

FLOOD MAP DESKTOP™

PROCEDURE AND BEST PRACTICE FOR IMPORTING DFIRM TOOLS DATA



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PREMISE

The issue for the Flood Map Desktop™ (FMD) user is “how do I transfer a project from FEMA’s DFIRM Tools software to Flood Map Desktop?” This white paper will present best practices for transferring a project to minimize the effect on project budget and schedule.

BACKGROUND

Flood Map Desktop™ (FMD) is an ESRI ArcGIS Desktop software extension created by PBS&J that creates flood hazard mapping products for the Federal Emergency Management Agency’s (FEMA) Risk Analysis Division (RAD) in a Geographic Information System (GIS). FMD automates many of the production tasks for FEMA deliverables including but not limited to: Digital Flood Insurance Rate Maps (DFIRM); DFIRM Database; Digital Capture Standards (DCS) Database; flood hazard profiles, and Letter of Map Revision (LOMR) maps. The software is available in two versions: Standard and Professional.

That’s a technical way of saying it makes flood insurance maps for FEMA. You’ll need ESRI ArcGIS software to operate FMD, so it is intended for the mapping professional under contract to produce maps and other products for FEMA. It is not floodplain modeling software, but it will interpret some riverine and coastal models into flood insurance maps.

The Standard FMD version is available free of charge from a website (www.floodmapdesktop.com) and contains all of the database templates, map symbols, and basic tools for the user to create FEMA products that meet their standards. The Professional version is licensed for a fee and contains automation for functions such as, but not limited to: automated base flood elevation (BFE) placement; quality control; profile creation; advanced automated cartographic placement; conversion of DFIRM Tools data; multi-data format support; and coastal and riverine model support.

TRANSFERRING A DFIRM TOOLS PROJECT TO FMD

Flood Map Desktop™ is built on FEMA database standards from the *Guidelines and Specifications for Flood Hazard Mapping Partners* as is FEMA’s DFIRM Tools software. Therefore, fundamentally, data transfer between the systems is a straightforward process and FMD has a built-in tool to make the transfer as easy as possible. There are, however, some key differences between the databases, namely: the cartographic data and storage methods; domain codes; and record identification numbers. The entire transfer process is described in the following paragraphs.

PREPARATION

FEMA’s DFIRM Tools contains special symbols and true type fonts developed by MapText™ that must be transferred to your system to display the DFIRM Tools data in the FMD software. FEMA and MapText™ have provided these fonts for your use and are located here: https://hazards.fema.gov/femaportal/docs/DFIRM_Tools_Decommissioning_Template_Information.zip. Save the file to your computer and extract the contents. In the LabelEX_Info folder, copy the labelezcustom.TTF file to the font folder on your computer which is typically located at C:\WINDOWS\Fonts. This is all that is necessary to install the MapText™ fonts on your computer.

You will also need to obtain a copy of the DFIRM Tools project to be transferred to FMD. This can be done by exporting the project to an ESRI personal geodatabase through the DFIRM Tools software, or by contacting MIP Help for assistance at miphelp@riskmapcds.com.

CREATE FMD PROJECT AND DATABASE

The next step in the transfer process is to create a FMD project that will accept the DFIRM Tools project. This process is the same for creating all FMD projects and can also be found in the FMD help files installed with the software.

- 1) Open ArcMap and the FMD window in the ArcMap table of contents
- 2) Right click the Project Management node in the FMD tree view
 - a. Navigate to a folder that will become the FMD Project workspace and will store the FMD database
- 3) Right click the workspace name in the FMD tree view and select 'create/add' project
- 4) Create a FMD project
 - a. Project Type = DFIRM
 - b. Database Format = user preference (most common is ESRI personal geodatabase)
 - c. Created By = user preference
 - d. Spatial Reference = browse to select the spatial reference of your new FMD database
 - e. Project Name = user preference

TRANSFERRING DFIRM TOOLS CARTOGRAPHY

The FMD project and database are now created and the user will need to make a decision about how cartographic elements (labels, leaders, symbols, etc.) will be stored in the FMD database because there are several options to choose from and they are dependent on your needs to give the user maximum flexibility over their own production processes. The options are: element database (ELM); element feature class (X_ELEMENTS); graphics file (GRF); or ESRI annotation feature class (NONE). Descriptions of these cartographic methods are located in the FMD help documentation installed with the software or downloaded separately from www.floodmapdesktop.com/downloads. Detailed procedure is as follows.

- 1) Right click the DFIRM project name in the FMD tree view and select Project Settings.
- 2) Select the appropriate cartographic method using Project Setting #60.
 - a. Click OK to close the Project Settings window
- 3) Right click on the Data node for your DFIRM project and select Import → DFIRM Tools Data
- 4) Browse to the location of the DFIRM Tools database that is to be imported to FMD
 - a. A pop-up dialog box will open asking if you want to 'Import Data'
 - i. Click Yes.
 - ii. Since computer speed and DFIRM Tools project sizes vary widely, FMD provides you with a staged import process to import the data and the cartographic elements separately so as to not overwhelm your computer.
 - iii. If you are using the X_ELEMENTS storage method, you should compact the FMD database through ArcCatalog before proceeding. After the database compaction is complete, you can then go through the import process again beginning at step 4, but click 'No' for Import Data (since you have already done this), then proceed to step 4b.
 - b. Another pop-up dialog box will ask if you want to 'Import Annotation'
 - i. Click Yes

Your GIS data and cartographic elements from the DFIRM Tools should now be in your new FMD project. We believe it is a best practice to now perform quality control procedures for your FMD project. Any errors in the DFIRM Tools project will persist in the FMD project and you will want to ensure all the data and cartographic elements were transferred correctly.

QUALITY CONTROL FOR DFIRM TOOLS TRANSFER

As a best practice, a quality control and/or quality assurance process should be part of the standard operating procedure whenever data is transferred from one system to another. This is the case for the DFIRM Tools to FMD transfer process and some guidelines are provided below. Since each FEMA Region or CTP has special needs, we recommend tailoring these guidelines to your project workflow and standards.

- 1) Automated data integrity review
 - a. Right click the data node for your DFIRM project
 - b. Select QA/QC → Refresh Data State and run QA/QC
 - c. The data layer icons will change color: black – no data; blue – QC not performed; red – QC failed; green – QC passed.
 - d. Right click any data layer and choose View Errors to review errors.
- 2) Automated data integrity review
 - a. Right click the data node for your DFIRM project
 - b. Select QA/QC → QA/QC Configuration
 - c. In this dialog you may create and save custom database queries to be included in the FMD Error Report.
- 3) Automated GIS topology review
 - a. FMD includes similar topology rules as the DVT and MIP verification system. To run the following topology review, we recommend all other errors in the database are solved first.
 - i. Right click the Data node, select the QA/QC option, then select Topology Check
 1. This automated process requires several minutes of processing time depending on the size of the database
 2. During the automated process, FMD will insert ESRI topology feature classes into your FMD database that will be the basis of the topology error report.
 - ii. Once the topology review is completed by FMD, a report window will display the topology errors.
 - iii. You can now use the standard ESRI topology editor tools to correct the errors.
- 4) Automated cartographic review
 - a. FMD includes a feature to automatically search for labels that overprint each other, which is a quality violation. To perform this review, follow the instructions below.
 - b. Within a panel edit session (see FMD Help files), the Overprint QC Tool will become active.
 - i. Create a Panel Layout from the numbered panel node on the Panel node in the tree view.
 - ii. Select Start Editing Panel Graphics from the panel's context menu.
 - iii. Turn on the FMD Error Toolbar from your ESRI toolbar menu
 - iv. On the FMD Error Toolbar,
 1. Error Layer = default
 2. Error Type = default
 3. Click the fourth button on the toolbar to generate the Overprint Report
 - v. Once the automated overprint procedure has completed, an error window will be displayed and zoom your map to the first error in the table
 1. You can fix overprint errors manually based on your mapping needs.
 2. Click the next error in the table and it will zoom to that location
 - c. This procedure will locate all label overprint errors, as well as some label and feature overprint issues.
- 5) Manual cartographic review
 - a. After completing the previous quality reviews, ensure the maps adhere to FEMA specifications by manually reviewing the cartographic panels individually. The following list contains common, easily identifiable, errors that would behoove the user to correct at this stage of the project.
 - i. Avoid overprinting lines and never overprint political or flood boundary lines
 - ii. All political areas should be labeled
 - iii. Verify 'Joins Panel' labels as well as corner coordinates are placed correctly with the correct values
 - iv. Verify all information in the title block has been correctly populated
 - v. All SFHA zones should be labeled except unshaded zone X areas
 - vi. Correct text rotation
 - vii. Verify all transportation features crossing the SFHA or within 1 map inch of the SFHA are labeled
 - b. For a full list of items to be reviewed during the manual cartographic review stage, contact your internal QC coordinator or the regional QA/QC Coordinator

The procedures above may or may not be necessary in all DFIRM Tools transfer cases, but are good practice to perform when transferring DFIRM data from one system to another. Common issues have included: overlapping labels; incorrect font sizes; and incorrect label and leader placement. Errors of this sort are not a result of the DFIRM Tools to FMD transfer, but should be addressed nonetheless in the quality review process before proceeding with the remainder of the project.

TIPS & BEST PRACTICES

The following is a collection of best practices gathered through much iteration of the DFIRM Tools to FMD transfer process. These items are not necessarily part of the transfer process but they will help the user with ancillary processes or other questions that might arise. Also be sure to check the FMD forum at www.floodmapdesktop.com/forums to connect to other FMD users and browse previously asked questions.

TOPOLOGY

DFIRM Tools databases were developed with tolerances different than the new automated FEMA quality review tool for DFIRM databases - the DFIRM Validation Tool (DVT). FMD uses the same tolerance specification as DVT to ensure the topology review in FMD matches the DVT review. Because of the discrepancy, you are most likely to see a large number of topology errors in the FMD database after the DFIRM Tools transfer. Sometimes it is easier to rebuild the original data than to individually correct each topology error, but that is a user preference depending on how many topology errors exist in the data.

Those topology errors are most often seen in the political, flood hazard, and PLSS feature classes. When we rebuild the data, we convert the polygon to a point feature class and create a topology for the lines only. The topology rules for the political, flood hazard, and PLSS feature classes include:

- must not intersect or self-intersect;
- must not overlap; must not have dangles; and
- must not intersect or touch interior.

Once the line topology contains no errors the polygons can be built from the error-free lines through ESRI ArcCatalog by:

- right click the feature class;
- select New → 'Polygon Feature Class from Lines'.

This process will allow you to select the line features that are topologically correct as well as the Point feature class you converted previously to attribute the newly created polygons. Previous transfer projects have displayed as few as 2,500 topology errors to over 40,000. Results will vary, but it is likely your project will contain some topology errors after the transfer due to the DVT tolerances and not due to the transfer process itself.

STUDY INFORMATION TABLE (STUDY_INFO)

The Study Information (study_info) table is automatically created by FMD when a new FMD project database is created. Some of the information in this table is populated automatically with default values. Following your DFIRM Tools data import, you may notice there is a second record in this table yet the DFIRM specification only allows for one record. Deleting the record that was created by FMD is the best solution. The projection zone field (PROJ_ZONE) can also be incorrect and is most likely most likely because DFIRM Tools data is stored in the un-projected geographic coordinate system and the new FMD database is projected. The PROJ_ZONE field can be fixed with project setting #20 or in the database table itself using the standard ESRI table editor.

PANEL BOUNDARIES (S_FIRM_PAN)

After importing DFIRM Tools data to FMD, we have seen an instance where the QA/QC Error Report determines that the corner coordinate values for the panel boundaries are not correct. The error was isolated to an extra space placed after the decimal which should not be there.

Another coordinate value error we have noticed in some transfers is a corner coordinate with excessive significant digits. For example, a coordinate value of 92° 31' 52.501" should read 92° 31' 52.5". We have found that creating a new panel boundary layer using FMD tools will remove all of these problems and is often quicker than editing the coordinate values.

CARTOGRAPHIC ELEMENTS

FMD and DFIRM Tools perform the labeling process in different ways but arrive at the same result – a cartographic map meeting FEMA specifications. Underlying the process differences are small differences in the FMD and DFIRM databases for storing information about how the labels should be displayed on a map because the fields in the DFIRM database do not quite contain enough information for some of the label automation. For more information about proper feature attribution for FMD cartography, please go through the FMD Help File and read the section titled 'Special Database Fields for Labeling'.

BASE MAP NOTE IN NOTES TO USERS

A few projects transferred from the DFIRM Tools environment do not contain the Base Map note in the Notes to Users. To add the note:

- Open FMD's Project Settings;
- Choose project setting 27; and
- Enter the base map information for the note.

This note will most likely need to be added using formatted text to ensure correct word and line spacing. ESRI tags for formatting text can be used such as `\r\n` to create a hard return or `\r\n\r\n` at the end of the note to create two hard returns for the space between the following note.

METADATA

DFIRM Tools and FMD both automate the creation of FEMA's metadata profiles, but in slightly different processes. The `L_SOURCE_CIT` table in the DFIRM Tools database is roughly equivalent to the `X_METADATA` table in FMD, but there are some differences. The `X_METADATA` table contains a few fields that the `L_SOURCE_CIT` table does not. The user will need to verify and update the records after the transfer process if additional metadata profiles are to be automatically created from this FMD project. The additional information should be easily obtained from the metadata documents of the source data in the project file.

CONCLUSION

Flood Map Desktop™ (FMD) is an effective DFIRM tools replacement software that contains automated features to efficiently transfer DFIRM Tools data to a FMD project database. A user following the processes, best practices, quality review, and other guidelines in this document should experience minimal project interruption