Annexure C

Annexure C.1

2010 Site selection process

2 SITE SELECTION PROCESS

The purpose of this chapter is to document and describe the process and rationale by which the proposed sites were identified and selected. It describes the regional boundaries within which the sites were identified and the criteria used to identify potential sites.

2.1 BACKGROUND

As outlined in Chapter 1, given the need to develop additional ~~storage~~ disposal facilities for ash produced by the coal-fired Kriel Power Station, Eskom initiated an EIA process for the development of a new ash ~~dam~~ disposal facility that would have sufficient capacity for the remaining operational life of the power station until ~~2039~~ 2043 plus a five year contingency. While ~~Eskom has initially indicated their preference~~ the initial focus, from a logistical/ operational perspective, ~~for a site~~ was on an area identified by Jones and Wagener Consulting Engineers (Jones and Wagener)[6] in 2006 to the immediate south of the Kriel Power Station and the existing ash dams, it was recognised that the EIA process requires the applicant to consider all reasonable and feasible alternatives thoroughly. As part of the EIA process, the Aurecon EIA team, assisted by Eskom and Jones and Wagener, undertook the identification of potential sites within a 10 km radius[7] of the Kriel Power Station, in order to ensure that the EIA process could commence from a robust and defendable starting point.

The process of identifying potential sites within the 10 km radius included a site visit to the Kriel Power Station, various discussions with relevant Eskom personnel, as well as a number of internal project team meetings and workshops. The Department of Water Affair's guideline on minimum requirements for waste disposal for landfill sites (2nd edition, 1998) were also taken into consideration during the screening process. The criteria discussed in this document were used to identify potential environmental impacts and to inform specialist investigations. These criteria include: potential to pollute surface and ground water resources, stability issues, sensitive environmental features, landscape characteristics, surrounding land use, air quality, distance of site from waste source and visual aesthetics. Please refer to the sections below, as well as Chapters 5 and 6 of this document for more information on the potential environmental impacts and specialist investigations.

The purpose of this Chapter is to document the process that led to the identification of the proposed site alternatives for further investigation in this EIA process.

---

6 Kriel Power Station Ash Dam Feasibility Investigation, September 2006. Report No: JW127/06/A407

7 The 10 km radius has been extended to 12 km as two of the identified sites are located between 10 and 12 km from the Power Station.

Chapter 2

2.2 SELECTION OF POTENTIAL AREAS

2.2.1 Determining the boundaries of the investigation area

At the onset of the site selection process, it was indicated by Eskom that the ash dam should be located on Eskom-owned land, within a 3 km radius area. This area was however subsequently extended to a 6 km radius area from the Kriel power station, to include both Eskom and privately owned properties. The 6 km radius limit was based on the maximum capacity of the existing ashing transportation infrastructure being utilised by Eskom (ash slurry pumps), price of electricity and the costs of additional infrastructure. However during further investigations and discussions, it was decided to increase the area of investigation to a radius of 10 km (**Figure** 2-1) as it became clear that there was limited space left for an ash dam within the 6 km radius area, i.e. areas that are not located on coal resources and/or underground mines. It was also pointed out by Eskom's engineers that the existing pumps cannot work effectively over a distance of more than 6 km and that new infrastructure would be required.

2.2.2 Selection of potential areas

With the outer boundaries of the project footprint identified, potential candidate areas within the study area were identified by considering a range of ~~potential~~ technical, financial and environmental criteria. These included *inter alia* locality of coal resources and undermined areas, existing infrastructure, groundwater/ hydrological features, geotechnical considerations and sensitive biodiversity features, which are described below.

A. Technical / Financial Criteria

(i) Locality of coal resources and undermined areas

The Kriel Power Station is located near the northern boundary of the Highveld Coalfield on various exploitable coal seams that occur within the area. The Jones and Wagener technical screening report (2010) (see **Annexure D**) identified three coal seams belonging to the Kriel Colliery, Seams 2, 4 and 5 that are located within the 10 km radius of the power station. Currently only Seam 4 is mined (underground mine and opencast). Kriel Colliery has indicated that Seams 2 ~~(underground mine)~~ and 5 ~~(open cast and underground mines)~~ will be mined in the future.

Coal resources of South Africa, which are under the control of the Department of Mineral Resources (DMR), are regarded as a strategic resource for the future of the country in terms of affordable energy provision. The sterilisation of a coal resource through development on top of it is therefore considered to be unacceptable, especially in the case of an ash dam[8]. Furthermore, the sterilisation of a coal resource would be unacceptable to the mining right holder~~, in this case Anglo Coal,~~ due to the large amounts of resources invested in obtaining the mining right. The option to place the proposed ash dam on top of deep coal, which could be mined in the future

[8] Also see Section 53 of the Mineral and Petroleum Resources Development Act, 2002 (No. 28 of 2002) regarding activities that may have a detrimental impact on the mining of mineral resources.

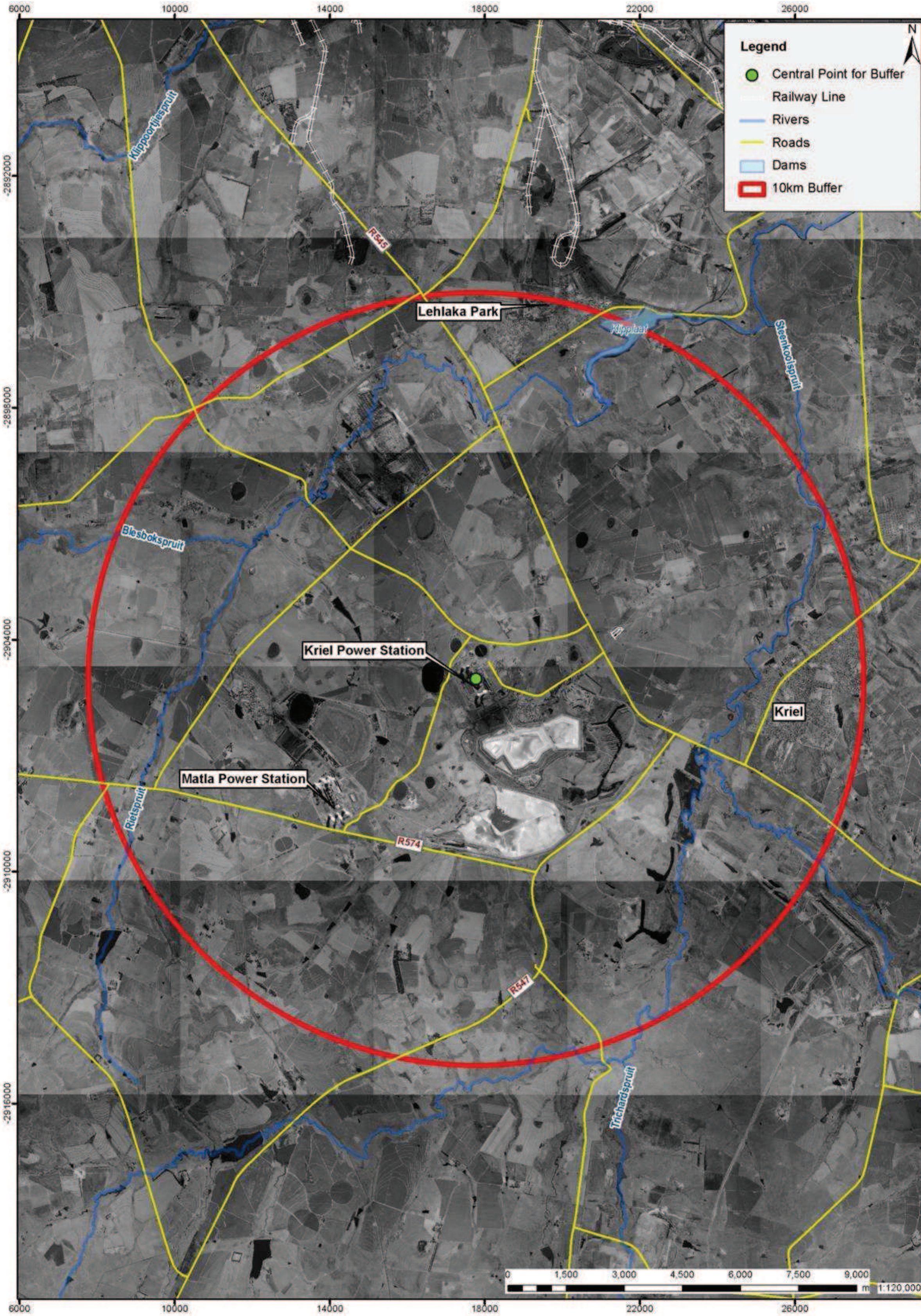

Figure 2-1 Map indicating the 10 km radius areas of investigation

by making use of underground mining methods, was also considered. However, this option would reduce the volume of coal that could be abstracted, and should the mine pillars fail for some reason, it could result in liner and sidewall failure of the ash dam. While it is possible to prevent sidewall failure of the ash dam, the failure of the liner cannot be prevented and is considered to be a fatal flaw.

It was also decided not to construct the ash disposal facility on top of previous underground mines, as the mines (making use of the board and pillars method) were constructed to support the weight of the current overburden, and placing an ash disposal facility in such an area would increase the overburden weight, leading to mine collapse and surface subsidence. Furthermore, it would be prohibitively expensive to place an ash disposal facility across an area identified for an opencast mine in the future as the dam would have to be removed at a later stage when the mining commences.

(ii) Existing Infrastructure

The position of existing, primary infrastructure was also considered as one of the main criteria during the identification of the potentially suitable areas, including:

- Tarred roads
- Primary power lines
- Significant pipelines
- Urban developments
- Mine shafts

It was however concluded by Eskom that the relocation of primary infrastructure was not a fatal flaw to locating an ash disposal facility, and that if necessary, infrastructure of this nature could be avoided or relocated, if required. Therefore, for the purposes of the area selection exercise, the avoidance of primary infrastructure was considered to be a negotiable criterion, unlike the sterilisation of coal reserves.

2.2.3 Selection of potential sites

Based on the findings of the area selection process outlined above, sites were identified as being potentially suitable for further consideration in the site screening exercise to follow (Table 2). To reiterate, the potential candidate sites were identified on the basis of being within (or just outside) 10 km of the power station and being located on land which is not undermined or has the potential in the future to be subjected to open cast or underground mining.

Table 2-1 Potential areas and coal resources occurring within the area (Jones and Wagener, 2010)

SITE	Available Area (ha)	Status of Coal Mine underlying area				Comments
		2-Seam Resource	Old 4-Seam Works		2-Seam Resource	
			UG*	OC*		
1	393		Kriel		Kriel	Mined
2	306	Kriel	Kriel		Kriel	Mined
3	356	Kriel	Kriel		Kriel	In Kriel Mine Plan
4	234	Kriel	Kriel		Kriel	In Kriel Mine Plan if LoPP is extended
5	376		Kriel		Kriel	In Kriel Mine Plan
6	139		Kriel		Kriel	Area too small
7	160	Kriel	Kriel		Kriel	Area too small
8	87	Kriel	Kriel		Kriel	Area too small, part of current open cast
9	243		Kriel		Kriel	Mined
10	**359**			**Kriel**		**Depleted open cast mine**
11	170	Matla				Area too small
12	162	Matla				Area too small
13	143	Matla				Area too small
14	734	Matla				On Matla coal
15 North	217			Kriel		Area too small
15 South	**282**			**Kriel**		**Rehabilitated open cast mine**
16 North	**308**		**Insignificant quantities does not influence ash disposal facility siting**			**Low grade coal; prospecting application lodged with DME; owned by Emalahleni Municipality**
16 Central	312	Yes, Unknown applicant	Yes, Unknown applicant			Prospecting application lodged with DME
16 South	181	Unknown				Area too small
17	560	~~No coal~~ Coal				Includes property leased by the Kriel and Matla Collieries

*(UG: Underground; OC: Open Cast)

From the above, it is apparent that all areas within the 10 km radius area are located on coal or previously mined areas, except for Areas 10, 15S and 16 North (16N). ~~and 17.~~ It must be noted that a very small volume of coal has been identified on the border of Site 16N and extends over a limit area beneath the site. It is however possible to avoid the coal when placing the ash disposal facility at Site 16N that occurs within a 12 km radius of the power station.

Note that ~~Furthermore,~~ an additional site (Site 17) was identified later in the screening process that is located to the northwest of the power station. ~~This site is considered to be suitable from a coal resource perspective, as well as proximity to the power station.~~ Initial data and a high level investigation suggested that this site is without coal resources. However information submitted by the mining right holder Exxaro[9], confirmed the occurrence of coal and undermined areas within Site 17. As the occurrence of coal and undermined areas have been identified as a fatal flaw, Site 17 is no longer considered to be a potential site for the proposed ash disposal facility.

2.3 SCREENING OF POTENTIAL SITES

2.3.1 Criteria used to screen sites

The process of selecting potential areas was followed by the screening of potential sites based on site specific technical, financial and environmental criteria. These included the ash disposal facility design and operating requirements, cost of new infrastructure, groundwater and hydrological features, geotechnical considerations and "other factors". These are described below. Cress

A. Technical and Financial Criteria

(i) Design and operating requirements

Capacities and areas: The maximum area, height and rate of rise were used to compare the capacities of the sites as indicated in **Table 2-2**. The rate of rise (RoR) for Site 10 is lower than the 3 m/year and is limited by the adjacent existing Ash Dam 3. This dam could however ~~come back into service~~ be used for ashing again once Site 10 reaches the crest of Ash Dam 3. Furthermore, since the RoR is lower than 3 m/year for Sites 10, 15 and 16N, the footprint areas could be reduced while still achieving the set capacity.

Table 2-2 Area capacities (Jones and Wagener, 2010)

SITE	LIFE (years)	FINAL RoR	HEIGHT (m)	A	B	B/A
				AREA (m^2)	STORAGE VOLUME (m^3)	LINER EFFICIENCY (m)
10	26+	1.7	71	359	110 000 000+	-
15 South	26+	2.6	65	282	110 000 000+	-

9 Refer to Comments and Response Report II in Annexure C for a copy of the information submitted.

SITE	LIFE (years)	FINAL RoR	HEIGHT (m)	A	B	B/A
				AREA (m^2)	STORAGE VOLUME (m^3)	LINER EFFICIENCY (m)
16 North	26+	2.2	70	308	110 000 000+	35.7
~~17~~	~~26+~~	~~2.2~~	~~70~~	~~308~~	~~110 000 000+~~	~~35.7~~

Perimeter lengths: The toe length of the sites is considered to be very important as the delivery line infrastructure is installed along the toe of the dam. The parameter length of areas crossing spoils is also important due to the cost associated with the construction of an outer wall along these areas which is considerably higher than on natural ground. Furthermore, areas on backfilled spoils are also important as drainage systems to ensure stability along the outer walls. Note that continues under drainage systems are used with lined areas over the full facility footprint and not just along the perimeter. Additional costs associated with perimeter drains are not considered to be significant. As indicated in
Table 2-3 the length of the toe lines are very similar for Site 15S and 16N~~ and 17~~, except Site 10 which is significantly longer. This is due to Ash Dam 3 that could come into operation again at a later stage and increase the available area and associated perimeter.

Table 2-3 Area perimeter lengths (Jones and Wagener, 2010)

SITE	PERIMETER LENGTH	
	Total(km)	On spoils(km)
10	8.7	0.9
15 South	6.8	1.7
16 North	7.0	0.0
~~17~~	~~7.0~~	~~0.0~~

Relative elevations: As indicated by **Table 2-4** below, all the areas are located below the Power Station, with the final crest levels rising approximately to the same level as the Power Station. Therefore the demand on the delivery infrastructure would be less (due to gravity), whereas the demand on the return infrastructure would be more.

Table 2-4 Relative elevations and distances from the plant and relative elevations (Jones and Wagener, 2010)

SITE	DISTANCE FROM PLANT (km)	DISTANCE TO PLANT (km)	LEVELS		
			PLANT (mamsl)	ASH DISPOSAL FACILITY CREST (mamsl)	RWD FLOOR (mamsl)
10	5.5	6.3	1619	1618.5	1542.5
15 South	8.1	8.2	1619	1616	1545.5

SITE	DISTANCE FROM PLANT (km)	DISTANCE TO PLANT (km)	LEVELS		
			PLANT (mamsl)	ASH DISPOSAL FACILITY CREST (mamsl)	RWD FLOOR (mamsl)
16 North	11.1	11.7	1619	1615	1540.5
~~17~~	~~~10~~	~~~10~~	~~1619~~	~~1615~~	~~1540.5~~

Distance from station: The fact that Site 16N ~~and 17 are~~ is located ~~more than 10 km~~ at a distance of approximately 12 km from the power station (see **Table 2-4**) may however result in a number of potential negative technical, financial and environmental issues, including:

Technical/ financial

- Based on current challenges experienced on a system that extends only 3 km, it would be a logistical challenge to manage the further distances, which would include responding to the increased security issues (e.g. copper theft), maintenance (spillages, blockages and dust along the entire length of the delivery system which eventually impacts security of power supply.
- There would be higher maintenance costs.
- Sites further away from the Power Station would have a higher electricity demand than sites located closer. Seen in the light of the existing electricity shortage experienced in South Africa, sites with a high electricity demand are considered to be less favourable as it could have a negative impact on South Africa's electricity security.
- Existing infrastructure could be affected, e.g. a section of the main road to Kriel (R545) may need to be relocated.
- There would be higher likelihood of spills/ leakages from conveyors/ pipes.
- Bulk infrastructure and services in the area may need to be relocated.
- Additional infrastructure would be required, e.g. new ash ~~removal~~ transportation system, return water line, slurry plant, substation and transfer houses.

Environmental (also see Section 2.3.1 B below)

- There would ~~probably~~ be a loss of viable agricultural land;
- It makes more environmental sense to have all the waste/ ash disposal systems together in order to consolidate the associated disturbance footprint, as much as possible;
- Area 10 is an existing, disturbed mining area, as compared to Area 16N which is currently less disturbed;
- Area 10 and 15S would have a smaller impact on landowners / tenants as these areas are disturbed, old mined land;
- The incremental impact at Site16 ~~and 17~~ would be higher;
- Moist grassland and wetland corridors occurring at Site 16N are considered to be very important dispersal corridors for fauna, as well as potential foraging habitat for the near-threatened Serval (*Leptailurus serval*);

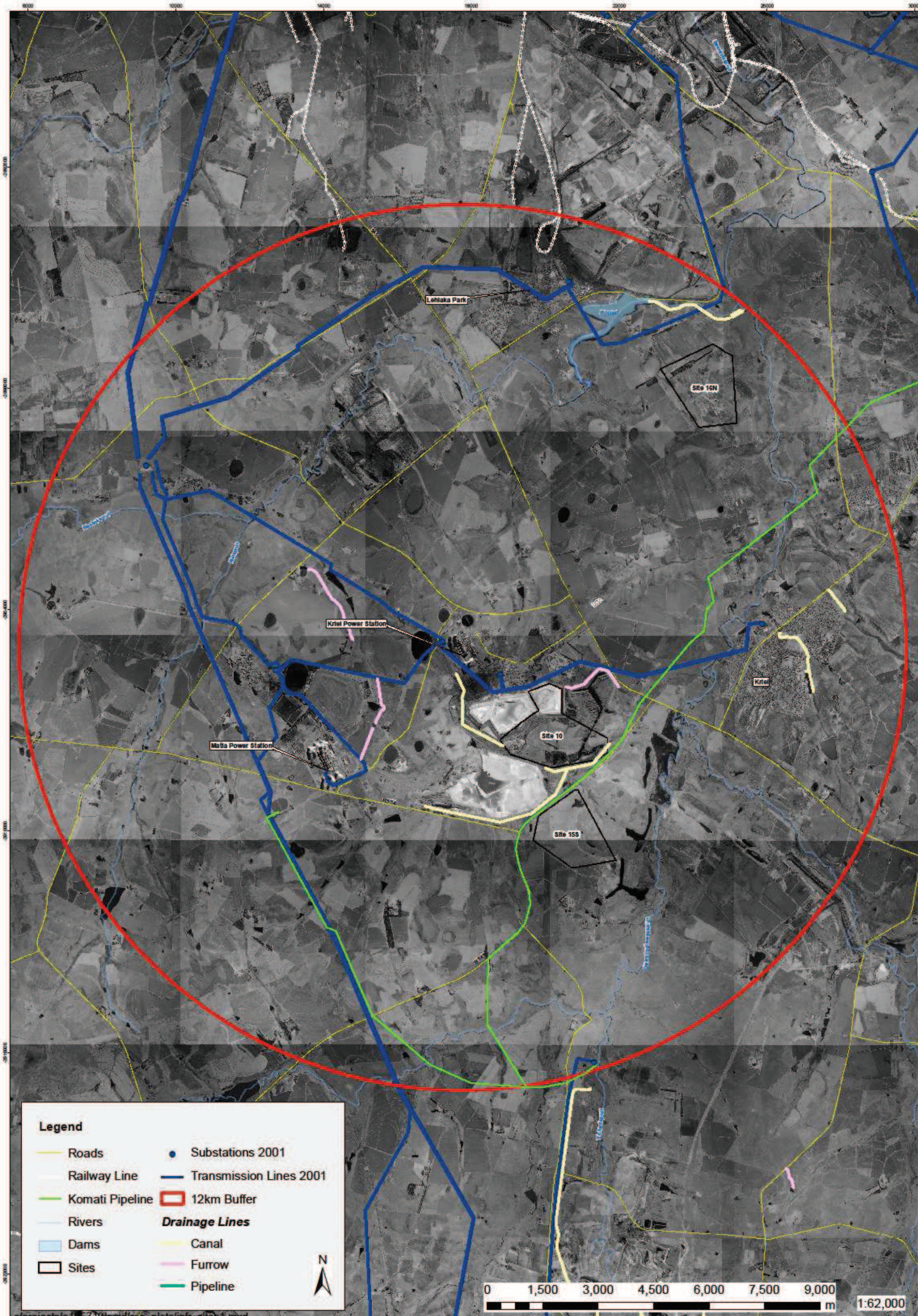

Figure 2-2 Map indicating existing infrastructure within the 12 km radius area

- The opportunity to improve current water issues at Area 10 would no longer exist; and
- Increased risk of water pollution should there be damage to ash transport infrastructure.

Liners: It was estimated that collapse settlement of approximately 3 m could occur on the spoils at Sites 10 and 15S. This could result in substantial differential movement in the foundation of the ash disposal facility that would be very difficult, ~~if possible at all,~~ for the liner system to accommodate. The ~~option~~ details to line an open cast mine will however be investigated via a detailed geotechnical investigation.

(ii) Cost of infrastructure

In order to compare the different areas from an infrastructure cost perspective, a rough estimate was calculated for Sites 10, 15S and 16N~~ and 17~~ with regards to liner costs, slurry delivery and return water costs and pre-built embankment. A summary of the costs are indicated in **Table** 2-5. More-detailed costs are provided in Jones and Wagener's technical screening report, included as **Annexure D**.

Table 2-5 Summary of major cost items (Jones & Wagener, 2010)

DESCRIPTION	Cost (x R 1 000 000)			
	Site 10	Site 15 South	Site 16 North	~~Site 17~~
Delivery and Return Infrastructure Cost	110.2	125.6	152.6	~~152.6~~
Liner System[10]	TBC[11]	TBC	600	~~600~~
Pre-built embankments	40	70	0	~~0~~
Total	**150.2**	**195.6**	**752.6**	~~**752.6**~~

Delivery and return infrastructure cost: In order to compare the sites, the above calculations were based on the assumption that the existing slurry delivery system would be discarded and a new pump station and pipeline would be required. However, it would be possible to retain the existing system should Site 10 be approved. Furthermore, a rate of 30c/kWh for electricity was also taken into consideration.

With regards to preliminary water treatment costs, it was assumed that the volumes would be similar for all ~~four~~ three sites provided that the footprint areas are similar[12]. Seepage would be collected by the liner system for treatment, whereas seepage from the open cast mines could be abstracted from the groundwater by pumping from the final void or from boreholes around the site.

[10] Liner costs for Site 10 and 15S to be confirmed based on groundwater and detailed geotechnical investigations.

[11] To be confirmed.

[12] Note that the volume of water at Site 10 could be larger (than other sites) due to groundwater seepage and will be investigated by the relevant specialist in the EIA Phase.

Liner cost: As noted earlier in this chapter, liner costs would need to be calculated for Sites 10 and 15S based on the findings of a geotechnical investigation. A liner system can however be used for Site 16N ~~and 17 as these two sites are~~ as the site is located on natural soil with no possibility of surface subsidence occurring. The calculated costs for the ~~liners are~~ liner is R2 million per hectare.

Pre-built embankments: Costs were calculated based on a 30 m high embankment, however the height would need to be investigated as part of the detailed geotechnical investigation.

B. Environmental Criteria

(iii) Hydrological features

The locality of permanent streams, wetlands, dams and the geohydrology of the area were taken into consideration due to the regional scale of potential impacts on water resources.

Groundwater: Ash from power stations is usually composed of alumina, silica, lime and iron oxides. Seepage from ash disposal sites contains high concentrations of dissolved salts and potentially elevated concentrations of certain trace elements such as arsenic, boron, manganese, nickel, lead, selenium, molybdenum and fluoride and could contaminate soils and groundwater. Furthermore, the ash water has a pH of 12.6 and could result in the solution and mobilisation of complex trace metal compounds. However, exposure to the atmosphere, anaerobic microbial action or the mixing of ash water with acidic groundwater would generally lower the pH. In terms of Site 10, previous studies on this site indicated that the water occurring in the opencast mine has an inherent resistance to acidification (lowering of pH). Under neutral and acidic conditions the soluble metal complexes and carbonates would precipitate and increase the potential for pollution. Groundwater pollution could not only have a negative impact on the water resources, fauna and flora, but also on agricultural productivity and income. These potential impacts are elaborated on in **Section 5.3.3**.

Surface water: The proposed sites are located within the B11D and B11E quaternary catchments which are dominated by the Steenskoolspruit (quaternary catchment B11D). A small portion of Sites 16N ~~and 17 are~~ is located within quaternary B11E, the Rietspruit, which is a tributary of the Steenkoolspruit.

(iv) Geotechnical considerations

Of major concern is the possibility of collapse settlements of the foundation at Site 10 and 15S which would require portions of the wall to be constructed across the backfilled pit. Furthermore, it has been assumed that a pre-built embankment would need to be constructed where the toe of the facility is founded on spoils. The embankment would allow monitoring of settlements and possibly induce collapse settlement before ash could be deposited. An additional benefit would be that the spoils below the borrow area (i.e. where the embankment material has been excavated from) would be over-consolidated and less initial settlement can be expected.

(v) Sensitive biodiversity features

The Mpumalanga Biodiversity Conservation Plan (MBCP) (Ferrar & Lötter, 2007) has identified land units in the surrounding landscape (**Figure 2-3**) that are categorised as important and necessary (Category 4), areas of least concern / ecological corridors (Category 5) and areas with no natural habitat left (Category 6). Each of these categories permits or restricts specific land use types. Category 4 specifically does not allow any surface mining activities / developments, including any mine waste and refuse dumps, to be developed, whereas Categories 5 and 6 allow for restricted developments. Most of the surface area of the sites is zoned as Category 5, although a section of wetland system is found at Site 16N which is zoned as Category 4. This wetland is important as a dispersal and ephemeral foraging habitat for faunal species and is therefore considered to be ecologically important.

C. Other factors

Other factors were considered, but did not significantly differentiate between the areas within the 10 km radius identified as being potentially suitable for the proposed ash disposal facility and therefore did not influence the site selection process. These included:

- **Safety:** The operational plan for the proposed ash disposal facility will include mitigation measures to identify potential safety risks during the operational phase as well as after the ash disposal facility has been decommissioned.

- **Land ownership:** Eskom indicated that the proposed ash disposal facility could be placed on either Eskom owned or private owned property. <u>To this end, Eskom would engage with landowners for purchase of new land, according to Eskom's Involuntary Resettlement policies, which are in line with the World Bank principles.</u> Furthermore, no conservation areas are located within the area of investigation. Therefore this criterion was not considered an important decision making factor.

- **Topography:** The general topography of the area is relatively flat with no features that significantly differentiate between identified areas and possible sites.

- **Vegetation type:** Eastern Highveld Grassland (Gm 8) and Soweto Highveld Grassland (Gm12) occurs within the area of investigation (Mucina & Rutherford, 2006). Both vegetation types are considered to be endangered.

- **Sensitive fauna:** Due to the disturbed nature of the areas investigated, <u>through agriculture, power industry and mining operations,</u> the likelihood of endangered fauna to occur within the sites are very low (see Section 2.3.1 (B)(v)).

- **Wetlands:** The Terrestrial Biodiversity Assessment tool of the MBCP was used to identify any areas of biodiversity concern, including wetlands, within the sites (see Section 2.3.1 (B)(v)).

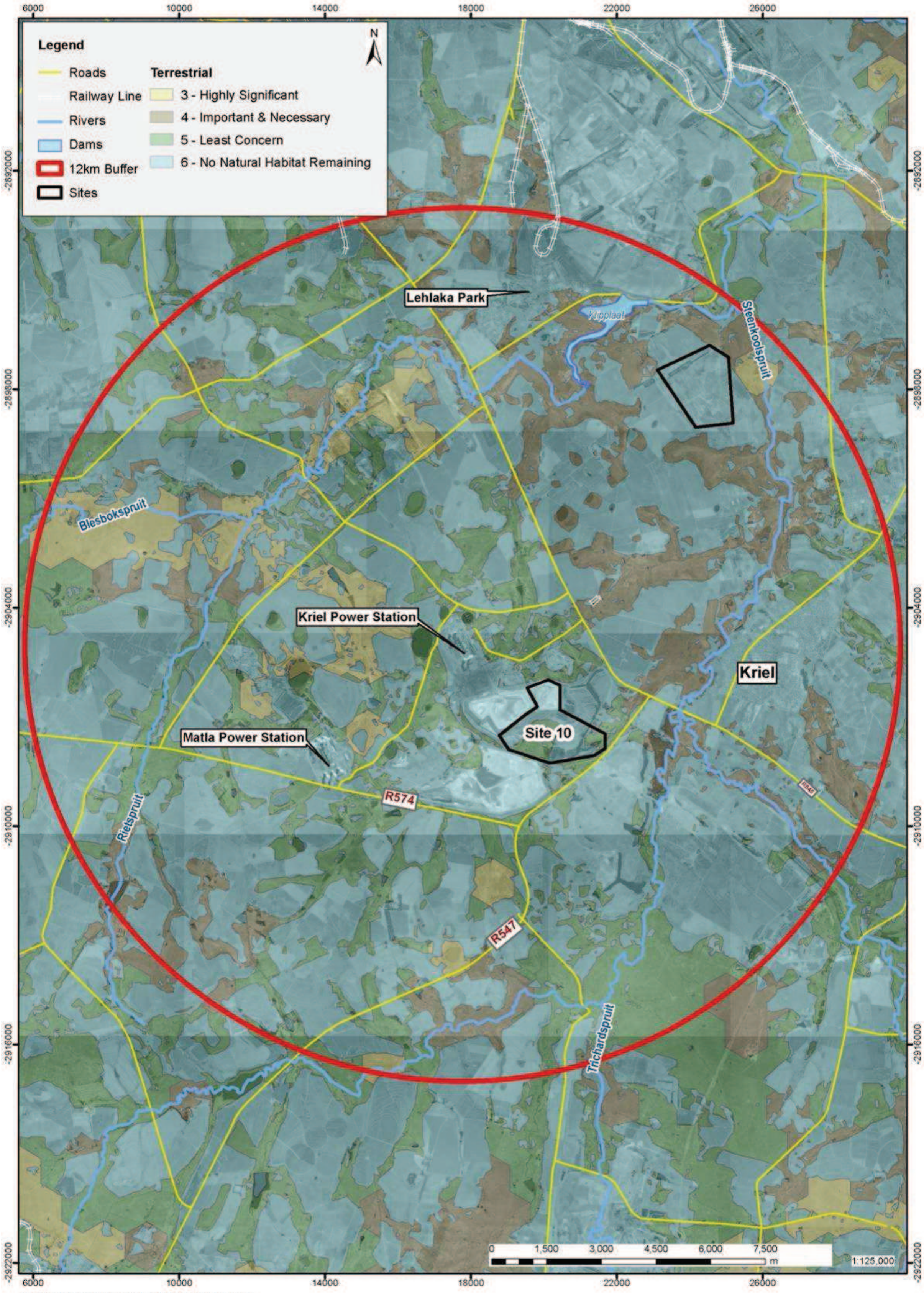

Figure 2-3 Sensitive land units identified by the MBCP at the Kriel Power Station

- **Visual:** An ash disposal facility of the magnitude required for the Kriel Power Station would have a visual impact on the surrounding landscape at all potential areas identified during the selection process. The scale of this impact will however depend on the site's proximity to the Power Station and existing ash disposal facilities.

- **Noise:** Noise generated by the pumping infrastructure could be mitigated and was therefore not used to distinguish between sites.

- **Dust:** The impact of dust on the surrounding landscape could the mitigated and was therefore not used to distinguish between sites.

- **Heritage:** Heritage resources are expected to occur within the vicinity of the potential sites and would need to be assessed via a Heritage Impact Assessment.

2.3.2 Description of potential sites

- **Site 10** overlies a backfilled open cast mine pit (Pit 1) and is bordered by the backfilled Kriel Colliery open cast mine pit Pit 1 to the east. The Provincial Road R547 (Evander-Kriel) is located to the south, Matla Power Station to the west and the Kriel Power Station to the north.

Advantages	Risks
Located relatively close to the Kriel Power Station and therefore requires less capital costs.	Situated over a depleted opencast mine ~~undermined areas~~ with associated groundwater and stability issues.
Shorter crossing of backfilled area than Site 15S.	Eastern final void of Pit 1 is open to groundwater and could result in metals leaching from the ash.
Brown fields area with limited future land use.	Possibility of collapse settlements in the foundation that could pose significant risks in terms of environmental (groundwater in particular) pollution should the correct measures not be in place.
Limited visual footprint.	
Predominantly located on Eskom owned land.	
Opportunity to address existing water quality and quantity issues associated with Pit 1.	

- **Site 15 South** also overlies a backfilled open cast mine (Pit 23) with the low point located to the east. The Provincial Road R547 is located to the north of the site and a backfilled open cast mine to the south. Agricultural land occurs to the west.

Advantages	Risks
Located relatively close to the Kriel power station and therefore requires less capital costs.	Situated over undermined areas with associated potential groundwater issues.
Most likely possible to avoid deposition over significant water filled areas open to groundwater*.	Unlike Site 10, this site has been rehabilitated and includes a wetland area.
Brown fields area with limited future land use.	The visual footprint of the Power Station will be spread over a wider area, thus increasing the existing impact on aesthetics and sense of place.
Located on Eskom owned land.	It would be necessary for pump infrastructure to cross the R547 to reach the site and could disrupt existing traffic patterns due to the movement of people and infrastructure to the ash disposal facility when in operation.
	Could potentially interfere with operations of nearby F-Block. May also be necessary to re-route F-Block services.
	Longer outer wall required than for Site 10, which is also more costly.
	East and south toe areas overlie coal resources, but could be negligible due to low additional overburden pressure at the dam toe.

*A low point with standing water is however located in the centre of the site.

- **Site 16N** overlies natural ground that is partially used for agriculture and is bordered by the Steenkoolspruit to the east, agricultural land and a valley ridge to the north and south and to the west agricultural land that is underlain by the Kriel Colliery Coal fields.

Advantages	Risks
Underlain by natural ground with no instability concerns.	Located relatively far from the Kriel Power Station and would therefore require high infrastructure costs.
Possible to avoid coal located within the site.	Adjacent to Steenkoolspruit and could potentially pollute the river should an accident occur.

Advantages	Risks
	Expensive liner system would be required.
	Disturbance of a Greenfields area that is partially used for agriculture.
	Privately owned property.

- ~~**Site 17** is located to the northwest of the power station on Farms Rietvlei 62, Vierfontein 61 and Nooitgedacht 37. The site is bordered by agricultural land on all sides. To the east the R545 (regional road from Ogies to Bethal) is located and to the southeast the Matla Colliery.~~

~~Advantages~~	~~Risks~~
~~Underlain by natural ground with no instability concerns.~~	~~Located relatively far from the Kriel Power Station and would therefore require high infrastructure costs.~~
~~No coal resources or undermined areas are located on site.~~	~~Located 600 m to the west of the Rietspruit and could potentially pollute the river should seepage occur.~~
	~~Expensive liner system would be required.~~
	~~Disturbance of a Greenfields area that is used for agriculture.~~
	~~It would be necessary to realign tertiary roads located within the site.~~
	~~Privately owned property.~~

2.3.3 Ranking of potential sites identified

A basic ranking system was used ~~to screen~~ provide a comparison between the potential sites in terms of the screening criteria discussed in Section 2.3.1. In light of the preliminary nature of this investigation ~~and lack of broader consultation,~~ this ranking should be regarded as initial, and is purely intended to guide Eskom and its consultants in their deliberations regarding the way forward.

The site ranking methodology entails:

- Rating of site suitability criteria (to identify any “fatal flaws”);
- Weighting of site suitability ranking; and
- Site selection based on site ranking

A score was assigned to each site for each of the criteria as indicated in **Table 2-6** below.

Table 2-6 Scores assigned to criteria to indicate the various levels of site suitability

Site Suitability Rating	Score
Fatal flaw	0
Low	1
Medium	2
High	3

Note: A low score reflects the unsuitability of the site, whilst a high score reflects that the site is suitable. The suitability of a site is based on the mitigation potential of impacts (i.e. if they can be effectively mitigated).

Weightings were assigned to the different criteria. The weightings were decided upon following the site visit, discussions with Eskom and the project engineers.

Site	Design/ operating requirements	Cost[13]	Geotechnical stability	Groundwater pollution	Other sensitive environmental features (e.g. Critical Areas, arable land)
10	2	3	1	1	3
15S	2	3	1	1	2
16N	2	1	3	3	1
~~17~~	~~2~~	~~1~~	~~3~~	~~3~~	~~1~~

The final scores for each criterion were calculated using the following formula:

$$\frac{Score}{3} \text{ X Weighting}$$

The results of the site ranking process for the three identified sites are presented in **Table 2-7**.

Table 2-7 Site ranking matrix

Site	Design/ operating requirements	Cost	Geotechnical stability	Groundwater pollution	Other sensitive environmental features (e.g. Critical Areas, arable land)	Total
Weighting	20	15	25	25	15	100
10	13.3	15	8.3	8.3	15	59.9

[13] Excludes rehabilitation (including water treatment facility), mitigation and maintenance costs. These would be required for the approved site.

Chapter 2

Site	Design/ operating requirements	Cost	Geotechnical stability	Groundwater pollution	Other sensitive environmental features (e.g. Critical Areas, arable land)	Total
Weighting	20	15	25	25	15	100
15S	13.3	15	8.3	8.3	10	54.9
16N	13.3	5	25	25	5	73.3
~~17~~	~~13.3~~	~~5~~	~~25~~	~~25~~	~~5~~	~~73.5~~

2.3.4 Site selection summary and way forward

Based on the above, the following summary of the site selection process is provided:

- Sites 10 and 15S are considered to be the least favourable sites with the following screening criteria ranked as “least favourable”: geotechnical stability, groundwater pollution and sensitive biodiversity features. ~~This rating may however change based on the information received from the detailed groundwater and geotechnical investigations.~~
- Site 16N ~~and 17 are located outside the 10 km radius area. However these two sites are~~ is “more favourable” than Site 10 in terms of geotechnical stability and groundwater pollution risks and “least favourable” in terms of design / operating requirements (reasons described in Section 2.3.1 A(i)), cost and sensitive environmental features as it would extend the environmental disturbance footprint of the power station and its associated infrastructure.
- ~~Site 16N and 17 are is ranked as the most favourable site with cost and sensitive environmental features ranked as “least favourable”.~~
- ~~Site 16N and 17 are the is least preferred from a logistical/ functioning perspective only, for the reasons described in Section 2.3.1 A(i), and will result in a further extension to the environmental disturbance footprint of the power station and its associated infrastructure.~~

It is apparent from the above sections of this chapter, as well as the ranking matrix, that Sites 10 and 15S are very similar with regards to groundwater and geotechnical characteristics. However, Site 15S has been indicated as the least favourable option. This is mainly due to the fact that the site has been rehabilitated and includes a wetland area. In addition, Site 15S is located further away from the Power Station than Site 10 and would thus have a higher visual impact on the surrounding landscape. With regards to Site 10, a previous investigation completed in 2002 on the hydrology of the site indicated that a desalination plant ~~could~~ would be ~~established there~~ required for use of this site, to treat the seepage water and ~~improve~~ manage the existing water quantity and quality issues at the site. Therefore, it is proposed to take Site 10 and 16N forward into the EIA Report stage for detailed assessment. ~~, together with Sites 16N and 17.~~