HARGEISA WATER AGENCY

COMMERCIAL FINANCE PRE-FEASIBILITY REPORT

Prepared for:

PUBLIC-PRIVATE INFRASTRUCTURE ADVISORY FACILITY

20 December 2018

USD 1 = SLSH 10,500

1. EXECUTIVE SUMMARY

The Hargeisa Water Agency (HWA) presents opportunities for catalytic investments ranging from US$30,000 to US$2.5m that could cumulatively triple HWA revenues from an average of SLSH 28bn (US$ 2.7m) to over SLSH 82bn (US$7.8m) within 3 years. The key opportunities lie in investments that leverage grant-financed infrastructure to generate additional revenue. Donors are currently implementing infrastructure projects worth more than US$40m to develop and link new water supply systems to an upgraded transmission line and distribution network in Hargeisa City. Funding gaps and surplus capacity generated by these projects create commercially viable windows for investment. In addition, there are smaller investments that could help HWA optimize its existing operations. Specific investments include:

1. **Reducing energy costs and the associated foreign-exchange risk of relying on diesel:** HWA generates power at an estimated cost of US$0.24/kWh. A vendor-financed solar power transaction to supply 20% of HWA's power requirements is financially viable but would not make a significant difference to HWA's cash flow. However, diversifying some of the utility's water supply production away from diesel could help build resilience against volatility in diesel prices and supply chains. Developing a decentralized solar system to operate borehole pumps in the aquifers at Hora Haadley or the tanker filling station in Investment 4 could have strategic value for HWA.

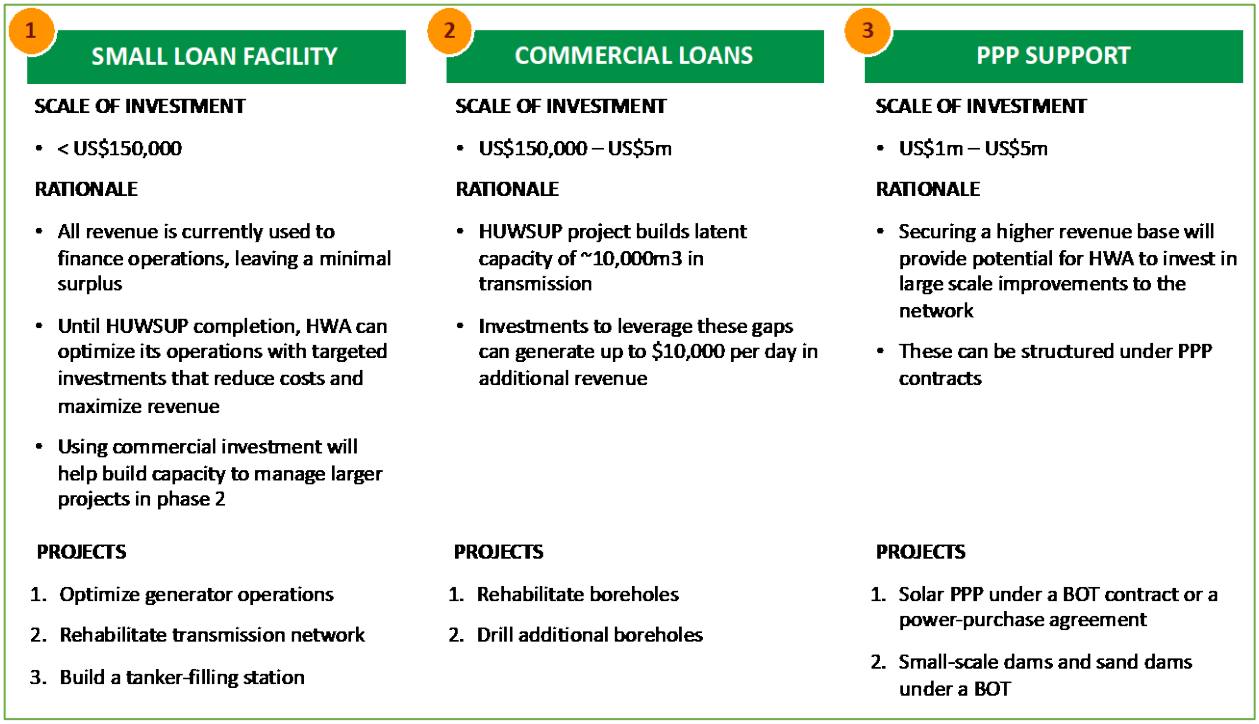
2. **Optimizing existing pump and generator operations:** HWA relies entirely on pumps and generators to extract and transport water from its boreholes into Hargeisa city. However, the utility does not have a trained electrical engineer on staff to help optimize how these systems operate. Specific investments could include upgrading and resizing cabling to reduce losses, installing variable frequency drives to optimize pump operations, and installing synchronization panels to enable more sophisticated load sharing across the generators. Potential energy savings could range from 10-50%, translating to annual savings of at least US$400,000.

3. **Leveraging the new pipeline to produce and distribute more water:** Increasing water supply into Hargeisa City offers HWA and investors the highest rate of return because the utility has a strong record of monetizing its scarce water resources. Donors are currently building a new pipeline from the wellfield in Geed Deeble, tripling transmission capacity from 10,000m3/day to 30,000m3/day into the city. Investing in new boreholes to utilize surplus transmission capacity in the new pipeline could generate more than US$3.3m in revenue a year.

4. **Repurposing the existing pipeline to build a dedicated tanker filling station:** While tankers are not a desirable water supply solution in the long term, HWA will have to continue supplying water through public and private tankers for the foreseeable future. The utility can optimize its distribution strategy by rehabilitating the existing pipeline and building a dedicated tanker filling station at Byo-Khadir. This will also help ensure the existing pipeline serves as a back-up to the new donor-financed transmission line. The tanker filling station could help HWA generate an additional US$1.3m in revenue each year.

5. **Reducing technical losses:** HWA has identified three critical points along the existing transmission pipe and in the distribution network that lose an estimated 8,400m3 of water per year. Assuming an average tariff of US$1/m3, these physical losses have a financial cost of US$8,400 annually. According to the utility's engineers, it would cost US$7,260 to fix the problems in the transmission pipes, indicating positive returns within a year.

Figure 1: HWA Investment Summary



2. HWA WATER SUPPLY OPERATIONS

HWA is a state-owned enterprise that currently provides water services to over 200,000 people in Hargeisa, the capital of Somaliland. The utility operates a water network of 21,000 household connections, 400 water kiosks, and 3 water tanker standpipes. Despite limited infrastructure and storage capacity the utility currently extends services to 30% of the city's population. The majority of these connections are concentrated in the northern half of the city with households in the south depending on alternative sources of water, delivered by tankers, that are often 5-6 times as costly.

HWA draws all of its water from 12 boreholes in Geed Deeble, which is located 20km from the city. The aquifers in this area have been a reliable source of water for the city, with yields remaining stable even during the recent drought period in 2016/17. Water from the boreholes is pumped to a reservoir at the Geed Deeble Pumping Station where four booster pumps push the water up a 300m gradient to the "Chinese Reservoir" – Hargeisa's main reservoir – via a booster station at Byo-Khadir. The borehole pumps are operated for 23 hours each day and extract an average of 50m3 of water per hour. Total water production is not currently metered but is estimated to be 13,500m3/day. This is higher than HWA figures, which are based on an estimated volume of water that is distributed from Chinese Reservoir.

Table 1: HWA Borehole Pump Estimated Yield

Pump ID	Pump Size	Year of Installation	Estimated Potential Yield	Current Pumping Hours	Current Operating Yield
	kW	Year	m3/hr	hrs	m3/day
K3	18.5	2000	40	23	913
K4	26.0	2005	45	Not in use	Not in use
K5	18.5	1991	52	23	1,198
K6	18.5	2003	64	23	1,477
K7A	15.0	2002	47	23	1,090
K7B	22.0	2013	63	23	1,449
K8	18.5	1991	55	23	1,263
K9	15.0	2001	34	23	778
K10	22.0	2013	63	23	1,440
K11	18.5	1999	40	23	911
K12	18.5	2003	38	23	871
K13	18.5	2012	45	Not in use	Not in use
K14	18.5	2010	45	23	1,035
K15	22.0	2010	50	23	1,151

The current transmission pipeline was built under a project financed by China in the 1970's and consists of two parallel 300mm pipes that supply up to 9,000m3 of water to the Chinese Reservoir a day. The ongoing donor-financed Hargeisa Urban Water Supply Upgrade Project (HUWSUP) is building a new 600mm pipeline that will increase capacity to 25,000m3/day. The infrastructure works involve rehabilitating the wellfield collector network, building the New Geed Deeble Pumping Station (NGDPS), and increasing water production by rehabilitating existing boreholes and drilling new boreholes in Geed-Deeble, Las Dur, and Hora Haadley. These interventions will increase HWA's water supply by 50% to an estimated 15,000m3 a day. The current plans involve decommissioning the existing pipeline once the HUWSUP project is complete. The HUWSUP project was initially meant to be commissioned in April 2018 but has faced construction delays and is currently scheduled to become operational towards the end of 2019.

In parallel, KfW is supporting a US$20m investment to expand the distribution network within Hargeisa City. The expanded distribution network will enable HWA to extend its water services to customers in the southern part of the city. The project relies on the increased water supply from the HUWSUP project to be successful.

Project Note: Facilitating a shift to data-driven management

Water production at the boreholes and distribution via the booster stations and Chinese Reservoir are not metered. An assessment of the borehole pump specifications and HWA operations indicates that the utility is producing an estimated 13,500m3 of water from the Geed-Deeble boreholes. An analysis of HWA's non-revenue water revealed that HWA discounts water that is used to irrigate fields near the boreholes. The project team has worked with HWA to analyze the monetary value of this water and recommended that HWA monitor the volume of water that was distributed for irrigation. HWA has financed the installation of meters to improve how they measure water production and distribution. The utility is exploring whether and how it can start charging a small fee for agricultural water supply in Geed Deeble.

3. HWA COMMERCIAL OPERATIONS

HWA's operations are relatively efficient with steady revenues of at least US$200,000 each month since 2014. Collections on billed revenue is estimated to be above 90%, highlighting the strength of HWA's commercial operations. The utility has a rising block volumetric tariff but generally charges flat rates because most of its domestic meters are not functional.

HWA faces a number of factors that create financial bottlenecks that restrict its ability to invest in further improving and expanding services without external donor support. The utility is exposed to significant foreign exchange risk because the majority of its expenses are in U.S. Dollars while revenues are collected primarily in Somaliland Shillings (SLSH). Somaliland experienced a 30% depreciation in its currency between 2015-2017, depreciating from 7,500 to 10,500 SLSH to the USD. This was linked primarily to reduced livestock exports during the drought and may have been exacerbated by the DP World concession on Berbera port, which shifted port charges that were paid to the government in USD to DP World. In 2018 the Government took steps to stabilize the exchange rate.

HWA is particularly vulnerable to global diesel prices as it relies entirely on high-speed diesel generators to power the pumps that deliver water from its boreholes in Geed Deeble into Hargeisa City. The utility spends between 40-55% of its revenue on diesel each year. Local wholesale diesel prices increased from US$103 to US$120 per barrel, or by approximately 20%, over 2017, reflecting an underlying increase in global oil prices. The price of diesel compounded by a depreciating exchange rate led to an accumulation of debt of US$750,000 in 2017 and an additional US$180,000 in the first four months of 2018. The majority of this debt is in the form of arrears (payables) to HWA's main diesel supplier.

4. HWA POWER GENERATION AND USE

HWA spent more than US$4,400 a day, or over 55% of revenue, transporting 7,000 liters of diesel from Berbera Port to borehole and booster pumps at its well field in the Geed-Deeble catchment area in 2017. The utility's borehole and booster pumps are operated for 23hrs per day and require 975kWh of power. The utility currently operates 10 diesel generators located at the Geed Deeble and Byo-Khadir pumping stations. The generators require an estimated 3.2 million liters of diesel each year, which costs the utility between US$1.5-1.9m annually. In 2017, HWA was generating its power at a cost of US$0.24/kWh.

HWA Energy Inputs

	CURRENT	HUWSUP
Borehole Pumps	270	336
Booster Pumps	705	880
Total	**975**	**1216**

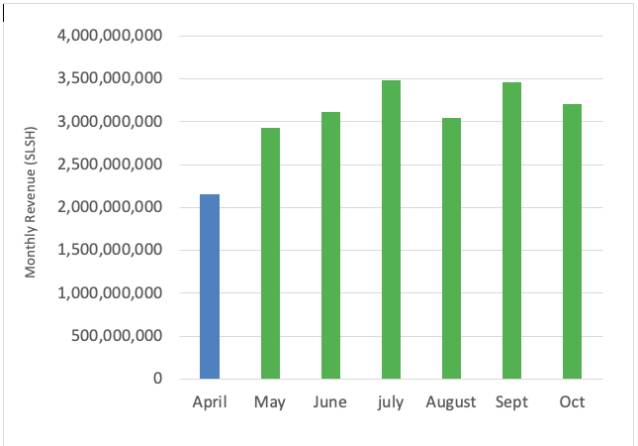
Under the HUWSUP project, the new booster pumps and all boreholes in Geed Deeble and Las Duur will be powered by new 1KVA generators located at the New Geed Deeble Pumping Station (NGDPS). The boreholes at Hora Haadley, however, will be operated by smaller on-site generators. While the new system will require more power, the new generators are significantly more efficient and are expected to help reduce HWA's energy costs. According to project calculations, total power required will increase from 975kWh to 1.2MWh but total diesel consumption will drop from 3.2m to 3.1m liters of diesel per day.

Project Note: Building resilience against macro-economic shocks

The currency and diesel price shocks had a major impact on HWA's finances because the utility was not generating a surplus and did not have the cash flow to cushion against these external developments. As a result, HWA accrued significant debt of approximately US$750,000 over 2017. The project team adjusted its implementation strategy to help the utility address its urgent challenge of increasing revenue to cover its debt. The TA strategy focused on three goals:

1. Increasing the tariff
2. Reducing NRW
3. Optimizing energy generation and utilization

Increasing the tariff: The World Bank team analyzed three years of billing and collections data to help HWA make the case for an emergency tariff increase. The proposed plan aimed to help the utility generate an additional US$989,000 a year in revenue to cope with higher diesel costs. HWA's request was approved in April 2018. Revenues in May increased by 35% in May 2018. The increase has allowed the utility to cover its current operating expenses but the outstanding debt remains.



Reducing NRW: Developing a detailed financial model with HWA highlighted a discrepancy in water production and distribution data. It emerged that HWA provides a significant quantity of water from its boreholes for small-scale farms and gardens in Geed Deeble. The project team worked with HWA to estimate the financial cost of this system. HWA is tackling this issue by installing meters to measure the quantity of water that is being distributed. The utility's management will use this information to develop a strategy for monetizing this water.

In parallel, the project team also worked with HWA to identify other major points in the system where the utility loses significant quantities of water. In discussion with HWA management it emerged that there were known areas where the transmission mains were eroding due to salinity in the soil. This intervention is included as a potential investment in this report.

Reducing cost by optimizing existing energy generation and utilization: The project team is working with HWA to reduce its operating costs by optimizing pump and generator operations. A local electrical engineer helped assess HWA operations and proposed potential investments to increase efficiency and reduce diesel consumption. The preliminary investment plan is included as a potential investment in this report. The total investment for this is expected to be approximately US$150,000. (See details below) While the net savings will not be significant for the first year, HWA has been receptive to the concept and has indicated that it will hire a full time electrical engineer as a result of the TA.

5. PROSPECTS FOR COMMERCIAL INVESTMENT

The assessment to identify the potential for commercially viable investments uses a project finance lens to ensure that any debt and equity payments can be serviced from positive cash-flows generated as a result of the intervention. This is because HWA does not generate a cash surplus and would therefore not be able to make payments out of its existing cashflow. The investments, however, may not require a project finance structure if the sponsors are willing to use debt financing to support the transaction.

Investment I: Reducing energy costs with solar power

A vendor-financed solar investment could help reduce HWA's energy costs and diversify its dependence on diesel supply chains. This investment model is used because HWA will not be able to raise the capital required for a solar power project. Furthermore, a model that shifts all operations and maintenance costs and complexities to the private operator will help HWA focus on its core business of producing and distributing water. Based on the project assessment, HWA generated its power at a cost of US$0.24/kWh in 2017, when diesel prices averaged US$0.60/liter. This provides the baseline for any proposed investment.

In order to understand the cost model, the project team assessed the capacity and ratings for HWA's borehole and booster pumps to understand total power requirements. Based on the assessment, HWA needs to operate its pumps for 8,395 hours per year. The pumps have a cumulative operating load of 975 kWh. This does not account for the additional power required to start the pumps each day. The surge capacity required is estimated to be 3-4 times the rated power of each pump. Pumps can be turned on in sequence, reducing the total installed power required. Furthermore, pumps can also be fitted with soft-starters, which reduces the extra power requirements for start-up. The solar transaction would therefore need to provide an estimated 1MW of power.

It is important to note that HWA's power requirements are at the borehole and booster pump sites, which are located up to 25km away from the city. The existing mini-grid in Hargeisa does not reach these areas. This implies that a solar investment would not be able to off-load surplus power or capture efficiencies of scale by installing a larger plant to sell power to other consumers without investing in developing transmission capacity.

Based on this data and with support from the World Bank project team, HWA has assessed preliminary proposals from two prospective solar providers in Hargeisa. Sompower, a local power company, proposed meeting 100% of HWA demand with a combination of a solar plant with battery storage supplemented with its own diesel generators. Sompower quoted a rate of US$0.32 / kWh. Equator Energy, a regional player, offered to supply 20% of HWA's power requirements, or approximately 5hrs of power each day, at a cost of US$0.15/kWh. This implies that HWA would need to continue operating its diesel generators for 18hrs each day. The total annual savings are estimated to be in the range of US$147,000 a year.

The financial analysis of the vendor financed solar project is assessed under the assumption that the vendor meets 20% of HWA demand at a rate of US$0.15/kW. The net present value (NPV) of the

transaction would be US$749,000. The cash flows are assessed over a 15-year contract period using a discount rate of 15%. The NPV is tested against three scenarios. The first two relate to understanding the risk of signing a long-term power-purchase agreement. While a fixed rate protects HWA under its present circumstances, there is a risk that Hargeisa will have access to lower cost alternatives in the future. These could, for example, include power from a national grid and/or a link to the Ethiopian grid. The first scenario assumes that HWA could access a lower-cost alternative for 100% of its power requirements at a cost of US$0.10/kWh after 10 years. The NPV in this scenario is US$(333,000). The negative NPV reflects the significant savings that HWA loses because it is locked into a more expensive contract with the solar vendor. Similarly, the second scenario assumes HWA would have access to a lower-cost alternative for 50% of its power requirements at a cost of US$0.10/kWh after 10 years. The remaining 50% of its power requirements would be met with its own generators under this scenario. The NPV for scenario 2 is US$233,000.

NPV of vendor financed solar power

Assumptions							
Discount rate	15%						
Cost of production - HWA ($/kWh)	0.24						
Cost of purchase - Vendor ($/kWh)	0.15						
Energy requirements	**Unit**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**...Year 15**
Borehole pumps	kW/hr	270	270	270	270	270	270
Booster pumps	kW/hr	705	705	705	705	705	705
Tota energy requirement	kW/hr	975	975	975	975	975	975
Energy cost savings							
HWA generators	USD	-	1,964,430	1,964,430	1,964,430	1,964,430	1,964,430
Solar vendor - 20%	USD	-	1,817,098	1,817,098	1,817,098	1,817,098	1,817,098
Total savings	**USD**	-	147,332	147,332	147,332	147,332	147,332
NPV @ 15%		749,136					

Notes:

1. Assume vendor meets 20% of HWA demand
2. Investments will not incur additional operating expenses, including staff and equipment

Sensitivity analysis	**NPV**
Lowest cost alternative available Year 10 - 100%	(322,831)
Lowest cost alternative available Year 10 - 50%	213,152
Discount rate increases to 20%	574,040

Proposed financial structure: Vendor financed with PPA

Recommended next steps:

- Short-term: Assess whether HWA can tender a bid for a vendor-financed solar investment to test if the market can provide a lower cost alternative
- Medium to long-term:
    1. Focus on structuring a small-scale solar transaction for the new boreholes at Hora Haadley; timing will need to align with HUWSUP project completion
    2. Assess potential for a large solar power project that can be anchored around the dedicated demand for 1.2MW of power from HWA for the new HUWSUP pipeline.
- Upon completion of HUWSUP: Consider solar facility to operate boreholes on existing pipeline to supply dedicated tanker filling station. See Investment III for details.

Investment II: Optimizing existing pump and generator operations

The process of assessing the solar transaction for HWA revealed a number of inefficiencies in the utility's existing pump and generator operations and in HWA's management of its diesel supplies. Preliminary discussions with electrical engineers indicated that minor adjustments could result in efficiency gains of up to 40%. The World Bank project team contracted a local engineer to provide a more detailed assessment to identify potential investments that could help HWA capture these efficiency gains. The broad findings included:

- *Optimizing generator load:* HWA currently connects its borehole and booster pumps to generators based on their use and not on the optimal load for each generator. Three generators used to run borehole pumps at Geed Deeble Pumping Station are currently operating at 40% load capacity. Rearranging the load across the three generators would allow HWA to operate only two generators at 63% load with one serving as a back-up. This would save HWA an estimated 420 liters of diesel per day, resulting in annual cost savings of more than US$127,000 assuming diesel cost of US$0.83/liter. Applying the same principle at Byo-Khadir would save HWA 480 liters of diesel per day representing annual cost savings of an additional US$145,000. Simply re-wiring pumps to different generators would not be expensive. However, a better technical solution would be to introduce the use of synchronization panels at each pumping station at a total cost of US$105,000.
- *Efficient pump operations:* HWA's pumps were sized based on expected peak flows. However, in daily operations the actual flow varies and is often significantly lower. Installing variable frequency drives (VFD) would enable HWA to generate significant energy savings of 10-50% by adjusting the power supplied to the motors to match the actual flow. Using the conservative estimate of 10%, the anticipated energy savings would reduce HWA's diesel expenditures by at least US$270,000 a year. VFD's for HWA's 11 booster pumps would cost an estimated US$42,000.
- *Resizing cabling:* The four cables from the main distribution panels to the booster pumps control panels at the Geed Deeble Pumping station are 16mm^2 copper cables, which are significantly undersized and therefore inefficient. A 90 kW (160 A) booster pump could be connected with one 70mm^2 copper cable. Similarly, the control panels in the control room are located at quite a distance from the generators. Relocating the control panels would provide savings on the length of cable required. More detailed analysis is required to assess the financial impact of the undersized cables.

In addition to the investments in equipment, HWA can also improve basic operating protocols around pump and generator operations. The technical assessment showed poor health and safety practices that could be improved at no additional cost. Standard maintenance procedures would also help reduce generator degradation. Finally, HWA will need to install fuel pumps at both pumping stations to help manage and monitor diesel consumption.

Based on this assessment, the net present value (NPV) of the investment to optimize HWA's pump and generator operations is estimated to be US$2.3m. The cash flows are projected over a fifteen-year period using a discount rate of 15%. The fifteen-year period reflects a conservative useful asset-life. The NPV of the investment is tested against four scenarios: (1) the cost of capital increases to 20%; (2) the cost of diesel drop to the 2017 price of US$0.60/liter; (3) the anticipated gains from using VFD's drops to 5%;

and (4) all of the above. The sensitivity analysis shows that the NPV remains positive under all four scenarios.

NPV of optimizing pump and generator operations

Assumptions							
Discount rate	15%						
Cost of diesel (June 2018)	0.83						
Energy cost - No change	**Unit**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**...Year 15**
Diesel consumption	Liters / year	3,285,000	3,285,000	3,285,000	3,285,000	3,285,000	3,285,000
Total energy cost	**USD**	**2,726,550**	**2,726,550**	**2,726,550**	**2,726,550**	**2,726,550**	**2,726,550**
Investment							
Synchronization panel - Geed Deeble	USD	58,300	-	-	-	-	-
Synchronization panel - Biyo Khadir	USD	46,700	-	-	-	-	-
Variable frequency drives	USD	41,800	-	-	-	-	-
Fuel pump	USD	4,400					
Total investment cost	**USD**	**151,200**	-	-	-	-	-
Energy cost - After investment							
Diesel consumption	Liters / year	3,285,000	2,660,522	2,675,320	2,690,119	2,704,918	2,719,717
Total energy cost	**USD**	**2,726,550**	**2,208,233**	**2,220,516**	**2,232,799**	**2,245,082**	**2,257,365**
Total savings	**USD**	**(151,200)**	**518,317**	**506,034**	**493,751**	**481,468**	**469,185**
NPV @ 15%		**2,335,704**					

Sensitivity analysis	**NPV**
Cost of capital increases to 20%	1,774,278
30% decline in diesel price	1,652,027
VFD gains drop to 5%	1,702,569
All of the above	897,375

Proposed financial structure: Working capital loan / line of credit

Recommended next steps:

- Short-term: HWA should hire an electrical engineer to optimize generator loads and to assess the impact and technical requirements of resizing cables.
- Short-term: World Bank prepare technical due diligence on proposed investments and provide TA to support a transaction for a working capital loan from the Central Bank or a commercial bank such as Dahabshiil.

Investment III: Leveraging the new pipeline to produce and distribute more water

The ongoing HUWSUP project is expected to almost triple transmission capacity from the wellfields in Geed Deeble, Hora Haadley and Las Duur into Hargeisa City. The HUWSUP project is focused on building the bulk transfer system and the New Geed Deeble Pumping Station (NGDPS) but is also drilling and connecting new boreholes to increase water supply by an additional 5,000m3 of water per day. However, there is a bottleneck in bringing this additional water supply into the city because of a funding gap for installing two of the four new booster pumps at NGDPS. Without these pumps, NGDPS will not be able to transfer the additional water supply into the city. This funding gap forms a commercially viable investment opportunity. An investment of US$750,000 to purchase and install two additional pumps would allow the utility to transfer and distribute the additional water, generating revenues of up to US$1.8m a year.

In addition, the HUWSUP project has also completed groundwater assessments on the aquifers at Las Duur and Hora Haadley and has identified boreholes with the potential of producing at least another 5,000m3 of water per day. Each new borehole would yield an average of 1000m3 of water per day at a cost of approximately US$650,000. The return on each borehole would be in the range of US$365,000 per year assuming an average tariff of US$1/m3 of water.

The actual return on both investments relies entirely on HWA's ability to bill and collect on the additional water supply. The utility has a strong record of robust commercial operations but doubling water supply in the city would add some complexity to its business model. This is a risk that will need to be addressed by developing a proactive distribution plan for the increased water supply.

The NPV of the investment is estimated to be US$4m. The cash flows are projected over a fifteen-year period using a discount rate of 15%. The financial calculations assume HWA starts with drilling and connecting two boreholes and installing two additional pumps at NGDPS. The two remaining boreholes will be connected in year 1. This sequencing will allow for a gradual increase in water supply into the system.

Installing pumps and boreholes will have an impact on HWA's energy costs. This is captured by estimating the incremental volume of diesel required to operate the generators for each new pump. The NPV of the investment is tested against five scenarios: (1) the cost of capital increases to 20%; (2) the cost of diesel increases by 20% to US$1.00/liter; (3) NRW increases by 20% from a baseline of 30% to 36%; (4) NRW increases by 50% from the baseline of 30% to 45%; and (5) there is a 30% drop in average yield across all the new water supply systems. The sensitivity analysis shows that the NPV remains positive under all five scenarios but the financial viability of the investment is particularly sensitive to a decrease in yield.

The biggest risk or concern with this investment from a commercial perspective is that it relies entirely on the completion of the HUWSUP bulk transmission project. While this is not something that HWA or an external investor can control, all indications suggest that the donors are committed to the investment and will ensure the infrastructure is commissioned by 2020.

NPV of producing and distributing more water

Assumptions							
Discount rate	15%						
Cost of diesel (June 2018)	0.83						
Baseline NRW	30%						
Investment	**Unit**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**...Year 15**
Pumps at NGDPS	USD	700,000	-	-	-	-	-
Pump fittings and installation	USD	50,000	-	-	-	-	-
Borehole - drilling	USD	300,000	300,000	-	-	-	-
Borehole - connection to wellfield collector	USD	1,000,000	1,000,000	-	-	-	-
Number of new boreholes	#	2	2				
Total investment cost	**USD**	**2,050,002**	**1,300,000**	**-**	**-**	**-**	**-**
Operating cost	**Unit**						
Diesel - borehole pumps	USD/year	-	484,720	484,720	484,720	484,720	484,720
Diesel - booster pumps	USD	-	484,720	484,720	484,720	484,720	484,720
Total operating cost	**USD**	**-**	**969,440**	**969,440**	**969,440**	**969,440**	**969,440**
Water supply							
Water supply - NGDPS	m3/year	-	1,825,000	1,825,000	1,825,000	1,825,000	1,825,000
Water supply - boreholes	m3/year	-	1,460,000	1,460,000	1,460,000	1,460,000	1,460,000
Total additional water supply	**m3/year**	**-**	**3,285,000**	**3,285,000**	**3,285,000**	**3,285,000**	**3,285,000**
Cash flow	**USD/year**	**(2,050,002)**	**30,060**	**1,330,060**	**1,330,060**	**1,330,060**	**1,330,060**
NPV @ 15%		**3,997,319**					

Sensitivity analysis	NPV
Cost of capital increases to 20%	2,571,103
20% increase in diesel price	2,987,707
20% increase in NRW	2,995,130
50% increase in NRW	1,491,848
30% decrease in yield	489,659

Proposed financial structure: Commercial loan

Recommended next steps:

- Short-term:
    1. Assess in more detail the viability of new boreholes and associated costs
    2. Develop distribution plans to ensure HWA can distribute and sell additional water supply
    3. Continue engagement with commercial banks put in place the pieces for a future transaction
- Upon completion of HUWSUP: TA for commercial sharia compliant investment

Investment IV: Repurposing the existing pipeline to build a dedicated tanker filling station

The existing pipeline from Geed Deeble to Hargeisa, which was meant to be decommissioned after HUWSUP, can be repurposed to serve as a back-up line for the city. This will help build some resilience into HWA's supply chain and provide the potential for increasing water supply into the city. In order to keep the system operational, the booster station at Byo-Khadir, which is on the outskirts of the city, can be developed into a dedicated high-capacity tanker filling station for HWA tankers and other public and private operators.

The new pipeline is designed to operate the boreholes for 16 hours each day. Under this investment, the old boreholes at Geed Deeble would be operated for an additional 4 hours, with the water supply being

diverted to storage tanks at Biro Khadir via the old pipeline. This would provide an additional 2,350m3 of water each day with potential revenues of US$1.3m annually. Channeling all tanker services through a dedicated pumping station will help HWA optimize its revenues from tanker operations and lower the burden currently placed by private operators on rural water points. The tanker filling station can include the use of pre-paid meters to enforce payment for water. In parallel, HWA can work with municipal authorities to ensure tankers do not use the distribution network within the city. Assessing the financial impact of this investment is not straightforward because it is unclear how much water HWA currently loses to unauthorized tankers using its supplies. Furthermore, this investment would change how the market for tanker supplies functions in Hargeisa. The analysis therefore only looks at the additional water that will be supplied by re-commissioning the old pipeline.

The NPV of the investment is estimated to be US$6.4m. The cash flows are projected over a fifteen-year period using a discount rate of 15%. Operating borehole pumps for four extra hours will have an impact on HWA's energy costs. This is captured by estimating the incremental volume of diesel required to operate the generators for each additional hour. The NPV of the investment is tested against four scenarios: (1) the cost of capital increases to 20%; (2) the cost of diesel increases by 20% to US$1.00/liter; (3) the tariff for sales to tankers decreases to US$1; and (4) there is a 25% drop in average yield. The sensitivity analysis shows that the NPV remains positive under all four scenarios.

NPV of tanker filling station

Assumptions							
Discount rate	15%						
Cost of diesel (June 2018)	0.83						
Tariff for tankers	1.5						
Investment and operating costs	**Unit**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**...Year 15**
Tanker filling station	USD	250,000	-	-	-	-	-
Storage tanks	USD	100,000					
Total investment cost	**USD**	**350,000**	**-**	**-**	**-**	**-**	**-**
Operating cost	**Unit**						
Diesel - borehole pumps	USD/year	-	30,295	30,295	30,295	30,295	30,295
Other O&M	USD	-	20,000	20,000	20,000	20,000	20,000
Total operating cost	**USD**	**-**	**30,295**	**30,295**	**30,295**	**30,295**	**30,295**
Water supply							
Number of boreholes	#	-	12	12	12	12	12
Pumping hours	Hrs/day	-	4	4	4	4	4
Total additional water supply	**m3/year**	**-**	**876,000**	**876,000**	**876,000**	**876,000**	**876,000**
Cash flow	**USD/year**	**(350,000)**	**1,314,000**	**1,314,000**	**1,314,000**	**1,314,000**	**1,314,000**
NPV @ 15%		**6,376,908**					

Sensitivity analysis	**NPV**
Cost of capital increases to 20%	4,827,976
20% increase in diesel price	6,376,908
Tariff for tanker sales decreases to $1/m3	4,149,823
25% decrease in yield	4,706,594

Proposed financial structure: Commercial loan
Recommended next steps:

- Short-term: HWA to develop plans and a design for the tanker filling station
- Upon completion of HUWSUP project: TA for commercial sharia compliant investment
- Note: Assess the use solar power if the four operating hours can be during the day

Investment V: Reducing non-revenue water

Building on data from the operational and financial model, the World Bank project team worked with HWA to develop a high-level strategy of 'quick wins' to reduce non-revenue water (NRW). The main opportunities are in monetizing water that is distributed to gardens at the borehole sites and in fixing major leaks in the existing transmission pipes. HWA has identified three areas where the existing transmission line runs through saline sand, which corrodes the pipe and causes frequent bursts. While the pipes are not metered, HWA estimates that the three areas lose an estimated 8,400m3 of water annually. Assuming an average tariff of US$1/m3, these physical losses have a financial cost of US$8,400 annually. According to the utility's engineers, it would cost US$7,260 to fix the problems in the transmission pipes. This indicates a positive cash flow as a result of the investment after Year 1. While the financial returns are not significant, this could be an opportunity to work with HWA to trial the use of performance-based NRW management contracts.

Proposed financial structure: Working capital loan / line of credit
Recommended next steps:

- Short-term: World Bank to support HWA in developing performance-based contracts for NRW management.

Project Note: Potential Project Sponsors - Dahabshiil Bank

In January 2018, the World Bank team worked with HWA's management team to develop a preliminary investment proposal to present to Dahabshiil Bank in Hargeisa. The proposal hinged around the investments that will be possible after HUWSUP is complete. Dahabshiil indicated an active interest in investing in HWA and requested a more detailed analysis of each potential investment and supplementary material for its due diligence processes.

Following the successful meeting with Dahabshiil, however, there were a number of external developments that required deferring further discussions around specific investments. These included the delay in the HUWSUP project and the broader challenges HWA was facing due to the FX rate and rising diesel prices. The team shifted its strategy to look into potential projects that didn't rely on the HUWSUP project.

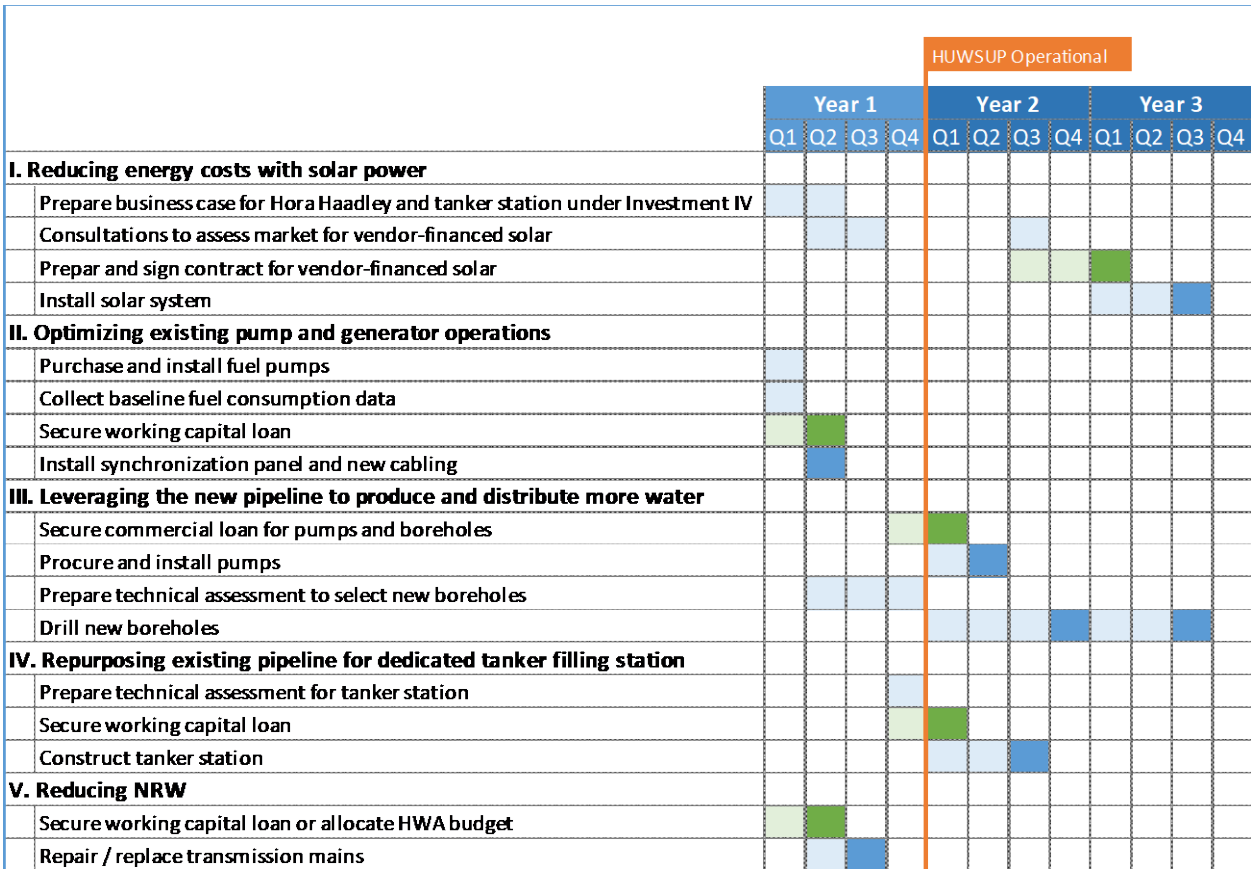
6. FORWARD LOOKING INVESTMENT PLAN & WORLD BANK SUPPORT

As noted above HWA still has outstanding debt due to the depreciation in the SLSH and to the increase in global oil prices in 2017-18. While the emergency tariff increase has helped the utility stabilize its finances, HWA will not be able to pay down its remaining debt without further increases in revenue or reductions in cost. Furthermore, HWA remains vulnerable to a variety of economic, political, and environmental shocks.

All five investments represent strategic interventions for HWA that will help the utility improve water supply in Hargeisa and build resilience against these shocks. Three of the five investments rely on the completion of the HUWSUP project. While the timeline for the HUWSUP project is not under HWA's control, this period gives the utility the opportunity to develop smaller transactions that carry less risk and that give HWA staff and management time to learn how to engage with commercial partners. Furthermore, the early investments require small working capital loans or a line of credit, which should be easier to structure than a commercial loan or a vendor-financed project.

World Bank support in 2019 should be structured around providing TA for investments that help HWA draw down existing debt before the HUWSUP project is operational. A detailed energy audit will help the utility assess the impact of and prioritize investments to reduce the cost of operating its borehole and booster pumps. In parallel, HWA needs support in continuing the discussions with commercial banks, with a specific focus on facilitating ongoing discussions with Dahabshiil. Figure 2 presents a high-level plan that summarizes the recommended sequence of work.

Figure 2: Proposed Investment Timeline


HUWSUP Operational
Year 1
Year 2
Year 3
Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4 Q1 Q2 Q3 Q4
I. Reducing energy costs with solar power
Prepare business case for Hora Haadley and tanker station under Investment IV
Consultations to assess market for vendor-financed solar
Prepar and sign contract for vendor-financed solar
Install solar system
II. Optimizing existing pump and generator operations
Purchase and install fuel pumps
Collect baseline fuel consumption data
Secure working capital loan
Install synchronization panel and new cabling
III. Leveraging the new pipeline to produce and distribute more water
Secure commercial loan for pumps and boreholes
Procure and install pumps
Prepare technical assessment to select new boreholes
Drill new boreholes
IV. Repurposing existing pipeline for dedicated tanker filling station
Prepare technical assessment for tanker station
Secure working capital loan
Construct tanker station
V. Reducing NRW
Secure working capital loan or allocate HWA budget
Repair / replace transmission mains