



BASIC ASSSSMENT PROCESS

**FOR THE PROPOSED CONSTRUCTION OF RIVER CROSSINGS
ALONG V132kV/88kV HIGH VOLTAGE (HV) UNDERGROUND
CABLE FEEDER WITHIN CROYDON/GERMISTON AREA IN THE
CITY OF EKURHULENI, GAUTENG PROVINCE**

DEA Reference: 14/12/16/3/3/1/1888

FINAL BASIC ASSESSMENT REPORT

MAY 2018

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PROJECT DETAILS

DEA Reference No. : DEA Reference: 14/12/16/3/3/1/1888
Title : The Proposed Construction of River Crossings along 132kV/88kV High Voltage (HV) Underground Cable Feeder within Croydon/Germiston area in the City of Ekurhuleni, Gauteng Province

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Client : **Eskom Holdings SOC Ltd**

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Reviewed by: Jubilee Bubala

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EXECUTIVE SUMMARY

INTRODUCTION

Eskom SOC (Pty) Ltd is proposing a replacement and network strengthening strategy for HV cable systems in the Gauteng Province to sustain load growth as well as provide a high-level of network reliability for the future. Many areas supplied by HV cables in the Gauteng Operating Unit are economically important and also enjoy moderate to high media attention (Soweto Soccer stadiums, JSE, Gautrain, etc.). A major part of all the HV cable feeders supplied by Gauteng Operating Unit are from the 88kV Craighall MTS, where annualised growth for Sandton alone is estimated at $\pm 3.5\%$ p.a over the last 5 years. These HV cables systems need to be replaced before extensive interruptions in the region is experienced, as these HV cables systems have reached their end of life. A number of areas within both the City of Joburg (CoJ) and the City of Ekurhuleni (CoE) have been considered for the replacement strategy including Craighall (Sandton), Randburg and Croydon (Germiston). The proposed HV cables systems will be crossing watercourses in certain areas as shown in Figure 1.1. This assessment will be focused on river crossings along HV cable within **Croydon/Germiston area** and the other areas will be assessed through a separate EIA process

In terms of sections 24(2) and 24D of the National Environmental Management Act (Act No. 107 of 1998), as read with the Environmental Impact Assessment (EIA) Regulations of GNR 982 to R985 (as amended), river crossings is a listed activity for which a Basic Assessment Process is required in order for Eskom to obtain environmental authorisation for the construction of the cables through watercourses. NB: the upgrade of the HV cables is not a listed activity and therefore will not be discussed in details in this report, what necessitate this study is the fact that these cables are crossing watercourses, river crossings of the HV cables will therefore be the focus of this Basic Assessment Report.

Eight (8) River crossings are proposed to be constructed in support of upgrading the HV cable systems within Croydon/Germiston area and discussed in this report.

REQUIREMENT FOR A BASIC ASSESSMENT PROCESS

The proposed project is subject to the requirements of the Environmental Impact Assessment Regulations (2014 EIA Regulations) in terms of the National Environmental Management Act (NEMA, Act 107 of 1998, as amended). NEMA is national legislation that provides for the authorisation of certain controlled activities known as "listed activities". In

terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed, and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. Eskom requires an Environmental Authorisation for this project in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and GNR 982, 983, 984 and 985 of the Environmental Impact Assessment Regulations, 2014 as amended 07 April 2017 (GNR 326) a Basic Assessment (BA) Process is required for this project. An environmental impact assessment is an effective planning and decision-making tool for the applicant as it provides the opportunity for the applicant to be fore-warned of potential environmental issues and assess if potential environmental impacts need to be avoided, minimised or mitigated to acceptable levels. The Basic Assessment process includes certain feasibility studies for a proposed project and will inform the final design process in order to ensure that environmentally sensitive areas are avoided to an acceptable level as confirmed by the Environmental Assessment Practitioner (EAP). Comprehensive, independent environmental studies elaborated by specialists are required in accordance with the EIA Regulations to inform the EAP of its comprehensive recommendation and provide the competent authority with sufficient information in order to make an informed decision. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority and the Gauteng Department of Agriculture, Rural Development (GDARD) will act as a commenting authority. Eskom has appointed Envirolution Consulting (Pty) Ltd, as independent environmental consultants, to undertake the BA process and compile the BA Report and Environmental Management Programme (EMPr).

PROJECT NEED AND DESIRABILITY

Many areas supplied by HV cables in Gauteng Operating Unit are economically important and also enjoy moderate to high media attention (Soccer stadiums, JSE, Gautrain, etc.) A replacement and network strengthening strategy need to be devised to sustain load growth as well as provide a high-level of network reliability going into the future. A study by Eskom shows that the cables in service are aged and is at a point in time where performance will deteriorate. Foresight is needed to replace these cables before they cause extensive interruptions in the Region. Unfortunately these cables are entrenched in the areas making it difficult to replace. The point is if it difficult to replace, how much more

difficult will it be to maintain once the cables start to fail more frequently.

Due to the nature of this project – the only option available to Eskom is to replace these old cable feeders with new technology XLPE cables. The area of supply does not allow any overhead line alternatives and the optimization of load distribution will be done per individual feeder design. Based on these identified risks as per the problem statement, Eskom Gauteng Operating Unit performed a risk model to devise a replacement strategy for all these HV oil filled cables. The strategy/approach is to replace all HV oil filled cables within the next 3-8 years as strengthening and refurbishment projects. The risk criticality model was used to identify the feeders of highest risk for the replacement strategy plan and is incorporated into this document.

CONCLUSION (IMPACT STATEMENT)

Many areas supplied by HV cables in Gauteng Operating Unit are economically important and also enjoy moderate to high media attention (Soccer stadiums, JSE, Gautrain, etc.). A replacement and network strengthening strategy need to be devised to sustain load growth as well as provide a high-level of network reliability going into the future. A study by Eskom shows that the cables in service are aged and is at a point in time where performance will deteriorate. Foresight is needed to replace these cables before they cause extensive interruptions in the Region. The proposed HV cables systems will be crossing watercourses in certain areas hence the focus of this Basic Assessment Report (BAR).

This Basic Assessment Report has provided a comprehensive assessment of the potential environmental impacts associated with the proposed construction of **Eight (8) watercourse** crossings along HV cable within Croydon/Germiston in the City of Ekurhuleni. The assessment concludes (in section 7.1) that most of the negative impacts associated with the river crossing can be mitigated to low significance if all mitigation measures identified and included in the Environmental Management Programme (EMPr) attached in **Appendix G**. The Positive impacts associated with the water crossings are long-term in nature and are meant to address network strengthening strategy within Gauteng that will sustain load growth as well as

provide a high-level of network reliability for the future. Owing to the fact that the project is a replacement of infrastructure that are in dire need for restoration, **the benefits of the project are expected to occur beyond the local area therefore the benefits partially offset the localised environmental costs of the project.**

The proposed project has the potential to negatively affect local ecology considering the status of the aquatic ecosystems, and furthermore the nature and requirements of the project. However, the watercourse crossings occur in a system that has been significantly impacted. Disturbance at the site of the drill rigs can be effectively rehabilitated. Therefore, should the proposed mitigation actions be implemented, the negative impacts can be effectively reduced to a minimum. In light of the above, it is the opinion of the EAP that no significant fatal flaws could be identified in this assessment. Responsible environmental management will be required on site, during the planning and construction phases of the watercourse crossing along underground HV cables. This assessment concludes that either technology alternative (Horizontal (Directional) Drilling or Pipe Jacking) can be implemented for the watercourse crossing. However, the selection of the technically preferred technology will be incumbent on Eskom as all alternatives are deemed to be environmentally appropriate within the context of the receiving environment.

RECOMMENDATIONS

There are no insurmountable environmental or social constraints that prevent the implementation of the watercourse crossing along HV cable within Croydon/Germiston in the City of Ekurhuleni. Envirovolution Consulting (Pty) Ltd recommends that the proposed watercourse crossing be considered for approval subject to the following general recommendations:

- EMPr (**Appendix G**) for this application be made a binding document for the contractors and managers on site;
- An independent ECO should be present during construction to monitor the implementation of the EMPr and the environmental authorization once issued;
- Compliance with the mitigation measures outlined in this BA report and EMPr;
- Development should be done in a manner that does not further alter the natural watercourses (rivers and wetlands) and their catchments. This includes protecting and improving current eroded wetlands before additional water inputs can be implemented.
- Avoid, as far as reasonably possible, disturbing wetlands within the study area. Similarly, restore wetlands that will remain intact if they have been affected by construction activity;

- Adequate measures must be put in place to prevent polluted runoff water from entering the, wetland and soil, thus preventing surface and groundwater pollution; No chemicals, building materials hydrocarbons or soils must be stockpiled within the 30m buffer zone;
- It is required that suitable investigative work be conducted prior to construction to determine optimal installation starting and end points to prevent damage to watercourse banks, and to determine the optimal installation depth.
- All relevant legislation and requirement of other government departments (National, Provincial), in particular of Section 28 (duty of care) of NEMA, must be complied with.
- In the event of a major incident (e.g. fire causing damage to property and environment, major spill or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/ incidents, as per the requirements of section 30 of NEMA.
- Water Use License must be obtained from Department of Water and Sanitation prior to the commencement of construction activities.
- A number of provincially protected plants occurring in the study area are listed in the Transvaal Nature Conservation Ordinance Act No. 12 of 1983. These plants are not to be removed, damaged, or destroyed without permit authorisation from Gauteng Department of Agriculture and Rural Development (GDARD).
- Should heritage features, archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
- In the event of a major incident (e.g. fire causing damage to property and environment, major spill or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/ incidents, as per the requirements of NEMA.
- The site after construction must be rehabilitated back to its original state as per the **Rehabilitation & Monitoring Plan (Appendix D7)**, if not possible to a state that conforms to the principles of sustainable development.

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Appendix I: Specialist's declaration of interest

Appendix J: Additional Information (Properties details & coordinates)

ABBREVIATIONS AND ACRONYMS

BAR	Basic Assessment Report
CoE	City of Ekurhuleni
CoJ	City of Johannesburg
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EMPr	Environmental Management Programme
EIA	Environmental Impact Assessment
GN	Government Notice
GDARD	Gauteng Department of Agriculture, Rural Development
Ha	Hectares
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NHRA	National Heritage Resources Act (No. 25 of 1999)
NWA	National Water Act (No 36 of 1998)
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework

LEGAL REQUIREMENTS IN TERMS OF THE EIA REGULATIONS

Table 1 below details how the legal requirements of **APPENDIX 1** of the 2014 EIA Regulations have been addressed within this report.

Table 1: Legal requirements in terms of the 2014 EIA regulations (APPENDIX 1)

REGULATIONS 2014 GNR 982: Appendix 1: CONTENT OF BASIC ASSESSMENT REPORTS	Cross-reference in this BAR report
Scope of assessment and content of basic assessment reports	
<p>3. (1) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—</p> <p>(a) details of—</p> <p>(i) the EAP who prepared the report; and</p> <p>(ii) the expertise of the EAP, including a curriculum vitae;</p>	Chapter 1 (section 1.4), Appendix H
<p>(b) the location of the activity, including:</p> <p>i. the 21 digit Surveyor General code of each cadastral land parcel;</p> <p>ii. where available, the physical address and farm name;</p> <p>iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;</p>	i. Appendix J
<p>(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale;</p> <p>or, if it is-</p> <p>(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or</p> <p>(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;</p>	Chapter 1 (section 1.1) Appendix A
<p>(d) a description of the scope of the proposed activity, including—</p> <p>i. all listed and specified activities triggered and being applied for; and</p> <p>ii. a description of the activities to be undertaken including associated structures and infrastructure;</p>	Chapter 3 (section 3.1)
<p>(e) a description of the policy and legislative context within which the development is proposed including—</p> <p>(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and</p> <p>(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;</p>	Chapter 3 (section 3.3)
<p>(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;</p>	Chapter 2 (section 2.3)
<p>(g) a motivation for the preferred site, activity and technology alternative;</p>	Chapter 2 (Section 2.3) and (Section 2.4)
<p>(h) a full description of the process followed to reach the proposed preferred alternative within the site, including—</p>	<p>i. Chapter 2 (section 2.3)</p> <p>ii. Chapter 4 (section 4.1 &</p>

<ul style="list-style-type: none"> i. details of all the alternatives considered; ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— <ul style="list-style-type: none"> (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. the possible mitigation measures that could be applied and level of residual risk; ix. the outcome of the site selection matrix; x. if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and xi. a concluding statement indicating the preferred alternatives, including preferred location of the activity; 	<ul style="list-style-type: none"> 4.2) iii. Chapter 4 (section 4.3) iv. Chapter 5 v. Chapter 6 vi. Chapter 6 vii. Chapter 6 viii. Chapter 6 ix. n/A x. All feasible alternatives were identified xi. Chapter 7
<p>(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including—</p> <ul style="list-style-type: none"> (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures; 	<p>Chapter 6</p>
<p>(j) an assessment of each identified potentially significant impact and risk, including—</p> <ul style="list-style-type: none"> (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or 	<p>Chapter 6</p>

	mitigated;	
(k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Chapter 7
(l)	an environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	i. Chapter 7 (Section 7.1) ii. Appendix A iii. Section 7.3
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr;	Appendix G
(n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapter 6
(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Chapter 6
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Chapter 6
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	Section 1.2
(r)	an undertaking under oath or affirmation by the EAP in relation to— (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	Appendix H
(s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t)	any specific information that may be required by the competent authority ¹ ; and	N/A
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A
(2)	Where a government notice <i>gazetted</i> by the Minister provides for the basic assessment process to be followed, the requirements as indicated in such a notice will apply	N/A

¹ A meeting was held with the DEA on the 9th November 2016 in discussion of the lapsing of the previous applications and the way forward i.e. the combining of the three separate applications into one project. Minutes of this meeting and DEA request as part of the resubmission is included in **Appendix E6**.

In addition to the above, the following table outlines the DEA requirements as per the comments received on the Draft BA Report on the 13/03/2018 from Mr Sizwe Mabilisa, the table below indicates where the comments have been addressed within this Final Basic Assessment Report for ease of reference.

Comment	Cross Reference In This Final BA Report
<p>This letter serves to inform you that the following information must be included in the final BAR:</p> <p>a) The declaration form of the applicant incorporated into the application form is not signed by the applicant. You are requested to ensure that the final BAR has a signed declaration form by the applicant.</p> <p>b) You are reminded to attach the CV of the EAP who prepared the EMPr as part of the EMPr document as per the requirements of Appendix 4 of the Environmental Impact Assessment (EIA) Regulations, 2014 as amended.</p> <p>c) The rehabilitation and monitoring plan attached in Appendix D7 must be incorporated into the EMPr.</p> <p>d) Please also ensure that the BAR includes the period for which the environmental authorisation is required and the date on which the activity will be concluded as per the Appendix 1 (3)(1)(q) of the Environmental Impact Assessment (EIA) Regulations, 2014 as amended (GN R. 982).</p> <p>e) For clarity purposes, please can it be explicitly clarified in the BAR as to why the 132kV/88kV high voltage (HV) feeder underground cables themselves do not require authorisation (i.e. they fall below the thresholds in listed activity 11 of GN R. 983, since they will be constructed within an urban area).</p> <p>f) An original signed undertaking under oath or affirmation by the EAP (administered by a Commissioner of Oaths), must be included in the final BAR, as per Appendix 1 (3)(r) of the EIA Regulations, 2014, which states that the BAR must include: "an undertaking under oath or affirmation by the EAP in relation to:</p> <ul style="list-style-type: none"> i. the correctness of the information provided in the reports; ii. the inclusion of comments and inputs from stakeholders and I&APs; iii. the inclusion of inputs and recommendations from the specialist reports where relevant; and iv. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties'. <p>g) You are further reminded to provide proof to show that the registered interested and affected parties and organ of states received written notification of the proposed activities, as per the requirements of regulation 41 (2)(b) of the EIA Regulations, 2014. This proof may include any of the following:</p> <ul style="list-style-type: none"> i. e-mail delivery reports; ii. registered mail receipts; iii. courier waybills; iv. signed acknowledgements of receipt; and/or any other proof as agreed upon by the competent authority. 	<p>a) The declaration form of the applicant is incorporated into the Final BA Report, please refer to appendix H and an original copy is sent separately in an envelope.</p> <p>b) CV of the EAP who prepared the EMPr attach to the EMPr document as Appendix C.</p> <p>c) The rehabilitation and monitoring plan attached is incorporated into the EMPr and attached as Appendix B of the EMPr document</p> <p>d) <u>Period for which the environmental authorisation is required:</u> The environmental authorization is required for a period of 10 years from the date of issue. Should a longer period be required, the applicant/EAP will be required to provide a detailed motivation on what the period of validity should be. <u>The date on which the activity will be concluded:</u> Eskom will try to accommodate new load with existing lines, cables an substation until a point in future will be reached where new lines and a substation will be required. Eskom is interested in reserving space for future services now before it is occupied by development. Eskom does not develop, but can only follow and enable development. Therefore Eskom is dependent on signals from (independent) developers to build infrastructure. It stands to reason, then, that Eskom is not in control of developmental timelines and actual construction must wait until such suitable / feasible triggers are identified in the area. An EA is valid for a limited number of years, and have to be renewed before hardware is constructed. With a suitable trigger, construction will immediately follow the EA approval. This explanation is included in Ch 1 (section 1.2) of the FBAR.</p> <p>e) Please refer to Chapter 1 (section 1.2 - Requirement for a Basic Assessment Process) of the FBAR whereby clarity is given as to why the 132kV/88kV high voltage (HV) feeder underground cables themselves do not require authorisation.</p> <p>f) An original signed undertaking under oath or affirmation by the EAP is attached in Appendix H of the Final BA Report</p> <p>g) Proof of notifications that the registered interested and affected parties and organ of states received written notification is attached in Appendix E2</p>

<p>h) Please ensure that all issues raised and comments received during the circulation of the draft BAR to registered I&APs and organs of state which have jurisdiction (including this Department's Biodiversity & Conservation Branch) in respect of the proposed activity are adequately addressed in the final BAR.</p> <p>i) Proof of correspondence with the various stakeholders must be included in the final BAR. Should you be unable to obtain comments, proof must be submitted to the Department of the attempts that were made to obtain comments. The public participation process must be conducted in terms of Regulation 39, 40, 41, 42, 43 and 44 of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended.</p> <p>j) The final BAR must comply with these comments and all other comments and conditions issued by the Department in relation to the proposed development.</p> <p>k) A Comments and Response (C&R) report must be submitted with the final BAR. The C&R report must incorporate all comments received for this development. Please note that a response such as "Noted" is not regarded as an adequate response to I&APs' comments.</p> <p>l) The Environmental Management Programme (EMPr) must address all impact management issues raised by the I&APs and must meet the requirements of Appendix 4 of the EIA Regulations, 2014.</p>	<p>(interested and affected parties) and Appendix E4 (organ of states).</p> <p>h) The Comment & Response report (Appendix E3) outlines all issues raised and comments received during the circulation of the draft BAR and the EAP responses to those issues/comments raised with reference to the FBAR (where applicable).</p> <p>i) Proof of correspondence with the various stakeholders is included in Appendix E6 in the final BAR.</p> <p>j) The final BAR have complied with comments and conditions issued by Departments in relation to the proposed development.</p> <p>k) A Comments and Response (C&R) report is attached to Appendix 3 of the FBAR.</p> <p>l) The Environmental Management Programme (EMPr) (Appendix G of the FBAR) have address all impact management issues raised by the I&APs and meets the requirements of Appendix 4 of the EIA Regulations, 2014.</p>
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INVITATION TO COMMENT ON THE DRAFT BA REPORT

The Draft Basic Assessment Report (DBAR) was prepared by Envirolution Consulting (Pty) Ltd in order to assess the potential environmental impacts associated with the proposed Construction of River Crossings along 132kV/88kV High Voltage (HV) Underground Cable Feeder within Croydon/Germiston in the City of Ekurhuleni, Gauteng Province. The report was made available for comments for 30-day review period from **19 February 2018 – 22 March 2018** at the following places:

- **Pimrose Public Library:** Beaconsfield Ave, Primrose, Germiston, 1401
- Dropbox link sent to registered I&APs via email
- Email copy of the DBAR document (without appendices)

The due date for comments on the DBAR was the 22 March 2018, I&APs were requested to submit written comments as follows;

Environmental Assessment Practitioner

Name: Cheda Sheila Bolingo
Physical Address: Vista Place, Suite 1a & 2, No 52, Cnr Vorster Avenue & Glen Avenue, Glenanda
Postal Address: PO Box 1898, Sunninghill, 2157
Telephone Number: (0861) 44 44 99
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1 INTRODUCTION

1.1 Project Background

Eskom SOC (Pty) Ltd is proposing a replacement and network strengthening strategy for HV cable systems in the Gauteng Province to sustain load growth as well as provide a high-level of network reliability for the future. Many areas supplied by HV cables in the Gauteng Operating Unit are economically important and also enjoy moderate to high media attention (Soweto Soccer stadiums, JSE, Gautrain, etc.) . A major part of all the HV cable feeders supplied by Gauteng Operating Unit are from the 88kV Craighall MTS, where annualised growth for Sandton alone is estimated at $\pm 3.5\%$ p.a over the last 5 years. These HV cables systems need to be replaced before extensive interruptions in the region is experienced, as these HV cables systems have reached their end of life. A number of areas within both the City of Joburg (CoJ) and the City of Ekurhuleni (CoE) have been considered for the replacement strategy including Craighall (Sandton), Randburg and Croydon (Germiston). The proposed HV cables systems will be crossing watercourses in certain areas as shown in **Figure 1.1**. This assessment will be focused on river crossings along HV cable within Croydon/Germiston area and the other areas will be assessed through a separate EIA process

In terms of sections 24(2) and 24D of the National Environmental Management Act (Act No. 107 of 1998), as read with the Environmental Impact Assessment (EIA) Regulations of GNR 982 to R985 (as amended), **river crossings is a listed activity** for which a Basic Assessment Process is required in order for Eskom to obtain environmental authorisation for the construction of the cables through watercourses. NB: the **upgrade of the HV cables is not a listed activity** and therefore will not be discussed in details in this report, what necessitate this study is the fact that these cables are crossing watercourses, **river crossings of the HV cables** will therefore be the **focus of this Basic Assessment Report**.

The following **Eight (8) River crossings** are proposed to be constructed in support of upgrading the HV cable systems within Croydon/Germiston area:

- » **River Crossing 1** is located along Croydon / Bedfordview Munic 1 & 2 132kV HV Feeder on Boeing Road E, Bedfordview : Point a) (Lat.: 26° 9'46.020"S; Long: 28° 9'0.230"E); Point b) (Lat.: 26° 9'45.186"S; Long: 28° 9'1.639"E);
- » **River Crossing 2** is located along the Croydon / Bedfordview Munic 1 & 2 132kV HV Feeder on Gibson Rd in Hurleyvale: a) (Lat.: 26° 9'11.97"S; Long: 28°10'2.89"E); b) (Lat.: 26° 9'11.317"S; Long: 28°10'3.645"E);
- » **River Crossing 3** is located along the Croydon / Bedfordview Munic 1 & 2 132kV HV Feeder on Minauch Road in Burrendal: a)(Lat.: 26° 8'52.34"S; Long: 28°10'35.62"E) b) (Lat.: 26° 8'51.718"S; Long: 28°10'36.928"E)
- » **River Crossing 4** is located along the Croydon / Bedfordview Munic 1 & 2 132kV HV Feeder at the T-Junction of Hurleyvale Av & Gibson Rd, Hurleyvale: a) (Lat: 26° 8'30.58"S; Long: 28°11'19.64"E) b) (Lat.: 26° 8'29.930"S; Long: 28°11'20.668"E)

- » **River Crossing 5** is located along the Croydon / Germiston North 2 132kV HV Feeder on ERF 605, Avondgloed Road in Klopperpark (Germiston) Klopperpark (Germiston) : a) (Lat.: 26° 8'39.03"S; Long: 28°11'33.59"E) b) (Lat.: 26° 8'38.079"S; Long: 28°11'34.620"E)
- » **River Crossing 6** is located along the Croydon / Germiston North 2 132kV HV Feeder on Avondgloed Road in Klopperpark (Germiston) : a) (Lat.: 26° 8'52.30"S; Long: 28°11'21.18"E) b) (Lat.: 26° 8'52.30"S; Long: 28°11'21.18"E)
- » **River Crossing 7** is located along the Croydon / Germiston North 2 132kV HV Feeder at the cnr of Pretoria Road & Oak Avenue in Primrose (Germiston): a)(Lat.: 26°11'5.393"S; Long: 28°10'19.293"E); b) (Lat.: 26°11'5.026"S; Long: 28°10'19.891"E)
- » **River Crossing 8** is located along the Croydon / Germiston North 2 132kV HV Feeder on Portion 132 of farm Driefontein 87/IR, Stanley Street in Primrose (Germiston): a)(Lat.: 26° 11'16.860"S; Long: 28°10'19.435"E) b)(Lat.: 26° 11'17.828"S; Long: 28°10'19.808"E)

Please refer to Appendix A for detailed maps of each crossing

1.2 Requirement for a Basic Assessment Process

The proposed project is subject to the requirements of the Environmental Impact Assessment Regulations (2014 EIA Regulations) in terms of the National Environmental Management Act (NEMA, Act 107 of 1998, as amended). NEMA is national legislation that provides for the authorisation of certain controlled activities known as "listed activities". In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed, and reported on to the competent authority (the decision-maker) charged by NEMA with granting of the relevant environmental authorisation. Eskom requires an Environmental Authorisation for this project in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and GNR 982, 983, 984 and 985 of the Environmental Impact Assessment Regulations, 2014 as amended 07 April 2017 (GNR 326) a Basic Assessment (BA) Process is required for this project.

The construction and **upgrade of the HV cables is not a listed activity** and therefore will not be discussed in details in this report, what necessitate this study is the fact that these cables are crossing watercourses. Listing Notice 11 of GNR 983 stipulates that:

*"The development of facilities or infrastructure for the transmission and distribution of electricity—
(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or
(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or More"*

The cables are inside the urban areas BUT with a capacity of less than 275 kilovolts i.e. 132/88 kilovolts. Therefore **river crossings of the HV cables** will be the **focus of this Basic Assessment Report** and not the proposed cables.

An environmental impact assessment is an effective planning and decision-making tool for the applicant as it provides the opportunity for the applicant to be fore-warned of potential environmental issues and assess if potential environmental impacts need to be avoided, minimised or mitigated to acceptable levels. The Basic Assessment process includes certain feasibility studies for a proposed project and will inform the final design process in order to ensure that environmentally sensitive areas are avoided to an acceptable level as confirmed by the Environmental Assessment Practitioner (EAP). Comprehensive, independent environmental studies elaborated by specialists are required in accordance with the EIA Regulations to inform the EAP of its comprehensive recommendation and provide the competent authority with sufficient information in order to make an informed decision. As this is a proposed electricity generation project and thereby considered to be of national importance, the National Department of Environmental Affairs (DEA) is the competent authority and the Gauteng Department of Agriculture, Rural Development (GDARD) will act as a commenting authority. Eskom has appointed Envirolution Consulting (Pty) Ltd, as independent environmental consultants, to undertake the BA process and compile the BA Report and Environmental Management Programme (EMPr).

Period for which the environmental authorisation is required: The environmental authorization is required for a period of 10 years from the date of issue. Should a longer period be required, the applicant/EAP will be required to provide a detailed motivation on what the period of validity should be.

The date on which the activity will be concluded: Eskom will try to accommodate new load with existing lines, cables and a substation until a point in future will be reached where new lines and a substation will be required. Eskom is interested in reserving space for future services now before it is occupied by development. Eskom does not develop, but can only follow and enable development. Therefore Eskom is dependent on signals from (independent) developers to build infrastructure.

It stands to reason, then, that Eskom is not in control of developmental timelines and actual construction must wait until such suitable / feasible triggers are identified in the area.

An EA is valid for a limited number of years, and have to be renewed before hardware is constructed. With a suitable trigger, construction will immediately follow the EA approval

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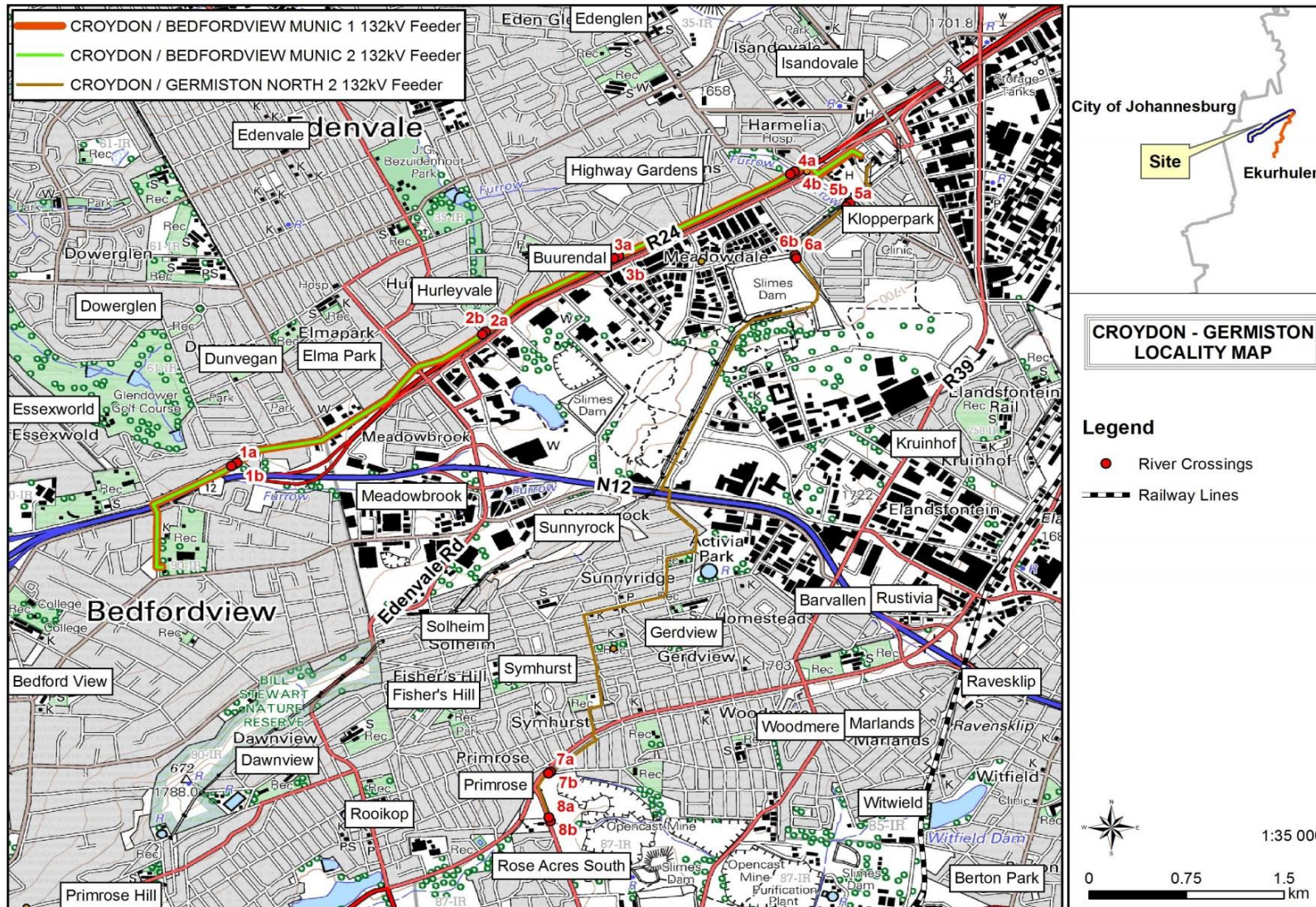


Figure 1.1: Locality map showing the proposed river crossings along HV feeder cables (refer to **Appendix A** for A3 maps and zoomed in images of individual watercourse crossing).).

1.3 **Objectives of the Basic Assessment process**

According to Appendix 1 of the 2014 EIA Regulations, 2014, Government Notice R982, the objective of the basic assessment process is to, through a consultative process—

- (a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- (b) identify the alternatives considered, including the activity, location, and technology alternatives;
- (c) describe the need and desirability of the proposed alternatives;
- (d) through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine—
 - (i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
 - (ii) the degree to which these impacts—
 - (aa) can be reversed;
 - (bb) may cause irreplaceable loss of resources; and
 - (cc) can be avoided, managed or mitigated; and
- (e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
 - (i) identify and motivate a preferred site, activity and technology alternative;
 - (ii) identify suitable measures to avoid, manage or mitigate identified impacts; and
 - (iii) identify residual risks that need to be managed and monitored.

The main objective of the BA Report and EMP is to identify and assess potential environmental impacts associated with the proposed project, and to compile appropriate mitigation measures.

1.4 **Project Team**

Environmental Assessment Practitioner

Company Name: Envirovolution Consulting (Pty) Ltd
Name: Cheda Sheila Bolingo
Physical Address: Vista Place, Suite 1a & 2, No 52, Cnr Vorster Avenue & Glen Avenue, Glenanda
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Telephone Number: (0861) 44 44 99
Fax Number: (0861) 62 62 22
E-mail: sheila@envirovolution.co.za

Expertise of the EAP to carry out the EIA procedures

- Cheda Sheila Bolingo, the principle author of this Basic Assessment holds an Msc degree in Environmental Management and has 7 years of experience in the environmental management field. Her key focus areas are on strategic environmental assessment and advice on environmental impact assessments; public

participation; environmental management programmes, and mapping through ArcGIS for variety of environmental projects. She is currently involved in several diverse projects across the country.

- Gesan Govender, the project manager and Environmental Assessment Practitioner (EAP) responsible for this project, is a registered Professional Natural Scientist and holds an Honours degree in Botany. He has over 15 years of experience within the field of environmental management. His key focus is on strategic environmental assessment and advice; management and co-ordination of environmental projects, which includes integration of environmental studies and environmental processes into larger engineering-based projects and ensuring compliance to legislation and guidelines; compliance reporting; the identification of environmental management solutions and mitigation/risk minimising measures; and strategy and guideline development. He is currently responsible for the project management of EIA's for several diverse projects across the country.

Curricula vitae for the project team consultants are included in **Appendix H**.

Specialists

In order to adequately identify and assess potential environmental impacts associated with the proposed project, Envirolution Consulting has appointed the following specialists to conduct specialist impact assessments:

- Aquatic – Andrew Husted of The Biodiversity Company
- Fauna – Dr Rautenbach and company
- Vegetation – Antoinette Eyssel of Dimela EcoConsulting
- Heritage - Johan van Schalkwyk of Johan Heritage Consultant
- Geohydrology – Robert Crosby of AGES
- Floodline - Sivan Dhaver of SD Hydrological Services (Pty) Ltd
- Wetland- Antoinette Bootsman of Limosella Consulting

Specialist declarations are included in **Appendix I**.

2 PROJECT DESCRIPTION

2.1 Need and Desirability

According to the DEA Draft Guideline on Need and Desirability (October 2012) in terms of the Environmental Impact Assessment (EIA) Regulations, 2010 the need and desirability of a development must be measured against the contents of the Integrated Development Plan (IDP), Spatial Development Framework (SDF) and Environmental Management Framework (EMF) for an area, and the sustainable development vision, goals and objectives formulated in, and the desired spatial form and pattern of land use reflected in, the area's IDP and SDF.

2.1.1 The Need for the project at the National and Local Policy level

The City of Ekurhuleni (CoE) acknowledges that the provision of electricity infrastructure is of key importance and prioritises the need to provide universal access to this service. The IDPs highlight that the area require considerable resources to eliminate the backlogs of electricity provision to ensure that the provision of service keeps pace with the demand to prevent a further accumulation of backlogs. Within the Local Municipalities, the smaller villages in the rural areas have the greatest backlog. Electrification of rural homes, schools, clinics, small businesses is one the main policy considerations currently under discussion. Increased number of substations is considered as a need to increase the electricity supply within the area. Eskom will invest in the local economy by providing the infrastructure, which in turn will then assist the municipalities in reaching their objectives. In this way the proposed development is aligned with the municipal objectives and priorities for service delivery and infrastructural development in the area. The proposed project would thus assist CoE to provide a sustainable urban environment supported by the required infrastructure while facilitating the urban in-migration.

According to the City of Ekurhuleni Spatial Development Framework: 2015, main findings from the municipality status quo analysis include *"Water, sewer and electrical services - all need expansion, specifically in the north-eastern and southern sectors of the metro"*

In addition to the above, the Gauteng Employment, Growth and Development Strategy (2009) states that the infrastructure network of the Province is a strategic, socio-economic and bulk infrastructure investment and includes: transport and logistics (including roads, rail and air), Information and Communication and Technologies, schools, hospitals, clinics, libraries, universities (if applicable), electricity services (energy), water reticulation services, sewage and sanitation services, waste management services, and so forth. Thus the provision of electrical infrastructure is in line with SDF.

2.1.2 The Desirability for the project in the area:

Many areas supplied by HV cables in Gauteng Operating Unit are economically important and also enjoy moderate to high media attention (Soccer stadiums, JSE, Gautrain, etc.) A replacement and network strengthening strategy need to be devised to sustain load growth as well as provide a high-level of network reliability going into the future. A study by Eskom shows that the cables in service are aged and is at a point in time where performance will deteriorate. Foresight is needed to replace these cables before they cause extensive interruptions in the Region. Unfortunately these cables are entrenched in the areas making it difficult to replace. The point is if it difficult to replace, how much more difficult will it be to maintain once the cables start to fail more frequently.

Due to the nature of this project – the only option available to Eskom is to replace these old cable feeders with new technology XLPE cables. The area of supply does not allow any overhead line alternatives and the optimization of load distribution will be done per individual feeder design. Based on these identified risks as per the problem statement, Eskom Gauteng Operating Unit performed a risk model to devise a replacement strategy for all these HV oil filled cables. The strategy/approach is to replace all HV oil filled cables within the next 3-8 years as strengthening and refurbishment projects. The risk criticality model was used to identify the feeders of highest risk for the replacement strategy plan and is incorporated into this document.

2.2 Technical details of the proposed river crossings

2.2.1 Overview

The proposed HV cables systems will be crossing watercourses in certain areas as explained in section 1.1, and therefore river crossings are proposed in those areas.

2.2.2 Associated infrastructure²

Cable Trench: The HV underground cable will be positioned in an excavated trench (refer to **Figure 2.1**). The servitude required will be 3m width. Where the cable trench runs parallel to and under the road surface, it shall be positioned at least 200mm from the edge of the kerbing/road tarred surface. A tar cutting machine will be used and backfill will be done to the specifications of the relevant Road Agency.

The duct for the fibre optic cable shall be installed on the side of the trench closest to the property boundary (the spacing to be determined by the engineer). The duct shall be installed without any horizontal or vertical snaking (due to sagging). A sieve of 12mm mesh size will be used to sift soil. Where sand bags are installed before the installation of the cable, they shall be filled with bedding soil. To prevent sagging, the areas between the bag rows shall be filled with bedding soil and compacted before installing cables. Blanket soil will be compacted with hand compacting tools only.

² Please note that these infrastructures are not listed and therefore do not require environmental authorisations for construction, these are mentioned for the purpose of putting the proposed river crossings into perspective



Figure 2.1: Cable Trenching

The 132kV/88kV underground cable trench will be approximately 1m wide (in a 3m servitude) and up to 1m deep. The bedding layer will consist of compacted layer of sifted soil. The blanket layer will compacted by hand. The backfill layer will be compacted mechanically.

The specialist report “General Wetland Rehabilitation- And Monitoring Plan To Mitigate the Construction Related Impacts” (**Appendix D8**) describes special precautions and mitigation measures for impacts such as:

- The removal of vegetation,
- The disturbance of the soil layers, and
- Compaction of soil around construction footprint as well as along the servitude.

Underground Distribution Cable Specifications: The preferred technology alternative for the underground distribution cables are Cross-linked polyethylene cables (XLPE). The cables will be placed in cable pipe ducts and two different placement formations alternatives are available. The Flat Foil formation (refer to **Figure 2.2**) and Tre-Foil Formations (refer to **Figure 2.3**).

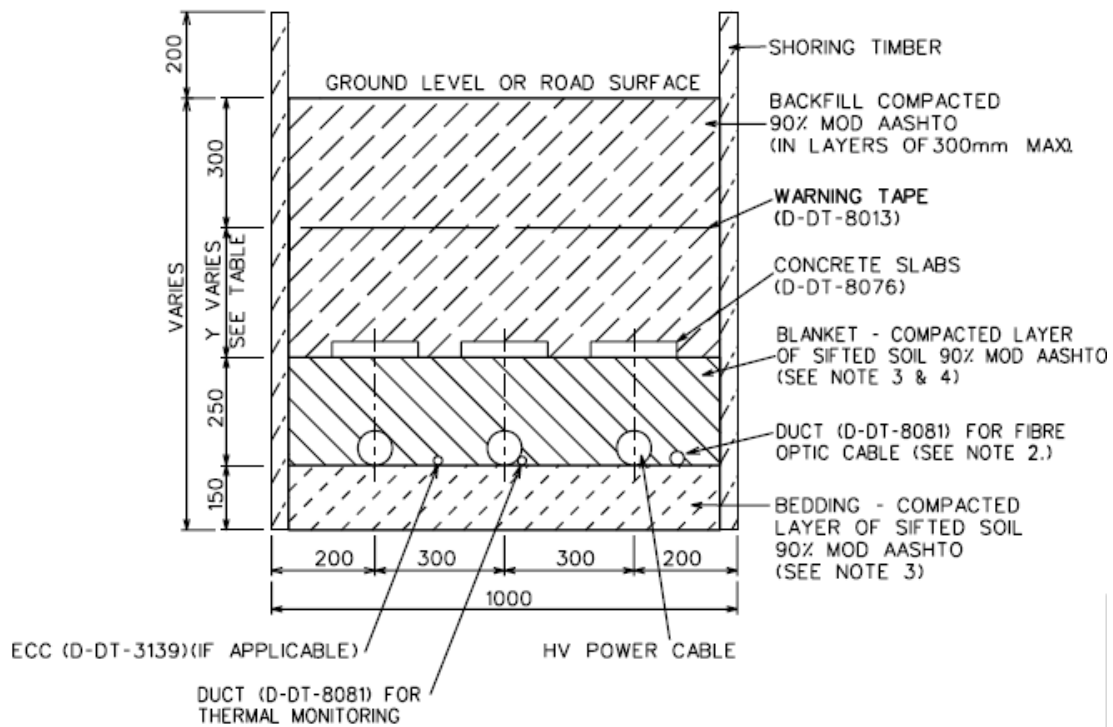


Figure 2.2: Flat Foil Formation

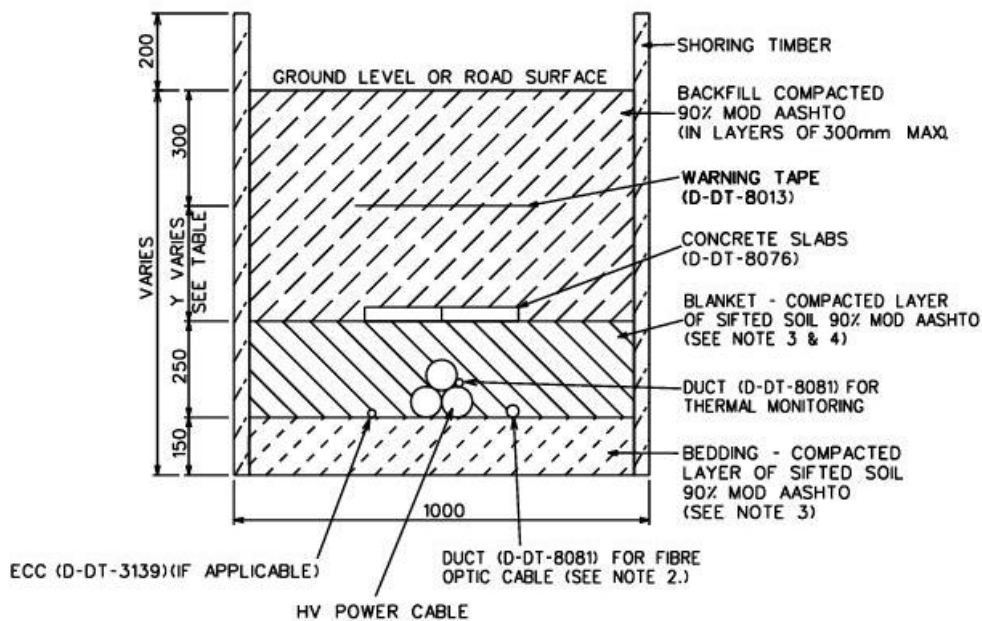


Figure 2.3: Tre-Foil Formation

In instances where space limitations and/or the presence of other underground services within the road reserve prevent the positioning of the trench and joint bays between the road and the adjacent property boundary, consideration may need to be given to the positioning of the trench and joint bays under the road surface. Where major interruptions to traffic flow in main roads cannot be avoided, open trench excavation may be restricted to shorter lengths (e.g. 100m) by the local authorities. In such a case, cable ducts shall be installed into which the cable can be pulled at a later stage. Where severe space limitations exist, consideration may need to be given to

the use of underground cable tunnels where multiple feeders / circuits can be installed within a relatively confined space.

2.2.3 Property description:

Province	Gauteng
District Municipality	City of Ekurhuleni (CoE)
Local Municipality	City of Ekurhuleni
Ward Number(s)	Ward 20, 21 & 92 (CoE)
Farm Name/Erf number & Portion number	Refer to Appendix J
SG Codes	Refer to Appendix J
Activity coordinates	Refer to Appendix J

Refer to **Appendix J** for the full properties details.

2.3 Alternatives Considered for the River Crossings

In accordance with the requirements of the EIA Regulations, alternatives are required to be considered within any environmental impact assessment (EIA) process, and may refer to any of the following:

- Site alternatives;
- Technology alternatives; and
- The No-go alternative.

2.3.1 Site alternatives

The approach is to replace all HV oil filled cables in Gauteng within the next 3-8 years as strengthening and refurbishment projects. Different areas/site has been considered for the upgrades based on the need for a replacement strategy. Due to the nature of this project – the only option available to Eskom is to replace these old cable feeders with new technology XLPE cables. The area of supply does not allow any overhead line alternatives and the optimization of load distribution will be done per individual feeder design. Based on these identified risks as per the problem statement, Eskom Gauteng Operating Unit performed a risk model to devise a replacement strategy for all these HV oil filled cables in certain areas within Gauteng, and Croydon/Germiston has been identified as one of those areas that will support the continuous reliable supply of electricity within the region.

2.3.2 Technology alternatives

Two technology alternatives are being considered for the proposed river crossings along HV cables within Croydon/Germiston and include:

- Horizontal Directional Drilling- **Alternative 1**

- Pipe jacking – [Alternative 2](#)

Horizontal Directional Drilling:

Directional drilling is a controlled horizontal trenchless drilling method by which ducting pipes are installed for underground applications (cables and auxiliary services/equipment) as part of the procedure, after drilling. Underground directional drilling equipment is used to drill holes that correspond to the pipe diameter being installed and is the Eskom preferred method for trenchless road, river, rail and service crossings or where it may not be possible to construct a standard cable trench. This method is limited by a combination of the maximum length of the drilling (+- 80m), depth of drilling and is not suitable to go through large rock formations.

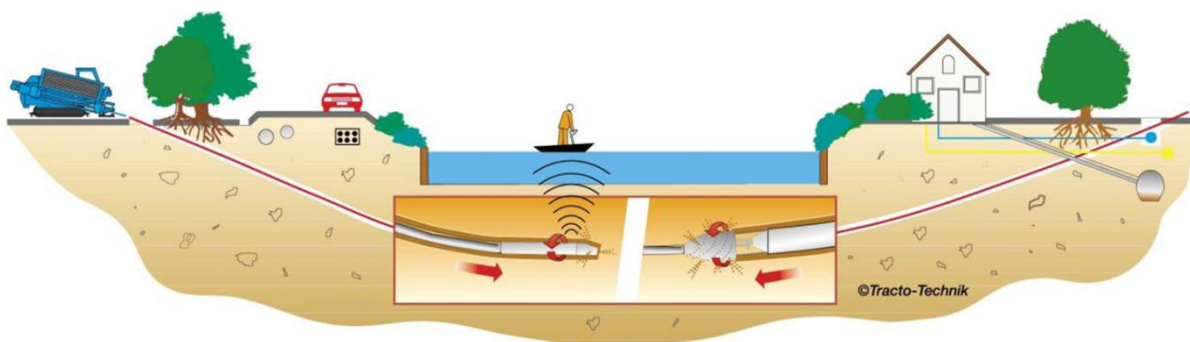


Figure 2.4: Horizontal directional drilling

Method: A Directional drilling rig and supporting equipment (**Figure 2.4**) is set-up at the drill entry location determined during the design phase. (This is typically close to, next to or inside the end of an already excavated cable trench, stabilised by wooden shoring.) The directional drilling rig is anchored to the ground surface using anchor stakes. The Directional drilling rig is used to drill (through the use of a drill string, and drill bit for mechanical cutting) a pilot hole through a predetermined drill path comprising of soil and rock. (Drill bits are capable of drilling through minor rock formations.) The drilling is also assisted by a natural fluid mixture of pure clay, oil and water, if required. This fluid is pumped out at low pressure at the tip of the drill head to: Transport drill cuttings to the surface, clean build-up on the drill bit, cool the drill bit, reduce the friction between the drills and bore wall, and stabilize the bore hole.

Periodic readings from electronic tracking components situated inside the head of the drill bit are used to determine the horizontal and vertical coordinates along the pilot hole in relation to the initial entry point. The pilot drill path may also be tracked using surface monitoring system. This information can then be used by the drill operator to control the drill bit head from the directional drilling rig. The drill path can be straight, at an arc or semi-circle, depending on the depth to be achieved and application.

Once the directional drilling rig and drill bit was successful in breaking the ground surface at the exit location (where another standard cable trench would be), the drill bit is replaced with a back reamer (similar to a drill bit but has a larger cutter head). The drill string is then pulled back through the pilot hole and the back reamer

enlarges the diameter of the pilot drill hole. The back reamer may be used over a few passes in order to achieve the desired bore hole diameter. Once the desired bore hole diameter is achieved, the reamer is replaced with a pipe puller and a PVC pipe (composing of a single piece or multiple pieces welded together, +- up to 250mm in diameter) which is then pulled from the exit side of the bore hole to where the directional drilling rig is located. The same fluid as mentioned previously is used during back reaming as well installation of the PVC pipe.

The PVC pipe is protected with rollers inside the cable trench during the installation / back pulling. An inspection of the PVC pipe is performed to identify any damage done to the pipeline during the pull back. Upon successful pull back of the PVC pipe, the drilling equipment is dismantled and demobilized.

The PVC pipes installed can now be filled with cable, auxiliary equipment or kept as spares (fitted with non-metallic draw wires and sealed-off). The PVC pipes containing cable and auxiliary equipment may also be filled with bentonite, to allow for good thermal conduction to the surrounding environment as shown in **Figure 2.5**.

Once the above is completed, the cable trench (es) leading to the PVC pipe(s) are backfilled and the surfaces are re-instated.

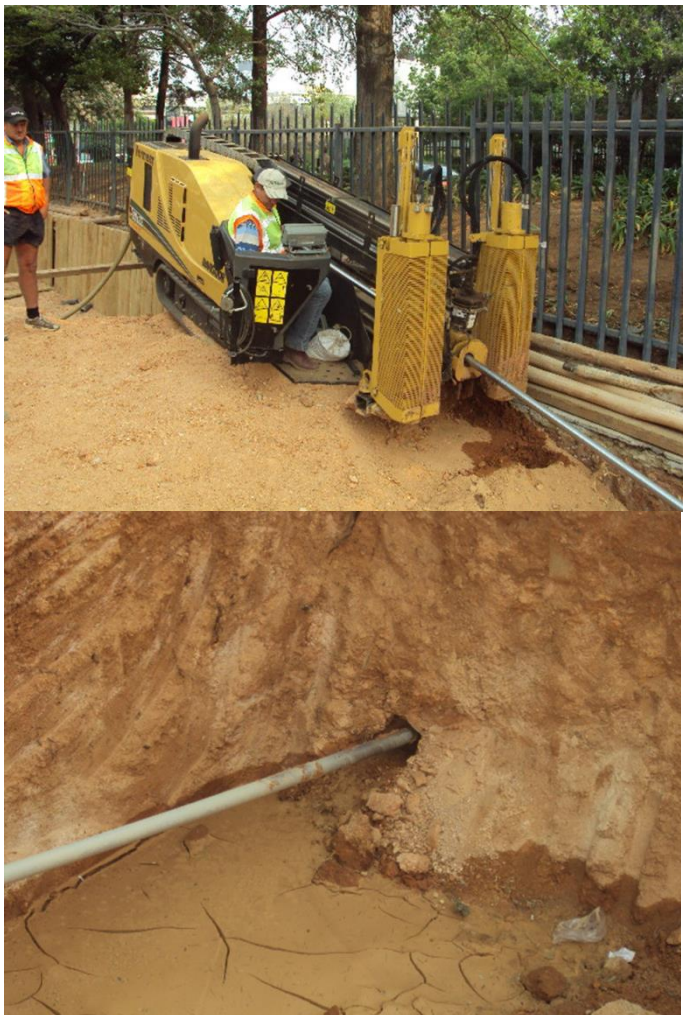


Figure 2.5: Horizontal directional drilling

Pipe jacking:

Pipe jacking is horizontal trenchless hydraulic push method by which concrete pipes are jacked into position, and ducting pipes are installed inside the concrete pipes for underground applications (cables and auxiliary services/equipment). It is the Eskom preferred method for trenchless road, river, rail and service crossings where directional drilling cannot be applied. - This method is not as limited as directional drilling, and can be used over long distances, at greater depths and can go through larger rock formations.

Method: A pipe jacking rig and supporting equipment are set-up above ground level at the pipe jacking entry location determined during the design phase. (This is typically close to an already excavated cable trench.) The Pipe jacking rig comprises of a crane which is anchored to the ground surface using anchor stakes, and a hydraulic jack installed at the bottom of a shaft. Before pipe jacking can take place, a shaft has to be excavated. The shaft's dimensions must be adequate to allow a concrete pipe (+- Up to 1,5m diameter, +- 2,5m long) to be lowered comfortably in the shaft, to the required depth it must be installed. (The side wall of the shaft is also stabilised using wooden shoring and concrete and is dependent on the soil conditions on-site.) A similar shaft is constructed at the remote end, which is aligned to the designed pipe jacking path.

Once excavations are done, a concrete pipe is lowered into the shaft. A hydraulic jack at the bottom of the shaft is used to push the concrete pipe horizontally forward, between the beginning and end shafts. Once the concrete pipe has been pushed / jacked into place, hand excavation is used to remove the soil and rock inside the concrete pipe. This process is then repeated by lowering the next concrete pipe, hydraulically jacking the pipe, removing the soil and rock inside it, until a continuous concrete pipe tunnel is constructed between start and end shafts. Concrete screed is used between the individual concrete pipes to seal the concrete pipe tunnel. (Should large rock formations be encountered, the rock can be jack hammered or blasted way.) The direction of the concrete pipe tunnel is carefully controlled through control over the hydraulic jack, to ensure a perfect connection between the start and end shafts.

Once the concrete pipe tunnel is complete, it is inspected for any defects. PVC pipes in varying diameters (composing of a single piece or multiple pieces welded together, +- up to 250mm in diameter) are then installed inside the concrete pipe tunnel and fixed into place with a bentonite filling. The PVC pipes are inspected for defects after installation. Upon successful completion of the installation, the pipe jacking rig is dismantled and demobilized.

The PVC pipes installed can now be filled with cable, auxiliary equipment or kept as spares (fitted with non-metallic draw wires and sealed-off). The PVC pipes containing cable and auxiliary equipment may also be filled with bentonite, to allow for good thermal conduction to the surrounding environment (as shown in **Figure 6** and **Figure 7**)

Once the above is completed, the cable trench (es) and pipe jacking shaft leading to the PVC pipes are backfilled and the surfaces are re-instated.

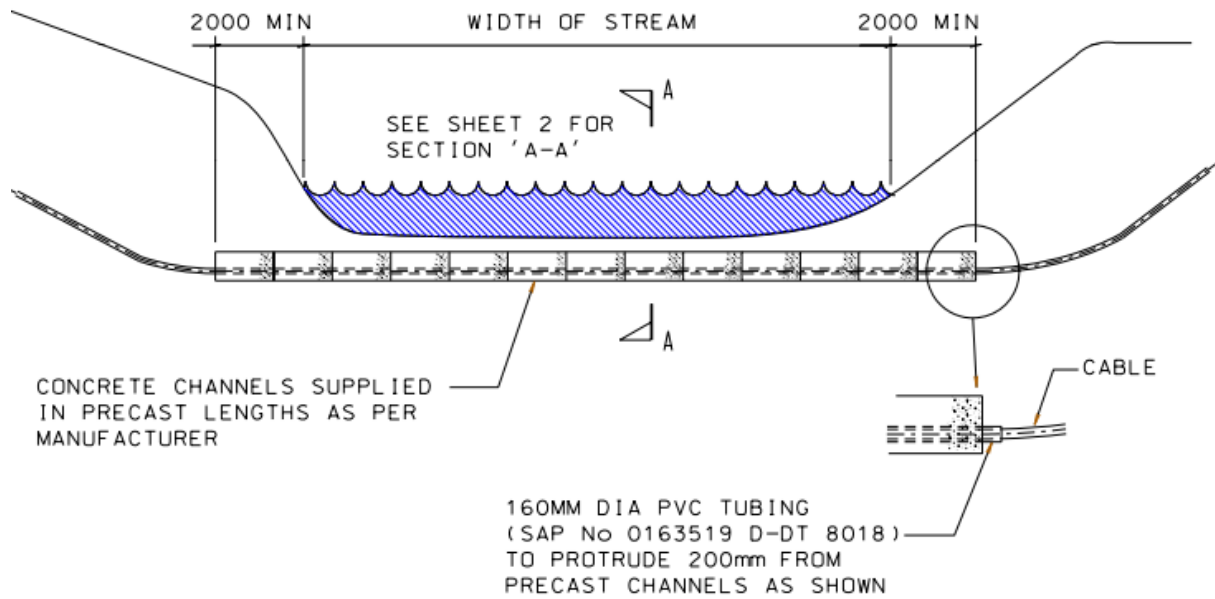


Figure 2.6: Pipe jacking Technology

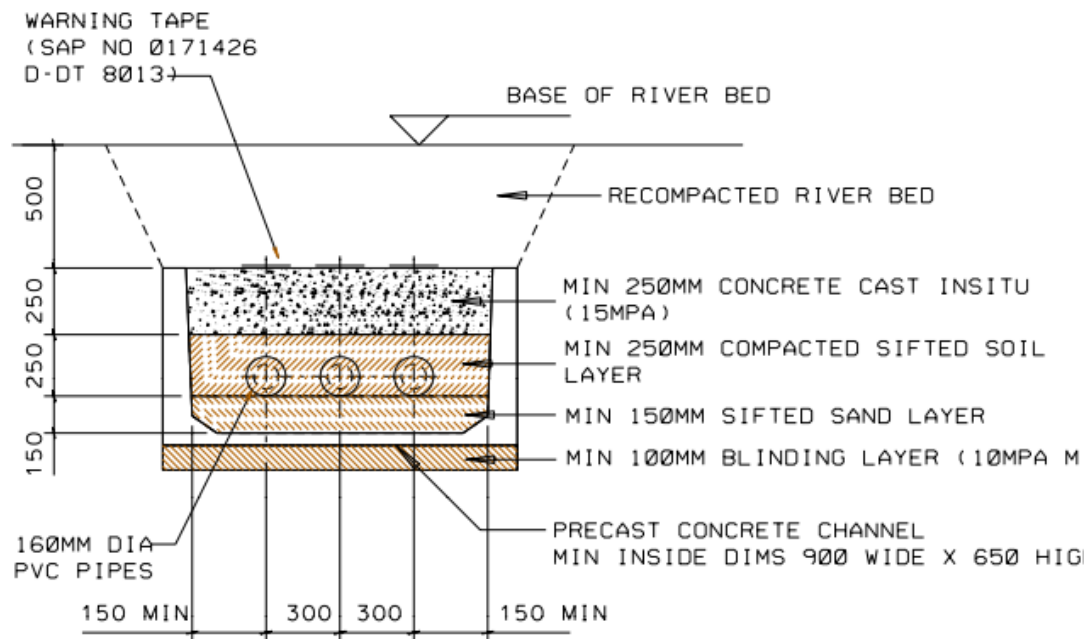


Figure 2.6: Pipe jacking Technology

2.3.3 No-go alternative

The No-go option implies that the Project does not proceed, and will thus comprise of Eskom not going ahead with the upgrade of ageing underground HV cables. Ideally this would be the preferred alternative as the status quo of the environment remains unchanged, however due to the growing demand for energy and activities that will require electricity in the area, this alternative is not feasible. Should Eskom rely on the existing network to supply future demand it is highly likely that present supply will be compromised due to the increased load on the

network. Although the no-go alternative has been considered, it is not a practical project alternative in terms of providing stable electricity supply in the area as it implies a continuation of the current situation or the status quo; therefore, it doesn't render any positive outcomes.

This proposed project will improve the customer interruptions and also the performance of the supply. By not increasing the supply to the greater area, development will be constrained as the already existing network is operating at near-capacity and will not be able to accommodate the amount of load that will be brought by future developments.

In summary, the implications of the no-go alternative include:

- There is no change to current landscape;
- There will be insufficient electricity for existing and new users in the area;
- Electricity supply will be unreliable and this can result in blackouts and major disturbances in energy provision to existing users;
- Future development in the broader area within Croydon/Germiston will be constrained;
- Proposed objectives of Provincial and Metropolitan Municipality planning initiatives such as IDPs, SDFs and Gauteng Growth Management Strategy will not be achieved.

Based on above points, the 'No-go' alternative is therefore not considered to be a feasible alternative and will not be considered further within the EIA process.

2.4 Proposed Activities during the Project Development Stages

Eskom uses the following procedure³ for the construction of their new transmission lines which can be adapted in the construction of river crossing along HV line.

2.4.1 Planning

The Transmission System Planning Department of Eskom are the system network planners which formulate five-year, ten-year or 20-year Transmission Development Plans (TDP), which are strategic documents aimed at identifying the entire infrastructure required throughout South Africa for the transmission of electricity. All projects initiated by the Eskom planners have to be in line with the requirements stipulated in the TDP. All projects which are initiated are thoroughly investigated to ensure that they are both viable and feasible before being approved for implementation.

2.4.2 Appointment of EIA Practitioners

Once a project is internally approved to be investigated, the Eskom Development Department initiates the process of the Environmental Impact Assessment (EIA). In the case of this project, a Basic Assessment Process was followed by Envirolution Consulting (Pty) Ltd. The purpose of the process is as follows:

³ Eskom Fact Sheet: Construction of power lines

- To identify both the positive and the negative impacts on the environment, communities and the local economy;
- To identify the impact on the proposed infrastructure;
- To recommend all possible mitigation measures for each impact identified; and
- To develop a plan for implementing the mitigating measures.

All the available information has now been gathered and collated into this document called the Basic Assessment Report (BAR), to be submitted to the decision making authority, the National Department of Environmental Affairs (DEA). The document will provide the DEA with all the alternative assessed during the BA process and recommend the least impacting technology for authorisation. If authorised, the DEA will issue an Environmental Authorisation, which will allow Eskom to implement the project. An Environmental Authorisation (EA) normally stipulates all conditions that should be adhered to before construction can commence. One such condition would be to finalise an Environmental Management Programme (EMPr) for approval by DEA before construction can commence. During construction, an Environmental Compliance Officer (ECO) must be employed to ensure that the specifications of the EA and EMPr are adhered to.

2.4.3 Land and rights acquisition

Once a positive uncontested Environmental Authorisation has been granted, the process of securing the servitude or title of the said portions of land will commence. To achieve this, the following activities have to be completed:

- The legal boundaries are identified for each property affected by the project;
- The legal ownership of each property is identified;
- An independent property evaluator is appointed to determine the market value of the affected properties; and
- Negotiations are conducted by Transmission negotiators with each lawful landowner to acquire the rights to construct river crossings over their properties. Rights are also acquired from affected statutory bodies and mineral right holders.

All land and rights acquired for the purpose of building power lines are registered at the Deeds Office accordingly under title deeds or servitudes.

2.4.4 Survey and crossings design

Topographical surveys are conducted subsequent to identifying and securing servitudes. The survey information is used by the design engineers to design the tower foundations, structures, buildings, and the exact placement of structures. The draft EMPr (part of this BAR) will be finalised when all the profiles and local site plans are available (after EA has been given). The EMPr will outline all activities to be undertaken, where such activities are to take place, responsible persons, all possible environmental or social impacts, mitigation measures, rehabilitation plans, monitoring methods, the frequency of monitoring as well as performance indicators. The EMPr is a legally binding document which is used to ensure that Eskom adheres to all conditions of the Environmental Authorisation and Final BA Report.

2.4.5 Construction

A procurement process is followed to identify a suitable construction contractor. During this process all potential contractors are invited to bid for the implementation of the project. Various factors are considered when appointing these contractors. Factors considered include but are not limited to; capacity, legal status, adherence to all Eskom standards (ie safety, quality, and environment) and other legislated regulations, policies and procedures.

In this regard, the following **simplified sequence will be followed:**

- Establishment of construction camp, vegetation clearance and construction of access roads (where required);
- Construction of terrace and foundations;
- Assembly and erection of equipment;
- Connection of conductors to equipment;
- Rehabilitation of any disturbed areas and protection of erosion sensitive areas;
- Testing and commissioning; and
- Continued maintenance.

2.4.6 Required Services

Access Routes & Storm Water

Access will be required during both the construction and operation / maintenance phases of the power line life cycle. Access roads will enable the transportation of construction material as well as construction teams to the site and facilitate maintenance activities once the river crossings have been constructed. All River Crossings are in close proximity to existing roads, the existing servitude maintenance road will be used for access and therefore no new access roads will have to be constructed. Where no access roads/tracks exist, the access points and roads will be negotiated with the relevant landowner, and will be established during the construction phase.

Storm water will be managed according to the Eskom Guidelines for Erosion Control and Vegetation Management as well as the Environmental Management Programme (EMPr), which will be compiled for the construction phase.

Construction Site Camps

The construction contractor would need to set up at least one site camp but this does not necessarily need to be near the river crossings. The contractor may however prefer to use a fully serviced site at another location. The contractor will be encouraged to utilise already disturbed areas for construction camp purposes, in order to minimise cumulative impacts. It is likely that a number of construction camps would need to be established for the construction period.

Sewage

A negligible sewage flow is anticipated for the duration of the construction period. Chemical toilets will be utilised during construction, and the contractor will ensure regular treatment of these facilities. The toilets will be serviced regularly, as specified by the final site specific EMPr.

Solid Waste Disposal

It is anticipated that construction waste will be comprised mainly of spoil material from clearing activities as well as metal and cabling off-cuts. Spoil material excavated, such as topsoil and subsoil, will be used on site as per the management programme for the construction phase and the associated mitigation / control measures in the EMPr. Excess spoil will be removed from site and appropriately disposed of. Non-biodegradable waste will be immediately trucked to the nearest registered waste disposal facility for appropriate disposal or recycling.

In order to comply with legal requirements should there be excess solid construction waste after recycling options have been exhausted, the waste will be transported to a licenced waste disposal facility for appropriate disposal. General waste removed from site will be disposed of at the nearest registered landfill. Safe disposal certificates will be obtained.

Water & Electricity

Water will be required for potable use and in the construction of the river crossing. The water will be sourced from approved abstraction points/municipal source at locations closest to the area of construction. The construction team might have temporary connection and supply of electricity from the existing network. Diesel generators will be utilised as an option for the provision of electricity.

2.4.7 Rehabilitation & Maintenance

After the project has been completed, all affected properties are rehabilitated to their original status. Landowners sign off release forms to confirm the rehabilitated status.

3 LEGISLATION AND GUIDELINES CONSIDERED

3.1 Requirement for a Basic Assessment Process

In terms of sections 24(2) and 24D of the National Environmental Management Act (Act No. 107 of 1998), as read with the Environmental Impact Assessment (EIA) Regulations of GNR 982 to R985 (as amended), a Basic Assessment process is required for the proposed project. **Table 3.1** contains the listed activities in terms of the EIA Regulations (as amended) and includes a description of those project activities which relate to the applicable listed activities.

Table 3.1 BA Listed Activities Applicable applied for to be authorise

Listed activities	Description of project activity that triggers listed activity
<p>Activity 12 of GNR R.983: The development of</p> <p>(ii) infrastructure or structures with a physical footprint of 100 square meters or more where such development occurs</p> <p>where such development occurs—</p> <p>a. Within a watercourse; (c) if no development setback exists within 32m of a watercourse measured from the edge of a watercourse.</p>	<p>River crossings of more than 100 m² will be constructed within 32m of a watercourse along underground HV cabling system in Croydon/Germiston</p>
<p>Activity 19 of GNR R.983: The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse</p>	<p>The construction of river crossings will require infilling or removal of 10m³ or more of material into/from the watercourse for the placement of river crossings.</p>
<p>Activity 12 of GNR R.985: The clearance of an area of 300 square metres or more of indigenous vegetation</p> <p>(b) In Gauteng:</p> <p>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans; or</p>	<p>The project is proposed within endangered ecosystem listed in terms of section 52 of the NEMBA and within Critical Biodiversity Areas /Ecological Support Areas identified in the Gauteng Conservation Plan.</p>
<p>Activity 14 of GNR R.985: The development of:</p> <p>(ii) Infrastructure or structures with a physical footprint of 10 square metres or more. where such</p>	<p>River crossings of more than 100 m² will be constructed within 32m of a watercourse on sites identified as Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and</p>

<p>development occurs—</p> <p>a. Within a watercourse; (c) if no development setback exists within 32m of a watercourse measured from the edge of a watercourse.</p> <p>(c) In Gauteng:</p> <p>(iv) Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;</p> <p>(v) Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004)</p>	<p>threatened ecosystems in terms of NEMBA.</p>
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3.2 Legislation and Guidelines that have informed the preparation of this EIA Report

Several other Acts, standards or guidelines have also informed the project process and the scope of issues assessed in this report. A listing of relevant legislation is provided in **Table 3.2**, where the level of applicability of the legislation or policy to the activity/project is detailed.

Table 3.2: Relevant legislative and permitting requirements applicable to the proposed project

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<p>The EIA Regulations have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without an environmental authorisation are identified within these Regulations.</p> <p>In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.</p> <p>In terms of GNR 982 of 2014 (as amended), a Basic Assessment Process is required to be undertaken for the proposed project.</p> <p><i>The final BA report is to be submitted to the DEA in support of the application for authorisation.</i></p>	<p>Department of Environmental Affairs (DEA) – competent authority</p> <p>Gauteng Department of Agriculture and Rural Development (GDARD)</p>
<p>National Environmental Management Act (Act No 107 of 1998)</p>	<p>In terms of the Duty of Care Provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, stopped or minimised.</p> <p>In terms of NEMA, it has become the legal duty of a project</p>	<p>DEA</p> <p>GDARD</p>

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	<p>proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.</p> <p><i>While no permitting or licensing requirements arise directly by virtue of the proposed project, this section will find application during the BA phase and will continue to apply throughout the life cycle of the project.</i></p>	
<p>National Water Act (Act No 36 of 1998)</p>	<p>The development also triggers activities that require a Water Use License (WUL) because it crosses several water courses. Therefore, before construction activities may take place, the activity will require a Water Use License as per requirement in the National Water Act (Act No.36 of 1998) (NWA) under Section 21 Water Uses. In terms of the NWA, this development requires a Water Use License for the following water uses:</p> <ul style="list-style-type: none"> • Section 21(c) impeding or diverting the flow of water in a watercourse and; • Section 21 (i) altering the bed, banks, course or characteristics of a watercourse. <p><i>A water use license (WUL) is required in terms of Section 21(c) and 21 (i) of the National Water Act. If wetlands or drainage lines are impacted on, or the regulated area of a watercourse (being the riparian zone or the 1:100yr floodline whichever is greatest).</i></p>	<p>Department of Water and Sanitation (DWS)</p>
<p>National Environmental Management: Air Quality Act (Act No 39 of 2004)</p>	<p>S18, S19, and S20 of the Act allow certain areas to be declared and managed as “priority areas.”</p> <p>Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards.</p> <p>GN R 827 – National Dust Control Regulations prescribes general measures for the control of dust in all areas</p>	<p>DEA CoE</p>
<p>National Heritage Resources Act (Act No 25 of 1999)</p>	<p>» S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including</p> <ul style="list-style-type: none"> » The construction of a road, power line, pipeline, canal or other similar linear development or barrier exceeding 300 m in length; » Any development or other activity which will change the character of a site exceeding 5 000 m² in extent » The relevant Heritage Authority must be notified of developments such as linear developments (i.e. roads and power lines), bridges exceeding 50 m, or any development or other activity which will change the character of a site 	<p>South African Heritage Resources Agency (SAHRA) Provincial Heritage Resources Authority</p>

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	<p>exceeding 5 000 m²; or the re-zoning of a site exceeding 10 000 m² in extent. This notification must be provided in the early stages of initiating that development, and details regarding the location, nature and extent of the proposed development must be provided.</p> <p>» Stand-alone HIAs are not required where an EIA is carried out as long as the EIA contains an adequate HIA component that fulfils the provisions of S38. In such cases only those components not addressed by the EIA should be covered by the heritage component.</p> <p><i>A permit may be required should identified cultural/heritage sites on site be required to be disturbed or destroyed as a result of the proposed development</i></p>	
<p>National Environmental Management: Biodiversity Act (Act No 10 of 2004)</p>	<p>In terms of S57, the Minister of Environmental Affairs has published a list of critically endangered, endangered, vulnerable, and protected species in GNR 151 in Government Gazette 29657 of 23 February 2007 and the regulations associated therewith in GNR 152 in GG29657 of 23 February 2007, which came into effect on 1 June 2007.</p> <p>In terms of GNR 152 of 23 February 2007: Regulations relating to listed threatened and protected species, the relevant specialists must be employed during the EIA Phase of the project to incorporate the legal provisions as well as the regulations associated with listed threatened and protected species (GNR 152) into specialist reports in order to identify permitting requirements at an early stage of the EIA Phase.</p> <p>The Act provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (GG 34809, GN 1002), 9 December 2011). GNR 598: The Alien and Invasive Species (AIS) Regulations provides for the declaration of weeds and invader plants.</p>	<p>DEA GDARD</p>

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	<p><i>An ecological study has been undertaken as part of the BA process, as such the potential occurrence of critically endangered, endangered, vulnerable, and protected species and the potential for them to be affected has been considered within this report.</i></p>	
<p>National Forests Act (Act No. 84 of 1998)</p>	<p>In terms of S5(1) no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree, except under a license granted by the Minister to an (applicant and subject to such period and conditions as may be stipulated”</p> <p>GN 908 provides a list of protected tree species.</p> <p><i>While no permitting or licensing requirements arise from this legislation, and this Act will find application during the construction and operational phase of the project.</i></p>	<p>Department of Agriculture, Forestry and Fisheries</p>
<p>National Veld and Forest Fire Act (Act 101 of 1998)</p>	<p>In terms of S13 the landowner would be required to burn firebreaks to ensure that should a veldfire occur on the property, that it does not spread to adjoining land.</p> <p>In terms of S13 the landowner must ensure that the firebreak is wide and long enough to have a reasonable chance of preventing the fire from spreading, not causing erosion, and is reasonably free of inflammable material. In terms of S17, the applicant must have such equipment, protective clothing, and trained personnel for extinguishing fires.</p> <p><i>While no permitting or licensing requirements arise from this legislation, and this Act will find application during the construction and operational phase of the project.</i></p>	<p>Department of Agriculture, Forestry and Fisheries</p>
<p>Hazardous Substances Act (Act No 15 of 1973)</p>	<p>This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive, irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products.</p> <p>» Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or</p>	<p>Department of Health</p>

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	<p>because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance</p> <ul style="list-style-type: none"> » Group IV: any electronic product; and » Group V: any radioactive material. <p>The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.</p> <p><i>It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the site and in what operational context they are used, stored or handled. If applicable, a license is required to be obtained from the Department of Health</i></p>	
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</p>	<p>The Minister may by notice in the <i>Gazette</i> publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.</p> <p>The Minister may amend the list by –</p> <ul style="list-style-type: none"> » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. <p>In terms of the Regulations published in terms of this Act (GN 921), A Basic Assessment or Environmental Impact Assessment is required to be undertaken for identified listed activities (Category A and B) while Category C Activities (such as storage of waste) must be undertaken in accordance with the necessary norms and standards.</p> <p>Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that:</p> <ul style="list-style-type: none"> » The containers in which any waste is stored, are intact and not corroded or in » any other way rendered unfit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are 	<p>DEA: Chemicals and Waste Management</p> <p>GDARD: General waste</p>

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	<p>prevented.</p> <p><i>As no waste disposal site is to be associated with the proposed project, no permit is required in this regard. Waste handling, storage and disposal during construction and operation is required to be undertaken in accordance with the requirements of the Act, as detailed in the EMP. The volumes of waste to be generated and stored on the site during construction and operation of the facility will not require a waste license.</i></p>	
<p>National Road Traffic Act (Act No 93 of 1996)</p>	<p>» The technical recommendations for highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads” outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed.</p> <p>» Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.</p> <p>» The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.</p> <p><i>An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include: Route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m.</i></p>	<p>South African National Roads Agency Limited (SANRAL) (national roads)</p> <p>Provincial Department of Transport</p>
<p>Conservation of Agricultural Resources Act (Act No 43 of 1983)</p>	<p>Regulation 15 of GNR1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GNR1048. Declared Weeds and Invaders in South Africa are categorised according to one of the following categories: Category 1 plants: are prohibited and must be controlled. Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps</p>	<p>DAFF</p>

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	<p>are taken to prevent their spread.</p> <p>Category 3 plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the floodline of watercourses and wetlands.</p> <p>These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.</p> <p><i>While no permitting or licensing requirements arise from this legislation, this Act will find application during the BA process and will continue to apply throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies must be developed and implemented.</i></p>	
<p>Subdivision of Agricultural Land Act (Act No 70 of 1970)</p>	<p>Details the subdivision of agricultural land and provisions under which the act is triggered. It also provides for the approval of such division by the Minister of Agriculture. Applies for subdivision of all agricultural land and long-term leasing of portions of agricultural land.</p> <p><i>Long-term leases on portions or subdivision of the site properties will require an approval of the Minister of Agriculture. An application to DAFF will need to be submitted detailing the areas to be subdivided or leased for the purposes of the proposed development. An application in terms of SALA will need to be undertaken and submitted following the issuing of an environmental authorisation for the proposed project.</i></p>	<p>(DAFF) Provincial Departments of Agriculture and Environment - commenting authority. Local Municipality – competent authority</p>
<p>Spatial Planning And Land Use Management Act 16 OF 2013</p>	<p>This Act has the main objectives to:</p> <ul style="list-style-type: none"> • provide for a uniform, effective and comprehensive system of spatial planning and land use management for the Republic; • ensure that the system of spatial planning and land use management promotes social and economic inclusion; • provide for development principles and norms and standards; • provide for the sustainable and efficient use of land; • provide for cooperative government and intergovernmental relations amongst the national, Regulations under the SPLUMA not in force yet. <p>Legislation that regulates Land Use Planning has led to “spatial planning tools” that are contained in Municipal and District Strategic Management Frameworks (SMFs), Strategic</p>	<p>City of Ekurhuleni</p>

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	Development Initiatives (SDIs) and Municipal By-laws	
Development Facilitation Act (Act No 67 of 1995)	<p>The Development Facilitation Act contains development facilitation regulations under the Regulations under Development facilitation Act 3. The Act is directed at provincial and local spheres of government; and serves to re-address the imbalances of the past and to ensure that there is equity in the application of spatial development planning and land use management systems.</p> <p>Provides for the overall framework and administrative structures for planning throughout the Republic.</p> <p>S (2-4) provides general principles for land development and conflict resolution.</p> <p>The applicant must submit a land development application in the prescribed manner and form as provided for in the Act. A land development applicant who wishes to establish a land development area must comply with procedures set out in the DFA.</p>	GDARD

3.3 Policy Guidelines

The following Guideline documents have been considered in the preparation of this report:

- Department of Environmental Affairs (DEA) Integrated Environmental Management Guideline Series 7, Public Participation in the EIA Process as published in Government Gazette No. 33308, 18 June 2010; and
- Implementation Guidelines (published for comment) in Government Notice 603 of 2010
- Integrated Environmental Management Information Series (Booklets 0 to 23) (DEAT, 2002 – 2005);
- DEA&DP Guideline on Alternatives, August 2010)
- DEA&DP, Guideline on Public Participation (August 2010)
- DEA&DP Guideline on Need and Desirability (, August 2010)
- Guidelines for Involving Specialists in the EIA Processes Series (DEA&DP; CSIR and Tony Barbour, 2005 – 2007)
- DEAT (2004) Cumulative Effects Assessment, Integrated Environmental Management, Information Series 7.
- Gauteng Environmental Implementation Plan 2015-2020
- The Gauteng Provincial Environmental Management Framework (GPEMF), 2014
- Gauteng Spatial Development Framework 2030 (GSDF)
- Gauteng Conservation Plan (C-Plan) 2011

4 PUBLIC PARTICIPATION PROCESS

The Public Participation Process (PPP) was conducted in accordance with **Chapter 6 of the Environmental Impact Assessment Regulations, Published in Government Notice R982 (as amended-07 April 2017)**. In addition the PPP was guided by the Integrated Environment Management Guidelines Series 7, Public Participation in the EIA process, published in Government Gazette no. 33308, 18 June 2010.

4.1 Purpose of Public Participation

The engagement of Interested and Affected Parties (I&AP's) and the Stakeholder Engagement Process is an important part of any environmental Impact assessment. The main objectives of the Stakeholder Engagement / Public Participation Process includes amongst others:

- Informing the adjacent landowners, tenants, residents' associations, ward councillors, the local municipality and other organs of state of the proposed project;
- Establishing lines of communication between the stakeholders, I&AP's and the project team;
- Providing all parties with an opportunity to exchange information and to express their views and concerns regarding the proposed project;
- Obtaining comments/input from stakeholders and I&AP's, and ensuring that all views, issues, concerns and queries raised are fully documented; and
- Identifying all the significant issues associated with the proposed project

4.2 Public Participation Undertaken

In terms of the requirement of Chapter 6 of the EIA Regulations of December 2014, the following key public participation tasks are required to be undertaken:

- Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of—
 - (i) the site where the activity to which the application relates is or is to be undertaken; and
 - (ii) any alternative site mentioned in the application;
- Giving written notice to:
 - (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
 - (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
 - (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
 - (v) the municipality which has jurisdiction in the area;
 - (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
 - (vii) any other party as required by the competent authority.
- Placing an advertisement in:
 - (i) one local newspaper; and

- (ii) in at least one provincial newspaper.
- Open and maintain a register/ database of interested and affected parties and organs of state.
 - » Release of a Draft BA Report for Public Review
 - » Preparation of a Comments and Responses Report which documents all of the comments received and responses from the project team.

In compliance with the requirements of Chapter 6 of the EIA Regulations, 2014, the following summarises the key public participation activities conducted to date.

4.2.1 Stakeholder and land owner Identification

Identification of I&APs was undertaken by Envirolution through existing contacts and databases, recording responses to site notices and the newspaper advertisement, as well as through the process of networking. The key stakeholder groups identified include authorities, local and district municipalities, public stakeholders, Parastatals and Non-Governmental Organisations (refer to **Table 4.1**).

Table 4.1: Key stakeholder groups identified during the BA Process

ORGANISATION	DESIGNATION	CONTACT PERSON: FIRSTNAME & LASTNAME
National Government Departments		
Department of Water and Sanitation		Lilian Siwelane
Department of Water and Sanitation		Vongani Mhinga
SANRAL		Victoria Botha
South African Heritage Resources Agency (SAHRA)		Andrew Salomon
Provincial Government Departments		
Gauteng Department of Agriculture and Rural Development		Nkosana Giyose
Gauteng Department of Agriculture and Rural Development		Nhlanhla Makhathini
Gauteng Department of Public Transport, Roads and Works		Dennis Emett
Provincial Heritage Resources Authority Gauteng (PHRAG)		Tebogo Molokomme
Local Government Departments		
City of Ekurhuleni	Environmental Resource Management: Compliance	Stewart Green
Ekurhuleni: Metropolitan Municipality	Environmental Infrastructure Service department (Admin)	Cecilia Rakgoale/ Anél Hietbrink/ Lilian Kwakwa

Ekurhuleni: Metropolitan Municipality	Implementation	Daniel Masemola	
Ekurhuleni: Metropolitan Municipality	Roads and Stormwater	Tony Mulder	
Ekurhuleni: Metropolitan Municipality	Local Economic Development	Caiphus Chauke	
Ekurhuleni: Metropolitan Municipality	Parks and Cemeteries	Vincent Campbell	
Ekurhuleni: Metropolitan Municipality	Water and Sanitation	Danie van der Merwe	
Ekurhuleni Ward 92	Ward 92 Cllr	Tiziana Burtone	
Ekurhuleni Ward 20	Ward 20 Cllr	Jill Humphreys	
Ekurhuleni Ward 21	Ward 21Cllr	Brian Ngada	
Rand Water		Natalie Koneight/ Gail Andrew	
Conservation Authorities			
Wildlife and Environment Society of South Africa (WESSA)		Karin	Max
Endangered Wildlife Trust (EWT)		Harriet	Davies-Mostert
Neighbouring landowners			
Refer to Appendix E5 .			

An I&AP's register was opened and maintained in terms of Regulation 42 and contains the names, contact details and addresses of:

- i. all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;
- ii. all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and
- iii. all organs of state which have jurisdiction in respect of the activity to which the application relates.

All relevant stakeholder and I&AP information has been recorded within a **database** of affected parties (refer to **Appendix E5**). While I&APs were encouraged to register their interest in the project from the onset of the process undertaken by Envirolution Consulting, the identification and registration of I&APs has been on-going for the duration of the BA process.

4.2.2 Project Announcement

i. Placement of Site Notices & Newspaper advertisement

Site notices were displayed in different points within the study area. Newspaper advertisement was placed in **Bedfordview & Edevale News and Germiston City News** requesting Interested and Affected Parties (I&APs) to register, and submit their comments as shown in **Table 4.2**

Table 4.2: Site Notices & Newspaper advertisement

Publication name	Bedfordview & Edevale News and Germiston City News		
Date published	Friday, 10 November 2017		
Site notice position	Location	Latitude	Longitude
	Site Notice 1: Boeing Road E, Bedfordview	26° 9'45.67"S	28° 9'0.76"E
	Site Notice 2: At the T-Junction of Hurleyvale Av & Gibson Rd, Hurleyvale	26° 9'11.76"S	28° 10'3.25"E
	Site Notice 3: Along Minauch Road, Burrendal	26° 8'52.09"S	28° 10'36.43"E
	Site Notice 4: At the T-Junction of Minauch Road & Sheri Street in Harmelia	26° 8'29.43"S	28° 11'21.20"E
	Site Notice 5: Avondgloed Road in Klopperpark	26° 8'38.59"S	28° 11'34.13"E
	Site Notice 6: Avondgloed Road in Klopperpark (Germiston)	26° 8'50.52"S	28° 11'21.06"E
	Site Notice 7: cnr Pretoria Road & Oak Avenue in Primrose (Germiston)	26° 11'4.49"S	28° 10'19.95"E
	Site Notice 8: Stanley Street in Primrose (Germiston)	26° 11'17.02"S;	28° 10'18.96"E
Date placed	Wednesday, 08 November 2017		

Proof of the above is included in **Appendix E1**.

ii. Written notifications

Access to all information that could influence interested and affected parties has been initiated by the project announcement; a Background Information Document (BID) was produced and distributed in the form of

- i) email distribution to registered I&APs
- ii) a "knock and drop" exercise during visits to surrounding areas

Notification and Consultation with Organs of State that may have jurisdiction over the project, including:

- o Provincial departments
- o Parastatals and Non-Governmental Organisations

- o Local Municipality

These are all included in **Appendix E2 and E4** (for the **organs of states** correspondence).

4.2.3 Public Review of the Draft Basic Assessment Report

- a. **Stakeholder:** The draft BA Report was publically made available to all registered I&AP's from **19 February 2018 – 22 March 2018** at the following locations:
 - **Primrose Public Library:** Beaconsfield Ave, Primrose, Germiston, 1401
 - Dropbox link sent to registered I&APs vial email
 - Email copy of the BAR document (without appendices)
- b. **Authority:** The Draft BA Report was sent to (amongst others):
 - Department of Environmental Affairs - -Integrated Authorisation
 - . Department of Environmental Affairs – Biodiversity & Conservation
 - Gauteng Department of Agriculture and Rural development;
 - Department of Water and Sanitation
 - City of Ekurhuleni

4.2.4 Public consultation & Public Meeting

In order to provide information regarding the proposed project and the BA process, a background information document (BID) for the project was compiled at the outset of the process.. In order to accommodate the varying needs of stakeholders and I&APs within the study area, as well as capture their views, issues and concerns regarding the project, various opportunities will be provided in order for I&APs to have their issues noted. I&APs will be consulted through the following means:

- Public meeting in the study area (open meeting)
- Focus group meetings (pre-arranged and stakeholders invited to attend)
- One-on-one consultation meetings (for example with directly affected or surrounding landowners)
- Telephonic consultation sessions
- Written, faxed or e-mail correspondence

In order to accommodate the varying needs of stakeholders and I&APs, a number of focus group meetings were held during the review period as outlined in the table below:

Consultations:	Date
Focus Group Meeting with Ekurhuleni Local Municipality: Department of Environmental Resource Management-Legislative Compliance	Friday, 16 March 2018
Focus Group Meeting with Ekurhuleni Local Municipality Councillors	Friday, 16 March 2018
Site visit with Ekurhuleni Local Municipality: Department of Environmental Resource Management-	Tuesday, 27 March 2018

Legislative Compliance	
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4.2.5 Comments and Responses Report

Issues and comments raised by I&APs over the duration of the BA process have been synthesised into a Comments and Response Report. The Comments and Response Report includes responses from members of the project team and/or the project proponent. The Comments and Response Report is included in **Appendix E3**.

4.3 Summary of Issues Raised by I&AP's

No issues of concerns have been raised by I&APs for this project, comments received are mostly from the Organs of states which are usually of administrative issues in nature, these comments have been integrated into the Comment and Responses Report the Final Basic Assessment Report.

5 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section provides a description of the environment that may be affected by the proposed project, as stipulated in the EIA Regulations (Appendix 3 Section (h) iv). The requirement is that the description of the footprint should focus on the geographical, physical, biological, social, economic, heritage and cultural aspects. The environmental specialist studies that were undertaken to inform this section of the BA Report and have focussed on significant environmental issues of the project.

5.1 Biophysical Attributes/Features of the Study Area

Geographical features are man-made or naturally-created features of the Earth. Natural geographical features consist of landforms and ecosystems.

5.1.1 Climate

The study area is situated in the Highveld with summer rainfall and dry winters. Summer temperatures can reach an average of about 30°C while frost is common in winter. Annual rainfall is about 682mm.

5.1.2 Soils and Geology

Due to the urban nature of the area, the soil profile is primarily disturbed. As a result, mottling and gleying was seldom found in wetlands. The wetlands were lined, incised and eroded, in some places up to bedrock. This has transformed the majority of wetlands into channelled valley bottom wetlands as opposed to the natural unchannelled valley bottom state expected to have occurred in this area. Sandy alluvial deposits were found adjacent to the valley bottom wetlands. The channelled valley bottom wetlands also share some characteristics of riparian systems such as bedrock, boulders, cobbles and pebbles as well as riparian vegetation. Due to the increased hardened surfaces in the catchment, as well as increased high energy stormwater input, these wetlands are prone to flooding which results in further erosion of the bank walls. Furthermore, large sections of the valley bottom wetlands are either lined with cement or with gabions and thus no redoximorphic features were visible in these sections.

Regional Geological Setting, and is predominantly characterised as Volcanic and Sedimentary rocks of the Ventersdorp Supergroup (e.g.: basaltic lava, breccia, conglomerate, greywacke and shale) towards the northern parts, and sedimentary and metamorphic rocks of the Witwatersrand Supergroup (e.g.: quartzite, conglomerate, shale, banded ironstone and tillite) towards the southern parts. The area is not inferred underlain by water-soluble strata (e.g.: dolomite or limestone), and as such is deemed "non-dolomitic land".

5.2 Water Resources of the study area

5.2.1 Wetland Delineation (please refer to Appendix D4 for the full Wetland Assessment Report)

Quaternary Catchments: As per Macfarlane et al, (2009) one of the most important aspects of climate affecting a wetland's vulnerability to altered water inputs is the ratio of Mean Annual Precipitation (MAP) to Potential

Evapotranspiration (PET) (i.e. the average rainfall compared to the water lost due to the evapotranspiration that would potentially take place if sufficient water was available). The majority of the cable routes fall in Quaternary Catchment A21C. A small section of the southernmost route, the Croydon Germiston North 2 line (crossings 7 and 8) falls in Quaternary Catchment C22B. In this catchment, the precipitation rate is lower than the evaporation rate with a Mean Annual Precipitation (MAP) to Potential Evapotranspiration (PET) of 0.32 and 0.31 respectively. Consequently, wetlands in this area are sensitive to changes in regional hydrology, particularly where their catchment becomes transformed and the water available to sustain them becomes redirected.

Nine water management areas were established by, and their boundaries defined in Government Notice No. 40279 on 16 September 2016. Quaternary Catchment A21C falls within the First WMA, the Limpopo WMA. The major rivers in this WMA include the Limpopo, Matlabas, Mokolo, Lephalala, Mogalakwena, Sand, Nzhelele, Mutale, and Luvuvhu Rivers. Quaternary Catchment C22B falls within the Fifth WMA, the Vaal Major WMA. The major rivers in this WMA include the Wilge, Liebenbergsvlei, Mooi, Renoster, Vals, Sand, Vet, Harts, Molopo and Vaal Rivers. The watercourses on the study site drain into either the Jukskei, Modderfontein or Elsburgspruit Rivers directly or indirectly.

Hydrology: Surface water spatial layers such as the National Freshwater Ecosystems Priority Areas (NFEPA) Wetland Types for South Africa (SANBI, 2010) and Gauteng Department of Agriculture and Rural Development (GDARD) were consulted for the presence of wetlands and rivers. This layer reflects several river and wetland areas crossing the proposed lines (**Figure 5.1**).

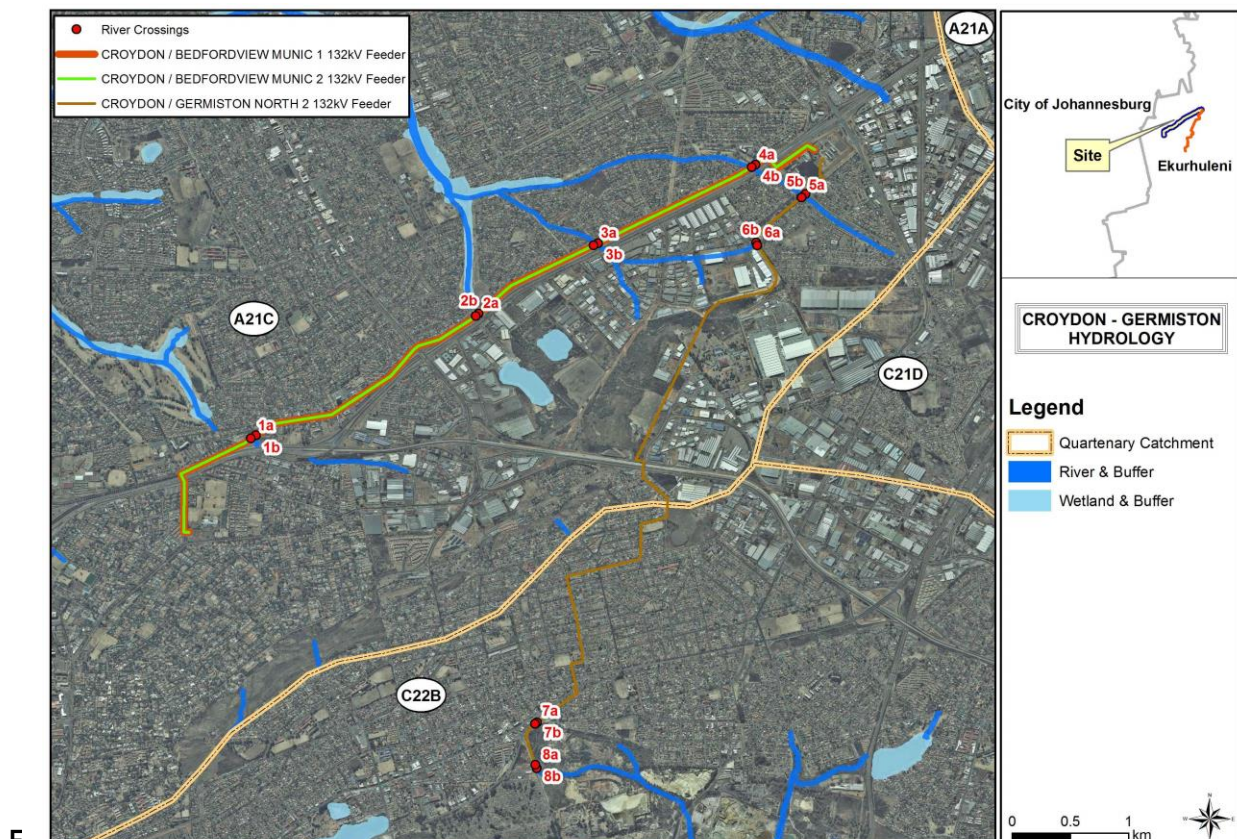


Figure 5.1 Hydrology of the study area (refer to Appendix 1 for the map).

Wetland/Riparian Classification and Delineation: A total of 8 watercourse crossings were studied (**Figure 5.2**). Some of the watercourse crossings occur at cement/gabion lined sections of the watercourse. These watercourses were likely natural in the past and were lined in order to flow under highways and roads and as a result large sections of the watercourses currently occur underground. Since the majority of the crossings occur near these cement lined sections of the watercourses it is likely that the proposed underground power cables will have a small impact on the overall health of the watercourses.

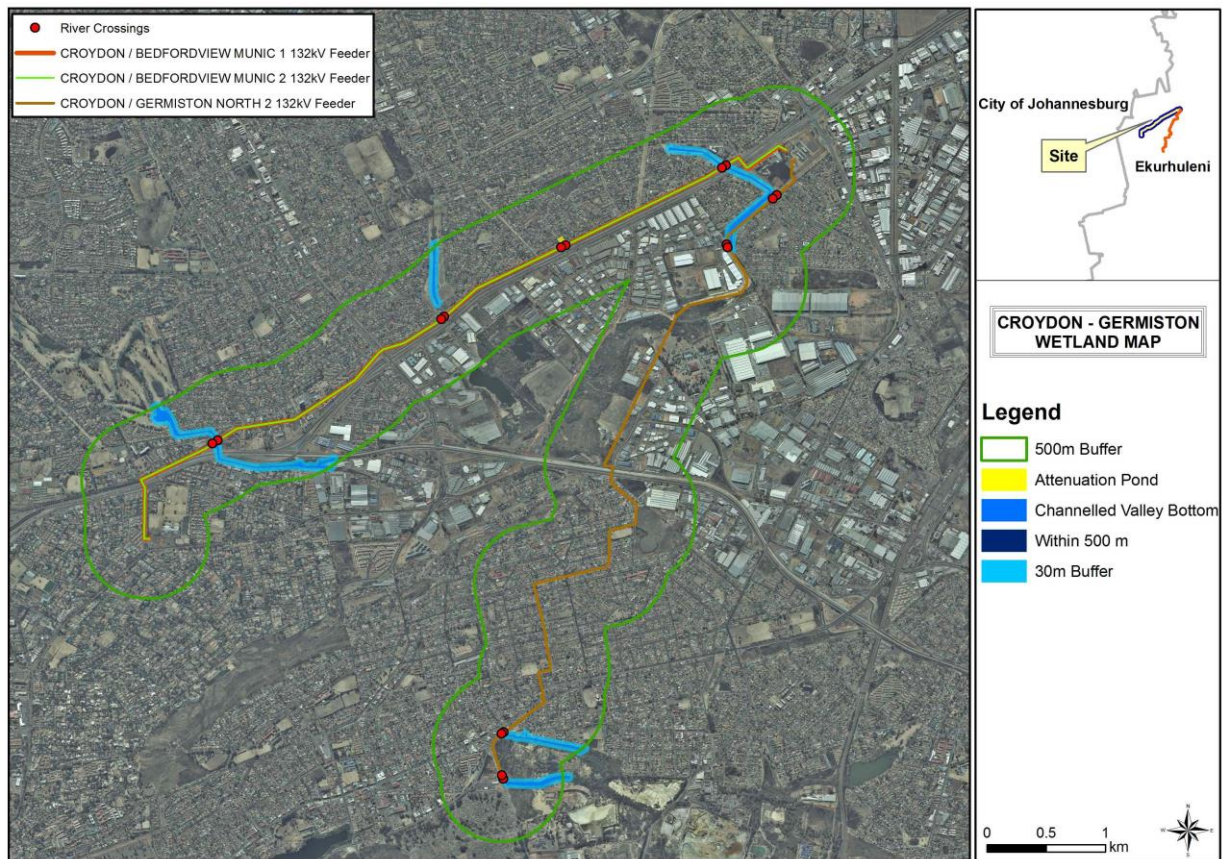


Figure 5.2: Delineated wetlands and their associated buffer zones relative to the powerline route alternatives. (Refer to **Appendix A** for A3 maps).

5.2.2 Geohydrology

Regional geohydrological settings: The study area falls within the A21C quaternary catchment of the Limpopo Water Management Area. The regional and local geological setting has had a tremendous impact on the geohydrological setting and the groundwater potential in the area. Two aquifers are identified underlying the study area. The first, and most significant to the project is intergranular aquifer in the shallow alluvial deposits. The alluvium is expected to be high yielding, with a high Transmissivity and Storativity. The alluvium is not developed uniformly through the study area and may vary from being totally absent to being tens of meters in depth.

According to the “1:500 000 General Hydrogeological Map of Johannesburg (2526)”, the second deeper aquifer is a highly weathered and fractured aquifer associated with deeper weathering, fracturing and jointing. The fractured aquifer shows a reduction in permeability with depth, in other words the underlying material becomes more solid and less weathered with depth, (Abiye, Mengistu, & Demlie, 2011). The groundwater potential for this aquifer is deemed to be moderate or medium and borehole yields of between 0.5 - 2 ℓ/s can be expected. Higher yielding boreholes may be developed and are usually associated with localised linear geological structures or areas of deeper weathering.

Low groundwater recharge is estimated for the study area based on the high levels of urbanisation and runoff that occurs in the study area.

Aquifer classification: The aquifer(s) underlying the study area is classified as “Minor Aquifer System” using the aquifer classification of the Department of Water Affairs and Forestry (Department of Water Affairs and Forestry, 1995), since there are few production boreholes in the area, and groundwater does not define a primary source of domestic water supply. According to the Groundwater Quality Management (GQM) Index that was used to differentiate the degree to which an aquifer should be protected (Parson, 1995). According to the scoring system of the GQM Index was calculated to be 4. In relation to the GQM Index the aquifer underlying the study area is classified as requiring “Medium Level Protection”. This infers that the aquifer underlying the study area requires a moderate level of protection to adhere to DWA’s water quality objectives.

Interaction between surface water and groundwater: The surface water bodies can recharge or discharge groundwater. The exchange rate of water is usually controlled by the difference in hydraulic heads (water levels) and resistance of the media between the groundwater and surface water bodies. The study area is located in a portion of quaternary catchment A21C. Based on the available information, the study area is deemed to be effluent, with surface water features and streams being recharged from the groundwater during the summer rainfall periods. It is noted that the streams in the close vicinity are all semi-permanent in nature, and flow for most months of the year.

Groundwater flow direction: The regional groundwater gradient is expected to be influenced by the following:

- The relatively high Transmissivity expected in the alluvial aquifer may result in a very flat groundwater gradient in the proximity and along the watercourses
- On a local scale (or micro-scale), the highly urbanised area will cause irregular infiltration and recharge, resulting in very complex groundwater flow orientations
- On a regional scale however, the groundwater is expected to mimic the local topography, with baseflow from groundwater recharging local streams and water features
- The regional groundwater flow directions are illustrated in **Figure 5.3**

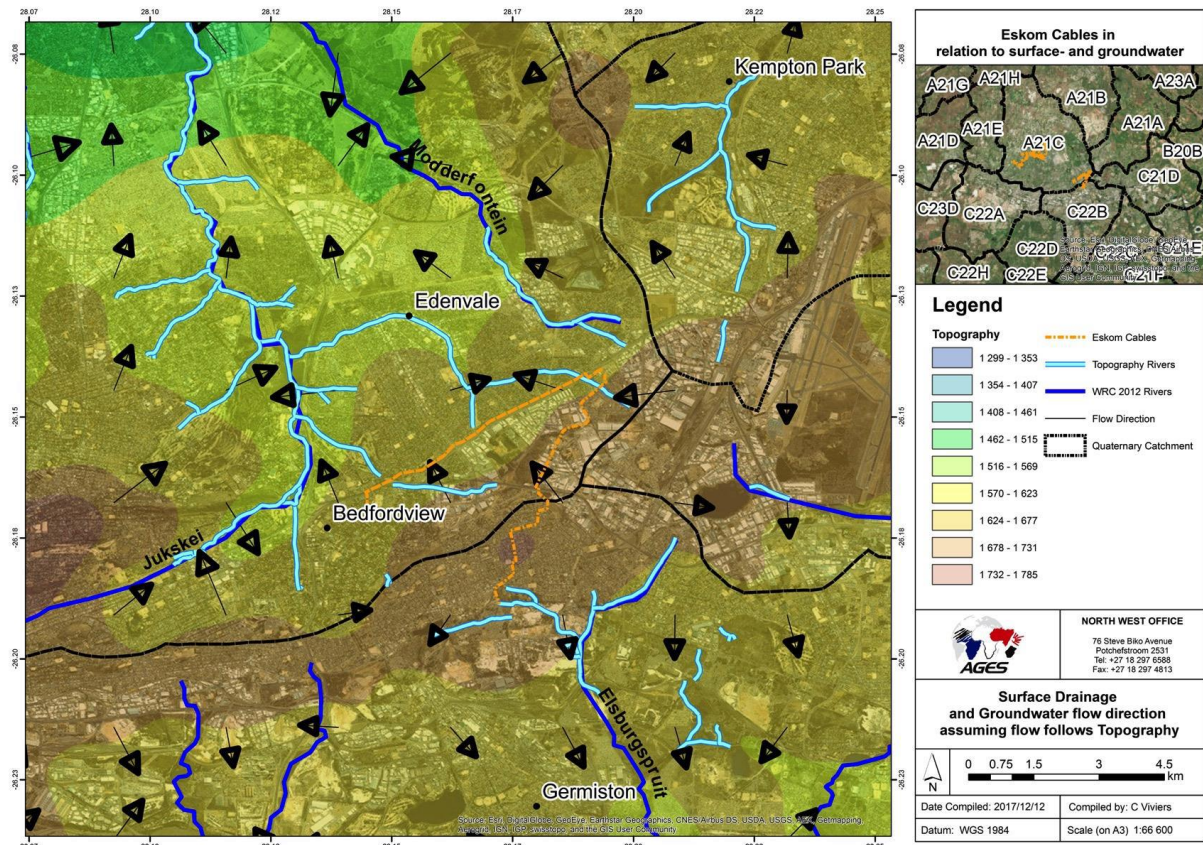


Figure 5.3: Eskom Cables in relation to surface and groundwater.

5.2.3 Floodline delineation (please refer to Appendix D7 for the full Floodline Assessment Report)

Floodline modelling: The modelling was undertaken for all the drainages/ivers which drain the project area. The main objective of the floodline model assessment is to delineate the 1:100 year floodline for the section of the mentioned drainages/ivers located within the project area. It must be noted that the project catchments are highly urbanised resulting in most of the natural drainage being modified.

Adopted Software: HEC-RAS 5.0 was used for the purposes of routing the peak flows resulting from the 1:100 year storm event through the identified watercourses/ivers. HEC-RAS is a hydraulic programme used to perform one-dimensional hydraulic calculations for a range of applications, from a single watercourse to a full network of natural or constructed channels.

Peak Flow Estimation and Model Setup:

5.3 Ecology

5.3.1 Vegetation (please refer to Appendix D1 for the full Vegetation Assessment Report)

Regional Vegetation: As per the recent Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006), the study area stretches over two biomes. The Grassland biome constitutes the majority of the study area, while a strip through the middle of the study area falls within the Savanna biome as shown in **Figure**

5.4. Soweto Highveld Grassland Comprises a moderately undulating landscape that supports short to medium high and dense grassland dominated mainly by the grass *Themeda triandra*. Wetlands, rocky outcrops and ridges are embedded in this grassland. Whilst the Carletonville Dolomite Grassland is species-rich grassland that forms a complex mosaic pattern dominated by various grass species. This grassland occurs on undulating plains bisected by rocky ridges. The Carletonville Dolomite Grassland is nationally classified as Vulnerable. The Gold Reef Mountain Bushveld (Savannah Biome), Comprises open woody vegetation occurring on the west-east trending rocky hills and ridges of the North-West, Gauteng. Typical species include: *Senegalia caffra*, *Combretum molle*, *Protea caffra* and *Cheilanthes hirta*. Denser woody vegetation are typically found on the south-facing slopes. Tree and shrub layers are often continuous while the herbaceous layer is dominated by grasses. This vegetation is considered not to be threatened.

Note that the vegetation types mapped is the original, undisturbed extent of the vegetation, prior to development and degradation in the study area.

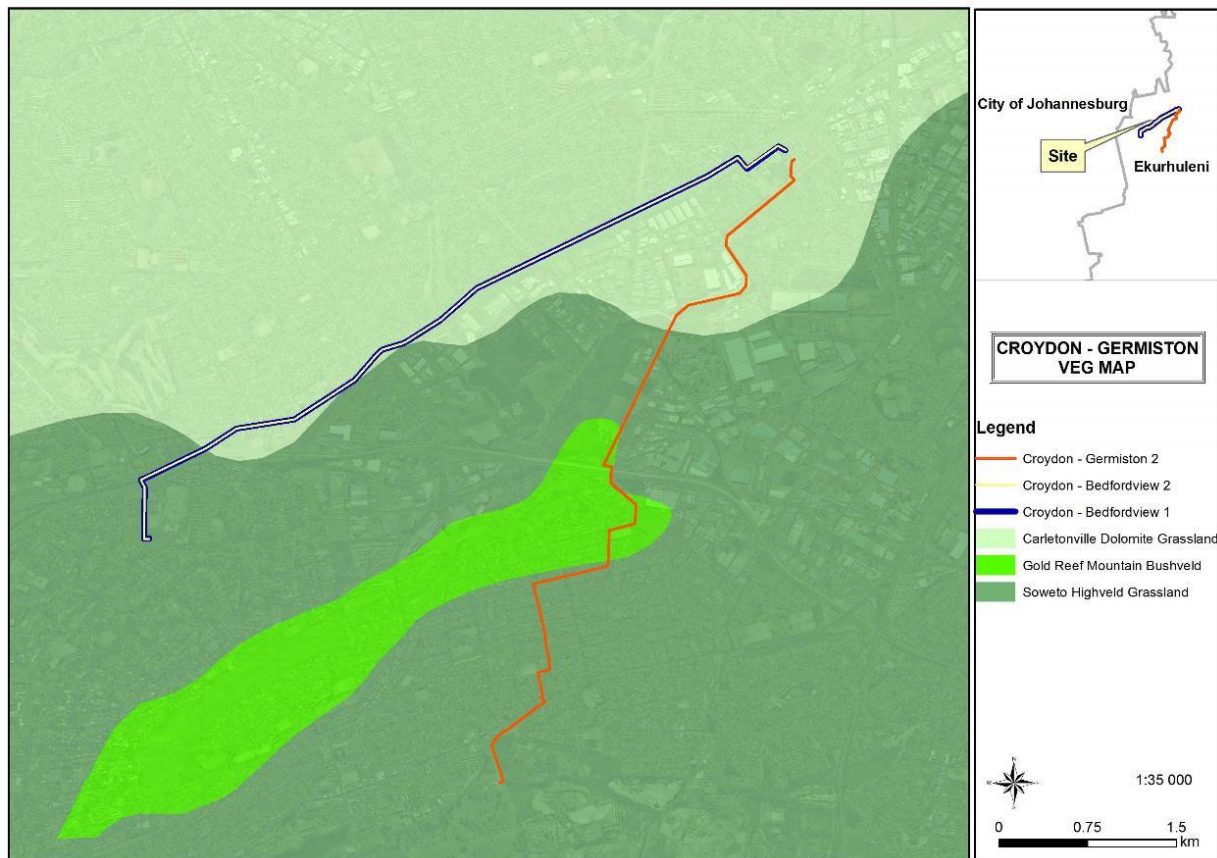


Figure 5.4: Original (undisturbed) extent of vegetation types within the study area

Listed Ecosystems: The study area includes one listed ecosystems (Section 52(1)(a) of the National Environmental Management: Biodiversity Act (Government Gazette 34809, Government Notice 1002, 9 December 2011)). The purpose of listing threatened ecosystems is primarily to reduce the rate of ecosystem and species extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems.

Soweto Highveld Grassland is listed as a Vulnerable ecosystem under criterion: A1 Irreversible loss of natural habitat. It is estimated that about 60% of this ecosystems original extent remains

Plant of Conservation Concern: A list of plants of conservation concern that was historically recorded within the study area was compiled using information from the Plants of Southern Africa (POSA) website for the quarter degree square that the study area falls in, as well as information from the Gauteng Department of Agriculture and Rural Development's (GARD) data base. Plant species that occur in riparian areas, wetlands and moist grasslands were short listed. Ten (10) plant species of conservation concern that could thus potentially occur along the watercourses that will be crossed are listed in **Table 5.1**. These species were surveyed for during the site visit.

Table 5.1: Plant species of conservation concern that could occur at the water crossings

Specie	Conservation status	Habitat description	Flowering time
<i>Alepeidea attenuata</i>	Near threatened	Wetlands in grassland.	January-March
<i>Crinum bulbispermum</i>	Declining (reclassified to LC nationally)	This bulb occurs near rivers, streams, seasonal pans and in damp depressions.	Sept-Nov
<i>Dicliptera magaliesbergensis</i>	Vulnerable	Savanna, riverine forest.	Feb-April
<i>Eucomis autumnalis</i>	Declining (reclassified to LC nationally)	Damp, open grassland and sheltered places between rocks.	Nov-April
<i>Gnaphalium nelsonii</i>	Near threatened	Seasonally wet places in grassland and savanna, and along dry watercourses.	Oct-Dec
<i>Gunnera perpensa</i>	Declining (reclassified nationally as Least Concern)	Damp marshy area and vleis from coast to 2400m.	Oct-March
<i>Hypoxis hemerocallidea</i>	Declining (reclassified to LC nationally)	Occurs in a wide range of habitats, appears to be drought and fire tolerant and can tolerate some disturbance.	Sept-March
<i>Ilex mitis var. mitis</i>	Declining (reclassified to LC nationally)	Along rivers and streams in forest and thickets, sometimes in the open.	Oct-Dec
<i>Kniphofia typhoides</i>	Near Threatened	Heavy, black clay soil, climax <i>Themeda triandra</i> grassland, low lying marshy ground - pans or vleis.	Feb-March

Specie	Conservation status	Habitat description	Flowering time
<i>Nerine gracilis</i>	Near Threatened	Occurs in moist grasslands, in full sun in damp depressions, near pans or on the edges of streams; grassland, riverbanks, vleis.	Feb-March

Provincially Protected Plants: A number of provincially protected plants are listed in the Transvaal Nature Conservation Ordinance Act No. 12 of 1983. These plants are not to be removed, damaged, or destroyed without permit authorisation from Gauteng Department of Agriculture and Rural Development (GDARD).

The water crossings could support some of these protected plant species and the most likely taxa to occur include: *Zantedeschia* spp., *Kniphofia* spp., *Nerine* spp, *Scadoxis* spp., *Schizostylis coccinea*, *Hesperantha coccinea* and *Nymphaea* spp.

Gauteng C-Plan: The Gauteng Conservation Plan (Version 3.3) (GDARD, 2011) classified areas within the province on the basis of its contribution to reach the conservation targets within the province. Areas of conservation importance are classified as Critical Biodiversity Areas (CBAs) that should be conserved and Ecological Support Areas (ESAs) that are important for the maintenance of ecosystem function. CBAs are either 'Irreplaceable' (must be conserved) or 'Important' to reach the conservation targets and were classified based on the presence of primary vegetation as well as threatened plant species. Ecological Support Areas' (ESAs) were also set aside to ensure sustainability in the long term. ESAs can include buffered wetlands, open natural, semi-natural vegetation and even cultivated areas. ESAs provide vital connections between areas of high or critical biodiversity importance and are therefore not necessarily good condition or primary vegetation. In addition, areas formally protected are also indicated.

Figure 5.5 shows the extent of Important and Ecological Support Areas within the study area. No protected areas are present. Small portions of ESAs, could be impacted on by the proposed water crossings.

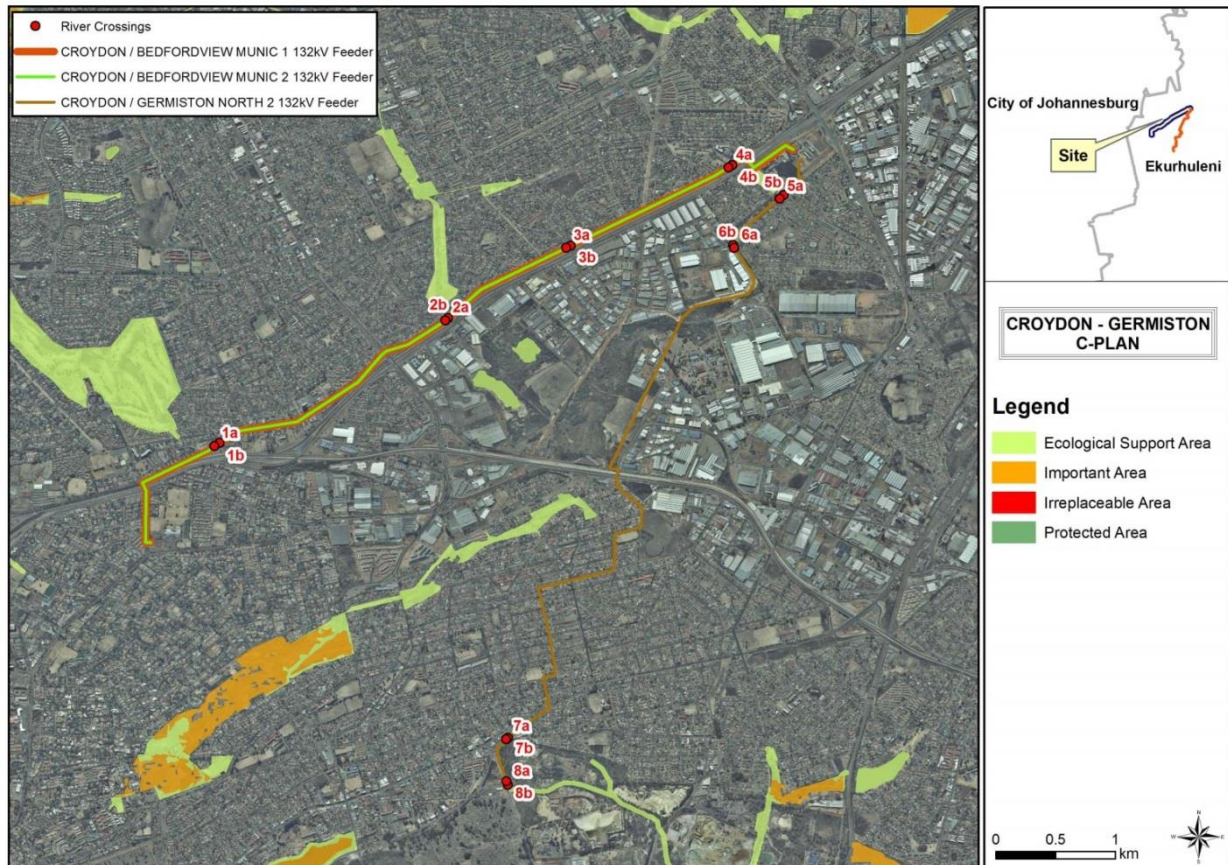


Figure 5.5: The Gauteng Conservation Plan in relation to the project area. (Refer to **Appendix A** for A3 maps).

Alien and Invasive Plant Species: The study area likely includes a number of category 1 and category 2 species. Declared invasive should be removed and the vegetation rehabilitated. However, where dense stands of species such as wattle are present, removal and rehabilitation will be costly and can take a number of years. In addition, the small footprint of the cable compared to the infestation likely present in the upstream habitat, could render any rehabilitation efforts around the cable footprint futile.

Results of the Ecological Study

The results of the site visit are discussed for each water crossing in terms of dominant species and state of the vegetation; existing impacts, alien invasive species and the occurrence or potential occurrence of plant species of conservation concern (refer to **Table 5.2**). The Croyden-Bedfordview Municipal Substation route 1 & 2 are discussed first and thereafter the Croyden-Germiston North 2 route water crossings in

Four water crossings were assessed on the Croyden-Bedfordview routes. Natural water crossings within the area are expected to comprise mainly moist grassland and riparian areas with some indigenous tree species. However, the wc's were all in a disturbed or modified state. Modified landscapes are regarded as areas where the vegetation structure and composition have been compromised and are not representative of the reference state. Modified land can range from moderately modified to severely or irreversibly modified. Subsequently, these areas are usually of a poor to fair ecological condition (SANBI, 2016).

Table 5.2: Summary of findings

Name of the line	WC	Coordinates	Summary of findings
Croydon Bedfordview Munic 1 & 2 132kV Feeder Cable	1	26° 9'46.52"S and 28° 9'0.41"E	Moist grassland with invasive plant species and limited indigenous species. <i>Phragmites australis</i> (common reed) dominated on the eastern section of the crossing with some <i>Typha capensis</i> (bulrush) present within the streambed. The grass layer was dominated by the exotic <i>Pennisetum clandestinum</i> (kikuyu). Vegetation classified as being in a fair ecological condition. A likelihood that <i>Hypoxis hemerocallidea</i> , <i>Gnaphalium nelsonii</i> and <i>Crinum bulbispermum</i> may occur in proximity to the wc, however, none was observed at the time of the site visit.
	2	26° 9'12.57"S and 28° 10'2.86"E	Mowed lawns, dominated by the exotic grass <i>Pennisetum clandestinum</i> (kikuyu). No natural moist grassland (e.g. wetland vegetation) or riparian vegetation are present and the vegetation is classified as being modified and in a poor ecological condition. No plant species of conservation concern present or suitable habitat.
	3	26° 8'53.62"S and 28° 10'35.84"E	Grassland around the water channel is mowed and included indigenous species such as <i>Hyparhenia hirta</i> and <i>Eragrostis curvula</i> , as well as the exotic <i>Pennisetum clandestinum</i> along the road edge. The indigenous forb layer was very limited and species within the water channel included the exotic <i>Conyza</i> species and <i>Persicaria capitata</i> . No natural moist grassland (e.g. wetland vegetation) or riparian vegetation are present and the vegetation is classified as being in a poor ecological condition. No plant species of conservation concern present or suitable habitat.
	4	26° 8'32.70"S and 28° 11'18.05"E	Mowed grassland with a number of indigenous grass species flanking the water crossing. However, the watercourse itself comprised <i>Pennisetum clandestinum</i> dominated lawn and the exotic tree <i>Salix babylonica</i> tree. None was recorded at the small crossing at the time of the site visit and no suitable habitat is present.
Germiston North 2 132kV Feeder	5	26° 8'38.52"S and 28° 11'34.16"E	The vegetation at the given point comprised terrestrial grassland with no species indicating moist grassland conditions. Regularly mowed with pedestrian and likely some vehicular traffic. The species diversity was low and dominated by hardy and pioneer species and regarded as being in a poor ecological condition. No plant species of conservation concern present or suitable habitat.
	6	26° 8'52.19"S and 28° 11'20.93"E	Moist, channelled grassland, however, the area is likely only temporarily wet with limited hydrophilic species present. Alien invasive plant species were abundant and the vegetation was classified as being in a fair ecological condition.

Name of the line	WC	Coordinates	Summary of findings
			The channelization likely destroyed species of conservation concern. Although the author has recorded <i>Crinum bulbispemum</i> within such channelled watercourses in Gauteng before, this species was not recorded at the time of this site visit and it is unlikely to occur at the water crossing
	7	26°11'5.39"S and 28°10'19.40"E	Modified with some grassland around the storm water channel that constitutes the water crossing. The vegetation was dominated by alien and invasive plant species with limited indigenous species present and in a poor ecological condition. No plant species of conservation concern present or suitable habitat.
	8	26°11'17.12"S and 28°10'19.56"E	The vegetation comprised degraded moist grassland dominated by alien and invasive plant species with limited indigenous species present. Indigenous plants were mostly grasses and weedy, pioneer forb species and the vegetation is classified as being in a poor ecological condition. The area is regarded as too degraded for plant species of conservation concern to persist

5.3.2 Fauna (please refer to Appendix D2 for the full Fauna Assessment Report)

Mammals: No mammals were sighted during the site visit. Mammals narrowly adapted to an arboreal, terrestrial and rupicolous habitat types were a priori deleted from the list of potential occurrences since lack of suitable habitats preclude their presence (the lesser bushbaby is an exception to the previous statement – these small primates proved themselves to be quite adaptable and extended their range into the alien trees planted in gardens of Gauteng (where they were absent during historical times).

Only common and robust wetland-reliant species (such as the forest shrew, cane rats and two vlei rat species) are deemed present since the riparian zone does not support prime wetland habitat). The African marsh rat and the marsh mongoose may still be a resident in less disturbed area, but if so they will be under survival stress. Common terrestrial small mammals (such as the two multimammate species, pouched mouse, lesser musk shrew and yellow & slender mongooses are most likely residents along the stream and adjacent strips of undeveloped (albeit transformed). Scarcer terrestrial small mammals such as the hedgehog are listed, but only because they are occasionally unexpectedly found in likely habitat, but in the centre of town (such as the Rietondale Experimental Farm in Queenswood Pretoria). Most of the species of the resident diversity are common and widespread. This is a typical diversity that can be expected on a regenerating extensive strip of area along a perennial stream. The bats listed are common and widespread and considering the availability of suitable roosting sites in the form of houses in the vicinity, they can be expected to over fly the site while hunting for aerial invertebrate prey. The species richness is low which is ascribed to one large (but transformed) terrestrial habitat. It would even have been less if it were not for the perennial stream.

Threatened and Red Listed Mammal Species Flagged: African Hedgehogs are 'Near Threatened' as a result of interference by humans and their pets. Under natural conditions, the passive defence mechanisms of these rather docile insectivores are sufficient to maintain breeding populations in a healthy condition. Considering the size of the district and unimpaired connectivity towards especially the south and west it is considered possible that a small population of hedgehogs persists.

No other Red Data or sensitive species are deemed present on the site, either since the site is too disturbed, falls outside the distributional ranges of some species, or does not offer suitable habitat(s).

Avifauna: In the area considered for the desktop survey, a total of 411 species has been recorded. However, many of these are extremely unlikely to occur at the stream crossing sites. Common suburban species confirmed during the site visit include Black-collared and Crested Barbet, Southern Red Bishop, Grey Go-away-bird, Hadedda Ibis, and Karoo Thrush. A total of 28 species were observed during the site visit, with a further 48 deemed likely to occur. The proposed stream crossings do not fall within an Important Bird and Biodiversity Area (Marnewick et al. 2015).

Threatened and Red Listed Bird Species Flagged: A total of 28 threatened or near threatened bird species have been recorded in the area considered for the desktop survey (Table 3 in Appendix D2), a relatively high

number reflecting the large area included. None of these are likely to occur at the stream crossings for the Croyden-Germiston underground HV cables.

Reptiles and Frogs: Of the 36 reptile species which may occur on the study site (Table 4), none were confirmed during the site visit (Table 5 Appendix D2) and of the 13 amphibian species which may possibly occur on the study site (Table 4 Appendix D2), one was confirmed during the site visit (Table 5 Appendix D2).

The American red-eared terrapin (*Trachemys scripta elegans*) and the Brahminy blind snake (*Ramphotyphlops braminus*) are the only two feral reptile or amphibian species known to occur in South Africa (De Moor and Bruton, 1988; Picker and Griffiths, 2011), but with only a few populations, they are not expected to occur on this particular site.

The species assemblage is typical of what can be expected of habitat that is severely disturbed or transformed, but with sufficient habitat to sustain populations. Most of the species of the resident diversity (Table 4 Appendix D2) are fairly common and widespread (viz. common house snake, mole snake, speckled rock skink, Cape gecko, guttural toad, Boettger's caco, common platanna and the common river frog).

Threatened and Red listed Reptile and Amphibian Species: The study site falls outside the natural range of the Southern African python and Nile crocodile and these species should not occur on the study site. The striped harlequin snake has been recorded in the quarter degree square of this study area, but no moribund termitaria, where this species is most likely to be found, are present on the study site. The coppery grass lizard has been recorded on this quarter degree square (TVL Museum Records or Ditsong Museum of Natural History), but the habitat is not suitable for the coppery grass lizard. This species should not occur on the study site.

The East Rand is known for its giant bullfrog populations. However, none of the eight study sites contain temporary pans. Temporary pans are potential breeding places for giant bullfrogs. However, the conservation status of giant bullfrogs is controversial.

5.3.3 Aquatic environment (please refer to Appendix D3 for the full Aquatic Assessment Report)

Overall: The result of the desktop assessment indicates that the considered SQR's PES are in a class E or seriously modified status. Ecological importance in the SQR's was determined to be low in the A21C-1269 SQR and moderate in the C22B-1342 SQR. The ecological sensitivity of both SQR's was determined to be moderate. The Default Ecological Category for both of the considered river reaches was class C or moderately modified based on desktop information. According to Nel *et al.* (2011), the National Freshwater Ecological Priority Area (NFEPA) status of the catchment considered in this assessment is an Upstream Management Area. This catchment should be managed in a manner that promotes downstream water and habitat quality.

Water Quality: The results of the in situ assessment indicated that sewage eutrophication was the central degrading factor influencing water quality in the project area. Physical water quality parameters were found to be fair with pH ranges from 7.0 at C6 to 7.9 at C1. Levels of conductivity were found to range from 157 $\mu\text{S}/\text{cm}$ at C6

to 661 $\mu\text{S}/\text{cm}$ at C3. The concentrations of dissolved oxygen were low between 2.5 mg/l at C6 to 5.5 mg/l at C3. These low levels of dissolved oxygen would negatively affect aquatic biota at the sites.

Intermediate Habitat Integrity Assessment: The results of the instream and riparian integrity assessment derived a class E (seriously modified) status for the A21C-1269 SQR reaches in this assessment. The predominant factors influencing the habitats are largely attributed to urban landuse activities. Serious instream habitat modification has taken place in the catchment with the entire stream being canalised with serious bed modification and in some cases complete alteration of the stream banks and substrates (**Figure 5.6a**).



Figure 5.6 a: Complete modification of stream substrate and banks (C4; December 2017)

The results of the instream and riparian integrity assessment derived a class E (seriously modified) status for the C22B-1342 SQR reaches in this assessment. Similarly, the A21C SQR, the predominant factor influencing the quality of the habitats is largely attributed to urban landuse activities. Serious instream habitat modification has taken place in the catchment with canalization, solid waste and sewage effluent common at the sites (**Figure 6b**).



Figure 5.6 b: Solid Waste and Sewage Observed at C8 (December 2017)

Aquatic Organisms: The presence of sewage in the considered river reaches prohibited the safe sampling of local aquatic ecology. However, considering the severe habitat modification observed as described above, it is assumed that aquatic ecology responses would be of a similar nature. Considering this, the waterbodies considered in this assessment contain highly tolerant aquatic organisms are.

5.4 Land uses

The study area is located in an urban built up environment with small open areas. These open areas either form part of parks, golf courses or are fenced off to the public. Some of the wetlands are incorporated into greenspaces which serves as parks, dog walkways etc. The wetlands in this area are an important feature as they form ecological corridors for animals to travel in. they also serves as habitat and breeding areas. The southernmost extent of the proposed line is located adjacent to old mining areas and informal settlements.

5.5 Cultural Heritage Aspects of the area (please refer to Appendix D5 for the full Heritage Assessment Report)

Overview of the region: Except for a few natural water courses that are in most cases linked to public open spaces, the area has been subjected to high density urban development over the past fifty years. This would have

effectively destroyed any heritage features that predated this development. Exceptions are rocky outcrops, which in most cases are protected and are known for their geological significance.

Identified sites: Plotting known sites in the study area as well as in a buffer area of three kilometres surrounding the study area, **Figure 5.7** below, it can be seen that few sites or features of heritage significance exists. It is noted that no sites, features or objects dating to the Stone Age, Iron Age and historical period were identified in the study area.

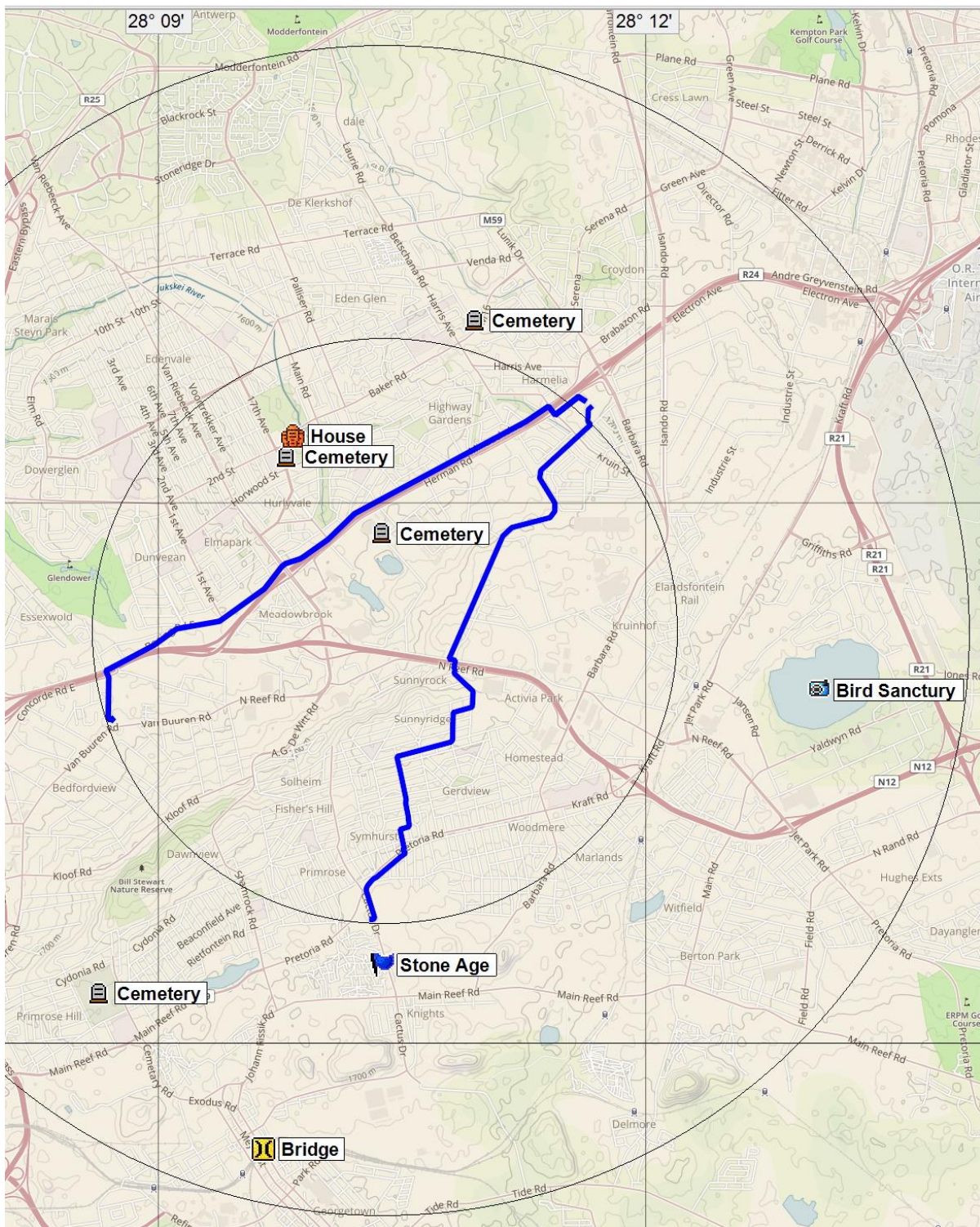


Figure 5.7: Heritage scan of the surrounding area.

5.6 Social Characteristics of the Study Area and Surrounds

The purpose of this section is to provide an overview of the current socio-economic situation within the proposed project area. This section will provide a strategic understanding of the socio-economic profile of the study area, in order to develop a better understanding of the socio-economic performance as a background to the development of the project. The data presented in this section has been largely derived from the most recent (2011) Census, as well as the municipalities IDP.

5.6.1 Socio-Economic Context

The following data was taken from the City of Ekurhuleni (CoE) IDP 2017-18.

Demographics:

According to the Ekurhuleni IDP 2017-18, a 2016 Community Survey found that the City of Ekurhuleni has an estimated population of 3 379 104, up 200 634 people from 3 178 470 in the 2011 census. The population growth rate has slowed from as high as 4% in the period between 1996 and 2001 to 2.47% between 2001 and 2011. This represents over 6% of the population of South Africa. An important feature of the growth in the Ekurhuleni population is the net migration into the City as together with Tshwane and Johannesburg are the largest recipients of in-migration in the country. The figure below shows other key population attributes from the 2011 census such as the dependency ratio, sex ratio, number of households and household size. Major shifts seem to have occurred in the population composition by broad age groups between 2011 and 2016, for example the promotion of the young, the 0-14-year age group increasing from 24% to 35% and that of elderly, the 65+ population more than doubling from 4% to 9%. When compared to other regions in Gauteng, Ekurhuleni accounts for a total population of 3.38 million, or 25.7% of the total population.

Economic:

The 2016 State of the Cities Report buttresses the central role of the contribution of the South African cities in the national economy and showing the 5 largest cities Johannesburg, Cape Town, Tshwane, Ekurhuleni and eThekweni playing a dominant role in the national economy. Ekurhuleni's contribution to the national economy has increased from 8.2% in 1995 to 8.8% in 2016, overtaking eThekweni as the fourth largest city in the process¹⁰. Between 1995 and 2013, four of the cities increased their share of South Africa's GVA: Johannesburg (11.7% to 13.9%), Cape Town (10.3% to 10.9%), Tshwane (8.9% to 9.2%) and Ekurhuleni (8.2% to 8.8%), but the shares of eThekweni and all the three smaller metros declined.

Unemployment:

In 2015, the unemployment rate in Ekurhuleni (based on the official definition of unemployment) was 29.72%, which is an increase of 0.868 percentage points. The unemployment rate in Ekurhuleni is higher than that of Gauteng as can be seen in the figure below. The unemployment rate for South Africa was 25.28% in 2015, which is a decrease of 1.27 percentage points from 26.55% in 2005. In terms of unemployment, Ekurhuleni as with both Gauteng and South Africa have witnessed a steady

increase in the unemployment rate from 2009. From a low of 26.6% in 2006, unemployment rose to 29.7% in 2015 for Ekurhuleni. The number of people employed in the City of Ekurhuleni declined from 1 190 000 in the second quarter of 2015 to 1 161 000 in the second quarter of 2016.

Education

Within the City of Ekurhuleni, the number of people without any schooling decreased from 2005 to 2015 with an average annual rate of -4.83%, while the number of people within the 'matric only' category, increased from 538,000 to 818,000. The number of people with 'matric and a certificate/diploma' increased with an average annual rate of 4.82%, with the number of people with a 'matric and a Bachelor's' degree increasing with an average annual rate of 6.33%. Overall improvement in the level of education is visible with an increase in the number of people with 'matric' or higher education.

Municipal Services

Figure 5.8 below profiles the access statistics of some basic municipal services in Ekurhuleni between 1996 and 2015. It is clear from this table that remarkable strides have been made in the provision across all major municipal services (electricity, water and refuse removal).

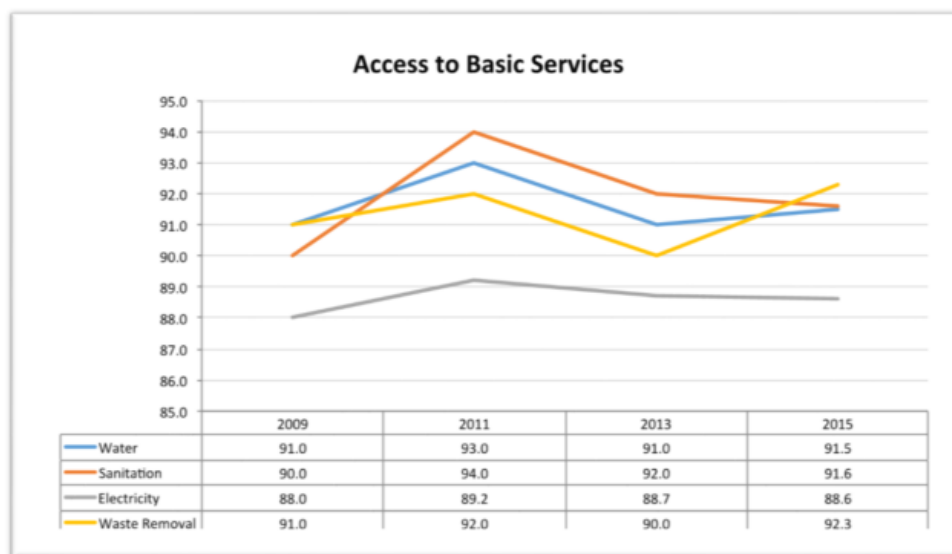


Figure 5.8: Access to Municipal Services in Ekurhuleni

5.6.2 Socio-economic value of the activity

What is the expected capital value of the activity on completion?	315 000 000.00
What is the expected yearly income that will be generated by or as a result of the activity?	No income to be generated by the infrastructure
Will the activity contribute to service infrastructure?	YES
Is the activity a public amenity?	YES

How many new employment opportunities will be created in the development and construction phase of the activity/ies?	This is dependent on the contractor that is employed to construct the power line. Supplier Development and Localization (SDNL) requirements and Standard Condition of Employment (SCE) apply
What is the expected value of the employment opportunities during the development and construction phase?	This is dependent on the contractor that is employed to construct the power line. Supplier Development and Localization (SDNL) requirements and Standard Condition of Employment (SCE) apply
What percentage of this will accrue to previously disadvantaged individuals?	60%
How many permanent new employment opportunities will be created during the operational phase of the activity?	None. The opportunities created will strategic in nature. Due to security of electricity supplies in these areas, investors will be encouraged to invest in the area and industries to grow.
What is the expected current value of the employment opportunities during the first 10 years?	No new jobs during operation
What percentage of this will accrue to previously disadvantaged individuals?	N/A

6 ASSESSMENT OF POTENTIAL IMPACTS

6.1 Impact Evaluation methodology

Potential impacts associated with the construction and operation of the proposed river/watercourse crossings are discussed below. The following methodology was used in assessing impacts related to the proposed development. All impacts are assessed according to the following criteria:

The Significance of the impact is calculated as follows and rating significance is explained below.

- » The **nature**, a description of what causes the effect, what will be affected, and how it will be affected.
- » The **extent**, wherein it is indicated whether the impact will be local (limited to the immediate area or site of development), regional, national or international. A score of between 1 and 5 is assigned as appropriate (with a score of 1 being low and a score of 5 being high).
- » The **duration**, wherein it is indicated whether:
 - * The lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - * The lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - * Medium-term (5–15 years) – assigned a score of 3;
 - * Long term (> 15 years) - assigned a score of 4; or;
 - * Permanent - assigned a score of 5.
- » The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - * 0 is small and will have no effect on the environment;
 - * 2 is minor and will not result in an impact on processes;
 - * 4 is low and will cause a slight impact on processes;
 - * 6 is moderate and will result in processes continuing but in a modified way;
 - * 8 is high (processes are altered to the extent that they temporarily cease); and
 - * 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
 - * Assigned a score of 1–5, where 1 is very improbable (probably will not happen);
 - * Assigned a score of 2 is improbable (some possibility, but low likelihood);
 - * Assigned a score of 3 is probable (distinct possibility);
 - * Assigned a score of 4 is highly probable (most likely); and
 - * Assigned a score of 5 is definite (impact will occur regardless of any prevention measures).
- » The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high.
- » The **status**, which is described as positive, negative or neutral.
- » The degree to which the impact can be reversed.
- » The degree to which the impact may cause irreplaceable loss of resources.
- » The degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

$S = (E+D+M) P$; where

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance** weightings for each potential impact are as follows:

- » **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- » **30-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- » **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

6.2 Impact Summary

A summary and anticipated significance of the potential direct, indirect and cumulative impacts that are likely to occur as a result of the construction and operational phases of the proposed river/watercourse crossings is provided in the tables overleaf.

The full impact assessment is attached as **APPENDIX F**.

6.2.1 Potential impacts on vegetation

The tables below list the activities that could impact on the vegetation as a result of the construction of the river/watercourse crossings, as well as impacts that may be associated with the operation and maintenance thereof. Please refer to Appendix D1 for the full Vegetation Assessment Report.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
Clearing of vegetation for construction purposes and potential pollution of the soil	<p>Direct Impacts:</p> <ul style="list-style-type: none"> Destruction of natural vegetation and potential pollution of the soil <p>Indirect Impacts:</p> <ul style="list-style-type: none"> Reduction of indigenous species. Alien plants are likely to invade the site as a result of the disturbance created during construction <p>Cumulative Impacts:</p> <p>Should mitigation measure not be implemented, and changes made to the bed or banks of watercourse unstable channel conditions may result causing erosion, meandering, increased potential for flooding and movement of bed material. The loss of the soil seedbank cannot be reversed. Reversing this process is unlikely and should be mitigated.</p>	<p>LOW</p>	<p><u>Planning:</u></p> <ul style="list-style-type: none"> Keep the disturbance footprint as small as possible and keep the drill entry location or pipe jacking entry location outside of the buffer as recommended by the wetland assessment (Limosella Consulting, 2017). <p><u>Construction::</u></p> <ul style="list-style-type: none"> Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction or earthworks in that area (DWAF, 2005). Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. Construction in and around watercourses must be restricted to the dryer winter months where possible. Rehabilitation plans must be adhered to. Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. Runoff from the construction area must be managed to avoid erosion and pollution problems. Implementation of best management practices <p><u>Maintenance/ operational:</u></p> <ul style="list-style-type: none"> Only indigenous plant species, naturally occurring in the area, should be used for the rehabilitation of the disturbed footprint as per a rehabilitation plan.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
Clearing of vegetation for construction purposes and potential pollution of the soil	<p>Direct Impacts: Exposure to erosion and subsequent sedimentation or pollution of proximate moist grassland</p> <p>Indirect Impacts: Pollution of the moist grassland and downstream water sources</p> <p>Cumulative Impacts: Erosion of the development footprint upslope from the moist grasslands could increase sedimentation. However, this could be mitigated. Possible contamination of wetlands and/or groundwater reserves due to hydrocarbon or other spillage and an increase of modified areas (together with surrounding developments) that will affect flora population dynamics and runoff patterns</p>	LOW	<ul style="list-style-type: none"> • Maintenance should not disturbed vegetation unduly. <p><u>Construction:</u></p> <ul style="list-style-type: none"> • No construction / activities should be undertaken within buffer areas as recommended by the wetland specialist. • Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area (DWAF, 2005). • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. The grassland can be removed as sods and re-established after construction is completed. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and work areas. • Prevent spillage of construction material, oils or other chemicals, strictly prohibit other pollution. Ensure there is a method statement in place to remedy any accidental spillages immediately. After construction clear any temporarily impacted areas of all foreign materials, re-apply and/or loosen topsoils and landscape to surrounding level. <p><u>Operational:</u></p> <ul style="list-style-type: none"> • Do not disturbed watercourses and surrounding vegetation during any operational activities. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular or pedestrian access.
Activities associated with vegetation clearing and construction of the watercourse crossings as	<p>Direct Impacts: Potential increase in invasive vegetation</p>		<p><u>Construction:</u></p> <ul style="list-style-type: none"> • Alien invasive species, in particular category 1b species that were identified within the study area, should be removed from the development footprint and immediate surrounds, prior to construction or soil disturbances. By removing these species,

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
well as operation.	<p>Indirect Impacts:</p> <p>Potential to introduce additional invasive species to the construction areas.</p> <hr/> <p>Cumulative Impacts:</p> <p>Re-infestation in areas initially cleared.</p>	Low	<p>the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation.</p> <ul style="list-style-type: none"> • Manual removal is preferred to chemical control, particularly in the moist grassland. • Only suitably trained contractors (e.g. certified by the South African green Industries Council (SAGIC)) with knowledge of the species in question should be employed. • All alien seedlings and saplings must be removed as they become evident for the duration of construction. • All construction vehicles and equipment, as well as construction material should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access on to the construction areas. This should be verified by the ECO. • If filling material is to be used, this should be sourced from areas free of invasive species. <p><u>Maintenance:</u></p> <ul style="list-style-type: none"> • Implement an alien invasive plant monitoring and management plan whereby the spread of alien and invasive plant species into the areas disturbed by the construction are regularly removed and re-infestation monitored.

6.2.2 Potential Impacts on Fauna

The tables below list the activities that could impact on the Fauna as a result of the construction of river/watercourse crossings, as well as impacts that may be associated with the operation and maintenance thereof. Please refer to Appendix D2 for the full Fauna Assessment Report.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
Clearing of and damage to vegetation in construction footprint, access roads, construction camps (Construction & Operation)	Direct Impacts:	Construction: LOW Operation: Moderate	Rehabilitation will depend on effort and resources invested, and permanence will require continued conservation endeavours.
	<ul style="list-style-type: none"> Loss of Fauna Habitat / Fragmentation and Faunal Disturbance 		
	Indirect Impacts:		
	<ul style="list-style-type: none"> Crossings may result in fragmentation where not designed and maintained correctly. Diminished species diversity and persistence in the area. 		
	Cumulative Impacts:		
	Considerable should habitats and connectivity are not fully restored..		
Clearing of and damage to vegetation in construction footprint, access roads,	Direct Impacts:		<ul style="list-style-type: none"> Minimise areas cleared for construction activities and access roads Restrict construction activities to area directly below power line Construction sites must be fully rehabilitated after construction is complete
	<ul style="list-style-type: none"> Avifaunal habitat loss 		
	Indirect Impacts:		

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
construction camps (Construction & Operation)	Will result in additional loss of habitat in an area that is already highly transformed. Cumulative Impacts: Will result in additional loss of habitat in an area that is already highly transformed.	LOW	<ul style="list-style-type: none"> • Either pipe jacking or directional drilling will be suitable as a construction method from an avifaunal perspective.
Presence of vehicles and personnel during construction	Direct Impacts: <ul style="list-style-type: none"> • Avifaunal disturbance Indirect Impacts: Construction activities, and to a lesser extent maintenance activities thereafter, will increase overall levels of human disturbance in an area that is already highly disturbed.	LOW	<ul style="list-style-type: none"> • Construction workers must be instructed to minimise disturbance of birds at all times. • Illegal hunting of birds must be strictly prevented
	Cumulative Impacts: Construction activities, and to a lesser extent maintenance activities thereafter, will increase overall levels of human disturbance in an area that is already highly disturbed.		

6.2.3 Potential Aquatic Impacts

The tables below list the activities that could impact on the aquatic environment as a result of the construction of the river/watercourse crossings, as well as impacts that may be associated with the operation and maintenance thereof. Please refer to Appendix D3 for the full Aquatic Assessment Report.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
<p>» Construction activities which disturb vegetated and instream areas may potentially degrade downstream water quality.</p> <p>» the storage of use of construction materials and hydrocarbons can also lead to downstream water quality deterioration</p>	<p>Direct Impacts:</p> <p>» Water Quality Deterioration</p> <p>» Habitat Quality Deterioration</p> <p>Indirect Impacts:</p> <p>» Possible impact on the remaining catchment due to changes in run-off characteristics within the development site.</p> <p>» During flood events, any unstable banks (eroded areas) and sediment bars (sedimentation downstream) already deposited downstream. However due to low mean annual runoff within the region this is not anticipated due to the nature of the development together with the proposed layout.</p> <p>Cumulative Impacts:</p>	<p>LOW</p>	<ul style="list-style-type: none"> • Should pipe jack methods be applied, the method which does not divert or impede the watercourse should be employed. • The working/drilling areas should be outside of the proposed 30m buffer zone; • Water used for the drilling activities should not be obtained from the watercourse being crossed. Instead, water should be brought in on a tanker; • No chemicals, building materials hydrocarbons or soils must be stockpiled within the 30m buffer zone; • Existing sewage pipelines should be identified and avoided for each crossing point; • Should the river be diverted it must be done in a manner that avoids downstream erosion; • Stream banks must be avoided by up to 30m where appropriate; • Should stream banks be disturbed, rehabilitation activities must take place; • The cable structure should be sufficiently below the stream surface so as to avoid the dewatering of the stream; • Any disturbed areas must be revegetated.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
	<ul style="list-style-type: none"> » The baseline environment indicated largely tolerant aquatic biology. » Considering this, the proposed project poses a limited cumulative impact to the surrounding aquatic environment 		

6.2.4 Potential Impacts on Wetlands

The tables below list the activities that could impact on Wetland as a result of the construction of the river/watercourse crossings, as well as impacts that may be associated with the operation and maintenance thereof. Please refer to Appendix D4 for the full Wetland Assessment Report.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
<ul style="list-style-type: none"> • Earthwork activities during structure construction and maintenance • Disturbance of soil surface including soil compaction • Disturbance of slopes through creation of access roads and tracks adjacent to the wetland (Construction and Operation)	<p>Direct Impacts: Changes in sediment entering and exiting the system.</p> <p>Indirect Impacts: The loss of topsoil, sedimentation of the wetland and increase the turbidity of the water.</p> <p>Cumulative Impacts: May be high unless effective mitigation measures are applied. Refer to the accompanying General Monitoring and Rehabilitation report.</p>	<p>Construction: Moderate</p> <p>Operation: Low</p>	<ul style="list-style-type: none"> • Plan for the smallest possible footprint • Prevent access of heavy vehicles and machinery in the wetlands • Work in wet conditions should be avoided • Ensure that effective sediment traps are installed • Rehabilitation plans must be submitted and approved for rehabilitation of damage during construction activities and that plan must be implemented immediately upon completion of construction. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular and pedestrian access. • Implementation of best management practices
<ul style="list-style-type: none"> • Soil compaction through movement of heavy vehicles • Disturbance of vegetation cover through trampling • Creation of 	<p>Direct Impacts: Changes in the hydrology of wetlands also impacts downstream areas.</p> <p>Indirect Impacts: None</p> <p>Cumulative Impacts:</p>	<p>Construction: Low</p> <p>Operation: Low</p>	<ul style="list-style-type: none"> • Prevent access of heavy vehicles and machinery in the wetlands • Rehabilitation plans must be submitted and approved for rehabilitation of damage during upgrade activities and that plan must be implemented immediately upon completion of construction. • Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If necessary, these areas should be fenced off to prevent vehicular and pedestrian access.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
additional access roads, particularly parallel to wetlands	May be high unless effective mitigation measures are applied. Refer to the accompanying General Monitoring and Rehabilitation report.		<ul style="list-style-type: none"> Implementation of best management practices
Any activities that damages the natural vegetation cover will result in opportunistic invasions after disturbance and the introduction of seed in construction materials and on vehicles	<p>Direct Impacts:</p> <p>Introduction and spread of alien vegetation.</p> <p>Indirect Impacts:</p> <p>Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users.</p> <p>Cumulative Impacts:</p> <p>Expected to be high to moderate. Regular monitoring should be implemented during construction, rehabilitation including for a period after rehabilitation is completed. Refer to the accompanying General Rehabilitation and Monitoring Report</p>	<p>Construction: Moderate</p> <p>Operation: Low</p>	<ul style="list-style-type: none"> Weed control Retain vegetation and soil in position for as long as possible, removing it immediately ahead of construction / earthworks in that area and returning it where possible afterwards. Monitor the establishment of alien invasive species within the areas affected by the construction and maintenance and take immediate corrective action where invasive species are observed to establish. Rehabilitate or revegetate disturbed areas

6.2.5 Potential Heritage Impacts

The tables below list the activities that could impact on Heritage as a result of the construction of the river/watercourse crossings, as well as impacts that may be associated with the operation and maintenance thereof. Please refer to Appendix D5 for the full Heritage Assessment Report.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
Vegetation clearing	<p>Direct Impacts: Displacement or destruction of heritage structures or features in the proposed development areas.</p>	LOW	<ul style="list-style-type: none"> • All identified sites should be avoided as far as possible. • Mitigation should take the form of isolating known sites and declare them as no-go zones with sufficient large buffer zones around them for protection. • In exceptional cases mitigation can be implemented after required procedures have been followed.
	<p>Indirect Impacts: Overall loss of features with heritage significance if appropriate measures are not undertaken when objects are found.</p>		
	<p>Cumulative Impacts: The various features are subject to damage. Not always easy to identify and therefore makes it difficult to avoid. Variety of interconnected elements makes up the whole. Impact on part therefore implies an impact on the whole.</p>		

6.2.6 Potential Geohydrology Impacts

The tables below list the activities that could impact on geohydrology of the area as a result of the construction of the river/watercourse crossings, as well as impacts that may be associated with the operation and maintenance thereof. Please refer to Appendix D6 for the full Geohydrological Assessment Report.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
Altering of (artificial) watercourse banks during construction	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • Erosion / collapse of watercourse banks and long-term instability • Alteration of watercourse channel (i.e.: stream flow path and flow velocity) <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • Damage to adjacent infrastructure and properties due to bank instability / erosion / slope failure <p>Cumulative Impacts:</p> <ul style="list-style-type: none"> • Stream course alteration due to disturbance of banks (where meandering) • Flooding induced by altering of watercourses 	LOW	<ul style="list-style-type: none"> • Prevent construction works directly within (or in in close proximity to) the banks of the watercourses (and artificial watercourses). • Safe working distance from artificial watercourse banks to be determined b.m.o. engineering review of existing structures • Build properly designed and constructed erosion protection structures where poor natural watercourse bank stability prevails, or where artificial watercourse erosion protection structures are of poor quality. <i>NB: The stability of all adjacent embankments must be considered during all planning, design and construction activities to prevent induced slope failure (e.g.: in the vicinity of the constructed embankment between crossing numbers 5 and 6).</i> • Erosion control and prevention will also be required at watercourses where existing infrastructure is already exposed due to scour (e.g.: crossing numbers 3 and 8) • Prevent induced slope failure and ravelling adjacent existing infrastructure and in close proximity to existing structures, embankments, properties etc. (safe excavation depths and distances, and drill starting points, to be determined by Professional Engineer)
Construction of buried sleeves by means of HDD / Pipe Jacking beneath watercourses	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • Pollution of watercourse (lubricants, diesel, petrol, other fluids, spoil from drilling and excavations: drilling mud, water and rock/soil etc.) 	LOW	<ul style="list-style-type: none"> • Ensure that cable construction (e.g.: b.m.o. horizontal directional drilling or the constructing of vertical pipe jacking shafts with connecting horizontal tunnel) commences at a suitable distance away from (artificial) watercourse banks to prevent sidewall collapse and failure, sedimentation into the watercourse, and watercourse flow direction alteration due to bank instability and alterations

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
	<ul style="list-style-type: none"> • Damage to artificial streambeds and embankments during construction (e.g.: damage to channel linings) <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • Induced slope instability upslope of construction site <p>Cumulative Impacts: n/a</p>		<ul style="list-style-type: none"> • Ensure that storm water, surface water, and groundwater inflow into excavations are limited to prevent collapse and transportation of pollutants, including – but not limited to: <ul style="list-style-type: none"> ○ the installation of temporary excavation shoring ○ localized dewatering of excavations ○ waterproofing of natural ground surfaces beneath construction equipment, with suitable sumps • Ensure borehole / micro-tunnel construction (and subsequent installation of cable sleeves) are done at a suitable depth below the (artificial) watercourse base to prevent: <ul style="list-style-type: none"> ○ scour by stream flow (along banks and/or base) ○ exposure of infrastructure within watercourse banks due to stream migration, scour or erosion ○ alterations to the hydrological and geohydrological character of the watercourse caused by installing infrastructure at insufficient depth that could potentially hamper base flow ○ damage to the artificial embankments and erosion protection structures • Spillage prevention and collection, carting of spoil off site and disposing the prescribed manner, sealed return-water / drilling mud attenuation pond, employ minimum required environmental protection measures and procedures
Operation of new HV electrical infrastructure constructed within underground sleeves NOTE: Significance of impacts are inferred assuming that all the required and applicable	<p>Direct Impacts:</p> <ul style="list-style-type: none"> • Impediment / retardation of base flow after construction due to installed infrastructure • Damage to installed infrastructure as a result of scour <p>Indirect Impacts:</p> <ul style="list-style-type: none"> • Flooding due to impediment / retardation of Watercourse 	Horizontal Directional Drilling: LOW Pipe Jacking: LOW	<p><u>WHERE HORIZONTAL DIRECTIONAL DRILLING* or PIPE JACKING** WAS USED AS CONSTRUCTION METHOD *</u></p> <ul style="list-style-type: none"> • Ensure sleeves was constructed at the required minimum depth and distance away from (artificial) watercourse banks and erosion protection structures • Ensure proper erosion control and/or prevention structures was constructed along crossings with: <ul style="list-style-type: none"> ○ a natural migrating character ○ high susceptibility to natural or induced erosion, and ○ where construction took place in close proximity to artificial watercourse banks

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
mitigation measures were implemented prior to- and during construction	natural flow capacity and pattern • Stream course alteration due to scour and impediment Cumulative Impacts: • Damage to adjacent infrastructure, services, embankments, or structures		<ul style="list-style-type: none"> Determine the depth of construction to ensure installed infrastructure does not cause damage to artificial channel linings

* Installation of cables employing the HDD method is inferred to consist of various PVC-type cable sleeves not exceeding an outside diameter of ± 250 mm, constructed adjacent one another

** Installation of cabled employing the Pipe Jacking method is inferred to consist of a single concrete-type cable sleeve with an outside diameter of $\pm 1\ 200$ mm

6.2.7 Potential Social Impacts

The tables below list the activities that could impact on Social as a result of the construction of the river/watercourse crossings, as well as impacts that may be associated with the operation and maintenance thereof.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
Construction of river/ watercourse crossing structures	Direct Impacts: Inflow of Workers	LOW	<ul style="list-style-type: none"> • Local labourers should be employed where possible. • Labourers should remain at their existing residences. No workers should thus be accommodated on site at night. The erection of a construction camp where workers would be housed would not be recommended. • Before construction commences, representatives from the municipality, other community leaders and management structures of the security villages and complexes, as well as affected property owners should be informed of the details of the contractors, size of the workforce and construction schedules. • The contractor should make certain that the “outside” workforce carry identification tags or uniforms to be easily identifiable. It should furthermore be ensured that the inflow of workers and their presence in the local communities do not create conflict in the surrounding communities. • Local community organisations and policing forums / neighbourhood watches must be informed of the presence of an outside workforce (where relevant).
	Indirect Impacts: Perceived increase in crime levels in the area		
	Cumulative Impacts: Construction workers remaining in the larger area once this development has been completed.		
	Direct Impacts: Employment Opportunities		
	Indirect Impacts: Increase skills		<p>Enhancement:</p> <ul style="list-style-type: none"> • The use of local labour should be maximised where possible. • Local people could be employed during the construction phase as Community Liaison officers. • Eskom and the appointed contractors should promote capacity building through skills development.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
	<p>Cumulative Impacts: Jobseekers possibly coming to the area in search of employment at other construction projects undertaken in the study area</p>	LOW	<ul style="list-style-type: none"> • Eskom and the appointed contractors should create conditions that are conducive for the involvement of entrepreneurs, small businesses and SMME's during the construction and operational process. • Tender documentation should contain guidelines for the involvement of labour, entrepreneurs, businesses and SMME's from the local sector.
<p>Direct Impacts: Disturbance of daily Living and Movement Patterns</p>	<ul style="list-style-type: none"> • Working hours should be kept to normal working hours (e.g. 7 am until 5 pm) during the construction phase. • Construction vehicles should keep to the speed limits. Speeding on gravel access roads should also be avoided to limit any excess dust pollution. • Clear warning signs should be erected at strategic places during the construction phase. • The contractor should contact affected property owners before construction commences to inform them of the contractor's plans, procedures, and schedules. • Construction sites should be fenced off to limit unauthorised entry. • Sufficient water and sanitation facilities should be provided for the workers on site during the construction period. • Construction sites should be rehabilitated as soon as the construction activities and planning allows. 		
<p>Indirect Impacts: Increase in crime traffic and damage to the nearby roads</p>			
<p>Cumulative Impacts: Possible impact on daily living and movement patterns due to various power line servitudes within the study area</p>			
<p>Direct Impacts: Safety and Security Risks</p>			<ul style="list-style-type: none"> • Before construction commences, the affected property owners, should be informed of the details of the contractors, size of the workforce and construction schedules. • Working hours should be kept to normal working hours (e.g. 7 am until 5 pm) during the construction phase. • Construction workers and permanent employees should be easily identifiable by wearing uniforms and even identity tags.
<p>Indirect Impacts: Perceived increase in crime levels in the area</p>			

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
	<p>Cumulative Impacts: None anticipated</p>		<ul style="list-style-type: none"> • Construction workers should refrain from unauthorised entry on private properties and should thus remain within the construction site boundaries. • The construction sites should be properly fenced and access should be controlled to limit unauthorised entry. • Eskom should take a strong stance with regards to the illegal entering of the servitude areas and substation site.

6.2.8 No-Go Alternative Assessment

The No-go option implies that the upgrades will not proceed, and thus comprise of Eskom not going ahead with the construction of the proposed infrastructure. Ideally if the status quo of the environment remains unchanged no negative impacts will occur, however due to the growing demand for energy and activities that will require electricity in the area, this alternative is not feasible. Should Eskom rely on the existing network to supply future demand it is highly likely that present supply will be compromised due to the increased load on the network. Although the no-go alternative has been considered, it is not a practical project alternative in terms of providing stable electricity supply in the area as it implies a continuation of the current situation or the status quo; therefore, it doesn't render any positive outcomes. The project will improve the customer interruptions and also the performance of the supply. By not increasing the supply to the greater area, development will be constrained as the already existing network is operating at near-capacity and will not be able to accommodate the amount of load that will be brought by future developments. The 'Do nothing' alternative is, therefore, not a preferred alternative.

6.3 Gaps, Limitations and Assumptions of the study

A number of limitations and assumptions, as described below, are noted for this environmental impact assessment.

- Due to the vast area covered by this linear project and time limitations, individual properties could not be inspected. Use was made of a desktop assessment by examining the projected transmission line routes that were mapped onto Google Earth. Comments from the public participation process provided details of the concerns on the affected properties which were investigated by means of interviews, focus group meetings and consultation.
- Although various methods of communication were used to inform IAPs of the project and the EIA process, it should be understood that participation is a voluntary involvement and that communities are not equally mobilised or comfortable to attend public forums or communicate via modern technologies such as e-mail, sms, the internet or fax.
- The impact on tangible heritage resources could not be accurately predicted, as many of the objects are obscured along the route and may only be uncovered during construction. Intangible resources are even more problematic to identify, as are traditional areas that have not yet been documented for protection.
- A single aquatic ecology site survey was completed for this assessment. Thus, temporal trends were not investigated. Due to the rapid nature of the assessment and the survey methods applied, fish diversity and abundance was likely to be under estimate
- Sections of the area surrounding the study site was fenced off and access was an issue here, extrapolation was used here.

7 CONCLUSIONS AND RECOMMENDATIONS

The previous chapters of this report together with the specialist studies contained within **Appendix D** provide a detailed assessment of the potential impacts that may result from the proposed project. This chapter concludes the Basic Assessment Report for the river/watercourse crossings by providing a summary of the conclusions of the assessment of the proposed powerline. In so doing, it draws on the information gathered as part of the BA process and the knowledge gained by the environmental specialist consultants and presents an informed opinion of the environmental impacts associated with the proposed project. Potential impacts which could occur as a result of the proposed project are summarised in the sections which follows.

7.1 Summary of key findings

The specialist findings are summarised as follows:

Vegetation Assessment:

The vegetation at the eight water crossings was found to be in a moderate to poor ecological state, dominated by alien and invasive plant species and with an altered vegetation structure and species composition. The majority of the water crossings traverse watercourses that are piped or channelled underneath roads and the crossings will seemingly make use of pavement areas whereby the cable will likely run on top of these structures adjacent to roads i.e. the crossing does not directly impact on vegetation within the watercourse. In addition, no plant species of conservation concern were recorded at either of the water crossings. Most of the water crossings do not provide suitable habitat for such species due to altered streambeds and vegetation structure. Both the proposed methods of crossing the watercourse involve drilling or jacking the cable underneath the watercourse, without disturbing the aboveground vegetation in the watercourse. However, the above ground footprint of the drilling or pipe jacking entry location and machinery will impact on vegetation adjacent to the watercourse, some of which was in a fair condition, including indigenous grasses or trees. Disturbance to such vegetation could also lead to erosion and the colonisation of the disturbance footprint by alien and invasive plant species.

This vegetation assessment does not object to the water crossings, provided that the above impacts are mitigated as set out in the report and that all relevant legislation pertaining to watercourses be adhered to.

Although the vegetation was observed to be modified and dominated by alien and invasive plant species, it still plays an important role in flood attenuation, prevent soil erosion and sedimentation of water courses and promote the uptake of toxins from the water.

Fauna Assessment:

It is concluded that the impact of the proposed development on the stream and the riparian section of the crossings is ranked as low during the construction phase and moderate once operational. Calculating the impact (consequence) does not take into account the ecologically transformed nature of the riparian zones where crossing will be located. Taking the latter into account, the realistic impact is significantly less. Either pipe jacking or directional drilling will be suitable as a construction method from fauna perspective. Considering on the nature

of the development and the implementation of conservation measures, it is expected that none of the terrestrial vertebrates with their habitat(s) will be displaced.

Aquatic Assessment:

The results of the PES assessment derived critically modified (class F) conditions in the A21C-1269 SQR considered in this assessment. The modified conditions were largely attributed to cumulative habitat level impacts which have resulted in the serious modification instream and riparian habitat. The results of the PES assessment derived critically/seriously modified (class E/F) conditions in the A21C-1269 SQR considered in this assessment. The modified conditions were largely attributed to cumulative habitat level impacts which have resulted in the serious modification instream and riparian habitat.

The results of the risk assessment derived predominately low risks for the proposed project. The pipe jacking technological alternative which makes use of channel diversions and an instream trench was determined to have moderate risks associated with the activities. This was determined to be due to the nature of the activity which requires a trench to be constructed in the stream channel and river flows diverted. The risk for the directional drilling and pipe jacking method which does not divert or trench in the instream area, were determined to have similar risk ratings and therefore comparably acceptable methods. The operation of the proposed project was determined to have a moderate risk. This risk was largely due to the permanent nature of the structures which has increased the overall significance of the impact. **It is however anticipated that the overall impact of the proposed project will be low when considering the recommended mitigation measures.**

Wetlands Assessment:

Five watercourses were recorded within the study area. A total of 8 watercourse crossings were studied. Some of the watercourse crossings occur at cement/gabion lined sections of the watercourse. These watercourses were likely natural in the past and were lined in order to flow under highways and roads and as a result large sections of the watercourses now occur underground. Since the majority of the crossings occur near these cement lined sections of the watercourses it is likely that the proposed underground power cables will have a small impact on the overall health of the watercourses.

The two proposed methods are very similar in the effect they are likely to have on the wetland system although Pipe Jacking will probably have a larger disturbance footprint where the drilling rigs will be set up. For this reason, directional drilling is preferred. However, it is important to note that this is not a very significant difference. Should Pipe Jacking be better suited to the project due to other constraints, this method is not considered altogether unsuitable and disturbance of a larger footprint may be effectively rehabilitated.

Heritage Assessment:

Due to the density of the urban development in the region, it is very unlikely that any sites or features dating to the pre-colonial history of the region would still exist in the study area. However, isolated objects such as Stone Age artefacts might be exposed in areas close to stream beds. A large number of features, mostly houses, but also infrastructure related features, occur in the region. All of these are very formal and clearly visible. Due to the fact that the development will take place inside the river reserve, it is highly unlikely that any such features would be impacted on by the construction of construction of the HV Underground Cable Feeder. Both the alternative

technologies proposed for installing the HV cables would be suitable for constructing the underground HV feeder cables. From a heritage point of view it is recommended that the proposed development be allowed to continue. Should heritage features, archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

Floodline delineation

Due to all infrastructures (HV Feeder Cables) being located well below the surface of all the drainage/river crossings, the risk of damage to the mentioned infrastructure due to flooding is low to non-existent.

Although the risk to damage of the HV Feeder Cables by flooding is considered low to non-existent, routine site inspection is recommended after periods of extreme storm events so as to ensure the anticipated high flow velocities do not expose the subsurface cables due to erosion of the drainage/river bed.

Geohydrology Assessment:

The construction and operation of the HV cables are inferred to impose a moderate impact on watercourse crossing numbers 1 and 8. It is recommended that the required authorisation (e.g. Water License) be obtained for construction works at these crossings. It is required that suitable investigative work be conducted prior to construction to determine optimal installation starting and end points to prevent damage to watercourse banks, and to determine the optimal installation depth (i.e.: typical studies may include river hydrological studies – where required – to determine the influence depth of river scour, as well as geotechnical investigations in support of design and construction – which specifically address the anticipated impacts of the effects of groundwater during construction).

No substantial impacts are inferred for watercourse crossing numbers 2 to 7, provided that no construction takes place within the channel, and that the suitable investigative work be conducted prior to construction, in order to determine optimal installation starting and end points to prevent damage to watercourse banks, as well as to determine the optimal installation depth.

Social

From a Social perspective, the implementation of river crossings will have minimal impacts on the society within the study area

Cumulative Impact Assessment:

Due to the largely modified and secondary nature of much of the vegetation, the proposed development could accelerate degradation, fragmentation and erosion in the area. However, cumulative impacts on the vegetation and watercourse can be limited if mitigation measures as set out in this report are adhered to as a minimum. With regards to the fauna in the area, diminished species diversity and persistence in the area can take place if impacts are not properly mitigated.

No-go alternative

The No-go option implies that the upgrades will not proceed, and thus comprise of Eskom not going ahead with the construction of the proposed infrastructure. Ideally if the status quo of the environment remains unchanged no negative impacts will occur, however due to the growing demand for energy and activities that will require electricity in the area, this alternative is not feasible. Should Eskom rely on the existing network to supply future demand it is highly likely that present supply will be compromised due to the increased load on the network. Although the no-go alternative has been considered, it is not a practical project alternative in terms of providing stable electricity supply in the area as it implies a continuation of the current situation or the status quo; therefore, it doesn't render any positive outcomes. The project will improve the customer interruptions and also the performance of the supply. By not increasing the supply to the greater area, development will be constrained as the already existing network is operating at near-capacity and will not be able to accommodate the amount of load that will be brought by future developments. The 'Do nothing' alternative is, therefore, not a preferred alternative.

7.2 Summary of the comparative assessment of alternatives

With regards to the assessment of alternatives, **Table 7.1** gives an overall summary of the comparative assessment undertaken for each alternative considered for the proposed river crossings along HV underground cable (please refer **Appendix F** for the full comparative assessment of the alternatives).

Table 7.1: Comparative Assessment Table of the alternative technologies

Aspect	Alternative 1: Horizontal (Directional) Drilling	Alternative 2: Pipe Jacking
Vegetation	√	√
Fauna	√	√
Wetland	√	X
Heritage	√	√
Geotechnical	√	√
Aquatic	√	X
Social	√	√

It is noted from the **wetland and aquatic assessment** that the proposed methods are very similar in the effect they are likely to have on the wetland system although Pipe Jacking will probably have a larger disturbance footprint where the drilling rigs will be set up. For this reason, **directional drilling is preferred**. From a **technical perspective**, however, **directional drilling is the preferred technology**, as its much cheaper and quicker to

implement then pipe jacking technology. It is clear from this assessment that there are no significant differences between either alternatives technology assessed for the river crossings.

7.3 Conclusion (Impact Statement)

Many areas supplied by HV cables in Gauteng Operating Unit are economically important and also enjoy moderate to high media attention (Soccer stadiums, JSE, Gautrain, etc.). A replacement and network strengthening strategy need to be devised to sustain load growth as well as provide a high-level of network reliability going into the future. A study by Eskom shows that the cables in service are aged and is at a point in time where performance will deteriorate. Foresight is needed to replace these cables before they cause extensive interruptions in the Region. The proposed HV cables systems will be crossing watercourses in certain areas hence the focus of this Basic Assessment Report (BAR).

This Basic Assessment Report has provided a comprehensive assessment of the potential environmental impacts associated with the proposed construction of **Eight (8) watercourse** crossings along HV cable within Croydon/Germiston area in the City of Ekurhuleni. The assessment concludes (in section 7.1) that most of the negative impacts associated with the river crossing can be mitigated to low significance if all mitigation measures identified and included in the Environmental Management Programme (EMPr) attached in **Appendix G**. The Positive impacts associated with the water crossings are long-term in nature and are meant to address network strengthening strategy within Gauteng that will sustain load growth as well as provide a high-level of network reliability for the future. Owing to the fact that the project is a replacement of infrastructure that are in dire need for restoration, **the benefits of the project are expected to occur beyond the local area therefore the benefits partially offset the localised environmental costs of the project.**

The proposed project has the potential to negatively affect local ecology considering the status of the aquatic ecosystems, and furthermore the nature and requirements of the project. However, the watercourse crossings occur in a system that has been significantly impacted. Disturbance at the site of the drill rigs can be effectively rehabilitated. Therefore, should the proposed mitigation actions be implemented, the negative impacts can be effectively reduced to a minimum. In light of the above, it is the opinion of the EAP that no significant fatal flaws could be identified in this assessment. Responsible environmental management will be required on site, during the planning and construction phases of the watercourse crossing along underground HV cables. This assessment concludes that either technology alternative (Directional)Drilling or Pipe Jacking) can be implemented for the watercourse crossing. However, the selection of the technically preferred technology will be incumbent on Eskom as all alternatives are deemed to be environmentally appropriate within the context of the receiving environment.

7.4 Recommendations

There are no insurmountable environmental or social constraints that prevent the implementation of the watercourse crossing along HV cable within Croydon/Germiston area in the City of Ekurhuleni. Envirolution Consulting (Pty) Ltd recommends that the proposed watercourse crossing be considered for approval subject to the following general recommendations:

- EMPr (**Appendix G**) for this application be made a binding document for the contractors and managers on site;

- An independent ECO should be present during construction to monitor the implementation of the EMPr and the environmental authorization once issued;
 - Compliance with the mitigation measures outlined in this BA report and EMPr;
 - Development should be done in a manner that does not further alter the natural watercourses (rivers and wetlands) and their catchments. This includes protecting and improving current eroded wetlands before additional water inputs can be implemented.
 - Avoid, as far as reasonably possible, disturbing wetlands within the study area. Similarly, restore wetlands that will remain intact if they have been affected by construction activity;
 - Adequate measures must be put in place to prevent polluted runoff water from entering the, wetland and soil, thus preventing surface and groundwater pollution; No chemicals, building materials hydrocarbons or soils must be stockpiled within the 30m buffer zone;
 - It is required that suitable investigative work be conducted prior to construction to determine optimal installation starting and end points to prevent damage to watercourse banks, and to determine the optimal installation depth.
 - All relevant legislation and requirement of other government departments (National, Provincial), in particular of Section 28 (duty of care) of NEMA, must be complied with.
 - In the event of a major incident (e.g. fire causing damage to property and environment, major spill or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/ incidents, as per the requirements of section 30 of NEMA.
 - Water Use License must be obtained from Department of Water and Sanitation prior to the commencement of construction activities.
 - A number of provincially protected plants occurring in the study area are listed in the Transvaal Nature Conservation Ordinance Act No. 12 of 1983. These plants are not to be removed, damaged, or destroyed without permit authorisation from Gauteng Department of Agriculture and Rural Development (GDARD).
 - Should heritage features, archaeological sites or graves be exposed during construction work, it must immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.
 - In the event of a major incident (e.g. fire causing damage to property and environment, major spill or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/ incidents, as per the requirements of NEMA.
 - The site after construction must be rehabilitated back to its original state as per the **Rehabilitation & Monitoring Plan (Appendix D7)**, if not possible to a state that conforms to the principles of sustainable development.
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