TOWNSHIP OF UPPER MAKEFIELD
BUCKS COUNTY, PENNSYLVANIA

ACT 537
SEWAGE FACILITIES PLAN UPDATE

PREPARED BY:

CKS ENGINEERS, INC.
88 SOUTH MAIN STREET
DOYLESTOWN, PENNSYLVANIA 18901

REF: #6700-78

ADOPTED MARCH 17, 2015

APPROVED BY

PENNSYLVANIA DEPARTEMENT OF ENVIRONMENTAL PROTECTION

SEPTEMBER 23, 2015

PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION

APPROVAL CORRESPONDENCE

DATED

SEPTEMBER 23, 2015

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

SEP 23 2015

Mr. David Nyman, Manager
Upper Makefield Township
1076 Eagle Road
Newtown, PA 18940

Re: Approval Letter – Official Plan Update
Township of Upper Makefield, Bucks County, PA
Act 537 Sewage Facilities Plan Update
APS ID 879185, AUTH ID 1087694
Upper Makefield Township
Bucks County

Dear Mr. Nyman:

The Department of Environmental Protection (DEP) has reviewed the proposed Official Plan Update titled Township of Upper Makefield, Bucks County, Pennsylvania, Act 537 Sewage Facilities Plan Update (Plan), which was prepared by CKS Engineers, Inc., dated March 17, 2015, and submitted to DEP on March 30, 2015. On July 24, 2015, DEP received additional supplemental information in support of the March 17, 2015, plan.

The submission is consistent with the planning requirements in Chapter 71 of DEP's regulations. The Plan provides for the sewage disposal needs of the entire township.

This approval provides for the following:

1. The Township will continue to implement its Sewage Management Program and enforce its on-lot sewage disposal system management ordinance for all areas not currently served by public sewers.

The Township will implement the following steps, consistent with the Amended Implementation Schedule dated July 20, 2015, submitted with the supplemental information for the identified Taylorsville and Dolington needs areas:

2. Taylorsville and Dolington Areas

   The Township will amend its on-lot sewage disposal system (OLDS) management ordinance to delineate special sewage management program districts for the Taylorsville and Dolington areas. A document titled "Preliminary Draft Potential OLDS Ordinance Amendments" was provided with the supplemental information.

The Taylorsville and Dolington special sewage management districts are shown on Exhibit C of the draft OLDS ordinance amendment.

The amended OLDS ordinance will include supplemental provisions for the Taylorsville and Dolington areas that will include, but not be limited to, the following:

i. Increasing the frequency of septic tank pumping from three to two years.

ii. Requiring pumper/inspector reports to be submitted to the Township within fifteen days of the work being completed, regardless of whether problems are noted by the pumper/inspector. The Township will enter these reports into a database that will be created as part of the OLDS Conditions Monitoring Program to be established for the Taylorsville and Dolington areas.

iii. Requiring property owners to perform annual inspections/assessments of the existing OLDS serving their properties utilizing the Property Owner Inspection Report Form developed by the Township. The Township will enter the results of these reports into the OLDS Conditions Monitoring Program database.

iv. Implementing requirements for replacement of existing plumbing fixtures with low-flow/usage fixtures in conjunction with any plumbing repairs/upgrades performed on any property within the special sewage management program districts.

We note that the final draft of the OLDS ordinance amendments will ultimately be adopted by the Township Board of Supervisors upon their consideration of comments provided by outside reviewing agencies, as well as the public. Please provide DEP with a copy of the final enacted amended OLDS ordinance.

3. Taylorsville Area Only

The Township will evaluate the effectiveness of the increased operation and maintenance requirements on the performance of OLDS within the Taylorsville area by performing an updated OLDS survey.

4. Dolington Area Only

The Township has committed to conduct additional sewage facilities planning to address the long-term sewage disposal needs of the Dolington area. This planning effort will refine/reassess the currently preferred long-term sewage disposal alternative, reassess all currently identified long-term sewage disposal alternatives and identify any new alternatives that may be available based upon changes in current conditions and/or technology that may potentially occur over the short-term planning period.

We request that the subsequent planning effort include an analysis, supported by data that shows long-term user costs for similar systems in terms of size and treatment components. The Township may not construct the preferred alternative until additional planning is approved by DEP and all necessary permits have been obtained.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800.654.5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in braille or on audiotape from the Secretary to the Board at 717.787.3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717.787.3483) FOR MORE INFORMATION.

If you have any questions or concerns, please contact Ms. Kelly Boettlin at the 484.250.5184.

Sincerely,

Jennifer Fields, P.E.
Regional Manager
Clean Water

cc: Bucks County Planning Commission
Bucks County Health Department
Bucks County Conservation District
Mr. Zarko – CKS Engineers, Inc.
Planning Section
Re 30 (GJE15CLW)253

TOWNSHIP OF UPPER MAKEFIELD, BUCKS COUNTY, PENNSYLVANIA

ACT 537 SEWAGE FACILITIES PLAN UPDATE

SUPPLEMENTAL INFORAMTION SUBMISSION

DATED

JULY 21, 2015

CKS Engineers, Inc.
88 South Main Street
Doylestown, PA 18901
215-340-0600 • FAX 215-340-1655

David W. Connell, P.E.
Joseph J. Nolan, P.E.
Thomas F. Zarko, P.E.
James F. Weiss
Patrick P. DiGangi, P.E.
Ruth Cunnane

July 21, 2015
Ref:# 6700-78

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Commonwealth of Pennsylvania
Department of Environmental Protection
Southeast Regional Office
2 East Main Street
Norristown PA 19401

Attention: Kelly Boettlin, Sewage Planning Specialist 2

Reference: Township of Upper Makefield, Bucks County, Pennsylvania
Act 537 Sewage Facilities Plan Update
Supplemental Information

Dear Ms. Boettlin:

As a follow up to our June 25, 2015 meeting concerning the Upper Makefield Township Act 537 Sewage Facilities Plan Update (Act 537 Plan Update) that was previously submitted to the Department for review, we hereby provide the following supplemental information/ documentation for your review and consideration:

1. **PROPOSED PROTOCOL FOR MONITORING AND ASSESSMENT OF ON-LOT SEWAGE DISPOSAL SYSTEMS (OLDS) WITHIN THE TAYLORSVILLE AND DOLINGTON AREAS WITHIN THE SHORT-TERM (5 YEAR) PLANNING PERIOD.**

As outlined within the Act 537 Plan Update, the Township intends to address the short-term sewage disposal needs of both the Taylorsville and Dolington areas by improving the performance of existing OLDS, primarily though the promotion of water conversation and increased system oversight/maintenance requirements that will be effectuated by an amendment of the Townships OLDS Ordinance to incorporate additional maintenance provisions specific to these areas. Some of the envisioned amendments specific to the Taylorsville and Dolington areas would include:

- Increasing the frequency of septic tank pumping from three to two years;
- Requiring the completion of an OLDS Condition Inspection Report by the septic hauler at the time of septic tank pumping with the property owners subsequently forwarding the report to the Township for review. The Township will log the

septic hauler reports into a database which will be created as part of the OLDS Conditions Monitoring Program that will be established for the Taylorsville and Dolington areas;

- Requiring all property owners within the Taylorsville and Dolington areas to perform an annual inspection/assessment of their OLDS based upon a standard inspection report form that will be developed by the Township. The Property Owner Inspection Reports will be submitted to the Township for review and will be incorporated into the overall database noted above;

- Implementing requirements for replacement of existing plumbing fixtures with low-flow/usage fixtures in conjunction with any plumbing/repairs/upgrades performed on a property within the Taylorsville and Dolington areas.

It is expected that the OLDS Ordinance Amendments summarized above will increase a property owner's awareness of OLDS Operation and Maintenance Requirements, which will in turn result in improved performance of the systems. In addition, the Township intends to conduct educational/informational sessions concerning OLDS Operation and Maintenance issues that would be available to all Township residents which will further increase property owner awareness and improve the performance of existing OLDS.

During the short term planning period, the Township intends to monitor OLDS operational conditions in both the Taylorsville and Dolington areas by maintaining the database mentioned above and periodically interfacing with the Bucks County Health Department, (BCHD) to obtain any available information /feedback concerning OLDS conditions within these areas.

At the conclusion of the short-term planning period, the Township intends to perform an updated OLDS Survey within the Taylorsville Area, similar in scope with the OLDS Survey that was completed as part of the Act 537 Plan Update process, to confirm the effectiveness of the increased operation maintenance requirements on the performance of OLDS in the area.

With regard to the Dolington area, the Township expects that the increased operation and maintenance requirements summarized above will effectively address the short term sewage disposal needs of the area, but will not address long-term sewage disposal needs due to several factors that are outlined within the Act 537 Plan Update. To that end, at the commencement of the long-term (10-year) planning period, the Township will initiate supplemental planning for the Dolington Area including the reassessment of the long term sewage disposal alternatives that are currently identified within the Act 537 Plan Update, as well as, assess any new alternatives that may be available based upon changes in current conditions and / or technology that may occur over the short-term planning period, select the long-term sewage disposal alternative that is to be implemented, and subsequently initiate the administrative, legal, engineering, and procedural efforts required to implement the selected alternative.

2. PROPOSED AMENDMENTS TO THE TOWNSHIPS OLDS ORDINANCE

As noted above, the Township intends to incorporate amendments to its existing OLDS Ordinance during the short-term planning period to improve the performance of existing OLDS within the Taylorsville and Dolington areas. The OLDS Ordinance amendment process will be initiated as one of the primary measures in the short- term planning period and will involve; preparation of the draft ordinance amendments, distribution to the Bucks County Planning Commission, BCHD and Township Planning Commission for review/comment, releasing for public input /feedback and final adoption by the Board of Supervisors at a public meeting. It is anticipated that the first draft of the OLDS Ordinance Amendments will evolve into a final version that will ultimately be adopted by the Board of Supervisors by virtue of the comments/feedback that is provided by the outside reviewing agencies as well as the public. Nevertheless, as requested by the Department, we have attached to this letter a preliminary draft of the potential amendments to the Townships OLDS Ordinance addressing the supplemental OLDS Operation and Maintenance requirements specific to the Taylorsville and Dolington Areas envisioned with the Act 537 Plan Update. As noted above, it should be stressed that the enclosed Preliminary Draft OLDS Ordinance Amendment is expected to change as a result of the regulatory agency and public vetting process noted herein.

3. SUPPLEMENTAL DETAILS CONCERNING THE PREFERRED LONG-TERM SEWAGE DISPOSAL ALTERNATIVE FOR THE DOLINGTON AREA

As noted within the Act 537 Plan Update , the preferred long-time sewage disposal alternative identified for the Dolington Area includes the installation of a Septic Tank Effluent Pumping (STEP) system on each property, which would discharge to a wastewater collection system within the Dolington Area and flow to a centralized secondary treatment system located within the unimproved portion of the existing Balderston Drive right-of-way. The envisioned layout of the sewerage facilities proposed in conjunction with this alternative are illustrated on Figure 28 of the Act 537 Plan Update (copy attached). The primary components of the aforementioned sewerage facilities would include:

A. STEP System

A new multi-compartment septic tank with a final low pressure effluent pump compartment (refer to attached detail) would be installed to accommodate the wastewater generated at each property within the Dolington Area. The septic tank would function similar to that utilized in conjunction with a conventional OLDS by separating/treating solids at each property and discharging clarified effluent to the final pumping chamber of the tank. The operation and maintenance of the STEP System would be the responsibility of the property owner and would require that solids be removed from the septic tank compartments periodically as is the current procedure with their existing OLDS. The clarified effluent from the STEP System would be pumped into a collection system that would be installed within the existing road right-of-way that abuts each property.

Although it would be feasible to reuse the existing septic tank at each property and install auxiliary pumping equipment, due to concerns regarding the condition of the existing tanks which could result in the introduction of inflow/infiltration into the sewer system, the preferred alternative includes the replacement of the septic tank at each property. The cost for the septic tank replacement was factored into the on-lot costs for this alternative that is presented within Table 14 of Act 537 Plan Update.

B. Wastewater Colletion System

The Wastewater Collection System would include an underground piping network consisting of common conveyance lines and individual laterals that would be extended to each property, all of which would be located within existing roadway rights-of-way abutting the properties. The collection system would function similar to a Low Pressure Sewer System with the exception that minimal solids would be introduced into the pipng network as solids removal would be performed at the STEP System located on each property. All components of the wastewater collection system would be owned, operated, and maintained by the Township.

C. Centralized Secondary Treatment System

The currently envisioned location of the Centralized Secondary Treatment System would be in the unimproved section of the existing Balderston Drive right-of-way located at the northeasterly side of the Dolington Area. The treatment system would include a packed bed filter design, using a textile fabric as the treatment media. The treatment system would include initial treatment via re-circulation through filter media beds followed by subsequent polishing through a denitrification reactor. Final treatment of effluent would be provided by the use of ultraviolet disinfection prior to discharge to the existing receiving stream at the terminus of Balderston Drive. All of the components of the treatment system would be completely or partially in-ground structures, with only a relatively small chemical storage/feed shed and sound attenuated emergency generator being at-grade installations (refer to attached photograph). All components of the centralized secondary treatment system would be owned, operated, and maintained by the Township. Considering the fact that the treatment system would not include solids processing/handling due to the fact that this is performed by the functioning of the individual STEP Systems, potential odor concerns regarding the functioning of the facility would be minimal. It is anticipated that the treatment system will be wholly enclosed by decorative security fencing and would be fully buffered from adjacent properties. A more detailed conceptual sketch illustration the layout of the secondary treatment system is attached.

As noted in the Act 537 Plan Update, during the initial stage of the long-term planning period, the Township will re-assess all currently identified long-term sewage disposal alternatives, identify any new alternatives that may be available based upon changes in current conditions and/or technology that may potentially occur over the short term planning period and initiate the implementation of the ultimately selected long-term sewage disposal alternative for the Dolington Area. This supplemental planning assessment could very well result in a change in the design, location, etc, of the currently envisioned centralized treatment system to further reduce potential impacts to properties within the area.

4. IMPLEMENTATION SCHEDULE

As requested by the Department, we have amended the format of the Implementation Schedule that was contained within the Act 537 Plan Update from a "date specific" activity schedule to a schedule based upon a time-line commencing on the date of PADEP planning approval. A copy of the amended implementation schedule is attached.

If you should have any questions concerning the supplemental information outlined above and attached hereto, or if you have any additional questions concerning the prior submission of the Act 537 Plan Update, please do not hesitate to contact me.

Very truly yours,
CKS ENGINEERS, INC.
Township Water/Sewer Consultants

Thomas F. Zarko, P.E.

Enclosure

cc: David Nyman, Interim Township Manager
Mary Eberle, Esq. Township Solicitor
Dave Kuhns, Director of Planning and Zoning
Elizabeth Mahoney, PADEP
File

PRELIMINARY DRAFT

POTENTIAL OLDS ORDINANCE AMENDMENTS

PRELMINARY DRAFT
CHAPTER 18

SEWERS AND SEWAGE DISPOSAL

TABLE OF CONTENTS

PART 1

ONLOT DISPOSAL SYSTEMS

A. GENERAL PROVISIONS.

§101. TITLE

This Part shall be known as the "Upper Makefield Township Onlot Disposal System (OLDS) Management Ordinance."

(Ord. 143 8/17/1988, §101)

§102. STATEMENT OF FINDINGS.

The Board of Supervisors of Upper Makefield Township finds that:

1. Inadequate management of individual and community onlot sewage disposal systems increases surface water pollution, ground water contamination, the potential of public health problems and general nuisance conditions.
2. A comprehensive and reasonable program of onlot disposal system (OLDS) management regulations is fundamental to the public health, safety and welfare and to the protection of present and future residents and the environment of Upper Makefield Township.

(Ord. 143, 8/17/1988, §102)

§103. PURPOSE.

The purpose of this Part is to promote the public health, safety and welfare by minimizing the problems described in §102.1 of the Part b:

1. Review of OLDS plans for conformance with the Township's Official Sewage Facilities Plan (Act 537 Plan) and regulations and ordinances enacted to implement the Act 537 Plan.
2. Enactment and implementation of this and appurtenant ordinances concerning holding tanks and water conservation and sewage flow reduction.
3. Development and implementation of a public education program to supplement the public assurance program.
4. Giving force and effect to the policies adopted in the Official Act 537 plan of Upper Makefield Township.

(Ord. 143, 8/17/1988, §103)

§104. ADOPTION; AUTHORITY; APPLICABILITY.

The Board of Supervisors of Upper Makefield Township, Bucks County, Pennsylvania, pursuant to the Clean Streams Law of Pennsylvania (Act 394 of June 22, 1937, P.L. 1987, as amended), the Pennsylvania Sewage Facilities Act (Act 537, of January 24, 1966, P.L.1535, as amended, 35 P.S. §750.1 *et seq.*.), and the Second Class Township Code (53 P.S. §§65727, 65729 & 66951), hereby enacts and ordains this Part as the "Upper Makefield Township Onlot Disposal System (OLDS) Management Ordinance." This Part shall apply to all onlot sewage systems as defined in §112 of this Part. No requirement of this Part shall preempt the functions, duties, and jurisdiction of the Bucks County Department of Health (BCDH), the Clean Streams Law, or BCDH rules and regulations of OLDS.

(Ord. 143, 8/17/1988, §104)

§105 RIGHT-OF-ENTRY.

After giving adequate notice and upon presentation of proper credentials, the Code Enforcement Officer of Upper Makefield Township may enter at reasonable times upon any property within the Township to investigate or ascertain the condition of and OLDS on the Property.

(Ord. 143, 8/17/1988, §105; as amended by Ord. 186, 12/6/1995)

§106. COMPATIBILITY WITH OTHER PERMITS AND ORDINANCES.

Operation and maintenance agreements executed pursuant to this Part do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other applicable code, rule, act or ordinance.

(Ord. 143, 8/17/1988, §108)

§107. MUNICIPAL LIABILITY.

Nothing in this Chapter shall relieve the owner of a property on which an OLDS is located of responsibility to those adversely affected by the operation and maintenance of the OLDS. Further, the Township assumes no responsibility to either the developer, the homeowner, the adjoining property owner, or any other person or entity affected by operation of an OLDS on property not owned by the Township.

(Ord. 143, 8/17/1988, §109)

B. DEFINITIONS.

§111. GENERAL.

Words used in the singular include the plural and words used in plural include the singular. The word "building" shall be construed as if followed by the words "or parts thereof". The word "may" is permissive; the words "shall" and "will" are mandatory.

(Ord. 143, 8/17/1988, §201)

§112. DEFINITIONS.

The following words and terms, when used in this Part, shall have the following meanings, unless the context clearly indicates otherwise:

ABSORPTION AREA – A component of an individual or community sewage system where liquid from a treatment tank seeps into the soil; it consists of an aggregate-filled area containing piping for the distribution of liquid and the soil or sand/soil combination located beneath the aggregate. This area can also consist of a drip irrigation or spray irrigation field.

ALTERNATE SEWAGE SYSTEM – a system employing the use of demonstrated technology as outlined in the most current alternate systems guidance by the PADEP.

AEROBIC UNIT – a mechanically aerated treatment tank that provides aerobic biochemical stabilization of sewage prior to its discharge to an absorption area.

APPLICANT – a landowner, as herein defined, or agent of the landowner, who has filed an application for an operation and maintenance agreement.

BCDH – acronym for the Bucks County Department of Health, the local agency in the County of Bucks responsible for enforcing the rules and regulations of the PADEP regarding sewage facilities, Pa. Code Title 25 Chapters 71, 72, and 73 promulgated thereunder.

BUILDING – any structure, either temporary or permanent, having walls and a roof, designed or used for the shelter of any person, animal or property, and occupying more than one hundred (100) square feet of area.

COMBINED INDIVIDUAL AND COMMUNITY SYSTEMS – within a given group of buildings and/or lots, the use, where feasible, of onlot disposal systems (OLDS), and for lots not suitable for OLDS, the incorporation of the sewage from two (2) or more of the unsuitable lots into a community sewage system in order to meet the sewage treatment/disposal needs of the area.

COMMUNITY SEWAGE SYSTEM – any system, whether publicly or privately owned, for the collection of sewage from two (2) or more lots and for the treatment or disposal of the sewage on one (1) or more of the lots, or at any other site.

COMMUNITY SUBSURFACE SYSTEM – a community sewage system that employs any of the several types of aggregate-filled sewage effluent absorption areas installed below original soil grade level, or, in the case of an elevated sand

mound, installed above original grade with ultimate percolation into the original soil. This can also be a drip irrigation field.

CONSOLIDATED COMMUNITY SYSTEMS – the combination of two (2) or more community systems.

CONSTRUCTION ESCROW – financial security posted by the property owner or agent of the property owner and held by the Township or a third party (under an agreement with the Township) for the purpose of guaranteeing that the construction of a sewage system is completed and properly done.

CONVENTIONAL SUBSURFACE ABSORPTION SYSTEMS – any of several types of aggregate-filled sewage effluent absorption areas installed below original soil grade level, or, in the case of an elevated sand mound, installed above original grade with ultimate percolation into the original soil.

DEVELOPER – any landowner, agent of such landowner or tenant with the permission of such landowner who makes or causes to be made a subdivision or land development.

ELEVATED SAND MOUND – a type of above-ground absorption area consisting of a level layer of sand between the surface of the natural soil and an aggregate distribution area to insure adequate renovation of sewage effluent

EXPERIMENTAL SEWAGE SYSTEM – any method of sewage disposal not described in the PADEP Title 25 rules and regulations, but authorized by the PaDEP for the purpose of testing and observation, as well as the most current alternate systems guidance by the PADEP.

FINANCIAL SECURITY – funds guaranteed or held in escrow accounts in Federal or common charted lending institutions or irrevocable letters of credit issued by such institution.

HOLDING TANK – a watertight receptacle, whether permanent or temporary, which receives sewage via a water-carrying system and retains sewage and is designed and constructed to facilitate ultimate disposal of the sewage at another facility.

HOMEOWNERS' ASSOCIATION – a nonprofit or for-profit corporation controlled by a board of directors which administers by-laws and rules and regulations governing all and/or common area in a residential development.

INDIVIDUAL RESIDENTIAL SPRAY IRRIGATION SYSTEM (IRSIS) – an individual sewage system which serves a single dwelling and which treats and disposes of sewage using a system of piping, treatment tanks and soil renovation through spray irrigation.

INDIVIDUAL SEWAGE SYSTEM – a system of piping, tanks, or other facilities serving a single lot and collecting and disposing of sewage in whole or in part into the soil or into any waters of the Commonwealth or by means of conveyance to another site for final disposal.

INDUSTRIAL WASTE – any liquid, gaseous, radioactive, solid or other substance resulting from manufacturing, industry or other operations which is not sewage. The term shall include all such substances whether or not generally characterized as waste. These shall not be discharged to any onlot disposal system.

LAGOON (SEWAGE LAGOON) – any of the several different types of sewage stabilization ponds or oxidation ponds employed to treat sewage by aerobic

and/or anaerobic decomposition. Lagoons are generally followed by land application or stream discharge of effluent.

LAND DEVELOPMENT – the improvement of one (1) lot or two (2) or more contiguous lots, tracts or parcels of land for any purpose involving:

(a) a group of two (2) or more residential or nonresidential buildings whether proposed initially or cumulatively, or a single nonresidential building on a lot or lots regardless o the number of occupant or tenure, including any additions to existing nonresidential buildings or conversions of residential to nonresidential buildings with additions, or (b) the division or allocation of land or space, whether initially or cumulatively, between or among two (2) or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups or other features or

(b) a subdivision of land

LARGE VOLUME ONLOT SEWAGE SYSTEM – an individual or community onlot sewage system with design capacity to discharge subsurface sewage flows that are in excess of ten thousand (10,000) gallons per day. These systems require a Water Quality Management Permit issued by PADEP.

LOT – a part of a subdivision or a parcel of land used as a building site or intended to be used for building purposes, whether immediate or future, which would not be further subdivided.

MANAGEMENT AGENCY – an entity, either private or public, formed for the purpose of managing water and/or wastewater facilities. Types of management agencies include municipal authorities, municipal governing bodies, private corporations, private engineering or technical service firms, etc.

MUNICIPALITY – a city, incorporated town, township or borough.

NONSEWERED APPROACH – limiting the expansion of centralized wastewater facilities by encouraging onlot disposal systems (OLDS) where feasible and economical.

OFFICIAL ACT 537 PLAN – a comprehensive plan for the provision of adequate sewage systems adopted by a municipality or municipalities possessing authority over the provision of such systems and submitted to and approved by the Department as provided by the Pennsylvania Sewage Facilities Act 537 and Chapter 71, Rules and Regulations, promulgated thereunder.

ONLOT DISPOSAL SYSTEM (OLDS) – a system of piping, tanks and/or other components serving a residence or establishment, usually on a single lot, by collecting, treating and disposing of sewage in whole or in part into the soil or into waters of this Commonwealth.

OLDS MANAGEMENT PROGRAM – a method of managing onlot sewage disposal systems (OLDS) which has as its general goal the installation of sound OLDS and the assurance that new and existing OLDS are properly operated and maintained.

OPERATION AND MAINTENANCE AGREEMENT (O&M)- An agreement regulating the operation and maintenance of an OLDS.

PADEP – acronym for the Pennsylvania Department of Environmental Protection which is a cabinet level agency with broad authorities granted by legislation to

protect Pennsylvania's many environmental resources. The PADEP is responsible for overseeing the plans, designs, and construction of wastewater treatment facilities throughout the State.

PERFORMANCE GUARANTEE – Financial Security accompanied by a written promise to pay the Township a sum of money to secure the performance of an installed sewage system. The purpose of such a performance bond is to guarantee proper function, operation and maintenance of such a system for a specified period of time.

PERSON – any individual, partnership, company, association, corporation or other group or entity.

PRESSURIZED DISTRIBUTION – a network of piping within an absorption area such as an elevated sand mound, through which treated sewage effluent is pumped to assure equal distribution throughout the absorption area.

PROOF OF PUMP-OUT – method by which a property owner verifies that his/her onlot sewage system has been cleaned to remove septage.

PROPERTY OWNER – the legal, beneficial, equitable owner or owners of land, including the holder of an option or contract to purchase (whether or not such option or contract is subject to any conditions), a lessee (if he is authorized under the lease to exercise the rights of the landowner), or any other person having a proprietary interest in land.

PROPERTY OWNERS ASSOCIATION – a for-profit or nonprofit corporation controlled by a board of directors which administers bylaws and rules and regulations governing all lots and/or common area (open space) in a nonresidential development such as an industrial park.

PUBLIC ASSURANCE PROGRAM – that part of an OLDS management program which, through an onlot system inspection process, seeks to ensure that individual and community sewage systems are operated and maintained properly.

RURAL RESIDENCE – a structure occupied or intended to be occupied by not more than two (2) families on a tract of land of ten (10) acres or more.

SAND FILTRATION WITH STREAM DISCHARGE – a type of domestic sewage treatment and disposal system, used where soil absorption of effluent is not possible, which utilizes a septic or aerobic tank followed by a sand filter and disinfection before discharge of treated effluent to a drainage way.

SECOND CLASS TOWNSHIP CODE – Pennsylvania Statute 53 (53 P.S. §65101 *et seq.*) outlining laws relating to townships of the second class. The act as amended became effective July 1, 1947.

SEEPAGE BED – a type of subsurface absorption area that is more adaptable to limited space than are standard trench systems.

SEPTAGE – the residual scum and sludge pumped from septic systems.

SEPTIC TANK – a sewage treatment tank that provides for anaerobic decomposition of sewage prior to discharging effluent to an absorption area.

SEWAGE – a substance that contains the waste products or excrement or other discharge from the bodies of human beings or animals; a substance harmful to the public health, to animal or aquatic life, or to the use of water for domestic

water supply or for recreation; or a substance which constitutes pollution under The Clean Streams Law (35 P.S. §§691.1-691.1001).

SEWAGE ENFORCEMENT OFFICER (SEO) – the Bucks County Department of Health official who issues and reviews permit applications and conducts such investigations and inspections as are necessary to implement Chapter 71 ("Administration of Sewage Facilities Planning Program), and Chapter 73, (Standards for Sewage Disposal Facilities).

STANDARD TRENCH SYSTEM – a type of absorption area consisting of two (2) or more trenches which are twelve (12) to thirty-six (36) inches deep, one (1) to six (6) feet wide, a maximum of one hundred (100) feet long and adequately spaced apart to allow for the uniform spreading of effluent over the entire absorption area.

STREAM DISCHARGE SYSTEM – any of the several types of sewage systems which ultimately dispose of treated effluent into the surface waters of the Commonwealth. Such systems require a permit from the PADEP.

SUBDIVISION – the division or redivision of a lot, tract or other parcel of land into two (2) or more lots, tracts, parcels or other divisions of land including changes in existing lot lines for the purpose, whether immediate or future, of lease, transfer of ownership or building or lot development; provided, however, that the subdivision by lease of land for agricultural purposes into parcels of more than ten (10) acres, not involving any new street or easement of access or residential dwellings, shall be exempted.

TOWNSHIP – Upper Makefield Township, Bucks County, Pennsylvania.

WATERCOURSE – a permanent or intermittent stream, river, brook, creek, run, channel, swale, pond, lake or other body of water, whether natural or manmade, for gathering or carrying surface water.

WATERS OF THIS COMMONWEALTH – rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, ponds, springs and all other bodies or channels of conveyance of surface and underground water or any of their parts, whether natural or artificial within or on the boundaries of this Commonwealth.

(Ord. 143, 8/17/01988, §202)

C. PROGRAM REQUIREMENTS AND POLICIES.

§121. GENERAL.

The following programs are hereby enacted to effect improved onlot disposal system (OLDS) installation, operation and maintenance. These programs apply to both existing and new OLDS in conjunction with appurtenant ordinances as outlined in §103 of this Part.

(Ord. 143, 8/17/1988, §301)

§122. OLDS PLANNING POLICIES.

1. The Township Planning Commission shall review all subdivision/land development plans containing OLDS system design and layout details for conformance with the Official Sewage Facilities (Act 537) Plan, this Part, and all applicable ordinances. In addition to this general planning function, all Township officials (e.g., Supervisors, Planning Commission, Zoning Officer, building inspector, etc.) shall include the provisions of the OLDS program in their respective duties and functions.
2. Onlot sewage disposal systems shall be encouraged wherever feasible and economical throughout Upper Makefield Township. The following OLDS planning policies foster the non-sewered approach and the conservation of ground water resources:
    a) Limit expansion of existing centralized sewage facilities by encouraging onlot systems.
    b) Maintain OLDS ownership with the individual property owner, homeowners' association or developer.
    c) Encourage the use of innovative sewage facilities that reduce water consumption and sewage generation.
    d) Recycle sewage by relying upon individual OLDS and community OLDS for groundwater recharge via either subsurface or surface disposal of treated sewage effluent.
    e) Promote subsurface disposal of effluent wherever possible.
    f) Restrict community subsurface systems to pressurized distribution systems.
    g) Encourage water conservation and sewage flow reduction by the use of water saving devices, non-water toilets, sewage effluent recycling and reuse, and other state-of-the-art water conservation methods.
    h) Require, via a separate water conservation ordinance, that all newly constructed residential, commercial, industrial, agricultural, recreational, governmental, or public buildings or structures of any kind have installed water saving fixtures. Such fixtures will reduce the quantity of water required to flush toilets and will reduce the flow rates of showers and faucets.

(Ord. 143, 8/17/1988, §302)

§123. MANAGEMENT OF ONLOT DISPOSAL SYSTEMS (OLDS).

The organizational format for OLDS management in Upper Makefield Township is outlined in Table 1 of this Part.

1. System Ownership and Maintenance. All individual OLDS shall be owned and maintained by the property owner. All community OLDS shall be: a) offered for dedication to the Township; or b) agency designated by the Township or owned and maintained by a homeowners' association. The operator of all community sewage facilities must be licensed by PADEP.

2. Financial Requirement. Financial requirements for all new systems shall be as follows:

   a) Individual conventional subsurface systems. None required.

   b) Individual Residential Spray Irrigation Systems (IRSIS), individual small flow stream discharge systems, and individual alternate and experimental systems. Three thousand dollar ($3,000.00) performance guarantee for the life of the system to be deposited with the Township by system owner. The escrow shall be replenished as required in a maintenance agreement governing the escrow executed prior to the installation of the OLDS.

   c) Community Systems (All Types) Construction Escrow. One hundred ten (110%) percent of the estimated construction cost as approved by the Township Engineer. This escrow is to be held until construction is completed to the satisfaction of the Township Engineer.

   d) Community Systems (All Types) Performance Guarantee. (i.e., Operation and Maintenance (O&M) Fund) – A cash escrow in an amount equal to two times the estimated annual O&M to be retained by the Township for the life of the system. The escrow shall be replenished as required in an O & M Agreement executed prior to the start of construction,

3. Township's Right of Entry. Township, for the purpose of examining the system, has right to enter at reasonable times upon any premises in the Township upon which there is suspected to be any nuisance or public health hazard, or threat to the public, health, safety and welfare.). (53 P.S. §66957)

4. Required Pumping and Inspection of OLDS.

   a) All onlot disposal systems utilizing a septic tank as a primary treatment unit shall be pumped on the following schedule at a minimum:

      1) Individual Subsurface Systems. Once every three (3) years. Additionally, the system shall be pumped out more frequently if required per the pumper/inspector recommendations.

      2) IRSIS. Annually, or as otherwise specified in the Township O&M Agreement.

      3) Community Systems (all types). Annually, or as otherwise specified in the Township O&M Agreement.

      4) Alternate and Experimental Systems. Annually, or as otherwise specified in the Township O&M Agreement.

   b) All aerobic unit systems shall be inspected annually for proper operation and certified to be in good working order.

5. OLDS Pumping and Inspection Procedures.

   a) It is the responsibility of the property owner to have a Township registered pumper/inspector perform the necessary work. A list of registered pumpers/inspectors can be obtained from the Township.

b) A Pumper/Inspector Report (See Appendix B) must be completed during every site visit by an Upper Makefield Township licensed pumper/inspector and given to the property owner as proof of pump-out. In the event that cracks, leaks, inoperable baffles, or a system malfunction are found by the pumper or inspector, both the Pumper/Inspector and property owner must submit the Pumper/Inspector Report to Upper Makefield Township within fifteen (15) days of the work being completed. The Township will submit a copy of the Report to the BCDH for their records when a system malfunction is documented. The damage or malfunction must be repaired within sixty (60) days and the property owner must submit a certification by the person performing the repairs that the repairs have been completed. If the sixty (60) day time limit met, the property owner may request relief from the time requirement. The request for relief may, at the option of the Township, be granted if the property has shown good cause for the delay and if the property owner has demonstrated that the repairs will be made at the earliest possible opportunity.

c) The following procedure shall be utilized in pumping and inspecting an onlot disposal system utilizing a septic tank as a primary unit:

1) Locate the septic tank and the absorption areas (tile field trenches, seepage pits, elevated sand mound, etc.)

2) Locate the septic tank cleanout manhole and excavate around the cover to prevent soil from falling into the tank when the cover is removed. The owner shall be responsible to have the clean out manhole excavated whether by the sewage hauler or otherwise.

3) Remove clean out manhole cover. Break up scum in the tank and pump out a portion of the material in the tank. The inspection port over the baffle shall not be pumped out as this may damage the baffle and will not permit the tank contents to be thoroughly mixed for pumping.

4) Re-inject the pumped liquid back into the tank to further break up the scum and mix the sludge at the bottom of the tank with the liquid. Pump out the mixed material.

5) Repeat subsection (4) until the tank is pumped out, i.e./sludge and scum removed.

6) Inspect the empty tank for cracks, leaks, deterioration and missing baffles. The tank shall not be entered for the purpose of inspection. A mirror and light may be helpful to see inside the tank. Note any problems with the tank. Acid or chemical cleaner shall not be used in the tank.

7) Replace the manhole cover carefully and securely.

8) If the clean-out manhole is buried deeper than a foot, risers shall be installed over the clean out manhole and inspection port to facilitate future cleaning and inspection. The riser clean out manhole should be twenty-four (24) inches in diameter.

9) Backfill over the cover or around the riser.

10) Make a visual inspection of the disposal area for seepage, breakouts, etc., and note any problems.

11) Inform the property owner of any problems encountered with any of the components of the system and, if possible, suggest corrective measures.

12) Clean up any spillage. Dispose of the septage at any PADEP approved disposal site.

d) Aerobic systems may not need to be pumped, but shall be inspected by a qualified person to determine that they are in good working order.

6. Registration of Sewage Haulers and Inspectors.

a) Annual Registration Required. No sewage hauler, including those persons delivering, picking up and cleaning portable sanitary facilities, or inspector of aerobic systems shall engage in business within the Township or offer such service within the Township without first registering with the Township, on forms hereinafter provided from the Code Enforcement Office.

b) Application for Registration. Applications for registration issued hereunder shall be made upon forms prepared and made available by the Township Code Enforcement Office which shall state at a minimum:

1) The personal name, home address, and business name and address, if any, of the applicant, and type of business organization under which the business is operated (i.e. sole proprietor, partnership, corporation).

2) For sewage haulers, the location, description, and listing of the sewage hauling trucks owned, leased or operated by the applicant.

3) Experience and training of the operators of the vehicles proposed for licensing or the inspectors.

4) For sewage haulers, the BCDH license issued pursuant to §4 of the BCDH Rules and Regulations Governing Individual Sewage Disposal for the sewage transportation vehicle or vehicles being used.

5) Name, address, policy number, expiration date and policy limits of applicant's liability insurance policies.

6) Such other information as the Code Enforcement Office shall find reasonably necessary to effectuate the purpose of this Part and to fairly determine the applicant's compliance with the terms of this part.

7) The disposal site for septage is a PADEP or NJDEP licensed facility.

c) Minimum Standards. Each sewage hauler/inspector registering with the Township, except persons who are registering to deliver, pick-up and/or clean portable sanitary facilities shall submit proof that:

1) The sewage hauler/inspector has pumping equipment which is capable of reversing flow or re-injecting pumped material back into the tank to thoroughly mix the sludge and scum into pumped liquid.

2) Each vehicle carries a mirror or reflecting device and an appropriate light source for inspecting tanks.

d) Insurance Policies. Sewage hauler/inspector shall deliver to the Code Enforcement Office certification of a general public liability policy in a minimum amount of One Million Dollars ($1,000,000.00) which policy shall be effective for a period of one (1) year from the date of the application. The Township shall be named as an additional insured on the insurance certificate.

e) A sewage hauler or inspector who registers with the Township shall agree in writing to abide by the regulations and procedures of this Part.

f) Revocation of Status of Registered Sewage Hauler/Inspector. The Township may revoke the registration made hereunder if the registration was made fraudulently, or by making a false statement or statements of a material fact, which, if disclosed at the time of the registration would have disqualified the registrant. The Township may also revoke a registration if the sewage hauler/inspector violates the regulations and procedures of PADEP, BCDH or of this Part.

g) Registration under this Part shall not confer upon the sewage hauler/inspector any status as an employee or independent contractor of the Township, and payment for services rendered to the sewage hauler/inspector shall be by the owner, operator or custodian of the system being pumped.

7. Special Sewage Management Program Districts

a. The Bucks County Health Department has identified the following areas within the Township as "Needs Areas" with history or malfunctioning OLDS.

- Taylorsville Area
- Dolington Area

The boundaries of these Needs Areas, hereinafter referred to as Special Sewage Management Program (SSMP) Districts, along with an identification of the Properties contained therein, are attached hereto within Appendix C.

b. The Official Act 537 Plan includes supplemental provisions specific to the SSMP Districts beyond those proposed in the preceding sections of this Ordinance to improve the performance of the existing OLDS in these districts. These supplemental provisions include the following:

1. The frequency of Septic Tank Pumping as noted in Section 123.4.a.1 of this Ordinance shall be increased to once every two (2) years within the SSMP Districts

2. The Pumper/Inspector Report referenced in Section 123.5.b of this Ordinance shall be submitted to the Township within fifteen (15) days of the work being completed within the SSMP Districts, whether or not problems with the OLDS are noted by the Pumper/Inspector.

3. Property owners within the SSMP Districts shall perform an annual inspection/assessment of the existing OLDS serving their property utilizing the Property Owner Inspection Report Form developed by the Township (See Appendix D). The OLDS inspection/assessment shall be performed during the months of March, April, or May of the given year. The Property Owner Inspection Report form must be submitted to the Township by no later than June 15th of the given year.

4. Low Flow/Usage Plumbing Fixtures shall be used in conjunction with any plumbing repairs/upgrades performed on any property within the SSMP Districts.

5. Notwithstanding the supplemental provisions outlined within Section 123.7.b above, all other aspects of Section 123 of this Ordinance apply to properties within the SSMP Districts.

(Ord. 143, 8/17/1988, §303)

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D. OPERATION & MAINTENANCE AGREEMENT PROCEDURES AND REQUIREMENTS.

§131. GENERAL

In accordance with §104 of this Part, an onlot disposal system (OLDS) as defined in Table 1 of this Part requiring an Operation and Maintenance Agreement (O&M) shall not be installed nor shall any building be occupied until an OLDS O&M Agreement in a form deemed acceptable by the Township has been executed by the Township. The applicant for a building permit for any subdivision or land development, which will utilize such an OLDS shall submit to the Township an OLDS O&M Agreement prior to filing of a building permit application.

(Ord. 143, 8/17/1988, §401)

§132. APPLICATION PROCEDURE.

To meet the requirements of §131, an OLDS O&M Agreement shall be submitted to the Upper Makefield Township Code Enforcement Office on any business day.

1. The Code Enforcement Office shall forward one (1) copy of the O&M Agreement to the Township Engineer and Solicitor for review and comment. (Ord. 186)
2. The Code Enforcement Office may review the O&M Agreement with the Township Planning Commission, Township Engineer, Township Solicitor and other municipal officials in order to determine approval, conditional approval or disapproval of the Agreement. (Ord. 186)

(Ord. 143, 8/17/1988, §402; as amended by Ord. 186, 12/6/1995)

§133. O&M AGREEMENT ISSUANCE.

1. The Code Enforcement Office shall issue a Township OLDS O&M Agreement for IRSIS, individual small flow stream discharge, alternate or experimental OLDS after the Township has received a copy of the Bucks County Department of Health (BCDH) sewage disposal system permit, and in the case of a large volume onlot sewage system, a Water Quality Management Permit from PADEP. In the case of new systems that require sewage facilities planning approval, the property owner shall execute an O&M Agreement prior to sewage permit issuance by the BCDH. This section applies to new and replacement of existing OLDS. (Ord. 186)
2. No OLDS as defined in Table 1 of this Part requiring an O&M Agreement shall be installed nor shall any building be occupied until an OLDS O&M Agreement has been issued by the Township.

(Ord. 143, 8/17/1988, §403; as amended by Ord. 186, 12/6/1995)

§134. APPLICATION REQUIREMENTS.

New OLDS Installation. An application for an OLDS O&M Agreement for new construction shall include the following items:

1. Two (2) copies of the proposed O&M Agreement in a form acceptable to the Township. (See Appendix A for an example O&M Agreement).
2. Two (2) copies of the approved subdivision or land development plan, except for situations in which an O&M Agreement is required as part of sewage facilities planning, which event the proposed subdivision or land development plan shall be submitted with the application..
3. Two (2) copies of BCDH sewage disposal system permit including a copy of the application for the permit with all approved maps, plans, and narratives.

§135. CONSTRUCTION ESCROW / PERFORMANCE GUARANTEE.

1. Construction Escrow

   a) As required by Table 1 of this Part and as outlined below, the property owner or agent of the owner shall file with the Upper Makefield Board of Supervisors a construction escrow financial security for each community OLDS. The construction standards and purpose and management of the escrow shall be governed by a Construction Agreement and a Financial Security Agreement between the Township and the Owner in a form acceptable to the Township. (Ord. 186)

   b) Financial security shall be in the form of cash, an irrevocable letter of credit, a restricted escrow account, or other form deemed acceptable by the Township

   c) The amount of the construction escrow shall be as follows:

      1) For conventional individual subsurface OLDS, there shall be no construction escrow required.

      2) For individual residential spray irrigation systems (IRSIS), individual small flow stream discharge systems and individual alternate or experimental OLDS, there shall be no construction escrow required.

      3) For all community OLDS, the construction escrow shall be one hundred ten (110) percent of the estimated construction cost. The cost of the facilities shall be established by submission to the Board of Supervisors a bona fide bid from the contractor or contractors chosen by the developer or proper owner to complete the facilities reviewed and approved by the Township Engineer. If the developer requires more than one (1) year from the date of posting of the financial security to complete the required facilities, the amount of financial security shall be increased by an

additional ten (10) percent for each one (1) year period after the first anniversary date of posting of financial security.

4) Construction escrow shall be released to property owner following completion of OLDS construction to the satisfaction of the BCDH and Township Engineer, and upon posting of the performance guarantee required by §135.2(3) of this Part. Escrow funds shall be reduced by unpaid administrative, engineering, and legal expenses incurred during construction.

2. Performance Guarantee

a) The Township requires a financial security performance guarantee to ensure continued operation and maintenance of the system. As outlined in Table 1 of this Part, the following are the requirements for performance guarantees for OLDS operation and maintenance:

1) For conventional individual subsurface OLDS, there shall be no performance guarantee required.

2) Individual Residential Spray Irrigation Systems (IRSIS), individual small flow stream discharge systems, and individual alternate and experimental systems shall required a Three Thousand Dollar ($3,000.00) cash performance guarantee for the life of the system to be deposited with the Township by system owner. The escrow shall be replenished as required by the Operation and Maintenance Agreement.

3) For all Community OLDS, the performance guarantee shall be a cash escrow in an amount equal to two times the estimated annual cost of operation and maintenance which shall be retained by the Township for the life of the system. The cash escrow shall be provided by the property owner, developer or contractor at the time of execution of the O&M Agreement, and must be verified as accurate by the Township Engineer. The escrow shall be replenished as required.

(Ord. 143, 8/17/1988, §410; as amended by Ord. 186, 12/6/1995)

E. ADMINISTRATION.

§141. CIVIL REMEDIES.

1. Any person or entity engaged in the construction of an OLDS as defined in §112 of this Part or involved in the installation, operation and/or maintenance of any or all components of an OLDS, shall comply with all regulations and requirements of the BCDH or PADEP permit and this Part. Any activity conducted in violation of this Part, or BCDH, or PADEP rules and regulations or permit requirements is hereby declared a violation of this Part.

2. In the event of a violation, and in addition to the penalties set forth in §142 of this Part, the Upper Makefield Township Board of Supervisors may file suit in law or in equity in any court of competent jurisdiction to restrain, prevent or abate violations of this Part.

(Ord. 143, 8/17/1988, §501)

§142. PENALTIES.

1. Any person or entity who shall violate any of the provisions of this Part, or who shall fail to comply with any written notice from Upper Makefield Township which describes a condition of noncompliance, shall be guilty of an offense and, upon conviction, thereof, shall be sentenced to a fine of not more than one thousand dollars ($1,000.00) plus court costs, fees and expenses. A new and separate violation shall be deemed to be committed for each day after receipt of the aforesaid notice that such violation exits. (Ord. 186)
2. The penalties and remedies of this part shall be cumulative.

(Ord. 143, 8/17/1988, §502; amended by Ord. 186, 12/6/1995)

§143. APPEAL TO BOARD OF SUPERVISORS OF UPPER MAKEFIELD TOWNSHIP.

Any persons aggrieved by any action of the Code Enforcement Office may appeal to the Board of Supervisors of Upper Makefield Township within twenty (20) days of that action.

(Ord. 143, 8/17/1988, §503; as amended by Ord. 186, 12/6/1995)

PART 2

HOLDING TANKS

A. INSTALLATION AND OPERATION.

§201. PURPOSE.

The purpose of this Part is to establish procedures for the use and maintenance of holding tanks when the Township, Bucks County Department of Health (BCDH) and the Pennsylvania Department of Environmental Protection (PADEP) determine that the use of a holding tank is necessary to abate a nuisance or public health hazard. This Part also applies to institutional, recreational or commercial establishments with a sewage flow of eight hundred gallons (800) per day or less. It is hereby declared that the regulations of this Part is necessary for the protection, benefit and preservation of the health, safety and welfare of the residents of Upper Makefield Township.

(Ord. 183, 8/2/1995, §I)

§202. DEFINITIONS.

Unless the context specifically and clearly indicates otherwise, the meaning of terms used in this Part shall be as follows:

RETAINING TANK – a watertight receptacle, whether permanent or temporary, which receives and retains sewage and is designed and constructed to facilitate ultimate disposal of the sewage at another facility. Holding tanks include but are not limited to the following:

CHEMICAL TOILET – a permanent or portable non-flushing toilet using chemical treatment in the retaining tank for odor control.

COMPOSTING TOILET – a device for holding and processing human and/or organic kitchen waste employing the process of biological degradation through the action of microorganisms to produce a stable, humus-like material.

HOLDING TANK – a watertight receptacle, whether permanent or temporary, which receives sewage via a water-carrying system and retains sewage and is designed and constructed to facilitate ultimate disposal of the sewage at another facility.

INCINERATING TOILET – a device capable of reducing waste materials to ashes.

PRIVY – a tank designed to receive sewage where water under pressure is not available.

RECYCLING TOILET – a device in which the flushing medium is restored to a condition stable for reuse and flushing.

Other terms as may be used in this Part shall be as defined in Part 1, §112.

(Ord. 183, 8/2/1995, §I)

§203. RIGHTS AND PRIVILEGES GRANTED.

The Township Supervisors and their duly authorized agents are authorized and empowered to undertake within the Township the control and methods of holding tanks, sewage disposal, and the collection and transportation thereof.

(Ord. 183, 8/2/1995, §I)

§204. RULES AND REGULATIONS.

The Board of Supervisors are hereby authorized and empowered to adopt, by resolution, such rules and regulations concerning sewage, which it may deem necessary from time to time to effect the purposes of this Part..

(Ord. 183, 8/2/1995, §I)

§205. RULES AND REGULATIONS TO BE IN CONFORMITY WITH APPLICABLE LAW.

All such rules and regulations adopted by the Township shall be in conformity with the provisions herein, all other ordinances of the Township, and all applicable laws and regulations of administrative agencies of Bucks County and the Commonwealth of Pennsylvania.

(Ord. 183, 8/2/1995, §I)

§206. PROCEDURE FOR OBTAINING HOLDING TANK PERMIT.

Before a holding tank may be installed, the property owner shall:

1. Obtain a permit for the holding tank from the BCDH.
2. File a copy of the BCDH permit, application and plan with the Township.
3. File annually with the Township a copy of a written agreement between the property owner, hauler and acceptor covering the periodic emptying of the tank.
4. Submit such additional information on the size and location of the tank and such other information as the Township may require in order to complete this review.
5. Deposit and/or post the sum of money to serve as financial security, in the form and/or amount as provided by the rules and regulations promulgated for this Part. These funds are to be held by the Township and used in the event the Township is required to perform any services or pay for any services or maintenance relative to the holding tank. The Board of Supervisors shall have the right to claim the entire escrow deposit as reimbursement for Township expenses, including administrative, engineering and legal fees.

6. Pay a fee to the Township for the holding tank permit in accordance with the appropriate resolutions as adopted by the Board of Supervisors from time to time.

7. Execute an agreement, in a form acceptable to the Township, indemnifying and holding the Township harmless in the event of a claim against the Township arising from the operation of the holding tank.

A permit issued under the terms of this Part shall become null and void if the holding tank installation has not been completed to the satisfaction of the Township within one (1) year of the date of issuance.

(Ord. 183, 8/2/1995, §I)

§207. DUTIES OF PROPERTY OWNER.

The owner of a property that utilizes a holding tank shall:

1. Maintain the holding tank in conformance with this Part or any ordinance of the Township, the provisions of any applicable law, and the rules and regulations of the Township, Bucks County, and any administrative agency of the Commonwealth of Pennsylvania.

2. Permit only persons authorized by the BCDH or PADEP to collect, transport and dispose of the contents of the tank.

3. Be responsible for the periodic cleaning or emptying of the holding tank as well as the cost thereof.

4. Be responsible for the periodic testing of sewage and the cost thereof when deemed necessary by the Township.

(Ord. 183, 8/2/1995, §I)

§208. DISCONNECTION.

Whenever sanitary sewer service provided by the Township becomes available for use, the holding tank must be disconnected and disposed of in accordance with applicable BCDH and PADEP regulations, and proper connection shall be made to the sanitary sewer within ninety (90) days after notice to make connection.

(Ord. 183, 8/2/1995, §I)

§209. PENALTIES.

1. Any person or entity who shall violate any of the provisions of this Part, or who shall fail to comply with any written notice from Upper Makefield Township which describes a condition of noncompliance, shall be guilty of a a violation of this Part, and, upon conviction, thereof, shall be sentenced to a fine of not more than one thousand dollars ($1,000.00) plus costs and expenses. A new and separate violation shall be deemed to be committed for each day after receipt of the aforesaid notice that such violation exits. (Ord. 186)In addition to the penalties in §209.1, the Township may institute

an action, in law or in equity before any before any court of competent jurisdiction.

2. The remedies of this Section 209 shall be cumulative.

(Ord. 143, 8/17/1988, §502; amended by Ord. 186, 12/6/1995)

B. RULES AND REGULATIONS.

§221. GENERAL REQUIREMENTS.

1. Proposed disposal site, method of disposal and waste hauler for holding tank waste shall be approved by the BCDH or PADEP prior to final approval for installation of the holding tank.
2. Whenever Upper Makefield Township issues permits for holding tanks, the Township may impose other conditions it deems necessary for operation and maintenance of the tanks in order to prevent a nuisance or public health hazard.
3. Holding tanks require regular service and maintenance to prevent their malfunction and overflow and shall be used in lieu of other methods of sewage disposal only when the following conditions are met:
   a) An Act 537 revision provides for replacement of the holding tank by adequate sewerage services in accordance with a schedule approved by Upper Makefield Township and the PADEP.
   b) When the Township, BCDH and PADEP determined that the use of a holding tank is necessary to abate a nuisance or public health hazard.
   c) In the case of an institutional, recreational or commercial establishment with a sewage flow of eight hundred (800) gallons per day or less, a holding tank may be utilized. (Res. 99-05-05).
4. The property owner shall execute an agreement shall be executed with Upper Makefield Township in a manner acceptable to the Township guaranteeing future maintenance of the holding tank. Said agreement shall include provisions for Township to receive and review pumping receipts for the holding tank, periodic inspection and procedures and penalties for correction of malfunctions or public health hazards from use of the holding tank.
5. The applicant shall deposit and/or post with Township a sum of money in a form and amount determined by the Township to serve as financial security, to guarantee the proper installation, operation, and maintenance of the holding tank and to reimburse the Township for any services and expenses incurred by the Township relative to the holding tank.

(Res. 95-08-02, 8/2/1995, Art I; as amended by Res. 99-05-05, 5/5/1999)

§222. STANDARDS FOR HOLDING TANKS.

1. In addition to other requirements of this Part, holding tanks shall be constructed to meet specifications of Pa. Code, Title 25, Chapter 73, as well as PADEP rules and regulations relating to standards for septic tanks.
2. The minimum capacity of a holding tank shall be one thousand (1,000) gallons or a volume equal to the quantity of waste generated within three (3) days, whichever is larger.
3. Holding tanks shall be equipped with a warning device to indicate when the tank is filled seventy-five (75) percent capacity. The warning device shall create an audible and visual alarm at an exterior location frequented by the property owner or responsible individual or entity.
4. Disposal of the waste from a holding tank shall be at a site approved by the BCDH, PADEP, or NJDEP.

(Res. 95-08-02, 8/2/1995, Art. II)

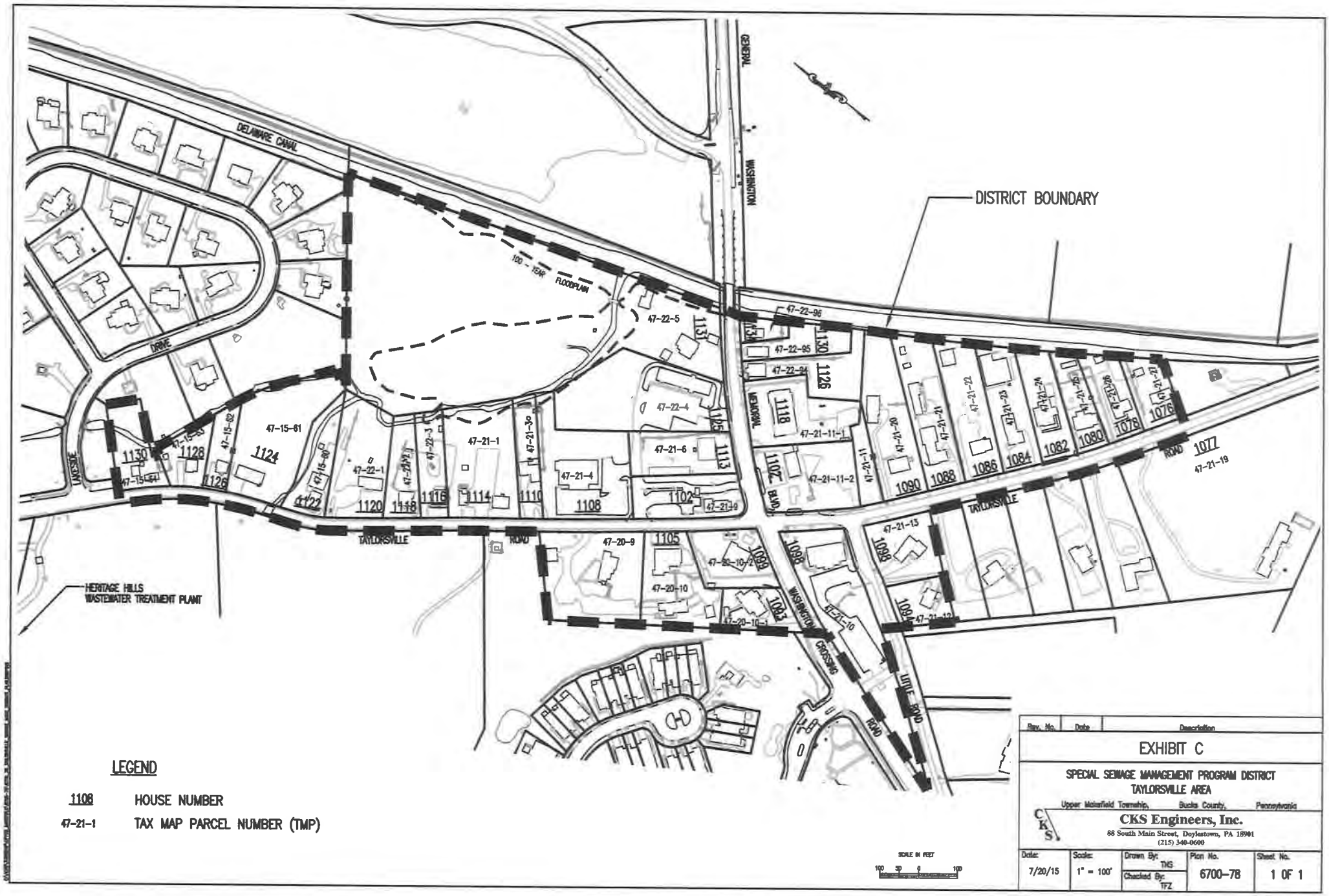
§223. PERMIT PROCESSING.

1. Upon receipt of approval by the BCDH and/or PADEP for the installation of a holding tank, applicant shall secure a holding tank permit for tank installation from Upper Makefield Township and make payment of required permit fee. All applications for permits shall include the following:
   a) Completed holding tank application.
   b) Application fee per current Township fee schedule.
   c) Project description.
   d) Detailed construction plan.
   e) Written approval from the BCDH or PADEP.
   f) Holding tank hauling agreement executed by owner, hauler and acceptor.
   g) A cash escrow performance guarantee shall be established with Upper Makefield Township pursuant to §221(5), above, as determined by the Board of Supervisors within the written agreement which requires a minimum of three times the fee to pump out the holding tank(s).

(Res. 95-08-02, 8/2/1995, Art. III)

APPENDIX C

SPECIAL SEWAGE MANAGEMENT PROGRAM DISTRICTS



LEGEND

1108	HOUSE NUMBER
47-21-1	TAX MAP PARCEL NUMBER (TMP)

SCALE IN FEET
100 50 0 100

Rev. No.	Date	Description

EXHIBIT C

SPECIAL SEWAGE MANAGEMENT PROGRAM DISTRICT
TAYLORSVILLE AREA
Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

Date:	Scale:	Drawn By:	Plan No.	Sheet No.
7/20/15	1" = 100'	TNS	6700-78	1 OF 1
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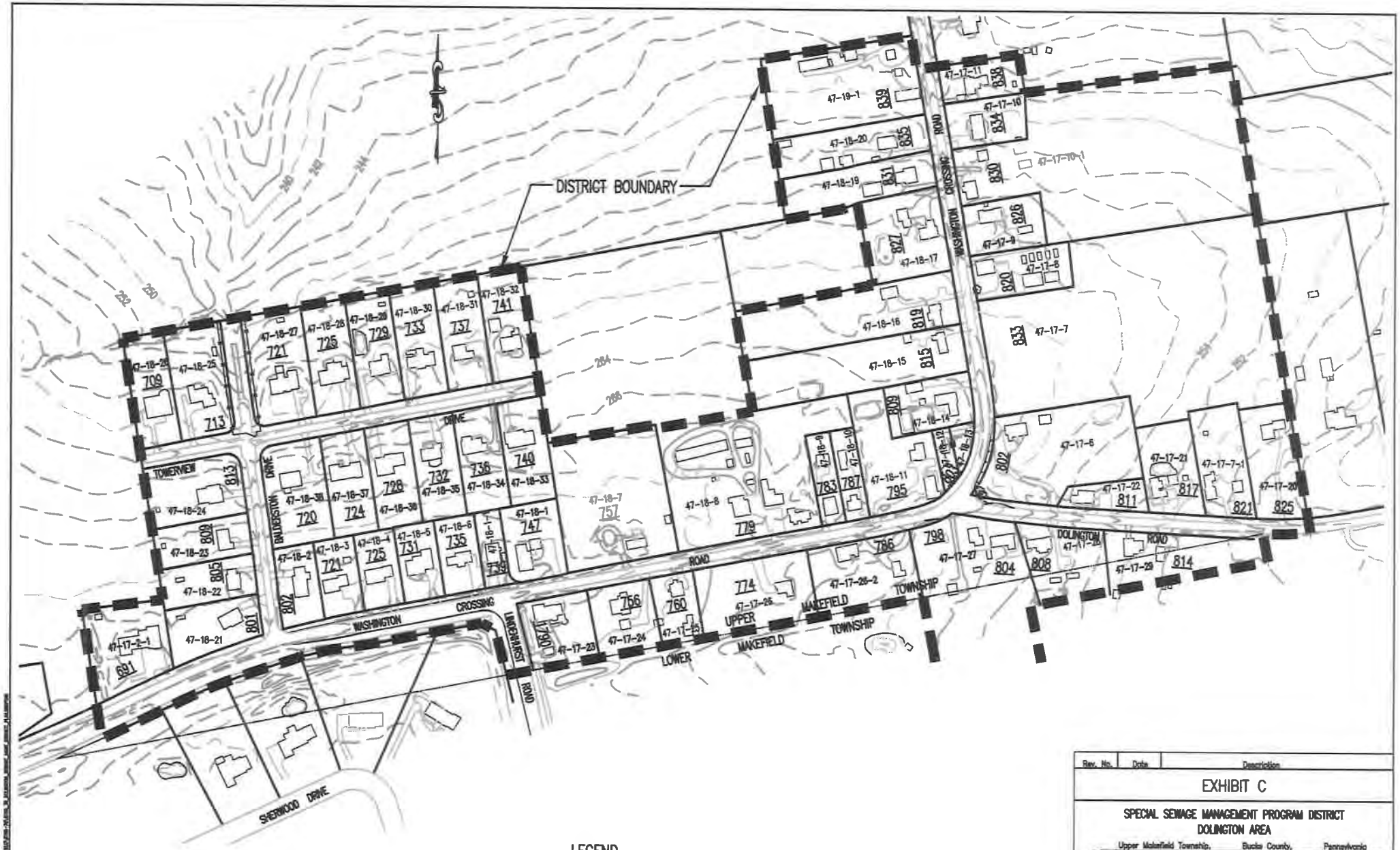

LEGEND

757 HOUSE NUMBER

47-18-4 TAX MAP PARCEL NUMBER (TMP)

Rev. No.	Date	Description

EXHIBIT C

SPECIAL SEWAGE MANAGEMENT PROGRAM DISTRICT
DOLINGTON AREA

Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

Date:	Scale:	Drawn By:	Plan No.	Sheet No.
7/20/15	1" = 100'	TNS	6700-78	1 OF 1
		Checked By: TFZ		

APPENDIX D

SAMPLE PROPERTY OWNER OLDS INSPECTION FORM

PRELIMINARY DRAFT

ON-LOT SEWAGE DISPOSAL SYSTEM (OLDS) INSPECTION REPORT

DATE

Inspection Performed By

Name: _____ **Mailing Address:** _____
Telephone# : _____ **City, State, Zip:** _____

Responsible Agent (if different)

Name: _____ **Mailing Address:** _____
Telephone# : _____ **City, State, Zip:** _____

Property

Tax Parcel # _____
Subdivision _____
City, State, Zip _____
Location: _____

Type of Structure
_____ Single Family Dwelling
_____ Duplex
_____ Multi-Family
_____ Community
_____ Commercial

Age of Structure _____ # of Bedrooms _____ # of Residents _____

Occupied: Yes _____ No _____

Length of Vacancy: _____ Weeks _____ Months

Permit / System

Permit Available _____ Yes _____ No Permit # _____
Copy Attached _____ Yes _____ No Age of System: _____

System Type:
_____ Standard Trench
_____ Standard Bed
_____ Elevated Sand Mound
_____ Elevated Sand Trench
_____ A/B System
_____ Cesspool
_____ IRSIS
_____ Drip Disposal
_____ At-Grade
_____ Drip Micromound
_____ Seepage Bed
_____ Other: _____

General Information

Tank Pumping Data
Last Pump Out Date: _____
Pumping Frequency: _____

Repairs
Repairs to the System: _____ Yes _____ No
Was repair permit issued? _____ Yes _____ No

Details: _____

Water Supply

_____ Public Water
_____ Distance Well to Septic Tank (ft)
_____ On-Site Well
_____ Distance Well to Absorption Area (ft)

Is there a water softener discharging into the systems? _____ Yes _____ No
Does grey water discharge somewhere other than the septic system? _____ Yes _____ No
If Yes, Location: _____

ON-LOT SEWAGE DISPOSAL SYSTEM (OLDS) INSPECTION REPORT

Inspection Data

** No Inspection should take place within 4 weeks of system being pumped/cleaned.

Date: _____ Recent Heavy Precipitation: _____ Yes _____ No

Site Condition: _____ Dry _____ Wet
Weather: _____ Sunny _____ Cloudy _____ Rain _____ Snow
** No Inspection should take place if the ground is covered with snow.

Is there evidence that sewage has backed up into the structure? _____ YES _____ NO
Do trees or tree roots appear to interfere with the system? _____ YES _____ NO
Is there evidence or documentation of wastewater surfacing? _____ YES _____ NO
Is any poriton of the system below a deck, driveway, walkway, etc? _____ YES _____ NO

Treatment Tank(s)

_____ Septic Tank — Capacity (gal)* _____ # of Compartments _____ Material ** _____
_____ Cesspool — Capacity (gal)* _____ # of Compartments _____ Material ** _____
_____ Other — Capacity (gal)* _____ # of Compartments _____ Material ** _____

	OK	NOT OK	N/A		OK	NOT OK	N/A
Tank	_____	_____	_____	Liquid Level In Tank	_____	_____	_____
Lid/Risers (if appl.)	_____	_____	_____	Effluent Filter	_____	_____	_____
Baffles	_____	_____					

Distribution System

Does effluent from the absorption area run back into the treatment tank? _____Yes _____No _____N/A
Evidence of effluent surfacing above the treatment tank(s)? _____Yes _____No
Evidence of any overflow lines? _____Yes _____No

Pump Tank

_____ Lift Tank _____ Dosing Tank

Gallons: _____
Material: _____
Dimensions: _____x _____x _____

	OK	**NOT OK**	**N/A**		**OK**	**NOT OK**	**N/A**
Tank	_____	_____	_____	**Electrical Connections**	_____	_____	_____
Top/Lids/Risers	_____	_____	_____				
Pump/Siphon Operation	_____	_____	_____	**Pump Elev. Off Tank Floor**	_____	_____	_____
Alarm	_____	_____	_____				

Accumulated solids found in pump tank? _____ YES _____ NO
Inflitration of surface waters? _____ YES _____ NO

Absorption Area

Are there signs of previous absorption facility failure: _____ YES _____ NO

Are there any overflow lines? _____ YES _____ NO

Summary of System Component Inspection

	OK	NOT OK	N/A
Treatment Tank(s)	____	____	____
Pump Tank	____	____	____
Absorption Area	____	____	____

ON-LOT SEWAGE DISPOSAL SYSTEM (OLDS) INSPECTION REPORT

Overall Comments

Sketch of On-Lot Sewage Disposal System Location

North Arrow

I hereby certify that the information provided on this report is complete and accurate .

Name: _____

Signature: _____

Date: _____

ACT 537 PLAN UPDATE: FIGURE 28

STEP SYSTEM/CENTRALIZED TREATMENT

SYSTEM WITH STREAM DISCHARGE

EFFLUENT DISPOSAL

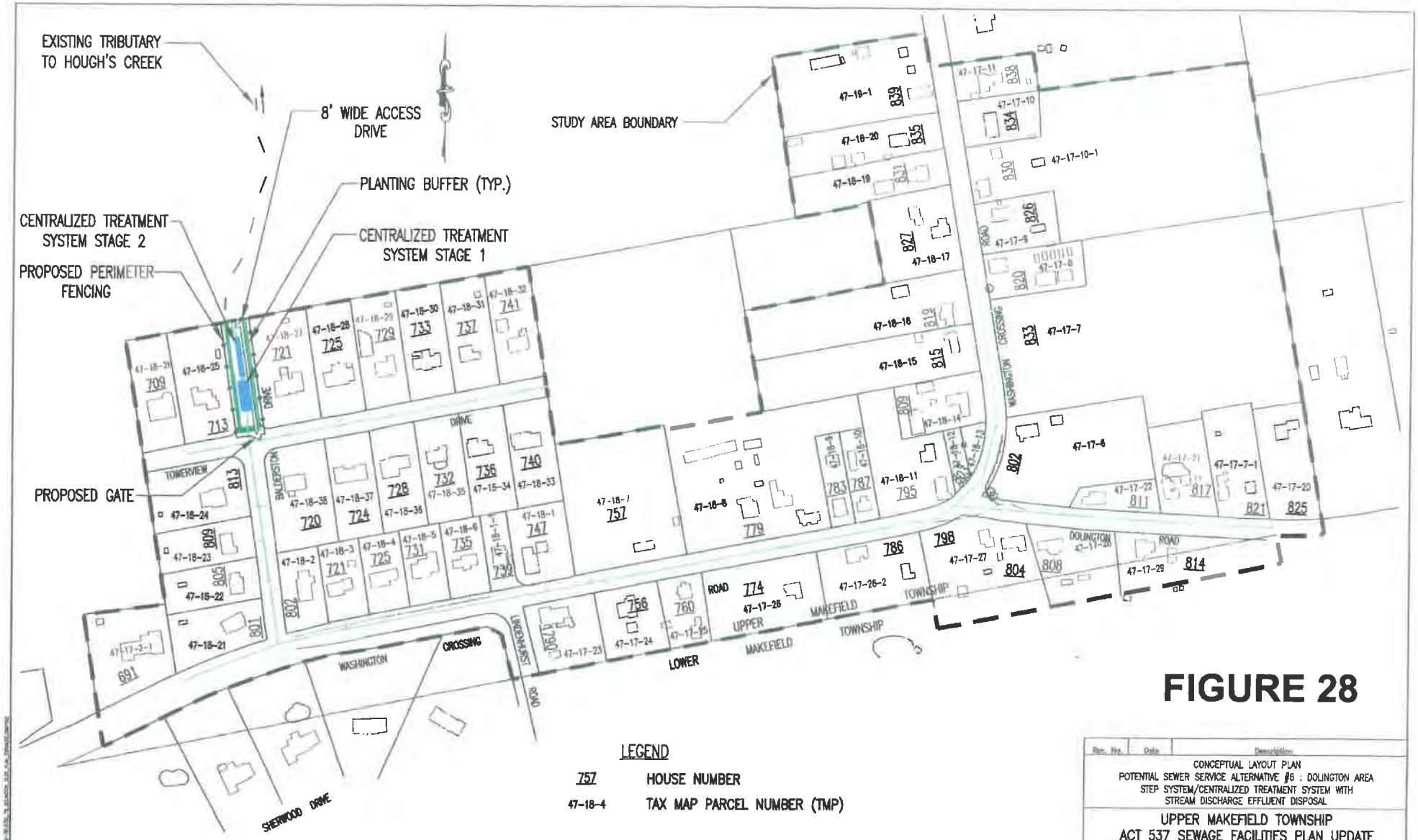

FIGURE 28

Rev. No.	Date	Description

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #6 : DOLINGTON AREA
STEP SYSTEM/CENTRALIZED TREATMENT SYSTEM WITH
STREAM DISCHARGE EFFLUENT DISPOSAL

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

Date:	Scale:	Drawn By:	Plan No.	Sheet No.
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		Checked By: KDK		

101

DETAIL ILLUSTRATING ON-LOT

COMPONENTS OF

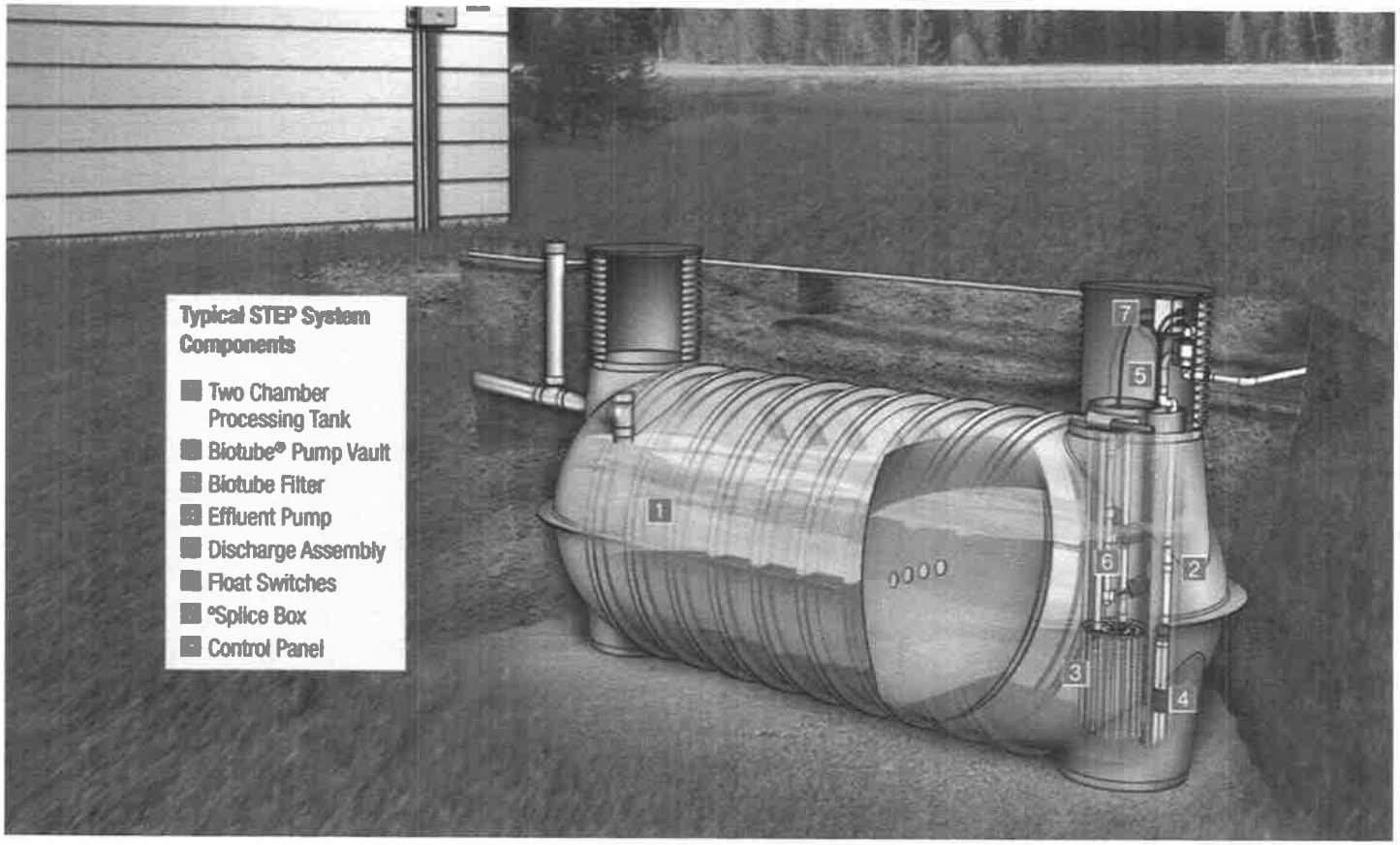
STEP SYSTEM

UPPER MAKEFIELD TOWNSHIP

ACT 537 SEWAGE FACILITIES PLAN UPDATE

ALTERNATIVE #6 : STEP SYSTEM/CENTRALIZED TREATMENT SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL

ELEVATION VIEW : ON-LOT SYSTEM COMPONENTS

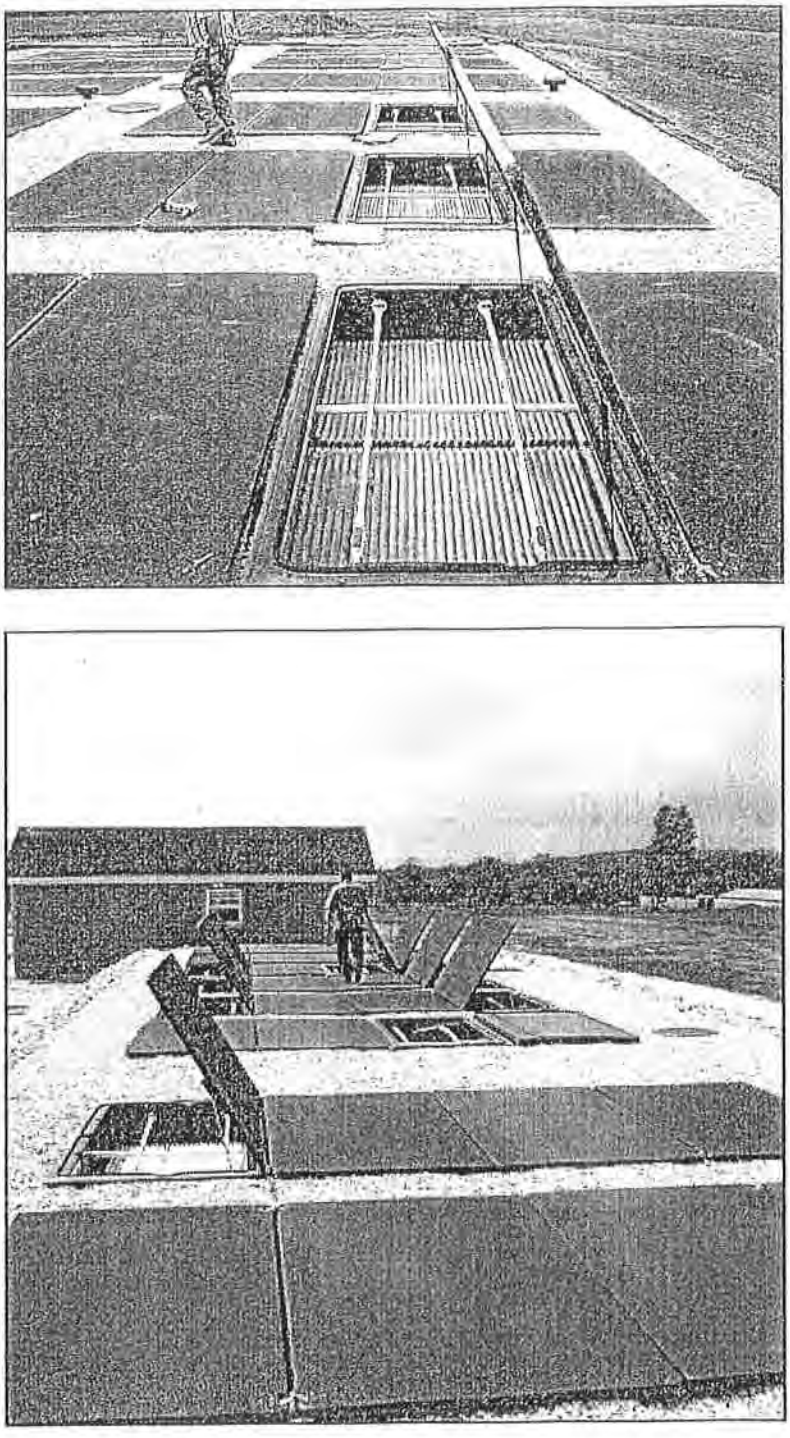


10/15/14
REF. NO. 6700-78
CKS Engineers, Inc.

PHOTOGRAPHS ILLUSTRATING

EXISTING CENTRALIZED

SECONDARY TREATMENT SYSTEM INSTALLATION



AX100 pods at site 1 (top) and site 2 (bottom) will ultimately serve more than 1,000 new residents of Bethel Heights. Treatment performance remains excellent; after three years of operation, effluent BOD, TSS, and NH_3-N average <10 mg/L, <10 mg/L, and <5 mg/L, respectively.

CONCEPTUAL LAYOUT SKETCH

OF

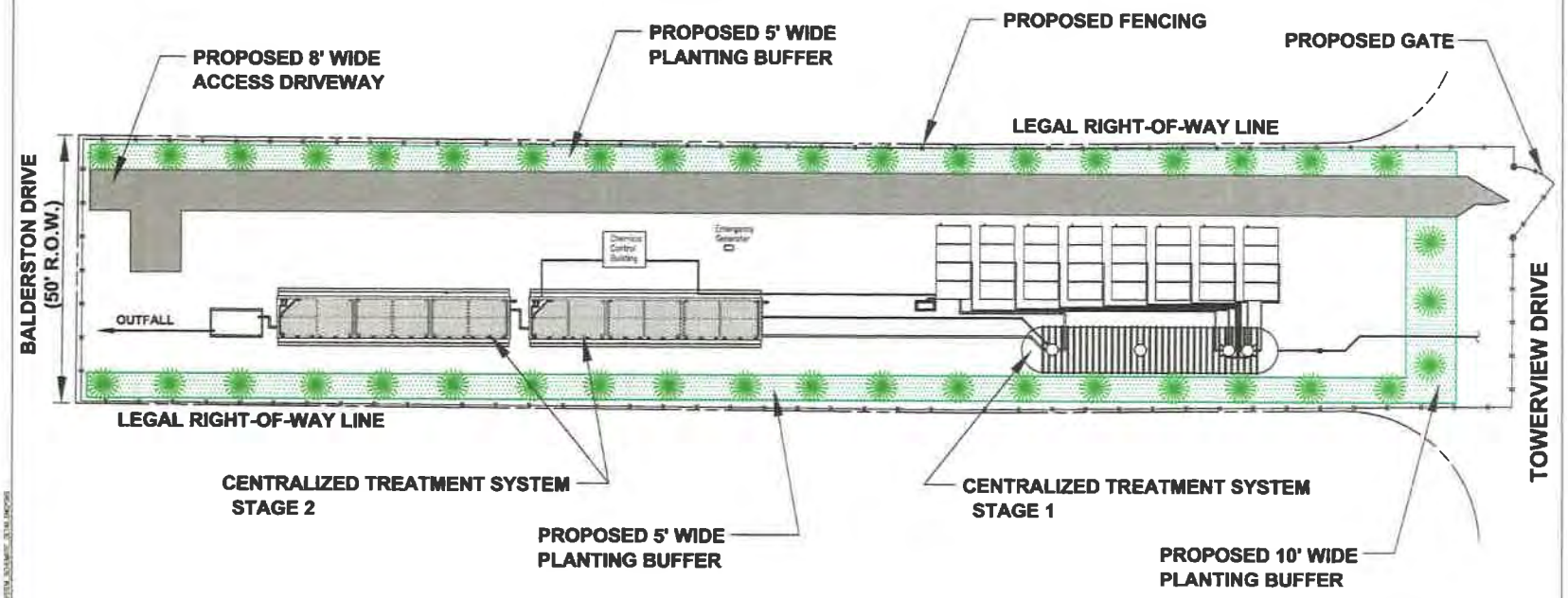
CENTRALIZED SECONDARY TREATMENT SYSTEM

UPPER MAKEFIELD TOWNSHIP

ACT 537 SEWAGE FACILITIES PLAN UPDATE

ALTERNATIVE #6 : STEP SYSTEM/CENTRALIZED TREATMENT SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL

PLAN VIEW : CENTRALIZED TREATMENT SYSTEM



10/15/14
REF. NO. 6700-78

CKS Engineers, Inc.

AMENDED IMPLEMENTATION SCHEDULE

TOWNSHIP OF UPPER MAKEFIELD BUCKS COUNTY, PENNSYLVANIA
ACT 537 SEWAGE FACILITIES PLAN UPDATE
AMENDED IMPLEMENTATION SCHEDULE

Five-Year Planning Period (Short-Term Sewage Disposal Alternative) - Taylorsville Area and Dolington Area:	
Activity	**Projected Start/Completion From Date of PADEP Act 537 Plan Update Approval**
Prepare Amended OLDS Ordinance	1/4 Months
Township Adoption of Amended OLDS Ordinance Provisions for the Taylorsville and Dolington Areas	4/6 Months
Township Implementation of Amended OLDS Ordinance Provisions for Taylorsville and Dolington Areas via a Modified OLDS Sewage Management Program	7/60 Months
Township Evaluations of Effectiveness of Short-Term Sewage Disposal Alternative in Taylorsville Area	54/60 Months
Ten-Year Planning Period (Long-Term Sewage Disposal Alternative) -Dolington Area:	
Activity	**Projected Start/Completion From Date of PADEP Act 537 Plan Update Approval**
Refine/Reassess Preferred Long-Term Sewage Disposal Alternative and Identify Any New Alternatives that may be Available Based on Changes in Current Conditions and/or Technology That May Potentially Occur over the Short-Term Planning Period	3/60 Months
Prepare/Submit Minor Planning Study Addressing Selection Long-Term Sewage Disposal Alternative for Dolington Area to PADEP for Review/Approval.	60/72 Months
Establish Policy Guidelines for Implementation of Selected Long-Term Sewage Disposal Alternative	72/84 Months
Prepare Engineering Design/Bidding Documents	84/96 Months

Ten-Year Planning Period (Long-Term Sewage Disposal Alternative) - Dolington Area: (continued)	
Activity	**Projected Start/Completion From Date of PADEP Act 537 Plan Update Approval**
Submit Regulatory Agency Permitting/Approval Applications	90/102 Months
Evaluate Funding Alternatives	90/102 Months
Secure Financing	102/108 Months
Release Bidding Documents / Receive Bids	102/104 Months
Award Construction Contract	104/106 Months
Commence/Complete Construction	108/120 Months
Authorize/Complete Connections	120/123 Months

ACKNOWLEDGEMENT

Portions of this document were extracted from Draft Act 537 Plan Updates prepared between 2003 and 2010 by Mercuri & Associates, Inc. and Gilmore & Associates, Inc.

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FIGURES

TABLES

APPENDICES

EXECUTIVE SUMMARY

This Act 537 Sewage Facilities Plan Update has been prepared to address the present and future sewage disposal needs of Upper Makefield Township, Bucks County, Pennsylvania. The existing Upper Makefield Township Act 537 Plan has not been revised since its completion in 1979. This Plan Update has been prepared in accordance with 25 PA Code, Chapter 71, "Administration of Sewage Facilities Planning Program."

This Plan Update addresses sewage disposal needs for the entire Township, which includes private on-lot sewage disposal systems, private small flow treatment facilities, and Township-owned public sewerage facilities. In conjunction with the preparation of this Plan Update, various Federal, State, and Local planning documents and reports related to wastewater planning issues affecting Upper Makefield Township were reviewed, and an extensive evaluation of surface hydrology, soils, geology, topography, water quality, environmental impacts, on-lot sewage disposal, existing sewage facilities, future growth, zoning, land planning, and land conservation was performed. Meetings and file reviews were conducted with Bucks County Health Department ("BCHD") representatives to identify any "Needs Areas" in the Township with histories of malfunctioning on-lot sewage disposal systems. The Township commissioned the performance of detailed On-Lot Sewage Disposal System Surveys by an independent consultant to thoroughly evaluate present conditions within the Needs Areas that were identified by the Health Department. Additionally, during the course of the Plan Update preparation, the Township had numerous discussions and attended several meetings with Pennsylvania Department of Environmental Protection ("PA DEP") representatives to obtain initial input/feedback concerning the potential short-term and long-term sewage disposal alternatives that have been developed for the identified Needs Areas.

The most significant findings/conclusions that were reached in conjunction with the preparation of this Plan Update are summarized below:

A. <u>Short-Term and Long-Term Sewage Disposal Needs Assessment</u>

- The majority of properties within the Township are served by On-Lot Sewage Disposal Systems ("OLDS"). With the exception of isolated instances, based upon the evaluation performed in conjunction with this Plan Update, the continued use of OLDS will address the long-term sewage disposal needs of the majority of properties within the Township.

- In conjunction with the continuing use of OLDS within the Township, it is essential that the Township continue to implement its Sewage Management Program, which includes enforcement of its OLDS Ordinance. The OLDS Ordinance (Upper Makefield Township Code, Chapter 18) includes the following requirements that apply to all areas of the Township:

  a) Required pumping of OLDS at a minimum of every three years.

  b) Pumper/Inspector report to be completed and given to property owner after each inspection; form to be forwarded to Township when repairs are required, or a malfunction is observed.

c) Educate property owners about OLDS and proper operation and maintenance procedures through website, newsletter, and pamphlets available at the Township.

The Sewage Management Program is administered and enforced by the Township Code Enforcement Office. No additional Township personnel will be required, even with the proposed OLDS Ordinance amendments described in this Plan Update.

- The existing sewage facilities consisting of private and/or community treatment plants or public sewage treatment facilities that currently serve specific properties or areas within the Township were evaluated and determined to be adequate to satisfy current/future sewage disposal needs of the properties and/or areas served. Current operation and maintenance requirements for these facilities should be continued.

- At the outset of the Act 537 Plan Update process, the Township had contacted the BCHD requesting that the Health Department identify any "Needs Areas" within the Township that were experiencing problems with the functioning of existing OLDS. The BCHD had initially identified two specific areas in the Township with histories of OLDS functioning problems, namely the Taylorsville and Dolington Areas.

  In response to the input received from the BCHD, the Township reviewed all Health Department records concerning OLDS within the Taylorsville and Dolington Areas to determine the severity of the OLDS functioning problems in each area. During mid – late 2012, the Township performed an exhaustive review of BCHD records for the Taylorsville and Dolington Areas, found the available information to be incomplete and/or inconsistent and, therefore, determined that the BCHD records would not conclusively document the severity of OLDS functioning problems within each area.

  Based on the results of the BCHD records research, and in an effort to more accurately establish the current OLDS functioning conditions, the Township commissioned an intensive OLDS Survey of all properties located within the Taylorsville and Dolington Areas, where authorization was obtained from the affected property owners.

  The conclusions reached in conjunction with the OLDS Survey that was performed within the Taylorsville Area were that the majority of existing OLDS appear to be functioning properly with no indications of widespread problems. The OLDS functioning problems noted during the survey were limited to three properties, and it was determined that there were viable OLDS solutions that would be available to address the specific problems noted at each of the three properties.

  The conclusions reached in conjunction with the OLDS Survey that was performed within the Dolington Area were not as favorable with regard to the continuing use of potential OLDS alternatives for addressing the long-term sewage disposal needs of the area as compared to the Taylorsville Area. A relatively higher number of properties within the Dolington Area were noted as having periodic problems with the functioning of their primary OLDS thereby relying on supplemental holding tanks to address seasonal conditions. Additionally, a number of properties are served by OLDS that were constructed in the 1950s – 1960s that would not meet current PA DEP design and siting guidelines due to inadequate setbacks/isolation distances, limiting zone restrictions, etc., which would also affect the viability of

potential OLDS solutions in the event future problems develop. Nevertheless, based upon the results of the OLDS Survey, the functioning of existing OLDS within the Dolington Area is being properly managed at this time by the affected property owners in that no widespread indications of OLDS malfunctioning conditions were noted, and the associated groundwater quality evaluation revealed no contamination concerns related to potential OLDS malfunctions.

- The following alternatives were developed to address the short-term and long-term sewage disposal requirements for the two (2) Needs Areas that were identified/evaluated in conjunction with this Plan Update:

    1. Taylorsville Area – The short-term sewage disposal needs of this area will be addressed during the Five-Year Planning Period by improving the performance of existing OLDS through water conservation, increased system oversight/maintenance, educating property owners on OLDS use/maintenance and amendment of the Township's OLDS Ordinance to incorporate additional maintenance provisions specific to the Area. Immediate sewage disposal needs will also be addressed by repair and/or replacement of the limited number of OLDS (noted during the OLDS Survey) with operational problems, utilizing potential OLDS solutions with input/assistance from the BCHD. If this short-term approach is found to be effective after five years of implementation, it will be considered to also satisfy the long-term sewage disposal needs of the area for the Ten-Year Planning Period.

    2. Dolington Area – The short-term sewage disposal needs of this area for the Five-Year Planning Period can be effectively addressed through water conservation, increased system oversight/maintenance, educating property owners on OLDS use/maintenance and amendment of the Township's OLDS Ordinance to incorporate additional maintenance provisions specific to the Dolington Area. The Township will also provide input to the property owners where the recent OLDS Survey identified operational problems, with regard to potential OLDS solutions with input/assistance from the BCHD.

        Upon considering such factors as public and private implementation costs, ongoing operation and maintenance costs/ responsibilities, anticipated reliability/performance, and consistency with prior Township planning/policies, it was determined that Alternative #6; STEP System/ Centralized Treatment System with Stream Discharge Effluent Disposal (Refer to Figure 28) would be the preferred option to address the long-term sewage disposal needs of the Dolington Area.

        During the short-term (5 Year) planning period of this Plan Update, the Township is committed to continuing to work to refine the preferred long-term sewage disposal alternative in an effort to reduce currently projected costs that would be imposed on the affected property owners. Subsequently, during the initial stage of the long-term (10 Year) planning period of the Plan Update, the Township will re-assess the currently identified long-term sewage disposal alternatives, identify any new alternatives that may be available based upon changes in current conditions and/or technology that may potentially occur over the short-term planning period, and initiate the administrative, legal, engineering, and

procedural efforts associated with the implementation of the selected long-term sewage disposal alternative for the Dolington Area.

B. Municipal Commitments

Upper Makefield Township has the necessary staff and administrative resources required to continue the existing Sewage Management Program throughout the Township (including the proposed additional requirements for Taylorsville and Dolington Areas) as well as implement the long-term sewage disposal alternatives proposed in conjunction with this Plan Update. Administrative management of Upper Makefield's water and sewer systems and Sewage Management Program is addressed by the Township's Code Enforcement Department. The costs of administration are budgeted annually by the Township at which time future needs are anticipated.

Implementation of the short-term and long-term sewage disposal alternatives discussed herein will be through the existing Township administrative structure and no new departments or authorities will be required.

C. Implementation Schedule

1. Taylorsville Area Implementation Schedule:

Activities associated with the implementation of the selected alternative to address the short-term sewage disposal needs for this area during the Five-Year Planning Period are scheduled to commence immediately after approval of this Plan Update by PADEP. If this short-term approach is found to be effective after five years of implementation, it will continue and will be considered to also satisfy the long-term sewage disposal needs of the area for the Ten-Year Planning Period.

2. Dolington Area Implementation Schedule:

Activities associated with the implementation of the selected alternative to address the short-term sewage disposal needs for this area during the Five-Year Planning Period is scheduled to commence immediately after approval of this Plan Update by PADEP.

During the short-term (5 Year) planning period of this Plan Update, the Township is committed to continuing to work to refine the preferred long-term sewage disposal alternative in an effort to reduce currently projected costs that would be imposed on the affected property owners. Subsequently, during the initial stage of the long-term (10 Year) planning period of the Plan Update, the Township will re-assess the currently identified long-term sewage disposal alternatives, identify any new alternatives that may be available based upon changes in current conditions and/or technology that may potentially occur over the short-term planning period, and initiate the administrative, legal, engineering, and procedural efforts associated with the implementation of the selected long-term sewage disposal alternative for the Dolington Area. It is projected that a long-term sewage disposal alternative for the Dolington Area will be accomplished within the Ten-Year Planning Period, by January 2026.

I – PREVIOUS WASTEWATER PLANNING

A.1 Previous Planning undertaken under Sewage Facilities Act

The Upper Makefield Township Board of Supervisors adopted an Act 537 Sewage Facilities Management Plan (Plan) prepared by Roy F. Weston, Inc. dated June 1979 ("1979 Plan"). Previous planning had been the Bucks County Sewage Facilities Plan adopted in 1970, which acted as 537 planning for a number of municipalities including Upper Makefield Township.

All of the programs recommended in the 1979 Plan have been carried out in accordance with the approved implementation schedule. This Plan Update is being prepared to account for changing growth patterns and the resultant sewer service needs within the Township. Refer to Figure 1 for a map of Upper Makefield Township, which is the study area for this Plan Update.

Taken together, the 1979 Plan and subsequent resolutions, ordinances, planning modules, and planning "exemptions" approved by the Pennsylvania Department of Environmental Protection ("PADEP") established the Township's Sewage Management Program to date. There are no sewer authorities having jurisdiction of facilities located within Upper Makefield Township.

All changes to the 1979 Plan since its adoption have occurred as the result of planning modules and planning "exemptions" as approved by PADEP.

A.2 Other Planning

Various plans have been approved by other entities that deal directly with growth in the region including Upper Makefield Township, and indirectly with sanitary sewage management, besides Upper Makefield Township's 1979 Plan. Planning on the Township level includes the Upper Makefield Subdivision and Land Development Ordinance (1977, last revised in 2006), Newtown Area Joint Municipal Zoning Ordinance (2006), Newtown Area Joint Comprehensive Plan (2009), the Comprehensive Park and Recreation Plan (1998), establishment of Agricultural Security Zones (1991), and Open Space Land Acquisitions. There are several County level plans including the Bucks County Wastewater Facilities Plan (1989), the Bucks County Comprehensive Plan (2011), the Bucks County Natural Areas Inventory (2011), and the Bucks County Land Use Plan (1996).

The Newtown Area Joint Comprehensive Plan ("NAJCP") (2009) proposes sewage facilities planning as the primary method for implementing regional land use and ground water protection policies. While recognizing that different areas and types of development will require different types of collection, conveyance, and treatment the NAJCP emphasizes the need to balance ground water withdrawals with recharge.

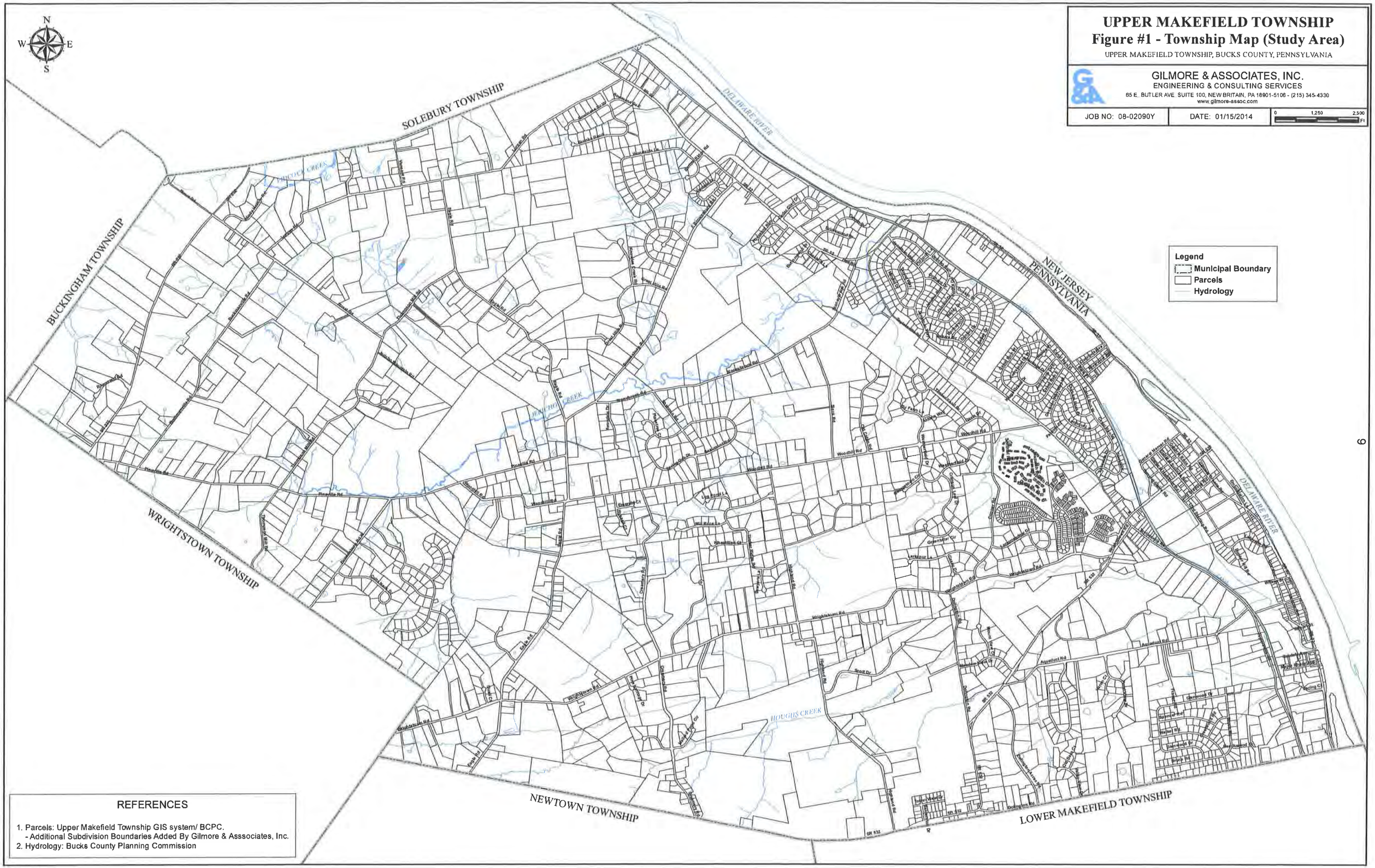
The Bucks County Wastewater Facilities Plan ("BCWFP") (1989) updates the 1960 Master Plan for Sewage Facilities and 1970 Sewerage Facilities Plan. The BCWFP inventoried all wastewater facilities in the County and projected flows until 2010. From these findings a program was developed to meet the County sewer needs through 2010. In this plan it was proposed that a portion of flow from Upper Makefield Township would be treated at the New Hope Sewage Treatment Plant.

UPPER MAKEFIELD TOWNSHIP
Figure #1 - Township Map (Study Area)

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

GILMORE & ASSOCIATES, INC.
ENGINEERING & CONSULTING SERVICES
65 E. BUTLER AVE. SUITE 100, NEW BRITAIN, PA 18901-5106 - (215) 345-4330
www.gilmore-assoc.com

JOB NO: 08-02090Y | DATE: 01/15/2014 | 0 1,250 2,500 FT



REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission

The Bucks County Comprehensive Plan ("BCCP") (2011) was developed based upon the concept of meeting economic needs while protecting public health and conserving natural resources. The Infrastructure and Basic Services section of the BCCP addresses wastewater planning and encourages a sustainable use plan to conserve, enhance, and manage water resources of the County. The BCCP also advocates pretreatment of industrial sewage, and proper operation and maintenance of existing and future facilities including repair of failing on-lot sewage disposal systems. The BCCP recommends on-lot sewage disposal systems for rural regions of the County.

The Bucks County Natural Areas Inventory ("BCNAI") (2011) was developed to identify and locate significant natural resources. The BCNAI also stresses the need to protect these resources and balance development with protection of resources.

The Bucks County Land Use Plan ("BCLUP") (1996) stresses the need for preservation and creation of amenities such as open space, natural areas, historic sites, and recreational facilities. The BCLUP also provides methods for managing growth by emphasizing that any development project is not only a benefit to the owner, but also is an asset to the community. The BCLUP outlines methods for siting, design, and maintenance of wastewater treatment plants. According to the document, in order to reduce human and environmental risks related to unplanned growth, the following items should be evaluated:

- Existing environmental conditions
- Consistency of the proposed development with the land use component of the Municipality's Comprehensive Plan
- Costs and benefits analysis of the proposed sewage facilities
- Analysis of the environmental impacts related to the proposed facilities
- The ability of the selected facility to expand or adapt to future needs
- Compliance of the facility with regulatory requirements.

The Plan to Preserve Upper Makefield Township Farmland & Open Space (PPF&OS") (1998) was developed to preserve the farmland and open space of the Township. In order to do this, the Township has procured bonds and has instituted plans and programs to guide decision-making policies regarding the distribution of the money realized from the bonds. Part of the reason for the PPF&OS and the bonds was the community's desire to maintain the character of the Township in the face of development pressure. Specific regulations that assist in achieving the ends put forth by the plan include the following:

- Subdivision Land Development
- Land Dedication for Parks
- Performance Zoning and Specific Variance Procedures
- On Lot Disposal Systems
- Natural Resources Protection District
- Erosion and Sedimentation Control
- Woodland Preservation
- Wetlands
- Significant Features
- Floodplains
- Steep Slopes
- Buffer Zones
- Storm Water Management Ordinance

- Tree Protection Ordinance
- Ground Water and Well Construction Ordinances

Open Space and Park Land has been increased in recent years through acquisition of land along with approval of new land developments. As of January 2014, the Township has 5,190 acres of preserved open space (37.7% of Township acreage), with the remaining land zoned for agriculture or conservation, residential, or village commercial.

A.3 Anticipated planning required by a Chapter 94 Corrective Action Plan

There are no current or future projects that are anticipated, planned, or approved under a Chapter 94 Corrective Action Plan.

A.4 Development and improvements accomplished through Planning Modules

Planning Modules are a method of revising a municipality's Act 537 Sewage Facilities Plan. Planning Module applications are normally completed by a developer and submitted by the Township for review/processing. The process includes sending a mailer application to the PADEP for a preliminary review/evaluation. If the proposed project falls within certain guidelines, the Planning Module requirement can be waived. Should the project not receive a waiver, a complete Planning Module Application must be submitted.

Developments that have approved or pending planning modules include those shown on Table 1.

Table 1 Pending and DEP Approved Planning Modules as of February 2014					
Project Name	**Proposed Lots**	**Marginal Soils**	**Component No.**	**Pending/ DEP Approved**	**Lots Remaining to be Developed**
Ryan Property	2	No	1	Approved	2
Cipullo Property	2	No	1	Approved	0
Inderitzen Property	2	No	2	Approved	1
Dziekonski Property	1	No	Exemption	Approved	0
DiPippo Property	2	Yes	Exemption	Approved	1
Creeks Bend *	12	Yes	Exemption	Approved	6
Schoenung Property	1	No	Exemption	Approved	0
Tierney Property	4	No	2	Approved	4
Merrick Farm- Lot 8	1	No	1	Approved	0
Merrick Farm- Lot 1	1	No	2	Approved	0
Riss Property	2	Yes	1	Approved	1
Yates Property	7	Yes	1	Approved	7
Bicakcioglun Property*	1	No	2	Approved	0
Matheson Property*	1	No	1	Approved	0
Dudley Property	2	Yes	1	Approved	1
Sager Tract	2	Yes	-	Approved	1
Vintage Farm	22	No	2	Approved	10
Slack Tract	8	No	1	Approved	8
London Court*	12	Yes	2	Approved	4
Price Property	2	Yes	-	Approved	1
Reese Tract	3	Yes	-	Approved	2
Vintage Farm- Lot 1*	1	No	-	Approved	0
Zogorski Tract*	3	No	1	Approved	3
Dutchess Farms*	68	N/A	3	Approved	39
White Farm	80	N/A	3	Approved	80
Melsky Tract	45	N/A	3	Approved	45
Gray Tract*	96	N/A	3	Approved	96
Giagnacova Property	1	No	Exemption	Approved	0
Alden Property	1	No	Exception	Approved	0
Foster Property (Lot 2)	1	No	Exemption	Approved	0
Calkins Property	2	No	2	Approved	0
Grillo Property (Zaveta)	1	No	2	Approved	0
Ryan Subdivision (Lot 1)	1	No	2	Approved	0
Cohen Subdivision	2	No	1	Approved	1
Hritz Property	1	No	Exemption	Approved	0
Vizza Subdivision	2	No	1	Approved	1
Mooradian Property	1	Yes	1	Approved	0

* Projects under construction.

II – PHYSICAL CONDITIONS AND DEMOGRAPHIC ANALYSIS

A. Regional Setting

Upper Makefield Township is located along the Delaware River in central Bucks County. The Township consists of 21.7 square miles and is bordered by five municipalities and the Delaware River. As shown in Figure 1 – Township Map, the Township is bordered by Solebury Township on the north, Buckingham and Wrightstown Townships on the west, Newtown and Lower Makefield Townships along the south, and the Delaware River to the east. State Routes located in the Township are Route 32, Route 232, and Route 532.

The majority of the Township is served by on-lot sewage disposal systems and private wells. Public sewer and public water systems serve the three residential developments of Heritage Hills, Traditions, and Lakeside. The Dutchess Farms Development is also served by a centralized sewer system. Upper Makefield Township maintains these public facilities.

Upper Makefield Township has been historically characterized as an open rural municipality, however, economic and cultural patterns have closely linked the Township with nearby Trenton, NJ, and it is considered as an integral part of the Philadelphia Metropolitan Area. The Township is within commuting distance of several major employment centers, such as Trenton, NJ, New York, NY, and Wilmington, DE, in addition to Philadelphia, PA. In addition to the Amtrak rail line and the New Jersey Turnpike, Interstate Route 95 has greatly enhanced its accessibility to the northeastern population corridor.

As there are a limited number of employment opportunities within the municipality, Upper Makefield Township has become a bedroom community for daily commuters. During the last quarter of the 20th century, movement of both population and business activities into the suburban regions of the metropolitan centers, including the Philadelphia-Trenton region, has been accelerated. Bucks County, because of its central location within the greater northeastern United States area, has attracted substantial development and growth.

Over the past several years, the development of communities for active adults has become a trend within area municipalities. These communities often provide for an increase to the local tax base with relatively low demand on Township resources.

B. Surface Hydrology

Surface water drainage in the Township is to the Delaware River through four drainage basins (Refer to Figure 2).

1. Pidcock Creek
2. Jericho Creek
3. Houghs Creek
4. Dyers Creek

Of these four basins, Jericho and Houghs Creeks drain directly to the Delaware River within Upper Makefield Township. Prior to entering the Delaware River, Pidcock Creek and Dyers Creek flow through Solebury and Lower Makefield Townships, respectively. In addition to the Delaware River and the Delaware Canal, Jericho Creek, Houghs Creek, Pidcock Creek, Dyers Creek and a few other unnamed streams and ponds comprise the surface water bodies in Upper Makefield Township.

UPPER MAKEFIELD TOWNSHIP
Figure #2 - Hydrology Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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JOB NO: 08-02090Y | DATE: 01/15/2014 | 0 1,250 2,500 Ft

N W E S

Legend
- Municipal Boundary
- Watershed Delineation
- Parcels
- Hydrology

FEMA Floodplains
- AE- 100yr
- A- 100yr
- 0.2 PCT ANNUAL CHANCE FLOOD HAZARD

SOLEBURY TOWNSHIP
BUCKINGHAM TOWNSHIP
WRIGHTSTOWN TOWNSHIP
NEWTOWN TOWNSHIP
LOWER MAKEFIELD TOWNSHIP
NEW JERSEY
PENNSYLVANIA
DELAWARE RIVER
PIDCOCK CREEK
JERICHO CREEK
HOUGHS CREEK
DYERS CREEK
BORE CREEK

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. Floodplains: FEMA digital floodplains.

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C. Soils

The 2008 Soil Survey Geographic ("SSURGO") database for Bucks County, Pennsylvania describes the 31 different soil series in Upper Makefield Township. The soil survey characterizes the soil and the material in which it formed. Soil properties can change within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Clayey or wet soils are poorly suited to use as septic absorption fields. The following paragraphs detail the taxonomic class, the parent material, the landform, permeability, drainage and the depth of soils within Upper Makefield Township.

Figure 3 details the mapped soils in the Township per the United States Department of Agriculture ("USDA") – Natural Resources Conservation Service. Figure 4 shows the areas mapped as prime farmland or farmland of statewide importance.

With regard to on-lot sewage disposal feasibility, one way to assess soils is divide the soil drainage class into well-drained, moderately well-drained, somewhat poorly drained, and poorly drained categories. In-ground systems are generally installed in well-drained soils; sand mounds in moderately well-drained soils; and individual residential spray irrigation system ("IRSIS") in somewhat poorly drained soils; while poorly drained soils are unsuitable for the aforementioned types of on-lot sewage disposal systems. Refer to Figure 5 for areas of the Township that may be suitable for on-lot sewage disposal systems per soil drainage classifications.

The following is a summary of the various soil series that exist within Upper Makefield Township:

Abbottstown Series

The Abbottstown soil is a fine-loamy mixed, mesic Aeric Fragiaqualf consisting of angular and subangular channers of residuum from acid red shale, siltstone and sandstone. Its natural position in the landform is foot slopes of uplands in valleys of the piedmont. Its permeability is moderate above the fragipan, slow in the fragipan, and slow to moderately slow below the fragipan. It is somewhat poorly drained. It is deep, moderately deep to the fragipan.

Alton Series

The Alton soil is a loamy-skeletal, mixed, mesic Dystric Eutrochrept consisting of well-rounded through sub-rounded gravels and cobbles of mixed igneous, sedimentary and metamorphic rocks of alluvium and glacial outwash from dominantly hard acid rock. Its natural position on the landform is interfluves and shoulders of side and nose slopes of alluvial fans and terraces in the northern coastal plain. Its permeability is rapid above 40 inches and ranges from rapid to slow in the substratum and is well to somewhat excessively drained. It is very deep, moderately deep to sandy skeletal plain material.

Amwell Series

The Amwell soil is a fine-loamy, mixed, mesic Aquic Fragiudalf consisting of angular and subangular gravels through channers of mixed metamorphic and sedimentary rocks of colluvium derived from gray metamorphic shale, siltstone and igneous rocks. Its natural position in the landform is dissected hill slopes with broad long slopes of low relief. Its permeability is moderate above the fragipan and slow to moderate in the fragipan. It is very deep and somewhat poorly drained.

UPPER MAKEFIELD TOWNSHIP
Figure #3 - Soils Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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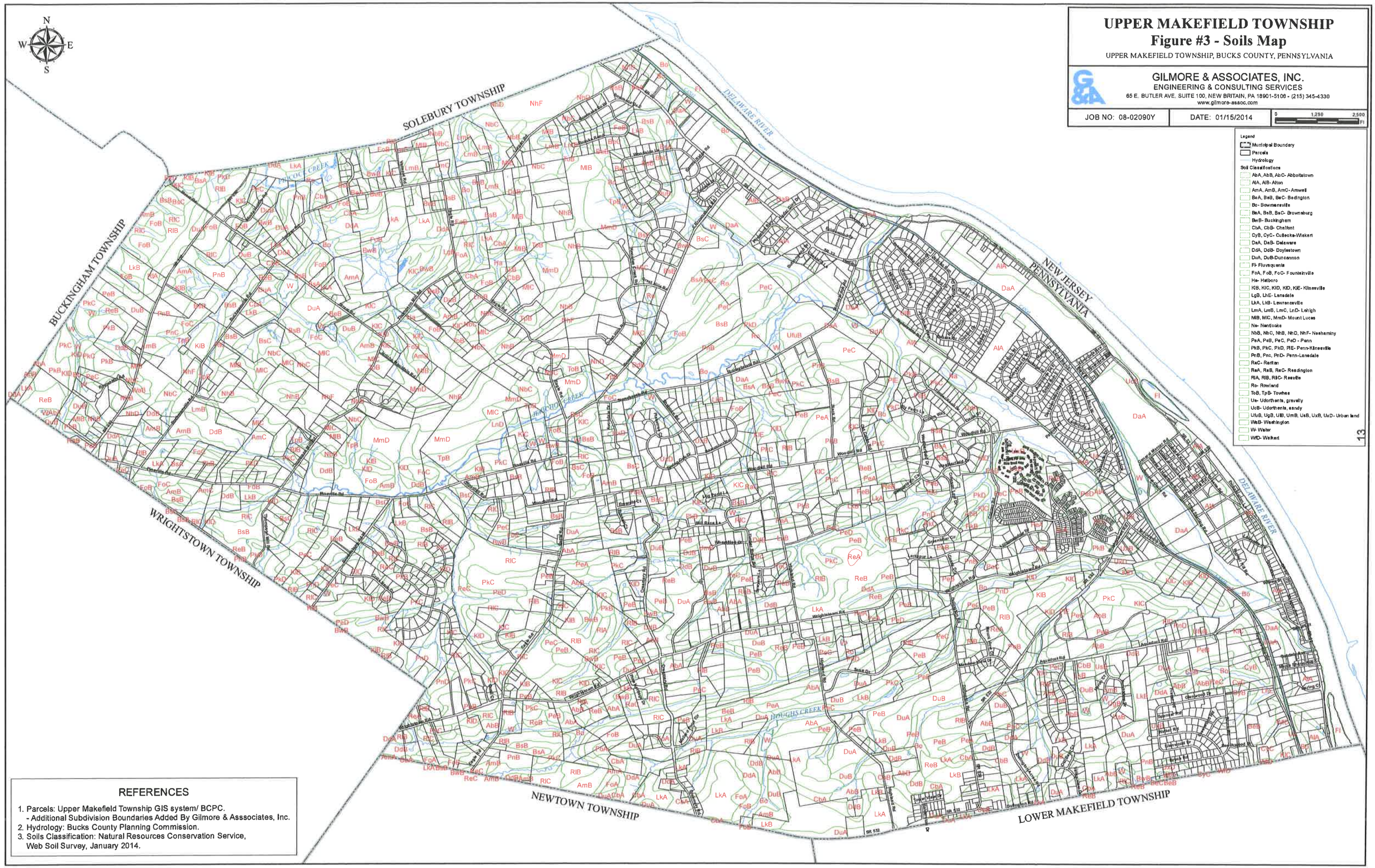

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. Soils Classification: Natural Resources Conservation Service,
   Web Soil Survey, January 2014.

UPPER MAKEFIELD TOWNSHIP
Figure #4 - Prime Farmlands Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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N W E S

SOLEBURY TOWNSHIP

BUCKINGHAM TOWNSHIP

WRIGHTSTOWN TOWNSHIP

NEWTOWN TOWNSHIP

LOWER MAKEFIELD TOWNSHIP

DELAWARE RIVER

NEW JERSEY
PENNSYLVANIA

JERICHO CREEK

NEWTOWN CREEK

Legend
- Municipal Boundary
- Parcels
- Hydrology

Prime Farmland Soils Classification
- Prime Farmlands
- Statewide Important Farmlands

REFERENCES

1. Parcels: Upper Makefield Township GIS system, BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. Prime & Statewide Important Farmland:
   USDA- Natural Resources Conservation Service,
   Web Soil Survey, January 2014.

UPPER MAKEFIELD TOWNSHIP
Figure #5 - On-lot Sewage Disposal Suitability
Drainage Class Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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N W E S

SOLEBURY TOWNSHIP

BUCKINGHAM TOWNSHIP

WRIGHTSTOWN TOWNSHIP

NEWTOWN TOWNSHIP

LOWER MAKEFIELD TOWNSHIP

NEW JERSEY
PENNSYLVANIA

DELAWARE RIVER

PIDCOCK CREEK

Legend
- Municipal Boundary
- Parcels
- Hydrology

Drainage Class
- Somewhat excessively drained; Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained; Very poorly drained
- Unclassified

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. Drainage: USDA Natural Resources Conservation Service, Web Soil Survey, January 2014.

Bedington Series

The Bedington soil is a fine-loamy, mixed, mesic Typic Hapludult consisting of angular and subangular channers and flagstones of siltstone, shale and sandstone. Its natural position on the landform is summits, side slopes and shoulders of hills on uplands in shale hills. Its permeability is moderate. It is well drained.

Bowmansville Series

The Bowmansville soil is a fine-loamy, mixed, nonacid, mesic Aeric Fluvaquent consisting of well-rounded through sub-rounded gravel, cobble and pebble size sandstone, siltstone and shale of alluvium of mixed origin of reddish basic rocks. Its natural position on the landform is along perennial streams and flood plains. Its permeability is moderate in the surface, moderately slow to moderate in the subsoil and moderately rapid in the substratum. It is very deep and somewhat poorly drained.

Brownsburg Series

The Brownsburg soil is a coarse-loamy, mixed, mesic Typic Hapludalf consisting of angular and subangular channers of metamorphic shale, siltstone and sandstone of loess deposits over red shale and siltstone residuum. Its natural position on the landform is summits and back slopes of hills. Its permeability is moderate. It is deep and well drained.

Buckingham Series

The Buckingham soil is a fine-loamy, mixed, mesic Aeric Fragiaqualf consisting of well-rounded through subangular gravels, cobbles and channers of metamorphic and sedimentary shale, siltstone and sandstone of colluvium and alluvium derived from gray and red shale, siltstone and sandstone material eroded from adjacent uplands. Its natural position on the landform is on head slopes, in drainage ways, and in u-shaped valleys of hills. It is somewhat poorly drained. It is very deep and moderately deep to the fragipan. Its permeability is moderate above the fragipan, slow in the fragipan and slow to moderately slow below the fragipan.

Chalfont Series

The Chalfont soil is a fine-silty, mixed, mesic Aquic Fragiudalf consisting of angular and subangular gravels and channers of shale, siltstone and sandstone with a loess mantle overlying weathered residuum of red shale and sandstone. Its natural position on the landform is in concave foot slopes and loess hills. Its permeability is moderate above the fragipan, slow in the fragipan and slow to moderately slow in the substratum. It is somewhat poorly drained. It is very deep and moderately deep to the fragipan.

Culleoka Series

The Culleoka soil is a fine-loamy, mixed, mesic Ultic Hapludalf consisting of angular and subangular channers and flagstones of shale, siltstone and sandstone derived from residuum or colluvium from gray and black shale plus fine grain sandstone or siltstone, generally formed on the Lockatong formation. Its natural position on the landform is mid and upper sides of ridges and hillsides in the piedmont. Its permeability is moderate to moderately rapid in the A, moderate in the B and slow to very slow in the bedrock. It is well drained.

Delaware Series

The Delaware soil is a coarse-loamy, mixed mesic Typic Dystrochrept consisting of well-rounded through sub-rounded gravels and cobbles of sandstone derived from glacial outwash and alluvium. Its natural position on the landform is nearly level interfluves and back slopes of side slopes on terraces of the Delaware River valley. Its permeability is moderate to rapid. It is very deep and well drained.

Doylestown Series

The Doylestown soil is a fine-silty, mixed, mesic Typic Fragiaqualf consisting of angular and subangular gravels and channers of shale and siltstone derived from silty materials, presumably loess, over soil materials weathered from a variety of parent materials, but principally red shale. Its natural position on the landform is on foot slopes and toe slopes of nearly level to gently undulating drainage ways and broad basins. Its permeability is moderate in the upper part of the solum and slow to moderately slow in the lower part. It is deep and poorly drained.

Duncannon Series

The Duncannon soil is a coarse-silty, mixed, mesic, Ultic Hapludalf consisting of angular and subangular gravels and channers of shale, derived from silty to very fine sandy loam material, presumed to be loess, overlaying a variety of residuum materials and stream deposits. Its natural position on the landform is interfluves of uplands. Its permeability is moderate. It is very deep and well drained.

Fluvaquents Series

The Fluvaquents soil is classified only at the subgroup level due to high variability, but consists of well-rounded to subangular gravels, cobbles, boulders and channers of diabase, shale and sandstone, derived from alluvium from mixed igneous, metamorphic and sedimentary rocks. Its natural position on the landform is nearly level toe slopes of head slopes in flood plains. It has distinctive bar and channel features in dendritic patterns, hummocks from wind throws, closed depressions adjacent to natural levees, such as small islands within the Delaware River. Its permeability is moderately slow to moderate in the upper part of the soil and moderately slow to rapid in the upper part of the substratum and moderately slow to very slow in the lower part of the substratum, and moderately slow to moderately rapid in the buried layers, if present. It is somewhat poorly to very poorly drained. It is very deep, and moderately deep to impermeable layers.

Fountainville Series

The Fountainville soil is a fine-silty, mixed, mesic Oxyaquic Fragiudalf consisting of angular and subangular gravels and channers of sedimentary and metamorphic shale, siltstone and sandstone derived from loess deposits over red or brown shale and siltstone residuum. Its natural position on the landform is interfluves and back slopes and foot slopes of side and head slopes of hills. Its permeability is moderate above the fragipan and slow to moderately slow in the fragipan. It is moderately well drained. It is deep and moderately deep to the fragipan.

Hatboro Series

The Hatboro soil is a fine-loamy, mixed, nonacid, mesic Typic Fluvaquent consisting of well-rounded gravels and cobbles of gneiss or quartzite derived from alluvium washed

from schist, gneiss and quartzite parent materials. Its natural position on the landform is toe slopes on nearly level flood plains. It distinctively is dissected with channel and bar features subject to common flooding. Water stands on the surface sometimes for very brief periods during heavy rains and after spring thaw. Its permeability is moderate in the solum and moderately rapid in the substratum. It is very deep and poorly drained.

Klinesville Series

The Klinesville soil is a loamy-skeletal, mixed, mesic Lithic Dystrochrept consisting of angular and subangular gravels and channers of shaley siltstone and sandstone derived from red shale and siltstone residuum. Its natural position on the landform is broad hilltops and hillsides of rolling hills, ridges and mountain valleys. Its permeability is moderately rapid in the upper part and slow to moderate in the substratum. It is shallow and somewhat excessively drained.

Lansdale Series

The Lansdale soil is a coarse-loamy, mixed, mesic Typic Hapludult comprised of subangular gravels and cobbles of sandstone derived from residuum of sandstone. Its natural position on the landform is side slopes and ridges of nearly level to steep uplands in the piedmont. Its permeability is moderately slow to moderate in the A horizon, moderately slow to moderately rapid in the B horizon, moderately rapid in the substratum and moderately slow in the bedrock. It is deep and well drained.

Lawrenceville Series

The Lawrenceville soil is a fine silty, mixed, mesic Typic Fragiudalf consisting of angular and subangular channers of shale, siltstone and sandstone derived from loses from shale-siltstone material over residuum from shale siltstone material. Its natural position on the landform is on side slopes of uplands. Its permeability is moderate. It is moderately well drained. It is very deep, moderately deep to fragipan.

Lehigh Series

The Lehigh soil is a fine-loamy, mixed, mesic Aquic Hapludalf comprised of angular and subangular channers and cobbles of diabase, shale and siltstone, derived from residuum or colluvium from metamorphosed shale and sandstone. Its natural position on the landform is on lower slopes of hills in uplands. Its permeability is moderate in the surface and slow in the subsoil and substratum. It is a deep soil and moderately well drained.

Mount Lucas

The Mount Lucas soil is a fine loamy, mixed mesic Aquic Hapludalf comprised of rounded and sub-rounded gravels and cobbles of diabase, derived from residuum and colluvium from diabase. Its natural position in the landform is on foot slopes and drainage ways in the uplands. Its permeability is moderate in the surface horizons, slow to moderately slow in the subsoil and slow to moderately rapid in the substratum. It is a very deep soil and is moderately well drained to somewhat poorly drained.

Nanticoke Series

The Nanticoke soil is a fine-silty, mixed nonacid, mesic Typic Hydraquent comprised of well-rounded and rounded gravels of sandstone, derived from high n-value loamy (silty) estuarine deposits. Its natural position on the landform is fresh water estuarine marshes

and depressions associated with flood plains of tidally influenced rivers and creeks in the mid-Atlantic coastal plain. Its permeability is moderately slow. It is very deep and very poorly drained.

Neshaminy Series

The Neshaminy soil is a fine-loamy, mixed, mesic Ultic Hapludalf, comprised of rounded and sub-rounded gravels, cobbles and stones of diabase, and is derived of residuum from diabase. Its natural position on the landform is tops and sides of high hills of uplands. Its permeability is moderate in the A and E horizons and moderately slow in the B and C horizons. It is a deep soil and is well drained.

Penn Series

The Penn soil is a fine-loamy, mixed, mesic Ultic Hapludalf comprised of angular and subangular channers of siltstone and shale derived from residuum of red Triassic shale, siltstone and fine grained sandstone. Its natural position on the landform is broad hilltops and hillsides of uplands. Its permeability is moderate to moderately rapid. It is moderately deep and well drained.

Raritan Series

The Raritan series is a fine-loamy, mixed, mesic Aquic Fragiudult comprised of rounded through subangular gravels and channers of sandstone, siltstone and shale, derived from old alluvium from red shale and sandstone. Its natural position on the landform is terraces near major streams of uplands. Its permeability is moderate above the fragipan, moderately slow in the fragipan, and moderate to moderately rapid below the fragipan. It is moderately well and somewhat poorly drained. It is very deep and moderately deep to fragipan.

Readington Series

The Readington soil is a fine-loamy, mixed, mesic Oxyaquic Fragiudalf comprised of angular and subangular channers of siltstone, shale and some quartz, derived from residuum and colluvium from red shale, siltstone and fine-grained sandstone. Its natural position on the landform is depressions and broad drainage ways of uplands. Its permeability is moderate in the Ap, Ba and Bt horizons and moderately slow in the Bx horizon. It is moderately well drained. It is deep, very deep and moderately deep to the fragipan.

Reaville Series

The Reaville soil is a fine-loamy, mixed, Aquic Hapludalf comprised of angular and subangular channers of shale, siltstone and sandstone derived from residuum of red shale, siltstone and fine grained sandstone. Its natural position on the landform is depressions and broad drainage ways of uplands. Its permeability is moderate in the Ap and slow in the B and C horizons. It is moderately deep and is moderately well drained to somewhat poorly drained.

Rowland Series

The Rowland soil is a fine-loamy, mixed, mesic Fluvaquent Dystrochrept comprised of well-rounded through subangular gravels and channers of sandstone, siltstone and shale, derived from alluvium from red and brown shale, siltstone and sandstone and conglomerate. Its natural position on the landform is low flood plains of nearly level

bottom lands in piedmont river valleys. Its permeability is moderately slow to moderate in the surface, subsoil, upper substratum and moderately rapid in the lower substratum. It is very deep and is moderately well to somewhat poorly drained.

Towhee Series

The Towhee soil is a fine-loamy, mixed, mesic Typic Fragiaqualf comprised of rounded through subangular gravels, cobbles and channers of diabase and gneiss derived from colluvium or residuum from igneous rocks. Its natural position on the landform is foot slopes of uplands. Its permeability is moderate above the fragipan, slow in the fragipan and slow to moderately slow below the fragipan. It is poorly drained. It is very deep and moderately deep to the fragipan.

Udorthents, Gravelly Series

The Udorthents are well-rounded gravels and cobbles of mixed igneous, metamorphic and sedimentary rocks derived from sandy and gravelly alluvium and glacial outwash sediments from mixed sedimentary, metamorphic and igneous rocks. Its natural position on the landform is nearly level to gently sloping broad flats and terraces of the mid-Atlantic northern coastal plain. This soil consists of areas that have been cut and filled during grading for roads, railroads, building site developments, recreation areas and other similar uses and now have been converted to lawns, playgrounds or sedimentation basins for aesthetic, recreational or storm water control uses in close proximity to large urban areas. Its permeability is rapid to very rapid throughout. Its drainage class is moderately well to somewhat excessively. It is deep and very deep, and moderately deep to very deep to gravels.

Washington Series

The Washington soil is a fine-loamy, mixed, mesic Ultic Hapludalf consisting of rounded through subangular gravels of sandstone, quartz, and limestone derived from glacial fill overlying limestone. Its natural position on the landform is side slopes and hilltops of uplands. Its permeability is moderate in the surface and subsoil and moderate to moderately rapid in the substratum. It is very deep and well drained.

Weikert Series

The Weikert soil is a loamy-skeletal, mixed, mesic Lithic Dystrochrept, consisting of angular and subangular channers of shale with some siltstone and sandstone, derived from residuum of interbedded gray and brown acid shale, siltstone and fine grained sandstone. Its natural position on the landform is broad tops and sides of hills on convex uplands. Its permeability is moderately rapid. It is shallow and is well drained to somewhat excessively drained.

D. Geology

Upper Makefield Township is underlain primarily by the Brunswick and Lockatong Formations. Both of these formations are part of the Newark Group, a thick sequence of non-marine sedimentary rocks of upper Triassic to lower Jurassic age. Other geologic deposits found within the Township include Pre-Wisconsin/Wisconsin River terrace and flood plain deposits and the igneous diabase intrusions that occur within the sedimentary shales and argillites (Refer to Figure 6).

Pre-Wisconsin/Wisconsin

This geologic unit is comprised of unconsolidated sand, gravel and clay deposits in the Delaware River terrace and flood plain. The deposition of the unconsolidated sands, gravels and clays of this geologic unit corresponds to glacial activity in this area during Pre-Wisconsin/Wisconsin times. These unconsolidated sediments only occur along the Delaware River in Upper Makefield Township. The unconsolidated sediments overlie the older shales and argillites of the Brunswick and Lockatong Formations, which in this area occur between 25 and 50 feet below the ground surface.

Diabase

In Upper Makefield Township, diabase rocks can be found as igneous intrusions into the Triassic-age Brunswick Formation. The intrusions are thought to have occurred in early Jurassic times. Near the contact with the diabase, the Brunswick sedimentary rocks have been metamorphosed to dark, hard hornfels through the intense temperature of the igneous intrusion. This transformation of the sedimentary rocks makes the shales and siltstones more susceptible to fracturing. The diabase intrusions occur in the northern part of the Township, forming Jericho Mountain and Bowman Hill. Diabase rocks are more resistant to weathering than the sedimentary rocks in the area, which explains the topography and hilly terrain in Upper Makefield Township.

Brunswick Formation

The Brunswick Formation in Upper Makefield Township is comprised predominantly of soft reddish-brown, thin to thick bedded shales and siltstones with occasional fine to coarse-grained reddish sandstone beds. The Brunswick sediments for the most part, were deposited under fluvial, oxidizing conditions. The Brunswick Formation is part of the Newark Basin, an elongated northeast-southwest trending structural basin extending from northern Virginia to southeastern New York. The Newark Basin is one of a series of disconnected extensional basins, which are found from Nova Scotia to North Carolina along the Atlantic Coast. Within the Newark Group, it is problematic to establish a precise boundary between the formations in the group, since the change between them is gradational. Near the transition with the Lockatong, the Brunswick contains hard red argillite and occasional layers of gray shale. The red shales and sandstones of the Brunswick Formation have been altered to black hard hornfels in areas adjacent to the diabase intrusions. The Brunswick shales are more easily weathered than the Lockatong lithofacies. As a result, the Brunswick shales tend to form the valleys between the Lockatong ridges.

UPPER MAKEFIELD TOWNSHIP
Figure #6 - Geology Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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N W E S

SOLEBURY TOWNSHIP

BUCKINGHAM TOWNSHIP

WRIGHTSTOWN TOWNSHIP

NEWTOWN TOWNSHIP

LOWER MAKEFIELD TOWNSHIP

DELAWARE RIVER

NEW JERSEY
PENNSYLVANIA

Diabase

Brunswick Formation

Diabase

Brunswick Formation

Wisconsin

Brunswick

Lockatong

Lockatong Formation

U D

HOUGHS CREEK

JERICHO CREEK

Legend
- Municipal Boundary
- Parcels
- Hydrology

Surface Geology

NAME
- Brunswick
- Diabase
- Lockatong
- Wisconsin
- U D Fault Line

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. Geology: Pennsylvania Bureau of Topographic and Geologic Survey, Department of Conservation and Natural Resources- 2001 & Ground-Water Resources of Bucks County, PA- 1953.

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Lockatong Formation

The Lockatong Formation in Upper Makefield consists mainly of dark gray to black, thick-bedded argillite inter-bedded with thin-layered dark shale and siltstone. The dominant rock type is fine-grained argillite, but there can be variations in color and bedding. The Lockatong lithofacies is usually gray to black in color, but commonly red-brown or even red beds are also present and, in some areas, even dominant. Within the same outcrop, different colors are often found, and it is not unusual to find individual beds showing a graded color change. Localities with high percentage of red beds commonly have small shale beds along with argillite, while most of the argillite is found in massive blocky beds thicker than four (4) feet. There is considerable variation in bedding; small and medium bedded rocks are present, and finely laminated beds are also found.

Like the Brunswick Formation, the Lockatong lithofacies is also a member of the Newark Group. The Lockatong sediments were deposited in a lacustrine or swampy environment under reducing conditions, which is evidenced by the dark color of the rocks and the presence of pyrite. Occasional ripple marks and mud cracks are also indications of a shallow water depositional environment. Lockatong rocks are generally more resistant to weathering than the Brunswick shales and form low ridges parallel to the strike of the beds. It is reported that, in Bucks County, the Lockatong Formation is as much as 4,000 feet thick.

Mixed Zone

The Brunswick Formation is comprised of soft red shales and siltstones and, to a lesser extent, fine-grained sandstones, and the Lockatong Formation is composed predominantly of hard gray to black argillites. In Upper Makefield Township, rocks of the Brunswick lithofacies are predominant. The zone of inter-layering of the two formations (lithofacies) is referred to as the “mixed zone”, which lies between the two formations and consist of thick red beds of the Brunswick and thick gray beds of the Lockatong formations.

The inter-layering of the Lockatong and Brunswick Formations is believed to have originated from the oscillations between lacustrine and fluvial conditions in a basin environment. The sediment of the Lockatong was deposited in a lacustrine or swampy environment under reducing conditions, while the Brunswick sediment, for the most part, was deposited under fluvial conditions.

This “mixed zone” between the Brunswick and Lockatong Formations has been divided by Olsen (1980), with the boundary between these formations location where the occurrence of red beds is dominant over the occurrence of the gray and black beds. However, it should be noted that establishing a precise boundary between the two (2) formations is problematic, since the change is gradational.

The strike of the strata in the “mixed zone” in Upper Makefield Township tends to run northeast to southwest, with a dip towards the northwest. Outside of the Jericho Mountain area, the dip generally ranges between 7° to 20°, with an average of about 13°. Folding in the “mixed zone” is not prevalent and the shales have not developed cleavage. Although, not prevalent, there is some folding in conjunction with small localized faults around Jericho Mountain and in the northern part of the Township, where more geological structural activity has taken place.

Joints and Fractures

The bedrock contains numerous quasi-horizontal and near-vertical fractures and joints. Joints are fractures where no appreciable movement has taken place. Fractures can be developed along bedding planes or occur inclined at steep angles. The degree of fracture development and their orientation are variable between the interbedded layers due to differences in physical properties, including grain size and hardness. The more competent rocks tend to show more fracturing than the more pliable rocks and fracturing along bedding planes becomes enhanced. Fractures can occur widely spaced or concentrated in narrow zones. Zones of fracturing can be aligned with or at angles to joint development. Many of the smaller fracture openings are filled with calcite.

Fault

In the northern portion of Upper Makefield Township, a normal fault exists. It is located north of Jericho Mountain. This fault lies within the Brunswick Formation, and appears to stop at the border of the Wisconsin unconsolidated sands and gravels, but may extend below the Wisconsin sediments.

E. Topography

The natural setting of Upper Makefield Township is entirely within the Triassic Lowland Section of the Piedmont Physiographic Province. The Triassic Lowland Section has relatively flat to gently rolling topography. This is evidenced by the rolling hills in the northwestern portion of the Township around Jericho Mountain, through the relatively level farmland stretching south and east from Jericho Mountain Road to River Road along the Delaware River. The ground surface elevation ranges from 40 feet above mean sea level in the vicinity of the Delaware River to 440 feet in the Bowman Hill and Jericho Mountain areas (Refer to Figure 7).

Additionally, Figure 8 displays on-lot sewage disposal system suitability based on the mapped soil's slope rating. Conventional in-ground and sand mound systems can be installed on slopes up to 12%; conventional in-ground systems and individual residential spray irrigation systems (IRSIS) can be installed on slopes up to 25%; and slopes greater than 25% are unsuitable for conventional on-lot sewage disposal.

F. Hydrogeology and Potable Water

Upper Makefield Township is underlain mainly by the sedimentary bedrock aquifers or the Brunswick and the Lockatong Formations. The unconsolidated sand and gravel deposits overlie the bedrock aquifers in the floodplain along the Delaware River. The Diabase rock, although a poor aquifer, is present in the northern part of the Township in the Jericho Mountain and Bowman's Hill area. The red shales of the Brunswick Formation in the vicinity of the diabase have been altered to hornfels due to contact metamorphism. The hornfels are hard and brittle and have developed increased porosity and permeability.

Porosity and permeability are two basic properties of rocks that control the availability, movement and quality of ground water in the bedrock. There is much variation in the porosity and permeability of each of these units. Thus, there is much variation in the quality and quantity of ground water present in each of them. The Brunswick aquifer is the most productive and the diabase is the least.

In Upper Makefield Township, ground water is the only source of water supply, and the Township has a substantial quantity of available ground water, which is a renewable

resource. However, in order to maintain its availability, it must be used properly and protected from any source of pollution. Although streams are not used as a source of drinking water, they should also be protected from any source of pollution. In order to protect water resources, proper location, design, construction, operation, and maintenance of wastewater treatment and disposal facilities are necessary. On-land disposal of the treated wastewater, wherever feasible, will enhance ground water recharge. For any on-site wastewater treatment and disposal, site-specific investigations must be undertaken.

Ground water occurs and moves in the fractures present in the bedrock. The fracture openings vary in size, areal extent, and in vertical distribution. In parts of the Township, there are subsurface zones of fracture concentration with increased porosity and permeability of the bedrock. Wells drilled in such zones generally experience relatively high yields.

Ground water in Upper Makefield Township occurs both under water table and confined or semi-confined conditions. The aquifer extends to depths of more than 550 feet. When a well intercepts any water-containing openings, the water level rises above the opening and the water is under pressure. The water level in the aquifer is not exposed to the atmosphere at the wellhead, and the well responds as under confined conditions. In some wells, the water-containing openings intercepted by them may be exposed to the atmosphere at some distance from the wellhead through interconnected openings. In that case, the well and the aquifer eventually respond as under water table conditions. Many Brunswick wells are under artesian conditions and overflow. Such conditions are present in some wells in the Township. Except for the water-supply wells in the Heritage Hills system operated by the Township, presently other Township residences receive their water supply from on-site residential wells

Ground water moves from a higher head area (recharge area) to a lower head area (discharge area) such as wells, springs, streams, and lakes, under the influence of the gravitational force. As a result, ground water from the upland areas moves away under natural conditions and the water level continues to decline even under relatively wet conditions. However, a properly constructed well should not experience any water-supply problems. Similarly, properly designed, installed and operated wastewater disposal systems should not be the source of contamination of the water resources.

The residential wells in Upper Makefield Township have been reported to have sufficient yields for domestic purposes (up to 60 gpm), and are more than 100 feet to 750 feet deep. Three wells are currently used to serve the residential developments of Heritage Hills, Traditions I & II, and Lakeside. The permitted yields for the three public wells are as follows: Well 1 = 206,000 gpd; Well 3 = 111,000 gpd; and Well 4 = 206,000 gpd. The two wells at the Gray Tract, GT-1 and GT-2 are also permitted for 75,000 gpd. However, they currently are not in use, but are projected to be placed into service in late 2014. Refer to Figure 9 for the well locations and public water service area.

UPPER MAKEFIELD TOWNSHIP
Figure #7 - Topography Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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N W E S

Legend
- Municipal Boundary
- Parcels
- Hydrology
- 30 - 60'
- 61' - 100'
- 101 - 140'
- 141 - 170'
- 171 - 200'
- 201 - 250'
- 251 - 300'
- 301 - 340'
- 341 - 390'
- 391 - 440'

SOLEBURY TOWNSHIP

BUCKINGHAM TOWNSHIP

WRIGHTSTOWN TOWNSHIP

NEWTOWN TOWNSHIP

LOWER MAKEFIELD TOWNSHIP

NEW JERSEY
PENNSYLVANIA

DELAWARE RIVER

HOUGHS CREEK

JERICHO CREEK

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. Topography/Contours: Derived from Township-wide 2008 digital aerial flight.

UPPER MAKEFIELD TOWNSHIP
Figure #8 - On-Lot Sewage Disposal Suitability - Slope Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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NEW JERSEY
PENNSYLVANIA
DELAWARE RIVER
PIDCOCK CREEK
JERICHO CREEK
HOUGUS CREEK

Legend
- Municipal Boundary
- Parcels
- Hydrology

Steep Slopes
- 0 - 12% (Sand Mound, In-Ground & IRSIS)
- 12 - 25% (In-Ground & IRSIS)
- 25 - 100% (Unsuitable for Onlot System)

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. On-Lot Septic System Suitability derived from Township-wide 2008 digital aerial flight topography/contours and not Soil Survey Slope Classification.

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Unconsolidated Sands and Gravels

In Upper Makefield Township, the Pre-Wisconsin/Wisconsin unconsolidated sands and gravels overlie the Brunswick and Lockatong lithofacies along the Delaware River. These unconsolidated sands and gravels are the source of the largest and most reliable ground water supplies in Bucks County. In Upper Makefield Township, this aquifer ranges in thickness between 25 and 50 feet. These deposits are highly permeable and contain significant amounts of water in storage. They are the source of ground-water recharge to the underlying bedrock aquifers in the Township. Average yield of wells in the unconsolidated sediments of Bucks County is approximately 300 gpm. However, its quality may be poor due to the presence of high concentrations of iron and other minerals. Ground water in the unconsolidated alluvial deposits occurs under water table conditions and is, generally, close to the surface of the ground. It is highly susceptible to potential contamination due to malfunctioning on-lot sewage disposal systems and/or other conditions created by human activities. The contamination that may be present or occur in this aquifer, may affect the quality of the ground water in the underlying bedrock aquifers because of poor well construction.

Proper well construction, in the bedrock overlain by alluvial deposits, will require extending the well casing below the unconsolidated deposits and grouting the annulus carefully to exclude contribution from the water table aquifer in the sand and gravel.

Diabase

This hydrogeologic unit is an igneous rock, which has intruded the older Brunswick shale formation. The diabase is a dense crystalline rock, which makes it hard for water to be stored and move through it. This rock is the poorest aquifer located within Upper Makefield Township. In the diabase, ground water flow is restricted to fractures and joints, because it has no bedding planes and has limited amount of secondary openings. Most ground water is limited to the weathered zone, which is located close to the land surface. In this zone, the diabase fractures and joints have been enlarged by weathering, creating relatively large openings for the storage and movement of water. Where there is no weathered zone, usually there is no water present. The diabase has the lowest porosity and permeability values in the Township, making it the poorest aquifer. Very low well yields are expected in the diabase. Most of the water occurs in the fractures and the weathered zone consisting of a mixture of sand, silt, clay and rock fragments atop the almost solid bedrock devoid of any fractures.

UPPER MAKEFIELD TOWNSHIP
Figure #9 - Public Water Service Area Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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WRIGHTSTOWN TOWNSHIP

NEWTOWN TOWNSHIP

LOWER MAKEFIELD TOWNSHIP

NEW JERSEY
PENNSYLVANIA

DELAWARE RIVER

PIDCOCK CREEK

JERICHO CREEK

HOUGHS CREEK

Well #4

Well #3

Well #1

Well # GT 1

Well # GT 2

Legend
- Municipal Boundary
- Parcels
- Hydrology
- Wells
- Public Water Service Area

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. Public Water: Upper Makefield Township GIS system, 2009.

Brunswick Formation

The Brunswick Formation is Upper Makefield Township's principal aquifer and it covers more than 70 percent of the area. It outcrops in places west of Taylorsville Road and occurs underneath the unconsolidated sands and gravels to the east. In this area, the Brunswick aquifer is overlain by Pre-Wisconsin and Wisconsin sands and gravels. The Brunswick aquifer in the Township consists of sedimentary rocks that are highly fractured. Ground water occurs under water table conditions, as well as confined or semi-confined conditions. The Brunswick Formation is characterized by primary and secondary porosity and permeability. Primary and secondary porosity and permeability provide the space and avenues necessary for the storage and movement of ground water. Primary porosity and permeability are associated with openings along bedding planes and inter-granular space in the siltstones and sandstones that occur in this formation. Except for siltstone and sandstone beds, the Brunswick shales are devoid of any inter-granular porosity and permeability. Joints and fractures comprise the secondary porosity and permeability. Ground water primarily occurs and moves through fractures and joints in the Brunswick shales in the Township. These fracture openings vary in size, areal extent, vertical distribution, and in the degree of interconnection. In the Brunswick aquifer there are areas where fractures are concentrated. Within these zones, the bedrock has experienced increased porosity and permeability. Wells drilled in such zones exhibit relatively high yields.

It is not possible to separate water contribution to a well from bedding plane openings from that of fractures; however, there is evidence suggesting that the contribution from bedding plane permeability increases with increased fracturing. The Brunswick hydrogeologic unit is comprised of a very complex aquifer system, with a water table or unconfined component, and a confined or semi-confined component. The Brunswick aquifer is characterized by water-producing zones. Some of these zones have little or no hydraulic interconnection among them.

Well yields in aquifers such as the Brunswick with secondary porosity and permeability are controlled by the nature, number, size, and degree of interconnection of the openings penetrated by the wells. The water quality in the Brunswick Formation is generally satisfactory. The water is basic and has moderate total hardness.

The Brunswick Formation is an important aquifer in Upper Makefield Township and in the nearby municipalities. The Brunswick aquifer consists of shale bedrock, which is characterized by the secondary porosity and permeability present along fracture openings. According to Hall (1934), in Solebury and nearby municipalities, the Brunswick shale is thoroughly faulted and jointed. The bedrock contains many openings with increased porosity and permeability. These openings are more prevalent in the Brunswick aquifer than any other bedrock aquifer found in Upper Makefield Township. The porosity and permeability of the rocks in the Brunswick Formation exhibit a wide range, and high-yield wells are found in the areas of fracture concentration.

Lockatong Formation

The Lockatong Formation forms the principal aquifer beneath the southern portion of Upper Makefield Township. The Lockatong argillites are composed of very fine-grained tightly cemented particles, with almost no inter-granular porosity and permeability. As a hydrogeologic unit, the Lockatong is, in general, characterized by poor hydraulic characteristics with low values for specific capacity, transmissivity, and storage coefficient. It exhibits a very fine texture with little or no primary or inter-granular permeability. Thus, nearly all of the water in the Lockatong occurs and moves in joints

and fractures, and to a lesser extent, in bedding plane openings. As a norm, the Lockatong hydrogeologic unit is not capable of providing large amounts of water and is considered the poorest of the Triassic sedimentary aquifers. Within low yield values, the Lockatong shows much variation in well productivity. This variation is controlled by the degree of fracturing within the unit.

Like the Brunswick lithofacies, the Lockatong is characterized by primary and secondary porosity and permeability. The Lockatong is characterized by a median specific capacity value of 0.05 gpm/foot of drawdown. The median yield of a well drilled in the Lockatong Formation is approximately 10 gpm. Although not common, large yield wells are also found in the Lockatong aquifer. Wells drilled at the Gray Tract (2004) and White Farm (test wells, 2005) exhibit yields that exceed 400 and 100 gpm, respectively. The Lockatong aquifer is present mainly in the southern part of the Township and is considered a poor aquifer. Much like the Brunswick aquifer, the Lockatong aquifer is also characterized by water-producing openings, which are not as common and open as in the Brunswick aquifer. They are generally small and narrow with relatively low yields.

G. Wetlands

Figure 10 identifies areas in Upper Makefield Township that have mapped wetlands per the National Wetland Inventory, as well as showing where hydric soils are per the 2008 SSURGO database for Bucks County, Pennsylvania.

UPPER MAKEFIELD TOWNSHIP
Figure #10 - Wetlands & Hydric Soils Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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DELAWARE RIVER

NEW JERSEY
PENNSYLVANIA

PEACOCK CREEK

JERICHO CREEK

HOUGHS CREEK

Legend
- Municipal Boundary
- Parcels
- Hydrology
- National Wetland Inventory
- Hydric Soil

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. National Wetlands Inventory: U.S. Fish & Wildlife Service, 2005.
4. Hydric Soils: Natural Resources Conservation Service,
   Web Soil Survey, January 2014.

III – EXISTING SEWAGE FACILITIES

A.1 Existing Sewer Facilities

Upper Makefield Township is primarily served by individual, on-lot sewage disposal systems. In addition, there are several relatively small private and/or community sewage treatment plants and two public sewage treatment facilities within the Township which include the following (Refer to Figure 11):

1. Village Queen Apartments (Charles Adcock)
   1058 Little Road
   Permit # 053244
   Design Flow: 1400 gpd
   Type of Plant: Extended Aeration with Sand Filtration
   Discharge: Houghs Creek

2. Jericho National Golf Club
   250 Brownsburg Road East
   Permit # 057908
   Design Flow: 4200 gpd
   Type of Plant: Extended Aeration with Sand Filtration
   Discharge: Jericho Creek

3. Washington Crossing State Park (lower section)
   1112 River Road
   Permit # 051268
   Design Flow: 36,000 gpd
   Type of Plant: Extended Aeration
   Discharge: Delaware River

4. Paul & Mary Ellen Zingarini
   130 Beaumont Drive
   Permit # 058238
   Design Flow: 700 gpd
   Type of Plant: Small Flow Treatment Facility
   Discharge: Tributary to Jericho Creek

5. Upper Makefield Township Municipal Complex
   1076 Eagle Road
   Permit # 040104
   Design Flow: 400 gpd
   Type of plant: Small Flow Treatment Facility
   Discharge: Tributary to Houghs Creek

6. Dutchess Farms (Upper Makefield Township)
   Brownsburg Road West
   Permit # 058858
   Design Flow: 20,225 gpd
   Type of Plant: Extended Aeration with Denitrification
   Discharge: On-site Wetland / Tributary to Jericho Creek

7. Heritage Hills Wastewater Treatment Plant (Upper Makefield Township)
   Taylorsville Road
   Permit # 052035
   Design Flow: 172,544 gpd
   Type of Plant: Activated Sludge
   Discharge: Surface Recharge Basin and/or Delaware River

UPPER MAKEFIELD TOWNSHIP
Figure #11 - Existing Sewer Facilities Service Area Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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N W E S

Legend
- Municipal Boundary
- Parcels
- Hydrology
- Public Sewer Service Area
- Private Sewer Systems

SOLEBURY TOWNSHIP
BUCKINGHAM TOWNSHIP
WRIGHTSTOWN TOWNSHIP
NEWTOWN TOWNSHIP
LOWER MAKEFIELD TOWNSHIP
DELAWARE RIVER
NEW JERSEY
PENNSYLVANIA
PIDCOCK CREEK
BEMUS CREEK
HOUGHS CREEK

Jericho National Golf Club

Paul & MaryEllen Zingarini

Washington Crossing State Park

Heritage Hills Wastewater Treatment Facility

Village Queen Apartments

Dutchess Farm Wastewater Treatment Facility

Upper Makefield Township Municipal Complex

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. Public Sewer: Upper Makefield Township GIS system, 2009.

The Heritage Hills public sanitary sewer system, owned and operated by Upper Makefield Township, serves the high-density townhome development of Heritage Hills, the single-family homes of the Lakeside development, and the high-density, age-qualified Traditions development. The developments are located on both the east and west sides of Taylorsville Road, just north of the intersection of Route 532 and Taylorsville Road. Ground water from two wells in the Lakeside development and one well in the Heritage Hills development are the sources of water supply. The average daily wastewater discharge from the Heritage Hills Wastewater Treatment Plant ("WWTP") in 2013 was approximately 47,630 gallons per day ("gpd").

In conjunction with the Traditions Development, the Heritage Hills WWTP and the sewer collection system were upgraded and expanded. The design capacity of the upgraded treatment plant is 172,544 gpd. Moreover, the WWTP includes advanced (tertiary) treatment for on-site disposal of the effluent thereby providing groundwater recharge. The treatment plant has four pump stations that serve the collection system. The pump stations are referred to as Sentinel Road, Traditions I, Traditions II, and Lakeside. A number of recharge basins are used for on-site disposal and groundwater recharge. The original effluent discharge mechanism, an underground pipeline to the Delaware River, will continue to be maintained for use during extreme weather conditions or other operational issues that may preclude discharge to the primary recharge basins.

The Heritage Hills WWTP process begins with a communitor chamber, followed by an equalization tank, from which wastewater is pumped into an oxygen uptake tank, followed by one of two anoxic tanks. From there the influent is split into one of two carousel aerobic treatment basins followed by one of two final clarifiers. Settled sludge is pumped into a sludge digester. Supernatant (clarified effluent) from the clarifiers flows through a chlorine contact tank and a gravity sand filter, before being aerated and discharged. Effluent is discharged to 14 effluent discharge basins. If bad weather or operational problems prevent discharge to the basins, WWTP Operators can discharge effluent directly to the Delaware River. Settled, digested liquid sludge is periodically removed for offsite disposal. The current treatment plant National Pollutant Discharge Elimination System ("NPDES") permit sets effluent limits for conventional pollutants only, which include $CBOD_5$, suspended solids, ammonia as N, total residual chlorine, pH, fecal coliform, and dissolved oxygen.

The Dutchess Farms Development is served by an extended aeration treatment plant. The average daily wastewater discharge from the Dutchess Farms WWTP in 2013 was approximately 3,900 gpd. At full build-out, the Dutchess Farms WWTP will serve approximately 67 single-family homes and discharge the treated effluent into a man-made wetland on-site. Presently, 25 homes are occupied and contribute flow to the treatment plant, which has a design capacity 20,225 gpd. This sewage treatment plant is currently operated by the Township, which will eventually own it, upon dedication by Toll Brothers, Inc.

The Dutchess Farms WWTP process starts at two equalization tanks. The influent must first pass through a sewage grinder, with back-up stainless steel bar screen and drying deck. The equalization tanks are aerated to freshen the raw wastewater prior to subsequent treatment. Subsequent to the equalization tanks, the wastewater will be biologically treated by a modified extended aeration process that provides secondary treatment including nitrification. The process involves a sequential train of units as follows: an aeration tank, aeration/anoxic/re-aeration tanks with anoxic mixer, a final settling (clarification) tank and a post aeration tank. Tertiary treatment is achieved by two tertiary filters that further remove suspended solids and BOD. Finally, ultraviolet

disinfection of the effluent is performed to meet fecal coliform limitations before it is pumped to the man-made marshland/wetland disposal area.

Copies of the 2013 Municipal Wasteload Management (Chapter 94) Reports for the Heritage Hills WWTP and Dutchess Farm WWTP are attached within Appendix A of this Plan Update.

A.2 Problems with Existing Facilities

The Heritage Hills WWTP and Dutchess Farms WWTP do not have existing collection, conveyance, or treatment problems and no hydraulic or organic overloads are projected in the next 10 years.

A.3 Future Upgrades or Expansions

Upgrades or expansions to the Heritage Hills WWTP and Dutchess Farms WWTP are not expected to be necessary in the next 10 years. Reserve capacity of exceeding 100,000 gallons is presently available at the Heritage Hills WWTP.

A.4 Small Flow Treatment Facilities

Upper Makefield Township has several private and/or community small flow treatment facilities (stream discharge), as shown on Figure 11. These small treatment facilities are permitted through the PADEP and monitored by both the Bucks County Department of Health (BCDH) and PADEP. The current Township On-Lot Sewage Disposal System (OLDS) Ordinance addresses these types of systems.

A.5 Approved Sewer Facilities

Toll Brothers has obtained a PADEP Part 2 Water Quality Management Permit to construct a sewage treatment plant to serve the Gray Tract. The developer has also obtained PADEP planning approval for a potential future expansion of the sewage treatment plant to serve the proposed White Farm and Melsky developments (Refer to Figure 18). This proposed sewage treatment plant on the Gray Tract, which will eventually be owned and operated by Upper Makefield Township, is currently under construction and will discharge treated effluent via a forcemain to Houghs Creek. As indicated in the approved Planning Module for the Gray Tract Development, the sewage treatment plant was sized to also accommodate 14 existing dwellings along Creamery Road in the future. A Component 3m Planning Module will need to be filed by the Township to obtain PADEP Planning Approval for these future connections. The proposed number of lots within each of the aforementioned developments is listed in Table 1 of Chapter I of this Plan Update. In conjunction with the future development of the White Farm and Melsky Developments, approval and permits will be obtained for further expansion of the Gray Tract WWTP to accommodate the associated wastewater flows.

Details concerning the Gray Tract WWTP are as follows:

Gray Tract WWTP
Location: Stoopville Road
Permit # 0907406 (20,000 gpd initial permitted construction)
Expansion: 55,550 gpd (per approved planning module)
Design Capacity: 70,000 gpd (with potential re-rating capacity of 80,000 gpd)
Type of Plant: Membrane Bioreactor
Discharge: Tributary to Houghs Creek

B.1 Existing On-Lot Sewage Disposal Systems

Before the 1980's, Upper Makefield Township was entirely served by on-lot sewage disposal systems. A majority of the older systems within the Township are cesspools, seepage pits, or in-ground absorption fields. More recently, sand mounds, individual residential spray irrigation systems (IRSIS), drip irrigation, at-grade beds, and A/B (shallow placement) systems have been constructed in the Township. The following is a brief description of some of those systems.

Cesspools – These systems are typically a rock or block-lined excavation with a cover that receives all the domestic sewage. This system retains the solids and organic matter, but allows the liquid to drain out the sides or through the bottom of the excavation. This system is no longer permitted in Pennsylvania.

Seepage Pits – This system includes a septic tank that retains solids and partially treats the wastewater. Following the septic tank is a seepage pit or pits that only permit percolation of the wastewater into the soil. This system is no longer permitted in Pennsylvania.

In-ground System – This conventional sewage disposal method includes a septic tank, distribution box, and a seepage bed or seepage trenches. The septic tank retains the solids, while allowing the wastewater to flow to the in-ground absorption field. The distribution box distributes the flow evenly to the seepage bed or trenches. The depth of the absorption areas is generally between 12" and 36".

Where percolation rates negate the installation of a conventional in-ground system in an area of deep soils, it is possible that a sub-surface sand filter system can be installed between 36" and 60". The sub-surface sand filter disposal field utilizes a septic tank, pump tank and an in-ground seepage bed or trench system. For this system, the unsuitable overlying soil is removed during installation and replaced with PADEP approved sand to act as a filter media. This system has to be pressure-dosed.

Elevated Sand Mound – The majority of the newer systems installed (post 1980) in the Township have been sand mounds. Sand mounds are installed above the existing ground surface due to limited depths of underlying suitable soil. A sand mound system is sited over existing soils that have a minimum of 20" to a water table or rock limiting zone. The components required for this system are a septic tank, pump tank, and an elevated sand mound disposal field. The elevated sand mound has to be pressure-dosed through a small diameter low pressure piping system. The septic tank retains the solids and the wastewater is pumped to the sand mound where it percolates through the PADEP approved sand material and into the existing soil. Conventional sand mounds are permitted on slopes up to 12 percent. Alternate sand mound systems can be installed on slopes up to 15 percent with special sizing considerations.

At-Grade Bed Systems – This alternate sewage disposal system requires either 48" of suitable soil or 20" of suitable soil when a peat or sand filter precedes the disposal field. At-grade bed systems require a septic tank and pump tank at a minimum, with a filter tank being required for shallow limiting zone soils (20" to 48"). Pressure dosing is required to pump the wastewater to the at-grade bed because they are constructed on top of the existing soil surface.

Drip Irrigation – This alternate disposal system allows the wastewater to be dispersed into the soil by irrigation tubing on slopes up to 25 percent. This system requires a minimum of 20" of suitable soil. If an aerobic unit is used, then only a pump tank is

required to dose the drip tubing; however, if a septic tank is used to retain solids, then a sand filter or peat filter must be installed prior to the pump tank and hydraulic unit. Drip irrigation systems have been installed more recently due to their aesthetic qualities over elevated sand mounds.

A/B Soil System – This alternative disposal system consists of a septic tank, a recirculating subsurface sand filter, and UV disinfection, with final treatment and disposal using an at-grade absorption area. The at-grade absorption field length is generally 100' to 150' long and installed on contour. These systems are installed on soils that would also support an Individual Residential Spray Irrigation System ("IRSIS"), but are usually more favorable because they do not spray treated effluent on the surface.

Small Flow Treatment Facility (SFTF) – Subsurface sewage disposal has been found to be unfeasible at several locations within the Township. For these properties, use of a SFTF was the only viable long-term sewage disposal method. These systems consist of an aerobic tank, pump tank, sand or peat filter tanks, and a chlorine contact tank, with the treated effluent being discharged to a local stream or drainageway.

The above referenced systems and other alternate systems will be described in more detail in Chapter V of this Plan Update.

B.2 Sewage Disposal Needs Assessment

Taylorsville and Dolington Areas

At the outset of the Act 537 Plan Update process, Upper Makefield Township had contacted the BCHD requesting that the Health Department identify any areas within the Township that were experiencing problems with the functioning of existing on-lot sewage disposal systems ("OLDS"). The BCHD serves as the Sewage Enforcement Officer to the Township and, as such, is responsible for the permitting of on-lot sewage disposal system installations and/or repairs and, therefore, maintains records for the majority of OLDS within the Township. The BCHD had initially identified two specific areas in the Township with histories of OLDS functioning problems, namely the Taylorsville and Dolington Areas. The general location of the aforementioned areas is depicted on Figure 12.

In response to the input received from the BCHD, the Board of Supervisors directed Township Staff to review all Health Department records concerning on-lot sewage disposal systems within the Taylorsville and Dolington Areas to determine the severity of the OLDS functioning problems in each area. During mid – late 2012, Township Staff performed an exhaustive review of BCHD records for the Taylorsville and Dolington Areas, found the available information to be incomplete and/or inconsistent and, therefore, determined that the BCHD records would not conclusively document the severity of OLDS functioning problems within each area.

Based on the results of the BCHD records research, and in an effort to more accurately establish the current OLDS functioning conditions, the Board of Supervisors commissioned an independent environmental consulting firm, Penn's Trail Environmental, LLC ("PTE"), to perform an intensive on-lot sewage disposal system survey of all properties located within the Taylorsville and Dolington Areas, where authorization was obtained from the affected property owners.

Relative to the above, the Township issued OLDS Survey Request forms via certified mail on three occasions, as well as attempted "door-knock" contact, with all property owners within the Taylorsville and Dolington Areas in an effort to maximize participation

in the survey. As illustrated on Figure 13, a total of 36 property owners within the Taylorsville Area were contacted, with 21 property owners responding and providing authorization to conduct all or specific components of the OLDS Survey. Similarly, within the Dolington Area, a total of 58 property owners were contacted and 31 provided authorization to conduct all or specific components of the OLDS Survey (Refer to Figure 14). Although 100% participation was the ideal goal envisioned by the Township, it is believed that both the number and various locations of the properties that were included within the PTE OLDS Surveys provided a representative depiction of current on-lot sewage disposal system conditions within both the Taylorsville and Dolington Areas.

PTE conducted the OLDS Survey within the Taylorsville and Dolington Areas between April 2013 and July 2013, and issued detailed reports outlining their findings to the Township. The complete PTE OLDS Survey Reports pertaining to the Taylorsville and Dolington Areas are attached as Appendix “B” and “C”, respectively, of this Plan Update. A summary of the findings of the OLDS Surveys performed by PTE within the Taylorsville and Dolington areas is as follows:

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE

SEWAGE DISPOSAL NEEDS ASSESSMENT AREAS
PER
BUCKS COUNTY HEALTH DEPARTMENT

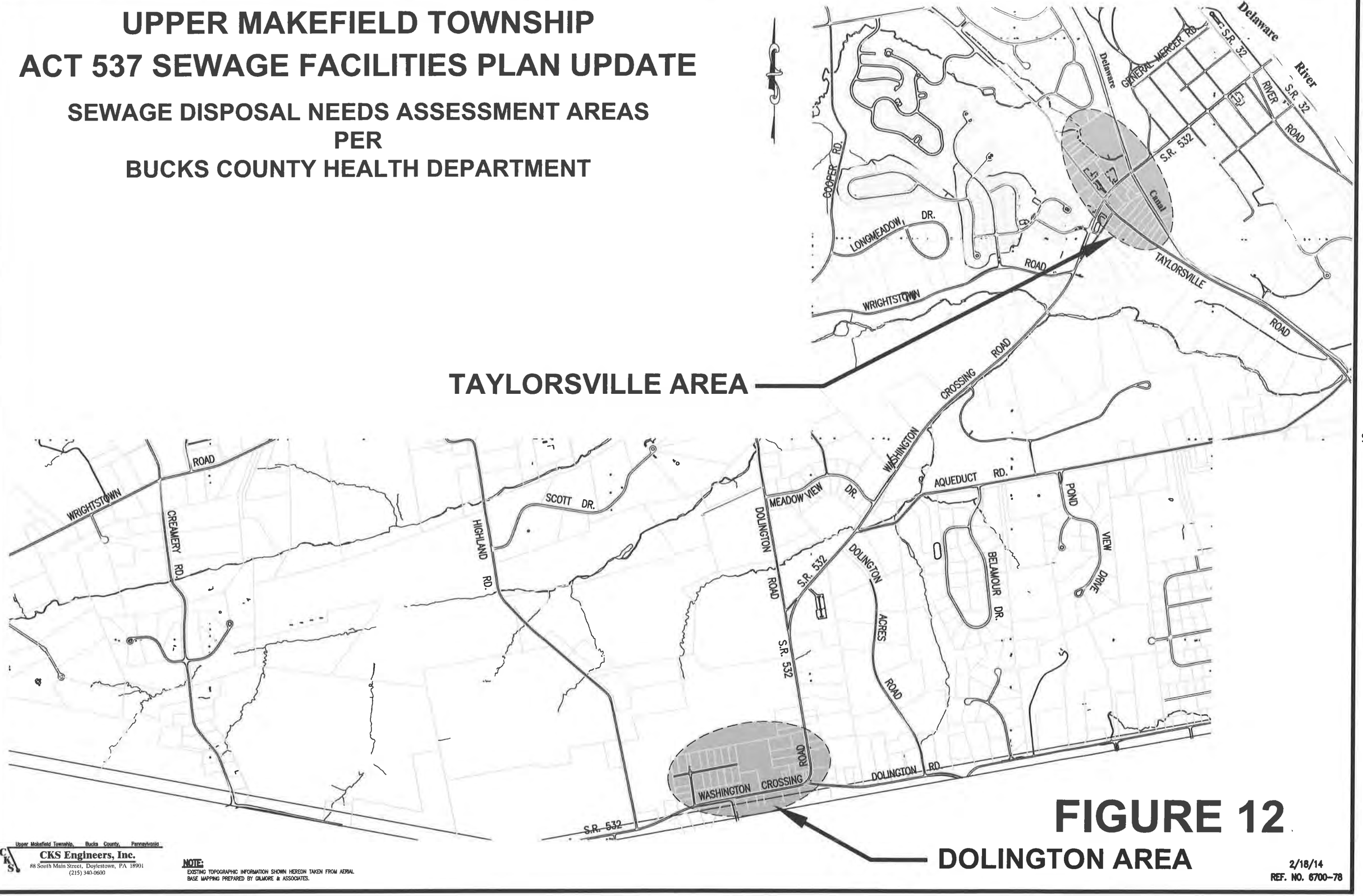


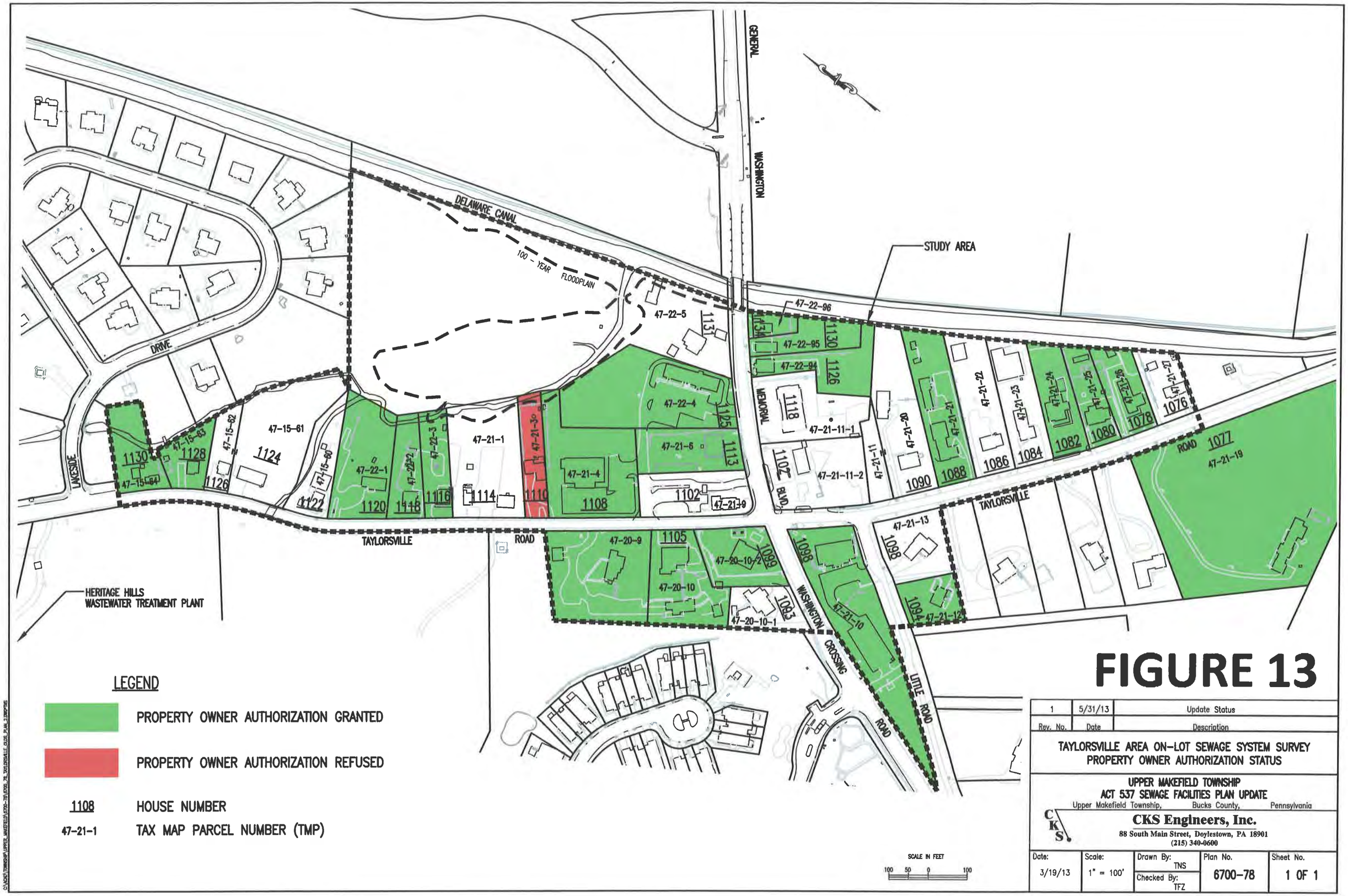
FIGURE 12

Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

NOTE:
EXISTING TOPOGRAPHIC INFORMATION SHOWN HEREON TAKEN FROM AERIAL BASE MAPPING PREPARED BY GILMORE & ASSOCIATES.

2/18/14
REF. NO. 6700-78



LEGEND

	PROPERTY OWNER AUTHORIZATION GRANTED
	PROPERTY OWNER AUTHORIZATION REFUSED
1108	HOUSE NUMBER
47-21-1	TAX MAP PARCEL NUMBER (TMP)

SCALE IN FEET
100 50 0 100

FIGURE 13

Rev. No.	Date	Description
1	5/31/13	Update Status

TAYLORSVILLE AREA ON-LOT SEWAGE SYSTEM SURVEY
PROPERTY OWNER AUTHORIZATION STATUS

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

Date:	Scale:	Drawn By:	Plan No.	Sheet No.
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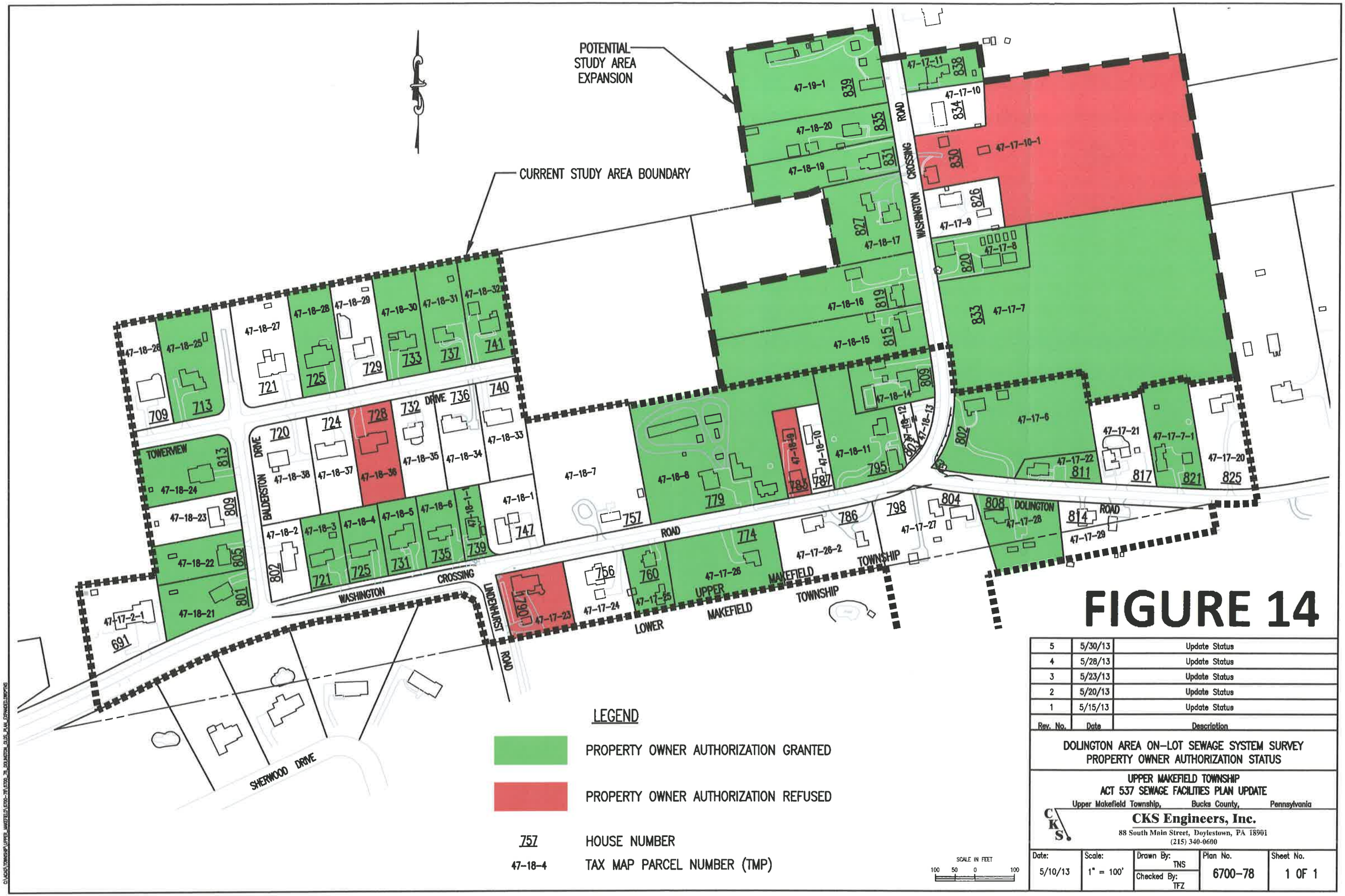

FIGURE 14

LEGEND

PROPERTY OWNER AUTHORIZATION GRANTED

PROPERTY OWNER AUTHORIZATION REFUSED

757 HOUSE NUMBER

47-18-4 TAX MAP PARCEL NUMBER (TMP)

SCALE IN FEET
100 50 0 100

Rev. No.	Date	Description
5	5/30/13	Update Status
4	5/28/13	Update Status
3	5/23/13	Update Status
2	5/20/13	Update Status
1	5/15/13	Update Status

DOLINGTON AREA ON-LOT SEWAGE SYSTEM SURVEY
PROPERTY OWNER AUTHORIZATION STATUS

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

Date:	Scale:	Drawn By:	Plan No.	Sheet No.
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Taylorsville Area OLDS Survey

General Findings

- No visible or odor indications of malfunctioning OLDS were noted by PTE at the properties surveyed.

- Two (2) property owners involved in the survey reported periodic problems requiring regular pumping to prevent OLDS operational problems.

- One (1) commercial property involved in the survey was served by a holding tank.

- The results of the private well water analysis performed in conjunction with the survey did not indicate any coliform bacteria contamination within the samples taken. Additionally, the Nitrate-Nitrogen concentrations within the samples ranged from 2.16 parts per million (ppm) to 6.72 ppm, which is below the maximum concentration levels permitted under PADEP Public Water Drinking Standards.

Refer to Table 2 of this Plan Update for a summary of the results of the PTE OLDS Survey conducted within the Taylorsville Area.

Refer to Figure 15 of this Plan Update for a graphical illustration of the OLDS Survey results.

Conclusions

- Based upon the results of the PTE OLDS Survey, the OLDS malfunctioning problems within the Taylorsville Area not as extensive as previously reported by the BCHD.

- The OLDS operational problems noted at two (2) of the properties surveyed may potentially be resolved with on-lot solutions.

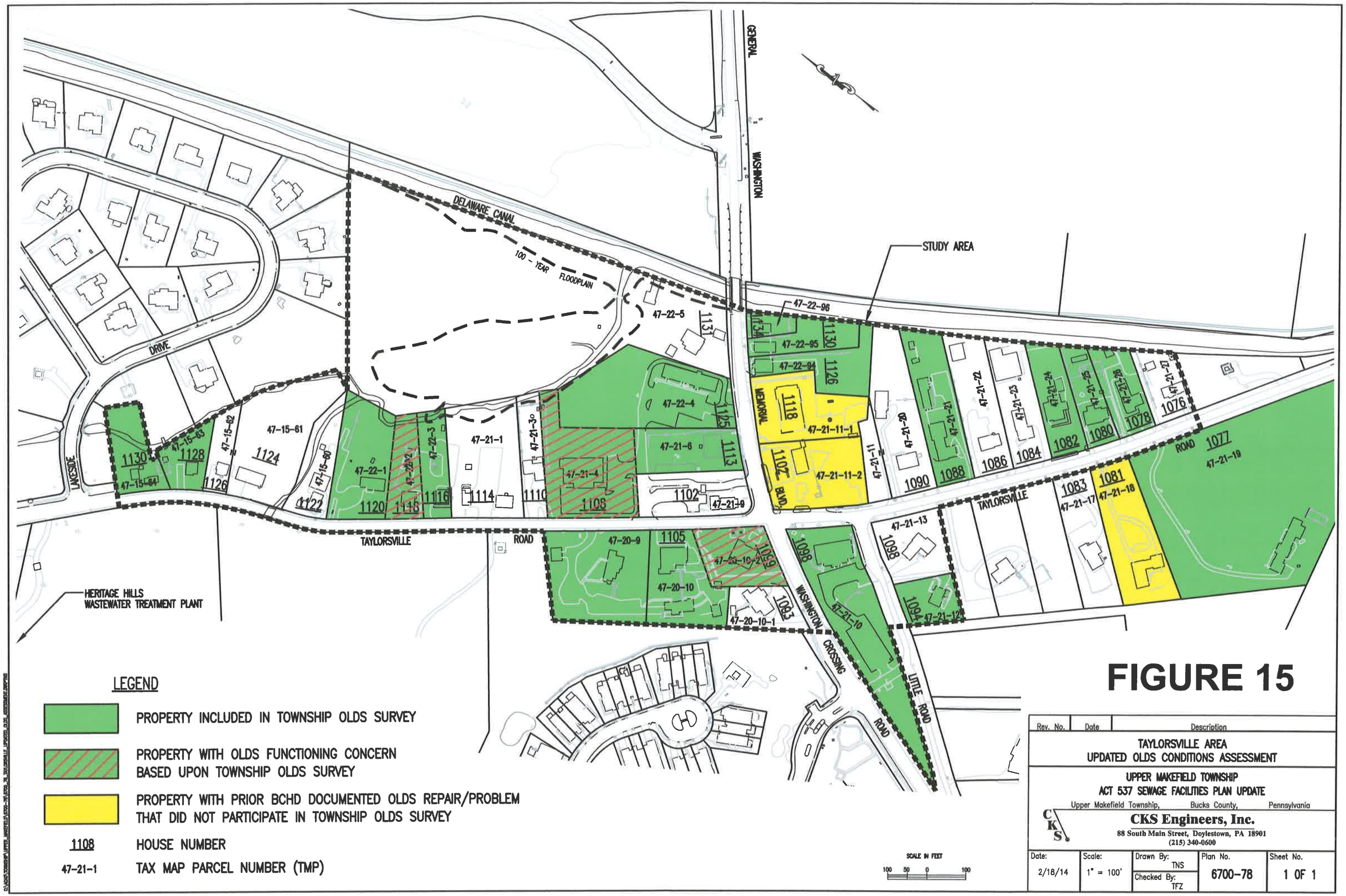
- The single commercial property that is currently being served by a holding tank is a relatively low water usage facility, has historically maintained the onsite system properly without any reported incidents, and can continue status quo with continued oversight/maintenance.

- The performance of the existing OLDS in the Taylorsville Area may be improved by promoting water conservation as well as increased OLDS oversight/maintenance.

Table 2
Taylorsville Area Needs Assessment 2013
Well Sampling and OLDS Survey Summary
Upper Makefield Township

Tax Parcel	Date Inspected	System Malfunction	Well Water Sample	Coliform Bacteria*	Nitrate Concentration (mg/L)**	BCDH Record	Sewage System Type
#47-15-63	4/18/13	No	Yes	<1	4.0	No	ING
#47-15-64	4/17/13	No	No	--	--	No	ING
#47-20-9	4/19/13	No	Yes [2,4]	<1	2.95	No	ING
#47-20-10	4/19/13	No	Yes [0]	<1	2.19	No	ING
#47-20-10-2	4/18/13	No	Yes [0]	<1	3.23	No	HT
#47-21-4	4/17/13	No	Yes [3]	<1	5.14	Yes	ESM/HT
#47-21-6	4/17/13	No	Yes[4]	<1	2.18	No	ING
#47-21-10	4/19/13	No	Yes [1]	<1	5.80	Yes	ESM
#47-21-12	4/18/13	No	Yes [2]	<1	2.51	No	ING
#47-21-19	4/17/13	No	Yes [1]	<1	2.29	Yes	ING
#47-21-21	4/17/13	No	Yes [0]	<1	4.45	Yes	ING
#47-21-24	4/17/13	No	Yes [0]	<1	2.16	No	ING
#47-21-25	4/17/13	No	No	--	--	No	ING
#47-21-26	4/17/13	No	Yes [1,2]	<1	2.43	No	ING
#47-22-1	4/17/13	No	Yes [1,5]	<1	4.84	No	ING
#47-22-2	4/17/13	No	Yes [3]	<1	4.56	Yes	ING
#47-22-3	4/17/13	No	Yes [0]	<1	4.39	Yes	ING
#47-22-4	4/17/13	No	Yes [0]	<1	3.16	No	ING
#47-22-94	4/17/13	No	Yes [0]	<1	3.64	No	ING
#47-22-95	4/18/13	No	Yes [1,2]	<1	6.72	No	ESM
#47-22-96	4/17/13	No	No	--	--	No	ING

[0] no treatment
[1] particulate filter
[2] UV treatment
[3] chlorine treatment
[4] carbon filter
[5] water sample collected from Tax Parcel# 47-22-1 post particulate filter at owner's request
*- <1 = not detected by test method
** - Nitrate MCL is 10 mg/L
ING – unspecified in-ground absorption area (cesspool, seepage pit, trenches or bed)
ESM – elevated sand mound
HT – holding tank



LEGEND

- PROPERTY INCLUDED IN TOWNSHIP OLDS SURVEY
- PROPERTY WITH OLDS FUNCTIONING CONCERN BASED UPON TOWNSHIP OLDS SURVEY
- PROPERTY WITH PRIOR BCHD DOCUMENTED OLDS REPAIR/PROBLEM THAT DID NOT PARTICIPATE IN TOWNSHIP OLDS SURVEY
- 1108 HOUSE NUMBER
- 47-21-1 TAX MAP PARCEL NUMBER (TMP)

SCALE IN FEET
100 50 0 100

FIGURE 15

Rev. No.	Date	Description

TAYLORSVILLE AREA
UPDATED OLDS CONDITIONS ASSESSMENT

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

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Dolington Area OLDS Survey

General Findings

- Evidence of a malfunctioning OLDS was noted by PTE at one of the 31 properties surveyed.

- Three (3) of the 31 properties surveyed were served seasonally by holding tanks.

- The initial results of the private well water analysis performed in conjunction with the survey indicated positive coliform bacteria was present at three of the 27 participating properties. However, subsequent sampling/analysis performed at the aforementioned properties revealed no contamination related to malfunctioning OLDS. Additionally, the Nitrate-Nitrogen concentrations within the samples ranged from <0.5 ppm to 8.66 ppm, which is below the maximum concentration levels permitted under PADEP Public Water Drinking Standards.

- The results of the soil probe evaluation conducted on 27 of the 31 properties that participated in the survey were as follows:

    - The Limiting Zone on 18 of the 27 participating properties was $\geq$ 20", which could potentially support a "standard" design OLDS replacement system, if necessary.

    - The Limiting Zone on 7 of the 27 participating properties was $\geq$ 10", which could potentially support an "alternative" design OLDS replacement system, if necessary.

    - The Limiting Zone on 2 of the 27 participating properties was < 10", which would preclude the installation of a replacement OLDS.

Refer to Table 3 of this Plan Update for a summary of the results of the PTE OLDS Survey conducted within the Dolington Area.

Refer to Figure 16 of this Plan Update for a graphical illustration of the OLDS Survey results.

Conclusions

- Based upon the results of the PTE OLDS Survey, the functioning of the existing OLDS within the Dolington Area is being managed at the present time.

- The performance of the existing OLDS in the Dolington Area may be improved by promoting water conservation, as well as increased OLDS oversight/maintenance.

- The long-term sewage disposal needs of properties within the Dolington Area with recently permitted OLDS, on the relatively larger properties would be considered to be addressed.

- The long-term sewage disposal needs of properties within the Dolington Area that are served by holding tanks or without practical on-lot solutions will have to be further assessed.

Table 3
Dolington Area Needs Assessment 2013
Well Sampling and OLDS Survey Summary
Upper Makefield Township

Tax Parcel	Date Inspected	System Malfunction	Water Sample	Coliform Bacteria	Nitrate (mg/L)**	BCDH Record	Sewage System	Limiting Zone
#47-17-6	6/06/13	No	Yes [2,4,5]	<1*	4.19	YES	ESM	20"M
#47-17-7-1	5/29/13	No	Yes [0]	<1*	2.14	No	ING	16-26" M
47-17-7	vacant	No	No	---	---	YES	---	21"M
#47-17-8	5/29/13	No	Yes [1]	<1*	4.90	No	ING	20"M
#47-17-11	6/06/13	No	Yes[0]	<1*	<0.50	YES	ING/HT	10"M
#47-17-22	6/06/-7/12/13	No	Yes [1,2]	12/0	3.24	YES	ING/HT	17"M
#47-17-25	5/29/13	No	Yes [1]	<1*	<0.50	No	ING	20"M
#47-17-26	6/03/13	No	Yes [4,5]	<1*	4.51	No	ING	23"M
#47-17-28	5/29/13	No	Yes [0]	<1*	<0.50	YES	ESM	20" M
#47-18-1-1	5/28/13	No	Yes [0]	<1*	6.89	YES	ING	26"M
#47-18-3	5/28/13	No	Yes [0]	<1*	4.15	YES	ING	25"R
#47-18-4	5/28/13	No	Yes [0]	<1*	7.12	No	ING	21"R
#47-18-5	6/06/13	No	Yes [0]	<1*	6.82	No	ING	26"R
#47-18-6	5/28/13	Yes	No	--	--	No	ING	28"M
#47-18-8	5/29/13	No	Yes [1,2]	<1*	8.66	YES	ESM	23"M
#47-18-11	5/29/13	No	Yes [0]	<1*	3.59	No	ESM	20"M
#47-18-14	5/29/13	No	Yes [5]	<1*	6.34	YES	ALT	Insufficient area
#47-18-15	6/05/13	No	Yes [4,5]	<1*	6.80	YES	ESM	22"M
#47-18-16	6/06/13	No	Yes [5]	<1*	5.42	YES	ING	26"M
#47-18-17	6/06/13	No	Yes [0]	<1*	6.28	YES	ESM	(declined)
#47-18-19	6/06/13	No	No	--	--	YES	EXP	(declined)
#47-18-20	6/06/-7/12/13	No	Yes [1,4,5]	4/0	3.61	No	ING	(declined)
#47-18-21	5/29/13	No	Yes [0]	<1*	<0.50	YES	ING	16"M
#47-18-22	5/29/13	No	Yes [0]	<1*	4.04	No	ING	12"M
#47-18-24	5/29/13	No	Yes [0]	<1*	2.15	YES	ING	28"M
#47-18-25	6/06/13	No	Yes [5]	<1*	<0.50	YES	ING	(declined)
#47-18-28	5/29/13	No	Yes [0]	<1*	<0.50	YES	ING/HT	0"M
#47-18-30	5/29/-6/06/-7/12/13	No	Yes [1,2]	11/28/0	3.15	No	ING	27"M
#47-18-31	5/29/13	No	No	--	--	--	ING	21-25"M
#47-18-32	5/29/13	No	Yes[1]	<1*	<0.50	No	ING	10"M
#47-19-1	6/06/13	No	Yes[0]	<1*	3.53	YES	ING	10"M

[0] no treatment

[1] particulate filter
[2] UV treatment
[3] chlorine treatment
[4] carbon filter
[5] water softener
*- <1 = not detected by test method
** - Nitrate MCL is 10 mg/L

ING – unspecified in-ground absorption area (cesspool, seepage pit, trenches or bed)
ESM – elevated sand mound
HT – holding tank
EXP – experimental system not meeting Chapter 73 standards
ALT – Alternate Technology, i.e. Peat Filter
M – soil mottling/redoximorphic features
R – Bedrock or rock with voids

POTENTIAL STUDY AREA EXPANSION

CURRENT STUDY AREA BOUNDARY

WASHINGTON CROSSING ROAD

DRIVE

TOWERVIEW

BALDERSTON

DOLINGTON ROAD

LINDENHURST ROAD

SHERWOOD DRIVE

UPPER MAKEFIELD TOWNSHIP

LOWER MAKEFIELD TOWNSHIP

LEGEND

- PROPERTY INCLUDED IN TOWNSHIP OLDS SURVEY
- PROPERTY WITH OLDS FUNCTIONING OR POTENTIAL FUTURE REPLACEMENT CONCERN BASED UPON TOWNSHIP OLDS SURVEY
- PROPERTY WITH PRIOR BCHD DOCUMENTED OLDS REPAIR/PROBLEM THAT DID NOT PARTICIPATE IN TOWNSHIP OLDS SURVEY
- 757 HOUSE NUMBER
- 47-18-4 TAX MAP PARCEL NUMBER (TMP)

SCALE IN FEET
100 50 0 100

FIGURE 16

Rev. No.	Date	Description

DOLINGTON AREA
UPDATED OLDS CONDITIONS ASSESSMENT

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

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Needs Assessment – Remainder of Township Outside of Taylorsville and Dolington Areas

A "desktop" analysis of the Township's sewage disposal needs outside of the Taylorsville and Dolington Areas was previously performed by Township Consultants involved with the preparation of this Plan Update. This desktop analysis included the review of available soil mapping, zoning requirements, water quality data, Bucks County Department of Health records, and reports/studies previously completed in conjunction with the Plan Update.

Seven residential and commercial zoning districts encompass most of the Township's acreage (Refer to Figure 17). Municipal, educational, parks and open space were omitted for this desktop review. Most of the zoning districts require a minimum lot size of one acre. Some of the zoning districts permit smaller lots but require that additional open space be provided in-lieu of larger lots. Moreover, smaller lot sizes are generally found in single-family cluster developments. CR2 and VR1 zoning districts allow for lots less than an acre even with private on-lot wells and on-lot sewage disposal.

Single-family cluster developments, such as Buckland Valley Farms located between Taylorsville Road and the Delaware Canal, have lot sizes generally between 0.50 and 1.50 acres. This particular development pre-dates the current zoning regulations and has both private on-lot wells and on-lot sewage disposal. Even though the lot sizes may be small, the soils are deep, well-drained gravelly loams that are well suited for in-ground sewage disposal. Additionally, there are few recorded repairs or replacement systems being installed in this development, with the replacement systems also typically being in-ground sewage disposal systems.

At the present time, only properties located in the VC1, VR1 and CM zoning districts have a history of on-lot sewage disposal system malfunctions. Properties within the VC1 zoning district, which makes up part of Washington Crossing, have previously documented on-lot system malfunctions. Per current zoning regulations they are required to be at least one acre, but most of the properties are less than one acre since they pre-date that requirement. The properties located in the Dolington Village area, which is both in the VR1 and CM zoning districts, are approximately one acre in size or less.

Based on the zoning district review and a review of the Township tax parcel mapping, the CR2 and VR1 zoning districts appear to pose a potential problem due to lot size requirements. However, only the VR1 zoning district has a history of documented on-lot system malfunctions and a majority of the CR2 zoning district is served by the Heritage Hills WWTP. Based on the zoning map, these two zoning districts make up a relatively small portion of the Township's overall acreage. Further, a significant portion of the VR1 area includes the Dolington Area, which is discussed in Sections III and IV of this Plan Update. For those areas of the Township not served by public sewer, it is the intent of the On-Lot Disposal System Management Ordinance to provide and protect the long-term viability of all on-lot sewage disposal systems.

Upper Makefield has approximately 31 soil series spread throughout the Township. Soils play an important role in determining an on-lot sewage disposal system's working life span. When assessing the soils through a desktop review process, it is important to determine what soils are marginal for on-lot sewage disposal. Generally, the soils in the Township are classified as marginal if they have a seasonal high water table (SHWT) at less than 20 inches below the ground surface or if they have steep slopes (>15%). For purposes of categorizing soils as having a SHWT, a drainage class of somewhat poorly drained or worse was chosen. By reviewing the 2008 SSURGO database for Bucks

County, Pennsylvania, one can determine which soils are considered having a SHWT at less than 20 inches. Additionally, by using the soil map units, one can ascertain which soils generally have a slope greater than 15 percent.

As a result of the desktop review and with the aid of GIS mapping, it was found that approximately 50% of the Township has marginal soils. About 40% is due to a SHWT, with the other 10% a result of steep slopes which primarily exist in the vicinity of Jericho Mountain. Please Refer to Figures 5 and 8 included in Chapter II, which illustrate the SHWT and steep slope soils, respectively.

The SHWT soils are located throughout the Township. These soils generally occur due to shallow bedrock or hydraulically restrictive subsoils, and are also located in or near floodplains. There is a concentration of these soils near the boundary line with Lower Makefield and Wrightstown Townships, as well as surrounding Jericho Mountain. The SHWT soils are generally not present along the ridgelines and along the Delaware River.

The soils located on steep slopes generally occur on the sides of hills, most notably around Jericho Mountain. Steep slopes are also located along Taylorsville Road near Washington Crossing. Steep slopes are also found along creek or streambeds, as can be seen on Figure 8.

In summary, approximately 50% of the Township has marginal soil conditions based on soil drainage classification and steep slopes. However, the marginal soils are spread widely throughout the Township with low concentrations in areas with small lot sizes. Repairs to or replacement of malfunctioning on-lot sewage disposal systems are more likely to be viable on large lots. Moreover, even though the soils may be marginal for on-lot sewage disposal, only two distinct areas with on-lot sewage disposal system functioning problems had been identified by the BCHD, namely the Taylorsville and Dolington Areas. The severity of the OLDS functioning problems in the aforementioned areas is discussed in detail in earlier sections of this Plan Update. Notwithstanding isolated instances of previously reported problems, based on historical data the soils located within the Township should be able to support existing on-lot sewage disposal systems in the future.

Based upon consultation with BCHD representatives and research of BCDH records overall, the Township's on-lot sewage disposal facilities are functioning properly. Through file reviews at the BCDH, it was found that a majority of complaints previously filed with BCDH were for properties located in the Taylorsville and Dolington Areas. Review of BCDH files also yielded data showing that preceding preparation of this Plan Update, very few replacement systems were installed in the Township due to malfunctioning on-lot sewage disposal systems. Addressing, the short-term and long-term sewage disposal needs of the Taylorsville and Dolington Areas of the Township are discussed within subsequent sections of this Plan Update.

B.3 Operation and Maintenance Requirements

Upper Makefield Township has an ordinance governing the management of individual and community on-lot sewage disposal systems. The Township adopted their "On-lot Disposal System (OLDS) Management Ordinance" in August 1988 and amended it in the following years as needed to be consistent with current oversight and maintenance standards. The purposes enumerated for the OLDS ordinance are as follows:

1. Review OLDS Permit Plans/Applications for conformance with the Township's Official Sewage Facilities Plan and associated ordinances.

2. Enactment and implementation of the OLDS Ordinance and related ordinances concerning holding tanks and water conservation/wasteflow reduction.

3. Development and implementation of a public education program to supplement the Public Assurance Program.

4. Implement the policies adopted in the Township's Official Sewage Facilities Plan.

The OLDS Ordinance was adopted for the purpose of promoting the public health, safety and welfare by improved OLDS installation, operation, and maintenance. Improper installation and inadequate maintenance of individual and community on-lot sewage disposal systems increase the chances of contamination of water resources and potential public health problems. In order to protect the public health, safety and welfare, and the environment, a comprehensive, pragmatic and reasonable program of on-lot sewage disposal system management regulations is imperative.

The duties of the Sewage Enforcement Officer (SEO) in Upper Makefield Township are performed by an employee of the BCDH. The SEO is responsible for approving sites and designs for new systems. The SEO is also responsible for establishing and administering a program that addresses existing problem areas and providing technical and regulatory guidance to property owners installing new systems, or repairing and replacing existing systems. Compliance with the OLDS Ordinance is the responsibility of the Township's Code Enforcement Officer who also performs the duties of Sanitary Officer.

The OLDS Ordinance applies to both existing and new OLDS in conjunction with the ordinances concerning holding tanks and water conservation/wastewater flow reduction. The Township Planning Commission reviews all subdivision and land development plans containing OLDS system design and layout details for conformance with the Township's Official Sewage Facilities Plan and with other applicable ordinances. Wherever feasible and economical, on-lot sewage disposal systems are encouraged throughout Upper Makefield Township. The Township's OLDS planning policies foster the non-sewered approach and conservation and protection of groundwater resources.

All individual OLDS are owned and maintained by the property owner. All community OLDS can be offered for dedication to the Township or agency designated by the Township, or owned and maintained by a homeowners association.

A construction escrow is required by the Township as part of the OLDS Construction Application process for all new systems, except for the individual conventional systems. The escrow is maintained until construction is completed to the satisfaction of the Township. For community systems, the Township requires performance bonds, i.e., operation and maintenance (O & M) fund for a two (2)-year period. The amount of the performance bond is equal to three times the estimated annual O & M cost for the community system. The two-year period begins when all units that will utilize the community system have been completed and sold, and occupancy permits have been issued for all units.

The Sanitary Officer is responsible to enforce the provisions of the OLDS Ordinance for the purpose of abating any and all public health nuisances and surface and groundwater contamination. In the performance of assigned duties, the Sanitary Officer cannot usurp the duties and functions of the SEO, nor can his actions conflict with the rules and regulations of the BCDH or Title 25 Pennsylvania Code PADEP Rules and Regulations,

Chapter 71, "Administration of Sewage Facilities Program," Chapter 72, "Administration of Sewage Facilities Permitting" and Chapter 73, "Standards for Sewage Disposal Facilities."

All on-lot sewage disposal systems with a septic tank as a primary treatment unit must be pumped in accordance with the requirements of the OLDS Ordinance and all sewage haulers and inspectors are required to obtain licenses for offering any such services in the Township. Before issuing a license the Sanitary Officer must satisfy himself that the applicant complies with all the requirements and standards of the license.

As prime land is removed from the market by various mechanisms, housing developers will look, by necessity, to less desirable parcels of ground that have environmental constraints, marginal soil conditions, or both. This will make the use of alternative on-lot sewage disposal systems more common. While such alternative systems are acceptable from a technical standpoint (in most cases they achieve higher levels of treatment), they are more sophisticated mechanically and require more intensive maintenance to operate satisfactorily. The Upper Makefield Township OLDS Ordinance and Operation and Maintenance Agreement (Refer to Appendix D) have been amended to address increased oversight and maintenance necessary for alternative on-lot sewage disposal systems.

C. Wastewater Sludge and Septage Generation

The Heritage Hills WWTP and Dutchess Farms WWTP are presently the only Township owned and operated sewage treatment plants that are fully operational and generate wastewater sludge. Refer to Figure 11 for locations of these two treatment plant service areas.

Since Upper Makefield Township is a rural community with two small Township-owned sewage treatment plants, a majority of the wastewater sludge generated within the Township is from septic tanks that must be pumped on a periodic basis to ensure proper operation of the on-lot sewage disposal systems. Most of the septage that is pumped out of on-lot sewage disposal systems within the Township is transported for processing to either the Hatfield Township Municipal Sewer Authority's Wastewater Treatment Plant in Montgomery County, or to the Delaware County Regional Water Quality Control Authority Regional Treatment Facility in Chester, Delaware County.

The wastewater sludge that is generated at the Heritage Hills WWTP and Dutchess Farms WWTP is transported via a permitted sewage hauler to the Valley Forge Sewer Authority Regional Treatment Facility in Chester County on a weekly basis. The monthly average sludge removal from the Heritage Hills plant in 2013 was approximately 28,000 gallons. The monthly average sludge removal from the Dutchess Farms plant in 2013 was approximately 2,900 gallons.

IV – FUTURE GROWTH AND LAND DEVELOPMENT

A.1 Land Use and Zoning

Upper Makefield Township is predominantly a bedroom community for daily commuters. Its primary land use activity is residential development. The Township's zoning map is presented as Figure 17. Zoning designations are consistent with the requirements of the Pennsylvania Municipalities Planning Code in that they include "provisions regulating the siting, density of residential, commercial, industrial and other developments in order to assure the availability of reliable, safe and adequate water supplies to support the intended land uses within the capacity of available water resources." In addition, the Newtown Area Joint Municipal Zoning Ordinance (NAJMZO) promotes, protects, and facilitates the "preservation of the natural, scenic and historic values in the environment and preservation of forests, wetlands, aquifers, and floodplains."

A.2 Zoning Regulations as Related to Sewage Disposal

The following descriptions of the zoning types and their suitability for sewage disposal are from the 2006 NAJMZO (last amended December 22, 2010):

1. JM – Jericho Mountain – Poor suitability for on lot sewage disposal systems – limited to single-family detached scatter type development.
2. CM – Conservation Management – Single-family detached, single-family detached cluster and performance subdivisions "allowed so long as the sewage disposal method shall replenish the water table in accordance with the wastewater policies of the Newtown Area Joint Municipal Comprehensive Plan (NAJMCP) and the Sewage Facilities Plan (Act 537)."
3. CR-1 – Country Residential 1 – Low Density – Same sewage limitations as CM.
4. CR-2 – Country Residential 2 – Medium Density – Same sewage limitations as CM.
5. R-2 – Residential/High Density District – Except for single-family detached uses, all such uses shall be served by a franchised water company and centralized sewer facility.
6. VR-1 – Village Residential 1 – Low Density District – Single-family detached on larger lots, no mention of sewer or water service. This zoning was instituted to assist with maintenance of existing communities.
7. MS – Municipal Services – No water or sewer service issues discussed.
8. EIR – Educational, Institutional, and Recreational - No water or sewer service issues discussed.
9. POS – Parks and Open Space - No water or sewer service issues discussed.
10. FCO – Federal Cemetery Overlay District – Water and sewer service within the Overlay District must be provided by community wells and a community package sewage treatment plant.

UPPER MAKEFIELD TOWNSHIP
Figure #17 - Zoning Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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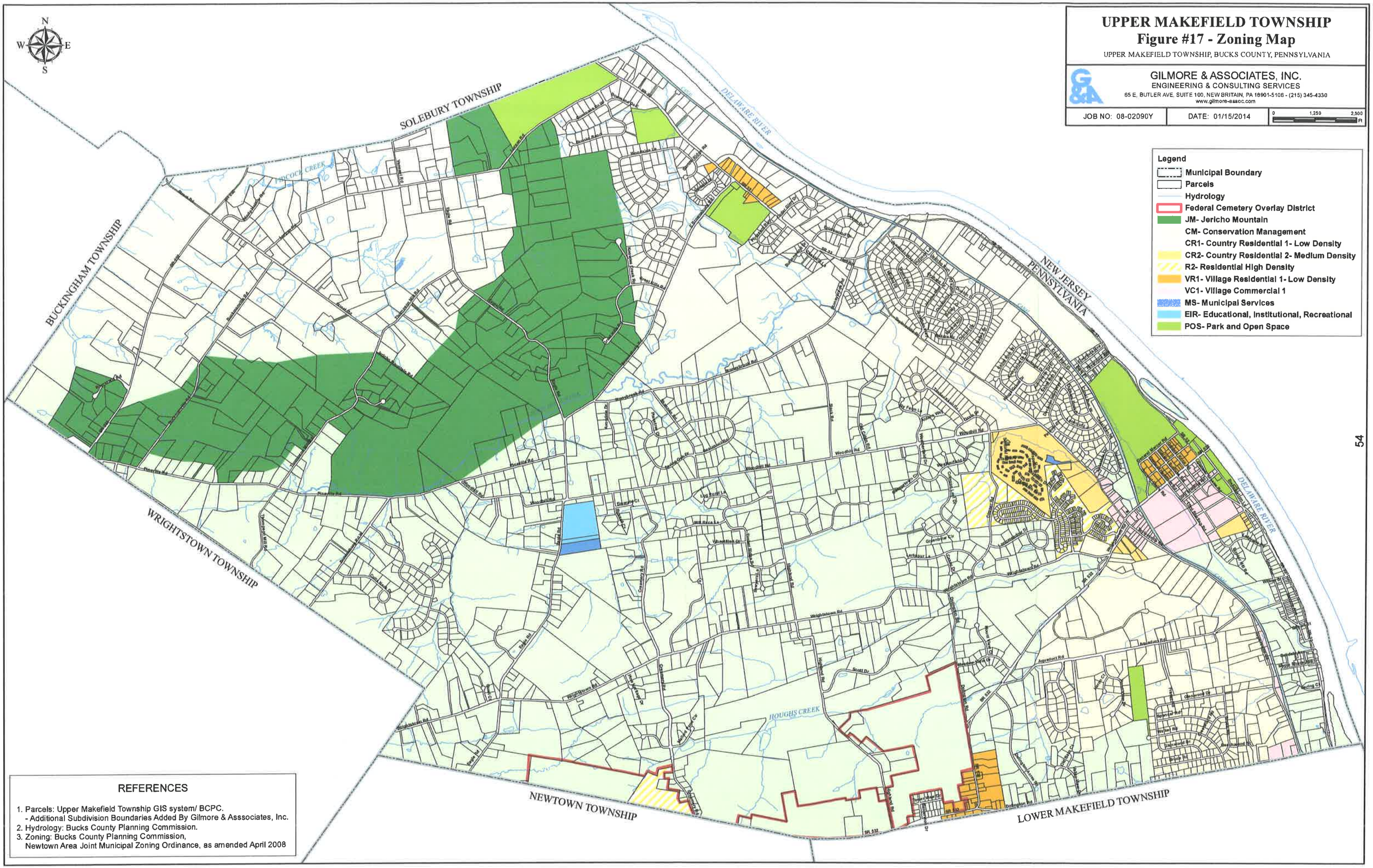
JOB NO: 08-02090Y | DATE: 01/15/2014 | 0 1,250 2,500 Ft



REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Hydrology: Bucks County Planning Commission.
3. Zoning: Bucks County Planning Commission,
   Newtown Area Joint Municipal Zoning Ordinance, as amended April 2008

A.3 Floodplain and Stormwater Land Use Limitations

The Delaware River South Watershed Act 167 Stormwater Management Ordinance for Upper Makefield Township, Bucks County, Pennsylvania, Ordinance No. 263, as amended by Ordinance No. 272, establishes uses within special floodplain and stormwater management areas within the Township as follows:

"No structure or land shall hereafter be used and no structure shall be located, relocated, constructed, reconstructed, enlarged, or structurally altered, except in full compliance with the terms and provisions of this Part and any other applicable ordinances and regulations which apply to structures and uses within the jurisdiction of the ordinance. Permitted uses of floodplain land include agriculture and recreation."

The purpose of the Ordinance includes the promotion of designs to minimize impacts to surface and groundwater, and encourage non-structural best management practices, minimization of increases in stormwater volume and impervious surfaces, and to manage stormwater problems at their source to promote groundwater recharge. In addition, the Ordinance strives to utilize the existing natural drainage systems by preserving and restoring the flood carrying capacity of streams, maintaining the existing flows and quality in watercourses in the area, and implementation of an illegal discharge detection and elimination program that addresses non-stormwater discharges into the municipality's separate storm sewer system.

The Delaware River South Watershed has been divided into stormwater management Districts A, B, and C as shown on the Watershed Map in Appendix E. In addition to the requirements specified below, the water quality (Section 303), groundwater recharge (Section 304), and the streambank erosion (Section 305) requirements shall be implemented. Table 4 shows the present and future developments relative to stormwater management districts.

Table 4
Development in Stormwater Management Districts

Development	District
White Tract	A
Gray Tract	A
Melsky Tract	A
Belamour Estates	B
Creeks Bend	B
Dutchess Farm	B
Merrick Farm	B
Deer Ridge	A/B
Veteran Cemetery	A/B
Vintage Farm	A/B
Yates	A/B

B.1 Future Growth Projections

It is expected that future growth will be consistent with the zoning ordinance requirements and according to the goals set forth by the Township. Much of the growth is expected to be in the form of low-density residential housing that will be served by individual on-lot wells and sewage disposal systems. Sewage planning for future medium and high-density development will be part of the planning process for each development.

To understand the expected growth, or increase in residential development, this section will address projected population increases through the year 2030 and corresponding demand for housing. The U.S. Census Bureau projections are shown in Tables 5 and 6. Housing projections for the years 2010 to 2030 are based on Upper Makefield's average household size of 2.64 persons.

As indicated in Table 6, the population of Upper Makefield Township increased by 14 percent between 2000 and 2010, and is projected to increase by 11 percent between 2010 and 2020, and 9 percent between 2020 and 2030. This population growth along with its associated service and institutional demands will place additional waste disposal requirements on the municipality.

Table 5
Upper Makefield Township Population Projections

Year	Census Numbers	Density (people/sq.mi.)
1970	2,905*	133.9
1980	4,577*	210.9
1990	5,949*	274.1
2000	7,180*	330.9
2010	8,190*	377.4
2020	9,120 **	420.3
2030	9,980 **	459.9

Table 6
Upper Makefield Township Housing Unit Projections

Year	Census Numbers	Density (homes/sq.mi.)
1970	875*	40.3
1980	1,472*	67.8
1990	2,024*	93.3
2000	2,512*	115.8
2010	3,100*	142.8
2020	3,454 (est.)***	159.2
2030	3,780 (est.)***	174.2

* Based upon U.S. Census Data.

** Based upon DVRPC 2010-2040 Population Forecast for Upper Makefield Township, Bucks County, Pennsylvania.

*** Based upon Upper Makefield Township's average household size of 2.64 persons and DVRPC 2010-2040 Population Forecast. Average household size is calculated by dividing 2010 US Census population by US Census 2010 housing units.

B.2 Existing and Future Development

As evidenced by the long-range projections previously presented, Upper Makefield Township continues to experience growth in various locations within its boundaries. Figure 18 shows present and future developments within the Township in the next five to ten years. Table 7 below lists projects that are either proposed or currently under construction, with details on proposed number of lots, sewage disposal method, and build-out timeline within the Five and Ten-Year Planning Periods.

Table 7
Proposed and Under-Construction Projects

Project Name	Proposed Dwelling Units	Lots Remaining to be Developed	Type	5-yr Growth	10-yr Growth
Ryan Property *	2	2	On-Lot	x	
Inderbitzen Property	2	1	On-Lot	x	
DiPippo Property	2	1	On-Lot	x	
Creeks Bend *	11	1	On-Lot	x	
Deer Ridge *	4	3	On-Lot	x	
Riss Property	2	1	On-Lot	x	
Yates Property	7	7	On-Lot	x	
Vintage Farm *	21	3	On-Lot	x	
Slack Tract	6	6	On-Lot	x	
Reese Tract *	3	2	On-Lot	x	
Zogorski Tract *	3	3	On-Lot	x	
Belamour Estates *	29	5	On-Lot	x	
Dutchess Farm *	68	39	Public Sewer	x	
Gray Tract *	96	96	Public Sewer	x	
White Tract	80	80	Public Sewer		x
Melsky Tract	45	45	Public Sewer		x

Note: *Under Construction

UPPER MAKEFIELD TOWNSHIP
Figure #18 - Present & Future Major Land Developments Map

UPPER MAKEFIELD TOWNSHIP, BUCKS COUNTY, PENNSYLVANIA

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JOB NO: 08-02090Y | DATE: 01/15/2014 | 0 1,250 2,500 Ft

N W E S

SOLEBURY TOWNSHIP

BUCKINGHAM TOWNSHIP

WRIGHTSTOWN TOWNSHIP

NEWTOWN TOWNSHIP

LOWER MAKEFIELD TOWNSHIP

DELAWARE RIVER

NEW JERSEY
PENNSYLVANIA

Reese Tract
3 Lots on 62 acres

Zogorski Tract
3 SFD on 20 acres

Ryan Property
2 SFD on 31 acres

Slack Tract
8 Lots on122 acres

Vintage Farm
Zaveta Builders
21 SFD on 80 acres

Dutchess Farm
Toll Brothers, Inc.
68 SFD on 230 acres

Deer Ridge
Mack/Roedel
4 SFD on 50 acres

Merrick Farm
Worthington Builders
8 SFD on 91 acres

Creeks Bend
Zaveta Builders
11 SFD on 157 acres

Yates Subdivision
6 SFD on 135 acres

Veteran Cemetery
199 acres

Belamour Estates
Pisani Builders
29 SFD on 60 acres

Melsky Tract
Toll Brothers, Inc.
45 SFD on 54 acres

Gray Tract
Toll Brothers, Inc.
96 Age-Restricted
SFD on 34 acres

White Tract
Toll Brothers, Inc.
80 SFD on 129 acres

Legend
- Municipal Boundary
- Parcels
- Hydrology
- Proposed Developments
- Under Construction

REFERENCES

1. Parcels: Upper Makefield Township GIS system/ BCPC.
   - Additional Subdivision Boundaries Added By Gilmore & Asssociates, Inc.
2. Developments: Upper Makefield Township GIS system.

B.3 Protection of Land and Water Resources

Upper Makefield is a participant in a Joint Zoning Ordinance and Comprehensive Plan adopted by Newtown Township, Wrightstown Township, and Upper Makefield Township. Both the 2009 Newtown Area Joint Comprehensive Plan (NAJCP), zoning, and ordinances enacted to regulate and implement land use reflect the largely rural nature and character of the Township, and the need to protect and conserve its environmental resources. In addition to Upper Makefield Township's Zoning, and Subdivision and Land Development Ordinances, the Township has several ordinances addressing the land development processes that are designed to conserve water and to protect water quality, water quantity and public health and safety. These ordinances are: Water (Upper Makefield Township Code, Chapter 26) and Sewers and Sewage Disposal (Upper Makefield Township Code, Chapter 18). These specific regulations govern:

- Subdivision Land Development
- Land Dedication for Parks
- Performance Zoning and Specific Variance Procedures
- On-Lot Disposal Systems ("OLDS")
- Natural Resources Protection District
- Erosion and Sedimentation Control
- Woodland Preservation
- Wetlands
- Significant Features
- Floodplain
- Steep Slopes
- Buffer Zones
- Stormwater Management
- Tree Protection
- Ground Water

In addition to the above, the citizens of Upper Makefield Township have expressed a strong desire to preserve the nature and character of the Township. To best accomplish these goals, the Board of Supervisors has commissioned the Environmental Advisory Council (EAC) to develop a plan to preserve open space. Generally, an open space plan is defined primarily by both the community's needs and land preservation needs. Community needs are driven by the needs of the current generation for active and passive recreation and the intangible need for "a sense of place", a familiar landscape, or a sense of community that promotes a communal, positive feeling in the Township. On the other hand, land preservation needs are driven primarily by the need to protect the community's heritage for future generations.

V – IDENTIFICATION OF ALTERNATIVES

The following is a summary of various alternatives that were evaluated in conjunction with this Plan Update for addressing the sewage disposal needs of the Township:

A.1 Regional Wastewater Treatment

Upper Makefield Township is an open rural municipality; therefore, a single regional wastewater treatment facility would not be technically or economically feasible. The developed areas are dispersed throughout the Township at a low density and existing land use planning and zoning discourages increased density through new development (Figure 17).

Currently, there are only two public wastewater treatment facilities that are operated by the Township: Heritage Hills WWTP which is owned by the Township and serves the Heritage Hills and the age-restricted Traditions developments; and the Dutchess Farms WWTP, which, until dedication, is technically owned by the developer, Toll Brothers, and will ultimately serve the Dutchess Farms development of 67 single-family detached dwellings. These two facilities are located too far apart for combination into a single facility to be feasible.

A.2 Extension of Existing Municipal & Non-Municipal Sewage Facilities

The existing sewer facilities within Upper Makefield Township are identified in Section A.1 of Chapter III of this Plan Update and are illustrated in Figure 11. The facilities, as shown, include both municipal and non-municipal (private) sewage collection, conveyance, treatment and/or disposal systems.

The existing non-municipal sewer systems within the Township have limited potential to service surrounding users due to their specific use, size, and ownership; extension of these private systems is therefore not considered a feasible alternative.

The Heritage Hills WWTP, which is owned and operated by Upper Makefield Township, is located in the eastern portion of the Township along Taylorsville Road. The permitted capacity of this treatment plant is 172,544 gpd. The 2013 Chapter 94 Report for the plant indicated an average daily flow of 47,630 gpd, which is only 28% of the overall plant capacity. This indicates that the plant does have excess treatment capacity available to potentially serve surrounding areas. A copy of the Chapter 94 Report for this treatment facility is included in Appendix A of this Plan Update.

The Dutchess Farms WWTP, which is located in the southwestern area of the Township near the border with Wrightstown Township, is operated by Upper Makefield Township and will be owned by the Township after dedication. This facility has been constructed to serve only the Dutchess Farms residential development, and it will be several years until the approved development is fully constructed, thus any potential capacity that may be available is presently unknown. The permitted capacity of this treatment plant is 20,225 gpd. The 2013 Chapter 94 Report indicated an average daily flow of 3,900 gpd, from the 25 dwellings contributing flow to the facility as of the end of 2013. Since the treatment plant is not located in the vicinity of any areas where long-term sewage disposal needs were identified, expansion of its service area and design capacity is not necessary. A copy of the Chapter 94 Report for this treatment facility is included in Appendix A of this Plan Update.

Public sewer collection and conveyance facilities are located in Lower Makefield Township, which could potentially service portions of Upper Makefield Township.

However, the potential servicing of any properties within Upper Makefield Township via connection to Lower Makefield Township sewer facilities would not result in groundwater recharge which is a primary policy of Upper Makefield Township and is inconsistent with the goals of the Newtown Area Joint Comprehensive Plan (NAJCP). Further, the available capacity within the sections of the Lower Makefield Township collection/ conveyance system, which could potentially service portions of Upper Makefield Township, as well as the downstream conveyance/treatment facilities, would need to be assessed, and Intermunicipal Sewer Service Agreements would need to be developed, before this alternative could be considered as a viable option.

A.3 Continued Use of Existing Sewage Facilities

All of the existing public and private sewage facilities listed in Section A.1 of Chapter III of this Plan Update are anticipated to continue to remain in service. These existing facilities are relatively new and are generally in good repair, with no operational problems such as infiltration/inflow, or excessive organic or hydraulic overloading. Additionally, no operation and maintenance (O&M) concerns have been identified. As such, there are no appreciable potential gains in system capacity to be made through repairs, upgrades or improved O&M, either by way of flow reductions or capacity increases in treatment or conveyance.

As mentioned in Section A.2 above, the Heritage Hills WWTP is operating well below its permitted capacity, which allows for possible connection of new collection and conveyance lines. On the other hand, the Dutchess Farms WWTP is not yet fully operational (as only 25 of 67 dwellings are contributing flow as of the end of 2013), so any potential excess available capacity is unknown until construction and connection of all permitted dwellings to the facility have been completed. The remaining private sewage facilities have been designed for site-specific purposes to accommodate the current user's wastewater.

A.4 Repair or Replacement at Existing Collection and Conveyance Systems

As stated above, no significant problems with the existing collection and conveyance systems within Upper Makefield Township have been identified. Therefore, potential repairs or replacement of these systems or portions thereof to obtain increased sewage capacity is not necessary.

The Township will continue to maintain and monitor these existing systems to ensure that they remain in good repair and provide the required sewage capacity.

A.5 Construction of New Community Sewage Systems and/or Treatment Systems

As previously discussed, two specific areas of Upper Makefield Township were included within the Needs Analysis that was performed in conjunction with this Plan Update: the Taylorsville Area and Dolington Area. Both of these areas are existing residential and commercial communities with reports of stressed or malfunctioning on-lot sewage disposal systems provided by the BCHD, and each could potentially be served by construction of new community sewage systems including collection and treatment facilities.

The Heritage Hills WWTP is located in close proximity to the Taylorsville Area. As noted in the preceding section of this Plan Update, there is excess available capacity within this WWTP that would be sufficient to accommodate projected wastewater flows from the Taylorsville Area. To that end, connection to the Heritage Hills WWTP to accommodate the long-term sewage disposal needs of the Taylorsville Area would be a

possible alternative to meet the long-term sewage disposal needs of the area, if necessary.

The Dolington Area consists of existing single-family and multi-family residential properties, which could be served by new community sewage systems, but there is a limited amount of undeveloped land presently available to construct the associated facilities. Relative to this, the federal government had previously acquired the surrounding agricultural land to the north of the Dolington Area for a veterans' cemetery, which includes a 5-acre presently undeveloped parcel in the Village of Dolington. However, acquisition of the aforementioned parcel of land from the federal government for the potential use as a Community Sewage System and/or Treatment System would be difficult, and would also require a thorough investigation of onsite soils to determine if a Community Soil Absorption Area would be a viable option.

As shown in Figure 18, a new community treatment plant is currently being constructed as part of the Gray Tract development, which will include a discharge to an unnamed tributary of Houghs Creek. The Dolington Area could be added to the service area of this new wastewater treatment facility by construction of additional collection and conveyance systems. Although the permitted treatment capacity of the Gray Tract WWTP does not include sewage flow from the Dolington Area, it has sufficient design capacity to accommodate future flow from the Dolington Area, pending acquisition of permit approval from PADEP for expanded treatment capacity.

Other potential community sewage systems and/or treatment system alternatives that would be available to address the long-term sewage disposal needs of the Dolington Area will be evaluated in subsequent sections of this Plan Update.

A.6 Use of Innovative/Alternative Methods of Collection/Conveyance to Serve Needs Areas Using Existing Treatment Facilities

As noted above, the servicing of the Taylorsville Area via the connection of a potential sanitary sewer collection/conveyance system to the Heritage Hills WWTP is a possible alternative to meet the long-term sewage disposal needs of the area, if necessary.

The Dolington Area is located more than two miles away from the Heritage Hills WWTP. To that end, as documented in subsequent sections of this Plan Update, no conventional or innovative/alternative collection and conveyance system would be economically feasible to connect the Dolington Area to the existing Heritage Hills system for sewer service. Additionally, the existing Dutchess Farms wastewater treatment plant is over five miles away from the Dolington Area and, therefore, would also not be a viable option.

B. Individual On-lot Sewage Disposal Systems

Management of wastewater by on-lot sewage disposal systems has long been the practice and policy of the Township. A vast majority of the Township population is served by on-lot sewage disposal systems. In Chapter II of this Plan Update, brief discussions are provided regarding on-lot sewage disposal system suitability relative to soil drainage class and slope. Additionally, Figure 5 provides a Township-wide assessment of soil drainage class, while Figure 8 visually outlines the steep slope areas within the Township. A desktop review of the soils' drainage class and site topography can provide a baseline assessment of on-lot sewage disposal system feasibility; however, a site specific investigation of the soils is required to determine the appropriate system from the many available options, both conventional and alternate.

In this section, additional detail will be provided regarding soil criteria as it relates to the suitability for individual on-lot sewage disposal systems. Selection of an on-lot sewage disposal system is primarily based on the following three soil characteristics: soil depth class, soil drainage class, and soil permeability rating. These three soil criteria are generalized for each soil in the soil survey; however, site-specific testing is required to confirm suitable conditions. Soil depth is based on the depth to bedrock; soil drainage class is based on the directly or indirectly (soil mottling) observed seasonal high water table; and soil permeability is a classification of the soil according to its most restrictive permeability, measured in inches per hour.

The following is a summary of on-lot sewage disposal systems that are permitted by the PADEP as primary or replacement systems for use throughout the Commonwealth:

1. PADEP Approved Conventional On-Lot Sewage Disposal Systems include the following:

   a) Conventional In-ground Trench or Bed System

      In-ground septic systems require very deep, well-drained soil types with suitable permeability that is neither too fast nor too slow. Seepage beds can be installed on slopes up to 8%, while trench systems can be installed on slopes up to 25%. These systems employ either stone-filled seepage beds or stone-filled trenches to distribute the effluent into the subsurface soil after exiting the septic tank. These systems where presently installed are relatively old, and a limited number of new in-ground systems have been proposed as there are few undeveloped areas remaining in the Township with very deep, well-drained soils.

   b) Conventional Elevated Sand Mound System

      In areas with restrictive depth to bedrock or seasonal high water table, the elevated sand mound system is the conventional on-lot system that is appropriate. Elevated sand mounds can be sited over moderately deep and moderately well-drained soils, as well as the same soils that can support an in-ground system. The minimum soil depth to a restrictive rock or water table layer is 20 inches. Soils suitable for elevated sand mounds generally have moderately slow to moderately fast permeability rates. Conventional elevated sand mounds can be installed on slopes up to 12%. Elevated sand mounds utilize their sand component to filter the septic tank effluent prior to percolating into the soil. Elevated sand mound systems are in abundance in the Township due to shallow bedrock and seasonal high water table restrictions.

   c) Individual Residential Spray Irrigation System

      The use of on-lot spray irrigation systems has become increasingly popular and accepted throughout the Commonwealth. This conventional sewage disposal method requires 10 inches of suitable surface soil and can be installed on slopes up to 25%. Permeability of the soil is not a factor in sizing the spray irrigation field. Primary treatment in spray irrigation systems is provided by either a septic tank or aerobic unit. Secondary treatment is provided by either a sand filter or peat filter, and then effluent is disinfected and stored in a tank until it can be discharged to the land surface through a pressurized sprinkler distribution system. Long-term effluent quality monitoring and maintenance of this system is required.

Individual residential spray irrigation systems generally require a disposal field between 20,000 and 40,000 square feet.

2. PADEP Permitted Alternative On-Lot Sewage Disposal Systems – Aside from the systems identified as "conventional", PADEP allows installation of "alternative" systems. Alternative systems are regulated under 25 PA Code § 73.72, which establishes general requirements. More specific requirements are provided in the PADEP's "Alternative Systems Guidance", which identifies fifteen alternative on-lot sewage disposal systems and provides design and operational requirements for each system. The fifteen alternative systems that could be considered for replacement of existing malfunctioning OLDS are summarized as follows:

   a) Alternative Individually Designed Composting Toilets - Toilet with integral containers to compost human waste materials. A separate disposal system is required to dispose of greywater.

   b) Flow Equalization - Use of an additional tank, controls and dosing system to equalize periods of peak and low flows. Absorption area may be sized based on the equalized flow rate plus an additional allowance of 15-20%. This would be most applicable to public assembly uses. Additional area is required for installation of the equalization tank.

   c) Alternative Peat based System Options - Utilize a peat filter for treatment in addition to a septic or aerobic tank. A peat filter for a three bedroom house would be approximately 75 square feet in area in addition to the septic tank and absorption area. Also required is the installation and maintenance of an ultraviolet disinfection unit. The primary advantage of these systems is that the minimum depth to the seasonal high water table limiting zone in the absorption area can be reduced from 20 inches to 10 inches, and the minimum depth to rock is reduced to 16 inches from 48 inches.

   d) Free Access Gravity Sand Filter - This system utilizes a 40 square foot sand filter for a three bedroom home, and additional 10 square feet of filter area is required for each additional bedroom. Sand filters are used in conjunction with individual residential spray irrigation systems, at-grade absorption areas, and alternative drip irrigation systems. When used in conjunction with an at-grade absorption system, the requirement for depth of suitable soils is reduced from 48 inches to 20 inches.

   e) CO-OP RFS Ill System Option - This system includes a septic tank and a recirculating filter system (RFS) to provide treatment to the effluent. Flow is recirculated by a pump. Use of an ultraviolet disinfection unit is also required. When used in conjunction with an at-grade absorption system, the requirement for depth of suitable soils is reduced from 48 inches to 20 inches. The minimum depth to the seasonal high water table in the absorption area can be reduced from 20 inches to 10 inches, and the minimum depth to rock is reduced to 16 inches from 48 inches.

   f) Leaching Chambers - Leaching chambers are constructed of plastic and are used within the absorption area of an in-ground or elevated sand mound in lieu of aggregate. A reduction in the absorption area of up to 40% may be allowable in systems using leaching chambers. However, the guidance manual requires that sufficient area for a full size absorption area

be available. Also no additional reduction in area for use of an aerobic tank may be taken.

g) Alternative Aggregates - Use of several alternate aggregates are allowed in-lieu-of quarry produced coarse stone or sand. The use of natural round stone, tire chips, and ground glass is allowed as alternative aggregates. No change in absorption area results from this substitution.

h) Greywater Systems - Treatment of greywater (washwater, etc.) is allowable, in cases where separate blackwater (domestic human waste) disposal is provided by composting, chemical or incinerating toilets A reduction of up to 40% in absorption area may be allowed. However, sufficient area for a full size absorption area must be available.

i) At-Grade Bed Systems - An at-grade bed is used in conjunction with a pretreatment system such as a peat filter, sand filter or recirculating filter. The at-grade bed consists of a minimum 10 inches of coarse stone aggregate with distribution piping and one foot of topsoil. The at-grade bed requires a pump system to transport effluent from the filter to the absorption bed. The use of an at-grade bed requires the same amount of area as an in-ground system or elevated sand mound. The primary advantage of these systems is that with the lower height of the at-grade bed may be less visually obtrusive compared to an elevated sand mound.

j) Modified Subsurface Sand Filter for Fast Percolation, Shallow Bedrock Sites with No Water Table Present - This system is allowable on sites with very specific soil conditions. An application rate of 1.5 square feet per gallon is required, resulting in the same absorption area as an elevated sand mound.

k) Shallow Placement Pressure Dosed System - This system is used on sites where a limiting zone is found at depths of 58 inches or more. It utilizes a septic tank and dosing tank with a pump system, and a wide, shallow absorption bed. This system requires a larger absorption area than a conventional system.

l) Drip Irrigation Systems - Drip irrigation uses specially constructed perforated tubing to apply effluent to the soil in small amounts over a large area. Drip irrigation systems are allowed in well drained and moderately well drained soils. Seasonal high water table must be greater than 20 inches deep and a minimum 20-inch vertical distance between rock and the drip irrigation emitters is required. These systems include a septic tank, and either an intermittent sand filter, peat filter, or aerobic treatment unit. Additionally, an automatically backwashed disc filter unit is required to remove solids and prevent emitter tubing from becoming clogged. Two zones of drip tubing, each approximately 600 lineal feet minimum, is installed underground, below the frostline.

m) Steep Slope Elevated Sand Mound Beds on Slopes between 12 and 15% and Percolation rates of 3 - 30 minutes per inch - This system is a sand mound installation modified for installations on a slope. No reduction in absorption bed size is allowed for use of an aerobic treatment tank.

n) A/B Soil System - These systems consist of a septic tank, recirculating sand filter, dosing tank and pump, and an ultraviolet disinfection system. An at-grade absorption area is used for disposal of the effluent. A minimum separation depth to seasonal high water table of 10 inches and 16 inches to rock is required.

o) Non-Infiltration, Evapotranspiration Bed contained within a Greenhouse - This technology consists of low flow plumbing fixtures inside the home, and aerobic treatment system tank, and disposal of effluent by evapotranspiration within a modified greenhouse. Plants are used to uptake the effluent and release water to the atmosphere.

3. PADEP On-Lot Alternative Technology Listings – This listing is essentially an addendum to the Alternative Systems Guidance manual, showing specific technology (products) which have been approved by PADEP. The listing currently includes seven (7) products, as follows:

a) AdvanTex AX-Series Treatment System – Orenco System, Inc. – This system consists of dual compartment tank with one zone serving as a septic tank and the second zone holding liquid effluent to be pumped to a textile multi-pass filter, which provides aerobic treatment to the sewage. Use of an ultraviolet disinfection system is also required. Treated liquid is pumped to an absorption field for disposal. A 40% reduction in the absorption area may be allowed by PADEP based on the use of this system.

b) Air Injection Absorption Area Renovation – Soil Air System/ Geometrix, LLC – This product is generally used in septic system repairs. The installation includes an air blower forcing air into the soil of the absorption area. This air rejuvenates the soil by encouraging aerobic conditions within the soil and allowing the growth of aerobic (oxygen using) bacteria to treat the sewage effluent. This aerobic environment replaces an anaerobic environment in the soil. Anaerobic (oxygen deficient) bacterial growth creates a biomat accumulation which lowers the permeability of the soil. This repair system requires specific evaluation and long-term operation of an electric powered blower.

c) Drip Distribution PERC-RITE Primary Effluent – American Manufacturing Co. Inc. – This is the additional approval of a specific manufacturer's drip irrigation system, as described previously.

d) Drip Distribution PERC-RITE Micro-Mound – American Manufacturing Co. Inc. – This system is a specific application of drip irrigation systems. This system includes a septic or aerobic treatment tank, a dosing tank and pumping system, a filtration unit, and final discharge to a drip irrigation tubing within a micromound absorption area. Micromound systems require 12 inches of sand below the drip tubes and 2 inches of sand above the tube, producing a low profile mound that may be more aesthetically pleasing than a conventional sand mound.

e) Floating Outlet (Flout) Siphon – Tissy Plastics, Inc. – This product can be used in a dosing tank to replace a dosing pump in certain hydraulic situations. This product's use would be related to flow equalization systems as discussed above.

f) Geotextile Sand Filters – Eljen Corporation – This product is used to provide treatment area and distribution of sewage effluent in the absorption bed area. The filter unit consists of perforated piping atop of plastic matrix then wrapped in two types of geotextile fabric. The complete units look like mattresses. These units are buried within the absorption bed surrounded by sand. The plastic matrix and filter fabric provide area for the growth of bacteria to treat the wastewater prior to infiltration into the soil. A 40% reduction in absorption bed size is allowed with the use of these units.

g) Leaching Chambers – Infiltrator Systems, Inc. – This listing approves three additional infiltration chamber designs/sizes for use under the leaching chamber section of the Alternative System Guidance.

Based upon the desktop analysis described in the preceding sections of this Plan Update, the PADEP-approved individual on-lot sewage disposal systems summarized above provide a variety of options that could be considered for addressing the long-term sewage disposal need for the majority of properties within the Township. The selection of the most appropriate option would be based on site specific testing performed in conjunction with the OLDS planning and permitting process.

With regard to specific areas within the Township that were identified by the BCHD as experiencing problems with the functioning of existing on-lot sewage disposal systems, namely the Taylorsville and Dolington Areas, the conclusions developed by the recent On-Lot Sewage Disposal System Surveys recently conducted by the Township that is summarized in Section III.B.2 of this Plan Update are as follows:

Taylorsville Area

As detailed in the preceding sections of this Plan Update, an On-Lot Sewage Disposal System Survey was conducted within the Taylorsville Area in 2013. The conclusions reached in conjunction with the aforementioned OLDS Survey were that the majority of existing OLDS serving the Taylorsville Area appear to be functioning properly with no indications of widespread problems. The OLDS functioning problems noted during the survey were limited to three properties, and it was determined that there were viable on-lot sewage disposal solutions that would be available to address the specific problems noted at each of the three properties.

Based upon the results of the recent OLDS Survey, it is proposed that the future sewage disposal needs within the Taylorsille Area be addressed utilizing the following approach over the “short term” (5 year) planning window of this Plan Update:

- Improve the performance of existing OLDS by water conservation and/or increased system oversight/maintenance. Relative to this matter, the Township has committed to conducting educational seminars with area property owners regarding OLDS operation and maintenance and will incorporate supplemental provisions into the Township’s current OLDS Maintenance Ordinance addressing the specific needs/issues within the Taylorsville Area.

- Address the current limited number of OLDS operational problems noted during the survey utilizing potential on-lot sewage disposal solutions. Information concerning the problems noted during the survey, as well as recommendations for corrective work, will be distributed to the affected property owners by the

Township in an effort to improve the operation or facilitate repairs/upgrades to the on-lot sewage disposal systems.

The Township will continue to monitor the functioning of OLDS within the Taylorsville Area to ensure the approach proposed above is effective in meeting the long-term sewage disposal needs of the area. Should such monitoring reveal that the proposed approach is not effective, the Township will perform additional planning and develop supplemental alternatives to meet the long-term sewage disposal needs of the Taylorsville Area.

Dolington Area

The conclusions reached in conjunction with the On-Lot Sewage Disposal System Survey that was performed within the Dolington Area, as detailed in preceding sections of this Plan Update, are not as favorable with regard to the continuing use of potential on-lot sewage disposal alternatives for addressing the long-term sewage disposal needs of the area as compared to the Taylorsville Area. A relatively higher number of properties within the Dolington Area were noted as having periodic problems with the functioning of their primary on-lot sewage disposal systems thereby relying on supplemental holding tanks to address seasonal conditions. Additionally, a number of properties are served by on-lot sewage disposal systems that were constructed in the 1950s – 1960s that would not meet current PADEP design and siting guidelines due to inadequate setbacks/isolation distances, limiting zone restrictions, etc., which would also affect the viability of potential on-lot sewage disposal solutions in the event future problems develop.

Notwithstanding the above, based upon the results of the recent OLDS Survey, the functioning of existing on-lot sewage disposal systems within the Dolington Area is being properly managed at this time by the affected property owners in that no widespread indications of OLDS malfunctioning conditions were noted, and the associated groundwater quality evaluation revealed no contamination concerns related to potential OLDS malfunctions. To that end, the Township's approach to addressing both the short-term (5 year) and long-term (10 year) planning periods of the Dolington Area would include the following:

- Improve the performance of all existing OLDS within the Dolington Area by water conservation and/or increased system oversight/maintenance. To that end, during the short-term planning period of this Plan Update, the Township has committed to conducting educational seminars with area property owners regarding OLDS operation and maintenance and will incorporate supplemental provisions into the Township's current OLDS Maintenance Ordinance addressing the specific needs/issues within the Dolington Area, similar to that proposed for the Taylorsville Area above.

- Based upon a review of BCHD records, input received from BCHD Representatives and the overall evaluation of properties performed in conjunction with the OLDS Survey, the long-term sewage disposal needs of properties with recently permitted OLDS, or the relatively larger properties within the Study Area, would be considered to be addressed.

- Based upon the results of the OLDS Survey including the Soil Probe Evaluations and/or existing isolation distance limitations previously noted at the relatively smaller properties, the viability of using replacement OLDS to address the long-term sewage disposal needs of the affected properties is doubtful.

- Long-term sewage disposal needs of properties served by holding tanks or without practical on-lot solutions must be further assessed.

The evaluation of potential alternatives to address the long-term sewage disposal needs of the potential "problem" properties noted above will be discussed in subsequent sections of this Plan Update.

C. Small Flow Treatment Facilities

A Small Flow Treatment Facility (SFTF) is an individual or community sewerage system that is designed to adequately treat sewage flows not greater than 2,000 gpd for final disposal using a stream discharge or other disposal method approved by the PADEP. §71.64 of the Pennsylvania Code Title 25 further explains that the use of these systems is restricted to replacement or repair systems which the Department determines is necessary to abate an existing nuisance or public health hazard or as a system to serve residential dwellings or commercial facilities which generate domestic wastewater not containing industrial waste.

Since an SFTF has restricted uses, the following information is required by the PADEP prior to approval of an SFTF:

1. Documentation that soils are not suitable for the installation of individual or community on-lot sewage disposal systems, excluding individual residential spray irrigation systems proposed for use in areas outside the watershed of waters classified as high quality or exceptional value.

2. A preliminary hydrogeologic evaluation when the SFTF will use land disposal or a dry stream channel discharge for final disposal.

3. Documentation, which confirms that existing or proposed drinking water uses will be protected, and that effluent will not create a public health hazard or a nuisance.

4. Documentation that the proposed use of the SFTF does not conflict with comprehensive sewage planning for the area.

5. An evaluation that establishes specific responsibilities for operation and maintenance of the proposed SFTF.

6. An evaluation of the density of development and the number and density of other similar systems in the watershed.

7. An evaluation of the alternatives available to provide sewage facilities which documents that the use of a SFTF is a technically, environmentally, and administratively acceptable alternative.

In addition to the requirements by the PADEP, Upper Makefield Township requires that an Operation and Maintenance Agreement be executed between the applicant and the Township. This Agreement requires, at a minimum, annual maintenance inspections and effluent testing pursuant to the Clean Streams Law and/or NPDES permit.

If an SFTF is to be considered as a viable long-term sewage disposal alternative, compliance with anti-degradation surface water requirements of the PA Clean Streams

Law will need to be sufficiently documented. Protection of the Delaware River and avoidance of the adverse effects of discharging inadequately treated effluent to streams tributary to the Delaware River is a priority for the Township. Although there are no exceptional value or high quality streams within the Township, this is consistent with its intention to protect ground water and surface water resources.

The surface water resources of the Township are also ecologically significant, containing individual species and ecological habitats noted in the Bucks County Natural Resource Inventory and the PA Natural Diversity Inventory (PNDI). Additionally, studies conducted by the United States Geological Survey scientifically link the region's surface and ground water hydrology. Therefore, wastewater treatment/disposal alternatives involving stream discharge of treated effluent are generally not promoted by the Township, unless land disposal alternatives prove not to be feasible.

An SFTF may be a viable alternative to address the existing malfunctioning systems identified within both the Taylorsville and Dolington Areas, if repair or replacement of an existing system is not feasible due to severity of malfunction (precluding repair of malfunctioning system components), or soil and parcel area/size limitations precluding installation of a conventional or other alternative on-lot sewage disposal system. The evaluation of the potential SFTF Alternative to address the long-term sewage disposal needs of the "problem" properties within the Dolington Area will be discussed in subsequent sections of the Plan Update.

D. Community Land Disposal

Community On-Lot Sewage Disposal Systems ("CSDS") can be used as a long-term sewage disposal alternative for residential, commercial, industrial or institutional developments where projected wastewater flows will be in excess of 800 gpd. The criteria for this application is generally based on the number of lots to be served and/or the wastewater flow equivalent. Commercial, industrial, and institutional land developments that will generate a flow of less than 800 gpd are considered to have an individual on-lot sewage disposal system. Depending on the development type, flow generated, and site conditions, sewage facilities planning for CSDS could be in the form of Planning Module Components 2, 3, or 3s.

The feasibility of utilizing CSDS land disposal alternatives, like that of individual system alternatives, is based on existing site and soil conditions. If conventional individual on-lot sewage disposal systems prove not feasible, developments could potentially use community land disposal. Any new community systems installed within Upper Makefield Township must be offered for dedication to the Township or would be owned and maintained by a homeowners' association or other entity as may be approved by the Township consistent with the Township's OLDS Ordinance. Maintenance Agreements, as well as financial and other institutional mechanisms, must be provided in conjunction with any CSDS proposal to ensure long-term viability. Additionally, CSDS must provide for bonding and agreements to ensure future maintenance, or if required, the repair or replacement of the system. A proposed CSDS must also provide for ground water recharge since Upper Makefield Township is solely dependent on ground water for its potable water supply.

The potential use of a CSDS to meet the long-term sewage disposal needs of the problem properties within the Dolington Area will be evaluated in subsequent sections of this Plan Update.

E. Retaining Tanks

A retaining tank is a watertight receptacle that receives and retains sanitary sewage and is designed and constructed to facilitate periodic removal and disposal at another site. Per Pennsylvania Code Title 25 Chapter 71, retaining tanks can be a holding tank, privy, chemical toilet, composting toilet, incinerating toilet, and a recycling toilet. These retaining tank options will be described in more detail below. General requirements listed in Chapter 71 for retaining tanks are as follows:

1. The official plan or revision addressing the retaining tank use shall meet the requirements of Subchapters B and C of Chapter 71.

2. Proposed disposal sites, the method of disposal and the hauler of the retaining tank waste shall be approved by PADEP consistent with the Solid Waste Management Act prior to approval of the official plan or revision allowing the use of the retaining tank.

3. A municipality, sewer authority, or sewage management agency may delegate or contract for the collection and disposal of the contents of retaining tanks except that the ultimate responsibility for the proper collection and disposal of the contents shall remain with the municipality, authority, or agency.

4. Whenever the local agency issues permits for retaining tanks, the municipality or local agency may impose other conditions it deems necessary for operation and maintenance of the tanks to prevent a nuisance or a public health hazard.

Privies and chemical toilets are designed to receive sewage where there is no water under pressure and no piped wastewater facilities. Privies are permissible when properties with no water under pressure have soil and site suitability testing that meets the requirements for sewage disposal by one of the systems described in Chapter 73. Site suitability testing for a conventional sewage disposal area is not required if the lot was in existence prior to May 15, 1972, is greater than 1 acre, and does not and will not have water under pressure. Chemical toilets are permissible for temporary uses, such as construction sites or at the site of public gatherings and entertainment.

Incinerating, composting, and recycling toilets are forms of retaining tanks that are used to minimize wastewater flow, but do not eliminate the necessity of an on-lot sewage disposal system for greywater flow from sinks and showers. Pennsylvania Code Chapter 73 outlines construction requirements for these three retaining tank systems. Additionally, the PADEP Alternate Systems Guidance provides standards for individually designed composting toilets.

The most notable type of retaining tank is a holding tank, which can be used on a temporary basis to abate a nuisance or public health hazard, and in interim periods prior to a public sewer connection. Per PADEP regulations, temporary holding tanks are permitted when the following conditions are met:

1. The applicable Official Sewerage Facilities Plan or revision thereto authorizes the use of a holding tank on an interim basis and provides for replacement by adequate sewer facilities in accordance with a schedule approved by the PADEP.

2. The applicable Official Sewerage Facilities Plan or revision thereto includes municipal financial assurance of the replacement facilities implementation,

such as public financing, bonding or other security, to assure completion, or other assurances either singularly or in combination that the PADEP deems necessary.

Holding tanks are also permitted on a permanent basis for commercial, industrial, or institutional establishments that generate less than 800 gpd in wastewater flow. Holding tanks must have suitable construction specifications, and a minimum capacity of either 1,000 gallons or a volume equal to the quantity of waste generated in three days, whichever is greater. Moreover, the holding tanks are to have an audible and visual warning device that is activated when the tank is at 75% of its capacity. Lastly, holding tanks are to be pumped out on a regular basis with the waste being disposed of at a site approved by the PADEP.

Holding tanks are regulated in Upper Makefield Township by Township Code, Chapter 18. A copy of the Township's Holding Tank Ordinance is included in Appendix D, along with the Township's OLDS Ordinance.

Properties located within both the Taylorsville and Dolington Areas have permitted holding tanks. The holding tank within the Taylorsville Area services a commercial property with less than 800 gpd of wastewater flow and is, therefore, considered a viable long-term sewage disposal option for the property. The holding tanks within the Dolington Area were installed to address seasonal problems with the functioning of existing on-lot sewage disposal systems on several residential properties and would not be considered as an acceptable means of addressing the long-term sewage disposal needs of the properties.

F. Sewage Management Program

The management of on-lot sewage disposal systems within Upper Makefield Township is a key element in the successful, long-term operation of properly designed and installed systems. Improper installation and inadequate management of on-lot sewage disposal systems increase the chances of water resource contamination and potential public health problems. An effective Sewage Management Program would include adequate soil testing, sewage planning for development, on-lot sewage disposal system design, installing the appropriate system correctly, and maintaining the on-lot sewage disposal system as required by state or local regulations. For these reasons, Upper Makefield Township has adopted an OLDS Ordinance for the management of individual and community on-lot sewage disposal systems.

The purpose of the Township's OLDS Ordinance is to promote the public health by setting minimum standards for OLDS installation, operation, and maintenance. The OLDS Ordinance applies to both new and existing OLDS in conjunction with the ordinances concerning holding tanks and water conservation. Wherever feasible and economical, OLDS shall be encouraged throughout Upper Makefield Township. The guidelines set forth in the Ordinance strive to protect ground water resources and promote water conservation through proper operation and maintenance of on-lot sewage disposal systems.

All individual OLDS shall be owned and maintained by the property owner. All community OLDS shall be offered for dedication to the Township or agency designated by the Township, or owned and maintained by a homeowners' association. The operator of all community sewage disposal facilities must be licensed through the PADEP.

Soil testing is one of, if not the most important, part of development of an on-lot sewage disposal system. Site soil testing is necessary to establish whether sites are suitable to treat and dispose of wastewater generated by proposed development. Site suitability is established by evaluating soil depth, drainage, and permeability. Additional evaluation of underlying geologic formations is sometimes necessary, such as developments with high lot density, areas of the Township with groundwater concerns, or where carbonate geology is located. For all site evaluations, the BCHD SEO represents Upper Makefield Township as the regulatory authority who witnesses site testing and approves sites for on-lot sewage disposal.

For new land developments and lots with proposed flows exceeding 800 gpd, Sewage Facilities Planning is required by the PADEP. Sewage Facilities Planning Modules are prepared and submitted to the proper regulatory agencies for review, prior to Township review and approval. At the Township level, the planning module process includes review by the Township Engineer, Planning Commission, and the Board of Supervisors. The Board of Supervisors is the last entity to review the planning module before it is submitted to the PADEP. In some instances, when the use of holding tanks, IRSIS, or alternate systems are proposed, operation and maintenance agreements are to be completed prior to Township approval of the Module and submission to the PADEP.

Also important is the design and review of the proposed on-lot sewage disposal system prior to installation. Proper design review by the BCDH SEO for an on-lot sewage disposal system permit is crucial to the long-term viability of the system. Installation and construction reviews ensure that systems are constructed according to plans, specifications, and PADEP Guidelines. A BCDH SEO conducts routine inspections during the installation of all on-lot sewage disposal systems.

After the on-lot sewage disposal system is installed, operation and maintenance of the system must be performed as outlined in the Township's OLDS Ordinance, or as specified in more stringent individual Operation and Maintenance Agreements. On-lot sewage disposal systems may be located over deep, well-drained soils, but may ultimately fail due to poor operation and maintenance. Refer to Appendix D for more details on operation and maintenance procedures per the OLDS Ordinance (Chapter 18 of the Township Code). At a minimum, on-lot sewage disposal systems must be pumped out every three years, and an inspection report must be submitted to the Township if a malfunction is noted by the licensed pumper, or if repairs are needed.

In conjunction with the OLDS Ordinance requirements to pump out the system regularly and have it inspected by the pumper, the Township's Sewage Management Program strives to educate the Township residents about how on-lot sewage disposal systems work and the need for proper operation and maintenance of the system. With that in mind, the Township currently provides general information about on-lot sewage disposal system maintenance through its website and newsletter, as well as handing out pamphlets upon request. This information includes frequency of pumping on-lot sewage disposal systems, general inspection procedures, and the need for installation of water conservation devices.

Upper Makefield Township's OLDS Ordinance has been included in this Plan Update to document the Township's desire to ensure long-term viability of existing and new on-lot sewage disposal systems, to protect groundwater resources, and to promote public health. The OLDS Ordinance is a great tool to keep functioning on-lot sewage disposal systems operating properly.

Upon approval of this Plan Update by PADEP, Upper Makefield Township will complete the following additional activities related to on-lot sewage disposal systems:

1. On-lot Disposal System Ordinance, Chapter 18 of the Township Code, will be amended to include more stringent management/maintenance requirements specific to Taylorsville and Dolington Areas, which will focus on:

   a) Increased water conservation measures.

   b) Increased OLDS oversight/maintenance.

2. Educational sessions will be conducted for Taylorsville and Dolington Area property owners/residents to review OLDS operation, benefits and methods of water conservation, operation and maintenance requirements for standard, pressure dosed, and advanced treatment OLDS, as well as identifying preliminary signs of OLDS malfunctions. These sessions will be open to all Township residents and will be broadcast on the Township's Government Access channel.

With the amendments proposed to be completed to the previously enacted OLDS Ordinance (as identified above), it is expected that the Township's Sewage Management Program will effectively improve the operation and life expectancy of the previously identified Sewage Disposal Needs Areas of the Township, including both the Taylorsville and Dolington Areas.

G. Non-Structural Comprehensive Planning Alternatives

The Newtown Area Joint Comprehensive Plan, last revised in 2009, summarizes Upper Makefield Township's vision and policies on its future growth, preservation, and conservation. The Jointure today allows Newtown, Upper Makefield, and Wrightstown Townships, tied together geographically, to combine their diverse characteristics and strengths into a single planning unit intended to promote the vitality and health of each community and their entire region. It remains one of the few cooperative planning arrangements which govern land use with a common zoning ordinance. The various on-lot sewage disposal alternatives considered in this section are evaluated with the purpose of protecting the natural and rural character of the planning area and protecting surface and groundwater critical to maintaining water quality within Upper Makefield Township and its adjacent communities.

The Township's Subdivision and Land Development Ordinance (SALDO) strives to control the subdivision and development of land in the Township in order to preserve agricultural lands, scenic areas, historical sites, and water resources. The SALDO also attempts to ensure adequate open space; provide proper distribution of the population; assure sites are suitable for building purposes; and most importantly, give effect to the policies and proposals of the Township's Comprehensive Plan and implement the requirements of the Zoning Ordinance. The SALDO does not include detailed requirements concerning on-lot sewage disposal. However, this topic is addressed in detail within the Joint Zoning Ordinance and the Township's OLDS Ordinance.

The Newtown Area Joint Municipal Zoning Ordinance (NAJMZO) was last amended in 2010. This document establishes the basic land use regulations for Upper Makefield, Newtown and Wrightstown Townships. This current and up-to-date document provides comprehensive planning which supports prudent sewage planning for existing and future conditions.

The land use designations for Upper Makefield Township are identified in Section A.2 of Chapter IV of this Plan Update. The majority of the Township is designated as CM –

Conservation Management, followed by JM – Jericho Mountain. Most of the area in these zoning districts has been previously developed as rural residential and many of the remaining agricultural tracts of land have been set aside for preservation. Almost all of the CR-1 – Country Residential 1 Low Density zoned land in the Township has been developed, as well as the CR-2 – Country Residential 2 Medium Density, R2 – Residential High Density, and VR-1 – Village Residential 1 Low Density zoned districts.

Currently the JM District has a minimum lot size for single family detached with on-lot sewage disposal and water of 5-acres, mostly due to steep slopes and soils. The CM District has a minimum lot size of 1-acre for this same use as does the CR-1 District. Since a majority of the Township is comprised of these three zoning designations, Upper Makefield has been able to closely control lot sizes for those that require OLDS. Therefore, the current zoning districts and requirements can be viewed as effectively controlling land development and assuring the use of OLDS as a viable long-term sewage disposal method.

Since Upper Makefield Township relies solely on groundwater for their water supply, the Township has enacted a comprehensive well ordinance to protect drinking water. Upper Makefield Township's well ordinance addresses requirements for construction of production wells, permitting of private wells, well yield criteria, well casing criteria, well depth, and water quality. The main goal of the well ordinance is to keep current the requirements for production wells in the best interest of the health, safety, and welfare of Township residents.

As mentioned previously, the OLDS Ordinance (Refer to Appendix D) reinforces the Township's desire to promote public health, prevent groundwater degradation, and keep municipal sewerage facilities to a minimum. When properly followed and enforced, the OLDS Ordinance will help prevent on-lot sewage disposal problems and keep alternate sewage disposal needs to a minimum. The OLDS Ordinance will also help the Township to identify additional sewage disposal needs areas if they were to arise, in conjunction with the reporting program that is outlined in the Ordinance. The Township, in theory, should be able to supply themselves with the necessary background data in the future to identify problem areas, without solely relying on BCDH records or complaints.

In summary, the Township's planning, zoning, land development, and well and OLDS Ordinances provide a comprehensive framework to regulate land development, maintain groundwater quality, and sustain a healthy community and environment.

Most of the private OLDS and wells within Upper Makefield Township are situated on lots greater than 1 acre, which supports the Township's philosophy to maintain a safe drinking water supply and provide enough land to properly site OLDS. There is presently no interest in modifying zoning requirements in the future that could promote higher density developments that would be inconsistent with the use of OLDS and private wells.

The OLDS Ordinance provides Township oversight of the operation and maintenance of OLDS, a comprehensive education program on OLDS for Township residents and a monitoring program that allows the Township to identify additional sewage needs areas and possibly prevent future OLDS problems. Further, as noted in the preceding sections of this Plan Update, Upper Makefield Township will amend the current OLDS Ordinance to include additional provisions for the Taylorsville Area and Dolington Area to increase OLDS oversight and maintenance, water conservation and education of OLDS owners/uses regarding system maintenance and repair. Therefore, the Township's existing planning documents and ordinances, in combination with proposed amendment

to the OLDS Ordinance, adequately assist in meeting the existing and future sewage disposal needs of the Township.

H. Summary of the Proposed Alternatives to Address the Short and Long-Term Sewage Disposal Needs within the Taylorsville and Dolington Areas of the Township

The following is a summary of various alternatives that have been developed to address the short and long-term sewage disposal needs within the two specific Needs Areas within the Township discussed in the preceding sections of this Plan Update:

Taylorsville Area

1. Short-term Sewage Disposal Needs (Five-Year Planning Period) - The immediate sewage disposal needs of this area will be addressed by improving the performance of existing OLDS through water conservation, increased system oversight/maintenance, educating property owners concerning OLDS use/maintenance and amendment of the Township's OLDS Ordinance to incorporate additional maintenance provisions specific to the Taylorsville Area. Immediate sewage disposal needs will also be addressed by repair and/or replacement of the limited number of OLDS with operational problems (noted during the OLDS Survey), utilizing potential on-lot sewage disposal solutions, where possible.

2. Long-Term Sewage Disposal Needs (Ten-Year Planning Period) - If the short-term approach (identified above) is found to be effective after five years of implementation, it will be continued by the Township to also satisfy the long-term sewage disposal needs of the area for the Ten-Year Planning Period.

Dolington Area

1. Short-term Sewage Disposal Needs (Five-Year Planning Period) - The immediate sewage disposal needs of this area will be addressed by improving the performance of existing OLDS through water conservation, increased system oversight/maintenance, educating property owners concerning OLDS use/maintenance and amendment of the Township's OLDS Ordinance to incorporate additional maintenance provisions specific to the Dolington Area. Immediate sewage disposal needs will also be addressed by interim repairs to the OLDS with operational problems (noted during the OLDS Survey), as necessary, utilizing potential on-lot sewage disposal solutions, including Best Technological Guidance, where possible.

2. Long-Term Sewage Disposal Needs (Ten-Year Planning Period) - Based upon a review of BCHD records, input received from BCHD Representatives and the overall evaluation of properties performed in conjunction with the OLDS Survey, the long-term sewage disposal needs of properties with recently permitted OLDS, or the relatively larger properties within the Study Area, would be considered to be addressed. However, based upon the results of the OLDS Survey including the Soil Probe Evaluations and/or existing isolation distance limitations previously noted at the relatively smaller properties, the viability of using replacement OLDS to address the long-term sewage disposal needs of the affected properties is doubtful. To that end, six (6) potential alternatives for addressing the long-term sewage disposal needs of the current or potential "problem" properties within the Dolington Area have been developed, which are detailed below:

Alternative No. 1: Conventional Gravity Sewer and Pump Station to the Gray Tract WWTP

As shown on Figures 19 and 20, this alternative includes the construction of a gravity sanitary sewer collection system within the Dolington Area, which would convey wastewater flows to three new pump stations situated at strategic locations within the Needs Area. Wastewater would then be conveyed from the pump stations through a force main to the Gray Tract gravity sanitary sewer collection system (already constructed), eventually discharging to the Gray Tract WWTP (currently under construction). This alternative will require a re-rating of the current permitted capacity of the Gray Tract WWTP.

All of the sanitary sewerage facilities that would be constructed in conjunction with this alternative that are located within public rights-of-way and/or easements would be owned/operated/maintained by the Township. All facilities that would be installed on private properties would be owned/maintained by the respective property owners.

Table 8 summarizes the estimated cost for the supplemental public sanitary sewer collection/conveyance facilities that would be required in conjunction with this alternative. This cost addresses the common elements or components of the proposed Conventional Gravity Sewer and Pump Station System, including a proposed gravity collection system, three pump stations, force mains and related improvements. The total estimated Project Cost for public sewer facilities proposed in conjunction with this alternative is approximately $3,614,615.00.

Alternative No. 2: Low-Pressure Sewer System (LPSS) to Gray Tract WWTP

As shown on Figures 21 and 22, this alternative includes the construction of an LPSS within the Dolington Area, which would convey wastewater flows from the Dolington Area to the Gray Tract gravity sewer collection system (already constructed), and eventually to the Gray Tract WWTP (currently under construction). This alternative will also require a re-rating of the current permitted capacity of the Gray Tract WWTP.

All of the sanitary sewerage facilities that would be constructed in conjunction with this alternative that are located within public rights-of-way and/or easements would be owned/operated/maintained by the Township. All of the facilities that would be installed on private properties would be owned/maintained by the respective property owners, and would also be subject to a Maintenance/Oversight Agreement with the Township to ensure the facilities will be properly maintained.

Table 9 summarizes the estimated cost for the supplemental public sanitary sewer collection/conveyance facilities that would be required in conjunction with this alternative. This cost addresses the common elements or components of the proposed LPSS. The total estimated Project Cost for this alternative is approximately $1,824,700.00.

Alternative No. 3: LPSS to White Farm Community Sewage Disposal System

As illustrated on Figures 23 and 24, this alternative includes the construction of an LPSS within the Dolington Area which would convey wastewater flows to a

Proposed Community Sewage Disposal System that would be constructed within a portion of the Open Space Area proposed as part of the White Farm Development. This alternative would require acquisition of land within the White Farm Development, soil testing, design, permitting, and construction of a Community Sewage Disposal System, which would include a package treatment plant and community sand mounds for onsite disposal of the treatment plant effluent.

All of the sanitary sewerage facilities that would be constructed in conjunction with this alternative that are located within Township property, public rights-of-way and/or easements would be owned/operated/maintained by the Township. All of the facilities that would be installed on private properties would be owned/maintained by the respective property owners, and would also be subject to a Maintenance/Oversight Agreement with the Township to ensure the facilities will be properly maintained.

Table 10 summarizes the estimated cost for the public sanitary sewer collection/conveyance/ treatment facilities that would be required in conjunction with this alternative. The costs address the LPSS, package treatment plant, Community sand mounds and associated appurtenances. The total estimated Project Cost for this alternative, which does not include cost for land acquisition and easements, is approximately $4,248,455.00.

LEGEND

- EXISTING SANITARY MANHOLE
- EXISTING GRAVITY SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- PROPOSED GRAVITY SANITARY SEWER
- PROPOSED PUMP STATION
- PROPOSED FORCE MAIN

NEEDS AREA BOUNDARY

FORCE MAIN TO "GRAY TRACT WWTP"

NOTE:
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SCALE IN FEET
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FIGURE 19

Rev. No.	Date	Description
1	10/8/14	General Revisions

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #1 : DOLINGTON AREA
GRAVITY SEWER & PUMP STATION TO "GRAY TRACT" WWTP

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE

Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

Date:	Scale:	Drawn By:	Plan No.	Sheet No.
2/18/14	AS SHOWN	TNS	6700-78	1 OF 2
		Checked By: KGK		

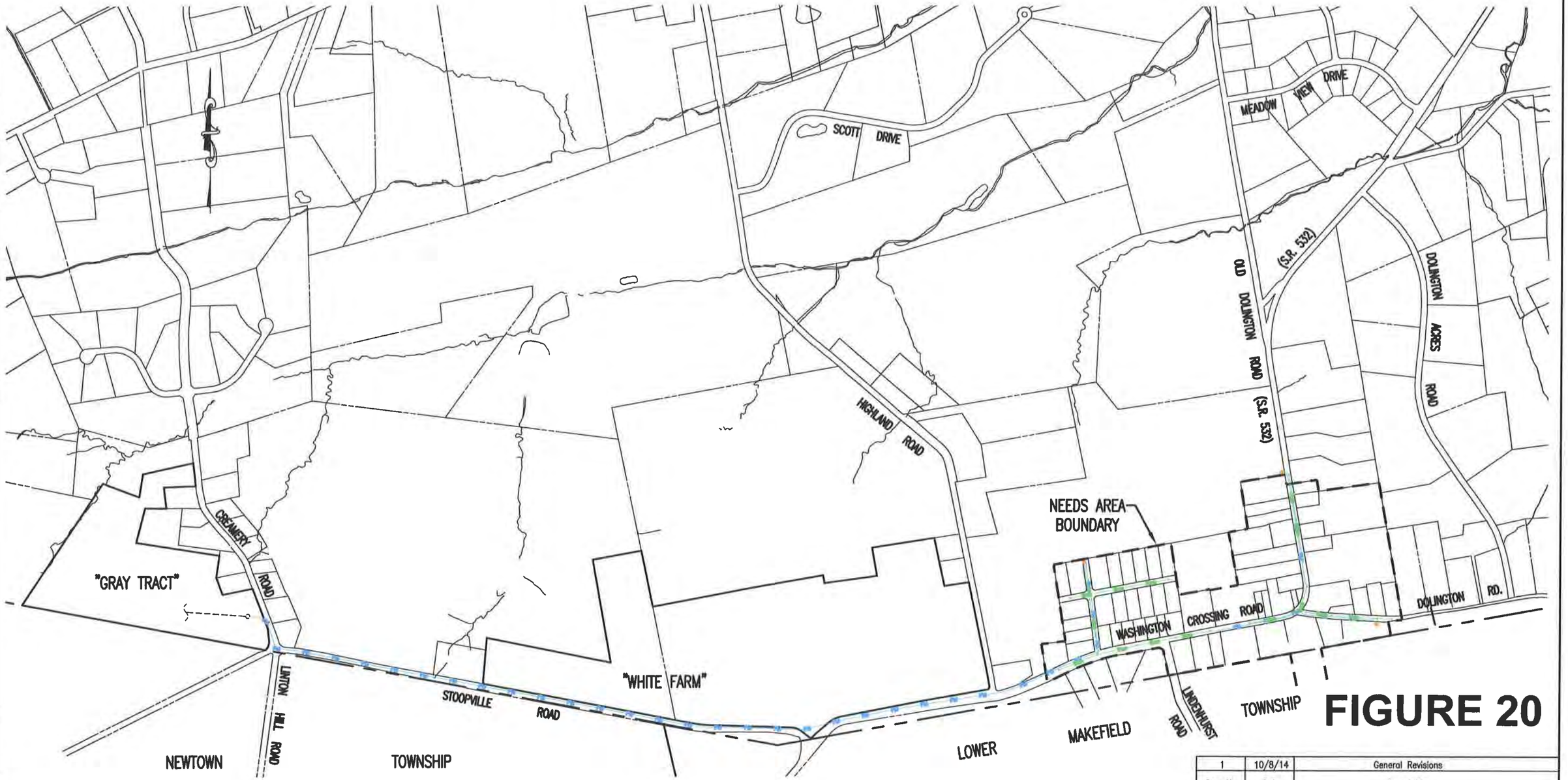

FIGURE 20

LEGEND

- EXISTING SANITARY MANHOLE
- EXISTING GRAVITY SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- San — PROPOSED GRAVITY SANITARY SEWER
- PROPOSED PUMP STATION
- FM — PROPOSED FORCE MAIN

NOTE:
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SCALE IN FEET
400 200 0 400

Rev. No.	Date	Description
1	10/8/14	General Revisions

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #1 : DOLINGTON AREA
GRAVITY SEWER & PUMP STATION TO "GRAY TRACT" WWTP

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE

Upper Makefield Township, Bucks County, Pennsylvania

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(215) 340-0600

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		Checked By: KGK		

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TABLE 8
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
CONVENTIONAL GRAVITY SEWER & PUMP STATION TO GTWWTP
ALTERNATIVE #1
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
1	8" PVC Main in State Highways, including Excavation and Backfill	3,500	L.F.	$130.00	$455,000.00
2	8" PVC Main in Township Streets, including Excavation and Backfill	1,455	L.F.	$125.00	$181,875.00
3	8" PVC Main in Easements, including Excavation and Backfill	220	L.F.	$80.00	$17,600.00
4	6" PVC Service Laterals	1,645	L.F.	$75.00	$123,375.00
5	PVC Tees	59	Ea.	$115.00	$6,785.00
6	Manholes - Standard	21	Ea.	$3,100.00	$65,100.00
7	Manholes - Watertight	2	Ea.	$3,400.00	$6,800.00
8	Sanitary Sewage Pump Station	3	Ea.	$200,000.00	$600,000.00
9	2-1/2" PVC Force Main in State Highways	955	L.F.	$50.00	$47,750.00
10	2-1/2" PVC Force Main in Easements	45	L.F.	$33.00	$1,485.00
11	3" PVC Force Main in State Highways	8,775	L.F.	$52.00	$456,300.00
12	3" PVC Force Main in Township Streets	705	L.F.	$48.00	$33,840.00
13	3" PVC Force Main in Easements	500	L.F.	$34.00	$17,000.00
14	Air Release Chambers	2	Ea.	$5,000.00	$10,000.00
15	Clean Out Chambers	1	Ea.	$5,600.00	$5,600.00
16	Odor Abatement System	L.S.	L.S.	$50,000.00	$50,000.00
17	Stream Crossings	1	Ea.	$2,500.00	$2,500.00
18	Connection to Existing Sewer System Manhole	1	Ea.	$1,500.00	$1,500.00
19	State Highway Restoration (3)	7,900	S.Y.	$60.00	$474,000.00
20	Township Road Restoration (3)	1,400	S.Y.	$47.00	$65,800.00
21	Unimproved Easement Restoration	1,300	S.Y.	$5.00	$6,500.00

TABLE 8
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
CONVENTIONAL GRAVITY SEWER & PUMP STATION TO GTWWTP
ALTERNATIVE #1
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
				ESTIMATED CONSTRUCTION COST	$2,628,810.00
				10% CONTINGENCIES	$262,880.00
				SUBTOTAL	$2,891,690.00
				25%± ENGINEERING/LEGAL/INSPECTION	$722,925.00
				TOTAL (4)	**$3,614,615.00**

NOTES

(1) Unit costs based upon July 2013 construction cost data.

(2) Preliminary construction cost estimates based upon conceptual design layout and are subject to change with preparation of detailed engineering plans.

(3) Restoration costs based upon standard PennDOT and Township trench and roadway restoration criteria.

(4) Preliminary estimated project cost does not include easement acquisition costs.

LEGEND

- EXISTING SANITARY MANHOLE
- EXISTING GRAVITY SANITARY SEWER
- FM — PROPOSED FORCE MAIN

NEEDS AREA BOUNDARY

LPSS FORCE MAIN TO "GRAY TRACT WWTP"

NOTE:
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SCALE IN FEET
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FIGURE 21

Rev. No.	Date	Description
1	10/8/14	General Revisions

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #2 : DOLINGTON AREA
LOW PRESSURE SEWER SYSTEM TO "GRAY TRACT" WWTP

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE

Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

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		Checked By: KGK		

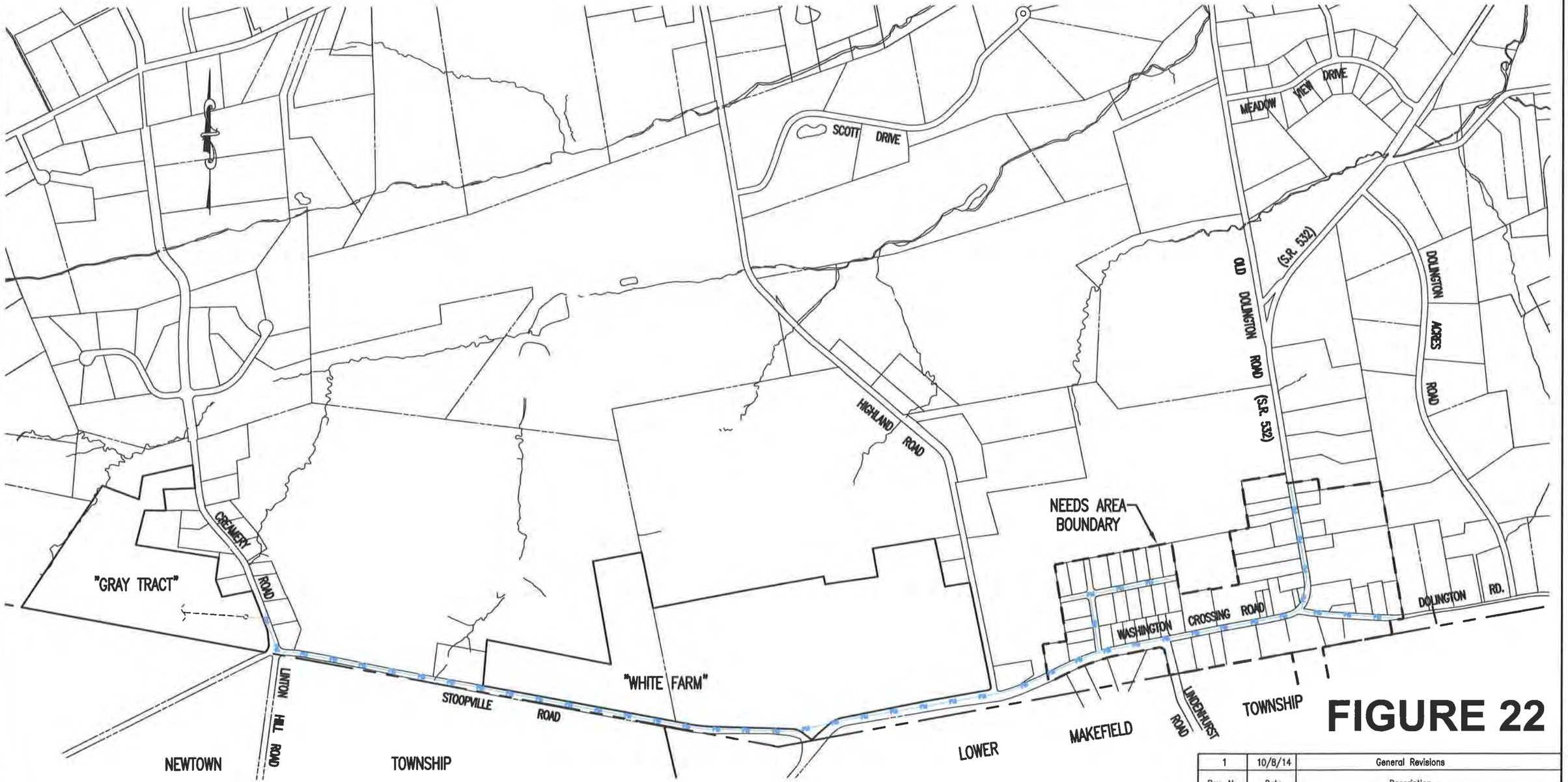

FIGURE 22

LEGEND

- EXISTING SANITARY MANHOLE
- EXISTING GRAVITY SANITARY SEWER
- FM — PROPOSED FORCE MAIN

NOTE:
EXISTING TOPOGRAPHIC INFORMATION SHOWN HEREON TAKEN FROM AERIAL BASE MAPPING PREPARED BY GILMORE & ASSOCIATES, INC.

SCALE IN FEET
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Rev. No.	Date	Description
1	10/8/14	General Revisions

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #2 : DOLINGTON AREA
LOW PRESSURE SEWER SYSTEM TO "GRAY TRACT" WWTP

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE

Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

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TABLE 9
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
LOW PRESSURE SEWER SYSTEM TO GTWWTP
ALTERNATIVE #2
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
1	3" PVC Force Main in State Highways	9,060	L.F.	$52.00	$471,120.00
2	2-1/2" PVC Force Main in State Highways	685	L.F.	$50.00	$34,250.00
3	2" PVC Force Main in State Highways	660	L.F.	$47.00	$31,020.00
4	1-1/2" PVC Force Main in State Highways	425	L.F.	$44.00	$18,700.00
5	3" PVC Force Main in Township Streets	85	L.F.	$48.00	$4,080.00
6	2-1/2" PVC Force Main in Township Streets	490	L.F.	$46.00	$22,540.00
7	2" PVC Force Main in Township Streets	545	L.F.	$44.00	$23,980.00
8	1-1/2" PVC Force Main in Township Streets	290	L.F.	$42.00	$12,180.00
9	3" PVC Force Main in Easements	360	L.F.	$34.00	$12,240.00
10	1-1/4" PVC Individual Force Main Laterals	1,645	L.F.	$46.00	$75,670.00
11	Lateral Assemblies	59	Ea.	$675.00	$39,825.00
12	Flushing Connections	9	Ea.	$1,750.00	$15,750.00
13	Air Release Chambers	6	Ea.	$5,000.00	$30,000.00
14	Clean Out Chambers	4	Ea.	$5,600.00	$22,400.00
15	Odor Abatement System	L.S.	L.S.	$50,000.00	$50,000.00
16	Stream Crossings	1	Ea.	$2,500.00	$2,500.00
17	Connection to Existing Sewer System Manhole	1	Ea.	$1,500.00	$1,500.00
18	State Highway Restoration (3)	6,900	S.Y.	$60.00	$414,000.00
19	Township Road Restoration (3)	900	S.Y.	$47.00	$42,300.00
20	Unimproved Area Restoration	600	S.Y.	$5.00	$3,000.00

TABLE 9
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
LOW PRESSURE SEWER SYSTEM TO GTWWTP

ALTERNATIVE #2

PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
				ESTIMATED CONSTRUCTION COST	$1,327,055.00
				10% CONTINGENCIES	$132,705.00
				SUBTOTAL	$1,459,760.00
				25%± ENGINEERING/LEGAL/INSPECTION	$364,940.00
				TOTAL (4)	**$1,824,700.00**

NOTES

(1) Unit costs based upon July 2013 construction cost data.

(2) Preliminary construction cost estimates based upon conceptual design layout and are subject to change with preparation of detailed engineering plans.

(3) Restoration costs based upon standard PennDOT and Township trench and roadway restoration criteria.

(4) Preliminary estimated project cost does not include easement acquisition costs.

LEGEND

- EXISTING SANITARY MANHOLE
- EXISTING GRAVITY SANITARY SEWER
- FM — PROPOSED FORCE MAIN

NEEDS AREA BOUNDARY

LPSS FORCE MAIN TO "WHITE FARM" COMMUNITY DISPOSAL SYSTEM

NOTE:
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SCALE IN FEET
100 50 0 100

FIGURE 23

Rev. No.	Date	Description
1	10/8/14	General Revisions

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #3 : DOLINGTON AREA
LOW PRESSURE SEWER SYSTEM TO "WHITE FARM" COMMUNITY DISPOSAL SYSTEM

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE

Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

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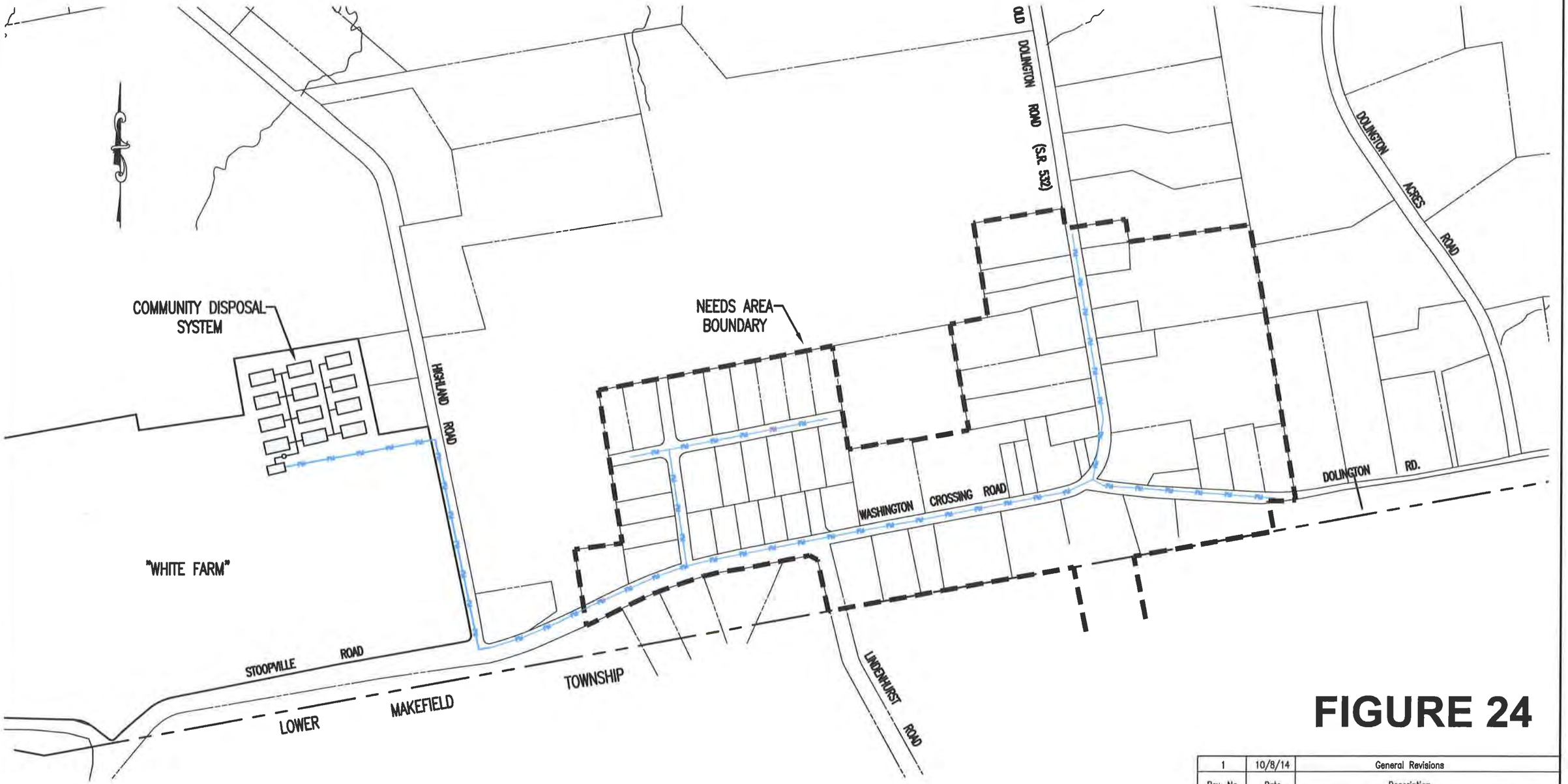

FIGURE 24

LEGEND

- ○ EXISTING SANITARY MANHOLE
- EXISTING GRAVITY SANITARY SEWER
- FM PROPOSED FORCE MAIN

NOTE:
EXISTING TOPOGRAPHIC INFORMATION SHOWN HEREON TAKEN FROM AERIAL BASE MAPPING PREPARED BY GILMORE & ASSOCIATES, INC.

SCALE IN FEET
400 200 0 400

Rev. No.	Date	Description
1	10/8/14	General Revisions

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #3 : DOLINGTON AREA
LOW PRESSURE SEWER SYSTEM TO "WHITE FARM" COMMUNITY DISPOSAL SYSTEM

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE

Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

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		Checked By: KGK		

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TABLE 10
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
LOW PRESSURE SEWER SYSTEM TO "WHITE FARM"
COMMUNITY DISPOSAL SYSTEM
ALTERNATIVE #3
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
1	3" PVC Force Main in State Highways	2,670	L.F.	$52.00	$138,840.00
2	2-1/2" PVC Force Main in State Highways	685	L.F.	$50.00	$34,250.00
3	2" PVC Force Main in State Highways	660	L.F.	$47.00	$31,020.00
4	1-1/2" PVC Force Main in State Highways	425	L.F.	$44.00	$18,700.00
5	3" PVC Force Main in Township Streets	925	L.F.	$48.00	$44,400.00
6	2-1/2" PVC Force Main in Township Streets	490	L.F.	$46.00	$22,540.00
7	2" PVC Force Main in Township Streets	545	L.F.	$44.00	$23,980.00
8	1-1/2" PVC Force Main in Township Streets	290	L.F.	$42.00	$12,180.00
9	3" PVC Force Main in Easements	745	L.F.	$34.00	$25,330.00
10	1-1/4" PVC Individual Force Main Laterals	1,645	L.F.	$46.00	$75,670.00
11	Lateral Assemblies	59	Ea.	$675.00	$39,825.00
12	Flushing Connections	9	Ea.	$1,750.00	$15,750.00
13	Air Release Chambers	5	Ea.	$5,000.00	$25,000.00
14	Clean Out Chambers	4	Ea.	$5,600.00	$22,400.00
15	Connection to Existing Disposal System	1	Ea.	$2,000.00	$2,000.00
16	State Highway Restoration (3)	2,850	S.Y.	$60.00	$171,000.00
17	Township Road Restoration (3)	1,450	S.Y.	$47.00	$68,150.00
18	Unimproved Area Restoration	1,250	S.Y.	$5.00	$6,250.00

TABLE 10
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
LOW PRESSURE SEWER SYSTEM TO "WHITE FARM"
COMMUNITY DISPOSAL SYSTEM
ALTERNATIVE #3
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
19	Community Sewage Disposal System				
	a. Package Treatment System	1	Ea.	$1,260,000.00	$1,260,000.00
	b. Dosing System	1	Ea.	$152,500.00	$152,500.00
	c. Community Sand Mounds	12	Ea.	$52,500.00	$630,000.00
	d. Electric Service	1	Ea.	$53,000.00	$53,000.00
	e. Emergency Generator	1	Ea.	$53,000.00	$53,000.00
	f. Site Improvements/Landscaping	1	Ea.	$164,000.00	$164,000.00
				ESTIMATED CONSTRUCTION COST	$3,089,785.00
				10% CONTINGENCIES	$308,980.00
				SUBTOTAL	$3,398,765.00
				25%± ENGINEERING/LEGAL/INSPECTION	$849,690.00
				TOTAL (4)	**$4,248,455.00**

NOTES

(1) Unit costs based upon July 2013 construction cost data.

(2) Preliminary construction cost estimates based upon conceptual design layout and are subject to change with preparation of detailed engineering plans.

(3) Restoration costs based upon standard PennDOT and Township trench and roadway restoration criteria.

(4) Preliminary estimated project cost does not include land and/or easement acquisition costs.

Alternative No. 4: Conventional Gravity Sanitary Sewer System and Pump Station to the Heritage Hills WWTP

As shown on Figures 25 and 26, this alternative includes the construction of a gravity sanitary sewer collection system within the Dolington Area, which would convey wastewater flows to three new pump stations situated at strategic locations within the Needs Area. Wastewater would then be conveyed from the pump stations to the Heritage Hills WWTP via force main. The Heritage Hills WWTP has sufficient excess capacity to accommodate the projected wastewater flows from the Dolington Area.

All of the sanitary sewerage facilities that would be constructed in conjunction with this alternative that are located within public rights-of-way and/or easements would be owned/operated/maintained by the Township. All facilities that would be installed on private properties would be owned/maintained by the respective property owners.

Table 11 summarizes the estimated cost for the public sanitary sewer collection/conveyance facilities that would be required in conjunction with this alternative. The costs address the new gravity collection system, three pump stations and significant length of force main to the Heritage Hills WWTP. The total estimated Project Cost for this alternative is approximately $4,126,245.00.

Alternative No. 5: On-Lot Treatment Systems/Effluent Collection & Conveyance System with Stream Discharge Effluent Disposal

As shown on Figure 27, this alternative includes the installation of an on-lot treatment system on each property that would provide secondary treatment of the effluent discharged from the onsite septic tank. The on-lot treatment system effluent would discharge to an effluent collection system within the Dolington Area and flow to a proposed flow metering/sampling/effluent disinfection chamber that would be located within the unimproved portion of the existing Balderston Drive right-of-way. Flow discharged to the aforementioned chamber would subsequently outfall to an existing drainage way at the terminus of the right-of-way, which is an unnamed tributary of Houghs Creek.

The PA DEP has recently issued Preliminary Treatment Requirements (“PTR”) dictating the effluent quality requirements that must be met by the on-lot treatment systems proposed under this alternative (Refer to Appendix F). Upper Makefield Township has received confirmation from manufacturers of potential on-lot treatment system equipment that would be used in conjunction with this alternative indicating that the PA DEP PTR effluent quality criteria can be satisfied which would make this a viable long-term sewage disposal alternative (Refer to Appendix G).

All of the sanitary sewerage facilities that would be constructed in conjunction with this alternative that are located within public rights-of-way and/or easements would be owned/operated/maintained by the Township. All of the facilities that would be installed on private properties would be owned/maintained by the respective property owners, and would also be subject to a Maintenance/Oversight Agreement with the Township to ensure the facilities will be properly maintained. The Maintenance/Oversight Agreement would include requirements for an annual treatment system service contract with a manufacturer authorized service contractor, as well as

requirements for routine on-lot treatment system effluent sampling/analysis to ensure continuing proper performance of the on-lot treatment systems.

Table 12 summarizes the estimated cost for the proposed public sanitary sewer collection/conveyance/disinfection/monitoring facilities that would be required in conjunction with this alternative. This cost addresses the common elements or components of the proposed effluent collection system. The total estimated Project Cost for this alternative is approximately $1,036,000.00.

LEGEND

- EXISTING SANITARY MANHOLE
- EXISTING GRAVITY SANITARY SEWER
- PROPOSED SANITARY MANHOLE
- San — PROPOSED GRAVITY SANITARY SEWER
- PROPOSED PUMP STATION
- FM — PROPOSED FORCE MAIN

FORCE MAIN TO "HERITAGE HILLS" WWTP

NEEDS AREA BOUNDARY

WASHINGTON CROSSING ROAD

DOLINGTON ROAD

BALDERSTON DRIVE

TOWERVIEW DRIVE

LINDENHURST ROAD

SHERWOOD DRIVE

AMBER DRIVE

POWDERHORN DR.

LOWER MAKEFIELD TOWNSHIP

UPPER MAKEFIELD TOWNSHIP

NOTE:
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SCALE IN FEET
100 50 0 100

FIGURE 25

Rev. No.	Date	Description
1	10/8/14	General Revisions

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #4 : DOLINGTON AREA
GRAVITY SEWER & PUMP STATION TO "HERITAGE HILLS" WWTP

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE

Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

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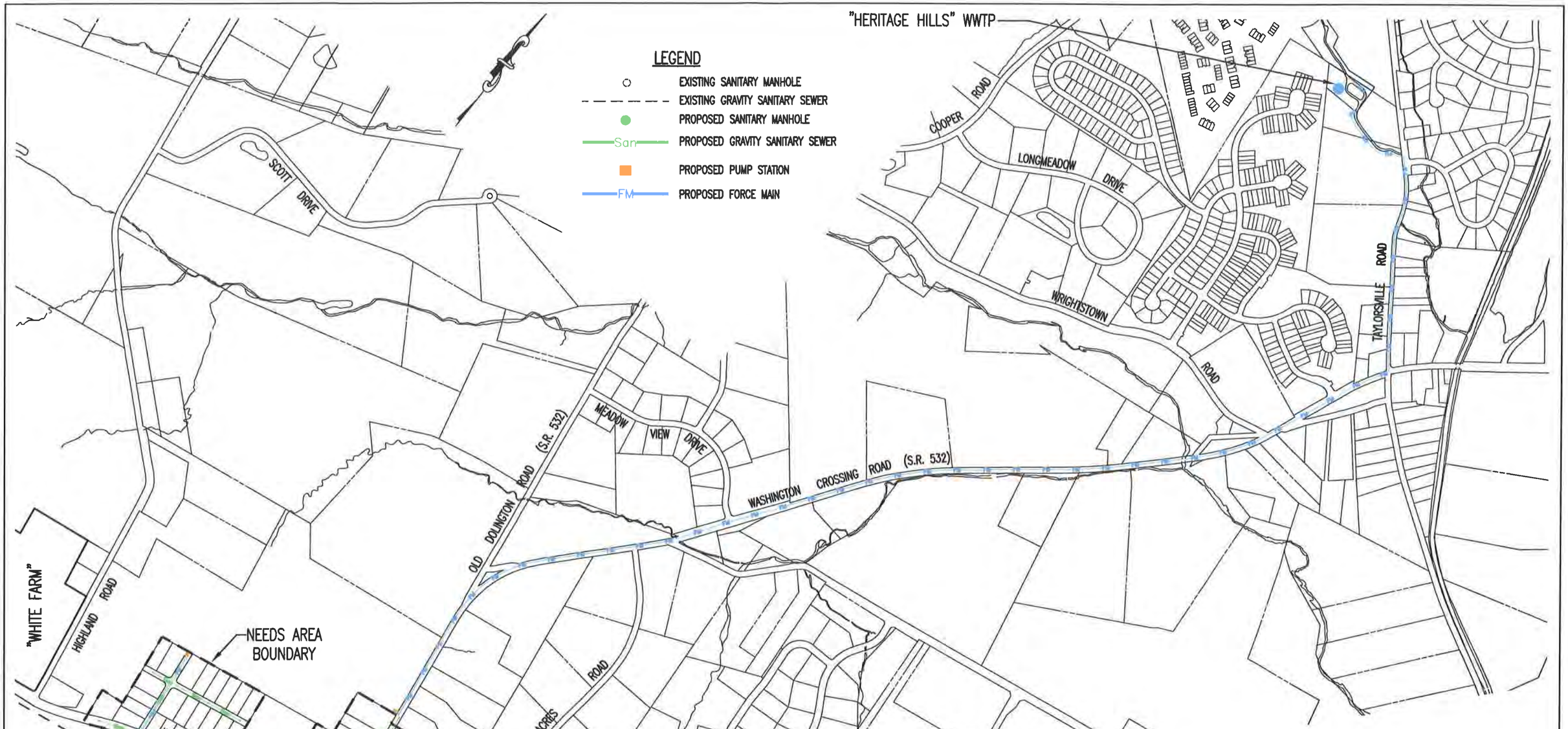

NOTE:
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SCALE IN FEET
400 200 0 400

FIGURE 26

Rev. No.	Date	Description
1	10/8/14	General Revisions

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #4 : DOLINGTON AREA
GRAVITY SEWER & PUMP STATION TO "HERITAGE HILLS" WWTP

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE

Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

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		Checked By: KGK		

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TABLE 11
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
CONVENTIONAL GRAVITY SEWER & PUMP STATION TO HHWWTP
ALTERNATIVE #4
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
1	8" PVC Main in State Highways, including Excavation and Backfill	3,500	L.F.	$130.00	$455,000.00
2	8" PVC Main in Township Streets, including Excavation and Backfill	1,455	L.F.	$125.00	$181,875.00
3	8" PVC Main in Easements, including Excavation and Backfill	220	L.F.	$80.00	$17,600.00
4	6" PVC Service Laterals	1,645	L.F.	$75.00	$123,375.00
5	PVC Tees	59	Ea.	$115.00	$6,785.00
6	Manholes - Standard	21	Ea.	$3,100.00	$65,100.00
7	Manholes - Watertight	2	Ea.	$3,400.00	$6,800.00
8	Sanitary Sewage Pump Station	3	Ea.	$200,000.00	$600,000.00
9	2-1/2" PVC Force Main in State Highways	1,275	L.F.	$50.00	$63,750.00
10	2-1/2" PVC Force Main in Township Streets	620	L.F.	$46.00	$28,520.00
11	2-1/2" PVC Force Main in Easements	140	L.F.	$33.00	$4,620.00
12	3" PVC Force Main in State Highways	12,085	L.F.	$52.00	$628,420.00
13	3" PVC Force Main in Easements	1,065	L.F.	$34.00	$36,210.00
14	Air Release Chambers	4	Ea.	$5,000.00	$20,000.00
15	Clean Out Chambers	5	Ea.	$5,600.00	$28,000.00
16	Odor Abatement System	L.S.	L.S.	$50,000.00	$50,000.00
17	Stream Crossings	4	Ea.	$2,500.00	$10,000.00
18	Connection to Existing Sewer System @ WWTP	1	Ea.	$2,000.00	$2,000.00
19	State Highway Restoration (3)	10,000	S.Y.	$60.00	$600,000.00
20	Township Road Restoration (3)	1,300	S.Y.	$47.00	$61,100.00

TABLE 11
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
CONVENTIONAL GRAVITY SEWER & PUMP STATION TO HHWWTP
ALTERNATIVE #4
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
21	Unimproved Easement Restoration	2,350	S.Y.	$5.00	$11,750.00
				ESTIMATED CONSTRUCTION COST	$3,000,905.00
				10% CONTINGENCIES	$300,090.00
				SUBTOTAL	$3,300,995.00
				25%± ENGINEERING/LEGAL/INSPECTION	$825,250.00
				TOTAL (4)	**$4,126,245.00**

NOTES

(1) Unit costs based upon July 2013 construction cost data.

(2) Preliminary construction cost estimates based upon conceptual design layout and are subject to change with preparation of detailed engineering plans.

(3) Restoration costs based upon standard PennDOT and Township trench and roadway restoration criteria.

(4) Preliminary estimated project cost does not include easement acquisition costs.

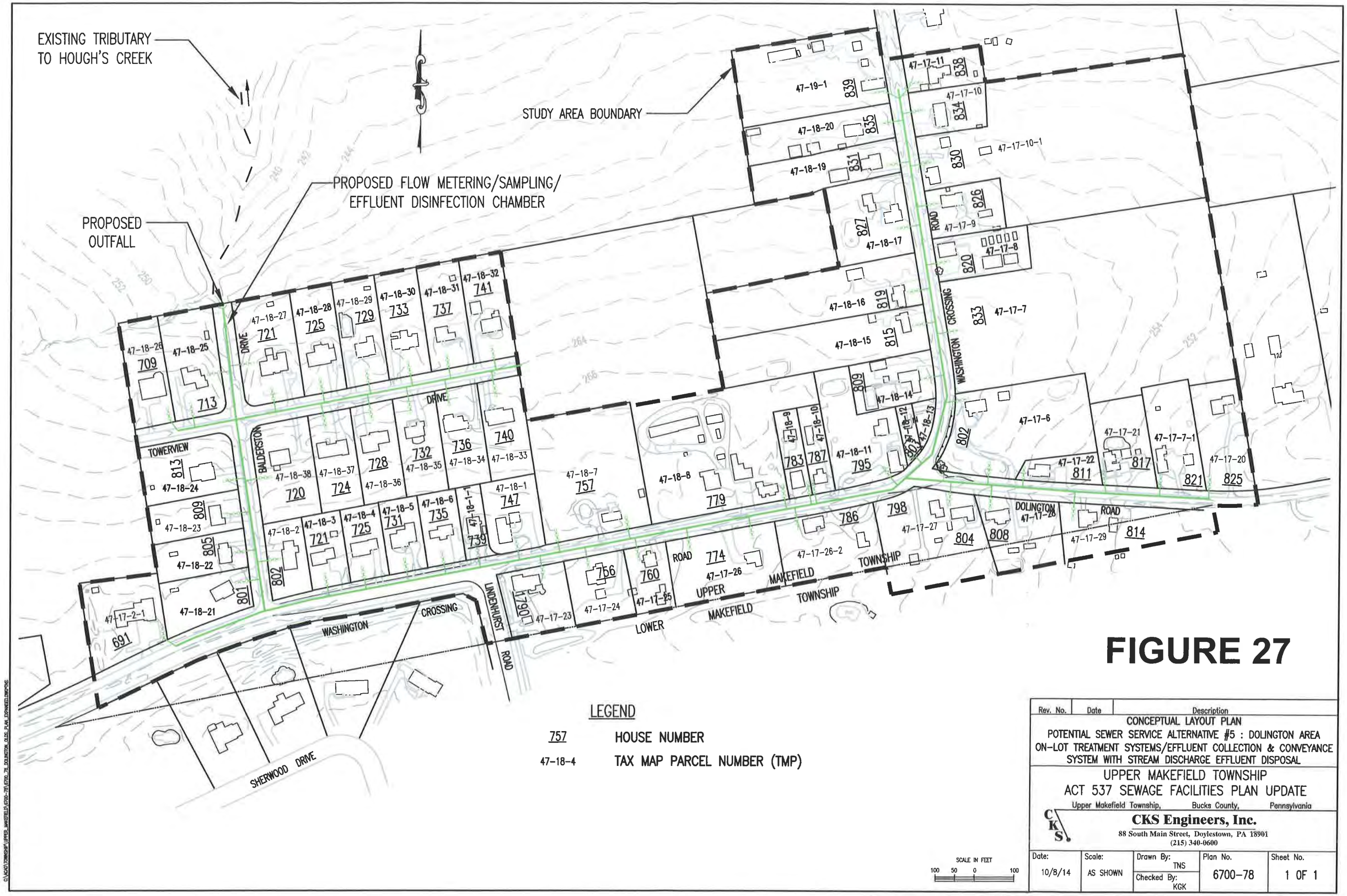

FIGURE 27

LEGEND

757 HOUSE NUMBER

47-18-4 TAX MAP PARCEL NUMBER (TMP)

SCALE IN FEET
100 50 0 100

Rev. No.	Date	Description

CONCEPTUAL LAYOUT PLAN
POTENTIAL SEWER SERVICE ALTERNATIVE #5 : DOLINGTON AREA
ON-LOT TREATMENT SYSTEMS/EFFLUENT COLLECTION & CONVEYANCE SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

Date:	Scale:	Drawn By:	Plan No.	Sheet No.
10/8/14	AS SHOWN	TNS	6700-78	1 OF 1
		Checked By: KGK		

TABLE 12
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
ON-LOT TREATMENT SYSTEMS/EFFLUENT COLLECTION & CONVEYANCE SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL
ALTERNATIVE #5
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
1	3" PVC Force Main in State Highway	1,725	L.F.	$52.00	$89,700.00
2	3" PVC Force Main in Township Street	580	L.F.	$48.00	$27,840.00
3	3" PVC Force Main in Unimproved Township Right-of-Way	210	L.F.	$34.00	$7,140.00
4	2-1/2" PVC Force Main in State Highway	390	L.F.	$50.00	$19,500.00
5	2" PVC Force Main in State Highway	480	L.F.	$47.00	$22,560.00
6	2" PVC Force Main in Township Street	645	L.F.	$44.00	$28,380.00
7	1-1/2" PVC Force Main in State Highway	465	L.F.	$44.00	$20,460.00
8	1-1/2" PVC Force Main in Township Street	940	L.F.	$42.00	$39,480.00
9	1-1/4" PVC Individual Force Main Laterals	1,830	L.F.	$46.00	$84,180.00
10	Lateral Assemblies	61	Ea.	$675.00	$41,175.00
11	Flushing Connections	8	Ea.	$1,750.00	$14,000.00
12	Air Release Chambers	1	Ea.	$5,000.00	$5,000.00
13	Clean Out Chambers	2	Ea.	$5,600.00	$11,200.00
14	State Highway Restoration (3)	1,950	S.Y.	$60.00	$117,000.00
15	Township Road Restoration (3)	1,370	S.Y.	$47.00	$64,390.00
16	Unimproved Area Restoration	350	S.Y.	$5.00	$1,750.00

TABLE 12
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
ON-LOT TREATMENT SYSTEMS/EFFLUENT COLLECTION &
CONVEYANCE SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL
ALTERNATIVE #5
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
17	Flow Metering/Sampling/Effluent Disinfection Chamber				
	a. Precast Concrete Vault	1	Ea.	$35,000.00	$35,000.00
	b. Mag Meter	1	Ea.	$15,000.00	$15,000.00
	c. U.V. Disinfection System	1	Ea.	$58,500.00	$58,500.00
	d. Electric Service	1	Ea.	$15,000.00	$15,000.00
	e. Effluent Sampler	1	Ea.	$10,000.00	$10,000.00
	f. Site Improvements	1	Ea.	$26,245.00	$26,245.00
				ESTIMATED CONSTRUCTION COST	$753,500.00
				10% CONTINGENCIES	$75,350.00
				SUBTOTAL	$828,850.00
				25%± ENGINEERING/LEGAL/INSPECTION	$207,150.00
				TOTAL (4)	**$1,036,000.00**

NOTES

(1) Unit costs based upon July 2013 or September 2014 construction cost data.

(2) Preliminary construction cost estimates based upon conceptual design layout and are subject to change with preparation of detailed engineering plans.

(3) Restoration costs based upon standard PennDOT and Township trench and roadway restoration criteria.

(4) Preliminary estimated project cost does not include land and/or easement acquisition costs.

Alternative No. 6: STEP System/Centralized Treatment System with Stream Discharge Effluent Disposal

As shown on Figure 28, this alternative includes the installation of a Septic Tank Effluent Pumping (STEP) System on each property, which would discharge to a wastewater collection system within the Dolington Area and flow to a centralized secondary treatment system located within the unimproved portion of the existing Balderston Drive right-of-way. The centralized secondary treatment system would outfall to the existing unnamed tributary of Houghs Creek located at the terminus of the right-of-way and would be subject to the PTR that was recently issued by the PA DEP (Refer to Appendix F), similar to the on-lot treatment systems proposed under Alternative No. 5 above.

All of the sanitary sewerage facilities that would be constructed in conjunction with this alternative that are located within public rights-of-way and/or easements would be owned/operated/maintained by the Township. All of the facilities that would be installed on private properties would be owned/maintained by the respective property owners, and would also be subject to a Maintenance/Oversight Agreement with the Township to ensure the facilities will be properly maintained.

Table 13 summarizes the estimated cost for the proposed public sanitary sewer collection/conveyance/treatment facilities that would be required in conjunction with this alternative. This cost addresses the common elements or components of the proposed wastewater collection/conveyance system, as well as the centralized secondary treatment system. The total estimated Project Cost for this alternative is approximately $2,050,900.00.

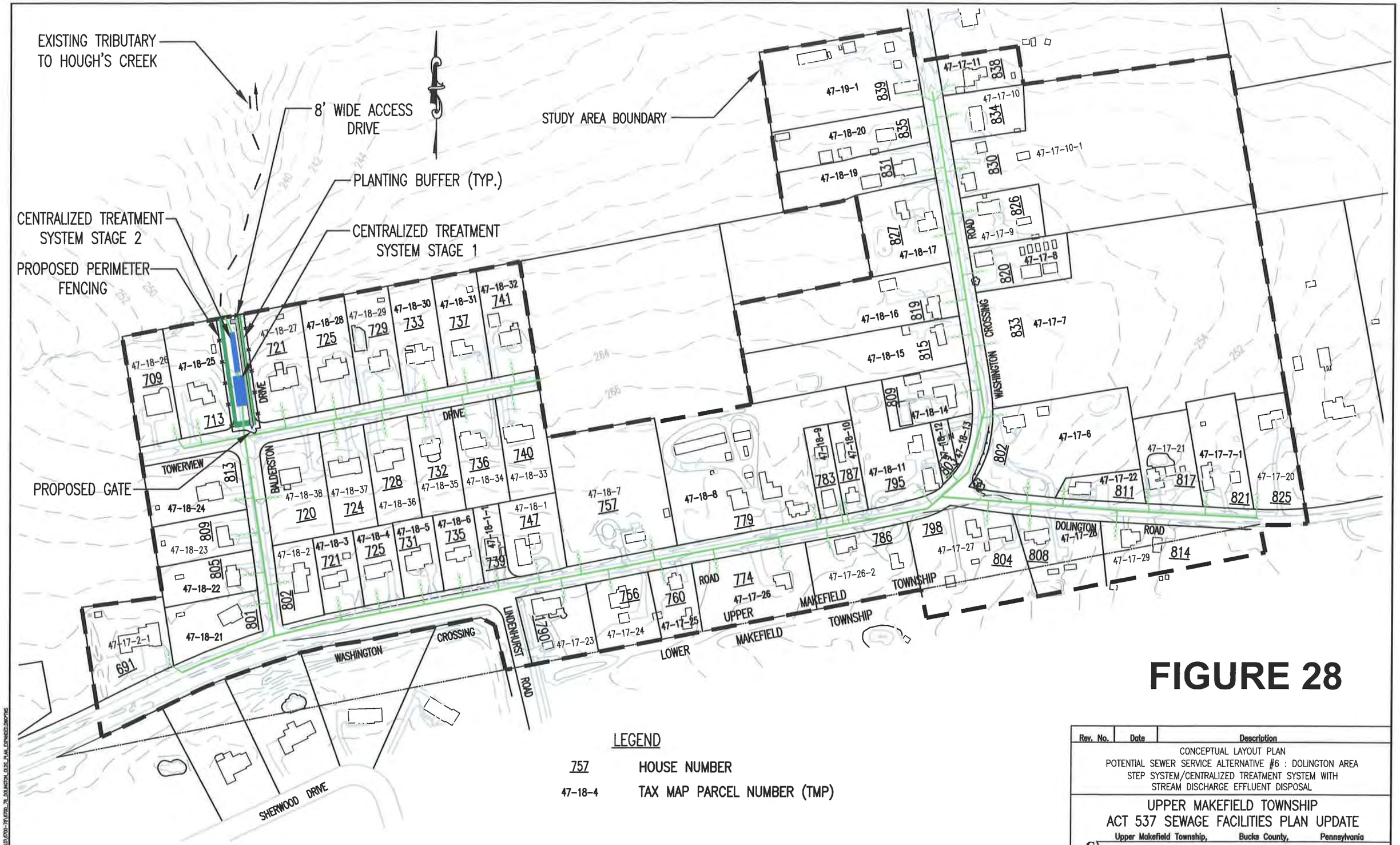

FIGURE 28

LEGEND

757 HOUSE NUMBER

47-18-4 TAX MAP PARCEL NUMBER (TMP)

SCALE IN FEET
100 50 0 100

Rev. No.	Date	Description
		CONCEPTUAL LAYOUT PLAN POTENTIAL SEWER SERVICE ALTERNATIVE #6 : DOLINGTON AREA STEP SYSTEM/CENTRALIZED TREATMENT SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
Upper Makefield Township, Bucks County, Pennsylvania

CKS Engineers, Inc.
88 South Main Street, Doylestown, PA 18901
(215) 340-0600

Date:	Scale:	Drawn By:	Plan No.	Sheet No.
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		Checked By: KGK		

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TABLE 13
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
STEP SYSTEM/CENTRALIZED TREATMENT SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL
ALTERNATIVE #6
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
1	3" PVC Force Main in State Highway	1,725	L.F.	$52.00	$89,700.00
2	3" PVC Force Main in Township Street	545	L.F.	$48.00	$26,160.00
3	2-1/2" PVC Force Main in State Highway	390	L.F.	$50.00	$19,500.00
4	2" PVC Force Main in State Highway	480	L.F.	$47.00	$22,560.00
5	2" PVC Force Main in Township Street	645	L.F.	$44.00	$28,380.00
6	1-1/2" PVC Force Main in State Highway	465	L.F.	$44.00	$20,460.00
7	1-1/2" PVC Force Main in Township Street	940	L.F.	$42.00	$39,480.00
8	1-1/4" PVC Individual Force Main Laterals	1,830	L.F.	$46.00	$84,180.00
9	Lateral Assemblies	61	Ea.	$675.00	$41,175.00
10	Flushing Connections	8	Ea.	$1,750.00	$14,000.00
11	Air Release Chambers	1	Ea.	$5,000.00	$5,000.00
12	Clean Out Chambers	2	Ea.	$5,600.00	$11,200.00
13	State Highway Restoration (3)	1,950	S.Y.	$60.00	$117,000.00
14	Township Road Restoration (3)	1,345	S.Y.	$47.00	$63,215.00
15	Centralized Treatment System				
	a. Package Treatment System	1	Ea.	$739,000.00	$739,000.00
	b. Electric Service	1	Ea.	$53,000.00	$53,000.00
	c. Emergency Generator	1	Ea.	$53,000.00	$53,000.00
	d. Site Improvements/ Landscaping	1	Ea.	$64,500.00	$64,500.00

TABLE 13
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
STEP SYSTEM/CENTRALIZED TREATMENT SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL
ALTERNATIVE #6
PRELIMINARY ESTIMATED PROJECT COST

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT COST (1)	TOTAL COST (2)
				ESTIMATED CONSTRUCTION COST	$1,491,510.00
				10% CONTINGENCIES	$149,151.00
				SUBTOTAL	$1,640,661.00
				25%± ENGINEERING/LEGAL/INSPECTION	$410,239.00
				TOTAL (4)	**$2,050,900.00**

NOTES

(1) Unit costs based upon July 2013 or October 2014 construction cost data.

(2) Preliminary construction cost estimates based upon conceptual design layout and are subject to change with preparation of detailed engineering plans.

(3) Restoration costs based upon standard PennDOT and Township trench and roadway restoration criteria.

(4) Preliminary estimated project cost does not include land and/or easement acquisition costs.

Table 14 contained within this Plan Update provides a summary of the potential long-term sewage disposal alternatives developed for the Dolington Area. Additionally, the aforementioned table provides a breakdown of the total cost that could potentially be incurred by the owner of a property containing a typical single-family dwelling within the Needs Area under each alternative. The cost breakdown includes estimates of Special Purpose Tapping Fees on an Equivalent Dwelling Unit (EDU) basis considering the total number of projected EDUs within the Dolington Area, estimated on-lot costs, and estimated on-lot sewage disposal system abandonment costs. The actual basis of Special Purpose Tapping Fees would need to be determined by the Township prior to the implementation of the selected long-term sewage disposal system alternative.

All of the alternatives discussed above are viable options for addressing the long-tem sewage disposal needs within the Dolington Area, but there is a wide variation in potential costs that would be imposed on a typical owner of a single-family residential property ranging from approximately $37,000 to $72,000. The projected costs for the relatively higher cost alternatives can not be reasonably imposed on the affected property owners. However, there are three potential alternatives at the “lower end” of the total per property cost range that were considered by Township Officials, including;

- Alternative #2; Low Pressure Sewer System to Gray Tract WWTP
- Alternative #5; On-Lot Treatment Systems/Effluent Collection & Conveyance System with Stream Discharge Effluent Disposal
- Alternative #6; STEP System/Centralized Treatment System with Stream Discharge Effluent Disposal.

Upon considering such factors as detailed within Table 15 of this Plan Update, including public and private implementation costs, ongoing operation and maintenance costs/responsibilities, anticipated reliability/performance, and consistency with prior Township planning/policies, it was determined that Alternative #6; STEP System/Centralized Treatment System with Stream Discharge Effluent Disposal would be the preferred option to address the long-term sewage disposal needs of the Dolington Area.

During the short-term (5 Year) planning period of this Plan Update, the Township is committed to continuing to work to refine the preferred long-term sewage disposal alternative in an effort to reduce currently projected costs that would be imposed on the affected property owners. Subsequently, during the initial stage of the long-term (10 Year) planning period of the Plan Update, the Township will re-assess the currently identified long-term sewage disposal alternatives, identify any new alternatives that may be available based upon changes in current conditions and/or technology that may potentially occur over the short-term planning period, and initiate the administrative, legal, engineering and procedural efforts associated with the implementation of the selected long-term sewage disposal alternative for the Dolington Area.

TABLE 14

UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA PUBLIC/COMMUNITY SEWER SYSTEM SERVICE ALTERNATIVES
COST BREAKDOWN SUMMARY

COST CATEGORY	POTENTIAL SEWER SERVICE ALTERNATIVE					
	#1 CONVENTIONAL GRAVITY SEWER & PUMP STATION TO GTWWTP (1)	**#2** LOW PRESSURE SEWER SYSTEM TO GTWWTP (1)	**#3** LOW PRESSURE SEWER SYSTEM TO WHITE FARM COMMUNITY SEWAGE DISPOSAL SYSTEM (1)	**#4** CONVENTIONAL GRAVITY SEWER & PUMP STATION TO HERITAGE HILLS WWTP (1)	**#5** ON-LOT TREATMENT SYSTEMS/EFFLUENT COLLECTION & CONVEYANCE SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL	**#6** STEP SYSTEM/ CENTRALIZED TREATMENT SYSTEM WITH STREAM DISCHARGE EFFLUENT DISPOSAL
Project Cost	$3,614,615.00	$1,824,700.00	$4,248,455.00	$4,126,245.00	$1,036,000.00	$2,050,900.00
Projected Capacity EDUs (2)	74	74	74	74	74	74
Special Purpose Tapping Fee (3)	$48,847.00	$24,659.00	$57,412.00	$55,760.00	$14,000.00	$27,715.00
On-Lot Costs (4)	$8,000.00	$13,500.00	$13,500.00	$8,000.00	$21,500.00	$9,500.00
OLDS Abandonment Cost (5)	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00
TOTAL COST PER SINGLE FAMILY RESIDENTIAL DWELLING CONNECTION (6)	$58,047.00	$39,359.00	$72,112.00	$64,960.00	$36,700.00	$38,415.00

NOTES

(1) Project cost estimates and EDU projections for sewer service alternatives developed by CKS Engineers, Inc.

(2) Equivalent Dwelling Unit (EDU) – The estimated amount of capacity utilized by a single-family residential dwelling. A "residential dwelling" shall be a single-family dwelling and each family unit of a multi-family dwelling (apartment, condominium, twin, townhouse, etc.).

(3) Special Purpose Tapping Fee based upon total estimated project cost divided by estimated number of EDUs involved in public sewer service alternative.

(4) On-lot costs include the on-lot treatment system, STEP system, and/or plumbing costs associated with each alternative. Estimated average cost per property noted. Costs may vary based upon specific property requirements.

(5) OLDS abandonment costs include the pump-out of the existing septic tank and decommissioning of OLDS components in accordance with the requirements of the BCHD.

(6) Total estimated cost for typical single family residential connection.

TABLE 15
UPPER MAKEFIELD TOWNSHIP
ACT 537 SEWAGE FACILITIES PLAN UPDATE
DOLINGTON AREA
COMPARISON OF LEAST COSTLY LONG-TERM SEWAGE DISPOSAL ALTERNATIVES

ALTERNATIVE DESCRIPTION[1]	ESTIMATED COST FOR TYPICAL SINGLE-FAMILY RESIDENTIAL CONNECTION[1]			DEFERRED CONNECTION OPTION	OPERATION & MAINTENANCE REQUIREMENTS	ANNUAL OPERATION & MAINTENANCE COSTS PER CONNECTION					
	INITIAL COST	COST AT TIME OF CONNECTION	TOTAL COST			SERVICE CONTRACT[2]	ELECTRICITY[2]	CHEMICAL COSTS[2]	SEPTIC TANK PUMPING[3]	SEWER RENTAL[4]	TOTAL
#2 Low Pressure Sewer System to Gray Tract WWTP	$24,659	$14,700	$39,359	Partial	Minimal	$100	$15	N/A	N/A	$718	$833
#5 On-Lot Treatment Systems/ Effluent Collection & Conveyance System with Stream Discharge Effluent Disposal	$14,000	$22,700	$36,700	Yes	Moderate	$500	$100	$200	$110	$334	$1,244
#6 STEP System/Centralized Treatment System with Stream Discharge Effluent Disposal	$27,715	$10,700	$38,415	Yes	Minimal	$100	$15	N/A	$110	$1,250	$1,475

NOTES:

[1]Alternative/Estimated Costs taken from Table 14 of Upper Makefield Township, Draft Act 537 Sewage Facilities Plan Update, Dated October 15, 2014.

[2]Annual Operation and Maintenance Costs provided by manufacturers of proposed on-lot treatment systems.

[3]Septic Tank Maintenance Cost of $330 per service provided by Franc Environmental. Cost of triannual service requirement distributed annually for purposes of this comparison.

[4]Annual Sewer Rental Costs are estimated, based upon available representative data.

I. No-Action Alternative

As noted in the preceding sections of this Plan Update, the existing and future long-term sewage disposal needs of the majority of properties within Upper Makefield Township will continue to be met by the use of on-lot sewage disposal systems. To that end, the Township intends to continue managing the permitting, design, construction and operation/maintenance of OLDS consistent with the regulations contained within the OLDS Ordinance.

With regard to the sewage disposal needs areas that were previously identified by the BCHD as having potential problems with the functioning of OLDS, namely the Taylorsville and Dolington Areas, the Township has committed to implement supplemental measures to ensure both the short-term and long-term sewage disposal needs of the areas are addressed, which would preclude consideration of a No-Action Alternative as a viable option.

VI – EVALUATION OF ALTERNATIVES

Prior to implementation, the proposed sewage disposal alternatives must be evaluated for their consistency with existing plans and programs affecting Upper Makefield Township. The proposed alternatives should be consistent with the following objectives and policies:

- Comprehensive Water Quality Management Plans, COWAMP/208
- Chapter 94 Reporting
- Plans developed under the Clean Water Act, or the Water Quality Act of 1987
- County and Jointure Comprehensive Planning
- Anti-degradation requirements contained in Chapters 93, 95, 102 and the Clean Water Act
- State Water Plans
- Pennsylvania Prime Agricultural Land Policy
- County Stormwater Management Plans
- Wetland Protection
- Pennsylvania Natural Diversity Inventory
- Pennsylvania Historic Preservation Act

A.1 Comprehensive Water Quality Management Plans, COWAMP/208

In 1978, the Delaware Valley Regional Planning Commission (DVRPC) prepared the COWAMP/208 Water Quality Management Plan for Southeastern Pennsylvania. The purpose of this Plan was to develop an area-wide wastewater treatment management plan to protect surface and ground water from pollution.

The DVRPC's Plan identifies Upper Makefield Township as containing some areas experiencing on-lot sewage disposal system malfunctions. Per the DVRPC's Plan, steps have been taken to address the areas with malfunctioning systems by encouraging the non-sewered approach by first exhausting alternate land application methods, requiring system maintenance and water conservation devices, and promoting public education programs. If these methods fail to adequately address the areas with malfunctioning systems, additional long-term sewage disposal alternatives will need to be implemented. Therefore, the proposed short-term and long-term sewage disposal alternatives pertaining to the two Needs Areas identified in this Plan Update are consistent with the COWAMP/208 plan.

A.2 Chapter 94 Reporting

The Municipal Wasteload Management regulations under Chapter 94 require that municipalities that own and operate sewage facilities control the organic and hydraulic loading on their treatment plants. Permittees are required to submit annual reports to PADEP, which document the present flows and organic loading as compared to design flows and design loading of the treatment plant. Wastewater flows also must be projected for five years so that future overloads can be anticipated. In some cases, connections to a sanitary sewer collection system are denied until a treatment plant overload is resolved. Copies of the Township's 2013 Chapter 94 Reports for the Heritage Hills WWTP and the Dutchess Farms WWTP are included in Appendix A.

Chapter 94 reporting for the Heritage Hills WWTP indicates that the current (2013) wastewater flow through the plant is approximately twenty-eight percent (28%) of the design capacity of 172,544 gpd. Therefore, any proposed alternatives for connecting the Needs Areas identified in this Plan Update to the Heritage Hills WWTP will not create a hydraulic or organic overload at the treatment plant. To that end, any potential connection to the Heritage Hills WWTP is consistent with Chapter 94 requirements. The

distance from the Dutchess Farm WWTP to the identified Needs Areas is too great to make this a viable alternative.

A.3 Plans developed under the Clean Water Act, or the Water Quality Act of 1987

Plans developed under Title II of the Clean Water Act contain information on waste treatment management plans and practices which shall provide for: the application of the best practicable waste treatment technology before discharging into receiving waters, including reclaiming and recycling of water; the confined disposal of pollutants so they will not migrate to cause water or other environmental pollution; and the consideration of advanced waste treatment techniques.

For the majority of the Township, which relies solely on land-based sewage disposal methods, on-lot sewage disposal alternatives and the Township's OLDS Ordinance strive to protect both ground and surface water. The OLDS Ordinance primary purpose is to protect the Township's groundwater resources from contamination by requiring maintenance of on-lot sewage disposal systems and providing education to property owners that will aid in better management of their on-lot sewage disposal systems. In addition, the replacement or abandonment of suspected or confirmed malfunctioning on-lot sewage disposal systems will prevent further ground water degradation and protect existing groundwater quality.

For those proposed alternatives that will require connection to existing or future wastewater treatment facilities, or the installation of individual on-lot or centralized treatment systems, strict effluent requirements are and/or will be followed in order to protect the waters of the Commonwealth. The potential application of advanced waste treatment techniques will be assessed for any new public or private treatment facility. To that end, proposed treatment facilities alternatives will be consistent with the Water Quality Act of 1987.

A.4 County and Jointure Comprehensive Planning

The Bucks County Comprehensive Plan (BCCP) of 2011 discusses growth, economy, community facilities, recreation, and infrastructure within Bucks County. The BCCP states that surface and ground water resources shall be protected from point and non-point source pollutants. The Plan promotes ground water recharge by use of on-lot sewage disposal systems as opposed to stream discharge systems and wastewater treatment facilities. The BCCP recommends on-lot sewage disposal systems for rural regions of the county. The proposed alternatives for the Needs Areas identified in the Plan Update and the balance of the Township will provide solutions to address existing malfunctioning sewage disposal systems and prevent future on-lot system malfunctions, and are therefore consistent with the BCCP.

The Newtown Area Joint Comprehensive Plan (NAJCP), last revised in 2009, summarizes Upper Makefield Township's vision and policies regarding its future growth, preservation, and conservation. The NAJCP states that the land's ability to renovate sewage effluent via on-lot sewage disposal systems is a consideration in the Township's development and zoning criteria. The proposed short-term and long-term sewage disposal alternatives pertaining to the Needs Areas identified in this Plan Update are consistent with the purpose of protecting the natural and rural character of the planning area and protecting surface and groundwater critical to maintaining water quality within the Township and its adjacent communities and, therefore, are consistent with the NAJCP.

A.5 Anti-degradation requirements contained in Chapters 93, 95, 102, and the Clean Water Act

Proposed wastewater alternatives must be consistent with Chapter 93, which designates uses of the waters of the Commonwealth. The alternatives must be consistent with both the wastewater treatment requirements of Chapter 95 and the erosion and sedimentation control regulations contained in Chapter 102. The Township's existing municipal sewage treatment plants currently meet Chapter 93 and 95 requirements. The proposed long-term sewage disposal alternatives pertaining to the Needs Areas identified in this Plan Update that will utilize existing wastewater treatment facilities will not affect the facilities' consistency with said anti-degradation requirements. For alternatives that propose the construction of new public or private treatment facilities or connection to an existing/proposed facility, the facilities will be required to meet anti-degradation requirements through the planning module and permit processes at the state level.

Contractors associated with implementing the proposed alternatives will be required to install stormwater management control facilities to improve quality of surface runoff and erosion and sedimentation controls per Bucks County Conservation District guidance and PADEP NPDES Permit requirements to minimize non-point source pollution to waters of the Commonwealth. To that end, the proposed alternatives are consistent with Chapter 102 anti-degradation requirements.

A.6 State Water Plans

State water plans have been developed for use as a management tool to guide in the conservation, development, and administration of the Commonwealth's water and related land resources on a comprehensive and coordinated basis. Upper Makefield Township is addressed under State Water Plan 3 (SWP-3), Sub-basin 2, Central Delaware River Basin, Watershed F (July 1983). The SWP-3 advocates water conservation, ground water recharge, protection of floodplains, and elimination of malfunctioning on-lot sewage disposal systems.

Participation in the sewage management program and amendment of OLDS Ordinance to include additional oversight and maintenance provisions for on-lot disposal system and more stringent water conservation measures in the Needs Areas identified in the Plan Update will help prevent on-lot system malfunctions and preserve the viability of on-lot sewage disposal systems, thus protecting ground water quality and increasing recharge potential. In the Dolington Area, this approach will be utilized until the long-term disposal alternatives discussed in the subsequent sections of this Plan Update can be implemented. Therefore, the proposed alternatives are consistent with the objectives of the State Water Plan.

A.7 Pennsylvania Prime Agricultural Land Policy

Pennsylvania's Prime Agricultural Land Policy orders and directs the prevention of irreversible conversion of prime agricultural land to uses that result in its loss as an environmental or essential food production resource. Prime farmland and Statewide important farmland are identified in Figure 4.

Upon review of available mapping by the Natural Resource Conservation Service, the prime agricultural soils found in Upper Makefield Township will not be adversely impacted by the implementation of the short-term and long-term sewage disposal alternatives that have been developed in conjunction with this Plan Update. To that end, the proposed alternatives are consistent with the Pennsylvania Prime Agricultural Land Policy.

A.8 County Stormwater Management Plans

The Storm Water Management Act states that inadequate management of stormwater resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of streams and storm sewers, greatly increases the cost of public facilities to carry and control stormwater, undermines flood plain management and flood control efforts in downstream communities, reduces ground water recharge and threatens public health and safety.

Upper Makefield Township is located in the Delaware River South stormwater planning area. The Delaware River South Stormwater Management Plan (Act 167, August 2004) is a collaborative effort to control the quantity, velocity, and quality of stormwater runoff from new development, and to provide for proper maintenance of stormwater management facilities. Upper Makefield Township adopted their own Stormwater Management Ordinance No. 263 (as amended by Ordinance No. 272) that relies heavily on the information provided in the BCPC plan.

The proposed short-term and long-term alternatives that have been developed in conjunction with the Plan Update are intended to reduce surface and ground water pollution, increase ground water recharge where applicable, and prevent future failures that would have increased contaminants contained in stormwater. Construction activities required for any proposed alternative will be required to install erosion and sedimentation control measures. The proposed alternatives are, therefore, consistent with the Delaware River South Stormwater Management Plan.

A.9 Wetland Protection

Wetlands are described as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, and bogs.

No disturbance of wetlands is anticipated with any of the short-term and long-term alternatives that have been developed in conjunction with the Plan Update; however, any discovery of existing wetlands that could potentially be impacted will be addressed at the time of implementation of the specific alternative. To that end, the proposed alternatives are consistent with Chapter 105 for wetland protection.

A.10 Pennsylvania Natural Diversity Inventory

There is an increasing effort at the local, state, and federal levels of government to protect the habitat of rare, endangered, and threatened species. There are state and federal laws and regulations administered by numerous agencies that protect these species.

As part of this Plan Update, a Pennsylvania Natural Diversity Inventory (PNDI) request was submitted for the proposed long-term alternatives that have been developed in conjunction with the Plan Update that will require earth disturbance as a result of installation of collection and conveyance components, or treatment plant construction. A copy of the PNDI Environmental Receipt is included in Appendix I. Proposed individual on-lot systems that will be maintained per the Township's Sewage Management Program will be addressed on a site-specific basis. Developments that will utilize on-lot sewage disposal systems will be required to complete a PNDI request and resolve all conflicts prior to planning approval. Therefore the proposed alternatives are consistent with the Pennsylvania Natural Diversity Inventory.

A.11 Pennsylvania Historic Preservation Act

The Pennsylvania Historical Preservation Act of 1978 requires that Commonwealth agencies and municipalities cooperate fully with the Pennsylvania Historical and Museum Commission (PHMC) in the preservation, protection, and investigation of archaeological resources.

A Cultural Resource Notice (CRN) has been completed and submitted to the PHMC for the proposed alternatives that have been developed in conjunction with the Plan Update that may have an impact on archaeological and/or historical resources. Copies of the CRNs and the PHMC's responses are included in Appendix I. As stated in the PHMC response letters, if archaeological resources are uncovered during construction activities, the PHMC will be notified immediately. In addition, a CRN will need to be completed during the sewage planning process for certain projects that will utilize on-lot sewage disposal systems. Conflicts that are identified by the PHMC will need to be resolved prior to planning approval. Therefore, the proposed alternatives are consistent with the Pennsylvania Historic Preservation Act.

B. Inconsistencies

There are no inconsistencies that require resolution.

C. Water Quality Standards and Effluent Limitations

The proposed wastewater treatment plant that will serve the Gray Tract, White Farm, and Melsky Tract developments, has planning approval for a 55,550 gpd discharge to Houghs Creek. However, the treatment plant is designed to treat up to 80,000 gpd, and the facility could be re-rated to this capacity to accommodate the needs of the Dolington Area if required in conjunction with two of the potential long-term sewage disposal alternatives that are discussed in subsequent sections of this Plan Update. The current or potentially re-rated treatment plant will be required to meet or exceed the effluent limitations for stream discharge into Houghs Creek, set forth by its NPDES Permit. Additionally, as discussed in the preceding sections of this Plan Update, any long-term sewage disposal alternatives that involve the installation of individual on-lot or centralized treatment systems will be subject to water quality standards and effluent limits established by the PA DEP.

D. Analysis of Available Funding Methods for Identified Needs Areas

The funding for the efforts/activities that will be performed to implement measures proposed to address the short-term sewage disposal needs within the Taylorsville and Dolington Areas will be included as part of the overall funding of the Township Sewage Management Program.

The funding of the public components of the sanitary sewer facility infrastructure proposed in conjunction with the potential long-term sewage disposal alternatives developed as part of this Plan Update for the Dolington Area will be imposed on the affected property owners via assessments and/or tapping fees. However, the Township will continuously monitor the availability of potential Federal, State, or local grant programs to address all or portions of the aforementioned funding requirements in an effort to reduce the costs to the affected property owners, but will not require the expenditure of Township Funds.

For the purpose of the initial funding of the infrastructure improvements until such time as potential grant monies or assessments/tapping fees can be collected, the Township

may borrow funds from a bank or similar lending institution or publicly issued bonds. The option of borrowing funds from the Pennsylvania Infrastructure Investment Authority (PennVest) will not be considered since it is very unlikely that Upper Makefield Township would qualify for the limited funds available. Furthermore, the current economic climate has made other forms of borrowing very competitive with PennVest, without the associated administrative requirements.

It is too early in the implementation process to determine which short-term funding approach or combination will be most cost-effective to implement the potential long-term alternatives that are being considered for the Dolington Area. The funding methods will be determined by the Township in consultation with its legal and financial advisors at the appropriate time.

E. Implementation Analysis: Identified Needs Areas

1. Taylorsville Area

As outlined in the preceding sections of this Plan Update, the sewage disposal needs of this area can be addressed by improving the performance of existing OLDS through water conservation, increased system oversight/maintenance, educating property owners on OLDS use/maintenance, and amendment of the Township's OLDS Ordinance to incorporate additional maintenance provisions specific to the Taylorsville Area. The Township will also provide input to the property owners where the recent OLDS Survey identified operational problems, with regard to potential on-lot sewage disposal solutions. This process will commence immediately upon approval of this Plan Update by PADEP.

Should it be concluded five years after approval of this Plan Update that the sewage disposal needs of the Taylorsville Area are not being satisfactorily addressed by the short-term approach detailed herein, other long-term sewage disposal alternatives will be identified and evaluated and the Sewage Facilities Plan will be updated accordingly.

2. Dolington Area

As outlined within the preceding sections of this Plan Update, the OLDS Survey conducted within the Dolington Area had concluded that the functioning of on-lot sewage disposal systems is being properly managed with no indications of widespread failures or public health concerns. To that end, the short-term sewage disposal needs of this area (for the Five-Year Planning Period) can be effectively addressed through water conservation, increased system oversight/maintenance, educating property owners on OLDS use/maintenance and amendment of the Township's OLDS Ordinance to incorporate additional maintenance provisions specific to the Dolington Area. The Township will also provide input to the property owners where the recent OLDS Survey identified operational problems, with regard to potential on-lot sewage disposal solutions. This process will commence immediately upon approval of this Plan Update by PADEP.

As discussed in the preceding sections of this Plan Update, upon considering such factors as public and private implementation costs, ongoing operation and maintenance costs/responsibilities, anticipated reliability/performance, and consistency with prior Township planning/policies, it was determined that Alternative #6; STEP System/Centralized Treatment System with Stream

Discharge Effluent Disposal (Refer to Figure 28) would be the preferred option to address the long-term sewage disposal needs of the Dolington Area.

During the short-term (5 Year) planning period of this Plan Update, the Township is committed to continuing to work to refine the preferred long-term sewage disposal alternative in an effort to reduce currently projected costs that would be imposed on the affected property owners. Subsequently, during the initial stage of the long-term (10 Year) planning period of the Plan Update, the Township will re-assess the currently identified long-term sewage disposal alternatives, identify any new alternatives that may be available based upon changes in current conditions and/or technology that may potentially occur over the short-term planning period, and initiate the administrative, legal, engineering, and procedural efforts associated with the implementation of the selected long-term sewage disposal alternative for the Dolington Area.

For more information on the implementation schedule for Taylorsville Area and Dolington Area, Refer to Section C of Chapter VIII of this Plan Update.

F. Administrative Requirements

As will be discussed in greater detail in Chapter VII, Upper Makefield Township has the administrative structure and legal authority necessary for the implementation of this Plan Update.

VII – INSTITUTIONAL EVALUATION

A.1 Financial and Debt Status

Upper Makefield Township operates the existing municipal sanitary sewerage facilities in the Township, including Heritage Hills WWTP and Dutchess Farms WWTP. The Gray Tract WWTP is currently under construction by Toll Brothers, Inc., and will eventually be owned and operated by the Township. The Township has a five (5) member Board of Supervisors that operates in accordance with the Pennsylvania Second Class Township Code. The Township utilizes a Contract Operations Firm for the operation of its municipal sewerage facilities.

Any potential future public sewerage facilities proposed in conjunction with this Plan Update will be implemented by the Township, including design, funding, construction and operation.

As documented in Upper Makefield Township's audit for the year ending December 31, 2013, the Township had a total long term debt of $16.3 million at the end of 2013. This debt was incurred to construct the Township Administrative and Police Facilities, as well as other uses. The debt service for 2013 was $2,148,060.00.

The Township maintains a Water and Sewer Fund to account for water and sewer services provided by the Township. As of December 31, 2013, this fund had current (cash and equivalents) assets of $1,724,149.00 and capital (water and sewer systems) assets of $3,335,338.00. Total net fund assets were $4,493,793.00.

Water and sewer operating revenues (user fees) collected during 2013 totaled $411,422.00, and operating expenses totaled $482,811.00. The average user fee for sewer service in the Heritage Hills service area is approximately $550.00 per year.

A.2 Available Staff and Administrative Resources

Upper Makefield Township has the necessary staff and administrative resources required to implement its On-Lot Sewage Management Program, which will be amended to include additional oversight/maintenance and water conservation provisions proposed in this Plan Update. The Contract Operations Firm will provide staffing as required for the municipal sewerage facilities, including the Gray Tract WWTP, which is currently under construction.

A.3 Existing Legal Authority

The Second Class Township Code and the Laws of the Commonwealth of Pennsylvania afford Upper Makefield Township the full legal right and power to:

- Operate and maintain the municipal sewerage facilities
- Implement wastewater planning recommendations
- Set fees and purchase services, materials and equipment
- Prosecute violators of Township ordinances
- Negotiate agreements

- Issue bonds or borrow money to finance the construction, operation, and maintenance of the system
- Article 15, Corporate Powers, and Article 25, Sanitary Sewers, of the Code, enumerate in detail the rights and powers of the Township with regard to the public sewer system

B. Institutional Alternatives to Implement Technical Alternatives

Administrative management of Upper Makefield Township's water and sewer systems and On-Lot Sewage Management Program is provided by the Township's Code Enforcement Department. Township staff is responsible for billing, annual budget development, record keeping, operations contractor oversight, and all other functions required for sound system management. The Code Enforcement Department also coordinates engineering activities, the processing of sewage facilities planning modules for new land developments, and communications with the BCHD. The costs of administration are budgeted annually by the Township at which time future needs are considered.

Implementation of the technical alternatives discussed herein will be through the existing Township administrative structure and no new departments or authorities will be required.

C. Necessary Administrative and Legal Activities to be Completed and Adopted to Ensure Implementation of Recommended Alternatives

Upper Makefield Township has the necessary staff and professional consultants required to perform the supplemental administrative or legal activities which must be completed in conjunction with implementation of the selected short-term and long-term sewage disposal alternatives. The Township has already developed and implemented ordinances, regulations and standards addressing the planning, construction and operation of municipal sewage facilities and an existing Sewage Management Program for on-lot sewage disposal systems within the Township, which will require supplements or updates to address the selected short-term and long-term sewage disposal alternatives.

D. Proposed Institutional Alternative

It is proposed that Upper Makefield Township implement the selected alternatives with its currently existing institutional structure and staff. The Township has the necessary experience, technical and administrative resources, and legal authority to implement the selected alternatives.

VIII – IMPLEMENTATION SCHEDULE AND JUSTIFICATION FOR ALTERNATIVES

A.1 Existing and Future Wastewater Disposal Needs

The existing and future wastewater disposal needs of Upper Makefield Township that have been identified in conjunction with this Plan Update include:

- In the Taylorsville and Dolington Needs Areas, short-term, sewage disposal needs will continue to be addressed by the Township On-Lot Sewage Management Program which will be amended to include additional provisions related to system oversight and maintenance, specific to these areas.

- Long-term sewage disposal needs of the Taylorsville Area will be reassessed five years after approval of this Plan Update and if the short-term disposal alternative described above is found to be ineffective, other long-term sewage disposal alternatives will be evaluated as part of the Ten-Year Planning Period.

- The preferred option to address the long-term sewage disposal needs of the Dolington Area is Alternative # 6; STEP System/Centralized Treatment System with Stream Discharge Effluent Disposal. During the short-term (5 Year) planning period of this Plan Update, the Township is committed to continuing to work to refine the preferred long-term sewage disposal alternative in an effort to reduce currently projected costs that would be imposed on the affected property owners. Subsequently, during the initial stage of the long-term (10 Year) planning period of the Plan Update, the Township will re-assess the currently identified long-term sewage disposal alternatives, identify any new alternatives that may be available based upon changes in current conditions and/or technology that may potentially occur over the short-term planning period, and initiate the administrative, legal, engineering, and procedural efforts associated with the implementation of the selected long-term sewage disposal alternative for the Dolington Area.

- The current Township On-Lot Sewage Management Program will be continued in all other areas of the Township that are served by on-lot sewage disposal systems.

Existing centralized wastewater disposal needs are addressed by the Heritage Hills and Dutchess Farms treatment systems. Private on-lot sewage disposal systems serve the vast majority of the Township.

Future wastewater disposal needs will continue to be principally served by on-lot sewage disposal systems with educational and management oversight by the Township. The needs of the Taylorsville and Dolington Areas will be met as described above.

A.2 Operation and Maintenance Considerations

As with the Township's existing public wastewater facilities, contract operations and maintenance staff will be responsible for any new facilities proposed in conjunction with this Plan Update. The projected impact of the applicable short-term and long-term

sewage disposal alternatives proposed in conjunction with this Plan Update on staffing and cost is minimal.

A.3 Cost Effectiveness

As demonstrated in Chapter VI, the applicable short-term and long-term sewage disposal alternatives for the identified Needs Areas, along with continued on-lot sewage disposal elsewhere in the Township, are the most cost-effective approaches that also consider ongoing operation and maintenance costs/responsibilities, anticipated reliability/performance, and consistency with prior Township planning/policies which will meet the wastewater disposal needs within the Township.

A.4 Available Management and Administrative Systems

Chapter VII documents the functioning of Upper Makefield Township's sewage management and administrative procedures/programs. No changes or additions will be required to implement the selected alternatives.

A.5 Available Financing Methods

As documented in Section E of Chapter VI of this Plan Update, the Township has various options available for financing the short-term costs associated with the implementation of the selected long-term sewage disposal alternative. Upper Makefield Township staff and financial advisors will determine the most appropriate financing approach at the time the selected alternative is implemented.

A.6 Environmental Soundness

As documented in the preceding sections of this Plan Update, there are no widespread problems with the functioning of on-lot sewage disposal systems within the Township. Additionally, recent OLDS Surveys conducted within previously identified Needs Areas within the Township have reached similar conclusions. Further, existing/proposed municipal wastewater facilities have been evaluated and were determined to be adequate to accommodate current and future needs. To that end, the short-term and long-term sewage disposal alternatives proposed in this Plan Update are environmentally sound and compliant with natural resource planning and preservation programs.

B. Capital Financing Plan

As previously stated, there are numerous alternatives for financing of short-term costs associated with the implementation of the long-term sewage disposal alternatives proposed in this Plan Update. Selection of the most appropriate capital financing plan will be made by Township staff and financial advisors at the time of implementation of the selected long-term sewage disposal alternative.

C. Implementation Schedule

The Township's On-Lot Sewage Management Program is already in force for all areas of the Township. The amendment of the OLDS Ordinance to incorporate increased oversight and maintenance of existing on-lot sewage disposal systems for the

Dolington and Taylorsville Needs Areas is proposed within the Five-Year Planning Period and will commence immediately upon approval of this Plan Update by PADEP. Implementation of the selected long-term sewage disposal alternative in the Dolington Area will be addressed during the Ten-Year Planning Period.

Implementation of chosen alternatives will follow independent schedules:

Five-Year Planning Period (Short-Term Sewage Disposal Alternative) - Taylorsville Area and Dolington Area:

Activity	Projected Date
Township Act 537 Plan Update Adoption	February 2015
PADEP Act 537 Plan Update Approval	***June 2015***
Prepare Amended OLDS Ordinance	September 2015
Township Adoption of Amended OLDS Ordinance Provisions for the Taylorsville and Dolington Areas	November 2015
Township Evaluation of Effectiveness of Short-Term Sewage Disposal Alternative in Taylorsville Area	November 2020

Ten-Year Planning Period (Long-Term Sewage Disposal Alternative) - Dolington Area:

Activity	Projected Date
Township Act 537 Plan Update Adoption	February 2015
PADEP Act 537 Plan Update Approval	***June 2015***
Refine/Reassess Preferred Long-Term Sewage Disposal Alternative and Identify Any New Alternatives That May Be Available Based on Changes in Current Conditions and/or Technology That May Potentially Occur over the Short-Term Planning Period	July 2015 – December 2020
Establish Policy Guidelines for Implementation of Selected Long-Term Sewage Disposal Alternative	June 2021
Submit Regulatory Agency Permitting/Approval Applications	December 2022
Prepare Engineering Design/Bidding Documents	December 2023
Evaluate Funding Alternatives	December 2023
Release Bidding Documents	March 2024
Receive Bids	May 2024
Secure Financing	June 2024
Award Construction Contract	July 2024
Commence Construction	September 2024
Complete Construction	September 2025
Authorize Connections	January 2026