PRELIMINARY ENGINEERING REPORT

TOWN OF HAYDEN
WASTEWATER TREATMENT FACILITY

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Prepared by

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WASTEWATER TREATMENT FACILITY

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SGM Project # 2010-414.003

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1.0 Executive Summary

- The Town is seeking funding assistance in the form of grants and loans.

- The Colorado Department of Public Health and Environment (CDPHE) issued revised effluent limits to the Town and implemented a compliance schedule. The effluent limits require a secondary level of treatment with enhanced ammonia removals.

- Wastewater treatment facility alternatives are considered as follows:

    - Use of the existing aerated lagoon facility with discharge directly to the Yampa River
    - New Integrated Fixed Film Activated Sludge Treatment System
    - New IFAS MBBR Treatment Technology
    - New Aero-Mod Sequox Treatment Facility
    - New Sequencing Batch Reactor (SBR) Technology

- The existing lagoons are not capable of meeting enhanced ammonia removals and therefore were not considered as a stand alone alternative.

- Both future tap fees and monthly user fees will have to be significantly raised to implement the recommended alternative.

- The Town does not have sufficient current capital reserves to cover the entire cost of the project and will seek loans and grants to offset the rate increases.

- Based on the overall present worth cost, total capital cash requirements and the recommended alternative is to pursue discharge of the effluent directly to the Yampa River with an easement for the forcemain.

- The purpose of this report is to assess a basis for the Town of Hayden to move forward on addressing their treatment needs. This report will identify feasible alternatives for constructing new or modified wastewater treatment facilities and discharging treated effluent directly to the Yampa River. Specifically, the report will address the following:
    - Define future service needs.

    - Review current Colorado Department of Public Health and Environment (CDPHE) discharge requirements.

    - Identify potential future CDPHE discharge requirements.

    - Consider treatment options.

    - Identify capital and maintenance/operation costs of treatment options available.

2.0 Planning Conditions

2.1 Planning Area

The water and wastewater maps located in the Appendix shows the current service area for the Town of Hayden.

2.1.1 Floodplains

The online FEMA Flood Insurance Rate Map (FIRM) system was reviewed and the existing wastewater treatment facility site is located outside of the 100-year floodplain. The site is located adjacent to Zone A of the Yampa River with an approximate floodplain elevation of 6,331. See Panel 785 of 1475 located in the Appendix.

Any new structures or equipment will be placed at an elevation above the 100-year floodplain.

2.1.2 Plan Coordination

There is not a current 208 Plan applicable to the Hayden area. The existing Hayden Wastewater Treatment Facility (WWTF) predates any regional plans.

2.1.3 Environmental Resources Present

A Jurisdictional Wetland Delineation was prepared by Western Bionomics LLC in November 2011 for the forcemain route, see the appendix. No evidence of threatened or endangered animal or plant species was observed or has been documented anywhere within or adjacent to the proposed project area.

In summary, no substantial environmental consequences will be incurred as a result of the implementation of the preferred project alternative. Any short term impacts normally associated with lift station and forcemain construction will be mitigated with BMPs. The disturbed areas will be revegetated and restored to original or better condition.

2.1.4 Growth Areas and Population Trends

Population projections for Routt County and the Town of Hayden were obtained from the state demographers office. Table 1 shows the population projections and annual growth rate for Routt County from 2000 to 2030.

Table 1. Population projections for Routt County.

Year	Demographer Estimated Population	Annual Growth Rate
2000	20,121	
2001	20,528	2.0%
2002	21,063	2.5%
2003	21,378	1.5%
2004	21,623	1.1%
2005	21,862	1.1%
2006	22,384	2.3%
2007	23,011	2.7%
2008	23,622	2.6%
2009	24,109	2.0%
2010	24,465	1.5%
2011	24,866	1.6%
2012	25,301	1.7%
2013	26,016	2.7%
2014	26,738	2.7%
2015	27,513	2.8%
2016	28,273	2.7%
2017	29,047	2.7%
2018	29,803	2.5%
2019	30,567	2.5%
2020	31,322	2.4%
2021	32,085	2.4%
2022	32,883	2.4%
2023	33,728	2.5%
2024	34,615	2.6%
2025	35,495	2.5%
2026	36,373	2.4%
2027	37,245	2.3%
2028	38,115	2.3%
2029	38,973	2.2%
2030	39,826	2.1%
	Average	**2%**

Analyzing the annual percent growth in population from 2010 to 2030 shows an average growth of approximately 2% for Routt County.

Population estimates for the Town of Hayden were also obtained from the State Demograher's office. Table 2**Error! Reference source not found.** shows the population estimates and percent growth for the Town of Hayden from 2000 to 2010.

Table 2. Population estimates and percent growth for the Town of Hayden

Year	Population	Percent Growth
2000	1,634	
2001	1,667	2%
2002	1,694	2%
2003	1,726	2%
2004	1,742	1%
2005	1,769	2%
2006	1,815	3%
2007	1,848	2%
2008	1,859	1%
2009	1,859	0%
2010	1,810	-3%
		1.0%

Analyzing the annual percent growth in population from 2010 to 2020 shows an average growth of approximately 1% for the Town of Hayden.

For planning purposes this report will use the more conservative growth rate of 2%.

Historic average daily wastewater flows for 2008 to 2010 were obtained from the Town of Hayden and show an average daily flow of approximately 0.152 MGD. Table 3**Error! Reference source not found.** shows the average daily wastewater flowrates for each month from 2008, 2009, & 2010.

Table 3. Historic Wastewater Flowrates 2008-2010

	Average Flow (mgd)		
	2008	**2009**	**2010**
January	0.082	0.095	0.082
February	0.095	0.121	0.077
March	0.232	0.257	0.119
April	0.370	0.187	0.206
May	0.213	0.176	0.181
June	0.219	0.195	0.233
July	0.180	0.153	0.161
August	0.156	0.138	0.114
September	0.173	0.125	0.121
October	0.170	0.132	0.179
November	0.113	0.080	0.095
December	0.085	0.080	0.094
Average	**0.174**	**0.145**	**0.138**

The monthly maximum flow is the average daily flow to the plant during the month with the highest flow. Historically, the maximum monthly flow has been approximately 1.5 times the average daily flow. Therefore a peaking factor of 1.5 will be utilized to relate average daily flow to monthly max flow.

Table 4 shows the projected population, average daily flow rate, and monthly max flowrate for 2013 to 2030. The projection population is based on a 2% growth rate.

Table 4. Projected Average and Monthly Max Flows.

Year	Projected Population	Estimated Average Daily Flowrate (mgd)	Monthly Max Flow (mgd)
2013	1,921	0.152	0.228
2014	1,959	0.155	0.233
2015	1,998	0.158	0.237
2016	2,038	0.161	0.242
2017	2,079	0.165	0.247
2018	2,121	0.168	0.252
2019	2,163	0.171	0.257
2020	2,206	0.175	0.262
2021	2,251	0.178	0.267
2022	2,296	0.182	0.272
2023	2,341	0.185	0.278
2024	2,388	0.189	0.283
2025	2,436	0.193	0.289
2026	2,485	0.197	0.295
2027	2,534	0.201	0.301
2028	2,585	0.205	0.307
2029	2,637	0.209	0.313
2030	2,690	0.213	0.319

The existing wastewater lagoon system is designed for an average daily flow of 0.75 MGD. The projected maximum monthly flows over the next 20 years will be far less than the current permitted capacity of the lagoon system. Therefore this report will consider the design limit of any new equipment to maintain a design capacity up to 0.75 MGD.

2.1.5 Wastewater Flow Forecasts

Table 5 summarizes the design values used for the flow estimation for the design. A design monthly max flow of 0.75 MGD will provide the facility with well over 20 years of capacity. The peaking factors shown in the table are used to correlate the flows to peaking events such as peak hour.

Table 5. Design Flows for Treatment Processes

Average Daily Flow (MGD)	0.75
Monthly Max Flow (MGD)	1.5
Existing Influent Pumping Capacity (MGD)	3
Peak Hour Flow (MGD)	3

Based on an estimated future wastewater flow of 0.75 MGD, effluent waste load projections are as follows:

Effluent BOD: 30 mg/l – 30 day average

Effluent TSS: 75 mg/l – 30 day average
Effluent Ammonia: 40 mg/l – 30 day average

SGM contacted CDPHE to discuss obtaining new preliminary effluent limits (PELs) for the Town of Hayden. The Water Quality Assessment (WQA) completed in June of 2008 by CDPHE examined the Town's preliminary limits using the correct and current design flow, and looked specifically at a potential discharge to the Yampa River. As this analysis is fairly recent, we were informed by CDPHE that the results of a new PEL analysis would be nearly identical, in the event that no standards have changed.

Upon closer inspection, the only regulation that has been altered for the Town's segment in the last few years since the original WQA is an increase in the allowable arsenic, which is not a pollutant of concern for a minor domestic facility such as the Town's.

Therefore, CDPHE found that it was not necessary to complete a new PEL analysis for the Town of Hayden's wastewater treatment facility at this time, as the limits suggested in the WQA conducted in 2008 still apply. See the Appendix for a copy of the Water Quality Assessment. Table 6 summarizes the existing and new Water Quality Based Effluent Limits (WQBEL) for discharging directly to the Yampa River.

Table 6. WQBELs Summary Outfall 001B (0.75 MGD) Discharge Directly to the Yampa River.

WQBELs Summary Outfall 001B (0.75 MGD) Discharge Directly to the Yampa River				
Pollutant	**Existing Permit Limit**	**Existing Permitted Load (lbs/day)**	**New WQBEL**	**New WQBEL Load (lbs/day)**
E. coli (#/100 ml)	2000	12510	5901	36911
TRC (mg/l)	0.05	0.31	0.54	3.4
NH_3, Tot (mg/l) Jan	26.3	165	135	844
NH_3, Tot (mg/l) Feb	34	213	160	1001
NH_3, Tot (mg/l) Mar	34	181	195	1220
NH_3, Tot (mg/l) Apr	29	102	155	970
NH_3, Tot (mg/l) May	16.3	104	675	4222
NH_3, Tot (mg/l) Jun	16.6	104	91	569
NH_3, Tot (mg/l) Jul	16.6	104	60	375
NH_3, Tot (mg/l) Aug	16.6	104	49	306
NH_3, Tot (mg/l) Sep	16.6	104	54	338
NH_3, Tot (mg/l) Oct	16.6	104	68	425
NH_3, Tot (mg/l) Nov	16.8	105	100	626
NH_3, Tot (mg/l) Dec	27	169	130	813

There are no other effluent parameters that are regulated that are applicable to an effluent waste load projection.

Table 7 summarizes the design parameters used to evaluate the treatment processes and keeping the discharge point to Dry Creek.

Table 7. Design Parameters for New Treatment Process

Parameter	Influent	Effluent
	mg/l	mg/l
BOD	300	30
TSS	450	30
Ammonia	36	0.5

3.0 Description of Existing Facilities

3.1 Service Area Features

The service area map located in Appendix A shows the current service area for the Town of Hayden, including the location of the existing WWTF site.

3.2 Area Discharge Permits

An assessment of nearby facilities based on EPA's Permit Compliance System (PCS) database was conducted. According to PCS, the nearest upstream and downstream dischargers along the Yampa River were:

- Town of Milner WWTF, which discharges to the Yampa River approximately 20 miles upstream from the Dry Creek's point of confluence with the Yampa River.
- City of Craig WWTF, which discharges to the Yampa River approximately 22 miles downstream from Dry Creek's point of confluence with the Yampa River.

3.3 Facilities Layout and Description

The existing facility consists of an influent 6-inch Parshall flume with recorder; influent lift station; two aerated ponds; one polishing pond; two chlorine contact basins, dechlorination; and an effluent 12-inch Palmer Bowlus flume with recorder. There are also two holding ponds for irrigation and a 35-acre land application site.

The staff reports that all of the unit process equipment is in good condition and working order. Maintenance by Town staff occurs at routine intervals to maximize the useful life of equipment. It is expected that the unit process equipment will need minor repairs over the next 20 years.

3.4 Wastewater Flows

The current plant is permitted for a capacity of 0.75 MGD, from the Colorado Department of Public Health and Environment (CDPHE), NPDES Permit Number CO-040959. The plant has not seen toxic pollutants and does not expect to see any in the future. Peaking factors and influent parameters were discussed in section 2.5, please refer to this section for information on the influent characteristics. The Town of Hayden does not receive large seasonal variation in flows.

No overload conditions with the treatment works are known to exist.

From the population estimates previous discussed, the Town served a population of 1,810 persons in 2010. Based on the average 30-day max influent flow of 0.212 MGD as reported in 2010, the flow per capita per day was computed to be 117 gallons per capita per day (gpcpd). This is less than CDPHE's threshold of 120 gpcpd. Therefore inflow/infiltration (I/I) does not represent a major problem with the Town's sewer system.

The Town of Hayden has an I/I rehabilitation program. The Town has replaced a significant portion of sewer pipe and has been rehabilitating manhole structures with inserts.

There are no combined sewers, overflows or bypasses in the system.

3.5 Financial Status of Users

Both the existing and proposed facilities are owned and operated by the Town of Hayden and not part of a separate sanitation district. Therefore the Town of Hayden manages all related expenses and sets user rates and system development fees in order to balance all O&M cost, existing debt and capital improvements. Each year as part of the Town's annual proposed budget for the following year, it creates a water and sewer budget and water and sewer capital improvement plans.

The Town collects most of the revenues for both operating and capital expenditures from user rates and system development fees.

Rates for water usage are designed to encourage water conservation. The metered rate for residential usage is $3.47/1,000 gallons of metered usage up to a total of 6,000 gallons per billing period; $3.63/1,000 gallons of metered usage more than 6,000 gallons and up to 12,000 gallons per billing period; $3.95/1,000 gallons of metered usage more than 12,000 gallons of metered usage per billing period.

The metered rate for commercial usage is $3.47/1,000 gallons of metered usage up to a total of 12,500 gallons per billing period; $3.63/1,1000 gallons of metered usage more than 12,500 gallons and up to 25,000 gallons per billing period; $3.95/1,000 gallons of metered usage more than 25,000 gallons of metered usage per billing period. Non-profits are charged at the same rate and usage levels as commercial customers.

Qualified senior citizens, those aged 65 or over, receive a 40% discount on water rates. Out-of-town users are charged double the associated in-town rate.

The metered rates for key pump users is $6.94/1,000 gallons up to 3,000 gallons per billing period, $7.25/1,000 gallons for usage more than 3,000 and up to 8,000 gallons per billing period and $15.82/1,000 gallons for usage greater than 8,000 gallons per billing period.

Sewer rates are calculated each year in January and are based on the prior year's water usage. The lowest usage of the months of January, February, and March is averaged with the usage from November and December. This method is utilized because water is not being used during these months for irrigation of outdoor plants and lawns, which does not impact the sewer system. The rate stays fixed at this calculated amount until the following year.

Table 8 shows the existing water and sewer rates. Table 9 shows the current system development fees. The Town of Hayden has no significant industrial users.

Table 8. Current Water and Sewer Base Rates.

Current Water and Sewer Rates	
Type	**Monthly Base Rate**
Water Base - Residential	$ 36.13
Water Base - Senior Citizen	$ 21.68
Water Base - Key Pump	$ 48.73
Sewer Base - All Customers	$ 15.20
**40% discount on water rates for senior citizens*	

Table 9. System Development Fees

Table 10 shows a tabulation of the water volumes used by the type of user for the year 2011. Residential users account for the largest consumption of water in the Town.

Table 10. Tabulation of water volumes used by type of user for 2011.

	Quantity	Water Usage (gal)
Commercial	76	6,412,100
Key Pump (no sewer)	41	1,835,169
Non-Profit	73	10,299,994
Residential	669	35,977,162
Senior Citizen	79	6,314,500
Total	938	60,838,925

4.0 Project Purpose and Need

4.1 Compliance

The Town of Hayden was placed under a compliance schedule by CDPHE during their discharge permit renewal in April 2009. The current aerated lagoon system cannot meet the proposed total ammonia limits based on continuing discharge to Dry Creek. The existing lagoon facility was not designed to remove ammonia to levels required in the discharge permit. In order to meet the discharge parameters, the Town must upgrade the existing facility or look at discharging directly to the Yampa River.

4.2 Security

The site is enclosed by a chain link fence with a barb wire top on all sides. There are no apparent security concerns, or vulnerabilities at the site.

4.3 Operation and Maintenance

The Town has established Operation and Maintenance (O&M) policies that outline procedures for efficient operations, including the repair and replacement of short lived assets such as pumps and blowers. These expenditures are minimal due to adherence to established maintenance procedures. Present equipment at the lagoons will provide sufficient operations until a new treatment alternative is implemented. The Town promotes annual operator training and retains qualified personnel.

4.4 Growth

The Sewer Fund is in relatively good financial shape with a fund balance sufficient to cover smaller emergency situations. The Town has a rate structure for water and wastewater that is below the State Average. Rates were recently increased to accommodate the expected new debt to fund this project. The Town has established procedures for utility billing, reporting, and collections. Included in the Appendix is a copy of the 2012 budget information for the Sewer Fund O&M expenses, revenues from interest, user fees.

5.0 Assessment of Alternatives

Several alternatives were considered to meet the proposed discharge limits and maintain compliance with CDPHE. The following alternatives were considered:

1. Use of the existing aerated lagoon facility with discharge directly to the Yampa River
2. New Integrated Fixed Film Activated Sludge Treatment System
3. New IFAS MBBR Treatment Technology
4. New Aero-Mod Sequox Treatment Facility
5. New Sequencing Batch Reactor (SBR) Technology

5.1 Description

Several treatment alternatives to meet the discharge requirements were analyzed. The effluent water quality requirements directly relate to the discharge location. The ammonia standards are more stringent if discharging to Dry Creek as compared to directly discharging to the Yampa River. The following sections will discuss each process alternative individually.

5.1.1 Existing Lagoons with Direct Discharge to Yampa River

An alternative to meet the proposed discharge limits is construction of a lift station and forcemain to deliver treated effluent directly to the Yampa River. This alternative requires an easement from the Nature Conservancy who owns the land adjacent to the existing plant and the Yampa River. The existing lagoons and related equipment would continue to serve their current role.

A new lift station would be constructed following the chlorine disinfection and dechlorination system. In addition an 8-inch forcemain would be installed with an approximate length of 1,600 linear feet to pump treated effluent directly to the Yampa River in lieu of discharging as the system currently does to Dry Creek which flows to the Yampa River.

5.1.2 Integrated Fixed-Film Activated Sludge (IFAS) Treatment Technology

Another technology, Bio-Wheel, that should be considered for a new treatment facility is manufactured by a company called Wastewater Treatment Technologies. This proprietary technology is capable of meeting the effluent discharge parameters, contains a small footprint, and consumes considerably less energy than comparable technologies. A facility utilizing this treatment technology is installed in Hudson, CO and another is currently under construction in Red Cliff, CO

The Bio-Wheel™ biological treatment system has been developed to combine the compactness and flexibility of the activated sludge process with the stability and simplicity of the fixed film process. The Bio-Wheel™ system integrates the two processes in a single tank by using a simple mechanical drive system. The

rotation of the Bio-Wheel™ provides alternating air and water cycles for the fixed film process, and aeration and mixing for the activated sludge process.

With the Bio-Wheel™ system, advanced water treatment with high quality effluent is possible by biodegradation of the organic compounds, nitrification, and denitrification and uptake of excess P without using chemicals. The combination of the two processes provides high stability, with low capital and operating costs. Figure 1 reveals the basic treatment process of the Bio-Wheel system.

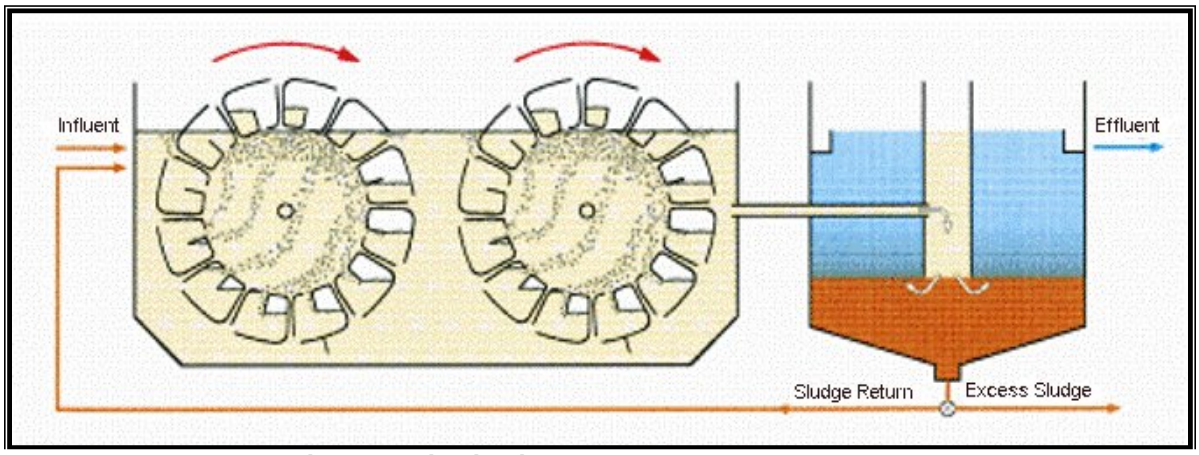


Figure 1. Biowheel Treatment Process

In general the following process steps are involved:

- Mechanical pretreatment with a bar screen, comminutor or pre-clarification.
- Aeration and mixing in the bio-tank with the rotating Bio-Wheel™.
- Clarification, with sludge recycling to the bio-tank and withdrawal of excess sludge.

The heart of the wastewater treatment process is the Bio-Wheel™ which consists of a rotating structure with patented cell plates arranged in a series of rows. The cell plates are 3/4" apart and provide a roughened surface as media for fixed film growth, and also provide a source of aeration for the activated sludge. By adjusting the speed of rotation for varying oxygen requirements, treatment of the wastewater occurs both in the activated sludge and the fixed film.

During rotation of the Bio-Wheel™, trapped air is gradually released into the mixed liquor as fine bubble aeration, see Figure 2. Some of the air is transferred from one pocket to another inside the cells providing additional buoyancy reducing energy requirements. Before the cells are rotated to the surface, all air is expended as fine bubble diffusion. By this method, the time of retention of air-water contact is extended so that oxygen transfer is optimized.

The rotational speed of the Bio-Wheel™ is adjustable, which regulates the amount of aeration and mixing in the bio-tank. The deep submergence of the wheel in the mixed liquor increases the efficiency of oxygen transfer.

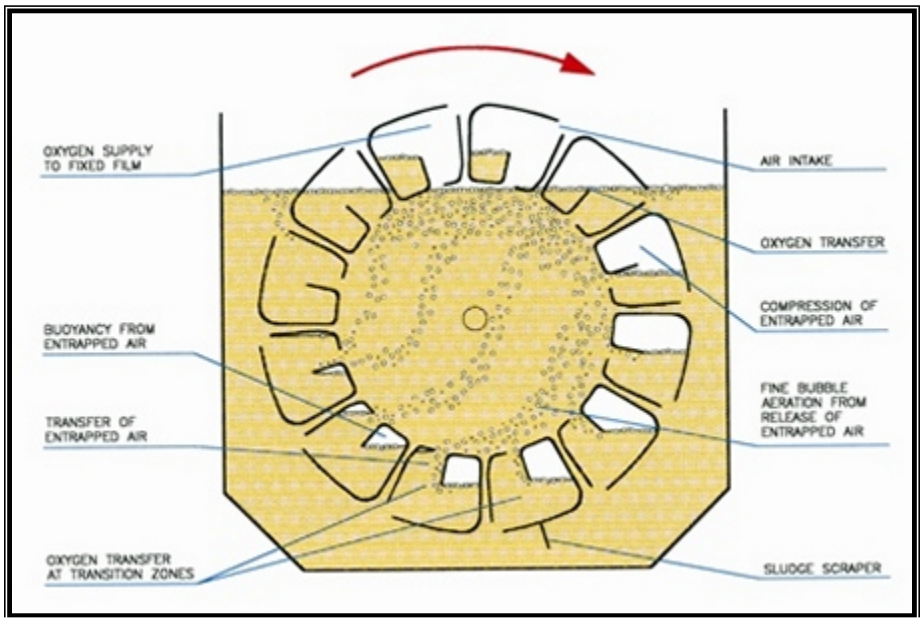


Figure 2. Biowheel Wastewater Operation

The Bio-Wheel™ consists of a number of cells, which are arranged in a circular fashion around a horizontal shaft. Each cell contains a number of specially profiled polypropylene plates which form a self supporting segment to provide aeration and mixing as well as a surface area for the biologically active fixed film. The wheel is submersed to 80% of its diameter in the mixed liquor and is driven by an easily accessible gear motor and chain drive located above the liquid level on the upper wall of the bio-tank.

As the Bio-Wheel™ rotates and the cell segments are submerged into the mixed liquor, the entrapped air is compressed and forced toward the bottom of the bio-tank. During downward rotation, a portion of the air escapes to the surface as fine bubbles. The resulting turbulence, combined with the rotation of the wheel, provides homogeneous mixing in the bio-tank. During upward rotation of the wheel, the partially air filled cell provides buoyancy and reduces the power required for rotation.

The fixed film on the surface area within the cells is supplied with oxygen while above the surface, and air is taken in to be compressed and distributed during rotation. This process results in the coincident supply of oxygen for the fixed film and the activated sludge.

The intake of air is adjusted by the speed of rotation of the Bio-Wheel™. Even with very high loading and corresponding high oxygen consumption rates, a

sufficient supply of oxygen can be transferred. The fixed film component provides an ideal environment for slow growing nitrifiers to provide stable nitrification. By creating a separate anoxic zone, complete nitrification and denitrification can be provided with minimal power consumption by the Bio-Wheel™ system.

The Bio-Wheel wastewater treatment system can be installed above or below ground as shown in Figure 3.

Figure 3. Two train Bio-Wheel wastewater treatment facility below ground.

5.1.3 IFAS MBBR Treatment Technology

An option evaluated in this report is the MBBR technology which is capable of meeting the stringent effluent limits and has been implemented most recently in New Castle, Colorado. The MBBR technology is an IFAS process and manufacturers include Kruger, Siemens, and others. SGM is very familiar with this technology including the advantages and disadvantages of its implementation.

The MBBR process is the addition of biofilm carriers to a conventional activated sludge process. The process utilizes cylindrical polyethylene biofilm carriers which provide an environment in which specific bacterial populations can grow very effectively. Custom retention screens are employed to retain the media in the tanks and aeration is used to provide the oxygen needed for growth in aerobic configurations. This aeration also supplies the mixing energy which causes the carriers to be dispersed throughout the liquid and completely mixed.

The agitation created during mixing by the aeration system, enables the biomass to continuously slough, maintaining a thin and efficient biological film.

The medium for the support of biofilm growth consists of high-density polyethylene (HDPE) cylinders with approximate dimensions of 10 mm diameter and 7 mm long, see Figure 4. The media has small fins on the outer circumference and a cross piece in the center.

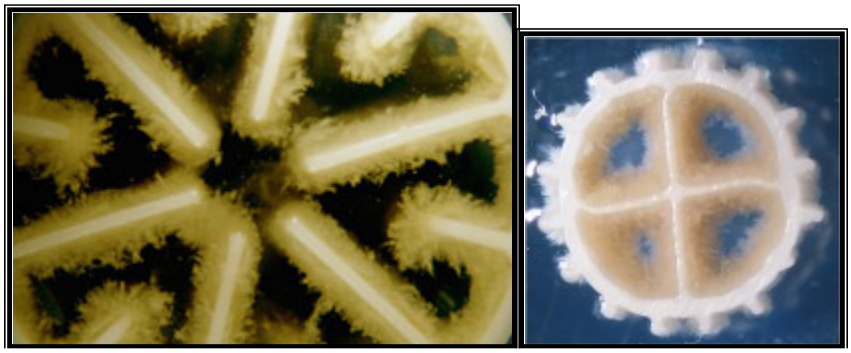


Figure 4. AnoxKaldness media which promotes biofilm growth.

An MBBR treatment system consists of a reactor tank equipped with an outlet screen to retain the media, the media itself, a means of aeration and mixing, and a clarification device. Aeration and mixing are performed by the use of a medium bubble system design using stainless steel laterals and diffusers. Within the reactor the media, wastewater, MLSS and air are completely mixed which results in very efficient contact between the biomass and substrates within the liquid. One of the important features of the treatment process is that biofilm thickness is controlled by the movement of the media so that oxygen diffusion through the biofilm is encouraged. Sloughed or detached biofilm is suspended within the reactor and becomes part of the MLSS, which then leaves the reactor tank to be separated in the downstream clarifier.

The reactor tanks can be of almost any shape and existing tanks have been used in a number of cases. Ideal tank depths are between approximately 10 feet and 24 feet, which maximizes oxygen transfer efficiency while making blower choice simple and keeping typical superficial air velocities within reasonable limits. Square or circulator reactor tanks are preferable over large rectangular reactors, see Figure 5. Each reactor is considered a continuous stirred tank reactor (CSTR), so in order to differentiate between process conditions (i.e. Aerobic, Anoxic); a number of reactors in series may be required.

Figure 5. AnoxKaldness wastewater treatment facility.

Screens are used to retain the media and a typical design uses horizontally mounted cylindrical wedge wire screens with appropriate wire spacing, see Figure 6. In order to avoid debris accumulations in the treatment process, upstream 6mm (0.25 inch) preliminary screening, primary clarifiers or other upstream treatment processes should be incorporated.

Since the treatment process is operated the same way as a typical activated sludge plant secondary clarifiers, digesters, and associated piping are still needed.

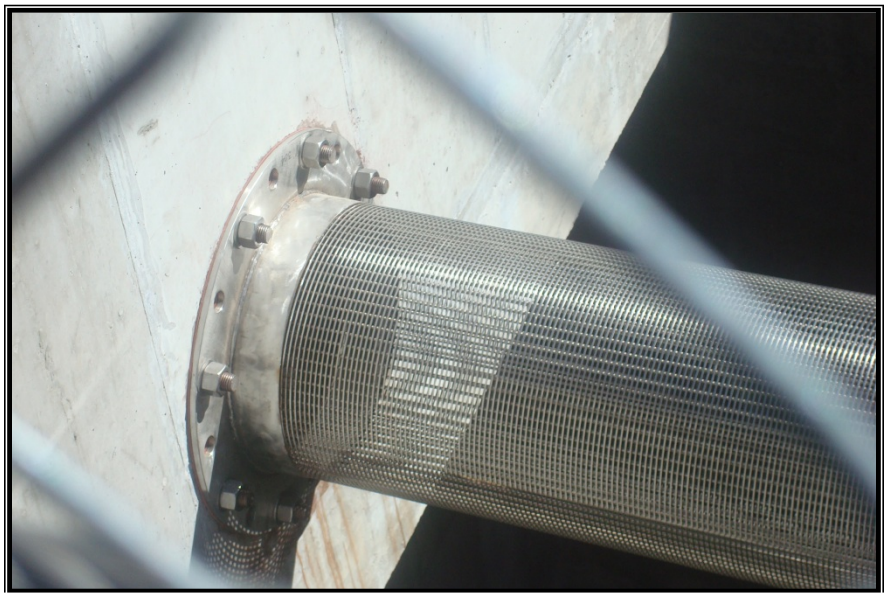


Figure 6. Reactor screen to retain media.

5.1.4 Aero-Mod Sequox Treatment Facility

Aero-Mod is a manufacturer of wastewater treatment equipment and provides a proprietary SEQUOX process which incorporates common tank walls and is capable of handling variable flows. The SEQUOX process is founded on the principles of activated sludge wastewater treatment. This technology has been incorporated on a variety of systems on the Western Slope of Colorado including more recently the Town of Silt. This technology was chosen for its ability to meet effluent discharge limits and capability of handling variable flows and loadings.

While this treatment technology resembles the activated sludge process, it has been modified in order to meet more stringent discharge requirements. The SEQUOX technology offers the benefits of sequencing aeration with the reliability of continuous clarification. Excellent denitrification occurs, and levels of 3 mg/l for Total N have been achieved. To achieve better solids settling, the SEQUOX process incorporates a selector tank to provide a preconditioning of raw wastewater that inhibits filamentous growth. The process is energy efficient and has a small footprint, lowering capital costs.

Combining the SEQUOX Process with Aero-Mod's proprietary ClarAtor Clarifier offers the ability to handle up to 4:1 sustained peak flows, resulting in additional treatment without additional costs.

The Aero-Mod ClarAtor provides clarification to the Aero-Mod System. It features no moving parts below the water, a uniform distribution and collection of the influent, and the unique ability to regulate the effluent flow rate.

Stainless steel components, PVC piping, and aluminum handrails and walkways are installed into common-wall concrete tankage. This compact rectangular configuration reduces the overall plant construction costs. Figure 7 shows an above ground Aero-Mod wastewater treatment facility in New Richmond, Ohio with concrete tanks.

Figure 7. Aero-Mod treatment facility in New Richmond, OH.

The Slide Rail Diffuser Access System used in the Aero-Mod treatment system provides simple access to the aeration diffusers. The key to the SR Diffuser Access System is the ability to take a flexible, lightweight, PVC diffuser drop pipe and make it stationary by attaching it to a rigid, stainless steel guide rail.

Isolation and air control are provided by a ball valve on each assembly. Removal is achieved by loosening a stainless steel union and lifting up the lightweight assembly on guides. A permanently mounted slide rail of stainless steel, firmly bolted to the tank wall and floor, provides rigidity. Since all equipment below the water surface is stainless steel and permanently mounted, there is no need to drain the tanks for maintenance, see Figure 8 and Figure 9.

Figure 8. Aero-Mod empty aeration basin.

Sliderail Diffuser Access System Advantages:

- Access to the diffusers without turning off blowers or draining the tankage
- Eliminates the need for hoist or wenching systems
- Access to individual drop pipes without affecting the entire aeration system

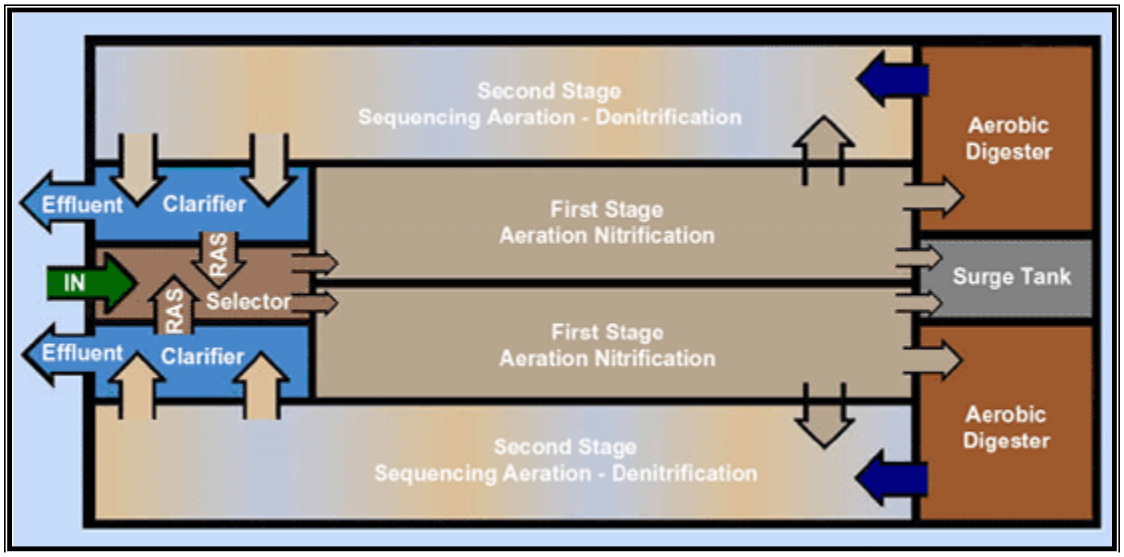


Figure 9. Aero-Mod biological nutrient removal wastewater system.

5.1.5 Sequencing Batch Reactor (SBR) Treatment Facility

Another treatment technology that is capable of meeting the effluent discharge requirements is the sequencing batch reactor (SBR). This technology has also

been employed in a variety of treatment systems throughout Colorado and different variations are available from several equipment vendors.

The SBR process utilizes a fill-and-draw activated sludge system for wastewater treatment. In this type of process, wastewater is added to a single “batch” reactor, treated to remove undesirable constituents, and then discharged. The steps of equalization, aeration, and clarification can all be achieved using a single batch reactor. To optimize the performance of the system, two or more batch reactors are used in a predetermined sequence of operations. Figure 10 depicts an SBR wastewater treatment facility.

Figure 10. SBR wastewater treatment facility

In the SBR system, influent wastewater generally passes through screens and grit removal prior to the SBR basins. The wastewater then enters a partially filled reactor, containing biomass, which is acclimated to the wastewater constituents during preceding process cycles. Once the reactor is full, it behaves like a conventional activated sludge system, but without a continuous influent or effluent flow. After the biological reactions are complete, the aeration and mixing is discontinued, the biomass settles, and the treated supernatant is removed. Excess biomass can be wasted at any time during the process cycle. The SBR process is characterized by the following steps:

MIX FILL -

- Influent enters reactor
- Complete mix of contents is achieved without use of aeration
- Controls filamentous organisms
- Essential for systems requiring phosphorus removal

REACT FILL -

- Influent flow continues under mixed and aerated conditions

- Aeration may be intermittent to promote aerobic or anoxic conditions
- Nitrification and denitrification is easily managed
- Aeration source may also be turned down during low flow conditions to conserve energy

REACT -

- Influent flow is terminated
- Mixing and aeration continue in absence of raw waste
- Dissolved oxygen probes can be used to deliver oxygen on "as needed" basis without loss of mixing
- Provides a treatment barrier that separates the Fill phases from the Settle and Decant Non-Fill phases

SETTLE -

- Influent flow does not enter reactor
- Mixing and aeration cease
- Ideal solids/liquid separation is achieved due to perfectly quiescent conditions
- Adjustable time value allows settling time to match prevailing process needs

DECANT/SLUDGE WASTE -

- Influent flow does not enter reactor
- Mixing and aeration remain off
- Decantable volume removed by subsurface withdrawal
- Reactor is immediately ready to receive next batch of raw influent
- A small amount of sludge is wasted near end of each cycle

Figure 11 depicts the operating sequence and common steps for a sequencing batch reactor treatment system.

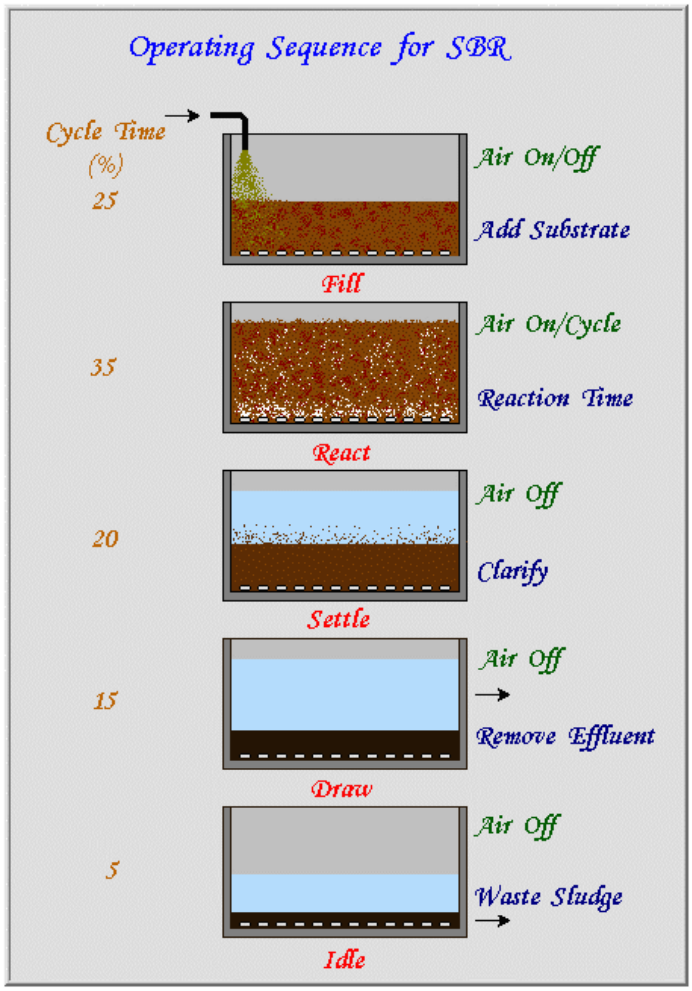


Figure 11. Sequencing Batch Reactor process.

An SBR serves as an equalization basin when the basin is filling with wastewater, enabling the system to tolerate peak flows/loadings in the influent and to equalize them in the batch reactor. In many conventional activated sludge facilities, separate equalization is needed to protect the biological system from peak flows, which may wash out the biomass, or peak loads, which may upset the treatment process.

5.2 Design Criteria

The feasible treatment technologies presented in section 5.1 were designed to meet the effluent criteria presented in Section 2.5, and all associated processes were designed within all criteria presented in the CDPHE Design Criteria.

5.3 Environmental Impacts

Analysis of the environmental and social impacts of proposed treatment alternatives shows that each alternative has minimum impacts to the environment and no measurable social impacts. The only adverse environmental

impacts from the proposed expansion are related to construction, and will thus only be temporary impacts such as noise, and dust. Every effort will be made to mitigate these impacts during construction.

There are no adverse environmental affects from this project. Conversely, a new mechanical plant will deliver a higher quality effluent to the receiving water.

The current site is not located on any historical, archeological sites, or wetlands, thus construction within the site will not affect of the areas in question.

In summary, no substantial environmental consequences will be incurred as a result of the implementation of the preferred project alternative. Any short term impacts normally associated with lift station and forcemain construction will be mitigated with BMPs

5.4 Land Requirements

All the proposed technologies were designed to remain on the existing site, within the existing boundary. The site is currently owned by the Town of Hayden. An easement from the Nature Conservancy will be necessary to implement the lift station and forcemain alternative to pump treated effluent directly to the Yampa River.

5.5 Construction Problems

Technologies with smaller footprints are favored to allow for site access and construction. It is also necessary for the plant to continue operating during construction thus any new technology must fit within the site, but not interfere with the existing process train. The site is located near the Yampa River and thus the water table is high. Dewatering will be necessary for construction activities.

5.6 Operational Aspects

CDPHE Regulation No. 100 “Water and Wastewater Facility Operators Certification Requirements” outlines the certification requirements as a function of plant size and process type. Plant sizes in the 0.5-1.00 MGD range require certification level C for waste stabilization ponds, including aerated and non-aerated types. Activated sludge process, the IFAS process, and the Aero-Mod Sequox technology would require a Class B operator. Currently the Town of Hayden has two small systems, one class D, and one class C certified operators. Staffing levels will vary from process to process. Primary treatment, headworks, lab facilities, disinfection etc. will be common to all the alternative processes.

All of the process alternatives will require biosolids management and disposal. The IFAS and Aero-Mod Sequox alternatives will require more frequent biosolids management and disposal. Biosolids management will require compliance with CDPHE Regulation No. 64 “Biosolids Regulation”. Sludge management for a plant of this size will require a full time dedicated operator or maintenance person to work with sludge dewatering, thickening and disposal, monitoring DO levels,

monitoring volatile solids levels etc. Use of biosolids for agriculture and land application of biosolids requires significant time spent on establishing cumulative pollutant loading limits, notification requirements, determining slope and application requirements, soil and groundwater issues, nutrient management, and biosolids monitoring and analysis.

As a base condition all of the secondary biological process will require two full time dedicated employees. First a chief plant operator should be in charge of the entire plant with a significant amount of time spent on supervision process control for the activated sludge or fixed film process. Further a second operator will be required for basic maintenance, for these processes to included return and waste pumping controls, MLSS process controls, DO and blower operation, clarifier and scum pumping requirements.

Based upon the above discussion the base plant of any of the processes will require between 2-3 employees.

5.7 Cost Estimates

Detailed cost estimates for each proposed process, with capital, equipment, and construction costs are shown in Table 11.

Table 11. Summary of Cost Estimates

Item No.	Description		AeroMod Sequox	SBR	IFAS (Bio-Wheel)	MBBR IFAS	Lift Station & Forcemain
1	Headworks & Screening		$200,000	$200,000	$200,000	$200,000	$0
2	Process Equipment		$1,500,000	$1,700,000	$1,900,000	$2,750,000	$0
3	Building for Process Equipment		$500,000	$500,000	$500,000	$500,000	$0
4	Process Concrete & Tankage		$800,000	$950,000	$0	$75,000	$0
5	Clarifier Equipment		$0	$0	$0	$85,000	$0
6	Clarifier Concrete		$0	$0	$0	$150,000	$0
7	Covers for Clarifiers		$0	$0	$0	$165,000	$0
8	RAS/WAS/SCUM Pump Station		$0	$0	$100,000	$150,000	$0
9	Internal Recycle Pumps		$0	$0	$0	$75,000	$0
10	UV Disinfection		$150,000	$150,000	$150,000	$150,000	$0
11	Digester Concrete		$165,000	$165,000	$165,000	$165,000	$0
12	Digester Equipment		$95,000	$95,000	$95,000	$95,000	$0
13	Covers for Digesters		$165,000	$165,000	$165,000	$165,000	$0
14	Odor Control		$85,000	$85,000	$85,000	$85,000	$0
15	Backup Generator		$325,000	$325,000	$325,000	$325,000	$50,000
16	Biosoilds/Dewatering		$225,000	$225,000	$225,000	$225,000	$0
17	Duplex Lift Station		$0	$0	$0	$0	$150,000
17	8-inch Forcemain		$0	$0	$0	$0	$150,000
17	Easement Acquisition		$0	$0	$0	$0	$8,300
17	Outfall Structure		$0	$0	$0	$0	$25,000
17	Remove and Dispose of Existing Equipment		$0	$0	$0	$0	$10,000
18	Mobilization	10.0%	$421,000	$456,000	$391,000	$536,000	$39,330
19	Decommissioning Facility and Lagoons		$100,000	$100,000	$100,000	$100,000	$0
	Subtotal:		**$4,731,000**	**$5,116,000**	**$4,401,000**	**$5,996,000**	**$432,630**
	Cost per Gallon (0.75MGD)		$6.31	$6.82	$5.87	$7.99	$0.58
	Contingency	10.0%	$473,100.0	$511,600.0	$440,100.0	$599,600.0	$43,263.0
	Permitting, Engineering & Construction Management	22.0%	$1,040,820.0	$1,125,520.0	$968,220.0	$1,319,120.0	$95,178.6
	Project Total		**$6,244,926**	**$6,753,127**	**$5,809,326**	**$7,914,728**	**$571,072**
	Cost per Gallon (0.75 MGD)		**$8.33**	**$9.00**	**$7.75**	**$10.55**	**$0.76**

The estimated annual operation and maintenance costs for each alternative are shown in Table 12.

Table 12. Annual Operation and Maintenance Costs.

PROCESS		AeroMod Sequox	SBR	IFAS (Bio-Wheel)	MBBR IFAS	Lift Station & Forcemain
Total Capital Cost		**$ 6,244,926**	**$ 6,753,127**	**$5,809,326**	**$7,914,728**	**$ 571,072**
Labor Cost						
number of operators		2	2	2	2	2
work hours	per person	40	40	40	40	40
Total Labor cost	**$/year**	**$ 180,000**	**$ 180,000**	**$ 180,000**	**$ 180,000**	**$ 180,000**
Power Usage						
Electrical equipment running time	days/week	7	7	7	7	7
	hours/day	24	24	24	24	24
Installed Horsepower	hp	200	200	200	200	20
Used Horsepower (bhp)	hp	120	120	120	120	12
Process Electricity usage	kWhrs/yr	781,732.22	781,732.22	781,732.22	781,732.22	78,173.22
Total Process Power Cost	$/year	$ 62,539	$ 62,539	$ 62,539	$ 62,539	$ 6,254
Other Power Consumption In Plant	$/year	$ 6,000	$ 6,000	$ 6,000	$ 6,000	$ 6,000
Total Power Costs	**$/year**	**$ 68,539**	**$ 68,539**	**$ 68,539**	**$ 68,539**	**$ 12,254**
Plant Supply Costs	**$/year**	**$ 75,000**	**$ 75,000**	**$ 75,000**	**$ 75,000**	**$ 75,000**
Plant Services Costs	**$/year**	**$ 100,000**	**$ 100,000**	**$ 100,000**	**$ 100,000**	**$ 100,000**
Total Chemical cost	**$/year**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 4,000**
Total Maintenance Cost (3% of capital cost)	**$/year**	**$ 187,348**	**$ 202,594**	**$ 174,280**	**$ 237,442**	**$ 17,132**
Total annual costs	$/year	**$ 610,900**	**$ 626,100**	**$ 597,800**	**$ 661,000**	**$ 388,400**

A present worth analysis was performed for each of the alternatives and is displayed in Table 13.

Table 13. Present Worth Analysis

COMPONENTS	AeroMod Sequox	SBR	IFAS (Bio-Wheel)	MBBR IFAS	Lift Station & Forcemain
capital cost	$ 6,244,926	$ 6,753,127	$ 5,809,326	$ 7,914,728	$ 571,072
annual cost	$ 610,900	$ 626,100	$ 597,800	$ 661,000	$ 388,400
annual cost present worth	$ 7,613,200	$ 7,802,600	$ 7,449,900	$ 8,237,500	$ 4,840,300
salvage value	$ (200,000)	$ (200,000)	$ (200,000)	$ (200,000)	$ (200,000)
total present worth	$ 13,658,126	$ 14,355,727	$ 13,059,226	$ 15,952,228	$ 5,211,372

5.8 Advantages/Disadvantages

Currently the Town of Hayden operates an aerated lagoon facility that is 20 years old. The facility has been a reliable treatment facility throughout its life, experiencing only minimum, infrequent equipment failure and has met all discharge requirements except for a few isolated exceptions. The facility is operated by a public works staff that is also responsible for sewer lines, waterlines, streets, drainage and the water treatment and storage system. The cost of operation and maintenance of the treatment facility is currently a small part of the overall Town's infrastructure budget. Each treatment alternative has its own advantages and disadvantages which should be scrutinized.

5.8.1 Existing Lagoons with Direct Discharge to Yampa River

The advantages of implementing this alternative include:

- Low Construction Cost
- Low Operation & Maintenance Cost
- Short construction time frame
- Meet Water Quality Standards

The disadvantages of implementing this alternative include:

- No improvement in the quality of the effluent leaving the treatment facility
- Unable to meet more stringent water quality regulations

5.8.2 Integrated Fixed-Film Activated Sludge (IFAS)Treatment Technology

The advantages of implementing this alternative include:

- High Process Efficiency
  By combining activated sludge and fixed film processes into a single system, a much higher treatment efficiency is obtained.
- Reliability of Operation
  A high degree of flexibility and stability in the treatment process is possible due to the wide spectrum of fixed and suspended microorganisms combined with the

ability to regulate oxygen intake. Temporary overloads can be buffered without problem.

- Reduced Need for Space, Lower Cost to Build
  High operating efficiency and compact design reduce space requirements as much as 40% over comparable systems. There is no yard piping, yard electrical or buildings to house equipment. Cost of construction is reduced due to the small size and simplicity of the system.
- Reduced Power Consumption and Operating Cost
  Power consumption of the Bio-Wheel™ is less than 30% of other aerobic processes using blowers, see Figure 12.

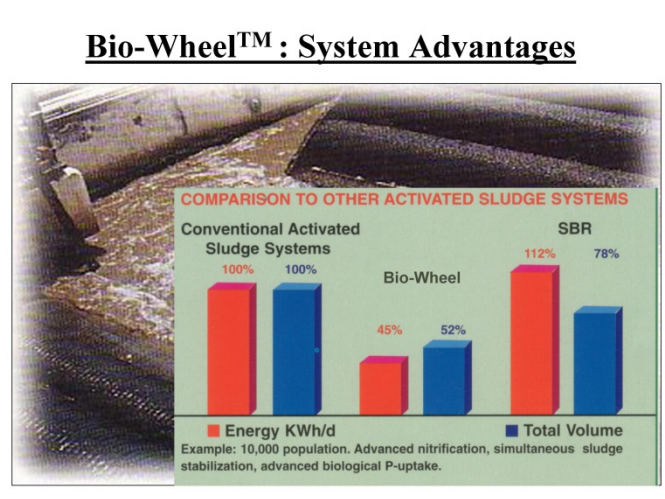


Figure 12. Comparison of Bio-Wheel energy consumption to other activated sludge systems.

- Advanced Wastewater Treatment
  With the Bio-Wheel™ process, it is possible to achieve nitrification and denitrification, bringing BOD5, TSS and N Total substantially below 10 mg/L, and reducing P to 1.0 mg/L or less.
- No Annoying Odors, Low Noise Level
  Through efficient oxygen transfer, air intake requirement is minimized. Most of the turbulence and mixing take place within the submerged aerator, minimizing the production of aerosols and emission of odors. There are no blowers requiring dust control, silencers, or protective covers.
- Simple Control System
  Sophisticated microprocessor controls are not required. Electrical panels are straight forward based on position switches and annunciator lights.
- Optimum Consistency of the Sludge
  The sludge settles well and has excellent dewatering characteristics due to the fixed film component of the system. The clarifier and sludge treatment facilities can be designed with less volume and be more compact. Waste sludge is greatly reduced in volume.

The disadvantages of implementing this alternative include:

- High Capital Cost
- High O&M Cost
- Increased water quality testing
- High Operator Certification Level

5.8.3 IFAS MBBR Treatment Technology

The advantages of implementing this alternative include:

- Common wall construction with a smaller footprint, covering becomes more feasible with smaller footprint, and the process requires very low maintenance.

The disadvantages of implementing this alternative include:

- Need for separate digesters and clarifiers and aeration tanks contain plastic carrier elements that must be dealt with for “in-basin” repairs.
- High Capital Cost
- High O&M Cost
- Increased water quality testing
- High Operator Certification Level

5.8.4 New Aero-Mod Sequox Treatment Facility

The advantages of implementing this alternative include:

- Selector tank promotes rapid settling
- Batch reaction, continuous withdrawal
- Allows batch withdrawal for high flow
- Dedicated nitrification tank
- Sequencing without stopping blowers
- Simple operation, minimal valves
- No moving parts below water surface

The disadvantages of implementing this alternative include:

- High Capital Cost
- High O&M Cost
- Increased water quality testing
- High Operator Certification Level

5.8.5 New Sequencing Batch Reactor (SBR) Treatment Facility

The advantages of implementing this alternative include:

- Time-managed nutrient control
- Independent aeration and mixing
- Complete mixed reactors
- Flexible aeration options

- Maintenance-free decanter system
- Small footprint
- Eliminates final clarifiers and associated pumping
- Simple to upgrade or expand

The disadvantages of implementing this alternative include:

- A higher level of sophistication is required (compared to conventional systems), especially for larger systems, of timing units and controls.
- Higher level of maintenance (compared to conventional systems) associated with more sophisticated controls, automated switches, and automated valves.
- Potential plugging of aeration devices during selected operating cycles, depending on the aeration system used by the manufacturer.
- Potential requirement for equalization after the SBR, depending on the downstream processes.
- High Operator Certification Level

5.8.6 Matrix Rating

Table 13**Error! Reference source not found.** displays the process comparison matrix and ranks each wastewater treatment technology with 1 being the highest and 4 being the lowest.

Table 14. Process Comparison Matrix

PROCESS	AeroMod Sequox	SBR	IFAS (Bio-Wheel)	MBBR IFAS	Lift Station & Forcemain
Footprint	3	3	2	2	1
Energy Use	4	3	2	4	1
Environmental Impacts	3	2	3	2	1
Social Costs / Public Concern	3	4	2	2	2
Sludge Production	4	3	3	2	1
Ease of Maintenance / Operator Attention	3	3	2	2	1
Ease of Expandability & Adaptability	2	4	2	3	2
Stability / Reliability	2	3	4	2	1
Process Controls	3	2	2	2	1
Overall Cost	4	4	3	4	1
Rank	3.10	3.10	2.50	2.50	1.20
Overall Rank	**3**	**3**	**2**	**4**	**1**

6.0 6.0 Selected Alternative

6.1 Justification of Selected Alternative

The lift station and forcemain alternative is the best alternative for the Town of Hayden based on the least financial impact to the Town and capability of meeting the discharge requirements. This matrix weighs the financial, social, and environmental costs of each alternative, creating a comprehensive picture of each proposed technology in a clear format for comparison.

6.2 Technical Description

The lift station and forcemain will be constructed to meet demands as follows:

- Average day flow: 0.75 MGD
- Peak hour flow: 760 gpm

System component locations are shown on the site plan located in the Appendix. A design basis and description for system components follows:

- Lift Station
  - Design basis – peak hour flow of 760 gpm
  - Type – we well/dry well with flooded suction centrifugal pumps
  - Standby power required
  - 2 – pump system, each sized 760 gpm
- Force Main
  - Design basis – peak flow of 760 gpm
  - Length – 1,600 feet
  - Size – 8” diameter

All associated processes were designed within the criteria presented in the CDPHE Design Criteria (Policy 96-1 Draft, March 2012).

6.3 Costs

Table 15 shows the estimated total construction cost for the selected alternative. Costs associated with surveying, engineering, permitting, and construction administration are not shown.

Table 15. Selected Alternative Cost Estimate

Item No.	Description	Unit	Unit Price	Alternative 1 Quantity	Alternative 1 Cost
1	Remove and Dispose Existing Equipment	LS	$ 10,000	1	$ 10,000
2	Mobilization	LS	$ 35,000	1	$ 35,000
3	8-inch forcemain	LF	$ 90	1,600	$ 144,000
4	Lift Station	LS	$ 150,000	1	$ 150,000
5	Fence repair/replace	LS	$ 5,000	1	$ 5,000
6	Outfall Structure w/Check Valve	LS	$ 25,000	1	$ 25,000
7	Erosion Control	LS	$ 5,000	1	$ 5,000
8	Revegetation and Restoration	LS	$ 10,000	1	$ 10,000
9	Backup Generator	LS	$ 50,000	1	$ 50,000
10	Easement Acquisition	LS	$ 5,000	1	$ 8,300
				Subtotal	**$ 442,300**

6.4 Green Project Reserve

No green components were specifically incorporated into the selected alternative.

6.5 Selected Alternative - Implementation

The Town will hold a public meeting with a 30-day notice period per Section 6.6 of the CDPHE Wastewater Preliminary Engineering Report Guidance & Review Checklist Form. The Town and Engineer will provide a summary of the public meeting including; financing, recommendations; required legal arrangements and/or intergovernmental agreements.

6.6 Miscellaneous Permits

We anticipate the project will need a 404 nationwide permit with the Army Corps of Engineers due to the outfall structure located on the Yampa River. No additional permits are expected at this time.

7.0 Proposed Project (Recommended Alternative)

Previous sections of this report have identified needs for improvements and evaluated alternatives for those improvements. The recommended alternative includes the construction of a lift station and forcemain. This section will summarize the project and describe the financial impact to the Town of Hayden.

7.1 Project Design

The improvements that are recommended for the Proposed Project are summarized in the bulleted list below:

- Lift Station
- Forcemain
- Easement Acquisition

7.2 Total Project Cost Estimate

The total estimated capital costs for the recommended alternative are summarized in Table 16**Error! Reference source not found.**. The costs include surveying, permitting, engineering, bidding, and construction administration costs.

Table 16. Estimated Total Project Costs

Item No.	Description	Unit	Unit Price	Alternative 1 Quantity	Alternative 1 Cost
1	Remove and Dispose Existing Equipment	LS	$ 10,000	1	$ 10,000
2	Mobilization	LS	$ 35,000	1	$ 35,000
3	8-inch forcemain	LF	$ 90	1,600	$ 144,000
4	Lift Station	LS	$ 150,000	1	$ 150,000
5	Fence repair/replace	LS	$ 5,000	1	$ 5,000
6	Outfall Structure w/Check Valve	LS	$ 25,000	1	$ 25,000
7	Erosion Control	LS	$ 5,000	1	$ 5,000
8	Revegetation and Restoration	LS	$ 10,000	1	$ 10,000
9	Backup Generator	LS	$ 50,000	1	$ 50,000
10	Easement Acquisition	LS	$ 5,000	1	$ 8,300
				Subtotal	**$ 442,300**
				Contingency (10%)	$ 44,230
				Surveying	$ 5,000
				CDPHE Permitting	$ 10,000
				Permitting	$ 22,115
				Engineering	$ 44,230
	Bidding, Construction Administration, Observation				$ 35,384
				Estimated Project Total	**$ 603,259**

7.3 Debt Repayments

The costs of capital improvements will be paid for by an increase in annual sewer fees. The total debt service is based upon a 20-year loan at 3.5% interest for the full amount of the capital cost of the loan. The estimated annual debt repayment for the proposed project is $41,757.12.

1.1.1.1.1.1 Reserves

An industry standard for the required debt service reserve is 10% of the total annual debt payment. The expected loan payment for the Proposed Project is $41,757.12 using 20-years at 3.5% interest. Thus, the total required debt service reserve for all of the loan obligations is estimated to be $4,175.71 (10% x $41,757.12).

1.1.1.1.1.2 Summary of Annual Operating Budget

A summary of the estimated income and expenses following completion of the Proposed Project is presented in Table 17.

Table 17. Estimated Income and Expenses

Existing Users		881
Current Monthly Base Rate	$	12.00
Yearly Revenue	$	126,864.00
Current Yearly O&M	$	126,864.00
Difference	$	-
Monthly Base Rate Increase	$	3.20
Additional Yearly Revenue	$	33,830.40
New Yearly Debt	$	41,757.12
New O&M	$	3,000
Subtotal		44,757.12
Difference	$	10,926.72
Estimated Base Rate Increase	$	1.03
Revenue Generated	$	10,926.72

Using the total project cost, a minor increase to the sewer base rate will be needed to cover the expected loan payment as well as operation and maintenance of the lift station. Future adjustments will be made on a yearly basis during the yearly budgeting process.

7.4 Impact of Recommended Project on User Rates

During budgeting for 2012, the Town of Hayden took a proactive approach and increased the sewer user rate from $12.00 to $15.20. This increase of $3.20 will

generate yearly revenue of $33,830.40 to cover the majority of the expected loan payment for the recommended alternative. This assumes a 20-year loan with 2% interest and 100% loan for the project amount. Minor adjustments will be needed in future years depending on the exact total project cost and to cover the additional operation and maintenance costs associated with lift station. Grants will serve to reduce the financial impact of the project to the Town residents and keep affordable rates for the community.

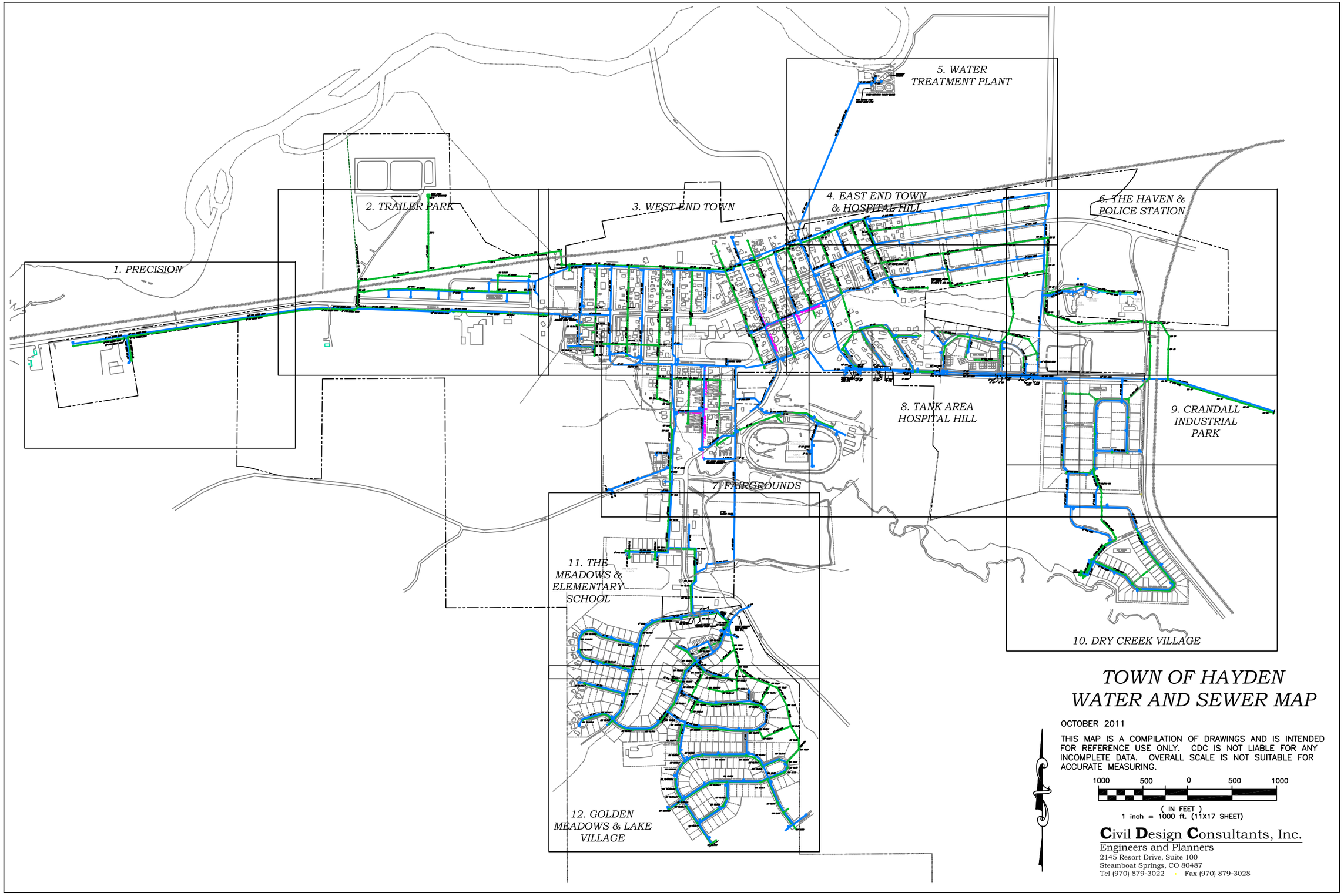
7.5 Project Implementation

An estimated time frame for project implementation is as follows:

• PEL's	Not Required
• Site Application	December 1st, 2012
• Process Design Report (PDR)	Part of Site Application
• Final Design	December 31st, 2012
• Project Bid Date	April 1st, 2013
• Construction	Begin June 2013

Appendix A

Water and Sewer Infrastructure Maps



TOWN OF HAYDEN WATER AND SEWER MAP

OCTOBER 2011

THIS MAP IS A COMPILATION OF DRAWINGS AND IS INTENDED FOR REFERENCE USE ONLY. CDC IS NOT LIABLE FOR ANY INCOMPLETE DATA. OVERALL SCALE IS NOT SUITABLE FOR ACCURATE MEASURING.

1000 500 0 500 1000

(IN FEET)
1 inch = 1000 ft. (11X17 SHEET)

Civil Design Consultants, Inc.
Engineers and Planners
2145 Resort Drive, Suite 100
Steamboat Springs, CO 80487
Tel (970) 879-3022 · Fax (970) 879-3028

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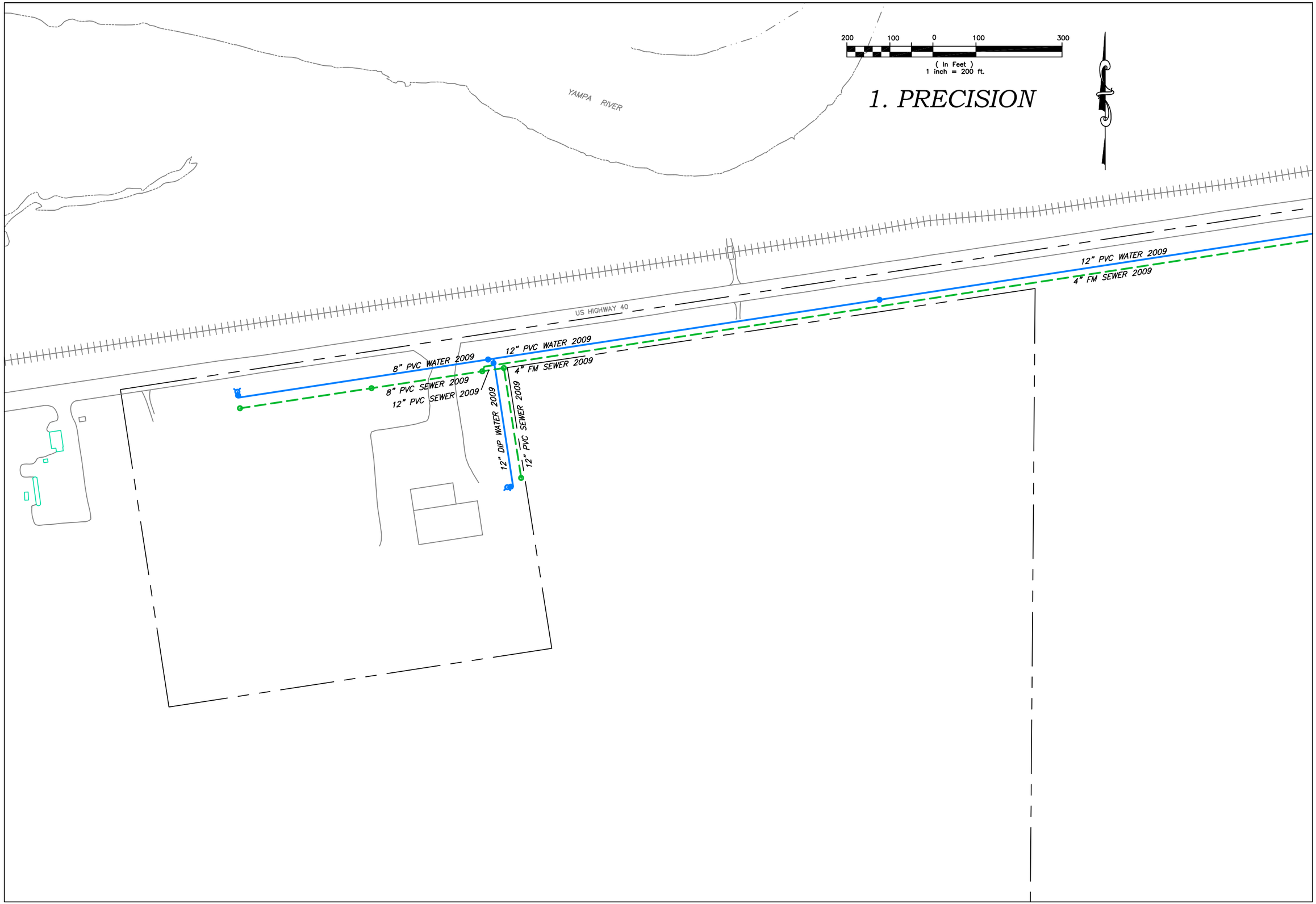

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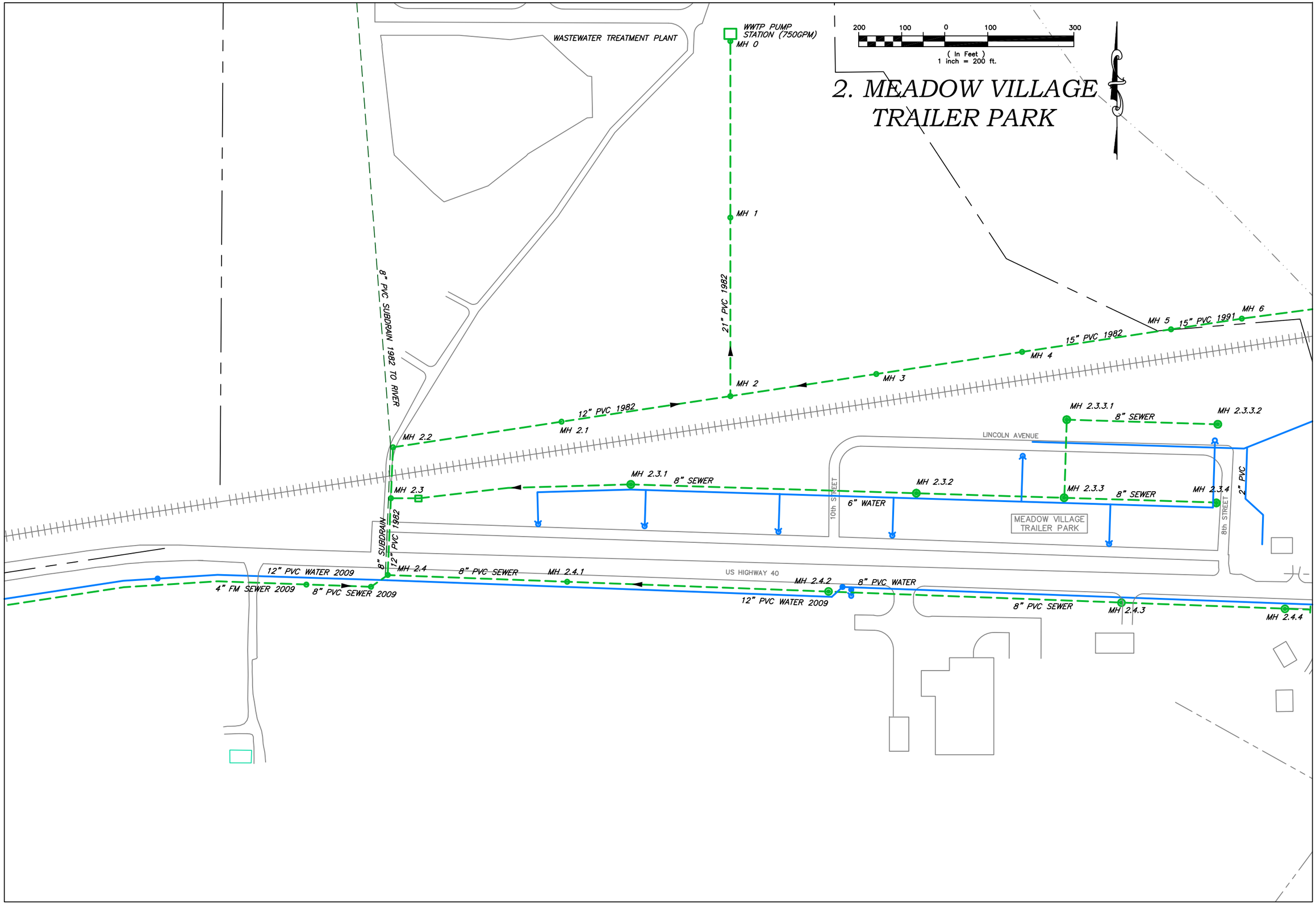

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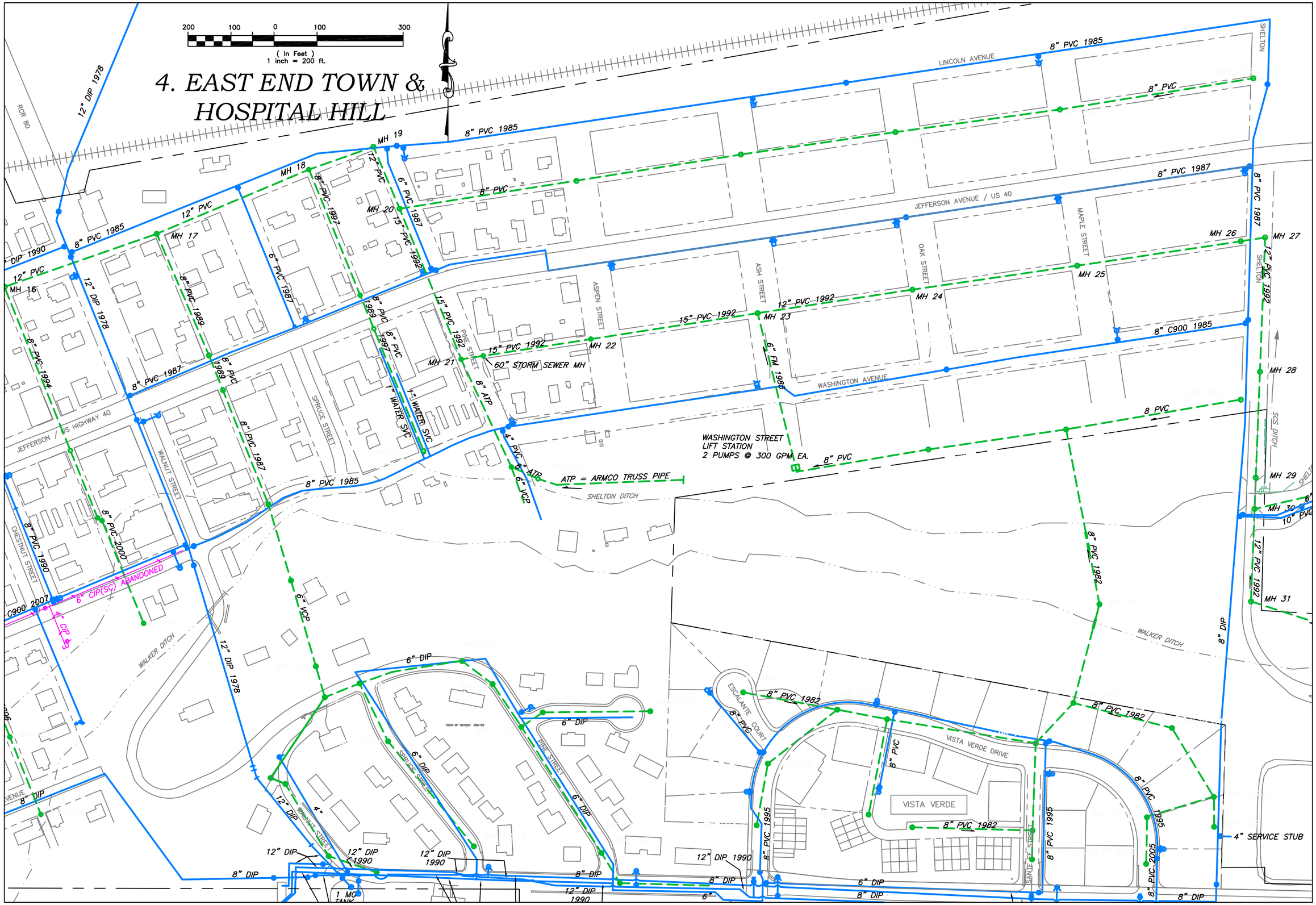
4. EAST END TOWN & HOSPITAL HILL



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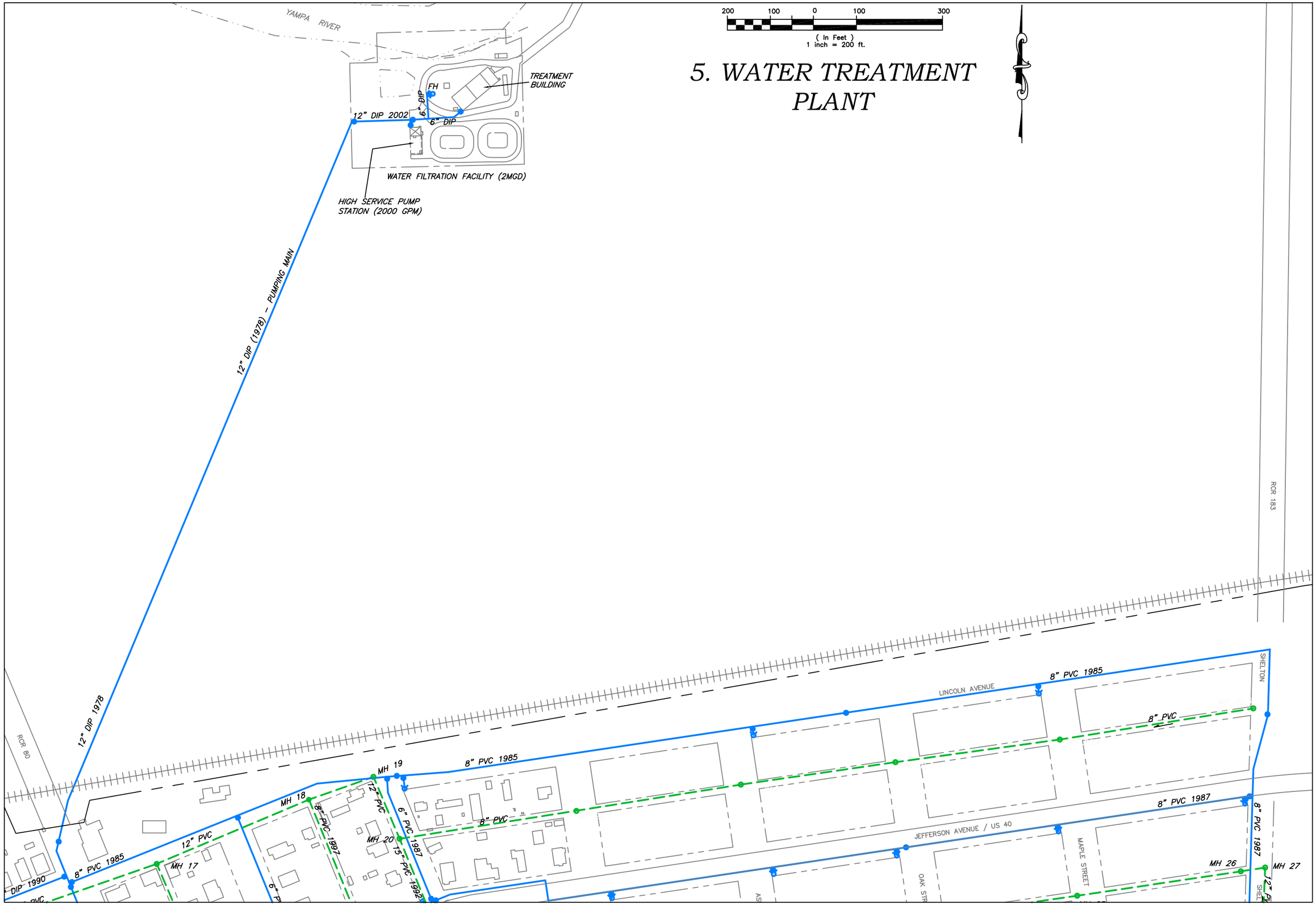
5. WATER TREATMENT PLANT



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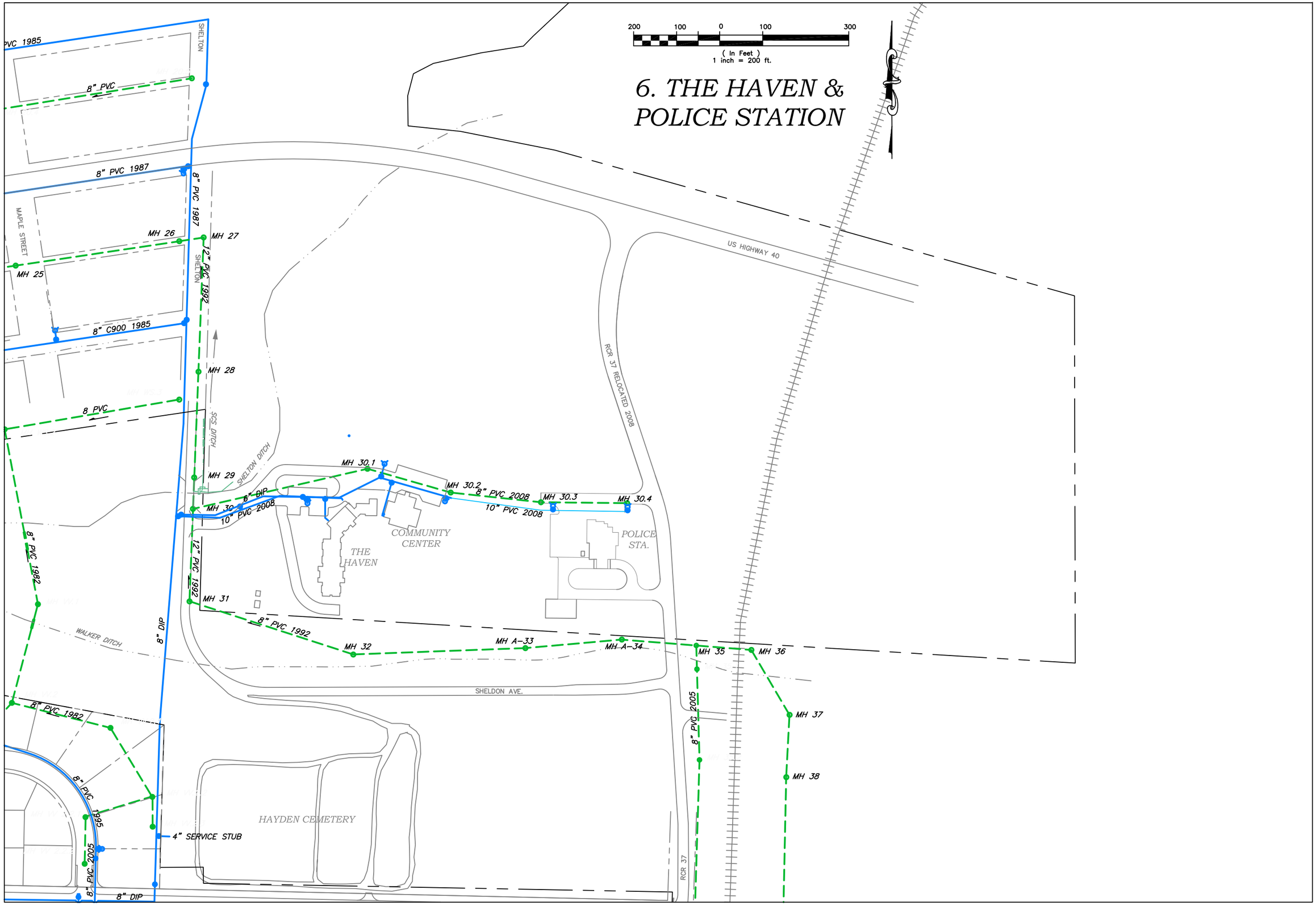

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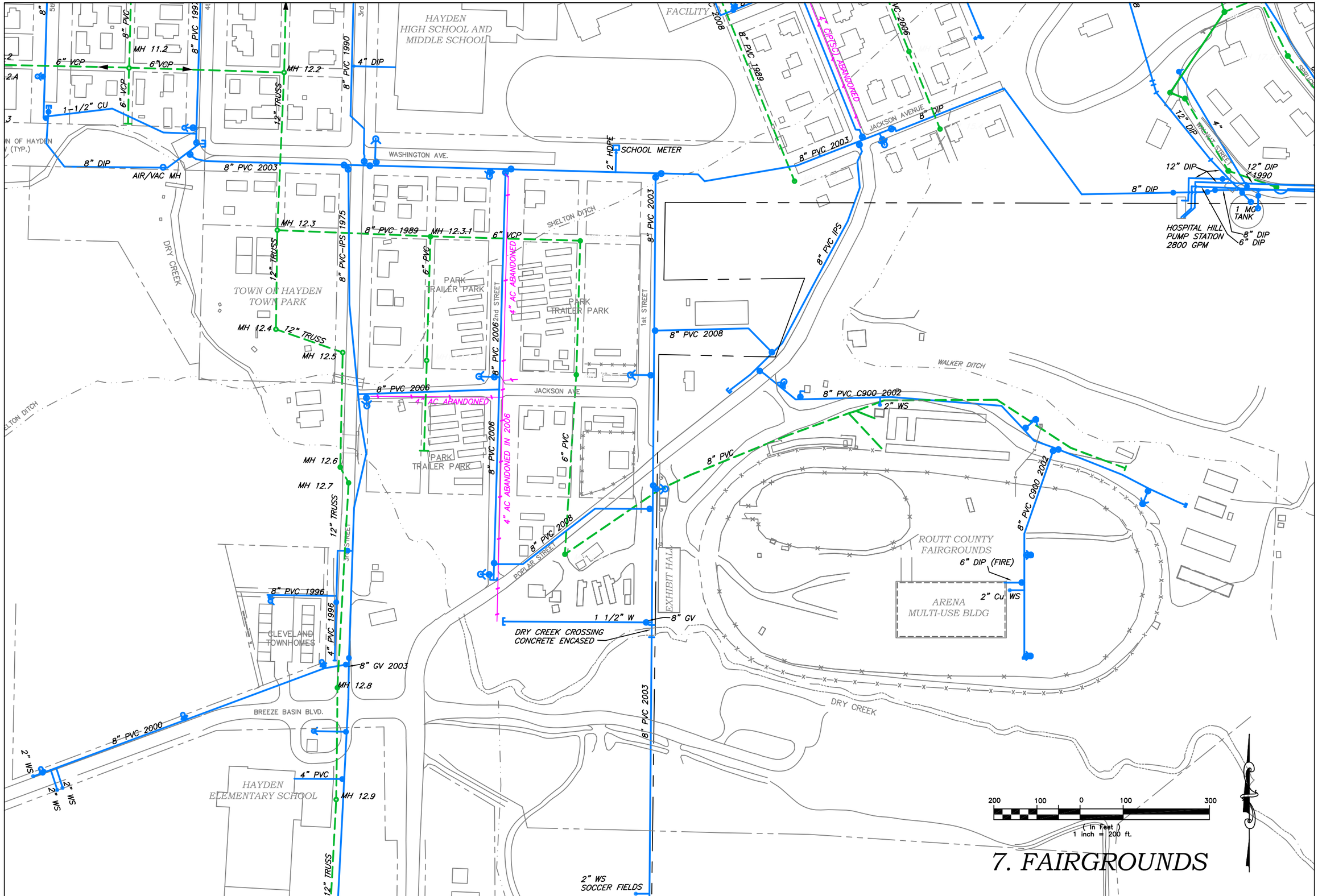

7. FAIRGROUNDS

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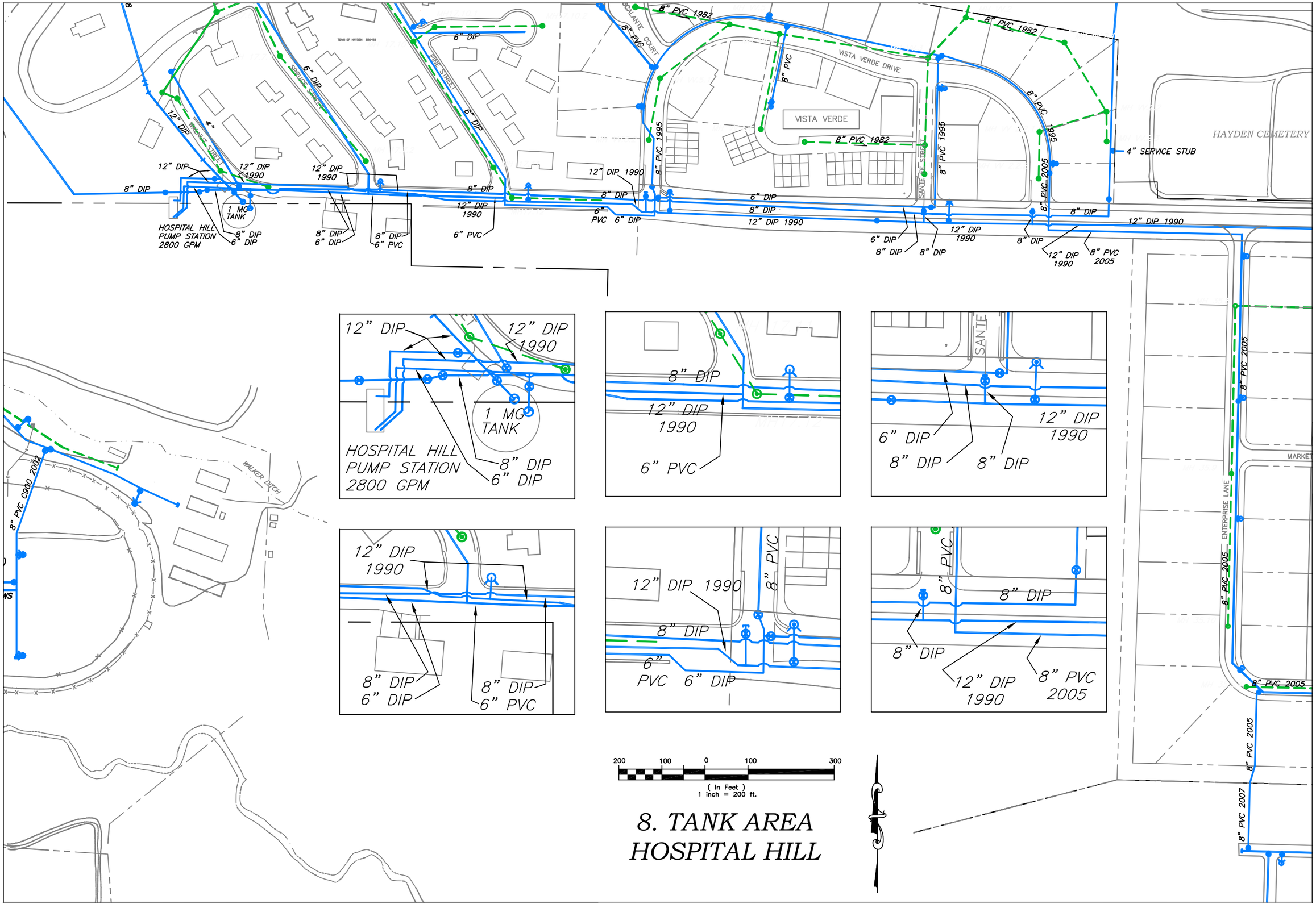

8. TANK AREA HOSPITAL HILL

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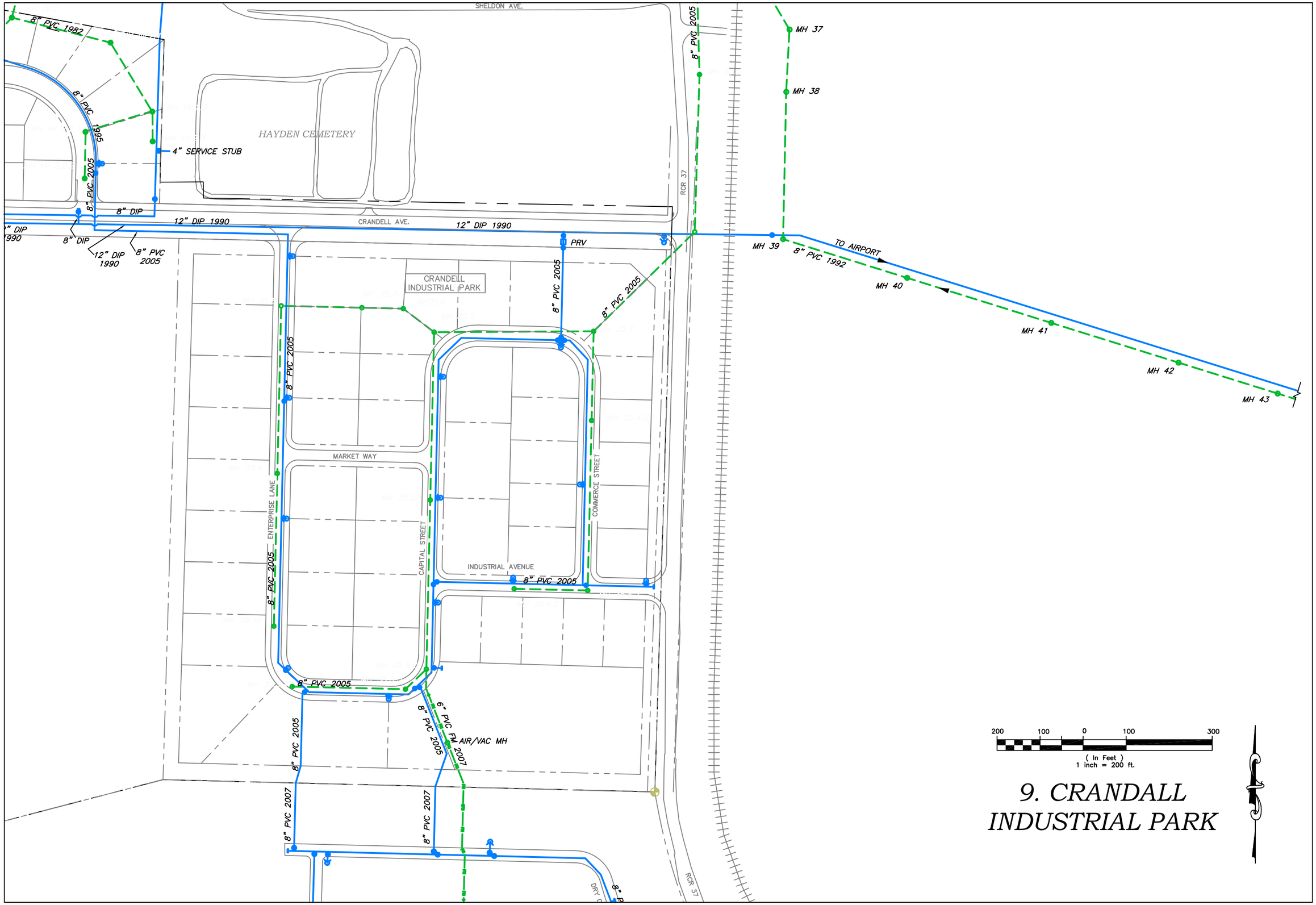

9. CRANDALL INDUSTRIAL PARK

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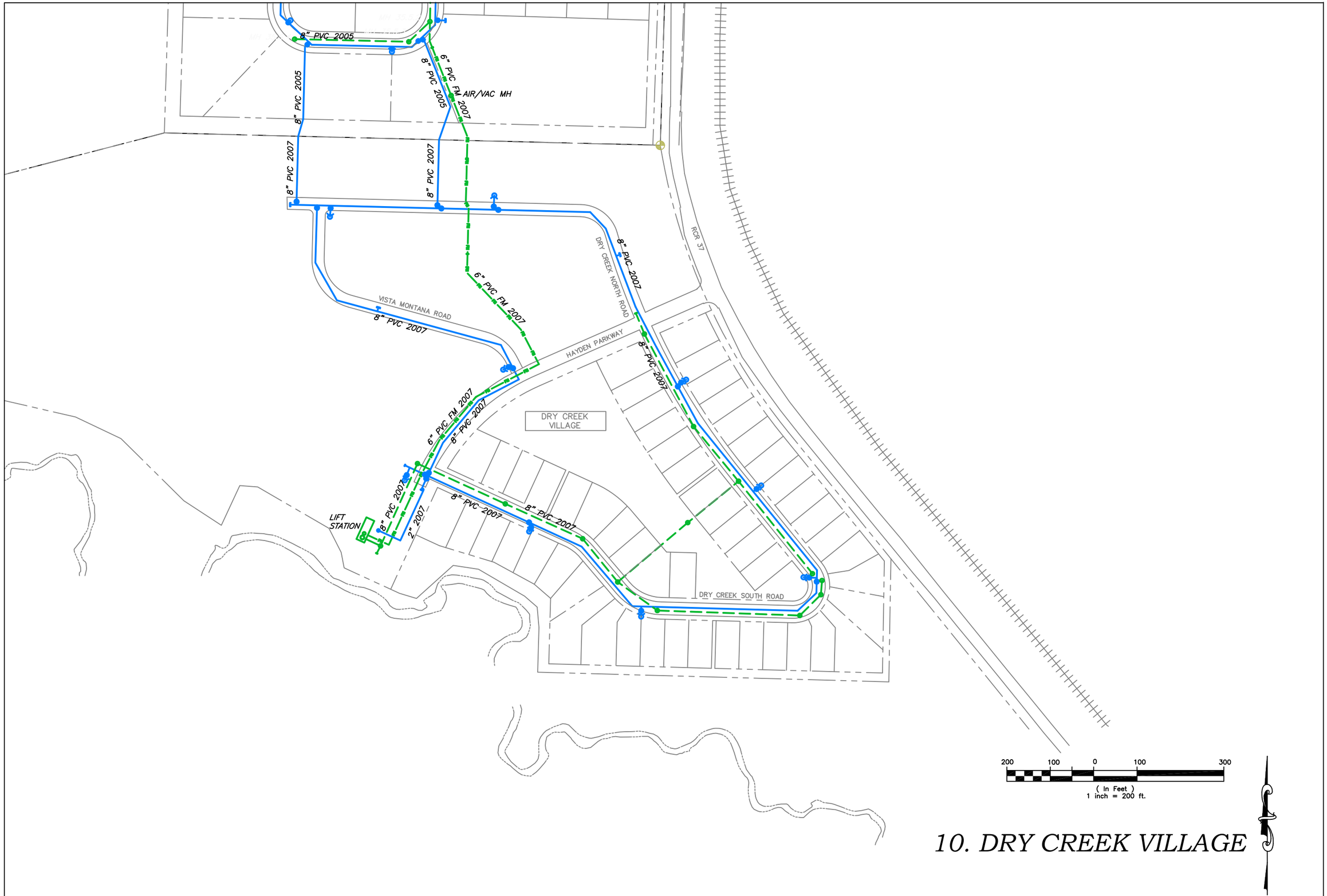

10. DRY CREEK VILLAGE

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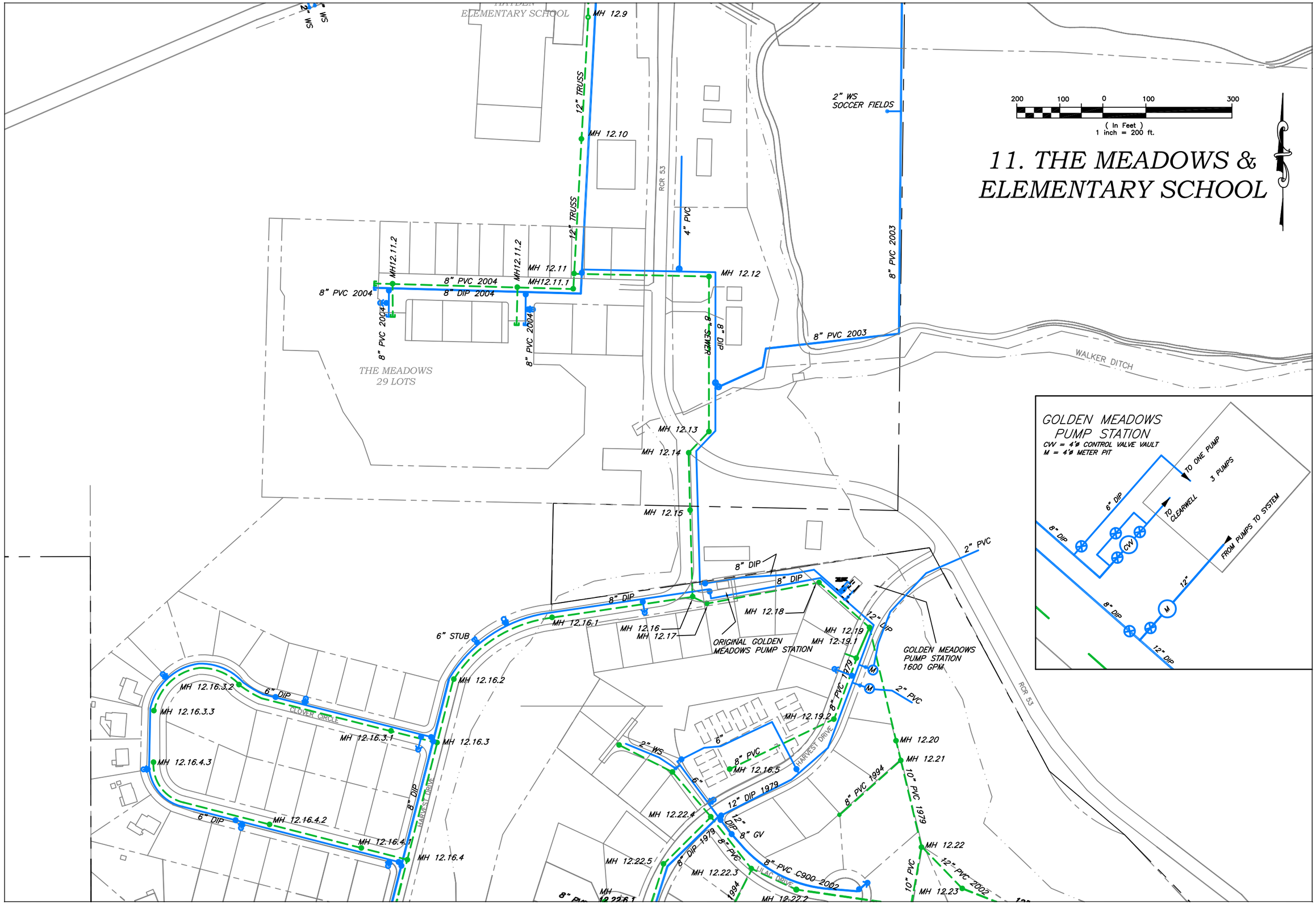
11. THE MEADOWS & ELEMENTARY SCHOOL



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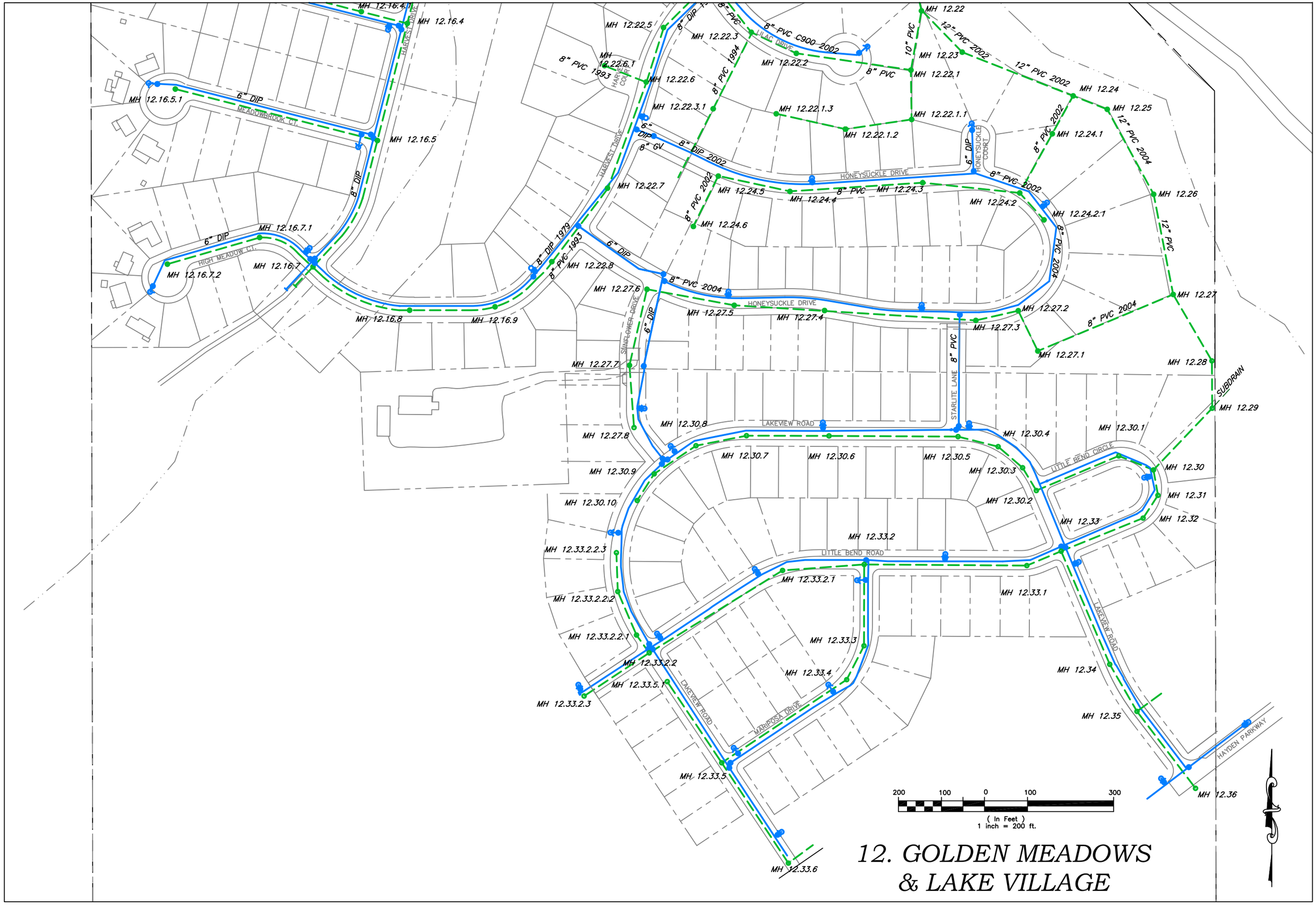

12. GOLDEN MEADOWS & LAKE VILLAGE

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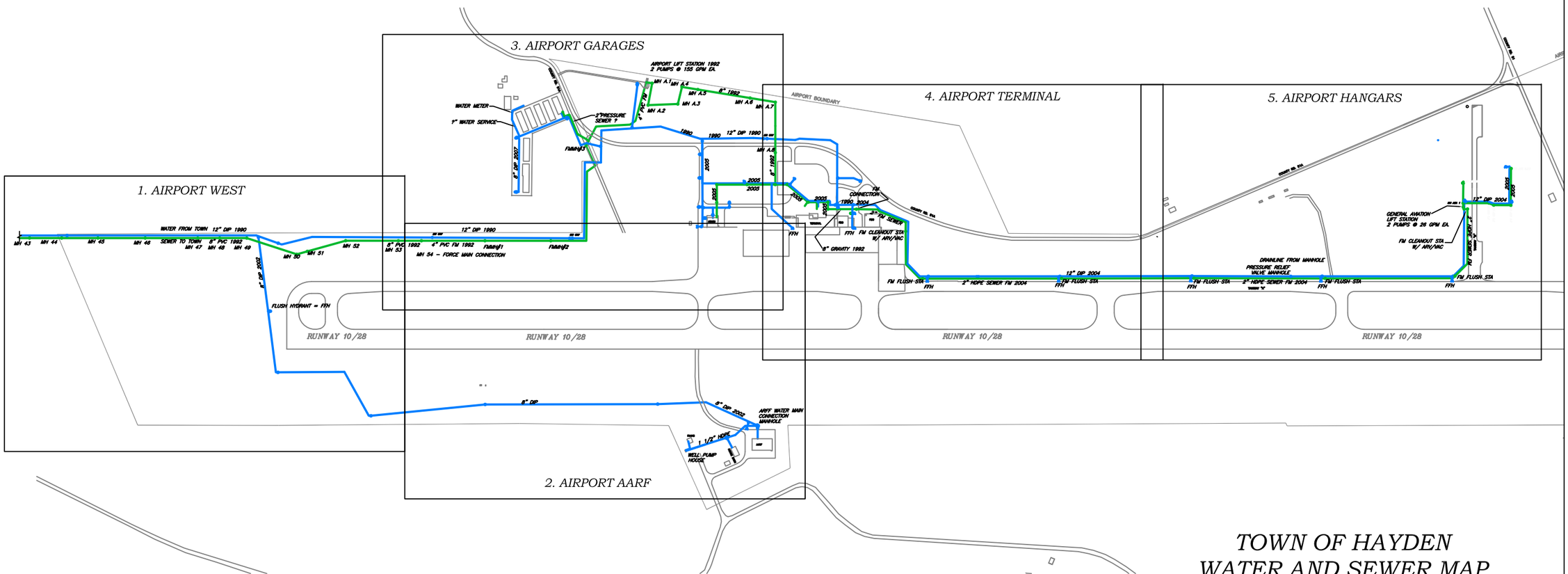

TOWN OF HAYDEN
WATER AND SEWER MAP
YAMPA VALLEY REGIONAL AIRPORT

OCTOBER 2011

THIS MAP IS A COMPILATION OF DRAWINGS AND IS INTENDED FOR REFERENCE USE ONLY. CDC IS NOT LIABLE FOR ANY INCOMPLETE DATA. OVERALL SCALE IS NOT SUITABLE FOR ACCURATE MEASURING.

400 200 0 200 400

(IN FEET)
1 inch = 400 ft. (11X17 SHEET)

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Engineers and Planners
2145 Resort Drive, Suite 100
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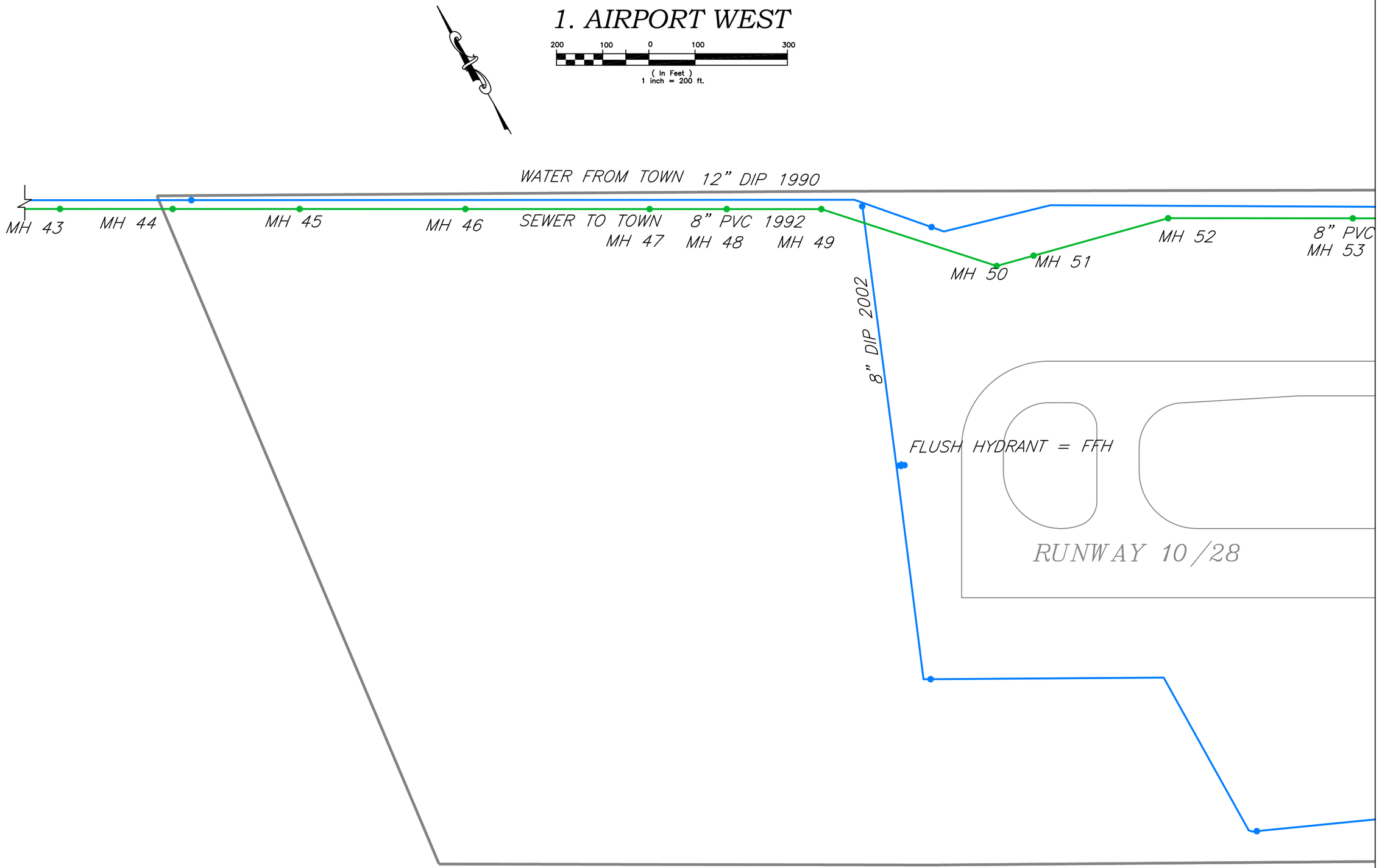

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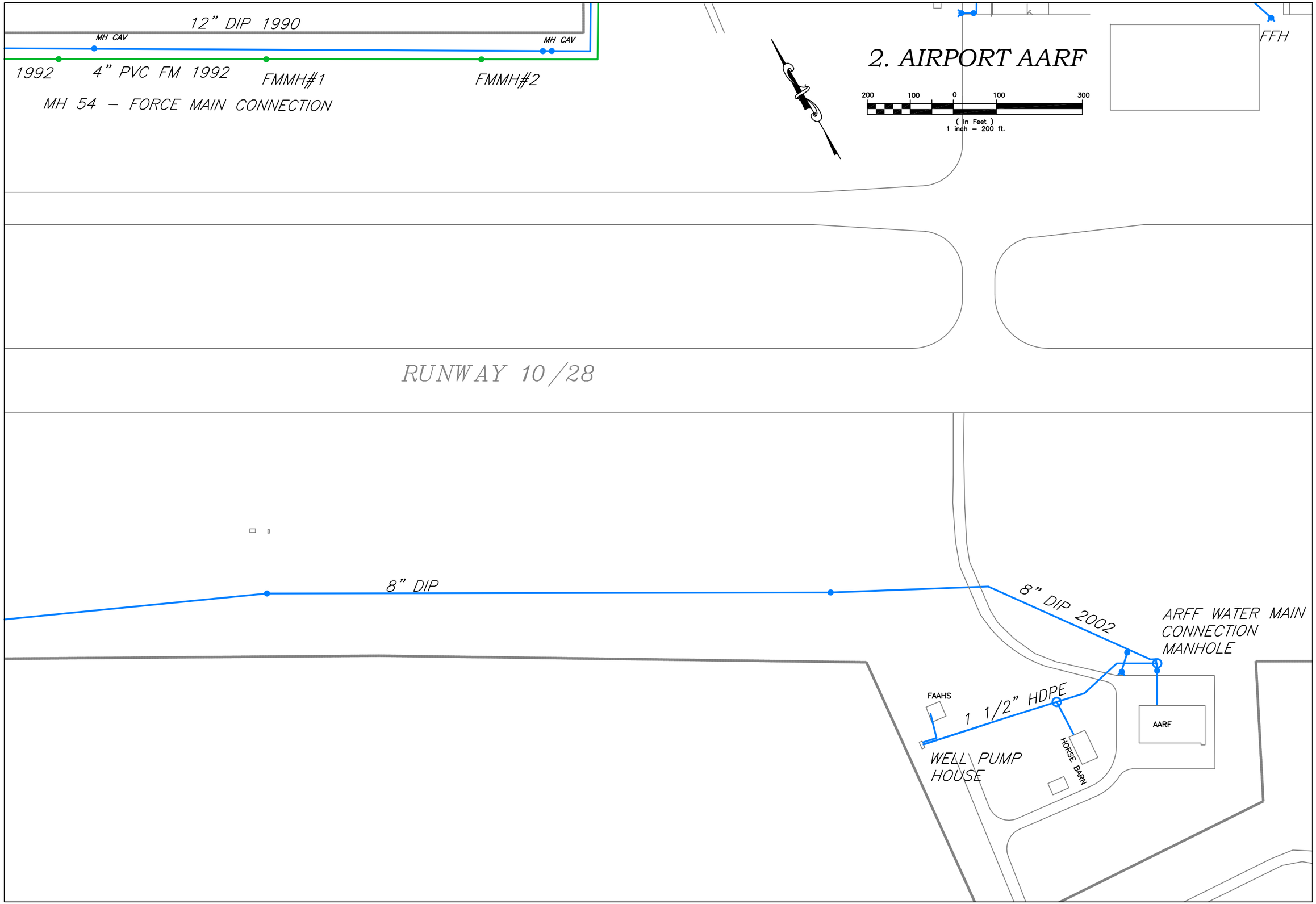

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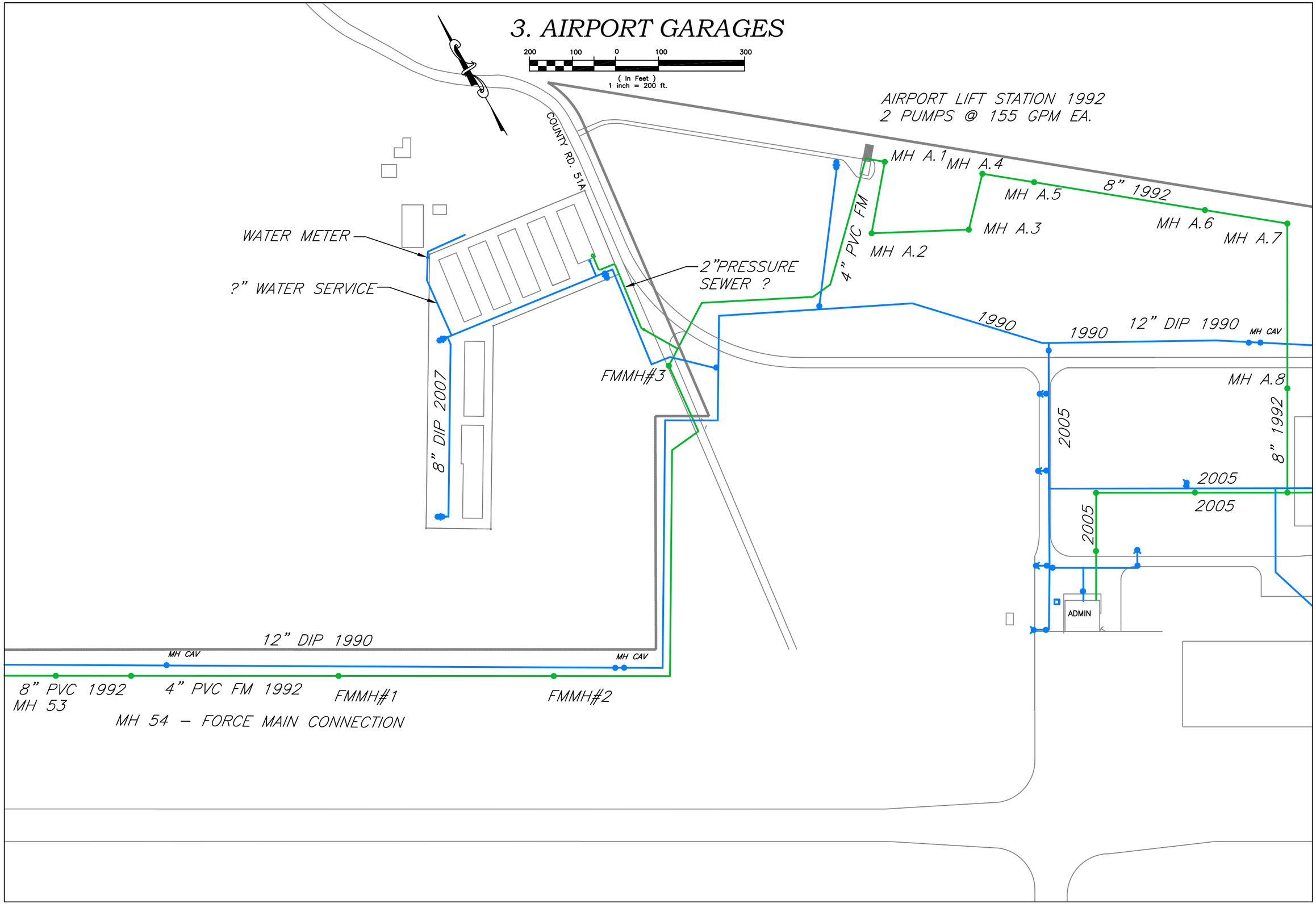

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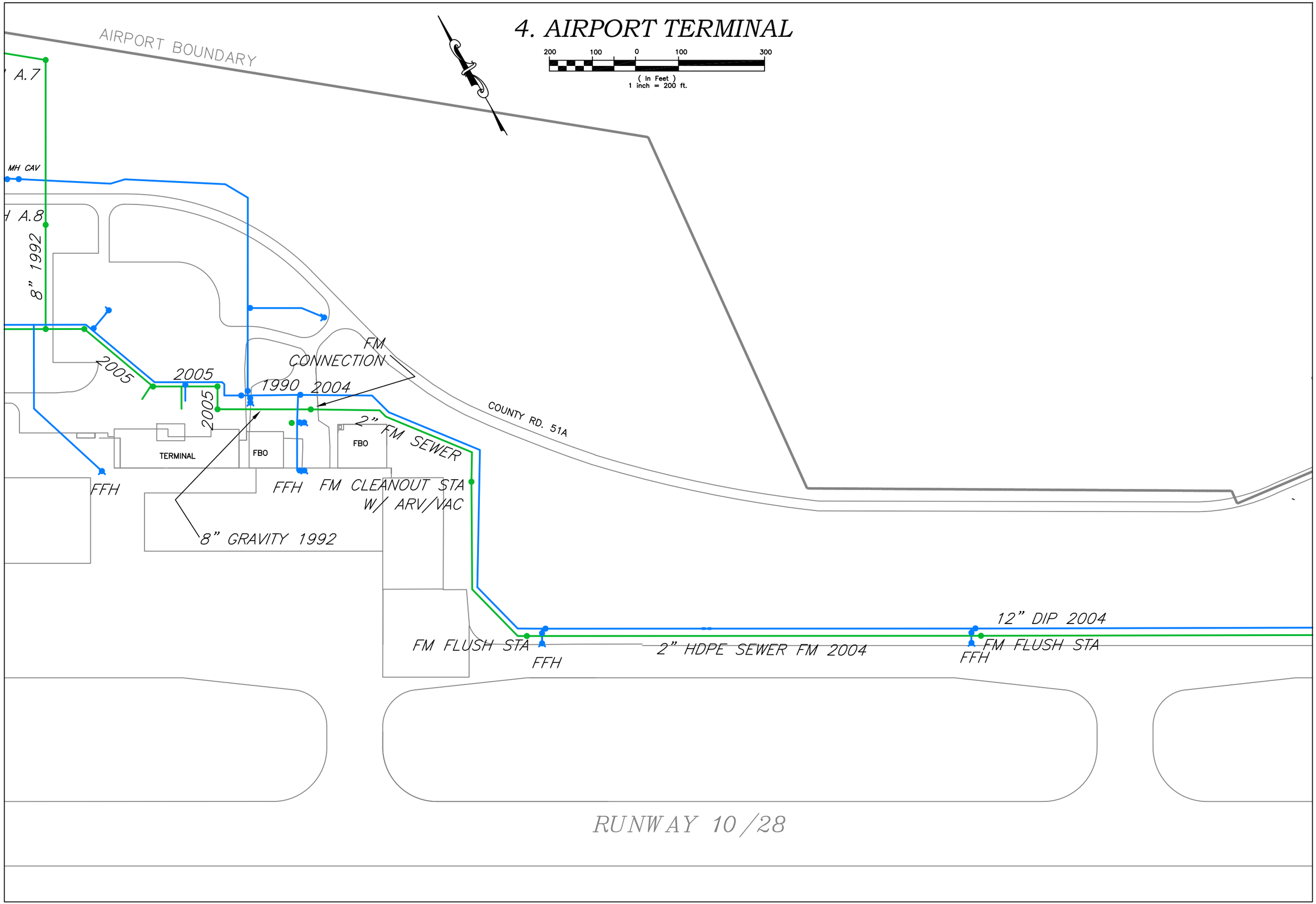

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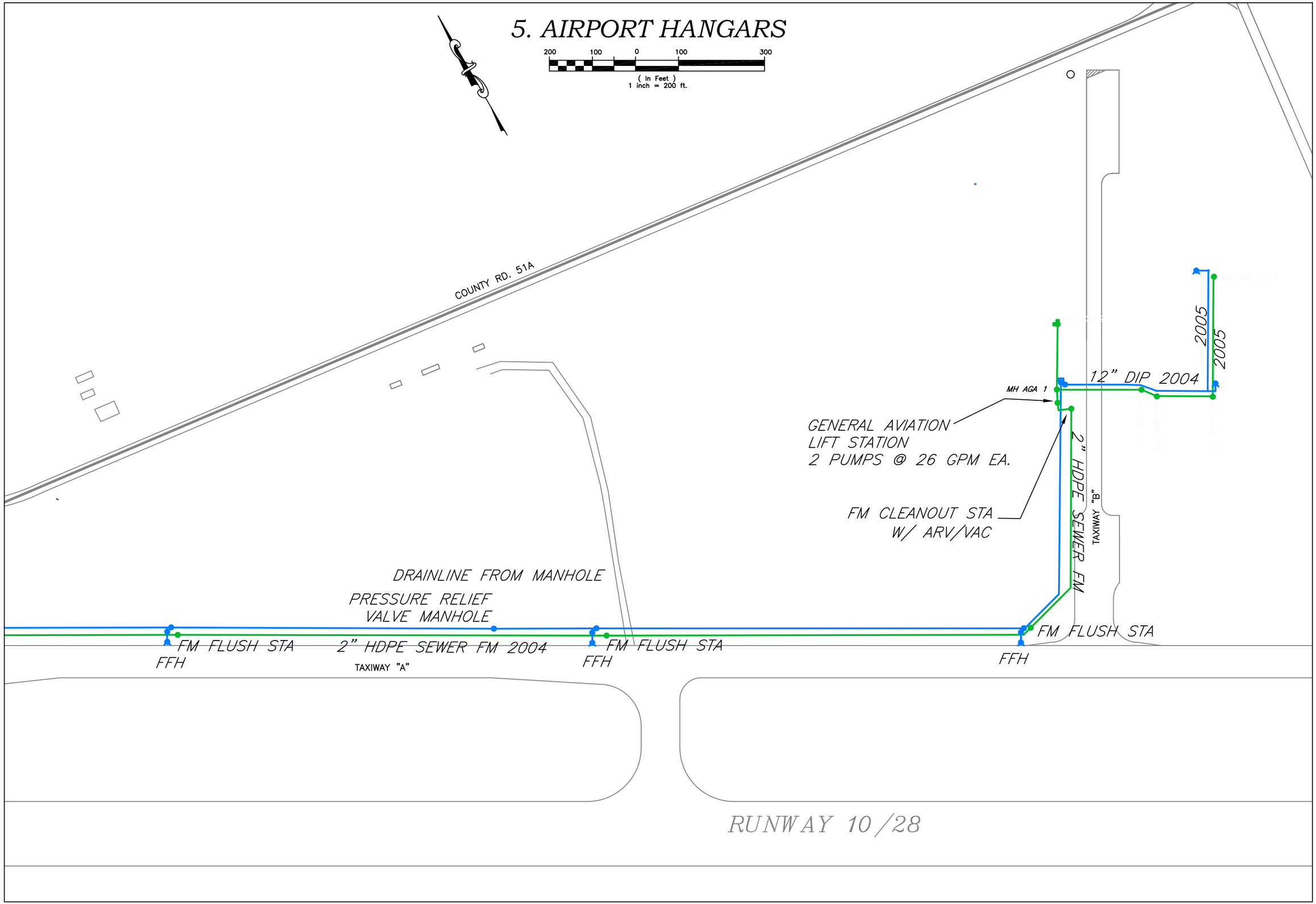

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Appendix B

Site Plan of the Existing Facility

REVISIONS		
BY	DATE	DESCR.
BY	DATE	DESCR.

DRAWN R.R.D. & J.H. DESIGNED W.H.M. DATE Aug. 13, 1982
SCALE 1" = 100' APPROVED PROJECT NO. 038-079

TARANTO, STANTON & TAGGE
CONSULTING ENGINEERS

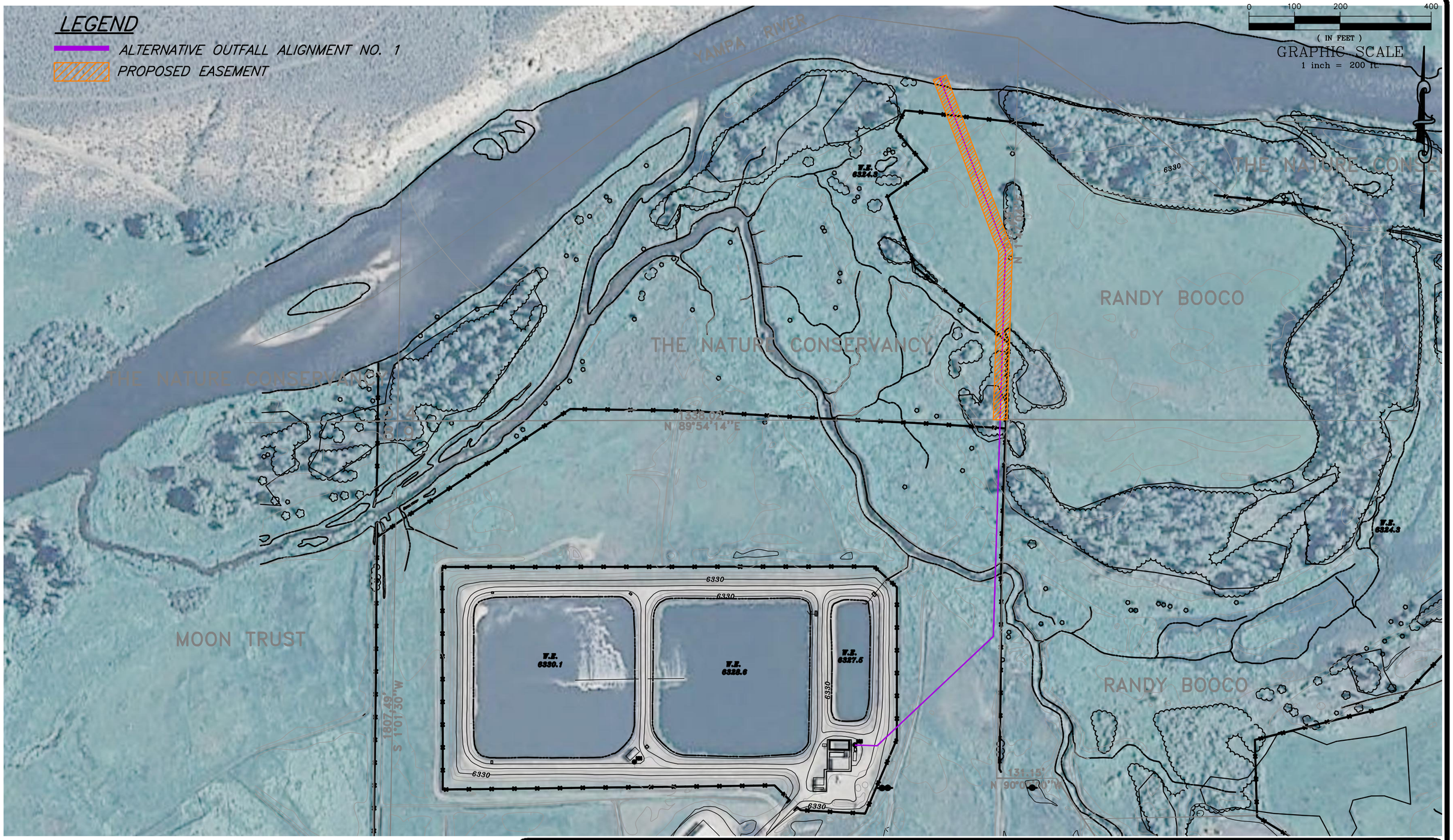
WASTEWATER TREATMENT FACILITY
TOWN OF HAYDEN, COLORADO

OVERALL SITE PLAN

SHEET 10

Appendix C

Preliminary Site Layout



PRELIMINARY
NOT
FOR
CONSTRUCTION

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ENGINEERS | SURVEYORS
E-mail: engineer@sgm-inc.com
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Glenwood Springs, Colorado 81601
(970) 945-1004 FAX (970) 945-5948
Aspen, Colorado (970) 925-6727
Gunnison, CO (970) 641-5355

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Appendix D

2012 Sewer Budget

Water Administration – The decrease of approximately 24% in this department reflects the elimination of the Town Manager's wages and benefits from the Enterprise Fund accounts and a reduction in health insurance costs in 2011.

Sewer Revenues

Revenues include sewer base rates and user fees. User fees are calculated annually for each household based on the average amount of water used in winter months. Also included are tap fees for one new EQR's, interest income and revenue from a lease for hay harvested at the sewer treatment plant. Base rates are anticipated to increase $3.20 per month to pay principle and interest expenses associated with the $550,000 mandated treatment plant outfall project.

Sewer Expenses

Vehicle and equipment replacement has increased by $11,000 to provide one-half funding for replacement of one pick-up truck; the water operation will incur the second one-half of this expense. The 2011 projected year-end includes $20,500 in SCADA improvements previously approved by the Council.

Sewer Operating - Salaries and associated costs reflect the replacement of one full time position that was vacant while a new employee was sought. Professional services include the cost of engineering service for the outfall project. Additional expense will be incurred for professional services necessary to determine if the treatment plant facilities can be used and/or modified to accept waste from oil and gas exploration generators. If the sewer operations can accept this waste stream additional revenue to offset costs are anticipated. Vehicle expense includes replacement of ½ the cost to replace one pick-up truck; the water operations will incur the second ½ of this expense.

Sewer Treatment Plant – The 2011 budget increased by approximately 12.5% due to the roof repair work completed. This work is not repeated in 2012 and with the exception of the $550,000 outfall project the plant total expenses increase by approximately 1.3%.

Washington Street lift station – Repair and maintenance is expected to increase due to deferred maintenance.

Sewer Collection – The Hospital Hill sewer line has been televised and maintained annually since the last line break and is presently functioning without failure. Staff will continue monitoring this line for signs of failure but for 2012 this line replacement or installing a liner will be delayed.

Airport Lift Station – No change from 2011 budget is recommended.

Dry Creek Lift Station – No developer reimbursements are anticipated in 2012. The reimbursement is per contract for expenses related to the new lift station for the Dry Creek subdivision. Costs are offset by quarterly contract payments.

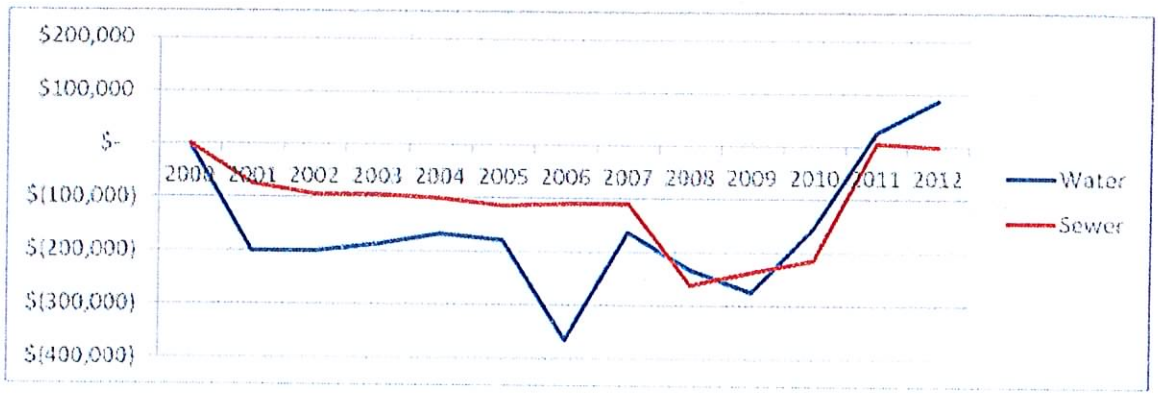
West End Lift Station – This is per contract for expenses related to the new lift station for the Dry Creek subdivision. Costs are offset by quarterly contract payments.

Sewer Principle and Interest – Projected annual principle and interest payments for a 20-year State revolving loan to fund the mandated $550,000 treatment plant outfall project.

Contingency – Funding has previously been budgeted for unforeseen water or sewer emergencies. With an anticipated enterprise fund balance of approximately $30,505 the rate covenants of existing loans is met and can provide contingency funding if necessary.

ENTERPRISE FUND REVENUES AND EXPENDITURES

Proposed Enterprise Fund revenues are budgeted to exceed proposed expenditures by $7143. This is a result of the Town's desire to move towards operating the Enterprise Fund self-sufficiently. The 2012 Budget includes a General Fund Transfer of $42,500 and a General Fund Contribution of $93,859.



CONSERVATION TRUST FUND

This fund is the Town's share of the State's lottery proceeds. The expected beginning fund balance is $82,000. The draft budget anticipates lottery proceeds in 2012 of $18,000. Of these funds, $30,245 has been designated for matching the CDOT trail/sidewalk projects.

DEVELOPMENT FEES

This fund accounts for fees received from subdivision developments and earmarked for specific future expenditures. The fees collected due to development include Drainage Basin Fees, Traffic Impact Fees and Park Facility Fees for potential development in 2009. No eligible expense from this fund is anticipated in 2012.

CAPITAL REPLACEMENT

The Town formerly maintained this fund to pay for major purchases of equipment and improvements to existing structures and utility plants. Revenues consisted of beginning fund balances and transfers from the General and Enterprise Funds to build reserves. It is recommended that Councilmembers consider funding for this purpose to plan for capital

vehicle and equipment replacement, and to spread out capital expenses to avoid peak and valley expense patterns that are difficult to fund from year-to-year.

CONCLUSION

Staff is pleased to present you with a balanced budget that includes minimal revenue increases. Because of the present economic conditions and upcoming presidential election we expect 2012 to be a year full of surprises and we are aptly prepared to adjust expenditures accordingly if revenue projections fall short.

Due to operational needs, deferred equipment replacement and a desire to be an employer of choice for employees of choice your senior staff has reviewed the organization as a whole and recommends the following additions to the 2012 budget to be discussed during the 2012 budget discussions.

Department	Request	Cost
Personnel:		
One-time 3% bonus		$23,500 one-time
Street Department	1 PTE	20,000 annually
Administration	1 PTE	17,000 annually
Public Safety	1 PTE	25,000 annually
Vehicles:		
Street Department	Replace 1995 F150	$22,000 State bid pricing
Public Safety	Replace one Squad car	$20,000 State bid pricing, reduce expense by selling three squads, reduce fleet from seven to five squad cars.
Infrastructure:		
Street repair work		$110,000; if supported staff will evaluate road conditions and recommend a strategy to Councilmembers that will cost effectively improve maintenance and/or replacement of street surfaces.

Total non-street capital cost: $129,000

Respectfully submitted,

David Torgler
Town Manager

Lisa Dowling
Finance Director

TOWN OF HAYDEN
Councils, Boards, Commissions and Employees
January 2012

Town Council

Mayor James Haskins
Mayor Pro Tem Lorraine Johnson
Councilmember Richard "Festus" Hagins
Councilmember Bill Hayden
Councilmember Dallas Robinson
Councilmember Tim Redmond
Councilmember Tom Rogalski

Board of Adjustment

Steve Dunn
Tim Frentress
Dal Leck
James Lewis

Economic Development Commission

Stefanus Nijsten, Chairman
Rodney McGowen, Vice Chairman
Martha Cannon, Alternate
Tammie Delaney
Jack Giessinger
Wendy Lind, Alternate

Recreation Board

Tim Johnston, Chairman
Tim Redmond, Council Representative
Cassie Reedy
Roger Muhme
Kasey Gabel
Steve Johnson
Craig Preston

Planning Commission

Karl Koehler, Chairman
Chuck VeDepo, Vice-Chairman
Tim Frentress
Donna Hellyer
Amy Williams
Angie Robinson, Alternate

Department Heads

Town Manager	David Torgler
Finance Director	Lisa Dowling
Town Clerk	Nathan Archuleta
Public Works Director	Sam Barnes
Acting Chief of Police	Gordon Booco
Recreation Coordinator	Jill Delay

Other Employees

Court Clerk	Kristen Hockaday
Police Clerk	Sandy Wells
Public Safety	Jeff Bond
	Kelly Brady
	Ed Corriveau
	Russ Davis
	Storm Fallon
Public Works	Jay Dee Hockaday
	Bryan Richards
Plant Operators	Jason Sholes
	Daniel Alden
Systems Manager	Frank Fox

Appointed Officials

Judge	Colette Erickson
Town Attorney	Mike Holloran

Appendix E

CDPHE Water Quality Assessment

APPENDIX B
WATER QUALITY ASSESSMENT
THE YAMPA RIVER
TOWN OF HAYDEN WWTF

Table B-1 Assessment Summary	
Name of Facility	Town of Hayden WWTF
CDPS Number	CO-0040959
WBID - Stream Segment	Upper Colorado River Basin, Yampa River Sub-basin, Stream Segment 02c: Mainstem of the Yampa River from a point immediately above the confluence with Oak Creek to a point immediately below the confluence with Elkhead Creek. COUCYA02c
Classifications	Cold Water Aquatic Life Class 1 Class E Agriculture Water Supply
Designation	Undesignated

I. Introduction

This water quality assessment (WQA) of the Yampa River near the Town of Hayden Wastewater Treatment Facility (WWTF) was developed for the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division (Division). The WQA was prepared to facilitate issuance of the Colorado Discharge Permit System (CDPS) permit for the Town of Hayden WWTF, CDPS Permit No. CO-0040959, and is intended to determine the assimilative capacities available to the Town of Hayden WWTF for pollutants commonly found at minor domestic WWTFs. Specifically, this WQA covers total residual chlorine, *Escherichia coli (E. coli*) and total ammonia.

The Town of Hayden WWTF currently discharges to Dry Creek, a tributary of the Yampa River. However, the *overland* distance between the Town of Hayden WWTF and the Yampa River is less than ¼ mile. This WQA was prepared to calculate potential discharge limits, should the facility decide to utilize an alternative discharge point directly to the mainstem of the Yampa River.

The ratio of the low flow of the Yampa River to the Town of Hayden WWTF peak design flow of 0.75 MGD is 58:1. The nearest upstream and downstream facilities had no impact on the assimilative capacities available to the Town of Hayden WWTF. Analyses thus indicate that assimilative capacities are very large.

It should be noted that this segment of the Yampa River is listed in *Colorado's Monitoring and Evaluation List, Regulation 94*, for the temperature. Further discussion of this issue would be

included in a future rationale to a permit, if the facility decided to discharge directly to the Yampa River.

Information used in this assessment includes data gathered from the Town of Hayden WWTF, the Division, the U.S. Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS), the U.S. Census Bureau and communications with the local water commissioner. The data used in the assessment consist of the best information available at the time of preparation of this WQA.

II. Water Quality

The Town of Hayden WWTF may potentially discharge to the Water Body Identification (WBID) stream segment COUCYA02c, which means the Upper Colorado River Basin, Yampa River Sub-basin, Stream Segment 02c. This segment is composed of the "Mainstem of the Yampa River a point immediately above the confluence with Oak Creek to a point immediately below the confluence with Elkhead Creek.." Stream segment COUCYA02c is classified for Cold Water Aquatic Life Class 1, Class E Recreation, Agriculture and Water Supply.

Statewide Basic Standards have been developed in Section 31.11(2) and (3) of *The Basic Standards and Methodologies for Surface Water* to protect the waters of the state from radionuclides and organic chemicals. In Section 31.11(1) of the regulations, narrative standards are applied to any pollutant of concern, even where there is no numeric standard for that pollutant. Waters of the state shall be "free from harmful substances in harmful amounts." Total dissolved solids (TDS), and sediment are such pollutants of concern being discussed by Agricultural and Water Quality Standards workgroups. In order to protect the Basic Standards in waters of the state, effluent limitations with monitoring, or "monitoring only" requirements for radionuclides, organics, TDS, or any parameter of concern could be put in CDPS discharge permits.

Numeric standards are developed on a basin-specific basis and are adopted for particular stream segments by the Water Quality Control Commission. To simplify the listing of the segment-specific standards, many of the aquatic life standards are contained in a table at the beginning of each chapter of the regulations. The standards in Table B-2 have been assigned to stream segment COUCYA02c in accordance with the *Classifications and Numeric Standards for Upper Colorado River Basin and North Platte River (Planning Region 12).*

Table B-2

In-stream Standards for Stream Segment COUCYA02c

Physical and Biological
Dissolved Oxygen (DO) = 6 mg/l, minimum (7 mg/l, minimum during spawning)
pH = 6.5 - 9 su
Fecal Coliform chronic = 200 colonies/100 ml
E. coli chronic = 126 colonies/100 ml
Inorganic
Total ammonia acute and chronic = TVS
Chlorine acute = 0.019 mg/l
Chlorine chronic = 0.011 mg/l
Free Cyanide acute = 0.005 mg/l
Sulfide chronic = 0.002 mg/l
Boron chronic = 0.75 mg/l
Nitrite acute = 0.05 mg/l
Nitrate acute = 10 mg/l
Chloride chronic = 250 mg/l
Sulfate chronic = WS
Metals
Total Recoverable Arsenic acute = 50 µg/l
Dissolved Cadmium acute for trout and Dissolved Cadmium chronic = TVS
Total Recoverable Trivalent Chromium acute = 50 µg/l
Dissolved Hexavalent Chromium acute and chronic = TVS
Dissolved Copper acute and chronic = TVS
Dissolved Iron chronic = WS
Total Recoverable Iron chronic = 1000 µg/l
Dissolved Lead acute and chronic = TVS
Dissolved Manganese chronic = WS
Dissolved Manganese acute and chronic = TVS
Total Mercury chronic = 0.01 µg/l
Dissolved Nickel acute and chronic = TVS
Dissolved Selenium acute and chronic = TVS
Dissolved Silver acute and Dissolved Silver chronic for trout = TVS
Dissolved Zinc acute and chronic = TVS

Note that the terms of and associated values that correspond to TVS and WS are further explained in the regulations. Except for ammonia, those pollutants with TVS-based and WS-based standards are not applicable to this facility and therefore no further discussion is provided as part of this analysis; ammonia is discussed further in Section IV of this analysis.

Ambient Water Quality

The Division evaluates ambient water quality based on a variety of statistical methods as prescribed in Section 31.8(2)(a)(i) and 31.8(2)(b)(i)(B) of the *Colorado Department of Public Health and*

Environment Water Quality Control Commission Regulation No. 31. Ambient water quality is evaluated in this WQA analysis for use in determining assimilative capacities.

To conduct an assessment of the ambient water quality upstream of the potential discharge location to the Yampa River from the Town of Hayden WWTF, data were gathered primarily from Division Station 12802 (Yampa River North of Hayden at California Park Road), located approximately ½ mile upstream of the confluence with Dry Creek. Data were available for a period of record from October 1996 through March 1999. Supplemental data for *E. coli* were available from Division Station 12802A (Yampa River West of Hayden at Hwy 40), located approximately one and a half miles downstream from the confluence. Note that although these *E. coli* data are based on samples collected at a downstream location, they are considered comparable to data representative of upstream water quality. A summary of these data is presented in Table B-3.

Table B-3

Ambient Water Quality for the Yampa River

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Chronic Stream Standard*	*Notes*
Temp (°C)	13	0.82	4.8	18	7.4	20	
DO (mg/l)	13	9.0	11	12	11	7.0	
pH (su)	13	7.9	8.1	8.6	8.2	6.5-9	
Fecal Coliform (#/100 ml)	8	4.2	9.0	98	13	200	1
E. coli (#/100 ml)	3	24	31	31	27	126	
NH_3, Tot (mg/l)	12	0.0012	0.0027	0.012	0.0057	TVS	
TSS (mg/l)	13	0	0	96	37	NA	

Note 1: The calculated mean is the geometric mean. Note that for summarization purposes, the value of one was used where there was no detectable amount because the geometric mean cannot be calculated using a value equal to zero.

III. Water Quantity

The Colorado Regulations specify the use of low flow conditions when establishing water quality based effluent limitations, specifically the acute and chronic low flows. The acute low flow, referred to as 1E3, represents the one-day low flow recurring in a three-year interval. The chronic low flow, 30E3, represents the 30-day average low flow recurring in a three-year interval.

Low Flow Analysis

To determine the low flows available to the Town of Hayden WWTF, data from USGS Gage Station 09244410 (Yampa River below Diversion, near Hayden, CO), located approximately seven miles upstream of the Dry Creek confluence, was used. This flow gage provides a representative measurement of the upstream flow because there are no diversions or confluence of significance between the flow gage and the facility.

Daily flows from the USGS Gage Station 09244410 (Yampa River below Diversion, near Hayden, CO) were obtained and the annual 1E3 and 30E3 low flows were calculated using U.S.

Environmental Protection Agency (EPA) DFLOW software. The output from DFLOW also provides calculated acute and chronic low flows for each month.

Current flow data were not available from this gage station. However, historic flow data from October 1, 1976 through September 30, 1986 were available from the gage station. According to discussions with the local Water Commissioner, the extreme low flow conditions reflected in this historic period of record are very similar to the extreme low flow conditions experienced in this area of Colorado during the 2002 and 2003 water years. One adjustment was made to DFLOW results: the DFLOW results for the month of July reflected an acute low flow value of 13 cfs, yet the Water Commissioner has data showing that during July 2002 there was at least 11 cfs in the Walker Ditch (an irrigation ditch tributary to the Yampa River near Hayden). Therefore, based on advice from the water commissioner, the monthly acute low flow value for July was adjusted to equal the second lowest DFLOW value, 50 cfs. The gage station and time frames were deemed the most accurate and representative of current flows and were therefore used in this analysis.

Based on the low flow analysis described previously, the upstream low flows available to the Town of Hayden WWTF were calculated and are presented in Table B-4.

Table B-4

Low Flows for the Yampa River at the Potential Discharge Location of the Town of Hayden WWTF

Low Flow (cfs)	*Annual*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*
1E3 Acute	33	106	124	156	146	432	70	50	33	50	61	97	97
30E3 Chronic	70	106	124	156	197	432	70	70	70	70	71	101	106

During the months of February, March, May and June, the acute low flow calculated by DFLOW exceeded the chronic low flow. In accordance with Division standard procedures, the acute low flow was thus set equal to the chronic low flow for these months.

IV. Technical Analysis

In-stream background data and low flows evaluated in Sections II and III are ultimately used to determine the assimilative capacity of the Yampa River near the Town of Hayden WWTF for pollutants of concern. For all parameters except ammonia, it is the Division's approach to conduct a technical analysis of stream assimilation capacity using the lowest of the monthly low flows (referred to as the annual low flow) as calculated in the low flow analysis. For ammonia, it is the standard procedure of the Division to determine assimilative capacities for each month using the monthly low flows calculated in the low flow analysis, as the regulations allow the use of seasonal flows when establishing assimilative capacities.

The Division's standard analysis consists of steady-state, mass-balance calculations for most pollutants and modeling for pollutants such as ammonia. The mass-balance equation is used by the Division to calculate the maximum allowable concentration of pollutants in the effluent, and accounts for the upstream concentration of a pollutant at the existing quality, critical low flow (minimal dilution), effluent flow and the water quality standard. The mass-balance equation is expressed as:

$$M_2 = \frac{M_3 Q_3 - M_1 Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = In-stream background pollutant concentrations at the existing quality
M_2 = Calculated maximum allowable effluent pollutant concentration
M_3 = Maximum allowable in-stream pollutant concentration (water quality standards)

The upstream background pollutant concentrations used in the mass-balance equation will vary based on the regulatory definition of existing ambient water quality. For most pollutants, existing quality is determined to be the 85th percentile. For pathogens such as fecal coliform and *E. coli*, existing quality is determined to be the geometric mean.

For non-conservative parameters and ammonia, the mass-balance equation is not as applicable and thus other approaches are considered where appropriate. Note that conservative pollutants are pollutants that are modeled as if mass is conserved and there is no degradation, whereas non-conservative pollutants degrade and sometimes are created within a receiving stream depending on stream conditions. A more detailed discussion of the technical analysis for these parameters is provided in the pages that follow.

Pollutants Evaluated

The following parameters were identified by the Division as pollutants to be evaluated for this minor domestic WWTF:

- Total Residual Chlorine
- *E. coli*
- Ammonia.
- Nitrate
- Iron, Sulfate and Manganese

Based upon the size of the discharge, the lack of industrial contributors, dilution provided by the receiving stream and the fact that no unusually high metals concentrations are expected to be found in the wastewater effluent, metals are not evaluated further in this water quality assessment.

According to the *Rationale for Classifications, Standards and Designations of the Upper Colorado River*, stream segment COUCYA02c is designated a water supply and intakes exist on the Yampa

River downstream of the Town of Hayden for Yampa River State Park and further downstream for the Town of Craig.

During assessment of the facility, nearby facilities, and receiving stream water quality, no additional parameters were identified as pollutants of concern.

Town of Hayden WWTF: The Town of Hayden WWTF is located in the NE ¼ of the NW ¼ and a portion of the SE ¼ of the NW ¼ of S9, T6S, R90W in Routt County. The current design capacity of the facility is 0.75 MGD (1.2 cfs). However, in previous permits, a tier at 0.25 MGD (0.39 cfs) was established and therefore will continue as part of this evaluation. Wastewater treatment is accomplished using aerated lagoons. The technical analyses that follow include assessments of the assimilative capacity based on this design capacity.

Nearby Sources

An assessment of nearby facilities based on EPA's Permit Compliance System (PCS) database was conducted. According to PCS, the nearest upstream and downstream dischargers along the Yampa River were:

- Town of Milner WWTF, which discharges to the Yampa River approximately 20 miles upstream from the Dry Creek's point of confluence with the Yampa River.
- City of Craig WWTF, which discharges to the Yampa River approximately 22 miles downstream from Dry Creek's point of confluence with the Yampa River.

The ambient water quality background concentrations used in the mass-balance equation account for pollutants of concern contributed by upstream sources, and therefore it was not necessary to model upstream dischargers together with the Town of Hayden WWTF when determining the available assimilative capacities in the Yampa River. Due to the distance traveled and the changes in the characteristics of the receiving stream, modeling downstream facilities in conjunction with the Town of Hayden WWTF was not necessary.

Based on available information, there is no indication that other sources were a significant source of pollutants of concern. Thus, other sources were not considered in this assessment.

Chlorine: The mass-balance equation was used to determine the assimilative capacity for chlorine. There are no point sources discharging total residual chlorine within one mile of the potential Town of Hayden WWTF outfall. Because chlorine is rapidly oxidized, in-stream levels of residual chlorine are detected only for a short distance below a source. Ambient chlorine was therefore assumed to be zero.

Using the mass-balance equation provided in the beginning of Section IV, the acute and chronic low flows set out in Section III, the chlorine background concentration of zero as discussed above, and the in-stream standards for chlorine shown in Section II, assimilative capacities for chlorine were calculated. The data used and the resulting calculations of the allowable discharge concentrations, M_2, are set forth below for each design tier.

Outfall 001A (up to 0.25 MGD) Discharge Directly to the Yampa River

Parameter	*Q_1 (cfs)*	*Q_2 (cfs)*	*Q_3 (cfs)*	*M_1 (mg/l)*	*M_3 (mg/l)*	*M_2 (mg/l)*
Acute Chlorine	33	0.39	33.4	0	0.019	***1.6***
Chronic Chlorine	70	0.39	70.4	0	0.011	***2.0***

Outfall 001B (more than 0.25 MGD up to 0.75 MGD) Discharge Directly to the Yampa River

Parameter	*Q_1 (cfs)*	*Q_2 (cfs)*	*Q_3 (cfs)*	*M_1 (mg/l)*	*M_3 (mg/l)*	*M_2 (mg/l)*
Acute Chlorine	33	1.2	34.2	0	0.019	***0.54***
Chronic Chlorine	70	1.2	71.2	0	0.011	***0.65***

***E. coli*:** There are no point sources discharging E. coli within one mile of the potential Town of Hayden WWTF outfall. Thus, assimilative capacities were evaluated separately.

Using the mass-balance equation provided in the beginning of Section IV, the chronic low flow set out in Section III, the background concentrations contained in Section II and discussed above, and the chronic in-stream standards for *E. coli* shown in Section II, the assimilative capacities for *E. coli* were calculated. The data used and the resulting calculations of the allowable discharge concentrations, M_2, are set forth below for each design tier.

Outfall 001A (up to 0.25 MGD), Discharge Directly to the Yampa River

Parameter	*Q_1 (cfs)*	*Q_2 (cfs)*	*Q_3 (cfs)*	*M_1 (#/100 ml)*	*M_3 (#/100 ml)*	*M_2 (#/100 ml)*
E. coli	70	0.39	70.4	27	126	***17,895***

Outfall 001B (more than 0.25 MGD up to 0.75 MGD) Discharge Directly to the Yampa River

Parameter	*Q_1 (cfs)*	*Q_2 (cfs)*	*Q_3 (cfs)*	*M_1 (#/100 ml)*	*M_3 (#/100 ml)*	*M_2 (#/100 ml)*
E. coli	70	1.2	71.2	27	126	***5,901***

Ammonia: The Ammonia Toxicity (AMMTOX) Model is a software program designed to project the downstream effects of ammonia and the ammonia assimilative capacities available to each discharger based on upstream water quality and effluent discharges. To develop data for the AMMTOX model, an in-stream water quality study should be conducted of the upstream receiving water conditions, particularly the pH and corresponding temperature, over a period of at least one year.

Temperature and corresponding pH data sets reflecting ambient receiving water conditions were limited and therefore several data sets were combined. Specifically, data were collected from the aforementioned Division Station 12802 (Yampa River North of Hayden at California Park Road) for a period of record from October 1996 through March 1999. Data were also collected from Division Station 12802A (Yampa River West of Hayden at Hwy 40) and Riverwatch Station 14 (West

Bridge), both located approximately one and a half miles downstream from the potential Town of Hayden WWTF outfall, available for a period of record from February 1995 through August 2002. These combined data sets were used to establish the setpoint and average headwater conditions in the AMMTOX model.

Effluent pH data were also available from the EPA's PCS online database and were used to establish the average facility pH contributions in the AMMTOX model. There were, however, no effluent temperature data available for the Town of Hayden WWTF that could be used as adequate input data for the AMMTOX model. Therefore, the Division standard procedure is to rely on statistically-based, regionalized data for pH and temperature compiled from similar facilities.

Upstream ammonia data for each month were not adequate to represent monthly ambient water quality concentrations for the AMMTOX model. Thus, the mean total ammonia concentration found in the Yampa River as summarized in Table B-4 was used as an applicable upstream ammonia concentration reflective of each month.

The AMMTOX model may be calibrated for a number of variables in addition to the data discussed above. The values used for the other variables in the model are listed below:

- Stream velocity = $0.3Q^{0.4d}$
- Default ammonia loss rate = 6/day
- pH amplitude was assumed to be medium
- Default times for pH maximum, temperature maximum, and time of day of occurrence
- pH rebound was set at the default value of 0.2 su per mile
- Temperature rebound was set at the default value of 0.7 degrees C per mile.

The results of the ammonia analyses for the Town of Hayden WWTF at each design tier are presented in Tables B-5 and B-6.

Table B-5

AMMTOX Model Results for the Town of Hayden WWTF for Outfall 001A Discharge Directly to the Yampa River

Design of 0.25 MGD (0.39 cfs)

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	400	575
February	500	725
March	600	850
April	475	625
May	2100	2500
June	275	400
July	175	300
August	145	180
September	150	190
October	205	215
November	300	400
December	375	525

Table B-6

AMMTOX Model Results for the Town of Hayden WWTF for Outfall 001B Discharge Directly to the Yampa River

Design of 0.75 MGD (1.2 cfs)

Month	*Total Ammonia Chronic (mg/l)*	*Total Ammonia Acute (mg/l)*
January	135	190
February	160	225
March	195	275
April	155	210
May	675	825
June	91	135
July	60	100
August	49	66
September	54	67
October	68	72
November	100	135
December	130	170

V. Antidegradation Review

As set out in *The Basic Standards and Methodologies of Surface Water*, Section 31.8(2)(b), an antidegradation analysis is required except in cases where the receiving water is designated as "Use Protected." Note that "Use Protected" waters are waters "that the Commission has determined do not warrant the special protection provided by the outstanding waters designation or the antidegradation review process" as set out in Section 31.8(2)(b). The antidegradation section of the regulation became effective in December 2000, and therefore antidegradation considerations are applicable to this WQA analysis.

According to the *Classifications and Numeric Standards for Upper Colorado River Basin and North Platte River (Planning Region 12)*, stream segment COUCYA02c is Undesignated. Thus, an antidegradation review is required for this segment if new or increased impacts are found to occur. It should be noted that standard Division procedure is to forgo an antidegradation review when the dilution ratio is greater than 100:1. Although the dilution ratio is 179:1 at Outfall 001A, where the tiered flow is established, an antidegradation review will be conducted to be consistent with the analysis conducted for Outfall 001B, which has a dilution ratio of 58:1.

The Division's *Antidegradation Significance Determination for New or Increased Water Quality Impacts Procedural Guidance* provides guidance on the determination of new or increased water quality impacts and significant degradation. For the potential Town of Hayden WWTF discharge to the Yampa River, downstream data were determined to be adequate to characterize BWQ concentrations for many pollutants. However, for other pollutants, the equation noted above was used because either downstream data were not available or the use of downstream data would not appropriately reflect downstream conditions. The methods used to determine BWQ concentrations are discussed in the paragraphs that follow.

BWQ Concentrations Based on Downstream Ambient Water Quality

Data collected at Division Station 12802A (Yampa River West of Hayden at Hwy 40), located approximately one and a half miles downstream from the potential Town of Hayden WWTF outfall, were determined to be representative of fully mixed conditions downstream from the facility and thus the data were used to determine BWQ concentrations during the antidegradation review period for the following pollutants:

- *E. coli*
- Total residual chlorine.
- Ammonia

Data from this location were available for a period of record from March 2001 through August 2002 for fecal coliform, and June through September 2001 for E. coli. Although these data were not collected during the five years prior to September 2000, the Division has determined that, absent data available during the antidegradation period, the available data are considered representative of ambient water quality during the antidegradation review period.

The BWQ concentrations based on these data, represented by the geometric mean for coliforms, and the 85th percentile for other pollutants, are summarized in Table B-7. Note that the values in ***bold,***

italicized and underlined font represent the BWQ concentration for each pollutant based on the appropriate determining percentile for that pollutant.

Table B-7

BWQ Concentrations for Potential Pollutants of Concern Based on Downstream Ambient Water Quality Concentrations in the Yampa River

Parameter	*Number of Samples*	*15th Percentile*	*50th Percentile*	*85th Percentile*	*Mean*	*Chronic Stream Standard*	*Notes*
E. coli (#/100 ml)	3	24	31	31	***27***	126	1,2
TRC (mg/l)	0	0	0	0	***0***	0.011	3

Note 1: The calculated mean is the geometric mean. Note that for summarization purposes of *E. coli*., the value of one was used where there was no detectable amount because the geometric mean cannot be calculated using a value equal to zero.

Note 2: The current data as already summarized in Table A-4 were used here as well.

Note 3: Based on the previous discussion for total residual chlorine in Section IV of this assessment, the ambient water quality concentration for total residual chlorine has been assumed to be zero.

For the remaining pollutants for which downstream data were not available or were not representative, the BWQ equation was used to calculate the BWQ concentration as discussed in the following subsection.

BWQ Concentrations Based on the BWQ Equation

BWQ concentrations calculated using the BWQ equation require the determination of the upstream low flows and existing ambient water quality during the antidegradation period, as well as the establishment of the facility contributions during the antidegradation review period. This is further discussed in the paragraphs that follow.

The period of record of the data used to establish low flows during the antidegradation review generally differ from the period of record of the low flows discussed in Section III of this analysis. However, for purposes of this analysis, the data used are the same. Thus, the low flows summarized in Section III of this WQA were thus used for $Q_{u/s}$ when establishing BWQ concentrations.

Currently, it is the Division's approach to evaluate five years of ambient water quality data, if available, for the five years prior to September 30, 2000, when determining the ambient water quality during the antidegradation review period ($M_{u/s}$). Because the ambient water quality data already summarized in Section II of this WQA were available for the same or comparable period of record, the ambient water quality data already summarized in Section II were also used to define the $M_{u/s}$ and therefore are not repeated in this section.

To establish Q_{eff} and M_{eff}, monthly average effluent concentrations available from PCS for flow and ammonia were used. PCS data for flow were obtained for both Outfalls 001A and 001B and averaged separately for a period of record from October 1998 through September 2000. Except for the month of November, for ammonia, very limited monitoring was conducted during the

antidegradation period. Therefore, except for November, the period of record was expanded beyond the antidegradation period to ensure that adequate and representative data, consisting of 5 datums for each month, were available. The average concentrations for each month were then determined and were used as the M_{eff} for the respective month. For the months of June through October, no discharge occurs to surface water and has not occurred historically; therefore, a M_{eff} value equal to zero was used.

BWQ concentrations for total ammonia are calculated by incorporating the average effluent concentrations and average flow, and the ambient water quality and low flows for the antidegradation period into the AMMTOX model and determining the maximum ammonia concentration downstream in the Yampa River (note that the discharge travels for 0.6 miles in Dry Creek prior to the confluence with the Yampa River).

In cases where the BWQ concentration exceeds the water quality standard, the calculated BWQ concentration must then be set equal to the water quality standard. This occurred for none of the pollutants.

Determinations of Antidegradation Based Average Concentrations

New or increased impacts on the receiving stream are expected as a result of this permit issuance because the concentration or loading based on proposed water quality-based effluent limits (WQBELs) is greater than the existing permit limit or load for the following pollutants:

- *E. coli*
- Total residual chlorine
- Total ammonia.

Note that the evaluation of the existing permit limit and load and the water quality-based effluent limit and load is further discussed at the end of this assessment.

For the bulleted pollutants, the antidegradation review procedure must continue to determine if impacts are significant. Impacts are deemed to be significant if the calculated assimilative capacity exceeds the calculated antidegradation-based average concentration (ADBAC). ADBACs are calculated using the significant concentration threshold (SCT), which is the additional amount of pollutant above BWQ concentration that would not cause significant degradation. Section 31.8 (3)(c) specifies that the discharge of pollutants should not be considered to result in significant degradation of the reviewable waters if one of the following summarized conditions is met:

- For bioaccumulative toxic pollutants such as mercury, the new or increased loading from the source under review is less than 10 percent of the existing total load to that portion of the segment impacted
- For all other pollutants
  - the flow rate is greater than 100:1 dilution at low flow; or
  - the new effluent load is less than 15 percent of the remaining assimilative capacity; or
  - only a temporary change in water quality will result.

The SCT for most pollutants equals the BWQ concentration plus 15 percent of the remaining assimilative capacity, and is calculated by the following equation:

$$SCT = 0.15 \times (WQS\text{-}BWQ) + BWQ$$

Where,

WQS = water quality standard (chronic standard or, in the absence of a chronic standard, the acute standard)

When the BWQ concentration is equal to zero, the following equation results:

$$SCT = 0.15 \times WQS$$

ADBACs are then determined by re-calculating the mass-balance equation using the SCT in place of the water quality standard, as in the following equation:

$$ADBAC = \frac{SCT \times Q_3 - M_1 \times Q_1}{Q_2}$$

Where,

Q_1 = Upstream low flow (1E3 or 30E3)
Q_2 = Average daily effluent flow (design capacity)
Q_3 = Downstream flow ($Q_1 + Q_2$)
M_1 = Ambient existing water quality concentration (From Section II)
SCT = Significant concentration threshold

The SCTs and ADBACs for pollutants of concern except ammonia were calculated and are set forth in Table B-8.

Table B-9

SCTs and ADBACs for Potential Pollutants of Concern Except Ammonia Outfall 001B (0.75 MGD) Discharge Directly to the Yampa River

Pollutant	***SCT***	***M_1***	***Q_1(cfs)***	***Q_2 (cfs)***	***Q_3 (cfs)***	***ADBAC***
E. coli (#/100 ml)	42	27	70	1.2	71.2	***917***
TRC (mg/l)	0.0017	0	70	1.2	71.2	***0.10***

SCTs for total ammonia were calculated using the SCT equation above that adds 15 percent of the remaining assimilative capacity to the BWQ for ammonia.

ADBACs for total ammonia are then calculated by substituting the SCT in place of the chronic standard in the AMMTOX model. The resulting ADBACs for total ammonia are set forth in Table.

Note that ADBACs for ammonia are evaluated based on the AMMTOX model, which generates monthly ADBACs. However, it is the procedure of the Division to either impose the minimum of the calculated monthly ADBACs or determine average ADBACs for three groups. The ADBAC groups that were determined are summarized in the table below.

In lieu of being subject to the ADBACs, facilities have the option of selecting non-impact limits (NILs), which are concentration limits based on their existing permitted load and the proposed design flow. By agreeing to meet the NILs, new or increased impacts will not occur and thus ADBACs will not be required to be considered in CDPS permits. For those pollutants for which permit limits have not yet been established, an implicit load allocation is determined and an implicit permit limit is established. In accordance with the Division's *E. coli* policy, an implicit limit for *E. coli* is determined as 0.32 times the permit limit for fecal coliform. For total ammonia during January through May at Outfall 001B, implicit limits were determined based on the Division's standard approach that specifies that implicit limits be developed based on the maximum concentration.

For all pollutants evaluated, a summary of the existing permit limits (including implicit limits), the existing permitted loads, the new WQBELs, the new WQBEL loads, ADBACs and NILs are contained in ???

Table B-13

WQBELs, ADBACs, and NILs Summary
Outfall 001B (0.75 MGD) Discharge Directly to the Yampa River

Pollutant	***Existing Permit Limit***	***Existing Permitted Load (lbs/day)***	***New WQBEL***	***New WQBEL Load (lbs/day)***	***ADBAC***	***NIL***
E. coli (#/100 ml)	2000	12510	5901	36911	***917***	***2000***
TRC (mg/l)	0.050	0.31	0.54	3.4	***0.10***	***0.050***
NH_3, Tot (mg/l) Jan	26.3	165	135	844	***45***	***26***
NH_3, Tot (mg/l) Feb	34	213	160	1001	***45***	***34***
NH_3, Tot (mg/l) Mar	34	213	195	1220	***45***	***34***
NH_3, Tot (mg/l) Apr	29	181	155	970	***45***	***29***
NH_3, Tot (mg/l) May	16.3	102	675	4222	***195***	***16***
NH_3, Tot (mg/l) Jun	16.6	104	91	569	***14***	***17***
NH_3, Tot (mg/l) Jul	16.6	104	60	375	***14***	***17***
NH_3, Tot (mg/l) Aug	16.6	104	49	306	***14***	***17***
NH_3, Tot (mg/l) Sep	16.6	104	54	338	***14***	***17***

NH_3, Tot (mg/l) Oct	16.6	104	68	425	***14***	***17***
NH_3, Tot (mg/l) Nov	16.8	105	100	626	***45***	***17***
NH_3, Tot (mg/l) Dec	27	169	130	813	***45***	***27***
Note that loading for E. coli cannot be calculated; but, for comparison purposes, the approach is sufficient.						

The existing permitted loads, the new WQBEL loads and the NILs were calculated using the following equations:

$$\textit{Existing permitted load} = M_{permitted} \times Q_{permitted} \times 8.34$$
$$\textit{New WQBELs load} = M_2 \times Q_2 \times 8.34$$
$$\textit{NIL} = \textit{Existing permitted load} \div Q_2 \div 8.34$$

Where,

$M_{permitted}$ = Existing permit limit or implicit permit limit as of September 2000 (mg/l)
$Q_{permitted}$ = Design flow used in the existing permit as of September 2000 (mgd)
M_2 = Maximum allowable discharge concentration (mg/l)
Q_2 = Average daily effluent flow (design capacity in mgd)

For purposes of selecting the existing permit limit, $M_{permitted}$, where more than one limit has been established for a specific parameter (e.g., a 30-day average limit and a daily maximum limit), the most stringent was used. Similarly, when selecting the M_2, where both chronic and acute allowable discharge concentrations have been calculated, the most stringent was used. In the interests of limiting tables to only those explicitly necessary, detailed calculations of the existing permitted loads, proposed WQBEL loads and NILs are not provided. However, the values for each factor in the equations noted above can be easily found in this assessment and therefore calculations can be easily verified.

As noted in Tables ?? ADBACs and NILs are not applicable when the new WQBEL load is less than the existing permitted load, or when the new WQBEL is less than the ADBAC. For the pollutants for which ADBACs and NILs apply, as highlighted by ***bold and italicized font***, if the facility chooses the NIL as the proposed permit limit, the ADBAC will not be applied. For each pollutant, the most likely selection between the ADBAC and the NIL is highlighted in ***underlined, bold, italics font***.

Additionally, the facility may complete an alternatives analysis, which would also result in ADBACs not being applied. These options can be further explored with the Division.

VI. References

Classifications and Numeric Standards for Upper Colorado River Basin and North Platte River (Planning Region 12), Regulation No. 33, CDPHE, WQCC, effective March 1, 2008.

The Basic Standards and Methodologies for Surface Water, Regulation 31, CDPHE, WQCC, Effective May 31, 2008.

Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance, CDPHE, WQCD, December 2001.

Memorandum Re: First Update to [Antidegradation] Guidance Version 1.0, CDPHE, WQCD, April 23, 2002.

Rationale for Classifications, Standards and Designations of Segments of the Upper Colorado River, CDPHE, WQCD, effective May 6, 2003.

Policy Concerning Escherichia coli versus Fecal Coliform, CDPHE, WQCD, July 20, 2005.

Colorado's Monitoring and Evaluation List, Regulation 94, CDPHE, WQCC, Effective April 30, 2008.

Appendix F

Signed Forcemain Easement

RESOLUTION 2012 - 07

A RESOLUTION OF THE TOWN COUNCIL FOR HAYDEN, COLORADO ENTERING INTO A WASTEWATER TREATMENT FACILITY OUTFALL EXTENSION EASEMENT AGREEMENT

RECITALS

1. The Conservancy is the owner of land located in Sections 4 and 5, Township 6 North, Range 88 West of the 6th P.M., Routt County, Colorado (the "Land").

2. The Town owns a parcel of land located in the NW1/4 of Section 9, T6N R88W, 6th P.M., Routt County, Colorado (the "Town Property") on which the Town operates a sewage collection and sewage treatment facility serving the Town (the "Hayden Wastewater Treatment Facility"). The Hayden Wastewater Treatment Facility is located adjacent to the Conservancy's Land.

3. To ensure compliance with the Colorado Pollution Discharge Elimination System Permit for the Hayden Wastewater Treatment Facility, the Town desires to obtain an easement from the Conservancy to extend the sewage outfall pipeline from the Hayden Wastewater Treatment Facility directly to the Yampa River (the "WWTF Outfall Extension") across a portion of the Conservancy's Land.

4. The Conservancy is willing to grant the Town an easement across the Conservancy's Land for the WWTF Outfall Extension upon payment of $8,292.00.

5. The Conservancy and the Town intend by this Agreement to set forth the terms and conditions under which the Conservancy agrees to grant to the Town an easement across the Conservancy's Land for the Hayden Wastewater Treatment Facility WWTF Outfall Extension.

NOW, THEREFORE BE IT RESOLVED BY THE HAYDEN TOWN COUNCIL AS FOLLOWS:

Section 1. That the Town Council hereby finds and determines that the Agreement is necessary to ensure compliance with the Colorado Pollution Discharge Elimination System Permit for the Hayden Wastewater Treatment Facility

Section 2. That the Wastewater Treatment Facility Outfall Extension Easement Agreement (the "Agreement") dated as of April 18, 2012, by and between The Nature Conservancy, a District of Columbia non-profit corporation and the Town of Hayden, Colorado and attached hereto as Schedule A is accepted, and the Mayor and Town Clerk are hereby authorized to sign the Agreement, generally in the format attached as Schedule A.

Section 3. That the Town shall pay $8,292.00 to purchase the easement across the Conservancy's Land for the WWTF Outfall Extension at the time of signing of the Agreement.

PASSED, APPROVED, AND RESOLVED THIS 19 DAY OF APRIL, 2012.

James M. Haskins, Mayor

ATTEST:

Melisa Owens, Town Clerk

RECEPTION#: 725307, 05/17/2012 at
09:21:06 AM,
1 OF 8, R $46.00 Doc Code:EAS
Kay Weinland, Routt County, CO

Schedule A

RECORDING REQUESTED BY AND)
WHEN RECORDED RETURN TO:)
The Nature Conservancy)
Western Regional Office)
2424 Spruce Street, Suite 100)
Boulder, Colorado 80302)
Attn: Legal Department)

Clerk and Recorder: Please index in the real property records with the Town of Hayden as Grantee and The Nature Conservancy as Grantor.

WASTEWATER TREATMENT FACILITY OUTFALL EXTENSION EASEMENT AGREEMENT

This Wastewater Treatment Facility Outfall Extension Easement Agreement (the "Agreement") dated as of April 18, 2012, is by and between The Nature Conservancy, a District of Columbia non-profit corporation, with a mailing address of 2424 Spruce Street, Boulder, CO 80302, hereinafter referred to as the "Conservancy", and the Town of Hayden, a political subdivision of the State of Colorado, with a mailing address of P.O. Box 190, Hayden, CO 81639, hereinafter referred to as the "Town".

Recitals

A. The Conservancy is the owner of land located in Sections 4 and 5, Township 6 North, Range 88 West of the 6th P.M., Routt County, Colorado (the "Land"), as more fully described on **Exhibit A** attached hereto.

B. The Town owns a parcel of land located in the NW1/4 of Section 9, T6N R88W, 6th P.M., Routt County, Colorado (the "Town Property") on which the Town operates a sewage collection and sewage treatment facility serving the Town (the "Hayden Wastewater Treatment Facility"). The Hayden Wastewater Treatment Facility is located adjacent to the Conservancy's Land.

C. To ensure compliance with the Colorado Pollution Discharge Elimination System Permit for the Hayden Wastewater Treatment Facility, the Town desires to obtain an easement from the Conservancy to extend the sewage outfall pipeline from the Hayden Wastewater Treatment Facility directly to the Yampa River (the "WWTF Outfall Extension") across a portion of the Conservancy's Land. Attached hereto as **Exhibits B** and **B-1** are a survey and legal description for the easement.

D. The Conservancy is willing to grant the Town an easement across the Conservancy's Land for the WWTF Outfall Extension upon payment of $8,292.00.

E. The Conservancy and the Town intend by this Agreement to set forth the terms and conditions under which the Conservancy agrees to grant to the Town an easement across the Conservancy's Land for the Hayden Wastewater Treatment Facility WWTF Outfall Extension.

Terms and Conditions

1. In consideration for payment from the Town in the amount of $8,292.00, receipt of which is acknowledged hereby, the Conservancy grants to the Town a fifty foot wide temporary construction easement, including a thirty (30) foot wide perpetual easement across the Conservancy's Land for the purpose of access with persons, vehicles, and equipment for constructing, installing, maintaining, repairing and replacing an underground WWTF Outfall Extension for the Hayden Wastewater Treatment Facility in the location as shown on the attached **Exhibits B** and **B-1**. The Conservancy makes this grant with the understanding that the Town will notify the Conservancy of the construction plans and scheduling in advance, and obtain the approval of the Conservancy prior to commencement of construction of the WWTF Outfall Extension. The WWTF Outfall Extension shall be underground. The Town further agrees that prior to performing any repair or maintenance of the WWTF Outfall Extension after it is installed, the town shall notify the Conservancy and obtain the approval of the Conservancy, which approval shall not be unreasonably withheld, prior to performing any repair or maintenance. In the event of a problem with the WWTF Outfall Extension that is critical in nature and would significantly impact the operations of the Hayden Wastewater Treatment Facility unless repairs are done expeditiously, the Town shall first make good faith efforts to notify the Conservancy and obtain the approval of the Conservancy before commencing repairs, but if the Town is unable after making such good faith efforts to contact the Conservancy, then the Town may perform such repairs and notify the Conservancy after commencing said repairs.

2. The Town shall not damage, alter or use any portion of the Land except as explicitly permitted in this Agreement. The Town shall fill and recompact the trench in which the WWTF Outfall Extension is placed and shall restore the disturbed area in accordance with permit requirements and the plan for restoration agreed to by the Conservancy and the Town attached hereto as **Exhibit C**.

3. At all times, with the exception of the construction period, the Town shall use the WWTF Outfall Extension easement granted hereby in such a manner to prevent and avoid any obstruction or hindrance of the Conservancy's operations on the Land, including but not limited to livestock grazing and haying.

4. The Easement conveyed herein shall run with and be appurtenant to the Grantees' Town Property and shall be a perpetual burden against the Land.

5. The Town covenants and agrees to indemnify and hold harmless the Conservancy against any and all claims for damages to persons or property arising out of or resulting from the Town's construction and use of the easement granted hereunder. The Town further agrees to

surrender and quitclaim such easement to the Conservancy, upon the Conservancy's written request, upon abandonment of use of such easement.

6. Any notice required under this Agreement may be personally delivered or mailed in the United States mails, first class postage prepaid to the party to be served. Notices personally served shall be deemed served on the date of delivery. Notices mailed shall be deemed served the next business day following the date of mailing if mailed in Steamboat Springs, Colorado.

7. This Agreement is to be recorded in the records of the Office of the Clerk and Recorder of Routt County, Colorado.

8. This Agreement shall run with and burden the Land of the Conservancy as described in **Exhibits B** and **B-1**. The rights of the Town under this Agreement may not be used for any purposes other than servicing the Hayden Wastewater Treatment Facility, nor sold, transferred, conveyed or assigned separately from the Hayden Wastewater Treatment Facility. This Agreement shall be binding on and inure to the benefit of the Conservancy and the Town and their respective successors and permitted assigns, and shall not be deemed to be for the benefit of or enforceable by any third party. This Agreement may not be amended except by a written document executed by both the Conservancy and the Town, or their successors in interest.

9. In the event that either party to this Agreement brings suit to enforce or interpret any portion of this Agreement, the party substantially prevailing in such action shall be entitled to recover all costs incurred in such action, including without limitation reasonable attorney fees.

10. This Agreement shall be governed by and construed in accordance with the internal laws of the State of Colorado without reference to choice of laws rules. The Conservancy and the Town agree that venue for any action on this Agreement shall be in the Colorado judicial district in which Routt County, Colorado is located at the time of such action.

11. The Conservancy covenants that it is the owner of the Land.

THE CONSERVANCY:

THE NATURE CONSERVANCY, a District of Columbia non-profit corporation

By: _____

Its: Colorado State Director

Date: 5/15/12

TOWN:

TOWN OF HAYDEN, a political subdivision of the State of Colorado

By: _____

Its: Mayor

Date: 5-2-12

STATE OF COLORADO)
) ss.
COUNTY OF Routt)

The foregoing Wastewater Treatment Facility Outfall Extension Easement Agreement was acknowledged before me this 2nd day of May, 2012, by James M. Haskins, as Mayor of Town of Hayden.

Witness my hand and official seal.
My Commission expires: 9/17/13

Lisa D. Bowling
Notary Public

LISA D. BOWLING NOTARY PUBLIC STATE OF COLORADO

STATE OF COLORADO)
) ss.
COUNTY OF Boulder)

The foregoing Wastewater Treatment Facility Outfall Extension Easement Agreement was acknowledged before me this 8th day of May, 2012, by Tim Sullivan, as Colorado State Director of The Nature Conservancy.

Witness my hand and official seal.
My Commission expires: 09-04-2013

Melissa Hansen
Notary Public

MELISSA HANSEN NOTARY PUBLIC STATE OF COLORADO My Commission Expires 09-04-2013

Exhibit A

LEGAL DESCRIPTION

A parcel of land in the SW1/4SW1/4 of Section 4 and the SE1/4SE1/4 of Section 5, all in Township 6 North, Range 88 West of the 6th P.M., Routt County, Colorado and being more particularly described as follows:

Beginning at the SW corner of said Section 4,
thence along the south line of the SW1/4 of said Section 4, N 89deg 23'14" E, 1338.02 feet to the SE corner of said SW1/4SW1/4 Section 4; thence along the east line of said SW1/4SW1/4 Section 4, N 01deg 16'04" E, 839.29 feet to a point on the centerline of the Yampa River, thence along said centerline the following five courses:

1) N 84deg 03'56" W 405.88 feet;
2) S 67deg 20'02" W 423.36 feet;
3) S 46deg 21'53" W 690.10 feet;
4) S 66deg 52'23" W 570.56 feet;
5) S 73deg 13'11" W 152.44 feet to a point on the south line of said SE1/4SE1/4 Section 5,

thence along said south line, N 88deg51'30" E 608.10 feet to the point of beginning.

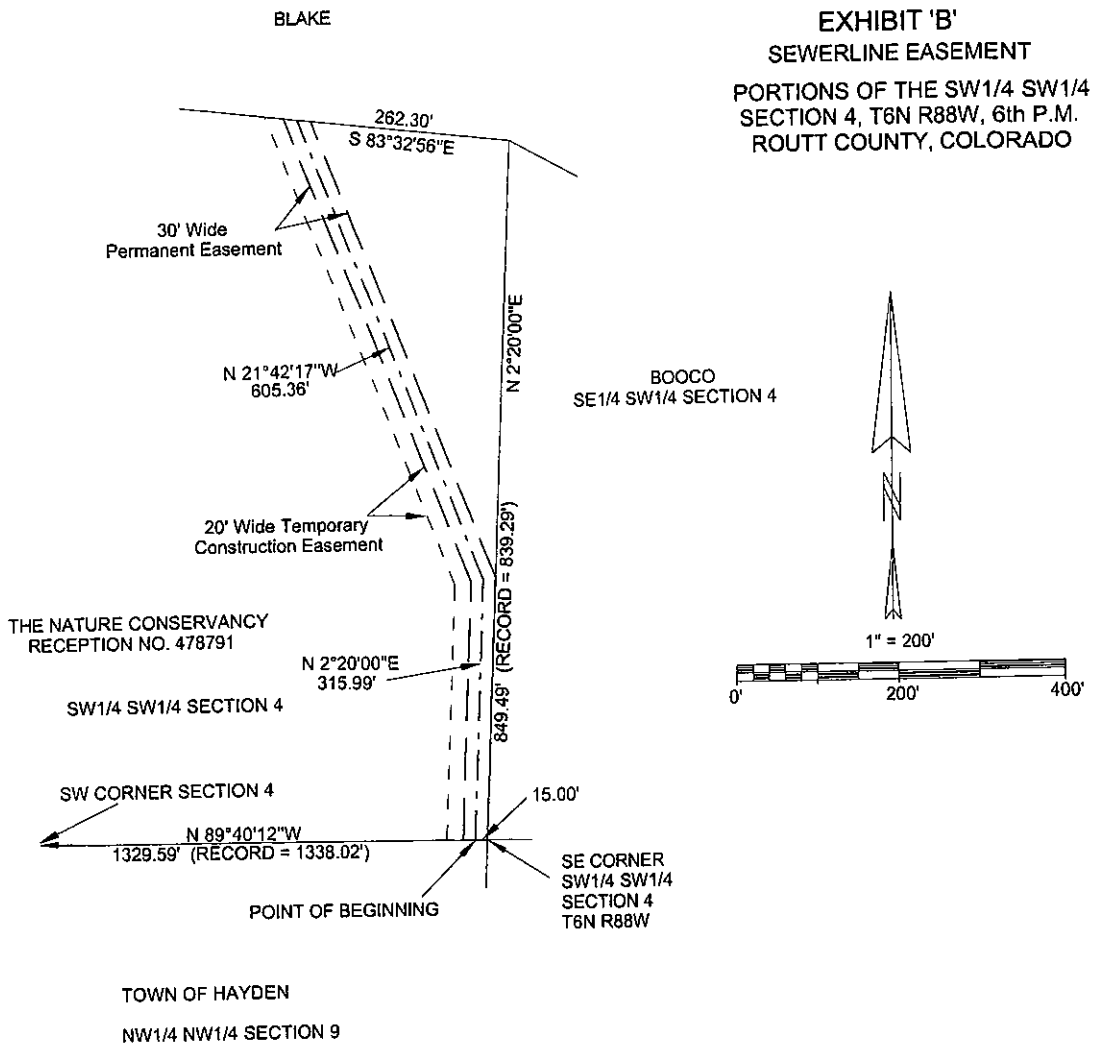
The east line of the SE1/4 of said Section 4 is considered to bear N 01deg 50'39" E and is marked with a 2.5 G.L.O. Brass Cap at each end.

County of Routt, State of Colorado.

EXHIBIT 'B'

SEWERLINE EASEMENT

PORTIONS OF THE SW1/4 SW1/4
SECTION 4, T6N R88W, 6th P.M.
ROUTT COUNTY, COLORADO



NOTICE: According to Colorado Law, you must commence any legal action based on any defect in this survey within three years after you first discover such defect, in no event may any action be commenced more thAn ten years from the date of certification shown hereon.

TOWN OF HAYDEN				EXHIBIT 'B' SEWERLINE EASEMENT
				PORTIONS OF THE SW1/4 SW1/4 SECTION 4, T6N R88W, 6th P.M.
SCALE	DRG	DATE	FILE	ROUTT COUNTY, COLORADO
1" = 200'	GRD	12/8/11	HAYSEWR4	

DOWLING LAND SURVEYORS, LLC
P.O. BOX 954
HAYDEN, COLORADO 81639
(970) 276-3613
dowling@plotz.biz

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Exhibit B-1

LEGAL DESCRIPTION OF EASEMENT

SEWERLINE EASEMENT (PERMANENT)

A thirty (30) foot wide strip of land (15 feet on each side of the centerline) located in the SW1/4 SW1/4 of Section 4, T6N R88W, 6th P.M., Routt County, Colorado, further being a portion of that parcel of land as described at Reception No. 478791, records of Routt County, the centerline of which is described as follows:

BEGINNING at a point on the South line of said SW1/4 SW1/4 of Section 4, from which the Southeast Corner thereof bears S89°40'12"E a distance of 15.00 feet; thence N02°20'00"E along a line 15 feet Westerly and parallel with the East line of said SW1/4 SW1/4, a distance of 315.99 feet; thence diverging from said parallel line, N21°42'17"W a distance of 605.36 feet, to a point on the Northerly line of said parcel described at Reception No. 478791 from which the Northeast Corner thereof bears S83°32'56"E a distance of 262.30 feet, and the terminus of this description.

SEWERLINE EASEMENT (TEMPORARY CONSTRUCTION)

A twenty (20) foot wide temporary construction easement that lies Westerly, adjacent and parallel with the Westerly line of the above described Permanent Easement.

Bearings based on the Town of Hayden Datum, the South line of Section 9, T6N R88W, both ends being GLO Brass Caps S88°33'29"E

Exhibit C

RESTORATION PLAN

Upon Completion of Installation of Pipeline:

a. Promptly after completion of installation, the disturbed area will be re-contoured to match the surrounding topography while creating and blending to the prevailing topography.

b. If gravel was used any gravel not used in the construction project will be removed.

c. In the spring or fall, the chosen hay meadow, native grass and forb seed mix specified by The Nature Conservancy will be sown into the disturbed area.

d. If the native seed re-vegetation effort fails in whole or in part for any reason the reclamation process will continue until such time that the site has been successfully reclaimed.

e. The Town of Hayden will be responsible for noxious weed control until restoration success is attained.

f. Restoration Success. A site shall be successfully reclaimed when (i) two growing seasons have passed and (ii) the disturbed area has reached eighty percent cover of native species where applicable when compared to adjacent locations.

Appendix G

Jurisdictional Wetland Delineation

Town of Hayden
Wastewater Plant Outfall Line

JURISDICTIONAL WETLAND DELINEATION

February 15, 2012

Prepared For

Town of Hayden

PO Box 190, Hayden, CO 81639-0190

and

SACRAMENTO DISTRICT
Regulatory Branch

Colorado/Gunnison Basin Reg. Office • 400 Rood Avenue Room 142
Grand Junction, CO 81501-2563

Prepared By

WESTERN BIONOMICS LLC

Natural Resource Management Services

31040 Willow Lane • Steamboat Springs, CO 80487

Ph: 970-846-8223 • kscolfer@westernbionomics.com

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Appendix A - Field Data Sheets
Appendix B - Representative Photographs
Appendix C – Wetland Functions and Values Assessment

1. INTRODUCTION

The Hayden Wastewater Plant is located between US Highway 40 and the Yampa River on the west end of the town of Hayden, in Routt County, Colorado (Figure 1). Wetlands on the property are associated with the Yampa River. The Wastewater Plant can be found on the USGS Hayden, Colorado 7.5' series topographic quadrangle on a parcel of land owned by the Town of Hayden. The entire parcel occupies 60.5± acres in the sixth principal meridian T6N, R88W, Section 9. The property is centered at 40.497594° North Latitude, 107.272866° West Longitude. Plant communities on the property include monotypic reed canarygrass, upland pasture, and cottonwood-riparian.

The Colorado Department of Public Health and Environment (CDPHE) issued revised effluent limits to the Town of Hayden and implemented a compliance schedule. The existing lagoon wastewater treatment facility is not capable of meeting the proposed ammonia limits with the current discharge to dry creek. Therefore the Town is proceeding with a direct discharge of treated wastewater from the existing facility to the Yampa River which will have less stringent water quality criteria. The project will consist of a lift station and forcemain.

The address of the project proponent is the Town of Hayden. The project engineer is the primary contact:

Cooper Best P.E.
Schmueser, Gordon, Meyer
118 W. Sixth Street, Suite 200
Glenwood Springs, CO 81601
(970) 945-1004
CooperB@sgm-inc.com

Wetlands were delineated on a 4.8 acre project area located within the Town of Hayden parcel for the purposes of this project. This document establishes, within the project area, the limits of federal jurisdiction with respect to Section 404 of the Clean Water Act.

2. METHODS

Prior to preparation of this jurisdictional wetland delineation report, pertinent background information was reviewed, individuals familiar with the project were interviewed, and maps, aerial photos, and soil map unit descriptions of the project area were obtained by Western Bionomics.

Upon completion of the pre-field work, the project area was identified and examined on November 9, 2011 to ascertain the physical arrangement of plant communities and to establish sample plot locations. Sample plots were established near the edge of each change in plant community type in order to ascertain weather the site was a wetland or upland. Each sample plot was numbered and designated with orange flagging. Ecosystem parameters (vegetation, soils, and hydrology) were characterized and recorded on field data forms (Appendix A) at each observation point, as per Army Corps guidelines (US Army Corps of Engineers Wetland Delineation Manual 1987; Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region, U.S. Army Corps of Engineers, April 2008). The location of sample plots was mapped and is displayed in Figure 2.

Based on observations of all three wetland parameters at each sample plot, wetland boundaries were designated with fluorescent pink flagging. Boundary markers were individually numbered by Western Bionomics personnel and recorded by the surveyor to provide reference. A point to point survey of the delineated boundaries of each wetland was conducted by Emerald Mountain Surveyors. The wetland boundary was located with respect to the project datum and a map of wetland boundary locations relative to the project datum was created by the surveyor. The map is reproduced in Figure 2 at the end of this narrative.

The characteristics of vegetation, soils, and hydrology within wetlands and uplands on the parcel are presented in Section 3 of this report. Furthermore, wetland functions and values were assessed within each wetland polygon. The results of the functions and values assessment are presented in Section 3.4, Wetland Functions, Values, and Area. The total area of each wetland complex is also displayed in Table 2 within Section 3.4. Copies of the field data forms and wetland functional analysis data sheets are included in Appendix A. Representative photos of the project area are included in Appendix B. Detailed wetland functional analysis data sheets are included in Appendix C.

3. RESULTS

Wetland sample plots revealed the boundary between sites which exhibited all 3 wetland parameters and sites which were lacking one or more wetland parameters. Based on the presence or absence of parameters, wetland boundaries were designated.

The following narrative presents the results of the field examinations with respect to soil parameters, vegetation composition, hydrological indicators, and ecological functions of wetlands delineated in the project area. Figure 3 presents soil map units on the project area.

No evidence of threatened or endangered animal or plant species was observed or has been documented anywhere within or adjacent to the proposed project area.

3.1 SOILS

3.1.1 NRCS Soil Mapping Units

Soil survey information compiled by the Natural Resources Conservation Service (NRCS) identifies 2 mapping units within the limits of the project area (Figure 3). The following narrative provides a description of these mapping units.

3.1.1.1 Map Unit 90A – Apmay-Manbow complex, 0 to 3 percent slopes

Setting
Position on landscape: flood plains
Elevation: 6,150 to 6,450 feet
Air temperature: 42 to 44 degrees F
Annual precipitation: 14 to 18 inches
Frost-free period: 75 to 95 days

Composition
Apmay soil and similar inclusions: 50 percent
Manbow soil and similar inclusions: 30 percent
Contrasting inclusions: 20 percent

Contrasting Inclusions
Frolic soils
very poorly drained Aquents and Aquolls soils

Typical Profile
Apmay
Surface layer:
0 to 4 inches=dark grayish brown sandy clay loam

Subsurface layer:
4 to 19 inches=dark grayish brown sandy clay loam
19 to 23 inches=grayish brown gravelly sandy loam

Underlying material:
23 to 60 inches=light yellowish brown extremely gravelly sand

Soil Properties and Qualities
Apmay
Parent material: alluvium
Depth class: very deep
Drainage class: somewhat poorly drained
Seasonal High Water Table: 12 to 36 inches; May-June
Permeability: moderate over very rapid
Available water capacity: low
Potential rooting depth: 60 or more inches for water-tolerant plants and 12 to 36 inches for non-water-tolerant species
Flooding: common
Runoff: low to medium

Hazard of water erosion: slight
Hazard of soil blowing: low

Typical Profile
Manbow
Surface layer:
0 to 5 inches=dark grayish brown very gravelly sandy loam

Subsurface layer:
5 to 15 inches=dark grayish brown gravelly sandy loam
15 to 21 inches=brown extremely gravelly loamy sand

Underlying material:
21 to 60 inches=light yellowish brown extremely gravelly sand

Soil Properties and Qualities
Manbow
Parent material: alluvium
Depth class: very deep
Drainage class: somewhat poorly drained
Seasonal high water table: 12 to 30 inches; May-June
Permeability: moderately rapid over very rapid
Available water capacity: low
Potential rooting depth: 60 or more inches for water-tolerant plants, 15 to 30 inches for non-water-tolerant species
Flooding: rare
Runoff: negligible to low
Hazard of water erosion: slight
Hazard of soil blowing: moderate

3.1.1.2 Map Unit 91A - Frolic loam, 0 to 3 percent slopes

Setting
Depth class: very deep
Drainage class: moderately well drained
Seasonal high water table: 30 to 40 inches; April-June
Position on landscape: flood plains
Parent material: alluvium
Elevation: 6,150 to 6,450 feet
Air temperature: 42 to 44 degrees F
Annual precipitation: 14 to 16 inches
Frost-free period: 75 to 95 days

Composition
Frolic soil and similar inclusions: 85 percent
Contrasting inclusions: 15 percent

Contrasting Inclusions
Somewhat poorly to very poorly drained Aquolls and Aquents soils
Apmay soils

Manbow soils

Typical Profile
Surface layer:
0 to 6 inches=dark grayish brown loam

Subsurface layer:
6 to 13 inches=dark grayish brown loam

Underlying material:
13 to 30 inches=dark grayish brown clay loam
30 to 60 inches=grayish brown clay loam

Soil Properties and Qualities
Permeability: moderately slow
Available water capacity: high
Potential rooting depth: 60 or more inches for water-tolerant plants, 30 to 40 inches for non-water-tolerant species
Flooding: rare
Runoff: low to medium
Hazard of water erosion: slight to moderate
Hazard of soil blowing: low

Sample plot data sheets are located in Appendix A.

3.2 VEGETATION

Within the boundaries of the project area, hydrophytic vegetation was dominant within delineated wetlands. Hydrophytic vegetation was not observed to be dominant outside the wetland boundary. The dominant plant associations can be broadly characterized as follows:

- Upland pastures dominated by mixed cultivated grasses including timothy, Kentucky bluegrass, meadow foxtail, western wheatgrass, and smooth brome.
- Emergent hydrophytic grasslands dominated by reed canarygrass
- Cottonwood riparian uplands.

Table 1 displays vegetation found in the project area and its wetland indicator status. Vegetation on the project area is characteristic of that which is found on similar landscapes in the Yampa Valley.

Table 2. List of Plants on the Property, including wetland indicator status

Common Name	Scientific Name	R8 Ind	National Ind	Habit*
Grasses				
BENTGRASS,SPREADING	Agrostis stolonifera	FACW	FAC+,FACW	PNG
BLUEGRASS,KENTUCKY	Poa pratensis	FACU	FACU,FAC-	PNG
BROME, SMOOTH	Bromus inermis	-------	-------	
FOXTAIL,MEADOW	Alopecurus pratensis	NI	FAC,FACW	PIG
GRASS,ORCHARD	Dactylis glomerata	FACU	FACU,FACU+	PIG
GRASS,REED CANARY	Phalaris arundinacea	OBL	FACW,OBL	PNG
TIMOTHY	Phleum pratense	FACU	FACU	PIG

Table 2. List of Plants on the Property, including wetland indicator status				
Common Name	**Scientific Name**	**R8 Ind**	**National Ind**	**Habit***
WHEATGRASS,WESTERN	Agropyron smithii	FACU	UPL,FAC-	PNG
Sedges and Rushes				
RUSH,BALTIC	Juncus balticus	FACW	FACW,OBL	PNGL
SEDGE,SMALL-WING	Carex microptera	FAC	FAC,FACW	PNGL
Forbs				
CATTAIL,BROAD-LEAF	Typha latifolia	OBL	OBL	PNEF
CINQUEFOIL,VARILEAF	Potentilla diversifolia	FACU	FACU,FACW	PNF
CLOVER,RED	Trifolium pratense	FACU	FACU-,FAC	BPIF
DANDELION,COMMON	Taraxacum officinale	FACU+	FACU-,FACU+	PIF
DOCK,CURLY	Rumex crispus	FACW	FACU,FACW	PIF
PLANTAIN,COMMON	Plantago major	FAC	FACU,FACW	PIF
PURSLANE,COMMON	Portulaca oleracea	FAC	FACU,FAC	AN$F
THISTLE,CREEPING	Cirsium arvense	FACU	FACU-,FAC	PIF
YARROW,COMMON	Achillea millefolium	FACU	FACU	PNF
Trees and Shrubs				
COTTONWOOD,NARROW-LEAF	Populus angustifolia	FAC*	FAC,FACW	NT
DOGWOOD,RED-OSIER	Cornus stolonifera	FACW	FAC,FACW+	NS
HAWTHORN,CERRO	Crataegus erythropoda	NI	FAC?	NT
ROSE,WOODS	Rosa woodsii	FAC-	UPL,FAC-	NS

* A – Annual, B – Biennial, C – Clubmoss, E – Emergent, F – Forb, F3 – Fern, G – Grass, GL – Grasslike, H – Partly woody, HS – Half shrub, H2 – Horsetail, I – Introduced, N – Native, P – Perennial, P3 – Pepperwort, Q – Quillwort, S – Shrub, Z – Submerged, T – Tree, V – Herbaceous Vine, W – Waterfern, WV – Woody vine, @ – Epiphytic, / – Floating, $ – Succulent, + Parasitic, - Saprophytic

3.3 HYDROLOGY

Waters of the United States that are found on the property are associated with the Yampa River. The 100 year floodplain at the location of the project area has been mapped by FEMA. The project area is entirely within the limits of the 100 year floodplain.

Saturation within the root zone, inundation of the sample site, presence of one primary or 2 or more secondary wetland indicators was confirmed in all sample plots located in areas mapped as wetland.

3.4 WETLAND FUNCTIONS, VALUES, AND JURISDICTIONAL EXTENT

The ecological functions of wetlands on the project site were assessed using an approach based on the hydrogeomorphic methodology (HGM). Our approach is documented in Appendix C, and rates the potential for a wetland to perform a particular function. The rate is classified on a scale from 1 – 6, ranging from very low to very high.

Based on the above methodology, wetlands on the property were functionally ranked as shown in the following table. Table 2 displays the overall functional value of each wetland identified on the property, along with a rating of the quality of performance of each of the 6 functions within the wetland.

TABLE 2. SUMMARY OF JURISDICTIONAL WATER EXTENT AND FUNCTIONAL RATINGS OF WETLANDS.*									
WETLAND	WETLAND AREA	COWARDIN CLASSIFICATION	DYNAMIC WATER STORAGE	FLOOD FLOW ATTENUATION	PRODUCTION EXPORT	NUTRIENT AND POLLUTANT REMOVAL / SEDIMENT RETENTION	SHORELINE STABILIZATION / SEDIMENT CONTROL	WILDLIFE HABITAT	OVERALL WETLAND FUNCTIONAL VALUE
All	47341	Emergent Herbaceous	5	4	5	4	3	3	**4**
* Numerical Rating System: 0 = None / NA 1 = Very Low 2 = Low 3 = Moderate 4 = Moderately High 5 = High 6 = Very High									

Wetland functional analysis within the project area demonstrates that wetlands delineated on this portion of the property are moderately high functioning wetlands.

4. DISCUSSION AND SUMMARY

A total of 1.09 acre of moderately high quality wetland was delineated within the property boundary. Wetlands are located in the 100 year floodplain.

APPENDIX A - FIELD DATA SHEETS

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: HDN WASTE WATER City/County: RT Sampling Date: 11-9-11

Applicant/Owner: TOH State: CO Sampling Point: 1

Investigator(s): KC / BM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____
Hydric Soil Present?	Yes ✓	No _____
Wetland Hydrology Present?	Yes ✓	No _____

Is the Sampled Area within a Wetland? Yes ✓ No _____

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. ALOPECURUS PRATENSIS			NI*
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	_____	x 1 = _____
FACW species	_____	x 2 = _____
FAC species	_____	x 3 = _____
FACU species	_____	x 4 = _____
UPL species	_____	x 5 = _____
Column Totals:	_____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

* FAC IN ADJ RGN

SOIL

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
10	10YR3/1		7.5YR4/6	2	C	M	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: THIS WOULD NOT HAVE BEEN WETLAND 2 YEARS AGO. RECENT CHANGE TO INTERPRETATION OF NI SPP.

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: HDN WASTEWATER City/County: RT Sampling Date: 11.9.11

Applicant/Owner: TOH State: CO Sampling Point: 2

Investigator(s): KC BM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	Is the Sampled Area within a Wetland? Yes _____ No ✓
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. ALOPECURUS PRATENSIS	40	✓	NI*
2. PHLEUM PRATENSE	40	✓	FACU
3. POA PRATENSIS	20	✓	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	_____	x 1 = _____
FACW species	_____	x 2 = _____
FAC species	_____	x 3 = _____
FACU species	_____	x 4 = _____
UPL species	_____	x 5 = _____
Column Totals:	_____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
10	10YR 3/1		7.5YR 4/6	2	C	M	SL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ *Sandy Redox (S5)*
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ *2 cm Muck (A10)*
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: HDN WASTEWATER City/County: _____ Sampling Date: 11-9-11

Applicant/Owner: TOH State: CO Sampling Point: 3

Investigator(s): _____ Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	Is the Sampled Area within a Wetland? Yes _____ No ✓
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. BROMUS INERMIS	60	✓	UPL*
2. POA PRATENSIS	20	✓	FACU
3. ALOPECURUS PRATENSIS	5		NI*
4. PHLEUM PRAT	5		FACU
5. PASCO SMITH	10		FACU
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	_____	x 1 = _____
FACW species	_____	x 2 = _____
FAC species	_____	x 3 = _____
FACU species	_____	x 4 = _____
UPL species	_____	x 5 = _____
Column Totals:	_____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

*SEE PG 25 WMV SUPPLEMENT (NOT LISTED = UPL)
(NI = NEAREST ADJ RGN)

SOIL

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
10	10YR3/1		7.5YR4/4	4	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ *Sandy Redox (S5)*
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ✓ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ *2 cm Muck (A10)*
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: HDN WASTEWATER City/County: RT Sampling Date: 11-9-11

Applicant/Owner: TOH State: CO Sampling Point: 4

Investigator(s): KC BM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓	No _____	Is the Sampled Area within a Wetland? Yes ✓ No _____
Hydric Soil Present?	Yes ✓	No _____	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: _____)			
1. PHALARIS ARUNDINACEAE	100	✓	OBL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	_____ = Total Cover		
Woody Vine Stratum (Plot size: _____)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	_____	x 1 = _____
FACW species	_____	x 2 = _____
FAC species	_____	x 3 = _____
FACU species	_____	x 4 = _____
UPL species	_____	x 5 = _____
Column Totals:	_____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
8	10YR3/1		7.5YR4/6	2	C	M	CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ *Sandy Redox (S5)*
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ *2 cm Muck (A10)*
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✓ No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): _____

Water Table Present? Yes ___ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: HDN WASTEWATER City/County: RT Sampling Date: 11-9-11

Applicant/Owner: TOH State: CO Sampling Point: 5

Investigator(s): KC BM Section, Township, Range: _____

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: _____ Long: _____ Datum: _____

Soil Map Unit Name: _____ NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✓ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✓	Is the Sampled Area within a Wetland? Yes _____ No ✓
Hydric Soil Present?	Yes _____	No _____	
Wetland Hydrology Present?	Yes _____	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
		= Total Cover	

Sapling/Shrub Stratum (Plot size: _____)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	

Herb Stratum (Plot size: _____)			
1. BROMUS INERMIS	✓	70	*
2. PHAL ARUND	✓	19	OBL
3. PASCO SMIT		11	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
		= Total Cover	

Woody Vine Stratum (Plot size: _____)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	_____	x 1 = _____
FACW species	_____	x 2 = _____
FAC species	_____	x 3 = _____
FACU species	_____	x 4 = _____
UPL species	_____	x 5 = _____
Column Totals:	_____ (A)	_____ (B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Wetland Non-Vascular Plants[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks: * UPL SINCE NOT IN PLANT LIST

SOIL

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
10	10YR 4/1						CL	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1) **(except MLRA 1)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Water-Stained Leaves (B9) **(except MLRA 1, 2, 4A, and 4B)**
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Stunted or Stressed Plants (D1) **(LRR A)**
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9) **(MLRA 1, 2, 4A, and 4B)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Raised Ant Mounds (D6) **(LRR A)**
- ___ Frost-Heave Hummocks (D7)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX B - REPRESENTATIVE PHOTOGRAPHS

PHOTO 1. Yampa River at project area.

PHOTO 2. Small wetland on TNC Parcel.

PHOTO 3. Large wetland on Town of Hayden parcel.

PHOTO 4. Wetland C. Monotypic reed canarygrass stand on Town of Hayden parcel, facing north.

PHOTO 5. Looking south from near Town of Hayden wetland boundary towards wastewater plant.

APPENDIX C – WETLAND FUNCTIONS AND VALUES ASSESSMENT

4.1 Wetland Functions and Values

The ecological functions of wetlands on the project site were assessed using an approach based on the hydrogeomorphic methodology (HGM) currently under development in the wetland scientific community. Our approach involves the use of professional judgment to assign a qualitative functional value to wetlands. This approach was developed based on several interim HGM methodologies currently being used throughout the country until a specific methodology is approved for the Sacramento District.

Western Bionomics' methodology rates the potential for a wetland to perform a particular function, and classifies this potential on a scale from 1 – 6, ranging from very low to very high. Functions evaluated on the project area are described below:

- **Dynamic Water Storage (DWS)** is a wetland's ability to store water either derived from the wetland or from adjacent uplands.
- **Flood Flow Attenuation (FFA)** is a wetland's ability to receive overbank flows from a stream or river and store that water for some period of time.
- **Nutrient and Pollutant Removal / Sediment Retention (NPR)** is a wetland's ability to influence water quality.
- **Shoreline Stabilization / Sediment Control (SSSC)** relates to a wetland's ability to maintain a healthy stable channel and shoreline by maintaining stable river banks and lake shorelines.
- **Production Export (PE)** is a wetlands ability to provide the organic matter that is the base of the aquatic food chain.
- **Wildlife Habitat (WH)** is provided by wetlands for a wide variety of animals.

Field Indicators for the functions described above include some of the variables used in HGM models currently under development. The presence or absence of indicators, and the degree to which that indicator is present, provides the basis for determining the quality of function performed by a specific wetland.

4.2 Recognized Field Indicators for Wetland Function

The first step in evaluating a wetland's function is to rate the quality of field indicators within the wetland, based on professional judgment. Once all field indicators are rated, the wetland is assigned an overall qualitative rating based on the presence or absence and quality of field indicators. Field indicators include the following:

Microtopographic Variation

Microtopographic variation provides a tortuosity to flow paths within a wetland, thus reducing the average velocity and detention time of surface water flowing through a wetland. Microtopography is an important field indicator for the DWS, FFA, and NPR functions. Subcategories of Microtopography include:

A) Hummocks
B) Coarse Woody Debris

Macrotopographic Variation

Macrotopographic variation is the larger scale variation present within a wetland, such as stump holes, meander scars, old oxbows, restricted outlets, and any other depression or levee present within a wetland that serves to slow or restrict the flow of water out of a wetland. This is another important indicator for DWS, FFA, and NPR functions.

Vegetation Density

Vegetation density within a wetland provides an important influence on wetland functions of DWS, NPR, PE, and WH.

Vegetation Structural Diversity and Species Richness

Vegetation Structural Diversity and Species Richness are important indicators of WH and of a wetland's ability to withstand disturbances.

Soil Depth to Bedrock

Soil depth to bedrock provides an indication of the DWS function.

Organic Litter

Organic litter provides an indication of the PE function.

Wetland Hydrology

Wetland hydrology, its source and the manner in which it is expressed indicates how well a wetland may perform certain functions. Hydrological patterns and the particular wetland functions which they serve include:

- Groundwater Discharge (DWS, NPR, PE)
- Seasonal Inundation (NPR, DWS, PE, FFA)
- Overbank Flooding (NPR, FFA)
- Side Channel Flows (FFA)
- Drainage Patterns Feeding Outlet Stream (PE)
- Surface Inflows (DWS, NPR)
- Tributaries Not Connected to the Main Channel (DWS, FFA, NPR)
- Tributary Inflow at Confluence (FFA, NPR)
- Bank Erosion (SSSC)
- Upstream Source of Pollutants (NPR)

Human Land Use within 300 feet

Human land use within 300 feet of a wetland affects the ability of a plant community to provide habitat for wildlife and is thus an indicator for WH.

Direct Observation of Wildlife

Direct observation of wildlife or evidence of their presence such as beaver ponds, animal tracks, or pellet piles is an indicator for WH.

Western Bionomics LLC
Natural Resource Management Services

Wetland Functions & Values

Field Data Sheet

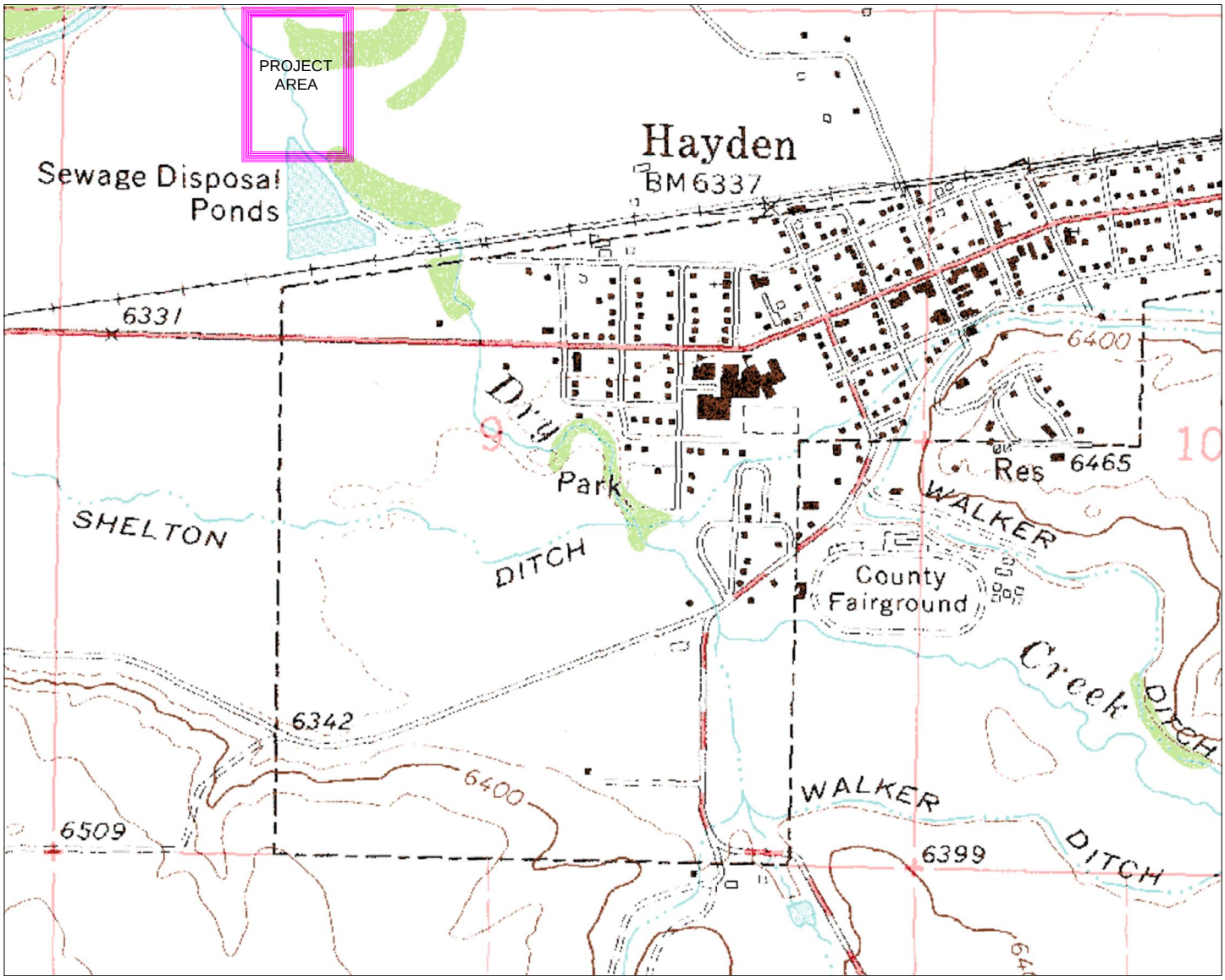
12/13/2011

Project Name: Hayden Wastewater Outfall **Evaluator:** Colfer

Wetland Area Identification: All **Type of Wetland:** Emergent Herbaceous

Function/ Value	Indicators	Rating Criteria	Degree Present	Rating
Dynamic Water Storage (DWS)	Microtopography	Hummocky	6	**5**
		Large Woody Debris (LWD)	2	
	Vegetation	Density / % Cover	6	
	Soils	Depth	6	
	Surface In-Flow	Present	4	
Flood Flow Attenuation (FFA)	Overbank Flow (OBF)	Wetland Receives OBF @ <1.5 x Bankfull Depth?	3	**4**
	Wetland Width	Width:Bankfull Width >2?	6	
	Microtopography	Hummocky	6	
		LWD	2	
	Vegetation	Density / % Cover	6	
	Tributary Inflow	Connected to Main Channel?	3	
		Receive OBF > 3 CFS?	3	
Production Export/Aquatic Food Chain Support (PE/AFS)	Vegetation	Density	6	**5**
	Drainage	Into Adjoining Stream/Pond	6	
	OBF	Evidence?	3	
	Organic Litter	Present?	6	
Nutrient & Pollutant Removal (NPR)	Microtopography	Hummocky	6	**4**
		LWD	2	
	Macrotopography	Closed Depressions	4	
		Restricted Outlet	3	
	Microbial Activity	Surface Leaf Litter, Humus	6	
	Vegetation	Density / % Cover	6	
	Soils	Histosols?	0	
		Texture / Clay Content	5	
	OBF	Evidence?	3	
	Subsurface Inundation	Evidence?	6	
Shoreline Stabilization/Sediment Retention (SS)	Stream Bank Rooted Vegetation	% Cover Below Bankfull Elevation	3	**3**
Wildlife Habitat (WH)	Plant Community	Species Diversity > 3?	1	**3**
		Structural Diversity	1	
	Direct Observation	Species Observed	2	
	Adjacent Land Use	Proximity >300= ?	6	
	Open Water	Present?	3	
	Travel Corridor	Used As?	3	
Overall Functional Rating				**4**

Numerical Rating System: 0 = None / NA 1 = Very Low 2 = Low 3 = Moderate 4 = Moderately High 5 = High 6 = Very High



Horizontal Scale

1000' 0 500' 1000' 2000'

1" = 1000'

N

HAYDEN WASTEWATER PLANT OUTFALL PIPE

VICINITY MAP

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Natural Resource Management Services
31040 WILLOW LANE STEAMBOAT SPRINGS, CO 80487 970-846-8223

Date: Drawn:

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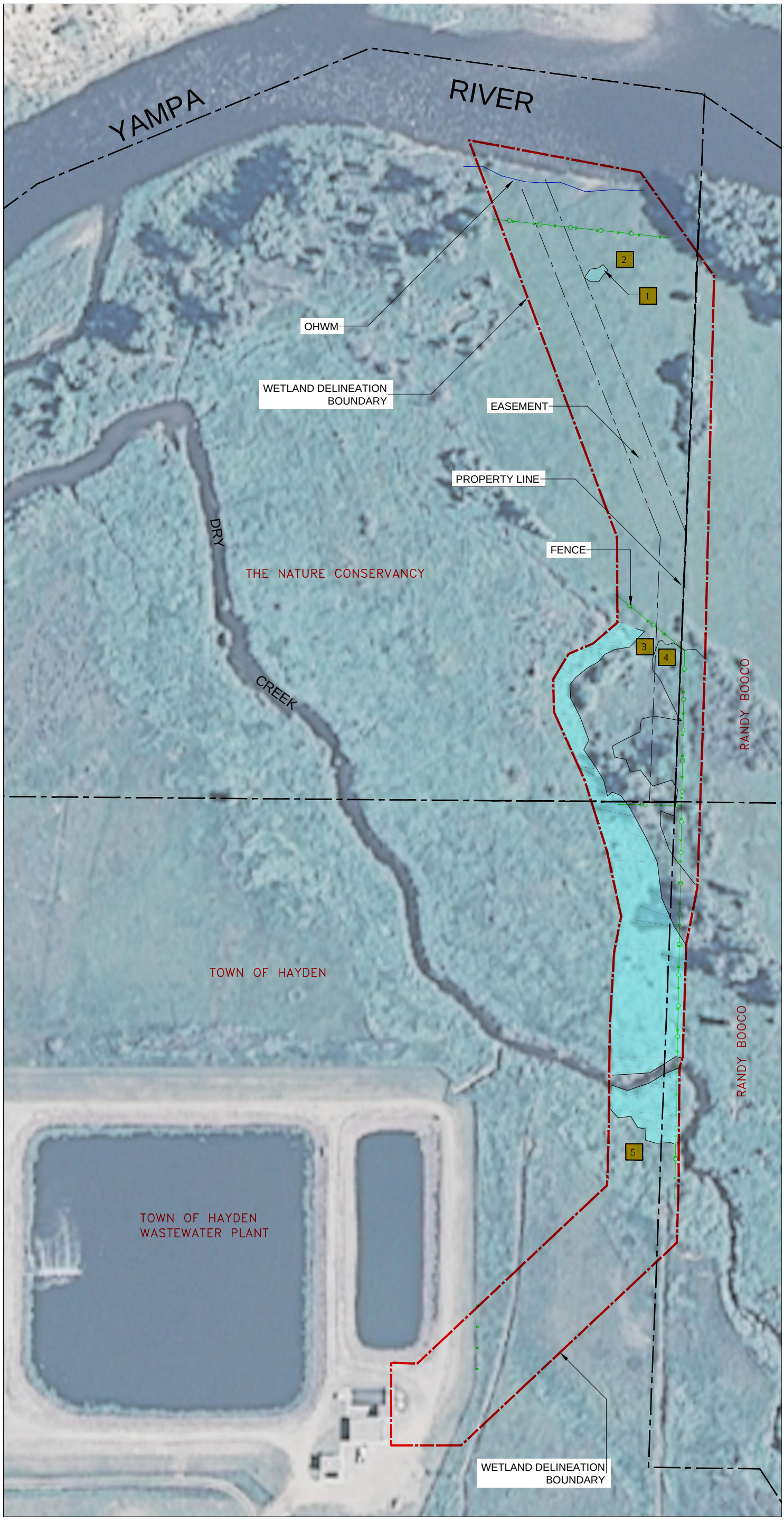

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HORIZONTAL SCALE

0 60' 120' 240'

1" = 120'

WETLAND

2 WETLAND SAMPLE POINT

HAYDEN WASTEWATER PLANT
OUTFALL PIPE

JURISDICTIONAL WETLAND DELINEATION

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Date: 02/15/2012 | Drawn: KSC | Delineated:

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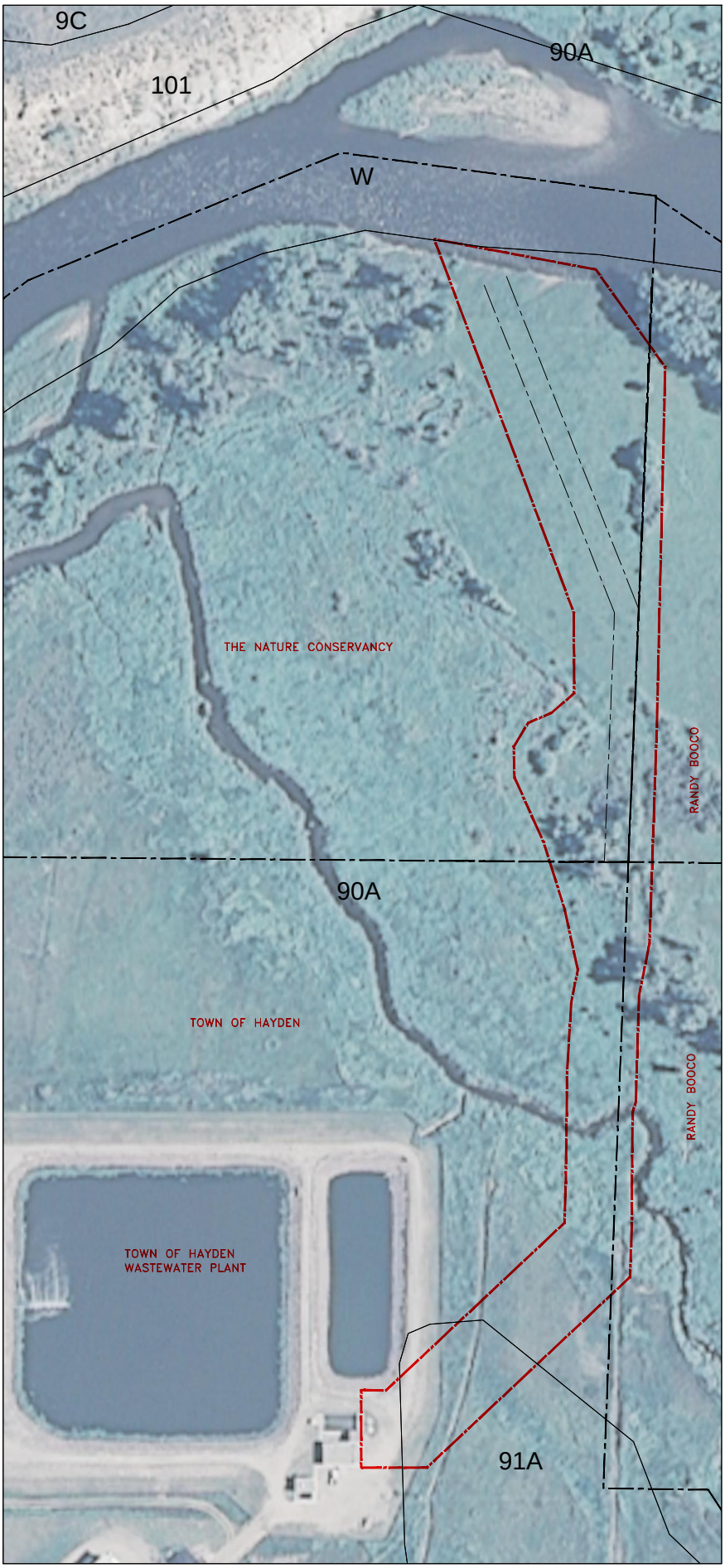

HORIZONTAL SCALE

1" = 120'

HAYDEN WASTEWATER PLANT
OUTFALL PIPE

NRCS SOIL MAP

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