HUMBOLDT BAY MUNICIPAL WATER DISTRICT

To: Board of Directors

From: Paul Helliker

Date: February 9, 2017

Subject: Capital Improvement Plan

At the January Board meeting, staff presented the project spreadsheet for the Capital Improvement Plan (CIP) 2017 update. The Board requested that it be reviewed in more detail at the February meeting. The attached spreadsheet has been revised since the version presented in January, to shift some projects from 2017-18 into 2018-19 and 2019-20, to reduce the costs in 2017-18. These shifts will help HCSD, Eureka and Manila CSD reduce their rate increases in that year. Each of these municipal customers is in the process of developing and adopting a five-year rate package.

Also included with the spreadsheet are the project worksheets for projects projected to occur during the first five years (2017-2022), as well as the list of engineering studies that have been conducted. The financial plan is still in development, as well as the update to the main body of the plan (which requires information from the financial plan). These chapters will be presented to the Board as soon as they are ready.

The CIP spreadsheets, project worksheets and list of engineering studies are included in a separate attachment.

Project Worksheets

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Diversion and Pumping – Ranney Collector 1	**FINAL PRIORITY RANKING:** 3
PROJECT: Collection Laterals Replacement	

DESCRIPTION:
The Ranney collectors consist of concrete caissons installed to a depth of approximate 60-feet below the ground surface, with laterals projecting out horizontally from the bottom of the caisson. The laterals collect the water and direct it to the central caisson for distribution. New laterals will be required to replace the aging existing laterals. Costs assume 3 new laterals of approximately 500 feet total length.

JUSTIFICATION:
Collector Wells International's 2006 report indicates all laterals are either plugged, capped or have the valves closed or nearly closed. According to the Winzler & Kelly's 2006 Pump Station 2 Evaluation Final Report, installation of new laterals (in existing collectors) will provide for added operational life to the system and may also allow for an increase in production if system demands increase in the future. Based on Winzler & Kelly's 2008 Ranney Collector Final Evaluation Report, reopening Pump Station 1 laterals could potentially provide additional summer time capacity provided the valves and laterals can be reopened. Installation of new laterals has been found to be more cost beneficial than lateral rehabilitation due to the minimal benefits realized by rehabilitating existing laterals in Pump Station 2 (approximately 13% improvement in specific capacity with reduced drawdown of approximately 1.8').

FOCUSED ENGINEERING STUDIES:

- 2002 – Video Inspection and Pump Test of Pump Station 2, Reynolds, Inc.
- 2003 – Ranney Collector Rehabilitation Feasibility Report, Winzler & Kelly
- 2005 – Pump Station 2 Cleaning and Rehabilitation, Maintenance Report, Collector Well Pumping Station No. 2, Collector Wells International, Inc.
- 2006 – Humboldt Bay Municipal Water District Groundwater Study, Winzler & Kelly
- 2006 - Pump Station 2 Evaluation Final Report, Winzler & Kelly
- 2006 – Inspection Report Collector Wells 1, 1A, 3, 4, Collector Wells International, Inc.
- 2008 – Ranney Collector Final Evaluation Report, Winzler & Kelly

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2015 Dollars		Cost	FY
1.	Design	$ 184,950	
2.	Construction	$ 1,230,864	
3.	Inspection	$ 98,640	
4.	Contingency	$ 151,257	
5.	O&M	$	
	Total	$ 1,665,711	2015

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Diversion and Pumping – Ranney Collector 1

FINAL PRIORITY RANKING: 2.7

PROJECT: Pump 1-1, Worthington 350 hp, Pump Replacement

DESCRIPTION: Replace Pump 1-1 with new 400 hp pump. Current Pump 1-1 is a: Worthington 350 hp Model 24M440 E-2 SN 6863; Motor G.E. SN: FBJ608010

JUSTIFICATION:
Based on Flowserve's 2007 Energy Efficiency Study, the pump is running about 8% below the pump performance curve. More recent efficiency tests conducted by the District estimate 71% efficiency (pump wire to water efficiency). Replacing the pump should lead to increased productivity, longevity, and improved energy efficiency. The motor was cleaned and dipped in 2006, and the motors and pumps are on a 12-15 year replacement/upgrade cycle. This motor and pump are overdue. The District deferred the next replacement/upgrade given loss of the pulp mills, and given that the Collector 1 lateral replacement project was slated for the first five years of the CIP planning horizon at the time, and it was decided that this pump and motor would be replaced in conjunction with the lateral replacement project, after the new operational conditions of Collector 1&1A were assessed. It is likely that this 350hp pump will be replaced with a 400hp pump is to have the pump setup at Collector 1 be the same as that of Collector 3. The 350hp pumps had been running at the top of their curves (causing a decrease in efficiency), and the newer 400 hp pump in Collector 3 has been running great and efficiently.

FOCUSED ENGINEERING STUDIES:

- 2006 – Pump Station 2 Evaluation Final Report, Winzler & Kelly
- 2007 – Flowserve's Energy Efficiency Study and Report
- District's ongoing energy efficiency testing program

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:
Current motor and pump were rebuilt in 1967. This pump should be addressed in conjunction with the lateral replacement project at this Collector.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$206,620**	2017/18

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Diversion and Pumping – Ranney Collector 1	**FINAL PRIORITY RANKING:** 3
PROJECT: Pump 1-2, Worthington 350 hp, Pump Replacement	

DESCRIPTION:
Replace Pump 1-2.
Worthington 350 hp Model 24M440 E-2 SN:, Motor G.E. SN: RWJ420007

JUSTIFICATION:
Based on Flowserve's 2007 Energy Efficiency Study, the pump is running about 7% below the pump performance curve. More recent efficiency tests conducted by the District estimate 71% efficiency (pump wire to water efficiency). Replacing the pump should lead to increased productivity, longevity and improved energy efficiency.

HBMWD motors and pumps are on a 12-15 year replacement/upgrade cycle and this motor and pump are overdue having been rebuilt 44 years ago (1967).

The District deferred the next replacement/upgrade given loss of the pulp mill, and given that the Collector 1 lateral replacement project is slated for the first five years of the CIP planning horizon. The District recommends replacing this pump and motor in conjunction the lateral replacement project.

FOCUSED ENGINEERING STUDIES:

- 2006 - Pump Station 2 Evaluation Final Report, Winzler & Kelly
- 2007 – Flowserve's Energy Efficiency Study and Report
- District's ongoing energy efficiency testing program

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:
Current motor and pump were rebuilt in 1967. This pump should be addressed in conjunction with the lateral replacement project at this Collector.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2015 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 135,630	2015

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Diversion and Pumping – Ranney Collector 1

FINAL PRIORITY RANKING: 3

PROJECT: Pump 1-4, Byron Jackson 200 hp, Pump Replacement

DESCRIPTION:
Replace Pump 1-4
Byron Jackson 200 hp pump, Model 20KKH, SN: 390652, Motor G.E. SN: 1285068002

JUSTIFICATION:
Based on Flowserve's 2007 Energy Efficiency Study, the pump is running about 8% below the pump performance curve. More recent efficiency tests conducted by the District estimate 63% efficiency (pump wire to water). Replacing the pump should lead to increased productivity, longevity and improved energy efficiency.

HBMWD motors and pumps are on a 12-15 year replacement/upgrade cycle and this motor and pump are overdue having been rebuilt 25 years ago (1986).

The District deferred the next replacement/upgrade given loss of the pulp mill, and given that the Collector 1 lateral replacement project is slated for the first five years of the CIP planning horizon. The District recommends replacing this pump and motor in conjunction the lateral replacement project.

FOCUSED ENGINEERING STUDIES:

- 2006 - Pump Station 2 Evaluation Final Report, Winzler & Kelly
- 2007 – Flowserve's Energy Efficiency Study and Report
- District's ongoing energy efficiency testing program

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:
Current motor and pump rebuilt in August 1986. This pump should be addressed in conjunction with the lateral replacement project at this Collector.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2015 Dollars		Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 123,300	2015

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Diversion and Pumping – Ranney Collector 3

FINAL PRIORITY RANKING: 3.3

PROJECT: Collection Laterals Replacement

DESCRIPTION:
The Ranney collectors consist of concrete caissons installed to a depth of approximate 60-feet below the ground surface, with laterals projecting out horizontally from the bottom of the caisson. The laterals collect the water and direct it to the central caisson for distribution. Three or four new laterals will be installed to replace the existing laterals.

JUSTIFICATION:
Based on Winzler & Kelly's 2008 Ranney Collector Final Evaluation Report, Pump Station 3 has a potential yield of 10 MGD at a drawdown of 30 feet based on installation of 200 feet of additional lateral length. Collector Wells International's 2006 report indicates bacteria and mineral deposits found on all existing lateral screens. According to the Winzler & Kelly's 2006 Pump Station 2 Evaluation Final Report, installation of new laterals (in existing collectors) will provide for added operational life to the system and may also allow for an increase in production if system demands increase in the future. Installation of new laterals has been found to be more cost beneficial than lateral rehabilitation due to the minimal benefits realized by rehabilitating existing laterals in Pump Station 2.

FOCUSED ENGINEERING STUDIES:

- 2002 – Video Inspection and Pump Test of Pump Station 2, Reynolds, Inc.
- 2003 – Ranney Collector Rehabilitation Feasibility Report, Winzler & Kelly
- 2005 – Pump Station 2 Cleaning and Rehabilitation, Maintenance Report, Collector Well Pumping Station No. 2, Collector Wells International, Inc.
- 2006 – Humboldt Bay Municipal Water District Groundwater Study, Winzler & Kelly
- 2006 – Pump Station 2 Evaluation Final Report, Winzler & Kelly
- 2006 – Inspection Report Collector Wells 1, 1A, 3, 4, Collector Wells International, Inc.
- 2008 – Ranney Collector Final Evaluation Report, Winzler & Kelly
- 2009 – Categorical Exemption Filed
- 2009 – Plans and Specifications completed

IDENTIFIED FUNDING SOURCE:
District Reserve Account (DWFP) and Loan

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2012 Dollars	Cost	FY
1.	Design	$ 184,950	
2.	Construction	$ 1,230,968	
3.	Inspection	$ 98,704	
4.	Contingency	$ 151,257	
5.	O&M	$	
	Total	**$** 1,665,879	2012

PROJECT WORKSHEET

ASSET CATEGORY: Regional/Domestic System – Diversion and Pumping	**FINAL PRIORITY RANKING:** 3.0
PROJECT: Surge Tank for Collectors 1, 2 and 4	

DESCRIPTION:
Collectors/Pump Stations 1, 2 and 4 each have a Surge Tank located on the top of the Collector, which provides surge protection to the pipeline and appurtenances and prevents excessive cycling of the pumps. This project would consist of general repairs, painting and maintenance of these tanks.

JUSTIFICATION:
General maintenance is required to ensure the continued operation and extend the lifetime of the surge tanks.

FOCUSED ENGINEERING STUDY CONCLUSIONS
None performed to date or likely required.

IDENTIFIED FUNDING SOURCE

General Fund

COMMENTS

It is unclear when the last round of sensor probe replacement and comprehensive maintenance was performed on the surge tanks, and although no problems have been identified, it is recommended that this project not be delayed much past it's scheduled completion.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$23,000**	2020/21

PROJECT WORKSHEET

ASSET CATEGORY: Regional/Domestic System – Diversion and Pumping	**FINAL PRIORITY RANKING:** 1.7
PROJECT: Ranney Collector 5 – Hardening Collector to prevent vandalism	

DESCRIPTION:
Collector 5 was taken out of service years ago as it was not a good producer and had turbidity issues. The pumps were removed and the electrical service disconnected. The ladder up to the collector was cut short and access is locked and the door into the collector is also locked; however, there have been instances where the locks have been cut, and it is obvious people have gotten into the electrical and valve deck in the collector. This project would remove the ladder to the collector completely and would weld the doors shut or further strengthen the doors to prevent the public from accessing the collector.

JUSTIFICATION:
If someone were to get into the collector they could potential introduce pollution into the collector that could impact the river or the aquifer, and if someone were to actually fall into the collector, they potentially could not get out, and would likely not be found for days/weeks/months.

FOCUSED ENGINEERING STUDY CONCLUSIONS
None performed to date, although an engineering study should be performed to determine whether Collector 5 should be dismantled in its entirety.

IDENTIFIED FUNDING SOURCE

General Fund

COMMENTS
Although the District has implemented reasonable measures to prevent public access to the collector, it is recommend that further measures be implemented to make it as impossible as reasonable feasible for the public to get access to the collector. Unauthorized access to the collector is a public health and safety concern.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$22,000**	2018/19

PROJECT WORKSHEET

ASSET CATEGORY: Regional/Domestic System – Water Treatment	**FINAL PRIORITY RANKING:** 2.0
PROJECT: Install Chlorine System Scrubber	

DESCRIPTION:
Chlorine gas is used to disinfect the potable water coming from the collectors. Chlorine gas is injected into the domestic pipeline near the Essex facility and allowed to contact the water as it is pumped up the hill to the TRF site, where the residual chlorine level is adjusted again (using sodium hypochlorite) prior to its final distribution to the District's customers. The District has a Risk Management Plan in place for release of chlorine gas at the Essex Facility, and there are emergency valve shut offs and alarms, etc. to help contain and notify employees and the public in the event of a release. The current measures comply with all necessary State and Federal Risk Management measures. However, the installation of a chlorine system scrubber is another level of safety that could be added to the system. This would consist of a passive system that, in the event of a release of chlorine gas in the Chlorine Building at Essex, would direct the ventilation from the building through a large tank of carbon fiber that would absorb the chlorine and prevent its release to the atmosphere.

JUSTIFICATION:
This is a public and employee health and safety issue. The addition of a chlorine scrubber system is probably the most cost effective additional protective measure that can be added to the Chlorine system to control an accidental release, short of switching to the use of Sodium Hypochlorite for disinfection. The switching to Sodium Hypochlorite instead of chlorine gas was assessed in a 2004 Report from Kennedy Jenks. The Report found Sodium Hypochlorite would generally result in higher operation and maintenance costs as compared to chlorine gas. The advantage of sodium hypochlorite however is that it is safer to handle and store.

FOCUSED ENGINEERING STUDY CONCLUSIONS

- March 29, 2004 report on switching to Sodium Hypochlorite by Kennedy Jenks.

IDENTIFIED FUNDING SOURCE

General Fund although possibly Hazard Mitigation or Homeland Security grants.

COMMENTS

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$320,000**	2017/18

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Water Treatment – "CT" Tank	**FINAL PRIORITY RANKING:** 3
PROJECT: Repaint 2-MG Contact Tank	
DESCRIPTION: Prepare and re-paint facility chlorine Contact Tank, also known as the "CT" tank.	
JUSTIFICATION: Painting of contact tank is on a 15-year cycle that concludes in 2013. Painting creates a barrier to reduce the potential of water/chlorine induced deterioration of the concrete tank shell as well as corrosion of the reinforcing steel.	
FOCUSED ENGINEERING STUDIES: None performed to date on condition or lifecycle analysis of tank. Painting should continue on 15-year life cycle. An engineering study should be performed on 40-50 cycle unless change in condition warrants looking at it earlier.	
IDENTIFIED FUNDING SOURCE: General Fund/Loans	
COMMENTS: Contact tank put in service in May/June 1997.	

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2013 Dollars		Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 170,086	2013

PROJECT WORKSHEET

ASSET CATEGORY: Regional/Domestic System – Water Treatment

FINAL PRIORITY RANKING: 3.0

PROJECT: CT Tank Fabric Baffles

DESCRIPTION:
The 2-MG Contact Tank or "CT" tank located at the TRF site has fabric baffles located inside of the tank to increase the flow path and "contact time" for the sodium hypochlorite disinfectant that is injected into the domestic water system just prior to this tank. This helps to ensure that water contacts the chlorine for sufficient time to facilitate disinfection. One of the baffles was replaced due to wear in 2010 at the cost of $16,300. It is estimated that all 5 baffles will need to be replaced by approximately 2018.

JUSTIFICATION:
This is a public health issue. The baffles in the tanks help to ensure there is sufficient contact time to ensure proper disinfection. The failure of one or perhaps more of the baffles would likely not jeopardize public safety, but failure of them all would likely increase the chance of insufficient contact time.

FOCUSED ENGINEERING STUDY CONCLUSIONS
No Focused Engineering Studies have been performed to date on the life cycle of the baffles. The draining of the tanks to inspect the condition of the baffles is a fairly large undertaking, and it is recommended that the planned replacement precede for the 2019/20 Fiscal Year, and if it needs to be delayed, a effort be undertaken to firmly fix the current condition prior to any delays.

IDENTIFIED FUNDING SOURCE

General Fund

COMMENTS
Contact Tank put into service in May/June 1997.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$95,000**	2019/20

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Water Treatment – Blowers	**FINAL PRIORITY RANKING:** 3
PROJECT: Centrifugal Blowers 75 hp, Blower Replacement	

DESCRIPTION:
Two 75 hp centrifugal air-wash blowers. Multi-stage with soft start, intake and exhaust silencers, and surge control

JUSTIFICATION:
Rebuild air-wash blowers to air-wash media during the back wash cycle. Blowers should be re-built or replaced every 10 years to reduce the potential for breakdowns that would prevent air-washing of the media during the back wash cycle. 2013 will be end of 10-year cycle.

FOCUSED ENGINEERING STUDIES:
None performed to date. Engineering study likely not required provided 10-year rebuilt/replacement cycle is adhered to.

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2013 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 79,373	2013

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Water Treatment – Cationic Feed System	**FINAL PRIORITY RANKING:** 3.3
PROJECT: Pumps, Valves, Pipes, and Controls Maintenance	

DESCRIPTION:
Rebuild or replace pumps and valves, inspect and clean pipes and test controls.

JUSTIFICATION:
End of 10-year life cycle. Adherence to the maintenance schedule (10-year life cycle) reduces the potential for unanticipated breakdowns of the cationic feed system.

FOCUSED ENGINEERING STUDIES:
None performed to date. Engineering study likely not required provided 10-year rebuilt/replacement cycle is adhered to.

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2013 Dollars		Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 105,347	2013

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Water Treatment – Non-Ionic Polymer Feed System	**FINAL PRIORITY RANKING:** 3.3
PROJECT: Filter Aid System Maintenance and Replacement	

DESCRIPTION:
Repair/replace Filter Aid system components: 65-gallon tote polymer feed system, including scales, mixer, drum pump, feeders, and controls.

JUSTIFICATION:
End of 10-year life cycle. Adherence to the maintenance schedule (10-year life cycle) reduces the potential for unanticipated breakdowns of the filter aid system.

FOCUSED ENGINEERING STUDIES:
None performed to date. Engineering study likely not required provided 10-year rebuilt/replacement cycle is adhered to.

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2013 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 105,347	2013

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Water Treatment – Non-Ionic Polymer Feed System	**FINAL PRIORITY RANKING:** 3.3
PROJECT: Conditioning Feed System Repair and Replacement	

DESCRIPTION:
Repair/replace polymer feed system components including 400-gallon tote conditioning system, platform scale, metering pumps, and controls.

JUSTIFICATION:
End of 10-year life cycle. Adherence to the maintenance schedule (10-year life cycle) reduces the potential for unanticipated breakdowns of the conditioning feed system.

FOCUSED ENGINEERING STUDIES:
None performed to date. Engineering study likely not required provided 10-year rebuilt/replacement cycle is adhered to.

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2013 Dollars		Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 105,347	2013

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Water Treatment	**FINAL PRIORITY RANKING:** 3.3
PROJECT: Plant Water System Maintenance and Repair	

DESCRIPTION:
Rebuild/replace Plant Water System pumps and valves.

JUSTIFICATION
End of 10-year life cycle. Adherence to the maintenance schedule (10-year life cycle) reduces the potential for unanticipated breakdowns of the plant water system. Plant water system provides water for other treatment processes and is an integral component to facility operation.

FOCUSED ENGINEERING STUDIES:
None performed to date. Engineering study likely not required provided 10-year rebuilt/replacement cycle is adhered to.

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:
Repair/replacement of Plant Water System pumps and valves are on a 10-year life cycle.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2013 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 105,347	2013

PROJECT WORKSHEET

ASSET CATEGORY: Regional/Domestic System – Water Treatment	**FINAL PRIORITY RANKING:** 2.7
PROJECT: TRF Valve network upgrade	

DESCRIPTION:
The valves and their controllers for the automated operation of the Turbidity Reduction Facility were installed in 2002/03, and the equipment has approximately a +/-10 year life. Some of them have begun to fail and have being replaced. A systemic replacement of all of the valves and operators should be undertaken.

JUSTIFICATION:
The valves and their controllers for the TRF should be replaced on a 10-year life cycle to reduce the potential for breakdowns that would prevent the operation of the TRF. 2013 is the end of a ten year cycle and the current scheduled replacement is 2020/21 through 2023/24 or a 20-year cycle. Serious consideration should be given prior to extending replacement out past this planned replacement schedule.

FOCUSED ENGINEERING STUDY CONCLUSIONS
None performed to date. Engineering Study likely not required if the replacement schedule is adhered too.

IDENTIFIED FUNDING SOURCE

General Fund

COMMENTS

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$95,000**	2019/20

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Water Storage and Transmission – Korblex Domestic Reservoir

FINAL PRIORITY RANKING: 4.0

PROJECT: Replace roof and paint entire reservoir

DESCRIPTION:
Replace the roof on the 1-MG domestic reservoir and paint the interior and exterior of the tank.

JUSTIFICATION:
A 2015 inspection of the existing 1-MG domestic reservoir indicated that there was severe corrosion of the beams, center column, and roof vents for the tank. The extent of the corrosion is such that, to ensure the continued life of the overall tank, the entire roof needs to be replaced. Since there will be painters there to paint the new roof, it is an ideal time to get the rest of the tank sandblasted and re-painted as well.

FOCUSED ENGINEERING STUDIES:

- 2015 – One Million Gallon Reservoir Structural Inspection, GHD

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:
As of the time of preparation of this worksheet, the project has been bid, with the low bid being in the amount of $460,837.50. The project has not been awarded to the Contractor yet. Design and Construction Management costs were lumped together in one contract with GHD for an amount of $102,000. The District had $500,000 budgeted for the construction of the project.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2017 Dollars	Cost	FY
1.	Design	$102,000	2016
2.	Construction	$500,000	2016
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$602,000**	2016

PROJECT WORKSHEET

ASSET CATEGORY: Regional/Domestic System – Water Storage and Transmission	**FINAL PRIORITY RANKING:** 3.3
PROJECT: Install New Valve below 1MG Reservoir at Korblex	

DESCRIPTION:
The installation of a 30-inch butterfly valve in the domestic water line to South (which feeds Eureka, Arcata, Manila & HCSD) downstream of where the line that feed the customers to the North (McKinleyville, Blue Lake, Fieldbrook) comes off, would allow the line to the South to be isolated, but still allow us to feed water to the customers to the North.

JUSTIFICATION:
The installation of this valve would allow for added flexibility in the operation of the system and potentially allow the District to continue to serve many of their customers if the mainline feeding Eureka/Arcata/Manila/HCSD needs to be shut down for any reason.

FOCUSED ENGINEERING STUDY CONCLUSIONS
None performed to date and likely not required.

IDENTIFIED FUNDING SOURCE

General Fund or possibly Hazard Mitigation Funds

COMMENTS

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$30,000**	2016/17

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Water Storage, Transmission, and Distribution – Transmission Pipelines	**FINAL PRIORITY RANKING:** 3.3
PROJECT: Replace Pipeline on NCRA Trestle over Mad River (Blue Lake-FG-CSD River Crossing	

DESCRIPTION:
In 2009 the north end pipe supports on existing trestle were repaired. The Mad River pipeline is proposed to be relocated from the existing Blue Lake Trestle to a new aerial crossing over the Mad River.

JUSTIFICATION:
Proposed crossing will help maintain the water supply to the City of Blue Lake and the Fieldbrook-Glendale Community Service District. 2006 – Emergency Pipeline Crossing Report recommended relocating pipeline or providing adequate pipeline support before failure occurs. Failure of this section of pipeline would potentially interrupt service. The 2016 Feasibility Study determined that a new directionally drilled crossing under the river would be the most cost effective solution.

FOCUSED ENGINEERING STUDIES:

- 2006 – Emergency Pipeline Crossing Report
- 2008 – Structural Inspection of NCRA Railroad bridge across Mad River
- 2009 – Feasibility Study of Alternatives to construct secondary pipelines across Mad River
- 2015 – Preliminary Geotechnical Report, Crawford & Associates
- 2016 – Trenchless Feasibility Report, Bennett Trenchless Engineers
- 2016 – Feasibility Study, Construction of Secondary Pipeline Across Mad River, GHD

IDENTIFIED FUNDING SOURCE:
FEMA Grant/NCIRWMP Grant

COMMENTS:
Estimated cost is based on replacement with aerial crossing (Blue Lake -FG-CSD River Crossing Replacement).

- 2010 NCIRWMP Prop 84 Grant was recommended for funding in the amount of $700,000
- 2011 FEMA Pre-Disaster Mitigation Grant was determined to be eligible, cost effective and feasible by Cal EMA and forwarded to FEMA for funding consideration

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2016 Dollars		Cost	FY
1.	Design		
2.	Construction		
3.	Inspection		
4.	Contingency		
5.	O&M		
	Total	$ 3,573,458	17/18 & 18/19

PROJECT WORKSHEET

ASSET CATEGORY: Domestic System Water Storage and Transmission – Transmission System Pipelines and Appurtenances	**FINAL PRIORITY RANKING:** N/A
PROJECT: Pipeline Engineering Study	

DESCRIPTION:
This project will provide a condition assessment of HBMWD's domestic water pipelines. Available information relating to the domestic water pipelines will be collected and reviewed in order to identify appropriate locations and methods for detailed assessment. These condition assessments will then take place to determine the potential for pipeline failure at various locations, including risk of failure due to corrosion. After this is done, a risk assessment will be performed to compare the risk of pipeline failure to the consequence of failure in each zone of assessment. This will allow for the scheduling and prioritization of the pipeline replacement for the District moving forward.

JUSTIFICATION:
A system-wide condition assessment of HBMWD's domestic water pipelines has never been performed to date. It is crucial at this juncture to assess the condition of the District's aging pipelines, especially in high-risk areas, to ensure continued, uninterrupted service to the District's customers. The performance of a risk assessment and development of an asset management program will give the District a go-by for future planning and will support a system-wide pipeline replacement program by determining the areas of greatest need.

FOCUSED ENGINEERING STUDIES:
None performed to date. This will be the first.

IDENTIFIED FUNDING SOURCE:
General Fund and potentially Hazard Mitigation Grant if certain sections could fail due to earthquakes or some other hazard.

COMMENTS:
This Engineering Study will support a system-wide pipeline replacement program by determining the areas of greatest need.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$211,499**	2017/18

PROJECT WORKSHEET

ASSET CATEGORY: Regional Domestic System-Water Storage and Transmission	**FINAL PRIORITY RANKING:** 3.0
PROJECT: Mainline Valve Replacement Program	

DESCRIPTION:
This project would consist of a systematic replacement of the mainline valves in the domestic pipeline network. Most of these valves are the original valves installed in the late 1960's/early 1970's. The District would prioritize valve replacements and systematically replace valves over the next 10+ years.

JUSTIFICATION:
A system-wide condition assessment of HBMWD's domestic water pipelines has never been performed to date. The District routinely operates the valves to ensure that they open and close, and some valves that are failing have been discovered during the maintenance program and have been replaced when there have been concerns that the valve would not open/close when needed. Existing valves have also been inspected when they were exposed for other construction projects, such as the Techite Pipeline Replacement Project, and have been found to be generally in OK condition, but with poor seats and some pitting and corrosion. It is crucial at this juncture to plan for the replacement of these aging valves to ensure continued, uninterrupted service to the District's customers.

FOCUSED ENGINEERING STUDIES:
None performed to date. The District is performing a Pipeline Condition Assessment Focused Engineering Study which should also be applicable to the Mainline Valves.

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:
The total cost estimate is $1.5M spread over ten years starting in FY 16/17 and ending in FY 25/26.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$1,500,000**	2016 to 2026

PROJECT WORKSHEET

ASSET CATEGORY: Regional Domestic System- Water Storage and Transmission	**FINAL PRIORITY RANKING:** 2.7
PROJECT: Samoa Booster Pump Station-Replace 100hp Pump & Motor	

DESCRIPTION:
This project would consist of the replacement of the 100hp pump and motor at the Samoa Booster Pump Station.

JUSTIFICATION:
The current pump and motor were installed in 1996 (Pump-Floway serial number 21620-1-1, Motor-GE serial number L405TP16). Typical lifespan to plan for is 15 to 20 years. Fifteen years was 2011, twenty years is 2016. There have not been excessive issues with the pump or motor as of 2016, and current planned replacement is in FY 20/21, which is a 25-year lifetime. It is crucial at this juncture to plan for the replacement of this pump and motor to ensure continued, uninterrupted service to the District's customers. Careful consideration should be given to delaying the replacement past the planned replacement.

FOCUSED ENGINEERING STUDIES:
None performed to date. One likely is not required if the planned replacement schedule is adhered to. If it is extended out past FY 20/21, an assessment should be made of the pump and motor.

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$78,200**	2020/21

PROJECT WORKSHEET

ASSET CATEGORY: Regional Domestic System, Water Storage and Transmission-Transmission System Cathodic Protection	**FINAL PRIORITY RANKING:** 2.0
PROJECT: Jackson Ranch, 299 and Jane's Creek Anode Beds	

DESCRIPTION:
This project would consist of the replacement of the three sacrificial anode beds/wells located at/named the Jackson's Ranch Anode Bed, the 299 Anode Bed, and the Jane's Creek Anode Bed.

JUSTIFICATION:
The domestic pipelines are project from corrosion by a cathodic protection system. There are three anode beds, consisting of sacrificial anodes made of magnesium or zinc, which sit in a "well" backfilled with gypsum and bentonite and connected to the pipe by a metal rod. The anode then protects the pipe from corrosion by "sacrificing" itself to corrosion instead of the pipeline. The anodes are replaced a regular intervals, but the wells themselves also need to be replaced at regular intervals to ensure they continue to have low resistivity and continue to function.

FOCUSED ENGINEERING STUDIES:
The cathodic protection system is inspected at a regular intervals. The last inspection was performed .

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:
The plan is to replace the Jackson Ranch Anode Bed in FY 2018/19, the 299 Anode Bed in FY 19/20, and the Jane's Creek Anode Bed in FY 20/21.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$138,000/EA**	2018 thru 2021

PROJECT WORKSHEET

ASSET CATEGORY: Regional Domestic System, Support Systems-Electrical Systems & Equipment	**FINAL PRIORITY RANKING:** 2.7
PROJECT: Starters Replacement	

DESCRIPTION:
This project would consist of the replacement of the nine starters for the Domestic System pumps.

JUSTIFICATION:
Most of the various domestic pumps located on the collectors have Allen Bradley/Rockwell SMC-FLEX 150-F880N808 Softstarts on them (two on the 350hp pumps on Coll 1, two on the 350hp pumps on Coll 2, three on the 400, 350 & 250hp pumps on Coll 3, two on the 350hp pumps on Coll 4). These starters protect the pumps and motors from overloads, over/under voltage, excessive starts, etc. and help to ensure that the pumps and motors last their full life expectancy. The last time the starters were replaced was in 2007-09 for a cost of $116,000. They are anticipated to have a lifetime of +/-10years and are scheduled for replacement in 2018/19.

FOCUSED ENGINEERING STUDIES:
None performed to date and likely not required.

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$135,934**	2018/19

PROJECT WORKSHEET

ASSET CATEGORY: Domestic System Support Systems – Electrical Systems and Equipment	**FINAL PRIORITY RANKING:** 3.0
PROJECT: Main switchgear (incoming) – replace existing incoming 12-kV switchgear at Essex	
DESCRIPTION: The existing 12-kV switchgear at Essex will be decommissioned and new switchgear will be installed approximately 80 feet to the southeast of the existing switchgear on the NCRA railroad grade (or another potential location for the new switchgear would be an additional 25 feet to the south, off of NCRA property and back on to HBMWD property).	
JUSTIFICATION: The 2001 Winzler & Kelly Dam Failure Study modeled the floodwave from Matthews Dam if the dam were to fail during a winter flood event. The modeling of the flood wave showed it would inundate the area around the Essex Control Center and the existing switchgear with 7 to 9 feet of water. This would likely short-out the switchgear, which would then render all of the electrical gear at the Control Facility, including all the source water pumps, inoperable. This hazard has been discussed at each of the Federal Energy Regulatory Commission mandated Dam Break exercises conducted by HBMWD every 5 years since the initial Dam Failure Study was completed. A 2015/16 Facilities Plan prepared by GHD looked at means to alleviate the flood risk posed to the main switchgear and recommended that the switchgear be moved to the southeast, to an existing railroad grade (elevation of approximately 70 feet) that is approximately 2-4 feet above the modeled height of the flood wave.	
FOCUSED ENGINEERING STUDIES: • 2001 – Dam Failure Study, Winzler & Kelly • 2009 – Essex High Voltage System Condition Assessment Report, Winzler & Kelly • 2016 – Essex Control Facilities Plan, GHD	
IDENTIFIED FUNDING SOURCE: The District has applied for grant funding through FEMA's Hazard Mitigation Grant Program (HMGP) for this project. The total estimated cost for this project (including design, construction, etc.) is $1,820,000. FEMA requires a 25% match, meaning that the Federal share would be $1,365,000 and the District's match would be $455,000.	
COMMENTS: This project has not yet been approved for grant funding by FEMA; however, discussion with FEMA has indicated that the project will likely be grant funded in the requested amount of $1,365,000. The project will not be officially approved until FEMA finishes going through the environmental review/NEPA process. If the project does not end up getting funded this round, it will be re-submitted under FEMA's HMGP and/or Pre-Disaster Mitigation Program.	

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2017 Dollars	Cost	FY	
1.	Design	$		**$455,000 is the District Match if this project is funded by a Hazard Mitigation Grant**
2.	Construction	$		
3.	Inspection	$		
4.	Contingency	$		
5.	O&M	$		
	Total	**$1,820,000**	2017	

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Support Systems for Regional Water Systems – Electrical Systems and Equipment	**FINAL PRIORITY RANKING:** 3.0
PROJECT: Replace 12kV Transformers on Collectors (Federal Pacific Company and Allis Chalmers)	
DESCRIPTION: 12kV Oil Filled Transformers are used to supply the power to the domestic water collectors. Transformers for Collectors # 1, 2, 3, and 4 were fabricated in 1974. The 2009 Essex High Voltage System Condition Assessment Report indicated the transformers are of rugged design and have copper windings. Condition assessment ratings for the transformers were 11 in the 2009 Report (out of 20 possible). Transformers were fabricated by FPE Company, Allis Chalmers and Federal Pacific Company; these companies are no longer in business.	
JUSTIFICATION: Recommend updating/replacing of aging infrastructure to reduce the potential for breakdowns that would interrupt service and to improve system efficiency. The 2009 Essex High Voltage System Condition Assessment Report recommended development of a replacement schedule for the transformers and provided a preventative maintenance schedule for the transformers and other equipment. An additional Focused Engineering Study may be warranted to evaluate replacement timing.	
FOCUSED ENGINEERING STUDIES • 2009 - Essex High Voltage System Condition Assessment Report	
IDENTIFIED FUNDING SOURCE: General Fund/Loans	
COMMENTS:	

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2014 and 2016 Dollars		Cost	FY	
1.	Design	$		
2.	Construction	$		
3.	Inspection	$		
4.	Contingency	$		
5.	O&M	$		
	Total	$ 123,418* $ 134,203*	2014* 2016*	*Project occurs in FY 2014 and FY 2016 in 2014-2016 Dollars

PROJECT WORKSHEET

ASSET CATEGORY: Domestic System Support Systems – Communications and Control	**FINAL PRIORITY RANKING:** 3.0
PROJECT: Fiber optic link to Collector 2	

DESCRIPTION:
This project consists of engineering, permitting, and construction of an underground 12-kV electrical feed and new fiber optic cable from Essex to Collector 2. The project would also include elements that would accommodate a future project to extend this undergrounded power and communications to Park 4 for future connections to Collectors 3 & 4. The new electrical feed to Collector 2 would likely be fed from a spare breaker in the 12-kV switchgear.

JUSTIFICATION:
The goal of this project would be to eliminate the vulnerability of relying on overhead power transmission lines and would establish a separate breaker feed to Collector 2. A fiber optic link is also proposed as part of the project to further harden communications and control reliability.

FOCUSED ENGINEERING STUDIES:
None to date.

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:
The assumption is made that the District will be doing the construction work themselves. Plans will be prepared by GHD (estimated budget of $24,000) with sufficient detail to allow the District to complete the construction.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$115,000**	

PROJECT WORKSHEET

ASSET CATEGORY: Domestic Support Systems for Regional Water Systems – Communications and Control	**FINAL PRIORITY RANKING:** 4
PROJECT: Essex Control System Upgrade	

DESCRIPTION:
The existing Essex Supervisory Control and Data Acquisition System (SCADA) collects system-wide data and controls various water collection and distribution system processes. Data collected includes flow rates for domestic and industrial use, water levels in collector wells and reservoirs, pressures, temperatures, head losses, turbidity, residual chlorine, valve positions and other hydraulic parameters. The system measures and records Mad River water surface levels. Domestic turn out flow rates for City of Eureka, City of Arcata, Humboldt Community Services District, Blue Lake Community Services District, Fieldbrook Community Services District and McKinleyville Community Services District are collected and recorded by the system. Also measured and recorded by the system is the residual chlorine and pH of the filtered, domestic water. The system controls pumping operations (domestic and industrial) as well as chlorination and pH levels in the domestic water. The system sounds alarms when adverse conditions such as abnormally high head losses across debris racks or traveling water screens, low differential pressures between the lubrication water system and industrial water pump bearings, high or low water levels in the reservoirs, high turbidity, high ph, high or low chlorine residual, chlorine leak, and loss of power or communication is detected. The system was last upgraded in 1987.

JUSTIFICATION:
The existing SCADA system is more than 20 years old and there have been significant hardware and software updates since then. Technical support for the old hardware/software is disappearing. Replacing the existing Essex SCADA with a system that is technologically more up-to-date would maintain and improve the water distribution system's automation and efficiency. Recommendation is to replace the aging control system to reduce the potential for breakdowns that would interrupt service and to improve system efficiency.

FOCUSED ENGINEERING STUDIES:
- 2007 – Energy Efficiency and Demand Response Activities
- 2009 - Essex High Voltage Condition Assessment Report

IDENTIFIED FUNDING SOURCE:
General Fund/Loans

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	$ 281,063	2016

PROJECT WORKSHEET

ASSET CATEGORY: Regional Domestic System, Support Systems-Buildings & Facilities	**FINAL PRIORITY RANKING:** 2.0
PROJECT: Construct Sandblasting Building	

DESCRIPTION:
This project would consist of the construction of an approximately 20-foot by 40-foot building at the Essex Operation Facility for use when equipment needs to be sandblasted prior to painting or other maintenance.

JUSTIFICATION:
The District maintains most of their equipment in-house. In order to fully rehabilitate, repair or repaint equipment, it is often desirable to sandblast it with an abrasive to fully clean off any rust, corrosion, old paint, pitting, etc. The use of sandblasting on larger equipment generally requires a room dedicated to that practice to ensure that there is sufficient ventilation, the abrasive is recollected, no other equipment is damaged, etc. The District currently does not have a building appropriate for this use. District staff would construct the building, thereby reducing the construction cost, and the use of the building would save the District money in the long run by not having to send equipment out to be sandblasted.

FOCUSED ENGINEERING STUDIES:
None performed to date and likely not required.

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$81,560**	2018/19

PROJECT WORKSHEET

ASSET CATEGORY: Regional Domestic System, Support Systems-Buildings & Facilities

FINAL PRIORITY RANKING: 2.7

PROJECT: Build Break Room and Training Center Additions

DESCRIPTION:
This project would consist of the construction of an approximately 960 square foot addition to the Essex Operation Facility to add an additional bathroom, and an expanded breakroom/training facility.

JUSTIFICATION:
In 2006-2007 the District began planning an addition to the existing Essex Control Building. The main reasons for the expansion were to increase the available bathroom facilities (including having separate men's and women's facilities), and to increase the size of the available breakroom to where it could also be used to accommodate staff trainings. Martha Jain Architect developed two proposed conceptual layouts. Concept 1 is a 960sf addition that includes a 440sf breakroom/classroom, a 120sf office space, and two double-stall bathrooms. Concept 2 is a 700sf addition with a 353sf breakroom/classroom and two single-stall bathrooms, plus an additional 160 SF porch. Although Concept 1 will be more expensive to construct, District Staff felt that it satisfied more of the goals of the project than Concept 2. There was hesitation in moving forward with this planned expansion since these additional facilities would also be located within the inundation area if Matthews Dam were to have a catastrophic failure during the winter while the Mad River was at flood stage. Although this is of concern, it is felt that the addition of these "non-critical" facilities in this area results in an acceptable risk. In the event of a dam break there should be sufficient warning to ensure that District personnel are evacuated from the Essex Control Facility with plenty of time to prevent injury.

FOCUSED ENGINEERING STUDIES:

- Martha Jain Architectural studies in 2006/7
- Essex Control Facilities Plan, GHD, Aug. 2016

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$489,362**	2018/19

PROJECT WORKSHEET

ASSET CATEGORY: Hydro-Electric – Hydro-Electric Plant	**FINAL PRIORITY RANKING:** N/A (Hydro projects require economic analysis)
PROJECT: 2000 KVA Oil Filled Transformer Replacement	

DESCRIPTION:
Transformers are used at the hydro-electric plant to increase (step-up) or reduce (step-down) the electrical voltage and current. 2007 Assessment Report projected a useful life of approximately 30-50 years, and recommended potentially rebuilding/replacing in 2013-2033.

JUSTIFICATION:
Economic analysis required. Adherence to the maintenance schedule reduces the potential for a system breakdown that could interrupt service. An additional Focused Engineering Study is recommended to determine whether it is economically justified to replace the transformer in 2014 as is tentatively scheduled.

FOCUSED ENGINEERING STUDIES:

- 2007 – Assessment of the Mechanical and Electrical Components of the Gosselin Hydroelectric Plant, GEI

IDENTIFIED FUNDING SOURCE:
To be determined (requires economic analysis)

COMMENTS:
Need maintenance/repairs schedule and anticipated life cycle.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2014 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 140,707	2014

ASSET CATEGORY: Hydro-Electric – Hydro-Electric Plant	**FINAL PRIORITY RANKING:** N/A (Hydro projects require economic analysis)
PROJECT: 2000 KVA Transformer Replacement	

DESCRIPTION:
Transformers are used at the hydro-electric plant to increase (step-up) or reduce (step-down) the electrical voltage and current.

JUSTIFICATION:
The 2007 GEI Hydoelectric Plant Assessment Report projected a useful life of 30 to 50yrs for the transformers and recommended potentially replacing them in 2013-2033. The District had decided during the first iteration of the CIP that an additional economic study was required to determine whether it is economically justified to replace the components as planned. However, in 2016 the District began assessing the feasibility of a Renewable Energy Market Adjusting Tariff (ReMAT) contract with PG&E to increase revenues from the power generated at Ruth. The Board approved the contract in Aug. 2016 for a contract period of 20 years. The contract requires HBMWD to produce a min annual level of Guaranteed Energy Production (GEP). If HBMWD does not provide this quantity over a 2-yr period, and does not cure the failure within 90 days of the end of the 2-yr period, it will be in "GEP failure" and will be required to pay liquidated damages to PG&E. In Apr 2016, the District hired Mark Trawick of RTA Construction to evaluate the hydro facilities and provide detailed info on the remaining life and potential capital expenses which may be incurred over a 20yr ReMAT contract period. Mr. Trawick's report did not specifically address the life of this transformer, but it stated; "Based on the test reports and latest inspections of the features in the Transformer/Switchyard area this equipment would be expected to remain in service for 5-10 years" (which places it at 2021 to 2026). And also stated "Transformers of this age should be looked at by the manufacturer and evaluated for replacement." Failure of this transformer without replacement during the 20 yr contract period would leave the District in GEP failure. Replacement of the transformer after failure would not be a minor undertaking and would take most of a year at least. Serious consideration and an economic impact analysis should be undertaken if the District chooses not to replace this switchgear as scheduled.

FOCUSED ENGINEERING STUDIES:

- 2007 – Assessment of the Mechanical and Electrical Components of the Gosselin Hydroelectric Plant, GEI
- Ruth lake Hydro Power Generating Facility, Facility Analysis for Operational Life Expectancy and Current Mechanical Condition Opinion after Site Visit on 4-13-16, Mark Trawick, RTA Construction, April 20, 2016

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2016 Dollars		Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 61,217	2019/20

PROJECT WORKSHEET

ASSET CATEGORY: Hydro-Electric Power Plant	**FINAL PRIORITY RANKING:** N/A
PROJECT: 2, 1000kW AC Generators, Brushless	

DESCRIPTION:
This project would consist of the replacement of the 1000kW Generators at the Ruth Hydro Plant used to generate power.

JUSTIFICATION: The 2007 GEI Hydoelectric Plant Assessment Report projected a useful life of 30 to 50yrs for the generator and recommended potentially rebuilding/replacing them in 2013/2033. The District had decided during the first iteration of the CIP that an additional economic study was required to determine whether it is economically justified to replace the generator in 2020/21 as planned. However, in 2016 the District began assessing the feasibility of a Renewable Energy Market Adjusting Tariff (ReMAT) contract with PG&E to increase revenues from the power generated at Ruth. The Board approved the contract in Aug. 2016 for a contract period of 20 years. The contract requires HBMWD to produce a min annual level of Guaranteed Energy Production (GEP). If HBMWD does not provide this quantity over a 2-yr period, and does not cure the failure within 90 days of the end of the 2-yr period, it will be in "GEP failure" and will be required to pay liquidated damages to PG&E. In Apr 2016, the District hired Mark Trawick of RTA Construction to evaluate the hydro facilities and provide detailed info on the remaining life and potential capital expenses which may be incurred over a 20yr ReMAT contract period. Mr. Trawick said the hydro plant is in good condition and should easily meet the requirements of a ReMAT contract over the next 20yrs. That being said, failure of the generators without replacement during the 20 yr contract period would leave the District in GEP failure. Replacement of the generators after failure would not be a minor undertaking and would likely take most of 2 years. Serious consideration and an economic impact analysis should be undertaken if the District chooses not to replace the generators as scheduled.

FOCUSED ENGINEERING STUDIES:

- 2007-Assessment of the Mechanical and Electrical Components of the Gosselin Hydroelectric Plant, GEI
- 2016-Mark Trawick, RTA Construction Report

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2016 Dollars		Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$393,455**	2020/21

ASSET CATEGORY: Hydro-Electric – Hydro-Electric Plant	**FINAL PRIORITY RANKING:** N/A (Hydro projects require economic analysis)

PROJECT: Replace Protective Relays System

DESCRIPTION:
The protective relay system at the Hydroelectric Plant protects and interfaces with PG&E's distribution system.

JUSTIFICATION:
The 2007 GEI Hydoelectric Plant Assessment Report projected a useful life of 20 to 30yrs for the transformers and recommended potentially replacing them in 2003-2033. The District had decided during the first iteration of the CIP that an additional economic study was required to determine whether it is economically justified to replace the components as planned. However, in 2016 the District began assessing the feasibility of a Renewable Energy Market Adjusting Tariff (ReMAT) contract with PG&E to increase revenues from the power generated at Ruth. The Board approved the contract in Aug. 2016 for a contract period of 20 years. The contract requires HBMWD to produce a min annual level of Guaranteed Energy Production (GEP). If HBMWD does not provide this quantity over a 2-yr period, and does not cure the failure within 90 days of the end of the 2-yr period, it will be in "GEP failure" and will be required to pay liquidated damages to PG&E. In Apr 2016, the District hired Mark Trawick of RTA Construction to evaluate the hydro facilities and provide detailed info on the remaining life and potential capital expenses which may be incurred over a 20yr ReMAT contract period. Mr. Trawick's report stated; "The protection relays and other components regarding interface with PG&E are dated and are at their upgraded capacity. These components will not be easily replaced if necessary, and therefore could cause excessive expenses to replace. The condition and test results show all these components to be in satisfactory condition and should have 5-10 years of service life." Failure of this system without replacement during the 20 yr contract period would leave the District in GEP failure. Replacement of the relays after failure would not be a minor undertaking and would take most of the 2 year GEP failure period. Serious consideration and an economic impact analysis should be undertaken if the District chooses not to replace this equipment as scheduled.

FOCUSED ENGINEERING STUDIES:

- 2007 – Assessment of the Mechanical and Electrical Components of the Gosselin Hydroelectric Plant, GEI
- Ruth lake Hydro Power Generating Facility, Facility Analysis for Operational Life Expectancy and Current Mechanical Condition Opinion after Site Visit on 4-13-16, Mark Trawick, RTA Construction, April 20, 2016

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 40,000 $120,000	2017/18 2018/19

FOCUSED ENGINEERING STUDY WORKSHEET

ASSET CATEGORY: Hydro-Electric Power Plant

FINAL PRIORITY RANKING: N/A

PROJECT: Interrupter switchgear Panel

DESCRIPTION:
This project would consist of the replacement of the Interrupter Switchgear Panel at the Ruth Hydro Plant. This is the 600 amp, Westinghouse panel located outside next to the transformer.

JUSTIFICATION: The 2007 GEI Hydoelectric Plant Assessment Report projected a useful life of 15 to 30yrs for the transformers and recommended potentially replacing them in 2013. The District had decided during the first iteration of the CIP that an additional economic study was required to determine whether it is economically justified to replace the components as planned. However, in 2016 the District began assessing the feasibility of a Renewable Energy Market Adjusting Tariff (ReMAT) contract with PG&E to increase revenues from the power generated at Ruth. The Board approved the contract in Aug. 2016 for a contract period of 20 years. The contract requires HBMWD to produce a min annual level of Guaranteed Energy Production (GEP). If HBMWD does not provide this quantity over a 2-yr period, and does not cure the failure within 90 days of the end of the 2-yr period, it will be in "GEP failure" and will be required to pay liquidated damages to PG&E. In Apr 2016, the District hired Mark Trawick of RTA Construction to evaluate the hydro facilities and provide detailed info on the remaining life and potential capital expenses which may be incurred over a 20yr ReMAT contract period. Mr. Trawick's report did not specifically this switchgear, but it stated; "Based on the test reports and latest inspections of the features in the Transformer/Switchyard are this equipment would be expected to remain in service for 5-10 years" (which places it at 2021 to 2026). The report also mentioned the cabinets do not have adequate minimum clearance. Failure of this switchgear without replacement during the 20 yr contract period would leave the District in GEP failure. Replacement of the switchgear after failure would not be a minor undertaking and would take most of a year at least. Serious consideration and an economic impact analysis should be undertaken if the District chooses not to replace this switchgear as scheduled.

FOCUSED ENGINEERING STUDIES:

- 2007-Assessment of the Mechanical and Electrical Components of the Gosselin Hydroelectric Plant, GEI
- Ruth lake Hydro Power Generating Facility, Facility Analysis for Operational Life Expectancy and Current Mechanical Condition Opinion after Site Visit on 4-13-16, Mark Trawick, RTA Construction, April 20, 2016

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$27,548**	2019/20

PROJECT WORKSHEET

ASSET CATEGORY: Hydro-Electric Power Plant	**FINAL PRIORITY RANKING:** N/A
PROJECT: 30kW Generator	

DESCRIPTION:
This project would consist of the replacement of the 30kW generator at the Ruth Hydro Plant. This generator provides emergency power at the Hydroplant.

JUSTIFICATION: The 2007 GEI Hydoelectric Plant Assessment Report projected a useful life of 30yrs for the generator and recommended potentially replacing them in 2013. The District had decided during the first iteration of the CIP that an additional economic study was required to determine whether it is economically justified to replace the components as planned. However, in 2016 the District began assessing the feasibility of a Renewable Energy Market Adjusting Tariff (ReMAT) contract with PG&E to increase revenues from the power generated at Ruth. The Board approved the contract in Aug. 2016 for a contract period of 20 years. The contract requires HBMWD to produce a min annual level of Guaranteed Energy Production (GEP). If HBMWD does not provide this quantity over a 2-yr period, and does not cure the failure within 90 days of the end of the 2-yr period, it will be in "GEP failure" and will be required to pay liquidated damages to PG&E. In Apr 2016, the District hired Mark Trawick of RTA Construction to evaluate the hydro facilities and provide detailed info on the remaining life and potential capital expenses which may be incurred over a 20yr ReMAT contract period. Mr. Trawick said the hydro plant is in good condition and should easily meet the requirements of a ReMAT contract over the next 20yrs. That being said, failure of the generator without replacement during the 20yr contract period would probably NOT leave the District in GEP failure. However, as the hydroplant will continue to be operated, the generator should be replaced on the existing planned schedule.

FOCUSED ENGINEERING STUDIES:

- 2007-Assessment of the Mechanical and Electrical Components of the Gosselin Hydroelectric Plant, GEI
- 2016-Mark Trawick, RTA Construction, Condition Assessment Report

IDENTIFIED FUNDING SOURCE:
General Fund

COMMENTS:

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

2016 Dollars		Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$31,740**	2019/20

PROJECT WORKSHEET

ASSET CATEGORY: Industrial Water Storage, Transmission, and distribution – Terminal Industrial Reservoir	**FINAL PRIORITY RANKING:** N/A (Given status of Industrial Water system users)
PROJECT: Terminal Reservoir Painting	

DESCRIPTION
Prepare surface and repaint Terminal Reservoir. Painting creates a barrier to reduce the potential of water/chlorine induced deterioration of the metal tank shell.

JUSTIFICATION:
Reduce the potential for reservoir surface rust and oxidation to occur.

FOCUSED ENGINEERING STUDIES:
None performed to date.

IDENTIFIED FUNDING SOURCE:
None – until new industrial system users are identified

COMMENTS:
Need to make policy decision on continued use of industrial system and whether ongoing maintenance costs are justified. Last painted in 1998.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2012 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 318,214	2012

PROJECT WORKSHEET

ASSET CATEGORY: Industrial Water Storage, Transmission, and distribution – Terminal Industrial Reservoir	**FINAL PRIORITY RANKING:** N/A (Given status of Industrial Water system users)
PROJECT: General Maintenance and Cleanout	

DESCRIPTION:
Clean sediment out of the Terminal Reservoir. Perform maintenance tasks on reservoir while drained. Routine maintenance can reduce potential for excess sediment accumulation that could impair water quality.

JUSTIFICATION:
Reservoir has reached the end of a 5-year cleaning cycle.

FOCUSED ENGINEERING STUDIES:
None performed to date.

IDENTIFIED FUNDING SOURCE:
None – until new industrial system users are identified

COMMENTS:
Need to make policy decision on continued use of industrial system and whether ongoing maintenance costs are justified. Reservoir cleaned in 2007, at a cost of $23,000. Cleaning approximately 5 years. Realignment of the boiler ash piles may affect the area used for depositing past clean out spoils. This could force a more expensive disposal alternative.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2013 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$** 30,181	2013

PROJECT WORKSHEET

ASSET CATEGORY: Industrial System- Water Storage and Transmission–Terminal Industrial Reservoir	**FINAL PRIORITY RANKING:** N/A Given Status of Industrial System
PROJECT: General Repairs	

DESCRIPTION:
Includes repairs to the roof beams and other repairs as necessary on the 1-MG Industrial Water. Repairs should coincide with the cleaning and repainting of the reservoir.

JUSTIFICATION:
A 2015 inspection of the existing 1-MG Domestic reservoir indicated that there was severe corrosion of the beams, center column, and roof vents for the tank. The extent of the corrosion is such that, to ensure the continued life of the overall tank, the entire roof needed to be replaced. The Industrial Water Reservoir was last painted in 1998, and the roof beams in the reservoir were replaced/repaired in 1988. It is suspected that the beams in the Industrial Water reservoir are likely in similar condition to those in the Domestic reservoir, but an inspection has not yet been performed on them since there is currently not an Industrial Water Customer to cover the costs. The exterior of the Industrial Water Reservoir has visibly degraded since the loss of the pulpmill customers and lack of ongoing maintenance. This is a large piece of District infrastructure that it would be a shame to let degrade into complete disrepair.

FOCUSED ENGINEERING STUDIES:
- Structural Inspection scheduled for 2017, but has not been performed yet

IDENTIFIED FUNDING SOURCE:
Will have to come from the General Fund with approval of Muni Customers unless an industrial water system customer is identified.

COMMENTS:
Need to make policy decision on continued use of industrial system and whether ongoing maintenance costs are justified. Last painted in 1998.

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2016 Dollars	Cost	FY
1.	Design	$	
2.	Construction	$	
3.	Inspection	$	
4.	Contingency	$	
5.	O&M	$	
	Total	**$279,574**	2019/20

PROJECT WORKSHEET

ASSET CATEGORY: Industrial System Water Storage, Transmission, and Distribution – Surge tower	**FINAL PRIORITY RANKING:** N/A (given status of Industrial Water System users)
PROJECT: Engineering analysis of surge tower; General Repairs, replace surge tower	
DESCRIPTION: This project includes an engineering analysis to identify the requirement of the surge tower in protecting the industrial transmission lines. If surge protection is required, an analysis will be performed to determine methods to replace the surge tower. This analysis will lead into the design for the project. After the engineering analysis and design are complete, a contractor will be hired for the demolition, removal, and disposal of the surge tower and replacement with an appropriate surge protection mechanism (air/vacuum relief valve and/or surge valve), if required. The project also includes CEQA/NEPA, permitting (including a potential Coastal Development Permit), construction surveys, and construction management.	
JUSTIFICATION: The condition of the existing surge tower has degraded substantially since it was constructed in 1962, as noted in the 2012 Surge Tower Evaluation by GHD. If the surge tower fails during a seismic or major storm event, the 42-inch industrial line would rupture, and it is likely that the immediately adjacent 20-inch domestic water line would be damaged as well. This would leave 7,400 people without water services or associated wastewater and firefighting services. The removal of the 70-foot tall, rusted and earthquake susceptible surge tower will ensure that it cannot fall over and damage the 42-inch industrial and/or 20-inch domestic water lines. If required, the surge tower will be replaced with a new air/vacuum relief and/or surge valve(s) that will be sized to ensure that they effectively replace the function of the existing surge tower.	
FOCUSED ENGINEERING STUDIES: • 2012 – Surge Tower Evaluation, GHD	
IDENTIFIED FUNDING SOURCE: The District has applied for grant funding through FEMA's Hazard Mitigation Grant Program (HMGP) for this project. The total estimated cost for this project (including design, construction, permitting, etc.) is $960,000. FEMA requires a 25% match, meaning that the Federal share will be $720,000 and the District's match will be $240,000.	
COMMENTS: FEMA has awarded grant money for Phase 1 of the project, which includes environmental special studies for CEQA/NEPA, a soil contamination assessment, and design plans and specifications ($157,500 total; $118,125 grant portion; $39,375 District match).	

PROJECT COST ESTIMATE AND FISCAL YEAR TO BE COMPLETED IN

	2017 Dollars	Cost	FY	
1.	Design	$		**District Match would be $240,000 if project is funded by Hazard Mitigation Funds**
2.	Construction	$		
3.	Inspection	$		
4.	Contingency	$		
5.	O&M	$		
	Total	**$960,000**	2019/20	

Engineering Studies

Humboldt Bay Municipal Water District
Engineering Studies Related to District's System/Infrastructure

This list was prepared to supplement the CIP. Its purpose was to create a reference for studies related to District infrastructure. It likely does not contain all studies ever done, especially in the earlier years.

Domestic Diversion and Pumping	Inspection Report Pump Station 1 Ranney Collector	Sept. 1996	Aqua Video Engineering
	Seismic Vulnerability Analysis and Recommended Modifications to Pump Columns on Pump Stations 1, 2, 3, and 4	April 1998	Winzler&Kelly Engineers
	Containment for Ranney Transformers	May 1999	Winzler&Kelly Engineers
	Check Valve Replacement for Ranney Collectors	May 1999	Winzler&Kelly Engineers
	Report of Inspection and Pump Test of Ranney Well No. 2	Feb. 2003	Ranney Method
	Ranney Collector Rehabilitation Feasibility Report	Dec. 2003	Winzler&Kelly Engineers
	Maintenance Report Collector Well Pumping Station No.2	October 2005	Collector Wells International
	Groundwater Study-the development of groundwater models was used to support the Ranney and CIP recommendations *(Funded by DWR Groundwater Assistance grant)*	May 2006	Winzler&Kelly Engineers
	Pump Station 2 Evaluation Final Report	June 2006	Winzler&Kelly Engineers
	Inspection Report Collector Wells 1A, 1, 3 and 4	January 2007	Collector Wells International
	Ranney Collector Final Evaluation Report	June 2008	Winzler&Kelly Engineers
	Assessment of Essex High-voltage electrical system and related electric components	July 2009	Winzler&Kelly Engineers
	Ranney Collector No. 3 Maintenance Report New Lateral Installations	Aug. 2012	Layne (Ranney Collector Wells)
	Report for Collectors 1&1A, Dive Survey, Topographic Survey, & Initial Lateral Assessment for New Lateral Installation	Aug. 2013	GHD
	Report of Geophysical Investigation, HBMWD Collector 1	Aug. 6, 2014	Spectrum Geophysics
	MM Dive on Collector 4	June 27, 2014	MM Diving
	MM Dive on Collectors 1&1A with Ultrasonic thickness testing of laterals & inspection of siphon	June 2014	MM Diving

Humboldt Bay Municipal Water District
Engineering Studies Related to District's System/Infrastructure

	Collectors 1&1A Rehabilitation Project, Plans & Specs	Sept. 2015	GHD
	Collector 3 Capstone Report	Nov. 2015	GHD
Industrial Diversion and Pumping	Mad River Station 6 Diversion Facility Phase I Report: Identification of Project Alternatives-to maintain adequate flow during low-flow times (a requirement of the District's HCP)	August 2005	Northwest Hydraulic Consultants
	Pump Station 6 Painting/Galvanizing Analysis	April 2007	Winzler&Kelly Engineers
	Mad River Station 6 Hydraulic Feasibility Assessment (followed Phase 1 study completed in Sept. 2005)	August 2007	Northwest Hydraulic Consultants
	Surge Tower Evaluation	Sept 2012	GHD
Energy Studies	Revised Analysis of PG&E Energy Efficiency Rebate Program for Collectors 1-4 and Pump Station 6	February 1995	Winzler&Kelly Engineers
	Flowserve Pump Efficiency Analysis and Report	2005	Flowserve
	Essex Pump Station Energy Efficiency & Rate Schedule Analysis (*Funded by CEC Energy Partnership Program Grant)*	April 2006	CH²MHill
	Solar Photovoltaic Feasibility Study (Essex and Korblex)	April 2007	Urfer Engineering
	Integrated Energy Audit for Essex Pumping Station *(Funded by PG&E Technical Assistance Grant)*	October 2007	Base Energy
	Demand Response Audit, Technical Analysis & Modeling of Interconnected System *(Note - funded by PG&E Technical Assistance Grant)*	December 2007	Efficiency Analysts Intl.
Treatment	Water Treatment Plant Feasibility Study for HBMWD (for SWTR-compliant plant)	March 1992	Winzler&Kelly Engineers and Black & Veatch
	Pilot Plant Report – High-Rate Water Treatment (for SWTR-compliant plant)	Sept. 1994	Kennedy/Jenks Consultants
	Preliminary Design Report Water Treatment Plant HBMWD (for SWTR-compliant plant)	Sept. 1994	Kennedy/Jenks Consultants, Winzler&Kelly Engineers

Humboldt Bay Municipal Water District
Engineering Studies Related to District's System/Infrastructure

	Alternate Sites Geotechnical Evaluation for TRF	April 1994	Taber
	Pilot Plant Report – In-Line Filter Treatment (for Turbidity Reduction Facility which was constructed)	May 1998	Kennedy/Jenks Consultants
	Fault Investigation-TRF Korblex Site Geotechnical Investigations-TRF Korblex Site	Oct 1999 Dec 1999	Taber
Drinking Water Storage	Geotechnical Investigation Water Storage Tank-Korblex	December 1995	Taber
	Amended Initial Study for proposed 2.0 mg Steel Tank	April 1996	Winzler & Kelly Engineers
	Analysis of Korblex Facility Additional Storage Study	July 2005	Kennedy/Jenks Consultants
	Thickness Survey of Korblex Domestic Water Reservoir Floor	June 2006	Winzler&Kelly Engineers
	1 MG Reservoir Roof- Engineering Evaluation of roof beams in reservoir	Sept. 2008	Winzler&Kelly Engineers
	One Million Gallon Reservoir Structural Inspection	Sept. 17, 2015	GHD
	1-MG Domestic Reservoir Roof Replacement & Painting Project	Nov. 2016	GHD

Humboldt Bay Municipal Water District
Engineering Studies Related to District's System/Infrastructure

Domestic Transmission System	Inspection of Mad River Slough Crossing-Double and Single Crossing inspected.	June 1996 January 2002	Winzler&Kelly Engineers
	Geotechnical Investigation Mad River Slough Crossings – both double and single crossing	1998	Kleinfeleder, Inc.
	10% Design Report for the Reconstruction of the Mad River Slough Crossing for Industrial and Domestic Pipeline (includes alternative analysis)	Dec. 1998	Winzler&Kelly Engineers
	Fieldbrook Community Services District Booster Pump Station Evaluation (completed for FCSD, but proposed booster station is on HBMWD's system)	Feb. 2004	Winzler&Kelly Engineers
	Domestic Water Trestle Inspection-Trestle #1 just north of Alder Grove Rd.	June 2006	Winzler&Kelly Engineers
	Emergency Pipeline Crossing (over Mad River for McKinleyville CSD and/or Blue/Lake/Fieldbrook)-Feasibility level analysis	June 2006	Winzler&Kelly Engineers
	Domestic Water System WaterCAD Model	June 2006	Winzler&Kelly Engineers
	Assessment of Condition of NCRA Railroad Trestle over Mad River (which supports line to Blue Lake/Fieldbrook)—included recommendations	Feb 2008	Winzler&Kelly Engineers
	Techite Domestic Water Line Evaluation-Assessment of condition and recommendations re: 18 –inch Techite line on Samoa Peninsula	June 2008	Winzler & Kelly Engineers
	Feasibility Study of Alternatives to Construct Secondary Pipelines Across the Mad River to Supply Water to Fieldbrook and Blue Lake -Recommendations and Preliminary Design of Water Supply Pipeline for Blue Lake/Fieldbrook	May 2009	Winzler&Kelly Engineers
	Community Interties Feasibility Study 2012	June 2012	GHD
	Techite Pipeline Replacement Project Plans & Specs	July 2013	GHD
	Community Interties Project Plans & Specifications	July 2013	GHD
	A Cultural Resource Investigation of the Glendale CSD Pipeline Mad River Crossing, Humboldt County, CA	July 2014	Roscoe & Associates
	Blue Lake Fieldbrook Glendale CSD Pipeline, Mad River Crossing, Wetland Delineation	Sept. 2014	GHD
	Hazardous Materials Corridor Study, City of Blue Lake/	Sept. 2014	GHD

Humboldt Bay Municipal Water District
Engineering Studies Related to District's System/Infrastructure

	Fieldbrook Glendale CSD Pipeline, Mad River Crossing		
	Preliminary Geotechnical Report, Water Transmission Pipeline Replacement Over Mad River	Dec. 2015	Crawford & Associates
	Trenchless Feasibility Report, BLFG CSD Water Transmission Pipeline Replacement, Mad River Crossing	Feb. 2016	Bennett Trenchless Engr.
	Feasibility Study, Construction of a Secondary Pipeline Across the Mad River to Supply Water to Fieldbrook & Blue Lake	April 2016	GHD
	Historical Resource Evaluation and Archaeological Excavation at CA-HUM-931 and P-12-000815 Mad River Pipeline Crossing Project	June 2016	Roscoe & Associates
	A Cultural Resources Addendum Investigation of Two Additions to the Mad River Pipeline Crossing Project APE	Nov. 2016	Roscoe & Associated
	Blue Lake Fieldbrook Glendale CSD Pipeline, Mad River Crossing, Biological Evaluation	Nov. 2016	GHD
	Amendment to Biological Evaluation, Blue Lake Fieldbrook Glendale CSD Pipeline, Mad River Crossing, HMGP #1911-09-09	Nov. 2, 2016	GHD
	Main Collector Pipeline Single Point Failure Focused Engineering Study	Oct. 2016	GHD
Industrial Transmission System	Inspection of Mad River Slough Crossing-Double and Single Crossing inspected.	June 1996 January 2002	Winzler&Kelly Engineers
	Geotechnical Investigation Mad River Slough Crossings – both double and single crossing	1998	Kleinfeleder, Inc.

Humboldt Bay Municipal Water District
Engineering Studies Related to District's System/Infrastructure

R.W. Matthews Dam at Ruth Lake	Preliminary Engineering Report on the Enlargement of Ruth Dam	April 1967	Winzler&Kelly and Kennedy Engineers
	Photographic Inspection of Ruth Hydro-plant penstock and Howell Bunger Valve	April 1987	HARCO Technology Corp.
	Study on the Adequacy of the Log Boom Engineering Inspection of Log Boom Evaluation of Existing Log Boom-documenting the debris blocking effectiveness and condition of log boom Inspection of Log Boom Inspection of Log Boom	Nov 1990 June 2006 June 2008 Sept 2010 June 2014	Winzler&Kelly Engineers
	Dam Inundation Study	April 2001	Winzler&Kelly Engineers
	Five-Year Safety Inspection Report (performed by Independent Consultant in accordance with FERC's Part 12 regulations)	Dec 1981 Oct 1986 Dec 1991 Aug 1996 Aug 2001 Nov. 2006 June 2011 Sept. 2016	Clifford Cortright Wahler & Assoc. Wahler & Assoc. R.L. Volpe & Associates GEI Consultants GEI Consultants GEI Consultants Cardno
	Report on Spillway Structure Stability Evaluation	June 2002	GEI Consultants
	Supporting Technical Information (includes Probable Failure Modes Analysis report)	Nov. 2006	GEI Consultants
	Probable Maximum Flood Study	Dec. 2006	GEI Consultants
	Ruth Dam Bridge Inspection	October 2007	Winzler&Kelly Engineers
	Matthews Dam Spillway Inspection	March 2010	Winzler & Kelly
	Ruth Lake Slide Gate Hydraulic Evaluation and Repair (Project completed in December 2010, HBMWD staff did	July 2009	Winzler & Kelly Overall project

Humboldt Bay Municipal Water District
Engineering Studies Related to District's System/Infrastructure

	the work on project)		review, trench design
	Water Shortage Contingency Plan Analysis	Jan. 2016	GHD
	Ruth Bridge Evaluation 2011	Oct. 6, 2011	Winzler & Kelly
	Letter to FERC, Log Boom Replacement Calculations	Apr. 4, 2013	GHD
	Ruth Landslide Assessment	Apr. 8, 2013	GHD
	Ruth Lake Underwater Inspection	Mar. 17, 2015	MM Diving
Hydro Plant	Feasibility Study on Hydroelectric Power Generation from R.W. Matthews Dam at Ruth Lake	April 1977	Winzler&Kelly Engineers
	R.W. Matthews Dam Power Generation Feasibility Study	August 1980	Winzler&Kelly Engineers
	Assessment of Hydro, Mechanical and Electrical Components of Gosselin Hydroelectric Power House	June 2007	GEI Consultants
	Ruth lake Hydro Power Generating Facility, Facility Analysis for Operational Life Expectancy and Current Mechanical Condition Opinion after Site Visit on 4-13-16	April 20, 2016	Mark Trawick, RTA Construction
System-Wide	Seismic Vulnerability Assessment (District-wide)	Nov. 2006	G&E Engineering Systems, Inc.
	Treatment Plant SCADA System Upgrade Project proposal	February 1998	Ervin Engineering
	2016 Review of Cathodic Protection (CP) Systems on Domestic Water System	Oct. 3, 2016	Farwest Corrosion Control Company
	LTSAA Fish Passage Study	Dec. 2014	Stillwater Sciences
	Mad River Hydrology Study Flow Analysis of Mad River	Dec. 2013	GHD
	Matthews Dam Controlled Release Analysis	Mar. 18, 2015	GHD
	Essex Control Facilities Plan	Aug. 2016	GHD
	Collectors 1, 2&4 Trolley Car Inspections	Oct. 13, 2016	GHD
Water Resource Planning	Reconnaissance Evaluation Financial Viability Transporting Potable Water By Sea	Oct. 2011	Winzler & Kelly
	Term Sheet Transfer of Water by HBMWD	Dec. 2011	HBMWD
	Humboldt Bay Municipal Water District Water Supplies Fact Sheet	Dec. 2013 v3	HBMWD

Humboldt Bay Municipal Water District
Engineering Studies Related to District's System/Infrastructure

	Water Resource Planning Pipeline Routes, Reconnaissance Level Pipeline Study	Sept. 2014	GHD

CIP 16/17 - 25/26

HUMBOLDT BAY MUNICIPAL WATER DISTRICT

CAPITAL IMPROVEMENT/REPLACEMENT PROJECTS
(For Jan, 2017 Capital Improvement Plan)

	ASSET INVENTORY		PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
									FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
	Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
								2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
	SOURCE OF SUPPLY																
R.W. Mathews Dam and Reservoir	**Ruth Lake Boom Log Repair**	Essex maintenance crew completed replacement of log boom in June of 2014. I contacted Worthington and they said expected life of the new log boom is not less than 10-15 years with proper maintenance. That said, I put replacement every 12 yers.	2	4	4	**3.3**	**YES 1**									**$ 135,034**	
	Howell Bunger Valve Replacement	Cost for 36" Cone Valve from Rodney Hunt Co 800-448-8860. Major repair, and coating of existing valve done in June 2002 (cost $24,000)	1	4	4	**3.0**											
	Ruth Bridge Painting	2014 - Quote from James-Carl Painting - Tom Shivley $70,000. Reccomended by Pat K. for every 5 yrs.														**$ 109,313**	
	Ruth Bridge Replacement	Quote from Big R Bridge	1	2	3	**2.0**											
	Plunge pool repair	Variable scope and cost (extent of damage given degradation due to storm events over time). Cost shown is reasonable placeholder.	N/A												**$ 125,059**		
	Dam Spillway Wall Repair/Retrofit (Phase 1)	At some point in the near future work will be required to strengthen/retrofit the spillway walls - whether triggered by HBMWD given monitoring results, or triggered by the FERC or DSOD. Two projects are proposed as placeholders until a more definitive scope is known:1)for engineering assessment and design, or minor repairs, and 2)more significant structural repairs/improvements. This project is the first of two phases.	3	3	4	**3.3**											
	Dam Spillway Wall Repair/Retrofit (Phase 2)	At some point in the near future work will be required to strengthen/retrofit the spillway walls - whether triggered by HBMWD given monitoring results, or triggered by the FERC or DSOD. Two projects are proposed as placeholders until a more definitive scope is known:1) engineering assessment and design, or minor repairs, and 2)more significant structural repairs/improvements. This project is the second of the two phases.	2	3	4	**3.0**											
	Slide Gate Hydraulics	Replace hydraulic lines and system for the dam's slidegate. (work completed by HBMWD and M&M Dive).	N/A - Done				**YES 2**						**$ 33,113**				
	TOTAL - SOURCE OF SUPPLY							**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 33,113**	**$ -**	**$ 125,059**	**$ 244,347**	**$ -**

HUMBOLDT BAY MUNICIPAL WATER DISTRICT

CAPITAL IMPROVEMENT/REPLACEMENT PROJECTS
(For Jan, 2017 Capital Improvement Plan)

	ASSET INVENTORY		PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
								FY11/12 to 15/16			FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
	Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
REGIONAL/DOMESTIC SYSTEM - Diversion and Pumping																	
Ranney Collector 1	**Collection Laterals**	1) See Collector Wells International report, and series of engineering assessments and planning documents for Ranney lateral replacement program. Also see HBMWD July 3, 2008 memo re: CIP Development Recommendations. 2) Lead time for this project required to develop project. Includes some valve replacement and testing for water in Collector 1. If water unavailable in existing laterals in Collector 1, move to collector 1a and install new laterals. 3) Refinement of scope and cost estimate for this project required after Collector 3 lateral replacement project complete.	3	3	3	3.0	YES 3	$ 1,920,000									
	Pump 1-1, Worthington 350hp Model 24M440 E-2 SN 6863, Motor G.E. SN FBJ608010	Motor cleaned and dipped, 2006; Pump rebuilt from inventory 2006; 15 year lifecycle on all pumps + efficiency testing	2	3	3	2.7			$ 206,620								
	Pump 1-2, Worthington 350hp Model 24M440 E-2 SN, Motor G.E. SN RWJ420007	Motor and pump rebuilt 1967;Tested ok in 05. Scheduled for pump test in 08, will schedule replacement based on pump test or planned for replacement after lateral replacement project	3	3	3	3.0					$ 206,620						
	Pump 1-3, Flowserve	New in 08, Flowserve 17EPH 4000 gpm capacity	2	3	3	2.7									$237,612		
	Pump 1-4, Byron Jackson 200hp Model 20KKH, SN 390652, Motor G.E. SN: 1285068002	Motor and pump rebuilt August 1986, $28,000.00. Tested OK in 05, scheduled for pump test in 08, will schedule replacement based on pump test	3	3	3	3.0					$ 195,702						
	Valves and Distribution to Domestic Reservoir	Life cycle and more detailed engineer cost estimate required. Ballpark cost and represents 1/4 of total: $4,070,725 for all collectors	3	3	3	3.0	YES 11							$1,337,729			
	Paint/Galvanize Collector	FY89, cost: $161,000 (all five collectors)	2	2	4	2.7											$ 264,4
	Surge Tank	Place holder for repairs and painting, probe replacement	2	3	4	3.0						$ 23,000					
Ranney Collector 2	**Engineering**	Design, Plans & Specifications, Bid CM	N/A												$ 88,695		
	Collection Laterals	1) Cleaned laterals, pump tested and installed new lateral valves, August 05. 2) See Collector Wells International report, and series of engineering assessments and planning documents for Ranney lateral replacement program. Also see HBMWD July 3, 2008 memo re: CIP Development Recommendations. 3) Refinement of scope and cost estimate for this project required after Collector 3 lateral replacement project complete.	3	3	3	3.0	YES 3								$ 2,365,191		
	Pump 2-1, Flowserve 350hp Model 20EKH 4 Stage , Motor	Pump and motor replaced in 2007	2	3	3	2.7										$ 231,062	
	Pump 2-2, Worthington 350hp Model 24M440 E-2 SN6872 , Motor G.E. SN RWJ420006	Motor rebuilt 1987, installed 2001, pump rebuilt 1987, scheduled for pump test in 08, will schedule replacement based on pump test	2	3	3	2.7										$ 231,062	

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	ASSET INVENTORY		PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
								FY11/12 to 15/16			FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
	Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
	Valves and Distribution to Domestic Reservoir	Life cycle and more detailed engineer cost estimate required. Ballpark cost and represents 1/4 of total: $4,070,725 for all collectors	3	3	3	3.0	YES 11										$1,375,6
	Paint/Galvanize Collector	FY89, cost: $161,000 (all five collectors)	2	2	4	2.7											$ 264,4
	Surge Tank	Place holder for repairs and painting, probe replacement	2	3	4	3.0						$ 18,700					
Ranney Collector 3	Engineering	Bid & CM	N/A														
	Collection Laterals We need the actual final cost of project.	See Collector Wells International report and series of engineering assessments and planning documents for Ranney lateral replacement program. Replace 3 laterals at Collector 3. Replacement of laterals valves already done (FY 2009-10) as well as preparation of plans and specs.	1	3	3	2.3	YES 3										
	Pump 3-1, Flowserve Model 18ENH-6 stage pump. S/N 1408NSH01908-1. Motor- 400 HP US motor. S/N 422707-006	Pump purchased in FY-13/14. Not installed umtil March 2016 due to other higher priority work. New Pump, 316SS lube tubes, 416 SS shafts, Bronze bearings & Motor. Scheduled to be installed in March 2016	2	3	3	2.7											
	Pump 3-2, Flowserve Model 18ENH-6 Stage pump , SN 1311NSH01720-1, Motor - 400 HP US Motor SN: U11 2013746 S0100	New Pump, 316SS lube tubes, 416 SS shafts, Bronze bearings & Motor. Scheduled to be installed in March 2014	2	3	3	2.7											
	Pump 3-3, Flowserve Model 16ENL-8 stage, SN 1311NSH01719-1, Motor - 250 HP US Motor. SN: U11 20130744 0001 R0001	Complete new installation. Pump purchased FY 13/14 - New pump, motor, Column, 316 SS lube tubes,416 SS line shafts, bronze bearings, motor stand.. - Purchased through Pacific Water Resources.	2	3	3	2.7											
	Valves and Distribution to Domestic Reservoir	Life cycle and more detailed engineer cost estimate required. Ballpark cost and represents 1/4 of total: $4,070,725 for all collectors	3	3	3	3.0	YES 11									$1,414,643	
	Paint/Galvanize Collector	FY89, cost: $161,000 (all five collectors)	2	2	4	2.7											$ 264,4
Ranney Collector 4	Engineering	Design, Plans & Specifications, Bid CM	N/A														
	Collection Laterals	1) See Collector Wells International report, and series of engineering assessments and planning documents for Ranney lateral replacement program. Also see HBMWD July 3, 2008 memo re: CIP Development Recommendations. 2) Refinement of scope and cost estimate for this project required after Collector 3 lateral replacement project complete.	3	3	3	3.0											
	Pump 4-1, Flowserve	New in 08 Flowserve 17EPH 4000 gpm capacity	2	3	3	2.7											
	Pump 4-2, Flowserve 350hp Model 20EKH 4 Stage , Motor	Pump and motor replaced in 2007	2	3	3	2.7											
	Valves and Distribution to Domestic Reservoir	Life cycle and more detailed engineer cost estimate required. Ballpark cost and represents 1/4 of total: $4,070,725 for all collectors	2	3	4	3.0	YES 11										$1,454,74

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									FY11/12 to 15/16			FY16/17 to 20/21			FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
ASSET INVENTORY			PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**											
Assets and Proposed Projects		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**
	Paint/Galvanize Collector	FY89, cost: $161,000 (all five collectors)	2	2	4	**2.7**											$ 264,4
	Surge Tank	Place holder for repairs and painting, probe replacement	2	3	4	**3.0**						$ 23,000					
Ranney Collector 5	**Rehab vs. Decommission**	Engineering study required	3	1	1	**1.7**	**YES 12**										
	Harden Collector to prevent vandalism	Depends on Engr Study Results. Ball park cost provided	N/A Given status of collector							$ 21,749							$
	Replace Collector Door	Planned in FY 03-04 Budget. Depends on Engr. Study Results										$ -					
	Paint/Galvanize Collector	FY89, cost: $161,000 (all five collectors). Depends on Engr. Study Results										$ -					
Subtotal - Diversion and Pumping								$ 1,920,000	$ 206,620	$ 21,749	$ 402,322	$ 64,700	$ -	$ 1,337,729	$ 2,691,497	$ 1,876,768	$ 3,888,3
REGIONAL/DOMESTIC SYSTEM - Water Treatment																	
	Upgrade Existing system																
Chlorination Facility	**Install CL2 system scrubber**	Install a Cl2 scrubber to mitigate the hazard of CL2 Instead of installing a Hypochlorite system I propose we consider this as the best method to reduce the hazard of Cl2, vs going with Hypochlorite due to higher costs, more maintenance required, and more frequent delivery's required. DHD Need discussion with Management and Board.	1	3	2	**2.0**					$ 335,489						
	Replace Cl2 injection line, install double containment	This will replace the existing chlorine injection line between the chloring room and West End Rd. injection point and make it double contained per current requirments for new construction.	3	4	4	**3.7**					$ 111,830						
	Chlorine System Upgrade to Hypochlorite	Reference March 29, 2004 report from Kennedy/Jenks Consultants. Need discussion with Management and Board.	4	4	4	**4.0**	**YES 4**										
"CT" Tank	**General Maintenance and Repairs and painting**	CT tank put in service in 1997. This work is for periodic major maintenance and painting (15 year cycle)	2	4	3	**3.0**					$ 167,745						
	CT Tank Fabric Baffles	One baffle replaced in 2010 ($16,300). Engineering study required to establish life cycle, but estimated replacement before 2018	2	4	3	**3.0**					$ 95,055						
	TRF Filter Building - Structural Components	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A										$ 59,130				
	TRF Replace two Blowers (for filter air wash function)	10 yr repair cycle ($35,000 each 75 Hp Centrifugal Multi-stage with soft start/intake and exhaust silencers, surge control)	2	4	3	**3.0**								$ 48,645			$ 52,9

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								FY11/12 to 15/16			FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
	Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Regional Treatment Plant - Turbidity Reduction Facility (TRF)	**TRF Filter Beds - Replace Filter Media (Anthracite)**	The Maintenance Projects Plan assumes periodic partial replacement of the anthracite. At a lesser frequency, total replacement will be required. (Quantities: 450CY/12,150CF/322tons. Eff. Size=1.40-1.60mm, Uniform. Coeff=1.40 or less)	2	4	4	**3.3**	**YES**						**$ 251,876**				
	TRF Chemical Feed Building - Structural Components	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A											**$ 60,806**			
	TRF Replace Emergency Generator	Replacement of 80 kW generator (assumes transfer switch, etc. remains)	2	3	4	**3.0**											
	TRF Chemical Feed Systems - Secondary coagulant (Alum)	Replace pumps, drives and valves 10yr life cycle (2 pumps, pipes and controls, $70,000) For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR.	2	4	4	**3.3**								**$ 21,890**			
	TRF Chemical Feed Systems - Primary coagulant system #2 (Alum)	In FY 12/13 we installed 2 new Alum chemical pumps. These pumps were sized more appropriate to our lower end chemical dosages. The orignal system is still fully functional for high dosage delivery if needed.	2	3	3	**2.7**								**$ 18,242**			
	TRF Chemical Feed Systems - Cationic Polymer for coagulation aid	Replace pumps, drives and valves 10yr life cycle (330 gallon tote, platform scale, metering pumps P-631 & 632, controls, $70,000) For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR.	2	4	4	**3.3**				**$ 24,468**							
	TRF Chemical Feed Systems - Non-ionic Polymer for Filter aid & Pre-treat filter	Replace pumps, drives and valves 10yr life cycle (120 gallon tote, scales, mixer, drum pump, 800 gal day tank Metering pumps P-641, 642,& P-652 controls) Replaced P-652 in Nov. 2013. For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR.	2	4	4	**3.3**				**$ 32,624**							
	TRF Chemical Feed Systems - Non-ionic Polymer for Pre-treat	Rebuild pumps and valves 10yr life cycle For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR .Pumps 651, 653, 654 are unused.	2	4	4	**3.3**											
	TRF Chemical Feed System - Sodium Hypochlorite	Replace pumps and valves 10yr life cycle (3 metering pumps, 1 recirculation pump, valves, controls, $70,000) For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR.	2	4	4	**3.3**									**$ 22,511**		
	TRF Chemical Feed System - Caustic System for pH control.	Currently system not in use and not likely to be required. No cost calculated at this time	N/A														
	TRF Plant Water System	Replace pumps and valves 10yr life cycle	2	4	4	**3.3**								**$ 115,531**			

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	ASSET INVENTORY		PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
								FY11/12 to 15/16		FY16/17 to 20/21			FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
	Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Regional Treatment Plant - Turbidity Reduction Facility (TRF)	**TRF Washwater Recovery Basins - Chain and Flight System**	Replace chain and flights, motors & gears	2	4	4	**3.3**										**$ 514,416**	
	TRF Sludge Beds - Structural Components	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A													**$ 64,302**	
	TRF Backwash Pump Building - Structural Components	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A														**$ 66,1**
	TRF Backwash Pumps	15-20 year life expectancy (2 ea 250 hp split case centrifugal pumps with soft start, $105,000 each)	2	4	4	**3.3**									**$ 137,565**		**$ 145,4**
	TRF Rapid Mix Building - Structural Components	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A												**$ 31,265**		
	TRF Washwater Pre-Return System (Pressure Filter)	Replacement of Pressure Filter System is not anticipated in planning horizon (through 2025/26). Costs shown are reasonable estimate to assess condition and determine replacement timeframe and/or to perform maintenance. This is for sand blasting and painting	2	3	4	**3**								**$ 30,403**			
	TRF Washwater Pre-Return System (Washwater return pumps)	Replacement of 1 Washwater return pump was necessary in 2014. Propose we consider 10 yr life cycle	2	3	3	**2.7**								**$ 15,810**			**$ 17,1**
	TRF- Instrumentation Replacement	This project replaces level sensorsl,	2	4	4	**3.3**							**$ 118,260**				
	TRF - SCADA system upgrade							**$ 100,000**									

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	A	B	C	I	J	K	L	M	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
1										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
2	**ASSET INVENTORY**			PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
3	**Assets and Proposed Projects**		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**										
4									**16/17**	**17/18**	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**
81		**TRF - Valve network upgrade**	Replsace Valve operator network. Phased project	2	3	3	**2.7**						**$ 115,000**	**$ 118,260**	**$ 121,612**	**$ 125,059**		
82		**TRF - Valves**		2	3	3	**2.7**											
83	**Subtotal - Water Treatment**								**$100,000**	**$0**	**$57,092**	**$710,119**	**$115,000**	**$547,524**	**$432,938**	**$316,399**	**$578,718**	**$281,6**
84	**REGIONAL/DOMESTIC SYSTEM - Water Storage and Transmission**																	
85	**Korblex Domestic Reservoir**	**Reservoir Painting**	Last painted in combination with ID Reservoir in 1998 total cost for both reservoirs: $346,149	3	3	3	**3.0**											
86		**Replace roof and Paint entire reservoir**	Due to structural review of roof in August of 2015 it was determined that roof replacement was required. It was also determined that while we had painters there it would be the right time to paint the entire reservoir.	4	4	4	**4.0**		**$ 602,000**									
87		**General Maintenance and Cleanout**	(3)- Ops – Maint techs and (1) Supervisor for 10 days	2	3	4	**3.0**							**$ 18,922**				
88		**General Repairs**	Minor repairs and paint touch up as needed	2	3	4	**3.0**	**YES** $_{6}$										
89		**Install new valve below 1 Mg reservoir**	Installation of this valve would make isolating parts of the system easier and reduce the need to bypass the reservoir to isolate the South feed (Eka, Arc, HCSD) and still serve the North feed (McK, BL, FB).	4	3	3	**3.3**		**$ 30,403**									
90	**Appurtenances**	**Peninsula - Replace 15" DW line**	At some point in the near future, capacity of the domestic water pipeline on the Peninsula will need to be addressed. It is currently operating very close to its maximum capacity. This project assumes an upgrade to 3.75 miles of the 15-inch pipeline. Detailed engineering study required, but the project represents a reasonable placeholder.	2	3	4	**3.0**	**YES** $_{8}$										**$ 7,009,2**
91		**Peninsula - Replace 18" DW Techite line**	Replace Techite pipeline (1.87 miles) at southern end of Samoa Peninsula. District applied for and should receive FEMA Hazard Mitigation Grant (which will fund 75% of the project).	3	3	4	**3.3**	**YES** $_{9}$										
92		**Pipeline on NCRA Trestle over Mad River (Emergency Repair)**	Completed temporary trestle repair in 2009. Pipeline will be difficult to maintain & repair if trestle is not replaced within 5 years.	N/A - Done				**YES** $_{10}$										
93		**Replace pipeline on NCRA Trestle over Mad River (Blue Lake-FG-CSD River Crossing)**	Must replace current pipeline crossing over Mad River (or fix RR bridge). Cost based on replacement with new aerial crossing per W&K feasibility report (May 2009). District has applied for Prop. 84 grant via Northcoast IRWMP and for a FEMA Hazard Mitigation Grant.	3	3	4	**3.3**	**YES** $_{10}$		**$ 1,786,729**	**$ 1,786,729**							

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									AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK		
										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3		
	ASSET INVENTORY		PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**												
	Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26			
94	Transmission System Pipelines and Al — Peninsula Slough Crossing (Double Pipeline)	Piling structure replaced in 2003, including upgrade to current seismic standards. Likely will not need replacement until 2030's or 2040's	N/A - Done																	
95	Peninsula Slough Crossing (Single Pipeline)	Board policy/business decision required re: Industrial Water System. If asset is to be maintained, need engineering estimate re: condition and cost	N/A				YES 15													
96	Pipeline Engineering Study	This Engineering study will support Pipeline replacement project below by determining area of greatest need.	N/A						$ 211,499											
97	Pipeline Replacement Program (system wide)	Timing and extent yet to be determined. Establish monitoring program to assess condition and determine when programmatic replacements is necessary. This will be a very costly program over time.	1	3	3	2							Assess Condition and Develop Plan to Programmatically Replace							
98	Mainline Valve Replacement Program	Engineering study required to determine life cycle and detailed cost estimate. This represents ballpark costs spread out over 10 years for programmatic replacement of mainline valve.	2	3	4	3.0		$ 100,000	$ 187,588	$ 192,906	$ 198,374	$ 203,997	$ 209,780	$ 215,726	$ 221,841	$ 228,130	$ 234,5			
99	Valve Box 1	This is for structural repairs of the vault itself. Valve replacement is included in Mainline Valve Replacement Project (above)	2	2	1	1.7							$ 59,130							
100	Valve Box 2	This is for structural repairs of the vault itself. Valve replacement is included in Mainline Valve Replacement Project (above)	2	2	1	1.7											$ 66,1			
101	Transmission System - Samoa Booster Pump Station — General Building & Fence Repairs	148 tons asphalt overlay, re-roof, 3 roof hatches replaced, 500ft of fence and 3 double wide gates replaced, assumed 30 yr life	2	2	1	1.7											$99,1			
102	Samoa Booster Station - Replace 100 hp Pump & Motor	Installed March 1996 (Floway SN: 21620-1-1, Motor G.E. SN L405TP16). Evaluate in 12 years given 15-20 yr life expectancy	2	3	3	2.7						$ 78,200								
103	Samoa Booster Station - Replace 200 hp Pump & Motor	Installed March 1996 (Floway SN: 21620-3-1, Motor G.E. SN L447TP16). Does not run as frequently as 100 hp pump. Evaluate in 12 years given 15-20 yr life expectancy	2	3	1	2.0									$ 115,054					
104	ic Protection — Jackson Ranch Anode Bed	Approximately $115,000 in construction and engineering costs per well assuming each well is constructed individually. Includes mobilization, abandonment, drilling, replacement, labor and engineering services.	2	3	1	2.0	YES				$ 134,196									

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										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3		
ASSET INVENTORY			PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**												
Assets and Proposed Projects		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**			
Transmission System - Cathod	**299 Anode Bed**	Approximately $115,000 in construction and engineering costs per well assuming each well is constructed individually. Includes mobilization, abandonment, drilling, replacement, labor and engineering services.	2	3	1	**2.0**	**YES**			**$ 130,497**										
	Jane's Creek Anode Bed	Approximately $115,000 in construction and engineering costs per well assuming each well is constructed individually. Includes mobilization, abandonment, drilling, replacement, labor and engineering services.	2	3	1	**2.0**	**YES**					**$ 138,000**								
Subtotal - Water Storage and Transmission								**$ 732,403**	**$ 2,185,817**	**$ 2,110,132**	**$ 332,570**	**$ 420,197**	**$ 287,831**	**$ 215,726**	**$ 336,895**	**$ 228,130**	**$ 7,409,1**			
REGIONAL/DOMESTIC SYSTEM - Support Systems																				
Electrical Systems and Equipment	**Distribution System**	Replace poles, wire, and cross arms. MOVED TO AN ANNUAL MAINTENANCE ITEM SEE MRAR	2	3	4	**3.0**	**YES** [13]					**$ -**								
	Starters	Replace Domestic pump starters (last project 2007-09, $116,000)	2	3	3	**2.7**				**$ 135,934**			**$ 147,824**			**$ 160,755**				
	2MW Generator	Replace Generator (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	2	3	3	**2.7**											**$ 595,1**			
	Switchgear for 2MW Generator	Replace Switchgear (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	2	3	3	**2.7**											**$ 343,8**			
	Transformer for 2 MW Generator 2,500 KVA	Replace Transformers (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	2	3	3	**2.7**											**$ 79,3**			
	35 KW Generator		2	2	2	**2.0**										**$ 45,011**				
	Main switch gear (incoming)	Replace Incoming Switchgear (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	2	3	4	**3.0**						**$ 1,800,000**								
	Replace 12kV Transformers on DW Collectors	Replace Collector Transformers (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	3	2	4	**3.0**	**YES** [14]				**$ 111,830**	**$ 115,000**								
mmunications and Control	**Collector Telemetry Upgrade**	This project was last completed in FY 14/15. This project put wireless communications from collectors 2,3 & 4 to collector 1. From Collector 1 the information gets to the control center via a fibre optic link.	2	2	4	**2.7**														
	Fibre Optic link to Collector 1	This link was installed in FY 14/15. Assume 20 yr life.	1	3	3	**2.3**														
	Fiber Optic Link to Collector 2	This project consists of engineering, permitting & construction of an underground 12KV electrical feed and new fiber optic cable from Essex to Collector 2.	3	3	3	**3.0**						**$ 115,000**								

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Assets and Proposed Projects		Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
								16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Col	Essex Control System Upgrade Phase 1	FY87, cost: $118,000 Planning phase	3	3	3	3.0											
	Essex Control System Upgrade Phase 2	Construction phase	4	4	4	4.0		$ 381,000									
Building Facilities	Construct Sandblasting Building	Assume 20'x40' and $100/SF	2	2	2	2.0				$ 81,560							
	Build Maintenance Shop Addition	Assume 75'x40' and $150/SF	2	2	1	1.7									$ 562,765		
	Emergency Operations Center at TRF	Assumes two storey, 40'x60' EOC w/ Line Shed below at TRF (see Option 3, "Essex Control Facilities Plan", GHD Aug. 2016)	1	2	2	1.7							$ 1,655,633				
	Build Break Rm and Training Center Addition		3	3	2	2.7				$ 489,362							
Subtotal - Support Systems								$ 381,000	$ -	$ 706,857	$ 111,830	$ 2,029,999	$ 1,803,458	$ -	$ 562,765	$ 205,766	$ 1,018,3
TOTAL - REGIONAL/DOMESTIC SYSTEM								$ 3,133,403	$ 2,392,436	$ 2,895,830	$ 1,556,840	$ 2,629,895	$ 2,671,926	$ 1,986,393	$ 4,032,616	$ 3,133,729	$ 12,597,5
HYDRO-ELECTRIC POWER PLANT																	
Hydro-Electric Plant	Ruth Hydro Sump Pump Replacement	Replaced in 1999, Replacement cycle 15 years. Barnes Submersible non-clog pump model 4SE5094L															
	Transformer, Oil Filled 2000 KVA	Need maintenance/repairs schedule/life cycle					YES 2					$ 161,838					
	2 1048 KW horizontal shaft Francis turbines (Boving)	Need maintenance/repairs schedule/life cycle					YES 2										
	2000 KVA Transformers										$ 61,217						
	2, 1000 KW AC Generators, Brushless, (Ideal)	Need maintenance/repairs schedule/life cycle					YES 2					$ 393,455					
	Replace Electrical/Mechanical Components	Estimated cost of $800,000 - $1,200,000 based on GEI Report Assessment of Mechanical and Electrical Gosselin Hydro June 2005 (line 20 -25 included in this estimate) See CIP Development Recommendations dated July 3, 2008															
	Replace Protective relays system								$ 40,000	$ 120,000							
	Hydraulic systems, governors, controls, electric panels, circuit breaker, Auto Synchronizer	Need maintenance/repairs schedule/life cycle					YES 2								$ 230,679		

N/A, discretionary projects which must be evaluated based on economics and policy factors.

HUMBOLDT BAY MUNICIPAL WATER DISTRICT

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(For Jan, 2017 Capital Improvement Plan)

										FY11/12 to 15/16			FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
ASSET INVENTORY			PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**											
Assets and Proposed Projects		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**	**23/24**	**24/25**	**25/26**
	Interrupter switchgear panel, Westinghouse, (located outside next to transformer) 600 amp	Need maintenance/repairs schedule/life cycle, $18,000					YES 2				$ 27,548						
	Static Exciter															$ 153,044	
	30 KW generator										$ 31,740						
	Battery Bank Replacement																
	Dedicated Hydro Study	Need input for project scope and cost															
TOTAL - HYDRO-ELECTRIC POWER PLANT								$ -	$ 40,000	$ 120,000	$ 120,505	$ 555,292	$ -	$ -	$ 230,679	$ 153,044	$
INDUSTRIAL SYSTEM - Water Storage and Transmission																	
Terminal Industrial Reservoir	**Reservoir Painting**	Painted 1998									$ 279,574						
	General Maintenance and Cleanout	Cleanout in 1997, $16,733 Realignment of the boiler ash piles may affect the area we have used for depositing past clean out spoils. This could force us to look into a more expensive disposal alternative. FY01. Cleaned in 2007, $23,000, approximately 5 year cycle									$ 34,230			$38,279			
	General Repairs	Roof Beam Replacement FY88, cost: $110,000									$ 279,574						
Surge Tower	**Engineering Analysis**						YES 19										
	General Repairs, replace	Engineering Analysis Required. All part costs provided for dismantling only.					YES 19				$ 960,000						
Transmission Pipelines	**42" RW pipeline TV inspection**	FY92 cost: $18,500, Inspection required to estimate repairs and costs					YES 20						$118,260				
Subtotal - Industrial Storage and Transmission								$ -	$ -	$ -	$ 1,553,379	$ -	$ 118,260	$ 38,279	$ -	$ -	$
INDUSTRIAL SYSTEM - Diversion and Pumping																	
	Pump 6-1, Worthington 700hp, Model 28hh1200 3 stage 30.1% below pump curve, repair now according to 05 Flowserve pump tests	Pump rebuilt in 1983, scheduled for pump test in 07													$ 392,149		
	Pump 6-2, Worthington 700hp, Model 28hh1200 3 stage	Pump rebuilt in 1988, scheduled for pump test in 07													$ 414,696		

N/A Given status of industrial system.

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	ASSET INVENTORY			PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
									FY11/12 to 15/16		FY16/17 to 20/21			FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
	Assets and Proposed Projects		Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
	Pump Station 6	Pump 6-3, Byron Jackson, 200hpSN: 95WC0014 16.7% below pump curve, repair now according to 05 Flowserve pump tests	Installed 12-6-95, scheduled for line shaft bearings 08, will schedule replacement based on pump test	N/A Given status of industrial system.													$ 312,647	
		Pump 6-4, Worthington 700hp, Model 28hh1200 3 stage	Pump rebuild 1989 will schedule replacement based on pump test														$ 426,451	
		Pump 6-5, Worthington 700hp, Model 28hh1200 3 stage	Pump rebuilt in 1986, Tension bearing installed in 08, will schedule replacement based on pump test														$ 426,451	
		Pump 6-6, Byron Jackson, 200hpSN: 95WC0013	Installed 12-6-95, will schedule replacement based on pump test														$ 312,647	
		Fore bay Inlet Screens and Debris Rake	10 year life cycle															$ 20,2
		Rock Weir Extension	Channel work and construction of gravel berm (per Corps & DFG permits and HCP) may ensure flow to Station 6 during low-flow season for years without building new river structures. Cost provided is ballpark figure including engineering, permitting and construction for new jetty structure.															$ 750,7
		Traveling Water Screen Repair	Chain and Tensioner replacement FY 93, cost: $75,000	N/A Given status of industrial system.													$ 184,526	
		Structure Replacement	Project started as painting of existing "super structure." Engineering study determined replacement more cost effective. Project planned for FY 2008/09. Kernan Construction Bid was $415,000 in 2008. Project cancelled when Evergreen Pulp mill ceased operation.											$ 505,617				
	Subtotal - Industrial Diversion and Pumping								$ -	$ -	$ -	$ -	$ -	$ 505,617	$ -	$ 806,845	$ 1,662,724	$ 770,9
	TOTAL - INDUSTRIAL SYSTEM								$ -	$ -	$ -	$ 1,553,379	$ -	$ 623,876	$ 38,279	$ 806,845	$ 1,662,724	$ 770,9

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ASSET INVENTORY		PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
							FY11/12 to 15/16			FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/3
Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
GRAND TOTAL*							$ 3,133,403	$ 2,432,436	$ 3,015,830	$ 3,230,724	$ 3,185,188	$ 3,328,915	$ 2,024,672	$ 5,195,199	$ 5,193,843	$ 13,368,4
	Total Costs FY11/12 - FY15/16			**2011-2016 Total**												
	Total Costs FY16/17 - FY20/21			**2017-2021 Total**			$				14,997,581					
	Total Costs FY21/22 - FY25/26			**2022-2026 Total**								$				29,111,0
*Notes: Includes all Regional/Domestic, Hydro-electric and Industrial Project Costs.				MRAR Amounts			$ 535,200	$ 406,683	$ 336,822	$ 353,604	$ 406,571	$ 486,171	$ 405,301	$ 385,904	$ 580,992	$ 594,2
				Total Funding Need			$ 3,668,603	$ 2,839,120	$ 3,352,652	$ 3,584,328	$ 3,591,759	$ 3,815,086	$ 2,429,973	$ 5,581,104	$ 5,774,835	$ 13,962,7(
				Funding Source:												
					Advance Charges		(538,000)									
					Grants		(666,000)	(1,786,729)	(1,786,729)	(720,000)	(1,350,000)					
					Hydro ReMat Revenue			(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(300,000)	(300,0(
					Reserves		-	-	-	-	-					
					Rates FY16/17		(2,302,400)	(2,302,400)	(2,302,400)	(2,302,400)	(2,302,400)	(2,302,400)	(2,302,400)	(2,302,400)	(2,302,400)	(2,302,4(
					Financing		(162,200)	(162,200)	(162,200)	(162,200)	(162,200)	(162,200)				
				Funding Needed / (Surplus)			$ 3	$ (1,712,209)	$ (1,198,677)	$ 99,728	$ (522,841)	$ 1,050,486	$ (172,427)	$ 2,978,704	$ 3,172,435	$ 11,360,3(

Legend

- : Complete 2011/12 through 2015/16
- : Complete 2016/17 through 2020/21
- : Complete 2021/22 through 2025/26
- : Complete 2026/27 through 2030/31
- : Complete 2031/32 through 2035/36
- : Need Cost Data or Engineering Study
- White :1) Projects that will reoccur beyond planning horizon (2025/26) or
  :2) Projects that are not currently required.

Priority Ranking:

Remaining Useful Life
< 2 yrs = 4
< 5 yrs = 3
Operating below efficiency or recommended life + 3
5 - 20 yrs = 2
> 20 yrs = 1

Importance
Existing threat to public health or internal safety concern = 4
Mandated regulatory requirements = 4
Potential public health or safety concern = 3
Increase service reliability or capacity = 3
Increase reliability or capacity = 3
Improve system operations and/or maintenance (O&M) = 2
It would be nice to do = 1

Redundancy
System can not function without Asset = 4
System can have limited functioning without Asset = 3
System requires asset for Emergency Operations = 2
System can function without Asset = 1

Final Priority Ranking = Average of Useful Life, Importance, and Redundancy

**Escalation Factor 1 (EF1 = 0.043) updated on 8/2016 based on Engineering News Record average escalation for San Francisco Construction Cost Index for years 2010-2016 (see sheet "SF Cost Change"). EF1 was used for all projects. Former EF2 for just labor was changed to match EF1.

CIP 26/27 – 35/36

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	ASSET INVENTORY		PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
								AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
									FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/
	Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36
								2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
	SOURCE OF SUPPLY																
R.W. Mathews Dam and Reservoir	**Ruth Lake Boom Log Repair**	Essex maintenance crew completed replacement of log boom in June of 2014. I contacted Worthington and they said expected life of the new log boom is not less than 10-15 years with proper maintenance. That said, I put replacement every 12 yers.	2	4	4	3.3	YES 1										
	Howell Bunger Valve Replacement	Cost for 36" Cone Valve from Rodney Hunt Co 800-448-8860. Major repair, and coating of existing valve done in June 2002 (cost $24,000)	1	4	4	3.0		$ 611,992									
	Ruth Bridge Painting	2014 - Quote from James-Carl Painting - Tom Shivley $70,000. Reccomended by Pat K. for every 5 yrs.														$ 144,816	
	Ruth Bridge Replacement	Quote from Big R Bridge	1	2	3	2.0								$ 739,821			
	Plunge pool repair	Variable scope and cost (extent of damage given degradation due to storm events over time). Cost shown is reasonable placeholder.	N/A														
	Dam Spillway Wall Repair/Retrofit (Phase 1)	At some point in the near future work will be required to strengthen/retrofit the spillway walls - whether triggered by HBMWD given monitoring results, or triggered by the FERC or DSOD. Two projects are proposed as placeholders until a more definitive scope is known:1)for engineering assessment and design, or minor repairs, and 2)more significant structural repairs/improvements. This project is the first of two phases.	3	3	4	3.3		$ 815,989									
	Dam Spillway Wall Repair/Retrofit (Phase 2)	At some point in the near future work will be required to strengthen/retrofit the spillway walls - whether triggered by HBMWD given monitoring results, or triggered by the FERC or DSOD. Two projects are proposed as placeholders until a more definitive scope is known:1) engineering assessment and design, or minor repairs, and 2)more significant structural repairs/improvements. This project is the second of the two phases.	2	3	4	3.0						$ 5,323,024					
	Slide Gate Hydraulics	Replace hydraulic lines and system for the dam's slidegate. (work completed by HBMWD and M&M Dive).	N/A - Done				YES 2								$ 46,159		
	TOTAL - SOURCE OF SUPPLY																

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	A	B	C	I	J	K	L	M	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
1										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/
2		**ASSET INVENTORY**		PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
3		**Assets and Proposed Projects**	**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**
4																		
17	**REGIONAL/DOMESTIC SYSTEM - Diversion and Pumping**																	
18	**Ranney Collector 1**	**Collection Laterals**	1) See Collector Wells International report, and series of engineering assessments and planning documents for Ranney lateral replacement program. Also see HBMWD July 3, 2008 memo re: CIP Development Recommendations. 2) Lead time for this project required to develop project. Includes some valve replacement and testing for water in Collector 1. If water unavailable in existing laterals in Collector 1, move to collector 1a and install new laterals. 3) Refinement of scope and cost estimate for this project required after Collector 3 lateral replacement project complete.	3	3	3	**3.0**	**YES 3**											
19		**Pump 1-1, Worthington 350hp Model 24M440 E-2 SN 6863, Motor G.E. SN FBJ608010**	Motor cleaned and dipped, 2006; Pump rebuilt from inventory 2006; 15 year lifecycle on all pumps + efficiency testing	2	3	3	**2.7**											
20		**Pump 1-2, Worthington 350hp Model 24M440 E-2 SN, Motor G.E. SN RWJ420007**	Motor and pump rebuilt 1967;Tested ok in 05. Scheduled for pump test in 08, will schedule replacement based on pump test or planned for replacement after lateral replacement project	3	3	3	**3.0**											
21		**Pump 1-3, Flowserve**	New in 08, Flowserve 17EPH 4000 gpm capacity	2	3	3	**2.7**											
22		**Pump 1-4, Byron Jackson 200hp Model 20KKH, SN 390652, Motor G.E. SN: 1285068002**	Motor and pump rebuilt August 1986, $28,000.00. Tested OK in 05, scheduled for pump test in 08, will schedule replacement based on pump test	3	3	3	**3.0**											
23		**Valves and Distribution to Domestic Reservoir**	Life cycle and more detailed engineer cost estimate required. Ballpark cost and represents 1/4 of total: $4,070,725 for all collectors	3	3	3	**3.0**	**YES 11**											
24		**Paint/Galvanize Collector**	FY89, cost: $161,000 (all five collectors)	2	2	4	**2.7**											
25		**Surge Tank**	Place holder for repairs and painting, probe replacement	2	3	4	**3.0**											
26	**Ranney Collector 2**	**Engineering**	Design, Plans & Specifications, Bid CM	N/A														
		Collection Laterals	1) Cleaned laterals, pump tested and installed new lateral valves, August 05. 2) See Collector Wells International report, and series of engineering assessments and planning documents for Ranney lateral replacement program. Also see HBMWD July 3, 2008 memo re: CIP Development Recommendations. 3) Refinement of scope and cost estimate for this project required after Collector 3 lateral replacement project complete.	3	3	3	**3.0**	**YES 3**											
		Pump 2-1, Flowserve 350hp Model 20EKH 4 Stage , Motor	Pump and motor replaced in 2007	2	3	3	**2.7**											

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	A	B	C	I	J	K	L	M	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU			
										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/			
2	**ASSET INVENTORY**			**PRIORITIZATION RANKING**					**COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)****												
3	**Assets and Proposed Projects**		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**			
4																					
29	**Ranney Collector 3**	**Pump 2-2, Worthington 350hp Model 24M440 E-2 SN6872 , Motor G.E. SN RWJ420006**	Motor rebuilt 1987, installed 2001, pump rebuilt 1987, scheduled for pump test in 08, will schedule replacement based on pump test	2	3	3	**2.7**														
30		**Valves and Distribution to Domestic Reservoir**	Life cycle and more detailed engineer cost estimate required. Ballpark cost and represents 1/4 of total: $4,070,725 for all collectors	3	3	3	**3.0**	**YES 11**													
31		**Paint/Galvanize Collector**	FY89, cost: $161,000 (all five collectors)	2	2	4	**2.7**														
32		**Surge Tank**	Place holder for repairs and painting, probe replacement	2	3	4	**3.0**														
33		**Engineering**	Bid & CM	N/A																	
34		**Collection Laterals We need the actual final cost of project.**	See Collector Wells International report and series of engineering assessments and planning documents for Ranney lateral replacement program. Replace 3 laterals at Collector 3. Replacement of laterals valves already done (FY 2009-10) as well as preparation of plans and specs.	1	3	3	**2.3**	**YES 3**													
35		**Pump 3-1, Flowserve Model 18ENH-6 stage pump. S/N 1408NSH01908 1. Motor- 400 HP US motor. S/N 422707-006**	Pump purchased in FY-13/14. Not installed umtil March 2016 due to other higher priority work. New Pump, 316SS lube tubes, 416 SS shafts, Bronze bearings & Motor. Scheduled to be installed in March 2016	2	3	3	**2.7**														
36		**Pump 3-2, Flowserve Model 18ENH-6 Stage pump , SN 1311NSH01720 1, Motor - 400 HP US Motor SN: U11 2013746 S0100**	New Pump, 316SS lube tubes, 416 SS shafts, Bronze bearings & Motor. Scheduled to be installed in March 2014	2	3	3	**2.7**														
37		**Pump 3-3, Flowserve Model 16ENL-8 stage, SN 1311NSH01719-1, Motor - 250 HP US Motor. SN: U11 20130744 0001 R0001**	Complete new installation. Pump purchased FY 13/14 - New pump, motor, Column, 316 SS lube tubes,416 SS line shafts, bronze bearings, motor stand.. - Purchased through Pacific Water Resources.	2	3	3	**2.7**														
38		**Valves and Distribution to Domestic Reservoir**	Life cycle and more detailed engineer cost estimate required. Ballpark cost and represents 1/4 of total: $4,070,725 for all collectors	3	3	3	**3.0**	**YES 11**													
39		**Paint/Galvanize Collector**	FY89, cost: $161,000 (all five collectors)	2	2	4	**2.7**														
40	**Collector 4**	**Engineering**	Design, Plans & Specifications, Bid CM	N/A						$ 104,890											
41		**Collection Laterals**	1) See Collector Wells International report, and series of engineering assessments and planning documents for Ranney lateral replacement program. Also see HBMWD July 3, 2008 memo re: CIP Development Recommendations. 2) Refinement of scope and cost estimate for this project required after Collector 3 lateral replacement project complete.	3	3	3	**3.0**				$ 2,876,349										
42		**Pump 4-1, Flowserve**	New in 08 Flowserve 17EPH 4000 gpm capacity	2	3	3	**2.7**					$ 280,999									

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	A	B	C	I	J	K	L	M	AI	AM	AN	AO	AP	AQ	AR	AS	AT	AU		
1										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/		
2	**ASSET INVENTORY**			**PRIORITIZATION RANKING**					**COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)****											
3	**Assets and Proposed Projects**		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**												
4									**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**		
43	**Ranney**	**Pump 4-2, Flowserve 350hp Model 20EKH 4 Stage , Motor**	Pump and motor replaced in 2007	2	3	3	**2.7**					$ 280,999								
44		**Valves and Distribution to Domestic Reservoir**	Life cycle and more detailed engineer cost estimate required. Ballpark cost and represents 1/4 of total: $4,070,725 for all collectors	2	3	4	**3.0**	**YES 11**												
45		**Paint/Galvanize Collector**	FY89, cost: $161,000 (all five collectors)	2	2	4	**2.7**													
46		**Surge Tank**	Place holder for repairs and painting, probe replacement	2	3	4	**3.0**													
47	**Ranney Collector 5**	**Rehab vs. Decommission**	Engineering study required	3	1	1	**1.7**	**YES 12**												
48		**Harden Collector to prevent vandalism**	Depends on Engr Study Results. Ball park cost provided	N/A Given status of collector																
49		**Replace Collector Door**	Planned in FY 03-04 Budget. Depends on Engr. Study Results																	
50		**Paint/Galvanize Collector**	FY89, cost: $161,000 (all five collectors). Depends on Engr. Study Results																	
51	**Subtotal - Diversion and Pumping**								$ -	$ 104,890	$ 2,876,349	$ 561,998	$ -	$ -	$ -	$ -	$ -	$ -		
52	**REGIONAL/DOMESTIC SYSTEM - Water Treatment**																			
53	**Chlorination Facility**	**Upgrade Existing system**																		
54		**Install CL2 system scrubber**	Install a Cl2 scrubber to mitigate the hazard of CL2 Instead of installing a Hypochlorite system I propose we consider this as the best method to reduce the hazard of Cl2, vs going with Hypochlorite due to higher costs, more maintenance required, and more frequent delivery's required. DHD Need discussion with Management and Board.	1	3	2	**2.0**													
55		**Replace Cl2 injection line, install double containment**	This will replace the existing chlorine injection line between the chloring room and West End Rd. injection point and make it double contained per current requirments for new construction.	3	4	4	**3.7**													
56		**Chlorine System Upgrade to Hypochlorite**	Reference March 29, 2004 report from Kennedy/Jenks Consultants. Need discussion with Management and Board.	4	4	4	**4.0**	**YES 4**												
57	**"CT" Tank**	**General Maintenance and Repairs and painting**	CT tank put in service in 1997. This work is for periodic major maintenance and painting (15 year cycle)	2	4	3	**3.0**													
58		**CT Tank Fabric Baffles**	One baffle replaced in 2010 ($16,300). Engineering study required to establish life cycle, but estimated replacement before 2018	2	4	3	**3.0**													

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	A	B	C	I	J	K	L	M	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU		
										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/		
2	**ASSET INVENTORY**			PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**											
3	**Assets and Proposed Projects**		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**		
4																				
59	**Regional Treatment Plant - Turbidity Reduction Facility (TRF)**	**TRF Filter Building - Structural Components**	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A																
60		**TRF Replace two Blowers (for filter air wash function)**	10 yr repair cycle ($35,000 each 75 Hp Centrifugal Multi-stage with soft start/intake and exhaust silencers, surge control)	2	4	3	**3.0**													
61		**TRF Filter Beds - Replace Filter Media (Anthracite)**	The Maintenance Projects Plan assumes periodic partial replacement of the anthracite. At a lesser frequency, total replacement will be required. (Quantities: 450CY/12,150CF/322tons. Eff. Size=1.40-1.60mm, Uniform. Coeff=1.40 or less)	2	4	4	**3.3**	**YES**												
62		**TRF Chemical Feed Building - Structural Components**	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A																
63		**TRF Replace Emergency Generator**	Replacement of 80 kW generator (assumes transfer switch, etc. remains)	2	3	4	**3.0**		$ 67,999											
64		**TRF Chemical Feed Systems - Secondary coagulant (Alum)**	Replace pumps, drives and valves 10yr life cycle (2 pumps, pipes and controls, $70,000) For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR.	2	4	4	**3.3**													
65		**TRF Chemical Feed Systems - Primary coagulant system #2 (Alum)**	In FY 12/13 we installed 2 new Alum chemical pumps. These pumps were sized more appropriate to our lower end chemical dosages. The orignal system is still fully functional for high dosage delivery if needed.	2	3	3	**2.7**													
66		**TRF Chemical Feed Systems - Cationic Polymer for coagulation aid**	Replace pumps, drives and valves 10yr life cycle (330 gallon tote, platform scale, metering pumps P-631 & 632, controls, $70,000) For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR.	2	4	4	**3.3**				$ 35,716									
67		**TRF Chemical Feed Systems - Non-ionic Polymer for Filter aid & Pre-treat filter**	Replace pumps, drives and valves 10yr life cycle (120 gallon tote, scales, mixer, drum pump, 800 gal day tank Metering pumps P-641, 642,& P-652 controls) Replaced P-652 in Nov. 2013. For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR.	2	4	4	**3.3**				$ 47,622									

	A	B	C	I	J	K	L	M	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU		
1										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/		
2		ASSET INVENTORY		PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**											
3		Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)												
4									26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36		
66		TRF Chemical Feed Systems - Non-ionic Polymer for Pre-treat	Rebuild pumps and valves 10yr life cycle For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR Pumps 651, 653, 654 are unused.	2	4	4	3.3													
69		TRF Chemical Feed System - Sodium Hypochlorite	Replace pumps and valves 10yr life cycle (3 metering pumps, 1 recirculation pump, valves, controls, $70,000) For CIP we should only fund for pump and Starter replacement. Piping and other small equipment should be done out of Maintenance contigency in MRAR.	2	4	4	3.3													
70		TRF Chemical Feed System - Caustic System for pH control.	Currently system not in use and not likely to be required. No cost calculated at this time	N/A																
71		TRF Plant Water System	Replace pumps and valves 10yr life cycle	2	4	4	3.3								$ 152,789					
72		TRF Washwater Recovery Basins - Chain and Flight System	Replace chain and flights, motors & gears	2	4	4	3.3													
73		TRF Sludge Beds - Structural Components	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A																
74		TRF Backwash Pump Building - Structural Components	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A																
75		TRF Backwash Pumps	15-20 year life expectancy (2 ea 250 hp split case centrifugal pumps with soft start, $105,000 each)	2	4	4	3.3													
76		TRF Rapid Mix Building Structural Components	Structural work, of significance, on this building is not anticipated to be necessary during planning horizon (thru 2025/26). Cost shown are reasonable estimate to conduct engineering assessment or maintenance work during this planning horizon.	N/A																

t - Turbidity Reduction Facility (TRF)

HUMBOLDT BAY MUNICIPAL WATER DISTRICT

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									AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU		
1										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/		
2	**ASSET INVENTORY**			PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**											
3	**Assets and Proposed Projects**		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**		
4																				
77	**Regional Treatment Plan**	**TRF Washwater Pre-Return System (Pressure Filter)**	Replacement of Pressure Filter System is not anticipated in planning horizon (through 2025/26). Costs shown are reasonable estimate to assess condition and determine replacement timeframe and/or to perform maintenance. This is for sand blasting and painting	2	3	4	**3**													
78		**TRF Washwater Pre-Return System (Washwater return pumps)**	Replacement of 1 Washwater return pump was necessary in 2014. Propose we consider 10 yr life cycle	2	3	3	**2.7**													
		TRF- Instrumentation Replacement	This project replaces level sensorsl,	2	4	4	**3.3**													
80		**TRF - SCADA system upgrade**																		
81		**TRF - Valve network upgrade**	Replsace Valve operator network. Phased project	2	3	3	**2.7**													
82		**TRF - Valves**		2	3	3	**2.7**		$ 203,997											
83	**Subtotal - Water Treatment**								$67,999	$0	$83,338	$0	$0	$0	$152,789	$0	$0	$		
84	**REGIONAL/DOMESTIC SYSTEM - Water Storage and Transmission**																			
85	**Korblex Domestic Reservoir**	**Reservoir Painting**	Last painted in combination with ID Reservoir in 1998 total cost for both reservoirs: $346,149	3	3	3	**3.0**											$ 437,24		
		Replace roof and Paint entire reservoir	Due to structural review of roof in August of 2015 it was determined that roof replacement was required. It was also determined that while we had painters there it would be the right time to paint the entire reservoir.	4	4	4	**4.0**													
87		**General Maintenance and Cleanout**	(3)- Ops – Maint techs and (1) Supervisor for 10 days	2	3	4	**3.0**		$ 25,733					$ 29,593						
88		**General Repairs**	Minor repairs and paint touch up as needed	2	3	4	**3.0**	**YES** $_6$	$ 13,600											

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										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/
2		**ASSET INVENTORY**		PRIORITIZATION RANKING						COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**								
3		**Assets and Proposed Projects**	**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**
89		**Install new valve below 1 Mg reservoir**	Installation of this valve would make isolating parts of the system easier and reduce the need to bypass the reservoir to isolate the South feed (Eka, Arc, HCSD) and still serve the North feed (McK, BL, FB).	4	3	3	**3.3**											
90		**Peninsula - Replace 15" DW line**	At some point in the near future, capacity of the domestic water pipeline on the Peninsula will need to be addressed. It is currently operating very close to its maximum capacity. This project assumes an upgrade to 3.75 miles of the 15-inch pipeline. Detailed engineering study required, but the project represents a reasonable placeholder.	2	3	4	**3.0**	**YES** $_{8}$										
91		**Peninsula - Replace 18" DW Techite line**	Replace Techite pipeline (1.87 miles) at southern end of Samoa Peninsula. District applied for and should receive FEMA Hazard Mitigation Grant (which will fund 75% of the project).	3	3	4	**3.3**	**YES** $_{9}$										
		Pipeline on NCRA Trestle over Mad River (Emergency Repair)	Completed temporary trestle repair in 2009. Pipeline will be difficult to maintain & repair if trestle is not replaced within 5 years.	N/A - Done				**YES** $_{10}$										
93	**Transmission System Pipelines and Appurtenances**	**Replace pipeline on NCRA Trestle over Mad River (Blue Lake-FG-CSD River Crossing)**	Must replace current pipeline crossing over Mad River (or fix RR bridge). Cost based on replacement with new aerial crossing per W&K feasibility report (May 2009). District has applied for Prop. 84 grant via Northcoast IRWMP and for a FEMA Hazard Mitigation Grant.	3	3	4	**3.3**	**YES** $_{10}$										
94		**Peninsula Slough Crossing (Double Pipeline)**	Piling structure replaced in 2003, including upgrade to current seismic standards. Likely will not need replacement until 2030's or 2040's	N/A - Done														
95		**Peninsula Slough Crossing (Single Pipeline)**	Board policy/business decision required re: Industrial Water System. If asset is to be maintained, need engineering estimate re: condition and cost	N/A				**YES** $_{15}$										
96		**Pipeline Engineering Study**	This Engineering study will support Pipeline replaceement project below by determining area of greatest need.	N/A														
97		**Pipeline Replacement Program (system wide)**	Timing and extent yet to be determined. Establish monitoring program to assess condition and determine when programmatic replacements is necessary. This will be a very costly program over time.	1	3	3	**2**											
98		**Mainline Valve Replacement Program**	Engineering study required to determine life cycle and detailed cost estimate. This represents ballpark costs spread out over 10 years for programmatic replacement of mainline valve.	2	3	4	**3.0**											

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	ASSET INVENTORY			PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
									FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/	
	Assets and Proposed Projects		Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36
		Valve Box 1	This is for structural repairs of the vault itself. Valve replacement is included in Mainline Valve Replacement Project (above)	2	2	1	**1.7**											
		Valve Box 2	This is for structural repairs of the vault itself. Valve replacement is included in Mainline Valve Replacement Project (above)	2	2	1	**1.7**											
	Transmission System - Samoa Booster Pump Station	**General Building & Fence Repairs**	148 tons asphalt overlay, re-roof, 3 roof hatches replaced, 500ft of fence and 3 double wide gates replaced, assumed 30 yr life	2	2	1	**1.7**											
		Samoa Booster Station - Replace 100 hp Pump & Motor	Installed March 1996 (Floway SN: 21620-1-1, Motor G.E. SN L405TP16). Evaluate in 12 years given 15-20 yr life expectancy	2	3	3	**2.7**											
		Samoa Booster Station - Replace 200 hp Pump & Motor	Installed March 1996 (Floway SN: 21620-3-1, Motor G.E. SN L447TP16). Does not run as frequently as 100 hp pump. Evaluate in 12 years given 15-20 yr life expectancy	2	3	1	**2.0**											
	Transmission System - Cathodic Protection	**Jackson Ranch Anode Bed**	Approximately $115,000 in construction and engineering costs per well assuming each well is constructed individually. Includes mobilization, abandonment, drilling, replacement, labor and engineering services.	2	3	1	**2.0**	**YES**										
		299 Anode Bed	Approximately $115,000 in construction and engineering costs per well assuming each well is constructed individually. Includes mobilization, abandonment, drilling, replacement, labor and engineering services.	2	3	1	**2.0**	**YES**										
		Jane's Creek Anode Bed	Approximately $115,000 in construction and engineering costs per well assuming each well is constructed individually. Includes mobilization, abandonment, drilling, replacement, labor and engineering services.	2	3	1	**2.0**	**YES**										
	Subtotal - Water Storage and Transmission																	
	REGIONAL/DOMESTIC SYSTEM - Support Systems																	
		Distribution System	Replace poles, wire, and cross arms. MOVED TO AN ANNUAL MAINTENANCE ITEM SEE MRAR	2	3	4	**3.0**	**YES** 13										

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										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/
ASSET INVENTORY			**PRIORITIZATION RANKING**					**COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)****											
Assets and Proposed Projects		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**
Electrical Systems and Equipment	**Starters**	Replace Domestic pump starters (last project 2007-09, $116,000)	2	3	3	**2.7**			$ 174,816								
	2MW Generator	Replace Generator (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	2	3	3	**2.7**											
	Switchgear for 2MW Generator	Replace Switchgear (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	2	3	3	**2.7**											
	Transformer for 2 MW Generator 2,500 KVA	Replace Transformers (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	2	3	3	**2.7**											
	35 KW Generator		2	2	2	**2.0**											
	Main switch gear (incoming)	Replace Incoming Switchgear (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	2	3	4	**3.0**											
	Replace 12kV Transformers on DW Collectors	Replace Collector Transformers (Reference July 20, 2009 Report - Essex High Voltage System Condition Assessment Report)	3	2	4	**3.0**	**YES** [14]										
Communications and Control	**Collector Telemetry Upgrade**	This project was last completed in FY 14/15. This project put wireless communications from collectors 2,3 & 4 to collector 1. From Collector 1 the information gets to the control center via a fibre optic link.	2	2	4	**2.7**				$ 40,819							
	Fibre Optic link to Collector 1	This link was installed in FY 14/15. Assume 20 yr life.	1	3	3	**2.3**										$ 8,548	
	Fiber Optic Link to Collector 2	This project consists of engineering, permitting & construction of an underground 12KV electrical feed and new fiber optic cable from Essex to Collector 2. The project would also include elements that would	3	3	3	**3.0**											
	Essex Control System Upgrade Phase 1	FY87, cost: $118,000 Planning phase	3	3	3	**3.0**						$ 55,756					
	Essex Control System Upgrade Phase 2	Construction phase	4	4	4	**4.0**							$ 414,299				
Building Facilities	**Construct Sandblasting Building**	Assume 20'x40' and $100/SF	2	2	2	**2.0**											
	Build Maintenance Shop Addition	Assume 75'x40' and $150/SF	2	2	1	**1.7**											
	Emergency Operations Center at TRF	Assumes two storey, 40'x60' EOC w/ Line Shed below at TRF (see Option 3, "Essex Control Facilities Plan", GHD Aug. 2016)	1	2	2	**1.7**											
	Build Break Rm and Training Center Addition		3	3	2	**2.7**											
Subtotal - Support Systems								$ -	$ 174,816	$ 40,819	$ -	$ 55,756	$ 414,299	$ -	$ -	$ 8,548	$

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	A	B	C	I	J	K	L	M	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU
										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/
2	**ASSET INVENTORY**			PRIORITIZATION RANKING					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**									
3	**Assets and Proposed Projects**		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**
4																		
127	**TOTAL - REGIONAL/DOMESTIC SYSTEM**								$ 67,999	$ 279,706	$ 3,000,506	$ 561,998	$ 55,756	$ 414,299	$ 152,789	$ -	$ 8,548	$ -
128	**HYDRO-ELECTRIC POWER PLANT**																	
130	Hydro-Electric Plant	**Ruth Hydro Sump Pump Replacement**	Replaced in 1999, Replacement cycle 15 years. Barnes Submersible non-clog pump model 4SE5094L														$ 9,051	
131		**Transformer, Oil Filled 2000 KVA**	Need maintenance/repairs schedule/life cycle					YES 2										
132		**2 1048 KW horizontal shaft Francis turbines (Boving)**	Need maintenance/repairs schedule/life cycle					YES 2					$ 624,409					
133		**2000 KVA Transformers**																
134		**2, 1000 KW AC Generators, Brushless, (Ideal)**	Need maintenance/repairs schedule/life cycle					YES 2										
135		**Replace Electrical/Mechanical Components**	Estimated cost of $800,000 - $1,200,000 based on GEI Report Assessment of Mechanical and Electrical Gosselin Hydro June 2005 (line 20 -25 included in this estimate) See CIP Development Recommendations dated July 3, 2008														$ 2,736,586			
136		**Replace Protective relays system**						N/A, discretionary projects which must be evaluated based on economics and policy factors.										
137		**Hydraulic systems, governors, controls, electric panels, circuit breaker, Auto Synchronizer**	Need maintenance/repairs schedule/life cycle					YES 2										
138		**Interrupter switchgear panel, Westinghouse, (located outside next to transformer) 600 amp**	Need maintenance/repairs schedule/life cycle, $18,000					YES 2										
139		**Static Exciter**																
140		**30 KW generator**																
141		**Battery Bank Replacement**							$ 23,652									
142		**Dedicated Hydro Study**	Need input for project scope and cost															
143	**TOTAL - HYDRO-ELECTRIC POWER PLANT**								$ 23,652	$ -	$ -	$ -	$ 624,409	$ 2,736,586	$ -	$ -	$ 9,051	$

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									FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/
ASSET INVENTORY			**PRIORITIZATION RANKING**					**COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)****									
Assets and Proposed Projects		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**
INDUSTRIAL SYSTEM - Water Storage and Transmission																	
Terminal Industrial Reservoir	**Reservoir Painting**	Painted 1998	N/A Given status of industrial system.														
	General Maintenance and Cleanout	Cleanout in 1997, $16,733 Realignment of the boiler ash piles may affect the area we have used for depositing past clean out spoils. This could force us to look into a more expensive disposal alternative. FY01. Cleaned in 2007, $23,000, approximately 5 year cycle															
	General Repairs	Roof Beam Replacement FY88, cost: $110,000															
Surge Tower	**Engineering Analysis**						**YES** [19]										
	General Repairs, replace	Engineering Analysis Required. All part costs provided for dismantling only.					**YES** [19]										
Transmission Pipelines	**42" RW pipeline TV inspection**	FY92 cost: $18,500, Inspection required to estimate repairs and costs					**YES** [20]										
Subtotal - Industrial Storage and Transmission								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$
INDUSTRIAL SYSTEM - Diversion and Pumping																	
Pump Station 6	**Pump 6-1, Worthington 700hp, Model 28hh1200 3 stage 30.1% below pump curve, repair now according to 05 Flowserve pump tests**	Pump rebuilt in 1983, scheduled for pump test in 07	N/A Given status of industrial system.														
	Pump 6-2, Worthington 700hp, Model 28hh1200 3 stage	Pump rebuilt in 1988, scheduled for pump test in 07															
	Pump 6-3, Byron Jackson, 200hpSN: 95WC0014 16.7% below pump curve, repair now according to 05 Flowserve pump tests	Installed 12-6-95, scheduled for line shaft bearings 08, will schedule replacement based on pump test															
	Pump 6-4, Worthington 700hp, Model 28hh1200 3 stage	Pump rebuild 1989 will schedule replacement based on pump test															

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										FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/			
	ASSET INVENTORY			**PRIORITIZATION RANKING**					COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**												
	Assets and Proposed Projects		**Comments**	**Remaining Useful Life**	**Importance**	**Redundancy**	**Final Priority Ranking**	**Recommended Focused Engineering Study to Compile More Information (Y/N)**	**26/27**	**27/28**	**28/29**	**29/30**	**30/31**	**31/32**	**32/33**	**33/34**	**34/35**	**35/36**			
157	**Pump Station 6**	**Pump 6-5, Worthington 700hp, Model 28hh1200 3 stage**	Pump rebuilt in 1986, Tension bearing installed in 08, will schedule replacement based on pump test	N/A Given status of industrial system.																	
158		**Pump 6-6, Byron Jackson, 200hpSN: 95WC0013**	Installed 12-6-95, will schedule replacement based on pump test																		
159		**Fore bay Inlet Screens and Debris Rake**	10 year life cycle																		
160		**Rock Weir Extension**	Channel work and construction of gravel berm (per Corps & DFG permits and HCP) may ensure flow to Station 6 during low-flow season for years without building new river structures. Cost provided is ballpark figure including engineering, permitting and construction for new jetty structure.																		
161		**Traveling Water Screen Repair**	Chain and Tensioner replacement FY 93, cost: $75,000																		
162		**Structure Replacement**	Project started as painting of existing "super structure." Engineering study determined replacement more cost effective. Project planned for FY 2008/09. Kernan Construction Bid was $415,000 in 2008. Project cancelled when Evergreen Pulp mill ceased operation.																		
163	**Subtotal - Industrial Diversion and Pumping**								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$			
164	**TOTAL - INDUSTRIAL SYSTEM**								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$			

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ASSET INVENTORY		PRIORITIZATION RANKING					FY11/12 to 15/16		FY16/17 to 20/21		FY21/22 to 25/26		FY26/27 to 30/31		FY31/32 to 35/
							COST ESTIMATE BY FISCAL YEAR (Costs are Escalated)**								
Assets and Proposed Projects	Comments	Remaining Useful Life	Importance	Redundancy	Final Priority Ranking	Recommended Focused Engineering Study to Compile More Information (Y/N)	26/27	27/28	28/29	29/30	30/31	31/32	32/33	33/34	34/35	35/36
GRAND TOTAL*							$ 91,651	$ 279,706	$ 3,000,506	$ 561,998	$ 680,165	$ 3,150,885	$ 152,789	$ -	$ 17,599	$ -
	Total Costs FY11/12 - FY15/16				**2011-2016 Total**											
	Total Costs FY16/17 - FY20/21				**2017-2021 Total**											
	Total Costs FY21/22 - FY25/26				**2022-2026 Total**		$				4,614,026	$				3,321,27

*Notes: Includes all Regional/Domestic, Hydro-electric and Industrial Project Costs.

MRAR Amounts

Total Funding Need

Funding Source:

- Advance Charges
- Grants
- Hydro ReMat Revenue
- Reserves
- Rates FY16/17
- Financing

Funding Needed / (Surplus)

Legend

- : Complete 2011/12 through 2015/16
- : Complete 2016/17 through 2020/21
- : Complete 2021/22 through 2025/26
- : Complete 2026/27 through 2030/31
- : Complete 2031/32 through 2035/36
- : Need Cost Data or Engineering Study
- White :1) Projects that will reoccur beyond planning horizon (2025/26) or
- :2) Projects that are not currently required.

Priority Ranking:

Remaining Useful Life

< 2 yrs = 4
< 5 yrs = 3
Operating below efficiency or recommended life + 3
5 - 20 yrs = 2
> 20 yrs = 1

Importance

Existing threat to public health or internal safety concern = 4
Mandated regulatory requirements = 4
Potential public health or safety concern = 3
Increase service reliability or capacity = 3
Increase reliability or capacity = 3
Improve system operations and/or maintenance (O&M) = 2
It would be nice to do = 1

Redundancy

System can not function without Asset = 4
System can have limited functioning without Asset = 3
System requires asset for Emergency Operations = 2
System can function without Asset = 1

Final Priority Ranking = Average of Useful Life, Importance, and Redundancy