

DRAFT REPORT  
FOR AN ACT 537  
WASTEWATER FACILITIES  
SPECIAL STUDY

EAST HANOVER TOWNSHIP  
DAUPHIN COUNTY  
PENNSYLVANIA

Updated: August 2021

PREPARED FOR:  
East Hanover Township Municipal Authority  
8848 Jonestown Road  
Grantville, PA 17028

PREPARED BY:  
Glance Associates, Inc.  
Consulting Engineers  
3705 Trindle Road  
Camp Hill, PA 17011  
Phone: 717-731-1579



EAST HANOVER TOWNSHIP MUNICIPAL AUTHORITY  
WASTEWATER FACILITIES SPECIAL STUDY  
FOR THE 2020 SERVICE AREA  
AUGUST 2021 –Draft

SPECIAL STUDY

Introduction/Background

Glance Associates, Inc. was authorized on June 9, 2020, to prepare a Special Study to serve as an update to East Hanover Township’s Official Wastewater Facilities Plan (known as an Act 537 Plan) for an area identified as the 2020 Service Area (Manada Oaks) or Area 4F as cited in the 2011 Wastewater Facilities Plan. See attached Project Location Map prepared by GHD.

In September 2011, DEP approved the Township’s Act 537 Plan prepared by LTL Consultants, Ltd. Included in that Plan was this area referred to as the Manada Oaks area. The schedule to install public sewers in this area showed that the construction bids were to be received in **April 2020** with construction completed by **April 2021**. In 2018, the Authority authorized GHD Engineers to prepare 60% Drawings to meet the target date of receiving bids by April 2020. GHD completed the preliminary design phase and prepared an Opinion of Costs. See Attachment 1. However, the costs were well in excess of costs anticipated by the Authority and Township. The Authority subsequently reached out to Glance Associates, Inc. for a second opinion on the construction and projected-related costs. Per an agreement dated **May 2, 2019**, Glance Associates, Inc. provided a second independent review of the Opinion of Costs prepared by GHD for the public wastewater collection system to serve the 2020 Service Area. See Attachment 2. Glance’s letter report dated June 10, 2019, affirmed GHD’s initial opinion of costs of \$16,768,000 for installation of public sewers in this area.

It was found that the Opinion of Costs of project costs prepared by GHD in the amount of \$16,768,000.00 was within the expected range for the defined scope of work in 2019. Updating the previously selected project costs to August 2021 using the ENR Index, the anticipated construction cost is now estimated at \$16,606,00 and project costs at \$18,612,480. In 2019, the initial capital costs of strictly the collection system was estimated at approximately \$90,000.00 per dwelling, well over any Environmental Protection Agency maximum threshold affordability guidelines. See Attachment 3. This cost does not include any capital, operating or debt service related to any treatment plant capacity usage which utilize the EPA affordability guidelines as a basis for determining interest rates for loans and possibly grant funds.

Therefore, for this project using a 20-year 1% loan through Pennvest for project costs of the collection system above is  $\$4.60/\$1,000$  per month x 12 months x  $\$18,612.50 = \$1,027,410$  annual payments ÷ 165 customers = \$6,227 in debt service only per EDU annually or \$519 per

month per EDU. Tacking on \$40 per month for annual payments to account for the capital costs for the wastewater treatment capacity value and adding on \$40 per month for O&M costs, the EDU charge would be approximately \$600 per month or \$7,200 per year. This is greater than the 1 to 2% of the service area median household income, which is the range found in most funding agency affordability guidelines. The median household income of East Hanover Township in 2019 was estimated at \$77,397.00. Taking 1 to 2% of that figure calculates to be \$774 to \$1,548 per year that is in the affordability range for annual wastewater fees. The estimated \$7,200 per year cost per EDU under the previously selected collection system alternative is 4.5 times the affordability guideline published by EPA.

This is also well beyond the affordability threshold in accordance with Pennvest and USDA-Rural Utility Services guidelines which essentially utilize the EPA affordability guidelines as a basis for determining agency loan rates and possible grants to offset projects with projected high user fees. As such, the Authority and Township desired to explore other possible options to reduce the overall costs for sewer customers in the Township. The existing and potential customers are primarily residential. Glace Associates, in conjunction with Township and Authority representatives, identified potential alternatives, which could result in a less costly project. However, environmental, planning and intergovernmental concerns or roadblocks were identified which likely are not advantageous to pursuing alternatives that may be only slightly more affordable than the current system that had previously been submitted by the Township to DEP. Permit approval for the previous selected 2011 alternative for this area was issued by DEP on December 18, 2019, for the construction of the sewer extension including four required pumping stations. The evaluated alternatives, while a few million dollars less overall, still have a price tag in excess of any maximum threshold for collection system costs per user.

#### Excess Cost Basis

The primary reasons for the high costs to provide public sewer in the Manada Oaks area can be attributed to the following conditions:

1. The project topography consists of rolling terrain with multiple sub-drainage areas that are not conducive to the installation of gravity sewer main construction.
2. Most of the lots are large and spread out, thus adding additional footage and resultant higher cost per potential customer.
3. The topography requires four pumping stations to convey the sewage which, for approximately 165 existing potential customers, is a significant investment.
4. Crossing the 4 lanes of Route 22 with a deep boring gravity sewer adds expense.
5. Three stream crossings add to the expense.
6. Installing 14,125 L.F. of force main from proposed Pump Station No. 9 on Crooked Hill Road to the treatment plant with no additional customers adds a considerable investment to sewer approximately 165 existing customers and five vacant lots. Just for the force main construction, this amounts to slightly over \$19,200 (August 2021 indexed costs) per EDU,

which by itself is above the upper range of affordable construction dollars per EDU for a collection system (Attachments 3), let alone the gravity collection portion, pump stations, and the treatment plant capital expenses though having an inherent monetary value, even though it is a sunk cost.

This length of force main with few customers presents an operations issue for the operators as the wastewater will be septic and more difficult and costly to treat at the plant. Odors are inherent to this type of condition which adds to costly equipment to treat the odors and likely odor complaints around any pump stations, air release valves and at the treatment plant.

Armed with these “opinions of anticipated project costs,” the Authority Board in consultation with Township staff authorized Glace Associates to proceed with a preliminary evaluation of several cost-saving potential alternatives.

Glace reviewed several new or updated alternatives identified below. Alternatives 1 and 4 from the Township’s 2011 Act 537 Plan were rejected as not being feasible for multiple reasons and thus not worth the added effort to update those costs. The cost alternatives considered within this Special Study include the following (see Table 1 for a comparison of the various alternatives).

- 1) Alternative 2- Connect to South Hanover Collection System along Manada Creek with Treatment at Derry Township
- 2) Alternative 3- Connect to South Hanover Collection System Via Sand Beach Road with Treatment at Derry Township
- 3) Alternative 5-Single Force Main Heading West to West Hanover Township Pump Station with Treatment at West Hanover WWTP
- 4) Alternative 6-Force Main Heading East Along Route 22 to Existing EHTMA Collection and Treatment System
- 5) Alternative 7-Single Force Main Heading East to Sand Beach Road with Treatment at EHTMA WWTP
- 6) Alternative 8-Single Force Main Heading North on Crawford and East on Meadow to Pheasant Road Pump Station with Treatment at EHTMA WWTP
- 7) Alternative 9-Construction of a Package WWTP with Discharge to Manada Creek off Crooked Hill Road
- 8) Alternatives 10 A & B-Construction of a Package WWTP with Discharge to Manada Creek off Carlson Road

9) Alternative 11-Continue with an On-Lot Management Program with Possible Enhancements

10) Alternative 12 – Grinder Pumps with Low-Pressure Sewer System Mains with 5 Sub-Options

### Discussion

The other options in the 2011 adopted Act 537 Plan were discounted for various reasons such as lack of intermunicipal agreements, capacity and technical issues, in addition to higher overall project costs. Other options were evaluated between 2019 and 2021, but they were also discounted for similar reasons. Under this Special Plan update, Alternative 12 with five new sub-options of a low-pressure sewer system were evaluated in addition to updating the costs of the previously evaluated alternatives. (See attached updated Project Location Map for the LPSS options).

A review of the 2020 service area (Alternative 4F within the 2011 Act 537 Plan) showed that there were 183 tracts with specific Dauphin County assigned Property Identification Numbers (PINs). Of these, 4 residences have combined 2 lots, which reduces the number of residences to 179. Of these, 17 or slightly less than 10% of the residential lots are less than one acre in size. Seven of these 17 lots are greater than 0.9 acres in size. The remaining 162 lots are one acre or larger in size. Only 2 lots are less than a half-acre in size. There is judged to be a fair distance between most of the wastewater on-lot disposal systems and the private wells on the lots. The entire evaluated Special Study area uses private wells as water supplies for their homes.

Less than 20 properties are located in the 100-year flood plain but virtually all the homes are constructed above the 100-year base flood elevation. Based on field observations and available mapping, very few on-lot disposal systems are located in the 100-year flood plain. All of these properties in this Special Study area are located in the Manada Run drainage area.

The Township SEO, Len Spencer, was contacted by Glace Associates, Inc. regarding any on-lot malfunction of septic systems in this potential public sewer service system area that he was notified of and for which he issued repair permits. Over the past 6 years, there were only 2 septic system repair permits issued as follow:

155 South Mill Road – Septic Tank Replacement

238 North Mill Road – Building Sewer Line Replacement

The number of permits issued for repair are less than 2% of the septic systems in the service area. In addition, both of these repairs were for physical facilities and not saturated or non-percolating soils in drainage fields. This does not indicate a prevalence of on-lot septic system malfunctions in this area by any metric.

Historically, from the 2011 Act 537 Plan, SEO documented malfunctions in this area from 2003 to 2009 had only 2 cases. Both required that sand mounds be installed. These 2 properties have not had any repeat malfunctions reported. Again, this demonstrates that this area has only a few issues. The 2 septic system repairs were as follow:

149 Red Fox Road – surface malfunction – replaced with sand mound  
406 Crooked Hill Road – surface malfunction – replaced with sand mound

The area used to be primarily agricultural. Between fertilizers and primarily chicken manure being applied, the groundwater in the area had elevated nitrate levels. With the area mostly residential and with likely a lower nitrogen loading from the on-lot septic disposal systems than from the application of fertilizers, the nitrate levels in the local groundwater should improve over time. The Township/Authority may want to monitor these levels on a periodic basis to try to identify a trend in nitrate levels in the groundwater. In cases where the levels are high, there are processes which can be installed on an individual basis to treat the well water and/or the wastewater prior to discharge to a disposal system. This would still be considerably less expensive than a centralized public wastewater collection and treatment system.

The underlying soils in this Special Study area are limited in suitability for on-lot septic systems. (See a summary of the soils in the Special Study area on Table 2). As a result of these soil conditions, the majority of homes in the area have sand mound systems installed to handle the wastewater needs of the individual homes. Many of the homes were constructed after 1972, which is when the Department of Environmental Resources now known as the Department of Environmental Protection started standardizing on-lot permits and having trained sewage enforcement officials in each municipality review the soil conditions, proposed designs and inspection of the installation of the on-lot wastewater facilities. With on-going maintenance and proper care of items disposed of into the wastewater system, these facilities can operate properly for decades without any more maintenance than routine pump out of the septic tanks and occasional replacement of dose pumps. The Township currently has an On-Lot Management Ordinance which was developed to ensure that at a minimum the septic tanks are emptied of solids thus the solids overflow into the drain field or sand mound is minimized. The Township requires an on-lot pump out and inspection of all these on-lot septic systems at a minimum of every 3 years. A copy of the current On-Lot Management System is attached as Attachment 4. For this Special Study area, the Township/Authority should consider enhancing the program requirements to increase the longevity and effectiveness of the on-lot systems. If necessary, a typical sand mound can be replaced for \$9,000 to \$15,000 depending on the size of the system, not including the septic tank(s), dosing pump and associated tank, electric service and force main and gravity lines from the building to the septic tank. A new complete sand mound system for a 3-bedroom home typically costs from \$16,200 to \$31,000 (Attachment 5) depending on the depth of underlying suitable soils, size of sand mound, distance from buildings, wells, surface contours and final grading/restoration of the area.

Should a property owner need to replace their sand mound, that cost would be approximately 10 to 15% of the anticipated initial project cost of just the collection portion of installing public sewer mains and laterals in the Special Study area. The Township would incur no costs under this scenario with the exception of the administration of the on-lot septic system maintenance system. Taking into account that the property owner would need to connect from their building to the lateral provided by the Authority and then be charged a tapping fee to cover the collection and treatment components by the Authority, the cost to repair/replace an existing sand mound or install a new sand mound would be a more economical option to pursue.

A spreadsheet displaying the addresses, PINS, acreage, soil type, and slopes has been prepared in Table 2. This shows that the general soil conditions in the Special Study area are not conducive to conventional septic systems unless sand mounds or other acceptable systems are constructed. The majority of the slopes in the area are acceptable for on-lot disposal systems. See the attached overall Soil Map prepared by GHD for the Special Study area.

### Conclusion

As discussed earlier, due to the affordability issue for the previously chosen alternative and preliminary evaluation of other options to provide wastewater service to the Manada Oaks area in the western central portion of East Hanover Township and the proposed and existing changes to the developed areas both in and adjacent to East Hanover Township since the 2011 Act 537 Sewage Facilities Plan, it is Glace's recommendation that the Authority seriously consider evaluating the on-lot management alternative through this Special Study under the auspices of the existing 2011 Act 537 Plan. The Township/Authority met with DEP concerning the existing approved 2011 Act 537 plan for this Special Study area and the Township/Authority have generally met the schedule, and DEP has agreed to a new schedule to further investigate the continuance of the on-lot management program for this Special Study area. Enhancements to the Township's existing on-lot septic management plan could be a combination of the following:

1. Provide homeowner education pamphlet.
2. Hold individual or group meetings with residents and Township approved septic haulers.
3. Periodic testing of the private well water for fecal coliform; total coliform and nitrate.
4. Increase pumping and inspection cycles.
5. If nitrate levels are found to be in excess of 10 mg/l or other designated slightly lower level, the Township could require the installation of a nitrate removal system or a sand mound (if one is not already serving the property).
6. Install screens and grease traps in septic tank influent line.
7. The Township or Authority could establish a revolving fund to loan monies to homeowners faced with replacing or upgrading their on-lot septic facilities. Pennvest also has a loan program to cover this type of on-lot septic system improvements.

DEP has provided ample time for the Township/Authority to meet and further evaluate this option, with the final updated Special Study to be submitted to DEP in the first quarter of 2022.

Based on field observations, SEO records over the past 6 years, relatively large lot sizes and soil suitability for septic disposal systems, it is our opinion that the current on-lot management program can be continued and closely monitored by the SEO, Township and Authority. This will ensure that the on-lot systems are not degrading on a large scale to a point where public



sewers may be warranted or required in the future. Given the relatively large lots and low densities, it will be more economical for the property owner to repair, upgrade or in the worst case replace their individual on-lot disposal field than to install public sewers. If there is a trend in malfunctions in the drain fields, the Township/Authority may want to provide some enhancements to the on-lot management program such as the distribution of homeowner education pamphlets, individual and/or group meetings with the homeowners in the Special Study area, increase pumping and inspection cycles, install screens and grease traps and other related efforts. Homeowners should be motivated to address any concerns or prevent unnecessary and premature failure of on-lot septic disposal systems due to the enormous cost of installing a public sewage system.

The Township should consider the option of continued on-lot management of the sewage disposal systems. Adoption of this Special Study by the Board of Supervisors, after required public notifications and hearings, should be approved and the resolution and supporting documents submitted to DEP's planning section for their review and anticipated concurrence with the Study's findings and conclusion to continue with the On-Lot Management Program for this Special Study Area of East Hanover Township.

#### Attachments

Attachment 1 – GHD Project Cost Estimate for Manada Oaks Area

Attachment 2 – Glace 6/10/19 Second Opinion Review Letter Report

Attachment 3 – EPA Proposed 2020 Financial Capability Assessment Guidance, September 2020

Attachment 4 – EHT Current On-Lot Management System Ordinance

Attachment 5 – Typical Costs of On-Lot Systems

Attachment 6 – Maps of Alternatives

#### Tables

Table 1 – Comparison of Various Alternatives

Table 2 – Listing of Properties in Special Study Area

Table 3 – Opinion of Construction & Project Related Costs Indexed as of August 2021



## ATTACHMENT 1

### GHD PROJECT COST ESTIMATE FOR MANADA OAKS AREA MAY 2019

Pipe install and trench restoration	\$7,100,000
Force Main, PS#9 to WWTP	\$2,400,000
Pump Stations	\$1,500,000
Mill and overlay, single lane	\$2,100,000
Spoils	\$500,000
<b>Construction total</b>	<b>\$13,600,000</b>
10% Contingency	\$1,360,000
<b>Construction Subtotal</b>	<b>\$14,960,000</b>
Design Subtotal	\$489,000
Financing	\$180,000
Legal	\$164,000
ROW and Property	\$205,000
RPR Services	\$650,000
Construction Management	\$120,000
<b>Project Total</b>	<b>\$16,768,000</b>



## ATTACHMENT 2

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# GLACE ASSOCIATES, INC.

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CONSULTING ENGINEERS  
3705 Trindle Road  
Camp Hill, PA 17011

717-731-1579 • FAX 717-731-1348

June 10, 2019

File: 7881901

*Via Email: Rick Hoover*

*Rick.Hoover@quality-geophysics.com*

East Hanover Township Municipal Authority  
8848 Jonestown Road  
Grantville, PA 17028

*RE: 2020 Sewer Expansion  
Second Opinion Review*

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Dear Board,

Pursuant to our agreement with the Authority dated May 2, 2019, Glace Associates, Inc. has conducted a review of the proposed 2020 Sewer Expansion which includes the unsewered Manada Oaks section of the Township. As part of the evaluation, we conducted a site observation of the areas to be sewerred, reviewed the proposed location of the sewer lines, the types of lines, depths of lines and other standard conditions of sanitary sewer design.

Additionally, Glace reviewed the opinion of costs for construction of the project, looking at historical costs for similar projects in central Pennsylvania as well as projecting the costs to 2020 based on the current bidding climate.

### Plan Review

Our preliminary findings are as follow:

1. The project topography consists of rolling terrain with multiple sub-drainage areas that are not conducive to the installation of gravity sewer main construction.
2. Most of the lots are large and spread out, thus adding additional footage and resultant cost per potential customer.
3. The topography requires four pumping stations to convey the sewage which, for approximately 170 customers, is quite an investment.
4. Having to cross Route 22 with a deep boring is an added expense.
5. Three stream crossings add to the expense.
6. Installing 14,275 L.F. of force main from Crooked Hill Road to the treatment plant with no additional customers adds a considerable investment for sewerred approximately 165 existing customers and five vacant lots. Just for construction, this amounts to over \$17,300 per EDU which is by itself in the upper range of affordable construction dollars per EDU.

Page 1 of 3

7. The sewer main routes selected by GHD are the optimum ones based on existing underground utilities, minimization of pavement disturbance and overall constructability.
8. Many of the gravity sewer mains are over 15 feet in depth which adds to the capital cost.
9. Substituting grinder pumps and LPSS mains for gravity lines would result in more shallow lines with approximately four feet of cover but will require grinder pumps and longer laterals which would offset much of the potential cost savings of raising the sewer mains. Each installed grinder pump is approximately \$7,500 plus the additional service line up to close to the houses. Additionally, normally the sewer contractor installs the control panel and PVC conduit at a location near the house selected by the property owner. This adds extra yard restoration which often results in call-backs for sunken trenches, reseeding, etc. and produces slightly higher bids.

### **Discussion of Cost**

Glance has checked the approximate quantities of the most critical components of the system. The quantities provided by GHD are close to what Glance had independently calculated. The unit prices connected to the unit quantities were checked against recent historical data and the Engineering News Record (ENR) Construction Cost Index. The unit prices are slightly higher (less than 10%) than recent bids. However, with the bids scheduled to be advertised later this year or early next year, the actual bid prices may be closer to the projected engineer's opinion of construction costs.

There has been a steady increase in construction prices in central Pennsylvania over the past two to three years due in part to some of the factors below:

- Increased utility construction activity due to new development.
- Increase in material and labor costs due to increased demand.
- Less competition among utility contractors due to increased workloads.
- Lack of skilled operators and laborers available to work on projects.
- Backlog of work due to the wet weather conditions of the past 18 months.
- Increased minimum prevailing wage requirements for public works projects.

That given, if the \$16,768,000 engineer's opinion of project costs is close to the bids received, the per EDU for the project's 165 EDUs would be \$101,624 per customer which is well beyond the upper range of affordability for just the collection cost, let alone adding on the treatment portion of the project costs. Using up treatment capacity, even if the new users are not paying for it in their tapping fees, is still a cost to the remaining sewer customers.

Even taking out \$2,100,000 for mill and overlay will result in a \$14,668,000 project or almost \$88,900 per EDU.

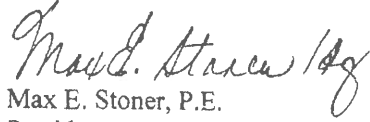
Switching to all grinder pumps and LPSS saves some money but not nearly enough to reduce the project cost significantly enough to meet affordability for the new customers or to be absorbed by the existing customers.

Besides the local share grants from the Hollywood Casino through Dauphin County, based on the homes in the Manada Oaks potential service area, grants would likely not be available and the anticipated collection system cost would far exceed the Pennvest and USDA RUS funding maximum thresholds.

I look forward to meeting with the Board on June 11<sup>th</sup> to discuss our review of the project in more detail.

Sincerely,

GLACE ASSOCIATES, INC.



Max E. Stoner, P.E.  
President

MES/dmg

Cc: East Hanover Township, Paul Cornell, Manager (Via email - [twpmanager@ehtdcpa.org](mailto:twpmanager@ehtdcpa.org))





## ATTACHMENT 3

United States  
Environmental Protection  
Agency

Office of Water  
Washington, DC 20460

EPA-HQ-OW-2020-0426  
September 2020



# Proposed 2020 Financial Capability Assessment Guidance

September 2020

The community or EPA would evaluate the financial burden of CWA costs for LQI households in its service area by preparing a table to determine the Cost Per Lowest Quintile Household as a Percent of the Upper Boundary of the LQI. The proposed steps for performing this calculation are described below. This analysis, based on easily acquired Census data, is consistent with and builds off the structure of the Residential Indicator analysis. Exhibit 1 provides a proposed template and a sample calculation that computes the Cost per Household (CPH) and as a percentage of LQI.

**Exhibit 1: Template (with Sample Numbers) for Calculation of Lowest Quintile Residential Indicator**

<b>Calculation of Lowest Quintile Residential Indicator</b>			
1	Ratio of Lowest Quintile HH Size to Median HH Size	70.2% (unless superseded by local information)	2018 value for United States based on U.S. Census Bureau Current Population Survey data
2	Cost for Median Household	\$860	Line 109 from FCA Residential Indicator Analysis
3	Cost for Lowest Quintile Household	\$604	Line 1 * Line 2
4	Upper Limit of Lowest Income Quintile for Service Area	\$28,500	5-Yr ACS value for upper boundary of lowest quintile of household income in service area
5	Cost as Percentage of Low-Income Household	2.1%	(Line 3 / Line 4) * 100
6	LQRI Impact Rating	High Impact	Based on Line 5 result, select from below impacts.
<b>Lowest Quintile Residential Indicator Benchmarks</b>			
	Low Impact	Less than 1.0%	
	Mid-Range Impact	1.0% to 2.0%	
	High Impact	Above 2.0%	

ATTACHMENT 4

# Official Zoning Ordinance

## East Hanover Township Dauphin County, PA

**Enacted: April 1, 2003**

*RothPlan*

Harry B. Roth, AICP  
Community Planning Consultant  
22E East Roseville Road  
Lancaster, PA 17601  
Phone - (717) 560-2383  
Fax - (717) 560-3709  
Email - rothplan@dejazzd.com



2. All applications shall be reviewed, and permits issued, by the Zoning Officer. No sign permit shall be issued, except in conformity with the regulations of this Ordinance, except upon order of the Zoning Hearing Board, granted pursuant to the procedures established for the issuance of a variance;
3. Permit Issuance - Following permit application approval, a sign permit will be issued by the Zoning Officer upon receipt of all required fees;
4. If there is any change in location or dimensions of any sign, or in advertising or informative contents of a sign, a new permit shall be required; and,
5. Revocation of Permits:
  - A. All permits shall be subject to revocation upon fifteen (15) days written notice for violation of any provision or upon change of information provided in the application; and,
  - B. Revocation of a permit shall not be cause for refund of the permit fee.

## Section 315 Roadway Classifications

For the purposes of this Ordinance, the Township's roads shall be classified in the following categories:

Arterial Roads	Collector and Local Collector Roads		Local Roads
Interstate 81 Allentown Boulevard Laudermilch Road Manada Bottom Road Manada Gap Road Mountain Road Sandbeach Road	Bow Creek Road Canal Road Carlson Road Cliff Road Colt Drive County Line Road Crawford Road Crooked Hill Road Devonshire Heights Road Douglas Road Dry Run Road Early's Mill Road Faith Road Firehouse Road	High Drive Jonestown Road Level Road Meadow Lane Mill Road Moyer Drive Pheasant Road Pine Road Rabbit Lane Ridge Road Shady Lane Shell's Church Road Station Road Trail Road	All roads not listed as arterials or collectors.

## Section 316 Zoning Requirements for Use of On-Lot Sewage Disposal Systems

- 316.1. Except for those nonconforming lots described in Section 507.1. of this Ordinance, as of the effective date of this Ordinance, all future uses that rely upon on-lot sewage disposal systems shall be required to specifically test for and secure one disposal site (field, bed, or trench) and replacement area. Both disposal sites shall be approved by the Sewage Enforcement Officer. Furthermore, the alternate disposal site shall be perpetually protected from excavation, construction, and other activities that would result in disturbance of the soils' ability to renovate sewage effluent, until such time as the alternate field is activated due to malfunction of the initial disposal site;

- 316.2. Regardless of any maximum lot area requirements listed elsewhere in this Ordinance, the minimum required lot size may be increased to insure an acceptable level of nitrate-nitrogen in the adjoining groundwaters. Such determinations will be made by the PA DEP, through its sewer module review process. In those cases where applicable maximum lot area requirements are exceeded to protect groundwater quality, the applicant shall furnish evidence that the amount of land needed to protect local groundwater is the minimum necessary for such protection;
- 316.3. Every use relying upon on-lot sewage disposal systems shall be required to properly maintain and repair such systems, in accordance with the East Hanover Township On-Lot Disposal System Management Program; and,
- 316.4. Every use relying upon an on-lot sewage disposal system shall be required to comply with the Pennsylvania Sewage Facilities Act 537, as may be amended.

### **Section 317 Permanent/Temporary Occupancy Requirements**

No persons or family shall be permitted to permanently reside within any tent, travel trailer, bus, boat, camper, or motor home. However, temporary occupancy of a tent, travel trailer, camper, or motor home shall be permitted within an approved campground or for periods of up to fifteen (15) days in any calendar year on the property of a friend or relative.

### **Section 318 Operations and Performance Standards**

All uses proposed within East Hanover Township shall operate in compliance with applicable State and Federal regulations, as they are periodically amended. The following lists known governmental regulations associated with various land use impacts or specific requirements imposed by this Ordinance. This list in no way excludes or limits Federal or State jurisdiction over uses within the Township, but is merely provided for information to applicants and landowners.

- 318.1. **Noise** - Except for agricultural, horticultural and forestry uses, no use shall as a matter of normal operations regularly generate exterior noise levels in excess of those listed in the following table:

<b>Measurement Taken Along An Adjoining Property Within the Following Districts</b>	<b>Time Period</b>	<b>Maximum Permitted Noise Level</b>
C, RA, RMD, VR, MHP, and VO	7 a.m. to 10 p.m.	50 dBA
C, RA, RMD, VR, MHP, and VO	10 p.m. to 7 a.m.	45 dBA
HC, IC, and CR	7 a.m. to 10 p.m.	60 dBA
HC, IC and CR	10 a.m. to 7 a.m.	55 dBA
I	Anytime	70 dBA

Should the ambient noise level at any location exceed the above standards, that ambient noise level shall become the maximum permitted noise level at that location. The maximum permitted noise level shall be applied to regularly-occurring uses and activities; short-term temporary noises and infrequent instantaneous noises may be permitted at noise levels 20 dBA higher than the above-described standards, but only between 7 a.m. and 10 p.m.;

# ATTACHMENT 5

Septic Systems Costs & Prices - ProMatcher Cost Report

## ProMatcher | Septic Systems

[Septic Systems](#) [ProMatcher](#) [Directory](#) [Cost Report](#)

### Septic Systems Costs & Prices - ProMatcher Cost Report

Find Costs & Prices: 17112

#### Septic Systems Costs & Prices

We have collected data nationwide to help calculate the average cost of septic systems in the US. The following are average costs and prices reported back to us:

##### Cost of Septic System Installation

\$6,700.00 fixed fee for drain field replacement  
(Range: \$3,700.00 - \$9,700.00)

✓ \$23,600.00 fixed fee for engineered septic system (3-bedroom house) (Range: \$16,200.00 - \$31,000.00)

\$7,957.87 fixed fee for new conventional system (3-bedroom house) (Range: \$7,243.04 - \$8,672.69)

\$830.69 fixed fee for septic perc test  
(Range: \$570.91 - \$1,090.47)

\$5,379.17 for septic tank replacement (1,000-gallon concrete tank) (Range: \$4,083.33 - \$6,675.00)

[Free Estimates from Local Pros](#)

##### Cost of Septic System Repair

\$130.00 per hour (plus materials)  
(Range: \$100.00 - \$160.00)

[Free Estimates from Local Pros](#)

##### Cost of Septic Tank Cleaning or Pumping

\$291.95 fixed fee for 1,000 gallon tank  
(Range: \$267.95 - \$315.94)

\$469.17 fixed fee for 1,500 gallon tank  
(Range: \$366.67 - \$571.67)

\$531.67 fixed fee for 2,000 gallon tank  
(Range: \$430.00 - \$633.33)

\$0.25 per gallon (Range: \$0.22 - \$0.28)

[Free Estimates from Local Pros](#)

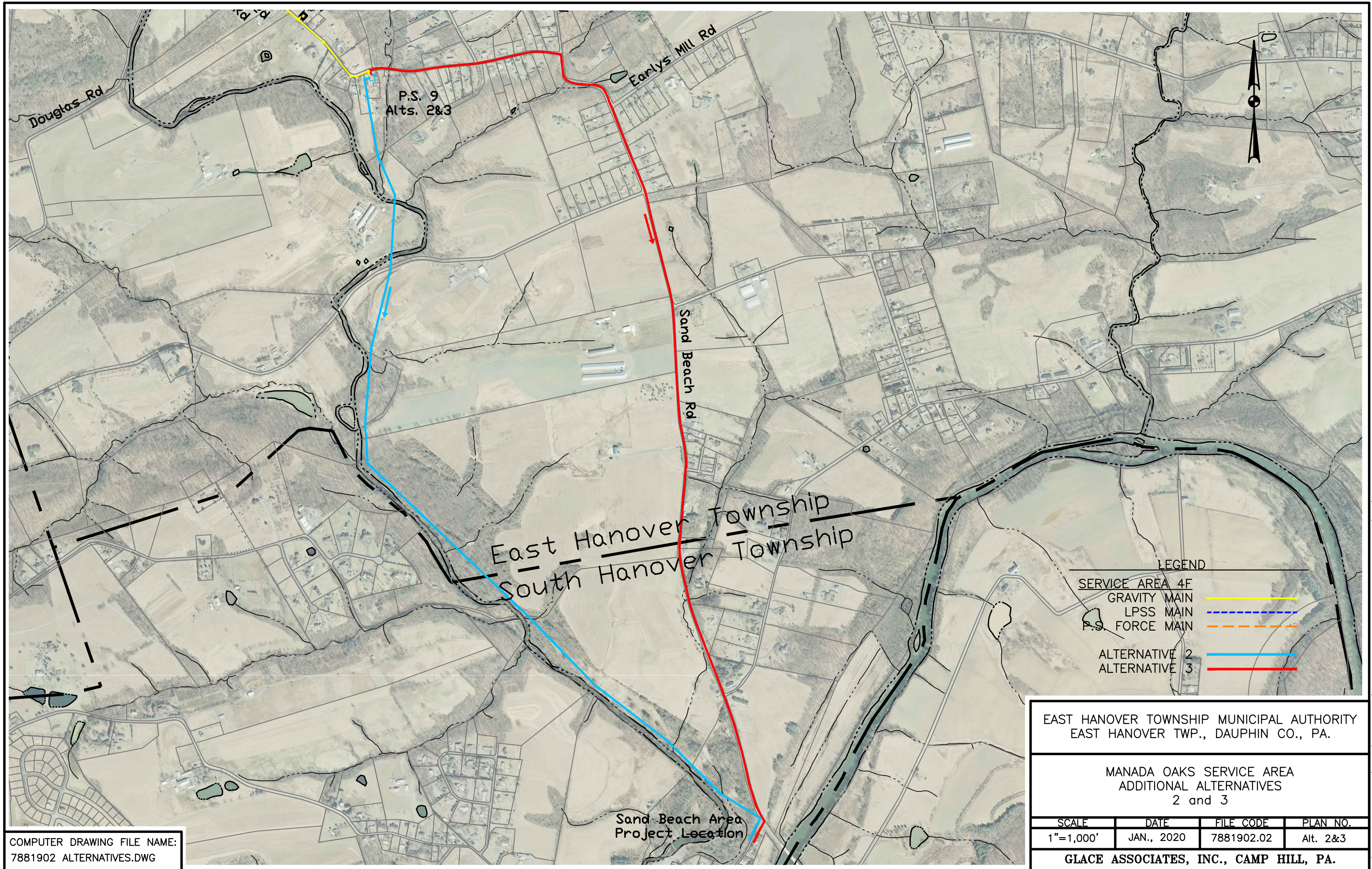
### Get Matched & Get Quotes From Septic System Contractors

#### Select a Service to Get Started

- [Septic System - Install or Replace](#)
- [Septic System - Repair](#)
- [Septic Tank - Pumping or Cleaning](#)







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7881902 ALTERNATIVES.DWG

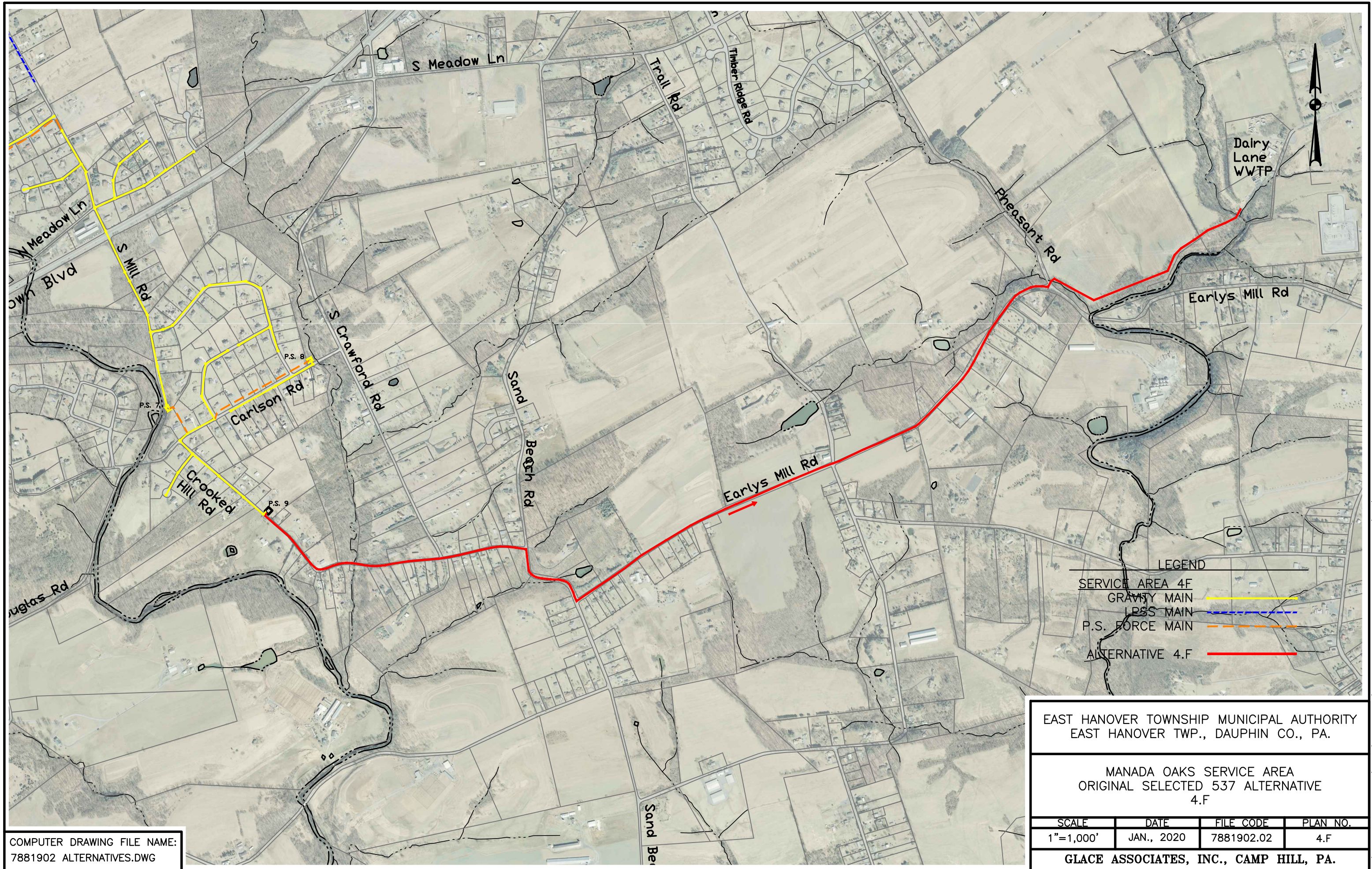
EAST HANOVER TOWNSHIP MUNICIPAL AUTHORITY  
EAST HANOVER TWP., DAUPHIN CO., PA.

MANADA OAKS SERVICE AREA  
ADDITIONAL ALTERNATIVES  
2 and 3

SCALE	DATE	FILE CODE	PLAN NO.
1"=1,000'	JAN., 2020	7881902.02	Alt. 2&3

GLACE ASSOCIATES, INC., CAMP HILL, PA.

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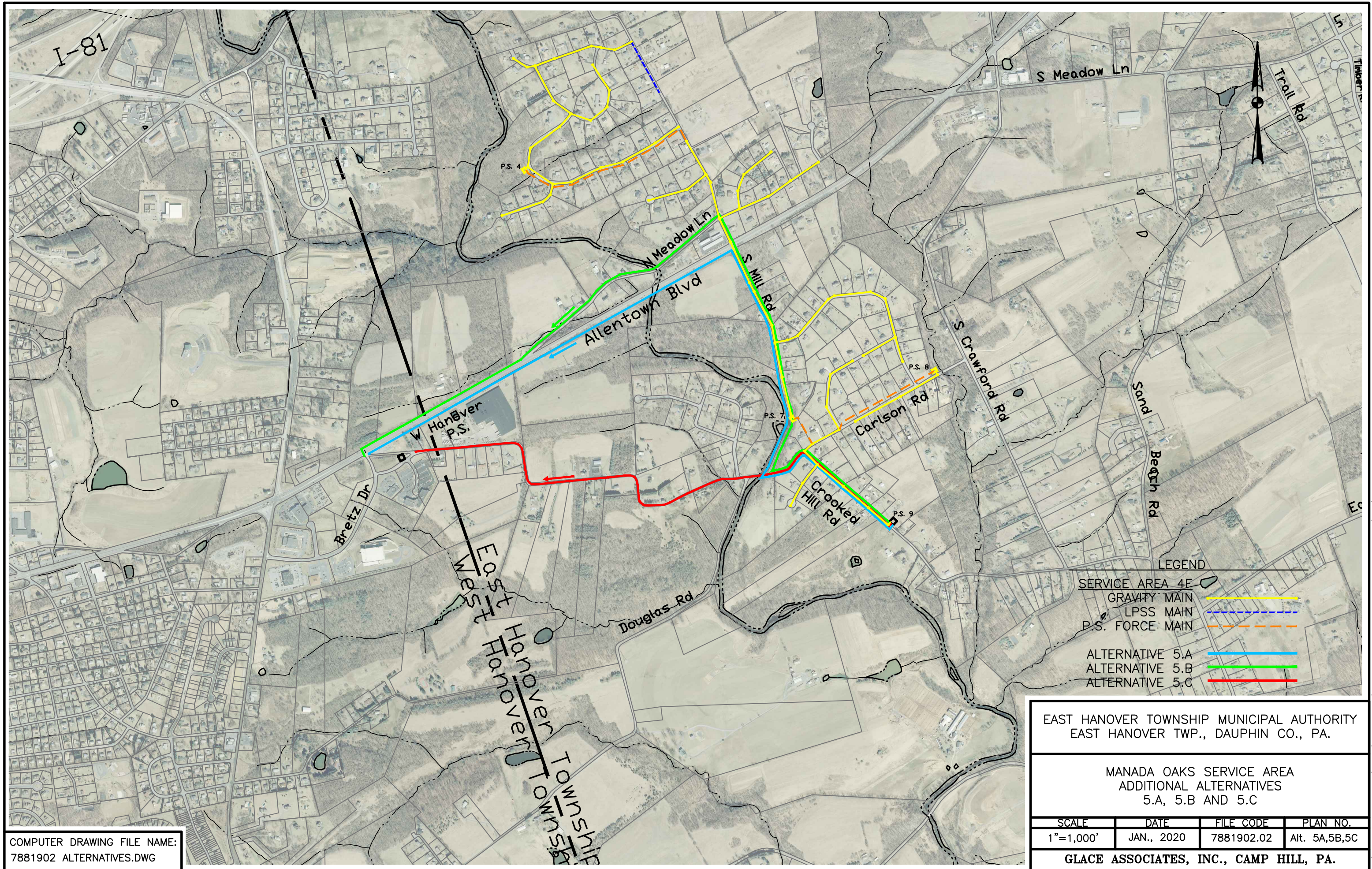
EAST HANOVER TOWNSHIP MUNICIPAL AUTHORITY  
EAST HANOVER TWP., DAUPHIN CO., PA.

MANADA OAKS SERVICE AREA  
ORIGINAL SELECTED 537 ALTERNATIVE  
4.F

SCALE	DATE	FILE CODE	PLAN NO.
1"=1,000'	JAN., 2020	7881902.02	4.F

GLACE ASSOCIATES, INC., CAMP HILL, PA.

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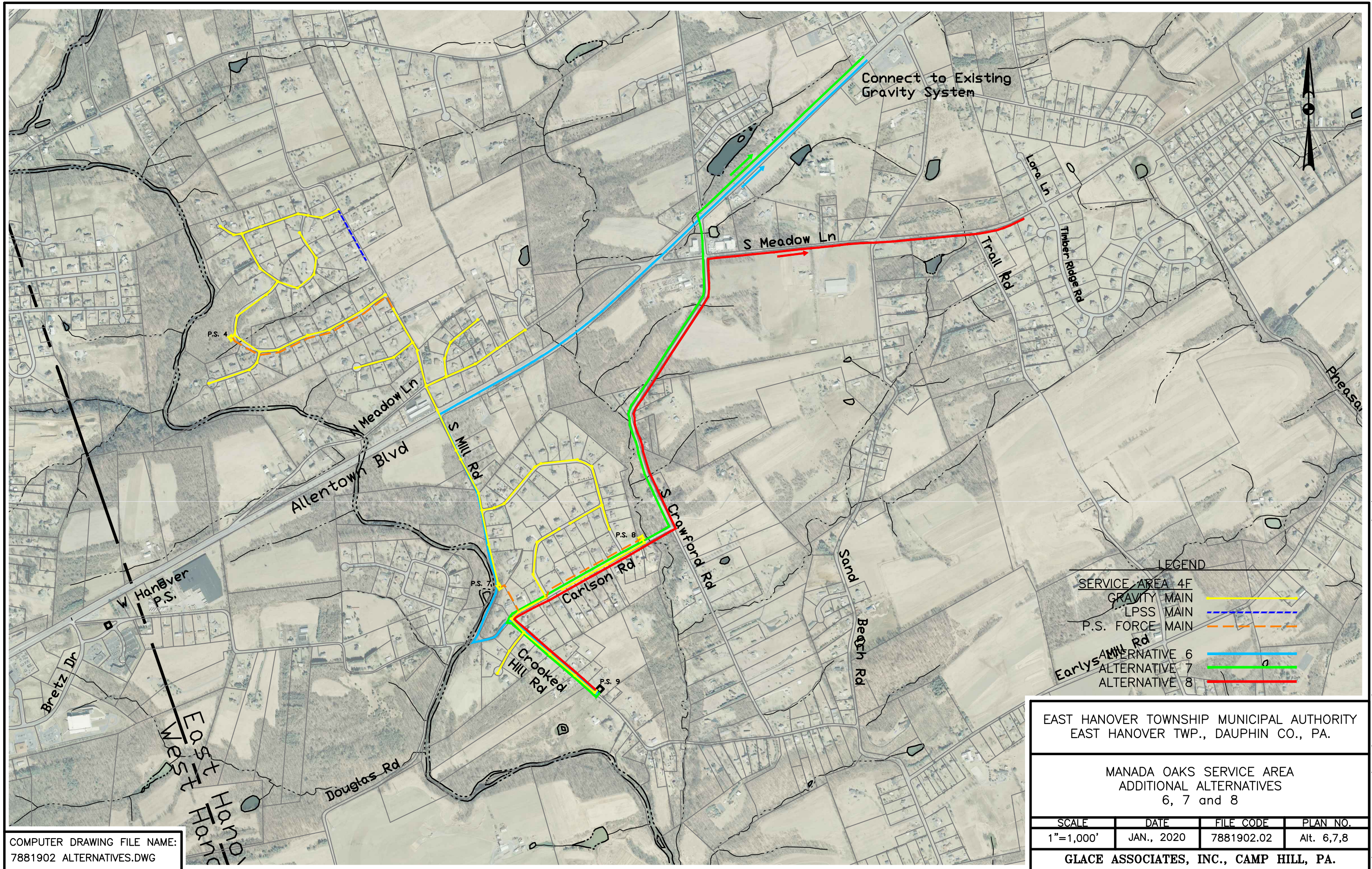
EAST HANOVER TOWNSHIP MUNICIPAL AUTHORITY  
EAST HANOVER TWP., DAUPHIN CO., PA.

MANADA OAKS SERVICE AREA  
ADDITIONAL ALTERNATIVES  
5.A, 5.B AND 5.C

SCALE	DATE	FILE CODE	PLAN NO.
1"=1,000'	JAN., 2020	7881902.02	Alt. 5A,5B,5C

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LEGEND

SERVICE AREA 4F	
GRAVITY MAIN	
LPSS MAIN	
P.S. FORCE MAIN	
ALTERNATIVE 6	
ALTERNATIVE 7	
ALTERNATIVE 8	

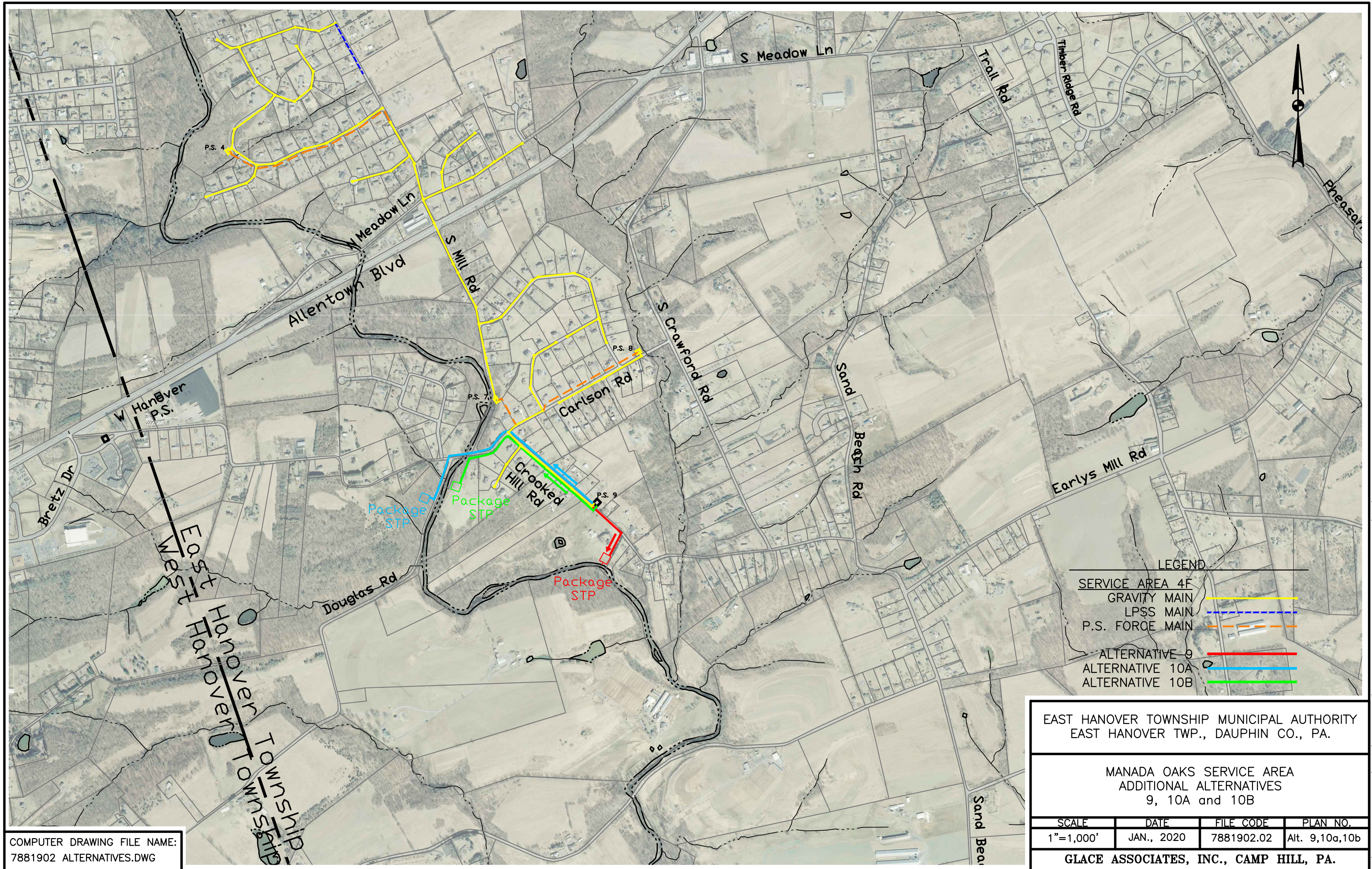
EAST HANOVER TOWNSHIP MUNICIPAL AUTHORITY  
EAST HANOVER TWP., DAUPHIN CO., PA.

MANADA OAKS SERVICE AREA  
ADDITIONAL ALTERNATIVES  
6, 7 and 8

SCALE	DATE	FILE CODE	PLAN NO.
1"=1,000'	JAN., 2020	7881902.02	Alt. 6,7,8
GLACE ASSOCIATES, INC., CAMP HILL, PA.			

COMPUTER DRAWING FILE NAME:  
7881902 ALTERNATIVES.DWG

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LEGEND

SERVICE AREA 4F	
GRAVITY MAIN	Yellow solid line
LPSS MAIN	Blue dashed line
P.S. FORCE MAIN	Orange dashed line
ALTERNATIVE 9	Red solid line
ALTERNATIVE 10A	Light blue solid line
ALTERNATIVE 10B	Green solid line

EAST HANOVER TOWNSHIP MUNICIPAL AUTHORITY  
 EAST HANOVER TWP., DAUPHIN CO., PA.

MANADA OAKS SERVICE AREA  
 ADDITIONAL ALTERNATIVES  
 9, 10A and 10B

SCALE	DATE	FILE CODE	PLAN NO.
1"=1,000'	JAN., 2020	7881902.02	Alt. 9,10a,10b

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COMPUTER DRAWING FILE NAME:  
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TABLE 1  
SEWER AREAS DESIGNATED AS THE MANADA OAKS AREA  
(ALSO REFERRED TO AS AREA 4-F OR 2020 SERVICE AREA)

Alternative	Description	Status
Alternative A.1 & A.2	Sewer areas north of Route 22 only.	Rejected and included as part of Alternative 4-F
Alternative B.1 & B.2	Sewer areas south of Route 22 only.	Rejected and included as part of Alternative 4.F
Alternative 2	Connect to South Hanover Collection System along Manada Creek with treatment at Derry Township.	Rejected – <ul style="list-style-type: none"> <li>• Need to obtain multiple easements from private property owners.</li> <li>• Requires a long force main (over 2 miles long) with no additional customers.</li> <li>• Requires 9 stream crossings.</li> <li>• Need Intermunicipal sewage agreements with South Hanover and Derry Townships and their respective authorities.</li> <li>• More costly than Alt. 4-F as conveyance and treatment capacity would need to be purchased from South Hanover and Derry Townships.</li> </ul>
Alternative 3	Connect to South Hanover Collection System via Sand Beach Road with treatment at Derry Township.	Rejected – <ul style="list-style-type: none"> <li>• Approximately 1,100 more linear feet of force main than Alternative 2.</li> <li>• Construction cost is anticipated to be higher than Alternative 2 due to extensive road restoration.</li> <li>• Very few potential customers along the force main route.</li> <li>• Need Intermunicipal sewage agreements with South Hanover and Derry Townships and their respective authorities.</li> <li>• More costly than Alt. 4-F as conveyance and treatment capacity would need to be purchased from South Hanover and Derry Townships.</li> </ul>

Alternative 4F	Combined Manada Oaks area with 4 pump stations and force main to the EHTMA Dairy Lane WWTP.	<p>Rejected –</p> <ul style="list-style-type: none"> <li>• Costs are more excessive than Alternative 11.</li> <li>• Crossing of Route 22 is costly.</li> <li>• Force main is almost 3 miles long.</li> <li>• Wastewater will be septic by the time it reaches the plant and will require odor treatment as well as extensive water treatment processes.</li> </ul>
Alternative 5	<p>Single force main heading west to West Hanover Township pump station with treatment at West Hanover WWTP.</p> <ul style="list-style-type: none"> <li>• 5.A Along south side of Route 22</li> <li>• 5.B Along North Meadow Lane and north side of Route 22</li> <li>• 5.C Along Carlson Road</li> </ul>	<p>Rejected –</p> <ul style="list-style-type: none"> <li>• Costs are excessive.</li> <li>• Need to enter into intermunicipal agreement with West Hanover Township and Authority.</li> <li>• Not many new potential customers along the route.</li> </ul>
Alternative 6	Force main heading east along Route 22 to existing EMTMA collection and treatment system.	<p>Rejected –</p> <ul style="list-style-type: none"> <li>• Difficult terrain along south side of Route 22 to install force main off the shoulder.</li> <li>• Expensive installation in shoulder with PennDOT requirement.</li> <li>• No new potential customers along the route.</li> <li>• Flow goes through multiple pump stations.</li> </ul>
Alternative 7	Single force main heading east to Sand Beach Road with treatment of EXITMA WWTP	<p>Rejected –</p> <ul style="list-style-type: none"> <li>• Difficult terrain along south side of Route 22 to install force main off the shoulder.</li> <li>• Expensive installation in shoulder with PennDOT requirement.</li> <li>• No new potential customers along the route.</li> <li>• Flow goes through multiple pump stations.</li> </ul>
Alternative 8	Single force main heading north on Crawford and east on Meadow to Pheasant Road Pump Station with treatment at EHTMA WWTP.	<p>Rejected –</p> <ul style="list-style-type: none"> <li>• No new potential customers along the force main route.</li> <li>• Force main in local streets will require a lot repaving.</li> <li>• Flow goes through multiple pump stations.</li> </ul>

Alternative 9	Construction of a package WWTP Permit Discharge to Manada Creek off Crooked Hill Road.	<p>Rejected –</p> <ul style="list-style-type: none"> <li>• PTR requirements submitted by PA DEP show negligible nutrient budget making stream discharge impractical.</li> <li>• Cost is not justified based on the number of homes served.</li> <li>• Not consistent with the goals of this plan. This option creates an unwanted nutrient source to the Chesapeake Bay and does not utilize existing infrastructure.</li> <li>• Lengthy permitting process.</li> </ul>
Alternative 10	<p>Construction of a package WWTP with Discharge to Manada Creek off Carlson Road.</p> <ul style="list-style-type: none"> <li>• 10.A West side of Manada Creek</li> <li>• 10.B East side of Manada Creek</li> </ul>	<p>Rejected –</p> <ul style="list-style-type: none"> <li>• PTR requirements submitted by PA DEP show negligible nutrient budget making stream discharge impractical.</li> <li>• Cost is not justified based on the number of homes served.</li> <li>• Not consistent with the goals of this plan. This option creates an unwanted nutrient source to the Chesapeake Bay and does not utilize existing infrastructure.</li> <li>• Lengthy permitting process.</li> </ul>
Alternative 11	Continue with an On-Lot Management with possible enhancements.	<p>Selected –</p> <ul style="list-style-type: none"> <li>• Only option which is in the affordability range.</li> <li>• Only a handful of on-lot issues since 2003.</li> </ul>



Alternative 12

Grinder pumps with Low-Pressure Sewer System Mains with 5 Sub-Options

- 12.A -Flow to West Hanover pump station on Carlson Road with treatment at West Hanover WWTP.
- 12.B - Flow to South Meadow Lane to tie-in near Timber Ridge Road with treatment at East Hanover WWTP.
- 12.C - Flow to Allentown Boulevard gravity tie-in via South Crawford Road with treatment at East Hanover WWTP.
- 12.D - Flow to Allentown Boulevard gravity tie-in via Allentown Boulevard from South Mill Road with treatment at East Hanover WWTP.
- 12.E - Flow to Crooked Hill Road to new WWTP along Manada Creek.

Rejected –

- Initial capital costs less than previously selected Alternative 4.F, but operation and management costs are higher.
- Require restoration on private properties, which often prompts property owners' complaints.
- Need to cross Route 22.
- Result in odor and treatability issues at pump stations, air release valves and treatment plant.
- Grinder pumps only last approximately 8 to 10 years.
- Unpopular with property owners.

**TABLE 2  
LISTING OF PROPERTIES IN SPECIAL STUDY AREA**

Address	PIN #	Acreeage	Soil Types	Slope
122 Campbell Ct	25-017-154	1.37	BkB2, BkC2	3-8%/8-15%
129 Campbell Ct	25-017-163	0.9	BkB2, BkD2	3-8%/15-25%
140 Campbell Ct	25-017-157	1.06	BkB2, BkD2	3-8%/15-25%
153 Campbell Ct	25-017-162	1.01	BkB2, BkD2	3-8%/15-25%
160 Campbell Ct	25-017-158	1.25	BkB2, BkD2	3-8%/15-25%
166 Campbell Ct	25-017-159	1.86	BkB2, BkD2	3-8%/15-25%
167 Campbell Ct	25-017-161	0.84	BkB2	3-8%
169 Campbell Ct	25-017-160	2.13	BkB2	3-8%
622 Carlson Road	25-020-060	10	BkC2, CoB2	8-15%/3-8%
677 Carlson Road	25-017-116	2.81	WeE2, BkC2	25-40%/8-15%
716 Carlson Road	25-020-117	1.6	BkB2, CoB2	3-8%/3-8%
723 Carlson Road	25-017-206	1.18	BkB2, BkC2	3-8%/8-15%
729 Carlson Road	25-017-205	1.43	WeE2, BkC2, BkB2	25-40%/8-15%/3-8%
735 Carlson Road	25-017-208	1.01	BkB2	3-8%
738 Carlson Road	25-020-116	1.61	BkB2, CoB2	3-8%/3-8%
742 Carlson Road	25-020-079	1.6	BkB2, CoB2, BtB2	3-8%/3-8%/3-8%
747 Carlson Road	25-017-209	1.01	BkB2, BkC2	3-8%/8-15%
752 Carlson Road	25-020-080	1.56	BkB2, CoB2	3-8%/3-8%
755 Carlson Road	25-017-210	1.01	BkB2, BkC2	3-8%/8-15%
763 Carlson Road	25-017-211	1	BkB2, BkC2	3-8%/8-15%
764 Carlson Road	25-020-081	1.55	BkB2, CoB2	3-8%/3-8%
775 Carlson Road	25-017-212	1.01	Ph, BkB2, BkC2	0-3%/3-8%/8-15%
776 Carlson Road	25-020-082	1.54	BkB2, CoB2	3-8%/3-8%
781 Carlson Road	25-017-213	1	Ph, BkB2, BkC2	0-2%/3-8%/8-15%
802 Carlson Road	25-020-051	2.19	BkB2, CoB2	3-8%/3-8%
814 Carlson Road	25-020-032	1.79	BkB2, BkD2, CoB2	3-8%/15-25%/3-8%
828 Carlson Road	25-020-073	1.63	BkB2, BkD2, CoB2	3-8%/15-25%/3-8%
842 Carlson Road	25-020-074	2.06	BkB2, BkD2, CoB2	3-8%/15-25%/3-8%
852 Carlson Road	25-020-058	1.22	BkB2, BkD2	3-8%/15-25%
1001 Chestnut Place	25-017-240	1.46	BkB2	3-8%
1006 Chestnut Place	25-017-207	1.89	BkB2, BkC2	3-8%/8-15%
1007 Chestnut Place	25-017-219	1	BkB2	3-8%
1012 Chestnut Place	25-017-220	1.79	BkB2, BkC2, WeE2	3-8%/8-15%/25-40%
1013 Chestnut Place	25-017-218	1	BkB2, BkC2	3-8%/8-15%
1018 Chestnut Place	25-017-221	1.3	BkB2, BkC2	3-8%/8-15%
1019 Chestnut Place	25-017-217	1	BkB2, BkC2	3-8%/8-15%
1024 Chestnut Place	25-017-222	1.95	BkB2, BkC2	3-8%/8-15%
1025 Chestnut Place	25-017-216	1	BkB2, BkC2	3-8%/8-15%
1030 Chestnut Place	25-017-223	1.73	BkB2, BkC2	3-8%/8-15%
1031 Chestnut Place	25-017-215	1.12	BkB2, BkC2	3-8%/8-15%
1036 Chestnut Place	25-017-239	1	BkB2, BkC2	3-8%/8-15%
112 Circle Dr	25-027-015	0.71	BkC2	8-15%
113 Circle Dr	25-027-004	2.5	BkC2, BtB2	8-15%/3-8%
128 Circle Dr	25-027-017	0.64	BkB2, BkC2	3-8%/8-15%
139 Circle Dr	25-027-006	0.63	BtB2, BkC2, BkB2	3-8%/8-15%/3-8%
139 Circle Dr	25-027-007	0.72	BkB2, BkC2	3-8%/8-15%
151 Circle Dr	25-027-008	0.61	BtB2, BkC2, BkB2	3-8%/8-15%/3-8%
151 Circle Dr	25-027-009	0.66	BkB2, BkC2	3-8%/8-15%
177 Circle Dr	25-027-010	0.66	BkB2, BkC2	3-8%/8-15%
190 Circle Dr	25-027-011	0.84	BkB2, BkC2	3-8%/8-15%
381 Crooked Hill Rd	25-020-035	23.6	BkB2	3-8%
390 Crooked Hill Rd	25-020-048	6.9	BkB2, BkC2	3-8%/8-15%
406 Crooked Hill Rd	25-020-036	0.47	BkB2	3-8%

\*Items highlighted in Orange are less than 1 Acre

\*Items highlighted in Blue are 2 lots with the same address

**TABLE 2  
LISTING OF PROPERTIES IN SPECIAL STUDY AREA**

<b>Address</b>	<b>PIN #</b>	<b>Acreage</b>	<b>Soil Types</b>	<b>Slope</b>
430 Crooked Hill Rd	25-020-113	1.1	BkB2, BtB2	3-8%/3-8%
446 Crooked Hill Rd	25-020-005	1.18	BkB2	3-8%
455 Crooked Hill Rd	25-020-033	9.9	BkB2, BtB2	3-8%/3-8%
456 Crooked Hill Rd	25-020-006	8.57	BkB2	3-8%
471 Crooked Hill Rd	25-020-075	10	BkB2, BtB2	3-8%/3-8%
472 Crooked Hill Rd	25-020-059	1	BkB2, BtB2	3-8%/3-8%
481 Crooked Hill Rd	25-020-026	1	BkB2, BtB2	3-8%/3-8%
491 Crooked Hill Rd	25-020-125	1	BkB2	3-8%
524 Crooked Hill Rd	25-020-119	1.36	BkB2, CoB2	3-8%/3-8%
532 Crooked Hill Rd	25-020-118	1.16	BkB2	3-8%
893 Crooked Hill Rd	25-020-120	1.06	BkB2, BtB2, Ph	3-8%/3-8%/0-3%
111 Hunter Lane	25-017-045	1.04	BkB2	3-8%
130 Hunter Lane	25-017-043	1.52	BkC2	8-15%
130 Hunter Lane	25-017-044	0.71	BkC2	8-15%
140 Hunter Lane	25-017-042	1.09	BkC2	8-15%
149 Hunter Lane	25-017-048	1.05	BkB2, BtB2	3-8%/3-8%
149 Hunter Lane	25-017-047	1.19	BkB2, BtB2	3-8%/3-8%
162 Hunter Lane	25-017-041	1	BkB2	3-8%
174 Hunter Lane	25-017-040	1	BkB2, BtB2	3-8%/3-8%
199 Hunter Lane	25-017-039	1	BkB2, BkC2	3-8%/8-15%
204 Hunter Lane	25-017-049	1.01	BkB2, BkC2, BtB2	3-8%/8-15%/3-8%
229 Hunter Lane	25-017-037	1.95	BkD2, BkC2	15-25%/8-15%
242 Hunter Lane	25-017-038	1.1	BkB2, BkC2	3-8%/8-15%
243 Hunter Lane	25-017-036	1.39	BkD2	15-25%
177 Mill Rd	25-017-150	1	BkB2, BkC2, BtB2	3-8%
366 N Meadow Ln	25-017-118	2.2	BkC2, BtB2	8-15%/3-8%
373 N Meadow Ln	25-017-009	0.74	BtB2, BkD2	3-8%/15-25%
388 N Meadow Ln	25-017-147	1.16	BkB2, BkC2	3-8%/8-15%
432 N Meadow Ln	25-017-145	1.06	BkB2, BkC2	3-8%/8-15%
441 N Meadow Ln	25-027-014	0.78	BkB2, BkC2	3-8%/8-15%
452 N Meadow Ln	25-017-144	1.01	BkB2, CoB2	3-8%/3-8%
453 N Meadow Ln	25-027-013	0.59	BkC2, BkB2	8-15%/3-8%
467 N Meadow Ln	25-027-012	1.02	BkB2	3-8%
472 N Meadow Ln	25-017-052	1.08	BkB2, CoB2, BkC2	3-8%/3-8%/8-15%
477 N Meadow Ln	25-017-012	1.02	BkB2, BkC2	3-8%/8-15%
494 N Meadow Ln	25-017-152	1.3	CoB2, BkB2, BtB2	3-8%/3-8%/3-8%
510 N Meadow Ln	25-017-014	1.32	BtB2	3-8%
214 N Mill Rd	25-017-072	3	BkB2, BkC2	3-8%/8-15%
215 N Mill Rd	25-017-153	0.97	BkB2	3-8%
223 N Mill Rd	25-017-029	0.22	BkB2	3-8%
238 N Mill Rd	25-017-001	33.97	BkB2, BkC2	3-8%/8-15%
273 N Mill Rd	25-017-067	1.21	BtB2, BkC2	3-8%/8-15%
297 N Mill Rd	25-017-066	1.15	BkB2, BkD2	3-8%/15-25%
316 N Mill Rd	25-017-089	2.9	CoB2, BkB2, BtB2	3-8%/3-8%/3-8%
335 N Mill Rd	25-017-065	1.07	BtB2, BkB2	3-8%/3-8%
337 N Mill Rd	25-017-064	0.99	BkB2	3-8%
338 N Mill Rd	25-017-088	3.1	BkB2, CoB2	3-8%/3-8%
364 N Mill Rd	25-017-087	2.9	BkB2, BtA, CoB2	3-8%/0-3%/3-8%
378 N Mill Rd	25-017-086	3.9	BkB2	3-8%
112 Red Fox Ln	25-017-080	1.05	BkB2	3-8%
119 Red Fox Ln	25-017-079	0.99	BkB2	3-8%
124 Red Fox Ln	25-017-081	1.05	BkB2, BtB2	3-8%/3-8%
135 Red Fox Ln	25-017-078	1.1	BkB2	3-8%

\*Items highlighted in Orange are less than 1 Acre

\*Items highlighted in Blue are 2 lots with the same address

**TABLE 2  
LISTING OF PROPERTIES IN SPECIAL STUDY AREA**

<b>Address</b>	<b>PIN #</b>	<b>Acreage</b>	<b>Soil Types</b>	<b>Slope</b>
138 Red Fox Ln	25-017-082	1.1	BkB2, Btb2, BkC2	3-8%/3-8%/8-15%
149 Red Fox Ln	25-017-077	1.04	BkB2	3-8%
167 Red Fox Ln	25-017-076	1.04	BkB2	3-8%
176 Red Fox Ln	25-017-083	2.24	BkB2, BkD2	3-8%/15-25%
183 Red Fox Ln	25-017-075	1.6	BkB2	3-8%
193 Red Fox Ln	25-017-074	1.19	BkB2	3-8%
198 Red Fox Ln	25-017-085	1.18	BkB2, BkD2	3-8%/15-25%
206 Red Fox Ln	25-017-099	1.23	WeE2, BtA, BkD2, BkB2	25-40%/0-3%/15-25%/3-8%
211 Red Fox Ln	25-017-093	1.23	BkB2	3-8%
224 Red Fox Ln	25-017-098	1.23	WeE2, BtA, BkD2, BkB2	25-40%/0-3%/15-25%/3-8%
235 Red Fox Ln	25-017-094	1.28	BkB2	3-8%
243 Red Fox Ln	25-017-096	1.11	BkB2	3-8%
258 Red Fox Ln	25-017-097	1.16	WeE2, BtA, BkD2, BkB2	25-40%/0-3%/15-25%/3-8%
270 Red Fox Ln	25-017-241	3.85	WeE2, BtA, BkD2, BkC2	25-40%/0-3%/15-25%/8-15%
265 Red Fox Ln	25-017-249		BkC2, BkD2, BtA	8-15%/15-25%/0-3%
360 Red Fox Ln	25-017-035	3.85	BtA, BkC2, BkD2, WeE2	0-3%/8-15%/3-8%/25-40%
155 S Mill Rd	25-017-178	1.46	BkB2, CoB2, BtA	3-8%/3-8%/0-3%
165 S Mill Rd	25-017-177	1.46	BkB2, CoB2, BtA	3-8%/3-8%/0-3%
175 S Mill Rd	25-017-175	1.11	BkB2, CoB2, BtA	3-8%/3-8%/0-3%
180 S Mill Rd	25-017-176	1.03	CoB2, BtA	3-8%/0-3%
187 S Mill Rd	25-017-174	1	BkB2, CoB2, BtA	3-8%/3-8%/0-3%
200 S Mill Rd	25-017-031	15.39	Bta, BkC2, At	0-3%/8-15%/0-3%
200 S Mill Rd	25-017-032	4.88	Bta, BkC2, At	0-3%/8-15%/0-3%
207 S Mill Rd	25-017-192	1.08	BkB2, BkC2, CoB2	3-8%/8-15%/3-8%
217 S Mill Rd	25-017-193	1.1	CoB2, BkC2	3-8%/8-15%
243 S Mill Rd	25-017-194	1.03	CoB2, BkC2	3-8%/8-15%
261 S Mill Rd	25-017-195	1	CoB2, BkC2	3-8%/8-15%
281 S Mill Rd	25-017-149	2.32	WeE2, BkC2	25-40%/8-15%
2 Samantha Ct	25-017-184	1	BeB2, BkC2	3-8%/8-15%
102 Steeplechase Ln	25-017-140	0.99	WeE2, BkD2	25-40%/3-8%
125 Steeplechase Ln	25-017-132	1.68	BkD2, BkC2	3-8%/8-15%
141 Steeplechase Ln	25-017-134	1.43	BkD2, BkC2	3-8%/8-15%
146 Steeplechase Ln	25-017-139	0.94	WeE2, BkD2	25-40%/3-8%
147 Steeplechase Ln	25-017-135	1.09	BkD2, BkC2	3-8%/8-15%
161 Steeplechase Ln	25-017-136	1.12	BkD2, BkC2	3-8%/8-15%
170 Steeplechase Ln	25-017-138	0.9	WeE2, BkD2	25-40%/3-8%
172 Steeplechase Ln	25-017137	4.19	WeE2, BkD2	25-40%/3-8%
173 Steeplechase Ln	25-017-095	3.6	BkD2	3-8%
134 Stirrup Lane	25-017-054	4.1	WeE2, BtB2, BkD2, BkC2	25-40%/3-8%/3-8%/8-15%
135 Stirrup Lane	25-017-050	1.06	BkD2, BtB2	3-8%
138 Stirrup Lane	25-017-056	1.14	BkC2, BkD2	3-8%
155 Stirrup Lane	25-017-071	1.11	BkD2	3-8%
180 Stirrup Lane	25-017-057	2.49	BkC2, BtA, BkD2, WeE2, BtB2	8-15%/0-3%/15-25%/25-40%/3-8%
185 Stirrup Lane	25-017-070	1.33	BkD2	3-8%
194 Stirrup Lane	25-017-058	1.26	BkC2, BkD2	8-15%/15-25%
208 Stirrup Lane	25-017-059	0.96	BkC2, BkD2	8-15%/15-25%
219 Stirrup Lane	25-017-068	1.53	BkC2, BkD2, BtB2	8-15%/15-25%/3-8%
222 Stirrup Lane	25-017-061	1.2	BkD2, BtB2, BkC2, BkD2	15-25%/3-8%/8-15%/3-8%
236 Stirrup Lane	25-017-063	1.96	BtB2, BkD2, BkD2	3-8%/3-8%/15-25%
274 Stirrup Lane	25-017-046	1.16	BkD2, BtB2	3-8%/3-8%
901 Sycamore Ln	25-017-202	1.62	BkC2, CoB2	8-15%/3-8%
906 Sycamore Ln	25-017-197	1	BkD2	3-8%
907 Sycamore Ln	25-017-201	1.62	BkC2, BkD2, CoB2	8-15%/3-8%/3-8%

\*Items highlighted in Orange are less than 1 Acre

\*Items highlighted in Blue are 2 lots with the same address

**TABLE 2  
LISTING OF PROPERTIES IN SPECIAL STUDY AREA**

<b>Address</b>	<b>PIN #</b>	<b>Acreage</b>	<b>Soil Types</b>	<b>Slope</b>
912 Sycamore Ln	25-017-198	1	BkC2, BkB2, CoB2	8-15%/3-8%/3-8%
913 Sycamore Ln	25-017-200	1	BkC2, BkB2	8-15%/3-8%
918 Sycamore Ln	25-017-199	1.04	BkC2, BkB2, CoB2	8-15%/3-8%/3-8%
919 Sycamore Ln	25-017-226	1.66	BkB2	3-8%
924 Sycamore Ln	25-017-227	1.3	BkB2	3-8%
925 Sycamore Ln	25-017-225	1.34	BkB2	3-8%
930 Sycamore Ln	25-017-228	1.67	BkB2, BkC2	3-8%/8-15%
936 Sycamore Ln	25-017-229	1.57	BkB2, BkC2	3-8%/8-15%
937 Sycamore Ln	25-017-224	1.06	BkB2, BkC2	3-8%/8-15%
942 Sycamore Ln	25-017-230	2.69	BkB2, BkC2	3-8%/8-15%
943 Sycamore Ln	25-017-214	35.99	Ph, BkB2, BkC2	0-3%/3-8%/8-15%
948 Sycamore Ln	25-017-231	1.61	BkB2, BkC2	3-8%/8-15%
954 Sycamore Ln	25-017-232	1.1	BkB2, BkC2	3-8%/8-15%
974 Sycamore Ln	25-017-234	2.35	BkB2, BkC2	3-8%/8-15%
980 Sycamore Ln	25-017-235	1	BkB2, BkC2	3-8%/8-15%
986 Sycamore Ln	25-017-236	1	BkB2, BkC2	3-8%/8-15%
994 Sycamore Ln	25-017-237	1	BkB2, BkC2	3-8%/8-15%
1000 Sycamore Ln	25-017-238	1.95	BkB2, BkC2	3-8%/8-15%
105 Ulrich Ct	25-020-126	1.1	BkB2	3-8%
106 Ulrich Ct	25-020-131	1.14	BkB2, BkC2	3-8%/8-15%
117 Ulrich Ct	25-020-127	1	BkB2, BkB3	3-8%/8-15%
120 Ulrich Ct	25-020-130	1	BkB2, BkC2	3-8%/8-15%
127 Ulrich Ct	25-020-128	2.2	BkB2, CoB2	3-8%/3-8%
130 Ulrich Ct	25-020-129	1	BkB2, BkC2, CoB2	3-8%/8-15%/2-8%
<b>TOTAL ACRES</b>		<b>397.08</b>		

\*Items highlighted in Orange are less than 1 Acre

\*Items highlighted in Blue are 2 lots with the same address

**TABLE 3****SEWER AREAS DESIGNATED AS THE MANADA OAKS AREA****(ALSO REFERRED TO AS AREA 4-F OR 2020 SERVICE AREA)****OPINON OF CONSTRUCTION & PROJECT RELATED COSTS INDEXED AS OF AUGUST 2021**

<b>Alternative</b>	<b>Description</b>	<b>Opinion of Construction Costs</b>	<b>Opinion of Project Costs</b>	<b>Comments</b>
Alternative A.1 & A.2	Sewer areas north of Route 22 only	-	-	Not calculated as it is part of Alternative 4F
Alternative B.1 & B.2	Sewer areas south of Route 22 only	-	-	Not calculated as it is part of Alternative 4F
Alternative 2	Connect to South Hanover Collection System along Manada Creek with treatment at Derry Township	\$14,210,665	\$16,332,475	Less 6" force main from P.S. No 9 (13,000 L.F.) More easements and associated legal work Less Paving Need to have agreements with S. Hanover & Derry Townships
Alternative 3	Connect to South Hanover Collection System via Sand Beach Road with treatment at Derry Township	\$15,673,345	\$17,465,595	Less 6" force main from P.S. No. 9 (12,400 L.F.)
Alternative 4F	Combined Manada Oaks area with 4 pump stations and force main to the EHTMA Dairy Lane WWTP	\$16,606,000	\$18,612,480	Previously Selected Option 14,275 L.F. of force main from P.S. 9 Treated at EHTMA plant

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Alternative	Description	Opinion of Construction Costs	Opinion of Project Costs	Comments
Alternative 5	Single force main heading west to West Hanover Township pump station with treatment at West Hanover WWTP	\$15,162,150	\$17,178,450	5.A - No crossing of Route 22, reduced force main from P.S. 9 and reduced size of P.S. 9 In shoulder of Route 22 Add \$25,000 in PennDOT inspection
	<ul style="list-style-type: none"> <li>5.A Along south side of Route 22</li> </ul>	\$15,257,688	\$17,273,988	5.B - Crossing of Route 22, reduced force main of P.S. 9 and reduced size of P.S. 9 In shoulder of Route 22 Add \$25,000 in PennDOT inspection
	<ul style="list-style-type: none"> <li>5.B Along North Meadow Lane and north side of Route 22</li> <li>5.C Along Carlson Road</li> </ul>	\$14,999,950	\$17,006,830	5.C - No crossing of Route 22, has 2 stream crossings, reduced force main from P.S. 9 and reduced size of P.S. 9
Alternative 6	Force main heading east along Route 22 to existing EHTMA collection and treatment system	\$14,823,258	\$16,867,058	Have involvement with Route 22 Using multiple pump stations to get to EHTMA WWTP Added \$50,000 in PennDOT inspection
Alternative 7	Single force main heading east to South Crawford Road & Route 22 to existing EHTMA collection & treatment system	\$14,662,420	\$16,689,720	Have minor involvement with Route 22 Using multiple pump stations to get to EHTMA WWTP Added \$25,000 in PennDOT inspection
Alternative 8	Single force main heading north on Crawford and east on Meadow to Pheasant Road Pump Station to existing EHTMA collection & treatment system	\$14,582,000	\$16,588,880	No involvement with Route 22 Using multiple pump stations to get to EHTMA WWTP
Alternative 9	Construction of a package 66,000 gpd WWTP Permit Discharge to Manada Creek off Crooked Hill Road	\$14,969,168	\$17,087,048	Eliminate P.S. 9 & P.S. 9 force main Add WWTP & 385 L.F. 8" PVC & related work

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Alternative	Description	Opinion of Construction Costs	Opinion of Project Costs	Comments
Alternative 10	Construction of a package 66,000 gpd WWTP with Discharge to Manada Creek off Carlson Road <ul style="list-style-type: none"> <li>10.A - West side of Manada Creek</li> <li>10.B East side of Manada Creek</li> </ul>	\$15,864,187	\$18,181,787	10.A - Reduced & redirected P.S. 9 force main Reduced size of P.S. No. 9 Added Stream Crossings, paving Additional engineering for WWTP and additional property purchase cost
		\$15,703,449	\$17,876,829	10.B - Reduced & redirected P.S. 9 force main Reduced size of P.S. No. 9 Added additional for paving, additional engineering for WWTP and additional property purchase cost
Alternative 11	Continue with an On-Lot Management with possible enhancements	\$0	\$5,000	May be ongoing costs for certain property owners and administrative costs for Township administrative staff
Alternative 12	Grinder pumps with Low-Pressure Sewer System Mains with 5 Sub-Options <ul style="list-style-type: none"> <li>12.A - Flow to W. Hanover pump station on Carlson Road with treatment at W. Hanover WWTP</li> <li>12.B - Flow to South Meadow Lane to tie-in near Timber Ridge Rd with treatment at E. Hanover WWTP</li> <li>12.C - Flow to Allentown Boulevard gravity tie-in via South Crawford Rd with treatment at E. Hanover WWTP</li> <li>12.D - Flow to Allentown Boulevard gravity tie-in via Allentown Blvd from South Mill Rd with treatment at E. Hanover WWTP</li> </ul>	\$7,315,090	\$9,321,970	12.A – Have 2 stream crossings Shortest distance to a connection point No additional crossing of Route 22 Need an agreement with West Hanover
		\$7,900,590	\$9,907,470	12.B – Have 3 stream crossings No additional crossing of Route 22 Multiple pump stations to the EHTMA WWTP
		\$7,969,135	\$9,985,435	12.C – Have 3 stream crossings Have involvement in shoulder of Route 22 Multiple pump stations to the EHTMA WWTP
		\$8,481,155	\$10,524,935	12.D – Have 5 stream crossings Have longer involvement in shoulder of Rte 22 Multiple pump stations to the EHTMA WWTP

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Alternative 12 (continued)	<ul style="list-style-type: none"> <li>12.E - Flow to Crooked Hill Road to new WWTP along Manada Creek</li> </ul>	\$8,244,800	\$10,253,810	12.E – No additional stream crossings No additional involvement in Route 22 No additional pump stations for flows Reduce the need for P.S. 9
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