

ACT 537

**Sewage Facilities Plan
Update**

FOR

**CONEWAGO TOWNSHIP
DAUPHIN COUNTY
PENNSYLVANIA**

MAY 2002

Project No. 011141-06

Prepared by:

RETTEW Associates, Inc.
2500 Gettysburg Road, Suite 100
Camp Hill, PA 17011
(717) 697-3551

RETTEW
Associates, Inc.

Engineers
Planners
Environmental Consultants
Landscape Architects
Surveyors

Disclaimer: For an official copy of this document, see the Township Office.
This computer version was prepared by **Conewago Online**, which is not affiliated with the township government. Transcription errors are possible and accuracy is not guaranteed.
Last revised: 09/05/2003 02:00 pm. © 2003 by Joel Buckley.

**CONEWAGO TOWNSHIP
ACT 537, SEWAGE FACILITIES PLAN UPDATE
LAUREL WOODS STUDY AREA**

The following is a revision to the 1998 Act 537 Sewage Facilities Plan Update for Conewago Township, Dauphin County. The purpose of this revision is to further analyze and inventory the existing needs within the Laurel Woods Study Area as identified in the 1998 Plan. All other sections of the 1998 plan, including the existing needs analysis for areas outside of Laurel Woods/Basler Road, remain valid. Based on this scope, the report will consist of the following information:

- Extracting and summarizing the existing needs and well sampling results section from the 1998 Conewago Township Sewage Facilities Plan Update,
- A summary of the Sewage Enforcement Officer's (SEO) door to door investigation,
- Conducting Tier Two well sampling of the Laurel Woods Service Area and summarizing the results,
- Reviewing the Sewage Enforcement Officer's records since 1998 to account for any repairs or any new holding tanks within the Laurel Woods Service Area, and
- Develop a final composite existing needs report based on all the above mention items.

Planning Area Map

Planning Area

As highlighted on the Planning Area Map on the previous page, the planning area for this Act 537 Plan Update Revision encompasses the Laurel Woods Study Area within Conewago Township, Dauphin County. The Pennsylvania Department of Environmental Protection (DEP) has approved the scope of work for this Plan Update Revision. A copy of the Department's letter approving the scope is provided in Appendix A of this Plan.

Background

In 1998, Conewago Township adopted and the DEP approved an Act 537 Sewage Facilities Plan Update for Conewago Township, Dauphin County. The Laurel Woods Study Area was identified as an area of existing and potential on-lot sewage disposal problems. Several structural alternatives were considered by the Board of Supervisors based on existing sewage needs, the condition of the groundwater, and the cost analysis of the alternative. Based on these factors, the Supervisors selected Alternative 3B to be implemented between zero to five years from the plan adoption. Alternative 3E was selected as an optional layout to be determined at the preliminary design stage. Finally, a Township-wide On-lot Management Program was determined necessary for all on-lot sewage disposal systems.

To date, the Township is exploring different funding options for Alternative 3B. These options include pursuing a low interest loan through PENNVEST, or joining with a DTMA bond issue. Because PENNVEST ranks applications based on the existing needs within the service area, many other municipalities were prioritized higher, therefore, the Township has elected to conduct this study to further define in greater detail the existing needs of the Laurel Woods Study Area.

Other Wastewater Planning

The Township has implemented an On-lot Management Program and has provided the DEP with quarterly reports, as required. This Revision represents the only other anticipated update to the wastewater planning for the Township at this point. All other alternatives from the 1998 Plan are under consideration, implemented, or are being pursued.

1998 Act 537 Plan Update Findings

In April 1998 domestic well testing of the planning area was conducted as part of the Sewage Needs Survey. The survey included an analysis of nitrate-nitrogen, total coliform, and fecal coliform in drinking water supplies within the planning area.

According to the U.S. Environmental Protection Agency (EPA), the maximum limit of nitrate-nitrogen in drinking water is 10 milligrams per liter (mg/L). Sources of nitrate-nitrogen include natural decay of organic matter, precipitation, mineral weathering, manure application, chemical fertilizers, and malfunctioning sewage disposal systems. In areas where nitrate-nitrogen is

greater than 5 mg/L, the DEP requires preliminary hydrogeologic evaluations for proposed developments as part of the Planning Module for Land Development process.

Total coliform is an “indicator” bacteria which also exists naturally in the soil, vegetation, and the intestines of warm-blooded animals. Fecal coliform testing measures mostly Escherichia coli (E. coli) bacteria, which is found in the stool of humans and other warm-blooded animals. EPA standards for drinking water require that the water be free of total or fecal coliform bacteria. Therefore, a water sample with one colony of bacteria per one hundred milliliters (1 col./100 ml) is considered to exceed the EPA drinking water standards.

As required by the DEP, 136 domestic wells were tested in the Township. This number represents slightly more than the required 15 percent of the total number of potable wells (estimated at 878 wells). Of the 878 estimated wells within the Township, it is estimated that 216 wells are located within the Laurel Woods Study Area. Of the 216 wells within the Laurel Woods Study Area, 41 or 19 percent were tested in 1998. The following provides the results of the 41 samples taken in the Laurel Woods Study Area:

<p align="center">Table 1 1998 Well Sampling Results for the Laurel Woods Study Area</p>							
Study Area	Total Samples	Nitrate Nitrogen > 10		Total Coliform > 0		Fecal Coliform > 0	
Laurel Woods/ Basler Road	41	2	5%	7	17%	0	0%
<p align="center">Source: 1998 Act 537 Sewage Facilities Plan for Conewago Township, Dauphin County</p>							

* *The exact location of the well sample and the individual property results can be found in the 1998 Act 537 Sewage Facilities Plan.*

To further evaluate the status of on-lot systems in the planning area, a Sewage Needs Survey was conducted in February 1998. The survey was initiated with a mail survey that was sent to 878 improved property owners in the planning area. A total of 575 surveys were completed by the property owners which equates to a response rate of 65 percent. Confirmation of 135 of the 575 responses was obtained through site visits at the same time well samples were collected.

The SEO records and the Sewage Needs Survey results were then analyzed and categorized using the following method of classification:

Table 2 Existing Needs Analysis Classification	
Confirmed Malfunction	Confirmed through observation by SEO or other qualified professional, dye testing, best technical guidance repairs, seasonally wet absorption areas, system back-ups, piped discharges with evidence of sewage.
Suspected Malfunction	Abnormally green grass, piped discharges without evidence of sewage, absorption areas with known unsuitable soils, cesspools in high density development, and pit privies.
Potential Malfunction	Appear to operate satisfactorily but are one of the following: <ul style="list-style-type: none"> • Pre-regulatory system or are unlikely to receive a permit under current regulations; • Repair due to poor site conditions; • Repair due to aging system; or • Septic tank pumping more frequently than once per year.
Wildcat Sewer System	Sewage collection system with multiple connections and an unlawful discharge.
Borehole Disposal	Discharge to a borehole or abandoned well.
Holding Tank	As per survey response or SEO files, drainfield has been abandoned and a holding tank has been used to retain sewage until pumping is required.
Adequate or New System	Survey response indicates adequate site conditions and system or SEO has issued a new permit.

Table 3 provides a summary of the categories of on-lot systems using the SEO records and survey results for the Laurel Woods Study Area.

Table 3 1998 Laurel Woods Study Area Existing Needs Analysis									
Study Area	Total On-Lot Systems	Confirmed Malfunction		Suspected Malfunction		Potential Malfunction		Holding Tank	
Laurel Woods/ Basler Road	216	7	3.2%	31	14.4%	50	23.2%	0	0%
Source: 1998 Act 537 Sewage Facilities Plan for Conewago Township Dauphin County									

Considering the existing and potential on-lot sewage disposal problems identified, the Laurel Woods Study Area was evaluated for the feasibility of connecting to public sewer.

Sewage Enforcement Officer’s Door to Door Analysis

In 1999, a study was performed by Meeting With Success to sample a group of one hundred improved properties in two study areas to determine the presence of malfunctioning or marginally performing on-lot sewage disposal systems. The Board of Supervisors underlying expectations were:

- The evaluation would be conducted independently from the work performed by RETTEW Associates, Inc.
- The selection of properties for evaluation would be done in a random and impartial manner, removing the conscious hand of human intervention in their selection,
- The evaluation would be performed in a manner consistent with the “Sewage Disposal Needs Identification Guidance March 1996” document (Needs Document) published by the DEP,
- The permission of the owners of all randomly selected properties would be secured by the Township Secretary in advance of the site visit, and
- The field surveys would be conducted in a manner that did not rely upon the owner(s)’s presence.

The one hundred properties were divided between the Laurel Woods and Route 743 Areas. The Laurel Woods Study Area has 218 properties and the Route 743 Area has 169, therefore 55 sites would be surveyed in the Laurel Woods Study Area and 45 sites would be surveyed in the Route 743 Area. A list of property owners within each area was developed and a “fish bowl” method of selection was used for randomize selection.

Since the purpose of this Revision is to analyze in further detail the Laurel Woods Study Area, the results from the Meeting With Success Study of 743 Area were not included in this Plan.

The Township Secretary contacted the selected property owners to secure permission to perform on site inspections and performed a telephone survey to gather background information on the property and the existing system. Gilbert L. Longwell, Jr., SEO # 680, of Meeting With Success reviewed the surveys and performed the on site evaluations.

First, the preliminary site information from the telephone survey was reviewed. This information provided an orientation to each property by identifying the location of the well, treatment tank, and absorption area as they were recognized by the landowner. The landowner’s perception of an existing or past malfunction and any other system history and problem(s) were noted. Other landowner provided information was also recorded. Field survey notes were written on the back of the form.

During the site investigation, a fiberglass rod was used to probe surface and near surface conditions of an absorption area. The surface’s firmness or its resistance to the rod was considered. Any inconsistencies were noted and explored to understand the cause of the inconsistency. Where appropriate, conclusions were noted. The use of the probe exploration was conducted based on the following:

- Saturated soils, were identified through the distinctive sucking noise that was juxtaposed with the withdrawal of the probe.
- To access areas under bushes and thickets.
- To access pipes, surface depressions, storm drains and areas covered with significant depths (up to 30 inches) of leaf litter.

Table 4 provides the results of Meeting With Success’s field investigation for the Laurel Woods Study Area.

Table 4 Meeting With Success’s Laurel Woods Study Area Results							
Study Area	Total in Study	Confirmed Malfunction		Suspected Malfunction		Potential Malfunction	
Laurel Woods/ Basler Road	55	12	22%	4	7%	3	5%
Source: Meeting With Success January 4, 1999 Report							

Meeting With Success then took the percentages in each category and projected what the results for the entire Laurel Woods Study Area would be. Table 5 provides the results of this analysis.

<p align="center">Table 5 1999 Meeting With Success's Projected Results of the Laurel Woods Study Area</p>							
Study Area	Properties in Study Area	Confirmed Malfunction		Suspected Malfunction		Potential Malfunction	
		Count	Percentage	Count	Percentage	Count	Percentage
Laurel Woods/ Basler Road	218	48	22%	15	7%	11	5%
<p align="center">Source: Meeting With Success January 4, 1999 Report</p>							

Other noteworthy findings:

- Three properties seem to have been subject to “wildcat” repairs (i.e., repairs undertaken without the benefit of a Local Agency (Township) permit.
- Although treatment tank condition was not a survey element, one landowner displayed a deteriorating treatment tank which is a candidate for prompt replacement.
- One enterprise has apparently placed several feet of fill and a parking lot over the absorption area serving the property. While there is no DEP regulation preventing such placement, research at leading universities demonstrates that absorption areas perform best when installed and kept within three feet of the soil surface.
- Two systems are in need of prompt repair due to the burrowing action of wild animals. These systems did not appear to be experiencing a malfunction in the context of effluent discharging to the surface or similar conditions, however, the animal burrows are clearly detrimental to the system’s performance.
- In two cases, when investigating one system the system on an adjoining property was seen or suspected to be malfunctioning. These two properties were not selected for the survey and they are not part of the statistical summary.

Second Tier Well Sampling Results

Areas that are considering public sewer alternatives may sometimes perform a Tier Two Well Sampling Analysis to further define the limits of the public service area and the needs of that area. In the second tier well sampling for Conewago Township, the Township was required by the DEP to sample twenty percent of the wells out of the 218 total wells within the Laurel Woods Study Area. As required by DEP, 50 domestic well samples were tested in the Township for total and fecal coliform bacteria. This number represents slightly more than the twenty percent of the total number of drinking water wells in the Laurel Woods Study Area.

Table 6 Summary of Tier Two Sampling Well Sampling	
Fecal Coliform > 0 col./ 100 ml.	Total Coliform > 0 col./ 100 ml.
0 or 0%	18 or 36%
Total # of which are not of drinking water quality based on EPA and DEP Standards 18 out of 50 or 36%	

Map 1 in Appendix B shows the well sample results for the Tier Two Well Sampling Analysis. Table 7 provides the individual results for each well sample taken during the 2001 Tier Two Well Sampling Analysis:

Table 7 2001 Tier Two Individual Well Results		
2001 Sample Number	2001 Total Coliform Results	2001 Fecal Coliform Results
1	302	ND
2	2	ND
3	1	ND
4	1	ND
5	0	ND
6	0	ND
7	0	ND
8	33	ND
9	4	ND
10	11	ND
11	0	ND
12	0	ND
13	23	ND
14	0	ND
15	18	ND
16	0	ND
17	0	ND
18	0	ND
19	1	ND
20	1	ND
21	0	ND
22	1	ND
23	0	ND
24	2	ND
25	0	ND
26	0	ND

Table 7 continued 2001 Tier Two Individual Well Results		
2001 Sample Number	2001 Total Coliform Results	2001 Fecal Coliform Results
27	0	ND
28	0	ND
29	0	ND
30	0	ND
31	0	ND
32	146	ND
33	0	ND
34	4	ND
35	0	ND
36	0	ND
40	0	ND
41	0	ND
42	0	ND
43	6	ND
44	0	ND
45	0	ND
46	0	ND
47	0	ND
100	0	ND
101	3	ND
102	3	ND
103	0	ND
104	0	ND
200	0	ND
201	0	ND

** ND = No detection of contaminants*

To further evaluate the status of the on-lot systems within the Laurel Woods Study Area, a Sewage Needs Analysis was conducted coinciding with the well sampling. A site inspection and questionnaire was completed based on the door to door survey found in the “Needs Document” published by the DEP.

The following table provides a summary of the categories of on-lot systems using the survey results. Map 2 in Appendix B shows the geographic distribution of the categories of on-lot systems.

Table 8									
2001 Tier Two Existing Needs Analysis									
Study Area	Total On-Lot Systems	Confirmed Malfunction		Suspected Malfunction		Potential Malfunction		Holding Tank	
Laurel Woods/ Basler Road	50	14	28%	11	22%	7	14%	1	2%
Source: 2001 Tier Two Sampling for Conewago Township Dauphin County									

Review of the Township’s Sewage Enforcement Officer’s Records since the 1998 Plan

Proper pumping and maintenance has been witnessed not only within the Laurel Woods Study Area but the entire Township since the adoption and implementation of the On-lot Management Program. However, one repair has taken place within the Laurel Woods Study Area in which the property owner had no other choice but to install a holding tank on his property to correct the existing problem.

Final Composite Existing Needs and Well Sampling Analysis for Laurel Woods Study Area

This section will provide a compilation of the well sampling results and the needs analysis associated with the Laurel Woods Study Area. This section will include merge data from the 1998 Act 537 Sewage Facilities Plan Update, the Meeting With Success Analysis, the Tier Two Analysis, and the SEO records since 1998 into one final analysis for the Laurel Woods Study Area.

Final Composite Well Sampling Report

The results from the 1998 Act 537 Plan Update were compared with the Tier Two Analysis that was performed in December 2001 to produce a Final Composite Well Sampling Report. The following table provides the combined results of both sampling periods:

Table 9				
Final Well Sampling Results from Laurel Woods Area, Conewago Township, Dauphin County				
Total Wells Sampled	Total Wells Within Study Area	Total Coliform > 0	Fecal Coliform > 0	Nitrate Nitrogen > 10
74 or 34%	218	23 or 31%	0 or 0%	2 or 3%
Source: RETTEW Associates, Inc.				

Map 3 in Appendix B displays the location of all the non-potable wells within the Laurel Woods Study Area. Table 10 displays what the well sampling results would look like if they were projected over the entire Laurel Woods Area based on the percentages from the Tier Two Well Sampling Analysis:

Table 10 Projected Well Sampling Results for Laurel Woods Area, Conewago Township, Dauphin County		
Total Coliform > 0	Fecal Coliform > 0	Nitrate Nitrogen > 10
74 or 34%	0 or 0%	7 or 3%
Source: RETTEW Associates, Inc.		

Although in 1998 and 2001, a total of 91 samples were taken within the Laurel Woods Study Area, several sites were revisited to determine if the 1998 results continued. Therefore, a total of 74 independent well samples were collected within the Study Area. There were no traces of fecal coliform in any of the well samplings from either 1998 or 2001. Nitrate Nitrogen was only sampled in 1998. Therefore, the projected 7 wells or 3% of the Study Area results are projected from the 1998 Plan. An increase from 17% to 36% of the presence of total coliform bacteria occurred between the 1998 and 2001 well sampling period. It is projected that just over a third of the wells within the Laurel Woods Study Area are contaminated.

Final Composite Needs Analysis

By combining the Meeting With Success Report, 1998 Act 537 Plan Update, SEO Results since 1998, and the Tier Two Needs Analysis a total of 130 out of the 218 housing units were surveyed within the Laurel Woods Study Area. Table 11 displays the results from that compilation.

Table 11 Final Needs Analysis for Laurel Woods Study Area, Conewago Township, Dauphin County					
Total Units Surveyed in the Study Area	Holding Tanks	Confirmed Malfunction	Suspected Malfunction	Potential Malfunction	No Problem Detected
130 out of 218 or 60%	1 or 0.5%	32 or 25%	31 or 24%	39 or 29.5%	28 or 21%
Source: RETTEW Associates, Inc.					

The final needs analysis of the Laurel Woods Study Area is graphically depicted in Map 4 in Appendix B. Table 12 provides the projected needs analysis of the Laurel Woods Area based on the compiled results and percentages from Table 11:

Table 12 Projected Needs Analysis for Laurel Woods Study Area, Conewago Township, Dauphin County				
Holding Tanks	Confirmed Malfunction	Suspected Malfunction	Potential Malfunction	No Problem Detected
1 or 0.5%	55 or 25%	52 or 24%	64 or 29.5%	46 or 21%
Source: RETTEW Associates, Inc.				

Nearly 172 housing units or nearly 80% of the Laurel Woods Study area projects to be classified as some type of malfunction (potential, suspected, confirmed). Additionally, one-quarter of the 218 dwelling units within the Laurel Woods Study Area projects to be classified as a confirmed malfunction. Only 46 units or 21% are projected to be acceptable or having no problems detected.

Based on the high malfunction rate and the well sampling results, Conewago Township should still consider a structural alternative for the Laurel Woods Study Area.

Conewago Township’s Final Composite Results Versus PENNVEST Ranking

In the 1998 Plan, PENNVEST was identified as a possible source for funding for alternative 3B to service the Laurel Woods Study Area with public sewerage to Derry Township Municipal Authority (DTMA). To date, the Township has not secured funding from PENNVEST based on other municipalities receiving higher priority based on a higher needs rankings. The PENNVEST Funding Ranking is provided in Table 13 below:

Table 13 PENNVEST Funding Ranking			
On-lot System Confirmed Malfunctions		Wells with a Presence of Fecal Coliform	
Less than 10%		Greater than 5%	Less than 10%
Greater than 10%	Less than 25%	Greater than 10%	Less than 25%
Greater than 25%	Less than 50%	Greater than 25%	
Greater than 50%			
Source: PENNVEST			

Upon completion of the 1998 Act 537 Plan, the Laurel Woods Study Area Confirmed Malfunction Rate fell within the less than 10% category at 3.2% and no fecal coliform bacterias were detected in any of the well samples. Those needs levels make it difficult to secure any funding from PENNVEST. In 1999, the Laurel Woods Study Area displayed a 22% confirmed malfunction rate in the Meeting With Success’s Laurel Woods Study which moved the Township up to the next overall ranking to the greater than 10% but less than 25% category. Pre-Applications were filed with PENNVEST but did not receive significant consideration due

no presence of fecal coliform contamination. In 2001 the DTMA. approached Conewago Township and indicated that the Authority would secure a bond in early 2002 to fund further extensions and wanted to consider adding the Laurel Woods Study Area as a part of their extension. In an effort to secure PENNVEST funding one final time, the Conewago Township Board of Supervisors elected to conduct this Tier Two Study and revise the 1998 537 Plan. As discussed earlier, the malfunction rate increased by only 3 % to 25% and there were still no traces of fecal coliform in the well sampling conducted in late 2001. This equates to Conewago Township retaining its existing ranking of greater than 10% but less than 25% category with no fecal coliforms present.

Conclusion

Based on the composite results, Conewago Township's opportunity for securing funding from PENNVEST has not significantly increased. Therefore, the Board of Supervisors elected to secure a bond fund through DTMA for Alternative 3B based on the low interest rates witnessed at the time of this report rather than further pursuing PENNVEST. In January 2002, DTMA secured funding for Alternative 3B, which will service the Laurel Woods Study Area.

Engineering design of the system to service the Laurel Woods Study Area was initiated through DTMA in 2001.

The anticipated project schedule is as follows:

Advertise for Bids	September 2002
Receive Bids	October 2002
Notice to Proceed	December 2002
Start Construction	January 2003
Complete Construction	December 2003

Appendix A

Copy of DEP letter approving the Scope of Work

Proof of Publication

Comments

Response to Comments

Pennsylvania Department of Environmental Protection

909 Elmerton Avenue
Harrisburg, PA 17110-8200
February 26, 2002
Southcentral Regional Office (717) 705-4707
FAX (717) 705-4760

Conewago Township Supervisors
c/o Donna Spittle, Secretary
3279 Old Hershey Road
Elizabethtown, PA 17022

Re: Act 537 Planning (22910)
Plan of Study and Task/Activity Report
Act 537 Official Plan Update Revision
Laurel Woods - Basler Road Areas
Conewago Township, Dauphin County

Ladies and Gentlemen:

We received a Task/Activity Report (TAR) submitted by Rettew Associates, Inc., under a cover letter dated December 7, 2001 for preparation of an Act 537 Official Plan Update Revision.

We have approved your TAR for an estimated total cost of \$9,201. The resulting Act 537 Update Revision must be consistent with Act 537, Chapter 71, Sections 71.21 and 71.31 of DEP regulations, and with information contained in both A Guide for Preparing Act 537 Update Revisions (February 1998) and Sewage Disposal Needs Identification Guidance (March 1996).

Following Departmental approval of your completed Act 537 Plan, you may apply for the reimbursement. At that time, as part of your reimbursement application, you will find that you must submit cost invoices clearly identifying the task in the approved Task/Activity Report to which they apply.

If you have any questions, please call me at 717-705-4766.

Sincerely,

Paul Curry
Sewage Planning Specialist
Water Management Program

cc: Rettew Associates, Inc.

www.dep.state.us

Appendix B

Map 1 - Tier Two Well Sampling Results

Map 2 - Tier Two Existing Needs Analysis

Map 3 - Final Well Sampling Results

Map 4 - Final Needs Analysis