been thinking of or preparing for. In other words, "what aren't we expecting?" The greatest problems often come from what we are not expecting, rather than what we are.

Appendix A

(Pump Station and WWTP Assets; Alphabetical by Location)

Table A1. Banyan SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
BAN0014 - PUMP #1 - CONTROLLER	Fair	1	4	5	20
BAN0012 - PROPANE EMERGENCY BACK UP MOTOR	Fair	6	2	5	10
BAN0015 - PUMP #2 - MOTOR	Fair	2	3	3	9
BAN0015 - PUMP #2 - PUMP	Good	3	3	3	9
BAN0014 - PUMP #1 - MOTOR	Fair	2	3	2	6
BAN0014 - PUMP #1 - PUMP	Good	3	3	2	6
BAN0015 - PUMP #2 - CHECK VALVE	Average	6	2	3	6
BAN0026 - VALVE	Fair	6	2	3	6
BAN0027 - VALVE	Fair	6	2	3	6
BAN0028 - VALVE	Fair	6	2	3	6
BAN0029 - VALVE	Fair	6	2	3	6
BAN0005 - AIR RELIEF VALVE #1	Average	6	2	2	4
BAN0006 - AIR RELIEF VALVE #2	Average	6	2	2	4
BAN0014 - PUMP #1 - CHECK VALVE	Average	6	2	2	4

Table A2. Hale Halawai SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
HAL0001 - AUTO DAILER ALARM SYSTEM	Fair	1	4	4	16
AL0004 - PUMP #1 - ISOLATION VALVE	Poor	0	5	2	10
HAL0004 - PUMP #1 - CHECK VALVE	Fair	4	3	3	9
HAL0011 - ISOLATION VALVE	Fair	3	3	3	9
HAL0018 - AUTOMATIC TRANSFER SWITCH	Average	3	3	3	9
HAL0025 - PUMP #2 - CHECK VALVE	Fair	4	3	3	9
HAL0025 - PUMP #2 - ISOLATION VALVE	Fair	4	3	3	9
HAL0025 - PUMP #2 - PUMP	Fair	3	4	2	8
HAL0004 - PUMPS (NON-PORTABLE)	Excellent	6	2	3	6
HAL0006 - CONTROLLER - PUMP #1 & #2	Good	10	2	3	6
HAL0017 - GENERATOR	Good	8	2	3	6
HAL0026-WET WELL LEVEL SENSOR	Good	5	2	3	6

Table A3. Hilo WWTP

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0255 - BIOTOWER RECIRC PUMP #1 - DRIVE SHAFT	Poor	0	5	5	25
HIL0256 - BIOTOWER RECIRC PUMP #2 - DRIVE SHAFT	Poor	0	5	5	25
HIL0257 - BIOTOWER RECIRC PUMP #3 - DRIVE SHAFT	Poor	0	5	5	25
HIL0306 - ROOF	Poor	0	5	5	25
HIL0307 - ROOF	Poor	0	5	5	25
HIL0403 - GATE	Poor	0	5	5	25
HIL0210 - 4 ARM ROTARY DISTRIBUTOR ARM FOR BIOTOWE - INTERNAL STRUCTURES	Poor	1	4	5	20
HIL0211 - 4 ARM ROTARY DISTRIBUTOR ARM FOR BIOTOWE - INTERNAL STRUCTURES	Poor	1	4	5	20
HIL0259 - CLARIFIER SCUM/DRAIN PUMP - ISOLATION VALVE	Poor	1	4	5	20
HIL0260 - CLARIFIER SCUM/DRAIN PUMP - ISOLATION VALVE	Poor	1	4	5	20
HIL0261 - CLARIFIER SCUM/DRAIN PUMP - ISOLATION VALVE	Poor	1	4	5	20
HIL0262 - EFFLUENT SAMPLER	Fair	1	4	5	20
HIL0270 - RSS PUMPS - ISOLATION VALVE	Poor	1	4	5	20
HIL0272 - RSS PUMPS - ISOLATION VALVE	Poor	1	4	5	20
HIL0273 - RSS PUMPS - ISOLATION VALVE	Poor	1	4	5	20
HIL0114 - GRIT TANK NO. 1 - CONTROLLER	Poor	0	5	4	20
HIL0183 - SLIDE GATE VALVE - DRIVE SHAFT	Poor	0	5	4	20
HIL0184 - SLIDE GATE VALVE - MOTOR	Poor	0	5	4	20
HIL0185 - SLIDE GATE VALVE - PUMP	Poor	0	5	4	20
HIL0186 - SLIDE GATE VALVE - CONTROLLER	Poor	0	5	4	20
HIL0187 - SLIDE GATE VALVE - DRIVE SHAFT	Poor	0	5	4	20
HIL0188 - SLIDE GATE VALVE - MOTOR	Poor	0	5	4	20
HIL0190 - SLIDE GATE VALVE - CONTROLLER	Poor	0	5	4	20
HIL0191 - SLIDE GATE VALVE - DRIVE SHAFT	Poor	0	5	4	20
HIL0192 - SLIDE GATE VALVE - MOTOR	Poor	0	5	4	20
HIL0193 - SLIDE GATE VALVE - PUMP	Poor	0	5	4	20
HIL0194 - SLIDE GATE VALVE - CONTROLLER	Poor	0	5	4	20
HIL0195 - SLIDE GATE VALVE - DRIVE SHAFT	Poor	0	5	4	20
HIL0199 - SLIDE GATE VALVE - DRIVE SHAFT	Poor	0	5	4	20
HIL0200 - SLIDE GATE VALVE - MOTOR	Poor	0	5	4	20
HIL0269 - RSS PUMPS - PUMP	Poor	0	5	4	20
HIL0271 - RSS PUMPS - PUMP	Poor	0	5	4	20
HIL0274 - RSS PUMPS - PUMP	Poor	0	5	4	20
HIL0380 - BUILDING - CRANE/HOIST	Poor	0	5	4	20
HIL0380 - BUILDING - ROOF	Poor	0	5	4	20

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0415 - METER	Poor	0	5	4	20
HIL0078 - BAR SCREEN - MOTOR	Fair	3	4	4	16
HIL0115 - GRIT TANK NO. 2 - DRIVE SHAFT	Poor	3	4	4	16
HIL0123 - HYDROPRESS #1 - CONTROLLER	Poor	1	4	4	16
HIL0124 - HYDROPRESS #2 - CONTROLLER	Poor	1	4	4	16
HIL0255 - BIOTOWER RECIRC PUMP #1 - PUMP	Fair	1	4	4	16
HIL0256 - BIOTOWER RECIRC PUMP #2 - PUMP	Fair	1	4	4	16
HIL0257 - BIOTOWER RECIRC PUMP #3 - PUMP	Fair	1	4	4	16
HIL0263 - GOULDS CENTRIFUGAL PUMP - CONTROLLER	Fair	2	4	4	16
HIL0269 - RSS PUMPS - ISOLATION VALVE	Poor	1	4	4	16
HIL0271 - RSS PUMPS - ISOLATION VALVE	Poor	1	4	4	16
HIL0274 - RSS PUMPS - ISOLATION VALVE	Poor	1	4	4	16
HIL0291 - SECONDARY CLARIFIER DIVERSION	Fair	1	4	4	16
HIL0344 - SLUDGE MIX PUMP - PUMP	Fair	3	4	4	16
HIL0345 - SLUDGE MIX PUMP - PUMP	Fair	3	4	4	16
HIL0418 - CHLORINGE BLDG - ROOF	Fair	2	4	4	16
HIL0208 - BIOTOWER #3 - INTERNAL STRUCTURES-CENTER COLUMN COMPONENTS	Poor	2	3	5	15
HIL0209 - BIOTOWER #2 - INTERNAL STRUCTURES - CENTER COLUMN COMPONENTS	Poor	2	3	5	15
HIL0252 - BIO-TOWER PUMP DISCHARGE PIPING - AIR DELIVERY MAINS/LATERALS/VAVLES	Fair	2	3	5	15
HIL0259 - CLARIFIER SCUM/DRAIN PUMP - CHECK VALVE	Poor	2	3	5	15
HIL0259 - CLARIFIER SCUM/DRAIN PUMP - PUMP	Fair	2	3	5	15
HIL0260 - CLARIFIER SCUM/DRAIN PUMP - CHECK VALVE	Poor	2	3	5	15
HIL0260 - CLARIFIER SCUM/DRAIN PUMP - PUMP	Fair	2	3	5	15
HIL0261 - CLARIFIER SCUM/DRAIN PUMP - CHECK VALVE	Poor	2	3	5	15
HIL0261 - CLARIFIER SCUM/DRAIN PUMP - PUMP	Fair	2	3	5	15
HIL0270 - RSS PUMPS - CHECK VALVE	Poor	2	3	5	15
HIL0270 - RSS PUMPS - PUMP	Fair	2	3	5	15
HIL0272 - RSS PUMPS - CHECK VALVE	Poor	2	3	5	15
HIL0272 - RSS PUMPS - PUMP	Fair	2	3	5	15
HIL0273 - RSS PUMPS - CHECK VALVE	Poor	2	3	5	15
HIL0273 - RSS PUMPS - PUMP	Fair	2	3	5	15
HIL0277 - OUTFALL FLOW RECORDER	Average	5	3	5	15
HIL0285 - SECONDARY CLARIFIER #1 - INTERNAL STRUCTURES-DRIVE/RAKE/SKIMMER/WEIR/LAUNDER/ETC	Poor	3	3	5	15

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0286 - SECONDARY CLARIFIER #2 - INTERNAL STRUCTURES-DRIVE/RAKE/SKIMMER/WEIR/LAUNDER/ETC	Poor	3	3	5	15
HIL0287 - SECONDARY CLARIFIER #3 - INTERNAL STRUCTURES-DRIVE/RAKE/SKIMMER/WEIR/LAUNDER/ETC	Poor	3	3	5	15
HIL0349 - SLUDGE TRANSFER PUMP - MOTOR	Fair	2	3	5	15
HIL0349 - SLUDGE TRANSFER PUMP - PUMP	Fair	3	3	5	15
HIL0401 - INFLOW METER	Good	8	3	5	15
HIL0077 - BAR SCREEN - CONTROLLER	Poor	0	5	3	15
HIL0166 - SEPTAGE PUMP	Poor	0	5	3	15
HIL0167 - SEPTAGE PUMP	Poor	0	5	3	15
HIL0189 - SLIDE GATE VALVE - VALVE	Poor	0	5	3	15
HIL0333 - ODOR TOWER - CONTROLLER	Poor	0	5	3	15
HIL0337 - CHEMICAL DELIVERY SYSTEM - CONTROLLER	Poor	0	5	3	15
HIL0338 - POLYMER BLEND - CONTROLLER	Poor	0	5	3	15
HIL0345 - SLUDGE MIX PUMP - INFLUENT ISOLATION 2	Poor	0	5	3	15
HIL0346 - SLUDGE RECIRCULATOR PUMP - EFFLUENT ISOLATION 1	Poor	0	5	3	15
HIL0347 - SLUDGE RECIRCULATOR PUMP	Poor	0	5	3	15
HIL0347 - SLUDGE RECIRCULATOR PUMP - EFFLUENT ISOLATION 1	Poor	0	5	3	15
HIL0348 - SLUDGE TRANSFER PUMP	Poor	0	5	3	15
HIL0349 - SLUDGE TRANSFER PUMP - EFFLUENT ISOLATION	Poor	0	5	3	15
HIL0358 - SLUDGE GRINDER	Poor	0	5	3	15
HIL0077 - BAR SCREEN - BARS/RAKE/DRIVES	Average	4	3	4	12
HIL0078 - BAR SCREEN - BARS/RAKE/DRIVES	Fair	4	3	4	12
HIL0078 - BAR SCREEN - MOTOR	Poor	1	3	4	12
HIL0104 - VENTILATION FAN - OLDER, CLOSE TO CLARIFIER	Fair	3	3	4	12
HIL0140 - PRE-AERATION TANK NO. 1 - STRUCTURE/RAILS/STAIRS	Fair	3	3	4	12
HIL0141 - PRE-AERATION TANK NO. 2 - STRUCTURE/RAILS/STAIRS	Fair	3	3	4	12
HIL0149 - GRIT PUMP - MOTOR	Fair	3	3	4	12
HIL0150 - GRIT PUMP - MOTOR	Fair	3	3	4	12
HIL0172 - SUMP PUMP - CHECK VALVE	Fair	4	3	4	12
HIL0172 - SUMP PUMP - CONTROLLER	Fair	4	3	4	12
HIL0172 - SUMP PUMP - MTR & PMP	Average	3	3	4	12
HIL0173 - SUMP PUMP - CHECK VALVE	Fair	4	3	4	12
HIL0173 - SUMP PUMP - CONTROLLER	Fair	4	3	4	12

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0173 - SUMP PUMP - MTR & PMP	Average	3	3	4	12
HIL0196 - SLIDE GATE VALVE - MOTOR	Fair	3	3	4	12
HIL0197 - SLIDE GATE VALVE - PUMP	Fair	3	3	4	12
HIL0198 - SLIDE GATE VALVE - CONTROLLER	Fair	3	3	4	12
HIL0255 - BIOTOWER RECIRC PUMP #1 - CONTROLLER	Average	3	3	4	12
HIL0255 - BIOTOWER RECIRC PUMP #1 - MOTOR	Average	3	3	4	12
HIL0256 - BIOTOWER RECIRC PUMP #2 - CONTROLLER	Average	3	3	4	12
HIL0256 - BIOTOWER RECIRC PUMP #2 - MOTOR	Average	3	3	4	12
HIL0257 - BIOTOWER RECIRC PUMP #3 - CONTROLLER	Average	3	3	4	12
HIL0257 - BIOTOWER RECIRC PUMP #3 - MOTOR	Average	3	3	4	12
HIL0263 - GOULDS CENTRIFUGAL PUMP - PUMP	Fair	1	3	4	12
HIL0285 - SECONDARY CLARIFIER #1 - CONTROLLER	Fair	3	3	4	12
HIL0285 - SECONDARY CLARIFIER #1 - GBX	Poor	2	3	4	12
HIL0285 - SECONDARY CLARIFIER #1 - MOTOR	Poor	2	3	4	12
HIL0286 - SECONDARY CLARIFIER #2 - CONTROLLER	Fair	3	3	4	12
HIL0286 - SECONDARY CLARIFIER #2 - GBX	Poor	2	3	4	12
HIL0286 - SECONDARY CLARIFIER #2 - MOTOR	Poor	2	3	4	12
HIL0287 - SECONDARY CLARIFIER #3 - CONTROLLER	Fair	3	3	4	12
HIL0287 - SECONDARY CLARIFIER #3 - GBX	Poor	2	3	4	12
HIL0287 - SECONDARY CLARIFIER #3 - MOTOR	Poor	2	3	4	12
HIL0337 - CHEMICAL DELIVERY SYSTEM - CHEM PUMP	Average	3	3	4	12
HIL0337 - CHEMICAL DELIVERY SYSTEM - MOTOR	Good	3	3	4	12
HIL0337 - CHEMICAL DELIVERY SYSTEM - POLYBLEND UNIT	Fair	4	3	4	12
HIL0344 - SLUDGE MIX PUMP - MOTOR	Fair	2	3	4	12
HIL0345 - SLUDGE MIX PUMP - MOTOR	Fair	2	3	4	12
HIL0350 - SUMP PUMP - MTR & PMP	Fair	3	3	4	12
HIL0402 - CONTROLLER	Good	3	3	4	12
HIL0417 - CHLORINGE BLDG - BUILDING	Fair	5	3	4	12
HIL0077 - BAR SCREEN - MOTOR	Fair	1	4	3	12
HIL0123 - HYDROPRESS #1 - INTERNAL STRUCTURES	Fair	2	4	3	12
HIL0124 - HYDROPRESS #2 - PUMP	Fair	2	4	3	12
HIL0301 - CENTRIFUGE #1	Fair	1	4	3	12
HIL0301 - CENTRIFUGE #1 - MOTOR	Fair	1	4	3	12
HIL0302 - CENTRIFUGE #1 BACK DRIVE - DRV	Fair	1	4	3	12
HIL0302 - CENTRIFUGE #1 BACK DRIVE - MTR	Fair	1	4	3	12

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0303 - CENTRIFUGE #2	Fair	1	4	3	12
HIL0303 - CENTRIFUGE #2 - MOTOR	Fair	1	4	3	12
HIL0304 - CENTRIFUGE #2 BACK DRIVE - DRV	Fair	1	4	3	12
HIL0304 - CENTRIFUGE #2 BACK DRIVE - MOTOR	Fair	1	4	3	12
HIL0305 - CENTRIFUGE CONTROL PANEL	Poor	2	4	3	12
HIL0312 - DAFT SKIMMER ARM - GBX	Poor	1	4	3	12
HIL0312 - DAFT SKIMMER ARM - MOTOR	Fair	1	4	3	12
HIL0338 - POLYMER BLEND - MOTOR	Poor	1	4	3	12
HIL0338 - POLYMER BLEND - POLY BLEND UNIT	Poor	1	4	3	12
HIL0344 - SLUDGE MIX PUMP - INFLUENT ISOLATION 1	Poor	1	4	3	12
HIL0345 - SLUDGE MIX PUMP - INFLUENT ISOLATION 1	Poor	1	4	3	12
HIL0346 - SLUDGE RECIRCULATOR PUMP - MOTOR	Fair	2	4	3	12
HIL0346 - SLUDGE RECIRCULATOR PUMP - PUMP	Poor	3	4	3	12
HIL0352 - THICKENED SLUDGE PUMP - CONTROLLER	Fair	1	4	3	12
HIL0352 - THICKENED SLUDGE PUMP - MOTOR	Fair	1	4	3	12
HIL0352 - THICKENED SLUDGE PUMP - PUMP	Fair	1	4	3	12
HIL0353 - THICKENED SLUDGE PUMP - CONTROLLER	Fair	1	4	3	12
HIL0353 - THICKENED SLUDGE PUMP - PUMP	Fair	1	4	3	12
HIL0381 - BUILDING - ROOF	Poor	1	4	3	12
HIL0404 - GATE	Poor	1	4	3	12
HIL0405 - GATE	Poor	1	4	3	12
HIL0406 - AIR DELIVERY	Poor	1	4	3	12
HIL0417 - CHLORINGE BLDG - EXTERIOR STRUCTURE/RAIL/STAIRS	Fair	2	4	3	12
HIL0208 - BIOTOWER #3 - MEDIA	Good	8	2	5	10
HIL0209 - BIOTOWER #2 - STRUCTURE/RAILS/STAIRS	Good	8	2	5	10
HIL0426 - PUMPS (NON-PORTABLE) - CONTROLLER	Excellent	9	2	5	10
HIL0113 - GRIT HOPPER - PUMP	Good	5	3	3	9
HIL0140 - PRE-AERATION TANK NO. 1 - AIR DELIVERY	Poor	3	3	3	9
HIL0141 - PRE-AERATION TANK NO. 2 - AIR DELIVERY	Poor	3	3	3	9
HIL0146 - DEWATERING PUMP - CONTROLLER	Fair	3	3	3	9
HIL0146 - DEWATERING PUMP - ISOLATION VALVE	Fair	4	3	3	9
HIL0146 - DEWATERING PUMP - ISOLATION VALVE	Fair	4	3	3	9
HIL0157 - PREAERATION SLUDGE PUMP - MOTOR	Average	4	3	3	9
HIL0158 - PREAERATION SLUDGE PUMP - MOTOR	Average	4	3	3	9
HIL0161 - PRIMARY SLUDGE PUMP #1 - INFLUENT ISOLATION 1	Average	4	3	3	9

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0161 - PRIMARY SLUDGE PUMP #1 - INFLUENT ISOLATION 2	Average	4	3	3	9
HIL0161 - PRIMARY SLUDGE PUMP #1 - MOTOR	Average	3	3	3	9
HIL0161 - PRIMARY SLUDGE PUMP #1 - PUMP	Fair	4	3	3	9
HIL0162 - PRIMARY SLUDGE PUMP #2 - CKV	Average	4	3	3	9
HIL0162 - PRIMARY SLUDGE PUMP #2 - INFLUENT ISOLATION 1	Average	4	3	3	9
HIL0162 - PRIMARY SLUDGE PUMP #2 - INFLUENT ISOLATION 2	Average	4	3	3	9
HIL0162 - PRIMARY SLUDGE PUMP #2 - MOTOR	Average	3	3	3	9
HIL0162 - PRIMARY SLUDGE PUMP #2 - PUMP	Fair	4	3	3	9
HIL0163 - PRIMARY SLUDGE PUMP #3 - INFLUENT ISOLATION 1	Average	4	3	3	9
HIL0163 - PRIMARY SLUDGE PUMP #3 - INFLUENT ISOLATION 2	Average	4	3	3	9
HIL0163 - PRIMARY SLUDGE PUMP #3 - MOTOR	Average	3	3	3	9
HIL0163 - PRIMARY SLUDGE PUMP #3 - PUMP	Fair	4	3	3	9
HIL0172 - SUMP PUMP - ISOLATION VALVE	Average	4	3	3	9
HIL0173 - SUMP PUMP - ISOLATION VALVE	Average	4	3	3	9
HIL0264 - NO. 3 WATER PUMP (HIGH PSI) - MOTOR	Excellent	5	3	3	9
HIL0265 - NO. 3 WATER PUMP (LOW PSI) - MOTOR	Excellent	5	3	3	9
HIL0269 - RSS PUMPS - CHECK VALVE	Fair	2	3	3	9
HIL0269 - RSS PUMPS - CONTROLLER	Fair	3	3	3	9
HIL0271 - RSS PUMPS - CHECK VALVE	Fair	2	3	3	9
HIL0271 - RSS PUMPS - CONTROLLER	Fair	3	3	3	9
HIL0274 - RSS PUMPS - CHECK VALVE	Fair	2	3	3	9
HIL0274 - RSS PUMPS - CONTROLLER	Fair	1	3	3	9
HIL0312 - DAFT SKIMMER ARM - ARM REDUCTION BOX	Fair	2	3	3	9
HIL0312 - DAFT SKIMMER ARM - CONTROLLER	Good	2	3	3	9
HIL0312 - DAFT SKIMMER ARM - RAKE AND SHAFT	Good	5	3	3	9
HIL0338 - POLYMER BLEND - PUMP	Average	3	3	3	9
HIL0346 - SLUDGE RECIRCULATOR PUMP - CHECK VALVE	Fair	3	3	3	9
HIL0346 - SLUDGE RECIRCULATOR PUMP - EFFLUENT ISOLATION 2	Good	3	3	3	9
HIL0346 - SLUDGE RECIRCULATOR PUMP - INFLUENT ISOLATION	Average	3	3	3	9
HIL0347 - SLUDGE RECIRCULATOR PUMP - CHECK VALVE	Fair	3	3	3	9
HIL0347 - SLUDGE RECIRCULATOR PUMP - EFFLUENT ISOLATION 2	Good	3	3	3	9
HIL0347 - SLUDGE RECIRCULATOR PUMP - INFLUENT ISOLATION	Average	3	3	3	9

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0348 - SLUDGE TRANSFER PUMP - EFFLUENT ISOLATION	Average	3	3	3	9
HIL0348 - SLUDGE TRANSFER PUMP - INFLUENT ISOLATION	Average	3	3	3	9
HIL0349 - SLUDGE TRANSFER PUMP - INFLUENT ISOLATION	Average	3	3	3	9
HIL0352 - THICKENED SLUDGE PUMP - VALVES - DAFT BOTTOM	Fair	1	3	3	9
HIL0352 - THICKENED SLUDGE PUMP - VALVES - PRIMARY CLARIFIER	Fair	1	3	3	9
HIL0352 - THICKENED SLUDGE PUMP - VAVES - DAFT BEACH	Fair	1	3	3	9
HIL0352 - THICKENED SLUDGE PUMP - VAVLES - DIGESTOR ISOLATION	Fair	1	3	3	9
HIL0353 - THICKENED SLUDGE PUMP - MOTOR	Good	3	3	3	9
HIL0357 - SLUDGE GRINDER	Fair	2	3	3	9
HIL0357 - SLUDGE GRINDER - MOTOR	Fair	3	3	3	9
HIL0408 - GATE	Good	2	3	3	9
HIL0409 - GATE	Good	2	3	3	9
HIL0410 - GATE	Good	2	3	3	9
HIL0411 - GATE	Good	2	3	3	9
HIL0412 - GATE	Good	2	3	3	9
HIL0413 - GATE	Good	2	3	3	9
HIL0414 - GATE	Good	2	3	3	9
HIL0417 - CHLORINGE BLDG - INTERNAL STRUCTURES/WEIR/LAUNDER	Average	3	3	3	9
HIL0425 - CONTROLLER - CENTRIFUGE #2	Fair	3	3	3	9
HIL0103 - VENTILATION FAN - NEWER	Good	6	2	4	8
HIL0111 - GRIT CLASSIFIER - DRIVE SHAFT	Excellent	10	2	4	8
HIL0112 - GRIT CLASSIFIER - MOTOR	Excellent	10	2	4	8
HIL0149 - GRIT PUMP - CHECK VALVE	Fair	3	2	4	8
HIL0149 - GRIT PUMP - PUMP	Good	6	2	4	8
HIL0150 - GRIT PUMP - CHECK VALVE	Fair	3	2	4	8
HIL0150 - GRIT PUMP - PUMP	Good	6	2	4	8
HIL0292 - SECONDARY CLARIFIER DIVERSION	Good	6	2	4	8
HIL0293 - SECONDARY CLARIFIER DIVERSION	Good	6	2	4	8
HIL0426 - PUMPS (NON-PORTABLE) - CHLORINATION PUMP 1	Excellent	9	2	4	8
HIL0426 - PUMPS (NON-PORTABLE) - CHLORINATION PUMP 2	Excellent	9	2	4	8
HIL0261 - CLARIFIER SCUM/DRAIN PUMP - CONTROLLER	Fair	1	4	2	8
HIL0407 - AIR DELIVERY	Poor	2	4	2	8
HIL0137 - NO. 2 WATER SYSTEM	Good	6	2	3	6

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0146 - DEWATERING PUMP - INTERNAL STRUCTURES	Average	7	2	3	6
HIL0146 - DEWATERING PUMP - PUMP	Good	6	2	3	6
HIL0149 - GRIT PUMP - EFFLUENT ISOLATION	Fair	3	2	3	6
HIL0149 - GRIT PUMP - INFLUENT ISOLATION 1	Fair	3	2	3	6
HIL0149 - GRIT PUMP - INFLUENT ISOLATION 2	Fair	3	2	3	6
HIL0150 - GRIT PUMP - EFFLUENT ISOLATION	Fair	3	2	3	6
HIL0150 - GRIT PUMP - INFLUENT ISOLATION	Fair	3	2	3	6
HIL0157 - PREAERATION SLUDGE PUMP - CHECK VALVE	Average	4	2	3	6
HIL0157 - PREAERATION SLUDGE PUMP - EFFLUENT ISOLATION	Average	4	2	3	6
HIL0157 - PREAERATION SLUDGE PUMP - INFLUENT ISOLATION	Average	4	2	3	6
HIL0157 - PREAERATION SLUDGE PUMP - PUMP	Average	6	2	3	6
HIL0158 - PREAERATION SLUDGE PUMP - CHECK VALVE	Average	4	2	3	6
HIL0158 - PREAERATION SLUDGE PUMP - EFFLUENT ISOLATION	Average	4	2	3	6
HIL0158 - PREAERATION SLUDGE PUMP - INFLUENT ISOLATION	Average	4	2	3	6
HIL0158 - PREAERATION SLUDGE PUMP - PUMP	Average	6	2	3	6
HIL0161 - PRIMARY SLUDGE PUMP #1 - CKV	Good	6	2	3	6
HIL0161 - PRIMARY SLUDGE PUMP #1 - EFFLUENT ISOLATION 1	Good	6	2	3	6
HIL0161 - PRIMARY SLUDGE PUMP #1 - EFFLUENT ISOLATION 2	Good	6	2	3	6
HIL0162 - PRIMARY SLUDGE PUMP #2 - EFFLUENT ISOLATION 1	Good	6	2	3	6
HIL0162 - PRIMARY SLUDGE PUMP #2 - EFFLUENT ISOLATION 2	Good	6	2	3	6
HIL0163 - PRIMARY SLUDGE PUMP #3 - CHECK VALVE	Good	6	2	3	6
HIL0163 - PRIMARY SLUDGE PUMP #3 - EFFLUENT ISOLATION 1	Good	6	2	3	6
HIL0163 - PRIMARY SLUDGE PUMP #3 - EFFLUENT ISOLATION 2	Good	6	2	3	6
HIL0253 - NO. 3 WATER SYSTEM - AIR DELIVERY DIFFUSERS	Good	6	2	3	6
HIL0264 - NO. 3 WATER PUMP (HIGH PSI) - CONTROLLER	Good	6	2	3	6
HIL0264 - NO. 3 WATER PUMP (HIGH PSI) - PUMP	Excellent	6	2	3	6
HIL0265 - NO. 3 WATER PUMP (LOW PSI) - CONTROLLER	Good	6	2	3	6
HIL0265 - NO. 3 WATER PUMP (LOW PSI) - PUMP	Excellent	6	2	3	6
HIL0061 - BLOWER - CONTROLLER	Average	5	3	2	6

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0062 - BLOWER - CONTROLLER	Average	5	3	2	6
HIL0063 - BLOWER - CONTROLLER	Average	5	3	2	6
HIL0064 - BLOWER - BLOWER	Average	7	3	2	6
HIL0064 - BLOWER - CONTROLLER	Average	5	3	2	6
HIL0064 - BLOWER - MOTOR	Average	3	3	2	6
HIL0065 - BLOWER - BLOWER	Average	7	3	2	6
HIL0065 - BLOWER - CONTROLLER	Average	5	3	2	6
HIL0065 - BLOWER - MOTOR	Average	3	3	2	6
HIL0079 - CROSS COLLECTOR #1 - GEAR REDUCER	Fair	3	3	2	6
HIL0079 - CROSS COLLECTOR #1 - INTERNAL STRUCTURE/LINER/PIPING/VALVES/ETC	Fair	3	3	2	6
HIL0079 - CROSS COLLECTOR #1 - MOTOR	Fair	3	3	2	6
HIL0080 - CROSS COLLECTOR #2 - GEAR REDUCER	Fair	3	3	2	6
HIL0080 - CROSS COLLECTOR #2 - INTERNAL STRUCTURE/LINER/PIPING/VALVES/ETC	Fair	3	3	2	6
HIL0080 - CROSS COLLECTOR #2 - MOTOR	Fair	3	3	2	6
HIL0081 - CROSS COLLECTOR #3 - GEAR REDUCER	Fair	3	3	2	6
HIL0081 - CROSS COLLECTOR #3 - INTERNAL STRUCTURES	Fair	3	3	2	6
HIL0081 - CROSS COLLECTOR #3 - MOTOR	Fair	3	3	2	6
HIL0142 - PRIMARY CLARIFIER NO. 1 - GEAR REDUCER	Fair	3	3	2	6
HIL0142 - PRIMARY CLARIFIER NO. 1 - GEAR REDUCER	Fair	3	3	2	6
HIL0142 - PRIMARY CLARIFIER NO. 1 - INTERNAL STRUCTURES	Fair	4	3	2	6
HIL0142 - PRIMARY CLARIFIER NO. 1 - MOTOR	Average	3	3	2	6
HIL0142 - PRIMARY CLARIFIER NO. 1 - STRUCTURE/RAILS/STAIRS	Fair	4	3	2	6
HIL0143 - PRIMARY CLARIFIER NO. 2 - CONTROLLER	Average	3	3	2	6
HIL0143 - PRIMARY CLARIFIER NO. 2 - GEAR REDUCER	Fair	3	3	2	6
HIL0143 - PRIMARY CLARIFIER NO. 2 - GEAR REDUCER	Fair	3	3	2	6
HIL0143 - PRIMARY CLARIFIER NO. 2 - INTERNAL STRUCTURES	Fair	4	3	2	6
HIL0144 - PRIMARY CLARIFIER NO. 3 - CONTROLLER	Good	4	3	2	6
HIL0144 - PRIMARY CLARIFIER NO. 3 - GEAR REDUCER	Fair	3	3	2	6
HIL0144 - PRIMARY CLARIFIER NO. 3 - GEAR REDUCER	Fair	3	3	2	6
HIL0144 - PRIMARY CLARIFIER NO. 3 - MOTOR	Average	3	3	2	6
HIL0146 - DEWATERING PUMP - MOTOR	Fair	3	3	2	6

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0149 - GRIT PUMP - CONTROLLER	Fair	3	3	2	6
HIL0150 - GRIT PUMP - CONTROLLER	Fair	3	3	2	6
HIL0157 - PREAERATION SLUDGE PUMP - CONTROLLER	Average	4	3	2	6
HIL0158 - PREAERATION SLUDGE PUMP - CONTROLLER	Average	4	3	2	6
HIL0159 - PRIMARY SCUM PUMP	Fair	3	3	2	6
HIL0161 - PRIMARY SLUDGE PUMP #1 - CONTROLLER	Fair	3	3	2	6
HIL0162 - PRIMARY SLUDGE PUMP #2 - CONTROLLER	Fair	3	3	2	6
HIL0163 - PRIMARY SLUDGE PUMP #3 - CONTROLLER	Fair	3	3	2	6
HIL0163 - PRIMARY SLUDGE PUMP #3 - CONTROLLER	Fair	3	3	2	6
HIL0177 - HELICAL SKIMMER - CONTROLLER	Fair	3	3	2	6
HIL0177 - HELICAL SKIMMER - GBX	Fair	2	3	2	6
HIL0177 - HELICAL SKIMMER - INTERNAL STRUCTURES	Fair	3	3	2	6
HIL0177 - HELICAL SKIMMER - MOTOR	Poor	2	3	2	6
HIL0178 - HELICAL SKIMMER - CONTROLLER	Fair	3	3	2	6
HIL0178 - HELICAL SKIMMER - GBX	Fair	2	3	2	6
HIL0178 - HELICAL SKIMMER - INTERNAL STRUCTURES	Fair	3	3	2	6
HIL0178 - HELICAL SKIMMER - MOTOR	Fair	2	3	2	6
HIL0179 - HELICAL SKIMMER - CONTROLLER	Fair	3	3	2	6
HIL0179 - HELICAL SKIMMER - GBX	Fair	2	3	2	6
HIL0179 - HELICAL SKIMMER - INTERNAL STRUCTURES	Fair	3	3	2	6
HIL0203 - SOLIDS CONTACT BLOWER - BLOWER	Average	3	3	2	6
HIL0203 - SOLIDS CONTACT BLOWER - CONTROLLER	Fair	3	3	2	6
HIL0203 - SOLIDS CONTACT BLOWER - MOTOR	Fair	3	3	2	6
HIL0204 - SOLIDS CONTACT BLOWER - BLOWER	Average	3	3	2	6
HIL0204 - SOLIDS CONTACT BLOWER - CONTROLLER	Fair	3	3	2	6
HIL0205 - SOLIDS CONTACT BLOWER - BLOWER	Average	3	3	2	6
HIL0205 - SOLIDS CONTACT BLOWER - CONTROLLER	Fair	3	3	2	6
HIL0205 - SOLIDS CONTACT BLOWER - MOTOR	Fair	3	3	2	6
HIL0259 - CLARIFIER SCUM/DRAIN PUMP - CONTROLLER	Fair	3	3	2	6
HIL0260 - CLARIFIER SCUM/DRAIN PUMP - CONTROLLER	Fair	3	3	2	6
HIL0270 - RSS PUMPS - CONTROLLER	Fair	3	3	2	6

Equipment	Condition	Useful Life	POF	COF	Risk Score
HIL0272 - RSS PUMPS - CONTROLLER	Fair	3	3	2	6
HIL0273 - RSS PUMPS - CONTROLLER	Fair	3	3	2	6
HIL0275 - WSS PUMP -	Fair	2	3	2	6
HIL0275 - WSS PUMP - CONTROLLER	Fair	3	3	2	6
HIL0276 - WSS PUMP	Fair	2	3	2	6
HIL0276 - WSS PUMP - CONTROLLER	Fair	3	3	2	6
HIL0288 - SHREDDER/STRAINER - CONTROLLER	Poor	3	3	2	6
HIL0288 - SHREDDER/STRAINER	Fair	3	3	2	6
HIL0352 - THICKENED SLUDGE PUMP - CHECK VALVE	Fair	2	3	2	6
HIL0353 - THICKENED SLUDGE PUMP - CHECK VALVE	Fair	2	3	2	6
HIL0416 - CHLORINE SHREDDER	Fair	3	3	2	6
HIL0416 - CHLORINE SHREDDER - CONTROLLER	Poor	3	3	2	6
HIL0151 - INFLUENT ISCO SAMPLER	Excellent	4	1	5	5
HIL0380 - BUILDING - STRUCTURE/RAILS/STAIRS	Fair	10	1	4	4
HIL0381 - BUILDING - STRUCTURE/RAILS/STAIRS	Fair	10	1	4	4
HIL0061 - BLOWER - BLOWER	Average	7	2	2	4
HIL0061 - BLOWER - MOTOR	Average	3	2	2	4
HIL0062 - BLOWER - BLOWER	Average	7	2	2	4
HIL0062 - BLOWER - MOTOR	Average	3	2	2	4
HIL0063 - BLOWER - BLOWER	Average	7	2	2	4
HIL0063 - BLOWER - MOTOR	Average	3	2	2	4
HIL0079 - CROSS COLLECTOR #1 - CONTROLLER	Fair	6	2	2	4
HIL0080 - CROSS COLLECTOR #2 - CONTROLLER	Fair	6	2	2	4
HIL0081 - CROSS COLLECTOR #3 - CONTROLLER	Fair	6	2	2	4
HIL0142 - PRIMARY CLARIFIER NO. 1 - CONTROLLER	Fair	6	2	2	4
HIL0143 - PRIMARY CLARIFIER NO. 2 - DRIVE SHAFT	Fair	6	2	2	4
HIL0144 - PRIMARY CLARIFIER NO. 3 - STRUCTURE/RAILS/STAIRS	Fair	6	2	2	4
HIL0179 - HELICAL SKIMMER - MOTOR	Good	7	2	2	4
HIL0288 - SHREDDER/STRAINER - MOTOR	Poor	2	2	2	4
HIL0400 - FENCE	Average	8	2	2	4
HIL0416 - CHLORINE SHREDDER - MOTOR	Good	3	2	2	4
HIL0159 - PRIMARY SCUM PUMP - MOTOR	Excellent	8	1	3	3
HIL0176 - SEPTAGE PIT FOR WASTE HAULERS	Average	10	1	3	3
HIL0419 - CRANE	Fair	5	3	1	3
HIL0204 - SOLIDS CONTACT BLOWER - MOTOR	Excellent	6	1	2	2
HIL0066 - ODOR CONTROL SYSTEM - MOTOR	Excellent	10	1	1	1
HIL0067 - ODOR CONTROL SYSTEM - MOTOR	Excellent	10	1	1	1

Table A4. Holualoa SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
HOL0004 - ODOR CONTROL SYSTEM #2	Poor	0	5	4	20
HOL0002 - AUTOMATIC TRANSFER SWITCH	Average	5	3	4	12
HOL0004 - ODOR CONTROL SYSTEM - BLOWER	Average	2	3	4	12
HOL0004 - ODOR CONTROL SYSTEM - MOTOR	Average	3	3	4	12
HOL0036 - EFFLUENT FLOW METER	Poor	0	5	2	10
HOL0003 -PROCESS AIR - BLOWER	Average	3	3	3	9
HOL0003 -PROCESS AIR - MOTOR	Average	5	3	3	9
HOL0011 - ISOLATION VALVE - BYPASS PUMPING	Average	3	3	3	9
HOL0035 - AIR RELIEF VALVE	Average	5	3	3	9
HOL0001 - GENERATOR DIESEL	Good	10	2	4	8
HOL0004 - ODOR CONTROL SYSTEM - MEDIA	Good	15	2	4	8
HOL0034 - LEVEL SENSOR FOR PUMP AND ALARM ACTIVATION	Good	5	2	4	8
HOL0004 - ODOR CONTROL SYSTEM - AUTO DAILER ALARM SYSTEM	Good	5	2	3	6
HOL0005 - PUMP CONTROLLER - PUMP #1 & #2 & #3	Good	5	2	3	6
HOL0031 - PUMP #1 - PUMP	Average	5	3	2	6
HOL0031 - PUMP #1 - CHECK VALVE	Average	5	3	2	6
HOL0031 - PUMP #1 - ISOLATION VALVE	Average	5	3	2	6
HOL0032 - Pump #2 - CHECK VALVE	Average	5	3	2	6
HOL0032 - Pump #2 - ISOLATION VALVE	Average	5	3	2	6
HOL0033 - Pump #3 - CHECK VALVE	Average	5	3	2	6
HOL0033 - Pump #3 - ISOLATION VALVE	Average	5	3	2	6
HOL0033 - Pump #3 - PUMP	Average	5	3	2	6
HOL0032 - Pump #2 - PUMP	Good	8	2	2	4

Table A5. Honoka'a WWTP

Equipment	Condition	Useful Life	POF	COF	Risk Score
HON0003 - AUTO DAILER ALARM SYSTEM - ALARM #2	Average	5	3	4	12
HON0003 - AUTO DAILER ALARM SYSTEM - ALARM #1	Average	5	3	4	12
HON0001 - INFLUENT FLOW METER	Poor	0	5	2	10
HON0016 - EFFLUENT COMPOSITE SAMPLER	Average	2	3	3	9
HON0004 - GENERATOR	Good	10	2	4	8
HON0005 - AUTOMATIC TRANSFER SWITCH	Good	10	2	4	8
HON0008 - LAGOON #2 VALVE VAULT - ISOLATION VALVE #1	Good	5	2	4	8
HON0006 - MECHANICAL AERATOR - CELL #1, AERATOR#1	Fair	3	4	2	8
HON0006 - MECHANICAL AERATOR - CELL #1, AERATOR #2	Fair	3	4	2	8
HON0006 - MECHANICAL AERATOR - CELL #2, AERATOR #1	Fair	3	4	2	8
HON0002 - MICROSTRAINER - CONTROLLER	Good	8	2	3	6
HON0002 - MICROSTRAINER - GEAR REDUCER	Good	6	2	3	6
HON0002 - MICROSTRAINER - MOTOR	Good	6	2	3	6
HON0002 - MICROSTRAINER - SCREW	Good	6	2	3	6
HON0006 - TREATMENT LAGOON - CONTROLLER 1	Good	5	2	3	6
HON0006 - TREATMENT LAGOON - CONTROLLER 2	Good	5	2	3	6
HON0006 - TREATMENT LAGOON - CONTROLLER 3	Good	5	2	3	6
HON0009 - TREATMENT LAGOON - CONTROLLER 1	Good	5	2	3	6
HON0009 - TREATMENT LAGOON - CONTROLLER 2	Good	5	2	3	6
HON0009 - TREATMENT LAGOON CELL #3 - MECHANICAL AERATOR	Average	2	3	2	6
HON0009 - TRTMENT LAGOON CELL #4 – COVER	Average	10	3	2	6
HON0009 - TREATMENT LAGOON CELL #4 - SMALL MIXER	Average	2	3	2	6
HON0006 - TREATMENT LAGOON #1 - LINER	Good	15	1	4	4
HON0015 - ISOLATION VALVE	Excellent	10	1	4	4
HON0008 - LAGOON #2 VALVE VAULT - ISOLATION VALVE #2	Good	5	2	2	4
HON0007 - WEIR CONTROLS LEVEL LAGOON 1	Good	15	1	2	2
HON0010 - TREATMENT LAGOON - WEIR	Good	15	1	2	2

Table A6. Kaloko WWTP

Equipment	Condition	Useful Life	POF	COF	Risk Score
KXL0004-WET WELL LEVEL SENSOR - FLOATS	Good	2	3	4	12
KXL0006 - FLOW EQUALIZATION BASIN - PUMP #1	Average	2	3	4	12
KXL0006 - FLOW EQUALIZATION BASIN - PUMP #2	Average	2	3	4	12
KXL0011 - AUTO DAILER ALARM SYSTEM	Average	4	3	4	12
Kxl0009-DAF TREATMENT UNIT	Average	1	3	4	12
Kxl0009-DAF Solids Pump	Good	4	3	4	12
KXL0009 - DAF CHEM PUMPS-ALUM	Fair	1	4	3	12
KXL0009 - DAF CHEMP PUMPS-POLY	Fair	1	4	3	12
Kxl0013-Odor Control System - media	Average	1	4	3	12
KXL0009 - DAF CHEM PUMPS-CHLORINE	Excellent	2	3	3	9
Kxl0007-solids return pump #1	Average	2	3	3	9
Kxl0007-solids return pump #2	Average	2	3	3	9
KXL0003 - CONTROLLER - WET WELL PUMPS	Good	6	2	4	8
KXL0006 - FLOW EQUALIZATION BASIN - CONTROLLER	Good	5	2	4	8
Kxl0008-Air Compressor #1	Good	10	2	4	8
Kxl0008-Air Compressor #1 - mtr	Good	10	2	4	8
Kxl0010- Air Compressor #2 - Motor	Good	10	2	4	8
KXL0001 - PUMP #1 - PUMP	Good	6	2	3	6
KXL0001 - PUMP #1- CHECK VALVE	Good	10	2	3	6
KXL0001 - PUMP #1 - ISOLATION VALVE	Good	10	2	3	6
KXL0002 - PUMP #2 - PUMP	Good	6	2	3	6
KXL0002 - PUMP #2 - CHECK VALVE	Good	10	2	3	6
KXL0002 - PUMP #2 - ISOLATION VALVE	Good	10	2	3	6
Kxl0010- Air Compressor #2	Good	10	2	3	6
Kxl0013-Odor Control System - fan	Good	10	2	3	6
Kxl0013-Odor Control System - motor	Good	5	2	3	6
Kxl0005-Splitter Box	Excellent	15	1	4	4
Kxl0200-Treatment Train #2	Poor	6	1	2	2

Table A7. Kapehu WWTP

Equipment	Condition	Useful Life	POF	COF	Risk Score
KAP0028 - SHREDDER #1 - SHREDDER	Fair	1	4	3	12
KAP0029 - SHREDDER #2 - SHREDDER	Fair	1	4	3	12
KAP0028 - SHREDDER #1 - MOTOR	Average	2	3	3	9
KAP0029 - SHREDDER #2 - MOTOR	Good	5	3	3	9
KAP0001 - BLOWER #1	Good	6	2	2	4
KAP0001 - CONTROLLER	Good	6	2	2	4
KAP0001 - MOTOR	Good	6	2	2	4
KAP0002 - BLOWER #2 - BLOWER	Good	6	2	2	4
KAP0002 - BLOWER #2 - CONTROLLER	Good	6	2	2	4
KAP0002 - BLOWER #2 - MOTOR	Good	6	2	2	4
KAP0023 - INFLUENT FLOWMETER	Good	6	2	2	4
KAP0028 - SHREDDER #1 - CONTROLLER	Good	6	2	2	4
KAP0029 - SHREDDER #2 - CONTROLLER	Good	6	2	2	4
KAP0003 - BLOWER #3	Fair	5	3	1	3

Table A8. Kealakehe SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
KEA0002 - WET WELL #1 PUMP #2 - PUMP	Fair	0	5	4	20
KEA0022 - PUMP (#5) - CHECK VALVE	Fair	2	4	4	16
KEA0022 - PUMPS (#5) - PUMP	Fair	2	4	4	16
KEA0030 - ODOR CONTROL SYSTEM - FAN	Fair	3	4	4	16
KEA0021 - AUTOMATIC TRANSFER SWITCH	Average	5	3	5	15
KEA0030 - ODOR CONTROL SYSTEM - MEDIA	Good	1	3	4	12
KEA0030 - ODOR CONTROL SYSTEM - MOTOR	Average	4	3	4	12
KEA0001 - WET WELL #1 PUMP #1 - CHECK VALVE	Fair	1	4	3	12
KEA0001 - WET WELL #1 PUMP #1 - ISOLATION VALVE	Poor	1	4	3	12
KEA0020 - GENERATOR	Good	10	2	5	10
KEA0014 - WET WELL #1 INFLUENT SLUICE GATE-MOTOR	Poor	0	5	2	10
KEA0014 - WET WELL #1 INFLUENT SLUICE GATE - GATE	Average	5	3	3	9
KEA0015 - WET WELL #2 INFLUENT SLUICE GATE - GATE	Average	5	3	3	9
KEA0022 - PUMPS (#5) - ISOLATION VALVE	Fair	3	3	3	9
KEA0032 - WET WELL LEVEL SENSOR	Average	3	3	3	9
KEA0002 - WET WELL #1 PUMP #2 - CHECK VALVE	Poor	1	4	2	8
KEA0031 - ICE MACHINE	Fair	2	4	2	8
KEA0014 - WET WELL #1 INFLUENT SLUICE GATE-CONTROLLER	Average	3	3	2	6
KEA0015 - WET WELL #2 INFLUENT SLUICE GATE - CONTROLLER	Average	3	3	2	6
KEA0015 - WET WELL #2 INFLUENT SLUICE GATE - MOTOR	Average	2	3	2	6
KEA0016 - EFFLUENT SLUICE GATE-GATE	Good	10	1	5	5
KEA0002 - WET WELL #1 PUMP #2 - ISOLATION VALVE	Average	5	2	2	4

Table A9. Kealakehe WWTP

Equipment	Condition	Useful Life	POF	COF	Risk Score
KEA1004 - AIR COMPRESSOR (H)	Poor	0	5	4	20
KEA1125 - MECHANICAL BAR SCREEN #1 - BARS/RAKE/DRIVES	Poor	0	5	4	20
KEA1125 - MECHANICAL BAR SCREEN #1 - CONTROLLER	Poor	0	5	4	20
Kea1163 - Lagoon 1, Flow Div Bx 1A, North - SLUICE GATE	Poor	0	5	4	20
KEA1125 - MECHANICAL BAR SCREEN #1 - MOTOR	Fair	2	4	4	16
KEA1126 - MECHANICAL BAR SCREEN #2 - BARS/RAKE/DRIVES	Fair	1	4	4	16
KEA1133 - GRIT DEWATERING SCREW - MOTOR	Fair	2	4	4	16
KEA1162 - GRIT PROCESS BYPASS - SLUICE GATE	Fair	3	4	4	16
KEA1037 - EFFLUENT FLOW METER	Fair	2	3	5	15
KEA1053 - GRIT PUMP #2 - PUMP	Poor	0	5	3	15
KEA1116 - CHLORINE SUPPLY PUMP	Poor	0	5	3	15
KEA1168-EFFLUENT COMPOSITE SAMPLER	Poor	0	5	3	15
KEA1005 - AIR COMPRESSOR - KAILUA	Average	3	3	4	12
KEA1054 - GRIT PUMP #1 - PUMP	Average	3	3	4	12
KEA1054 - GRIT PUMP #1 - CONTROLLER	Average	3	3	4	12
KEA1115 - CHLORINE MOTIVE WATER PUMP - PUMP	Average	3	3	4	12
KEA1115 - CHLORINE MOTIVE WATER PUMP - MOTOR	Average	3	3	4	12
Kea1125 - MECHANICAL BAR SCREEN #1 - INFLUENT GATE VALVE	Fair	4	3	4	12
KEA1126 - MECHANICAL BAR SCREEN #2 - INFLUENT GATE VALVE	Fair	4	3	4	12
KEA1126 - MECHANICAL BAR SCREEN #2 - CONTROLLER	Average	2	3	4	12
KEA1126 - MECHANICAL BAR SCREEN #2 - EFFLUANT GATE VALVE	Fair	4	3	4	12
KEA1126 - MECHANICAL BAR SCREEN #2 - MOTOR	Fair	2	3	4	12
KEA1133 - GRIT DEWATERING SCREW - GEAR REDUCER	Average	2	3	4	12
KEA1160 - SEPTAGE RECEIVING AREA - ISOLATION VALVE	Average	2	4	3	12
KEA1164 - FLOW DIVERSION BOX 1B-E - - SLUICE GATE	Poor	4	4	3	12
KEA1164 - FLOW DIVERSION BOX 1B-SW - - SLUICE GATE	Fair	4	4	3	12
KEA1164 - FLOW DIVERSION BOX-1B-SE - - SLUICE GATE	Fair	4	4	3	12

Equipment	Condition	Useful Life	POF	COF	Risk Score
KEA1164 - FLOW DIVERSION BOX1B-W - SLUICE GATE	Fair	4	4	3	12
KEA1038 - INFLUENET FLOW METER	Poor	0	5	2	10
Kea1163 - Lag 1, Flow Div Bx 1A, South Gate - SLUICE GATE	Poor	0	5	2	10
KEA1097 - GRIT CHAMBER - EFFLUANT GATE VALVE	Average	4	3	3	9
KEA1097 - GRIT CHAMBER - INFLUENT GATE VALVE	Average	4	3	3	9
KEA1098 - GRIT CHAMBER-KAILUA, grit chamber #1 - EFFLUENT SLUICE GATE	Average	4	3	3	9
KEA1098 - GRIT CHAMBER-KAILUA, grit chamber #1 - INFLUENT SLUICE GATE	Average	4	3	3	9
Kea1125 - MECHANICAL BAR SCREEN #1 - EFFLUANT GATE VALVE	Fair	4	3	3	9
KEA1166 - FLOW DIVERSION BOX-3 - E - SLUICE GATE	Fair	4	3	3	9
KEA1166 - FLOW DIVERSION BOX-3 - N - SLUICE GATE	Fair	4	3	3	9
KEA1166 - FLOW DIVERSION BOX-3 - S - SLUICE GATE	Fair	4	3	3	9
KEA1167 - FLOW DIVERSION BOX-4A-E - SLUICE GATE	Fair	4	3	3	9
KEA1167 - FLOW DIVERSION BOX-4A-N - SLUICE GATE	Fair	4	3	3	9
KEA1167 - FLOW DIVERSION BOX-4A-S - SLUICE GATE	Fair	4	3	3	9
KEA1133 - GRIT DEWATERING SCREW - GRIT CLASSIFIER	Average	5	2	4	8
KEA1050 - EFFLUENT PUMP (#2) - ISOLATION VALVE	Fair	3	4	2	8
KEA1051 - EFFLUENT PUMP (#1) - ISOLATION VALVE	Fair	3	4	2	8
KEA1052 - EFFLUENT PUMP (#3) - ISOLATION VALVE	Fair	3	4	2	8
KEA1013 - CHLORINE SYSTEM - Pump #1	Good	5	2	3	6
KEA1014 - CHLORINE SYSTEM - Pump #2	Good	5	2	3	6
KEA1050 -EFFLUENT PUMP (#2) - CHECK VALVE	Fair	2	3	2	6
KEA1051 - EFFLUENT PUMP (#1) - CHECK VALVE	Fair	2	3	2	6
KEA1052 - EFFLUENT PUMP (#3) - CHECK VALVE	Fair	2	3	2	6
KEA1053 - GRIT PUMP #2 - CONTROLLER	Average	3	3	2	6
Kea1163 - Lagoon 1, Flow Div Bx 1A-WEST - SLUICE GATE	Average	6	3	2	6
KEA1060 - AERATED LAGOON #1 -HEADER	Excellent	20	1	5	5
KEA1061 - AERATED LAGOON #2 - HEADER	Excellent	20	1	5	5

Equipment	Condition	Useful Life	POF	COF	Risk Score
KEA1062 - AERATED LAGOON #3 - HEADER	Excellent	20	1	5	5
KEA1114 - HOIST	Poor	0	5	1	5
KEA1060 - AERATED LAGOON #1 - LINER	Excellent	20	1	4	4
KEA1061 - AERATED LAGOON #2 - LINER	Excellent	20	1	4	4
KEA1062 - AERATED LAGOON #3 - LINER	Excellent	20	1	4	4
KEA1170 - AERATION BLOWER #1 - AIR BLOWER	Excellent	10	1	4	4
KEA1170 - AERATION BLOWER #1 - MOTOR	Excellent	10	1	4	4
KEA1171 - AERATION BLOWER #2 - BLOWER	Excellent	10	1	4	4
KEA1171 - AERATION BLOWER #2 - MOTOR	Excellent	10	1	4	4
KEA1051 - EFFLUENT PUMP (#1) - CONTROLLER	Excellent	7	2	2	4
KEA1060 - AERATED LAGOON #1 - LATERAL 1	Excellent	8	2	2	4
KEA1061 - AERATED LAGOON #2 - LATERAL #1	Excellent	8	2	2	4
KEA1062 - AERATED LAGOON #3 - LATERAL	Excellent	8	2	2	4
KEA1161 - INF SAMPLER	Good	4	3	1	3
KEA1050 - EFFLUENT PUMP (#2) - PUMP	Excellent	10	1	2	2
KEA1050 - EFFLUENT PUMP (#2) - MOTOR	Excellent	5	1	2	2
KEA1051 - EFFLUENT PUMP (#1) - PUMP	Excellent	10	1	2	2
KEA1051 - EFFLUENT PUMP (#1) - MOTOR	Excellent	5	1	2	2
KEA1050 - EFFLUENT PUMP (#3) - PUMP	Excellent	10	1	2	2
KEA1052 - EFFLUENT PUMP (#3) - MOTOR	Excellent	5	1	2	2
KEA1170 - AERATION BLOWER #1 -HYDRAULIC SUPPORT SYSTEM	Excellent	10	1	2	2
KEA1170 - AERATION BLOWER #1 - CONTROLLER	Excellent	15	1	2	2
KEA1171 - AERATION BLOWER #2 - CONTROLLER	Excellent	15	1	2	2
KEA1171 - AERATION BLOWER #2 - HYDRAULIC SUPPORT SYSTEM	Excellent	10	1	2	2
KEA1172 - BLOWER #1 - CRANE/HOIST	Excellent	15	1	1	1
KEA1173 - BLOWER #2 - CRANE/HOIST	Excellent	15	1	1	1

Table A10. Keopa SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
KEO0006 - VENTILATION SYSTEM	Fair	2	3	4	12
KEO0008 - SUMP PUMP	Fair	2	4	3	12
KEO0001 - PUMP #1	Fair	2	3	3	9
KEO0002 - PUMP #2	Average	5	3	3	9
KEO0002 - PUMP #2 - CHECK VALVE	Average	2	4	3	9
KEO0002 - PUMP #2 - ISOLATION VALVE	Average	3	3	3	9
KEO0001 - PUMP #1 - MOTOR	Fair	3	2	2	9
KEO0002 - PUMP #2 - MOTOR	Good	5	2	2	9
KEO0001 - PUMP #1 - ISOLATION VALVE	Good	10	2	3	6
KEO0003 - CONTROLLER - BOTH PUMPS	Good	5	3	3	6
KEO0004 - WET WELL SENSOR	Good	5	4	3	6
KEO0005 - AUTO DAILER ALARM SYSTEM	Good	7	2	3	6
KEO0007 - BYPASS VALVE - ISOLATION VALVE	Good	10	2	3	6
KEO0001 - PUMP #1 - CHECK VALVE	Good	10	2	2	6

Table A11. Kolea SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
KOL0017 - PUMP #2 - CONTROLLER	Poor	2	4	5	20
KOL0018 - SUMP PUMP - CONTROLLER	Poor	2	4	5	20
KOL0024 - MAIN LIFT - CONTROLLER	Fair	1	4	3	12
KOL0024 - MAIN LIFT - GEAR REDUCER	Fair	1	4	3	12
KOL0024 - MAIN LIFT - MOTOR	Fair	1	4	3	12
KOL0016 - PUMP #1 - MOTOR	Average	4	3	2	6
KOL0017 - PUMP #2 - MOTOR	Average	4	3	2	6
KOL0018 - MOTOR AND PUMP	Excellent	3	1	4	4
KOL0017 - PUMP #2 - CHECK VAVLE	Fair	6	2	2	4
KOL0017 - PUMP #2 - PUMP	Fair	3	2	2	4
KOL0023 - LEVEL SENSOR - CONTROLLER	Average	6	2	2	4
KOL0016 - PUMP #1 - ISOLATION INF	Average	10	1	2	2
KOL0017 - PUMP #2 - ISOLATION VALVE EFFLUENT	Average	10	1	2	2
KOL0017 - PUMP #2 - ISOLATION VALVE INFLUENT	Average	10	1	2	2

Table A12. Kulaimano WWTP

Equipment	Condition	Useful Life	POF	COF	Risk Score
KUL0051 - SECONDARY DIGESTER	Poor	0	5	4	20
KUL0066 - CONTROLLER - clarifier solids valves #1-6	Fair	2	3	5	15
Kul0074-Motor - Clarifier #2, motor for valve #4	Poor	0	5	3	15
Kul0074-Valve - Clarifier #2, solids valve #4	Poor	0	5	3	15
Kul0075-Motor - Clarifier #2, motor for solids valve #5	Poor	0	5	3	15
Kul0075-Valve - Clarifier #2, Valve #5	Poor	0	5	3	15
Kul0076-Motor- Clarifier #2, motor for solids valve #6	Poor	0	5	3	15
Kul0076-Valve - Clarifier #2, solids valve #6	Poor	0	5	3	15
KUL0039 - GRIT TANK AIR LIFT - TANK/GEAR BOX/MOTOR	Fair	5	3	4	12
KUL0044 - HEADWORKS BUILDING - ROOF	Fair	8	3	4	12
KUL0036 - BARMINUTOR	Poor	3	4	3	12
KUL0063 - CLARIFIER #1 - SOLIDS VALVE #1 - MOTOR	Fair	2	4	3	12
KUL0080 - CHLORINATION PUMP - CONTROLLER	Excellent	10	2	5	10
KUL0080 - CHLORINATION PUMP - PUMP 1	Excellent	10	2	5	10
KUL0080 - CHLORINATION PUMP - PUMP 2	Excellent	10	2	5	10
KUL0081 - sodium bisulfite CONTROLLER	Excellent	10	2	5	10
KUL0081 - sodium bisulfite PUMP 1	Excellent	10	2	5	10
KUL0081 - sodium bisulfite PUMP 2	Excellent	10	2	5	10
KUL0011 - BLOWER #1 - ALL PARENT CHILD	Poor	0	5	2	10
KUL0015 - CENTRIFUGE - CENTRIFUGE	Average	10	3	3	9
KUL0015 - CENTRIFUGE - MOTOR	Average	8	3	3	9
KUL0036 - BARMINUTOR - MOTOR	Good	3	3	3	9
KUL0049 - BUILDING - FENCE	Fair	3	3	3	9
KUL0063 - CLARIFIER #1 - SOLIDS VALVE #1 - VALVE	Fair	2	3	3	9
KUL0052 - PRIMARY DIGESTER	Fair	9	2	4	8
KUL0065 - CLARIFIER #1 - SOLIDS VALVE #3 - MOTOR	Good	6	2	4	8
KUL0065 - CCLARIFIER #1 - SOLIDS VALVE #3 - VALVE	Good	6	2	4	8
KUL0013 - BLOWER #3 - BLOWER	Average	9	2	3	6
KUL0014 - BLOWER #4 - BLOWER	Average	9	2	3	6
KUL0015 - CENTRIFUGE - BACK DRIVE	Good	10	2	3	6
KUL0019 - YALE 4000 - LB HOIST - BLOWER	Average	8	2	3	6
KUL0024 - EFFLUENT PUMP #1 - MOTOR	Average	5	2	3	6
KUL0024 - EFFLUENT PUMP #1 - PUMP	Average	5	2	3	6

Equipment	Condition	Useful Life	POF	COF	Risk Score
KUL0064 - CLARIFIER #1 - SOLIDS VALVE #2 - MOTOR	Good	4	2	3	6
KUL0064 - CLARIFIER #1- SOLIDS VALVE #2 - VALVE	Good	4	2	3	6
KUL0079 - SOLIDS BELT DRIVE INTERNAL STRUCTURES	Average	8	2	3	6
KUL0082 - EFFLUENT SAMPLER	Good	6	2	3	6
KUL0083 - EFFLUENT FLOW METER	Good	6	2	3	6
KUL0012 - BLOWER #2 - CONTROLLER	Average	2	3	2	6
KUL0013 - BLOWER #3 - CONTROLLER	Average	2	3	2	6
KUL0014 - BLOWER #4 - CONTROLLER	Average	2	3	2	6
KUL0039 - GRIT TANK AIR LIFT - AIR LIFT PUMP #1	Good	5	3	2	6
KUL0039 - GRIT TANK AIR LIFT - AIR LIFT PUMP #2	Good	5	3	2	6
KUL0057 - AERATION #1 - GEAR REDUCER	Fair	5	3	2	6
KUL0057 - AERATION #1 - MOTOR	Fair	5	3	2	6
KUL0058 - AERATION #2 - GEAR REDUCER	Fair	5	3	2	6
KUL0058 - AERATION #2 - MOTOR	Fair	5	3	2	6
KUL0059 - AERATION #3 - GEAR REDUCER	Fair	5	3	2	6
KUL0059 - AERATION #3 - MOTOR	Fair	5	3	2	6
KUL0060 - AERATION #4 - GEAR REDUCER	Fair	5	3	2	6
KUL0060 - AERATION #4 - MOTOR	Fair	5	3	2	6
KUL0061 - AERATION #5 - GEAR REDUCER	Fair	5	3	2	6
KUL0061 - AERATION #5 - MOTOR	Fair	5	3	2	6
KUL0062 - AERATION #6 - GEAR REDUCER	Fair	5	3	2	6
KUL0062 - AERATION #6 - MOTOR	Fair	5	3	2	6
KUL0068 - CLARIFIER SOLIDS PUMP #1 - GEAR REDUCER	Fair	4	3	2	6
KUL0072 - METER - WASTE SOLIDS FLOW METER	Average	4	3	2	6
KUL0044 - BUILDING - STRUCTURE/RAILS/STAIRS	Good	10	1	4	4
KUL0012 - BLOWER #2 - BLOWER	Average	9	2	2	4
KUL0012 - BLOWER #2 - MOTOR	Average	8	2	2	4
KUL0013 - BLOWER #3 - MOTOR	Average	8	2	2	4
KUL0014 - BLOWER #4 - MOTOR	Average	8	2	2	4
KUL0015 - CENTRIFUGE - CONTROLLER	Good	9	2	2	4
KUL0025 - EFFLUENT PUMP #2 - MOTOR	Good	5	2	2	4
KUL0025 - EFFLUENT PUMP #2 - PUMP	Average	5	2	2	4
KUL0057 - AERATION #1 - GATE	Good	5	2	2	4
KUL0058 - AERATION #2 - GATE	Good	5	2	2	4
KUL0059 - AERATION #3 - GATE	Good	5	2	2	4
KUL0060 - AERATION #4 - GATE	Good	5	2	2	4

Equipment	Condition	Useful Life	POF	COF	Risk Score
KUL0061 - AERATION #5 - GATE	Good	5	2	2	4
KUL0062 - AERATION #6 - GATE	Good	5	2	2	4
KUL0068 - CLARIFIER SOLIDS PUMP #1 - CHECK VALVE	Average	4	2	2	4
KUL0068 - CLARIFIER SOLIDS PUMP #1 - ISOLATION VALVE	Average	4	2	2	4
KUL0068 - CLARIFIER SOLIDS PUMP #1 - MOTOR	Average	4	2	2	4
KUL0068 - CLARIFIER SOLIDS PUMP #1 - PUMP	Fair	4	2	2	4
KUL0069 - CLARIFIER SOLIDS PUMP #2 - CHECK VALVE	Average	4	2	2	4
KUL0069 - CLARIFIER SOLIDS PUMP #2 - GEAR REDUCER	Fair	4	2	2	4
KUL0069 - CLARIFIER SOLIDS PUMP #2 - ISOLATION VALVE	Average	4	2	2	4
KUL0069 - CLARIFIER SOLIDS PUMP #2 - MOTOR	Average	4	2	2	4
KUL0069 - CLARIFIER SOLIDS PUMP #2	Fair	4	2	2	4
KUL0070 - CLARIFIER SOLIDS PUMP #3 - CHECK VALVE	Average	4	2	2	4
KUL0070 - CLARIFIER SOLIDS PUMP #3 - ISOLATION VALVE	Average	4	2	2	4
KUL0070 - CLARIFIER SOLIDS PUMP #3 - MOTOR	Average	4	2	2	4
KUL0070 - CLARIFIER SOLIDS PUMP #3	Fair	4	2	2	4
KUL0071 - CLARIFIER SOLIDS PUMP #4 - CHECK VALVE	Average	4	2	2	4
KUL0071 - CLARIFIER SOLIDS PUMP #4 - ISOLATION VALVE	Average	4	2	2	4
KUL0071 - CLARIFIER SOLIDS PUMP #4 - MOTOR	Average	4	2	2	4
KUL0071 - CLARIFIER SOLIDS PUMP #4	Fair	4	2	2	4
KUL0073 - METER - RETURN SOLIDS FLOW METER	Average	4	2	2	4
KUL0077 - DIGESTER SLUDGE FEED PUMP #1 - CHECK VALVE	Average	10	2	2	4
KUL0077 - DIGESTER SLUDGE FEED PUMP #1 - GEAR REDUCER	Average	10	2	2	4
KUL0077 - DIGESTER SLUDGE FEED PUMP #1 - ISO EFF	Average	10	2	2	4
KUL0077 - DIGESTER SLUDGE FEED PUMP #1 - ISO INF	Average	8	2	2	4
KUL0077 - DIGESTER SLUDGE FEED PUMP #1 - MOTOR	Average	10	2	2	4
KUL0077 - DIGESTER SLUDGE FEED PUMP #1 - PUMP	Average	10	2	2	4

Equipment	Condition	Useful Life	POF	COF	Risk Score
KUL0078 - DIGESTER SLUDGE FEED PUMP #2 - CHECK VALVE	Average	10	2	2	4
KUL0078 - DIGESTER SLUDGE FEED PUMP #2 - GEAR REDUCER	Average	10	2	2	4
KUL0078 - DIGESTER SLUDGE FEED PUMP #2 - ISOLATION VALVE EFFLUENT	Average	10	2	2	4
KUL0078 - DIGESTER SLUDGE FEED PUMP #2 - ISOLATION VALVE INFLUENT	Average	10	2	2	4
KUL0078 - DIGESTER SLUDGE FEED PUMP #2 - MOTOR	Average	10	2	2	4
KUL0078 – DIG. SLUDGE FEED PUMP #2 - PUMP	Average	10	2	2	4
KUL0079 - SOLIDS BELT DRIVE - MOTOR	Good	10	1	3	3
KUL0037 - HEADWORKS ODOR CONTROL FAN	Fair	4	3	1	3
KUL0005 - INFLUENT FLOW METER	Good	6	2	1	2
KUL0020 - YALE 4000 - LB HOIST - CHLORINE	Average	5	2	1	2

Table A13. Lanihau SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
LAN0023 - PUMP #3 - PUMP	Poor	0	5	3	15
LAN0002 - AUTO DAILER ALARM SYSTEM	Average	2	3	3	9
LAN0022 - PUMP #2 - PUMP	Average	4	3	3	9
LAN0003 - GENERATOR	Good	10	2	3	6
LAN0004 - AUTOMATIC TRANSFER SWITCH	Good	10	2	3	6
LAN0021 - PUMP #1 - CHECK VALVE	Average	10	2	3	6
LAN0021 - PUMP #1 - CONTROLLER	Good	5	2	3	6
LAN0021 - PUMP #1 - INFLUENT ISOLATION VALVE	Average	10	2	3	6
LAN0022 - PUMP #2 - CHECK VALVE	Average	10	2	3	6
LAN0022 - PUMP #2 - ISOLATION VALVE	Average	10	2	3	6
LAN0023 - PUMP #3 - CHECK VALVE	Average	10	2	3	6
LAN0023 - PUMP #3 - ISOLATION VALVE	Average	10	2	3	6
LAN0024 - WET WELL LEVEL SENSOR	Good	5	2	3	6
LAN0021 - PUMP #1 - PUMP	Good	5	3	2	6

Table A14. Mill Pond SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
MIL0003 - EMERGENCY GENERATOR	Poor	2	3	5	15
MIL0010 - CHECK VALVE #1	Average	3	3	3	9
MIL0011 - CHECK VALVE #2	Average	3	3	3	9
MIL0001 - AUTOMATIC TRANSFER SWITCH	Fair	7	2	3	6
MIL0007 - PUMP #1	Average	8	2	3	6
MIL0007 - PUMP #1 - MOTOR	Average	6	2	3	6
MIL0008 - PUMP #2	Average	8	2	3	6
MIL0008 - PUMP #2 - MOTOR	Average	6	2	3	6
MIL0025 - CONTROLLER	Good	6	2	3	6
MIL0019 - PUMP #1 ISOLATION VALVE - PLUG	Good	6	2	2	4
MIL0020 - PUMP #2 ISOLATION VALVE - PLUG	Good	6	2	2	4
MIL0021 - BYPASS VALVE - PLUG	Good	6	2	2	4
MIL0022 - FORCE MAIN ISOLATION - GATE VALVE	Good	6	2	2	4

Table A15. Onekahakaha SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
ONE0007 - MAN LIFT - CONTROLLER	Poor	0	5	4	20
ONE0008 - ENVIRONMENTAL CONTROL / EXHAUST BLOWER - EXHAUST BLOWER	Fair	3	3	5	15
ONE0007 - MAN LIFT - GEAR BOX AND DRIVE	Fair	3	3	4	12
ONE0007 - MAN LIFT - MOTOR	Fair	3	3	4	12
ONE0012 - SUMP PUMP - CONTROLLER	Fair	3	3	4	12
ONE0012 - SUMP PUMP - MOTOR AND PUMP	Fair	3	3	4	12
ONE0010 - PUMP #1 - CHECK VAVLE	Fair	5	3	3	9
ONE0011 - PUMP #2 - CHECK VAVLE	Average	5	3	3	9
ONE0015 - WET WELL SENSOR	Average	9	2	4	8
ONE0010 - PUMP #1 - CONTROLLER	Average	7	2	3	6
ONE0010 - PUMP #1 - ISOLATION VALVE EFFLUENT	Average	7	2	3	6
ONE0010 - PUMP #1 - ISOLATION VALVE INFLUENT	Average	7	2	3	6
ONE0010 - PUMP #1 - MOTOR	Average	9	2	3	6
ONE0010 - PUMP #1 - PUMP	Average	7	2	3	6
ONE0011 - PUMP #2 - CONTROLLER	Average	7	2	3	6
ONE0011 - PUMP #2 - ISOLATION VALVE EFFLUENT	Average	7	2	3	6
ONE0011 - PUMP #2 - ISOLATION VALVE INFLUENT	Average	7	2	3	6
ONE0011 - PUMP #2 - MOTOR	Average	9	2	3	6
ONE0011 - PUMP #2 - PUMP	Average	7	2	3	6

Table A16. Pahoehoe SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
PAH0001 - AUTODIALER	Good	3	3	4	12
PAH0006 - ODOR CONTROL SYSTEM - MEDIA	Average	3	3	4	12
PAH0007 - WET WELL LEVEL SENSOR	Good	5	3	4	12
PAH0020 - AUTOMATIC TRANSFER SWITCH	Average	5	3	4	12
PAH0008 - ISOLATION VALVE FOR FORCE MAIN	Average	7	3	3	9
PAH0019 - GENERATOR	Good	8	2	4	8
PAH0006 - ODOR CONTROL SYSTEM - BLOWER #1	Good	6	2	3	6
PAH0006 - ODOR CONTROL SYSTEM - BLOWER #2	Good	6	2	3	6
PAH0006 - ODOR CONTROL SYSTEM - BLOWER #1 - MOTOR	Good	6	2	3	6
PAH0006 - ODOR CONTROL SYSTEM - BLOWER #2 - MOTOR	Good	6	2	3	6
PAH0022 - PUMP #1 - CONTROLLER	Good	5	2	3	6
PAH0009 - ISOLATION VALVE FOR BYPASS PUMPING	Average	7	3	2	6
PAH0012 - PROCESS AIR BLOWER - MOTOR	Good	5	3	2	6
PAH0022 - PUMP #1 - CHECK VALVE	Average	5	3	2	6
PAH0022 - PUMP #1 - ISOLATION VALVE	Average	5	3	2	6
PAH0022 - PUMP #1 - PUMP	Good	8	3	2	6
PAH0023 - PUMP #2 - CHECK VAVLE	Average	5	3	2	6
PAH0023 - PUMP #2 - ISOLATION VALVE	Average	5	3	2	6
PAH0024 - PUMP #3 - CHECK VALVE	Average	5	3	2	6
PAH0024 - PUMP #3 - ISOLATION VALVE	Average	5	3	2	6
PAH0024 - PUMP #3 - PUMP	Average	4	3	2	6
PAH0012 - PROCESS AIR BLOWER - BLOWER	Good	5	2	2	4
PAH0023 - PUMP #2 - PUMP	Good	10	2	2	4

Table A17. Papaikou WWTP

Equipment	Condition	Useful Life	POF	COF	Risk Score
PAP0074 - AIR DEVIVERY SYSTEM FOR BOTH AERATION BASINS	Poor	3	4	5	20
PAP0023 - EFFLUENT FLOW METER	Average	3	3	4	12
PAP0063 - INFLUENT FLOW METER	Average	2	3	4	12
PAP0017 - DCG EQUIPMENT - SOLIDS REMOVAL	Fair	1	4	3	12
PAP0066 - CLARIFIER #1 - GEARBOX	Fair	1	4	3	12
PAP0066 - CLARIFIER #1 - INTERNAL STRUCTURES-DRIVE/RAKE/SKIMMER/WEIR/LAUNDER/ETC	Fair	1	4	3	12
PAP0067 - CLARIFIER #2 - INTERNAL STRUCTURES-DRIVE/RAKE/SKIMMER/WEIR/LAUNDER/ETC	Fair	1	4	3	12
PAP0020 - GENERATOR DIESEL	Average	5	2	5	10
PAP0076 - CHLORINATION PUMPS - CONTROLLER	Excellent	10	2	5	10
PAP0076 -CHLORINATION PUMPS - PUMP 1	Excellent	10	2	5	10
PAP0076 - CHLORINATION PUMPS - PUMP 2	Excellent	10	2	5	10
PAP0077 -DECHLORINATION PUMPS - CONTROLLER	Excellent	10	2	5	10
PAP0077 - DECHLORINATION PUMPS - PUMP 1	Excellent	10	2	5	10
PAP0077 - DECHLORINATION PUMPS - PUMP 2	Excellent	10	2	5	10
PAP0059 - BARMINUTOR	Average	0	5	2	10
PAP0059 - BARMINUTOR - MOTOR	Fair	0	5	2	10
PAP0012 - AIR BLOWER #2- CONTROLLER	Good	3	3	3	9
PAP0013 - AIR BLOWER #3- CONTROLLER	Good	3	3	3	9
PAP0034 - SCUM PUMP #1 - CONTROLLER	Fair	2	3	3	9
PAP0034 - SCUM PUMP #1 - PUMP	Good	5	3	3	9
PAP0035 - SCUM PUMP #2 - CONTROLLER	Fair	2	3	3	9
PAP0035 - SCUM PUMP #2 - PUMP	Good	5	3	3	9
PAP0065 - INFLUENT ISCO DATA CHART RECORDER	Fair	2	3	3	9
PAP0067 - CLARIFIER #2 - GEARBOX	Fair	2	3	3	9
PAP0070 - INTERNAL STRUCTURES/PIPING/VALVES - DIGESTER	Fair	3	3	3	9
PAP0080 - GRIT SCREW - CONTROLLER	Good	5	3	3	9
PAP0080 - GRIT SCREW - GEARBOX	Good	5	3	3	9
PAP0080 - GRIT SCREW - MOTOR	Good	5	3	3	9
PAP0084 - FACILITY PIT PUMP - CONTROLLER	Average	3	3	3	9
PAP0085 - FACILITY PIT PUMP #2 - CONTROLLER	Average	3	3	3	9
PAP0019 - FROTH SPRAY - MOTOR	Poor	2	4	2	8
PAP0019 - FROTH SPRAY - PUMP	Poor	2	4	2	8

Equipment	Condition	Useful Life	POF	COF	Risk Score
PAP0036 - SLUDGE PUMP #1 -EFFLUENT CHECK VALVE	Fair	3	4	2	8
PAP0036 - SLUDGE PUMP #1 -INFLUENT CHECK VALVE	Fair	3	4	2	8
PAP0036 - SLUDGE PUMP #1 - EFFLUENT ISOLATION VALVE	Fair	3	4	2	8
PAP0036 - SLUDGE PUMP #1 - INFLUENT ISOLATION VALVE	Fair	3	4	2	8
PAP0037 - SLUDGE PUMP #2 - EFFLUENT CHECK VALVE	Fair	3	4	2	8
PAP0037 - SLUDGE PUMP #2 - INFLUENT CHECK VALVE	Fair	3	4	2	8
PAP0037 - SLUDGE PUMP #2 - EFFLUENT ISOLATION VALVE	Fair	3	4	2	8
PAP0037 - SLUDGE PUMP #2 - INFLUENT ISOLATION VALVE	Fair	3	4	2	8
PAP0032 - RAS PUMP #1 - CHECK VALVE	Good	5	2	3	6
PAP0032 - RAS PUMP #1 - CONTROLLER	Good	5	2	3	6
PAP0032 - RAS PUMP #1 - GEAR BOX AND DRIVE	Good	5	2	3	6
PAP0032 - RAS PUMP #1 - EFFLUENT ISOLATION VALVE	Good	5	2	3	6
PAP0032 - RAS PUMP #1 - INFLUENT ISOLATION VALVE	Good	5	2	3	6
PAP0032 - RAS PUMP #1 - MOTOR	Good	5	2	3	6
PAP0032 - RAS PUMP #1 - PUMP	Good	5	2	3	6
PAP0033 - RAS PUMP #2 - CHECK VALVE	Good	5	2	3	6
PAP0033 - RAS PUMP #2 - CONTROLLER	Good	5	2	3	6
PAP0033 - RAS PUMP #2 - GEAR BOX AND DRIVE	Good	5	2	3	6
PAP0033 - RAS PUMP #2 - EFFLUENT ISOLATION VALVE	Good	5	2	3	6
PAP0033 - RAS PUMP #2 - INFLUENT ISOLATION VALVE	Good	5	2	3	6
PAP0033 - RAS PUMPS #2 - MOTOR	Good	5	2	3	6
PAP0033 - RAS PUMP #2 - PUMP	Good	5	2	3	6
PAP0041 - WAS PUMP #1 - CHECK VALVE	Good	6	2	3	6
PAP0041 - WAS PUMP #1 - CONTROLLER	Good	6	2	3	6
PAP0041 - WAS PUMP #1 - EFFLUENT ISOLATION	Good	6	2	3	6
PAP0041 - WAS PUMP #1 - GEAR BOX	Average	6	2	3	6
PAP0041 - WAS PUMP #1 - INFLUENT ISOLATION	Good	6	2	3	6
PAP0041 - WAS PUMP #1 - MOTOR	Average	6	2	3	6
PAP0041 - WAS PUMP #1 - PUMP	Average	6	2	3	6
PAP0042 - WAS PUMP #2 - CHECK VALVE	Good	6	2	3	6

Equipment	Condition	Useful Life	POF	COF	Risk Score
PAP0042 - WAS PUMP #2 - CONTROLLER	Good	6	2	3	6
PAP0042 -WAS PUMP #2 - EFFLUENT ISOLATION	Good	6	2	3	6
PAP0042 - WAS PUMP #2 - GEARBOX	Average	6	2	3	6
PAP0042 - WAS PUMP #2 - INFLUENT ISOLATION	Good	6	2	3	6
PAP0042 - WAS PUMP #2 - MOTOR	Average	6	2	3	6
PAP0042 - WAS PUMP #2 - PUMP	Average	6	2	3	6
PAP0066 - CLARIFIER #1 - CONTROLLER	Average	3	2	3	6
PAP0066 - CLARIFIER #1 - MOTOR	Good	3	2	3	6
PAP0067 - CLARIFIER #2 - CONTROLLER	Average	3	2	3	6
PAP0067 - CLARIFIER #2 - MOTOR	Good	3	2	3	6
PAP0081 - WAS FLOW METER	Good	5	2	3	6
PAP0082 - RAS FLOW METER	Good	5	2	3	6
PAP0017 - DCG EQUIPMENT - CONTROLLER	Fair	3	3	2	6
PAP0018 - DCG CHEMICAL PUMP	Average	2	3	2	6
PAP0019 - FROTH SPRAY - CONTROLLER	Fair	2	3	2	6
PAP0025 - COAGULANT MIXER	Fair	3	3	2	6
PAP0026 - DCG ROOM #1 POLYMER MIXER	Fair	3	3	2	6
PAP0027 - DCG ROOM #2 MIXER	Fair	3	3	2	6
PAP0029 - CHLROINE SAMPLE PUMP #1 - CONTROLLER	Average	6	3	2	6
PAP0030 - CHLORINE SAMPLE PUMP #2 - CONTROLLER	Average	6	3	2	6
PAP0036 - SLUDGE PUMP #1 - MOTOR	Fair	3	3	2	6
PAP0036 - SLUDGE PUMP #1 - PUMP	Fair	3	3	2	6
PAP0037 - SLUDGE PUMP #2 - MOTOR	Fair	3	3	2	6
PAP0037 - SLUDGE PUMP #2 - PUMP	Fair	3	3	2	6
PAP0083 - EFFLUENT SAMPLER	Average	5	3	2	6
PAP0084 - FACILITY PIT PUMP - CHECK VALVE	Fair	5	3	2	6
PAP0084 - FACILITY PIT PUMP - FACILITY PIT PUMP	Average	5	3	2	6
PAP0084 - FACILITY PIT PUMP - ISOLATION VALVE	Fair	5	3	2	6
PAP0084 - FACILITY PIT PUMP - MOTOR	Average	5	3	2	6
PAP0085 - FACILITY PIT PUMP #2 - CHECK VALVE	Fair	5	3	2	6
PAP0085 - FACILITY PIT PUMP #2 - ISOLATION VALVE	Fair	5	3	2	6
PAP0085 - FACILITY PIT PUMP #2 - PUMP	Average	5	3	2	6
PAP0022 - HOIST	Poor	0	5	1	5
PAP0086 - HOIST	Poor	0	5	1	5
PAP0011 - AIR BLOWER #1 - BLOWER	Average	5	2	2	4
PAP0011 - AIR BLOWER #1 - CONTROLLER	Good	3	2	2	4

Equipment	Condition	Useful Life	POF	COF	Risk Score
PAP0011 - AIR BLOWER #1 - MOTOR	Good	3	2	2	4
PAP0012 - AIR BLOWER #2 - BLOWER	Average	5	2	2	4
PAP0012 - AIR BLOWER #2 - MOTOR	Excellent	5	2	2	4
PAP0013 - AIR BLOWER #3 - BLOWER	Average	5	2	2	4
PAP0013 - AIR BLOWER #3 - MOTOR	Excellent	5	2	2	4
PAP0029 - CHLORINE SAMPLE PUMP #1 - PUMP & MOTOR	Good	5	2	2	4
PAP0030 - CHLORINE SAMPLE PUMP #2 - PUMP AND MOTOR	Good	7	2	2	4
PAP0085 - FACILITY PIT PUMP #2 - MOTOR	Excellent	10	1	2	2

Table A18. Paukaa SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
PAU0003 - AUTOMATIC TRANSFER SWITCH	Poor	1	4	4	16
PAU0010 - SUBMERSIBLE PUMP #1 - CONTROLLER	Poor	1	4	4	16
PAU0011 - SUBMERSIBLE PUMP #2 - CONTROLLER	Poor	1	4	4	16
PAU0002 - AUTO DAILER ALARM SYSTEM	Average	9	2	5	10
PAU0018 - GENERATOR	Average	5	2	5	10
PAU0011 - SUBMERSIBLE PUMP #2 - ISOLATION VALVE	Poor	2	3	3	9
PAU0029 - MULTITRODE	Average	9	2	3	6
PAU0010 - SUBMERSIBLE PMP #1 - CHECK VLV	Excellent	10	1	3	3
PAU0010 - SUBMERSIBLE PUMP #1 - ISOLATION VALVE	Excellent	10	1	3	3
PAU0011 - SUBMERSIBLE PUMP #2 - CHECK VALVE	Excellent	10	1	3	3

Table A19. Project 19 SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
PRO0004 - SUMP PUMP - CHECK VALVE	Good	3	3	4	12
PRO0004 - SUMP PUMP - MOTOR AND PUMP	Average	2	3	4	12
PRO0019 - AUTOMATIC TRANSFER SWITCH	Average	5	3	4	12
PRO0021 - PUMP #2	Poor	0	5	2	10
PRO0020 - PUMPS #1- CHECK VALVE	Fair	3	3	2	6
PRO0020 - PUMPS #1 - EFF ISOLATION VALVE	Fair	3	3	2	6
PRO0020 - PUMPS #1 - INFLUENT ISOLATION VALVE	Fair	3	3	2	6
PRO0020 - PUMPS #1 - MOTOR	Fair	3	3	2	6
PRO0020 - PUMPS #1 - PUMP	Fair	3	3	2	6
PRO0022 - PUMPS #2 - ISOLATION VALVE	Fair	4	3	2	6
PRO0022 - PUMPS #2 - PUMP	Excellent	6	2	2	4

Table A20. Pua SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
PUA1036 - PUMP #2 - CONTROLLER	Poor	0	5	4	20
PUA1036 - PUMP #2 - PUMP	Poor	1	4	4	16
PUA1037 - PUMP #3 - PUMP	Poor	1	4	4	16
PUA1037 - PUMP #3 - CONTROLLER	Poor	1	4	4	16
PUA1007 - PUMP #2 - CHECK VALVE	Fair	3	3	5	15
PUA1035 - MCE PUMP #1	Good	5	3	5	15
PUA1053 - PUMP #1 - INFLUENT CONTROLLER	Good	8	3	5	15
PUA1054 - PUMP #2 - CONTROLLER	Good	8	3	5	15
PUA1055 - PUMP #2 - EFFLURENT VALVE CONTROLLER	Good	8	3	5	15
PUA1056 - PUMP #3 - INFLUENT VALVE CONTROLLER	Good	8	3	5	15
PUA1057 - PUMP #3 - EFFLUENT VALVE CONTROLLER	Good	8	3	5	15
PUA1019 - SLIDE GATE #1	Poor	0	5	3	15
PUA1020 - SLIDE GATE #2	Poor	0	5	3	15
PUA1006 - PUMP #1 - CHECK VALVE	Fair	3	3	4	12
PUA1008 - PUMP #3 - CHECK VALVE	Fair	3	3	4	12
PUA1032 - PUMP CONTROL	Good	3	3	4	12
PUA1049 - BUILDING - CRANE/HOIST	Average	3	3	3	9
PUA1035 - MCE PUMP #1 - CONTROLLER	Excellent	8	2	4	8
PUA1049 - BUILDING - FENCE	Good	9	2	4	8
PUA1021 - SLUICE GATE	Good	7	2	3	6
PUA1043 - VAR FREQ DRIVE	Excellent	10	2	3	6
PUA1049 - BUILDING - SPECIALIZED DOOR OUTSIDE	Good	20	1	5	5
PUA1049 - BUILDING - SPECIALIZED DOOR #2	Average	20	1	4	4
PUA1049 - BUILDING	Average	10	1	4	4
PUA1052 - PUMP #1 - INFLUENT VAVLE	Good	8	1	2	2
PUA1053 - PUMP #1 - EFFLUENT VALVE	Good	8	1	2	2
PUA1053 - PUMP #1 - INFLUENT MOTOR	Good	10	1	2	2
PUA1054 - PUMP #2 - MOTOR	Good	10	1	2	2
PUA1054 - PUMP #2 - VALVE	Good	8	1	2	2
PUA1055 - PUMP #2 - EFFLUENT VALVE	Good	8	1	2	2
PUA1055 - PUMP #2 - EFFLUENT VALVE MOTOR	Good	10	1	2	2
PUA1056 - PUMP #3 - INFLUENT VALVE MOTOR	Good	10	1	2	2
PUA1056 - PUMP #3 - INFLUENT VALVE	Good	8	1	2	2
PUA1057 - PUMP #3 - EFFLUENT VALVE	Good	8	1	2	2
PUA1057 - PUMP #3 -EFFLUENT VALVE MOTOR	Good	10	1	2	2

Table A21. Waiaha SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
WAI0013 - NORTH FORCE MAIN ISOLATION VALVE	Average	5	3	5	15
WAI0001 - PA BLOWER	Average	3	3	4	12
WAI0001 - PA BLOWER - MOTOR	Average	3	3	4	12
WAI0029 - ODOR CONTROL SYSTEM - FAN #2	Fair	2	3	4	12
WAI0029 - ODOR CONTROL SYSTEM - MEDIA #2	Fair	1	3	4	12
WAI0029 - ODOR CONTROL SYSTEM - MOTOR #2	Average	3	3	4	12
WAI0026-AUTOMATIC TRANSFER SWITCH	Good	10	2	5	10
WAI0006 - PUMP #2 - PUMP	Fair		5	2	10
WAI0029 - ODOR CONTROL SYSTEM - FAN #1	Poor		5	2	10
WAI0029 - ODOR CONTROL SYSTEM - MEDIA #1	Poor		5	2	10
WAI0015 - BYPASS PUMPING ISOLATION VALVE	Average	3	3	3	9
WAI0001 - PA BLOWER - CONTROLLER	Average	5	2	4	8
WAI0025-GENERATOR - GENERATOR	Good	10	2	4	8
WAI0028 - AUTO DAILER ALARM SYSTEM	Good	5	2	4	8
WAI0030 - WET WELL LEVEL SENSOR	Good	5	2	4	8
WAI0005 - PUMP #1 - ISOLATION VALVE	Average	5	3	2	6
WAI0005 - PUMP #1 - PUMP	Average	5	3	2	6
WAI0006 - PUMP #2 - CHECK VALVE	Average	5	3	2	6
WAI0006 - PUMP #2 - ISOLATION VALVE	Average	5	3	2	6
WAI0008 - PUMP #3 - CHECK VALVE	Average	5	3	2	6
WAI0008 - PUMP #3 - ISOLATION VALVE	Average	5	3	2	6
WAI0008 - PUMP #3 - PUMP	Fair	2	3	2	6
WAI0029 - ODOR CONTROL SYSTEM - MOTOR #1	Poor	1	3	2	6
WAI0027 - EFFLUENT FLOW METER	Poor		5	1	5

Table A22. Wailoa SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
WAI1023 - FENCE	Poor		5	5	25
WAI1010 - GENERATOR	Poor	0	5	4	20
WAI1040 - AUTOMATIC TRANSFER SWITCH	Fair	7	3	5	15
WAI1010- generator diesel storage	Fair	5	2	5	10
WAI1009 - STATION EXHAUST FAN	Poor	2	3	3	9
WAI1014 - PUMP #1 - CONTROLLER	Fair	7	3	3	9
WAI1017 - PUMP #3 - FLOWMATCHER	Fair	7	3	3	9
WAI1047 - CONTROLLER - MERCOID SWITCH	Fair	5	3	3	9
WAI1014 - PUMP #1 - SUCTION ISOLATION VALVE	Fair	10	2	4	8
WAI1015 - PUMP #2 - SUCTION ISOLATION VALVE	Fair	10	2	4	8
WAI1017 - PUMP #3 - SUCTION ISOLATION VALVE	Fair	10	2	4	8
WAI1014 - PUMP #1 - CHECK VALVE	Good	20	2	3	6
WAI1014 - PUMP #1 - MOTOR	Average	10	2	3	6
WAI1015 - PUMP #2 - CHECK VALVE	Good	20	2	3	6
WAI1015 - PUMP #2 - CONTROLLER	Average	10	2	3	6
WAI1015 - PUMP #2 - MOTOR	Average	15	2	3	6
WAI1017 - PUMP #3 - CHECK VALVE	Good	20	2	3	6
WAI1017 - PUMP #3 - MOTOR	Average	15	2	3	6
WAI1024 - BUILDING	Fair	20	2	3	6
WAI1024 - BUILDING - STAIRS	Average	15	2	3	6
WAI1014 - PUMP #1 - CONTROLLER	Average	10	3	2	6
WAI1009 - STATION EXHAUST FAN - CONTROLLER	Average	10	2	2	4
WAI1014 - PUMP #1 - DRIVE SHAFT	Average	8	2	2	4
WAI1015 - PUMP #2 - DRIVE SHAFT	Average	8	2	2	4
WAI1017 - PUMP #3 - CONTROLLER	Average	10	2	2	4
WAI1014 - PUMP #1 - DISCHARGE ISOLATION VALVE	Good	20	1	3	3
WAI1014 - PUMP #1 - PUMP	Fair	10	1	3	3
WAI1015 - PUMP #2 - DISCHARGE ISOLATION VALVE	Good	20	1	3	3
WAI1015 - PUMP #2 - PUMP	Fair	10	1	3	3
WAI1017 - PUMP #3 - DISCHARGE ISOLATION VALVE	Good	20	1	3	3
WAI1017 - PUMP #3 - PUMP	Fair	10	1	3	3
WAI1024 - BUILDING - CRANE	Good	15	1	3	3
WAI1018 - SUMP PUMP	Fair	3	3	1	3
WAI1017 - PUMP #3 - DRIVE SHAFT	Good	9	1	2	2
WAI1024 - BUILDING - ROOF	Excellent	10	1	2	2

Equipment	Condition	Useful Life	POF	COF	Risk Score
WAI1044 - PUMP 5	Excellent	5	2	1	2
WAI1042 - CAUSTIC TRANSFER PUMP 6	Excellent	10	1	1	1
WAI1042 - CAUSTIC TRANSFER PUMP 6 - MOTOR	Excellent	10	1	1	1
WAI1043 - CAUSTIC TRANSFER PUMP 7 - MOTOR	Excellent	10	1	1	1
WAI1045 - CAUSTIC TANK 1	Excellent	20	1	1	1
WAI1045 - CAUSTIC TANK 2	Excellent	20	1	1	1
WAI1048 - CAUSTIC SYSTEM CONTROLLER	Excellent	15	1	1	1

Table A23. Wailuku SPS

Equipment	Condition	Useful Life	POF	COF	Risk Score
WAI2001 - AUTO DIALER ALARM SYSTEM	Good	5	3	5	15
WAI2006 - GENERATOR ELECTRIC	Fair	5	3	4	12
WAI2037 - AUTOMATIC TRANSFER SWITCH	Average	6	2	3	6
WAI2011 - SUBMERSIBLE PUMP #1 - CONTROLLER	Good	10	1	5	5
WAI2012 - SUBMERSIBLE PUMP #2 - CONTROLLER	Good	10	1	5	5
WAI2038 - WET WELL	Good	15	1	5	5
WAI2011 - SUBMERSIBLE PUMP #1	Average	8	2	2	4
WAI2012 - SUBMERSIBLE PUMP #2	Average	8	2	2	4
WAI2023 - BUILDING	Good	20	1	3	3
WAI2015 - SUMP PUMP	Average	5	3	1	3
WAI2005 - EXHAUST FAN	Fair	6	1	2	2
WAI2011 - SUBMERSIBLE PUMP #1 - CHECK VALVE	Good	15	1	2	2
WAI2012 - SUBMERSIBLE PUMP #2- CHECK VALVE	Good	15	1	2	2

APPENDIX C

County of Hawai'i Department of Environmental Management Wastewater Division Risk Assessment Report

Horizontal Assets

Southwest Environmental Finance Center / PG Environmental under EPA Contract No. EP-R9-16-02

March 2019

Executive Summary

The PG Team has been tasked with conducting a risk assessment of all wastewater assets in the County of Hawai'i. In general, these can be separated into vertical assets (e.g., pump stations and treatment plants) and horizontal assets (e.g., conveyances and connections). This report focuses on the horizontal assets.

The horizontal asset data most relevant to this report are related to pipes, manholes, services, and discharges, and are mostly located in the Wastewater Division's (WWD's) geographic information system (GIS) and closed-circuit television (CCTV) inspection videos/records. However, it has been found that there is only sufficient information to do a detailed analysis of WWD's pipe segments. The assessment revealed significant data gaps exist in GIS for characterizing services and discharges. Another major data gap observed is the lack of information showing whether pipe segment defects were repaired. A fair amount of data does exist for manholes; however, they are considered by WWD to be integrated into the pipe system and get managed accordingly (i.e., as part of the pipeline and not individually). The PG Team also found that the quantity of CCTV data is currently too low to be statistically significant, only about 5.7% of the entire collection system. Also, the same pipes are often televised multiple times due to concerns related to defects or clogs; therefore, a true risk assessment for every pipe segment is not possible due to limited documented and representative data.

In order to make best use of the data that is available in WWD's GIS and from past CCTV efforts, the PG Team rated potential of failure (POF) for those segments with existing CCTV data as well as implemented a process to prioritize segments in the entire collection system based on specific criteria defined by WWD staff. Discussions were also held with WWD staff to determine different criteria that may lead to problems in a pipe segment. Pipes with a greater likelihood of problems would be considered higher priority for further investigation using CCTV in the future.

Of the pipes ranked from the CCTV data, 7% were high POF, 26% were medium POF, and the remaining 67% ranked low POF. The prioritization part of the assessment yielded 179 high priority segments, 1,136 medium priority pipes, and 2,418 low priority pipes. The PG Team found that high POF segments and high priority segments did necessarily correlate, meaning WWD may have to reconsider the ranking factors. More likely, a greater sample of CCTV data is needed to determine a meaningful correlation, or lack thereof.

These efforts (described in more detail in the report below) should only be viewed as a starting point for risk assessment. Further data collection (extensive) and quality control is needed to perform a proper and complete risk assessment. A detailed description of the methods and preliminary analysis of priority pipe segments is presented in the report. Within this document, the PG Team has also offered recommendations for improving data collection, management, and analysis of horizontal asset data, as well as strategies for implementing a more effective CCTV program.

Background

Horizontal assets refer to those assets that are located within the service area or what is commonly referred to as "out in the field." These types of assets are typically responsible for the linear conveyance of wastewater from the point of collection to the treatment facility. Typical assets of this type include pipe, manholes, pipeline valves (e.g., air release valves), and service connections. Vertical assets are those assets included within pump stations and treatment plants, such as such as pumps, motors, electrical controls, tanks, treatment units, blowers, and disinfection units.

Horizontal and vertical assets are typically separated within asset management because managing the assets as well as data collection, storage, and analysis related to each set of assets, is considerably different. For example, there are often many, many identical horizontal assets (e.g., as many as several hundred pipe segments with the same material type, diameter, length, etc., installed at or around the same time) while there are often few identical within vertical asset categories (e.g., 2 or 3 pumps within a utility may be the same, while the rest are different sizes or types). For these reasons, as well as those listed below, the horizontal risk report is being prepared separately from the vertical risk report.

It is relatively easy to visually inspect vertical assets because most often they are located above ground or able to be accessed/observed from ground level. Horizontal assets, on the other hand, can be very difficult to visually evaluate. In many cases horizontal assets are buried with limited access points, requiring some type of specialized electronic device (e.g., closed-circuit television (CCTV) camera) for inspection.

Furthermore, operations and maintenance personnel often have greater knowledge of vertical assets because they interact with them on a more routine basis. This makes it easier to rate parameters related to asset management, including condition, useful life remaining, probability of failure (POF), and consequence of failure (COF). These assessments cannot generally be completed easily for individual horizontal assets. Operation and maintenance personnel do not typically have detailed information regarding the condition and performance of each piece of pipe or each manhole in the collection system. However, operation and maintenance personnel, as well as engineering personnel, may have a general knowledge of certain groups of assets or assets related to problem areas in the system. For example, clay pipes may outlive cast-iron pipes or pipes in a certain area under subject to certain conditions (e.g., closer to the coast) fail more often. Or pipes in certain areas may perform worse than other pipes in the system.

Data regarding vertical assets is typically stored in a computer program such as a computerized maintenance management system (CMMS), an asset management system, a spreadsheet, or a database. Horizontal assets are often stored in a geographic information system (GIS) database of some type. This relates to the fact that horizontal assets are more spatially related than vertical assets. In the future, if and when WWD obtains a CMMS system, this system may interact with the GIS system in some way such that data on horizontal assets may be obtained through either the GIS or CMMS or both.

Horizontal Asset Categories

The horizontal asset categories were obtained from WWD's GIS. The data in the GIS system was obtained from the best available resources. There was no other written or electronic data that were considered better sources of information on horizontal assets. The PG Team was given access to the entire GIS map and associated data, and all available information was downloaded into an electronic spreadsheet. Based on review of that data, the types of assets (also referred to as classes of assets) in the GIS included the following: chimneys, discharges (i.e., outfall pipes/pipelines), easements, grease interceptors, mains, manholes, plants, pump stations, pumps, services, and valves. Each class of asset represented in the GIS, along with a description of the available data is listed in Table 1. The table also includes a description of data gaps and the need for further work regarding that type of asset.

Table 1: WWD Horizontal Asset Classes

Class of Asset	Comments	GIS Data	Data Gaps / Further Analysis Needed
Chimney	There are 59 total assets of this type in the GIS database/inventory. Chimneys are no longer used and are not considered a separately managed asset from manholes.		No further analysis required.
Discharges	There are 10 total assets included – 7 private gang cesspools, 2 active WWD outfalls, and 1 active discharge identified as unknown.	Only date installed and location.	No further analysis possible at this time due to lack of data. Given the 7 private discharges, there are only 3 that potentially need further analysis. However, there is extremely limited information on the outfalls in the database.
Easements	There are 460 easements in the GIS database. These easements may be on private or public land. WWD does not manage this type of asset per se; therefore, no further analysis is necessary for this report. Additionally, there is almost no information on which to base an analysis.	Limited.	No further analysis possible or needed at this time. However, as a separate activity, the WWD may wish to determine who is responsible for maintaining easements and whether all easements are properly recorded and up to date.
Grease Interceptors	There are 32 grease interceptors in the GIS database. The interceptors are not owned or maintained by the WWD.		No analysis required.
Mains	After scrubbing and analyzing the existing data, it was determined there are 3,733 pipe segments in the GIS database. This report includes extensive analysis of the mains.	Description and analysis included in this report.	Data discussion and analysis included in this report.

Class of Asset	Comments	GIS Data	Data Gaps / Further Analysis Needed
Manholes	There are 3,445 manholes included in the GIS database. The manholes are not generally managed separately from the pipe. WWD inspects manholes when the pipe is televised. The manholes were discussed with staff and there were no particular attributes that anyone thought would make one manhole higher in priority than another, other than being associated with a high-priority pipe segment.	Asset ID, status, owner, date installed, type, top elevation, invert elevation, rehabbed (17 listed as "lined," rest as "not rehabbed"), material (2 brick, 1 concrete, all others unknown), depth (68 unknown, the rest range from 2.39 to 25.8 feet).	If manholes continue to be addressed as part of the pipe (integral to the pipe, no further analysis is required). If, however, there are attributes that would distinguish the priority of one manhole over another, and that data is available for analysis, the manholes can be analyzed as a separate component.
Plants	There are 9 plants listed in the GIS database. These plants were all analyzed during the Vertical Asset Risk Assessment.	See Vertical Asset Report.	All included in the Vertical Asset Risk Assessment.
Pump Stations	There are 23 assets listed in the GIS database. These pump stations were all analyzed during the Vertical Asset Risk Assessment.	See the Vertical Asset Risk Assessment.	All included in the Vertical Asset Risk Assessment.
Pumps	It is unclear what information is included here. There are 17 assets included in the GIS under this category. All pumps were included in the vertical asset analysis.	See the Vertical Asset Risk Assessment.	All included in the Vertical Asset Risk Assessment.
Services	There are 7,482 services listed in the GIS Database. This asset is one that WWD would like to do an analysis of, but there is insufficient information to do the analysis.	Status, date connected, cleanout), account name, number and address.	Further analysis is desired, but there is limited data about the services that are included. This is something that will have to be collected and updated over time. Some types of information that would be valuable include the GPS location of the cleanout, the material of the service line, and past problems with the service line.
Valves	There are 16 valves listed in the GIS database, of these 12 are listed as private ownership. Therefore, there are only 4 air relief valves listed as owned by the WWD. There is essentially no information available about the air relief valves.	Status, type of valve, and invert elevation.	If further analysis is required, field data collection would be required.

The horizontal asset data most relevant to this report are related to pipes, manholes, services, and discharges. However, at this time, there is only sufficient information to do a detailed analysis of pipe segments. Data exists for manholes; however, they are considered by WWD to be integrated into the pipe system and get managed accordingly. Significant data gaps exist for services and discharges. Further analysis could be conducted if additional information is collected, or, in the case of the manholes, personnel can provide some indication of how the existing data can be used to indicate the criticality of individual manholes. As noted above, several asset classes have been addressed in the Vertical Asset Risk Assessment, and the remainder have been excluded for various reasons (e.g., not managed by WWD).

Wastewater Pipe Data Sources and Information

There are two sets of available data that can potentially be used to perform an assessment of the individual pipe segments within the WWD system – the GIS system and the CCTV data. The best available data on individual pieces of pipe and manholes is the information that is produced from CCTV analysis. While this is the best available information, it does not mean that this data has been through a rigorous quality control process. Furthermore, the CCTV videos can be interpreted differently by different individuals so not all defects may be treated the same. There is no standard operating procedure for how the interpretations should be done, so the data is subject to differences. Nevertheless, at this point, this is the available data so it will be used for the analysis. In the future, more rigorous procedures can be adopted to improve the CCTV data quality.

This CCTV data includes videos and, in some cases, hand written records. When the data is provided to the GIS personnel, this information is added to the defects layer. This level of data – CCTV information – is only available for a small percentage of the pipe – about 5.7% (see Table 2).

Table 3 provides similar data, further broken down by diameter of pipe (CCTV data is discussed further in the *Pipe Analysis Using CCTV Data*). The other source of data is the general information contained in the GIS database. This data was downloaded from GIS into an *Excel* spreadsheet. Additional analysis was completed for both the spreadsheet data and using the spatial information in the GIS. This analysis is discussed in *Pipe Analysis Using GIS Data*.

The quantity of CCTV data is too low to be statistically significant. Furthermore, the pipes selected for CCTV were not selected such that they would represent a large cross-section of the collection system. Rather, these pipes were selected based on areas that operators knew or thought to be of concern. The same pipes are often televised due to concerns related to defects or clogs; there is no systematic approach for televising the entire collection system. A true risk assessment using POF and COF scores for every pipe segment is not possible because there is such limited documented and representative data.

In order to make best use of the information available in WWD's GIS and from past CCTV efforts, the PG Team rated POF for those segments with existing CCTV data as well as implemented a process to prioritize segments in the entire collection system based on specific criteria defined by WWD. These efforts (described in the report below) should only be viewed as a starting point for risk assessment. Further data collection (extensive) and quality control is needed to perform a proper and complete risk assessment.

Table 2: Amount of Pipe Televised (total for collection system)

Unit	Total Pipe Length of Collection System	Total Pipe Length Televised	Percentage of Pipe Televised
Feet	585,004	33,140	5.7%
Miles	110.80	6.28	

Table 3: Amount of Pipe Televised by Pipe Size

Pipe Size	Number of Pipe Segments Televised	Total Pipe Length Televised (feet)	Total Pipe Length Televised (miles)	Total Pipe Length in System (miles)	% of Total Pipe Televised
6”	18	1,819	0.34	12.69	2.7
8”	72	12,195	2.31	48.64	4.7
10”	26	5,728	1.08	11.54	9.4
12”	10	1,889	0.36	8.48	4.2
15”	8	1,931	0.37	5.22	7.1
18”	3	751	0.14	5.25	2.7
21”	4	1,041	0.20	1.99	10.1
24”	3	451	0.09	1.81	5.0
27”	4	874	0.17	0.56	30.4
36”	6	1,845	0.35	2.19	16.0
42”	10	3,381	0.64	4.02	15.9
48”	2	1,235	0.23	0.9	25.6
Unknown	9	N/A	N/A	N/A	N/A
Totals	**169**	**33,140**	**6.28**	**106.16**	

Note: Not all pipe sizes in the system are listed above in the table since some pipe sizes have not been Televised. Therefore, the lengths on the table above will not add up to the total of 106.16. That total includes all pipe sizes, whether scoped or not.

Pipe Analysis Using CCTV Data

There were three basic sources of information for CCTV data: 1) paper records of CCTV work with some indication of start and stop manhole, 2) video recordings for most CCTV work, and 3) information from the defects layer of the GIS system that contains some information regarding defects observed through CCTV work. None of these three sources was comprehensive and it is unlikely, even collectively, that all three sources provide all of the information related to all of the CCTV work that has been done by WWD. For example, WWD has been inconsistent in getting all of the observed defects from the videos logged onto paper, and subsequently, into the GIS database.

Another **major data gap** is the lack of information showing whether the defects were repaired. Almost all defects show up as “unresolved” in the GIS defect layer even though it is highly likely that at least some of the defects have been resolved. In some cases, the same pipe was surveyed on different dates and defects that appeared in the earlier survey are not evident in the later survey. This result provides some evidence that the defect was probably resolved but the GIS does not reflect that. Discussions with operators also indicated that certain types of defects are typically fixed soon after discovery. Therefore, it is highly likely that some of the defects discovered during the CCTV work have been repaired in some way – whether a spot repair or partial pipe replacement – but there is insufficient data to determine which ones have or have not been addressed.

The type of pipe defects that were noted on either the paper forms or the CCTV videos include the following:

• **Crack at joint:** the pipe is cracked where two pipes connect • **Crack:** the pipe is cracked somewhere between connections with neighboring pieces of pipe • **Infiltration/inflow (I/I):** water can be seen flowing into the pipe through the walls of the pipe • **Blockage:** The flow is blocked with debris or fats, oils, and grease that prevents either all or most of the sewage flow • **Deformed:** The pipe is not round all the way around; it is deformed from its original shape to something else. • **MSGPipe:** MSG stands for missing pipe. Most likely the crown is missing from sewer gases eroding it away but it can be any missing piece of pipe where only the dirt that used to be around the pipe is acting as pipe.	• **Offset:** The pipe is not aligned properly and one piece of pipe is off-set from the other so that there is not a smooth flow path between the neighboring pipes. • **Point:** A place in the sewer where a point repair has been made • **Root Intrusion:** Roots have infiltrated into the sewer. • **Sag:** The pipe is sagging in one section where that piece of pipe is lower than the ones before and after it. This creates low spots where debris can collect. • **Undercut:** The material supporting the sewer has been undercut and is no longer able to hold the sewer up properly or will not be in the future • **Unknown:** There is some type of defect in the pipe but it does not fit one of the other categories or it is not possible to identify what is causing the problem. This could be due to poor video quality.

The National Association of Sewer Service Companies (NASSCO) has established procedures for assigning ratings to sewer pipe related to condition and risk assessment, based on observations made during CCTV activities. These procedures, or similar procedures, have not been employed by WWD. As a result, there is no data to support this type of analysis. Developing this level of detail and rating of the sewer pipes would require a significant televising and re-televising effort, which cannot be completed with resources allocated for this project. Instead, a simpler approach has been employed using the available data and knowledge of the WWD operators.

The PG Team's approach included the following steps:

- Discussions were held with WWD staff to determine if any of the defects noted in GIS were considered higher priority than any others or were considered to have more of an impact on the overall integrity or functioning of the pipe. The three defects selected as higher priority were: crack at joint, crack, and I/I. These defects were given higher rating in our analysis.

- All available paper records of CCTV data were reviewed to determine which defects were noted during the CCTV work. These paper records were compared to the video footage to see if they matched up.
- All available CCTV data was reviewed to determine if defects were noted during the survey.
- All defects by pipe were noted on an *Excel* spreadsheet, including type of defect and position of defect along pipe (length from initial manhole).
- The start and stop manhole IDs were noted for each pipe. These manhole IDs were used to determine a pipe asset ID using GIS. There is no easy way to relate pipe lengths to manholes with ID information provided, so a manual process was used. The process involved selecting the entry and exit manholes on the GIS map and determining which pipe was in-between. The pipe asset ID was then taken off the GIS map and entered into the spreadsheet.
- The pipe type, size, and length of videoed pipe were noted whenever available on either the paper records or in text on the video.
- In cases where some or all of this information was missing, the pipe asset ID (found as described above) was used to look up information in the database. The pipe type, diameter, or pipe length were gained in this manner when possible. In some cases, the data did not exist in either the spreadsheet or the video, and these pipes were marked “unknown” for those criteria. In cases where data existed in both places (GIS and video), spot checks were made of the two lengths to see how well they corresponded. In many cases, the distances were close. In others, they were different. The CCTV was generally used as more reliable data source given that the video may not have included the entire pipe segment, or the GIS may be incorrect for length.

As an initial screening and prioritization of the televised pipe data, a ranking system was developed. Personnel at WWD were asked which defects were the most critical to the sewer condition and which were less critical. Based on those discussions, it was determined that the major defects were: crack at joint, crack, and Infiltration/Inflow. These defects were considered “major defects” and were given 5 points each, while other defects were considered to be “minor defects” and were given 1 point each. Table 4 describes the rating system. This rating system provides a starting point to rank sewers for future inspection and repair. It is a system that can be revised over time as WWD gains more experience with asset management and more knowledge about the sewer system.

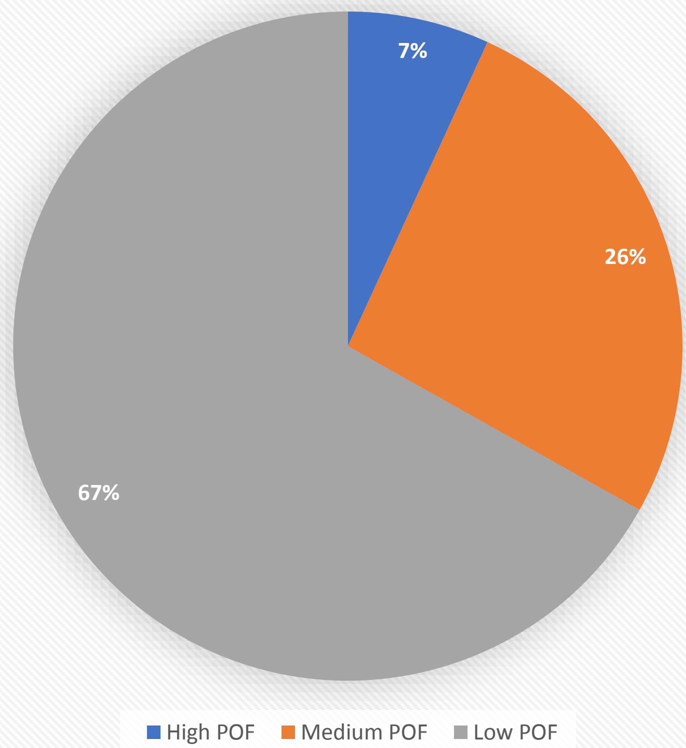
Table 4: Criteria for Probability of Failure for Wastewater Collection Pipes That Have Been Televised

Description	Number of Points	Total Score
Major defect: Crack at Joint	5 points per crack at joint	5 * Number of Cracks at Joint
Major defect: Crack	5 points per crack	5 * Number of Cracks
Major defect: I/I	5 points per I/I	5 * Number of I/I
Minor Defects	1 point per defect identified	1 * Number of minor defects

Each pipe segment that was Televised was assessed using the point totals in Table 4. Each major defect was given 5 points, each minor defect was given 1 point and the total number of points was calculated. The total scores ranged from a high of 121 to a low of 1. If all pipes were normalized together, the high scores would cause the vast majority of pipes to be a score of 1. This result does not help differentiate one pipe from another; rather it lumps a large number of pipes into the same category. To address this situation, the pipes were separated based on overall score first. Those pipes with a score 20 or greater were considered high POF and those with scores of less than 20 would be medium and low POF. The high POF pipes were then normalized to a 1 to 10 scale. The medium and low POF pipes were then normalized, as a group, to a 1 to 10 scale. Those pipes that scored 10 to 4 POF, were considered medium POF and those less than 4, low POF. It should be noted that the POF scores for the high POF pipes should NOT be compared to those in the medium and low categories.

The POF scores (1 to 10) indicate a probability of failure of the pipe segments, with higher scores indicating a greater risk of failure and lower scores indicating a lower risk of failure. The results of the analysis by pipe segment are contained in Appendix A, which has a table containing all pipe segments televised, their basin, location (generally indicated by street name), type and diameter, the number of defects observed and the normalized probability of failure (POF) score. The breakdown of the pipe segments based on POF is shown in Figure 1 below. **Of the pipes ranked, 7% were high POF, 26% were medium POF, and the remaining 67% ranked low POF**.

Figure 1: Percentage of Main Segment by POF (based on CCTV data)



A summary table and map are presented in Figure 2. The map shows locations of the 12 pipe segments with a high POF score.

Figure 2: Map of High POF Pipe from CCTV Data

Basin ID	Location	Asset ID	Material / Diameter	Crack at Joint	Crack	I/I	Other	Total Score	Normalized Score
Hilo	Not included in CoH GeoDatabase	31775	Vitrified Clay - 10”	8	8	0	41	121	10
Hilo	Ululani St - Puna side of Ponahawai St	30946	Vitrified Clay - 8”	2	21	0	0	115	10
Hilo	Keawe St / Puueo St	9710	Vitrified Clay - 10”	3	5	0	42	82	7
Hilo	Hoku St between Akialoha and Derby Ln	6734	Vitrified Salt Glaze - 6”	14	0	0	0	70	6
Hilo	Puueo / Ohai	3659	Vitrified Clay - 8”	4	6	0	10	60	5
Hilo	Kuawa St.	7921	Vitrified Clay - 8”	1	2	0	33	48	4
Hilo	Wailoa 48” Trunk Line	7888	Reinforced Concrete - 48”	4	0	2	0	30	2
Hilo	Kinoole St.	9875	Vitrified Clay - 6”	0	5	0	1	26	2
Hilo	Wailoa 48” Transition	7886	Reinforced Concrete - 48”	4	0	1	0	25	2
Kapehu	Kapehu - Within Parcel 3-5-007:028	1728	Vitrified Clay - 6”	1	3	0	1	21	2
Hilo	Banyan Dr.	5756	Vitrified Clay - 12”	0	4	0	1	21	2
Hilo	Kalanianaole Ave	18376	Reinforced Concrete - 27”	4	0	0	0	20	2

Pipe Analysis Using GIS Data

The entire wastewater collection system consists of approximately 111 miles of pipe, separated into 7 basins on the east and west sides of the island. The pipe is separated in the GIS database by pipe segment. A pipe segment is defined as the length of pipe between two manholes. Therefore, the pipe segments are not all the same length. The number of pipe segments found in each basin is shown in Table 5; there are 3,733 pipe segments in the collection system. However, the Heeia and Kilohana systems are not owned or maintained by the County. For this reason, no further analysis is provided for these basins.

Table 5: Number of Pipe Segments by Basin

East of West	Basin	Number of Segments
East	Hilo	1552
East	Kulaimano	183
East	Papaikou-Paukaa	286
West	Heeia	251
West	Kaloko	4
West	Kealakehe	1401
West	Kilohana	56
Totals		**3,733**

Each segment is given an asset ID number. In general, these asset IDs are unique. However, there are some situations in which duplicate ID numbers have been used. For example, 90000 series numbers were used at one time to indicate proposed pipe and, in some cases, pipe not owned by COH (e.g., private ownership.) The initial data dump with all pipes of all ownership types and including proposed pipes included 120 duplicate IDs. After further analysis, removing all proposed or inactive pipes and removing all pipes that were not owned by COH, there were still 11 pipes with duplicate asset IDs. The duplicates are shown below:

- Asset ID = 90007: 7 pipes listed as owned by the County with Active Status
- Asset ID = 9677: 2 pipes listed as owned by the County with Active Status
- Asset ID = 25335: 2 pipes listed as owned by the County with Active Status

The pipe segments with duplicate IDs have been left in the database. Eventually, these pipe segments will need to be renamed with unique ID numbers, or if the information about the ownership and status is incorrect, they will need to be removed altogether.

Method

The PG Team used GIS data to help expand the risk assessment beyond what was possible through CCTV data alone. Given that the majority of pipes have not been inspected with CCTV, the only way to develop a more robust prioritization is to use existing information available in GIS or information that could be developed from manipulating GIS data. Discussions were also held with WWD staff to determine which factors most likely indicated potential problems in a pipe segment. Pipes with a greater likelihood of problems would be considered higher priority for further investigation using CCTV in the future. Alternatively, these pipes may require further analysis in terms of operations to see if they are causing more back-ups or overflows due to issues such as capacity, slope, etc.

The factors identified by WWD staff as potential indicators that impact POF include: pipe material, depth of bury, diameter, installation date, and proximity to the shore while also at a relatively low surface elevation. Appendix B contains a description of how the factors were applied in the analysis. Some factors, particularly the proximity to shore, required an extensive process to determine whether the pipe segments were within "the buffer zone." The buffer zone was the terminology used to indicate if the pipe was within 600 feet of the shoreline and within 20 feet of sea level elevation.

Table 6 indicates the various factors that were used and how the points were applied. The factors were not given equal weight. The highest weight was given to concrete pipes in the buffer zone. This ranking was chosen in consultation with WWD staff. Based on their knowledge of pipes and how they perform throughout the system, pipes in the buffer zone were considered the most problematic because these pipes have the potential to be impacted by sea water, either sometimes or all the time. As sea level rises, this factor may become even more important. While high weight (5 points) was applied to any pipe in the buffer zone, a higher weight was given to the concrete pipes (5 extra points or 10 points total) based on discussions with WWD staff. While the initial assessment gave the highest ranking to pipes in the buffer zone, if future analysis or CCTV work determines that being close to the ocean has less impact than WWD initially thought, the weighting can be changed in the future to reflect this.

Table 6: Criteria for Probability of Failure for Prioritization of Wastewater Collection Pipes

Item	Category for Points	Number of Points	Comments
Pipe Within the Buffer Zone	Concrete Pipe within the Buffer Zone	10	The pipe is within 600 feet of the ocean in areas where the elevation is 20 feet or less from sea level
	Any Other Pipe Type Within the Buffer Zone	5	
	Pipe Outside the Buffer Zone	0	
Pipe Type	VCP	5	Unknown pipe type was given an average rating of 3.
	Cast Iron	4	
	Concrete or Unknown	3	
	PVC	2	
	Any Other Pipe Type	1	
Depth of Bury	Less Than 5 Feet	2	Pipe that was more shallowly buried was given a slightly higher rating given the potential for breaks to be slightly higher due to root intrusion, traffic, or potentially mechanical damage due to excavation.
	Greater Than 10 Feet	1	
	Unknown	1	
	Between 5 Feet and 10 Feet	0	
Diameter	8" Diameter or Less	2	Unknown was given a mid-range number of 1 for this factor
	Unknown	1	
	Greater than 8"	0	
Time Period of Pipe Installation	Installed in 1950s, 1960s or 1970s	5	In discussions with WWD personnel, pipe from the 50s, 60s, and 70s, has been performing more poorly than other ages of installation
	Unknown date	3	
	Any other date of installation	0	

In cases where the pipe characteristics were unknown, a higher moderate number of points was assigned for that characteristic. For example, if the pipe diameter was unknown, it was given 1 point, while if it was 8 inches or below it was given 2 points or 0 points if it was above 8 inches. The unknowns were given higher weight than the lowest score because the fact that the information is unknown poses some problems for the system.

For each pipe segment, the available data was assessed to determine which points should be applied. All points were added up to get a total score and then the highest total was used to normalize the scores from a 1 to 10 scale. The scores were normalized by Basin because the information will have greater meaning if pipes are compared to those in similar circumstances. The total score ranges, prior to normalization are shown in the table below. In two cases, Kaloko and Kilohana, all of the pipes had exactly the same characteristics (based on the chosen parameters) so all pipes scored the same number (10) on the normalization process. Further investigation may be necessary if there is a need to further differentiate this pipe. Because there are so few pipes in Kaloko it is probably not necessary. There are 56 segments in Kilohana so additional review may be warranted.

Table 7: Total Scores and Normalized Score Ranges by Basin

East or West	Basin ID	Total Score Range	Normalized Score
East	Hilo	1-15	1-10
East	Kulaimano	1-11	1-10
East	Papaikou-Paukaa	1-14	1-10
West	Kaloko	3	10
West	Kealakehe	1-21	1-10

In general, the pipes on the west side of the island had slightly higher scores than the east side. Because pipes in different basins are subject to slightly different conditions than pipes in other basins, the pipes were ranked based on the basin.

Tables 8 through 12 show the number of pipe segments by normalized score for each basin. Scores from 10 to 8 were considered high priority, scores from 7 to 4 were considered medium priority, and scores 3 or less were considered low priority. The tables are color-coded by priority (green = low, yellow = medium, red = high). Table 13 shows the number of segments overall by priority score.

Appendix C contains maps of the pipes with medium to high priority by basin and Appendix D contains a listing of every pipe segment in the system as well as the factors that were used to develop the priority ranking.

Table 8: Pipe Scores for Hilo

Normalized Score (1 to 10) By Basin	10	9	8	7	6	5	4	3	2	1
Number of Pipe Segments	4	17	2	66	165	144	262	193	569	130

Table 9: Pipe Scores for Kulaimano

Normalized Score (1 to 10) By Basin	10	9	8	7	6	5	4	3	2	1
Number of Pipe Segments	1	19	38	77	9	26	9	1	0	3

Table 10: Pipe Scores for Papaikou-Paukaa

Normalized Score (1 to 10) By Basin	10	9	8	7	6	5	4	3	2	1
Number of Pipe Segments	6	2	0	0	9	1	44	98	113	13

Table 11: Pipe Scores for Kaloko

Normalized Score (1 to 10) By Basin	10	9	8	7	6	5	4	3	2	1
Number of Pipe Segments	4	0	0	0	0	0	0	0	0	0

Table 12: Pipe Scores for Kealakehe

Normalized Score (1 to 10) By Basin	10	9	8	7	6	5	4	3	2	1
Number of Pipe Segments	1	12	13	22	48	102	89	165	737	212

Table 13: Summary Pipe Scores for All Basins

Normalized Score (1 to 10) By Basin	10	9	8	7	6	5	4	3	2	1
Number of Pipe Segments Included in The Score by Basin	4 Hilo 1 Kulaimano 6 Papaikou-Paukaa 4 Kaloko 1 Kealakehe	17 Hilo 19 Kulaimano 2 Papaikou-Paukaa 12 Kealakehe	2 Hilo 38 Kulaimano 13 Kealakehe	66 Hilo 77 Kulaimano 22 Kealakehe	165 Hilo 9 Kulaimano 9 Papaikou-Paukaa 48 Kealakehe	144 Hilo 26 Kulaimano 1 Papaikou-Paukaa 102 Kealakehe	262 Hilo 9 Kulaimano 44 Papaikou-Paukaa 89 Kealakehe	193 Hilo 1 Kulaimano 98 Papaikou-Paukaa 165 Kealakehe	569 Hilo 113 Papaikou-Paukaa 737 Kealakehe	130 Hilo 3 Kulaimano 13 Papaikou-Paukaa 212 Kealakehe
Total Number of Pipe Segments	**16 ASSETS**	**50 ASSETS**	**53 ASSETS**	**165 ASSETS**	**231 ASSETS**	**273 ASSETS**	**404 ASSETS**	**457 ASSETS**	**1419 ASSETS**	**358 ASSETS**

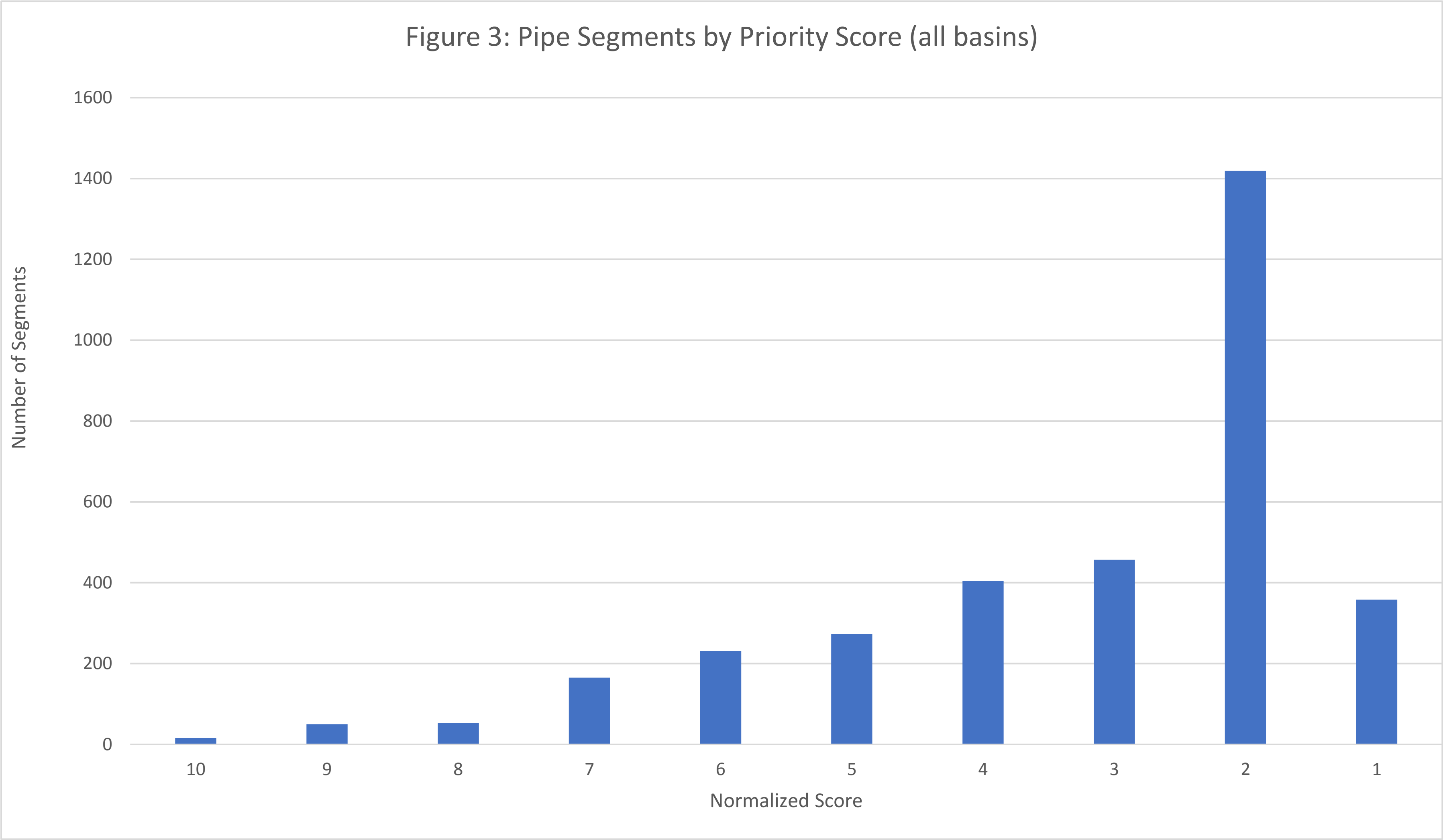


Figure 3: Pipe Segments by Priority Score (all basins)
Number of Segments
1600
1400
1200
1000
800
600
400
200
0
10
9
8
7
6
5
4
3
2
1
Normalized Score

The results of the prioritization scoring for wastewater collection pipe can be used to determine the highest priority for further analysis through future CCTV efforts or other means. This approach is described in *Selection of Pipes for CCTV*, below.

Comparison of CCTV Data to Pipe Prioritization

Although there is limited data from the CCTV work, the PG Team was able to perform some comparisons between pipes that were showing signs of distress (high numbers of defects) and how that same pipe ranked in the overall prioritization process utilizing GIS data. Table 16 compares high POF score pipe from the CCTV analysis with its score in the overall pipe prioritization. Table 17 compares medium and low POF score pipes to the overall pipe prioritization. The two groups were split because, as was discussed above, the two groups were normalized separately.

Table 16: Comparison of High POF Pipes from CCTV Data to Overall Prioritization

Basin ID	Location	Asset ID	Type & Size of Pipe	Normalized Score	Prioritization Score
Hilo	Puueo / Ohai	31775	Vitrified Clay - 10"	10	3
Hilo	Ululani St - Puna side of Ponahawai St intersection	30946	Vitrified Clay - 8"	10	2
Hilo	Keawe St / Puueo St	9710	Vitrified Clay - 10"	7	3
Hilo	Hoku St between Akialoha and Derby Ln	6734	Vitrified Salt Glaze - 6"	6	3
Hilo	Puueo / Ohai	3659	Vitrified Clay - 8"	5	4
Hilo	Kuawa St.	7921	Vitrified Clay - 8"	4	4
Hilo	Wailoa 48" Trunk Line	7888	Reinforced Concrete - 48"	2	5
Hilo	Kinoole St.	9875	Vitrified Clay - 6"	2	4
Hilo	Wailoa 48" Transition	7886	Reinforced Concrete - 48"	2	5
Kapehu	Kapehu - Within Parcel 3-5-007:028	1728	Vitrified Clay - 6"	2	N/A
Hilo	Banyan Dr.	5756	Vitrified Clay - 12"	2	6
Hilo	Kalanianaole Ave	18376	Reinforced Concrete - 27"	2	8

Table 17: Comparison of Medium and Low POF Pipes from CCTV Data to Overall Prioritization

Score From CCTV	Number of Pipes with the CCTV Score	Scores from Overall Prioritization			
		Number of Pipes with High Priority (10 – 8)	Number of Pipes with Medium Priority (7 – 4)	Number of Pipes with Low Priority (Less than 3)	Number of Pipes with Insufficient Information to Compare
10	3	1	1		1
9	1		1		
8	6			1	5
7	4			4	
6	6			3	3
5	3	3			
4	14	1	2	11	
3	15		12	2	1
2	13		8	5	
1	98	8	44	20	26

The comparison described above is not intended to prove the accuracy of the prioritization process; however, it does indicate that the prioritization process may need to consider other factors or weight factors differently. The lower POF score pipe from CCTV analysis is showing up as higher priority and the higher POF score pipe is generally not showing up as high priority.

There are two potential options: 1) continue with the prioritization as already conducted and do some random sampling of the pipe using CCTV to determine if there is sufficient correlation, or 2) revise the prioritization process and compare again with the CCTV data that already exists.

Recommendations

Based on the analyses described above, the PG Team offers the following recommendations for implementing better horizontal asset analysis processes in the future.

1. **Implement a more robust strategy for CCTV prioritization:** The most important recommendation is to implement a more robust process for selecting pipes to CCTV than what is used currently. Some of the pipes currently being televised more often do seem to have a considerable number of defects; however, others seem fine. WWD should review the factors selected for CCTV prioritization to determine if there are any factors that should be added, removed, or weighted differently. Following review, the analysis can be repeated. Implementing a more strategic prioritization approach will help assure that WWD is getting the most value out of its CCTV efforts. WWD should review the *Selection of Pipes for CCTV* section (below) for potential options to improve CCTV prioritization. The main issue is to use the CCTV as a tool to evaluate pipe condition and potential for failure and to ensure that the resources committed to CCTV are being well spent.

2. **Separate CCTV prioritization and cleaning prioritization processes:** It is important to distinguish between a pipe that needs to be cleaned often and one that needs to be televised often. Cleaning and CCTV activities should be separated into two functions. When pipes need to be cleaned often, they should be put into a rotation for cleaning, and should be televised only when other factors

indicate. CCTV should be used when detailed information about pipe status and condition is required or desired. Efficiencies should be gained by separating the two processes.

3. **Close data gaps for manholes, discharges, services, and valves:** There is insufficient data to fully assess POF and COF for horizontal assets, other than pipe. The assets of particular concern are manholes, discharges, services, and valves (those located in the field, not in treatment plants or pump stations). Basic data is missing for most of these assets and there is no useful operational data documented in an easily accessible manner for any of them. Going forward, WWD should take every opportunity to add basic characterization as well as operational data to the GIS database as described below.
    - *For basic data*: Any time field crews are working with horizontal assets, basic data should be collected for each asset and that data should be provided back to the GIS personnel. This data collection process can be completed using hand-held devices, or it can be written on paper and provided to the GIS personnel. In either case, a formalized procedure should be established. In particular, there is considerable missing data on discharges, services, and valves, and some missing data on manholes. Once this type of data is collected, an analysis of these types of horizontal assets can be performed. Developing a standard operating procedure (SOP) for this type of data collection, including what types of data to collect and how to collect it, should be considered.
    - *Operational data* regarding problems that have been experienced in the field, as well as the steps taken to correct the concerns, should be added to the database whenever possible. As an example, if a service has had issues and actions had to be taken to correct the problem, there needs to be a way to tie that information to the asset.

    When collecting data of all types, it is important to assure that the data is tied to the asset ID.

4. **Implement field verification of GIS data:** The GIS system is only as accurate as the information it was based on. Initially, this level of accuracy is the same as the accuracy of the sources, such as design drawings, as-builts and people's memories of asset locations, which is going to be limited. Over time, the accuracy can be increased when field personnel provide information back to the GIS personnel regarding any inaccuracies. The inaccuracies may relate to size, material, location, length, slope, or depth, and may be identified through CCTV work, sewer cleaning, or repair work. It is not uncommon to have some wrong information in the GIS database initially, but the situation can only improve with the implementation of a robust process of field data verification. This type of process will require standard operating procedures for how field personnel should report data and an approach to hold individuals accountable for sharing the information between the field and GIS personnel.

5. **Make sure operational data is available to inform prioritization:** Operational data regarding pipes is very helpful in asset management analyses. For example, information regarding pipe segments that experience frequent overflows or clogs can inform prioritization efforts. Spills and overflows are required to be reported but other problems are not, such as clogs. Some of this information is contained in the spills and bypass layer in GIS, however, some of the data is missing. Similar to recommendation number 4, there should be standard operating procedures for ensuring that spills, overflows, clogs, areas cleaned and other operational data regarding sewers is conveyed in a timely

manner to the GIS personnel. There should be some type of accountability to ensure that the information is conveyed and that it is added to the system.

6. **Create a CCTV data collection SOP:** The CCTV process is an excellent time to learn information about the wastewater collection system. Sometimes, this information is collected either in paper or on the video, by adding text and sometimes it is not effectively captured. In addition, sometimes the information is provided to the GIS system, but it isn't always provided. An SOP should be written to require specific and consistent data capture during the CCTV process. The SOP should include a description of the type of information to collect, when to collect it, how to collect it, and how to provide it to the GIS personnel. At a minimum, it would be helpful to have, the following: pipe asset ID, start and stop manhole with ID, diameter, pipe type, length of pipe videoed and length of pipe segment if entire pipe is completed, and defects (type and location).

7. **Verify the status of all defects included in GIS:** For all work completed on pipes, such as the repair of the cracks, information should be provided to the GIS personnel in a readily usable format so that the issue can be changed to "resolved." Currently almost every defect in the system is labeled as "unresolved" even though there is evidence to suggest that it has been resolved (e.g., evidence from later CCTV video and discussions with field personnel.) Keeping up with the resolution of defects would allow the defects layer to be of greater value in future analysis of horizontal pipe assets.

8. **Develop a condition rating process for evaluating the condition of sewer pipe using the CCTV data**: There are already established processes that could be used (e.g., NASSCO) or WWD could develop one of their own. WWD may wish to determine what processes are used by other counties in Hawai'i, if any, to see if one of those approaches might work. If a process from another county is used, it would give WWD peers to learn from as well as pose questions to if problems arise. In any case, the CCTV data can be more meaningful if it is used to develop a pipe condition rating. This rating should be added to the GIS.

9. Properly implementing a rating system for pipe using CCTV data is likely to require staff training. At a minimum, line maintenance personnel from both sides of the island should be trained. Additionally, supervisory staff may also benefit from attending this type of training.

10. **Include depth of bury in GIS for pipe segments:** The depth of bury should be included in GIS if it is a key criterion for identifying pipe segment POF. This data can be developed from manhole depths but not easily. If manholes are tied to a specific pipe, the depth field can be populated.

11. **Add risk or priority data to GIS:** Eventually, the risk or priority of the pipes needs to be added to the GIS database. The prioritization in this report is too preliminary to include. After a prioritization process is finalized and verified using CCTV, it can be added to the pipe assets using the asset ID. Pipes can then be color-coded based on priority to show that information visually.

12. **Improve GIS symbology:** The GIS symbology could be improved. There are some industry standard symbols that WWD might wish to use to make it easier for new personnel or contractors to work with the GIS maps and associated data.

13. **GIS could include different layers for different pipe types:** The sewer mains layer may benefit from being split into different layers. The pipe could be placed in different layers that can be turned on or off as desired based on the user's needs. The pipe types are: force, gravity, outfall, syphon, etc. If each of these was on a different layer, it would be easier to find certain types of pipe in the field as only those types would need to be displayed on the map. This can make easier for operators to target specific locations for specific maintenance activities.

14. **Remove duplicate pipe IDs from GIS:** As discussed in the report, there are duplicate asset ID numbers for some pipes, particularly in the Hilo Basin. Specifically, the duplicate pipe IDs were observed as follows:

    In Hilo:

    - Asset ID 90003: 45 pipes, proposed
    - Asset ID 90004: 64 pipes, proposed
    - Asset ID 90011: 7 pipes, active, and owned by WWD
    - Asset ID 9677: 2 pipes, active, but appear to be the same pipe entered twice
    - Asset ID 25335: 2 pipes, active, but appear to be the same pipe entered twice

    In Kealakehe:

    - Asset ID 90007: 9 pipes, active, but under private ownership
    - Asset ID 90009: 4 pipes, proposed

    In all, 133 pipe segments show up in the GIS data base with duplicate asset IDs. The duplicate IDs related to proposed pipe segments and private ownership can be eliminated by the filters that are normally put on the GIS system to keep field personnel from seeing these pipes. For the most part, they do not need to access the information. It is recommended that even these proposed pipes be given unique identifiers, but it is not absolutely necessary. For the pipes that are not proposed or under private ownership, the duplicate IDs should be eliminated. It is critical that all assets have unique ID numbers as it is the only way to distinguish one asset from another and is the key means of tying information together from one source to another.

15. For pipe that is proposed, an SOP should be established to describe how these pipes are to be entered, what the ID number will be, and how they will be distinguished from pipe that is active and installed in the system. The establishment of an SOP would help ensure that the procedure remains consistent even if there is staff turnover in the future.

Selection of Pipes for CCTV

The analysis described in this report should be used as a starting point for WWD to establish a more robust and proactive CCTV program. The success of a CCTV program is closely tied to the effectiveness of the strategy used to select and prioritize pipe for televising. There are different ways pipes can be selected, and each method has its merits and shortcomings. Some useful approaches for implementing a successful CCTV program are included below:

1. **Select a statistical sampling of the total pipes in the network:** In this approach the pipe in the collection system is categorized based on pipe type, size, location, age, condition, and any other descriptive factors to determine pipe "cohorts." A pipe cohort would be a set of pipes of similar characteristics. For example, all the 6-inch clay pipe in the Hilo basin of the age range 50 to 70 years old. The amount of pipe in each cohort would be identified by either pipe segment or pipe length. Then pipe can be selected at random from each cohort for CCTV analysis. Based on the results of the CCTV work, the condition of each sewer pipe televised would be assessed. Because this data would be statistically significant, the condition of the televised pipe could be used to provide an overall evaluation of the entire collection system.

   The benefit of this approach is that it would be possible to make some judgements about the overall system's condition and to use this information in developing a long-term pipe replacement program.

   The challenges with this approach include the need to categorize each pipe cohort. A fair amount of work would be required to complete that analysis. Pipes would then need to be selected at random in a quantity sufficient to have a statistical sampling. This work would need to be in addition to any CCTV work that is done on pipes with known problems so resources may be insufficient to complete the necessary work.

2. **CCTV all the pipe in the system on a rotating basis**: Based on the 110.8 miles of pipe in the WWD collection system, for the whole system to be reviewed even on a 10-year basis, 11 miles of pipe would have to be investigated every year. Given that only slightly more than 6 miles of pipe have been televised over the past several years, this pace of CCTV seems unrealistic. If half as much pipe was completed (5.5 miles per year), it would take 20 years to view every pipe. That schedule may not be fast enough to make the collection of the data useful.

   The benefit of this approach is that all the pipe would be viewed and the entire system's condition could be assessed with actual data from each pipe. Furthermore, the GIS system could be verified and corrected as the CCTV work was being completed.

   The challenges with this approach are the need for a much faster pace of work than is currently being achieved and the need for significant additional resources. It is hard to conclude that the money, personnel, equipment, and/or contracts that would be required to complete the work are the best expenditure of resources for the utility. The condition of vertical assets in some of the treatment plants and pump stations, as well as other resource needs, such as future regulatory compliance would be considered higher priorities than CCTV.

3. **Use a prioritization approach of pipe to determine which pipes require the CCTV work the most**: A prioritization approach should consider all that is readily known about the system and pipes. At this point, that information includes what is in the GIS database, which is limiting in many cases.

The benefit of this approach is that pipe would be televised based on thoughtful prioritization, completing those segments with a higher POF and/or COF first.

The challenges of this approach are the establishment of the prioritization metrics. The approach outlined in this report provide a starting point, but would need further refinement before adoption and full implementation. The current information – the GIS database – does not include sufficient operational data to improve the prioritization process. In the future, this method would be greatly enhanced by combining operational data, operational experience, and basic attribute information from the GIS.

4. **Select pipes for CCTV based only on past experience**: This is the approach that is currently employed. There are some merits to this, but there are also some shortcomings. The positive of this approach is to directly tie operator experience to the CCTV process. The challenges of this approach are that experience is not always the best judge overall.

Appendix A:

Pipe Segment POF based on CCTV Data

Table A-1: High POF Pipes from CCTV Data

Basin ID	Location	Asset ID	Type & Size of Pipe	Number of Cracks at Joint	Number of Cracks	Number of I/I Noted	Number of Other Defects	Normalized Score
Hilo	Puueo / Ohai	31775	Vitrified Clay - 10"	8	8	0	41	10
Hilo	Ululani St - Puna side of Ponahawai St intersection	30946	Vitrified Clay - 8"	2	21	0	0	10
Hilo	Keawe St / Puueo St	9710	Vitrified Clay - 10"	3	5	0	42	7
Hilo	Hoku St between Akialoha and Derby Ln	6734	Vitrified Salt Glaze - 6"	14	0	0	0	6
Hilo	Puueo / Ohai	3659	Vitrified Clay - 8"	4	6	0	10	5
Hilo	Kuawa St.	7921	Vitrified Clay - 8"	1	2	0	33	4
Hilo	Wailoa 48" Trunk Line	7888	Reinforced Concrete - 48"	4	0	2	0	2
Hilo	Kinoole St.	9875	Vitrified Clay - 6"	0	5	0	1	2
Hilo	Wailoa 48" Transition	7886	Reinforced Concrete - 48"	4	0	1	0	2
Kapehu	Kapehu - Within Parcel 3-5-007:028	1728	Vitrified Clay - 6"	1	3	0	1	2
Hilo	Banyan Dr.	5756	Vitrified Clay - 12"	0	4	0	1	2
Hilo	Kalanianaole Ave	18376	Reinforced Concrete - 27"	4	0	0	0	2

Table A-2: Medium POF Pipes from CCTV Data

Basin ID	Location	Asset ID	Type & Size of Pipe	Number of Cracks at Joint	Number of Cracks	Number of I/I Noted	Number of Other Defects	Normalized Score
Hilo	Ohai St / Wainaku St	21	VCP - 8"	1	2	0	1	10
Hilo	Near 144 Kapiolani Street	1183	Unknown - Unknown	1	0	2	1	10
Kulaimano	Kumula St near Kalika Pl	1430	Unknown - 8"	1	0	2	1	10
Kulaimano	Kumula St near Kaakepa St intersection	1550	Unknown - 10"	0	0	3	0	9
Hilo	Kalanianaole Ave	1656	Reinforced Concrete - 48"	1	1	0	3	8
Kapehu	Kapehu Camp / Latteral	1701	PVC - 6"	0	0	0	13	8
Kapehu	Kapehu Camp	1702	PVC - 8"	0	2	0	2	8
Kapehu	Kapehu Camp	1706	PVC - 8"	0	0	2	2	8
Kapehu	Kapehu - Within Parcel 3-5-007:030	1729	VCP - 6"	0	2	0	2	8
Papaikou-Paukaa	Papaikou - Parcel 2-7-004:119	1781	PVC - 12"	0	1	1	2	8
Papaikou-Paukaa	Papaikou	1783	PVC - 12"	0	2	0	1	7
Papaikou-Paukaa	Mai Way	2113	Unkown - 8"	1	1	0	1	7
Papaikou-Paukaa	Mai Way	2115	Unkown - 8"	0	2	0	1	7
Papaikou-Paukaa	Mai Way	2117	Unkown - 8"	0	2	0	1	7
Papaikou-Paukaa	Mai Way	2121	Unkown - 6"	0	2	0	0	6
Papaikou-Paukaa	Mai Way	2122	Unkown - 8"	0	0	2	0	6
Papaikou-Paukaa	Kulana St	3338	VCP - 6"	1	1	0	0	6

Basin ID	Location	Asset ID	Type & Size of Pipe	Number of Cracks at Joint	Number of Cracks	Number of I/I Noted	Number of Other Defects	Normalized Score
Hilo	Kauila St in Wainaku	3666	VCP - 8"	2	0	0	0	6
Hilo	Amauulu Rd	3729	VSGD - 6"	2	0	0	0	6
Hilo	Banyan Dr.	5760	RCP - 15"	1	0	0	4	6
Hilo	Banyan Dr.	5762	RCP - 15"	1	0	0	3	5
Hilo	Banyan Dr.	5764	RCP - 15"	1	0	0	3	5
Hilo	Banyan Dr.	5766	RCP - 15"	0	0	0	8	5
Hilo	Banyan Dr.	5768	RCP - 15"	0	0	0	7	4
Hilo	Line leading into Banyan SPS	5771	Unknown - 15"	1	0	0	2	4
Hilo	Kalanianaole near Banyan Way	5787	PVC - 12"	1	0	0	1	4
Hilo	Banyan Way and Kalanianaole St intersection	5789	Unknown - 15"	0	0	0	6	4
Hilo	Kalanianaole Ave	6142	CCRF - 36"	0	0	0	6	4
Hilo	Kalanianaole Ave	6143	CCRF - 36"	0	0	0	6	4
Hilo	Kalanianaole Ave	6144	Reinforced Concrete - 42"	0	0	0	6	4
Hilo	Kalanianaole Ave	6146	Reinforced Concrete - 42"	0	0	1	1	4
Hilo	Kalanianaole Ave	6148	Reinforced Concrete - 42"	1	0	0	1	4
Hilo	Kalanianaole Ave	6150	Reinforced Concrete - 48"	0	0	1	1	4
Hilo	Kalanianaole Ave	6152	Reinforced Concrete - 48"	0	1	0	1	4
Hilo	Kalanianaole Ave	6154	Reinforced Concrete - 48"	0	1	0	1	4
Hilo	Kalanianaole Ave	6156	Reinforced Concrete - 48"	0	1	0	1	4

Basin ID	Location	Asset ID	Type & Size of Pipe	Number of Cracks at Joint	Number of Cracks	Number of I/I Noted	Number of Other Defects	Normalized Score
Hilo	Kalanianaole Ave	6158	Reinforced Concrete - 48"	0	1	0	1	4
Hilo	Kalanianaole Ave	6160	Reinforced Concrete - 48"	0	1	0	0	3
Hilo	Kalanianaole Ave	6162	Reinforced Concrete - 48"	0	0	1	0	3
Hilo	Kalanianaole Ave	6164	Reinforced Concrete - 48"	0	1	0	0	3
Hilo	Kalanianaole Ave.	6205	VCP - 8"	1	0	0	0	3
Hilo	Kalanianaole Ave.	6207	VCP - 8"	0	0	0	5	3
Hilo	Kalanianaole Ave.	6209	VCP - 8"	1	0	0	0	3
Hilo	Kalanianaole Ave.	6211	VCP - 8"	0	0	0	5	3
Hilo	Kalanianaole Ave.	6213	VCP - 8"	1	0	0	0	3
Hilo	Kalanianaole Ave.	6215	VCP - 8"	0	1	0	0	3

Table A-3: Low POF Pipes from CCTV Data

Basin ID	Location	Asset ID	Type & Size of Pipe	Number of Cracks at Joint	Number of Cracks	Number of I/I Noted	Number of Other Defects	Normalized Score
Hilo	Kalanianaole Ave.	6217	VCP - 10"	0	0	0	4	3
Hilo	Kalanianaole Ave	6225	VCP - 10"	0	0	0	4	3
Hilo	Kalanianaole Ave	6239	VCP - 8"	0	0	0	4	3
Hilo	Kalanianaole Ave	6241	VCP - 8"	0	0	0	4	3
Hilo	Kalanianaole Ave	6245	VCP - 8"	0	0	0	4	3
Hilo	Kalanianaole Ave	6246	VCP - 8"	0	0	0	4	3
Hilo	Kalanianaole Ave	6254	RCP - 10"	0	0	0	3	2
Hilo	Kalanianaole Ave	6257	RCP - 10"	0	0	0	3	2
Hilo	Kalanianaole Ave	6259	RCP - 10"	0	0	0	3	2
Hilo	Dive Shop/Kojis	6410	PVC - 10"	0	0	0	3	2
Hilo	Ponahawai Street - Kinoole St	6431	RCP - 24"	0	0	0	3	2
Hilo	Ponahawai Street	6432	PVC - 8"	0	0	0	3	2
Hilo	Beckley Ln	6439	PVC - 8"	0	0	0	3	2
Hilo	Dive Shop/Kojis	6442	PVC - 10"	0	0	0	3	2
Hilo	Kilauea Ave near 2-2-008:001	6455	VCP - 8"	0	0	0	3	2
Hilo	Ponahawai Street	6513	Clay - 6"	0	0	0	3	2
Hilo	Kilauea Ave near 2-2-008:048	6516	VCP - 8"	0	0	0	3	2
Hilo	Kinoole St / Aala St	6541	Clay - 8"	0	0	0	3	2
Hilo	Pauahi St.	6606	VCP - 8"	0	0	0	3	2
Hilo	Pauahi St.	6611	VCP - 8"	0	0	0	2	1
Hilo	Aupuni St.	6616	VCP - 8"	0	0	0	2	1
Hilo	Aupuni St.	6622	VCP - 8"	0	0	0	2	1
Hilo	Aupuni St.	6624	VCP - 8"	0	0	0	2	1
Hilo	Aupuni St.	6626	VCP - 8"	0	0	0	2	1
Hilo	Kilavea Ave.	6670	VCP - 8"	0	0	0	2	1

Basin ID	Location	Asset ID	Type & Size of Pipe	Number of Cracks at Joint	Number of Cracks	Number of I/I Noted	Number of Other Defects	Normalized Score
Hilo	Kilauea Ave between Wilson and Hoku St	6672	VSGD - 8"	0	0	0	2	1
Hilo	Kilavea Ave.	6674	VSGD - 8"	0	0	0	2	1
Hilo	Kilavea Ave.	6676	VCP - 8"	0	0	0	2	1
Hilo	Aupuni St.	6678	VCP - 8"	0	0	0	2	1
Hilo	Aupuni St.	6679	VCP - 8"	0	0	0	2	1
Hilo	Pauahi St.	6712	VCP - 8"	0	0	0	2	1
Hilo	30 Waihau Ln, Hilo, HI	7458	UNK - UNK	0	0	0	2	1
Hilo	Wailoa State Park along Park Rd	7881	VCP - 15"	0	0	0	2	1
Hilo	Kuawa St	7902	UNK - 10"	0	0	0	2	1
Hilo	Ponahawai Street	9978	Reinforced Concrete - 24"	0	0	0	2	1
Hilo	Kapiolani Street	10022	VCP - 6"	0	0	0	2	1
Hilo	Waianuenue Ave near Hilo Annex	10055	VSGD - 10"	0	0	0	2	1
Hilo	SMH # 10243 to SMH # 10245 by Kukuau St. - 2nd Sag	10246	VSGD - 8"	0	0	0	2	1
Hilo	Kapiolani Street	10261	VSGD - 6"	0	0	0	2	1
Hilo	441 Haili St	10318	PVC - 18"	0	0	0	1	1
Hilo	Halai Hill at end of Halai St	10422	VCP - 6"	0	0	0	1	1
Hilo		10426	VCP - 6"	0	0	0	1	1
Hilo	235 feet from MH 10655 on Waianuenue Ave	10657	VCP - 10"	0	0	0	1	1
Hilo	Waianuenue Ave near Rainbow Falls	10706	VCP - 10"	0	0	0	1	1
Hilo	Kukuau St just mauka of SMH 29063	11002	VCP - 8"	0	0	0	1	1

Basin ID	Location	Asset ID	Type & Size of Pipe	Number of Cracks at Joint	Number of Cracks	Number of I/I Noted	Number of Other Defects	Normalized Score
Kealakehe	Pawai Pl at Kaiwi St intersection	11535	VCP - 6"	0	0	0	1	1
Hilo	Lanihau	13697	VCP - 12"	0	0	0	1	1
Hilo	Lanihau	13702	VCP - 8"	0	0	0	1	1
Kealakehe	Alii Dr near Kahikina Ln	13816	VCP - 12"	0	0	0	1	1
Kealakehe	Area between Hanama Pl and Alii Dr	13825	VCP - 8"	0	0	0	1	1
Kealakehe	Alii Dr	14096	VCP - 12"	0	0	0	1	1
Hilo	Pauahi St.	15256	VCP - 8"	0	0	0	1	1
	Kilauea St	15325	VCP - 6"	0	0	0	1	1
Hilo	Kalanianaole Ave	18286	Reinforced Concrete - 42"	0	0	0	1	1
Hilo	Kalanianaole Ave	18388	Reinforced Concrete - 21"	0	0	0	1	1
Hilo	Kalanianaole Ave	18564	RCP - 18"	0	0	0	1	1
Hilo	Kalanianaole Ave	18566	RCP - 18"	0	0	0	1	1
Hilo	Kalanianaole Ave	18708	Clay - 10"	0	0	0	1	1
Hilo	Kalanianaole Ave.	18712	VCP - 10"	0	0	0	1	1
Hilo	Kalanianaole Ave.	18714	VCP - 10"	0	0	0	1	1
Hilo	Kal Ave near 2-1-018:011	18715	Clay - 10"	0	0	0	1	1
Hilo	Kalanianaole Ave	19135	Reinforced Concrete - 27"	0	0	0	1	1
Hilo	Kalanianaole Ave	19136	Unknown - 27"	0	0	0	1	1
Hilo	Kalanianaole Ave	19146	Reinforced Concrete - 24"	0	0	0	1	1
Hilo	Nahale'a Ave.	19453	PVC - 8"	0	0	0	1	1
Hilo	Banyan Dr.	19685	Unknown - Unknown	0	0	0	1	1
Hilo	Puueo	20230	DIP - 10"	0	0	0	1	1
Hilo	Banyan Dr.	20366	VCP - 8"	0	0	0	1	1

Basin ID	Location	Asset ID	Type & Size of Pipe	Number of Cracks at Joint	Number of Cracks	Number of I/I Noted	Number of Other Defects	Normalized Score
Hilo	Ululani St near Police Station	20599	PVC - 8"	0	0	0	1	1
Hilo	Banyan Dr.	22449	VCP - 12"	0	0	0	1	1
Hilo	Off Banyan Dr in golf course area	23132	Unknown - Unknown	0	0	0	1	1
Hilo	Kalanianaole Ave	23285	VCP - 8"	0	0	0	1	1
Hilo	Kalanianaole Ave	23300	Reinforced Concrete - 27"	0	0	0	1	1
Hilo	Kalanianaole Ave	23304	RCP - 18"	0	0	0	1	1
Hilo	Kalanianaole Ave.	23306	VCP - 10"	0	0	0	1	1
Hilo	Kalanianaole Ave.	23308	VCP - 10"	0	0	0	1	1
Hilo	Kalanianaole Ave.	23310	VCP - 8"	0	0	0	1	1
Hilo	Kalanianaole Ave	23312	Reinforced Concrete - 27"	0	0	0	1	1
Kealakehe	Kaahumanu Pl	23808	VCP - 12"	0	0	0	1	1
Hilo	Wailoa 42" Trunk Line	24006	Reinforced Concrete - 42"	0	0	0	1	1
Hilo	Kapiolani St	24296	Unknown - 6"	0	0	0	1	1
Hilo	Kukuau St	24299	VSGD - 8"	0	0	0	1	1
Hilo	Kauila St in Wainaku	25362	VCP - 8"	0	0	0	1	1
Hilo	Hilo Outfall - Station 5+95	27131	RCP - 48"	0	0	0	1	1
Hilo	Hilo Outfall - Station 41+68 to 41+92	27142	RCP - 48"	0	0	0	1	1
Hilo	Kilauea Ave	27325	VCP - 8"	0	0	0	1	1
Hilo	Kawili St	28667	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa / Mamane / Rickard St	29261	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa / Mamane	29340	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa / Mamane St	29345	PVC - 8"	0	0	0	1	1

Basin ID	Location	Asset ID	Type & Size of Pipe	Number of Cracks at Joint	Number of Cracks	Number of I/I Noted	Number of Other Defects	Normalized Score
Honokaa	Honokaa / Mamane	29349	PVC - 10"	0	0	0	1	1
Honokaa	Honokaa / Mamane	29350	PVC - 10"	0	0	0	1	1
Honokaa	Honokaa / Mamane	29351	PVC - 10"	0	0	0	1	1
Honokaa	Honokaa / Mamane	29352	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa / Mamane	29353	PVC - 10"	0	0	0	1	1
Honokaa	Honokaa / Lehua	29355	PVC - 10"	0	0	0	1	1
Honokaa	Honokaa / Lehua	29356	PVC - 10"	0	0	0	1	1
Honokaa	Honokaa / Koniaka St	29357	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa / Puakalo	29360	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa Akia St	29362	PVC - 6"	0	0	0	1	1
Honokaa	Honokaa / Pookalo	29363	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa Gym	29364	PVC - 6"	0	0	0	1	1
Honokaa	Honokaa Gym	29365	PVC - 6"	0	0	0	1	1
Honokaa	Honokaa / Pakalana	29372	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa / Pakalana	29373	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa / Pakalana	29374	PVC - 8"	0	0	0	1	1
Honokaa	Honokaa / Pakalana	29375	PVC - 8"	0	0	0	1	1
Hilo	Andrade Rd.	29459	PVC - 8"	0	0	0	1	1
Hilo	Ponahawai Street	30839	Clay - 6"	0	0	0	1	1
Hilo	Kukuau St - Just below SMH 29063	30889	Clay - 8"	0	0	0	1	1
Hilo	Kalanianaole Ave	31890	Unknown - Unknown	0	0	0	1	1
Hilo	Lanikaula St / Off-Site	31981	PVC - 21"	0	0	0	1	1
Hilo	Lanikaula St / Off-Site	31982	PVC - 15"	0	0	0	1	1
Hilo	Lanikaula St / Off-Site	31983	PVC - 15"	0	0	0	1	1
Kapehu	Kapehu Camp - Koi Loop	32058	Unknown - Unknown	0	0	0	1	1
Hilo	Banyan Dr.	32132	Unknown - Unknown	0	0	0	1	1
Hilo	Kapiolani Street	32623	DIP - 8"	0	0	0	1	1

Appendix B:

GIS Data Analysis

Obtaining Horizontal Asset Criticality Analysis Data through GIS

The data required for the analysis of pipe criticality came from WWD's GIS. The GIS files were obtained by the PG Team and the underlying data behind the GIS data layers was downloaded to an *Excel* spreadsheet. The intent was to use the downloaded data to determine a prioritization and criticality of wastewater pipes, and determine the following aspects of the pipes:

- Pipe materials (pipe type)
- Pipe size
- Pipe age/date of installation
- Distance from ocean shoreline (termed "within the Buffer Zone" and defined as within 600 feet of the shoreline when it was also within 20 feet of sea level)
- Depth of bury (less than 5 feet, greater than 10 feet)

These factors were applied to all pipes within the wastewater collection system.

While some of the factors were easy to analyze using the *Excel* data generated from GIS (pipe type, size, and age of installation), two factors required a much more involved analysis: within the buffer zone and depth of bury. Neither of these attributes was directly in the database. The process used to gain this data is presented below.

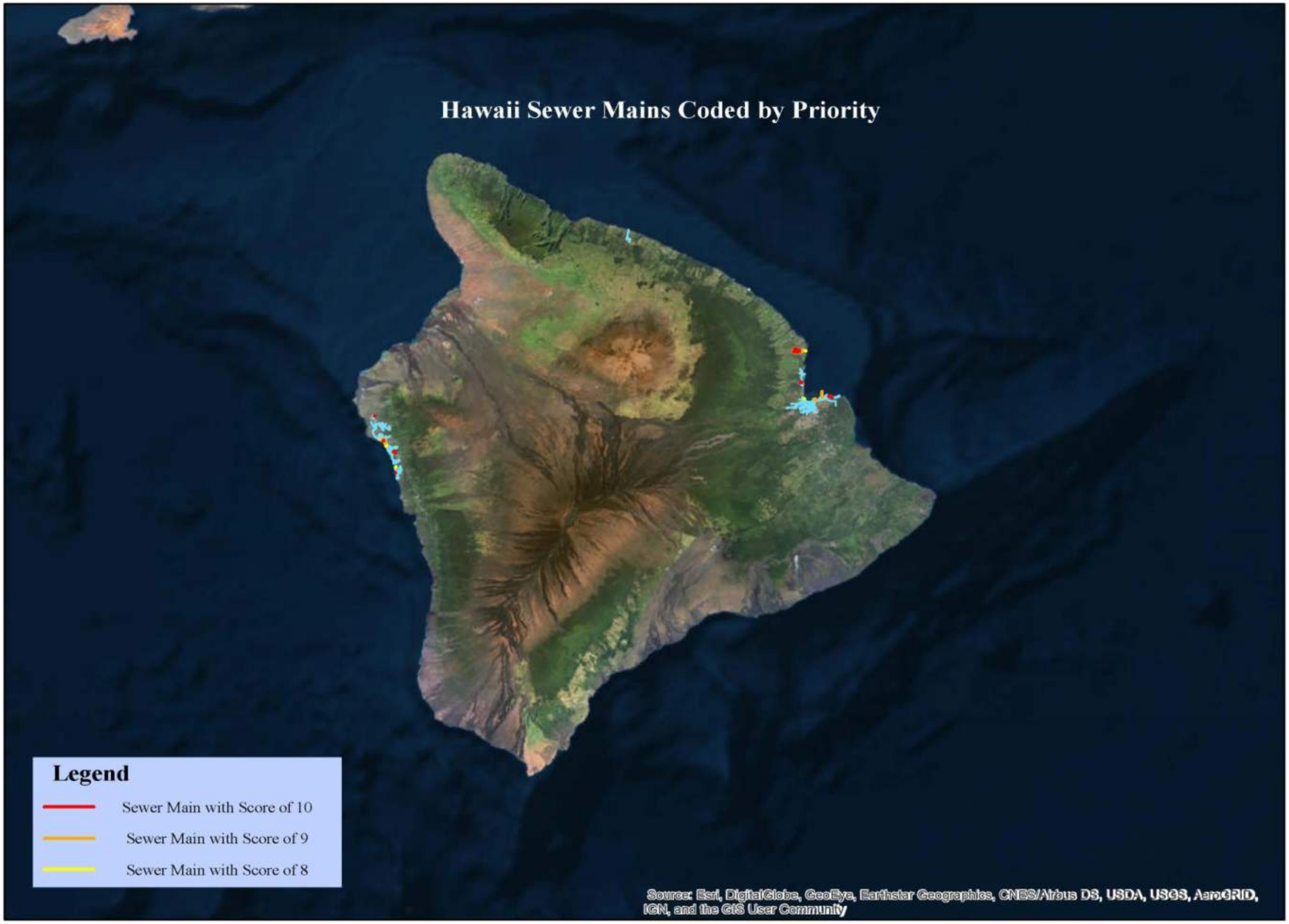
Within the "buffer zone" (distance from ocean shoreline and elevation within 20 feet of sea level): To find out whether the pipe segment was within the buffer zone, a polyline representing the shoreline was generated using the DEM (Digital Elevation Model) of the island. From this polyline, a duplicate was created and offset by 600 feet inland. Next a contour line at an elevation of 20 feet was generated from the same DEM. This contour line allowed for the exclusion of areas with elevations greater than 20 feet from the 600-foot shoreline buffer. The resulting buffer was used to capture all areas within 600 feet of the shore and at an elevation of 20 feet or less. Once this polyline was created, all the pipes within this buffer zone could be identified. All of these pipes were identified, and the data was captured within an *Excel* data table.

Depth of bury: The depth of bury for the wastewater pipes was not available directly as an attribute in the database. The closest associated data was the depth of manholes. Unfortunately, this data could not be used directly because the manholes were not associated directly with the pipe segment ID numbers. Therefore, another means of determining depth of bury had to be employed. The manhole depths that were less than 5 or greater than 10 feet deep were highlighted on the map. Then the pipe segments that were between the manholes were highlighted manually. The pipe IDs were then associated with the manholes to gain a depth for the pipe IDs. This was a lengthy process to gain all the main depths that were less than 5 feet or greater than 10 feet.

Analysis of remaining factors: For the analysis of the remaining factors, the associated *Excel* data tables were manipulated and sorted in various ways to give the pipes the appropriate scores.

Appendix C

Sewer Main Priority Maps

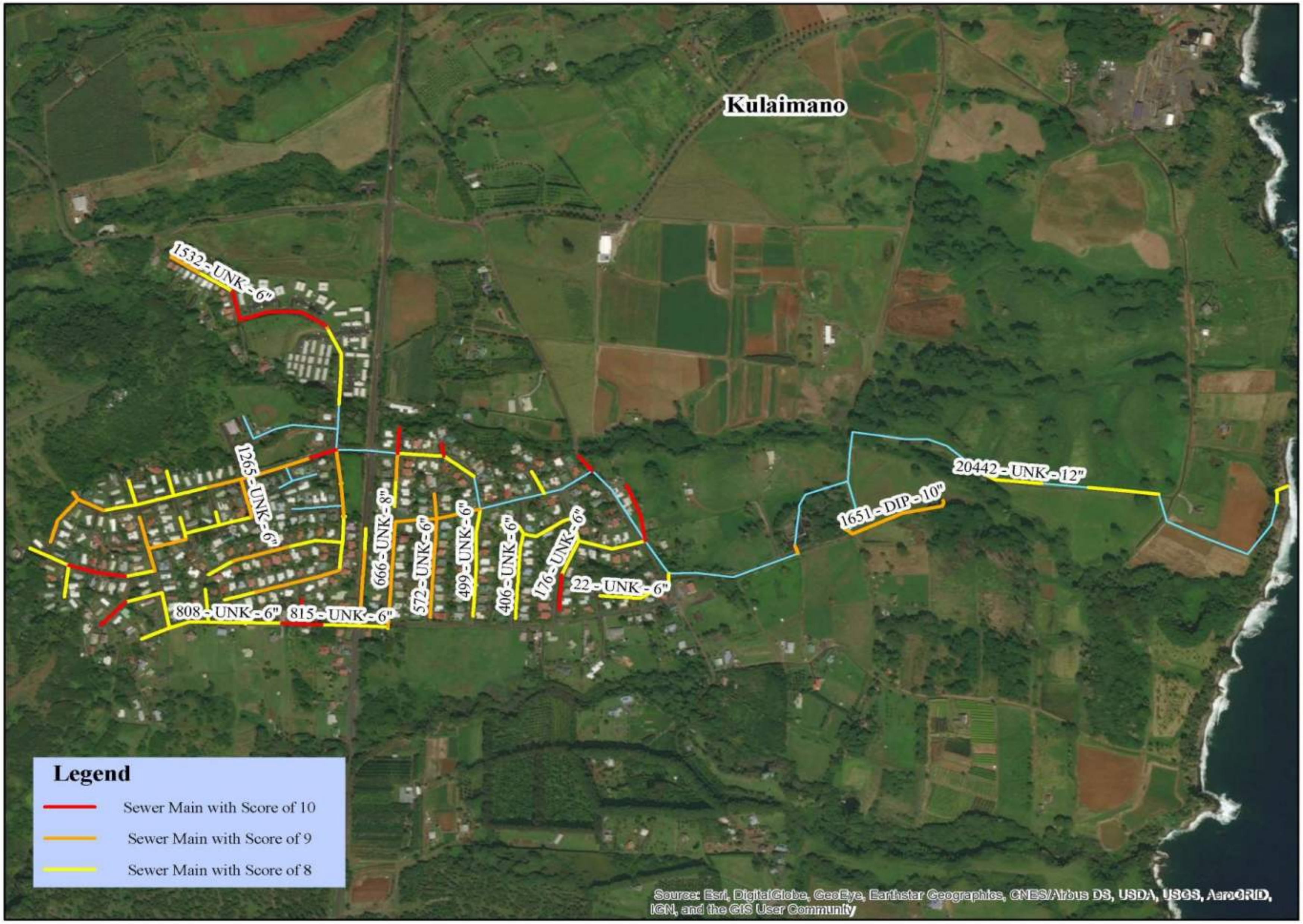

Hawaii Sewer Mains Coded by Priority
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

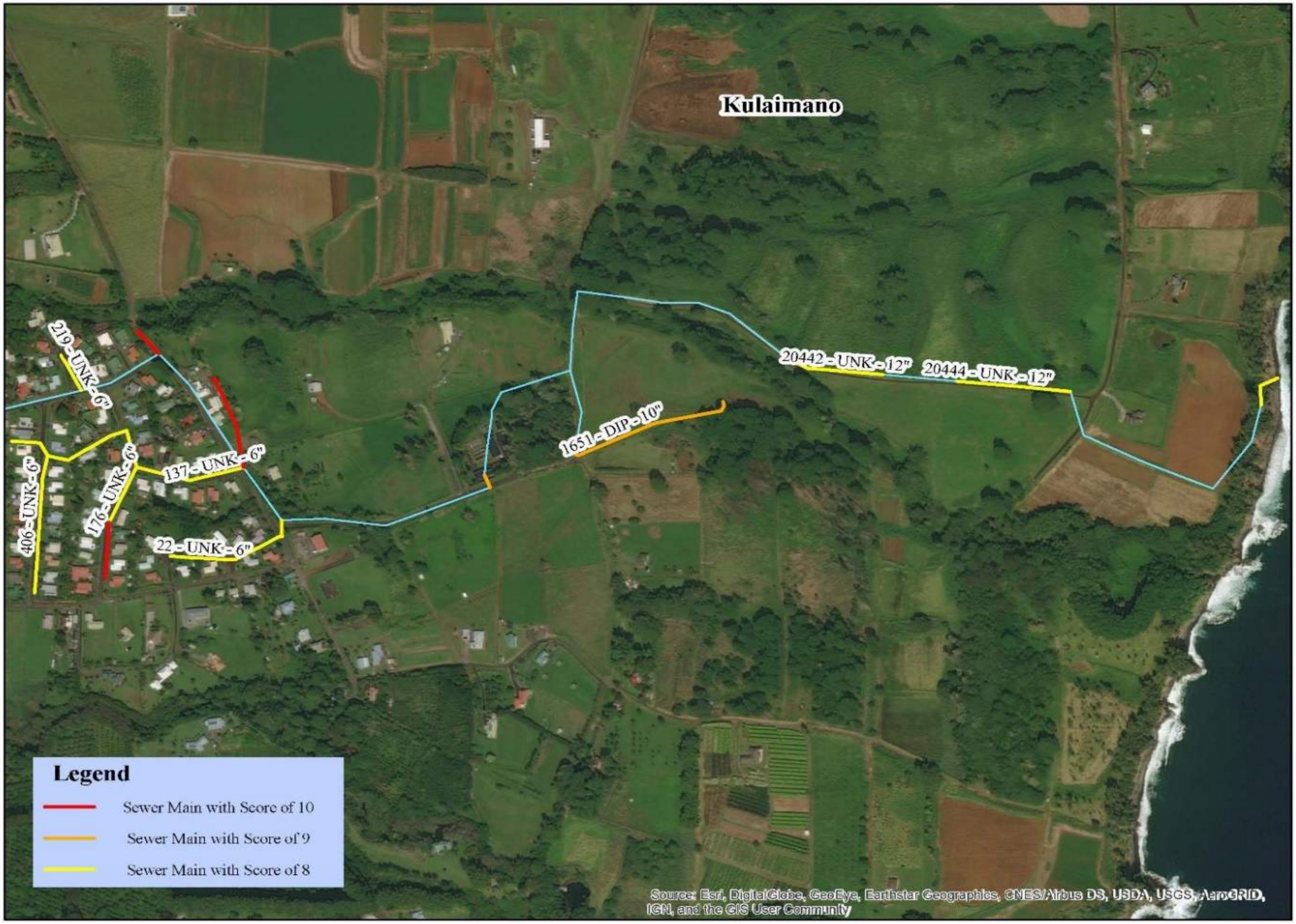

Hilo
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
Hilo
3655 - DIP - 12"
5766 - RCP - 15"
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Hilo
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
27138-RCP-48"
27134-RCP-48"
27131-RCP-48"
18504-RCP-18"
18564-RCP-18"
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Kulaimano
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
1532 - UNK - 6"
1538 - PVC - 6"
1544 - UNK - 8"
1548 - UNK - 6"
1423 - PVC - 8"
1431 - UNK - 8"
1265 - UNK - 6"
1267 - UNK - 6"
1159 - UNK - 6"
1259 - UNK - 6"
1063 - UNK - 6"
1069 - UNK - 6"
779 - UNK - 6"
799 - UNK - 6"
806 - UNK - 6"
737 - UNK - 6"
1018 - UNK - 6"
1014 - UNK - 6"
808 - UNK - 6"
822 - UNK - 6"
815 - UNK - 6"
672 - UNK - 8"
25610 - UNK - 6"
296 - UNK - 10"
269 - UNK - 8"
572 - UNK - 6"
499 - UNK - 6"
406 - UNK - 6"
219 - UNK - 6"
176 - UNK - 6"
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Kulaimano
1532 - UNK - 6"
1265 - UNK - 6"
666 - UNK - 8"
572 - UNK - 6"
499 - UNK - 6"
406 - UNK - 6"
176 - UNK - 6"
22 - UNK - 6"
808 - UNK - 6"
815 - UNK - 6"
1651 - DIP - 10"
20442 - UNK - 12"
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Kulaimano
219 - UNK - 6"
406 - UNK - 6"
176 - UNK - 6"
137 - UNK - 6"
22 - UNK - 6"
1651 - DIP - 10"
20442 - UNK - 12"
20444 - UNK - 12"
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Papaikou
3371-VCP-6"
3333-VCP-6"
3297-VCP-6"
3331-VCP-6"
3367-VCP-6"
3289-VCP-6"
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Heeia
28425-VCP-6"
28429-VCP-6"
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Heeia
28397-RCP-18"
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Kealakehe
13687-CIP-6"
13697-VCP-12"
13783-VCP-6"
13721-CIP-6"
13830-VCP-8"
13809-VCP-12"
13965-VCP-12"
14097-VCP-12"
14033-VCP-8"
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Risk of 8
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community


Kilohana
16151-VCP-8"
16142-VCP-8"
16155-VCP-8"
16171-VCP-8"
16178-VCP-8"
16160-VCP-8"
16163-VCP-8"
16233-VCP-8"
16211-VCP-8"
16205-VCP-8"
16237-VCP-8"
16244-VCP-8"
16217-VCP-8"
16248-VCP-8"
16267-VCP-8"
16279-VCP-8"
Legend
Sewer Main with Score of 10
Sewer Main with Score of 9
Sewer Main with Score of 8
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Appendix D

Horizontal Asset Priority by Pipe Segments and Basins

Table D-1: Hilo Basin Pipe Segments

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
6261	RCP - 18"	5	5	3	2	0	5	10
23304	RCP - 18"	5	5	3	2	0	5	10
18506	RCP - 18"	5	5	3	1	0	5	10
18508	RCP - 18"	5	5	3	1	0	5	10
5762	RCP - 15"	5	5	3	0	0	5	9
5764	RCP - 15"	5	5	3	0	0	5	9
5766	RCP - 15"	5	5	3	0	0	5	9
5768	RCP - 15"	5	5	3	0	0	5	9
18502	RCP - 18"	5	5	3	0	0	5	9
18504	RCP - 18"	5	5	3	0	0	5	9
18564	RCP - 18"	5	5	3	0	0	5	9
18565	RCP - 18"	5	5	3	0	0	5	9
18566	RCP - 18"	5	5	3	0	0	5	9
27131	RCP - 48"	5	5	3	0	0	5	9
27134	RCP - 48"	5	5	3	0	0	5	9
27136	RCP - 48"	5	5	3	0	0	5	9
27138	RCP - 48"	5	5	3	0	0	5	9
27142	RCP - 48"	5	5	3	0	0	5	9
27144	RCP - 48"	5	5	3	0	0	5	9
27146	RCP - 48"	5	5	3	0	0	5	9
27152	RCP - 48"	5	5	3	0	0	5	9
3655	DIP - 12"	5	0	4	1	0	5	8
32077	UNK - 6"	5	0	1	2	2	5	8
3726	VCP - 6"	0	0	5	2	2	5	7
4309	VCP - 8"	0	0	5	2	2	5	7
4315	VCP - 8"	0	0	5	2	2	5	7
18286	CCRF - 36"	5	5	3	1	0	0	7

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
18349	RCP - 48"	5	5	3	1	0	0	7
23561	RCP - 42"	5	5	3	1	0	0	7
23312	CCRF - 24"	5	5	3	1	0	0	7
23582	RCP - 42"	5	5	3	1	0	0	7
27117	RCP - 48"	5	5	3	1	0	0	7
6620	VCP - 0"	0	0	5	2	2	5	7
6670	VCP - 8"	0	0	5	2	2	5	7
6676	VCP - 8"	0	0	5	2	2	5	7
27120	RCP - 42"	5	5	3	1	0	0	7
27123	RCP - 30"	5	5	3	1	0	0	7
27125	RCP - 30"	5	5	3	1	0	0	7
27128	RCP - 42"	5	5	3	1	0	0	7
90011	CCRF - 42"	5	5	3	1	0	0	7
18351	CCRF - 42"	5	5	3	1	0	0	7
32645	CCRF - 42"	5	5	3	1	0	0	7
11367	VCP - 6"	0	0	5	2	2	5	7
24276	VCP - 8"	0	0	5	2	2	5	7
5135	VCP - 8"	0	0	5	1	2	5	7
3668	VCP - 8"	0	0	5	1	2	5	7
3670	VCP - 8"	0	0	5	1	2	5	7
4304	VCP - 8"	0	0	5	1	2	5	7
4306	VCP - 8"	0	0	5	1	2	5	7
4317	VCP - 8"	0	0	5	1	2	5	7
4319	VCP - 8"	0	0	5	1	2	5	7
4373	VCP - 8"	0	0	5	1	2	5	7
4580	VCP - 6"	0	0	5	1	2	5	7
4582	VCP - 6"	0	0	5	1	2	5	7
4584	VCP - 8"	0	0	5	1	2	5	7

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
4593	VCP - 6"	0	0	5	1	2	5	7
4595	VCP - 6"	0	0	5	1	2	5	7
4597	VCP - 6"	0	0	5	1	2	5	7
4599	VCP - 6"	0	0	5	1	2	5	7
4601	VCP - 6"	0	0	5	1	2	5	7
4602	VCP - 8"	0	0	5	1	2	5	7
4606	VCP - 8"	0	0	5	1	2	5	7
5046	VCP - 8"	0	0	5	1	2	5	7
5048	VCP - 8"	0	0	5	1	2	5	7
5050	VCP - 8"	0	0	5	1	2	5	7
5059	VCP - 8"	0	0	5	1	2	5	7
6215	VCP - 8"	0	0	5	1	2	5	7
6239	VCP - 8"	0	0	5	1	2	5	7
6241	VCP - 8"	0	0	5	1	2	5	7
6243	VCP - 8"	0	0	5	1	2	5	7
6245	VCP - 8"	0	0	5	1	2	5	7
6246	VCP - 8"	0	0	5	1	2	5	7
7224	VCP - 8"	0	0	5	1	2	5	7
7785	VCP - 8"	0	0	5	1	2	5	7
27127	RCP - 30"	5	5	3	0	0	0	7
27129	RCP - 48"	5	5	3	0	0	0	7
10940	VCP - 8"	0	0	5	1	2	5	7
11475	VCP - 8"	0	0	5	1	2	5	7
15256	VCP - 8"	0	0	5	1	2	5	7
17340	UNK - 8"	5	0	1	0	2	5	7
18424	VCP - 8"	0	0	5	1	2	5	7
20366	VCP - 8"	0	0	5	1	2	5	7
23104	VCP - 8"	0	0	5	1	2	5	7

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
23310	VCP - 8"	0	0	5	1	2	5	7
23422	VCP - 8"	0	0	5	1	2	5	7
23438	VCP - 8"	0	0	5	1	2	5	7
23440	VCP - 8"	0	0	5	1	2	5	7
28979	VCP - 8"	0	0	5	1	2	5	7
32075	UNK - 6"	5	0	1	0	2	5	7
5137	VCP - 8"	0	0	5	0	2	5	6
5139	VCP - 8"	0	0	5	0	2	5	6
5141	VCP - 8"	0	0	5	0	2	5	6
5143	VCP - 8"	0	0	5	0	2	5	6
5145	VCP - 8"	0	0	5	0	2	5	6
3632	VCP - 10"	0	0	5	2	0	5	6
3647	VCP - 8"	0	0	5	0	2	5	6
3664	VCP - 8"	0	0	5	0	2	5	6
3666	VCP - 8"	0	0	5	0	2	5	6
3671	VCP - 8"	0	0	5	0	2	5	6
4137	VCP - 8"	0	0	5	0	2	5	6
4139	VCP - 8"	0	0	5	0	2	5	6
4141	VCP - 8"	0	0	5	0	2	5	6
4143	VCP - 8"	0	0	5	0	2	5	6
4145	VCP - 8"	0	0	5	0	2	5	6
4147	VCP - 8"	0	0	5	0	2	5	6
4155	VCP - 8"	0	0	5	0	2	5	6
4157	VCP - 8"	0	0	5	0	2	5	6
4158	VCP - 8"	0	0	5	0	2	5	6
4296	VCP - 8"	0	0	5	0	2	5	6
4298	VCP - 8"	0	0	5	0	2	5	6
4300	VCP - 8"	0	0	5	0	2	5	6

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
4302	VCP - 8"	0	0	5	0	2	5	6
4311	VCP - 8"	0	0	5	0	2	5	6
4313	VCP - 8"	0	0	5	0	2	5	6
4366	VCP - 8"	0	0	5	0	2	5	6
4368	VCP - 8"	0	0	5	0	2	5	6
4576	VCP - 6"	0	0	5	0	2	5	6
4578	VCP - 6"	0	0	5	0	2	5	6
4586	VCP - 6"	0	0	5	0	2	5	6
4589	VCP - 6"	0	0	5	0	2	5	6
4591	VCP - 6"	0	0	5	0	2	5	6
4605	VCP - 6"	0	0	5	0	2	5	6
4608	VCP - 8"	0	0	5	0	2	5	6
4610	VCP - 8"	0	0	5	0	2	5	6
4612	VCP - 8"	0	0	5	0	2	5	6
4615	VCP - 8"	0	0	5	0	2	5	6
4617	VCP - 8"	0	0	5	0	2	5	6
4618	VCP - 8"	0	0	5	0	2	5	6
4621	VCP - 6"	0	0	5	0	2	5	6
4623	VCP - 6"	0	0	5	0	2	5	6
4625	VCP - 6"	0	0	5	0	2	5	6
4626	VCP - 6"	0	0	5	0	2	5	6
4815	VCP - 6"	0	0	5	0	2	5	6
4816	VCP - 6"	0	0	5	0	2	5	6
5034	VCP - 8"	0	0	5	0	2	5	6
5036	VCP - 8"	0	0	5	0	2	5	6
5042	VCP - 8"	0	0	5	0	2	5	6
5044	VCP - 8"	0	0	5	0	2	5	6
5061	VCP - 8"	0	0	5	0	2	5	6

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
6207	VCP - 8"	0	0	5	0	2	5	6
6209	VCP - 8"	0	0	5	0	2	5	6
6211	VCP - 8"	0	0	5	0	2	5	6
6213	VCP - 8"	0	0	5	0	2	5	6
6250	VCP - 8"	0	0	5	0	2	5	6
6514	VCP - 0"	0	0	5	0	2	5	6
6606	VCP - 8"	0	0	5	0	2	5	6
6611	VCP - 8"	0	0	5	0	2	5	6
6616	VCP - 8"	0	0	5	0	2	5	6
6622	VCP - 8"	0	0	5	0	2	5	6
6624	VCP - 8"	0	0	5	0	2	5	6
6626	VCP - 8"	0	0	5	0	2	5	6
6678	VCP - 8"	0	0	5	0	2	5	6
6679	VCP - 8"	0	0	5	0	2	5	6
6712	VCP - 8"	0	0	5	0	2	5	6
7287	VCP - 8"	0	0	5	0	2	5	6
7289	VCP - 8"	0	0	5	0	2	5	6
7729	VCP - 8"	0	0	5	0	2	5	6
7738	VCP - 8"	0	0	5	0	2	5	6
11001	VCP - 8"	0	0	5	0	2	5	6
11002	VCP - 8"	0	0	5	0	2	5	6
11016	VCP - 8"	0	0	5	0	2	5	6
11019	VCP - 8"	0	0	5	0	2	5	6
11021	VCP - 8"	0	0	5	0	2	5	6
11022	VCP - 8"	0	0	5	0	2	5	6
11024	VCP - 8"	0	0	5	0	2	5	6
11202	VCP - 8"	0	0	5	0	2	5	6
11298	VCP - 8"	0	0	5	0	2	5	6

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
11300	VCP - 8"	0	0	5	0	2	5	6
11302	VCP - 8"	0	0	5	0	2	5	6
11304	VCP - 8"	0	0	5	0	2	5	6
11306	VCP - 8"	0	0	5	0	2	5	6
16454	VCP - 8"	0	0	5	0	2	5	6
17333	UNK - 10"	5	0	1	1	0	5	6
25365	UNK - 30"	5	0	1	1	0	5	6
18363	UNK - 24"	5	0	1	1	0	5	6
18365	UNK - 24"	5	0	1	1	0	5	6
18420	VCP - 8"	0	0	5	0	2	5	6
18422	VCP - 8"	0	0	5	0	2	5	6
19146	UNK - 24"	5	0	1	1	0	5	6
23094	VCP - 8"	0	0	5	0	2	5	6
23105	VCP - 8"	0	0	5	0	2	5	6
23106	VCP - 8"	0	0	5	0	2	5	6
23107	VCP - 8"	0	0	5	0	2	5	6
23108	VCP - 8"	0	0	5	0	2	5	6
23234	UNK - 24"	5	0	1	1	0	5	6
23285	VCP - 8"	0	0	5	0	2	5	6
23372	VCP - 8"	0	0	5	0	2	5	6
23383	VCP - 8"	0	0	5	0	2	5	6
23426	VCP - 8"	0	0	5	0	2	5	6
23428	VCP - 8"	0	0	5	0	2	5	6
23436	VCP - 8"	0	0	5	0	2	5	6
23443	VCP - 8"	0	0	5	0	2	5	6
23445	VCP - 8"	0	0	5	0	2	5	6
23451	VCP - 8"	0	0	5	0	2	5	6
23455	VCP - 8"	0	0	5	0	2	5	6

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
23457	VCP - 8"	0	0	5	0	2	5	6
23462	VCP - 8"	0	0	5	0	2	5	6
23463	VCP - 8"	0	0	5	0	2	5	6
23464	VCP - 8"	0	0	5	0	2	5	6
23465	VCP - 8"	0	0	5	0	2	5	6
23458	VCP - 8"	0	0	5	0	2	5	6
23459	VCP - 8"	0	0	5	0	2	5	6
24182	VCP - 8"	0	0	5	0	2	5	6
24345	VCP - 8"	0	0	5	0	2	5	6
24347	VCP - 8"	0	0	5	0	2	5	6
24349	VCP - 8"	0	0	5	0	2	5	6
24351	VCP - 8"	0	0	5	0	2	5	6
24815	VCP - 8"	0	0	5	0	2	5	6
25360	VCP - 8"	0	0	5	0	2	5	6
25362	VCP - 8"	0	0	5	0	2	5	6
30889	VCP - 8"	0	0	5	0	2	5	6
3653	VCP - 12"	0	0	5	1	0	5	6
5681	VCP - 10"	0	0	5	1	0	5	6
5684	VCP - 10"	0	0	5	1	0	5	6
5688	VCP - 10"	0	0	5	1	0	5	6
5690	VCP - 10"	0	0	5	1	0	5	6
5692	VCP - 10"	0	0	5	1	0	5	6
5694	VCP - 10"	0	0	5	1	0	5	6
5696	VCP - 12"	0	0	5	1	0	5	6
5730	VCP - 10"	0	0	5	1	0	5	6
5756	VCP - 12"	0	0	5	1	0	5	6
5771	UNK - 15"	5	0	1	0	0	5	6
6217	VCP - 10"	0	0	5	1	0	5	6

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
6225	VCP - 10"	0	0	5	1	0	5	6
6248	VCP - 10"	0	0	5	1	0	5	6
6334	PVC - 6"	5	0	2	2	2	0	6
7100	VCP - 12"	0	0	5	1	0	5	6
7222	VCP - 10"	0	0	5	1	0	5	6
7229	VCP - 10"	0	0	5	1	0	5	6
7881	VCP - 15"	0	0	5	1	0	5	6
7883	VCP - 15"	0	0	5	1	0	5	6
7962	VCP - 12"	0	0	5	1	0	5	6
8016	VCP - 10"	0	0	5	1	0	5	6
8020	VCP - 10"	0	0	5	1	0	5	6
8399	VCP - 10"	0	0	5	1	0	5	6
8400	VCP - 10"	0	0	5	1	0	5	6
9679	UNK - 10"	5	0	1	0	0	5	6
9680	VCP - 12"	0	0	5	1	0	5	6
10941	VCP - 10"	0	0	5	1	0	5	6
17339	DIP - 4"	0	0	4	0	2	5	6
18376	CCRF - 27"	5	0	1	0	0	5	6
18388	UNK - 21"	5	0	1	0	0	5	6
18390	UNK - 12"	5	0	1	0	0	5	6
18708	VCP - 10"	0	0	5	1	0	5	6
18710	VCP - 10"	0	0	5	1	0	5	6
18712	VCP - 10"	0	0	5	1	0	5	6
19135	UNK - 27"	5	0	1	0	0	5	6
19136	UNK - 27"	5	0	1	0	0	5	6
23300	UNK - 27"	5	0	1	0	0	5	6
23306	VCP - 10"	0	0	5	1	0	5	6
23449	VCP - 12"	0	0	5	1	0	5	6

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
23515	VCP - 10"	0	0	5	1	0	5	6
25347	PVC - 6"	0	0	2	2	2	5	6
31527	VCP - 10"	0	0	5	1	0	5	6
5147	VCP - 10"	0	0	5	0	0	5	5
5149	VCP - 10"	0	0	5	0	0	5	5
3634	VCP - 12"	0	0	5	0	0	5	5
3638	VCP - 12"	0	0	5	0	0	5	5
3640	VCP - 12"	0	0	5	0	0	5	5
3642	VCP - 12"	0	0	5	0	0	5	5
3644	VCP - 12"	0	0	5	0	0	5	5
3649	VCP - 10"	0	0	5	0	0	5	5
3651	VCP - 10"	0	0	5	0	0	5	5
3657	VCP - 12"	0	0	5	0	0	5	5
3723	UNK - 0"	0	0	1	2	2	5	5
5052	VCP - 10"	0	0	5	0	0	5	5
5679	VCP - 10"	0	0	5	0	0	5	5
5726	VCP - 10"	0	0	5	0	0	5	5
5728	VCP - 10"	0	0	5	0	0	5	5
6319	UNK - 8"	5	0	1	2	2	0	5
6331	UNK - 8"	5	0	1	2	2	0	5
6332	UNK - 6"	5	0	1	2	2	0	5
6346	UNK - 8"	5	0	1	2	2	0	5
7101	VCP - 12"	0	0	5	0	0	5	5
7301	VCP - 12"	0	0	5	0	0	5	5
7828	VCP - 15"	0	0	5	0	0	5	5
7830	VCP - 15"	0	0	5	0	0	5	5
7832	VCP - 15"	0	0	5	0	0	5	5
7834	VCP - 15"	0	0	5	0	0	5	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
7877	VCP - 15"	0	0	5	0	0	5	5
7879	VCP - 15"	0	0	5	0	0	5	5
7942	VCP - 12"	0	0	5	0	0	5	5
7944	VCP - 12"	0	0	5	0	0	5	5
7952	VCP - 12"	0	0	5	0	0	5	5
7954	VCP - 12"	0	0	5	0	0	5	5
7956	VCP - 12"	0	0	5	0	0	5	5
7958	VCP - 12"	0	0	5	0	0	5	5
7960	VCP - 12"	0	0	5	0	0	5	5
8018	VCP - 10"	0	0	5	0	0	5	5
8306	VCP - 10"	0	0	5	0	0	5	5
8307	VCP - 10"	0	0	5	0	0	5	5
8327	VCP - 10"	0	0	5	0	0	5	5
8328	VCP - 10"	0	0	5	0	0	5	5
8403	VCP - 10"	0	0	5	0	0	5	5
8404	VCP - 10"	0	0	5	0	0	5	5
8509	VCP - 10"	0	0	5	0	0	5	5
8510	VCP - 10"	0	0	5	0	0	5	5
8519	VCP - 10"	0	0	5	0	0	5	5
8520	VCP - 10"	0	0	5	0	0	5	5
9669	CIP - 20"	5	0	4	1	0	0	5
18402	UNK - 6"	5	0	1	2	2	0	5
18404	UNK - 6"	5	0	1	2	2	0	5
18714	VCP - 10"	0	0	5	0	0	5	5
18715	VCP - 10"	0	0	5	0	0	5	5
18874	PVC - 6"	5	0	2	1	2	0	5
19807	UNK - 8"	5	0	1	2	2	0	5
23237	PVC - 6"	5	0	2	1	2	0	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
23293	PVC - 8"	5	0	2	1	2	0	5
23294	PVC - 8"	5	0	2	1	2	0	5
23308	VCP - 10"	0	0	5	0	0	5	5
24446	UNK - 8"	5	0	1	2	2	0	5
25373	UNK - 6"	5	0	1	2	2	0	5
25678	PVC - 6"	5	0	2	1	2	0	5
27149	DIP - 24"	5	0	4	1	0	0	5
27147	DIP - 30"	5	0	4	1	0	0	5
3636	VSGD - 8"	0	0	1	1	2	5	5
3731	PVC - 6"	0	0	2	0	2	5	5
4149	VCP - 8"	0	0	5	2	2	0	5
4151	VCP - 8"	0	0	5	2	2	0	5
4153	VCP - 8"	0	0	5	2	2	0	5
4321	VCP - 8"	0	0	5	2	2	0	5
5063	UNK - 8"	0	0	1	1	2	5	5
5870	VCP - 6"	0	0	5	2	2	0	5
6171	UNK - 8"	5	0	1	1	2	0	5
6402	PVC - 8"	5	0	2	0	2	0	5
6520	UNK - 8"	0	0	1	1	2	5	5
6751	VCP - 6"	0	0	5	2	2	0	5
6870	UNK - 8"	0	0	1	1	2	5	5
6958	UNK - 8"	0	0	1	1	2	5	5
7146	UNK - 8"	0	0	1	1	2	5	5
7235	PVC - 8"	0	0	2	0	2	5	5
7236	PVC - 8"	0	0	2	0	2	5	5
7310	DIP - 20"	0	0	4	0	0	5	5
5758	RCP - 15"	0	0	3	1	0	5	5
7886	RCP - 42"	0	0	3	1	0	5	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
7888	RCP - 42"	0	0	3	1	0	5	5
7968	RCP - 36"	0	0	3	1	0	5	5
7970	RCP - 36"	0	0	3	1	0	5	5
7972	RCP - 36"	0	0	3	1	0	5	5
7973	RCP - 36"	0	0	3	1	0	5	5
8022	RCP - 36"	0	0	3	1	0	5	5
8024	RCP - 36"	0	0	3	1	0	5	5
8025	RCP - 36"	0	0	3	1	0	5	5
8209	RCP - 36"	0	0	3	1	0	5	5
8211	RCP - 36"	0	0	3	1	0	5	5
8212	RCP - 36"	0	0	3	1	0	5	5
8630	RCP - 36"	0	0	3	1	0	5	5
8632	RCP - 36"	0	0	3	1	0	5	5
8633	RCP - 36"	0	0	3	1	0	5	5
8744	RCP - 36"	0	0	3	1	0	5	5
8746	RCP - 36"	0	0	3	1	0	5	5
8919	RCP - 36"	0	0	3	1	0	5	5
8937	RCP - 36"	0	0	3	1	0	5	5
9059	RCP - 36"	0	0	3	1	0	5	5
9061	RCP - 36"	0	0	3	1	0	5	5
9063	RCP - 36"	0	0	3	1	0	5	5
9738	RCP - 18"	0	0	3	1	0	5	5
9739	RCP - 24"	0	0	3	1	0	5	5
24006	RCP - 42"	0	0	3	1	0	5	5
10264	UNK - 8"	0	0	1	1	2	5	5
10294	UNK - 8"	0	0	1	1	2	5	5
10937	UNK - 8"	0	0	1	1	2	5	5
10949	UNK - 8"	0	0	1	1	2	5	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
11317	VCP - 8"	0	0	5	2	2	0	5
11318	VCP - 8"	0	0	5	2	2	0	5
18285	VCP - 6"	0	0	5	2	2	0	5
18454	PVC - 6"	5	0	2	0	2	0	5
18831	UNK - 8"	5	0	1	1	2	0	5
19140	PVC - 6"	5	0	2	0	2	0	5
19218	PVC - 10"	5	0	2	2	0	0	5
23213	PVC - 6"	5	0	2	0	2	0	5
23215	PVC - 6"	5	0	2	0	2	0	5
23221	PVC - 6"	5	0	2	0	2	0	5
23224	PVC - 6"	5	0	2	0	2	0	5
23231	PVC - 6"	5	0	2	0	2	0	5
23233	PVC - 6"	5	0	2	0	2	0	5
23239	PVC - 6"	5	0	2	0	2	0	5
23241	PVC - 6"	5	0	2	0	2	0	5
23261	PVC - 6"	5	0	2	0	2	0	5
23296	PVC - 8"	5	0	2	0	2	0	5
23447	UNK - 8"	0	0	1	1	2	5	5
23572	PVC - 10"	5	0	2	2	0	0	5
23597	UNK - 8"	0	0	1	1	2	5	5
23601	UNK - 8"	0	0	1	1	2	5	5
24283	UNK - 8"	0	0	1	1	2	5	5
24353	UNK - 8"	0	0	1	1	2	5	5
24453	UNK - 8"	0	0	1	1	2	5	5
24455	UNK - 8"	0	0	1	1	2	5	5
24457	UNK - 8"	0	0	1	1	2	5	5
25341	PVC - 6"	0	0	2	0	2	5	5
25346	PVC - 6"	0	0	2	0	2	5	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
25352	DIP - 24"	5	0	4	0	0	0	5
25366	DIP - 30"	5	0	4	0	0	0	5
25676	PVC - 6"	5	0	2	0	2	0	5
26197	UNK - 8"	0	0	1	1	2	5	5
26356	VCP - 6"	0	0	5	2	2	0	5
28691	UNK - 0"	0	0	1	1	2	5	5
31498	UNK - 6"	5	0	1	1	2	0	5
5155	VSGD - 8"	0	0	1	0	2	5	4
5157	VSGD - 8"	0	0	1	0	2	5	4
5160	VSGD - 8"	0	0	1	0	2	5	4
5161	VSGD - 8"	0	0	1	0	2	5	4
5163	VSGD - 8"	0	0	1	0	2	5	4
5165	VSGD - 8"	0	0	1	0	2	5	4
3757	VCP - 8"	0	0	5	1	2	0	4
3765	VCP - 8"	0	0	5	1	2	0	4
3767	VCP - 8"	0	0	5	1	2	0	4
3769	VCP - 8"	0	0	5	1	2	0	4
3932	VCP - 8"	0	0	5	1	2	0	4
5167	VSGD - 8"	0	0	1	0	2	5	4
5169	VSGD - 8"	0	0	1	0	2	5	4
6178	PVC - 36"	5	0	2	1	0	0	4
6317	UNK - 15"	5	0	1	2	0	0	4
6321	UNK - 8"	5	0	1	0	2	0	4
6336	UNK - 8"	5	0	1	0	2	0	4
6348	UNK - 8"	5	0	1	0	2	0	4
6350	UNK - 8"	5	0	1	0	2	0	4
6363	HDPE - 8"	5	0	1	0	2	0	4
6367	UNK - 8"	5	0	1	0	2	0	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
6369	UNK - 8"	5	0	1	0	2	0	4
6376	HDPE - 8"	5	0	1	0	2	0	4
6399	HDPE - 6"	5	0	1	0	2	0	4
6772	UNK - 8"	0	0	1	0	2	5	4
6781	UNK - 8"	0	0	1	0	2	5	4
6957	UNK - 8"	0	0	1	0	2	5	4
6971	UNK - 8"	0	0	1	0	2	5	4
7145	UNK - 8"	0	0	1	0	2	5	4
7302	PVC - 12"	0	0	2	1	0	5	4
7884	PVC - 36"	0	0	2	1	0	5	4
7949	UNK - 8"	0	0	1	0	2	5	4
8522	UNK - 8"	0	0	1	0	2	5	4
9065	PVC - 36"	0	0	2	1	0	5	4
9598	UNK - 8"	5	0	1	0	2	0	4
9633	UNK - 6"	0	0	1	0	2	5	4
9803	UNK - 6"	0	0	1	0	2	5	4
9806	UNK - 6"	0	0	1	0	2	5	4
9818	UNK - 8"	5	0	1	0	2	0	4
9871	UNK - 6"	0	0	1	0	2	5	4
10016	VCP - 6"	0	0	5	1	2	0	4
5760	RCP - 15"	0	0	3	0	0	5	4
6254	RCP - 10"	0	0	3	0	0	5	4
10241	UNK - 8"	0	0	1	0	2	5	4
6257	RCP - 10"	0	0	3	0	0	5	4
6259	RCP - 10"	0	0	3	0	0	5	4
6431	RCP - 24"	0	0	3	0	0	5	4
8918	RCP - 36"	0	0	3	0	0	5	4
9720	RCP - 18"	0	0	3	0	0	5	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
9722	RCP - 18"	0	0	3	0	0	5	4
11054	UNK - 8"	0	0	1	0	2	5	4
11056	UNK - 8"	0	0	1	0	2	5	4
11057	UNK - 8"	0	0	1	0	2	5	4
15208	VCP - 8"	0	0	5	1	2	0	4
15209	VCP - 8"	0	0	5	1	2	0	4
15255	UNK - 8"	0	0	1	0	2	5	4
15325	VCP - 6"	0	0	5	1	2	0	4
18277	UNK - 8"	5	0	1	0	2	0	4
18323	UNK - 6"	5	0	1	0	2	0	4
18325	UNK - 6"	5	0	1	0	2	0	4
18327	UNK - 6"	5	0	1	0	2	0	4
18330	UNK - 6"	5	0	1	0	2	0	4
18332	UNK - 6"	5	0	1	0	2	0	4
18333	UNK - 8"	5	0	1	0	2	0	4
0	UNK - 0"	5	0	1	0	2	0	4
18406	UNK - 6"	5	0	1	0	2	0	4
18408	UNK - 8"	5	0	1	0	2	0	4
18410	UNK - 8"	5	0	1	0	2	0	4
19808	UNK - 8"	5	0	1	0	2	0	4
19809	UNK - 8"	5	0	1	0	2	0	4
22591	HDPE - 0"	5	0	1	0	2	0	4
23518	UNK - 8"	0	0	1	0	2	5	4
23602	UNK - 8"	0	0	1	0	2	5	4
23603	UNK - 8"	0	0	1	0	2	5	4
23957	UNK - 8"	5	0	1	0	2	0	4
23996	UNK - 6"	0	0	1	0	2	5	4
24285	UNK - 0"	0	0	1	0	2	5	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
24329	UNK - 8"	0	0	1	0	2	5	4
24331	UNK - 8"	0	0	1	0	2	5	4
24333	UNK - 8"	0	0	1	0	2	5	4
24335	UNK - 8"	0	0	1	0	2	5	4
24459	UNK - 8"	5	0	1	0	2	0	4
24479	UNK - 8"	5	0	1	0	2	0	4
25371	UNK - 15"	5	0	1	2	0	0	4
26006	UNK - 2"	5	0	1	0	2	0	4
26360	VCP - 6"	0	0	5	1	2	0	4
26362	VCP - 6"	0	0	5	1	2	0	4
26364	VCP - 6"	0	0	5	1	2	0	4
26366	VCP - 6"	0	0	5	1	2	0	4
26685	VCP - 8"	0	0	5	1	2	0	4
26687	VCP - 8"	0	0	5	1	2	0	4
26689	VCP - 8"	0	0	5	1	2	0	4
26691	VCP - 8"	0	0	5	1	2	0	4
26693	VCP - 8"	0	0	5	1	2	0	4
26695	VCP - 8"	0	0	5	1	2	0	4
26697	VCP - 8"	0	0	5	1	2	0	4
26699	VCP - 8"	0	0	5	1	2	0	4
26701	VCP - 8"	0	0	5	1	2	0	4
26703	VCP - 8"	0	0	5	1	2	0	4
26705	VCP - 8"	0	0	5	1	2	0	4
26707	VCP - 8"	0	0	5	1	2	0	4
26709	VCP - 8"	0	0	5	1	2	0	4
26735	VCP - 8"	0	0	5	1	2	0	4
26737	VCP - 8"	0	0	5	1	2	0	4
26739	VCP - 8"	0	0	5	1	2	0	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
26741	VCP - 8"	0	0	5	1	2	0	4
26750	VCP - 6"	0	0	5	1	2	0	4
27121	UNK - 0"	5	0	1	0	2	0	4
32032	VCP - 6"	0	0	5	1	2	0	4
32041	UNK - 4"	5	0	1	0	2	0	4
32047	UNK - 4"	5	0	1	0	2	0	4
32079	UNK - 6"	0	0	1	0	2	5	4
32174	VCP - 8"	0	0	5	1	2	0	4
5151	PVC - 12"	0	0	2	0	0	5	4
3659	VCP - 8"	0	0	5	0	2	0	4
21	VCP - 8"	0	0	5	0	2	0	4
3740	VCP - 8"	0	0	5	0	2	0	4
3742	VCP - 8"	0	0	5	0	2	0	4
3771	VCP - 8"	0	0	5	0	2	0	4
3773	VCP - 8"	0	0	5	0	2	0	4
3833	VCP - 8"	0	0	5	0	2	0	4
3835	VCP - 8"	0	0	5	0	2	0	4
3837	VCP - 8"	0	0	5	0	2	0	4
3839	VCP - 8"	0	0	5	0	2	0	4
3841	VCP - 8"	0	0	5	0	2	0	4
3843	VCP - 8"	0	0	5	0	2	0	4
3845	VCP - 8"	0	0	5	0	2	0	4
3928	VCP - 8"	0	0	5	0	2	0	4
3930	VCP - 8"	0	0	5	0	2	0	4
4135	VCP - 8"	0	0	5	0	2	0	4
4347	VCP - 8"	0	0	5	0	2	0	4
4350	VCP - 6"	0	0	5	0	2	0	4
4352	VCP - 8"	0	0	5	0	2	0	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
4354	VCP - 6"	0	0	5	0	2	0	4
4357	VCP - 6"	0	0	5	0	2	0	4
5065	UNK - 10"	0	0	1	1	0	5	4
5067	UNK - 10"	0	0	1	1	0	5	4
5412	VCP - 6"	0	0	5	0	2	0	4
5414	VCP - 8"	0	0	5	0	2	0	4
5416	VCP - 8"	0	0	5	0	2	0	4
5596	VCP - 8"	0	0	5	0	2	0	4
5698	VCP - 8"	0	0	5	0	2	0	4
5700	PVC - 12"	0	0	2	0	0	5	4
5706	UNK - 18"	0	0	1	1	0	5	4
5708	UNK - 18"	0	0	1	1	0	5	4
5710	UNK - 18"	0	0	1	1	0	5	4
5712	UNK - 18"	0	0	1	1	0	5	4
5714	UNK - 18"	0	0	1	1	0	5	4
5716	UNK - 18"	0	0	1	1	0	5	4
5731	UNK - 15"	0	0	1	1	0	5	4
5742	UNK - 15"	0	0	1	1	0	5	4
5751	UNK - 12"	5	0	1	1	0	0	4
5787	PVC - 12"	5	0	2	0	0	0	4
6205	VCP - 8"	0	0	5	0	2	0	4
6410	PVC - 10"	5	0	2	0	0	0	4
6449	UNK - 30"	0	0	1	1	0	5	4
6455	VCP - 8"	0	0	5	0	2	0	4
6467	UNK - 30"	0	0	1	1	0	5	4
6516	VCP - 8"	0	0	5	0	2	0	4
6518	VCP - 8"	0	0	5	0	2	0	4
6527	UNK - 15"	0	0	1	1	0	5	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
6599	UNK - 30"	0	0	1	1	0	5	4
6656	UNK - 30"	0	0	1	1	0	5	4
6658	UNK - 30"	0	0	1	1	0	5	4
6663	UNK - 30"	0	0	1	1	0	5	4
6665	UNK - 30"	0	0	1	1	0	5	4
6667	UNK - 30"	0	0	1	1	0	5	4
6752	VCP - 6"	0	0	5	0	2	0	4
7097	UNK - 10"	0	0	1	1	0	5	4
7308	UNK - 21"	0	0	1	1	0	5	4
7312	UNK - 21"	0	0	1	1	0	5	4
7335	UNK - 21"	0	0	1	1	0	5	4
7487	UNK - 21"	0	0	1	1	0	5	4
7488	UNK - 21"	0	0	1	1	0	5	4
7747	UNK - 21"	0	0	1	1	0	5	4
7777	UNK - 24"	0	0	1	1	0	5	4
7778	UNK - 24"	0	0	1	1	0	5	4
7782	UNK - 21"	0	0	1	1	0	5	4
7783	UNK - 21"	0	0	1	1	0	5	4
7893	UNK - 42"	0	0	1	1	0	5	4
7900	UNK - 10"	0	0	1	1	0	5	4
7902	UNK - 10"	0	0	1	1	0	5	4
7904	UNK - 10"	0	0	1	1	0	5	4
7906	UNK - 10"	0	0	1	1	0	5	4
7908	UNK - 10"	0	0	1	1	0	5	4
7910	UNK - 10"	0	0	1	1	0	5	4
7915	UNK - 12"	0	0	1	1	0	5	4
7921	VCP - 8"	0	0	5	0	2	0	4
9592	PVC - 10"	5	0	2	0	0	0	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
9593	PVC - 10"	5	0	2	0	0	0	4
9671	UNK - 20"	5	0	1	1	0	0	4
9673	HDPE - 20"	5	0	1	1	0	0	4
9674	HDPE - 20"	5	0	1	1	0	0	4
9676	UNK - 10"	5	0	1	1	0	0	4
9707	VCP - 6"	0	0	5	0	2	0	4
9708	VCP - 6"	0	0	5	0	2	0	4
9762	UNK - 18"	0	0	1	1	0	5	4
9763	UNK - 24"	0	0	1	1	0	5	4
9795	UNK - 24"	0	0	1	1	0	5	4
9826	UNK - 24"	0	0	1	1	0	5	4
9829	UNK - 24"	0	0	1	1	0	5	4
9844	VCP - 6"	0	0	5	0	2	0	4
9875	VCP - 6"	0	0	5	0	2	0	4
9890	VCP - 6"	0	0	5	0	2	0	4
9931	VCP - 6"	0	0	5	0	2	0	4
10022	VCP - 6"	0	0	5	0	2	0	4
10239	UNK - 15"	0	0	1	1	0	5	4
10262	UNK - 15"	0	0	1	1	0	5	4
10266	UNK - 12"	0	0	1	1	0	5	4
10422	VCP - 6"	0	0	5	0	2	0	4
10424	VCP - 6"	0	0	5	0	2	0	4
10426	VCP - 6"	0	0	5	0	2	0	4
10698	VCP - 10"	0	0	5	2	0	0	4
10706	VCP - 10"	0	0	5	2	0	0	4
10710	VCP - 8"	0	0	5	0	2	0	4
10712	VCP - 8"	0	0	5	0	2	0	4
11308	VCP - 8"	0	0	5	0	2	0	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
11314	VCP - 8"	0	0	5	0	2	0	4
15251	VCP - 8"	0	0	5	0	2	0	4
18269	UNK - 12"	5	0	1	1	0	0	4
18375	PVC - 10"	5	0	2	0	0	0	4
18416	UNK - 21"	0	0	1	1	0	5	4
18417	UNK - 21"	0	0	1	1	0	5	4
18425	UNK - 21"	0	0	1	1	0	5	4
18510	UNK - 18"	0	0	1	1	0	5	4
18512	UNK - 18"	0	0	1	1	0	5	4
18514	UNK - 18"	0	0	1	1	0	5	4
18516	UNK - 18"	0	0	1	1	0	5	4
18517	UNK - 18"	0	0	1	1	0	5	4
19100	PVC - 10"	5	0	2	0	0	0	4
19322	PVC - 10"	5	0	2	0	0	0	4
19395	PVC - 10"	5	0	2	0	0	0	4
19779	VCP - 8"	0	0	5	0	2	0	4
19780	VCP - 8"	0	0	5	0	2	0	4
20365	VCP - 8"	0	0	5	0	2	0	4
23227	PVC - 10"	5	0	2	0	0	0	4
23302	UNK - 18"	0	0	1	1	0	5	4
23570	PVC - 10"	5	0	2	0	0	0	4
23997	UNK - 30"	0	0	1	1	0	5	4
24009	UNK - 30"	0	0	1	1	0	5	4
25364	UNK - 12"	5	0	1	1	0	0	4
25377	UNK - 12"	0	0	1	1	0	5	4
26711	VCP - 8"	0	0	5	0	2	0	4
26713	VCP - 8"	0	0	5	0	2	0	4
26715	VCP - 8"	0	0	5	0	2	0	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
26717	VCP - 8"	0	0	5	0	2	0	4
26719	VCP - 8"	0	0	5	0	2	0	4
26744	VCP - 8"	0	0	5	0	2	0	4
26746	VCP - 0"	0	0	5	0	2	0	4
26748	VCP - 0"	0	0	5	0	2	0	4
26752	VCP - 8"	0	0	5	0	2	0	4
26754	VCP - 8"	0	0	5	0	2	0	4
26756	VCP - 8"	0	0	5	0	2	0	4
26758	VCP - 8"	0	0	5	0	2	0	4
27325	VCP - 8"	0	0	5	0	2	0	4
28468	VCP - 0"	0	0	5	0	2	0	4
32033	VCP - 6"	0	0	5	0	2	0	4
32034	VCP - 6"	0	0	5	0	2	0	4
32169	VCP - 8"	0	0	5	0	2	0	4
32171	VCP - 8"	0	0	5	0	2	0	4
32173	VCP - 8"	0	0	5	0	2	0	4
30946	VCP - 8"	0	0	5	0	2	0	4
3934	VCP - 10"	0	0	5	1	0	0	3
4336	PVC - 8"	0	0	2	2	2	0	3
5739	UNK - 15"	0	0	1	0	0	5	3
5741	UNK - 15"	0	0	1	0	0	5	3
5745	UNK - 12"	5	0	1	0	0	0	3
5749	UNK - 18"	5	0	1	0	0	0	3
5785	UNK - 10"	5	0	1	0	0	0	3
5789	UNK - 15"	5	0	1	0	0	0	3
5792	UNK - 15"	5	0	1	0	0	0	3
5827	UNK - 10"	5	0	1	0	0	0	3
6170	UNK - 10"	5	0	1	0	0	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
6401	HDPE - 16"	5	0	1	0	0	0	3
6442	HDPE - 10"	5	0	1	0	0	0	3
6525	UNK - 15"	0	0	1	0	0	5	3
6601	UNK - 30"	0	0	1	0	0	5	3
7599	PVC - 8"	0	0	2	2	2	0	3
7603	PVC - 8"	0	0	2	2	2	0	3
7605	PVC - 8"	0	0	2	2	2	0	3
7648	PVC - 8"	0	0	2	2	2	0	3
7650	PVC - 8"	0	0	2	2	2	0	3
7860	PVC - 8"	0	0	2	2	2	0	3
7865	UNK - 24"	0	0	1	0	0	5	3
7922	VCP - 12"	0	0	5	1	0	0	3
7929	UNK - 10"	0	0	1	0	0	5	3
7930	UNK - 10"	0	0	1	0	0	5	3
8205	UNK - 24"	0	0	1	0	0	5	3
8207	UNK - 24"	0	0	1	0	0	5	3
9376	PVC - 8"	0	0	2	2	2	0	3
9588	HDPE - 16"	5	0	1	0	0	0	3
9590	HDPE - 16"	5	0	1	0	0	0	3
9594	UNK - 20"	5	0	1	0	0	0	3
9596	HDPE - 20"	5	0	1	0	0	0	3
9600	HDPE - 20"	5	0	1	0	0	0	3
9624	UNK - 18"	0	0	1	0	0	5	3
9628	UNK - 12"	0	0	1	0	0	5	3
9656	UNK - 15"	0	0	1	0	0	5	3
9665	UNK - 12"	0	0	1	0	0	5	3
9710	VCP - 10"	0	0	5	1	0	0	3
9760	UNK - 18"	0	0	1	0	0	5	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
9810	UNK - 24"	0	0	1	0	0	5	3
10225	UNK - 15"	0	0	1	0	0	5	3
10226	UNK - 15"	0	0	1	0	0	5	3
10235	UNK - 15"	0	0	1	0	0	5	3
10237	UNK - 15"	0	0	1	0	0	5	3
10428	DIP - 6"	0	0	4	0	2	0	3
10490	VCP - 12"	0	0	5	1	0	0	3
10491	VCP - 12"	0	0	5	1	0	0	3
10692	CIP - 12"	0	0	4	2	0	0	3
15253	UNK - 30"	0	0	1	0	0	5	3
18270	UNK - 15"	5	0	1	0	0	0	3
18271	UNK - 15"	5	0	1	0	0	0	3
18335	UNK - 12"	5	0	1	0	0	0	3
18337	UNK - 12"	5	0	1	0	0	0	3
18339	UNK - 12"	5	0	1	0	0	0	3
18341	UNK - 12"	5	0	1	0	0	0	3
19646	UNK - 10"	5	0	1	0	0	0	3
19804	UNK - 10"	5	0	1	0	0	0	3
23642	CIP - 12"	0	0	4	2	0	0	3
24011	UNK - 12"	0	0	1	0	0	5	3
28980	PVC - 8"	0	0	2	2	2	0	3
28981	PVC - 8"	0	0	2	2	2	0	3
28982	PVC - 8"	0	0	2	2	2	0	3
28983	PVC - 8"	0	0	2	2	2	0	3
28984	PVC - 8"	0	0	2	2	2	0	3
28985	PVC - 8"	0	0	2	2	2	0	3
28990	PVC - 8"	0	0	2	2	2	0	3
28992	PVC - 8"	0	0	2	2	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
28993	PVC - 8"	0	0	2	2	2	0	3
28995	PVC - 8"	0	0	2	2	2	0	3
28996	PVC - 8"	0	0	2	2	2	0	3
25300	PVC - 8"	0	0	2	2	2	0	3
25302	PVC - 8"	0	0	2	2	2	0	3
18301	UNK - 30"	0	0	1	0	0	5	3
25385	CIP - 8"	0	0	4	0	2	0	3
25386	CIP - 8"	0	0	4	0	2	0	3
26671	VCP - 10"	0	0	5	1	0	0	3
26683	VCP - 10"	0	0	5	1	0	0	3
28453	UNK - 24"	0	0	1	0	0	5	3
28960	CIP - 0"	0	0	4	0	2	0	3
28963	CIP - 4"	0	0	4	0	2	0	3
28962	CIP - 4"	0	0	4	0	2	0	3
28966	CIP - 4"	0	0	4	0	2	0	3
28968	CIP - 4"	0	0	4	0	2	0	3
31865	CIP - 0"	0	0	4	0	2	0	3
32623	DIP - 8"	0	0	4	0	2	0	3
90365	PVC - 8"	0	0	2	2	2	0	3
90364	PVC - 8"	0	0	2	2	2	0	3
90363	PVC - 8"	0	0	2	2	2	0	3
90362	PVC - 8"	0	0	2	2	2	0	3
5074	PVC - 8"	0	0	2	1	2	0	3
5075	PVC - 8"	0	0	2	1	2	0	3
3729	VSGD - 6"	0	0	1	2	2	0	3
3936	VCP - 10"	0	0	5	0	0	0	3
3938	VCP - 10"	0	0	5	0	0	0	3
3940	VCP - 10"	0	0	5	0	0	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
4050	VCP - 12"	0	0	5	0	0	0	3
4338	UNK - 8"	0	0	1	2	2	0	3
6507	PVC - 8"	0	0	2	1	2	0	3
6582	VCP - 10"	0	0	5	0	0	0	3
6672	VSGD - 8"	0	0	1	2	2	0	3
6674	VSGD - 8"	0	0	1	2	2	0	3
6728	UNK - 6"	0	0	1	2	2	0	3
6729	UNK - 6"	0	0	1	2	2	0	3
6732	VSGD - 6"	0	0	1	2	2	0	3
6734	VSGD - 6"	0	0	1	2	2	0	3
6735	VSGD - 6"	0	0	1	2	2	0	3
6744	UNK - 6"	0	0	1	2	2	0	3
6749	UNK - 6"	0	0	1	2	2	0	3
6756	UNK - 6"	0	0	1	2	2	0	3
7346	PVC - 8"	0	0	2	1	2	0	3
7364	PVC - 8"	0	0	2	1	2	0	3
7366	PVC - 8"	0	0	2	1	2	0	3
7443	PVC - 8"	0	0	2	1	2	0	3
7536	PVC - 8"	0	0	2	1	2	0	3
7552	PVC - 8"	0	0	2	1	2	0	3
7609	PVC - 8"	0	0	2	1	2	0	3
7610	PVC - 8"	0	0	2	1	2	0	3
7978	UNK - 8"	0	0	1	2	2	0	3
7980	UNK - 8"	0	0	1	2	2	0	3
8011	UNK - 8"	0	0	1	2	2	0	3
8014	UNK - 8"	0	0	1	2	2	0	3
8026	PVC - 8"	0	0	2	1	2	0	3
8334	UNK - 8"	0	0	1	2	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
8526	UNK - 8"	0	0	1	2	2	0	3
8527	UNK - 8"	0	0	1	2	2	0	3
8529	UNK - 8"	0	0	1	2	2	0	3
8783	PVC - 8"	0	0	2	1	2	0	3
8798	PVC - 8"	0	0	2	1	2	0	3
8848	PVC - 8"	0	0	2	1	2	0	3
8940	PVC - 8"	0	0	2	1	2	0	3
8942	PVC - 8"	0	0	2	1	2	0	3
9095	PVC - 8"	0	0	2	1	2	0	3
9243	PVC - 8"	0	0	2	1	2	0	3
9277	PVC - 8"	0	0	2	1	2	0	3
9379	PVC - 8"	0	0	2	1	2	0	3
9439	UNK - 8"	0	0	1	2	2	0	3
9441	UNK - 8"	0	0	1	2	2	0	3
9490	PVC - 8"	0	0	2	1	2	0	3
9725	UNK - 6"	0	0	1	2	2	0	3
10246	VSGD - 8"	0	0	1	2	2	0	3
10577	VCP - 10"	0	0	5	0	0	0	3
10656	VCP - 10"	0	0	5	0	0	0	3
10657	VCP - 10"	0	0	5	0	0	0	3
10659	VCP - 10"	0	0	5	0	0	0	3
10691	VCP - 10"	0	0	5	0	0	0	3
10695	VCP - 10"	0	0	5	0	0	0	3
10696	VCP - 10"	0	0	5	0	0	0	3
10701	VCP - 10"	0	0	5	0	0	0	3
10703	VCP - 10"	0	0	5	0	0	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
10705	VCP - 10"	0	0	5	0	0	0	3
18490	PVC - 6"	0	0	2	1	2	0	3
19022	PVC - 6"	0	0	2	1	2	0	3
19040	PVC - 6"	0	0	2	1	2	0	3
19064	PVC - 6"	0	0	2	1	2	0	3
19741	VCP - 10"	0	0	5	0	0	0	3
19760	VCP - 10"	0	0	5	0	0	0	3
20623	PVC - 8"	0	0	2	1	2	0	3
20625	PVC - 8"	0	0	2	1	2	0	3
20627	PVC - 8"	0	0	2	1	2	0	3
20628	PVC - 8"	0	0	2	1	2	0	3
22449	VCP - 12"	0	0	5	0	0	0	3
23478	UNK - 0"	0	0	1	2	2	0	3
23638	PVC - 8"	0	0	2	1	2	0	3
23644	VCP - 10"	0	0	5	0	0	0	3
24299	VSGD - 8"	0	0	1	2	2	0	3
28991	PVC - 8"	0	0	2	1	2	0	3
24761	PVC - 8"	0	0	2	1	2	0	3
25392	PVC - 8"	0	0	2	1	2	0	3
26673	VCP - 10"	0	0	5	0	0	0	3
26675	VCP - 10"	0	0	5	0	0	0	3
26677	VCP - 10"	0	0	5	0	0	0	3
26679	VCP - 10"	0	0	5	0	0	0	3
26681	VCP - 10"	0	0	5	0	0	0	3
26760	PVC - 8"	0	0	2	1	2	0	3
26762	PVC - 8"	0	0	2	1	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
26766	PVC - 8"	0	0	2	1	2	0	3
26768	PVC - 8"	0	0	2	1	2	0	3
26770	PVC - 8"	0	0	2	1	2	0	3
26772	PVC - 8"	0	0	2	1	2	0	3
26774	PVC - 8"	0	0	2	1	2	0	3
26799	PVC - 8"	0	0	2	1	2	0	3
26804	PVC - 8"	0	0	2	1	2	0	3
26806	PVC - 8"	0	0	2	1	2	0	3
31260	PVC - 8"	0	0	2	1	2	0	3
31770	VCP - 10"	0	0	5	0	0	0	3
31772	VCP - 10"	0	0	5	0	0	0	3
31775	VCP - 10"	0	0	5	0	0	0	3
90011	PVC - 6"	0	0	2	1	2	0	3
90011	PVC - 6"	0	0	2	1	2	0	3
90011	PVC - 6"	0	0	2	1	2	0	3
90011	PVC - 6"	0	0	2	1	2	0	3
90011	PVC - 6"	0	0	2	1	2	0	3
90011	PVC - 6"	0	0	2	1	2	0	3
32132	VCP - 12"	0	0	5	0	0	0	3
32648	PVC - 0"	0	0	2	1	2	0	3
5125	PVC - 8"	0	0	2	0	2	0	2
5126	PVC - 8"	0	0	2	0	2	0	2
4324	PVC - 8"	0	0	2	0	2	0	2
4326	PVC - 8"	0	0	2	0	2	0	2
4328	PVC - 8"	0	0	2	0	2	0	2
4330	PVC - 8"	0	0	2	0	2	0	2
4332	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
4333	PVC - 8"	0	0	2	0	2	0	2
4340	PVC - 8"	0	0	2	0	2	0	2
4342	PVC - 8"	0	0	2	0	2	0	2
4344	PVC - 8"	0	0	2	0	2	0	2
4364	UNK - 8"	0	0	1	1	2	0	2
5376	PVC - 8"	0	0	2	0	2	0	2
5423	PVC - 8"	0	0	2	0	2	0	2
5433	PVC - 8"	0	0	2	0	2	0	2
6267	PVC - 8"	0	0	2	0	2	0	2
6364	PVC - 8"	0	0	2	0	2	0	2
6420	PVC - 8"	0	0	2	0	2	0	2
6432	PVC - 8"	0	0	2	0	2	0	2
6439	PVC - 8"	0	0	2	0	2	0	2
6509	UNK - 8"	0	0	1	1	2	0	2
6532	VSGD - 8"	0	0	1	1	2	0	2
6653	PVC - 8"	0	0	2	0	2	0	2
6779	UNK - 8"	0	0	1	1	2	0	2
6872	UNK - 8"	0	0	1	1	2	0	2
6874	UNK - 8"	0	0	1	1	2	0	2
6876	UNK - 8"	0	0	1	1	2	0	2
6878	UNK - 8"	0	0	1	1	2	0	2
6912	UNK - 8"	0	0	1	1	2	0	2
6913	UNK - 8"	0	0	1	1	2	0	2
6976	UNK - 8"	0	0	1	1	2	0	2
7345	PVC - 8"	0	0	2	0	2	0	2
7368	PVC - 8"	0	0	2	0	2	0	2
7370	PVC - 8"	0	0	2	0	2	0	2
7378	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
7380	PVC - 8"	0	0	2	0	2	0	2
7381	PVC - 8"	0	0	2	0	2	0	2
7442	PVC - 8"	0	0	2	0	2	0	2
7445	PVC - 8"	0	0	2	0	2	0	2
7534	PVC - 8"	0	0	2	0	2	0	2
7541	PVC - 8"	0	0	2	0	2	0	2
7543	PVC - 8"	0	0	2	0	2	0	2
7545	PVC - 8"	0	0	2	0	2	0	2
7547	PVC - 8"	0	0	2	0	2	0	2
7549	PVC - 8"	0	0	2	0	2	0	2
7551	PVC - 8"	0	0	2	0	2	0	2
7601	PVC - 8"	0	0	2	0	2	0	2
7607	PVC - 8"	0	0	2	0	2	0	2
7651	PVC - 8"	0	0	2	0	2	0	2
7680	UNK - 8"	0	0	1	1	2	0	2
7749	UNK - 8"	0	0	1	1	2	0	2
7760	UNK - 8"	0	0	1	1	2	0	2
7767	UNK - 0"	0	0	1	1	2	0	2
7851	PVC - 8"	0	0	2	0	2	0	2
7853	PVC - 8"	0	0	2	0	2	0	2
7855	PVC - 8"	0	0	2	0	2	0	2
7857	PVC - 8"	0	0	2	0	2	0	2
7862	PVC - 8"	0	0	2	0	2	0	2
7863	PVC - 8"	0	0	2	0	2	0	2
8337	UNK - 8"	0	0	1	1	2	0	2
8682	PVC - 8"	0	0	2	0	2	0	2
8684	PVC - 8"	0	0	2	0	2	0	2
8685	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
8781	PVC - 8"	0	0	2	0	2	0	2
8795	PVC - 8"	0	0	2	0	2	0	2
8797	PVC - 8"	0	0	2	0	2	0	2
8850	PVC - 8"	0	0	2	0	2	0	2
8867	PVC - 8"	0	0	2	0	2	0	2
8943	PVC - 8"	0	0	2	0	2	0	2
9001	PVC - 8"	0	0	2	0	2	0	2
9003	PVC - 8"	0	0	2	0	2	0	2
9005	PVC - 8"	0	0	2	0	2	0	2
9092	PVC - 8"	0	0	2	0	2	0	2
9094	PVC - 8"	0	0	2	0	2	0	2
9143	PVC - 8"	0	0	2	0	2	0	2
9152	PVC - 8"	0	0	2	0	2	0	2
9153	PVC - 8"	0	0	2	0	2	0	2
9180	PVC - 8"	0	0	2	0	2	0	2
9229	PVC - 8"	0	0	2	0	2	0	2
9231	PVC - 8"	0	0	2	0	2	0	2
9242	PVC - 8"	0	0	2	0	2	0	2
9267	PVC - 8"	0	0	2	0	2	0	2
9275	PVC - 8"	0	0	2	0	2	0	2
9338	PVC - 8"	0	0	2	0	2	0	2
9340	PVC - 8"	0	0	2	0	2	0	2
9378	PVC - 8"	0	0	2	0	2	0	2
9445	UNK - 8"	0	0	1	1	2	0	2
9580	UNK - 8"	0	0	1	1	2	0	2
9616	UNK - 8"	0	0	1	1	2	0	2
9622	UNK - 8"	0	0	1	1	2	0	2
9667	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
9691	PVC - 8"	0	0	2	0	2	0	2
9767	UNK - 6"	0	0	1	1	2	0	2
9779	UNK - 6"	0	0	1	1	2	0	2
9804	PVC - 8"	0	0	2	0	2	0	2
9971	PVC - 6"	0	0	2	0	2	0	2
10045	UNK - 6"	0	0	1	1	2	0	2
10126	UNK - 6"	0	0	1	1	2	0	2
10191	PVC - 8"	0	0	2	0	2	0	2
10259	PVC - 6"	0	0	2	0	2	0	2
10431	PVC - 6"	0	0	2	0	2	0	2
4097	RCP - 15"	0	0	3	1	0	0	2
4099	RCP - 15"	0	0	3	1	0	0	2
6142	CCRF - 36"	0	0	3	1	0	0	2
6143	CCRF - 36"	0	0	3	1	0	0	2
6144	CCRF - 36"	0	0	3	1	0	0	2
6146	CCRF - 36"	0	0	3	1	0	0	2
6148	CCRF - 36"	0	0	3	1	0	0	2
6150	CCRF - 42"	0	0	3	1	0	0	2
6152	CCRF - 42"	0	0	3	1	0	0	2
10650	PVC - 8"	0	0	2	0	2	0	2
10652	PVC - 8"	0	0	2	0	2	0	2
10654	PVC - 8"	0	0	2	0	2	0	2
6154	CCRF - 42"	0	0	3	1	0	0	2
6156	CCRF - 42"	0	0	3	1	0	0	2
6158	CCRF - 42"	0	0	3	1	0	0	2
6160	CCRF - 42"	0	0	3	1	0	0	2
6162	CCRF - 42"	0	0	3	1	0	0	2
10000	RCP - 18"	0	0	3	1	0	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
15205	PVC - 8"	0	0	2	0	2	0	2
15220	PVC - 6"	0	0	2	0	2	0	2
15221	PVC - 6"	0	0	2	0	2	0	2
17338	DIP - 24"	0	0	4	0	0	0	2
18308	UNK - 6"	0	0	1	1	2	0	2
18412	UNK - 8"	0	0	1	1	2	0	2
18414	UNK - 8"	0	0	1	1	2	0	2
18457	PVC - 8"	0	0	2	0	2	0	2
10118	RCP - 18"	0	0	3	1	0	0	2
10158	RCP - 18"	0	0	3	1	0	0	2
10159	RCP - 18"	0	0	3	1	0	0	2
10304	RCP - 18"	0	0	3	1	0	0	2
19021	PVC - 6"	0	0	2	0	2	0	2
19037	PVC - 6"	0	0	2	0	2	0	2
19039	PVC - 6"	0	0	2	0	2	0	2
19063	PVC - 6"	0	0	2	0	2	0	2
19451	PVC - 8"	0	0	2	0	2	0	2
19453	PVC - 8"	0	0	2	0	2	0	2
19454	PVC - 8"	0	0	2	0	2	0	2
19455	PVC - 8"	0	0	2	0	2	0	2
19623	PVC - 8"	0	0	2	0	2	0	2
19625	PVC - 8"	0	0	2	0	2	0	2
10306	RCP - 18"	0	0	3	1	0	0	2
20230	DIP - 10"	0	0	4	0	0	0	2
10448	RCP - 15"	0	0	3	1	0	0	2
10507	RCP - 15"	0	0	3	1	0	0	2
20599	PVC - 8"	0	0	2	0	2	0	2
20646	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
22753	PVC - 6"	0	0	2	0	2	0	2
22935	PVC - 8"	0	0	2	0	2	0	2
23208	PVC - 6"	0	0	2	0	2	0	2
23266	PVC - 6"	0	0	2	0	2	0	2
23270	PVC - 6"	0	0	2	0	2	0	2
23274	PVC - 6"	0	0	2	0	2	0	2
23284	PVC - 8"	0	0	2	0	2	0	2
23288	PVC - 8"	0	0	2	0	2	0	2
23411	PVC - 2"	0	0	2	0	2	0	2
23480	UNK - 8"	0	0	1	1	2	0	2
23525	UNK - 6"	0	0	1	1	2	0	2
23526	UNK - 6"	0	0	1	1	2	0	2
23529	UNK - 6"	0	0	1	1	2	0	2
23531	UNK - 6"	0	0	1	1	2	0	2
23532	UNK - 6"	0	0	1	1	2	0	2
23536	UNK - 6"	0	0	1	1	2	0	2
23538	UNK - 6"	0	0	1	1	2	0	2
23542	UNK - 6"	0	0	1	1	2	0	2
23543	UNK - 6"	0	0	1	1	2	0	2
23544	UNK - 6"	0	0	1	1	2	0	2
23548	UNK - 6"	0	0	1	1	2	0	2
23549	UNK - 6"	0	0	1	1	2	0	2
23553	UNK - 6"	0	0	1	1	2	0	2
23554	UNK - 6"	0	0	1	1	2	0	2
23555	UNK - 6"	0	0	1	1	2	0	2
23557	UNK - 6"	0	0	1	1	2	0	2
23559	UNK - 6"	0	0	1	1	2	0	2
23640	UNK - 0"	0	0	1	1	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
23988	UNK - 6"	0	0	1	1	2	0	2
24046	UNK - 6"	0	0	1	1	2	0	2
24048	UNK - 6"	0	0	1	1	2	0	2
24072	PVC - 6"	0	0	2	0	2	0	2
24255	UNK - 8"	0	0	1	1	2	0	2
24257	UNK - 8"	0	0	1	1	2	0	2
24278	PVC - 8"	0	0	2	0	2	0	2
24301	PVC - 8"	0	0	2	0	2	0	2
24341	UNK - 0"	0	0	1	1	2	0	2
24343	UNK - 0"	0	0	1	1	2	0	2
24411	UNK - 6"	0	0	1	1	2	0	2
24413	UNK - 6"	0	0	1	1	2	0	2
24415	UNK - 6"	0	0	1	1	2	0	2
24427	UNK - 6"	0	0	1	1	2	0	2
24429	UNK - 6"	0	0	1	1	2	0	2
24451	CIP - 18"	0	0	4	0	0	0	2
28986	PVC - 8"	0	0	2	0	2	0	2
28987	PVC - 8"	0	0	2	0	2	0	2
28988	PVC - 8"	0	0	2	0	2	0	2
28989	PVC - 8"	0	0	2	0	2	0	2
28994	PVC - 8"	0	0	2	0	2	0	2
25317	PVC - 6"	0	0	2	0	2	0	2
25339	VSGD - 6"	0	0	1	1	2	0	2
25387	CIP - 10"	0	0	4	0	0	0	2
26309	PVC - 4"	0	0	2	0	2	0	2
26311	PVC - 6"	0	0	2	0	2	0	2
26467	UNK - 0"	0	0	1	1	2	0	2
26468	HDPE - 2"	0	0	1	1	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
26764	PVC - 8"	0	0	2	0	2	0	2
26802	PVC - 8"	0	0	2	0	2	0	2
26808	PVC - 8"	0	0	2	0	2	0	2
15224	RCP - 18"	0	0	3	1	0	0	2
19682	RCP - 42"	0	0	3	1	0	0	2
20268	RCP - 42"	0	0	3	1	0	0	2
20269	RCP - 42"	0	0	3	1	0	0	2
28665	PVC - 8"	0	0	2	0	2	0	2
28666	PVC - 8"	0	0	2	0	2	0	2
28667	PVC - 8"	0	0	2	0	2	0	2
28668	PVC - 8"	0	0	2	0	2	0	2
28669	PVC - 8"	0	0	2	0	2	0	2
28670	PVC - 8"	0	0	2	0	2	0	2
28524	UNK - 8"	0	0	1	1	2	0	2
28526	UNK - 0"	0	0	1	1	2	0	2
31072	DIP - 24"	0	0	4	0	0	0	2
18898	RCP - 42"	0	0	3	1	0	0	2
31496	UNK - 6"	0	0	1	1	2	0	2
31591	PVC - 4"	0	0	2	0	2	0	2
31594	PVC - 4"	0	0	2	0	2	0	2
31597	PVC - 4"	0	0	2	0	2	0	2
31599	PVC - 4"	0	0	2	0	2	0	2
31602	PVC - 4"	0	0	2	0	2	0	2
31605	PVC - 4"	0	0	2	0	2	0	2
31627	UNK - 8"	0	0	1	1	2	0	2
31629	UNK - 8"	0	0	1	1	2	0	2
31631	UNK - 8"	0	0	1	1	2	0	2
31633	UNK - 8"	0	0	1	1	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
31654	UNK - 8"	0	0	1	1	2	0	2
31656	UNK - 8"	0	0	1	1	2	0	2
31657	UNK - 8"	0	0	1	1	2	0	2
31665	UNK - 8"	0	0	1	1	2	0	2
31806	PVC - 8"	0	0	2	0	2	0	2
31878	PVC - 8"	0	0	2	0	2	0	2
31880	PVC - 8"	0	0	2	0	2	0	2
31882	PVC - 8"	0	0	2	0	2	0	2
25349	RCP - 42"	0	0	3	1	0	0	2
32624	PVC - 8"	0	0	2	0	2	0	2
90335	UNK - 8"	0	0	1	1	2	0	2
90336	PVC - 6"	0	0	2	0	2	0	2
90360	PVC - 8"	0	0	2	0	2	0	2
90361	PVC - 8"	0	0	2	0	2	0	2
10215	PVC - 8"	0	0	2	0	2	0	2
25351	RCP - 42"	0	0	3	1	0	0	2
31493	CCRF - 42"	0	0	3	1	0	0	2
4362	UNK - 8"	0	0	1	0	2	0	2
5070	UNK - 8"	0	0	1	0	2	0	2
5072	UNK - 8"	0	0	1	0	2	0	2
5284	VSGD - 8"	0	0	1	0	2	0	2
5286	VSGD - 8"	0	0	1	0	2	0	2
5298	UNK - 6"	0	0	1	0	2	0	2
5324	UNK - 6"	0	0	1	0	2	0	2
5337	UNK - 6"	0	0	1	0	2	0	2
5339	UNK - 6"	0	0	1	0	2	0	2
5402	UNK - 6"	0	0	1	0	2	0	2
5406	UNK - 6"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
5408	UNK - 6"	0	0	1	0	2	0	2
5418	UNK - 8"	0	0	1	0	2	0	2
5420	UNK - 8"	0	0	1	0	2	0	2
5422	UNK - 6"	0	0	1	0	2	0	2
5425	UNK - 6"	0	0	1	0	2	0	2
5427	UNK - 6"	0	0	1	0	2	0	2
5429	UNK - 6"	0	0	1	0	2	0	2
5431	UNK - 6"	0	0	1	0	2	0	2
5434	UNK - 8"	0	0	1	0	2	0	2
5436	UNK - 6"	0	0	1	0	2	0	2
5456	UNK - 6"	0	0	1	0	2	0	2
5510	UNK - 6"	0	0	1	0	2	0	2
5511	UNK - 6"	0	0	1	0	2	0	2
5529	UNK - 8"	0	0	1	0	2	0	2
5598	UNK - 8"	0	0	1	0	2	0	2
5600	UNK - 8"	0	0	1	0	2	0	2
5603	UNK - 6"	0	0	1	0	2	0	2
5605	UNK - 6"	0	0	1	0	2	0	2
5608	UNK - 8"	0	0	1	0	2	0	2
5879	UNK - 6"	0	0	1	0	2	0	2
5881	UNK - 6"	0	0	1	0	2	0	2
6338	UNK - 8"	0	0	1	0	2	0	2
6340	UNK - 8"	0	0	1	0	2	0	2
6352	UNK - 8"	0	0	1	0	2	0	2
6353	UNK - 8"	0	0	1	0	2	0	2
6511	UNK - 8"	0	0	1	0	2	0	2
6513	UNK - 6"	0	0	1	0	2	0	2
6530	VSGD - 8"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
6541	VSGD - 8"	0	0	1	0	2	0	2
6543	UNK - 8"	0	0	1	0	2	0	2
6583	UNK - 8"	0	0	1	0	2	0	2
6592	UNK - 6"	0	0	1	0	2	0	2
6593	UNK - 6"	0	0	1	0	2	0	2
6737	UNK - 8"	0	0	1	0	2	0	2
6738	UNK - 8"	0	0	1	0	2	0	2
6741	UNK - 6"	0	0	1	0	2	0	2
6742	UNK - 6"	0	0	1	0	2	0	2
6747	UNK - 6"	0	0	1	0	2	0	2
6755	UNK - 6"	0	0	1	0	2	0	2
6778	UNK - 8"	0	0	1	0	2	0	2
6809	UNK - 8"	0	0	1	0	2	0	2
6810	UNK - 8"	0	0	1	0	2	0	2
6837	UNK - 8"	0	0	1	0	2	0	2
6838	UNK - 8"	0	0	1	0	2	0	2
6911	UNK - 8"	0	0	1	0	2	0	2
6983	UNK - 8"	0	0	1	0	2	0	2
7058	UNK - 8"	0	0	1	0	2	0	2
7679	UNK - 8"	0	0	1	0	2	0	2
7762	UNK - 8"	0	0	1	0	2	0	2
7764	UNK - 8"	0	0	1	0	2	0	2
7769	UNK - 8"	0	0	1	0	2	0	2
7773	UNK - 15"	0	0	1	2	0	0	2
7925	UNK - 8"	0	0	1	0	2	0	2
7926	UNK - 8"	0	0	1	0	2	0	2
7981	UNK - 8"	0	0	1	0	2	0	2
8012	UNK - 8"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
8251	UNK - 8"	0	0	1	0	2	0	2
8253	UNK - 8"	0	0	1	0	2	0	2
8254	UNK - 8"	0	0	1	0	2	0	2
8336	UNK - 8"	0	0	1	0	2	0	2
8410	UNK - 8"	0	0	1	0	2	0	2
8412	UNK - 8"	0	0	1	0	2	0	2
8413	UNK - 8"	0	0	1	0	2	0	2
8530	UNK - 8"	0	0	1	0	2	0	2
9279	PVC - 12"	0	0	2	1	0	0	2
9300	PVC - 12"	0	0	2	1	0	0	2
9356	PVC - 12"	0	0	2	1	0	0	2
9357	PVC - 12"	0	0	2	1	0	0	2
9411	UNK - 8"	0	0	1	0	2	0	2
9413	UNK - 8"	0	0	1	0	2	0	2
9420	UNK - 15"	0	0	1	2	0	0	2
9444	UNK - 6"	0	0	1	0	2	0	2
9447	UNK - 8"	0	0	1	0	2	0	2
9449	UNK - 8"	0	0	1	0	2	0	2
9499	PVC - 12"	0	0	2	1	0	0	2
9501	PVC - 12"	0	0	2	1	0	0	2
9502	PVC - 12"	0	0	2	1	0	0	2
9504	PVC - 12"	0	0	2	1	0	0	2
9506	PVC - 12"	0	0	2	1	0	0	2
9585	PVC - 12"	0	0	2	1	0	0	2
9586	PVC - 12"	0	0	2	1	0	0	2
9618	PCP - 8"	0	0	1	0	2	0	2
9626	UNK - 8"	0	0	1	0	2	0	2
9677	UNK - 0"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
9689	UNK - 6"	0	0	1	0	2	0	2
9700	UNK - 6"	0	0	1	0	2	0	2
9705	PCP - 6"	0	0	1	0	2	0	2
9716	UNK - 6"	0	0	1	0	2	0	2
9718	UNK - 6"	0	0	1	0	2	0	2
9742	UNK - 0"	0	0	1	0	2	0	2
9765	UNK - 6"	0	0	1	0	2	0	2
9766	UNK - 6"	0	0	1	0	2	0	2
9778	UNK - 6"	0	0	1	0	2	0	2
9782	UNK - 6"	0	0	1	0	2	0	2
9783	UNK - 6"	0	0	1	0	2	0	2
9802	UNK - 6"	0	0	1	0	2	0	2
9807	UNK - 6"	0	0	1	0	2	0	2
9812	UNK - 6"	0	0	1	0	2	0	2
9815	UNK - 6"	0	0	1	0	2	0	2
9817	UNK - 8"	0	0	1	0	2	0	2
9820	UNK - 6"	0	0	1	0	2	0	2
9832	UNK - 6"	0	0	1	0	2	0	2
9833	UNK - 6"	0	0	1	0	2	0	2
90367	UNK - 0"	0	0	1	0	2	0	2
9870	VSGD - 6"	0	0	1	0	2	0	2
9874	UNK - 6"	0	0	1	0	2	0	2
9883	PCP - 6"	0	0	1	0	2	0	2
9884	UNK - 6"	0	0	1	0	2	0	2
9891	VSGD - 6"	0	0	1	0	2	0	2
9893	UNK - 6"	0	0	1	0	2	0	2
9929	VSGD - 6"	0	0	1	0	2	0	2
9977	UNK - 6"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
9978	UNK - 6"	0	0	1	0	2	0	2
9981	UNK - 6"	0	0	1	0	2	0	2
9982	UNK - 6"	0	0	1	0	2	0	2
9984	UNK - 8"	0	0	1	0	2	0	2
9986	UNK - 8"	0	0	1	0	2	0	2
9988	UNK - 8"	0	0	1	0	2	0	2
9990	UNK - 8"	0	0	1	0	2	0	2
9992	UNK - 8"	0	0	1	0	2	0	2
9994	UNK - 8"	0	0	1	0	2	0	2
9995	UNK - 0"	0	0	1	0	2	0	2
9997	UNK - 0"	0	0	1	0	2	0	2
10020	UNK - 6"	0	0	1	0	2	0	2
10029	UNK - 6"	0	0	1	0	2	0	2
10041	VSGD - 10"	0	0	1	2	0	0	2
10044	UNK - 6"	0	0	1	0	2	0	2
10047	VSGD - 10"	0	0	1	2	0	0	2
10049	UNK - 6"	0	0	1	0	2	0	2
10055	VSGD - 10"	0	0	1	2	0	0	2
10059	VSGD - 10"	0	0	1	2	0	0	2
10061	VSGD - 10"	0	0	1	2	0	0	2
10063	VSGD - 10"	0	0	1	2	0	0	2
10065	VSGD - 10"	0	0	1	2	0	0	2
10072	FCP - 8"	0	0	1	0	2	0	2
10079	UNK - 6"	0	0	1	0	2	0	2
10080	UNK - 6"	0	0	1	0	2	0	2
10083	UNK - 8"	0	0	1	0	2	0	2
10085	UNK - 8"	0	0	1	0	2	0	2
10087	UNK - 8"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
10120	UNK - 8"	0	0	1	0	2	0	2
10122	UNK - 8"	0	0	1	0	2	0	2
10125	UNK - 6"	0	0	1	0	2	0	2
10161	UNK - 8"	0	0	1	0	2	0	2
10162	UNK - 0"	0	0	1	0	2	0	2
10200	UNK - 6"	0	0	1	0	2	0	2
10229	VSGD - 8"	0	0	1	0	2	0	2
10230	VSGD - 8"	0	0	1	0	2	0	2
10261	VSGD - 6"	0	0	1	0	2	0	2
10297	UNK - 8"	0	0	1	0	2	0	2
10312	FCP - 8"	0	0	1	0	2	0	2
10314	FCP - 8"	0	0	1	0	2	0	2
10316	FCP - 8"	0	0	1	0	2	0	2
10317	FCP - 8"	0	0	1	0	2	0	2
10325	FCP - 6"	0	0	1	0	2	0	2
10328	UNK - 8"	0	0	1	0	2	0	2
10330	UNK - 8"	0	0	1	0	2	0	2
10331	UNK - 8"	0	0	1	0	2	0	2
10407	FCP - 6"	0	0	1	0	2	0	2
10409	FCP - 6"	0	0	1	0	2	0	2
10412	UNK - 6"	0	0	1	0	2	0	2
10413	UNK - 6"	0	0	1	0	2	0	2
10430	UNK - 6"	0	0	1	0	2	0	2
10433	UNK - 6"	0	0	1	0	2	0	2
10437	FCP - 6"	0	0	1	0	2	0	2
10439	FCP - 6"	0	0	1	0	2	0	2
10441	FCP - 6"	0	0	1	0	2	0	2
10442	FCP - 6"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
10488	VSGD - 10"	0	0	1	2	0	0	2
4101	RCP - 15"	0	0	3	0	0	0	2
4103	RCP - 15"	0	0	3	0	0	0	2
10520	UNK - 8"	0	0	1	0	2	0	2
10575	UNK - 8"	0	0	1	0	2	0	2
10588	UNK - 8"	0	0	1	0	2	0	2
10598	UNK - 8"	0	0	1	0	2	0	2
10599	UNK - 8"	0	0	1	0	2	0	2
10838	UNK - 0"	0	0	1	0	2	0	2
10853	UNK - 0"	0	0	1	0	2	0	2
10877	UNK - 0"	0	0	1	0	2	0	2
11128	FCP - 6"	0	0	1	0	2	0	2
11129	FCP - 6"	0	0	1	0	2	0	2
15223	PVC - 18"	0	0	2	1	0	0	2
10002	RCP - 18"	0	0	3	0	0	0	2
15687	UNK - 8"	0	0	1	0	2	0	2
15688	UNK - 8"	0	0	1	0	2	0	2
17332	UNK - 6"	0	0	1	0	2	0	2
10004	RCP - 18"	0	0	3	0	0	0	2
10005	RCP - 18"	0	0	3	0	0	0	2
10074	RCP - 18"	0	0	3	0	0	0	2
10076	RCP - 18"	0	0	3	0	0	0	2
10116	RCP - 18"	0	0	3	0	0	0	2
10302	RCP - 15"	0	0	3	0	0	0	2
10321	RCP - 18"	0	0	3	0	0	0	2
10322	RCP - 18"	0	0	3	0	0	0	2
10444	RCP - 15"	0	0	3	0	0	0	2
10446	RCP - 15"	0	0	3	0	0	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
10509	RCP - 15"	0	0	3	0	0	0	2
10511	RCP - 15"	0	0	3	0	0	0	2
10514	RCP - 15"	0	0	3	0	0	0	2
10515	RCP - 15"	0	0	3	0	0	0	2
20356	UNK - 8"	0	0	1	0	2	0	2
20587	UNK - 8"	0	0	1	0	2	0	2
21334	UNK - 8"	0	0	1	0	2	0	2
22939	HDPE - 2"	0	0	1	0	2	0	2
10517	RCP - 15"	0	0	3	0	0	0	2
10592	RCP - 15"	0	0	3	0	0	0	2
23476	UNK - 8"	0	0	1	0	2	0	2
10593	RCP - 15"	0	0	3	0	0	0	2
10595	RCP - 15"	0	0	3	0	0	0	2
23646	UNK - 0"	0	0	1	0	2	0	2
24076	VSGD - 8"	0	0	1	0	2	0	2
23990	UNK - 6"	0	0	1	0	2	0	2
23991	UNK - 6"	0	0	1	0	2	0	2
10716	RCP - 15"	0	0	3	0	0	0	2
24022	VSGD - 6"	0	0	1	0	2	0	2
24023	VSGD - 6"	0	0	1	0	2	0	2
24026	VSGD - 6"	0	0	1	0	2	0	2
24027	VSGD - 8"	0	0	1	0	2	0	2
24030	VSGD - 6"	0	0	1	0	2	0	2
24032	VSGD - 6"	0	0	1	0	2	0	2
24034	VSGD - 6"	0	0	1	0	2	0	2
24035	VSGD - 8"	0	0	1	0	2	0	2
24038	VSGD - 6"	0	0	1	0	2	0	2
24044	UNK - 6"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
24232	UNK - 8"	0	0	1	0	2	0	2
24234	UNK - 8"	0	0	1	0	2	0	2
24236	UNK - 8"	0	0	1	0	2	0	2
24238	UNK - 8"	0	0	1	0	2	0	2
24240	UNK - 8"	0	0	1	0	2	0	2
24242	UNK - 8"	0	0	1	0	2	0	2
24244	UNK - 8"	0	0	1	0	2	0	2
24246	UNK - 8"	0	0	1	0	2	0	2
24253	UNK - 8"	0	0	1	0	2	0	2
24294	UNK - 6"	0	0	1	0	2	0	2
24296	UNK - 6"	0	0	1	0	2	0	2
24304	VSGD - 8"	0	0	1	0	2	0	2
24365	UNK - 0"	0	0	1	0	2	0	2
24409	UNK - 6"	0	0	1	0	2	0	2
24417	UNK - 6"	0	0	1	0	2	0	2
24419	UNK - 6"	0	0	1	0	2	0	2
24421	UNK - 6"	0	0	1	0	2	0	2
24423	UNK - 6"	0	0	1	0	2	0	2
24431	UNK - 6"	0	0	1	0	2	0	2
24433	UNK - 6"	0	0	1	0	2	0	2
24435	UNK - 6"	0	0	1	0	2	0	2
24437	UNK - 6"	0	0	1	0	2	0	2
24439	UNK - 6"	0	0	1	0	2	0	2
24441	UNK - 6"	0	0	1	0	2	0	2
24443	UNK - 6"	0	0	1	0	2	0	2
24447	UNK - 10"	0	0	1	2	0	0	2
24481	UNK - 6"	0	0	1	0	2	0	2
24485	UNK - 0"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
25333	VSGD - 8"	0	0	1	0	2	0	2
25335	VSGD - 8"	0	0	1	0	2	0	2
25337	VSGD - 6"	0	0	1	0	2	0	2
10718	RCP - 15"	0	0	3	0	0	0	2
10720	RCP - 15"	0	0	3	0	0	0	2
25393	HDPE - 8"	0	0	1	0	2	0	2
26001	UNK - 2"	0	0	1	0	2	0	2
26368	FCP - 6"	0	0	1	0	2	0	2
26370	FCP - 6"	0	0	1	0	2	0	2
26372	FCP - 6"	0	0	1	0	2	0	2
26374	UNK - 6"	0	0	1	0	2	0	2
26376	FCP - 6"	0	0	1	0	2	0	2
26378	FCP - 6"	0	0	1	0	2	0	2
26380	FCP - 6"	0	0	1	0	2	0	2
26465	UNK - 0"	0	0	1	0	2	0	2
10722	RCP - 15"	0	0	3	0	0	0	2
10724	RCP - 15"	0	0	3	0	0	0	2
10725	RCP - 15"	0	0	3	0	0	0	2
20253	RCP - 42"	0	0	3	0	0	0	2
20255	RCP - 42"	0	0	3	0	0	0	2
20257	RCP - 42"	0	0	3	0	0	0	2
20259	RCP - 42"	0	0	3	0	0	0	2
20261	RCP - 42"	0	0	3	0	0	0	2
20263	RCP - 42"	0	0	3	0	0	0	2
20265	RCP - 42"	0	0	3	0	0	0	2
20266	RCP - 42"	0	0	3	0	0	0	2
28675	PVC - 10"	0	0	2	1	0	0	2
28676	PVC - 10"	0	0	2	1	0	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
28678	PVC - 10"	0	0	2	1	0	0	2
28679	PVC - 10"	0	0	2	1	0	0	2
27252	UNK - 0"	0	0	1	0	2	0	2
27256	UNK - 0"	0	0	1	0	2	0	2
31971	PVC - 21"	0	0	2	1	0	0	2
31972	PVC - 21"	0	0	2	1	0	0	2
31973	PVC - 21"	0	0	2	1	0	0	2
31974	PVC - 21"	0	0	2	1	0	0	2
31975	PVC - 21"	0	0	2	1	0	0	2
31976	PVC - 21"	0	0	2	1	0	0	2
31977	PVC - 21"	0	0	2	1	0	0	2
31978	PVC - 21"	0	0	2	1	0	0	2
31979	PVC - 21"	0	0	2	1	0	0	2
31984	PVC - 21"	0	0	2	1	0	0	2
31985	PVC - 15"	0	0	2	1	0	0	2
31986	PVC - 15"	0	0	2	1	0	0	2
31987	PVC - 15"	0	0	2	1	0	0	2
31988	PVC - 15"	0	0	2	1	0	0	2
31989	PVC - 15"	0	0	2	1	0	0	2
31990	PVC - 15"	0	0	2	1	0	0	2
31991	PVC - 15"	0	0	2	1	0	0	2
31997	PVC - 15"	0	0	2	1	0	0	2
31998	PVC - 15"	0	0	2	1	0	0	2
30839	UNK - 6"	0	0	1	0	2	0	2
31651	UNK - 8"	0	0	1	0	2	0	2
31800	UNK - 0"	0	0	1	0	2	0	2
31804	UNK - 0"	0	0	1	0	2	0	2
90372	UNK - 6"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
90354	UNK - 8"	0	0	1	0	2	0	2
90373	UNK - 0"	0	0	1	0	2	0	2
90374	UNK - 6"	0	0	1	0	2	0	2
90375	UNK - 0"	0	0	1	0	2	0	2
90359	UNK - 4"	0	0	1	0	2	0	2
6425	UNK - 24"	0	0	1	1	0	0	1
6427	UNK - 24"	0	0	1	1	0	0	1
6429	UNK - 30"	0	0	1	1	0	0	1
6521	UNK - 24"	0	0	1	1	0	0	1
6533	VSGD - 18"	0	0	1	1	0	0	1
6535	VSGD - 18"	0	0	1	1	0	0	1
6545	VSGD - 18"	0	0	1	1	0	0	1
7775	UNK - 15"	0	0	1	1	0	0	1
7912	UNK - 12"	0	0	1	1	0	0	1
7918	UNK - 12"	0	0	1	1	0	0	1
8861	PVC - 12"	0	0	2	0	0	0	1
8863	PVC - 12"	0	0	2	0	0	0	1
8865	PVC - 12"	0	0	2	0	0	0	1
9280	PVC - 12"	0	0	2	0	0	0	1
9312	PVC - 12"	0	0	2	0	0	0	1
9314	PVC - 12"	0	0	2	0	0	0	1
9559	PVC - 12"	0	0	2	0	0	0	1
9610	HDPE - 20"	0	0	1	1	0	0	1
9612	HDPE - 20"	0	0	1	1	0	0	1
9614	HDPE - 20"	0	0	1	1	0	0	1
9620	HDPE - 20"	0	0	1	1	0	0	1
9630	VSGD - 24"	0	0	1	1	0	0	1
9661	VSGD - 24"	0	0	1	1	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
9729	VSGD - 24"	0	0	1	1	0	0	1
9731	VSGD - 24"	0	0	1	1	0	0	1
9799	VSGD - 24"	0	0	1	1	0	0	1
9877	VSGD - 24"	0	0	1	1	0	0	1
9878	VSGD - 24"	0	0	1	1	0	0	1
18899	PVC - 10"	0	0	2	0	0	0	1
18904	PVC - 10"	0	0	2	0	0	0	1
18905	PVC - 10"	0	0	2	0	0	0	1
19213	PVC - 10"	0	0	2	0	0	0	1
19324	PVC - 10"	0	0	2	0	0	0	1
19326	PVC - 10"	0	0	2	0	0	0	1
19327	PVC - 10"	0	0	2	0	0	0	1
19393	PVC - 10"	0	0	2	0	0	0	1
19626	PVC - 10"	0	0	2	0	0	0	1
20374	UNK - 18"	0	0	1	1	0	0	1
20375	UNK - 18"	0	0	1	1	0	0	1
23299	PVC - 10"	0	0	2	0	0	0	1
25384	VSGD - 12"	0	0	1	1	0	0	1
28671	PVC - 10"	0	0	2	0	0	0	1
28672	PVC - 10"	0	0	2	0	0	0	1
28673	PVC - 10"	0	0	2	0	0	0	1
28674	PVC - 10"	0	0	2	0	0	0	1
28677	PVC - 10"	0	0	2	0	0	0	1
31980	PVC - 21"	0	0	2	0	0	0	1
31981	PVC - 21"	0	0	2	0	0	0	1
31982	PVC - 21"	0	0	2	0	0	0	1
31983	PVC - 21"	0	0	2	0	0	0	1
31992	PVC - 15"	0	0	2	0	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
31993	PVC - 15"	0	0	2	0	0	0	1
31994	PVC - 15"	0	0	2	0	0	0	1
31995	PVC - 15"	0	0	2	0	0	0	1
31996	PVC - 15"	0	0	2	0	0	0	1
28680	PVC - 10"	0	0	2	0	0	0	1
20	UNK - 15"	0	0	1	1	0	0	1
5953	UNK - 10"	0	0	1	0	0	0	1
5957	UNK - 10"	0	0	1	0	0	0	1
5959	UNK - 10"	0	0	1	0	0	0	1
5961	UNK - 10"	0	0	1	0	0	0	1
6003	UNK - 10"	0	0	1	0	0	0	1
6005	UNK - 10"	0	0	1	0	0	0	1
6387	UNK - 12"	0	0	1	0	0	0	1
6389	UNK - 18"	0	0	1	0	0	0	1
6391	UNK - 18"	0	0	1	0	0	0	1
6395	UNK - 18"	0	0	1	0	0	0	1
6396	UNK - 18"	0	0	1	0	0	0	1
6438	UNK - 20"	0	0	1	0	0	0	1
6441	UNK - 20"	0	0	1	0	0	0	1
6444	UNK - 10"	0	0	1	0	0	0	1
6536	UNK - 18"	0	0	1	0	0	0	1
6549	VSGD - 18"	0	0	1	0	0	0	1
6571	VSGD - 15"	0	0	1	0	0	0	1
6573	VSGD - 15"	0	0	1	0	0	0	1
6574	VSGD - 15"	0	0	1	0	0	0	1
6578	UNK - 10"	0	0	1	0	0	0	1
6580	UNK - 10"	0	0	1	0	0	0	1
7836	UNK - 15"	0	0	1	0	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
7838	UNK - 15"	0	0	1	0	0	0	1
7840	UNK - 15"	0	0	1	0	0	0	1
7842	UNK - 15"	0	0	1	0	0	0	1
7844	UNK - 15"	0	0	1	0	0	0	1
7846	UNK - 15"	0	0	1	0	0	0	1
7848	UNK - 15"	0	0	1	0	0	0	1
9606	HDPE - 20"	0	0	1	0	0	0	1
9698	UNK - 10"	0	0	1	0	0	0	1
9886	VSGD - 24"	0	0	1	0	0	0	1
9887	UNK - 24"	0	0	1	0	0	0	1
10038	VSGD - 10"	0	0	1	0	0	0	1
10039	UNK - 10"	0	0	1	0	0	0	1
10483	VSGD - 10"	0	0	1	0	0	0	1
10485	VSGD - 10"	0	0	1	0	0	0	1
10487	VSGD - 10"	0	0	1	0	0	0	1
10572	VSGD - 10"	0	0	1	0	0	0	1
10574	VSGD - 10"	0	0	1	0	0	0	1
15252	VSGD - 15"	0	0	1	0	0	0	1
18914	UNK - 10"	0	0	1	0	0	0	1
18916	UNK - 10"	0	0	1	0	0	0	1
18918	UNK - 10"	0	0	1	0	0	0	1
18920	UNK - 10"	0	0	1	0	0	0	1
18922	UNK - 10"	0	0	1	0	0	0	1
18923	UNK - 10"	0	0	1	0	0	0	1
19016	UNK - 10"	0	0	1	0	0	0	1
19506	UNK - 10"	0	0	1	0	0	0	1
19508	UNK - 10"	0	0	1	0	0	0	1
19510	UNK - 10"	0	0	1	0	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
19512	UNK - 10"	0	0	1	0	0	0	1
19514	UNK - 10"	0	0	1	0	0	0	1
19516	UNK - 10"	0	0	1	0	0	0	1
19518	UNK - 10"	0	0	1	0	0	0	1
19520	UNK - 10"	0	0	1	0	0	0	1
19521	UNK - 10"	0	0	1	0	0	0	1
19638	UNK - 10"	0	0	1	0	0	0	1
20308	HDPE - 20"	0	0	1	0	0	0	1
23578	UNK - 12"	0	0	1	0	0	0	1
24017	VSGD - 10"	0	0	1	0	0	0	1
24248	UNK - 15"	0	0	1	0	0	0	1
24250	UNK - 15"	0	0	1	0	0	0	1
24355	UNK - 10"	0	0	1	0	0	0	1
24357	UNK - 10"	0	0	1	0	0	0	1
24359	UNK - 10"	0	0	1	0	0	0	1
24361	UNK - 10"	0	0	1	0	0	0	1
24363	UNK - 10"	0	0	1	0	0	0	1
24367	UNK - 10"	0	0	1	0	0	0	1
24369	UNK - 10"	0	0	1	0	0	0	1
24371	UNK - 10"	0	0	1	0	0	0	1
24449	VSGD - 24"	0	0	1	0	0	0	1
25682	UNK - 10"	0	0	1	0	0	0	1
25684	UNK - 10"	0	0	1	0	0	0	1

Table D-2: Kulaimano Basin Pipe Segments

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
1536	PVC - 6"	0	0	2	2	2	5	10
175	UNK - 6"	0	0	1	2	2	5	9
298	UNK - 6"	0	0	1	2	2	5	9
325	UNK - 6"	0	0	1	2	2	5	9
812	UNK - 6"	0	0	1	2	2	5	9
814	UNK - 8"	0	0	1	2	2	5	9
822	UNK - 6"	0	0	1	2	2	5	9
1018	UNK - 6"	0	0	1	2	2	5	9
1065	UNK - 6"	0	0	1	2	2	5	9
1067	UNK - 6"	0	0	1	2	2	5	9
1534	UNK - 6"	0	0	1	2	2	5	9
1538	PVC - 6"	0	0	2	1	2	5	9
1540	PVC - 6"	0	0	2	1	2	5	9
1635	UNK - 6"	0	0	1	2	2	5	9
1636	UNK - 6"	0	0	1	2	2	5	9
25489	UNK - 8"	0	0	1	2	2	5	9
25577	UNK - 6"	0	0	1	2	2	5	9
25616	UNK - 6"	0	0	1	2	2	5	9
25618	UNK - 8"	0	0	1	2	2	5	9
26015	PVC - 8"	0	0	2	1	2	5	9
69	CIP - 12"	0	0	4	0	0	5	8
269	UNK - 8"	0	0	1	1	2	5	8
271	UNK - 6"	0	0	1	1	2	5	8
355	UNK - 6"	0	0	1	1	2	5	8
388	UNK - 8"	0	0	1	1	2	5	8
570	UNK - 6"	0	0	1	1	2	5	8
572	UNK - 6"	0	0	1	1	2	5	8

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
573	UNK - 6"	0	0	1	1	2	5	8
666	UNK - 8"	0	0	1	1	2	5	8
668	UNK - 8"	0	0	1	1	2	5	8
670	UNK - 8"	0	0	1	1	2	5	8
672	UNK - 8"	0	0	1	1	2	5	8
739	PVC - 6"	0	0	2	0	2	5	8
741	PVC - 6"	0	0	2	0	2	5	8
787	UNK - 6"	0	0	1	1	2	5	8
789	UNK - 6"	0	0	1	1	2	5	8
801	UNK - 6"	0	0	1	1	2	5	8
803	UNK - 6"	0	0	1	1	2	5	8
805	UNK - 6"	0	0	1	1	2	5	8
1153	UNK - 6"	0	0	1	1	2	5	8
1154	UNK - 6"	0	0	1	1	2	5	8
1157	UNK - 6"	0	0	1	1	2	5	8
1159	UNK - 6"	0	0	1	1	2	5	8
1161	UNK - 6"	0	0	1	1	2	5	8
1253	UNK - 6"	0	0	1	1	2	5	8
1265	UNK - 6"	0	0	1	1	2	5	8
1274	UNK - 6"	0	0	1	1	2	5	8
1410	UNK - 8"	0	0	1	1	2	5	8
1415	PVC - 8"	0	0	2	0	2	5	8
1423	PVC - 8"	0	0	2	0	2	5	8
1430	UNK - 8"	0	0	1	1	2	5	8
1431	UNK - 8"	0	0	1	1	2	5	8
1530	UNK - 6"	0	0	1	1	2	5	8
1651	DIP - 10"	0	0	4	0	0	5	8
25529	UNK - 6"	0	0	1	1	2	5	8

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
25538	PVC - 6"	0	0	2	0	2	5	8
25542	UNK - 8"	0	0	1	1	2	5	8
25598	DIP - 10"	0	0	4	0	0	5	8
22	UNK - 6"	0	0	1	0	2	5	7
24	UNK - 6"	0	0	1	0	2	5	7
26	UNK - 8"	0	0	1	0	2	5	7
132	UNK - 6"	0	0	1	0	2	5	7
134	UNK - 6"	0	0	1	0	2	5	7
136	UNK - 6"	0	0	1	0	2	5	7
137	UNK - 6"	0	0	1	0	2	5	7
176	UNK - 6"	0	0	1	0	2	5	7
219	UNK - 6"	0	0	1	0	2	5	7
296	UNK - 10"	0	0	1	2	0	5	7
327	UNK - 10"	0	0	1	2	0	5	7
328	UNK - 10"	0	0	1	2	0	5	7
392	UNK - 6"	0	0	1	0	2	5	7
394	UNK - 6"	0	0	1	0	2	5	7
396	UNK - 6"	0	0	1	0	2	5	7
398	UNK - 6"	0	0	1	0	2	5	7
404	UNK - 6"	0	0	1	0	2	5	7
406	UNK - 6"	0	0	1	0	2	5	7
408	UNK - 6"	0	0	1	0	2	5	7
497	UNK - 6"	0	0	1	0	2	5	7
499	UNK - 6"	0	0	1	0	2	5	7
501	UNK - 6"	0	0	1	0	2	5	7
503	UNK - 6"	0	0	1	0	2	5	7
737	UNK - 6"	0	0	1	0	2	5	7
743	UNK - 6"	0	0	1	0	2	5	7

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
744	UNK - 8"	0	0	1	0	2	5	7
779	UNK - 6"	0	0	1	0	2	5	7
791	UNK - 6"	0	0	1	0	2	5	7
793	UNK - 6"	0	0	1	0	2	5	7
796	UNK - 6"	0	0	1	0	2	5	7
799	UNK - 6"	0	0	1	0	2	5	7
806	UNK - 6"	0	0	1	0	2	5	7
808	UNK - 6"	0	0	1	0	2	5	7
810	UNK - 6"	0	0	1	0	2	5	7
815	UNK - 6"	0	0	1	0	2	5	7
1003	UNK - 6"	0	0	1	0	2	5	7
1005	UNK - 6"	0	0	1	0	2	5	7
1007	UNK - 6"	0	0	1	0	2	5	7
1014	UNK - 6"	0	0	1	0	2	5	7
1016	UNK - 6"	0	0	1	0	2	5	7
1061	UNK - 6"	0	0	1	0	2	5	7
1063	UNK - 6"	0	0	1	0	2	5	7
1069	UNK - 6"	0	0	1	0	2	5	7
1163	UNK - 6"	0	0	1	0	2	5	7
1165	UNK - 6"	0	0	1	0	2	5	7
1256	UNK - 6"	0	0	1	0	2	5	7
1257	UNK - 6"	0	0	1	0	2	5	7
1259	UNK - 6"	0	0	1	0	2	5	7
1261	UNK - 6"	0	0	1	0	2	5	7
1263	UNK - 6"	0	0	1	0	2	5	7
1267	UNK - 6"	0	0	1	0	2	5	7
1269	UNK - 6"	0	0	1	0	2	5	7
1273	UNK - 6"	0	0	1	0	2	5	7

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
1532	UNK - 6"	0	0	1	0	2	5	7
1544	UNK - 8"	0	0	1	0	2	5	7
1546	UNK - 6"	0	0	1	0	2	5	7
1548	UNK - 6"	0	0	1	0	2	5	7
1684	UNK - 12"	0	0	1	2	0	5	7
15096	UNK - 6"	0	0	1	0	2	5	7
20035	UNK - 12"	0	0	1	2	0	5	7
20441	UNK - 12"	0	0	1	2	0	5	7
20442	UNK - 12"	0	0	1	2	0	5	7
20444	UNK - 12"	0	0	1	2	0	5	7
20452	UNK - 12"	0	0	1	2	0	5	7
25487	UNK - 8"	0	0	1	0	2	5	7
25495	UNK - 6"	0	0	1	0	2	5	7
25497	UNK - 6"	0	0	1	0	2	5	7
25531	UNK - 6"	0	0	1	0	2	5	7
25533	UNK - 6"	0	0	1	0	2	5	7
25544	UNK - 6"	0	0	1	0	2	5	7
25546	UNK - 6"	0	0	1	0	2	5	7
25548	UNK - 6"	0	0	1	0	2	5	7
25550	UNK - 6"	0	0	1	0	2	5	7
25602	UNK - 8"	0	0	1	0	2	5	7
25604	UNK - 6"	0	0	1	0	2	5	7
25609	UNK - 8"	0	0	1	0	2	5	7
25610	UNK - 6"	0	0	1	0	2	5	7
28	UNK - 12"	0	0	1	1	0	5	6
30	UNK - 12"	0	0	1	1	0	5	6
32	UNK - 12"	0	0	1	1	0	5	6
353	UNK - 10"	0	0	1	1	0	5	6

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
472	PVC - 12"	0	0	2	0	0	5	6
1507	UNK - 10"	0	0	1	1	0	5	6
20451	UNK - 12"	0	0	1	1	0	5	6
29455	UNK - 10"	0	0	1	1	0	5	6
20450	UNK - 12"	0	0	1	1	0	5	6
39	UNK - 12"	0	0	1	0	0	5	5
50	UNK - 12"	0	0	1	0	0	5	5
54	UNK - 10"	0	0	1	0	0	5	5
56	UNK - 10"	0	0	1	0	0	5	5
62	UNK - 10"	0	0	1	0	0	5	5
64	UNK - 10"	0	0	1	0	0	5	5
65	UNK - 10"	0	0	1	0	0	5	5
237	UNK - 10"	0	0	1	0	0	5	5
471	UNK - 12"	0	0	1	0	0	5	5
1550	UNK - 10"	0	0	1	0	0	5	5
1551	UNK - 10"	0	0	1	0	0	5	5
1652	UNK - 12"	0	0	1	0	0	5	5
17450	UNK - 10"	0	0	1	0	0	5	5
20433	UNK - 14"	0	0	1	0	0	5	5
20434	UNK - 14"	0	0	1	0	0	5	5
20435	UNK - 12"	0	0	1	0	0	5	5
20436	UNK - 12"	0	0	1	0	0	5	5
20437	UNK - 12"	0	0	1	0	0	5	5
20438	UNK - 12"	0	0	1	0	0	5	5
20439	UNK - 12"	0	0	1	0	0	5	5
20443	UNK - 12"	0	0	1	0	0	5	5
25594	UNK - 12"	0	0	1	0	0	5	5
20446	UNK - 12"	0	0	1	0	0	5	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
20447	UNK - 12"	0	0	1	0	0	5	5
20448	UNK - 12"	0	0	1	0	0	5	5
1428	PVC - 8"	0	0	2	1	2	0	5
1417	PVC - 8"	0	0	2	0	2	0	4
1419	PVC - 8"	0	0	2	0	2	0	4
1421	PVC - 8"	0	0	2	0	2	0	4
1426	PVC - 8"	0	0	2	0	2	0	4
29457	PVC - 8"	0	0	2	0	2	0	4
29459	PVC - 8"	0	0	2	0	2	0	4
29461	PVC - 8"	0	0	2	0	2	0	4
29463	PVC - 8"	0	0	2	0	2	0	4
29465	PVC - 8"	0	0	2	0	2	0	4
25596	UNK - 0"	0	0	1	0	2	0	3
1647	UNK - 12"	0	0	1	0	0	0	1
1649	UNK - 12"	0	0	1	0	0	0	1
25600	UNK - 12"	0	0	1	0	0	0	1

Table D-3: Papaikou-Paukaa Basin Pipe Segments

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
3289	VCP - 6"	0	0	5	2	2	5	10
3297	VCP - 6"	0	0	5	2	2	5	10
3331	VCP - 6"	0	0	5	2	2	5	10
3333	VCP - 6"	0	0	5	2	2	5	10
3367	VCP - 6"	0	0	5	2	2	5	10
25633	VCP - 6"	0	0	5	2	2	5	10
3371	VCP - 6"	0	0	5	0	2	5	9
25629	VCP - 6"	0	0	5	0	2	5	9
3338	VCP - 6"	0	0	5	2	2	0	6
3340	VCP - 6"	0	0	5	2	2	0	6
3293	CIP - 6"	0	0	4	2	2	0	6
3295	CIP - 6"	0	0	4	2	2	0	6
3328	CIP - 6"	0	0	4	2	2	0	6
3334	CIP - 6"	0	0	4	2	2	0	6
3336	CIP - 6"	0	0	4	2	2	0	6
15187	VCP - 8"	0	0	5	1	2	0	6
25433	VCP - 8"	0	0	5	1	2	0	6
1784	VCP - 12"	0	0	5	2	0	0	5
3376	PVC - 8"	0	0	2	2	2	0	4
15186	PVC - 8"	0	0	2	2	2	0	4
25435	DIP - 12"	0	0	4	2	0	0	4
25650	DIP - 10"	0	0	4	2	0	0	4
3444851	CIP - 0"	0	0	4	0	2	0	4
4084933	CIP - 0"	0	0	4	0	2	0	4
1878	UNK - 6"	0	0	1	2	2	0	4
2018	UNK - 6"	0	0	1	2	2	0	4
2020	UNK - 6"	0	0	1	2	2	0	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
2031	UNK - 8"	0	0	1	2	2	0	4
2032	UNK - 8"	0	0	1	2	2	0	4
2232	UNK - 8"	0	0	1	2	2	0	4
2234	UNK - 8"	0	0	1	2	2	0	4
2274	UNK - 6"	0	0	1	2	2	0	4
2275	UNK - 8"	0	0	1	2	2	0	4
2287	UNK - 8"	0	0	1	2	2	0	4
2290	UNK - 6"	0	0	1	2	2	0	4
2292	UNK - 6"	0	0	1	2	2	0	4
2666	UNK - 8"	0	0	1	2	2	0	4
2668	UNK - 6"	0	0	1	2	2	0	4
2670	UNK - 8"	0	0	1	2	2	0	4
2710	PVC - 8"	0	0	2	1	2	0	4
2857	DIP - 12"	0	0	4	1	0	0	4
2878	UNK - 8"	0	0	1	2	2	0	4
2880	UNK - 8"	0	0	1	2	2	0	4
3129	UNK - 8"	0	0	1	2	2	0	4
3218	UNK - 6"	0	0	1	2	2	0	4
3372	PVC - 8"	0	0	2	1	2	0	4
3382	UNK - 8"	0	0	1	2	2	0	4
3384	UNK - 8"	0	0	1	2	2	0	4
3394	UNK - 6"	0	0	1	2	2	0	4
3399	UNK - 6"	0	0	1	2	2	0	4
3401	UNK - 6"	0	0	1	2	2	0	4
3402	UNK - 6"	0	0	1	2	2	0	4
3506	UNK - 8"	0	0	1	2	2	0	4
3525	UNK - 8"	0	0	1	2	2	0	4
22923	PVC - 8"	0	0	2	1	2	0	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
25399	UNK - 8"	0	0	1	2	2	0	4
25431	PVC - 8"	0	0	2	1	2	0	4
25437	UNK - 0"	0	0	1	2	2	0	4
25638	UNK - 6"	0	0	1	2	2	0	4
31069	UNK - 8"	0	0	1	2	2	0	4
90376	RCP - 0"	0	0	3	0	2	0	4
90377	RCP - 0"	0	0	3	0	2	0	4
1741	UNK - 6"	0	0	1	1	2	0	3
1743	UNK - 6"	0	0	1	1	2	0	3
1749	UNK - 6"	0	0	1	1	2	0	3
1751	UNK - 6"	0	0	1	1	2	0	3
1752	UNK - 8"	0	0	1	1	2	0	3
1766	UNK - 8"	0	0	1	1	2	0	3
1779	PVC - 12"	0	0	2	1	0	0	2
1781	PVC - 12"	0	0	2	1	0	0	2
1783	PVC - 12"	0	0	2	2	0	0	3
1787	UNK - 6"	0	0	1	0	2	0	2
1788	UNK - 6"	0	0	1	1	2	0	3
1792	UNK - 6"	0	0	1	1	2	0	3
1885	UNK - 6"	0	0	1	1	2	0	3
1886	UNK - 6"	0	0	1	1	2	0	3
1892	DIP - 12"	0	0	4	0	0	0	3
1894	DIP - 12"	0	0	4	0	0	0	3
1896	DIP - 12"	0	0	4	0	0	0	3
1938	UNK - 6"	0	0	1	1	2	0	3
1971	UNK - 8"	0	0	1	0	2	0	2
1973	UNK - 8"	0	0	1	0	2	0	2
1974	UNK - 8"	0	0	1	1	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
1976	UNK - 6"	0	0	1	0	2	0	2
1978	UNK - 6"	0	0	1	1	2	0	3
1980	UNK - 6"	0	0	1	1	2	0	3
1982	UNK - 6"	0	0	1	1	2	0	3
2007	UNK - 8"	0	0	1	0	2	0	2
2009	UNK - 8"	0	0	1	1	2	0	3
2011	UNK - 8"	0	0	1	1	2	0	3
2013	UNK - 8"	0	0	1	0	2	0	2
2015	UNK - 8"	0	0	1	1	2	0	3
2021	UNK - 6"	0	0	1	0	2	0	2
2029	UNK - 8"	0	0	1	1	2	0	3
2100	UNK - 6"	0	0	1	0	2	0	2
2102	UNK - 6"	0	0	1	0	2	0	2
2104	UNK - 8"	0	0	1	0	2	0	2
2107	UNK - 6"	0	0	1	0	2	0	2
2109	UNK - 6"	0	0	1	0	2	0	2
2110	UNK - 8"	0	0	1	0	2	0	2
2113	UNK - 8"	0	0	1	1	2	0	3
2115	UNK - 8"	0	0	1	1	2	0	3
2117	UNK - 8"	0	0	1	0	2	0	2
2118	UNK - 8"	0	0	1	0	2	0	2
2121	UNK - 6"	0	0	1	0	2	0	2
2122	UNK - 8"	0	0	1	0	2	0	2
2236	UNK - 8"	0	0	1	1	2	0	3
2238	UNK - 8"	0	0	1	1	2	0	3
2240	UNK - 8"	0	0	1	0	2	0	2
2248	UNK - 8"	0	0	1	0	2	0	2
2250	UNK - 8"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
2258	UNK - 6"	0	0	1	0	2	0	2
2260	UNK - 6"	0	0	1	0	2	0	2
2262	UNK - 6"	0	0	1	1	2	0	3
2263	UNK - 6"	0	0	1	1	2	0	3
2266	UNK - 6"	0	0	1	0	2	0	2
2268	UNK - 6"	0	0	1	0	2	0	2
2270	UNK - 6"	0	0	1	0	2	0	2
2272	UNK - 6"	0	0	1	0	2	0	2
2278	UNK - 6"	0	0	1	0	2	0	2
2280	UNK - 6"	0	0	1	0	2	0	2
2282	UNK - 6"	0	0	1	0	2	0	2
2284	UNK - 8"	0	0	1	0	2	0	2
2294	UNK - 6"	0	0	1	0	2	0	2
2296	UNK - 6"	0	0	1	1	2	0	3
2297	UNK - 8"	0	0	1	0	2	0	2
2300	UNK - 8"	0	0	1	0	2	0	2
2302	UNK - 6"	0	0	1	0	2	0	2
2304	UNK - 6"	0	0	1	1	2	0	3
2306	UNK - 8"	0	0	1	1	2	0	3
2307	UNK - 8"	0	0	1	0	2	0	2
2310	UNK - 6"	0	0	1	1	2	0	3
2311	UNK - 8"	0	0	1	1	2	0	3
2514	UNK - 8"	0	0	1	0	2	0	2
2515	UNK - 8"	0	0	1	0	2	0	2
2527	UNK - 8"	0	0	1	1	2	0	3
2529	UNK - 8"	0	0	1	0	2	0	2
2533	UNK - 8"	0	0	1	0	2	0	2
2534	UNK - 8"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
2547	UNK - 8"	0	0	1	1	2	0	3
2551	UNK - 8"	0	0	1	1	2	0	3
2555	UNK - 8"	0	0	1	0	2	0	2
2557	UNK - 8"	0	0	1	0	2	0	2
2559	UNK - 8"	0	0	1	0	2	0	2
2562	UNK - 8"	0	0	1	1	2	0	3
2564	UNK - 8"	0	0	1	1	2	0	3
2566	UNK - 8"	0	0	1	0	2	0	2
2568	UNK - 8"	0	0	1	0	2	0	2
2570	UNK - 6"	0	0	1	0	2	0	2
2573	UNK - 6"	0	0	1	0	2	0	2
2575	UNK - 6"	0	0	1	0	2	0	2
2576	UNK - 6"	0	0	1	0	2	0	2
2618	UNK - 8"	0	0	1	0	2	0	2
2622	UNK - 6"	0	0	1	0	2	0	2
2648	UNK - 8"	0	0	1	0	2	0	2
2649	UNK - 8"	0	0	1	0	2	0	2
2673	UNK - 6"	0	0	1	1	2	0	3
2674	UNK - 6"	0	0	1	1	2	0	3
2708	UNK - 8"	0	0	1	1	2	0	3
2715	UNK - 6"	0	0	1	0	2	0	2
2723	UNK - 8"	0	0	1	1	2	0	3
2734	PVC - 8"	0	0	2	0	2	0	3
2735	UNK - 8"	0	0	1	0	2	0	2
2763	UNK - 6"	0	0	1	0	2	0	2
2765	UNK - 6"	0	0	1	0	2	0	2
2767	UNK - 6"	0	0	1	0	2	0	2
2769	UNK - 6"	0	0	1	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
2771	UNK - 6"	0	0	1	0	2	0	2
2774	UNK - 6"	0	0	1	0	2	0	2
2776	UNK - 6"	0	0	1	0	2	0	2
2777	UNK - 6"	0	0	1	0	2	0	2
2779	UNK - 8"	0	0	1	0	2	0	2
2781	UNK - 6"	0	0	1	0	2	0	2
2783	UNK - 8"	0	0	1	1	2	0	3
2785	UNK - 8"	0	0	1	1	2	0	3
2786	UNK - 8"	0	0	1	0	2	0	2
2851	RCP - 12"	0	0	3	1	0	0	3
2853	RCP - 12"	0	0	3	1	0	0	3
2855	RCP - 12"	0	0	3	1	0	0	3
2859	DIP - 12"	0	0	4	0	0	0	3
2861	DIP - 12"	0	0	4	0	0	0	3
2863	DIP - 12"	0	0	4	0	0	0	3
2865	DIP - 12"	0	0	4	0	0	0	3
2870	UNK - 6"	0	0	1	0	2	0	2
2872	UNK - 6"	0	0	1	1	2	0	3
2874	UNK - 6"	0	0	1	1	2	0	3
2876	UNK - 6"	0	0	1	0	2	0	2
2883	UNK - 8"	0	0	1	1	2	0	3
2934	UNK - 6"	0	0	1	1	2	0	3
2936	UNK - 8"	0	0	1	1	2	0	3
2938	UNK - 8"	0	0	1	1	2	0	3
2941	UNK - 8"	0	0	1	1	2	0	3
2942	UNK - 8"	0	0	1	1	2	0	3
2962	UNK - 8"	0	0	1	1	2	0	3
2964	UNK - 8"	0	0	1	1	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
2966	UNK - 8"	0	0	1	1	2	0	3
3005	UNK - 6"	0	0	1	0	2	0	2
3007	UNK - 6"	0	0	1	0	2	0	2
3011	UNK - 6"	0	0	1	0	2	0	2
3013	UNK - 6"	0	0	1	0	2	0	2
3030	UNK - 6"	0	0	1	0	2	0	2
3041	UNK - 6"	0	0	1	0	2	0	2
3042	UNK - 6"	0	0	1	0	2	0	2
3060	UNK - 6"	0	0	1	1	2	0	3
3062	UNK - 8"	0	0	1	1	2	0	3
3067	UNK - 6"	0	0	1	1	2	0	3
3069	UNK - 6"	0	0	1	1	2	0	3
3071	UNK - 6"	0	0	1	0	2	0	2
3073	UNK - 6"	0	0	1	0	2	0	2
3077	UNK - 6"	0	0	1	0	2	0	2
3079	UNK - 6"	0	0	1	0	2	0	2
3081	UNK - 6"	0	0	1	0	2	0	2
3097	UNK - 8"	0	0	1	1	2	0	3
3099	UNK - 8"	0	0	1	1	2	0	3
3101	UNK - 8"	0	0	1	1	2	0	3
3103	UNK - 8"	0	0	1	1	2	0	3
3105	UNK - 8"	0	0	1	1	2	0	3
3106	UNK - 8"	0	0	1	1	2	0	3
3107	UNK - 8"	0	0	1	1	2	0	3
3117	UNK - 8"	0	0	1	1	2	0	3
3119	UNK - 8"	0	0	1	0	2	0	2
3121	UNK - 8"	0	0	1	0	2	0	2
3131	UNK - 8"	0	0	1	1	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
3133	UNK - 8"	0	0	1	0	2	0	2
3135	UNK - 8"	0	0	1	0	2	0	2
3138	UNK - 6"	0	0	1	0	2	0	2
3140	UNK - 6"	0	0	1	1	2	0	3
3141	UNK - 8"	0	0	1	1	2	0	3
3143	UNK - 8"	0	0	1	1	2	0	3
3146	UNK - 6"	0	0	1	0	2	0	2
3147	UNK - 8"	0	0	1	0	2	0	2
3149	UNK - 8"	0	0	1	0	2	0	2
3152	UNK - 6"	0	0	1	0	2	0	2
3220	UNK - 6"	0	0	1	1	2	0	3
3221	UNK - 6"	0	0	1	1	2	0	3
3237	UNK - 6"	0	0	1	0	2	0	2
3249	UNK - 8"	0	0	1	0	2	0	2
3250	UNK - 8"	0	0	1	1	2	0	3
3256	UNK - 6"	0	0	1	0	2	0	2
3258	UNK - 6"	0	0	1	0	2	0	2
3260	UNK - 6"	0	0	1	1	2	0	3
3261	UNK - 6"	0	0	1	1	2	0	3
3374	PVC - 8"	0	0	2	0	2	0	3
3380	UNK - 8"	0	0	1	1	2	0	3
3386	UNK - 6"	0	0	1	0	2	0	2
3389	UNK - 6"	0	0	1	0	2	0	2
3391	UNK - 6"	0	0	1	0	2	0	2
3392	UNK - 6"	0	0	1	0	2	0	2
3397	UNK - 6"	0	0	1	1	2	0	3
3504	UNK - 8"	0	0	1	1	2	0	3
3527	UNK - 8"	0	0	1	1	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
3528	UNK - 8"	0	0	1	1	2	0	3
6302	RCP - 12"	0	0	3	0	0	0	2
15116	UNK - 8"	0	0	1	0	2	0	2
15151	UNK - 8"	0	0	1	0	2	0	2
15174	UNK - 8"	0	0	1	0	2	0	2
15175	UNK - 8"	0	0	1	0	2	0	2
15179	UNK - 8"	0	0	1	1	2	0	3
15180	UNK - 8"	0	0	1	1	2	0	3
16030	UNK - 8"	0	0	1	0	2	0	2
16031	UNK - 8"	0	0	1	1	2	0	3
31068	UNK - 8"	0	0	1	0	2	0	2
24675	UNK - 8"	0	0	1	0	2	0	2
25397	UNK - 8"	0	0	1	1	2	0	3
25440	RCP - 12"	0	0	3	0	0	0	2
25441	UNK - 0"	0	0	1	0	2	0	2
25443	UNK - 0"	0	0	1	0	2	0	2
25451	UNK - 6"	0	0	1	1	2	0	3
25644	UNK - 8"	0	0	1	1	2	0	3
27530	PVC - 8"	0	0	2	0	2	0	3
17330	UNK - 8"	0	0	1	0	2	0	2
0	UNK - 0"	0	0	1	0	2	0	2
0	UNK - 0"	0	0	1	0	2	0	2
1768	UNK - 12"	0	0	1	1	0	0	1
1771	UNK - 10"	0	0	1	1	0	0	1
1773	UNK - 10"	0	0	1	1	0	0	1
1777	UNK - 10"	0	0	1	1	0	0	1
1790	UNK - 12"	0	0	1	1	0	0	1
1876	UNK - 12"	0	0	1	1	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
1880	UNK - 12"	0	0	1	1	0	0	1
1882	UNK - 12"	0	0	1	1	0	0	1
15183	UNK - 10"	0	0	1	1	0	0	1
15184	UNK - 10"	0	0	1	1	0	0	1
25652	UNK - 10"	0	0	1	1	0	0	1
1888	UNK - 12"	0	0	1	0	0	0	1
1890	UNK - 12"	0	0	1	0	0	0	1

Table D-4: Kaloko Basin Pipe Segments

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
0	UNK - 0"	0	0	1	1	1	0	10
0	UNK - 0"	0	0	1	1	1	0	10
0	UNK - 0"	0	0	1	1	1	0	10
0	UNK - 0"	0	0	1	1	1	0	10

Table D-5: Kealakehe Basin Pipe Segments

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
13942	RCP - 18"	5	5	5	1	0	5	10
13702	VCP - 8"	5	0	4	2	2	5	9
13706	VCP - 6"	5	0	4	2	2	5	9
13713	VCP - 8"	5	0	4	2	2	5	9
13726	VCP - 6"	5	0	4	2	2	5	9
13830	VCP - 8"	5	0	4	2	2	5	9
13924	VCP - 8"	5	0	4	2	2	5	9
13989	VCP - 8"	5	0	4	2	2	5	9
14029	VCP - 8"	5	0	4	2	2	5	9
14031	VCP - 8"	5	0	4	2	2	5	9
14033	VCP - 8"	5	0	4	2	2	5	9
23727	VCP - 8"	5	0	4	2	2	5	9
23745	VCP - 6"	5	0	4	2	2	5	9
13721	CIP - 6"	5	0	3	2	2	5	8
13693	VCP - 8"	5	0	4	0	2	5	8
13697	VCP - 12"	5	0	4	2	0	5	8
13705	VCP - 6"	5	0	4	0	2	5	8
13727	VCP - 8"	5	0	4	0	2	5	8
13783	VCP - 6"	5	0	4	0	2	5	8
14096	VCP - 12"	5	0	4	2	0	5	8
14097	VCP - 12"	5	0	4	2	0	5	8
14117	RCP - 36"	5	5	5	1	0	0	8
14119	RCP - 36"	5	5	5	1	0	0	8
14121	RCP - 36"	5	5	5	1	0	0	8
17402	RCP - 36"	5	5	5	1	0	0	8
17417	RCP - 36"	5	5	5	1	0	0	8
13687	CIP - 6"	5	0	3	0	2	5	7

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
13809	VCP - 12"	5	0	4	1	0	5	7
13811	VCP - 12"	5	0	4	1	0	5	7
13949	VCP - 12"	5	0	4	1	0	5	7
13950	VCP - 12"	5	0	4	1	0	5	7
13965	VCP - 12"	5	0	4	1	0	5	7
13667	UNK - 0"	5	0	1	2	1	5	7
13689	VCP - 12"	5	0	4	0	0	5	7
13691	VCP - 12"	5	0	4	0	0	5	7
13715	VCP - 12"	5	0	4	0	0	5	7
13717	VCP - 12"	5	0	4	0	0	5	7
13813	VCP - 12"	5	0	4	0	0	5	7
13815	VCP - 12"	5	0	4	0	0	5	7
13816	VCP - 12"	5	0	4	0	0	5	7
13943	CIP - 12"	5	0	3	1	0	5	7
13967	VCP - 12"	5	0	4	0	0	5	7
13969	VCP - 12"	5	0	4	0	0	5	7
14027	VCP - 10"	5	0	4	0	0	5	7
23808	VCP - 12"	5	0	4	0	0	5	7
23810	VCP - 12"	5	0	4	0	0	5	7
23811	VCP - 12"	5	0	4	0	0	5	7
23813	VCP - 12"	5	0	4	0	0	5	7
11535	VCP - 6"	0	0	4	2	2	5	6
11554	VCP - 6"	0	0	4	2	2	5	6
11555	VCP - 6"	0	0	4	2	2	5	6
11595	VCP - 8"	0	0	4	2	2	5	6
11620	VCP - 8"	0	0	4	2	2	5	6
11624	VCP - 8"	0	0	4	2	2	5	6
12353	VCP - 6"	0	0	4	2	2	5	6

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
13329	VCP - 8"	0	0	4	2	2	5	6
13331	VCP - 6"	0	0	4	2	2	5	6
13335	VCP - 6"	0	0	4	2	2	5	6
13339	VCP - 8"	0	0	4	2	2	5	6
13343	VCP - 8"	0	0	4	2	2	5	6
13345	VCP - 8"	0	0	4	2	2	5	6
13361	VCP - 6"	0	0	4	2	2	5	6
13662	CIP - 12"	5	0	3	0	0	5	6
13669	VCP - 8"	0	0	4	2	2	5	6
13671	VCP - 8"	0	0	4	2	2	5	6
13719	CIP - 12"	5	0	3	0	0	5	6
13767	VCP - 6"	0	0	4	2	2	5	6
13819	VCP - 6"	0	0	4	2	2	5	6
13823	VCP - 8"	0	0	4	2	2	5	6
13825	VCP - 8"	0	0	4	2	2	5	6
13828	VCP - 6"	0	0	4	2	2	5	6
13829	VCP - 6"	0	0	4	2	2	5	6
13850	VCP - 8"	0	0	4	2	2	5	6
13904	VCP - 6"	0	0	4	2	2	5	6
13911	VCP - 8"	0	0	4	2	2	5	6
13928	VCP - 8"	0	0	4	2	2	5	6
13931	VCP - 8"	0	0	4	2	2	5	6
13988	VCP - 6"	0	0	4	2	2	5	6
14035	VCP - 8"	0	0	4	2	2	5	6
14037	VCP - 8"	0	0	4	2	2	5	6
14417	VCP - 8"	0	0	4	2	2	5	6
14419	VCP - 6"	0	0	4	2	2	5	6
14423	VCP - 6"	0	0	4	2	2	5	6

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
23718	VCP - 8"	0	0	4	2	2	5	6
23720	VCP - 6"	0	0	4	2	2	5	6
23744	VCP - 6"	0	0	4	2	2	5	6
23767	VCP - 8"	0	0	4	2	2	5	6
23769	VCP - 8"	0	0	4	2	2	5	6
11567	CIP - 8"	0	0	3	2	2	5	6
11569	CIP - 8"	0	0	3	2	2	5	6
11571	CIP - 8"	0	0	3	2	2	5	6
11573	CIP - 8"	0	0	3	2	2	5	6
11622	VCP - 8"	0	0	4	1	2	5	6
12356	CIP - 8"	0	0	3	2	2	5	6
23648	VCP - 8"	0	0	4	1	2	5	6
23650	VCP - 8"	0	0	4	1	2	5	6
11527	VCP - 6"	0	0	4	0	2	5	5
11531	VCP - 6"	0	0	4	0	2	5	5
11533	VCP - 6"	0	0	4	0	2	5	5
11537	VCP - 6"	0	0	4	0	2	5	5
11539	VCP - 6"	0	0	4	0	2	5	5
11575	VCP - 8"	0	0	4	0	2	5	5
11577	VCP - 8"	0	0	4	0	2	5	5
11579	VCP - 8"	0	0	4	0	2	5	5
11589	VCP - 18"	0	0	4	2	0	5	5
11592	VCP - 18"	0	0	4	2	0	5	5
11593	VCP - 18"	0	0	4	2	0	5	5
11597	VCP - 8"	0	0	4	0	2	5	5
11600	VCP - 8"	0	0	4	0	2	5	5
11602	VCP - 8"	0	0	4	0	2	5	5
11632	VCP - 12"	0	0	4	2	0	5	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
11669	VCP - 6"	0	0	4	0	2	5	5
11670	VCP - 6"	0	0	4	0	2	5	5
11737	PVC - 4"	0	0	2	2	2	5	5
11739	PVC - 4"	0	0	2	2	2	5	5
11749	PVC - 4"	0	0	2	2	2	5	5
11764	PVC - 4"	0	0	2	2	2	5	5
11767	PVC - 4"	0	0	2	2	2	5	5
11787	PVC - 4"	0	0	2	2	2	5	5
11789	PVC - 4"	0	0	2	2	2	5	5
11803	PVC - 6"	0	0	2	2	2	5	5
11805	PVC - 6"	0	0	2	2	2	5	5
11809	PVC - 4"	0	0	2	2	2	5	5
11812	PVC - 4"	0	0	2	2	2	5	5
11814	PVC - 4"	0	0	2	2	2	5	5
11830	PVC - 6"	0	0	2	2	2	5	5
11831	PVC - 6"	0	0	2	2	2	5	5
11866	PVC - 4"	0	0	2	2	2	5	5
11868	PVC - 4"	0	0	2	2	2	5	5
11888	PVC - 6"	0	0	2	2	2	5	5
11894	PVC - 6"	0	0	2	2	2	5	5
11896	PVC - 6"	0	0	2	2	2	5	5
11898	PVC - 4"	0	0	2	2	2	5	5
11900	PVC - 6"	0	0	2	2	2	5	5
11948	PVC - 4"	0	0	2	2	2	5	5
11950	PVC - 4"	0	0	2	2	2	5	5
11981	PVC - 4"	0	0	2	2	2	5	5
12029	PVC - 4"	0	0	2	2	2	5	5
12053	PVC - 6"	0	0	2	2	2	5	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
12054	PVC - 6"	0	0	2	2	2	5	5
12089	PVC - 6"	0	0	2	2	2	5	5
12095	PVC - 6"	0	0	2	2	2	5	5
12097	PVC - 6"	0	0	2	2	2	5	5
12098	PVC - 6"	0	0	2	2	2	5	5
12103	PVC - 4"	0	0	2	2	2	5	5
12105	PVC - 4"	0	0	2	2	2	5	5
12196	PVC - 6"	0	0	2	2	2	5	5
12200	PVC - 4"	0	0	2	2	2	5	5
12202	PVC - 4"	0	0	2	2	2	5	5
12204	PVC - 4"	0	0	2	2	2	5	5
12206	PVC - 4"	0	0	2	2	2	5	5
12209	PVC - 6"	0	0	2	2	2	5	5
12210	PVC - 6"	0	0	2	2	2	5	5
12270	PVC - 4"	0	0	2	2	2	5	5
12272	PVC - 4"	0	0	2	2	2	5	5
12280	PVC - 6"	0	0	2	2	2	5	5
12282	PVC - 6"	0	0	2	2	2	5	5
12283	PVC - 6"	0	0	2	2	2	5	5
12354	VCP - 6"	0	0	4	0	2	5	5
12431	VCP - 8"	0	0	4	0	2	5	5
12433	VCP - 8"	0	0	4	0	2	5	5
12434	VCP - 8"	0	0	4	0	2	5	5
13337	VCP - 8"	0	0	4	0	2	5	5
13347	VCP - 10"	0	0	4	2	0	5	5
13355	VCP - 10"	0	0	4	2	0	5	5
13357	VCP - 10"	0	0	4	2	0	5	5
13364	VCP - 6"	0	0	4	0	2	5	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
13366	VCP - 6"	0	0	4	0	2	5	5
13400	VCP - 18"	0	0	4	2	0	5	5
13403	VCP - 18"	0	0	4	2	0	5	5
13404	VCP - 18"	0	0	4	2	0	5	5
13852	VCP - 8"	0	0	4	0	2	5	5
13879	VCP - 6"	0	0	4	0	2	5	5
13881	VCP - 6"	0	0	4	0	2	5	5
13882	VCP - 8"	0	0	4	0	2	5	5
14081	VCP - 10"	0	0	4	2	0	5	5
14084	VCP - 10"	0	0	4	2	0	5	5
14085	VCP - 10"	0	0	4	2	0	5	5
14472	VCP - 12"	0	0	4	2	0	5	5
23652	VCP - 8"	0	0	4	0	2	5	5
23654	VCP - 8"	0	0	4	0	2	5	5
23660	VCP - 8"	0	0	4	0	2	5	5
23662	VCP - 8"	0	0	4	0	2	5	5
23664	VCP - 8"	0	0	4	0	2	5	5
23666	VCP - 8"	0	0	4	0	2	5	5
23762	VCP - 8"	5	0	4	0	2	0	5
24789	PVC - 8"	5	0	2	2	2	0	5
24764	PVC - 8"	5	0	2	2	2	0	5
25715	PVC - 4"	0	0	2	2	2	5	5
25983	PVC - 4"	0	0	2	2	2	5	5
28538	VCP - 8"	5	0	4	0	2	0	5
28913	PVC - 4"	0	0	2	2	2	5	5
11565	DIP - 20"	0	0	3	2	0	5	5
11585	DIP - 20"	0	0	3	2	0	5	5
11587	DIP - 20"	0	0	3	2	0	5	5

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
13415	VCP - 18"	0	0	4	1	0	5	5
14087	UNK - 8"	0	0	1	2	2	5	5
14089	UNK - 8"	0	0	1	2	2	5	5
11581	PVC - 8"	0	0	2	0	2	5	4
11583	PVC - 8"	0	0	2	0	2	5	4
11692	PVC - 6"	0	0	2	0	2	5	4
11694	PVC - 6"	0	0	2	0	2	5	4
11696	PVC - 8"	0	0	2	0	2	5	4
11734	PVC - 4"	0	0	2	0	2	5	4
11761	PVC - 4"	0	0	2	0	2	5	4
11765	PVC - 4"	0	0	2	0	2	5	4
11769	PVC - 4"	0	0	2	0	2	5	4
11864	PVC - 4"	0	0	2	0	2	5	4
11883	PVC - 4"	0	0	2	0	2	5	4
11885	PVC - 4"	0	0	2	0	2	5	4
11902	PVC - 4"	0	0	2	0	2	5	4
11952	PVC - 4"	0	0	2	0	2	5	4
11971	PVC - 4"	0	0	2	0	2	5	4
11973	PVC - 4"	0	0	2	0	2	5	4
11975	PVC - 4"	0	0	2	0	2	5	4
11977	PVC - 4"	0	0	2	0	2	5	4
11979	PVC - 6"	0	0	2	0	2	5	4
12020	PVC - 6"	0	0	2	0	2	5	4
12022	PVC - 6"	0	0	2	0	2	5	4
12024	PVC - 4"	0	0	2	0	2	5	4
12027	PVC - 4"	0	0	2	0	2	5	4
12091	PVC - 4"	0	0	2	0	2	5	4
12101	PVC - 4"	0	0	2	0	2	5	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
12198	PVC - 4"	0	0	2	0	2	5	4
12264	PVC - 6"	0	0	2	0	2	5	4
12267	PVC - 4"	0	0	2	0	2	5	4
12268	PVC - 4"	0	0	2	0	2	5	4
12275	PVC - 4"	0	0	2	0	2	5	4
12277	PVC - 4"	0	0	2	0	2	5	4
12366	PVC - 8"	0	0	2	0	2	5	4
13351	VCP - 10"	0	0	4	0	0	5	4
13353	VCP - 10"	0	0	4	0	0	5	4
13358	VCP - 10"	0	0	4	0	0	5	4
13406	VCP - 18"	0	0	4	0	0	5	4
13408	VCP - 18"	0	0	4	0	0	5	4
13410	VCP - 18"	0	0	4	0	0	5	4
13412	VCP - 18"	0	0	4	0	0	5	4
13481	UNK - 8"	5	0	1	1	2	0	4
13483	UNK - 8"	5	0	1	1	2	0	4
13485	UNK - 8"	5	0	1	1	2	0	4
13487	UNK - 8"	5	0	1	1	2	0	4
13489	UNK - 8"	5	0	1	1	2	0	4
13495	UNK - 8"	5	0	1	1	2	0	4
14025	VCP - 10"	0	0	4	0	0	5	4
15764	UNK - 8"	5	0	1	1	2	0	4
16404	PVC - 8"	5	0	2	0	2	0	4
16406	PVC - 8"	5	0	2	0	2	0	4
16408	PVC - 8"	5	0	2	0	2	0	4
17353	PVC - 4"	5	0	2	0	2	0	4
25975	PVC - 4"	0	0	2	0	2	5	4
25977	PVC - 4"	0	0	2	0	2	5	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
25984	PVC - 4"	0	0	2	0	2	5	4
25986	PVC - 6"	0	0	2	0	2	5	4
25988	PVC - 4"	0	0	2	0	2	5	4
25990	VCP - 10"	0	0	4	0	0	5	4
26791	PVC - 4"	0	0	2	0	2	5	4
26792	PVC - 4"	0	0	2	0	2	5	4
28926	PVC - 6"	0	0	2	0	2	5	4
28955	PVC - 4"	0	0	2	0	2	5	4
30519	PVC - 4"	0	0	2	0	2	5	4
30799	VCP - 18"	0	0	4	0	0	5	4
90357	PVC - 8"	5	0	2	0	2	0	4
13663	PVC - 8"	5	0	2	0	2	0	4
13414	VCP - 18"	0	0	4	0	0	5	4
12349	VCP - 6"	0	0	4	2	2	0	4
12351	VCP - 6"	0	0	4	2	2	0	4
12362	VCP - 6"	0	0	4	2	2	0	4
13499	UNK - 8"	5	0	1	0	2	0	4
13501	UNK - 8"	5	0	1	0	2	0	4
13503	UNK - 8"	5	0	1	0	2	0	4
13505	UNK - 8"	5	0	1	0	2	0	4
14127	RCP - 8"	0	0	5	1	2	0	4
14980	PVC - 24"	5	0	2	1	0	0	4
14988	PVC - 24"	5	0	2	1	0	0	4
14995	PVC - 24"	5	0	2	1	0	0	4
16305	PVC - 24"	5	0	2	1	0	0	4
16307	PVC - 24"	5	0	2	1	0	0	4
16309	PVC - 24"	5	0	2	1	0	0	4
16311	PVC - 24"	5	0	2	1	0	0	4

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
16501	PVC - 15"	5	0	2	1	0	0	4
16544	PVC - 18"	5	0	2	1	0	0	4
16546	PVC - 18"	5	0	2	1	0	0	4
16547	PVC - 18"	5	0	2	1	0	0	4
23317	PVC - 12"	5	0	2	1	0	0	4
23656	UNK - 8"	0	0	1	0	2	5	4
23658	UNK - 8"	0	0	1	0	2	5	4
23761	VCP - 8"	0	0	4	2	2	0	4
24525	UNK - 24"	5	0	1	1	0	0	3
24527	UNK - 24"	5	0	1	1	0	0	3
24528	UNK - 24"	5	0	1	1	0	0	3
13986	VCP - 6"	0	0	4	1	2	0	3
14126	RCP - 8"	0	0	5	0	2	0	3
14897	PVC - 30"	5	0	2	0	0	0	3
14899	PVC - 36"	5	0	2	0	0	0	3
14901	PVC - 24"	5	0	2	0	0	0	3
14903	PVC - 24"	5	0	2	0	0	0	3
14935	PVC - 24"	5	0	2	0	0	0	3
14937	PVC - 24"	5	0	2	0	0	0	3
14939	PVC - 24"	5	0	2	0	0	0	3
14941	PVC - 24"	5	0	2	0	0	0	3
14966	PVC - 24"	5	0	2	0	0	0	3
14978	PVC - 24"	5	0	2	0	0	0	3
16297	PVC - 15"	5	0	2	0	0	0	3
16313	PVC - 24"	5	0	2	0	0	0	3
16315	PVC - 24"	5	0	2	0	0	0	3
16317	PVC - 30"	5	0	2	0	0	0	3
16319	PVC - 30"	5	0	2	0	0	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
16320	PVC - 30"	5	0	2	0	0	0	3
16410	PVC - 12"	5	0	2	0	0	0	3
16416	PVC - 12"	5	0	2	0	0	0	3
16418	PVC - 15"	5	0	2	0	0	0	3
16499	PVC - 15"	5	0	2	0	0	0	3
16526	PVC - 10"	5	0	2	0	0	0	3
16528	PVC - 10"	5	0	2	0	0	0	3
16530	PVC - 10"	5	0	2	0	0	0	3
20429	VCP - 8"	0	0	4	1	2	0	3
24763	PVC - 24"	5	0	2	0	0	0	3
26044	VCP - 8"	0	0	4	1	2	0	3
26046	VCP - 8"	0	0	4	1	2	0	3
26055	VCP - 8"	0	0	4	1	2	0	3
26060	VCP - 8"	0	0	4	1	2	0	3
27353	RCP - 8"	0	0	5	0	2	0	3
30956	UNK - 0"	5	0	1	0	1	0	3
24533	UNK - 10"	5	0	1	0	0	0	3
11541	VCP - 8"	0	0	4	0	2	0	3
12358	PVC - 6"	0	0	2	2	2	0	3
12360	PVC - 6"	0	0	2	2	2	0	3
12394	VCP - 6"	0	0	4	0	2	0	3
12395	VCP - 6"	0	0	4	0	2	0	3
12445	VCP - 18"	0	0	4	2	0	0	3
12447	VCP - 18"	0	0	4	2	0	0	3
13368	VCP - 6"	0	0	4	0	2	0	3
13370	VCP - 8"	0	0	4	0	2	0	3
13372	VCP - 8"	0	0	4	0	2	0	3
13374	VCP - 8"	0	0	4	0	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
13376	VCP - 8"	0	0	4	0	2	0	3
13984	VCP - 6"	0	0	4	0	2	0	3
14012	VCP - 10"	0	0	4	2	0	0	3
14014	VCP - 10"	0	0	4	2	0	0	3
14189	RCP - 36"	0	0	5	1	0	0	3
14191	RCP - 36"	0	0	5	1	0	0	3
14193	RCP - 36"	0	0	5	1	0	0	3
14195	RCP - 21"	0	0	5	1	0	0	3
14197	RCP - 21"	0	0	5	1	0	0	3
14199	RCP - 21"	0	0	5	1	0	0	3
14201	RCP - 21"	0	0	5	1	0	0	3
14461	PVC - 8"	0	0	2	2	2	0	3
14463	PVC - 8"	0	0	2	2	2	0	3
14465	PVC - 8"	0	0	2	2	2	0	3
15782	PVC - 8"	0	0	2	2	2	0	3
15835	PVC - 8"	0	0	2	2	2	0	3
16939	PVC - 8"	0	0	2	2	2	0	3
17331	UNK - 16"	5	0	1	0	0	0	3
17536	PVC - 8"	0	0	2	2	2	0	3
17538	PVC - 8"	0	0	2	2	2	0	3
17996	PVC - 8"	0	0	2	2	2	0	3
17998	PVC - 8"	0	0	2	2	2	0	3
18010	PVC - 8"	0	0	2	2	2	0	3
18012	PVC - 8"	0	0	2	2	2	0	3
18014	PVC - 8"	0	0	2	2	2	0	3
18024	PVC - 8"	0	0	2	2	2	0	3
18026	PVC - 8"	0	0	2	2	2	0	3
20428	VCP - 8"	0	0	4	0	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
20431	PVC - 8"	0	0	2	2	2	0	3
20769	PVC - 8"	0	0	2	2	2	0	3
20771	PVC - 8"	0	0	2	2	2	0	3
20913	PVC - 8"	0	0	2	2	2	0	3
20915	PVC - 8"	0	0	2	2	2	0	3
20917	PVC - 8"	0	0	2	2	2	0	3
20919	PVC - 8"	0	0	2	2	2	0	3
21357	PVC - 8"	0	0	2	2	2	0	3
21421	PVC - 8"	0	0	2	2	2	0	3
21581	PVC - 8"	0	0	2	2	2	0	3
22992	PVC - 8"	0	0	2	2	2	0	3
22993	PVC - 8"	0	0	2	2	2	0	3
22994	PVC - 8"	0	0	2	2	2	0	3
23361	UNK - 10"	5	0	1	0	0	0	3
23774	PVC - 8"	0	0	2	2	2	0	3
23776	PVC - 8"	0	0	2	2	2	0	3
23778	PVC - 8"	0	0	2	2	2	0	3
23782	PVC - 8"	0	0	2	2	2	0	3
23784	PVC - 8"	0	0	2	2	2	0	3
23789	RCP - 42"	0	0	5	1	0	0	3
24653	PVC - 8"	0	0	2	2	2	0	3
24655	PVC - 8"	0	0	2	2	2	0	3
24787	PVC - 8"	0	0	2	2	2	0	3
24788	PVC - 8"	0	0	2	2	2	0	3
24766	PVC - 8"	0	0	2	2	2	0	3
24779	PVC - 8"	0	0	2	2	2	0	3
26048	VCP - 8"	0	0	4	0	2	0	3
26050	VCP - 8"	0	0	4	0	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
26057	VCP - 8"	0	0	4	0	2	0	3
26059	VCP - 8"	0	0	4	0	2	0	3
26919	PVC - 8"	0	0	2	2	2	0	3
26970	PVC - 8"	0	0	2	2	2	0	3
27231	PVC - 6"	0	0	2	2	2	0	3
30318	PVC - 8"	0	0	2	2	2	0	3
30319	PVC - 8"	0	0	2	2	2	0	3
30321	PVC - 8"	0	0	2	2	2	0	3
30323	PVC - 8"	0	0	2	2	2	0	3
30324	PVC - 8"	0	0	2	2	2	0	3
30325	PVC - 8"	0	0	2	2	2	0	3
30334	PVC - 8"	0	0	2	2	2	0	3
30336	PVC - 8"	0	0	2	2	2	0	3
30337	PVC - 8"	0	0	2	2	2	0	3
30339	PVC - 8"	0	0	2	2	2	0	3
30340	PVC - 8"	0	0	2	2	2	0	3
30343	PVC - 8"	0	0	2	2	2	0	3
30355	PVC - 8"	0	0	2	2	2	0	3
30356	PVC - 8"	0	0	2	2	2	0	3
30358	PVC - 8"	0	0	2	2	2	0	3
30359	PVC - 8"	0	0	2	2	2	0	3
30360	PVC - 8"	0	0	2	2	2	0	3
30361	PVC - 8"	0	0	2	2	2	0	3
30363	PVC - 8"	0	0	2	2	2	0	3
30364	PVC - 8"	0	0	2	2	2	0	3
30368	PVC - 8"	0	0	2	2	2	0	3
30374	PVC - 8"	0	0	2	2	2	0	3
30375	PVC - 8"	0	0	2	2	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
30376	PVC - 8"	0	0	2	2	2	0	3
30377	PVC - 8"	0	0	2	2	2	0	3
30378	PVC - 8"	0	0	2	2	2	0	3
30379	PVC - 8"	0	0	2	2	2	0	3
30384	PVC - 8"	0	0	2	2	2	0	3
30392	PVC - 8"	0	0	2	2	2	0	3
30393	PVC - 8"	0	0	2	2	2	0	3
30394	PVC - 8"	0	0	2	2	2	0	3
30396	PVC - 8"	0	0	2	2	2	0	3
30397	PVC - 8"	0	0	2	2	2	0	3
30398	PVC - 8"	0	0	2	2	2	0	3
30399	PVC - 8"	0	0	2	2	2	0	3
30400	PVC - 8"	0	0	2	2	2	0	3
30401	PVC - 8"	0	0	2	2	2	0	3
30406	PVC - 8"	0	0	2	2	2	0	3
30410	PVC - 8"	0	0	2	2	2	0	3
30411	PVC - 8"	0	0	2	2	2	0	3
30412	PVC - 8"	0	0	2	2	2	0	3
30413	PVC - 8"	0	0	2	2	2	0	3
30719	PVC - 8"	0	0	2	2	2	0	3
30727	PVC - 8"	0	0	2	2	2	0	3
30728	PVC - 8"	0	0	2	2	2	0	3
29468	PVC - 8"	0	0	2	2	2	0	3
29469	PVC - 8"	0	0	2	2	2	0	3
29470	PVC - 8"	0	0	2	2	2	0	3
29471	PVC - 8"	0	0	2	2	2	0	3
29472	PVC - 8"	0	0	2	2	2	0	3
29473	PVC - 8"	0	0	2	2	2	0	3

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
29474	PVC - 8"	0	0	2	2	2	0	3
29475	PVC - 8"	0	0	2	2	2	0	3
29476	PVC - 8"	0	0	2	2	2	0	3
32644	PVC - 8"	0	0	2	2	2	0	3
32646	PVC - 8"	0	0	2	2	2	0	3
24512	VCP - 18"	0	0	4	1	0	0	2
24516	VCP - 18"	0	0	4	1	0	0	2
11543	PVC - 8"	0	0	2	1	2	0	2
11629	UNK - 8"	0	0	1	2	2	0	2
12439	VCP - 18"	0	0	4	1	0	0	2
12441	VCP - 18"	0	0	4	1	0	0	2
12443	VCP - 18"	0	0	4	1	0	0	2
12453	VCP - 27"	0	0	4	1	0	0	2
12455	VCP - 27"	0	0	4	1	0	0	2
12467	VCP - 27"	0	0	4	1	0	0	2
12469	VCP - 30"	0	0	4	1	0	0	2
12492	PVC - 8"	0	0	2	1	2	0	2
12494	PVC - 8"	0	0	2	1	2	0	2
12496	PVC - 8"	0	0	2	1	2	0	2
12498	PVC - 8"	0	0	2	1	2	0	2
12507	PVC - 8"	0	0	2	1	2	0	2
12509	PVC - 8"	0	0	2	1	2	0	2
12519	PVC - 8"	0	0	2	1	2	0	2
12521	PVC - 8"	0	0	2	1	2	0	2
12525	PVC - 8"	0	0	2	1	2	0	2
12527	PVC - 8"	0	0	2	1	2	0	2
12533	PVC - 8"	0	0	2	1	2	0	2
12540	PVC - 8"	0	0	2	1	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
12850	PVC - 8"	0	0	2	1	2	0	2
12852	PVC - 8"	0	0	2	1	2	0	2
12858	PVC - 8"	0	0	2	1	2	0	2
12860	PVC - 8"	0	0	2	1	2	0	2
12862	PVC - 8"	0	0	2	1	2	0	2
12870	PVC - 8"	0	0	2	1	2	0	2
12872	PVC - 8"	0	0	2	1	2	0	2
12874	PVC - 8"	0	0	2	1	2	0	2
12885	PVC - 8"	0	0	2	1	2	0	2
12891	PVC - 8"	0	0	2	1	2	0	2
12893	PVC - 8"	0	0	2	1	2	0	2
12895	PVC - 8"	0	0	2	1	2	0	2
12897	PVC - 8"	0	0	2	1	2	0	2
12903	PVC - 8"	0	0	2	1	2	0	2
12904	PVC - 8"	0	0	2	1	2	0	2
13655	UNK - 6"	0	0	1	2	2	0	2
13656	UNK - 8"	0	0	1	2	2	0	2
13884	UNK - 6"	0	0	1	2	2	0	2
14022	VCP - 10"	0	0	4	1	0	0	2
14091	UNK - 6"	0	0	1	2	2	0	2
14203	RCP - 21"	0	0	5	0	0	0	2
14457	PVC - 8"	0	0	2	1	2	0	2
14467	PVC - 8"	0	0	2	1	2	0	2
14488	PVC - 8"	0	0	2	1	2	0	2
14507	PVC - 8"	0	0	2	1	2	0	2
14517	PVC - 8"	0	0	2	1	2	0	2
14519	PVC - 8"	0	0	2	1	2	0	2
14521	PVC - 8"	0	0	2	1	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
14590	PVC - 8"	0	0	2	1	2	0	2
16072	VCP - 15"	0	0	4	1	0	0	2
16082	RCP - 30"	0	0	5	0	0	0	2
16943	PVC - 8"	0	0	2	1	2	0	2
17035	PVC - 8"	0	0	2	1	2	0	2
17037	PVC - 8"	0	0	2	1	2	0	2
17048	PVC - 8"	0	0	2	1	2	0	2
17050	PVC - 8"	0	0	2	1	2	0	2
17557	PVC - 8"	0	0	2	1	2	0	2
17559	PVC - 8"	0	0	2	1	2	0	2
17561	PVC - 8"	0	0	2	1	2	0	2
17563	PVC - 8"	0	0	2	1	2	0	2
17565	PVC - 8"	0	0	2	1	2	0	2
17569	PVC - 8"	0	0	2	1	2	0	2
17571	PVC - 8"	0	0	2	1	2	0	2
17583	PVC - 8"	0	0	2	1	2	0	2
17597	PVC - 8"	0	0	2	1	2	0	2
17599	PVC - 8"	0	0	2	1	2	0	2
18268	PVC - 8"	0	0	2	1	2	0	2
20044	VCP - 12"	0	0	4	1	0	0	2
20046	VCP - 12"	0	0	4	1	0	0	2
20052	VCP - 18"	0	0	4	1	0	0	2
20054	VCP - 18"	0	0	4	1	0	0	2
20056	VCP - 18"	0	0	4	1	0	0	2
20058	VCP - 18"	0	0	4	1	0	0	2
20067	VCP - 15"	0	0	4	1	0	0	2
20069	VCP - 15"	0	0	4	1	0	0	2
20070	VCP - 15"	0	0	4	1	0	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
20090	VCP - 10"	0	0	4	1	0	0	2
20091	VCP - 12"	0	0	4	1	0	0	2
20099	VCP - 10"	0	0	4	1	0	0	2
20101	VCP - 10"	0	0	4	1	0	0	2
20123	VCP - 10"	0	0	4	1	0	0	2
20124	VCP - 12"	0	0	4	1	0	0	2
20138	VCP - 12"	0	0	4	1	0	0	2
20142	VCP - 12"	0	0	4	1	0	0	2
20144	VCP - 12"	0	0	4	1	0	0	2
20146	VCP - 12"	0	0	4	1	0	0	2
20148	VCP - 12"	0	0	4	1	0	0	2
20150	VCP - 12"	0	0	4	1	0	0	2
20152	VCP - 12"	0	0	4	1	0	0	2
20154	VCP - 12"	0	0	4	1	0	0	2
20156	VCP - 12"	0	0	4	1	0	0	2
20158	VCP - 12"	0	0	4	1	0	0	2
20159	VCP - 15"	0	0	4	1	0	0	2
20189	VCP - 18"	0	0	4	1	0	0	2
20191	VCP - 18"	0	0	4	1	0	0	2
20193	VCP - 18"	0	0	4	1	0	0	2
20195	VCP - 18"	0	0	4	1	0	0	2
20197	VCP - 18"	0	0	4	1	0	0	2
20201	VCP - 18"	0	0	4	1	0	0	2
20203	VCP - 18"	0	0	4	1	0	0	2
20205	VCP - 18"	0	0	4	1	0	0	2
20207	VCP - 18"	0	0	4	1	0	0	2
20209	VCP - 18"	0	0	4	1	0	0	2
20211	VCP - 18"	0	0	4	1	0	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
20213	VCP - 18"	0	0	4	1	0	0	2
20215	VCP - 18"	0	0	4	1	0	0	2
20217	VCP - 18"	0	0	4	1	0	0	2
20219	VCP - 18"	0	0	4	1	0	0	2
20220	VCP - 18"	0	0	4	1	0	0	2
20238	CIPC - 12"	0	0	5	0	0	0	2
20409	VCP - 18"	0	0	4	1	0	0	2
20414	VCP - 15"	0	0	4	1	0	0	2
20903	PVC - 8"	0	0	2	1	2	0	2
21064	PVC - 8"	0	0	2	1	2	0	2
21065	PVC - 8"	0	0	2	1	2	0	2
21213	PVC - 8"	0	0	2	1	2	0	2
21215	PVC - 8"	0	0	2	1	2	0	2
22138	PVC - 8"	0	0	2	1	2	0	2
22225	PVC - 8"	0	0	2	1	2	0	2
22226	PVC - 8"	0	0	2	1	2	0	2
22394	PVC - 8"	0	0	2	1	2	0	2
22396	PVC - 8"	0	0	2	1	2	0	2
23175	PVC - 8"	0	0	2	1	2	0	2
22980	PVC - 8"	0	0	2	1	2	0	2
22988	PVC - 8"	0	0	2	1	2	0	2
22947	PVC - 8"	0	0	2	1	2	0	2
23098	PVC - 8"	0	0	2	1	2	0	2
23099	PVC - 8"	0	0	2	1	2	0	2
23102	PVC - 8"	0	0	2	1	2	0	2
23103	PVC - 8"	0	0	2	1	2	0	2
22995	PVC - 8"	0	0	2	1	2	0	2
23790	RCP - 42"	0	0	5	0	0	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
23875	UNK - 6"	0	0	1	2	2	0	2
23885	VCP - 15"	0	0	4	1	0	0	2
23887	VCP - 15"	0	0	4	1	0	0	2
23891	VCP - 15"	0	0	4	1	0	0	2
23893	VCP - 15"	0	0	4	1	0	0	2
23895	VCP - 15"	0	0	4	1	0	0	2
23897	VCP - 15"	0	0	4	1	0	0	2
23899	VCP - 15"	0	0	4	1	0	0	2
23917	VCP - 15"	0	0	4	1	0	0	2
23918	VCP - 15"	0	0	4	1	0	0	2
23926	PVC - 8"	0	0	2	1	2	0	2
24500	VCP - 12"	0	0	4	1	0	0	2
24502	VCP - 12"	0	0	4	1	0	0	2
24643	PVC - 8"	0	0	2	1	2	0	2
24657	PVC - 8"	0	0	2	1	2	0	2
24727	PVC - 8"	0	0	2	1	2	0	2
24756	PVC - 8"	0	0	2	1	2	0	2
27229	PVC - 8"	0	0	2	1	2	0	2
24800	PVC - 8"	0	0	2	1	2	0	2
24811	PVC - 8"	0	0	2	1	2	0	2
24813	PVC - 8"	0	0	2	1	2	0	2
26094	PVC - 8"	0	0	2	1	2	0	2
26095	PVC - 8"	0	0	2	1	2	0	2
26181	DIP - 30"	0	0	3	2	0	0	2
26183	DIP - 30"	0	0	3	2	0	0	2
26185	DIP - 30"	0	0	3	2	0	0	2
27589	PVC - 8"	0	0	2	1	2	0	2
27590	PVC - 8"	0	0	2	1	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
27336	VCP - 15"	0	0	4	1	0	0	2
27364	PVC - 8"	0	0	2	1	2	0	2
27366	PVC - 8"	0	0	2	1	2	0	2
27389	PVC - 8"	0	0	2	1	2	0	2
27444	PVC - 8"	0	0	2	1	2	0	2
30344	PVC - 8"	0	0	2	1	2	0	2
30345	PVC - 8"	0	0	2	1	2	0	2
30370	PVC - 8"	0	0	2	1	2	0	2
30371	PVC - 8"	0	0	2	1	2	0	2
30383	PVC - 8"	0	0	2	1	2	0	2
30385	PVC - 8"	0	0	2	1	2	0	2
30386	PVC - 8"	0	0	2	1	2	0	2
30387	PVC - 8"	0	0	2	1	2	0	2
28566	VCP - 18"	0	0	4	1	0	0	2
28635	UNK - 6"	0	0	1	2	2	0	2
29478	PVC - 8"	0	0	2	1	2	0	2
29479	PVC - 8"	0	0	2	1	2	0	2
31706	PVC - 8"	0	0	2	1	2	0	2
31708	PVC - 8"	0	0	2	1	2	0	2
31710	PVC - 8"	0	0	2	1	2	0	2
32628	PVC - 8"	0	0	2	1	2	0	2
90037	PVC - 8"	0	0	2	1	2	0	2
20140	VCP - 12"	0	0	4	1	0	0	2
32647	PVC - 8"	0	0	2	1	2	0	2
24514	VCP - 18"	0	0	4	0	0	0	2
11626	PVC - 15"	0	0	2	2	0	0	2
12449	VCP - 18"	0	0	4	0	0	0	2
12451	VCP - 27"	0	0	4	0	0	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
12457	VCP - 27"	0	0	4	0	0	0	2
12459	VCP - 27"	0	0	4	0	0	0	2
12461	VCP - 27"	0	0	4	0	0	0	2
12463	VCP - 27"	0	0	4	0	0	0	2
12465	VCP - 27"	0	0	4	0	0	0	2
12481	VCP - 15"	0	0	4	0	0	0	2
12484	PVC - 8"	0	0	2	0	2	0	2
12486	PVC - 8"	0	0	2	0	2	0	2
12488	PVC - 8"	0	0	2	0	2	0	2
12490	PVC - 8"	0	0	2	0	2	0	2
12500	PVC - 8"	0	0	2	0	2	0	2
12503	PVC - 8"	0	0	2	0	2	0	2
12505	PVC - 8"	0	0	2	0	2	0	2
12511	PVC - 8"	0	0	2	0	2	0	2
12513	PVC - 8"	0	0	2	0	2	0	2
12514	PVC - 8"	0	0	2	0	2	0	2
12517	PVC - 8"	0	0	2	0	2	0	2
12523	PVC - 8"	0	0	2	0	2	0	2
12529	PVC - 8"	0	0	2	0	2	0	2
12531	PVC - 8"	0	0	2	0	2	0	2
12535	PVC - 8"	0	0	2	0	2	0	2
12538	PVC - 8"	0	0	2	0	2	0	2
12542	PVC - 8"	0	0	2	0	2	0	2
12544	PVC - 8"	0	0	2	0	2	0	2
12545	PVC - 8"	0	0	2	0	2	0	2
12829	PVC - 8"	0	0	2	0	2	0	2
12844	PVC - 8"	0	0	2	0	2	0	2
12847	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
12854	PVC - 8"	0	0	2	0	2	0	2
12856	PVC - 8"	0	0	2	0	2	0	2
12864	PVC - 8"	0	0	2	0	2	0	2
12866	PVC - 8"	0	0	2	0	2	0	2
12868	PVC - 8"	0	0	2	0	2	0	2
12876	PVC - 8"	0	0	2	0	2	0	2
12878	PVC - 8"	0	0	2	0	2	0	2
12884	PVC - 8"	0	0	2	0	2	0	2
12889	PVC - 8"	0	0	2	0	2	0	2
12899	PVC - 8"	0	0	2	0	2	0	2
12901	PVC - 8"	0	0	2	0	2	0	2
13266	PVC - 8"	0	0	2	0	2	0	2
13267	PVC - 8"	0	0	2	0	2	0	2
13997	PVC - 21"	0	0	2	2	0	0	2
14018	VCP - 10"	0	0	4	0	0	0	2
14020	VCP - 10"	0	0	4	0	0	0	2
14274	PVC - 8"	0	0	2	0	2	0	2
14459	PVC - 8"	0	0	2	0	2	0	2
14513	PVC - 8"	0	0	2	0	2	0	2
14514	PVC - 8"	0	0	2	0	2	0	2
14515	PVC - 8"	0	0	2	0	2	0	2
14637	PVC - 8"	0	0	2	0	2	0	2
14648	PVC - 8"	0	0	2	0	2	0	2
14650	PVC - 8"	0	0	2	0	2	0	2
14652	PVC - 8"	0	0	2	0	2	0	2
14655	PVC - 8"	0	0	2	0	2	0	2
14656	PVC - 8"	0	0	2	0	2	0	2
14658	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
14660	PVC - 8"	0	0	2	0	2	0	2
14662	PVC - 8"	0	0	2	0	2	0	2
14664	PVC - 8"	0	0	2	0	2	0	2
14666	PVC - 8"	0	0	2	0	2	0	2
14765	PVC - 8"	0	0	2	0	2	0	2
14773	PVC - 8"	0	0	2	0	2	0	2
14775	PVC - 8"	0	0	2	0	2	0	2
14777	PVC - 8"	0	0	2	0	2	0	2
14779	PVC - 8"	0	0	2	0	2	0	2
14781	PVC - 8"	0	0	2	0	2	0	2
14783	PVC - 8"	0	0	2	0	2	0	2
14785	PVC - 8"	0	0	2	0	2	0	2
14787	PVC - 8"	0	0	2	0	2	0	2
15834	PVC - 8"	0	0	2	0	2	0	2
15837	PVC - 21"	0	0	2	2	0	0	2
15909	PVC - 12"	0	0	2	2	0	0	2
15955	PVC - 12"	0	0	2	2	0	0	2
15957	PVC - 12"	0	0	2	2	0	0	2
16039	PVC - 8"	0	0	2	0	2	0	2
16520	PVC - 8"	0	0	2	0	2	0	2
16522	PVC - 8"	0	0	2	0	2	0	2
16734	PVC - 8"	0	0	2	0	2	0	2
16736	PVC - 8"	0	0	2	0	2	0	2
16738	PVC - 8"	0	0	2	0	2	0	2
16740	PVC - 8"	0	0	2	0	2	0	2
16742	PVC - 8"	0	0	2	0	2	0	2
16745	PVC - 8"	0	0	2	0	2	0	2
16749	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
16751	PVC - 8"	0	0	2	0	2	0	2
16752	PVC - 8"	0	0	2	0	2	0	2
16755	PVC - 8"	0	0	2	0	2	0	2
16757	PVC - 8"	0	0	2	0	2	0	2
16758	PVC - 8"	0	0	2	0	2	0	2
16941	PVC - 8"	0	0	2	0	2	0	2
16945	PVC - 8"	0	0	2	0	2	0	2
16947	PVC - 8"	0	0	2	0	2	0	2
17026	PVC - 8"	0	0	2	0	2	0	2
17027	PVC - 8"	0	0	2	0	2	0	2
17029	PVC - 8"	0	0	2	0	2	0	2
17030	PVC - 8"	0	0	2	0	2	0	2
17032	PVC - 8"	0	0	2	0	2	0	2
17038	PVC - 8"	0	0	2	0	2	0	2
17040	PVC - 8"	0	0	2	0	2	0	2
17043	PVC - 8"	0	0	2	0	2	0	2
17045	PVC - 8"	0	0	2	0	2	0	2
17046	PVC - 8"	0	0	2	0	2	0	2
17280	PVC - 8"	0	0	2	0	2	0	2
17282	PVC - 8"	0	0	2	0	2	0	2
17284	PVC - 8"	0	0	2	0	2	0	2
17286	PVC - 8"	0	0	2	0	2	0	2
17288	PVC - 8"	0	0	2	0	2	0	2
17290	PVC - 8"	0	0	2	0	2	0	2
17292	PVC - 8"	0	0	2	0	2	0	2
17293	PVC - 8"	0	0	2	0	2	0	2
17518	PVC - 8"	0	0	2	0	2	0	2
17520	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
17522	PVC - 8"	0	0	2	0	2	0	2
17524	PVC - 8"	0	0	2	0	2	0	2
17526	PVC - 8"	0	0	2	0	2	0	2
17532	PVC - 8"	0	0	2	0	2	0	2
17534	PVC - 8"	0	0	2	0	2	0	2
17540	PVC - 8"	0	0	2	0	2	0	2
17542	PVC - 8"	0	0	2	0	2	0	2
17544	PVC - 8"	0	0	2	0	2	0	2
17546	PVC - 8"	0	0	2	0	2	0	2
17548	PVC - 8"	0	0	2	0	2	0	2
17550	PVC - 8"	0	0	2	0	2	0	2
17552	PVC - 8"	0	0	2	0	2	0	2
17555	PVC - 8"	0	0	2	0	2	0	2
17568	PVC - 8"	0	0	2	0	2	0	2
17573	PVC - 8"	0	0	2	0	2	0	2
17575	PVC - 8"	0	0	2	0	2	0	2
17579	PVC - 8"	0	0	2	0	2	0	2
17581	PVC - 8"	0	0	2	0	2	0	2
17586	PVC - 8"	0	0	2	0	2	0	2
17588	PVC - 8"	0	0	2	0	2	0	2
17590	PVC - 8"	0	0	2	0	2	0	2
17592	PVC - 8"	0	0	2	0	2	0	2
17594	PVC - 8"	0	0	2	0	2	0	2
17596	PVC - 8"	0	0	2	0	2	0	2
17601	PVC - 8"	0	0	2	0	2	0	2
17603	PVC - 8"	0	0	2	0	2	0	2
17605	PVC - 8"	0	0	2	0	2	0	2
17607	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
17610	PVC - 8"	0	0	2	0	2	0	2
17611	PVC - 8"	0	0	2	0	2	0	2
17616	PVC - 8"	0	0	2	0	2	0	2
17617	PVC - 8"	0	0	2	0	2	0	2
17619	PVC - 8"	0	0	2	0	2	0	2
17620	PVC - 8"	0	0	2	0	2	0	2
17622	PVC - 8"	0	0	2	0	2	0	2
17779	PVC - 8"	0	0	2	0	2	0	2
17780	PVC - 8"	0	0	2	0	2	0	2
17925	PVC - 8"	0	0	2	0	2	0	2
17926	PVC - 8"	0	0	2	0	2	0	2
17929	PVC - 8"	0	0	2	0	2	0	2
17931	PVC - 8"	0	0	2	0	2	0	2
17933	PVC - 8"	0	0	2	0	2	0	2
17935	PVC - 8"	0	0	2	0	2	0	2
17936	PVC - 8"	0	0	2	0	2	0	2
17971	PVC - 8"	0	0	2	0	2	0	2
17973	PVC - 8"	0	0	2	0	2	0	2
17975	PVC - 8"	0	0	2	0	2	0	2
17977	PVC - 8"	0	0	2	0	2	0	2
17979	PVC - 8"	0	0	2	0	2	0	2
17981	PVC - 8"	0	0	2	0	2	0	2
17983	PVC - 8"	0	0	2	0	2	0	2
17986	PVC - 8"	0	0	2	0	2	0	2
17988	PVC - 8"	0	0	2	0	2	0	2
17990	PVC - 8"	0	0	2	0	2	0	2
17992	PVC - 8"	0	0	2	0	2	0	2
17994	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
18001	PVC - 8"	0	0	2	0	2	0	2
18003	PVC - 8"	0	0	2	0	2	0	2
18005	PVC - 8"	0	0	2	0	2	0	2
18007	PVC - 8"	0	0	2	0	2	0	2
18009	PVC - 8"	0	0	2	0	2	0	2
18017	PVC - 8"	0	0	2	0	2	0	2
18019	PVC - 8"	0	0	2	0	2	0	2
18021	PVC - 8"	0	0	2	0	2	0	2
18023	PVC - 8"	0	0	2	0	2	0	2
18027	PVC - 8"	0	0	2	0	2	0	2
18267	PVC - 8"	0	0	2	0	2	0	2
19864	PVC - 8"	0	0	2	0	2	0	2
20080	VCP - 10"	0	0	4	0	0	0	2
20082	VCP - 10"	0	0	4	0	0	0	2
20084	VCP - 10"	0	0	4	0	0	0	2
20086	VCP - 10"	0	0	4	0	0	0	2
20088	VCP - 10"	0	0	4	0	0	0	2
20103	VCP - 10"	0	0	4	0	0	0	2
20105	VCP - 10"	0	0	4	0	0	0	2
20107	VCP - 10"	0	0	4	0	0	0	2
20109	VCP - 10"	0	0	4	0	0	0	2
20110	VCP - 10"	0	0	4	0	0	0	2
20119	VCP - 10"	0	0	4	0	0	0	2
20121	VCP - 10"	0	0	4	0	0	0	2
20199	VCP - 18"	0	0	4	0	0	0	2
20411	VCP - 15"	0	0	4	0	0	0	2
20412	VCP - 15"	0	0	4	0	0	0	2
20735	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
20737	PVC - 8"	0	0	2	0	2	0	2
20739	PVC - 8"	0	0	2	0	2	0	2
20740	PVC - 8"	0	0	2	0	2	0	2
20745	PVC - 8"	0	0	2	0	2	0	2
20746	PVC - 8"	0	0	2	0	2	0	2
20773	PVC - 8"	0	0	2	0	2	0	2
20774	PVC - 8"	0	0	2	0	2	0	2
20816	PVC - 8"	0	0	2	0	2	0	2
20818	PVC - 8"	0	0	2	0	2	0	2
20820	PVC - 8"	0	0	2	0	2	0	2
20822	PVC - 8"	0	0	2	0	2	0	2
20824	PVC - 8"	0	0	2	0	2	0	2
20825	PVC - 8"	0	0	2	0	2	0	2
20905	PVC - 8"	0	0	2	0	2	0	2
20907	PVC - 8"	0	0	2	0	2	0	2
20909	PVC - 8"	0	0	2	0	2	0	2
20911	PVC - 8"	0	0	2	0	2	0	2
20920	PVC - 8"	0	0	2	0	2	0	2
20922	PVC - 8"	0	0	2	0	2	0	2
21005	PVC - 8"	0	0	2	0	2	0	2
21006	PVC - 8"	0	0	2	0	2	0	2
21027	PVC - 8"	0	0	2	0	2	0	2
21050	PVC - 8"	0	0	2	0	2	0	2
21052	PVC - 8"	0	0	2	0	2	0	2
21054	PVC - 8"	0	0	2	0	2	0	2
21056	PVC - 8"	0	0	2	0	2	0	2
21058	PVC - 8"	0	0	2	0	2	0	2
21060	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
21173	PVC - 8"	0	0	2	0	2	0	2
21174	PVC - 8"	0	0	2	0	2	0	2
21203	PVC - 8"	0	0	2	0	2	0	2
21205	PVC - 8"	0	0	2	0	2	0	2
21207	PVC - 8"	0	0	2	0	2	0	2
21209	PVC - 8"	0	0	2	0	2	0	2
21211	PVC - 8"	0	0	2	0	2	0	2
21216	PVC - 8"	0	0	2	0	2	0	2
21360	PVC - 10"	0	0	2	2	0	0	2
21374	PVC - 8"	0	0	2	0	2	0	2
21376	PVC - 8"	0	0	2	0	2	0	2
21378	PVC - 8"	0	0	2	0	2	0	2
21380	PVC - 8"	0	0	2	0	2	0	2
21382	PVC - 8"	0	0	2	0	2	0	2
21384	PVC - 8"	0	0	2	0	2	0	2
21386	PVC - 8"	0	0	2	0	2	0	2
21388	PVC - 8"	0	0	2	0	2	0	2
21389	PVC - 8"	0	0	2	0	2	0	2
21395	PVC - 8"	0	0	2	0	2	0	2
21397	PVC - 8"	0	0	2	0	2	0	2
21399	PVC - 8"	0	0	2	0	2	0	2
21400	PVC - 8"	0	0	2	0	2	0	2
21405	PVC - 8"	0	0	2	0	2	0	2
21407	PVC - 8"	0	0	2	0	2	0	2
21408	PVC - 8"	0	0	2	0	2	0	2
21412	PVC - 8"	0	0	2	0	2	0	2
21413	PVC - 8"	0	0	2	0	2	0	2
21423	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
21424	PVC - 8"	0	0	2	0	2	0	2
21557	PVC - 8"	0	0	2	0	2	0	2
21580	PVC - 8"	0	0	2	0	2	0	2
21655	PVC - 8"	0	0	2	0	2	0	2
21657	PVC - 8"	0	0	2	0	2	0	2
21658	PVC - 8"	0	0	2	0	2	0	2
21729	PVC - 8"	0	0	2	0	2	0	2
21731	PVC - 8"	0	0	2	0	2	0	2
21733	PVC - 8"	0	0	2	0	2	0	2
21734	PVC - 8"	0	0	2	0	2	0	2
21819	PVC - 8"	0	0	2	0	2	0	2
21821	PVC - 8"	0	0	2	0	2	0	2
21822	PVC - 8"	0	0	2	0	2	0	2
21831	PVC - 8"	0	0	2	0	2	0	2
21833	PVC - 8"	0	0	2	0	2	0	2
21834	PVC - 8"	0	0	2	0	2	0	2
21944	PVC - 8"	0	0	2	0	2	0	2
21946	PVC - 8"	0	0	2	0	2	0	2
21948	PVC - 8"	0	0	2	0	2	0	2
21950	PVC - 8"	0	0	2	0	2	0	2
21951	PVC - 8"	0	0	2	0	2	0	2
21954	PVC - 8"	0	0	2	0	2	0	2
21955	PVC - 8"	0	0	2	0	2	0	2
21958	PVC - 8"	0	0	2	0	2	0	2
21959	PVC - 8"	0	0	2	0	2	0	2
21962	PVC - 8"	0	0	2	0	2	0	2
21963	PVC - 8"	0	0	2	0	2	0	2
22134	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
22136	PVC - 8"	0	0	2	0	2	0	2
22218	PVC - 8"	0	0	2	0	2	0	2
22220	PVC - 8"	0	0	2	0	2	0	2
22221	PVC - 8"	0	0	2	0	2	0	2
22222	PVC - 8"	0	0	2	0	2	0	2
22308	PVC - 8"	0	0	2	0	2	0	2
22309	PVC - 8"	0	0	2	0	2	0	2
22312	PVC - 8"	0	0	2	0	2	0	2
22313	PVC - 8"	0	0	2	0	2	0	2
23097	PVC - 8"	0	0	2	0	2	0	2
23100	PVC - 8"	0	0	2	0	2	0	2
23101	PVC - 8"	0	0	2	0	2	0	2
22397	PVC - 8"	0	0	2	0	2	0	2
23337	PVC - 8"	0	0	2	0	2	0	2
23780	PVC - 8"	0	0	2	0	2	0	2
23786	PVC - 8"	0	0	2	0	2	0	2
23867	UNK - 6"	0	0	1	1	2	0	2
23869	UNK - 6"	0	0	1	1	2	0	2
23889	PVC - 8"	0	0	2	0	2	0	2
23901	VCP - 15"	0	0	4	0	0	0	2
23903	VCP - 15"	0	0	4	0	0	0	2
23905	VCP - 15"	0	0	4	0	0	0	2
23907	VCP - 15"	0	0	4	0	0	0	2
23909	VCP - 15"	0	0	4	0	0	0	2
23911	VCP - 15"	0	0	4	0	0	0	2
23913	VCP - 15"	0	0	4	0	0	0	2
23915	VCP - 15"	0	0	4	0	0	0	2
24496	VCP - 21"	0	0	4	0	0	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
24498	VCP - 18"	0	0	4	0	0	0	2
24504	VCP - 10"	0	0	4	0	0	0	2
24645	PVC - 8"	0	0	2	0	2	0	2
24648	PVC - 8"	0	0	2	0	2	0	2
24659	PVC - 8"	0	0	2	0	2	0	2
24700	PVC - 8"	0	0	2	0	2	0	2
24702	PVC - 8"	0	0	2	0	2	0	2
24704	PVC - 8"	0	0	2	0	2	0	2
24706	PVC - 8"	0	0	2	0	2	0	2
24708	PVC - 8"	0	0	2	0	2	0	2
24710	PVC - 8"	0	0	2	0	2	0	2
24712	PVC - 8"	0	0	2	0	2	0	2
24719	PVC - 8"	0	0	2	0	2	0	2
24721	PVC - 8"	0	0	2	0	2	0	2
24723	PVC - 8"	0	0	2	0	2	0	2
24724	PVC - 8"	0	0	2	0	2	0	2
24732	PVC - 8"	0	0	2	0	2	0	2
24734	PVC - 8"	0	0	2	0	2	0	2
24736	PVC - 8"	0	0	2	0	2	0	2
24743	PVC - 8"	0	0	2	0	2	0	2
24748	PVC - 8"	0	0	2	0	2	0	2
24750	PVC - 8"	0	0	2	0	2	0	2
24792	PVC - 8"	0	0	2	0	2	0	2
24794	PVC - 8"	0	0	2	0	2	0	2
27200	PVC - 8"	0	0	2	0	2	0	2
27201	PVC - 8"	0	0	2	0	2	0	2
27202	PVC - 8"	0	0	2	0	2	0	2
27203	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
27204	PVC - 8"	0	0	2	0	2	0	2
27205	PVC - 8"	0	0	2	0	2	0	2
27206	PVC - 8"	0	0	2	0	2	0	2
27207	PVC - 8"	0	0	2	0	2	0	2
27208	PVC - 8"	0	0	2	0	2	0	2
27209	PVC - 8"	0	0	2	0	2	0	2
27210	PVC - 8"	0	0	2	0	2	0	2
27220	PVC - 8"	0	0	2	0	2	0	2
27221	PVC - 8"	0	0	2	0	2	0	2
27222	PVC - 8"	0	0	2	0	2	0	2
24809	PVC - 8"	0	0	2	0	2	0	2
25978	PVC - 4"	0	0	2	0	2	0	2
25979	PVC - 4"	0	0	2	0	2	0	2
26171	DIP - 30"	0	0	3	1	0	0	2
26173	DIP - 30"	0	0	3	1	0	0	2
26175	DIP - 30"	0	0	3	1	0	0	2
26177	DIP - 30"	0	0	3	1	0	0	2
26179	DIP - 30"	0	0	3	1	0	0	2
26281	PVC - 8"	0	0	2	0	2	0	2
26283	PVC - 8"	0	0	2	0	2	0	2
26285	PVC - 8"	0	0	2	0	2	0	2
26286	PVC - 8"	0	0	2	0	2	0	2
26508	PVC - 8"	0	0	2	0	2	0	2
26510	PVC - 8"	0	0	2	0	2	0	2
26512	PVC - 8"	0	0	2	0	2	0	2
26514	PVC - 8"	0	0	2	0	2	0	2
26516	PVC - 8"	0	0	2	0	2	0	2
26518	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
26520	PVC - 8"	0	0	2	0	2	0	2
26522	PVC - 8"	0	0	2	0	2	0	2
26524	PVC - 8"	0	0	2	0	2	0	2
26526	PVC - 8"	0	0	2	0	2	0	2
26528	PVC - 8"	0	0	2	0	2	0	2
26530	PVC - 8"	0	0	2	0	2	0	2
26532	PVC - 8"	0	0	2	0	2	0	2
26534	PVC - 6"	0	0	2	0	2	0	2
26536	PVC - 6"	0	0	2	0	2	0	2
26538	PVC - 4"	0	0	2	0	2	0	2
26540	PVC - 4"	0	0	2	0	2	0	2
26542	PVC - 8"	0	0	2	0	2	0	2
26544	PVC - 8"	0	0	2	0	2	0	2
26546	PVC - 8"	0	0	2	0	2	0	2
26548	PVC - 8"	0	0	2	0	2	0	2
26550	PVC - 6"	0	0	2	0	2	0	2
26552	PVC - 6"	0	0	2	0	2	0	2
26554	PVC - 6"	0	0	2	0	2	0	2
26556	PVC - 6"	0	0	2	0	2	0	2
26558	PVC - 8"	0	0	2	0	2	0	2
26779	PVC - 8"	0	0	2	0	2	0	2
26780	PVC - 3"	0	0	2	0	2	0	2
26818	PVC - 8"	0	0	2	0	2	0	2
26838	PVC - 8"	0	0	2	0	2	0	2
26840	PVC - 8"	0	0	2	0	2	0	2
26872	PVC - 8"	0	0	2	0	2	0	2
26874	PVC - 8"	0	0	2	0	2	0	2
26921	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
26923	PVC - 8"	0	0	2	0	2	0	2
26925	PVC - 8"	0	0	2	0	2	0	2
26972	PVC - 8"	0	0	2	0	2	0	2
26974	PVC - 8"	0	0	2	0	2	0	2
26976	PVC - 8"	0	0	2	0	2	0	2
26978	PVC - 8"	0	0	2	0	2	0	2
26980	PVC - 8"	0	0	2	0	2	0	2
27026	PVC - 8"	0	0	2	0	2	0	2
27028	PVC - 8"	0	0	2	0	2	0	2
27030	PVC - 8"	0	0	2	0	2	0	2
27032	PVC - 8"	0	0	2	0	2	0	2
27034	PVC - 8"	0	0	2	0	2	0	2
27036	PVC - 8"	0	0	2	0	2	0	2
27230	PVC - 8"	0	0	2	0	2	0	2
27339	PVC - 8"	0	0	2	0	2	0	2
27342	PVC - 6"	0	0	2	0	2	0	2
27346	PVC - 8"	0	0	2	0	2	0	2
27348	PVC - 8"	0	0	2	0	2	0	2
27358	PVC - 8"	0	0	2	0	2	0	2
27360	PVC - 8"	0	0	2	0	2	0	2
27362	PVC - 8"	0	0	2	0	2	0	2
27368	PVC - 8"	0	0	2	0	2	0	2
27385	PVC - 8"	0	0	2	0	2	0	2
27387	PVC - 8"	0	0	2	0	2	0	2
27391	PVC - 8"	0	0	2	0	2	0	2
27415	PVC - 8"	0	0	2	0	2	0	2
27417	PVC - 8"	0	0	2	0	2	0	2
27419	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
27421	PVC - 8"	0	0	2	0	2	0	2
27440	PVC - 8"	0	0	2	0	2	0	2
27442	PVC - 8"	0	0	2	0	2	0	2
27446	PVC - 8"	0	0	2	0	2	0	2
30320	PVC - 8"	0	0	2	0	2	0	2
30322	PVC - 8"	0	0	2	0	2	0	2
30326	PVC - 8"	0	0	2	0	2	0	2
30327	PVC - 8"	0	0	2	0	2	0	2
30328	PVC - 8"	0	0	2	0	2	0	2
30329	PVC - 8"	0	0	2	0	2	0	2
30330	PVC - 8"	0	0	2	0	2	0	2
30331	PVC - 8"	0	0	2	0	2	0	2
30332	PVC - 8"	0	0	2	0	2	0	2
30333	PVC - 8"	0	0	2	0	2	0	2
30335	PVC - 8"	0	0	2	0	2	0	2
30338	PVC - 8"	0	0	2	0	2	0	2
30341	PVC - 8"	0	0	2	0	2	0	2
30342	PVC - 8"	0	0	2	0	2	0	2
30346	PVC - 8"	0	0	2	0	2	0	2
30347	PVC - 8"	0	0	2	0	2	0	2
30348	PVC - 8"	0	0	2	0	2	0	2
30349	PVC - 8"	0	0	2	0	2	0	2
30350	PVC - 8"	0	0	2	0	2	0	2
30351	PVC - 8"	0	0	2	0	2	0	2
30352	PVC - 8"	0	0	2	0	2	0	2
30353	PVC - 8"	0	0	2	0	2	0	2
30354	PVC - 8"	0	0	2	0	2	0	2
30357	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
30362	PVC - 8"	0	0	2	0	2	0	2
30365	PVC - 8"	0	0	2	0	2	0	2
30366	PVC - 8"	0	0	2	0	2	0	2
30367	PVC - 8"	0	0	2	0	2	0	2
30369	PVC - 8"	0	0	2	0	2	0	2
30372	PVC - 8"	0	0	2	0	2	0	2
30373	PVC - 8"	0	0	2	0	2	0	2
30380	PVC - 8"	0	0	2	0	2	0	2
30381	PVC - 8"	0	0	2	0	2	0	2
30382	PVC - 8"	0	0	2	0	2	0	2
30388	PVC - 8"	0	0	2	0	2	0	2
30389	PVC - 8"	0	0	2	0	2	0	2
30390	PVC - 8"	0	0	2	0	2	0	2
30391	PVC - 8"	0	0	2	0	2	0	2
30395	PVC - 8"	0	0	2	0	2	0	2
30402	PVC - 8"	0	0	2	0	2	0	2
30403	PVC - 8"	0	0	2	0	2	0	2
30404	PVC - 8"	0	0	2	0	2	0	2
30405	PVC - 8"	0	0	2	0	2	0	2
30407	PVC - 8"	0	0	2	0	2	0	2
30408	PVC - 8"	0	0	2	0	2	0	2
30409	PVC - 8"	0	0	2	0	2	0	2
30720	PVC - 8"	0	0	2	0	2	0	2
30721	PVC - 8"	0	0	2	0	2	0	2
30722	PVC - 8"	0	0	2	0	2	0	2
30723	PVC - 8"	0	0	2	0	2	0	2
30724	PVC - 8"	0	0	2	0	2	0	2
30725	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
30726	PVC - 8"	0	0	2	0	2	0	2
30729	PVC - 8"	0	0	2	0	2	0	2
30730	PVC - 8"	0	0	2	0	2	0	2
30414	PVC - 8"	0	0	2	0	2	0	2
28555	UNK - 0"	0	0	1	2	1	0	2
28629	PVC - 6"	0	0	2	0	2	0	2
29467	PVC - 8"	0	0	2	0	2	0	2
29477	PVC - 8"	0	0	2	0	2	0	2
29480	PVC - 8"	0	0	2	0	2	0	2
29481	PVC - 8"	0	0	2	0	2	0	2
30415	PVC - 8"	0	0	2	0	2	0	2
30416	PVC - 8"	0	0	2	0	2	0	2
30792	UNK - 0"	0	0	1	2	1	0	2
30801	PVC - 8"	0	0	2	0	2	0	2
30803	PVC - 8"	0	0	2	0	2	0	2
30805	PVC - 8"	0	0	2	0	2	0	2
30807	PVC - 8"	0	0	2	0	2	0	2
30809	PVC - 8"	0	0	2	0	2	0	2
30811	PVC - 8"	0	0	2	0	2	0	2
30813	PVC - 8"	0	0	2	0	2	0	2
31018	PVC - 6"	0	0	2	0	2	0	2
31417	PVC - 8"	0	0	2	0	2	0	2
31419	PVC - 8"	0	0	2	0	2	0	2
31702	PVC - 12"	0	0	2	2	0	0	2
31704	PVC - 12"	0	0	2	2	0	0	2
31712	PVC - 12"	0	0	2	2	0	0	2
31726	PVC - 12"	0	0	2	2	0	0	2
31736	PVC - 2"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
31737	PVC - 6"	0	0	2	0	2	0	2
90019	PVC - 8"	0	0	2	0	2	0	2
90027	PVC - 8"	0	0	2	0	2	0	2
90028	PVC - 8"	0	0	2	0	2	0	2
90334	PVC - 8"	0	0	2	0	2	0	2
90030	PVC - 8"	0	0	2	0	2	0	2
90031	PVC - 8"	0	0	2	0	2	0	2
90032	PVC - 8"	0	0	2	0	2	0	2
90033	PVC - 8"	0	0	2	0	2	0	2
90034	PVC - 8"	0	0	2	0	2	0	2
90035	PVC - 8"	0	0	2	0	2	0	2
90036	PVC - 8"	0	0	2	0	2	0	2
90038	PVC - 8"	0	0	2	0	2	0	2
90039	PVC - 8"	0	0	2	0	2	0	2
90040	PVC - 8"	0	0	2	0	2	0	2
90041	PVC - 8"	0	0	2	0	2	0	2
90042	PVC - 8"	0	0	2	0	2	0	2
90043	PVC - 8"	0	0	2	0	2	0	2
90044	PVC - 8"	0	0	2	0	2	0	2
90045	PVC - 8"	0	0	2	0	2	0	2
90046	PVC - 8"	0	0	2	0	2	0	2
90047	PVC - 8"	0	0	2	0	2	0	2
90048	PVC - 8"	0	0	2	0	2	0	2
6650677	PVC - 8"	0	0	2	0	2	0	2
5530881	PVC - 8"	0	0	2	0	2	0	2
4741041	PVC - 8"	0	0	2	0	2	0	2
4771060	PVC - 8"	0	0	2	0	2	0	2
7490524	PVC - 8"	0	0	2	0	2	0	2

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
8830279	PVC - 8"	0	0	2	0	2	0	2
3540446	PVC - 6"	0	0	2	0	2	0	2
4960480	PVC - 6"	0	0	2	0	2	0	2
9580742	PVC - 6"	0	0	2	0	2	0	2
9430768	PVC - 6"	0	0	2	0	2	0	2
6380743	PVC - 6"	0	0	2	0	2	0	2
8070436	PVC - 6"	0	0	2	0	2	0	2
5070461	PVC - 6"	0	0	2	0	2	0	2
9350782	PVC - 6"	0	0	2	0	2	0	2
9670725	PVC - 6"	0	0	2	0	2	0	2
6480748	PVC - 6"	0	0	2	0	2	0	2
9710119	PVC - 8"	0	0	2	0	2	0	2
90366	UNK - 2"	0	0	1	1	2	0	2
0	UNK - 8"	0	0	1	1	2	0	2
11545	PVC - 42"	0	0	2	1	0	0	1
11547	PVC - 42"	0	0	2	1	0	0	1
11549	PVC - 18"	0	0	2	1	0	0	1
11557	PVC - 15"	0	0	2	1	0	0	1
11611	PVC - 36"	0	0	2	1	0	0	1
11613	PVC - 36"	0	0	2	1	0	0	1
11615	PVC - 36"	0	0	2	1	0	0	1
11617	PVC - 36"	0	0	2	1	0	0	1
11627	PVC - 36"	0	0	2	1	0	0	1
11631	PVC - 36"	0	0	2	1	0	0	1
13301	PVC - 30"	0	0	2	1	0	0	1
13303	PVC - 30"	0	0	2	1	0	0	1
13305	PVC - 30"	0	0	2	1	0	0	1
13307	PVC - 30"	0	0	2	1	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
13309	PVC - 30"	0	0	2	1	0	0	1
13311	PVC - 30"	0	0	2	1	0	0	1
13314	PVC - 30"	0	0	2	1	0	0	1
13315	PVC - 30"	0	0	2	1	0	0	1
13317	PVC - 30"	0	0	2	1	0	0	1
13319	PVC - 30"	0	0	2	1	0	0	1
13321	PVC - 30"	0	0	2	1	0	0	1
13323	PVC - 30"	0	0	2	1	0	0	1
13342	PVC - 12"	0	0	2	1	0	0	1
13653	PVC - 42"	0	0	2	1	0	0	1
13993	PVC - 30"	0	0	2	1	0	0	1
14003	PVC - 21"	0	0	2	1	0	0	1
14007	PVC - 21"	0	0	2	1	0	0	1
14009	PVC - 21"	0	0	2	1	0	0	1
14130	DIP - 14"	0	0	3	0	0	0	1
14278	PVC - 12"	0	0	2	1	0	0	1
14280	PVC - 18"	0	0	2	1	0	0	1
14282	PVC - 18"	0	0	2	1	0	0	1
14284	PVC - 24"	0	0	2	1	0	0	1
14286	PVC - 24"	0	0	2	1	0	0	1
15840	PVC - 21"	0	0	2	1	0	0	1
15841	PVC - 21"	0	0	2	1	0	0	1
15913	PVC - 12"	0	0	2	1	0	0	1
15915	PVC - 12"	0	0	2	1	0	0	1
15931	PVC - 12"	0	0	2	1	0	0	1
15933	PVC - 12"	0	0	2	1	0	0	1
15935	PVC - 12"	0	0	2	1	0	0	1
15937	PVC - 12"	0	0	2	1	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
15961	PVC - 12"	0	0	2	1	0	0	1
15963	PVC - 12"	0	0	2	1	0	0	1
15969	PVC - 12"	0	0	2	1	0	0	1
15971	PVC - 18"	0	0	2	1	0	0	1
15973	PVC - 18"	0	0	2	1	0	0	1
16303	PVC - 24"	0	0	2	1	0	0	1
16534	PVC - 12"	0	0	2	1	0	0	1
16536	PVC - 15"	0	0	2	1	0	0	1
16538	PVC - 15"	0	0	2	1	0	0	1
16540	PVC - 15"	0	0	2	1	0	0	1
16542	PVC - 15"	0	0	2	1	0	0	1
17354	DIP - 14"	0	0	3	0	0	0	1
17361	PVC - 24"	0	0	2	1	0	0	1
21359	PVC - 10"	0	0	2	1	0	0	1
23000	UNK - 6"	0	0	1	0	2	0	1
23001	UNK - 6"	0	0	1	0	2	0	1
23002	UNK - 6"	0	0	1	0	2	0	1
23008	UNK - 8"	0	0	1	0	2	0	1
23009	UNK - 8"	0	0	1	0	2	0	1
23006	PVC - 24"	0	0	2	1	0	0	1
23010	UNK - 8"	0	0	1	0	2	0	1
23011	UNK - 8"	0	0	1	0	2	0	1
23419	PVC - 30"	0	0	2	1	0	0	1
23861	UNK - 8"	0	0	1	0	2	0	1
23863	UNK - 8"	0	0	1	0	2	0	1
23865	UNK - 8"	0	0	1	0	2	0	1
23871	UNK - 6"	0	0	1	0	2	0	1
23873	UNK - 6"	0	0	1	0	2	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
24506	UNK - 8"	0	0	1	0	2	0	1
27218	PVC - 10"	0	0	2	1	0	0	1
27223	PVC - 10"	0	0	2	1	0	0	1
27224	PVC - 10"	0	0	2	1	0	0	1
27225	PVC - 10"	0	0	2	1	0	0	1
27228	PVC - 15"	0	0	2	1	0	0	1
27582	PVC - 12"	0	0	2	1	0	0	1
27583	PVC - 12"	0	0	2	1	0	0	1
27584	PVC - 12"	0	0	2	1	0	0	1
27585	PVC - 12"	0	0	2	1	0	0	1
27586	PVC - 12"	0	0	2	1	0	0	1
27587	PVC - 12"	0	0	2	1	0	0	1
27588	PVC - 12"	0	0	2	1	0	0	1
25992	UNK - 6"	0	0	1	0	2	0	1
26187	DIP - 30"	0	0	3	0	0	0	1
26505	UNK - 0"	0	0	1	1	1	0	1
90368	UNK - 6"	0	0	1	0	2	0	1
90369	UNK - 6"	0	0	1	0	2	0	1
90370	UNK - 6"	0	0	1	0	2	0	1
90371	UNK - 6"	0	0	1	0	2	0	1
90022	PVC - 18"	0	0	2	1	0	0	1
90023	PVC - 18"	0	0	2	1	0	0	1
90024	PVC - 18"	0	0	2	1	0	0	1
90025	PVC - 18"	0	0	2	1	0	0	1
90026	PVC - 18"	0	0	2	1	0	0	1
90355	PVC - 12"	0	0	2	1	0	0	1
3430468	UNK - 6"	0	0	1	0	2	0	1
8160441	UNK - 6"	0	0	1	0	2	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
24531	UNK - 14"	0	0	1	1	0	0	1
11559	PVC - 18"	0	0	2	0	0	0	1
11561	PVC - 18"	0	0	2	0	0	0	1
11563	PVC - 18"	0	0	2	0	0	0	1
12475	PVC - 10"	0	0	2	0	0	0	1
12477	PVC - 10"	0	0	2	0	0	0	1
12479	PVC - 10"	0	0	2	0	0	0	1
13257	PVC - 12"	0	0	2	0	0	0	1
13259	PVC - 12"	0	0	2	0	0	0	1
13261	PVC - 12"	0	0	2	0	0	0	1
13269	PVC - 12"	0	0	2	0	0	0	1
13271	PVC - 12"	0	0	2	0	0	0	1
13273	PVC - 12"	0	0	2	0	0	0	1
13276	PVC - 12"	0	0	2	0	0	0	1
13278	PVC - 12"	0	0	2	0	0	0	1
13280	PVC - 12"	0	0	2	0	0	0	1
13281	PVC - 12"	0	0	2	0	0	0	1
13283	PVC - 12"	0	0	2	0	0	0	1
13285	PVC - 12"	0	0	2	0	0	0	1
13287	PVC - 12"	0	0	2	0	0	0	1
13289	PVC - 12"	0	0	2	0	0	0	1
13291	PVC - 12"	0	0	2	0	0	0	1
13293	PVC - 12"	0	0	2	0	0	0	1
13295	PVC - 12"	0	0	2	0	0	0	1
13297	PVC - 12"	0	0	2	0	0	0	1
13992	PVC - 30"	0	0	2	0	0	0	1
13995	PVC - 21"	0	0	2	0	0	0	1
14123	UNK - 36"	0	0	1	1	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
14131	PVC - 21"	0	0	2	0	0	0	1
14276	PVC - 10"	0	0	2	0	0	0	1
14789	PVC - 12"	0	0	2	0	0	0	1
14790	PVC - 12"	0	0	2	0	0	0	1
15836	PVC - 21"	0	0	2	0	0	0	1
15911	PVC - 12"	0	0	2	0	0	0	1
15917	PVC - 12"	0	0	2	0	0	0	1
15919	PVC - 12"	0	0	2	0	0	0	1
15921	PVC - 12"	0	0	2	0	0	0	1
15923	PVC - 12"	0	0	2	0	0	0	1
15925	PVC - 12"	0	0	2	0	0	0	1
15927	PVC - 12"	0	0	2	0	0	0	1
15929	PVC - 12"	0	0	2	0	0	0	1
15939	PVC - 12"	0	0	2	0	0	0	1
15941	PVC - 12"	0	0	2	0	0	0	1
15943	PVC - 12"	0	0	2	0	0	0	1
15945	PVC - 12"	0	0	2	0	0	0	1
15947	PVC - 12"	0	0	2	0	0	0	1
15949	PVC - 12"	0	0	2	0	0	0	1
15951	PVC - 12"	0	0	2	0	0	0	1
15953	PVC - 12"	0	0	2	0	0	0	1
15959	PVC - 12"	0	0	2	0	0	0	1
15965	PVC - 12"	0	0	2	0	0	0	1
15975	PVC - 18"	0	0	2	0	0	0	1
15977	PVC - 18"	0	0	2	0	0	0	1
15979	PVC - 18"	0	0	2	0	0	0	1
15981	PVC - 18"	0	0	2	0	0	0	1
15984	PVC - 21"	0	0	2	0	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
16299	PVC - 15"	0	0	2	0	0	0	1
16301	PVC - 24"	0	0	2	0	0	0	1
16524	PVC - 10"	0	0	2	0	0	0	1
16532	PVC - 12"	0	0	2	0	0	0	1
16548	UNK - 24"	0	0	1	1	0	0	1
20163	UNK - 12"	0	0	1	1	0	0	1
20165	UNK - 12"	0	0	1	1	0	0	1
20168	UNK - 12"	0	0	1	1	0	0	1
20171	UNK - 12"	0	0	1	1	0	0	1
23390	UNK - 0"	0	0	1	0	1	0	1
23759	PVC - 12"	0	0	2	0	0	0	1
23841	PVC - 10"	0	0	2	0	0	0	1
23842	PVC - 15"	0	0	2	0	0	0	1
23845	PVC - 10"	0	0	2	0	0	0	1
23857	UNK - 0"	0	0	1	0	1	0	1
23859	UNK - 0"	0	0	1	0	1	0	1
24510	UNK - 18"	0	0	1	1	0	0	1
27211	PVC - 10"	0	0	2	0	0	0	1
27212	PVC - 10"	0	0	2	0	0	0	1
27213	PVC - 10"	0	0	2	0	0	0	1
27214	PVC - 10"	0	0	2	0	0	0	1
27215	PVC - 10"	0	0	2	0	0	0	1
27216	PVC - 10"	0	0	2	0	0	0	1
27217	PVC - 10"	0	0	2	0	0	0	1
27219	PVC - 10"	0	0	2	0	0	0	1
27226	PVC - 12"	0	0	2	0	0	0	1
27227	PVC - 12"	0	0	2	0	0	0	1
27344	PVC - 10"	0	0	2	0	0	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
28464	UNK - 0"	0	0	1	0	1	0	1
28557	UNK - 0"	0	0	1	0	1	0	1
28559	UNK - 0"	0	0	1	0	1	0	1
28561	UNK - 0"	0	0	1	0	1	0	1
29449	UNK - 0"	0	0	1	0	1	0	1
30793	UNK - 0"	0	0	1	0	1	0	1
90358	PVC - 18"	0	0	2	0	0	0	1
90010	PVC - 15"	0	0	2	0	0	0	1
31529	UNK - 0"	0	0	1	0	1	0	1
31700	PVC - 12"	0	0	2	0	0	0	1
90012	PVC - 18"	0	0	2	0	0	0	1
90013	PVC - 18"	0	0	2	0	0	0	1
90014	PVC - 18"	0	0	2	0	0	0	1
90015	PVC - 18"	0	0	2	0	0	0	1
90016	PVC - 18"	0	0	2	0	0	0	1
90017	PVC - 18"	0	0	2	0	0	0	1
90018	PVC - 18"	0	0	2	0	0	0	1
90020	PVC - 18"	0	0	2	0	0	0	1
90021	PVC - 15"	0	0	2	0	0	0	1
90356	PVC - 12"	0	0	2	0	0	0	1
4250462	PVC - 12"	0	0	2	0	0	0	1
5930556	PVC - 12"	0	0	2	0	0	0	1
8250686	PVC - 12"	0	0	2	0	0	0	1
10610818	PVC - 12"	0	0	2	0	0	0	1
3730411	PVC - 15"	0	0	2	0	0	0	1
3830393	PVC - 15"	0	0	2	0	0	0	1
11760882	PVC - 12"	0	0	2	0	0	0	1
19	UNK - 0"	0	0	1	0	1	0	1

Asset ID	Type - Diameter	Points Assigned for Factors						Prioritization 1 - 10 Normalized by Basin
		Inside the Buffer	Inside the Buffer Concrete	Pipe Type	Depth of Bury	Diameter	Date of Install	
24518	UNK - 12"	0	0	1	0	0	0	0
15783	UNK - 24"	0	0	1	0	0	0	0