COLORADO
Colorado Water Conservation Board
Department of Natural Resources

MEETING MINUTES

Project Name:	Arapahoe Countywide Risk Mapping Assessment and Planning (Risk MAP)
Meeting:	Arapahoe County Phase 1 Kickoff Meeting
Date & Time:	January 26, 2023 from 2 - 3 PM
Place:	Virtual via Zoom

Recording and meeting documents available at https://drive.google.com/drive/folders/1lpZkJtBhJ-MuoQOqZscirndLZuC3rSYv?usp=sharing

Welcome & Introductions

Terri Fead welcomed people to the meeting and moderated the introductions of the attendees from the Colorado Water Conservation Board (CWCB), Mile High Flood District (MHFD), and Michael Baker Int. Terri overviewed the meeting purpose and presentation outline. Terri clarified that this 2-Dimensional (2D) Base Level Engineering (BLE) data will not supersede any effective information within the MHFD, but rather CWCB will be updating flood hazard data outside MHFD. The list of meeting attendees is included in the table below.

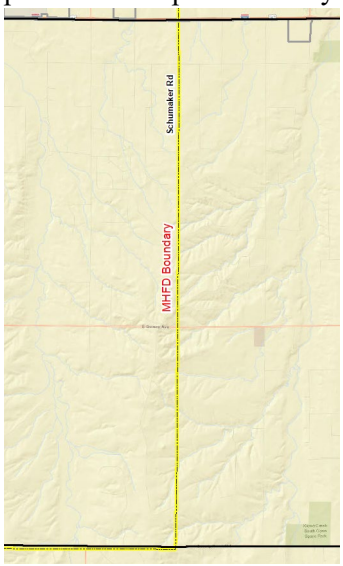
Entity	Name	Role
City of Sheridan	Randy Mourning	Superintendent of Public Works
Town of Columbine Valley	Troy Carmann	Civil Engineer, ICON Engineering
City of Greenwood Village	Ann Woods	Community Development Engineer
City of Littleton	Carolyn Roan	Floodplain Administrator
City of Aurora	Sam Miller	City Engineer
Arapahoe County	Chuck Haskins	Floodplain Administrator
SEMSWA	Cynthia Love	Floodplain Administrator
CWCB	Marta Blanco Castaño	Flood Mapping Program Assistant
	Terri Fead	Floodplain Mapping Program Coordinator
MHFD	Stacey Thompson	Floodplain Manager
	Brooke Seymour	Planning and Floodplain Management Director
	Jon Villines	South Watershed Manager
Michael Baker Int.	Matt McGlone	Project Manager

1. **National Flood Insurance Program (NFIP) and Risk Mapping, Assessment and Planning (Risk MAP) Background**
   - Terri Fead overviewed the National Flood Insurance Program (NFIP) and described it as a "four-legged stool" that includes Flood Insurance, Flood Hazard Mapping, Floodplain Management, and Mitigation Grants. For studies like this one for Arapahoe County, we will produce Flood Hazard Mapping that will most likely end up on Flood Insurance Rate Maps (FIRM) and flood information/products aimed at protecting life and property. A basic breakdown of the program aspects was provided, including information about how the communities join the NFIP voluntarily to partner with FEMA and tap into flood insurance and disaster assistance grants. It was also noted that this only applies to communities within the CWCB jurisdiction (i.e. Town of Bennett, Town of Deer Trail and Unincorporated Arapahoe County).
   - Stacey Thompson described the MHFD process for mapping updates. She explained they're locally funded and performed in partnership with communities. Board approved studies are sent to the state for designation and approval. This allows local governments' authority to regulate these as flood hazard areas.

- Terri Fead described the CWCB process for mapping updates. She went over the Phase 1 (Base Level Engineering) project objectives and described the four steps in the Risk Mapping, Assessment and Mapping (Risk MAP) cycle: Identify Risk, Assess Risk, Communicate Risk, and Mitigate Risk.
- Marta Blanco Castaño described the Risk MAP process and timeline, and how communities are involved with the four phases (i.e., Discovery, Data Development, preliminary maps/appeals, and community adoption). Marta highlighted that, at this point, we are at the BLE kickoff and will plan on following up with a Discovery meeting in the next few weeks. After Discovery and discussion with communities on how data will be used, Phase 2 or Data Development will begin in Spring/Summer 2023. Marta described the third phase as the Preliminary Maps and Appeal Period. The final phase was described at community adoption followed by Flood Insurance Rate Maps (FIRMs) going effective.

2. **Project Scope and Goals**

- Matt McGlone discussed community locations within MHFD and CWCB and why this will be important on following slides. He explained that the MHFD/CWCB boundary falls along Schumaker Road for the northern portion of Arapahoe County.



- Matt then went over the current Arapahoe County effective mapping, showing current effective Zone A (164 miles) and Zone AE (200 miles) for the entire county. He explained that the most current Arapahoe Countywide Flood Insurance Study (FIS) is effective as of 9/4/2020, with the most recent update being the incorporation of 6 Flood Hazard Area Delineation (FHAD) Studies through the 8-Floodplain Physical Map Revision (PMR) for Cherry Creek, Happy Canyon Creek & Green Acres Tributary, Senac Creek, Toll Gate Creek, Lower East/West Toll Gate Creek, Unnamed Creek and Littles Creek.
- For the CWCB jurisdiction, Matt explained that Phase 1 has been initiated for the Risk MAP study. He provided further detail on Phase 1 studies that included using updated/improved terrain data, accounting for changed conditions and improved techniques such as the used of HEC-RAS 6.3. This type of study method is semi-automated and allows the production team to study on a watershed/countywide basis vs. only individual streams or just the CWCB district. Matt explained that it was more economical and efficient to produce the modeling/mapping for the entire county vs. carving out the MHFD service area. This data will be provided to MHFD also for their use and will be explained in upcoming slides.
- Matt explained that this study will include countywide 2D BLE modeling based on drainages with areas greater than 1 square mile shown on slide 11 in green. He further explained that this modeling/mapping also identifies areas where ponding may exist. Ultimately, the results created are approximate, or Zone A ready, and actual regulatory reaches will be identified later with input from communities. However, CWCB will have to update anything that is currently mapped in the FEMA floodplain maps outside of the MHFD area.

3. **Two-Dimensional (2D) Base Level Engineering (BLE) Methodology**

   - Matt provided a high-level description of what 2D Base Level Engineering methodology entails, stating that Base Level Engineering is a FEMA term that also can be described as doing engineering at a base level or an approximate level of study (i.e. Zone A). The approach is semi-automated so that it can be done at a larger scale, such as by watershed or, in the case of Arapahoe County, by County. Matt described that the process starts with good terrain data like any model, and that a digital elevation model will be created for Arapahoe County utilizing the 2018-2020 LiDAR that's available. Matt then described the process of breaking down the study into separate domains that are defined by topographic features. Matt explained that the next step is to then create and apply a mesh, or cells, where calculations occur and can be further refined to include structures. Matt described the next step as applying rainfall events to the mesh in order to see where water concentrates and flows. Finally, Matt explained that the model is run through FEMA's predictive simulations that include 10% annual chance, 4%, 2%, 1%, 1+% and 0.2%.

4. **2D BLE Results and Uses**

   - Matt discussed some of the benefits of 2D BLE results that included:
     - Improved delineations using more recent, higher resolution terrain data.
     - Improved technology and methodology.
     - Capable of larger scales such as at a watershed level or countywide level like this study.
     - Results in 6 or more recurrence intervals instead of just the 1% and 0.2%.
     - Additional data can also be obtained from models such as velocity, depth, flow and Water Surface Elevation (WSEL) grids.
   - Stacey Thompson and Brooke Seymour explained how the BLE results will be used in the MHFD. The BLE data will require additional refinement before it is usable within urban areas. Stacey stated that, currently, MHFD does not plan on carrying the BLE forward as Zone A areas. Brooke did mention that, in the future, it may make sense to revisit areas, such as some eastern areas in the MHFD, to possibly use 2D BLE for approximate Zone A analysis.
   - Jon Villines talked about the pilot study being done on Niver Creek, where approximate BLE is being used to develop a detailed 2D model. The 2D model will be compared back to the recently completed Niver Creek FHAD Study (1D model) and gage data to determine best practices, including cost and timelines, so that the detailed 2D modeling can be generated district-wide.
   - Jon also explained that the MHFD intends to develop a Risk Scoring system using the depth, velocity and probability data from the 2D model. The data will be applied to roads, structures (buildings), trails, etc. to develop a risk score. The Risk Scoring Data will be displayed in GIS and MHFD Confluence to help inform and understand risk for our communities (see example on slide 17).
   - Matt presented example 2D BLE results in contrast to effective data originating from the 1970s and 1980s to show the increased resolution and coverage available with 2D BLE.
   - Marta summarized the community options for using the 2D BLE results for the CWCB jurisdiction.
     - In areas that are currently mapped as Zone A, the 2D BLE results will replace/update the effective mapping. There is also an option to request an upgrade or enhancement to these reaches by studying with detailed methods for Zone AE mapping during the Phase 2 effort.
     - For areas that are currently unmapped, the 2D BLE results can either be: (1) leveraged as Best Available Information (BAI) for internal community use; (2) adopted as new regulatory Zone A mapping; or (3) form the basis for a recommended detail study to produce Zone AE mapping.
   - Communities are to consider these options and provide feedback at or following the Discovery Meeting, prior to the Phase 2 kickoff around spring/summer 2023.

5. **Open Discussion & Questions**

- Chuck Haskins (Arapahoe County) mentioned that they have conducted some studies of the approximate Zone A basins over the last several years. It's used mostly for better info to ensure structures are outside the floodplain and look at structure crossings. They have done 3 different Creeks and have some of the tributaries – especially if over 1 square mile. Terri responded that that information would be really helpful for this study and stated that anything you have that we can use/leverage would be welcome.
- Carolyn Roan (City of Littleton) asked when these delineations will be available to view. She also asked if they would be able to compare these results to current regulatory delineations as it would be interesting to see the differences. Marta responded that the Discovery meeting will be held with the CWCB communities in the coming weeks where information will be shared. The MHFD can share data with you if they so choose.
- Terri and Brooke asked if there are any specific areas that communities on the call would like to see the draft 2D BLE mapping for. Carolyn Roan asked to see the Littleton area. Matt pulled up the draft mapping in this area. Terri also restated that the draft 2D data needs further refinement for use in the urban area.
- Chuck Haskins (Arapahoe County) asked to look at the draft mapping for the eastern portion of the county. Matt pulled up the draft mapping in this area. Chuck added that the studies they had done in these areas produced narrower floodplains. Marta added that these draft floodplains are subject to change.
- Stacey Thompson mentioned to Chuck that there may be value in pursuing a regulatory Zone A study on West Sand Creek. Chuck agreed and stated that the cost has been the factor in a study not being pursed in this area.
- Cynthia Love (SEMSWA) request to see the draft mapping for Cherry Creek, North of Arapahoe Rd. Matt pulled up the draft mapping in this area.
- Jon Villines mentioned to Carolyn Roan that on Littles Creek, it appears there are a lot of discontinuities at roadway crossings, because without additional work it is just reflecting the LiDAR, which is going to result in a lot more inadvertent detention than is really there. MHFD is hoping to add that additional detail over the course of 2023 and 2024.
- Carolyn Roan (City of Littleton) asked Jon about Lee Gulch and Slaughterhouse Gulch. Jon responded that MHFD will be sure to involve you in the process once we start adding those refinements, but we can take a look at the data as it stands whenever you like. It'd be very interesting to know where it seems to do a good job as-is and where it doesn't.