PROPOSED ESKOM KUDU 400Kv TRANSMISSION POWER-LINE FROM ORANJEMOND SUBSTATION TO JUNO SUBSTATION

AGRICULTURAL IMPACT ASSESSMENT
ADDENDUM ALTERNATIVES G & F

Prepared by:

JJN Lambrechts
F Ellis
A Kunneke

Department of AgriSciences
University Stellenbosch
Private Bag X1
Matieland
Stellenbosch
7602

Prepared for:
STRATEGIC ENVIRONMENTAL FOCUS
P.O. Box 74785
Lynnwood Ridge
0040

1. INTRODUCTION

The approach that was followed to evaluate the agricultural impact of construction of transmission power-lines along alternative routes G and F was the same as discussed in the Final Agricultural Impact Assessment Report.

In Appendix Table 1 the land types along alternative routes F and G from Gromis to Juno is listed with a specification of terrain type, mean annual rainfall, soil forms and subsoil limitations. In Appendix Table 2 the evaluated water and wind erosion hazard associated with the different land types along alternative corridors F and G are listed as well as the parameters on which the hazard was based.

2. WIND AND WATER EROSION HAZARD

In Table 1 the distance of water and wind erosion hazard classes along alternative power-line corridors F and G as well as that of C and E expressed as a percentage of the total distance is listed. It is evident that construction of a transmission power-line along corridors F and G will have an insignificant effect on wind erosion. Due to the uneven and hilly terrain along long sections of corridors F and G the water erosion hazard is high. More than 50 % route along both corridors has a moderate to severe water erosion hazard.

Table 1: Distance of water and wind erosion hazard classes along alternative power-line corridors F and G expressed as a percentage of the total distance (for comparison purposes C and E is also listed)

Alternative (Total distance of corridor)	Water erosion				Wind erosion			
	Erosion class	Class symbol	Distance (km)	Percent of route	Erosion class	Class symbol	Distance (km)	Percent of route
Alternative C (345.3 km)	None	1	9.3	2.7	None	1	327.8	94.9
	Low	2	65.9	19.1	Low	2	15.7	4.5
	Low-Mod	3	0.0	0.0	Low-Mod	3	1.8	0.5
	Moderate	4	55.1	16.0	Moderate	4	0.0	0.0
	Severe	5	215.0	62.3	Severe	5	0.0	0.0
Alternative E (276.1 km)	None	1	29.3	10.6	None	1	82.3	29.8
	Low	2	125.8	45.6	Low	2	123.4	44.7
	Low-Mod	3	21.4	7.8	Low-Mod	3	34.7	12.6
	Moderate	4	27.5	10.0	Moderate	4	24.8	9.0
	Severe	5	72.1	26.1	Severe	5	10.9	3.9
Alternative F (321.7 km)	None	1	49.2	15.3	None	1	163.7	50.9
	Low	2	107.2	33.3	Low	2	104.9	32.6
	Low-Mod	3	1.9	0.6	Low-Mod	3	53.1	16.5
	Moderate	4	29.5	9.2	Moderate	4	0.0	0.0
	Severe	5	133.9	41.6	Severe	5	0.0	0.0
Alternative G (261.4 km)	None	1	2.7	1.0	None	1	127.1	48.6
	Low	2	82.9	31.7	Low	2	77.4	29.6
	Low-Mod	3	11.9	4.6	Low-Mod	3	56.8	21.7
	Moderate	4	15.2	5.8	Moderate	4	0.0	0.0
	Severe	5	148.6	56.8	Severe	5	0.0	0.0

3. WATER EROSION IMPACT ASSESSMENT

Heavy vehicle traffic during the construction phase and traffic along the service road along the transmission power-line during the operational phase will lead to accelerated water erosion along certain land types with a moderate to severe water hazard.

The potential impact of accelerated water erosion along certain sections of alternative routes F and G is summarised in **Table 2**.

Table 2: Impacts of water erosion

Nature	Loss of grazing capacity and potential arable land due to surface water erosion and formation of erosion gullies		Status	-
Impact source(s)	Clearance of land for roads for construction vehicles, pylon sites and service road			
Affected stakeholders	Individuals or organisations with properties along the route; those concerned with conservation and tourism			
Alternative F				
Magnitude	*Extent*	Local (163.4 km is moderately and severely affected along route)		
	Intensity	Medium to high		
	Duration	Medium to long term		
	Reversibility	Reversible		
	Probability	Highly probable		
Significance	*Without mitigation*	Medium		M
	With mitigation	Low		L
Confidence	High			
Alternative G				
Magnitude	*Extent*	Local (163.8 km is moderately and severely affected along the route)		
	Intensity	Medium		
	Duration	Medium		
	Reversibility	Reversible		
	Probability	Highly probable		
Significance	*Without mitigation*	Medium		M
	With mitigation	Low		L
Confidence	High			

4. COMPARISON OF ALTERNATIVE CORRIDORS C, E, F AND G

In the Final Agricultural Impact Assessment Report alternatives C and E have been discussed.

Alternative F

Alternative F is comparable alternative C, but is slightly shorter (322 km). Although wind erosion has no impact, alternative F cuts across a great number (and longest distance) of land types with a moderate to severe water erosion hazard. Soils in water erosion sensitive land types are predominantly shallow and the terrain is hilly to mountainous with a low percentage level land and high local relief. To mitigate the negative impact, especially along the service road, will be difficult due to the steep slopes and high runoff rates especially in land types with a class B5, C4, C5 and D5 terrain type. The impact of the pylon footprints on loss of arable land and production of small-grain will, however, be small. It is only the service road that will have a slight impact on the total small-grain yield.

Alternative G

Compared to the other alternatives this is the shortest alternative (261 km). In the north the land is used mainly for grazing while lands cleared for small-grain production is common in the south. Wind erosion will have no impact. Land types that are sensitive to water erosion are common along this alternative. The soils that are sensitive to water erosion are predominantly shallow and the terrain is hilly with a low percentage level land and high local relief. Although this is the shortest route with the least disturbance due to a shorter footprint, less pylons and shorter construction time, crossing the Namaqua National Park will have a negative impact.

5. CONCLUSION

Based on the nature of the land types along alternatives C, E, F and G, route length, wind and water erosion hazard, as well as the potential impact on grazing potential and rehabilitation of disturbed vegetation, these alternatives can be arranged according to the potential agricultural impact in the following order:

Lowest impact	**G**
	E
	F
Highest impact	**C**

Appendix Table 1: Different land types along alternative routes F and G from Gromis to Juno with a specification of terrain type, mean annual rainfall, soil forms and subsoil limitations.

ALTERNATIVE F

Landtype symbol	Rainfall zone	North-south index	Mean annual rainfall (mm)	Length (km)	Terrain type	Soil forms			Limitations		
						Dominant ≥50 %	Subdominant 10-50 %	Rare ≤10%	Dominant	Sub-dominant	Rare
Af 17	154W	1	65		A2	Hu		Cv, Vf, ms			ka, ne
Ag 54	158W	2	105	4.6	C4	Hu	Ms	R, Ms, Oa, Du	R, db	R	R, db
Fb157	163W	3	200	6.8	C5	Ms, Gs	R, Sw	Hu, Oa	R, so	R	R
Fc133	169W	4	186	0.4	C5	R	Hu	Ms, Gs, Sw, Va, Oa	R	R, db, ka	R, pr, vp, so
Ib127	170W	5	75	9.5	D5	R	Hu	Gs, Ms, Va, Du	R	R, db, ka	so, vp, R
Ah 38	155W	6	76		A3		Hu, Cv, Vf, Pn	Du		ca, ka, db, ne, gc	
Ae77	158W	7	105	6.2	A2	Hu		Ms, Oa, Du	db, R, ka		db, R
Ag 55	164W	8	115	17	A3	Hu		R, Ms, Du, Sw, Oa	R, db		U, db, vp
Fb154	159W	9	119	4.2	D5		R, Ms, Gs, Hu	Sw, Du		R, so	Vp, R
Ib124	165W	10	220	14.7	C5	R	Hu	Ms, Gs, Sw, Ss, Oa, Du	R	R	so, vp, pr, R
Ae82	172W	11	150	5	C5	Hu	R	Gs, Ms	db, R	R	R
Ae 81	171W	12	200	4.8	B4		R, Gs, Hu, Sw	Oa, Kd, Du		R, so, vp	R, gc
Ib235	173W	13	260	10	D5	R	Hu	Ms, Gs, Sw, Oa, Du	R	R, db	so, vp, R
Ic 64	188W	14	366	21.6	C5	R		Gs, Ms, Hu, Cv, Oa	R		so, R, U
Ah42	189W	15	222	6.6	A3	Cv, Hu	R	Kd, Gs, Es, Oa, Ms	R, so	R	pr, so
Ah43	189W	16	222	10.8	C4	Cv	Hu, R	Oa	R	R	R
Ae161	187W	17	134	6.8	C4	Hu		R, Oa, Cv	R, so, db		U, so
Ah 40	192W	18	230	2.6	C3		Cv, R, Hu	Pn, Gs, Ms, Oa, Es, Kd		R, so	gc, so, R, U
Ai 18	190W	19	251	4.4	C4		Cv, R	Hu, Kd, Pn, Ms		R, so	R, so, gc
Ib273	191W	20	200	2.9	C5	R	Gs	Ms, Cv, Oa, Hu	R	so, R	R, so, db
Ae165	155W	21	76	0.6	B3	Hu	Oa	R, Cv, Du	R, db		R, db

Ae163	187W	22	134	20.6	C4	Hu		Oa, Cv, R, Du, Pn	R, db		R, so, gc
Ag 87	187W	23	134		C4	Hu	R, Ms	Gs, Oa	R, so, db, ca	R	R, so
Ag95	187W	24	134	10.8	C3	Hu	R	Oa	R, so, db	R	U
Ia 36	187W	25	134	0.5	A1		Oa, Du, Cv	R, Hu			R
Ae168	187W	26	134	0.1	B2	Hu		Oa, R	R, so, db		R
Ah46	155W	27	76	2.3	A1	Cv	Hu, Pn	Es, R	R	R, pr	ne, pr
Ag100	187W	28	134		C4	Hu	R	Cv, Oa, Ms, Du, Other	R	`	R, U
Ah49	155W	29	76	8.2	A1	Hu	Cv	Pn, Du	R, db	ne, db	R
Ae174	155W	30	76	2.6	A1	Hu		Cv, Ou, R	R, db		R
Ag103	193W	31	216		C2		R, Hu	Oa, Kd Ms		R, db	gc, R
Ag107	155W	32	76		A2		Oa, Hu			db, R, so	
Ag104	194W	33	160		B3	Hu	Oa		R, db	R, db	
Ae166	155W	34	76		B2	Hu	Cv	Du	R, db, ne	R, db, ne	
Ae374		35			A4						
Ah 44	195W	36	110		A3	Hu	Cv	Dunes	R, ne, ka	R, ne	
Ah 41	195W	37	110		A2		R, Cv, Hu	Kd, Ms, Es, Oa		R, so	pr, gc
Ag106	194W	38	160		C3		Hu, Oa	Cv		R, db	
Ai 66	276W	39	125		A3	Cv		Pn, Kd, Other			gc, sp
Ae373		40			A3						
Ag203	2758W	43	148		C3	Hu		Gs, Oa, Du	db, ka		R, db
Ae372	2758W	44	148		A3	Hu	Hu, Oa	Hu, Ms, Other	db	db, ka	

ALTERNATIVE G

Landtype symbol	Rainfall zone	North-south index	Mean annual rainfall (mm)	Length (km)	Terrain type	Soil forms			Limitations		
						Dominant ≥50 %	Subdominant 10-50 %	Rare ≤10%	Dominant	Sub-dominant	Rare
Af 17	154W	1	65	1.9	A2	Hu		Cv, Vf, Ms			ka, ne
Ag 54	158W	2	105	12.3	C4	Hu	Ms	R, Oa, du	R, db	R	R, db
Ah 38	155W	3	76	22.8	A3		Hu, Cv, Vf, Pn	Du		ca, ka, db, ne, gc	
Ai 13	154W	4	65	18.5	A3	Cv	Pn, Vf	Ms, Hu, Oa, Du		gc, ne	ka, ca, ne
Ib123	155W	5	76	1.4	C4	R	Hu	Ms, Gs, Du	R	R	so, R
Ae 79	158W	6	105	14.7	A3	Hu		Ms, Oa	R, db		ka
Ae164	187W	7	134	14.6	C4	Hu	Oa		so, db	R	
Ag 96	187W	8	134	16.3	C5	Hu		Oa, Du	db, so		
Ae161	187W	9	134	19.2	C4	Hu		R, Oa, Cv	R, so, db		U, so
Ae165	155W	10	76	9.6	B3	Hu	Oa	R, Cv, Du	R, db		R, db

Ae163	187W	11	134	9.3	C4	Hu		Oa, Cv, R, Du, Pn	R, db		R, so, gc
Ag105	187W	12	134	2.4	B3		Hu, R, Oa			R, db, U	
Ag 87	187W	13	134	48.7	C4	Hu	R, Ms	Gs, Oa	R, so, db, ca	R	R, so
Ag 95	187W	14	134	10.8	C3	Hu	R	Oa	R, so, db	so, db	U
la 36	187W	15	134	0.8	A1		Oa, Du, Cv	R, Hu			R
Ae168	187W	16	134	11.5	B2	Hu		Oa, R	R, so, db		R
Ag100	187W	17	134	24.1	C4	Hu	R	Cv, Oa, Ms, Du, Other	R	R	R, U
Fc786	2759W	19	105	2.6	C4		Hu, Ms, Oa, Gs	Du		R, ka, db	so
Ae374	2761W	18	157	0.4	A4	Hu	Oa	Cv, R, Stream, Other	db, R	db, R	db, R, so
Ag203	2758W	20	148	4.4	C3	Hu	R	Ms, Oa, Other	db, ka	db, ka	R, db
Ae372	2758W	21	148	15.0	A3	Hu	Oa	Ms, Other	db, ka	db	R, db
Total				261.4							

Appendix Table 2: Water and wind erosion hazard of land types along the alternative transmission power-line corridors F and G and the parameters on which the hazard was based.

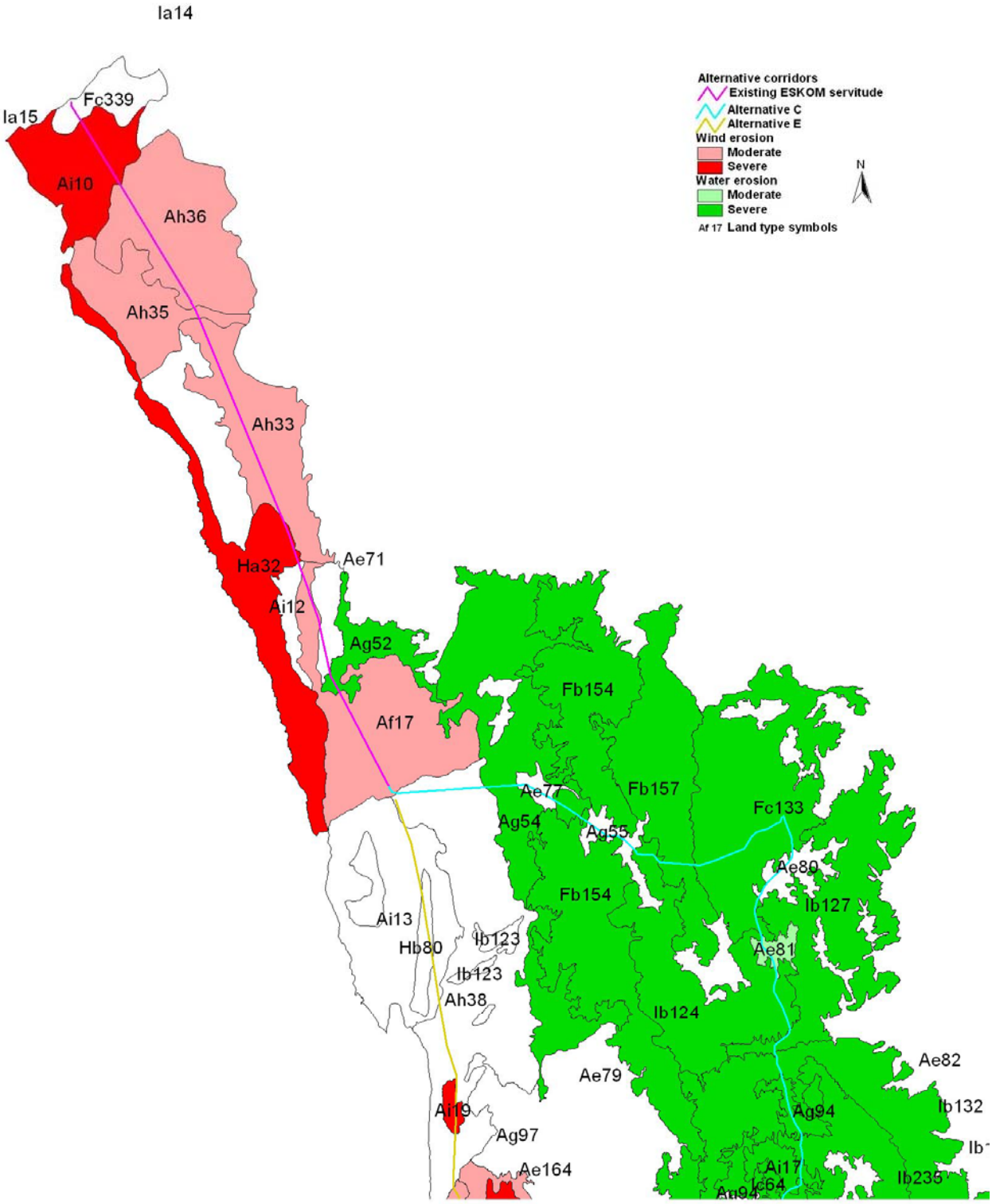
ALTERNATIVE F

Land type symbol	Terrain type	North-south index number	Length (km)	Average depth (cm)	Average clay (%)	Water erosion hazard	Water erosion hazard
Af 17	A2	1	1.8	1271	4.0	None	Low-Mod
Ag 54	C4	2	10.1	249	3.5	Severe	None
Fb157	C5	3	6.8	218	6.4	Severe	None
Fc133	C5	4	0.4	228	4.6	Severe	None
Ib127	D5	5	9.5	198	3.3	Severe	None
Ah 38	A3	6	15.3	904	1.3	Low	None
Ae 77	A2	7	7.6	634	3.0	Low	Low
Ag 55	A3	8	17.0	395	3.2	Low	None
Fb154	D5	9	4.2	225	1.7	Severe	None
Ib124	C5	10	14.7	266	5.0	Severe	None
Ae 82	C5	11	5.0	792	3.2	Severe	Low
Ae 81	B4	12	4.8	433	4.0	Moderate	Low
Ib235	D5	13	9.9	205	1.6	Severe	None
Ic 64	C5	14	21.6	254	3.5	Severe	None
Ah 42	A3	15	6.6	578	2.5	Low	Low-Mod
Ah 43	C4	16	10.8	481	3.1	Severe	Low-Mod
Ae161	C4	17	6.8	702	4.2	Severe	low
Ah 40	C3	18	2.6	629	3.1	Moderate	Low-Mod
Ai 18	C4	19	4.4	353	2.8	Severe	Low
Ib273	C5	20	2.9	490	4.8	Severe	None
Ae165	B3	21	0.6	700	4.4	Low-Mod	Low
Ae163	C4	22	20.6	381	3.6	Severe	Low
Ag 87	C4	23	4.2	316	4.6	Severe	None
Ag 95	C3	24	10.8	427	4.0	Moderate	None
Ia 36	A1	25	0.5	1298	2.8	None	None
Ae168	B2	26	0.4	777	4.0	Low	Low
Ah 46	A1	27	11.8	854	2.7	None	Low-Mod
Ag100	C4	28	1.7	416	3.8	Severe	None
Ah 49	A1	29	8.2	840	3.0	None	Low-Mod
Ae174	A1	30	7.4	672	3.0	None	Low
Ag103	C2	31	7.8	477	4.4	Low	None
Ag107	A2	32	4.1	783	4.0	None	None
Ag104	B3	33	1.3	703	3.7	Low-Mod	None
Ae166	B2	34	5.8	624	3.0	Low	Low
Ae374	A4	35	28.5	516	2.9	Low	Low
Ah 44	A3	36	5.2	872	2.9	Low	Low-Mod
Ah 41	A2	37	6.1	862	2.7	None	Low-Mod
Ag106	C3	38	6.1	700	4.5	Moderate	None
Ai 66	A3	39	2.9	895	2.5	Low	Low
Ae373	A3	40	1.9	612	2.1	Low	Low

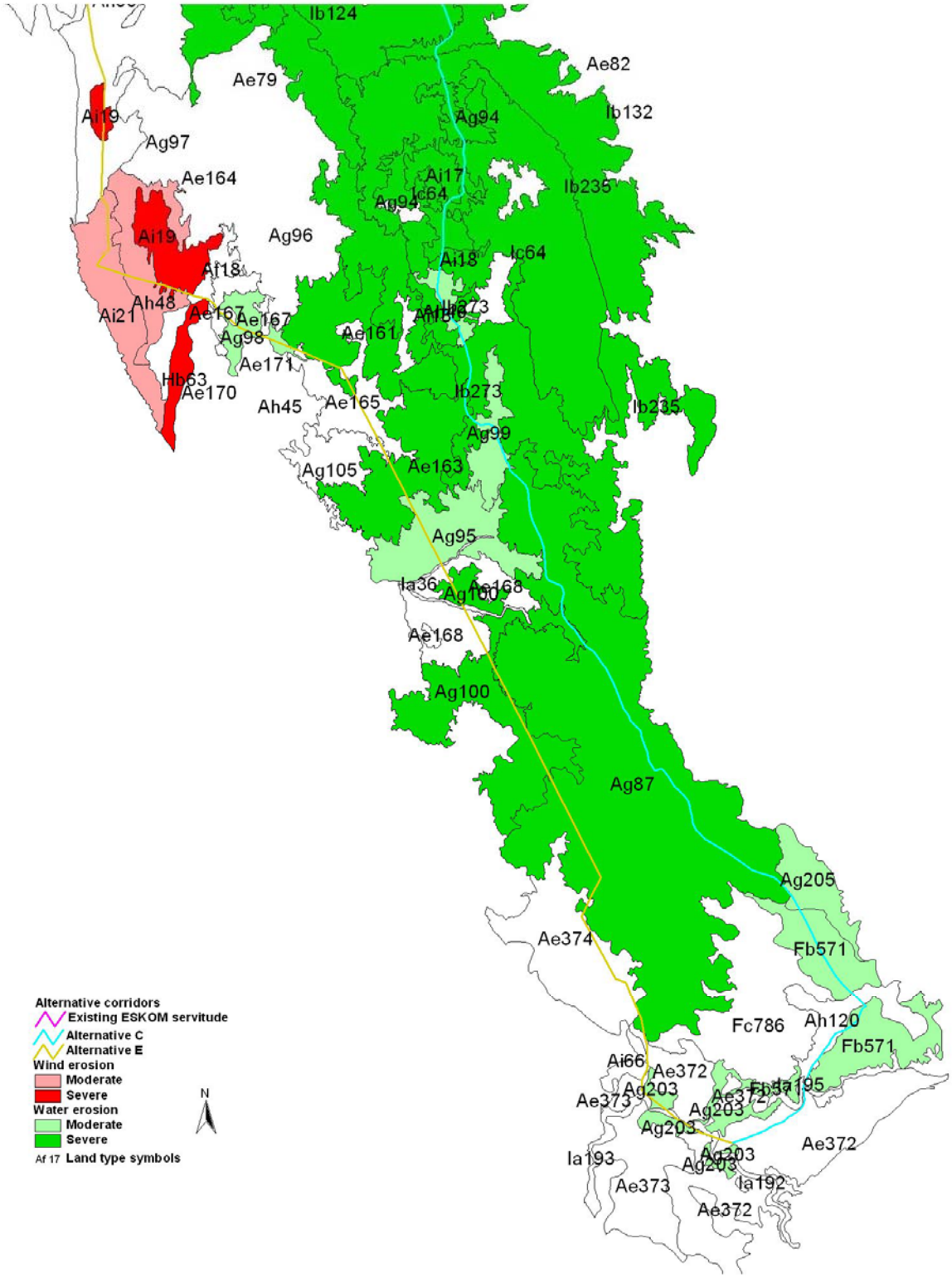
Ia193	A1	41	1.1	1036	6.3	None	None
Ia192	A1	42	8.2	952	9.2	None	None
Ag203	C3	43	5.2	335	8.6	Moderate	None
Ae372	A3	44	8.2	612	2.7	Low	Low
			321.7				

ALTERNATIVE G

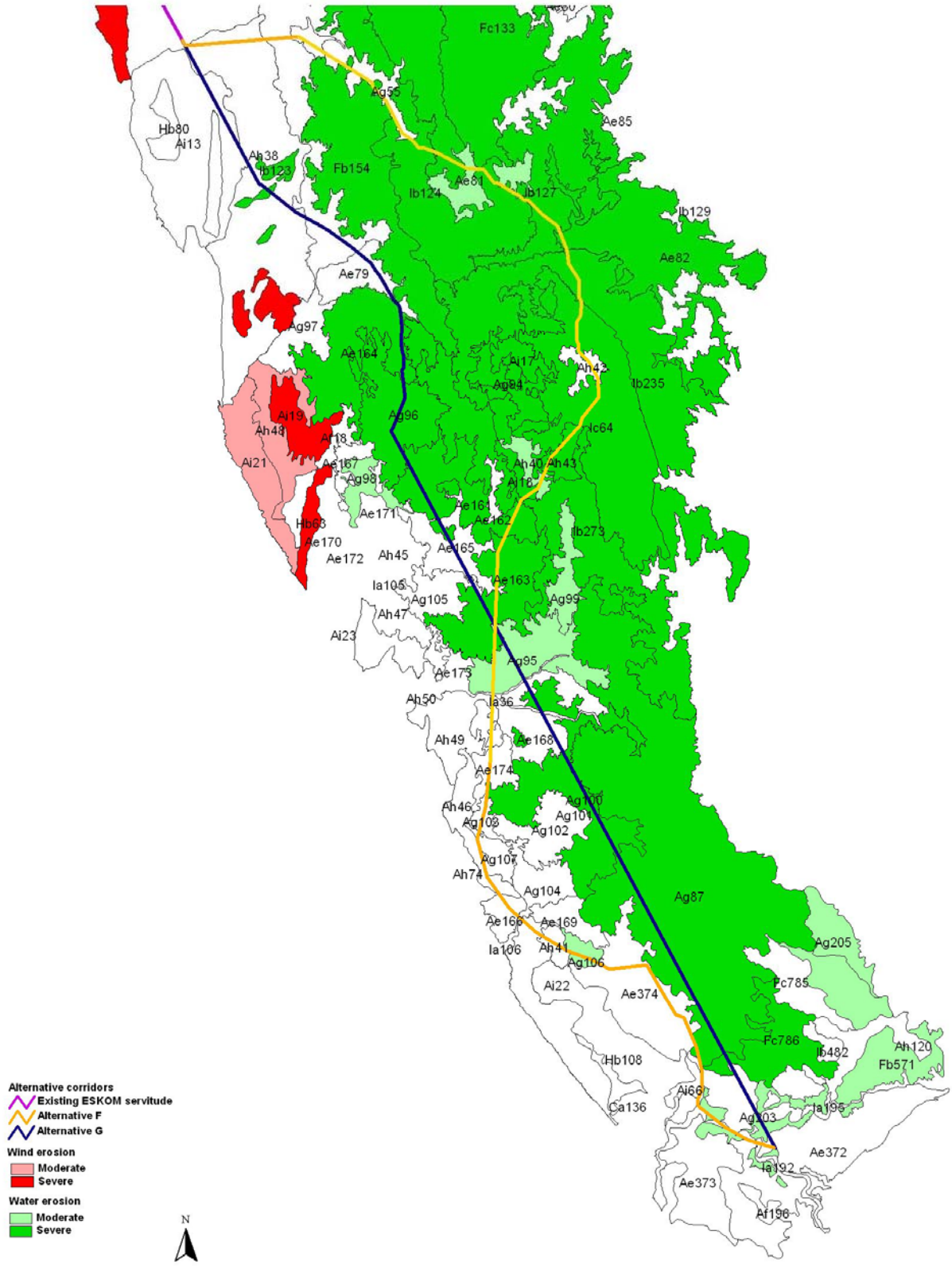
Land type symbol	Terrain type	North-south index number	Length (km)	Average depth (cm)	Average clay (%)	Water erosion hazard	Wind erosion hazard
Af 17	A2	1	1.9	1271	4	None	Low-Mod
Ag 54	C4	2	12.3	249	3.5	Severe	None
Ah 38	A3	3	22.8	904	1.3	Low	None
Ai 13	A3	4	18.5	955	3	Low	Low-Mod
Ib123	C4	5	1.4	168	3	Severe	None
Ae 79	A3	6	14.7	799	2	Low	Low
Ae164	C4	7	14.6	827	3.9	Severe	Low
Ag 96	C5	8	16.3	355	4.3	Severe	Low-Mod
Ae161	C4	9	19.2	702	4.2	Severe	Low-Mod
Ae165	B3	10	9.6	700	4.4	Low-Mod	Low
Ae163	C4	11	9.3	381	3.6	Severe	Low
Ag105	B3	12	2.4	514	3.8	Low-Mod	Low
Ag 87	C4	13	48.7	316	4.6	Severe	None
Ag 95	C3	14	10.8	427	4	Moderate	None
Ia 36	A1	15	0.8	1298	2.8	None	Low-Mod
Ae168	B2	16	11.5	777	4	Low	Low
Ag100	C4	17	24.1	416	3.8	Severe	None
Ae374	A4	18	0.4	516	2.9	Low	Low
Fc786	C4	19	2.6	369	5.7	Severe	None
Ag203	C3	20	4.4	335	8.6	Moderate	None
Ae372	A3	21	15.0	612	2.7	Low	Low
261.4 km							



Appendix Figure 1: Land types along alternative corridors C and E and existing ESKOM servitude. Land types with a moderate and severe water or wind hazard highlighted.



Appendix Figure 1: Land types along alternative corridors C and E and existing ESKOM servitude. Land types with a moderate and severe water or wind hazard highlighted.



Appendix Figure 2: Land types along alternative corridors F and G and existing ESKOM servitude. Land types with a moderate and severe water or wind hazard highlighted.