Zitholele Consulting
Reg. No. 2000/000392/07

PO Box 6002 Halfway House 1685
South Africa
Thandanani Park, Matuka Close
Halfway Gardens, Midrand
Tel + (27) 11 207 2060
Fax + (27) 86 674 6121
E-mail : mail@zitholele.co.za

KENDAL POWER STATION PROJECTS:

1. CONTINUOUS ASHING DISPOSAL FACILITY

2. 30 YEAR ASH DISPOSAL FACILITY

DWA Pre-Application Consultation Meeting

Thursday, 30 May 2013, 10h00, Department of Water Affairs, Bronkhorstspruit.

1. EVACUATION PROCEDURES

- **Mr Stanford Macevele (SM)** informed everyone in the meeting about the evacuation procedures in the event of emergency.

2. WELCOMING AND ATTENDANCE

- **MV** welcomes DWA representatives for their presence in the meeting and asked everyone to introduce themselves.

a. Present (see Appendix A for attendance register)

Warren Kok (**WK**)	Zitholele Consulting
Dr Mathys Vosloo (**MV**)	Zitholele Consulting
Musa Lubambo (**ML**)	Department of Water Affairs (DWA)
Stanford Macevele (**SM**)	Department of Water Affairs (DWA)
Virginia Ramakuwela (**VR**)	Zitholele Consulting

b. Apologies

Mokgadi Maloba (**MM**)	Department of Water Affairs (DWA)

3. APPROVAL OF AGENDA

Agenda was circulated before the meeting started and it was accepted without any changes.

4. DECLARATION OF INTEREST

All attendees declared that they have no personal interest or gain in the project.

5 GENERAL

- DWA emphasised that it is very important that DWA is made part of the site selection process. DWA can provide valuable input during the planning phase, which will prevent problems and misunderstandings during later phases in the EIR. **SM**
- The two projects are at different phases in the EIA process. The Kendal Continuous project is at the beginning of the DEIR phase, and the Kendal 30yr project is in late stages of the DSR. **MV & WK**
- A workshop needs to be arranged with DWA, where Kelvin Legge is present. **SM & WK**

6. KENDAL CONTINUOUS ASHING

- **WK** provided a general project overview on the need for both projects, and the importance thereof. The various lifecycles of the power station was explained and the when each disposal will need to be ready for use. The urgency of the project emphasised. **WK**
- **WK** explained that this project has no real site alternatives. However, there are different options to consider, and the option selected will also influence the 30 yr project.
- **WK** explained the six options and how each came about:
    - Option 1A: Minimum facility ï Fatally flawed (Not enough capacity)
    - Option 1B: Minimum facility plus staged piggyback
    - Option 1C: Minimum facility plus concurrent piggyback
    - Option 2A: Maximum facility ï requires stream diversion
    - Option 2B: Maximum facility plus staged piggyback
    - Option 2C: Maximum facility plus concurrent piggyback ï Preferred option ï Decreases the footprint required for the 30 yr project ï if piggybacking is feasible.
- The deciding factor was the specialist reports and studies done ï many still on-going.

6.1 DISCUSSION

- DWA does not foresee a problem in diverting the stream. However, DWA wants Eskom to incorporate the existing water management system including the in-stream clean and dirty water dams in the possible stream diversion. To ensure that no pollution enters into the stream. The existing dams are a problem. The Water use license application needs to **SM**

incorporate diverting the stream around the existing dam system.

- DWA wants the Aquatic specialist to motivate for the stream diversion, by explaining that the diversion will benefit the ecosystem, and the water will be of better quality. **SM**
- The stream to the south of the existing ash disposal facility has been impacted by an instream dam that was probably constructed by the farmer to irrigate the two centre pivots where continuation of the ash disposal will expand to. During high flows the dam overtops and backflows into the open pit mine upstream if the dam. WK has concerns about the close proximity of the dam to the ash body and is going to suggest to Eskom that the situation be relooked at as they now own the property on which the dam is located. Would the department also support any works on the southern stream such as diversion of the stream around the open pit, or removal of the farm dam. SM was in agreement that improvement of the water and stormwater situation is imperative to protect the Wilge River and ensure proper management of water quality around the ash disposal facility, and would support such initiatives. WK thanked him and indicated that he would discuss this with Eskom. **WK**

6.2 DECISIONS

- N/A

7 KENDAL 30YR ASHING PROJECT

- The project was summarised and the process followed to identify the proposed alternative sites explained. The developable areas where identified and analysed in more details based on the sensitivity layers identified. The areas where then ranked. The site selection report is incorporated in the draft scoping report that will be made available for public review early in June. **MV**

7.1 DISCUSSION

- All the different buffers used must please be explained to prevent confusion. It is not clear for someone with little or no background of the area. **SM**
- DWA has experienced in the past that the NFEPA layer is not always correct. In certain instances entire wetlands and pans where left out. **SM**
- **MV** explained that the level of study done now was only on desktop level. As soon as the number of possible alternative sites where decreased, the specialists will go out into the field, and do an in-depth study of all surface and ground water features.
- The site selection process went through four iterations. It was decided on which sensitivities compromised could be reached. Only in iteration 4, potential sites come to the front ï the approached that allowed that was decreasing the buffers around all surface **MV**

water features to the bare minimum of a 100m.

- The engineers found that the best case scenario based on a storage capacity requirement of 37 years is 550 hectares and the worst case scenario is 770 hectares. This will be decided by the geotechnical studies. **MV**
- Each possible site was identified on the map and briefly discussed. **MV**
- All 8 identified sites where discussed in the workshop that was held with the specialists. The specialists gave input, based on their experience in the area. **MV**
- The rating matrix was explained. Rating was done for Environmental impacts, Social impacts and Technical impacts, and how it aided in determining which sites to take further in the study. **MV**
- Most ideal sites after the combined ranking process are: E2, C, and F. **MV**
- Each of the top six sites where considered in more detail.
- After a more in-depth consideration of the top 6 ranked site areas, B, C, D, and F came up as the most ideal sites to take further in the study. Site area E2 was eliminated due to the high risk of being fatally flawed resulting from the extent of mining activities on site and the difficulty expected in institutional arrangements to transfer liability from the mine to Eskom at such a large scale. Site area F was eliminated due to the complexity of relocating transmission lines exiting Kendal Power Station, relocation of the R555 and presence of the Kendal-Kusile pipeline across the area. **MV**
- Reports will be circulated for comment.

7.2 DECISIONS

- DWA does not foresee a problem with a stream diversion at this stage; however a detailed wetland study needs to be undertaken. DWA wants to see the process used to motivate the stream diversion explained appropriately. **SM**
- DWA would like to have the WULA together with the final report to enable them to make an informed decision. Similar to an integrated EIA and WML process. **SM**
- The WULA can only be completed during the DEIR phase, because that is the due date for the detailed specialist studies. **WK**
- DWA would recommend having a reserve determination done parallel with the specialist studies, to enable DWA to speed up their process that will accommodate the strict time frames on the project. DWA will provide the terms of reference for the reserve determination study. If the reserve determination is done in this manner the up to 5 months can be saved in issuing the WUL for the project. **SM**

8 CLOSURE

- As soon as the detailed reports from the specialists are available another meeting with DWA will be arranged to give more detailed feed-back for each site. The proposed preferred site will also be announced and explained. **MV**
- When does DWA want the WULA application forms to be submitted? **WK**
- DWA wants it submitted with the WULA Tech report.
- DWA needs the detailed engineering drawings in advance to allow it sufficient time to work through it and give appropriate feedback and comment on it. **SM**
- Is DWA able to indicate who will be the DWA Case officer?
- Musa is the point of contact in DWA for any technical or administrative related matters. Case officer will only be appointed once the application forms have been received. **MV** **SM**

9 PROPOSED MEETINGS

- Meeting with Kelvin Legge to present the conceptual design report to ask for input into the process.
- A workshop will be scheduled to present all the relevant specialist studies to DWA once detailed studies become available. This will inform DWA at an early stage of the outcomes of these specialist studies in order for DWA to still make inputs into the process.
- A second meeting will be arranged with Kelvin Legge to present the detailed reports for his consideration.

9 MEETING CLOSED

- With no further business to conduct the meeting was closed with thanks to all for attending.

KENDAL 30 YEAR ASH DISPOSAL FACILITY

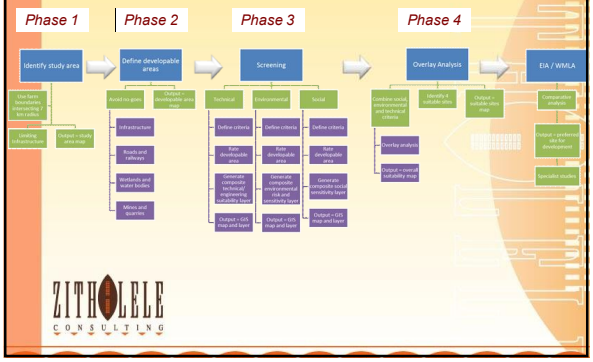
SITE IDENTIFICATION MEETING WITH ESKOM KENDAL POWER STATION

THURSDAY, 30 MAY 2013
BRONKHORSTSPRUIT

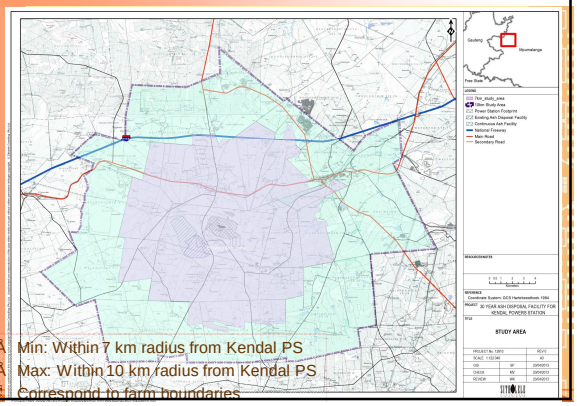
Agenda

- *SAFETY / EVACUATION PROCEDURE*
- *WELCOME, INTRODUCTIONS AND DECLARATION OF INTEREST*
- *APPROVE AGENDA*
- *KENDAL CONTINUOUS ASH*
  - *Options analysis and preferred option*
  - *Finalisation of preferred option*
- *KENDAL 30 YEAR ASH*
  - *Brief overview of site identification process*
  - *Sensitivity ratings and most feasible site*
  - *Finalisation of site alternatives for Scoping Phase*
- *WAY FORWARD & CLOSURE*

Approach



Phase 1 - Study Area



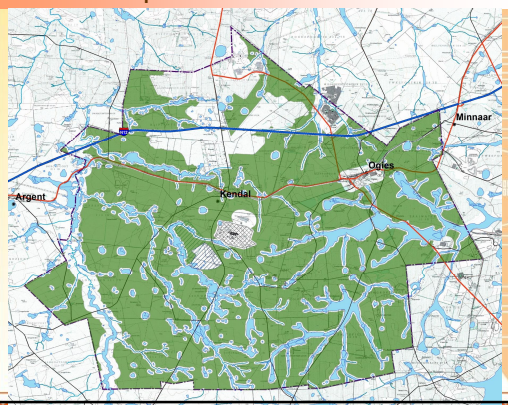
- Min: Within 7 km radius from Kendal PS
- Max: Within 10 km radius from Kendal PS
- Correspond to farm boundaries

Phase 2 ï Defining developable areas

- Negative mapping
- High level desktop assessment:
  - Environmental,
  - Social
  - Infrastructure layers,
  - Aerial photography
  - 1:50000 topographical maps
- Field verification

Features	Iteration 1	Iteration 2	Iteration 3	Iteration 4
Natural Environment				
Wilge River	*500 m buffer*			
Rivers / Streams	500 m	500 m	500 m	100 m
Wetlands / Dams	500 m	500 m	500 m	100 m
Red Data Species	100 m	100 m	100 m	100 m
Protected areas and parks	None in study area			
Social Environment				
High density residential areas	*500 m buffer*			
Farmsteads	1 km	☒	☒	☒
Schools	1 km	☒	☒	☒
Cemetries, Churches, Monuments, and heritage and culturally significant areas	Not identified in study area from high level scan			
Built Environment / Engineering Requirements				
New Largo footprint	*100 m buffer*			
Open Pits	100 m	100 m	☒	☒
Undermined Areas	100 m	100 m	☒	☒
Richards Bay Rail	*50 m buffer*			
Other Railway Lines	50 m	50 m	☒	☒
N12 National Road	*100 m buffer*			
Tarred Roads	100 m	☒	☒	☒
FarmRoads	100 m	☒	☒	☒
Overhead Pow er lines	Serv	☒	☒	☒
Gas Pipeline	Serv	☒	☒	☒
Water Pipeline	Serv	☒	☒	☒
Air strips	3 km	3 km		
Conveyor Belt	50 m	☒	☒	☒

Developable areas ï Iteration 4

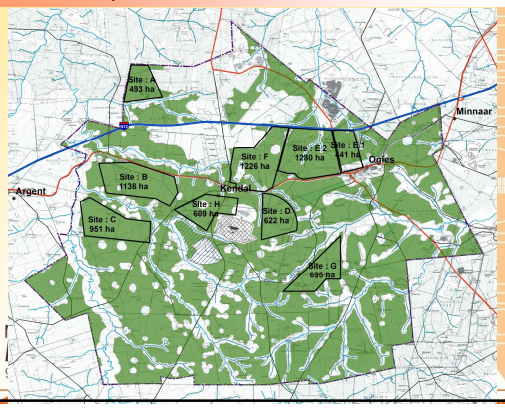


Site footprint determination

Ash production	**576,223 m³ per month**
Design life of dump	**37 years**
Total ash produced	**256 million m³**
Dump side slopes	**1:5**
Dump height	**50 metres**
Footprint required (includes 15% additional for topography and 50 ha for RWD, roads, site camp, etc)	**770 hectares**
Dump height	**100 metres**
Footprint required (includes 15% additional for topography and 50 ha for RWD, roads, site camp, etc)	**520 hectares**

ZITHOLELE CONSULTING

Developable areas ï Identified sites



Developable areas ï Identified sites

Potential Sites	
Individual Sites:	
Site:	**Area (Ha):**
Site A	492
Site B	1 137
Site C	950
Site D	622
Site E2	1 280
Site F	1 226
Site G	694
Site H	609
Area Combinations:	
Area E1 & E2	441 + 1 280 = 1 721

Area of Site A not large enough to support the minimum facility footprint size of 520 ha – Fatally flawed

ZITHOLELE CONSULTING

Environmental and Social Rating

ZITHOLELE CONSULTING

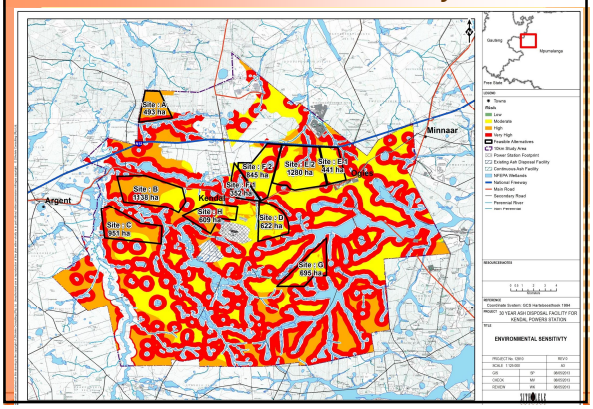
Sensitivity criteria used

Shapefile	Data source	Data	Value	Reasoning
Mphumalanga Biodiversity Conservation Plan	SANBI (2007)	Protected, Irreplaceable Area	5	In order of importance
		Highly significant	4	
		Important and Necessary	3	
		Least concern	2	
		No Natural	1	
Natural wetlands (NFEPA)	SANBI (2010)	Wetlands with a 100 to 500m buffer.	5	
Rivers (NFEPA)	NFEPA (National Freshwater Ecosystem Protection Areas)	Unmodified, Natural	5	Wetlands and rivers were given a No-Go buffer area of 100m (iteration 4). Sensitivities applicable for area betw een 100 m and 500 m from a river or wetland.
		Largely Natural	4	
		Moderately/Largely Modified	3	
		Seriously Modified	2	
		Critically, Extremely modified	1	
Land Capability	Agricultural Geo-referenced Information Systems (AGIS)	High potential arable land	4	
		Moderate potential arable land	3	
		Marginally potential arable land	2	
Landuse	DWAF 2009	Urban Residential	5	Resettlement is a last option
		Mines, Quarries	3	Important land uses, but can be bought out
		Thickets, Forestry	1	
Agri Fields	Department of Agriculture (DoA) (2008)	Agricultural Fields	4	Quality agricultural lands
Households		*500 m buffer*	*5*	
		500 m - 1 km buffer	*3*	
Mine areas		Workings	*4*	
		Resources	*3*	
		Coal rights	*1*	
Roads - Small Scale	ArcGIS (2012)	National road (excl. N12)	*4*	Dont want to move major roads
		Main. Arterial road	3	
		Secondary road	1	
Rail (RBY) via Ogies	DWAF	Railway line - standard	5	Important major railway line
Rail via Kendal		Railway line - standard	3	Rail is cheaper than a road to move but logistically is just as difficult
Powerlines (HV)	Eskom	765 kV, 533 kV, 400 kV Tx	*4*	
Powerlines (Transmission)		275 kV, 220 kV	3	
Powerlines (Distribution)		132 kV	*2*	
		Power substation footprint		

Rating Scale

Rating	Description
1	Very Low sensitivity
2	Low sensitivity
3	Moderate sensitivity
4	High sensitivity
5	Very High sensitivity

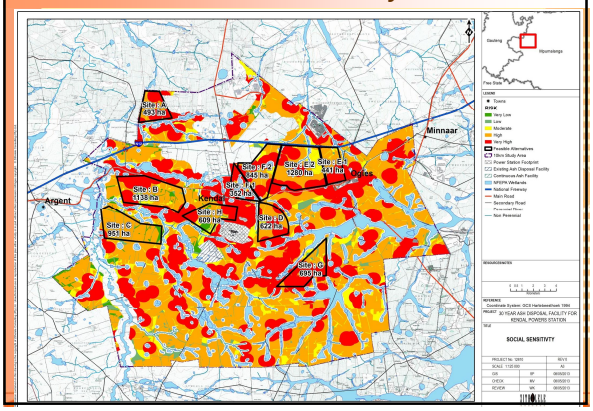
Environmental sensitivity



Environmental Sensitivity Rating

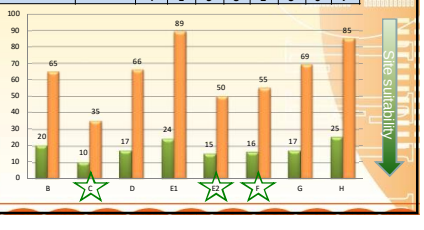
Element	Weighting	B	C	D	E1	E2	F	G	H
Terrestrial Biodiversity	3	1	3	4	1	1	3	2	4
Wetlands - NFEPA	5	4	4	3	1	1	2	5	3
Rivers - NFEPA	5	4	4	2	1	1	1	5	2
Land Capability	2	3	4	3	1	1	1	3	3
Score Un-weighted		**12**	**15**	**12**	**4**	**4**	**7**	**15**	**12**
Rank Un-weighted		**4**	**7**	**4**	**1**	**1**	**3**	**7**	**4**
Score Weighted		**49**	**57**	**43**	**15**	**15**	**26**	**62**	**43**
Rank Weighted		**6**	**7**	**4**	**1**	**1**	**3**	**8**	**4**

Social sensitivity



Social Sensitivity Rating

Element	Weighting	B	C	D	E1	E2	F	G	H
Land Use	5			1	5	1		1	1
Households	5	5	1	4	4	1	3	5	5
Fields	4	3	4	3	1	1	1	3	3
Mining	4			4	4	4	4	4	4
Roads	2	1	1	1	5	4	4	1	1
Powerlines	2	3		1	1				4
Pipelines	2	4							4
Wind direction (Air Quality)	3	4	4	3	4	4	4	3	3
Score Un-weighted		**20**	**10**	**17**	**24**	**15**	**16**	**17**	**25**
Rank Un-weighted		**6**	**1**	**4**	**7**	**2**	**3**	**4**	**8**
Score Weighted		**65**	**35**	**66**	**89**	**50**	**55**	**69**	**85**
Rank Weighted		**4**	**1**	**5**	**8**	**2**	**3**	**6**	**7**



Technical Rating

Technical assessment

Site Characteristics

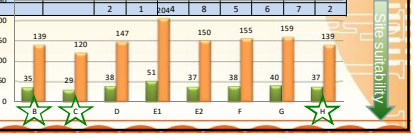
Site ID	Area (ha)	Average Slope (%)	No. of drainage directions
A	493	3.3	2
B	1 138	3.1	2
C	956	2.2	1
D	622	2.6	2
E1	441	1.0	1
E2	1 280	1.6	1
F	1 226	1.4	2
G	695	2.1	2
H	609	3.5	3

Site Suitability

Site ID	Storage potential (No of years)		
	50 metres high	75 metres high	100 metres high
A	20	27	32
B	52	72	88
C	42	57	69
D	27	36	44
E1	17	23	27
E2	61	85	106
F	49	66	79
G	28	37	44
H	25	33	39

Technical Sensitivity Rating

Objective	Weight	B	C	D	E1	E2	F	G	H
Distance to powerstation (conveyor route)	5	3	4	1	4	4	2	3	1
Topography	2	4	3	3	5	5	5	3	4
Storage and expansion potential	1	1	1	4	5	1	1	3	4
Accessibility	3	3	2	2	4	4	3	3	1
Capacity of site	5	1	1	3	5	1	1	2	3
Storage efficiency	3	3	3	3	3	3	3	3	3
Drainage direction	3	4	1	4	1	1	2	4	5
Capital costs	5	3	4	2	4	4	3	4	2
Operational costs	5	3	3	2	4	3	3	4	1
Diversion of natural or major infrastructure	5	1	1	1	5	4	4	1	5
Under mined areas	5	4	1	4	5	1	1	3	1
Open cast mining (Inst)	5	1	1	1	4	4	4	1	1
Operability	5	2	2	4	1	1	3	3	3
Rehabilitation	5	2	2	4	1	1	3	3	3
Score Un-weighted		**35**	**29**	**38**	**51**	**37**	**38**	**40**	**37**
Rank Un-weighted		**2**	**1**	**5**	**8**	**3**	**5**	**7**	**3**
Score Weighted		**139**	**120**	**147**	**204**	**150**	**155**	**159**	**139**
Rank Weighted		**2**	**1**	**5**	**8**	**3**	**6**	**7**	**2**

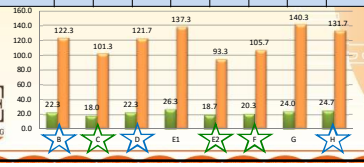


Combined Sensitivity Rating ï Equal weighting to Environmental, Social and Technical

ZITHOLELE CONSULTING

Combined Sensitivity ï Equal weighting

Aspect	Weighing	B	C	D	E1	E2	F	G	H
Environmental	**33.33%**								
Score Un-weighted		12	15	12	4	4	7	15	12
Score Weighted		49	57	43	15	15	26	62	43
Social	**33.33%**								
Score Un-weighted		20	10	17	24	15	16	17	25
Score Weighted		65	35	66	89	50	55	69	85
Technical	**33.33%**								
Score Un-weighted		35	29	38	51	37	38	40	37
Score Weighted		253	212	256	308	215	236	290	267
Combined Score Un-weighted		***22.3***	***18.0***	***22.3***	***26.3***	***18.7***	***20.3***	***24.0***	***24.7***
Combined Rank Un-weighted		**4**	**1**	**4**	**8**	**2**	**3**	**6**	**7**
Combined Score Weighted		***122.3***	***101.3***	***121.7***	***137.3***	***93.3***	***105.7***	***140.3***	***131.7***
Combined Rank Weighted		**5**	**2**	**4**	**7**	**1**	**3**	**8**	**6**



ZITHOLELE CONSULTING

1. Site area E2

2. Site area C

3. Site area F

4. Site area D

5. Site area B

6. Site area H

General Discussion

ZITHOLELE CONSULTING

Way Forward

ZITHOLELE CONSULTING

KENDAL POWER STATION PROJECTS:

1. CONTINUOUS ASHING DISPOSAL FACILITY
2. 30 YEAR ASH DISPOSAL FACILITY

30 May 2013 @10H00, DWA BRONKHORSTSPRUIT

ATTENDANCE REGISTER - DWA PRE-APPLICATION CONSULTATION MEETING

TITLE	FIRST NAME	SURNAME	ORGANISATION	CONTACT DETAILS		SIGNATURE
Mr	Warren	Kok	Zitholele Consulting	Tel No:	011 207 2073	
				Fax No:		
				Cell No:	071 250 5371	
				e-mail:	warrenk@zitholele.co.za	
MS	Virginia	Ramakuwela	Zitholele Consulting	Tel No:	011 207 2061	
				Fax No:		
				Cell No:	083 353 8254	
				e-mail:	Virginiar@zitholele.co.za	
Dr	Mathys	Vosloo	Zitholele Consulting	Tel No:	011 207 2079	
				Fax No:		
				Cell No:	0847483018	
				e-mail:	mathysv@zitholele.co.za	
Mr	Musa	Lubambo	DWA	Tel No:	0833205489	
				Fax No:	0862317108	
				Cell No:	0139322061	
				e-mail:	LubamboM@dwa.gov.za	

TITLE	FIRST NAME	SURNAME	ORGANISATION	CONTACT DETAILS		SIGNATURE
MR	Stanford	Macevele	DWA	Tel No:	(013) 932 2061	
				Fax No:	0866617621	
				Cell No:	078 460 3439	
				e-mail:	macevelest@dwaa.gov.za	
				Tel No:		
				Fax No:		
				Cell No:		
				e-mail:		
				Tel No:		
				Fax No:		
				Cell No:		
				e-mail:		
				Tel No:		
				Fax No:		
				Cell No:		
				e-mail:		
				Tel No:		
				Fax No:		
				Cell No:		
				e-mail:		
				Tel No:		
				Fax No:		
				Cell No:		
				e-mail:		

Zitholele Consulting
Reg. No. 2000/000392/07

PO Box 6002 Halfway House 1685
South Africa
Building 1, Maxwell Office Park, Magwa Crescent West
c/o Allandale Road & Maxwell Drive, Waterfall City, Midrand
Tel + (27) 11 207 2060
Fax + (27) 86 674 6121

ESKOM SOC LTD

ENVIRONMENTAL IMPACT ASSESSMENT, WASTE MANAGEMENT LICENSE AND WATER USE LICENSE APPLICATION FOR THE 30 YEAR ASH DISPOSAL FACILITIES AT KENDAL POWERSTATION

Meeting with DWS National and Regional Office

Thursday, 14 August 2014 at 13h:00

DWA Office Sedibeng 401, Pretoria

DEA Ref: 14/12/16/3/3/3/68; NEAS Ref: DEA/EIA/0001624/2013

Attendees present

First Name	Surname	Abbreviation	Organisation
Edwin	Seitei	ES	Eskom
Emmy	Molepo	EM	Eskom
Tsakani	Holeni	TH	Eskom
Humbulani	Ndou	HN	Eskom
Piet	Ackerman	PA	DWS
Lumka	Kuse	LK	DWS
Ronald	Malaudzi	RM	DWS
Mokgadi	Maloba	MM	DWS
Tania	Oosthuizen	TO	Zitholele
Mathys	Vosloo	MV	Zitholele
Nevin	Rajasakran	NR	Zitholele

Presentation Attached.

1. Introduction

1.1 Everyone introduced themselves and PA indicated what the safety evacuation procedure is.

2. Background

2.1 TO stated that the objectives of the meeting are to obtain guidance and input from DWS on the way forward with regard to site selection on the Kendal 30 year project. Several of the sites could impact on water resources, and input from DWS is therefore required.

2.2 TO indicated that Zitholele have had meetings with DWS Regional office in May and in August 2013.

2.3 TO explained that the life of the Kendal Power Station have been extended by 40 years. In order to make up that 40 years, two projects are running simultaneously:

1) The Kendal Continuous Project (which involves an extension of the current Ash Disposal Facility (ADF) to accommodate approximately 10 years of ash
2) The Kendal 30 year Project which entails an new ADF which will be required to accommodate approximately 30 years of ash

TO indicated that Zitholele are appointed as the Environmental Assessment Practitioners on both these projects.

TO explained that the purpose of this day's meeting is to discuss the Kendal 30 year project.

2.4 TO gave feedback of both projects. The Kendal Continuous project is further advanced in programme, and the plan is to submit the IWULA for it before the end of August 2014. The Kendal 30 year project is still in site selection stage although the Scoping phase have been completed and the Final Scoping Report has been accepted.

3 Site Selection

3.1 PA asked whether, in our previous engagements with DWS, we were advised to avoid or exclude watercourses and wetlands? TO responded in the affirmative, stating that that was the basis of the site selection process. TO pointed out that it will become clear, as the presentation goes on, how the site selection was done. EM

3.2 TO explained the model that was used for the site selection. It started off by defining the study area, which is a 10 km radius around the Kendal Power Station. The next step was to define developable areas. Thereafter there was a technical, environmental and social screening and they overlaid the results and ranked the sites.

3.3 PA asked how far the site is from the Kusile Power Station. NR responded that it is 25 km South of the Kusile Power Station. TO pointed the two sites out on the map.

3.4 TO explained the negative mapping process that was followed. The layers that could be obtained such as river, NFEPA wetlands, communities, etc. were overlaid with suitable buffers. TO showed the result of the negative mapping exercise which shows the "developable areas" in green.

3.5 PA asked whether the Kendal Continuous project has already been approved. TO responded that it has not yet been submitted. It is currently in the Draft EIR phase. The plan is to submit the IWULA before the end of August 2014.

3.6 PA asked why the project (Kendal Continuous ADF) is being expanded to the north west and not towards the south east. NR responded to say that the piece of property belongs to Eskom, and they are continuing on their own property. TO also added that there is a road preventing them from continuing to the east.

3.7 RM asked how far the Kendal Continuous project is from the wetland. EM responded to say that the plan is to divert the stream. NR added that on the northern side the proposal is to divert the stream (as per the IWULA that will be submitted). On the

southern side, the Continuous ADF will be outside of the 1:100 year floodline.

3.8 TO pointed out again that this discussion is the subject of its own EIA and IWULA process and that the purpose of this day's meeting is to discuss the Kendal 30 year project.

3.9 PA stated that DWS have a very big problem when applicants who base their site selection purely on economic and land use factors.

3.10 NR indicated that on the Kendal Continuous project, the decision was not based on economics. It was mainly based on the fact that the footprint had already been impacted. By maximising the volume that could be achieved from the Kendal Continuous site, it will minimise the size of the site required for the Kendal 30 year project which might be on a new / virgin site.

3.11 PA enquired about the environmental impacts. NR explained that there are several mitigation measures in place such as the Class C barrier system (liner); concrete lined toe drains; leachate collection system which report to several pollution control dams; a clean dam with monitored, controlled release. These are put in to ensure the environment will not be impacted negatively.

3.12 TO also explained that there had been numerous workshops undertaken with DWS on this (Kendal Continuous) project. The team had at least two meetings with the region, a meeting with Valerie and also two meetings with Kelvin Legge. She added that the Kendal Continuous project is not based on a quick fix solution. It entails a very sophisticated design. TO asked if the meeting could please bank the issues related to Kendal Continuous for the time being, so that focus could be given to Kendal 30 year, which is the objective of this day's meeting.

3.13 TO showed a slide indicating the parameters that are required for the Kendal 30 year project. If the maximum dump option (which includes the river diversion) is approved for the Kendal Continuous project, then the Kendal 30 year project will need to accommodate 25 years of ash. The footprint required was shown to be approximately 400 ha. TO then explained that the aim was then to find suitably sized sites within the developable areas (shown green on the projected map).

3.14 MV explained how the environmental and social sensitivities were represented on the slides shown. Red was used to show the more sensitive environmental features, such as proximity to watercourses and wetlands. Technical factors were also considered. A number of sites were determined as feasible to take into the next phase of investigation. However, Eskom reduced the number of sites to be taken further to three.

3.15 TO explained that specialist baseline investigations were then undertaken on the three "best" sites.

3.16 PA enquired whether Eskom will undertake the reserve determination on behalf of DWS? EM indicated that, based on discussions with Barbara (on the Kendal Continuous project), the reserve has been done. PA indicated that for the New Largo project it was suggested that the consultant do the reserve determination in order to speed up JH

the process. PA indicated that the consultant (Gary) used for the New Largo study did an excellent job. EM and TO discussed that at this stage it is too early to determine whether the reserve determination done for Kendal Continuous will also be suitable for Kendal 30 year. They discussed that it will be dependent on the site that is selected and the catchment in which it falls.

3.17 MM entered the meeting. PA asked her whether a reserve determination has been requested. She responded to say that because the IWULA had not yet been submitted, it has not been requested. However, a surface water reserve might be available. But, if there are wetlands, a reserve will have to be determined for this.

3.18 TO continued with the presentation – going through some of the sites that were eliminated based on the extensive mining and long life of mines remaining. The feasible sites that remained for detailed investigation by specialists are: B, C, F and H.

3.19 TO explained that after the specialists went to site, it was discovered that the Ogies Dyke was present in the area, and actually traversed all of the sites. The detailed wetland delineation also revealed more wetlands that encroach on the sites.

3.20 TO then went through the sites one by one. The problems on Site B, C and F are mostly related to mining rights and existing mining. Refer to the presentation attached.

3.21 TO explained that all the sites will require a conveyer belt that will run from the E-dump at the power station. This will be several kilometres long for some of the sites. It will be the shortest for Site H (± 700m).

3.22 TO explained that Site H appears to be the only site that can be taken further. It has a pan on it of 18 ha in size. TO added that there are linear infrastructure that cut across Site H. All these are mostly Eskom owned, i.e. transmission lines, distribution lines and the Kendal-Kusile Pipeline. There is also a gravel road that needs to be redirected.

3.23 PA enquired about the PES of the pan. TO indicated that the PES of the Pan is a “D”. But, indicated that the pan is not the only wetland on Site H that will be affected.

3.24 TO indicated that Site H might be the site with the lowest overall environmental impact considering that it is the closest to the power station and taking into cognisance that the pan on it is already being utilised by a farmer leasing from Eskom. The farmer is pumping water from a dam south of the power station into the pan and then irrigating his crops out of the pan.

3.25 TO pointed out that at the moment, there are no mining rights held on site H. There is a company that has prospecting rights and have applied for mining rights. Eskom is in talks with them.

3.26 PA asked which of the sites is best from a groundwater point of view. TO indicated that the presence of the Ogies Dyke makes all of the sites problematic. The design of Site H could be changed to avoid the Ogies Dyke, potentially making it the best site from a groundwater perspective.

3.27 PA indicated that it is best to have pollution sources close together. TO and NR

explained that Site H is close to the existing Power Station and existing and continuous ADF.

3.28 PA enquired whether there are other pans in the area that might be worthwhile to conserve? TO indicated that there are similar pans to the South of Site C which could be considered.

3.29 NR explained that to design a stable foundation on any of the other three site alternatives will be very difficult and costly (billions). It will have to be compacted in layers.

3.30 PA enquired which site would be the second most preferred if it wasn't for the mines? TO indicated that Site C could be feasible. However, it will have the longest conveyor crossing wetlands and it is the most sensitive site from an environmental point of view.

3.31 PA stated that he has been convinced. He understands the challenges of the projects. He made the following recommendations:

1. PA referred to New Largo Honingkrans Pan. He says that the surface and groundwater interaction studies done for that project was very informative.
2. Wetland offset strategy should be considered (as a last resort – as avoidance is also preferred).

3.32 EM enquired whether, if there is a connection between the surface and groundwater, does it render the entire site unfeasible? PA indicated that one should still consider the site, but it will provide a more holistic picture as to the system and how it feeds into the rivers etc. BM added that the groundwater directorate at DWS will have to evaluate the findings of the study and provide inputs.

3.33 It was decided that Zitholele & Eskom will continue with the studies and design on Site H. It will be recommended to Eskom to do the additional studies (as described in 3.31 above).

3.34 Some time was spend discussing the design requirements for the Kendal Continuous project. PA also enquired about the possibility of moving the Kendal Continuous to the southern side of the existing ADF. NR explained the constrains from a technical and operational point of view.

DATE: 27 January 2015

SIGNATURE: 

ZITHOLELE CONSULTING

KENDAL 30 YEAR ASH DISPOSAL FACILITY

DWS Consultation meeting

THURSDAY, 14 AUGUST 2014
PRETORIA

Need for the project

- Growing demand for electrical power
- Eskom extended Kendal Power Station life by 40 years - coal will be the source of fuel
- Combustion of coal results in ash by-product
- Additional ash generated at the station during extended period - disposed in an environmentally responsible manner
- A new Ash Disposal Facility (ADF) required to receive ash for the additional 30 year life of the station

Agenda

- **Safety / Evacuation Procedure**
- **Welcome, Introductions And Declaration Of Interest**
- **Objectives Of The Meeting**
- **Projects Background And Status**
  - **Kendal Continuous Ash**
  - **Kendal 30 Year Ash**
- **Kendal 30 Year Site Selection & Challenges**
- **Way Forward & Closure**

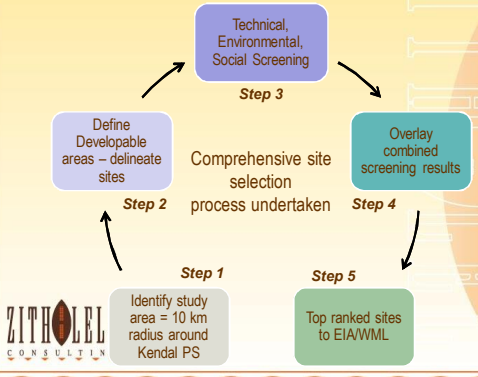
Kendal Environmental Projects Status

- Zitholele appointed for Kendal Continuous as well as Kendal 30 year projects
- **Kendal Continuous:**
  - Continuation on the current Ash Disposal Facility (± 10 years)
  - In Draft EIR phase
  - IWULA will be submitted before end of August 2014
- **Kendal 30 year:**
  - New Ash Disposal Facility required (± 30 years)
  - Scoping report accepted
  - Busy with site selection

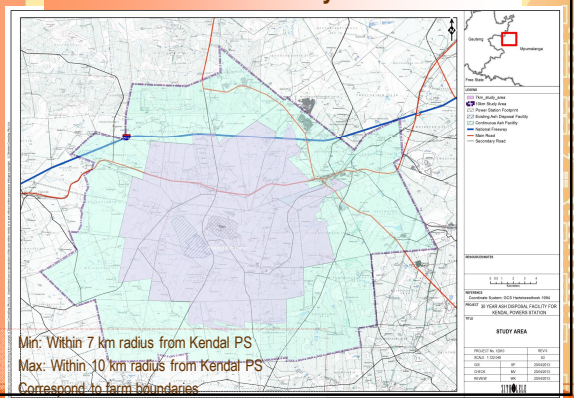
Objectives of the meeting

- Recap site selection and feasible alternatives
- Feedback on Site Assessment & Challenges
- Opportunity to DWA to raise comments and concerns and advise on way forward

Site Identification Process



Phase 1 - Study Area



- Min: Within 7 km radius from Kendal PS
- Max: Within 10 km radius from Kendal PS
- Correspond to farm boundaries

Site footprint calculation

Ash production	539,000 m³ per month
Design life of dump	25 years
Total ash produced	161 million m³
Rehabilitated side slopes	1:5
Dump height	± 75 metres
Footprint required	400 hectares

(includes PCD, roads, site camp, etc)

ZITHOLELE CONSULTING

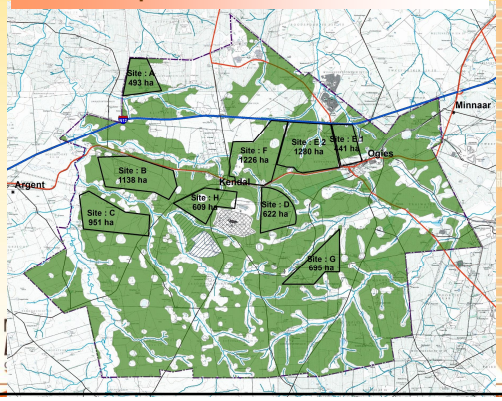
Phase 2 – Defining developable areas

- Negative mapping
- High level desktop assessment:
  - Environmental,
  - Social
  - Infrastructure layers,
  - Aerial photography
  - 1:50000 topographical maps

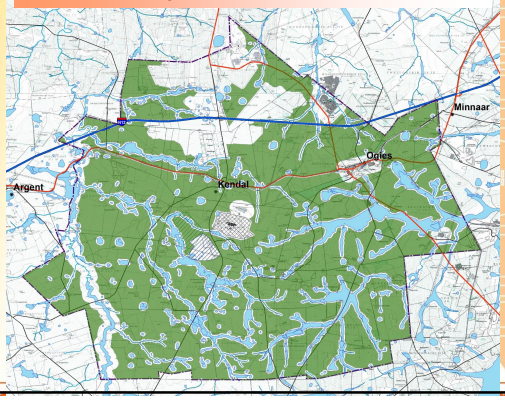
Features	Iteration 1	Iteration 2	Iteration 3	Iteration 4
Natural Environment				
Wilge River	*500 m buffer*			
Rivers / Streams	500 m	500 m	500 m	100 m
Wetlands / Dams	500 m	500 m	500 m	100 m
Red Data Species	100 m	100 m	100 m	100 m
Protected areas and parks	None in study area			
Social Environment				
High density residential areas	*500 m buffer*			
Farmsteads	1 km	☒	☒	☒
Schools	1 km	☒	☒	☒
Cemetries, Churches, Monuments, and heritage and culturally significant areas	Not identified in study area from high level scan			
Built Environment / Engineering Requirements				
New Largo footprint	*100 m buffer*			
Open Pits	100 m	100 m	☒	☒
Undermined Areas	100 m	100 m	☒	☒
Richards Bay Rail	*50 m buffer*			
Other Railway Lines	50 m	50 m	☒	☒
N12 National Road	*100 m buffer*			
Tarred Roads	100 m	☒	☒	☒
Farm Roads	100 m	☒	☒	☒
Overhead Pow er lines	Serv	☒	☒	☒
Gas Pipeline	Serv	☒	☒	☒
Water Pipeline	Serv	☒	☒	☒
Air strips	3 km	3 km		
Canyon or Ball	50 m	☒	☒	☒

ZITHOLELE CONSULTING

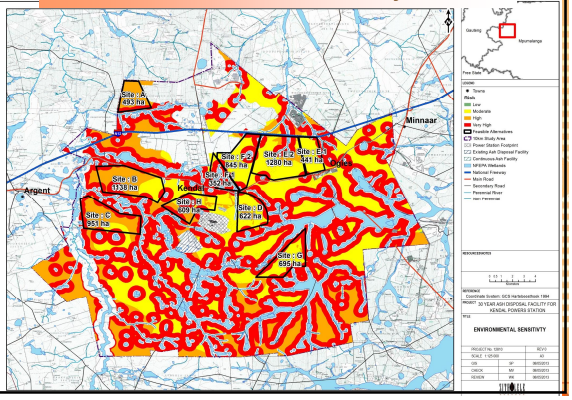
Developable areas – Identified sites



Developable areas – Iteration 4



Environmental sensitivity



Environmental sensitivity rating

Element	Weighting	B	C	D	E1	E2	F	G	H
Terrestrial Biodiversity	3	1	3	4	1	1	3	2	4
Wetlands - NFEPA	5	4	4	3	1	1	2	5	3
Rivers - NFEPA	5	4	4	2	1	1	1	5	2
Land Capability	2	3	4	3	1	1	1	3	3
Score Un-weighted		**12**	**15**	**12**	**4**	**4**	**7**	**15**	**12**
Rank Un-weighted		**4**	**7**	**4**	**1**	**1**	**3**	**7**	**4**
Score Weighted		**49**	**57**	**43**	**15**	**15**	**26**	**62**	**43**
Rank Weighted		**6**	**7**	**4**	**1**	**1**	**3**	**8**	**4**

Technical assessment

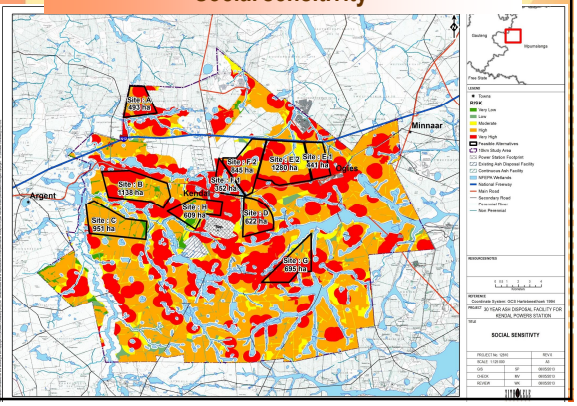
Site Characteristics

Site ID	Area (ha)	Average Slope (%)	No. of drainage directions
A	493	3.3	2
B	1 138	3.1	2
C	956	2.2	1
D	622	2.6	2
E1	441	1.0	1
E2	1 280	1.6	1
F	1 226	1.4	2
G	695	2.1	2
H	609	3.5	3

Site Suitability

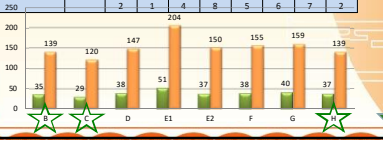
Site ID	Storage potential (No of years)		
	50 metres high	75 metres high	100 metres high
A	20	27	32
B	52	72	88
C	42	57	69
D	27	36	44
E1	17	23	27
E2	61	85	106
F	49	66	79
G	28	37	44
H	25	33	39

Social sensitivity



Technical sensitivity rating

Objective	Weight	B	C	D	E1	E2	F	G	H
Distance to powerstation (conveyor route)	5	3	4	1	4	4	2	3	1
Topography	2	4	3	3	5	5	3	4	
Storage and expansion potential	1	1	1	4	5	1	1	3	4
Accessibility	3	3	2	2	4	4	3	3	1
Capacity of site	5	1	1	3	5	1	1	2	3
Storage efficiency	3	3	3	3	3	3	3	3	3
Drainage direction	3	4	1	4	1	1	2	4	5
Capital costs	5	3	4	2	4	4	3	4	2
Operational costs	5	3	3	2	4	3	3	4	1
Diversion of natural or major infrastructure	5	1	1	1	5	4	4	1	5
Under mined areas	5	4	1	4	5	1	1	3	1
Open cast mining (Inst)	5	1	1	1	4	4	4	1	1
Operability	5	2	2	4	1	1	3	3	3
Rehabilitation	5	2	2	4	1	1	3	3	3
Score Un-weighted		**35**	**29**	**38**	**51**	**37**	**38**	**40**	**37**
Rank Un-weighted		2	1	5	8	3	5	7	3
Score Weighted		**139**	**120**	**147**	**204**	**150**	**155**	**159**	**139**
Rank Weighted		2	1	4	8	5	6	7	2

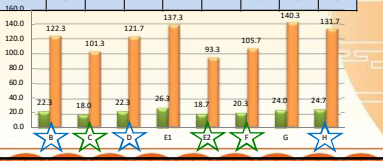


Social sensitivity rating

Element	Weighting	B	C	D	E1	E2	F	G	H
Land Use	5			1	5	1		1	1
Households	5	5	1	4	4	1	3	5	5
Fields	4	3	4	3	1	1	1	3	3
Mining	4			4	4	4	4	4	4
Roads	2	1	1	1	5	4	4	1	1
Powerlines	2	3			1	1			4
Pipelines	2	4							4
Wind direction (Air Quality)	3	4	4	3	4	4	4	3	3
Score Un-weighted		**20**	**10**	**17**	**24**	**15**	**16**	**17**	**25**
Rank Un-weighted		**6**	**1**	**4**	**7**	**2**	**3**	**4**	**8**
Score Weighted		**65**	**35**	**66**	**89**	**50**	**55**	**69**	**85**
Rank Weighted		**4**	**1**	**5**	**8**	**2**	**3**	**6**	**7**

Combined sensitivity – equal rating

Aspect	Weighing	B	C	D	E1	E2	F	G	H
Environmental	**33.33%**								
Score Un-weighted		12	15	12	4	4	7	15	12
Score Weighted		49	57	43	15	15	26	62	43
Social	**33.33%**								
Score Un-weighted		20	10	17	24	15	16	17	25
Score Weighted		65	35	66	89	50	55	69	85
Technical	**33.33%**								
Score Un-weighted		35	29	38	51	37	38	40	37
Score Weighted		253	212	256	308	215	236	290	267
Combined Score Un-weighted		***22.3***	***18.0***	***22.3***	***26.3***	***18.7***	***20.3***	***24.0***	***24.7***
Combined Rank Un-weighted		**4**	**1**	**4**	**8**	**2**	**3**	**6**	**7**
Combined Score Weighted		***122.3***	***101.3***	***121.7***	***137.3***	***93.3***	***105.7***	***140.3***	***131.7***
Combined Rank Weighted		**5**	**2**	**4**	**7**	**1**	**3**	**8**	**6**



Undertake specialist studies

- Terrestrial Ecology
- Avifauna
- Surface Water Quality
- Wetlands
- Aquatic Ecology
- Soils / Land Capability
- Groundwater
- Air Quality
- Geotechnical

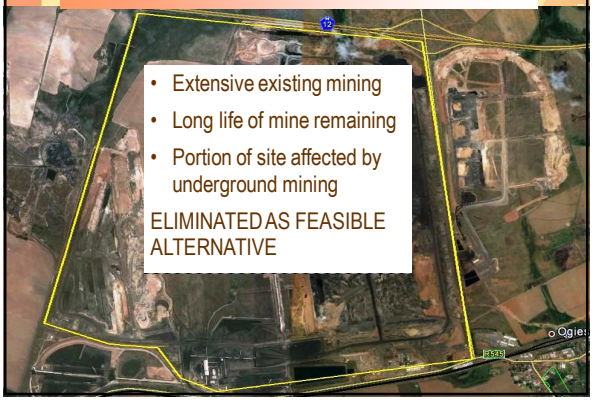
Å Heritage Impact Assessment
Å Social Impact Assessment
Å Visual Impact Assessment
Å Noise assessment
Å Sustainability Assessment
Å Engineering & Ash Classification

Feasible sites

Å Feasible sites remaining: B, C, F, H
Å Detailed investigation of feasible sites undertaken in EIR
Å Specialist complete baseline studies

ZITHOLELE CONSULTING

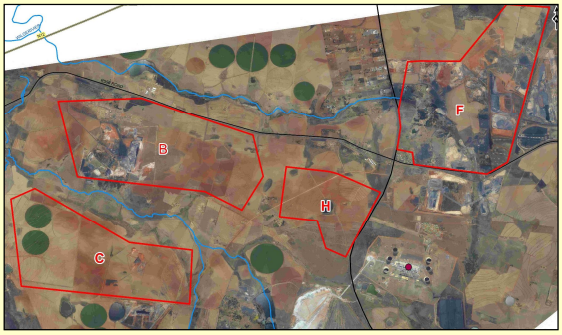
Site E2



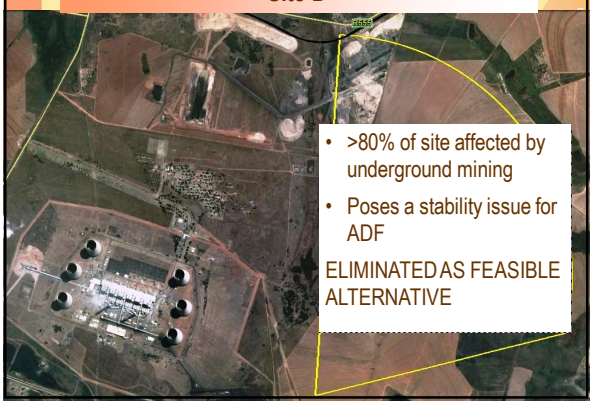
- Extensive existing mining
- Long life of mine remaining
- Portion of site affected by underground mining

ELIMINATED AS FEASIBLE ALTERNATIVE

Feasible sites remaining



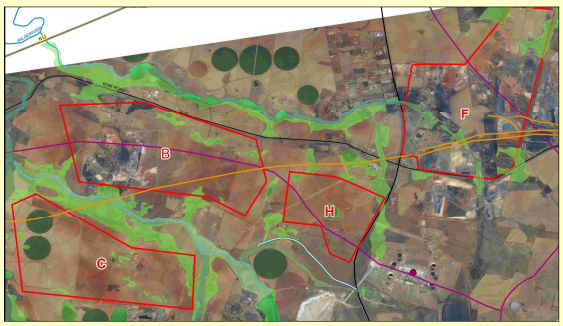
Site D



- >80% of site affected by underground mining
- Poses a stability issue for ADF

ELIMINATED AS FEASIBLE ALTERNATIVE

Ogies Dyke and Wetlands



Site B

Site B - Findings

- **Heritage:**
  - 3 cemeteries (**CCF1**, **KAD9** and **KAD10**) with a total of 67 graves, and a single farmstead (**KAD15**) dating to 1901.
- **Ecology:**
  - Contains small section of Critical Biodiversity Area (CBA) on the south eastern side
- **Groundwater:**
  - Site B ranked lowest: Complex groundwater flow regime with steep gradients, geological discontinuities, natural discharge boundaries on both sides of the surface water divide intersecting the potentially available land, as well as the flow regime to the south of this divide being intersected by the
  - Ogies dyke which most probably represents a **preferential groundwater flow zone**

Site B - Findings

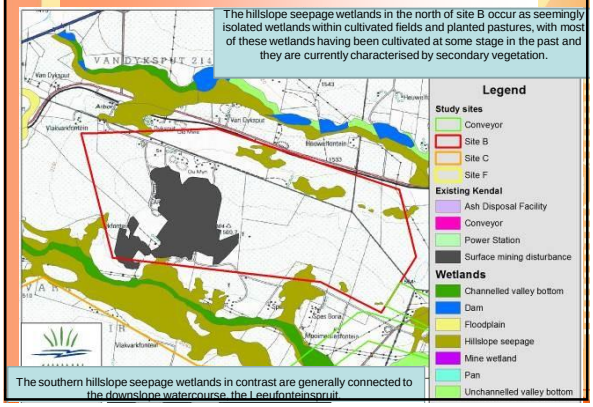
- **Surface Water:**
  - Watershed – site is drained by two rivers
- **Wetlands:**
  - Approx 49.74 ha of wetlands occur within direct footprint – 4.3% of study area
  - All hillslope seepage
- **Geotech:**
  - No apparent fatal flaws
- **Geology:**
  - Ogies Dyke running through site

ZITHOLELE CONSULTING

Site B - Ecology

Site B - Wetlands

The hillslope seepage wetlands in the north of site B occur as seemingly isolated wetlands within cultivated fields and planted pastures, with most of these wetlands having been cultivated at some stage in the past and they are currently characterised by secondary vegetation.



The southern hillslope seepage wetlands in contrast are generally connected to the downslope watercourse, the Leeufonteinspruit.

Site C

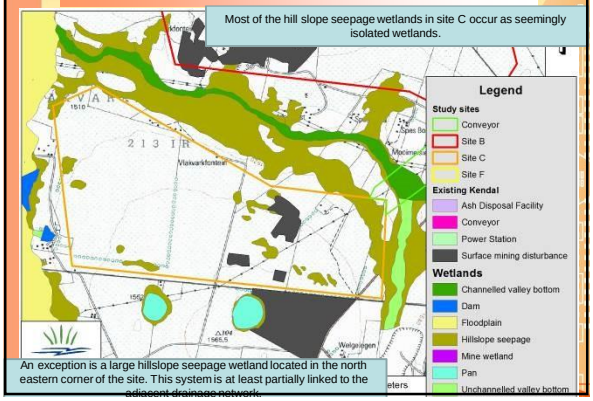
Site C - Findings

- **Wetlands:**
  - Approx 62.86 ha of wetlands occur within direct footprint – 6.6% of study area
  - All hillslope seepage
  - Major issues with its conveyor route crossing wetlands
  - Most sensitive from aquatics point of view
- **Geotech:**
  - Alluvial sediments east and northeast (correlate with wetlands)
- **Hertitage:**
  - The heritage resources consist of 4 cemeteries (**KAD3**, **KAD5**, **KAD6** and **KAD8**) with a total of 23 graves, and a single farmstead (**KAD1**) dating to the early 1950s.

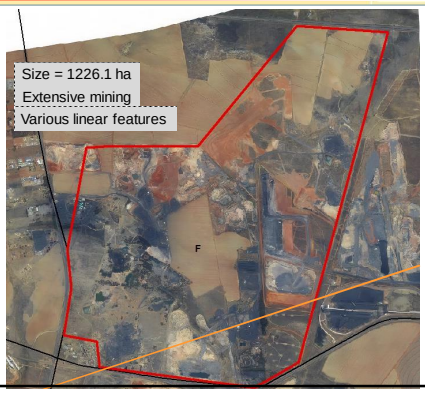
Site C - Findings

- **Ecology:**
  - Conveyor route crossing crosses CBA area
- **Geology:**
  - Ogies Dyke running through site

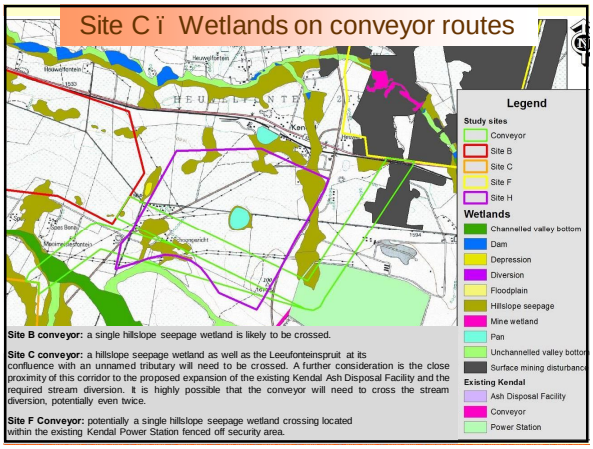
Site C - Wetlands



Site F



Site C – Wetlands on conveyor routes



Site B conveyor: a single hillslope seepage wetland is likely to be crossed.

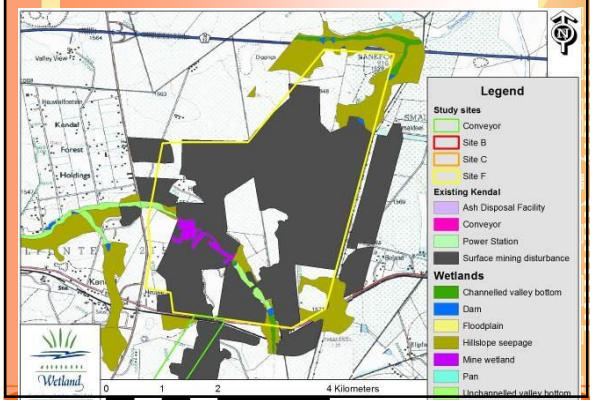
Site C conveyor: a hillslope seepage wetland as well as the Leeufonteinspruit at its confluence with an unnamed tributary will need to be crossed. A further consideration is the close proximity of this corridor to the proposed expansion of the existing Kendal Ash Disposal Facility and the required stream diversion. It is highly possible that the conveyor will need to cross the stream diversion, potentially even twice.

Site F Conveyor: potentially a single hillslope seepage wetland crossing located within the existing Kendal Power Station fenced off security area.

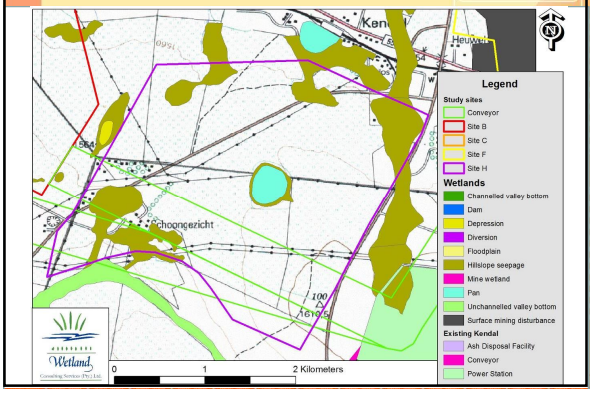
Site F - Findings

- Surface Water
  - Watershed - site is drained by 2 rivers
- Wetlands:
  - Approx 105 ha of wetlands occur within direct footprint – 8.54% of study area
- Geotech:
  - Pre-Karoo dolomites of the Malmani subgroup may be present below the lowermost coal seams at Site F which needs to be verified as this may be prove to be a fatal flaw in respect of development of this site.

Site F - Wetlands



Site H - Wetlands



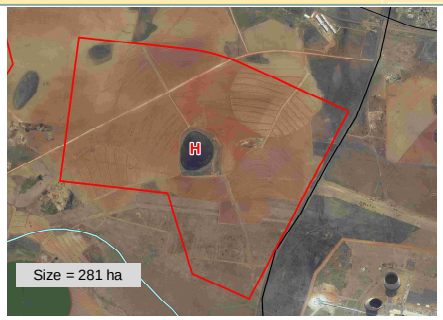
Site F - Findings

- **Heritage:**
  - Heritage resources consist of 3 cemeteries (**KAD12**, **KAD13**, **KAD6** and **KAD14**) with approximately 250 graves, and a single open air church (**KAD11**).
  - Site F least preferred from heritage perspective
- **Ecology:**
  - Considered almost entirely ecologically sterilized and accordingly is regarded as the preferred site
- **Geology:**
  - Ogies Dyke running through site

Site H - Findings

- **Ecology:**
  - Sections of the southern areas are designated as CBA. Flamingo have previously been recorded
- **Geology:**
  - Not affected by Ogies Dyke
- **Heritage**
  - The heritage resources consist of 6 cemeteries (VVF1, KAD9, KAD10, KAD16, KAD18 and KAD20) with a total of 76 graves, and a single farmstead (KAD15) dating to 1901.

Site H

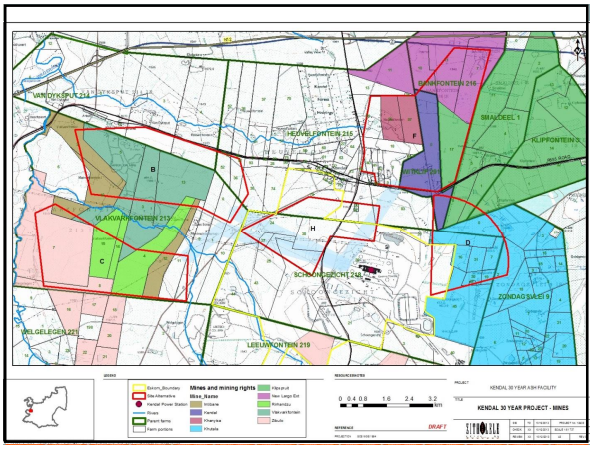


Affected by wetlands

Various infrastructure (Eskom)

Mining

- The map on next slide presents current findings of areas with Mining Rights or Operational Mines



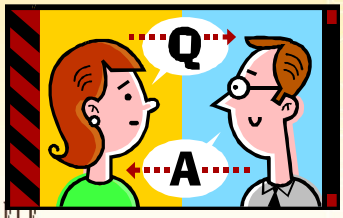
Cost differentials between sites

Site ID	Foundation Preparation Bulk Earthworks (Rm)	Conveyance Structures (Rm)	Deviation of Exist Services (Rm)	Total Cost Rm (excludes ADF site development)
B	R 10 490	R 325	R 0	R 10 814
C	R 9 761	R 498	R 23	R 10 281
F	R 12 918	R 274	R 0	R 13 191
H	R 0	R 77	R 333	R 409

ZITHOLELE CONSULTING

How can we proceed?

- Any suggestions from DWS on way forward?
- Least problematic site (H) has wetland
- Opportunities for off-sets and rehabilitation



ZITHOLELE CONSULTING

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND WASTE MANAGEMENT LICENSE APPLICATION FOR THE PROPOSED 30 YEAR ASH DISPOSAL FACILITY AT KENDAL POWER STATION

DEA Ref No 14/12/16/3/3/3/68; NEAS Reference: DEA/EIA/0001624/2013

Meeting with Department of Water and Sanitation

Thursday, 14 August 2014, 13:00hrs to 14:30hrs

Sedibeng 401 Pretoria Head Office

ATTENDANCE REGISTER

TITLE	FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
Ms	Tania	Oosthuizen		Zitholele Consulting	Building 1, Maxwell Office Park, Magwa Crescent West, Cnr Allandale Road & Maxwell Drive, Waterfall City, Midrand, RSA	Tel No:	011 088 8462
						Cell No:	083 504 9881
						e-mail	taniao@zitholele.co.za
Ms	Emmy	Molepo		Eskom	MegawattPark, Maxwell Drive, Sunninghill Sandton	Tel No:	011 800 4211
						Cell No:	082 860 0919
						e-mail	MolepoME@eskom.co.za
Ms	Tsakani	Holeni		Eskom		Tel No:	0136476822
						Cell No:	0726840014
						e-mail	HoleniTP@eskom.co.za

	FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
	Nevin	Rajasakran		Zitholele Consulting	Building 1, Maxwell Office Park, Magwa Crescent West, Cnr Allandale Road & Maxwell Drive, Waterfall City, Midrand, RSA	Tel No:	+27 11 207 2060
						Cell No:	+27 72 385 4312
						e-mail	nevinr@zitholele.co.za
Mr.	Humbulani	Ndou.		Eskom.	Building 1 Maxwell office Megawatt park. Sunninghill	Tel No:	011 516 7100
						Cell No:	071 379 3397
						e-mail	Ndouhv@eskom.co.za.
	Mathys	Vosloo		Zitholele Consulting		Tel No:	084 748 3018
						Cell No:	011 207 2079
						e-mail	mathysv@zitholele.co.za.
	Piet		RA	DWS	P/Bag X313 Pretoria 0001	Tel No:	012 336 8217
						Cell No:	082 807 3572
						e-mail	adamspa@dwa.gov.za
Ms	Lumka	Kuse		DWS	Private Bag X313 Pretoria 0001	Tel No:	012 336 8336
						Cell No:	083 661 7999
						e-mail	kusel@dwa.gov.za

FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
Eddie	Seitei		Eskom		Tel No:	
					Cell No:	
					e-mail	
Ronald	Mulaudzi		DWS		Tel No:	012 336 7952
					Cell No:	
					e-mail	
Mokgadi	Malobja		DWS	Private Bag X10580 Bronkhorstspruit 1020	Tel No:	013 932 2061
					Cell No:	082 870 7150
					e-mail	maldam@dwa.gov.za
					Tel No:	
					Cell No:	
					e-mail	
					Tel No:	
					Cell No:	
					e-mail	

Zitholele Consulting
Reg. No. 2000/000392/07

PO Box 6002 Halfway House 1685
South Africa
Building 1, Maxwell Office Park, Magwa Crescent West
c/o Allandale Road & Maxwell Drive, Waterfall City, Midrand
Tel + (27) 11 207 2060
Fax + (27) 86 674 6121

ESKOM SOC LTD

ENVIRONMENTAL IMPACT ASSESSMENT, WASTE MANAGEMENT LICENSE AND WATER USE LICENSE APPLICATION FOR THE 30 YEAR ASH DISPOSAL FACILITIES AT KENDAL POWERSTATION

29 January 2015 at 10H00, DWA Bronkhorstspruit

DWA BHT Meeting Regarding Drilling Next to the Pan

Project No : 12935

ACTION

1. Present

Makgadi Maloba (MM)	Department of Water and Sanitation
Mpetjane Kgole (MK)	Eskom
Petro Hendricks (PH)	Eskom
Tania Oosthuizen (TO)	Zitholele Consulting

2. Purpose of the meeting

TO introduced herself and explained that Zitholele Consulting (ZC) has been appointed by Eskom to undertake the EIA for the Kendal 30 Year Ash Disposal Facility (ADF) Project. ZC has undertaken a lengthy site selection process. Site H appears to be the most feasible site. It is the site closest to the power station and least affected by mining activities. One of the challenges with Site H is that there is pan (and other smaller wetlands) in its footprint area.

In giving background to the purpose of the meeting, TO reminded the attendees of the meeting held in Pretoria with Peter Ackerman, Mokgadi Maloba (MM) and two other DWS representatives on 14 of August 2014. In this meeting DWS instructed ZC to undertake the following two studies on the pan on Site H:

1.) A surface and groundwater interaction study; and
2.) A wetland offset strategy.

Eskom appointed ZC to undertake these studies, and a follow up meeting was held with Pieter Ackerman on the 15th of January 2015 to clarify the Scope of Work (SoW). In this meeting it was agreed that Eskom will only be required to apply for a General Authorisation to undertake the drilling activities associated with the surface and groundwater interaction study. It was agreed that Eskom would include a risk assessment with the GA application.

Subsequent to the meeting, the DWS regional office informed Eskom that they may no longer do a GA for this water use, but that they have to do a Water Use Licence Application (WULA).

TO explained that the purpose of that day's meeting was to discuss the nature of the water use application that DWS requires.

3. Drilling activity next to the pan

Zitholele explained the temporary nature of the drilling activities to be undertaken within 500 m of a wetland. The drilling activity and testing of the borehole will take no more than a few days. Based on this, and the fact that this study is being undertaken because it was requested by DWS, TO requested that the requirement to apply for a full WUL be waived.

ACTION

4. Precedent set with Honingkrans Pan

TO referred to the authorisation process requirements for the Honingkrans Pan as part of the New Largo project. For this project, which required the same drilling and testing activities (and for which the same specialists are appointed), the DWS allowed them to only do a GA application with risk assessment. Therefore, it is felt that DWS Bronkhorstspruit should impose the same authorisation requirements on this project.

5. Way forward

5.1 MM agreed to take up the matter with Stanford Macevele, and provide feedback to the Eskom, Zitholele team whether this application can be processed as a GA. MM

MM requested that the applicant submit the following:

- Risk matrix
- Section 21 (a), (c) and (i) application forms,
- Method Statement; and
- Wetland Risk study.

5.2 MM added that once all relevant information is received, it should take the DWS, two to three weeks to make a decision.

6. Meeting closed

DATE: 17 February 2015

SIGNATURE: 

ZITHOLELE CONSULTING

Z:\Projects\12935 - Kendal 30yr Ash\1 Project Management\11 Meetings\2015 meetings and workshops\DWS 29 January 2015\12935-11-Min-001-DWS-Meeting minutes-Draft1.docx

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND WASTE MANAGEMENT LICENSE APPLICATION AND WATER USE LICENCE APPLICATION FOR THE PROPOSED 30 YEAR ASH DISPOSAL FACILITY AT KENDAL POWER STATION

29 JANUARY 2015 @10H00, DWA BRONKHORSTPRUIT

ATTENDANCE REGISTER - DWA BHT MEETING REGARDING DRILLING NEXT TO PAN

TITLE	FIRST NAME	SURNAME	ORGANISATION	CONTACT DETAILS		SIGNATURE
	Petro	Hendriks	Eskom	Tel No:	011 800 4762	
				Fax No:	0866633050	
				Cell No:	083 525 2824	
				e-mail:	hendripe@eskom.co.za	
	Mpetjane	Kgole	Eskom	Tel No:	011 800 4121	
				Fax No:		
				Cell No:	082 922 4095	
				e-mail:	mpetjane.kgole@eskom.co.za	
	Tania	Oosthuizen	zitholele	Tel No:	011 088 8462	
				Fax No:		
				Cell No:	083 504 9881	
				e-mail:	taniaO@zitholele.co.za	
	Makgadi	Malaba	DWS	Tel No:	013 932 2061	
				Fax No:	013 932 2071	
				Cell No:	078 822 6061	
				e-mail:	malabam@dwa.gov.za	
				Tel No:		
				Fax No:		

Zitholele Consulting
Reg. No. 2000/000392/07

PO Box 6002 Halfway House 1685
South Africa

Building 1, Maxwell Office Park, Magwa Crescent West
c/o Allandale Road & Maxwell Drive, Waterfall City, Midrand
Tel + (27) 11 207 2060
Fax + (27) 86 674 6121

ESKOM SOC LTD

ENVIRONMENTAL IMPACT ASSESSMENT, WASTE MANAGEMENT LICENSE AND WATER USE LICENSE APPLICATION FOR THE 30 YEAR ASH DISPOSAL FACILITIES AT KENDAL POWERSTATION

29 May 2015, 10:00 am

DEA Offices, Soutpansberg Road

DEA meeting –Interim Feedback

Project No : 12935

			ACTION
1.	**Present**		
	Emmy Malepo (EM)	Eskom	
	Masina Listoane (ML)	DWS	
	Solly Chokoe (SC)	Eskom	
	Lenny Govender (LG)	Eskom	
	Edwin Setei (ES)	Eskom	
	Tania Oosthuizen (TO)	Zitholele Consulting	
2.	**Safety moments**		
	ML explained the evacuation procedure		
3.	**Declaration of interest**		
	TO declared that Zitholele Consulting has no interest vested on the project and thus act independently from the duties of an Environmental Assessment Practitioner.		
3.	**Presentation**		
3.1	Please refer to presentation attached hereto.		
4.	**Purpose of the meeting**		
4.1	TO explained that the purpose of the meeting, which was to communicate the site selection and the challenges for the Kendal 30 year Ash Disposal Facility (ADF) project, and subsequently get advice from DEA on the way forward.		

		ACTION
	Meeting can also be thought of a window provided to DEA to submit their advice, comments and concerns.	
5.	**Background**	
5.1	TO provided a brief recap of the project background. In brief, Eskom has extended the life the power station, by roughly 40yrs. The extension is split into two projects, namely the Kendal Continuous ADF (*an extension of the existing ADF foot print*) and the Kendal 30yr ADF (*on a new footprint*).	
5.2	The Final Environmental Impact Report (FEIR) for the Kendal Continuous ADF was submitted in September 2014 and the Final Scoping Report for Kendal 30yr ADF was submitted in 2013. The site selection process has caused a major delay on the Kendal 30 year project.	
4.	**Site challenges as mentioned**	
4.1	The sites that were assessed as part of the site selection process, turned out to have mining rights registered on them to an extent that the top three sites all became unfeasible from a technical point of view. Site H was then reintroduced into the site selection process.	
4.2	The environmental baseline studies were undertaken on four sites (B, C, F and H). Only Site H is feasible from a technical point of view.	
4.3	Site H is the site located the closest to the Kendal Power Station and large parts of it is owned by Eskom.	
4.4	Site H have several environmental issues, which was discussed with the DEA	
4.4.1	➢ **Wetlands:** Some wetlands occur on Site H, and this also includes a 9.4 ha pan. The wetlands mostly have a Present Ecological State (PES) of D, with a small depression on the western site being a PES of C. The pan is currently used for irrigation. Water is pumped from a dam to the South of Kendal Power Station to the pan from where crops are irrigated. The pan is currently in an artificial state. This was presented to the Department of Water and Sanitation (DWS) on 14 August 2014. The DWS requested ZC to conduct two studies, namely the Wetland Offset Strategy and Surface and Groundwater Interaction Study. Zitholele is currently awaiting the Water Use Licence (WUL) from DWS for the drilling to be undertaken for the surface and groundwater interaction study..	
4.4.2	➢ **Communities** Communities (Khayalethu, Olympic and Triangle) are located close to Site H. The Triangle community is located on Eskom-owned land and will be relocated by Eskom should they be granted the environmental authorisation for Site H. TO explained that the Khayalethu Community is located on an area where Kusile Mining have applied for a Mining Right. They have already received their	

		ACTION
	environmental authorisation. It is assumed that Kusile Mining will move this community. Some land to the north of Site H is owned by Transnet. Some illegal occupants are living here. They refer to themselves as the Olympic Community. Zitholele have consulted with Transnet on this. Transnet indicated that they might evict these occupants via the Emalahleni Community.	
4.4.3	➢ **Heritage** Site H also includes heritage features. It consist of 7 cemeteries with approximately 149 graves and a single farmstead. The graves will have to be relocated, which will include a full consultation process. This will also only be initiated following environmental authorisation.	
4.4.4	➢ **Infrastructure** Some linear infrastructure will have to be deviated. This includes: • The D1390 (gravel road) • Distribution lines: 11kV, 22kV, 88kV, 132kV; • Transmission line: 400 kV; • Transnet 18'' fuel pipeline	
5	**Department of Environmental Affairs (DEA) Concerns, Recommendations or Advise**	
5.1	ML stated that she can see that an alternatives assessment was undertaken. And she can understand the constraints to the sites other than Site H. She explained that the DEA will not object the following proposals: • Road diversion • Community relocation • Graves can be relocated, although it can be controversial, and the • Transnet diesel pipeline can also be diverted. She explained that the DEA will be interested to see what the DWS says about the pan. TO explained that once the additional water studies are completed, Zitholele will give feedback to the DWS. At that stage it would be good if the DEA could also attend the feedback session. ML agreed.	
6	**In conclusion**	
6.1	TO mentioned that the team was investing a lot of time and cost on Site H, and is very positive that site H is the only feasible site in the area. Zitholele has presented all the designs to DWS and they have accepted (16 April 2015). Now we waiting on the WUL to start with the drilling for the surface and groundwater interaction study.	

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND WASTE MANAGEMENT LICENSE APPLICATION FOR THE PROPOSED 30 YEAR ASH DISPOSAL FACILITY AT KENDAL POWER STATION

DEA Ref No 14/12/16/3/3/3/68; NEAS Reference: DEA/EIA/0001624/2013

DEA meeting –Interim Feedback

Thursday, 29 May 2015, 10:00 am

DEA Offices, Soutpansberg Road

ATTENDANCE REGISTER

TITLE	FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
						Tel No:	
						Fax No:	
Ms	Emmy	Molepo		Eskom		Cell No:	0828600919
						e-mail:	
						Tel No:	012 399 9375
						Fax No:	
Ms	Masia	Litsoane		DEA		Cell No:	
						e-mail:	MLitsoane@environment.gov.za
						Tel No:	0747107823
						Fax No:	
Mr	Solly	Chokoe		Eskom - tender		Cell No:	
						e-mail:	Chokoems@eskom.co.za

TITLE	FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
MR	Lenny	Govendon		Eskom Projects		Tel No:	
						Fax No:	
						Cell No:	072 249 6249
						e-mail:	govendle@eskom.co.za
MR	Eddie	Seitei		Eskom		Tel No:	
						Fax No:	
						Cell No:	072 125 6881
						e-mail:	SeiteiGE@eskom
MRS	Tania	Oosthuizen		Zitholele		Tel No:	
						Fax No:	
						Cell No:	083 504 9881
						e-mail:	tania o@ zitholele.co.za
						Tel No:	
						Fax No:	
						Cell No:	
						e-mail:	
						Tel No:	
						Fax No:	
						Cell No:	
						e-mail:	
						Tel No:	
						Fax No:	
						Cell No:	
						e-mail:	

Zitholele Consulting
Reg. No. 2000/000392/07

PO Box 6002 Halfway House 1685
South Africa
Building 1, Maxwell Office Park, Magwa Crescent West
c/o Allandale Road & Maxwell Drive, Waterfall City, Midrand
Tel + (27) 11 207 2060
Fax + (27) 86 674 6121

ESKOM SOC LTD

ENVIRONMENTAL IMPACT ASSESSMENT, WASTE MANAGEMENT LICENSE AND WATER USE LICENSE APPLICATION FOR THE 30 YEAR ASH DISPOSAL FACILITIES AT KENDAL POWERSTATION

16 April 2015 at 13H30, DWS Sedibeng Building

DWS Meeting Regarding Engineering Design

Project No : 12935

ACTION

1. Present

Jyothika Heera (JH)	Zitholele Consulting
Tania Oosthuizen (TO)	Zitholele Consulting
Nevin Rajasakran (NR)	Zitholele Consulting
Eddie Setei (ES)	Eskom
Andre Kreuiter (AK)	Eskom
Kelvin Legge (KL)	DWS
Michelle Parker (MP)	DWS
Keith Mnisi (KM)	DWS
Boitomeo Seake (BS)	DWS
Claire Fricker (CF)	DWS
Mpho Nevondo (MN)	DWS
Malise Noe (MN)	DWS
Rendani Ndou (RN)	DWS

2. Presentation

JH handed out a presentation to the attendees. Please refer to presentation attached hereto.

3. Purpose of the meeting

TO explained that the purpose of the meeting was to present the proposed conceptual engineering design of the Kendal 30 year Ash Disposal Facility (ADF) project. She explained that following a rigorous site selection process, Site H was selected as the preferred site. It is the site closest to the Kendal power station and least affected by mining activities.

4. Proposed design

JH went through the slides explaining the deviation of infrastructure, the waste classification and barrier system design, the falling head permeability results of the liner design, the capping design and the water balance.

5. Discussion of Drawings

5.1 NR explained the proposed liner design. KM explained that DWS is looking for a composite effect, so that in case there is a hole in the geomembrane, there is clay to assist with the leakage. However, the A10 beneath the geomembrane will have an effect on transmissivity and cause the leak to spread out. KM explained that the DWS therefore recommends that the A10 be removed. NR explained that the CQA must then be spot on. KL explained that a full drum roll will be required on the final layer below the 2mm geomembrane. KL enquired whether a double textured HDPE geomembrane will be used. KL stated that the most important will be for the CQA to be implemented properly.

ACTION

5.2 KL advised that construction is always difficult, and that Zitholele specified a non-woven needle punch of 200g/m^2 A4 over the cuspated system. KL asked NR how he intends to join the geotextile without letting it blow in the wind. He asked if it will be continuous over the whole area and stitched or whether it will be heat seamed.

NR enquired whether KL was referring to the biddim which KL confirmed. NR stated that the proposal is not to leave the biddum there for a long time. The fly ash must be blended into the *in situ* material and used to cover up the biddum to protect it. KL stated that the design is fine. He warned that the construction method will have to address what the contractor must do to avoid the biddum blowing around before the pioneer layer with the fly ash blend is placed. KL stated that there are various options to address this: boulders, stitching, heat seaming etc. KL stated that this detail must be addressed in the CQA plan.

5.3 KL requested to discuss the details of the toe of the sidewall. He asked whether there are any paddocks. NR explained that there is a solution trench which decants to the pollution control dams via the silt traps. NR explained that the paddocks are concrete lined. KL enquired how the paddocks decant. NR explained that pipes will be put in on the facility itself, on each level and they will decant into pipes. Down the sides there will be pipes ….. into the solution trenches and they will be open channel right down to the pollution control dams. KL suggested that where they decant into the solution trench that Zitholele includes an upstand in the pipe, or provide for the pipe not to decant from the invert level. He stated that this will provide an early sediment trap, so material is not conveyed down to the sediment trap and then brought up. KL stated that making use of this as a sediment trap will saves a lot of material volume to manage.

5.4 KM enquired about the A4 biddum on top of the cuspated sheets, on the drawing it says that it is strips. NR explained that it is not fully over the cuspated drains but only over the gaps.

5.5 JH explained the drawings of the pollution control dams. KL enquired which dams are higher than 5m wall height. NR responded that there are about 2 or 3 dams. The capacities are in the order of about 190 Mℓ. NR confirmed that a dam safety engineer will be required during detail design.

5.6 KM went through the drawing of the silt trap. NR explained that the design is such so that it can be contained by a skid steer. He further explained that the adjustable weir is to ensure that silt does not get into it, but it also depends on the operation and maintenance of it.

5.7 With regards to the pollution control dams liner, NR explained that the only difference in design (from the ADF) is that it will not have a leachate collection system. KM confirmed that on the PCD's there will be a 1.5 mm geomembrane. KM enquired what will be used for the ballast. NR replied that we propose to use a stabilised layer of 300 mm. NR explained that if it is the same *in situ* material we will use a 2 mm layer. He explained that this is the give and take. If we get less than 10^{-7} cm/second then we will use the 2 mm layer. KL warned against using two different geomembranes on site because accidents can happen and people can put the wrong thing in the wrong place. The detailed drawing of the dam liner system was not available. JH will send the drawing to DWS.

5.8 JH discussed the Emergency Dump. KM read out the make-up of the liner system. NR stated that the 200 mm thick RC bed mentioned on the drawing should be changed to fibre reinforced concrete. NR explained that Zitholele does not use mesh anymore, because in terms of construction it is too difficult. Zitholele currently uses 600 -800 g/m^3 ^{of} polypropelyne fibres to reduce shrinkage in concrete . It is in cast in panels of 25 x 25 and saw cut joints are cut at 5m x 5m. KL enquired if it is partial cuts. Nevin affirmed that it is 30 mm.

ACTION

5.9 NR stated that the conveyor system will also be concrete lined. KL enquired whether all the concrete lined channels will be fibre reinforced. NR confirmed that they will be.

5.10 KM enquired whether this is a pre-application meeting. TO responded that it is a pre-application meeting. She added that Zitholele is currently waiting for a WUL to perform drilling in order to undertake the surface and groundwater interaction study. She explained that this is what is currently holding up the programme. Zitholele would like to include this study in the EIA and IWULA. She added that Zitholele hopes to submit in June / July 2015.

5.11 KM enquired what will be done on the clean water dams. NR explained that the soils will be compacted, but that there will be no liner system.

5.12 The capping was discussed. NR explained that the reason for the soil saver on top of the ash body retains water and facilitates dust suppression .

KL enquired whether any strength tests have been done on the existing facility's ash after about five years. NR explained that tests are currently being undertaken on the ash. He stated that the results will be sent to KL when they become available.

KL enquired about the sideslopes of the rehabilitated areas. NR explained that the advancing face is sloped at 1:1.5. After passing this point the slopes are down (with a cut and fill) to 1:5. Benches for drains will be put in. KL stated that it is much flatter than he thought. He stated that the reason why he asked was about block stability.

5.13 KM enquired whether a CQA plan is included in the design report. JH indicated that it is not yet included but, will be submitted to DWS together with the outstanding drawings by 23 April 2015. KL stated that the CQA is critical. He stated that it is very easy to deal with in terms of the SANS or GRIM13 standards. DWS prefer the GRIM13 now that it has been amended. The geotextiles are also easy to deal with. The CQA author should be careful to specify the performance they require from the cuspated system because there isn't a South African standard for that. KL advises that there are products on the world market that will only last a few minutes. He stated that they are not concerned with crushing strengths at this stage because this design has the fly ash blend which will provide stability.

6. KM thanked everyone for their time and closed the meeting.

DATE: 22 April 2015

SIGNATURE: 

ZITHOLELE CONSULTING

KENDAL POWER STATION 30 YEAR ASH DISPOSAL FACILITY

CONCEPTUAL ENGINEERING DESIGN

DEPARTMENT OF WATER & SANITATION
16 APRIL 2015

PRESENTED BY:
TANIA GOSTHUIZEN – ZC ENVIRONMENTAL
&
JYOTHIKA HEERA – ZC ENGINEERING

Layout of Presentation

- Introduction and Background
- Deviation of Infrastructure
- Geology – Site H
- Groundwater – Site H
- Waste classification
- Liner design
- Capping
- Water Balance Modelling
- Clean Water Dams
- Layout
- Presentation of drawings

Introduction & Background

- Zitholele is appointed by Eskom for two Ash Disposal Facility (ADF) Projects:
  - Kendal Continuous
  - Kendal 30 year
- The Kendal Continuous project entails the continuation of the existing ADF. The Kendal 30 year project is for an additional, new facility required to accommodate the ash up to **2058**;
- The Kendal Continuous EIA, WML and IWULA was submitted in September 2014;
- The Kendal 30 year site will need to accommodate **176.2 Mm^3** of ash;
- The deposition rate will be **539,000m^3/month**;
- The maximum height of the ADF will be **75 m**;
- Life of operation will be **27 years**, and construction will start in **2025**;
- Rigorous site selection has been undertaken, with Site H emerging as the preferred site. Issues with the other sites relate mainly to current and future mining activities;
- Site H is the closest to Kendal Power Station of all the sites investigated.

1

Deviation of Infrastructure

- In order to construct the Site H ADF, the following infrastructure will have to be deviated:
  - The D1390 (gravel road);
  - Distribution lines: 11kV, 22kV, 88kV, 132kV;
  - Transmission line: 400 kV;
  - Transnet 18'' fuel pipeline.

2

Geology – Site H

- Most of Site H is underlain by pedogenic ferricrete of either nodular or hardpan ferricrete;
- Various sedimentary units of the Vryheid Formation, Karoo Supergroup, namely sandstone and shale were found to occur at some of the test positions;
- Intrusive rocks of the Rooiberg Suite were encountered in two trial pits on the southern portion of the site;
- The natural geology and ground profile of the site comprises of sandstones and mudstones of the Vryheid Formation, overlain by residual soils, which in turn are overlain by transported soils of colluvial origin;
- The Ogies Dyke crosses west-east through the north-western corner of the site;
- No signs of outcropping rock or dykes were observed on site.

3

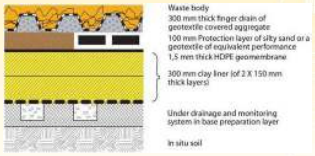
Groundwater – Site H

- The average recharge for Site H is indicated as ranging between 50mm to 75mm per annum;
- The aquifer is classified as a minor aquifer system;
- The aquifer type is indicated as intergranular and fractured;
- The average borehole yield in the area is indicated as ranging between 0.5l/s and 2.0l/s;
- Groundwater vulnerability is indicated as low to medium;
- Groundwater flow mimics the topography;
- Site H's groundwater samples are all below the SANS 241 (2011) drinking water compliance standards except for the reported nitrate concentration which exceeds the drinking water compliance limit of 11.0mg/l;
- Zitholele is planning to undertake a surface and groundwater interaction study – which will feed into the final design report. ZC is currently awaiting water use licence.

4

Waste Classification

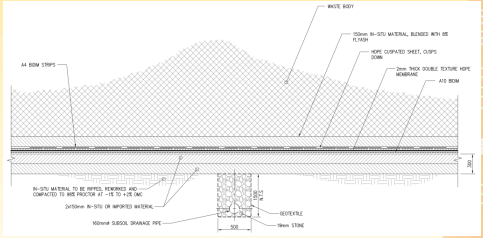
- Waste classified as Type 3 (low hazard) in terms of DEA's waste classification regulations;
- This classification was the result of the leachable concentration of boron and the total concentration of barium and fluoride in the ash;
- Disposal on a Class C barrier system is proposed;
- Ash is below limit set for material to be considered as radioactive.



Typical Class C Landfill Barrier System

5

Liner Design



6

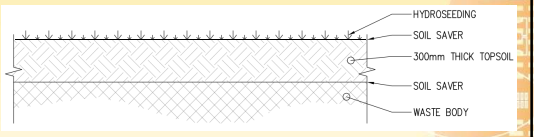
Liner Design – Falling Head Permeability Test Results

Lab. Sample Reference	Field Sample Reference	Depth (m)	Moisture Contents Before Test (%)	Moisture Contents After Test (%)	Dry density Kg/m³ Initial	Dry density Kg/m³ As tested	Coefficient of Permeability (m/s) Range Minimum	Range Maximum	Average
858-1	C1 + C3	-	18.9	20.4	1619	1653	2.6E-08	3.8E-08	**3.2E-08**
858-2	C1 + C3	4% Bentonite	18.1	18.8	1716	1754	1.3E-10	2.1E-10	**1.7E-10**
858-3	C1 + C3	8% Bentonite	21.5	26.2	1636	1696	3.9E-11	2.8E-10	**1.4E-10**
858-4	C2	-	37.7	44.5	1070	1160	7.3E-07	1.9E-06	**1.1E-06**
858-5	H1	-	8.6	11.7	1928	1954	9.3E-08	1.4E-07	**1.2E-07**
858-6	H1	4% Bentonite	9.1	13.4	1906	1929	1.7E-10	2.2E-10	**1.9E-10**
858-7	H1	8% Bentonite	10.5	14.1	1851	1909	2.0E-10	3.0E-10	**2.5E-10**
858-8	H2	-	14.0	15.4	1798	1794	2.1E-09	9.9E-09	**4.9E-09**
858-9	H2	4% Bentonite	16.0	19.2	1759	1780	2.2E-10	3.3E-10	**2.7E-10**
858-10	H2	8% Bentonite	16.2	20.6	1749	1789	4.9E-11	7.6E-11	**6.4E-11**

Remarks: Samples remoulded to approximately 95% Proctor.
Saturated and tested under a load of 100kPa.
Densities reported are under a load of 100kPa.

7

Capping



8

Water Balance Modelling (WBM) - Objectives

- The objective of the water balance modelling was to size the new Ash Water Return Dam to be in compliance with Government Notice 704. More specifically, Clause 6 (d) of the regulation indicates that:

Design, construct, maintain and operate any dirty water system at the mine or activity so that it is not likely to spill into any clean water system more than once in 50 years.

9

WBM – Modelling Approach & Assumptions

- A 50 year daily time step model was set up using Microsoft, Excel;
- 50 year rainfall data;
- Existing & New dam stage curves;
- Operating flows;
- The water balance model included the existing Dirty Water Dam, Emergency Dirty Water Dam and Clean Water Dam, as well as 7 proposed new dams that were identified.

10

WBM – Modelling Approach & Assumptions (contd.)

Inputs	Outputs
Rain water runoff	Evaporation
Direct rain	Process water out
Process water in	Dust Suppression
	Irrigation

Rainfall Data	
Rainfall Station Name:	Welgelegen, Ermelo
Rainfall Station Number:	0480170-4
Distance to Camden PS:	17 km
Rainfall data period used from Rainfall Station:	June 1964 – October 2006
Rainfall data period used from Camden Power Station:	November 2006 – June 2014
Rainfall period used:	50 Years

ZITHOLELE CONSULTING

11

WBM - Results

Pollution Control Dams		
Dam	Capacity (ML)	Comments
1	135	Capacity includes 2 days storage for dust suppression water
2	9.75	E-dump dam
4	135	
6	90	
7	130	

ZITHOLELE CONSULTING

12

Clean Water Dams

Clean Water Dams		
Dam	Capacity (ML)	Comments
3	158	Sized for a 1:50 year storm event
5	197	Sized for a 1:50 year storm event

ZITHOLELE CONSULTING

13

Layout

14

Presentation & Discussion of Drawings

ZITHOLELE CONSULTING

15

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND WASTE MANAGEMENT LICENSE APPLICATION FOR THE PROPOSED 30 YEAR ASH DISPOSAL FACILITY AT KENDAL POWER STATION

DEA Ref No 14/12/16/3/3/3/68; NEAS Reference: DEA/EIA/0001624/2013

DWS meeting -Engineering

Thursday, 16 April 2015, 13:30am to 14:15pm

DWS Head office, Room 501, Sedibeng Building

ATTENDANCE REGISTER

TITLE	FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
Ms	Jyothika	Heera		Zc		Tel No:	0724633810
						Fax No:	
						Cell No:	
						e-mail:	jyothikah@zitholele.co.za
MR	Nevin	Rajasekram		Zitholele		Tel No:	0723854312
						Fax No:	
						Cell No:	
						e-mail:	nevinr@zitholele.co.za
Mr	Edelie	Seitei		Eskom		Tel No:	
						Fax No:	
						Cell No:	
						e-mail:	SeiteiGE@eskom.co.za

TITLE	FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
MRS	Tania	Oosthuizen		Zitholele		Tel No:	011 207 2060
						Fax No:	
						Cell No:	083 504 9881
						e-mail:	tania o@ zitholele.co.za
MR	ANDRE	KREUITER		ESKOM		Tel No:	011 800 4248
						Fax No:	
						Cell No:	073 150 6814
						e-mail:	andre.kreuiter@eskom.co.za
Mr	KELVIN ~~LEGGE~~	LEGGE		DWS		Tel No:	012 336 8677
						Fax No:	
						Cell No:	
						e-mail:	legge@dws.gov.za
Ms	MICHELLE	PARKER		DWS		Tel No:	012 336 8252
						Fax No:	
						Cell No:	
						e-mail:	parkerm@dws.gov.za
Mr	Keith	Mnisi		DWS		Tel No:	012 336 8944
						Fax No:	
						Cell No:	
						e-mail:	mnisikk@dwa.gov.za.
Ms	Rakwadi	Seake		DWS		Tel No:	012 336 7561
						Fax No:	
						Cell No:	
						e-mail:	seakeb@dwa.gov.za

TITLE	FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
Ms	Claire	Fricker		dws		Tel No:	012 336 66 56
						Fax No:	
						Cell No:	
						e-mail:	frickerc@dwa.gov.za
ms i	Mpho	Nevondo		DWS		Tel No:	012 336 8379
						Fax No:	
						Cell No:	
						e-mail:	Nevondom2@dws.gov.za
Mr.	Malise	Noe		DWS		Tel No:	012 336 7639
						Fax No:	
						Cell No:	079 511 4174
						e-mail:	noem@dws.gov.za
Mr	Rendani	Mdou		DWS		Tel No:	012 336 7843
						Fax No:	
						Cell No:	072 3683816
						e-mail:	ndour@dws.gov.za
						Tel No:	
						Fax No:	
						Cell No:	
						e-mail:	
						Tel No:	
						Fax No:	
						Cell No:	
						e-mail:	

KENDAL 30 YEAR ADF PROJECT

MEETING NO. 2016/06 (DWS SPECIALIST FEEDBACK) - MINUTES

CLIENT	:	Eskom SOC Limited
CONSULTANT	:	Zitholele Consulting (Pty) Ltd
PROJECT	:	Kendal 30 year ADF EIA and IWULA
CONTRACT NO.	:	4660024961
PROJECT NO.	:	12935
DATE	:	31/05/2016
TIME	:	11:00 - 12:00
VENUE	:	DWS Offices (Sedibeng Building)
REFERENCE	:	12935

PRESENT

Pieter Ackerman (PA)	DWS
Lumka Kuse (LK)	DWS
Ronald Malaudzi (LM)	DWS
Paul Meulebeld (PM)	DWS
Tania Oosthuizen (TO)	Zitholele Consulting
Nevin Rajasakran (NR)	Zitholele Consulting
Emmy Molepo (EM)	Eskom
Prof Kai Witthueser (KW)	Delta H
Dr Martin Holland (MH)	Delta H
Dieter Kassier (DK)	WETCS
Warren Funston (WF)	Eskom

ABSENT

Emmy Molepo (EM)	Eskom
Mokgadi Maloba (MM)	DWS

ITEM	DISCUSSION POINTS	ACTION, DATE
1.	**Introduction**	
1.1	Slide 1-3: TO provided an introduction to the meeting and of the project. It was discussed that the Kendal Continuous Water Use License (WUL) was received in January 2016. TO mentioned that the objective of the meeting was to provide feedback on the two additional water-related specialist studies undertaken on request by the DWS, i.e.: - Surface and Groundwater Interaction Study - Wetland Offset Study	
1.2	Slide 4 - 6: TO explained what activities the Kendal 30 yr Site H Ash Disposal Facility (ADF) will entail and its dimensions.	
1.3	Slide 7: TO explained that some of the reasons why Site H was favorable was because it was not affected by current and future mining activities and that it is largely owned by Eskom. It is also the site closest to the power station.	
	PA enquired whether a site with historical mining could be pursued. TO explained that the other sites were eliminated more on the basis of current and future planned	

	mining than historical mining. NR added that it would sterilize minable land.	
	PA enquired whether there are flamingos on Site H. TO stated that there had been a siting which the specialists refer to in their reports.	
2.	**Wetland offset Study**	
2.1	Slide 9 - 11: DK provided an introduction to the wetland study. He confirmed that the wetland offset study was requested by the DWS following an initial feedback presentation to them on Site H and the pan that will be destroyed. DK pointed out that the wetland offset study that has been undertaken by WETCS is conceptual and doesnôt include any costing or designs.	
2.1	Slide 12: DK pointed out on the map where the different types of wetlands are located. He pointed out that the site is located on a watershed and he showed how the different systems drain in different directions. He stated that most of the wetlands are quite impacted by cultivation. He stated that the pan is being artificially kept full by a farmer leasing from Eskom. He stated that there is very little zonation of vegetation. Some time was spent by TO, DK and NR to explain to the DWS how to the water is being pumped from the ñfarm damòSouth of the Kendal Power Station to the pan. DK stated that the fact that the pan in its current state (permanently full) is less favourable flamingo habitat than it would have been if it was in its natural state.	
2.2	Slide 13: DK explained the PES scores for the different wetland types on Site H. The PES of the pan is a ñDò	
2.3	Slide 14: DK pointed out which wetlands will be directly and indirectly lost. Shown as red and yellow on the map. PA enquired whether the pan could not be avoided. NR explained what the constraints are locking the site in. He stated that on the Western and Eastern flanks there are mining activities. On the Southern side it is the Kendal Continuous Ash. North is the railway line and Afgri Silos. NR further explained that ZItholele investigated the implications of avoiding three key wetlands as determined by the wetland specialist. The result was that the airspace requirement will be 8.1 years short. Also, moving the dams out of the lowest areas would render their design very impractical and unsafe. TO and NR pointed out that the irregular shape of the ADF shown is due to the placement of the Pollution Control Dams, the ash body itself cannot be cut out ñlike a jigsawò	
2.4	Slide 15: TO pointed out that the shaded area shows the progression of the ash body over time (27 years). She explained that all of the wetlands will not be destroyed immediately although many wetlands including the pan will unfortunately be destroyed in the first 5 years.	
2.5	Slide 16 - 17: DK explained what the offset calculator results are. The functional offset target is 63.5 ha eq and the Ecosystem conservation target is 78.6 ha eq. He explained that 50 % of offset target derived from wetland losses in first 5 years	
2.6	Slide 18 -20: DK explaine the methodology followed to identify the target sites. The sites highlighted in yellow on Slide 12 were the target sites investigated.	
2.7	Slide 21 ï 22: DK discussed Target Site 1. He explained that it is privately owned and the mining right status is unknown. He pointed out that there is a community to the north and they might be using the pan for communial grazing.	
2.8	Slide 23 ï 24: DK discussed Target Site 2. It is located just North of Kriel Power Station. There are less opportunities for rehabilitation intervention on this pan. It	

	was dry at the time of sampling. The pan might potentially undermined. A positive aspect of this site is Eskom owned.	
2.9	Slide 25 ï 26: DK discussed Target Site 3. It is 2 pans located between Matla and Kriel Power Stations. Positve of this site is that it is a cluster of 2 pans and there is opportunity for rehabilitation.	
2.10	Slide 27: DK explained that Target Site 4 is fatally flawed.	
2.11	Slide 28: This slide shows a table of how the sites were weighed up against each other. PM enquired which target site is preferred. DK explained that from a purely wetland perspective, i.e. that which can be gained ï Target site 1 is recommended. PM explained that the DWS will probably licence the site that is the best from a wetland point of view.	
2.13	Slide 29 - 30: DK explained that all three offsets together contribute only about 55% of the functional offset target. For the ecosystem target which is possibly the more appropriate offset target for pans as the most important functions of pans are biodiversity support: * Alternative 1 exceeds target significantly * Alternative 2 achieves 78 % of target	
2.14	Slide 31 - 32: DK concluded with the recommendation of target site 1 and gave reasons why.	
3.	**Ekom Question about Offsets**	
3.1	WF stated that for Eskom, following the mitigation hierarchy is key. Eskom donôt want to get into a situation where they are forced into offsets. They would rather aboid the area. PM explained that Site H was the preferred site because the wetlands will be sacrificed. WF elaborated that the significance of the loss needs to be understood. It should be established what that significance is for an offset to be required. Eskom has been trying to get this information from SANBI. WF stated that this discussion should be lost in this project. WF also stated that offsets might be approved. However, in reality it may not be implementable. PM responded that the pan will be lost and pans are endanged systems. He stated that this is the primary reason why an offset is required.	
4.	**Water Loss to the system**	
4.1	PA stated that the project should advise how much water will be lost from the system and state how these will be put back. TO to address this in the EIA and IWULA.	TO
4.2	NR explained how the water will run off from the ADF. There will be runoff from the rehabilitated areas, from the open ash area and from the newly grassed areas. Once the ADF is rehabilitated, all runoff will once again runoff to the natural system. During the operational phase only 80 ha will be open ash area and therefore will be ñlostò as this runoff will have to go into the pollution control dams from where dust suppression will happen. PM asked whether the water that used to be pumped to the pan from the South (for irrigation) could not be kept so that it can help with the loss of water. It was explained that the water is being pumped from what is called the ñfarm damò and releases from this dam will be used to sustain the wetland downstream of it.	

4.3	Some time was spent discussing the option of continuous pumping and the feasibility thereof in the long term.	
4.4	TO enquired whether the Wetland Offset Plan can be submitted at the level is is now ï with the three target sites still open, and not proposing a single site. She added that the wetland offset plan could then be managed as a separate project by Eskom. This is so that the submission of the EIA and IWULA is not delayed by the finalization of this study.	
5.	**Surface and Groundwater Interaction Study**	
5.1	Slide 31 - 32: KW gave an introduction of his study, stating that he will discuss the outcomes of the drilling programme, which focused specifically on the pan. It will indicate to what extent the pan and downstream wetlands are being fed by groundwater.	
5.2	PM asked how the Ogies Dyke is perceived from a hydrogeological point of view. KW responded that it is not an issue. He stated that it is a dry ash facility which will be lined. He stated that it is more a geotechnical issue than a hydrogeological or a contaminant point of view.	
5.3	Slide 35: KW provided information on the project location, catchment and altitude.	
5.4	Slide 36: KW showed where the 5 shallow boreholes were drilled.	
5.5	Slide 37: KW spoke about the hydraulic testing. He indicated that pump tests could not be undertaken because of the low yields. Therefore slug tests had to be done to get some hydraulic conductivities for the boreholes which was found to be very low. KW stated that the vertical infiltration of water is quite inhibited by the in-situ wheathered material and soils. KW stated that the groundwater quality is quite good and that the conductivity is low. He stated that exceedances of drinking water standards of aluminium, iron and manganese are attributable to active weathering reactions in a shallow to perched aquifer system	
5.6	Slide 38- 39: KW spoke about the geology and the 4 different aquifer zones of the Karoo groundwater systems.	
5.7	Slide 40: KW pointed out the regional groundwater model showing that the groundwater level in the general area is fairly shallow.	
5.8	Slide 41: KW pointed out that the conceptualization of the pan shows that the groundwater levels are below the pan elevation. So, the gradient for most sections of the pan is from the pan towards the aquifer and not the other way around. This already provides a first indication that this pan is primarily fed by surface flow and rainwater and not by groundwater.	
5.9	Some time was spent discussing whether pans originate from the Karoo or pre-Karoo period. Also some discussion about Honingkrantz Pan.	
5.10	KW stated that to sustain this pan (slide 41) it would require a large surface area to collect runoff. Based on this statement, TO asked KW whether it would then make a difference if the pan alone is avoided (cut out like a jigsaw) from the ADF footprint, as it will not be able to be sustained without a large catchment around it. DK stated that if the pumping will stop it will dry out during winter time.	
5.11	Slide 42 - 43: KW noted the elements of the groundwater model and the calibration statistics.	
5.12	Slide 44: This slide shows the regional wetlands in the area with their ID numbers.	

	He stated that the pan gains about 0.03 l/s of groundwater which is neglible. Usually these figures would not even be shown because they would be deemed within the model accuracy. He also noted that most of the wetlands in the area are not fed by the groundwater which is too deep, but instead by interflow. KW showed that the calibrated groundwater model with the proposed ADF. The pan will be completely destroyed, therefore it is shown as 100%. Some wetlands immediately downstream of the proposed ADF will also be impacted by it. There is a reduction of groundwater inflows because of a sealing of the surface by a liner. Essentially the impact is the footprint of the ADF multiplied by the regional recharge rate of 18mm. This is the water you take out of the system. You give it back once the ADF is rehabilitated. You will probably get more runoff because of the steeper slopes.	
5.13	Slide 45 ï 50: These are the model outputs that show the impact of the ADF on groundwater flow over time. It shows that there will be no impact to groundwater flow due to the sealing of the surface with a liner. In terms of the contaminant transport, these are essentially confined to the footprint area.	
5.14	Slide 51: KW stated that the only element exceeding its leachable concentration limits is boron. He reiterated that we have a low recharge and we are not that concerned about the leachable concentrations as they are just above the drinking water standard which gets further diluted in the aquifer.	
5.15	Slide 52: KW concluded that essentially the reduction in regional groundwater recharge is the only groundwater impact worth noting.	
6.	**Due dates**	
6.1	TO stated that these are the latest studies that were outstanding before the EIA and IWULA can be compiled.	
6.2	TO stated that the Engineering Design was presented to Kelvin Legge in April 2015.	
7.	**Conclusion**	
7.1	PA stated that it is important to show what the % of losses will be and how these will be dealt with. DK stated that there is only one system where one can discharge into to the east of Site H.	TO
7.2	It was agreed that we will set up a meeting with PA post submission.	TO
7.3	PA stated that one could also look at creating an artificial wetland.	

ACTION	FUNCTION	NAME	DATE	SIGNATURE
Prepared	Environmental Assessment Practitioner	Tania Oosthuizen	14 July 2016	
Reviewed	Lead Engineer	Nevin Rajasakran	14 July 2016	

KENDAL 30 YEAR ADF

Feedback from Specialists

31 May 2016

Tania Oosthuizen
12935

1

1. AGENDA SUMMARY

1. Introduction and Overview
2. Wetland Offset
3. Surface and Groundwater Interaction

2

2. Objectives of the Meeting

To present the two specialist studies as requested by the DWS:

- Wetland Offset
- Surface and Groundwater Interaction Study

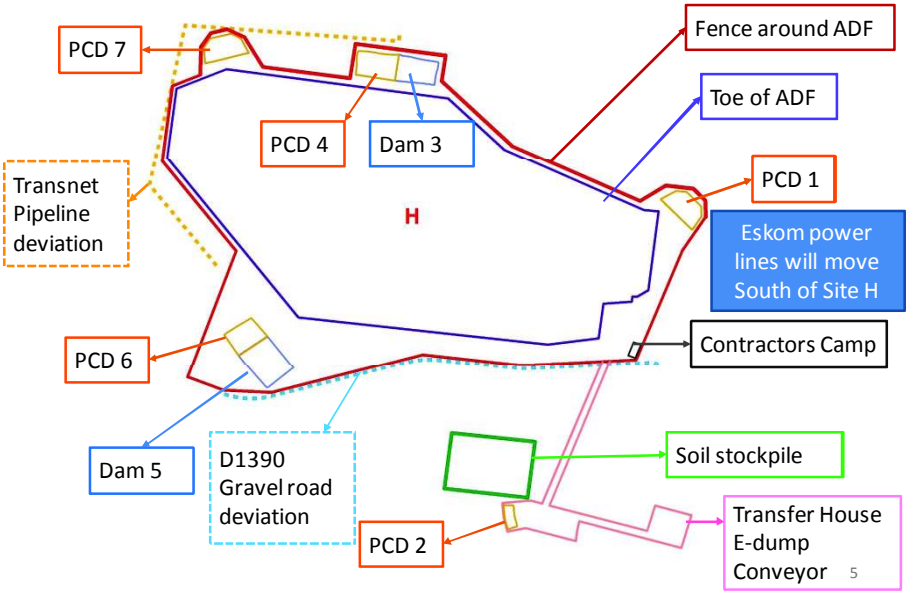
3

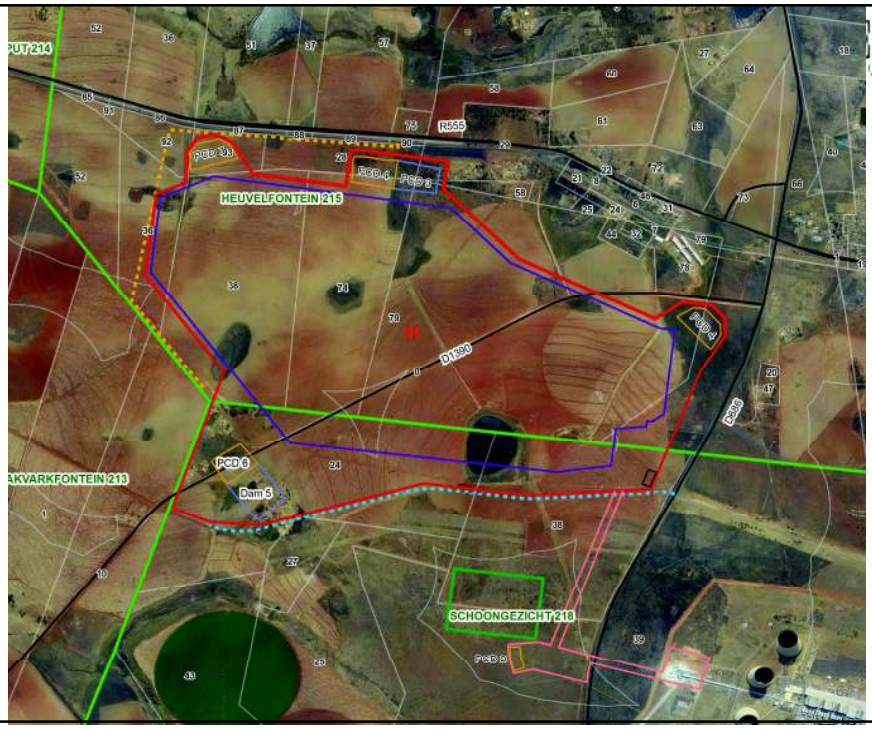
3. What is proposed

- Two Kendal Projects = Kendal Continuous and Kendal 30 yr
- Start of construction for Kendal 30 yr = 2025
- The new ADF is modelled to 2058. Volume = 177.7 Million m3
- Footprint area of new ADF = 404.7 Ha
- 7 new dams proposed, 4 = PCD and 2 = clean water dams

4

4. What is Proposed



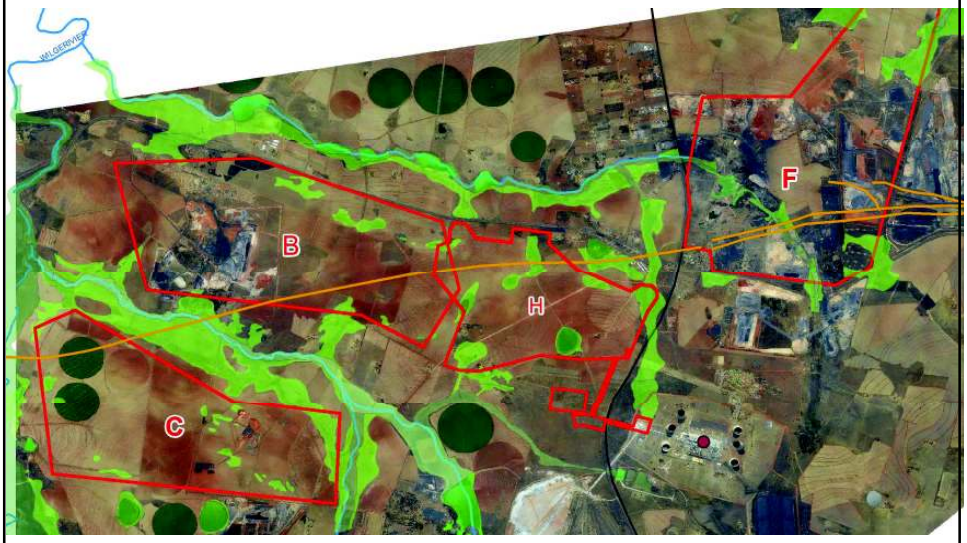


Site H – Land owners

Yellow = Eskom
Blue = Transnet

7

Ogies Dyke & Wetlands



8

Kendal 30-Year ADF

Towards the Development of a Wetland Offset Strategy for the Proposed Kendal 30-year Ash Dam

31 May 2016

Wetland Consulting Services (Pty) Ltd

Dieter Kassier

Background

- Wetland Consulting Services (WCS) was appointed by Golder Associates Africa to undertake the specialist wetland study for the Kendal 30-year ADF EIA being compiled by Zitholele
- Following interaction between Zitholele and the DWS (August 2014) additional studies were requested by the DWS:
  - Surface/Groundwater interaction study
  - Wetland Offset Strategy
- WCS appointed by Zitholele Consulting to compile a wetland offset strategy
  - Conceptual
  - Excludes costing and design of rehabilitation interventions

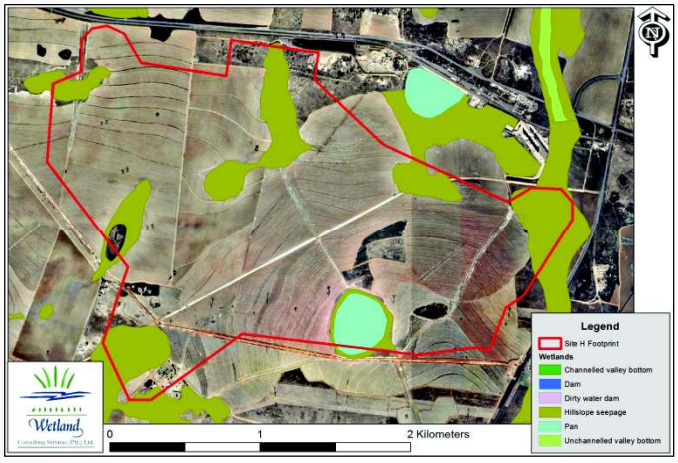
Objectives & Approach

- The broad objectives of this study were:
  - To develop an approach to the wetland offset strategy;
  - To determine and quantify the required offset targets using the recently developed and revised offset calculator (SANBI & DWS, 2014); and
  - To identify, at a desktop level, a number of possible target sites for implementation of the offset.

- **SANBI & DWS. 2014**. *Wetland Offsets: a best-practice guideline for South Africa*. South African National Biodiversity Institute and the Department of Water Affairs. Pretoria. 69 pages.

11

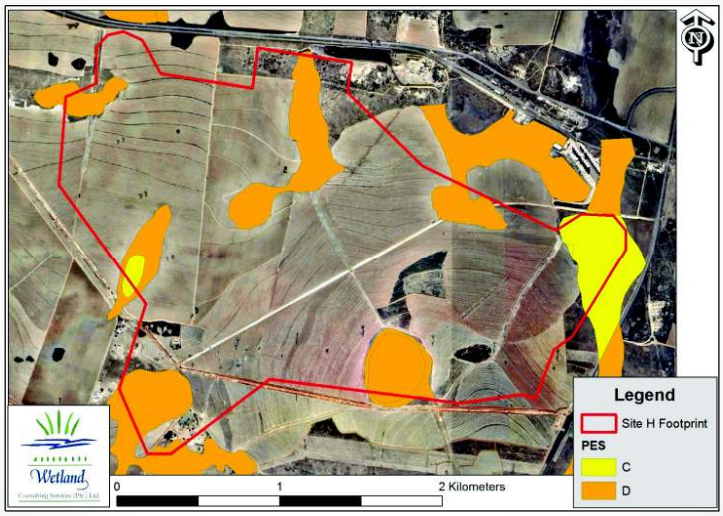
Wetlands



Wetland Type	Area (ha)	% of wetland area	% of footprint area
Pan/depression	12.6	14.6%	2.4%
Hillslope seepage	73.9	85.4%	13.9%
TOTAL	**86.5**	**100.0%**	**16.3%**

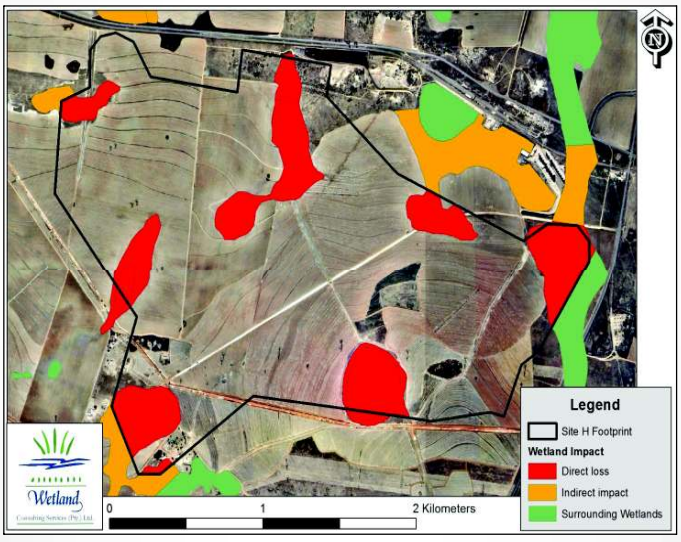
12

Present Ecological State



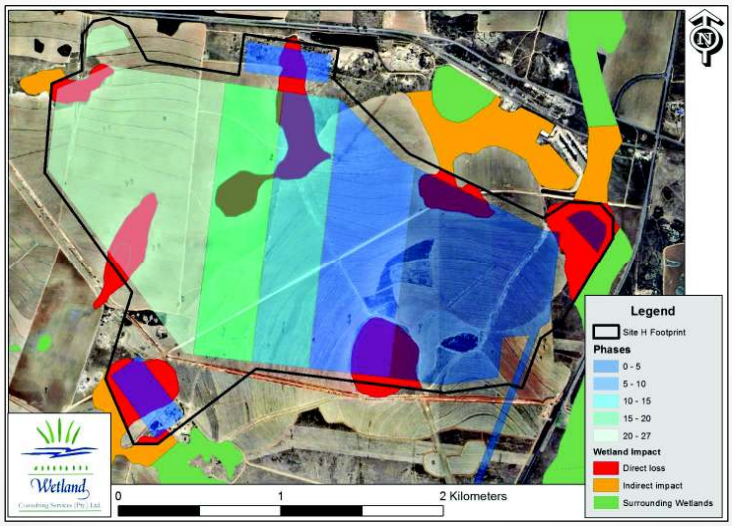
13

Wetland Losses



14

Development Phases



15

Offset Targets

* Functional offset target = 63.5 ha-eq.
* Ecosystem conservation offset target = 78.6 ha-eq.

Year	Wetland Unit	Wetland Type	Loss (ha)	PES	EIS	Integrity	Functional Offset Target	Habitat hectare equivalent	Ecosystem Conservation Ratio	Ecosystem Conservation Target
0 - 5	1	Pan	11.62	D	D	50%	5.81	5.81	7.59	44.1
0 - 5	2	Hillslope seepage	4.44	D	D	60%	2.66	1.73	0.50	0.9
0 - 5	7	Hillslope seepage	8.03	D	D	59%	4.74	4.02	0.49	2.0
0 - 5	7	Hillslope seepage	25.42	D	D	59%	5.08	2.54	0.49	1.3
0 - 5	8	Hillslope seepage	15.68	D	D	73%	11.45	10.66	1.07	11.5
0 - 5	11	Hillslope seepage	8.32	D	D	56%	1.66	0.83	0.79	0.7
5 - 10	6	Hillslope seepage	3.83	D	D	60%	2.30	1.53	0.50	0.8
5 - 10	9	Hillslope seepage	13.83	D	C	45%	6.22	4.15	0.53	2.2
5 - 10	9	Hillslope seepage	10.81	D	C	45%	2.16	1.62	0.53	0.9
10 - 15	6	Hillslope seepage	12.51	D	D	60%	7.51	5.01	0.50	2.5
15 - 20	6	Hillslope seepage	6.26	D	D	60%	3.75	2.50	0.50	1.2
20 - 27	3	Depression	2.45	C	C	70%	1.72	1.72	5.06	8.7
20 - 27	4	Hillslope seepage	8.47	D	D	58%	4.91	2.12	0.50	1.1
20 - 27	5	Hillslope seepage	4.72	D	D	44%	0.94	0.94	0.50	0.5
20 - 27	5	Hillslope seepage	2.80	D	D	44%	1.23	0.00	0.50	0.0
20 - 27	10	Hillslope seepage	7.17	D	D	50%	1.08	0.72	0.50	0.4
20 - 27	10	Hillslope seepage	2.89	D	D	50%	0.29	0.29	0.50	0.1
		TOTAL	149.25				63.52			78.6

16

Wetland Losses

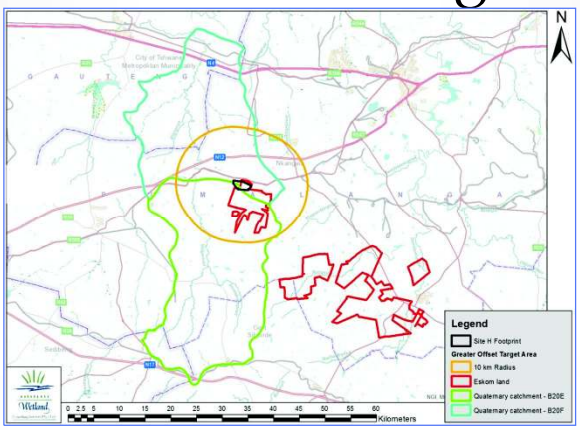
- 80 % of offset target associated with direct impacts
- 50 % of offset target derived from wetland losses in first 5 years

	Wetland Loss	Functional Offset Target	Ecosystem Conservation Target
Direct Loss	89.9	52.3	74.8
Indirect Loss	59.3	11.2	3.7
Total Loss	**149.3**	**63.5**	**78.6**

Development Phase (Years)	Wetland Loss	Functional Offset Target	Ecosystem Conservation Target
0 - 5	73.5	31.4	60.3
5 - 10	28.5	10.6	3.8
10 - 15	12.5	7.5	2.5
15 - 20	6.3	3.8	1.2
20 - 27	28.5	10.2	10.7
Total Loss	**149.3**	**63.5**	**78.6**

17

Identification of target sites



- Two quaternary catchments;
- A 10km radius around the proposed development site; and
- Eskom owned land within the Upper Olifants catchment.

18

Identification of target sites

- Initial database used NFEPA wetland map, 1:50 000 topographical maps and rapid scan of aerial imagery
- Merging all polygons into individual wetland systems;
- All pan/depression wetlands classified as artificial were deleted from the dataset;
- All pan/depression wetlands were more than 75% of the surface area was located outside the offset target area were deleted;
- All wetland systems that had been incorrectly classified as pan/depression wetlands in the NFEPA dataset were deleted; and
- All remaining pan/depression wetlands smaller than 5 ha in size were deleted from the dataset.

19

Identification of target sites

Number	NFEPA Wetland Type	NFEPA Natural / Artificial	Wetland Vegetation	Area (ha)	Discussion
1	Depression	Natural	Mesic Highveld Grassland Group 4	69.49099	Possible Kusile offset. Many properties
2	Depression	Natural	Mesic Highveld Grassland Group 4	49.14622	Adjacent ash dump. Water storage?
3	Depression	Natural	Mesic Highveld Grassland Group 4	42.96207	Potential target. Limited seepage
4	Depression	Natural	Mesic Highveld Grassland Group 4	40.35840	Potential target. Large seepage wetland
5	Depression	Natural	Mesic Highveld Grassland Group 4	29.72898	Potential target. Limited seepage
6	Depression	Natural	Mesic Highveld Grassland Group 4	24.45648	Potential target. Eskom owned
7	Depression	Natural	Mesic Highveld Grassland Group 4	19.88822	Potential target. Eskom owened. Sand mining
8	Depression	Natural	Mesic Highveld Grassland Group 4	19.05663	Mining near pan. irrigation
9	Depression	Natural	Mesic Highveld Grassland Group 4	17.68287	Potential target. Eskom owned. Water storage?
10	Depression	Natural	Mesic Highveld Grassland Group 4	17.48224	Potential target. No seepage wetland
11	Depression	Natural	Mesic Highveld Grassland Group 4	15.31477	Many nearby excavations. Mining?
12	Depression	Natural	Mesic Highveld Grassland Group 4	14.04508	Used for irrigation
13	Depression	Natural	Mesic Highveld Grassland Group 4	12.62410	Potential target. Limited seepage
14	Depression	Natural	Mesic Highveld Grassland Group 4	10.78140	Kusile Site C Pan, possible Kusile offset
15	Depression	Natural	Mesic Highveld Grassland Group 4	10.26046	Potential target. Limited seepage
16	Depression	Natural	Mesic Highveld Grassland Group 4	8.75977	Many nearby excavations. Mining?
17	Depression	Natural	Mesic Highveld Grassland Group 4	8.46014	Highly impacted, half developed
18	Depression	Natural	Mesic Highveld Grassland Group 4	7.61320	Stream diversion immediately adjacent
19	Depression	Natural	Mesic Highveld Grassland Group 4	6.26170	Potential target. Limited seepage
20	Depression	Natural	Mesic Highveld Grassland Group 4	5.93129	Potential target. Highly ephemeral
21	Depression	Natural	Mesic Highveld Grassland Group 4	5.77240	Potential target. Limited seepage
22	Depression	Natural	Mesic Highveld Grassland Group 4	5.61076	Potential target. Limited seepage
23	Depression	Natural	Mesic Highveld Grassland Group 4	5.42184	Potential target. Community on bank
24	Depression	Natural	Mesic Highveld Grassland Group 4	5.12448	Potential target. Limited seepage
25	Depression	Natural	Mesic Highveld Grassland Group 4	5.01313	Potential target. Large seepage wetland

20

Target Pan 1

Wetland	Area (ha)	PES category	PES score
Pan	30.2 ha	C	2.42
Pan	2.7 ha	B	1.98
Hillslope seepage	174 ha	C	3.6

21

Target Pan 1

- Extensive pan and seepage habitat
- Important wetland system
- Many rehabilitation opportunities
- Privately owned land
- Mining Rights unknown

22

Target Pan 2

Wetland	Area (ha)	PES category	PES score
Pan	28.7	C	2.14
Hillslope seepage	54	C	2.82

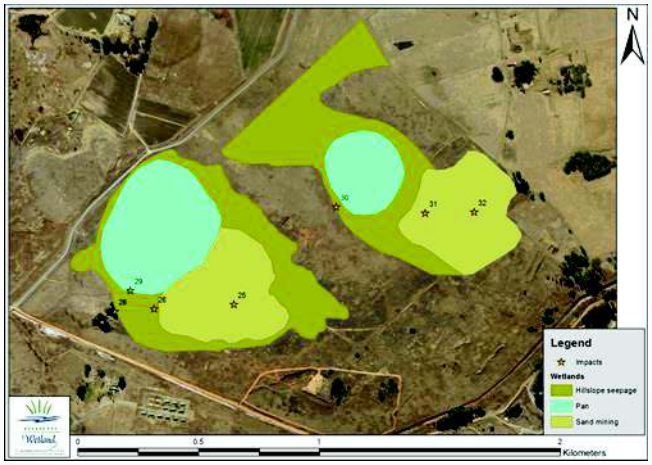
23

Target Pan 2

* Dry at time of sampling – no water quality.
* Large seepage wetland.
* Limited rehab opportunity; undermined?
* Mostly Eskom owned land.

24

Target Pan 3



Wetland	Area (ha)	PES category	PES score
Eastern Pan	7.9	C	2.3
Eastern Hillslope seepage	30.0	D	4.1
Western Pan	17.75	C	3.2
Western Hillslope seepage	33.8	D	4.2

25

Target Pan 3

- Cluster of 2 pans and associated seepage wetland habitat
- Limited seepage habitat
- Heavily impacted – historical sand mining, water quality
- Eskom owned land.

26

Target Pan 4

!! Fatally Flawed !!

* Not a suitable target.
* Used for mine water storage – elevated sulphates

27

Rehabilitation Opportunities

Alternative Site	Impact Number	Description of the problem/issue	Rehabilitation Objectives	Expected Outcomes	Type of Interventions likely to be required
Alternative 1	0 1 2 5 6 10 11 12 19	Drains/trenches channelling flow and lowering local water table	Plugging of drains to prevent formation of preferential flow paths and raise local water table	Improve water retention and distribution within the wetland. Increase saturation of the wetland, with resultant improvement in vegetation.	Earthen plugs, possibly with reinforcing in places.
	3 4 7 9 18	Cultivation extending into wetland area	Re-establish indigenous grassland vegetation within wetland	Improve species richness and vegetation composition within the pan catchment area	Withdrawal of cultivation from wetland habitat. Ploughing, shaping and re-seeding.
	8	Alien vegetation.	Removal of alien invasive vegetation.	Improve species richness and vegetation composition within the pan catchment area. Improve water make to pan by reducing evapotranspiration losses from alien vegetation.	Physical removal of alien vegetation using Working for Water guidelines. Developing monitoring and evaluation plans
	13 14 15	Digging/Sand burrowing within the pan catchment area	Infilling of excavated areas within the pan catchment areas	Improve flow retention and distribution within the wetland. Improve aesthetic appeal of the catchment area as well as the integrity of the area. Improve species richness and vegetation composition within the wetland.	Earthworks, shaping and re-vegetation
	16	Dams/Flow impoundment. Reduced flow in downstream reaches.	Removal of impeding structure or lowering of impeding structure	Promote water distribution, increase wetness signature and promote vegetation establishment and re-colonisation and improve species richness.	Earthworks, shaping and re-vegetation
	17	Culvert	Improve flow connectivity.	Improve water retention and distribution within the wetland.	Installation of additional culverts/crossing upgrade

28

Evaluation of Gains – Functional Offset

- Pans typically provide little opportunity for improving functionality as generally no interventions are possible/ required within the pan basin
- Three alternatives together only contribute approximately 55 % of the target

Alternative	Wetland	Area	Functional Value Before	Functional Value After Rehabilitation	Change in Functional Value	Preliminary contribution	Adjustment factor	Final Functional Offset Contribution	TOTAL per Alternative
Alt 1	Seepage	174.66	68.00%	79.00%	11.00%	19.2126	0.66	12.7	14.6
Alt 1	Pan	30.2	76.00%	85.00%	9.00%	2.718	0.66	1.8	
Alt 1	Pan	2.7	80.00%	85.00%	5.00%	0.135	0.66	0.1	
Alt 2	Pan	28.7	79.00%	85.00%	6.00%	1.722	0.66	1.1	2.6
Alt 2	Seepage	54	72.00%	76.00%	4.00%	2.16	0.66	1.4	
Alt 3	Pan E	7.9	77.00%	85.00%	8.00%	0.632	0.66	0.4	4.2
Alt 4	Seepage E	30	59.00%	67.00%	8.00%	2.4	0.66	1.6	
Alt 5	Pan W	17.75	68.00%	75.00%	7.00%	1.2425	0.66	0.8	
Alt 6	Seepage W	33.8	58.00%	64.00%	6.00%	2.028	0.66	1.3	
TOTAL								21.3	

29

Evaluation of Gains – Ecosystem Conservation

- Possibly the more appropriate offset target for pans
- Most important function of pans is biodiversity support
- Alternative 1 exceeds target significantly
- Alternative 2 achieves 78 % of target

Alternative	Wetland	Area	Habitat intactness	Area of buffer	Wetland Habitat Contribution	Buffer Zone Contribution	Contribution Towards Ecosystem Conservation Targets	TOTAL per Alternative
Alt 1	Seepage	174.66	60.00%	39	104.796	9.75	114.546	139.7
Alt 1	Pan	30.2	76.00%		22.952	0	22.952	
Alt 1	Pan	2.7	80.00%	0	2.16	0	2.16	
Alt 2	Pan	28.7	79.00%		22.673	0	22.673	61.5
Alt 2	Seepage	54	66.00%	12.8	35.64	3.2	38.84	
Alt 3	Pan E	7.9	77.00%		6.083	0	6.083	57.7
Alt 4	Seepage E	30	57.00%	8.2	17.1	2.05	19.15	
Alt 5	Pan W	17.75	68.00%		12.07	0	12.07	
Alt 6	Seepage W	33.8	54.00%	8.4	18.252	2.1	20.352	
TOTAL							258.8	

30

Preferred Alternative

- Alternative 1
  - Most gains in terms of functional as well as ecosystem conservation target
  - Wetland generally in good condition
  - Pans support Red Data bird species
  - Hillslope seepage wetland is a wetland FEPA
  - Close to Kendal. Within same catchment
- Risks
  - Mining Rights?
  - Privately owned
  - Argent Township
  - Communal grazing land

31

Thank you!

Dieter Kassier
Wetland Consulting Services
Email: dieterk@wetcs.co.za
Tel: (012) 349 2699
Cell: 076 403 2398

32

delta h
WATER SYSTEMS MODELLING

Zitholele Consulting

Hydrogeological Study for the Kendal Ash Disposal Facility

Delta H (Dr Martin Holland and Prof Kai Witthüser)
Date: 31 May 2015

33

Scope

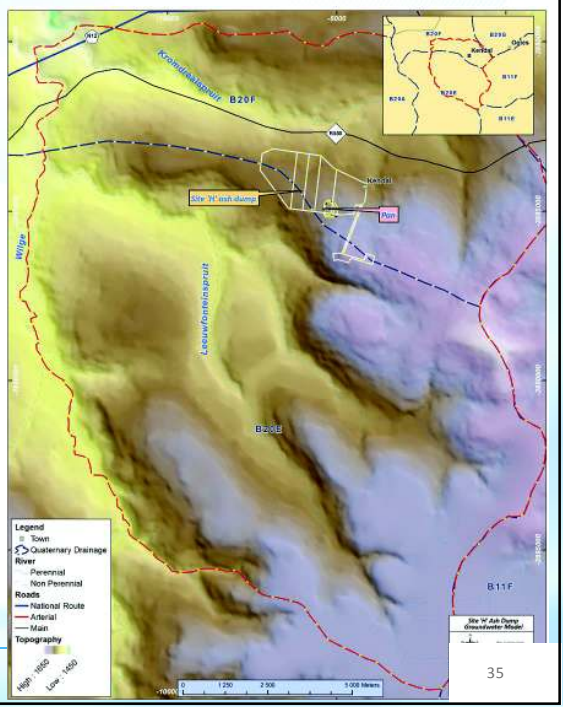
1. Accumulate and assess all available geological, soil and hydrogeological data:
   a) Intrusive investigation (drilling, testing and sampling of 5 boreholes in the vicinity of the pan)
   b) Include site-specific information from the drilling results in the model
2. Develop and calibrate of site-specific 3D numerical groundwater flow model which is able to simulate surface seepages (to the pan(s)) and spring discharges (potentially feeding the hill slopes and valley bottom wetlands).
   a) Use the model to predict the impacts on the groundwater flow, including surface seepages and spring discharges.
3. Evaluate the impacts of the proposed ash dump on the ambient groundwater quality using a conservative advective-dispersive transport model, taking into consideration the 2014 waste classification report for the Site 'H' ash disposal facility

WATER SYSTEMS MODELLING

34

Setting/locality

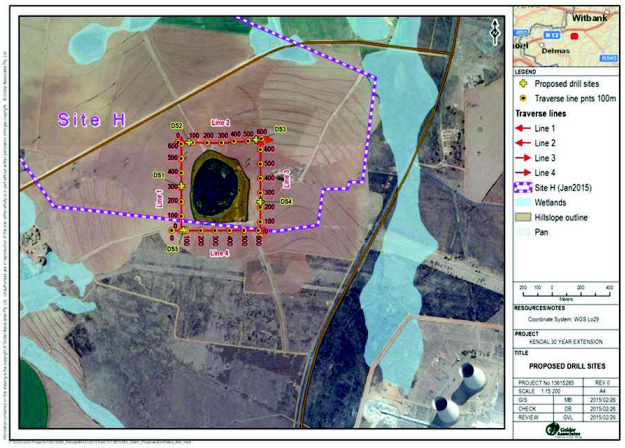
- The study area is located along the Wilge River and largely within quaternary catchment B20F, part of the Olifants River Water Management Area.
- The altitude ranges between 1 450 and 1 650 mamsl, sloping from south-east to north-east.



Intrusive Investigation

Characterise site specific aquifer properties:

- Geophysics
- 5 shallow boreholes (15 m)
- Hydraulic testing and sampling



Borehole number	Latitude	Longitude	Drilling Depth (m)	Diameter (mm)	Water Strike (l/s)	WL (mbgl)	Geological Formation Intersected
KMBH-01	-26.07301	28.94554	15	53	Seepage	6.22	Overburden and clay
KMBH-02	-26.07030	28.94607	15	53	Seepage	7.25	Overburden, clay and sandstone(14-15m)
KMBH-03	-26.07400	28.95102	15	53	Dry	-	Overburden, clay and shale(14-15m)
KMBH-04	-26.07120	28.95073	15	53	Seepage	3.94	Overburden, clay and sandstone(7-15m)
KMBH-05	-26.07580	28.94569	15	53	Seepage	6.70	Overburden, clay and sandstone(12-15m)

Intrusive Investigation

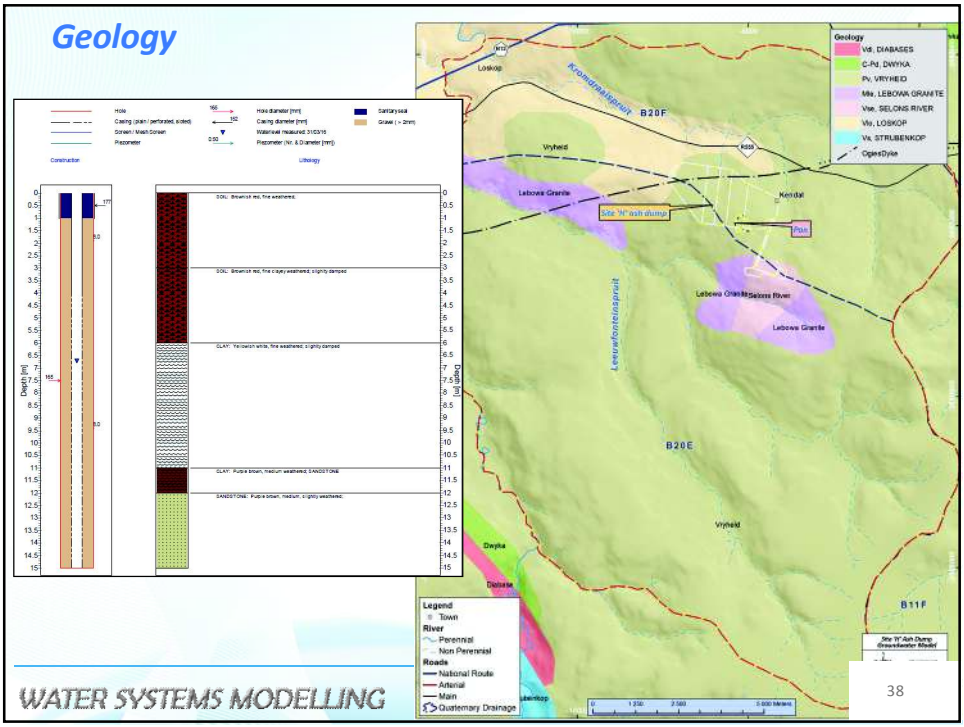
- Slug tests to determine hydraulic conductivity

Borehole number	WL (mbgl)	Hydraulic conductivity (m/d)
KMBH-01	6.22	0.0016
KMBH-02	7.25	0.0021
KMBH-04	3.94	0.005
KMBH-05	6.70	0.006

- Groundwater is of good quality →45 with Electrical Conductivity (EC) values of below 25 mS/m and a neutral pH of just below 7
- Exceedances of aluminium, iron and manganese drinking water limits in samples → attributable to active weathering reactions in a shallow to perched aquifer system

Borehole Number	KMBH-01	KMBH-02	KMBH-04	KMBH-05	SANS241: 2015
PH	6.9	6.9	6.8	6.6	9.7
EC (mS/m)	22.5	8.3	13.9	15.9	<170
Total Dissolved Solids	196	58	95	110	1200
Ca (mg/l)	12.43	6.191	7.062	15.94	-
Mg (mg/l)	7.201	3.289	2.764	5.317	-
Na (mg/l)	23.49	6.906	10.56	7.111	200
K (mg/l)	4.56	4.61	7.50	5.15	-
Total Alkalinity CaC03	28	12	20	20	-
Cl (mg/l)	16	5	8	5	300
SO_4 (mg/l)	37	7	7	7	500
NO_3 as N (mg/l)	7.2	4	8.9	12	11
F (mg/l)	<0.2	<0.2	<0.2	<0.2	1.5
Ba (mg/l)	0.128	0.238	0.200	0.189	-
Mn (mg/l)	0.34	0.70	0.45	0.46	0.5
Fe (mg/l)	4.77	5.85	4.21	5.87	0.3
Zn (mg/l)	0.070	0.094	0.078	0.155	<0.5
Al (mg/l)	7.79	8.17	3.58	7.00	<0.3
Cr (mg/l)	<0.010	0.010	<0.010	0.014	<0.05
Ni (mg/l)	0.10	0.05	0.03	0.05	<70

Geology



Aquifers

Karoo groundwater systems comprise of 4 different aquifer zones :

I. Karoo aquifers

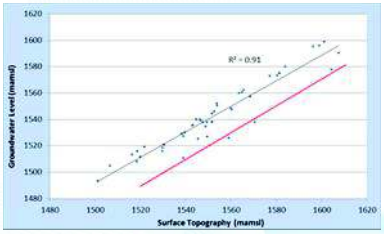
a. Shallow perched Karoo aquifers
   - encountered within the soil (overburden) horizon
   - Localised in nature

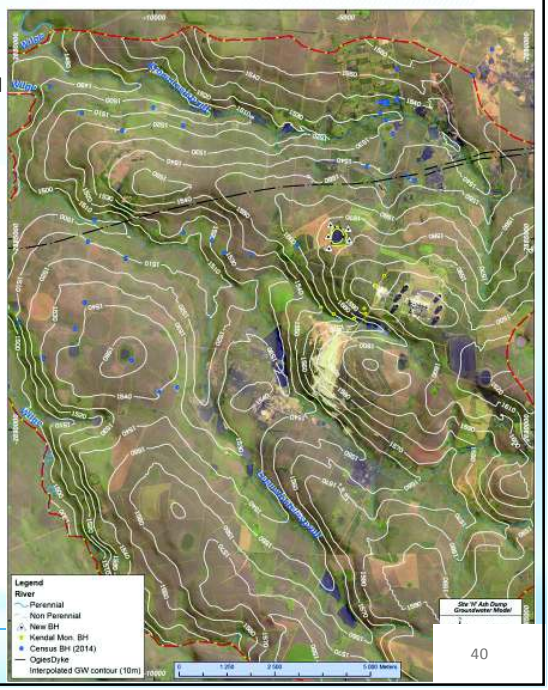
b. Shallow weathered zone Karoo aquifers (depth of 5 to 30 m)
   - unconfined or semi-confined, where the primary water intersections are found

c. Deep Karoo fractured aquifers (depth 100 mbgl)
   - consists of the various Karoo lithologies (incl. coal), where groundwater flow is governed by secondary porosities like faults, fractures, joints, bedding planes or other geological contacts

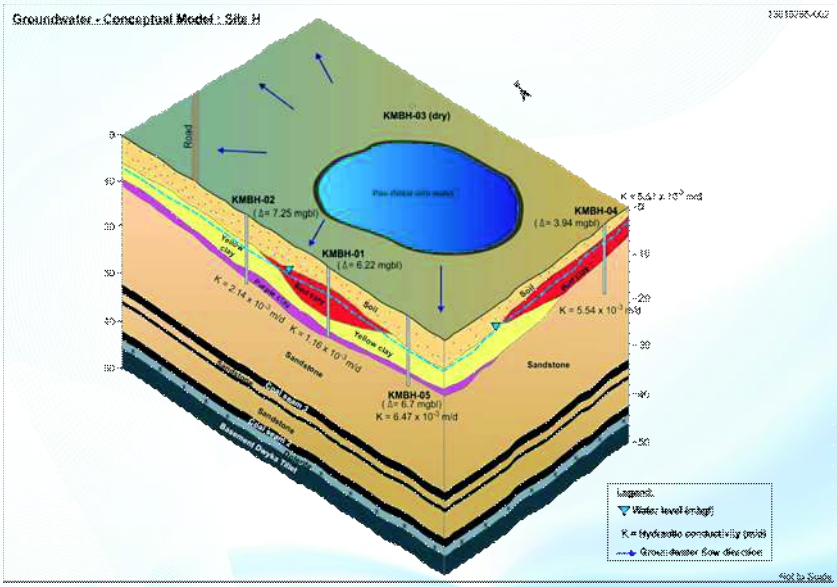
Conceptual Model

- Good correlation between the measured water levels and surface topography →some poorly correlated water levels plot on related to the occurrence of two distinct aquifer systems (plus local perched aquifers) with different water levels and can be attributed to the semi-confined nature of the fractured aquifer
- Groundwater levels vary between 0 (at springs) and 33 m below surface



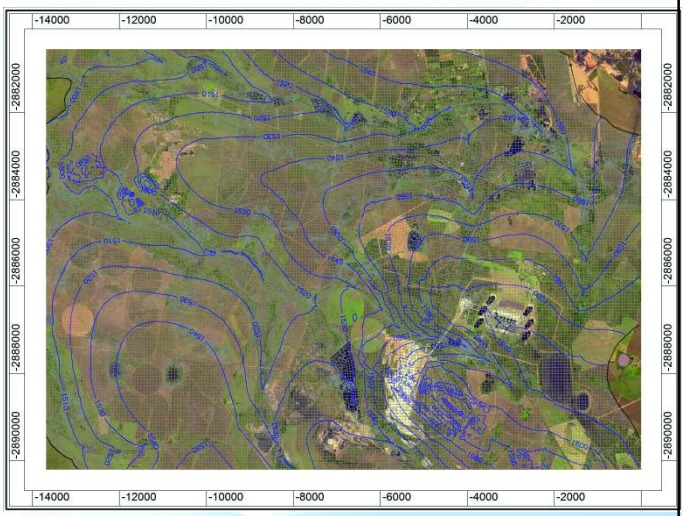


Conceptual Model



Model Development

- Finite Element Model
- 222 km^2
- 4 Element layer
- 228 760 Nodes
- 254 580 Elements



Model Calibration

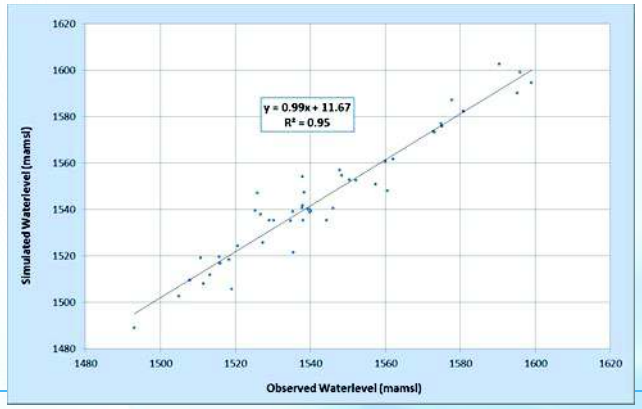
50 boreholes targeting Karoo Aquifer

$$\sqrt{\frac{\sum(\quad)^{2}}{}} \quad 7.05$$

$$\frac{}{} \quad 6.66\%$$

Weathered aquifer: 1.0E-07 to 3.5E-06 m/s

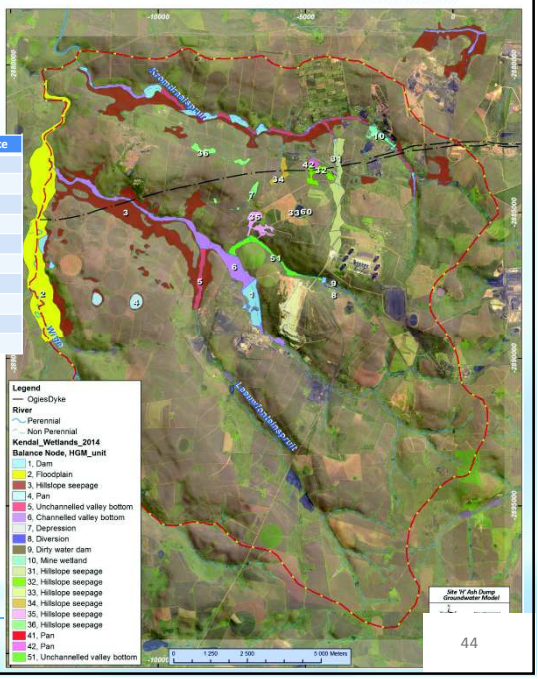
Fractured aquifer: 4.0E-08 to 3.0E-07 m/s



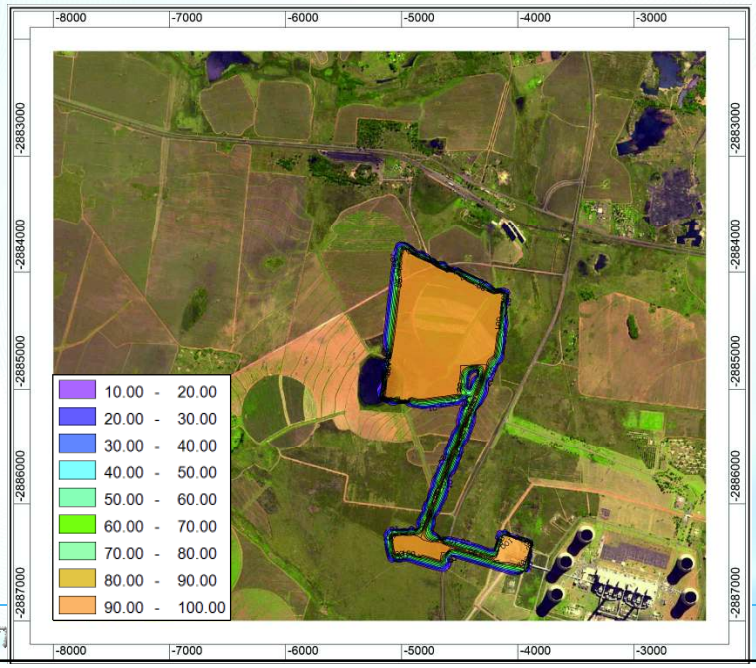
Model (Impact) Predictions

Estimated Contribution to wetlands (Steady State)

Wetland	Status Quo Model		ADF (year 27)		Difference
ID	m3/a	l/s	m3/a	l/s	%
1	770	0.02	277	0.01	64%
2	28 493	0.90	28 492	0.90	0%
3	76 232	2.42	69 142	2.19	9%
6	2 833	0.09	2 531	0.08	11%
8	925	0.03	446	0.01	52%
9	2 464	0.08	1 272	0.04	48%
31	11 652	0.37	11 651	0.37	0%
51	7 767	0.25	1 500	0.05	81%
60 (Pan)	1 027	0.03	0	0	100%



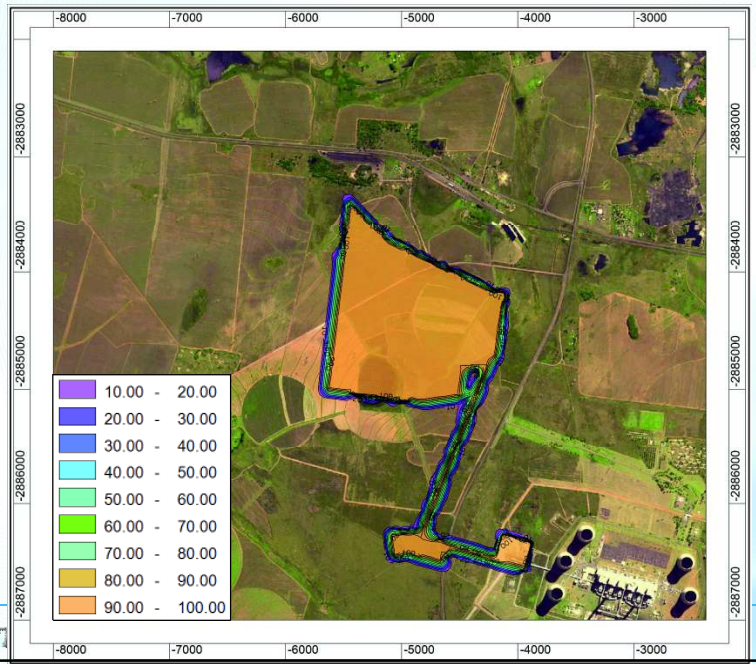
Model (Impact) Predictions – 5 years



WATI

45

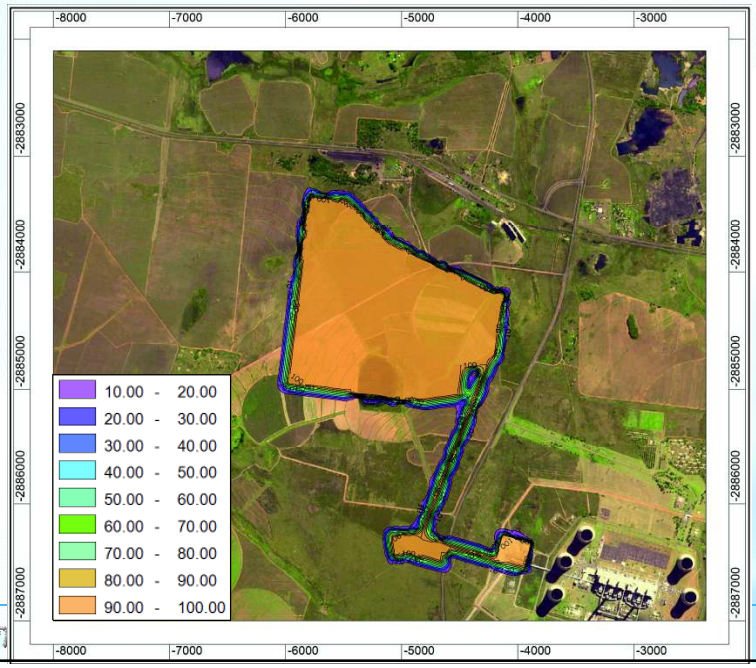
Model (Impact) Predictions – 10 years



WATI

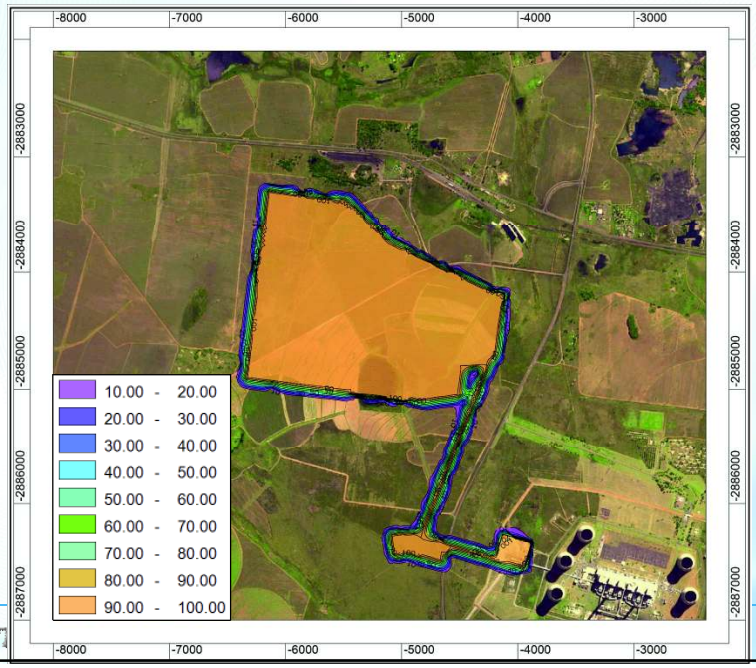
46

Model (Impact) Predictions – 15 years



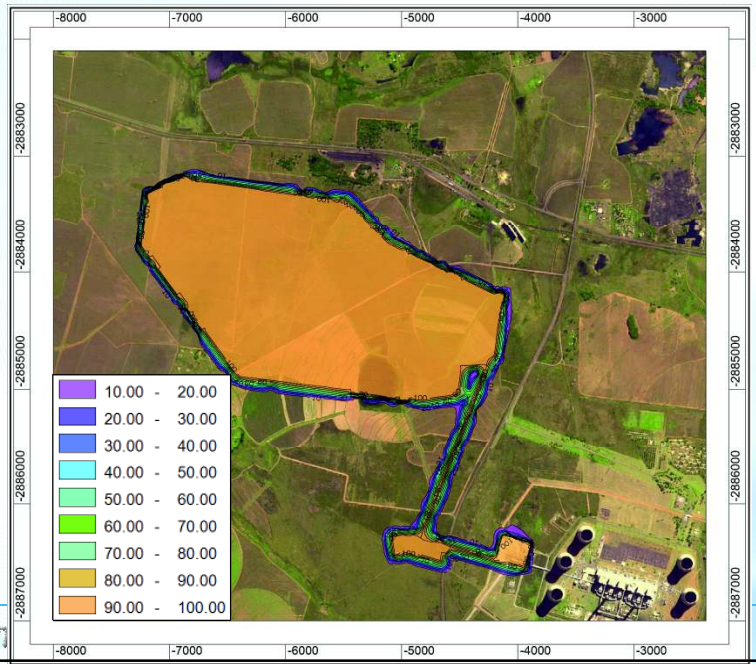
47

Model (Impact) Predictions – 20 years

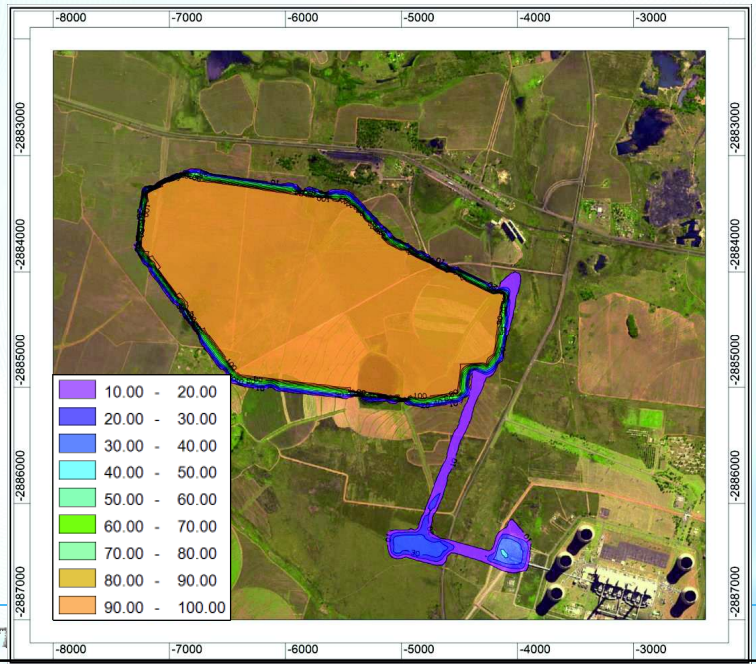


48

Model (Impact) Predictions – 27 years



Model (Impact) Predictions – 50 years



Model (Impact) Predictions

Limited impacts direct result of

- Low recharge (dry deposition and liner system)
- Low conductivities of underlying strata
- Limited gradients

Concentrations shown as % of 100% source concentration

- Constituents of concern (Zitholele 2014) include
  - boron (0.733 mg/l leachable),
  - barium (570 mg/l total) and
  - fluoride (112 mg/l total).

Model (Impact) Predictions

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
	Low	Study Site	Long term	Could happen	
Groundwater quality	**2**	**2**	**4**	**3**	**1.6**

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
	Very Low	Study Site	Long term	Could happen	
Groundwater recharge	**1**	**2**	**4**	**3**	**1.4**
Groundwater flow	**1**	**2**	**4**	**3**	**1.4**

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND WASTE MANAGEMENT LICENSE APPLICATION FOR THE PROPOSED 30 YEAR ASH DISPOSAL FACILITY AT KENDAL POWER STATION

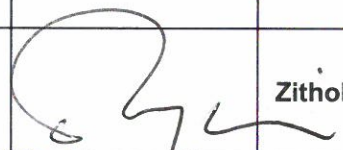
DEA Ref No 14/12/16/3/3/3/68; NEAS Reference: DEA/EIA/0001624/2013

DWS Specialist Feedback

Tuesday, 31 May 2016, 11:00 pm to 12:00pm

DWS Offices, Pretoria

ATTENDANCE REGISTER

TITLE	FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
Ms	Tania	Oosthuizen		Zitholele	PO Box 6002 Halfway House 1685	Tel No:	011 088 8462
						Fax No:	
						Cell No:	083 504 9881
						e-mail:	taniao@zitholele.co.za
Mr	Pieter	Ackerman	Signed on next page.	DWS		Tel No:	012 336 8217
						Fax No:	
						Cell No:	082 807 3512
						e-mail:	AckermanP@dws.gov.za
Ms	Emmy	Molepo	No apology received	Eskom		Tel No:	011 800 4211
						Fax No:	
						Cell No:	082 860 0919
						e-mail:	molepome@eskom.co.za
Mr	Nevin	Rajasakran		Zitholele	PO Box 6002 Halfway House 1685	Tel No:	011 207 2065
						Fax No:	
						Cell No:	072 385 4312
						e-mail:	nevinr@zitholele.co.za
Ms	Mokgadi	Maloba	No apology received	DWS		Tel No:	013 932 2061
						Fax No:	013 932 2071
						Cell No:	
						e-mail:	malobam@dws.gov.za

TITLE	FIRST NAME	SURNAME	SIGNATURE	ORGANISATION	POSTAL ADDRESS	CONTACT DETAILS	
Mr	Warren	Fantaw		Eskom	Megawatt Park	Tel No:	011 800 4309
						Cell No:	082 805 7760
						e-mail:	warren.fantaw@eskom.co.za
Dr	Martin	Holland		Delta H	PO Box 11465 Silver Lakes 0054	Tel No:	
						Cell No:	082 497 9088
						e-mail:	martin@deltah.co.za
Prof	Kai	Witthueser		Delta H	"	Tel No:	
						Cell No:	072 506 1343
						e-mail:	kai@deltah.co.za
Mr	Dieter	Kassier		WETCS	PO Box 72295 Lynnwood Ridge 0040	Tel No:	012 349 2699
						Cell No:	076 403 2398
						e-mail:	dieterK@wetcs.co.za
Ms	Lumka	Kuse		DWS	Private Bag x 313 Pretoria 0001	Tel No:	012 336 8336
						Cell No:	083 661 7999
						e-mail:	kusel@dws.gov.za
Mr	Ronald	Mulaudzi		DWS	"	Tel No:	012 336 7952
						Cell No:	
						e-mail:	mulaudzin@dws.gov.za
	Peter	Ackerman		DWS	"	Tel No:	012 336 7217
						Cell No:	
						e-mail:	ackermanp@dws.gov.za
Mr	Dieter					Tel No:	
						Cell No:	
						e-mail:	
						Tel No:	
						Cell No:	
						e-mail:	
						Tel No:	
						Cell No:	
						Email:	
						Tel No:	
						Cell No:	
						Email:	
						Tel No:	
						Cell No:	
						Email:	
						Tel No:	
						Cell No:	
						Email:	