

APPENDIX I3

AGRICULTURAL IMPACT ASSESSMENT



AGRICULTURAL IMPACT ASSESSMENT FOR THE PROPOSED MOKOLO AND CROCODILE RIVER (WEST) WATER AUGMENTATION PROJECT (PHASE 2A)

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1 BACKGROUND

Water requirements will increase in the Lephalale area due to various planned and anticipated developments associated with the Waterberg coalfields. The Department of Water and Sanitation (DWS) commissioned the proposed Mokolo and Crocodile River (West) Water Augmentation Project (Phase 2A) (MCWAP-2A) Feasibility Study to investigate the options for meeting the aforementioned water requirements.

The proposed MCWAP-2A, which entails the transfer of water from the Crocodile River (West) to the Steenbokpan and Lephalale areas, consist of:

1. Water Transfer Infrastructure (WTI); and
2. Borrow Pits.

The project is located within the western part of the Limpopo Province. The footprint of MCWAP-2A WTI traverses the Thabazimbi Local Municipality (LM) and Lephalale LM, which fall within the Waterberg District Municipality (DM).

The major scheme components for the proposed **MCWAP-2A WTI** include the following:

- Vlieëpoort Abstraction Weir on the Crocodile River (West);
- Low lift Pumping Station;
- Low lift Rising Main;
- Sedimentation Works;
- Balancing Reservoir;
- High lift Pumping Station;
- High lift Rising Main to and the Break Pressure Reservoir (BPR);
- Gravity Pipeline from the BPR to and the Operational Reservoir (OR);
- Gravity pipeline from Operational Reservoir to Medupi Tee-off via Steenbokpan; and
- Ancillary infrastructure (gauging weirs, River Management System, access roads, accommodation, offices, workshops and security measures).

In addition, construction material will need to be sourced from approximately 23 Borrow Pits that will be located at approximately 5 km intervals along the project footprint.

The agricultural impact assessment of the project will deal with the following:

- Potential impacts during construction:
 - Loss of cultivated land and grazing land within the construction domain;
 - Loss of stock watering points within the construction domain;
 - Disruptions to farming operations as a result of construction related use of existing access roads; and
 - Loss of fertile soil through land clearance.
- Potential impacts during operational phase:
 - Potential impacts to water users (and associated agro-economic impact from reduced crop and food production) downstream of the abstraction works and BP SS1 on the Crocodile River; and
 - Permanent loss of cultivated land due to physical infrastructure.

The location of the site and the various components are indicated in Figure 1.

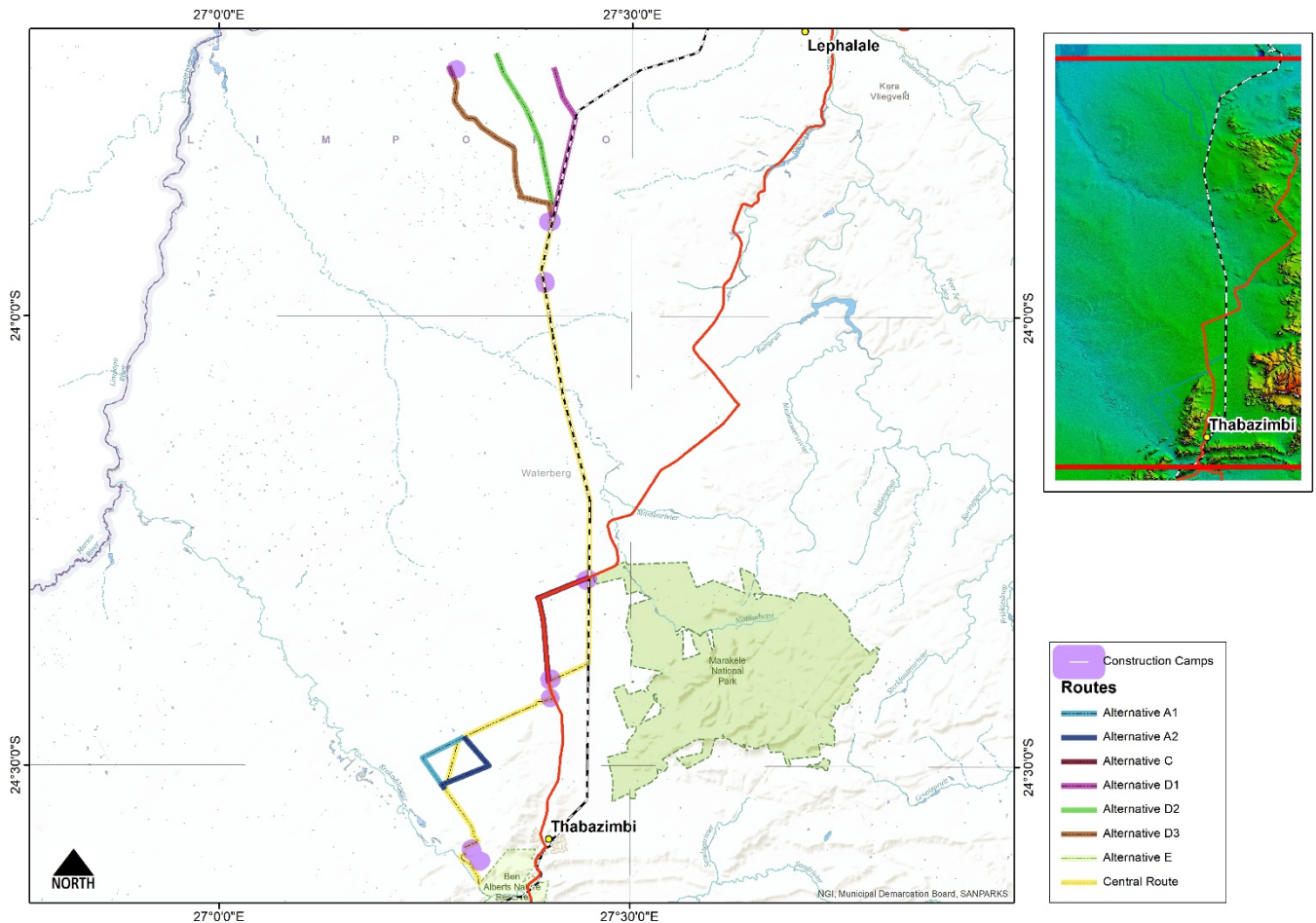


Figure 1. Location and layout

2 PROCESS OF THE ASSESSMENT

The present land use was identified from satellite images dated 2017/8 and then verified by field visits. Google Earth has images taken from 2004 up to now from which cultivated land could be identified.

The approach for the photo interpretation was the use the most recent images as the basis and then compare the results with historical images as well as a GIS dataset of the Department of Agriculture.

The past couple of years experienced extreme droughts, which may have created false interpretations, particularly in areas where subsistence farmers are located. In these instances, historical images were relied on.

Observation were made at 145 points and were photographed as part of ground truthing – these are provided as an addendum.

The land uses were delineated as five categories:

- 1) Irrigated land;
- 2) Land under cultivation;
- 3) Fallow irrigation land that may be irrigated in future;
- 4) Orchards (horticulture);
- 5) Old lands; and
- 6) Grazing (open veld or pastures).

The impact assessment will assign values to each category in a matrix to indicate the significance of loss.

Extent of survey

- A corridor of 100 metres was assessed for the EIA (this is 50 metres to each side of the route centreline);
- The temporary loss for grazing land will be for a strip of 50 metres from the boundary fence of the property. This width includes 40 metre within the construction servitude and 10 additional metres to allow for disturbances caused to the animals by construction vehicles and dust that may settle on the leaves of grass and trees; and
- The period of the loss will be for the duration of construction and the time it will take for the grass to recover;

Impact of the Route Alignment as per Figure 1:

- The Central Route will be the baseline;
 - Alternatives A1 and A2 on the farm Paarl 124 KQ;
 - Alternative C on farms Honingvley, Blaaupan, Tarentaalpan and Ruigtevley;
 - Alternatives D1, D2 and D3 in the northern part on the project; and
 - Alternative E on Mooivallei 342 KQ.

3 AGRICULTURAL LAND USE

Land use in agriculture is dynamic and constantly changes depending on the climate and socio-economic conditions of the farmer and of the region and even the country.

3.1 PIPELINE ROUTES

The land uses are as follows:

Table 1. Land uses in the survey area in hectares

Route	Fallow	Grazing	Irrigated	Old lands	Orchards	TOTAL
A1		104,6				104,6
A2		11,9				116,9
Central A		62,2				62,2
C		172,0			1,3	173,3
Central C		141,1				141,1
D1		196,9				196,9
D2		198,9		22,2		221,1
D3		253,2		8,7		261,9
E	3,3	38,7	11,5		0,7	54,2
Central E	1,8	40,5	9,0		1,4	52,7
Central		680,7	17,8	17,8		716,3
TOTAL		2 005,7	38,3	48,7	3,4	2 101,2

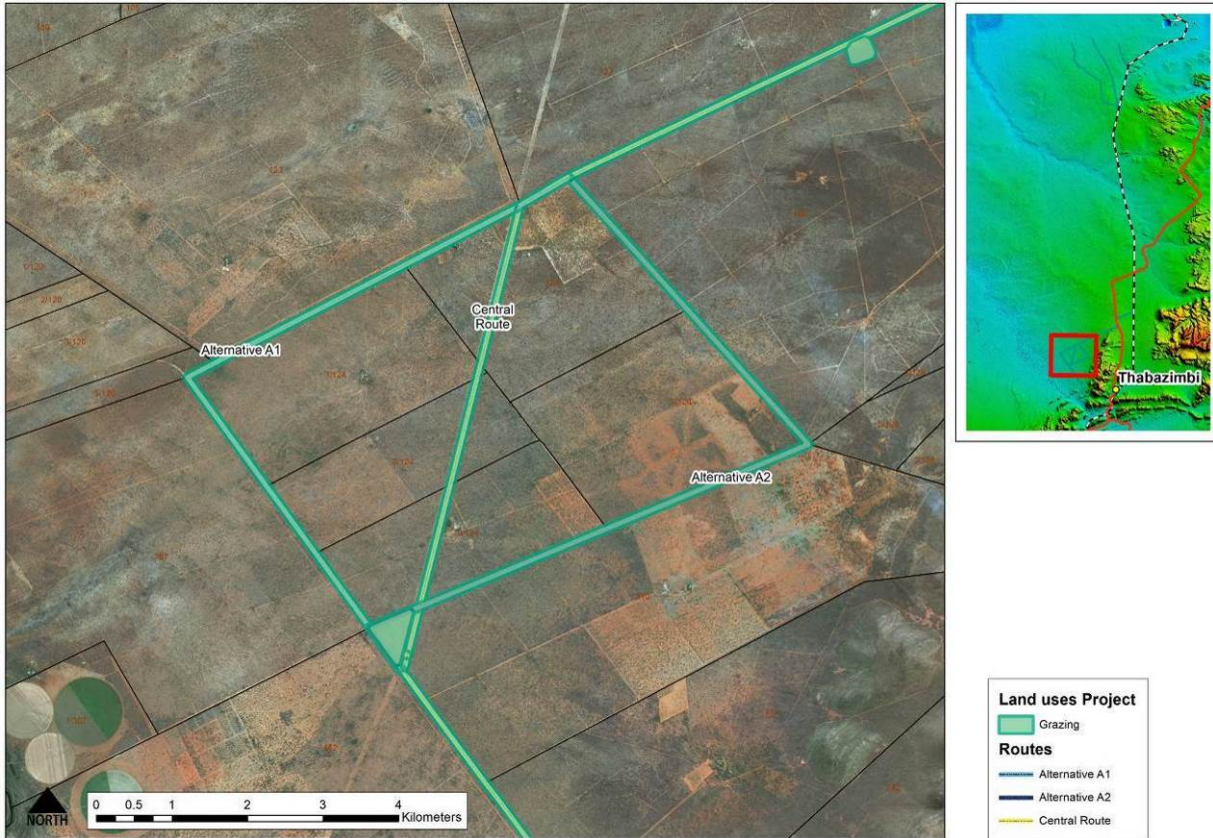


Figure 2. Land uses along Route Alternatives A1 and A2

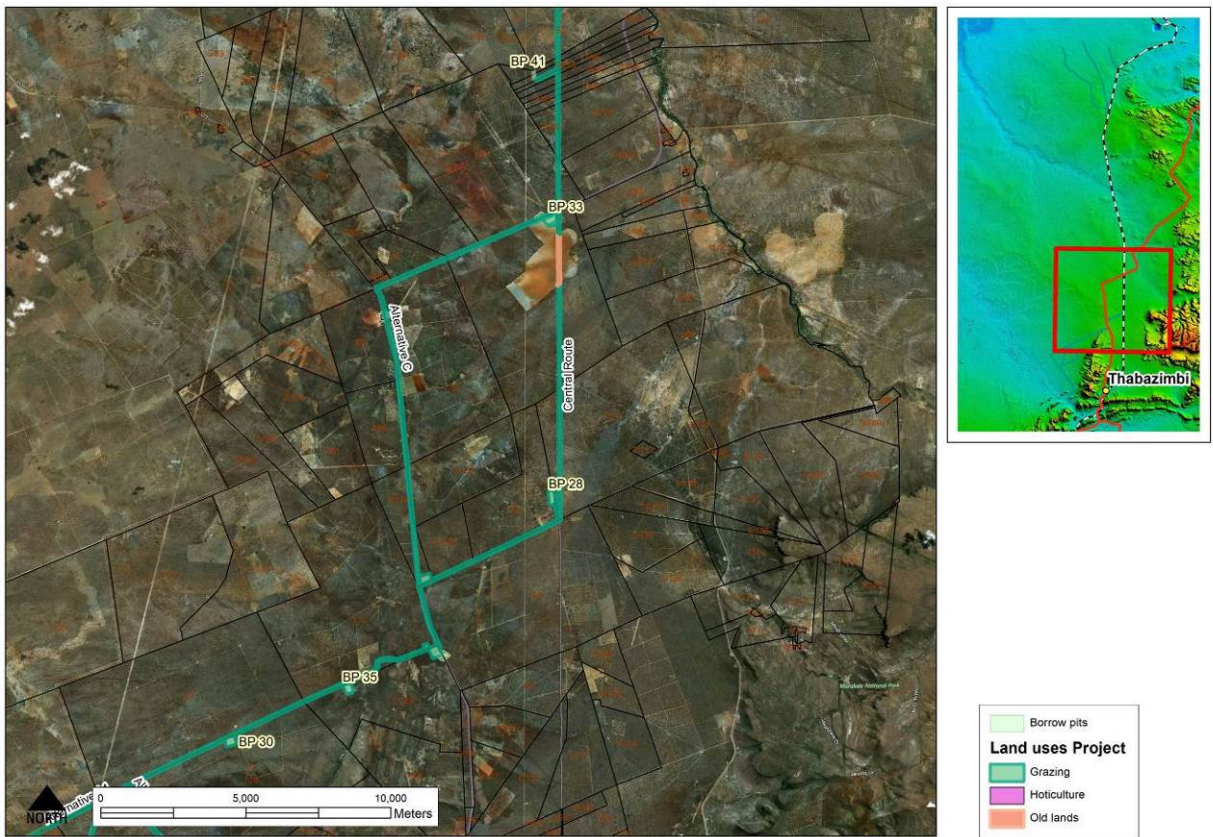


Figure 3. Land uses along Route Alternative C

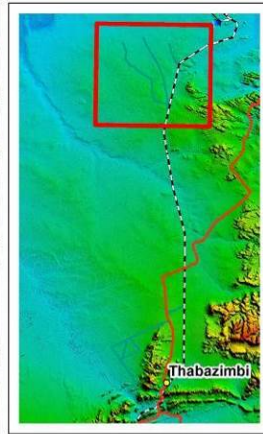


Figure 4. Land uses along Route Alternatives D1, D2 and D3

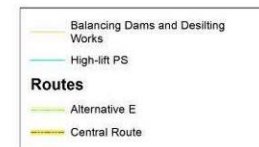
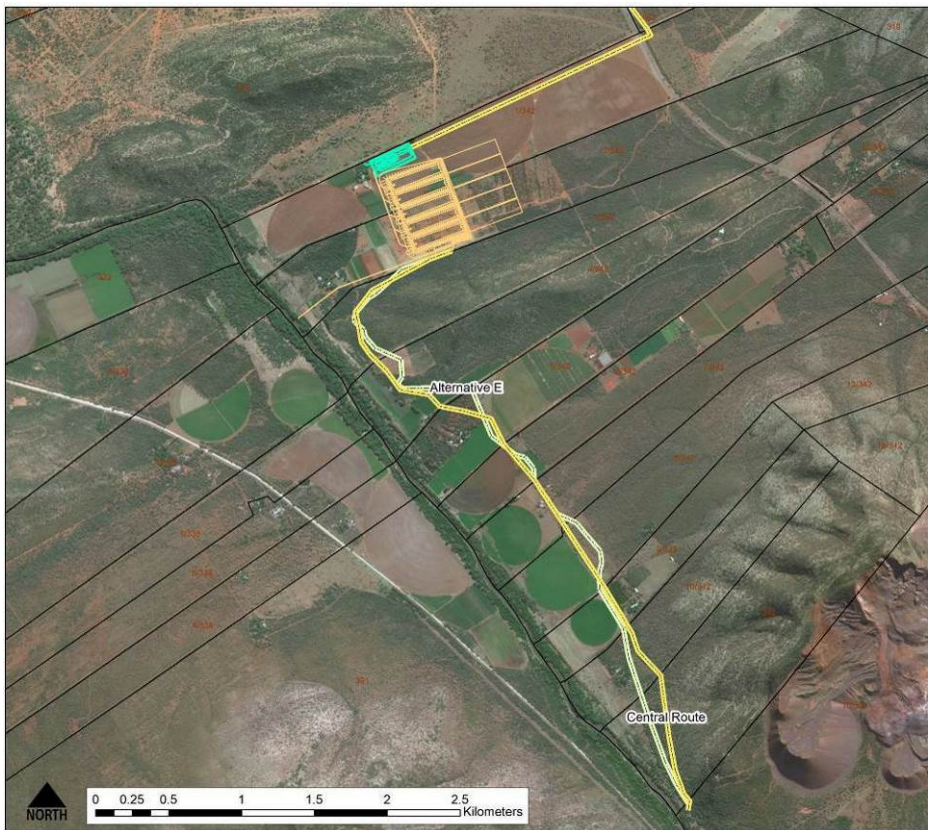


Figure 5. Land uses along Route Alternative E

- The predominant land use is animal production. Approximately 95% of the land is grazing. The land indicated as *fallow* has recently been cultivated and in some instances have been left to return to grazing.

The following photos show the main activities:



Photo 1. Land irrigated from the Crocodile River



Photo 2. Grazing land

A photo record of the land uses is provided as an addendum.

Irrigated land was found on the following properties:

Table 2. Properties with irrigated land

21 K Farm digit	Parcel No	Latitude	Longitude
TOKQ0000000034200001	1/342	27,307789	-24,590171
TOKQ0000000034200002	2/342	27,310984	-24,593385
TOKQ0000000034200003	3/342	27,307484	-24,598281
TOKQ0000000034200004	4/342	27,309057	-24,601314
TOKQ0000000034200005	5/342	27,311149	-24,604165
TOKQ0000000034200006	6/342	27,313467	-24,606500
TOKQ0000000034200007	7/342	27,325335	-24,602699
TOKQ0000000034200008	8/342	27,326581	-24,606477
TOKQ0000000034200009	9/342	27,315810	-24,616934
TOKQ0000000034200010	10/342	27,317779	-24,619415

Conclusions

- Except for the properties listed in Table 2, no irrigated land nor cultivated land was identified;
- The main crops produced are lucerne, wheat, citrus and cotton;
- Livestock and combination or separately takes place on the largest part of the area;
- The bush density is very high in the southern part and some farmers are thinning out the vegetation to improve the grazing capacity of the veld; and
- Other farming activities identified are taxidermy, meat processing, hunting, guesthouses and tourism activities.

3.2 BORROW PITS

The only land uses observed on the land proposed for the borrow pits were grazing or browsing for animals. No farming infrastructure will be negatively impacted on by the locality of the borrow pits. BP SS1 is in the river bed at has no agricultural use.

The positions of the BP are indicated in Figure 6 and the size of the pit, the access roads and the buffer in Table 3.

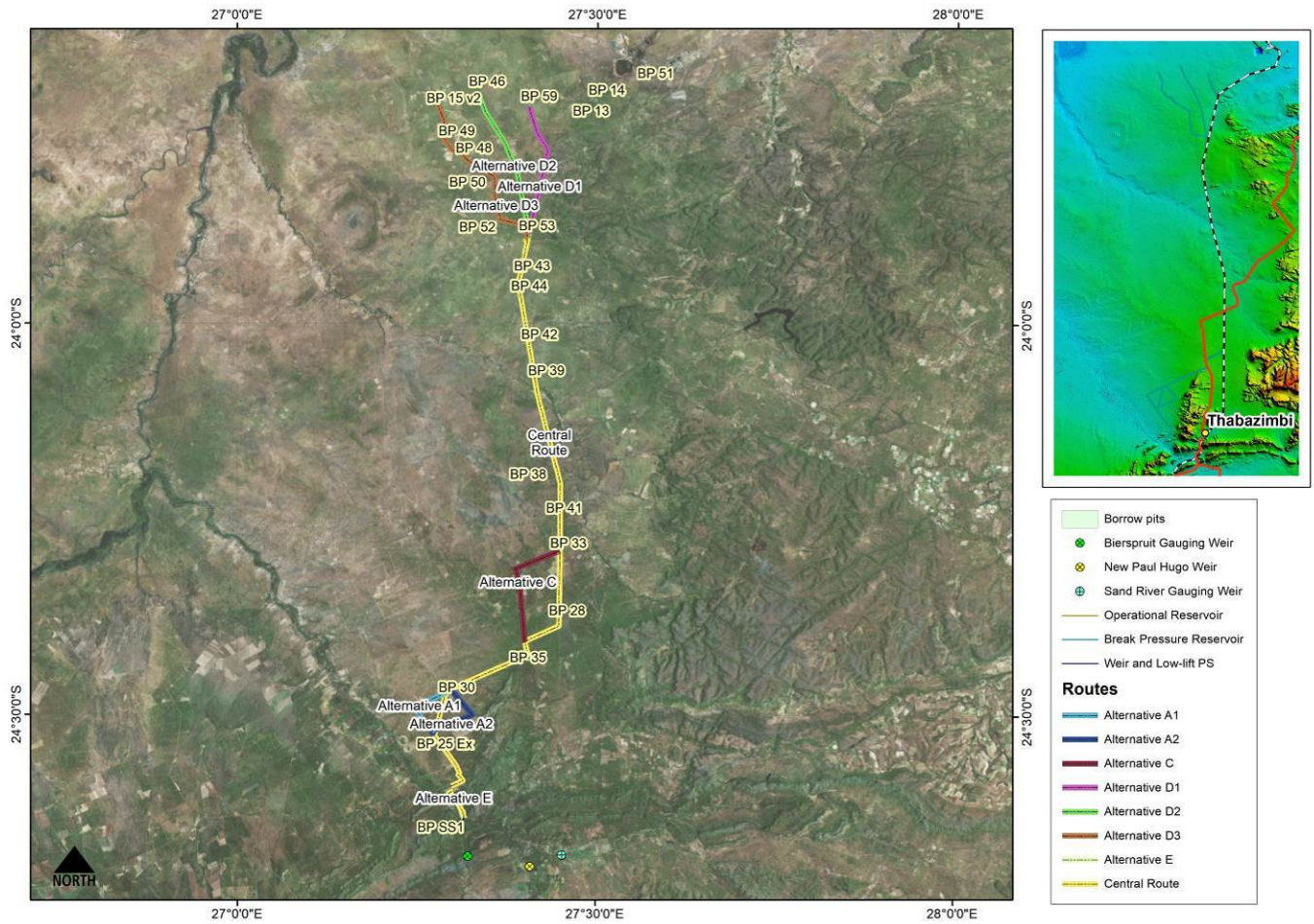


Figure 6. Locality of borrow pits

Table 3. Size of BP, access road and corridor of 50 metres of the pit perimeter

Pit number	Area (ha)	Pit number	Area (ha)
BP 51	13,5	BP41	8,9
BP ss1	3	BP42	16,9
BP13	34,1	BP43	13,5
BP14	24,9	BP44	12,2
BP15 v2 CAMP	9,4	BP46	6,7
BP25Ex	26,4	BP48	20,8
BP28	17,9	BP49	11,6
BP30	10,8	BP50	22
BP33	16,4	BP52	14
BP35	11,1	BP53	6,1
BP38	22,2	BP59	7,4
BP39	18	TOTAL	347,8

4 NATURAL RESOURCES – BASELINE CONDITION

4.1 CLIMATE

The site is located in the western portion of Limpopo Province. It has a typical summer rainfall pattern.

A summary of the climate data is as follows:

Table 4. Average monthly temperature and rainfall at Thabazimbi

	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Avg. Temperature (°C)	25,4	25,3	23,5	21,1	16,8	13,9	14,1	17,6	22,1	24,4	24,8	25,9
Min. Temperature (°C)	19,4	19,3	17,4	13,7	8,4	4,8	5,1	8,8	14,2	17,4	18,3	19,4
Max. Temperature (°C)	31,4	31,3	29,7	28,5	25,3	23	23,1	26,4	30	31,5	31,4	32,4
Rainfall (mm)	102	119	100	33	7	4	2	2	9	42	62	112

Temperature

The average monthly maximum of 32,9 °C is reached in January while the minimum of 4,8 °C is in June.

Weather data suggests that the area has experienced above normal maximum summer temperatures during 2015 to 2017 (refer Figure 7).

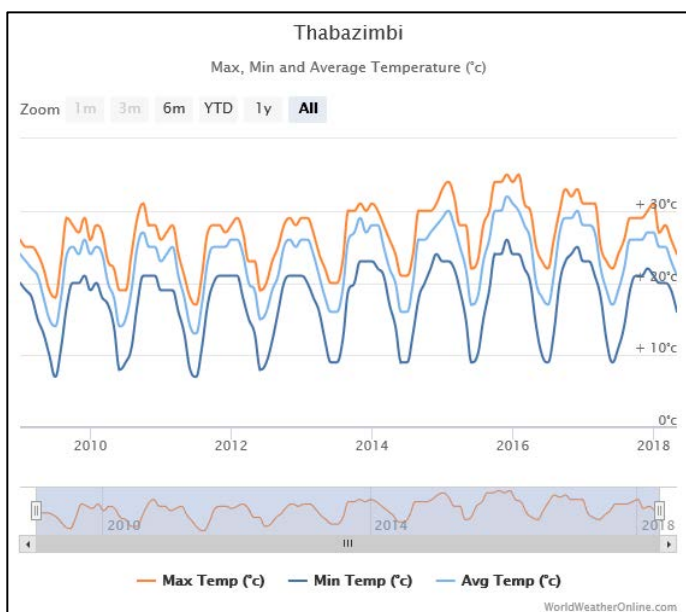


Figure 7. Temperature statistics for 2008 to 2018

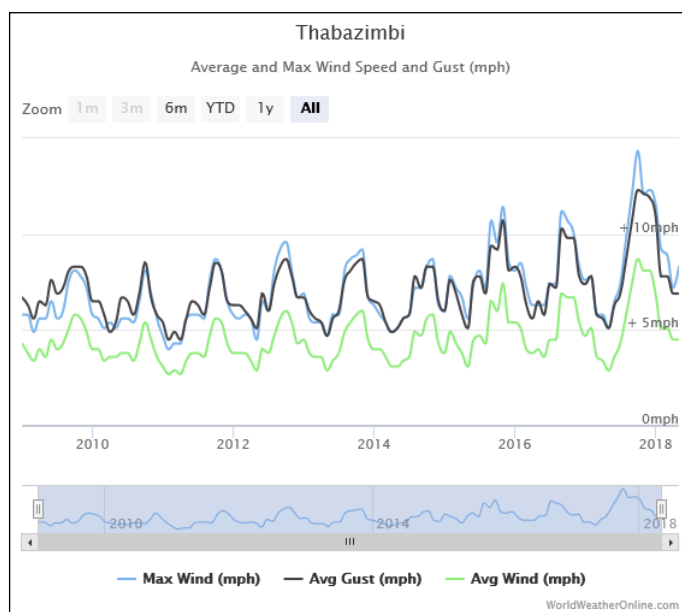


Figure 8. Wind speeds at Thabazimbi from 2008 to 2018

Rainfall

The average annual rainfall is 595 mm for most of the study area, and up to 600 in the far northern portion. The project area falls in the summer rainfall area of the Highveld Region and is not suitable for rain fed crop production.

Wind

Average wind speeds are around 8 km/h but can experience gusts of more than 15 km/h or higher.

4.2 VEGETATION

When rainfall is plotted against temperature at a ratio of 1:2 the resulting graph indicates the growing season.

The growing season commences in December when precipitation exceeds 50% of transpiration. This lasts until early April. The dry season with a rain deficit lasts for 8 months (April to November) of the year. The winter period is dry with little or no vegetative growth. This is also reflected in the grazing capacity for livestock. Site rehabilitation must be programmed to coincide with the *growing season / moist period* between the beginning of December and the end of March.

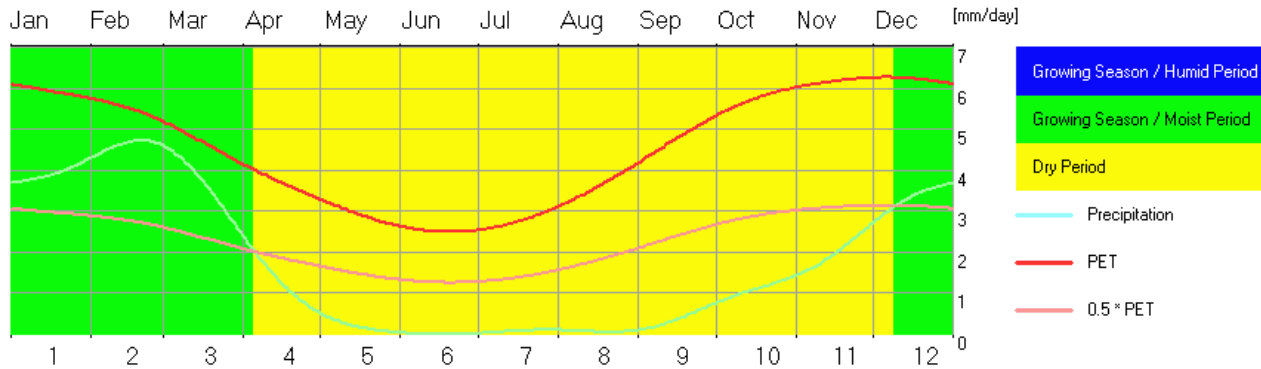


Figure 9. Climatogram of the study area

The grazing capacity of natural veld, according to the Department of Agriculture, is estimated at 7 hectares per large stock unit (LSU) for the southern portion close to Thabazimbi, gradually diminishing to 11 at Lephalale. The browsing value of the Sandy Bushveld and Limpopo Sweet Bushveld trees and shrubs tend to favour browsing animals, hence, the large number of game farms or at least farmers that have both game and livestock.

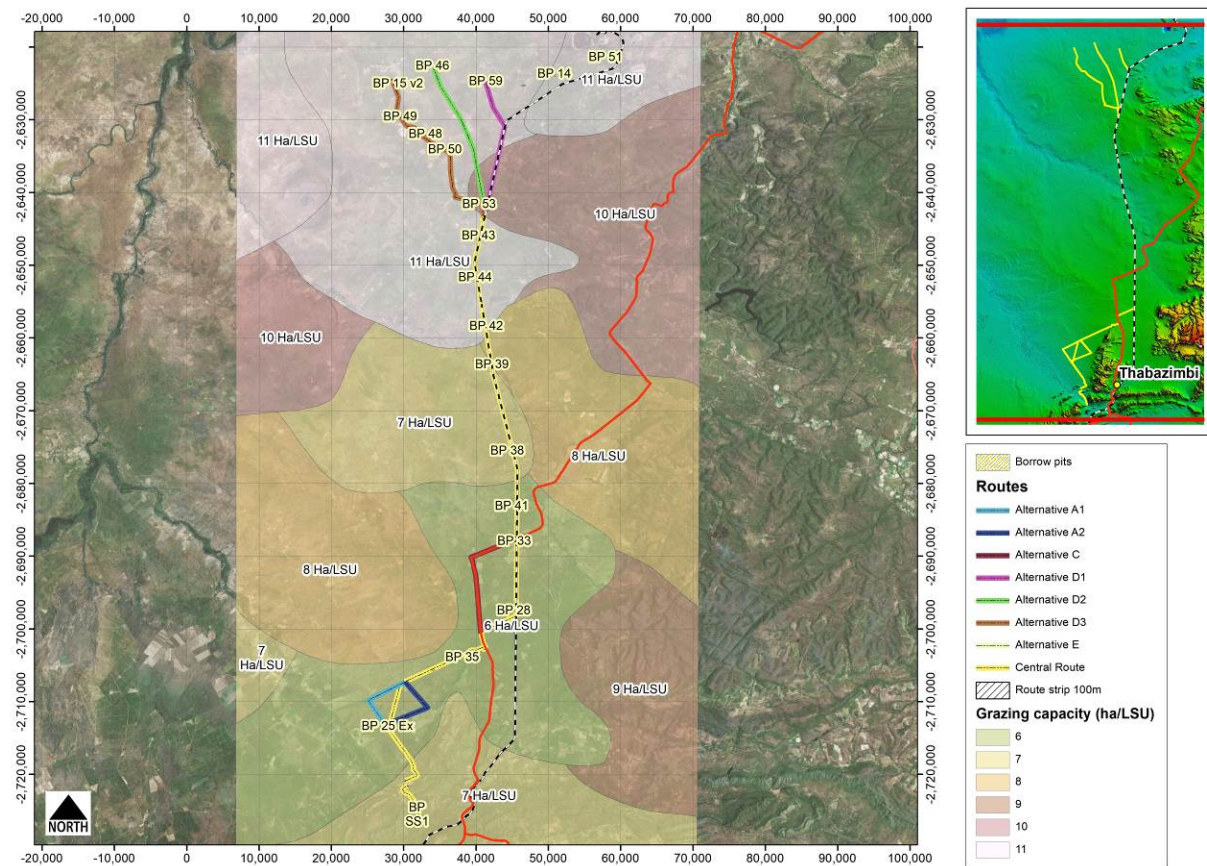


Figure 10. Grazing capacity of the site (ha/LSU)

4.3 SOIL

4.3.1 Soil types

Soils that occur on the site is based on the published Land Type Maps of the Department of Agriculture. It indicates the main soil types that occurs within each catena of land zone (refer to Figure 11 Soil types).

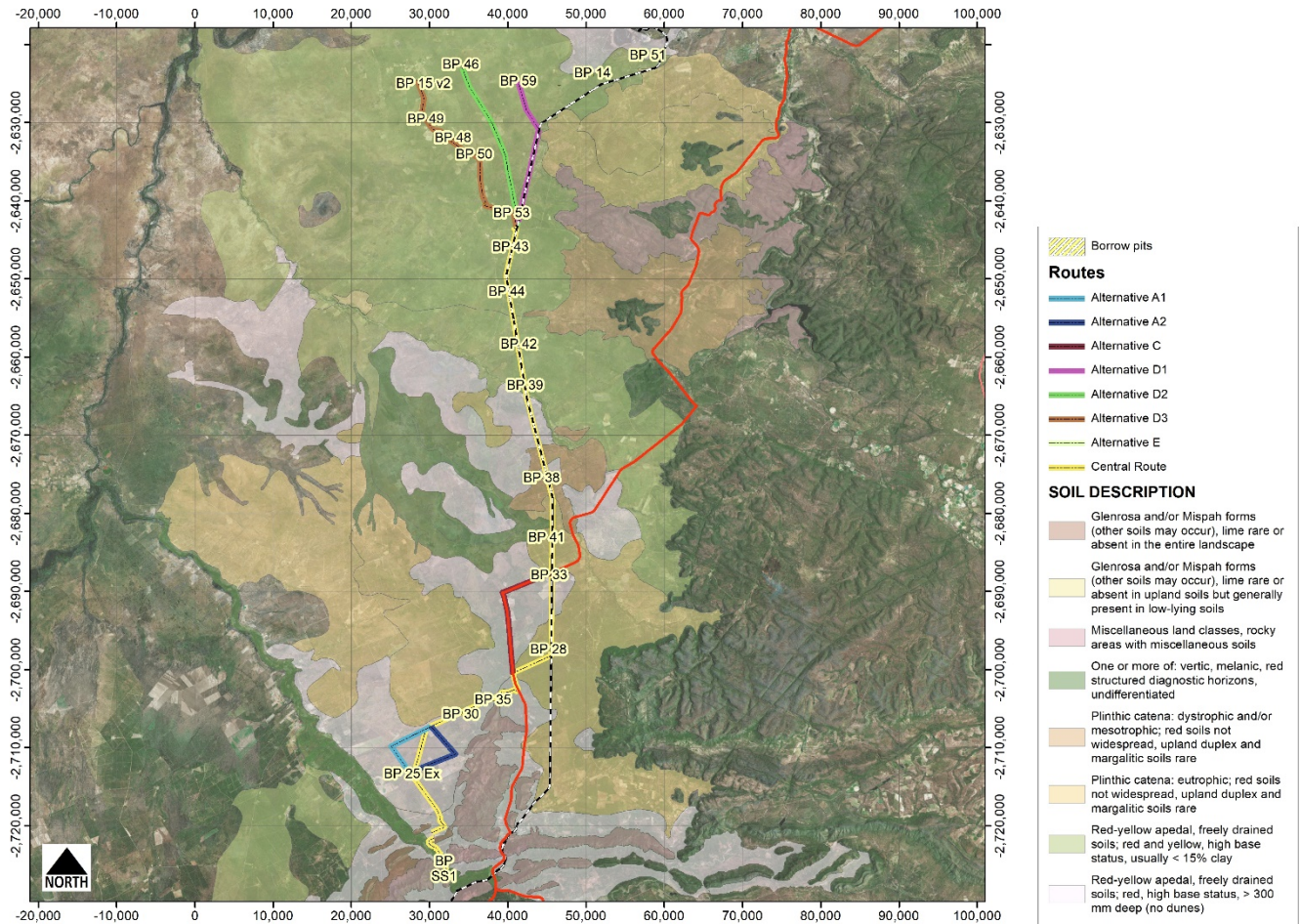


Figure 11 Soil types

4.3.2 Soil potential

Soil potential is based on the published Land Type Maps of the Department of Agriculture. It indicates the soil suitability of the various land types for various agricultural uses. (Refer to Figure 12 Soil potential).

4.3.3 Dryland crop production potential

The climate and soils are the main environment factors that determine dryland crop potential on an area.

The entire site is not recognized as a rain fed cropping area, the only crop production takes place where irrigation water is available. A few portions of land had been cleared of vegetation before 2002; but has since reverted to veld. Grass has recovered but trees and shrubs are only now slowly returning to its previous condition.

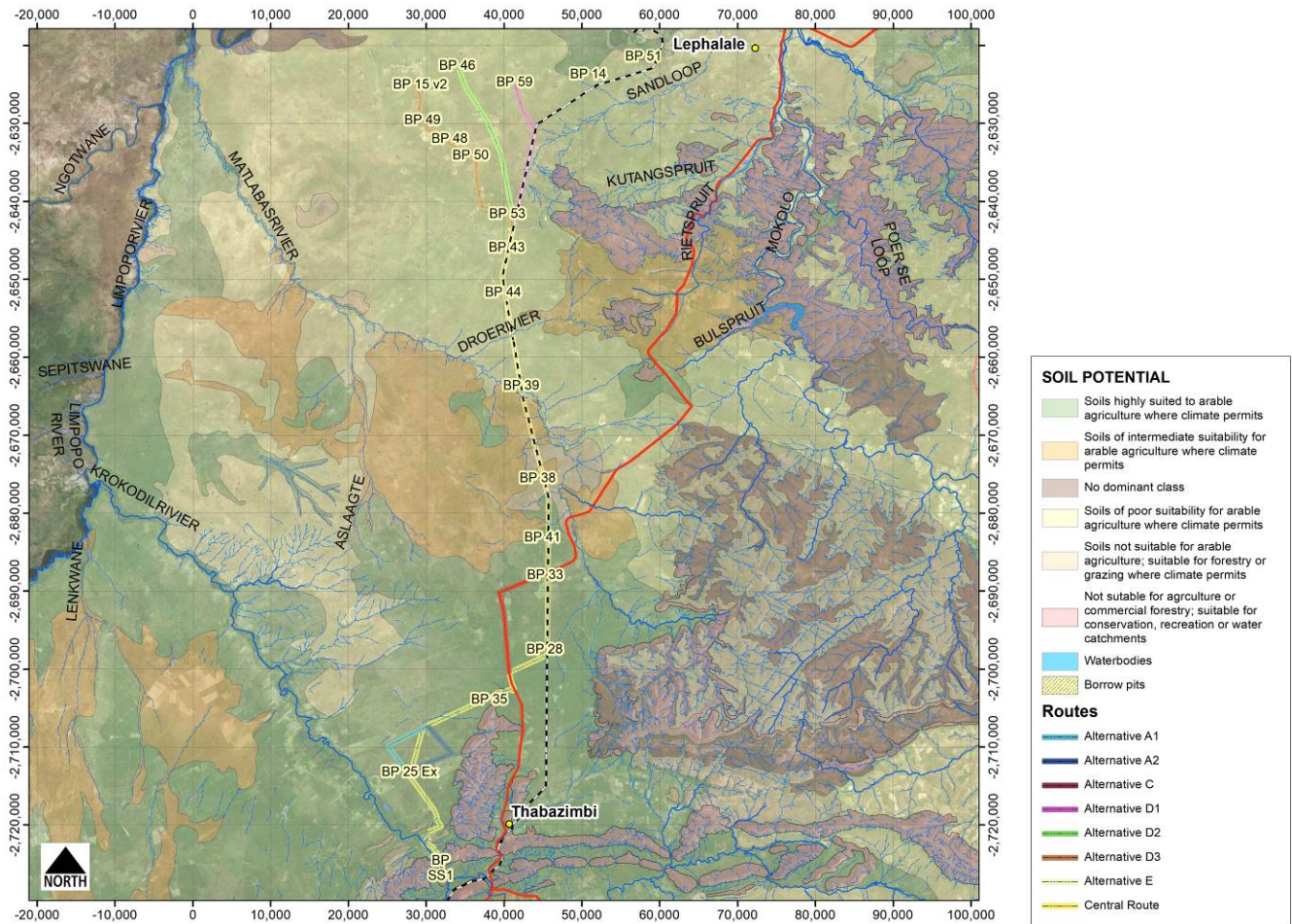


Figure 12 Soil potential

5 IMPACT ASSESSMENT

5.1 ASSUMPTIONS

The land uses on which the impact is based are as follows:

Table 5. Land uses (areas in hectare)

Route	Fallow	Grazing	Orchards	Irrigated	Old lands	Orchards	Potentially irrigable	Water Course	TOTAL
Pipeline routes									
A1		104,6							104,6
A2		116,9							116,9
Central A		62,2							62,2
C		172,0	1,3						173,3
Central C		141,1							141,1
E	3,3	38,7		11,5		0,7			54,2
Central E	1,8	40,5	1,4	9,0					52,7

Route	Fallow	Grazing	Orchards	Irrigated	Old lands	Orchards	Potentially irrigable	Water Course	TOTAL
D1		196,9							196,9
D2		198,9			22,2				221,1
D3		253,2			8,7				261,9
Central (other than at diversions)		680,7		17,8	17,8				716,3
Total pipeline routes		2 005,7	2,7	38,3	48,7	0,7			2 101,2
Borrow pits									
BP ss1									0
BP13		34,1							34,1
BP14		24,9							24,9
BP15 v2 CAMP		9,4							9,4
BP25Ex		26,4							26,4
BP28		17,9							17,9
BP30		10,8							10,8
BP33		16,4							16,4
BP35		11,1							11,1
BP38		22,2							22,2
BP39		18							18
BP41		8,9							8,9
BP42		16,9							16,9
BP43		13,5							13,5
BP44		12,2							12,2
BP46		6,7							6,7
BP48		20,8							20,8
BP49		11,6							11,6
BP50		22							22
BP 51		13,5							13,5
BP52		14							14
BP53		6,1							6,1
BP59		7,4							7,4
Total borrow pits		347,8							347,8
Sedimentation Works		1,6		23,1			7,7		32,4
Construction camps		58,5							58,5
High lift Reservoir				11,5					11,5
Break pressure reservoir		8,1							8,1
Operational reservoir		15,6							15,6
Weir and low lift PS		0							0
TOTAL	5,1	2 421,7	2,7	66,3	53,2	0,7	7,7	3	2 567

- Grazing land will be temporary lost for a 50 metres¹ strip along the path of the pipeline. The browsing value of trees, however, will be lost notwithstanding the grass returning.
- Fallow and old lands are now mostly upgraded veld grazing. There are some areas along the Crocodile River that are now fallow, but which is potentially irrigable.
- Irrigated lands are mostly under centre pivot irrigation systems, which has permanent and expensive underground infrastructure that will have to be considered in the routing of the pipeline. Fertility of irrigated land is usually built

¹ The temporary loss for grazing land will be for a strip of 50 metres from the boundary fence of the property. The width is to allow for disturbances caused to the animals by construction vehicles and dust that may settle on the leaves of grass and trees.

up over time and must also be taken into consideration in the evaluation. Traversing the pivot irrigation system will lead to a temporary loss of the land along the pipeline and may influence cropping depending on the season when construction takes place.

- Housing and farming infrastructure is a cost item but will not directly impact on the farming income, unless it is used as packing sheds, which is then part of the production process. Loss of infrastructure should be dealt with under the social assessment of the EIA.
- The National Department of Agriculture defines high potential land as follows:
 - land best suited to, and capable of consistently producing acceptable levels of goods and services for a wide range of agricultural enterprises in a sustainable manner, taking into consideration expenditure of energy and economic resources; and includes:
 - (i) land capability Classes I, II and III²;
 - (ii) unique agricultural land;
 - (iii) irrigated land; and
 - (iv) land suitable for irrigation (deep well-drained soils and assuming irrigation water is available);

Rating criteria

The following rating was used to indicate impacts:

Extent

- Local - extend to the site and its immediate surroundings;
- Regional - impact on the region but within the province;
- National - impact on an interprovincial scale and
- International - impact outside of South Africa.

Magnitude

Degree to which impact may cause irreplaceable loss of resources:

- Low - natural and social functions and processes are not affected or minimally affected;
- Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way; and
- High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.

Duration

- Short term: 0 to 5 years;
- Medium term: 5 to 11 years;
- Long term - impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention; and
- Permanent - mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Probability

- Almost certain - the event is expected to occur in most circumstances;
- Likely - the event will probably occur in most circumstances;

² Land Type maps of the Department of Agriculture.

- Moderate - the event should occur at some time;
- Unlikely - the event could occur at some time; and
- Rare/Remote - the event may occur only in exceptional circumstances.

Significance

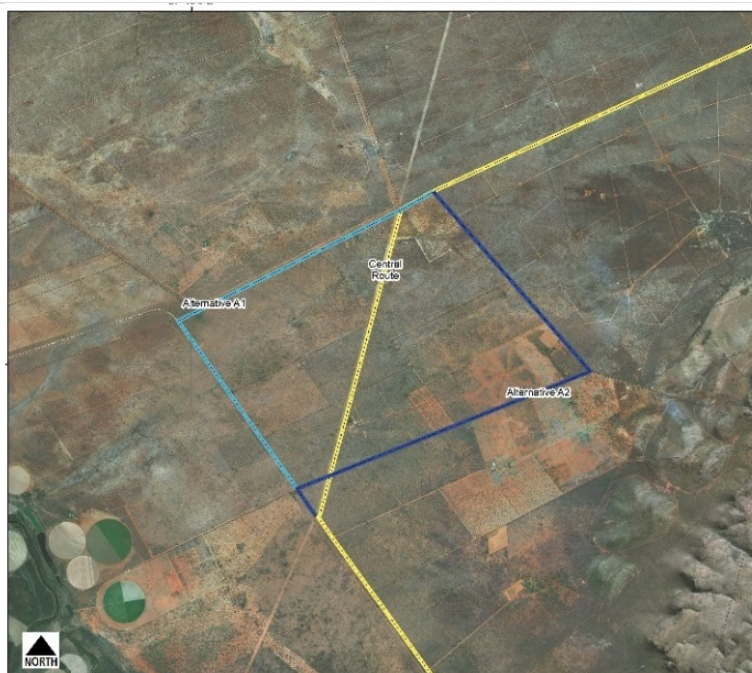
Provides an overall impression of an impact’s importance, and the degree to which it can be mitigated. The range for significance ratings is as follows:

- 0 – Impact will not affect the environment. No mitigation necessary;
- 1 – No impact after mitigation;
- 2 – Residual impact after mitigation; and
- 3 – Impact cannot be mitigated.

5.2 LOSS OF AGRICULTURAL RESOURCES

5.2.1 Impact description

5.2.1.1 Pipeline



ALTERNATIVE A

Loss of high potential agricultural land:

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: 0 – Impact will not affect the environment.
- Not applicable.

Loss of cultivated land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: 0 – Impact will not affect the environment.
- Not applicable.

Loss of grazing land

- Extent: Local.
- Magnitude: Low.
- Duration: Temporary.
- Probability: Certain.
- Significance: 2 (Residual impact after mitigation).
- Mitigation:
 - limit construction vehicles to the minimum area possible; reseeding must take place during December to February.

- Compensation for temporary loss of resource

PREFERRED OPTION

- Alternatives A1 or A2. Pipeline will follow boundary lines where it will be within the firebreak.



ALTERNATIVE C

Loss of high potential agricultural land (Area with orchards under irrigation from boreholes)

- Extent: Local.
- Magnitude: High.
- Duration: Temporary.
- Probability: Certain.
- Significance: 2 (Residual impact after mitigation).
- Mitigation:
 - Avoid orchards or replace in suitable agreed to locality.
 - Compensation.

Loss of cultivated land: Area with orchards. As above.

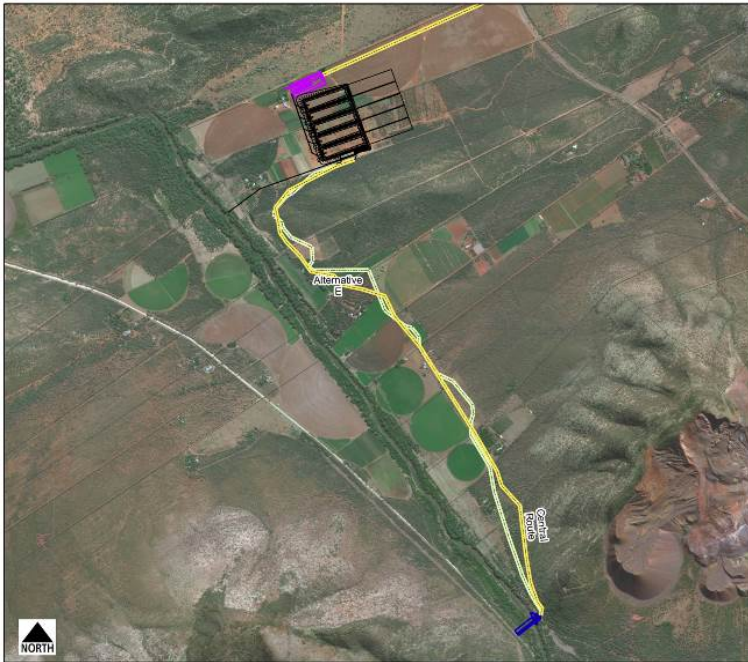
- Extent: Local.
- Magnitude: High.
- Duration: Temporary.
- Probability: Certain.
- Significance: 2 (Residual impact after mitigation).
- Mitigation:
 - Avoid orchards or replace in suitable agreed to locality.
 - Compensation.

Loss of grazing land

- Extent: Local.
- Magnitude: Low.
- Duration: Temporary.
- Probability: Certain.
- Significance: 2 (Residual impact after mitigation).
- Mitigation:
 - limit construction vehicles to the minimum area possible; reseeded must take place during December to February.
 - Compensation for temporary loss of resource / income.

PREFERRED OPTION

- Alternative Central C.



ALTERNATIVE E

Loss of high potential agricultural land:

- Extent: Local.
- Magnitude: High.
- Duration: Temporary.
- Probability: Certain.
- Significance on local community: Low /Moderate.
- Significance on regional level: 2 (Residual impact after mitigation).
- Mitigation:
 - Try and time construction to have the least impact on the production process. Communicate this with the farmers.
 - Separate the topsoil from subsoil during excavation and replace in the same sequence when backfilling.
 - Compensation for temporary loss of resource.

Loss of cultivated land (See loss of agricultural land, above)

- Extent: Local.
- Magnitude: High.
- Duration: Temporary.
- Probability: Certain.
- Significance on local community: Low /Moderate.
- Significance on regional level: 2 (Residual impact after mitigation).
- Mitigation:
 - Try and time construction to have the least impact on the production process. Communicate this with the farmers.
 - Separate the topsoil from subsoil during excavation and replace in the same sequence when backfilling.
 - Compensation for temporary loss of resource.

Loss of grazing land

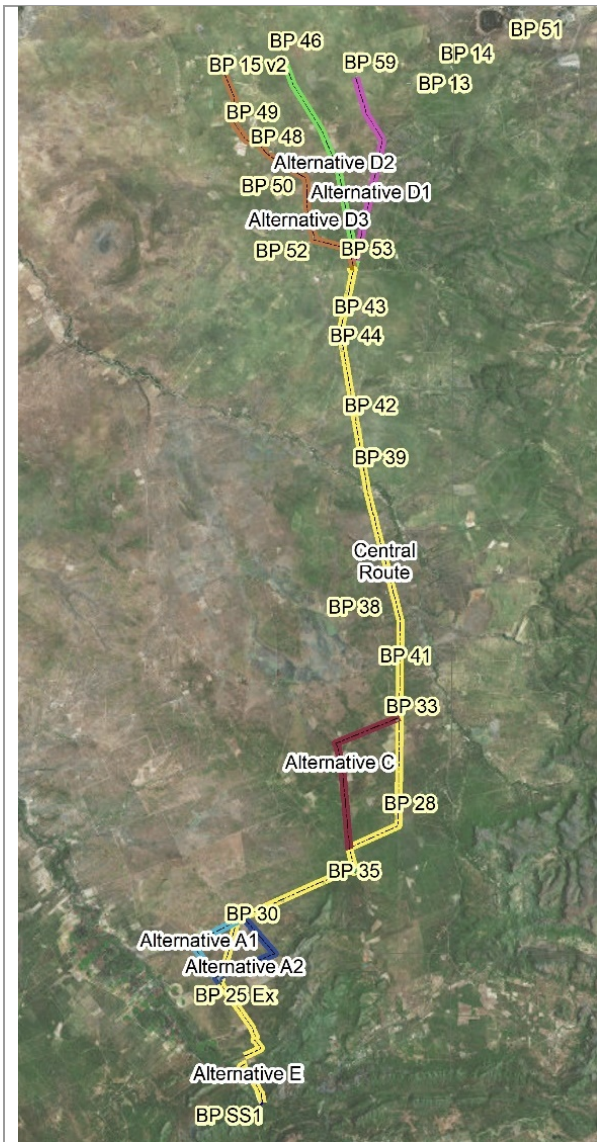
- Extent: Local.
- Magnitude: Low.
- Duration: Temporary.
- Probability: Certain.
- Significance on local community: 2 (Residual impact after mitigation).

- Mitigation:
 - Compensation for temporary loss of resource.
- PREFERRED OPTION**
- Central E will have the smallest impact on irrigation land.

5.2.1.2 Borrow pits

Refer to size and locations of the BPs in Paragraph 5.3.1.2.

BP SS1 will be submerged once construction is completed and because it will not influence flow volumes in the river. It will, therefore, not have any impact on the downstream water users. The descriptions below refers to the others.



BORROW PITS

Loss of high potential agricultural land:

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of cultivated land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of grazing land

- Extent: Local.
- Magnitude: Low.
- Duration: Temporary.
- Probability: Certain.
- Significance on local community: 2 (Residual impact after mitigation).
- Mitigation:
 - Remove topsoil prior to excavating material; create self-draining landform and rehabilitate and seed during December to February.
 - Compensation for temporary loss of resource.

5.2.1.3 Pumping stations and storage infrastructure

Consists of the following:

- Vlieëpoort Abstraction Weir on the Crocodile River;
- Low lift Pumping Station;
- Low lift Rising Main;
- Balancing Reservoir;
- Break Pressure Reservoir;
- High-lift Pumping Station;
- Gauging weirs; and
- Accommodation, offices, workshops and security measures.



Break Pressure Reservoir

Loss of high potential agricultural land:

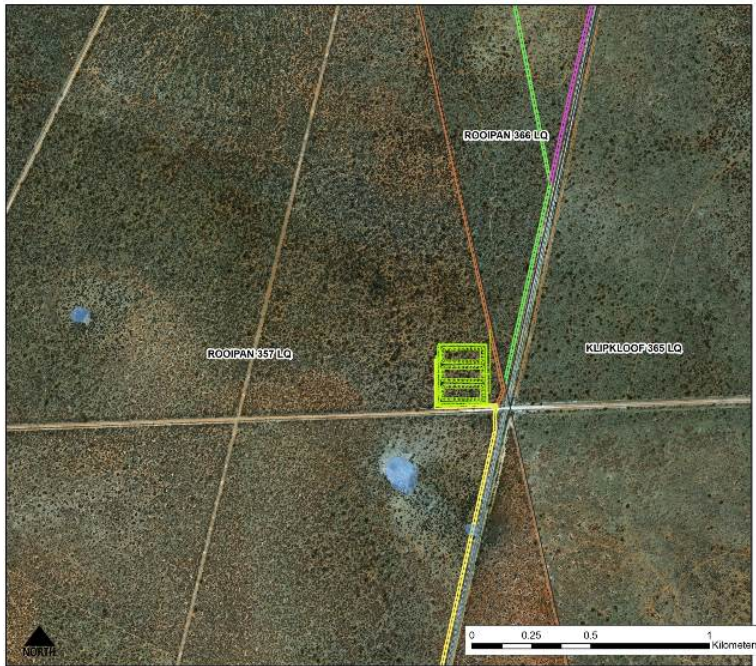
- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of cultivated land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of grazing land

- Extent: Local.
- Magnitude: High.
- Duration: Permanent.
- Probability: Certain.
- Significance: 3 .
- Mitigation: Compensation.



Operational Reservoir

Loss of high potential agricultural land:

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of cultivated land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of grazing land

- Extent: Local.
- Magnitude: High.
- Duration: Permanent.
- Probability: Certain.
- Significance: 3 .
- Mitigation:
 - Compensation for loss of resource



Vlieëpoort Weir and low-lifting pump station

Loss of high potential agricultural land:

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

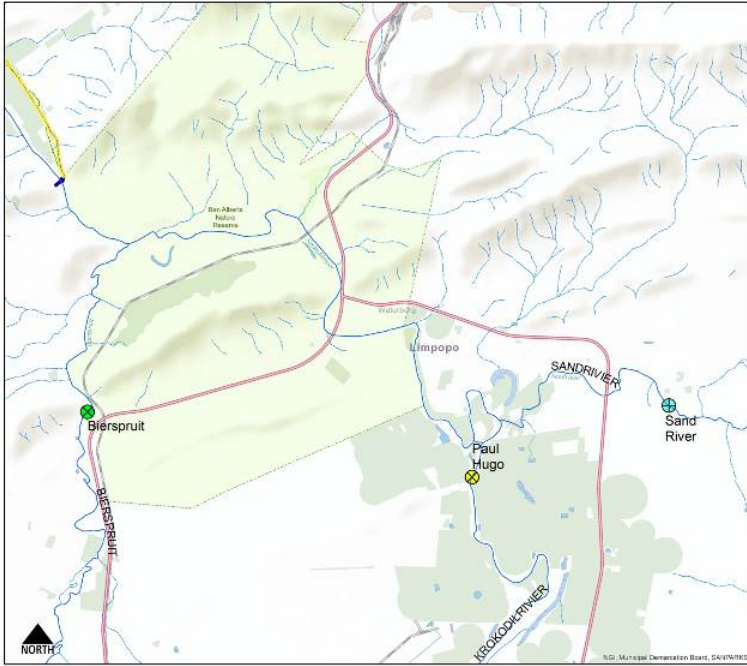
Loss of cultivated land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of grazing land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.

- Significance: Not applicable.
- Mitigation: Not applicable.



Gauging weirs

Loss of high potential agricultural land:

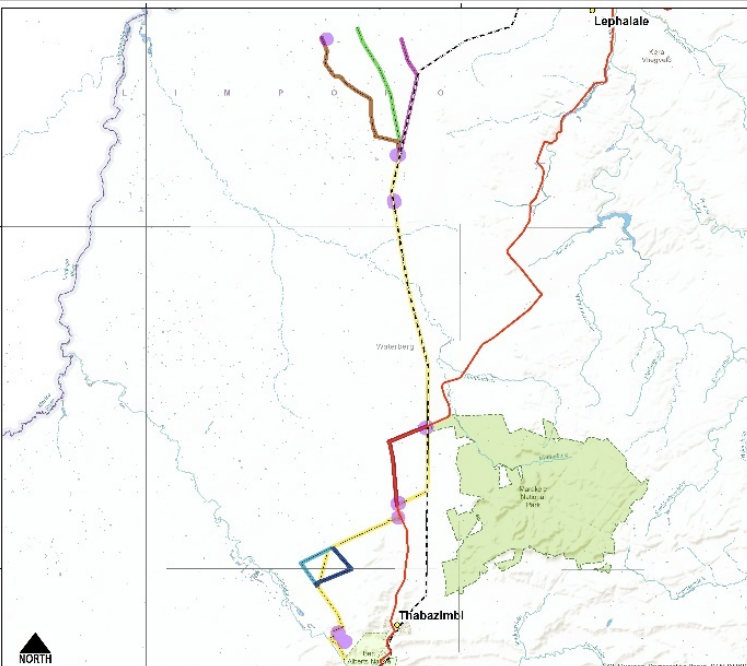
- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of cultivated land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of grazing land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.



Construction camps

Loss of high potential agricultural land:

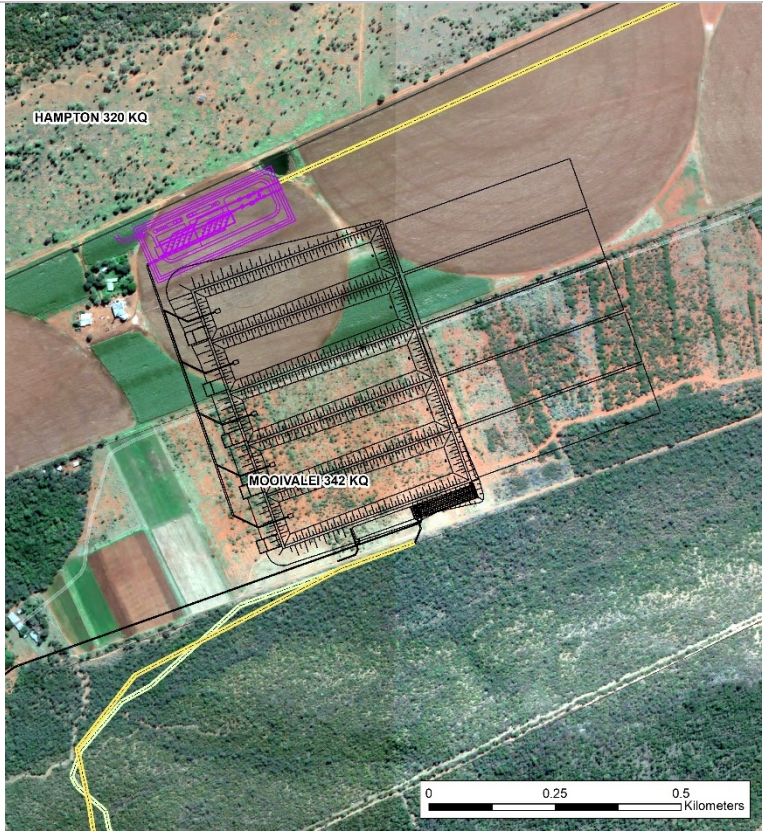
- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of cultivated land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.
- Mitigation: Not applicable.

Loss of grazing land

- Extent: Local.
- Magnitude: Low.



- Duration: Temporary.
- Probability: Certain.
- Significance on local community: 2 (Residual impact after mitigation).
- Mitigation:
 - limit construction camps to the minimum area possible; reseeding must take place during December to February.
 - Compensation for temporary loss of resource.

Desilting works

Loss of high potential agricultural land:

- Extent: Regional.
- Magnitude: High.
- Duration: Permanent.
- Probability: Certain.
- Significance: 3.
- Mitigation: Compensation.

Loss of cultivated land

- Extent: Regional.
- Magnitude: High.
- Duration: Permanent.
- Probability: Certain.
- Significance: 3.
- Mitigation: Compensation .

Loss of grazing land

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: Not applicable.

Mitigation

- Limit footprint to the minimum area possible.
- Irrigation water is pumped from the Crocodile River. The pivot irrigation system will be lost and remaining land outside of the infrastructure boundary replaced with a conventional irrigation system.
- The extent of the loss could be so large that the farming unit may no longer be economically viable. It will then have to be subdivided and consolidated with an adjoining farm in terms of Sub-division of Agricultural Land Act, Act 70 of 1970.
- Compensation for loss of resource.

5.2.1.4 Agricultural infrastructure

The impact on agriculture has three components;

- the replacement of infrastructure;
- loss of income in cases where the farming opportunity is lost or reduced in size; and
- the temporary loss of income during the period of construction.

Permanent infrastructure on farms is critical in the production process and can have a major impact on farming income, especially in the case where pivot irrigation systems are used. Irrigation may cease during the period that the pipeline is constructed. In the case of permanent infrastructure such as pumping infrastructure and the desilting works, the total pivot system will be permanently lost. Alternative irrigation systems are possible as mitigation but could lead to increase labour requirement for the farming operations and place an additional burden on management. This will have to be considered when the land is valued.

In addition, there are a number of houses in proximity of the routes that will impact on the farming operations, either permanently, or at least for the duration of the construction. The impact is dealt with by the Socio-economic Assessment.

There are a number of cattle or game watering and handling facilities that will have to be moved or replaced. This may include boreholes from which water is pumped.

The scoping report indicates that water off-take points can be provided. It is DWS' standing policy to only provide offtake points for livestock and/or game watering to authorised directly affected landowners. A limited volume of water will be set aside for this purpose. Such users will have to apply for a water use licence (Chapter 4 of the NWA) and enter into an agreement with DWS. Water tariffs will be payable in accordance with the prevailing Pricing Strategy.

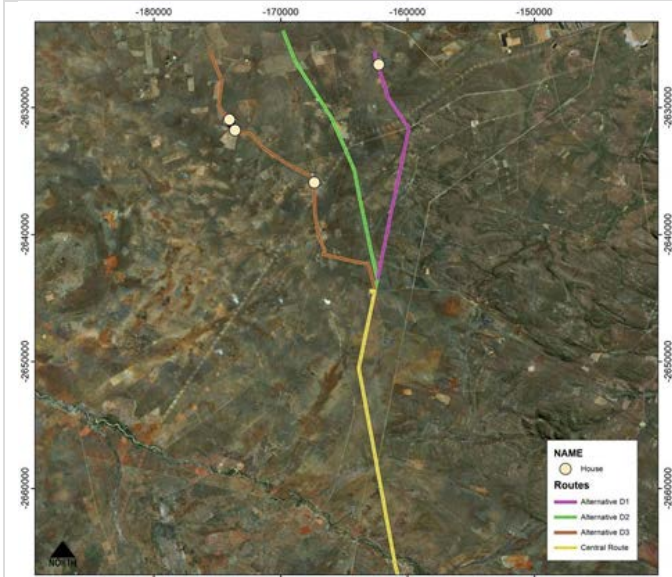
None of the borrow pits will impact on infrastructure, housing, farm buildings or permanent irrigation lines. It will however, impact on fences and farm roads.

The farm infrastructure on each route are as follows (refer to Table 3 and Figure 6 to 8):

Table 6. Farm infrastructure within each route

Route	Pivots
A1	0
A2	0
Central A	0
C	0
Central C	0
D1	0
D2	0
D3	0
E	0
Central E	0
Central at Mooivallei	3
Total	3

The loss of farming infrastructure in this assessment is limited to structures that are directly linked to production, i.e., irrigation supply lines and packing sheds.



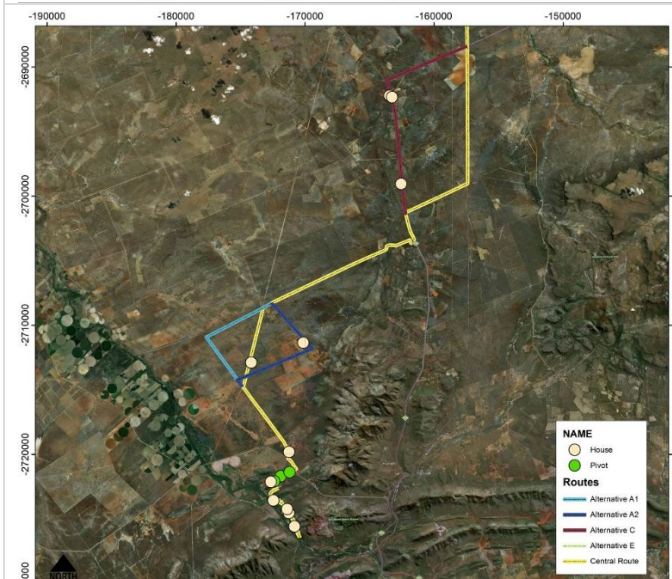
NORTHERN SECTION

Loss of pivot irrigation systems

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: 0 – will not affect the environment.
- Not applicable.

PREFERRED OPTION

- There is no preference.



SOUTHERN SECTION NORTH OF MOOIVALLEI

Irrigation pivots

- Extent: Not applicable.
- Magnitude: Not applicable.
- Duration: Not applicable.
- Probability: Not applicable.
- Significance: 0 – Impact will not affect the environment.
- Not applicable.

PREFERRED OPTION

- There is no preference.



FARMS ALONG THE CROCODILE RIVER SECTION

Irrigation pivots

Irrigation pivots will be affected by the construction of the Balancing Dams and Desilting Works; as well as on the Central route west of the works.

- Extent: Local.
- Magnitude: High.
- Duration: Two pivots will be affected permanently and one temporary.
- Probability: Certain.
- Significance: 3.

PREFERRED OPTION

Alternative E and the Central Route to the west of Balancing Dams and Desilting Plant.

5.2.2 Indirect Impact of development

Theft and vandalism usually increase during construction and has to be managed.

Mitigation

Theft and vandalism can be reduced by providing security to farmers.

5.2.3 Biological

Some possible environmental impacts of the development are the following:

- Dust along the main roads that is created by large trucks has a severe impact on crop yield and on the number of livestock that the farm can sustain; and
- Noise and dust will impact on tourism and hunting opportunities of game farms.

Mitigation

- Keep the construction period as short as possible. One accepts that this will automatically be the case.
- Employ dust reduction methods.
- Communicate blasting and after-hours construction work of farms where tourism and hunting takes place.

5.3 FARMING OPERATIONS

Many of the properties are used for wildlife breeding or production with hunting and safari excursions as focus. Fences are of game standard with many electrified to protect the animals.

The hunting season is a particularly sensitive period when people movement along the construction sites must be controlled or at least be communicated to the farmers in order to ensure the safety of workers.

Many farmers expressed a fear that construction would disrupt their activities.

Some possible impacts of construction, albeit temporary, on the farmers are as follows:

- Theft and vandalism is likely to increase during construction;
- Dust along the main roads that is created by large trucks has a severe impact on animal capacity of adjoining properties;
- Noise and dust will impact on tourism and hunting opportunities of game farms; and
- Increased fire hazard emanating from the construction site or camps.

Mitigation

- Theft and vandalism can be reduced by providing security to farmers;
- Keep the construction period as short as possible and employ dust reduction methods;
- Communicate blasting and after-hours construction work of farms where tourism and hunting takes place; and
- National Veld and Forest Fire Bill (B122B of 1998) provides guidelines on the prevention of fires and for making fire breaks. The width is not prescribed in the Bill but is left to the discretion of the farmers for their particular situation and with what is acceptable for the region. Fire break will have to be made each year to accommodate the higher risk emanating from the construction process. Compensate the farmers for the cost incurred because of additional actions or locations where fire breaks will have to be made.

5.4 PREFERRED ROUTE ALIGNMENT OPTIONS

- Permanent loss of land that is irrigated from the Crocodile River at the location where the Balancing Dam and Desilting Works will be constructed. Temporary disruption of other irrigated land will be experienced during construction;
- Loss of grazing and land under cultivation is largely temporary and is for the period of construction and the time it takes for the soil and or vegetation to recover;
- Loss of agriculture related infrastructure is for housing and irrigation infrastructure; and
- Other impacts are aesthetics and visual impacts during construction; which are outside the scope of the agricultural assessment.

The following indicates the order of preference:

Table 7. Preference of Route alignments

Alternative A	Alternative C	Alternative D	Alternative E
No clear preference.	No clear preference.	No clear preference.	Route E: This is the preferred route. It will have the least impact on the irrigation farmers because it tries to avoid irrigated land.

5.5 IMPACT OF THE VLIËPOORT WEIR ON DOWNSTREAM WATER USERS

5.5.1 Background

The Scoping report indicated that overall there will be sufficient water for lawful water users in the river system:³

- The increasing surplus return flow in the Crocodile River (West) catchment that can be transferred is set out in the on-going review of the Crocodile River (West) Water Supply System Reconciliation Strategy.
- Given that the growth in water requirements for the main urban centres (Johannesburg, Midrand, Pretoria, Rustenburg) will continue to be supplied from the Vaal River System via Rand Water's network, and the commensurate growth in urban return flows towards the Crocodile River (West) and its tributaries, sufficient water is expected to be available to meet all the entitlements for water in its catchment.
- Return flows to the Crocodile River (West) are discharged into various tributaries. These mainly converge upstream and at the confluence of the Pienaars River with the Crocodile River (West), which offers the opportunity for large scale abstraction (such as for the Lephalale area) and possible regulation downstream of that point.
- Should the need for water transfer from the Crocodile River (West) catchment to the Lephalale area be taken into account, together with the effluent flows from the Rand Water transfers to the Crocodile River (West) catchment, the low water use scenarios in the Crocodile River (West) catchment also result in the lowest total transfers from the Vaal River System, despite the need for additional augmentation (raw water) in the Lephalale area to meet the growing requirements.
- The planning phase, therefore, concluded that the requirement for additional water to the project area should be augmented from the Crocodile River (West) and that adequate volumes of water should be available for such transfer.

³ Excerpts from the Scoping Report dated April 2018.

Formation of a River Management System is suggested in the Final Scoping Report but is not yet in place. In order to supply sufficient water to the take-off point at the Vlieëpoort abstraction works, the upstream lawful users are very likely ensured of a secure supply of irrigation water. The downstream users, however, less so. A management system for their particular circumstances should be included in the River Management System eluded to earlier.

It is estimated that approximately 5 900 hectares are irrigated in the Lower Crocodile Irrigation Area (Drainage Unit A24J) at present.⁴ Most of the irrigation takes place within the first 25 to 30 km downstream of the Vlieëpoort weir.

Many fallow lands were observed further downstream of Gana Hoek 111KQ, which are likely land abandoned and that is now grazing.

The farmers claimed that after the completion of the Roodekopjes Dam the water flow in the Crocodile River reduced dramatically and the irrigated area dropped to 2 950 hectares. A further reduction took place by the beginning of the 1990's to about 980 hectares. According to the farmers, during the 1990's the flow in the river improved as the runoff into the Hartebeespoort Dam increased and the farmers reacted to the improved water situation by again steadily increasing the irrigated area. The irrigators are of the opinion that their assurance of supply in 2010 could have been as high as 98%⁵. The present status of the supply has not been confirmed.

Irrigation area and water use

The areas and figures in the following tables were supplied by the local Farmers Association in 2010 and seems to also reflect the present situation.

- Irrigated Area: 5 500 ha (now measured at 5 900 ha)
- Crop area at 60% double cropping: 8 800 ha;
- Average water use per hectare: 8 000 m³/annum; and
- Average rainfall per annum: 350mm.

DWS virtually completed the validation of the registered water users. The process is continuing, but according to their present estimate, approximately 22 million m³ is registered from surface water resources, which is mainly from the Crocodile River. This is sufficient for roughly 2 752 hectares, but is subject to the final validation. A further 23,4 million is registered from boreholes. This in total comes to about the present figure of land under irrigation.

Table 9 indicates the cropping pattern on which the financial impact is based:

Table 8. Crop distribution in Lower Crocodile Irrigation area

Crop	Hectares
Soya Beans	3 300
Maize	1 100
Wheat	3 300
Cotton	275
Lucerne	275
Summer Vegetables	550
Total	8 800

⁴ Delineated from 2018 Google satellite images.

⁵ Draft 2: - Economic Impact Assessment of the Proposed Crocodile River (West) Water Augmentation Project. DWA 2010. Conningarth Economists. Pretoria

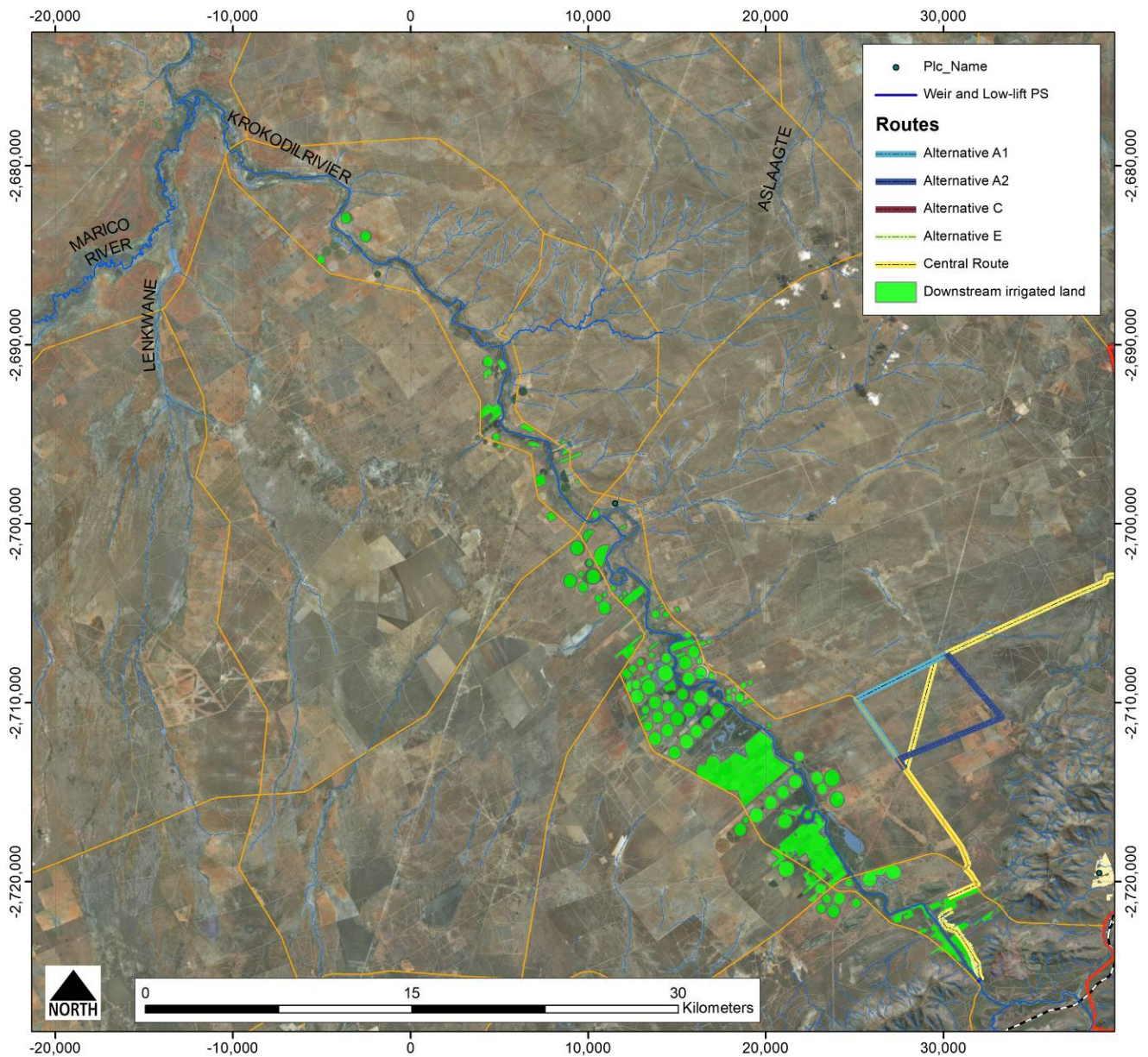


Figure 13. Irrigation activities downstream of the Vlieëpoort Weir

More detailed maps are provided in the Addenda.

5.5.2 Projected income from irrigated farming

The estimated income from farming downstream of the Vlieëpoort Weir is R79,8 million annually. The farmers employ around 1 353 people. Irrigated farming is a major economic activity downstream of the weir. ⁶

⁶ Estimated from industry standards and is only a best estimate.

Table 9. Projected income from irrigated farming downstream of Vlieëpoort Weir

Enterprise	Irrigated field crops	Irrigated vegetables	Pastures	TOTAL
Area	7 975	550	275	8 800
Yield/ numbers (t/ha)	8	60	12	
Income /ha	21 430	105 000	18 000	
Cost/ha	14 882	58 418	10 800	
Income (R mil)	170,9	57,7	4,9	233,6
Expenses (R mil)	118,7	32,1	3,0	153,8
Net farm income (R mil)	52,2	25,6	2,0	79,8
People employment	797	550	6	1 353

5.5.3 Impact description

While the Scoping Report assures lawful irrigators downstream of the weir a secure supply in line their present rights and entitlements, DWS cannot guarantee the assurance of supply (which is in accordance with the National Water Act). This leaves the farmers unable to plan their production program.

Loss of high potential agricultural land:

- Extent: Low if conclusions above are correct.
- Duration: 3.
- Probability: 2 – impact may occur.
- Significance: 0 – Impact will not affect high potential land.

Loss of production

- Extent: Low if conclusions above are correct.
- Duration: 3.
- Probability: 2 – impact may occur.
- Significance: 0.

Mitigation

- Uncertainty of supply and inability of farmers to plan their production program.
 - A management plan for their particular circumstances should be developed and then included in the suggested River Management System.
 - Management procedures should be put in place to indicate the prevailing situation and to timeously inform farmers of potential water shortages. This is fully discussed in the Final Scoping Report (Proposed Mokolo and Crocodile River (West) Water Augmentation Project (Phase 2a))
 - A flow gauge must be installed at the Vlieëpoort Weir to inform farmers of the availability of water.
 - Unlawful water use needs to be stopped, which would reduce the risk of inadequate supply of lawful users.

5.6 SUMMARY OF IMPACTS

The impacts are as follows:

Table 10. Impact assessment

	Potential impact	Proposed Management Objectives / Mitigation Measures	Extent	Magnitude	Duration	Probability	Significance
ROUTE ALIGNMENTS							
1	Loss of high potential arable land						
	Before mitigation	Temporary loss of 38 hectares irrigated land on Mooivallei.	Local	High	Temporary	Certain	Low
	Mitigation	Place the line to avoid irrigated land and keep the construction period short. Compensate the farmer for loss on income.					
2	Loss of dryland cultivated land						
	Before mitigation	Not applicable. There is no dryland crop production along the alignment.					
	Mitigation	Not applicable.					
3	Loss of grazing land						
	Before mitigation	Temporary loss of 2 006 ha of grazing / browsing land.	Local	Low	Temporary	Certain	Low
	Mitigation	Keep the construction period as short as possible. Employ dust reducing practices to protect adjoining grazing land. Compensate the farmer for loss on income.	Local	Low	Temporary	Certain	Low
4	Loss of agricultural production						
	Before mitigation	Permanent loss of irrigated crops on Mooivallei. Approximately 80 ha of irrigated crops will be lost for the construction period. Approximately 200 LSU will be lost for the duration of construction.	Local	Moderate	Temporary	Certain	Low
	Mitigation	Can be partially mitigated by changing the crop selection, unless the land is planted with permanent crops like lucerne or citrus. Compensate the farmer for loss on income.	Local	Moderate	Temporary	Certain	Low
5	Loss of agricultural infrastructure						
	Before mitigation	The irrigation infrastructure will be permanently lost.	Local	Moderate	Permanent	Certain	High
	Mitigation	Move infrastructure to alternative site, provided the farmer has suitable land and water if it is available. Compensate the farmer for loss.	Local	Low	Permanent	Uncertain	Low

	Potential impact	Proposed Management Objectives / Mitigation Measures	Extent	Magnitude	Duration	Probability	Significance
BORROW PITS							
1	Loss of high potential arable land						
	Before mitigation	Not applicable. There is no high potential land on the BP sites.					
2	Loss of dryland cultivated land						
	Before mitigation	Not applicable. There is no dryland crop production on the BP sites.					
3	Loss of grazing land						
	Before mitigation	Temporary loss of 348 ha of grazing / browsing land. History shows that the borrow pits takes some time to recover one they are restored.	Local	Low	Permanent	Certain	Low
	Mitigation	Keep the footprint as small as possible. Restore and reseed the site. Compensate the farmer for loss of income.	Local	Low	Temporary	Certain	Low
4	Loss of agricultural production						
	Before mitigation	Temporary impact. The land lost will sustain 30 livestock.	Local	Moderate	Temporary	Certain	Low
	Mitigation	Keep the footprint as small as possible. Restore and reseed the site. Compensate the farmer for loss of income.					
5	Loss of agricultural infrastructure						
	Before mitigation	No infrastructure will be lost.	Local	Moderate	Permanent	Certain	High
BALANCING DAMS AND DESILTING WORKS AND HIGH LIFT RESERVOIR							
1	Loss of high potential arable land						
	Before mitigation	Permeant loss of 34,6 ha irrigated land. Some of which will change from pivot irrigation to conventional irrigation or to smaller pivots.	Local	High	Permanent	Certain	High
	Mitigation	The farm may not remain financially viable at its reduced size. Compensate the farmer for loss of income.					

	Potential impact	Proposed Management Objectives / Mitigation Measures	Extent	Magnitude	Duration	Probability	Significance
2	Loss of dryland cultivated land						
	Before mitigation	Not applicable. There is no cultivated land on the site.					
3	Loss of grazing land						
	Before mitigation	Not applicable. There is no grazing land on the site.					
4	Loss of agricultural production						
	Before mitigation	Permeant loss of grain, fodder and fibre that can be produced on 34,6 ha irrigated land.	Regional	Moderate	Permanent	Certain	High
	After mitigation	Compensate the farmer for loss on income.					
5	Loss of agricultural infrastructure						
	Before mitigation	The pivot irrigation system will be lost and remaining land outside of the infrastructure boundary replaced with a conventional irrigation system or smaller pivot.	Local	Moderate	Permanent	Certain	High
	Mitigation	Compensate the farmer for loss on income.	Local	Low	Permanent	Uncertain	Low
CONSTRUCTION CAMPS, BREAK PRESSURE RESERVOIR AND OPERATIONAL RESERVOIR							
1	Loss of high potential arable land						
	Before mitigation	No loss of high potential land.					
	Mitigation	Not applicable					
2	Loss of dryland cultivated land						
	Before mitigation	Not applicable. There is no dryland crop production along the alignment.					
	Mitigation	Not applicable					
3	Loss of grazing land						
	Before mitigation	Temporary loss of 58 ha and 23,7 ha permanent loss of grazing / browsing land	Local	Low	Permanent	Certain	Low
	Mitigation	The construction camp can be restored as grazing after construction. Restore land and reseed. Compensate the farmer for loss on income.	Local	Low	Temporary	Certain	Low

	Potential impact	Proposed Management Objectives / Mitigation Measures	Extent	Magnitude	Duration	Probability	Significance
4	Loss of agricultural production						
	Before mitigation	The land lost will sustain 8 livestock for the construction period and 2 livestock permanently.	Local	Low	Temporary/permanent	Certain	Low
	After mitigation	Keep the footprint as small as possible. Restore and reseed the site. Compensate the farmer for loss on income.	Local	Moderate	Temporary	Certain	Low
5	Loss of agricultural infrastructure						
	Before mitigation	No infrastructure will be lost.					
	Mitigation	Not applicable					

6 SUMMARY AND CONCLUSIONS

The predominant land use is animal production. Livestock in combination with game or separately takes place on the largest part of the area. Approximately 95% of the land is grazing.

The bush density is very high in the southern part and some farmers are thinning out the vegetation to improve the veld condition.

Irrigated land only occurs along the Crocodile River on the farm Mooivallei. The main crops produced are lucerne, wheat, citrus and cotton.

Permanent infrastructure on farms is critical in the production process and can have a major impact on farming income, especially in the case where pivot irrigation systems are used. Irrigation may cease during the period that the pipeline is constructed. In the case of permanent structures such as pumping infrastructure and the desilting works, the total pivot system will be permanently lost. Installing alternative irrigation systems is possible as mitigation on the remaining land, but it could lead to increase labour requirement for farming operations like shifting irrigation pipes and also place an additional burden on management.

There are a number of livestock or game watering or handling facilities that will have to be moved or replaced.

The temporary loss for grazing land will be for a strip of 50 metres from the boundary fence of the property. This width includes 40 metre within the construction servitude and 10 additional metres to allow for disturbances caused to the animals by construction vehicles and dust that may settle on the leaves of grass and trees. The period of the loss will be for the duration of construction and the time it will take for the grass to recover.

The only land uses observed on the land proposed for the borrow pits, were grazing or browsing for animals. No farming infrastructure will be negatively impacted on by the placement of the borrow pits. It will however, impact on fences and farm roads.

Preferred route alignment option

- Alternative A: There is no clear preference.
- Alternative C: There is no clear preference.
- Alternative D: There is no clear preference.
- Alternative E: Route E - This is the preferred route. It will have the least impact on the irrigation farmers because it avoids irrigated land.

The environmental impact on farming is as follows:

- ROUTE ALIGNMENTS
 - There will be a temporary loss of 38 hectares irrigated land.
 - Temporary loss of 2 006 ha of grazing / browsing land.
 - Fences and a small number of animal watering facilities will be permanently lost and must be replaced.
- BORROW PITS
 - There will be no impact on high potential arable land or dryland under cultivation.
 - Temporary loss of 348 ha of grazing / browsing land. The land lost will sustain 30 livestock.
- BALANCING DAMS AND DESILTING WORKS AND HIGH LIFT PUMPING STATION
 - The largest impact of the development will be the permanent loss of 34,6 ha irrigated land and the grain, fodder and fibre it can produce.
 - Portions 1 and 2 of Mooivallei may not remain economically viable at its reduced size.
- CONSTRUCTION CAMPS, BREAK PRESSURE RESERVOIR AND OPERATIONAL RESERVOIR
 - There will be no impact on high potential or rain fed arable land.
 - Loss of grazing land: temporary loss of 58 ha and 23,7 ha permanent loss of grazing / browsing land.

Overall, there seems to be sufficient water for all the lawful users, including for irrigation and for the environmental demand downstream of the Vlieëpoort Weir. It is estimated that approximately 5 900 hectares are irrigated at present. Most of the irrigation takes place within the first 25 to 30 km from the Vlieëpoort weir.

The projected income of these farmers is R79,8 million annually and they employ around 1 353 people. It is the major economic activity downstream of the weir. While the Scoping Report assures lawful irrigators downstream of the weir a secure supply in line their present rights and entitlements, DWS cannot guarantee assurance of supply, which is in accordance with the National Water Act. This leaves the farmers unable to plan their production program.

In mitigation of this uncertainty of supply and inability of farmers to plan their production program, the following is suggested:

- A management plan for their particular circumstances should be developed and then included in the suggested River Management System.
- Management procedures should be put in place to indicate the prevailing situation and to timeously inform farmers of potential water shortages.
- A flow gauge must be installed at the Vlieëpoort Weir to inform farmers of the availability of water.
- Unlawful water use needs to be stopped or discouraged, which would reduce the risk of inadequate supply of lawful users.

7 REFERENCES

- 1) Grondklassifikasie Werkgroep, 1991. Grondklassifikasie, 'n Taksonomiese sisteem vir Suid Afrika, Departement van Landbou-ontwikkeling, Pretoria.
- 2) Veld types: Musina and Rutherford.
- 3) Department of Agriculture. Grazing capacity. *Development of Agricultural Land Framework Bill, 2016*
- 4) WRC, 2003 South African Atlas of Agrohydrology and Climatology, Water Research Commission, Pretoria
- 5) DWA, 2018. Proposed Mokolo and Crocodile River (West) Water Augmentation Project (Phase 2a) (Mcwap-2a): Water Transfer Infrastructure. Scoping report. DEA Reference No. - 14/12/16/3/3/1/2/817

8 ADDENDA

8.1 GROSS MARGINS FOR FIELD CROPS UNDER IRRIGATION

IRRIGATED CROPS		Maize	Sojabeans	Average
INCOME				
Yield	T/HA	12.00	4.00	8.00
Net Farm Gate Price	R/TON	1 851	5162	3 507
Gross income	R/ha	22 212	20 648	21 430
VARIABLE EXPENDITURES				
Crop insurance	R/HA	844	2 519	1 682
Fertiliser	R/HA	6 178	2 968	4 573
Lime	R/HA	425	-	425
Seed	R/HA	3 880	1834	2 857
Fuel	R/HA	990	370	680
Herbicide	R/HA	1 236	857	1 047
Insecticide	R/HA	232	225	229
Repairs and maintenance	R/HA	631	354	493
Electricity	R/ HA	3 144	2 572	2 858
Water	R/HA	278	228	253
TOTAL VARIABLE EXPENDITURE	R/HA	17 838	11 927	14 883
GROSS MARGIN:	R/HA	4 374	8 721	6 548

8.2 FIREBREAKS

National Veld and Forest Fire Bill (B122B of 1998)

The requirement to prepare firebreaks

- Landowners are required to prepare firebreaks on their side of the boundary where there is a reasonable risk of veld fire (section 12(1)).
- How do we know what a reasonable risk is?
- The courts use the “reasonable person test”:
 - if a reasonable person in the position of the landowner would foresee that by not preparing a firebreak, a veld fire could start or spread across his or her land, causing harm to someone else,
 - and therefore would prepare one,
 - then the landowner should also prepare one.

Preparing firebreaks

- Firebreaks can be prepared in a number of ways, for example, by grading, ploughing, disking, hoeing or burning.
- However, any soil disturbance is subject to the Conservation of Agricultural Resources Act. Owners should ensure that firebreaks are positioned and prepared in such a way as to cause the least disturbance to soil and biodiversity.

- Section 16 allows the owner to damage, destroy or remove any protected plants in making a firebreak, despite what the National Forests Act or any other law says. But the owner must transplant protected plants if possible or position the firebreak to avoid protected plants.
- The National Environmental Management Act requires biodiversity to be protected, so remind landowners of this when advising them about firebreaks.
- The Act sets out a procedure for burning firebreaks.
- Neighbours can agree to reposition a firebreak on a common boundary.

Requirements for firebreaks

- The Act doesn't specify requirements for firebreaks.
- This is because requirements will vary from one situation to the next. For example, on the Cape Peninsula, firebreak requirements would be different to what is needed in the eastern Free State.
- Local practice and local issues must determine what the requirements are.
- The Act states that the owner must pay attention to weather, climate, terrain and vegetation in deciding on how to prepare the break.
- The break must:
 - be wide enough and long enough to have a reasonable chance of stopping the veld fire
 - not cause soil erosion
 - be reasonably free of inflammable material (section 13).

Co-ordination with other legislation

- Burning of firebreaks must co-ordinate with other legislation and regulations.
- Conservation of Agricultural Resources Act (CARA):
 - Regulation 12 contains provisions dealing with prevention and control of veld fires, preventing land users from burning or grazing burnt veld without written permission from the executive officer
 - Rules for burning veld (firebreaks and controlled burns) must not contradict the procedure set out in CARA.
- Atmospheric Pollution Prevention Act:
 - Although the Act does not apply to smoke caused by veld fires, it may apply to smoke caused by management practices such as burning firebreaks and controlled burns.
 - If occupiers of premises make representation to the local authority regarding smoke that is causing a nuisance, the authority is obliged to serve an abatement notice.
 - Failure to comply with the notice (i.e. failure to abate or stop) constitutes an offence.

8.3 DOWNSTREAM IRRIGATED LAND

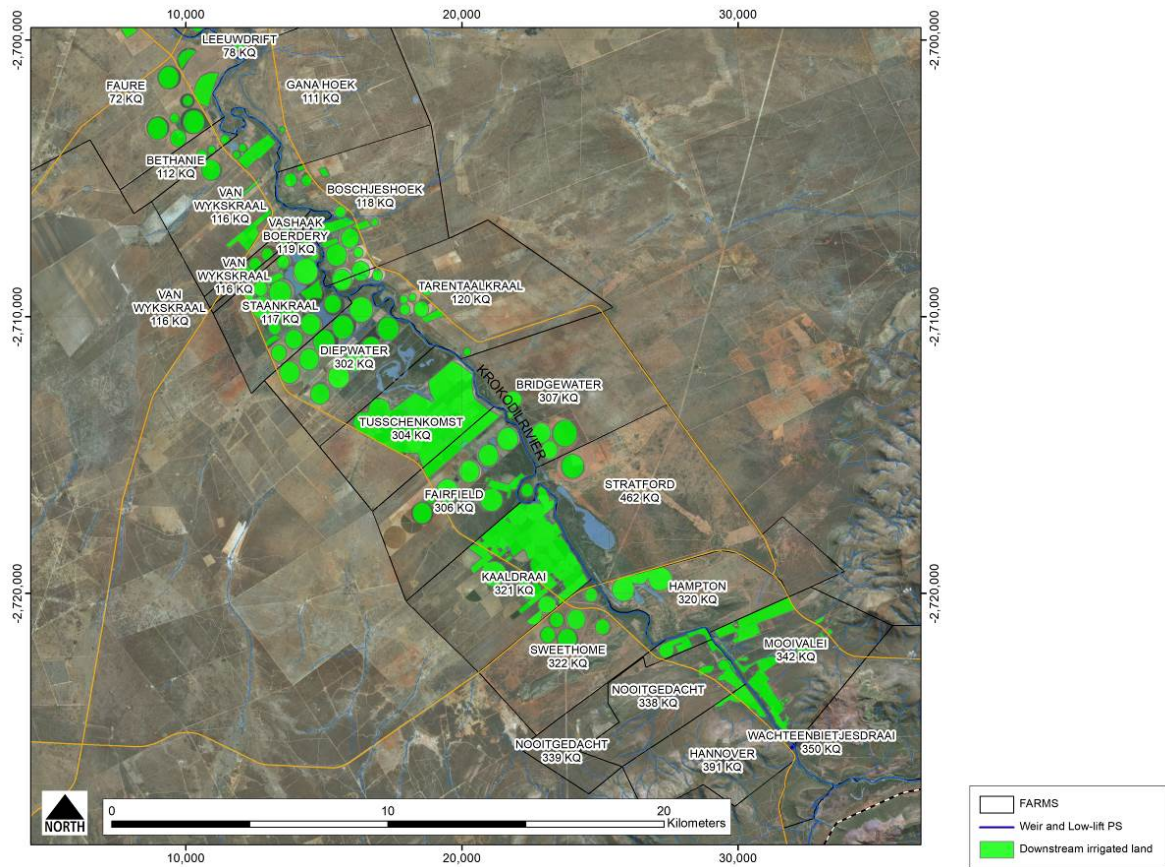


Figure 14. Irrigation activities downstream of the Vlieëpoort Weir: Southern section

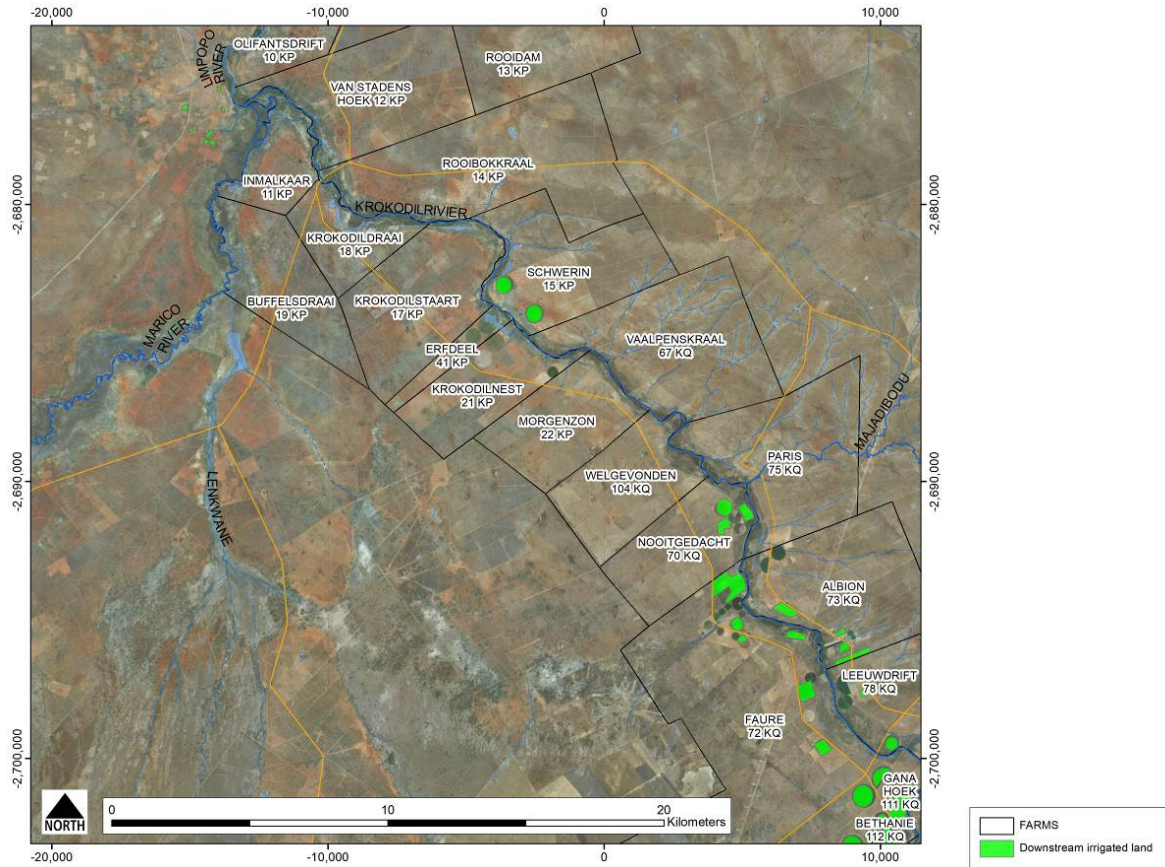
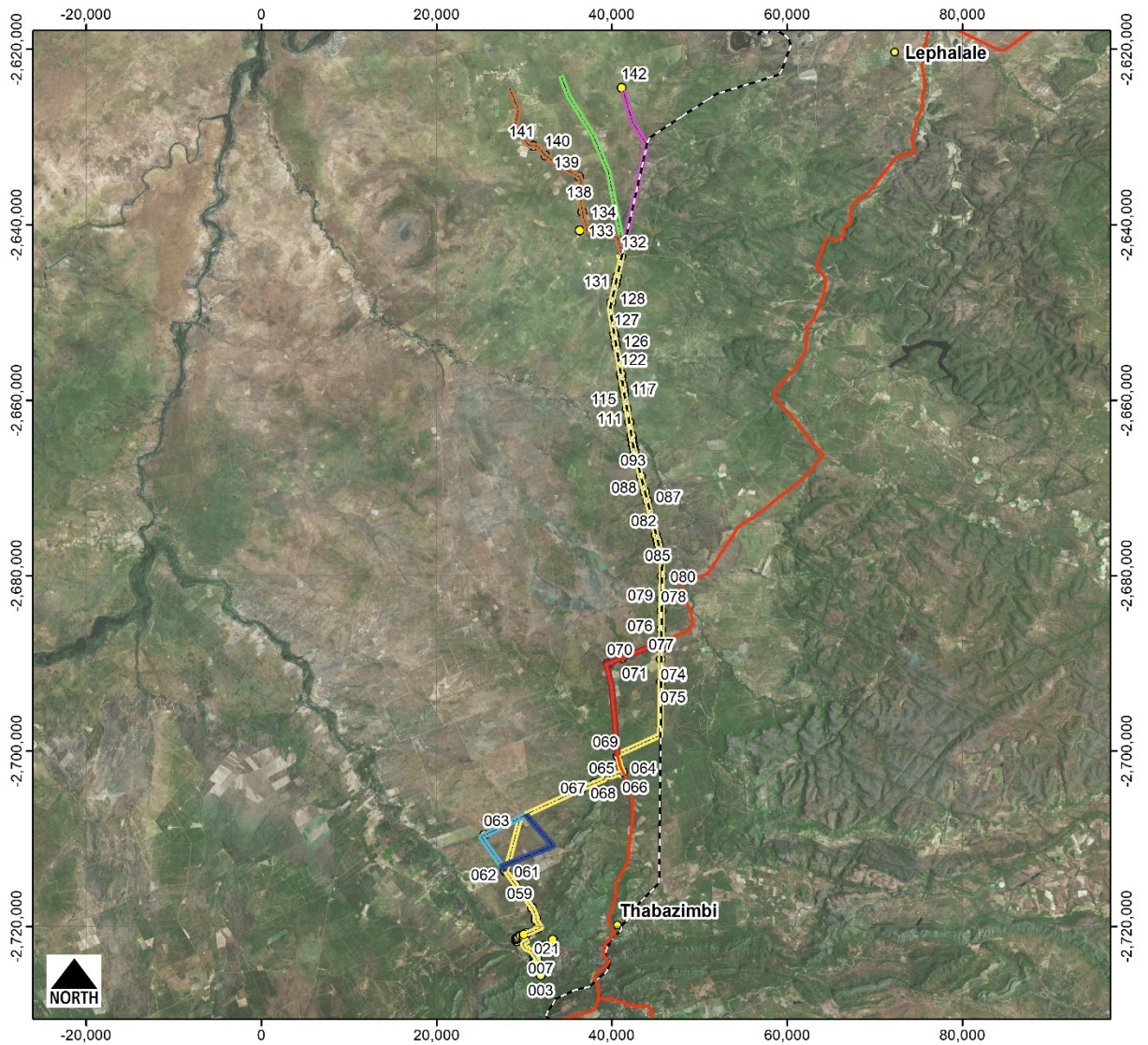
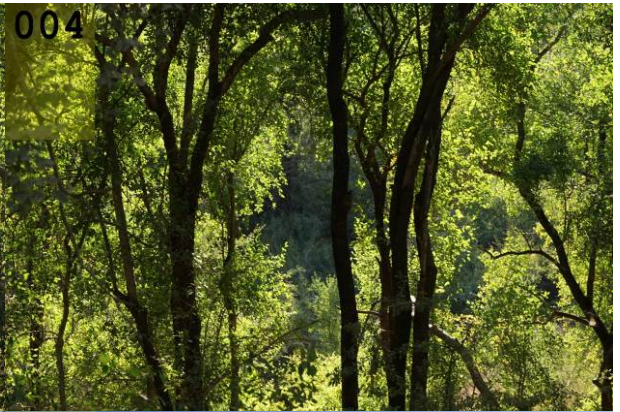


Figure 15. Irrigation activities downstream of the Vlieëpoort Weir: Northern section

8.4 PHOTO RECORDS

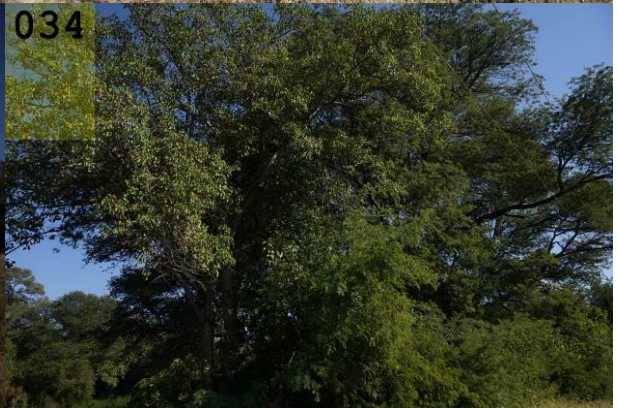
Position of photos





































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