September 23, 1983

TO: Addressee

SUBJECT:

Millstone Nuclear Power Station, Unit No. 3
Transmittal of Amendment to FSAR/ER
Docket No. 50-423

Enclosed is Amendment 4 to Copy No. ________ of the Millstone Nuclear Power Station, Unit No. 3 Final Safety Analysis Report/Environmental Report. Please complete and return the attached form acknowledging that you have received and incorporated this amendment into your copy of the FSAR/ER.

The insertion instructions enclosed should be used to assist you in incorporating the revisions, and as such should be retained until the Effective Page Listing is again updated.

If you have any questions, please contact me at (203) 666-6911 ext. 3285.

Sincerely,

Carol J. Shaffer

Carol J. Shaffer
Generation Facilities Licensing
Northeast Utilities Service Company

NORTHEAST UTILITIES
THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut
P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 666-6911

September 27, 1983

Docket No. 50-423
B10905

Director of Nuclear Reactor Regulations
Attn: Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

References: (1) W. G. Counsil letter to B. J. Youngblood, Millstone Nuclear Power Station, Unit No. 3, Responses Related to the Operating License Application Review, dated June 30, 1983.

Dear Mr. Youngblood:

Millstone Nuclear Power Station, Unit No. 3
Transmittal of Amendment 4
to the Environmental Report

As committed in Reference (1) and in accordance with 10 CFR 50.30 (c)(1)(iv), Northeast Nuclear Energy Company, herewith submits Amendment 4 of the Environmental Report (ER).

Enclosed are the following documents and the number of each:

o	Environmental Report Amendment 4 (pages for insertion into the ER and Acceptance Review questions/responses)	41 copies
o	Environmental Report Volume 4 (Volume 4 is dedicated to questions/responses)	41 copies

This amendment is being submitted in order to:

- o Amend the ER to include responses to the requests for additional information that resulted from NRC's review of our operating license application. Questions/Responses are provided in a

dedicated Volume 4. All resultant changes to the ER are being incorporated throughout the text.

- o Correct typographical errors.
- o Provide updated information.

If you have any concerns related to commitments contained herein or any questions related to our responses, please contact our licensing representative directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL

By: NORTHEAST NUCLEAR ENERGY COMPANY, Their Agen

W. G. Counsil
Senior Vice President

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me W. G. Counsil, who being duly sworn, did state that he is Senior Vice President of Northeast Nuclear Energy Company, applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Notary

My Commission Expires March 31, 1988

NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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(203) 666-6911

Mail to:

Carol J. Shaffer
Generation Facilities Licensing
Northeast Utilities Service Company
P. O. Box 270
Hartford, CT 06101

SUBJECT:

Millstone Nuclear Power Plant, Unit 3
Acknowledgement of Distribution of NRC Questions and Responses
and Amendment 4 of the ER

NRC Questions and Responses and Amendment 4 of the Millstone Nuclear Power Plant, Unit 3 Environmental Report to Copy No. 71 have been received.

____
Organization Name

____
Copy Holder's Name

____
Signature Date

INSERTION INSTRUCTIONS FOR AMENDMENT 4

Remove old pages and insert Amendment 4 pages as instructed below (amendment pages bear the amendment number and date at the foot of the page).

Vertical bars (change bars) have been placed in the outside margins of revised text pages and tables to show the location of any technical changes originating with this amendment. A few unrevised pages have been reprinted because they fall within a run of closely spaced revised pages. No change bars are used on figures or on new sections, appendices, questions and responses, etc.

Transmittal letters along with these insertion instructions should either be filed or entered in Volume I of Part I, in front of any existing letters, instructions, distribution lists, etc.

LEGEND

Remove/Insert Columns

Entries beginning with "T" or "F" designate table or figure numbers, respectively. All other entries are page numbers:

T2.3-14 = Table 2.3-14 F2.3-14 = Figure 2.3-14

2.1-9 = Page 2.1-9 EP2-1 = Page EP2-1 vii = Page vii

Pages printed back to back are indicated by a "/":

1.2-5/6 = Page 1.2-5 backed by Page 1.2-6

T2.3-14(5 of 5)/15(1 of 3) = Table 2.3-14, sheet 5 of 5, backed by Table 2.3-15, sheet 1 of 3

Location Column

Ch = Chapter, S = Section, Ap = Appendix

Remove	Insert	Location
	VOLUME 1	
EP2-1 thru EP2-8	EP2-1 thru EP2-8	After Ch. 2 Tab
	VOLUME 3	
2.1-7/2.1-8	2.1-7/2.1-8	After S2.1 Tab
2.1-11/2.1-12	2.1-11/2.1-12	

INSERTION INSTRUCTIONS FOR AMENDMENT 4 (Cont)

Remove	Insert	Location
T2.1-25 (1 of 3)/ T2.1-25 (2 of 3)	T2.1-25 (1 of 3)/ T2.1-25 (2 of 3)	
F2.1-34	F2.1-34	
2.3-1/2.3-2	2.3-1/2.3-2	
EP7-1/Blank	EP7-1/Blank	After Ch.7 Tab
7-iii/Blank	7-iii/Blank	
7-v/Blank	7-v/Blank	
7-vii/Blank	---	
EP8-1/Blank	EP8-1/Blank	After Ch. 8 Tab
T8.2-1 (1 of 2)/ T8.2-1 (2 of 2)	T8.2-1 (1 of 1)/ T8.2-1 (2 of 2)	After S8.2 Tab

VOLUME 4

The tab NRC Questions and Responses, the tab January 31, 1983 and the material following it, are to be removed from Volume 3 and placed in the enclosed Volume 4. The following material is to be placed in Volume 4 after January 31, 1983 tab.

EPQ-1/EPQ-2	EPQ-1/EPQ-2
Q231.1-1/Q240.1-1	QE100.2-1/Blank TQE100.2-1 (1 of 9) thru TQE100.2-1 (9 of 9) Q231.1-1/Blank Q240.1-1/Q240.1-2 FQ240.1-1 thru FQ240.1-5 Exhibit 240.1-1 - Cover Page/Blank i/ii 1 thru 22
Q240.2-1/QE100.2	Q240.2-1/Blank

LIST OF EFFECTIVE PAGES

Page, Table (T), or Figure (F)	Amendment Number
2-i thru 2-xvii	0
2.1-1 thru 2.1-6	0
2.1-7	1
2.1-8	4
2.1-9 thru 2.1-10	0
2.1-11	4
2.1-12 thru 2.1-30	0
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T2.1-2 (1 of 1)	0
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T2.1-25 (1 of 3)	4
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T2.1-26 (1 of 1)	0
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T2.1-28 (1 of 1)	0
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T2.1-30 (1 of 1)	0
T2.1-31 (1 of 1)	0
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Summary TC i thru ii	0
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2.3-13 thru 2.3-24	0
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F2.4-12	0
F2.4-13	0
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F2.5-1	0
F2.5-2	0
2.6-1 thru 2.6-3	0
T2.6-1 (1 thru 2 of 2)	0
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Attachment 2.6A (Cover) - 1 page	0
Attachment 2.6A - 1 page	0
Attachment 2.6A (letter) - 3 pages	0
Attachment 2.6A (list) - 15 pages	0
Attachment 2.6B (cover) - 1 page	0
Attachment 2.6B - 1 page	0
Attachment 2.6B (letter) - 2 pages	0
2.7-1	2
2.7-2 thru 2.7-3	0
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T2.7-2 (1 of 1)	0
T2.7-3 (1 thru 2 of 2)	0
F2.7-1	0
F2.7-2	2

utilities are shown at New London (Waterford) and Croton/New London (Trumbull) Airports, the Port of New London, and the Millstone site. 1
Commercial development is scattered along major roads.

Growth is occurring throughout the 10-km (6-mile) region, particularly the expansion of suburban development. Growth of mixed urban uses is taking place adjacent to the town centers of New London and Groton.

It is expected that Waterford will experience some multi-family development along Boston Post Road and Rope Ferry Road in response to new sewer lines. Approximately 200 new elderly housing and condominium units have been approved for development north and north-northeast of the site, between 4 and 8 km (2.5 and 5 miles). A major shopping mall has been approved for development on Route 85 between Interstate 95 and Route 52 (Connecticut Turnpike) near the area targeted for industrial development by town zoning (Telecon, Ellis 1981o; Waterford Planning and Zoning Commission 1977).

Suburban residential development in Old Lyme is expected to continue in the 10-km (6-mile) region. Land south of Interstate 95 at Interchange 71 has been designated for industrial development (Town of Old Lyme, Conn. 1975). The town garage and some small firms with two to three employees are located in this area.

Zoning maps for the six zoning jurisdictions within the 10-km (6-mile) region are shown on Figures 2.1-25 through 2.1-30. There are presently no moritoriums on growth in any of the towns within the 10-km region.

Transportation

The area within 10 km (6-miles) of Millstone 3 is served by interstate, state, and local roads. These and other transportation facilities are shown on Figure 2.1-31.

Average daily traffic counts (ADT) in the vicinity of Millstone 3 ranged from 2,300 on Route 213 near Goshen Road, to 30,100 on I-95, east of the junction with Route 52 (Telecon, Ellis 1981f). Several ADT counts for the 10-km region are provided in Table 2.1-23.

Two major highway improvements are presently planned for the 10-km (6-mile) region. The section of Route 85 between I-95 and Route 52 will be widened in connection with the new shopping mall to be built on Route 85 (Telecon, Ellis 1981e). A new bridge between Waterford and East Lyme is currently in design by the Connecticut Department of Transportation and will replace the Niantic River Bridge with a high-rise bridge one mile long (Telecon, Ellis 1981o; Telecon, Ellis 1981e).

Major local roads in Waterford include Rope Ferry Road (Route 156), Great Neck Road (Route 213), Boston Post Road (U.S. Highway 1), Niantic River Road, and Spithead Road.

Two airports are located within the 10-km (6-mile) region. The
4 | Groton/New London Airport (Trumbull) is located in Groton,
approximately 10 km (6 miles) east-northeast of Millstone 3. In
addition to charter, private, rental, and instructional activities,
4 | Groton/New London has commercial service by Pilgrim Airlines (for
which it is a base of operations) and U.S. Air. There were a total
of 125,000 operations in 1980 (Telecon, Ellis 1981n).

The New London (Waterford) Airport has charter service and private planes. No data are available on use, and there are currently no plans to expand the facilities or services. New London Airport is located approximately 7 km (4.3 miles) north-northeast of Millstone 3.

The Consolidated Rail Corporation (ConRail), Providence and Worcester Co., and Central Vermont Railway operate freight trains within the 10-km region. Amtrak owns the trackage of the Shore Line, which crosses the Millstone site. Amtrak provides passenger service, and Conrail provides freight service on that line. As discussed in Section 2.1.3.1.2, the Northeast Corridor Rail Improvement Plan is expected to make improved rail service possible between Boston and Washington, D.C. Improvements to trackage in Massachusetts and Connecticut are nearly complete, and all other improvements are expected to be complete by 1985 (Telecon, Ellis 1981k).

Major Industries

Major industries (companies with 50 or more employees) are listed in Table 2.1-24 and on Figure 2.1-32. The largest employer, with 20,600 employees, is General Dynamics Corporation - Electric Boat Division, located on the Thames River in Groton, approximately 8.2 km (5 miles) east-northeast of Millstone 3 (Southeastern Connecticut Chamber of Commerce 1977). Electric Boat Division is involved in the design and construction of nuclear submarines. The largest manufacturing employer in Waterford is the Bureau of Business Practices, which employs 315 people in publishing training materials (Southeastern Connecticut Chamber of Commerce 1977). The Bureau of Business Practices is located approximately 4.5 km (2.8 miles) northeast of Millstone 3.

Educational Facilities

Schools and colleges in the 10-km (6-mile) region are listed in Table 2.1-25, which includes the town or city where the school is located, its distance and direction from the site, grades taught, and student enrollment. Programs for children with special needs are located in Waterford and New London.

Several colleges and graduate programs are located in New London and Groton. The U.S. Coast Guard Academy, with 987 boarding students, is located approximately 9 km (5.6 miles) northeast of the site. The Connecticut College Campus 9 km (5.6 miles) north-northeast of the site is also the location of the Connecticut College Program for Children with Special Needs and the Williams School, a private school

Several state-owned areas offer access to lakes and streams for fresh water fishing in the 10-km (6-mile) region. These facilities are shown in Table 2.1-28. Those on Pataguanset Lake, Dodge Pond, and Gorton Pond have boat launches. The boat launch site on the Niantic River and all other salt water based recreational facilities are discussed in Section 2.1.3.2. Additional state boat launch access points are planned for the Thames River, under the Gold Star Memorial Bridge in Groton and in New London.

Sites of historic, scenic, or cultural significance in the 10-km (6-mile) region are discussed in Section 2.6.1.

Other Major Institutions

Lawrence and Memorial Hospital in New London is the only hospital in the 10-km (6-mile) region. With 325 beds and 1,200 staff (Telecon, Ellis 1981r), it serves Waterford, New London, and surrounding communities. Five nursing homes licensed for 50 or more beds are located in the 10-km (6-mile) region. These major medical facilities are shown on Figure 2.1-32 and in Table 2.1-29.

Seaside Regional Center provides training and housing for handicapped citizens. There are 185 residents, 100 day students, and 260 full- and part-time staff on the Waterford Campus (Telecon, Ellis 1981q), located approximately 3 km (1.9 miles) east-southeast of the site.

The Connecticut Correctional Institute at Niantic and the J.B. Gates Correctional Unit occupy 341 hectares (843 acres) in East Lyme, 6.2 km (3.9 miles) west-northwest of the site. The facility contains a total of 307 inmates and 171 full-time and 7 part-time staff (Cerino 1981).

Also in East Lyme, the Connecticut National Guard runs Camp O'Neill and Stones Ranch Military Reservation. Camp O'Neill (named for the present governor, identified in earlier reports as Camp Grasso or Meskill) is the barracks area. Stones Ranch is the training ground for between 500 and 600 National Guard Troops from the end of May to mid-August. Camp barracks have a capacity for 800 people and, with tents, can accommodate up to 1,000 (Telecon, Ellis 1981i). Camp O'Neill includes 31 hectares (76 acres) and is 3.2 km (2 miles) northwest of Millstone 3. Stones Ranch (with 366 hectares or 904 acres) is turned over to the Connecticut Department of Environmental Protection from November 15 to December 31 for hunting.

2.1.3.1.2 Land Use Within 80 km

The 80-km region surrounding Millstone 3 includes portions of Connecticut, Rhode Island, and Suffolk County, New York. Major features of the region are identified on Figure 2.1-35. Surface water bodies within 80 km (50 miles) include: Long Island Sound, Block Island Sound, the Atlantic Ocean south of Long Island, and Rhode Island Sound. The Connecticut River and Thames River in Connecticut, Narragansett Bay and the Providence River in Rhode

Island, and the bays of eastern Long Island (Gardner's, Great Peconic, Shinnecock, and Moriches) are also shown on Figure 2.1-35.

The cities and towns within the 80-km (50-mile) region are major locations for industrial and commercial development, and educational, recreational and cultural facilities. Hartford, the capital of Connecticut, is located on the Connecticut River, approximately 63 km (39 miles) northwest of the Millstone site. Providence, Rhode Island, is located northeast of Millstone at the boundary of the 80-km region, at the head of Narragansett Bay. Development in Suffolk County, New York, in the 80-km (50-mile) region is mainly residential, with most towns oriented to seasonal use.

Urban and suburban areas in the 80-km (50-mile) region are located along major rivers, transportation routes, and the seacoast. The extensive shoreline created by bays, barrier beaches, and islands is an important resource throughout the region. Most of the coastline is characterized by seasonal developments which contain many recreational, cultural and tourist facilities.

Land use, as it appeared in 1970, is shown on Figure 2.1.-36. As shown on the generalized land use map, the 80-km (50-mile) region is characterized by extensive areas of forest and agricultural lands and numerous lakes and ponds (U. S. Department of the Interior, U. S. Geological Survey 1972-78). Built-up lands (commercial, industrial, and mixed urban uses) and suburban development (residential use) predominate in the Hartford-Bridgeport corridor, northwest and west of the site.

Cities and towns such as New Britain, Meriden, Wallingford, Hamden, New Haven, and Milford comprise the corridor which follows major highway and rail lines between Hartford and New York City. Bristol and Waterbury are additional locations of urban and suburban development west of the Hartford-Bridgeport corridor in the 80-km (50-mile) region. New London, Groton, and Norwich, Connecticut form a secondary corridor of development along the Thames River. Figure 2.1-36 also shows small areas of mixed urban development at Putnam and Danielson and primarily residential land use along the shore of Long Island Sound in Connecticut (The Continuing Committee on State Planning and Development, State of Connecticut 1979).

The second major area of built-up land and residential development is 70 km (43.5 miles) northeast of Millstone 3 at Providence, Cranston, and Warwick, Rhode Island. Newport, Kingston, and Westerly, Rhode Island are also centers for mixed urban and residential land uses.

The most extensive areas of agriculture in the 80-km (50-mile) region are located in Suffolk County, New York (U. S. Department of the Interior, U. S. Geological Survey 1972-73). As indicated on Figure 2.1-36, residential development with scattered occurrences of mixed urban uses characterize the towns along the Atlantic coast. Riverhead and Brookhaven also contain some mixed urban use.

TABLE 2.1-25

SCHOOLS AND COLLEGES WITHIN 10 km

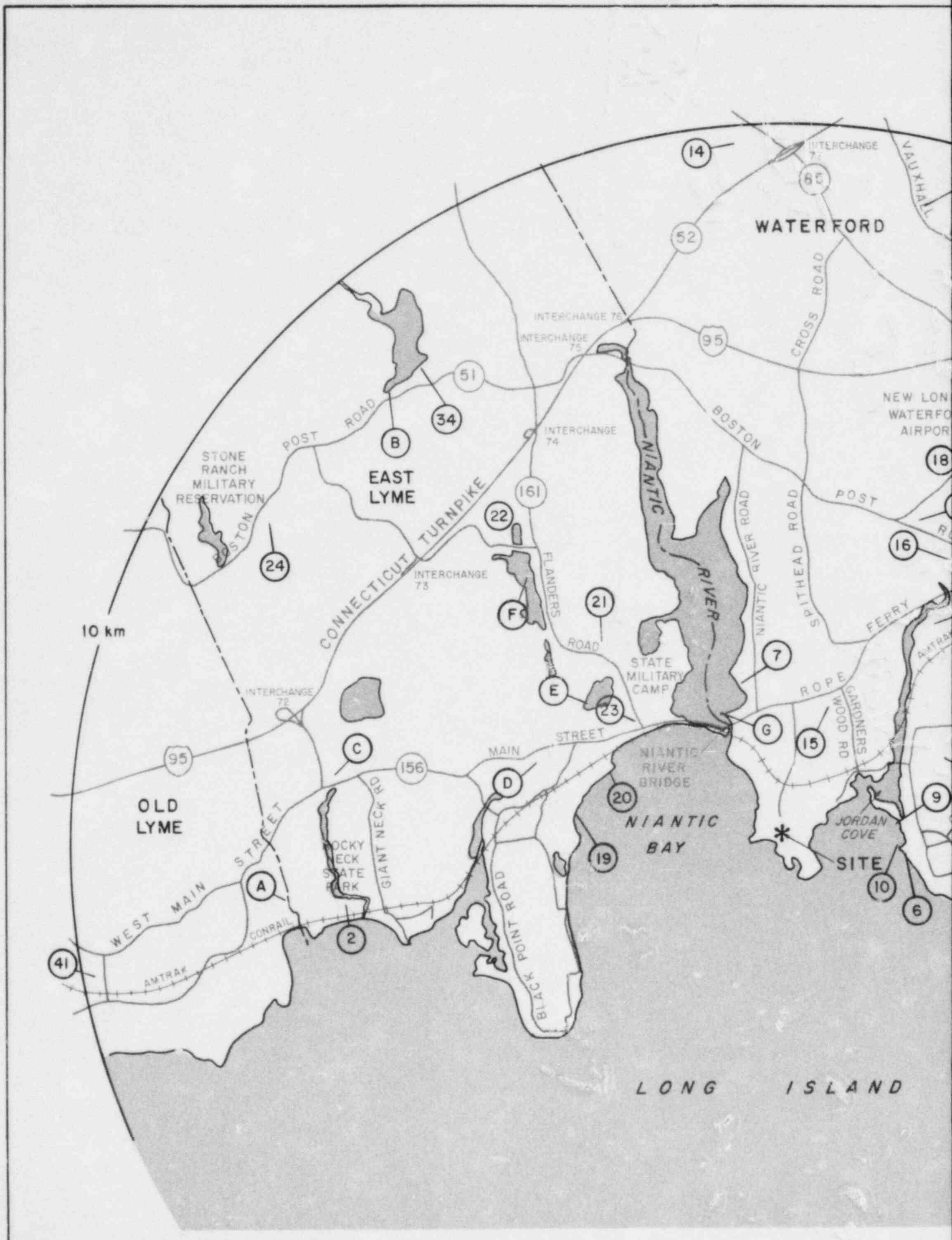
Map Code*	School or College	Location	Approximate Distance and Direction from Site	Grades	1980 - 1981 Enrollment
1	Cohansie Elementary	Waterford	7.8 km NNE	K-6	369
2	Great Neck Elementary	Waterford	2.8 km ENE	K-6	293
3	Quaker Hill Elementary	Waterford	11 km NNE	K-6	203
4	Southwest Elementary	Waterford	2.7 km N	K-6	384
5	Oswegatchie Elementary	Waterford	5.0 km N	K-6	271
6	Clark Lane Junior High	Waterford	5.8 km NE	7-8	572
7	Waterford High School	Waterford	4.6 km NE	9-12	1,073
8	New London County Seventh Day Adventist School	Waterford	9 km NE	1-8	11 (h)
9	Seaside Regional Center	Waterford	3.4 km ESE	Vocational training	12 (k)
10	Flanders School	East Lyme	7.5 km NNW	K-5 and Special ed	496
11	Niantic School	East Lyme	3.4 km WNW	K-5	381
12	Lillie B. Haynes School	East Lyme	5.8 km NW	K-5	372
13	East Lyme Junior High	East Lyme	6.1 km NW	6-8 and Special ed	785
14	East Lyme High School	East Lyme	7.5 km NNW	9-12	1,220
15	Edgerton School	New London	7.0 km NE	K-6	390
16	Harbor School	New London	6.2 km ENE	K-6	366
17	Jennings School	New London	7.5 km NE	K-6	357
18	Nathan Hale School	New London	5.8 km ENE	K-6	434
19	Winthrop School	New London	8.6 km NE	K-6	375
20	Little Red Schoolhouse	New London	8.2 km NE	Training classes	21 (f)
21	New London Junior High	New London	7.3 km NE	7-8	562

4

TABLE 2.1-25 (Cont)

Map Code*	School or College	Location	Approximate Distance and Direction from Site	Grades	1980 - 1981 Enrollment
22	New London High School	New London	6.7 km NE	9-12	1,181
23	Grace Heritage Christian School	New London	7.9 km NE	K-12	45 (c)
24	St. Joseph's School	New London	6.4 km NE	-	183 (m)
25	St. Mary's School	New London	7.4 km E	1-8	220 (n)
26	New London Independent High	New London	7.4 km NE	7-12	35 (i)
27	The Williams School	New London	9.0 km NNE	7-12	202 (o)
28	Connecticut College	New London	9.0 km NNE	College	1,927 (a)
29	Mitchell College	New London	6.1 km ENE	College	914 (g)
30	U.S. Coast Guard Academy	New London	9.0 km NNE	College	987 (p)
31	University of New Haven Extension (Mitchell College Campus)	New London	6.1 km ENE	College	450 (q)
32	Connecticut College School for Children with Special Needs	New London	9.0 km NNE	Special ed	25 (b)
33	Colonel Ledyard School	Groton	8.5 km ENE	Pre K-3	176
34	Eastern Point School	Groton	8.5 km ENE	Pre K-6	479
35	Groton Heights School	City of Groton	9.5 km NE	4-6	146
36	William Seely School	Groton	10.1 km NE	K-6	325
37	West Side Junior High	Groton	8.9 km ENE	7-9	332
38	Sacred Heart School	Groton	8.8 km ENE	Pre K-8	250 (j)
39	Southeastern Branch, University of Connecticut	Groton	8.5 km E	College	650 (l)
40	Graduate School of Marine Sciences	Groton	8.5 km E	Graduate School	35 (d)
41	Hartford Graduate Center	Groton	8.5 km E	Graduate School	325 (e)
42	Mill Creek School	Old Lyme	10 km W	K-6	258

* Locations are shown on Figure 2.1-33.


WATERFORD
INTERCHANGE 76
INTERCHANGE 75
INTERCHANGE 74
INTERCHANGE 73
INTERCHANGE 72
VAUXHALL
CROSS ROAD
NEW LON
WATERFO
AIRPOR
EAST LYME
STONE RANCH MILITARY RESERVATION
BOSTON POST ROAD
CONNECTICUT TURNPIKE
FLANDERS ROAD
NIANTIC RIVER
NIANTIC RIVER ROAD
SPITHEAD ROAD
BOSTON POST
FERRY
ROPE
WOOD RD
GARDENERS
STATE MILITARY CAMP
MAIN STREET
NIANTIC RIVER BRIDGE
NIANTIC BAY
JORDAN COVE
SITE
OLD LYME
WEST MAIN STREET
ROCKY NECK STATE PARK
GIANT NECK RD
BLACK POINT ROAD
CONRAIL
AMTRAK
10 km
LONG ISLAND
95
52
51
65
161
156
A
B
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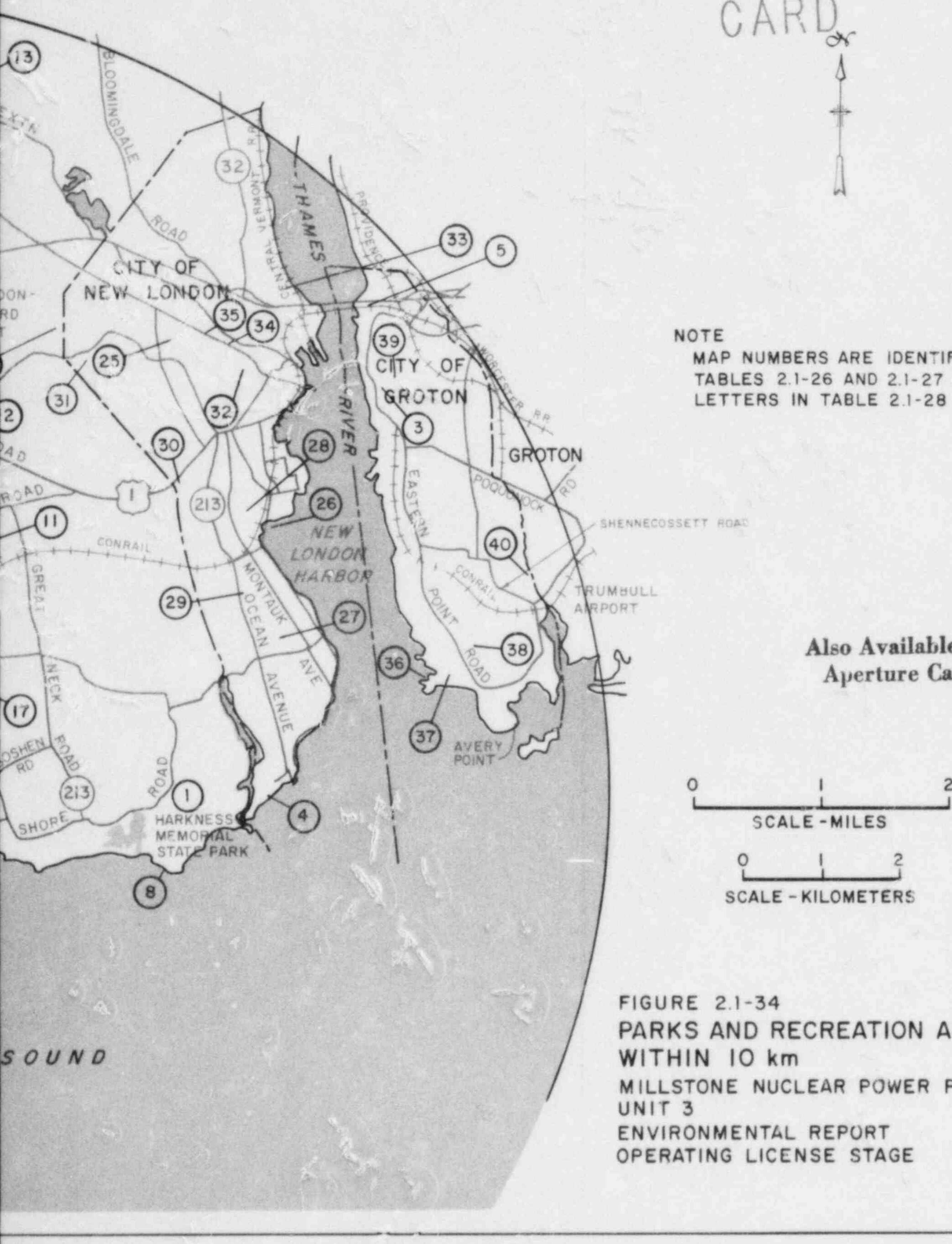

NOTE
MAP NUMBERS ARE IDENTIFIED IN TABLES 2.1-26 AND 2.1-27 AND LETTERS IN TABLE 2.1-28

Also Available On Aperture Card

FIGURE 2.1-34
PARKS AND RECREATION AREAS WITHIN 10 km
MILLSTONE NUCLEAR POWER PLANT UNIT 3
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE

8310040527-01

2.3 METEOROLOGY

This section provides a meteorological description of the site and its surrounding areas, along with supporting data.

2.3.1 Regional Climatology

2.3.1.1 Data Sources

The climatology of the Millstone site region may be reasonably described by data collected by the National Weather Service at Bridgeport, Connecticut. The National Weather Service Station for Bridgeport is located at the Sikorsky Memorial (Bridgeport Municipal) Airport, approximately 80 km (50 miles) west-southwest of the site. The airport is located on a peninsula which protrudes into Long Island Sound in a similar manner to the Millstone site peninsula and thus provides a better representation to the site data than other slightly nearer stations.

The Bridgeport meteorological data are reasonably representative of the climate at the Millstone site since both Bridgeport and the site are influenced by similar synoptic scale and mesoscale meteorological conditions. All data were collected at Bridgeport Municipal Airport locations. From May 16, 1953 to February 29, 1960 and June 1, 1981 to June 30, 1982, the Bridgeport Weather Station was closed between the hours of 11 p.m. and 6 a.m. Hourly data were recorded 16 hours per day by the National Weather Service. For climatological purposes, data during these time periods were not used with the exception of precipitation and the 1981 Local Climatological Annual Summary.

2.3.1.2 General Climate

The general climate of the region is described with respect to types of air masses, synoptic features, general airflow patterns, temperature, humidity, precipitation, and relationships between synoptic-scale atmospheric processes and local meteorological conditions.

The Millstone site region has a continental climate, modified by the maritime influence of Long Island Sound and the Atlantic Ocean, immediately to the south and southeast. The general eastward movement of air encircling the globe at middle latitudes transports large air masses into the region. Four types of air masses usually produce the meteorology in the region of the Millstone site: cold, dry continental polar air originating in Canada; warm, moist tropical air originating over the Gulf of Mexico and the Atlantic Ocean; cool, damp maritime air originating over the North Atlantic; and modified maritime air originating over the Pacific Ocean. Constant interaction of these air masses produces a large number of migratory cyclones and accompanying weather fronts, passing near or over the site region throughout the year. These weather systems are strongest during the winter and decrease in intensity during the summer.

Infrequently, a storm of tropical origin affects the Millstone site region.

2.3.1.3 Prevailing Winds

The weather pattern in the site region is controlled by the global band of prevailing westerly winds throughout most of the year. These winds provide a steering current for synoptic scale weather systems which produce day-to-day weather changes.

During the winter months, the predominating northwesterly winds transport cold, dry air from the northern United States and Canada into the region. From April through September, warm and often humid southwesterly winds occur most frequently. Winds from the south through the west-southwest sectors occur nearly 42 percent of the time during the summer months, indicative of the increased activity of a sea breeze during these months. Table 2.3-1 presents monthly, seasonal, and annual frequency distributions of wind direction at Bridgeport, while Table 2.3-2 (NOAA 1949-1980) shows directional persistence. Winds were assumed to persist if they remained in the same 22.5-degree sector for at least 5 consecutive hours.

The annual frequency of calm winds (less than 3.2 km/hr (2 mph)) is
4 2.9 percent. The highest frequency of calm and light winds (less than or equal to 4.8 km/hr (3 mph)) occurs during the summer season. Higher wind speeds commonly occur from November through April when weather systems of synoptic scale are strongest. Wind speeds greater than 40 km/hr (25 mph) occur 6.2 percent of the time during the months of January through March. Frequency distributions of wind speed at Bridgeport are presented in Table 2.3-3 (NOAA 1949-1980).

2.3.1.4 Strong Winds

Strong winds, usually caused by intense low-pressure systems, tropical cyclones, or passages of strong winter cold frontal zones, occasionally affect the region. For the 1961 through 1981 period, the fastest-mile wind speed recorded at Bridgeport was 107 km/hr (67 mph) occurring with a north-northwest wind in January 1964. Table 2.3-4 lists extreme wind speeds on a monthly, seasonal, and annual basis (NOAA 1970, 1974, 1978, 1981).

Fastest-mile wind speeds of 80, 96, 112, 120, and 144 km/hr (50, 60, 70, 75, and 90 mph) are expected to recur at the site in intervals of approximately 2, 10, 25, 50, and 100 years, respectively, according to a study by Thom (1968). Based on observations from Montauk Point (located about 37 km (23 miles) southeast of Millstone Point on the eastern tip of Long Island), the maximum reported wind speed in the region was associated with the passage of a hurricane during which sustained winds of 184 km/hr (115 mph), with short-term gusts up to 140 mph (Dunn and Miller 1960) were observed.

LIST OF EFFECTIVE PAGES

LIST OF TABLES

LIST OF FIGURES

LIST OF EFFECTIVE PAGES

TABLE 8.2-1

STATION COST INFORMATION

Direct Costs	
Land and land rights	$ 122,000
Structures and site facilities	$ 268,592,000
Reactor (boiler) plant equipment	$ 263,257,000
Turbine plant equipment, not including heat rejection systems	$ 65,946,000
Heat rejection system	$ 31,499,000
Electric plant equipment	$ 94,484,000
Miscellaneous equipment	$ 25,993,000
Spare parts and allowance	$ 24,700,000
Contingency allowance	$ 289,061,000
Subtotal	$1,063,654,000
Indirect Costs	
Construction facilities, equipment, and services	$ 407,177,000
Engineering and construction management services	$ 356,977,000
Interest during construction[1]	$1,180,000,000
Other costs	346,100,000
Subtotal	$2,290,254,000
Escalation During Construction[2] 10 percent/year =	$ 186,092,000
Total cost at start of commercial operation	$3,540,000,000

4

TABLE 8.2-1 (Cont)

NOTES:

1. AFUDC calculated using the "net of tax" philosophy under the method of FPC order number 561. The rate for 1982 is estimated at 9.0% per annum compounded semi-annually. Future rates are estimated at 9.25% per annum.

2. Escalation is computed at 10.0 percent per annum compounded from a present day of March 31, 1982.

LIST OF EFFECTIVE PAGES

Page, Table (T), or Figure (F)	Revision Number
EROLS Questions (Index) (1 thru 2 of 2)	0
QE100.2-1	1
TQE100.2-1 (1 of 9 thru 9 of 9)	1
Q231.1-1	0
Q240.1-1	1
FQ240.1-1	1
FQ240.1-2	1
FQ240.1-3	1
FQ240.1-4	1
FQ240.1-5	1
Exhibit 240.1-1	0
Q240.2-1	0
QE290.1-1	0
QE291.1-1 thru QE291.1-2	0
QE291.2-1	0
TQE291.2-1 (1 thru 2 of 2)	0
TQE291.2-2 (1 of 1)	0
TQE291.2-3 (1 of 1)	0
TQE291.2-4 (1 of 1)	0
QE291.3-1 thru QE291.3-2	0
QE291.4-1	0
QE291.5-1	0
QE291.6-1	0
QE291.7-1	0
QE291.8-1	0
QE291.9-1	0
QE291.10-1	0
QE291.11-1	0
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QE291.15-1	0
QE291.16-1	0
QE291.17-1	0
QE291.18-1	0
QE311.5-1	0
TQE311.5-1 (1 of 1)	0
TQE311.5-2 (1 of 1)	0
TQE311.5-3 (1 of 1)	0
TQE311.5-4 (1 of 1)	0
TQE311.5-5 (1 of 1)	0
TQE311.5-6 (1 of 1)	0
TQE311.5-7 (1 of 1)	0

LIST OF EFFECTIVE PAGES (Cont)

NRC Letter: January 31, 1983

Question No. QE100.2

In addition to other requested information, provide a summary and brief discussion, in table form, by section, of differences between currently projected environmental effects (including those that would degrade and those that would enhance environmental conditions) and the effects discussed in the environmental report and environmental hearings associated with the construction permit review. On a similar basis, indicate changes in plant or plant component design, location or operation that have been made or planned since the construction permit review.

Response:

Projects undergo many alterations prior to arriving at a final design. These typically result from regulatory changes, design review, improved construction techniques, research and operational experience, regional and national economic conditions, and updated monitoring data. A review of the Environmental Report Construction Permit Stage (ERCPS) and corresponding sections of the Environmental Report Operating License Stage (EROLS) was performed to delineate differences between environmental effects predicted in the ERCPS with those currently projected in the EROLS. Hearing Testimony, Final Environmental Statement and Audit Program for the Environmental Protection Commitments During Construction were also reviewed. Table E100.2-1 lists and evaluates the changes from the conceptual design stage. For the most part, predicted environmental impacts have not changed from the ERCPS to the EROLS, however, new information from ongoing studies and research efforts have allowed for more detailed and refined asessments. In some areas, impacts are addressed for the first time in the EROLS.

Only those plant design changes having an environmental effect are listed in Table E100.2-1. Changes in plant component design, location, or operation that have been made since the issuance of the construction permit are described in detail in the Millstone 3 FSAR Table 1.3-16.

Chapters 6 through 12 of the EROLS do not correspond to Sections 6 through 11 of the ERCPS. Thus, direct comparison of sections is not meaningful. Additionally, with the exception of Chapter 7, this material does not relate to environmental effects, and therefore has not been included in the table.

TABLE QE100.2-1

Informational Changes from
Construction Permit Stage Environmental Report

EROLS Section	Present Status	Discussion	Change In Impact Predicted in ERCPS
2.2	Ecological field studies conducted since 1973	To provide data to comply with Reg. Guides 4.2, Rev. 2, NPDES and commitments.	No change in site/environs but refinement of assessments due to enlarged data base
3.0 (3.1-3.9)	Plant design	Numerous changes to plant design and components resulting from review, research, NUREG's, TMI's, etc.	Refer to FSAR Table 1.3-16 for details
5.1 Pages 3-15	Additional hydrographic and hydrothermal studies conducted since 1973	Temperature measurements, dye plumes, and infrared survey results confirmed each other and described extent of plume.	Results are not comparable and differences cannot be detailed
	New thermal plume prediction model and results was utilized	Methods used to predict size and shape of thermal plume were recalibrated with new data. Results of plume predictions in the ERCPS are for average flood and ebb conditions. EROLS plume predictions are for maximum flood and ebb and slack after ebb and flood.	
5.1 Page 17	Longer transit time of entrained organisms through quarry was predicted	ERCPS predicted 170 minute transit time for organisms passing through quarry during two unit operation. EROLS predicts 180 minutes for 2 unit operation. Three unit operation transit time is 85 minutes.	None
	Mechanical damage due to entrainment	EROLS reports mortality of larval fish from passage through condenser due to mechanical stress. (Info. based on recent studies that were not available at time of ERCPS).	None

TABLE QE100.2-1 (Cont)

EROLS Section	Present Status	Discussion	Change In Impact Predicted in ERCPS
5.1 Page 20	Three species of zooplankton exposed to plume temperature which approach levels of thermal stress	Based primarily on studies conducted since the ERCPS, three species of zooplankton; Crangon septem spinosa, Cancer irroratus and Neomysis americana, may be exposed to temperature levels which approach their critical thermal maximum. However, the entrainment time is expected to be much shorter than test exposure time shown to reach critical thermal maximum temperature.	None
5.1 Page 21	Additional study of effects on fouling and wood-boring organisms	Since the EROLS, an exposure panel study has been completed. Results of that study indicate effects of 2 unit operation on abundance and temporal distribution of fouling and wood boring organisms is limited to the quarry area. Additional changes during 3 unit operation are expected to be minor.	Minor changes
5.1 Page 21	Intertidal rocky shores community impacts will be minor	Since the ERCPS, a rocky intertidal community study has been conducted. Results of that study show that 2 unit operation has resulted in the exclusion of growth of Ascophyllum nodosum from a portion of the shoreline within 25 meters of the point of discharge into Long Island Sound. Enhanced growth was found about 75 meter from the discharge. Three unit operation is expected to shift this pattern further along the shoreline. The displaced Ascophyllum is expected to be replaced by Fucus vesiculosus.	Yes - minor change

TABLE QE100.2-1 (Cont)

EROLS Section	Present Status	Discussion	Change In Impact Predicted in ERCPS
5.1 Page 23	Benthic infaunal community study complete - no changes expected	Since publication of the ERCPS, a benthic infauna study has been completed. Two unit operation results in a 20 m by 200 m scour extending seaward from the quarry cut. Three unit operation is expected to increase the width of this scour area. Community composition is expected to change from deposit feeders to suspension feeders in this area. This effect is expected to have a negligible effect on the benthic ecology of the Millstone area. Intertidal benthic infauna are not expected to be affected by additional thermal stresses since these communities are subject to more extreme temperature changes during air exposure. Subtidal communities are expected to be influenced only near the enlarged discharge cut since plume effects are primarily a surface phenomenon. No significant changes in the subtidal infaunal communities are expected.	Changes are negligible or not significant
5.1 Page 25	Lobster - Sluice return system should improve impingement survival while increased discharge scour area should produce additional shelter for inshore populations of lobsters.	The sluiceway impingement return system for Millstone 3 and for backfit of Millstone 1, should provide greater impingement survival than past two unit operation. Three unit operation is expected to increase the area of bottom scour outside the quarry. This extra area is expected to provide additional exposed boulders which should provide additional habitat for adult lobsters.	Yes - beneficial effect

TABLE QE100.2-1 (Cont)

EROLS Section	Present Status	Discussion	Change In Impact Predicted in ERCPS
5.1 Pages 26-2	Discussion of impact on macroinvertebrates is expanded	The EROLS discusses impacts of entrainment and impingement to macroinvertebrates in more detail than is provided in the ERCPS. The discussion covers historical impingement and trawl catch records, recent thermal tolerance data, and survival estimates from the impingement sluice return system. Predicted effects of the thermal plume are not expected to be of concern. Projected impingement mortality of all abundant macroinvertebrates except Atlantic long-finned squid is expected to be low. Predicted impingement mortality to this species is only about 0.006 percent of the estimated population size.	Thermal effects not expected to be of concern. Impingement mortality low for all major species except long-finned squid
5.1 Pages 28-30	New fish barrier at quarry cut	To mitigate thermal-related fish kill in the quarry, a fish barrier was installed in the existing quarry cut. A second cut and fish barrier, equivalent in dimensions to the original, has been added such that discharge velocities will be no greater than presently exists.	None
5.1 Page 30	Secondary entrainment of ichthyoplankton in the thermal plume is discussed	The EROLS provides a discussion of the effects of entrainment of ichthyoplankton into the thermal plume. Ichthyoplankton would be subject to a temperature range of 6 to 11°C down to 1.5°C for 6 to 14 minutes. A table of thermal tolerance data with many references post dating the ERCPS is also provided. This aspect of thermal plume mortality is small compared to direct entrainment and impingement effects which are predicted not to be detrimental to finfish populations.	None

TABLE QE100.2-1 (Cont)

EROLS Section	Present Status	Discussion	Change In Impact Predicted in ERCPS
5.1 Pages 30-32	Impingement predictions for 3 unit operation	EROLS provides additional data on historical impingement of Millstone 1 and 2. Three unit operation total impingement is expected to be near or within the range of annual losses currently experienced by Millstone 1 and 2 because of the sluice return system for Millstone 3 and backfit for Millstone 1.	None
5.1 Pages 33 to 36	An expanded section describing entrainment and impingement effects on selected species with extensive use of mathematical models is provided	An extensive discussion of effects of entrainment and impingement is provided. Use of the equivalent adult model is included to assess effects of entrainment. Detailed discussions are provided for the following selected species: sand lance, anchovies, Atlantic menhaden, killifishes, sticklebacks, silversides, striped bass, grubby, bluefish, winter flounder, window pane, scup, tautog, and cunner. More detailed models were developed for menhaden and winter flounder populations. Forecasted impacts due to entrainment and impingement will not be detrimental to finfish populations.	None
5.2.1	New data for Millstone 3 radioactive releases	Numerous changes in liquid and gaseous radwaste systems resulted in new source term data.	Station discharge concentrations are generally less than reported in ERCPS.
5.2.2	New models used to predict radioactivity in the environment	Models which more accurately predict the behavior of radioactivity in the environment have been utilized.	None
5.2.3	Dose rates for additional biota have been analyzed	Dose rate estimates for additional biota other than man have been provided for liquid and gaseous pathways.	None

TABLE QE100.2-1 (Cont)

EROLS Section	Present Status	Discussion	Change In Impact Predicted in ERCPS
5.2.4	Revised dose rate estimates for man	As a result of source term changes, updated demographic data, and updates on numerous other parameters associated with radiological pathways of exposure to man, projected dose rates to maxi mumly exposed indiviudals and the general population have been revised. Resulting doses are still in compliance with 10CFR Part 50, Appendix I dose limits.	Minor changes in claculated radiological doses.
		Projected doses to the contiguous U.S. population have been provided.	Not previously addressed.
5.3.1 to 5.3.3	Numerous changes in makeup demineralizer and condensate polishing waste discharge flows and sodium and sulfate concentrations	Quantities and concentrations of chemicals in steam generator blowdown and demineralizer wastes differ from the ERCPS. This occurs because the steam generator selected has different makeup water quality considerations than that planned in the ERCPS.	No (NPDES limitations will be met for wastes discharged)
5.3.4	New data from condenser tube corrosion study	Study on condenser tube corrosion on trace metal concentrations in Long Island Sound has been conducted since ERCPS. Copper, nickel, and zinc concentrations were measured at the intake outfall and far field plume. Results indicated an increase in levels of metals in the discharge, but concentrations return to ambient at a rate similar to temperature along the discharge plume. Corrosion is therefore expected to have a minimal impact on the water quality of Long Island Sound.	Not previously addressed

TABLE QE100.2-1 (Cont)

EROLS Section	Present Status	Discussion	Change In Impact Predicted in ERCPS
5.4.2	Gaseous emissions provided	Emission rates of particulates, sulfur dioxide, nitrogen dioxide, carbon monoxide, and hydrocarbons are provided for auxiliary boilers and emergency generators. Ground level concentrations based on model predictions should be much lower than NAAQS. Downwash is also not expected to violate standards.	Not previously addressed
5.5.1 to 5.5.3	Effects of operations and maintenance of transmission system	Operation/maintenance of the transmission line will have little or no effect on other land uses. Beneficial effects of maintenance of row include fire control and increase in habitat/wildlife diversity. Existing corona effects are sufficiently low to avoid interference or annoyance. No adverse impact on humans or animals is anticipated.	Not previously addressed
5.6.1	EROLS provides discussion of noise during operation	Noise levels (offsite) are projected by measurement and computer models. Total plant noise is less than the level requisite for protection of public health and welfare. Also, complies with Connecticut Noise Pollution Act.	None
		No deleterious impacts of noise on wildlife are expected.	Not previously addressed
5.6.2	Effects of physical presence of the facility	Potential for major nocturnal migrating bird kills is considered small because structures do not exceed 500' in height and reduced ceilings during migrating period are infrequent.	Not previously addressed

TABLE QE100.2-1 (Cont)

EROLS Section	Present Status	Discussion	Change In Impact Predicted in ERCPS
5.6.3	Effects of transmission facilities on birds is discussed	Factors affecting impact of transmission lines on bird mortality is discussed. It is concluded that although some mortalities may occur, particularly during spring and fall migration periods during unfavorable weather conditions, collision with the transmission towers and power lines should not be appreciable.	Not previously addressed
5.7	A discussion of resources committed is provided	Millstone 3 is expected to consume 12,650 metric tons of uranium concentrate over its assumed forty-year economic life. One-hundred and fourteen acres of land are committed to use by Millstone 1, 2, and 3 during power production. After dismantling and decommissioning, however, 3.5 acres will be placed on permanent restricted use. An average of 144,000 gallons of city water is used per day. Millstone 3 is not expected to significantly affect aquatic ecology at the site.	None
5.8	Decommissioning and Dismantling	Removal, partial dismantlement, delayed removal and immediate dismantlement/prompt removal are options. The last option is presently considered the preferred alternative.	Not previously addressed
7.1	Site boundary thyroid, gamma, and beta doses are reported in Table 7.1-1, and population doses are reported in Table 7.1-2 for various accidents.	Only whole body population doses were reported in the ERCPS. Reported doses have changed due to the changes in source terms a meteorological data.	The predicted population dose values have increased but are insignificant compared to annual contribution from background data.

TABLE QE100.2-1 (Cont)

EROLS Section	Present Status	Discussion	Change in Impact Predicted in ERCPS
Appendix F	Dose calculation models and assumptions	New appendix. Information previously provided in the ERCPS Section 5.1.	None
	Cost Benefit Analysis	New appendix. Information previously provided in the ERCPS Section 10.5.	None

NRC Letter: January 31, 1983

Question No. Q231.1 (Section 2.5)

Revise the Environmental Report to accurately reflect the results of the site faulting investigations as presented in the FSAR. Page 2.5-2 (second and third paragraphs) of the ER is incorrect (based on the more detailed geologic submittal presented in the FSAR) as far as:

1. The number of faults mapped at the Unit 3 site,

2. The age of most recent faulting, and

3. The type of faulting.

Response:

EROLS Section 2.5 has been revised in Amendment 2 to reflect consistency with the FSAR.

NRC Letter: January 31, 1983

Question No. Q240.1 (Section 2.4)

Description of floodplains, as requested by Executive Order 11988, Floodplain-Management, have not been provided. The definition used in the Executive Order is:

Floodplain: The lowland and relatively flat areas adjoining inland and coastal waters including flood prone areas of offshore islands, including at a minimum that area subject to a one percent or greater chance of flooding in any given year.

a. Provide descriptions of the floodplains adjacent to the site. On a suitable map(s) provide delineations of those areas that will be flooded during the one percent (100-year) flood, both before and after plant construction or operation.

b. Provide details of the methods used to determine the floodplains in response to a. above. Include your assumption of, and basis for, the pertinent parameters used in the computation of the flood flows and water elevations. If studies approved by the Federal Insurance Administration (FIA) are available for the site and other affected areas, the details of the analyis used in the reports need not be supplied. You can instead provide the reports from which you obtained the floodplain information.

c. Identify, locate on a map and describe all plant structures and topographic alternations in the floodplains.

d. Discuss the hydrologic effects of all items identified in response to c. above. Discuss the potential for altered flood flows and levels, offsite. Discuss the effects on offsite areas of debris generated from the site during flood events.

e. Provide the details of your analysis used in response to d. above. The level of detail is similar to that identified in item b. above.

Response:

The Millstone 3 station is located on Millstone Point, a peninsula that extends into Long Island Sound.

a. The peninsula is flanked by Niantic Bay to the west and Jordan Cove to the east, both of which are extensions of Long Island Sound. Flooding at the plant site is caused by storm induced high water in Long Island Sound. The one percent chance storm-tide elevation is 10.7 ft NGVD. The coincident floodplain with this elevation prior to construction is shown on Figure Q240.1-1. The floodplain is mostly limited to the coastal perimeter of the site. One area with more extensive flooding is a low lying neck of land just west of the

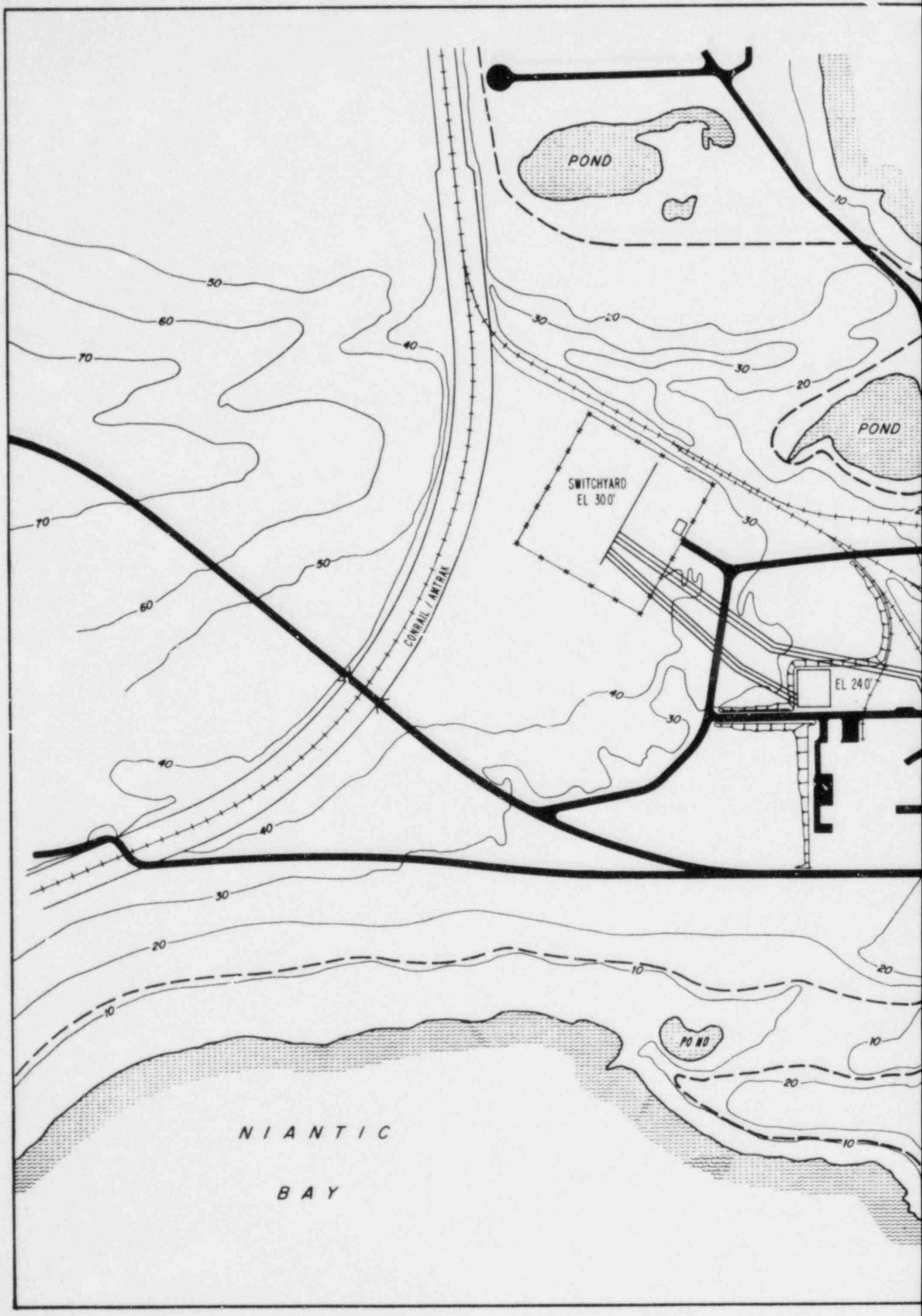
quarry. The floodplain also inundates large areas just to the east and west of the station. Figure Q240.1-2 shows the floodplain after plant construction.

b. A Flood Insurance Study report was completed in 1980 by James P. Purcell, Associates, Inc. for the Federal Insurance Administration. The 1 percent chance flood elevation of 10.7 ft NGVD from that report is used for the response to these floodplain questions. The flood insurance study report is included as Exhibit 240.1-1.

c. Figure Q240.1-2 shows the floodplain with plant structures in place. The outfall structure, the circulating and service water pumphouse, and the new discharge canal are partially in the floodplain. Details of site grade revisions for these three facilities are given in Figures Q240.1-3, Q240.1-4, and Q240.1-5.

d. The plant structures within the floodplain have no effect on coastal flooding generated by Long Island Sound. The large size of the Sound eliminates the possibility that water levels will change due to the presence of these structures in the floodplain. The effects of debris on downstream facilities is a factor only in riverine flooding.

e. The response to part d is based on the physical characteristics of the site and did not require a detailed quantitative analysis.



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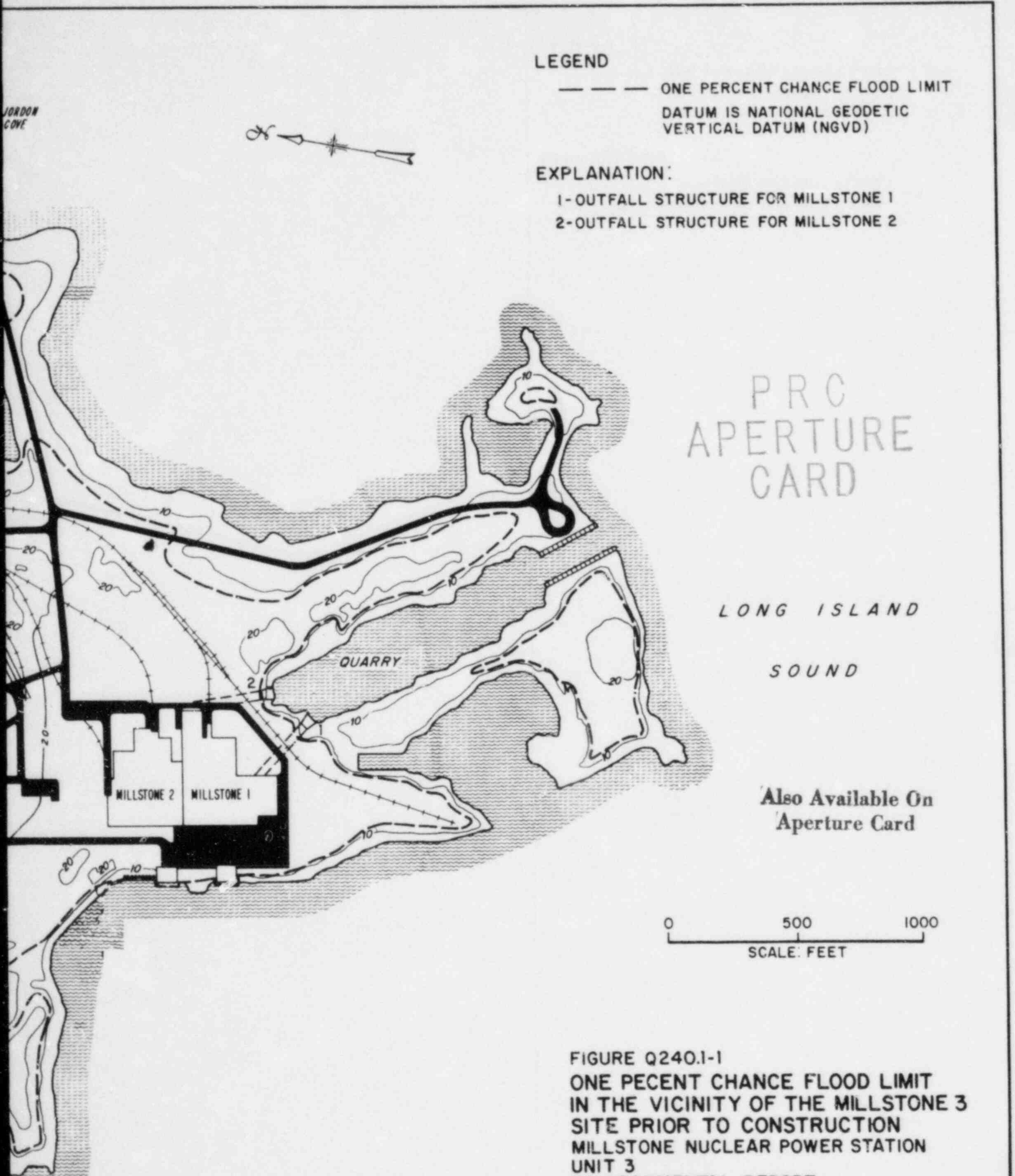
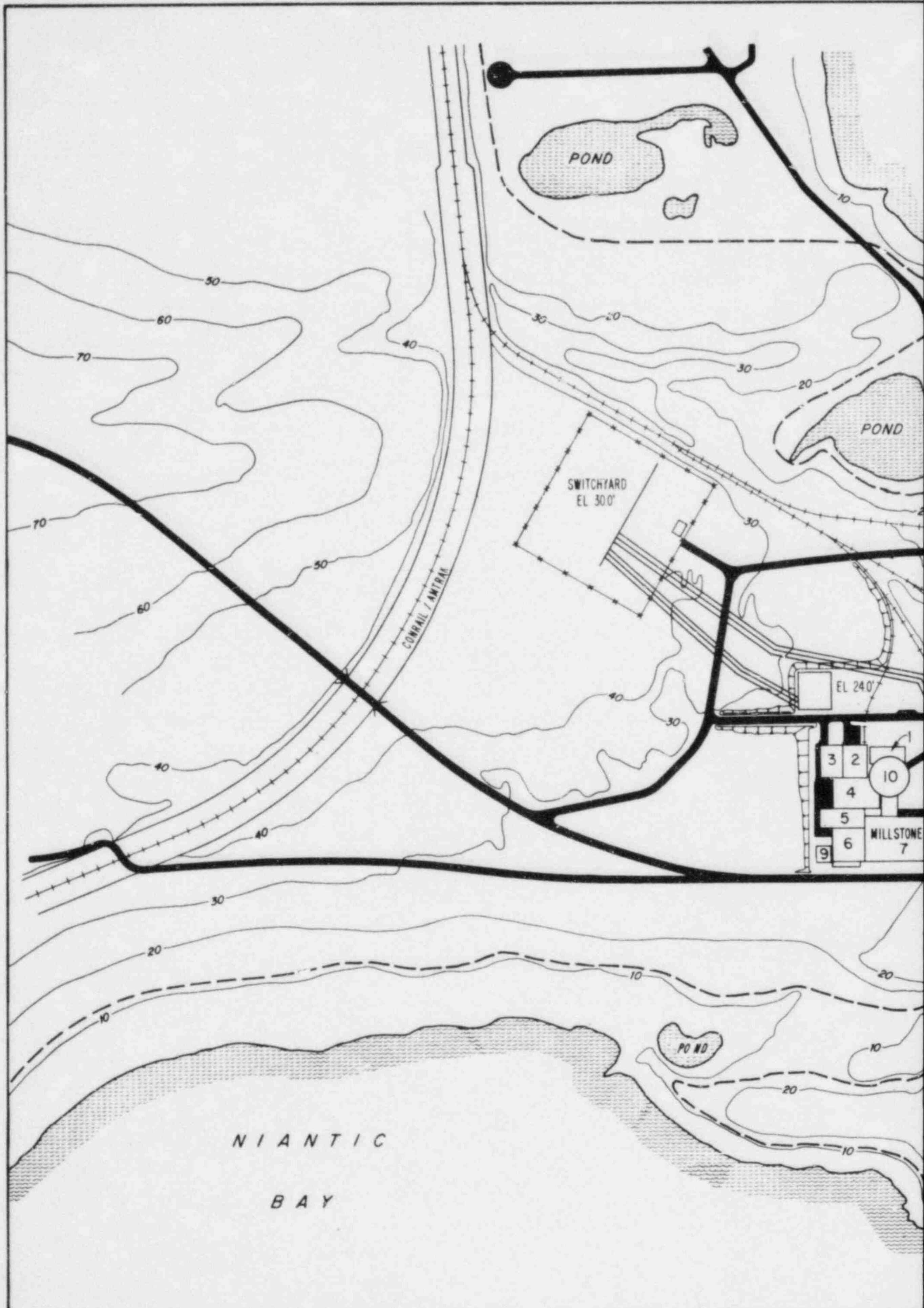


FIGURE Q240.1-1
ONE PECENT CHANCE FLOOD LIMIT IN THE VICINITY OF THE MILLSTONE 3 SITE PRIOR TO CONSTRUCTION
MILLSTONE NUCLEAR POWER STATION
UNIT 3
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE



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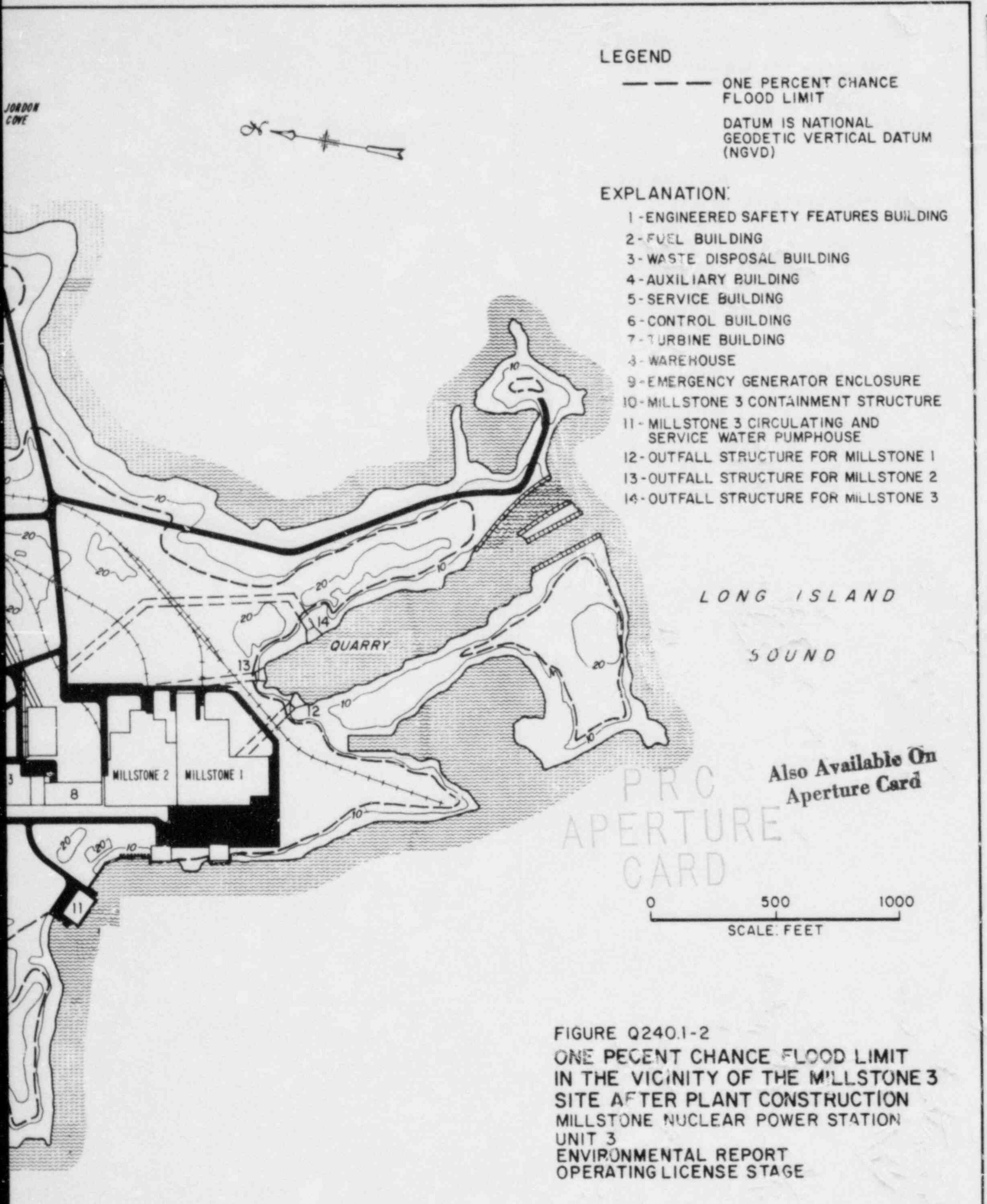
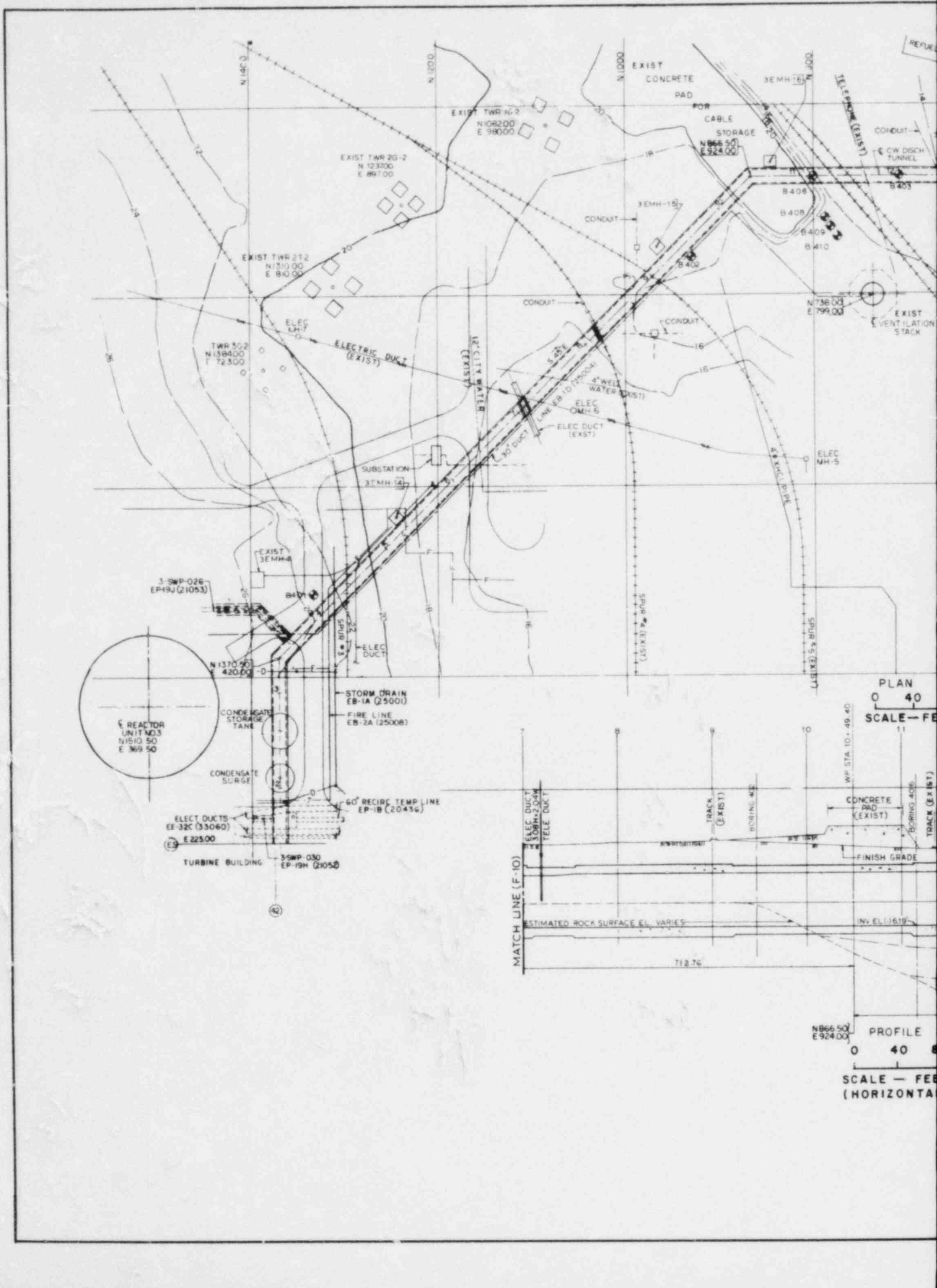
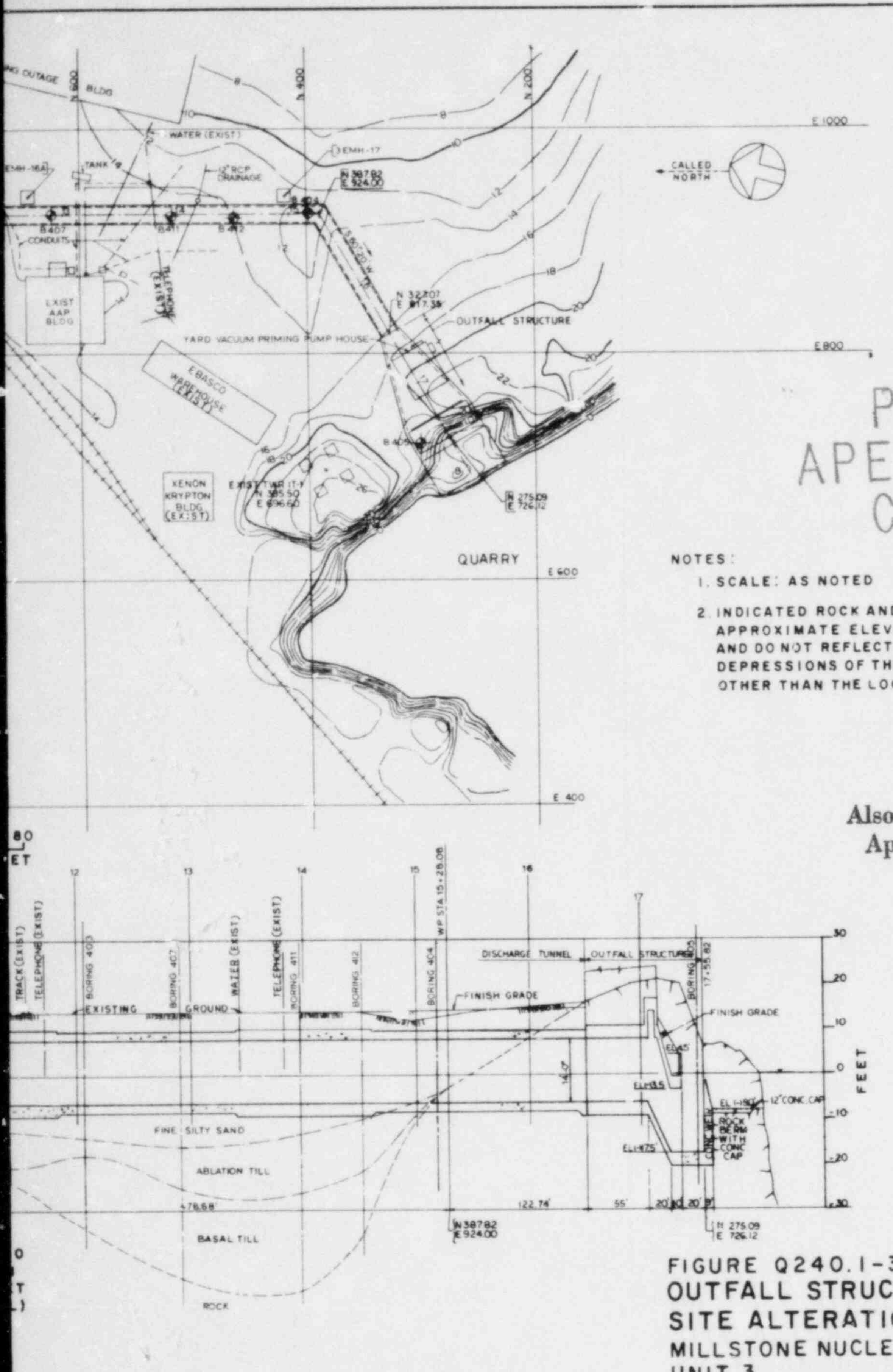


FIGURE Q240.1-2
ONE PECENT CHANCE FLOOD LIMIT IN THE VICINITY OF THE MILLSTONE 3 SITE AFTER PLANT CONSTRUCTION
MILLSTONE NUCLEAR POWER STATION
UNIT 3
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE



EXIST CONCRETE PAD FOR CABLE STORAGE
EXIST TWR 1G-2 N 1062.00 E 980.00
EXIST TWR 2G-2 N 1237.00 E 897.00
EXIST TWR 2T2 N 1310.00 E 810.00
TWR 3G2 N 1384.00 E 723.00
3EMH-16
3EMH-15
3EMH-14
EXIST 3EMH-4
TELEPHONE (EXIST)
CONDUIT
℄ CW DISCH TUNNEL
N 866.50 E 924.00
B 403
B 406
B 408
B 409
B 410
B 402
B 401
N 738.00 E 799.00
EXIST ℄ VENTILATION STACK
ELEC MH-7
ELECTRIC DUCT (EXIST)
12" CITY WATER (EXIST)
4" WELL WATER (EXIST)
ELEC OMH-6
ELEC DUCT (EXST)
30" DUCT
ELEC MH-5
48" RCCP PIPE
SUBSTATION
SPUR 9 (EXIST)
SPUR 4.5 (EXIST)
3-SWP-026 EP-19J (21053)
N 1370.50 E 420.00
ELEC DUCT
STORM DRAIN EB-1A (25001)
FIRE LINE EB-2A (25008)
℄ REACTOR UNIT NO.3 N 1510.50 E 369.50
CONDENSATE STORAGE TANK
CONDENSATE SURGE
60" RECIRC TEMP LINE EP-1B (20436)
ELECT DUCTS EE-32C (33060)
E 225.00
TURBINE BUILDING
3-SWP-030 EP-19H (21052)
PLAN
0 40
SCALE—FE
MATCH LINE (F-10)
ELEC DUCT 308H+2.04W TELE DUCT
TRACK (EXIST)
BORING 412
WP STA 10+49.40
CONCRETE PAD (EXIST)
BORING 406
TRACK (EXIST)
FINISH GRADE
ESTIMATED ROCK SURFACE EL. VARIES
INV EL (-) 6.19
712.76
N 866.50 E 924.00
PROFILE
0 40 8
SCALE — FEE
(HORIZONTA



NOTES:

1. SCALE: AS NOTED
2. INDICATED ROCK AND TILL SURFACES DELINEATE APPROXIMATE ELEVATIONS BETWEEN BORINGS AND DO NOT REFLECT LOCAL RISES OR DEPRESSIONS OF THESE SURFACES IN AREAS OTHER THAN THE LOCATION OF BORINGS.

PRC APERTURE CARD

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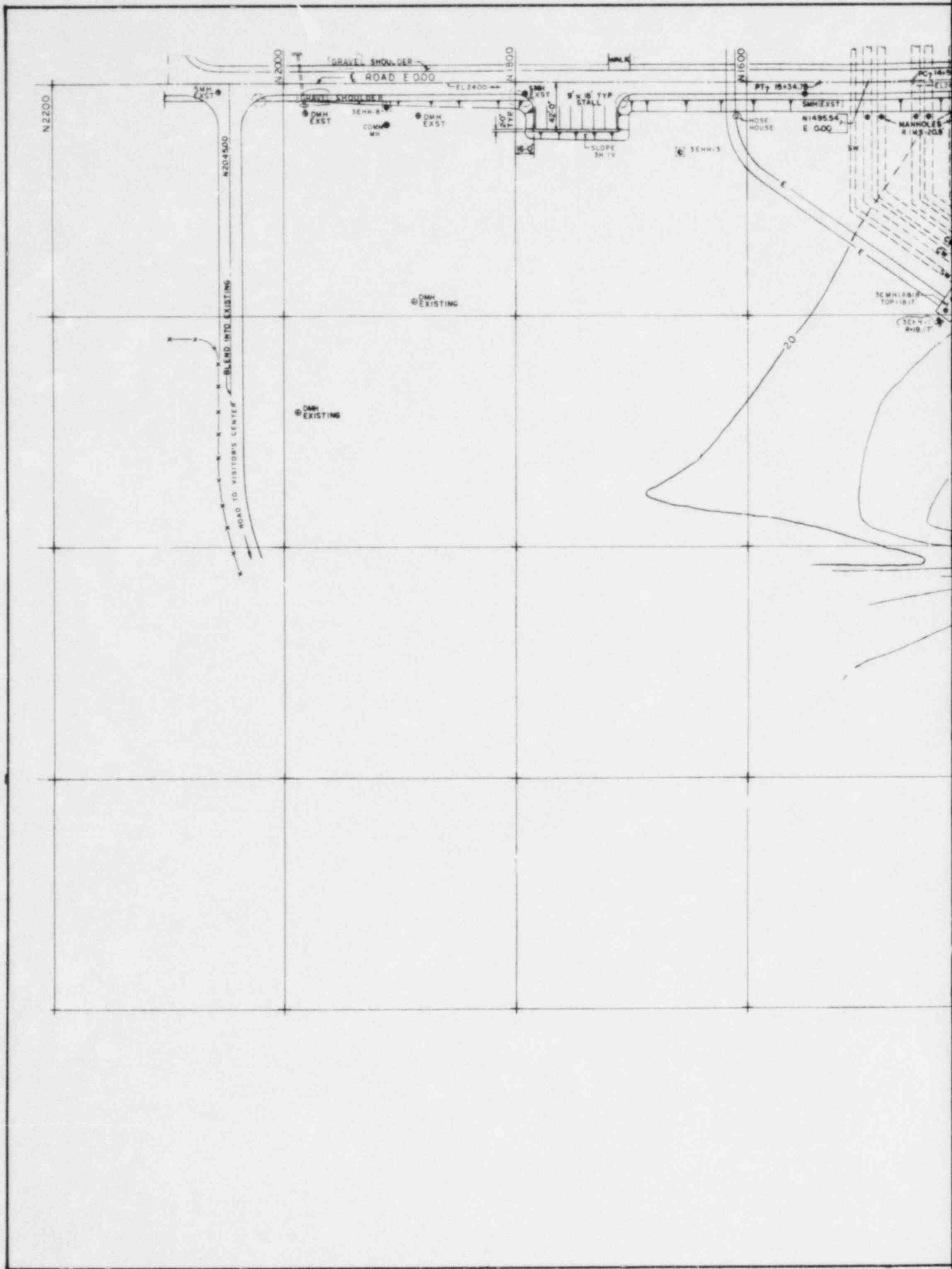
FIGURE Q240.1-3
OUTFALL STRUCTURE
SITE ALTERATIONS
MILLSTONE NUCLEAR POWER STATION
UNIT 3
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE

8310040527-04


GRAVEL SHOULDER
ROAD E 0.00
GRAVEL SHOULDER
WALK
N2200
N2000
N1800
N1600
SMH EXST
DMH EXST
COMM MH
9' x 18' TYP STALL
SLOPE 3H 1V
HOSE HOUSE
N1495.54
E 0.00
MANHOLES
DMH EXISTING
DMH EXISTING
BLEND INTO EXISTING
ROAD TO VISITOR'S CENTER
20

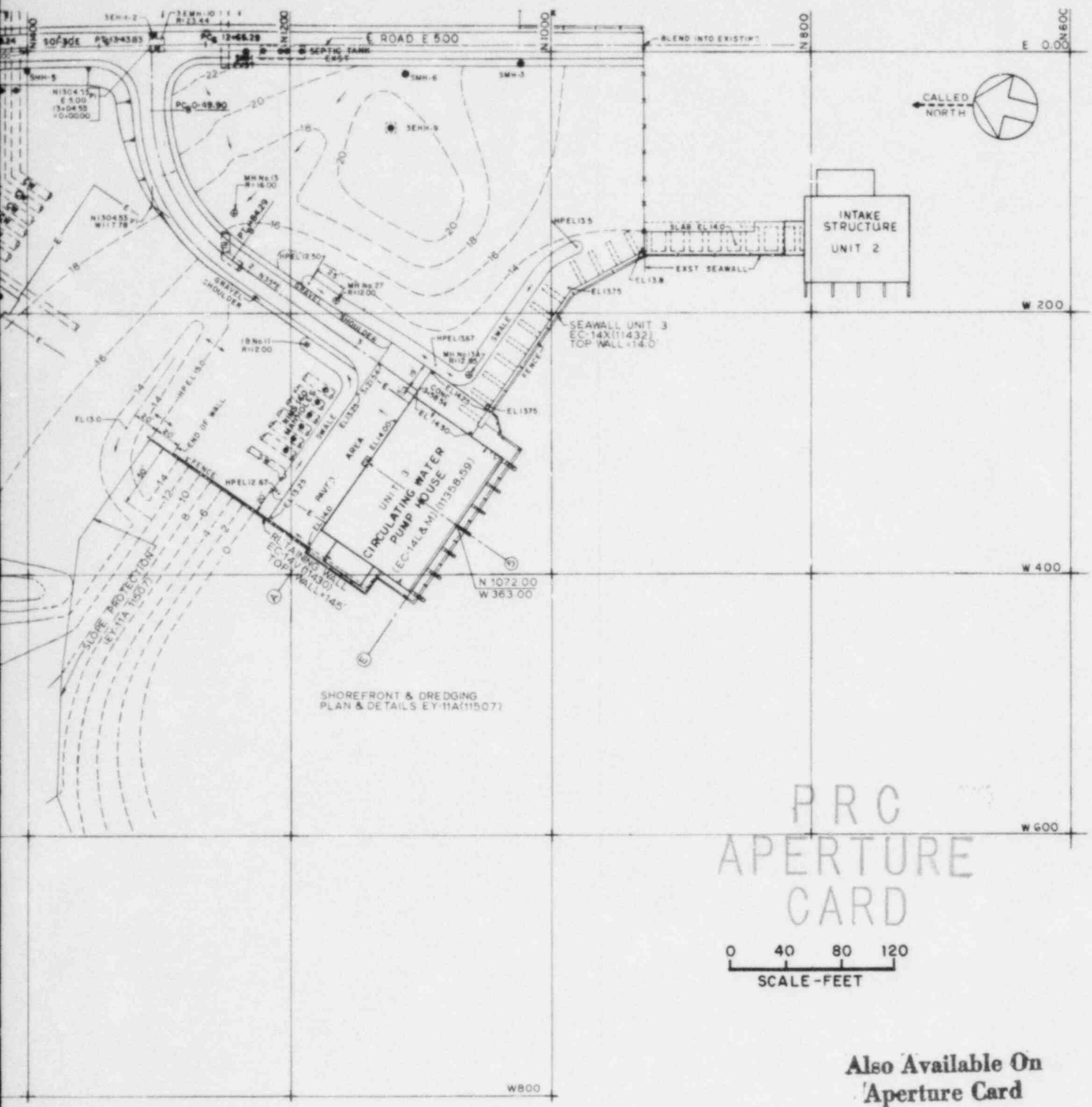
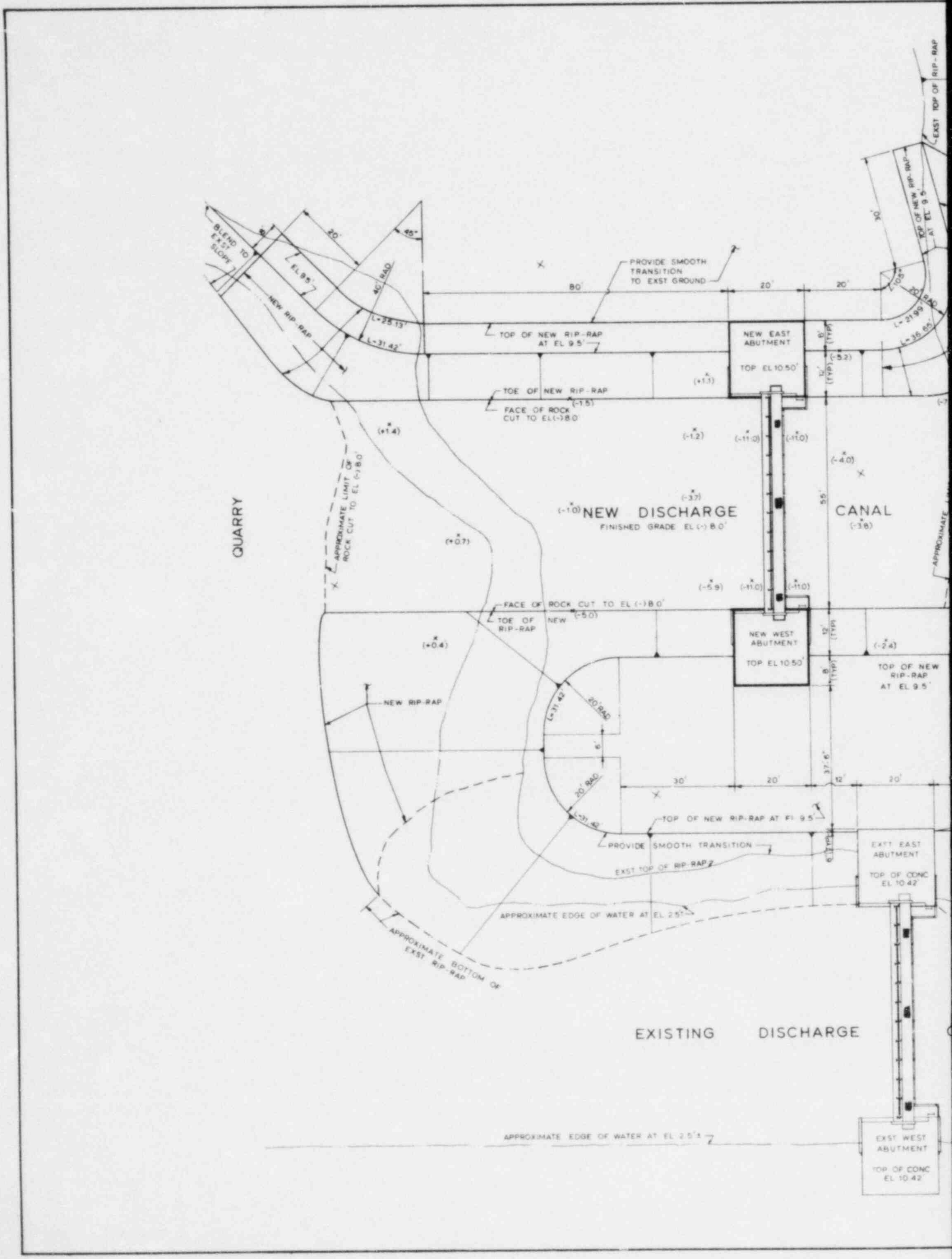
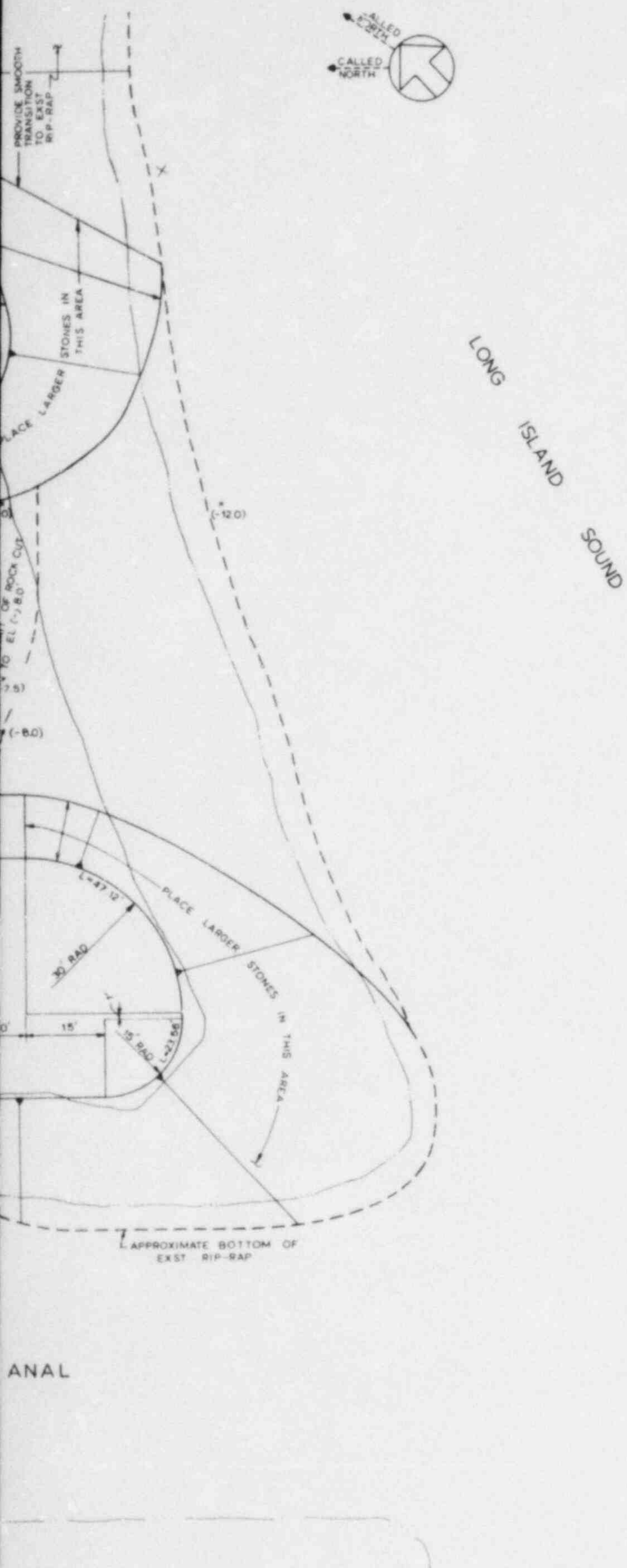


FIGURE Q240.1-4
INTAKE STRUCTURE
SITE ALTERATIONS
MILLSTONE NUCLEAR POWER STATION
UNIT 3
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE


QUARRY
NEW DISCHARGE
CANAL
FINISHED GRADE EL (-) 8.0'
BLEND TO EXST SLOPE
NEW RIP-RAP
EL 9.5'
40' RAD
PROVIDE SMOOTH TRANSITION TO EXST GROUND
TOP OF NEW RIP-RAP AT EL 9.5'
TOE OF NEW RIP-RAP
FACE OF ROCK CUT TO EL (-) 8.0'
NEW EAST ABUTMENT
TOP EL 10.50'
APPROXIMATE LIMIT OF ROCK CUT TO EL (-) 8.0'
FACE OF ROCK CUT TO EL (-) 8.0'
TOE OF NEW RIP-RAP
NEW WEST ABUTMENT
TOP EL 10.50'
TOP OF NEW RIP-RAP AT EL 9.5'
20' RAD
TOP OF NEW RIP-RAP AT EL 9.5'
PROVIDE SMOOTH TRANSITION
EXST TOP OF RIP-RAP
EXST EAST ABUTMENT
TOP OF CONC EL 10.42'
APPROXIMATE EDGE OF WATER AT EL 2.5'
APPROXIMATE BOTTOM OF EXST RIP-RAP
EXISTING DISCHARGE
APPROXIMATE EDGE OF WATER AT EL 2.5'±
EXST WEST ABUTMENT
TOP OF CONC EL 10.42
EXST TOP OF RIP-RAP
TOP OF NEW RIP-RAP AT EL 9.5'



NOTE:

1. x(-8.0) INDICATES TOP OF EXISTING ROCK ON DEC. 1982

0 10 20 30 40

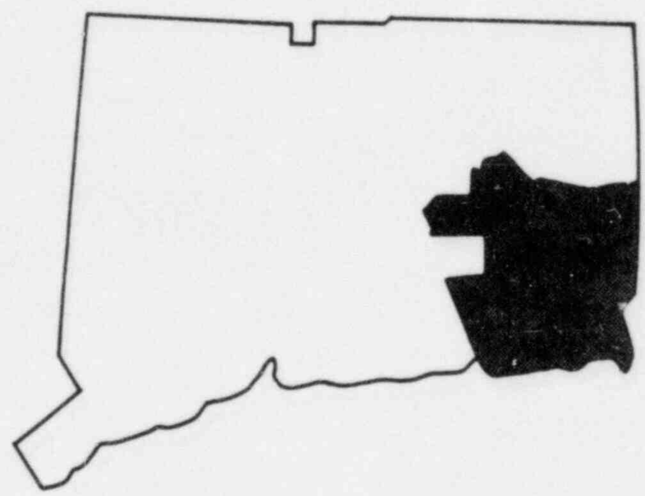
SCALE-FEET

FIGURE Q240.1-5
DISCHARGE CANALS
SITE ALTERATIONS
MILLSTONE NUCLEAR POWER STATION
UNIT 3
ENVIRONMENTAL REPORT
OPERATING LICENSE STAGE

Exhibit 240.1-1

FLOOD INSURANCE STUDY

TOWN OF WATERFORD, CONNECTICUT
NEW LONDON COUNTY



AUGUST 4, 1980

federal emergency management agency
federal insurance administration

COMMUNITY NUMBER - 090107

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FLOOD INSURANCE STUDY
TOWN OF WATERFORD, CONNECTICUT

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Waterford, New London County, Connecticut, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Waterford to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally-supported studies are based. These criteria take precedence over the minimum federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 24 CFR, 1910.1(d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared by James P. Purcell, Associates, Inc., for the Federal Insurance Administration, under Contract No. H-4561. This work, which was completed in March 1979, covered all significant flooding sources in the Town of Waterford.

1.3 Coordination

Contacts were made and meetings were held with the first selectman, the director of public works, officials from the building and planning departments, and other town officials and residents. The initial Consultation and Coordination Officer's (CCO) meeting was held on June 8, 1977, at which time the tidal and riverine flooding and

drainage problems were described and discussed. Streams to be studied in detail were identified and it was confirmed that a detail study would be made of coastal flooding. Information concerning potential development along streams and on the coast was provided by the director of public works. Maps and survey data were also provided. Contacts were made with the Connecticut Department of Transportation. A town roads map and survey data were obtained.

During the course of the work, specific information on peak discharge-frequency relationships, previous flood hazard evaluations, recent and impending flood plain development, and the extent of historical flooding was obtained, reviewed and discussed with town officials, members of the Connecticut Department of Transportation, local residents and the FIA. An intermediate CCO meeting was held on January 19, 1979, to review the hydrologic and hydraulic analyses.

On January 8, 1980, results of this study were reviewed at the final CCO meeting, which was attended by representatives of the Town of Waterford, the FIA, and James P. Purcell, Associates, Inc. (the study contractor).

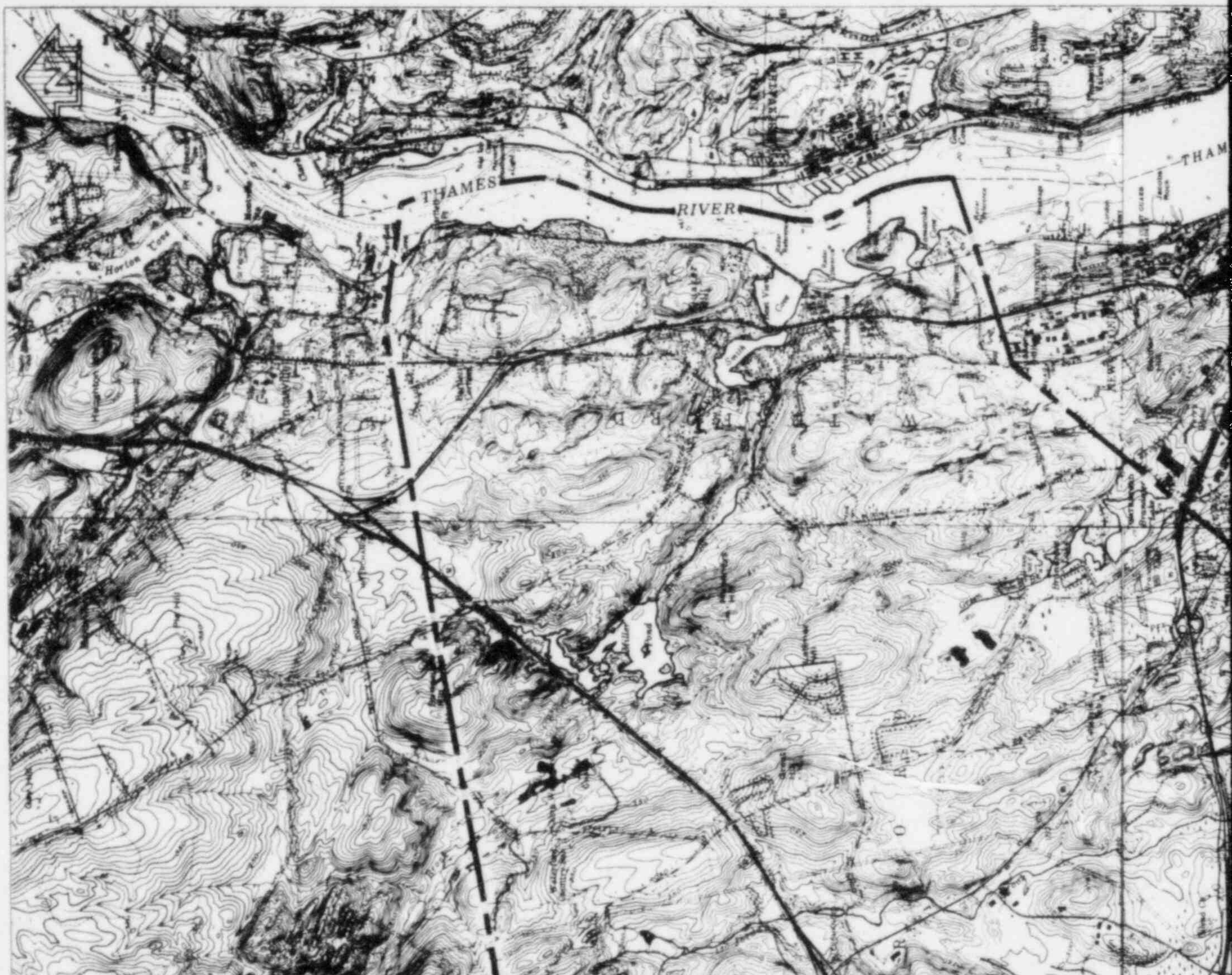
2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Waterford, New London County, Connecticut. The area of study is shown on the Vicinity Map (Figure 1).

Detailed tidal flood analysis was performed on the complete coastline of Waterford, for which the flooding source is Long Island Sound. Floods caused by storm tides on the Niantic and Thames Rivers were also studied in detail. For Jordan and Nevins Brooks, a detailed study of non-tidal, riverine flooding was made. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction for the next five years, through March 1984.

Portions of Jordan Brook and Nevins Brook above the limits of detailed study were studied by approximate methods. Church, Fenger, Green Swamp, Hunts, Lakes Pond, Oil Mill and Stony Brooks were also studied by approximate methods along with other smaller flooding sources. Approximate methods of analysis were used to study those areas having low development potential and minimal flood hazards as identified at the initiation of the study. The scope and methods of study were proposed to and agreed upon by the FIA.



Also Available On
Aperture Card

FIGURE 1	FEDERAL EMERGENCY MANAGEMENT AGENCY Federal Insurance Administration **TOWN OF WATERFORD, CT** (NEW LONDON CO.)	APPROXIMATE SCALE 800 0 800 1600 2400 FEET **VICINITY MAP**

be separated into village concentrations by the transportation system. State Route 52, State Route 85, Interstate Route 95 and the railroad right-of-way act as barriers that serve to reinforce the historic villages that comprise the Town of Waterford (Reference 4).

This village separation has played a significant role in the development of Waterford's character as a small, open, residential community. Industrial and commercial development has been pretty well segregated and contained away from the residential villages (Reference 4).

Development in Waterford consists mostly of single-family, detached houses on medium to large lots, commercial areas concentrated on Boston Post Road, and some small industrial and warehousing operations primarily within the State Route 52 - State Route 85 - Interstate Route 95 triangle with the major exception of Millstone Point. Urban development now occupies about 25 percent of the town's land area, an additional 50 percent of the land contains physical characteristics that are not conducive to development (steep slopes, shallow lying bedrock, and wetlands). The remaining 25 percent, over 6,000 acres, presents no constraints to development (Reference 4).

2.3 Principal Flood Problems

The most severe flooding in Waterford occurs during hurricanes or coastal storms. These storms, with their intense winds and rainfall can create abnormally high tidal surges, wave run-up and peak runoff. When the hurricane's storm track is west of the community, the hurricane's counter-clockwise winds tend to increase the adverse effect of the tidal surge. Hurricanes normally occur in late summer or early fall, but occurrence of coastal storms is not restricted to any particular season. When coastal storms occur in winter and spring, the flooding problem is compounded by ice jams and runoff of melting snow.

Reports of flooding in eastern Connecticut extend back to the early 17th century. Records indicate that the hurricanes of 1635 and 1638 caused extensive tidal flooding in coastal areas of Massachusetts and Rhode Island, probably the greatest ever experienced in New England during the past 340 years. Though no records exist for Connecticut, it is reasonable to assume that these hurricanes caused extensive tidal flooding of the Connecticut coast.

Records do indicate that the coast of Connecticut has experienced or has been threatened by hurricane tidal flooding on 66 occasions since 1769. On nine of these occasions severe tidal flooding did

occur. The five greatest, as far as can be determined from existing records, were the hurricanes of 1938, 1893, 1954, 1815, and 1944 (in descending order of estimated magnitude) (Reference 5).

In the COE study entitled Hurricane Survey, Connecticut Coastal and Tidal Areas, information regarding flood problems in Waterford is included (Reference 6). The following information has been taken from that Hurricane Survey.

The Town of Waterford has a shorefront along Long Island Sound of about 7.3 miles. About one mile is publicly owned. The total tidal shoreline, including that on the east bank of the Niantic River and the west bank of the Thames River is about 22 miles. (This distance presumably includes the shores of Jordan Cove, the western shore of Alewife Cove and all other coves and indentations.) (Reference 6).

Hurricane tidal flood damages for Waterford reached 370,000 dollars for the 1938 hurricane and 310,000 dollars for the 1954 hurricane according to the Hurricane Survey (Reference 6). These figures were adjusted, in the survey report, to a 1963 price level. The damages were scattered along the entire shoreline with principal concentrations at the head of Niantic Bay and in the Ridgewood area on the west bank of Alewife Cove. Much of the loss in 1954 was from damage to boats (Reference 6).

Tidal surges during severe storms cause flooding along both the Niantic and the Thames Rivers, the larger rivers in the area, and also along other smaller streams flowing into either these rivers or Long Island Sound. Where structures are located in the flood plains of these streams, damage is inflicted. Further inland, riverine flooding, not directly related to tidal surges, has occurred on many of these and other streams. Again, where structures are located in the flood plains, damage is inflicted.

2.4 Flood Protection Measures

According to the COE Hurricane Survey, no flood protection measures for the coast of Waterford have been considered (Reference 6).

The State of Connecticut and the U. S. Department of Agriculture are providing for protection of tidal marshes by prohibiting future development. Coastal flooding of marshes, as opposed to developed areas, will not result in large monetary losses.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one-percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten) and, for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each riverine flooding source, and to establish the peak elevation-frequency relationships for the other flooding sources studied in detail affecting the community.

To define discharge-frequency data for Jordan and Nevins Brooks, the USGS flood flow formulas for ungaged streams were used (Reference 7). These formulas were empirically derived from stream-gaging and precipitation-gaging stations in Connecticut with 10 to 45 years of record. The formulas utilize drainage basin characteristics and precipitation data and yield the 100-year peak discharge. The values of the 10-, 50-, and 500-year peak discharges were determined from a log-Pearson Type III distribution, which was obtained from the calculated 100-year peak discharge, the standard deviation and skew coefficient of annual maximum flows.

Tidal flood elevations for Long Island Sound, the Niantic River and the other tidal-affected streams (except the Thames River) are based upon a storm-surge frequency curve from the COE report entitled Long Island Sound, Interim Memo No. COE-2, Tidal Hydrology (Reference 5).

This curve was developed by statistically combining elevations of the hurricanes of 1938 and 1954 and records of great historic storms with records of the U. S. Coastal and Geodetic Survey, and with municipal and public utility company tidal gages for a 26 to 42 year period starting in 1930.

In this study, flood elevations along the Thames River are based upon a storm-frequency curve published in the COE report entitled Hurricane Survey, Eastern Connecticut (Reference 8). In addition to that report, frequency tidal data compiled by the COE at Thamesville (Norwich) and Uncasville (Montville) were utilized to substantiate flood profiles published in the Hurricane Survey report.

A summary of drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges." A summary of tidal elevation-frequency relationships for the tidal areas is shown in Table 2, "Summary of Elevations."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-YEAR	50-YEAR	100-YEAR	500-YEAR
JORDAN BROOK					
At confluence with Jordan Cove	6.39	760	1,200	1,500	2,200
Above confluence with Nevins Brook	4.53	420	680	820	1,200
900 feet downstream from Boston Post Road	3.85	370	600	730	1,100
At Interstate Route 95	2.66	300	500	600	900
3500 feet downstream from State Route 52	1.76	220	350	430	640
At State Route 52	0.72	160	270	330	480
NEVINS BROOK					
Above confluence with Jordan Brook	1.86	220	360	440	660
At Fog Plain Road	1.23	180	280	350	510
At Interstate Route 95	0.29	90	150	180	270

TABLE 2 - SUMMARY OF ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet)			
	10-YEAR	50-YEAR	100-YEAR	500-YEAR
LONG ISLAND SOUND				
At the Niantic River	6.7	9.4	10.7	14.4
At Alewife Cove	6.6	9.3	10.7	14.1
THAMES RIVER				
At the City of New London corporate limits	6.7	9.6	11.0	14.4
At the Town of Montville corporate limits	7.5	10.4	12.0	15.6

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of Jordan and Nevins Brooks and the shoreline characteristics of Long Island sound, the Niantic River, and the Thames River were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the flooding sources.

For Jordan and Nevins Brooks, cross-section data were obtained from aerial mapping (Reference 9). Data for the below-water sections were obtained by field measurement. All bridges and culverts on these streams were surveyed to obtain elevation data and structural geometry.

Roughness coefficients (Manning's "n") for the streams were estimated by field inspection at each cross section. For Jordan Brook, the roughness coefficients range from 0.015 to 0.080 for the channel and from 0.030 to 0.080 for the overbank areas. For Nevins Brook, the coefficients range from 0.015 to 0.060 for the channel and from 0.030 to 0.080 for the overbank areas.

Starting water-surface elevations for the streams studied in detail were estimated between the mean spring tide levels and the coastal storm surge levels for the various return frequency floods.

Water-surface profiles were developed using the COE HEC-2 computer program (Reference 10). Comparisons of the profiles were made with the estimated profiles or elevations of historic floods. Reasonable correlation was evident. The estimated profiles or elevations were obtained as the result of observations made in the field and interviews with town officials and local citizens.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross-section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 3).

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if hydraulic structures remain unobstructed and do not fail.

Areas of coastline subjected to wave attack are referred to as coastal high hazard zones. Coastal high hazard zones were identified by use of the abbreviated analytical method described in Section 2 of the COE Guidelines for Identifying Coastal High Hazard Zones (Reference 11). In determining coastal high hazard zones, consideration was given to reaches of open water which were sufficiently long to permit generation of damaging waves. Some shelter of the study area from the open sea is afforded by Long Island.

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929. Locations of the elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year

flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using aerial maps at a scale of 1:2,400. Stereoscopic plotters were used to determine spot elevations (Reference 9). The 100-and 500-year boundaries of the tidal areas were delineated using topographic maps at a scale of 1:24,000, with a contour interval of 10 feet (Reference 12). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year boundary has been shown.

For streams studied by approximate methods, the 100-year flood boundaries were established from Flood Hazard Boundary Maps and from information provided by the Town of Waterford and local citizens (Reference 13). Field verification was made of all data and information.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding. Owing to limitations of the map scale and lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood can be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are

not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plains. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 3).

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "With Floodway" elevations presented in Table 3 for certain downstream cross sections of Jordan Brook are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

As shown on the Flood Boundary and Floodway Map (Exhibit 3), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each flooding source affecting the Town of Waterford.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Jordan Brook								
A	50	100	221	6.8	10.7	10.6[2]	10.6	0.0
B	1,300	350	2,402	0.6	15.8	15.8	16.8	1.0
C	2,400	350	2,417	0.3	15.8	15.8	16.8	1.0
D	3,930	130	480	1.5	16.0	16.0	17.0	1.0
E	5,800	40	193	3.8	28.8	28.8	29.1	0.3
F	6,590	30	209	3.5	33.5	33.5	33.5	0.0
G	7,620	125	362	2.0	33.8	33.8	34.8	1.0
H	9,120	80	499	1.5	36.0	36.0	36.3	0.3
I	10,830	120	229	3.2	45.4	45.4	45.9	0.5
J	12,155	40	127	5.8	54.2	54.2	54.2	0.0
K	13,470	38	124	5.9	62.0	62.0	62.0	0.0
L	15,120	150	1,055	0.6	63.8	63.8	64.3	0.5
M	17,740	100	219	2.7	78.5	78.5	78.9	0.4
N	19,440	60	90	4.8	90.9	90.9	91.0	0.1
O	21,560	82	114	3.8	104.2	104.2	104.2	0.0
P	22,860	40	107	4.0	109.3	109.3	109.8	0.5
Q	24,265	50	141	3.0	118.2	118.2	118.8	0.6
R	25,825	50	119	3.6	118.6	118.6	119.4	0.8
S	27,105	50	78	5.5	121.5	121.5	122.0	0.5

[1]Feet above confluence with Jordan Cove

[2]Elevation computed without consideration of backwater effects from Long Island Sound

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

TOWN OF WATERFORD, CT
(NEW LONDON CO.)

FLOODWAY DATA

JORDAN BROOK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Nevins Brook								
A	1,480	50	86	5.1	16.4	16.4	16.6	0.2
B	2,040	40	208	2.1	21.5	21.5	21.5	0.0
C	4,110	60	105	4.2	25.2	25.2	25.2	0.0
D	6,650	30	103	4.3	30.6	30.6	31.5	0.9
E	7,225	40	222	1.6	33.7	33.7	33.8	0.1
F	9,120	40	145	2.4	33.7	33.7	34.6	0.9
G	10,050	50	263	1.3	41.1	41.1	41.1	0.0
H	11,660	30	74	4.8	46.3	46.3	46.5	0.2

[1]Feet above confluence with Jordan Brook

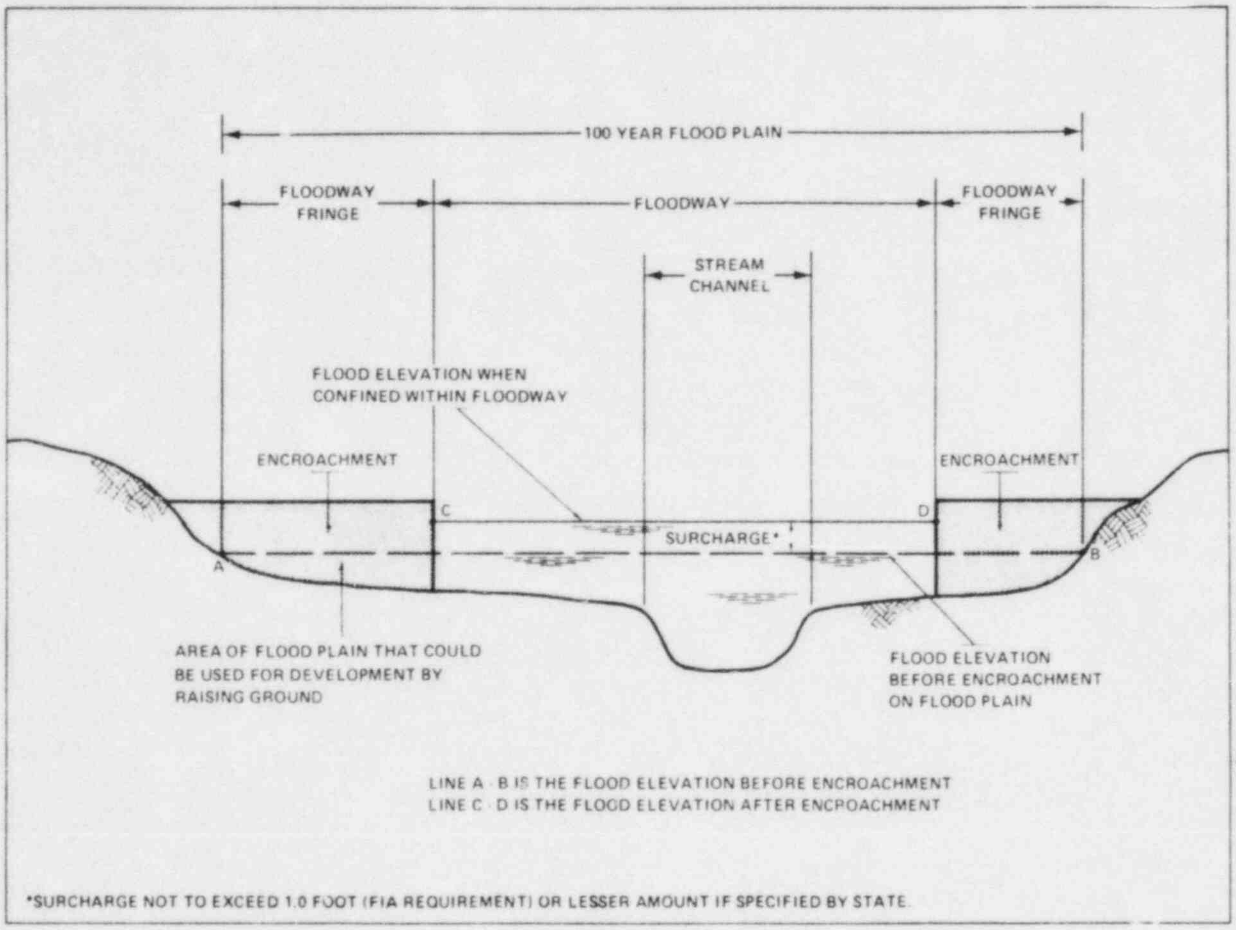
TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

TOWN OF WATERFORD, CT
(NEW LONDON CO.)

FLOODWAY DATA

NEVINS BROOK



FLOODWAY SCHEMATIC Figure 2

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of reaches determined for the riverine flooding sources of the Town of Waterford are shown on the profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 4). In tidal areas, reaches are limited to the distance for which the difference between the 10-year and 100-year flood elevations does not vary more than 1.0 foot. Using these criteria, the shorelines of the Thames River and Long Island Sound each qualify as one reach. The Niantic River is entirely controlled by backwater from Long Island Sound and does not qualify as a separate reach.

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Town of Waterford was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations shown or FHFs determined.
Zones A1, A2, A3, A4, A6, A8 and A9:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHF.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND 10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)	FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
Jordan Brook							
Reach 1	15	-1.2	-0.4	+2.6	010	A2	Varies
Reach 2	15	-1.5	-0.2	+0.5	015	A3	Varies
Reach 3	15	-2.0	-0.5	+1.4	020	A4	Varies
Reach 4	15	-3.0	-0.4	+0.8	030	A6	Varies
Reach 5	15	-1.5	-0.4	+0.7	015	A3	Varies
Reach 6	15	-0.8	-0.3	+0.6	010	A2	Varies
Reach 7	15	-1.3	-0.4	+1.5	015	A3	Varies
Reach 8	10,15,20	-0.6	-0.2	+0.5	005	A1	Varies
Reach 9	10	-4.2	-0.2	+0.3	040	A8	Varies
Reach 10	10	-1.4	-0.2	+0.4	015	A3	Varies
Reach 11	10	-0.6	-0.2	+0.4	005	A1	Varies
Nevins Brook							
Reach 1	15	-1.5	-0.2	+0.3	015	A3	Varies
Reach 2	15	-0.6	-0.1	+0.3	005	A1	Varies
Reach 3	15	-2.8	-1.1	+0.5	030	A6	Varies
Reach 4	15	-0.8	-0.3	+0.5	010	A2	Varies
Reach 5	15	-0.4	-0.3	+0.4	005	A1	Varies
Reach 6	15	-2.2	-0.8	+0.8	020	A4	Varies
Reach 7	15	-0.5	-0.2	+0.5	005	A1	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted average
[3]Rounded to the nearest foot - see map

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

TOWN OF WATERFORD, CT
(NEW LONDON CO.)

FLOOD INSURANCE ZONE DATA

JORDAN BROOK AND NEVINS BROOK

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Thames River Reach 1	20	-4.4	-1.5	+3.5	045	A9	Varies
Long Island Sound Reach 1	05,15	-4.0	-1.3	+3.6	040	A8,V8	11

[1]Flood Insurance Rate Map Panel

[2]Weighted average

[3]Rounded to the nearest foot - see map

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

TOWN OF WATERFORD, CT
(NEW LONDON CO.)

FLOOD INSURANCE ZONE DATA

THAMES RIVER AND LONG ISLAND SOUND

Zone V8:	Special Flood Hazard Areas along coasts inundated by the 100-year flood as determined by detailed methods, and that have additional hazards due to velocity (wave action); base flood elevations shown, and zones subdivided according to FHFs.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 4, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the Town of Waterford.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Town of Waterford is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

The tidal hydrologic data used in this study were drawn from a previous study conducted by the COE in 1973 of the coastline between Willets Point, New York and Pawcatuck Point, Connecticut (Reference 5). The Town of Waterford lies within this area. The COE study provides consistent results for communities that base their tidal flooding elevation on that source.

The results of this report are consistent with the Flood Insurance Study for the City of New London, Connecticut (Reference 14).

This study is authoritative for purposes of the Flood Insurance Program, and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Insurance and Mitigation Division of the Federal Emergency Management Agency, Regional Director, Region I Office, J. W. McCormack Post Office and Courthouse Building, Room 462, Boston, Massachusetts 02109.

8.0 BIBLIOGRAPHY AND REFERENCES

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13. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Town of Waterford, New London County, Connecticut, Washington, D. C., July 1974.

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NRC Letter: January 31, 1983

Question No. Q240.2 (Section 7.1.9)

Calculate the radiological consequences of a liquid pathway release from a postulated core melt accident. The analysis should assume, unless otherwise justified, that there has been a penetration of the reactor basemat by the molten core mass, and that a substantial portion of radioactivity contaminated sump water was released to the ground. Doses should be compared to those calculated in the Liquid Pathway Generic Study (NUREG-0440, 1978). Provide a summary of your analysis procedures and the values of parameters used (such as permeabilities, gradients, populations affected, water use). It is suggested that meetings with the staff of the Hydrologic Engineering Section be arranged so that we may share with you the body of information necessary to perform this analysis.

Response:

As stated in Section 7.1.9 of the Millstone 3 EROLS, "The analyses of the probabilities and consequences of accidents beyond the design bases of the Millstone 3 plant will be comprehensively discussed in the relevant portions of the Millstone 3 Probabilistic Safety Study (PSS), which the applicants presently estimate will be completed within 6 months after the docketing of the FSAR" (August 1983).