



TOWN OF SOUTH KINGSTOWN, RI

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Wakefield, RI 02879
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Public Services Department

November 20, 2020

Mr. Eric M. Prive, PE
DiPrete Engineering Associates, Inc.
Two Stafford Court
Cranston, RI 02920

Subject: Sewer Feasibility Review
The Village at Curtis Corner
A.P. 40-4, Lot 55
Curtis Corner Road
Wakefield, RI

Dear Mr. Prive:

The Department of Public Services offers the following finding and determination in regard to sewer access for the Village at Curtis Corner Subdivision. As proposed, the Village at Curtis Corner is a 32-unit single-family/duplex residential development on approximately 28 acres located on Curtis Corner Road. Presently, the site is vacant and wooded with a large wetland complex. The land development proposal follows the requirements of the Comprehensive Permit process. The applicant is proposing a connection to the municipal sanitary sewer service available in Curtis Corner Road.

As required by Town Ordinance, Section 19-115(1)b2 (itemizing specific considerations for review by the Department of Public Services) the applicant offers the following *Comments* (*italic*) in a Sewer Feasibility Study dated October 27, 2020. The Department of Public Services **Response** is shown in **bold**.

(i) Conformity to Town of South Kingstown Comprehensive Plan

Comment 1: The proposed residential project is within the Future Sewer Service area which is depicted within Figure 6.2 of the Town's Comprehensive Community Plan (CCP). This is an area of the Town where public sewer service is recommended for any significant new development. The Town of South Kingstown Comprehensive Community Plan specifies that individual developments must be reviewed on a case-by-case basis in order to determine if it is feasible to extend public sewers.

Response: The proposed land development project lies entirely within the Sewer Service Area, which is depicted within Figure 6.1 of the Comprehensive Community Plan (CCP). Planning for sewer services addresses the need for service within the dense core of the Town (which is comprised of smaller acreage lots), whereas rural, less dense periphery areas (with larger acreage lots) will be supported by OWTS.

Because the proposed subdivision is fully within the future service area and the applicant is proposing sewer connection, the proposal is in conformance with the Town of South Kingstown Comprehensive Plan.

(ii) Areas of existing ISDS problems or failures

Comment 2: Areas of existing OWTS problems and failures proves not to be applicable to this project. Existing information shows that the area surrounding the site is already serviced by public sewer. Using the Town of South Kingstown’s Comprehensive Community Plan, it has been determined that the project is to utilize public sewer. This is further confirmed by The State of Rhode Island and Providence Plantations Department of Environmental Management’s Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatments Systems establishes in Rule 250-RICR-150-10-6.15 E. that OWTS systems would not be approved for this project. Rule 250-RICR-150-10-6.15 E. is as follows:

E. Connection to a Public Wastewater System - An OWTS application shall not be approved if such OWTS is proposed to serve a premises for which a public wastewater system is reasonably accessible as determined by the Director, and for which permission to enter the public wastewater system can be obtained from the authority having jurisdiction. The Director shall require the owner or occupant to connect the structure to a public wastewater system within a specified period of time if the following occur:

- 1. The OWTS is failing;*
- 2. Public wastewater system is reasonably accessible as determined by the Director; and*
- 3. Permission to connect to the public wastewater system can be obtained from the authority having jurisdiction over it.*

Using local and state regulations, it is believed that OWTS systems for the project are not a viable option and that connecting to public sewer is the best option for the project.

Response: DPS concurs with the findings.

(iii) Soil conditions not suitable for ISDS placement

Comment 3: RIDEM OWTS Regulations Rule 250-RICR-150-10-6.15 E. states that OWTS systems are not an option for this project as shown in the previous section. However, the soils information for this project have been added to this report for reference. Information from Soil Evaluations that were performed on site show that ledge depths on site are greater than 8 feet. There are three different soil types located in the area of the proposed upland area as mapped by the USDA Natural Resources Conservation Service and the soil types are described as follows:

<i>Soil Symbol</i>	<i>Description</i>	<i>Hydrologic Group</i>
<i>BmA</i>	<i>Bridgehampton silt loam, 0 to 3 percent slopes</i>	<i>B</i>
<i>BmB</i>	<i>Bridgehampton silt loam, 3 to 8 percent slopes</i>	<i>B</i>
<i>NbB</i>	<i>Narragansett very stone silt loam, 0 to 8 percent slopes</i>	<i>B</i>

Response: DPS concurs with the findings.

(iv) Proximity to wetlands, coastal ponds, groundwater resources and other environmental sensitive areas

Comment 4: The proposed development is approximately 28 acres and is located on Curtis Corner Road, which is west of Kingstown Road (Route 108). There is a wooded swamp wetland on the property with an associated 50' perimeter wetland. The proposed development does not propose any disturbance to the onsite jurisdictional wetland.

This site is not located within any of the following areas: Narrow River Special Area Management Plan (CRMC), Salt Ponds Special Area Management Plan (CRMC), Groundwater Protection Overlay District (Town), OWTS Critical Resource Area (RIDEM), Drinking Water Supply (RIDEM).

The Site is within the Asa Pond watershed (RI0010045L-02), which does not have a Total Maximum Daily Loading (TMDL) associated with it.

The residential development is not proposed with onsite wastewater treatment systems (OWTS's) and the project will not contribute additional pathogens to watershed. A Rhode Island Pollutant Discharge Elimination System permit is currently pending with RIDEM to ensure that the project complies to the program regulations for stormwater water quality treatment and mitigation. A copy of the RIPDES Permit will be provided to the town prior to final approval.

Response: DPS concurs with the findings.

(v) Existing and/or planned municipal potable water line locations

Comment 5: The site is serviced by municipal public water. Public utilities exist adjacent to the Site along Curtis Corner Road. Suez Water Rhode Island Inc. (SWRI) is the authority with jurisdiction over access to public water in the area of the development. A connection to the existing 12" water main in Curtis Corner Road is proposed for servicing the Site. Confirmation has been received via letter from Suez Water Rhode Island, that both domestic water service and fire protection is available from the Curtis Corner Road water main.

Response: DPS concurs.

(vi) Economic Feasibility

Comment 6: There are no reasonable alternatives to the proposed sewer connection to the main located in Curtis Corner Road. As such, economic feasibility is not a consideration for this project. The proposed sewer system has been designed as a gravity system with manholes at all major bends and intersections to provide inspection/maintenance access locations. Below is the Schedule of Values for the proposed sewer system:

Land Development Performance Cost Estimate

Rev. 10/27/20

Project Name: The Village at Curtis Corner
 Land Developer: SA Builders, LLC
 Cost Estimate Prepared By: DiPrete Engineering
 Date: October 2020

ITEM NO.	DESCRIPTION	UNIT	QUAN.	UNIT COST	PRE-RECORDING	POST RECORDING	LUMP SUM
					NON-BOND ITEM COST	BOND ITEM COST	ITEM COST
7.0 Sewer							
	4' Diameter Sewer Manhole	EACH	7	\$2,400.00	\$16,800.00	\$0.00	\$16,800.00
	SMH Frame and Cover (TSK STD)	EACH	7	\$640.00	\$4,480.00	\$0.00	\$4,480.00
	6" SDR 35 PVC Sewer Pipe	LF	620	\$60.00	\$37,200.00	\$0.00	\$37,200.00
	8" SDR 35 PVC Sewer Pipe	LF	630	\$60.00	\$37,800.00	\$0.00	\$37,800.00
	Crushed Gravel (Sewer Pipe bedding & initial backfill)	CY	140	\$36.00	\$5,040.00	\$0.00	\$5,040.00
	Sewer Tests (Pressure, Vacuum, Mandrel)	EACH	1	\$500.00	\$500.00	\$0.00	\$500.00
	Traceable Sewer Tape	EACH	1	\$80.00	\$80.00	\$0.00	\$80.00
				Subtotal	\$101,900.00	\$0.00	\$101,900.00

*CONSTRUCTION COSTS BASED ON RHODE ISLAND DEPARTMENT OF TRANSPORTATION (RIDOT) WEIGHTED AVERAGE PRICES, DATA OBTAINED FROM SOUTH KINGSTOWN ENGINEERING DEPARTMENT, AND DIPRETE ENGINEERING ASSOCIATES LOCAL KNOWLEDGE

Response: DPS concurs with the estimated cost of construction for sanitary sewers. Further, an analysis of other sanitary sewer configurations is not warranted, since the proposed collection system is entirely via gravity and no wastewater pumping stations are proposed. Consideration for future extension of sewers to the north or west of the land area proposed for development is also not warranted to due a large wetlands complex.

(vii) Lot size

Comment 7: The Site includes a total of approximately 28 acres with frontage on Curtis Corner Road. The project is proposed as 32 unit residential subdivision.

While public sewers are available in Curtis Corner Road, we analyzed the alternative for the feasibility/potential for an Onsite Wastewater Treatment System (OWTS) on the property. Soil evaluations were performed by an RIDEM Class IV Licensed Soil Evaluator and were determined to be 54-96" throughout the site. RIDEM criteria for minimum seasonal high groundwater table to support an OWTS is 24" depth, so it is feasible on the property. Also, the site is not located within any RIDEM Critical Resource Areas, therefore a conventional leachfield can be utilized. Also, the subject property and surrounding properties are serviced by public water through Suez Water, therefore additional setback requirements to private/public wells are not required.

The following calculations provide a rough sizing for an OWTS on the property:

- 32 residential homes @ 2-bedrooms per unit = 64 bedrooms total
- 64 bedrooms @ 115 gallons per day (gpd)/bedroom (per RIDEM OWTS Regulations) = 7,360 gpd
- Assuming a soil loading rate of 0.61 square feet (sf) per gallon for sandy loam, the leachfield size would need to be a minimum of 12,066 sf (7,360 gpd / 0.61 = 12,066 sf)

At a minimum leachfield size of 12,066 sf (or 3.7% of the upland suitable area), there is more than adequate space for a proposed leachfield area, if it were necessary.

Response: DPS concurs with the findings although the lots are proposed to be smaller than would be required to allow for a higher density. The proposed layout is more conducive to an urban core and better suited to municipal sewer.

(viii) Impact on areas in the vicinity of the proposed main extension

Comment 8

Future Service Area

According to Figure 6.2 of the Town's Comprehensive Community Plan (CCP) the site is located in a Future Sewer Service Area and is to utilize public sewer.

Property Value

Connection to the existing sewer main will not require an easement and will not diminish the property value of adjacent properties.

Overall Wastewater Flow Rates

The Technical Review Committee (TRC) comments from Department of Public Services also requested that a downstream carrying capacity analysis be performed to determine the ability of the existing wastewater infrastructure to handle the proposed flows. The existing sewer line within Curtis Corner Road is a 12" diameter gravity main with a 0.22% slope. The existing 12" gravity sewer main within Curtis Corner Road can transmit approximately 1.4 cubic feet per second (cfs) of flow, which equates to approximately 0.90 million gallons per day (MGD). The Village at Curtis Corner is proposing a 32 unit subdivision with an estimate average daily flow of 300 gpd per unit. The calculated average daily flow is 9,600 gpd for the development. The 9,600 gpd flow represents 1.1% of the pipe capacity proving to be a negligible impact on the system.

Impact on Receiving Wastewater Treatment Facilities

Flow from this development ultimately discharges to the South Kingstown Regional Wastewater Treatment Facility (WWTF). The South Kingstown Regional Wastewater Treatment Facility serves Narragansett, South Kingstown, and the University of Rhode Island (URI). Although the Regional WWTF has an average design capacity of 5.0 MGD, according to the Town's RIPDES permit issued by RIDEM, available capacity at the Regional WWTF is based upon the highest three (3) consecutive months of wastewater flow. The highest three (3) months of flow for the past two years is as follows: 71.59% in FY 2017-18 and 76.04% in FY 2018-19. The proposed development design flow of 9,600 gpd is an approximate 0.8% increase to the available capacity (9,600 gpd/1.2 MGD = 0.8%). The Regional WWTF will not be impacted by the proposed 32 unit residential subdivision.

Response: DPS concurs with the findings. In the downstream carrying capacity analysis (attached hereto), dated September 4, 2020, prepared by the applicant, the calculations show that the impacts to the existing sewer infrastructure within Curtis Corner Road is negligible and that there is adequate capacity in the Curtis Corner Road to accommodate sanitary wastewater flow from the subject development. As such, upgrades to the Curtis Corner Road interceptor by the project developer are not warranted at this time.

(ix) Potential effect on private or municipal potable water groundwater wells within the future

Comment 9: It has been determined that a proposed sewer connection would not affect any groundwater wells being that there are none in the area. RIDEM OWTS regulations state in Rule 250-RICR-150-10-6.15 E. that OWTS systems are not feasible options for this project

which entirely rules out the potential effect on groundwater wells by OWTS systems. Information from RIDEM and the Town of South Kingstown was used for this determination.

Response: DPS concurs with the findings.

Summary:

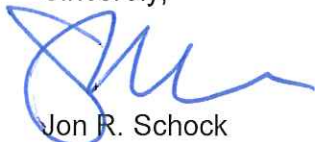
As stated above, Section 19-115(1)b2, requires that conformity to the Comprehensive Community Plan be considered for property within the existing and/or future sewer service area. The Services and Facilities Element of the South Kingstown Comprehensive Community Plan specifically addresses the connection of new developments within the sewer service area to municipal sewers.

Furthermore, Figure 6.1 Sewer Service Areas of the Comprehensive Community Plan indicates certain areas in the central part of Town as being a Future Sewer Service Area. "Generally, it is the policy of the Town to encourage public sewer service to these areas in order to mitigate contamination to the ground and surface waters which may result from the cumulative impacts of septic systems in high density areas." As such, this office does not dispute the findings of DiPrete Engineering with regard to the project as represented and agrees that the connection of the future lots to the existing sewer service on Curtis Corner Road is warranted.

Therefore, it is the finding and determination of this Office that the proposed 32-unit development known as the "Village at Curtis Corner" is approved with sanitary sewer connection as proposed.

Please feel free to contact me at 789-9331, extension 2250, should you have any additional questions relative to this matter.

Sincerely,



Jon R. Schock
Public Services Director

Attachments:

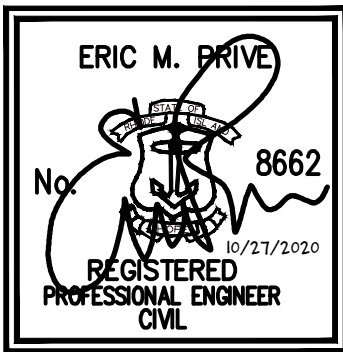
cc: Kathy Perez, Wastewater Superintendent
Richard Bourbonnais, PE, Town Engineer
James Rabbitt, Director of Planning

The Village at Curtis Corner

Sewer Feasibility Study

South Kingstown, Rhode Island

October 27, 2020



Prepared for:
5A Builders, LLC
220 Knowlesway Extension
Narragansett, RI 02882

Prepared by:
DiPrete Engineering Associates, Inc.
Two Stafford Court
Cranston, RI 02920

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Introduction

The Village at Curtis Corner (Site) is proposed as a 32-unit residential subdivision located on approximately 28 acres located off Curtis Corner Road. The residential subdivision proposes the construction of 32 new residential units consisting of a mixture of single-family and duplex homes.

The sewer connection was analyzed using the criteria found in the Code of Ordinances for the Town of South Kingstown, Chapter 19, Article II, Sec. 19-115 (1) b. 2.

2. The director shall consider the following criteria in determining if a mandatory connection and/or sewer main extension is required:

- (i) Conformity to Town of South Kingstown Comprehensive Plan.*
- (ii) Areas of existing ISDS problems or failures.*
- (iii) Soil conditions not suitable for ISDS placement.*
- (iv) Proximity to wetlands, coastal ponds, groundwater resources and other environmentally sensitive areas.*
- (v) Existing and/or planned municipal potable waterline locations.*
- (vi) Economic feasibility.*
- (vii) Lot size.*
- (viii) Impact on areas in the vicinity of the proposed main extension.*
- (ix) Potential effect on private or municipal potable water groundwater wells within the future.*

1.0 Conformity to Town of South Kingstown Comprehensive Plan

The proposed residential project is within the Future Sewer Service area which is depicted within Figure 6.2 of the Town's Comprehensive Community Plan (CCP). This is an area of the Town where public sewer service is recommended for any significant new development. The Town of South Kingstown Comprehensive Community Plan specifies that individual developments must be reviewed on a case-by-case basis in order to determine if it is feasible to extend public sewers.

2.0 Areas of Existing OWTS Problems and Failures

Areas of existing OWTS problems and failures proves not to be applicable to this project. Existing information shows that the area surrounding the site is already serviced by public sewer. Using the Town of South Kingstown's Comprehensive Community Plan, it has been determined that the project is to utilize public sewer. This is further confirmed by The State of Rhode Island and Providence Plantations Department of Environmental Management's Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatments Systems establishes in Rule 250-RICR-150-10-6.15 E. that OWTS systems would not be approved for this project. Rule 250-RICR-150-10-6.15 E. is as follows:

- E. Connection to a Public Wastewater System - An OWTS application shall not be approved if such OWTS is proposed to serve a premises for which a public wastewater system is reasonably accessible as determined by the Director, and for which permission to enter the public wastewater system can be obtained from the authority having jurisdiction. The Director shall require the owner or occupant to connect the structure to a public wastewater system within a specified period of time if the following occur:*
- 1. The OWTS is failing;*
 - 2. Public wastewater system is reasonably accessible as determined by the Director; and*
 - 3. Permission to connect to the public wastewater system can be obtained from the authority having jurisdiction over it.*

Using local and state regulations, it is believed that OWTS systems for the project are not a viable option and that connecting to public sewer is the best option for the project.

3.0 Soil Conditions Not Suitable for OWTS Placement

RIDEM OWTS Regulations Rule 250-RICR-150-10-6.15 E. states that OWTS systems are not an option for this project as shown in the previous section. However, the soils information for this project have been added to this report for reference. Information from Soil Evaluations that were performed on site show that ledge depths on site are greater than 8 feet. There are three different soil types located in the area of the proposed upland area as mapped by the USDA Natural Resources Conservation Service and the soil types are described as follows:

<u>Soil Symbol</u>	<u>Description</u>	<u>Hydrologic Group</u>
BmA	Bridgehampton silt loam, 0 to 3 percent slopes	B
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4.0 Proximity to Wetlands, Coastal Ponds, Groundwater Resources & Other Environmental Sensitive Areas

The proposed development is approximately 28 acres and is located on Curtis Corner Road, which is west of Kingstown Road (Route 108). There is a wooded swamp wetland on the property with an associated 50' perimeter wetland. The proposed development does not propose any disturbance to the onsite jurisdictional wetland.

This site is not located within any of the following areas: Narrow River Special Area Management Plan (CRMC), Salt Ponds Special Area Management Plan (CRMC), Groundwater Protection Overlay District (Town), OWTS Critical Resource Area (RIDEM), Drinking Water Supply (RIDEM).

The Site is within the Asa Pond watershed (RI0010045L-02), which does not have a Total Maximum Daily Loading (TMDL) associated with it.

The residential development is not proposed with onsite wastewater treatment systems (OWTS's) and the project will not contribute additional pathogens to watershed. A Rhode Island Pollutant Discharge Elimination System permit is currently pending with RIDEM to ensure that the project complies to the program regulations for stormwater water quality treatment and mitigation. A copy of the RIPDES Permit will be provided to the town prior to final approval.

5.0 Existing and/or Planned Municipal Potable Water Line Locations

The site is serviced by municipal public water. Public utilities exist adjacent to the Site along Curtis Corner Road. Suez Water Rhode Island Inc. (SWRI) is the authority with jurisdiction over access to public water in the area of the development. A connection to the existing 12" water main in Curtis Corner Road is proposed for servicing the Site. Confirmation has been received via letter from Suez Water Rhode Island, that both domestic water service and fire protection is available from the Curtis Corner Road water main.

6.0 Economic Feasibility

There are no reasonable alternatives to the proposed sewer connection to the main located in Curtis Corner Road. As such, economic feasibility is not a consideration for this project. The proposed sewer system has been designed as a gravity system with manholes at all major bends and intersections to provide inspection/maintenance access locations. Below is the Schedule of Values for the proposed sewer system:

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Rev. 10/27/20

Project Name: The Village at Curtis Corner
 Land Developer: 5A Builders, LLC
 Cost Estimate Prepared By: DiPrete Engineering
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	4" Diameter Sewer Manhole	EACH	7	\$2,400.00	\$16,800.00	\$0.00	\$16,800.00
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7.0 Lot Size

The Site includes a total of approximately 28 acres with frontage on Curtis Corner Road. The project is proposed as 32 unit residential subdivision.

While public sewers are available in Curtis Corner Road, we analyzed the alternative for the feasibility/potential for an Onsite Wastewater Treatment System (OWTS) on the property. Soil evaluations were performed by an RIDEM Class IV Licensed Soil Evaluator and were determined to be 54-96" throughout the site. RIDEM criteria for minimum seasonal high groundwater table to support an OWTS is 24" depth, so it is feasible on the property. Also, the site is not located within any RIDEM Critical Resource Areas, therefore a conventional leachfield can be utilized. Also, the subject property and surrounding properties are serviced by public water through Suez Water, therefore additional setback requirements to private/public wells are not required.

The following calculations provide a rough sizing for an OWTS on the property:

- 32 residential homes @ 2-bedrooms per unit = 64 bedrooms total
- 64 bedrooms @ 115 gallons per day (gpd)/bedroom (per RIDEM OWTS Regulations) = 7,360 gpd
- Assuming a soil loading rate of 0.61 square feet (sf) per gallon for sandy loam, the leachfield size would need to be a minimum of 12,066 sf (7,360 gpd / 0.61 = 12,066 sf)

At a minimum leachfield size of 12,066 sf (or 3.7% of the upland suitable area), there is more than adequate space for a proposed leachfield area, if it were necessary.

8.0 Impact on Areas in the Vicinity of the Proposed Main Extension

Future Service Area

According to Figure 6.2 of the Town's Comprehensive Community Plan (CCP) the site is located in a Future Sewer Service Area and is to utilize public sewer.

Property Value

Connection to the existing sewer main will not require an easement and will not diminish the property value of adjacent properties.

Overall Wastewater Flow Rates

The Technical Review Committee (TRC) comments from Department of Public Services also requested that a downstream carrying capacity analysis be performed to determine the ability of the existing wastewater infrastructure to handle the proposed flows. The existing sewer line within Curtis Corner Road is a 12" diameter gravity main with a 0.22% slope. The existing 12" gravity sewer main within Curtis Corner Road can transmit approximately 1.4 cubic feet per second (cfs) of flow, which equates to approximately 0.90 million gallons per day (MGD). The Village at Curtis Corner is proposing a 32 unit subdivision with an estimate average daily flow of 300 gpd per unit. The calculated average daily flow is 9,600 gpd for the development. The 9,600 gpd flow represents 1.1% of the pipe capacity proving to be a negligible impact on the system.

Impact on Receiving Wastewater Treatment Facilities

Flow from this development ultimately discharges to the South Kingstown Regional Wastewater Treatment Facility (WWTF). The South Kingstown Regional Wastewater Treatment Facility serves Narragansett, South Kingstown, and the University of Rhode Island (URI). Although the Regional WWTF has an average design capacity of 5.0 MGD, according to the Town's RIPDES permit issued by RIDEM, available capacity at the Regional WWTF is based upon the highest three (3) consecutive months of wastewater flow. The highest three (3) months of flow for the past two years is as follows: 71.59% in FY 2017-18 and 76.04% in FY 2018-19. The proposed development design flow of 9,600 gpd is an approximate 0.8% increase to the available capacity (9,600 gpd/1.2 MGD = 0.8%). The Regional WWTF will not be impacted by the proposed 32 unit residential subdivision.

9.0 Potential Effect on Private or Municipal Potable Water Groundwater Wells Within the Future

It has been determined that a proposed sewer connection would not affect any groundwater wells being that there are none in the area. RIDEM OWTS regulations state in Rule 250-RICR-150-10-6.15 E. that OWTS systems are not feasible options for this project which entirely rules out the potential effect on groundwater wells by OWTS systems. Information from RIDEM and the Town of South Kingstown was used for this determination.

10.0 Conclusion

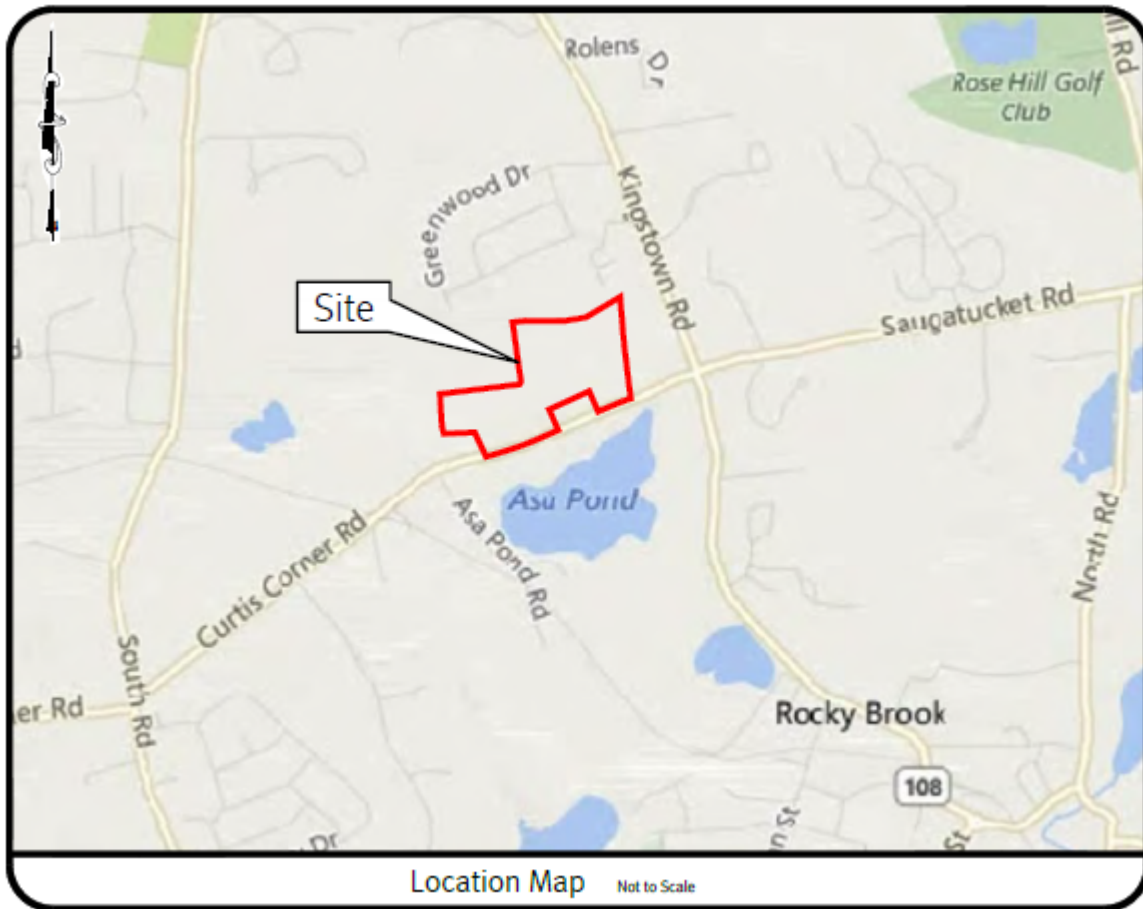
After reviewing the criteria found in the Code of Ordinances for the Town of South Kingstown, Chapter 19, Article II, Sec. 19-115 (1) b. 2. and considering RIDEM OWTS Regulations Rule 250-RICR-150-10-6.15 E., connecting to the sewer main in Curtis Corner Road is the only feasible option.

Factors for generating conclusion:

- Surrounding properties are connected to the public sewer lines by means of gravity sewer
- The project is within the Town of South Kingstown's Comprehensive Community Plan Future Sewer Service Area
- Projected flow from the project accounts for negligible increase to the existing infrastructure
- Ledge excavation is not anticipated
- The Curtis Corner Road sewer main can adequately convey the additional wastewater flow from the project
- The Curtis Corner Road sewer line is downgradient of the Site, which provides optimal elevations to extend a gravity sewer to the proposed development
- The project adheres to RIDEM OWTS Regulations Rule 250-RICR-150-10-6.15 E. that rules out the option of individual OWTS
- The project does not abut any other streets

In conclusion, the project provides a gravity sewer line that will serve the proposed development and connects to the existing Curtis Corner Road gravity sewer main. It is DiPrete Engineering's professional opinion that a gravity sewer line connection to Curtis Corner Road has been proven to be the most feasible option for The Village at Curtis Corner project.

Appendix A: Locus Map



Appendix B: Town Ordinance

Sec. 19-115. Connection policy.

The town hereby establishes the following policy relative to future connections to the sewer system:

(1) *Property within the existing and/or future sewer service area.* Any parcel of land located within the existing and/or future sewer service area as defined in figure 6.2 entitled "Sewer Service Areas," of the Town of South Kingstown Comprehensive Community Plan, may be required to connect to the sanitary sewer system. The property owner agrees to abide by all conditions, restrictions, standards, specifications, design criteria, and to pay all fees which may be established by the town. The property owner shall also pay any cost(s) associated with sewer service connection and/or sewer main extensions.

a. Property located along and abutting an existing sewer line shall be governed by section 19-33.

b. Property not located along and not abutting an existing sewer line where the property will require a sewer line extension shall be governed by section 19-111 and the following:

1. The utilities director may require that property(s) proposed for development be required to connect to the sanitary sewer system provided the following conditions are met: i.) satisfactory grades are established meeting the approval of the utilities director, and ii.) permanent rights-of-way and easements are granted to the town (where required).

2. The utilities director shall consider the following criteria in determining if a mandatory connection and/or sewer main extension is required:

- (i) Conformity to Town of South Kingstown Comprehensive Plan.
- (ii) Areas of existing ISDS problems or failures.
- (iii) Soil conditions not suitable for ISDS placement.
- (iv) Proximity to wetlands, coastal ponds, groundwater resources and other environmentally sensitive areas.
- (v) Existing and/or planned municipal potable waterline locations.
- (vi) Economic feasibility.
- (vii) Lot size.
- (viii) Impact on areas in the vicinity of the proposed main extension.
- (ix) Potential effect on private or municipal potable water groundwater wells within the future.

3. if connection is mandated, then the individual property owner(s) must submit an extension request under the following procedure. The owner of property, or his agent, shall apply in writing to the utilities department giving the following information:

- (i) Name.
- (ii) Street.
- (iii) Address.

- (iv) Assessor's plat and lot.
- (v) Proposed use of property.
- (vi) Number of units (residential).
- (vii) Proposed daily wastewater flow (nonresidential).

c. Individual sewer lift or pumping stations will be subject to approval by the utilities director. Only pressure connections to individual lots constructed perpendicular to a gravity sewer main will be considered. The pressure sewer line shall transition to a gravity sewer lateral at the applicant's property line. Community low-pressure sewer mains and/or laterals serving more than one (1) property is prohibited.

d. An applicant requesting sewer main extensions within the existing and/or future sewer service area shall prepare an engineering study at applicant's expense by a registered professional engineer delineating various wastewater methodologies satisfactory to the utilities director. This study shall address, as a minimum, the criteria identified in subsection (1)b.2 to the satisfaction of the utilities director. This document will be subject to applicable local, state and federal regulations.

e. The requested sewer connection must demonstrate that the existing sewer main designated for extension is of sufficient capacity to properly accommodate the projected sewer flows as determined by the utilities director.

f. All sewer main extensions for land subdivisions as defined in the Subdivision Regulations of the Town of South Kingstown shall be subject to planning board approval.

g. The utilities director may waive the requirement for mandatory sewer connection when in the opinion of the director sufficient evidence indicates that sewer connection is not feasible based upon criteria delineated in subsections (1) b.2 and (1)c–e.

(2) *Properties abutting or beyond the future sewer service area.* Any applicant requesting sanitary sewers for property(s) either abutting or beyond the future sewer service area which meets the criteria delineated for such extensions in the comprehensive plan may be permitted. The applicant for said extension shall submit an application to the town clerk for amendment to the future sewer service area map of the comprehensive plan in accordance with the procedure set forth in chapter 45-22.2 of the General Laws, the Rhode Island Comprehensive Planning and Land Use Regulation Act. The application for amendment to the comprehensive plan shall be accompanied by all information required under subsection (1)b.

(3) *Appeals.* Appeals contrary to the utilities director's decision regarding sanitary sewer connection shall be made to the town manager.

(4) *Property owner/developer obligations.* The following obligations apply to all sewer line connections:

a. The property owner and/or developer agrees to abide by all conditions, restrictions, standards, specifications, design criteria and to pay all fees which may be established by the town and/or the State of Rhode Island. All costs for sewer main extensions shall be paid for by the developer and/or property owner, including pipelines and services, and will not be entitled to any refunds or rebates.

b. The developer's contractor shall submit evidence satisfactory to the utilities



September 4, 2020
 Revised October 7, 2020

Richard J. Bourbonnais, PE, Town Engineer
 Town of South Kingstown
 Department of Engineering
 509 Commodore Perry Highway
 Wakefield, RI 02879

**RE: The Village at Curtis Corner Sewer Study
 Curtis Corner Road
 South Kingstown, RI
 DE Project #: 0265-053-A03**

Dear Mr. Bourbonnais:

The above referenced project is proposed for construction at Curtis Corner Road, South Kingstown, Rhode Island. The site is located on Assessors' Plat 40-4 Lot 55 (portion of former Lot 33 shown on the attached Sewer Load Analysis). The proposed 32-unit subdivision is proposed to be serviced by public water, public sewer and underground utilities. We are respectfully submitting this letter to summarize flows resulting from the development and its impact to the town sewer system.

Development Sewer Flow Estimation:

The sewer flow for the project was estimated conservatively using 150 gallons per bedroom per day.

32 Two-bedroom units = (150 gpd/unit x 2 bedrooms/unit x 32 units) = **9,600 gallons per day (6.7 gpm).**

Downstream Sewer Flow Review:

Curtis Corner Road is serviced by a 12" sewer main with slope of 0.0022'/' per the Curtis Corner Road as-built drawing prepared by CE Maguire, Inc. dated June 1979. This flows into the Kingstown Road 21" interceptor approximately 700' east of the proposed site driveway location. The capacity of the Curtis Corner Road main using a conservative n value of 0.013 is:

$$Q = (1.49 / 0.013) * (\pi * 0.5^2) * (0.25^{2/3}) * (0.0022^{1/2}) = 1.68 \text{ cfs} * 7.48 \text{ gal/cf} * 60 \text{ s/min} = 754 \text{ gpm.}$$

Per Town of South Kingstown Department of Public Services' environmental consultant, we have been requested to use 0.7D when calculating pipe capacity. In satisfying their request, the pipe capacity would be:

Inputs		Results	
Pipe diameter, d ₀	12 in	Flow, Q	627.8811 gpm
Manning roughness, n	0.013	Velocity, v	2.3824 ft/sec
Pressure slope (possibly ? equal to pipe slope), S ₀	0.0022 rise/run	Velocity head, h _v	1.0586 in H ₂ O
Percent of (or ratio to) full depth (100% or 1 if flowing full)	0.7 fraction	Flow area	84.5613 sq. in.
		Wetted perimeter	23.7878 in
		Hydraulic radius	3.5548 in
		Top width, T	10.9982 in
		Froude number, F	0.52
		Shear stress (tractive force), tau	0.0407 psf

Reference: hawsedc.com

Q = 628 gpm.

Sewer flow information for all areas contributing to the Curtis Corner main was obtained in June 2019 and organized to determine upstream and downstream flows. See attached for the spreadsheet with raw data. The total annual flow contributing to the sewer main prior to discharge to the Kingstown Road interceptor is 3,274,090 cu. ft. (24,490,193 gallons). The average daily flow is:

$24,490,193 \text{ gallons} / 365 \text{ days} = 67,096 \text{ gpd} / 1440 \text{ minutes} = \mathbf{46.6 \text{ gpm}}$.

Using a conservative safety/peaking factor of 5.6 rounded to 6 for "peak on maximum day" from the TR-16 Guide, the peak flow would be **280 gpm**.

Under these conditions, the current pipe flows at 280 gpm / 628 gpm = *44.6% capacity*.

The new subdivision will result in a 1.07% (6.7 gpm / 628 gpm) increase to the pipe's flow, for a proposed pipe flow at $44.6\% + 1.07\% = 45.7\% \text{ capacity}$.

Using a conservative infiltration/inflow rate of 500 gallons per day per inch diameter per mile from the top end suggestion in the TR-16 guide, the I/I for this branch of the system is approximately:

$500 * 12" \text{ diameter} * 6 \text{ miles (rounded up from measured 5.1 miles)} = 36,000 \text{ gpd} / 1,440 \text{ m/d} = \mathbf{25 \text{ gpm}}$.

Therefore the final existing and proposed flow as a proportion of 0.7 times full pipe capacity will be:

Existing = $(280 \text{ gpm} + 25 \text{ gpm}) / 628 \text{ gpm} = \mathbf{48.6\% \text{ capacity}}$.
Proposed = $(305 \text{ gpm} + 6.7 \text{ gpm}) / 628 \text{ gpm} = \mathbf{49.6\% \text{ capacity}}$.

It is our opinion that this increase to the sewer system will be insignificant and not contribute to an overloading of pipe capacity.

We are respectfully seeking confirmation of sewer service availability for this project.

If you have any further questions on this matter, please feel free to contact me at your earliest convenience.

Sincerely,
DiPrete Engineering Associates, Inc.

Kevin DeMers, PE
Project Manager

Attachments: Table 1 – Sewer Data for Curtis Corner sewer main branch
Figure 2 – Curtis Corner Minor Subdivision Sewer Load Analysis
Figure 3 – TR-16 "Relation of Extreme Discharges on Maximum and Minimum Days to the Average Daily Discharge of Domestic Sewer"

Table 1

Plat	Lot	Parcel ID	Parcel Location	Sewer Account	Parcel Address	Property Type	Annual Consumption
40-1	128	40-1:128	DOWNSTREAM	S-13-1176-10	1790 KINGSTOWN ROAD	COMMERCIAL	18,200
40-4	32	40-4:32	DOWNSTREAM	S-11-0786-00	57 CURTIS CORNER ROAD	RESIDENTIAL	4,400
39-3	15	39-3:15	UPSTREAM	S-11-1205-90	415 CURTIS CORNER ROAD	RESIDENTIAL	10,500
39-3	17	39-3:17	UPSTREAM	S-11-1165-00	391 CURTIS CORNER ROAD	RESIDENTIAL	1,700
39-3	18	39-3:18	UPSTREAM	S-11-1263-90	381 CURTIS CORNER ROAD	COMMERCIAL	20,000
39-3	19	39-3:19	UPSTREAM	S-11-1274-20	376 CURTIS CORNER ROAD	RESIDENTIAL	5,500
39-3	20	39-3:20	UPSTREAM	S-13-1163-80	301 CURTIS CORNER ROAD	COMMERCIAL	59,690
39-3	28	39-3:28	UPSTREAM	S-11-1163-20	14 SWEET ALLEN FARM ROAD	RESIDENTIAL	7,400
40-4	2	40-4:2	UPSTREAM	S-11-0109-00	333 CURTIS CORNER ROAD	RESIDENTIAL	9,500
40-4	21	40-4:21	UPSTREAM	S-11-0559-00	298 CURTIS CORNER ROAD	RESIDENTIAL	5,500
40-4	22	40-4:22	UPSTREAM	S-11-0018-50	310 CURTIS CORNER ROAD	RESIDENTIAL	1,800
40-4	23	40-4:23	UPSTREAM	S-11-0331-50	276 CURTIS CORNER ROAD	RESIDENTIAL	5,600
40-4	25	40-4:25	UPSTREAM	S-11-0812-50	260 CURTIS CORNER ROAD	RESIDENTIAL	10,700
40-4	28	40-4:28	UPSTREAM	S-11-0020-00	240 CURTIS CORNER ROAD	RESIDENTIAL	5,000
40-4	29	40-4:29	UPSTREAM	S-11-0938-50	214 CURTIS CORNER ROAD	RESIDENTIAL	10,600
40-4	3	40-4:3	UPSTREAM	S-11-0933-50	15 MELLBRIDGE DRIVE	RESIDENTIAL	12,200
40-4	30	40-4:30	UPSTREAM	S-11-1205-30	202 CURTIS CORNER ROAD	RESIDENTIAL	10,000
40-4	31	40-4:31	UPSTREAM	S-11-0841-50	190 CURTIS CORNER ROAD	RESIDENTIAL	1,900
40-4	33	40-4:33	UPSTREAM	S-11-0800-50	109 CURTIS CORNER ROAD	RESIDENTIAL	10,000
40-4	34	40-4:34	UPSTREAM	S-11-0083-00	231 CURTIS CORNER ROAD	RESIDENTIAL	5,100
40-4	35	40-4:35	UPSTREAM	S-11-0036-50	259 CURTIS CORNER ROAD	RESIDENTIAL	9,500
40-4	4	40-4:4	UPSTREAM	S-11-0620-50	31 MELLBRIDGE DRIVE	RESIDENTIAL	2,900
40-4	41	40-4:41	UPSTREAM	S-11-1196-90	245 CURTIS CORNER ROAD	RESIDENTIAL	19,100
40-4	44	40-4:44	UPSTREAM	S-11-1117-50	230 CURTIS CORNER ROAD	RESIDENTIAL	9,900
40-4	5	40-4:5	UPSTREAM	S-11-0033-00	51 MELLBRIDGE DRIVE	RESIDENTIAL	4,000
40-4	6	40-4:6	UPSTREAM	S-11-0516-50	50 MELLBRIDGE DRIVE	RESIDENTIAL	9,700
40-4	7	40-4:7	UPSTREAM	S-11-0600-00	40 MELLBRIDGE DRIVE	RESIDENTIAL	5,000
40-4	8	40-4:8	UPSTREAM	S-11-0253-00	26 MELLBRIDGE DRIVE	RESIDENTIAL	6,800
40-4	9	40-4:9	UPSTREAM	S-11-0948-50	10 MELLBRIDGE DRIVE	RESIDENTIAL	9,800
47-2	100	47-2:100	UPSTREAM	S-11-1189-40	20 LUPINE COURT	RESIDENTIAL	10,000
47-2	101	47-2:101	UPSTREAM	S-11-1193-10	24 BITTERSWEET LANE	RESIDENTIAL	7,700

47-2	104	47-2:104	UPSTREAM	S-11-1197-00	326 MULBERRY DRIVE	RESIDENTIAL	15,400
47-2	105	47-2:105	UPSTREAM	S-11-1196-40	310 MULBERRY DRIVE	RESIDENTIAL	6,900
47-2	106	47-2:106	UPSTREAM	S-11-1205-60	301 MULBERRY DRIVE	RESIDENTIAL	11,100
47-2	107	47-2:107	UPSTREAM	S-11-1196-00	315 MULBERRY DRIVE	RESIDENTIAL	4,400
47-2	108	47-2:108	UPSTREAM	S-11-1200-60	329 MULBERRY DRIVE	RESIDENTIAL	14,000
47-2	109	47-2:109	UPSTREAM	S-11-1201-50	335 MULBERRY DRIVE	RESIDENTIAL	23,400
47-2	110	47-2:110	UPSTREAM	S-11-1196-20	345 MULBERRY DRIVE	RESIDENTIAL	7,300
47-2	111	47-2:111	UPSTREAM	S-11-1199-00	357 MULBERRY DRIVE	RESIDENTIAL	6,800
47-2	112	47-2:112	UPSTREAM	S-11-1198-00	371 MULBERRY DRIVE	RESIDENTIAL	15,700
47-2	113	47-2:113	UPSTREAM	S-11-1197-80	364 MULBERRY DRIVE	RESIDENTIAL	12,400
47-2	114	47-2:114	UPSTREAM	S-11-1195-60	350 MULBERRY DRIVE	RESIDENTIAL	14,900
47-2	115	47-2:115	UPSTREAM	S-11-1202-30	30 WINTERBERRY LANE	RESIDENTIAL	9,700
47-2	17	47-2:17	UPSTREAM	S-11-1225-40	102 GENTIAN DRIVE	RESIDENTIAL	15,100
47-2	38	47-2:38	UPSTREAM	S-11-1218-30	91 GENTIAN DRIVE	RESIDENTIAL	12,400
47-2	42	47-2:42	UPSTREAM	S-11-1081-50	81 ELDERBERRY LANE	RESIDENTIAL	11,200
47-2	43	47-2:43	UPSTREAM	S-11-1151-70	68 ELDERBERRY LANE	RESIDENTIAL	9,800
47-2	44	47-2:44	UPSTREAM	S-11-1066-00	80 ELDERBERRY LANE	RESIDENTIAL	11,600
47-2	45	47-2:45	UPSTREAM	S-11-1131-00	21 INKBERRY DRIVE	RESIDENTIAL	12,400
47-2	46	47-2:46	UPSTREAM	S-11-1159-00	33 INKBERRY DRIVE	RESIDENTIAL	11,300
47-2	47	47-2:47	UPSTREAM	S-11-1060-00	47 INKBERRY DRIVE	RESIDENTIAL	6,900
47-2	51	47-2:51	UPSTREAM	S-11-1186-60	28 SWEET ALLEN FARM ROAD	RESIDENTIAL	8,700
47-2	52	47-2:52	UPSTREAM	S-11-1159-80	15 SWEET ALLEN FARM ROAD	RESIDENTIAL	4,100
47-2	53	47-2:53	UPSTREAM	S-11-1159-20	23 SWEET ALLEN FARM ROAD	RESIDENTIAL	7,200
47-2	54	47-2:54	UPSTREAM	S-11-1154-40	31 SWEET ALLEN FARM ROAD	RESIDENTIAL	12,000
47-2	55	47-2:55	UPSTREAM	S-11-1150-00	41 SWEET ALLEN FARM ROAD	RESIDENTIAL	7,800
47-2	56	47-2:56	UPSTREAM	S-11-1150-20	47 SWEET ALLEN FARM ROAD	RESIDENTIAL	12,900
47-2	57	47-2:57	UPSTREAM	S-11-1159-40	55 SWEET ALLEN FARM ROAD	RESIDENTIAL	5,400
47-2	58	47-2:58	UPSTREAM	S-11-1154-20	65 SWEET ALLEN FARM ROAD	RESIDENTIAL	12,400
47-2	59	47-2:59	UPSTREAM	S-11-1187-90	233 MULBERRY DRIVE	RESIDENTIAL	4,600
47-2	60	47-2:60	UPSTREAM	S-11-1198-60	247 MULBERRY DRIVE	RESIDENTIAL	25,400
47-2	61	47-2:61	UPSTREAM	S-11-1199-30	261 MULBERRY DRIVE	RESIDENTIAL	8,400
47-2	62	47-2:62	UPSTREAM	S-11-1168-30	224 MULBERRY DRIVE	RESIDENTIAL	3,000
47-2	63	47-2:63	UPSTREAM	S-11-1168-90	240 MULBERRY DRIVE	RESIDENTIAL	6,100
47-2	64	47-2:64	UPSTREAM	S-11-1174-10	61 INKBERRY DRIVE	RESIDENTIAL	25,700

47-2	65	47-2:65	UPSTREAM	S-11-1172-40	49 DEWBERRY LANE	RESIDENTIAL	10,400
47-2	66	47-2:66	UPSTREAM	S-11-1175-30	33 DEWBERRY LANE	RESIDENTIAL	15,600
47-2	67	47-2:67	UPSTREAM	S-11-1168-50	19 DEWBERRY LANE	RESIDENTIAL	3,900
47-2	68	47-2:68	UPSTREAM	S-11-1167-50	22 DEWBERRY LANE	RESIDENTIAL	4,400
47-2	69	47-2:69	UPSTREAM	S-11-1175-20	36 DEWBERRY LANE	RESIDENTIAL	5,200
47-2	70	47-2:70	UPSTREAM	S-11-1168-80	52 DEWBERRY LANE	RESIDENTIAL	11,900
47-2	71	47-2:71	UPSTREAM	S-11-1167-20	68 DEWBERRY LANE	RESIDENTIAL	27,500
47-2	72	47-2:72	UPSTREAM	S-11-1175-70	260 MULBERRY DRIVE	RESIDENTIAL	14,000
47-2	73	47-2:73	UPSTREAM	S-11-1182-90	120 GENTIAN DRIVE	RESIDENTIAL	8,400
47-2	74	47-2:74	UPSTREAM	S-11-1177-60	134 GENTIAN DRIVE	RESIDENTIAL	11,200
47-2	75	47-2:75	UPSTREAM	S-11-1183-00	148 GENTIAN DRIVE	RESIDENTIAL	5,700
47-2	76	47-2:76	UPSTREAM	S-11-1194-30	18 WINTERBERRY LANE	RESIDENTIAL	16,000
47-2	77	47-2:77	UPSTREAM	S-11-1193-40	6 CURTIS CIRCLE	RESIDENTIAL	11,600
47-2	78	47-2:78	UPSTREAM	S-11-1194-20	16 CURTIS CIRCLE	RESIDENTIAL	4,800
47-2	79	47-2:79	UPSTREAM	S-11-1194-10	17 CURTIS CIRCLE	RESIDENTIAL	10,700
47-2	80	47-2:80	UPSTREAM	S-11-1193-70	9 CURTIS CIRCLE	RESIDENTIAL	4,700
47-2	81	47-2:81	UPSTREAM	S-11-1189-50	9 WINTERBERRY LANE	RESIDENTIAL	13,100
47-2	82	47-2:82	UPSTREAM	S-11-1194-50	155 GENTIAN DRIVE	RESIDENTIAL	6,200
47-2	83	47-2:83	UPSTREAM	S-11-1186-70	135 GENTIAN DRIVE	RESIDENTIAL	4,900
47-2	84	47-2:84	UPSTREAM	S-11-1179-60	125 GENTIAN DRIVE	RESIDENTIAL	5,500
47-2	90	47-2:90	UPSTREAM	S-11-1190-80	19 BITTERSWEET LANE	RESIDENTIAL	8,800
47-2	91	47-2:91	UPSTREAM	S-11-1194-90	31 BITTERSWEET LANE	RESIDENTIAL	12,300
47-2	92	47-2:92	UPSTREAM	S-11-1190-30	43 BITTERSWEET LANE	RESIDENTIAL	6,000
47-2	93	47-2:93	UPSTREAM	S-11-1193-80	53 BITTERSWEET LANE	RESIDENTIAL	18,200
47-2	94	47-2:94	UPSTREAM	S-11-1190-90	63 BITTERSWEET LANE	RESIDENTIAL	3,200
47-2	95	47-2:95	UPSTREAM	S-11-1208-80	275 MULBERRY DRIVE	RESIDENTIAL	11,600
47-2	96	47-2:96	UPSTREAM	S-11-1215-80	289 MULBERRY DRIVE	RESIDENTIAL	16,300
47-2	97	47-2:97	UPSTREAM	S-11-1191-00	294 MULBERRY DRIVE	RESIDENTIAL	6,500
47-2	98	47-2:98	UPSTREAM	S-11-1191-10	7 LUPINE COURT	RESIDENTIAL	7,900
47-2	99	47-2:99	UPSTREAM	S-11-1189-00	21 LUPINE COURT	RESIDENTIAL	6,700
47-3	1	47-3:1	UPSTREAM	S-11-1179-70	64 DEER TRAIL ROAD	RESIDENTIAL	4,200
47-3	10	47-3:10	UPSTREAM	S-11-1218-20	25 MULBERRY DRIVE	RESIDENTIAL	5,000
47-3	100	47-3:100	UPSTREAM	S-11-1176-90	86 MILLSTONE ROAD	RESIDENTIAL	3,600
47-3	101	47-3:101	UPSTREAM	S-11-1186-50	68 MILLSTONE ROAD	RESIDENTIAL	6,300

47-3	102	47-3:102	UPSTREAM	S-11-1176-70	32 MILLSTONE ROAD	RESIDENTIAL	6,600
47-3	103	47-3:103	UPSTREAM	S-11-1173-80	14 MILLSTONE ROAD	RESIDENTIAL	7,200
47-3	104	47-3:104	UPSTREAM	S-11-1188-60	25 DEER TRAIL ROAD	RESIDENTIAL	10,800
47-3	105	47-3:105	UPSTREAM	S-11-1188-70	69 DEER TRAIL ROAD	RESIDENTIAL	41,700
47-3	106	47-3:106	UPSTREAM	S-11-1185-50	87 DEER TRAIL ROAD	RESIDENTIAL	5,200
47-3	107	47-3:107	UPSTREAM	S-11-1185-80	117 DEER TRAIL ROAD	RESIDENTIAL	6,000
47-3	108	47-3:108	UPSTREAM	S-11-1184-70	145 DEER TRAIL ROAD	RESIDENTIAL	14,200
47-3	109	47-3:109	UPSTREAM	S-11-1185-60	29 FOXRIDGE CIRCLE	RESIDENTIAL	16,500
47-3	11	47-3:11	UPSTREAM	S-11-1233-00	41 MULBERRY DRIVE	RESIDENTIAL	11,400
47-3	110	47-3:110	UPSTREAM	S-11-1184-80	134 DEER TRAIL ROAD	RESIDENTIAL	19,500
47-3	111	47-3:111	UPSTREAM	S-11-1179-40	148 DEER TRAIL ROAD	RESIDENTIAL	17,600
47-3	112	47-3:112	UPSTREAM	S-11-1182-20	74 FOXRIDGE CIRCLE	RESIDENTIAL	6,200
47-3	113	47-3:113	UPSTREAM	S-11-1180-50	54 FOXRIDGE CIRCLE	RESIDENTIAL	4,400
47-3	114	47-3:114	UPSTREAM	S-11-1182-30	44 FOXRIDGE CIRCLE	RESIDENTIAL	17,500
47-3	115	47-3:115	UPSTREAM	S-11-1186-30	30 FOXRIDGE CIRCLE	RESIDENTIAL	33,500
47-3	116	47-3:116	UPSTREAM	S-11-1186-40	110 DEER TRAIL ROAD	RESIDENTIAL	6,500
47-3	117	47-3:117	UPSTREAM	S-11-1179-90	98 DEER TRAIL ROAD	RESIDENTIAL	7,400
47-3	118	47-3:118	UPSTREAM	S-11-1185-90	82 DEER TRAIL ROAD	RESIDENTIAL	7,600
47-3	36	47-3:36	UPSTREAM	S-11-1210-10	44 MULBERRY DRIVE	RESIDENTIAL	11,000
47-3	47	47-3:47	UPSTREAM	S-11-1096-00	225 WEATHERVANE ROAD	RESIDENTIAL	9,900
47-3	48	47-3:48	UPSTREAM	S-11-1009-50	91 FOSTER SHELDON ROAD	RESIDENTIAL	7,200
47-3	49	47-3:49	UPSTREAM	S-11-1053-50	87 FOSTER SHELDON ROAD	RESIDENTIAL	10,200
47-3	50	47-3:50	UPSTREAM	S-11-1024-50	77 FOSTER SHELDON ROAD	RESIDENTIAL	7,100
47-3	51	47-3:51	UPSTREAM	S-11-1078-00	61 FOSTER SHELDON ROAD	RESIDENTIAL	10,000
47-3	52	47-3:52	UPSTREAM	S-11-1050-50	53 FOSTER SHELDON ROAD	RESIDENTIAL	10,700
47-3	53	47-3:53	UPSTREAM	S-11-1016-00	38 FOSTER SHELDON ROAD	RESIDENTIAL	4,800
47-3	54	47-3:54	UPSTREAM	S-11-1025-50	44 FOSTER SHELDON ROAD	RESIDENTIAL	11,700
47-3	55	47-3:55	UPSTREAM	S-11-1025-00	52 FOSTER SHELDON ROAD	RESIDENTIAL	4,900
47-3	56	47-3:56	UPSTREAM	S-11-1151-80	60 FOSTER SHELDON ROAD	RESIDENTIAL	12,700
47-3	57	47-3:57	UPSTREAM	S-11-1100-00	70 FOSTER SHELDON ROAD	RESIDENTIAL	6,100
47-3	58	47-3:58	UPSTREAM	S-11-1026-50	76 FOSTER SHELDON ROAD	RESIDENTIAL	6,100
47-3	59	47-3:59	UPSTREAM	S-11-1047-50	82 FOSTER SHELDON ROAD	RESIDENTIAL	7,900
47-3	60	47-3:60	UPSTREAM	S-11-1041-00	90 FOSTER SHELDON ROAD	RESIDENTIAL	9,700
47-3	61	47-3:61	UPSTREAM	S-11-1041-50	100 FOSTER SHELDON ROAD	RESIDENTIAL	9,100

47-3	62	47-3:62	UPSTREAM	S-11-1085-50	108 FOSTER SHELDON ROAD	RESIDENTIAL	9,000
47-3	63	47-3:63	UPSTREAM	S-11-1089-00	201 WEATHERVANE ROAD	RESIDENTIAL	6,900
47-3	64	47-3:64	UPSTREAM	S-11-1026-00	65 MULBERRY DRIVE	RESIDENTIAL	6,900
47-3	65	47-3:65	UPSTREAM	S-11-1070-50	79 MULBERRY DRIVE	RESIDENTIAL	10,800
47-3	66	47-3:66	UPSTREAM	S-11-1010-00	93 MULBERRY DRIVE	RESIDENTIAL	9,200
47-3	67	47-3:67	UPSTREAM	S-11-1028-50	107 MULBERRY DRIVE	RESIDENTIAL	6,000
47-3	68	47-3:68	UPSTREAM	S-11-1043-50	119 MULBERRY DRIVE	RESIDENTIAL	11,500
47-3	69	47-3:69	UPSTREAM	S-11-1042-00	126 MULBERRY DRIVE	RESIDENTIAL	13,900
47-3	70	47-3:70	UPSTREAM	S-11-1073-00	112 MULBERRY DRIVE	RESIDENTIAL	14,200
47-3	71	47-3:71	UPSTREAM	S-11-1065-50	98 MULBERRY DRIVE	RESIDENTIAL	5,700
47-3	72	47-3:72	UPSTREAM	S-11-1151-30	84 MULBERRY DRIVE	RESIDENTIAL	14,200
47-3	73	47-3:73	UPSTREAM	S-11-1040-50	72 MULBERRY DRIVE	RESIDENTIAL	8,400
47-3	74	47-3:74	UPSTREAM	S-11-1076-50	58 MULBERRY DRIVE	RESIDENTIAL	7,000
47-3	75	47-3:75	UPSTREAM	S-11-1160-80	24 INKBERRY DRIVE	RESIDENTIAL	11,700
47-3	76	47-3:76	UPSTREAM	S-11-1165-40	61 ELDERBERRY LANE	RESIDENTIAL	4,400
47-3	77	47-3:77	UPSTREAM	S-11-1059-00	51 ELDERBERRY LANE	RESIDENTIAL	6,200
47-3	78	47-3:78	UPSTREAM	S-11-1152-20	37 ELDERBERRY LANE	RESIDENTIAL	7,900
47-3	79	47-3:79	UPSTREAM	S-11-1152-60	23 ELDERBERRY LANE	RESIDENTIAL	3,300
47-3	80	47-3:80	UPSTREAM	S-11-1161-40	20 ELDERBERRY LANE	RESIDENTIAL	10,300
47-3	81	47-3:81	UPSTREAM	S-11-1154-60	34 ELDERBERRY LANE	RESIDENTIAL	9,400
47-3	82	47-3:82	UPSTREAM	S-11-1163-40	48 ELDERBERRY LANE	RESIDENTIAL	4,200
47-3	83	47-3:83	UPSTREAM	S-11-1120-00	237 WEATHERVANE ROAD	RESIDENTIAL	3,400
47-3	84	47-3:84	UPSTREAM	S-11-1120-50	245 WEATHERVANE ROAD	RESIDENTIAL	6,000
47-3	85	47-3:85	UPSTREAM	S-11-1211-70	54 DEER TRAIL ROAD	RESIDENTIAL	10,700
47-3	86	47-3:86	UPSTREAM	S-11-1199-20	44 DEER TRAIL ROAD	RESIDENTIAL	10,600
47-3	87	47-3:87	UPSTREAM	S-11-1207-50	610 SOUTH ROAD	RESIDENTIAL	8,800
47-3	88	47-3:88	UPSTREAM	S-11-1184-60	9 MILLSTONE ROAD	RESIDENTIAL	6,900
47-3	9	47-3:9	UPSTREAM	S-11-1194-80	13 MULBERRY DRIVE	RESIDENTIAL	5,700
47-3	90	47-3:90	UPSTREAM	S-11-1200-70	41 MILLSTONE ROAD	RESIDENTIAL	14,900
47-3	91	47-3:91	UPSTREAM	S-11-1195-20	51 MULBERRY DRIVE	RESIDENTIAL	8,800
47-3	92	47-3:92	UPSTREAM	S-11-1188-50	51 MILLSTONE ROAD	RESIDENTIAL	8,600
47-3	93	47-3:93	UPSTREAM	S-11-1186-20	67 MILLSTONE ROAD	RESIDENTIAL	12,200
47-3	94	47-3:94	UPSTREAM	S-11-1174-80	85 MILLSTONE ROAD	RESIDENTIAL	11,700
47-3	95	47-3:95	UPSTREAM	S-11-1174-90	99 MILLSTONE ROAD	RESIDENTIAL	7,300

47-3	96	47-3:96	UPSTREAM	S-11-1177-40	119 MILLSTONE ROAD	RESIDENTIAL	8,300
47-3	97	47-3:97	UPSTREAM	S-11-1177-50	125 MILLSTONE ROAD	RESIDENTIAL	14,200
47-3	98	47-3:98	UPSTREAM	S-11-1174-50	126 MILLSTONE ROAD	RESIDENTIAL	10,000
47-3	99	47-3:99	UPSTREAM	S-11-1173-60	110 MILLSTONE ROAD	RESIDENTIAL	10,000
48-1	10	48-1:10	UPSTREAM	S-11-1013-00	239 SWEET ALLEN FARM ROAD	RESIDENTIAL	10,900
48-1	11	48-1:11	UPSTREAM	S-11-1011-00	231 SWEET ALLEN FARM ROAD	RESIDENTIAL	5,400
48-1	12	48-1:12	UPSTREAM	S-11-1012-50	221 SWEET ALLEN FARM ROAD	RESIDENTIAL	3,700
48-1	13	48-1:13	UPSTREAM	S-11-1012-00	211 SWEET ALLEN FARM ROAD	RESIDENTIAL	7,100
48-1	15	48-1:15	UPSTREAM	S-11-1135-00	222D SWEET ALLEN FARM ROAD	RESIDENTIAL	32,800
48-1	16	48-1:16	UPSTREAM	S-11-1046-50	8E ACORN COURT	RESIDENTIAL	102,400
48-1	17	48-1:17	UPSTREAM	S-11-1075-50	18F ACORN COURT	RESIDENTIAL	21,300
48-1	18	48-1:18	UPSTREAM	S-11-1151-40	30G ACORN COURT	RESIDENTIAL	30,000
48-1	24	48-1:24	UPSTREAM	S-11-1046-00	179 MULBERRY DRIVE	RESIDENTIAL	2,500
48-1	25	48-1:25	UPSTREAM	S-11-1050-00	189 MULBERRY DRIVE	RESIDENTIAL	13,700
48-1	26	48-1:26	UPSTREAM	S-11-1042-50	194 MULBERRY DRIVE	RESIDENTIAL	3,400
48-1	27	48-1:27	UPSTREAM	S-11-1107-00	195 SWEET ALLEN FARM ROAD	RESIDENTIAL	8,500
48-1	29	48-1:29	UPSTREAM	S-11-1125-00	160 SWEET ALLEN FARM ROAD	RESIDENTIAL	17,800
48-1	30	48-1:30	UPSTREAM	S-11-1124-00	138/48 SWEET ALLEN FARM ROAD	RESIDENTIAL	18,500
48-1	31	48-1:31	UPSTREAM	S-11-1111-00	21-31 NOEL COURT	RESIDENTIAL	20,100
48-1	32	48-1:32	UPSTREAM	S-11-1115-00	41-51 NOEL COURT	RESIDENTIAL	32,300
48-1	33	48-1:33	UPSTREAM	S-11-1252-90	46 NOEL COURT	RESIDENTIAL	2,500
48-1	34	48-1:34	UPSTREAM	S-11-1098-00	20-30 NOEL COURT	RESIDENTIAL	31,000
48-1	35	48-1:35	UPSTREAM	S-11-1107-50	120-30 SWEET ALLEN FARM ROAD	RESIDENTIAL	28,400
48-1	36	48-1:36	UPSTREAM	S-11-1121-50	201 SWEET ALLEN FARM ROAD	RESIDENTIAL	2,600
48-1	37	48-1:37	UPSTREAM	S-11-1151-90	79 SWEET ALLEN FARM ROAD	RESIDENTIAL	4,700
48-1	38	48-1:38	UPSTREAM	S-11-1152-00	67 SWEET ALLEN FARM ROAD	RESIDENTIAL	13,000
48-1	39	48-1:39	UPSTREAM	S-11-1173-90	203 MULBERRY DRIVE	RESIDENTIAL	11,900
48-1	40	48-1:40	UPSTREAM	S-11-1174-60	215 MULBERRY DRIVE	RESIDENTIAL	19,100
48-1	41	48-1:41	UPSTREAM	S-11-1174-70	212 MULBERRY DRIVE	RESIDENTIAL	7,800
48-1	8	48-1:8	UPSTREAM	S-13-0027-60	364 CURTIS CORNER ROAD	COMMERCIAL	491,300
48-1	9	48-1:9	UPSTREAM	S-11-1010-50	247 SWEET ALLEN FARM ROAD	RESIDENTIAL	5,200
48-4	100	48-4:100	UPSTREAM	S-11-1137-50	325 SWEET ALLEN FARM ROAD	RESIDENTIAL	8,100
48-4	101	48-4:101	UPSTREAM	S-11-1099-50	220 WEATHERVANE ROAD	RESIDENTIAL	9,900
48-4	102	48-4:102	UPSTREAM	S-11-1091-00	230 WEATHERVANE ROAD	RESIDENTIAL	4,400

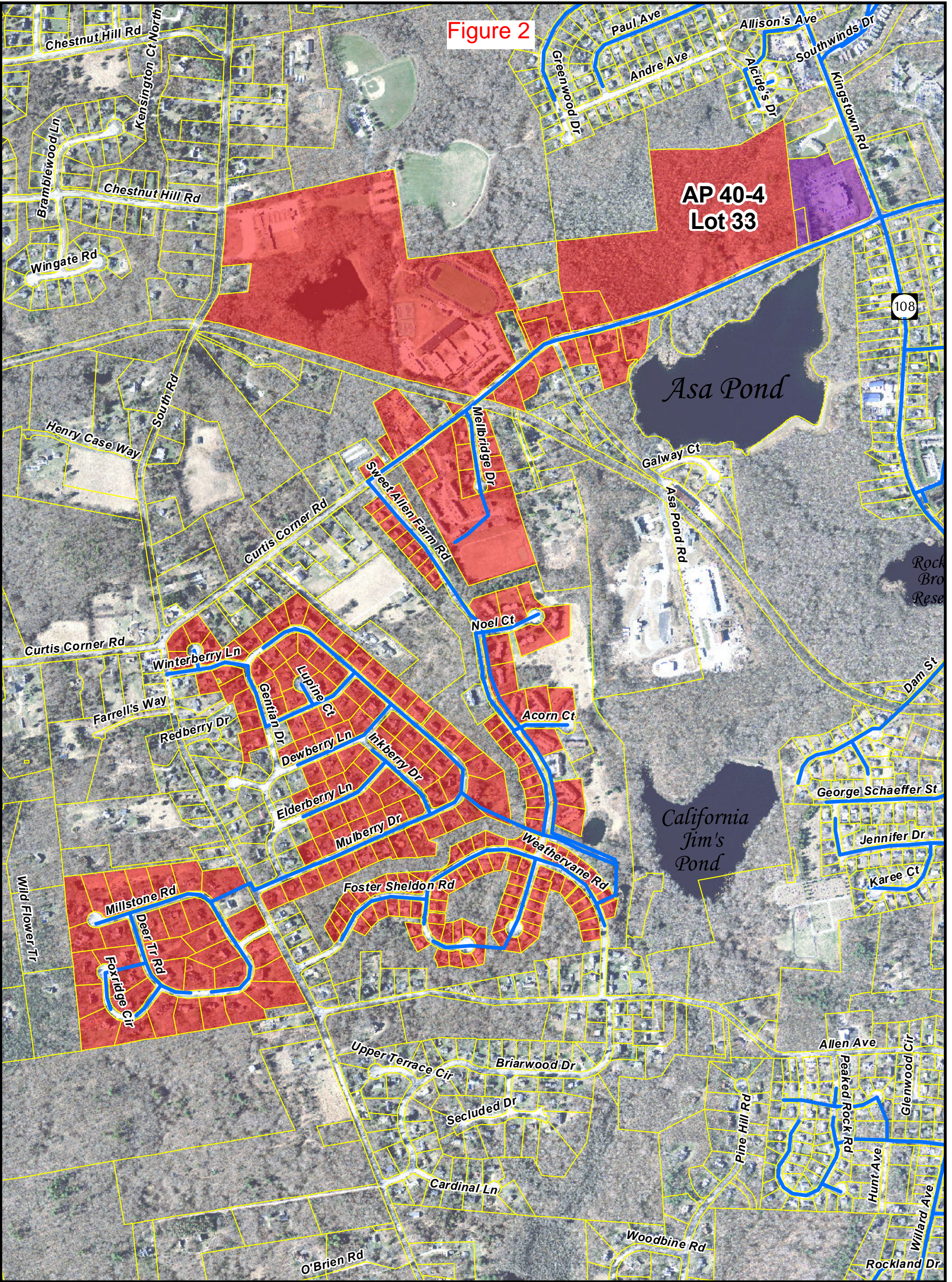
48-4	103	48-4:103	UPSTREAM	S-11-1088-50	242 WEATHERVANE ROAD	RESIDENTIAL	11,800
48-4	104	48-4:104	UPSTREAM	S-11-1109-50	260 WEATHERVANE ROAD	RESIDENTIAL	25,700
48-4	105	48-4:105	UPSTREAM	S-11-1091-50	270 WEATHERVANE ROAD	RESIDENTIAL	8,800
48-4	106	48-4:106	UPSTREAM	S-11-1122-00	274 WEATHERVANE ROAD	RESIDENTIAL	3,000
48-4	107	48-4:107	UPSTREAM	S-11-1122-50	280 WEATHERVANE ROAD	RESIDENTIAL	8,700
48-4	108	48-4:108	UPSTREAM	S-11-1093-50	277 WEATHERVANE ROAD	RESIDENTIAL	6,200
48-4	109	48-4:109	UPSTREAM	S-11-1114-50	273 WEATHERVANE ROAD	RESIDENTIAL	8,500
48-4	110	48-4:110	UPSTREAM	S-11-1101-50	265 WEATHERVANE ROAD	RESIDENTIAL	4,900
48-4	111	48-4:111	UPSTREAM	S-11-1109-00	257 WEATHERVANE ROAD	RESIDENTIAL	11,200
48-4	43	48-4:43	UPSTREAM	S-11-1089-50	112 WEATHERVANE ROAD	RESIDENTIAL	7,200
48-4	44	48-4:44	UPSTREAM	S-11-1099-00	130 WEATHERVANE ROAD	RESIDENTIAL	6,000
48-4	45	48-4:45	UPSTREAM	S-11-1086-50	138 WEATHERVANE ROAD	RESIDENTIAL	300
48-4	46	48-4:46	UPSTREAM	S-11-1047-00	150 WEATHERVANE ROAD	RESIDENTIAL	4,700
48-4	47	48-4:47	UPSTREAM	S-11-1064-00	160 WEATHERVANE ROAD	RESIDENTIAL	9,700
48-4	48	48-4:48	UPSTREAM	S-11-1064-50	170 WEATHERVANE ROAD	RESIDENTIAL	10,100
48-4	49	48-4:49	UPSTREAM	S-11-1016-50	180 WEATHERVANE ROAD	RESIDENTIAL	9,700
48-4	50	48-4:50	UPSTREAM	S-11-1088-00	188 WEATHERVANE ROAD	RESIDENTIAL	4,400
48-4	51	48-4:51	UPSTREAM	S-11-1051-50	198 WEATHERVANE ROAD	RESIDENTIAL	7,000
48-4	52	48-4:52	UPSTREAM	S-11-1123-00	210 WEATHERVANE ROAD	RESIDENTIAL	8,500
48-4	53	48-4:53	UPSTREAM	S-11-1137-00	181 WEATHERVANE ROAD	RESIDENTIAL	9,300
48-4	54	48-4:54	UPSTREAM	S-11-1067-50	171 WEATHERVANE ROAD	RESIDENTIAL	5,000
48-4	55	48-4:55	UPSTREAM	S-11-1087-00	161 WEATHERVANE ROAD	RESIDENTIAL	16,900
48-4	56	48-4:56	UPSTREAM	S-11-1069-00	151 WEATHERVANE ROAD	RESIDENTIAL	16,200
48-4	57	48-4:57	UPSTREAM	S-11-1093-00	137 WEATHERVANE ROAD	RESIDENTIAL	9,900
48-4	58	48-4:58	UPSTREAM	S-11-1076-00	293 SWEET ALLEN FARM ROAD	RESIDENTIAL	9,000
48-4	59	48-4:59	UPSTREAM	S-11-1014-00	283 SWEET ALLEN FARM ROAD	RESIDENTIAL	6,200
48-4	60	48-4:60	UPSTREAM	S-11-1011-50	275 SWEET ALLEN FARM ROAD	RESIDENTIAL	6,600
48-4	61	48-4:61	UPSTREAM	S-11-1051-00	259 SWEET ALLEN FARM ROAD	RESIDENTIAL	6,500
48-4	62	48-4:62	UPSTREAM	S-11-1013-50	251 SWEET ALLEN FARM ROAD	RESIDENTIAL	11,300
48-4	63	48-4:63	UPSTREAM	S-11-1014-50	260B SWEET ALLEN FARM ROAD	RESIDENTIAL	33,100
48-4	64	48-4:64	UPSTREAM	S-11-1015-50	272A SWEET ALLEN FARM ROAD	RESIDENTIAL	21,000
48-4	65	48-4:65	UPSTREAM	S-11-1071-50	300 SWEET ALLEN FARM ROAD	RESIDENTIAL	3,900
48-4	68	48-4:68	UPSTREAM	S-11-1065-00	157 MULBERRY DRIVE	RESIDENTIAL	17,500
48-4	69	48-4:69	UPSTREAM	S-11-1092-50	145 MULBERRY DRIVE	RESIDENTIAL	15,000

48-4	70	48-4:70	UPSTREAM	S-11-1044-00	133 MULBERRY DRIVE	RESIDENTIAL	6,200
48-4	71	48-4:71	UPSTREAM	S-11-1027-50	144 MULBERRY DRIVE	RESIDENTIAL	5,300
48-4	72	48-4:72	UPSTREAM	S-11-1166-80	170 MULBERRY DRIVE	RESIDENTIAL	5,400
48-4	73	48-4:73	UPSTREAM	S-11-1131-50	169 MULBERRY DRIVE	RESIDENTIAL	7,200
48-4	74	48-4:74	UPSTREAM	S-11-1108-50	46 WEATHERVANE ROAD	RESIDENTIAL	9,700
48-4	75	48-4:75	UPSTREAM	S-11-1138-40	54 WEATHERVANE ROAD	RESIDENTIAL	6,500
48-4	76	48-4:76	UPSTREAM	S-11-1142-60	62 WEATHERVANE ROAD	RESIDENTIAL	11,200
48-4	77	48-4:77	UPSTREAM	S-11-1139-20	72 WEATHERVANE ROAD	RESIDENTIAL	3,700
48-4	78	48-4:78	UPSTREAM	S-11-0037-60	80 WEATHERVANE ROAD	RESIDENTIAL	8,800
48-4	79	48-4:79	UPSTREAM	S-11-1141-20	90 WEATHERVANE ROAD	RESIDENTIAL	4,400
48-4	80	48-4:80	UPSTREAM	S-11-1141-40	102 WEATHERVANE ROAD	RESIDENTIAL	10,200
48-4	81	48-4:81	UPSTREAM	S-11-1123-50	105 WEATHERVANE ROAD	RESIDENTIAL	15,100
48-4	82	48-4:82	UPSTREAM	S-11-1086-00	99 WEATHERVANE ROAD	RESIDENTIAL	5,600
48-4	83	48-4:83	UPSTREAM	S-11-1081-00	93 WEATHERVANE ROAD	RESIDENTIAL	7,400
48-4	84	48-4:84	UPSTREAM	S-11-1087-50	85 WEATHERVANE ROAD	RESIDENTIAL	9,200
48-4	85	48-4:85	UPSTREAM	S-11-1094-00	79 WEATHERVANE ROAD	RESIDENTIAL	6,400
48-4	86	48-4:86	UPSTREAM	S-11-1092-00	71 WEATHERVANE ROAD	RESIDENTIAL	14,000
48-4	87	48-4:87	UPSTREAM	S-11-1077-00	65 WEATHERVANE ROAD	RESIDENTIAL	15,700
48-4	88	48-4:88	UPSTREAM	S-11-1106-00	324 SWEET ALLEN FARM ROAD	RESIDENTIAL	6,000
48-4	89	48-4:89	UPSTREAM	S-11-1106-50	332 SWEET ALLEN FARM ROAD	RESIDENTIAL	12,000
48-4	90	48-4:90	UPSTREAM	S-11-1090-50	338 SWEET ALLEN FARM ROAD	RESIDENTIAL	9,300
48-4	91	48-4:91	UPSTREAM	S-11-1084-00	346 SWEET ALLEN FARM ROAD	RESIDENTIAL	10,400
48-4	92	48-4:92	UPSTREAM	S-11-1101-00	354 SWEET ALLEN FARM ROAD	RESIDENTIAL	6,100
48-4	93	48-4:93	UPSTREAM	S-11-1083-00	360 SWEET ALLEN FARM ROAD	RESIDENTIAL	5,600
48-4	94	48-4:94	UPSTREAM	S-11-1084-50	366 SWEET ALLEN FARM ROAD	RESIDENTIAL	5,100
48-4	95	48-4:95	UPSTREAM	S-11-1090-00	365 SWEET ALLEN FARM ROAD	RESIDENTIAL	8,200
48-4	96	48-4:96	UPSTREAM	S-11-1083-50	355 SWEET ALLEN FARM ROAD	RESIDENTIAL	4,300
48-4	97	48-4:97	UPSTREAM	S-11-1085-00	347 SWEET ALLEN FARM ROAD	RESIDENTIAL	7,300
48-4	98	48-4:98	UPSTREAM	S-11-1097-00	341 SWEET ALLEN FARM ROAD	RESIDENTIAL	9,700
48-4	99	48-4:99	UPSTREAM	S-11-1121-00	335 SWEET ALLEN FARM ROAD	RESIDENTIAL	7,500

Total Annual Cu. Ft. 3,274,090

Total Annual Gals 24,490,193

Figure 2



Town of South Kingstown

Curtis Corner Minor Subdivision : AP 40-4 Lot 33 Sewer Load Analysis

Parcels with Sewers

- Downstream
- Upstream

Sewer Pipes

Aerial Photo RIGIS 2014

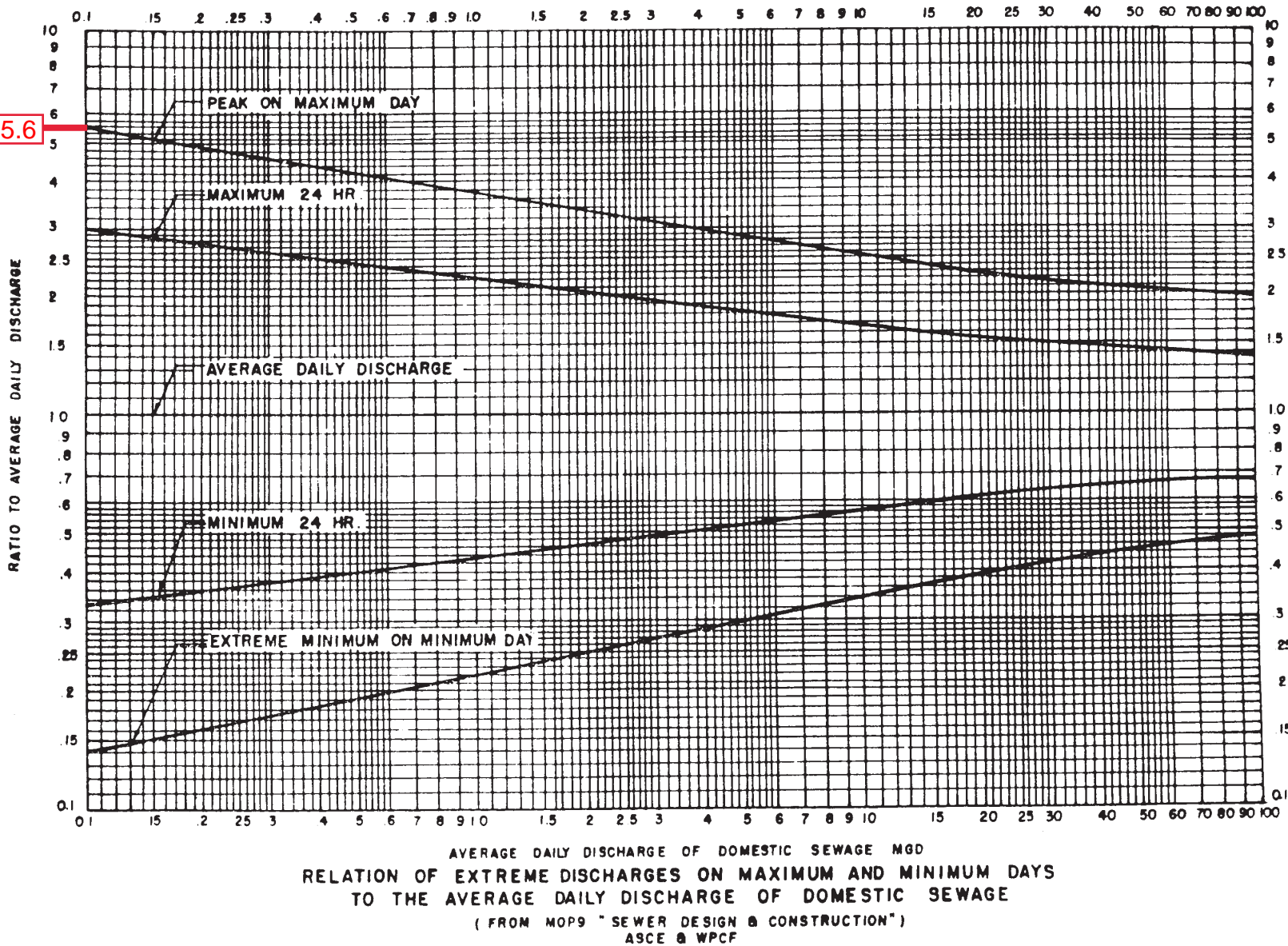


0 250 500 1,000
Feet



Geographic Information System

Figure 3



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