DRAFT BASIC ASSESSMENT REPORT

ATTERBURY ROAD EXTENSION

Reference No. Gaut: 002/14-15/0037

November 2014

Bokamoso Landscape Architects & Environmental Consultants CC.

P. O. Box 11375
Maroelana, 0161
Tel: (012) 346 3810
Fax: 086 570 5659
Email: lizelleg@mweb.co.za

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Application Form

GAUTENG PROVINCE

REPUBLIC OF SOUTH AFRICA

Application Form for Environmental Authorisation in terms of National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010, as amended (version 2)

Kindly note that:

1. This application form is current as of 01 April 2014. It is the responsibility of the applicant to ascertain whether subsequent versions of the form have been published or produced by the competent authority.

2. The application must be typed within the spaces provided in the form. The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided. Spaces are provided in tabular format and will extend automatically when each space is filled with typing.

3. Incomplete applications may be returned to the applicant for revision.

4. The use of the phrase **"not applicable"** in the form must be done with circumspection. Should it be done in respect of material information required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the Regulations.

5. Three copies of this form must be handed in at the offices of the relevant competent authority as detailed below.

6. No faxed or e-mailed applications shall be accepted. Only hand delivered or posted applications will be accepted

7. Unless protected by law, all information filled in on this application will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this application on request, during any stage of the application process.

8. Should a specialist report or report on a specialised process be submitted at any stage for any part of this application, the terms of reference for such report must also be submitted.

	For official use only
Application Number:	
NEAS Reference number:	
Date Received:	

1. DEPARTMENTAL DETAILS

Postal Address
Gauteng Department of Agriculture and Rural Development
Attention: Deputy Director: Strategic Administrative Unit of the Sustainable Utilization of the Environment (SUE) Branch
P. O. Box 8769
Johannesburg
2000

Physical Address
Administrative Unit of the Sustainable Utilisation of the Environment (SUE) Branch
Ground floor, Diamond Building, 11 Diagonal Street
Johannesburg

Queries should be directed to the Strategic Administrative Unit at:

Administrative Unit telephone number	(011) 240 3051/3052
Administrative Unit fax number	(011) 240 3055
Departmental central telephone number	(011) 240 2500

View the Department's website at http://www.oderd.gov.za for the latest version of the documents

Proof of payment must accompany this application. The application will not be processed without proof of payment unless one of the exclusions provided for in the fee Regulations is applicable **AND** such information in the exclusion section of this application form has been confirmed by this Department.

2. FEES

Gauteng Department of Agriculture and Rural Development' details for the payment of application fees

Payment Enquiries:
Contact person: Boniswa Belot
Tel: (011) 240 3377/3051
Email: Boniswa.Belot@gauteng.gov.za

Department Banking details:

Bank Name:	FNB Bank
Account Name:	GPG Agriculture and Rural Development PMG
Account Number:	62298144058
Branch Name and Number:	Global Transactional Services Johannesburg - 255005

Reference number: EIA - Date (Y – M – D) of payment e.g. EIA20140401 **(please quote this reference number when making payment)**

Application form to be submitted with proof of payment attached- **Annexure 1**

Tax exemption status:
Status: Tax Exempted

EXCLUSIONS

An applicant is excluded from paying fees if:

- The activity is a community based project funded by a government grant; or
- The applicant is an organ of state.

Applicants are required to tick the appropriate box below to indicate that either proof of payment is attached or that, in the applicant's view, exclusion applies. Proof and a motivation for exclusions must be attached to this application form as **Annexure 2.**

Proof attached ☐

Exclusion applies [X]

TYPE OF EXCLUSION	Tick where applicable. Proper motivation must be attached to the application
The activity is a community based project funded by a government grant	
The applicant is an organ of state	X

FEE AMOUNT

Application	Fee
Applications for an environmental authorisation for which basic assessment is required in terms of the Environmental Impact Assessment Regulations	**R2 000**
Application for an environmental authorisation, for which S&EIR is required in terms of the Environmental Impact Assessment Regulations	**R10 000**
Applications dealt with in terms of section 24L of the Act (where an environmental authorisation is required in terms of NEMA and a waste management license is required in terms of NEMWA and the same competent authority is dealing with both these applications)	**100% of the most expensive application, namely, R10 000 (Ten Thousand Rand) if S&EIR is triggered and R2 000 (Two Thousand Rand) if the basic assessment is triggered;** **(b) 50% of the other application, namely, R5 000-00 (Five Thousand Rand) if the S&EIR is triggered or R1 000 (One Thousand Rand) if the basic assessment is triggered.**

3. PROJECT TITLE

Construction of the extension of Atterbury Road up to the K147 intersection

4. PROPERTY DESCRIPTION

Portions 116 & 130 of the Farm Zwavelpoort No. 373 JR and the Remainder of Portion 1077 of the Farm Rietfontein No. 375 JR.

5. APPLICANT INFORMATION

Project applicant:	City of Tshwane Metropolitan Municipality		
Trading name (if any):	Nil		
Responsible position,	Director		
Contact person:	Hilton Voster		
Physical address:	1090 Arcadia Street, Hatfield, Pretoria		
Postal address:	P O Box 1409		
Postal code:	0001	**Cell:**	082 469 2285
Telephone:	012 358 7950	**Fax:**	086 6211 9136

Local municipality	City of Tshwane Metropolitan Municipality		
Contact person:	Livhuwani Siphuma		
Postal address:	Private Bag X1454, Pretoria		
Postal code:	0001	**Cell:**	082 772 5450
Telephone:	(012) 358 8871	**Fax:**	(012) 358 8934
E-mail:	livhuwanis@tshwane.gov.za		

Where there is more than one local authority involved, please attach a list of those authorities with their contact details as Annexure 3.

Land owner	See Annexure 5		
Contact person:			
Postal address:			
Postal code:		**Cell:**	
Telephone:		**Fax:**	
E-mail:			

In instances where there is more than one landowner, please attach a list of those landowners with their contact details as Annexure 4. If the applicant is not the owner or person in control of the land, proof of notice to the landowner or person in control of the land on which the activity is to be undertaken must be submitted as Annexure 5.

6. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) INFORMATION

EAP:	Bokamoso Landscape Architects & Environmental Consultants		
Professional affiliation/registration:			
Contact person (EAP):	Lizelle Gregory		
Company:	Bokamoso Landscape Architects & Environmental Consultants		
Physical address:	36 Lebombo Road, Lebombo Garden Building, Ashlea Gardens, 0081		
Postal address:	P.O. Box 11375, Maroelana		
Postal code:	0161	Cell:	0832558384
Telephone:	(012) 346 3810	Fax:	0865705659
E-mail:	lizelleg@mweb.co.za		

7. ACTIVITY(S) APPLIED FOR

An application may be made for more than one listed or specified activity that, together, make up one development proposal. All the listed activities that make up this application must be listed.

Number of Government Notice:	Activity No (s)	Description of each listed activity as per listing notices:
R. 544, 18 June 2010	11	The construction of: (i) Canals; (ii) Channels; (iii) Bridges; (iv) Dams; (v) Weirs; (vi) Bulk storm water outlet structures; (vii) Marinas; (viii) Jetties exceeding 50 square metres in size; (ix) Slipways exceeding 50 square metres in size; (x) Building exceeding 50 square metres or more Where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line.
R. 544, 18 June 2010	18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse; (ii) the sea; (iii) the seashore; (iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater- but excluding where such infilling, depositing, dredging,

		excavation, removal or moving (i) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or (ii) occurs behind the development setback line.
R. 544, 18 June 2010	22	The construction of a road outside urban areas, i. with a reserve wider than 13.5metres or where no reserve exists where the road is wider than 8 metres, or ii. for which an environmental authorisation was obtained for the route determination in terms of activity 5 in GN 387 of 2006 or activity 18 in Notice 545 of 2010
R. 546, 18 June 2010	13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous **b) In Gauteng:** ... v. Sites identified as irreplaceable or important in the Gauteng Conservation Plan,
R. 546, 18 June 2010	16	The construction of – ... (iii) buildings with a footprint exceeding 10m² in size or (i) infrastructure covering 10m² or more where such construction occurs within a watercourse or within 32 meters of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line, **(b) In Gauteng** ... v. All sites identified as irreplaceable or important in terms of the applicable Gauteng Conservation Plan ...

Please note that any authorisation that may result from this application will only cover activities applied for.

8. SECTOR BASED PROJECT DESCRIPTION

Please indicate which sector the project falls under by crossing out the relevant block in the table below:

Green economy + "Green" and energy-saving industries		Greenfield transformation to urban or industrial form	
Infrastructure – electricity (generation, transmission & distribution)		Biodiversity or sensitive area related activities	
Biofuels		Potential of metal fabrication capital & transport equipment – arising from large public investments	

Basic services (local government) – electricity and electrification		Boat building	
Basic services (local government) – area lighting		Manufacturing – automotive products and components, and medium and heavy commercial vehicles	
Infrastructure – transport (roads, land strips)	X	Manufacturing – plastics, pharmaceuticals and chemicals	
Basic services (local government access roads)	X	Manufacturing – clothing textiles, footwear and leather	
Basic services (local government) – public transport		Forestry, paper, pulp and furniture	
Infrastructure – water (bulk and reticulation)		Business process servicing	
Basic services (local government) – sanitation		Basic services (local government) – education	
Basic services (local government) – waste management		Basic services (local government) – health	
Agricultural value chain + agro-processing (linked to food security and food pricing imperatives)		Basic services (local government) – housing	
Infrastructure – information and communication technology		Basic services (local government) security of tenure	
Tourism + strengthening linkages between cultural industries and tourism		Other	
Basic services (local government) – public open spaces and recreational facilities			

9. SOCIO-ECONOMIC VALUES

Provide details on the anticipated socio-economic values associated with the proposed project

Anticipated CAPEX of the project on completion	**R47M**
What is the expected annual income to be generated by or as a result of the project?	-
New skilled employment opportunities created in the development phase of the project	5
New skilled employment opportunities created in the construction phase of the project	8
New un-skilled employment opportunities created in the development phase of the project	5
New un-skilled employment opportunities created in the construction phase of the project	25
What is the expected value of the employment opportunities during the development and construction phase?	R30M
What percentage of this new unskilled and skilled value that will accrue to previously disadvantaged individuals during both development and construction phase of the project?	75
What percentage of this value that will accrue to previously disadvantaged individuals?	75
The expected current value of the employment opportunities during the first 10 years	R115M
What percentage of this value that will accrue to previously disadvantaged individuals?	80

10. SITE DESCRIPTION

Farm name and number:	Zwavelpoort No. 373 JR & Rietfontein No. 375 JR
Portion / holding /erf number/	Portions 116, 130 & 131 & Portion 1077/R of the Farm Rietfontein 375-JR

(Where multiple properties (including alternatives) are involved, please attach a list of the properties as **Annexure 6).**

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in decimal degrees. The degrees should have at least six decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

Alternative:

Latitude (S):	Longitude (E):
°	°

In the case of linear activities:

- **Starting point of the activity**
- Middle point of the activity
- End point of the activity

For linear activities, coordinates at each turning point must also be indicated (attach a list of turning points as **Annexure 7)**

Latitude (S):	Longitude (E):
-25.838087°	28.351455°
-25.841934°	28.353614°
-25.845108°	28.355459°

SG 21 Digit Code(s) of the properties
(If there are more than 4, please attach a list with the rest of the codes as **Annexure 8)**
Please indicate the proportion of the property/ies to be developed (ecological footprint) as a percentage for each property

T	0	J	R	0	0	0	0	0	0	0	0	3	7	3	0	0	0	1	1	6
T	0	J	R	0	0	0	0	0	0	0	0	3	7	3	0	0	0	1	3	0
T	0	J	R	0	0	0	0	0	0	0	0	3	7	5	0	0	1	0	7	7
1	1%>		2	1%>		3	1%>	4								5				

Should any activities in GN R.546 be applied for, please provide a map indicating the triggering area (e.g. Critical Biodiversity Area, Conservancy Area, etc) overlaid by the study area in **Annexure 9.**

11. LAND USE ZONING

The zoning certificate of the property where the activity is going to be undertaken must be attached as **Annexure 10**

12. PROJECT SCHEDULE

A project schedule, indicating the different phases and timelines of the project, must be attached as **Annexure 11.**

13. OTHER AUTHORISATIONS REQUIRED

LEGISLATION	AUTHORISATION REQUIRED		APPLICATION SUBMITTED	
SEMAs	YES	NO	YES	NO
National Environmental Management: Air Quality Act		x		
National Environmental Management: Biodiversity Act		x		
National Environmental Management: Integrated Coastal Management Act		x		
National Environmental Management: Protected Areas Act		x		
National Environmental Management: Waste Act		x		
National legislation				
Mineral Petroleum Development Resources Act		x		
National Water Act	x			x
National Heritage Resources Act		x		
Others: Please specify		x		

Please provide proof of authorisations of submission of applications (if there are any) as **Annexure 12**.

14. LOCALITY MAP

A clear and legible locality map must be submitted with the application as **Annexure 13**

15. LIST OF ANNEXURES

		YES	N/A
Annexure 1	Proof of payment of a fee for this application		X
Annexure 2	Proof and a motivation for exclusions from paying a fee		x
Annexure 3	List of Local Municipalities (with contact details)		x
Annexure 4	List of land owners (with contact details) and proof of notification of land owners in the event there is more than one land owner	X	
Annexure 5	Proof of notice to the landowner or person in control of the land on which the activity is to be undertaken	X	
Annexure 6	List of properties in the case of multiple properties involved	X	
Annexure 7	List of co-ordinates at turning points for linear activities		x
Annexure 8	SGIDs		x
Annexure 9	Map indicating triggered areas for GN R.546	X	
Annexure 10	Land use zoning or zoning certificate of the property	X	
Annexure 11	Project schedule	X	
Annexure 12	Proof by way of copies of Environmental Authorisations obtained for the same property or submission of such applications		x
Annexure 13	Locality map	X	
Addendum 1	Declaration by the applicant	X	
Addendum 2	Declaration by the environmental assessment practitioner	X	

ADDENDUM 1

16. DECLARATIONS

DECLARATION OF THE APPLICANT

I, HILTON DEREK VORSTER, declare under oath that I

- am, or represent, the applicant in this application;
- have appointed / will appoint (delete that which is not applicable) an Environmental Assessment Practitioner (EAP) to act as the independent EAP for this application / will obtain exemption from the requirement to obtain an environmental assessment practitioner;
- will provide the EAP and the competent authority with access to all information at my disposal that is relevant to the application;
- will be responsible for the costs incurred in complying with the Regulations, including but not limited to –
  - costs incurred in connection with the appointment of the EAP or any person contracted by the EAP;
  - costs incurred in respect of the undertaking of any process required in terms of the Regulations;
  - costs in respect of any fee prescribed by the Minister or MEC in respect of the Regulations;
  - costs in respect of specialist reviews, if the competent authority decides to recover costs, and
  - the provision of security to ensure compliance with conditions attached to an environmental authorisation, should it be required by the competent authority;
- will ensure that the EAP is competent to comply with the requirements of the Regulations and will take reasonable steps to verify that the EAP
  - know the Act and the regulations, and how they apply to the proposed development
  - know any applicable guidelines
  - perform the work objectively, even if the findings do not favour the applicant
  - disclose all information which is important to the application and the proposed development
  - have expertise in conducting environmental impact assessments
  - complies with the Regulations
- will inform all registered I&APs of any suspension of the application as well as of any decisions taken by the competent authority in this regard;
- am responsible for complying with the conditions of any environmental authorisation issued by the competent authority;
- hereby indemnify the Government of the Republic, the competent authority and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action which the applicant or EAP is responsible for in terms of these Regulations;
- will not hold the competent authority responsible for any costs that may be incurred by the applicant in proceeding with an activity prior to obtaining an environmental authorisation or prior to an appeal being decided in terms of these Regulations;
- will perform all other obligations as expected from an applicant in terms of the Regulations;
- all the particulars furnished by me in this form are true and correct, and
- I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the applicant/ Signature on behalf of the applicant:

City of Tshwane Metropolitan Municipality

Name of company (if applicable):

April 2014 12 MAY 2014

Date:

Signature of the Commissioner of Oaths.

12 MAY 2014.

Date:

ADVOCATE.

Designation:

Commissioner of Oaths Official stamp (below)

PIETER ERNST GERHARDUS SCHUTTE
ADVOCATE OF THE HIGH COURT OF SOUTH AFRICA
23 SANDGROUSE ST
ROOIHUISKRAAL CENTURION
P.O. BOX 1273 ROOIHUISKRAAL 0154
☎ 012 661 9701/FAX 083 232 2933

ADDENDUM 2

DECLARATION OF THE EAP

I Ane Agenbacht on behalf of Bokamoso, declare that -

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation 8 of the Regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the Act.

Signature of the Environmental Assessment Practitioner:

Bokamoso Landscape Architects and Environmental Consultants
Name of company:

May 2014
Date:

Signature of the Commissioner of Oaths:

30 May 2014
Date:

A(SA)
Designation:

Commissioner of Oaths Official stamp (below)

LEONARD THEO GREGORY
COMMISSIONER OF OATHS
36 LEBOMBO ROAD
ASHLEA GARDENS
PRETORIA 0081
CHARTERED ACCOUNTANT OF SOUTH AFRICA

LIST OFANNEXURES

ANNEXURE 1: **Proof of payment of a fee for this application**

N/A- Applicant is an organ of state

ANNEXURE 2: **Proof and a motivation for exclusions from paying a fee**

N/A

ANNEXURE 3: **List of Local Municipalities (with contact details)**

N/A

ANNEXURE 4: **List of land owners (with contact details) and proof of notification of land owners in the event there is more than one land owner.**

	Property	Owner	Contact Details
1	Remainder of Portion 1077 of the Farm Rietfontein No. 375 JR	Century Property Developments (Applicant)	P.O. Box 70406, Bryanston, 2021, South Africa
2	Portion 116 of the Farm Zwavelpoort No. 373 JR	Auribush Inv (Pty) Ltd	P.O. Box 6294, Bloemfontein, 9300, South Africa
3	Portion 130 of the Farm Zwavelpoort No. 373 JR	Auribush Inv (Pty) Ltd	P.O. Box 6294, Bloemfontein, 9300, South Africa

ANNEXURE 5: **Proof of notice to the landowner or person in control of the land on which the activity is to be undertaken**

Lys van GEREGISTREERDE BRIEWE
(With an insurance option/met 'n versekeringsopsie)

Post Office

Full tracking and tracing/Volledige volg en spoor

Name and address of sender
Naam en adres van afsender Bobamoso PO Box 11375, Maroelana 0161

Atterbury Extended Road - Pirate

Toll-free number
Tolvry nommer
0800 111 502

No	Name and address of addressee Naam en adres van geadresseerde	Insured amount Versekerde bedrag	Insurance fee Versekeringsgeld	Postage Posgeld	Service fee Diensgeld	Affix Track and Trace customer copy Plak Volg-en-Spoor kliëntekrif
1	Aurlbus Investments P.O. Box 6294, Bloemfontein, 9300					RD 885 058 439 ZA CUSTOMER COPY
2	Century Property Developments P.O. Box 70406, Bryanston, 2021					RD 885 058 442 ZA CUSTOMER COPY
3						
4						
5						
6						
7						
8						
9						
10						
	Total Totaal	R	R	R	R	

Number of letters posted
Getal briewe gepos .....

Signature of client
Handtekening van kliënt.....

Signature of accepting officer
Handtekening van aanneembeampte.....

Date stamp
MERLYN
19 JAN 2016
Datumstempel

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R2 000,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

AFC*

701248

ANNEXURE 6: List of properties in the case of multiple properties involved

	Property	Owner
1	Remainder of Portion 1077 of the Farm Rietfontein No. 375 JR	Century Property Developments
2	Portion 116 of the Farm Zwavelpoort No. 373 JR	Auribush Inv (Pty) Ltd
3	Portion 130 of the Farm Zwavelpoort No. 373 JR	Auribush Inv (Pty) Ltd

ANNEXURE 7: **List of co-ordinates at turning points for linear activities**

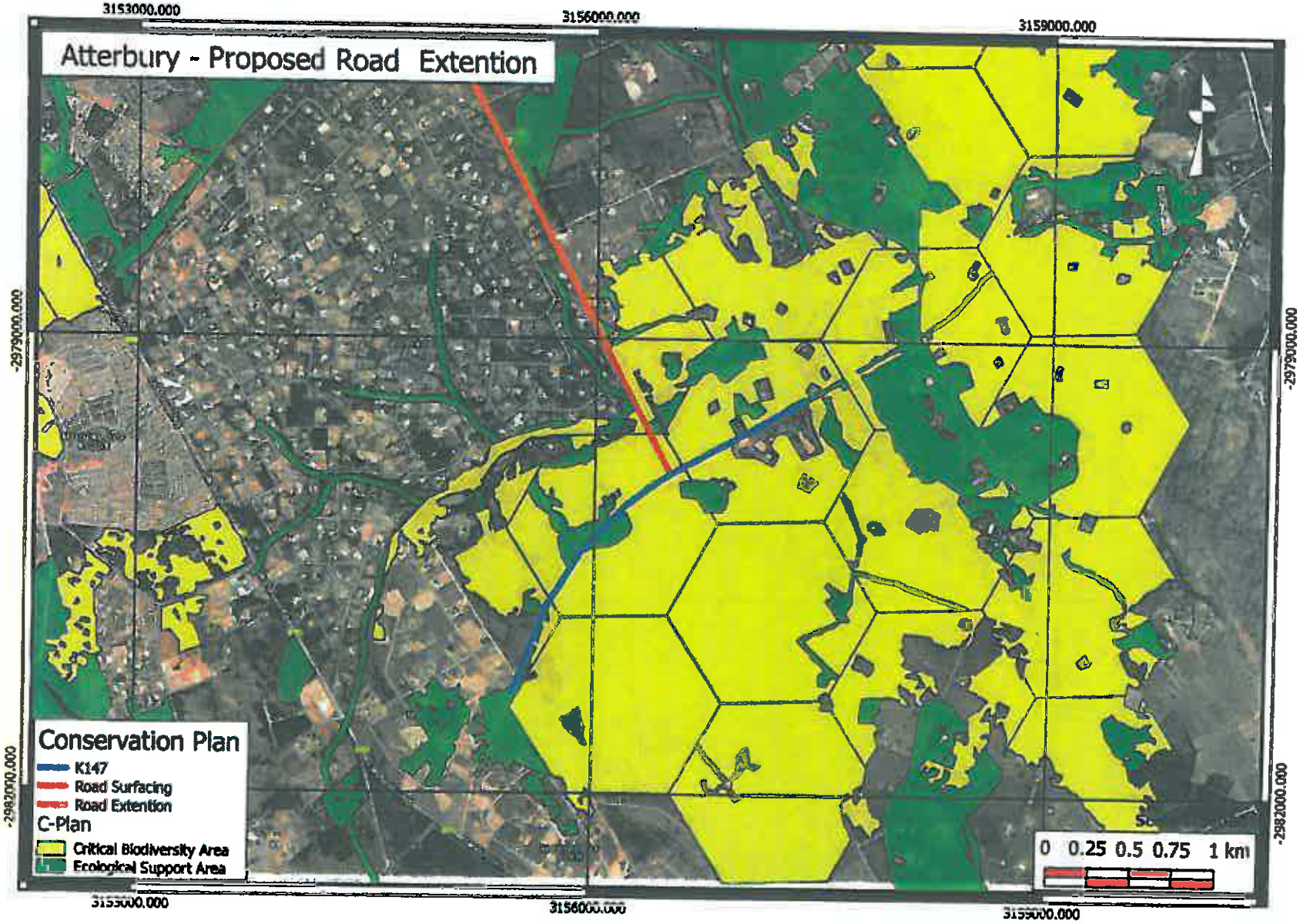
N/A

ANNEXURE 8: SGIDs

N/A

ANNEXURE 9: **Map indicating triggered areas for GN R.546**

- C-Plan Irreplaceable Map
- C-Plan Wetlands and Rivers


Atterbury - Proposed Road Extention
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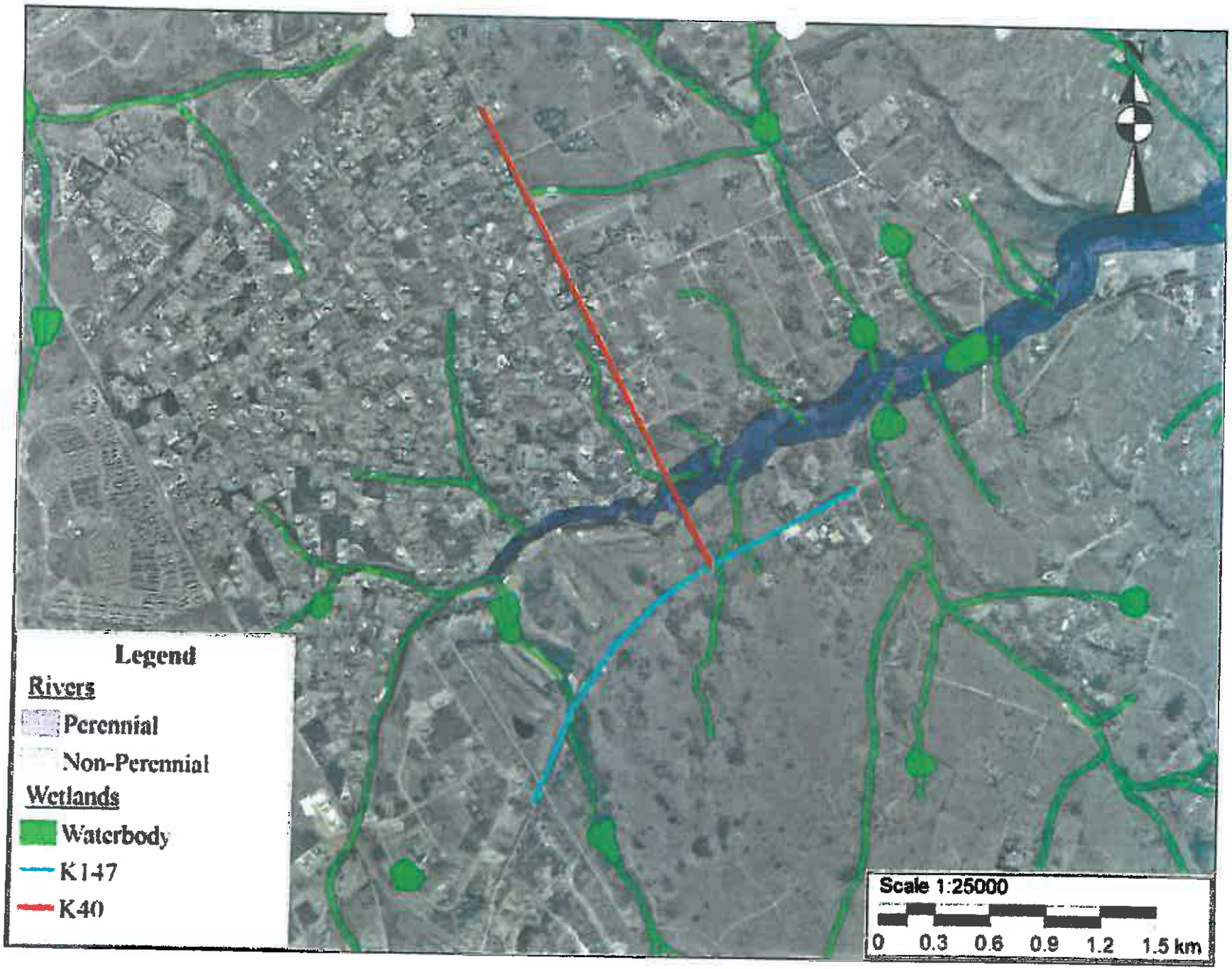
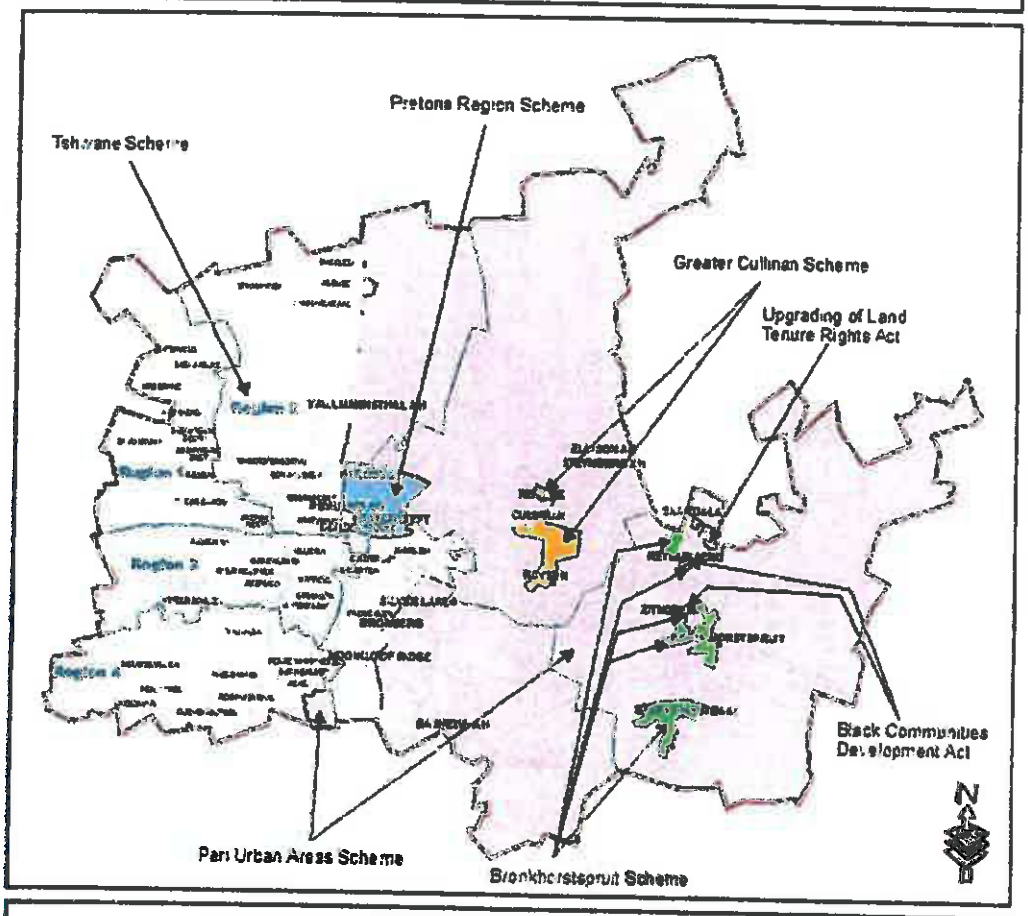
3156000.000
3159000.000
-2979000.000
-2982000.000
Conservation Plan
K147
Road Surfacing
Road Extention
C-Plan
Critical Biodiversity Area
Ecological Support Area
0 0.25 0.5 0.75 1 km


Legend
Rivers
Perennial
Non-Perennial
Wetlands
Waterbody
K147
K40
Scale 1:25000
0 0.3 0.6 0.9 1.2 1.5 km

ANNEXURE 10: **Land use zoning or zoning certificate of the property**

Peri-Urban/Agriculture

Town Planning Schemes in the City of Tshwane



Town Planning Schemes

- Tshwane Municipal Boundary
- Tshwane Regions
- Tshwane Scheme - 2008
- Bronkhorstspruit Scheme - 1980
- Greater Cullinan Scheme - 1999
- Pretoria Region Scheme - 1960
- Peri Urban Areas Scheme - 1975
- Black Communities Development Act
- Upgrading of Land Tenure Rights Act

CITY OF TSHWANE

N

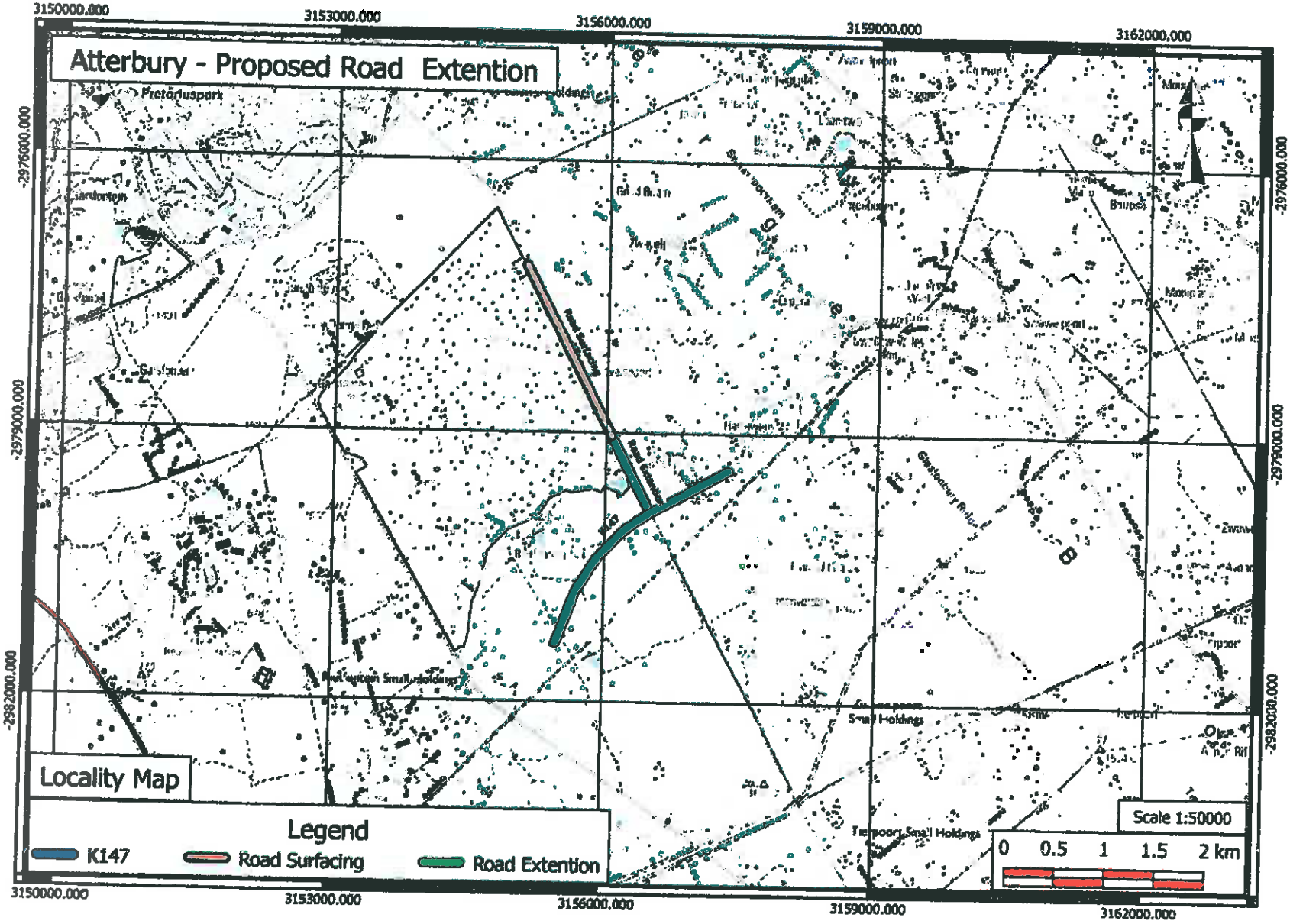
ANNEXURE 11: Project schedule

Stage	Activity	Estimated/Probable dates	
		Start	Complete
1	Project planning and preliminary designs	August 2013	January 2014
2	Approvals/licensing and assembly	February 2014	October 2014
3	Detailed designs and contracting	August 2014	Feb 2015
4	Construction and completion	Feb 2015	March 2016
5	Handover and closeout	March 2016	March 2016
6	Operation	From March 2016	

ANNEXURE 12: **Proof by way of copies of Environmental Authorisations obtained for the same property or submission of such applications**

N/A

ANNEXURE 13: **Locality map**


Atterbury - Proposed Road Extention
3150000.000
3153000.000
3156000.000
3159000.000
3162000.000
-2976000.000
-2979000.000
-2982000.000
Pretoriuspark
Locality Map
Legend
K147
Road Surfacing
Road Extention
Scale 1:50000
0 0.5 1 1.5 2 km

Acknowledgement letter from GDARD

agriculture and rural development
Department: Agriculture and Rural Development
GAUTENG PROVINCE

11 Diagonal Street, Diamond Building, Newtown, Johannesburg
P O Box 8769, Johannesburg, 2000

Telephone: (011) 240-2500
Fax: (011) 240-2700
Website: http://www.gdard.gpg.gov.za

Reference:	Gaut: 002/14-15/0037
Enquiries:	Faith Mlambo
Telephone:	(011) 240-3053
Email:	Faith.mlambo@gauteng.gov.za

Bokamoso Landscape Architects & Environmental Consultants

Email/Fax: lizelleg@mweb.co.za

Dear Sir / Madam

Application for Environmental Authorisation: Construction of the extension of Atterbury road up to the K147 intersection

The Department acknowledges having received the application form for environmental authorisation of the above-mentioned project on 03/06/2014, but final amendments were received on 24/06/2014.

The application has been assigned the reference number Gaut: 002/14-15/0037. Kindly quote this reference number in any future correspondence in respect of the application.

Please circulate the draft report to any state department that administers a law relating to a matter affecting the environment to comment.

You are required to submit two (2) copies (full colour CDs-PDF) of the Draft Basic Assessment Report as well as proof of submission to state departments referred to above.

In order to determine whether a biodiversity assessment is required and, if so, which specialist studies are required, please send a shapefile (WGS84 datum; geographic co-ordinate system) of the application site to our biodiversity information service (GDACE_BiodiversityInfo@gauteng.gov.za), the e-mail clearly indicating the project reference number. Where biodiversity assessment is required; please ensure that it is

conducted consistent with the *GDACE Requirements for Biodiversity Assessments*. A copy of this document can be obtained by e-mailing GDACE_BiodiversityInfo@gauteng.gov.za

In terms of Regulation 67(1) (2) of the NEMA EIA Regulations 2010, this application will lapse should you fail to submit the requested information within 6 months of the date of signature of this letter, except in the case where the Department has received and accepted written explanation for failure to submit such information.

Please draw the applicant's attention to the fact that the activity may not commence prior to an environmental authorisation being granted by the Department.

Yours faithfully

Boniswa Belot
Deputy Director: Strategic Administration Support
Date: 25/06/2014

CC: City of Tshwane Metropolitan Municipality — Att: H Vorster — Email/Fax 086 621 9136

BASSESSMENT REPORT

Gauteng Department of Agriculture and Rural Development (GDARD)

Basic Assessment Report in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2010 (Version 1)

List of all organs of state and State Departments where the draft report has been submitted, their full contact details and contact person

Kindly note that:

1. This Basic Assessment Report is the standard report required by GDARD in terms of the EIA Regulations, 2010.
2. This application form is current as of 2 August 2010. It is the responsibility of the EAP to ascertain whether subsequent versions of the form have been published or produced by the competent authority.
3. A draft Basic Assessment Report must be submitted to all State Departments administering a law relating to a matter likely to be affected by the activity to be undertaken. The draft reports must be submitted to the relevant State Departments and on the same day, two CD's of draft reports must also be submitted to the Competent Authority (GDARD) with a signed proof of such submission of draft report to the relevant State Departments.
4. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.
5. Selected boxes must be indicated by a cross and, when the form is completed electronically, must also be highlighted.
6. An incomplete report shall be rejected.
7. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.
8. Five (5) copies (3 hard copies and 2 CDs-PDF) of the final report and attachments must be handed in at offices of the relevant competent authority, as detailed below.
9. No faxed or e-mailed reports will be accepted. Only hand delivered or posted applications will be accepted.
10. Unless protected by law, and clearly indicated as such, all information filled in on this application will become public information on receipt by the competent authority. The applicant/EAP must provide any interested and affected party with the information contained in this application on request, during any stage of the application process.

DEPARTMENTAL DETAILS

Gauteng Department of Agriculture and Rural Development
Attention: Administrative Unit of the Sustainable Utilisation of the Environment (SUE) Branch
P.O. Box 8769
Johannesburg
2000

Administrative Unit of the Sustainable Utilisation of the Environment (SUE) Branch
18th floor Glen Cairn Building
73 Market Street, Johannesburg

Admin Unit telephone number: (011) 355 1345
Department central telephone number: (011) 355 1900

(For official use only)

File Reference Number:	
Application Number:	
Date Received:	

Has a draft report for this application been submitted to all State Departments administering a law relating to a matter likely to be affected as a result of this activity? **YES**

Is a list of State Departments referred to above been attached to this report? **YES**

if no, state reasons for not attaching the list.

SECTION A: ACTIVITY INFORMATION

1. ACTIVITY DESCRIPTION

Project title (must be the same name as per application form):

Atterbury Road Extension

Select the appropriate box

The application is for an upgrade of an existing development		The application is for a new development	X	Other, specify	

Description of the activity and associated infrastructure, which is being applied for, in detail

The activity entails the construction of approximately 900m of a single carriage-way road with one lane in each direction with a capacity of 1100 vehicles per hour (in about 10years time) being the extension of Atterbury Road starting from the end of an existing gravel road (sharp bend to the east) moving in a south-easterly direction to where the extension intersects with the proposed K147. The section of the road from the intersection with Jollify Main Road will be surfaced. The new road will be constructed from the end of the gravel road to the intersection with the K147.

As part of the road extension, a bridge will be constructed over the Swavelpoort Spruit together with the stormwater management infrastructure.

Please refer to Appendix G for the designs of the proposed road and the bridge.

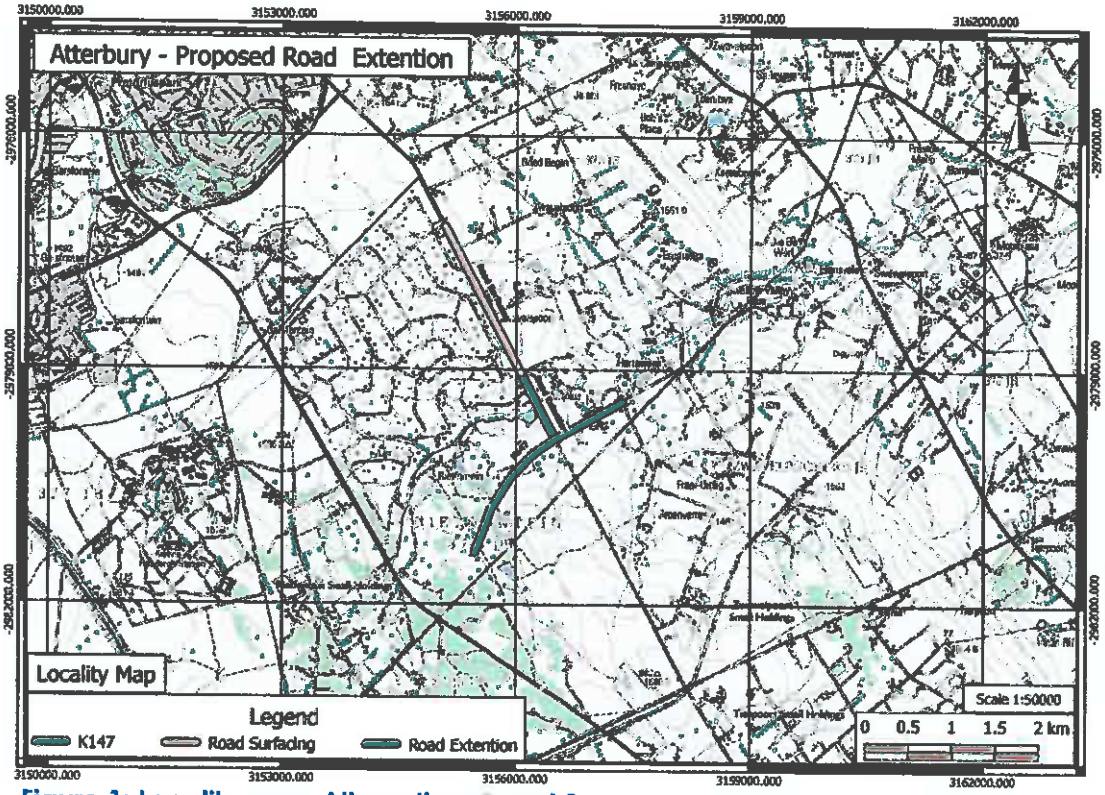


Figure 1: Locality map: Alternatives 1 and 3

Activities Applied for:

No. & date of the Govt. Notice:	Activity No (s	Describe each listed activity:
R. 544, 18 June 2010	11	The construction of: (i) Canals; (ii) Channels, (iii) Bridges, (iv) Dams, (v) Weirs, (vi) Bulk storm water outlet structures; (vii) Marinas; (viii) Jetties exceeding 50 square metres in size; (ix) Slipways exceeding 50 square metres in size, (x) Building exceeding 50 square metres or more Where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line
The proposed road extension crosses a perennial river. A bridge will be constructed at the crossing point. In addition some stormwater outlets and infrastructure will be built as part of the activity, therefore this activity is considered applicable and thus included for authorisation.		

R. 544, 18 June 2010	18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse; (ii) the sea; (iii) the seashore; (iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater- but excluding where such infilling, depositing, dredging, excavation, removal or moving (i) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or (ii) occurs behind the development setback line
The proposed road extension crosses a perennial river. A bridge will be constructed at the crossing point. In addition some stormwater outlets and infrastructure will be built as part of the activity, therefore this activity is considered applicable and thus included for authorisation.		
R. 544, 18 June 2010	22	The construction of a road outside urban areas, i. with a reserve wider than 13.5metres or where no reserve exists where the road is wider than 8 metres, or ii. for which an environmental authorisation was obtained for the route determination in terms of activity 5 in GN 387 of 2006 or activity 18 in Notice 545 of 2010
Parts of the road extension are located in an area that can be considered to lie outside developed areas. As a result, this activity is deemed to apply and has therefore applied for authorisation		
R. 546, 18 June 2010	13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous **b) In Gauteng:** ... v. Sites identified as irreplaceable or important in the Gauteng Conservation Plan,
Sections of the proposed road and the bridge will involve clearing of vegetation in areas considered either Critical Biodiversity Areas or Ecological Support Areas in terms of the Gauteng Conservation Plan.		
R. 546, 18 June 2010	16	The construction of – ... (iii) buildings with a footprint exceeding 10m^2 in size or (i) infrastructure covering 10m^2 or more where such construction occurs within a watercourse or within 32 meters of a watercourse, measured from the edge of a watercourse, excluding where such

		construction will occur behind the development setback line, **(b) In Gauteng** ... v. All sites identified as irreplaceable or important in terms of the applicable Gauteng Conservation Plan ...
The proposed activity entails construction of infrastructure (road, bridge, stormwater) some of which will be within a watercourse and within a geographic area identified in terms of the Gauteng C-Plan.		

2. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

Title of legislation, policy or guideline:	Administrating Authority:	Promulgation Date:
National Environmental Management Act No. 107 of 1998 (NEMA)	**National & Provincial**	**27 November 1998**

The NEMA is the primarily enabling Act that provides the principles which serve as the general framework within which environmental management and Environmental Impact Assessments as well as decisions thereof are to be conducted. The Environmental Impact Assessment Regulations[1] (the Regulations) were promulgated in terms of Chapter 5 of the NEMA and came into effect on 3 July 2006. These were subsequently amended in 2010.

Implication to the Development:
The application for the proposed road consists of activities listed under Notice No. R 544 and R546 therefore a Basic Assessment Report will be submitted for authorization from the Competent Authority.

Environmental Impact Assessment Regulations, 2010 in terms of the NEMA	**National**	**2010**

The Minister of Environmental Affairs passed (in June 2010) the Amended Environmental Impact Assessment Regulations in terms of Chapter 5 of the National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA). The Amended Regulations came into effect on 2 August 2010, and therefore all new applications must be made in terms of the Amended NEMA regulations. The purpose of this process is to determine the possible impacts of the proposed development on the surrounding environment and to provide measures for the mitigation of negative impacts and to maximize positive impacts.

Notice **No. R 544, R 545 and R 546** of the Regulations list the activities that indicate the process to be followed. The activities listed in Notice No. R 544 and R546 require that a Basic Assessment process be followed and the Activities listed in terms of Notice No. R 545 requires that the Scoping and EIA process be followed. Notice No. 546 has been introduced to make provision for Activities in certain geographical and sensitive areas.

Implication to the Development:
Significant – The application for the proposed development consist of activities listed under Notice R. 544 (Listing No. 1) and R. 546 (Listing No. 3) and therefore a Basic Assessment Report will be submitted to GDARD for consideration.

National Water Act, 1998 (Act No. 36 of 1998)	National & Provincial	20 August 1998

The purpose of this Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that take into account, amongst other factors, the following:

- Meeting the basic human needs of present and future generations;
- Promoting equitable access to water;
- Promoting the efficient, sustainable and beneficial use of water in the public interest;
- Reducing and preventing pollution and degradation of water resources;
- Facilitating social and economic development; and
- Providing for the growing demand for water use.

In terms of the section 21 of the National Water Act, the developer must obtain water use licenses if the following activities are taking place:

a) Taking water from a water resource;
b) Storing water;
c) Impeding or diverting the flow of water in a water course;
d) Engaging in a stream flow reduction activity contemplated in section 36; Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
e) Discharging waste or water containing waste into a water resource through a pipeline, canal, sewer, sea outfall or other conduit;
f) Disposing of waste in a manner which may detrimentally impact on a water resource;
g) Disposing in any manner which contains waste from or which has been heated in any industrial or power generation process;
h) Altering the bed, banks, course or disposing of water found underground if it is necessary for the safety of people;
i) Removing, discharging, or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
j) Using water for recreational purposes.

Figure 2 : Perennial and non-perennial rivers (Alternatives 1,2 and 3)

The National Water Act also requires that (where applicable) the 1:100 year flood line

be indicated on all the development drawings (even the drawings for the external services) that are submitted for approval.

Implication to the Development:
A river and riparian zone is present on the site. The proposed road will cross the Swavelpoort Spruit and a bridge will be constructed at the crossing point. Careful planning and consideration of the management of this part of the river and in particular its riparian zone as an important urban conservation corridor, beyond the scope of this report, is necessary. The site does not form part of a Freshwater Ecosystem Priority Area identified by the national atlas of freshwater ecosystem priority areas. No wetlands such as marshlands could be found at the site rather this is an aquatic system with a typical river and its riparian zone. Therefore, a Water Use License in terms of Section 21 will be required as construction activities will occur across the perennial river.

National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004)	**National & Provincial**	**2004**

The NEMA: AQA repealed the Atmospheric Pollution Prevention Act (45 of 1965) and various other laws dealing with air pollution and provides a more comprehensive framework for addressing air quality issues. The purpose of the Act is to set norms and standards that relate to:

- Institutional frameworks, roles and responsibilities
- Air quality management planning
- Air quality monitoring and information management
- Air quality management measures
- General compliance and enforcement.

Amongst other things, it is intended that the setting of norms and standards will achieve the following:

- The protection, restoration and enhancement of air quality in South Africa
- Increased public participation in the protection of air quality and improved public access to relevant and meaningful information about air quality.
- The reduction of risks to human health and the prevention of the degradation of air quality.

The Act describes various regulatory tools that should be developed to ensure the implementation and enforcement of air quality management plans. These include:

- Priority Areas, which are air pollution 'hot spots'.
- Listed Activities, which are 'problem' processes that require an Atmospheric Emission License.
- Controlled Emitters, which includes the setting of emission standards for 'classes' of emitters, such as motor vehicles, incinerators, etc.
- Control of Noise.
- Control of Odours.

Implication to the Development:
During the construction phase, dust and the generation of noise can become a significant factor, especially to the surrounding landowners. However if the development is well planned and the mitigating measures are successfully implemented the proposed development's contribution to air pollution and the generation of air pollution can become less significant.

National Heritage Resources Act, 1999 (Act No. 45 of 1965 (NHRA)	**National & Provincial**	**April 1965**

The National Heritage Resources Act, legislates the necessity and heritage impact assessment in areas earmarked for development, which exceed 0.5ha. The Act makes provision for the potential destruction to existing sites, pending the archaeologist's recommendations through permitting procedures. Permits are administered by the South African Heritage Resources Agency (SAHRA).

Implication to the Development:
Although no features of Heritage importance were identified during the Assessment, if any such features are discovered during construction activities and clearing of the application site, the correct "procedures for an Environmental incident" **(at the end of EMPr, Appendix H)** must be followed.

National Environmental Management Protected Areas Act, 2003 (Act No. 57 of 2003)	**National**	**2003**

The purpose of this Act is to provide for the protection, conservation and management of ecologically viable areas representative of South Africa's biological biodiversity and its natural landscapes.

Implication to the Development:
The study area does not fall within or close to any protected areas. Therefore, the provisions of the Act do not apply.

National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)	**National**	**2004**

The Biodiversity Act, provides for the management and protection of the country's biodiversity within the framework established by NEMA. It provides for the protection of species and ecosystems in need of protection, sustainable use of indigenous biological resources, equity and bioprospecting, and the establishment of a regulatory body on biodiversity- **South African Biodiversity Institute.**

The objectives of the Act:
(a) With the framework of the National Environmental Management Act, to provide for.
  (i) The management and conservation of biological diversity within the Republic and of the components of such biological diversity.
  (ii) The use of indigenous biological resources in a sustainable manner, and
  (iii) The fair and equitable sharing among stakeholders of benefits arising from bio-prospecting involving indigenous biological resources.

(b) To give effect to ratified international agreements relating to biodiversity which are binding on the republic,
(c) To provide for co-operative governance in biodiversity management and conservation, and
(d) To provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

Implication to the Development:
According to the Gauteng C-Plan, the road alignment traverses an area which is a

habitat for red listed mammal and bird species, has primary vegetation and is habitat for orange listed species. Relevant studies have been conducted which show that the impact of the proposed road will be mnimal.

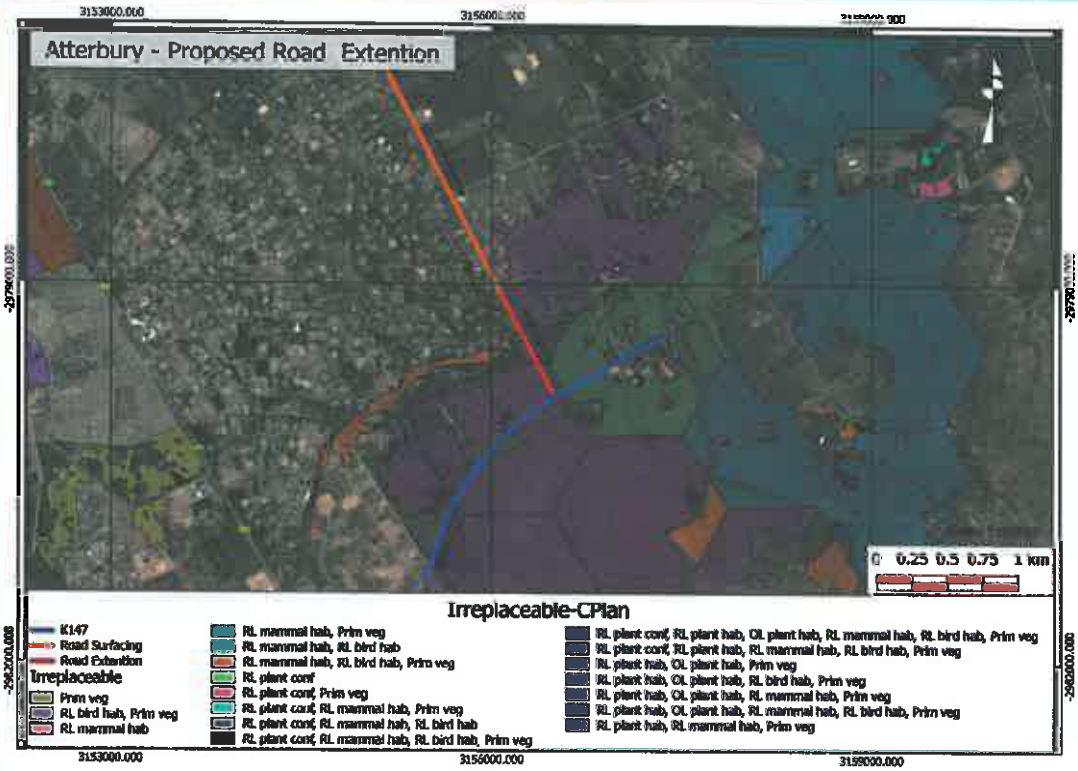


Figure 3: Biodiversity Sensitivity: Orange Listed Plant Habitats (Alternatives 1 and 2)

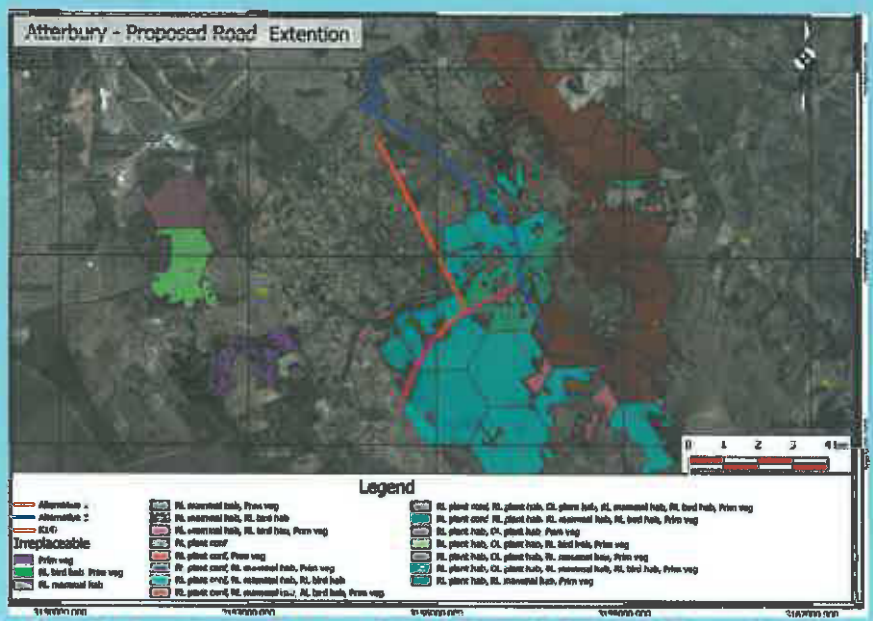


Figure 4: Biodiversity Sensitivity: Orange Listed Plant Habitats (Alternative 3)

GDARD Draft Ridges Policy	Provincial	2007

The main purpose of the draft Red Data Policy is to protect red data plant species in Gauteng Province. This policy requires that red data species remain in situ and it gives priority ratings (based on where they occur) to the different Red Data species. If Red Data species are discovered on the study area this policy will have relevance and it should be described in detail as to how it is applicable to this project in the BA report.

Implication to the Development:
The policy will not have to be considered for the application as the study area does not fall on a ridge or in a buffer zone of any ridge.

Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	**National**	**1 June 1983**

This act provides for the control of the utilization of natural agricultural resources of South Africa in order to promote the conservation of soil, water sources and the vegetation as well as the combating of weeds and invader plants; and for matters connecting therewith.

Implication to the Development:
The project is not located in an agricultural area and will involve the construction of road and related infrastructure. This will not have any impact on the agricultural resources.

GDARD Agricultural Potential Policy	**Provincial**	**2006**

GDARD identified 7 Agricultural Hubs in the province. These hubs are areas of soils with high agricultural potential. They are earmarked for agricultural activities/production. The related policies and guidelines should be taken into consideration when one plans to develop in these hubs areas. Urban development is usually not supported in these hubs.

Implications to the Development:
The study area is not situated within any of the 7 agricultural hubs identified for Gauteng.

Gauteng Urban Edge 2008 / 2009	**Provincial**	**2009**

According to the Gauteng Department of Economic Development the urban edge is now delineated on a yearly basis and it is the responsibility of the local authorities to request for a yearly amendments to reflect development proposals submitted to them.

Implication to the Development:
The study area marks the edge of the urban edge as indicated on the map below. Given the spatial plans of the municipality the area serviced by the proposed road is earmarked for future development.

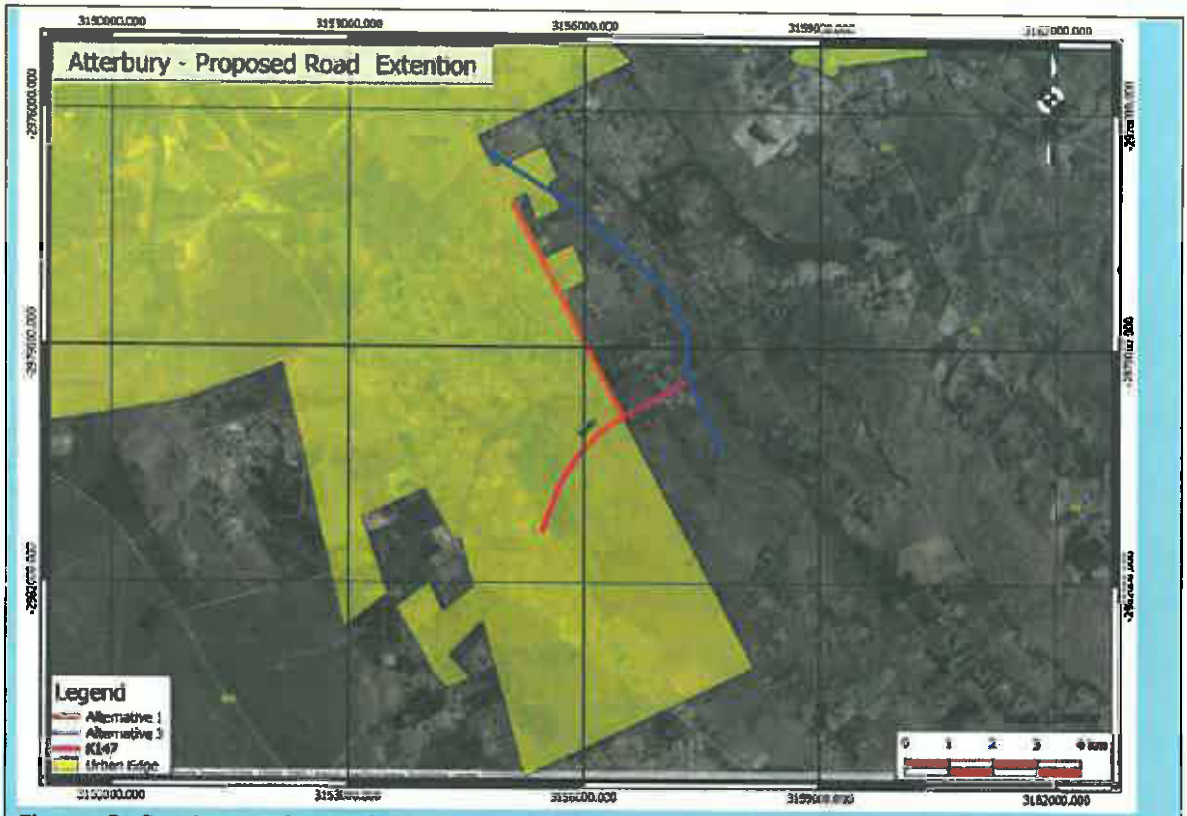


Figure 5: Gauteng Urban Edge

National Environmental Management: Waste Act (Act 59 of 2009)	**National**	**11 June 2010**

The Act aims to consolidate waste management in South Africa, and contains a number of commendable provisions, including:

- The establishment of a national waste management strategy, and national and provincial norms and standards, for amongst other, the classification of waste, waste service delivery, and tariffs for such waste services;
- Addressing reduction, reuse, recycling and recovery of waste;
- The requirements for industry and local government to prepare integrated waste management plans;
- The establishment of control over contaminated land,
- Identifying waste management activities that requires a license, which currently include facilities for the storage, transfer, recycling, recovery, treatment and disposal of waste on land;
- Co-operative governance in issuing licenses for waste management facilities, by means of which a licensing authority can issue an integrated or consolidated license jointly with other organs of state that has legislative control over the activity, and
- The establishment of a national waste information system.

Implication to the Development:
No waste management license would be required for the construction or operational phases of the proposed road. Only a limited amount of solid construction waste will be stored and handled on the site, before being hauled away and dumped at the nearest

registered landfill site.

Red List Plant Species Guidelines	**Provincial**	**26 June 2006**

The purpose of these guidelines is to promote the conservation of Red List Plant Species in Gauteng, which are species of flora that face risk of extinction in the wild. By protecting Red List Plant Species, conservation of diverse landscapes is promoted which forms part of the overall environmental preservation of diverse ecosystems, habitats, communities, populations, species and genes in Gauteng.

These Guidelines are intended to provide a decision-making support tool to any person or organization that is responsible for managing, or whose actions affect, areas in Gauteng where populations of Red List Plant Species grow, whether such person or organization be an organ of state or private entity or individual; thereby enabling the conservation of the Red List Plant Species that occur in Gauteng.

Implication to the Development:
No Red Listed plant species were found on the site.

Gauteng Noise Control Regulations, 1999	**Provincial**	**1999**

The Regulations control noise pollution. According to the Regulations, the acceptable noise levels in a residential area situated within an urban area is 55dBA and the maximum acceptable noise levels in a rural area is 45dBA.

Implication to the Development:
Within the construction phase of the proposed development, the impact of noise could be problematic, but such impacts are generally short term. One should note that practical mitigation measures for noise pollution are low, but certain measures can be implemented to mitigate the severity. A specific study has been conducted and mitigation measures proposed for implementation. **(Please Refer to Appendix G)**

The Gauteng Transport Infrastructure Act, 2001	**Provincial**	**2001**

The Act was created to consolidate the laws relating to roads and other types of transport infrastructure in Gauteng, and to provide for the planning, design, development, construction, financing, management, control, maintenance, protection and rehabilitation of provincial roads, railway lines and other transport infrastructure in Gauteng; and to provide for matter connected therewith.

Implication to the Development:
The proposed road is applied for by the City of Tshwane Metropolitan Municipality to improve road infrastructure and accessibility in the area. This will contribute to the improvement in the road infrastructure network in the province.

3. ALTERNATIVES

Describe the proposal and alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The determination of whether the site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment.

The no-go option must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. **Do not** include the no go option into the alternative table below.

Note: After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.
Provide a description of the alternatives considered

No.	Alternative type,	Description
1	Alternative 1: Proposal	The extension of the Atterbury Road from where the existing dirt road bends sharply to the east to the intersection with the proposed K147. This will entail the construction of a single carriage-way road with one lane in each direction within a 25-metre road reserve, a bridge of 23m span over the Swavelpoort spruit and associated infrastructure.
2	Alternative 2 (Bridge Design alternative)	This alternative entails the construction of a road as described for Alternative 1 but instead of a single span bride of 23m, a culvert system of 3x7m culverts will be constructed over the Swavelpoort spruit and the associated infrastructure.
3	Alternative 3: Use of the K40 Alignment	Alternative 3 is the construction of approximately 4.7km of a new road along the re-aligned K40 alignment. This alignment however, has recently been adjusted mainly because of its impact on many existing properties that are affected. Further and extensive engagements between roads authorities and affected property owners is still required
4	Alternative 4 (No Go option)	No-Go Option- the road will not be built.

NOTE: The numbering in the above table must be consistently applied throughout the application report and process

4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the total physical size (footprint) of the proposal as well as alternatives. Footprints are to include all new infrastructure (roads, services etc), impermeable surfaces and landscaped areas:

	Size of the activity:
Proposed activity	
Alternatives:	
Alternative 1 (if any)	
Alternative 2 (if any)	

Ha/ m^2

or, for linear activities:

	Length of the activity:
Alternative 1: Proposed activity	900m
Alternative 2: Same alignment as in Alternative 1 but different bridge design	900m
Alternative 3: Alignment along the K40 Provincial Road	4.7km

Sizes of the servitudes (within which the above footprints will occur):

	Size of the site/servitude:
Alternative 1: Proposed activity	25m road reserve
Alternative 2 : Design	25m road reserve
Alternative 3 : K40 alignment	60m road reserve

Ha/m²

5. SITE ACCESS

Alternatives 1 and 2: Proposal

Does ready access to the site exist, or is access directly from an existing road? YES / NO

If NO, what is the distance over which a new access road will be built ____ m

Describe the type of access road planned:

Access can be obtained via the existing Atterbury and the dirt road

Include the position of the access road on the site plan.

Alternative 3: Re-alignment along K40

Does ready access to the site exist, or is access directly from an existing road? YES / NO

If NO, what is the distance over which a new access road will be built ____ m

Describe the type of access road planned:

The alignment is located within developed agricultural Holdings. No direct access exist

Include the position of the access road on the site plan.

Alternative 4 (No Go)

Does ready access to the site exist, or is access directly from an existing road? YES / NO

If NO, what is the distance over which a new access road will be built ____ m

Describe the type of access road planned:

Access can be obtained via the existing Atterbury Road but the entire length of the road will have to be constructed

Include the position of the access road on the site plan.

Section A 6-8 has been duplicated 0 Number of times

6. SITE OR ROUTE PLAN

A detailed site or route (for linear activities) plan(s) must be prepared for each alternative site or alternative activity. It must be attached as Appendix A to this document. The site or route plans must indicate the following:

- the scale of the plan, which must be at least a scale of 1:2000 (scale can not be larger than 1:2000 i.e. scale can not be 1:2500 but could where applicable be 1:1500)
- the property boundaries and numbers of all the properties within 50m of the site;
- the current land use as well as the land use zoning of each of the properties adjoining the site or sites;
- the exact position of each element of the application as well as any other structures on the site;
- the position of services, including electricity supply cables (indicate above or underground), water supply pipelines, boreholes, street lights, sewage pipelines, septic tanks, storm water infrastructure and telecommunication infrastructure;
- walls and fencing including details of the height and construction material;
- servitudes indicating the purpose of the servitude;
- sensitive environmental elements on and within 100m of the site or sites including (but not limited thereto):
  - Rivers and wetlands;
  - the 1:100 and 1:50 year flood line;
  - ridges;
  - cultural and historical features;
  - areas with indigenous vegetation (even if it is degraded or infested with alien species);
- for gentle slopes the 1m contour intervals must be indicated on the plan and whenever the slope of the site exceeds 1:10, the 500mm contours must be indicated on the plan; and
- the positions from where photographs of the site were taken.
- Where a watercourse is located on the site at least one cross section of the water course must be included (to allow the 32m position from the bank to be clearly indicated)

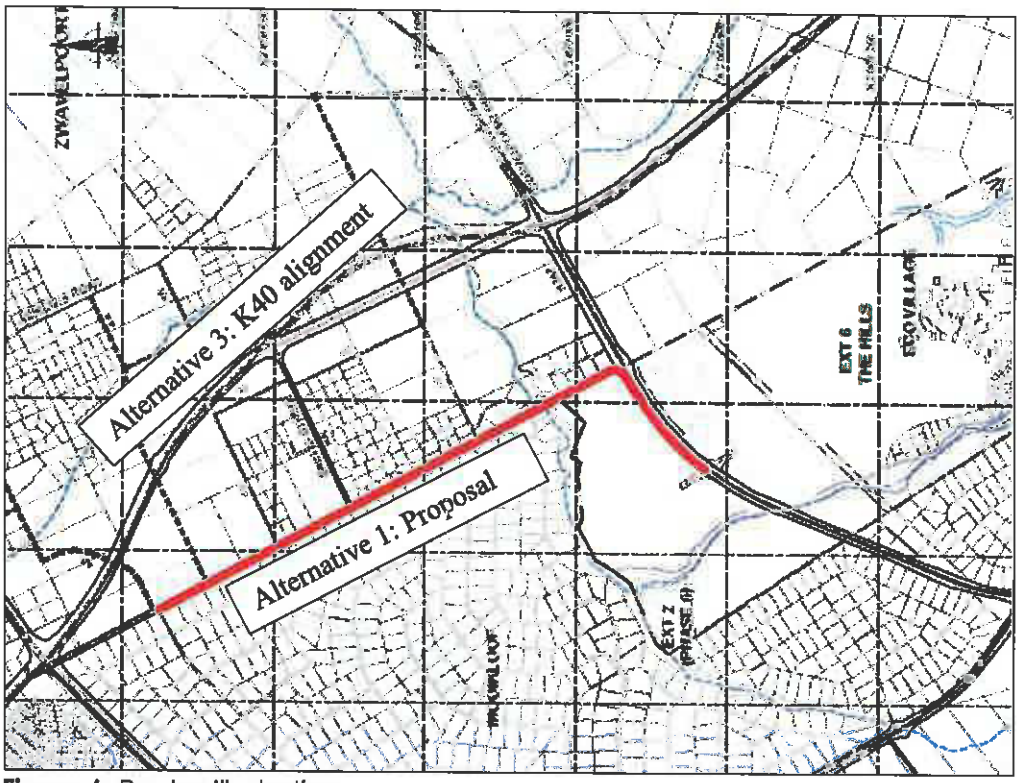


Figure 6: Routes Illustration

7. SITE PHOTOGRAPHS

Photographs are attached under **Appendix I.**

8. FACILITY ILLUSTRATION

See road designs in **Appendix G.**

SECTION B: DESCRIPTION OF RECEIVING ENVIRONMENT

1. PROPERTY DESCRIPTION

Property description:

The proposed (Alternative 1) road alignment is on Portions 116, 130 & 131 of the Farm Zwavelpoort No. 373 JR & Portion 1077/R of the Farm Rietfontein 375-JR

2. ACTIVITY POSITION

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates should be in decimal degrees. The degrees should have at least six decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

Alternative:

Latitude (S):	Longitude (E):
°	°

In the case of linear activities: Proposed alignment

- Starting point of the activity
- Middle point of the activity
- End point of the activity

Latitude (S):	Longitude (E):
-25 838314⁰	28 351606⁰
-25.841934⁰	28.353614⁰
-25 845108⁰	28.355459⁰

Co-ordinates taken every 250 meters along Alternative 3 the route are attached in **Appendix I.**

Addendum of route alternatives attached: **Yes**

3. GRADIENT OF THE SITE

Indicate the general gradient of the site.

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

4. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site.

Ridgeline	Plateau	Side slope of hill/ridge	Valley	Plain	Undulating plain/low hills	River front

5. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

a) Is the site located on any of the following?

Shallow water table (less than 1.5m deep)	YES / **NO**
Dolomite, sinkhole or doline areas	YES / **NO**
Seasonally wet soils (often close to water bodies)	**YES** / NO
Unstable rocky slopes or steep slopes with loose soil	YES / **NO**
Dispersive soils (soils that dissolve in water)	YES / **NO**
Soils with high clay content (clay fraction more than 40%)	YES / **NO**
Any other unstable soil or geological feature	YES / **NO**
An area sensitive to erosion	**YES** / NO

(Information in respect of the above will often be available at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used).

b) are any caves located on the site(s) YES NO

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)
Latitude (S): **Longitude (E):**

c) are any caves located within a 300m radius of the site(s) YES NO

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)
Latitude (S): **Longitude (E):**

d) are any sinkholes located within a 300m radius of the site(s) YES NO

If yes to above provide location details in terms of latitude and longitude and indicate location on site or route map(s)
Latitude (S): **Longitude (E):**

If any of the answers to the above are "YES" or "unsure", specialist input may be requested by the Department

6. AGRICULTURE

Does the site have high potential agriculture as contemplated in the Gauteng Agricultural Potential Atlas (GAPA 3)? YES NO

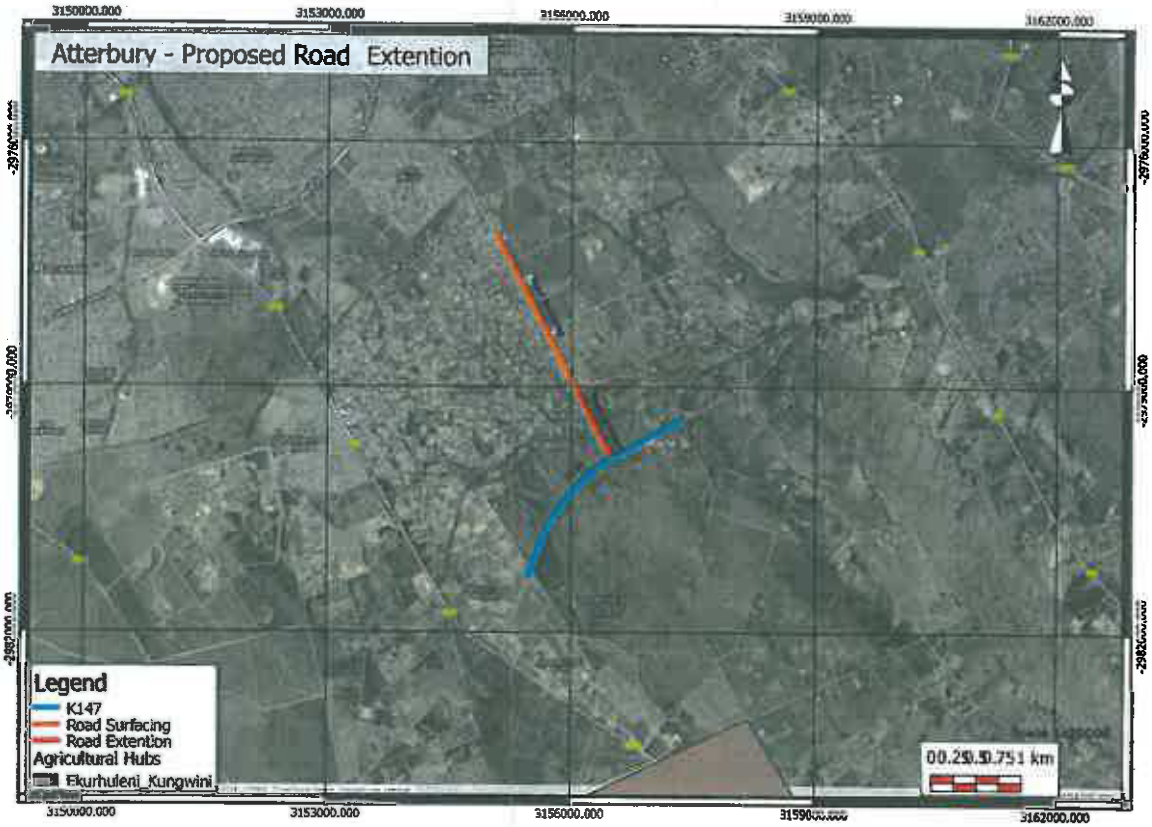


Figure 7: Agricultural Hubs

7. GROUNDCOVER

To be noted that the location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Indicate the types of groundcover present on the site and include the estimated percentage found on site

Natural veld - good condition % =	Natural veld with scattered aliens % =	Natural veld with heavy alien infestation % =	**Veld dominated by alien species % =95**	Landscaped (vegetation) % =

Sport field % =	Cultivated land % =	Paved surface (hard landscaping) % =5	Building or other structure % =	Bare soil % =

Please note: The Department may request specialist input/studies depending on the nature of the groundcover and potential impact(s) of the proposed activity/ies.

Are there any rare or endangered flora or fauna species (including red list species) present on the site	YES	NO

If YES, specify and explain:

Are there any rare or endangered flora or fauna species (including red list species) present within a 200m (if within urban area as defined in the Regulations) or within 600m (if outside the urban area as defined in the Regulations) radius of the site.	YES	NO

If YES, specify and explain:

According to the specialist, the vegetation analysis and the observations made during the survey the area has moderate to poor ecological functionality. Although no Red Data plant species were observed within the study area, the wetlands and ridges present in the development area and the adjacent grassland show only marginal potential for Red Data species while the wetland habitats are marginally suited to orchids of the *Habenaria* genus. However, this was not found during the assessment.

Are there any special or sensitive habitats or other natural features present on the site?	YES	NO

If YES, specify and explain:

The Swavelpoort Spruit and riparian zone are present on the site. The watercourse has been impacted by the urban development and is highly infested by exotic plant species. The affected area has moderate to poor ecological functionality. The wetlands and ridges present on the proposed development site show only marginal potential for Red Data species. The disturbance levels (alien vegetation, human presence) are considered high and a relatively small surface area of ridge (and associated intact vegetation) will be impacted by the proposed infrastructure. No Red Data plant species were observed within the study area.

Was a specialist consulted to assist with completing this section	YES	NO

If yes complete specialist details

Name of the specialist:	Sam Lawrence		
Qualification(s) of the specialist:	(Cand. Sci. Nat., Msc)		
Postal address:	P O Box 11375, Maroelana		
Postal code:	0161		
Telephone:	012 346 3810	Cell:	
E-mail:		Fax:	086 570 5659

Are any further specialist studies recommended by the specialist?	YES	NO

If YES, specify: A wetland delineation study

If YES, is such a report(s) attached?	YES	NO

If YES list the specialist reports attached below

Fauna and Flora Study: Enviro-Insight CC
Wetland Ecological Assessment: Scientific Aquatic Services

Signature of specialist: _____ Date:

Please note; If more than one specialist was consulted to assist with the filling in of this section then this table must be appropriately duplicated

If yes complete specialist details

Name of the specialist:	Stephen van Staden
Qualification(s) of the specialist:	BSc Hons (Aquatic Health) (RAU) M.Sc. Environmental Management (RAU) Pr.Sci.Nat (Ecological Sciences) 400134/08
Postal address:	91 Geldenhuis Road Malvern East Ext 1
Postal code:	2007
Telephone:	011 615 7893 Cell 08 415 23563
E-mail:	admin@saserivironmen tal.co.za Fax: 011 615 6240

Are any further specialist studies recommended by the specialist? YES NO

If YES, specify:

If YES, is such a report(s) attached? YES NO

If YES list the specialist reports attached below

Signature of specialist: _____ Date :

Please note; If more than one specialist was consulted to assist with the filling in of this section then this table must be appropriately duplicated

8. LAND USE CHARACTER OF SURROUNDING AREA

Using the associated number of the relevant current land use or prominent feature from the table below, fill in the position of these land-uses in the vacant blocks below which represent a 500m radius around the site

1. Vacant land	2. River, stream, wetland	3. Nature conservation area	4. Public open space	5. Koppie or ridge
6. Dam or reservoir	7. Agriculture	8. Low density residential	9. Medium to high density residential	10. Informal residential
11. Old age home	12. Retail	13. Offices	14. Commercial & warehousing	15. Light industrial
16. Heavy industrial[AN]	17. Hospitality facility	18. Church	19. Education facilities	20. Sport facilities
21. Golf course/polo fields	22. Airport[N]	23. Train station or shunting yard[N]	24. Railway line[N]	25. Major road (4 lanes or more)[N]
26. Sewage treatment plant[A]	27. Landfill or waste treatment site[A]	28. Historical building	29. Graveyard	30. Archeological site
31. Open cast mine	32. Underground mine	33. Spoil heap or slimes dam[A]	34. Small Holdings	

NOTE: Each block represents an area of 250m X250m

NORTH

8,9	9,8	34, 2	34	34
8	8	2,34	34	34
8	8		5,34	5,34
8	8	2,8	1,34	34
9	8,9	8,2	9	34

WEST EAST

SOUTH

= Site

Note: More than one (1) Land-use may be indicated in a block

Have specialist reports been attached YES NO

If yes indicate the type of reports below

- Fauna and Flora assessment
- Wetland ecological Assessment
- Noise impact assessment
- Geotechnical assessment

9. SOCIO-ECONOMIC CONTEXT

According to the City of Tshwane Metropolitan Municipality Spatial Development Framework, 2012, the site is located in Region 6 which is popular for retail as well as office functions as many of the higher category retail and office functions of the City have relocated to this region over the past few years. This region accommodates some of the city's most affluent citizens, though it is important to note that there is a clear distinction between the southern and northern sections of the region, the northern section being less developed and having less economic opportunities and thus a higher unemployment rate. The southern section (which extends to the site), on the other hand, continues to develop at a rapid pace, with many investors vying to locate their businesses in that area. The region as a whole is well serviced but will eventually require upgrades if the development in the area continues at the same pace.

High order residential developments have taken place within the vicinity of the application area. Infrastructure provisions and upgrades as well as complementary developments are required to services the increasing population and business uses in the area.

10. CULTURAL/HISTORICAL FEATURES

Are there any signs of culturally (aesthetic, social, spiritual, environmental) or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including archaeological or palaeontological sites, on or close to the site?	YES	NO
If YES, explain:		

If uncertain, the Department may request that specialist input be provided to establish whether there is such a feature(s) present on or close to the site.

Briefly explain the findings of the specialist if one was already appointed:

Will any building or structure older than 60 years be affected in any way?	YES	NO
Is it necessary to apply for a permit in terms of Act 25 of 1999?	YES	NO

If yes, please attached the comments from SAHRA in the appropriate Appendix

SECTION C: PUBLIC PARTICIPATION

1. ADVERTISEMENT

The following was undertaken in respect of public participation process: –

1(a) site notices were affixed at prominent positions. A copy of the notice is attached in **Appendix E**;

1(b) landowners and occupiers of adjacent land were informed of the applicant's intention to submit an application to the competent authority;

1(c) landowners and occupiers of land within 100 metres of the proposed Atterbury Road extension were informed of the applicant's intention to submit an application to the competent authority;

1(d) the ward councillor and adjacent HOA were informed of the applicant's intention to submit an application to the competent authority;

1(e) the municipality, as the applicant, is aware of the application; and

1(f) organ of state that may have jurisdiction over any aspect of the activity were informed of the applicant's intention to submit an application to the competent authority, and

1(g) An advert was placed in the Beeld newspaper to inform potential I&AP of the application.

2. LOCAL AUTHORITY PARTICIPATION

Local authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input. The planning and the environmental sections of the local authority must be informed of the application at least thirty (30) calendar days before the submission of the application to the competent authority (GDARD).

Has any comment been received from the local authority? **YES** / NO

If "YES", briefly describe the comment below (also attach any correspondence to and from the local authority to this application):

The CTMM is the applicant in this matter. However, Notice of this application was served on the Environment Section of the CTMM. Further, the Draft Basic Assessment Report was submitted to the City of Tshwane Environment Section for comments.

If "NO" briefly explain why no comments have been received

3. CONSULTATION WITH OTHER STAKEHOLDERS

Any stakeholder that has a direct interest in the activity, site or property, such as servitude holders and service providers, should be informed of the application at least thirty (30) calendar days before the submission of the application and be provided with the opportunity to comment.

Has any comment been received from stakeholders? **YES** / NO

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

As can be seen from the preliminary Issues and Response Register attached as **Appendix E** most of the adjacent property owners registered support for the road given the adverse environmental and other conditions presented by the current dirt road. Examples are given below:

- As a community of Swavelnest Estate we have over the last 5years repeatedly tried to get the road tarred and will be very happy if there is any hope for the project to be finalized.
- This road has become extremely busy and is such an environmental problem. Besides the bad dust, in the rainy seasons the muddy road gets really bad and sometimes impossible to drive on without getting stuck in the mud.
- Please can we find a solution to minimize the dust in this area. eg. Water tanks. It has become extremely bad! Not sure when if it will be tared soon. Hoping and praying! The traffic on these roads have increased tremendously, making it even more dusty in the area.

Other inputs sought clarity on the nature of the road proposed, the timing and potential impacts on their properties.

4. GENERAL PUBLIC PARTICIPATION REQUIREMENTS

The public participation was undertaken in accordance with the Regulations.

Records of comments received and responses to each comment of the public / interested and affected are captured in a Comments and Responses Report as prescribed in the regulations and be attached to this application.

5. APPENDICES FOR PUBLIC PARTICIPATION

All public participation information is to attached in the Appendix E and is ordered as detailed below

Appendix E_1 – Proof of site notice

Appendix E_2 – Written notices issued to those persons detailed in 1(b) to 1(f) above

Appendix E_3 – Proof of newspaper advertisements

Appendix E_4 –Communications to and from persons detailed in Point 2 and 3 above

Appendix E_5 – Minutes of any public and/or stakeholder meetings

Appendix E_6 - Comments and Responses Report

Appendix E_7 –Comments from I&APs on Basic Assessment (BA) Report

Appendix E_8 –Comments from I&APs on amendments to the BA Report

Appendix E_9 – Copy of the register of I&APs

Appendix E_{10} – Comments from I&APs on the application

SECTION D: RESOURCE USE AND PROCESS DETAILS

Section D has been duplicated for alternatives 2 times

SECTION D: ALTERNATIVE NO. 1 (PROPOSAL)

1. WASTE, EFFLUENT, AND EMISSION MANAGEMENT

Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase? YES / NO

If yes, what estimated quantity will be produced per month? 100 m³

How will the construction solid waste be disposed of (describe)?

The construction waste will be removed and transported to the nearest registered Municipal Dumping Site

Where will the construction solid waste be disposed of (describe)?

All construction solid waste will be disposed of at the nearest registered Municipal Dumping Site. No solid waste will be dumped on surrounding open areas or adjacent properties.

Will the activity produce solid waste during its operational phase? YES / NO

If yes, what estimated quantity will be produced per month? m³

How will the solid waste be disposed of (describe)?

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity? YES / NO

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

Insignificant amount – no special permission needed

Note: If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation? YES / NO

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility? YES / NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:

Liquid effluent (other than domestic sewage)

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system? YES / NO

If yes, what estimated quantity will be produced per month? m³

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the liquid effluent to be generated by this activity(ies)? YES / NO

Will the activity produce any effluent that will be treated and/or disposed of on site? Yes / NO

If yes, what estimated quantity will be produced per month? m³

If yes describe the nature of the effluent and how it will be disposed.

Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA

Will the activity produce effluent that will be treated and/or disposed of at another facility? YES / NO

If yes, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		Cell:	
E-mail:		Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system?	YES	NO
If yes, what estimated quantity will be produced per month?		m^3
If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity(ies)?	YES	NO
Will the activity produce any effluent that will be treated and/or disposed of on site?	YES	NO

If yes describe how it will be treated and disposed off.

Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	YES	NO
If yes, is it controlled by any legislation of any sphere of government?	YES	NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If no, describe the emissions in terms of type and concentration:

The only emissions as a result of the development will be emissions of the vehicles that will use the road. Not allowing the road will not result in any decrease in the traffic or traffic emissions in the area. Without the road traffic congestion on alternative routes will cause a concentration of emissions rather than the dispersal of lower concentrations of emissions.

2. WATER USE

Indicate the source(s) of water that will be used for the activity

municipal	Directly from water board	groundwater	river, stream, dam or lake	other	
					the activity will not require any significant water

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month: litres

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix

Does the activity require a water use permit from the Department of Water Affairs?	YES	NO

If yes, list the permits required

A section 21 Water-Use License will be required from the DWA

If yes, have you applied for the water use permit(s)?	Application is currently being prepared by Specialists	NO
If yes, have you received approval(s)? (attached in appropriate appendix)	YES	NO

3. POWER SUPPLY

Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source

Municipality - for street lighting

If power supply is not available, where will power be sourced from?

Not applicable

4. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Municipality will manage streetlights in an efficient manner.

Describe how alternative energy sources have been taken into account or been built into the design of the activity

SECTION D: ALTERNATIVE NO. 2 (BRIDGE DESIGN)

1. WASTE, EFFLUENT, AND EMISSION MANAGEMENT

Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase? **YES** / NO

If yes, what estimated quantity will be produced per month? 60 m³

How will the construction solid waste be disposed of (describe)?

The construction waste will be either used on site or (excess) removed to the nearest registered Municipal Dumping Site

Where will the construction solid waste be disposed of (describe)?

Construction waste that cannot be re-used on site will be disposed of at the nearest registered Municipal Dumping Site. No solid waste will be dumped on surrounding open areas or adjacent properties.

Will the activity produce solid waste during its operational phase? YES / **NO**

If yes, what estimated quantity will be produced per month? m³

How will the solid waste be disposed of (describe)?

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity? YES / **NO**

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

Insignificant amount – no special permission needed

Note: If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation? YES / **NO**

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility? YES / **NO**

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:

Liquid effluent (other than domestic sewage)

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system? YES / **NO**

If yes, what estimated quantity will be produced per month? m³

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the liquid effluent to be generated by this activity(ies)? YES / NO

Will the activity produce any effluent that will be treated and/or disposed of on site? Yes / NO

If yes, what estimated quantity will be produced per month? m³

If yes describe the nature of the effluent and how it will be disposed.

Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA

Will the activity produce effluent that will be treated and/or disposed of at another facility? YES / **NO**

If yes, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		Cell:	
E-mail:		Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system? YES / **NO**

If yes, what estimated quantity will be produced per month? m³

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity(ies)? YES / NO

Will the activity produce any effluent that will be treated and/or disposed of on site?	YES	**NO**

If yes describe how it will be treated and disposed off.

Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	YES	**NO**
If yes, is it controlled by any legislation of any sphere of government?	YES	NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If no, describe the emissions in terms of type and concentration:

The only emissions that will be as a result of the development will be emissions of the vehicles that will use the road. The prevention of the extension to the road will not result in any decrease in the traffic or traffic emissions in the area. Without the road traffic congestion on alternative routes will cause a concentration of emissions rather than the dispersal of lower concentrations of emissions.

2. WATER USE

Indicate the source(s) of water that will be used for the activity

municipal	Directly from water board	groundwater	river, stream, dam or lake	other	the activity will not require any significant water

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month: liters

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix

Does the activity require a water use permit from the Department of Water Affairs?	**YES**	NO

If yes, list the permits required

A section 21 Water-Use License will be required from the DWA

If yes, have you applied for the water use permit(s)?	Application will be prepared	NO
If yes, have you received approval(s)? (attached in appropriate appendix)	YES	**NO**

3. POWER SUPPLY

Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source

Municipality – for street lighting

If power supply is not available, where will power be sourced from?

Not applicable

4. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Municipality will manage streetlights in an efficient manner

Describe how alternative energy sources have been taken into account or been built into the design of the activity

SECTION D: ALTERNATIVE 3 (ALIGNMENT ALONG K40)

1. WASTE, EFFLUENT, AND EMISSION MANAGEMENT

Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase? **YES** / NO

If yes, what estimated quantity will be produced per month? ±1000 m³

How will the construction solid waste be disposed of (describe)?

The construction waste will either be used on site or (excess) removed to the nearest registered Municipal Dumping Site

Where will the construction solid waste be disposed of (describe)?

Construction waste that cannot be re-used on site will be disposed of at the nearest registered Municipal Dumping Site. No solid waste will be dumped on surrounding open areas or adjacent properties.

Will the activity produce solid waste during its operational phase? YES / **NO**

If yes, what estimated quantity will be produced per month? m³

How will the solid waste be disposed of (describe)?

Has the municipality or relevant service provider confirmed that sufficient air space exists for treating/disposing of the solid waste to be generated by this activity? YES / **NO**

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

Insignificant amount – no special permission needed

Note: If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation? YES / **NO**

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility? YES / **NO**

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Describe the measures, if any, that will be taken to ensure the optimal reuse or recycling of materials:

Liquid effluent (other than domestic sewage)

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system? YES / **NO**

If yes, what estimated quantity will be produced per month? m³

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the liquid effluent to be generated by this activity(ies)? YES / NO

Will the activity produce any effluent that will be treated and/or disposed of on site? Yes / NO

If yes, what estimated quantity will be produced per month? m³

If yes describe the nature of the effluent and how it will be disposed.

Note that if effluent is to be treated or disposed on site the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA

Will the activity produce effluent that will be treated and/or disposed of at another facility? YES / **NO**

If yes, provide the particulars of the facility:

Facility name:			
Contact person:			
Postal address:			
Postal code:			
Telephone:		Cell:	
E-mail:		Fax:	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

Liquid effluent (domestic sewage)

Will the activity produce domestic effluent that will be disposed of in a municipal sewage system? YES / **NO**

If yes, what estimated quantity will be produced per month? m³

If yes, has the municipality confirmed that sufficient capacity exist for treating / disposing of the domestic effluent to be generated by this activity(ies)? YES / NO

Will the activity produce any effluent that will be treated and/or disposed of on site?	YES	NO

If yes describe how it will be treated and disposed off.

Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	YES	NO
If yes, is it controlled by any legislation of any sphere of government? If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.	YES	NO

If no, describe the emissions in terms of type and concentration:

The only emissions that will be as a result of the development will be emissions of the vehicles that will use the road. The prevention of the extension to the road will not result in any decrease in the traffic or traffic emissions in the area. Without the road traffic congestion on alternative routes will cause a concentration of emissions rather than the dispersal of lower concentrations of emissions.

2. WATER USE

Indicate the source(s) of water that will be used for the activity

municipal	Directly from water board	groundwater	river, stream, dam or lake	other	the activity will not require significant water

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month: litres

If Yes, please attach proof of assurance of water supply, e.g. yield of borehole, in the appropriate Appendix

Does the activity require a water use permit from the Department of Water Affairs?	YES	NO

If yes, list the permits required

A section 21 Water-Use License will be required from the DWA

If yes, have you applied for the water use permit(s)?	Application will be prepared by Water Use Specialists	NO
If yes, have you received approval(s)? (attached in appropriate appendix)	YES	NO

3. POWER SUPPLY

Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source

Municipality – for street lighting

If power supply is not available, where will power be sourced from?

Not applicable

4. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Municipality will manage streetlights in an efficient manner.

Describe how alternative energy sources have been taken into account or been built into the design of the activity

SECTION E: IMPACT ASSESSMENT

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES- SUMMARY

The Public Participation Process for the proposed Atterbury Road Extension and associated infrastructure was undertaken in accordance with the Regulations, 2010.

The proposed activity was advertised in the Beeld newspaper on 17 July 2014 **(Refer to Appendix E3 – Proof of Newspaper advertisement)**. Site notices were also erected on prominent points on the application site on 18 July 2014 **(Refer to Appendix E1 – Proof of Site Notices)**. Furthermore notices were also distributed to residents, land owners, tenants and stakeholders in the surrounding area **(Refer to Appendix E2 – Written Notices)**.

It is the opinion of Bokamoso that the Public participation was extensive and transparent and ensured the I&AP were notified and the latter had the opportunity to raise comments or issues regarding the proposed development which were subsequently addressed and possible mitigation measures incorporated.

A full response must be provided in the Comments and Response Report.

See under Appendix E6: Comments and Response Report

2. IMPACTS THAT MAY RESULT FROM THE CONSTRUCTION AND OPERATIONAL PHASE

Brief description of the methodology utilised in the rating of significance of impacts

The significance methodology used by Bokamoso is presented to Environmental Consultants as part of impact assessments courses. No methodology can be absolutely accurate to a numerical value where the environment is concerned. Numerical values are only an indication of the significance or severance of impacts. While the methodology only acts as a guideline, experience in the field together with the methods are used in order to reach a realistic significance of impacts.

The significance of Environmental Impacts were assessed in accordance with the following method:

A) Significance:

- ☐ Improbable - Low possibility of impact to occur either because of design or historic experience
- ☐ Probable - Distinct possibility that impact will occur
- ☐ Highly probability - Most likely that impact will occur.
- ☐ Definite - Impact will occur, in the case of adverse impacts regardless of any prevention measures.

B) Intensity factor:

- ☐ Low intensity - Natural and manmade functions not affected
- ☐ Medium intensity - Environment affected but natural

		and manmade functions and processes continue
❑ High intensity	-	Environment affected to the extent natural or manmade functions are altered to the extent that it will temporarily or permanently cease
C) Duration:		
❑ Short term	-	<1 to 5 years - Factor 2
❑ Medium term	-	5 to 15 years - Factor 3
❑ Long term	-	impact will only cease after the operational life of the activity, because of natural process or by human intervention.
❑ Permanent	-	mitigation, either by natural process or by human intervention, will not occur in such a way or in such a time span that the impact can be considered transient

Comparative potential impacts, their significance rating, proposed mitigation and significance rating after mitigation that are likely to occur as a result of the construction phase for the various alternatives of the proposed development.

Alternative 1(Proposal):

Construction of a new single carriage-way road with one lane per direction, 900m in length with a single span bridge of 23m (made of precast concrete beams with cast in-situ slab type deck made composite with precast planks) over the Swavelpoort Spruit, and associated infrastructure.

Potential impacts:	Significance rating of impacts:	Proposed mitigation:	Significance rating of impacts after mitigation:
Positive Impacts			
Eradication of invasive species	**Medium**	No mitigation needed	**Medium**
Temporary jobs created	**Low**	No mitigation needed	**Low**
Operational- accessibility and reduction in traffic congestion	**High**	No mitigation needed	**High**
Reduction in air pollution caused by dust generation	**High**	No mitigation needed	**High**
Contribute to positive image of adjacent properties	**Medium**	No mitigation needed	**Medium**
Negative Impacts			
The clearing of the site and the construction of the road and bridge will result in the clearing of the existing vegetation and soil cover.	**Medium**	-The flora specialist identified areas that are regarded as sensitive. These should not be cleared if not located within the road alignment;	**Low**

		-These areas must be properly managed throughout the construction phase in terms of fire, eradication of exotics etc. to ensure continuous biodiversity; -Areas regarded as sensitive should be marked out prior to construction and be fenced-off (by barrier tape/ temporary construction fence) until the works have been completed; -As little as possible of the vegetation cover to be cleared to prevent erosion on site; and only sections that are intended for the additional lane must be cleared from vegetation.	
Topsoil will be lost due to excavations.	**Medium**	- Excavations on site must be kept to a minimum and done in one section at a time. Excavated soils must be stockpiled on the demarcated areas on site. - Erosion berms must be installed during construction to prevent gully formation.	**Low**
Stability of slopes	**Medium**	- Stabilisation of river banks in the vicinity of the bridge crossing by either employing one of the individual techniques below or a combination thereof, including: ✓ Re-sloping of banks to a maximum of a 1:3 slope; ✓ Re-vegetation of re-profiled slopes; ✓ Temporary stabilisation of slopes using geotextiles; and ✓ Installation of gabions and reno mattresses.	**Low**
Construction during the dry and windy season could cause dust pollution.	**Low**	The construction site must be damped down on a regular basis (once in the morning and once in the afternoon) with water to prevent dust formation. Frequency to be increased during dry and windy periods.	**Low / none**
The hydrology and river system of the study area, affected especially at the drainage line crossing. Changes in the flowing	**Medium to high**	- The proposed bridge span must allow for the free flow of water and must be designed to cause minimum disruption of the ecosystems associated	**Medium to low**

patterns of the water could have a negative impact on the ecological and wetland systems associated with the drainage line. Such negative impacts can eventually have a negative impact on the larger open space system to which the drainage line is linked.		with the drainage line. The proposed earth embankment must not have a negative impact on the floodline. - The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas; - The bridge design must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active channel, - Stabilisation of river banks and slopes in the vicinity of the bridge crossing.	
Impact on stream flow and aquatic system	**High**	- The bridge should, as far as possible, be placed on an existing bedrock outcrop within the riparian zone in order to limit the impact of the structure on stream flow and substrate and aquatic and wetland function and service provision; - The bridge design must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active channel	**Medium**
Contamination of water resources and soils due to spillages of oils/hazardous substances	**High**	- The contractor to provide method statements on the protocols to be followed, and contingencies to be put in place for the following potential incidents before construction may begin: Contamination of natural water resources from spills; contamination of soils from spills; and fire - Hazardous substances must be confined to specific and secured areas within the contractor's camp, and in a way that does not pose a danger of pollution even during times of high rainfall.	**Medium**

		The specific area may not be close to the riparian zone at any time. These areas must be imperviously bunded with adequate containment (at least 1.5 times the volume of the fuel) for potential spills or leaks. - Drip trays (minimum of 10cm deep) must be placed under all vehicles that stand for more than 24 hours. Vehicles suspected of leaking must not be left unattended, drip trays must be utilized.	
Excavated materials that are stockpiled in wrong areas can interfere with the natural drainage, cause siltation and water pollution.	**High**	An area(s) must be allocated for stockpiling of soil. These must be allocated before the construction takes place and must be situated away from any water source or drainage channels. A sediment fence or temporary barrier must be constructed around the stockpile to prevent soil from washing away by rain or any water.	**Low**
Disposal of building waste and liquids.	**Medium**	All waste created during the construction phase must be dumped at a pre-selected area on site to be carted to a registered landfill site on a weekly basis.	**Low**
Siltation, erosion and water pollution could occur in the water bodies lower down in the catchments area if a storm water management plan is not implemented.	**High**	A storm water management plan must be compiled for the construction and operational phases of the proposed development. Stormwater must be diverted away from areas susceptible to soil erosion.	**Low**
During the construction and operational phases (if not managed correctly) fauna species could be disturbed trapped, hunted or killed.	**Medium**	The contractor must ensure that no fauna species are disturbed, trapped or killed during the construction phase. Conservation orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance. Should rare or endangered fauna species be encountered during construction and operational phases of the development, these should be relocated to natural grasslands areas in the	**Low**

		vicinity.	
Stability of road	**Medium**	Precautionary measures and foundation design from involved geotechnical engineer must be implemented.	**Low**
Heavy vehicle traffic increase	**High**	The increase in heavy vehicles during construction will have an impact on the surrounding roads with an increased safety risk. Heavy construction vehicles must be instructed to use the main roads during off-peak hours. Safety signs should be erected around the site to indicate and caution road users about the construction site. A traffic regulator could be used on peak traffic times to regulate the traffic.	**Low**
Construction work could cause water pollution, siltation, soil compaction and soil erosion.	**High**	- The construction activities must be kept to one area at a time to prevent excessive open soil areas that could lead to soil erosion, siltation and excessive compaction. All soil compaction must be alleviated after construction before rehabilitation and landscaping of the site. - Install erosion berms during construction to prevent gully formation. Berms every 50m should be installed where any disturbed soils have a slope of less than 2%, every 25m where the track slopes between 2% and 10%, every 20m where the track slopes between 10% and 15% and every 10m where the track slope is greater than 15%;	**Low**
Veld fires may cause damage to infrastructure, neighbouring properties, cause loss of vegetation and fauna.	**Medium**	A specific area on site must be allocated, for fires for construction workers. This allocated area must have the least impact on the environment and surrounding landowners and must be far from any structures. No fires may be lit except in the designated location.	**None**
During the construction phase some safety and security problems (especially for the surrounding residents) are likely to occur.	**Medium**	Construction programme must be completed within the allocated time. No construction worker or relative may reside on the application site during the construction phase. All	**Low**

		construction workers must leave the site at the end of the day's work. A security guard should be appointed on site to prevent any security problems.	
The construction vehicles, the site camp and other construction related facilities will have a negative visual impact during the construction phase.	**Medium**	- Before construction, an area on site must be demarcated for a site camp. The location must have the least possible visual impact on the surrounding properties.	**Low**
Noise pollution from construction and operation can disturb residents of the study area.	**Medium**	- Construction works must comply with the Provincial noise requirements as outlined in the Provincial Notice No. 5479 of 1999: Gauteng Noise Control Regulations. - Noisy activities shall only take place during working hours. - Noise attenuation measures as suggested by the noise specialist must be implemented	**None**
Built up of settlement as workers sleep on the site.	**Medium**	No workers should be allowed to sleep on the site. Only security guard will be allowed to guard the construction site at night.	**Low**
Informal settlements (squatting) before construction commences or after construction.	**Low**	No construction worker, friend or relative may settle on site. Security guards may be present on site after construction hours.	**None**
Temporary detour lanes / lane closures of existing sub-standard road	**Medium**	No mitigation possible. Traffic to be informed about detour lanes/ closures during the construction phase. Any temporary road must be within disturbed areas and limit impact on sensitive environments include the river system	**Low**
Surface water flows will be altered during the construction phase.	**High**	- A stormwater management plan must be compiled for the construction and operational phases of the activity. - Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage - The bridge design must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active	**Medium**

		channel.	
No erosion protection at release points of water (especially during the rainy season)	**Medium**	The storm water management plan to be compiled must also address protection at release points.	**Low**
Blasting exercises	**High**	- Controlled blasting can only take place with appropriate notifications to the ECO and adjacent landowners - Where blasting is close to a road, Metro Police will be informed beforehand. Red flags, sirens and signs as required by applicable legislation to be erected/used.	**Medium-Low**
Security risk posed by bridge design	**Medium**	Permeable fencing that reduces the risk while allowing free flow of water can be used. This might cause problems during flood periods though.	**Low**

Alternative 2: Bridge Design

Extension of the Atterbury road with **cast in-situ 3x7m wide concrete culverts over the Swavelpoort Spruit**, and associated infrastructure

Potential impacts:	**Significance rating of impacts:**	**Proposed mitigation:**	**Significance rating of impacts after mitigation:**
Positive Impacts			
Eradication of invasive species	**Medium**	No mitigation needed	**Low**
Temporary job creation	**Low**	No mitigation needed	**Low**
Risk of unwanted access (through bridge opening)	**Medium**	Installation of security fence	**Medium**
Operational- accessibility and reduction in traffic congestion	**High**	No mitigation needed	**High**
Negative Impacts			
The clearing of the site and the construction of the road and bridge will result in the eradication of the existing vegetation and soil cover.	**Medium**	- Areas that are regarded as sensitive should be linked to natural open species on surrounding properties to establish connectivity; - These areas must be properly managed throughout the construction phase in terms of fire, eradication of exotics etc. to ensure continuous biodiversity; - Areas regarded as sensitive should be marked out prior to construction and be fenced-off	**Low**

		(by barrier tape/ temporary construction fence) until the upgrading works have been completed; -It is proposed that as little as possible of the vegetation cover to be cleared to prevent erosion on the application site; and	
Topsoil will be lost due to excavations.	**Medium**	- Excavations on site must be kept to a minimum and done in only one section at a time. Excavated soils must be stockpiled on the demarcated areas on site. - Install erosion berms during construction to prevent gully formation	**Low**
Stability of slopes	**Medium**	- Stabilisation of river banks in the vicinity of any bridge crossings by either employing one of the individual techniques below or a combination thereof, including: ✓ Re-sloping of banks to a maximum of a 1:3 slope; ✓ Revegetation of re-profiled slopes; ✓ Temporary stabilisation of slopes using geotextiles; and ✓ Installation of gabions and reno mattresses.	**Low**
Construction during the dry and windy season could cause dust pollution.	**Low**	The construction site must be damped down on a regular basis (once in the morning and once in the afternoon during the dry and windy season) with water to prevent dust formation.	**Low / none**
Impact on the hydrology and river system of the study area, especially at the drainage line crossing. Changes in the flowing patterns of the water could have a negative impact on the ecological and wetland systems associated with the drainage line. Such negative impacts can eventually have a negative impact on the larger open space system to which the drainage line	**High**	- Limit the impact of the culverts on the flow of water The proposed earth embankment must not have a negative impact on the floodline. - The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas; - Minimise the creation of turbulent flow in the system, in order to prevent downstream erosion.	**High**

is linked.		Footprint of support pillars within the active channel to be minimised. - Stabilisation of river banks and slopes in the vicinity of the bridge.	
Impact on stream flow and aquatic system	**High**	- The bridge should be placed on an existing bedrock outcrop within the riparian zone in order to limit the impact of the structure on streamflow and substrate and aquatic and wetland function and service provision; - The bridge design must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active channel	**High**
Stockpiled excavated materials can interfere with the natural drainage, cause siltation and water pollution.	**High**	An area must be allocated for stockpiling of topsoil. The area must be allocated before the construction takes place on the application site and must be situated away from any water source or drainage channels. A sediment fence or temporary barrier must be constructed around the stockpile to prevent soil from washing away by rain or any water.	**Low**
Disposal of building waste and liquids.	**Medium**	All waste created during the construction phase must be dumped at a pre-selected area on site to be carted to a registered landfill site on a weekly basis.	**Low**
Siltation, erosion and water pollution could occur in the water bodies lower down in the catchments area if a storm water management plan is not implemented.	**High**	A storm water management plan must be compiled for the construction and operational phases of the proposed development. Stormwater diversion away from areas susceptible to erosion.	**Low**
During the construction and operational phases (if not managed correctly) fauna species could be disturbed trapped, hunted or killed.	**Medium**	The contractor must ensure that no fauna species are disturbed, trapped or killed during the construction phase. Conservation orientated clauses should be built into contracts for construction personnel,	**Medium- Low**

		complete with penalty clauses for non-compliance. Should rare or endangered fauna species be encountered during construction and operational phases of the development, these should be relocated to natural grasslands areas in the vicinity.	
Stability of road	**Medium**	Precautionary measures and foundation design from involved geotechnical engineer must be implemented.	**Low**
Heavy vehicle traffic increase	**High**	Although a temporary impact, the increase in heavy vehicles will have a dramatic impact on the surrounding roads with an increased safety risk. Heavy construction vehicles must be instructed to use the main roads during off-peak hours. Safety signs should be erected around the site to indicate and caution road users about the construction site. A traffic regulator could be used on peak traffic times to regulate the traffic.	**Low**
Construction work could cause water pollution, siltation, soil compaction and soil erosion.	**High**	- Construction must be kept to one area at a time to prevent excessive open soil areas that could lead to soil erosion, siltation and excessive compaction. - All soil compaction must be alleviated after construction before rehabilitation and landscaping of the site. - Install erosion berms during construction to prevent gully formation. Berms every 50m should be installed where any disturbed soils have a slope of less than 2%, every 25m where the track slopes between 2% and 10%, every 20m where the track slopes between 10% and 15% and every 10m where the track slope is greater than 15%.	**Medium**
Veld fires may cause damage to infrastructure, neighbouring properties, cause loss of vegetation and fauna.	**Medium**	A specific area on site must be allocated, for fires for construction workers. This allocated area must have the least impact on the environment and surrounding landowners and must be far from any	**None**

		structures. No fires may be lit except in the designated location.	
During the construction phase some safety and security problems (especially for the surrounding residents) are likely to occur.	**Medium**	Construction must be completed in as short time as possible. No construction worker or relative may reside on the application site during the construction phase. All construction workers must leave the site at the end of the day's work. A security guard should be appointed on site to prevent any security problems.	**Low**
The construction vehicles, the site camp and other construction related facilities will have a negative visual impact during the construction phase.	**Medium**	Before construction; an area on site must be demarcated for a site camp. The location must have the least possible visual impact on the surrounding neighbours.	**Low**
Noise pollution from construction and operation can disturb residents of the study area.	**Medium**	- Site Workers must comply with the Provincial noise requirements as outlined in the Provincial Notice No. 5479 of 1999: Gauteng Noise Control Regulations. -Noise activities shall only take place during working hours. -Noise attenuation measures as suggested by specialist must be implemented	**None**
Workers sleep on site.	**Medium**	No workers should be allowed to sleep on the site. Only security guard will be allowed to guard the construction site at night.	**Low**
Potential for unplanned informal settlements (squatting) before, during and after construction. The likelihood of informal vending and prostitution also exists.	**Low**	No construction worker, friend or relative may settle on site. Security guards may be present on site after construction hours.	**None**
Temporary detour lanes / lane closures of existing sub-standard road	**Medium**	No mitigation possible. Traffic to be informed about detour lanes/ closures during the construction phase. Any temporary road must be within disturbed areas and limit impact on sensitive environments include the river system	**Low**
Surface water flows will be altered during the construction and operational phase.	**High**	- A storm water management plan must be compiled for the construction and operational phases of the activity.	**High-Medium**

		- Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage - The crossing design must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active channel	
Erosion at release points of water (especially during the rainy season)	**Medium**	The storm water management plan to be compiled must also address protection at release points.	**Low**
Uncontrolled veld fires may cause damage to infrastructure, cause loss of vegetation and fauna	**Medium**	The study area is situated immediately adjacent to residential areas and vacant areas therefore no uncontrolled fires should be permitted on the site.	**Low**
Blasting exercises	**High**	- Controlled blasting can only take place with appropriate notifications to the ECO and adjacent landowners - Where blasting is close to a road, Metro Police will be informed beforehand. Red flags, sirens and signs as required by applicable legislation to be erected/used.	**Medium-Low**
Security risk posed by bridge design	**Medium**	Permeable fencing that reduces the risk while allowing free flow of water can be used. This might cause problems during flood periods though.	**Low**

Alternative 3: Utilisation of the K40 alignment

Instead of utilising the existing dirt road and construction of approximately 900m of a new road, utilisation is made of the existing alignment of the K40 and the construction of approximately 4.7km of a new road. This alignment will result in two bridges, cut across mostly C-Plan sensitive areas and affect a number of existing properties.

Potential impacts:	**Significance rating of impacts:**	**Proposed mitigation:**	**Significance rating of impacts after mitigation:**
Positive Impacts			
Eradication of invasive species	**Medium**	No mitigation needed	**Medium**
Temporary jobs created during construction	**Medium**	No mitigation needed	**Medium**

Operational- accessibility and reduction in traffic congestion	**Medium**	No mitigation needed	**Medium**
Utilisation of existing alignment and potential reduction in number of roads through the area	**Low**	Alignment already known	**Low**
Negative Impacts			
Increased property deprivation and social costs	**High**	- Road to follow the existing alignment and limit the size of the road reserve. - Compensation to be paid for properties affected by the alignment.	**High**
Increased financial costs, lead times and delays to implementation	**High**	- Staggered/phased implementation to be considered to reduce the financial outlay required; - Efficiency in application processes, negotiation with affected property owners and scheduling to be emphasized	**High**
The extent of the road and the number of crossings of streams will result in large areas cleared of vegetation and increased impacts on the wetlands/streams	**High**	-Limit the clearance to development areas. Sensitive areas should be linked to natural open species on surrounding properties to establish connectivity; -These areas must be properly managed throughout the construction phase in terms of fire, eradication of exotics etc. to ensure continuous biodiversity; -Areas regarded as sensitive should be marked out prior to construction and be fenced-off (by barrier tape/ temporary construction fence) until the upgrading works have been completed; -Little as possible of the vegetation cover to be cleared to prevent erosion on the application site; and.	**Medium**
Impact on fauna and flora	**High**	The road affects ecological support areas as well as irreplaceable sites. Therefore: - Clearance areas must be limited; - Confirmed habitats and primary grassland areas must be protected; - Alignment redesign to protect sensitive areas; -	**Medium**

Topsoil will be lost due to excavations.	**Medium**	- Although some of the areas are already disturbed, excavations on site must be kept to a minimum and done in only one section at a time. Excavated soils must be stockpiled on the demarcated areas on site. - Install erosion berms during construction to prevent gully formation	**Low**
Stability of slopes	**Medium**	- Stabilisation of river banks in the vicinity of any bridge crossings by either employing one of the individual techniques below or a combination thereof, including: ✓ Re-sloping of banks to a maximum of a 1:3 slope; ✓ Re-vegetation of re-profiled slopes; ✓ Temporary stabilisation of slopes using geotextiles; and ✓ Installation of gabions and reno mattresses.	**Low**
Construction during the dry and windy season could cause dust pollution.	**Low**	The construction site must be damped down on a regular basis (once in the morning and once in the afternoon during the dry and windy season) with water to prevent dust formation.	**Low / none**
Impact on the hydrology and river system of the study area, especially at the drainage line crossings. Changes in the flowing patterns of the water could have a negative impact on the ecological and wetland systems associated with the streams. Such impacts can eventually have a negative impact on the larger open space system to which the drainage lines are linked.	**High**	- The designs of the bridges to allow for the free flow of water and must be designed to cause minimum disruption of the ecosystems associated with the streams. - The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas; - The bridges must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active channel - Stabilisation of river banks and slopes in the vicinity of the bridges.	**Medium**
Impact on stream flow and	**High**	- The bridges should be	**Medium**

aquatic system		placed on an existing bedrock outcrop within the riparian zone in order to limit the impact of the structure on stream flow and substrate and aquatic and wetland function and service provision; - The crossing design must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active channel	
Excavated materials that are stockpiled in the wrong areas can interfere with the natural drainage, cause siltation and water pollution.	**High**	Areas must be allocated for stockpiling of topsoil. The areas must be allocated along the alignment before construction takes place. These must be situated away from any water source or drainage channels. Sediment fences or temporary barriers must be constructed around the stockpile to prevent soil from washing away by rain or any water.	**Low**
Disposal of building waste and liquids.	**Medium**	All waste created during the construction phase must be stored at a pre-selected area on site to be carted to a registered landfill site on a weekly basis.	**Low**
During the construction and operational phases (if not managed correctly) fauna species could be disturbed trapped, hunted or killed.	**Medium**	The contractor must ensure that no fauna species are disturbed, trapped or killed during the construction phase. Conservation orientated clauses should be built into contracts for construction personnel, complete with penalty clauses for non-compliance. Should rare or endangered fauna species be encountered during construction and operational phases of the development, these should be relocated to natural grasslands areas in the vicinity.	**Low**
Stability of road	**Medium**	Precautionary measures and foundation design from involved geotechnical engineer must be implemented.	**Low**
Heavy vehicle traffic increase	**High**	Although a temporary impact, the increase in heavy vehicles will have a dramatic impact on	**Medium**

		the surrounding roads with an increased safety risk. Heavy construction vehicles must be instructed to use the main roads during off-peak hours. Safety signs should be erected around the site to indicate and caution road users about the construction site. A traffic regulator could be used on peak traffic times to regulate the traffic.	
Construction work could cause water pollution, siltation, soil compaction and soil erosion.	**High**	- Construction must be kept to one area at a time to prevent excessive open soil areas that could lead to soil erosion, siltation and excessive compaction. All soil compaction must be alleviated after construction before rehabilitation and landscaping of the site. - Install erosion berms during construction to prevent gully formation. Berms every 50m should be installed where any disturbed soils have a slope of less than 2%, every 25m where the track slopes between 2% and 10%, every 20m where the track slopes between 10% and 15% and every 10m where the track slope is greater than 15%;	**Low**
During the construction phase some safety and security problems (especially for the surrounding residents) are likely to occur.	**Medium**	Construction must be completed in as short time as possible. No construction worker or relative may reside on the application site during the construction phase. All construction workers must leave the site at the end of the day's work. A security guard should be appointed on site to prevent any security problems.	**Low**
The construction vehicles, the site camp and other construction related facilities will have a negative visual impact during the construction phase.	**Medium**	Before construction; an area on site must be demarcated for a site camp. The location must have the least possible visual impact on the surrounding neighbours.	**Low**
Noise pollution from construction and operation can disturb residents of the study area.	**Medium**	- Site Workers must comply with the Provincial noise requirements as outlined in the Provincial Notice No. 5479 of 1999:	**None**

		Gauteng Noise Control Regulations. - Noise activities shall only take place during working hours. - Noise attenuation measures as suggested by specialist must be implemented	
Workers sleep on the site.	**Medium**	No workers should be allowed to sleep on the site. Only security guard will be allowed to guard the construction site at night.	**Low**
Any proposed development offers the potential for unplanned informal settlements (squatting) before construction commences or after construction. The likelihood of informal vending and prostitution also exists.	**Low**	No construction worker, friend or relative may settle on site. Security guards may be present on site after construction hours.	**None**
Surface water flows will be altered during the construction phase.	**High**	- A stormwater management plan must be compiled for the construction and operational phases of the activity. - Limit the footprint area of the construction activities to what is absolutely essential in order to minimise environmental damage - The crossing design must ensure that the creation of turbulent flow in the system is minimised, in order to prevent downstream erosion. No support pillars should be constructed within the active channel.	**Medium**
No erosion protection at release points of water (especially during the rainy season)	**Medium**	The stormwater management plan to be compiled must also limit erosion at release points.	**Low**
Blasting exercises	**High**	- Controlled blasting can only take place with appropriate notifications to the ECO and adjacent landowners. - Where blasting is close to a road, Metro Police will be informed beforehand. Red flags, sirens and signs as required by applicable legislation to be	**Medium**

		erected/used.	
Security risk posed by bridge design	**Medium**	Permeable fencing that reduces the risk while allowing free flow of water can be used. This might cause problems during flood periods though.	**Medium**

Specialist Reports used:

- Red-data species biological assessment of the Atterbury Road Extension.
- Wetland ecological assessment
- Noise study for Environmental Impact Assessment: Proposed Extension of Atterbury Road, City of Tshwane

3. IMPACTS THAT MAY RESULT FROM THE DECOMMISSIONING AND CLOSURE PHASE

Although no decommission is envisaged in the long-term, the table below presents potential impacts and mitigation measures should this take place in future. Only one comparative table is provided for both alternatives as the potential impacts and their mitigation measures are the same, although more pronounced for Alternative 2.

Potential Impacts:	**Significance rating of impacts:**	**Proposed mitigation:**	**Significance rating of impacts after mitigation:**
Positive			
Temporary job opportunities created	**Medium**	No mitigation	**Medium**
Re-establishment of natural vegetation (long-term)	**Medium**	No mitigation	**Medium**
Connectivity and ecosystem establishment (long-term)	**Medium**	No mitigation	**Medium**
Negative			
Loss of accessibility	**High**	- Alternative routes/diversion	**High**
Traffic congestion on alternative routes	**High**	- Upgrades of alternative routes	**High**
Noise pollution	**High**	- Restricted working hours - Noise abatement measures implemented	**Medium**
Scaring of the affected land in the short-medium term	**High**	- Rehabilitation measures including planting of vegetation - Alternative use of site	**Low**
Dust mobilisation	**High**	- Dust control measures (water suppression, covers etc) - Avoid demolition during winter/windy months	**Medium**
Soil erosion	**High**	- Protection of exposed soils - Soil erosion prevention measures implemented especially during rainy season - Immediate rehabilitation of exposed areas.	**Medium**
Sediment mobilisation and	**High**	- Scheduling to avoid heavy	**Medium**

transport in short to medium term		rainfall periods - Mulching to stabilise exposed areas - Revevegetation of exposed areas - Prevention of offsite sediment transport by use of sediments ponds.	
Disturbance to wetland/river system in short to medium term	**High**	- Avoid works during high-flow periods - Limit movement into and across the stream to the essential - Diverting stream-flow to avoid mixing of water with high solid content	**Medium**
Slope stability	**High**	- Provide effective short-term measures for slope stabilisation, sediment control and subsidence control - Provide adequate drainage systems to minimise and control infiltration	**Low**
Generation and disposal of solid waste	**High**	- Part of material re-used on other construction sites - Limit disposal at landfills to non-recyclable material	**Medium**

List any specialist reports that were used to fill in the above tables.

- Wetland ecological assessment as part of the proposed Atterbury Road Extension
- Red-data species biological assessment of the Atterbury Road Extension
- Noise study for Environmental Impact Assessment: Proposed Extension of Atterbury Road, City of Tshwane

4. CUMULATIVE IMPACTS

Potential impacts that, on their own may not be significant, but is significant when added to the impact of other activities or existing impacts in the environment.

Should the proposed development be approved, the majority of cumulative impacts will be related to the construction phase:

a. Increase in noise pollution- construction only during daytime to reduce noise pollution and not upset residents of the area.
b. Water pollution:- measures to be put in place to limit water pollution, siltation and soil compression. Excavated materials to be stockpiled in designated areas to prevent interference with the natural drainage or cause siltation or water pollution.
c. Surface water flows will be altered during construction phase and this could impact negatively if no storm water management plan is implemented.
d. Dusty conditions may increase: -access roads to be checked and dust prevention measures implemented.
e. During the construction phase some safety and security problems (especially for the surrounding residents) are likely to occur.

These impacts can be mitigated if activities are correctly planned and measures are implemented to manage activities which could cause any negative cumulative impacts.

5. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that sums up the impact that the proposal and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

Proposal: Extension of the Atterbury Road through the construction of a 900m road up to the intersection with the proposed K147 including the bridge across the Swavelspoort Spruit and associated infrastructure.

The major impacts that is likely to occur during the construction and operational phase include the following:

- Bio-Physical Environment
  - In the short term, there will be loss of some of the natural vegetation as a result of site clearing and construction activities;
  - Topsoil will be lost due to erosion. Measures to minimise the loss of such as the reuse of topsoil in the construction of the road. Indigenous plants must be protected during construction;
  - In short term during construction and operation, the hydrology of the study area will be affected. This will be pronounced especially in the area where the bridge will be constructed;
  - During construction there could be incidences of dust pollution. This will be eliminated as the resultant road will be surfaced;
  - Eradication of invasive plants in the vicinity of the road alignment.
- Social Environment
  - Dangerous excavations can cause injury to people in the community if proper precautionary measures are not implemented during construction;
  - Safety and security problems during construction;
  - Increased traffic speed on the upgraded road during operation;
  - Increased traffic volumes (especially trucks) on the new access road;
  - Potential noise impacts during construction but not during operational phase as a result of attenuation measures implemented;
  - Dust pollution during the construction phase;
  - Provision of access to a major route that will be beneficial to the local area in the long term;
  - Elimination of dust pollution during the operational phase;
  - Upgraded Road with safe intersections and link to the K147 Road;
  - Provision of an improved emergency access;
- Economic Environment
  - The creation of job opportunities during the construction phase;
  - Decrease in fuel consumption and tail emissions because of less traffic congestion.
  - Efficient traffic movement in support of business and commuting activities in the area

Alternative 2: Construction of the 900m road, and instead of a single span bridge, a cast in-situ 3x7m wide concrete culverts over the Swavelpoort Spruit crossing and associated infrastructure

This alternative entails the construction of a 900m road to the intersection with the K147. Instead of a bridge spanning the river, a culvert system is used.

Although this alternative is cheaper compared to the other two, it has adverse environmental impacts as it will results in extensive construction and excavations within the river system. This will lead to damage of the river, the slopes and pollution downstream of the river. Compared with the Proposal, this alternative results in lower direct financial costs but higher environmental damage. This is because the damage to the river system will be additional to those identified if the Proposal is implemented.

Alternative 3: Construction of a 4.7km new road along the alignment of the K40.

This alternative entails the construction of a new road which will be 4.7km long along the alignment of the proposed K40 provincial road and part of the proposed K147 into the The Hills township. This alternative is the most expensive, has adverse environmental consequences and has high social costs. The major impacts likely to occur (which are additional to those identified above) include the following:

- Bio-Physical Environment
  - Due to the length of the road, there will be loss of some of the natural vegetation as a result of site clearing and construction activities;
  - Loss of habitat as the alignment cuts through a Critical biodiversity area, habitat for red listed plants and mammals as well as through primary vegetation;
  - The hydrology of the study area will be affected. This will be more pronounced given two bridges will have to be constructed;
  - Increased incidences of pollution due to the extensive road construction.
- Social Environment
  - Disturbance to the residential tranquility as the road runs through established Agricultural Holdings;
  - Extensive public participation and negotiations towards compensation for deprivation/loss of real estate;
  - Increased safety and security problems during construction;
  - Increased dust pollution during the construction phase;
  - Negative impacts on traffic circulation as a result of closure of access roads;
- Economic Environment
  - Increased opportunities for construction jobs in the area;
  - Improved linkages and efficient traffic movement in support of business and commuting activities in the wider area

Alternative 4: No-go

This alternative advocates for the status quo to remain. The implications are that there will be congestion will continue to increase on Garsfontein Road thereby contributing to vehicular emissions, the dust nuisance will persist on the dirt road

thereby affecting properties along the road, economic development in the area will be hampered by congestion and lack of efficient traffic circulation, improved and/or alternative access routes will not be built and the realisation of the proposal in the IDP will be curtailed.

6. IMPACT SUMMARY OF THE PROPOSAL

Alternative 1 (Proposal) – the extension of the Atterbury Road through the construction of new road of 900m along a predominately disturbed area with boundary walls on either side to link up with the proposed K147 will provide a direct access to The Hills township, improve road infrastructure in the area as well as eliminate the dusty conditions currently experienced by the residents. The benefits such as creation of job opportunities, eradication of invasive vegetation, limited impact on the river and hydrological system compared to the other alternatives and improved traffic circulation in the area will accrue.

Having assessed the significance of impacts of the proposal and alternative(s), please provide an overall summary and reasons for selecting the proposal or preferred alternative.

The road network in Gauteng is under increasing pressure. This is due to a number of factors, including:

- The economic growth of the province which currently stand at almost double the national growth rate.
- Increased car ownership.
- Increased urbanization towards major cities.
- Increased job opportunities resulting in more people entering the business market thereby increasing their personal wealth through property and car ownership.

Amongst others this has resulted in increased demand for road capacity in general in Gauteng. Pretoria East is one of the areas in Gauteng with a high number of vehicles per capita and is a growing/expanding region.

The need to extend the Atterbury Road to provide direct access to the Hills Township and to open up this area for development has been noted. The Hills Proper obtained Environmental Authorisation in 2014. The utilisation of the approved rights including the construction of a new school on this site requires improvements in the traffic flow/circulation in the area. The Garsfontein Road which is the main arterial in the area is already under strain.

The Atterbury Road Extension presents the shortest route, has limited impacts on the environment and at the same time provides an opportunity to address the dusty conditions emanating from the gravel road that currently services communities in the area.

The road alignment is along an area which is already disturbed, with boundary walls along parts of its length and marks the edge of the Urban Edge. According to the

ecological assessment, no red data species or important biodiversity features were found on site. With appropriate mitigation measures proposed, the bridge construction will have minimal impact on the hydrological system. The Noise specialist noted that although there is a risk of a noise impact of medium significance during the daytime construction phase, and a noise impact of moderate significance during the day and night times operational phase, these impacts can be mitigated.

Other issues considered include:

- The municipality regards this road as essential in the development of this region;
- The IDP identifies the area to be serviced by this road as a growth/development area;
- A number of comments in support of the application were received from I &AP;
- No significant bio-physical aspects were identified that would be affected by the road alignment.

If the recommendations in the EMPr are implemented and monitored then the proposed development will have a positive impact on the environment. Bokamoso's is therefore of the opinion that the proposed construction of the Atterbury Road be allowed to proceed, subject to the implementation and adherence to the mitigation measures contained in this report and the EMPr.

7. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the Environmental Assessment Practitioner).

YES	NO

If "NO", indicate the aspects that require further assessment before a decision can be made (list the aspects that require further assessment):

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

Bokamoso as environmental consultants assessed all the relevant environmental aspects that could be affected by the proposed road and its associated infrastructure. Based on the results of the assessment, it is recommended that the proposed Atterbury Road Extension and associated infrastructure be approved subject to the following conditions:

- The proposed road must comply with Gautrans and Local Authority Standards for roads;
- The maintenance responsibilities of the proposed road must be secured;
- Soil and construction related stockpiles must be bermed to prevent leachate and polluted run-off water from leaving the property;
- Excavations must be clearly marked off to ensure that people do not get hurt;
- Construction waste must be removed regularly;
- Construction activities must remain within the boundaries of the proposed road reserve;
- Dust control must be implemented using spray trucks. The frequency of damping down must be increased during dry and windy conditions;
- No vehicles must be allowed to move unnecessary in or across drainage lines;

- Where possible work should be restricted to one area at a time. This will give the smaller birds, mammals and reptiles a chance to weather the disturbance in an undisturbed zone close to their natural territories;
- Rehabilitation must be done correctly and timeously, specifically focusing on erosion control and prevention on exposed soils;
- All mitigation measures and recommendations in the specialist reports must be adhered to, and
- The EMPr attached must be adhered to at all times and the appointed ECO must ensure the developer complies with the EMPr.

8. ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

The EMPr is attached to this report as an **Appendix H.**

EMPr attached	YES

SECTION F: APPENDIXES

Appendix A: Locality Map
Appendix B: Photographs
Appendix C: Facility illustration
Appendix D: Route position information
Appendix E: Public participation information
- E_1: Site Notices
- E_2: Written Notices (including registered mail)
- E_3: Newspaper Advert
- E_4: Communication with I&APs
- F_5: Minutes of Meetings
- F_6: Comments and Issues Report
- F_7: Comments from I&APs on BAR
- F_8: Comments from I&APs on amended BAR
- F_9: Copy of Register of I&APs
- E_{10}: Comments from I&APs on Application

Appendix F: Water use license(s) authorisation, SAHRA information, service letters from municipalities, water supply information

Appendix G: Specialist reports
- G_1: Fauna and Flora Assessment
- G_2: Wetland Ecological Assessment
- G_3: Noise Impact Assessment
- G_4: Traffic Memorandum
- G_5: Road Conceptual Design
- G_6: Stormwater Master Plan

Appendix H: Draft Environmental Management Programme (EMPr)

Appendix I: Other information
- I_1: Coordinates of the Alternative Route (K40)
- I_2: Company Profile and CV

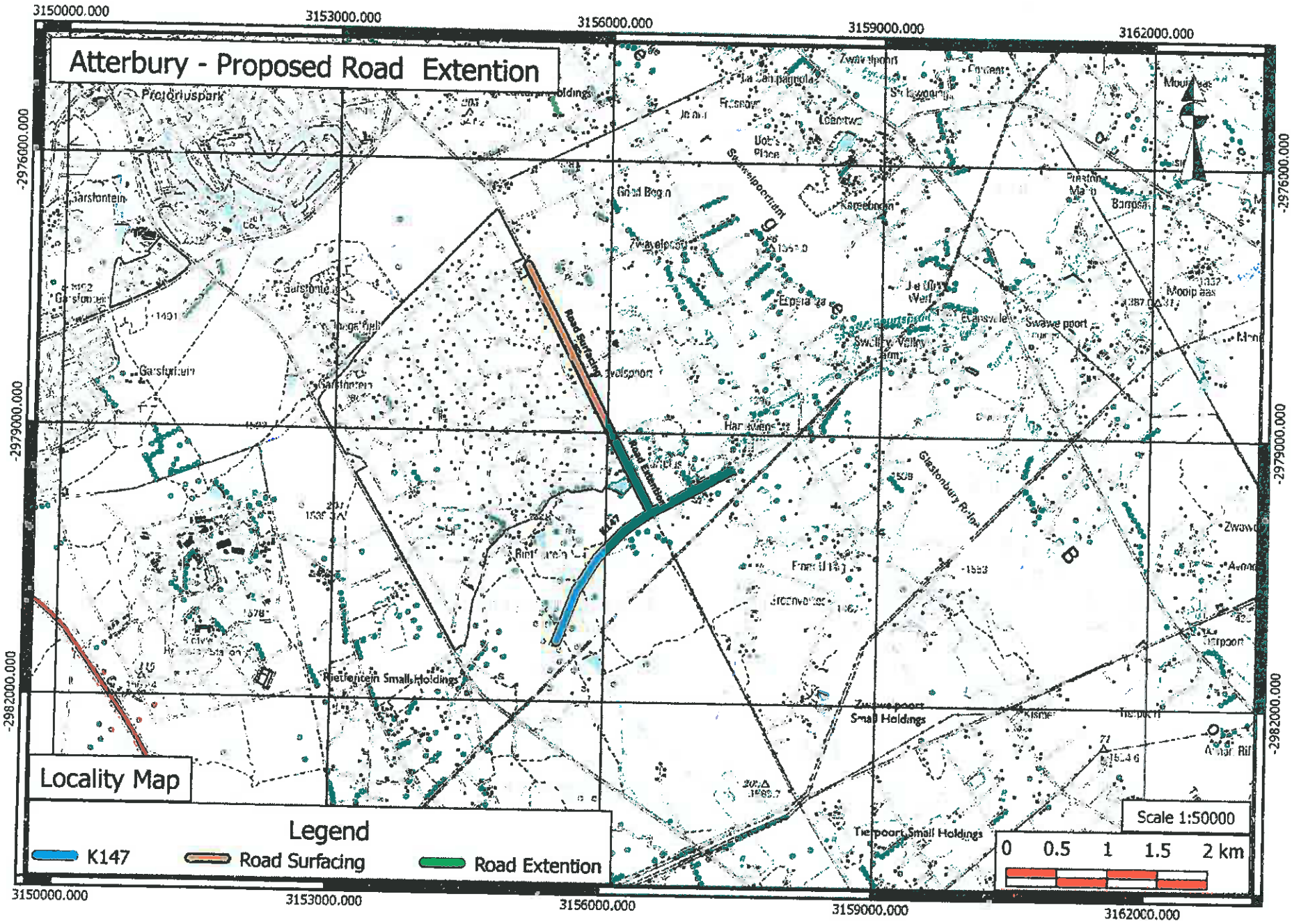
Appendix J: Enlarged figures
- J_1: Locality Map
- J_2: Perennial and non-perennial rivers
- J_3: Irreplaceable sites
- J_4: Biodiversity sensitivities
- J_5: Gauteng Urban Edge
- J_6: Routes Illustration
- J_7: Agricultural Hubs

CHECKLIST

To ensure that all information that the Department needs to be able to process this application, please check that:

- Where requested, supporting documentation has been attached;
- All relevant sections of the form have been completed; and

Appendix A: Locality Map


Atterbury - Proposed Road Extention
3150000.000
3153000.000
3156000.000
3159000.000
3162000.000
-2976000.000
-2979000.000
-2982000.000
Road Surfacing
Road Extention
K147
Glastonbury Rd
Locality Map
Legend
K147
Road Surfacing
Road Extention
Scale 1:50000
0 0.5 1 1.5 2 km

Appendix B: Photographs

South-East

South-East

North-West

North-West

South

South

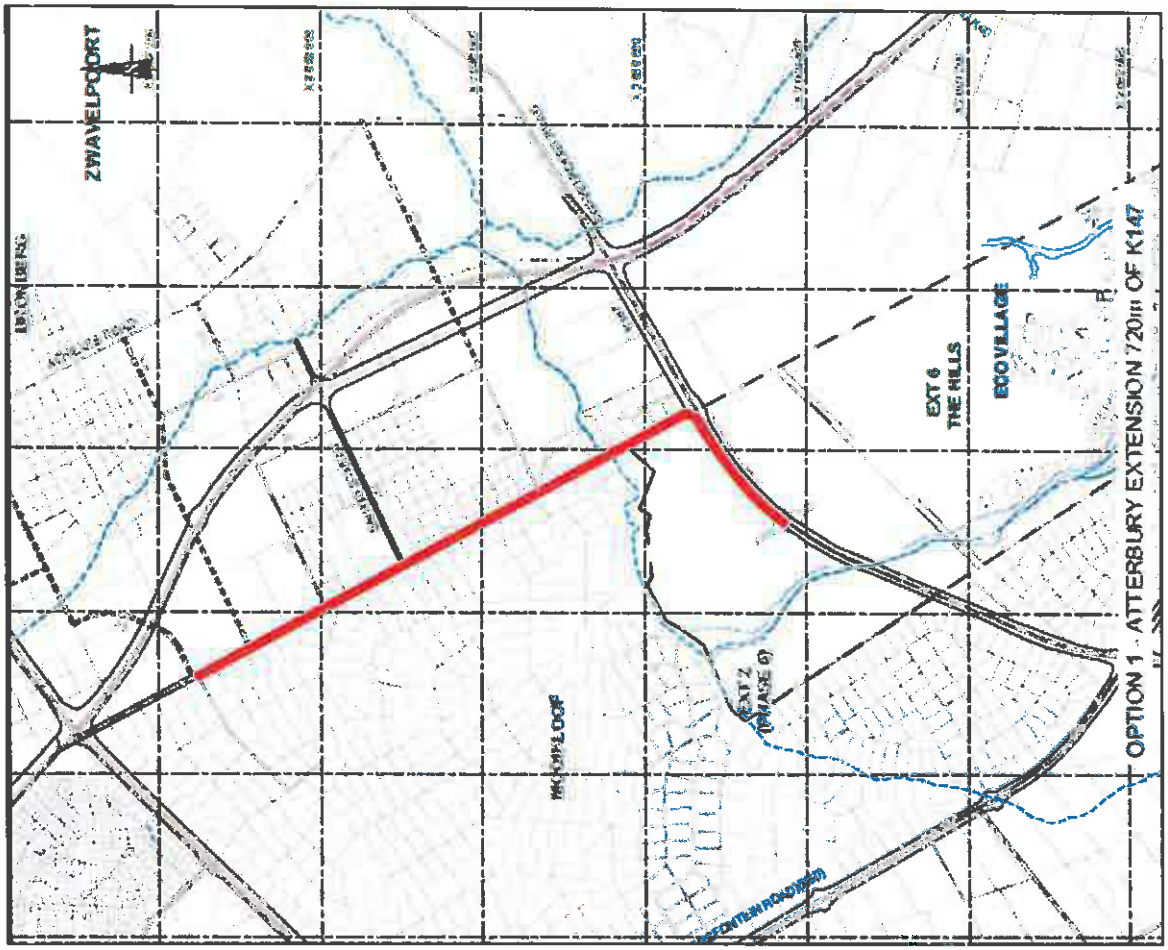
East

East

Appendix C: Facility illustration

N/A

Appendix D: Route position information


ZWAVELPOORT
EXT 6
THE HILLS
EDOVILLAGE
OPTION 1 - ATTERBURY EXTENSION 720m OF K147

Appendix E: Public participation information

Appendix E_1: Site Notices

NOTICE FOR A BASIC ASSESSMENT APPLICATION IN TERMS OF SECTION 24 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998)

Notice is hereby given of a **Basic Assessment Application** that was submitted to the Gauteng Department of Agriculture and Rural Development, in terms of Regulation No. R543 published in the Government Gazette No. 33306 of 18 June 2010 of the National Environment Management Act, 1998 (Act No. 107 of 1998) governing **Basic Assessment Procedures (Listing Notice: 1 and 3 – Government Notice R544 & R546)** for the following activity:

Reference No: Gaut: 002/14-15/0037
Project Name: Extension of the Atterbury Road up to the K147 Intersection
Property Description: On Portions 116 & 130 of the Farm Zwavelpoort No. 373 JR and the Remainder of Portion 1077 of the Farm Rietfontein No. 375 JR

Listing Activities Applied for:

GNR 544 (Listing Notice 1), 18 June 2010	Activity 11
GNR 544 (Listing Notice 1), 18 June 2010	Activity 18
GNR 544 (Listing Notice 1), 18 June 2010	Activity 22
GNR 546 (Listing Notice 3), 18 June 2010	Activity 13
GNR 546 (Listing Notice 3), 18 June 2010	Activity 16

NOTICE FOR SECTION 21 WATER – USE LICENSE IN TERMS OF SECTION 21 OF THE NATIONAL WATER ACT (ACT NO. 36 OF 1998)

Water Uses Applied for:

Section 21 (c) Water Use	Impeding or diverting the flow of water in a watercourse
Section 21 (i) Water Use	Altering the bed, banks, course or characteristics of a watercourse

Proponent Name: City of Tshwane Metropolitan Municipality

Location: Along the South Eastern boundary of the Mooikloof Estate up to and including the northern boundary of the Hills Township, parallel to the Garstfontein Road.

Date of Notice: 18 July 2014 – 26 August 2014

Queries regarding this matter should be referred to:

Bokamoso Landscape Architects and Environmental Consultants CC
Public Participation Registration and Inquiries: **Juanita De Beer**
Project Inquiries: **Anè Agenbacht**
Water Use License Inquiries: **Dashentha Naidoo**
P.O. Box 11375
Maroelana 0161
Tel: (012) 346 3810
Fax: (086) 570 5659
E-mail: lizelleg@mweb.co.za
www.bokamoso.biz

In order to ensure that you are identified as an Interested and/or Affected Party (I&AP) please submit your name, contact information and interest in the matter, in writing, to the contact person given above **within 40 days of this Notice.**


18 07 2014 12 11

Appendix E_2: Written Notices (including registered mail)

LEBOMBO GARDEN BUILDING
38 LEBOMBO ROAD
ASHLEA GARDENS
0081

P.O. BOX 11375
MAROELANA
0161
Tel: (012) 346 3810
Fax: 086 570 5659
E-mail: lizelleg@mweb.co.za
Website: www.bokamoso.net

Background Information Document:
BASIC ASSESSMENT PROCESS

Application for the Basic Assessment (BA) Authorization for the proposed Extension of the Atterbury Road
26 August 2014

PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide information regarding the proposed activity to allow the stakeholders to register as Interested and/or Affected Parties (I&AP's) and/or to provide comments and issues to be included in the final reports that will be submitted to the Gauteng Department of Agriculture and Rural Development (GDARD).

PROJECT BACKGROUND

Bokamoso Environmental Consultants were appointed by the **City of Tshwane Metropolitan Municipality** to undertake a **Basic Assessment Process** for the proposed construction of the extension of Atterbury Road with associated infrastructure. The proposed road will form an important east-west link parallel to the Garsfontien road.

THE PROPOSED PROJECT

The project entails the construction of an extension to the Atterbury Road from where the existing dirt road bends sharply to the east to the intersection with the proposed K147. This will include the construction of two lanes, one in each direction within a 25-metre road servitude, the construction of a bridge over the Swavelpoort spruit and associated infrastructure. The section of the road from the Jollify Main Road intersection to the bend is currently an existing dirt road; this section will be surfaced. Beyond this point (sharp bend) to the intersection with the K147, a new road will be constructed.

THE SITE AND LOCATION

The study area is located to the east of the Mooikloof suburb in the east of Pretoria and to the North of the Hills Eco Golf Estate. The M30 roadway (Garsfontein Road) runs approximately 2km west of the study area, with the M6 (Lynnwood Road) running approximately 4km east of the study area.

The road alignment affects Portions 116, 130 & 131 of the Farm Zwavelpoort No. 373 JR & Portion 1077/R of the Farm Rietfontein 375-JR

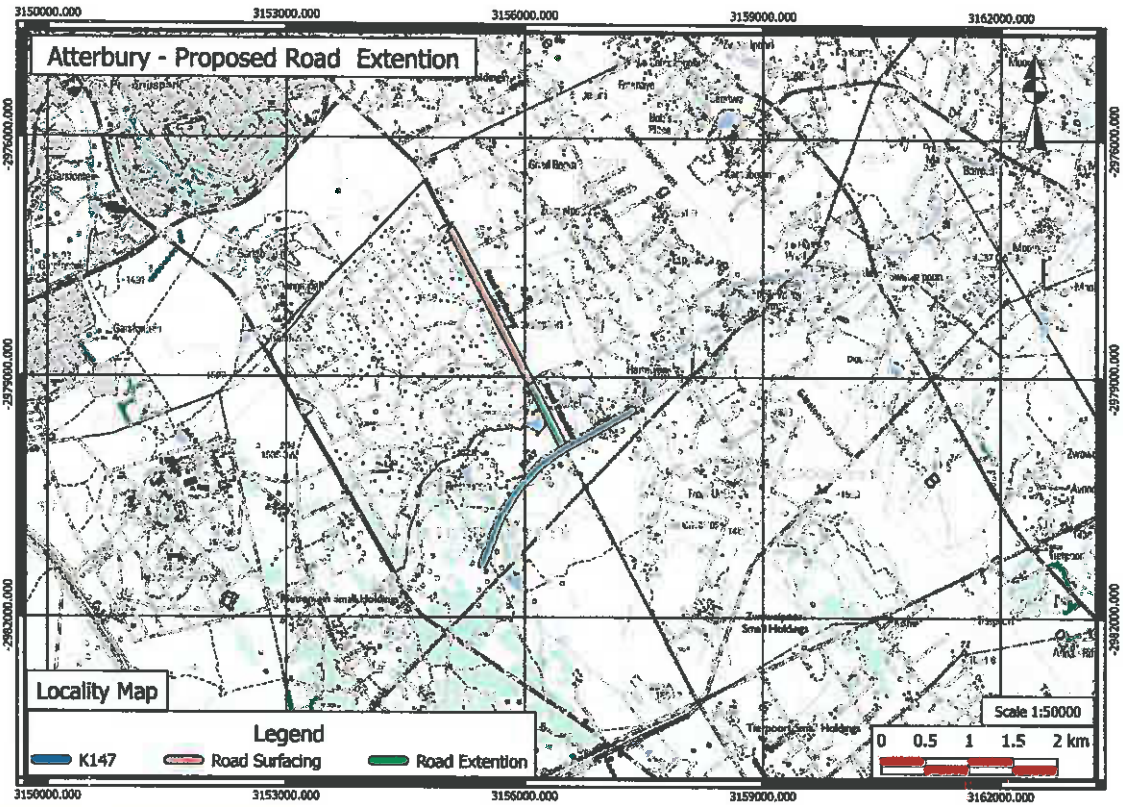


Figure 1: Locality Map

LEGAL ASPECT OF PROJECT

Regulations No. R543 and associated Notices published in the Government Notice No. 33306 of 18 June 2010 in terms of the National Environment Management Act, 1998 (Act No. 107 of 1998) identifies a list of activities which could have a detrimental impact on the environment. These listed activities require Environmental Authorization from the Competent Authority, i.e. The Gauteng Department of Agriculture and Rural Development (GDARD).

An application was submitted to GDARD in terms of the Government Listing Notice 1 and 3 (R544 & R546), 18 June 2010 for the following activities

No. & date of the Govt. Notice:	**Activity No (s**	**Describe each listed activity:**
R. 544, 18 June 2010	11	The construction of: (i) Canals; (ii) Channels, (iii) Bridges; (iv) Dams, (v) Weirs, (vi) Bulk storm water outlet structures; (vii) Marinas, (viii) Jetties exceeding 50 square metres in size, (ix) Slipways exceeding 50 square metres in size, (x) Building exceeding 50 square metres or more Where such construction occurs within a watercourse or within 32 metres of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line
The proposed road extension crosses a perennial river. A bridge will be constructed at the crossing point. In addition some stormwater outlets and infrastructure will be built as part of the activity, therefore this activity is considered applicable and thus included for **authorisation.**		
R. 544, 18 June 2010	18	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from (i) a watercourse; (ii) the sea, (iii) the seashore, (iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater- but excluding where such infilling, depositing, dredging, excavation, removal or moving (i) is for maintenance purposes undertaken in accordance with a management plan agreed to

		by the relevant environmental authority; or (ii) occurs behind the development setback line.
The proposed road extension crosses a perennial river. A bridge will be constructed at the crossing point. In addition some stormwater outlets and infrastructure will be built as part of the activity, therefore this activity is considered applicable and thus included for authorisation.		
R. 544, 18 June 2010	22	The construction of a road outside urban areas, i. with a reserve wider than 13.5metres or where no reserve exists where the road is wider than 8 metres, or ii. for which an environmental authorisation was obtained for the route determination in terms of activity 5 in GN 387 of 2006 or activity 18 in Notice 545 of 2010
Parts of the road extension are located in an area that can be considered to lie outside developed areas. As a result, this activity is deemed to apply and has therefore applied for authorisation		
R 546, 18 June 2010	13	The clearance of an area of 1 hectare or more of vegetation where 75% or more of the vegetative cover constitutes indigenous **b) In Gauteng:** ... v. Sites identified as irreplaceable or important in the Gauteng Conservation Plan,
Sections of the proposed road and the bridge will involve clearing of vegetation in areas considered either Critical Biodiversity Areas or Ecological Support Areas in terms of the Gauteng Conservation Plan.		
R. 546, 18 June 2010	16	The construction of – .. (iii) buildings with a footprint exceeding 10m² in size or (i) infrastructure covering 10m² or more where such construction occurs within a watercourse or within 32 meters of a watercourse, measured from the edge of a watercourse, excluding where such construction will occur behind the development setback line, **(b) In Gauteng** ... v. All sites identified as irreplaceable or important in terms of the applicable Gauteng Conservation Plan ...
The proposed activity entails construction of infrastructure (road, bridge, stormwater) some of which will be within a watercourse and within a geographic area identified in terms of the Gauteng C-Plan.		

The Draft and Final Basic Assessment Reports will be made available to registered Interested and Affected Parties (I&AP) for comment. After GDARD have issued an Environmental Authorization, Interested and Affected Parties (I&AP's) will be notified of the decision and if positive, informed of the opportunity to appeal to the MEC of GDARD.

THE PUBLIC PARTICIPATION PROCESS

A Public Participation Process is being conducted in accordance with the National Environmental Management Act, 1998 (Act No 107 of 1998) and the new Environmental Impact Assessment Regulations, June 2010. In particular, the following is to be noted:

1. Site notices were erected on 18 July 2014 at prominent points on and around the study area.
2. Flyers were distributed (18 July 2014) to the neighboring properties and estates/ developments that may be affected by the proposed development. Not all these properties could be reached due to a lack of sufficient access to them and therefore these flyers, together with this Background Information Document will be sent to possible interested an/or affected parties and surrounding landowners via email & registered mail.
3. Registered mail was sent to all surrounding land owners within a 100m radius of the study area.
4. Notices regarding the project were e-mailed and faxed to the councilor for the area and possible stakeholders in the area.
5. An advertisement was placed in "Beeld" newspaper on 17 July 2014.

STUDIES TO BE CONDUCTED AND ISSUES TO BE ADDRESSED

- Funa and flora
  - Vegetation
  - Birds
  - Habitat, etc
- Wetland assessment
- Noise Impact Assessment
- Geotechnical Investigations
- Traffic Impact Study
- Some of the key issues include
  - Visibility
  - stormwater
  - Noise
  - Dust
  - Safety and Security

- Ecological Surroundings
- "Sense of place"

In order to ensure that you are identified as an Interested and/or Affected Party (I&AP) please submit your name, contact information and concerns regarding the proposed development.

Please do not hesitate to contact us if there are any questions in connection with the above-mentioned development.

Public Participation Consultant: Juanita De Beer
Tel (012) 346 3810
Fax (086) 570 5659
E-mail lizelleg@mweb.co.za

CONSTRUCTION OF THE EXTENSION OF ATTERBURY ROAD TO THE K147 INTERSECTION

NOTICE FOR A BASIC ASSESSMENT APPLICATION IN TERMS OF SECTION 24 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998)

Notice is hereby given of a **Basic Assessment Application** that was submitted to the Gauteng Department of Agriculture and Rural Development, in terms of Regulation No. R543 published in the Government Gazette No. 33306 of 18 June 2010 governing **Basic Assessment Procedures (Notice 1 and 3 – Government Notice R544 & R546)** for the following activity:

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Project Name: Extension of the Atterbury Road up to the K147 intersection

Property Description: Portions 116 & 130 of the Farm Zwavelpoort No. 373 JR and the Remainder of Portion 1077 of the Farm Rietfontein No. 375 JR

Proponent Name: City of Tshwane Metropolitan Municipality

Listing Activities Applied: GNR 544 (Listing Notice 1), 18 June 2010 – Activity 11, 18 & 22 and GNR 546 (Listing Notice 3), 18 June 2010 – Activity 13 & 16.

NOTICE FOR A SECTION 21 WATER – USE LICENSE IN TERMS OF SECTION 21 OF THE NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

Water Uses Applied for: Section 21 (c) Water Use – Impeding or diverting the flow of water in a watercourse and Section 21 (i) Water Use – Altering the bed, banks, course or characteristics of a watercourse

Location: Along the South Eastern boundary of the Mooiloof Estate up to and including the Northern boundary of the Hills Township, parallel to the Garstfontein Road.

Date of Notice: 18 July 2014 – 26 August 2014
Queries regarding this matter should be referred to:
Bokamoso Landscape Architects and Environmental Consultants CC
Public Participation Registration and Inquiries: Juanita De Beer
Project Inquiries: Ané Agenbacht
Water Use License Inquiries: Dashenthia Naidoo
P.O. Box 11375
Maroelana 0161
www.bokamoso.biz
Tel: (012) 346 3810
Fax: (086) 570 5659
E-mail: lzellcg@mweb.co.za

In order to ensure that you are identified as an Interested and/or Affected Party (I&AP) please submit your name, contact information and interest in the matter, in writing, to the contact person given above within 40 days of this Notice.

List of REGISTERED LETTERS
Lys van GEREGISTREERDE BRIEWE
(With an insurance option/met 'n versekeringsopsie)

Post Office

Full tracking and tracing/Volledige volg en spoor

Name and address of sender
Naam en adres van afsender Bokamoso PO Box 11375, Maroeland 0161
Atteibury extend

Tollfree number / Tolvry nommer 0800 111 502

No	Name and address of addressee / Naam en adres van geadresseerde	Insured amount / Versekerde bedrag	Insurance fee / Versekeringsgeld	Postage / Posgeld	Service fee / Diensgeld	Affix Track and Trace customer copy / Plak Volg-en-Spoor-kliëntekopie
1	Auribus Investments P.O. Box 6294, Bloemfontein, 9300					RD 885 857 861 ZA CUSTOMER COPY
2	Marius Spangenberg P.O. Box 73396, Lynnwood Ridge, 0040					RD 885 857 950 ZA CUSTOMER COPY
3	Jan van Vuuren P.O. Box 13902, Clubview, 0014					RD 885 857 963 ZA CUSTOMER COPY
4	Aikaterini Zigiriadis P.O. Box 891306, Lyndhurst, Garsfontein, 2106					RD 885 857 932 ZA CUSTOMER COPY
5	David Upton P.O. Box 92261, Mooikloof, 0059					RD 885 857 946 ZA CUSTOMER COPY
6	Timothy Krafft P.O. Box 28800, Pretoria, 0001					RD 885 857 915 ZA CUSTOMER COPY
7	Karel Meyer P.O. Box 92299, Mooikloof, 0059					RD 885 857 929 ZA CUSTOMER COPY
8	Theunis Bester P.O. Box 73140, Lynnwood Ridge, 0040					RD 885 857 977 ZA CUSTOMER COPY
9						
10						
	Total / Totaal	R	R	R	R	

Number of letters posted
Getal briewe gepos

Signature of client
Handtekening van kliënt

Signature of accepting officer
Handtekening van aanneembeampte

Date stamp
11 JUL 2014
2
0063
Datumstempel

The value of the contents of these letters is as indicated and compensation is not payable for a letter received unconditionally. Compensation is limited to R100,00. No compensation is payable without documentary proof. Optional insurance of up to R2 000,00 is available and applies to domestic registered letters only.

Die waarde van die inhoud van hierdie briewe is soos aangedui en vergoeding sal nie betaal word vir 'n brief wat sonder voorbehoud ontvang word nie. Vergoeding is beperk tot R100,00. Geen vergoeding is sonder dokumentêre bewys betaalbaar nie. Opsionele versekering van tot R2 000,00 is beskikbaar en is slegs op binnelandse geregistreerde briewe van toepassing.

APCT

701248

LEBOMBO GARDEN BUILDING
38 LEBOMBO ROAD
ASHLEA GARDENS
0081

P.O. BOX 11375
MAROELANA
0181

Tel: (012) 346 3810
Fax: [illegible]
E-mail: [illegible]
Website: [illegible]

Bokamoso
ENVIRONMENTAL

Dear Landowner/Tenant **18 July 2014**

You are hereby informed that Bokamoso Environmental Consultants were appointed (as EAP) by City of Tshwane Metropolitan Municipality to conduct the Basic Assessment Process in terms of the amended 2010 NEMA EIA Regulations & Water Uses Applied for in terms of Section 21 of the National Water Act (Act No. 36 of 1998) at the Department of Water Affairs for the proposed Portions 116 & 130 of the Farm Zwavelpoort No. 373 JR and the Remainder of Portion 1077 of the Farm Rietfontein No. 375 JR.

The proposed Land-uses for the study area are as follows:
Extension of the Atterbury Road up to the K147 Intersection

In terms of Regulation No. R543 published in the Government Notice No. 33306 of 18 June 2010 of the National Environment Management Act, 1998 (Act No. 107 of 1998) governing Basic Assessment Procedures (Notice 1 and 3 – Governing Notice R544 & R546) of the 2010 amended NEMA Regulations, the EAP must inform all landowners and tenants within 100m from the study area of the proposed development.

Water Uses Applied for in terms of the National Water Act (Act No. 36 of 1998) at the Department of Water Affairs: Section 21 (c) Water Use – Impeding or diverting the flow of water in a watercourse and Section 21 (i) Water Use – Altering the bed, banks, course or characteristics of a watercourse.

Bokamoso already supplied you (landowner/Tenant) of the property within 100m with Notification Letter and request that you supply the contact details of any tenants or other interested and affected parties that reside or work on the property to Bokamoso. Bokamoso will then also supply these parties with the necessary Notification Letters.

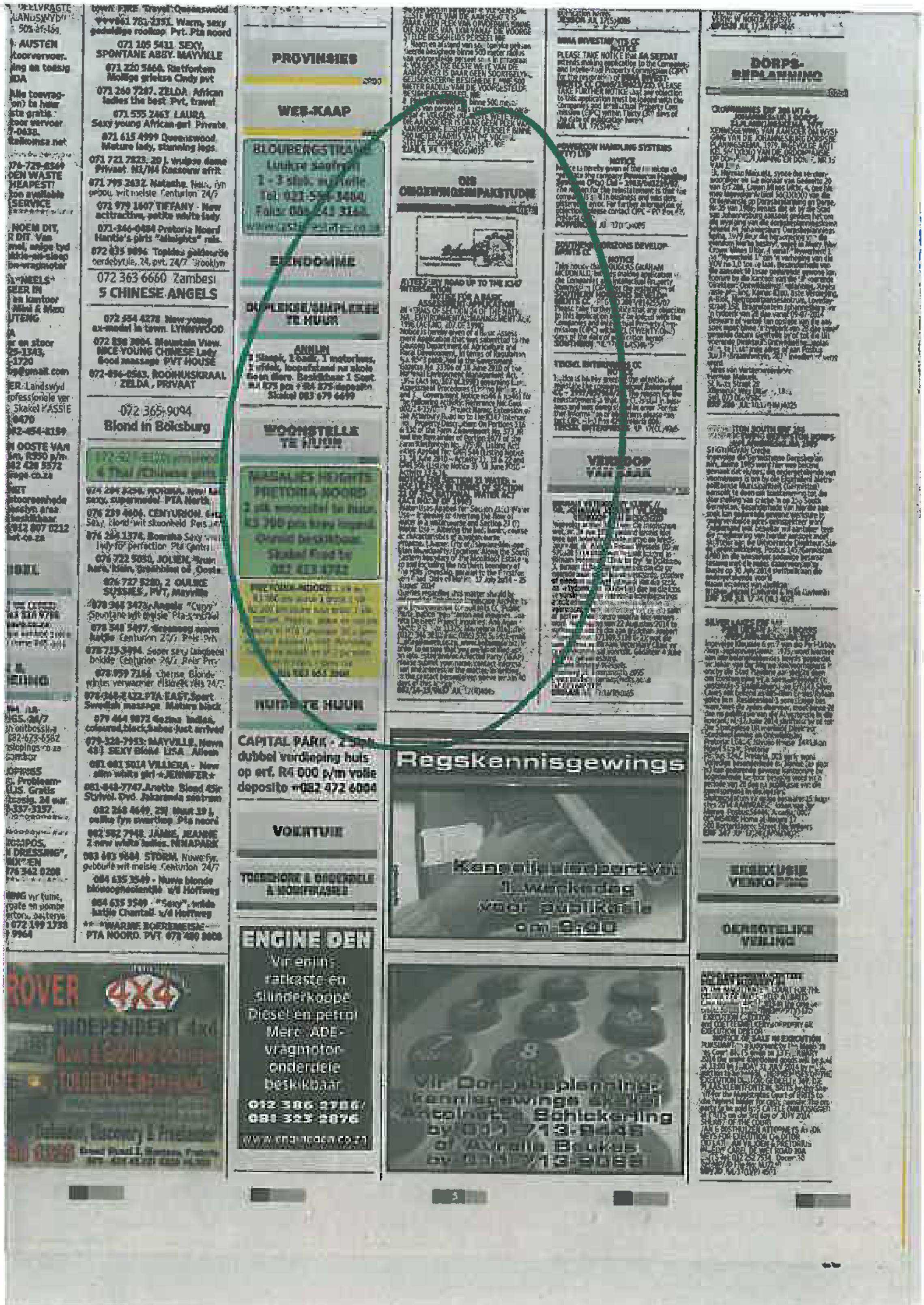
Alternatively, you are also welcome to distribute copies of your Notification to these parties. We will however require proof that you supplied the Notices to the Tenants, Landowners, Workers etc. Another option is to act as representative on behalf of these parties.

Please confirm (via email/Fax) that you received the Landowners/Tenant Notification and this Letter. Also indicate in this Confirmation Letter whether you have tenants on your property and you're preferred method of tenant/worker notification.

Regards

....
Lizelle Gregory/Juanita De Beer

Appendix E_3: Newspaper Advert


PROVINSIES
WES-KAAP
EIENDOMME
DUPLEKSE/SIMPLEKSE TE HUUR
WOONSTELLE TE HUUR
HUISE TE HUUR
VOERTUIE
OMGEWINGSIMPAKSTUDIE
NOTICE FOR A BASIC ASSESSMENT APPLICATION
VERKOOP VAN SAAK
DORPS-BEPLANNING
EKSEKUSIE VERKOPING
GEREGTELIKE VEILING
Regskennisgewings
ENGINE DEN
Vir enjins
ratkaste en
silinderkoppe
Diesel en petrol
Merc. ADE-
vragmotor-
onderdele
beskikbaar
012 386 2786/
081 323 2876
www.enginden.co.za
CAPITAL PARK - 2 Slpk dubbel verdieping huis op erf. R4 000 p/m volle deposito +082 472 6004
5 CHINESE ANGELS
Blond in Boksburg

Appendix E4: Communication with I&APs

Juanita

From: Juanita <user3@bokamoso.net>
Sent: 26 August 2014 08:47 AM
To: 'lex@middelberg.co.za'; devereaux@intentpm.co.za; tim@valleyfarmvet.co.za; amee@intekom.co.za
Cc: 'ncube.nali@gmail.com'
Subject: Atterbury Extend - BID Document
Attachments: Atterbury Road BID.pdf

Dear Interested and/or Affected Party Member,

Please refer to the attached BID (Background Information Document) for the proposed ***Extension of the Atterbury Road up to the K147 Intersection*** Project.

Hope this finds you well.

Kind Regards

Juanita De Beer

Public Participation Consultant

Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria I P.O. Box 11375 Maroelana 0161

Juanita

From: Juanita <user3@bokamoso.net>
Sent: 25 July 2014 03:28 PM
To: 'devereaux@intentpm.co.za'
Subject: RE: CONSTRUCTION OF THE EXTENSION OF ATTERBURY ROAD TO THE K147 INTERSECTION

Geagte Devereaux Pienaar,

Baie dankie vir jou terugvoering, jy is geregistreer as belanghebbende persoon vir die voorgestelde Atterbury Extend Projek.

Jou kommentare is geregistreer op ons Kommentaar en Bewaar Register.

Ons sal jou ophoogte hou in verband met die verdere proses in die toekoms.

Hoop dit is in orde.

Kind Regards

Juanita De Beer
Public Participation Consultant

Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria | P.O. Box 11375 Maroelana 0161

From: Devereaux Pienaar [mailto:devereaux@intentpm.co.za]
Sent: 25 July 2014 08:42 AM
To: lizelleg@mweb.co.za
Subject: CONSTRUCTION OF THE EXTENSION OF ATTERBURY ROAD TO THE K147 INTERSECTION

Vir aandag Ane

Goeie Dag

Met verwysing na my gesprek met Ane van vanoggend. Baie dankie Ane vir jou vriendelike bystand.Soos genoem is ek die ondervoorsitter van Swavelsnest Estate wat grens aan die beplande verlenging van Atterbury weg. As 'n gemeenskap het ons oor die laaste 5 jaar herhaaldelik gepoog om die pad geteer te kry en sal dus baie bly wees as ons enigsens van hulp kan wees om die projek te laat realiseer.

Dit sal dan ook baie waardeer word as ons op die kontaklys geplaas kan word om dan ingelig te word oor vordering met die projek.

Vriendelike Groete
Devereaux Pienaar
0833272322

From: Juanita [mailto:user3@bokamoso.net]
Sent: 21 July 2014 11:29 AM
To: 'jgrobler@geoscience.org.za'; asalomon@sahra.org.za; 'maphata.ramphele@gauteng.gov.za'; justicem@dwaf.gov.za; keetm@dwaf.gov.za; siwelanel@dwa.gov.za; tshifaror@dwa.gov.za; MathebeT@dwa.gov.za; 'central@eskom.co.za'; 'paia@eskom.co.za'; 'schmidk@nra.co.za'; 'kumen.govender@gauteng.gov.za'; mmpshe@randwater.co.za; 'nkoneigh@randwater.co.za'; RudzaniM@TSHWANE.GOV.za; loveous.tampane@transnet.net; 'casperm@tshwane.gov.za'; 'lex@middelberg.co.za'
Subject: Atterbury Extend - Public Participation Process

Dear Interested and/or Affected Party Member,

Please refer to the attached Public Notice & Landowner and Tenant Letter regarding the proposed ***Extension of the Atterbury Road up to the K147 Intersection*** Project.

Hope this finds you well.

Kind Regards

Juanita De Beer

Public Participation Consultant

Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria I P.O. Box 11375 Maroelana 0161

From: Juanita [mailto:user3@bokamoso.net]
Sent: 11 August 2014 01:45 PM
To: 'amee@intekom.co.za'
Subject: RE: EIA Atterbury Road extension - the Hills

Dear Craig Anderson,

Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed The Hills Atterbury Road Extension Project.

I have noted your comments on our Issues and Comments Register.

We will keep you updated regarding the process in the future.

Hope this finds you well.

Kind Regards

Juanita De Beer

Public Participation Consultant

Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria I P.O. Box 11375 Maroclana 0161

From: Craig Anderson [mailto:amee@intekom.co.za]
Sent: 11 August 2014 12:25 PM
To: lizelleg@mweb.co.za
Subject: Fwd: EIA Atterbury Road extension - the Hills

Att: Juanita

Please register me as an interested and affected party, as well as Zwavelsnest Private Estate (I am chairman). Please forward any relevant info, I support the tarring of the road.

Thanks
Craig Anderson

Dear Allan Chandler,

Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Atterbury Extend Project.
I have noted your comments on our Issues and Comments Register.

We will keep you updated regarding the process in the future.

Hope this finds you well.

Kind Regards

Juanita De Beer

Public Participation Consultant

Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria I P.O. Box 11375 Maroelana 0161

From: ALLAN CHANDLER [mailto:AWAC@GLOBAL.CO.ZA]
Sent: 28 August 2014 09:37 AM
To: lizelleg@mweb.co.za
Subject: k147 ASSESMENT

HI PLEASE include us in the status reports of this road as we live in ZWAVELS NEST and if we can help to get this expedited soonest we will the dust is killing us.

Beast regards

A

COMPUSTATION
TEL: 27 (0)12 9911261 CELL: 0836537807
A W CHANDLER
CEO

LIFE IS SHORT LIVE IT TO YOUR FULLEST

Dear Belinda Huyser,

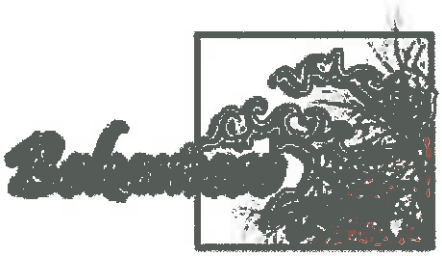
Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Atterbury Extend Project.

I have noted your comments on our Issues and Comments Register.

We will keep you updated regarding the process in the future.

Hope this finds you well.

Kind Regards
Juanita Le Roux
Public Participation Consultant



Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria I P.O. Box 11375 Maroelana 0161

From: Belinda Huyser [mailto:belinda@lesika.co.za]
Sent: 01 September 2014 12:24 PM
To: lizelleg@mweb.co.za
Subject: Proposed Extension of the Atterbury Road

Juanita De Beer /Lizelle

Good day

I would just like to enquire about surfacing/tarring the current dirt road (Atterbury up to Saint Street), If this would still be considered being done if the extension to the Hills is declined?

This road has become extremely busy and is such an environmental problem. Besides the bad dust, in the rainy seasons the muddy road gets really bad and sometimes impossible to drive on without getting stuck in the mud.

Thank you

Kind regards

Zwavel's Nest resident.

From: Juanita [mailto:user3@bokamoso.net]
Sent: 09 September 2014 04:29 PM
To: belinda@lesika.co.za
Cc: 'ncube.nali@gmail.com'
Subject: RE: DUST- Atterbury extension/Saint street

Dear Belinda,

Thank you for your response, I have noted your comments on our Issues and Comments Register.

We will keep you updated regarding the process in the future.

Hope this finds you well.

Kind Regards
Juanita De Beer
Public Participation Consultant

Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamcso.net
36 Lebombo Street, Ashlea Gardens, Pretoria I P.O. Box 11375 Maroelana 0161

From: Belinda Huyser [mailto:belinda@lesika.co.za]
Sent: 09 September 2014 03:58 PM
To: lex@ward91.org; 'Andre van der Walt'
Cc: lizelleg@mweb.co.za
Subject: DUST- Atterbury extension/Saint street

To whom it may concern

Please can we find a solution to minimise the dust in this area, eg. water tanks.
It has become extremely bad! Not sure when and if it will be tarred soon....hoping and praying!
The traffic on these roads have increased tremendously, making it even more dusty in the area.

Please help!

Thank you!

Dear C Kooiman,

Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Atterbury Road Extend Project.

I have noted your comments on our Issues and Comments Register. We will keep you updated regarding the process in the future.

Hope this finds you well.

Kind Regards
Juanita De Beer
Public Participation Consultant

Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria I P.O. Box 11375 Maroelana 0161

From: primarosa9@gmail.com [mailto:primarosa9@gmail.com]
Sent: 03 October 2014 10:14 AM
To: lizelleg@mweb.co.za
Subject: Ref no: Gaut:002/14-15/0037

Morning Lizelle, Ane, Juanita,

Can I ask you to please add me to the Public Participation Register for this project?

I reside in Zwavelsnest Private Estate and the Atterbury road extension will have a (possitive) impact on our property. Our HOA has been trying for years to get this section of road upgraded and we could perhaps supply you with valuable information.

All the best,

C Kooiman.
Cel: +27 (0)83 538 2964

Appendix E_5: Minutes of Meetings

NIL

Appendix E$_6$: Comments and Issues Report

COMMENT AND RESPONSE REPORT-
Extension of the Atterbury Road up to the K147 Intersection
Gaut: 002/14-15/0037

Issue	Commentator	Response
With reference with my conversation with Anè. Thank you for your kindly assistance. As I mentioned I am the Deputy of Swavelnest Estate adjacent for the proposed extension of Atterbury Road. As a community we have over the last 5 years repeatedly tried to get the road tarred and will be very happy if there is any hope for the project to be finalized. We will also appreciate it, to be on the contact list for all the updates and processes.	Devereaux Pienaar devereaux@intentpm.co.za Cell: 083 327 2322	Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Atterbury Extend Project. I have noted your comments on our Issues and Comments Register. We will keep you update regarding the process in the future. Hope this finds you well.
It is with some concern that I take note of the proposed extension of Atterbury Road along the South Eastern boundary of Mooikloof Equestrian Estate. I would like to register myself as an affected party and ascertain some details as to the proposal: 1. What is the proposed speed limit of this road? 2. Are there any side roads entering the proposed road and where? 3. Is this to be a tarred single lane road or other? 4. The proposed "impeding or diverting the flow of water in a watercourse" and "altering the beds, banks, course or characteristics of a watercourse" needs clarification. 5. Inasmuch as the proposed road connects with a road linking Garsfontein Drive and Lynnwood Road (K147), what is the estimated road use expectation in terms of vehicles per hour? 6. What time-frames are proposed for this development?	Tim Krafft tim@valleyfarmvet.co.za	Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Atterbury Extend Project. Herewith our response regarding your questions: 1. The speed limit will be in keeping with similar roads in urban areas. However, guidance will be provided at design stage as well as by the City of Tshwane Metropolitan Municipality. 2. There will be no new roads entering the proposed section of the Atterbury Road. All

		intersections will be in accordance with the City of Tshwane roads planning. 3. It will be a tarred road with a single lane in each direction. The road reserve is 25m which means that future expansion will be possible. 4. This is standard terminology used in the Water Act. They refer to specific licenses that need to be applied for given that a bridge will have to be built across the Swavelpoort Spruit. 5. A traffic assessment is being carried out and the results will be included in the Basic Assessment Report. 6. Preliminary estimate is that this development will be implemented within the next 3 – 5 years. I trust that Bokamoso has answered your questions. Should you need any further information or assistance, please do not hesitate to contact Bokamoso.
RANDWATER NOT AFFECTED.	Gugu Makhubu gmakhubu@randwater.co.za **Randwater**	Noted.
Please register me as an interested and affected party, as well as	Craig Anderson	Thank you for your response, I have

Zwavelnest Private Estate (I am chairman). Please forward any relevant info, I support the tarring of the road.	amee@intekom.co.za	registered you as Interested and/or Affected party Member for the proposed The Hills Atterbury Road Extension Project. I have noted your comments on our Issues and Comments Register. We will keep you updated regarding the process in the future. Hope this finds you well.
Please include us in the status reports of this road as we live in Zwavel Nest and if we can help to get this expedited soonest we will, the dust is killing us.	Allan Chandler awac@global.co.za	Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Atterbury Extend Project. I have noted your comments on our Issues and Comments Register. We will keep you updated regarding the process in the future.
I would just like to enquire about surfacing/tarring the current dirt road (Atterbury up to Saint Street), if this would still be considered being done if the extension to the Hills is declined? This road has become extremely busy and is such an environmental problem. Besides the bad dust, in the rainy seasons the muddy road gets really bad and sometimes impossible to drive on without getting stuck in the mud.	Belinda Huyser Belinda@lesika.co.za	Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Atterbury Extend Project. I have noted your comments on our Issues and Comments Register. We will keep you updated regarding the process in the future.

		Hope this finds you well.
Please can we find a solution to minimize the dust in this area, eg. Water tanks. It has become extremely bad! Not sure when if it will be tarred soon. Hoping and praying! The traffic on these roads have increased tremendously, making it even more dusty in the area. Please help!	Belinda Huyser Belinda@lesika.co.za	Thank you for your response, I have noted your comments on our Issues and Comments Register. We will keep you updated regarding the process in the future. Hope this finds you well.
Can I ask you to please add me to the Public Participation Register for this project? I reside in Zwavelnest Private Estate and the Atterbury road extension will have a (positive) impact on our property. Our HOA has been trying for years to get this section of road upgraded and we could perhaps supply you with valuable information.	C Kooiman Primarosa9@gmail.com	Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Atterbury Road Extension Project. I have noted your comments on our Issues and Comments Register. We will keep you updated regarding the process in the future.

Appendix E7: Comments from I&APs on BAR

Appendix E8: Comments from I&APs on amended BAR

Appendix E9: Copy of Register of I&APs

Nr	Registered Parties	Contact details	Address
Stakeholders			
1	Council Geo-Science	jgrobler@geoscience.org.za	
2	SAHRA Gauteng	asalomon@sahra.org.za	
		nndobochani@sahra.org.za	
3	PHRAG	maphata.ramphele@gauteng.gov.za	
4	DWA	justicem@dwaf.gov.za	
		keetm@dwaf.gov.za	
		siwelanel@dwa.gov.za	
		tshifaror@dwa.gov.za	
		mathebet@dwa.gov.za	
5	Eskom	central@eskom.co.za	
		paia@eskom.co.za	
6	SANRAL	schmidk@nra.co.za	
7	Gautrans	kumen.govender@gauteng.gov.za	
8	Randwater	mmpshe@randwater.co.za	
		nkoneigh@randwater.co.za	
9	City Of Tshwane	RudzaniM@tshwane.gov.za	
10	Spoornet	daniel.ramokone@transnet.net	
		loveous.tampane@transnet.net	
11	DA Roads	casperm@tshwane.gov.za	
	Ward Councillor		
12	Lex Middelberg	lex@middelberg.co.za	
		Cell: 083 627 3713	
Interested and Affected Parties			
1	Devereaux Pienaar	devereaux@intentpm.co.za	
		Cell: 083 327 2322	
2	Tim Krafft	tim@valleyfarmvet.co.za	
		Tel: 012 991 3573	
3	Craig Anderson	amee@intekom.co.za	
4	Allan Chandler	AWAC@GLOBAL.CO.ZA	
		Cell: 083 6537807	
		Tel: 012 991 1261	
5	Belinda Huyser	belinda@lesika.co.za	
6	C Kooiman	primarosa9@gmail.com	
		Cell: 083 538 2964	

Appendix E_{10}: Comments from I&APs on Application

From: Juanita [mailto:user3@bokamoso.net]
Sent: 19 August 2014 09:35 AM
To: tim@valleyfarmvet.co.za
Cc: 'ncube.nali@gmail.com'
Subject: RE: Extension of Atterbury Road

Dear Tim Krafft,

Herewith our response regarding your questions:

1. What is the proposed speed limit of this road?
   The speed limit will be in keeping with similar roads in urban areas. However, guidance will be provided at design stage as well as by the City of Tshwane Metropolitan Municipality.

2. Are there any side roads entering the proposed road and where?
   There will be no new roads entering the proposed section of the Atterbury Road. All intersections will be in accordance with the City of Tshwane roads planning.

3. Is this to be a tarred single lane road or other?
   It will be a tarred road with a single lane in each direction. The road reserve is 25m which means that future expansion will be possible.

4. The proposed "impeding or diverting the flow of water in a watercourse" and "altering the beds, banks, course or characteristics of a watercourse" needs clarification.
   This is standard terminology used in the Water Act. They refer to specific licenses that need to be applied for given that a bridge will have to be built across the Swavelpoort Spruit.

5. Inasmuch as the proposed road connects with a road linking Garsfontein Drive and Lynnwood Road (K147), what is the estimated road use expectation in terms of vehicles per hour?
   A traffic assessment is being carried out and the results will be included in the Basic Assessment Report.

6. What time-frames are proposed for this development?
   Preliminary estimate is that this development will be implemented within the next 3 – 5 years.

I trust that Bokamoso has answered your questions.

Should you need any further information or assistance, please do not hesitate to contact Bokamoso.

Hope this finds you well.

Kind Regards
Juanita De Beer
Public Participation Consultant

Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria I P.O. Box 11375 Maroelana 0161

From: Juanita [mailto:user3@bokamoso.net]
Sent: 29 July 2014 03:20 PM
To: 'tim@valleyfarmvet.co.za'
Cc: 'ncube.nali@gmail.com'
Subject: RE: Extension of Atterbury Road

Dear Tim Krafft,

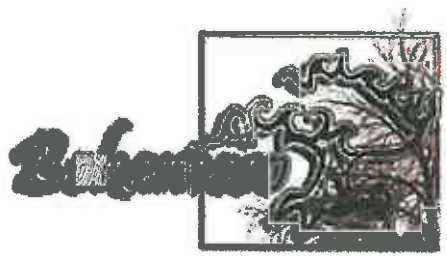
Thank you for your response, I have registered you as Interested and/or Affected Party Member for the proposed Atterbury Extend Project.

Our Project Consultant, Pirate Ncube, will respond to your questions as soon as possible.

We will keep you updated regarding the process in the future.

Hope this finds you well.

Kind Regards
Juanita De Beer
Public Participation Consultant



Landscape Architects &
Environmental Consultants

T: (+27)12 346 3810 I F: (+27) 86 570 5659 I E: lizelleg@mweb.co.za I www.bokamoso.net
36 Lebombo Street, Ashlea Gardens, Pretoria I P.O. Box 11375 Maroelana 0161

From: Tim Krafft [mailto:tim@valleyfarmvet.co.za]
Sent: 29 July 2014 02:55 PM
To: lizelleg@mweb.co.za
Cc: 'Nicholson, Tanya'
Subject: Extension of Atterbury Road

Valley Farm
Animal Hospital

BECAUSE YOUR PET'S HEALTH MATTERS.

Good day,
It is with some concern that I take note of the proposed extension of Atterbury Road along the South Eastern boundary of Mooikloof Equestrian Estate. I would like to register myself as an affected party and ascertain some details as to the proposal :
1/ What is the proposed speed limit of this road?
2/ Are there any side roads entering the proposed road and where?
3/ Is this to be a tarred single lane road or other?
4/The proposed "impeding or diverting the flow of water in a watercourse" and "altering the beds,banks,course or characteristics of a watercourse" needs clarification.
5/Inasmuch as the proposed road connects with a road linking Garsfontein Drive and Lynnwood Road (K147), what is the estimated road use expectation in terms of vehicles per hour ?
6/What time-frames are proposed for this development?

Regards,

Dr Tim Krafft BVSc
Valley Farm Animal Hospital
Mooikloof Equestrian Estate ,stand 491

Tel: +27 (12) 991 3573 (24/7 - Vet on site)
Fax: +27 (12) 991 4922

829 Old Farm Road, Faerie Glen, Pretoria East • PO Box 38600, Pretoria East, 0043
www.valleyfarmvet.co.za

Appendix F

Water use license(s) authorisation, SAHRA information, service letters from municipalities, water supply information

NOT APPLICABLE

Appendix G_1: Fauna and Flora Assessment

Mobile: Sam - 072 437 1742
Mobile: Luke - 083 784 1997
Email: info@enviro-insight.co.za
Website: www.enviro-insight.co.za

Bokamoso: Atterbury Road Extension

by

Luke Verburgt
Samuel Laurence
Ben Orban

info@enviro-insight.co.za

Mobile: Sam - 072 437 1742
Mobile: Luke - 083 784 1997
Email: info@enviro-insight.co.za
Website: www.enviro-insight.co.za

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1 INTRODUCTION

Enviro-Insight CC was commissioned by Bokamoso to perform a red-data species biological assessment of the Atterbury Road Extension (Figure 1). This site is situated in Gauteng province at the south-eastern end of the existing Atterbury Road infrastructure. In addition and as shown by Figure 1, the road extension infiltrates areas classified as irreplaceable by the C-Plan V3.3. The proposed development is that of an extension of the existing road infrastructure and should be compared against the GDARD (2012) Minimum Requirements for Biodiversity Assessments, which drives much of the approach for this study.

2 METHODS

2.1 FIELD SURVEY

A field survey was performed in April 2014 by two specialist ecologists where one focused on the botanical aspects while the other focussed on the faunal aspects. During the field survey the proposed development site was covered on foot and by vehicle in order to obtain an understanding of the ecology. Numerous georeferenced photographs were taken and vegetation documentation was performed where the dominant plant species were recorded. The field survey focused upon the potential presence of Red-Listed species, especially species identified by GDARD (2012) which serve as sensitivity triggers.

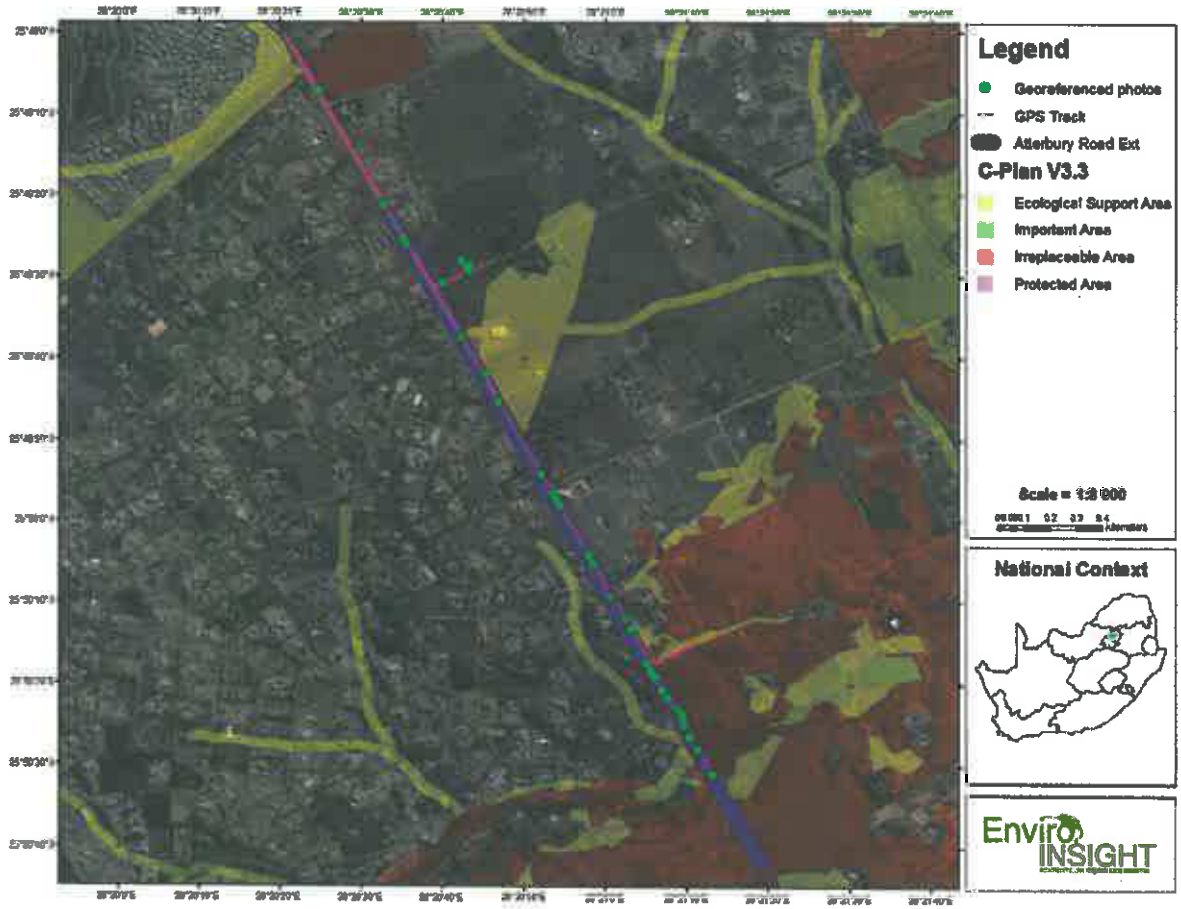

Figure 1: The study area in relation to the Gauteng C-Plan (V3.3) and prominent wetlands and dams

2.2 DESKTOP SURVEY

2.2.1 Literature study

As mentioned above, much of the approach for this survey is based upon the GDARD (2012) Requirements for Biodiversity Assessments. The level of this study does not warrant intensive sampling but rather serves to combine the aspects of the vegetation unit (obtained from Mucina and Rutherford 2006) with the C-plan (V3.3) analysis and GDARD minimum requirements in order to formulate a series of recommendations. Many of the avifaunal triggers were referenced by the

Southern Africa Bird Atlas Project (SABAP 2) and Hockey *et al.* (2005). Mammal information was referenced by Skinner and Chimimba (2005). These recommendations are to be used by the client (Bokamoso) in order to drive the process in accordance with the relevant legislation.

2.2.2 GIS

The Gauteng Conservation plan (C-plan V3.3) was used to initially evaluate ecologically sensitive areas. Wetlands and surface water were mapped from aerial imagery (Google Earth and Bing maps). In addition, the shuttle radar topography mission (SRTM) digital elevation model (DEM) was used to perform a basic terrain analysis that encompassed a slope and landforms analyses as well as water channel network and hydrological basin generation. Wherever possible, all models were verified with field-collected data. The habitat units are subjectively delineated based on variances in vegetation composition and available satellite imagery.

3 RESULTS

Figure 1shows the specialist coverage of the study area as well as the C-Plan delineation of conservation areas. s. The georeferenced photographs shown in Figure 1are presented as thumbnails in Appendix 1 to provide a photographic overview of the study area. The Figure 2 slope analysis shows significant steep slopes at the south-south-eastern end portion of the linear extension (red colour in Figure 2). Although clearly a steep rocky ridge, the disturbance levels (alien vegetation, human presence) are considered to be high and a relatively small surface area of ridge (and associated intact vegetation) will be compromised by the new infrastructure. Figure 3 illustrates the wetness index which can directly be related to wetland/ drainage line habitats which are a critical component of the Gauteng minimum requirements assessment and vital to the assessment of the presence of red-data faunal species.

Additional forms of land use and impacts on the study area include existing roads, security walls, security fencing, housing infrastructure and rubble dumping. These and additional impacts such as from exotic plant species and existing infrastructure were also observed, some of which are shown in Table 1. Analysis of habitat types were discussed in contextual setting in regards to the potential or actual presence of red-data species.

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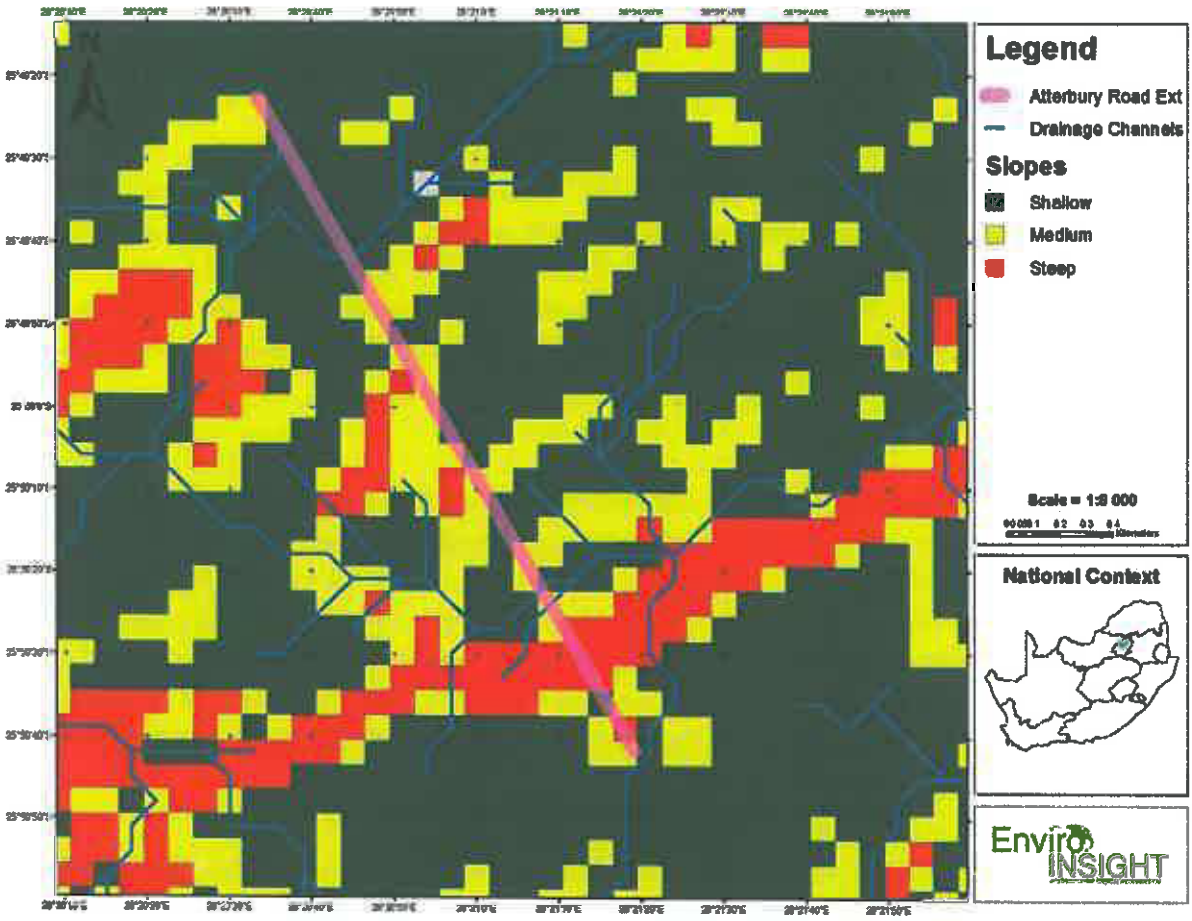

Figure 2: Road extension shapefile overlaid with the slope analysis

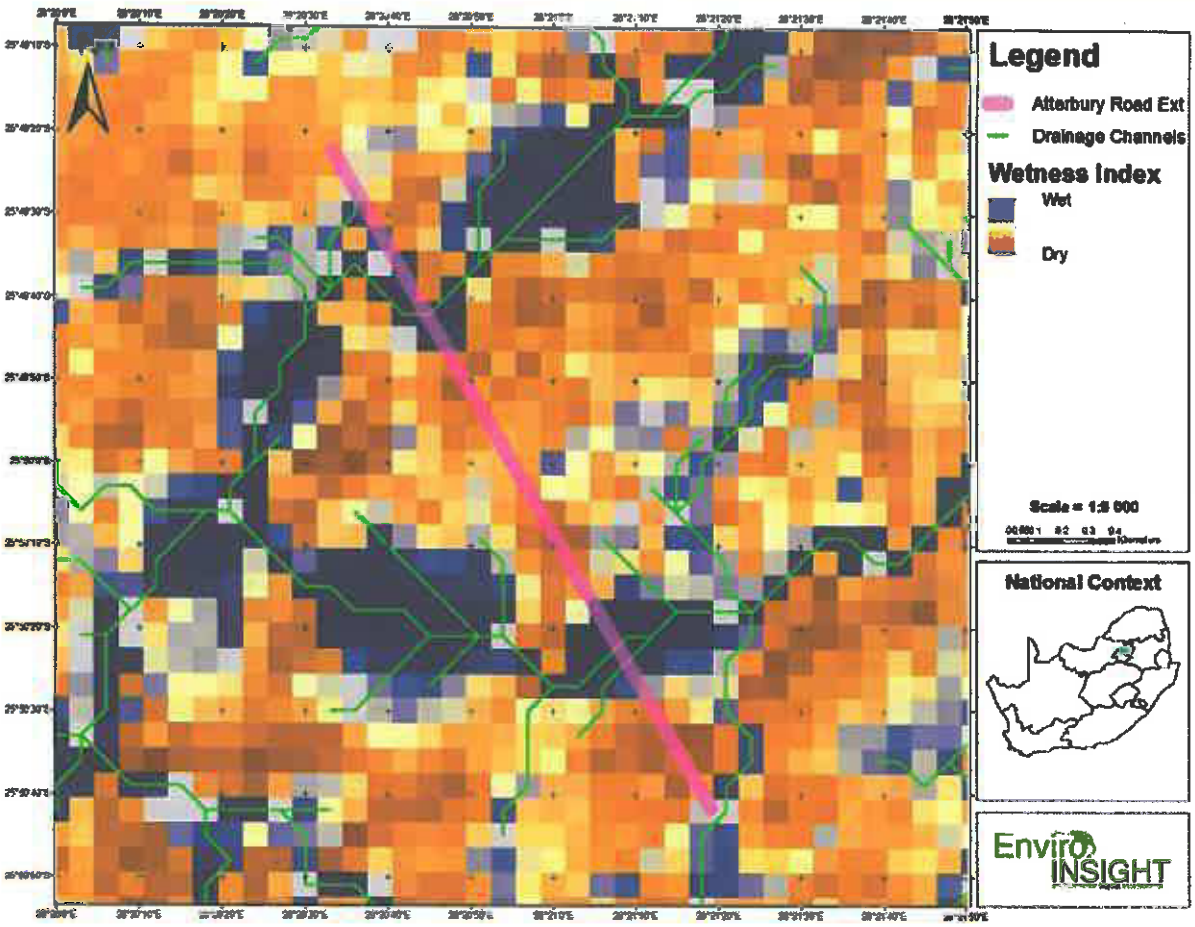

Figure 3: *Road extension shapefile overlaid with the Wetness Index Model*

Table 1: *Examples of current impacts observed in the study area during the survey*

		
Security Fencing	Existing infrastructure	Building rubble dumping site
		
Security walling	Exotic vegetation stands	Large regularly travelled road

3.1 HABITAT UNIT 1 – WOODED RIDGE AND GRASSLAND VEGETATION

The northern road verge is typically more densely vegetated and varies from typical open Highveld grassland to Bankenveld; and based on the high incidence of undesirable plant species such as *Lantana camara*, *Solanum mauritianum*, *Melia azedarach*, *Opuntia* spp., *Pyracantha angustifolia and Acacia mearnsii*are indicative of severe degradation and increased moisture regime due to excessive water run-off along the road.Various land-use options are applied along the northern road verge and include, urban development, grazing for livestock and natural areas with no apparent land-use. Although the soils are generally deep, red Hutton soils without rock, typically associated with the Highveld grassland found, soils in some section are more shallow and strewn with exposed boulders. Typically these sections support *Acacia caffra*, *Acacia karroo*, *Cussonia paniculata*, *Celtis africana*, *Euclea crispa*, *Ziziphus mucronata*, *Searsia lancea* and *Searsia pyroides*. However, a high incidence of *Eucalyptus* spp., *Pinus* spp., *Melia azedarach*, *Lantana camara* and *Pyracantha angustifolia* are also present, indicating degradation. This observation is supported by the high incidence of *Aloe greatheadii* var. *davyana*. Although the

forb layer is well represented by *Lippia javanica, Hypoxis rigidula, Hypoxis hemerocallidea, Vernonia oligocephala, Felicia muricata and Clematis brachiata, the high incidence of Schkuhria pinnata, Tagetes minuta, Bidens pilosa and Uncaria tomentosa* are again indicative of degradation. No Red Data species are present and, as the habitat is only considered marginally suitable no Red Data species are expected.

3.2 HABITAT UNIT 2- TRANSFORMED

The proposed road extension follows the current gravel road, through a drainage line and extends beyond this point to the top of the hill. Urban development is evident on the southern boundary with high security walls effectively blocking all terrestrial animal migration. The vegetated section between the gravel road and the wall is severely degraded and much of the vegetation removed to achieve a clear view along the wall, thus effectively reducing the security risk to these properties. Although many natural grass species such as *Hyparrheniahirta, Eragrostiscurvula, Sporobolusafricanus*and *Cynodondactylon* are present, the high incidence of *Aristidacongesta* subsp. *congesta, Aristidacongesta* subsp. *barbicollis* and *Melinisrepens* are indicative of this disturbance. Few tree species are present, but some scattered individuals of *Acacia caffra* and *Searsia lancea* can be found. No Red Data species are present and none are expected due to severe habitat modification.

3.3 HABITAT UNIT 3 – WETLAND/ DRAINAGE LINE

This habitat is identified by the wetness index analysis shown as Figure 3. Ground truthing showed that the wet areas shown to the North Northwest of the wetness index model is already largely disturbed through current impacts and shows very little potential for red-data species. However, the wet area to the South-Southeast of the linear structure is represented by a functional to semi-functional drainage line with riparian vegetetation and water flow both being maintained. Due to the high moisture regime present in this habitat unit *Phragmites australis* and *Populus canescens* formed significant stands. Normal migration of water associated mammals may be impeded by the security wall and no red-data species were recorded.Although no Red Data species was present during the survey, the habitat is considered marginally suitable to orchid species such as *Eulophia angolensis*, although the surface area affected is seen as negligable, especially if bridging over the wetland area is implemented.

4 DISCUSSION AND RECOMMENDATIONS

The Discussion and Recommendation section will be driven by both the GDARD minimum requirements and the level of the study commissioned by the client (Basic Assessment). The section will also be broken down into the various components of Fauna, Flora and Habitats.

4.1 FAUNA

According to GDARD's requirements for biodiversity assessments (GDARD 2012), no amphibian or reptile species

assessments are required for the sensitivity analysis. However, when discussing the impacts on ridges and wetlands, an assessment of both reptiles and amphibians may be required (if deemed necessary). The recommendations regarding the habitats are addressed below. In regards to specific species of conservation concern, four main triggers were identified showing a high probability of occurrence (based on habitat potential).

White-bellied Korhaan *Eupodotis senegalensis*

A resident of the type of mixed and sourveld grassland characteristic of the study area, white bellied korhaan may be resident on the site due to the high degree of habitat potential and suitable foraging requirements. According to the South African Bird Atlas Project (SABAP 2), White-bellied korhaan occur adjacent to the study area. The area is NOT however seen as being a core area of habitat and more importantly, the road extension itself does not impinge upon primary grassland usually colonised by the species. If impacts adjacent to the linear extension are minimised, the impact or potential impact on the species is regarded as being insignificant.

Water Rat *Dasymys incomtus*

The road extension infiltrates a portion of intact drainage/wetland system, especially to the south-south east of the linear shapefile, as shown by the wetness index model of Figure 1. However, the habitat observed is considered to be sub-optimal habitat for water rat (due to high levels of disturbance). It must be stated however that if the extension was to be developed without mitigation, the flow of the natural drainage line would be impeded significantly and downstream riparian habitat could be eliminated. In light of this data and by employing the precautionary principle 9assuming that water rat is present in the area), it is concluded that trapping assessments such as Sherman trapping and scat analysis (jawbones of predators such as owls, dogs and jackals) are not warranted. Instead, simple mitigation measures could be employed by altering the design of the road extension and ensuring bridging across the drainage line, thereby avoiding all direct impact and maintaining the existing integrity of the drainage line.

Spotted-neck otter *Lutra maculicollis*

It was apparent that some potentially suitable migratory habitat persists on site, especially on the south-south eastern portion of the linear extension. However, the area is mostly sub-optimal for spotted-neck otters which prefer deep, clear pools which support large populations of fish. The conclusion for the spotted-neck otter mirrors that of the water rat above which favours simple design alteration (bridging) rather than intensive studies on the presence of the species which may in fact prove inconclusive.

Juliana's golden mole *Neamblysomus julianae*

This species is a IUCN Critically Endangered resident which has previously been recorded adjacent to the study area by the author. The presence of this species can represent a fatal flaw for linear developments as the species relies on sandy/rocky substrates to forage just below the surface. Although most definitely a trigger in accordance to GDARD minimum

requirements, there are two distinct factors which mitigate against a fatal flaw classification of the Atterbury Road extension based on the presence of golden moles. 1) The extension is mostly an upgrade of an existing gravel track which is already highly impacted by substrate compaction and road traffic. 2) Much of the extension lies adjacent to an existing security wall which provides a significant barrier for free migration of populations. For these reasons, the potential for the local/regional population of golden moles to be significantly affected by the extension of Atterbury road is regarded as minimal.

4.2 FLORA

Based on the vegetation analysis and the observations made during the survey it is evident that the area currently has moderate to poor ecological functionality.. Although no listed Red Data plant species was observed within the study area, the adjacent grassland and wetland habitats are marginally suited to orchids of the *Habenaria sp's*. It is thus recommended either the natural areas along the proposed expansion be isolated from all development related disturbance or that a more in-depth investigation be launched to address all environmental aspects and assess the full conservation potential of the area.

4.3 HABITAT

Since the **wetlands** and **ridges** present on the proposed development property show only marginal potential for red-data species, the following recommendations are suggested:

Summary of recommendations based upon the basic assessment level study is summarised below.

- Large areas of important and ecological support areas as determined by the C-Plan V3.3 are to be excluded from any development related impacts.
- Wetland areas are to be avoided through the extension design.
- Due to the levels of current disturbance and the lack of habitat potential, it is deemed that detailed assessments need not be carried out in regards to the red-data trigger mammal species namely Juliana's golden mole, spotted-neck otter and water rat.
- Due to the levels of current disturbance and the lack of habitat potential, it is deemed that detailed assessments need not be carried out in regards to the red-data trigger bird species African grass owl, white-bellied korhaan and African marsh harrier. This is subject to the avoidance of ecologically intact areas of land lying adjacent to the road infrastructure.

5 REFERENCES

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6 APPENDIX

Appendix 1: *Georeferenced photographs taken during the fieldwork survey (shown in Figure 2)*

				
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Appendix G_2: Wetland Ecological Assessment

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Bokamoso

Atterbury Road Extension Ecological Red-Data Species and Basic Assessment

by

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Samuel Laurence
Ben Orban

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[1] South Eastern Portion of Proposed Road Extension

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1 INTRODUCTION

Enviro-Insight CC was commissioned by Bokamoso to perform a Red Data species biological assessment of the proposed Atterbury Road Extension (Figure 1). This site is situated in Gauteng province at the south-eastern end of the existing Atterbury Road infrastructure in Pretoria. In addition, the proposed road extension intersects areas classified as irreplaceable by the Gauteng C-Plan V3.3. The proposed development is that of an extension of the existing road infrastructure and should be compared against the GDARD (2012) Minimum Requirements for Biodiversity Assessments, which drives much of the approach for this study. The recommendations arising from this study are to be used by the client (Bokamoso) in order to facilitate the development process in accordance with the relevant legislation.

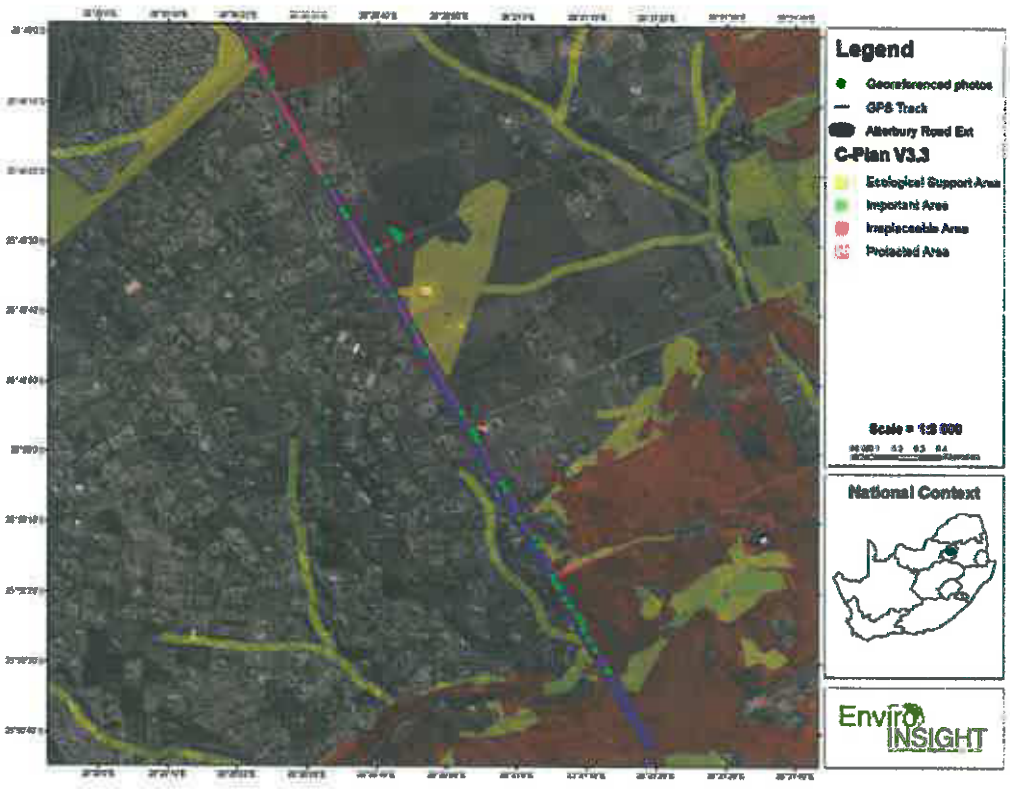

Figure 1: *The proposed road extension in relation to the Gauteng C-Plan (V3.3)*

2 METHODS

2.1 FIELD SURVEY

A field survey was performed in April 2014 by two specialist ecologists where one focused on the botanical aspects while the other focussed on the faunal aspects. During the field survey the proposed development site was covered on foot and by vehicle in order to obtain an understanding of the ecology. Numerous georeferenced photographs were taken and vegetation documentation was performed where the dominant plant species were recorded. The field survey focused upon the potential presence of Red Data species, especially species identified by GDARD (2012) which serve as sensitivity triggers.

2.2 DESKTOP SURVEY

2.2.1 Literature study

As mentioned above, much of the approach for this survey is based upon the GDARD (2012) Requirements for Biodiversity Assessments. The level of this study did not warrant intensive sampling but rather served to combine the aspects of the vegetation unit (Andesite Mountain Bushveld, obtained from Mucina and Rutherford 2006) with the C-plan (V3.3) analysis and GDARD minimum requirements in order to formulate a series of study recommendations. Many of the avifaunal triggers were referenced by the Southern Africa Bird Atlas Project (SABAP 2) and Hockey *et al.* (2005). Mammal information was referenced by Skinner and Chimimba (2005).

2.2.2 GIS

The Gauteng Conservation plan (C-plan V3.3) was used to initially evaluate ecologically sensitive areas. The shuttle radar topography mission (SRTM) digital elevation model (DEM) could not be used to perform a terrain analysis (slope, landforms, water channel network and wetness index model) due to low resolution (30 m) and the presence of tall buildings affecting the accuracy of the DEM. Consequently, high resolution remote sensing imagery (Bing Maps, Google Earth and ArcGIS online) was used for habitat mapping, which was verified with field-collected data.

3 RESULTS

Figure 1 shows the specialist coverage of the study area as well as the Gauteng C-Plan (V3.3) delineation of conservation areas. From this figure it is clear that portions of the proposed road extension intersect with both "Ecological Support" and "Irreplaceable areas" of the Gauteng C-Plan (V3.3). The georeferenced photographs shown in Figure 1 are presented as thumbnail images in Appendix 1 to provide a photographic overview of the study area. Significant steep topographic slopes of a rocky ridge were observed at the South-South-Eastern portion of the linear road extension. However, the disturbance levels (alien vegetation, human presence) are considered to be high and a relatively small surface area of ridge (and associated intact vegetation) will be compromised by the proposed infrastructure.

Additional forms of land use and impacts on the study area include existing roads, security walls, security fencing, housing infrastructure and rubble dumping. These and additional impacts such as from exotic plant species and existing infrastructure were also observed, some of which are shown in Table 1. Analysis of habitat types were discussed in contextual setting in regards to the potential or actual presence of Red Data species.

Table 1: *Examples of current impacts observed in the study area during the survey*

		
Security Fencing	Existing infrastructure	Building rubble dumping site
		
Security walling	Exotic vegetation stands	Large regularly travelled road

3.1 HABITAT UNIT 1 – WOODED RIDGE AND GRASSLAND VEGETATION

The Northern road verge is typically more densely vegetated and varies from typical open Highveld grassland to Bankenveld-like vegetation. Based on the high abundance of undesirable plant species such as *Lantana camara*, *Solanum mauritianum*, *Melia azedarach*, *Opuntia* spp., *Pyracantha angustifolia and Acacia mearnsii*are, this habitat is indicative of severe degradation and increased moisture regime due to excessive water run-off along the road. Various land-use options are applied along the Northern road verge and include, urban development, grazing for livestock and natural areas with no apparent land-use. Although the soils are generally deep, red Hutton soils without rock, typically associated with the Highveld grassland found, soils in some sections are more shallow and strewn with exposed boulders. Typically these sections support *Acacia caffra*, *Acacia karroo*, *Cussonia paniculata*, *Celtis africana*, *Euclea crispa*, *Ziziphus mucronata*, *Searsia lancea* and *Searsia pyroides*. However, a high occurrence of *Eucalyptus* spp., *Pinus* spp., *Melia azedarach*, *Lantana camara* and

Pyracantha angustifolia are also present, indicating disturbance and ecological degradation. This observation is supported by the high occurrence of *Aloe greatheadii* var. *davyana*. Although the forb layer is well represented by *Lippia javanica, Hypoxis rigidula, Hypoxis hemerocallidea, Vernonia oligocephala, Felicia muricata and Clematis brachiata,* the high incidence of *Schkuhria pinnata, Tagetes minuta, Bidens pilosa and Uncaria tomentosa* are again indicative of degradation. No Red Data species are present and, as the habitat is only considered marginally suitable, no Red Data species are expected.

3.2 HABITAT UNIT 2- TRANSFORMED

The proposed road extension follows the current gravel road, through a drainage line and extends beyond this point to the top of the hill. Urban development is evident on the Southern boundary with high security walls effectively blocking all terrestrial animal migration. The vegetated section between the gravel road and the wall is severely degraded and much of the vegetation removed to achieve a clear view along the wall, thus effectively reducing the security risk to these properties. Although many natural grass species such as *Hyparrhenia hirta*, *Eragrostis curvula*, *Sporobolus africanus* and *Cynodon dactylon* are present, the high incidence of *Aristida congesta* subsp. *congesta*, *Aristida congesta* subsp. *barbicollis* and *Melinis repens* are indicative of this disturbance. Few tree species are present, but some scattered individuals of *Acacia caffra* and *Searsia lancea* can be found. No Red Data species are present and none are expected due to severe habitat modification.

3.3 HABITAT UNIT 3 – WETLAND/ DRAINAGE LINE

Ground truthing showed that the wet area to the South-Southeast of the linear structure is represented by a functional to semi-functional drainage line with riparian vegetation and water flow both being maintained. Due to the high moisture regime present in this habitat unit *Phragmites australis* and *Populus canescens* formed significant stands. Normal migration of water associated mammals may be impeded by the security wall and no Red Data species were recorded. Although no Red Data species were present during the survey, the habitat is considered marginally suitable to orchid species such as *Eulophia angolensis*, although the surface area affected is seen as negligible, especially if bridging over the wetland area is implemented.

4 DISCUSSION AND RECOMMENDATIONS

This section is driven by both the GDARD minimum requirements and the level of the study commissioned by the client (Basic Assessment). The section is also broken down into the various components of Fauna, Flora and Habitats.

4.1 FAUNA

According to GDARD's requirements for biodiversity assessments (GDARD 2012), no amphibian or reptile species assessments are required for the sensitivity analysis. However, when discussing the impacts on ridges and wetlands, an assessment of both reptiles and amphibians may be required (if deemed necessary). The recommendations regarding the

habitats are addressed below. In regards to specific species of conservation concern, four main triggers were identified showing a relatively high probability of occurrence (based on habitat potential). Habitat potential was very low for the possible avifauna triggers African grass owl and African marsh harrier and their likelihood of occurrence in the area is therefore considered negligible. These two species are therefore omitted from the discussion below.

White-bellied Korhaan *Eupodotis senegalensis*

A resident of the type of mixed and sourveld grassland characteristic of the study area, white bellied korhaan may be resident on the site due to the high degree of habitat potential and suitable foraging requirements. According to the South African Bird Atlas Project (SABAP 2), White-bellied korhaan occur adjacent to the study area. The area is not however seen as being a core area of habitat and more importantly, the road extension itself does not impinge upon primary grassland usually colonised by the species. If impacts adjacent to the proposed linear road extension are minimised, the potential impact on this species is suggested to be insignificant.

Water Rat *Dasymys incomtus*

The road extension intersects a portion of intact drainage/wetland system, especially to the South-Southeast of the road alignment. However, the habitat observed is considered to be sub-optimal habitat for water rat (due to high levels of disturbance). It must be stated however that if the extension was to be developed without mitigation, the flow of the natural drainage line would be impeded significantly and downstream riparian habitat could be eliminated. In light of this and by employing the precautionary principle (assuming that water rat is present in the area), it is concluded that trapping assessments such as Sherman trapping and scat analysis (jawbones of predators such as owls, dogs and jackals) are not warranted. Instead, simple mitigation measures could be employed by altering the design of the road extension and ensuring bridging across the drainage line, so that free movement of animals can take place, thereby avoiding all direct impact and maintaining the existing integrity of the drainage line.

Spotted-neck otter *Lutra maculicollis*

It was apparent that some potentially suitable migratory/dispersal habitat persists on site, especially on the South-South-eastern portion of the linear extension. However, the area is mostly sub-optimal for spotted-neck otters which prefer deep, clear pools which support large populations of fish. The conclusion for the spotted-neck otter mirrors that of the water rat above which favours simple design alteration (bridging) rather than intensive studies on the presence of the species which may in fact prove inconclusive.

Juliana's golden mole *Neamblysomus julianae*

This species is an IUCN Critically Endangered resident which has previously been recorded adjacent to the study area by the author. The presence of this species can represent a fatal flaw for linear developments as the species relies on sandy/rocky substrates to forage just below the surface. Although most definitely a trigger in accordance to GDARD minimum requirements, there are two distinct factors which mitigate against a fatal flaw classification of the proposed Atterbury Road extension based on the presence of golden moles:

1. The proposed road extension is mostly an upgrade of an existing gravel track which is already highly impacted by substrate compaction and road traffic.
2. Much of the proposed road extension lies adjacent to an existing security wall which provides a significant barrier for free migration of terrestrial fauna.

For these reasons, the potential for the local/regional population of golden moles to be significantly affected by the extension of Atterbury road is regarded as minimal.

4.2 FLORA

Based on the vegetation analysis and the observations made during the survey it is evident that the area currently has moderate to poor ecological functionality. Although no Red Data plant species were observed within the study area, the adjacent grassland and wetland habitats are marginally suited to orchids of the *Habenaria* genus. It is thus recommended that either the natural areas along the proposed expansion be isolated from all development related disturbance or that a more in-depth investigation be launched to address all environmental aspects and assess the full conservation potential of the area.

4.3 HABITAT

Since the **wetlands** and **ridges** present on the proposed development property show only marginal potential for Red Data species, the following recommendations are suggested:

- Large areas of important and ecological support areas as determined by the C-Plan V3.3 are to be excluded from any development related impacts. This does NOT include the current disturbance of the proposed road footprint and associated buffering.
- Wetland areas are to be avoided through alteration of the road extension design (appropriate bridges).
- Due to the significant levels of current disturbance and the lack of habitat potential, detailed assessments need not be carried out for the Red Data trigger mammal species namely Juliana's golden mole, spotted-neck otter and water rat.
- Due to the levels of current disturbance and the lack of habitat potential, detailed assessments need not be carried out for the Red Data trigger bird species African grass owl, white-bellied korhaan and African marsh harrier. This is subject to the avoidance of ecologically intact areas of land lying adjacent to the proposed road alignment.

A preliminary habitat sensitivity map was developed based on the basic assessment fieldwork findings, habitat mapping and the C-Plan V3.3 (Figure 2). The drainage line and associated wetlands are considered to be of high ecological sensitivity while the C-plan irreplaceable areas are considered to be of medium-high ecological sensitivity.

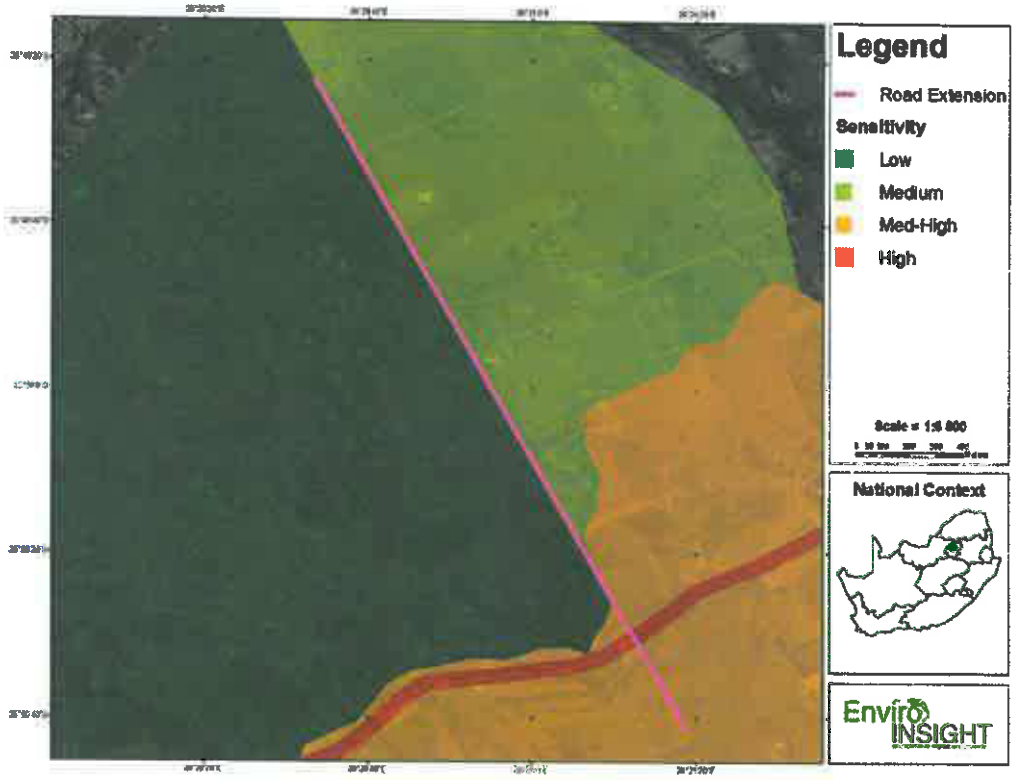

Figure 2: *Preliminary habitat sensitivity map for the proposed road extension*

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0841	0842	0843	0844	0845
				
0846	0847	0848	0849	0850
				
0851	0852	0853	0854	0855

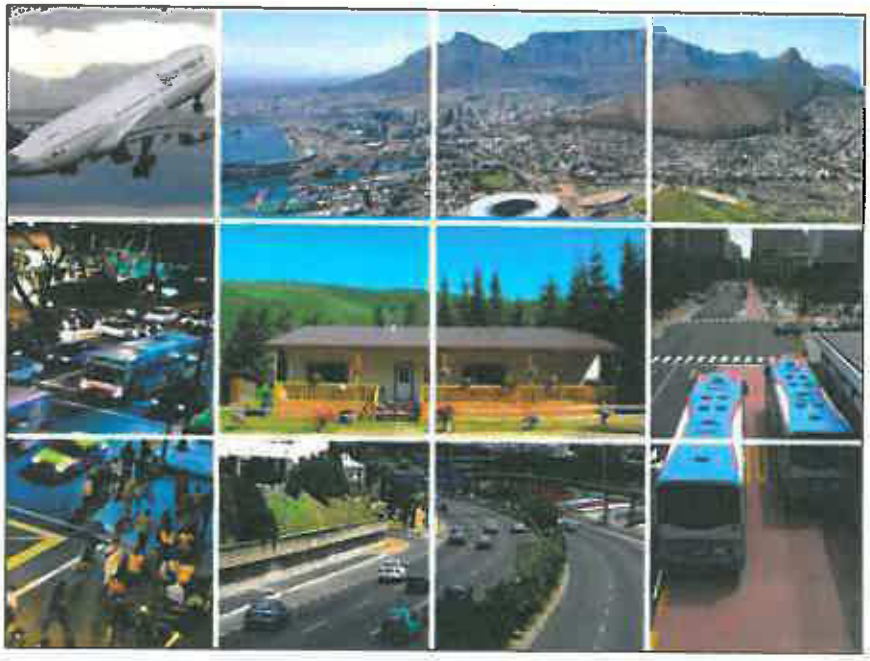
Appendix G_3: Noise Impact Assessment

Bokamoso Landscape Architects & Environmental Consultants

NOISE STUDY FOR

ENVIRONMENTAL IMPACT ASSESSMENT

Proposed Extension of Atterbury Road, City of Tshwane



Study done for:

Prepared by:

EAR
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EXECUTIVE SUMMARY

INTRODUCTION

Enviro-Acoustic Research (EARES) were appointed by Bokamoso Landscape Architects & Environmental Consultants to determine the potential noise impact on the surrounding environment due to the proposed Atterbury Road extension.

This report describes the Noise Rating Levels and potential noise impact that the operation of the noise source under investigation (Atterbury Road extension) may have on the surrounding receptors sound environment, highlighting the methods used, potential issues identified, findings and recommendations. This report only briefly discusses the basic principles of potential noise impacts on wildlife. The Terms of Reference (TOR) for this study is in the National/International guidelines and regulations: SANS 10103:2008, SANS 10210:2004, SANS 10328, SANS 10357, GN R154, GN 5479 (Noise Control Regulations), and IFC: General EHS Guidelines (Equator Principal).

An application for a proposed extension of the Atterbury Road p to the K147 intersection has been submitted to local authorities. The section of road under investigation lays directly adjacent to the Mooikloof Residential Estate in the eastern suburbs of Tshwane.

BASELINE

Ambient sound levels were measured at one location during a site visit from the 09th - 11th September 2014. Potential noise-sensitive receptors (NSDs) in the area were identified using tools such as Google Earth®, supported with a site investigation as to confirm the status of the identified dwellings. Conceptual noise-sensitive developments (representing a number of potential receptors) in the study area were numbered as NSD1 – NSD3.

NSD1 – NSND2 receptors were selected to represent dwellings directly adjacent and facing the noise source (Atterbury Road) under investigation. During site investigations it was viewed that most vehicles would turn into the Mooikloof Estate entrance, thus traffic becoming less after turn-off (heading further south-east). NSD1 is a conceptual dwelling with façade 20 m from the road under investigation (dwelling directly adjacent to road), while NSD2 is a conceptual dwelling façade at 40 m. NSD3 represents a School and religious facility (Evangelies Gereformeerde Kerk) of which is adjacent to the busier section of the noise source under investigation. The reason for the site visit, apart from measuring ambient sound levels (at certain receptors) was to confirm the presence/existence of derelict or abandoned dwellings that could possibly be seen as

sensitive receptors, small dwellings that could not be identified on the aerial image and dwellings that might have been constructed after the date of the aerial photograph.

The $L_{AIeq,16/8hr}$ daytime data indicate a sound level slightly higher than a typical busy urban area, yet lower than an business district. Night-time data range between a typical busy urban area, yet lower than a business district. Both the day and night-time data indicated an area where road traffic noises from the Atterbury Road dominated the soundscape. There is a high confidence in the ambient sound levels measured and the subsequent Rating Levels determined. The project should also consider the guideline levels for residential use as set by international institutions such as World Health Organization, World Bank and International Finance Corporation.

FINDINGS

Subsequent investigations indicated that there is a risk of a noise impact of medium significance during the daytime construction phase, and a noise impact of moderate significance during the day and night-times operational phase. This was assessed making use of SANS 10103:2008 guideline and International Finance Corporation noise limits for residential areas. This moderate impact is only applicable if a dwelling façade structure (such as a bedroom, school facility room etc.) is within 20 m from the proposed road. Construction and operational related mitigation options are highlighted in this document for the developer to consider.

RECOMMENDATIONS

Since there exist a risk of a noise impact during the operational phase it is recommended that the developer consider a feasible mitigation options as highlighted in this document. It should be noted that this does not suggest that the sound from the road traffic should not be inaudible under all circumstances, this is an unrealistic expectation that is not required or expected from any other agricultural, commercial, industrial or other transportation related noise source, but rather that the sound due to the road traffic should be at a reasonable level in relation to the ambient sound levels as per regulations.

If the layout of the road changes significantly (or assumptions change) as used in this report, this Environmental Noise Impact Assessment should be reviewed with the appropriate information supplied by the mine, including:

- Locality of the noise source;
- Operational time of the noise source; and
- If possible specifications regarding the noise source.

Title:

De Jager, M. (2014). *"Environmental Noise Impact Assessment:* Proposed Extension of Atterbury Road, City of Tshwane." Enviro-Acoustic Research cc, Pretoria

Client:

Bokamoso Landscape Architects & Environmental Consultants
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Report no:

B-A/ENIA/201409-Rev-2

Author:

M. de Jager *(B. Ing (Chem))*

Review:

Shaun Weinberg

Date:

November 2014

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GLOSSARY OF ABBREVIATIONS

ADT	Articulated Dump Truck
AZSL	Acceptable Zone Sound Level (Rating Level)
AADT	Annual Average Daily Traffic
ADDTT	Annual Average Daily Truck Traffic
CEO	Chief Executive Officer
CWR	Continuous Welded Rail
dB	Decibel
EARES	Enviro-Acoustic Research cc
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (Act 78 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
ENIA	Environmental Noise Impact Assessment
EMP	Environmental Management Plan
Ext.	Extension
FEL	Front End Loader
Ha	Hectare
HOD	Head of Department
IAPs	Interested and Affected Parties
i.e.	that is
IEM	Integrated Environmental Management
km	kilometres
LHD	Load haul dumper
LOP	Life of Project
m	Meters (measurement of distance)
m^2	Square meter
m^3	Cubic meter
mamsl	Meters above mean sea level
MW	Mega Watt
NCR	Noise Control Regulations (under Section 25 of the ECA)
NSD	Noise-sensitive Development
RMS	Root Mean Square
SABS	South African Bureau of Standards
SANS	South African National Standards
SLM	Sound Level Meter
TOR	Terms of Reference
UTM	Universal Transverse Mercator
UTFC	Ultra-Thin Frictional Course
WHO	World Health Organisation

1 INTRODUCTION

1.1 INTRODUCTION AND PURPOSE

Enviro-Acoustic Research (EARES) were appointed by Bokamoso Landscape Architects & Environmental Consultants to determine the potential noise impact on the surrounding environment due to the proposed Atterbury Road extension.

This report describes the Noise Rating Levels and potential noise impact that the operation of the noise source under investigation (Atterbury Road extension) may have on the surrounding receptors sound environment, highlighting the methods used, potential issues identified, findings and recommendations. This report only briefly discusses the basic principles of potential noise impacts on wildlife. The Terms of Reference (TOR) for this study is in the National/International guidelines and regulations: SANS 10103:2008, SANS 10210:2004, SANS 10328, SANS 10357, GN R154, GN 5479 (Noise Control Regulations), and IFC: General EHS Guidelines (Equator Principal).

1.2 BRIEF PROJECT DESCRIPTION

An application for a proposed extension of the Atterbury Road p to the K147 intersection has been submitted to local authorities. The section of road under investigation lays directly adjacent to the Mooikloof Residential Estate in the eastern suburbs of Tshwane.

1.3 STUDY AREA

The study area is described in terms of environmental components that may contribute to or change the sound character in the area. The local municipality with jurisdiction in the area falls under the Tshwane Metropolitan Municipality. The study area can be described as micro in its setting (in terms of acoustics) at approximately 2 km^2 in size. The project in its local capacity is illustrated in **Figure 1-1**.

The road alignment affects Portions 116, 130 & 131 of the Farm Zwavelpoort No. 373 JR & Portion 1077/R of the Farm Rietfontein 375-JR

1.3.1 Topography

ENPAT [1] (1998) describes the topography as *"plains and pans"*, while Musina L. & Rutherford (The vegetation of South Africa, Lesotho and Swaziland) [2] delineates the area

[1] Van Riet, W. Claassen, P. van Rensburg, J. van Viegen & L. du Plessis, *"Environmental Potential Atlas for South Africa"*, Pretoria, 1998.

as *"hill slopes and some valleys"*. Due to the micro nature of the study area, there are little natural features that could act as noise barrier considering practical distances at which sound propagates.

1.3.2 Surrounding Land Use

ENPAT (1998) defines most of the surrounding area as *"forest and woodlands"*[3]. The site investigations observed residential dwellings and small scale businesses, albeit not particularly densely that could be found be found in a dense urban setting. Most dwellings were singular or double storey in height. It is unsure for the purpose of this report what the local municipality delineates the area as where the project is proposed.

1.3.3 Roads and Railway Lines

The most important road(s) (in terms of calculable acoustics) is the noise source under investigation, the Atterbury Road (presented in **Figure 1-2**). This road is likely a metropolitan freeway, class U2 (urban major arterials, discussed briefly in **Section 4.2.1.7**)[4]. Many smaller single carriage paved roads exist in the study area, these secondary roads may not carry sufficient traffic to warrant considering their calculable contribution to the ambient soundscape.

1.3.4 Potential Sensitive Receptors (Noise-Sensitive Developments)

Residential areas and potential noise-sensitive developments/receptors were identified using tools such as Google Earth® with the areas up to a distance of up to 500 m (recommendation SANS 10328:2003) from road footprint (receptors illustrated in **Figure 1-2).** This was supported by a site visit to confirm the status of the identified dwellings.

Conceptual noise-sensitive developments (representing a number of potential receptors) in the study area were numbered as NSD1 – NSD3 (represented by green dots in **Figure 1-2**). NSD1 – NSND2 receptors were selected to represent dwellings directly adjacent and facing the noise source (Atterbury Road) under investigation. During site investigations it was viewed that most vehicles would turn into the Mooikloof Estate entrance, thus traffic becoming less after turn-off (heading further south-east). NSD1 is a conceptual dwelling with façade 40 m from the road under investigation (dwelling directly adjacent to road), while NSD2 is a conceptual dwelling façade at 20 m. NSD03 illustrates a School and religious facility (Evangelies Gereformeerde Kerk) of which is adjacent to the busier section of the noise source under investigation. The reason for the site visit, apart from

[2] Musina L. & Rutherford." The vegetation of South Africa, Lesotho and Swaziland". Strelitzia 19, South African National Biodiversity Institute, Pretoria. 2006.
[3] Van Riet, W. Claassen, P. van Rensburg, J. van Viegen & L. du Plessis, *"Environmental Potential Atlas for South Africa"*, Pretoria, 1998.
[4] Committee of Transport Officials. *"TRH 26, South African Road Classification and Access Management Manual"*. Version 1.0.2012.

measuring ambient sound levels (at certain receptors) was to confirm the presence/existence of derelict or abandoned dwellings that could possibly be seen as sensitive receptors, small dwellings that could not be identified on the aerial image and dwellings that might have been constructed after the date of the aerial photograph.

Localities of representative receptors are further defined in **Appendix C.1** in latitude and longitude co-ordinates (WGS84). Dwellings in the study area were for the most part single or double plastered brick walls with flat pitched and gabled (or similar) roofs, with the gabled roofs having an interior ceiling. Certain dwellings in the community did comprise of galvanized sheeting.

1.3.5 Other industrial and commercial processes

There are little industrial and commercial processes with significant acoustical contributions within close proximity to the site.

1.3.6 Ground Conditions and Vegetation

The area falls within the Grassland biome, with the vegetation type being *"Bakenveld"*[5]. The natural veldt has been significantly disturbed due to anthropogenic activities with most of the ground stripped, compacted, tarred, concreted etc. (i.e. medium - hard ground). The mean annual evaporation ranges between 717 – 719 mm per annum, while mean annual precipitation is approximately 2,000 – 2,200 mm per annum[6][7].

Taking into consideration available information it is the opinion of the author that the ground conditions (when considering acoustic propagation on a ground surface) can be classified as medium-hard, which implies that it is not acoustically absorbent. It should be noted that this factor is only relevant for air-borne waves being reflected from the ground surface, with certain frequencies slightly absorbed by the vegetation.

1.4 AVAILABLE INFORMATION

This report made use of the following available information:

- Memorandum conducted by traffic impact engineers – Civil Concepts *"Proposed Atterbury Road Extension: Memorandum."* October 2014; and
- Morne de Jager. "Noise Study for Environmental Impact Assessment: Tshwane Bus Rapid Transit System." October 2013.

[5] Musina L. & Rutherford." The vegetation of South Africa, Lesotho and Swaziland". Strelitzia 19, South African National Biodiversity Institute, Pretoria. 2006.P.g. 460.
[6] South African Water Research Commission, *"Water Resources of South Africa 2005 (WR2005).* WRC Report No.: K5/1491", South Africa: WRC Publications, 2009.
[7] Musina L. & Rutherford." The vegetation of South Africa, Lesotho and Swaziland". Strelitzia 19, South African National Biodiversity Institute, Pretoria. 2006.

1.5 TERMS OF REFERENCE

SANS 10328:2008 (Edition 3) specifies the methodology to assess the noise impacts from the surrounding environment may have on the proposed development. The standard also stipulates the minimum requirements to be investigated for Scoping purposes. These include:

1. The purpose of the investigation;
2. A brief description of the planned development or the changes that are being considered;
3. A brief description of the existing environment;
4. The identification of the noise sources that may affect the particular development, together with their respective estimated sound pressure levels or sound power levels (or both);
5. The identified noise sources that were not taken into account and the reasons why they were not investigated;
6. The identified noise-sensitive developments and the estimated impact on them;
7. Any assumptions made with regard to the estimated values used;
8. An explanation, either by a brief description or by reference, of the methods that were used to estimate the existing and predicted rating levels;
9. The location of the measurement or calculation points, i.e. a description, sketch or map;
10. Estimation of the environmental noise impact;
11. Alternatives that were considered and the results of those that were investigated;
12. A list of all the interested or affected parties that offered any comments with respect to the environmental noise impact investigation;
13. A detailed summary of all the comments received from interested or affected parties as well as the procedures and discussions followed to deal with them;
14. Conclusions that were reached;
15. Recommendations, i.e. if there could be a significant impact, or if more information is needed, a recommendation that an environmental noise impact assessment be conducted, and;
16. If remedial measures will provide an acceptable solution which would prevent a significant impact, these remedial measures should be outlined in detail and included in the final record of decision if the approval is obtained from the relevant authority. If the remedial measures deteriorate after time and a follow-up auditing or maintenance programme (or both) is instituted, this programme should be included in the final recommendations and accepted in the record of decision if the approval is obtained from the relevant authority.

Figure 1-1: Site map indicating the regional locality of the proposed Eloffsdal estate boundary

Figure 1-2: Study area Noise-Sensitive Developments for assessment purpose

2 LEGAL CONTEXT, POLICIES AND GUIDELINES

2.1 THE REPUBLIC OF SOUTH AFRICA CONSTITUTION ACT ("THE CONSTITUTION")

The environmental rights contained in section 24 of the Constitution provide that everyone is entitled to an environment that is not harmful to his or her well-being. In the context of noise, this requires a determination of what level of noise is harmful to well-being. The general approach of the common law is to define an acceptable level of noise as that which the reasonable person can be expected to tolerate in the particular circumstances. The subjectivity of this approach can be problematic which has led to the development of noise standards (see **Section 2.5**).

"Noise pollution" is specifically included in Part B of Schedule 5 of the Constitution, which means that noise pollution control is a local authority competence, provided that the local authority concerned has the capacity to carry out this function.

2.2 THE ENVIRONMENT CONSERVATION ACT

The Environment Conservation Act ("ECA") allows the Minister of Environmental Affairs and Tourism ("now the Ministry of Water and Environmental Affairs") to make regulations regarding noise, among other concerns. See also **section 2.2.1**.

2.2.1 National Noise Control Regulations (GN R154 of 1992)

In terms of section 25 of the ECA, the national Noise Control Regulations (GN R154 in *Government Gazette* No. 13717 dated 10 January 1992) were promulgated. The NCRs were revised under Government Notice Number R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations.

Subsequently, in terms of Schedule 5 of the Constitution of South Africa of 1996 legislative responsibility for administering the noise control regulations was devolved to provincial and local authorities. Provincial Noise Control Regulations exists in the Free State, Gauteng and Western Cape provinces.

The National Noise Control Regulations (GN R154 1992) defines:
"**controlled area**" as:
a piece of land designated by a local authority where, in the case of--
(a) road transport noise in the vicinity of a road-

i. the reading on an integrating impulse sound level meter, taken outdoors at the end of a period extending from 06:00 to 24:00 while such meter is in operation, exceeds 65 dBA; or

ii. the equivalent continuous "A"-weighted sound pressure level at a height of at least 1,2 meters, but not more than 1,4 meters, above the ground for a period extending from 06:00 to 24:00 as calculated in accordance with SABS 0210-1986, titled: "Code of Practice for calculating and predicting road traffic noise", published under Government Notice No. 358 of 20 February 1987, and projected for a period of 15 **years** following the date on which the local authority has made such designation, exceeds 65 dBA;

"**disturbing noise**" as:
noise level which exceeds the zone sound level or, if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more.

"**zone sound level**" as:
a derived dBA value determined indirectly by means of a series of measurements, calculations or table readings and designated by a local authority for an area. This is the same as the Rating Level as defined in SANS 10103.

"noise nuisance" means:
any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person.

Furthermore it states that (Clause 3a):
"No person shall-
build a road or change an existing road, or alter the speed limit on a road, if it shall in the opinion of the local authority concerned cause an increase in noise in or near residential areas, or office, church, hospital or educational buildings, unless noise control measures have been taken in consultation with the local authority concerned to ensure that the land in the vicinity of such road shall not be designated as a controlled area."

2.2.1.1 Noise Control Regulations: Gauteng Province (GN 5479 of 20 August 1999)

The Gauteng Noise Control Regulations is based on the National Noise Control Regulations and most of the regulations are the same. It prohibits the generation of a disturbing noise in any manner (Regulation 8) and defines and prohibits activities that can result in a noise nuisance (Regulation 9). Regulation 11(1) allows a local authority to designate a controlled area as well as zone sound levels for specific areas and during specific times.

The difference between the National Noise Control Regulations and the Gauteng Province is te criteria set out for a controlled area, namely:

"controlled area" means a piece of land designed by a local authority where, in the case of-

(a) road traffic noise in the vicinity of a road-

(i) the reading on an integrating impulse sound level meter, taken outdoors at the end of a period of 24 hours while such meter was in operation, exceeds 60 dBA; or

(ii) the outdoor equivalent continuous "A" -weighed sound pressure level at a height of at least 1,2 metres, but not more than 1,4 metres, above the ground for a period of 24 hours as calculated in accordance with SABS 0210, and projected for a period of 15 years following the date on which the local authority has made such designation, exceeds 60 dBA.

2.3 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT

The National Environmental Management Act ("NEMA") defines "pollution" to include any change in the environment, including noise. A duty therefore arises under section 28 of NEMA to take reasonable measures while establishing and operating any facility to prevent noise pollution occurring. NEMA sets out measures which may be regarded as reasonable. They include the following measures:

1. to investigate, assess and evaluate the impact on the environment
2. to inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment
3. to cease, modify or control any act, activity or process causing the pollution or degradation
4. to contain or prevent the movement of the pollution or degradation
5. to eliminate any source of the pollution or degradation
6. to remedy the effects of the pollution or degradation

2.4 NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT ("AQA")

Section 34 of the National Environmental Management: Air Quality Act (Act 39 of 2004) makes provision for:

(1) the Minister to prescribe essential national noise standards -

(a) for the control of noise, either in general or by specified machinery or activities or in specified places or areas; or

(b) for determining –

(i) a definition of noise

(ii) the maximum levels of noise

(2) When controlling noise the provincial and local spheres of government are bound by any prescribed national standards.

This section of the Act is in force, but no such standards have yet been promulgated. Draft regulations have however, been promulgated for adoption by Local Authorities.

An atmospheric emission licence issued in terms of section 22 may contain conditions in respect of noise. This however is unlikely to be relevant to the project, as no atmospheric emissions licence is foreseen to take place.

2.4.1 Model Air Quality Management By-law for adoption and adaptation by Municipalities

Model Air Quality Management By-Laws for adoption and adaptation by municipalities was published by the Department of Water and Environmental Affairs in the Government Gazette of 2 July 2010 as Government Notice 579 of 2010.

The main aim of the model air quality management by-law is to assist municipalities in the development of their air quality management by-law within their jurisdictions. It is also the aim of the model by-law to ensure uniformity across the country when dealing with air quality management challenges. Therefore, the model by-law is developed to be generic in order to deal with most of the air quality management challenges. With Noise Control being covered under the Air Quality Act (Act 39 of 2004), noise is also managed in a separate section under this Government Notice.

- **IT IS NOT** the aim of the model by-law to have legal force and effect on municipalities when published in the Gazette; and
- **IT IS NOT** the aim of the model by-law to impose the by-law on municipalities.

Therefore, a municipality will have to follow the legal process set out in the Local Government: Municipal Systems Act, 2000 (Act No. 32 of 2000) when adopting and adapting the model by-law to its local jurisdictions.

2.5 NOISE STANDARDS

A number of South African Bureau of Standards (SABS) scientific standards are considered relevant to noise from the roads. They are:

- SANS 10103:2008. 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'.
- SANS 10210:2004. 'Calculating and predicting road traffic noise'.
- SANS 10328:2008. 'Methods for environmental noise impact assessments'.
- SANS 10357:2004. 'The calculation of sound propagation by the Concave method'.
- SANS 10181:2003. 'The Measurement of Noise Emitted by Road Vehicles when Stationary'.
- SANS 10205:2003. 'The Measurement of Noise Emitted by Motor Vehicles in Motion'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. With regards to SANS 10103:2008, the recommendations are likely to inform decisions by authorities, but non-compliance with the standard will not necessarily render an activity unlawful *per se*. It must be noted that SANS10103:2008 does stipulate *"for industries legitimately operating in an industrial district during the entire 24 hr. day/night cycle, $L_{Req,d} = L_{Req,n} = 70$ dBA can be considered as typical and normal"*

2.6 NATIONAL TRANSPORT POLICY (SEPTEMBER 1996)

The White Paper sets the vision for transport in South Africa that provides for *safe, reliable, effective, efficient and fully integrated transport operations and infrastructure which..... are environmentally and economically sustainable*. The White Paper further states that "*the provision of transportation infrastructure and the operation of the transportation system have the potential for causing damage to the physical and social environment, inter alia, through atmospheric and noise pollution, ecological damage and severance. ... The Department of Transport is committed to an integrated environmental management approach in the provision of transport*". It is also stated that "*As part of the overall long-term vision for the South African transport system, transport infrastructure will, inter alia, be structured to ensure environmental sustainability and internationally accepted standards*". One of the strategic objectives for transport infrastructure to achieve this vision is to promote environmental protection and resource conservation.

2.7 CITY OF TSHWANE NOISE MANAGEMENT POLICY (DRAFT)

Tshwane has for many years been aware of the increasing problems of noise in the metropolitan area and several years before the consolidation of the Metropolitan

Municipality many of its component municipalities implemented the National and later the Gauteng Noise Control Regulations. The Council's approach has, however, been on an *ad hoc* basis generally reacting to problems as they occur. A stage was reached where a comprehensive pro-active approach to noise management and control is required with the first step being the development of Noise Management Policy. The purpose of this policy was to set out the basic framework to guide subsequent legislation in the form of by-laws and for establishing enabling procedures. The Policy takes into account, inter alia, the requirements of the Gauteng Provincial Government's Noise Control Regulations which were promulgated in August 1999.

2.8 ROAD TRAFFIC ACT, 1996 (ACT NO 93 OF 1996)

The Road Traffic Act of 1996 provides, *inter alia*, that *no person shall operate or permit to be operated on a public road and vehicle causing noise in excess of the prescribed noise level.* The Act, however, does not prescribe noise levels, but empowers the Minister of Transport to issue regulations prescribing them. The consolidated Road Traffic Regulations in terms of the Act do not prescribe any such noise levels, although the noise levels specified in the South African National Standard SANS 10181 (SABS 0181) have been specified as control standards.

2.9 INTERNATIONAL GUIDELINES

While a number of international guidelines and standards exist, those selected below are used by numerous countries for environmental noise management.

2.9.1 Guidelines for Community Noise (WHO, 1999)

The World Health Organization's (WHO) document on the *Guidelines for Community Noise* is the outcome of the WHO- expert task force meeting held in London, United Kingdom, in April 1999. It is based on the document entitled "Community Noise" that was prepared for the World Health Organization and published in 1995 by the Stockholm University and Karolinska Institute.

The scope of WHO's effort to derive guidelines for community noise is to consolidate actual scientific knowledge on the health impacts of community noise and to provide guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments. It discusses the specific effects of noise on communities including:

- interference with communication
- noise-induced hearing impairment

- sleep disturbance effects
- cardiovascular and psychophysiological effect
- mental health effects
- effects on performance
- annoyance responses and
- effects on social behavior.

It further discusses how noise can impact (and propose guideline noise levels) on specific environments such as:

- residential dwellings; schools and preschools; hospitals; ceremonies, festivals and entertainment events; sounds through headphones; impulsive sounds from toys; fireworks and firearms; and parklands and conservation areas.

To protect the majority of people from being seriously annoyed during the daytime, it propose that sound levels at outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB LAeq. At night, equivalent sound levels at the outside façades of the living spaces should not exceed 45 dBA and 60 dBA $\mathbf{L_{Amax}}$ so that people may sleep with bedroom windows open.

It is critical to note that this guideline requires the sound level measuring instrument to be set on the "fast" detection setting.

2.9.2 Night Noise Guidelines for Europe (WHO, 2009)

Refining previous Community Noise Guidelines issued in 1999, and incorporating more recent research, the World Health Organization has released a comprehensive report on the health effects of night time noise, along with new (non-mandatory) guidelines for use in Europe. Rather than a maximum of 30 dB inside at night (which equals 45-50 dB max outside), the WHO now recommends a maximum year-round outside night-time noise average of 40 db to avoid sleep disturbance and its related health effects. The report notes that only below 30 dB (outside annual average) are "*no significant biological effects observed,*" and that between 30 and 40 dB, several effects are observed, with the chronically ill and children being more susceptible; however, "*even in the worst cases the effects seem modest.*" Elsewhere, the report states more definitively, "*There is no sufficient evidence that the biological effects observed at the level below 40 dB (night, outside) are harmful to health.*" At levels over 40dB, "*Adverse health effects are observed*" and "*many people have to adapt their lives to cope with the noise at night. Vulnerable groups are more severely affected.*"

The 184-page report offers a comprehensive overview of research into the various effects of noise on sleep quality and health (including the health effects of non-waking sleep arousal), and is recommended reading for anyone working with noise issues. The use of an outdoor noise standard is in part designed to acknowledge that people do like to leave windows open when sleeping, though the year-long average may be difficult to obtain (it would require longer-term sound monitoring than is usually budgeted for by either industry or neighbourhood groups).

While recommending the use of the average level, the report notes that some instantaneous effects occur in relation to specific maximum noise levels, but that the health effects of these "cannot be easily established."

2.9.3 Equator Principles

The **Equator Principles** (EPs) are a voluntary set of standards for determining, assessing and managing social and environmental risk in project financing. Equator Principles Financial Institutions (EPFIs) commit to not providing loans to projects where the borrower will not or is unable to comply with their respective social and environmental policies and procedures that implement the EPs.

The Equator Principles were developed by private sector banks and were launched in June 2003. The banks chose to model the Equator Principles on the environmental standards of the World Bank and the social policies of the International Finance Corporation (IFC). 67 financial institutions (October 2009) have adopted the Equator Principles, which have become the de facto standard for banks and investors on how to assess major development projects around the world. The environmental standards of the World Bank have been integrated into the social policies of the IFC since April 2007 as the International Finance Corporation Environmental, Health and Safety (EHS) Guidelines.

2.9.4 IFC: General EHS Guidelines – Environmental Noise Management

These guidelines are applicable to noise created beyond the property boundaries of a development that conforms to the Equator Principle.

It states that noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception. The preferred method for controlling noise from stationary sources is to implement noise control measures at source.

It goes as far as to proposed methods for the prevention and control of noise emissions, including:

- Selecting equipment with lower sound power levels;
- Installing silencers for fans;
- Installing suitable mufflers on engine exhausts and compressor components;
- Installing acoustic enclosures for equipment casing radiating noise;
- Improving the acoustic performance of constructed buildings, apply sound insulation;
- Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m^2 in order to minimize the transmission of sound through the barrier. Barriers should be located as close to the source or to the receptor location to be effective;
- Installing vibration isolation for mechanical equipment;
- Limiting the hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas ;
- Re-locating noise sources to less sensitive areas to take advantage of distance and shielding;
- Placement of permanent facilities away from community areas if possible;
- Taking advantage of the natural topography as a noise buffer during facility design;
- Reducing project traffic routing through community areas wherever possible;
- Planning flight routes, timing and altitude for aircraft (airplane and helicopter) flying over community areas; and
- Developing a mechanism to record and respond to complaints.

It sets noise level guidelines (see **Table 2-1**) as well as highlighting the certain monitoring requirements pre- and post-development. It adds another criterion in that the existing background ambient noise level should not rise by more than 3 dBA. Because this criterion will effectively sterilize large areas of any development it is the considered opinion that this criterion was likely introduced in order to address cases where the existing ambient noise level is already at, or in excess of the recommended limits.

Table 2-1: IFC Table .7.1-Noise Level Guidelines

Receptor type	One hour L_{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Night-time 22:00 - 07:00
Residential; institutional; educational	55	45
Industrial; commercial	70	70

The document uses the $L_{Aeq,1\ hr}$ noise descriptors to define noise levels. It does not determine the detection period, but refers to the IEC standards, which requires the fast detector setting on the Sound Level Meter during measurements in Europe.

2.9.5 International Paper – Future Noise Policy European Commission Green Paper (1996)

The 1996 Green Paper highlighted the need for better mitigation measures to be implemented in the European Union regarding transport air-borne vibration and recognises the need for a harmonization methodology of assessment of noise exposures[8]. It is stressed that noise relating to road, rail and other transport modes in the European Union needed to be addressed.

2.9.6 National and International Guidelines - Appropriate limits for game parks and wilderness

The United States National Park Services identifies that "intrusive" un-natural sounds are concern for the National Park Services (United States[9]) as many visitors go to parks to enjoy the soundscape (interpreted as natural soundscape). Naturally quiet places will not mean (as per interpretation of the author and available information) that the noise levels in the area will be low but rather that the soundscape contributors are of a natural origin (faunal communication, wind shear, water etc.).

These natural events could include the dawn chorus when songbirds start to sing at the start of a new day or frogs croaking after a rainfall event. Although game park visitors, receptors in "natural" areas and hospitality industries may not seek intrusive un-natural sounds, the operation of the game park/hospitality industry or receptors dwelling itself is source of anthropogenic noise (vehicles, game park electrical and mechanical infrastructure etc.). National Parks do though implement their own guidelines/rules regarding noise created by park visitors. Natural sounds can contribute a meaningful magnitude[10] to the ambient soundscape depending on season, time, faunal species, habitat and habitat fragmentation etc. Although the magnitude may be loud, natural sounds may contain harmonics[11] and other pleasant sounds that visitors seek when going to parks or wilderness areas.

Certain International states have tried implementing laws regarding external environmental "un-natural" noise sources into areas with natural sounds. In USA there exists numerous state and local laws to encourage industries near parks to keep within limits set out by the local authorities[12]. The United States National Park Service's efforts include attempts to reduce the flights over the Grand Canyon due to the introduction of non-natural impulsive noise events at the park.

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[8] European Commission Green Paper (Com (96) 540).1996.
[9] National Park Services, "Soundscape Preservation and Noise Management", 2000, p. 1.
[10] Environ. We Int. Sci. Tech, "Ambient noise levels due to dawn chorus at different habitats in Delhi", 2001, p. 134.
[11] Panatcha Anusasananan, Suksan Suwanarat, Nipon Thangprasert, "Acoustic Characteristics of Zebra Dove in Thailand", p. 4.
[12] E.g. State of Oregon's Environmental Standards for Wilderness Areas

2.9.7 Environmental Management Systems

Many organisations implement their own Environmental Management Systems tools to for planning, implementing and maintaining policy for environmental protection. The more popular International system is highlighted below.

2.9.7.1 ISO 14000

ISO 14000 is a family of standards related to environmental management that exists to help organizations:

a. minimize how their operations (processes etc.) negatively affect the environment (i.e. cause adverse changes to air, water, or land);
b. comply with applicable laws, regulations, and other environmentally oriented requirements, and
c. continually improve in the above.

The term continual improvement refers to an on-going process of performance enhancement. In the context of this environmental standard, it means that you need to enhance your organization's overall environmental performance by enhancing its environmental management system and by improving its ability to manage the environmental aspects of its activities, products, and services. Continual improvements can be achieved by carrying out internal audits, performing management reviews, analyzing data, and implementing corrective and preventive actions.

2.9.8 European Parliament Directive 200/14/EC

Directive 2000/14/EC relating to the noise emission in the environment by equipment for use outdoors was adopted by the European Parliament and the Council and first published in May 2000. The Directive was applied from January 3rd, 2002. The directive placed sound power limits on equipment to be used outdoors in a suburban or urban setting. Failure to comply with these regulations may result in products being prohibited from being placed on the EU market. Equipment list is vast and includes machinery such as compaction machineries, dozers, dumpers excavators etc. Manufacturers as a result started to consider noise emission levels from their products to ensure that their equipment will continue to have a market in most countries.

3 CURRENT ENVIRONMENTAL SOUND CHARACTER

3.1 MEASUREMENT PROCEDURE

Ambient (background) noise levels were measured at appropriate times in accordance with the South African National Standard SANS 10103:2008 "***The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication***". The standard specifies the acceptable techniques for sound measurements including:

- type of equipment (Class 1);
- minimum duration of measurement;
- microphone positions and height above ground level;
- calibration procedures and instrument checks; and
- supplementary weather measurements and observations.

3.2 LIMITATIONS - ACOUSTICAL MEASUREMENTS AND ASSESSMENTS

Limitations due to environmental acoustical measurements include the following:

- Ambient sound levels are the cumulative effects of innumerable sounds generated at various instances both far and near. A high measurement may not necessarily mean that the area is always noisy. Similarly, a low sound level measurement will not necessarily mean that the area is always quiet, as sound levels will vary over seasons, time of day, dependant on faunal characteristics (mating season, dawn chorus[13] early hours of the morning, temperature etc.), vegetation in the area and meteorological conditions (especially wind). This excludes the potential effect of sounds from anthropogenic origin;
- As mentioned above seasonal changes in the surrounding environment can change the measured soundscape. Many faunal species are more active during warmer periods than colder periods. Cicada is usually only active during warmer periods. Certain cicada species can generate noise levels up to 120 dB for mating or distress purposes, sometimes singing in synchronisation magnifying noise levels they produce from their tymbals[14];
- Defining ambient sound levels using the result of one 10-minute measurement may be very inaccurate (very low confidence level in the results) relating to the reasons mentioned above;
- Determination of noise sources of environmental significance are important factor to consider when compiling an environmental acoustical report;

[13] Environ. We Int. Sci. Tech. *Ambient noise levels due to dawn chorus at different habitats in Delhi*. 2001. Pg. 134.
[14] Clyne, D. *"Cicadas: Sound of the Australian Summer, Australian Geographic"* Oct/Dec Vol 56. 1999.

- Measurements over wind speeds of 3 m/s could provide data influenced by wind-induced noises;
- Ambient sound levels recorded near rivers, streams, wetlands, trees and bushy areas can be high due to faunal activity which can dominate the sound levels around the measurement point (specifically during summertime, rainfall event or during dawn chorus of bird songs). This generally is still considered naturally quiet and accepted as features of the natural soundscape, and in various cases sought after and pleasing;
- Considering one or more sound descriptor or equivalent can improve an acoustical assessment. Parameters such as L_{AMin}, $L_{Aeq,I}$, $L_{Aeq,F}$, L_{Ceq}, L_{AMax}, L_{A10}, L_{A90} and spectral analysis forms part of the many variables that can be considered. The South African Legislation however is the $L_{Aeq,I}$ setting, and must at all times be considered;
- It is technically difficult and time consuming to improve the measurement of spectral distribution of large equipment in an industrial setting. This is due to the many correction factors that need to be considered (e.g. other noise sources active in the area, adequacy of average time setting, surrounding field non-uniformity etc. [15] as per SANS 9614-3:2005);
- Exact location of a sound level meter in an area in relation to structures, infrastructure, vegetation, wetlands and external noise sources will influence measurements. It may determine whether you are measuring anthropogenic sounds from a receptors dwelling, or environmental ambient soundscape contributors of significance (faunal, roads traffic, railway traffic movement etc.); and
- As a residential area develops the presence of people will result in increased dwelling related sounds. These are generally a combination of traffic noise, voices, animals and equipment (incl. TV's and Radios). The result is that ambient sound levels will increase as an area matures.

3.3 EXISTING MEASURED SOUNDSCAPE

The location of the day/night ambient sound measurement locations are presented in **Appendix C.2** and is also illustrated in **Figure 3-1** as blue squares. Measurements were conducted from the 09th - 11th September 2014. Sound level meter settings conform to specifications listed in SANS 10103:2008. Where possible International guidelines where referenced. The sound level meter and area was visited frequently during the day and night periods to investigate audible sounds.

[15] SANS 9614-3:2005. "Determination of sound power levels of noise sources using sound intensity – Part 3: Precision method for measurement by scanning".

Figure 3-1: Localities of ambient sound measurements

3.3.1 Measurement Point A01: Evangelies Gereformeerde Kerk (C/o Rev. Johan Botha)

A number of 10 minute measurements were taken over a day/night period from 09th - 11th September 2014. The equipment defined in **Table 3-1** was used for gathering data. Measured sound levels are presented in **Figure 3-2** and **Figure 3-4**.

Table 3-1: Equipment used to gather data (SVAN 977)

Equipment	Model	Serial No	Calibration Date
SLM	Svan 977	34160	28 May 2014
*Microphone	ACO 7052E	54645	28 May 2014
Calibrator	Rion NC-74	34494286	7 February 2014
Weather Station	WH3081PC	-	-

* Microphone fitted with the RION WS-03 outdoor all-weather windshield.

The measurement location was selected to be reflective of the environmental ambient sound levels in the vicinity of existing paved section of the Atterbury Road extension between the Atturbery/De Villebois Mareul junction and Mooikloof Estate entrance. The SLM was deployed in a relatively open field at least 7 m from any façade.

The noise source under investigation (i.e. Atterbury Road) was within 50 m from the measurement location and a direct line of sight could be achieved from the equipment to road due to electrical fencing on boundary of property (i.e. no boundary brickwall). No closer proximity within the Atterbury Road could be sourced due to safety concerns.

Ideally the sound level meter should be implemented between 4 and 15 m, however safety restriction limited the equipment within the safety of the grounds of the church (electric fence and alarm system). Some trees, shrubs and other foliage were situated near the locality, likely deciduous trees as they had shed their leaves during monitoring period (start of Autumn). At times sounds from the school grounds might be measured (collection of children during end of school times etc.). Refer to **Appendix B.1** for a photo of this measurement location.

Various other alternative localities were sought, including a measurement locality at the Bronberg Close and Mooikloof estates. After an initial visit to the Mooikloof no further feedback was received regarding a potential monitoring site at the estate.

3.3.1.1 Impulse Setting

Impulse equivalent sound levels (South African legislation): Figure 3-2 illustrates the impulse 10 minute equivalent values. Equivalent (average) sound levels for the day and night-time periods are shown on **Figure 3-2.** During the daytime $L_{Aeq,10min}$ values ranged between 55.8 to 65.7 dB. The night-time $L_{Aeq,10min}$ values ranged between 28.7 to 59.9 dB. The average value of the 181 10-minute equivalent daytime sound level measurements were calculated at 60.5 dB, while the average for the 96 night-time measurements were calculated at 46.6 dB.

$L_{Aeq,16h}$ day and $L_{Aeq,8h}$ night: Figure 3-2 illustrates the calculated $L_{Aeq,8h/16h}$ values. $L_{Aeq,16h}$ values was calculated each day in chronological order as 60.3 and 61.2 dB. $L_{Aeq,8h}$ values were calculated each night in chronological order as 52.0 and 51.0 dB

$L_{Aeq,24h}$ (till 24:00) calculated values[16]: Figure 3-2 illustrates the calculated $L_{Aeq,24h}$ values. The $L_{aeq,24h}$ level is for referenced purpose as per the Noise Control Regulations (National and Provincial-$L_{Aeq,18h}$). The $L_{Aeq,24h}$ was calculated over a 24 hour period as 59.7 dB.

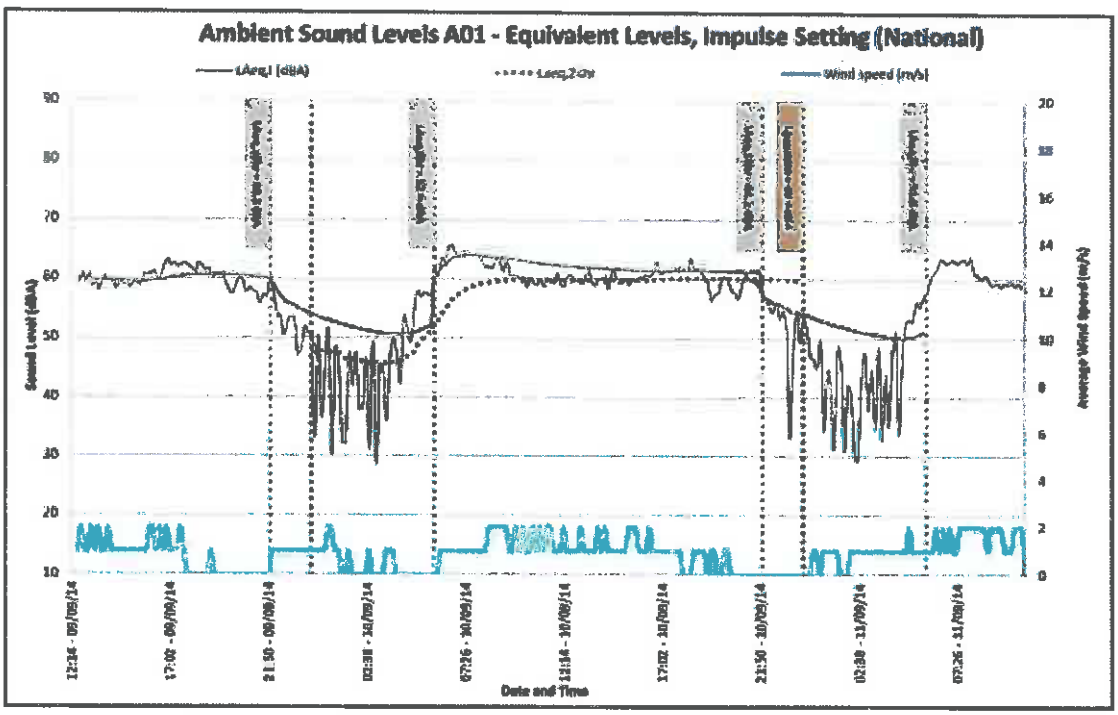

Figure 3-2: Ambient Sound Levels (Impulse) at A01

[16] National and Provincial NCR

3.3.1.2 Fast Setting

Fast equivalent sound levels (International guidelines): Equivalent (average) sound levels for the day and night-time periods are shown on **Figure 3-3.** During the daytime $L_{Aeq,10min}$ values ranged between 54.6 to 64.7 dB. The night-time $L_{Aeq,10min}$ values ranged between 26.5 to 58.6 dB. The average value of the 181 10 min. equivalent daytime measurements were calculated at 59.4 dB, while the average for the 96 night-time measurements were calculated at 45.0 dB.

$L_{Aeq,12h}$ (L_{day}), $L_{Aeq,4h}$ ($L_{evening}$) and $L_{Aeq,8h}$ (L_{night}) (ISO/European Union and IFC: General EHS Guidelines): Figure 3-3 illustrates the calculated **L_{day}, $L_{evening}$ and L_{night}** European Union Noise Indices. L_{day} values were calculated each day in chronological order as 59.5 and 60.2 dB. $L_{evening}$ values were calculated each evening in chronological order as 57.4 and 57.6 dB. L_{night} values were calculated each night in chronological order as 55.0 and 53.0 dB.

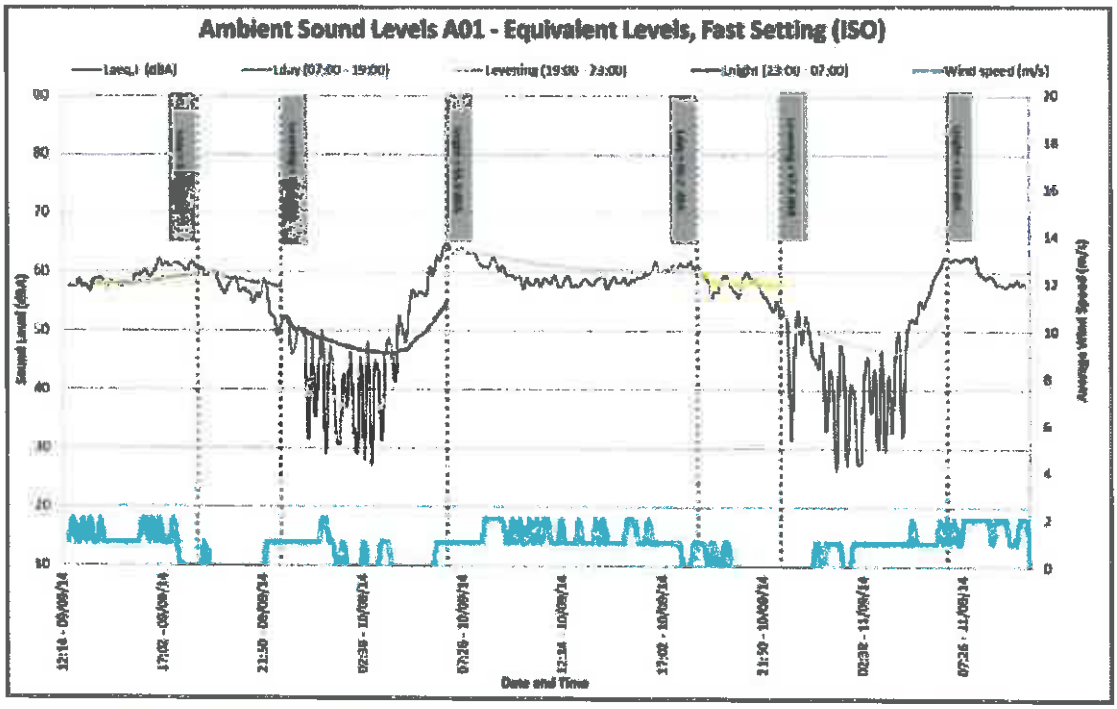

Figure 3-3: Ambient Sound Levels (Fast) at A01

3.3.1.3 Statistical values (fast), RMS (fast) and metrological data

Metrological conditions: The highest measured wind speed was a "light breeze" condition on the Beaufort Scale[17]. Refer to **Figure 3-2/Figure 3-3/Figure 3-4** indicating wind speeds in m/s (over a 10 minute period).

[17] Met Office, "National Meteorological Library and Archive Fact sheet 6 – The Beaufort Scale", Version 1, Crown copyright 2010, p.4.

Statistical sound levels ($L_{A90,10min}$ (fast)): The L_{A90} level is presented in this report as it is used to define the "background ambient sound level", or the sound level that can be expected if there were little single events (loud transient noises) that impacts on the average sound level. It is also illustrated on **Figure 3-4**. L_{A90} daytime values ranged from 30.8 to 58.7 dBA90. The night-time L_{A90} values ranged from 23.0 to 43.0 dB90. The average value of the 181 10 min. equivalent daytime measurements was calculated at 46.9 dB90, while the average for the 96 night-time measurements were calculated at 28.4 dB90.

L_{A90} levels indicate that there were very few times during the day and night-times when the background ambient soundscape became silent with consistent continuous sounds in the area. The L_{A90} statistical value subsidised to approximately 25 dB90 during the dead of the night at around 01:00 – 03:00. L_{A90} data also drastically increased at approximately 05:00 – 05:15 and would most likely be attributed to the surrounding area awakening during the dawn period preparing for their daily routine (bird dawn chorus, increased traffic flow on Atterbury road etc.).

Maximum noise levels ($L_{Amax,10min}$ (fast)): Maximum sound levels are illustrated on **Figure 3-4** with the loudest day sound measured at 81.9 dB (averaged 69.8 dB), while night-time loudest sound measured at 76.0 dB (averaged 62.3dBA). At times $L_{Aeq,10min}$ levels were influenced by maximum noise events (both magnitude and number events). During the night-times L_{Amax} levels sometimes exceeded 65 dB (during the 10 minute measurements) where amount of noise events and magnitude may become an annoyance when a peaceful time or rest is sought.[18]

Minimum noise levels ($L_{Amin,10min}$ (fast)): Minimum noise levels are illustrated on **Figure 3-4** with the quietest sounds measured during the day at 27.6 dB (averaged 40.8 dB), while night-time quietest was measured at 21.5 (averaged 26.2 dB). It illustrates a noisy area that is not quiet during the day with sound levels only subsiding during late night hours. L_{A90} statistical and L_{Amin} values can be seen in **Figure 3-4** indicating that the measured ambient 90th percentile statistical equivalent values almost mimicked the minimum sound levels. As was the case with the LA90 measured statistic value, the minimum value increased after 05:00 – 05:15 in the morning.

[18] World Health Organization, 2009, *'Night Noise Guidelines for Europe*

$L_{A10,18h}$ calculated value[19]: Figure 3-3 illustrates the calculated $L_{A10,18hr}$ and is for referenced purpose for the United Kingdom Calculation of Road Traffic. The $L_{A10,18h}$ was calculated at 60.5 dB10.

Sounds heard during deployment and collection of equipment: Refer to **Table 3-2** indicating sounds heard at the measurement point by the acoustical consultant.

Table 3-2: Noises/sounds heard during site visits at receptor A01

Ambient Sound Character -Sounds of Significance	
Magnitude Scale Code:	Faunal and Natural:
Audible	Residential and other Anthropogenic:
	Industries, Commercial and Road Traffic:

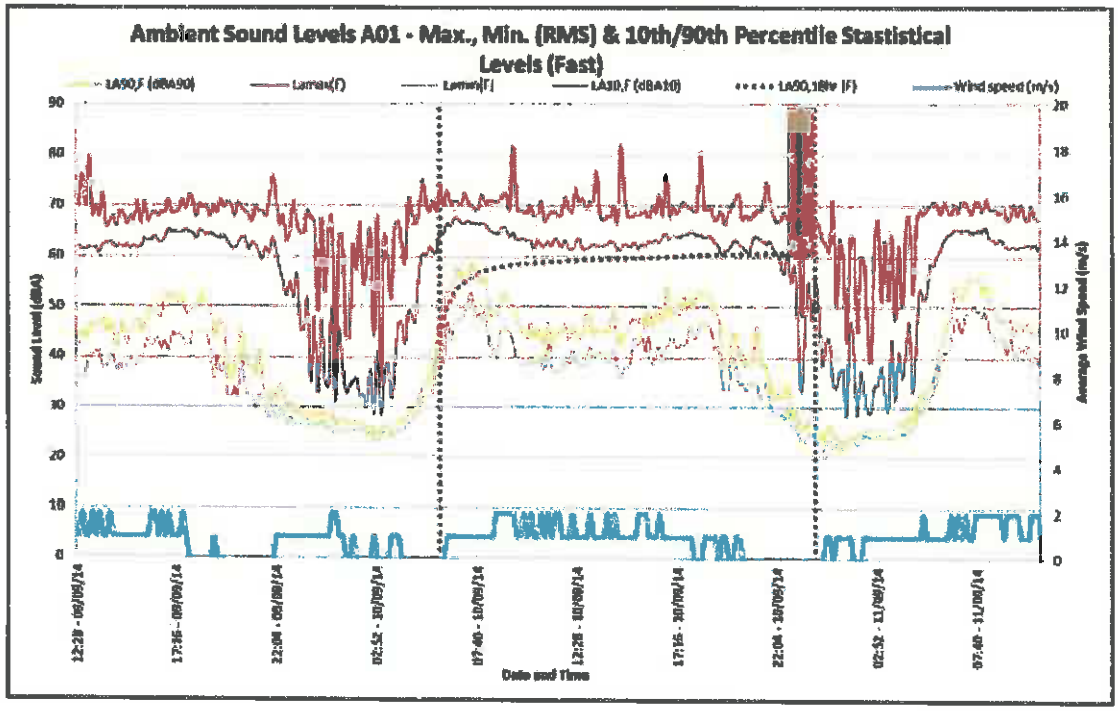

Figure 3-4: Maximum, minimum and statistical values at A01

3.3.1.4 Third Octave Frequencies

Third octave frequencies: Lower frequencies (20 – 250 Hz, although low frequency is 100 Hz or below): This frequency band is generally dominated by noises originating from

[19] CRTN methodology – not within 15m

anthropogenic activities (vehicles idling and driving, pumps and motors, etc.) as well as certain natural phenomena (wind shear, ocean surf splash etc.). Motor vehicle engine revolutions per minute (1000 - 6000 rpm[20]) mostly convert to this range of frequency (not considering other motor car acoustical sources e.g. tyre to road interaction pumping and "horn effect")[21]. Some faunal communication may contribute to this level (elephant infrasound), although smaller species (i.e. insecta family) generally communicate with dominant frequencies at much higher levels (see below). Lower frequencies (above infrasound etc.) also have the potential to propagate much further than the higher frequencies. The daytime 10min measurement illustrates a wide array of elevated frequencies with the clear predominant peak at the 31.5 Hz.

Third octave surrounding 1000 Hz: This range contains energy mostly associated with dominant frequencies of human speech (dominant frequencies mostly between 350 Hz – 2,000 Hz, other voice frequencies can range between 20 – 16,000 Hz), dwelling related sounds, dogs barking, and road to tyre interaction from road traffic[22]. The frequency band surrounding 1,000 Hz had clear elevated energy in measured data during most measurements.

Higher frequencies (2,000 Hz upwards until ultrasound range): Most smaller faunal species, including animals, birds, frogs, crickets and cicada would use this range as the dominant frequency to communicate, hunt with etc. [23] This could include male grasshoppers chirping at higher frequencies due to increased surrounding temperatures, mating season of a specific faunal species (and competition for territory - domination), insects near a wetland or before/during a drizzle/rain shower, cicada chirping or dawn chorus from birds during early morning hours etc. Natural faunal noise fluctuates depending on seasonal changes. During measurements there was little to no specific data in this range, on occasion some energy peaks near the ultrasound range.

Summary: Spectral Analysis (Figure 3-5 - Figure 3-9):

Refer to the inserts in the mentioned figures (in red) illustrating a basic interpretation of data by removing certain measured data with potentially unwanted spectral signatures (e.g. a time when grass is cut at a homeowner's property, extraneous noises sources etc.). The criterion used to illustrate these spectral profiles was the frequency of occurrences and repetitiveness of certain frequencies. It is for representation purpose

[20] Mechanical Engineering Conversion Factors, Dr. K. Clark Midkiff
[21] SILVIA. "Guidance Manual for the Implementation of Low Noise Road Surface". 2nd ed. P.g 19.
[22] SILVIA. "Guidance Manual for the Implementation of Low Noise Road Surface". 2nd ed. P.g 19.
[23] A Paradoxical Problem. Can bush crickets discriminate frequency?, J.C Hartley, University of Nottingham. An Automatic Monitoring System for Recording Bat Activity, Colin O' Donnel and J Sedgeley.Short Communication. The Scaling of song Frequency in Cicadas, H.C Bennet-Clark (1994).

only, and is used to represent a likely spectral character of the area (natural, suburban, industrial etc.), identify concerns or potential acoustical traits.

The higher frequency at 20,000 Hz could almost be comparable to a high pitch squeal and is relatively close to the ultrasound range. The contributors to these high frequencies were most likely due to faunal echolocation such as that can be found from bats. The spectral contributors to the mid and low frequencies were from local road traffic movement near measurement location. The lower frequency contribution would be from motor vehicle engine revolutions as vehicles passed measured locations.

The area surrounding the 1,000 Hz range did have elevated predominant peaks. The road tyre interaction between the vehicle and the pavement would contribute to this range. The road likely had a moderate roughness in texture as well as moderate porosity character to it resulting in the peaks in the 1,000 Hz. At speeds below 60 km/h engine noise (fan belt, piston revolutions etc.) would be more dominant over road tyre interaction noise. Both the day and night-time data indicated an area where road traffic noises dominated the soundscape.

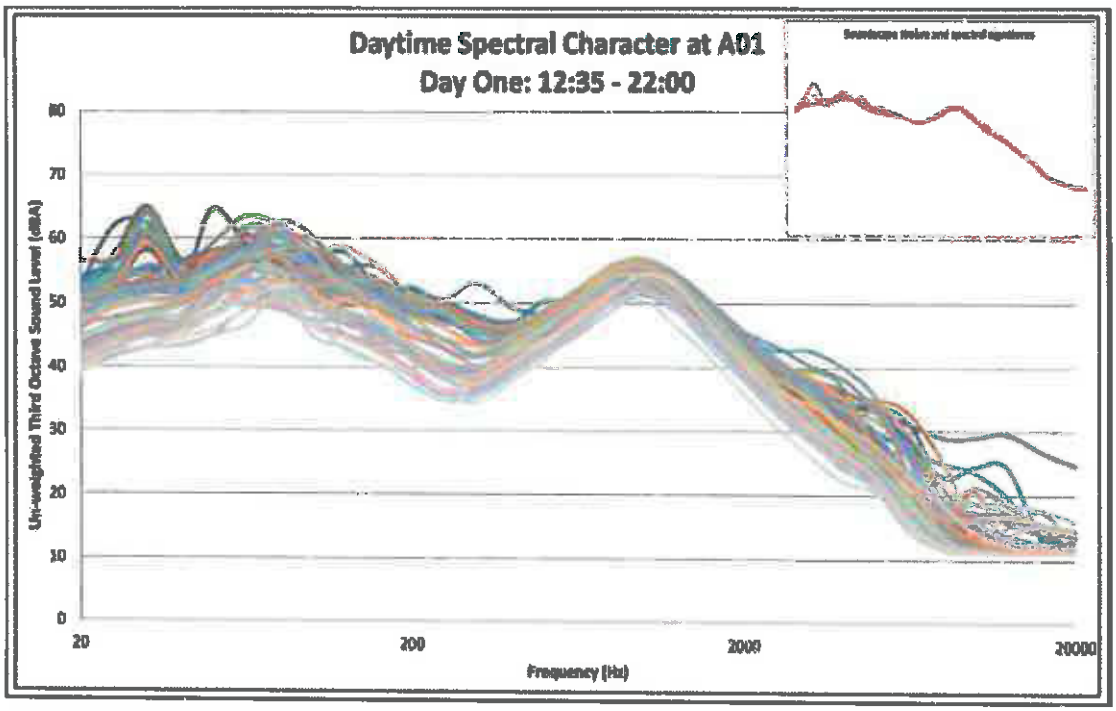

Figure 3-5: Daytime spectral frequency distribution at A01, 1st day

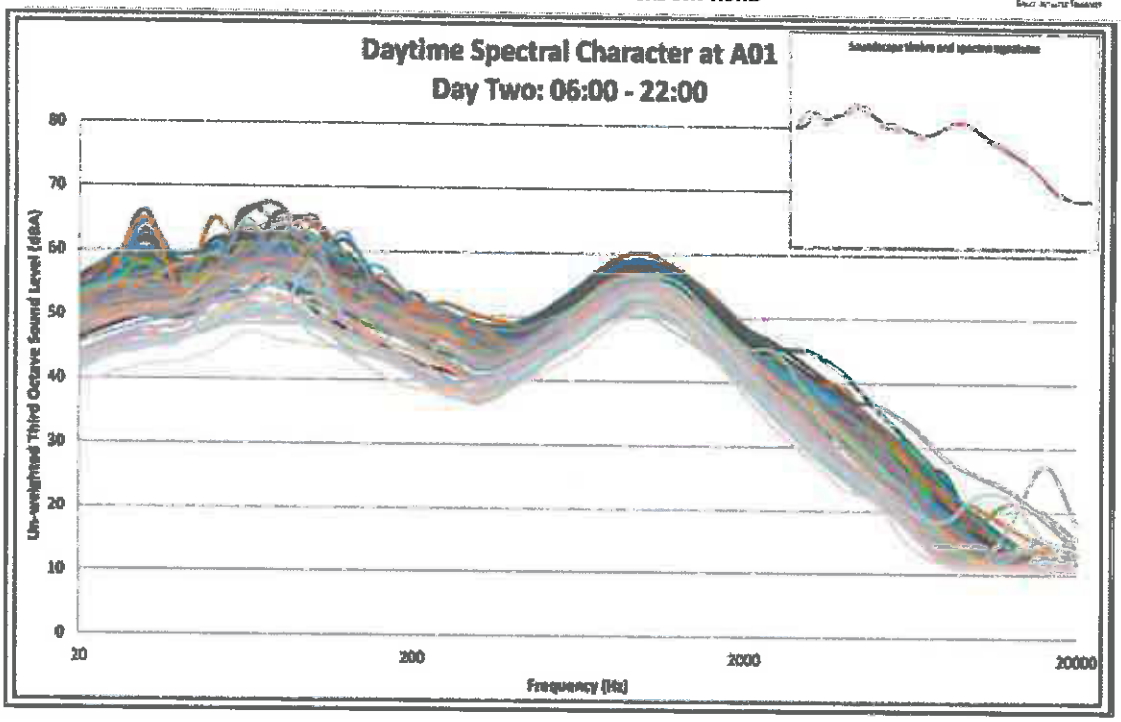

Figure 3-6: Daytime spectral frequency distribution at A01, 2nd day

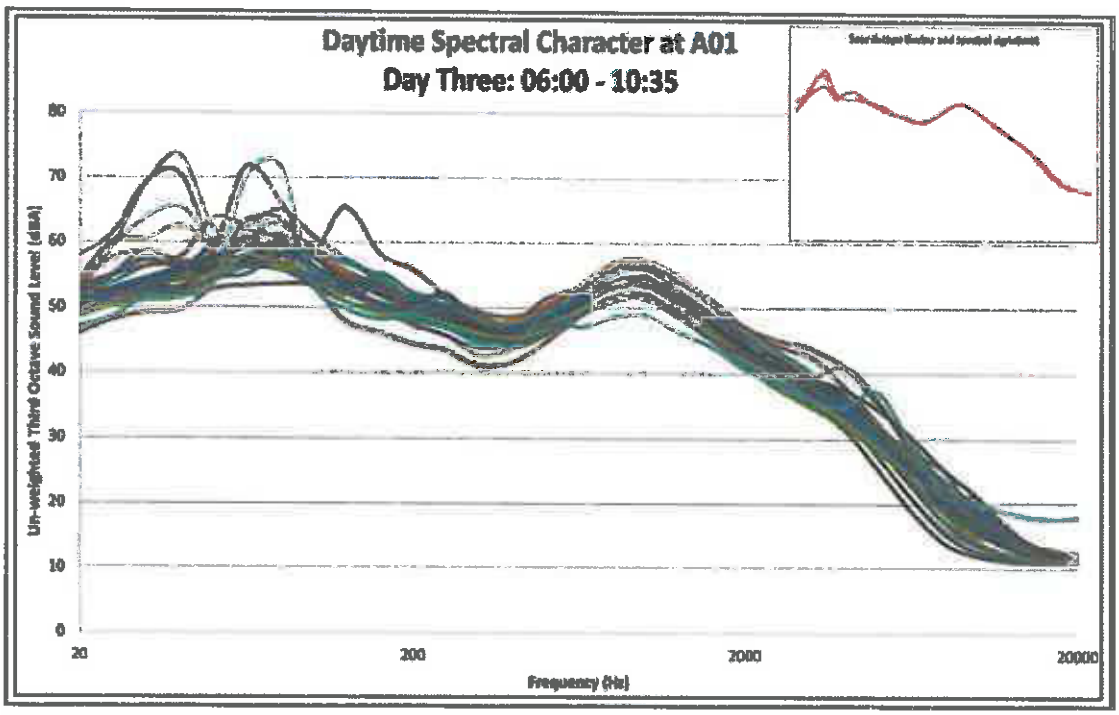

Figure 3-7: Daytime spectral frequency distribution at A01, 3rd day

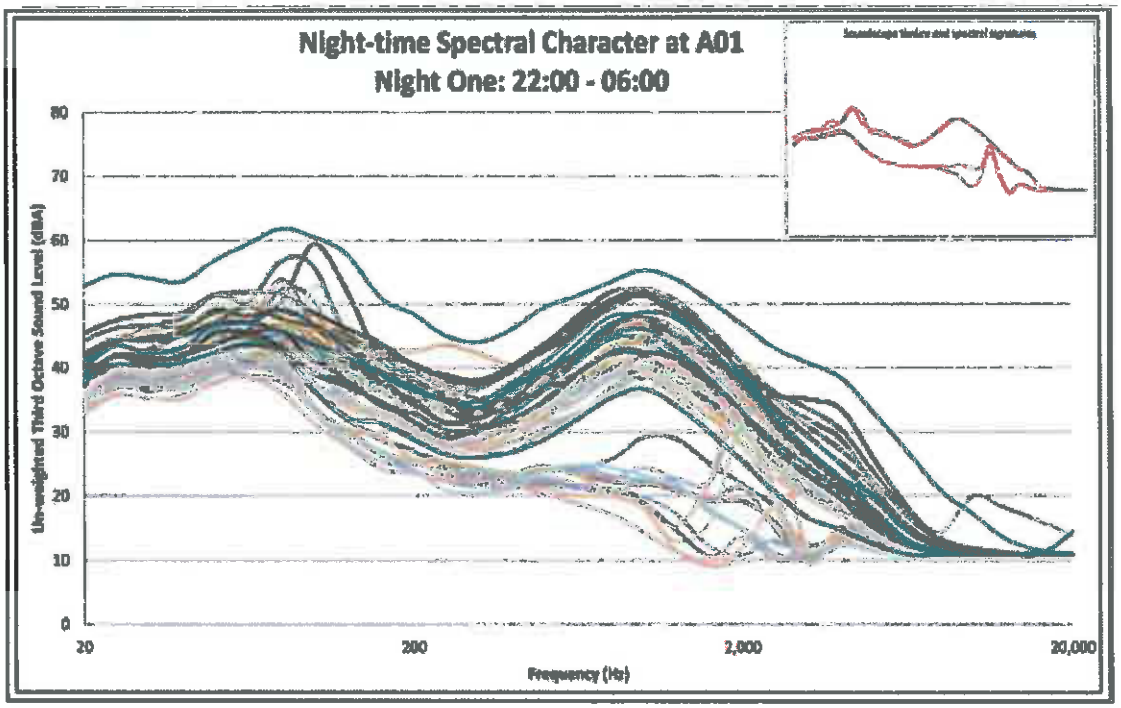

Figure 3-8: Night-time spectral frequency distribution at A01, 1st night

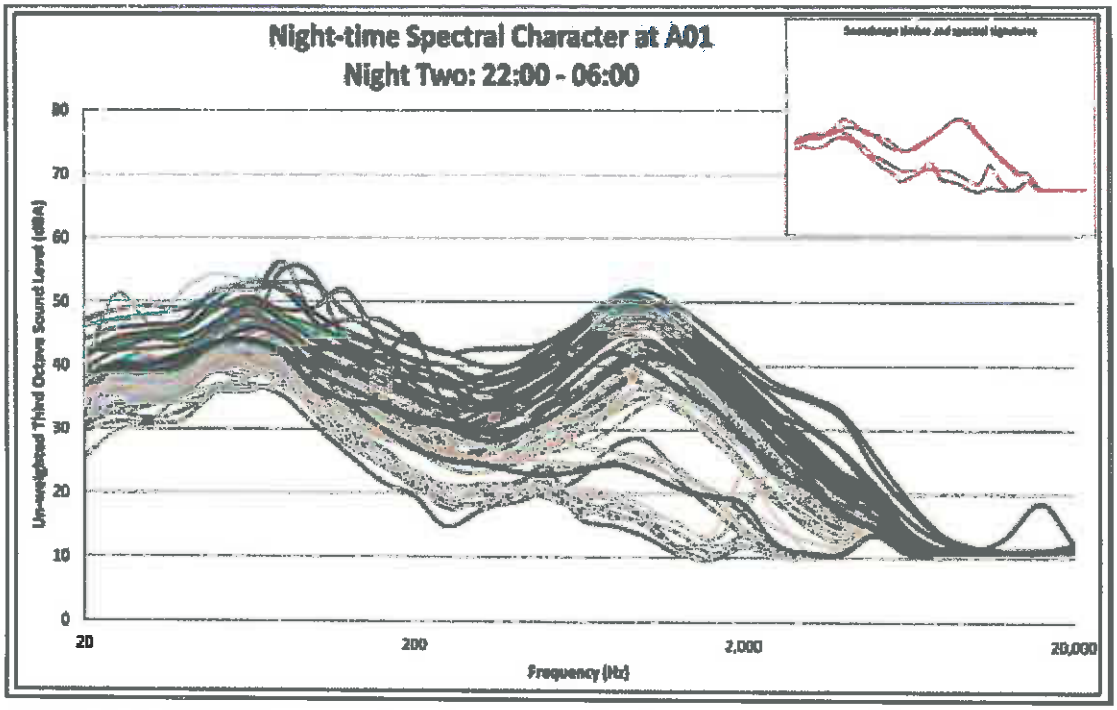

Figure 3-9: Night-time spectral frequency distribution at A01, 2nd night

3.3.2 Measurement Point for calibration of Construction Phase

One single sound measurement was collected on the 3rd November 2014. This was conducted on Simon Vermooten Weg (Tshwane) where construction activities are under

way for the Bus Rapid Transport System. The measurement was used for calibration of the construction scenario. One class-1 sound level meter as well as a portable weather station was used. The internal clocks were set to GMT+2. The resulting data is presented in **Table 3-3**, while **Appendix B.2** presents photos taken of the measurement location.

Table 3-3: Construction measurement locations (Datum type: WGS 84)

Point name	Latitude Longitude	$L_{Aeq,T}$ (dBA)	$L_{Aeq,T}$ (dBA)	L_{A90} (dBA)	L_{A10} (dBA)	L_{AMax} (dBA)	Comments
Refer1	-25.753053° 28.324957°	76.9	70.6	64.3	73.1	87.1	1x Excavator and 1x padded drum roller. Excavator @ approximately 20m, drum roller working between 11 and 22 m from microphone. Simon Vermooten Road Traffic audible during measurement period.

3.4 AMBIENT SOUND LEVELS – SUMMARY

The Rating Level for the area must consider the land use as proclaimed by local authorities, as well as acoustical legislation and guidelines. With the applicant for the road extension (the local municipality) zoning the area for a road (discussed with project co-coordinator, Mr. Pirate Ncumbe from Nali Sustainability Solutions) the corresponding Rating Level as per SANS 10103:2008 GN R154 would likely be high (busy urban rating level of 50 dB night and $L_{Aeq,24h}$ 60 dB respectively). This may not be acceptable to the receptors of the surrounding properties that may seek a peaceful area. Such situations could pose problems when a receptor/dwelling or community is based adjacent/ bordering or within close approximation to a controlled area.

SANS 10103:2008 typical Rating Levels for noise districts: Considering the L_{AIeq} measured daytime data ambient sound indicated many sound levels slightly higher than a typical busy urban area, yet lower than an business district. Night-time data similarly range between a typical busy urban area, yet lower than an business district. Refer to **Table 3-4** comparing each measured L_{Req} based on L_{AIeq} measurements.

ISO/European Union and IFC: General EHS Guidelines): Most 10 minute L_{Aeq} levels measured during the day conformed to the recommendation of 55 dBA set out by the World Health Organization (**Section 2.9.1** and **Section 2.9.2**), World Bank (**Section 2.9.3**) and International Finance Corporation (**Section 2.9.4**) for a residential area, with the equivalent levels being less than 55 dB. A number of 10-minute night-time measurements did not conform to the mentioned guidelines with the equivalent value just exceeding the 45 dB noise limit (for residential areas).

Noise Control Legislation: Calculated $L_{Aeq,24h}$ values complied with a controlled area of 60 dB.

There is a high confidence in the ambient sound levels measured and the subsequent Rating Levels determined (and noise levels that the proposed community will be exposed to). A summary of all determined SANS 10103:2008 noise districts rating levels are provided **Table 3-4** below.

Table 3-4: Rating level measured date profile

Point name	Noise district rating based on $L_{Aeq,T}$ measurement data (Day / Night)	Noise district rating based on all data and character of area	Existing ambient sound levels conforming to international recommended levels? (day / night)
A01	Busy urban –business district/ Busy urban – business district	Busy urban	Higher than IFC guidelines

4 INVESTIGATED NOISE SOURCES

4.1 POTENTIAL CONSTRUCTION NOISE – NOISE SOURCES UNDER INVESTIGATION

Increased noise levels are directly linked with the various activities associated with the construction and operation of the Atterbury Road extension. Construction of proposed extension will be briefly discussed in this section.

For reference purpose, potential maximum noise levels generated by construction equipment as well as the potential extent are presented in **Table 4-1.** The potential extent depends on a number of factors, including the prevailing ambient sound levels during the instance the maximum noise event occurred, as well as the spectral character of the noise and the ambient surroundings.

Average or equivalent sound levels are another factor that impacts on the ambient sound levels and is the constant sound level that the receptor can experience. Typical sound power levels associated with various activities that may be found at a construction site is presented in **Table 4-2**.

Road construction requires to source materials from borrow pits, likely from an off-site supplier. Materials would depend on the pavement surface (e.g. hot-mix bituminous surface with aggregate) as well as desired structural support sub soil layers or fill. Base materials would be hauled to site via Articulated Dump Trucks (ADT) and stockpiled onsite at a site office.

It is likely that existing road surfacing and/or topsoil will be stripped/filled with excavators to make way for a more suitable base. Graders will be used to spread the desired aggregate to the route. The sub base/base will require dust-suppression as well as water sprayed for subsoil compaction via a padded drum compactor. Geosynthetics such as geotextiles or grids may be sourced for higher durability and less maintenance of paved surfaces.

Once the desired subsoil density and structure are acquired the paving will commence. The asphalt will be laid by a paver (fed by ready mix trucks) and then rolled by a vibrating steel drum roller. A cape seal slurry or similar surface could be applied to further fill voids in the chip seal and bind chips to original surface. The seal would make use of a binder with a chip seal aggregate distributed with a chip spreader. The seal selection depends on many factors including traffic volumes, gradient, base type, maintenance capability, costs etc. The construction team may make use of an onsite paving plant for the manufacturing of asphalt.

4.1.1 Point source - Construction

The basic construction functions of an acoustical nature during the construction phase are briefly discussed below:

- Delivery of base materials onsite via ADTs;
- Excavation of undesired soils/topsoil etc. by means of an grader or similar;
- Spreading of base materials by means of a grader;
- Dust suppression by means of water tanker dozers;
- Compaction of sub base and base with padded drum roller or similar; and
- Asphalt paving by means of a paver, fed by ready mix trucks and compacted.

A scenario based on the excavation and compaction of sub bases and bases will be assessed. Many European, Western and Eastern countries have a set compliance noise emission level for heavy machinery (see **Section 2.9.8**). Constructions related equipment in use in South Africa would have complied with this.

4.1.2 Impulse or tone corrections[24]

A + 5 dBA correction can be implemented for a tone or impulsive noise source, with a highly impulsive event requiring a 12 dBA correction. The SANS 10103:2008 formulae $L_{Req,T} = L_{Aeq,T} + Ci + Ct$ would apply. Tones and impulsive noises will not be considered for this section as tones are unlikely (engineered out) and there are no noise sources with a significant impulsive component (warning alarms are exempt, refer to **Section 2.2.1**).

[24] SANS 10103:2008

Table 4-1: Potential maximum noise levels generated by construction equipment

Equipment Description[25]	Impact Device?	Maximum Sound Power Levels (dBA)	Operational Noise Level at given distance considering potential **maximum** noise levels (Cumulative as well as the mitigatory effect of potential barriers or other mitigation not included – simple noise propagation modeling only considering distance) (dBA)											
			5 m	10 m	20 m	50 m	100 m	150 m	200 m	300 m	500 m	750 m	1000 m	2000 m
Auger Drill Rig	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Backhoe	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Chain Saw	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Compactor (ground)	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Compressor (air)	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Concrete Batch Plant	No	117.7	92.7	86.7	80.6	72.7	66.7	63.1	60.6	57.1	52.7	49.2	46.7	40.6
Concrete Mixer Truck	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Concrete Pump Truck	No	116.7	91.7	85.7	79.6	71.7	65.7	62.1	59.6	56.1	51.7	48.2	45.7	39.6
Concrete Saw	No	124.7	99.7	93.7	87.6	79.7	73.7	70.1	67.6	64.1	59.7	56.2	53.7	47.6
Crane	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Dozer	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Drill Rig Truck	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Drum Mixer	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Dump Truck	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Excavator	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Flat Bed Truck	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Front End Loader	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Generator	No	116.7	91.7	85.7	79.6	71.7	65.7	62.1	59.6	56.1	51.7	48.2	45.7	39.6
Generator (<25KVA)	No	104.7	79.7	73.7	67.6	59.7	53.7	50.1	47.6	44.1	39.7	36.2	33.7	27.6
Grader	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Impact Pile Driver	Yes	129.7	104.7	98.7	92.6	84.7	78.7	75.1	72.6	69.1	64.7	61.2	58.7	52.6
Jackhammer	Yes	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Man Lift	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Mounted Impact Hammer	Yes	124.7	99.7	93.7	87.6	79.7	73.7	70.1	67.6	64.1	59.7	56.2	53.7	47.6
Paver	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6

[25] Equipment list and Sound Power Level source: http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm

Pickup Truck	No	89.7	64.7	58.7	52.6	44.7	38.7	35.1	32.6	29.1	24.7	21.2	18.7	12.6
Pumps	No	111.7	86.7	80.7	74.6	66.7	60.7	57.1	54.6	51.1	46.7	43.2	40.7	34.6
Rivit Buster/Chipping Gun	Yes	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Rock Drill	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Roller	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Sand Blasting (single nozzle)	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Scraper	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Sheers (on backhoe)	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Slurry Plant	No	112.7	87.7	81.7	75.6	67.7	61.7	58.1	55.6	52.1	47.7	44.2	41.7	35.6
Slurry Trenching Machine	No	116.7	91.7	85.7	79.6	71.7	65.7	62.1	59.6	56.1	51.7	48.2	45.7	39.6
Soil Mix Drill Rig	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Tractor	No	118.7	93.7	87.7	81.6	73.7	67.7	64.1	61.6	58.1	53.7	50.2	47.7	41.6
Vacuum Excavator	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Vacuum Street Sweeper	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Ventilation Fan	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Vibrating Hopper	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Vibratory Concrete Mixer	No	114.7	89.7	83.7	77.6	69.7	63.7	60.1	57.6	54.1	49.7	46.2	43.7	37.6
Vibratory Pile Driver	No	129.7	104.7	98.7	92.6	84.7	78.7	75.1	72.6	69.1	64.7	61.2	58.7	52.6
Warning Horn	No	119.7	94.7	88.7	82.6	74.7	68.7	65.1	62.6	59.1	54.7	51.2	48.7	42.6
Welder/Torch	No	107.7	82.7	76.7	70.6	62.7	56.7	53.1	50.6	47.1	42.7	39.2	36.7	30.6

Table 4-2: Potential equivalent noise levels generated by various equipment

Equipment Description	Equivalent (average) Sound Levels (dBA)	Operational Noise Level at given distance considering equivalent (average) sound power emission levels (Cumulative as well as the mitigatory effect of potential barriers or other mitigation not included – simple noise propagation modelling only considering distance) (dBA)											
		5 m	10 m	20 m	50 m	100 m	150 m	200 m	300 m	500 m	750 m	1000 m	2000 m
Bulldozer CAT D10	111.9	86.9	80.9	74.9	66.9	60.9	57.4	54.9	51.3	46.9	43.4	40.9	34.9
Bulldozer CAT D11	113.3	88.4	82.3	76.3	68.4	62.3	58.8	56.3	52.8	48.4	44.8	42.3	36.3
Bulldozer CAT D9	111.9	86.9	80.9	74.9	66.9	60.9	57.4	54.9	51.3	46.9	43.4	40.9	34.9
Bulldozer CAT D6	108.2	83.3	77.3	71.2	63.3	57.3	53.7	51.2	47.7	43.3	39.8	37.3	31.2
Bulldozer CAT D5	107.4	82.4	76.4	70.4	62.4	56.4	52.9	50.4	46.9	42.4	38.9	36.4	30.4
Bulldozer Komatsu 375	114.0	89.0	83.0	77.0	69.0	63.0	59.5	57.0	53.4	49.0	45.5	43.0	37.0
Bulldozer Komatsu 65	109.5	84.5	78.5	72.4	64.5	58.5	54.9	52.4	48.9	44.5	41.0	38.5	32.4
Diesel Generator (Large - mobile)	106.1	81.2	75.1	69.1	61.2	55.1	51.6	49.1	45.6	41.2	37.6	35.1	29.1
Dumper/Haul truck - CAT 700	115.9	91.0	85.0	78.9	71.0	65.0	61.4	58.9	55.4	51.0	47.5	45.0	38.9
Dumper/Haul truck - Terex 30 ton	112.2	87.2	81.2	75.2	67.2	61.2	57.7	55.2	51.7	47.2	43.7	41.2	35.2
Dumper/Haul truck - Bell 25 ton (B25D)	108.4	83.5	77.5	71.4	63.5	57.5	53.9	51.4	47.9	43.5	40.0	37.5	31.4
Excavator - Cat 416D	103.9	78.9	72.9	66.8	58.9	52.9	49.3	46.8	43.3	38.9	35.4	32.9	26.8
Excavator - Hitachi EX1200	113.1	88.1	82.1	76.1	68.1	62.1	58.6	56.1	52.6	48.1	44.6	42.1	36.1
Excavator - Hitachi 870 (80 t)	108.1	83.1	77.1	71.1	63.1	57.1	53.6	51.1	47.5	43.1	39.6	37.1	31.1
Excavator - Hitachi 270 (30 t)	104.5	79.6	73.5	67.5	59.6	53.5	50.0	47.5	44.0	39.6	36.0	33.5	27.5
FEL - CAT 950G	102.1	77.2	71.2	65.1	57.2	51.2	47.6	45.1	41.6	37.2	33.7	31.2	25.1
FEL - Komatsu WA380	100.7	75.7	69.7	63.7	55.7	49.7	46.2	43.7	40.1	35.7	32.2	29.7	23.7
General noise	108.8	83.8	77.8	71.8	63.8	57.8	54.2	51.8	48.2	43.8	40.3	37.8	31.8
Grader - Operational Hitachi	108.9	83.9	77.9	71.9	63.9	57.9	54.4	51.9	48.4	43.9	40.4	37.9	31.9
Grader	110.9	85.9	79.9	73.9	65.9	59.9	56.4	53.9	50.3	45.9	42.4	39.9	33.9
JBL TLB	108.8	83.8	77.8	71.8	63.8	57.8	54.3	51.8	48.3	43.8	40.3	37.8	31.8
Road Transport Reversing/Idling	108.2	83.3	77.2	71.2	63.3	57.2	53.7	51.2	47.7	43.3	39.7	37.2	31.2
Road Truck average	109.6	84.7	78.7	72.6	64.7	58.7	55.1	52.6	49.1	44.7	41.1	38.7	32.6
Vibrating roller	106.3	81.3	75.3	69.3	61.3	55.3	51.8	49.3	45.8	41.3	37.8	35.3	29.3
Water Dozer, CAT	113.8	88.8	82.8	76.8	68.8	62.8	59.3	56.8	53.3	48.8	45.3	42.8	36.8

4.2 POTENTIAL OPERATIONAL NOISE – NOISE SOURCES UNDER INVESTIGATION

The Atterbury road traffic volumes, road conditions etc. were sourced via information obtained from **Section 1.4** as well as visual observations and acoustical measurements. The road grade and design is envisaged to be a continuous medium graded asphalt bituminous route.[26] It is unsure what sort of seal will be used. An unreinforced concrete surface bed with grooves may be used for a portion of the road where gradient might require a skid resistance surface. Road speeds are envisaged to be set at 60 km/h.

4.2.1 Road design, specifications & information

Acoustics is not the only environmental and/or engineer discipline considered in the design and manufacturing of road paving. Other factors to play an important role in the prefeasibility stage of road construction include how well the road handles (i.e. skid resistance etc.) or how resistant it may be on tyre wear, costs involved in manufacturing and maintaining pavements etc. Although there are a host of noise generating mechanism in vehicle movement, the most important factor above 50 – 60 km/h is the road and tyre interaction between pavement and the vehicle (rolling noise).

The most important road noise/sound contributors are briefly discussed below.

4.2.1.1 Vehicle tyre design - road tyre interaction pt.1

Tyre design plays a role in the creation and propagation of noise as the tyre interacts with the road surface at different speeds. Tyre manufacturers and designs are abundant and have to consider a whole host of other factors besides acoustics, including handling, braking, acceleration, off-road abilities, durability to environmental factors (heat, stresses etc.), load index, aspect ratios, speed ratings etc. Test conducted by independent acoustical consultants have indicated various effective means of reducing Noise, Vibration and Harshness (NVH) due to tyre design selection. Such designs include exterior fibre wheel arch liners that help reduce tire noise in the wheel well area[27]. Although wheel arch liners are mostly designed for noise reduction of vehicle cabin interior, implementation of arch liners will help reduce air-borne noise as well. Irregularities on the tyre itself will cause vibrations similar to road imperfections.

It is widely recognised that tyres display a peak around the 1 kHz range, one factor in obtaining this peak is the pipe resonance displayed by tyre grooves. This is not a factor that can be controlled by the developer and will not be considered further.

[26] Bokamoso Landscape Architects & Environmental Consultants.
[27] Barry R. Wyerman. Gabriella Cerrato Jay. "Tire Noise Reduction with Fiber Exteriro Wheel Arch Liners". SAE International. 2007.

4.2.1.2 Stick-slip & stick-snap and air pumping - road tyre interaction pt.2[28][29]

As the thread block impacts with the road surface, shocks are sent through the block which generates vibrations. The air trapped between the tread blocks is compressed and decompressed as the tyre passes over the road surface. This is known as "*air pumping*". Organ pipe resonance occurs in the longitudinal tyre grooves. Friction forces acting on the tread blocks in contact with the road surface cause the "*slip-stick* "effect. This is not a factor that can be controlled by the developer and will not be considered further.

4.2.1.2.1 Helmholtz resonator

Helmholtz resonance is the phenomenon of air resonance in a cavity, which could occur in the cavity of the tyre tread when in contact with road surface. This is not a factor that can be controlled by the developer and will not be considered further.

4.2.1.2.2 Horn Amplification

Noise generated at or near the contact patch can be exaggerated due to the shape of the region between the tyre and road surface immediately to the rear (or front) of the contact patch. In this region multiple reflections between the tyre and road surface occur which focus the sound. The process is referred to as the "horn effect". The largest amplifications is reportedly to occur in the region of 2000 Hz, it was however found that substantial amplification occurred at frequencies from 1000 Hz up to approximately 10 kHz. The combination of the tyre design and road surface does play a factor. As the developer can control the road specifications this is relevant and discussed in the following sections.

4.2.1.3 Sub-grade, sub-base (or granular/cemented sub-base) and base course construction road tyre interaction pt.4

The underling material for the road provides a strong foundation for the asphalt to be paved upon. The strength of foundation layers or load bearing capacity (commonly referred to as the California bearing ratio or CBR[30]) depends on the strength of the material selected for sub-base (natural occurring material) and bases (specifically selected and designed materials), the thickness of sub-base/bases and the support of underlying sub-grade material etc.

Modern day traffic loads require certain criteria to be met when it considers environmental conditions including saturation levels (such as Atterberg limits[31] for liquid, plastic and plasticity limit/index) from drainage from above layer/paving. Saturation or temperature

[28] SILVIA. "Guidance Manual for the Implementation of Low Noise Road Surface". 2nd ed.
[29] Paul Sas. Structural Dynamic Behaviour of Tyres Noise & Vibration Engineering Research Group KU. Leuven. XIX CNIM 15-16/11 Castellon.
[30] South Africa National Roads Agency. Pavement Engineering Manual, Chapter 3: Materials Testing. 2009.
[31] South Africa National Roads Agency. Pavement Engineering Manual, Chapter 3: Materials Testing. 2009.

levels may degenerate the sub layer strengths by creating voids or reducing particle interlock between aggregate. Thus at times it is selected to design a geotextile seal below road paving to assist with water seepage and control soil erosion.

4.2.1.4 Road pavement options – road tyre interaction pt.5

Road design needs to consider a fair amount more factors besides noise propagation including such considerations as a simplified overview of the more commonly used pavement options are discussed below.

4.2.1.4.1 Hot-mix, cold-mix, synthetic binder, resin modified etc. asphalt

Asphalt requires a host of elements to achieve a viable and economical composite material of aggregate, filler and binder. The production and construction of a road using these methods is a much more complicated subject than what is discussed in this section. A simplified overview of the commonly implemented hot mix asphalt concrete requires the heating of the binder (of designers choice, including options such as rubberized binder[32] and selection of crude oils etc.) to achieve the required viscosity and removal of moisture content (from aggregate, could include sand, gravel, crushed stone, slag etc.) prior to mixing. Aggregate material is selected based on numerous factors including the size or grading, the toughness, surface texture, particle shape, absorption characteristics, availability etc. The resulting asphalt is paved on the base with the required compaction density achieved.

The aggregate size also plays an important choice to be made when designing the road. The aggregate crushing value is achieved in the construction phase by subjecting selected aggregated to various crushing and screening techniques via sieves to achieve the desired sizes. The most popular used sizes are 6.7, 9.5, 13.2, and 19 mm when considering road manufacturing in South Africa. A seal coating (sometimes applied to existing paving[33]) may be selected to improve waterproofing, skidding of vehicle tyres, prevent the deterioration of road surface as well as help bind the pavement top layer.

Information available regarding the preferred road paving options[34][35] or most commonly designed roads are briefly discussed below, and include:

1. Continuous graded asphalt– a mechanically mixed asphalt in which the aggregate and filler are distributed in size from coarse to fine fractions within a specific smooth grading envelope;

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[32] *George Way, Russ Evans (Ed.). Rubberised Bitumen in Road Construction.2006.*
[33] PD Naidoo & Associates. South African Highway Technology and Practice, ela and Thin Surfacing Technology.
[34] Afrisam. Asphalt Aggregate Production Brochure. 2008
[35] R.A Clayton. Experience with Cape Seals on Heavily Trafficked Roads Leading to Improved Design and Larger Aggregate Utilisation. 2004.

2. Gap graded and semi-gap graded asphalt- are 3 mechanically mixed asphalts from which some intermediate aggregate sizes are omitted to comply with a stepped grading envelope. These asphalt layers either contain a 19 mm or 26,5 maximum aggregate size;
3. Open graded asphalt - are mixes which normally require single sized crushed aggregate. It is mechanically mixed asphalt constituted to give a rough surface texture in the compacted state. This type of layer is also used when ultra-thin pavement is done using pavers. This design normally focuses on the very single size material of either 13.2 mm or 9.5 mm combined with a minus 3 mm sand having high dust content. Some of the names used in the industry are Stone Mastic Asphalt (SMA);
4. Large aggregates mixes for bases and surfaces (LAMBS) - graded asphalt containing large aggregates up to 37.5 mm and meeting prescribed engineering properties for the use as base course material;
5. Ultra-Thin Friction Course (UTFC) [36][37] - An ultra-thin friction course is constructed of a thin layer of gap graded, coarse aggregate hot mix asphalt concrete that provides a smooth, durable, and skid-resistant surface. The thin layer typically 9 to 19 mm thick, combines attributes of stone matrix asphalt and open graded friction course asphalt mixes. The hot mix asphalt layer is bound to the existing surface with a polymer modified emulsion that is specifically designed to seal the existing surface and bond the new mix to the existing surface.
6. Chip seal[38] – Chip seals are constructed by evenly distributing a thin base of hot asphalt onto an existing pavement and then embedding finely graded aggregate into it. The aggregate is evenly distributed over the seal spray, and then rolled into a smooth pavement surface. A chip-seal-surfaced pavement can optionally be sealed with a top layer; and
7. Cape seal[39] - The seal comprises a bituminous tack coat applied onto a primed base with single-sized stone. The voids between the stones are filled with two applications of slurry comprising a blend of crusher dust, stable grade emulsion, cement and water. Traditionally the seal is constructed with 19mm aggregate, but 13mm has been used with single slurry with less success. Once completed the seal provides a substantial surfacing.

[36] T.M Gilbert, P.A Olivier, N.E Galé. Ultra-Thin Friction Course: Five Years on in South Africa. Pg.1.
[37] Michael Maher, Chris Marshall, Frank Harrison, Kathy Baumgaertner. Context Sensitive Roadway Surfacing Selection Guide. Publication No. FHWA-CFL/TD-05-004. 2005.
[38] Wikepedia.
[39] R.A Clayton. Experience with Cape Seals on Heavily Trafficked Roads Leading to Improved Design and Larger Aggregate Utilisation. 2004.

Furthermore sometimes a chosen option is to have a twin asphalt paved one upon the other. The best option in road design when implementing a noise reducing surface would ideally incorporate a bitumen rubberised binder.

4.2.1.4.2 Portland cement concrete (PCCP)[40]

Portland cement concrete pavement is a mixture of aggregate, cementations material, and water that form a rigid, paved surfacing. Additives are used to help with production and paving and to improve durability. Typical additives include air entraining admixture, water reducing agents, and supplementary cementations materials (e.g. fly ash, ground blast furnace slag, silica fume, and calcinated clay). Concrete pavements are designed and constructed as plain concrete, plain concrete with dowelled joints, or as continuously reinforced.

4.2.1.4.3 Unpaved Roads

Gravel, unpaved, dirt roads (et el.) make use of no binder or asphalt for surface texture. It requires consistent rehabilitation or maintenance with routine blading and adding gravel as is needed. Gravel roads are prone to corrugation or "wash-boarding" as seen by a ripple effect on a gravel road. Where gravel roads meet with other surfaces (namely paved roads) a crown can form, creating a hard dip for vehicle tyres to interact with. Gravel roads are also prone to sub-surface and surface water retention, creating unevenness in road surface. Aggregate, stones, loose surface fragments, unevenness, crowns (dips) and corrugation allows a much rougher surface for road tyre interaction when in comparison to a paved surface.

4.2.1.5 Surface texture - road tyre interaction pt.6[41][42][43]

Texture amplitudes or surface roughness are components of indicating surface texture. It is a measure of how an object, substance, and compounds (etc.) may interact with the surrounding environment, in this case the adhesion, vibration and impacts of the road paving with vehicle tyre. The mean difference between peaks is represented by the wavelength symbol λ, representable in meter (m), centimeter (cm), millimeter (mm), micro macro etc. units. Surface texture results in radial vibrations of the tyre and tread of tyre carcass as low as 100 Hz up to 1 kHz[44].

[40] Michael Maher, Chris Marshall, Frank Harrison, Kathy Baumgaertner. Context Sensitive Roadway Surfacing Selection Guide. Publication No. FHWA-CFL/TD-05-004. 2005.
[41] SILVIA. "Guidance Manual for the Implementation of Low Noise Road Surface". 2nd ed.
[42] Giuseppe Loprencipe & Giuseppe Cantisani. Unified Analysis of Road Pavement Profiles for Evaluation of Surface Characteristics. Modern Applied Science; Vol. 7, No. 8. 2013.
[43] PIARC. World Road Association: Report of the Committee on Surface Characteristics. 1987.
[44] Paul Sas. Structural Dynamic Behaviour of Tyres Noise & Vibration Engineering Research Group KU. Leuven. XIX CNIM 15-16/11 Castellon.

A proposal for the identification of the relationships between fields of texture wavelengths and the irregularities connected with it from the road surface was presented by the World Road Association (PIARC), and is briefly summarized below:

- Micro-texture (Level - L_{MI}): $\lambda < 0.5$ mm - Surface texture of each aggregate depending on (particle) shape and angularity, texture of bituminous and cement mortar, surface texture of paving and setts and rock slabs, edges of grooves in concrete slabs (saving or brushing treatment). Road tyre interactions from micro-textures contribute to higher frequencies.
- Macro-texture (Level - L_{Ma}): 0.5 mm $< \lambda <$ 50 mm - Mix design including aggregate particle size, shape, spacing and arrangement. Surface treatment including chipping bush hammering, aggregate exposure, grading (width, depth, frequency and orientation of grooves). Deficiencies: loss of clipping, cracks, wide joints. Surface or internal drainage of the material. Road tyre interactions from macro-textures contribute from higher to lower frequencies. It is also the more important texture relating to rolling noise.
- Mega-texture (Level - L_{Me}): 50 mm $< \lambda <$ 500 mm - Type of materials (natural stone setts or concrete paving blocks - Regularity of laying and compaction methods. Deficiencies include corrugation, rutting, loss of surface material, potholes, spalled joints and cracks, step faulting, frost damage. Local treatments including planning and repairs done to roads. Road tyre interactions from mega-textures contribute to lower frequencies.
- Unevenness of roads : $\lambda > 0.5$ m – The unevenness of roads is split into three sub categories, namely short, medium and long wavelengths. These irregularities are caused by the quality of the work conducted including the spreading and compaction quality, deterioration by road traffic use, metrological damage, reliability of paving and guidance equipment during construction as well as deformation of sub-grade/sub-base/base soils.

A brief summary of findings presented by the World Road Association on road texture wavelength and its primary influences including road/tyre interaction noise is presented below in **Figure 4-1**. The figure indicates a correlation between texture wavelength (λ) and the spatial frequency cycle/m[45]. Such information has been implemented in practical scenarios by FEHRL (et. el) whereby measured data is compared to the texture of the pavement. Resulting noise levels vs. megatexture from mentioned report is illustrated in **Figure 4-2.** Data is presented in the Adjust R^2 best fit line.

[45] ISO 13473-2:2002 Characterization of pavement texture by use of surface profiles — Part 2: Terminology and basic requirements related to pavement texture profile analysis.

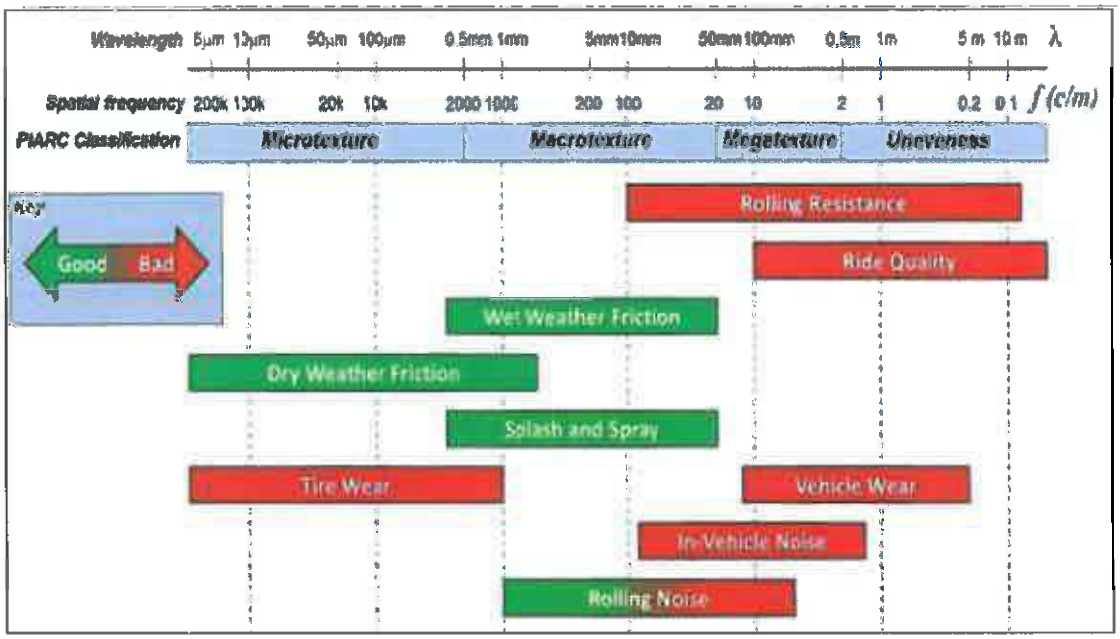

Figure 4-1: Road texture and its influences on tyre interaction[46]

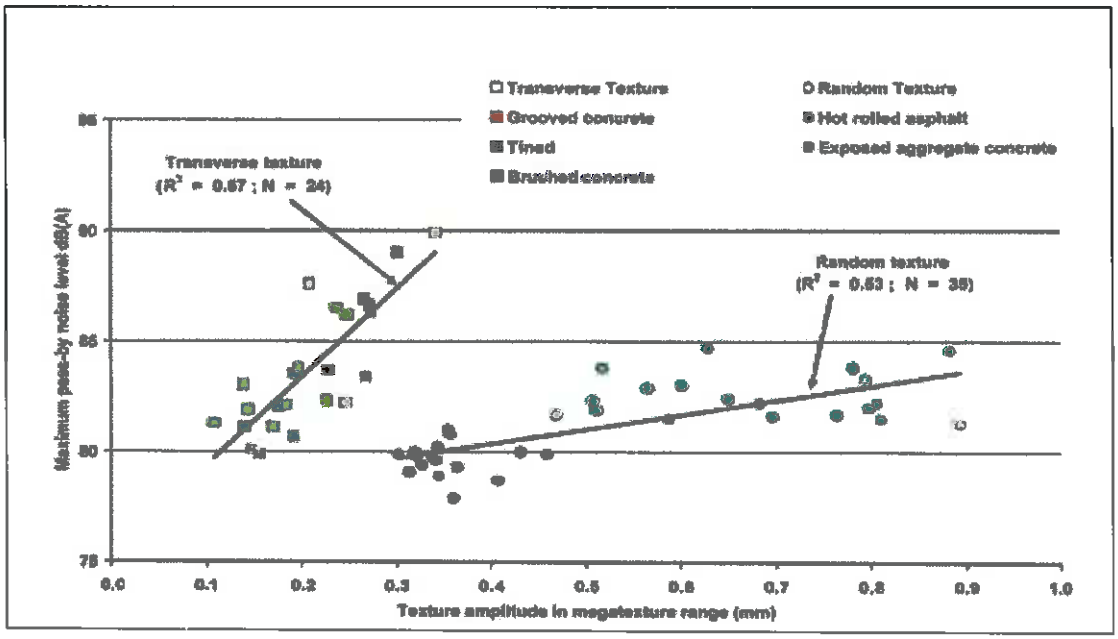

Figure 4-2: Megatexture vs. noise levels (speeds of app. 90 km/h @ 7.5 m)

Texture can also be classified into positive and negative textures (skewness)[47]. In general a reduction in noise levels can achieve by roads with aggregate sizes below 8mm, with a negative texture. Texture depth itself may help improve noise generated by tyre radial

[46] Kevin K. McGhee, Gerardo W. flintsch. High-Speed Texture Measurements of Pavements.VTRC 03-R9.2003.
[47] A. Ongel, E. Kohler, J Nelson. Acoustical Absorption of Open-Graded, Gap Graded and Dense Graded Asphalt Pavements. Research Report: UCPRC-RR-2007-12.2007.

interaction. Studies conducted on the matter (Douglas I. Hanson, Sandberg[48]) assessed the correlation between noise levels and Mean Profile Depth or Mean Texture Depth (MDP/MTD).

4.2.1.6 Surface porosity - road tyre interaction pt.4[49][50]

The reflective nature of the road is directly in correlation with reducing the noise propagated away from the road by sound absorption. But porous surfaces also reduce the generation of noise by several mechanisms related to the surface *porosity*. A measure of porosity can be defined as the percentage of voids that are open to the air in a given volume of total pavement mix, sometimes referred to as the residual air void content, Ω. Although defining a porous surface in terms of its void content has not been internationally the SILVIA consortium has recommended the following parameters:

- Dense layers (air void 4-9%);
- Semi-dense (air void 9-14%);
- Semi-open (air void 14-19%); and
- Open layers (air void over 19%) which are porous layers.

Porosity is not, however, the only parameter that influences sound absorption. Additional Parameters have been identified from results of modelling sound absorption and include:

- Thickness of the porous layer (d m) which influences where the maximum absorption occurs in the frequency spectrum. Increasing layer thickness lowers the fundamental frequency of maximum absorption together with its harmonics;
- Air flow resistance is important in governing the air flow in the pores of the surface;
- A high air flow resistance is favourable to sound energy dissipation, but a too high air flow resistance prevents the acoustic waves to penetrate into the layer. The optimum range of the air flow resistance depends on the thickness of the layer. It can be shown that the shape of the absorption curve in the frequency domain depends on the total air flow resistance of the layer, i.e. on the product of the specific air flow resistance of the porous medium by the thickness of the layer; and
- Tortuosity is a measure of the curved/meandering nature of the air path through the surface layer. In practice the air path through the layer will be dependent upon the shape of the interconnecting voids. The more tortuous the air path, the lower the fundamental frequency of maximum absorption. The fundamental frequency is therefore governed by both the tortuosity and the layer thickness.

[48] Ulf Sandberg. MIRIAM_P1 _04. Road Influence on tyre/road rolling resistance. 2011-12-31.

[49] A. Ongel, E. Kohler, J Nelson. Acoustical Absorption of Open-Graded, Gap Graded and Dense Graded Asphalt Pavements. Research Report: UCPRC-RR-2007-12.2007.

[50] SILVIA. "Guidance Manual for the Implementation of Low Noise Road Surface". 2nd ed.

4.2.1.7 Road classification[51]

Road classification in South Africa is classified depending on the use of the road[52]. National Highways usually start with the letter N, Metropolitan Freeways with an M, and a Provincial Main Road with an R. Furthermore roads are divided into urban and rural, with a classification between 1 and 6, depending on the speeds, amount of vehicles or road use

4.2.1.8 Road vehicle type

Vehicles noise emissions at speed vary from vehicle to vehicle. For acoustical purposes the classification of vehicles are considered as light or heavy and other factors are omitted. Heavy vehicles could be considered as articulated, tanker or other industrial freight trucks or any vehicle with heavy axle loads. Heavy vehicles obviously emit much more noise into the environment than light or passenger vehicles. The Sound Power Levels (SPL) from heavy vehicles mechanics are much higher than an average family sedan, emits much louder road-tyre interaction and many vehicles have their exhaust ports (a dominant noise source) above cabins allowing the noise to radiate over many dwellings boundary walls (an acoustical screen). Heavy vehicles also have noise sources with potential predominant tones to them, including air brakes or reverse hooters (only relevant when reversing).

4.2.1.9 Road traffic volume and speeds

The most significant noise contributor above 60 km p/h is the tyre interaction with the road surface. Tyre road impacts and shocks as well as tyre to road pumping (during standard rolling conditions, pumping is the compression of air under tyre tread) can contribute mainly below and above 1,000 Hz respectively (up to 2,000 Hz for pumping). The horn effect created by the geometry of the tyre and road surface can amplify up to frequencies of 10,000 Hz[53]. At speeds below 60 km/h engine noise (fan belt, piston revolutions etc.) would be more dominant over road tyre interaction noise which generally contributes to 1,000 Hz peaks (depending on road surface).

Road traffic with the volume and type of traffic generated may vary from day to day. Traffic volumes were sourced from the information presented in **Section 1.4**. Traffic speed on average was viewed to be in the region of 60 – 70 km/h[54] as is the regulations in South Africa for roads within an urban area.

[51] Committee of Transport Officials. *"TRH 26, South African Road Classification and Access Management Manual"*. Version 1.0.2012.
[52] Committee of Transport Officials. *"TRH 26, South African Road Classification and Access Management Manual"*. Version 1.0.2012.
[53] *FEHRL Report 2006/02, Guidance manual for the implementation of low-noise road surfaces*
[54] National Road Traffic Act, 1989.

4.2.1.10 Other road noise contributors

Other noise sources associated with motor vehicles include the exhaust outlet, engine motor and associated engine components such as fan belt (mostly audible below 60 km p/h). Many motor engine revs per minute (rpm) convert to a low range of frequency below the 100 Hz range. Wind shear noise can contribute to vehicle movement although mostly at very high speeds only.

4.2.1.11Single maximum noise events - magnitude and occurrences (L_{Amax})

Several road activities, including vehicle movement during night hours, emit repetitive noises of a significant level for brief periods of time that can interfere with sleep, communications, and the wellbeing of the residents of neighbouring properties (WHO 1999). International Standards relating to $\mathbf{L_{Amax}}$ singular maximum events is briefly discussed in **Section 2.9.2.**

4.3 POTENTIAL NOISE SOURCES: CLOSURE PHASE

Noises generated during the construction phase are generally less than the noise generated during other phases, including the construction phase. This is because the there is a lower "urgency" to complete the project and the number of simultaneous activities is quite few, using the least amount of people with the least number of equipment. The low magnitude of the potential noise level and short duration results in low significance of a noise impact will therefore not warrant further investigation.

5 METHODLOLGY: ENVIRONMENTAL NOISE IMPACT ASSESSMENT AND SIGNIFICANCE

5.1 POTENTIAL NOISE IMPACTS ON ANIMALS[55]

A great deal of research was conducted in the 1960's and 1970's on the effects of aircraft noise on animals. While aircraft noise have a specific characteristic that might not be comparable with industrial noise, the findings should be relevant to most noise sources.

Overall, the research suggests that species differ in their response to:

- Various types of noise, durations of noise, magnitude of the noise, characteristic of the noise and sources of noise.

A general animal behavioural reaction to aircraft noise is the startle response. However, the strength and length of the startle response appears to be dependent on:

- Which species is exposed (difference in hearing sensitivity, susceptibility to noise-induce hearing loss etc.);
- Whether there is one animal or a group; and
- Whether there have been some previous exposures.

There are numerous other factors in the environment of animals that also influence the effects of noise. These include predators, weather, changing prey/food base and ground-based disturbance, especially anthropogenic. This hinders the ability to define the real impact of noise on animals.

From these and other studies the following can be concluded:

- Animals respond to impulsive (sudden) noises (higher than 90 dBA) by running away. If the noises continue, animals would try to relocate. This is not relevant to wind energy facilities because the turbines do not generate impulsive noises close to these sound levels;
- Animals of most species exhibit adaptation with noise, including aircraft noise and sonic booms;
- More sensitive species would relocate to a more quiet area, especially species that depend on hearing to hunt or evade prey, or species that makes use of sound/hearing to locate a suitable mate; and
- Noises associated with helicopters, motor- and quad bikes significantly impact on animals.

[55] USEPA, 1971: *"Effects of Noise on Wildlife and other animals"*.

As such various South African/International guidelines existing very briefly mentioning potential noise impacts on wildlife from industrial and commercial industries, it has the issue where no acoustical criteria is defined[56]. Faunal guidelines exists regarding the protection of an animal's surrounding environment, with "physical" impacts such as water, vegetation etc. a far more critical impact than that of acoustics.

With the available information in mind, this documents intent remains a determination of the existing rating level and the potential increase of magnitude above (in dB, with applicable corrections) at a receptors dwelling as per legislation/guidelines, and due to a proposed noise source of significance (see **Section 2**).

5.1.1 Effects of Noise on Wildlife

Potential noise impacts on wildlife are very highly species dependent. Studies showed that most animals adapt to noises and would even return to a site after an initial disturbance, even if the noise continues. The more sensitive animals that might be impacted by noise would most likely relocate to a quieter area.

There are a few specific studies discussing the potential impacts of noise on wildlife associated with construction, transportation and industrial facilities. Available information indicates that noises from transportation and industrial may mask the sounds of a predator approaching; similarly predators depending on hearing would not be able to locate their prey.

Many natural based acoustics themselves may be loud or impulsive. Examples include thunder, wind induced noises that could easily exceed 35 dBA ($L_{A90,fast}$) above wind speeds averaging 6 m/s (wind conditions of a moderate breeze on the Beaufort Scale[57]), noise levels during early morning dawn chorus or loud cicada noises during late evening or early morning.

5.1.2 Effects of Noise on Domesticated Animals

It may be that domesticated animals are more accustomed to noise sources of an industrial, commercial or other anthropogenic nature, although exposure to high noise levels may affect domestic animals well-being. Sound levels in animal shelters can exceed 100 dB, much more than what can be expected at a domestic dwelling from an industrial, commercial or transportation noise source (10 minute equivalent)[58&59]. The high noise

[56] E.g. International council of Mining & Metals. "Good Practice Guidance for Mining and Biodiversity". P.g. 63.
[57] Met Office, "National Meteorological Library and Archive Fact sheet 6 – The Beaufort Scale", Version 1, Crown copyright 2010, p.4.
[58] Crista L. Coppola. Noise in the Animal Shelter Environment: Building Design and the Effects of Daily Noise Exposure.
[59] David Key, Essential Kennel Designs.

levels may see negative influences on animals cardiovascular systems and behaviour, and may damaging to the hearing of dogs in the kennel facility[60].

Domesticated animals may also respond differently to noises than animals in the wild. Domesticated dogs are pack animals and may respond excitedly or vocally to other noises, smells, visual and other stimulants, in contrast to wild animals that may flee at the slight sound of a noise or visual disturbances. Animals that are transported at least once in their life (such as pigs to an abattoir) would endure high noise levels for the duration of the delivery period[61]. A change in the heart rate, renal blood flow and blood pressure of study subjects were noted in the above studies.

5.1.3 Laboratory Animal Studies

Although many laboratory animals have wild counterparts (rats, mice) the laboratory test subjects differ in many aspects (genetics, behaviour etc.). Also noise levels of studies are conducted at generally very high levels at over 100 dB, much more than what would be experienced in environmental settings around industrial, commercial or transportation activities.[62] Other dissimilarities to laboratory tests and a natural environment include the time exposure (duration of noise), the spectral and noise character (impulsive noise vs. constant noise) etc. Although there exists dissimilarities in tests conducted and noise levels around commercial and industrial environments, laboratory rodents exposed to high noise levels did indicated physiological, behavioural changes, hearing loss and other such effects[63].

5.2 WHY NOISE CONCERNS COMMUNITIES[64]

Noise can be defined as "unwanted sound", and an audible acoustic energy that adversely affects the physiological and/or psychological well-being of people, or which disturbs or impairs the convenience or peace of any person. One can generalise by saying that sound becomes unwanted when it:

- Hinders speech communication;
- Impedes the thinking process;
- Interferes with concentration;
- Obstructs activities (work, leisure and sleeping); and
- Presents a health risk due to hearing damage.

[60] Wei, B. L. (1969). Physiological effects of audible sound. AAAS Symposium Science, 166(3904), 533-535.
[61] D B Stephens and R d Rader. J R Soc Med. 1983.
[62] USEPA, 1971: *"Effects of Noise on Wildlife and other animals"*.
[63] Ann Linda Baldwin. *"Effect of Noise on Rodent Physiology"*. 2007.
[64] World Health Organization, 1999; Noise quest, 2010; Journal of Acoustical Society of America, 2009

However, it is important to remember that whether a given sound is "noise" depends on the listener or hearer. The driver playing loud rock music on their car radio hears only music, but the person in the traffic behind them hears nothing but noise.

Response to noise is unfortunately not an empirical absolute, as it is seen as a multi-faceted psychological concept, including behavioural and evaluative aspects. For instance, in some cases, annoyance is seen as an outcome of disturbances, in other cases it is seen as an indication of the degree of helplessness with respect to the noise source.

Noise does not need to be loud to be considered "disturbing". One can refer to a dripping tap in the quiet of the night, or the irritating "thump-thump" of the music from a neighbouring house at night when one would prefer to sleep.

Severity of the annoyance depends on factors such as:

- Background sound levels as well as the background sound levels the receptor is used to;
- The manner in which the receptor can control the noise (helplessness);
- The time, unpredictability, frequency distribution, duration, and intensity of the noise;
- The physiological state of the receptor; and
- The attitude of the receptor about the emitter (noise source).

5.2.1 Annoyance associated with Industrial Processes

Annoyance is the most widely acknowledged effect of environmental noise exposure, and is considered to be the most widespread. It is estimated that less than a third of the individual noise annoyance is accounted for by acoustic parameters, and that the non-acoustic factors plays a major role. Non-acoustic factors that have been identified include age, economic dependence on the noise source, attitude towards the noise source and self-reported noise sensitivity.

On the basis of a number of studies into noise annoyance, exposure-response relationships were derived for high annoyance from different noise sources. These relationships, illustrated in **Figure 5-1**, are recommended in a European Union position paper published in 2002, stipulating policy regarding the quantification of annoyance. This can be used in Environmental Health Impact Assessment and cost-benefit analysis to translate noise maps into overviews of the numbers of persons that may be annoyed, thereby giving insight into the situation expected in the long term. It is not applicable to local complaint-type situations or to an assessment of the short-term effects of a change in noise climate.

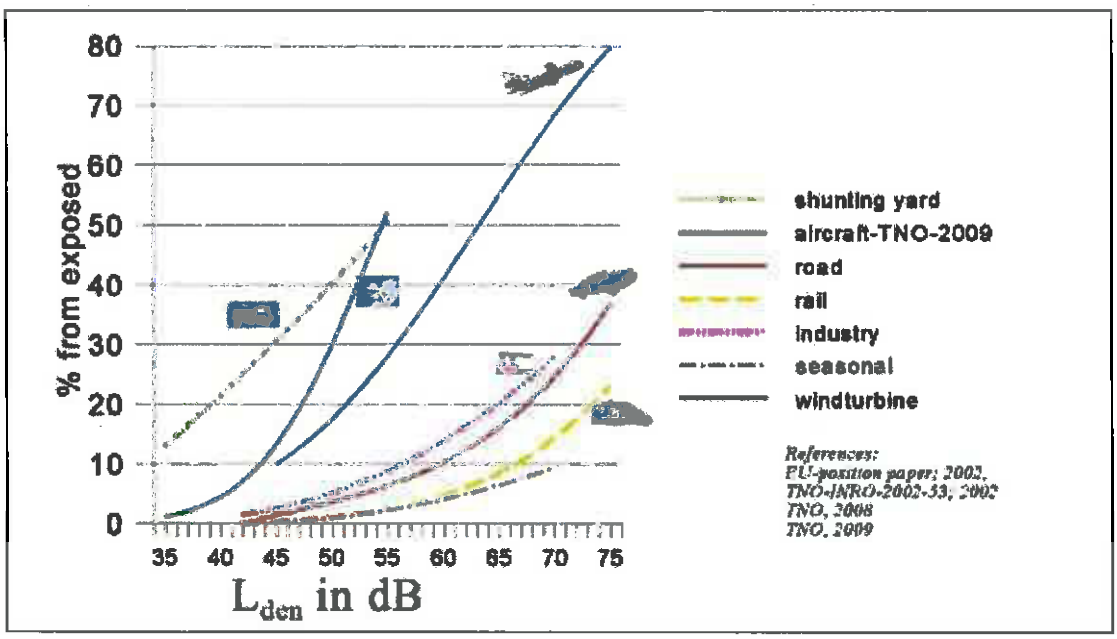

Figure 5-1: Percentage of annoyed persons as a function of the day-evening-night noise exposure at the façade of a dwelling

As shown in **Figure 5-1**, there is significant potential of annoyance associated with noise from shunting operations, mainly due to the highly impulsive character of the noises created.

5.3 IMPACT ASSESSMENT CRITERIA

5.3.1 Overview: The Common Characteristics

The word "noise" is generally used to convey a negative response or attitude to the sound received by a listener. There are four common characteristics of sound, any or all of which determine listener response and the subsequent definition of the sound as "noise". These characteristics are:

- Intensity;
- Loudness;
- Annoyance; and
- Offensiveness.

Of the four common characteristics of sound, intensity is the only one which is not subjective and can be quantified. Loudness is a subjective measure of the effect sound has on the human ear. As a quantity it is therefore complicated, but has been defined by experimentation on subjects known to have normal hearing.

The annoyance and offensive characteristics of noise are also subjective. Whether or not a noise causes annoyance mostly depends upon its reception by an individual, the environment in which it is heard, the type of activity and mood of the person and how acclimatised or familiar that person is to the sound.

5.3.2 Noise criteria of concern

The criteria used in this report were drawn from the criteria for the description and assessment of environmental impacts from the EIA Regulations, published by the Department of Environmental Affairs (June 2006) in terms of the NEMA, SANS 10103:2008 as well as guidelines from the World Health Organization.

There are a number of criteria that are of concern for the assessment of noise impacts. These can be summarised in the following manner:

- *Increase in noise levels:* People or communities often react to an increase in the ambient noise level they are used to, which is caused by a new source of noise. With regards to the Noise Control Regulations, an increase of more than 7 dBA is considered a disturbing noise. See also **Figure 5-2.**
- *Zone Sound Levels:* Previously referred to as the acceptable rating levels, it sets acceptable noise levels for various areas. See also **Table 5-1.**
- *Absolute or total noise levels:* Depending on their activities, people generally are tolerant to noise up to a certain absolute level, e.g. 65 dBA. Anything above this level will be considered unacceptable.

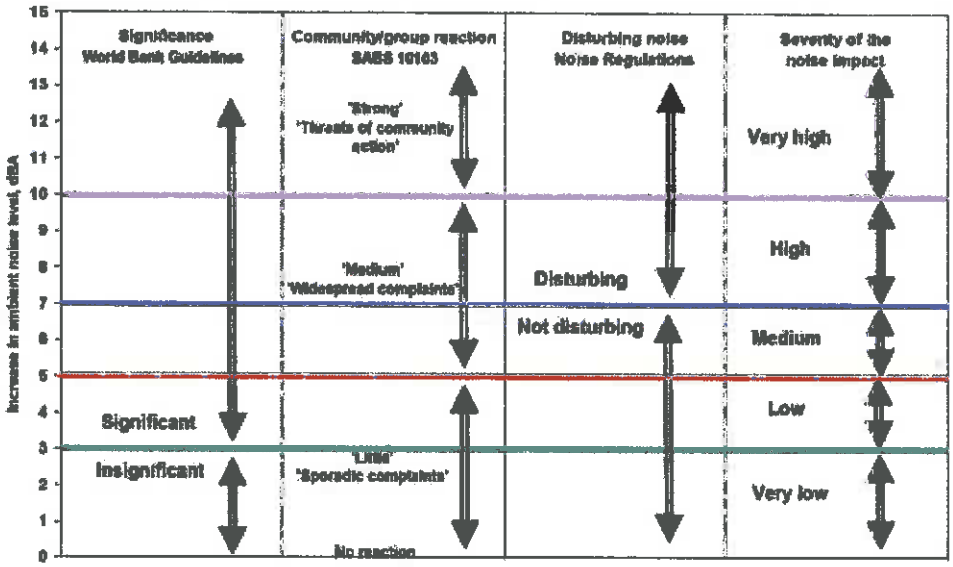

Figure 5-2: Criteria to assess the significance of impacts stemming from noise

In South Africa, the document that addresses the issues concerning environmental noise is SANS 10103:2008 (See also **Table 5-1**). It provides the equivalent ambient noise levels (referred to as Rating Levels), $L_{Req,D}$ and $L_{Req,N}$, during the day and night respectively to which different types of developments may be exposed. Measured data conducted indicated the current soundscape from the existing Atterbury Road portion.

During site measurements (**Section 3.3**) $L_{Aeq,I}$ ranged between busy urban – business district for both day and night-times. By considering other measured variables and by taking a precautious stance (due to seasonal faunal sounds, unwanted noises from dwellings etc.) the following SANS 10103:2008 rating levels will be considered:

- Busy urban district $L_{Req,D}$ of 60 dBA; and
- Busy urban district $L_{Req,N}$ of 50 dBA.

International guidelines should also be considered. The International IFC (Equator Principle) Residential; institutional and educational referenced areas includes ratings of:

- Use of $L_{Req,D}$ of 55 dBA during the daytimes; and
- Use of $L_{Req,N}$ of 45 dBA during the night-times.

SANS 10103:2008 also provides a guideline for estimating community response to an increase in the general ambient noise level caused by an intruding noise. If Δ is the increase in sound level, the following criteria are of relevance:

- **$\Delta \leq 3$ dBA:** An increase of 3 dBA or less will not cause any response from a community. It should be noted that for a person with average hearing acuity an increase of less than 3 dBA in the general ambient noise level would not be noticeable.
- **$3 < \Delta \leq 5$ dBA:** An increase of between 3 dBA and 5 dBA will elicit 'little' community response with 'sporadic complaints'. People will just be able to notice a change in the sound character in the area.
- **$5 < \Delta \leq 15$ dBA:** An increase of between 5 dBA and 15 dBA will elicit a 'medium' community response with 'widespread complaints'. In addition, an increase of 10 dBA is subjectively perceived as a doubling in the loudness of a noise. For an increase of more than 15 dBA the community reaction will be 'strong' with 'threats of community action'.

Note that an increase of more than 7 dBA is defined as a disturbing noise and prohibited (National and Provincial Noise Control Regulations).

Table 5-1: Acceptable Zone Sound Levels for noise in districts (SANS 10103:2008)

1	2	3	4	5	6	7
Type of district	Equivalent continuous rating level ($L_{Req,T}$) for noise dBA					
	Outdoors			Indoors, with open windows		
	Day/night $L_{R,dn}$ [a]	Daytime $L_{Req,d}$ [b]	Night-time $L_{Req,n}$ [b]	Day/night $L_{R,dn}$ [a]	Daytime $L_{Req,d}$ [b]	Night-time $L_{Req,n}$ [b]
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts with one or more of the following: workshops; business premises; and main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

5.3.3 Other noise sources of significance

In addition, other noise sources that may be present should also be considered. During the day, people are generally bombarded with the sounds from numerous sources considered "normal", such as animal sounds, conversation, amenities and appliances (TV/Radio/CD playing in background, computer(s), freezers/fridges, etc). This excludes activities that may generate additional noise associated with normal work.

At night, sounds that are present are natural sounds from animals, wind as well as other sounds we consider "normal", such as the hum from a variety of appliances (magnetostriction) drawing standby power, freezers and fridges. **Figure 5-4** illustrates the sound levels associated with some equipment or in certain rooms. This is however more for illustrative purposes, as there are many manufacturers with different equipment, each with a different noise emission character.

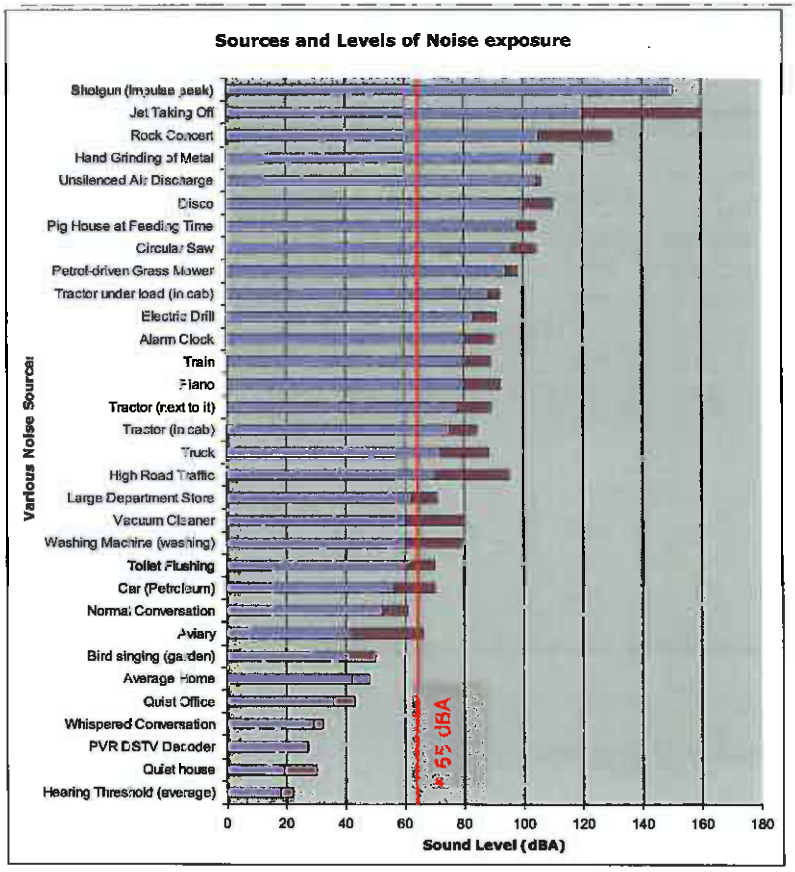

Figure 5-3: Typical Noise Sources and associated Sound Pressure Level

5.3.4 Determining the Significance of the Noise Impact

The level of detail as depicted in the EIA regulations was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value as defined in the third column in the tables below.

The impact consequence is determined by the summing the scores of Magnitude **Table 5-8**), Duration (**Table 5-9**) and Spatial Extent (**Table 5-10**). The impact significance (see **Sections 5.3.5** and **Section 5.3.6**) is determined by multiplying the Consequence result with the Probability score (**Table 5-5**).

An explanation of the impact assessment criteria is defined in the following tables.

Table 5-2: Impact Assessment Criteria - Magnitude

This defines the impact as experienced by any receptor. In this report the receptor is defined as any resident in the area, but excludes faunal species.		
Rating	**Description**	**Score**
Low	Increase in average sound pressure levels between 0 and 3 dB from the expected ambient sound levels. Ambient sound levels are defined by the lower of the measured $L_{AIeq,8\ h}$ or $L_{AIeq,16\ h}$ during measurement dates (**Section 3**). Total projected noise level is less than the Zone Sound Level and/or Equator Principle in wind-still conditions.	2
Low Medium	Increase in average sound pressure levels between 3 and 5 dB from the expected ambient sound levels. Total projected noise levels between 3 and 5 above the Zone Sound Level and/or Equator Principle (wind-less conditions).	4
Medium	Increase in average sound pressure levels between 5 and 7 dB from the ambient sound levels. Increase in sound pressure levels between 5 and 7 above the Zone Sound Level and/or Equator Principle (wind less conditions). Sporadic complaints expected.	6
High	Increase in average sound pressure levels between 7 and 10 from the ambient sound level. Total projected noise levels between 7 and 10 dBA above the Zone Sound Level and/or Equator Principle (wind-less condition). Medium to widespread complaints expected.	8
Very High	Increase in average ambient sound pressure levels higher than 10 dBA. Total projected noise levels higher than 10 dB above the Zone Sound Level and/or Equator Principle (wind less-conditions). Change of 10 dBA is perceived as 'twice as loud', leading to widespread complaints and even threats of community or group action. Any point at a receptor where 24 hr. measured value exceeds 61 dBA for an Industrial zoned or controlled area.	10

Table 5-3: Impact Assessment Criteria - Duration

The lifetime of the impact that is measured in relation to the lifetime of the proposed development (construction, operational and closure phases). Will the receptors be subjected to increased noise levels for the lifetime duration of the project, or only infrequently.		
Rating	**Description**	**Score**
Temporary	Impacts are predicted to be of short duration (portion of construction period) and intermittent/occasional.	1
Short term	Impacts that are predicted to last only for the duration of the construction period.	2
Long term	Impacts that will continue for the life of the Project, but ceases when the Project stops operating.	4
Permanent	Impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.	5

Table 5-4: Impact Assessment Criteria – Spatial extent

Classification of the physical and spatial scale of the impact		
Rating	**Description**	**Score**
Site	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.	1
Local	The impact could affect the local area (within 1,000 m from site).	2
Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.	3
National	The impact could have an effect that expands throughout the country (South Africa).	4
International	Where the impact has international ramifications that extend beyond the boundaries of South Africa.	5

Table 5-5: Impact Assessment Criteria - Probability

This describes the likelihood of the impacts actually occurring, and whether it will impact on an identified receptor. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:		
Rating	**Description**	**Score**
Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0 %).	1
Possible	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined to be up to 25 %.	2
Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined to be between 25% and 50 %.	3
Highly Likely	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined between 50 % to 75 %.	4
Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined to be between 75% and 100 %.	5

In order to assess each of these factors for each impact, the following ranking scales as contained in **Table 5-6** will be used.

Table 5-6: Assessment Criteria: Ranking Scales

PROBABILITY		MAGNITUDE	
Description / Meaning	**Score**	**Description / Meaning**	**Score**
Definite/don't know	5	Very high/don't know	10
Highly likely	4	High	8
Likely	3	Medium	6
Possible	2	Low Medium	4
Improbable	1	Low	2
DURATION		**SPATIAL SCALE**	
Description / Meaning	**Score**	**Description / Meaning**	**Score**
		International	5
Permanent	5	National	4
Long Term	4	Regional	3
Short term	2	Local	2
Temporary	1	Footprint	1

5.3.5 Identifying the Potential Impacts without Mitigation Measures (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned probabilities, resulting in a Significance Rating (SR) value for each impact (prior to the implementation of mitigation measures).

Significance without mitigation is rated on the following scale:

SR<30	Low (L)	Impacts with little real effect and which should not have an influence on or require modification of the project design or alternative mitigation. No mitigation is required.

30<**SR** <60	Medium (M)	Where it could have an influence on the decision unless it is mitigated. An impact or benefit which is sufficiently important to require management. Of moderate significance - could influence the decisions about the project if left unmanaged.
SR >60	High (H)	[illegible]

5.3.6 Identifying the Potential Impacts with Mitigation Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it will be necessary to re-evaluate the impact. Significance with mitigation is rated on the following scale:

SR <30	Low (L)	[illegible]
30<**SR** <60	Medium (M)	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
SR >60	High (H)	[illegible]

5.4 10103:2008 - Design and maximum rating levels for ambient noise for different areas of occupancy or activity indoors

SANS highlights limits for the design of facilities where indoor noise levels may be caused due to building services (e.g. ventilation systems, air-conditioning systems, lifts, plumbing and lighting. These maximum limits are presented in **Table 5-7** for reverence purpose only. It must be noted that these indoor limits are highlighted as they can be used for reference purpose when design dwellings at future stages, and adjacent to the road. These limits do not necessary apply to the calculated Rating Level as assessed in this document.

Table 5-7: Design and maximum rating levels for ambient noise for different areas of occupancy or activity indoors

Type of occupancy or activity - Residential	Design equivalent continuous rating level for ambient noise (dBA)	Maximum equivalent continuous rating level for ambient noise (dBA)
Living rooms	35	45
Kitchens and service areas	45	55
Bathrooms and toilets	40	55
Bedrooms	30	40
Classrooms	35	40

Places of worship up to 250 seats	30	35[b]

b - In cases where a speech amplification system is available to the speaker(s), the maximum tratig level for ambient noise ($L_{Req,T}$) can be increased to 40 dBA.

5.5 OTHER NOISE SOURCES OF SIGNIFICANCE

In addition, other noise sources that may be present should also be considered. During the day, people are generally bombarded with the sounds from numerous sources considered "normal", such as animal sounds, conversation, amenities and appliances (TV/Radio/CD playing in background, computer(s), freezers/fridges, etc). This excludes activities that may generate additional noise associated with normal work.

At night, sounds that are present are natural sounds from animals, wind as well as other sounds we consider "normal", such as the hum from a variety of appliances (magnetostriction) drawing standby power, freezers and fridges.

Figure 5-4 illustrates the sound levels associated with some equipment or in certain rooms. This is however more for illustrative purposes, as there are many manufacturers with different equipment, each with a different noise emission character.

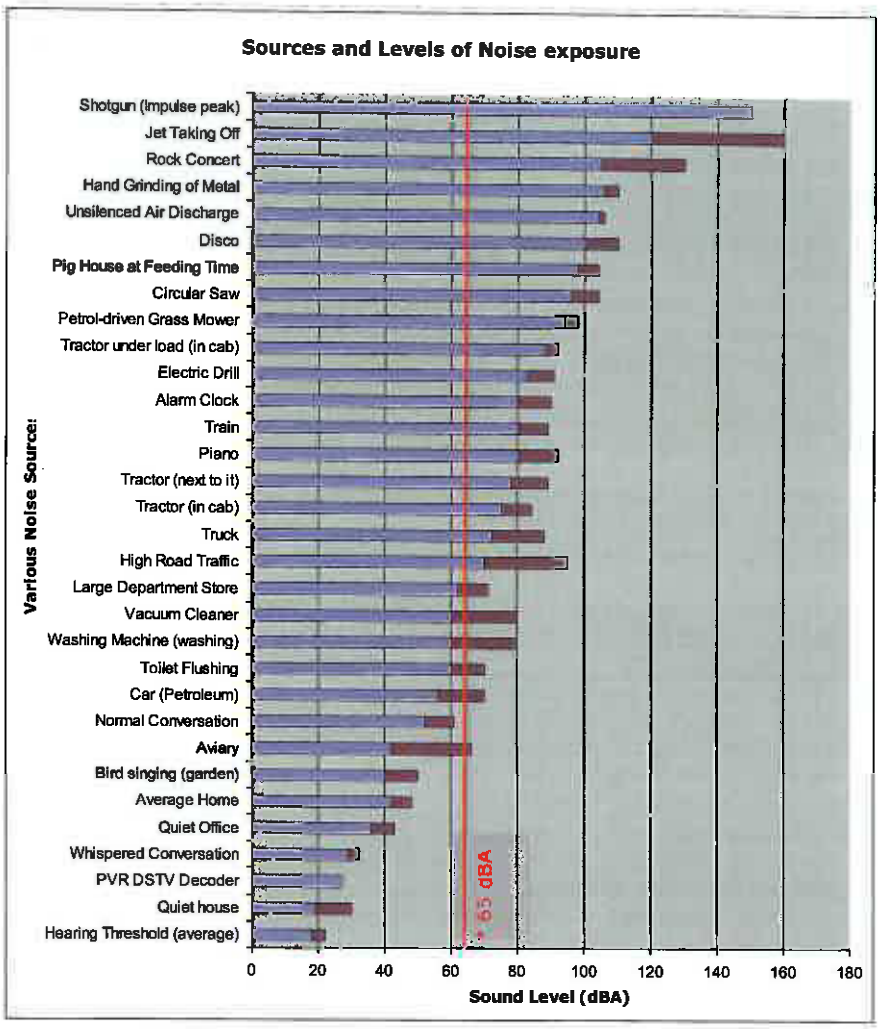

Figure 5-4: Typical Noise Sources and associated Sound Pressure Level

5.5.1 Determining the Significance of the Noise Impact

The level of detail as depicted in the EIA regulations was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value as defined in the third column in the tables below.

The impact consequence is determined by the summing the scores of Magnitude **Table 5-8**), Duration (**Table 5-9**) and Spatial Extent (**Table 5-10**). The impact significance (see **Sections 5.5.2** and **Section 5.5.3**) is determined by multiplying the Consequence result with the Probability score (**Table 5-11**). The magnitude may not be totally relevant to this study, as the noise sources under investigation are existing (roads, industrial and rail siding). However the designed worst-case scenario propagation model may indicate an

increase from the identified Rating Levels, making the magnitude criteria relevant. An explanation of the impact assessment criteria is defined in the following tables.

Table 5-8: Impact Assessment Criteria - Magnitude

This defines the impact as experienced by any receptor. In this report the receptor is defined as any resident in the area, but excludes faunal species.		
Rating	**Description**	**Score**
Low	Increase in average sound pressure levels between 0 and 3 dB from the expected ambient sound levels. Ambient sound levels are defined by the lower of the measured $L_{Aleq,3\,h}$ or $L_{Aleq,16\,h}$ during measurement dates (**Section 3.3**). Total projected outdoor noise level is less than the Rating Level and/or Equator Principle in wind-still conditions.	2
Low Medium	Increase in average sound pressure levels between 3 and 5 dB from the expected ambient sound levels. Total projected outdoor noise levels between 3 and 5 above the Rating Level and/or Equator Principle (wind-less conditions).	4
Medium	Increase in average sound pressure levels between 5 and 7 dB from the ambient sound levels. Increase in outdoor sound pressure levels between 5 and 7 above the Rating Level and/or Equator Principle (wind less conditions). Sporadic complaints expected.	6
High	Increase in average sound pressure levels between 7 and 10 from the ambient sound level. Total projected outdoor noise levels between 7 and 10 dBA above the Rating Level and/or Equator Principle (wind-less condition). Medium to widespread complaints expected.	8
Very High	Increase in average ambient sound pressure levels higher than 10 dBA. Total projected outdoor noise levels higher than 10 dB above the Rating Level and/or Equator Principle (wind less-conditions). Change of 10 dBA is perceived as 'twice as loud', leading to widespread complaints and even threats of community or group action. Any point at a receptor where 24 hr. measured value exceeds 61 dBA for an Industrial zoned or controlled area.	10

Table 5-9: Impact Assessment Criteria - Duration

The lifetime of the impact that is measured in relation to the lifetime of the proposed development (construction, operational and closure phases). Will the receptors be subjected to increased noise levels for the lifetime duration of the project, or only infrequently.		
Rating	**Description**	**Score**
Temporary	Impacts are predicted to be of short duration (portion of construction period) and intermittent/occasional.	1
Short term	Impacts that are predicted to last only for the duration of the construction period.	2
Long term	Impacts that will continue for the life of the Project, but ceases when the Project stops operating.	4
Permanent	Impacts that cause a permanent change in the affected receptor or resource (e.g. removal or destruction of ecological habitat) that endures substantially beyond the Project lifetime.	5

Table 5-10: Impact Assessment Criteria – Spatial extent

Classification of the physical and spatial scale of the impact		
Rating	**Description**	**Score**
Site	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.	1
Local	The impact could affect the local area (within 1,000 m from site).	2

Regional	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.	3
National	The impact could have an effect that expands throughout the country (South Africa).	4
International	Where the impact has international ramifications that extend beyond the boundaries of South Africa.	5

Table 5-11: Impact Assessment Criteria - Probability

This describes the likelihood of the impacts actually occurring, and whether it will impact on an identified receptor. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. The classes are rated as follows:		
Rating	**Description**	**Score**
Improbable	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0 %).	1
Possible	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined to be up to 25 %.	2
Likely	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined to be between 25% and 50 %.	3
Highly Likely	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined between 50 % to 75 %.	4
Definite	The impact will take place regardless of any prevention plans, and only mitigation actions or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined to be between 75% and 100 %.	5

In order to assess each of these factors for each impact, the following ranking scales as contained in **Table 5-12** will be used.

Table 5-12: Assessment Criteria: Ranking Scales

PROBABILITY		MAGNITUDE	
Description / Meaning	**Score**	**Description / Meaning**	**Score**
Definite/don't know	5	Very high/don't know	10
Highly likely	4	High	8
Likely	3	Medium	6
Possible	2	Low Medium	4
Improbable	1	Low	2
DURATION		**SPATIAL SCALE**	
Description / Meaning	**Score**	**Description / Meaning**	**Score**
		International	5
Permanent	5	National	4
Long Term	4	Regional	3
Short term	2	Local	2
Temporary	1	Site	1

5.5.2 Identifying the Potential Impacts without Mitigation Measures (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned probabilities, resulting in a Significance Rating (SR) value for each impact (prior to the implementation of mitigation measures).

Significance without mitigation is rated on the following scale:

SR<30	Low (L)	Impacts with little real effect and which should not have an influence on or require modification of the project design or alternative mitigation. No mitigation is required.
30<**SR** <60	Medium (M)	Where it could have an influence on the decision unless it is mitigated. An impact or benefit which is sufficiently important to require management. Of moderate significance - could influence the decisions about the project if left unmanaged
SR>60	High (H)	Impact is significant, mitigation is critical to reduce impact or risk. Resulting impact could influence the decision depending on the possible mitigation. An impact which could influence the decision about whether or not to proceed with the project.

5.5.3 Identifying the Potential Impacts with Mitigation Measures (WM)

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it will be necessary to re-evaluate the impact. Significance with mitigation is rated on the following scale:

SR<30	Low (L)	The impact is mitigated to the point where it is of limited importance.
30<**SR** <60	Medium (M)	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the **project,** the persistent impact does not constitute a fatal flaw.
SR>60	High (H)	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

5.6 TYPICAL ATTENUATION OF OUTSIDE NOISES THROUGH BUILDING STRUCTURE

Note 3 of Table 2 of this standard states that "*In districts where outdoor $L_{R,dn}$ exceeds 55 dBA, residential buildings (e.g. dormitories, hotel accommodation and residences) should preferably be treated acoustically to obtain indoor $L_{Req,T}$ values in line with those given in table 1.*"

When noise enters a building from the outside, it undergoes a reduction in level defined as the Noise Reduction (NR). The amount of NR obtained depends on the type of material used for the walls of the building, sizes and material used for windows and doors, the presence of noise leaks such as ventilation openings and the amount of acoustically-absorptive material inside the building. Noise Reduction can be measured directly or it may be calculated.

The calculation of NR is however a complex process and need to consider all the elements where noise can enter a building and is a separate field from Environmental Acoustics (Architectural or Structural Acoustics).

Section 4.2.3 of SANS 10103:2008 states that a building with natural ventilation (open doors and windows) will provide sound insulation of approximately 10 dBA. This will increase if the wall facing the noise source does not have any openings, windows or doors, with 20 dBA being a conservative value for a double brick wall without any openings. For the purpose of this study a reduction of 20 dBA will be considered.

5.7 REPRESENTATION OF NOISE LEVELS

Noise rating levels will be calculated in this report using the appropriate sound propagation models as defined. It is therefore important to understand the difference between sound or noise level as well as the noise rating level (also see Glossary of Terms, **Appendix A**).

Sound or noise levels generally refers to a level as measured using an instrument, whereas the noise rating level refers to a calculated sound exposure level to which various corrections and adjustments was added. These noise rating levels are further processed into a 3D map illustrating noise contours of constant rating levels or noise isopleths. In this project it illustrate the potential extent of the calculated noises of the complete project and not noise levels at a specific moment in time.

6 METHODOLOGY: CALCULATION OF FUTURE NOISE EMISSIONS DUE TO PROPOSED PROJECT

6.1 NOISE CLIMATE ON THE SURROUNDING ENVIRONMENT

6.1.1 Point Sources –Infrastructure

The noise emissions from various sources, as defined by the project, were calculated in detail for the operation of the construction and operational activities by using the sound propagation models described by SANS 10357 and ISO 9613-2 model.

The following were considered:

- The octave band sound pressure emission levels of processes and equipment;
- The distance of the receivers from the noise sources;
- The impact of atmospheric absorption;
- The meteorological conditions in terms of Pasquill stability;
- The details of the proposed project;
- Topographical layout; and
- Acoustical characteristics of the ground.

6.1.2 Linear Sources – Roads

The noise emission into the environment due to road traffic will be calculated using the sound propagation model described SANS 10210:2004 (Calculating and predicting road traffic noise) and Calculation of Road Traffic Noise (CRTN – 1988).

- Distance of receptor from the road;
- Road construction material;
- Average speeds of travel;
- Types of vehicles used;
- Road gradient; and
- Ground acoustical conditions.

6.2 SOUND PROPAGATION - CALCULATION LIMITATIONS

Limitations due to the calculations of the noise emissions into the environment include the following:

- Many sound propagation models do not consider certain sound characteristics as calculations are based on an equivalent level (however impulse and tone corrections do exists in certain models). These characteristics may include differentiation between "natural" or "unnatural" sounds or amplitude modulation;

- Many sound propagation models do not calculate the increase of the ambient soundscape due to wind shear (masking noise);
- Most sound propagation models do not consider refraction through the various temperature layers (specifically relevant during the night-times);
- Many sound propagation models do not consider the low frequency range (third octave 16 – 31.5 Hz). This would be relevant to facilities with a potentially low frequency issues;
- Many environmental models consider sound to propagate in hemi-spherical way. Certain noise sources (e.g. a speakers, exhausts, fans) emit sound power levels in a directional manner;
- It is assumed that the octave sound power levels selected for processes and equipment accurately represents the sound character and power levels of processes/equipment. The determination of these levels in itself is subject to errors, limitations and assumptions with any potential errors carried over to any model making use of these results;
- Rating level contours as illustrated in this document are representative of the various rating levels and the change of mentioned ratings. It is used as a representation for an assessment purposes;
- The impact of atmospheric absorption is simplified and very uniform meteorological conditions are considered. This is an over-simplification and the effect of this in terms of sound propagation modelling is difficult to quantify; and
- Acoustical characteristics of the ground are over-simplified with ground conditions accepted as uniform. Ground conditions will be considered in this assessment.

As such, sound propagation modelling does not aim to calculate the sound level at a receptors, but rather aim to estimate a noise level (referred to as the Rating Level) that considers factors and corrections such as source characteristics, tones, impulsiveness, time-of-day corrections, etc. The calculated noise level therefore is referred to as the noise Rating Level in this report. Due to these assumptions modelling generally could be out with as much as +10 dBA although realistic values ranging from 3 $\leq$ 5 dBA is more common in practice.

7 SCENARIO: NOISE CLIMATE

7.1 INVESTIGATED CONSTRUCTION SCENARIO

This section investigates the construction phase of the proposed development in terms of acoustics. Daytime (06:00 – 22:00) operations will be assessed. Even though construction activities are projected to take place only during daytimes, it might be required at times that construction activities take place during the night (particularly for a large project). Below is a list (and reasons) of construction activities that might occur during night time:

- Concrete pouring - large portions of concrete do require pouring and vibrating to be completed once started, and work is sometimes required until the early hours of the morning to ensure a well-established concrete foundation (relevant for Portland Cement, drainage channels etc.). However the work force at night will be considerably smaller than during the day; and
- Working late due to time constraints - weather plays an important role in time management in construction. A spell of bad weather can cause a construction project to fall behind its completion date. Therefore it is hard to judge beforehand if a construction team would be required to work late at night.

Calculations in this section are based on a worst-case scenario and will not be relevant for all times of the operation phase (not a moment in time, but the potential extent of noise Rating Levels during the operational phase). The operational phase *modus operandi* is discussed in more detail in **Section 4**.

7.1.1 Investigated $L_{Req,1hr}$ – Daytime

7.1.1.1 Point source - Construction

Based on available information a $L_{Req,1hr}$ worst-case scenario will be assessed taking into account the following:

- The noise rating levels will be on the outside of the building, as construction noise levels are only short-term. The noise levels inside structures will however be attenuated with 10 – 20 dB, depending on the construction of the building as well as the number of open windows. No other screening correction was considered i.e. boundary walls which could also see a slight reduction in noise levels. However many heavy equipment do have their exhaust ports above cabins (more than 3 m) etc.;
- As mentioned modelled scenario considered information as supplied in **Section 4**. It was selected to investigate the asphalt paving section by means of a paver, fed by ready mix trucks and compacted ; and
- Topography or other elevation corrections was not considered.

7.1.1.2 Existing Ambient Contributors and Acoustical Factors

The following ambient soundscape factors were considered:

- Intervening ground conditions of a medium-hard ground nature, i.e. some flora etc. (75% hard ground conditions). Refer to **Section 1.3.6** for more information;
- Activities assessed functioned during wind-still conditions, in good sound propagation conditions (20°C and 80% humidity).

7.2 INVESTIGATED OPERATIONAL SCENARIO

This section investigates the initial and future noise climate at houses directly adjacent to the noise source under investigation in terms of acoustics. Most critical investigational times would be the night-time hours when a quiet environment is desired (at night for sleeping, weekends etc.) Night-time is considered as between 22:00 – 06:00 (SANS 10103).

Calculations in this section are based on a worst-case scenario and will not be relevant for all times (not a moment in time, but the potential extent of noise Rating Levels). Assessed noise sources under investigation localities are illustrated in **Figure 7-1**.

As per SANS 10328:2008 '*Methods for environmental noise impact assessments*', a future scenario will be investigated (e.g. 15 years from initial development implementation).

7.2.1 Investigated $L_{Req,1hr}$– Daytime/Night-time initial and future

7.2.1.1 Road design, specifications & information

Modelled information considered observations, data analysis form measurements, information and *modus operandi* obtained in **Section 4** and **Section 1.4**. Based on available information a worst-case scenario will be assessed taking into account the following:

- Traffic data as available from Traffic Engineers, and assessed the following scenario:
    - Day-time period (06:00 – 22:00, data used to calculate the 1 hour peak traffic equivalent daytime noise rating levels):
        - Initial peak traffic at 399 light and 12 heavy (3% of total traffic) vehicles per hour travelling at 75 km/h (average); and
        - Future peak traffic at 533 light and 16 heavy (3% of total traffic) vehicles per hour travelling at 75 km/h (average).
    - Night-time period (22:00 – 06:00, a maximum assumption 10% of the peak day-time data used to calculate the potential 1 hour peak traffic equivalent night-time noise rating levels):