

Issue 32: Base Map Boundaries on North Carolina Digital Flood Insurance Rate Map Panels

Background

Along with flood hazard information, a Flood Insurance Rate Map (FIRM) also depicts base map data including political and administrative boundary information. Political boundaries could include Native American lands, state boundaries, county boundaries, corporate limits, and extra-territorial jurisdictions (ETJs); administrative boundaries could depict Coastal Barrier Resources Systems (CBRSs), Other Protected Areas (OPAs), military lands, other national lands, state lands, and property ownership (cadastral). Available vector data for each of these boundaries may have been captured by various sources such as local communities or State of North Carolina agencies.

For the North Carolina Floodplain Mapping Program, these boundaries are then reflected on a FIRM panel along with the aerial imagery base. The aerial imagery base has been provided by the community or by the State through a cooperative agreement with the U.S. Geological Survey (USGS). Many boundaries are known to follow surface features such as a road, a streamline, or a shoreline. In many cases, the existing digital vector boundary does not align with the appropriate surface feature shown on the aerial imagery.

The mismatch is typically the result of different sources of data, a disparity between the scales at which the two sets of data are collected, a disparity in dates when the data were collected, and/or from changes in the boundaries themselves. The main issues related to this problem include:

- How will the mismatches be resolved?
- Who will resolve the mismatches?
- How can it be determined if a boundary should follow a nearby ground feature?
- How will changing the vector boundaries affect the Digital FIRM and North Carolina FIRM database?

FEMA requires (DFIRM Specifications, November 2000) that all political, and most administrative boundaries, be shown on FIRM panels. Therefore, an option for producing an accurate product is to fix mismatches that exist. For North Carolina, existing digital data for county and/or state boundaries can be compared to the survey data and legal boundary descriptions that the North Carolina Geodetic Survey (NCGS) has on file. In addition, the State has an ongoing 7 year effort to survey the county lines within North Carolina. This effort is being led by Gary Thompson, Director of the NCGS.

If the State chooses to issue preliminary FIRM panels with political or administrative boundaries that do not align with corresponding features on a base map, the credibility of the flood hazard data on the map may be questioned by the public. In addition, a community can protest the location of community, ETJs, and other boundaries, submit accurate data in paper or digital format, and have the FIRM boundaries changed during the post-preliminary process. All changes to the FIRM that are a result of a post-preliminary comment or protest (except

North Carolina Cooperating Technical State Mapping Program

significant appeals) will be made by Dewberry & Davis LLC (D&D). At that time, D&D will also update the files for the North Carolina Digital FIRM database. If reliable data do not exist to resolve a boundary location discrepancy, the State may still want to adjust the vector data to match the base map. This is a potentially risky action, as there are not solid data proving that the boundary should be adjusted or to where it should be moved.

Discussion Summary

Date Discussed: 12/13/2001

Discussion Attendees: North Carolina Floodplain Mapping Core,
FEMA Headquarters, FEMA Region IV

Summary of Discussion

The options for resolving the boundary mismatch issues that were discussed are:

- Depict the boundaries on the digital FIRM panels as they currently exist even if a mismatch is evident;
- Leave the boundary lines and labels off the digital FIRM panels all together regardless of whether a mismatch is evident;
- Use existing boundaries on the digital FIRM panels unless they conflict with features on the base map. If so, do not include boundaries or labels on FIRM panels or index;
- Leave the area labels on the digital FIRM panels, but remove boundary lines;
- Depict the existing boundaries only on the map index, not on the individual digital FIRM panels; or
- If a mismatch is evident, either the State's contractors or CGIA fix all mismatches by adjusting the vector boundaries to fit base map features.

The chosen options are depicted in **Attachment A**, titled "Base Map Boundary Matrix." In addition the following guidelines are finalized:

- CGIA would like to use the best available base map data.
- A detailed GIS survey is included in the scoping process.
- CGIA will report on base map issues. This will include recommendations on sources of GIS data, published digital FIRM base maps, and a work plan outlining responsibilities.
- All communities/counties that provide base data are encouraged to sign a Memorandum of Agreement (MOA). The MOA is between the community/county and the CGIA; the purpose of the MOA is to enable and advance the sharing of strategic geospatial data resources and associated documentation between the agencies and among their data users to augment the use of best available data for flood hazard mapping.
- The above-mentioned MOA states that all parties agree:
 - ✓ To identify the primary point of contact for data sharing;
 - ✓ To identify sharable data layers, associated documentation (metadata), transfer formats, transfer media, schedules for transfer, and disclaimers (if any);
 - ✓ To waive agency fees, if any, for data sharing between agencies; and

North Carolina Cooperating Technical State Mapping Program

- ✓ To allow data shared under this agreement to be further redistributed with applicable metadata by either agency without fees in the public domain and without restriction, unless otherwise noted and/or unless subject to public laws of governing authorities.
- In the above-mentioned MOA, CGIA further agrees:
 - ✓ To focus internet capabilities as the primary mechanism for no-fee access to the corporate geographic database, including community data shared under this agreement; and
 - ✓ To provide training and assistance if requested and when resources are available in the area of metadata creation and dissemination as part of the North Carolina Geographic Data Clearinghouse.

Discussion Summary

Dates Discussed: 01/17/2002; 01/23/2002; and 02/06/2002

Discussion Attendees: North Carolina Floodplain Mapping Core

Summary of Discussion

Following coordination with FEMA and FIA by Doug Bellomo of FEMA Headquarters, neither the Federal nor the state property boundaries nor labels for those boundaries need to be shown on the printed FIRM panels. Furthermore, North Carolina has decided not to show these boundaries statewide, with the exception of those for military lands, which will be shown. This decision is depicted in **Attachment A**, titled "Base Map Boundary Matrix" and reflects the final resolution of this issue. Regarding the availability of these boundaries in the NC FMIS web mapping site, the boundaries for Federal and State lands are planned to be made available to the web user if judged adequate by CGIA and its partners. Lastly, the preferences of the sources of base map boundaries is listed in **Attachment B**, titled "Base Map Boundary Source Preferences."

Attachments

- A "Base Map Boundary Matrix"
- B "Base Map Boundary Source Preferences"

Point of Contact

Zsolt Nagy, North Carolina Center for Geographic Information and Analysis

Attachment A: Base Map Boundary Matrix

Boundary	FEMA Requirement to Show Boundary and Label on Printed FIRM if They Occur within Mapped Area	State Preference to Show on Printed FIRM Panels	State Preference to Reflect in North Carolina Digital FIRM Database	Preferred Option for Handling Base Map Boundary Discrepancies*
-----------------	---	--	--	---

POLITICAL	Native American Land	Yes	Yes ^a	Yes	1
	State Boundary	Yes	Yes ^a	Yes	1 ^b
	County Boundaries	Yes	Yes ^a	Yes	1 ^b
	Corporate Limits	Yes	Yes ^a	Yes	1
	ETJ Limits	Yes	Yes ^a	Yes	1

ADMINISTRATIVE	CBRS/OPAs	Yes	Yes ^a	Yes	2
	Military Lands	Yes	Yes ^a	Yes	1
	Other National Lands	No ^c	No	Yes ^d	3
	State Lands	No ^c	No	Yes ^d	3
	Property Ownership ^e	No	No	Yes ^d	3
	Other	No	No	No	3

- * 1) Use existing digital boundary (typically provided by CGIA to the State's contractor from data obtained from a community or other source) on preliminary FIRM as is. This boundary will be used on the new FIRM unless a community/appellant does not agree with the preliminary and submits sufficient technical data to support a revision. If this occurs, D&D will then update the boundary on the printed FIRM panel and database based on the submitted technical data.
- 2) CBRS/OPA boundaries must match the congressional adopted source maps and, therefore, the FIRM panel can not be updated until Congress adopts a new boundary. CBRS/OPA boundaries are being digitally captured for the North Carolina Floodplain Mapping Program by Dewberry & Davis LLC.
- 3) Do not include boundaries or labels on FIRM panels or index.

^a The State's preference concurs with FEMA's requirement.

^b The State's contractors and/or CGIA should coordinate with NCGS on State and county boundaries that significantly conflict with base map features.

^c FEMA requirements on showing these boundaries was waived for the North Carolina Floodplain Mapping Program.

^d To be reflected in the DFIRM database if the existing digital boundaries are determined adequate as judged by CGIA.

^e To be considered as a future component of the North Carolina FMIS.

Attachment B: Base Map Boundary Source Preferences

The State's flood mapping contractors will assemble each base map boundary data layer according to the preference provided in this Attachment. All base data layers will be referenced to the State Plane coordinate system (zone 3200) and the North American Datum of 1983 (NAD 83). The units of measure are US Survey feet.

State and County Boundaries

County boundaries could be derived from local (primarily county) data sources; however, discrepancies exist in county boundary data sets provided by adjacent counties. Therefore, the statewide county boundary file created by NCDOT should be used. This file consists of data from multiple sources (USGS, NCGS, county GISs). The preference of state and county boundary sources follows:

Preference	Feature Source(s)
1	CGIA/NCDOT 1:100,000-scale

Municipal Boundaries

Municipal boundaries (i.e., corporate limits) should be derived from local data sources wherever possible. If municipal boundaries are unavailable from local sources, municipal boundary data from NCDOT Powell Bill data may be used. The preference of municipal boundary sources follows:

Preference	Feature Source(s)
1	Locally derived data sources
2	Community hardcopies (if more recent than 1999 Powell Bill boundaries)
3	NCDOT Powell Bill boundaries

Extraterritorial Jurisdictional Boundaries

Extraterritorial jurisdictional boundaries may be available from local sources. If not, these boundaries will need to be compiled from other available sources, which may include current Flood Insurance Rate Maps (FIRMs). The preference of extraterritorial jurisdictional boundaries sources follows:

Preference	Feature Source(s)
1	Locally derived data sources
2	Community hardcopies
3	Existing effective FIRMs

North Carolina Cooperating Technical State Mapping Program

Native American Lands

Boundaries for Native American lands (i.e., the Cherokee Indian Nation) may be available from local sources. If not, these boundaries will need to be compiled from other available sources, which may include current Flood Insurance Rate Maps. The preference of Native American land boundaries sources follows:

Preference	Feature Source(s)
1	Locally derived data sources
2	Community hardcopies
3	Existing effective FIRM

Military Lands

Military lands may be available from local planimetric or parcel data sets. The preference of military land sources follows:

Preference	Feature Source(s)
1	Locally derived data sources
2	CGIA
3	Hardcopies

Parks, Forests, and Other Lands

Parks, forests, and other lands may be available from local planimetric or parcel data sets; however, the State has chosen not to depict these boundaries on the printed digital FIRM panel nor in the digital FIRM database. City parks and other small locally owned areas also do not need to be shown on the digital FIRM printed graphic and database.