Special Report
on
Interagency Cooperation
for
Floodplain Mapping

Prepared for:
Joint Standing Committee on
Natural Resources of the 124th Legislative Session

By
Maine State Planning Office
Maine Floodplain Management Program

January 15, 2009

Special Report on Interagency Cooperation for Floodplain Mapping

Acknowledgements

This report is prepared by the State Planning Office in response to the letter sent by the Joint Standing Legislative Committee on Natural Resources, 123rd session (see Appendix A).

The meetings and conversations held among and between named and participating agencies were enlightening and productive (see Appendix B). We would like to thank them for their willingness to both assist in both the content of this report as well as continue sharing common needs and interests.

Executive Office
State Planning Office
Maine Floodplain Management Program

38 State House Station
184 State Street
Augusta, Maine 04333-0038
(207) 287- 8934
www.maine.gov/spo/flood

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I. Introduction

During discussions of LD 2018, "An Act to Require the Accurate Designation of Floodplain Areas", by the Joint Standing Legislative Committee on Natural Resources, during the 123rd Maine Legislative Session, the Committee learned about some of the difficulties encountered by homeowners and municipal planners due to possible inaccurate 'mapping' of floodplains. Approximately 93% of Maine's municipalities participate in the National Floodplain Insurance Program, which allows homeowners and businesses to obtain insurance to protect them from losses due to flooding events. However, not all of those mapped floodplains are correctly mapped, leading to instances where homeowners may be unnecessarily purchasing flood insurance and instances where homeowners are not aware that they are located in a floodplain, so they do not have the flood insurance coverage, leaving them fully exposed should a flood event impact their property.

Even though LD 2018 did not receive support from the Natural Resources Committee, the Committee agreed with the State Planning Office, where the Maine Floodplain Management Program is located, that updating and correcting the basic topographical information used in mapping was a critical need. However, the Committee also learned about other state agencies and their possible use of this data, and it was this awareness that led to the Committee requesting the State Planning Office to coordinate this inter-agency discussion and encourage cooperation among the agencies in furthering efforts to obtain and more fully utilize updated topographical information.

A series of meetings were held through the summer of 2008 with the named agencies. There was support for gathering and sharing improved topographical information and discussions on possible ways and means of funding such efforts. These meetings were further supported by e-mail conversations and led to the information presented in this report.

It is our combined hope that this document provides a basis of understanding of state agency (and other group's) needs for updated and correct topographical data and also may serve to further current efforts to secure funding and full distribution of that data.

II. Executive Summary

Representatives of agencies included in the Committee's charge were invited to a series of meetings over the summer and fall of 2008. During the course of these meetings it became clear that collaboration should have occurred sooner and all appreciated the Committee's directive to initiate this process. Each agency compiled a list of activities requiring topographical data and agreed that better high resolution topographical data would allow them to do a much better job in their respective areas. (Appendix C lists the Legislative Mandates of Departments Requiring Accurate Topographic Data). During the discussions it also became clear that substantial economic benefits to the private and nonprofit sectors of Maine's economies if Maine acquired this data. Industries as diverse as wind power energy producers, forest products, and mining would benefit from acquiring high resolution topography.

They also agreed that acquiring high resolution topography was too expensive for any one agency to acquire and they should collaborate to achieve the goal of acquiring a statewide data set for Maine. Currently each agency acquires data for small areas for specific projects usually through the use of special grants. The most cost effective method for acquiring this data has proven to be in the use of LiDAR (Light Detection and Ranging) technology. This is a new digital technology that has proven itself in the last ten years to be highly accurate and valuable for multiple uses in addition to topography.

As of this date there are only a few acquisitions of LiDAR data in the state and each acquisition is tailored to meet the needs of a special project. Since inevitably there are variations in technical specifications as well as subtle differences in the acquisition process it would be difficult to splice the areas covered together even if they were contiguous. The most efficient means to acquire high resolution topography is to join forces with each other and federal agencies to initiate a statewide acquisition of the data.

Substantial cost savings to all agencies could be achieved by making a one time effort to acquire LiDAR data through a state wide acquisition. This large scale acquisition effort would reduce the per-unit area cost to approximately ten (10) percent of the cost of acquisition, if completed in small scale purchases. Significant long term savings would accrue to State Agencies as well as benefit economic development and conservation efforts. Wind power energy, forest resources development management, and hydro-power maintenance are all beneficiaries of high resolution topography.

Now is an appropriate time to investigate the feasibility of statewide acquisition of LiDAR data. Federal agencies are initiating projects in Maine to acquire LiDAR data. A state, federal and local partnership would leverage significant federal dollars that could pay for a substantial portion of the cost. The State Planning Office is attempting to implement a coordinated effort with FEMA, USGS and Northern Maine Development Commission to initiate a project in Aroostook County.

FEMA committed funds on December 17th, 2008 and we anticipate that USGS will be committing funds also. FEMA also immediately initiated a task order for LiDAR acquisition without benefit of any partnership funds, which may make any contemplated partnership effort more difficult.

In conclusion, the participating agencies have agreed to continue working together on sharing present data as well as pursuing the acquisition of updated topographic data. The State Planning Office will continue its role as coordinator of meetings and communications. The value of these meetings has been in: learning and sharing of specific agency need use and support of topographic data; building of relationships in utilization of data; and improved knowledge of the advances in technology related to mapping.

III. Departmental Activities That Create Data Useful in Floodplain Mapping

Maine Department of Environmental Protection

Uses of Data

The Department uses topographic data for a wide range of activities relative to permitting, licensing and monitoring of permitted activities. The Land and Water Bureau require digital elevation models (DEMS) for river modeling and river-shed analysis. Currently, the best available DEMS have a 10 meter horizontal resolution, and a variable vertical resolution that is approximately +/- 7 meters (according to the USGS description). This accuracy is insufficient to effectively model small watersheds; smaller intermittent streams and vernal pools are not 'seen' and so not taken into consideration as part of the review and monitoring process. The quality of the Department's Environmental Vulnerability Index maps for oil spill response would be enhanced with better topographical data also as well as providing significantly better tools for monitoring mining applications. Additionally this bureau has primary responsibility for reviewing wind energy applications, where having accurate topography is essential for creating 3D models to analyze the visual impacts on affected site lines.

The Air Bureau uses DEMS for receptor grid modeling from licensed facilities. Better DEMS would enable the bureau to do a better job of modeling air emissions for compliance with permits.

The Bureau of Remediation and Waste Management uses DEMS for site investigations and monitoring ground water where knowing the locations of intermittent streams and accurate representation of small watersheds is very important at the local township level.

Activities Creating Data

The Department does not have a budget for acquiring new topographic data. Occasionally as part of a special project the Department may acquire new topographic data for certain site specific areas. It relies substantially on applicants to provide site specific topographic data. Statewide high resolution topographic data would be very beneficial to the Department's mission. The Department is committed to collaborating with other state, local and federal agencies to facilitate the acquisition of this data for use in floodplain mapping and providing for homeland security through safe productive development.

Maine Department of Conservation

Uses of Data

As part of the Department's role as a partner in the Maine Coastal Program and to support regulations of the federal Coastal Zone Management Act and Maine's Natural Resources Protection Act , the Maine Geological Survey uses topographic data to map and monitor changes in coastal sand dunes and beaches. Data are used to calculate erosion rates and to project inundation from sea-level rise. Other uses are in mapping the state bedrock and surficial geology, delineating aquifers, predicting landslide susceptibility, evaluating coastal bluff stability and estimating erosion hazards along river banks.

Activities Creating Data

The Department does not have a budget for acquiring topographic data. However, through grants and special projects the Maine Geological Survey has acquired LIDAR data (1-foot resolution) for site specific uses and studies. High-resolution topographic data would be very beneficial to many of the Department's other programs in the Maine Forest Service, Bureau of Parks and Lands, and Land Use Regulation Commission. DOC is committed to collaborating with other state, local and federal agencies to facilitate the acquisition of this data for use in floodplain mapping, identifying and reducing natural hazards, and efficiently managing vast areas of the State of Maine.

Maine Department of Transportation

Uses of Data

The Department uses topographic data for a wide variety of planning and engineering purposes. These uses include general transportation planning, development of engineering design plans for projects such as highway reconstruction, flight path analysis for airports, noise analysis, hydrology analysis to determine appropriate size of drainage structures and determining elevation of infrastructure (such as roads and rail) relative to water bodies and adjacent slopes.

Activities Creating Data

The existing USGS topographic data is not very helpful for the Departments needs regarding engineering and detailed analysis. Consequently, it budgets for and develops topographic data for specific projects when new topographic data is needed. New topographic data developed according to the FEMA specifications as set out in Appendix III it would be helpful for route planning and pre-engineering work. Having statewide data would minimize the need for the Department to collect such data to support these activities.

High resolution topographic data would be very beneficial to transportation planning and the Department is committed to collaborating with other state, local and federal agencies to facilitate the acquisition of this data for use in floodplain mapping and providing for homeland security

through safe productive development as well as satisfying some of the departments topographical information needs.

Maine Department of Agriculture, Food and Rural Resources

Uses of Data

The Department uses topographic data for designing farm/irrigation and flood control ponds and works with farmers to produce manure management plans that are in part based on topographic data.

Activities Creating Data

The Department uses existing USGS data and does not have a budget for acquiring new topographic data. Any new data that is acquired would be done as part of a specific special project with only site specific value. High resolution topographic data would be very beneficial to the agricultural community and the Department is committed to collaborating with other state, local and federal agencies to facilitate the acquisition of this data for use in floodplain mapping and providing for homeland security through safe productive development.

Maine Department of Economic and Community Development

Uses of Data

The Department recognizes that high resolution topography would be extremely helpful for communities that are receiving grants to do large scale business and other community developments.

Acquisition of this data for site specific areas adds substantially to the cost of all development from locating critical facilities to development of business parks and other projects. The Department oversees grants to communities through the Community Development Block Grant Program. In order to receive a CDBG grant, communities must filter their proposed development through an environmental review process. High resolution topography will allow the State Planning Office to more accurately determine if projects are located in a floodplain. It will also assist other state and federal agencies in their decision making during the environmental review process.

Activities Creating Data

The Department does not use topographic data directly nor does not have a budget for acquiring new topographic data. However the Department does recognize the importance and benefits of having high resolution topographic data. Permitting requirements are generally based on having topographic data at the resolution of two foot contour intervals or better. This requirement places a burden on all development in Maine requiring permitting from agencies such as the Department of

Environmental Protection, LURC and others. This requirement increases the costs of development for private enterprise.

Because having high resolution topographic data available would have a very positive effect on all development the Department is committed to collaborating with other state, local and federal agencies to facilitate the acquisition of high resolution topography for use in floodplain mapping and providing for homeland security through safe development.

Maine Office of Information Technology

Uses of Data

The Office of Information Technology (OIT) is a provider but not a user of topographic data. However the office receives many requests for high resolution topography and is aware of many benefits, such data would bring to state and federal agencies

Activities Creating Data

Because having high resolution topographic data available would be very beneficial to numerous state and federal agencies as well as local communities through out the state, the Office is committed to collaborating with other agencies both state and federal to facilitate the acquisition of high resolution topography for use in floodplain mapping and providing for homeland security through safe development. To this end, OIT has collaborated with the Maine GeoLibrary Board to draft a bond request, for submittal to the Governor's Office, to acquire high resolution topography data. In addition, OIT is committed to collaborating with other state, local and federal agencies to facilitate the acquisition of high resolution topography for use in floodplain mapping and providing for homeland security.

Maine Department of Inland Fisheries and Wildlife

Uses of Data

The Department uses topographic data to assist with determining the potential extent of fish species movements within river drainage networks, analyze threats to a variety of native species, to map habitats for conducting environmental reviews under the Endangered Species Act and Natural Resources Protection Act, and to evaluate changing habitat conditions. This data is an integral part of developing management plans for a wide variety of fish and wildlife species as directed by legislative mandate and MDIFW's mission statement.

Activities Creating Data

The Department relies on USGS topographic data, but 30-meter resolution elevation data is too coarse for mapping most wildlife habitats where a change in 1 meter or less can be significant. The 10-meter elevation data acquired with the latest orthoimagery is much more useful but limited geographically. Forest understory is a critical component of wildlife habitat and MDIFW is

interested in the potential of LiDAR data for providing better data for mapping it. Also, 1-meter or less resolution may provide an opportunity to remotely identify previously unknown constraints to fish passage according to species individual capabilities. Having high resolution topographic data available would have a very positive effect on the Department's mission. Therefore the Department is committed to collaborating with other state, local and federal agencies to facilitate the acquisition of high resolution topography for use in floodplain mapping and providing for homeland security as well as the Departments uses.

Maine Emergency Management Agency

Uses of Data

The Agency uses topographic data in a variety of ways. Its mission is "to lessen the effects of disaster on the lives and property of the people of the State through leadership, coordination and support in the four phases of emergency management: mitigation, preparedness, response and recovery". To accomplish this mission the Agency needs high resolution topographic data to develop evacuation routes during flooding emergencies as well as using floodplain maps for identification of life and property in harms way. The current topographic is not sufficient for the Agency to plan properly.

Activities Creating Data

The Agency does not directly acquire high resolution topographic data nor does it have a budget for acquisition. However the Agency works closely with FEMA to encourage the development of data whenever possible. This agency is committed to working with other state, local and federal agencies to facilitate the acquisition of high resolution topography for use in floodplain mapping and providing for homeland security.

Maine Department of Marine Resources

Uses of Data

The Department's area of interest extends from inland streams, rivers, lakes, and pond as they relate to migratory fish and to offshore waters in the Gulf of Maine. Accurate topography is important in watershed studies for anadromous and catadromous fish species, as is high resolution topography the study of coastal stream and river spawners such as Rainbow Smelt. Other uses include accurate delineation of benchmark features such as coastal mean high water and the associated intertidal.

Activities Creating Data

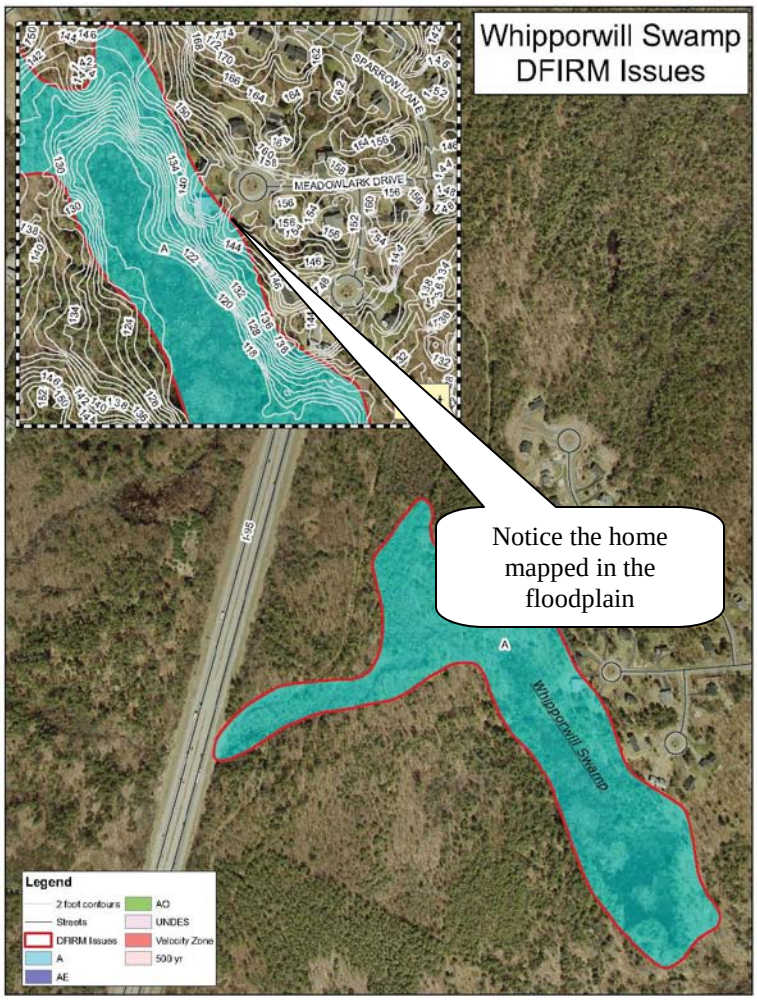
The Department does not have a budget for acquiring topographic data. However, through grants MEDMR has acquired high resolution subsea topographic data. Acquisition of both land and subsea topographic data would benefit many of the Department's programs.

State Planning Office
Maine Floodplain Management Program

Uses of Data

High resolution topography is critical to the production of accurate floodplain maps. Nearly all of Maine's maps are based on old topographic data mapped in 10 or 20 foot increments. So, despite the effort to update floodplain maps to digital products depicted on aerial photo base maps, they may still carry inaccuracies.

This illustration shows what happens when existing floodplains are overlaid onto an aerial photo base map, without the benefit of new topographic data. The town of York's GIS manager integrated new high resolution topographic data, FEMA Floodplain maps and an aerial photographic base map. As you can see, the boundaries cross topographic lines encompassing properties that probably should not be in a floodplain while leaving out others. Even more important is that the misinterpretation of data can lead to non-compliant development. Consequently some people may be paying flood insurance unnecessarily while others may be in danger and not know it.



In addition to the mapping component, this data is used for producing more accurate hydrological, hydraulic (H&H) studies. This is done through contractors working directly for the FEMA using United States Geological Survey (USGS) topographic data. Much of this data is 50 years old, or older, and

provides very general data which has severe limitations for creating accurate models for H&H studies or determining floodplain boundaries.

Floodplain maps and flood insurance studies are used by many community officials as well as county, state and federal agencies as well as private individuals and lenders when making decisions on a wide range of activities. The benefits from acquiring high resolution topography would have far reaching positive effects on all these constituents.

Activities Creating Data

The Maine Floodplain Management office does not generate topographic directly. It works with the FEMA to coordinate the development and maintenance of floodplain maps. From time to time, when floodplain studies are needed for map maintenance which requires new topographic data, FEMA will task a contractor to acquire limited amounts of new high resolution topographic (HRT) data relevant to the specific area to be remapped.

Cost is a major factor in determining the size of an area for which new topography data is procured. This office has requested several estimates for generating new high resolution topography. A recent quote for the remapping of a 20 square mile corridor along the Fish River in the Fort Kent area was nearly $40,000, or $2,000 per square mile. A larger acquisition of approximately 180 square miles in the same area is estimated to be about $180,000 or $1,000 per square mile. Economies of scale can be achieved as the area to be acquired gets larger. However given the limitations of funding for Map Modernization and maintenance only limited areas can be acquired for restudies.

High resolution topographic data would be very beneficial to the Maine Floodplain Management Program's mapping program and we are committed to collaborating with other state, local and federal agencies to facilitate the acquisition of this data for use in floodplain mapping and providing for homeland security through safe productive development.

Federal Agencies, Non-Profits and Private Interests

Uses of Data

Although the Committee's letter did not require looking at other users of data, this report would be incomplete if we failed to take into consideration other users outside of Maine government agencies. In addition to FEMA, the National Oceanic and Atmospheric Administration (NOAA), Army Corps of Engineers (ACOE), United States Department of Agriculture (USDA) and the United States Geological Survey (USGS) all have an interest in obtaining high resolution topography.

Within NOAA, the weather service needs better topographic data to improve its ability to forecast flooding events and another branch uses the data for modeling the effects of climate change and its potential impact on coastal flooding. The ACOE uses the data to plan and engineer flood control projects. Several divisions of the USDA use the data for wetlands identification, preparation

irrigation systems and farm pond plans, watershed management plans, erosion control plans, soils classifications as well as doing hydraulic and hydrological studies. The USGS is both a provider to other agencies and user of topographic data in its nearly three dozen programs. The uses include planning for homeland security issues and watershed flooding analysis among many others.

Private sector use of topographic data in Maine is wide spread. Frequently applications for private development involving subdivision or site location permits require topographic data with 2 foot contours. This includes such applications as wind farms, large retail and large industrial buildings, telecommunications towers and many others. In addition to these industries, there is a growing use of the data in the forest industry - - not just for woods road construction and maintenance but in the case of LiDAR acquired data, estimations of species specific volumetric quantification.

Activities Creating Data

Federal agencies are acquiring LiDAR based topographic data. So far the data acquired is in very specific locations for special projects. In Oxford County, FEMA has acquired (through the USGS) LiDAR for several small sections of streams. In York County, a similar acquisition was made. (See Appendix D for FEMA's typical specifications for obtaining LiDAR data).

The National Geo-Spatial Intelligence Agency (NGA- part of the USGS) has acquired data for the capital area and is in the process of acquiring data along the international border. The NGA's acquisition in the Capitol area is the only one so far to involve a partnership with other agencies. In that case, the USGS was able to partner with the Maine Department of Transportation, City of Augusta and the Town of Manchester to acquire LiDAR for both these communities.

The largest acquisitions of LiDAR so far have been on the Maine Coast between the New Hampshire border and the City of Bath. In the last four years ACOE, NOAA and FEMA all acquired data for virtually this same strip of land.

Acquisitions made by the private sector are not as well known. We have anecdotal information that wind power developers have acquired data for areas as large as a full township in northern sectors of the state, and for other specific areas under consideration for development. Obtaining knowledge of the full extent of private acquisitions is beyond the scope of this report.

Unfortunately the usefulness of the data obtained by LiDAR for other state agencies and local communities is limited. The acquisition of high resolution topography is highly technical and geo-spatially referenced within very close tolerances. Contractors for each acquisition are given different accuracy and performance specifications. This, in addition to differences in processing techniques and geodetic reference points, make trying to 'knit together' several acquisitions into one seamless mosaic covering a large area is impossible to do, without sacrificing the quality of the original acquisitions.

APPENDICES

APPENDIX A

Letter from the Committee on
Natural Resources

SENATE

JOHN L. MARTIN, DISTRICT 29, CHAIR
PHILIP L. BARTLETT, II, DISTRICT 5
DOUGLAS M. SMITH, DISTRICT 31

SUSAN E. JOHANNESMAN, LEGISLATIVE ANALYST
VERONICA SNOW, COMMITTEE CLERK

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BERNARD L. A. AYOTTE, CARIBOU

STATE OF MAINE

ONE HUNDRED AND TWENTY-THIRD LEGISLATURE

COMMITTEE ON NATURAL RESOURCES

March 17, 2008

Martha Freeman, Director
State Planning Office
#38 State House Station

Seth H. Bradstreet, III, Commissioner
Department of Agriculture, Food and Rural Resources
#28 State House Station

David Cole, Commissioner
Maine Department of Transportation
#16 State House Station

Richard Thompson, Chief Information Officer
Office of Information Technology
Maine Geographic Information Services
#145 State House Station

John Richardson, Commissioner
Maine Department of Economic and Community Development
#59 State House Station

Patrick K. McGowan, Commissioner
Maine Department of Conservation
#22 State House Station

Roland Martin, Commissioner
Maine Department of Inland Fisheries and Wildlife
#41 State House Station

Robert McAleer, Director
Maine Emergency Management
#72 State House Station

RE: LD 2018, An Act to Require the Accurate Designation of Flood plain Areas

Dear Agency Leaders:

The Joint Standing Committee on Natural Resources recently voted ought not to pass on LD 2018 with the understanding that we would send a letter to various state agencies encouraging the coordination of efforts regarding the updating of flood plain maps.

The purpose of this letter is to request that state departments and offices renew their commitment and effort to strengthen the collaborative effort with the Federal Emergency Management Agency and its contractors to revise and update floodplain maps for the state of Maine. Without accurate flood maps, Maine's economy, Maine's community development efforts and Maine's quality of place are not only hindered, but severely compromised.

Accurate floodplain maps are critical to Maine. They help reduce a community's and individual's risk of flood loss. Floodplain maps serve as the basis for purchasing flood insurance, elevating individual buildings, and modifying local zoning, which restricts construction in flood prone areas.

There is little reason to doubt the critical importance accurate floodplain maps play in Maine when one considers:

- There are 5,779 lakes and ponds, approximately 5,000,000 acres of wetlands, approximately 5,300 miles of coastline and 91,900 miles of stream and river shoreline in Maine;
- There are more than 2,772 square miles of floodplain in Maine, a greater land area than the state of Rhode Island;
- There are more than 8,200 flood insurance policies in effect in Maine, with more than 1.5 billion dollars in coverage; and
- There are approximately 33,000 civic, business and residential structures in Maine at risk of flooding.

Maine recognizes that in order to achieve a level of floodplain mapping with the accuracy needed to serve the State's homeland security and hazard mitigation goals, strong financial commitment is essential from the Federal Emergency Management Agency (FEMA), along with their willingness and ability to work cooperatively with the many partners associated with this effort. FEMA funding for mapping is a positive tool that fosters state, municipal and private investment in safe development.

To work cooperatively to aid FEMA efforts, the Committee requests that all state agencies, which, either in their day-to-day activities or sporadically from time-to-time, produce data that is or can be modified so as to be useful to support the ongoing Maine floodplain map modernization process, collaborate with the map modernization program at the State Planning Office to the greatest extent possible.

The Committee asks that the State Planning Office coordinate communication amongst the state agencies with activities covered by this letter; collect from each agency their activities that address the need for good, useful and accurate data for FEMA and the public; and report back to this Committee by January, 15, 2009 on progress and accomplishments.

Sincerely,

Senator John Martin
Senate Chair

Representative Ted Koffman
House Chair

cc: Members, Joint Standing Committee on Natural Resources

APPENDIX B

List of Agencies and Staff
Participating in Analysis of
High Resolution Topographic Needs

Members	Agency/Organization	Alternate
Janet Parker	State Planning Office	Liz Hertz
Joe Young	State Planning Office	
Seth Barker	Department of Marine Resources	
Matthew Bampton	University of Maine System	
Peter Slovinsky	Maine Geological Survey	Steve Dickson
John Lynam	Department of Environmental Protection	Christopher Kroot
Nate Kane	Department of Transportation	Harry Nelson
Mike Smith	Office of Information Technology	Larry Harwood
Dan Walters	United States Geological Survey	
Jon Giles	Maine Geo-Library Board	Dan Coker
Don Katnik	Inland Fisheries and Wildlife	
Lisa St. Hilaire	Department of Conservation NAP	
Greg Miller	Department of Conservation	Gena Denis
Dwane Hubert	Maine Emergency Management Agency	Joann Mooney
Sheldon Bird	Department of Agriculture	

APPENDIX C

Legislative Mandates of Departments Requiring Accurate Topographic Data

Legislative Mandates of Departments Requiring Accurate Topographic Data

(Statutory cites are provided; however, only a paraphrasing of the statutes is offered here)

Department of Environmental Protection

a. 38 MRSA, §§ 481-490 - Site Location of Development Act
    i. This law requires review of developments that may have a substantial effect upon the environment. These types of development have been identified by the Legislature, and include developments such as projects occupying more than 20 acres, metallic mineral and advanced exploration projects, large structures and subdivisions, and oil terminal facilities. A permit is issued if the project meets applicable standards addressing areas such as storm water management, groundwater protection, infrastructure, wildlife and fisheries, noise, and unusual natural areas.
b. 38 MRSA, § 420-D- Storm Water Management Act
    i. Maine's Storm water Management Law provides storm water standards for projects located in organized areas that include one acre of more of disturbed area.
c. 38 MRSA, §§ 490-A to 490-M
    i. Borrow, Clay, Topsoil or Silt
d. 38 MRSA, §§ 490-W to 490-EE
    i. Quarries
e. 38 MRSA, §§ 480-A to 480-Z
    i. *Protected natural resources* are coastal sand dune systems, coastal wetlands, significant wildlife habitat, fragile mountain areas, freshwater wetlands, great ponds and rivers, streams or brooks
f. 38 MRSA, §§ 435-449
    i. This law focuses upon areas near great ponds, rivers and larger streams, coastal areas, and wetlands. The “Shoreland Zoning” law helps to prevent and control water pollution; to protect fish spawning grounds, bird and wildlife habitat; to protect buildings and lands from flooding and accelerated erosion; to protect archeological and historic resources; to protect commercial fishing and maritime industries; to protect freshwater and coastal wetlands; to control building sites, placement of structures and land uses; to conserve shore cover, and visual as well as actual points of access to inland and coastal waters; to conserve natural beauty and open space; and to anticipate and respond to the impacts of development in shoreland areas.

g. 38 MRSA §§ 630-637. and SS 401 of the Clean Water Act
    i. Under section 401 of the Clean Water Act, the Maine Department of Environmental Protection (DEP) has independent authority to issue water certification to ensure that a hydro project will meet state water quality requirements. When FERC issues a license for a hydro project, the terms and conditions in the state water quality certification become part of that federal license.

Department of Conservation

a. Coastal Zone Management Act
b. 38 MRSA, §§ 480-A to 480-Z
    i. NRPA Coastal Sand Dune Rules (06-096 Ch. 355) permitting
c. Section 401 of The Clean Water Act
    i. Under section 401 of the Clean Water Act, the Land Use Regulation Commission has independent authority to issue water certification to ensure that a hydro project will meet state water quality requirements. When FERC issues a license for a hydro project, the terms and conditions in the state water quality certification become part of that federal license.

Department of Transportation

a. Submerged Lands Act Title 12 MRSA, §§1801 and 1862-1867

State Planning Office

a. Title 30-A, Chapter 187: PLANNING AND LAND USE REGULATION
    i. Change analysis, Land Use monitoring, Forest monitoring
b. National Flood Insurance Act of 1968, as amended, Federal Executive Order 11988 and Maine Executive Order 2 FY 1977
    i. Floodplain analysis and mapping

Maine Historic Preservation

a. The National Historic Preservation Act was last amended in 2006.

Appendix D

Federal Emergency Management Agency
Specifications
for Topographic Data

LIDAR PROJECT PLANNING REQUIREMENTS

Submit only ONE COMPLETE REQUIREMENT per Form

Project Title: Aroostook County LiDAR	**Primary Contact** (Liaison)**:**
Funding Sources: (Check all that apply)	USGS - ☐ : Other Federal - ☐ : State Government - ☐ : Local Government - ☒ : Other (explain) - ☐
Partner Agency Financial Point of Contact (Name, address, phone, and e-mail -Include all if more than one agency is involved)	
Project Foot Print (shapefile) Included : ☐ If Not – Why Not and when will it be provided : Shape file parameters: Datum – UTM meters or state plane feet : Projection – Utm zone 19 or State Plane Maine East Zone Shape files must be provided by partner before an estimate of project will be provided.	
Date Estimate is required: N/A **(Allow a minimum of 1 week for estimate from time of supplying all information. Allow more time for more complex tasks.)**	
Date Project is expected to start: **(Allow a minimum of 3 weeks from funding becoming available to NGTOC.)** Date FUNDING is expected to be available and all documents signed :	

VARIABLY SPACED LIDAR PRODUCTS

Ground Sample Distance	0.7-meter - ☐ : 1.0-meter - ☐ : 1.4-meter - ☒ : Other:
Collection Conditions	Leaf Off - ☒ : Snow Free - ☐ : Normal Water - ☐ : Other Conditions -
Accuracy Required (Bare Earth)	Vertical : 15cm VRMSE - ☒ : 18cm VRMSE - ☐ : Other - Horizontal : 1 meter RMS @ 95% confidence level - ☐ : Other – 0.5 meter RMSE
Products (Mass Points)	First Return - ☒ : Last Return - ☒ : Bare Earth - ☒ : No. Returns Required -
Datum (select one each)	Vertical : NGVD 29 - ☐ : NAVD 88 (default) - ☒ : Other - Horizontal : NAD 27 - ☐ : NAD 83 (default) - ☒
Coordinate System (select one)	Geographic: ☐ : UTM: ☐ - (Zone) 19 State Plane: ☒ - (Zone) State plane Maine East Zone
Units	Meters - ☐ to decimal places (meters is default for UTM) Feet - ☒ to 2 decimal places (feet is default for State Plane)
Tile Size	1500m x 1500m - ☐ : 2000m x 2000m - ☒ (default meters) : Other - 1mile x 1mile - ☐ : 2mile x 2mile - ☐ (default feet) : Other -
Metadata Required	Project Level - ☒ and/or File (tile) Level - ☐

SECONDARY PRODUCTS

(extra cost for each)

Break Lines	No - ☒ : Yes - ☐ (normally compiled from Intensity images)

DEM	1.0m - ☐ : 5.0m - ☒ : 10.0m - ☐ : Other : Hydro Enforced? ☐
Contours	0.5' - ☐ : 1.0' - ☐ : 2.0' - ☐ : 4.0' - ☐ : 1m - ☐ : Other -
Intensity Image	No - ☐ : Yes - ☒ (will match Bare Earth tile size – Required for Break Lines)
Other	State other requirement(s) not listed above: complete mission calibration over calibration site for every mission and Data collection to follow FEMA map modernization specifications for LiDAR in appendix A.
FORMAT AND DELIVERABLES	
Tile Sizes	Mass Points : (See above) DEM : Match VS data - ☐ : USGS QQ - ☐ : USGS Quad - ☐ : Other - Break Lines : Match VS data - ☐ : USGS QQ - ☐ : USGS Quad - ☐ : Other - 2km x 2k tiles Contours : Match VS data - ☐ : USGS QQ - ☐ : USGS Quad - ☐ : Other -
Formats	Mass Points : ASCII x,y,x,i format - ☒ : LAS format - ☒ : TIN - ☐ : ArcShape - ☐ DEM : USGS DEM - ☐ : ESRI Float Grid - ☒ : ESRI Integer Grid - ☐ - Other - Break Lines : Arc Shape - ☐ : Other - Contours : Arc Shape - ☐ : USGS DLG-O - ☐ : Other -
Delivery Media	CD-ROM - ☐ : DVD - ☐ : Firewire (external hard drive) - ☒ : Other -
Who Deliver To	(Include Name, Address, Phone #, and e-mail):
QA/QC	
Who will do QA/QC	**Note:** It is the responsibility of the liaisons to arrange or secure Quality Assessment. In cases where QA will be done via contract the Commercial Partnership Team will supply a cost estimate.
Partner	☐ - Partner agrees to 100% responsibility for QA to contract specifications within contractual time frame
NGTOC	☐ - Liaison will contact NGTOC Chief for separate QA agreement
Via Contract	☐ - Available for additional cost if NGTOC capacity is not available
Other Requirements not list above: ☒ : EXPLAIN – a minimum of 20 survey/GPS check points for 3 ground cover classes for a total of 60 check points and provide LiDAR campaign report including but not limited to survey methodolgy, calibration, mission accuracy specifications and any information critical to the collection and processing of the county.	
NOTICE This document is meant to be a "living" document. Additional requirements of modifications to this document may be requested via the Commercial Partnership Team	
