

MEETING  
MEMORANDUM

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**Project**

Newlin Gulch MDP

**Meeting Date**

March 18, 2013

**Sponsors**

UDFCD / Douglas County / Town of Parker

**Issue Date**

April 21, 2013

**Meeting Location**

UDFCD

**MEC Project No.**

12-050.01

**Attendees**

Shea Thomas, UDFCD  
Bill DeGroot, UDFCD  
Brad Robenstein, Douglas County  
Tom Williams, Town of Parker  
Jacob James, Town of Parker  
Derek Johns, Muller Engineering Company  
Jim Wulliman, Muller Engineering Company

**Minutes Prepared By**

Derek Johns

**Routing**

ASP / DDJ / JTW

**Purpose**

Newlin Gulch MDP – Progress Meeting #2

**Muller Action Items:**

1. Muller will evaluate two other options for routing at Rueter-Hess Reservoir:
  - a. Route flows through the auxiliary spillway.
  - b. Eliminate Rueter-Hess Reservoir completely and model reservoir subwatershed based on historic conditions and 2% imperviousness.
2. Muller will email the Sandpit Tributary flow rates to the project team.
3. Muller will evaluate flow rates for smaller storm events (2-yr, 5-yr, etc.) on Newlin Gulch by the Parker Homestead development and email these to Parker.
4. Muller will update the project schedule.

**UDFCD Action Items:**

1. Shea will provide input to Muller regarding depression storage losses for subwatersheds.
2. Shea will provide input to Muller regarding using Jarrett's equation to compute n-values for SWMM channels.
3. Shea will get the project website linked up to the UDFCD website.

**Douglas County Action Items:**

1. Brad will investigate whether or not there is a regional detention pond on the Spring Tributary upstream of I-25.
2. Brad and Tom will setup a meeting with PWSO to discuss Rueter-Hess Reservoir routing.

**Town of Parker Action Items:**

1. Jacob will provide Muller with drainage and as-built information for the regional detention pond on the Jordan Road Tributary upstream of Mainstreet.

## **Discussion**

THE FOLLOWING IS OUR UNDERSTANDING OF THE SUBJECT MATTER COVERED IN THIS CONFERENCE. IF THIS DIFFERS WITH YOUR UNDERSTANDING, PLEASE NOTIFY US IMMEDIATELY.

Derek provided an overview of the draft hydrology modeling completed since the last meeting and summarized the initial results. Below is a summary of the information discussed in the meeting.

### **1. SUBWATERSHEDS**

- a. Derek reviewed the mapping that was used for the hydrology analysis. The mapping consists of the following:
  - New 2-foot contour mapping for the Newlin Gulch channel corridor downstream of Rueter-Hess Reservoir. This mapping was completed in 2012 and provided by UDFCD.
  - Older 5-foot contour mapping for areas beyond the 2-foot mapping limits and for the watershed upstream of Rueter-Hess Reservoir. This older mapping was completed in 1996 and provided by Douglas County.
  - Aerial photography from Parker dated 2012.
- b. Derek explained that the older 5-foot mapping does not always reflect drainage patterns correctly in newly developed areas. Therefore, land development drainage reports/maps were used to help delineate subwatersheds in newly developed areas.
- c. Derek explained that the initial plan was to start with the subwatersheds from the 1993 Outfall Systems Plan (OSP) and then check the delineation based on the more current topographic mapping. However, it was discovered that the OSP subwatersheds were no longer applicable for the following reasons:
  - There have been many new developments since the OSP and these developments have changed drainage patterns within the watershed.
  - The Rueter-Hess Reservoir subwatershed is very large. The reservoir was delineated as a single subwatershed based on the normal pool elevation. The normal pool elevation is significantly higher than the current water level and this results in a subwatershed area of 1.8 square miles or approximately 12% of the entire Newlin Gulch watershed.
  - The OSP subwatersheds were delineated using older mapping.
- d. Given these issues, a new subwatershed delineation was completed based on the more current mapping. The 15.0 square mile Newlin Gulch watershed was subdivided into 111 subwatersheds. The average subwatershed size is approximately 90 acres and only a few subwatersheds exceed 130 acres.

### **2. SOILS MAP**

Derek handed out a map of the hydrologic soil types within the watershed. Most of the watershed consists of Type C/D soils. Type A and B soils exist along the Newlin Gulch channel.

### 3. LAND USE

- a. Derek handed out land use maps for existing and future development conditions and explained that these were prepared based on the 2012 aerial photography and information provided in land development drainage reports. Imperviousness values were assigned according to UDFCD guidelines.
- b. Douglas County. Land use for areas within unincorporated Douglas County include the following developments:
  1. Stonegate Village (existing) and Meridian Business Park (future).
  2. Happy Canyon Ranches, Sapphire Pointe, and development along Lemon Gulch Road.
    - a. Brad (Douglas County) agreed that these were all large lot developments and would stay that way in the future. Brad thought that the development along Lemon Gulch Road was 35-acre lots.
    - b. Brad agreed with the percent imperviousness values shown on the maps.
- c. Town of Parker. Land use within Parker includes the following existing and future developments:
  1. Challenger Park and Bradbury Ranch (existing).
  2. New Horizon, Regency, Newlin Meadows (mostly developed).
  3. Newlin Crossing (on-hold).
  4. Parker Homestead (just started).
  5. Reuter-Hess WTP (just started).
- d. Castle Pines. Land use within Castle Pines includes the following developments:
  1. The Canyons is a very large development being planned immediately upstream of Rueter-Hess Reservoir. Imperviousness values for this development were based on information provided in a Phase 1 drainage report.
  2. Lagae Ranch and Castle Pines Town Center (future).
- e. Major Roads. Imperviousness values assumed for major roads were as follows:
  1. For I-25 and Hess Road, 60% imperviousness was assumed including ROW.
  2. For Chambers, Lincoln, Mainstreet, and Jordan Road, the imperviousness was assumed to be 100%.
- f. For existing land use conditions, Derek said that the composite percent imperviousness for the entire watershed was 4.9% in the 1993 OSP Study and is 22.5% for the current study.
- g. For future land use conditions, Derek said that the composite percent imperviousness for the entire watershed was 12.6% in the 1993 OSP Study and is significantly higher at 34.7% for the current study.
- h. The Town of Parker and Douglas County will review the land use maps and provide comments to Muller.

### 4. CUHP MODEL

- a. Derek said that both 2-hr and 3-hr rainfall events were modeled.
- b. Derek stated that the depression losses used for the CUHP model approximately match the values used in the 1993 OSP. For pervious areas, a depression loss of 0.5-inches was used. For impervious areas, a depression loss of 0.1-inches was used (OSP ranged from 0.1 to 0.15-inches). These values are within the range listed in the UDFCD criteria manual but slightly higher than the “recommended” values. Shea stated that she will review these and get back to Muller with comments (see UDFCD Action Items).

- c. Rueter-Hess Reservoir subwatershed. Derek stated that the subwatershed for Rueter-Hess Reservoir was delineated at its normal pool elevation. An imperviousness of 100% and a subwatershed slope of 0.1% were assumed. This is consistent with how similar reservoirs have been modeled within the District. The draft results of the CUHP modeling indicate a 100-year peak flow of 2958 cfs or 2.6 cfs/acre for the Rueter-Hess subwatershed. Derek noted that this is similar to the results of a study completed on Standley Lake in Westminster, Colorado, which yielded a unit discharge of 3.1 cfs/acre for the lake.
- d. Derek said that Muller performed a unit discharge check of the CUHP results. It was found that for undeveloped areas the subwatershed unit discharge typically varied from 1.0 to 1.6 cfs/acre. For residential areas, the unit discharge ranged from 2.0 to 3.8 cfs/acre. For business/commercial areas, the unit discharge ranged from 3.8 to 4.9 cfs/acre. Shea said that the unit discharges for oddly shaped basins (i.e., not meeting the 4:1 shape factor) should be checked. If the unit discharges are outside the normal range, then the Cp value should be adjusted.

## 5. SWMM MODEL

- a. Derek explained that Muller developed a new SWMM model for the Newlin Gulch watershed and did not use the 1993 OSP model. This approach was used for the same reasons mentioned earlier regarding the subwatershed delineation.
- b. Natural Channel n-values.
  - Derek explained that initially Muller used typical channel n-values that would be used for hydraulic models and then increased them by 25% per UDFCD guidelines. However, it was found that the n-values computed in this way were typically lower than those in the 1993 OSP.
  - Therefore, Muller modified the n-values and used higher values that were closer to those in the 1993 OSP which were based on the Jarrett equation. Derek asked if the project sponsors had a preference on the approach for estimated n-values. Shea responded that she will look into the best approach for computing channel n-values for the SWMM model (see UDFCD Action Items).
- c. Rueter-Hess Reservoir. Derek described the approach that was used to route flows through Rueter-Hess (RH) Reservoir.
  - Storage/discharge data for the reservoir was based on tables shown on construction drawings provided by Parker Water and Sanitation District (PWSD).
  - The reservoir was assumed to be full at its normal pool elevation of 6215.1 at the start of the storm event.
  - Flows were routed through the service spillway which consists of a rectangular opening in the outlet works tower.
  - Subwatersheds adjacent and upstream of the reservoir were not routed but instead directly added to the reservoir inflow hydrograph.
  - Several options for routing through the reservoir were modeled.
    1. Historic conditions prior to the reservoir being built (entire watershed including reservoir at 2% imperviousness).
    2. With the RH reservoir storage in-place and flow routed through the service spillway.
    3. Without the RH reservoir storage attenuation benefits (but reservoir footprint at 100% imperviousness).
- d. Regional Detention Ponds. Derek stated that Muller was not aware of any eligible publically maintained detention ponds in the watershed.

- Tom and Bill mentioned that there is a regional pond on the Jordan Road Tributary upstream of Mainstreet. Jacob will send Muller information on this pond (see Parker Action Items).
  - Brad said that there may be a regional pond on the Spring Tributary upstream of I-25 and will look into this further (see Douglas County Action Items).
  - Tom mentioned that the Canyons development is proposing some regional detention ponds. However, since these are future ponds, they cannot be considered in the Baseline hydrology but would be applicable for the Master Plan conditions hydrology.
- e. Draft Hydrology Results. Muller prepared a table that summarizes the draft peak discharges for the 100-year event and compares them to discharges reported in the 1977 FHAD and the 1993 OSP studies. The draft results indicate the following.
1. The 100-year peak discharges for the “Historic Conditions” model are very similar to the discharges reported in the 1993 OSP for existing conditions. Shea said that since these values are within 10-percent of each other, no further calibration adjustments are necessary.
  2. The option of accounting for RH reservoir storage and routing through the service spillway results in peak discharges that are lower than both the 1977 FHAD and 1993 OSP discharges.
  3. The option of modeling without RH reservoir storage attenuation (but reservoir footprint at 100% imperviousness) results in peak discharges that are substantially larger (more than double) the 1977 FHAD and 1993 OSP discharges.
  4. The reservoir surcharge (rise in water level) is approximately 0.8-feet in the 100-year event when routed through the service spillway.
  5. The 100-year storm event never spills over the reservoir’s auxiliary spillway (emergency overflow spillway) because the auxiliary crest is 1.6-feet higher than the service spillway.
- f. If the storage attenuation benefits of Rueter-Hess Reservoir are ignored, the peak 100-discharges are much higher than the 1977 FHAD discharges and would result in floodplain impacts to properties downstream of reservoir. Derek presented a floodplain exhibit of Newlin Gulch that was prepared for a separate project located downstream of the reservoir. The exhibit included the delineation of the 500-year event (based on the FHAD discharge of approximately 8000 cfs) and showed that the resulting 500-year floodplain encroaches on several properties. Since the current study 100-year flows without RH reservoir are even higher than 8000 cfs, it was concluded that there would be floodplain impacts to properties downstream if the RH storage benefits were ignored.

## **6. NEXT STEPS FOR BASELINE HYDROLOGY EVALUATION**

- a. The group discussed Rueter-Hess Reservoir routing options. To account for RH reservoir storage attenuation benefits, an “adequate assurances” agreement with the reservoir owner, PWSD, would be needed.
- Derek suggested that perhaps routing through the auxiliary spillway should be considered to allow more flexibility in possible future changes to the reservoir. The auxiliary spillway would be more difficult to change and any changes would likely have minimal impacts to the attenuation benefits. The group agreed with evaluating this option.
  - Bill also requested that Muller look at the option of taking out RH reservoir completely and modeling the reservoir subwatershed based on historic conditions and 2% imperviousness.
  - There was some discussion regarding the reservoir’s emergency release rate of 590 cfs. This is the maximum discharge rate that the reservoir can release through the outlet works if there is a need to lower the water level for dam safety issues.

- b. Muller will model the two additional routing options for the reservoir discussed above. Once this is complete, Tom and Brad will setup a meeting with PWSD to discuss the draft hydrology results and the associated impacts of Rueter-Hess Reservoir.
- c. Shea said that regarding rainfall duration, only the 2-hr storm needs to be evaluated for the watershed given UDFCD's new guidelines. The previous UDFCD guidelines require that the 3-hour storm be used for areas greater than 10 sq. miles. However, the new guidelines that are coming out soon recommend that the 2-hour storm be used for watershed areas up to 15 square miles and that the 3-hour storm be used for areas greater than 15 square miles.

## **7. PROJECT WEBSITE**

Derek mentioned that the project website is complete and was sent to UDFCD. However, it appears that it has not been linked up to the "Master Plan" portion of the website. Shea will look into this (see UDFCD action items).

## **8. PROJECT SCHEDULE**

Derek will review and update the project schedule.

## **9. OTHER ITEMS**

- a. The project sponsors were interested in the flow rates for the Sandpit Tributary and requested that Muller email these results to the group (see Muller Action Items).
- b. Tom mentioned that a low water trail crossing of Newlin Gulch is being considered near the Parker Homestead development. Tom requested that Muller send draft peak flows at this locations for the smaller storm events such as the 2-yr, 5-yr, and 10-yr (see Muller Action Items).
- c. Shea and Brad said that they would like Muller to complete the dam breach and hazard evaluation for the Baldwin Gulch dam. Shea will send Muller a scope for this work.

**END OF MINUTES**