ENVIRONMENTAL IMPACT ASSESSMENT (EIA):

DRAFT EIA REPORT

PROPOSED TOWN DEVELOPMENT AT WESSELSHEIM, BETHLEHEM, FREE STATE

Applicant: **HVDM PROP CC**
MDA Ref No: **40367**
DETEA Ref No: **EMS / 11(xi), 15 / 13 / 27**
Date: **November 2014**

mda
Town & Regional Planners, Environmental & Development Consultants

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1. INTRODUCTION

1.1. BACKGROUND TO THE STUDY

The proposed development has had environmental authorisation from the Free State Department of Economic Development, Tourism and Environmental Affairs on 28 October 2005 (find lapsed environmental authorisation attached in **Annexure F**). Due to the economy it was not feasible to develop at that time. Since then the property has been sold and the applicant is re-applying for environmental authorisation.

The town of Bethlehem lies approximately 240 km north-east of Bloemfontein in the picturesque north-eastern Free State. The property of Wesselsheim is located to the east of La Provence suburb and stretches right up to the edge of the Loch Athlone Dam.

The owner of the application property identified the need to develop the property for residential purposes. The developer plans to develop a secure estate. The aim of the application is to establish a high value, medium density residential development in close proximity to the town and a natural environment.

It is important to note that the topography (including flood lines and storm water drainage) plays a role as to the density and layout that can be accommodated on the proposed site. As result a large portion of the terrain will not be developable and will therefore incorporate into open space area. Refer to **Annexure A** for locality plan.

1.2 COMPILATION OF EIA REPORT

The following report was compiled by MDA on acceptance of the submitted scoping report and advice from the competent authority in terms of Regulation 30(1)(a) to proceed with the tasks contemplated in the plan of study for environmental impact assessment, including the public participation process. The report was compiled according to Regulation 31 (2)(a) – (s) of the Regulations No. 543 of 18 June 2010 promulgated in terms of Chapter 5 of the National Environmental Management Act (Act No. 107 of 1998) stipulating the information that is necessary for the competent authority to consider the application and to reach a decision contemplated in Regulation 35.

1.3 TERMS OF REFERENCE

The objective of this study is to conduct an environment assessment exercise. The broad terms of reference for an assessment exercise are to:

- Conduct an in-depth investigation into biophysical and socio-economic aspects, focusing on key issues.
- Address the issues that were identified during the scoping process and investigation, which are associated with this planned project.
- Advise the proponent about the potential impacts (positive and negative impacts) of their planned development, as well as the implications for the design, construction and operational phases of the project.
- Facilitate public input on environmental and social matters.
- Identify possible measures to mitigate the potential impacts of the planned project.
- Address the cumulative impact of all aspects of the planned development as well as recommend possible mitigating measures.

1.4 METHODOLOGY OF EIA

This report addresses the biophysical as well as the socio-economic environments. The information was captured in the following manner:

- Site visits to determine the setting, visual character and land-uses in the area.
- Site surveys were conducted to identify any plant and animal populations that could be impacted by the development (scoping).
- The project plans were superimposed onto the gathered baseline environmental information to identify possible impacts.
- Discussions were held with the client to identify specific aspects of the development which could affect the environment.
- I & AP's were informed and consulted by phone, letters, notice boards and advertisements to capture issues that could affect the environment.
- Identifying positive, as well as negative issues.
- Specialist studies done by independent specialists in areas where impacts were identified.
- Making recommendations and presenting guidelines for the mitigation of impacts identified during this exercise.

2. ENVIRONMENTAL ASSESSMENT PRACTITIONERS (EAP'S)

2.1 DETAILS OF EAP'S

A multi-disciplinary team of specialists contributed to the information presented in this document:

Co-ordination, supervision, management

Mr. Neil Devenish - MDA Consultants

Public Participation & Report Writing

Ms. Marike du Plessis - MDA Consultants

2.2 EXPERTISE OF THE EAP'S

a) Mr. Neil Devenish

Key qualifications:

- Key competencies and experience include development control applications (applications and appeals pertaining to rezoning, consolidations, subdivisions etc.) township establishment applications, environmental management and control applications.
- Registered at the SACTRP [TRP(SA)].
- Registered at IAIAsa.

Education:

- B. A. (Sociology, Geography) University of the Free State, SA, 1994.
- Master of Town and Regional Planning, University of the Free State, SA, 1996.
- Managing the Environmental Impact Assessment Process, Environmental Management Unit, PU for CHE, 2000.
- Environmental Management Consulting, South African Institute of Ecologists & Environmental Scientists, 2001.
- Water Law of South Africa, The South African Institution of Civil Engineers (SAICE), 2006.

b) Ms. Marike du Plessis

Key qualifications:

- Key competencies include environmental management and research in geology.
- Registered at IAIAsa.

Education:

- B.Sc. (Geology), University of the Free State, South Africa, 2005.
- B.Sc. Honours (Geology), University of the Free State, South Africa, 2006.

Conferences:

- 'Studentesimposium in die Natuurwetenskappe', Potchefstroom, 2006.
- Young Earth Scientist Africa Symposium in conjunction with the 23rd Colloquium for African Geology, Johannesburg, 2011.
- First Science and Technology and Space Geodesy Observatory Workshop, Matjiesfontein, 2011.
- 8th Annual Inkaba yeAfrica Workshop, Cape Town, 2011.
- 6th Science Centre World Congress, Cape Town, 2011.
- Second Combined Science and Technology Train and Space Geodesy Observatory Workshop, Matjiesfontein, 2012.

3. PROJECT INFORMATION

3.1 PARTICULARS OF APPLICANT

HVDM PROP CC

Chatelet Plot, Eden Plots

P.O. Box 442

BETHLEHEM

9700

Contact person: **Mr. Hendri van der Merwe**

Tel: 058 303 2829

Cell: 082 413 7294

E-mail: elsabe@geminitrust.net

3.2 DESCRIPTION OF THE PROPOSED ACTIVITY

The site for the proposed development, namely the Remainder of the Farm Wesselsheim 1793, belongs to the applicant (refer to **Annexure E** for Title Deeds).

The provision of services is done in accordance with the Services Agreement reached between the Town Owner and the Dihlabeng Local Municipality. The development measures 45.55 ha in total. See Tables 1 and 2 for the land uses and sizes allowed by the proposed township establishment. Refer to the proposed site layout in **Annexure B**.

Table 1. Land uses and sizes of proposed development.

Zoning	No. of erven	Erf no.	Area	%
Single Residential	225	1 - 225	23.98	52.65
Medium Density Residential	6	226 - 231	3.87	8.5
Private Open Space	9	232 - 240	10.72	23.55
Access road (street)	-	-	6.97	15.30
TOTAL	243	-	45.55	100

Table 2. Summary of erven numbers and zoning thereof.

Use Zone	Erf No's
Single Residential	1-222
	91-105
	62, 83, 92, 96
Medium Density Residential	223-228
Private Open Space	229-235
	231-233
Street	236

A portion of the erf is subject to the 1:100 year flood line. No permanent residential buildings will be constructed in these flood line areas, as indicated.

The private open spaces are allocated to cover an area of 11.01 ha and will add esthetic and environmental value to the development.

Since the area is still farm land, there are no services, except for two water pipe lines in a 5 m wide servitude which cross the area. The servitude is situated 20 m - 50 m horizontally from the full supply water line of the dam. There is also a right of way servitude registered across the farm for a dirt road about 20 m horizontally from the water line. This dirt road was originally introduced to serve as a ring road along the circumference of Loch Athlone. This road can still be accessed via the internal streets as can be seen in the layout plan **(Annexure B).** The following associated infrastructure is also envisaged for the development:

3.2.1 Water provision

There is already a shortage of reservoir storage for the total water demand in Bethlehem. The ultimate reservoir storage required for Wesselsheim amount to 1.0 Ml, while the storage for the first phase is only 0.284 Ml. The developer is prepared to make a contribution towards the construction of an economical size reservoir if the council plans to build in the near future. The option of building a reservoir to satisfy the needs of Wesselsheim also exists.

3.2.2 Sewerage

The water treatment works and the sewer purification works have sufficient capacity to service the proposed development.

3.2.3 Waste management

The municipal solid waste site was designed for a life expectancy of 20 years and was only put into operation five years ago therefore there should be enough capacity to cater for the expected waste from this relative small development.

3.2.4 Roads and traffic

The existing road network of the surrounding area influenced the proposed road network. Provision was made to link up with all existing roads bordering against the proposed development. Access to the township will be via Baartman and La Provence Road from the west, while additional access will be provided from the east as soon as a proper access road for the Mary Ann area has been established. The planning of the road network was done in close collaboration with Civil and Traffic Engineers and is based on acceptable engineering and town planning norms. A Traffic Impact Study is included in **Annexure I.**

3.2.5 Storm water infrastructure

Provision is made to accommodate storm water over erven 62, 83 and 95 by means of a 3 m servitude. The topography of the southwest of the property is primarily the result of storm water draining from the south in a northerly direction. The developable areas next to these drainage lines are therefore defined by means of the 1:100 year flood line. No development will take place in the flood line area.

Loch Athlone adjoins the proposed development on the southern side. Storm water will be collected from street level where possible and redirected to the dam. All streets will be paved with paving blocks which will make it easier to deviate levels over short distances in order to regulate the flow of storm water in the desired direction. Channels will also be built of paving bricks. The 1:50

and 1:100 year flood lines have been determined and are indicated on the plan. Refer to **Annexure K** for the Bulk Civil Services Report.

3.2.6 Electricity provision

The electrical consultants are planning the supply of electricity for the development together with the electrical department of the council.

More details regarding the bulk civil services, electricity provision, road network and storm water drainage is available the Traffic Impact Study, Bulk Electrical Services and Bulk Civil Services Report (**Annexures I, J and K** respectively).

Refer to **Annexure N and O** for the approval of municipal services as well as the municipal town planning approval. These documents include the service level agreement between the developer and the Municipality, the confirmation of the Municipality has enough capacity for water, sewer and electrical demand and will be able to provide these services for the proposed development.

3.3 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITY

There is a current demand for this type of housing developments on the fringe of town. The proposed development will not have a negative impact on the surrounding land uses, but will rather fulfil a need for housing that exists and simultaneously compliment non-residential uses.

The proposed township establishment will be a contribution to the economy of the town of Bethlehem as the higher order land use means a higher income for the Local Municipality in the form of rates and taxes. Much needed job opportunities will also be created, temporary jobs during development and construction of the properties and permanent jobs when occupation by owners take place.

The proposed development will conform to the general character of the area while catering for an existing need in the housing market. Find attached the approval of municipal services as well as the municipal town planning

approval in **Annexure N and O** respectively.

3.4 FEASIBLE AND REASONABLE ALTERNATIVES

3.4.1 Site alternatives:

Site alternatives are not applicable for this project due to the fact that the proposed development is an extension of the existing town of Bethlehem. The application site falls within the jurisdiction of the Bethlehem Town Planning Scheme No. 1 of 1983. The Spatial Development Framework (IDP) of the Dihlabeng Local Municipality earmarks this area for future residential development and therefore for formal township developments. A site alternative will therefore not be feasible and will not be considered throughout the application.

3.4.2 Activity alternatives:

The proposed activity was identified by the developer to consist predominantly of a residential development, expanding the existing town of Bethlehem. The Spatial Development Framework (IDP) of the Dihlabeng Local Municipality earmarks this area for future residential development and therefore for formal township developments. No other activities were considered in this application due to the assessed need and feasibility of the proposed activity as in the Spatial Development Framework. An activity alternative will therefore not be feasible and will not be considered throughout the application.

3.4.3 Design alternatives:

The unique character and appeal of the area were taken into consideration with the design philosophy. Various layout alternatives were considered by the applicant and town planners, also taking terrain and environmental constraints into account. The topography of the area is suited for the township development and it had a significant effect on the design of the proposed layout plan. A design alternative will therefore not be feasible and will not be considered throughout the application.

3.4.4 No-go option:

The no-go option means keeping the status quo, i.e. not expanding housing options for the town of Bethlehem.

4. PUBLIC PARTICIPATION

4.1 INTRODUCTION AND OBJECTIVES

As an important component of the EIA process, the public participation process involves public inputs from Interested and Affected Parties (I & AP's) according to Section 56 of the NEMA 2010 Regulations. I & AP's may comment during the EIA of the proposed project.

The key objectives of the public participation process are to:

- Identify a broad range of I & AP's, and inform them about the proposed project.
- Understand and clearly document all issues, underlying concerns and suggestions raised by the I & AP's.
- Identify areas that require further specialist investigation.

4.2 METHODOLOGY

The following actions have already been undertaken as part of this process:

- Advertisement in the local newspaper.
- Written notices to identified I & AP's.
- On-site notices.
- Comment period for all I & AP's on the Draft Scoping Report.
- Response to all comments received from I & AP's.

4.2.1 Identification of key I & AP's

Key I & AP's, are the following types of organizations:

- Surrounding landowners
- Environmental organizations
- Authorities
- GO's
- NGO's
- Business and civic organizations.

See **Annexure D3** for a list of I & AP's.

4.2.2 Notification of potential I & AP's of EIA:

i) Newspaper advertisement: (Annexure D1)

Newspaper	Date of advertisement
Volksblad	17 January 2014

ii) On site notices: On site notices were also placed at the site on 22 January 2014 allowing 30 days for public response **(Annexure D2)**.

iii) Written notices: Written notices of the intent to apply for environmental authorisation were sent to the following identified interested and affected parties and were given a 30 day comment period:

- Thabo Mafutsanyane District Municipality
- Dihlabeng Local Municipality
- Ward Councillor (Ward no. 10, Ward code 41902010) Cllr. Gert Roetz
- Mail drops to all occupiers 100 m from proposed development.

4.2.3 Public comments

The Draft Scoping Report was circulated for the comment period of 40 days, the Final Scoping Report was also circulated to I & AP's. No comments were received. Registered post of Ms. S Veltman was unclaimed and returned to our offices. Please find attached in **Annexure D4** together will all comments and responses**.**

4.3 SUMMARY OF KEY ISSUES RAISED BY THE I & AP's

No issues / comments have thus far been received, but if any are received, will be included in the final EIA Report.

5. ENVIRONMENTAL ASPECTS

5.1 LITERATURE REVIEW

Literature on the environment pertinent to this area and its immediate environs has been reviewed. The literature included published and unpublished reports: Mucina & Rutherford 2006 and Smithers 1986 and others.

5.2 DESCRIPTION OF THE ENVIRONMENT

5.2.1 Biophysical Environment

The terrain has a topography that gradually slopes from east to west. The artificial dam, Lock Athlone, is situated immediately west of the site (refer to site layout in **Annexure B**). The site also slopes towards the dam (east to west). A small seasonal stream that drains into Loch Athlone from the east of the site to the west into the dam is visible. No rocky outcrop can be seen and the soils have a high clay content.

The site is still in a degraded condition due to ploughing and it is unlikely that it will be able to develop into a representative example of the natural vegetation type.

5.2.1.1 Climate

Bethlehem lies at an altitude of 1700 metres and this contributes to its cool climate with frosty winters and mild summers. The average annual temperature is around 24°C.

5.2.1.2 Geology

The area of the town is geologically underlain part of the Karoo Supergroup. The sediments of the Molteno, Elliot and Clarens Formations will be profound in the area. Dolerite intrusions would intersect sedimentary rock

5.2.1.3 Terrain forms & habitats

Table 3 below gives a description of the terrain and habitat type that can be found in the area of proposed development.

Table 3: Terrain form and habitats area to be developed.

Terrain form		Habitat types	
Hill top		Grassland	**X**
Hill side		Karoo	
Flat		Karroid (scattered)	
Valley		Natural forest	
River bank		Plantations	
Wetland		Ploughed or fallow fields	**X**
Gradual slope	**X**	Riparian	
		Savanna	
		Shrub	
		Wetland	
		*Other	**X**

***Other: The artificial waterbody and a small seasonal stream is regarded as sensitive and has been excluded from the development. No development will take place within 32 meters from the stream and will occur outside the 1:100 year floodline.**

5.2.1.4 Soils

Soils contain a high clay content. Refer to complete Geotechnical Report in **Annexure L.**

5.2.1.5 Vegetation

According to Mucina & Rutherford (2006) the area consists of Eastern Free State Sandy Grassland (Gm4). Although this vegetation type is Endangered (EN) the site in question has been ploughed previously and is no longer considered to be representative of this vegetation type. Ploughing of this area must have taken place many years ago as the area has undergone succession to an advanced state although it is unlikely that the area would able to rehabilitate itself to pristine condition. Refer to **Annexure G** for the complete Floristic and Ecological Assessment.

5.2.1.6 Animals (moths, butterflies, reptiles, fish, birds & mammals) of the area

A survey was also undertaken to assess the fauna occurring on the site and in adjacent areas, with particular emphasis on the detection of threatened species likely to occur. Refer to **Annexure G** for the complete Floristic and Ecological Assessment.

5.2.1.7 Aquatic systems

The proposed development is directly adjacent to the artificial Loch Athlone dam. The Jordaan River drains into this waterbody. The site also contains a small seasonal stream that drains into Loch Athlone from the east of the site to the west of the dam. Refer to **Annexure G** for the complete Floristic and Ecological Assessment.

5.2.1.8 1:100 year flood line

Refer to **Annexure B** for site layout plan including the 1:100 year flood line. The development is subject to the development setback line ensuring that no permanent structures are built within the 1:100 year flood line.

5.2.2 Socio-economic Environment

Bethlehem is situated on the N5 route between Bloemfontein and Durban (approximately 240 km north-east from Bloemfontein). Agriculture plays a vital role in the economy of the area as the area is well known for its wheat production and cattle farming.

The proposed development is expected to promote and enhance the existing Bethlehem tourism, economic and service sector. It is not foreseen that the proposed development will have a negative socio-economic impact on the region. In fact it will act as catalyst for stabilising economic growth in the region by creating a wide variety of job opportunities during the construction and operational phases.

5.2.2.1 Surrounding land uses

Except for the town of Bethlehem, the proposed development area is surrounded by agricultural land. Refer to the locality plan in **Annexure A**.

5.2.2.2 Historical, archaeological or cultural sites

An archaeological impact assessment has been undertaken to assess the site and determine whether any artifacts, rock paintings, other significant material or graves are present at or near the site. Please find complete Phase 1 Heritage Impact Assessment in **Annexure H.**

5.3 SUMMARY OF SPECIALIST STUDIES

The necessary specialist studies and specialised processes have been performed in areas where possible negative impacts were identified. This was done according to Section 32 of Regulations No. R. 543 published in the Government Notice No. 33306 of 18 June 2010 of NEMA. Specialised studies relevant to the project include:

5.3.1 Floristic and Ecological Assessment

A Floristic and Ecological Assessment was undertaken to evaluate the present state of the vegetation and ecological functioning of the proposed site for development, as well as identify possible negative impacts that could be caused by the proposed construction. Refer to **Annexure G** for the complete assessment.

Specialists: **EKO-environmental**
Mr. D van Rensburg
Private Bag X01
Brandhof
Bloemfontein
9324

Findings:

- According to Mucina & Rutherford, the area consists of Eastern Free State Sandy Grassland (Gm 4), but the area in question has been ploughed before previously and thus is no longer representative of this vegetation type.
- The ploughing of this area must have taken place many years ago as the area has undergone succession to an advanced state although it is unlikely that the area would be able to rehabilitate itself to pristine condition.

- The site does not contain any surface rock or exposed rocky formation.
- Soils contain a high clay content.
- Vegetation structure on the site consists of a grass layer with an absence of shurbs.
- The site contains a large artificial Bluegum woodlot and is not considered as part of the natural vegetation structure.
- The seasonal stream on the site contains extensive reedbeds.
- The site is in degraded condition due to ploughing and it is unlikely that the site will be able to develop into a representative example of the natural vegetation type.
- The site still contains contours from the previous cultivated fields. These contours degrade the site as they act as disturbed areas for the establishment of weeds.
- Numerous dirt roads also occur on site.
- The site contains a diversity of species but it is not comparable to with the natural diversity of the area.
- A bulbous species (Gladiolus species) identified on the site is considered to be of Least Concern and not endangered in any way. However, these are protected species within the Free State Province and are therefore of some conservational importance.
- The artificial waterbody (Loch Athlone) is considered sensitive. The Jordaan River drains into this waterbody, this river is considered a National Freshwater Ecosystem Priority Area (NFEPA): Fish Sanctuary and for this reason Loch Athlone must be considered sensitive. The residential development will be situated outside the 32m buffer zone from the high water mark and will therefore not have any direct impact on Loch Athlone. However, storm water from this development will likely flow into the water body. This will likely contribute to pollution of Loch Athlone.
- A small seasonal stream also occurs on site and flows from south east of the site into Loch Athlone. The small seasonal stream must be regarded as highly sensitive, however the stream is excluded from development and thus no development will take

place within 32 m from the stream and will occur outside the 1 : 100 year flood line.

Recommendations:

- It is recommended that the bulbous Gladiolus species are conserved by:
    i. Obtaining permits to conduct a search and rescue operation.
    ii. That the species be transplanted to an area on-site where they will not be affected, preferable an open space area.
    iii. Recreation on the transplanted site must be restricted in order for the species to remain undisturbed.
    iv. The species transplants easily and has attractive flowers and would therefore contribute to the aesthetics of the development.
    v. Weeds on the transplanted area must be removed on a continuous basis.
    vi. The search and rescue operation and transplantation should be led by a qualified ecologist.
- The exotic Bluegum woodlot species are seen as exotic and should preferably be removed as they do not form part of the natural vegetation and do not contribute to aesthetics or the natural ecosystem. The species are listed as a Category 2 invader.
- The storm water system of the development should be such that it minimises the likelihood of pollution of Loch Athlone.
- Recreation within the stream must be restricted as this will lead to progressive degradation of the stream. Walkways and foot- or road bridges should be kept to a minimum over this stream and should be designed to allow adequate flow of the stream and should not cause erosion.
- No harming, hunting or capturing of any of the animals on the site must be allowed.
- After construction has ceased all construction materials should be removed from the area.

5.3.2 Heritage Impact Assessment

An Archaeological Impact Assessment to investigate the archaeological, historical and cultural significance of the site. Please refer to complete report in **Annexure H.** The study was undertaken by:

Specialists: **National Museum**
Dr. L Rossouw
P.O. Box 266
BLOEMFONTEIN
9300

Findings:

- No above-ground evidence of residential building structures or material of cultural significance or intact archaeological sites within the demarcated area.
- A small graveyard containing at least five presumably modern graves is located near the south eastern boundary of the study area. The graves are unkept and barely visible. One of only two marked graves date back to 1985.
- The graveyard is considered of high to medium heritage significance and assigned the rating of Generally Protected A (GP.A).
- No Iron Age archaeological remains were located during the baseline study.
- There are also no indications of rock art, prehistoric structures or with the exception of the small graveyard, historical buildings older than 60 years within the vicinity of the study area.
- The terrain is regarded as of low archaeological significance.

Recommendations:

- The graveyards area is to be avoided entirely and a graveyard management plan included in the overall management plan for the project or alternatively, the destruction and removal of the burial grounds and graves permit applications should be directed to the SAHRA Burial Grounds and Graves (BGG) Unit.

- Preservation of the site will require that the area is properly demarcated and fenced off with at least a 20m buffer / no-go zone placed around the graveyard.

5.3.3 Traffic Impact Study

Aim of this study is to determine the traffic impact of the proposed development. Please refer to complete report in **Annexure I.**

Specialists: KMA Consulting Engineers
Mr K Marais
P.O. Box 52054
BLOEMFONTEIN
9330

Findings:

- The development is expected to generate 438 new trips during the peak hours.
- All analysed intersections are expected to continue to operate at acceptable levels of service, with the exception of the Baartman Street / Paul Laesecke Avenue intersection, which should be changed to a traffic circle and the La Provence Road / Kwagga Street intersection where the traffic control has to be changed.
- The site development plan, with consideration of the aspects discussed in the specialists report (refer to **Annexure I),** is acceptable from a traffic point of view.

Recommendations:

- All analysed intersections are expected to continue to operate at acceptable levels of service, with the exception of the Baartman Street / Paul Laesecke Avenue intersection, which should be changed to a traffic circle and the La Provence Road / Kwagga Street intersection where the traffic control has to be changed.

5.3.4 Bulk Electrical Services Report

The aim of this services report is to investigate the electrical supply to the proposed development. Please refer to complete report in **Annexure J.**

Specialists: BVI Engineering Procurement Management
Mr S Venter
P.O. Box 12441
BLOEMFONTEIN
9324

Findings:

- The developer will install the complete electrical distribution on his costs and will hand over the network to the Dihlabeng Local Municipality for future maintenance.

Recommendations:

- Where possible trenches will be shared with the civil works to limit expenditure and impact.

5.3.5 Bulk Civil Services Report

The aim of this report is to establish design criteria, to evaluate and quantify the availability of existing services, to design internal services and to evaluate geotechnical services. Please refer to complete report in **Annexure K.**

Specialists: Leganton Engineering
Mr R Nothnagel
91 La Provence Road
BETHLEHEM
9700

Findings:

- The water treatment works and the sewer purification works have sufficient capacity for the proposed development.

- The municipal sewage treatment plant has a design capacity of 25.6 ML/day, when fully operational, while the average daily sewage flow is presently 18 ML/day, leaving a spare capacity of 7.2 ML/day.
- The outfall sewers from Ribbok Street as well as La Provence Road capacities were assesseds and were found to be adequate to cater for this additional flow from Wesselsheim.
- A shortage of reservoir storage for the total water demand in Bethlehem exists. A new reservoir will be constructed, should the development be approved (refer to recommendations for details).
- The municipal solid waste site was designed for a life expectancy of 20 years and was only put into operation five years ago, therefore there should be enough capacity to cater for the expected waste from this relative small development.
- All municipal services will be provided by the developer. These services will be handed over to the council upon the expiry of the retention period for every stage.
- Storm water will be collected on street level, where possible and will be directed to the dam.

Recommendations:

- The developer is prepared to make a contribution towards the construction of an economical size reservoir if the council have plans to build it in the near future. However, the developer is keeping options open to build a reservoir to satisfy the needs of Wesselsheim only.
- The proposed implementation of a TRASH TRAP devise at the discharge ends of the pipes and the street level outlets for discharging storm water into Loch Athlone. Refer to Annexure P.
- Pollutants such as soluble matter should be traced by physical inspections and prevented from entering the storm water system.

5.3.6 Geotechnical Report

A Geotechnical Investigation was undertaken with regard to recommendations for the proposed establishment for building and other structures. For the complete report, refer to **Annexure L**.

Specialists: **Mostert, Van den Berg & De Leeuw Consulting Civil and Structural Engineers**
Mr. J Steyn
P.O. Box 1634
BETHLEHEM
9700

Findings:

- The area is similar to the greater area of Bethlehem with regards to geotechnical characteristics.

Recommendations:

- Specific building recommendations are made with regards to foundations and walls. Please refer to **Annexure L** for complete report.

6. IMPACT ASSESSMENT

6.1 METHODOLOGY

Impact assessment must take into account the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages from planning, through construction and operation to the decommissioning phase. Where necessary, the proposal for mitigation or optimisation of an impact is noted. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

A rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 4: Criteria for the classification of an impact.

Nature	A brief description of the environmental aspect being impacted upon by a particular action or activity is presented.
Extent (Scale)	Considering the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. Site: Within the construction site. Local: Within a radius of 2 km of the construction site. Regional: Provincial (and parts of neighbouring provinces). National: The whole of South Africa.
Duration	Indicates what the lifetime of the impact will be. Short-term: The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase.

	Medium-term: The impact will last for the period of the construction phase, where after it will be entirely negated. Long-term: The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. Permanent: The only class of impact which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.
Intensity	Describes whether an impact is destructive or benign. Low: Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected. Medium: Effected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way. High: Natural, cultural and social functions and processes are altered to extent that they temporarily cease. Very high: Natural, cultural and social functions and processes are altered to extent that they permanently cease.
Probability	Describes the likelihood of an impact actually occurring. Improbable: Likelihood of the impact materializing is very low. Possible: The impact may occur. Highly probable: Most likely that the impact will occur. Definite: Impact will certainly occur.
Significance	Significance is determined through a synthesis of impact characteristics. It is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. Low impact: No permanent impact of significance. Mitigation measures are feasible and are

		readily instituted as part of a standing design, construction or operating procedure.
	Medium impact:	Mitigation is possible with additional design and construction inputs.
	High impact:	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
	Very high impact:	The design of the site may be affected. Intensive remediation as needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area. Positive (+): Beneficial impact. Negative (-): Deleterious or adverse impact. Neutral: Impact is neither beneficial nor adverse. It is important to note that the status of an impact is assigned based on the *status quo* – i.e. should the project not proceed. Therefore not all negative impacts are equally significant.	
Reversibility	Describes whether the impact is reversible or irreversible.	

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented.

6.2 CUMULATIVE IMPACTS

Cumulative impacts refer to impacts on the environment, which result from the incremental impact of the actions when added to other past, present and reasonably foreseeable future actions. These impacts can result from individually minor but collectively significant actions or activities over a period of time. The effect of these impacts can take place so frequently in time that it is higher than the absorptive capacity of the environment.

6.3 ASPECTS OF POTENTIAL IMPACTS

Developments such as these do have, like many other types of developments, various direct but also indirect impacts on the environment. These impacts have to be managed in order to have the minimum environmental impact and the maximum benefit to man.

Issues identified during the Scoping process are discussed and assessed below:

6.3.1 VEGETATION

6.3.1.1 VEGETATION LOSS

Nature		
An ecological assessment has been undertaken to assess the sensitivity of the natural vegetation on the site, whether protected or endangered plant and animal species are present and make recommendations regarding conservation of the vegetation type, if necessary, or removal of protected plants. The vegetation on the site consists of Eastern Free State Sandy Grassland (Gm 4), but was ploughed in the past and is currently not a good representation of this vegetation type. There is conservational importance in the form of a bulbous species. Refer to **Annexure G** for the Report or Section 4.4.1 for the findings thereof.		
Cumulative impacts		
Soil erosion and alien invasion may all lead to additional loss of habitat that will exacerbate this impact.		
Residual impacts		
• Loss of vegetation. • Infestation of exotic weeds. • Habitat loss.		
	Without mitigation	**With mitigation**
Extent	Site	Site
Duration	Permanent	Permanent
Intensity	Medium	Medium
Probability	Definite	Definite
Significance	Low	Low
Status (+ or -)	Negative	Negative
Reversibility	Irreversible	Irreversible
Mitigation		
Planning phase: • The storm water system of the development should be such that it minimises the likelihood		

of pollution of Loch Athlone.

Construction phase:

- The exotic Bluegum woodlot are seen as exotic and should preferably be removed as they do not form part of the natural vegetation and do not contribute to aesthetics or the natural ecosystem. The species are listed as a category 2 invader.
- The storm water system of the development should be such that it minimises the likelihood of pollution of Loch Athlone.
- After construction has ceased all construction materials should be removed from the area.

Operational phase:

- TRASH TRAP devices are proposed at the discharge ends of the pipes and the street level outlets for discharging storm water into Loch Athlone.
- Soluble matter should be traced by physical inspections and prevented from entering the storm water system.
- Recreation must be restricted within the stream as this will lead to progressive degradation of the stream. Walkways and foot- or road bridges should be kept to a minimum over this stream and should be designed to allow adequate flow of the stream and should not cause erosion.

6.3.1.2 LOSS OF BULBOUS SPECIES

Nature
An ecological assessment has been undertaken to assess the sensitivity of the natural vegetation on the site, whether protected or endangered plant and animal species are present and make recommendations regarding conservation of the vegetation type, if necessary, or removal of protected plants. There is conservational importance in the form of a bulbous species. Refer to **Annexure G** for the Report or Section 4.4.1 for the findings thereof.
Cumulative impacts
Soil erosion and alien invasion may all lead to additional loss of habitat that will exacerbate this impact.
Residual impacts
• Loss of protected bulbous species.

	Without mitigation	**With mitigation**
Extent	Site	Site
Duration	Permanent	Short term
Intensity	Medium	Low
Probability	Definite	Improbable
Significance	Medium	Low
Status (+ or -)	Negative	Negative
Reversibility	Irreversible	Reversible

Mitigation
Planning phase: • It is recommended that the bulbous Gladiolus species are conserved by means of the following: i. Obtaining permits to conduct a search and rescue operation. ii. It is recommended that the species be transplanted to an area on-site where they will not be affected, preferable an open space area. iii. The species transplants easily and has attractive flowers and would therefore contribute to the aesthetics of the development. iv. Weeds on the transplanted area must be removed on a continuous basis. v. The search and rescue operation and transplantation should be led by a qualified ecologist. Construction phase: • It is recommended that the bulbous species are conserved: i. The species transplants easily and has attractive flowers and would therefore contribute to the aesthetics of the development. ii. Weeds on the transplanted area must be removed on a continuous basis Operational phase: • It is recommended that the bulbous species are conserved: i. Recreation on the transplanted site must be restricted in order for the species to remain undisturbed. ii. The species transplants easily and has attractive flowers and would therefore contribute to the aesthetics of the development. iii. Weeds on the transplanted area must be removed on a continuous basis.

6.3.2 FAUNA

Nature		
According to the Floristic and Ecological Assessment (**Annexure G)** no mammal species could be identified on the site, there were also no burrows or other signs of abundant mammal population activities. It is still likely that mammal species occur on the site, but it is unlikely that species of concern would occur, due to its proximity to high density residential areas.		
Cumulative impacts		
The cumulative impact of the destruction of habitat is low as the degraded area sustains low diversity and there is space for fauna to vacate to.		
Residual impacts		
• Killing / injuring animals.		
	Without mitigation	**With mitigation**
Extent	Site	Site
Duration	Permanent	Permanent
Intensity	Medium	Low

Probability	Improbable	Improbable
Significance	Medium	Low
Status (+ or -)	Negative	Negative
Reversibility	Irreversible	Irreversible
Mitigation		

Planning phase:

- None

Construction phase:

- No hunting, hunting or capturing of any of the animals on the site must be allowed.

Operational phase:

- None

6.3.3 IMPACT ON WATER SOURCES

Nature		
The artificial Loch Athlone Dam and the small seasonal stream are both considered sensitive. The contamination of ground or surface water is of high importance as this can be very detrimental to the environment.		
Cumulative impacts		
By contaminating any water source can pollute other water sources downstream. The combined pollution can cumulatively impact humans, animals and vegetation in other water sources.		
Residual impacts		
• Killing / harming of aquatic animals. • Damaging riparian vegetation. • Polluting valuable water sources.		
	Without mitigation	**With mitigation**
Extent	Regional	Local
Duration	Permanent	Short term
Intensity	Very high	Medium
Probability	Highly probable	Possible
Significance	High	Low
Status (+ or -)	Negative	Negative
Reversibility	Irreversible	Irreversible
Mitigation		

Planning phase:

- No development will take place within 32 m of the water courses.
- No development will take place within the 1:100 year flood line.
- Storm water system of the development should be such that it minimizes the likelihood of pollution of Loch Athlone.

Construction phase:

- No development will take place within 32 m of the water courses.
- No development will take place within the 1:100 year flood line.

Operational phase:

- Recreation must be restricted within the stream as this will lead to progressive degradation of the stream.
- Walkways and foot- or road bridges should be kept to a minimum over the stream and should be designed to allow adequate flow of the stream and should not cause erosion.
- TRASH TRAP devices are proposed at the discharge ends of the pipes and the street level outlets for discharging storm water into Loch Athlone.
- Soluble matter should be traced by physical inspections and prevented from entering the storm water system.

6.3.4 VISUAL IMPACT

The visual impact of the proposed development in the landscape is the function of several factors of which the viewing distance, visual absorption capacity and landform are measurable. Other factors are difficult to categorize because they are subjective viewpoints.

The visual impact for the proposed development is largely due to:

- The topography in terms of elevation and aspect.
- The vegetative cover in terms of its extent and height.
- The extent of the proposed development.
- Distance from point of origin.
- The low visual absorption capacity of the surrounding landscape.

6.3.4.1 Factors of visual impact

Visual character:

The visual character of an area has different elements that provide an overall perceived ambience. In the consideration of the visual character of a site, it is important to include not only the internal land use but that of the surrounding land as well.

Scale of landscape:

Visual scale is the apparent size relationships between landscape components and their surroundings (Smardon, *et al.* 1986).

The topography consists of a gradual slope towards the dam (east to west).

Visual analysis:

In this section the intensity of the visual impact of the development on the surrounding area is described. Aspects such as viewshed, visual absorption capacity and the appearance of the development from critical viewpoints will be used to determine this impact.

6.3.4.2 Site evaluation in terms of visual impact

Visual assessment ratings (Table 5) rates each criterion listed in the table from, high, medium to low according to specific characteristics of those criteria.

Table 5: Criteria used to determine the degree of visual impact of the proposed activities on the environment (adapted from Klapwijk 1998)

NO	CRITERIA	HIGH	MEDIUM	LOW
1	**Visibility**	Very visible from many places beyond 1km	Visible from within 1km zone but partially obscured by intervening objects	Only partially visible within the 1km zone and beyond due to screening by intervening objects
2	**Visual quality**	A very attractive setting	A setting with some aesthetic and visual merit	A setting which has little aesthetic merit
3	**Visible man-made structures**	Buildings as a dominant visual element	Buildings as a partial visual element	Buildings as a minor visual element
4	**Surrounding landscape compatibility**	Cannot accommodate proposed development without appearing totally out of place.	Can accommodate the proposed development without appearing totally out of place	Usually suits or matches the proposed development

5	**Character of site or surrounding area**	Exhibits a definite character	Exhibits some character	Little or no character
6	**Contrast between human scale and vertical & horizontal elements in the landscape**	There is high contrast	Landscape with some contrast	Limited vertical variation. Most elements are related to human and horizontal scale
7	**Visual absorption capacity (VAC)**	Inability of landscape to visually absorb a development because of a limited vegetation cover, flat slope and uniform texture	The lower ability of the landscape to visually absorb the development due to less diverse landform, vegetation & texture	The ability of landscape to easily accept visually a particular development because of its diverse landform, vegetation and texture
8	**View distance (uninterrupted)**	More than 5km	Between 5km & 1km	Between 1km & 500m
9	**Critical views**	Views of the development are to be seen by many people passing on road routes and from prominent areas	Some views of the development from surrounding routes and housing	Limited views to the development from roads and housing

6.3.4.3 Results and conclusions on visual impact of development assessment

No	Aspect	Result
1	Visibility	HIGH
2	Visual quality	HIGH
3	Visible man-made structures	MEDIUM
4	Surrounding landscape compatibility	MEDIUM
5	Character of site or surrounding area	MEDIUM
6	Contrast between human scale and vertical & horizontal elements in the landscape	MEDIUM
7	Visual absorption capacity (VAC)	MEDIUM
8	View distance (uninterrupted)	MEDIUM
9	Critical views	MEDIUM

The proposed development will have a medium visual impact. This is largely due to:

- The extent of the development

- The surrounding agricultural area and the nearby residential area
- Distance from roads and the existing town
- The medium visual absorption capacity of the surrounding landscape.

6.3.4.3 Results and conclusions on visual impact of development Assessment

Nature		
The visual impact of the proposed development in the landscape is the function of several factors of which the viewing distance, visual absorption capacity and landform are measurable. Other factors are difficult to categorize because they are subjective viewpoints. The visual impact for the proposed development is largely due to: • The topography in terms of elevation and aspect. • The vegetative cover in terms of its extent and height. • The extent of the proposed development. • Distance from point of origin. • The low visual absorption capacity of the surrounding landscape.		
Cumulative impacts		
Not applicable.		
Residual impacts		
• Aesthetically unattractive.		
	Without mitigation	**With mitigation**
Extent	Local	Local
Duration	Permanent	Long-term
Intensity	High	Medium
Probability	Definite	Definite
Significance	High	Medium
Status (+ or -)	Negative	Negative
Reversibility	Irreversible	Irreversible
Mitigation		
Planning phase: • None Construction phase: • Keep construction site tidy, as an untidy site would cause a negative visual impact. • Ensure control measures over the contractor's plant and material storage area. • The use of floodlights to illuminate construction sites must be limited. • All floodlights must be installed in such a way that the light and glare does not increase light pollution.		

Operational phase:

- Area should be kept clean and tidy.

6.3.5 HERITAGE

Nature		
No above-ground evidence of residential building structures, material of cultural significance or intact archaeological sites was found within the demarcated area. A small graveyard was however found. Refer to **Annexure H** for the complete Phase 1 Heritage Impact Assessment.		
Cumulative impacts		
Not applicable.		
Residual impacts		
Not applicable.		
	Without mitigation	**With mitigation**
Extent	Site	Site
Duration	Permanent	Permanent
Intensity	Medium	Medium
Probability	Definite	Definite
Significance	Medium	Medium
Status (+ or -)	Negative	Neutral
Reversibility	Irreversible	Irreversible

Mitigation

Planning phase:

- The identified burial grounds and graves will be protected.
- The graveyard area will be avoided and a graveyard management plan included as part of the overall management plan for the project.
- Preservation of the graveyard site will require that the area is properly demarcated and fenced off with at least a 20m buffer / no go zone placed around it.

Construction phase:

- If any archaeological, heritage or palaeontological finds, graves or skeletal material are unearthed, work must be halted in that area and notify the EO, ECO and SAHRA. Work can only resume with permission from SAHRA.
- The graveyard area will be avoided and a graveyard management plan included as part of the overall management plan for the project.
- Preservation of the graveyard site will require that the area is properly demarcated and fenced off with at least a 20m buffer / no go zone placed around it.

Operational phase:

- If any archaeological, heritage or palaeontological finds, graves or skeletal material are unearthed, work must be halted in that area and notify the EO, ECO and SAHRA. Work can only resume with permission from SAHRA.
- The graveyard area will be avoided and a graveyard management plan included as part of

the overall management plan for the project.

- Preservation of the graveyard site will require that the area is properly demarcated and fenced off with at least a 20m buffer / no go zone placed around it.

7. ENVIRONMENTAL IMPACT STATEMENT

7.1 SUMMARY OF THE KEY FINDINGS OF THE EIA

The results of the draft EIA report indicate that:

- The aim is to establish a high value, medium density residential development in close proximity to the city and a natural environment.
- Work opportunities will be created during the construction and operational phase of the activity.
- The need for housing will be met.
- The bulbous vegetation species is protected and a search and rescue operation will have to be undertaken with an ecologist to translocate these species.
- The graveyard will have to be conserved by removing the area (including a buffer zone) from the development.
- It is of high importance that a storm water management plan form part of the overall management plan to ensure the conservation of Loch Athlone and the small seasonal stream. TRASH TRAP devices are proposed at the discharge ends of the pipes and the street level outlets for discharging storm water into Loch Athlone. Soluble matter should be traced by physical inspections and prevented from entering the storm water sytem.
- Recreation in / near the stream should be kept to a minimum.
- Recreation where the bulbous vegetation species are replanted should be kept to a minimum.

7.2 COMPARATIVE ASSESSMENT OF THE PROPOSED ACTIVITY AND ALTERNATIVES

The following table compares the negative and positive impacts of the proposed development.

Table 6: Positive and negative implications of the proposed activity

POSITIVE IMPLICATIONS	NEGATIVE IMPLICATIONS
• Socio-economic benefits in terms of housing and infrastructure. • Creating employment opportunities.	• Natural vegetation in the development footprint area will be destroyed. • If not mitigated water sources can be contaminated.

	• Will have a visual impact. • Bulbous vegetation species must be protected and conserved. • Loch Athlone and small seasonal stream must be protected and conserved. • Grave sites will be conserved and outlined in the layout plan.

7.3 ASSUMPTIONS AND LIMITATIONS

7.3.1 Assumptions

The information obtained from all different sources was correct and valid at the time it was provided. The consultants do not accept responsibility in the event that additional information came to light at a later stage of the process.

7.3.2 Limitations

In terms of specialist studies, limiting factors included:

- For the Floristic and Ecological Assessment, some of the bulbous and herbaceous species may have finished flowering or has not yet flowered and may have been overlooked or not identifiable. Some animal species may not have been observed as a result of their nocturnal and / or shy habits. Refer to **Annexure G** for the complete Floristic and Ecological Assessment.

7.4 SHOULD THE PROPOSED ACTIVITY BE AUTHORISED

The current demand for this type of housing developments on the fringe of town, the developers presented the concept to suspecting buyers. The need for the proposed development has therefore been proven by a preview launch in Bethlehem.

The relevant site is ideally situated to accommodate the proposed development as it is located adjacent to the La Provence residential development in the area. The township development will not have a negative impact on the surrounding land uses, but will rather fulfil in a need for housing that exists and simultaneously compliment the non-residential uses.

The fact that the area was cultivated previously resulted in the vegetation to not be pristine and since ploughing took place a long time ago and the vegetation still hasn't returned to the original vegetation type makes the impact on vegetation less intense. The protected bulbous species on site has to be translocated and the graveyards either relocated or removed from the development.

In light of the above and in the view of the environmental assessment practitioner, the information contained in this report and the documentation attached hereto is sufficient to make a decision in respect of the activity applied for.

7.5 CONDITIONS THAT SHOULD BE MADE IN RESPECT OF THE AUTHORISATION

The following is a list of 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:

- It is recommended that the mitigation measures, suggested in this report for the planning, construction and operational phases be incorporated in the Environmental Authorisation, should this development receive authorisation to go ahead. Specific recommended mitigation measures are listed in Table 7.

Table 7: A summary of the specific recommended mitigation measures for the planned development.

RECOMMENDATION	MITIGATION MEASURES
Conservation of plant species.	Protected bulbous species should be translocated and conserved.
Erosion control.	Refer to draft Environmental Management Plan (**Annexure M**) for erosion control recommendations.
Conserve water sources.	Ensure Storm Water Management Plan forms part of the overall Management Plan to protect the Loch Athlone Dam (TRASH TRAP devices and the

	prevention of soluble matter entering the storm water system). Minimal recreation and invasion on dam and small seasonal stream.
Protection of heritage.	Grave sites will be conserved and outlined in the layout plan.

- An Environmental Management Programme (EMPr) is required for the activity to minimize any negative impacts during the different phases of the development, especially the construction phase. The EMPr contains guidelines and recommendations for minimizing the impacts identified during the EIA as well as address the rehabilitation of disturbed areas. A Draft EMPr is included in **Annexure M** of this report.

8. LITERATURE

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