

FRM-PCX Webinar #5: Implementing Nonstructural Measures in HEC-FDA

July 25, 2019

Q&A Session

This webinar provided insight into how nonstructural measures can be analyzed using the Corps-certified Flood Damage Reduction Analysis (HEC-FDA) model. The webinar was presented by Brian Maestri (National Nonstructural Committee member) and Britt Corley (Nonstructural Working Group member), both economists stationed in New Orleans District. The presentation covered the following topics: defining nonstructural measures, modeling nonstructural measures using the HEC-FDA model through use of modules to adjust the structure inventory, providing economic results for nonstructural plans using risk-based methods, incorporating sensitivity analyses for the participation rates of nonstructural plans, and using structure detail output information to evaluate increments of a nonstructural plan. This is the fifth in a series of webinars from the FRM Planning Center of Expertise (FRM-PCX) focused on helping PDTs with current and relevant challenges on their FRM Planning studies through tips, tools, and lessons learned.



This summary of the Question / Answer session of the webinar is not a transcription; questions and responses have been edited and reordered for clarity.

HEC-FDA Technical Design and Function

Does HEC-FDA populate the “Struc_Name” field? (See Slide 8 of presentation)

It does not. The structure inventory must be created separately in a text file. It’s critical that each structure name is unique, because when HEC-FDA imports the inventory it will read over duplicate structure names without throwing an error to alert the user.

Does the field “Struct_Val” refer to the depreciated replacement value?

Yes. Typically, the economist on your team would come up with those values using RSMMeans or Marshall and Swift software.

Note: The “Struct_Val” field should only reflect the value of the structure itself, and not the value of the land on which the structure is located.

If you assign “Buyout” as the “Mod_name,” will HEC-FDA remove those structures from your inventory for that specific plan?

No, HEC-FDA will not remove those structures. The “Mod_name” field won’t recognize what “Buyout” means; you can put any name/word in that field. Essentially, this field is just an indicator of what to turn off and on when you’re running your modules. In this case if the field is on, any structure that has “Buyout” in the “Mod_name” field will be damaged during your run; when you are conducting a with project run, therefore, you would turn the field off, which will simulate the structure no longer being there.

Estimating Damages and Values

Does the FRM-PCX have depth-damage functions standardized for nonstructural measures?

The FRM-PCX does not have standardized depth-damage functions for nonstructural measures; generally, the Economics sub-CoP handles those functions. However, this may something for the PCX to consider as a future research task.

How does the HEC-FDA model consider multi-story buildings with regard to percent damages?

Multi-story buildings will be reflected in the occupancy types and the associated depth-damage curves (e.g., 1-3 story vs. 3-5 story apartment buildings). The percent damages will be built into these curves.

Could you discuss the implementation guidance for buyouts and damages reduced calculated published by the Corps in 2001 ([Non-Structural Flood Damage Reduction Within the Corps of Engineers: What Districts Are Doing](#))?

The benefits associated with acquisition and buyouts are directly related to the damages that would have occurred had the buyout not happened (or the without project condition), per Section 219 of the Water Resources Development Act of 1999. Calculating these benefits involves looking at past annualized damages when the structure was still in the floodplain. The with project scenario results in zero damages, while the damages reduced are based on the without project condition.

Should you adjust structure values when modeling certain nonstructural measures (i.e., decreasing values for filling basements or increasing values for elevating structures)?

The changed value in the structure after a nonstructural measure is implemented would more so impact that market value of the structure, not the depreciated replacement value (i.e., the cost to rebuild that structure) used in HEC-FDA.

Where can one find historical cost estimates for non-structural measures?

There is no one central national data source for historical cost estimates; each District uses their own method (i.e., interviewing construction companies, working with the National Nonstructural Committee, etc.) It's important to work through the Engineering and Construction Division when working on these costs. If you do borrow costs from another District or project, remember that it is important to index those costs for both year and location.

Given that nonstructural plans are grouped, can you discuss how to apply interest during construction?

The time period used for interest during construction is the time it takes to implement the nonstructural measure for one of the structures in the group, assuming the other structures have a similar implementation time for the nonstructural measure. For example, if 50 structures are to be elevated, and it takes 6 months to elevate one of the structures in the group, then you would assume 6 months for the entire grouping, not 50 structures times 6 months. The guidance for interest during construction is discussed in [Planning Bulletin 2019-03, Further Clarification of Existing Policy for USACE Participation in Nonstructural Flood Risk Management and Coastal Storm Risk Management Measures](#).

Participation Rates

When doing the sensitivity analysis, does a 25% participation rate mean that 25% of the structure inventory was analyzed for nonstructural alternatives?

The participation rate refers to the number of structures that were assumed to have nonstructural measures that are actually participating in the nonstructural plan. If there are four nonstructural structures assumed in the full plan, then with a 25% participation rate only one of those structures would actually be participating. Buyouts are not included in this analysis, as they are conducted under eminent domain and therefore should result in a 100% participation rate.

If structures are randomly assigned to participate, why aren't benefits and costs more linear? (See *Slide 16 of presentation*)

Benefits and costs aren't more linear because the nonstructural measures – which have different costs and benefits – were assigned randomly. The random sampling was not an aggregation, so the structures included in the 25% participation sample may not have been included in the 75% sample. Also, not all the structures included in this example have a positive benefit/cost ratio.