BASIC ASSSSMENT PROCESS FOR THE PROPOSED CONSTRUCTION OF RIVER CROSSINGS ALONG 132kV/88kV HIGH VOLTAGE (HV) FEEDER UNDERGROUND CABLES WITHIN CRAIGHALL/SANDTON AREA IN THE CITY OF JOHANNESBURG METROPOLITAN MUNICIPALITY, GAUTENG PROVINCE

DRAFT BASIC ASSESSMENT REPORT FOR PUBLIC REVIEW

16 FEBRUARY 2018 – 19 MARCH 2018

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PROJECT DETAILS

DEA Reference No.	:	Not assigned as yet
Title	:	The Proposed Construction of River Crossings along 132kV/88kV High Voltage (HV) Feeder Underground Cables within Craighall/Sandton area in the City Of Johannesburg Metropolitan Municipality, Gauteng Province
Report compiled by:		**Envirolution Consulting** Contact person: Ms Sheila Bolingo Postal Address: P.O.Box 1898, Sunninghill, 2157 Telephone Number: 0861 44 44 99 Fax Number: 0861 62 62 22 Email: sheila@envirolution.co.za
Client	:	**Eskom Holdings SOC Ltd**
Status	:	Draft Basic Assessment Report
Review period	:	The 30-day period for review is from **16 February 2018 – 19 March 2018**
Reviewed by:		Jubilee Bubala
Approved By:		Gesan Govender

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 ±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 and Ekurhuleni Metrolitan Municipality have been consided for the replacement strategy including Craighall (Sandton), Randburg and Croydon (Germiston). This assessement will be focussed on river crossings along HV cable within Craighall/Sandton and the other areas will be assessed through a separate EIA process. The proposed HV cables systems will be crossing watercourses in certain areas as shown in **Figure 1.1**. The study area is located in Sandton, on the eastern side of the N1 western by-pass in the City of Johannesburg Metropolitan Municipality and includes suburbs such as Craighall, Hurlingham, Benmore, Riverclub and Bryanston and surrounds.

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/watercourse 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 new cables will be crossing watercourses in some areas, therefore **river crossings of the HV cables** will be the **focus of this Basic Assessment Report**.

15 River crossings are proposed to be constructed in support of upgrading the HV cable systems within Craighall/Sandton 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 watercourse crossings along HV cable within Craighall/Sandton in the City of Johannesburg. The assessment concludes (in section 7.1) that most of the negative impacts associated with the river crossing can be mitigated to very low/negligible 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 Craighall/Sandton in the City of Johannesburg. 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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[1] All the above **appendices** form part of **Volume 2** of this report expect for the **specialist reports** which together with the main report makes **Volume 1**..

ABBREVIATIONS AND ACRONYMS

BAR	Basic Assessment Report
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
HV	High Voltage
I&APs	Interested and Affected Parties
kV	Kilo Volt
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	
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— **(a)** details of— (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae;	Chapter 1 (section 1.4), Appendix H
(b) the location of the activity, including: i. the 21 digit Surveyor General code of each cadastral land parcel; ii. where available, the physical address and farm name; iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	i. Appendix J
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Chapter 1 (section 1.1) Appendix A
(d) a description of the scope of the proposed activity, including— i. all listed and specified activities triggered and being applied for; and ii. a description of the activities to be undertaken including associated structures and infrastructure;	Chapter 3 (section 3.1)
(e) a description of the policy and legislative context within which the development is proposed including— (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 (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	Chapter 3 (section 3.3)
(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;	Chapter 2 (section 2.3)
(g) a motivation for the preferred site, activity and technology alternative;	Chapter 2 (Section 2.3) and (Section 2.4)
(h) a full description of the process followed to reach the proposed preferred alternative within the site, including— i. details of all the alternatives considered; ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations,	i. Chapter 2 (section 2.3) ii. Chapter 4 (section 4.1 & 4.2)

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— (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;	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
(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— (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;	Chapter 6
(j) an assessment of each identified potentially significant impact and risk, including— (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 mitigated;	Chapter 6
(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 8
(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 associate structures and infrastructure on the environmental sensitivities of the preferred site indicating an areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identifie	i. Chapter 7 (Section 7.1) ii. Appendix A iii. Section 7.3

	alternatives;	
(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;	N/A
(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 t 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[2]; 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 *gazetted* by the Minister provides for the basic assessment process to be followed, the requirements as indicated in such a notice will apply		N/A

[2] 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 ie 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**.

INVITATION TO COMMENT ON THE DRAFT BA REPORT

The Draft Basic Assessment Report (BAR) has been 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) Feeder Underground Cables within Craighall/Sandton in the City of Johannesburg Metropolitan Municipality, Gauteng Province. The report is made available for public review for 30-day review period from **16 February 2018 – 19 March 2018** at the following places:

- **Randburg Public Library:** Bram Fischer Dr & Selkirk Ave, Ferndale, Randburg, 2194
- Dropbox link sent to registered I&APs vial email
- Email copy of the BAR document (without appendices)

In order to obtain further information or submit written comments please contact:

Environmental Assessment Practitioner

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The due date for comments on the Draft Basic Assessment Report is 19 March 2018

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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 ±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 and Ekurhuleni Metrolitan Municipality have been consided for the replacement strategy including Craighall (Sandton), Randburg and Croydon (Germiston). This assessement will be focussed on river crossings along HVcable within Craighall/Sandton and the other areas will be assessed through a separate EIA process. The proposed HV cables systems will be crossing watercourses in certain areas as shown in **Figure 1.1**. The study area is located in Sandton, on the eastern side of the N1 western by-pass in the City of Johannesburg Metropolitan Municipality and includes suburbs such as Craighall, Hurlingham, Benmore, Riverclub and Bryanston and surrounds.

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/watercourse 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 new cables will be crossing watercourses in some areas, therefore **river crossings of the HV cables** will be the **focus of this Basic Assessment Report**.

The following **15 River crossings** are proposed to be constructed in support of upgrading the HV cable systems within Craighall/Sandton:

- **River Crossing 1** is located along the Craighall /Sandpark 1 88kV HV Feeder on Portion 40 of farm Driefontein 41/IR within Shelley Park in Willowild next to the Bordeaux Riverside Trail (Lat: 26° 5'53.96"S; Long: 28° 1'11.27"E).
- **River Crossing 2** is located along Craighall /Sandpark 2 88kV HV Feeder on Portion 40 of farm Driefontein 41/IR within Shelley Park in Willowild next to the Bordeaux Riverside Trail (Lat: 26° 5'53.96"S; Long: 28° 1'11.27"E).
- **River Crossing 3** is located along Craighall /Sandpark 1 88kV HV Feeder on Portion 40 of farm Driefontein 41/IR within Shelley Park in Willowild between the Bordeaux Riverside Trail and Braamfontein Spruit Trail (Lat: 26° 5'56.55"S; Long: 28° 1'16.38"E).

- **River Crossing 4** is located along Craighall /Sandpark 2 88kV HV Feeder on Portion 40 of farm Driefontein 41/IR within Shelley Park in Willowild between the Bordeaux Riverside Trail and Braamfontein Spruit Trail (Lat: 26° 5'56.55"S; Long: 28° 1'16.38"E).
- **River Crossing 5** is located along Craighall /Sandpark 1 88kV HV Feeder on ERF 170 in Glenadrienne behind the William Nicol Dr Total garage (Lat: 26° 5'51.93"S; Long: 28° 1'51.29"E).
- **River Crossing 6** is located along Craighall /Sandpark 2 88kV HV Feeder ERF 170 in Glenadrienne behind the William Nicol Dr Total garage. (Lat: 26° 5'51.93"S; Long: 28° 1'51.29"E).
- **River Crossing 7** is located along Craighall /Sandpark 1 88kV HV Feeder on Potion 31 of the farm Zandfontein, 42/IR behind George Lea Park (Sandton Sport Club). (Lat:: 26° 5'59.30"S; Long: 28° 2'6.16"E).
- **River Crossing 8** is located along Craighall /Sandpark 2 88kV HV Feeder on Portion 31 of the farm Zandfontein, 42/IR behind George Lea Park (Sandton Sport Club). (Lat:: 26° 5'59.30"S; Long: 28° 2'6.16"E).
- **River Crossing 9** is located along Craighall / Bryanston 1 88kV HV Feeder on ERF 983 in Hurlingham Ext 5 behind St Stithians College sport ground. (Lat:26° 4'59.23"S; Long: 28° 1'18.89"E).
- **River Crossing 10** is located along Benmore / Bryanston 1 44kV HV Feeder on ERF 3501 in Bryanston Ext 7 near Pick it Up depot on Hobart Road in Bryanston. (Lat: 26° 4'38.55"S; Long: 28° 1'38.18"E).
- **River Crossing 11** is located along Benmore / Bryanston 1 44kV HV Feeder on ERF 541 in River Club Ext 12 near River Club Golf Course (Lat: 26° 4'46.99"S; Long: 28° 1'43.31"E).
- **River Crossing 12** is located along Bryanston / Morningside 2 44kv HV Feeder r between Westherford Rd & E Hertford Rd, in Bryaston between Braamfontein Spruit Trail and Cypress Walk trail (Lat: 26° 4'9.66"S; Long: 28° 2'19.10"E).
- **River Crossing 13** is located along Bryanston / Morningside 1 44kv HV Feeder on ERF 2188 in Bryanston next to the Braamfontein Spruit Trail (Lat: 26° 3'39.84"S; Long: 28° 2'40.57"E).
- **River Crossing 14** is located along Bryanston / Morningside 1 44kv HV Feeder on ERF 2187 in Bryanston next to the Braamfontein Spruit Trail along Bryanston Drive (Lat: 26° 3'38.66"S; Long: 28° 2'51.07"E).
- **River Crossing 15** is located along Bryanston / Morningside 2 44kv HV Feeder between E River Rd W and E River Rd in Bryanston (Lat: 26° 3'59.50"S; Long: 28° 3'1.48"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. 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).

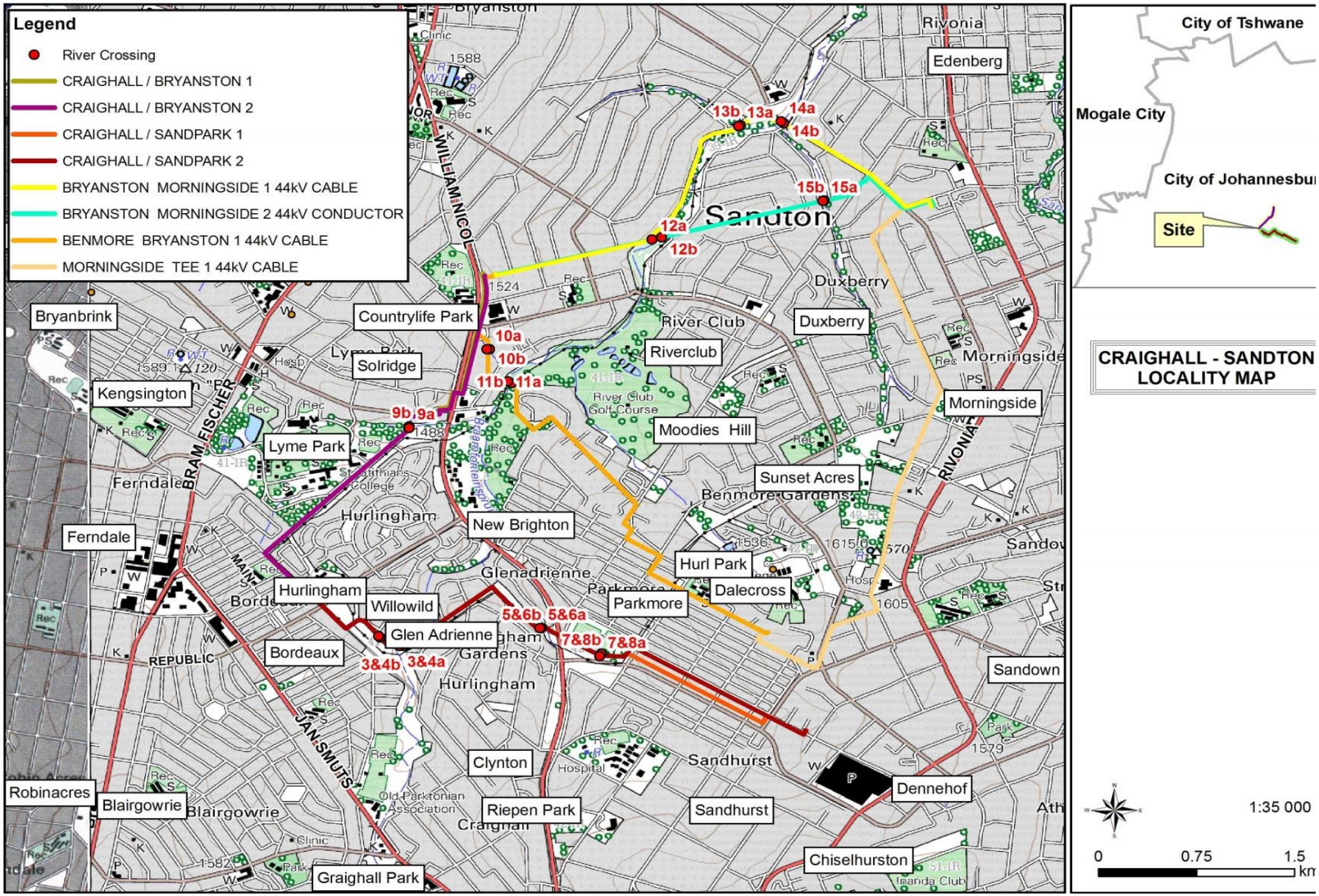

Figure 1.1: Locality map showing the proposed river crossings along HV feeder cables (refer to **Appendix A** for A3 mapsand zoomed in images of individual watercourse crossing).

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 EMPr 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:	Envirolution Consulting (Pty) Ltd
Name:	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
Fax Number:	(0861) 62 62 22
E-mail:	sheila@envirolution.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. 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

City of Johannesburg (CoJ) 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 the City of Johannesburg Metropolitan Municipality to provide a sustainable urban environment supported by the required infrastructure while facilitating the urban in-migration.

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 infrastructure3

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.

[3] 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 88kV underground cable trench will be approximately 1m wide (in 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 D**) 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**).

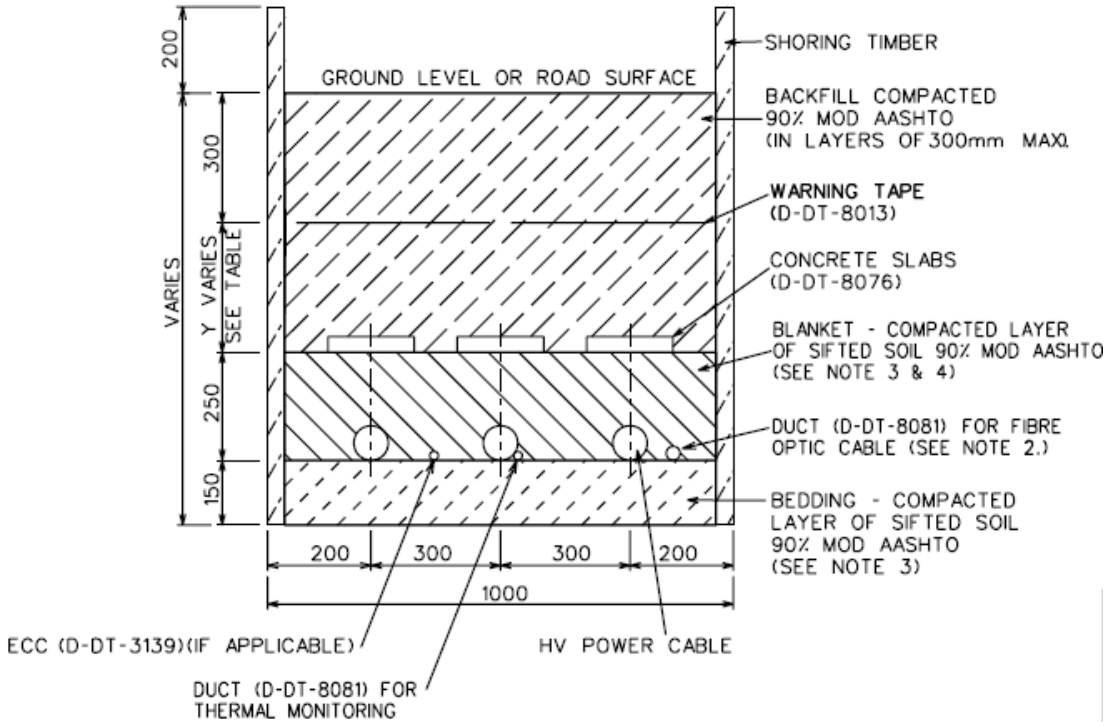

Figure 2.2: Flat Foil Formation

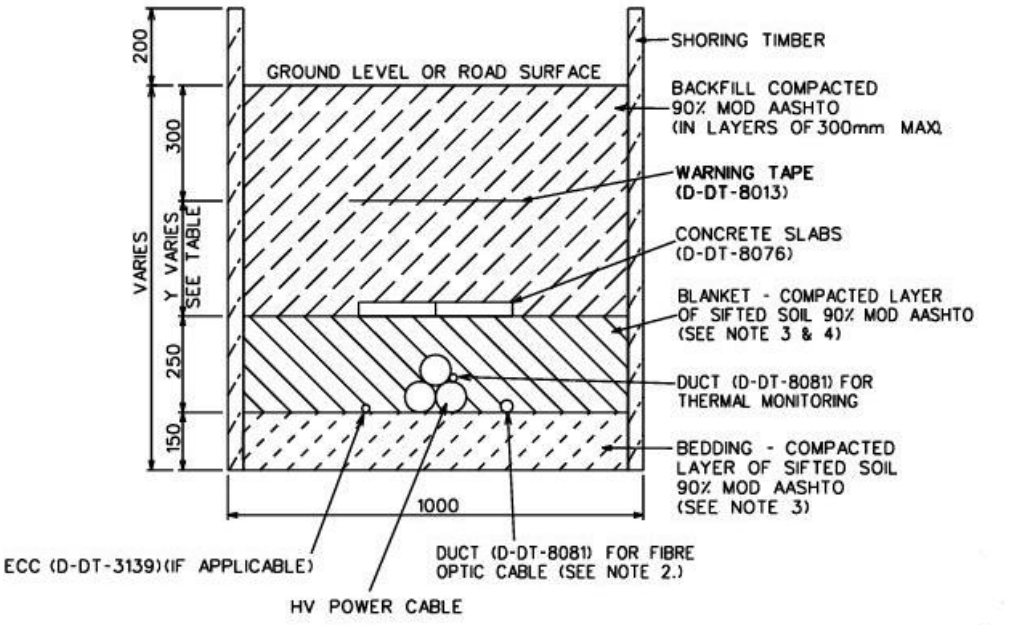

Figure 2.3: Tre-Foil Formation

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	Johannesburg Metropolitan
Local Municipality	City of Johannesburg
Ward Number(s)	Ward 90, 102 & 103
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 Craighall/Sandton 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 Craighall/Sandton 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.

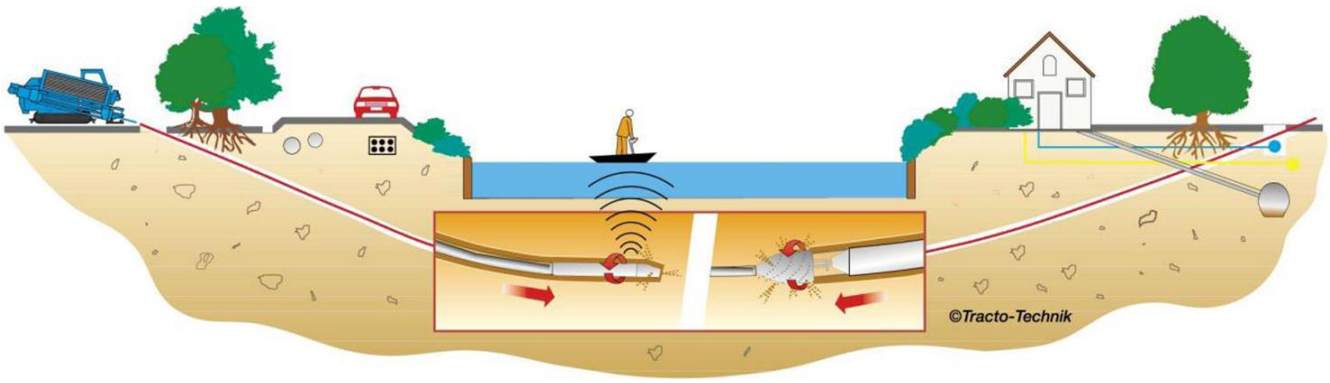

Figure 2.4: Horizontal directional drilling

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 drill 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 continues 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 2.6 and Figure 2.7**)

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.

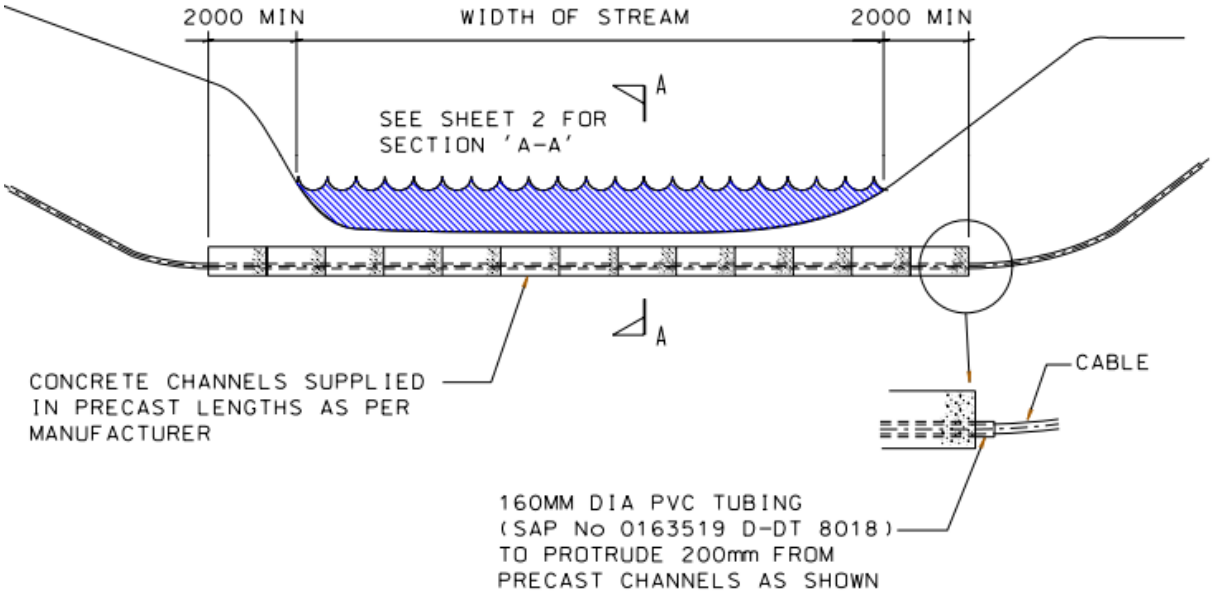

Figure 2.6: Pipe jacking Technology

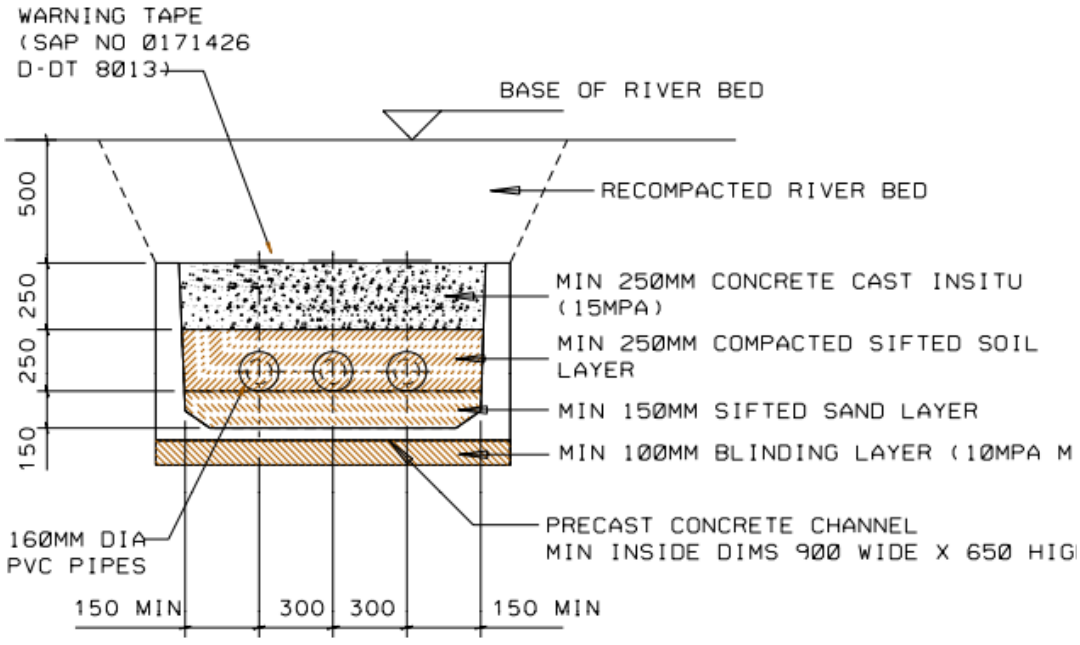

Figure 2.6: Pipe jacking Technology

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:

- The 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 Craighall/Sandton will be constrained;
- Proposed objectives of Provincial and Metropolitan Municipality planning initiatives such as IDPs, SDFs and Johannesburg 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 procedure4 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 Land 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:

[4] *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 utilised 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 contactor 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. The CoJ has many landfill sites including Limbro Park, Marie Louise, Mooiplaats, Robinson Deep, Goudkoppies, and Ennerdale. General waste removed from site will be disposed of at the nearest registered landfill, which is Marie Louise. 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.

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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
Activity 12 of GNR R.983: The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more where such development occurs where such development occurs— a. Within a watercourse; (c) if no development setback exists within 32m of a watercourse measured from the edge of a watercourse.	River crossings of more than 100 m² will be constructed within 32m of a watercourse along underground HV cabling system in Craighall/Sandton
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	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.
Activity 12 of GNR R.985: The clearance of an area of 300 square metres or more of indigenous vegetation **(b) In Gauteng:** 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; ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans; or	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.
Activity 14 of GNR R.985: The development of: (ii) Infrastructure or structures with a physical footprint of 10 square metres or more. where such development occurs— a. Within a watercourse; (c) if no development setback exists within 32m of a watercourse measured from the edge of a watercourse. **(c) In Gauteng:**	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 threatened ecosystems in terms of NEMBA.

(iv) Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans; (v) Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004)	

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
National Environmental Management Act (Act No 107 of 1998)	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. 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. In terms of GNR 982 of 2014 (as amended), a Basic Assessment Process is required to be undertaken for the proposed project. ***The final BA report is to be submitted to the DEA in support of the application for authorisation.***	Department of Environmental Affairs (DEA) – competent authority Gauteng Department of Agriculture and Rural Development (GDARD)
National Environmental Management Act (Act No 107 of 1998)	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. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts. ***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.***	DEA GDARD

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
National Water Act (Act No 36 of 1998)	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: • 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. ***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).***	Department of Water and Sanitation (DWS)
National Environmental Management: Air Quality Act (Act No 39 of 2004)	S18, S19, and S20 of the Act allow certain areas to be declared and managed as "priority areas." Declaration of controlled emitters (Part 3 of Act) and controlled fuels (Part 4 of Act) with relevant emission standards. GN R 827 – National Dust Control Regulations prescribes general measures for the control of dust in all areas	DEA CoJ

National Heritage Resources Act (Act No 25 of 1999)	» S38 states that Heritage Impact Assessments (HIAs) are required for certain kinds of development including
	  » 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 m^2 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 exceeding
	5 000 m^2; or the re-zoning of a site exceeding 10 000 m^2 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.
	» 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.
	
	A permit may be required should identified cultural/heritage sites on site be
		South African Heritage Resources Agency (SAHRA)
		
		Provincial Heritage Resources Authority

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	required to be disturbed or destroyed as a result of the proposed development	
National Environmental Management: Biodiversity Act (Act No 10 of 2004)	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. 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. 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. ***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***.	DEA GDARD
National Forests Act (Act No. 84 of 1998)	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" GN 908 provides a list of protected tree species. ***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.***	Department of Agriculture, Forestry and Fisheries
National Veld and Forest	In terms of S13 the landowner would be required to burn firebreaks to ensure	Department of

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
Fire Act (Act 101 of 1998)	that should a veldfire occur on the property, that it does not spread to adjoining land. 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. ***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.***	Agriculture, Forestry and Fisheries
Hazardous Substances Act (Act No 15 of 1973)	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. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc, nature or 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 » Group IV: any electronic product; and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force. ***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***	Department of Health
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	The Minister may by notice in the *Gazette* publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by – » Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list.	DEA: Chemicals and Waste Management GDARD: General waste

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	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. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » any other way rendered unlit 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 prevented. ***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 EMPr. 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***.	
National Road Traffic Act (Act No 93 of 1996)	» 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. » 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. » 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. ***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***	South African National Roads Agency Limited (SANRAL) (national roads) Provincial Department of Transport

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	abnormally heavy or abnormally dimensioned loads. Transport vehicles exceeding the dimensional limitations (length) of 22m.	
Conservation of Agricultural Resources Act (Act No 43 of 1983)	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 are taken to prevent their spread. 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. 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. ***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.***	DAFF
Subdivision of Agricultural Land Act (Act No 70 of 1970)	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. *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.*	(DAFF) Provincial Departments of Agriculture and Environment - commenting authority. Local Municipality – competent authority
Spatial Planning And Land Use Management Act 16 OF 2013	**This Act** has the main objectives to: • 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.	City of Johannesburg Metropolitan Municipality

LEGISLATION	APPLICABLE REQUIREMENTS	RELEVANT AUTHORITY
	Legislation that regulates Land Use Planning has led to "spatial planning tools" that are contained in Municipal and District Strategic Management Frameworks (SMFs), Strategic Development Initiatives (SDIs) and Municipal By-laws	
Development Facilitation Act (Act No 67 of 1995)	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. Provides for the overall framework and administrative structures for planning throughout the Republic. S (2-4) provides general principles for land development and conflict resolution. 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.	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) 2014
- City of Johannesburg MM Environmental Compliance and Monitoring Framework 2008
- City of Johannesburg MM Open Space System (JMOSS) 2002
    - City of Tshwane Open Space Framework (TOSF) 2005

- City of Johannesburg MM Biodiversity Strategy and Action Plan
- City of Johannesburg MM Integrated Development Plan IDP (2016-2021)
- City of Johannesburg MM Spatial Development Framework 2040
- City of Johannesburg MM Integrated Waste Management Plan (IWMP) 2011

4 APPROACH TO UNDERTAKING THE BA 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 EIA 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		
Johannesburg Heritage		Paul Gaul
City of Johannesburg		Linda Khun
City of Johannesburg: Metropolitan Municipality	Environmental Infrastructure Service department (Admin)	Gift Mabasa
City of Johannesburg: Metropolitan Municipality	Environmental	

	Department	Nozipho Maduse	
City of Johannesburg: Metropolitan Municipality	Regional Director (Region B)	Robert Monwabisi Siwedi	
City of Johannesburg: Metropolitan Municipality	Ward Governance	Vusi Tutu	
City of Johannesburg Ward 90	Ward 90 Cllr	Martin Williams	
City of Johannesburg Ward 102	Ward 102 Cllr	David Potter	
City of Johannesburg Ward 102	Ward Cllr - Constituency head (ward 90 & 102, 103)	Ian Ollis	
City of Johannesburg Ward 103	Ward 103 Cllr	Vincent Lawrence Earp	
Joburg City Parks		Cebo Mhlongo	
Johannesburg Roads Agency		Siphiwe Mxhosa	
Rand Water		Natalie Koneight/ Gail Andrew	
Johannesburg Water		Joyce Ngobele	
Department of Public Works: Johannesburg		Jeanette Monare	
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.**			

4.2.2 Stakeholder Database

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.

4.2.3 Placement of Site Notices & Newspaper advertisement

Site notices were displayed in different points within the study area. Newspaper advertisement was placed in *Sandton Chronicle* 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	Sandton Chronicle		
Date published	Wednesday, 8 November 2017		
Site notice position	**Location**	**Latitude**	**Longitude**
	Site Notice 1: At the end of Minerva Street in Glenadrienne, Sandton	26° 5'48.55"S	28° 1'51.37"E
	Site Notice 2: Stafford Crescent in Hurlingham Gardens	26° 5'53.41"S;	28° 1'48.21"E
	Site Notice 3: Cnr Shelley Av & Waggon Rd outside Shelley Park in Willowild Sandton	26° 5'52.56"S	28° 1'11.80"E
	Site Notice 4: Hobart Rd opp Pickitup Depot, Bryanston, Sandton)	26° 4'37.70"S	28° 1'35.14"E
	Site Notice 5: Arkow Rd in Bryanston Sandton	26° 4'43.79"S	28° 1'41.22"E
	Site Notice 6: cnr West Hertford Rd and The River Rd Bryanston Sandton	26° 4'10.19"S	28° 2'17.96"E
	Site Notice 7: cnr The River Rd & St James Crescent in Bryanston Sandton	26° 3'36.11"S	28° 2'45.68"E
	Site Notice 8: cnr E Hertford Rd and E River Rd in Bryanston Sandton	26° 3'59.37"S	28° 3'3.32"E
Date placed	Tuesday, 07 November 2017		

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

4.2.4 Written notifications

Access to all information that could influence interested and affected parties has been initiated by the project announcement; a Background Information Document was produced and distributed during the initial PPP phase in November 2017 in the form of

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

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

4.2.5 Public Review of the Draft Basic Assessment Report

i. Stakeholder: The draft BA Report was publically made available to all registered I&AP's from **16 February 2018 – 19 March 2018** at the following locations:
   - **Randburg Public Library:** Bram Fischer Dr & Selkirk Ave, Ferndale, Randburg, 2194
   - Dropbox link sent to registered I&APs vial email
   - Email copy of the BAR document (without appendices)

ii. Authority: The Draft BA Report was sent to (amongst others):
   - Department of Environmental Affairs.
   - Gauteng Department of Agriculture and Rural development;
   - Department of Water and Sanitation
   - City of Johannesburg

4.2.6 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

4.2.7 Comments and Responses Report

At the end of the announcement phase, all comments/input from stakeholders and I&AP's, will be captured in the Issues and Response Report (IRR) which formed part of the Final BA Report. The Comments and Response Report includes responses from members of the EIA project team and/or the project proponent. This is included in **Appendix E3.**

4.3 Summary of Issues Raised by I&AP's

No issues have been raised thus far, comments are anticipated once the Draft Basic Assessment Report (DBAR) (this report) has been circulated to all stakeholders and I&AP's. Issues and concerns raised by I&AP's have been integrated into the Issues and Responses Report and they will be recorded and reflected in 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

The study area falls on unconsolidated **soils**. These are soils that have lost their natural morphology due to transformation by human activities. Due to the urban nature of the area, the soil profile is significantly disturbed. As a result, mottling and gleying was seldom found in wetlands. The wetlands are incised and eroded, in some places up to bedrock. This has changed 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 are found adjacent to the valley bottom wetlands, probably a response to upstream erosion. The channelled valley bottom wetlands also share some characteristics of riparian systems such as bedrock, boulders, cobbles and pebbles. Due to the increased hardened surfaces in the catchment, as well as stormwater drains, these wetlands are prone to flooding which results in further erosion of the bank walls. Furthermore, large sections of the wetlands were either lined with cement or with gabions and thus no redoximorphic soils were recorded in these sections.

The **geology** of the site comprises the Halfway House Granite Dome formation (HHGD) (Van der Waals et al, 2015; Mucina & Rutherford, 2006). The HHGD include highly erodible soils where erosion sets in with runoff increasing by as little as 5%. These soils are dispersive due to dominant clays, sandy with no cohesion between soil particles which is 100 to 500% more erodible once saturated with water (Van der Waals et al, 2015).

The regional stratigraphic setting is indicated by Map 2: SANDTON WATERCOURSES Regional Geological Setting, and is predominantly characterised as granodiorite of the Halfway House Granite Suite. Regional shear zones are indicated to intersect the areas towards the west of and the east, along which the composition and weathering of the bedrock is expected to have been altered. 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 site is situated in the Quaternary Catchment A21C. 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. 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. The watercourses on the study site drains into Braamfonteinspruit River either directly or indirectly. The Braafonteinspruit River drains into the Jukskei River at Leewkop Prison. The Jukskei River drains into the Crocodile River which drains into the Limpopo River.

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**).

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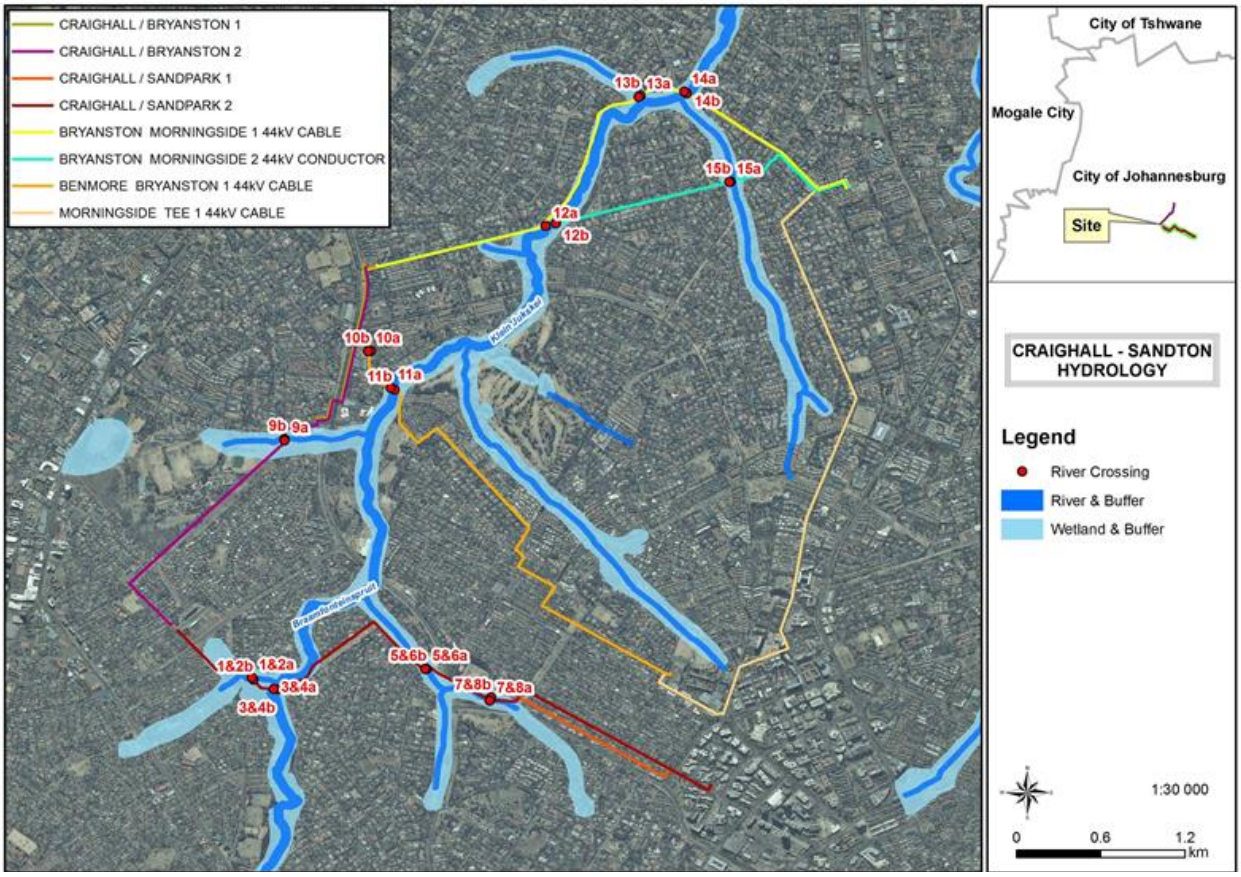

Figure 5.1: Hydrology of the study area

Wetland/Riparian Classification and Delineation: Several watercourses were recorded within the study area. A total of 15 watercourse crossings were studied. All of the watercourse crossing form part of the same wetland system and were classified as a channelled valley bottom wetlands (**Figure 5.2**). All of the wetlands either form part of the Braamfonteinspruit or drain into the Braamfonteinspruit. All of the proposed watercourse crossings occur within the channelled valley bottom wetlands with the exception of crossing 10a & 10b which is rather a Stormwater drain area and not considered a natural wetland area

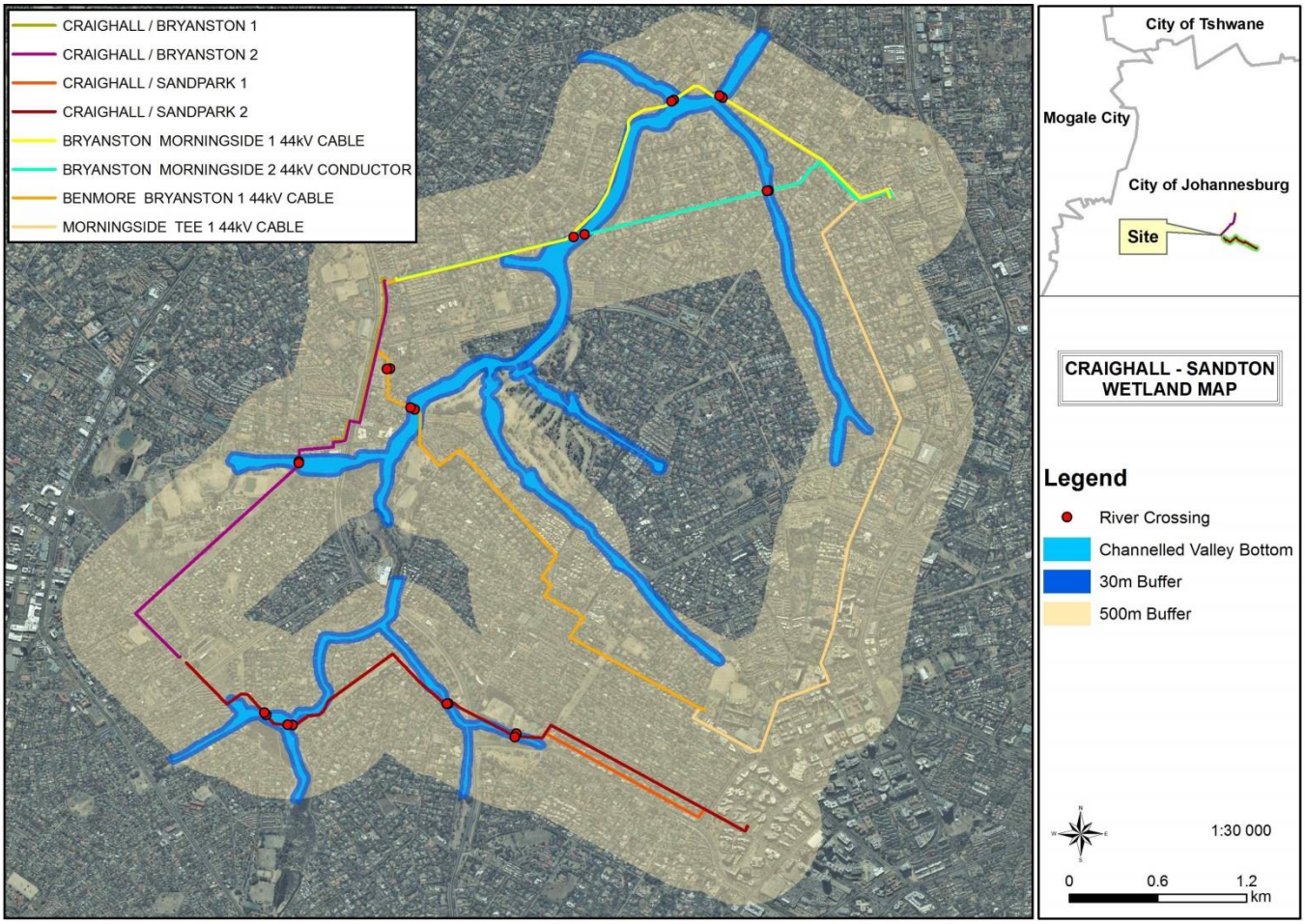

Figure 5.2: Delineated wetlands and their associated buffer zones relative to the 15 watercourse crossings.

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 Storability. 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 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 underlaying 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) under laying 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 define a primary source of domestic water supply. However in relation to the Groundwater Quality Management Index (GQM), the aquifer under laying the study area is classified as requiring "**Medium Level Protection**". This infers that the aquifer under laying the study area requires a moderate level of protection to adhere to DWA's water quality objectives.

Interaction between surface water and groundwater: 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**

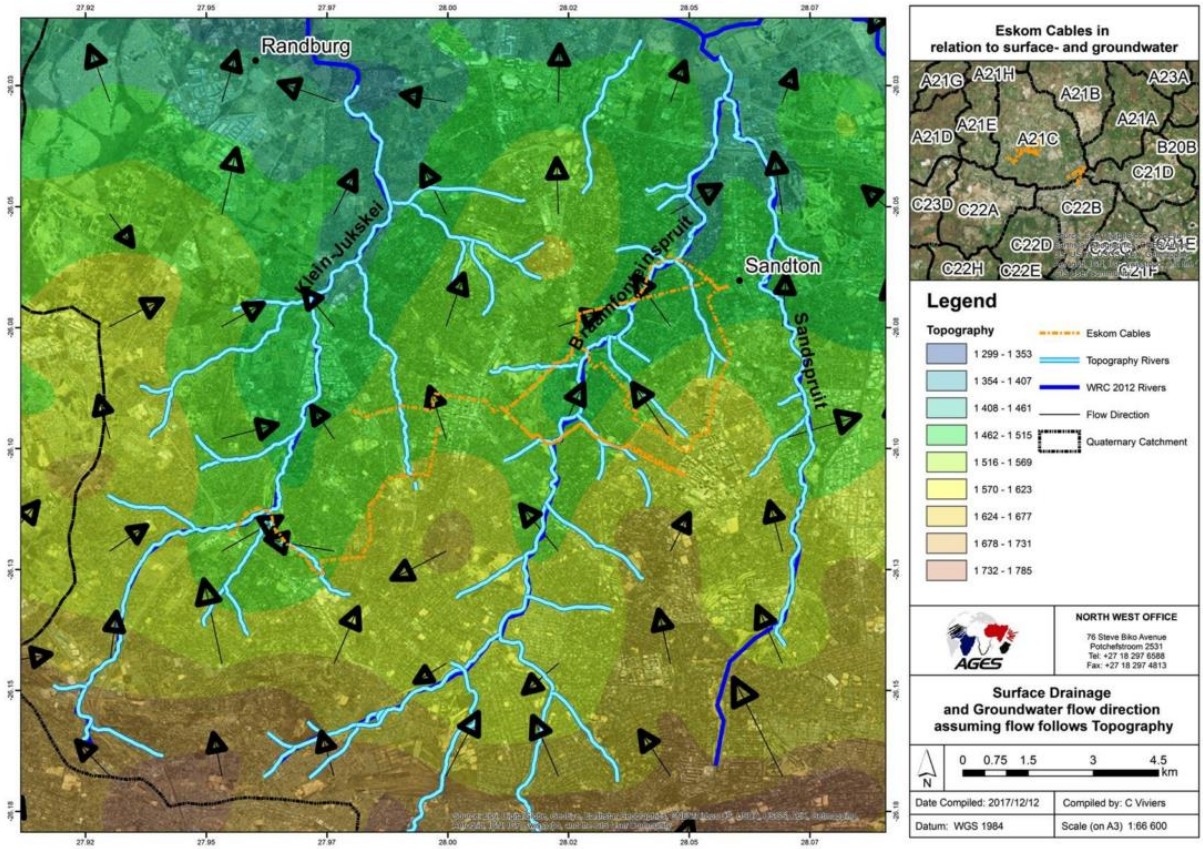

Figure 5.3: Eskom Cables in relation to surface and groundwater.

5.2.3 Floodline delineation

Floodline modelling: was undertaken for all the drainages/rivers 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/rivers located within the project area. It must be noted that the project catchment 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/rivers. 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. This project area is situated within the historical extent of the Egoli Granite Grassland (Mucina & Rutherford, 2006). Egoli Granite Grassland comprises climax

grass species with a patchy dominance and a high diversity of forbs (a herbaceous plant other than grasses). Very little Egoli Granite Grassland is still in this pristine condition and remnants are thus of high conservation value. When Egoli Granite Grassland is disturbed, *Hyparrhenia hirta* (common thatching grass) becomes the dominant grass and the forb diversity decreases (Bredenkamp *et al*, 2006). Egoli Granite Grassland is poorly conserved and is classified as endangered, indicating that it is facing a very high risk of extinction in the near future (Golding, 2002). The pressures for land in Gauteng lead to degradation and disturbances within the Egoli Granite Grasslands.

Plant of Conservation Concern: Aerial imagery indicate that the whole study area is built-up with limited open space that could be habitat to plant species of conservation concern. However, some of these species favour riparian or wetland areas and could persist within the watercourses in the study area. 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. Note that some of these species has recently been reclassified from Declining to Least Concern (SANBI, 2017). However, their population trends are decreasing, and some are used for medicinal purposes and to the author's knowledge, the provincial classification has not changed at the time of this assessment.

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

Specie	Conservation status	Habitat description	Flowering time
Alepidea attenuata	Near threatened	Wetlands in grassland.	January-March
Crinum bulbispermum	Declining (reclassified to LC nationally)	This bulb occurs near rivers, streams, seasonal pans and in damp depressions.	Sept-Nov
Dicliptera magaliesbergensis	Vulnerable	Savanna, riverine forest.	Feb-April
Eucomis autumnalis	Declining (reclassified to LC nationally)	Damp, open grassland and sheltered places between rocks.	Nov-April
Gnaphalium nelsonii	Near threatened	Seasonally wet places in grassland and savanna, and along dry watercourses.	Oct-Dec
Gunnera perpensa	Declining (reclassified nationally as Least Concern)	Damp marshy area and vleis from coast to 2400m.	Oct-March
Hypoxis hemerocallidea	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
Ilex mitis var. mitis	Declining (reclassified to LC nationally)	Along rivers and streams in forest and thickets, sometimes in the open.	Oct-Dec
Kniphofia typhoides	Near Threatened	Heavy, black clay soil, climax *Themeda triandra*	Feb-March

Specie	Conservation status	Habitat description	Flowering time
		grassland, low lying marshy ground - pans or vleis.	
Nerine gracilis	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 based on 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 5.4** shows the extent of Important and Ecological Support Areas within the project area. No protected areas are present. Small portions of ESAs and Important Areas, could be impacted on by the proposed water crossings.).

Alien and Invasive Plant Species: The study area likely includes several 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 several 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

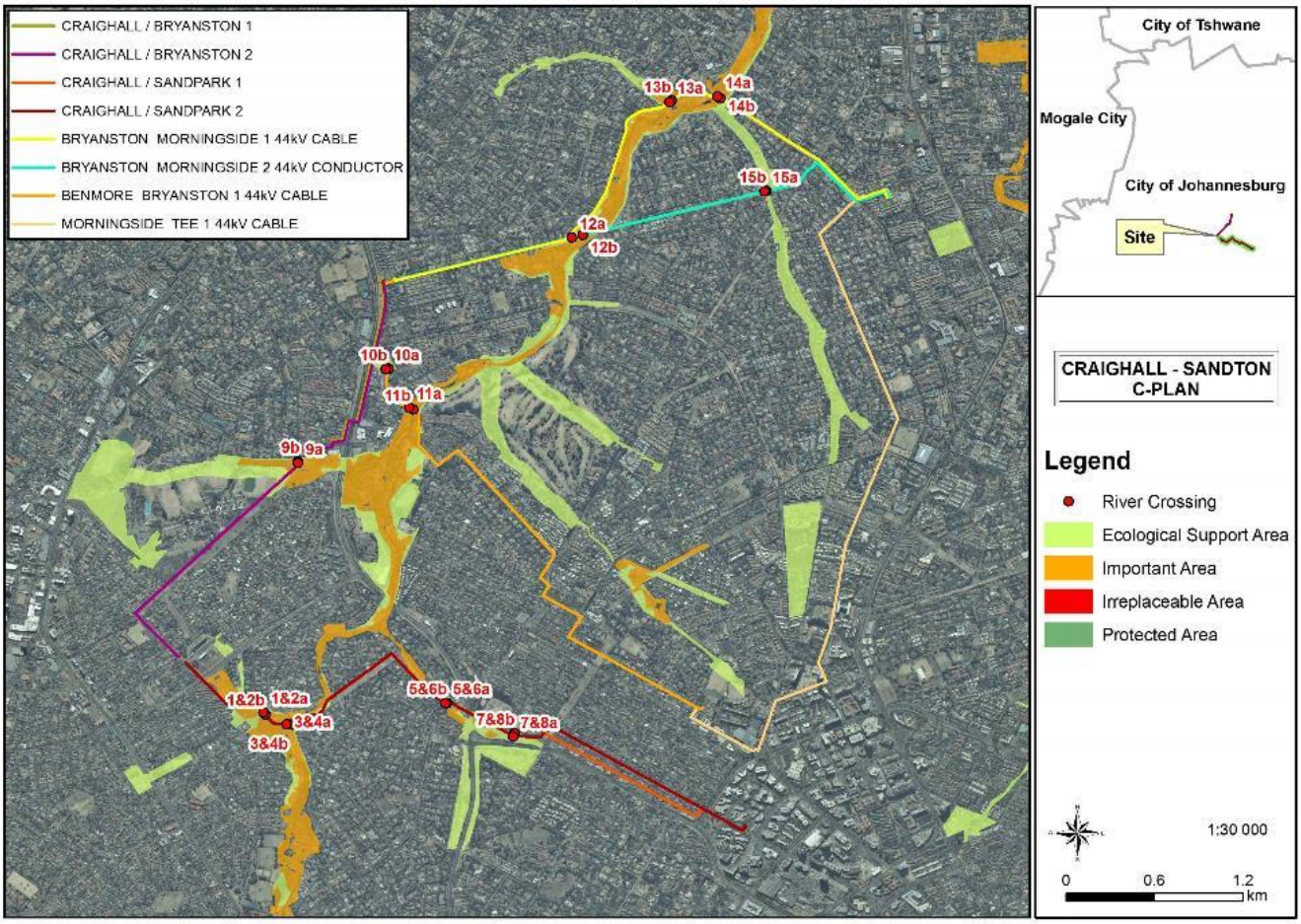

Figure 5.4: The Gauteng Conservation Plan in relation to the project area

Results of the Ecological Study

The results of the site visit are discussed for each water crossing (wc) 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 (**Table 5.2**). Due to two cables using the same route, some water crossings at the same locality are grouped and discussed together (e.g. wc 1 & 2). 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 modify. 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
Raighall / Sandpark 1 88kv Hv Feeder Oil Filled Underground Cable	**1 &2**	26° 5'54.27"S and 28° 1'11.06"E	The vegetation comprised moist grassland at the edge of the streambed with limited riparian vegetation as most was replaced by the dominance of the exotic grass *Pennisetum clandestinum* (kikuyu). There is a likelihood that plant species of conservation concern may occur, however, none was observed at the time of the site visit and the eroded state of the streambank was thought to be unsuitable habitat.
	3 & 4	26° 5'57.37"S and 28° 1'17.35"E	The vegetation comprised moist grassland at the edge of the streambed with limited riparian vegetation as most was replaced by the dominance of the exotic grass *Pennisetum clandestinum* (kikuyu) and invasive herbs such as *Melilotus alba* and *Verbena bonariense* (Appendix A). Indigenous trees were limited to *Combretum erythrophyllum* and *Searsia pyroides* and the vegetation was classified as being in a fair ecological condition. Downstream of the crossing, the riparian vegetation becomes dense with trees, albeit mostly exotic trees dominated by *Morus alba*. No threatened plant species were recorded at the crossing at the time of the site visit, however, suitable habitat is present upstream and downstream.
	5 & 6	26° 5'52.57"S and 28° 1'51.30"E	The vegetation around the crossing comprised mowed grassland including the exotic *Pennisetum clandestinum* and the hardy indigenous *Cynodon dactylon* (couch grass) (Appendix A). Downstream of the proposed crossing, the natural streambank is populated by *Phragmites australis*, however the dominant trees are alien and invasive species and the vegetation is classified as being in a fair ecological condition. No suitable habitat was present for plant species of conservation concern at the crossing due to the gabion structures, however, some of these species could occur downstream.
	7 & 8	26° 5'58.78"S and 28° 2'7.58"E	The vegetation around the watercourse comprised mowed grassland with several indigenous grass species flanking the water crossing. However, the watercourse itself included the invasive grass *Pennisetum clandestinum* with exotic tree and shrubs (Appendix A). The vegetation is classified as being in a fair to poor ecological condition. No plant species of conservation concern were recorded at the crossing at the time of the site visit and no suitable habitat is present due to the gabion structures and high level of invasive plant species present.
Bryanston 2 88kv Hv Feeder Oil Filled Underground Cable	**9**	26° 4'58.91"S and 28° 1'18.95"E	The riparian vegetation was dense and completely overgrown with alien and invasive plant species, dominated by the tree *Salix babylonica*. Indigenous vegetation was limited to some grass species and weedy pioneer forbs (Appendix A). The riparian vegetation was severely modified, however, some function still remains and it was classified as being in a fair ecological condition. No plant species of conservation concern were recorded at the crossing at the time of the site visit and no suitable habitat is present due to the high level of invasive plant species present and modified vegetation structure.

Name of the line	WC	Coordinates	Summary of findings
Benmore / Bryanston 1 44kv Cable	**10**	26° 4'39.95"S and 28° 1'37.81"E	The vegetation about 80m north of the wc was assessed through a palisade fence. The grass layer was dominated by the invasive grass *Pennisetum clandestinum* and exotic and invasive trees. The presence of hydrophytic vegetation (e.g. plant with an affinity to grow in water) could not be assessed, however, it is assumed that the crossing comprise much the same vegetation as could be seen from the closest fence (Appendix A). The vegetation was classified as being in poor ecological condition. Plant species of conservation concern that can tolerate disturbances such as *Hypoxis hemerocallidea* may occur.
	11	26° 4'48.01"S and 28° 1'44.16"E	The vegetation comprised moist grassland at the edge of the streambed with limited riparian vegetation as most was replaced by the dominance of the exotic grass *Pennisetum clandestinum* (kikuyu) and invasive herbs such as *Mirabilis jalapa*. Several indigenous trees were present along the water course and the vegetation was classified as being in a fair ecological condition. No plant species of conservation concern were recorded at the crossing at the time of the site visit, however, suitable habitat is present.
Bryanston / Morningside 2 44kv Conductor	**12**	26° 4'10.66"S and 28° 2'19.36"E	The vegetation comprised moist grassland at the edge of the streambed with a mixture of grasses, inducing the invasive *Pennisetum clandestinum* (kikuyu), and many alien and invasive tree species (Appendix A). The indigenous forb species was extremely limited, and the few indigenous trees were *Senegalia burkei* and *Celtis africana*. The vegetation was classified as being in a fair ecological condition. No plant species of conservation concern were recorded at the crossing at the time of the site visit, however, suitable habitat is present upstream and downstream.
	15	26° 4'0.40"S and 28° 3'1.28"E	The vegetation around the crossing comprised mowed grassland including the exotic *Pennisetum clandestinum* and the hardy indigenous *Cynodon dactylon* (couch grass) (Appendix A). The invasive *Arundo donax* grows downstream of the crossing and the streambed includes the invasive *Pennisetum clandestinum* and *Persicarya laphatifolia.* The vegetation at the crossing is classified as being in a poor ecological state, while further downstream, the vegetation is in a moderate ecological state. A clump of indigenous trees is situated about 30m north-east of the crossing and should not be directly impacted on. No plant species of conservation concern were recorded at the water crossing at the time of the site visit and no suitable habitat is present at the crossing due to the gabion structures, however, some of these species could occur downstream.
Bryanston / Morningside 1 44kv Cable	**13**	26° 3'40.80"S and 28° 2'39.66"E	The vegetation around the crossing comprised mowed grassland with a few indigenous grasses. The edge of the sandy streambed was colonised by the invasive *Pennisetum clandestinum*, *Bromus catharticus* the indigenous *Cynodon dactylon* (couch grass) and *Paspalum* species (Appendix A). The indigenous forb species was extremely limited. Downstream of the proposed crossing, the natural the riparian area of the Klein Jukskei River included tall growing *Celtis africana* trees, as well as exotics such as *Eucalyptus camalduensis*. The vegetation at the crossing was classified as being in a fair ecological condition, although it included many alien and invasive plant species. No plant species of conservation concern were recorded at the water crossing at the time of the site visit and no suitable habitat is present at the crossing. Suitable habitat is present south of the wc, along the Klein Jukskei River.

Name of the line	WC	Coordinates	Summary of findings
	14	26° 3'40.49"S and 28° 2'52.05"E	The streambed supported little vegetation other than grasses such as *Pennisetum clandestinum.* The southern streambank included *Arundo donax* and a planted garden and the northern area mowed grassland with species such as *Eragrostis lehmanniana, Paspalum* species. The riparian vegetation was modified, however, some function still remains and it was classified as being in a fair ecological condition. No plant species of conservation concern were recorded at the crossing at the time of the site visit, however, suitable habitat is present upstream and downstream

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 rupiculous 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).

Threatened and Red Listed Mammal Species Flagged: 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, Southern Boubou, Grey Go-away-bird, Hadeda Ibis, Karoo Thrush and Thick-billed Weaver. A total of 30 species were observed during the site visit, with a further 47 deemed likely to occur.

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 4 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 Craighall-Sandton line, although there is a small chance the near threatened Half-collared Kingfisher could occur in the area from time to time. The species is less likely to occur here compared to the nearby Randburg line, but its potential presence needs nevertheless to be taken into account.

The near-threatened Half-collared Kingfisher is the only red-listed species that needs further discussion here. This species regularly seen in the Johannesburg area, and whose occurrence is closely tied to vegetation along clear, fast-flowing streams (Peacock 2015). The species is threatened by anthropogenic alteration of its habitat, including vegetation clearing, water extraction and pollution, and is a key indicator species for riverine health (Peacock 2015). GDARD requirements stipulate that a 50-m buffer from the edge of a stream is required for developments in habitat potentially suitable for Half-collared Kingfishers. However, it is the opinion of the authors that a buffer zone is not necessary for any of the stream crossings involved in the Craighall-Sandton line

Reptiles and Frogs: Of the 37 reptile species which may occur on the study site (Table 5 in Appendix D2), none were confirmed during the site visit and neither were any of the 13 amphibian species which may be residents. 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 5 in 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.

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

Overall: The results of the desktop assessment indicate that the considered SQR PES was in a class E or seriously modified status. Ecological importance in the SQR was determined to be low. The ecological sensitivity of the SQR was determined to be moderate. The Default Ecological Category for the considered river reach 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 limited perturbations in terms of physical water quality. However, considering that the catchments of the river reaches are located in urban areas, urban runoff, which consists of a multitude of chemical and nutrient pollutants, is known to occur within the considered river reach. The pH values obtained at the sites was determined to be in the neutral range between 8.4 at C1 and 7.1 at C7. The high range of pH levels observed in the river reach is indicative of point source contaminants, as geology of the region is largely uniform. Levels of dissolved solids measured as conductivity was determined to

be low ranging from 200 µS/cm at C1 to 442 µS/cm at C4. Low levels of dissolved solids are a result of the recent rainfall events which have increased the overall discharge of the considered river reach. The dissolved oxygen concentrations ranged from 5.0 mg/l at C9 to 6.1 mg/l at C5. Temperatures observed during the survey were also determined to be within a natural range between 23 °C and 27 °C.

Intermediate Habitat Integrity Assessment: The results of the instream and riparian integrity assessment derived a class E (seriously modified) status for the A21C-1262 SQR reaches in this assessment. The predominant factor negatively influencing the habitats is attributed to urban land use activities. In order to contain flows/floods, serious instream habitat modification has taken place in the catchment with the stream being canalised or impounded at numerous points throughout the river reach. Riparian habitat has been removed through the canalization and invasive plants such as *Populus sp*. throughout the catchment.

Macroinvertebrates: The results of the SASS5 assessment derived SASS5 scores that ranged from 46 at C9 to 52 at C2. The number of taxa sampled was found to vary from 12 at C1 to 14 at C2. The Average Score Per Taxon (ASPT) was found to range from 3.5 at C9 to 4.1 at C1. The ecological classes were found is a class E/F at two of the sampled points with C2 being classed as class D. The results of the Macroinvertebrate Response Assessment Index (MIRAI) assessment indicate that a seriously modified invertebrate community was present in the considered watercourse. Habitat modification was determined to be the primary driver of the macroinvertebrate community. However, considering the overall results, each metric considered was modified (low). Therefore, the poor condition of the macroinvertebrate assemblage can be attributed to the cumulative impacts of diffuse urban runoff, habitat and flow modification. This result confirms the assumptions made in the water quality assessment and illustrates temporal water contamination in the river reach considered.

Fish Community: A total of 3 fish species were sampled during the December 2017 survey. Expected native species composition was determined at each site based on site specific habitat features. Sampled native fish community structures were calculated according to the percentage of the expected fish species sampled at a site. The Fish Response Assessment Index (FRAI) was completed on a reach level and is presented (in Table 13 of Appendix 3). The results of the FRAI derived a largely modified (class D) fish community structure. This modified fish community was largely attributed to the absence of several fish species. The fish species were not sampled due to habitat and water quality level impacts

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 green spaces that serve as parks, dog walkways etc. The wetlands in this area are an important feature as they form ecological corridors for dispersal and migration of fauna. It also serves as specialised habitat and breeding areas. Several sections of the watercourses in the River Club Golf Course were further converted into pools.

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: the following sites, features and objects of cultural significance were identified in the study area as depicted in **Figure 5.5**. 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.

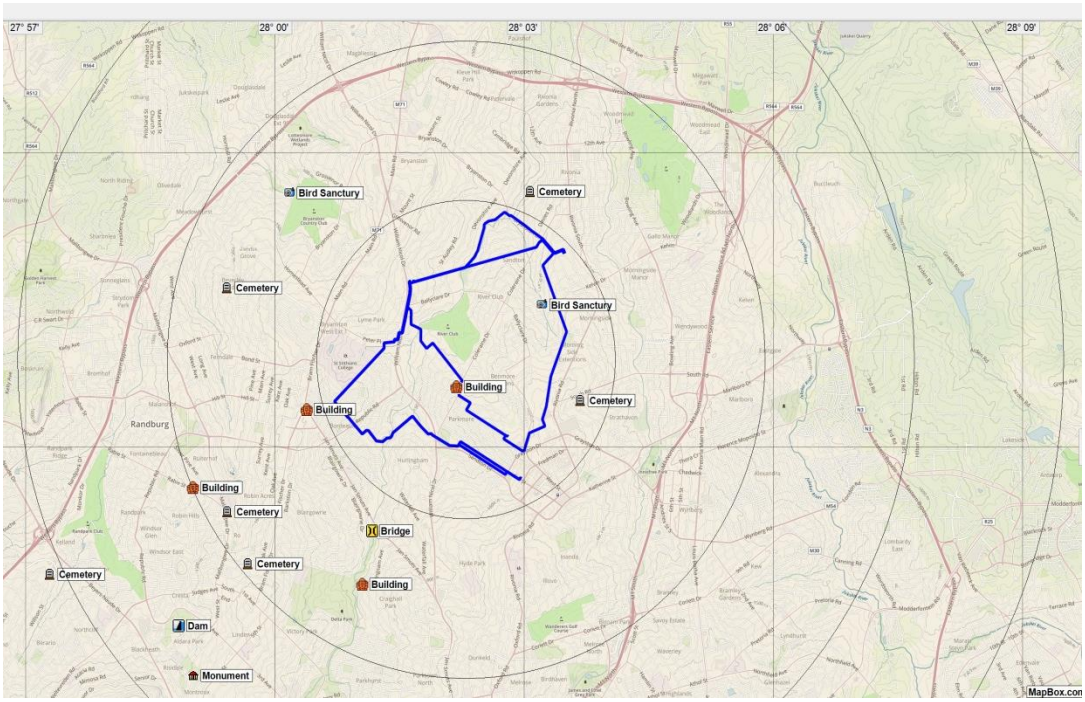

Figure 5.5: Heritage scan of the surrounding area.

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 2011 Census provides the following data on the levels of unemployment within the CoJ MM.

According to 2011 census the City of Johannesburg Local Municipality has a total population of 4,4 million of which 76,4% are black African, 12,3% are white people, 5,6% are coloured people, and 4,9% are Indian/Asian. Of those 20 years and older 3,4%have completed primary school, 32,4% have some secondary education, 34,9% have completed matric, 19,2% have some form of higher education, and 2.9% of those aged 20 years and older have no form of schooling.

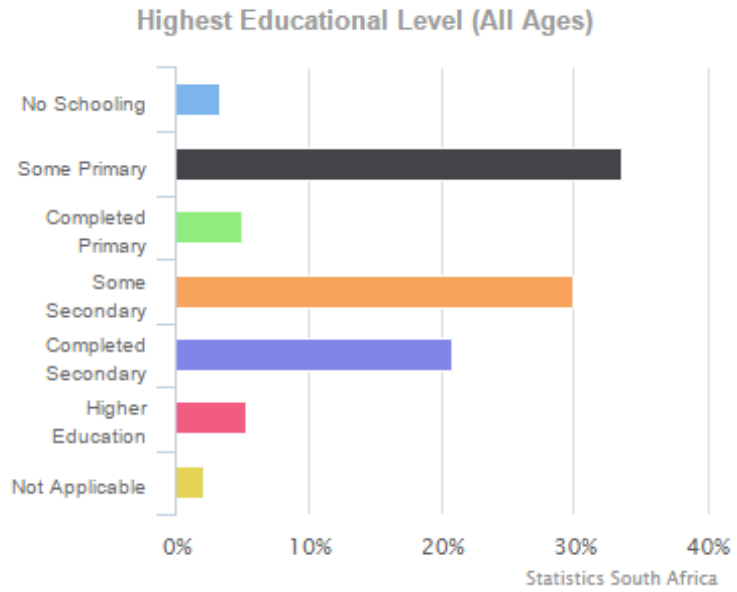

Figure 5.6: Levels of Education in the CoJ (StatsSA, 2011)

According to StatsSA, there are 2 261 490 economically active (employed or unemployed but looking for work) people in the City of Johannesburg; of these 25,0% are unemployed. Of the 1 228 666 economically active youth (15–35 years) in the area, 31, 5% are unemployed.

There is 1 434 856 households in the municipality with an average household size of 2,8 persons per household. 64,7% of households have access to piped water, 26,9% have water in their yard and only 1,4% of households do not have access piped water

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	**Direct Impacts:** • Destruction of natural vegetation and potential pollution of the soil **Indirect Impacts:** • Reduction of indigenous species. • Alien plants are likely to invade the site as a result of the disturbance created during construction **Cumulative Impacts:** 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 mitigated.	**LOW**	Planning: • 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). • Plan the drill or pipe jacking entry location to avoid indigenous tree clumps. Construction:: • 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 Maintenance/ operational: • Only indigenous plant species, naturally occurring in the area, should be used for the

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
			rehabilitation of the disturbed footprint as per a rehabilitation plan. • Maintenance should not disturbed vegetation unduly.
Clearing of vegetation for construction purposes and potential pollution of the soil	**Direct Impacts:** Exposure to erosion and subsequent sedimentation or pollution of proximate moist grassland **Indirect Impacts:** Pollution of the moist grassland and downstream water sources **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	**LOW**	Construction: • No construction / activities should be undertaken within buffer areas as recommended by the wetland specialist. • **Water crossings 1-4 are in proximity to existing system constructed underneath the watercourses. If the same system cannot house the Eskom cable, then the previous disturbance footprint should be utilised for the construction footprint of this project.** • **Water crossing 9 is situated at a bottom of a steep slope. Recent vegetation clearing on the southern banks of the water crossing has eroded the soil (Photograph 6). The proposed cable will traverse this same eroded slope prior to crossing the river and will lead to an increase in erosion and sedimentation of the watercourse if not probably mitigated. Also, machinery used could exacerbate the situation. This area should be stabilised, and topsoil protected from erosion during and post construction while rehabilitation of the grass layer with indigenous grass species are imperative.** • 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.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
			• After construction clear any temporarily impacted areas of all foreign materials, re-apply and/or loosen topsoil and landscape to surrounding level. Operational: • 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.
Clearing of vegetation for construction purposes and potential pollution of the soil	**Direct Impacts:** Removal / Destruction of protected plants and plants of conservation concern. **Indirect Impacts:** Species removed and relocated as part of rehabilitation could die due to transplantation shock or damage during replanting. **Cumulative Impacts:** If mitigation measures are adequately implemented, no cumulative impacts are expected.	**LOW**	Construction: • **Vegetation around wc 1, 5&6, 10, 11 and 12 may support plant species of conservation concern. Although the probability is low, as best practice, it is recommended that the machinery footprint adjacent to watercourses (e.g. terrestrial vegetation) be scanned during the growing period of such species that may occur.** • If found to be present these plants must be removed by a suitably qualified specialist and replanted as part of vegetation rehabilitation after the construction (Note, these plants may only be removed with the permission of the provincial authority). • Construction workers may not tamper or remove these plants, and neither may anyone collect seed from the plants without permission from the local authority. • If removed species are used as part of rehabilitation, their survival must be monitored for at least two growing seasons after rehabilitation was completed. Maintenance: • Maintenance workers may not trample natural vegetation and work should be restricted to previously disturbed footprint. In addition, mitigation measures as set out for the construction phase should be adhered to.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
Activities associated with vegetation clearing and construction of the watercourse crossings as well as operation.	**Direct Impacts:** Potential increase in invasive vegetation **Indirect Impacts:** Potential to introduce additional invasive species to the construction areas. **Cumulative Impacts:** Re-infestation in areas initially cleared.	**LOW**	Construction: • 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, the spread of seeds will be prevented into disturbed soils which could thus have a positive impact on the surrounding natural vegetation. • 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.

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
			Maintenance: • 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:** • Loss of Fauna Habitat / Fragmentation and Faunal Disturbance **Indirect Impacts:** • 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..	Construction: **LOW** Operation: **Moderate**	Rehabilitation will depend on effort and resources invested, and permanence will require continued conservation endeavours.
Clearing of and damage to vegetation in construction footprint, access roads,	**Direct Impacts:** • Avifaunal habitat loss **Indirect Impacts:**		• Minimize 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

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**	
Presence of vehicles and personnel during construction	**Direct Impacts:** • 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. **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.	**LOW**	• Construction workers must be instructed to minimise disturbance of birds at all times. • Illegal hunting of birds must be strictly prevented

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
» Construction activities which disturb vegetated and instream areas may potentially degrade downstream water quality. » The storage of use of construction materials and hydrocarbons can also lead to downstream water quality deterioration	**Direct Impacts:** » Water Quality Deterioration » Habitat Quality Deterioration **Indirect Impacts:** » Possible impact on the remaining catchment due to changes in run-off characteristics within the development site. » 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. **Cumulative Impacts:**	**LOW**	• 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
	» 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
• 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)	**Direct Impacts:** Changes in sediment entering and exiting the system **Indirect Impacts:** The loss of topsoil, sedimentation of the wetland and increase the turbidity of the water. **Cumulative Impacts:** May be high unless effective mitigation measures are applied. Refer to the accompanying General Monitoring and Rehabilitation report.	**Construction: Moderate** **Operation: Low**	• 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
• Soil compaction through movement of heavy vehicles • Disturbance of vegetation cover through trampling • Creation of	**Direct Impacts:** Changes in the hydrology of wetlands also impacts downstream areas **Indirect Impacts:** None **Cumulative Impacts:**	**Construction: Low**	• 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.	**Operation: Low**	• 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	**Direct Impacts:** Introduction and spread of alien vegetation.	**Construction: Moderate** **Operation: Low**	• 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
	Indirect Impacts: Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plans can easily colonise and impact on downstream users.		

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
	Cumulative Impacts: 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		

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	**Direct Impacts:** Displacement or destruction of heritage structures or features in the proposed development areas.	**LOW**	• 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.
	Indirect Impacts: Overall loss of features with heritage significance if appropriate measures are not undertaken when objects are found.		
	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.		

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 watercourse banks during construction	**Direct Impacts:** • Sedimentation in watercourse • Erosion / collapse of banks and long-term instability • Alteration of watercourse channel (i.e.: stream flow path and flow velocity) **Indirect Impacts:** • Damage to adjacent infrastructure and properties due to bank instability / erosion / slope failure **Cumulative Impacts:** • Stream course alteration due to disturbance of banks (where meandering) • Flooding induced by altering of Watercourses	**MEDIUM – HIGH**	• Prevent construction works directly within the banks of the watercourses – as far as practicable. Safe working distance from watercourse banks to be determined b.m.o. detailed geotechnical and hydrological studies (for design and construction purposes) • Where avoidance of construction within banks are impossible, remedial measures must be implemented for during construction (as per Professional Engineer's design and recommendations) to prevent erosion, altering of the natural flow pattern of the watercourse, slope instability and sedimentation. Watercourse banks are to be re-instated to its original status after construction. *NB: Erosion control and prevention will also be required at watercourses where existing infrastructure is already exposed due to scour, and where materials are potentially dispersive (e.g.: crossing **numbers 7/8, 9 and 13**)* • Build properly designed and constructed erosion protection structures where poor natural watercourse bank stability prevails. *NB: The stability of all adjacent embankment must be considered during all planning, design and construction activities to prevent induced slope failure (e.g.: in the vicinity of the constructed embankment at crossing **number 7/8**)* • Implementation of silt traps – or similar sedimentation prevention measures as per Professional Engineer's design and recommendations – where banks are being disturbed. To be constructed and implemented prior to construction • 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	**Direct Impacts:** • Pollution of watercourse	**MEDIUM**	• 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

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
HDD / Pipe Jacking beneath watercourses	(lubricants, diesel, petrol, other fluids, spoil from drilling and excavations: drilling mud, water and rock/soil etc.) • Alteration of watercourse platform and water flow level (i.e.: base of watercourse) • Interception / impediment of base flow component of stream flow • Damage to artificial streambeds and embankments during construction (e.g.: damage to channel linings) **Indirect Impacts:** • Induced slope instability upslope of construction site **Cumulative Impacts:** n/a		distance away from watercourse banks to prevent sidewall collapse and failure, sedimentation into the watercourse, and watercourse flow direction alteration due to bank instability and alterations • 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: o the installation of temporary excavation shoring o localized dewatering of excavations o 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 watercourse base to prevent: o scour by stream flow (along banks and/or base) o exposure of infrastructure within watercourse banks due to stream migration, scour or erosion o alterations to the hydrological and geohydrological character of the watercourse caused by installing infrastructure at insufficient depth that could potentially hamper base flow • 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*	**Direct Impacts:** • Watercourse alteration due to scour directly upstream of impervious installed infrastructure (where located within stream bed sediments of watercourse banks) • Impediment / retardation of base	Horizontal Directional Drilling: **LOW** Pipe Jacking: **MEDIUM**	<u>WHERE HORIZONTAL DIRECTIONAL DRILLING* or PIPE JACKING** WAS USED AS CONSTRUCTION METHOD *</u> • Ensure sleeves was constructed at the required minimum depth and distance away from Watercourse banks • Ensure proper erosion control and/or prevention structures was constructed along crossings with: o a natural migrating character

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
assuming that all the required and applicable mitigation measures were implemented prior to- and during construction	flow after construction due to installed infrastructure • Damage to installed infrastructure as a result of scour **Indirect Impacts:** • Flooding due to impediment / retardation of Watercourse natural flow capacity and pattern • Stream course alteration due to scour and impediment **Cumulative Impacts:** • Damage to adjacent infrastructure, services, embankments, or structures	**(where constructed within watercourse sediments)** **LOW (where constructed within bedrock beneath watercourse)**	o high susceptibility to natural or induced erosion and o where construction took place in close proximity to the Watercourse banks or the Watercourse stream • Determine the depth of turbidity at each Watercourse where construction will not take place wholly within bedrock, to ensure sleeves are constructed at adequate depths to prevent base flow retardation, scour and subsequent induced flooding

* 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 ±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 **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.	**LOW**	• 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).
	Direct Impacts: Employment Opportunities **Indirect Impacts:** Increase skills		***Enhancement:*** • 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
	Cumulative Impacts: Jobseekers possibly coming to the area in search of employment at other construction projects undertaken in the study area		• 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.
	Direct Impacts: Disturbance of daily Living and Movement Patterns	**LOW**	• 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.
	Indirect Impacts: Increase in crime traffic and damage to the nearby roads		
	Cumulative Impacts: Possible impact on daily living and movement patterns due to various power line servitudes within the study area		
	Direct Impacts: Safety and Security Risks		• 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.
	Indirect Impacts: Perceived increase in crime levels in the area		

ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE (WITH MITIGATION)	PROPOSED MITIGATION
	Cumulative Impacts: None anticipated		• 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 water crossings was found to be in a fair (moderate) to poor ecological state, dominated by alien and invasive plant species. The vegetation along the Braamfonteinspruit and Klein Jukskei River varied depending on amongst others the surrounding land use. Fenced, isolated and small areas tend to comprise mainly of dense alien and invasive infestations, whereas accessible watercourses in larger open space within residential areas included more indigenous species and were mostly better maintained. No plant species of conservation concern were recorded at either of the water crossings and due to altered streambeds and vegetation structure, it is unlikely that any of the proposed water crossings will have a direct impact on plant species of conservation concern.

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 be mitigated as set out in the report and that all relevant legislation pertaining to watercourses be adhered to. Some water crossings

Fauna Assessment:

It is concluded that the impact of the proposed development across the Braamfontein Spruit and Klein Jukskei River and their riparian zones 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. Considering on the nature of the development and the

implementation of conservation measures (such as spaced towers for the overhead line), it is expected that none of the terrestrial vertebrates with their habitat(s) will be displaced. Either pipe jacking or directional drilling will be suitable as a construction method from a faunal perspective.

Aquatic Assessment:

The results of the PES assessment derived seriously modified (class E) conditions in the river reach considered in this assessment. The modified conditions were largely attributed to cumulative habitat and water quality level impacts which have resulted in the modification of instream habitat, invertebrate and fish communities.

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:

Several watercourses were recorded within the study area although they were assessed as a single functional unit in the current study. A total of 15 watercourse crossings were studied. All of the watercourse crossing form part of the same wetland system classified as a channelled valley bottom wetland system. All of the wetlands form part of the Braamfonteinspruit or drain into the Braamfonteinspruit. All of the proposed watercourse crossings occur within the channelled valley bottom wetland with the exception of crossing 10a & 10b which was classified as a stormwater drain area and not a natural wetland.

The watercourse crossings occur in a system that has been significantly impacted. Disturbance at the site of the drill rigs can be effectively rehabilitated. The preferred method is Directional Drilling since this method appears to have a slightly smaller footprint. However, should Pipe Jacking be preferred, this larger disturbance footprint should also rehabilitate effectively. Activities have a high to medium impact score before implementation of mitigation measures and low impact score after mitigation.

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 feeder underground 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 nonexistent, 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 high impact on watercourse crossing numbers 1 to 9, 11 and 14. The construction and operation of the HV cables are inferred to impose a moderate impact on watercourse crossing numbers 10, 12 and 13. It is recommended that the required authorisation (e.g. Water License) be obtained for construction works at these crossings. No impacts are inferred for watercourse crossing number 15, 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 clear from this table that there are no significant differences between either alternatives technology assessed for the river crossings. It is noted however from the wetland and aquatic assessment that 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. Nevertheless in addition, directional drilling is the preferred technology from a technical perspective, as its much cheaper and quicker to implement then pipe jacking technology.

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 15 watercourse crossings along HV cable within Craighall/Sandton area in the City of Johannesburg. 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.

7.4 Recommendations

There are no insurmountable environmental or social constraints that prevent the implementation of the watercourse crossing along HV cable within Craighall/Sandton area in the City of Johannesburg. 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;
- 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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