

Caspian Tern	NT	13	-
White Stork	Bonn	3	2

CR = Critically Endangered; EN = Endangered; V = Vulnerable; NT = Near-threatened; Bonn = Protected Internationally under the Bonn Convention on Migratory Species.

Table 6.7: Report rates from Southern African Bird Atlas Project 2 (SABAP2) as of 09/10/2012.

Species	Cons. status	Pentad Report Rate (%)			
		2645_2915	2645_2920	2640_2915	2650_2915
<i>Pentad</i>					
<i>No Cards</i>		12	3	16	4
<i>Total Species</i>		121	94	121	60
Botha's Lark	EN	-	-	-	-
African Marsh Harrier	VU	-	-	-	-
Lesser Kestrel	VU	-	-	-	-
Blue Crane	VU	-	-	-	-
Southern Bald Ibis	VU	16.7	-	-	-
White-bellied Korhaan	VU	-	-	-	-
Yellow-billed Stork	NT	-	-	-	-
African Openbill	NT	-	-	6.3	-
Secretary Bird	NT	8.3	-	-	-
Greater Flamingo	NT	41.7	33.3	-	-
Lesser Flamingo	NT	8.3	-	-	-
Lanner Falcon	NT	8.3	-	-	-
Blue Korhaan	NT	-	33.3	18.8	-
Caspian Tern	NT	-	-	-	50
Black-winged Pratincole	NT	8.3	-	6.3	-
Pallid Harrier	NT	16.7	-	-	-
White Stork	Bonn	8.3	-	-	-

CR = Critically Endangered; EN = Endangered; V = Vulnerable; NT = Near-threatened; Bonn = Protected Internationally under the Bonn Convention on Migratory Species.

Further detail can be obtained from the Avifauna Specialist Report in **Appendix J**.

6.3.9 Surface Water

The study area considered in the screening and scoping phases encompasses an 8 km radius around the current infrastructure, and falls over three quaternary catchments in the Upper Vaal Water Management Area (WMA), with the Tutuka Power Station located in the C11K quaternary catchment, draining southwards towards the Grootdraai Dam via the Leeuspruit (**Figure 6.21**). The study area is located in an Upstream Management Catchment (NFEPA – Nel et al., 2011).

The study area in relation to the National Freshwater Ecosystem Priority Areas (NFEPA) and the Mpumalanga Biodiversity Conservation Plan (MBCP) is shown in **Figure 6.22** and **Figure 6.23**, with National Freshwater Ecosystem Priority Areas (NFEPA) Fish Support Areas located downstream (**Figure 6.22**). According to the MBCP (Ferrar & Lötter, 2007) the study area is located in an 'Ecosystem Maintenance' sub-catchment.

The main rivers in the 8 km radius of the Tutuka Power Station (**Figure 6.21**) include a tributary of the Leeuspruit and a tributary of the Vaal River, which are Order one rivers (**Table 6.8**), and the upper reaches of the Leeuspruit River (before the confluence with its tributary) being an Order one- and the lower reaches (after confluence with its tributary) an Order two river. Numerous smaller streams are shown in the 1:50 000 river coverage. The Leeuspruit and its tributary are classified as perennial rivers (with a Highveld 4 river signature), with the tributary of the Vaal River being non-perennial (Highveld 3 river signature).

The tributary of the Vaal, as indicated in **Figure 6.21**, will be affected by the Eskom proposed continuous ashing site. The aquatic ecosystems in the immediate vicinity include:

- The tributary of the Vaal, which is a valley bottom system and is currently diverted and dammed at numerous places due to existing ashing activities (running north to south);
- Various zero order tributaries of the aforementioned system; and
- Visually observed seeps on, particularly on the western section of the property

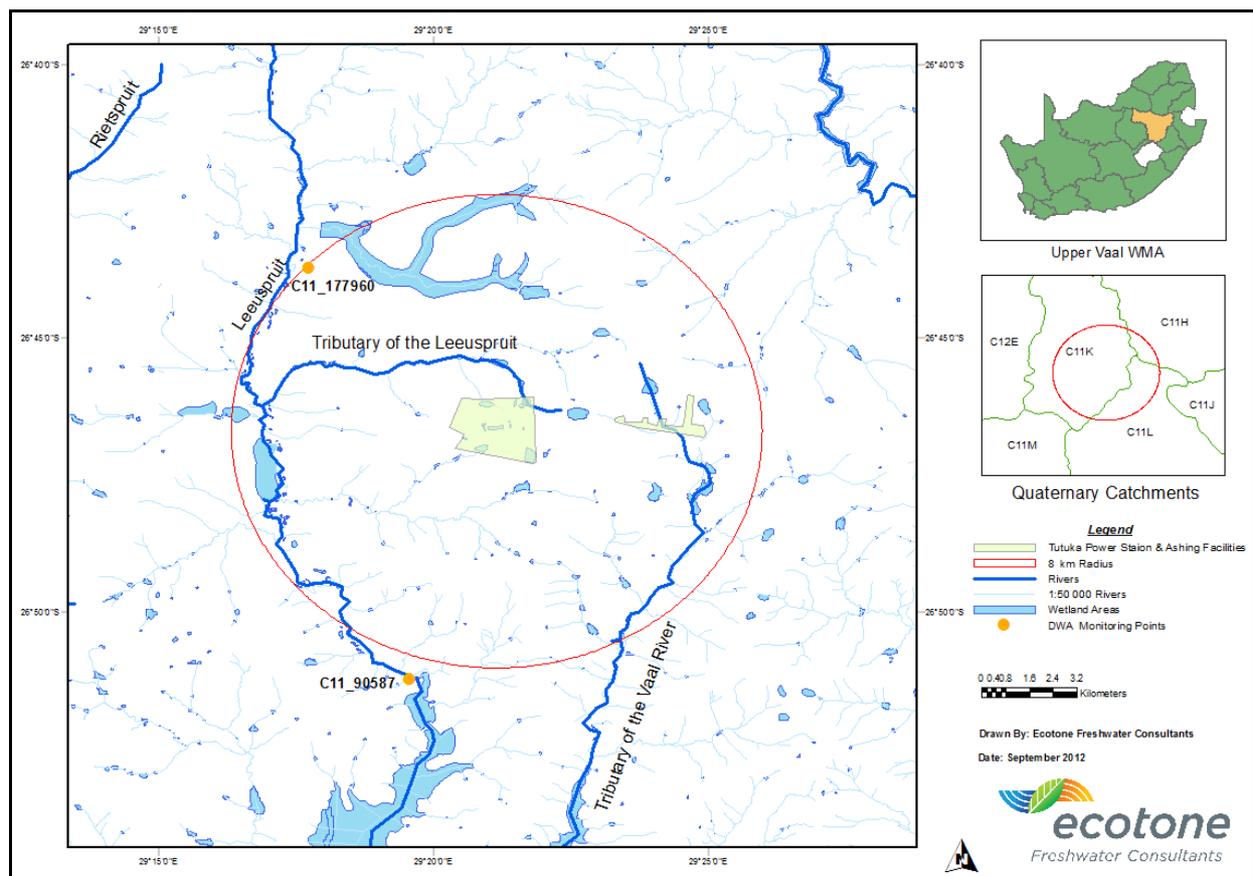


Figure 6.21: Tutuka Power Station, DWA monitoring points and main rivers located in the 8 km radius of the proposed Ash disposal facility (Nel et al., 2004; Chief Directorate – Surveys and Mapping, 2629; SANBI, 2010).

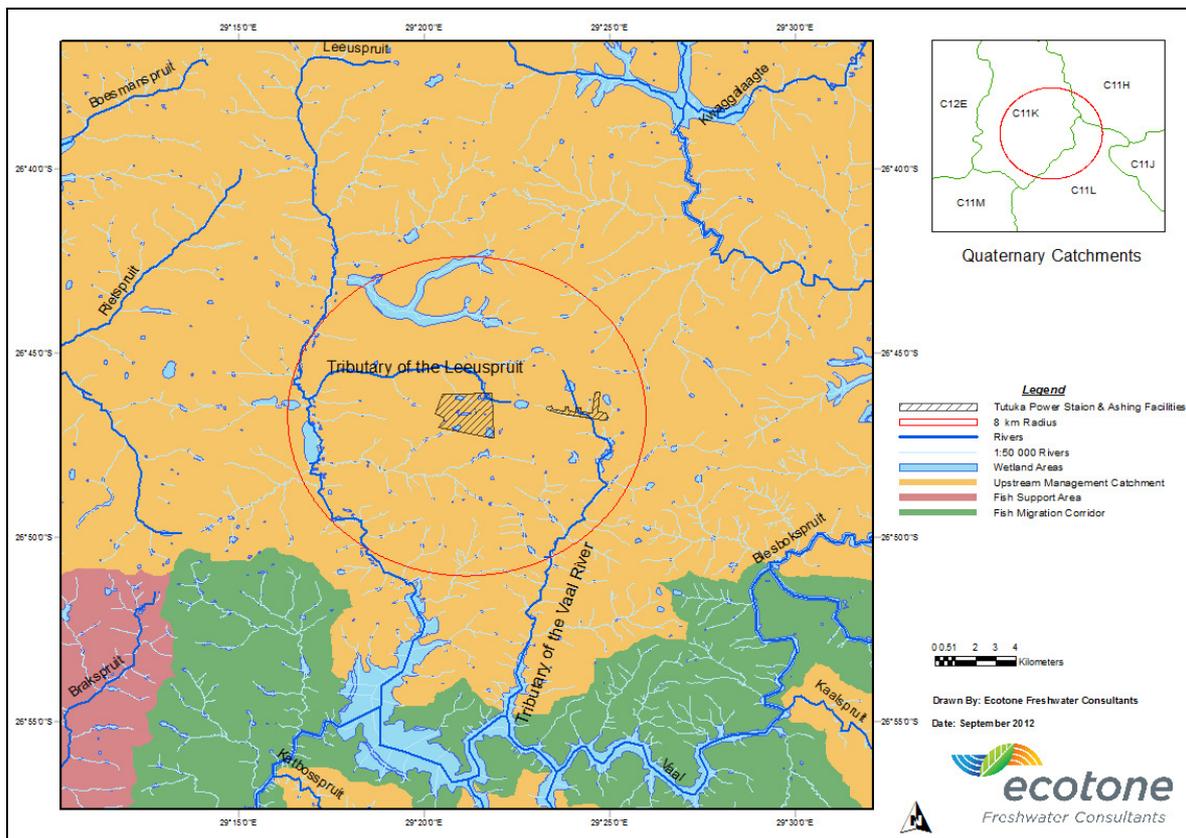


Figure 6.22: Map indicating the study area in relation to NFEPAs (Nel et al., 2004; SANBI, 2010; Nel et al., 2011).

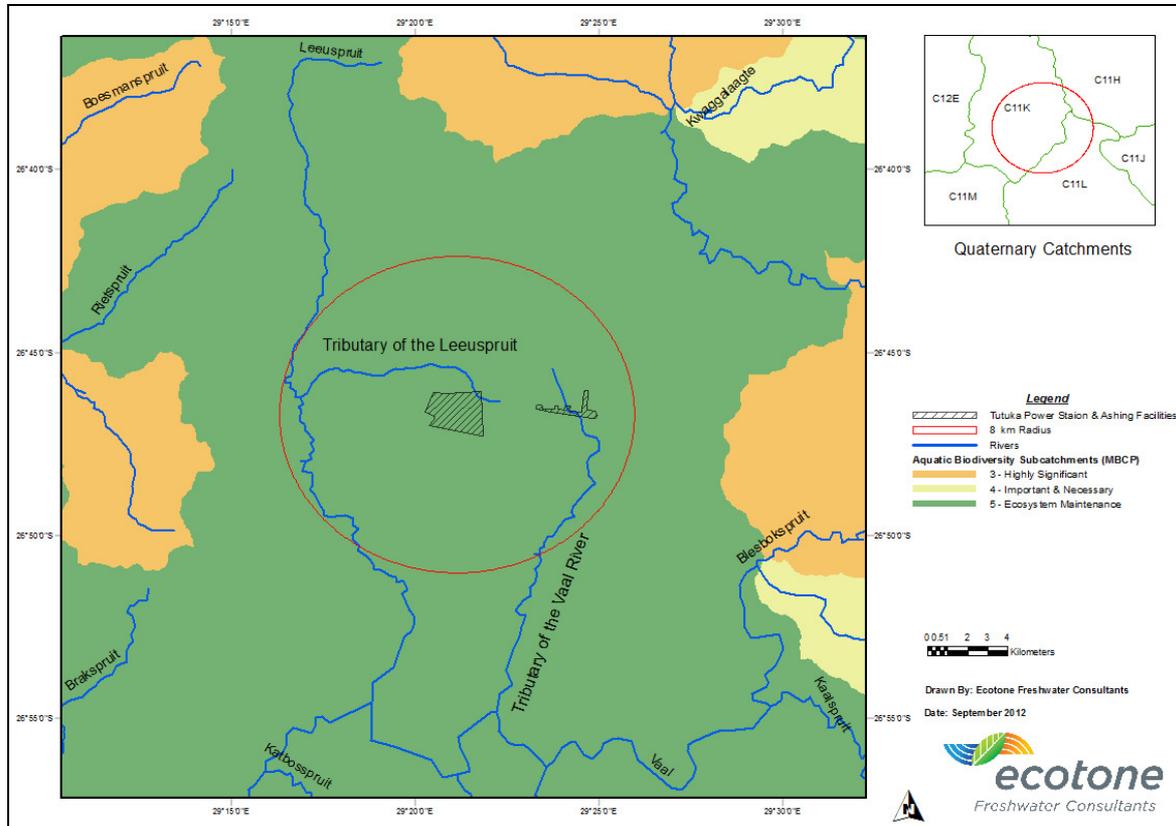


Figure 6.23: Map indicating the study area in relation to the MBCP (Nel et al., 2004; Ferrar & Lötter, 2007).

Table 6.8: Desktop characterisation of the main rivers in the 8 km radius of the study area.

River	Leeuspruit	Tributary of Leeuspruit	Tributary of Vaal
River Order	1 & 2	1	1
Hydrological Class	Perennial	Perennial	Non-perennial
River Signature	Highveld 4	Highveld 4	Highveld 3
Conservation Status (Nel et al., 2004)	Critically Endangered		
PES (Nel et al., 2004)	C	C	E/F
Water Management Area	Upper Vaal		
Aquatic Ecoregion	Highveld		
Quaternary Catchment	C11K	C11K	C11L
PES	D*	D*	E/F#
EIS	Moderate*		
PES: Present Ecological State; EIS: Ecological Importance and Sensitivity *DWAF (2007) ; #DWAF (2000)			

Nel et al. (2004) lists a status of critically endangered for all the river signatures associated with the study area. The ascribed river status indicates a limited amount of intact river systems carrying the same heterogeneity signatures nationally. This implies a severe loss in aquatic ecological functioning and aquatic diversity in similar river signatures on a national scale (Nel et al., 2004).

Six attributes were used to obtain the Present Ecological State (PES) on desktop quaternary catchment level by the National Spatial Biodiversity Assessment (NSBA - Nel et al., 2004). These attributes predominantly allude to habitat integrity of in-stream and riparian habitat. With this in mind, the receiving Leeuspruit systems and the tributary of the Vaal River fall within a C (moderately modified ecosystem state) and E/F (serious to critical modified ecosystem state) –category [according to the NSBA (Nel et al., 2004)], respectively.

According to the desktop PES categories from DWAF (2007), the rivers in quaternary catchment C11K fall in a D ecological category, indicating a largely modified ecosystem with an impairment of health evident. No current PES categories could be obtained for the Vaal River tributary (C11L) and therefore the PES categories from DWAF (2000) were consulted. The tributary of the Vaal River falls in an unacceptable ecosystem state (DWAF, 2000), with most community characteristics seriously modified or having extremely low species diversity. The rivers in quaternary catchment C11K at present are affected by sedimentation (farming and grazing), introduction of Carp and exotics such as Willow trees, erosion and agricultural run-off (DWAF, 2000). The Ecological Importance and Sensitivity (EIS - DWAF, 2007) for both quaternary catchments is considered moderately sensitive.

- **Catchment Drivers of Ecological Change**

As mentioned previously, the study area falls within the Upper Vaal WMA which includes the Vaal, Klip, Wilge, Liebenbergsvlei and Mooi Rivers. It covers a catchment area of 55 565 km² and includes the Vaal Dam, Grootdraai Dam and Sterkfontein Dam (DWAF, 2004). The Upper Vaal WMA is the most populous WMA in South Africa, with more than 80 % of the population residing in the area downstream of the Vaal Dam, and approximately 97% living in an urban environment. Land use in the WMA is dominated by cultivated dry land agriculture with the main crops being maize and wheat. About 75% of the irrigation is upstream of major storage dams and is supplied from rivers or farm dams (DWAF, 2004).

The majority of the water requirements of the WMA are for the urban, industrial and mining sectors (77 %), with 11 % for irrigation, 8 % for power generation and the remaining 4 % for rural water supplies. The Upper Vaal WMA is subdivided into three sub-areas, with the study area located in the 'upstream of the Vaal Dam' sub-area. Geographically, over 73 % of the total requirements for water are in the sub-area 'downstream of the Vaal Dam' and nearly 20 % in the sub-area upstream of the Vaal Dam. Most of the irrigation in the WMA is in the sub-area 'downstream of the Vaal Dam' (DWAF, 2004). The available water and total requirements for the year 2000, including transfers between WMAs is shown in **Table 6.9**.

Table 6.9: Reconciliation of requirements and available water for the year 2000 (million m³/a) without yield of Mohale Dam (DWAF, 2004)

Sub-area	MAR	Local yield	Transfers in	Transfers out	Local requirement	Deficit
Wilge	868	59	0	0	60	-1
US of Vaal Dam	1109	184	118	67	216	19
DS of Vaal Dam	446	889	1224	1343	769	1
MAR: Natural Mean Annual Run-off; US: Upstream, DS: Downstream						

With regards to the 8 km radius under consideration in the current study for the proposed continuous ashing activities, the main drivers of ecological change for the immediate aquatic ecosystems are agriculture (mainly grazing), mining (e.g. the New Denmark Colliery), residential (e.g. Thuthukani Township) and the Tutuka Power Station and associated infrastructure.

- **Historical Water Quality**

Historical water quality data (**Table 6.10**) were obtained for the Leeuspruit system in the C11K quaternary catchment from two relevant sites, namely: