

# EMERGENCY ACTION PLAN

## **Lake Sunapee Dam** **Sunapee, NH** **Dam #229.04 (Class B Dam)**



**Water Division**

*Lake Sunapee Dam - Sunapee, NH*

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May, 2000

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## **SECTION 2**

### **General Responsibilities**

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This Emergency Action Plan (EAP) has been developed under guidelines outlined in the NHDES-WD administrative rules, Part Env-Wr 505, to provide notification to local emergency response personnel in case of the development of a potentially hazardous situation at the dam.

The Lake Sunapee Dam is owned and operated by the New Hampshire Department of Environmental Services - Water Division (NHDES-WD), Dam Bureau. As owner of the dam, the NHDES-WD is responsible for its safe operation and maintenance. If NHDES-WD personnel or another observer notices a potentially dangerous situation or an actual failure of the dam, notification should be initiated as outlined on the flowchart in Section 1 of the Plan.

Local and state emergency response personnel will take appropriate action to ensure public safety as outlined in Appendix E A Local Evacuation Procedure. Appendix C includes inundation maps to assist in evacuation and road closures.

When the EAP is activated, and during annual testing of the notification procedures, each person making notification is requested to fill out, date, and sign the appropriate checklist, included in Section 3. Additional copies of the checklists are available by contacting the NHDES-WD, Dam Bureau. (See Appendix D for more information about testing.)

Any questions concerning actions to be taken or notifications to be made should be discussed with the NHDES-WD Dam Bureau located at 6 Hazen Drive, Concord, New Hampshire, telephone (603) 271-3406.

## SECTION 3

### Notification Procedures -

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The checklists are to be filled out after any Condition Yellow or Condition Red notification is received, and after annual testing of the EAP. For more information and definitions on Condition Yellow or Condition Red, refer to Section 4, Preventive Actions.

#### **Page Agency to Contact for Incident or Testing**

#### **3-2 NHDES-WD Dam Bureau Responsibilities**

If an emergency condition exists, personnel will dial 9-1-1.

#### **3-3 9-1-1 Dispatcher Responsibilities**

If the 9-1-1 dispatcher receives a call regarding a possible dam failure, (s)he shall contact Newport Police Department and New London Dispatch.

#### **3-4 Newport Police**

After being notified by 9-1-1, the Newport Police will contact the Sunapee Police Dept., and the NH State Police Communications HQ.

#### **3-5 Sunapee Fire Department**

After being notified by the New London Dispatch, the Sunapee Fire Dept will contact the Emergency Mgt. Director

#### **3-6 NH State Police Communications Responsibilities**

The NH State Police Communications will contact the NH Office of Emergency Management (NHOEM), the NHDES-WD (Dam Bureau) and NH DOT - Hooksett Dispatch.

#### **3-7 NH DOT Hooksett Dispatch Responsibilities**

The NH DOT Hooksett Dispatch will contact the NH DOT District 2 office.

#### **3-8 New London Dispatch**

After being notified by 9-1-1, the New London Dispatch will contact the Sunapee Fire Department.

<p><b>NHDES</b>  <b>WATER DIVISION</b>  <b>DAM BUREAU</b>  <i>Notification Checklist</i></p>
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Check if \_\_\_\_\_ Notification Test  
 \_\_\_\_\_ Condition Yellow (a potentially hazardous situation exists which could jeopardize the integrity of the dam. Evacuation may become necessary.)  
 \_\_\_\_\_ Condition Red (Dam failure is imminent or has occurred and evacuation procedures must followed immediately.)

<b>Monitor=s Name:</b>		
<b>Date:</b>	<b>Time:</b>	
<b>PARTY CONTACTED</b>	<b>TIME</b>	<b>PERSON CONTACTED</b>
1. 9-1-1		

If kept on the line by the 9-1-1 dispatcher to speak directly to town dispatchers, fill in the following box, also:

<b>PARTY CONTACTED</b>	<b>TIME</b>	<b>PERSON CONTACTED</b>
1. Newport Police Dept.		
2. New London Dispatch		

NHDES- WD Dam Bureau Personnel Signature: \_\_\_\_\_  
 Lake Sunapee Dam - Sunapee, NH

<h2 style="margin: 0;">ENHANCED 9-1-1 Notification Checklist</h2>
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Check if \_\_\_\_\_ Notification Test  
 \_\_\_\_\_ Condition Yellow (a potentially hazardous situation exists which could jeopardize the integrity of the dam. Evacuation may become necessary.)  
 \_\_\_\_\_ Condition Red (Dam failure is imminent or has occurred and evacuation procedures must followed immediately.)

<b>Name:</b>		
<b>Date:</b>	<b>Time:</b>	<b>Call Received from:</b>

	PARTY CONTACTED	TIME	PERSON CONTACTED
1.	Newport Police Dept.		
2.	New London Dispatch		

Please mail completed checklists to:

NH Department of Environmental Services, Dam Bureau  
 6 Hazen Drive  
 PO Box 95  
 Concord, NH 03302-0095

9-1-1 Dispatcher=s Signature: \_\_\_\_\_

<h2 style="margin: 0;">NEWPORT POLICE DEPT</h2> <h3 style="margin: 0;">Notification Checklist</h3>
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- Check if \_\_\_\_\_ Notification Test  
 \_\_\_\_\_ Condition Yellow (a potentially hazardous situation exists which could jeopardize the integrity of the dam. Evacuation may become necessary.)  
 \_\_\_\_\_ Condition Red (Dam failure is imminent or has occurred and evacuation procedures must followed immediately.)

<b>Name:</b>		
<b>Date:</b>	<b>Time:</b>	<b>Call Received from:</b>
<b>PARTY CONTACTED</b>	<b>TIME</b>	<b>PERSON CONTACTED</b>
1. Sunapee Police Department		
2. NH State Police Communications 1-800-852-3411		

Please mail completed checklists to:

NH Department of Environmental Services, Dam Bureau  
 6 Hazen Drive  
 PO Box 95  
 Concord, NH 03302-0095

Newport Police Dept. Signature: \_\_\_\_\_

<p><b>SUNAPEE FIRE DEPARTMENT Notification Checklist</b></p>
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Check if \_\_\_\_\_ Notification Test  
 \_\_\_\_\_ Condition Yellow (a potentially hazardous situation exists which could jeopardize the integrity of the dam. Evacuation may become necessary.)  
 \_\_\_\_\_ Condition Red (Dam failure is imminent or has occurred and evacuation procedures must followed immediately.)

<b>Name:</b>		
<b>Date:</b>	<b>Time:</b>	<b>Call Received from:</b>
<b>PARTY CONTACTED</b>	<b>TIME</b>	<b>PERSON CONTACTED</b>
1. Sunapee Emergency Management Director (if other than Fire Dept member)		
2. Sunapee Police Dept.*		

\* to ensure notification, and to coordinate response.

Please mail completed checklists to:

NH Department of Environmental Services, Dam Bureau  
 6 Hazen Drive  
 PO Box 95  
 Concord, NH 03302-0095

Sunapee Fire Department Signature: \_\_\_\_\_



# NEW HAMPSHIRE STATE POLICE COMMUNICATIONS Notification Checklist

Check if \_\_\_\_\_ Notification Test  
 \_\_\_\_\_ Condition Yellow (a potentially hazardous situation exists which could jeopardize the integrity of the dam. Evacuation may become necessary.)  
 \_\_\_\_\_ Condition Red (Dam failure is imminent or has occurred and evacuation procedures must followed immediately.)

<b>Name:</b>		
<b>Date:</b>	<b>Time:</b>	<b>Call Received from:</b>
<b>PARTY CONTACTED</b>	<b>TIME</b>	<b>PERSON CONTACTED</b>
1. NH Office of Emergency Management 271-2231		
2. NHDES-WD Dam Bureau Office 271-3406 or during non-working hours, use Emergency Notification List on file at Headquarters		
3. NH DOT - Hooksett Dispatch 485-9526 (24 hrs.)		

\* to ensure dual notification

Please mail completed checklists to:  
 NH Department of Environmental Services, Dam Bureau  
 6 Hazen Drive  
 PO Box 95  
 Concord, NH 03302-0095

N.H. State Police Signature: \_\_\_\_\_

**NH DEPARTMENT OF  
TRANSPORTATION  
(HOOKSETT DISPATCH)  
Notification Checklist**

Check if \_\_\_\_\_ Notification Test  
 \_\_\_\_\_ Condition Yellow (a potentially hazardous situation exists which could jeopardize the integrity of the dam. Evacuation may become necessary.)  
 \_\_\_\_\_ Condition Red (Dam failure is imminent or has occurred and evacuation procedures must followed immediately.)

<b>Name:</b>		
<b>Date:</b>	<b>Time:</b>	<b>Call Received from:</b>

<b>PARTY CONTACTED</b>	<b>TIME</b>	<b>PERSON CONTACTED</b>
2. NH DOT District 2		

Please mail completed checklists to:

NH Department of Environmental Services, Dam Bureau  
 6 Hazen Drive  
 PO Box 95  
 Concord, NH 03302-0095

NH DOT Hooksett Dispatch Signature: \_\_\_\_\_

<h2 style="margin: 0;">NEW LONDON DISPATCH</h2> <h3 style="margin: 0;">Notification Checklist</h3>
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Check if \_\_\_\_\_ Notification Test  
 \_\_\_\_\_ Condition Yellow (a potentially hazardous situation exists which could jeopardize the integrity of the dam. Evacuation may become necessary.)  
 \_\_\_\_\_ Condition Red (Dam failure is imminent or has occurred and evacuation procedures must followed immediately.)

<i>Name:</i>		
<i>Date:</i>	<i>Time:</i>	<i>Call Received from:</i>
<i>PARTY CONTACTED</i>	<i>TIME</i>	<i>PERSON CONTACTED</i>
1. Sunapee Fire Dept.*		

\* to ensure notification, and to coordinate response.

Please mail completed checklists to:

NH Department of Environmental Services, Dam Bureau  
 6 Hazen Drive  
 PO Box 95  
 Concord, NH 03302-0095

New London Dispatch Signature: \_\_\_\_\_

## **SECTION 4**

### **Preventive Actions**

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During high water conditions and routinely throughout the year, Dam Bureau personnel carefully inspect the dams to identify any potential problems. The frequency of this dam monitoring is determined by the Chief Engineer or his designee. The dam bureau maintains a log book which contains reservoir level readings, general condition and records of any maintenance on the dams.

There are two warning phases which will require different actions to be taken by the monitor, as outlined below.

#### **CONDITION YELLOW**

The monitor will initiate notification by contacting the NHDES-WD office by radio or telephone if a potentially hazardous situation is developing which could threaten the integrity of the dam. The office will then proceed as directed on the notification flow chart. This warning notification informs emergency response personnel that a dangerous situation exists, and that evacuation may become necessary. Every attempt should be made to discuss the situation with the Chief Engineer or his designee prior to a Condition Yellow notification. However, if this is not possible, the dam monitor can commence a Condition Yellow notification on his own.

Situations which could develop, resulting in a Condition Yellow notification include, but are not limited to, serious seepage, movement, cracking, or high water approaching the top of the dam. Any deficiency will be closely monitored, to detect further deterioration.

#### **CONDITION RED**

An emergency condition exists, and dam failure or overtopping is imminent or has occurred. The NHDES-WD personnel will immediately initiate notification of emergency personnel, so that evacuation can be initiated.

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*This sheet is an example of an inspection checklist which could be utilized by NHDES-WD personnel during Condition Yellow or Condition Red incidents.*

## Inspection Checklist

Date: \_\_\_\_\_

Time: \_\_\_\_\_  
am pm

Pond Level: \_\_\_\_\_

Cracking or movement of dam: YES \_\_\_\_\_ NO \_\_\_\_\_

Sloughing or sinkhole in embankment: YES \_\_\_\_\_ NO \_\_\_\_\_

If YES, location: \_\_\_\_\_  
(Locate on figures on next pages)

Seepage: YES \_\_\_\_\_ NO \_\_\_\_\_ If YES, location: \_\_\_\_\_

Estimated quantity of seepage \_\_\_\_\_ (g.p.m.)

Vortex: YES \_\_\_\_\_ NO \_\_\_\_\_, If YES, location: \_\_\_\_\_

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

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## **APPENDICES**

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Appendix A Project Description

Appendix B Impact of Breach

Appendix C      Inundation Map

Appendix D      Training and Annual Testing

Appendix E Local Evacuation Procedure

Appendix F      Posting of the Plan

Appendix G      Documentation

Appendix H      Record of Changes and Additions

## APPENDIX A--Project Description

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### Lake Sunapee Dam

The Lake Sunapee Dam is located at the outlet of Lake Sunapee, in Sunapee Harbor. It consists of three 5' wide x 10' high steel gates separated by concrete piers. The dam is in the constricted area downstream of a town road, and is flanked by a building at each end.

<b>Lake Sunapee Dam Basic Data</b>	
Maximum Height	14 feet
Overall Length	22 feet
Drainage Area	44.8 sq. mi.
Pond Area	4090 acres
Storage at Normal Pool	19,800 acre-feet
100-Year Storm Flow	875 cfs
Discharge Capacity	1285*

- Discharge capacity is actually dependent upon the capacity of the Town Dam, 750 feet downstream. If all gates are open at the town dam, it can discharge 1285 cfs. The Lake Sunapee Dam could actually pass slightly more than this.

## APPENDIX B

### Impact of Breach

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A dam-breach flood analysis was conducted by Dubois-King, Inc., at the request of the State of New Hampshire, under the authority of the Corps of Engineers Section 206 Flood Plain Management Services (FPMS) program. The analysis was conducted using Boss Corporation's 1992 release of the National Weather Service Dam-Breach Flood Forecasting Computer Model developed by D.L. Fread. This appendix includes excerpted sections of their report presenting the findings of the analysis performed for the failure of *the two dams* at the outlet of the Sunapee Lake.

The primary regulating structure at the outlet of Lake Sunapee is the gate structure in Sunapee Harbor. This dam is commonly known as the Sunapee Lake Dam. A second dam, known as the Town Dam, is located approximately 750 feet downstream of the gate structure. Due to their close proximity and configurations, failure of only one of these dams would not create a threat to public safety. This study analyzed the failure of both dams at or about the same time, which would result in an uncontrolled release of approximately 20,000 acre-feet of water. Since the maximum assumed breach width at Sunapee Lake Dam is only 21 feet (the entire length of the dam), this narrow cross section controls the peak discharge that can be released from the dam failure breach opening and produces a slow drawdown of the Sunapee Lake water storage.

The study extended from the Sunapee Lake Dam at Sunapee Lake downstream along the Sugar River through the Towns of Sunapee and Newport and terminated at a dam (referred to as the Newport Dam) on the Sugar River in Newport, located 6.17 miles downstream of the Sunapee Dam, approximately 4,000 feet upstream of the confluence of the South Branch of the Sugar River. There are several small flow structures and road crossings across the Sugar River between the Town Dam and the dam in Newport at MM 16.17, the downstream limits of the study. This study included four dams: the Sunapee Lake Dam (MM 10.00), the Town Dam (MM 10.12), Dam at Wendell Marsh (MM 11.90) and the Newport Dam

Two types of hypothetical dam failures were evaluated in this study, a sunny-day failure and a storm-day failure:

A **sunny-day** failure refers to a failure under normal water level usually associated with fair weather or non-flood conditions. An extreme condition such as a serious earthquake centered near this area could precipitate a sunny day failure. A sunny-day failure can also result from other causes, such as a sudden failure of a conduit under pressure or a structural component of the dam.

Failure of the Lake Sunapee Dam during sunny day conditions would not result in overtopping of the Town Dam, however, its failure was assumed as a worst case



scenario. Even if both dams were to fail under sunny day conditions, the peak outflow would be less than the 100-year storm at this location. Therefore, there would be minimal flooding in the river downstream of the dam. (See Table B-1 for peak flows and elevations during a sunny day failure.)

A **storm-day** failure is associated with major storm events and floods. During periods of significant rainfall and resulting runoff, the reservoir will rise to high levels. Sudden structural failure or progressive failure of stone or masonry elements can be a result of high reservoir levels associated with the storm-day type failures.

Failure of the Lake Sunapee Dam during storm conditions could result in overtopping the Town Dam, and subsequently this dam could also fail. However, even with both dams failing, the peak outflow would only be approximately two times the 100-year storm at Route 11, feet downstream. The Wendell Marsh dam would attenuate the flow even further, so that the peak failure outflow would be only 25% higher than the pre-existing storm conditions at this point. The river would only rise approximately  $\frac{1}{2}$  foot in the reaches below the Wendell Marsh Dam. (See Table B-2 for peak flows and elevations during a storm day failure.)

TABLE B-1

**Sunapee Lake Dams Sunny Day Failure  
Downstream Channel Routing Results**

<b>Downstream Location (River Miles)</b>	<b>Peak Discharge (CFS)<sup>1</sup></b>	<b>Peak Elevation (ft NGVD)</b>	<b>Time to Peak Elevation (hours)<sup>2</sup></b>	<b>Pre-breach Flow Elevation (ft NGVD)</b>	<b>Increase in Depth of Flow ( feet)</b>
Sunapee Lake Dam (10.00)	500	1093.2	0.2	1093.2	0.0
Town Dam (10.12)	1370	1092.9	0.2	1091.0	1.9
St. Rt.11 (10.34)	910	1015.3	0.3	1009.5	5.8
North Road (10.93)	660	994.2	0.6	991.4	2.8
Dam at Wendell Marsh (11.90)	510	982.2	6.1 <sup>3</sup>	979.8	2.4
St. Rt. 11 (12.75)	510	954.7	6.2	953.0	1.7
St. Rt. 11 (13.16)	510	912.5	6.3	909.7	2.8
Town of Newport (15.22)	510	845.7	6.8	844.2	1.5
Old Wooden Bridge (15.89)	510	839.9	7.2	838.8	1.1
Sugar River I Hydro Dam (16.17)	510	839.9	7.2	838.8	1.1

<sup>1</sup> Includes pre-breach flows and inflow from downstream watersheds

<sup>2</sup> Time to peak measured from start of breach at Sunapee Lake Dam

TABLE B-2

**Sunapee Lake Dams Storm Day Failure  
Downstream Channel Routing Results**

<b>Downstream Location (River Miles)</b>	<b>Peak Discharge (CFS)<sup>1</sup></b>	<b>Peak Elevation (ft NGVD)</b>	<b>Time to Peak Elevation (hours)<sup>2</sup></b>	<b>Pre-breach Flow Elevation (ft NGVD)</b>	<b>Increase in Depth of Flow ( feet)</b>
Sunapee Lake Dam (10.00)	1060	1095.9	0.2	1095.9	0.0
Town Dam (10.12)	2120	1095.4	0.2	1095.0	0.4
St. Rt. 11 (10.34)	1840	1017.4	0.3	1015.9	1.5
<u>North Road</u> (10.93)	1470	996.3	0.5	994.8	1.5
Dam at Wendell Marsh (11.90)	1060	984.1	3.2 <sup>3</sup>	983.5	0.6
St. Rt. 11 (12.75)	1060	956.0	3.8	955.6	0.4
St. Rt. 11 (13.16)	1060	914.3	3.8	913.8	0.5
Town of Newport (15.22)	1060	846.4	3.9	846.2	0.2
Old Wooden Bridge (15.89)	1060	840.9	4.6	840.6	0.3
Sugar River I Hydro Dam (16.17)	1060	840.8	4.6	840.5	0.3

<sup>1</sup>Includes pre-breach flows and inflow from downstream watersheds  
<sup>2</sup> Time to peak measured from start of breach at Sunapee Lake Dam

## **APPENDIX C**

# **Inundation Map**

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The purpose of these inundation maps is to delineate and quantify the extent of the likely inundation area in the event of a dam-break at Lake Sunapee dam.

This inundation mapping is approximate and in most instances limited to the accuracy of 20 foot USGS contour maps. The inundation area shown is based upon the assumed dam break conditions described in Appendix B. The dam break conditions in the event of an actual dam failure may vary based upon the specific failure conditions.

This mapping is for use only in emergency planning.

## APPENDIX D

### Training and Annual Testing

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#### D.1 Training

The dam is monitored by NHDES-WD Dam Bureau dam operators, who are trained and supervised by the Dam Bureau engineers. The operators are qualified to make operations as necessary, and are under the direct supervision of the Chief Engineer or his designee. Occasionally the dam may be monitored by the bureau's engineers or dam construction crew.

#### D.2 Annual Testing

Every year the EAP coordinator shall conduct or arrange to have conducted a test of the emergency notification procedure. This shall be done by the NHDES starting the notification procedure. The EAP coordinator shall monitor the test and collect a copy of the notification checklists noting any large discrepancy in the times calls were received by the different organizations/agencies. The coordinator shall also discuss the test with all participating parties to ensure the success of the test. A copy of the notification checklist shall be sent to:

NH Department of Environmental Services  
6 Hazen Drive  
PO Box 95  
Concord, NH 03301-95

## APPENDIX E

### Local Evacuation Procedure

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Person or Agency	Responsibility
NHDES-WD Dam Monitor	Monitor the dam, phone or radio the NHDES-WD office, operate the dam as instructed by the Chief Engineer.
NHDES-WD Chief Engineer or his designee	Provide instructions to dam monitor, start notification procedure.
911 Dispatch New Hampshire DOT Hooksett Dispatch Newport Police Dept.	Make all calls shown on the notification flowchart.
Sunapee Fire and Police Departments	Provide for local evacuation of impacted residents as indicated on the inundation map. Close any potentially impacted town roads - provide detours as necessary.
Sunapee Emergency Management Director	Coordinate town=s response.
NH DOT District 2	Close any potentially impacted state roads and provide detours as necessary.

## APPENDIX F

### Posting of the Plan

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A complete and up-to-date copy of the EAP shall be posted at the NHDES-WD office at 6 Hazen Drive at all times. All persons and agencies listed below have been issued a copy of the EAP, and shall be provided with an up-to-date copy of the EAP.

NH Dept. of Environmental Services  
Water Division  
64 N. Main St., PO Box 95  
Concord, NH 03302-0095  
Tel. 271-3406

Mr. Howard Sargent  
Sunapee Emergency Mgt. Director  
PO Box 171  
Sunapee, NH 03782

NH Office of Emergency Management  
107 Pleasant St.  
Concord, NH 03301-3809  
Tel. 271-2231

Mr. Al Soucy  
Sunapee Police Chief  
PO Box 121  
Sunapee, NH 03782

NH Dept. of Safety - State Police  
Headquarters/Communications  
10 Hazen Drive  
Concord, NH 03301  
Tel. 271-3636

Mr. Daniel Ruggles  
Sunapee Fire Chief  
PO Box 399  
Sunapee, NH 03782

NH Bureau of  
Emergency Communications  
Attn: Operations Supervisor  
10 Hazen Drive  
Concord, NH 03305  
(copy of flowchart only.)  
Tel. 271-6911

Mr. Alan G. Hanscom, PE  
N.H. DOT District 2 Engineer  
PO Box 232  
W. Lebanon, NH 03766

David A. Hoyt  
Newport Police Chief and Emergency  
Mgmt Co-Director  
59 Main Street  
Newport, NH 03733

NH DOT Hooksett Dispatch  
PO Box 16476  
Hooksett, NH 03106-6476  
(flowchart and checklist only)

Chief Seastrand  
New London Dispatch  
PO Box 240  
New London, NH 03257

## **APPENDIX G**

### **Documentation**

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The following pages include signed Acknowledgment Forms and any letters related to implementation of the Emergency Action Plan



