Review Comments on the Draft Hurricane Isaac Pre- and 2012 100-year HSDRRS Evaluation (September 2012)

Submitted by

The Water Institute of the Gulf

October 8, 2012

THE WATER INSTITUTE
OF THE GULF

Introduction

The Water Institute of the Gulf is an independent research-driven entity dedicated to advancing the understanding of coastal and deltaic systems and to the application of scientific and technological solutions for the benefit of society. At the invitation of Col. Fleming of the New Orleans District, and as requested by Senator Vitter, expert staff at The Water Institute of the Gulf engaged in an 'over the shoulder review' of the Hurricane Isaac Pre- and 2012 100-year HSDRRS Evaluation. This involved participation in Corps team weekly calls, individual discussions with Corps team members, and an in-depth meeting to understand aspects of the modeling. Due to the expedited nature of the assessment, Water Institute personnel were not engaged until after the scope and procedures for the assessment were determined. The comments provided here were developed in the six days provided for the review of the draft report by Dr. Denise Reed (Chief Scientist) and Dr. Ehab Meselhe (Director of Natural Systems Modeling and Monitoring). Dr. Chip Groat (President and CEO) reviewed the Water Institute comments. Additional ideas for editorial changes have been sent separately to the Corps team.

General Comments on the Report

The amount of information collated and assessed for this report is impressive both in terms of the range of data sets generated and explored, and the speed with which it was drawn together towards the assessment goal. The team was clearly dedicated to producing as thorough a product as possible within a short period following the event.

For the most part, data used in the report are shown with no consideration of the accuracy of the measurements. This can give a false sense of the ability of instruments, surveyors or models to capture small differences. There is much discussion of differences in decimal feet with one tenth of a foot being used as a discernible difference. For example, measuring a high-water mark through debris lines could introduce errors of several inches. The report would be improved with an early discussion in each chapter of the types of data that are being used in that part of the assessment, potential errors in their collection and/or generation and as assessment of their accuracy. Data tables which show differences between grids, or storms or conditions should report 'no difference' if the differences are within the error of the analyses/measurements. 'No difference' would not necessarily be the same as a calculated value of zero. The public and decision makers are familiar with the concept of 'detection limits' in many fields – a similar approach could be adopted here to make interpretation of the various data sets more meaningful.

Especially in section 3 but also elsewhere in the report, Hurricane Isaac is considered relative to 'typical Category 1' storms. The implication that there is any 'typical' set of conditions associated with any storm or wind speed category is fundamentally misleading. Indeed the extensive comparison of Isaac with other storms such as Gustav or Katrina is used to great effect in parts of the report to demonstrate how small differences in storm character can lead to substantial differences in the pattern and magnitude of the consequences. Throughout the

report it would be better to eliminate these types of overgeneralizations which do little to communicate the risks associated with storms to the reader.

Each section of the report should stay focused on the specific data sets or topical emphasis rather than expanding into areas covered in detail elsewhere. For instance, a section of winds should focus on characterizing the winds and not inferring (usually with no detailed basis for the inference) the effects of the winds on water levels and flooding.

The utility of the report would be markedly improved with additional location maps, especially for the sections which include data from specific gages or monitoring locations. Each section might include a location map for the specific sites mentioned with the track of Hurricane Isaac overlain. Such a map would make the interpretation of the data clearer, especially when distance or specific geographical characteristics are being in the interpretation.

The next draft of the report should include a Glossary of Terms and/or the use of specialist terminology should be reduced or explained more fully. Examples include the winds section where terms such as sustained winds, peak gusts, maximum winds, and strongest winds are all used to describe different aspects of a storm wind field. If they are all essential to convey the differences in characteristics then a Glossary or footnoted definitions will be important to ensure event technical readers with no experience in meteorology can understand the message.

Comments on Specific Sections of the Report

1.0 Introduction

The Introduction plays an important role by defining the scope of the assessment. Thus clear use of terms here sets the stage and expectation for the rest of the report. Our editorial comments point to several terminology issues which could be clarified.

2.0 Summary of 100-year HSDRRS conditions

This section is a basic description of the characteristics of the system. Our editorial comments point to several terminology issues which could be clarified.

3.0 Hurricane Isaac event overview

The summary section for this chapter is exceptionally long and does not effectively communicate main messages – it seems to be more of a collection of exemplary data. The data graphs should not be included in the summary section as they need much more information, e.g., a location map, to be understood.

The Chapter summary (second sentence) begins with a broad statement about what a wind speed ‘suggests’ in terms of flooding. Such statements seem to reinforce the conventional wisdom about a relationship between wind and flooding that clearly the section undermines.

Such statements imply that the report is trying to explain an anomaly rather than a complex phenomenon and add little to the report.

This section of the report (starting on page 3-6) includes mention of a 'normal Category 1 storm'. See general Comments regarding the use of such general terms. This section also needs to be careful in describing complex patterns of precipitation patterns in terms of a 'norm' for an area. Deviations from the norm are often the trouble spots and should not be disregarded.

In Figure 3.6 it needs to be clear how the figure was derived from NWS information. Are the regions imposed by USACE or NWS? What is the purpose of this 'regionalization'? It is also important to say more about the source of the data so as to explain why there are large areas with no data in the areas east and south of New Orleans.

The text on wind (page 3-14) includes a number of different terms which need explanation. What is Category One hurricane force – a specific value or anywhere within the range on Saffir-Simpson? The text mentions 1 minute and 2 minute winds but the columns on Table 3.3 do not distinguish. It would be helpful if the narrative could map directly onto the information in the table – using similar terminology would be useful, especially for the non-expert.

Section 3.2.2.2 includes several references to the coincidence (or not) of peak winds and peak surges but no data are presented to support this. The figures only show wind not wind and water. Either add the data here or make the connection later in the report during synthesis.

The sections (3.3 and 3.4) which compare Isaac to other events (real and synthetic) could be separated from the other more data driven parts of this section. They form a stand-alone assessment piece which could be better highlighted by being a separate structural element of the report. Some of the early text in 3.3 (on page 3-27) could be moved earlier in the report – at least to the start of this section – to introduce the idea of how a storm interacts with the landscape it moves over. Overall this is a very useful section of the report and it demonstrates that specific patterns of water level need a lot of explanation.

In section 3.3.2.3 it would be helpful to clarify whether the data presented and discussed are for surge alone or whether the effect of waves is included.

In section 3.4 the explanation of JPM-OS is good and the message is clear. Adding the characteristics of Isaac to Table 3.4 would reinforce the point.

4.0 Prior evaluations of the expected 100-year HSDRRS performance

This section provides a straightforward description of previous analyses. The sources are well documented and the information extracted from the previous work is appropriate for this report.

5.0 Hurricane Isaac Model Simulations

The first paragraph in page 5-2 offers a discussion regarding the model results in the Braithwaite area. You may consider adding a sentence that since the model over-estimates the surge height by nearly 3.0 ft, the predicted increase of 0.1 ft is not quite meaningful at this stage. When the wind field is finalized, and the model is revised further analysis would be needed for this area.

In page 5-15, it is mentioned that the 2012 grid reflects the as-built configuration. Has there been significant settlement/subsidence since these features were built that should be reflected in the model? Some acknowledgement of this should be included. Could this be added as the model is refined and finalized?

Section 5.4.1.1 offers a discussion about differences in the order of 0.1 and 0.2 ft. If these fall within the model uncertainty, wouldn't be better to state that these conditions are "similar" given that the model could not discern this level of difference? This is a good example of the general point regarding uncertainty made above.

6.0 Comparison of System Characteristics and Performance

This section includes a basic description of each of the elements of the HSDRRS system and their operation during the Isaac event. The information is clearly presented and well documented.

The discussion of the collection of highwater marks should describe the procedures used, including quality assurance for identification of water marks and/or survey techniques, to enable an assessment of the accuracy of the information collected by the many groups involved. This is especially important as data are reported in hundredths of a foot. While the data used are not final and the assessment is qualitative, such a discussion will assist the reader in their assessment of the quality of the information presented.

7.0 Detailed Evaluations

This section includes detailed consideration of local rainfall and runoff conditions in several areas. The hydrodynamic model results are also summarized. There is a lot of interesting information in this section that will help local leaders and the general public understand the patterns of water movement which did and did not influence flooding in specific areas. It is clear that the sections were developed in parallel due to the short time available for the study. This leads to some inconsistencies in approach (e.g., the use of synthetic rainfall in some areas and not in others, hydrology models in some areas and not others) which may cause confusion. The narrative varies in technical detail with some sections directed at a more general audience than others. A suggestion would be to apply a common format for each area and put some of the details into an appendix. Such a common format might include:

- Basic description of landscape/important physiographic features, including a map of key locations to be mentioned. LIDAR would be part of this where appropriate.
- A focus on hydrologic basins (the switch from basins to specific communities to administrative boundaries is confusing)
- Justification for different data sources/analytical approaches
- Qualitative consideration of some of the key assumptions (e.g., that rainfall in St. John was 24 hrs later than at MSY)
- Summary of the role of key elements in the duration/depth of flooding (e.g., ponding behind railroad tracks, operation of pump stations)
- Clearly identify the role of HSDRRS or not as the case may be.

The inclusion of a comparison to other storms at the local level is consistent with the approach in the report as a whole but seems inconsistent in application.

8.0 Summary of Findings

The purpose of this section could be to revisit the questions from the Introduction and provide succinct summary answers with some illustrative details from the preceding report. Rather the summary focusses on the modeling results and some of the 'storylines' which are so compelling in the main report (the progression of the surge through Lake Borgne, Lake Pontchartrain into Lake Maurepas shown in the gages, or the differences between Isaac, Gustav and Katrina are two examples) are not reiterated. In addition to the specific evaluation of HSDRRS contained here which was the initial motivation for the report, other important messages should be allowed to emerge and this summary section would be a good place to insert an additional 'Learning from Isaac' section.

Summary and Recommendations

In summary the Water Institute review of the Draft Hurricane Isaac Pre- and 2012 100-year HSDRRS Evaluation did not identify any flaws in the analysis and concur with the general findings described in section 8 of the report.

In addition to the comments on the report provided above the Water Institute of the Gulf offers the following recommendations regarding future work:

- Once final data is available on the wind field for Hurricane Isaac the modeling should be repeated for the Braithwaite area with the aim of improving the model predictions and providing a better assessment of the influence of HSDRRS on Isaac flooding levels in that area.
- Further analysis of the flooding during Hurricane Isaac in areas such as West Pontchartrain could elucidate the relative roles of direct precipitation, runoff and storm surge to allow planned protection measures for those areas to more fully appreciate the range of conditions that storms can generate.

- The Corps and their partners should consider expanding the JPM-OS to include Cat I slow moving storms. Isaac demonstrated that clearly these storms could cause significant flooding/damage and the report explains well how these types of storms were not included in the JPM-OS. Such an effort is beyond the scope of the current assessment but would be an important contribution to communicating risk to all in south Louisiana.
- Development of a model grid to reflect the current status of the HSDRRS would be of great benefit. This grid should have sufficient resolution to capture all the system elements. This new "base" grid could be used by many to reflect the interaction of the HSDRRS with other elements of the landscape or with specific storm characteristics. Such a grid would need to be maintained and any new protection element that gets added to the system or any change in its status should be reflected in the grid.