APPENDIX A

DEP ORDER

88-57

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OF CONNECTICUT
VS
THE TOWN OF ESSEX

ORDER MODIFICATION

IN THE MATTER OF AN ORDER TO THE TOWN OF ESSEX TO ABATE POLLUTION

Having found that the Town of Essex is a municipality in which a community pollution problem exists, under the provisions of Chapter 446k of the General Statutes as amended the Commissioner of Environmental Protection, acting under Section 22a-428, hereby orders the Town of Essex to comply with all conditions of the Order entered as an Order of the Commissioner on the 21st day of December, 1988 in accordance with the following modified schedule:

(B) On or before October 31, 1991, submit for the review and approval of the Commissioner of Environmental Protection a draft engineering report describing the corrective actions to be taken as defined in Directive 1 for all areas of town except the village area, including a schedule for implementation, such schedule to be incorporated in a modification of this order.

(C) On or before December 31, 1991, submit for the review and approval of the Commissioner of Environmental Protection a final engineering report describing the corrective actions to be taken as defined in Directive 1 for all areas of town including the village area, including a schedule for implementation, such schedule to be incorporated in a modification of this order.

The Town of Essex shall notify the Commissioner in writing immediately upon becoming aware that any part of the schedule in this order will or may not be met, indicating the reasons therefor and the anticipated dates by which compliance will be achieved.

Failure to comply with this order subjects the recipient to penalties under Section 22a-438 and injunction under Section 22a-435 of the Connecticut General Statutes.

Entered as a modification of an Order of the Commissioner of Environmental Protection numbered WC-4768 this 13th day of March, 1991.

Timothy R. E. Keeney
Commissioner

I CERTIFY THAT THIS DOCUMENT IS A TRUE COPY OF THE ORIGINAL.

Myrna Rodrigues
D.E.P. Clerk

ORDER NO. WC-4768 MODIFIED
TOWN OF ESSEX
DISCHARGE CODE M
DEP/WPC-050-001

Phone:
165 Capitol Avenue • Hartford, Connecticut 06106

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OF CONNECTICUT
VS
THE TOWN OF ESSEX

5 1990

ORDER MODIFICATION

IN THE MATTER OF AN ORDER TO THE TOWN OF ESSEX TO ABATE POLLUTION

Having found that the Town of Essex is a municipality which in which a community pollution problem exists, under the provisions of Chapter 446k of the General Statutes as amended the Commissioner of Environmental Protection, acting under Section 22a-428, hereby orders the Town of Essex to comply with all conditions of the Order entered as an Order of the Commissioner on the 21st day of December, 1988 in accordance with the following modified schedule:

(A) On or before July 31, 1990, submit for the review and approval of the Commissioner of Environmental Protection a revised plan of study for the development of the engineering report specified in Directive 1, with a greater focus on the interrelationship between the potential for onsite management of wastewater disposal and the land use management of the aquifer recharge areas of the town.

(B) On or before December 31, 1990, submit for the review and approval of the Commissioner of Environmental Protection an engineering report describing the corrective actions to be taken as defined in Directive 1 for all areas of town except the village area, including a schedule for implementation, such schedule to be incorporated in a modification of this order.

(C) On or before June 30, 1991, submit for the review and approval of the Commissioner of Environmental Protection an engineering report describing the corrective actions to be taken as defined in Directive 1 for the village area, including a schedule for implementation, such schedule to be incorporated in a modification of this order.

The Town of Essex shall notify the Commissioner in writing immediately upon becoming aware that any part of the schedule in this order will or may not be met, indicating the reasons therefor and the anticipated dates by which compliance will be achieved.

Failure to comply with this order subjects the recipient to penalties under Section 22a-438 and injunction under Section 22a-435 of the Connecticut General Statutes.

Entered as a modification of an Order of the Commissioner of Environmental Protection numbered WC-4768 this 15 day of June, 1990.

Leslie Carothers
Commissioner

ORDER NO. WC-4768 MODIFIED

TOWN OF ESSEX
DISCHARGE CODE M
DEP/WPC-050-001

Cynthia Crosby

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OF CONNECTICUT
VS
TOWN OF ESSEX

IN THE MATTER OF AN ORDER TO THE TOWN OF ESSEX TO ABATE POLLUTION

O R D E R

Having found that the Town of Essex is a municipality in which a community pollution problem exists, under the provisions of Chapter 446k of the General Statutes as amended, the Commissioner of Environmental Protection acting under Section 22a-428 hereby Orders the Town of Essex to take such action as is necessary to:

(1) Prepare an engineering report to evaluate the current wastewater disposal needs within the Town of Essex, identify alternatives available to properly deal with any existing or potential wastewater disposal problems in a manner which prevents pollution of the waters of the state, evaluate those alternatives with regard to both environmental and economic feasibility, provide recommendations to the Town based on that evaluation, and prepare a schedule for implementation of the recommendations of the report.

(2) Implement the recommendations of the report as approved by the Commissioner according to the schedule contained therein.

The Town of Essex is further Ordered to accomplish the above described program in accordance with the following schedule:

(A) On or before March 31, 1990, submit for the review and approval of the Commissioner of Environmental Protection an engineering report describing the corrective actions to be taken as defined in Directive 1 above, including a schedule for implementation, such schedule to be imcorporated in a modification of this order.

The Town of Essex shall notify the Commissioner in writing immediately upon becoming aware that any part of the schedule in this order will or may not be met, indicating the reasons therefor and the anticipated dates by which compliance will be achieved.

Phone:
165 Capitol Avenue • Hartford, Connecticut 06106

Failure to comply with this order subjects the recipient to penalties under Section 22a-438 and injunction under Section 22a-435 of the Connecticut General Statutes.

Entered as an Order of the Commissioner of Environmental Protection this 21 day of December 1988.

Leslie Carothers
Commissioner

ORDER NO. WC 4768
DEP/WPC 050-001
TOWN OF ESSEX
DISCHARGE CODE M
SENT CERTIFIED MAIL - RRR

MAILED TO: MR. JOHN A. JOHNS
FIRST SELECTMAN
MEMORIAL TOWN HALL
29 WEST AVENUE
ESSEX, CONNECTICUT 06426

APPENDIX B

MAY 1989 SAMPLING RESULTS

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 5/17/89, 5/19/89

PARAMETER	W-1	W-2	W-3	W-4	W-5	W-6	W-7
COLIFORM, FECAL (per 100 mls)	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
SURFACTANTS (MBAS) (mg/l)	0.02	0.01	0.032	0.03	0.03	0.02	<0.01
PHOSPHATE, ORTHO (mg/l)	0.05	0.02	0.02	0.04	0.03	0.02	<0.01
CHLORIDE (mg/l)	33.6	2.16	125.8	184.4	20.6	7.59	10.8
SODIUM (mg/l)	20	2.6	76	99	14	4.1	6.4
NITRATE as N (mg/l)	0.88	0.24	0.85	1.62	3.23	0.35	1.18
AMMONIA as N (mg/l)	<.05	.132	<.05	<.05	<.05	<.05	<.05
FIELD CONDITIONS							
DEPTH TO WATER (FT)	N/A	4.0	N/A	8.7	3.2	4.2	6.0
TEMPERATURE (oC)	12	12.0	12	11	12	12	15
SPECIFIC CONDUCTANCE (umhos/cm)	219.5	66.5	480.0	698.7	199.5	106.4	93.0
pH	6.63	6.63	5.99	6.07	6.34	6.08	6.01

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 5/17/89, 5/19/89

PARAMETER	W-8	W-9	W-10	W-11	W-12	W-13	W-14
COLIFORM. FECAL (per 100 mls)	<1.0	<1.0	<1.0	<1.0	17	<1.0	<1.0
SURFACTANTS (MBAS) (mg/l)	0.07	0.01	<0.1	0.14	0.21	0.03	0.02
PHOSPHATE, ORTHO (mg/l)	<0.01	0.03	0.04	0.10	3.67	0.09	0.04
CHLORIDE (mg/l)	100.8	6.50	2.71	16.27	5.42	10.84	35.25
SODIUM (mg/l)	57	4.9	3.8	11	9.1	7.4	21
NITRATE as N (mg/l)	0.89	1.22	0.88	7.70	2.26	3.94	3.68
AMMONIA as N (mg/l)	<.05	<.05	<.05	<.05	6.34	<.05	<.05
FIELD CONDITIONS							
DEPTH TO WATER (FT)	9.5	6.2	5.5	10.6	13.9	9.0	2.2
TEMPERATURE (oC)	13	12	13.0	15.6	20.0	14.0	13.0
SPECIFIC CONDUCTANCE (umhos/cm)	416.0	99.75	97.5	329.40	177.6	165.1	260
pH	6.01	6.20	6.05	6.52	6.54	5.58	5.41

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 5/17/89

PARAMETER	MW-1	MW-2	MW-3	MW-4
COLIFORM, FECAL (per 100 mls)	2.2	<1.1	<1.1	<1.1
SURFACTANTS (MBAS) (mg/l)	0.04	0.17	0.20	0.05
PHOSPHATE, ORTHO (mg/l)	0.04	0.09	0.04	0.04
CHLORIDE (mg/l)	59.66	13.55	18.98	13.55
SODIUM (mg/l)	33	14	12	12
NITRATE as N (mg/l)	3.17	1.61	5.00	8.60
AMMONIA as N (mg/l)	.264	8.72	.132	<.05

- Analysis is in uG/L (Parts per Billion)
- ND: None Detected - Detectable Limit <1.0 uG/L

VINYL CHLORIDE/			ND	ND
DICHLORODIFLUOROMETHANE			ND	ND
CHLOROETHANE			ND	ND
METHYLENE CHLORIDE			ND	ND
1,1-DICHLOROETHYLENE			ND	ND
1,1-DICHLOROETHANE			ND	ND
TRANS-1,2-DICHLOROETHYLENE			ND	ND
CHLOROFORM			3.7	ND
1,2-DICHLOROETHANE			ND	ND
1,1,1-TRICHLOROETHANE			1.5	4.4
CARBON TETRACHLORIDE			ND	ND
BROMODICHLOROMETHANE			ND	ND
TRICHLOROETHYLENE			ND	6.4
DIBROMOCHLOROMETHANE			ND	ND
BROMOFORM			ND	ND
TETRACHLOROETHYLENE			ND	ND
BENZENE			ND	ND
TOLUENE			ND	ND
CHLOROBENZENE			ND	ND
ETHYLBENZENE			ND	ND
1,3-DICHLOROBENZENE			ND	ND
1,2-DICHLOROBENZENE			ND	ND
1,4-DICHLOROBENZENE			ND	ND
TOTAL XYLENES			ND	ND

FIELD CONDITIONS

DEPTH TO WATER (FT)	16.8	2.6	4.3	6.4
TEMPERATURE (oC)	16.0	14.7	14.3	14.0
SPECIFIC CONDUCTANCE (umhos/cm)	314.6	620.0	151.20	355.6
pH	6.40	6.65	5.43	6.22

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 5/23/89

PARAMETER	SW-1 AM	SW-2 AM	SW-3 AM	SW-4 AM	SW-5 AM	SW-6 AM	SW-7 AM	SW-8 AM	SW-9 AM
COLIFORM, FECAL (per 100 mls)	<1.1	32	<1.0	11	1	18	17	7	1
SURFACTANTS (MBAS) (mg/l)	<.01	<.01	0.04	0.01	0.04	0.02	0.02	<.01	<.01
PHOSPHATE, ORTHO (mg/l)	<0.01	<0.01	0.01	<0.01	<0.01	0.15	<0.01	<0.01	0.01
CHLORIDE (mg/l)	11.78	7.0	18.8	11.78	14.1	14.1	30.6	14.1	11.78
SODIUM (mg/l)	4.5	5.5	13	6.0	8.2	14	19	7.0	8.1
NITRATE as N (mg/l)	0.48	1.83	2.00	1.50	2.00	1.60	2.00	1.34	1.68
AMMONIA as N (mg/l)	<.05	<.05	6.6	<.05	.198	<.05	.85	<.05	<.05
FIELD CONDITIONS									
TEMPERATURE (oC)	20.0	20.4	13.7	20.6	20.0	21.8	26.7	23.0	20.8
SPECIFIC CONDUCTANCE (umhos/cm)	61.05	66.0	140.8	64.8	105.45	162.64	194.0	81.12	97.2
pH	5.18	5.0	5.17	4.93	4.81	4.73	4.9	4.85	4.86

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 5/23/89

PARAMETER	SW-1 PM	SW-2 PM	SW-3 PM	SW-4 PM	SW-5 PM	SW-6 PM	SW-7 PM	SW-8 PM	SW-9 PM
COLIFORM, FECAL (per 100 mls)	<1.0	0	3	2	4	27	13	15	6
SURFACTANTS (MBAS) (mg/l)	<.01	<.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
PHOSPHATE, ORTHO (mg/l)	<0.01	<0.01	0.01	0.01	0.02	0.07	0.01	<0.01	0.06
CHLORIDE (mg/l)	7.0	11.78	21.2	9.42	14.1	14.1	30.6	7.0	14.1
SODIUM (mg/l)	4.5	5.7	13	6.0	8.2	10	19	7.2	8.1
NITRATE as N (mg/l)	0.50	1.80	2.03	1.54	2.00	2.06	1.80	1.34	1.58
AMMONIA as N (mg/l)	<.05	.066	.26	<.05	.198	.26	.59	<.05	0.66
FIELD CONDITIONS									
TEMPERATURE (oC)	22.0	20.2	15.3	20.3	19.6	21.2	23.0	21.4	20.8
SPECIFIC CONDUCTANCE (umhos/cm)	68.9	77.7	146.4	65.4	100.8	172.8	208.0	80.25	88.56
pH	4.93	4.98	4.89	5.08	4.97	4.89	4.96	4.99	4.96

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 5/23/89

PARAMETER	SW-10	SW-11	SW-12	SW-13	SW-14	SW-15
COLIFORM, FECAL (per 100 mls)	1	0	10	0	4	1
SURFACTANTS (MBAS) (mg/l)	0.01	0.02	<0.01	<0.01	0.01	<0.01
PHOSPHATE, ORTHO (mg/l)	0.01	0.01	0.01	0.01	0.01	0.01
CHLORIDE (mg/l)	14.1	11.78	11.78	11.78	11.78	11.78
SODIUM (mg/l)	7.5	7.1	6.7	7.3	6.8	7.0
NITRATE as N (mg/l)	1.40	1.34	1.34	1.40	1.34	1.34
AMMONIA as N (mg/l)	.13	.13	.13	<0.05	0.66	.13
FIELD CONDITIONS						
TEMPERATURE (oC)	21.0	19.5	19.0	19.9	18.9	18.9
SPECIFIC CONDUCTANCE (umhos/cm)	108.0	112.0	107.35	116.55	113.0	109.61
pH	4.91	5.1	5.1	5.03	5.02	5.03

APPENDIX B (Cont'd)

AUGUST 1989

SAMPLING RESULTS

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 8-25-89

PARAMETER	W-1	W-2	W-3	W-4	W-5	W-6	W-7	W-8	W-9	W-10
COLIFORM, FECAL (per 100mls)	2	0	0	0	0	11	0	0	0	0
MBAS SURFACTANTS (mg/l)	<0.01	<0.01	0.03	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
O-PHOSPHORUS (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
CHLORIDE (mg/l)	16.9	3.8	83	74.5	16.9	11.3	7.5	19.8	7.5	4.7
SODIUM (mg/l)	16	3.3	76	65	16	6.7	6.3	16	7.1	5.1
NITRATE AS N (mg/l)	0.9	0.1	6.4	1.8	5	0.1	1.1	1.2	1.9	0.15
AMMONIA AS N (mg/l)	0.17	0.42	0.61	0.25	0.42	0.34	0.18	0.7	0.44	0.35
FIELD CONDITIONS										
DEPTH TO WATER (FT)	5.29	6.21	N/A	8.96	3.21	7.21	6	9.5	7.88	7.21
TEMPERATURE (oC)	18.6	18.3	17.4	17.3	16.9	17.1	19.3	20.5	18	16.8
SPECIFIC CONDUCTANCE (umhos/cm)	160.74	68.4	446.6	407.16	180.54	133.34	77.28	136.25	81.65	94.4
pH	6.09	5.99	5.78	5.79	5.57	5.46	5.63	5.65	5.8	5.86

ESS8

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 8-25-89

PARAMETER	W-11	W-12	W-13	W-14
COLIFORM, FECAL (per 100mls)	0	113	0	0
MBAS SURFACTANTS (mg/l)	0.02	0.67	0.06	0.04
O-PHOSPHORUS (mg/l)	0.03	5.2	0.02	0.04
CHLORIDE (mg/l)	4.7	11.3	10.4	28.3
SODIUM (mg/l)	8.7	28	7.1	24
NITRATE AS N (mg/l)	4.5	0.4	3.65	4.55
AMMONIA AS N (mg/l)	0.18	10.6	1.05	0.53
FIELD CONDITIONS				
DEPTH TO WATER (FT)	7.71	15	7.85	4
TEMPERATURE (oC)	15.8	15.8	18	18
SPECIFIC CONDUCTANCE (umhos/cm)	349.44	314.6	148.35	263.35
pH	6.42	6.12	5.8	6.16

ESS8/89

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 8-29-89, 8-30-89

PARAMETER	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9
COLIFORM, FECAL (per 100mls)	0	0	0	10	0	0	10	0	0
MBAS SURFACTANTS (mg/l)	0.04	0.06	0.03	0.05	0.02	0.06	0.07	0.05	0.03
O-PHOSPHORUS (mg/l)	<0.01	0.01	0.03	0.03	<0.01	<0.01	<0.01	0.34	<0.01
CHLORIDE (mg/l)	50	2.8	11.3	4.7	64.1	76.4	20.7	4.7	120.7
SODIUM (mg/l)	35	14	11	7.8	37	48	20	143	94
NITRATE AS N (mg/l)	4.7	<0.1	3.75	4	5.75	16	6.9	0.2	3.9
AMMONIA AS N (mg/l)	0.44	12.1	0.88	1.67	0.35	0.44	0.18	49.4	0.44
FIELD CONDITIONS									
DEPTH TO WATER (FT)	17.5	4.08	4.35	3.35	16.85	14.5	15.7	11.6	5.25
TEMPERATURE (oC)	17.2	18.7	20.6	18	18.5	18.1	17.8	17.9	22.7
SPECIFIC CONDUCTANCE (umhos/cm)	341.02	696	125.35	411.7	356.5	460	310.5	1150	630
pH	6.2	6.78	5.36	6.41	5.55	5.92	7.02	6.07	6.24

ESS8/89

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 8-25-89

PARAMETER	SW-1 AM	SW-2 AM	SW-3 AM	SW-4 AM	SW-5 AM	SW-6 AM	SW-7 AM	SW-8 AM	SW-9 AM
COLIFORM, FECAL (per 100mls)	7	56	50	70	50	80	60	31	50
MBAS SURFACTANTS (mg/l)	0.062	0.044	1.76	0.031	0.032	0.037	0.047	0.041	0.032
O-PHOSPHORUS (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
CHLORIDE (mg/l)	3.8	10.4	15.1	7.5	13.2	12.3	21.7	10.4	11.3
SODIUM (mg/l)	4.7	6.9	15	5.3	8.1	9.8	16	5.9	6.9
NITRATE AS N (mg/l)	<0.1	0.56	2.05	0.1	<0.10	0.88	<0.1	0.18	0.2
AMMONIA AS N (mg/l)	<0.05	0.21	0.76	0.08	0.17	0.42	0.34	0.34	0.17
FIELD CONDITIONS									
TEMPERATURE (oC)	19.4	18.8	17.1	20.4	19.9	19.6	25.7	22.8	22.3
SPECIFIC CONDUCTANCE (umhos/cm)	68.32	90.4	165.2	65.4	108.78	181.44	88.11	72.8	82.95
pH	6.23	6.23	6.4	6.33	5.82	6.37	8.72	6.58	6.38

ESS8

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 8-25-89

PARAMETER	SW-1 PM	SW-2 PM	SW-3 PM	SW-4 PM	SW-5 PM	SW-6 PM	SW-7 PM	SW-8 PM	SW-9 PM
COLIFORM, FECAL (per 100mls)	4	40	>2400	55	34	46	5	45	32
MBAS SURFACTANTS (mg/l)	0.045	0.026	0.063	0.04	0.162	0.04	0.046	0.042	0.042
O-PHOSPHORUS (mg/l)	<0.01	<0.01	0.03	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
CHLORIDE (mg/l)	6.6	11.3	16.9	8.5	13.2	12.3	23.6	11.3	11.3
SODIUM (mg/l)	4.8	6.9	15	5.6	8.2	10	16	6.4	6.7
NITRATE AS N (mg/l)	<0.10	0.46	0.38	0.23	<0.1	0.85	0.21	0.19	0.21
AMMONIA AS N (mg/l)	0.42	0.17	0.51	0.08	0.68	0.25	0.34	0.42	0.17
FIELD CONDITIONS									
TEMPERATURE (oC)	24.8	21.5	18	22.1	20.3	21.7	27.4	23.6	23.5
SPECIFIC CONDUCTANCE (umhos/cm)	78	95.23	161	66.78	111.18	187.25	171	75.19	82.4
pH	6.22	6.24	6.36	6.36	5.86	6.43	9.03	6.46	6.34

ESS8

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 8-29-89

PARAMETER	SW-10	SW-11	SW-12	SW-13	SW-14	SW-15	SW-16
COLIFORM, FECAL (per 100mls)	117	84	71	>2400	>2400	>2400	400
MBAS SURFACTANTS (mg/l)	0.05	0.07	0.08	0.1	0.11	0.1	0.08
O-PHOSPHORUS (mg/l)	0.02	0.03	0.02	0.02	0.02	0.02	0.02
CHLORIDE (mg/l)	861	754	905	1169	1320	1537	1000
SODIUM (mg/l)	481	658	678	882	964	1065	709
NITRATE AS N (mg/l)	0.2	0.25	<0.1	0.25	0.3	0.2	0.25
AMMONIA AS N (mg/l)	0.88	0.61	0.44	0.61	0.61	0.53	0.53
FIELD CONDITIONS							
TEMPERATURE (oC)	23.1	23.3	23.5	23.6	23.8	23.6	23.5
SPECIFIC CONDUCTANCE (umhos/cm)	2626.5	3120	3193	4120	4488	5047	3811
pH	7.25	7.44	7.27	7.52	7.63	7.15	6.98

ESS8

APPENDIX B (Cont'd)

OCTOBER 1989

SAMPLING RESULTS

ESSEX - WASTEWATER MANAGEMENT STUDY
WATER QUALITY TESTING RESULTS

DATE SAMPLES TAKEN: 10-27-89

PARAMETER	SW-10	SW-11	SW-12	SW-13	SW-14	SW-15	SW-16
NITRATE AS N (mg/l)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
AMMONIA AS N (mg/l)	0.32	0.29	0.28	0.28	0.26	0.28	0.24
COLIFORM, FECAL (per 100mls)	144	158	180	350	154	350	800
STREP, FECAL (per 100 mls)	24	20	26	20	38	20	88
FECAL COLIFORM / FECAL STREP	6.0	7.9	6.9	17.5	4.1	17.5	9.1
FIELD CONDITIONS							
TEMPERATURE (oC)	16.7	8.3	8.9	11.5	12.4	8.1	9.8
SPECIFIC CONDUCTANCE (umhos/cm)	88.3	109.07	107.59	107.3	97.9	110.56	105.36
pH	6.95	6.52	6.66	6.77	6.78	6.78	6.79

ESS889

APPENDIX C

NITROGEN LOADING - FALLS RIVER

M E M O R A N D U M

TO: Peter Grose

FROM: Michael Curtis

DATE: July 10, 1989

SUBJECT: Essex Surface Water Sampling

Attached are the summary calculations from the Essex Surface Water Sampling effort undertaken on May 23, 1989. In this effort, surface water were sampled at nine (9) sites and a variety of indicator water quality parameters were measured. The sampling was performed twice at each station during a 10 hour sampling effort. A list of key stations is shown in the attached table. The goal of said sampling was to assess areal nonpoint source loading of contaminants to the Falls River watershed in Essex.

The sampling consisted of two distinct grab samples from the water quality stations; the first being performed upon arrival and the last being performed before departure. Concentrations of nitrogen series, (ammonia nitrite and nitrate nitrogen), chlorides and other indicator water quality parameters were measured. Loadings of nitrogen to the Falls River was investigated and loading from sub-watershed areas was calculated on a pounds-per-square-mile-per-day basis.

Conclusions of these analyses were that the developed areas in the watershed contributed nearly an order of magnitude (10 times) more nitrogen per square mile per day than did the undeveloped areas in the upper watershed. This is not unexpected and the loadings of nitrogen were not overly high from the developed areas of the watershed such as Ivoryton and Centerbrook. Upper watershed loadings were from 1-3 pounds per square mile per day while lower watershed loadings were from 25-35 pounds of nitrogen per day. This loading did not represent a water quality impact or problem at the measured flows. Flows were measured at from 10-35 cubic feet per second on two separate sites on the Falls River.

If this loading persists into the summer months, then it could impact water quality of the Falls River. It is my suggestion that an additional water quality survey similar in scope to the previous be performed in late August or early September, 1989 to verify or refute the long term loading from the urbanized areas to the Falls River watershed. Conclusions from such will aid in the determination of the need for sewage systems because of subsurface contamination and contribution to surface waters.

88-57
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ESSEX FACILITIES PLAN
SURFACE WATER SAMPLING RESULTS
FALLS RIVER – ESSEX, CONNECTICUT
SAMPLING DATE: MAY 23, 1989

SAMPLING POINT	DRAINAGE AREA (SQ. MI.)	FLOW (CFS)	TOTAL INORGANIC NITROGEN (mg/l)	MASS FLOW NITROGEN (#/day)	NITROGEN AERIAL LOADS (#/(sq. mi.–day))	SUBWATERSHED AERIAL LOADS (#/(sq. mi.–day))
SW–1 SITE 1 COMSTOCK POND	8.71	9.38	0.53	26.82	3.1	3.1
SW–2 SITE 2 SUMMIT STREET	0.94	1.01	1.88	10.23	1.06	1.06
SITE 2 WALNUT STREET	9.65	*10.40	ONLY FLOW MSMT. TAKEN HERE			
SW–3 SITE 4 IVORY STREET IVORYTON CENTER	0.80	2.61	8.80	14.83	18.5	
SW–4 SITE 5 READ STREET	10.4	12.9	1.55	107.37	10.32	27.23
SW–8 SITE 6 DENNISON ROAD	13.2	21.9	1.39	183.61	13.9	
SW–9 SITE 7 RIVER ROAD	17.2	*34.90	1.73	325.5	18.9	35.47

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ESSEX FACILITIES PLAN
SURFACE WATER SAMPLING RESULTS
FALLS RIVER – ESSEX, CONNECTICUT
SAMPLING DATE: AUGUST 30, 1989

SAMPLING POINT	DRAINAGE AREA (SQ. MI.)	FLOW (CFS)	TOTAL INORGANIC NITROGEN (mg/l)	MASS FLOW NITROGEN (#/day)	NITROGEN AERIAL LOADS (#/(sq. mi.-day))
SW-1 SITE 1 COMSTOCK POND	8.71	8.00	<0.33	14.22	1.63
SW-2 SITE 2 SUMMIT STREET	0.94	0.86	0.70	3.24	3.45
SITE 2 WALNUT STREET	9.65	8.86	ONLY FLOW MSMT. TAKEN HERE		
SW-3 SITE 4 IVORY STREET IVORYTON CENTER	0.80	0.73	1.85	7.28	9.10
SW-4 SITE 5 READ STREET	10.4	10.0	0.25	13.47	1.30
SW-8 SITE 6 DENNISON ROAD	13.2	14.3	0.57	43.91	3.33
SW-9 SITE 7 RIVER ROAD	17.2	20.37	0.38	41.70	2.42

APPENDIX D

ANALYSIS OF ON-SITE REPAIRS

M E M O R A N D U M

TO: FILE 88-57
ESSEX WASTEWATER MANAGEMENT STUDY

FROM: RAY MYETTE, ENVIRONMENTAL ENGINEER

DATE: FEBRUARY 12, 1991

SUBJECT: LOT ANALYSIS IN STUDY AREAS

This memo is intended to briefly summarize the analysis done to evaluate the feasibility of on-site septic system repairs in the study areas.

Each of the on-site sewage disposal study areas throughout Essex were evaluated to see if the lots in the area could support a septic system repair, meeting Connecticut Department of Health Services criteria, given the physical characteristics of each area.

Information for each area was collected to determine the type and size of repair required. Generally soils information was gathered from the USDA Soil Conservation Service (SCS) to estimate a sewage percolation rate for each area. The depth to maximum high seasonal ground water was obtained from the SCS, existing shallow water supply wells in the area and discussions with the Town Sanitarian. The depth to bedrock was determined for each area from available U.S. Geological Survey mapping and well data. Size and location of buildings were estimated.

Using the above information and the Connecticut Public Health Code technical standards for subsurface sewage disposal systems, a typical septic system repair was designed for each area. For residential buildings the estimated percolation rate and number

of bedrooms in the building were used to determine the size of septic system leaching field required. Nonresidential leaching systems were sized according to the percolation rate and an estimated daily sewage flow.

Septic tank size was based on the number of bedrooms in a residential building with a minimum of 1,000 gallons required.

The leaching system must be installed at least 18 inches above maximum high ground water and at least 4 feet above bedrock. Minimum separating distances are required by code between the septic system and water supply wells, buildings, open water courses and property lines.

A typical example of an adequately sized lot for a proper septic system repair is shown on Figure 1 attached.

Figure 2 illustrates a lot of insufficient size and soils to support a properly sized repair.

An example of a septic system repair in the Essex Village area is shown on Figure 3. Unlike the remainder of town Essex Village is underlain by relatively deep free draining sand and gravel. Because of these soils, deeper leaching system drywells can be used for repairs instead of shallower leaching fields requiring more space.

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REM	1/28/91			88-57

ESSEX

SHEET NO. 1 of

B. CHARLES ST. SOUTH

MAP 43 LOT 66
NO. 17 CEDAR ST.

ESTIMATED TO BE 3 BEDROOM HOUSE
HOUSE HAS FOUNDATION DRAIN
PERC. RATE ESTIMATED TO BE 20.1 TO 30 MIN/IN

FROM TABLE NO. 6 IN TECH. STDS

750 SQ. FT EFF. AREA REQ.

1. USING ELJEN IN-DRAIN
30" WIDE x 9" HIGH
AS PER 3/29/90 DOHS MEMO
5 FT^2 PER LF EFF. LEACHING AREA
16 FT C-C

$\frac{750\ FT^2}{5\ FT^2/LF} = 150\ LF\ REQ \leftarrow$

2. DEPTH TO GROUND WATER
FROM SCS DATA, SEASONAL HIGH GW @ 3.5 FT

3. SEE FIGURE 1 - ADEQUATE LAND EXISTS

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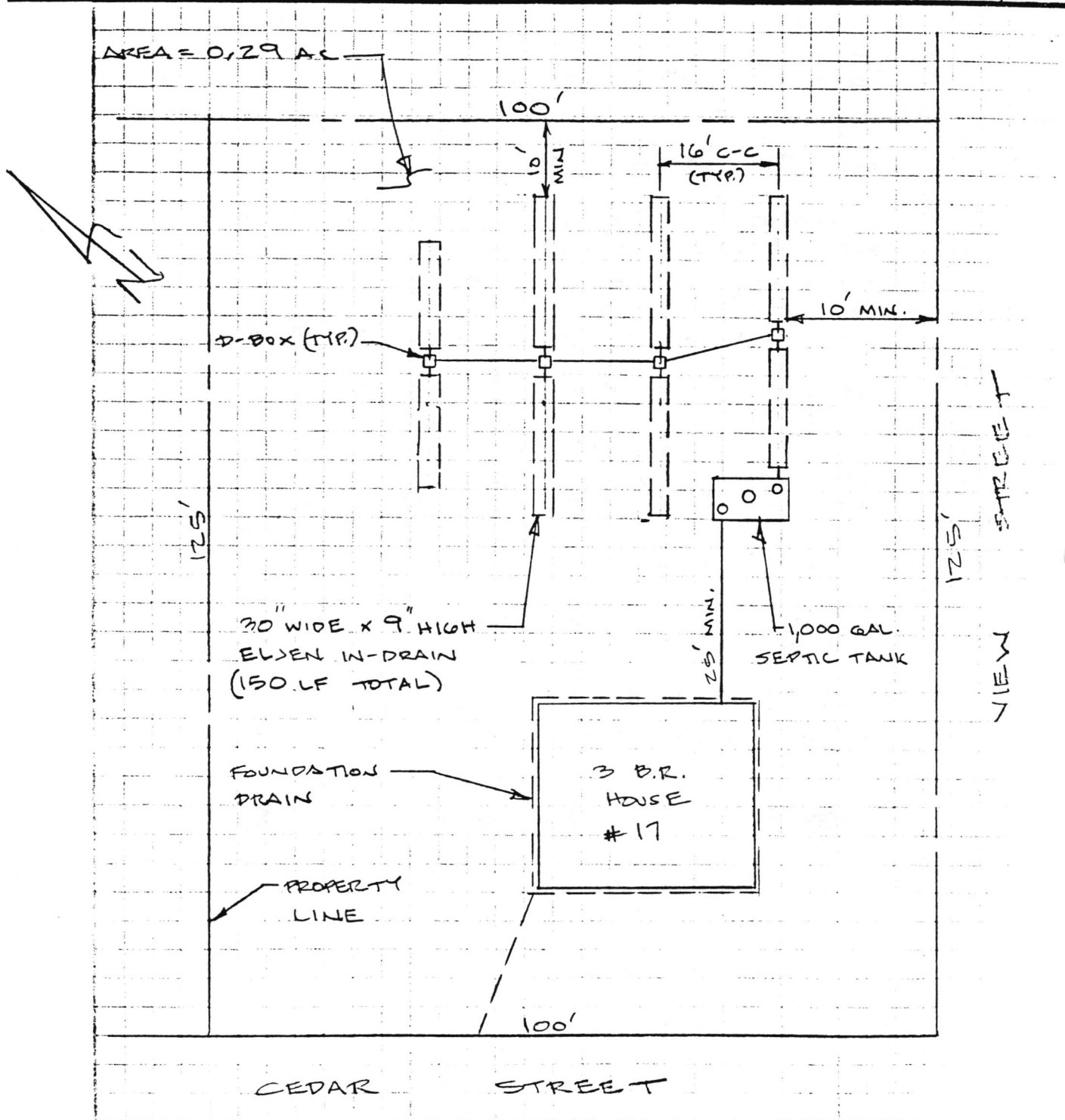
REM	1/29/91			89-57

ESSEX

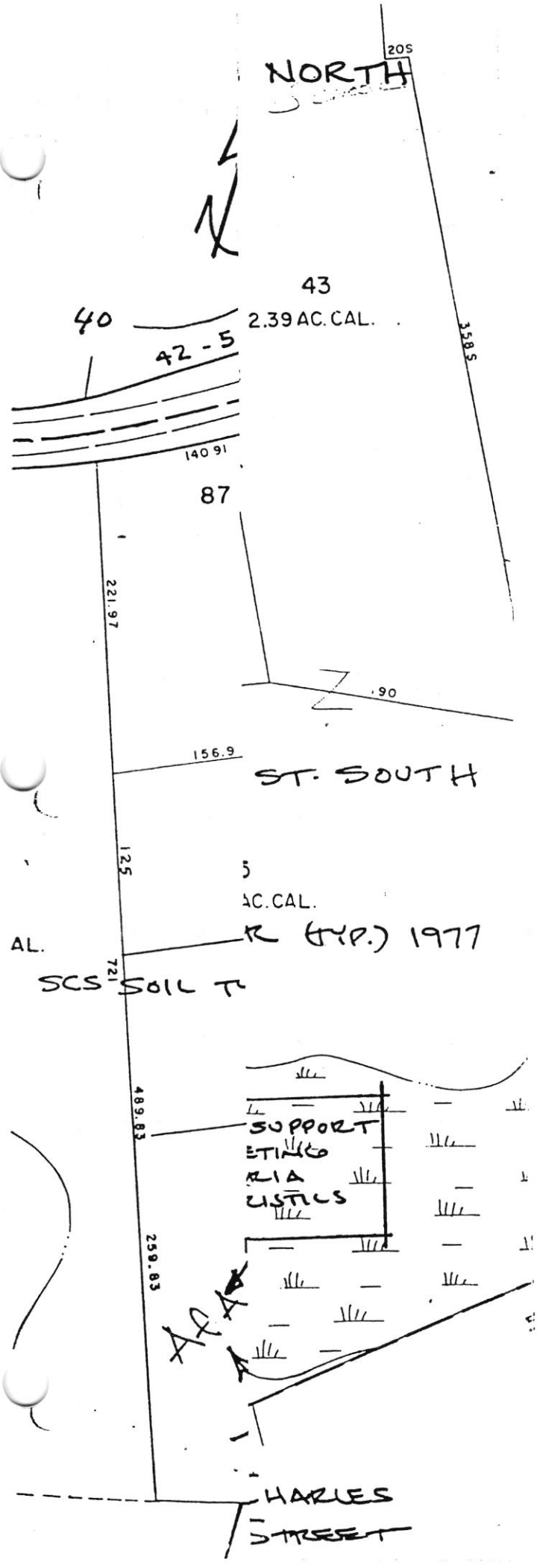
SHEET NO. 2 of



TYPICAL SEPTIC SYSTEM REPAIR
CHARLES STREET SOUTH AREA

SCALE 1" = 20'

FIG. 1


NORTH
205
43
2.39 AC. CAL.
40
42 - 5
140 91
87
221.97
358.5
.90
156.9
ST. SOUTH
125
AC. CAL.
R (TYP.) 1977
AL.
721
SCS SOIL T
489.83
SUPPORT
259.83
HARLES
STREET

C. COMSTOCK AVE.

MAP 57 LOT 51
COMSTOCK AVE
- LOT SERVED BY PUBLIC WATER SUPPLY
- ESTIMATED TO BE 3 BEDROOM HOUSE
- NO FOOTING OR FOUNDATION DRAIN
- PERC. RATE ESTIMATED TO BE 20.1 TO 30 MIN/IN

FROM TABLE NO. 6 IN TECH. STDS.

750 SQ. FT. EFF. AREA REQ.

1. USING CONVENTIONAL 3 FT WIDE CRUSHED STONE LEACHING TRENCHES PROVIDING
3 FT^2 PER LF EFF. LEACHING AREA
12 FT C-C

$$\frac{750\ FT^2}{3\ FT^2/LF} = 250\ LF\ REQ. \longleftarrow$$

2. DEPTH TO GROUND WATER
FROM SCS DATA, SEASONAL HIGH GW @ 3.5 FT

3 SEE FIG. 2 - INADEQUATE AREA FOR LEACHING SYSTEM
CONSIDER: VARIANCES TO SEPARATING DISTANCES
LOW FLOW PLUMBING FIXTURES

OR PURCHASE VACANT LOT FOR LEACHING FIELD

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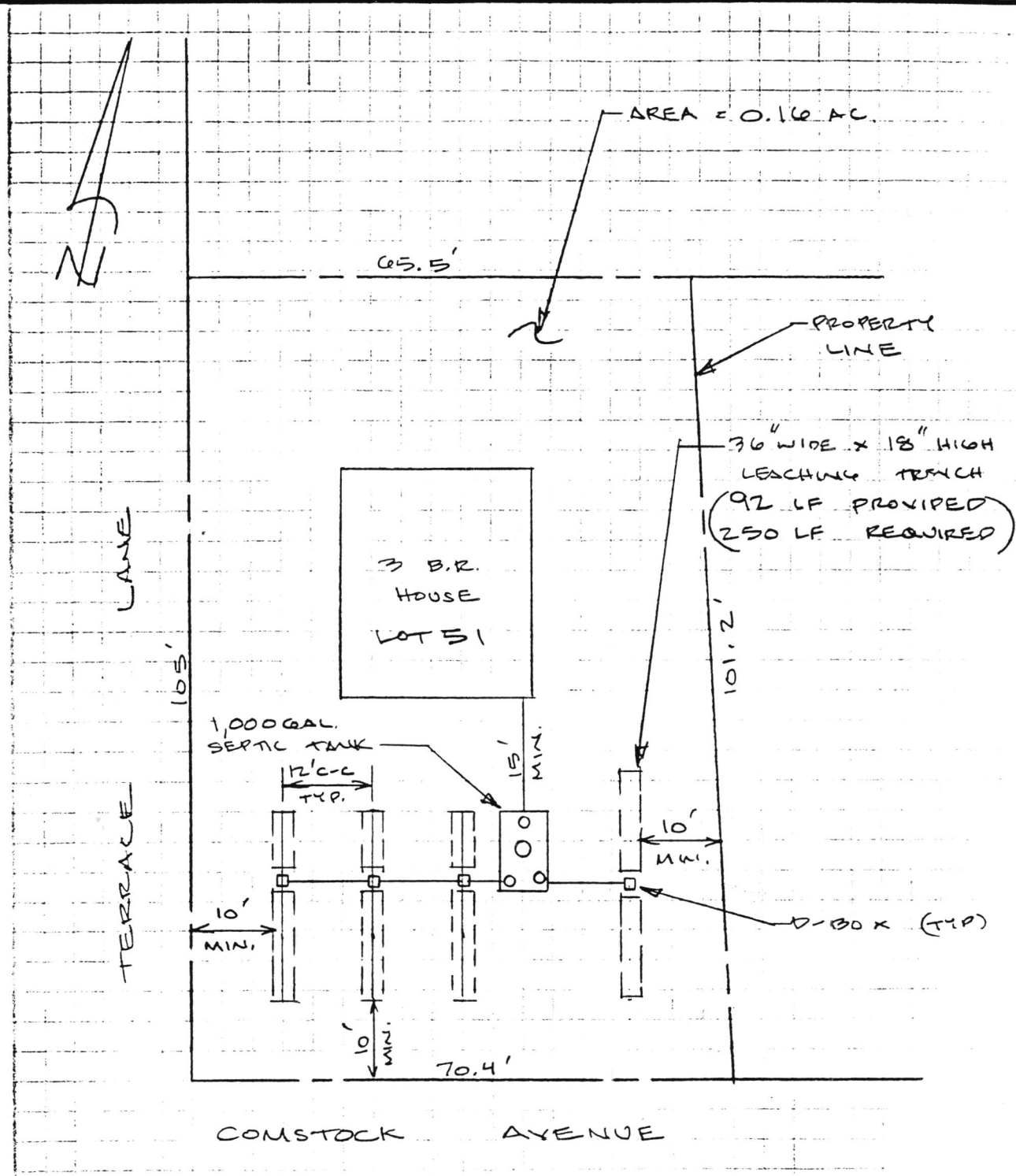
RSM	2/5/91			88-57

ESSEX

SHEET NO. 5 of



TYPICAL EXAMPLE OF INADEQUATE SIZED LOT FOR DOHS REPAIR

SCALE 1" = 20'

FIG. 2

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REM	1/29/91			88-57

ESSEX WASTEWATER MANAGEMENT STUDY

SHEET NO. 1 of

TYPICAL EXAMPLES OF DOHS TYPE SUBSURFACE DISPOSAL REPAIRS

1. ESSEX VILLAGE AREA
2. CHARLES ST. SOUTH

A. ESSEX VILLAGE AREA
MAP 47 LOT 92
No. 10 BANK LANE

ESTIMATED TO BE 3 BEDROOM HOUSE
- NO FOOTING OR FOUNDATION DRAIN
- PERC RATE ESTIMATED TO BE 1-5 MW/IN
- LOT SERVED BY PUBLIC WATER SUPPLY
(SEE ATTACHED COMPS FROM 10/27/89)

FROM TABLE NO. 6 IN TECH. STDS.

315 SQ. FT EFF. AREA REQ.

1. FROM PREVIOUS COMPS 6' Ø DRYWELL WITH 12" OF CRUSHED STONE AROUND PROVIDES 25 FT² E.A. PER FOOT OF DEPTH.

VERTICAL HEIGHT OF DRYWELL REQUIRED

$\frac{315\ FT^2}{25\ FT^2} = 15\ LF$ ⟵

2. DEPTH TO GROUND WATER
FROM MONI. WELL INSTALLATIONS

MW 5 GW @ 16 FT
MW 6 GW @ 14 FT

3. THEREFORE USE (2) 6 FT Ø DRYWELLS
- 24 FT C-C
- EACH DRYWELL @ 8 FT HIGH

* NOTE: FOR LOCATION OF LOT SEE PLAN TITLED "ESSEX VILLAGE AREA WASTEWATER MANAGEMENT STUDY TOWN OF ESSEX CONN.
SCALE 1" = 100 FT DATE OCT 1989

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consulting engineers

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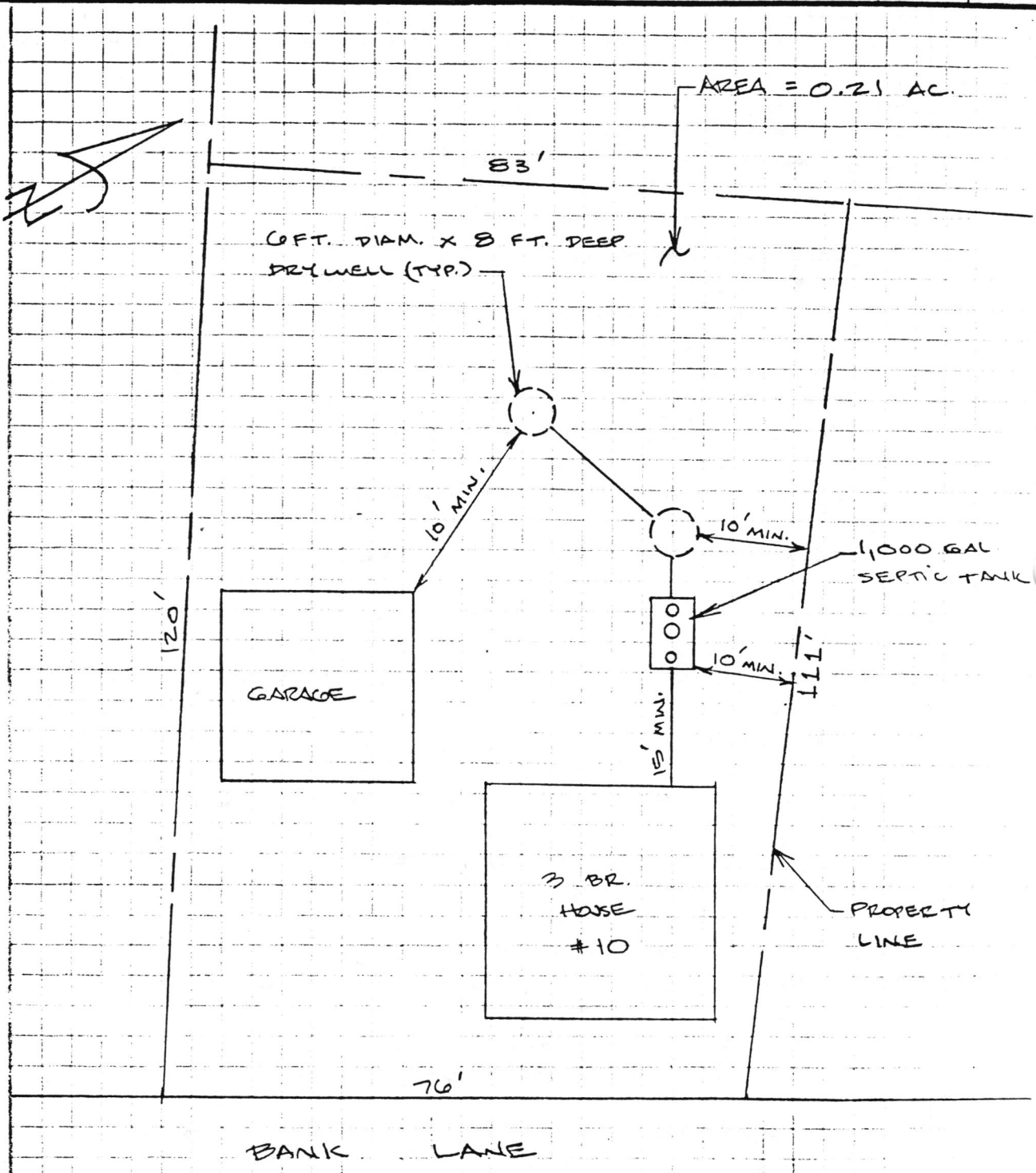
REM	1/28/91			88 7

ESSEX

SHEET NO. 8 of



TYPICAL SEPTIC SYSTEM REPAIR
ESSEX VILLAGE AREA

SCALE 1" = 20'

FIG 3

APPENDIX E

SEPTAGE LAGOON EVALUATION

SEPTAGE LAGOONS

An essential part of any wastewater management program that uses subsurface disposal is proper disposal of the septage collected in the septic tanks of the on-site subsurface disposal systems. Essex operates five septage lagoons on approximately 18 acres located southeast of the town landfill off of Route 154. The two lower lagoons were constructed in 1974. Two of the upper lagoons were constructed in 1978 and the third upper lagoon was constructed sometime after 1978.

The septage disposal facility is not currently permitted by the DEP. In a recent meeting, the DEP stated that it would be difficult to permit the lagoons because they do not have a sufficient unsaturated zone beneath them for virus removal. Additional concerns were expressed regarding the ability of the site to handle an increase in hydraulic loading due to future septage flows. Based on the State's past observations at the site, the soil conditions in the vicinity of the lagoons are restrictive for septage disposal and do not contain any additional capacity.

The Town has been under an Order from the DEP since August, 1981 to provide adequate facilities to insure proper disposal of septage generated within Essex. The DEP has indicated that they will eventually either issue a modified permit or revise the existing outstanding Order. The long term goal of the DEP is to develop a regional solution for septage disposal in southeastern Connecticut. The proposed wastewater treatment plant in Old Saybrook has been suggested as a possible site for such a facility. If this plan materializes, it is suggested that Essex consider participating in it.

As part of this wastewater management study, an evaluation was made of the existing septage disposal facility. Recommendations for improving existing facility operation include regular lagoon cleaning, periodic water quality monitoring, better controls on sewage discharges to the lagoons, and improvements to the facility.

In addition, four alternatives for future septage disposal were analyzed. For the purposes of this analysis, the 1989 flow of 1,102,000 gallons of septage was used. Costs to implement each of the four alternatives are summarized in Table E-1. The four alternatives are:

- Continued use of lagoons - Operation with or without an attendant was considered. Improvements to the septage receiving structure, distribution system, and site would be made. The lagoons would be cleaned and the infiltrative surface restored every two years.

- Disposal out of town - Septage would be hauled to facilities at either the East Hampton or Mattabassett wastewater treatment plants for treatment and disposal.

- Solar Aquatic septage treatment - Under this alternative, a solar aquatic septage treatment plant would be constructed at the existing septage facility and the clarified effluent would be discharged to the existing septage lagoons.

- Septage dewatering and composting - Equipment would be installed at existing facility to dewater the incoming septage. The filtrate would then be discharged to the existing lagoons and the dewatered septage would be composted on-site.

A summary of costs for the septage disposal alternates is shown on Table E-2. Improving and continuing use of the present lagoons is the least expensive alternative at $106/1,000 gal, if no attendant is hired. Disposal at other existing facilities is considerably more expensive, but has the advantage of no direct funding of capital or operating costs by the Town. Solar aquatic treatment for this application is prohibitively expensive. The WPCA has chosen to continue use of their lagoons for septage disposal and has started making recommended improvements to this facility.

TABLE E-1
ESSEX WASTEWATER MANAGEMENT STUDY
SEPTAGE DISPOSAL ALTERNATIVES AND COSTS

ALTERNATIVE 1: CONTINUED USE OF LAGOONS

A. With Attendant

1.	Capital Cost		
	a. Upper lagoon improvements	=	$ 60,400
	b. Lower lagoon improvements	=	25,100
	c. Engineering and contingencies, say 20%	=	17,100
	SUBTOTAL:		$102,600
	d. Capital cost amortization (n = 20 yrs., i = 8%, A/P = 0.10185)	=	$ 10,400/yr.
2.	Operation and Maintenance		
	a. Cleaning of upper and lower lagoons (avg. year basis)	=	$ 15,000
	b. Upper lagoons - General O&M	=	15,300
	c. Lower lagoons - General O&M	=	300
	SUBTOTAL		$ 30,600/yr.
3.	Septage Hauling Costs Without Permit Fees		
	a. Per 1,000 gal.	=	$ 75
	b. Per year (1989 = 1,102,000 gal.)	=	82,700/yr.
4.	Leasing Doane Property for Lagoons	=	$ 5,000/yr.
5.	Total Cost Per Year	=	$128,700/yr.
6.	Cost Per 1,000 Gal. (1989 = 1,102,000 gal.)	=	$ 117

B. Without Attendant

1.	Capital Cost		
	a. Upper lagoon improvements	=	$ 56,900
	b. Lower lagoon improvements	=	25,100
	c. Engineering and contingencies, say 20%	=	16,400
	SUBTOTAL		$ 98,400
	d. Capital cost amortization (n = 20 yrs., i = 8%, A/P = 0.10185)	=	$ 10,000/yr.
2.	Operation and Maintenance		
	a. Cleaning of upper and lower lagoons (avg. year basis)	=	$ 15,000
	b. Upper lagoons - General O&M	=	3,800
	c. Lower lagoons - General O&M	=	300
	SUBTOTAL		$ 19,100/yr.
3.	Septage Hauling Costs Without Permit Fees		
	a. Per 1,000 gal.	=	$ 75
	b. Per year (1989 = 1,102,000 gal.)	=	82,700/yr.
4.	Leasing Doane Property for Lagoons	=	$ 5,000/yr.
5.	Total Cost Per Year	=	$116,800/yr.
6.	Cost Per 1,000 Gal. (1989 = 1,102,000 Gal.)	=	$ 106

ALTERNATIVE 2: DISPOSAL OUT OF TOWN

1. Disposal at East Hampton Sewage Treatment Plant
   -- Disposal costs $30 per "septic tank pumping" used for Cost Analysis
   -- Estimate septic tank pumping = 1,000 gal.
   -- Disposal costs at Mattabasett S.T.P. in Cromwell $65 per 1,000 gal.

2. Septage Hauling Cost
   -- $150-200 to pump residential tank (1,000 gal.)
   * includes disposal

3. Total Cost Per Year:

$$\frac{(1{,}102{,}000 \text{ gal.})}{(1{,}000 \text{ gal./tank})} (\$175/\text{tank}) = \$192{,}900/\text{yr.}$$

4. Cost Per 1,000 Gal. = $ 175

ALTERNATIVE 3: SOLAR AQUATIC SEPTAGE TREATMENT

-- Clarified effluent to existing lagoons
-- From pump-out records April 1989 Q max. day = 4,712 gal./day
-- Design Flow: Qdes = 5,000 gal./day

1. Capital Cost
   a. Treatment works, includes design = $500,000
   b. Upper and lower lagoon improvements without attendant, includes engineering and contingencies = 98,400
   SUBTOTAL = $598,400
   c. Capital cost amortization = $ 61,000/yr.
   n = 20 yrs., i = 8%, A/P = 0.10185

2. Operation and Maintenance
   a.(1,102,000 gal./yr.)($0.12/gal.) = $132,200/yr.

3. Septage Hauling Costs Without Permit Fees
   a. Per 1,000 gal. = $ 75
   b. Per year (1989 = 1,102,000 gal.) = 82,700/yr.

4. Leasing Doane Property for Treatment Facility and Lagoons = $ 5,000/yr.

5. Total Cost Per Year = $280,900/yr.

6. Cost Per 1,000 Gal. (1989 = 1,102,000 gal.) = $ 255

ALTERNATIVE 4: SEPTAGE DEWATERING AND COMPOSTING

-- Filtrate to existing lagoons
-- From pump-out records April 1989 Qmax. day = 4,712 gal./day
-- Design Flow: Qdes = 5,000 gal./day

1.	Capital Cost		
	a. Facility and equipment: Storage tank, grinder, polymer addition, screw press, and aeration tank	=	$150,000
	b. Upper and lower lagoon improvements without attendant, includes engineering and contingencies	=	$ 98,400
	SUBTOTAL		$248,400
	c. Capital cost amortization n = 20 yrs., i = 8%, A/P = 0.10185	=	$ 25,300/yr.
2.	Operation and Maintenance (Including labor) (1,102,000 gal./yr.)($50/1,000 gal.) (1,000 gal.)	=	$ 55,100/yr.
3.	Cleaning of Upper and Lower Lagoons (avg. year basis)	=	$ 6,000/yr.
4.	Septage Hauling Costs Without Permit Fees		
	a. Per 1,000 gal.	=	$ 75
	b. Per year (1989 = 1,102,000 gal.)	=	$ 82,700/yr.
5.	Leasing Doane Property for Operations and Lagoons	=	$ 5,000/yr.
6.	Total Cost Per Year	=	$174,100/yr.
7.	Cost Per 1,000 Gal. (1989 = 1,102,000 gal.)	=	$ 158

TABLE NO. E-2

COST SUMMARY
SEPTAGE DISPOSAL ALTERNATIVES
ESSEX, CT

October 2, 1990

ALTERNATIVE	DESCRIPTION	CAPITAL COST	O&M COST PER YEAR	TOTAL COST PER YEAR (1)	COST PER 1,000 GAL (2) DISPOSAL	HAULING	TOTAL
1	Continued use of lagoons						
	A. With attendant	$102,600	$118,300	$128,700	42	75	117
	B. Without attendant	$ 98,400	$106,800	$116,800	31	75	106
2	Disposal out of town	----	----	$192,900	30	145	175
3	Solar aquatic septage treatment	$598,400	$219,900	$280,900	180	75	255
4	Septage dewatering and composting	$248,400	$148,800	$174,100	83	75	158

NOTE:
(1) Includes O&M cost plus capital cost amortized over 20 years at 8% interest.
(2) Based on 1989 pump-out records, total flow = 1,102,000 gal.

1003B90REM1

M E M O R A N D U M

TO: CORR. FILE 88-57, ESSEX/WASTEWATER MANAGEMENT STUDY

FROM: RAY MYETTE, ENVIRONMENTAL ENGINEER

DATE: SEPTEMBER 12, 1990

RE: ESSEX SEPTAGE DISPOSAL FACILITY
OPERATION AND MANAGEMENT PLAN

A. OPERATIONAL REQUIREMENTS

The following requirements should be satisfied in order to insure the septage disposal facility will be operated in a manner which minimizes nuisance conditions and public health problems.

1. Instruct septage haulers on the proper use of the septage disposal facility.

2. Sludge accumulation in the lagoons should be periodically monitored by measuring the depth of sludge. When the depth of sludge build-up becomes excessive and severely restricts infiltration, the lagoons should be cleaned. Based on past performance it is expected that the lagoons will require cleaning approximately every two years.

   Cleaning of lagoons should be accomplished by removing sludge from the lagoons as needed and either disposing of the sludge off site or stockpiling it in the designated area. The lagoon bottoms shall be restored by removing clogged soil and placing 6"-12" of clean medium sand following cleaning.

   This should become a regular line item in the Town's budget and will likely require competitive bidding for selection of a contractor to perform the work.

3. Water quality monitoring should be done on a regular basis and should consist of sampling the underdrain surface discharge and ground-water standpipes downgradient of the lagoons twice a year. The water samples should be tested for the following parameters:

pH
Specific Conductance
Chloride
Sodium
Nitrate as Nitrogen
Ammonia as Nitrogen
Total Kjeldahl Nitrogen
Ortho Phosphorus
Surfactants/Detergents
Fecal Coliform

4. Freeboard available in each lagoon should be monitored using graduated depth gauges. The freeboard in each lagoon can be used as an indicator of lagoon performance if the volume of septage entering the lagoon is known. The liquid depth in all lagoons should be recorded weekly. Which lagoons are in use and an inventory of hydrated lime should also be recorded regularly.

5. Restrict use of lagoons to septage only, with no oil or industrial waste being accepted. All septic tanks pumped more often than once a year, except grease traps, should be referred to the Essex Department of Health for inspection as to the adequacy of the building's subsurface sewage disposal system. Grease traps shall be pumped no more often than as scheduled, in writing, by the Essex Director of Health or the adequacy of the system shall be investigated.

   Raw sewage will not be permitted to be disposed of at the septage lagoons. Sewage must be taken to an alternative, properly-licensed disposal site (e.g., Mattabassett or East Hampton wastewater treatment facilities).

6. All septage hauling trucks are to be equipped for a vertical discharge into the primary lagoon receiving manhole. Trucks shall be maintained in a clean manner, pursuant to Section 19-13-B103c of the Connecticut Public Health Code. All trucks shall be equipped with a sight gauge which accurately indicates the volume being discharged.

7. The primary lagoon pH should be maintained between the levels of 6.8-7.2 in order to control odor and to promote further anaerobic digestion of the solids. The pH should be adjusted by the use of hydrated lime and may be determined by narrow range pH paper 6-8 with 0.2 increments. The

7. (cont'd) hauler shall be responsible for placing half an 80-lb. bag of hydrated lime in the receiving manhole prior to discharging each load of septage. The hydrated lime will be supplied by the Town.

8. Discharge of primary lagoon supernatant to the secondary lagoons will be controlled by use of a decanting outlet structure to minimize carry over of suspended solids.

9. The septage disposal facility shall be maintained in a clean and neat manner. Brush and weeds growing between and adjacent to the lagoons should be cut down periodically. A general clean-up of the facility should periodically be done including removing any trash from the grounds.

10. Pump out discharge permits for the septage disposal facility shall be used in order to monitor septage generation volumes. Records of all septage and sewage hauled out of town shall be submitted to the Essex WPCA for informational purposes. These records must be compiled monthly and submitted to the DEP, with copies to the WPCA and Health Department.

B. FACILITY IMPROVEMENTS

Several modifications can be made to the existing septage disposal facility in order to improve the effectiveness of the lagoons. Typically these improvements will increase control of the septage drop off process as well as provide better treatment of the septage.

The facility improvements are shown on the attached plans and generally include:

1. A chain link fence around the lagoons, including two gates, to control entry. In addition, bar gates should be installed to prohibit truck access from undesired locations. Posting a sign at the entrance road gate to identify the facility as the "Town of Essex Septage Disposal Facility." This sign should include the hours of operation and should clearly state that a permit is required to use the facility. In addition, signs should be posted at the upper and lower lagoons near the receiving areas. These signs should clearly state that discharge is only allowed at the receiving area and that the addition of hydrated lime is required for each truckload of septage discharged.

2. Grading the receiving area to facilitate complete draining of the septage hauling trucks.

3. Building up the berms of the lagoons such that the combined slope of the inside and outside bank is equal to or greater than 5:1.

4. Constructing a septage receiving splash pad at the upper primary lagoon to discharge septage into the lagoon.

5. Constructing storage sheds for bagged lime near the primary lagoon receiving areas.

6. A decanting outlet structure and platform shall be installed as the primary lagoon discharge for the upper and lower lagoons. The upper lagoons will be interconnected using baffled pipes. Graduated depth gauges will be installed on all lagoons to monitor freeboard.

7. Surface drainage swale shall be constructed up gradient of lagoons to prevent surface water run-off from entering the lagoons.

C. MANAGEMENT

Currently the Town's septage facility management program consists of using pump-out permit forms and controlling access to the facility.

The success of the Essex septage disposal facility can be enhanced by establishing, delegating, and identifying responsible parties for the necessary operations.

/gp

Enclosure

88-57/Corr.

TABLE NO. 1

SEPTAGE DISPOSAL FACILITY OPERATIONS AND RESPONSIBILITIES
OPERATION AND MANAGEMENT PLAN
ESSEX, CONNECTICUT #88-57
ROUTE 154

SEPTEMBER 12, 1990

	OPERATION		RESPONSIBLE PARTY
1.	Instruct septage haulers on the proper use of the septage disposal facility.	--	W.P.C.A. Chairman.
2.	Periodically recording depth of sludge.	--	(1)
3.	Weekly recording of freeboard available in each lagoon and the liquid depth using depth gauges.	--	(1)
4.	Regularly recording which lagoons are in use and inventory of hydrated lime.	--	(1)
5.	Biannual water quality monitoring of underdrain discharge and ground-water standpipes.	--	(1)
6.	Determine when lagoons should be cleaned.	--	Currently performed by Essex W.P.C.A.
7.	Inspect adequacy of subsurface disposal systems experiencing high frequency of pump outs.	--	Being completed by Town Sanitarian to some extent. Regular reports to W.P.C.A. desired.
8.	Check each truck load for completeness of permit, presence of oil or industrial waste, and verify volume being discharged.	--	(1)
9.	Checking pH of lagoons.	--	(1)
10.	Periodically cutting brush and weeds near lagoons and generally maintaining a clean facility.	--	(1)
11.	Compile monthly pumpout volumes using discharge permits.	--	Being done by Health Dept. Secretary.
12.	Compile monthly records of all septage and sewage hauled out of Essex and submit to D.E.P., Essex W.P.C.A., and the Town Health Dept.	--	(1)

NOTE:

(1) Responsible party is not presently identified.

0913A90REM1

APPENDIX F

AQUIFER DELINEATION MEMORANDUM

M E M O R A N D U M

DATE: January 9, 1991

TO: File, Essex Wastewater Management Study, 88-57

FROM: Ray Myette, Environmental Engineer

RE: Process of Identifying "Significant Aquifers" in Essex

This memo is intended to summarize the process by which significant aquifers were identified in Essex. For the purposes of this analysis, significant aquifers are defined as stratified drift aquifers capable of providing a minimum well yield of 50 gal/min.

The following references were used in this analysis:

1. Water Resources Inventory of Connecticut, Part 10, Lower Connecticut River Basin. Prepared by U.S.G.S. in cooperation with the Conn. DEP.
   Connecticut Water Resources Bulletin No. 31, 1982.

2. Guidelines for mapping stratified drift aquifers to level B standards.
   Prepared by Conn. DEP Water Compliance Unit March 29, 1989.

3. Report of the Aquifer Protection Task Force, February 15, 1989.

Three maps were produced to illustrate the data gathered during this process.

The first map produced is essentially an enlargement of Plate B in Bulletin No. 31. From Plate B, "A Geohydrologic Map of the Lower Conn. River Basin", the following information was reproduced at a scale of 1" = 800' for the Town of Essex.

1. Coarse - grained stratified drift areas
2. Fine-grained stratified drift areas
3. Coarse-grained stratified drift overlying fine-grained stratified drift areas
4. Lines of equal saturated thickness of stratified drift material

The second map prepared, "Transmissivity Isopleths", is a vellum overlay of Plate B and includes the following information.

1. Wells tapping stratified drift

   - Some of these data points contained transmissivity values calculated by the U.S.G.S. from adjusted specific capacities.

2. Test holes tapping stratified drift

   - Some of these data points contained transmissivity values calculated by the U.S.G.S. from median grain size and sorting relationships.

   The locations of all wells and test holes were taken from Plate A in Bulletin No. 31, "Collection Sites For Water Resources Data in the Lower Conn. River Basin".

3. For each well and test hole an independent estimation of transmissivity was made using drilling logs from Tables 1, 2 and 3 of Bulletin No. 31. Additional well drilling logs were obtained from the State Well Drilling Board to verify depth to bedrock and ground water in the stratified drift areas. Transmissivity values were computed using a saturated thickness and estimated hydraulic conductivity for each saturated soil strata. An average transmissivity value was computed for each data point.

4. Using the estimated transmissivity data points lines of equal transmissivity of stratified drift were plotted.

Map number three "Stratified Drift Aquifers" is also a vellum overlay of Plate B. Essentially this map illustrates the estimated limits of stratified drift aquifers capable of providing well yields of 50, 100 and 250 gal/min.

For the purposes of this analysis 50% of the saturated thickness was used as the available well screen length (versus 36% typically used for well construction). The increased screen length serves to account for seasonal variations in the ground water table. Therefore a conservative 50% of the saturated thickness (vs. 64%) is available for aquifer drawdown.

Using typical stratified drift saturated thicknesses, from Plate B, the available aquifer drawdown was computed for each thickness. (See attached comp. sheet No. 1, dated 11/8/90). The various computed aquifer drawdowns were taken in conjunction with a single well yield (50, 100 or 250 gal/min) in order to obtain an estimate of the minimum transmissivities required to provide the chosen yield. This was accomplished by utilizing Bulletin No. 31, Fig. 29 "Relation Between Aquifer Drawdown and Well Discharge in Screened wells" (see copy attached).

On map number three, the limits of stratified drift aquifers, providing 50, 100 and 250 gal/min were delineated using the plotted saturated thickness and transmissivity isopleths as well as the minimum required transmissivities. The direct and indirect aquifer recharge boundaries were also plotted on this map.

As part of this analysis, level 'B' mapping produced by the Conn. Water Co. was obtained. The mapping which covers Essex includes a plot of the direct and indirect recharge areas, and the initial set back area for the Dennison Road Well. The area designated by Conn. Water Co. is a small percentage of the total aquifer and direct recharge areas in Essex. In general, the information obtained from this analysis corresponds with the Conn. Water Co. level B mapping.

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO
REM	11/8/90			88-57

ESSEX - AQUIFER PROTECTION STUDY

SHEET NO. 1 of

ESTIMATE TRANSMISSIVITIES REQUIRED TO PROVIDE 50 GPM, 100 GPM & 250 GPM

FOR PURPOSES OF THIS ANALYSIS USE 50% OF SATURATED THICKNESS AS SCREEN DEPTH. (VS) 30% USUALLY USED FOR WELL CONSTRUCTION. THIS INCREASED SCREEN DEPTH IS TO ACCOUNT FOR SEASONAL VARIATIONS IN THE GROUNDWATER TABLE.

THEREFORE 50% OF THE SATURATED THICKNESS IS AVAILABLE FOR AQUIFER DRAWDOWN

TRANSMISSIVITIES ARE FROM FIG. 29 p40 USGS BULLETIN NO. 31

SAT. THICKNESS (b) FT	AVAILABLE AQUIFER DRAWDOWN (S) FT	Q = 50 GPM TRANSMISSIVITY REQUIRED (T) FT²/D	Q = 100 GPM	Q = 250 GPM
10	5	≥ 3,000 ±	≥ 6,000 ±	≥ 14,000 ±
20	10	≥ 1,200 ±	≥ 4,000 ±	≥ 9,000 ±
30	15	≥ 900 ±	≥ 3,000 ±	≥ 6,500 ±
40	20	≥ 800 ±	≥ 1,600 ±	≥ 4,500 ±
60	30	≥ 650 ±	≥ 1,200 ±	≥ 3,200 ±
50	40	≥ 500 ±	≥ 1,000 ±	≥ 2,500 ±
120	60	≥ 500 ±	≥ 900 ±	≥ 2,000 ±
			≥ 800 ±	≥ 1,750 ±
			≥ 700 ±	≥ 1,500 ±
			≥ 700 ±	≥ 1,000 ±

SAT. THICKNESS (b) FT	AVAILABLE AQUIFER DRAWDOWN (S) FT
10	5
20	10
30	15
40	20
60	30
50	40
120	60
10	5
15	7.5
20	10
30	15
40	20
50	25
60	30
70	35
80	40
120	60
10	5
15	7.5
20	10
30	15
40	20
50	25
60	30
70	35
80	40
120	60

FO - # 110

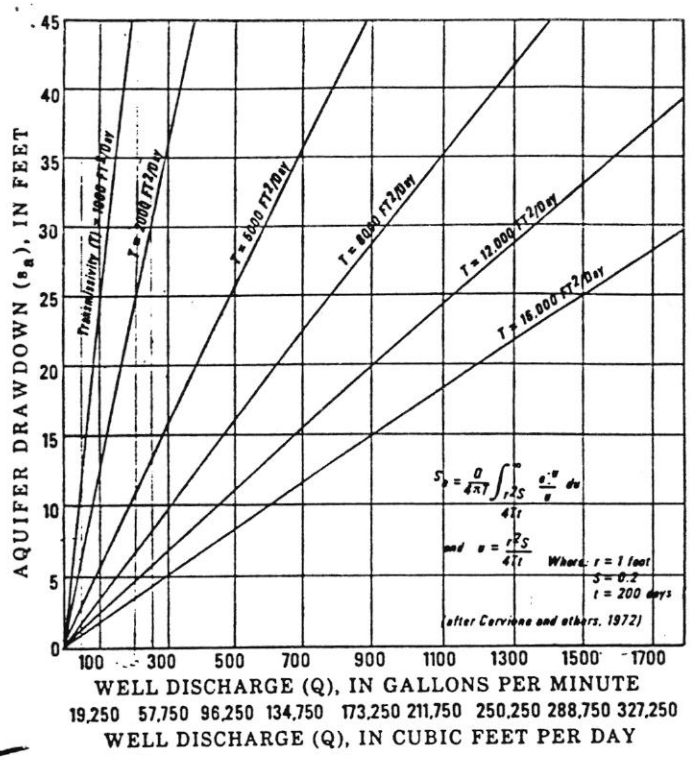


Figure 29.--Relation between aquifer drawdown and well discharge in screened wells

Impermeable-barrier and line-source boundaries limit the hydraulic continuity of an aquifer. Figures 25 and 26 illustrate how boundary conditions are equated to a system of infinite areal extent by use of recharging and discharging image wells. Different configurations of boundaries and pumping wells can also be made hydraulically equivalent to an aquifer of infinite areal extent by use of arrays of image wells (Ferris and others, 1962, p. 144). The drawdown (s_b) or buildup (s_r) of the water table produced by the resulting image wells can be estimated from figure 30 or calculated by the Theis equation.

The drawdown in a well can be approximately adjusted for dewatering the aquifer by the following equation (Jacob, 1944; Walton, 1962, p. 7):

$$s' = s - (s^2/2b)$$

Where

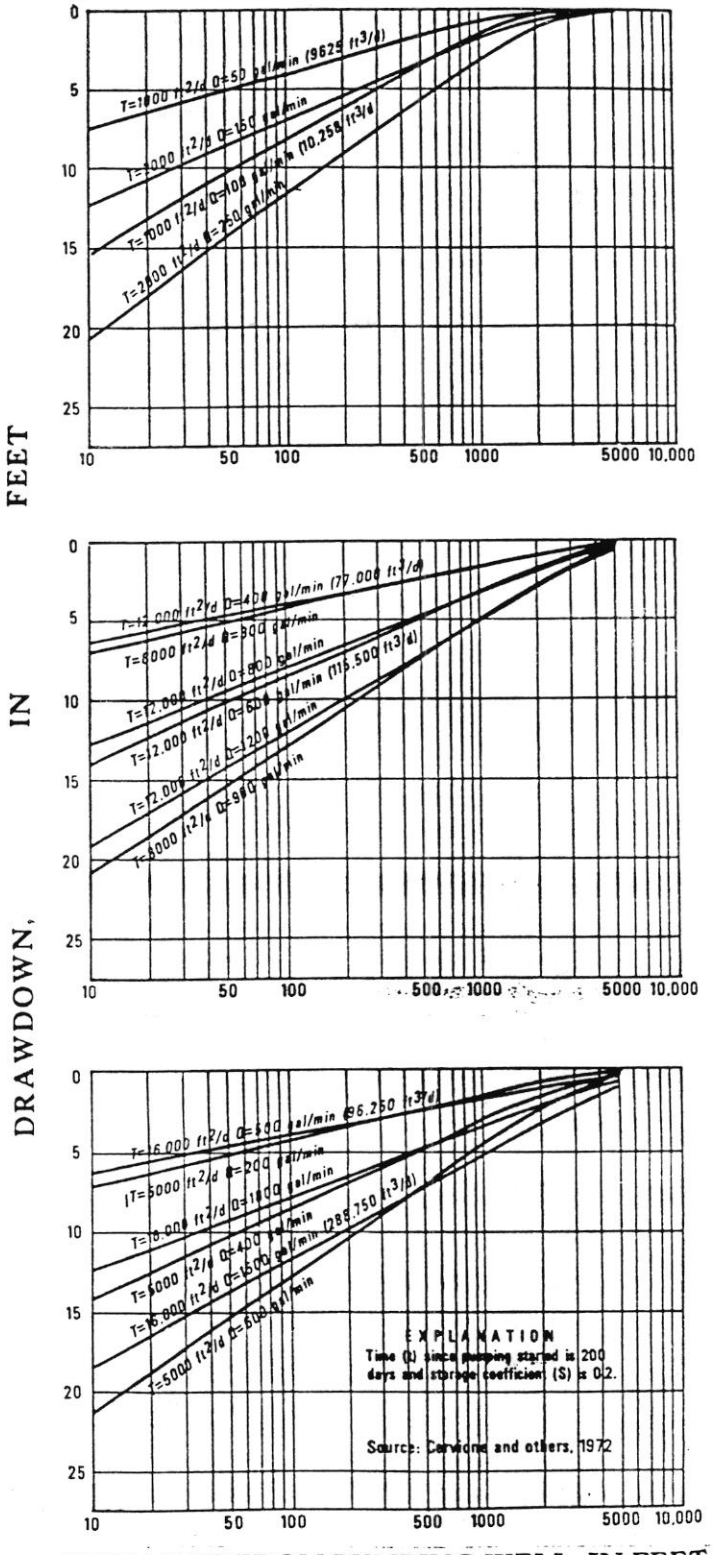
s' = the drawdown, in feet, that would occur if the saturated thickness of the aquifer did not decrease (equal to s_a as previously defined),

s = observed drawdown, in feet, under water-table conditions (equal to $s_a + s_d$, as previously defined), and

b = initial saturated thickness of the aquifer, in feet.

The drawdown due to dewatering, s_d, is equal to s - s' in the preceding equation. Figure 31 is a graph that can be used to quickly find the additional drawdown due to the effects of dewatering the aquifer; it relates values of s_d to values of s_a for representative saturated thicknesses ranging from 20 to 120 feet.

A correction for partial penetration is also needed because most wells in stratified drift are



DISTANCE FROM PUMPING WELL, IN FEET

Figure 30.--Distance-drawdown curves for selected values of transmissivity (T) and pumping rates (Q)

	DATA POINT NO.	TRANSMISSIVITY (FT^2/Day) (1) U.S.G.S.	(2) FUSS & O'NEILL
WATER WELLS	90	3200	300
	91	250	400
	92	3800	6200
	100	1200	4700
	101	NC	6000
	116	3900	5400
	117	4200	4300
	114	NC	5000
	*264	NC	700
	267	NC	3000
TEST HOLES	1	NC	150
	3	NC	150
	12	2000	1400
	13	NC	700
	15	NC	300
	*16	NC	250
	18	NC	2000
	19	NC	800
	*20	NC	2400
	20	NC	100
	*21	NC	1500
	21	NC	5300
	*22	4300	4400
	22	2500	3700
	23	2800	600
	24	NC	5700
	25	NC	3900
	26	NC	1000
	*27	NC	3500
	29	NC	380
	*30	NC	3100
	30	NC	3600
	31	NC	4100
	32	NC	700
	35	700	1100
	36	NC	1300
	37	500	700
	38	NC	1300
	39	NC	300
	40	NC	1000
	41	NC	800
	42	NC	2700
	43	NC	1300
	*44	NC	1100
	44	1800	1700
	*45	NC	700
	45	NC	6200
	*46	1200	1800
	46	NC	6800
	47	NC	5200
	49	4400	4400
	50	NC	1400
	53	NC	50
	55	NC	3100
	56	NC	5700
	57	4000	3600
	58	NC	400
	59	NC	1000
	60	NC	200

NOTE:
NC Not calculated

1. Transmissivity calculated by United States Geological Survey from adjusted specific capacity for water wells and from median grain size and sorting relationships for test holes.

2. Transmissivity estimated by Fuss & O'Neill, Inc. from drilling logs for water wells and test holes.

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APPENDIX G

LAND USE SURVEY - AQUIFER AREAS

* ACTIVITY OF CONCERN

ESSEX

NON-RESIDENTIAL LAND USE SUMMARY - DRAFT
ANNUAL SUMMARY JULY 1991

	Name of Business		Type of Activity
1.	HIGHLANDER LAUNDROMAT	*	LAUNDROMAT
	ESSEX PLAZA BEAUTY SALON	*	BEAUTY SALON
	CLARKE CYCLES		BICYCLE SHOP
	DIVERS COVE		SCUBA DIVING SHOP
	VISITING NURSES		NURSES' OFFICE
	MITCHELL REAL ESTATE		REAL ESTATE OFFICE
2.	L.C. DOANE CO.	*	LIGHTING MANUFACTURER
3.	SUNOCO GAS STATION	*	GASOLINE STATION
4.	ESSEX SASH & DOOR CO.		WINDOW & DOOR RETAILER
5.	E.E DICKENSON CO.	*	WITCHHAZEL DISTILLERY
6.	TOWER LABORATORIES	*	PHARMACEUTICAL MANUFACTURER
7.	ESSEX EMPORIUM CARVED SIGNS		SIGN MANUFACTURER
8.	CENTERBROOK POST OFFICE		POST OFFICE
9.	TRINITY LUTHERAN CHURCH		CHURCH
10.	HILLIARS FOREIGN MOTORS & TIRE SERVICE	*	AUTOMOTIVE GARAGE
11.	ENERSAVE HEATING		HEATING CONTRACTOR
12.	CENTERBROOK ARCHITECTS		OFFICE
	THILLS ANTIQUES		RETAIL
	CONTRACT ART INC.		OFFICE
	HUDSON & KILBY ATTORNEYS		OFFICE
	ESSEX THERAPEUTIC MASSAGE		OFFICE
13.	SCOTT NELSON CPA		OFFICE
14.	COASTAL SAVINGS BANK		BANK
15.	CBT		BANK
	ESSEX HARDWARE		RETAIL
	FLOWER SHOP		RETAIL
16.	DR. RESMER	*	DENTIST
	DR. BUENER		PODIATRIST
17.	PSYCHOTHERAPY CENTER OF ESSEX		OFFICE
18.	FINE BOUCHE RESTAURANT & CATERING		RESTAURANT
19.	GULF STATION	*	GASOLINE STATION
20.	ESSEX HOUSE OF FRAMING		RETAIL
21.	SPENCERS CORNER		OFFICE/RETAIL
22.	ESSEX ELEMENTARY SCHOOL		SCHOOL
23.	BP GAS	*	GASOLINE STATION
24.	PIZZA PUB LTD.		RESTAURANT
25.	FRANKS BEAUTY SALON	*	BEAUTY SALON
26.	SANFORD F. HALL AGENCY		INSURANCE AGENCY
27.	BENNIES FARM MARKET		GROCERY STORE

REM0812A91\8857
Corres.

* ACTIVITY OF CONCERN

ESSEX

NON-RESIDENTIAL LAND USE SUMMARY - DRAFT
ANNUAL SUMMARY JULY 1991

	Name of Business		Type of Activity
28.	DR. RICHMOND	*	DENTIST
	DR. REYNOLDS	*	DENTIST
29.	ESSEX COURT		ELDERLY HOUSING
30.	SEAWORTHY SYSTEMS INC.		OFFICE
31.	DISTINCTIVE KITCHEN DESIGNS		OFFICE
	L'INGENUE DRESSES		RETAIL
	LUELLEN CATERING		CATERING SERVICE
	DANIELS OIL		OFFICE
32.	PENFIELD PLACE		OFFICE SPACE
33.	METCO. INC.	*	INDUSTRIAL
	ADVANCED HEATING RESOURCES	*	INDUSTRIAL
	BERKSHIRE PETROLEUM	*	FUEL OIL DISTRIBUTOR
	APCO PRODUCTS	*	INDUSTRIAL
	COOPERMAN FIFE & DRUM CO.		FIFE AND DRUM MANUFACTURER
	MAINTENANCE GARAGE	*	INDUSTRIAL
34.	ROBINSON, WRIGHT & WAGNER		FUNERAL HOME
35.	ESSEX AMBULANCE ASSOC.		AMBULANCE CO.
36.	SNET		TELEPHONE CO. OFFICE
37.	McCULLEY & MONAHAN		OFFICE
	ESSEX CREDIT CO.		OFFICE
	ATTORNEYS OFFICE		OFFICE
38.	DOANES PHARMACY		PHARMACY
	DEBBIES RESTAURANT		RESTAURANT
	CORILLOS PACKAGE STORE		LIQUOR STORE
	MEDICAL EQUIPMENT OF CENTERBROOK		RETAIL
39.	REAL ESTATE OFFICE		OFFICE
40.	ESSEX PROFESSIONAL BUILDING		OFFICE
41.	HAIRTIQUE	*	HAIR SALON
42.	OFFICE BUILDING		OFFICE
43.	CHILDRENS HOUSE DAYCARE		CHILDCARE CENTER
44.	VALTEC AIRCRAFT SUPPLY		AIRCRAFT PARTS DISTRIBUTOR
45.	DEEP RIVER TOOL & DIE,	*	MACHINE SHOP
	LEATHERMAN FACTORY OUTLET		RETAIL
46.	RUDY'S BATTERY SERVICE	*	BATTERY AND RADIATOR RETAILER (OUT OF BUSINESS)
47.	E.E. DICKENSON CO.	*	WITCHHAZEL DISTILLERY
48.	SOUND RIGGING SERVICES		BOAT RIGGING COMPANY
49.	CREATIVE CRAFTS INC.		OFFICE/WAREHOUSE
50.	SPORTECH GOLF		COMPUTER MANUFACTURER
	ESSEX INTERIORS		INTERIOR DESIGN OFFICE
51.	CMTA - CONN. MARINE TRADES ASSOC.		OFFICE

REM0812A91\8857
Corres.

* ACTIVITY OF CONCERN

ESSEX

NON-RESIDENTIAL LAND USE SUMMARY - DRAFT
ANNUAL SUMMARY JULY 1991

	Name of Business		Type of Activity
52.	RIVERSIDE PRESS	*	PRINTING SHOP
53.	ZINGERS RESTAURANT		RESTAURANT
54.	DELA TRON INC.		ELECTRONIC ASSEMBLY
55.	BRASSWARE HOUSE LIGHTING		LIGHTING STORE
56.	ESSEX SAVINGS BANK		BANK
57.	PERKINS OIL		OIL CO. OFFICE
58.	ESSEX HOUSE LTD. INVESTMENTS		OFFICE
59.	ESSEX DETAILING AND AUTO RECONDITIONING	*	AUTOMOTIVE RECONDITIONING
60.	ESSEX RACING CO.		COMMERCIAL BUSINESS
61.	L.C. DOANE CO.		OFFICE
62.	PRECAST CONCRETE CO.		PRECAST CONCRETE MANU.
63.	R&M PROVISIONS		MEAT DISTRIBUTORS
64.	VALLEY RAILROAD	*	STEAM TRAIN YARD
65.	SULLIVAN PAVING CO. INC.		PAVING CO. OFFICE
66.	BLU-RAY INCORPORATED	*	BLUEPRINT MACHINE MANU.
67.	STRUCTURAL GRAPHICS		3-D ADVERTISING MANUFACTURER
68.	ESSEX AUTO WASH	*	CAR WASH
69.	ESSEX LEASING INC.		OFFICE
70.	CITCO GAS STATION	*	GASOLINE STATION
71.	UNDERWATER CONSTRUCTION CO.		CONSTRUCTION CO. OFFICE
72.	RITTENHOUSE PAPER CO. INC.		PAPER ROLL MANUFACTURER
73.	KAUFMAN AGENCY REAL ESTATE		REAL ESTATE AGENCY
74.	CENTRAL BURYING GROUNDS ASSOC.		CEMETERY
75.	OLIN SKI CO.		WAREHOUSE
76.	OFFICE		OFFICE BUILDING
77.	ESSEX PRODUCTS GROUP		MACHINE ASSEMBLY
78.	ESSEX PLUMBING CO.		PLUMBING CO. OFFICE
	ACE HEATING & AIR CONDITIONING		HVAC CO. OFFICE
79.	RADCLIFFE ENGINEERING		OFFICE
80.	MEADOWBROOK REST HOME		REST HOME
81.	OLIVERS RESTAURANT		RESTAURANT
	SOBER CAMEL SHOP		RETAIL
	DR. ANGELOFF		PSYCHOTHERAPIST
	DR. SHOEMAKER		PSYCHOTHERAPIST
	HEADQUARTERS OF ESSEX	*	HAIR STUDIO
	THE KITCHEN LOFT		RETAIL
	NAILS BY GINA		NAIL STUDIO
	PINCHPENNY GALLERY		ART GALLERY
	PORTFOLIO MANAGEMENT		OFFICE
	PREFERRED TRAVEL		TRAVEL AGENCY

REM0812A91\8857
Corres.

* ACTIVITY OF CONCERN

ESSEX

NON-RESIDENTIAL LAND USE SUMMARY - DRAFT
ANNUAL SUMMARY JULY 1991

	Name of Business		Type of Activity
82.	IGA COLONIAL MARKET		GROCERY STORE
	BROOKS DRUG STORE		DRUG STORE
	HONG KONG KITCHEN		RESTAURANT
	RACEWAY CO.		SLOT CAR ARCADE
	VALLEY SHORE VIDEO		VIDEO STORE
	CT NATIONAL BANK		BANK
	EURO CLEANERS	*	DRY CLEANER
	THE MAIL MALL		PACKAGE SHIPPING CO.
	A&A AUTO PARTS		AUTO PARTS STORE
83.	MIDDLESEX MEDICAL CENTER - SHORELINE CLINIC		MEDICAL CENTER
84.	ESSEX MEADOWS		NURSING HOME
85.	TOWN & COUNTRY AUTO	*	AUTOMOTIVE DEALER, AUTO BODY SHOP AND MAINTENANCE GARAGE

REM0812A91\8857
Corres.

APPENDIX H

SUGGESTED LIST OF PROHIBITED USES IN AQUIFER PROTECTION ZONES

Suggested list of prohibited uses in Aquifer Protection Zones:

Hazardous Waste Treatment, Storage, or Disposal Facilities (TSDF)
Sanitary Landfills and Solid Waste Transfer Stations
Recycling Facilities
Septage Disposal Sites
Junk or Salvage Yards
Road Salt Storage or Loading Areas
Oil, Gas or Hazardous Materials Pipelines
Cemeteries
Transportation Facilities with More than 10 vehicles
Gasoline Stations or Car Washes
Auto Repair or Body Shops
Automobile Dealerships
Dry Cleaning and Dyeing Services
Lawn Care Services
Photo Processors
Beauty Salons
Furniture Strippers

Heavy Industry such as:

- Metal Forming and/or Finishing
- Chemical Manufacturing
- Paint and ink Manufacturing
- Electric Power Generation
- Paper and Textile Mills
- Timber Products Processing and Manufacturing
- Printing and Publishing
- Rubber Processing
- Petroleum and Plastics Processing
- Battery Manufacturing
- Explosives Manufacturing
- Adhesives and Sealants
- Leather Tanning and Finishing
- Cleaning Products Manufacturing
- Food Processing

Activities:

Underground storage of fuel or any other chemicals
Agriculture that does not employ best management practices for application of pesticides and fertilizers and management of animal wastes

Outside storage of:

Sodium Chloride
Pesticides
Fertilizers and Animal Wastes
Fuel/Petroleum Products, Constituents, and By-products
Solvents or Chlorinated Hydrocarbons
PCBs
Phenols and Creosotes
Metals
Acids
Alkalies
Cyanides
Alcohols
Pharmaceutical Chemicals
Hazardous Materials
Organic/Inorganic Chemicals

APPENDIX I

WATER RESOURCES DISTRICTS - SECTION 104
ESSEX ZONING REGULATIONS (AMENDED TO JANUARY 1, 1989)

SECTION 104
WATER RESOURCE DISTRICTS

104A. PURPOSE. The purpose of the Water Resource Districts is to protect public health by preventing contamination of the ground and surface water resources provideing water supply for the Town of Essex.

104B. ESTABLISHMENT OF DISTRICTS. The Water Resource Districts are herein established as overlay districts. Water Resource District I includes the cones of depression of public water supply wells and upgradient area. Water Resource District II includes surrounding stratified drift material and surrounding till or bedrock material to the boundary of the watershed for that cone of depression, as determined by applicable U.S.G.S. studies for the Essex Quadrangle and modified by the Essex Zoning Commission. Water Resource Districts I and II are outlined on the map entitled "Town of Essex, Water Resource Districts," appended to these Zoning Regulations and on file with the Town Clerk, the Building Inspector, and the Zoning Office.

104C. DEFINITIONS.

104C.1. "Hazardous materials" means any substance or combination of substances which, because of quantity, concentration or physical, chemical, or infectious characteristics, pose a significant present or potential hazard to water supplies or to human health if disposed into or on any land or water in this town. Any substance deemed a "hazardous waste" under Section 3001 of the Resource Conservation and Recovery Act of 1976, 40 C.F.R. Part 261 (copy available in the Essex Zoning Office), shall also be deemed a hazardous material for purposes of these regulations.

104C.2. "Impervious" means impenetrable by surface water.

104C.3. "Recharge area" means the drainage area of the topographical basin of any cone of depression of a town/public water supply system. The boundary of the recharge area shall be the topographical divide of the basin containing the existing or potential well.

104D. USE REGULATIONS. Within the Water Resource Districts the requirements of the underlying Zoning Districts continue to apply, except that uses are prohibited where indicated by an "N" in the use schedules set forth in 104D.1. 2. and 3. and require a Special Exception where indicated by an "SE", even where

underlying Zoning District requirements are more permissive. Where there is no entry in these schedules, the underlying Zoning District controls.

104D.1. Principal Uses	WR I	WR II
Manufacture, use, storage, or dispersal of hazardous materials as a principal activity;	N	N
Sanitary landfill, junkyard, salvage yard, road salt stockpile, truck terminal with more than 12 trucks;	N	N
Gasoline station, car wash, auto repair or auto body shop.	N	N
104D.2. Accessory Uses		
Underground storage of hazardous materials, fuel, oil, or gasoline:	N	N
Hazardous materials storage, above ground, in quantities greater than associated with normal household use, other than fuel oil for a residential or commercial structure;	SE	SE
Parking area with more than 200 spaces;	N	SE
Any use generating hazardous wastes in quantities greater than associated with normal household use.	SE	SE
104D.3. Other Uses		
Rendering impervious more than 30% of total lot area, regardless of size;	N	SE
Any use retaining less than 30% of total lot area in a natural vegetative state with more than a minor removal of existing trees and vegetation;	N	SE
Any use, other than a single family dwelling, having an estimated sewage flow greater than 1,500 gpd, regardless of lot size.	SE	SE

104E. APPLYING FOR A SPECIAL EXCEPTION UNDER THIS SECTION.

Section 120A. B. C.9. F. H. I. J. K. L. M. N. O. P. shall apply,

and the information listed below shall be submitted.

(1) A complete list shall be provided of all potentially hazardous materials to be used or stored on the premises in quantities greater than that associated with normal household use; a description of the measures proposed to protect all storage containers or facilities from vandalism, corrosion, and leakage, and to provide for control of spills shall also be submitted.

(2) A description shall be provided of any potentially hazardous wastes to be generated, including storage and disposal methods, as in (1) above.

(3) For aboveground storage of hazardous materials, other than fuel oil for a residential or commercial structure, evidence shall be submitted of the professional design and the installation of such storage facilities and/or containers.

(4) For runoff from impervious surfaces greater than 30% of the total lot area, evidence shall be provided that such runoff will be recharged on-site and diverted toward areas covered with vegetation for surface infiltration to the maximum extent possible. Dry wells shall be used only where other methods are not feasible and shall be preceded by oil, grease, and sediment traps to facilitate removal of contaminants.

(5) For on-site disposal of domestic wastewater, other than from a single family dwelling, with an estimated sewage flow of greater than 1,500 gpd, evidence shall be submitted of professional supervision of design and installation, including an assessment of nitrate or coliform bacteria impact on groundwater quality.

104F. NONCONFORMING USES. Nonconforming uses in the Water Resource Districts shall be regulated as per Section 50 of these Zoning Regulations.

APPENDIX J

GROUNDWATER RIGHTS CONCEPT

1992 Public Presentation of Essex Village Area Groundwater Rights Concept

Groundwater quality in the Essex Village area is currently classified by the Connecticut Department of Environmental Protection (DEP) as GA which means that it should be suitable for drinking water. The surface water quality in the Connecticut River and coves surrounding Essex Village are Class B which means that they should be fishable and swimmable, but not suitable for drinking water without treatment. Data gathered as part of the wastewater management study shows that groundwater in the Village Area has been impacted by human activity (i.e. septic systems) and no longer meets the Class GA standard. The DEP has indicated that they want the groundwater cleaned up with the goal of returning it to drinking water quality.

To return the groundwater to drinking water quality (IF it is even possible) would require that septic systems could no longer be used in Essex Village. Therefore the entire Village would have to be sewered and a treatment plant be built. An alternative solution could be to improve the performance of existing septic systems by increased on-site management (including septic system repairs where needed) and a community disposal system for a limited number of smaller properties. This innovative approach would likely only meet Class B standards. In order for such a solution to be considered by DEP, the Town or a special wastewater management district would have to control the groundwater "plume" until it is discharged to a water body with a B classification (i.e. the Connecticut River and its coves).

In order to control the plume, the Town would need to obtain the groundwater rights for all properties on Essex Village through legal agreements with each property owner. The property owner would need to agree to let the Town or wastewater management district use the groundwater. This would not impact drinking water which is supplied by Connecticut Water Company from distant sources. It would not be expected to have any impact on other property-owner issues such as gardening and landscaping or resale value.

The legal steps required to implement the groundwater rights concept need to be defined further as well as legel fees. The purchase price to obtain these groundwater rights is not yet clear. If the Town pursues this innovative alternative it is hoped that each property owner would transfer their groundwater rights for $1.00. However if a property owner(s) did not want to do this, it may be possible for the Town to take these rights through eminent domain. The costs involved in such action are also unknown at this time.

APPENDIX K

DOCUMENTATION OF REQUESTS FOR GROUNDWATER RECLASSIFICATION

TOWN OF ESSEX
Water Pollution Control Authority
Essex Town Hall
29 West Avenue
Essex, Connecticut 06426

September 18, 1992

Mr. Dennis J. Greci
Supervising Sanitary Engineer
Department of Environmental Protection
Bureau of Water Management
122 Washington Street
Hartford, Connecticut 06106

Dear Dennis:

We appreciated your attendance at our WPCA meeting on August 3, 1992. We had considerable discussion at this meeting about the concept of obtaining groundwater rights for Essex Village and the potential benefits that it could provide as part of our wastewater management strategy for the Town of Essex.

At this meeting you stated you accepted the groundwater rights concept as an alternative for Essex Village and indicated that you had discussed it with various other people at DEP who also accepted the concept. Accordingly, we have discussed this concept further. It is our understanding that this concept is acceptable because the DEP believes that the groundwater quality under Essex Village does not adversely impact the Connecticut River and coves which surround Essex Village, and which have a B classification.

As part of the groundwater rights strategy, we would plan to take a series of measures to help improve groundwater quality under Essex Village and to protect the public health. A description and cost estimate of each of these measures follows:

a. Construction of a wastewater collection system and community subsurface disposal system in the park on Main Street to serve properties which do not have space to make septic system repairs (if required in the future) - **estimated costs: $125,000 for collection system; $120,000 for community septic system.**

b. Pass an ordinance to prohibit groundwater under Essex Village from being used for water supply - **nominal cost.**

c. Implement an on-site management plan for the entire Town of Essex, with particular scrutiny paid to the Essex Village septic systems - **estimated cost $50-60,000/year.**

d. Obtain groundwater rights for every property in Essex Village (approximately 104). Legal and title searching costs associated with obtaining groundwater rights have been estimated at **$140,000 to $195,000** assuming that no property would have to be purchased through eminent domain. This does not include our own administrative expenses, nor any contingencies. We have some serious concerns that getting all the groundwater rights could potentially cost more than this, partly because this is a new strategy and may have some hidden costs, but more importantly, because some residents could fight the idea. If residents fight the concept, we see a risk that the Town would have to buy their properties, which could raise the cost of this plan to the $3 to $5 million range.

We anticipate that the benefits to actual groundwater quality associated with the above measures will result from implementation of the tangible structural and maintenance improvements rather than from the abstract legal concept of ownership of groundwater rights.

As we have discussed the Essex Village issue further, we keep coming back to the idea of reclassifying the groundwater there. A key question is what benefit does obtaining groundwater rights have over simply designating this areas as GB? From a groundwater quality standpoint, none. Improvements to quality will come from installation of the community system and instituting the on-site management program, which would take place whether groundwater rights were obtained or reclassification to GB was made. In the latter case, the Town wouldn't legally own the groundwater, but we would manage its use through the on-site program and by prohibiting wells.

Where the two strategies differ is the economic burden to Essex of acquiring groundwater rights - this is the most expensive component of the strategy stated above, and the risk of a much higher cost should transfer of groundwater rights be contested.

To us, a groundwater classification of GB in an area such as Essex Village which has been developed for over 200 years by mixed commercial and residential uses appears consistent with DEP policy. The downtown areas of many Connecticut towns have GB classifications, including along rivers (Groton, Mystic, Pawcatuck, Jewett City, Danielson, Putnam, Willimantic, Portland, Middletown, Norwich, Rockville, Manchester, Thomaston, Torrington). Therefore we do not think classifying Essex Village as GB would represent a precedent-setting change in DEP policy.

We, therefore, request DEP to reconsider the water quality classification of Essex Village and designate it GB. While you have acknowledged that obtaining groundwater rights is an acceptable strategy for managing wastewater from the Village, we believe that changing the classification to GB along with the structural and management changes we have proposed is a far more preferable alternative, as the same groundwater quality will be achieved, but at a savings of hundreds of thousands, and potentially millions, of dollars to the Town.

We hope to discuss this request further with you soon. Please feel free to call us or Bruce Glowac, First Selectman (767-8201). Our next WPCA meetings are Tuesday, September 15 and Monday, October 5, 1992.

Thank you for your consideration.

Sincerely,

Elizabeth Pierson
Co-Chairman, Essex WPCA

David Cormier
Co-Chairman, Essex WPCA

cc: Robert Moore
William Hogan

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

December 7, 1992

Ms. Elizabeth Pierson and Mr. David Cormier, Co-chairman
Essex Water Pollution Control Authority
Essex Town Hall
29 West Avenue
Essex, CT 06426

Re: Groundwater classification

Dear Ms. Pierson & Mr. Cormier:

This is in response to your letter of September 18, 1992 once again requesting the reclassification of the groundwater under the village area from GA to GB. I am sorry to inform you that no further consideration will be given to this approach. You request was duly considered by the hearing officer during the last hearing on Water Quality Standards for the Connecticut River Basin, the issue was discussed in great depth within the Water Management Bureau, and the decision was reached to deny the change in classification.

Every property owner is responsible for the adequate treatment and disposal of wastes generated on their own property. If "the property" in question, by virtue of the acquisition of all groundwater rights, is the village, then it may be possible to adequately treat all wastewater "on site" using the approach described in your letter. If we must consider each property separately, then it is apparent that many of the properties within the village cannot adequately renovate their wastewater before it crosses a property line.

Your letter asks what benefit is there for acquiring the groundwater rights over just changing the classification, and you seem to feel that there is no difference. This presumption is incorrect. Controlling the rights to the groundwater imposes a real and legal responsibility, as well as control, of the use and protection of the groundwater.

Please bear in mind that downgrading a water body's classification is not an acceptable approach when there is a viable alternative which would restore the water to its designated quality. Such is the case in the village area of Essex. Proper treatment of wastewater could reduce the pollutant load to acceptable levels and restore the groundwater to class GA. This cannot be said of the groundwater beneath many of the municipalities listed in your letter. If we allowed the downgrading of the groundwater beneath Essex village, the precedent which would be set would tell polluters: "You don't have to clean it up, even if you can. Just downgrade the classification and don't let anyone use it anymore." This approach to resource management is simply unacceptable.

For further clarification, I am enclosing a copy of the initial review comments on your facilities plan from Fred Banach, whose responsibilities include administering DEP's Water Quality Standards system. I draw your attention to page 2 of these comments, where his discussion of the potential for utilizing the GB classification in this situation should further clarify DEP's position on this matter.

If you have any further questions, please feel free to contact me at 566-3282 or 566-7168.

Sincerely,

Dennis J. Graci
Supervising Sanitary Engineer
Bureau of Water Management

cc: Fuss & O'Neill (Attn: Peter Grose)

DEPARTMENT OF ENVIRONMENTAL PROTECTION
MEMORANDUM

April 10, 1992

To: William Hogan, Dennis Greci

From: Fred Banach

Subject: Draft Essex Facilities Plan

The Planning and Standards Section, with input from Warren Herzig, has reviewed the Draft Essex Facilities Plan prepared by Fuss & O'Neill. We have serious concerns with this proposal and fundamental disagreement with the premise that this document is based on. We are very concerned that the consultant's use and misinterpretation of the WQS has led to municipal misconceptions about what DEP is willing to consider an approvable abatement strategy. The following are our specific and general comments on this document.

Page 3-3. The value of this reported failure data is suspect. This has been demonstrated by many sanitary surveys and, most significantly by a study conducted by North Carolina State University (Dr. Michael Hoover, et al). In that study, 34% of conventional gravel filled systems were found to be in failure, while none were reported to the county health authorities.

Page 3-4. We find the reported 5.4% hydraulic failure rate rather high in such favorable soils.

Page 4-2. The plan indicates that DEP septic system standards do not apply. We strongly disagree. This facilities plan is being done to comply with a DEP Order and it is this agency's standards as well as the Health Code requirements that must be met. The Health Code is a construction minimum standard. No portion of that code reflects the minimums for the prevention of pollution. This erroneous assumption is reflected in many of the comments that follow.

Page 4-2. The premise that septic systems have a limited life span has been rejected by virtually every present-day authority in the field. At a minimum, given the current practice, such systems should last over 50 years.

Page 4-3. The comment that 1/2 acre is sufficient land for repair is true only for Health Code compliance. This land area is inadequate for a system that will meet DEP standards. We would normally look for 1.0 to 1.5 acres per system per system when utilizing conventional septic tank-leachfield technology.

Page 4-4. Repairs with mound systems may, or may not, provide an acceptable solution. The Department does not find that the parameters for a fill system contained in the public health code are necessarily adequate to protect water quality.

Chapter 4. The feasibility of the both on-site and off-site repairs, which are critical to the success of this plan is not well addressed with regard to technical adequacy and costs. We believe that this presentation minimizes the difficulty of both of those factors.

Page 5-2. We believe that this presentation is a misunderstanding of several aspects of the GB ground water classification. The following are our concerns:

a) There is a major misconception inherent in this report in the concept that a reclasssification to GB "gets" the town something in terms of septic system standards. Such a classification gains nothing since the Department has exactly the same requirements for septic systems in any ground water classification area. When contamination occurs in a Class GB area, and can be reasonably mitigated or reduced, DEP requires remediation. The Class GB designation is more usefull in setting of Water Bureau priorities, such as when, or how soon remediation will occur. The Class GB designation does not mean the Department should allow a correctable source of contamination to remain in place.

b) As best we can remember, the GB class goal has never been assigned to an urban or any other area because of too high a density of septic systems. Class GB is assigned to groundwater resources because of widespread, irremediable, contamination from myraid non-point sources. A common example, is the urban area of Hartford which, like most GB areas is provided with municipal water and sanitary sewers. Contamination comes from density of activities, motor vehicles, myriad commercial enterprises, two hundred years of commercial and industrial activities, and indirect discharges of contaminated stormwater. Contrast this to Essex Village. The location of each source of contamination is known, and the number and area is limited. Several technologies are available and generally affordable to remediate the contamination sources. In summary, conditions in Essex Village does not provide a good match to the review criteria for a Class GB goal.

We believe that the proposed ambient ground water nitrogen sampling may present an overly optimistic picture. While an area loading model, such as DEP uses, may present an overall theoretical model of loading, this does not portray the actual plume dimension or shape. Both Dr. John Cherry and The Buzzards Bay Project have demonstrated that plumes tend to be long and narrow. This renders the monitoring data suspect since there will not be full mixing until the plume discharges. Very simply put, the monitoring wells may easily miss the plumes.

Appendix D contains examples of system repairs that use technology that may not be accepted by this agency. One example, the use of Elgin "In-drains" is a product that has neither been approved, or disapproved, by this agency for large septic systems. Technical questions to the developer of this product has yet to be addressed. Furthermore, the example in the Appendix uses an application rate that is no longer acceptable to the Health Department for smaller systems. Another example shown in Appendix D, we have difficulties with, uses deep leaching pits. This technology has almost never been used by this agency. The deep nature of these systems provides poor oxygen transfer. Otis, et al, recommends that the application rates for such systems be reduced by 30% and cautions about poor renovation of effluent quality.

We strongly suggest that if Essex is to convince DEP it can solve its pollution problems without the installation of a complete municipal sewerage collection system, that the following course of action be pursued:

1) Essex will acquire groundwater rights as described in the report.

2) Essex will establish a management district, under the auspices of a service district. This will ensure:

a) The scheduled replacement of conventional septic tank systems with systems, such as individual RSF's, in Essex Village and other neighborhoods denoted as (B) or (C) on Figure 4., to provide adequate pretreatment prior to subsurface discharge. Such systems are grant and loan eligible (e.g. Ct. Clean Water Fund) as we understand it.

b) Routine inspection, monitoring and maintenance of these systems and other problem areas in town.

Adequate pretreatment means treatment to reduce nitrogen. Nitrogen is the critical contaminant in Essex Village and its reduction will improve groundwater quality. An additional benefit is that nitrogen removal will also contribute to the reduction of nitrogen loads to Long Island Sound. Treatment facilities proposed in both Old Saybrook (a regional POTW) and a small community POTW tentatively planned for center of East Haddam, will similarly be required to remove nitrogen from their effluent.

3) Finalize this facilities plan, with particular attention to capacity and cost estimates for the off-site portion of the project and cost estimates for on-site corrections.

Please contact me if you have questions about this.

c.c. Warren Herzig

146 Hartford Road, Manchester, CT 06040-5921
TEL 860 646-2469 FAX 860 643-6313

1200 Converse Street, Longmeadow, MA 01106-1721
TEL 413 567-9886 FAX 413 567-8936

Providence, RI TEL 401 828-3510

Fuss & O'Neill Inc. *Consulting Engineers*

Solid Waste Management	Environmental Engineering
Industrial/Hazardous Waste Management	Wastewater Management
Stream Impact Analysis	Site Planning/Engineering
Water Resources Engineering	Hydrogeology
Transportation Engineering	Park Design
Environmental Field Services	Surveying

September 4, 1996

Mr. Randall C. May
Water Planning and Standards Division
Bureau of Water Management
Connecticut Department of Environmental Protection
79 Elm Street
Hartford, CT 06106

Re: Groundwater Reclassification Request
Essex Village

Dear Mr. May:

On behalf of the Town of Essex Water Pollution Control Authority, Fuss & O'Neill (F&O) submits this request for the reclassification of groundwater under Essex Village in Essex, Connecticut. As you may know, a request for reclassification of this area was previously submitted to Dennis Greci by the Essex WPCA on September 18, 1992. This revised request addresses the five reclassification criteria you have developed in the March 28, 1996 reclassification guidance document.

The Essex Village area is shown on the attached map. It is bounded to the northeast, south, and west by the Connecticut River and its North and Middle Coves. To the west and northwest, it is bounded by South Main Street, North Main Street, and Bushnell Street. This area is currently classified GB/GA, but does not meet the GA standards for nitrate and coliform.

F&O believes that the proposed area meets the five reclassification criteria that DEP has developed. Our technical opinion is supported the work we have done with Dennis Greci of the DEP's Municipal Facilities section. In the subsequent sections, each of the five reclassification criteria is addressed.

Criterion 1: Public Water Supply

The proposed reclassification area is provided with public water supply by the Connecticut Water Company. There is no known use of groundwater as a potable water source. Since the Essex Village area has already been densely developed, it is not anticipated that water demand in this area would increase beyond that currently met by Connecticut Water Company.

Since Essex Village is surrounded on all sides by either surface water or higher elevations, there are no downgradient groundwater users.

Criterion 2: Surface Water Quality

The reclassification of the area will not result in the non-attainment of surface water quality goals. Groundwater flow is believed to be toward the Connecticut River (Class SB). The Connecticut River receives treated wastewater discharges from many municipal wastewater treatment plants, so this classification would not be expected to change. Based on several years of sampling of monitoring wells in Essex village, the known contaminants of concern are nitrate, ammonia, and coliform. There are no nitrate or ammonia standards for SB waters in Connecticut. During simultaneous sampling in Essex Village and the surrounding surface water, coliform concentrations have been significantly higher in the Connecticut River than in groundwater beneath Essex Village. Supporting data for surface and ground-water are presented in Tables 1 and 2, respectively.

Criterion 3: Public Health

Reclassification of the groundwater will not affect the status of the area with respect to public health. The entire area is served by public water and groundwater from the area flows to adjacent class SB surface waters.

Criterion 4: Industrial and Environmental History

The nitrate and bacterial contamination described above has resulted from intensive commercial, residential and to a lesser extent, industrial uses over the last two hundred years, including subsurface disposal systems. This is a historical area, with homes and businesses dating from the 1700's. Although Essex Village may have a quaint appearance, we believe that it can be considered "urban" since the density of development in the area has been the source of the groundwater contamination problems.

A groundwater classification of GB in an area such as Essex Village which has long-standing mixed commercial and residential uses appears consistent with DEP policy. The downtown areas of many Connecticut towns have GB classifications, including along rivers (Groton, Mystic, Pawcatuck, Jewett City, Danielson, Putnam, Willimantic, Portland, Middletown, Norwich, Rockville, Manchester, Thomaston, Torrington). Therefore we think classifying Essex Village as GB is consistent with both past practice and the new guidance.

Criterion 5: Potential Use as a Water Supply

Although Essex Village contains has a large area of stratified drift, it is not suitable for development of a potable water well since the surface waters in the Connecticut River and it's coves which surround this narrow peninsula are brackish.

Conclusions

As the above arguments demonstrate, the subject area meets each of the five evaluation criteria for groundwater reclassification to GB. These criteria include the dense historical commercial and residential development, (i.e. urbanization) the absence of known potable groundwater use, and the availability of public water throughout the area. Furthermore, our review of pertinent information relative to this area has indicated that reclassification of the parcel to GB will not result in non-attainment of surface water quality goals.

We are eager to discuss this request with you further. After you have reviewed this request, please contact the undersigned.

Sincerely,

Elizabeth P. Troop, P.E.
Senior Environmental Engineer

Reviewed by:

Peter H. Grose, P.E.
Vice President

c: Alvin Wolfgram, WPCA Chairman
Peter Webster, Essex First Selectman
Carol Speer, Sanitarian
William Hogan, DEP

Encl. Water Quality Data
Map of Essex Village

TABLE 1
CONNECTICUT RIVER WATER QUALITY DATA
ESSEX WASTEWATER MANAGEMENT STUDY

SURFACE WATER (CLASSIFICATION SB)

LOCATION	DATE	NO_3	NH_3	F.C.
SW-10	5/23/89	1.40	0.13	1
	8/29/89	0.2	0.88	117
	10/27/89	<0.5	0.32	144
	8/27/93	0.36	0.08	26
SW-11	5/23/89	1.34	0.13	0
	8/29/89	0.25	0.61	84
	10/27/89	<0.5	0.29	158
	8/27/93	0.44	<0.05	46
SW-12	5/23/89	1.34	0.13	10
	8/29/89	<0.1	0.44	71
	10/27/89	<0.5	0.28	180
	8/27/93	0.47	0.08	38
SW-13	5/23/89	1.40	<0.05	0
	8/29/89	0.25	0.61	>2,400
	10/27/89	<0.5	0.28	350
	8/27/93	0.48	<0.05	61
SW-14	5/23/89	1.34	0.66	4
	8/29/89	0.3	0.61	>2,400
	10/27/89	<0.5	0.26	154
	8/27/93	0.42	<0.05	46
SW-15	5/23/89	1.34	0.13	1
	8/29/89	0.2	0.53	>2,400
	10/27/89	<0.5	0.28	350
	8/27/93	0.42	0.09	83
SW-16	5/23/89	---	---	---
	8/29/89	0.25	0.53	400
	10/27/89	<0.5	0.24	800
	8/27/93	0.41	<0.05	67
AVERAGE	8/29/89	0.21	0.60	
	8/27/93	0.43	0.05	

STANDARD FOR SB			---	200 log mean 400 for <10% of samples

NOTES:
NO_3 = Nitrate, mg/L as N
NH_3 = Ammonia, mg/L as N
F.C. = Fecal Coliforms, Colonies/ 100 ml

~~DH~~ > FCS

88-05781

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

October 10, 1996

Mr. Peter H. Grose, P.E.
Vice President
Fuss & O'Neill Incorporated
146 Hartford Road
Manchester, Connecticut
06040-5921

Dear Mr. Grose:

We have received and reviewed the ground water reclassification request that you have submitted on behalf of the town of Essex. This application argues that the degradation of ground water by too great a density of septic systems is grounds for lowering the water quality classification to GB. Further, your firm and the town have stated the belief that such a change in classification would help the town to avoid installation of sewage treatment systems that are properly protective of ground and surface waters. Neither of those assumptions is correct and members of your firm have been so advised on several occasions.

We will not, therefore accept or approve this application. Note in this regard that the Commissioner "...may consider an application to lower a ground water classification to GB." (GW8). He is in no way bound to do so, particularly when the application contradicts the basic concepts of the Water Quality Standards.

I draw your attention first to the fact that from the inception of the ground water standards in 1980 the classification of GB is a reflection of multiple sources of past pollution, many of which may be unknown and difficult to attribute. The standards also presume that the discharge itself has ceased, leaving the residue of long term pollution. Every revision of the Standards has clearly stated the policy (currently in GW4) stating that our goal is to ..."regulate discharges to the ground water in order to prevent further degradation of ground water quality." Please note that this applies to all areas, including those classified as GB. Reclassification, if granted, would not alter the requirement that the town deal with its sewage disposal problems in exactly the same manner as if it was a class GA resource.

If you examine the areas that are classified as GB you will find that, with very few exceptions, the areas classified as GB also have eliminated the sewage discharge to groundwater by means of sewers. There has never been an intent to allow the continued degradation of a resource with an ongoing discharge simply because it is classified as GB.

I especially draw your attention to Standard GW11 which most clearly states this issue:

> "GW11. The Department's classification of ground water, whether as GB, GC, or otherwise, conveys no right to degrade that ground water or to utilize less effective treatment measures than those utilized for discharges to ground water designated for use as potable water. Domestic sewage shall be given the same treatment regardless of the classification of the ground water to which such sewage is discharged."

GB is essentially a classification granted when there is no practicable treatment for the pollution present and no potential potable use of the water. The source of degradation in Essex is perfectly understood as are a variety of practicable ways to remove it. Therefore, the staff cannot recommend to the Commissioner either the acceptance or approval of this application.

If you have questions regarding this please call me at 860- 424-3719.
Sincerely

Randy May
Supervising Sanitary Engineer
RM/hs

cc: Essex W.P.C.A.
Essex First Selectman

APPENDIX L

DOCUMENTATION OF BOKUM CENTER REPAIRS

October 13, 1994

Mr. Michael McCulley
McCulley & Monahan
40 Main Street
P.O. Box 209
Essex, CT 06426

RE: Bokum Center

Dear Mike:

The sanitary system replacement is complete at Bokum Center. I would like to review the construction and the condition of the existing system found during construction.

Four existing lines of shallow galleries, were replaced. It was found that the galleries were placed in gravel fill above a compacted layer of black organic silty soil, which was on top of various layers of very compact silty fine sand. We elected during excavation to remove the restrictive layer and key the new sanitary system in the more permeable sands located approximately 5 to 6 feet below the surface. While removing the existing lines to facilitate excavation of the unsuitable material, we noticed that the western end of the galleries was placed approximately 1 foot higher than the eastern end of the galleries. This was apparent because the top of the galleries was a fairly consistent distance from the pavement, and the pavement slopes down 1 foot from west to east. Also, we could see the effluent line on the galleries, which started at the top of the galleries on the eastern end and was approximately 6 inches up the gallery on the western end. It appears that the lines were not installed properly and could not be utilized to their full capacity because the western end of the gallery was partially above the top of the distribution manhole on the east side of the gallery. Because the manhole cover was below the western end of the gallery, effluent would flow out of the manhole before the full capacity of the gallery was used. Admittedly the functioning of the gallery was also affected by the impervious layer immediately below the gallery, and also somewhat affected by grease from the IGA sanitary system. It is difficult to determine exactly which of the three situations caused the premature failure of the system. However, I can say that each of the three items did contribute to the failure.

Our original design anticipated installing 2 additional lines on the north side of the existing system, as we progressed to the north during construction we observed the impervious layer and tight soils getting deeper. We, therefore, elected to look for an alternative location for the two northern lines. We found more favorable soil conditions approximately 50 feet north of the IGA in between the IGA and the existing Bank. We, therefore, installed lines 5 and 6 in front of the IGA. In this area we encountered the black organic soils and the tighter silty fine sands, which were removed to again key into the permeable sands. Lines 5 and 6 will be gravity fed from the septic tank and then over flow into the pump chamber, from which the effluent will be pumped to lines 1 through 4.

The site will be monitored through winter and spring, pursuant to the request of Art Castalazzo, of the State Health Department (see attached letters). Six monitoring pipes have been installed on the site. I will review the monitoring procedure with you in the very near future.

I am enclosing a bill for services rendered during the construction of the sanitary systems. Should you have any questions, please do not hesitate to contact me.

Very truly yours,

DOANE ENGINEERING COMPANY

Robert L. Doane, Jr., P.E., L.S.

RLD/laa

enc

APPENDIX M

1989 ESSEX VILLAGE SSDS REPAIR COMPUTATIONS

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO
REM	10/27/87	MDA	5/9/17	88-57

ESSEX - SEWAGE GENERATION STUDY — SHEET NO. 1 of

ESSEX VILLAGE

LEACHING PITS (DRY WELLS)

- FROM DOHS T.S.
- 5-10 FT DIAM, 12" STONE SURROUNDING
- C-C SPACING = 4 x DIAM

A. SIZING OF SYSTEMS PER D.O.H.S CRITERIA

- REP. PERC RATE FOR VILLAGE AREA

1-10 min/in → 1-5 MIN/IN

1-10 min/in req'd in T Public Health Code ded 1/1/94. Lots that annot meet eq'd area for -10 min/in erc rate can se the 1-5 min/in ate if the ot existed before 1/1/94.

1. SQUARE FT OF EFF. LEACHING AREA REQ.

FROM TABLE NO. 5 — RESIDENTIAL BUILDINGS

2 BR	3 BR	4 BR
300 FT²	375 FT²	500 FT²
(12 LF) → 15	(15 LF) 17.0	26.4 (20 LF) → 6 FT Ø DRYWELL
375	495	660 ← 1-10 min/inch pr

FROM TABLE NO. 6 - RESTAURANTS, LAUNDROMATS & RESIDENTIAL INSTITUTIONS

1-5 MIN/IN — SEWAGE APPLICATION RATE = 1.0 GPD/FT² → 0.8

FROM TABLE NO. 7 - NON-RESIDENTIAL BUILDINGS

1-5 MIN/IN — S.A.R = 2.0 GPD/FT² → 1.5

2. SQUARE FT. OF EFF LEACHING AREA PROVIDED

a. USING 6 FT Ø DRYWELLS

EFF. AREA PER LF OF DEPTH:

= (8 FT)(π) = 25 FT² PER LF ←