initially anticipated and that the suitability of certain portions is therefore more acceptable. This is particularly the case in point of the proposed Eskom site as visual observations revealed a moderately disturbed status of the portion of land under consideration. A preliminary recommendation is therefore that this portion of land is likely to be acceptable for the use of the proposed project, but EIA investigations still need to confirm the absence of conservation important flora and fauna taxa, and provide mitigation thereto.

- ***Surface Water***

The rationale applied with the aquatic sensitivity assessment is based on the premise that all watercourses or potential watercourse areas are sensitive. The catchment size, slope and position in the landscape predominantly determine the potential for water accumulation. Once accumulated other factors such as underlying geology and soil permeability also contribute towards the nature of particular wetness expressed. For the purpose of this assessment a Wetness Index was applied and superimposed by existing drainage lines and wetland areas. The result of the Wetness Index was consistent with known drainage lines and wetland areas and the application thereof is thus deemed suitable.

The SAGA Wetness Index, which is based on a modified catchment area calculation, is similar to the Topographic Wetness Index (TWI). The modified catchment area does not consider flow as very thin film and predicts raster cells situated in valley floors with a small vertical distance to a channel, a more realistic, higher potential soil moisture compared to the standard TWI calculation (Boehner et al., 2002).

The Wetness Index highlights areas with a propensity for water to accumulate within the study area, thereby indicating areas of low, moderate and high sensitivity from a surface water viewpoint (**Figure 7.7**). Areas highlighted in red have a high sensitivity and should be excluded during the planning of the proposed Tutuka Continuous Ashing Project. The construction and operational phase activities may result in potential alterations/impacts to the ecological integrity of the receiving aquatic ecosystems. Areas highlighted in orange are deemed moderately sensitive. If continuous ashing activities infringe on these areas, suitable mitigation measures are pertinent to limit the impacts on the receiving aquatic environment. The integrity and functioning of watercourses is directly dependant on their surrounding land area (Dodds & Oaks, 2008). Areas of low sensitivity are highlighted in green and will potentially have the least impact on the rivers/streams and wetlands located in the study area (**Figure 7.7**). The field verification that will be carried out during the EIA phase will provide additional information regarding the suitability of the identified low sensitivity areas

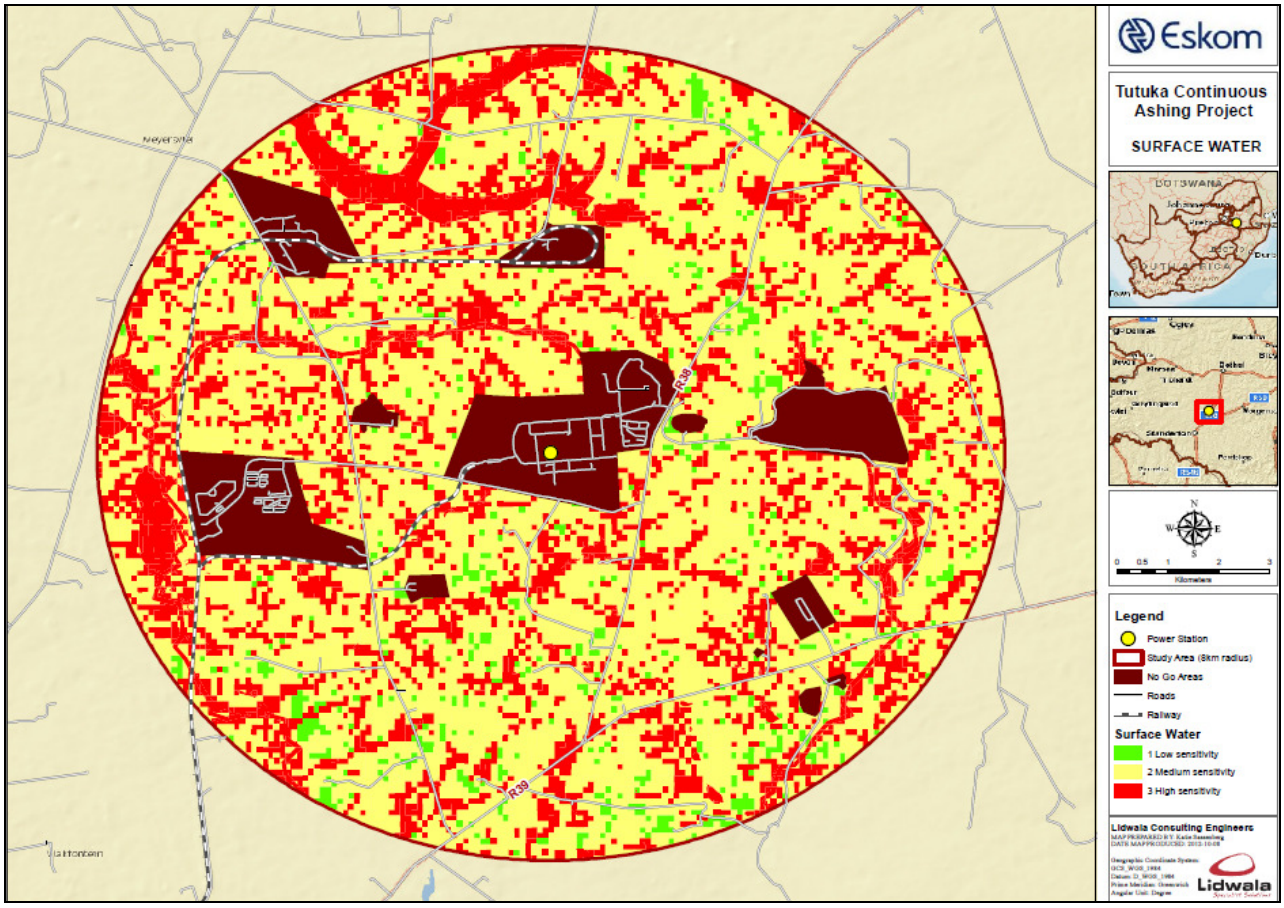

Figure 7.7: Surface Water Sensitivity Map

- ***Groundwater***

Ground Water

The study area is underlain predominantly by intrusive Karoo Dolerite and the sandstones of the Vryheid Formation.

The Karoo dolerite is likely to exhibit low primary porosity and permeability which would suggest a low risk to groundwater; however the dolerite is likely to exhibit fractures and fissures, with higher permeabilities often associated with the contact between an intrusion and the host rock. These factors would increase the risk to groundwater.

Quaternary deposits are present in areas within 8km of the power station and are associated with the main water courses. Due to the assumed higher permeability of such deposits, these areas are considered to be 'higher risk' and 'less preferable'

Aquifer Characteristics

The entire 8 km study area is underlain by a 'd2' type aquifer which is an inter-granular and fractured aquifer with borehole yields in the range of 0.1 to 0.5L/s. Fractures within the underlying geology can increase the vulnerability to the aquifer as they act as significant

pathways for contaminants to travel. However anticipated borehole yields are reasonably low and the porosity and / or permeability of the aquifer (i.e. the ability to transport contaminants) may be low.

Proximity to Surface Water Course

Perennial and ephemeral surface water courses derived from the 1:50 000 topography maps were buffered by 25 0m using ARC-GIS software since these zones were assumed to have shallower (and therefore more vulnerable) groundwater. In some cases it is possible that shallow groundwater is in hydraulic continuity with surface water features.

Summary

An area within an 8 km radius of the Tutuka power station was assessed in terms of the potential risk to groundwater from a proposed extension of the ash disposal facilities at the site. It is noted that this assessment has been based on limited data and a simple system based on the geology, hydrogeology map classification and buffer zones around surface water courses has been used to provide a preliminary classification into "less preferred" and "preferred" areas. The outcome of the assessment is presented in **Figure 7.8**.

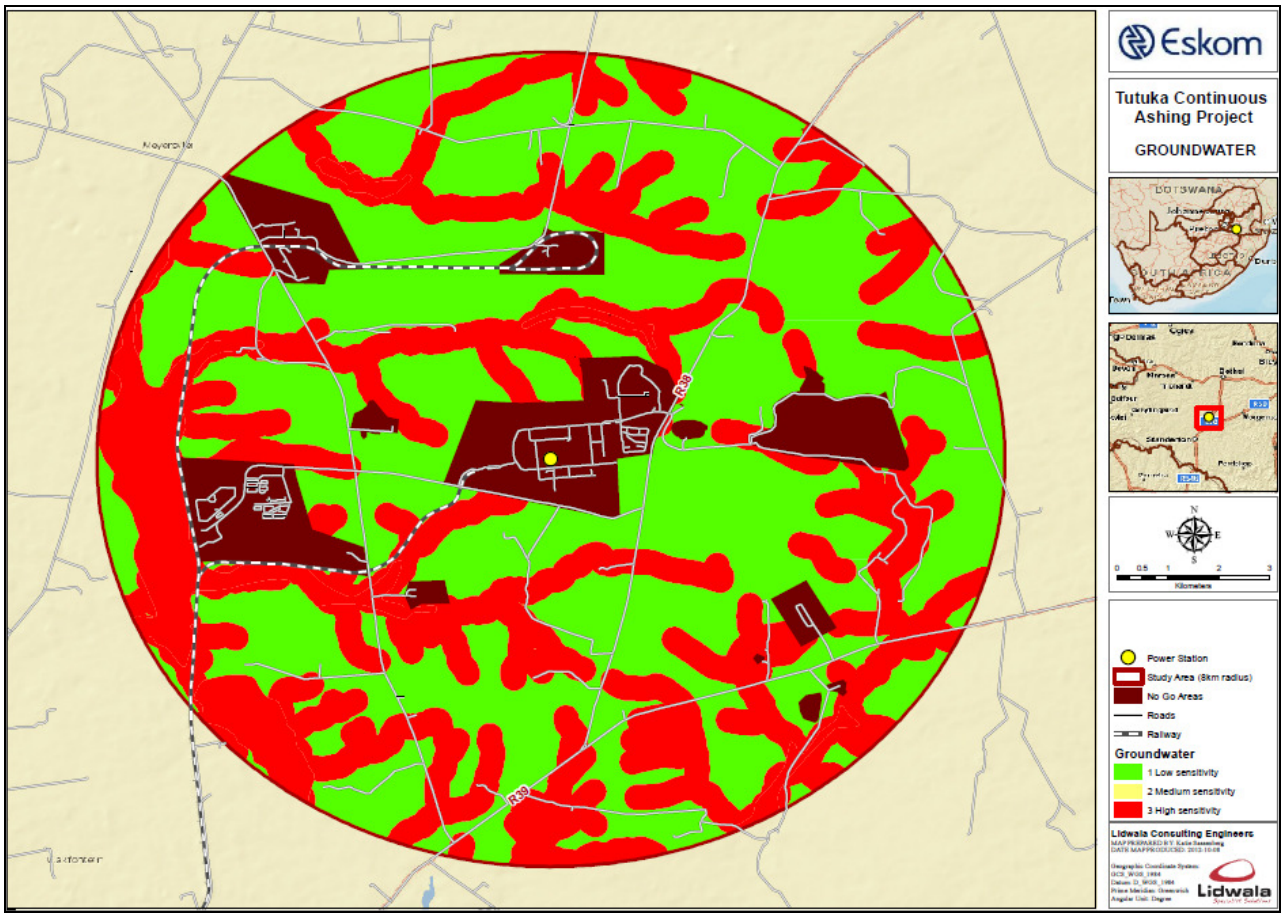

Figure 7.8: Groundwater sensitivity map

- ***Avifauna***

In general the site is moderate to highly sensitive in terms of avifauna, based on the occurrence of a number of listed bird and bat species in the study area, as well as the various micro-habitats available to avifauna. The sensitive zones are mapped and described below.

Figure 7.9 shows two features that have been buffered. These are the Rivers, and Wetland/dam areas. The rivers have been buffered by 100 m using GIS, while the dams and wetlands have been buffered by 200 m. The importance of these micro-habitats to avifauna has been discussed in earlier sections of this report. **All of these buffered zones are regarded as Medium-High Sensitivity areas and if possible should be avoided for construction activities. The remaining areas outside of these buffer zones are designated as Low – Medium sensitivity, although this is subject to change following the EIA phase site visit.**

Note that this sensitivity analysis is subject to change, following the site visit in the EIA phase, especially as some of the GIS layers may be outdated, and may not reflect the actual situation on the ground. Also note that certain natural grassland areas, as well as other drainage lines or wetland areas may also be designated as sensitive areas, should they be identified and mapped in the EIA phase.

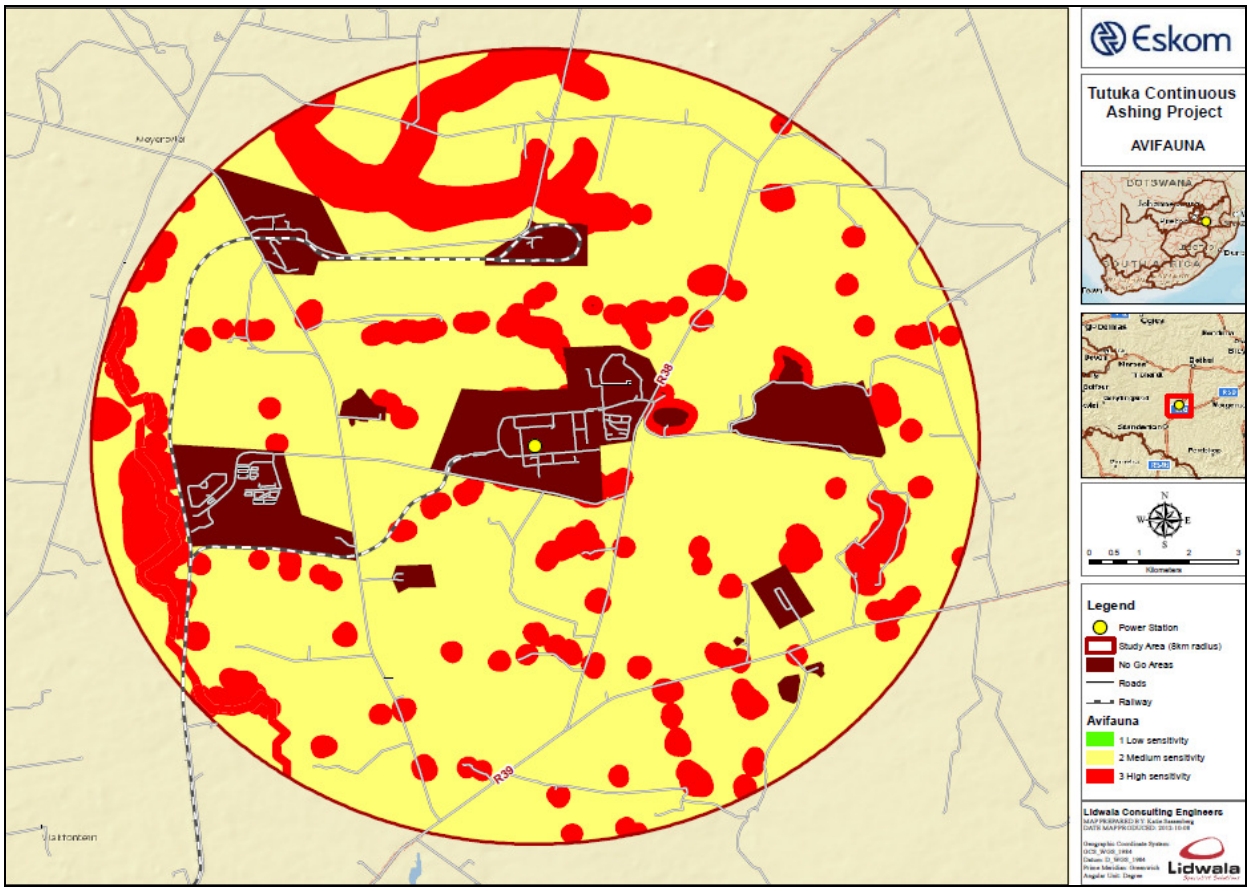

Figure 7.9: Avifauna Sensitivity Map

- ***Agricultural Potential***

The study area falls within the same land type (Ea17), which comprises dark clay soils of low to moderate agricultural potential. **Figure 7.10** illustrates the agricultural potential sensitivity of the study area.

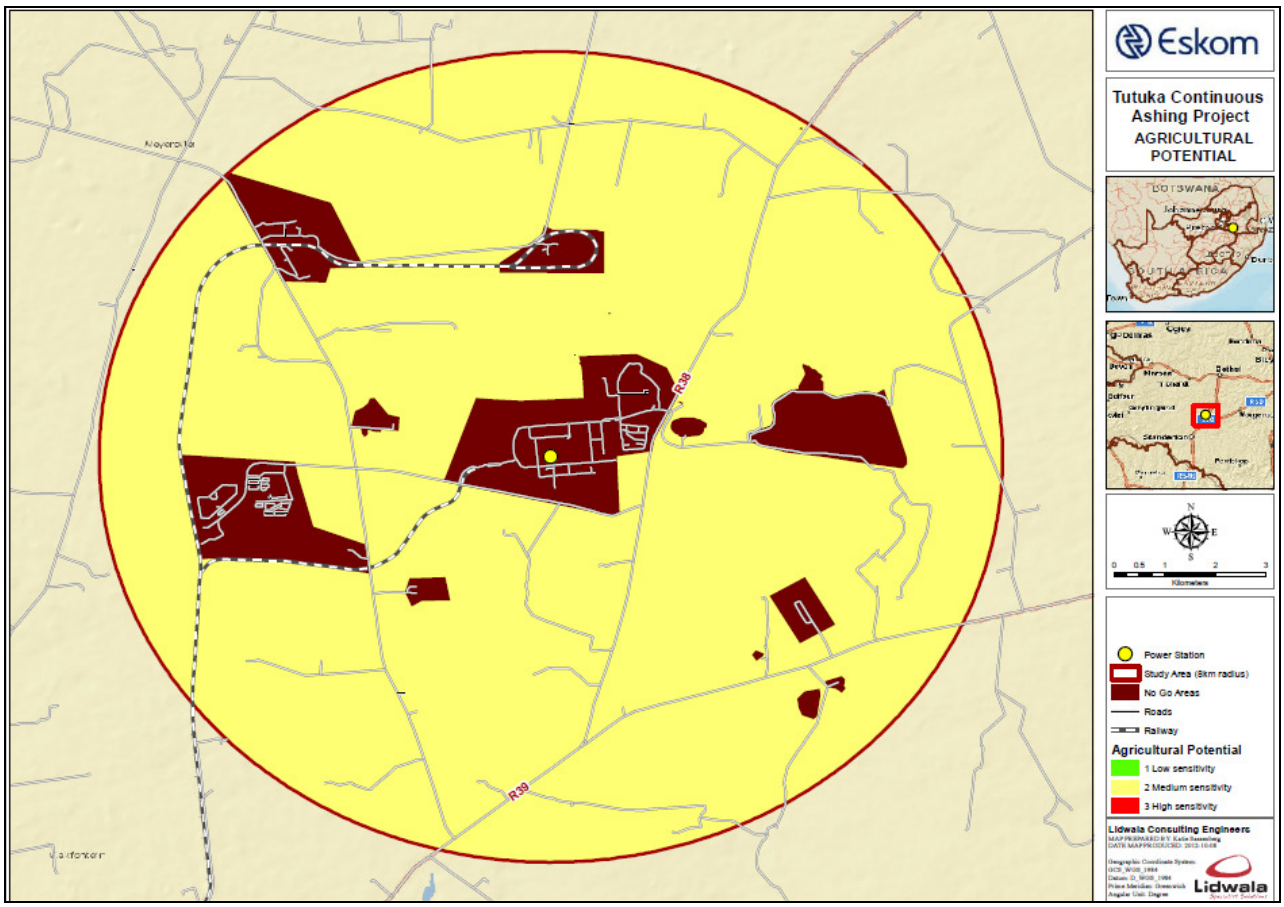

Figure 7.10: Agricultural Potential Sensitivity Map

- ***Social (including Visual and Noise)***

Demographic Processes

The study area is sparsely populated. The closest town is Standerton and falls outside of the study area. Isolated farm houses occur in the study area, as well as some small settlements such as Thuthukani and these are depicted on the sensitivity map (**Figure 7.12)**.

Economic and Land Use Processes

Farming activities consist of the grazing of cattle and cultivation of mealies. The IDP lists the the availability of agricultural land as an opportunity for growth. This gives an indication that the agricultural activities are important for the economic development of the area.