STRATEGIC PLAN FOR CAPITAL SPENDING

WATER – WASTEWATER – STORMWATER

HENDERSON WATER UTILITY

HENDERSON, KENTUCKY

Updated May 2015

HWU STRATEGIC PLAN
WATER – WASTEWATER – STORMWATER

I. GOALS AND PURPOSE OF THIS PLAN

This document is an annual update of a Strategic Plan first adopted in June 2014. Our objective is to develop a cost effective and environmentally sound strategy for improving the water, wastewater, and stormwater systems in the City of Henderson to accommodate existing needs and projected growth to the year 2025. The 10-year time frame was chosen to give some guidance to our efforts, with the realization that planning beyond about 5 years approaches a pipe dream, pun intended. We are updating this plan annually, prior to the budgeting process, in order to lay out a logical sequence of work that fits with the resources available.

To arrive at a plan, we here attempt to evaluate existing Henderson Water Utility (HWU) water and wastewater treatment facilities, along with our stormwater assets, to assess their physical condition, capacity, and improvement needs, and to use these assessments to schedule capital projects within budgetary constraints.

As a principal short-term goal of the implementation of this plan, we will finish the final LTCP project, negotiate termination of the Consent Judgment, and move on with our obligations for post-construction monitoring, CSO abatement, and meeting the requirements of the alphabet soup of current and proposed regulatory regimes in water and wastewater.

Beyond that, and primary in our work plan for the next few years, is a complete renovation of our water storage facilities and water treatment plants, where needed expenditures for maintenance and upgrades have been delayed by our work on the LTCP projects.

A further emphasis of this effort will be to build computer models of our systems that we can maintain internally, utilizing software that takes advantage of HWU's investment in GIS, and use those models to evaluate projects and review capacity, maintenance and improvement needs.

Recommended capital improvements in this plan are those required to provide safe, adequate and dependable treatment, distribution and collection systems to existing and future customers, taking into consideration population trends, changes in water use, regulatory requirements, and the ability of HWU's customers to bear the costs of proposed improvements. That's our goal. This plan lays the groundwork for increasing our capacity to serve growth areas, balanced with an attempt to maintain the systems and facilities we currently have, balancing risk with the money we have available. A long list of "wish we could" projects doesn't do much good, if the money's not there to build them, and a list that doesn't attempt to assess risk doesn't help with reliability of our systems.

II. WATER SYSTEM PROJECTS

A. ***North Water Treatment Plant***

i. *Raw Water Intake*: With the completion of the Raw Water Intake project in 2013, the supply side of the NWTP is in excellent condition. We installed pumps with a capacity of up to 16.0 mgd (with the two largest pumps running) and a 30" raw water supply line that runs from the intake to the vicinity of the plant. This 16 mgd capacity for raw water is sufficient for present needs, and for anticipated capacity for the term to 2025.

New Pumps and Travelling Screens @ Raw Water Intake

ii. *Capacity*: The nominal rated capacity of the NWTP treatment systems is 12.0 mgd, based on filter flow rate, with one of the six filters off-line. For the period from January 2007 to date, production at the plant has never exceeded 11.4 mgd (which appears to be an outlier due to a large break). During the higher usage months of May, June, July and August, peak usage often reaches the 9 to 11 mgd range for 1 to 3 days at a time. Average peak demand in any month during the period from 2007 to date was 7.1 mgd (treated). Average production thus equates to about 58% of plant capacity.

The following table shows residential (single and multi-family) water use data from 2009 generated from billing records, with average total residential sales of 2.05 mgd. A survey of our top 30 North service area industrial customers from the same time period shows an average daily use of 3.32 mgd, for a total of 5.37 mgd average. Average daily water pumped during 2009 was 6.61 mgd, which equates to "unbilled" water of approximately 19 percent, which includes lost water and government uses.

Ward Number	Single-Family Metered Sales			Multi-Family Metered Sales (gallons/day)	Average Residential Sales (MGD)
	Number of Accounts	Average Use (total gallons per day)	Per Capita Use * (gpcd)		
1	2,067	436,810	88.05	95,012	0.53
2	2,998	552,855	76.84	64,107	0.62
3	2,111	341,710	67.45	37,632	0.38
4	2,384	424,519	74.20	94,083	0.52
Total or Average	9,560	1,755,895	76.53	290,832	2.05
** Assumes 2.40 persons per single-family residence per 2000 U.S. Census data for Henderson County, KY.*					

If a large industrial customer locates in the North service area, an increase in filter capacity may be necessary, but for the ten year study period, it appears that capacity of the NWTP is sufficient, as it does not approach 80% of capacity on a sustained basis. However, an additional set of filters would provide an increased safety factor, and would allow longer operations between filter backwashes.

iii. *Critical Repairs (Phase 1 Project)*: We have completed a study of needed repairs at the North Water Treatment Plant in coordination with Clark Deitz, Inc. (CDI). The study looked at critical and non-critical elements of the plant buildings, basins and appurtenances, and included a complete structural evaluation of the basins due to concerns with ongoing leakage along the Water Street frontage of the plant.

The structurally unsound condition of the flash mixing basin is the main issue addressed in the Phase 1 project, and the recommended solution is to construct a new flash mixing basin and drop box within the abandoned settled water aeration area at the front of the plant near Water Street. In addition, by constructing a new wall along the west end of the superpulsator clarifiers and a new effluent channel from the superpulsator clarifiers to the contact basin, the water leakage beneath the riprap slopes on the west and north sides of the northwest corner of the plant should be eliminated.

While constructing these improvements, we will include other associated items such as replacing the influent screen, adding a bypass for the contact basin, replacing the deteriorated baffles and installing algae control covers. These improvements can all be constructed while keeping the plant in operation. In addition, dewatering these areas and using algae control covers will result in less chlorine demand, improve plant operations and make maintenance easier. Design and bidding for this project is complete, with construction to start after the high-demand summer period is over. Floating covers have already been installed on Basins 1 & 2.

iv. *Non-Critical Repairs (Phase 2 Project)*: Improvements in Phase 2 of the CDI study include replacing the pump check valves, improvements to the clear well, roof repair, upgraded HVAC system and facility aesthetics. Since the area currently used to store water treatment chemicals does not have the ventilation and cooling systems required to meet recommended standards, the main plant building's HVAC system should be upgraded. Phase 2 also includes

most of the structural and architectural building repair; however, short term repair of the brick façade is recommended and included within Phase 1 to ensure a safe working environment for HWU staff. Phase 2 projects may be accomplished in several smaller projects, some using HWU staff. Phase 2 will also include upgrades to the high service building, to make it fit better into the improved look of the Riverwalk and riverfront park areas.

All these NWTP improvements are shown on Sheet 2 of the Appendix, where the non-critical items are pushed out to 2019-2020.

v. *Long-Range Planning for North WTP*: In the longer term (15 to 25 years), it seems likely that regulations will lead us to a project to install membrane filtration for the North Water System. Given our investment in the Raw Water Intake and the origin of the distribution system around the NWTP location, it is unlikely that a new membrane filtration plant could be sited remotely from the present locale without significant additional expense to pipe a raw water supply to another location, and then pipe finished water back to Water Street where the larger distribution system piping originates. Due to the reduced footprint a membrane filter plant would occupy, it is possible that a new building could be located behind the present clearwell location, adjacent to Red Banks Park. Sedimentation basins could be constructed just south of the high service building, between it and the Station One power plant site. Since this would be at a lower elevation than the current plant, raw water pumping costs may be lower. This conceptual plan also allows continued use of the distribution system origin and the high service/clearwell facilities.

   This possibility should be considered in any work done to the Station One site, which will soon be park land. Taking this approach to a new North WTP might also allow the current plant site on the east side of Water Street to be redeveloped. No funding is included for any of this long-range planning.

B. ***South Water Treatment Plant***

i. *Study Underway*: A study of projects to mitigate risk at the South Water Treatment Plant (SWTP) was completed in 2014. Designs for several projects from that study are now being completed. J.R. Wauford is the design engineer.

ii. *Clearwell Improvements*: An inspection in late 2013 revealed internal corrosion of the 800,000 gallon ground-mounted steel tank used for storage of filtered water. There are also areas on the inlet piping that are rusted through, and we're unable to completely repair those areas since the tank cannot be dewatered while the plant is in operation. Wauford ran two scenarios, replacing the clearwell with a ground-mounted, prestressed concrete tank, and a second alternative of painting the existing steel tank. Replacement is estimated at $ 770,000, including engineering and contingency, and reuse of the existing tank is estimated at $ 330,000, including piping work required to turn the existing secondary clarifier into a temporary clearwell. The replacement option eliminates the future need to recoat the existing tank, but due to our financial constraints, spending the additional money at this time is not an option. Design of this project is nearly complete, with construction coming in the 2015-2016 FY.

iii. *Raw Water Supply and Plant Capacity*: Wauford's study includes options related to raw water pumping (which relies on cooling water pumps at the Big Rivers power plant), and includes an

option of installing our own raw water pumps in the Big Rivers intake (at $ 1.6 million), or possible improvements to the raw water feed lines, adding provision for emergency bypass connections ($ 580,000). This study also includes consideration of future capacity expansion. Currently, the SWTP runs near 80% of its rated capacity of 4.0 mgd for 5 days a week. There is thus insufficient extra capacity to serve potential industrial users at the nearby 4-Star industrial park. Planning for a capacity boost is included in sizing calculations for the raw water pipeline.

Expansion of the SWTP to increase capacity and replace the existing plant will be the final part of this study. A new plant with membrane filtration could be built in stages, spreading out the financial impact, and we have authorized Wauford to take this through the design stage, so that we can be ready to build the upgrade on short notice, if prompted by plant failure or capacity needed for a new industry. Since the choice of membrane technology from any of several bidders impacts other aspects of the design, we issued an RFP for the membrane equipment, and that process includes setting up a pilot plant at the SWTP to confirm that the membrane system proposed will work. That's as far as the membrane procurement will go, unless and until we make a decision to renovate/expand the plant. Membrane acquisition contract was awarded to Zenon Technologies, a division of General Electric, and expenditures for this pilot study will not exceed $ 125,000.

This strategy will require repairs to the existing plant to keep it in service until we can afford to build the expansion, and to insure that the existing plant life is extended until that expansion is complete. A project to expedite these repairs will be delayed until after the Clearwell painting project is complete.

We are also investigating the possibility of dredging or expanding the lake at the plant, to provide a larger reservoir of raw water that can be treated, should the Big Rivers intake be out of service, as a buffer. A survey to quantify our options should be completed this spring.

C. ***Water Distribution Systems***

i. *South Distribution*: At the South WTP, the distribution system is relatively new, and there are no known deficiencies that require upgrades. Most of our South distribution lines are "transmission" mains, as our primary customers are contractual (Sebree, Beech Grove, and the Tyson facilities). We have only a handful of residential accounts in that system. Additional industrial customers in the 4-Star Industrial Park might require relatively short water line extensions, depending on usage. One possible project that we will include in the South WTP planning report is a parallel transmission main from the plant to the 4-Star tank, which will allow the high service pumps to be used to maintain two pressure zones, one for Tyson and 4-Star, and one for Sebree and Beech Grove. This would facilitate plant and tank operations, removing the need to operate several valves each day to switch flow from the Tyson tank to Sebree. This project has an estimated cost of $ 585,000, and is shown in the out years of the plan.

ii. *North Distribution*: The North distribution system serving the City is divided into three pressure zones: North (from about 14th Street north, and east of the Cloverleaf on US 60), South (from

Fair Street, south and west out US 60 West, including the Riverport), and the low pressure or Central zone, which runs directly off the high service pumps and the Vine Street tank.

We have several challenges in the North water distribution system. In order to rationally determine our needs, we've contracted with Strand Associates to construct and calibrate our Water Model in the Innovyze software we purchased in 2011. This effort was completed late in 2014, and with the model in our hands, we can more readily identify areas or concern and projects to address them. We plan to contract with Strand on an ongoing basis to assess discrete projects as they come up, and the following are some areas that we know we need to address.

1. *North Pressure Zone*: The North pressure zone booster station in Atkinson Park was built in 2008 after the near collapse of the Atkinson Park tank. This zone is adequately served by two storage tanks (Frontier & Green River). There are areas within the North zone that have inadequate pressure due to elevation of the land, mostly in the back sections of Grantwood Hills, and on Timberline Drive. Staff has discussed a project to provide a booster station at a point near Green River Road and Osage Drive, to provide a small additional pressure zone in this area. An in-line booster pump or a small booster station could be provided on the new transmission main installed in that area for the Green River Road widening project. Detailed engineering and design has not started on this project.
2. *South Pressure Zone*: The South Zone is controlled by a small, outdated pump station on Fair Street. We have a current project to move an unused temporary booster station on Barret Boulevard to a new location on 60 West, near Fairmont Cemetery. This new station will move the boundary of the South zone further out, and should improve pressure and flow to outlying areas. Construction by our own crews is ongoing.

   The South pressure zone also suffers from having only one storage tank (College) available. This makes periodic cleaning or other tank maintenance difficult. In 2002 we purchased a small parcel near the intersection of the KY 425 Bypass and US 41 A with the intention of constructing a 1.0 million gallon elevated tank, but a large increase in steel prices at that time led to a decision to shelve that project and it was never constructed. Cost of that size and type of tank at present would be approximately $ 2.5 million. It is listed as a project on the attached schedules, but is put off to the end of the study period.
3. *Central (or Low Pressure) Zone*: The central pressure zone extends from the North and South zone boundaries and from Downtown to Graham Hill. Overall, its problems of pressure or flow are the result of older lines, some of which exceed an age of 100 years. The water system plan includes an amount for line replacement each year, and will concentrate on areas adjacent to the Downtown, and extending to the East End.

   One area of concern is the North Main-North Elm-Craig Drive corridor, from 8th Street to 12th Street. Users in that area experience rapid drops in pressure at odd times, and many homes have been equipped with booster pumps on the customer side of the meter. Investigation of that area is ongoing, and reinforcing mains and upsizing of mains is on our short-term construction schedule. One project that we are attempting to quantify through

the modeling effort is the possibility of moving this area to the North (Frontier) pressure zone. We have committed to these residents to continue our efforts to address the problem.

An area near the Accuride plant, and some areas on Outer Second Street suffer from lower than optimal pressure. One possible solution to this issue may be to construct an additional booster station at 2nd & Hwy 41, and operate an additional "Outer" pressure zone that would encompass the far eastern areas along Outer Second Street, Hwy 41 South, and the area along the KY 425 Bypass. Construction of the 41A tank, raising the elevation of the College Tank, and water line construction along KY 425 would be required to make this feasible. It would increase pressure and flow in several industrialized areas, and merits further study. This would also help to open up areas along the 425 bypass for future development; that would also require extension of sewer service to those areas.

Several main extension projects that would increase capacity and reliability in the system are included in the plan, but without cost estimates attached, pending modeling within the updated Water Model, and future detailed design. We also have included a placeholder amount for annual projects to replace 100-year-old cast iron mains in the older sections of town, which are well past their useful life.

D. ***WATER STORAGE TANKS***

We completed an assessment of the nine storage tanks in the water distribution system in May 2014. Inspection reports summarized the work needed at each tank, and the repair and coating items have been categorized by immediate needs and those that can be put off for a few years. Sheet 1 of the Appendix shows a proposed schedule of repairs to the tanks for the Years 2015 through 2023 using costs generated by the inspection reporting.

Several tanks have surfaces rated as being in fair to poor condition, which require repairs in the short term to protect our investment. Replacement of any one of these tanks is not an option; a new, elevated, 1 million gallon tank would cost approximately $ 2.0 to 2.5 million, or approximately $ 2-2.50 per gallon, depending on style and height of the tank. The longer coating projects are put off, the more likely that pitting of the steel will require more extensive (and expensive) repairs.

i. *Frontier*: This 500,000 gallon steel elevated tank was constructed in 1967-68, and was last cleaned and top-coated in 1992. There is significant paint failure and corrosion outside, and some corrosion and metal loss on the interior. This project will be bid in May 2015, and coating should be completed during the summer of 2015. In Sheet 1 of the Appendix, expenditures are shown starting in FY 2016, as we don't expect a billing from the contractor until after the start of the new FY.

Corrosion on shell and balcony of the Frontier Tank

ii. *College*: This 500,000 gallon steel elevated tank was constructed in 1967-68, and was last cleaned and top-coated in 1992. There is significant paint failure and corrosion outside, and some corrosion and metal loss on the interior. Our current plan is to paint this tank in the second group of tank projects in 2016-2017 fiscal year. Lead-based paint probably is present. We may also consider raising this tank elevation by 15 feet to enhance pressure in the area of the Riverport and the US 60 West industrial areas. Strand Associates is assessing this in additional engineering studies associated with our Water Model.

Corrosion on Diagonal Bracing - College Tank

iii. *Graham Hill*: This 750,000 gallon steel ground storage tank was constructed in 1989 and has had no major maintenance. There is minor paint failure and corrosion outside, and some corrosion and metal loss on the interior. The interior should be repainted within the next 12 months, the exterior within 4 years. This tank is of limited usefulness in our system currently, and may be removed from service; at one point, it was a critical link in our connection to the Henderson County Water District, but that is no longer the case. However, this tank does act as the backup for Vine Street, so it will likely remain in service until Vine Street is rehabbed. It is scheduled for rehab in 2020 on the current listing; a decision on keeping it in service should be made prior to any work being performed.

iv. *Tyson*: This is a fluted pedestal steel tank with a capacity of 1,000,000 gallons. It was constructed in 1996 and has not had any major maintenance. The exterior is in good condition, and will likely require top-coating within the next 5 years. The wet and dry interior surfaces are in poor condition, and will likely be painted in the fourth group of tanks in 2019.

v. *Vine Street*: This fluted pedestal steel tank has a capacity of 1,000,000 gallons. It was constructed in 1989 and was washed and top-coated in 1996. The exterior has 5 to 10% paint failure, and the wet interior surfaces show significant corrosion. Our current plan is to paint this tank in the 2016-2017 fiscal year, along with the College Tank.

Corrosion on Tank Exterior – Vine Street Tank

vi. *Chamberlain*: This 1,000,000 gallon steel ground storage tank was constructed in 2008 and has had no major maintenance. The exterior and interior surfaces are in good condition, and will likely not require painting within the next 5 years. Minor repair items are set for 2018.

vii. *Atkinson Park*: This is a 4,500,000 gallon steel ground storage tank constructed in 1945 and last painted inside and out in 2008 when the booster station associated with this tank failed. Interior and exterior are in good condition, and will likely not require painting within the next 5 years. This tank had heavy interior pitting of the steel when it was painted in 2008, and the repairs have worked and held up well. Minor repairs are shown in the plan in year 2021, with recoating in 2023.

viii. *4-Star*: This is an elevated steel tank with a capacity of 1,000,000 gallons. It was constructed in 2004 and has had no major maintenance. The exterior is in fair condition, with 1 to 2 % paint failure; the interior wet surfaces are in poor condition with 10 to 15% paint failure. Our current plan is to paint the interior of this tank in 2018.

ix. *Green River Road*: This tank is a steel, modified standpipe with a capacity of 330,000 gallons. It was constructed in 1991 and has had no major maintenance. The exterior is in fair condition, and will likely require painting within the next 5 years. The interior wet and dry surfaces show some corrosion and pitting, and both should be painted within 1 to 3 years. We have it on the accompanying list in 2018. This tank is our most problematic for disinfection by-products, and should have some internal plumbing installed to allow it to fill from the top and empty from the bottom, in lieu of a mixing system; this is listed as a "deferred" project in the Appendix.

Loss of Coating on the Roof of the Green River Road Tank

III. WASTEWATER SYSTEM PROJECTS

A. ***North Wastewater Treatment Plant***:

The North Wastewater Treatment Plant Improvements (Headworks) project will be completed in CY 2016. This project will take the plant capacity to 25.5 MGD, which maximizes the capacity of the existing aeration basins. At this point, only a small number of future projects would be planned for this plant over the 2014-2025 time period.

We have identified additional work in the old clarifiers, and in the original digester building that needs to be done within the short term. We are planning to split the additional items into at least a couple of small contracts, to be bid in 2015 or 2016. The clarifier work will be easier to do after the plant construction is complete, as we'll then have a third clarifier to work with. Waste sludge pumps and some electrical work in the digester building can be bid at any time.

The belt presses at the NWWTP will need to be replaced at some point during the study period, and the plan shows those spread out over several years. We completed a study of our sludge disposal options in 2013, and can readdress the question of the best method of sludge disposal at that time, by updating project costs for the various options and re-running the cost-benefit analysis. The presses at the North plant are near the end of their useful life.

We have also included a project in FYs 2018 & 2019 to upgrade NWWTP Basin # 2 in the same manner that Basin # 1 was upgraded in 2013, with fine bubble diffusers mounted to a concrete floor and a more robust liner with a gas removal system. Renovation of Basin # 2 might allow Basin # 3 to be taken off line and used as a surge basin, greatly reducing the amount of air required for aeration and mixing, leading to large savings in electric use. Timing of this project will depend on the uncertain life of the existing liner in Basin # 2.

All these Wastewater System projects are shown on Sheet 3 of the Appendix.

We have also discussed internally the possibility of constructing a plant on the North WWTP site that would allow Direct Potable Reuse (DPR) of highly-treated wastewater effluent. This water could possibly be used in an industrial process that's highly water-intensive, like a paper plant, or possibly as fire-suppression service in an industrial park. This sort of system would require a parallel distribution system, so it's likely that the only areas where it would be practical would be near the treatment plants. The color of our final effluent may also weigh on any possible re-use system; the current plant effluent at times has a distinct greenish hue, which is common of plants with a large paper plant as a customer. We have no plans to pursue a DPR system unless and until an industrial prospect that is compatible with this use surfaces.

B. ***South Wastewater Treatment Plant:***

South WWTP projects in this plan are minimal. Capacity of the SWWTP is rated at 8 mgd with the exception of the wastewater discharge line, and 8 mgd is twice the current capacity of the South water plant. Until a large industrial customer locates in the 4-Star area, no increase in SWWTP capacity is anticipated. We have included replacement of the SWWTP sludge presses, due to recent problems with these machines. As with the North plant, a rerun of the sludge

disposal study process would be appropriate at the time these presses are replaced, or when some other factor has a large impact on our dewatering and disposal processes.

One short term project of note at the SWWTP is the renovation of Basin # 6, which was taken out of service several years ago. Returning that basin to use will increase the redundancy of the plant, and is estimated to cost $ 185,000 for equipment alone.

C. ***Wastewater Collection Systems:***

Our goals for the Collection System are to continue with separation projects as we are able, to upgrade systems before they fail, and to insure compliance with EPA policy by reducing sewer overflows, either from the combined system, or from the separate system where capacity or maintenance might be an issue. Projects have been included in the plan for the following in the North Collection System:

i. *Atkinson Park and Myrene Drive pump stations*: Study completed on options for these stations. The Myrene Drive pump station improvements are currently under design, and are a priority due to overflow and backup experience in that area. Atkinson Park pump station is also a concern due to its age, condition and location. Many areas that once contributed flow to this station (Balmoral, Frontier, and other areas on US 60 East) have now been redirected to the Canoe Creek Interceptor, so assessment of this station will include the possibility of replacing it with a smaller station with submersible pumps in the same vicinity. The master planning effort that was recently completed for this area also addressed the possible elimination of the Spruce Drive pump station, along with a new master pump station in the far north end of the service area.

ii. *Countryview Subdivision Sewer Lining*: This project would reduce problems with inflow and infiltration (I & I) in this old system of clay pipes with offset joints and many leaks. This area and Highlander Acres are two prime sources of I & I, which cause us to pump and treat water that we shouldn't have to. Controlling I & I reduces costs to treat, and increases capacity in the system. This work is shown in the out years.

iii. *Highlander Acres Sewer Lining*: Like Countryview, older portions of this subdivision have clay-tile sewers that leak and are a maintenance concern. This estimated amount is subject to detailed design, which has not been begun.

iv. *Cantex Pump Stations*: Highlander Acres and Rolling Hills pump stations are Cantex stations that are maintenance headaches and are part of our long-term strategy to replace these outmoded stations. These are examples of facilities that are near the end of life. The amounts shown are placeholders, as detailed design has not begun.

v. *Audubon – Airline Sewer Project*: When the Bent Creek subdivision was constructed on Airline Road, we extended sewer to that area, but left a small pump station near Presidential Park in service. Additional flow and potential projects in that area mean that this pump station should be retired, and we have a project in the planning stages to bore a gravity sewer under the Audubon Parkway, connecting to an existing sewer on Airline Road near the School System's

maintenance building. This project has a cost estimate of $ 215,000. It will allow construction of a planned project for Colonial Assisted Living on Adams Lane.

vi. *Separation Projects*: We have done preliminary planning for two additional separation projects, one in the East End and one in the Washington-Ingram area. Both projects would relieve stormwater flows to the North Fork pump station, reducing sewer overflows even further than our current efforts. These estimates are placeholders, subject to further study and design.

The South collection system is essentially a series of transmission mains from customers in 4-Star industrial park, the Tyson facilities, and the City of Sebree. Since most of this system was newly constructed in 1995, it is not anticipated that large-scale repair or replacement will be necessary during the study period. Small projects to serve additional areas of 4-Star will likely happen as industrial development proceeds, but it makes little sense to construct wastewater collection lines to unoccupied lots in the industrial park.

IV. STORMWATER PROJECTS

We have included an annual amount through 2019 of $ 100,000 for continued stormwater work in Countryview Subdivision, which is being matched by the City. We've also included amounts for Neighborhood Stormwater projects, assuming that those will continue to surface.

The final phase of the Center & Julia project is shown being constructed in FYs 2021 and 2022, but that timing is subject to change. At this time, we have an application pending with the CSX Railroad for this crossing, but have not received a permit. This project would be moved up in case of the emergency collapse of the existing stone culvert that this stormwater line is meant to replace.

The small amounts we have included for "Neighborhood Stormwater" projects are place-holders, and do not represent our total efforts in this area. Most stormwater work is performed as maintenance, and is not included here as capital projects. As larger stormwater projects are programmed, they will be taken from the amount allocated under the annual capital budget.

V. OTHER AREAS: VEHICLES, AUTOMATION, IT, ADMINISTRATION

We have included entries for each of these areas in the strategic plan, in an attempt to insure that these areas are not forgotten. Prior to 2010, we had a vehicle replacement schedule in place, but that was abandoned when funds got tight during the LTCP projects. We will now be playing catch-up on that schedule. A new wash truck is being acquired in the 2015-2016 FY, along with a large purchase of new equipment items that is in our schedule.

Central to our IT effort in the coming months is the implementation of our new Cityworks asset management system. This software permeates our operations, and is the way we plan, schedule and track work for our field crews. It also is the method we use to allocate costs to our contractual customers. We are also committing to using this system as a predictive and preventive maintenance program for the treatment plants. Cityworks is able to support handheld computers in the field, so that our GIS mapping and system information will be more readily accessible to everyone.

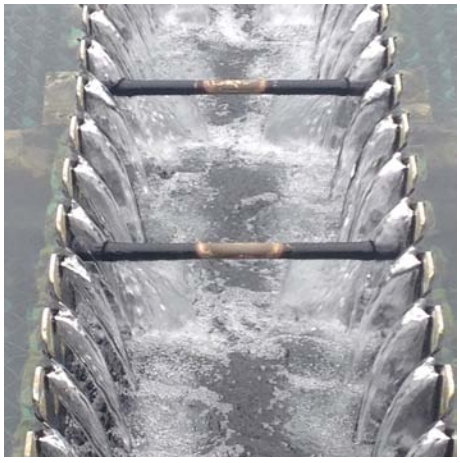
Another need we hope to address is the lack of a useful model of our wastewater system. The InfoWyse software we purchased for our water model has the capability of producing such a model, and we will likely pursue having a consultant develop that in the short term.

Placeholder entries for these items are shown on the final page of the Appendix in the "Overall Summary".

VI. SUMMARY

The last page of the Appendix shows an overall summary of the expenditures required by this strategic plan. Please note that several projects listed in the plan have no dollars associated with them, as yet. Also, the summary includes an inflation adjustment, assuming 1 to 2% construction industry inflation in the years ahead.

The summary sheet shows needed expenditures that match the Capital Spending figures in the latest cash flow forecast. Our task in the years to come will be to mold this plan to fit available resources as conditions change, as they always do.



Tank Coating and Repair Summary

Water Storage Tank - Repair and Coating Project Summary

Tank Project Summary					Estimated Repair Costs by Tank/FY										
Tank	*Volume (Gallons)*	*Year Constructed*	*Type*	*Last Major Maintenance (YR)*	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Atkinson Park	4,500,000	1946	Ground	2008							$130,000		$444,700		
Chamberlain	1,000,000	2008	Ground					$67,000							
College	500,000	1967	Elevated	1992 (See Note 1)			$603,000		$70,000						
Four Star	1,000,000	2004	Elevated					$219,000		$255,000					
Frontier	500,000	1967	Elevated	1992 (See Note 1)	$14,000	$664,000						$70,000			(Design 2015/ Paint 2016)
Graham Hill	750,000	1989	Ground	Interior 1991						$211,000	$230,000				
Green River Road	330,000	1991	Wet-Riser Hydropillar	Exterior 1992				$248,000						$125,000	
Tyson	1,000,000	1996	Fluted Column Hydropillar						$516,000			$395,000			
Vine Street	1,000,000	1989	Fluted Column Hydropillar	1996			$555,277			$20,000					
				Total Spending Per FY	$ 14,000	$ 664,000	$ 1,158,277	$ 534,000	$ 586,000	$ 486,000	$ 360,000	$ 465,000	$ 444,700	$ 125,000	

- Primary Coating/Repair Needs

- Secondary Coating/Repair Needs - (Deferred)

Note 1: Interior 1991 /Exterior 1992

Water System Projects

Water System												
Water Plant/Distribution System Project Summary			**Estimated Costs per FY**									
Project	*Location*	*Total Estimated Cost*	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
North WTP - Critical Elements - Flash Mix	North WTP	1,500,000	500,000	1,000,000								
North WTP - Non-Critical Elements - Buiding, HVAC	North WTP	1,195,000					597,500	597,500				
South WTP Expansion - Project 1 - Raw Water Supply Line Upgrade (Design 2015/ Build 2017)	South WTP	579,000	40,000		485,000							
South WTP Expansion - Project 2 - Immediate Repairs (Design 2015/ Build 2016)	South WTP	235,000	15,000		220,000							
South WTP Expansion - Project 3 - Clearwell Painting	South WTP	330,000		330,000								
South WTP Expansion - Project 4 - Capacity Upgrade/Membrane Filtration (Design Only)	South WTP	7,800,000	511,000		Not Funded /Design only							
Cast Iron Water Main Replacement - Yearly	Water Distribution	Annual Project	50,000		50,000	100,000	50,000	50,000				
U.S 60 West Water Booster Station	Water Distribution	185,000	185,000									
Green River Road Water Booster Station	Water Distribution	125,000				125,000						
Second Street Water Booster Station	Water Distribution	125,000							125,000			
South WTP Study - Project 6 - Sebree Pressure Zone Water Main	Water Distribution (South)	585,000								585,000		
New 425/41A Water Tank	Water Distribution	2,500,000									1,000,000	1,500,000
Ohio Drive to Riverport - 12" Water Line (Riverport Loop Project) - Mosaic	Water Distribution		150,500			300,000						
Borax Drive to Ohio Drive - 16" Water Line (Riverport Loop Project)	Water Distribution											
Extend 20" Water Main - Hancock St. to McClain (Riverport Loop Project)	Water Distribution											
Extend 20" Water Main - Washington To Vine	Water Distribution											
Extend 12" & 16" Water Main along KY 425 Bypass	Water Distribution											
Water Main Replacement - 8" on Green St - Vine to MLK	Water Distribution											
		Total Spending Per FY	$ 1,451,500	$ 1,330,000	$ 755,000	$ 525,000	$ 647,500	$ 647,500	$ 125,000	$ 585,000	$ 1,000,000	$ 1,500,000

Wastewater System Projects

Wastewater System

Wastewater Plant/Collection System Project Summary			**Estimated Costs per FY**									
Project	*Location*	*Total Estimated Cost*	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Countryview Sewer Lining	Collection System	1,500,000						250,000	250,000		750,000	250,000
East End Separation Project	Collection System	650,000							130,000	520,000		
Highlander Sewer Lining	Collection System	350,000							350,000			
Washington/Ingram Sewer Separation	Collection System	350,000									350,000	
Atkinson Park Sewershed - Project 1A - Myrene Dr PS - New Pumps	Pump Stations	212,000		212,000								
Atkinson Park Sewershed - Project 1B - Myrene Dr PS - New Force Main	Pump Stations	358,000			358,000							
Atkinson Park Sewershed - Project 2 - Atkinson Park PS Repairs or Replacement	Pump Stations	250,000				250,000						
Atkinson Park Sewershed - Project 3A - Manifold Force Main System	Pump Stations	1,433,000					286,600	1,146,400				
Atkinson Park Sewershed - Project 4 - Eliminate Spruce Dr PS	Pump Stations	447,000				447,000						
Audubon - Airline Sewer Project	Pump Stations	215,000			215,000							
Crestline Pump Station Upgrade	Pump Stations	50,000				50,000						
Highlander Acres Pump Station Upgrade	Pump Stations	150,000							150,000			
Rolling Hills Pump Station Upgrade	Pump Stations	120,000								120,000		
Add Second Grit Removal Train - NWWTP Headworks	North WWTP	650,000										650000
Replace Belt Presses (Sludge Disposal)	North WWTP	400,000			200,000				200,000			
Sludge Disposal Upgrades (ATAD System/Class A Sludge)	North WWTP	9,700,000	Not Funded									
Upgrade EAB # 2	North WWTP	1,700,000				680,000	1,020,000					
Replace Belt Presses (Sludge Disposal)	South WWTP	400,000				200,000			200,000			
Renovate Extended Aeration Basin # 6	South WWTP	296,000		296,000								
Sludge Storage Building	South WWTP	150,000	150,000									
	Total Spending Per FY		$ 150,000	$ 508,000	$ 773,000	$ 1,627,000	$ 1,306,600	$ 1,396,400	$ 1,280,000	$ 640,000	$ 1,100,000	$ 900,000

Stormwater System Projects

Stormwater System											
Stormwater System Project Summary		**Estimated Costs per FY**									
Project	*Total Estimated Cost*	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Countryview Stormwater Project (50/50 with City)	$ 200k Annually	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000					
Neighborhood Stormwater Projects		$ 25,000	$ 25,000	$ 25,000	$ 50,000	$ 50,000	$ 100,000	$ 100,000	$ 150,000	$ 150,000	$ 150,000
Van Wyck Road Box Culvert	$130,000					$ 130,000					
Center & Julia Phase III	$1,800,000							$ 900,000	$ 900,000		
	Total Spending Per FY	$ 125,000	$ 125,000	$ 125,000	$ 150,000	$ 280,000	$ 100,000	$ 1,000,000	$ 1,050,000	$ 150,000	$ 150,000

Overall Summary

System-Wide Summary - Capital Needs

Henderson Water Utility Project Summary	**Estimated Costs per FY - Indexed per Inflation Assumptions Shown Below**										
System or Area of Expenditures	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2015 - 2024
Tank Repair and Coating Projects	$ 14,000	$ 677,280	$ 1,205,071	$ 566,685	$ 634,305	$ 536,583	$ 405,418	$ 534,139	$ 521,037	$ 149,387	$ 5,243,906
Water System Projects	$ 1,451,500	$ 1,356,600	$ 785,502	$ 557,134	$ 700,875	$ 714,892	$ 140,770	$ 671,981	$ 1,171,659	$ 1,792,639	$ 9,343,553
Wastewater System Projects	$ 150,000	$ 518,160	$ 804,229	$ 1,726,585	$ 1,414,306	$ 1,541,738	$ 1,441,488	$ 735,159	$ 1,288,825	$ 1,075,583	$ 10,696,074
Stormwater System Projects	$ 125,000	$ 127,500	$ 130,050	$ 159,181	$ 303,081	$ 110,408	$ 1,126,162	$ 1,206,120	$ 175,749	$ 179,264	$ 3,642,515
Administrative - Computer, Software, Buildings	$ 50,000	$ 50,000	$ 50,000	$ 100,000	$ 50,000	$ 100,000	$ 50,000	$ 100,000	$ 50,000	$ 100,000	$ 700,000
Vehicles & Equipment	$ 235,000	$ 190,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 1,425,000
SCADA & Instrumentation Projects	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 50,000	$ 100,000	$ 100,000	$ 100,000	$ 100,000	$ 700,000
Small Equipment & Miscellaneous Capital Upgrades	$ 50,000	$ 50,000	$ 100,000	$ 100,000	$ 100,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 150,000	$ 1,150,000
Total Required Spending - FY	***$2,125,500***	***$3,019,540***	***$3,224,853***	***$3,359,586***	***$3,352,567***	***$3,303,622***	***$3,563,839***	***$3,647,399***	***$3,607,271***	***$3,696,873***	***$32,901,048***
Inflation Adjustment (Estimates on other pages are in 2014 dollars)	0%	2%	2%	2%	2%	2%	2%	2%	2%	2%	
HWU Construction Index	100.00	102.0000	104.0400	106.1208	108.2432	110.4081	112.6162	114.8686	117.1659	119.5093	