

APPENDIX A: RIPDES PERMIT AND CONSENT AGREEMENT



RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767

TDD 401-222-4462

August 28, 2013

CERTIFIED MAIL

Mr. Thomas Gordon, Town Manager
Town of Warren
514 Main Street
Warren, RI 02885-4369

RE: Final Permit Modification for the Warren WWTF; RIPDES No. RI0100056

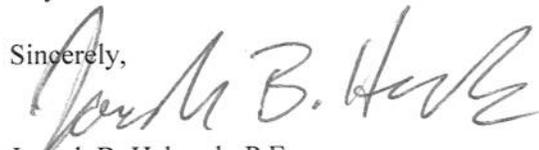
Dear Mr. Gordon:

Enclosed is your final Rhode Island Pollutant Discharge Elimination System (RIPDES) Permit modification issued pursuant to the Town of Warren's (the Town's) Design Flow Report that was submitted to the Rhode Island Department of Environmental Management (DEM) on January 17, 2013. No significant comments were received on the draft permit modification, therefore, a response to comments was not prepared. State regulations, promulgated under Chapter 46-12 of the Rhode Island General Laws of 1956, as amended, require this permit to become effective on the date specified in the permit.

Paragraph 10(C) of Consent agreement RIA-410, which was entered into between the Town and the DEM on September 29, 2011, requires the Town to submit a draft Wastewater Facilities Plan Amendment to the DEM within three (3) months of the DEM's issuance of the enclosed permit modification. Therefore, based on the date of this letter, **the Town shall submit a draft Wastewater Facilities Plan Amendment to the DEM by November 28, 2013.** The draft Wastewater Facilities Plan Amendment must include a recommendation of alternative(s) to attain compliance with the final permit limits contained in the attached permit modification and a proposed schedule to submit an Order of Approval application to the DEM. The schedule to submit the Order of Approval application shall assume two (2) months for DEM review of the draft Facilities Plan Amendment and three (3) months for the Town to conduct a public hearing, prepare a response to comments, and submit the final Wastewater Facilities Plan Amendment to DEM. Upon DEM approval of the Facilities Plan Amendment the Town shall submit an Order of Approval application for the selected treatment alternative(s) to the DEM in accordance with the approved schedule.

The DEM appreciates the Town's cooperation throughout the development of this permit modification. If the Town has any questions or would like to discuss any of the conditions contained in this letter, I may be contacted at 401-222-4700, extension 7715.

Sincerely,



Joseph B. Haberek, P.E.
Principal Sanitary Engineer

cc: Eric Beck, DEM (electronic)
Art Zeman, DEM (electronic)

Angelo Liberti, DEM (electronic)
Jonathan Himlan, Woodard and Curran (electronic)

Office of Water Resources/Telephone: 401.222.4700/Fax: 401.222.6177

MODIFICATION

AUTHORIZATION TO DISCHARGE UNDER THE
RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 46-12 of the Rhode Island General Laws, as amended, RIPDES Permit No. RI0100056 issued to the Town of Warren for the Warren Wastewater Treatment Facility located at 427 Water Street in Warren, Rhode Island on September 30, 2010, shall be modified as follows:

The Flow, BOD, and TSS limits in Part I.A.1 of the permit shall be deleted and replaced with the limits in Part I.A.1 found in *Attachment 1* of this modification.

The Total Residual Chlorine (TRC) limits in Part I.A.2 of the permit shall be deleted and replaced with the limits in Part I.A.2 found in *Attachment 2* of this modification.

The Total Nitrogen limits in Part I.A.3 of the permit shall be deleted and replaced with the limits in Part I.A.3 found in *Attachment 3* of this modification.

The Total Copper and Cyanide limits in Part I.A.4 of the permit shall be deleted and replaced with the limits in Part I.A.4 found in *Attachment 4* of this modification.

The remaining effluent limitations, monitoring requirements and other conditions in the original permit are unchanged and in effect.

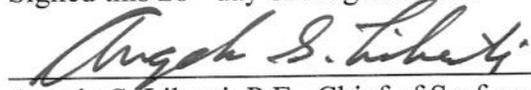
This modification shall become effective on September 1, 2013.

This permit and the authorization to discharge expire at midnight, November 30, 2015.

This change modifies the permit issued on September 30, 2010.

This modification consists of five (5) pages.

Signed this 28th day of August 2013.



Angelo S. Liberty, P.E., Chief of Surface Water Protection
Office of Water Resources
Rhode Island Department of Environmental Management
Providence, Rhode Island

ATTACHMENT 1

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date of this permit and lasting through permit expiration, the permittee is authorized to discharge from outfall serial number 001 (Final Discharge from the WWTF After All Treatment Processes).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Quantity - lbs./day		Discharge Limitations		Concentration - specify units		Monitoring Requirement	
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Average Weekly	Maximum Daily	Measurement Frequency	Sample Type
Flow (Nov. 1 – April 30) (May 1 – Oct. 31)	3.43 MGD 2.53 MGD	--- MGD --- MGD	* (Minimum)		* (Average)	* (Maximum)		
BOD ₅ (Nov. 1 – April 30) (May 1 – Oct. 31)	502 502	838 838	17.6 mg/l 23.8 mg/l		26.4 mg/l 35.8 mg/l	29.3 mg/l 39.7 mg/l	3/Week 3/Week	24-Hr. Comp. 24-Hr. Comp.
BOD ₅ - % Removal			85%				1/Month	Calculated
TSS (Nov. 1 – April 30) (May 1 – Oct. 31)	502 502	838 838	17.6 mg/l 23.8 mg/l		26.4 mg/l 35.8 mg/l	29.3 mg/l 39.7 mg/l	3/Week 3/Week	24-Hr. Comp. 24-Hr. Comp.
TSS - % Removal			85%				1/Month	Calculated
Settleable Solids					--- ml/l	--- ml/l	1/Day	Grab

--- Signifies a parameter that must be monitored and data must be reported; no limit has been established at this time.

Sampling for TSS and BOD₅ shall be performed Tuesday, Thursday, and either Saturday or Sunday. All BOD₅ and TSS samples shall be taken on the influent and effluent with appropriate allowances for hydraulic detention (flow-through) time.

Sampling for Flow and Settleable Solids shall be performed Sunday-Saturday.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 001A (Final Discharge from the WWTF After All Treatment Processes).

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

2. During the period beginning on the effective date of this permit and lasting through permit expiration, the permittee is authorized to discharge from outfall serial number 001 (Final Discharge from the WWTF After All Treatment Processes).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Concentration - specify units		Monitoring Requirement	
	Average Monthly	Maximum Daily	Average Monthly	Maximum Daily	Measurement Frequency	Sample Type
Enterococci	35 cfu ¹ 100 ml	100 ml	*(Minimum)	*(Maximum)	3/Week	Grab
Fecal Coliform	--- MPN ¹ 100 ml	100 ml	--- MPN ¹	--- MPN ¹	1/Week	Grab
Total Residual Chlorine (TRC) (Nov. 1 – April 30) (May 1 – Oct. 31)	267 ug/l ² 361 ug/l ²	267 ug/l ² 361 ug/l ²			Daily	Grab ² Grab ²
pH	(6.5 SU)	(6.5 SU)		(8.5 SU)	2/Day	Grab

¹Two (2) of the three (3) Enterococci samples are to be taken on Tuesday and Thursday. All three (3) of the Enterococci samples shall be taken at the same time of day as the second TRC sample. The Fecal Coliform sample shall be taken at the same time as either the Tuesday or Thursday Enterococci sample. The Geometric Mean shall be used to obtain the "monthly average."

²The use of a continuous TRC recorder after chlorination and prior to dechlorination is required to provide a record that proper disinfection was achieved at all times. Compliance with the permit limitations shall be determined by taking three grab samples of the final effluent (after dechlorination) Monday - Friday (except holidays), equally spaced over one (1) eight (8) hour working shift with a minimum of three hours between grabs, and on Saturdays, Sundays, and Holidays by taking at least two (2) grab samples each day with a minimum of two (2) hours between grabs. The maximum daily and average monthly values are to be computed from the averaged grab sample results for each day. The following methods may be used to analyze the grab samples: (1) DPD spectrophotometric, EPA No. 330.5 or Standard Methods (18th Edition) No.4500-Cl G; (2) DPD Titrimetric, EPA No. 330.4 or Standard Methods (18th Edition) No. 4500-Cl F; (3) Amperometric Titration, EPA No. 330.1 or Standard Methods (18th Edition) No. 4500-Cl D or ASTM No. D1253-86(92).

*Values in parentheses () are to be reported as Minimum/Maximum for the reporting period rather than Average Monthly/Maximum Daily.

Sampling for pH and Chlorine Residual shall be performed Sunday-Saturday.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: Outfall 001A (Final Discharge from the WWTF After All Treatment Processes).

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

3. During the period beginning on the effective date of this permit and lasting through permit expiration, the permittee is authorized to discharge from outfall serial number 001 (Final Discharge from the WWTF After All Treatment Processes).

Such discharges shall be monitored by the permittee as specified below:

Effluent Characteristic	Quantity - lbs. per day		Concentration - specify units		Monitoring Requirement	
	Seasonal Average	Maximum Daily	Average Monthly	Average Weekly	Measurement Frequency	Sample Type
Oil and Grease					1/Week	3 Grabs ¹
Nitrate, Total (as N) (Nov. 1 – April 30) (May 1 – Oct. 31)			--- mg/l	--- mg/l	1/Week	24-Hr. Comp.
Nitrite, Total (as N) (Nov. 1 – April 30) (May 1 – Oct. 31)			--- mg/l	--- mg/l	1/Week	24-Hr. Comp.
Total Kjeldahl Nitrogen - TKN (as N) (Nov. 1 – April 30) (May 1 – Oct. 31)			--- mg/l	--- mg/l	1/Week	24-Hr. Comp.
Nitrogen, Total (TKN + Nitrate + Nitrite, as N) (Nov. 1 – April 30) (May 1 – Oct. 31)	239.7 lbs/d ²		9.5 mg/l ²	---	1/Week	Calculated
	83.8 lbs/d ²		5.0 mg/l ²	---	1/Week	Calculated

¹Three (3) grab samples shall be equally spaced over the course of an eight (8) hour shift with a minimum of three (3) hours between grabs. Each grab sample must be analyzed individually and the maximum values reported.

²The Total Nitrogen quantity limit (lbs/d) is a rolling seasonal average limit. For example, the May value shall be determined by averaging the Total Nitrogen loads from May with the loads from June – October of the previous year and report this value on the May DMR. For each subsequent month that the seasonal limit is in effect, the seasonal average shall be calculated using samples from that month and the previous five (5) months that the seasonal limit is in effect. The Total Nitrogen concentration limit (mg/l) is a monthly average limit.

--- signifies a parameter that must be monitored and data must be reported; no limit has been established at this time.

Samples taken in compliance with the monitoring requirements specified above shall be taken Monday through Friday at the following location: Outfall 001A (Final Discharge from the WWTF After All Treatment Processes).

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

4. During the period beginning on the effective date of this permit and lasting through permit expiration, the permittee is authorized to discharge from outfall serial number 001 (Final Discharge from the WWTF After All Treatment Processes).

Such discharges shall be monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations		Concentration - specify units		Monitoring Requirement	
	Quantity - lbs. per day	Average Monthly	Average Weekly	Maximum Daily	Measurement Frequency	Sample Type
Copper, Total (Nov. 1 – April 30) (May 1 – Oct. 31)	Average Monthly	29.3 ug/l 39.7 ug/l			1/Month 1/Month	24-Hr. Comp. 24-Hr. Comp.
	Maximum Daily			94.9 ug/l 128.7 ug/l		
Cyanide (Nov. 1 – April 30) (May 1 – Oct. 31)	Average Monthly	16.4 ug/l 22.2 ug/l			1/Quarter 1/Quarter	Composite ¹ Composite ¹
	Maximum Daily					
Cadmium, Total	Average Monthly	---			1/Quarter	24-Hr. Comp.
Chromium, Total	Average Monthly	---			1/Quarter	24-Hr. Comp.
Lead, Total	Average Monthly	---			1/Quarter	24-Hr. Comp.
Zinc, Total	Average Monthly	---			1/Quarter	24-Hr. Comp.
Nickel, Total	Average Monthly	---			1/Quarter	24-Hr. Comp.
Aluminum, Total	Average Monthly	---			1/Quarter	24-Hr. Comp.

¹ Three (3) grab samples shall be equally spaced over one (1) eight (8) hour shift, with a minimum of three (3) hours between grabs. All three (3) samples shall be composited, then analyzed for available Cyanide.

Samples taken in compliance with the monitoring requirements specified above shall be taken Monday through Friday at the following locations: Outfall 001A (Final Discharge from the WWTF After All Treatment Processes).

Fact Sheet

RHODE ISLAND POLLUTANT DISCHARGE ELIMINATION SYSTEM (RIPDES) PERMIT TO DISCHARGE TO WATERS OF THE STATE

RIPDES PERMIT NO. **RI0100056**

NAME AND ADDRESS OF APPLICANT:

Town of Warren
514 Main Street
Warren, RI 02885

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Warren Wastewater Treatment Facility
427 Water Street
Warren, RI 02885

RECEIVING WATER: **Warren River**

CLASSIFICATION: **SB1**

I. Proposed Action

Effluent limits for Flow, BOD, and TSS from Part I.A.1 of the permit; Total Residual Chlorine (TRC) from Part I.A.2 of the permit; Total Nitrogen from Part I.A.3 of the permit; and Total Copper and Cyanide from Part I.A.4 of the permit are being modified from the limits that were in the original RIPDES permit issued on September 30, 2010.

II. Permit Limitations and Conditions

Effluent limits for Flow in Part I.A.1 of the permit are being changed from an annual limit of 2.01 Million Gallons/Day (MGD) to seasonal limits of 3.43 MGD for November 1 – April 30 and 2.53 MGD for May 1 – October 31. Based on these increased seasonal Flow limits the BOD and TSS concentration limits from Part I.A.1 of the permit, the TRC concentration limits from Part I.A.2 of the permit, and the Total Copper and Cyanide concentration limits from Part I.A.4 of the permit have been decreased to ensure that there is not an increased mass load to the receiving water. In addition, the Total Nitrogen load limits from Part I.A.3 of the permit have been changed from monthly average limits to seasonal average limits and the Total Nitrogen concentration limit for November 1 – April 30 from Part I.A.3 of the permit has been changed to be consistent with the limits included in paragraph 10.B of consent agreement RIA-410.

III. **Permit Basis and Explanation of Effluent Limitation Derivation**

The Town of Warren owns and operates the Wastewater Treatment Facility (WWTF) located at 427 Water Street in Warren, Rhode Island. The discharge to the Warren River consists of treated sanitary and industrial sewage contributed by the Town. Treatment consists of Coarse Screening, Grit Removal, Comminution, Primary Settling, Aeration, Secondary Flocculation and Clarification, Chlorination, and Dechlorination.

Outfall 001A discharges to the Warren River in the segment defined as waterbody ID number RI0007023E-01A. This segment is described as the Warren River from the confluence with the Barrington and Palmer Rivers, approximately 2500 feet south of the East Bay Bike Path trestles, south to a line between the concrete jetty at the north end of the Warren Town Beach through Nun Buoy 18 and its extension to the Barrington Shore. This segment is located in Barrington and Warren and is classified as a Class SB1 water body according to the RI Water Quality Regulations. Class SB1 waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However all Class SB criteria must be met. Currently, this segment is not listed as impaired. However, water from this segment flows into the Palmer River (waterbody ID number RI0007022E-01A), which is listed as not supporting Fish and Wildlife habitat due to the fact that it is impaired by Total Nitrogen and Dissolved Oxygen (DO) and not supporting primary and secondary contact recreation and shellfish consumption due to Fecal Coliform impairments.

The Town has an Industrial Pretreatment Program that was approved by the Department of Environmental Management (DEM) on September 10, 1998. Based on the Town's most recent Pretreatment Annual Report the Town receives industrial wastewater from two (2) Significant Industrial Users. The permit includes specific pretreatment requirements that are consistent with the requirements from 40 CFR 403. These requirements are not being changed.

The requirements set forth in this permit modification are from the State's Water Quality Regulations and the State's Regulations for the Rhode Island Pollutant Discharge Elimination System, both filed pursuant to Chapter 46-12, as amended. DEM's primary authority over the permit comes from EPA's delegation of the program in September 1984 under the Federal Clean Water Act (CWA).

On September 30, 2010 the DEM issued a final permit to the Town which included limits for Flow and Total Nitrogen that the Town could not consistently comply with. By letter dated October 25, 2010 the Town requested an administrative hearing and moved to stay certain conditions of the Permit. In lieu of convening an administrative hearing regarding the disputed permit conditions and in order to effect a resolution of all disputed permit conditions, the parties entered into a consent agreement on September 29, 2011. This consent agreement contained a schedule for the Town to

submit a Draft Design Flow Report that includes a determination of a revised design flow based on the results of the Town's Inflow and Infiltration (I/I) removal work and a future sewerage needs evaluation. Upon DEM approval of the Final Design Flow Report, the consent agreement required the DEM to modify the Permit as necessary in response to the revised design flow(s).

On December 22, 2011 the Town submitted a Draft Design Flow Report to the DEM. The DEM reviewed this Draft Design Flow Report and issued comments to the Town in a September 11, 2012 letter. The Town submitted a revised Draft Design Flow Report to the DEM on January 17, 2013. The DEM has reviewed the revised Draft Design Flow Report and has prepared the attached permit modification in response to the revised design flows recommended in the Draft Design Flow Report. Within three (3) months of the DEM's issuance of the final permit modification, the consent agreement requires that the Town submit a draft Wastewater Facilities Plan Amendment that will include the revised design flows and a recommendation of alternative(s) to attain compliance with the final permit limits contained in the permit modification. Upon approval of the Facilities Plan Amendment the Town shall submit an Order of Approval application for the selected treatment alternative(s) and, upon receipt of an Order of Approval for the selected treatment alternative(s), the Town shall then complete construction and initiate operation of the required equipment in accordance with the approved schedule.

Total Flow Limits:

The Warren wastewater collection system consists of approximately 40 miles of sewers, 10 pump stations and a WWTF. The original design flow for the WWTF was a maximum monthly average flow of 2.01 MGD. The Town's collection system is subject to infiltration and inflow (I/I), particularly during wet weather. As a result, the monthly average flow limit is exceeded for several months of the year during wet weather. Although the flow limit is exceeded, other RIPDES discharge limits are not typically exceeded. Over the past 15 years, the Town has undertaken multiple I/I studies and removal efforts as follows:

- Phase I Sewer System Evaluation Survey (SSES): The Phase I SSES was completed in July 1996 and recommended further investigation in two sub-areas which were found to contribute 80 percent of the measured inflow. In addition, 21 inflow sources were identified through smoke testing.
- Phase II SSES: The Phase II SSES was complete in March 1998 and included additional smoke testing and building inspections. Results of the Phase II SSES included the identification of an additional 78 inflow sources and 204 suspect inflow sources.
- Contract 1 Sewer Rehabilitation Project: On July 25, 2002, the Town opened bids for Contract 1 which included the removal and replacement of approximately 6,700 linear feet of vitrified clay gravity sewer and brick manholes in the Belchers Cove area.
- Contract 2 Sewer Rehabilitation Project: On August 6, 2003, the Town bid Contract 2, which included trenchless rehabilitation work on approximately 7,400 linear feet of sewer and the rehabilitation of 29 manholes.

- Contract 3 Sewer Rehabilitation Project: On June 8, 2006, Contract 3 was bid, which included trenchless rehabilitation work and dig and replace work for approximately 10,000 linear feet of sewer and the rehabilitation of 60 manholes.
- 2007 Inflow Source Investigation: The 2007 investigation was performed as follow-up to the Phase II SSES and included dye testing of roof leaders that were identified as suspect, inspection of buildings to confirm sources had been removed, and inspection of buildings that had not been previously inspected. The 2007 Inflow Source Investigation confirmed 48 sources (identified during the Phase II SSES) were removed, 8 new sources were identified and 117 suspect sources were removed from further consideration.
- 2008 Inflow Metering Report: This report evaluated flow data from collection system monitoring in 2004 and 2008, and WWTF flow data to estimate sewer capacity and measure the effects of I/I reduction efforts.
- 2009 Inflow Investigation Update Report: This report provided an update on inflow work that was performed as follow-up on the recommendations of the 2007 Inflow Source Investigation Report which included dye testing of suspect properties and the investigation and dye testing of 9 large roof buildings.
- Inspection of the 12 Town-owned buildings and 50 “large” buildings with roof areas greater than 10,000 square feet to confirm that they are not inflow sources.

The Town’ Draft Design Flow Report reviewed historic flow data, evaluated the future sewerage needs for the WWTF’s service area, and recommended seasonal flow limits of 2.53 MGD May 1 – October 31 and 3.43 MGD November 1 – April 30. Since the Town has completed the above-mentioned I/I projects and still has regular exceedances of its flow limit, without exceedances of other permit limits, the DEM has determined that it is appropriate to modify the WWTF’s flow limit. Therefore, the DEM has reviewed the Town’s recommended seasonal flows and has determined that they are the appropriate flows to be included in the WWTF’s RIPDES permit. As a result, the permit is being modified to include a monthly average flow limit of 2.53 MGD for the period from May 1 through October 31 and a monthly average flow limit of 3.43 MGD for the period from November 1 through April 30.

Total Nitrogen Limits:

As indicated above, the Palmer River is impaired for nutrients (e.g., Total Nitrogen) and hypoxia (e.g., Dissolved Oxygen). The WWTF and Blount Seafood, both have RIPDES permits authorizing them to discharge into the Warren River. However, it has been determined that the effluent from these facilities enter the Palmer River. Therefore, the discharge from these facilities is pertinent to the Palmer River. In order to address the Palmer River’s impairments, DEM sampled the Palmer River as part of an assessment of the Palmer River. During the assessment, it was found that oxygen levels rise after sunrise. This is caused by plant respiration during daylight hours causing elevated oxygen levels and is indicative of eutrophication, which is also evidenced

by the excessive growth of green macroalgae and high chlorophyll a levels in the water column. The excessive growth of macroalgae and the high dissolved oxygen concentrations during daylight hours demonstrates that the Palmer River is eutrophic from excessive amounts of nitrogen entering the system. Therefore, to address the Palmer River's impairments, it is necessary that the amount of nitrogen discharged to the River be controlled. To address the Palmer River's impairments, the DEM had to determine the allowable nitrogen load that could be assimilated without causing eutrophic conditions.

The Buzzards Bay Program (BBP) in Massachusetts developed empirical relationships between nitrogen loadings and eutrophication response from observations made in a number of estuaries. The BBP approach uses land use information to estimate nitrogen loads and is considered by DEM to offer a number of advantages for use in Rhode Island based on physical and biological similarities that make the use of the loading - estuarine response relationships for Buzzards Bay appropriate in the Palmer River. The BBP developed an Eutrophication Index (EI) to assist in determining the level of nutrient enrichment a waterbody is experiencing at any given time. The EI uses a scale of 0 to 100 points where 0 equals the most eutrophic and 100 is equivalent to a pristine waterbody. The BBP estimated that an appropriate EI value for Outstanding Natural Resource Waters (ONRW) is 65. Since the Palmer River is designated as a Special Resource Protection Water, whose designated uses are essentially equivalent to those of ONRWs, it should have an EI of 65 or better. Two sampling stations were established in the Palmer River and the results indicate that the Palmer River is eutrophic with an EI score of 32. This supports the need to reduce nitrogen discharges to the Palmer River.

A relationship between the nitrogen loading rate and EI from the BBP was developed that is a function of the loading rate per unit estuary volume. Acceptable loading rates for ONRWs are $50 \text{ mg m}^{-3} \text{ Vr}^{-1}$. The calculation for allowable annual load is:

$$\text{Annual Load (in kg yr}^{-1}\text{)} = \frac{\text{Loading rate} \times \text{volume at half tide (in m}^3\text{)} \times (1 + \tau_w^{1/2})}{\tau_w * 1,000,000}$$

Where τ_w is the hydraulic turnover time in years and the Vollenweider flushing term is $\tau_w/(1 + \tau_w^{1/2})$.

For the Palmer River, with a flushing time of 17.88 hours, a mean volume of $3.13 \times 10^6 \text{ m}^3$, and an allowable loading rate of $50 \text{ mg m}^{-3} \text{ Vr}^{-1}$, the corresponding nitrogen assimilative capacity of the Palmer River is 80,011 kg/yr. Using the annual allowable Total Nitrogen load for the Palmer River, the allowable seasonal Total Nitrogen loads for the Warren WWTF were established in the DEM's document titled *Evaluation of Nitrogen Targets and Load Reductions for the Palmer River* as being 6,309 Kg May – October and 19,664 Kg November – April. These allowable seasonal nitrogen loads were converted into monthly average load limits of 83.8 lbs/day May 1 – October 31 and 239.7 lbs/day for November 1 – April 30 in the WWTF's September 30, 2010 permit. These load limits were used to determine Total Nitrogen concentration limits of 5.0 mg/l May 1 –

October 31 and 14.3 mg/l November 1 – April 30 at the original 2.01 MGD design flow in the WWTF's September 30, 2010 permit.

In order to ensure that the WWTF's discharge meets the allowable seasonal Total Nitrogen load targets for the Warren WWTF from the DEM's document titled *Evaluation of Nitrogen Targets and Load Reductions for the Palmer River*, the DEM is carrying the load limits of 83.8 lbs/day May 1 – October 31 and 239.7 lbs/day November 1 – April 30 forward into this permit modification. However, since the Nitrogen load targets from the document titled *Evaluation of Nitrogen Targets and Load Reductions for the Palmer River* are seasonal targets, the load limits in this permit modification are being assigned as a seasonal average load. Therefore, the May value shall be determined by averaging the Total Nitrogen loads from May with the loads from June – October of the previous year and report this value on the May Discharge Monitoring Report (DMR). For each subsequent month that the seasonal limit is in effect, the seasonal average shall be calculated using samples from that month and the previous five (5) months that the seasonal limit is in effect. The Total Nitrogen concentration limit of 5.0 mg/l, for the period from May 1 through October 31, is being carried forward from the WWTF's September 30, 2010 permit. The Total Nitrogen concentration limit for the period from November 1 through April 30 is being set at 9.5 mg/l as indicated in paragraph 10.B of the consent agreement that was entered into between the DEM and the Town. The Town agreed not to appeal a permit modification that included these Total Nitrogen concentration limits. The Total Nitrogen concentration limits remain monthly average limits.

Limits for Other Pollutants:

In order to comply with the Antibacksliding and Antidegradation requirements, the DEM decreased the concentration-based allowable discharge levels for all water quality-based limits proportional to the flow increase, such that the mass load is held constant using the following equations:

a) Background concentration unknown or available data is impacted by sources that have not yet achieved water quality based limits.

$$Limit = (DF) * (Criteria) * (80\%) * (Original Flow / New Flow)$$

b) Using available background concentration data.

$$Limit = [(DF) * (Criteria) * 90\% - (Background) * (DF - 1)] * (Original Flow / New Flow)$$

Where: DF = acute or chronic dilution factor, as appropriate

Reference Attachment A for calculations of allowable water quality-based limits using Aquatic Life and Human Health Criteria.

In accordance with 40 CFR 122.4(d)(1)(iii), it is only necessary to establish water quality-based permit limits for those pollutants in the discharge which have the reasonable potential to cause or contribute to the exceedance of instream criteria. In order to evaluate the need for permit limits, the most stringent calculated acute (daily maximum) and chronic (monthly average) limits are compared to the DMR and the State User Fee Program data. Based on this analysis, permit limits are required for Total Residual Chlorine (TRC), Cyanide, and Total Copper.

DEM's User Fee Program detected the presence of the pesticides Aldrin and Heptachlor in the facility's effluent. However, DEM has not established permit limitations for these pollutants because of the sporadic nature of the detection of these parameters (one detect for Aldrin and two detects for Heptachlor), which DEM attributed to laboratory interference. Instead, the permit requires continued monitoring for these pollutants as part of the annual priority pollutant scans.

Although reasonable potential was not established for the following pollutants, monitoring is being required quarterly as part of the bioassay testing: Total Cadmium, Total Chromium, Total Lead, Total Zinc, Total Nickel, and Total Aluminum. These pollutants, in addition to Total Copper and Cyanide, are all part of the DEM's list of standard parameters, for discharges to salt waters, that must be measured as part of the bioassay procedures. Total Copper and Cyanide are already being measured and limited because, as discussed above, these pollutants had reasonable potential to cause or contribute to an exceedance of instream water quality criteria.

Attachment A includes a summary comparison of the allowable limits vs. the DMR and State User Fee Program data.

In order to comply with the Antibrackling and Antidegradation requirements, the DEM also decreased the BOD₅ and TSS concentration-based limits proportional to the flow increase, such that the mass load is held constant using the following equation:

$$\text{Limit} = \text{Original Limit} * (\text{Original Flow} / \text{New Flow})$$

The remaining general and specific conditions of the permit remain unchanged and are based on the RIPDES regulations as well as 40 CFR Parts 122 through 125 and consist primarily of management requirements common to all permits.

IV. Comment Period, Hearing Requests, and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the draft permit modification is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the Rhode Island Department of Environmental Management, Office of Water Resources, 235 Promenade Street, Providence, Rhode Island, 02908-5767. Any person may submit a request in writing for a public hearing to consider the draft permit to the Rhode Island Department of Environmental Management. Such requests shall state the nature of the issues proposed to be raised in the hearing. A public hearing may be held if the response to this notice indicates significant public interest. In reaching a final decision on the draft permit the Director will respond to all significant comments and make these responses available to the public at DEM's Providence Office.

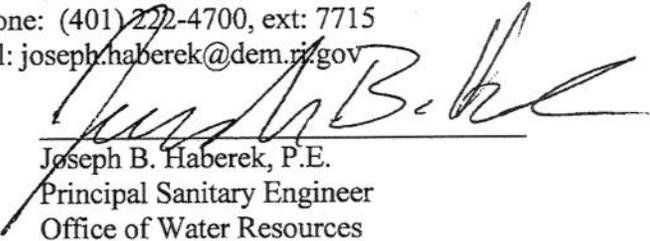
Following the close of the comment period and after the public hearing, if held, the Director will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments, provided oral testimony, or requested notice. Within thirty (30) days following the notice of the final permit decision any interested person may submit a request for a formal hearing to reconsider or contest the final decision. Requests for formal hearings must satisfy the requirements of Rule 49 of the Regulations for the Rhode Island Pollutant Discharge Elimination System.

V. DEM Contact

Additional information concerning the permit modification may be obtained between the hours of 8:30 a.m. and 4:00 p.m., Monday through Friday, excluding holidays from:

Joseph Haberek, P.E.
Department of Environmental Management
Office of Water Resources
235 Promenade Street
Providence, Rhode Island, 02908-5767
Telephone: (401) 222-4700, ext: 7715
E-mail: joseph.haberek@dem.ri.gov

7/2/13
Date



Joseph B. Haberek, P.E.
Principal Sanitary Engineer
Office of Water Resources
Department of Environmental Management

Permit No. RI0100056
Modification Attachment

Attachment A

**CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS
FACILITY SPECIFIC DATA INPUT SHEET**

NOTE: LIMITS BASED ON RI WATER QUALITY CRITERIA DATED JULY 2006

FACILITY NAME: **Warren Wastewater Treatment Facility**

RIPDES PERMIT #: **RI0100056**

	DISSOLVED BACKGROUND DATA (ug/L)	ACUTE METAL TRANSLATOR	CHRONIC METAL TRANSLATOR
ALUMINUM	NA	NA	NA
ARSENIC	NA	1	1
CADMIUM	NA	0.994	0.994
CHROMIUM III	NA	NA	NA
CHROMIUM VI	NA	0.993	0.993
COPPER	NA	0.83	0.83
LEAD	NA	0.951	0.951
MERCURY	NA	0.85	NA
NICKEL	NA	0.99	0.99
SELENIUM	NA	0.998	0.998
SILVER	NA	0.85	0.85
ZINC	NA	0.946	0.946

USE NA WHEN NO DATA IS AVAILABLE

NOTE 1: METAL TRANSLATORS FROM RI WATER QUALITY REGS.

DILUTION FACTORS	
ACUTE =	35 x
CHRONIC =	100 x
HUMAN HEALTH =	100 x

NOTE: TEST WWTF'S DILUTION FACTORS OBTAINED FROM A DYE STUDY.

DESIGN FLOWS	
"ORIGINAL" ANNUAL =	2.01 MGD
"NEW" MAY - OCT =	2.53 MGD
"NEW" NOV - APRIL =	3.43 MGD

TOTAL AMMONIA CRITERIA (ug/L)	
WINTER ACUTE =	5600
CHRONIC =	840
SUMMER ACUTE =	4400
CHRONIC =	660

NOTE 1: LIMITS ARE FROM TABLE 3 IN THE RI WATER QUALITY REGS.

USING:

- SALINITY = 20 g/Kg
- WINTER (NOV-APRIL) pH=8.4 s.u.;
- SUMMER (MAY-OCT) pH=8.2 s.u.
- WINTER (NOV-APRIL) TEMP=10.0 C;
- SUMMER (MAY-OCT) TEMP=20.0 C.

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Warren Wastewater Treatment Facility
 RIPDES PERMIT #: RI0100056

NOTE: METALS CRITERIA ARE DISSOLVED, METALS LIMITS ARE TOTAL; AMMONIA CRITERIA AND LIMITS HAVE BEEN CONVERTED TO ug/l N.

CHEMICAL NAME	CAS #	BACKGROUND CONCENTRATION (ug/L)	SALTWATER CRITERIA ACUTE (ug/L)	ORIGINAL DAILY MAX LIMIT (ug/L)	SALTWATER CRITERIA CHRONIC (ug/L)	HUMAN HEALTH NON-CLASS A CRITERIA (ug/L)	ORIGINAL MONTHLY AVE LIMIT (ug/L)
PRIORITY POLLUTANTS:							
TOXIC METALS AND CYANIDE							
ANTIMONY	7440360						
ARSENIC (limits are total recoverable)	7440382	NA	69	No Criteria	36	640	51200
ASBESTOS	1332214			1932		1.4	112
BERYLLIUM	7440417			No Criteria			No Criteria
CADMIUM (limits are total recoverable)	7440439	NA	40	1126.760563	8.8		No Criteria
CHROMIUM III (limits are total recoverable)	16065831	NA		No Criteria			No Criteria
CHROMIUM VI (limits are total recoverable)	18540299	NA	1100	31017.11984	50		4028.197382
COPPER (limits are total recoverable)	7440508	NA	4.8	161.9277108	3.1		298.7951807
CYANIDE	57125		1	28.00	1	140	80
LEAD (limits are total recoverable)	7439921	NA	210	6182.9653	8.1		681.3880126
MERCURY (limits are total recoverable)	7439976	NA	1.8	59.29411765	0.94	0.15	12
NICKEL (limits are total recoverable)	7440020	NA	74	2092.929293	8.2	4600	662.6262626
SELENIUM (limits are total recoverable)	7782492	NA	290	8136.272545	71	4200	5691.382766
SILVER (limits are total recoverable)	7440224	NA	1.9	62.58823529		0.47	No Criteria
THALLIUM	7440280			No Criteria		26000	37.6
ZINC (limits are total recoverable)	7440666	NA	90	2663.84778	81		6849.894292
VOLATILE ORGANIC COMPOUNDS							
ACROLEIN	107028			No Criteria		290	23200
ACRYLONITRILE	107131			No Criteria		2.5	200
BENZENE	71432			No Criteria		510	40800
BROMOFORM	75252			No Criteria		1400	112000
CARBON TETRACHLORIDE	56235			No Criteria		16	1280
CHLOROBENZENE	108907			No Criteria		1600	128000
CHLORODIBROMOMETHANE	124481			No Criteria		130	10400
CHLOROFORM	67663			No Criteria		4700	376000
DICHLOROBROMOMETHANE	75274			No Criteria		170	13600
1,2DICHLOROETHANE	107062			No Criteria		370	29600
1,1DICHLOROETHYLENE	75354			No Criteria		7100	568000
1,2DICHLOROPROPANE	78875			No Criteria		150	12000
1,3DICHLOROPROPYLENE	542756			No Criteria		21	1680
ETHYLBENZENE	100414			No Criteria		2100	168000
BROMOMETHANE (methyl bromide)	74839			No Criteria		1500	120000
CHLOROMETHANE (methyl chloride)	74873			No Criteria			No Criteria
METHYLENE CHLORIDE	75092			No Criteria		5900	472000

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Warren Wastewater Treatment Facility RIPDES PERMIT #: RI0100056

NOTE: METALS CRITERIA ARE DISSOLVED, METALS LIMITS ARE TOTAL; AMMONIA CRITERIA AND LIMITS HAVE BEEN CONVERTED TO ug/l N.

CHEMICAL NAME	CAS #	BACKGROUND CONCENTRATION (ug/L)	SALTWATER CRITERIA ACUTE (ug/L)	ORIGINAL DAILY MAX LIMIT (ug/L)	SALTWATER CRITERIA CHRONIC (ug/L)	HUMAN HEALTH NON-CLASS A CRITERIA (ug/L)	ORIGINAL MONTHLY AVE LIMIT (ug/L)
1,1,2,2-TETRACHLOROETHANE	79345			No Criteria		40	3200
TETRACHLOROETHYLENE	127184			No Criteria		33	2640
TOLUENE	108883			No Criteria		15000	1200000
1,2TRANS-DICHLOROETHYLENE	156605			No Criteria		10000	800000
1,1,1-TRICHLOROETHANE	71556			No Criteria		160	No Criteria
1,1,2-TRICHLOROETHANE	79005			No Criteria		300	12800
TRICHLOROETHYLENE	79016			No Criteria		2.4	24000
VINYL CHLORIDE	75014			No Criteria			192
ACID ORGANIC COMPOUNDS							
2CHLOROPHENOL	95578			No Criteria		150	12000
2,4-DICHLOROPHENOL	120832			No Criteria		290	23200
2,4-DIMETHYLPHENOL	105679			No Criteria		850	68000
4,6-DINITRO-2-METHYL PHENOL	534521			No Criteria		280	22400
2,4-DINITROPHENOL	51285			No Criteria		5300	424000
4-NITROPHENOL	88755			No Criteria			No Criteria
PENTACHLOROPHENOL	87865		13	364	7.9	30	632
PHENOL	108952			No Criteria		1700000	136000000
2,4,6-TRICHLOROPHENOL	88062			No Criteria		24	1920
BASE NEUTRAL COMPOUNDS							
ACENAPHTHENE	83329			No Criteria		990	79200
ANTHRACENE	120127			No Criteria		40000	3200000
BENZIDINE	92875			No Criteria		0.002	0.16
POLYCYCLIC AROMATIC HYDROCARBONS				No Criteria		0.18	14.4
BIS(2-CHLOROETHYL)ETHER	111444			No Criteria		5.3	424
BIS(2-CHLOROISOPROPYL)ETHER	108601			No Criteria		65000	5200000
BIS(2-ETHYLHEXYL)PHTHALATE	117817			No Criteria		22	1760
BUTYL BENZYL PHTHALATE	85687			No Criteria		1900	152000
2-CHLORONAPHTHALENE	91587			No Criteria		1600	128000
1,2-DICHLOROBENZENE	95501			No Criteria		1300	104000
1,3-DICHLOROBENZENE	541731			No Criteria		960	76800
1,4-DICHLOROBENZENE	106467			No Criteria		190	15200
3,3-DICHLOROBENZIDENE	91941			No Criteria		0.28	22.4
DIETHYL PHTHALATE	84662			No Criteria		44000	3520000
DIMETHYL PHTHALATE	131113			No Criteria		1100000	88000000
Di-n-BUTYL PHTHALATE	84742			No Criteria		4500	360000
2,4-DINITROTOLUENE	121142			No Criteria		34	2720

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Warren Wastewater Treatment Facility
 RIPDES PERMIT #: RI0100056

NOTE: METALS CRITERIA ARE DISSOLVED, METALS LIMITS ARE TOTAL; AMMONIA CRITERIA AND LIMITS HAVE BEEN CONVERTED TO ug/l N.

CHEMICAL NAME	CAS #	BACKGROUND CONCENTRATION (ug/L)	SALTWATER CRITERIA ACUTE (ug/L)	ORIGINAL DAILY MAX LIMIT (ug/L)	SALTWATER CRITERIA CHRONIC (ug/L)	HUMAN HEALTH NON-CLASS A CRITERIA (ug/L)	ORIGINAL MONTHLY AVE LIMIT (ug/L)
1,2DIPHENYLHYDRAZINE	122667			No Criteria		2	160
FLUORANTHENE	206440			No Criteria		140	11200
FLUORENE	86737			No Criteria		5300	424000
HEXACHLOROBENZENE	118741			No Criteria		0.0029	0.232
HEXACHLOROBUTADIENE	87683			No Criteria		180	14400
HEXACHLOROCYCLOPENTADIENE	77474			No Criteria		1100	88000
HEXACHLOROETHANE	67721			No Criteria		33	2640
ISOPHORONE	78591			No Criteria		9600	768000
NAPHTHALENE	91203			No Criteria		690	No Criteria
NITROBENZENE	98953			No Criteria		30	55200
NNITROSODIMETHYLAMINE	62759			No Criteria		5.1	2400
NNITROSODINPROPYLAMINE	621647			No Criteria		60	408
NNITROSODIPHENYLAMINE	86306			No Criteria		4000	4800
PYRENE	129000			No Criteria		70	320000
1,2,4trichlorobenzene	120821			No Criteria			5600
PESTICIDES/PCBs							
ALDRIN	309002		1.3	36.4		0.0005	0.04
Alpha BHC	319846			No Criteria		0.049	3.92
Beta BHC	319857			No Criteria		0.17	13.6
Gamma BHC (Lindane)	58899		0.16	4.48	0.004	1.8	144
CHLORDANE	57749		0.09	2.52	0.001	0.0081	0.32
4,4DDT	50293		0.13	3.64		0.0022	0.08
4,4DDE	72559			No Criteria		0.0022	0.176
4,4DDD	72548			No Criteria		0.0031	0.248
DIELDRIN	60571		0.71	19.88	0.0019	0.00054	0.0432
ENDOSULFAN (alpha)	959988		0.034	0.952	0.0087	89	0.696
ENDOSULFAN (beta)	33213659		0.034	0.952	0.0087	89	0.696
ENDOSULFAN (sulfate)	1031078			No Criteria		89	7120
ENDRIN	72208		0.037	1.036	0.0023	0.06	0.184
ENDRIN ALDEHYDE	7421934			No Criteria		0.3	24
HEPTACHLOR	76448		0.053	1.484	0.0036	0.00079	0.0632
HEPTACHLOR EPOXIDE	1024573		0.053	1.484	0.0036	0.00039	0.0312
POLYCHLORINATED BIPHENYLS3	1336363			No Criteria	0.03	0.00064	0.0512
2,3,7,8TCDD (Dioxin)	1746016		0.21	No Criteria		0.000000051	0.00000408
TOXAPHENE	8001352		0.42	5.88	0.0002	0.0028	0.016
TRIBUTYL TIN				11.76	0.0074		0.592

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Warren Wastewater Treatment Facility
 RIPDES PERMIT #: RI0100056
 NOTE: METALS CRITERIA ARE DISSOLVED, METALS LIMITS ARE TOTAL; AMMONIA CRITERIA AND LIMITS HAVE BEEN CONVERTED TO ug/l N.

CHEMICAL NAME	CAS #	BACKGROUND CONCENTRATION (ug/L)	SALTWATER CRITERIA ACUTE (ug/L)	ORIGINAL DAILY MAX LIMIT (ug/L)	SALTWATER CRITERIA CHRONIC (ug/L)	HUMAN HEALTH NON-CLASS A CRITERIA (ug/L)	ORIGINAL MONTHLY AVE LIMIT (ug/L)
NON PRIORITY POLLUTANTS:							
OTHER SUBSTANCES							
ALUMINUM (limits are total recoverable)	7429905	NA		No Criteria			No Criteria
AMMONIA as N (winter/summer)	7664417		4603	128890	690.5		55238.4
4BROMOPHENYL PHENYL ETHER				No Criteria			43401.6
CHLORIDE	16887006			No Criteria			No Criteria
CHLORINE	7782505		13	455	7.5		750
4CHLORO2METHYLPHENOL				No Criteria			No Criteria
1CHLORONAPHTHALENE				No Criteria			No Criteria
4CHLOROPHENOL	106489			No Criteria			No Criteria
2,4DICHLORO6METHYLPHENOL				No Criteria			No Criteria
1,1DICHLOROPROPANE				No Criteria			No Criteria
1,3DICHLOROPROPANE	142289			No Criteria			No Criteria
2,3DINITROTOLUENE				No Criteria			No Criteria
2,4DINITRO6METHYL PHENOL				No Criteria			No Criteria
IRON	7439896			No Criteria			No Criteria
pentachlorobenzene	608935			No Criteria			No Criteria
PENTACHLOROETHANE				No Criteria			No Criteria
1,2,3,5tetrachlorobenzene				No Criteria			No Criteria
1,1,1,2TETRACHLOROETHANE	630206			No Criteria			No Criteria
2,3,4,6TETRACHLOROPHENOL	58902			No Criteria			No Criteria
2,3,5,6TETRACHLOROPHENOL				No Criteria			No Criteria
2,4,5TRICHLOROPHENOL	95954			No Criteria			No Criteria
2,4,6TRINITROPHENOL	88062			No Criteria			No Criteria
XYLENE	1330207			No Criteria			No Criteria

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Warren Wastewater Treatment Facility RIPDES PERMIT #: RI0100056

CHEMICAL NAME	MAY-OCT DAILY MAX LIMIT (ug/L)	NOV-APR DAILY MAX LIMIT (ug/L)	MAY-OCT MONTHLY AVE LIMIT (ug/L)	NOV-APR MONTHLY AVE LIMIT (ug/L)
PRIORITY POLLUTANTS:				
TOXIC METALS AND CYANIDE				
ANTIMONY	No Criteria	No Criteria	40676.68	30003.50
ARSENIC, TOTAL	1534.91	1132.1633	88.98	65.63
ASBESTOS	No Criteria	No Criteria	No Criteria	No Criteria
BERYLLIUM	No Criteria	No Criteria	No Criteria	No Criteria
CADMIUM, TOTAL	895.17	660.28826	562.68	415.04
CHROMIUM III, TOTAL	No Criteria	No Criteria	No Criteria	No Criteria
CHROMIUM VI, TOTAL	24642.06	18176.213	3200.27	2360.55
COPPER, TOTAL	128.65	94.890583	128.65	94.89
CYANIDE	22.25	16.408163	22.25	16.41
LEAD, TOTAL	4912.16	3623.2537	541.34	399.30
MERCURY, TOTAL	47.11	34.746699	9.53	7.03
NICKEL, TOTAL	1662.76	1226.4688	526.43	388.30
SELENIUM, TOTAL	6464.00	4767.9032	4521.61	3335.18
SILVER, TOTAL	49.72	36.677071	49.72	36.68
THALLIUM	No Criteria	No Criteria	29.87	22.03
ZINC, TOTAL	2116.34	1561.0303	2116.34	1561.03
VOLATILE ORGANIC COMPOUNDS				
ACROLEIN	No Criteria	No Criteria	18431.62	13595.34
ACRYLONITRILE	No Criteria	No Criteria	158.89	117.20
BENZENE	No Criteria	No Criteria	32414.23	23909.04
BROMOFORM	No Criteria	No Criteria	88980.24	65632.65
CARBON TETRACHLORIDE	No Criteria	No Criteria	1016.92	750.09
CHLOROBENZENE	No Criteria	No Criteria	101691.70	75008.75
CHLORODIBROMOMETHANE	No Criteria	No Criteria	8262.45	6094.46
CHLOROFORM	No Criteria	No Criteria	298719.37	220338.2
DICHLOROBROMOMETHANE	No Criteria	No Criteria	10804.74	7969.68
1,2DICHLOROETHANE	No Criteria	No Criteria	23516.21	17345.77
1,1DICHLOROETHYLENE	No Criteria	No Criteria	451256.92	332851.3
1,2DICHLOROPROPANE	No Criteria	No Criteria	9533.60	7032.07
1,3DICHLOROPROPYLENE	No Criteria	No Criteria	1334.70	984.49
ETHYLBENZENE	No Criteria	No Criteria	133470.36	98448.98
BROMOMETHANE (methyl brom)	No Criteria	No Criteria	95335.97	70320.70
CHLOROMETHANE (methyl chl)	No Criteria	No Criteria	No Criteria	No Criteria
METHYLENE CHLORIDE	No Criteria	No Criteria	374988.14	276594.8
1,1,2,2TETRACHLOROETHANE	No Criteria	No Criteria	2542.29	1875.22

CHEMICAL NAME	MAY-OCT DAILY MAX LIMIT (ug/L)	NOV-APR DAILY MAX LIMIT (ug/L)	MAY-OCT MONTHLY AVE LIMIT (ug/L)	NOV-APR MONTHLY AVE LIMIT (ug/L)
TETRACHLOROETHYLENE	No Criteria	No Criteria	2097.39	1547.0554
TOLUENE	No Criteria	No Criteria	953359.68	703207
1,2TRANSDICHLOROETHYLENE	No Criteria	No Criteria	635573.12	468804.66
1,1,1TRICHLOROETHANE	No Criteria	No Criteria	No Criteria	No Criteria
1,1,2TRICHLOROETHANE	No Criteria	No Criteria	10169.17	7500.8746
TRICHLOROETHYLENE	No Criteria	No Criteria	19067.19	14064.14
VINYL CHLORIDE	No Criteria	No Criteria	152.54	112.51312
ACID ORGANIC COMPOUNDS				
2CHLOROPHENOL	No Criteria	No Criteria	9533.60	7032.07
2,4DICHLOROPHENOL	No Criteria	No Criteria	18431.62	13595.335
2,4DIMETHYLPHENOL	No Criteria	No Criteria	54023.72	39848.397
4,6DINITRO2METHYL PHENOL	No Criteria	No Criteria	17796.05	13126.531
2,4DINITROPHENOL	No Criteria	No Criteria	336853.75	248466.47
4NITROPHENOL	No Criteria	No Criteria	No Criteria	No Criteria
PENTACHLOROPHENOL	289.19	213.30612	289.19	213.30612
PHENOL	No Criteria	No Criteria	108047431	79696793
2,4,6TRICHLOROPHENOL	No Criteria	No Criteria	1525.38	1125.1312
BASE NEUTRAL COMPOUNDS				
ACENAPHTHENE	No Criteria	No Criteria	62921.74	46411.662
ANTHRACENE	No Criteria	No Criteria	2542292.5	1875218.7
BENZIDINE	No Criteria	No Criteria	0.13	0.0937609
PAHs	No Criteria	No Criteria	11.44	8.438484
BIS(2CHLOROETHYL)ETHER	No Criteria	No Criteria	336.85	248.46647
BIS(2CHLOROISOPROPYL)ETHER	No Criteria	No Criteria	4131225.3	3047230.3
BIS(2ETHYLHEXYL)PHTHALATE	No Criteria	No Criteria	1398.26	1031.3703
BUTYL BENZYL PHTHALATE	No Criteria	No Criteria	120758.89	89072.886
2CHLORONAPHTHALENE	No Criteria	No Criteria	101691.70	75008.746
1,2DICHLOROBENZENE	No Criteria	No Criteria	82624.51	60944.606
1,3DICHLOROBENZENE	No Criteria	No Criteria	61015.02	45005.248
1,4DICHLOROBENZENE	No Criteria	No Criteria	12075.89	8907.2886
3,3DICHLOROBENZIDENE	No Criteria	No Criteria	17.80	13.126531
DIETHYL PHTHALATE	No Criteria	No Criteria	2796521.7	2062740.5
DIMETHYL PHTHALATE	No Criteria	No Criteria	69913043	51568513
DI-n-BUTYL PHTHALATE	No Criteria	No Criteria	286007.91	210962.1
2,4DINITROTOLUENE	No Criteria	No Criteria	2160.95	1593.9359
1,2DIPHENYLHYDRAZINE	No Criteria	No Criteria	127.11	93.760933
FLUORANTHENE	No Criteria	No Criteria	8898.02	6563.2653

CALCULATION OF WATER QUALITY BASED SALTWATER DISCHARGE LIMITS

FACILITY NAME: Warren Wastewater Treatment Facility
 RIPDES PERMIT #: RI0100056

CHEMICAL NAME	MAY-OCT DAILY MAX LIMIT (ug/L)	NOV-APR DAILY MAX LIMIT (ug/L)	MAY-OCT MONTHLY AVE LIMIT (ug/L)	NOV-APR MONTHLY AVE LIMIT (ug/L)
FLUORENE	No Criteria	No Criteria	336853.75	248466.5
HEXACHLOROBENZENE	No Criteria	No Criteria	0.18	0.14
HEXACHLOROBUTADIENE	No Criteria	No Criteria	11440.32	8438.48
HEXACHLOROCYCLOPENTADIENE	No Criteria	No Criteria	69913.04	51568.51
HEXACHLOROETHANE	No Criteria	No Criteria	2097.39	1547.06
ISOPHORONE	No Criteria	No Criteria	610150.20	450052.5
NAPHTHALENE	No Criteria	No Criteria	No Criteria	No Criteria
NITROBENZENE	No Criteria	No Criteria	43854.55	32347.52
N-NITROSODIMETHYLAMINE	No Criteria	No Criteria	1906.72	1406.41
N-NITROSODI-N-PROPYLAMINE	No Criteria	No Criteria	324.14	239.09
N-NITROSODIPHENYLAMINE	No Criteria	No Criteria	3813.44	2812.83
PYRENE	No Criteria	No Criteria	254229.25	187521.9
1,2,4trichlorobenzene	No Criteria	No Criteria	4449.01	3281.63
PESTICIDES/PCBs				
ALDRIN	28.92	21.33	0.03	0.02
Alpha BHC	No Criteria	No Criteria	3.11	2.30
Beta BHC	No Criteria	No Criteria	10.80	7.97
Gamma BHC (Lindane)	3.56	2.63	3.56	2.63
CHLORDANE	2.00	1.48	0.25	0.19
4,4DDT	2.89	2.13	0.06	0.05
4,4DDE	No Criteria	No Criteria	0.14	0.10
4,4DDD	No Criteria	No Criteria	0.20	0.15
DIELDRIN	15.79	11.65	0.03	0.03
ENDOSULFAN (alpha)	0.76	0.56	0.55	0.41
ENDOSULFAN (beta)	0.76	0.56	0.55	0.41
ENDOSULFAN (sulfate)	No Criteria	No Criteria	5656.60	4172.36
ENDRIN	0.82	0.61	0.15	0.11
ENDRIN ALDEHYDE	No Criteria	No Criteria	19.07	14.06
HEPTACHLOR	1.18	0.87	0.05	0.04
HEPTACHLOR EPOXIDE	1.18	0.87	0.02	0.02
POLYCHLORINATED BIPHENYL	No Criteria	No Criteria	0.04	0.03
2,3,7,8TCDD (Dioxin)	No Criteria	No Criteria	0.00	0.00
TOXAPHENE	4.67	3.45	0.01	0.01
TRIBUTYL TIN	9.34	6.89	0.47	0.35

CHEMICAL NAME	MAY-OCT DAILY MAX LIMIT (ug/L)	NOV-APR DAILY MAX LIMIT (ug/L)	MAY-OCT MONTHLY AVE LIMIT (ug/L)	NOV-APR MONTHLY AVE LIMIT (ug/L)
NON PRIORITY POLLUTANTS:				
OTHER SUBSTANCES				
ALUMINUM, TOTAL	No Criteria	No Criteria	No Criteria	No Criteria
AMMONIA (as N), WINTER (NOV-APR)	102398.46	75530.06	43885.05	32370.024
AMMONIA (as N), SUMMER (MAY-SEP)	80455.93	59345.04	34481.11	25433.591
4BROMOPHENYL PHENYL ETHER	No Criteria	No Criteria	No Criteria	No Criteria
CHLORIDE	No Criteria	No Criteria	No Criteria	No Criteria
CHLORINE	361.48	266.63	361.48	266.63265
4CHLORO2METHYLPHENOL	No Criteria	No Criteria	No Criteria	No Criteria
1CHLORONAPHTHALENE	No Criteria	No Criteria	No Criteria	No Criteria
4CHLOROPHENOL	No Criteria	No Criteria	No Criteria	No Criteria
2,4DICHLORO6METHYLPHENOL	No Criteria	No Criteria	No Criteria	No Criteria
1,1DICHLOROPROPANE	No Criteria	No Criteria	No Criteria	No Criteria
1,3DICHLOROPROPANE	No Criteria	No Criteria	No Criteria	No Criteria
2,3DINITROTOLUENE	No Criteria	No Criteria	No Criteria	No Criteria
2,4DINITRO6METHYL PHENOL	No Criteria	No Criteria	No Criteria	No Criteria
IRON	No Criteria	No Criteria	No Criteria	No Criteria
pentachlorobenzene	No Criteria	No Criteria	No Criteria	No Criteria
PENTACHLOROETHANE	No Criteria	No Criteria	No Criteria	No Criteria
1,2,3,5tetrachlorobenzene	No Criteria	No Criteria	No Criteria	No Criteria
1,1,1,2TETRACHLOROETHANE	No Criteria	No Criteria	No Criteria	No Criteria
2,3,4,6TETRACHLOROPHENOL	No Criteria	No Criteria	No Criteria	No Criteria
2,3,5,6TETRACHLOROPHENOL	No Criteria	No Criteria	No Criteria	No Criteria
2,4,5TRICHLOROPHENOL	No Criteria	No Criteria	No Criteria	No Criteria
2,4,6TRINITROPHENOL	No Criteria	No Criteria	No Criteria	No Criteria
XYLENE	No Criteria	No Criteria	No Criteria	No Criteria

**Facility Name: Warren WWTF
 RIPDES Permit #: RI0100056**

Outfall #: 001A

NOTE: METALS LIMITS ARE TOTAL METALS

Parameter	UFP Data (ug/L) 3/08 - 3/13		DMR Data (ug/L) 9/04 - 9/09		Potential Permit Limits (ug/L)				Reasonable Potential (y/n)
	Max	Ave	Daily Max	Monthly Ave	May - Oct		Nov - April		
					Daily Max	Monthly Ave	Daily Max	Monthly Ave	
PRIORITY POLLUTANTS									
TOXIC METALS AND CYANIDE									
ANTIMONY						40676.67984		30003.49854	
ARSENIC (limits are total recoverable)	2	1.55			1534.909091	88.98023715	1132.163265	65.63265306	
ASBESTOS									
BERYLLIUM									
CADMIUM (limits are total recoverable)			13	1.6		895.2	562.7	415.0	n
CHROMIUM III (limits are total recoverable)									
CHROMIUM VI (limits are total recoverable)	1.3	1.15	1	0.13	24642.1	3200.3	18176.2	2360.5	n
COPPER (limits are total recoverable)	52	26.07	58.8	7.3	128.6	128.6	94.9	94.89058274	y
CYANIDE	20	20	10	1.3	22.24505929	22.24505929	16.40816327	16.40816327	y
LEAD (limits are total recoverable)	6	4.275	3	0.5	4912.2	541.3	3623.3	399.3	n
MERCURY (limits are total recoverable)					47.1	9.5	34.7	7.032069971	
NICKEL (limits are total recoverable)					1662.8	526.4	1226.5	388.3	
SELENIUM (limits are total recoverable)					6464.0	4521.6	4767.9	3335.2	
SILVER (limits are total recoverable)					49.7	49.7	36.7	36.7	
THALLIUM						29.87193676		22.03381924	
ZINC (limits are total recoverable)	56	39.4	34	12.9	2116.3	2116.3	1561.0	1561.0	n
VOLATILE ORGANIC COMPOUNDS									
ACROLEIN						18431.62055		13595.33528	
ACRYLONITRILE						158.8932806		117.2011662	
BENZENE						32414.22925		23909.0379	
BROMOFORM	1	1				88980.23715		65632.65306	n
CARBON TETRACHLORIDE						1016.916996		750.0874636	
CHLOROBENZENE						101691.6996		75008.74636	
CHLORODIBROMOMETHANE	3.8	2.5				8262.450593		6094.460641	n
CHLOROFORM	4.4	2.66				298719.3676		220338.1924	n
DICHLOROBROMOMETHANE	8	4.23				10804.74308		7969.6793	n
1,2DICHLOROETHANE						23516.20553		17345.77259	
1,1DICHLOROETHYLENE						451256.917		332851.312	
1,2DICHLOROPROPANE						9533.596838		7032.069971	

1,3DICHLOROPROPYLENE							1334.703557	984.4897959
ETHYLBENZENE							133470.3557	98448.97959
BROMOMETHANE (methyl bromide)							95335.96838	70320.69971
CHLOROMETHANE (methyl chloride)							No Criteria	No Criteria
METHYLENE CHLORIDE							374988.1423	276594.7522
1,1,2,2TETRACHLOROETHANE							2542.29249	1875.218659
TETRACHLOROETHYLENE	1.6						2097.391304	1547.055394 n
TOLUENE							953359.6838	703206.9971
1,2TRANSDICHLOROETHYLENE							635573.1225	468804.6647
1,1,1TRICHLOROETHANE							No Criteria	No Criteria
1,1,2TRICHLOROETHANE							10169.16996	7500.874636
TRICHLOROETHYLENE							19067.19368	14064.13994
VINYL CHLORIDE							152.5375494	112.5131195
ACID ORGANIC COMPOUNDS								
2CHLOROPHENOL							9533.596838	7032.069971
2,4DICHLOROPHENOL							18431.62055	13595.33528
2,4DIMETHYLPHENOL							54023.71542	39848.3965
4,6DINITRO2METHYL PHENOL							17796.04743	13126.53061
2,4DINITROPHENOL							336853.7549	248466.4723
4NITROPHENOL							No Criteria	No Criteria
PENTACHLOROPHENOL							289.1857708	213.3061224
PHENOL							108047430.8	79696793
2,4,6TRICHLOROPHENOL							1525.375494	1125.131195
BASE NEUTRAL COMPOUNDS								
ACENAPHTHENE							62921.73913	46411.66181
ANTHRACENE							2542292.49	1875218.659
BENZIDINE							0.127114625	0.093760933
POLYCYCLIC AROMATIC HYDROCARBONS							11.44031621	8.438483965
BIS(2CHLOROETHYL)ETHER							336.8537549	248.4664723
BIS(2CHLOROISOPROPYL)ETHER							4131225.296	3047230.321
BIS(2ETHYLHEXYL)PHTHALATE	23.8						1398.26087	1031.370262 n
BUTYL BENZYL PHTHALATE							120758.8933	89072.8863
2CHLORONAPHTHALENE							101691.6996	75008.74636
1,2DICHLOROBENZENE							82624.50593	60944.60641
1,3DICHLOROBENZENE							61015.01976	45005.24781
1,4DICHLOROBENZENE							12075.88933	8907.28863
3,3DICHLOROBENZIDENE							17.79604743	13.12653061
DIETHYL PHTHALATE							2796521.739	2062740.525
DIMETHYL PHTHALATE							69913043.48	51568513.12
DInBUTYL PHTHALATE							286007.9051	210962.0991



RHODE ISLAND
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

235 Promenade Street, Providence, RI 02908-5767

TDD 401-222-4462

September 29, 2011

CERTIFIED MAIL

Mr. C. Richard Paduch, Town Manager
Town of Warren
514 Main Street
Warren, RI 02885-4369

RE: Warren Wastewater Treatment Facility; Final Consent Agreement No. RIA-410

Dear Mr. Paduch:

Enclosed please find a fully executed copy of Consent Agreement No. RIA-410 that resolves the Town of Warren's (Warren's) appeal of certain conditions of its Rhode Island Pollutant Discharge Elimination System (RIPDES) Permit No. RI0100056 that was issued on September 30, 2010. As a reminder, paragraph 10.A of the consent agreement requires a Draft Design Flow Report to be submitted to the Department of Environmental Management (DEM) within two (2) months of the date of execution of this agreement. Therefore, since the agreement was fully executed on September 29, 2011, the Draft Design Flow Report must be submitted to the DEM by November 29, 2011. Subsequent schedules are contingent upon DEM approval of the Draft Design Flow Report and are detailed in paragraph 10 of the consent agreement.

Thank you for your cooperation in reaching this Agreement. If you have any questions, you may contact Joseph Haberek, P.E. of the DEM's RIPDES Program at 401-222-4700, extension 7715.

Sincerely,

Angelo S. Liberti, P.E.
Chief of Surface Water Protection

cc: Eric Beck, DEM (electronic)
Joseph Camara, DEM (electronic)
Annie McFarland, DEM (electronic)
Bonnie Stewart, DEM (electronic)
David Komeiga, United Water (electronic)
Jonathan Himlan, Woodard & Curran (electronic)

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF WATER RESOURCES

IN RE: AAD No. 10-003/WRA

No. RIA-410

CONSENT AGREEMENT

This Consent Agreement is entered into by and between the Department of Environmental Management (the "DEM") and the Town of Warren (the "Respondent" or "Town"), which is responsible for the operation of the Warren Wastewater Treatment Facility, (the "Facility"), located in Warren, Rhode Island. This Agreement is entered into in accordance with Chapters 46-12 and 42-17.1 of the Rhode Island General Laws ("RIGL").

The DEM issued a final permit to the Town dated September 30, 2010 (the "Permit"). By a letters dated October 25, 2010 the Town requested an administrative hearing and moved to stay certain conditions of the Permit. In lieu of convening an Administrative Hearing regarding the disputed permit conditions and in order to effect a resolution of all disputed issues in this matter between DEM and the Respondent, the parties agree as follows:

1. The Respondent is subject to the provisions of Chapter 46-12 of the RIGL for purposes of this Agreement.
2. DEM has jurisdiction over the subject matter of this Agreement and has personal jurisdiction over the Respondent for purposes of this Agreement.
3. The provisions of this Agreement shall apply to and be binding upon the Respondent, its agents, servants, employees, successors and assigns, and all persons, firms and corporations acting under, through and for it.
4. The compliance with the terms of this Agreement does not relieve the Respondent from compliance with any other applicable laws or regulations administered by DEM or any other governmental entity. This Agreement shall not operate to shield the Respondent from liability arising from future activities, as of the date of execution of this Agreement. Execution of this Agreement is for the sole purpose of resolving AAD case number 10-003/WRA and does not in any way resolve any compliance issues associated with RIPDES Permit No. RI0100056.
5. Upon the determination by the Director of the DEM that there is an immediate threat to the public health or the environment, or upon the discovery of new information, the DEM reserves the right to order additional remedial action or other enforcement measures as provided by law or regulations.

6. The Director of the DEM may, for good cause shown, defer any of the compliance dates prescribed herein. In the event that the Respondent believes that good cause exists for extending any such dates, the Respondent shall submit a written request to DEM for an extension at least seven (7) days prior to such deadline, together with a complete statement of the reasons why the Respondent believes that such an extension is justified. Any such request shall be subject to DEM review and approval. If DEM denies the Respondent's extension request, that decision may be appealed to Superior Court in accordance with RIGL 42-35-1 et seq. The Agreement may be amended by mutual agreement of the parties in writing.
7. In the event that the Respondent fails to comply with any of the schedules in paragraph 10 of this Agreement it shall pay a stipulated penalty of one thousand dollars (\$1,000) a day for each and every day it remains in violation of the schedule. Penalties will not be assessed if the schedule has been extended for good cause under paragraph 6 and the Respondent complies with the extended schedule. The payment of a stipulated penalty in accordance with this paragraph shall not preclude DEM from seeking any other appropriate remedy.
8. In the event the Respondent fails to comply with any of the interim limits of paragraph 10 of this Agreement it may be subject to an administrative penalty as determined by the DEM in accordance with the *Rules and Regulations for Assessment of Administrative Penalties*. The payment of an administrative penalty in accordance with this paragraph shall not preclude DEM from seeking any other appropriate remedy.
9. This Agreement shall have the full force and effect of a final administrative adjudication, shall be deemed a final administrative decision under the Administrative Procedures Act (RIGL Chapter 42-34) and shall be fully enforceable in the Superior Court of the State of Rhode Island.
10. The Respondent shall attain compliance with the final effluent limits for Flow and Total Nitrogen for the May 1 – October 31 and November 1 – April 30 seasons, as specified in the Permit, in accordance with the following schedule:
 - A. Within two (2) months of the date of execution of this agreement, the Respondent shall submit a Draft Design Flow Report. The Draft Report shall be subject to DEM review, modification and approval. Within one (1) month of receipt of DEM's comments on the Report, the Respondent shall modify the Draft Design Flow Report in response to the DEM's comments and provide a public notice relative to the future sewerage needs evaluation and the determination of the revised design flow. Within one (1) month of the public notice, the Respondent shall hold a public meeting to obtain public input on the future sewerage needs evaluation and the determination of the revised design flow. Within one (1) month of the public meeting, the Respondent shall prepare a Final Design Flow Report and submit it to the DEM. At a minimum, the Report shall include the following information:

- (i) A summary of all I/I reduction work performed by the Town including, but not limited to, the results of its inspections of all commercial and industrial buildings with roof areas greater than 10,000 ft².
- (ii) The results of its inspections of all municipal buildings.
- (iii) An estimate of the volume of I/I removed from any confirmed sources of I/I from large roofed buildings and municipal buildings.
- (iv) The results of its efforts to disconnect the previously identified 92 confirmed residential inflow sources.
- (v) The results of I/I removal activities at the former American Tourister mill facility.
- (vi) Detailed “after” flow analysis, based on the average and maximum daily wastewater flows through the Facility measured at the Facility’s intermediate pump station. The analysis shall document the extent to which both inflow and infiltration have been reduced and include a recommendation on whether, or not, additional corrective actions are needed and are cost effective.
- (vii) A determination of a revised design flow based on the results of the I/I removal work and a future sewerage needs evaluation that includes all of the minimum requirements of a Facilities Plan Amendment, up to and including section V of the DEM’s Facilities Plan Review Checklist.
- (viii) A detailed update on the Town’s implementation of the conditions, from the DEM’s August 12, 2010 letter, that the DEM placed on its approval of the recommended sewage disposal alternative for Touisset Point and the Highlands. At a minimum, this update shall include the following:
 - (a) An update on the Town’s merging adjacent, non-conforming lots that are in common ownership in the Touisset Point and Highlands areas.
 - (b) An update on the Town’s implementation of the recommendations of the approved Onsite Wastewater Management Plan.
 - (c) An update on the Town’s implementation of an ordinance requiring that all onsite wastewater disposal systems in the Touisset Point and Highlands areas utilize nitrogen reducing technologies.

- (d) An update on the Town's implementation of an Onsite Wastewater Management Ordinance that requires inspections of onsite wastewater disposal systems within the Touisset Point and Highlands areas.
- (e) An update on the Town's implementation of an inventory and maintenance/inspection tracking system for all onsite wastewater disposal systems within the Touisset Point and Highlands areas.
- (f) An update on the Town's evaluation of the adequacy of the public water supply system in the Touisset Point and Highlands areas and a recommendation on the need to upgrade/add supply wells.
- (g) An update on the Town's implementation of an ordinance prohibiting unmerging of lots for the purpose of building new homes in the Touisset Point and Highlands areas.
- (h) An update on the Town's efforts to acquire or secure an interest, or right of first refusal, for parcels identified as having potential for local community wastewater disposal facilities in the Touisset Point and Highlands areas. In particular, at least one parcel for Touisset Point (preferably 16-21) and a portion of one parcel for the Highlands (17-1 or 17-7).
- (i) A proposed schedule for completing any conditions from paragraphs 10.A(viii)(a) – 10.A(viii)(h) that have not been completed. The proposed schedule is subject to DEM review, modification, and approval.

B. Upon DEM approval of the Final Design Flow Report, the DEM will modify the Permit as necessary in response to the revised design flow(s). If the approved Final Design Flow Report recommends an increase in the design flow, the Town agrees not to appeal a permit modification that establishes lower concentration limits, for all pollutants except Total Nitrogen, provided that the lower concentration limits are established to keep the pollutant loadings in the modified Permit equal to the pollutant loadings in the current Permit. The Town agrees not to appeal a permit modification that establishes seasonal monthly average Total Nitrogen limits of 5.0 mg/l for May 1 – October 31 with flows of approximately 2.01 MGD and 9.5 mg/l for November 1 – April 30 with flows of approximately 3.3 MGD. These seasonal flows are based on preliminary figures and are not intended to be an approval of revised design flows in any way. The final design flow(s) will be determined by the Final Design Flow Report. The Town does not give up its ability to appeal revised limits that are not consistent with the above-mentioned limits.

- C. Within three (3) months of the DEM's issuance of the final permit modification from paragraph 10.B, the Respondent shall submit a draft Wastewater Facilities Plan Amendment that will include the revised design flow(s) from the approved Final Design Flow Report and an evaluation and recommendation of alternative(s) to attain compliance with the final permit limits. The three (3) month schedule assumes that the flows included in the final permit modification do not change from the flows in the approved Final Design Flow Report. The draft Wastewater Facilities Plan Amendment shall include engineering calculations that demonstrate compliance with the revised permit limits at the new design flow(s). The draft Wastewater Facilities Plan Amendment shall also include a schedule to submit an Order of Approval application to the DEM. The schedule shall assume two (2) months for DEM review of the draft Facilities Plan and three (3) months for the Respondent to conduct a public hearing, prepare a response to comments, and submit the final Wastewater Facilities Plan Amendment to DEM. The Facilities Plan Amendment shall be subject to DEM review, modification and approval.
 - D. Upon approval of the Facilities Plan Amendment the Respondent shall submit an Order of Approval application for the selected treatment alternative(s) to the DEM in accordance with the approved schedule. At a minimum, the Order of Approval application shall include final plans, the appropriate fee, technical specifications, design calculations, and a schedule for construction and initiation of operation (not to exceed December 1, 2015 which includes three months for DEM review and issuance of an Order of Approval), which are subject to DEM review, modification, and approval. Initiation of operation shall be defined as the date of substantial completion of construction.
 - E. Upon receipt of an Order of Approval for the selected treatment alternative(s), the Respondent shall complete construction and initiate operation of the equipment required therein in accordance with the approved schedule.
 - F. From the date of execution of this Agreement until three (3) months after completion of construction and initiation of operation of the selected treatment alternative(s), the Respondent shall meet the interim limitations for Flow and Total Nitrogen in *Attachments 1* and *2* of this Agreement, which is attached hereto and incorporated herein. For any pollutants not specifically listed in the Attachments, the Respondent shall be subject to the final limits from the Permit.
11. No later than fourteen (14) calendar days following a date identified in any schedule of compliance, the Respondent shall submit either a report of progress or, in the case of specific actions being required by identified dates, a written notice of compliance or noncompliance. In the latter case, the notice shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirements.

12. All reports and other documentation that the Respondent is required to submit to the DEM by the terms of this Agreement shall be sent to the Office of Water Resources, RIPDES Program, 235 Promenade Street, Providence, RI 02908-5767. Each document shall be subject to DEM review and approval. Upon DEM review of the document, DEM shall provide written notification to the Respondent, either granting approval or stating the deficiencies revealed therein. Within fourteen (14) days (unless a longer time is specified) of receiving a notification of deficiencies, the Respondent shall submit to DEM a revised document consistent with the DEM comments.
13. This Agreement supersedes Consent Agreement RIA-335.
14. This Agreement shall be deemed entered as of the date of execution by the parties.

TOWN OF WARREN

David Frerichs
DAVID FRERICHS, **COUNCIL PRESIDENT**
 (Name), (Title)

SEPT. 14, 2011
 Date

The individual signing on behalf of the Town of Warren represents that he/she has the actual authority to enter into this Agreement, and the authority to bind the Town of Warren to the requirements contained within.

In Warren Town Hall, on the 14th day of September 2011, before me personally appeared David Frerichs (signing party's name), to me known and known by me to be the party executing the foregoing Consent Agreement on behalf of the Town of Warren and the acknowledged said instrument executed by him/~~her~~ to be his/~~her~~ free act and deed.

Elizabeth Johnson
 Notary Public
 My Commission expires: 6/5/2013

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 FOR THE DIRECTOR

Angelo S. Liberti
 Angelo S. Liberti, P.E.
 Chief of Surface Water Protection
 Office of Water Resources

September 29, 2011
 Date

ATTACHMENT 1

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date and lasting through the completion of Paragraph 10.F of Consent Agreement RIA-410, the permittee is authorized to discharge from outfall serial number 001 (Final Discharge from the WWTF After All Treatment Processes). Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>			<u>Monitoring Requirement</u>			
	Quantity – lbs/Day Average Monthly	Maximum Daily	Concentration - specify units Average Monthly	Average Weekly	Maximum Daily	Measurement Frequency	Sample Type
Flow	--- MGD	---	MGD	---	MGD	Continuous	Recorder

--- Signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

Sampling for Flow shall be performed Sunday – Saturday.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: at Outfall 001 (Final Discharge from the WWTF After All Treatment Processes).

ATTACHMENT 2

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

- During the period beginning on the effective date and lasting through the completion of Paragraph 10.F of Consent Agreement RIA-410, the permittee is authorized to discharge from outfall serial number 001 (Final Discharge from the WWTF After All Treatment Processes). Such discharges shall be limited and monitored by the permittee as specified below:

<u>Effluent Characteristic</u>	<u>Discharge Limitations</u>				<u>Monitoring Requirement</u>		
	Quantity – lbs/Day		Concentration - specify units		Measurement Frequency	Sample Type	
	Average Monthly	Maximum Daily	Average Monthly	Average Weekly	Maximum Daily		
Total Nitrogen (TKN + Nitrate + Nitrite, as N) (May 1 – October 31)		--- lbs/day	--- mg/L		---mg/L	1/Week	Calculated
(November 1 – April 30)		--- lbs/day	--- mg/L		---mg/L	1/Week	Calculated

--- Signifies a parameter which must be monitored and data must be reported; no limit has been established at this time.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: at Outfall 001 (Final Discharge from the WWTF After All Treatment Processes).

APPENDIX B: COMPREHENSIVE COMMUNITY PLAN

Land Use Appendix A

Build Out Assumptions

The following assumptions guided the build out analysis.

1. Only residential development permitted as-of-right is considered. Single-family residential is permitted as-of-right. (Hence, multi-family and/or accessory dwelling units are not considered in the analysis).
2. No new development will occur on any protected open space lands (federal, state, town, land trust, ASRI, farms with purchased development rights), cemeteries and other exempt properties (churches, hospitals, schools, town, etc.). These lots are shown on Figure 1.⁷ (Farm Forest Open Space, or State Class Code `33` lots are only temporarily protected, unless protected by conservation easements and/or development right purchase, and therefore could be subject to further residential development).
3. All adjacent lots that are in same ownership that would be required to be merged if developed, under Section 32-82 of the Zoning Ordinance, will be merged.
4. The number of existing dwelling units per lots will be estimated using various information from the Assessor's database, including State Class Code (`01`/single-family, `02`/two-five family, etc.), main building design (`2` family, `3` family, colonial, etc), and for `03`/apartments using oblique aerial photography from www.maps.live.com. See Figure 2 for distribution of Existing Dwelling Units.
5. Existing lots split by two or more zoning districts (e.g., R10/R20 or R40/M) were considered. Existing dwelling units were applied only to the appropriate portion of the lot using buildout footprint data from the GIS and aerial photography.
6. The RIGIS Wetlands dataset (1995) was considered to be the best available townwide wetlands information, hence were used to calculate the area on all lots that are "Suitable for Development", as per Section 32-76.1 of the Zoning Ordinance. (This Section generally specifies that areas not suitable for development shall include fresh and coastal wetlands and areas with slopes in excess of twenty-five (25) percent. Slopes in excess of twenty-five (25) percent were not present based on a review of the RIGIS Soils data). Wetlands are shown on Figure 1.
7. The potential number of additional lots that could be created by subdivision (as-of-right) was based on the minimum lot size within each zoning district and the land area suitable for development. The distribution of Additional Dwelling Units and Build Out is shown on Figure 3.

⁷ Note that the numbering of the figures in the build out does not follow the numbering of figures for all maps in the Land Use Element. The main body of this element has three figures: Fig 1. Existing Land Use, Fig 2. Existing Zoning, and Fig 3. Future Land Use. We also need to insert the map of the planning areas. The build out starts with Fig 1. Existing Lots Not Subject to Build out analysis, etc. These will have to be renumbered.

-
8. Frontage considerations for potential new lots was made on the following bases, and the following formulae used to calculate Potential Lots, respectively:
- a. If two lots could be created (that is, where the area suitable for development is less than three (3) times the minimum lot size) it was assumed that the existing lot would already have road frontage (and could be basically split):

Potential Lots (rounded down)

= Area Suitable for Development / Minimum Lot Size
 - b. If, however, three or more lots could be created (that is, where the area suitable for development is more than three (3) times the minimum lot size) it was assumed that fifteen (15) percent of the land area suitable for development would be removed to allow for new roads:

Potential Lots (rounded down)

= (Area Suitable for development * 0.85) / Minimum Lot Size
9. All lots were considered to have road frontage, even though some lots are known to be land-locked.
10. The impact of cluster development on R40, R20 and R10 was not considered.
11. All new lots that could be created in the VB and W zoning districts will be split proportionately between residential and commercial (since both are permitted as-of-right). Hence the number of potential units would be halved on new residential lots.
12. Within all other zoning districts (i.e., excluding those described in Assumption 9. above), we calculated the number of potential units to be equal to the number of potential lots (since all are single-family and require the same minimum lot area).
13. If the number of existing units on each lot was equal or greater than the number of potential units then those lots are considered "maxed out" under this development scenario. Additional units would therefore be zero.
14. However, if the number of existing units on each lot is less than the number of potential units, then those lots are considered to have additional development potential. Additional units could be calculated. All Additional Dwelling Units are shown on Figure 3.
15. Within each zoning district the total number of units (Total Units) is the sum of the number of existing units (Existing Units) and number of additional units (Additional Units). All units are calculated on a lot-by-lot basis then summarized by zoning district and shown in Table 1 and Figure 4.
16. The average household size derived from the 2000 Census of Population and Housing was used to estimate the existing and projected populations.
17. The 2007 existing units across all zoning districts was estimated at 4,710 units (or 11,304 persons) using the Assessor's database (and 2000 Census -- see Assumption 14). This estimate is considered very reasonable; the 2000 Census estimated 4,977 units (or 11,945 persons) and RI Statewide Planning Program has projected a decline in total population to

11,328 persons as of July 1, 2005.

The tables that follow provide build out projections by zoning districts. The zoning districts are in the current Zoning Ordinance. The existing Zoning Ordinance provides for the following zoning districts:

- **R40 Residence District.** This district is for residential uses with a density of one dwelling unit per 40,000 square feet.
- **R30 Residence District.** This district is for residential uses with a density of one dwelling unit per 30,000 square feet.
- **R20 Residence District.** This district is for residential uses with an approximate density of one dwelling unit per 20,000 square feet.
- **R15 Residence District.** This district is for residential uses with a density of one dwelling unit per 15,000 square feet.
- **R10 Residence District.** This district is for residential uses with a density of one dwelling unit per 10,000 square feet.
- **R6 Residence District.** This district is for residential uses with a density of one dwelling unit per 6,000 square feet.
- **Residential Village District.** This is an overlay district applied to certain areas of compact residential development in the Touisset area, for which modified dimensional regulations are applied to substandard lots of record.
- **Village Business.** This district includes the central business area off Main Street as well as the business area off Child Street and Metacom Avenue, where permitted business uses are in character and scale with the mixed-use areas of town, and have less traffic impact and parking demand than more intensive business uses.
- **Business.** This district includes all other commercial areas which are not in the Village Business District, and which are suitable for more intensive business uses, including those areas along major thoroughfares where businesses rely on easy vehicular access.
- **Waterfront District.** This district includes mixed-use areas along and adjoining the Warren River for which water dependent uses are encouraged.
- **Special District.** This district is designated primarily for the American Tourister site and Parker Mill.
- **Waterfront Overlay District.** This is an overlay district applied to the Waterfront District and Special District. This district requires development plan review by the planning board.
- **Manufacturing District.** This district includes land currently used for manufacturing and related uses, and areas which are considered suitable for development of manufacturing uses.
- **Commercial Industrial District.** This district is in the vicinity of Old Market Street, New Industrial Way and Commercial Way intended for mixed industrial and commercial uses.
- **Farm Conservation District.** This district includes agricultural lands which are permanently

protected against development, and are now or formerly in active farming use.

- **Conservation District.** This district includes areas of protected coastal land and open space, which are in public ownership, or owned by a private organization, for the purpose of maintaining it in its natural condition and/or protecting a plant or animal habitat area. Permitted uses include passive recreation and habitat management.
- **Kickemuit Reservoir Watershed Overlay Protection District.** This is an overlay district applied to the watershed of the Kickemuit Reservoir, for which certain uses otherwise permitted in the underlying districts are prohibited, and for which site plan review is required.
- **Rural Business.** This district is intended for mixed commercial uses characterized by architectural and site design standards consistent with providing a aesthetically unobtrusive gateway to the Town.

Table 1: Residential Build out Projections by Zoning Districts, 2008

Zoning District	Total Acres	Existing Units	Additional Units	Total Units
B	143	174	-	174
C	359	1	-	1
CI	32	-	-	-
FC	207	-	-	-
M	121	28	-	28
R6	165	1,133	147	1,280
R10	866	2,133	607	2,740
R15	46	64	18	82
R20	160	147	68	215
R30	78	23	1	24
R40	1,374	504	536	1,040
S	25	10	0	10
VB	51	442	19	461
W	20	51	19	70
Water, Roads, etc.	331	0	0	0
Totals	3,976	4,710	1,415	6,125

Table 2: Projected New Residential Lots by Zoning District, 2008

Zoning District	Total Acres	Min. Lot Size (SF)	Total Existing Lots*	Existing Lots With Potential Residential	Potential Add'l Lots	Percent Increase in New Lots	Percent of New Lots in Warren
R6	165	6,000	747	71	109	15%	8%
R10	866	10,000	2,033	253	609	30%	46%
R15	46	15,000	85	7	13	15%	1%
R20	160	20,000	49	5	77	157%	6%
R30	78	30,000	23	1	1	4%	0%
R40	1,374	40,000	635	116	480	76%	36%
VB	51	10,000	309	24	19	6%	1%
W	20	10,000	75	22	17	23%	1%
Totals	2760		3,956	499	1,325	33%	100%

* Includes ``merged lots`` in total (see Assumption 3)

Table 3: Projected New Residential Units by Zoning District, 2008

Zoning District	Total Acres	Min. Lot Area Per Unit (SF)	Existing Units	Add'l Units	Total Units	Percentage Increase in DU's	Percentage of New DU's In Warren
R6	165	6,000	1,133	147	1,280	13%	10%
R10	866	10,000	2,133	607	2,740	28%	43%
R15	46	15,000	64	18	82	28%	1%
R20	160	20,000	147	68	215	46%	5%
R30	78	30,000	23	1	24	4%	0%
R40	1,374	40,000	504	536	1,040	106%	38%

Zoning District	Total Acres	Min. Lot Area Per Unit (SF)	Existing Units	Add'l Units	Total Units	Percentage Increase in DU's	Percentage of New DU's In Warren
VB	51	10,000	442	19	461	4%	1%
W	20	10,000	51	19	70	37%	1%
Totals	2,760		4,497	1,415	5,913	31%	100%

Major Findings

- Under current zoning (R40) the *Touisset Peninsula Greenway* is approximately half developed, despite several large permanently protected farms and conservations areas.
- There are an estimated 384 existing dwelling units of which 95% (or 363 units) are single-family. There are just a total of nine (9) lots with more than one unit.
- There are 376 additional single-family dwelling units that could potentially be allowed as-of-right in this area.
- The total number of projected dwelling units in this area is 760 units. This represents 27% of all new residential development in Warren, and 70% of all additional units in the R40 zone.
- There are just 11 existing lots that will potentially generate 236 lots and an additional 216 units. Of these 11 subdivisions they could potentially range from a 12-lot to a 45-lot development.

Physiographic Description

Physically, the character of Warren can be isolated into two main areas. The first area, located to the south of Belcher Cove and Kickemuit Road and west of the Kickemuit River is essentially developed, except for a central area of wetlands and adjacent cemeteries. The second area located north and east of Belcher Cove, is an area which contains large open spaces many of which, however, are fronted by housing or strip commercial uses. The waterfront along the Warren River forms the western edge of this area. The Waterfront Historic District contains a mixture of residential and commercial development and is located along the northern portion of this area. To the south, medium high residential development is characteristic of the neighborhoods while strip development is prevalent along Metacom Avenue. A mixture of industrial uses is located between Child Street and the railroad right-of-way. Warren's land use is more complex within the built-up portions of the western section of Town. Warren's development history has resulted in side-by-side industries and residences with extensive road-related commercial and service uses. Vestiges of the once-dominant mill life of the Town remain. A layering of predominant uses moves inland from the Warren River: waterfront, historic district, Main Street,

mills, and related housing. From the Kickemuit River side, the land ranges from residential uses to strip commercial. In the middle, all of these land uses meet, intermingle and are made more complex by several industries.

The second principal area is located east of Belcher Cove and the Kickemuit River. In contrast to the first area, farmland and the largely undeveloped nature of Touisset characterize this more rural portion of town. There is, however, a large industrial/commercial development located along the northern portion of Market Street and a sizeable area of medium density residential development on the eastern end of Child Street.

Circulation acts as both stimulant and depressant to the image and character of the town. Life in Warren is characterized by hustle-bustle but also by ragged edges and congestion. All of these characteristics are present along its principal roads.

The Historic Center⁸ (Warren's Waterfront Historic District), retains the harbor as its western edge. To the south, coastal wetland at one time more clearly demarcated this area than is obvious today. Historically, the inland boundary that extends from Belcher Cove south along the cemeteries was also more clearly defined.

The ridge north of Belcher Cove and related high lands on either side of Market Street compose the second area. The area is defined by the coastal edge of the Palmer River and associated wetlands as well as similar edge conditions along the upper Kickemuit River (now Kickemuit Reservoir).

North and south of eastern Child Street is defined by wetlands located southeast of the Kickemuit Reservoir, wetlands associated with the Kickemuit River and extensive wetlands south of Child Street along the state line and the coast.

Touisset Point is a long ridge of contained land defined by the coast and wetlands in the Chase Cove area. Soil and groundwater conditions further restrict settlement potential.

Laurel Park is the last contained area and was once was separate from the rest of built-up Warren. Due to the development of Metacom Avenue and residential in filling of the last several decades, this area now merges with downtown Warren.

There are essentially four development patterns in Warren: rural, suburban, town center and strip commercial.

The rural pattern dominates in two areas, Touisset Point and the northern part of town, with the exception of the commercial and industrial corridor of Market Street. The ideal and actual images for the rural pattern, however, are not in sync. Although there is widespread interest in retaining the rural character as embodied Warren's farms and open spaces, development con-

⁸ Warren has two other areas of historic significance; Kickemuit River Crossing/Windmill Hill Historic District and Touisset.

tinues to erode the Town's rural nature.

Town wide some 40 percent of the land is classified as prime agricultural soils. Efforts to preserve farmland through state programs and the local land trust have given only marginal control to the incremental transformation of these areas. Rural character is very important to Neck Historic District. Of these three districts only the waterfront historic area is currently an official historic district. The Rhode Island Historic Preservation and Heritage Commission in 1975 initially recommended the other two. Protection and enhancement of Warren's historic resources is vital to maintaining town character.

Warren's identity must be protected through appropriate zoning and land planning techniques. Agreements such as Warren's local Farm, Forest and Open Space Protection Plan to protect open space are important first steps in preserving the Town's remaining rural areas.

The suburban pattern is an extension and acceleration of what began as small town residential growth. It is the most consistent pattern and includes older residences as well as modern subdivisions. It is most prevalent in large areas on both sides of Metacom Avenue and throughout the Town in variously sized pockets extending back from roads. There is an obvious conflict where this pattern encroaches into agricultural and rural areas. Residential development and the preservation of rural character, however, are not mutually exclusive. Techniques such as conservation development and flexible zoning, when used in conjunction with rural site design criteria, allows sustainable residential growth to occur while still preserving the beauty of these important areas.

The village is a complex pattern consisting of three layers: the waterfront, Water Street and Main Street. It also encompasses the built fabric of the immediately adjacent streets. It consists of a historic small town pattern overlaid in part by more recent amenities and modifications. It is an area of surprising juxtapositions and details but also one with many missing pieces and the calluses of neglect and under-recognized worth. Warren's downtown is one of the municipality's defining attributes, a diamond in the rough. Economic development and the preservation of the historic character are integral components to any development or redevelopment of the town center.

The strip pattern is primarily found along Metacom Avenue and in a commercial/industrial area along Child and Market Streets. Strip development has resulted in urban congestion and detracts from a tangible heritage and a sense of place. It is the most negative development patterns in Warren. Vacant or under-used land and ragged edge conditions also characterize Warren's strip development. The presence of vacant and under used land, however, could be positive in terms of visual and traffic related improvements for future development and commercial upgrades.

Large industrial buildings also play an important part in the overall character of Warren. They do so as exceptions to the above patterns and should, depending on the circumstances, be seen

either as landmarks or eyesores.

Profile Areas

In previous comprehensive plans, Warren was divided into four planning areas for the purpose of assessing demographic and service needs. These areas did not, however, describe Warren's more complex natural and cultural land use patterns. The following profile areas help to understand the diversity of Warren and to better address the specific needs of different neighborhoods.

A. Market Street (Road-related uses: Town line to Kickemuit Road)

This profile area is a linear stretch that includes all of the road-related commercial, industrial, service, open space, and residential uses within approximately 200 feet of Market Street and those roads (mostly dead ends) which stem from it. The area's character is defined by the alternating pattern of housing, farms, roadside businesses, service uses, and vacant land.

B. Belcher Cove (Bike path around Belcher Cove to town line)

This profile area includes all of the coastal land surrounding Belcher Cove and related undeveloped or marginally used lands. The area is very scenic as viewed from the water but is essentially hidden from view when looking towards the water. This area is most often viewed from a distance and the best views are from Barrington. The East Bay Bike Path has increased the public's awareness of this area. Three main issues must be addressed in future plans: the natural vulnerability of the edge, the possibility of adjacent development between the coast and Market Street, and the high conservation potential.

C. Upper Kickemuit Reservoir (Rural/agricultural lands)

This area contains a substantial portion of agricultural land, some of which is still actively farmed. Residential development extends back from Market Street and along parts of School House Road and adjacent roads. This area is centered on the Kickemuit River, a major scenic feature that complements the agricultural land. Preservation and enhancement of rural and scenic character is an objective of this area.

D. Town Village (Waterfront, Water Street and Upper Main Street, Warren River Bridge to Franklin Street, bike path and edge of Belcher Cove wetlands)

This profile area contains three critical components of the town: Main Street, the historic district on and around Water Street, and the waterfront. They have been combined into one area due to their proximity and linked histories. Main Street in Warren is an example of the classic American commercial and civic main street that saw the passing of its heyday several decades ago. In Warren, however, it still serves as the center of town life. Water Street and adjoining blocks comprise an historic maritime core with an ongoing commercial life (antiques, crafts, restaurants, and water-related businesses) and a large stock of Early American and Victorian buildings.

Although largely obscured by the American Tourist complex and other buildings, especially at its northern end, the waterfront has retained its commercial life. The southern end of this area contains boat yards, boat building, the Warren Town Beach, Burr Hill Park, the sewage treatment plant and dead-end residential streets and rights-of-ways with varying degrees of accessibility.

Overall, it is a complex area of three parallel linear sections: the waterfront, the historic district and Main Street.

E. Lower Main Street & West (Main Street to Warren River: Franklin Street to Bristol line)

This is a small neighborhood, exhibiting residential condominium land use pattern found along the adjacent shore in Bristol. These attached residential units are set apart from the rest of Warren by unified landscaping and well built stone walls left by earlier settlement patterns. Together these help to define an exclusive atmosphere.

F. Metacom Avenue (Strip development, Kickemuit Road to Bristol line)

This linear area is engulfed by the franchise and related commercial activity of the Metacom strip that extends well into Bristol. Unlimited curb cuts, excessive signage, little or no landscaping and heavy traffic all set this area apart from abutting residential neighborhoods.

G. East of Metacom (Residential area east of Metacom Avenue)

This area, similar to profile area 9, consists of suburban, residential developments on a rough grid of streets that meander as they reach the slope descending to the Kickemuit River. Again, the residences are predominantly post-World War II with older structures scattered throughout.

H. Touisset (Touisset Neck south of Child Street area developments)

This is the largest and least densely developed area. It is mainly composed of farms and nurseries with scattered, recently built, individual "suburban" houses and two enclaves of former summer houses, most of which are now used year-round. Touisset is the largest unsewered part of town and has the greatest natural constraints to development. The central issue here is the balance between the rural and agricultural landscape and development pressure. There is strong interest in preserving active agriculture, but land planning techniques need to be established to ensure that residential development does not relentlessly establish a new suburban pattern.

General Nonresidential Land Use

Commercial development comprises 3.35 percent of the land in Warren and can be divided into the following four categories. Traditional Main Street retail stores extend roughly from North Water to Franklin Street. This is the traditional main street found in most small towns. Highway-related commercial development found on Market and Child streets (Child Street from the Bike Path east; most of Market Street). These strips have different characteristics: Child is an older

mix of automobile services, some residences, mills, and miscellaneous services; Market Street is a newer version with larger, more spread out facilities catering to automobiles and boating and providing various services. Strip commercial uses on Metacom Avenue from Franklin Street south, dominated by fast food businesses and small businesses and restaurants. Metacom is the modern strip of franchise fast food businesses, gas stations, super markets, and other typical strip businesses--all serviced by many curb cuts. Small enterprises and the absence of large shopping malls characterize this area. Because of its linear location and design this relatively minor land use (in terms of total acres) disproportionately dominates one's image of Warren. The corner of Child Street and Metacom Avenue is an older neighborhood commercial area marked by diminishing convenience shop and restaurant activity. Other isolated commercial activities include waterfront services and restaurants along Water Street and in the harbor area. Formerly more dominant, industrial activity now comprises only about two percent of Warren's land. There are essentially three types of industrial activity in Warren: mill and related multilevel manufacturing, newer single-story service uses, assembly plants and marine activities.

Former Industrial Sites (Isolated sites found in the center of the town). Three locations can be identified: The American Tourist complex along the Warren River; several buildings between Child and Franklin streets in the center of Warren, and the former Parker Mill. These facilities are vestiges of a passing way of life and present the opportunity for creative re-use options.

The Franklin development plant is a large, one-story structure along the old railroad tracks north of the cemeteries, used for storage.

Marine Industries (Southern end of Water Street). This area is dominated by water-related uses including a boat yard and Blount Seafood plant north of the new sewage treatment plant. The southern end of the harbor also contains smaller marinas and marine services.

A large part of Warren consists of mixed land uses where stores, homes, industries, services, and farms are found adjacent to each other or even on the same property or in the same building. This mixed-use pattern contributes vitality and diversity and, at the same time, confusion and fragmentation. Diversity comes in the form of many auxiliary or more affordable residential units that are located above stores or in other mixed-used situations. Confusion is caused by the ambiguous delineation of one land use area from another and it is sometimes difficult to determine any dominant land use.

These land uses consist of public and semi-public facilities, schools, religious institutions, nursing homes and health facilities, and social clubs. About 1.17 percent of Warren's land is occupied by these uses. (See the Services and Facilities Element for more in-depth information.)

Public facilities: (Primary facilities are the Town Hall, East Bay Government Center, Public Works facilities on Birch Swamp Road, Bristol County Water Facility and the Warren Wastewater Treatment Facility on Water Street). These basic Town functions are located separately from each other with little land set aside for possible expansion. Bristol County Water Authority is a

public utility owned by Warren, Bristol and Barrington.

Schools: (the complex located off of Asylum Road plus other school sites). The primary complex includes Kickemuit Middle School, and the Hugh Cole School. The land appears adequate to accommodate a larger complex. The other public schools are located at individual sites which are being adapted for other uses. Our Lady of Fatima is the largest private educational institution in Warren.

Semi-public facilities: (George Hail Free Library) These functions complement public facilities and provide necessary services. The library contributes to municipal life in the center of town.

Religious institutions: (several religious buildings are located within the Historic District and Main Street). Two historic churches, the Warren Baptist Church and the First Methodist Church, are located at the core of the original village. Other churches are located along Main Street. Our Lady of Fatima School is located off Market Street. Three main cemeteries hold prominent positions: South Burial Grounds, Greenwood Cemetery and the oldest cemetery in Warren which is located on the Kickemuit along Serpentine Road,

Nursing homes and health facilities: (Nursing homes are located on either side of the Kickemuit and on Metacom Avenue and Main Street). These moderately scaled facilities are located in or on the edges of residential neighborhoods.

Appendix A Natural Resource Identification and Conservation

Natural Conditions

This section summarizes Warren's natural environment including its geography, geology, ground and surface waters, water quality, soils, agricultural land, wetlands and coastal resources. The benefits and constraints of these resources as they relate to community development are also discussed.

Geography

The geography and natural systems of Warren are well defined and have strongly influenced settlement patterns. Though small in area, Warren has approximately 16 miles of coastline along the Palmer, Warren and Kickemuit rivers, and Narragansett and Mount Hope bays. The Kickemuit River has had a major influence on settlement and land use and separates several sections of the Town from each other. Like many communities on Narragansett Bay, Warren is made up of landforms that extend southward into the Bay.

Warren's topography ranges from sea level to approximately 90 feet. This is typical of the characteristics of the Narragansett Bay region. The bay and rivers have sculpted a land area of low ridges generally running north to south, separated by open water or lowlands that are characterized by high water tables and wetlands, generally unsuitable for development. Although erosion control is always an important consideration, steep slopes do not present a major development constraint. Slopes greater than eight percent characterize approximately 135 acres, 3.7 percent of Warren's soils. Substantial acreage however is constrained by the lack of slope. This together with overall low elevation leaves them vulnerable to periodic flooding and persistently poor drainage.

Bedrock and Surficial Geology

Bedrock and surficial geology describes the skeletal framework of the land and affects the distribution of soil types, surface hydrology and the location and amount of groundwater. Warren is part of the 102 square mile Narragansett Basin, composed of coal age (Pennsylvania Period) sedimentary rocks including conglomerate, sandstone, shale, and coal. Warren has a few bedrock outcrops mostly located to the east of Metacom Avenue and between Metacom Avenue and Main Street. Visible bedrock is evidence of the powerful scouring effect of the glaciers. Bedrock types include Scituate granite gneiss (sgf) Hope Valley alaskite (hva) and mafic dikes and sills. Mafic is a dark color igneous rock rich in magnesium and iron. Dikes and sills are rocks, which when in the molten condition, filled in either fissures (dike) or between layers (sill) of older rocks.

Surficial deposits are sandwiched between the bedrock and the soils and consist either of till or outwash. Till is an unsorted mixture of boulders, cobble, gravel and sand deposited directly by glacial ice and is often characterized by an impermeable or restrictive layer. Outwash is a well sorted deposit carried by glacial melt water. Groundwater is generally more abundant in outwash than in till. Other deposits not of glacial origin include those deposits by waves, rivers or wind.

Warren is in the Narragansett Till Plains, which make up the area immediately around Narragansett Bay. This area is covered by glacial till composed of sedimentary rock, shale, sandstone, conglomerate, and, in a few places, coal. The till is generally compacted to a color ranging from dark gray to olive and is finer in texture than till derived from granite. Most of the landforms have been smoothed by glacial action. Till deposits in Warren (1,666 acres) are primarily located, to the west of Market Street north of School House Road, in a band along Birchswamp Road and Metacom Avenue and throughout much of the eastern portion of the town. Outwash deposits (2,279 acres) are located in the vicinity of Touisset Point and throughout much of the western portion of the Town.

Soils

The RI Soil Survey provides comprehensive soil mapping and classification. It describes the physical and chemical characteristics of particular soils and assigns soils to a hydrological group. It also discusses the constraints and benefits of each soil type relative to such things as construction, septic system functioning, natural resource and agricultural management.

The majority of Warren's soils (66%) present severe constraints for onsite sewage treatment systems. These soils are either slowly permeable or have high watertables or both and generally run in bands from the north to the south. In addition another 620 acres (17%) are characterized by excessive permeability. Excessively permeable soils include those soils with percolation rates of 5 minutes per inch or faster. These outwash soils have sandy or gravelly sub soils and due to the rapid percolation may inadequately treat septic system effluent. This is particularly true of nitrates, which in excess cause eutrophication of estuarine waters and presents a health threat to drinking water. Septic systems in these soils may require special design in order to prevent groundwater contamination and reduce nitrates.

Warren would benefit from an onsite wastewater (septic system) management plan and ordinance. This Wastewater management ordinance would require regular inspection and maintenance of onsite wastewater treatment system (OWTS) and cesspool phase out. Sewers have been necessary west of the Kickemuit, south of Belcher Cove and out along developed roads to the north. The remaining land continues in agricultural use. Extension of sewers into the western portion of Warren would facilitate suburban sprawl and is contrary to the comprehensive plan objectives of preserving Warren's environment and its agricultural and rural components.

Seventeen percent (630 acres) of soils are classified as urban. These soils vary in character and are located in the more built-up sections of Town. In addition to the urban soils ten acres have been classified as "du" (dump) and another 70 acres as beach.

Agricultural Soils

Much of Warren consists of prime and secondary farmland soils. Some of this productive land has been built upon, especially in the more urban western portion of the Town. These lands are primarily in the Touisset Point area, but a band down the center of the western area and extending into Bristol and out to the Kickemuit River is also designated as important farmland. Developed intensively, this area is effectively non-productive. Most of the agricultural land is located in the western portion of Warren and along the reservoir. Farms and nurseries in the Touisset area correspond with the soil designations.

As of 2003/2004 the land area of Warren is approximately 3,965 acres of which 17% is used for farmland. In terms of land cover/land use there are 521 acres of tillable cropland, 9 acres of orchards and nurseries and 143 acres of pasture for total of 673 acres.³⁶

In addition to purchasing development rights, farming should be encouraged through tax incentives and farm-friendly zoning regulations. Residential development that occurs in agricultural areas should be designed to protect as much agricultural land as possible. As an alternative to conventional subdivisions small-scale developments

³⁶ RIGIS Land Cover Land Use data 2003/2004. Note that the data collection method is different from previous Land Use Land Cover datasets for the State, so comparison, in terms of how much a certain land use has been gained or lost cannot be stated or calculated.

or family compounds with reduced road standards, flexible zoning and a decrease in allowable density should be required.

In addition to this element, the land use and economic development elements of the comprehensive plan emphasize the importance of preserving Warren's working farms.

Freshwater and Coastal Wetlands

Nature has set very definite limits to the types of development that can occur in Warren. In addition to flooding, the proximity of water presents coastal constraints governed by law and monitored by the CRMC, the Army Corps of Engineers and other regulatory agencies. Extensive inland water bodies and wetlands have related constraints and are protected to some degree by the RI Wetlands Act. The Town, however, should consider the cumulative impact of small changes on wetlands in the review of development proposals.

The principal drainage areas are the Kickemuit River, Mount Hope Bay, Narragansett Bay, Palmer River and Warren River. When developing water quality protection strategies, the characteristics of the basin and the receiving waters should be taken into account.

According to the RIGIS database Warren has 701 acres of wetlands. Of these 588 acres are freshwater and under the jurisdiction of RIDEM and the remaining 113 are coastal and under the jurisdiction of CRMC. Forested swamp and salt marsh are the two most prevalent wetland types.

The town has many freshwater resources including wetlands, ponds, streams and the Kickemuit reservoir. RIGIS Ponds data indicate approximately 47 acres of ponds and open water and 273.77 acres of Estuarine Emergent Wetland (salt marsh). Much of the remaining acres are deciduous forested or shrub wetlands that often follow streams running north to south. Some of these stream systems, particularly in agricultural areas support emergent wetlands (marshes).

There are three large wetland systems of statewide importance: the wetlands north of the reservoir, preserved as Green Acres; east of Long Lane along the Massachusetts border; and behind the Hugh Cole Recreation Park. These wetlands provide important habitats for flora and fauna, erosion and flood controls, pollution buffers and scenic resources. The location of wetlands within the more built-up sections of Town helps to explain why so many sub-neighborhoods are separated from adjacent development and why certain lands are not built upon. In some cases, wetlands have been so encroached upon that their natural condition is severely compromised. In extreme cases, such as in the center of Town between Child Street and the Bristol line, encroachment has all but obliterated original wetland conditions.

Warren is blessed with a good harbor and many saltwater wetlands. Hundreds of acres of salt marshes lie along the Warren, Palmer and Kickemuit rivers; they are among the state's most valuable coastal features. In addition to their scenic value, they are productive nursery areas for fish and shellfish, provide habitat for important flora and fauna, and serve as nutrient traps and buffers against storms and floods.

The Warren River has approximately 2.5 miles of saltwater coastline featuring a half-mile stretch of natural and manmade beaches and almost a mile of wetlands around Hanley's Point and Little Island. It abuts the downtown Waterfront Historic District, where stone wharves dating from the eighteenth and nineteenth century are still used today. Besides its obvious historic and scenic significance, the waterfront concentrates pollution from commercial and industrial sources, potentially making it easier to monitor and control. Little Island serves as a permanent wild-life refuge, pollution buffer and scenic resource in this busy harbor.

The Palmer River has roughly four miles of coastline, made up entirely of saltwater wetlands. RIDEM has designated 760 acres of these wetlands as top priority for protection and has classified the area SA, the highest environmental quality rating. CRMC has similarly categorized the area Type 1 (conservation area). In addition to providing scenic beauty, both the Palmer and the Kickemuit Rivers provide valuable fish, plant and wildlife habitats; offer year-round active and passive recreation; help control flooding, erosion and pollution; and accommodate fin and shell fishing.

Along the Kickemuit River there are approximately five miles of saltwater coastline, of which about 80% is wetland and 20% natural beach. The most outstanding feature is Chace Cove, which was the summer camp of Massasoit and the Wampanoags. Over 60 acres around the cove have been donated to the Rhode Island Audubon Society for permanent protection. This river is rated SA by the DEM and Type 2 (low intensity use) by the CRMC. The upper Kickemuit River and the Kickemuit Reservoir have approximately 3 miles of freshwater shoreline, along which 50% is pasture, 30% forest and 20% residential. The reservoir's watershed extends well inland, particularly on the eastern/southeastern side. Features along the banks of the upper river and the reservoir include five working farms, Warren's oldest cemetery, several historic homes, numerous archaeological sites, and Green Acres Heritage Park.

About one and a half miles of the Warren coastline along Touisset Point is natural beach abutting Mount Hope Bay. The area offers good swimming and fishing opportunities. Behind the beach are bluffs 30 feet high with spectacular views. Unfortunately, the bluffs are eroding at the rate of 2 to 5 feet per decade, posing a threat to the homes built here. Along Hanley's Point there is a stretch of natural beach about a half-mile long that faces Narragansett Bay. On the inland side of the beach is a 60-acre wetland of state importance. A DEM right-of-way extending from the bike path to the shore provides scenic views of the historic harbor, wetlands and the bay.

Warren's coastal water quality standards, developed by DEM in accordance with the federal Clean Water Act and state laws, "provide water quality for the protection and propagation of fish, shellfish and wildlife, and for recreation in and on the water; take into consideration their use and value as public water supplies; and take into consideration their use for aquaculture, industrial and other purposes including navigation."³⁷

Water Quality and TMDL Plans³⁸

Rhode Island's water quality restoration planning efforts are centered on the federally mandated requirement that states develop Total Maximum Daily Load (TMDL) plans for waters not meeting one or more water quality criteria. Consistent with federal Clean Water Act requirements, the Rhode Island Department of Environmental Management's Office of Water Resources identifies those waters not meeting water quality standards based upon the most recent assessment of water quality conditions completed as part of the state's new *Integrated Water Quality Monitoring and Assessment Report*. The resulting 303(d) List of Impaired Waters identifies these waterbody impairments (waterbody segment and water quality parameter specific) and prioritizes them for TMDL development.

Warren should work in concert with all other towns fronting the Bay to improve overall water quality. This can be accomplished by eliminating remaining point sources of pollution and the installing adequate storm sewers to eliminate periodic discharges into the Bay. The Town must monitor pollution and recreational activity in accordance with state water quality classifications. Local benefits include improved fin and shell fishing, increased swimming opportunities, and greater attractiveness to potential tourists and business opportunities.

³⁷ Harbor Management Plan

³⁸ Section on TMDL's adapted from RIDEM's TMDL website www.state.ri.us/dem/programs/benviron/water/quality/rest/index.htm

More insidious perhaps are sources of nonpoint pollution. These include such things as septic system effluent and stormwater runoff, which can contain everything from pet wastes and fertilizers to petroleum products. The implementation of an onsite wastewater management district and the use of structural and non-structural best management practices (BMP's) for buffer enhancement and runoff improvement should be implemented.

A total maximum daily load (TMDL) is a term that refers to a detailed plan to restore water quality to a waterbody that does not meet State water quality standards and is listed as impaired water on the State's 303(d) list of impaired waters. States must take into account seasonal variations and must include a margin of safety to account for uncertainty in the modeling and monitoring process. A TMDL reflects the total pollutant loading of the impairing substance a waterbody can receive and still meet water quality standards. TMDL Plans are currently being developed for the Palmer River for pathogens and nutrients and for the Kickemuit Reservoir for nutrients and bacteria.

Palmer River TMDL

The estuarine waters of the Palmer River lie in Rhode Island, but 90% of its watershed lies in Massachusetts. The Palmer River fecal coliform sources are from areas in Massachusetts and from two streams that flow into Belcher Cove. The sources in Massachusetts have been linked to agricultural operations, which are improving their management practices with the help of the Massachusetts Division of Food and Agriculture. The sources in the streams flowing into Belcher Cove are varied and include dog waste, storm water runoff, wildlife and agricultural operations. Measures are being put in place to reduce the fecal coliform sources in Belcher Cove. More detail can be found in the Palmer River fecal coliform TMDL.

The Palmer River also has high levels of nutrients loads, which affect reduce water quality by increasing algal growth and reducing dissolved oxygen levels, a condition referred to as hypoxia. The Palmer River is listed on the state's 303d List of Impaired Waters for nutrients and hypoxia. Nutrients increase the growth of phytoplankton and macroalgae which shade beneficial submerged aquatic vegetation. The excess growth of these organisms causes an increased use of oxygen during the night and early morning hours when the plants respire. Oxygen in the water column is also depleted when these organisms decay and the nutrients are then released back into the water column. This kind of decreased water quality condition is called eutrophication, and results in a decrease in the population size and diversity of animals and plants including eelgrass in the area. Eelgrass, a submerged aquatic plant, provides an excellent nursery ground for fish and shellfish. The Palmer River was once filled with eelgrass, but over the past century, the eelgrass in the Palmer River has disappeared completely.

Kickemuit TMDL

RIDEM is currently in the process of preparing a Total Maximum Daily Load (TMDL) plan for the Kickemuit, which serves as a drinking water supply for the Bristol County Water Authority.

EPA has provided extensive staff resources as well as \$50,000 in consultant services to monitor and model water quality in the watershed. Since most of the watershed lies in Massachusetts, RIDEM, is also involving state and local officials in Massachusetts in this restoration effort.

Implementing TMDLs

After EPA and the State have approved a TMDL, the town should examine its zoning and subdivision regulations and investigate other means such as public education and onsite wastewater management to help meet the standards of the plans. Non-point source controls may be established by implementing Best Management Practices (BMPs) through voluntary or mandatory programs for enforcement, technical and financial assistance, training and education, and demonstration projects. RIDEM evaluates the effectiveness of TMDLs using the following strate-

gies; monitoring pollutant loadings, tracking implementation and effectiveness of controls, Assess water quality trends in the waterbody, and reevaluate TMDL for attainment of water quality standards.

Water Supply

Surface Water (Kickemuit Reservoir)

In addition to water from the Scituate Reservoir transported through the cross bay pipeline, water is supplied by the Bristol County Water Authority (BCWA), which acquired the utility from the Bristol County Water Company in 1986. Locally, water is drawn from four reservoirs, the Kickemuit in Warren and three others in Swansea and Rehoboth. The Kickemuit Reservoir and nearby land is also an important local wildlife area.

The watershed of the Kickemuit Reservoir, including its acreage in adjacent communities, totals 3,310 acres. The Town adopted a watershed protection overlay district as part of its 1997 zoning amendments. The overlay district prohibits certain harmful uses within the watershed, establishes development standards for new subdivisions and requires site plan review for most uses within the watershed.

Even with the construction of the cross bay pipeline, the Kickemuit Reservoir must continue to meet current and future water supply needs. Furthermore, and more specific to this Element, the scenic natural habitat, open space, and recreational potential of the reservoir and its watershed should be protected and retained as a major inland facility for passive uses including fishing, picnicking, hiking and nature study. However, top priority use of the reservoir should be as a water supply.

Groundwater

Groundwater is water that lies beneath the surface of the ground and saturates the soil. This flowing water is usually located a predictable distance below the surface but has seasonal highs and lows. Although there are no significant aquifers in Warren, groundwater will continue to be an important water supply source outside of the water service area. In addition to the surface water reservoirs, water supply also comes from two wells in Barrington.

Most of the town's groundwater is classified as GA. The recharge area for the well at Touisset Point is classified as GAA. In addition there is a large area of degraded water quality (GB) in the center of Town and several smaller areas of GA non-attainment. In order to preserve Warren's groundwater for future use protection measures such as the adoption of an onsite wastewater management plan should be implemented.

Flood Zones

The Federal Insurance Rate Map (FIRM) is the legal document for determining flood zone location and may be viewed at town hall. Flooding is primarily limited to tidal surges caused by hurricanes. As a hurricane travels in its usual north to northeast direction, the counterclockwise wind circulation around the low-pressure center results in strong winds from all directions. Thus a hurricane passing near the Narragansett Bay area can create tidal surges along any shoreline where there is sufficient "fetch" length.

Located in the upper part of Narragansett Bay, Warren experiences high surge elevations due to the funneling effect the Bay has on severe cyclone storms passing by the area. Flooding from such surges occurred during the 1938 hurricane and again during Hurricane Carol in 1954. The 1938 hurricane, which was comparable to a 100-year flood, generated flood elevations of approximately 14 feet in Warren. Elevations from Hurricane Carol were about

13 feet. Locally, the effects of both storms were extensive, damaging properties along the Warren and Kickemuit rivers, Mount Hope Bay and Belcher Cove, as well as contaminating the Kickemuit Reservoir when water from the Kickemuit River poured over the Child Street Dam.

Zoning regulations and building codes for special flood hazard areas (A, V and V-30 Zones) conform to Federal Emergency Management Agency (FEMA) development standards. Many communities have developed hazard mitigation plans to address the impact of natural disasters such as flooding.

Vegetation and Forest Resources

Most of the remaining undeveloped land in Warren is wetland (900+- acres), farmland (795 acres), forested areas (406 acres) and brushland 30 acres. Eighty percent of the upland forests are deciduous, 2 percent are coniferous and 18 percent are mixed. (A forest with greater than 80% deciduous trees is considered deciduous, greater than 80 percent coniferous is classified as coniferous. Fifty to eighty percent deciduous or coniferous is classified as mixed). A greenway corridor extends from Palmer River to Touisset Point.

Rare, Threatened and Endangered Species

Warren has a number of ecologically significant natural communities and is home to several rare species. The Palmer River in particular provides critical habitat for rare species. The salt marsh along its shores is recognized as a high quality wetland, providing habitat for several rare species. Wetlands along northern parts of the river support the Northern Diamond Back Terrapin, osprey and several uncommon plants. A small area of critical habitat is also located in Touisset Point in the vicinity of Chase Cove. Other significant habitats in Warren include the power line/pipeline right-of-way, where species depend on open habitat and regular mowing and the wooded upland to the west of the right-of-way. Threats to these habitats include improper maintenance of right-of-ways, the spread of phragmites along the pipeline, dumping of household waste in the adjacent woodland, and potential development of the upland border of the marsh.

Air Quality

Warren's air quality is affected by the quality of air throughout the region. Clean, dry, high quality air arrives with fronts from Canada but must compete with moist air from the south and west that is often polluted by the New York/Washington D.C. urban corridor and the industrial Midwest. It is this air that has been recognized as the primary cause of acid rain affecting lakes and trees in the northeast, as well as posing a threat to pregnant women and persons with respiratory problems.

Sources of high-level air pollution in Warren are few but nonetheless threaten residents' health. One source is the buildup of carbon monoxide fumes from dense automobile traffic statewide that can create unhealthy conditions. In addition, local industries are known to emit noxious fumes.

In accordance with guidelines provided by the RIDEM Division of Forest Environment, the Town should consider implementation of development requirements pertaining to vegetation and lot coverage. In addition to improving the appearance and traffic circulation of development, these guidelines can help cleanse the air and mitigate the "heat island effect. While Warren and its residents can have little effect on regional air quality, local industry can be monitored for emissions violations.

Hazardous Materials

The Town should maintain specific plans for addressing the issue of hazardous materials in the workplace and on its roads. Ideally this should be embodied in a local Hazardous Materials Plan. The Town's emergency management operations include provisions for hazardous materials mitigation.

Appendix B Historic and Cultural Resources

Historical Resources

Besides many significant historic buildings covering a wide range of periods and styles, Warren has a National Register District, two other historic districts, historic and archaeological sites, and a rich historic context. Of the three districts described below, only the waterfront historic area is currently an official historic district. In 1975, the Rhode Island Historic Preservation Commission recommended the other two areas as well.

Warren Waterfront Historic District

This district is bounded, approximately, by the Warren River on the west and north; Main Street and the railroad right-of-way on the east; and sections of Franklin, Campbell, and Wheaton Streets on the south (2/28/74; expanded 10/2/03).

First designated in 1974 and expanded in 2003, almost half a square mile of this area is in the District. Over 300 documented historic buildings dating as far back as the mid-eighteenth century are located within this district. Books, studies and documents show that this area has been recognized as historically important for over 150 years. Besides the large number and variety of individual historic buildings, the eighteenth century layout of the streets and wharves and the ongoing vitality of the waterfront add to the cohesiveness and importance of this district.

Kickemuit River Crossing/Windmill Hill Historic District

This historic area is noteworthy more for historic events and sites than for historic structures. The area is bounded on the north and east by the Massachusetts border, on the south by the old Fall River Railroad and on the west by Birch Swamp Road. Along the Massachusetts border are Margaret's Cave and King's Rock, site of the Wampanoag Nation's grinding mill. The oldest house in Warren, built by Levi Haile in 1682, still stands nearby. To the south along the Kickemuit River was the location of a "sweat," a hut where Wampanoags came to cleanse body and soul. Many significant events involving early white settlers and the Wampanoags took place in this area--including Massachusetts's 1653 sale to Hugh Cole and others of the first tract of the land later incorporated as the town of Sowams. Warren's first houses were built here but were destroyed during the war in 1675. Warren's oldest cemetery, dating from 1690, lies along the Kickemuit. The district also contains Windmill Hill and the Ice Pond, just north of the reservoir. With the exception of Green Acres Heritage Park and the cemetery, this important historic area has no protection or programs for preservation.

Touisset Neck Historic District

This rural area extends from the old Fall River Railroad south to Mount Hope Bay, bounded on the east by the Massachusetts border and on the west by the Kickemuit River. With the exception of two summer colonies started in the early 1900s, and recent suburban growth, Touisset has remains rural in character. The area contains several large historic farms and houses dating from the 1700s. The largest farm still in operation is Manchester's Farm, once known as "Gardener's Ideal Farm," comprising over 330 acres. The railroad that extended through the area in the 1860s increased the prosperity of the farming community, enabling farmers to sell produce and dairy products directly to Providence and Fall River markets. Today, development pressures and the lack of protective measures threaten the district's preservation.

Historic Buildings

A complete list of documented historic buildings can be found in the Warren, Rhode Island Statewide Preservation Report. The RIHPHC survey of Warren identifies several individual properties as possibly eligible for listing on the National Register. In addition, the Town has conducted an inventory of its housing stock by date of construction.

Archeological Resources

Warren has significant archeological resources, including Burr's Hill (between Main and Water Streets) which was a major Wampanoag burial ground from the 1500s to the 1700s. Although long thought to have been removed, parts of the cemetery may remain in the Town Park. The presence of the cemetery indicates that a sizable Wampanoag village may have existed nearby. The RIHPHC survey includes an overview of local archeology. Using this information, the Town should give special attention to known and potential archeological sites.

A large part of the town is listed in the National Register of Historic Places as the Warren Waterfront Historic District, covering more than half of a square mile and more than 300 buildings; an area of farms and early 20th-century summer residences centered on Touisset Neck outside of the town center has slowly been replaced with year-round homes.

With Community Development Block Grant funds, the town is supporting rehabilitation work for the 2nd Story Theater, a professional theater company housed downtown in the historic French-Canadian benevolent and fraternal society building, Cercle Jacques Cartier Hall.

LAND USE

Warren is a special place to residents and visitors alike. It has a long and rich history, a scenic, coastal location, and a central village development pattern that embody a real sense of place.

The town was shaped by its geophysical characteristics and location. Bounded by the Palmer River and Warren River to the west, and the Kickemuit River to the east, the Town developed into two distinct areas. The western side is a compact settlement characterized by a working waterfront, mill buildings and a downtown village district. The eastern half of town is rural with low-density housing, farms and open space. The physical layout of Warren makes the town the charming and appealing place and the primary goal of this plan is to **preserve and maintain that character while accommodating reasonable and sustainable growth and appropriate economic development.**

The Land Use Element is central to the Comprehensive Plan because it directly affects all other elements. **This element is organized with a brief description of the Town's character, existing conditions, and a summary of the major findings of the build-out analysis, followed by the policies and actions.** Background information is provided in an appendix at the end of this element.

This element includes a residential build-out analysis. It was conducted to determine possible growth patterns based on current zoning and **other guidelines developed for the allocation of land between the various zoning categories.** The resulting land use plan takes into account demographics and regional conditions, and is accompanied by policies and recommended actions for its implementation.

This element also includes an **Existing Land Use Map, an existing Zoning Map and a Future Land Use Map.** Several profile areas have been delineated in order to provide an overview of the diverse nature of the community and to guide several policies and actions.

Principal Goal

To manage land use to support the short- and long-range goals and policies of all elements of the Comprehensive Plan in the best interests of town character and the health, welfare and quality of life of Warren residents.

Town Character and Land Use Patterns

Warren is characterized by its residents as a small town, with its heritage tied to its harbor and water-related history. To a large extent, the presence of rivers, wetlands and harbors has dictated where development has been possible and what land uses have been practical. There is also an important rural component to the town, exemplified in its remaining farms and open spaces. The town has a land area of approximately six square miles (not including the Kickemuit Reservoir). The 2000 Census population count was 11,360 or 1,893.33 persons per square mile. In 2010, the U.S. Census population is 10,611 or 1,768.5 persons per square mile.

The town's initial settlers were attracted to the area due to the value of the sheltered harbor. The configuration of surface waters restricted growth and forced development to extend southward

until it met Bristol and eastward where land provided a link to Massachusetts communities. Remaining land was either too wet to develop or better used for agriculture. Development pressure along the two north-south corridors has resulted in intensive linear commercial and mixed-use development. Active agriculture, particularly in eastern portions of the Town, is still a significant component of the landscape. Productive agriculture, together with open space, enhances Warren's small town character.

Warren's current land use is a complex configuration of patterns with a wide variety of uses within constricted areas. These patterns are illustrated in [Figure 1 Existing Land Use / Land Cover 2003](#). Many spot zones are present and are the result of incremental decisions rendered over time in response to small-scale actions. It is difficult to assess the extent to which piecemeal land use and zoning is a product of the physical configuration of the town and its historic evolution and how much is due to opportunistic development. In the past, there was no plan directing the distribution of land uses, but rather a reactive process of acknowledging inevitable change.

The complexity of Warren's land use pattern generally precludes assignment of single uses to neatly defined areas. However, there are exceptions: sectors that are nearly all residential should remain so, and areas now dominated by farms and large lot housing should be recognized as farm conservation areas. On the other hand, transitional areas with many disparate uses and a great deal of vacant land should be given focused land use objectives in order to develop a cohesive mixed-use policy.

Portions of the Town have radically changed within the past 10 to 15 years. Chief among these is the increased commercial development along Market Street and Metacom Avenue. What were once predominantly industrial uses have changed to commercial and mixed use. Warren's diverse land use patterns, along with its relatively intact rural areas, create its special identity. Achievable land use objectives must be defined that recognize and protect the qualities that make Warren unique.

Several key areas and parcels of land have critical reuse potential. These properties should be carefully marketed and planned for redevelopment that reflects Warren's character in changing times; recent reuse, such as at Cutler Mill, has shown that adaptive reuse serving a range of small business and artisans can be successful.

The most discussed property in recent decades has been the former American Tourister complex, now targeted for residential redevelopment by its new owner. Standards for redevelopment of the site to provide waterfront paths with public access have been drafted but were not formally adopted by the Town prior to the recent sale of the property. Still, the Town should advocate for redevelopment that is both more environmentally sensitive than the site's current highly paved condition and provides public access to the water. Potential impacts on Town services should be carefully monitored.

Other key properties include Parker Mill and the former site of "India" on Main Street, both of which should be seen as opportunities to redevelop and attract new business in key locations. "Hope and Main" will be used as a culinary business incubator and may present additional spillover opportunities for under-utilized properties.

These under-used properties and the opportunities they represent are discussed in greater detail in the Economic Development Element.

Warren Residential Build Out Analysis 2008

Prepared by Mary F. Hutchinson, GIS Mapping and Planning Services, Inc., July 7, 2009.

A build out analysis was conducted in order to project future residential development in Warren. The estimated potential number of dwelling units that could be built as-of-right was calculated based on existing zoning and using digital parcel data from the Warren Geographic Information System (GIS).

Summary of Findings

The Build-out Analysis projected that an additional 1,415 single-family dwelling units could be developed as-of-right based on the land available for development and zoning in place in 2008. Under these build-out conditions, the total number of units would be 6,125 units. Based on the average household size of 2.4 persons, the town's population would increase by 30% (or 3,396 persons) resulting in a total population of 14,700 persons.

- In the R40 zoning district there are 116 existing lots that have the potential for creating 480 additional lots and 536 additional units. These additional units would more than double (106% increase) the number of units in that zone. Of all projected new residential units in Warren it is estimated that 38% would be within R40.
- In the R20 zoning district there are five (5) existing lots that have the potential for an additional 68 units, or an increase of 46% of units in that zone. However, the overall effect is < 5% of total new units in Warren.
- In the R10 zoning district there are 253 existing lots that have the potential for an additional 607 units, or an increase of 28% units in that zone. Of all new residential units in Warren it is estimated that 43% would be within R10.
- In the R6 zoning district there are 71 existing lots have the potential for an additional 147 units, or an increase of 14% of units in that zone. Of all new residential units in Warren approximately 10% would be within R6.
- The other zoning districts (R15, R30, VB and W) are projected to create a total of 50 new lots or 57 additional units. Of all new residential units in Warren, a total of 3% would be within the R15, R30, VB, and W zones combined. These districts have little potential for new residential development under this scenario. New development in these districts will primarily result from redevelopment, zoning relief, and/or consolidation of lots (and are not subject to this analysis).

The assumptions that guided the build-out, as well as detailed tables, are located in [Appendix A](#) of this element. In addition, profile areas that are the basis of several policies and actions below are described in [Appendix A](#).

Profile Areas

In previous comprehensive plans, Warren was divided into four planning areas for the purpose of assessing demographic and service needs. These areas did not, however, describe Warren's more complex natural and cultural land use patterns. The following profile areas help to understand the diversity of Warren and to better address the specific needs of different neighborhoods.

A. Market Street (Road-related uses: Town line to Kickemuit Road)

This profile area is a linear stretch that includes all of the road-related commercial, industrial, service, open space, and residential uses within approximately 200 feet of Market Street and those roads (mostly dead ends) which stem from it. The area's character is defined by the alternating pattern of housing, farms, roadside businesses, service uses, and vacant land.

B. Belcher Cove (Bike path around Belcher Cove to town line)

This profile area includes all of the coastal land surrounding Belcher Cove and related undeveloped or marginally used lands. The area is very scenic as viewed from the water but is essentially hidden from view when looking towards the water. This area is most often viewed from a distance and the best views are from Barrington. The East Bay Bike Path has increased the public's awareness of this area. Three main issues must be addressed in future plans: the natural vulnerability of the edge, the possibility of adjacent development between the coast and Market Street, and the high conservation potential.

C. Upper Kickemuit Reservoir (Rural/agricultural lands)

This area contains a substantial portion of agricultural land, some of which is still actively farmed. Residential development extends back from Market Street and along parts of School House Road and adjacent roads. This area is centered on the Kickemuit River, a major scenic feature that complements the agricultural land. Preservation and enhancement of rural and scenic character is an objective of this area.

D. Town Village (Waterfront, Water Street and Upper Main Street, Warren River Bridge to Franklin Street, bike path and edge of Belcher Cove wetlands)

This profile area contains three critical components of the town: Main Street, the historic district on and around Water Street, and the waterfront. They have been combined into one area due to their proximity and linked histories. Main Street in Warren is an example of the classic American commercial and civic main street that saw the passing of its heyday several decades ago. In Warren, however, it still serves as the center of town life. Water Street and adjoining blocks comprise an historic maritime core with an ongoing commercial life (antiques, crafts, restaurants, and water-related businesses) and a large stock of Early American and Victorian buildings.

Although largely obscured by the American Tourist complex and other buildings, especially at its northern end, the waterfront has retained its commercial life. The southern end of this area contains boat yards, boat building, the Warren Town Beach, Burr Hill Park, the sewage treatment plant and dead-end residential streets and rights-of-ways with varying degrees of accessibility.

Overall, it is a complex area of three parallel linear sections: the waterfront, the historic district and Main Street.

E. Lower Main Street & West (Main Street to Warren River: Franklin Street to Bristol line)

This is a small neighborhood, exhibiting residential condominium land use pattern found along the adjacent shore in Bristol. These attached residential units are set apart from the rest of Warren by unified landscaping and well-built stone walls left by earlier settlement patterns. Together these help to define an exclusive atmosphere.

F. Metacom Avenue (Strip development, Kickemuit Road to Bristol line)

This linear area is engulfed by the franchise and related commercial activity of the Metacom strip that extends well into Bristol. Unlimited curb cuts, excessive signage, little or no landscaping and heavy traffic all set this area apart from abutting residential neighborhoods.

G. East of Metacom (Residential area east of Metacom Avenue)

This area, similar to profile area 9, consists of suburban, residential developments on a rough grid of streets that meander as they reach the slope descending to the Kickemuit River. Again, the residences are predominantly post-World War II with older structures scattered throughout.

H. Touisset (Touisset Neck south of Child Street area developments)

This is the largest and least densely developed area. It is mainly composed of farms and nurseries with scattered, recently built, individual "suburban" houses and two enclaves of former summer houses, most of which are now used year-round. Touisset is the largest unsewered part of town and has the greatest natural constraints to development. The central issue here is the balance between the rural and agricultural

landscape and development pressure. There is strong interest in preserving active agriculture, but land planning techniques need to be established to ensure that residential development does not relentlessly establish a new suburban pattern.

DRAFT

POLICIES AND ACTIONS LAND USE

TOWN CHARACTER

Policy 1: Preserve town character exemplified by settlement patterns and historic buildings, natural assets including extensive wetlands and rivers, farmland, and other open space, while allowing for appropriate development.

LU	Action	Action Agents
1.1	Expand design review procedures for all parts of Warren.	Planning Board and Town Council.
1.2	Enact mandatory historic district zoning.	Planning Board and Town Council.
1.3	Preserve scenic view corridors, stone walls and other natural features through easements, dedication of land or fees in lieu of land. <i>Consider protecting historic stone walls through local ordinance.</i>	Planning Board and Town Council.
1.4	Provide incentives to maintain active farms through purchase of development rights, tax incentives and other techniques.	Planning Board and Town Council, Conservation Commission.
1.5	Pursue open space acquisition wherever available and subject to funding.	Planning Board and Town Council, Conservation Commission.

Policy 2: Preserve the scale of the town as characterized by the size and massing of its buildings, pattern of contained developed areas separated by relatively open spaces, centralized village with its mix of commercial and municipal uses, and historic district.

LU	Action	Action Agents
2.1	Maintain zoning densities to ensure the current scale of the town.	Planning Board and Town Council.

2.2	Encourage mixed use in the village, especially residential in upper stories of commercial structures.	Planning Board and Town Council.
2.3	Designate the village as a growth center as defined by Statewide Planning Land Use 2025. ⁶	

⁶In 2000, the Governor’s Growth Planning Council launched an initiative to promote *growth centers* by recommending the adoption of a State investment strategy that would act as an incentive. This investment strategy would prioritize State discretionary investments (to include State managed federal funds) as well as technical assistance and expedited regulatory review to locally designated and State approved centers. Growth centers are defined as having “a core of commercial and community services, residential development, and natural and built landmarks and boundaries that provide a sense of place,” making them dynamic and efficient centers for development

Policy 3: Ensure the compatibility of contiguous land uses without sacrificing the diverse pat-tern of uses in the town.

LU	Action	Action Agents
3.1	Strengthen enforcement of existing codes governing maintenance of landholdings; examine code for possible deficiencies and remedy them; encourage lot and neighborhood beautification.	Planning Board, Town Council. DPW? Health?
3.2	Rewrite the Zoning Ordinance and Subdivision Development Regulations to reflect this Comprehensive Plan; in-corporate mechanisms for special planning districts; conservation development and implement watershed protection and buffering requirements. Continue to review and amend town land use regulations as deemed necessary.	Planning Board, Town Council.
3.3	Tighten the process of land use review and development permitting by instituting higher and more comprehensive standards and restricting special use permits, variances and zone changes. Zone changes, particularly those re-requesting a more intense use of the land than planned for in the	Planning Board, Town Council.

	comprehensive plan, must be shown to be unquestionably in conformance with all aspects of this plan.	
3.4	Require training for all town boards such as the Planning Board and Zoning Board using the resources of agencies like Grow Smart Rhode Island and the Statewide Planning Program.	Planning Board, Town Council.
3.5	Identify funding sources to provide a professional point person at Town Hall to guide prospective businesses and developers through the permitting process.	Planning Board, Town Council.
3.6	Identify and provide adequate funding for professional support to Town Council and the various boards and commissions in order to accomplish the above policies and actions.	Planning Board, Town Council.

Policy 4: Ensure the recreational and natural value of Warren’s Rivers.

Action	Action Agents
4.1	Direct development in the areas surrounding the Kickemuit River and its tributaries in such a manner as to encourage the use of Best Management Practices; re-strict any land use that would cause degradation of its high water quality.
4.2	Develop buffer guidelines for Warren’s rivers and streams.

4.3	Identify and work with appropriate conservation groups to provide technical and financial assistance to farmers in the implementation of agricultural best management practices that are designed to protect ground and surface water quality.	Conservation Commission, Town Council, Planning Board.
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TOWN IMAGE

Policy 5: Increase and extend public access to and views of the water and harbor.

LU	Action	Action Agents
5.1	Establish walking trails and provide viewsheds along all of Warren's waterfronts by acquiring key water view and public access parcels. Identify and provide funding and or grant writing assistance to accomplish this action.	Conservation Commission, Town Council, Planning Board
5.2	Amend the subdivision development review regulations to require consideration of scenic views to and across the water and of the Town's skyline as seen from the water.	Conservation Commission, Town Council, Planning Board

Policy 6: Encourage and enforce private maintenance of land holdings, including lawn maintenance and removal of trash, dormant automobiles and other potential eyesores.

LU	Action	Action Agents
6.1	Enforce anti-dumping and all building code and zoning ordinances.	Building Official.

Policy 7: Provide guidelines and incentives to facilitate revitalization of commercial and industrial centers and improve town image.

LU	Action	Action Agents
7.1	Eliminate billboards on a town-wide basis.	Town Council, Planning Board
7.2	Establish site plan review procedures with specific landscape, design and performance standards for construction and upgrading of commercial and industrial sites.	Town Council, Planning Board
7.3	Establish wayfinding signs on Main Street and in the Village with special requirements to encourage pedestrian and bicycle usage.	Town Council, Planning Board
7.4	Provide a system of ticketing zoning and building code violators to encourage compliance with all codes,	Town Council, Building Official.

RESIDENTIAL LAND USES

Policy 8: Establish and update procedures that will ensure a diverse mix of housing for all economic levels in accordance with affordable housing goals established in the Housing Element.

Action	Action Agents
8.1	Encourage reuse of older buildings by conversion of suitable structures to multi-unit housing; such units should meet applicable codes and be serviced by necessary utilities. Investigate off-site parking for downtown units. If it is reinstated, encourage use of the RI Historic Tax Credit in restoration projects.

8.2	Establish clear criteria for determining allowable residential densities based on the availability and affordability of utilities, emergency vehicle access, the prevailing development pattern of each area, and the environmental carrying capacity of the land, based on soil and ground-water conditions, flood hazard, impact on surface waters, depth to bedrock, etc.	Town Council, Planning Board
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OTHER LAND USES

Policy 9: Improve the recreational and industrial uses of the waterfront while protecting and enhancing the image of the harbor.

LU	Action	Action Agents
9.1	Provide incentives to expand and introduce working waterfront businesses such as fish processing and other sustainable industries.	Town Council, Planning Board and Economic Development Board.
9.2	Maintain the deep water wharves of Warren's waterfront.	Town Council, Harbormaster.

POLICIES FOR PROFILE AREAS

A. Market Street (Road-related uses: Town line to Kickemuit Road)

Policy 10: Clarify the distinction between commercial, service/industrial and residential land uses, and improve road edge conditions along Market Street.

LU	Action	Action Agents
10.1	Reestablish zoning boundaries, limit strip commercial uses and require setbacks and buffers.	Town Council, Planning Board
10.2	Monitor the development in the northern edge of town. This district should retain open space while allowing development that meets specific standards--such as for setbacks and vegetative buffers. The historic integrity of structures and landscapes such as the Levi Haile House and associated buildings should be preserved when incorporated into any development plans. In addition, development should be well sited and provide access to the nearby coastline.	Town Council, Planning Board

Policy 11: Establish and maintain a distinctive and attractive "gateway" into Warren from the north along Market Street.

B. Belcher Cove (Bike path around Belcher Cove to town line)

Policy 12: Protect the fragile water's edge and wetlands at Belcher Cove and provide visual access to the water.

C. Upper Kickemuit Reservoir (Rural/agricultural lands)

Policy 13: Support and protect the Kickemuit Reservoir, which defines residential areas while retaining the open character of existing farms and fields.

LU	Action	Action Agents
13.1	Develop performance standards for maintaining the environmental, agricultural and visual integrity of this area	Town Council, Planning Board
13.2	Require substantial buffers between active land uses and monitored vulnerable watershed lands.	Conservation Commission, Bristol County Water Authority.
13.3	Enforce the watershed and aquifer protection overlay	Conservation Commission, Zoning Board.

	districts.	
13.4	Preserve and protect the Kickemuit River as an SA (salt water Class A) water body suitable for shellfishing and water contact sports.	Town Council, Planning Board
13.5	Amend the zoning ordinance to prohibit any land use that would cause degradation of the high water quality of the Kickemuit River.	Town Council, Planning Board

D. Town Village (Waterfront, Water Street and Upper Main Street, Warren River Bridge to Franklin Street, bike path and edge of Belcher Cove wetlands)

Policy 14: Continue revitalization of Main Street and pay special attention to its small town, historic character.

LU	Action	Action Agents
14.1	Strengthen the association of Main Street business owners and concerned.	Town Council, Planning Board, Economic Development Board
14.2	Devise a Main Street strategy, which includes renewal of existing buildings, conversion of upper floors to residential use, overall street management, and concentration of commercial land uses. Investigate the potential to establish of a Business Improvement District (BID) to coordinate promotion, renovation and marketing. (See also Economic Development Element.)	Town Council, Planning Board, Economic Development Board

14.3	Extend decorative lighting to Water Street.	Town Council, Planning Board, Economic Development Board
14.2	Wok with the owner/developer of the American Tourister Complex to produce a redevelopment that will contribute positively to town character and provide public access to the waterfront. (See also Economic Development Element.)	Town Council, Planning Board

Policy 15: Rededicate and expand a preservation planning process for this mixed-land use historic area.

LU	Action	Action Agents
15.1	Establish a mandatory historic zoning district.	Town Council, Planning Board, Historic District Com-mission.
15.2	Expand National Register Districts that will enable use of tax credits in historic restoration and rehabilitation.	Town Council, Planning Board, Historic District Com-mission.

E. Lower Main Street & West (Main Street to Warren River: Franklin Street to Bristol line)

Policy 16: Retain existing residential areas.

LU	Action	Action Agents
16.1	Retain tree, vegetation and stone walls along street edges. Retain and plant new street trees.	Conservation Commission, Planning Board & Town Council
16.2	Provide and maintain ROWs to the water wherever feasible.	Conservation Commission, Planning Board & Town Council

F. Metacom Avenue (Strip development, Kickemuit Road to Bristol line)

Policy 17: Encourage investment in and overall management of commercial areas, determining its limits with respect to adjacent residential neighborhoods.

LU	Action	Action Agents
17.1	Implement Site and Building Design Concepts, Design Guidelines and proposed Zoning Amendments delineated in the Metacom Avenue Corridor Plan (2012). DO WE NEED DETAILS HERE?	Planning Board, Town Council

17.2	Protect residential neighborhoods adjacent to Metacom Avenue by limiting the encroachment of businesses as detailed in the Metacom Avenue Corridor Plan).	Planning Board, Town Council
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G. East of Metacom (Residential area east of Metacom Avenue)

Policy 18: Protect the character of the neighborhood east of Metacom Avenue while providing increased views of and access to the water.

LU	Action	Action Agents
18.1	Maintain existing access and establish new ROWs to the water	Conservation Commission, Town Council, Planning Board, Harbor Commission.
18.2	Require adequate buffers between development and the water to maintain visual access and water quality, such as through easements, land dedication, rights-of-way and other mechanisms. Include bonus provisions and payments in lieu of land dedication.	Conservation Commission, Town Council, Planning Board, Harbor Commission.

H. Touisset (Touisset Neck south of Child Street area developments)

Policy 19: Develop regulations that will retain farmland and limit residential construction in accordance with cultural and natural values associated with Touisset.

LU	Action	Action Agents
19.1	Establish a Farmland/Agriculture Overlay District in Touisset.	Town Council, Planning Board.
19.2	Purchase development rights and provide tax incentives for the preservation of farmland and active farming.	Town Council, Planning Board.

Policy 20: Protect wetland and coastal features and retain and define buffers for older water's edge enclaves: Touisset Highlands and Coggeshall.

LU	Action	Action Agents
20.1	Ensure adequate public access to water bodies.	Town Council, Planning Board
20.2	Ensure that development is directed in such a manner as to protect the use of the Kickemuit River for shellfishing and recreational activities.	Town Council, Planning Board