



PINEY CREEK MAJOR DRAINAGEWAY PLAN

Progress Meeting Minutes

August 31, 2010

Attendees:

- Shea Thomas, UDFCD
- Monica Bortolini, SEMSWA
- Hoanh Tran, City of Aurora
- Curtis Bish, Aurora Parks, Recreation and Open Space Department
- Brad Robenstein, Douglas County
- Stacey Thompson, Arapahoe County
- Alan Leak, WRC Engineering, Inc.
- Nate Torrey, WRC Engineering, Inc.

A sign-in sheet and meeting agenda were distributed to attendees prior to the start of the meeting.

Draft Baseline Hydrology Report - Comments

The draft baseline hydrology report was submitted to UDFCD on July 23, 2010 and comments were received August 18, 2010 from UDFCD, SEMSWA, Aurora, and Douglas County. Specific comments were reviewed and discussed from each of the sponsors. Only those comments where WRC needed clarification or input from the sponsors were discussed. The sponsor's comments are provided below in italics followed by the meeting minutes.

SEMSWA Comments:

1. *There is concern that the size of the subbasins in this study are too small. Because the average subbasin size is 72 acres, the CUHP "rational formula calibration" formula is most often used to estimate the hydrology for each subbasin. For a watershed basin that is 22 sq. miles in size, this seems excessively conservative. I think we should discuss this in our next progress meeting.*

It was WRC's intent to delineate subbasins consistent with the 2003 OSP and to accurately represent drainage patterns. The 2003 OSP has an average subbasin size of 77 acres, the average subbasin size for the entire watershed is 72 acres. The concern is that smaller subbasins will result in increased discharges. Shea stated that in the end the models will be calibrated to the 1975 FHAD study and that the subbasin size will not be an issue. Also, the more subbasins that are present, the more design points the sponsors have available to them.

2. *There is concern about the rainfall distribution methodology used in this study. Using the methodology included in the draft report results in 72 separate models, making future use of the hydrology models cumbersome. The initial findings from using one distribution for the entire basin shows the difference in results is not significant. I would like to discuss using the 3-hr distribution for the entire watershed instead of the 2-hr, 3-hr and 6-hr distributions also at our next progress meeting.*

CONSULTING ENGINEERS

The hydrologic analysis was based on UDFCD criteria which requires a typical 2-hr storm distribution for watersheds 0-10 square miles, a 3-hr storm distribution for watersheds 10-20 square miles, and a 6-hr storm distribution for watersheds greater than 20 square miles. The Piney Creek watershed is 22 square miles, which results in 72 separate models (a 2-, 3-, and 6-hr CUHP model and a 2-, 3-, and 6-hr SWMM model for all recurrence intervals for existing and future conditions). This could be simplified by removing the 6-hr storm distribution for the last 2 square miles of watershed and using the 3-hr storm instead. It was agreed this was the methodology to be used.

3. *Since we are preparing a FHAD shouldn't we include the 500-yr hydrology?*

Typically the 500-year hydrology is not included in the master plan, only the FHAD. However, it was agreed that it would make sense to include it in the baseline hydrology. So WRC will develop the 500-yr hydrology and include it in the baseline hydrology analysis.

4. *Shouldn't the UDFCD rainfall depths be used instead of the depths recorded in the ACSWMM?*

Yes, the UDFCD rainfall depths should be used. It was noted that there is no significant difference between the two values at this location.

5. *This section doesn't include any discussion of where the future development impervious area estimates within SEMSWA's jurisdiction came from.*

WRC will include this in the report. Development within SEMSWA is almost fully built-out.

6. *Only portions of Piney Creek are based on the 1975 FHAD, there are also several LOMRs and a LMMP Study included. It is likely that they are based on the hydrology from the 1995 FIS, not the FHAD but I didn't check to be certain.*

The 1995 FIS and 2010 FIS Summary of Discharges table does not list Piney Creek. The 1975 FHAD floodplain workmaps were compared to the FIRM and found to be identical. Therefore it was assumed that the 1975 FHAD was the basis for the 1995 FIRM. The Revisions Description section of the 1995 FIS and 2010 FIS states that the study was revised on December 3, 1993 as a result of an LMMP developed by Love & Associates. The discharges used are the same as in the 1975 FHAD. (Following the progress meeting, it was confirmed that LOMR Case Nos. 95-08-360P, 00-08-023P, and 06-08-B400P also used the 1975 FHAD discharges)

WRC will readdress Figures 6 and 12 and determine if there is a better way to present the information, color is an acceptable option.

Figures 7 and 8 will remain in the report.

The dips downstream of Sampson Gulch are not a pond. The dip is a result of the transition from a 2-hr duration storm to a 3-hr duration storm. This dip should have been corrected during development of the plot. The profile will extend horizontally from the 2-hr storm to the 3-hr storm until it intersects the profile. This will be revised in the final report.

Aurora Comments:

Page 5. Section 3.4 Subbasin Characteristic: 4th paragraph, 1st sentence: City of Aurora imperviousness value for roof is 96%, not 90% as shown in the report.

UDFCD impervious values should be used for consistency; drives and walks – 90%, roofs – 90%, paved streets – 100%, greenbelts/agriculture – 2%

Page 10: 2nd Paragraph: the statement “The differences were generally less 10%, so calibration is not necessary” does not appear to be entirely accurate. Increase in future conditions 100-year peak flows at the following locations exceeds 10%:

The Gartrell crossing is already in place and Piney Creek downstream of Gartrell is already channelized. The design was probably based on 2003 OSP flows. Any increase in flows would require an increase in detention requirement on the upstream watershed. Is a calibration required at this time?

4th paragraph: Report indicated the inclusion of the Tallyn’s Reach water quality/detention pond at the confluence of Sampson Gulch and Robinson Gulch (Junct_157) resulted in an increase in the future conditions 100-year peak discharge downstream of the pond. The summary of the Peak Discharges in Appendix B seems to indicate otherwise: the 100-year peak flow downstream of the pond on the west side of Aurora Parkway (Junct_457), is 2,348 cfs, which is less than the 2,580 cfs from the 2003 OSP. Please clarify.

A table will be added comparing values and percent difference.

The Tallyn’s Reach regional water quality/detention pond does decrease peak discharges along Sampson Gulch, however peak discharges are slightly increased along the main stem of Piney Creek. This is due to timing of the upstream peak discharges. The report will be revised to include more detail.

Figure 4.2: An imperviousness of 25% was used for the E-470 ROW. This value appears to be low, especially when on page 5, section 3.4, it was stated that “the ROW were assigned a composite 90% imperviousness.”

The E-470 impervious value was determined by digitizing the paved areas and calculating the percent impervious area based on UDFCD recommendations. The E-470 ROW is much larger than typical ROW and contains a lot of grass areas. Overall, the ROW contains only 25% of paved area. The report will be revised to include more detail.

Figure 5.2: An imperviousness of 25% was used for the Rocking Horse development. The master drainage indicated a composite imperviousness of 28% - 30%.

The Rockinghorse development will be revised to 30% impervious area for future conditions.

Figure 7.1 SWMM Routing Map: It is helpful to explain how series of numbers were assigned to each creek and tributaries. As presented, it is difficult to follow the routing along the creeks, as numbers vary along the same creek and do not appear to follow a determined series (e.g. series 2000 for Piney Creek main stem, 3000 for Sampson Gulch, etc.).

The SWMM numbering system was not changed from the 2003 OSP in the upper watershed. SWMM nodes in the lower watershed, downstream of the 2003 OSP, were assigned labels consistent with the

subbasin numbers (2000). Links were assigned labels consistent with the subbasin they are associated with (3000). Ok as is.

Figure 7.2:

Pond 285 in Saddle Rock Golf Club North appeared to be an irrigation pond.

Pond 263 in Saddle Rock Golf Club South appeared to be a water feature, not a detention pond. Please verify.

For clarification and reference purposes, it is helpful to additionally identify the ponds as they were labeled in the respective approved studies, e.g. "Pond A in Saddle Rock Golf Club South Filing no. 5".

Ponds 285 and 263 were included in the 2003 OSP and met the requirements to be included in the modeling (>100 ac tributary, owned/operated by City). WRC will verify if the ponds provide detention. (Following the progress meeting, it was determined that the ponds were designed for irrigation and as a water feature, so they were removed from the modeling)

*Appendix C Summary of Detention Pond Rating Curves:
Refer to comment for Ponds 285 and 263 above*

Please add North or South to Saddle Rock Golf Club Subdivision.

There are existing regional ponds in Rocking Horse that meet UDFCD criteria. They are maintained by a Metro District which is a recognized public entity. They should be included in this OSP modeling.

The above comments also apply to the ponds in Kings Point, although they might have not been built yet.

The Rockinghorse detention ponds were not initially included in the modeling because they were owned and maintained by a metro district. UDFCD has stated in the past that metro district ponds should not be included because there is no agreement in place with the local government that mandates the maintenance of the ponds. Metro district ponds could be included in the alternative analysis modeling if an agreement is in place between the metro district and government.

However, Hoanh mentioned that the City of Aurora has an agreement in place with Rockinghorse which would allow us to include it in the modeling. Hoanh will provide rating curve information for the Rockinghorse ponds.

The Kings Point development also has detention ponds planned, but have not been built. There is a small detention pond at a nearby school, but it has a tributary area less than 100 ac.

*Appendix E SWMM Input/Output:
Please increase lettering size for readability.*

SWMM Output - Flow Routing Continuity: there is a difference of 195 ac feet between the inflow and outflow volumes. This is an 8.9% volume reduction from the inflow volume, which may be lost or stored somewhere, and could affect the overall peak discharges.

The difference in inflow and outflow volumes is the result of only running a 6 hour simulation. When the simulation time was increased to 12 hours, the problem was corrected.

Douglas County Comments:

1. *The future condition imperviousness (25%), outlined on Figure 5.3, for the development within the City of Aurora, north of Inspiration Drive and south of the Arapahoe/Douglas Line seems low, based on the lot sizes that have been platted within that area. The existing large lot rural residential development in Douglas County to the east has a 20% imperviousness which seems reasonable, but that is much less dense than the development in the City of Aurora, which is projected at 25% imperviousness.*

The Rockinghorse development will be revised to 30% impervious area for future conditions.

12. *There are a few instances where design points and conveyance elements have the same number, such as 1212, shown on Figure 8.3, SWMM Schematic. IS that acceptable?*

This is typically not acceptable; however this is from the 2003 OSP, which was not revised as part of this study

Figures 12.1 – 12.3 will be revised to make it clearer.

All other comments relate to SWMM schematic and routing map errors and omissions, the figures will be reviewed and corrected as necessary.

UDFCD Comments:

16. *Figure 1 – Removing the SEMSWA hatch would make this easier on the eyes. I don't think it's needed, but let's check with Monica.*

WRC will revise the figure to remove the hatch and make it clearer.

17. *Also include land use maps that were used to derive these numbers.*

WRC proposes to include the land use maps in the appendix, UDFCD stated this is acceptable.

19. *Figure 7.2 – I only did a spot check on this figure, but noticed some missing elements (i.e. 782, 882, 982, 1082, 389). Please check this figure against the schematic. Also, there are a few oddly shaped subbasins (i.e. 84, 93, 94, 2018, 2009). Please check the unit flow rate for these subbasins to see if they compare to others with similar imperviousness.*

All unit flow rates and imperviousness values were compared and no subbasins were shown to be outliers.

20. *Figure 10 – Please address the following: What is the reason for the dip in the profile around Station 33,000?*

The dip is a result of the transition from a 2-hr duration storm to a 3-hr duration storm. This dip should have been corrected during development of the plot. The profile will extend horizontally from the 2-hr storm to the 3-hr storm until it intersects the profile. This will be revised in the final report.

Hydrology Calibration:

Alan summarized general calibration philosophy and methods:

Why may calibration be necessary:

- Changes in model software
- Don't like the results (this reason cannot be supported)
- Believe results are inaccurate
- Regulatory reasons

What to calibrate to:

- No stream gages in Piney Creek, thus models are needed
- Chosen model must produce more accurate or reliable results

What condition to calibrate to:

- Which development condition (1975, 2003, 2010)
- Which detention ponds to include

Possible ways on how to calibrate:

- Adjust model parameters, must maintain realistic values, some are physically based
- Prorate equally basin wide (i.e. 20% decrease in all flows)
- Adjust basin sizes (increase or decrease number of basins)
- Adjust rainfall

Ramifications for/against calibration:

- Must be supportable to UDFCD/FEMA
- Floodplain impacts/structures in floodplain
- Future design impacts
- Master plan improvements

Shea stated that the new model must be calibrated to the flows from the 1975 FHAD because increases in discharges and floodplain impacts should not be attributed to changes in modeling software. This was not in the original scope of services, so Shea requested that WRC provide a fee request for the calibration effort and a revised schedule.

The new model should be calibrated to the 1975 flows by first using the 1975 FHAD impervious area estimates, removing all detention ponds not modeled originally (there were none), and adjusting the Cp coefficient in CUHP to bring the peak discharges at design points to within 10% of the 1975 FHAD peak flows.

Once this is accomplished, revised future impervious values and detention ponds should be added into the calibrated model to create the baseline hydrologic model.

Additional Survey

Additional survey needs were discussed. The uppermost crossing on Antelope Creek was incorrectly surveyed, the wrong structure was surveyed. Also, recent construction at the Sanctuary at Tallyn's Reach apartments is not represented in the project mapping.

The structure survey provided by UDFCD included channel cross sections on the upstream side of the structures, however not on the downstream side. It may be helpful to have the cross sections surveyed on the downstream side at some of the major crossings.

Preliminary floodplain results were reviewed and discussed. Monica mentioned that it might be helpful to obtain additional survey information at The Farm development where the revised floodplain delineation may impact properties.

WRC will put together a list of additional survey needs and forward to the project sponsors for comment.

Meeting was adjourned at 10:30 A.M.

Minutes Developed By:



Nathan R. Torrey