# 6.0 SUMMARY

Overall, changes in the eastern PRB from 2002 to 2020 involve an assumed gradual reduction in pumpage rates for CBNG wells as they mature and continue to migrate to the west and southwest tapping deeper levels of the coal-bearing units in the Upper Fort Union. Based on modeling results, this leads to a shift in drawdown in the Upper Fort Union to the southwest of Wright, with corresponding rebound in groundwater levels west of the coal mines along SR 59 as the CBNG wells in this area cease production and pumpage of groundwater. For the Wasatch, discharge of CBNG water from 2002 to 2020 results in mounding of up to 30 feet in areas of substantial CBNG pumpage. It also is assumed that the coal mines would continue to operate and dewater up to 2050: however, reclamation of the mined-out areas allows groundwater to rebound in the reclaimed mine areas. Based on modeling results, drawdown within the mine areas and within about 2 to 3 miles west of the mines continues to be about the same from 2002 to 2020. Discharge of CBNG water to drainages in the eastern PRB leads to a decrease in EC in most drainages and an increase in SAR; however, the final mixed water continues to be suitable for irrigation in most drainages during a normal precipitation year and for most months during a dry year. During the dry year, months with low normal flows often have mixed water that would not be suitable for irrigation during those months, if they receive substantial CBNG discharge.

Based on the groundwater modeling results for 2010, groundwater flow in the Wasatch and Upper Fort Union is to the northeast south of Wright and gradually shifts to the northwest east of Wright. Most drawdown in the Wasatch (up to 70 feet) is in the Subregion 3 coal mines located southeast of Wright. West of the Subregion 3 coal mines, drawdown in the Wasatch is 10 to 20 feet. Groundwater mounds due to CBNG discharge of up to 30 feet are present west of Wright and west of the Subregion 2 coal mines. For the Upper Fort Union, there is a substantial groundwater depression, with up to 575 feet of drawdown since 1990 (350 feet of drawdown since 2002), southwest of Wright. Drawdown since 1990 in the coal mine areas is up to 250 feet in the Subregion 3 coal mines, up to 125 feet in the Subregion 2 coal mines, and up to 75 feet in the Subregion 1 coal mine areas. Drawdown since 2002 is 150 feet or less in the coal mine areas. Rebound in the Upper Fort Union since 2002 is up to 100 feet along SR 59.

Based on groundwater modeling for 2015, groundwater flow patterns in the Upper Fort Union and the Wasatch are the same as projected for 2010. Drawdown in the Wasatch is mostly in the Subregion 3 coal mines and ranges up to 80 feet, with up to 30 feet of drawdown west of the mines since 1990. Drawdown in the Wasatch since 2002 is up to 60 feet in the Subregion 3 mines and up to 30 feet west of the mines. Groundwater mounding up to 20 feet within the Wasatch continues to be present in areas of CBNG water discharge. For the Upper Fort Union, the groundwater depression noted in 2010 southwest of Wright shifts further to the south, and the drawdown is up to 475 feet since 1990 (350 feet since 2002). Drawdown in the Subregion 3 coal mines is up to 150 feet in the Upper Fort Union, with comparable drawdown in the Subregion 2 coal mines and considerably less drawdown in the Subregion 1 coal mines. Rebound of groundwater levels since 2002 is projected in the Upper Fort Union, with up to 200 feet of rebound in some areas of the Subregion 3 coal mines and 25 to 50 feet of rebound in the Subregion 1 and Subregion 2 coal mine areas. There is a general rebound of up to 275 feet in the Upper Fort Union along SR 59 due to the reduction in CBNG pumpage since 2002.

## 6.0 Summary

Based on groundwater modeling results for 2020, groundwater flow patterns in the Wasatch and Fort Union are much the same as projected for 2010 and 2015. Drawdown in the Wasatch is up to 70 feet in the Subregion 3 coal mines, and up to 20 feet in both the Subregion 1 and Subregion 2 coal mines. Groundwater mounds up to 20 feet are present near Wright and west of the Subregion 2 coal mines. Since 2002, drawdown in the Wasatch is up to 60 feet in the Subregion 3 coal mines and up to 20 feet in both the Subregion 1 and Subregion 2 coal mines. Drawdown in the Upper Fort Union is 425 feet southwest of Wright since 1990 (350 feet since 2002). Drawdown in the Subregion 3 coal mines is up to 125 feet, with up to 75 feet in the Subregion 2 coal mines and up to 25 feet in the Subregion 1 coal mines. Rebound of groundwater levels up to 125 feet is found in the reclaimed areas of the coal mines. Groundwater rebound of up to 20 feet since 1990 is found in the basin west of the Subregion 2 coal mines and near Wright. Since 2002, rebound of groundwater levels west of the Subregion 2 coal mines is up to 175 feet, and up to 275 feet in the Upper Fort Union along SR 59.

After 2050, modeled groundwater levels in the eastern PRB begin to rebound due to the projected cessation of CBNG pumpage around 2030 and the projected cessation of coal mining around 2050. The Wasatch begins to show noticeable rebound after approximately 50 years (around year 2100) and substantial rebound after 200 years (around year 2250). The Upper Fort Union shows recovery after 50 to 100 years (2100 to 2150) and substantial rebound after 200 years (year 2250). Both the Wasatch and the Upper Fort Union are projected to rebound and reach approximately 80 percent of steady-state after 300 to 500 years, or between years 2350 and 2550.

Resaturation of the coal mine pit backfill to form backfill aquifers may take approximately 100 years after cessation of mining and is projected to result in the westward migration of groundwater with elevated TDS levels. Modeling of this westward migration indicates that TDS levels should be down to the average background value of approximately 1,000 mg/L within 2,000 feet of the final western extent of the coal mine boundaries. Thus, no impact to groundwater quality in either the Wasatch or the Upper Fort Union aquifers is expected beyond approximately 2,000 feet west of the final coal mine boundaries.