Item 10
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Water and Wastewater Infrastructure Plan

West Lake Park and Scott County Park

Scott County Conservation Board

Report

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SHIVEHATTERY
ARCHITECTURE + ENGINEERING

Project # 2132202540

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1.0 Summary

1.1 General

The purpose of this study is to evaluate and document conditions of the water and wastewater system at West Lake Park and Scott County Park. From a review of existing data, discussions with park staff, and site visits, the condition of the infrastructure is assessed; and based on those findings, potential concepts and budgetary costs for improvements are developed, where needed. The proposed improvements are summarized in a priority list. The priority list is intended to help plan improvements over an implementation horizon, as funding and needs arise.

Budgetary costs were developed for the proposed improvements, which includes the estimated capital cost of each improvement, a 15% contractor markup (for overhead and profit), and a 30% contingency to account for design scope which has not been fully defined; unknown subsurface conditions; variability in the bidding market; changing labor rates; and material cost volatility.

1.2 West Lake Park

West Lake Park sewer utilities encompasses a collection system and new WWTP serving a portion of the park; and five separate septic systems serving other portions of the park. The water system includes three wells and two distribution systems, plus several pressure tanks and yard/RV hydrants. Some infrastructure has been upgraded within the last 10 years, as an example the WWTP was completed in 2019, but most of the infrastructure is 40-plus years old.

Below is a summary of the proposed improvements along with their priority, as co-developed with Scott County Conservation staff. Items shaded in blue are proposed for the American Recovery and Reinvestment Act (ARRA) funding. In general, the top priorities were selected for approximately $1 million of improvements at the park. The budgetary cost for the highlighted items total to more than $1 million. Depending on funding that is available, not all highlighted items may be completed, or projects may be reprioritized. Project(s) will be bid with alternates to allow scope reduction, if needed based on actual bid prices.

Item	Name	Age/Condition	Improvement	Improvement Budgetary Cost
Wastewater				
1	Park Terrace Collection System	~50 Years/Fair-to-Poor	Replace original sewer and manholes; Televise for other sources of I&I, repair defects found	$200,000
2	Main Collection System	40+ Years/Good	Rehabilitate lines with visual defects (two locations)	$65,000
3	Summit Campground	40 Years / Poor	Connect to sewer system/WWTP	$390,000
4			Convert to Full Service	$290,000
5	Administration Office Septic System	40+ Years/Poor	Replace septic system	$14,000

Item	Name	Age/Condition	Improvement	Improvement Budgetary Cost
6	Maintenance Shop Septic System	40 Years / Fair	Replace septic system	$14,000
7	Rolling Hills Septic System	35 Years/Fair	Connect to sewer system/WWTP	$15,000
8	Summit Cabins Septic	6 Years/Good	Connect to sewer system/WWTP	$40,000
Water				
1	Summit Campground	~20 Years/Good-to-Fair	Replace, if Summit is converted to full service.	$190,000
2	IDNR Recommendations	-	Drawdown gauges at Summit and Park Terrace Wells	$2,000
3	Summit and Rolling Hills Wells	40 Years/Fair	Potential to connect Iowa American Water	$140,000
4	Park Terrace Well	~20 Years/Fair	Potential to connect to Iowa American Water	$60,000

1.3 Scott County Park

Scott County Park water and wastewater system is a decentralized system with infrastructure more-or-less dedicated to individual campgrounds, public use facilities, and park staff facilities. Overall, the wastewater system includes 19 septic systems; two lift stations with connection to Park View Water & Sanitary System; and a lagoon system. The water system includes 14 wells and associated distribution systems with pressure tanks, hydrants, and service connections. The water and wastewater infrastructure of the park is in varying condition, with infrastructure age ranging from new (installed in 2021) to 50-plus years old (service since the mid 1960's).

Similar to West Lake discussed above, the proposed improvements are summarized and listed in priority that was co-developed with Scott County Conservation staff. Shaded items are the highest priories and proposed for $1 million of ARRA funding at the park. Budgetary cost for the shaded list is greater the $1 million, as such, not all shaded items may be completed, or projects may be re-prioritized depending on available funding.

Item	Name	Age/Condition	Improvement	Improvement Budgetary Cost
Wastewater				
1	Pool	Unknown/Poor	Replace lagoon w/ permitted treatment unit	$500,000

Item	Name	Age/Condition	Improvement	Improvement Budgetary Cost
2	Incahias Campground	45 Years / Poor	Connect to Woodside Lift Station	$40,000
3			Convert to full service	$430,000
4	Pine Grove	~50 Years / Poor	Replace Restroom/Shower House Septic w/ Filter	$50,000
5	Sac Fox	~50-Years/Fair Condition	Replace West Restroom /Shower House Septic	$20,000
6	Bald Eagle	18-Years/Good	Replace valves at lift station and along force main	$5,000
7	Buffalo Bill Cody Homestead	Unknown/Poor	Replace Septic	$20,000
8	Pioneer Village	Unknown/Good-to-Fair	Permit grey water discharge, add absorption field	$6,000
9	West Residence	Unknown/Poor	Replace septic system	$14,000
10	Glynn's Creek Golf Course	Unknown/Good-to-Fair	Add grease trap	$8,000
11	Golf Maintenance Shop	Unknown/Good	Add oil-water separator	$8,000
Water				
1	Incahias Campground	~45 Years/Fair	Connect to Woodside	$20,000
2			Replace distribution system, if converted to full service	$200,000
3	West Residence	Unknown/Poor	New well	$50,000
4	IDNR Recommendations	-	Drawdown gauges and flow meters	$10,000
5	Replace wells, when and as needed.	1 Year to ~58 Years / Fair-to-Good	New wells or connect to PVW&SD	$1.8 to $2.4 million

2.0 West Lake Park

2.1 General

West Lake Park sewer utilities encompasses a collection system and new WWTP serving a portion of the park; and five separate septic systems serving other portions of the park. The water system includes three wells and two distribution systems, plus several pressure tanks and yard/RV hydrants. Some infrastructure has been upgraded within the last 10 years, as an example the WWTP was completed in 2019, but most of the infrastructure is 40-plus years old.

2.2 Wastewater System

2.2.1 Park Terrace Collection System

Park Terrace is a full-service campground. A portion of the campground's collection system pre-dates West Lake Park and originally served a mobile home park. The mobile home park and sewer system was integrated into West Lake Park when West Lake was constructed in the 1970's. There is limited data about this portion of the system, other than the laterals to the camp sites were replaced with PVC pipe. This area is reported to have noticeable infiltration and inflow (I&I), which was the driver for the lateral replacement.

Although some of the laterals were replaced, connections were made outside of the manholes. Indications are the manholes and lateral connections remain original, and could be sources of I&I.

From historic records, most sanitary sewers original to the park are clay pipe (VCP), which was common for the era. As such, it is assumed the original collection system at Park Terrace is also VCP. VCP can provide long service life, as evidenced at West Lake Park (approaching 50 years). However, it is susceptible to cracking, root invasion, and due to limited pipe length, many joints that can be sources of leaks.

Considering the above, it is proposed to replace the original sewer main (approximately 500 linear feet), and 5 manholes, including new connections to the PVC laterals. Sources of I&I can be difficult to locate, so the budgetary cost includes televising approximately 2,200 linear feet of sewer as well as an allowance of $25,000 to repair defects, if found.

Park Terrace was expanded in 1995 with additional full-service camp sites and a PVC collection pipes tied into the original system. It is thought this portion of the system is not a significant source of I&I.

2.2.2 Main Collection System

Overall, the collection system at West Lake is considered in **good condition**. However, there are two areas noted as potential issues based on video exploration, both are at Lake of the Hills. These areas are not leaking but are areas of concern due to visual cracking/deficiency in the pipe.

- Location 1: In a 535-foot run of 8-inch pipe under Lake of the Hills between Manhole 12 and Manhole 17. From the original design drawings, this segment includes a run of ductile iron pipe under the lake, with runs of VCP at the manholes. One of the VCP pipe runs had visual deficiency near a manhole.
- Location 2: A 400-foot run of 16-inch pipe crossing under I-280 between Manhole 4 and Manhole 6. From original design drawings, the pipe is cast iron. A deficiency in the pipe was noticed near the downstream manhole.

As previously mentioned, the pipes are not known to be leaking, but because of their location, are candidates for rehabilitation. Repair of the two pipe segments consider cured-in-place liner of the pipe runs between the manholes. The budgetary cost of doing so is as follows:

- Location 1: $25,000
- Location 2: $40,000

2.2.3 Summit Campground

Summit Campground wastewater system consists of two 1,500-gallon septic tanks with 3,300 square feet of absorption trenches. This septic system services the restroom/shower house, dump station, and camp host site. The wastewater system is approximately 40 years old (constructed in 1981). In recent years, the absorption field has been prone to plugging. It is considered in **poor condition**.

In addition to age, original design documents indicate that the absorption field is in an area with questionable soils, as several of the test holes were noted as failed (as being acceptable). However, the original design provided laterals in areas with acceptable test results.

With today's standards, there would be more scrutiny of the acceptability of the soils for an absorption field, a replacement field would be larger than existing, and the capacity would trigger permitting review as a public system through IDNR.

West Lake Park WWTP has the capacity to accept the estimated flows and loadings from Summit Campground. From a preliminary evaluation, it appears Summit Campground could be connected via gravity sewer to the existing collection system at Manhole 9. In general, routing would require approximately 3,000 linear feet of gravity sewer and 7 manholes. Additionally, Manhole 10, and potentially Manhole 9, would be replaced due to their shallow depth (Manhole 10 is 6-feet deep). From Manhole 9, the terrain (and sewer) falls at a fairly steep slope to Manhole 7, which is about 19-feet deep.

In addition to replacement of the septic system, this concept provides:

- Capacity for converting Summit Campground to full service (addition of sanitary sewer at each RV camp site).
- Conveyance capacity and routing to allow other septic based sewer systems to be connected to the WWTP, when the time for replacement is needed. Such includes Summit Cabins and Rolling Hills Shelter. These are discussed in each of their respective sections.
- Conveyance and route for managing sanitary sewer at the planned lodge (near Gate 1). Because of the elevation and terrain of the camp site, a grinder lift station and force main will be needed to connect the new lodge to the proposed sanitary sewer conveyance.

Budgetary Cost for improvements Summit Campground septic system:

Item	Budgetary Cost
Sewer Connection and Conveyance	$390,000
Full-Service RV Sites	$290,000
Total	**$680,000**

2.2.4 Administration Office and Maintenance Office

The Administration Office and Maintenance Shop are each served by septic systems. Records of the Administration Office septic system are limited, but it is thought to have been constructed in the 1970's. It is considered in **poor condition** due to age, as well as plugging and maintenance issues, particularly of late. The septic system serving the Maintenance Shop is considered to be in **fair condition**. It was constructed in 1979 and has had some maintenance issues.

The Administration Office septic systems typically serves four (4) full time employees, whereas the Maintenance Shop system services six (6) full-time and up to sixteen (16) seasonal staff. Seasonal staff at the Maintenance Shop are typical working out in the park, and are not officed full time in the shop.

At both locations, the capacity and size of the septic systems are in line with systems that would serve a 3-to-4 room residential house and lend themselves to review by the County Health Department. Budgetary cost for replacement of the systems (septic tank, distribution box, and laterals/absorption field) is on the order of $14,000, each.

An alternative to septic system replacement would be package type grinder pump station for each building and a shared forced main to connect them to the existing sanitary sewer collection system at Park Terrace Camp Site, and hence connection to the WWTP. Routing of the force main would require approximately 1,300 linear feet of pipe. The force main routing would be in proximity to the Park Terrace well. For a public well, separation distance of 75-feet is required by IDNR. If this separation distance cannot reasonably be achieved, an alternative involves using approximately 150-feet of casing pipe for the force main while it is in the vicinity of the well. In any event, budgetary cost for this concept is on the order of $74,000.

Replacement of the septic system(s) at the Administration Office and Maintenance Shop is the cost-effective option, as compared to a connection to the sanitary collection system and WWTP.

2.2.5 Rolling Hills Shelter

Rolling Hills Shelter is a 200-person capacity shelter located Southeast of Summit Campground. Maintenance staff at Scott County Conservation did not indicate problems with its existing septic system, which consists of a 1,500-gallon septic tank an 1,800 square feet of absorption trenches. However, the system is relatively old with a construction date of 1987. It is considered to be in **fair condition**.

When the time comes to replace the septic system, it would be a candidate for connecting to the sanitary sewer system and the WWTP. Assuming the sewer extension serving Summit Campground is in-place (or being constructed), Rolling Hills could be connected by a modest run of gravity pipe (approximately 150 linear feet). Budgetary cost for this connection is on the order of $15,000.

2.2.6 Summit Cabins

Summit Cabins share a septic system consisting of a 2,000-gallon septic tank and 2,175 square feet of absorption trenches. This septic system was permitted in 2016 and is considered to be in **good condition**.

Like Rolling Hills, Summit Cabins are candidates for connecting to the WWTP when the time comes for replacement of the septic system. This assumes the sewer collection system has been extended to serve Summit Campground. However, the terrain and Cabins are at a lower elevation and would likely require a lift station and force main to connect to the sewer system. For this

concept, a package grinder lift station and approximately 450 linear feet of force main would be shared by both cabins. Budgetary cost for this alternative is on the order of $40,000.

2.2.7 Wastewater Treatment Plant

West Lake WWTP was completed in 2019. It's permitted capacity is 20,000 gpd, with a loading of 35 pound per day (ppd) of BOD, 8 ppd TSS, and 13 ppd TKN, all on an average wet weather basis. On a max day basis, the plant is permitted for 39,000 gpd, 41 ppd, 8 ppd, and 15 ppd BOD, TSS, and TKN, respectively. The WWTP is in **good condition**.

2.3 Water System

2.3.1 Summit Campground Distribution System

Summit Campground water distribution system is primarily 1-1/4-inch to 1-inch piping built in the early 1990's. It serves the RV sites and restroom/shower house and considered to be in **fair-to-good condition**, but:

- The system is primarily PVC pipe, including the service lines to the hydrants at each RV site. These are prone to breaking the water mains if the service hydrant is hit.
- There is limited isolation in the system, requiring the whole campground to be shut-off from water in the event of a break.
- If Summit Campground is converted to full service, replacement of the water distribution system could be worthwhile during that construction.

Budgetary cost for the water distribution replacement is on the order of $200,000.

2.3.2 Summit, Rolling Hills, and Park Terrace Wells

West Lake Park water is sourced from three wells:

- The northern area, including Summit Campground, Rolling Hills Shelter, Summit Cabins, the beach house, Lakeview Shelter, and the boat ramp are serviced by Summit Well and Rolling Hills Well. These two wells are connected at the Summit Well House to serve the area. From Geosam data, Summit Well was drilled in 1981 to a depth of 444 feet and has a yield of 30 gpm. There is limited available data on the Rolling Hills well, other than it was drilled to 497 feet. The exact year of construction is unknown, but it is reported to be older than Summit Well.

  At Summit Well house, there is a 1,100-gallon pressure tank, controls for the wells, and a water softener dedicated to Summit Cabins.

- The southern area, including Park Terrace Campground, the Administration Office, Maintenance Shop, High Meadows Shelter, and a hydrant at Arrowhead Shelter receive their water supply from the Park Terrace Well. Per the drilling logs (Geosam records), the well was constructed in 2003, has a depth of 480 feet, and yields 90 gpm. The well is cased to 480 feet with 304 feet of 8-inch PVC casing and 180 feet of 6-inch PVC casing.

  Parke Terrace well has a 1,100-gallon pressure tank and controls located in the wellhouse. In addition, pressure tanks are located at High Meadows, Park Terrace, and the maintenance shop. There is a water softener in the Administration Building.

Well Name	Distribution Network	Year Drilled	Year Pump Installed	Reported Pump Rate (gpm)
Summit Well	Summit Campground, Rolling Hills Shelter, summit Cabins, Beach House, Lakeview Shelter, Boat Ramp	1981	1994	28
Rolling Hills Well		Unknown	2002	33
Park Terrace Well	Park Terrace Campground, Administration Office, Maintenance Shop, High Meadows Shelter, Arrowhead Shelter	2003	2004	40

Based on available information, including discussion with park staff, the well maintenance provider (Johnson H2O), and the 2019 IDNR Sanitary Survey, the wells are considered to be in **good-to-fair condition.**

IDNR did recommended drawdown gauges for the wells. It appears Johnson H2O measures static and pump water levels as part of maintenance, but drawdown gauges could be added when other maintenance is ongoing for $1,000 or less.

In general, a properly maintained and protected well should have a service life of 50 to 100 years, although there are host of factors that impact the service life. Pump service life should be around 20 to 30 years, depending on use and other factors. Due to well condition or water quality, well replacement would include:

- Abandoning and plugging the old well
- Drilling, developing, and completing a new well.
- Connecting the new well to existing well house or distribution systems.

Assuming similar size wells as are at the park now and locating the well in reasonable proximity to the existing well houses, budgetary cost for replacing the wells, when needed, is on the order of $170,000 per well.

Iowa American Water

Should a well become compromised, or potentially to reduce maintenance and operation items, an alternative for the wells is a connection to Iowa American Water for source water. This potential was discussed with Iowa American Water and they have indicated interest in serving West Lake Park:

- Iowa American Water has an existing 12-inch water main along 110th Avenue.
- They were open to two meter connections, one for the northern area (replaces Summit and Rolling Hills wells) and one for the southern area (replaces Park Terrace Well).
- Iowa American Water would provide service taps and meters at each location and consider each a long, private service lines.

- Scott County Conservation would provide piping to connect to the meters and maintain ownership and responsibility of the water distribution system inside the park.

For this alternative, we assumed 2-inch service meters as well as backflow preventers in an above ground, freeze protected box, at each location. From the meters, 3-inch water main would be routed to the existing water distribution systems. As a concept, one meter would be at Gate 1 and the other meter at Gate 4.

Capital cost for connection to Iowa American Water would be on the order of:

Item	Budgetary Cost
Gate 1 Connection	$140,000
Gate 4 Connection	$60,000
Total	**$200,000**

The cost is driven in large part by the length of water main to connect from 110th Avenue to the existing distribution systems. If other improvements are made, such as upgrading the Summit Campground water distribution system and/or connecting to the planned lodge near Windy Knoll/Gate 1, such improvements could anticipate a potential connection to Iowa American Water to gain some economies of scale.

With this alternative, there will be monthly service fees. At 2021 rates, there is a monthly service fee of $111.90 for each 2-inch meter plus rates for water usage in tiers. From well production records, monthly water usage can range from a few thousand gallons per month in the off-season, to as much as 250,000 gallons per month during the summer. Overall, the average water usage is around 125,000 gallons per month.

Based on current rates and recent water usage, the annual water cost would be on the order of $10,000, including meter service charge, water usage, and water excise charge.

3.0 Scott County Park

3.1. General

Scott County Park water and wastewater system is decentralized system with infrastructure more-or-less dedicated to individual campgrounds, public use facilities, and park staff facilities. Overall, the wastewater system includes 19 septic systems; two lift stations with connection to Park View Water & Sanitary System; and a lagoon system. The water system includes 14 wells and associated distribution systems with pressure tanks, hydrants, and service connections. The water and wastewater infrastructure of the park is in varying condition, with infrastructure age ranging from new (installed in 2021) to 50-plus years old (service since the mid 1960's).

In addition to Scott County Park, Buffalo Bill Cody Homestead is included in the evaluation.

3.2 Wastewater System

3.2.1 Pool

The pool's sanitary sewer flows to a lagoon system located approximately 350 feet to the Northeast. The lagoon is in **poor condition and essentially has failed**. It contains mounds of pool filter media (or other material); as well as trees and other plant life is actively growing in the lagoon and along the berms. During high loadings, it is reported water spills over the berm. The lagoon discharges into the nearby forest area. Permit records for the lagoon or associated discharge could not be found.

Based on Iowa criteria, design usage for pools is 13 gpd per guest. The number of pool visitors per day varies, and overall, is unknown. An estimate of design equivalent is based on parking spaces. Assuming 3 guests per parking space, the design equivalent is 534 people, and the design flow would be approximately 7,000 gpd. This flow assumes sanitary sewer flows from bathrooms, sinks and showers, not pool filter backwash, pool drainage, etc.

The pool sanitary sewer system is considered a public system. The lagoon could be upgraded, but such would require conversion to a 2 cell, aerated lagoon to meet IDNR standards, which limits this alternative. There is a fair amount of green space around the pool for a septic system, which may be viable depending on soil conditions. However, a fairly large absorption field would be needed. Another alternative would be an aerobic treatment system (ATS). Such would provide treatment, allowing for a condensed absorption field for disposal and/or surface discharge. For budgeting, a treatment system is considered, including primary treatment, secondary reactors, and UV disinfection. Budgetary cost for providing sanitary sewer treatment at the pool is $500,000.

3.2.2 Incahias Campground

Incahias Campground has 50 sites (including host) with electrical and water service, restroom/shower house, and a dump station.

The wastewater system consists of two septic systems, one serving the shower house and one serving the dump station. The system serving the restroom/shower house includes a 1,500-gallon septic tank, distribution box and approximately 1,300 square feet of absorption trenches. The systems were constructed about 45 years ago (1977) and in the past several years, both have shown signs of failure including ground saturation and plugging. Because of this, along with the septic field's age, they are considered in **poor condition**.

Incahias is in close proximity to the recently completed Woodside Campground. Woodside sanitary sewer is pumped to the Park View Water & Sanitary District for treatment. Given the

proximity of Incahias, to Woodside, connection to the recently completed lift station and hence to Park View Water & Sanitary District is an alternative. As a base option, the septic field serving the restroom/shower house could be connected to the Woodside Campground lift station via gravity sewer. This would require approximately 200 feet of gravity sewer and one manhole. Re-piping and excavation of some of the existing septic system would also be needed.

However, connection to Woodside lift station and Park View Water & Sanitary District would also provide capacity for converting Incahias to full service camp sites. The Woodside lift station is a duplex lift station rated for 50 gpm. With Woodside (45 camp sites) and Incahias (50 camp sites) connected, the estimated design flow is approximately 14,000 gallons per day (equivalent to 145 gallon per day per campsite). The lift station has capacity to pump this flow in approximately 4.5 hours, which may be needed during peak usage.

For the preliminary concept of converting to full service, approximately 3,400 feet of gravity sewer and some 8 manholes would be provided along with services at each camp site.

Item	Budgetary Cost
Sewer Connection and Conveyance	$40,000
Full-Service RV Sites	$430,000
Total	$470,000

The above alternatives are focused on the restroom/shower house and RV camp sites. The terrain at Incahias has the existing dump station septic system on a downhill gradient from the remaining campground as well as on the other side of a solar panel field. The system is prone to ground saturation and considered in **poor condition**. The system could be replaced with a tie-in to Woodside; however, there is interest in upgrading Incahias to full service. With full service, the need for replacing the dump station may be negated.

3.2.3 Pine Grove

The Pine Grove Campground, which consists of 41 campsites (including host site), two cabins, and a dump station, is served by three septic systems.

Restrooms/Show House Septic System

The system that serves the restroom/shower house is in a wooded area, which raises concerns about actual performance, absorption field capacity, and effluent quality. There is little available information on this system, but assumed to be installed in early 1970's. Because of the age and location of the absorption field, the septic system is considered in **poor condition**.

Assuming a design loading rate of 35 gpd per campsite, the replacement system would be a minimum of 1,435 gpd (for design, it would be rounded upwards to 1,500 gpd). This capacity is below the threshold for a public system; and therefore, could fall within Scott County Health Department review and approval. The replacement system would need to be located to maintain at least 200 feet set back from the existing well.

The site is relatively constrained with the existing campground layout, location of the restroom/shower house, wooded area and setback distances for the well. As such, a concept is to locate the treatment to the south (across the entrance road) provide a manufacturer filtered, such as coco-based filters, to provide a media for treatment (in lieu of the soil) and help limit the

footprint for treatment. From the filters, treated water would be dispersed below the filters and absorption trenches for disposal. The manufactured filter system would include and equalization tank, dosing pumps, coco-filters (or similar) with polyethylene covers. Budgetary cost for replacing the septic system is $50,000.

Dump Station Septic System

The dump station is served by a septic tank and absorption field. The original date of the system is unknown, but the absorption field was expanded in 1978 to include a total of 648 square feet of absorption trench. From permit information, the field is located in a grass area between the dump station gravel drive and the paved road. However, from the site visit, there appears to be a septic tank south of the dump station, which does not show on the permit information (from 1978). It is considered to be in **fair-to-good condition**.

Cabins Septic System

Pine Grove Cabins includes two (2) cabins located Northeast of Pine Grove Campground. The septic system for the cabins was permitted in 2004 and includes two 1,300-gallon septic tanks (one for each cabin) and a 960-square foot sand filter (serves both cabins). The system is considered to be in **good condition**.

Alternative Concept

An alternative to the above is to provide grinder-type lift stations(s) to serve the restroom and dump station with a common force main to convey flow to the proposed treatment unit at the pool. When needed, the cabins could also be connected to the conveyance system.

For this concept, two grinder-type lift stations (one for the restroom and one for the dump station) as well as approximately 1,700 linear feet of force main would be routed from Pine Grove to the pool. Order of magnitude cost for the conveyance system is $120,000, plus an allowance of $65,000 for upsizing the proposed treatment unit at the pool. As such, this alternative would require and investment over replacing the septic systems.

3.2.4 Sac Fox Campground

Sac Fox campground has 34 camp sites (including host) and two restrooms/shower houses.

West Restroom/Shower House.

There is little information available on the septic system serving the original restroom facility at Sac Fox. The age of the system is unknown, but thought to be early 70's vintage. From site visits and review of aerial photographs, the system includes a septic tank (of unknown capacity), distribution box, and absorption field of 4 or 5 laterals approximately 100-feet long.

The system was on the park staff of priorities, mainly because of the unknowns associated with the system. It is considered to be in **fair condition**.

Assuming the east restroom/shower house serves half the campground at a usage rate of 35 gpd per site, the design flow would be 1,000 gpd. This capacity is below the threshold for a public system; and therefore, could fall with Scott County Health Department review and approval. Budgetary cost for replacing the septic system, including new septic tank, distribution box, and absorption field, is $20,000.

East Restroom/Shower House

The east restroom/shower house was constructed in the early 1990's with a septic system, including 1,500 gallon septic tank and approximately 500 feet of lateral runs (of unknown width). This septic system was not reported to be a maintenance issue and is considered in **good condition**.

3.2.5 Bald Eagle

Bald Eagle Campground was constructed in 1994 and includes 54 full-service camp sites (including host), restroom/shower house, dump station, and two cabins. Sanitary sewer is conveyed to a lift station that pumps the flow to Park View Water & Sanitary District for treatment and disposal. The sanitary sewer system is in **good condition**.

A maintenance issue is the valves associated with the lift station and force main connecting Bald Eagle to Park View Water & Sanitary District. Replacement of the isolation valves, check valves, and air release valves is on the order of $5,000

3.2.6 Buffalo Bill Cody Homestead

Park staff indicates the absorption fields are 90-feet away from the well, which does not meet set back requirements. Additionally, a portion of the system is below the garage and driveway. Further, only one absorption field is functional. It is considered to be in **poor condition**. There is little available information on the existing septic system serving the Cody home, but a budgetary cost of $20,000 is assumed to cover a new septic system.

3.2.7 Pioneer Village

Pioneer Village sanitary sewer is from the restroom building, which is connected to a septic system. Constructed in 1991, the septic system includes a 1,500-gallon septic tank and 1,200 square feet of absorption trenches. No issues were reported with the septic system, and considering its age, is considered in **good-to-fair condition**.

A separate, cistern tank serves the ice cream shop, which is grey water from a dishwater and sink. There are no construction documents or other information readily available, but it is assumed the tank drains to Glynn Creek.

The ice cream shop drain should be to a permitted system. Considering relatively low volume, and grey water, it seems this would be a candidate for permitting through the County Health Department. In concept, the cistern tank would be re-used, but a distribution box and absorption trenches would be added for permitting. Design flow to the system is estimated to be 300 gpd, assuming 4 hours of sink usage and 4 dishwater cycles per day. The budgetary cost of this system is on the order of $6,000.

3.2.8 West Residence

There is little available information on the existing septic system serving the West Residence. From discussion with park staff, the age and configuration of the system is unknown, but there is a concern with the proximity of the absorption field to the wetlands in the area. As such, it is considered to be in **poor condition**. Conceptually the septic system could be replaced, and assuming a residential type of system, budgetary cost is on the order $14,000

3.2.9 Glynn's Creek Golf Course Clubhouse

The septic system at Glynn's Creek Golf Course Clubhouse is in **good-to-fair condition**. The first septic system at the clubhouse failed, so a sand filter was installed. Over time, grease has been a problem for the septic system. This is likely due to lack of a grease trap, or lack of maintaining a grease trap, for the small kitchen and food service provided at the clubhouse.

Assuming a grease trap is needed, budgetary cost is on the order of $8,000.

3.2.10 Golf Maintenance Building

Similar to the Maintenance shop, golf maintenance has a small restroom for employees. The septic system is thought to be 25 to 30 years old. Park staff did not report issues with the system, and it is considered to be in **good condition**.

Although it is thought that septic system only serves the restroom, there is concern with oil or similar material entering the septic system. As such, a oil-water separator is considered. Capital cost is on the order of $8,000

3.2.11 Maintenance Shop

Maintenance shop includes a small restroom for park employees that is connected to a septic system. Little information is available on the septic system, but park staff report the system is not a maintenance issue, has an oil-water separator, and is considered to be in **good condition**.

3.2.12 Pioneer Village Office / North Residence

There is little available information on the existing septic system serving the North Residence house. From discussion with park staff, it is a new system and not a maintenance issue. As such, it is considered to be in **good condition**.

3.2.13 Wilderness Campground

Wilderness Campground has 65 rustic camp sites (including the host site) along with a restroom/shower house. The septic system serving the restroom/shower house was permitted in 1990 and includes a 1,500-gallon septic tank and 1,575 square feet of absorption trenches. The septic system was reported in **good condition**.

3.2.14 Entrance Building

The Entrance Building has one bathroom for park staff use. The building is served by a septic system constructed in 1991 that includes a 1,000-gallon septic tank and 450 square feet of absorption trench. The system was reported to be low use with no issues and in **good condition**.

3.2.15 Buffalo Bill Shelter

Buffalo Bill shelter has a capacity for up to 200 guests. A restroom facility and associated septic system were constructed in 1999. The septic system includes a 1,500-gallon septic tank, and approximately a 770-square-foot sand filter. No issues were reported with the septic system, and it is in **good condition**.

3.2.16 Whispering Pine Shelter

This enclosed shelter has a capacity for up to 200 guests and includes restroom facility connected to a septic system. The restroom and associated septic system were constructed in 2006. The septic system includes s 1,000-gallon septic tank, an 880-square-foot sand filter, and approximately 130-foot long rock absorption trench. No issues were reported with the septic system, and it is in **good condition**.

3.2.17 Ranger House

The septic system serving the house was upgraded/replaced in 2019. The system includes a 1,500-gallon septic tank, a 1,300 gallon septic tank, and 975 square feet of absorption trench. The septic system is in **good condition**.

3.2.18 Nature Center

The nature Center includes a small kitchen and two individual restrooms. A new septic system was permitted in 2021, including a 1,500-gallon septic tank and 1,245 square-feet of absorption trench. The sanitary sewer system is in **good condition**.

3.2.19 Woodside Campground

Woodside is the newest campground to the park, completed in 2021. The campground has 45 full-service camp sites (including host) as well as a restroom/shower house. Sanitary sewer is conveyed to a lift station and pumped to Park View Water & Sanitary District for treatment and disposal. The sanitary sewer system is in **good condition**.

3.3 Water System

3.3.1 Wells

Based on information obtained from Geosam and Johnson H20, below is a summary of the wells at Scott County Park:

Well Name	Distribution Network	Year Drilled	Year Pump Installed	Reported Pump Rate (gpm)
Bald Eagle Well	Bald Eagle Campsites, Bald Eagle Restrooms, Bald Eagle Cabins	2003	2003	55
Incahias Well	Incahias Campsites, Incahias Restroom	1977	2009	25
Maintenance Building Well	Maintenance Building, Golf Clubhouse, Golf Maintenance Shop	1979	2009	55
Nature Center Well	Nature Center, Pioneer Village	1979	1994	55
Pine Grove Well	Pine Grove Cabins, Pine Grove Restrooms	1964	1994	28
Pool Well	Pool, Pool bathhouse, Buffalo Bill Shelter, Indian Hills Shelter	1971	2006	150
Sac Fox Well	Sac Fox Restroom	1964	2008	33
Wilderness Well	Wilderness Restroom, Wilderness Campsites	1987	Unknown	Unknown
Whispering Pines Well	Whispering Pines Picnic Shelter Restroom	1964	2006	25

Woodside Well	Woodside Campsites, Woodside Restroom	2021	2021	65
Cody Home Well	Cody Home	Unknown	Unknown	Unknown
North Residence Well	North Residence	Unknown	Unknown	Unknown
Ranger House Well	Ranger House, Entrance Building	Unknown	Unknown	Unknown
West Residence Well	West Residence	Unknown	Unknown	Unknown

From discussions with park staff and Johnson H2O as well as review of the available IDNR sanitary surveys, there are no known major issues with the wells. However, IDNR did make some recommendations for the wells:

- Bald Eagle: Addition of drawdown gauge was recommended.
- Incahias: Addition of a drawdown gauge, an isolation gate valve, and a check valve were recommended.
- Nature Center: Addition of a drawdown gauge and a flow meter were recommended.
- Pine Grove: Addition of a drawdown gauge and a flow meter were recommended. Also, it was recommended the “casing” extend a minimum of 18-inches above the finished ground surface.
- Pool Well: Addition of a drawdown gauge and a flow meter were recommended.
- Whispering Pines: Addition of a drawdown gauge and a flow meter were recommended.
- Wilderness Well: Addition of a drawdown gauge and a flow meter were recommended.

Johnson H2O reported static and drawdown water levels of several wells; as such, it seems they check water levels as part of maintenance. However, a drawdown gauge could be added to each well. If done with other ongoing maintenance, such would be $1,000 or less (per well).

Flow meters could also be added to the wells to record flow. For the pool well, which is located inside, the meter could be installed with modification of existing pipes. For the other wells, which are located outside, a manhole/meter box and meter would be needed for the pipe connecting the well to the facilities; or the meter could potentially be installed the restroom/shower houses (if the well is dedicated to only serving that facility).

Regarding the Pine Grove Well, it has a pitless unit extended above grade. It is not clear the reference measurement, but if the pitless unit vent is not 18-inches above grade, it seems some slight regrading could be in order.

For the above, $10,000 is budgeted to cover the items.

For Incahias Well, see discussion in the Inchais Water System Section.

As mentioned under West Lake Park - a properly maintained and protected well should have a service life of 50 to 100 years, although there are host of factors that impact the service life. Pump service life should be around 20 to 30 years, depending on use and other factors. Due to well condition or water quality, well replacement would include:

- Abandoning and plugging the old well
- Drilling, developing, and completing a new well.
- Connecting the new well to facilities being served.

Assuming similar size well as are at the park now and locating the well in reasonable proximity to facilities being served, budgetary cost for the above is on the order of $170,000 per well. However, a resident well, such as serving the West Resident or Pioneer Village Office would be on the order of $50,000.

3.3.2 Incahias Water System

Incahias well services the Incahias Campground drinking water system, which consists of service to each camp site and the restroom/shower house. The well, located near the campground restroom, was constructed in 1977 with a pump rated at 25-gpm. Bac-T testing has been in compliance, but maintenance staff at Scott County Park indicate that this is the location where they have the highest frequency of bad samples, requiring retesting. Because of the age of the well and its history of sampling problems, the Incahias Well is considered to be in **fair condition.**

Woodside well could service Incahias Campground. Assuming an equivalent of 145 gallons per day (gpd) for each campsite (for RV site service as well as restroom/shower house), water demand for combined Incahias and Woodside would be on the order of 15,800 gpd. Indications are the Woodside well is a 65 gpm pump. The well could meet the above demand in 4 hours, which may be needed assuming a reasonable peaking factor.

Noteworthy, the drillers log for the well indicates the well yields 100 gpm. As such, there is some reserve capacity available in the well for a larger pump and to serve potential Woodside Cabins in the future.

The estimated construction cost for connecting Incahias to Woodside is on the order of $20,000, assuming approximately 240 linear feet of water main crossing the road is needed, This connection may (or may not) have been constructed with Woodside.

Incahias water system is predominately 1-1/2-inch piping and is 30-years old. It is considered to be in **fair condition**, but:

- At one time, the service lines to the hydrants at each RV site were PVC. These are prone to breaking the water mains if the service hydrant is hit, and has since been changed by park staff to flexible connections.
- There is limited isolation in the system, requiring the whole campground to be shut-off from water in the event of a break.
- If Incahias is converted to full service, replacement of the water distribution system could be worthwhile during that construction.

Budgetary cost for the water distribution replacement is on the order of $200,000.

3.3.3 West Residence Well

The West Residence well is a windmill driven, of unknown age, and of poor water quality (due to postive Bac-T/E.Coli). As discussed with park staff, the well is dedicated to the house (not public use), but the resident does no consume the well water. It is in **poor conditon**.

Assuming plugging and abandoning the the existing well and replacing with a new, residential type well is on the order of $50,000

3.3.4 Park View Water & Sanitary District

A potential option for the park is purchase water from Park View Water & Sanitary District. We discussed the concept with the District and they indicated interest in serving the park. Based on the discussion, their concept for the connection would be:

- The District would provide a wholesale, metered water supply to the park.
- To limit instantaneous demand on the District's system, and help with pressure, Scott County Conservation would provide a tank to be filled from the District water supply.
- Scott County Conservation distribute water from the tank.
- Scott County Conservation owns and operates the distribution system, including tank and piping network throughout the park.

The District's water system is on the south end of the park, so the connection to District water would be in the vicinity of the south gate. To cover in-season demands as well as an allowance for growth in the park, a 50,000 gallon tank is considered. Tank alternatives are discussed in the following sections.

There would be a monthly service fee ($21.14) as well as monthly water usage charge of $4.56 per 1,000 gallons for the first 2,000 gallons, and then $4.06 per 1,000 gallons over the 2,000 gallons. Rates can change at the discretion of the District Board.

Well production data is limited at Scott County Park; as such, water usage is estimated based on West Lake average monthly usage while considering Scott County Park has more facilities and camp sites. As an estimate, the overall average monthly water usage is likely on the order 280,000 gallons per month. Noteworthy, this estimate does not include high water usages, such as the pool. If the park switches to purchasing water from the District, it would be beneficial to maintain a well for the pool and similar maintenance needs.

As an estimate of the annual water cost under this alternative, assuming current rates and approximate water usage noted above, the annual cost would be on the order of $14,000 per year.

Elevated Tank Option

The District operates their system between 40 psi and 45 psi. The Park's south entrance is relatively at the same elevation as the District systems, and therefore, the District should be able to fill an elevated tank providing 40 psi to 45 psi (when full). From the South Gate to Pioneer Village, there is roughly a 100 feet elevation change. Campgrounds and amenities, in general, are at elevation 730 to 765. This considered, the static pressure at the campgrounds and facilities would be in the neighborhood of 49 psi to 62 psi (tank full), and operate downwards to 45 psi to 57 psi assuming water levels fluctuate across half the tank volume. There would be exceptions, for example higher pressure at Pioneer Village (upwards of 83 psi), and lower pressures at the South Gate (downwards to 36 psi at Ranger House and Entrance Building, at tank half full).

The benefit of elevated tanks is reliability of gravity, provides water storage at system pressure, and reduces the need for pressure tanks throughout the system. The downside is cost. Although not necessarily a downside, the max pressure (i.e. tank height) is fixed by the District's pressure (unless a booster pump is also provided), which can impact distribution system pipe sizing. Minimum normal working pressure should target 35 psi and the system under peak instantaneous demands should be above 25 psi.

Budgetary cost for an elevated tank is on the order of $430,000.

Ground Storage Tank Option

Ground storage tank provides water storage below system pressure. As such, the tank would also require a booster pump station to pump from ground storage into the distribution system. With this sytem, pressure tanks at the campgrounds and facilities would be maintained, at least in part, to help pump operation. System operation would be dependient on the booster pump station, and standby power is considered in the concept

Budgetary cost for a ground storage tank with booster pump station is the order of $360,000.

Distribution System

For this alternative, a relatively vast distribution system would be need to convey water from the South gate across the park to the various campgrounds and facilities. Depending on routing, and the degree of looping, upwards of 5.5 miles of water main could be required. Along with piping is connection to campgrounds and facilities, isolation valves and flush hydrants.

Budgetary cost for a distribution system is on the order of $2.4 million. Noteworthy, the system could be built in phases over time to eventually serve the entire park. In the interim, certain portions of the park would continue to rely on wells.