
Cape May County Wastewater Management Plan

Municipal Buildout Report

For

Township of Upper

Chapter 12

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Prepared By:



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I. FUTURE WASTEWATER DEMAND AND CAPACITY ANALYSIS

This section of the report describes the buildout methodology used to project future wastewater treatment demand for future sewer service areas and septic management areas within the Township of Upper. This buildout analysis has been prepared as part of the Cape May County Wastewater Management Plan (CMCWMP).

In urbanized municipalities it is assumed that redevelopment of previously developed portions of the municipality will make up the majority of the future wastewater management needs. Therefore, an analysis limited to development potential based solely on the zoning of the undeveloped and developable land area of the municipality in these municipalities may underestimate their future wastewater management needs. In these municipalities, a 20-year wastewater projection is based on population and employment projections.

The NJDEP Water Quality Management Planning Rule (N.J.A.C. 7:15-1.15) defines urban municipalities as those municipalities where 90 percent of the municipality's land area appears as "Urban" as designated in the NJDEP 2007 Land Use/Land Cover geographical information systems (GIS) database. Urbanized municipalities also include those municipalities identified as "Urban Aid" municipalities pursuant to the New Jersey Redevelopment Act, N.J.S.A. 55:19-20 et seq.; as an Urban Enterprise Zone pursuant to the New Jersey Urban Enterprise Zones Act, N.J.S.A. 52:27H-60 et seq.; as a "Garden State Growth Zone" municipality pursuant to the New Jersey Economic Opportunity Act of 2013, N.J.S.A. 52:27D-489p et seq.; and as Transit Villages approved by the New Jersey Department of Transportation and NJ Transit.

As shown in **Table 12-1**, the Township of Upper encompasses 19,851.6 acres within its boundaries, including water and environmentally sensitive lands. According to the 2012 NJDEP Land Use/Land Cover data, only 4,448.7 acres (22.4 percent) of Upper Township are classified as Urban Lands. The municipality does not qualify for Urban Aid, Urban Enterprise Zone, Garden State Growth Zone or Transit Village. Therefore, the Township of Upper does not qualify as an urbanized municipality.

Table 12-1: Urbanized Municipality Analysis	
Total Municipal Area	43,785.1 acres
Urban Land Area	4,179.2 acres
Urban Land Coverage	9.5%
Urban Aid Municipality	No
Urban Enterprise Zone	No
Garden State Growth Zone	No
Transit Village	No
Urbanized Municipality	No

In accordance with the N.J.A.C. 7:15-4.5(b)(2), municipalities that are not defined as urbanized must estimate build-out future wastewater flows from existing development that is not currently connected and future development based on flow projections.

This analysis has been prepared in order to assess the amount of remaining developable lands within the Township of Upper and to assess the amount of potential development, if these lands were fully developed to their maximum potential. Utilizing GIS (geographic information system) technology, the



amount of developable land has been assessed based on lot area and bulk requirements as compared to the minimum requirements of each individual zone district.

This study is meant to demonstrate that the overall extent of potential future development based on the proposed zoning and the implications to the wastewater treatment facilities serving existing and future development. The results generated by these analyses were based on mathematic calculations of lot area and contiguous unconstrained land (land not encumbered with wetlands or riparian buffers) with regards to the requirements of the respective zoning. These analyses represent the total development limits of the municipality and do not account for time factors, economic factors or real estate trends. In other words, the analyses represent the maximum amount of development that could occur based on the amount of remaining developable lands. This study does not make any assumptions as to timeframe for the Township to reach full buildout, or even if it will. The results of this study are meant to illustrate the effects that the zoning would have if the Township were to become fully built-out. The calculated development potential of each parcel is subject to site-specific review of applicable state environmental regulations as well as municipal subdivision and site plan procedures.

Data Sources

This build-out study is based on existing land use conditions and the most recently adopted zoning standards for the Township of Upper. The following discusses the data sources that were utilized in the preparation of this report and the processes for updating and validating the data:

- Existing Land Use. In order to analyze the remaining developable lands within Upper Township, a parcel database is utilized, which is linked to the Mod-IV property tax information for each parcel. Each parcel's land use type is based on the tax classification. Upper Township's parcel database was provided by the Cape May County Planning Department, dated November 2017. Some properties in the parcel database do not have a corresponding line item in the Mod-IV data, which results in a number of properties being unclassified. The Cape May County Planning Department attempted to classify those properties, to the extent possible, by utilizing the "additional lots" field for other Mod-IV records or Pictometry© images to determine whether a property is developed. (See **Map 12-1: Existing Land Use**)
- Zoning Boundaries. The zoning boundaries and standards are from the Zoning Ordinance (Chapter 20) and the Zoning Map for the Township of Upper, revised August 13, 2018. The zoning requirements utilized are shown in **Table 12-2**. For this build-out, parcels crossed by a zoning boundary are calculated as separate lots within each zone. (See **Map 12-2: Existing Zoning**)



Table 12-2: Schedule of Municipal Zoning Requirements

Zone	Use	Minimum Lot Area	Maximum Dwellings per Acre	Maximum Lot Coverage	Maximum Impervious Coverage	Maximum Building Height	Effective Floor Area Ratio
AHGR	Affordable Housing Group Home	5 acres					
AR	Residential (Single-Family)	120,000					
C	Residential (Single-Family)	10 acres					
CM2	Commercial	40,000		20%	30%	35	10%
		5 acres		15%	35%	35	12%
		10 acres		15%	35%	35	12%
CM4	Commercial	120,000		5%	15%	35	5%
CMP	Commercial	120,000		5%	15%	35	5%
F10	Residential (Single-Family)	10 acres					
F25	Residential (Single-Family)	25 acres					
F3	Residential (Single-Family)	3.20 acres					
M	Mining						
MH	Mobile Homes	20 acres	7				
MTCD	Marmora Town Center	40,000	12	45%	70%	5 stories	225%
		10 acres	12	45%	70%	5 stories	225%
PV	Residential (Single-Family)	1 acres					
R	Residential (Single-Family)	40,000					
R2	Residential (Single-Family)	40,000					
RC	Residential (Single-Family)	6,000					
RD	Residential (Single-Family)	3.75 acres					
RP	Residential (Single-Family)	3.75 acres					
RPPV	Residential (Single-Family)	3.75 acres					
RR	Residential (Single-Family)	4,000					
TC	Mixed Use	40,000	6	30%	50%	45	17%
TCC	Mixed Use	5 acres	6	20%	60%	45	20%
		10 acres	6	15%	60%	45	15%
		40,000	6	35%	60%	45	20%
TR	Residential (Single-Family)	5 acres	6	25%	70%	45	23%
		10 acres	6	20%	70%	45	20%
		2 acres					
TV	Residential (Single-Family)	15,000					
U	Utility						

- Adopted Sewer Service Areas. The NJDEP adopted the Future Wastewater Service Areas Map for Cape May County on November 6, 2013. The boundaries are depicted in the current NJDEP Sewer Service Areas GIS data as published December 20, 2017. (See **Map 12-3: Adopted Sewer Service Areas**)



- Environmental Constraints. Environmentally sensitive areas were spatially attributed to the parcel database for Upper Township to assess the amount of contiguous unconstrained land within each parcel and the constrained lands were removed from the analysis.

In accordance with N.J.A.C 7:15-1.5, "environmentally sensitive areas" means those areas identified in an areawide WQM plan as land areas possessing characteristics or features that are important to the maintenance or improvement of water quality, or to the conservation of the natural resources of the State. Environmentally sensitive areas include, but are not limited to, areas mapped as endangered or threatened wildlife species habitat on the Department's most currently available Landscape Maps of Habitat for Endangered, Threatened or Other Priority Species, Natural Heritage Priority Sites, wetlands and riparian zones.

For the purposes of this buildout analysis, the following environmental constraints, as shown on **Map 12-4: Hydrologic Features**, were assumed to constrain future development within the adopted wastewater service areas:

- Open Water Bodies as delineated by the NJDEP National Hydrography Dataset (NHD) Waterbody GIS data, last updated by NJDEP on November 1, 2010.
- Freshwater Wetlands were extracted from the 2012 NJDEP Land Use/Land Cover data. Transitional area buffers were added to the constrained area. Wetlands areas associated with a primary water body (river, bay, ocean, etc.) and/or containing habitat for threatened and endangered species (Rank 3, 4 and 5 as per the NJDEP Landscape Project Version 3.3) were assumed to have exceptional resource value and 150-foot transition area buffers were applied. Isolated patches of wetlands not containing threatened and endangered species habitat were assumed to have intermediate resource value and 50-foot buffers were applied.
- Category-One ("C1") Waters and their Tributaries as delineated by the NJDEP Surface Water Quality Standards data were given a 300-foot Special Water Resource Protection Area (SWRPA) buffer included in the constrained area.
- Riparian Buffers were added to non C1 streams in accordance with the NJDEP Flood Hazard Control Act. Streams adjacent to threatened and endangered species habitat are given a 150-foot wide riparian buffer. All other streams are given a 50-foot riparian buffer.

Map 12-5: Natural Features depicts the following layers, which were considered in the adoption of the wastewater service areas:

- Habitat for Endangered, Threatened or Other Priority Species. Rank 3, 4 & 5 habitat patches for state and federally listed threatened and endangered species are shown, as published in Version 3.3 of the NJDEP Landscape Project mapping.
 - Natural Heritage Priority Sites as published by the NJDEP March 1, 2007.
- HUC11 Planning Boundary. In order to analyze the development potential for septic areas in conformance with the WQMP Rule, the zoning boundaries are segregated by the HUC11 Watershed in which the land lies. HUC11 boundaries were published by the NJDEP dated



January 20, 2006. The HUC11 boundaries were modified in order to avoid dividing parcels into small slivers of land. The HUC11 Planning Boundaries were snapped to lot lines when possible, not straying more than 500 feet from the HUC11 lines delineated by NJDEP. Larger tracts of land are split into separate subzones according to the HUC11 line. (See HUC11 Planning Boundary shown on **Map 12-6: Buildout Results**)

Future Sewer Service Area Analysis

This future sewer service area analysis has been prepared to assess the potential wastewater demand generated by potential development and redevelopment within the municipality's future sewer service area. The analysis provides a maximum yield for potential additional residential units and non-residential floor area within the future sewer service area.

Methodology and Assumptions

- The Township of Upper is proposing to extend sewer service to the Marmora Town Center District and the existing development along Roosevelt Boulevard to the Ocean City Regional Wastewater Treatment Plant (WTP). Alternatively, the Marmora future sewer service area would discharge to groundwater if connection to Ocean City Regional WTP is not feasible.
- The Township is considering extending sewer to the existing development in Strathmere from the Seven Mile Beach/Middle Township Regional WTP. However, this analysis is only based on the adopted Sewer Service Area map, which does not include the Strathmere area. Should the Township wish to consider sewerage Strathmere, the municipality will need to pursue the site-specific amendment process with the NJDEP.
- The buildout analysis of the Marmora Town Center District, performed by the Upper Township Engineer in September 2018, is incorporated into this analysis.
- The analysis assumes that the Marmora Town Center District will be redeveloped in accordance with the underlying MTCD zone district. Future development outside of the Marmora Town Center District is considered under the septic buildout analysis.
- As there is currently no sewer service for Marmora, the total buildout will contribute to future wastewater demand. Existing development is not subtracted from the future flows.
- The permitted use(s) of each zone dictates whether each property is assigned a residential, non-residential or mixed use development.
- Where a zone permits mixed-use development, the analysis assumes that the first floor will be retail with residential on the upper floors.
- The analysis was performed based on blocks rather than individual parcels in accordance with the concept plan prepared by the Upper Township Engineer.
- NJDEP projected flows for residential dwellings are based on the number of bedrooms in each unit (1 bedroom = 150 GPD, 2 bedroom = 225 GPD, 3+ bedroom = 300 GPD). Future residential



units are assumed to have 3 or more bedrooms, which would produce an average of 300 GPD per unit.

- NJDEP projected flows for nonresidential development differ based on type of development (i.e. office, retail, restaurant, church, theater, etc.). All nonresidential development is assumed to produce 0.100 GPD/sq. ft., which is the projected criterion for both office and retail.

Buildout Analysis of Future Sewer Service Area

Table 12-2: Buildout Analysis of Future Sewer Service Area shows the existing and future residential dwelling units (DU) and non-residential floor area (SF) potential development for each zone.

The analysis estimates 2,436 residential units and 8.526 million square feet of non-residential space within the Marmora Town Center, which is proposed to be served by the Ocean City Regional WTP.

The analysis also shows a total of 777 units planned or approved which would discharge to groundwater greater than 2,000 GPD under individual New Jersey Pollutant Discharge Elimination System (NJPDES) permits.

Table 12-3: Buildout Analysis of Sewer Service Areas								
Future Wastewater Service Area	Zone	Existing to be Connected		New Development		Planned/ Approved	Total	
		(DU)	(SF)	(DU)	(SF)	(DU)	(DU)	(SF)
Ocean City Regional WTP	MTCD	0	0	2,436	8,526,505	0	2,436	8,526,505
	Subtotal	0	0	2,436	8,526,505	0	2,436	8,526,505
Proposed Discharge to Groundwater Greater than 2,000 GPD	AHGR	0	0	0	0	8	8	0
	AR	0	0	0	0	60	60	0
	MH	0	0	0	0	210	210	0
	R	0	0	0	0	334	334	0
	R2	0	0	0	0	15	15	0
	TCC	0	0	0	0	150	150	0
	Subtotal	0	0	0	0	777	777	0

Wastewater Demand Analysis for Future Sewer Service Area

Table 6-4: Wastewater Demand Analysis for Sewer Service Areas summarizes the estimated wastewater flows by multiplying the results in **Table 12-3** by the NJDEP projected flows of 300 gallons per day (GPD) per residential unit and 0.100 GPD per square foot of non-residential floor area. Industrial wastewater flow is estimated at 0.030 GPD per square foot of industrial floor area. Campsites use a multiplier of 200 GPD per unit.

Table 12-4: Wastewater Demand Analysis of Sewer Service Areas						
Future Wastewater Service Area	Zone	Total Residential		Total Non-Residential		TOTAL DEMAND
		(DU)	(GPD)	(SF)	(GPD)	(GPD)
Ocean City Regional WTP	MTCD	2,436	730,800	8,526,505	852,650	1,583,450
	Subtotal					
Discharge to Groundwater	AHGR	8	2,400	0	0	2,400
	AR	60	18,000	0	0	18,000
	MH	210	63,000	0	0	63,000
	R	334	100,200	0	0	100,200
	R2	15	4,500	0	0	4,500
	TCC	150	45,000	0	0	45,000
	Subtotal	777	233,100	0	0	233,100

Wastewater Capacity Analysis of Future Sewer Service Area

In accordance with N.J.A.C. 7:15-4.5(b)2, the wastewater demand projections for the service area must be compared against the total wastewater capacity of the treatment plant. **Table 12-5: Wastewater Capacity Analysis of Sewer Service Areas** provides the total projected future wastewater demand for each wastewater service area within Upper Township.

Table 12-5: Wastewater Capacity Analysis of Sewer Service Areas			
Future Sewer Service Area	Existing (MGD)	Future (MGD)	Total (MGD)
Ocean City Regional WTP	0	1.583	1.583

Upper Township does not have any wastewater allocation in the Ocean City Regional WTP. The analysis estimates that approximately 1.583 MGD will need to be allocated from the Ocean City Regional WTP for Upper Township to develop the Marmora Town Center per the MTCD zoning. This will need to be coordinated with the CMCMUA and Ocean City after the future wastewater demand is established for Ocean City.



Future Septic Management Area Analysis

Methodology and Assumptions

Assumptions

- The permitted use(s) of each zone dictated whether each property is assigned a residential or non-residential development.
- Per the request of the Township, all Township-owned properties are considered preserved and not developable for the purposes of this analysis.
- After locating further developable parcels, the number of new residential dwelling units available for further development under the zoning are based on contiguous unconstrained land area, excluding 10% for necessary utility improvements such as roads or septic/sewer easements is calculated.
 - Vacant or farmland property is assigned a development potential by subtracting 10 percent of the lot area for infrastructure and dividing the remaining 90 percent by the minimum lot area of the zone. (*Contiguous Unconstrained Land X 90% / Minimum Lot Area = Potential Number of New Units*).
 - Residential property is assigned a development potential by subtracting 10 percent of the lot area for infrastructure and dividing the remaining 90 percent by the minimum lot area. One unit is subtracted from the development potential to account for the existing residence. (*Contiguous Unconstrained Land X 90% / Minimum Lot Area - 1 unit = Potential Number of New Units*).
- In accordance with Cape May County Health Department policy, a minimum lot area of 35,000 square feet and a minimum of 15,000 square feet of unconstrained land is needed for the development of a dwelling with a septic system. Any vacant parcel with less than the minimum residential lot size but greater than 35,000 square feet and with at least 15,000 square feet of contiguous unconstrained land is assumed to be grandfathered and is allocated a development potential of one unit.
- In order to assess the wastewater discharge associated with anticipated future nonresidential uses, the development potential must be converted from square feet of non-residential floor area into the equivalent number of residential uses. The following formula is provided by the NJDEP for this calculation: (*Equivalent Residential Units = [Non-Residential Floor Area x 0.125 gal/sq. ft./day] / 500 Gal/ Unit/ Day*).
- Where a zone permits mixed-use development in the Septic Management Area, the analysis assumes single-story retail only.
- Non-residential development exceeding 2,000 GPD of wastewater flow would require connection to public sewer or a NJPDES permit. Non-residential development not connected to sewer is assumed not to exceed 26,666 square feet, which is equivalent to 6.7 dwelling units (or 2,000



- GPD). Similarly, future development in mixed-use zones is assumed not to exceed 26,666 square feet of commercial with no residential component.
- The Pinelands Management Area is removed from the analysis since the Pinelands Management Areas are based on a nitrate dilution analysis performed by the Pinelands Commission.
 - Non-residential development exceeding 2,000 GPD of wastewater flow would require connection to public sewer or a NJPDES permit. Non-residential development not connected to sewer is assumed not to exceed 26,666 square feet, which is equivalent to 6.7 dwelling units (or 2,000 GPD). Similarly, future development in mixed-use zones is assumed not to exceed 26,666 square feet of commercial with no residential component.

Methodology

- Undevelopable parcels are excluded in accordance with the following:
 - The contiguous unconstrained land area of each property is calculated based on Environmental Constraints layers. Inaccessible and non-contiguous areas are removed from the contiguous unconstrained land total acreage for each property.
 - Vacant or farmland properties containing less than 35,000 square feet of total lot area or less than 15,000 square feet of contiguous unconstrained land are considered undevelopable, unless property can be merged with adjacent lot(s) to form a conforming lot.
 - Properties not fronting on a public road are considered undevelopable, except where such properties are contiguous to a property with road frontage under the same ownership.
- Properties with site plan or subdivision approvals are assumed to be developed as per the development approvals. The total number of approved units is subtracted from the total allowable units for the watershed prior to the calculation of any future development potential.
- Vacant or farmland properties containing at least 35,000 square feet in total lot area and at least 15,000 square feet of contiguous unconstrained land, but less than the minimum lot area required in the zone are considered “grandfathered” and assigned a development potential of 1 unit. The total number of grandfathered lots is subtracted from the total allowable units for the watershed prior to the calculation of any future development potential.
- After the approved and grandfathered lots are subtracted from the total allowable units, the future buildout potential of the remaining developable lots is calculated.
 - Vacant or farmland properties containing less than twice the minimum lot area in the zone are considered “Developable but Not Subdividable” and are assigned a development potential of 1 unit.
 - Oversized residential properties containing greater than two times the minimum lot size and containing at least 30,000 sq. ft. of contiguous unconstrained land are considered “Residential Further Subdividable”. Development potential is allocated based on total lot area divided by minimum lot area minus 1 unit to account for the existing dwelling.



Buildout Analysis of Septic Management Area

The buildout analysis of the septic management area calculates the future development potential on a parcel-by-parcel basis, based on existing or proposed zoning for the Township of Upper. **Table 12-5: Buildout Analysis of Septic Management Area** shows the development potential for each zone, segregated by watershed, which is calculated as the sum of the approved development, grandfathered parcels, and remaining developable vacant and farmland properties. Future non-residential uses are converted from square feet of floor area to the equivalent number of residential uses.

Table 12-6: Buildout Analysis of Septic Management Area							
HUC11 Watershed	Zone District	Grand-fathered Parcels	Developable Vacant & Farmland Properties	Further Subdividable Residential Properties	Non-Residential		Total Potential Units
					Floor Area (Sq. Ft.)	Equivalent Residential Units	
02040302060 Patcong Creek /Great Egg Harbor Bay	R	1	1	5	0	0.0	7.0
	TC	0	0	0	11,733	2.9	2.9
	Subtotal	1	1	5	11,733	2.9	9.9
02040302070 Tuckahoe River	AR	17	27	0	0	0.0	44.0
	C	2	5	0	0	0.0	7.0
	CM2	0	0	0	23,723	6.0	6.0
	CM4	0	0	0	10,972	2.8	2.8
	R	2	107	43	0	0.0	152.0
	R2	2	32	5	0	0.0	39.0
	RP	0	45	8	0	0.0	53.0
	TC	0	0	0	103,998	26.1	26.1
	TCC	0	0	0	7,663	1.9	1.9
	TR	0	25	1	0	0.0	26.0
	TV	0	8	25	0	0.0	33.0
	MTCD	0	0	0	26,666	6.7	6.7
	Subtotal	23	249	82	173,022	43.5	397.5
02040302080 Cape May Bays & Tribes East	CM2	0	0	0	19,388	4.9	4.9
	R	3	40	37	0	0.0	80.0
	R2	2	37	38	0	0.0	77.0
	TC	0	0	0	32,732	8.2	8.2
	TCC	0	0	0	281,966	70.8	70.8
	MTCD	0	0	0	106,664	26.8	26.8
	Subtotal	5	77	75	334,087	110.7	267.7
02040302940 Atlantic Coast (34th St to Cape May Pt)	N/A	0	0	0	0	0.0	0.0
	Subtotal	0	0	0	0	0.0	0.0
TOTAL		29	327	162	518,842	157.1	675.1



Antidegradation Analysis of Septic Management Area

In areas outside of sewer service areas, the default wastewater management alternative is discharge to groundwater of 2,000 gallons per day or less, commonly referred to as septic systems. The assessment of water quality impacts from development on septic systems relies on nitrate concentration. In this analysis, nitrate acts as a conservative surrogate for any of a number of constituents that could be discharged from a septic system (e.g. cleaners, solvents, pharmaceuticals, etc.). Nitrate is chosen because it is highly soluble in water, and because it is a stable compound that by itself could render water unsuitable for human consumption. The capacity to support septic systems without violating groundwater quality standards is determined by the amount of dilution available. The Water Quality Management Planning Rules advocate a watershed approach to assessing the adequacy of available dilution to meet future development on septic systems. Using this approach, available dilution, (essentially groundwater recharge), is calculated within a HUC 11 watershed and translated into a finite amount of wastewater that can be discharged, which in turn can be translated into a finite number of housing units that can be supported while maintaining a target concentration of nitrate in groundwater. Zoning is then applied to the available land in that same watershed, outside of any sewer service area, to calculate the number of units that could be developed on septic systems. The results of these two analyses are then compared and if the number of units based on zoning does not exceed the maximum units that can be supported, adequate capacity has been demonstrated. If the number of units allowed by zoning exceeds that which can be supported in a particular watershed, then some adjustment to zoning within that watershed is required.

The NJDEP Water Quality Management Planning Rule (N.J.A.C. 7:15-5.25(e)) requires the CMCWMP to determine the development density that can be accommodated in undeveloped and underdeveloped areas that will result in attainment of 2.0 mg/L nitrate in the ground water on a HUC11 watershed basis. This section summarizes the nitrate dilution modeling calculations and results for the lot density (minimum lot size) that can be supported in the septic management areas of the municipality to meet the nitrate target goal.

The Nitrate Dilution Analysis determines the amount of land contributing to nitrate dilution and groundwater recharge, which in turn determined the average septic density within each HUC11 watershed in the municipality required to meet the NJDEP's 2 mg/L target nitrate concentration anti-degradation policy and the maximum number of new septic systems that can be supported in each HUC11.

The nitrate dilution analysis for septic systems is performed in similar fashion to that conducted for sewer service areas, except that environmentally sensitive areas are not removed prior to performing the build-out analysis. This is due to the fact that while certain areas may be unbuildable, such as riparian zones or steep slopes, they still contribute to the overall available dilution of nitrate in groundwater. These areas were also not removed when analyzing the available dilution on a HUC11 basis used to establish the maximum number of units that can be built in a watershed and continue to meet the 2 mg/L nitrate target. Thus, while some areas may contribute less overall groundwater recharge, due to factors such as soils or topography, these limitations have already been taken into consideration when calculating the maximum average density allowable.

This analysis used NJDEP's nitrate-nitrogen target of 2 mg/L, with the assumption that all ammonium and other nitrogen compounds are converted to nitrate within the property, and that the nitrate concentrations dilute evenly across the HUC11 watershed. These assumptions are implicit in the nitrate dilution model developed by NJDEP.



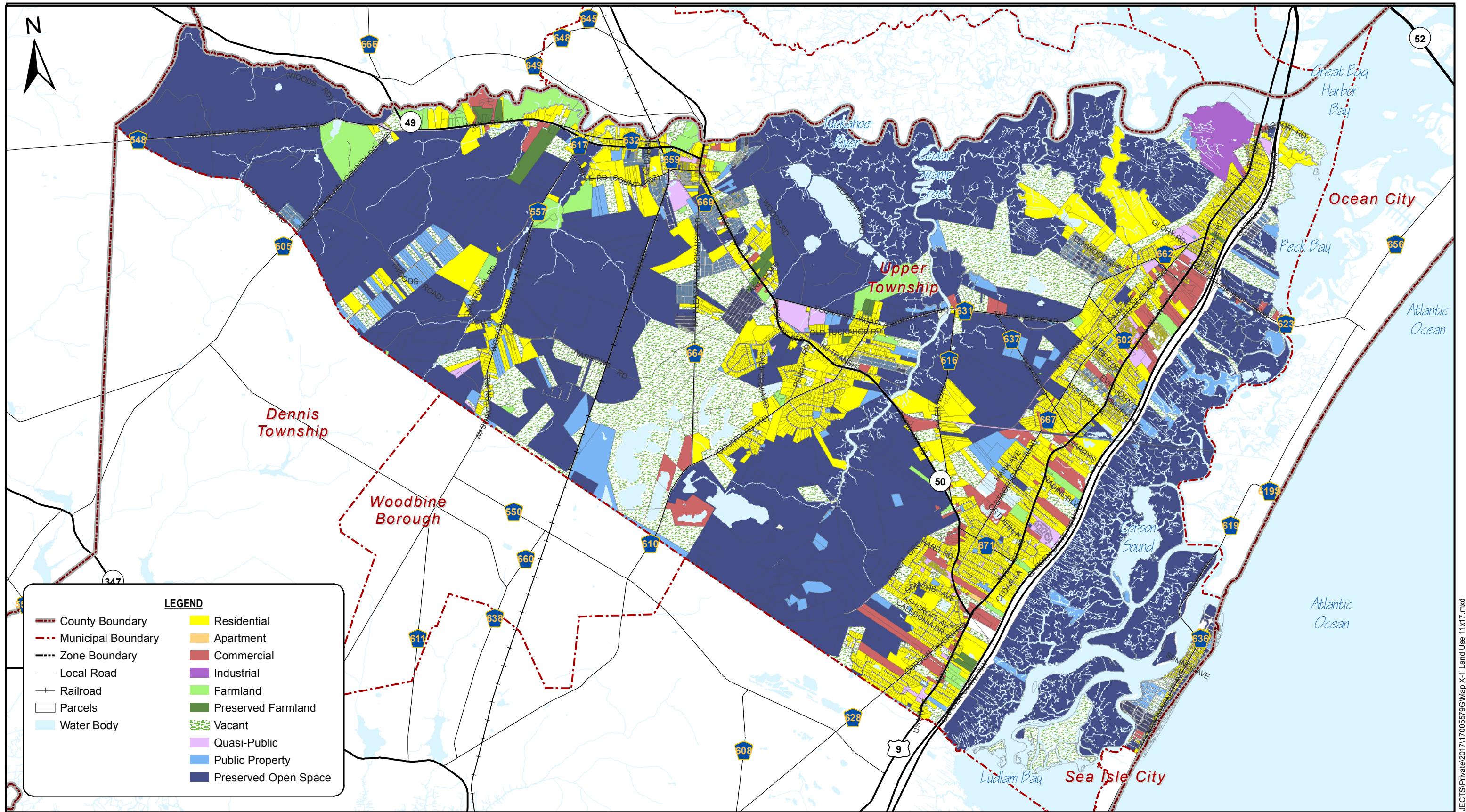
The WQMP Rule does not mandate uniformly zoning minimum lot sizes at the calculated densities across the watershed. Rather, this comparable residential zoning density represents the total number of units that, if built, would not result in a degradation of groundwater quality within a given watershed by exceeding the 2 mg/L nitrate limit. The NJDEP advocates zoning to allow for center-based development, clustering, and protection of environmental features and agriculture land.

Table 12-6: Antidegradation Analysis of Septic Management Area below presents the maximum number of new residential units that can be developed within the septic management area of the Township of Upper without substantially degrading the water quality within each HUC11 Watershed. The Potential New Units is then compared against the Target Septic Units for each HUC11 Watershed to determine whether the zoning will result in degradation of the watershed above the 2 mg/L nitrate standard.

Based on the buildout analysis, the Cape May Bays & Tributaries East HUC11 watershed (02040302080) within the Township of Upper will exceed the target septic density by 209 units at full buildout and the Patcong Creek/Great Egg Harbor Bay HUC11 watershed (02040302060) will exceed the target septic density by 6 units at full buildout.

Table 12-7: Antidegradation Analysis of Septic Management Area					
HUC11 Watershed	Recharge (Acres)	Septic Density (Acres / Septic)	Target (Septic Units)	Potential New Units	Surplus(+)/ Deficit(-)
02040302060 Patcong Creek/Great Egg Harbor Bay	38	8.7	4.32	9.9	-5.58
02040302070 Tuckahoe River	3,110	6.1	509.83	397.5	112.33
02040302080 Cape May Bays & Tribs East	514	8.8	58.38	267.7	-209.32
02040302940 Atlantic Coast (34th St to Cape May Pt)	57	8.6	6.61	0	6.61
TOTAL	3,718	N/A	579.14	675.1	-95.96

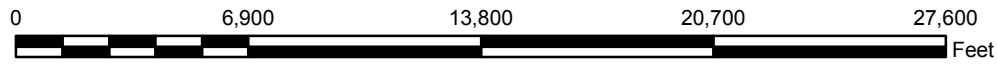




County Boundary
 Municipal Boundary
 Zone Boundary
 Local Road
 Railroad
 Parcels
 Water Body

LEGEND

Residential
 Apartment
 Commercial
 Industrial
 Farmland
 Preserved Farmland
 Vacant
 Quasi-Public
 Public Property
 Preserved Open Space



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MAP 12-1: EXISTING LAND USE

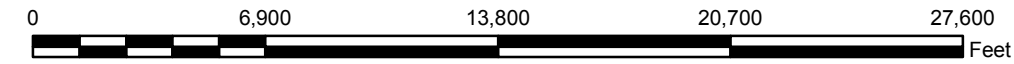
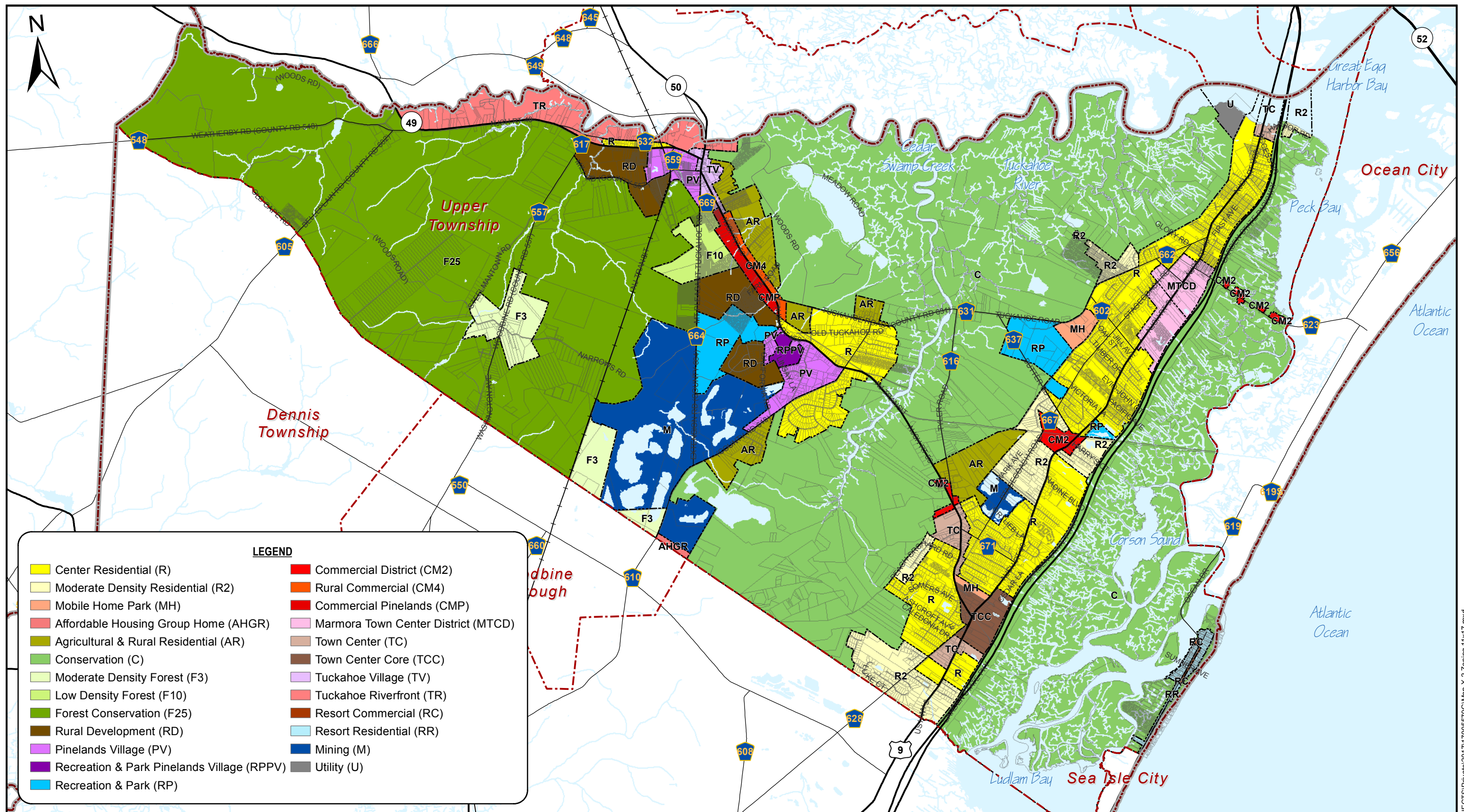
TOWNSHIP OF UPPER

CAPE MAY COUNTY WASTEWATER MANAGEMENT PLAN

COUNTY OF CAPE MAY, NEW JERSEY

MASER
CONSULTING P.A.

May 2018



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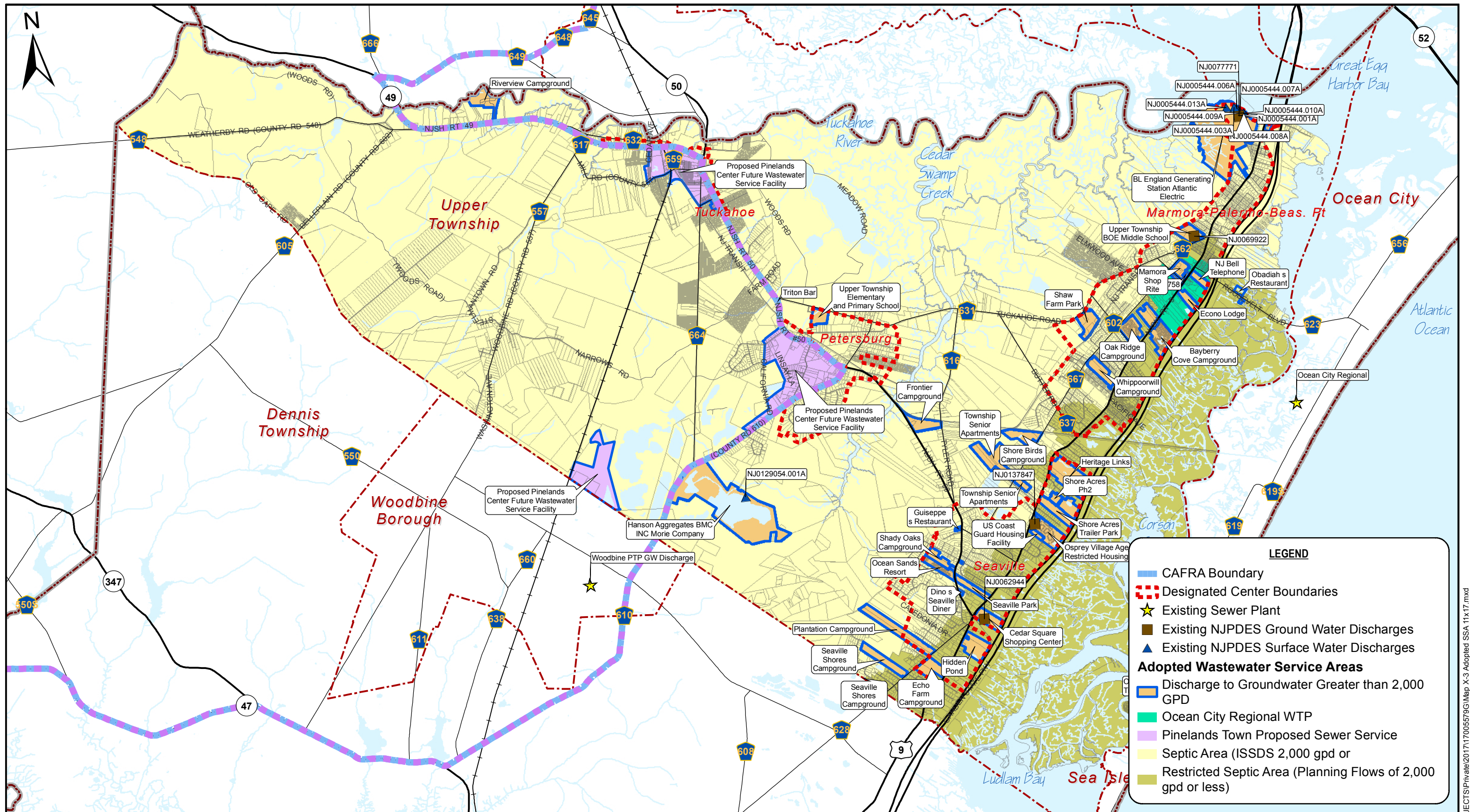
MAP 12-2: EXISTING ZONING TOWNSHIP OF UPPER

CAPE MAY COUNTY WASTEWATER MANAGEMENT PLAN

COUNTY OF CAPE MAY, NEW JERSEY



December 2018



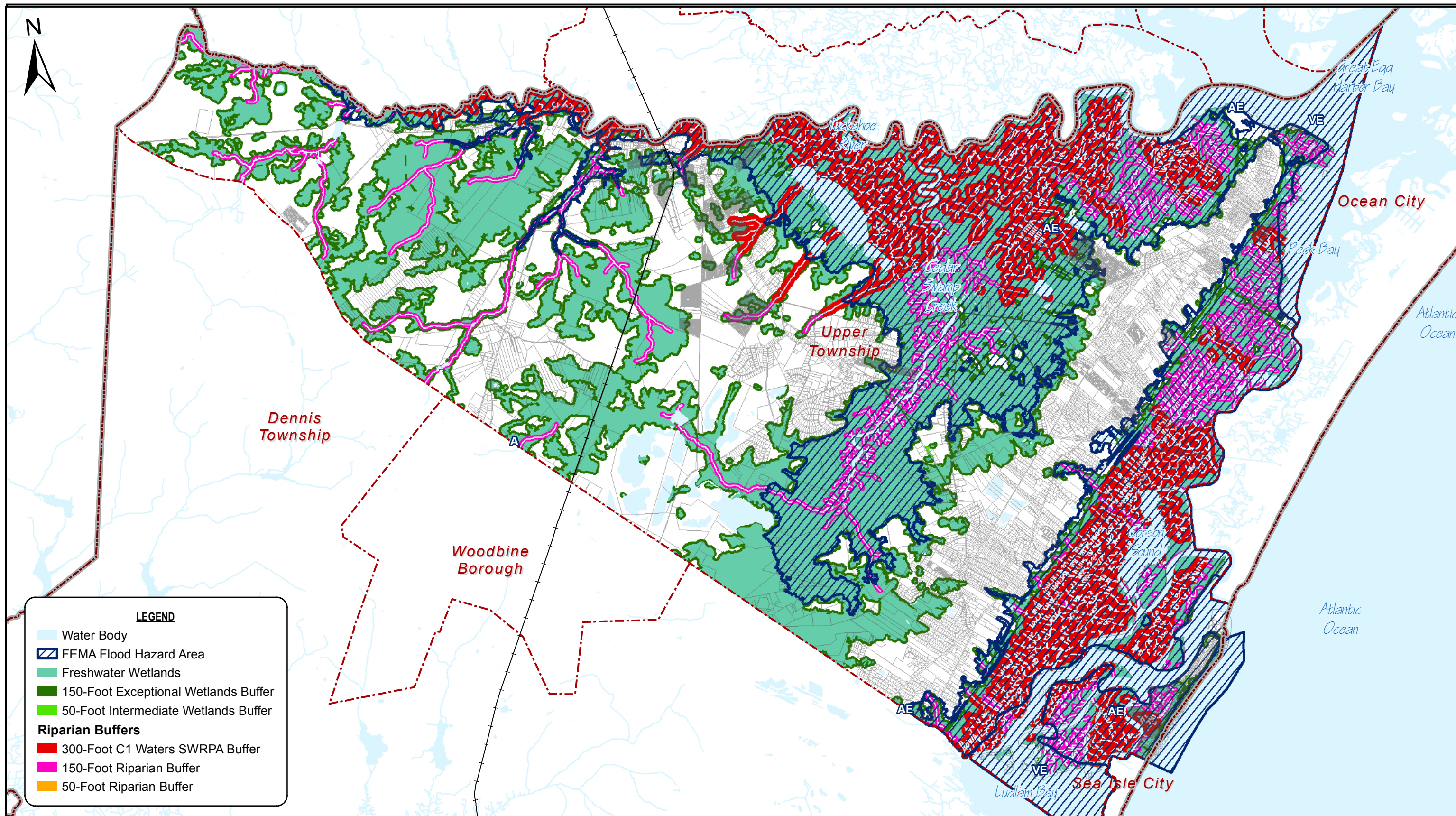
0 6,900 13,800 20,700 27,600 Feet

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MAP 12-3: ADOPTED WASTEWATER SERVICE AREAS TOWNSHIP OF UPPER CAPE MAY COUNTY WASTEWATER MANAGEMENT PLAN COUNTY OF CAPE MAY, NEW JERSEY



\\HOFAS1\Survey\GIS\SPROJECTS\Private\2017\17005579\GMap X-3 Adopted SSA 11x17.mxd



0 6,900 13,800 20,700 27,600 Feet

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MAP 12-4: HYDROLOGIC FEATURES

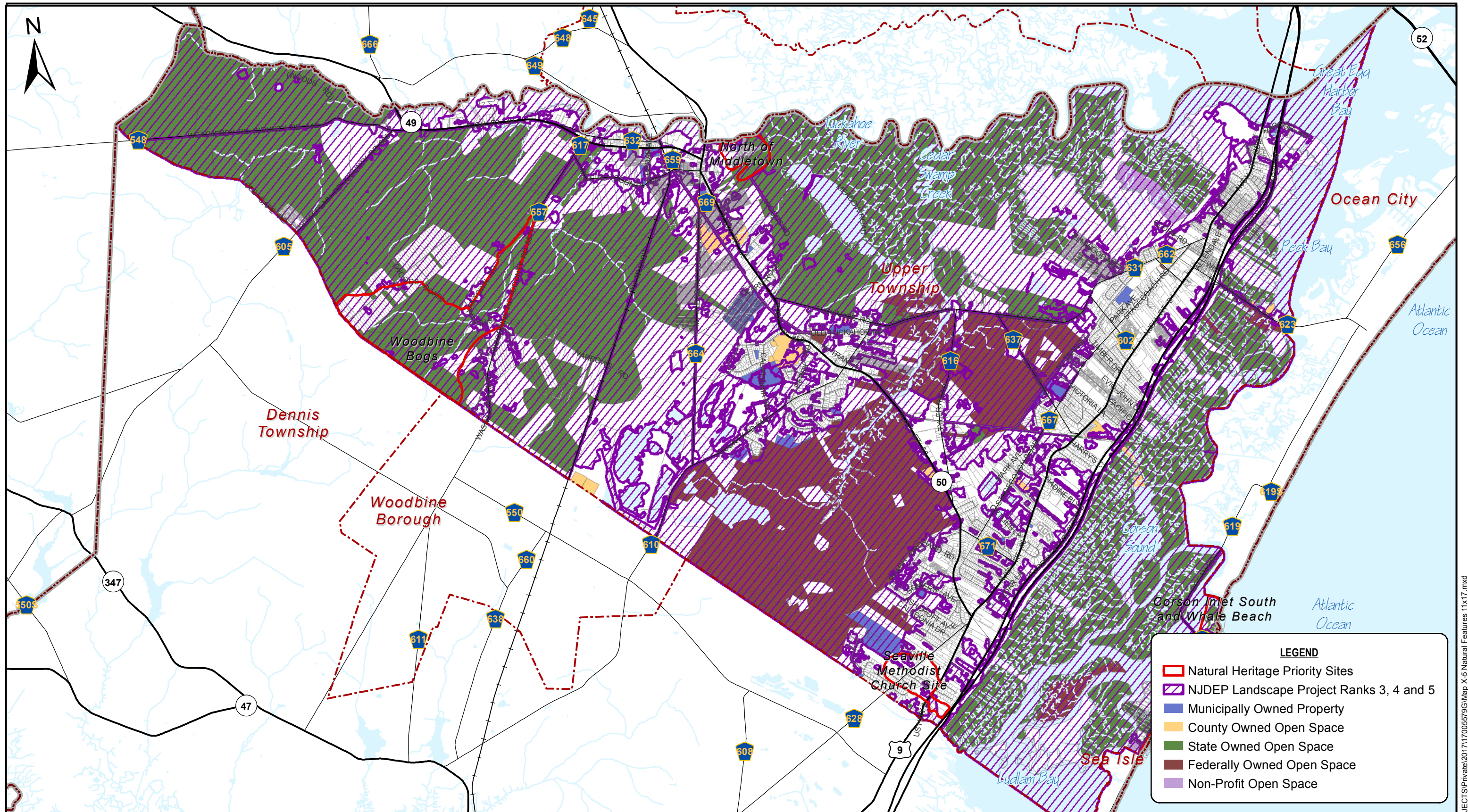
TOWNSHIP OF UPPER

CAPE MAY COUNTY WASTEWATER MANAGEMENT PLAN

COUNTY OF CAPE MAY, NEW JERSEY



March 2018



0 6,900 13,800 20,700 27,600 Feet

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MAP 12-5: NATURAL FEATURES

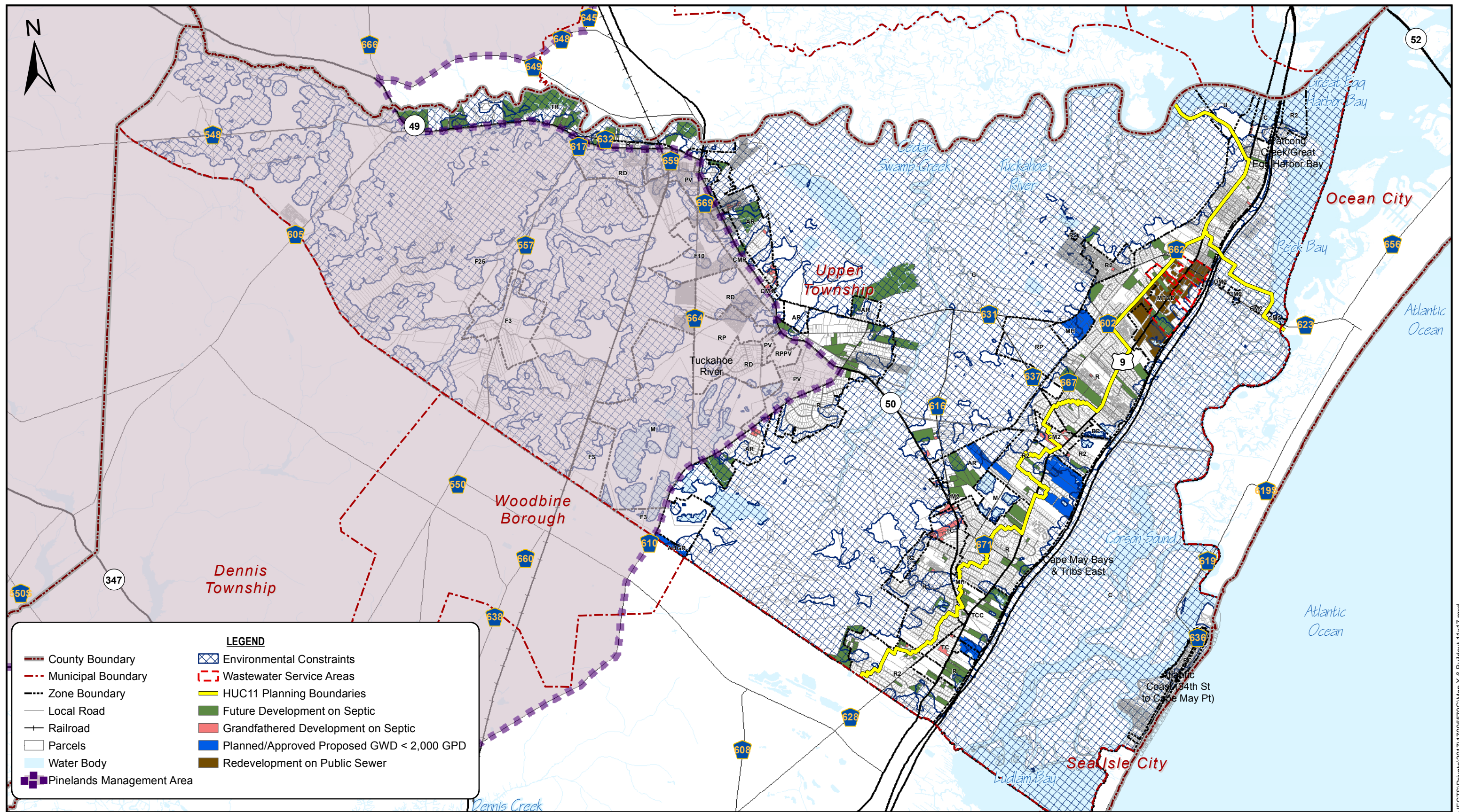
TOWNSHIP OF UPPER

CAPE MAY COUNTY WASTEWATER MANAGEMENT PLAN

COUNTY OF CAPE MAY, NEW JERSEY



May 2018



0 6,900 13,800 20,700 27,600 Feet

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MAP 12-6: BUILDOUT RESULT

TOWNSHIP OF UPPER

CAPE MAY COUNTY WASTEWATER MANAGEMENT PLAN

COUNTY OF CAPE MAY, NEW JERSEY



January 2018