5.0 Conclusions

Based on the findings of this study, the following conclusions are made:

- The Pembina Valley Water Cooperative Inc. operates a treated water supply system that services approximately 40,000 residents in south-central Manitoba. As part of their ongoing risk management strategy, they have identified that the system is susceptible to water shortages during periods of drought. The solution identified for this problem is to develop a supplemental water supply from an independent source that is not susceptible to drought. The minimum emergency rate of water supply required is 50 litres per second (800 USgpm). The results of the initial evaluation of potential sources has identified the Bedford Ridge area within the Sandilands Provincial Forest as a potential source.

- The primary designated land-use within the study area is forest management within the Sandilands Provincial Forest. The land is primarily crown owned and is managed to promote forest growth for timber harvesting. Other land uses are allowed in this area provided that they do not negatively affect the ability of the forest to regenerate between timber harvests. Other development in the area is limited, primarily due to the moderately severe to very severe limitations of the soil for use for arable agriculture.

- The results of previous and current studies have shown that the overburden soil stratigraphy can be subdivided into four major stratigraphic units consisting of (in descending order) an Upper Sand Unit; an Upper Silt Unit; a Lower Sand Unit; and, a Lower Till Unit. Beneath the target area for this development, the bedrock consists of a thin veneer of Winnipeg Formation sandstones and shales underlain by Precambrian metamorphics. Within this sequence, the Upper Sand Unit, the Lower Sand Unit, and the sandstones are considered sufficiently permeable to host groundwater resources of sufficient capacity for this project. The studies have also shown that the Upper Silt Unit and Lower Till Unit are effective aquitards that limit the vertical movement of groundwater between the aquifer systems. As a result, groundwater flow is primarily horizontal within each aquifer system.

- The results of the groundwater exploration program completed as part of this study determined that the preferred target aquifer for the development of this water supply is the Lower Sand Unit. This aquifer has very high quality water, an indicated high transmissivity suitable for developing and sustaining the required flow rates, and an apparent limited hydraulic connection to the nearby surface environment. Based on these positive preliminary results, a full scale aquifer pumping test was conducted to confirm the initial indications. This full scale pumping test confirmed that the aquifer system had a suitable high transmissivity and high water quality, and that the hydraulic connection with the surface environment within the drawdown cone area was negligible.

- Testing of the full scale test well installed as part of this program demonstrated that it had a well capacity of approximately 100 litres per second (1,600 USgpm), double the project requirement of 50 litres per second (800 USgpm). The test well is therefore suitable for use as a permanent pumping well with minor modifications to the well head.

- The review of the available information indicates that the existing groundwater users are all located at a distance of at least 6 kilometres from the proposed pumping well site, except for one well located at a distance of 4 kilometres. This closest well is used to supply a forestry station and has an available drawdown of at least 30 metres (100 feet) and an indicated well capacity of at least 6.3 litres per second (100 USgpm). The assessment of the potential drawdown in water levels at these distances due to project pumping has shown that the existing wells will not be adversely affected and that the changes in water levels will be within the normal range of fluctuation.

- Relative to the potential impacts to the existing environment, the results of this study have shown that the water balance within the shallow unconfined aquifer that interacts with the surface environment will not be affected by the proposed project pumping and therefore the environment will not be affected.

- The assessment of the available information has shown that the proposed groundwater withdrawal rate of 50 litres per second (800 USgpm) is approximately an order of magnitude less than the existing groundwater flow rate within the target Lower Sand Unit aquifer system. The withdrawal will therefore not deplete the groundwater reserve in storage and is therefore sustainable over the long term.