

## VIII. Proposed Water Quality Detention Ponds

Two Water Quality Capture Volume Detention Ponds will be provided for the proposed site. One will be provided for the area north of Bent Grass Meadows Drive and the other will be provided for the area to the south. Both ponds are private. These detention ponds will only provide water quality. The EURV and 100-year volumes will be conveyed via the emergency overflow weir, which will be lined. The water quality volume release will be controlled with an orifice plate that will release in 40 hours. The north water quality pond will release into RWT204 and the south will release into RWT210.

## IX. Proposed Channel Improvements

As can be seen in the drainage maps the proposed Filing No. 2 does not encroach into the existing channel for the RWT204 reach. It is desired to leave the channel in its existing condition if the channel can be proven to be stable. In the future when the remainder of the site is developed the RWT204 channel will be consolidated into a smaller designed cross section and will be relocated to within a tract. It will be realigned off of its current alignment.

The future channel and the existing channel do not align at this location. Therefore, a small amount of grading is proposed to direct runoff from the existing channel to the proposed culvert location. After outfalling to the south of Bent Grass Meadows Parkway there is another small section of grading to direct flows back to the existing channel. The radii of these bends were designed such that super elevation/increased velocities are not expected.

The future channel design is anticipated to have a series of Grouted Sloping Boulder Drops within it.

Reviewing the HEC-RAS model prepared for the conditions proposed by this report will show that the existing and proposed conditions have similar velocities and Froude numbers. Given that the channel is stable in its current state it is proposed to not provide improvements to the channel at this time. (with early grading)

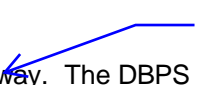
Riprap protection will be provided at the individual outfalls from the site into the channel to prevent scouring from the point discharges. Riprap protection will be provided for Swales B, C and F as they do not meet the 5 ft/s velocity constraint. Each of these swales will be lined with type M riprap.

Future filings will need to review the channel for necessary improvements if the ultimate channel is not constructed at such time.

At this time the RWT202 reach will be rerouted on the north end of the site and directed into the existing RWT204 reach. This has been modeled in the HEC-RAS model to ensure that the channel will still be stable with this additional flow.

The MDDP identifies the use of check structures for the RWT210 channel downstream of the site. Again, due to the existing stability of the channel and the minor increase in flows velocities and Froude numbers have only slightly changed. For the purposes of this Filing it is proposed to leave the channel as is and install the proposed improvements with subsequent filings.

The channel design flow rates have previously been established using HEC-HMS in the DBPS. The site has been analyzed using the Rational method. The HEC-HMS model for the basin has been obtained from El Paso County and has been revised accordingly for the developed site. It was necessary to break apart the basin into a couple of smaller basins in order to accurately design the crossings of Bent Grass

 Drive  
Meadows Parkway. The DBPS also shows the pond SR3 which has been removed with this project, so it was necessary to remove it from the model.

In addition to the changes made with this project several changes have been made upstream of the Bent Grass Subdivision. The Ranch MDDP has added detention ponds for their project and has corrected several of the other offline ponds near the northern end of their site. In addition to the ponds the DBPS had identified a flow diversion from the Falcon Watershed into the Sand Creek Watershed. This diversion has been corrected with The Ranch MDDP. The updated HEC-HMS model is necessary because the DBPS hydrology has now been superseded by The Ranch design.

The Ranch MDDP has also investigated the connection from The Ranch site through the Meadows Filing No. 3 to the Bent Grass site. It has been identified that the existing homes within the Meadows do not have the adequate drainage improvements to convey storm water through the subdivision. The drainage path through the Meadows is incorrectly identified and allowed homes built closer to the flow path than should have been allowed. In addition, several culverts were erroneously constructed restricting the flow path through the subdivision.

The conclusion of The Ranch MDDP is that major channel improvements are necessary through the Meadows subdivision. They state that multiple meetings have taken place with El Paso County regarding this issue and funding for the improvements is being discussed.

## **X. Proposed Regional Pond Improvements**

As has been previously mentioned the DBPS identified a pond named SR3 at the junction of RWT202 and RWT204 near the south end of the Bent Grass Residential Subdivision. The purpose of this pond was to provide EURV for a portion of the tributary area, it was identified to have a volume of 1 acre-foot. It has been discussed with El Paso County to not construct this pond. In its place will be two on-site WQCV detention ponds. In addition, Pond WU will be modified to provide water quality for the entire tributary area. It is not understood how the 1 ac-ft volume for pond SR3 was generated. The onsite water quality ponds proposed have a total 0.85 ac-ft volume. If pond SR3 was truly online and provided EURV for the entire tributary area the volume would far exceed the 1 ac-ft volume that was required. In general as the undeveloped areas develop and are now required to provide onsite water quality this will aide in detaining the lower event storms which will aide in the stability of the existing channel in small storm events.

Utilizing the areas and percent impervious values from the future models in the DBPS it was determined that pond WU has a tributary area of 3.58 square miles and a 7.33% impervious. Utilizing the WQCV equations contained with the Criteria it has been determined that a volume of 9.764 ac-ft is required for the entire tributary area. This volume exceeds the volume for the 5-year event per the DBPS.

The stage storage data for the pond was taken from the DBPS and it was found that the required volume exceeds the front edge of the existing outlet structure on the pond. It is proposed to raise the front edge of the existing outlet to provide the required water quality capture volume. The existing orifices on the face of the outlet structure will be covered to prevent release through them and a new rectangular hole will be cut through the existing wall. An orifice plate with square orifices will be installed to release the WQCV. A well screen will be installed on the face of the outlet structure. A small micro pool will be proposed directly in front of the orifice plate in an effort to reduce clogging of the well screen. The revised HEC-HMS model prepared for the channel flow rates will review the pond function and release rates when prepared.