

6. Discussion

6.1 Physio-chemical properties

The pH of groundwater at the site is considered slightly acidic, and was typically less than 5.5 during the 2016 monitoring period. pH values are considered consistent with historic data (Appendix F).

Groundwater at the site is considered to be relatively fresh, with TDS typically below 300 mg/L. However, location SE5D continues to report significantly higher TDS (among other parameters) to other locations at the site.

6.2 Major ions

Chloride concentrations are generally considered low, likely related to the fresh (low TDS) groundwater observed across the site. Location SE5D reported the highest chloride concentration (357 mg/L in October), which exceeded the NPUG criteria. It is noted that all wells reported slightly higher chloride concentrations in October compared to April.

Calcium and potassium concentrations are considered to be low and stable over the monitoring period.

6.3 Metals

The majority of guideline exceedances for the investigation (Section 5.4) are attributed to dissolved metals, particularly those exceeding the adopted Fresh Waters guideline criteria. It is noted that these guidelines are applicable to the protection of fresh water ecosystems (such as rivers and streams, or groundwater dependant ecosystems). Whilst there are no known aquatic ecosystems present on-site, the ephemeral waterway Crooked Brook is located approximately 1km to the south and south west of the site (not considered directly down hydrological gradient of the site). Further to this, metals at or above the LOR were reported at SE5 which is position up hydrological gradient of the site potentially indicating that some of these detections may be regional or resulting from another source.

6.4 Nutrients

In general, concentrations of nitrogen (in the form of nitrate, nitrite, ammonia) are considered to be of low concentration across the site and did not exceed any of the adopted assessment criteria. However, total nitrogen concentrations at SE3D, SE6D and SE8D slightly exceeded the Fresh Water criteria.

Phosphorus concentrations exceeded both the Fresh Water and Long Term Irrigation criteria at SE5D (0.33 mg/L) and exceeded the Long Term Irrigation criteria only at SE6D (0.06 mg/L). The highest phosphorus concentration was reported at SE5 which is position up hydrological gradient of the site potentially indicating an offsite source.

6.5 Organics

Low concentrations of TRH were reported above the LOR in the following locations over the monitoring period:

- TRH _{C6-C10} at SE1D (April), SE9D (April) and SE10D (October);
- TRH _{>C16-C34} at SE9D (October); and
- TRH _{>C34-40} at SE9D (October).

The highest reported TRH concentration was 130 µg/L at location SE9D in both the >C16-C34 and >C34-40 fractions, during the October 2016 monitoring event.

Naphthalene was reported at concentrations marginally above the LOR at all monitoring well locations (other than SE8D during the October 2016 as it was unable to be sampled). It is noted that while no presence of naphthalene was reported in the April monitoring event, the presence in October is due to changes in the laboratory LOR, rather than an increase in naphthalene concentrations at the site.

BTEX, PAH (other than naphthalene), Phenols, PCBs, OCP, OPP and PFAS were reported below the LOR for both of the biannual sampling events for all samples analysed.

6.6 Spatial trends

No spatial trends or differences were apparent for the majority of analytes reported.

The most notable observation was at the up-gradient location SE5D reporting the:

- Lowest pH.
- Highest TDS, phosphorus, aluminium, iron and lead concentrations.

While SE5D appears to have different characteristics to other monitoring wells, it is located over 700 m away from the nearest monitoring well (SE3D). Given the activities on site, the number of ponds, dams and cells, in addition to the low concentrations of analytes reported it is considered there is inconclusive evidence to identify a spatial pattern. It is not well understood why the water quality appears to be more impacted in SE5D than the down gradient wells.