MADIBENG
LOCAL MUNICIPALITY

Memorandum

Proposed township
Mooinooi Extension 13

on

the Remaining Extent of Portion 1 and Portion 34 (a portion of Portion 7) of the farm Elandsdrift No. 467-JQ

Prepared for:	Prepared by:
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1. INTRODUCTION

Informal settlements remain eyesores across major cities in South Africa. They consist of non-conventional housing built without complying with legal building procedures. These settlements are usually built at the edge of the cities where land is cheap and neglected. However, these informal settlements are often better located than the housing developments to which the government seeks to relocate them. The urban poor usually use salvaged materials like wood, tins, corrugated iron and others to build these settlements. Broadly, these crude dwellings mostly lack proper indoor infrastructures, such as water supply, sanitation, drainage, waste disposal and proper road access. Urban households regularly live in these awful conditions which increased the spread of contagious diseases. The result of the rapid urban growth and lack of supplemented investments in services, mainly in the indigents' areas has given rise to an increase in the number of households living in informal settlements without suitable infrastructures.

There is also a bond between poor housing and environmental conditions in informal settlements which also reflect poverty. Linking basic services such as water to health is viewed as a false separation as these services are 'intimately related to housing'. It becomes a housing issue if children playing outside the house contract diarrhoea via ingesting pathogens from fecal matter which contaminates the land on which they play. Otherwise, it is the house which provides for shelter against injury, weather and disease. Improving the surroundings of the house is to limit severe health risks existing within poor quality housing.

The awful state of informal settlements in South African is often multiplied by constraints of land costs suitable for housing the urban poor and low-income groups. Indeed, the lack of land and housing causes many urban poor including migrants to build their own houses in informal settlements, just to solve the housing problems by themselves.

Informal settlements are described as illegal and spontaneous shantytowns lacking decent services and infrastructure. These settlements are characterized by illegality and informality, environmental hazards, poverty and vulnerability, social stress and others**.** Informal settlements provide housing for the urban poor in South African cities and towns.

One of the South African Government's greatest challenges stems from the fact that informal settlements continue to grow faster than the rate of low-income housing delivery. The need therefore, for in-situ informal settlement upgrade is paramount. National Development Outcome 8 mandates an ambitious target of improving the quality of life of 400 000 households by 2014 by upgrading informal settlements in well-located areas. The National Upgrading Support Programme (NUSP) was created by the National Department of Human Settlements (NDHS) to provide assistance to provinces and municipalities in their efforts to upgrade informal settlements. The HDA is an important partner in providing technical support or upgrading under the coordination of the NUSP.

The Upgrading Informal Settlements Programme (UISP) and urban Settlements Development Grant (USDG) administered by the NDHS, are the primary policy and grant instruments used to meet national targets. Municipalities are required to act as developers for the UISP and the NUSP provides support, in partnership with the province and the NDHS, to help them to do so effectively.

The three pillars of the UISP are basic services (including water and sanitation), security of tenure and community empowerment. Most municipalities have the capacity to provide basic services but

fewer have looked to alternative means of security of tenure other than the orthodox approach of freehold. Fewer still effectively undertake community empowerment as required by the National Housing Code. On this third issue the NUSP provides technical assistance for municipalities to undertake planning in conjunction with communities. It also has a capacity building programme which aims to assist municipal and provincial officials to understand and meet the range of needs for informal settlement upgrade. The NUSP also provides support to municipalities in project development and to implement more integrated planning.

NUSP will support 49 priority municipalities with their informal settlement upgrading plans. Ultimately, the goal of the NUSP is to strengthen the capacity of institutions involved in the upgrade of informal settlements which, in turn, will help meet the Outcome 8 target of assisting 400 000 household by 2014.

It is against the fore-mentioned background that Maxim Planning Solutions (Pty) Ltd was appointed by the Department of Human Settlements, Public Safety & Liaison on 05 March 2012 to investigate the feasibility in respect of the establishment of a township on the Remaining Extent of Portion 1 and Portion 34 (a portion of Portion 7) of the farm Elandsdrift No. 467-JQ in order to eradicate the existing informal settlement referred to as the Mamba Informal Settlement. The fore-mentioned feasibility study formed part of the program of the Department of Human Settlements, Public Safety & Liaison to eradicate informal settlements by 2014. By June 2011, the formalisation of 206 informal settlements had been completed. Of the 2 700 informal settlements countrywide, 1 100 had been identified for upgrading and a further 335 targeted for formalisation. Cabinet approved the Comprehensive Housing plan (CHP) for the Development of Integrated Sustainable Human Settlements (Breaking New Ground [BNG]) that aims, among others, to eradicate informal settlements in South Africa in the shortest possible time.

The BNG incorporates principles such as the:

- Integration of subsidizes, rental and bonded housing;
- Provision of engineering services at a higher level than many other townships, and applied consistently throughout the township; and
- Provision of ancillary facilities such as schools, clinics and commercial opportunities.

As part of the CHP, government provides a house with two bedroom, a separate bathroom with a toilet, shower and handbasin, a combined living area and kitchen with a washbasin and a ready board electrical installation where electricity supply is available in the township, to qualifying households earning less than R3 500 a month.

The feasibility study set out key inputs that need to be addressed to illustrate the residential development potential of a certain area of land taking into account the Environmental issues, Madibeng Housing Sector Plan, Spatial guidelines as well as provision of services.

The methodology employed for the preparation of the feasibility study consisted of a logical sequence of activities.

This included:

a. A study of all relevant strategic policies and guidelines and the guidelines pertaining to the provision of housing. This includes the following:

- Constitution of the Republic of South Africa, 1996 (Act 108 of 1996).
- Development Facilitation Act, 1995 (Act 65 of 1995)
- Desired Development Concept and Spatial Goals as determined by the North West Province:2011
- Madibeng Spatial Development Framework Plan 2000 – 2007
- Madibeng Housing Sector Plan : 2008

b. A study of the physical factors of the land applicable. The studies conducted include:
   - Civil Engineering Report
   - Electrical Engineering Report
   - Traffic Impact Study
   - Geological Study
   - Archaeological Impact Assessment.
   - Topographical Survey
   - 1:100 Year Floodline

All the activities were conducted to determine the feasibility and development potential in respect of the utilization of the subject properties for the purposes of establishing a residential township area as well as the identification of possible constraints in developing the said township area.

The results of the various studies conducted during the feasibility study phase of the project will be discussed in detail in the relevant sections of this report. The feasibility study made the following recommendations:

" It is recommended that, in order to address the existing backlogs and increasing demand for housing, the Remaining Extent of Portion 1 and Portion 34 (a portion of Potion 7) of the farm Elandsdrift No.467-JQ be utilized for human settlement purposes in accordance with the Notarial Deed of Agreement entered into between the National Department of Land Affairs of the Republic of South Africa and the Madibeng Local Municipality and set out in further details in Notarial Agreement K4374/2009.

Township establishment could take place based on the following:

- *That bulk engineering services could be obtained from Mooinooi (water and sewer), but upgrading will be required.*
- *The electricity might be available from Eskom as the Mooinooi 88/11kV substation, located 1.8km north-east of the proposed development was recently upgraded and adequate spare capacity exists to accommodate the proposed development. The Elandsdrift substation is currently operating at demand beyond its safe capacity of 10MVA, and upgrades of transformers will be necessary irrespective of whether this development continues or not.*
- *That access will be obtained from the existing "dirt road" which links to D314, which provides access to the N4.*
- *That the 1:100 year floodline be taking into consideration.*
- *That in the case where any archaeological and/or historical sites, features or artifacts are found during development, a qualified archaeologist be called to investigate.*
- *That, based on geotechnical findings, special foundation solutions will be needed as pointed out in the report.*

- *That the impact of possible mining activities is verified with the various mining groups - It is proposed that a meeting be scheduled between the Madibeng Local Municipality and Lonmin Mining Group to address outstanding matters as a matter of urgency.*
- *That an estimated 966 residential erven can be provided on the proposed development area (dependent on the factors mentioned in paragraph 6 "Development Potential" above)".*

The feasibility study was presented to the Project Steering Committee on 20 April 2012 and was approved by the fore-mentioned Committee. The study was also presented to the Department of Human Settlements, Pubic Safety and Liaison on 05 May 2012 and was also approved by the fore-mentioned Department.

Following approval of the feasibility study, Maxim Planning Solutions (Pty) Ltd (2002/017393/07) continued in accordance with our appointment by the Department of Human Settlements, Public Safety and Liaison with the establishment of a township, Mooinooi Extension 13 on the concerned properties.

The draft layout plan compiled in respect of the proposed township area of Mooinooi Extension 13 was presented to the Project Steering Committee on 14 September 2012. The Project Steering Committee proposed certain amendments to the layout plan and the amended layout plan was again presented to the Project Steering Committee on 01 November 2012 and was subsequently approved on 07 November 2012. The details in respect of the layout plan of the township area as well as the amendments effected during the layout planning phase will be discussed in detail in the relevant section.

Following approval of the layout plan of the proposed township area by the Project Steering Committee, Maxim Planning Solutions (Pty) Ltd set out to continue with the statutory township establishment process in accordance with the prescriptions of Chapter IV of the Town Planning and Townships Ordinance, 1986 (Ordinance 15 of 1986).

2. GENERAL BACKGROUND

2.1. LOCALITY

The proposed township area comprises the Remaining Extent of Portion 1 and Portion 34 (a portion of Portion 7) of the farm Elandsdrift No. 467-JQ. These properties are located approximately 3km north of Mooinooi between Wonderkop and Mooinooi as well as within existing mining activities. The properties are further located approximately 10km from Bapong and north of the N4 Platinum Freeway. The properties are located within the area of jurisdiction of the Madibeng Local Municipality which in turn comprises part of the Bojanala Platinum District Municipality area of jurisdiction.

The proposed township area is located adjacent and to the north and south of district road 108 and is intersected by the fore-mentioned road.

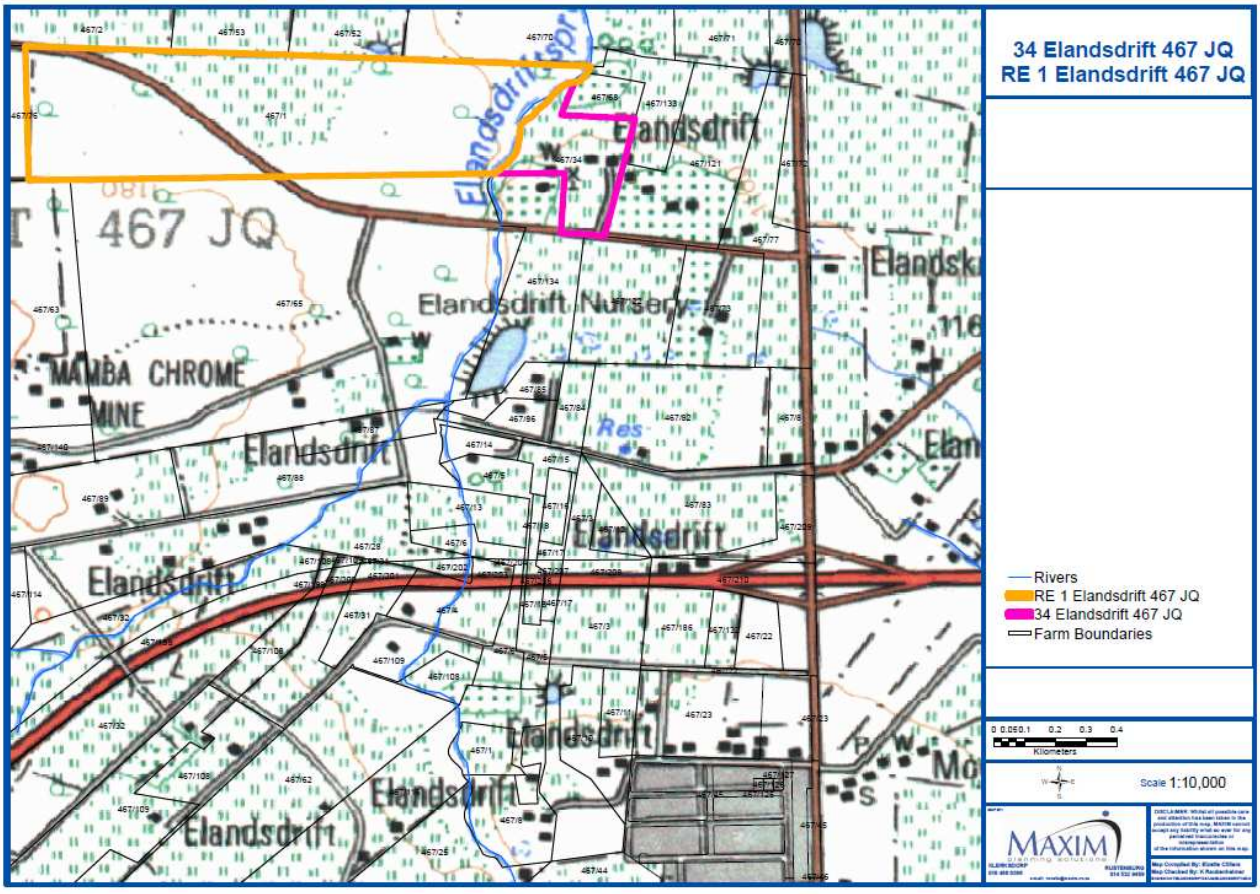


Plate 1: Topographical Map indicating locality of farm portions

The Remaining Extent of Portion 1 of the farm Elandsdrift No. 467-JQ is reflected on diagram S.G. No. A332/1891 (refer **Annexure D** to the application for township establishment). Portion 34 of the farm Elandsdrift No. 467-JQ is indicated on diagram S.G. No. A227/1935 (refer **Annexure D** to the application for township establishment).

2.2. PROPERTY DETAIL

The properties on which the proposed township is to be established are currently registered as follows:

PROPERTY DESCRIPTION	TITLE DEED	OWNER DETAILS	EXTENT
Remaining Extent of Portion 1 of the farm Elandsdrift No. 467-JQ	T61074/2009	Local Municipality of Madibeng	60,8547 hectares
Portion 34 (a portion of Portion 7) of the farm Elandsdrift No. 467-JQ	T61074/2009	Local Municipality of Madibeng	9,5779 hectares

(Refer Aktex Deeds Office Enquiry attached as **Annexure E** to the application for township establishment and Deed of Transfer T61074/2009 attached as **Annexure F** to the application for township establishment)

2.3. BONDHOLDER

The properties to which this township applies are currently not subject to a bond.

2.4. RESTRICTIVE TITLE DEED CONDITIONS

The Title Deed conditions contained in Deed of Transfer T61074/2009 will be addressed per individual land portion.

Remaining Extent of Portion 1 of the farm Elandsdrift No. 467-JQ
Conditions 1.A, 1.B and 1.C relate to certain water rights that the subject property is subject to as well as certain rights to water. In view of the fact that the Elandsdrift Spruit traverses the proposed development area, the area relating to the fore-mentioned spruit area will comprise part of the 1:100 year floodline area. The proposed development will therefore not impact on the flow of water along the Elandsdrift Spruit or the rights to water of properties located upstream or downstream of the Elandsdrift Spruit. As per normal practice relating to the establishment of township areas, any rights to water attaching to the subject properties will only be retained in terms of the farm portion but will not be transferred to the erven in the proposed township area.

In addition to the conditions contained in Deed of Transfer T61074/2009 relating to certain water rights as discussed above, the Remaining Extent of Portion 1 of the farm Elandsdrift No. 467-JQ is also subject to a servitude of right of way in favour of Portion 73 (a portion of Portion 68) and the Remaining Extent of Portion 68 of the farm Elandsdrift No. 467-JQ as indicated on diagram SG No. A6436/1954 and as registered in terms of Notarial Deed of Servitude K1438/1966S (refer condition 1.E as contained in Deed of Transfer T61074/2009 – **Annexure F** to the application for township establishment) (refer Servitude Diagram S.G. No. A6436/1954 – **Annexure D** to the application for township establishment). This servitude is located along the northern boundary of the subject property and will have to be accommodated in the layout pan of the proposed township area or suspended in terms of applicable legislation should it be found not to be in use anymore. Based on the aerial survey that was conducted in respect of the proposed development area, no evidence could be found that the servitude is still in use as no evidence of a road could be found. Based on the fore-mentioned this servitude of right of way will be cancelled in terms of the provisions of the Removal of Restrictions Act, 1967 (Act 84 of 1967) and will also be addressed as such in the Conditions of Establishment of the proposed township area.

The Remaining Extent of Portion 1 of the farm Elandsdrift No. 467-JQ is also subject to Notarial Deed of Agreement No. 4374/2009 dated 11 September 2009 whereby the National Department of Land Affairs of the Republic of South Africa imposed certain conditions pursuant to the acquisition of the property on behalf of the Madibeng Local Municipality for human settlement purposes. This notarial deed of agreement sets out the responsibilities of the various parties in respect of the development of the subject property in order to allow for the transfer of erven to the respective beneficiaries. The process of township establishment embarked on by the Madibeng Local Municipality aims at ensuring compliance with the conditions contained in the fore-mentioned Notarial Deed of Agreement (refer **Annexure H** attached to the application for township establishment for Notarial Deed of Agreement K4374/2009S).

Portion 34 (a portion of Portion 7) of the farm Elandsdrift No. 467-JQ
Conditions 1.A, 1.B, 1.C, and 1.D as contained in Deed of Transfer T61074/2009 relate to certain water rights that the subject property is subject to as well as certain rights to water. In view of the fact that the Elandsdrift Spruit traverses the proposed development area, the area relating to the fore-mentioned spruit area will comprise part of the 1:100 year floodline area. The proposed development will therefore not impact on the flow of water along the Elandsdrift Spruit or the rights to water of properties located upstream or downstream of the Elandsdrift Spruit. As per normal practice relating to the establishment of township areas, any rights to water attaching to the subject properties will only be retained in terms of the farm portion but will not be transferred to the erven in the proposed township area

In addition to the conditions contained in Deed of Transfer T61074/2009 relating to certain water rights, Portion 34 (a portion of Portion 7) of the farm Elandsdrift no. 467-JQ is also subject to Notarial Deed of Agreement No. 4374/2009 dated 11 September 2009 whereby the National Department of Land Affairs of the Republic of South Africa imposed certain conditions pursuant to the acquisition of the property on behalf of the Madibeng Local Municipality for human settlement purposes. This notarial deed of agreement sets out the responsibilities of the various parties in respect of the development of the subject property in order to allow for the transfer of erven to the respective beneficiaries. The process of township establishment embarked on by the Madibeng Local Municipality aims at ensuring compliance with the conditions contained in the fore-mentioned Notarial Deed of Agreement (refer **Annexure H** attached to the application for township establishment for Notarial Deed of Agreement K4374/2009S).

2.5. MINERAL RIGHTS HOLDER

The mineral rights are discussed per individual land portion:

Remaining Extent of Portion 1 of the farm Elandsdrift No 467-JQ
The rights to minerals in respect of the fore-mentioned property were reserved in favour of Grefchrome (Proprietary) Limited (1962/000439/07) by virtue of Notarial Cession of Mineral Rights No. 243/1962RM registered on 09 March 1962. These rights were subsequently ceded in favour of Samancor Chrome Limited (1970/003898/06) by virtue of Notarial Deed of Cession of Mineral Rights No. K1071/1993RM registered on 25 February 1993. Samancor Chrome Limited (1970/003898/06) subsequently ceded their rights to minerals to Samancor Limited (01/008883/06) by virtue of Notarial Deed of Cession of Mineral Rights K1072/1993RM similarly registered on 25 February 1993 (refer Notarial Deeds of Cession of Mineral Rights K1071/1993RM and K1072/1993RM – **Annexure I** attached to the application for township establishment).

Portion 34 of the farm Elandsdrift No 467-JQ

The rights to chrome in respect of the fore-mentioned property initially vested in the name of Michiel Andries Stephanus Pretorius (280221 5048 00 7). The chrome rights were subsequently ceded to Cromore Limited (1970/003898/06) by virtue of Notarial Cession of Chrome Rights K2175/1988RM registered on 22 July 1988. The fore-mentioned rights to chrome were subsequently ceded from Samancor Chrome Limited (1970/003898/06) to Samancor Limited (01/008883/06) by virtue of Notarial Cession of Chrome Rights K979/1993RM registered on 22 February 1993 (refer Notarial Deeds of Cession of Chrome Rights K2175/1988RM and K979/1993RM – **Annexure J** attached to the application for township establishment).

2.6. EXISTING ZONING

The current zoning of the subject properties is "Agriculture" in terms of the Peri Urban Areas Town Planning Scheme, 1975.

2.7. SURROUNDING ZONINGS AND LAND USE DEVELOPMENTS

The development area is surrounded by "Agricultural", "Mining" and "Formal Township" land use activities.

See Google photo inserted. Informal settlement also took place within the study area as shown on the pictures below (refer also to Aerial Survey results attached as **Annexure K** to the application for township establishment).

Plates 2 to 5: View of existing and surrounding informal residential structures

Plate 6: View of development area in relation to mining and Mooinooi urban area

The development area has to a large extent already been occupied by informal housing structures as well as a limited number of formal housing structures. This specifically applies to the central portion of the development area north of Road 108 and west of the Elandsdrift Spruit as is evident on the following aerial survey of the development area.

Plate 7: View of existing residential development

3. STRATEGIC GUIDELINES

3.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA, ACT No 108 OF 1996

In terms of Chapter 3 of the Constitution of the Republic of South Africa (Act No. 108 of 1996), the government is constituted as national, provincial and local spheres of government which are distinctive, interdependent and interrelated.

All spheres of government and all organs of state within each sphere must preserve:

- the peace, national unity and the indivisibility of the Republic;
- secure the well-being of the people of the Republic;
- provide effective, transparent, accountable and coherent government for the Republic as a whole;
- be loyal to the Constitution, the Republic and its people;
- respect the constitutional status, institutions, powers and functions of government in the other spheres;
- not assume any power or function except those conferred on them in terms of the Constitution;
- exercise their powers and perform their functions in a manner that does not encroach on the geographical, functional or institutional integrity of government in another sphere; and
- co-operate with one another in mutual trust and good faith by fostering friendly relations;
- assisting and supporting one another;
- informing one another of, and consulting one another on, matters of common interest;
- co-ordinating their actions and legislation with one another;
- adhering to agreed procedures; and
- avoiding legal proceedings against one another.

According to Chapter 2: Bill of Rights of the Constitution of the Republic of South Africa (Act 108 of 1996), in Section 24 it stipulates that “Everyone has the right

a. to an environment that is not harmful to their health or well-being; and
b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that
   i. prevent pollution and ecological degradation;
   ii. promote conservation; and
   iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

In Section 26 it stipulates the following with regard to housing:

- Everyone has the right to have access to adequate housing.
- The state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of this right.
- No one may be evicted from their home, or have their home demolished, without an order of court made after considering all the relevant circumstances. No legislation may permit arbitrary evictions.

Section 151 within Chapter 7 of the Constitution, states that developmental local government should make provision for a democratic and accountable government for communities. It also encourages

municipalities to ensure the provision of services to communities in a sustained manner in order to promote social and economic development. Local government must promote a safe and healthy environment and encourage community involvement in local government matters such as municipal transport, municipal health services, municipal roads, and municipal parks and recreation.

Section 152 of the Constitution says that local government should provide democratic and accountable government for local communities.

Section 153 of the Constitution states that each municipality should structure and manage its administration, budgeting, and planning processes to give priority to the basic needs of the community and to promote the social and economic development of the community. Municipalities should participate in national and provincial programmes and infrastructure development programmes.

Section 153 of the Constitution also encourages municipalities to involve communities in their affairs.

Taking the above-mentioned into account, it is clear that the Government from National level to Local level has a responsibility with regard to the provision in the basic needs of the people of South Africa which includes housing.

The Madibeng Local Municipality has taken the initiative to upgrade an informal settlement currently situated on portions the farm Elandsdrift No. 467-JQ north of Mooinooi as part of their contribution and responsibility to provide in the need for housing.

3.2 DEVELOPMENT FACILITATION ACT (ACT No. 65 OF 1995)

The Development Facilitation Act (DFA) has formalized the restructuring of urban settlements and planning in South Africa. The aim of the DFA has been to expedite land development projects and to promote efficient and integrated land development. It is aimed at concluding the Reconstruction and Development Planning (RDP) Programme and to a certain extent replaces the RDP. The Act contains general principles for land developments. It provides that the municipalities must prepare their Land Development Objectives (LDOs) on an annual basis.

All the regulations contained in the Development Facilitation Act, 1995 (Act 65 of 1995) contain provisions relating to public participation, creating room for communities to be involved in matters of land development in their areas. The LDOs deal with how people will gain access to basic services and the standard of the services. Since the inception of the Integrated Development Plans (IDPs), the land development objectives are addressed in the Spatial Development Framework (SDF), which could form part of the sector plans in the IDP.

Sections of the Act state that development initiatives are necessary for:

- Promoting integration in respect of social, economic, institutional and physical aspects of development;
- Promoting integrated development in rural and urban areas
- Promoting development of localities that are nearer to residential and employment opportunities;
- Optimizing the use of existing resources
- Discouraging urban sprawl and contributing to more compact cities and towns.

With regard to the farm Elandsdrift No. 467-JQ, it can be seen that the establishment of a township will adhere to the development initiatives as stipulated in the Development Facilitation Act (Act 65 of 1995) namely:

- Promoting of integration in respect of social, economic institutional and physical aspects of development;
- Promoting integrated development in rural and urban areas
- Promoting development of localities that are nearer to residential and employment opportunities; and
- Optimizing the use of existing resources

3.3 THE NORTH WEST PROVINCE SDF, 2011

The North West Provincial Spatial Development Framework provides clear guidelines for spatial development on a local municipal level. It divides geographical space into four types of intervention zones. These zones and guidelines are summarized in the table below:

SPATIAL STRUCTURING IMPLICATIONS	GUIDELINES FOR LOCAL SDF CONTENT
INTERVENTION ZONES	
Zone One: Main Economic Growth Areas for prioritized development spending **Purpose of Intervention Zone One:** **Strengthening and consolidating a hierarchy of nodes in terms of :** • Areas currently representing existing spatial concentrations of economic activity • Areas showing future potential for development expansion in terms of economic growth • Areas that play a supportive role to existing and future economic development areas. **Spatial Structuring Elements** At a District and Local Municipal level these areas indicate areas that will be prioritized in terms of development spending and investment	**Spatially indicate Intervention Zone One: Accelerating Growth and Development** • Areas of local significant economic activity • How do these areas manifest spatially • Economic growth vs. decline and spatial expansion • How do these areas interact with markets • Which areas need to be prioritized
Intervention Zone Two: Social Inclusion Areas representing areas for investment in people rather than in places: **Purpose of Intervention Zone Two:** Zone Two is Rural focused and promotes the concept of social inclusion by promoting and strengthening overlaps in economic activity and poverty to address high levels of spatial fragmentation and exclusion.	**Sharing Growth and Development** • Areas of economically marginalized communities • Accessibility between poor areas and economic activity areas • Socio economic profiles and the response in

Spatial Structuring Elements At a District and Local Municipal level these areas will be prioritized in terms of development spending and investment.	terms of public spending • How can economic inclusion be facilitated
Intervention Zone Three: Stimulating and kick starting New Potential Growth Nodes **Purpose of Intervention Zone Three:** Zone Three will identify and focus on the emergence of potential new nodes where spatial overlaps between areas of economic activity and areas of poverty occur. This implies focused investment in poverty concentrations that show potential for economic development in their spatial and socio-economic context. **Spatial Structuring Elements** At a District and Local Municipal level these areas indicate areas that will be prioritized in terms of development spending and investment.	**Stimulating and kick starting New Potential Growth Nodes** • Areas with high levels of poverty and high development potential should receive investment beyond basic services to exploit this potential. • Areas with high concentrations of people and high accessibility to markets and job opportunities • Focusing future settlement and economic development opportunities into activity corridors and nodes adjacent to, or linked to main growth centre's i.e.: ✓ Previously disadvantaged areas within existing urban areas ✓ Agriculturally orientated villages in areas of high agricultural potential ✓ Communities settled in potential game farming areas ✓ Communities situated in Tourism Corridors and Eco Tourism areas.
Intervention Zone Four: Environmentally Sensitive Zone. **Purpose of Intervention Zone Four:** Development Zone Four will largely concentrate on future sustainable development approaches in terms of sustainable development spending. This will be achieved by focusing on rectifying development imbalances relating to equitable access to basic services, the protection of the natural and cultural resources and spatial form that promotes greater efficiencies in land-use and service provision. Important Spatial Structuring Elements include:	**Sustainable Growth and Development** • What are the key environmental assets that need protection and promoted • Development threats to quality of life (Where do potential conflict zones occur between future development, current settlements and environmentally sensitive areas) in terms of the following: o Protected Areas o Terrestrial Critical Biodiversity Areas

• Identify priority(critical) biodiversity areas in the Province • Identify and prioritize areas for the creation of protected area networks that are representative of the Province and that are ecologically sustainable • Spatial analysis of land use pressures in relation to biodiversity; and • Identification of possible conflict zones(development vs. conservation and bio- diversity protection)	o Aquatic Critical Biodiversity Areas o Ecological support areas o Ecological corridors and nodes o Land use management guidelines that will apply

From the Macro Spatial Development Framework: Bojanala Platinum District Municipality, the following facts with regard to the farm Elandsdrift No. 467-JQ are summarised as follows:

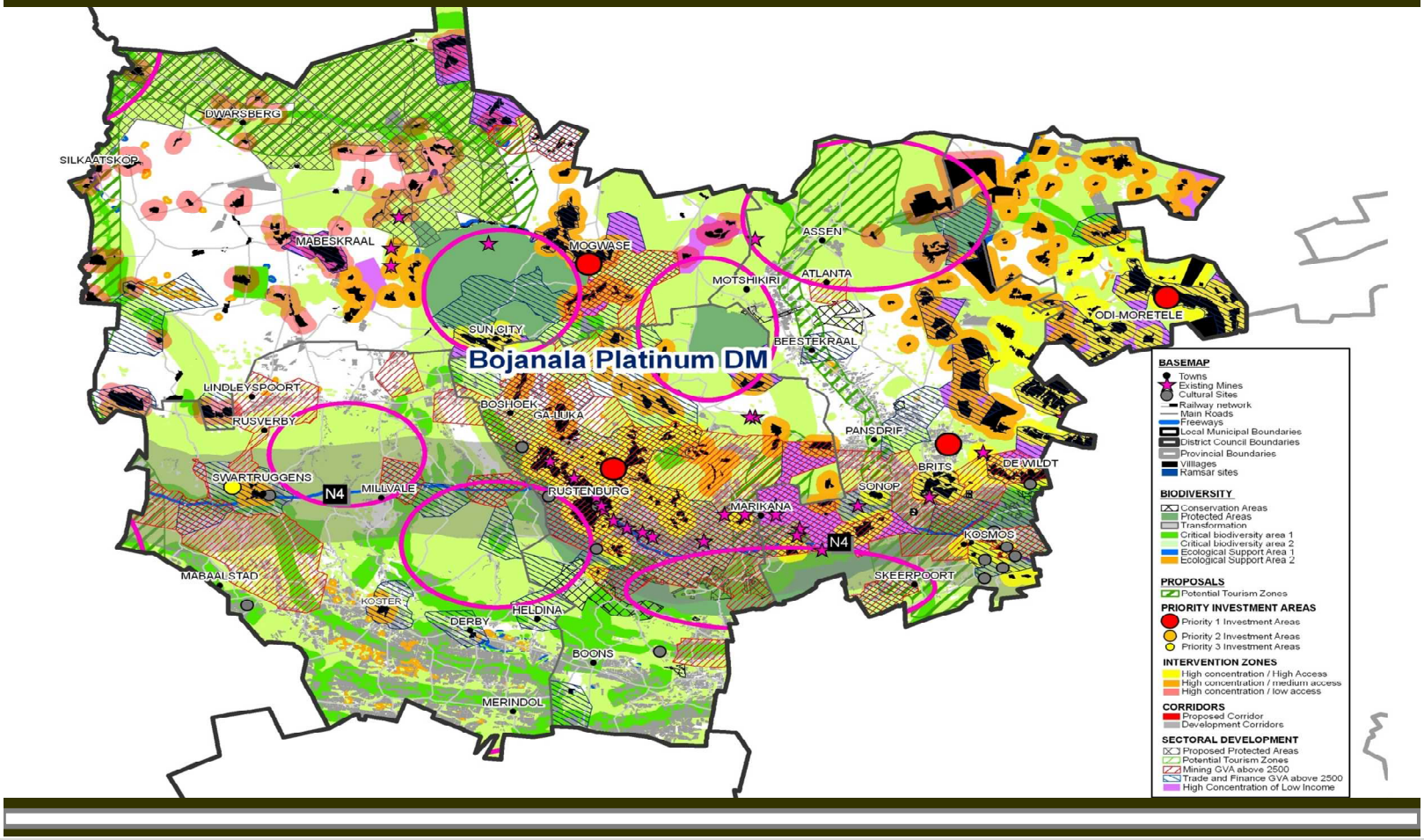
- The farm is located less than 3km north of the N4 Platinum Freeway.
- The farm is located near Mooinooi which according to the Intervention zone is located in an area earmarked as High Concentration/High Access to economical development.
- The farm is located in an area earmarked as a high concentration of Low income.
- The farm is located in the near vicinity of existing mines.
- The farm is located near the vicinity of a Priority 3 Investment Area (Mooinooi).

To conclude, the residential development on the farm Elandsdrift No. 467-JQ will adhere to the:

Intervention Zone Two: *Social Inclusion Areas representing areas for investment in people rather than in places: The purpose of Intervention Zone Two is to focus on rural development by promoting the concept of social inclusion and the strengthening in economic activity and poverty to address high levels of spatial fragmentation and exclusion.*

Intervention Zone Three: *Stimulating and kick starting New Potential Growth Nodes as indicated in the North West Spatial. The purpose of the Intervention Zone Three is to focus on the emergence of potential new nodes where spatial overlaps between areas of economic activity and areas of poverty occur. This implies focused investment in poverty concentrations that show potential for economic development in their spatial and socio-economic context.*

MACRO SPATIAL DEVELOPMENT FRAMEWORK



3.4 MADIBENG SPATIAL DEVELOPMENT FRAMEWORK PLAN: 2000-2007

3.4.1 RESIDENTIAL

Formal Residential
The core formal residential area in Madibeng is Brits/Oukasie. Brits/Oukasie encompasses various formal suburbs with specific land uses associated with it, such as schools, churches, townhouse complexes, local shopping centres, filling stations and libraries. Other formal residential areas of Madibeng include Letlhabile located north of Brits, and Mothutlung, located east of Brits.

Formal residential areas are also located around the Hartbeespoort Dam including Ifafi, Kosmos and Pecanwood and Schoemansville. These residential settlements around the Dam have the full range of land uses associated with residential areas.

The growth rate of formal settlement is in the order of 3%.

Informal Residential
The bulk of the Madibeng population live in informal settlements primarily located in the north-eastern quadrant of Madibeng. They include Maboloka, Jericho, Legonyana, Fafung, Makgabatloane, Shakung, Moiletswane, Madidi, Kgabalatsane and Hebron. These settlements are essentially extensions of the Winterveld – Temba- Garankuwa region and this fact is clearly seen by the access roads linking these settlements to this region.

Other significant informal settlements surround and are dependant of mines such as Bapong which is located north of the N4 freeway and approximately 10km from the farm Elandsdrift.

The relation between Residential and Regional land use is as follows:
Residential uses do not cover large land surfaces, although they are scattered over large areas, with informal settlements covering 4% of the land surface and formal residential areas only covering 1%.

The growth rate of informal settlements is in the order of 1,5%.

3.4.2 MINING

Mining is primarily found to the west of Brits, north of the N4 freeway. This area lies on the Merensky Reef, which stretches from the south of Brits westwards towards Rustenburg. The past few years have seen the opening of various new opencast mines in the region, some of which are located at very visible positions, which has a negative impact on the environment.

The relation between Mining and regional land use is as follows:
Mining covers close to 2% of the land surface and is also dispersed over a wide area.

In terms of the Madibeng Spatial Development Framework, the application site is located within the "Mining Corridor" that stretches from Bapong in the direction of Rustenburg along the N4 Platinum Freeway.

Current mining activities, as well as planned mining activities, will play an important role in the economic development of and employment creation in Madibeng. In this context, mining should be

supported through the development of the necessary infrastructure, especially along the Merensky Reef. However, one must always keep in mind that mining and the economic wealth it creates has a limited lifespan, as opposed to tourism and agriculture, which is perpetually sustainable. This means that although mining creates far more wealth over the short and medium term than other industries, it does not necessarily do so over the long term. On the other hand, the environmental effects of mining do have long-term implications, especially on industries such as tourism and agriculture.

3.4.3 PLATINUM TRANSPORTATION CORRIDOR

The Platinum Corridor must be considered as a primary development corridor due to its high-profile nature. From a land use point of view, one of the drawbacks of this corridor is its low level of accessibility. Due to the corridor road being a freeway, only limited number of intersections will be provided on the sections traversing Madibeng. For this reason, the Platinum Corridor is more a transportation corridor than it is a land use corridor. However, where intersections are provided, nodal land use development can occur.

Primary nodes along the Platinum Corridor in the near vicinity of the farm Elandsdrift No. 467-JQ are Bapong and Mooinooi. Bapong and Mooinooi owe its existence largely to the employment opportunities provided by the mines northwest of it.

3.4.4 POPULATION ESTIMATE AND ESTIMATED NUMBER OF HOUSES

The farm Elandsdrift No. 467-JQ is located approximately 10km from Bapong and approximately 3km from Mooinooi which is an indication that this portion of land can be seen as part of the Settlement Cluster that formed between Mooinooi and Bapong.

The following Table illustrates the population estimate for the year 2000 and number of houses for the year 2000 with regard to Bapong and Mooinooi.

TOWN/ SETTLE-MENT	SDF POPULATION	ASSUMED HOUSEHOLD SIZE	No OF RESIDENTIAL HOUSES	TOWN/ SETTLEMENT AREA(HA)	SETTLEMENT DENSITY (UNITS/ HECTARE)	DENSITY CLASSIFICATION
Bapong	46 277	4,7	9 846	1 465	6,7	Informal/High
Mooinooi	6 799	4,5	1 511	327	4,6	Formal/Medium

3.4.5 CLASSIFICATION OF SERVICE DELIVERY CENTRES

In the year 2000, Bapong was classified as a 2nd order Settlement and 601,3 hectares is needed for residential development till the year 2007. Mooinooi was classified as a 3rd order Settlement and 42,8 hectares is needed for residential development.

A second order SDC provides medium – order social services to settlement clusters. It thus provides services to communities located beyond the border of the town in which it is located. Such a centre should consist of primary schools, a secondary school, a community hall, a clinic and a police station only on a smaller scale than those provided in a first order centre.

The social facilities needed for the year 2000-2007 for Bapong and Mooinooi are as follows:

Town	Primary School	Secondary School	Tertiary Institution	Clinic	Hospital	Post office	Police Station	Community Centre
Bapong	20	9		4		1		7
Mooinooi	2	1		1				1

3.4.6 ERF SIZES FOR RESIDENTIAL DEVELOPMENT

In terms of the Madibeng Spatial Development Framework Plan the following stand sizes are proposed for Madibeng with regard to future residential development:

- It is proposed that an average stand size of 500m² – 900m² be strived for informal settlements through their formalization.
- It is proposed that a stand size of 300m² – 500m² is used on new townships establishments for lower and lower – middle income groups.

It is proposed by the Madibeng Local Municipality that the extent of the erven provided will be 350m² on average which adhere to the proposed policy with regard to the provision of erven in a low income group.

3.4.7 HOUSING AND TENURE DELIVERY

It was indicated that housing was mainly the responsibility of Provincial and National Government. However Local Government has a role to play and the commitment of the Madibeng Local Municipality to fulfil this role is evident in the existence and operation of its Housing Department.

Housing delivery comprises three distinct elements or phases, namely:

- The provision of tenure
- The supply of essential services
- The construction of top structures.

The provision of tenure basically involves a Township Establishment process. The supply of essential services is an engineering aspect and involves the design and implementation of engineering services. The third component of housing and tenure delivery is the construction of top structures. The construction of the top structures is done through the provision of Government subsidies and is normally constructed by private construction companies.

The above 3 part housing delivery process can either be dealt with as one process or in separate stages. In other words, it is possible to only provide tenure at one stage, without necessarily having to provide services or housing directly after that. The variation of approaches also commonly distinguishes the two main focus areas of housing and tenure delivery. The first RDP type housing and tenure delivery provide the full range (tenure, services and housing) on green-fields developments.

The second is informal settlement upgrading, which basically provides for existing informal settlements.

The Provincial Government tends to follow the former approach, developing new low-cost housing on green-fields. Local Governments are more suited to focus on the latter by formalising the informal settlement in its area of jurisdiction.

According to the IDP the total number of formal and informal housing structures within Madibeng is estimated at 67 000. The houses are subdivided in 23 949 formal structures, 5 638 informal structures, 1267 backyard and 1171 units on plots.

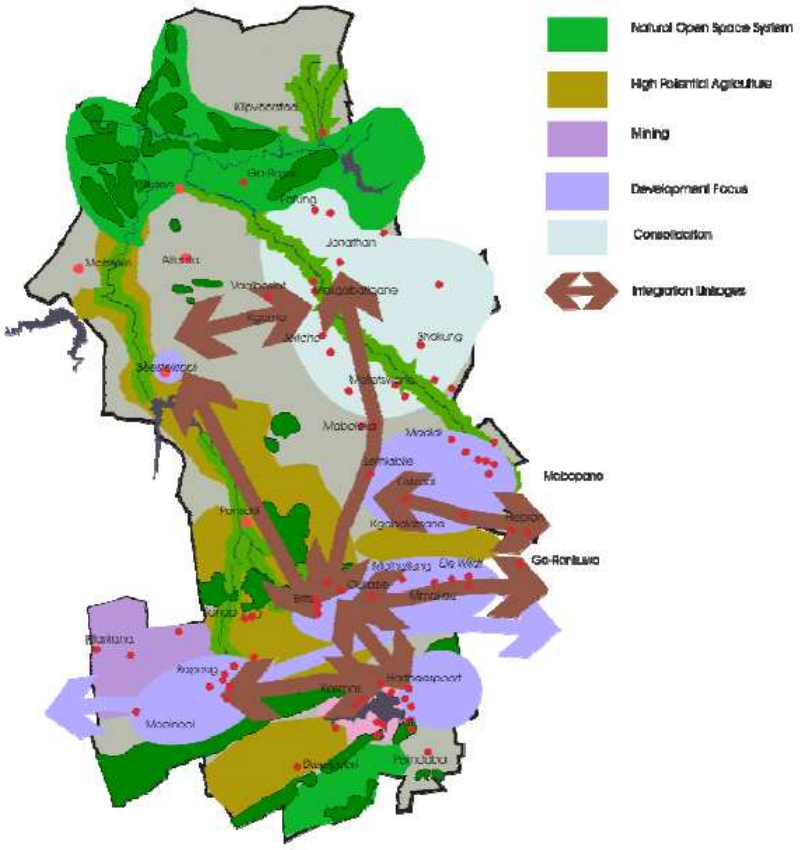
The housing projects and subsidies that have been approved by the North – West Provincial Development Board for Madibeng by 1998 was indicated at a total of 10 000 subsidies. Since 1998 an additional 4500 subsidies have been approved for Klipgat A and a further 5 500 subsidies for Klipgat B & C.

In the Madibeng IDP for 2002 it was indicated that seven housing projects were in process namely for the areas Letlhabile, Oukasie, Damonsville and Mothutlung.

The Role of the Madibeng Local Municipality with regard to housing were also spelled out which include to develop a housing strategy and to upgrade informal settlements.

The Spatial Development Framework clearly indicated that Bapong needs to be upgraded and is classified as an implementation phase 1.

To conclude it needs to be noted that the Housing Sector Plan for Madibeng was compiled during 2008 whilst the Spatial Development Framework Plan was compiled during 2000. With regard to the current situation of housing, it is believed to concentrate more on the Housing Sector Plan to compile a more realistic situation.



Source: Madibeng SDF (Draft, 2008)

3.5 HOUSING SECTOR PLAN FOR MADIBENG: 2008

The Housing Sector Plan indicated certain Settlement Development Areas which are discussed as follows:

3.5.1 SETTLEMENT DEVELOPMENT AREAS – GENERAL PRINCIPLES

In order to achieve efficient and sustainable development in Madibeng, it is vital to focus settlement development in specific areas. This will counteract the current dispersed inefficient spatial form that is characteristic of the municipal area.

For the purpose of focusing development, it is necessary to identify those existing settlement areas or clusters of settlements that have inherent development potential and which lie on the logical system of connectivity in Madibeng. These areas must then be further developed rather than creating new settlement areas. This development of existing settlements should take place through **infill development** and **managed expansion**.

Infill development refers to the identification of vacant land parcels within the demarcated settlement area, and developing these parcels of land according to their optimal development potential levels.

Managed expansion refers to the gradual and incremental outward growth of a settlement (i.e. the so-called ripple effect), but within the boundaries of a demarcated urban development boundaries (or urban edge). The purpose of the urban edge is to discourage leap frog developments that result in developments that are not physically and functionally integrated with the main settlement development area.

Demarcating an **urban edge** has specific advantages, the primary being to prevent uncontrolled urban sprawl. Urban sprawl is undesirable since it increases pressures on the limited resources of local government, from public transport to water and sanitation infrastructure provision. Drawing an urban edge will also protect valuable agricultural land and ecologically sensitive areas from urban encroachment.
Each of the settlement development areas comprises its own urban development boundary.
Because of the general problems experienced with service infrastructure, these urban development boundaries have been demarcated conservatively, to ensure that large development areas do not further contribute to the problems experienced with service delivery.

3.5.2 SETTLEMENT DEVELOPMENT AREAS

The Mooinooi/Bapong complex in the south-western part of the region is one of the identified important future development areas. Not only is this area characterized by a number of settlements that are poorly services and poorly connected, but it is also of strategic importance in the sense that it lies on the Bakwena Platinum Corridor and the mining focus area. (**Madibeng SDF**.)

The Bapong complex is an ever growing settlement cluster that should be the focus area for the introduction of infrastructure and services. If it is expected that the mining activities in this area will further expand in future, then it can be expected that these settlements will also further grow. The location of these settlements on the Platinum Corridor will enable them to benefit from economic development along the corridor once that begins to materialize in Madibeng.

As previously indicated the farm Elandsdrift No. 467-JQ can be seen as part of the Bapong/Mooinooi Settlement Development area.

3.5.3 AFFORDABLE HOUSING DEVELOPMENT

The Madibeng Local Municipality is currently in the process of drafting a Housing Development Plan, which will identify specific low-cost and affordable housing projects. However, it is the responsibility of the Madibeng Spatial Development Framework to establish the principles according to which housing development should take place in the municipal area.

According to the Madibeng IDP, the following housing and tenure objectives were identified:

- Provide subsidies for housing, land and infrastructure development.
- Provide security of tenure to individual households through land acquisition and ownership.
- Develop affordable, low-cost housing.
- Secure adequate land and funding for rural housing development. To meet the abovementioned objectives, the IDP has identified the following strategies:
    - Creation of public-private partnerships.
- Formalization of informal settlements, as well as establishing new townships using subsidies allocated by the Provincial Government.
- Drawing up business plans to ensure efficient housing delivery and to ensure that the housing delivery program is in line with the programs of other Local, Provincial and National Departments
- Provision of adequate municipal services.
- Appointment of conveyances to deal with security of tenure.

In the past, National and Provincial Housing Departments decided that the best way to address the housing backlog was to adopt a strategy that was based on chasing numbers: a mass housing approach. Through this approach, houses were built everywhere where land could be acquired cheaply and this perpetuated urban sprawl. This meant that houses were built further from job opportunities and social amenities, undermining economic viability and environmental sustainability. Also the quality of the houses was compromised through this approach. During the past few years, realities in the provision of housing have brought to light that a shift in the housing strategies of Provincial and National Governments was necessary. The challenge now is to go beyond the simple provision of houses; it is to build communities and create conditions that promote economic viability and environmental sustainability. Now the approach is to build houses on well-located land, that is closer to job opportunities and necessary social amenities. Such land typically is located on infill areas within cities, such as the areas left vacant between racially divided urban areas, created by the previous dispensation.

People need to be afforded the opportunity to reside close to employment opportunities and areas with concentrations of business activities and community and social facilities.

The most important principle put forward by the Madibeng Spatial Development Framework is that housing development must focus on social and economic integration and inclusion. The implication therefore is that housing development should form an integral part of the Settlement Development Areas, or Future Development Areas, once infrastructure is available, and no housing development initiatives must be identified outside of these areas.

Allowing and developing low-cost housing in the Hartbeespoort Dam region for example is a highly sensitive issue, one that has been hotly debated for some time now. On the other hand, from a national policy as well as social-morally perspective, it is vital that low-cost and affordable housing developments be developed in this area. One of the key areas for future housing development which is related to the mining activities is the Bapong Settlement Development Area. Elandsdrift No. 467-JQ can be seen as part of the Bapong Settlement Development area as it is located between Mooinooi, mining activities and Bapong.

Major attractors of labour in the area, such as mines and agriculture, should discuss a joint strategy with the municipality on how and where housing will be developed, and how each sector could contribute to the eradication of the housing problem.

3.5.4 DEVELOPMENT AND MANAGEMENT DIRECTIVES

- No housing development shall take place if proper water and sanitation is not in place
- New housing developments must be restricted to settlement development areas. A development strategy must be formulated for each of the settlement development areas whereby land can be identified and procured by the municipality and/or provincial government for housing projects.
- The municipality must develop a strategy for the development of Social Housing and Restructuring Zones.
- All future housing developments that take place in the municipal area shall adhere to the principles of the policy document ***Breaking New Ground: A Comprehensive Plan for the Development of Sustainable Human Settlement.*** These include principles such as:
    - Residents should live in a safe and secure environment, and have **adequate access** to economic opportunities, a mix of safe and secure housing, and tenure types, reliable and affordable basic services, educational, entertainment and cultural activities, and health, welfare and police services.
- Ensure the development of **compact, mixed land use**, diverse, life-enhancing environments with maximum possibilities for **pedestrian movement and transit** via safe and efficient public transport in cases where motorised means of movement is imperative.
- Ensure that low-income housing is provided in **close proximity to areas of opportunity**.
- Integrate previously excluded groups into the city, and the benefits it offers, and to ensure the development of more **integrated, functional and environmentally sustainable** human settlements, towns and cities. The latter includes densification.
- Encourage **Social (Medium-Density) Housing**.
- **Multi-purpose cluster concept** will be applied to incorporate the provision of primary municipal facilities, such as parks, playgrounds, sports fields, crèches, community halls, taxi ranks, satellite police stations, municipal clinics, and informal trading facilities.
- Enhancing settlement design by including design professionals at planning and project design stages, and developing **design guidelines**.
- Social housing must be understood to accommodate a **range of housing product** designs to meet spatial and affordability requirements.

3.5.5 STRATEGIC LINKAGES

One of the three main strategies for the development of Madibeng is to ensure high quality linkages between the various strategic focus areas in Madibeng and between major centres outside of Madibeng.

In order to give effect to this strategy, the Madibeng Spatial Development Framework indicates a number of critical strategic linkages that either does not exist or exists, but is in dire need of upgrading.

These strategic linkages should also ideally be developed as the road based public transport system. Because of the relative low population densities and population numbers, it is unrealistic to believe that the area will comprise of a mass public transport system in the near future. However, the existing bus and taxi operations should be channelled towards these strategic linkages. In turn, the municipality must ensure that the condition of these roads supports public transport.

These strategic linkages are:

- A linkage between the Elandsberg and Klipvoor Dam region and to the R511. The lack of proper linkages in this area severely impacts on the region's tourism potential and should be addressed
- **A linkage between the Bapong/Mooinooi Settlement Development Area and Brits**
- A linkage between Brits and the Lethlabile/Hebron Settlement Development Area
- The R566 linkage with Rosslyn
- The R511 linkage between Hartbeespoort Dam and Brits.

3.5.6 POPULATION TRENDS

It was indicated that the estimated population for the Madibeng LM increased from approximately 346 000 to just over 371 000 by 2007. The total number of households over this period increased from 95 244 to 96 361. According to the Madibeng IDP (2006-2011) the total population of the Madibeng area is given as 338 254. It can also be realistically expected that the average population growth rates are spatially differentiated in different parts of the Madibeng LM. It can be anticipated that the population growth rates in the central and southern parts of Madibeng in and around the major growth areas of Brits, Oukasie, Hartebeespoort, Bapong and Mooinooi would be significantly higher than the central northern and extreme southern parts of the municipality characterised by rural settlements and farming areas. In the projection of potential future housing needs, a differentiated growth rate for these different areas will be assumed.

3.5.7 HOUSING DEMAND

3.5.7.1 BACKLOG PER SETTLEMENT CLUSTER

For the purposes of defining a multi-year housing delivery programme, it is however also necessary to analyse housing statistics at a spatially disaggregated level, and not only at municipal level. The quantification of accurate estimates at this spatially disaggregated level is even more challenging than reconciling the figures at the overall municipal level. For this purpose, the various settlements within the Madibeng area have been grouped in terms of logical clusters which coincide with its spatial characteristics and possible functional interactions as detailed in Municipal Spatial Development Framework.

Elandsdrift, Western Platinum Mines, Wonderkop, Mooinooi, Maroelakop, Segwaelane are indicated as part of Cluster 1 and Bapong is indicated as Cluster 2.

The average annual growth rate that was utilized for Clusters 1 and 2 is 5,3% per annum which implicates a total Backlog estimated in 2007 as 5 407.

In 2007 the potential effective demand (affordability) is 4 650, the Potential effective demand (other criteria) is 3 488 and the Potential projected effective demand for 2013 is 4 164.

3.5.8 ERADICATION OF INFORMAL SETTLEMENT

The development of new **mining activities spawns the rapid development of settlements** in its vicinity. These settlements are usually informal in nature to accommodate a large number of immigrants to the area. It is imperative that rapid urbanization of this nature be anticipated and dealt with in a manner that will ensure that it occurs in an orderly manner. Formal township layouts will have to be designed timeously and the necessary social and municipal infrastructure will have to be developed.

It is recognised that the development of informal housing areas in Madibeng is largely the result of the strongly growing local economy and the perceived availability of employment opportunities in certain areas. This is further exacerbated by the living conditions in the more remote rural parts of the municipality, and even beyond the boundaries of the municipality. In line with the commitment of the National Minister of Housing, and the Provincial Growth and Development Strategy, the Madibeng Municipality commits itself to the **eradication of informal settlements** by the end of the 2013/14 financial year. This commitment is considered necessary to address the growth of informal settlements in a number of areas. The key elements of this strategy include:

- The mapping of all informal settlements;
- The registration of houses and beneficiaries living in such settlements;
- Feasibility studies to determine whether to upgrade the informal settlement in-situ or, alternatively, demolish the structures concerned and re-housing the occupants at an alternative more suitable location;
- If in-situ upgrading is the preferred option, the progressive upgrading of services, top-structures and tenure rights for households;
- On-going monitoring of informal housing areas to monitor the establishment of new structures.

3.5.9 POTENTIAL HOUSING PROJECTS

The identification of potential projects for consideration to be included in the multi-year implementation plan needs to proceed from the assumption that the housing sector plan is inherently integrated and aligned with the municipal IDP. The priorities and potential projects as conceptualized in the IDP should thus be utilized as a point of departure in this regard. The potential projects were identified in terms of three categories:

Category 1:

These include projects where funding is already committed and/or where contractual agreements have already been entered into. These include projects still to be initiated as well as projects already underway but not completed.

Category 2:

These include projects broadly conceptualized in the IDP and with the concept having been refined through the housing sector plan. Although the extent and budget of these projects may differ from those in the IDP (based on better statistics and information available in the housing sector plan), the location and intent of these projects are broadly aligned with the original IDP projects.

Category 3:

These include other potential projects not included in the IDP but identified through the housing sector plan process required for addressing certain key strategic interventions and imperatives.

Bapong is indicated as a Current Housing Project Rural (PHP) which comprises of 50 subsidy housing units.

With regard to Potential New Housing Projects, Mooinooi area informal settlement upgrade is indicated as a project within the Multi Year Implementation programme for the Year 2012/2013 – 2016/17 whereby a minimum of 1000 units will be created.

3.6 MADIBENG SPATIAL DEVELOPMENT FRAMEWORK: 2009

3.6.1 MOOINOOI / BAPONG

The Mooinooi/Bapong complex in the south-western part of the region is an important future development area. Not only is this an area that is characterized by a number of settlements that are poorly serviced and poorly connected, but it is also of strategic importance in the sense that it lies on the Bakwena Platinum Corridor and the mining focus area.

The Bapong complex is an ever growing settlement cluster that should be a focus area for the introduction of infrastructure and services. It is expected that mining activities will further expand in future, then it can be expected that these settlements will also further grow. The location of these settlements on the Platinum Corridor will enable them to benefit from the economic development along the corridor once that begins to realise in Madibeng. The fact that it lies adjacent to the corridor also makes this a highly accessible location for settlement development.

Further development around Mooinooi/Bapong will be subject to the following conditions:

- It may not affect high potential agricultural land; and
- It must be connected to the municipality's bulk services network.

3.6.2 PRINCIPLES FOR AFFORDABLE HOUSING DEVELOPMENT

In terms of the Madibeng Spatial Development Framework, 2009, one of the key areas for future housing development which is related to the mining activities is the Bapong urban area. Major attractors of labour in the area, such as mines and agriculture, should discuss a joint strategy with the municipality on how and where housing will be developed and how each sector could contribute to the eradication of the housing problemThe Mooinooi/Bapong complex

4. ANALYSIS OF THE FARM ELANDSDRIFT NO. 467-JQ

4.1 TRAFFIC ANALYSIS

A traffic Impact study was conducted by Route 2 Transport Strategies and the following are indicated:

4.1.1 INTRODUCTION

Route^2 – Transport Strategies was appointed to undertake a Traffic Impact Assessment for the proposed township on the Remaining Extent of Portion 1 and Portion 34 (a portion of Portion 7) of the farm Elandsdrift No. 467-JQ to assess the likely impact of the development traffic on the external road network and make recommendations for intersection upgrades.

Plate 8: View of the site

4.1.2 SURROUNDING ROAD NETWORK

The site is located to the north of the N4 between Pretoria and Rustenburg and west of D314. The D314 is a provincial road linking the mines with Mooinooi to the south of the N4.

Plate 9: N4 at Mooinooi off-ramp

Plate 10: View of Road D314

4.1.3 PROPOSED DEVELOPMENT & SITE ACCESS

It is proposed to develop up to 900 residential units on the site with supporting land uses like commercial, schools etc.

Access into the Township will be from the D108 linking to the D314. Provision is made for 30m wide road servitude for the D108.

Plate 11: View of Road D108

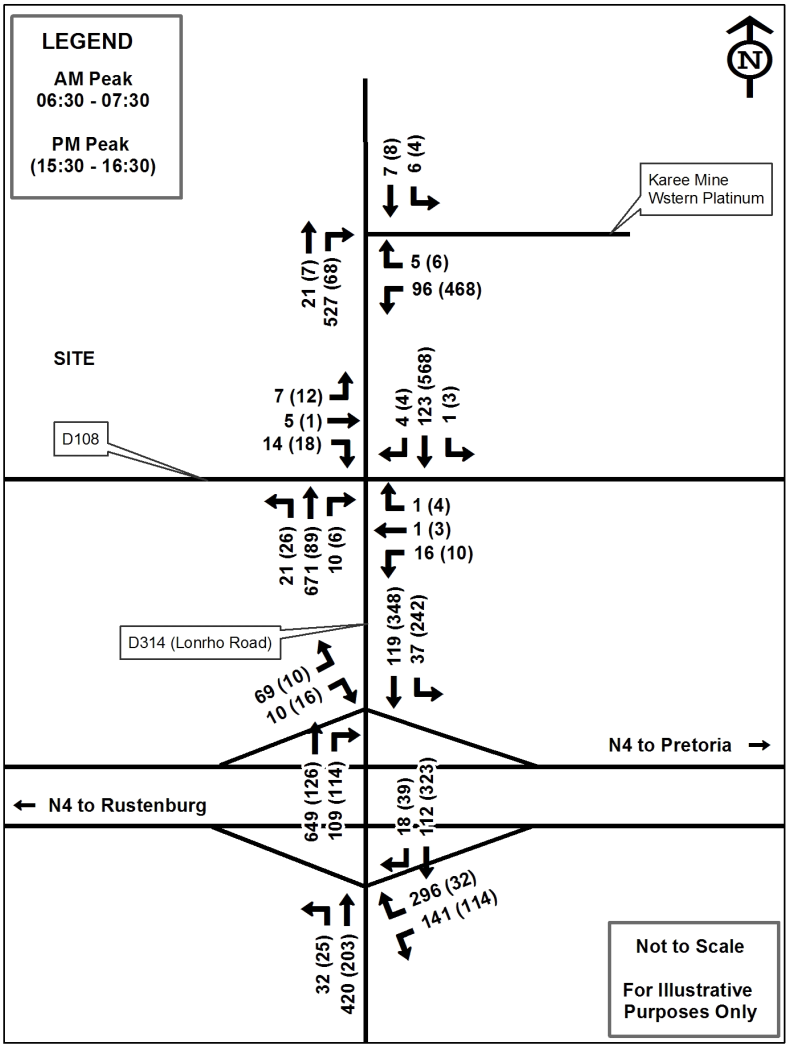
4.1.4 TRAFFIC FLOWS & TRIP GENERATION

Existing Traffic Flows & Traffic Patterns

Traffic was counted on Monday 23 April 2012 at the following intersections during the morning and afternoon peak periods:

1. **Intersection 1:** D314 (Lonrho Road) and Karee Mine – priority.
2. **Intersection 2:** D314 (Lonrho Road) and D108 – priority.
3. **Intersection 3:** D314 and N4 northern ramp terminal – priority.
4. **Intersection 4:** D314 and N4 southern ramp terminal – priority.

The existing weekday AM and PM peak hour traffic volumes are summarised in the following Figure



Background Traffic Flows & Latent Rights

The potential for other new developments in the area has been taken into consideration by growing the background traffic by 5% per annum to 2017.

Trip Generation (Private Trips)

The trip generation of the proposed development was derived using the South African Trip Generation Rates manual.

The predicted weekday AM peak hour traffic to and from the site is summarised in the table below. The reverse will apply for the PM peak hour.

AM Peak Hour Trip Generation

Peak Hour	Land Use	Trip Rate	Split (in: out)	New Trips	
				IN	OUT
AM	Group & Cluster Housing	0.25 / unit	25:75	54	163

Trip Generation (Private & Public Transport Trips)

The trip generation of the proposed development in terms of private and public transport trips has also being determined and was used in the assessment.

The predicted Weekday PM peak hour trips per mode of transport for the whole development is summarised in the table below.

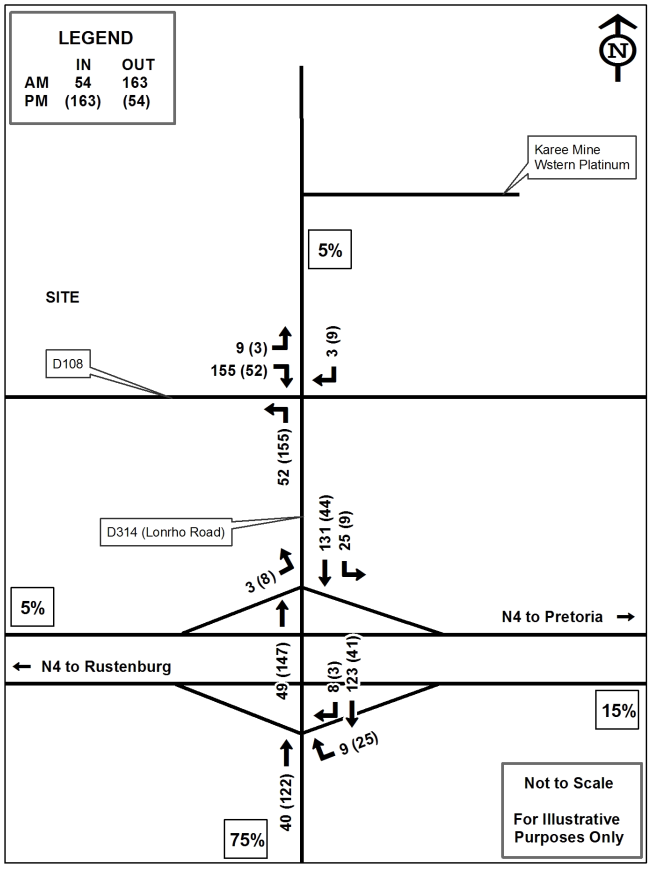
Vehicle Trips by Mode

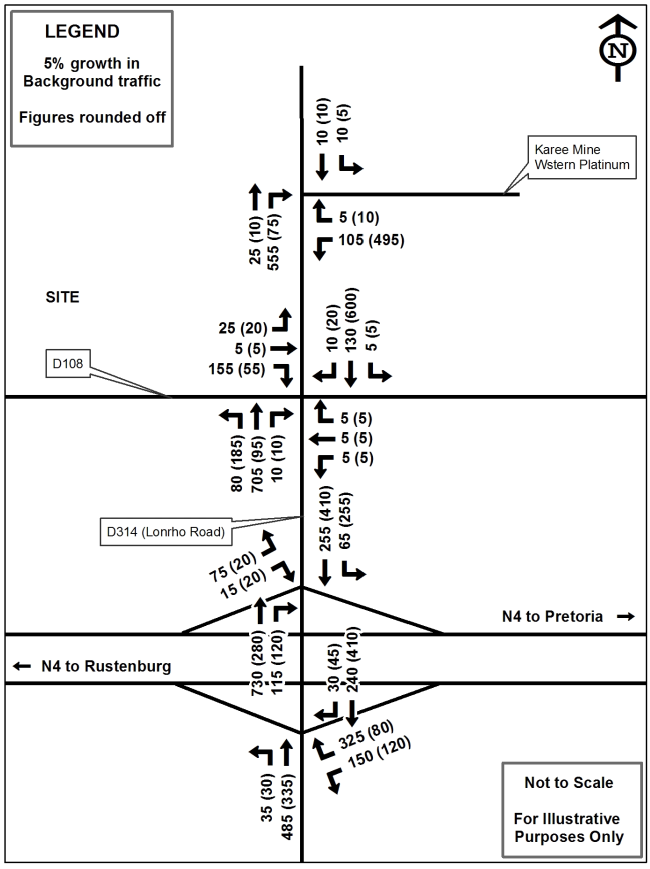
Mode	Directional Split	
	IN	OUT
Bus	3	1
Minibus-taxi	32	11
Car	163	54
TOTAL	198	66

Trip Distribution

Assumptions on the expected trip distribution were based on the location of the site accesses, the existing traffic volumes and traffic patterns in the area.

The following two Figures illustrate the assumed trip distribution for the development traffic as well as the **Base 2013** traffic with the additional development traffic and an expected 5% growth in background traffic.





4.1.5 TRAFFIC IMPACT & CAPACITY ANALYSES

The intersections have been analysed using aaSIDRA traffic analysis software. SIDRA is a computer program that provides a number of performance measures including v/c ratios, delays, level of service (LOS), etc.

When elements of a road network such as intersections are analyzed, their operating conditions are described in terms of LOS. The six letters from A to F are used to indicate different LOS. LOS A indicates very light traffic with correspondingly low delays. LOS E reflects capacity conditions, with high delays and unstable flow. LOS F reflects conditions where traffic demand exceeds capacity and traffic experiences congestion and delays. Generally LOS A to D is considered acceptable in accordance with international standards. LOS E and F on the other hand are deemed unacceptable.

A further measure of the operating conditions prevailing at any one point in a road network is the volume to capacity ratio (v/c). As the name implies it is the traffic demand volume divided by the available capacity of the roadway element. Generally ratios of up to approximately 0.9 are internationally deemed acceptable.

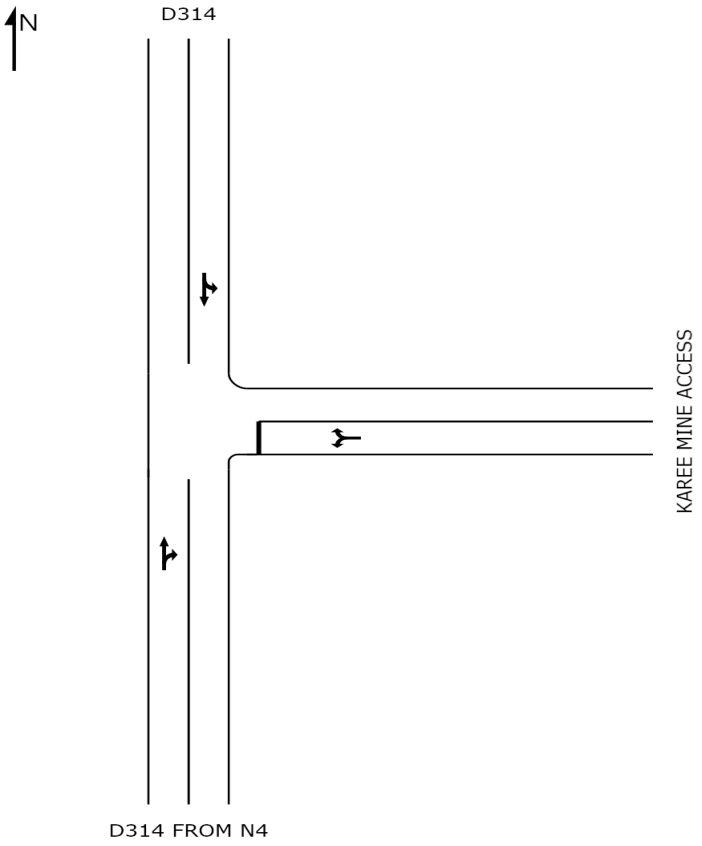
For the capacity analyses using aaSIDRA, the following three scenarios were analysed, namely:

- **Existing 2012** AM and PM peak hour flows;
- **Base 2013** AM and PM peak hour flows with development traffic; and
- **Future 2017**.

Results of the aaSIDRA capacity analyses at the intersections are discussed in the following sub sections.

D314 and Karee Mine Access

The intersection is priority-controlled. The layout is illustrated below:

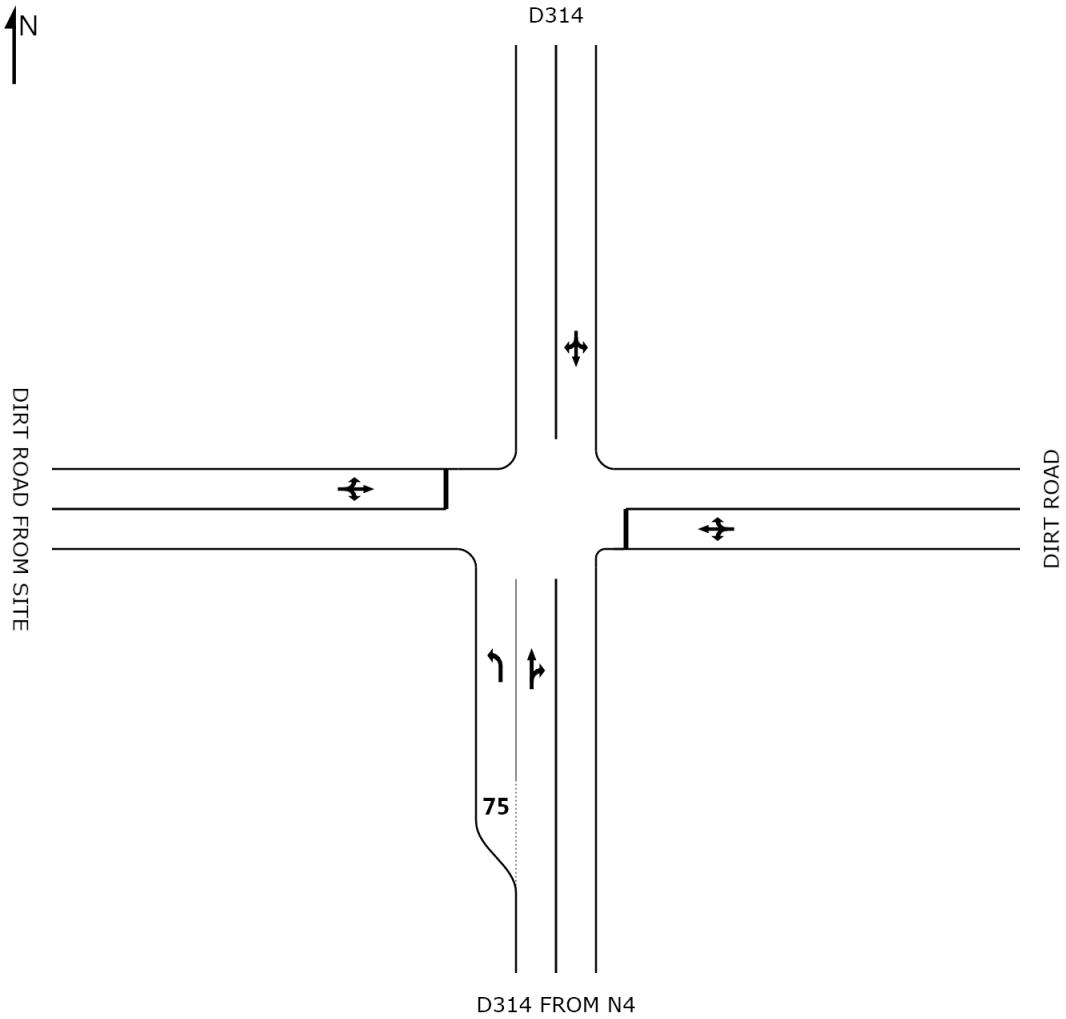


Results of Analysis:

Scenario	Intersection Control	AM Peak LOS	PM Peak LOS
Existing 2012	Existing Layout & Side Road Stopped	LOS **A** to **B**	LOS **A** to **B**
Base 2013	Existing Layout & Side Road Stopped	LOS **A** to **B**	LOS **A** to **B**
Future 2017	Existing Layout & Side Road Stopped	LOS **A** to **B**	LOS **A** to **B**

For the **Existing 2012** scenario the analysis indicates that the intersection operates with an acceptable LOS during the peak hours analysed.
With including the development traffic by **2013** the intersection operation will deteriorate slightly although will remain acceptable.
No upgrades will be required for the **Future 2017** scenario.

D314 and D108
The intersection is priority controlled. The layout is illustrated below:

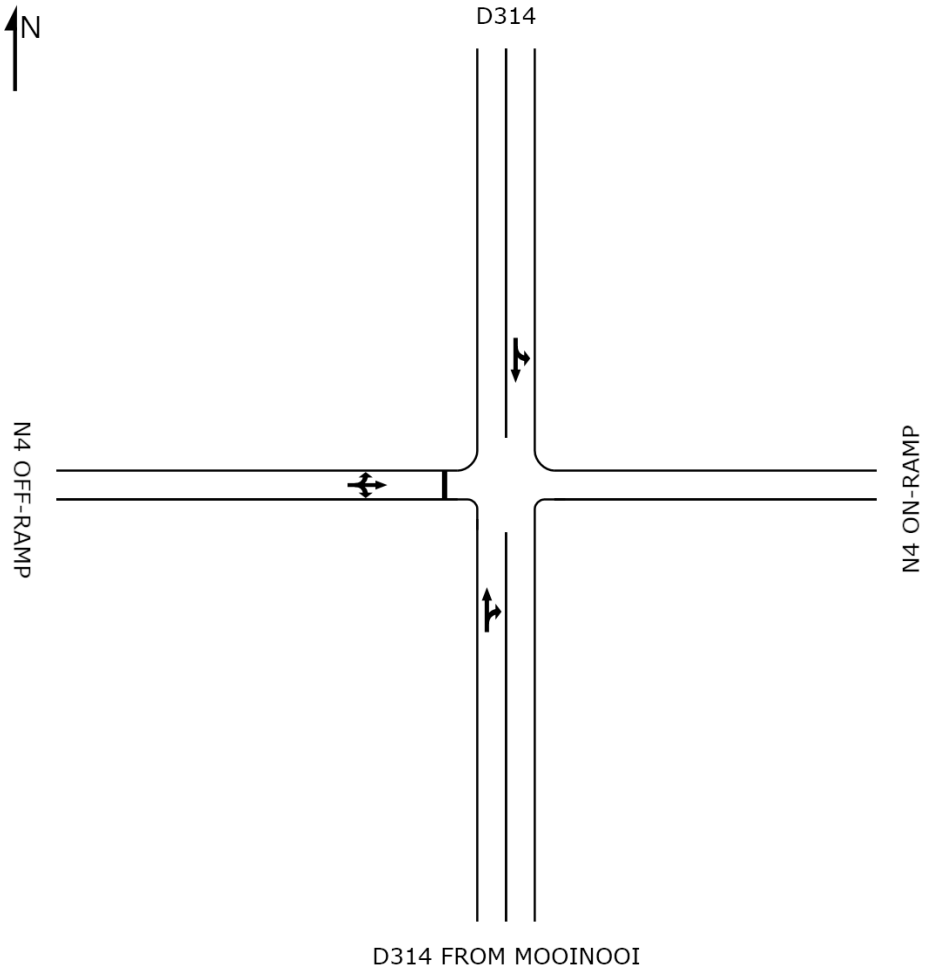


Results of Analysis:

Scenario	Intersection Control	AM Peak LOS	PM Peak LOS
Existing 2012	Existing Layout & Side Road Stopped	LOS **A** & **C**	LOS **A** & **C**
Base 2013	Existing Layout & Side Road Stopped	LOS **A** & **E**	LOS **A** & **C**
Future 2017	Existing Layout & Side Road Stopped	LOS **A** & **F**	LOS **A** & **D**
Future 2017	Existing Layout & Signalised	Overall LOS **B**	Overall LOS **A**

For the **Existing 2012** scenario the analysis indicates that the intersection operates within acceptable LOS ranges during the peak hours.
With including the development traffic by **2013** and **2017** the intersection operation will deteriorate. To mitigate this it is proposed to signalise the intersection by **2017**.

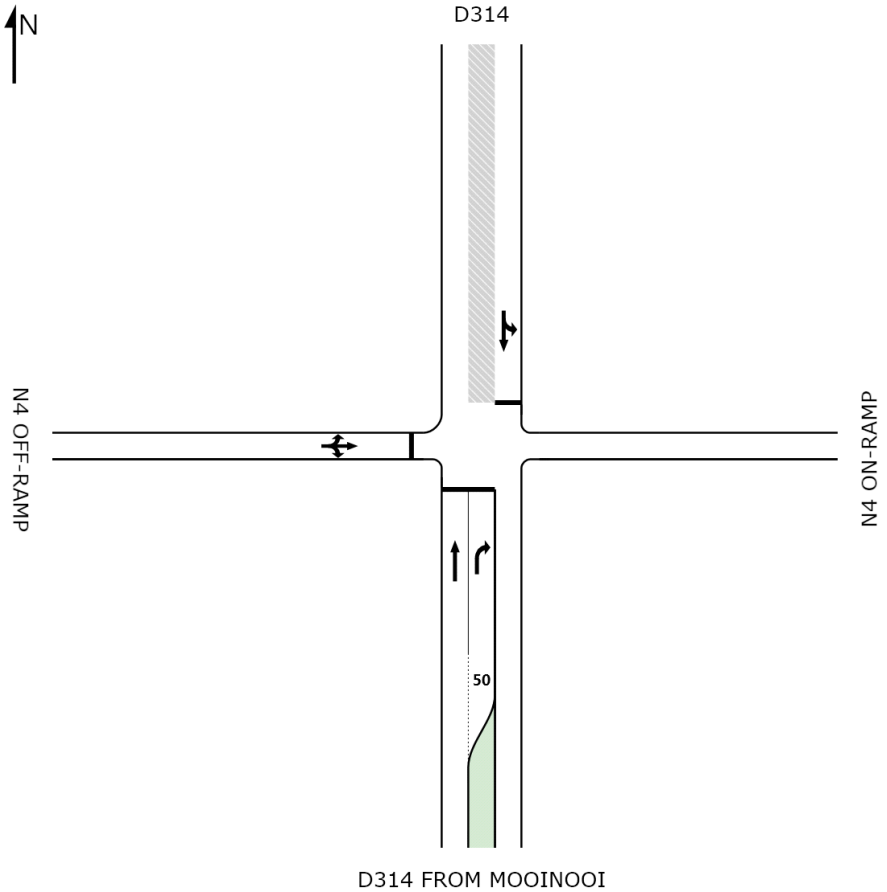
D314 and N4 Northern Ramp Terminal
The intersection is priority controlled. The layout is illustrated below:



Results of Analysis:

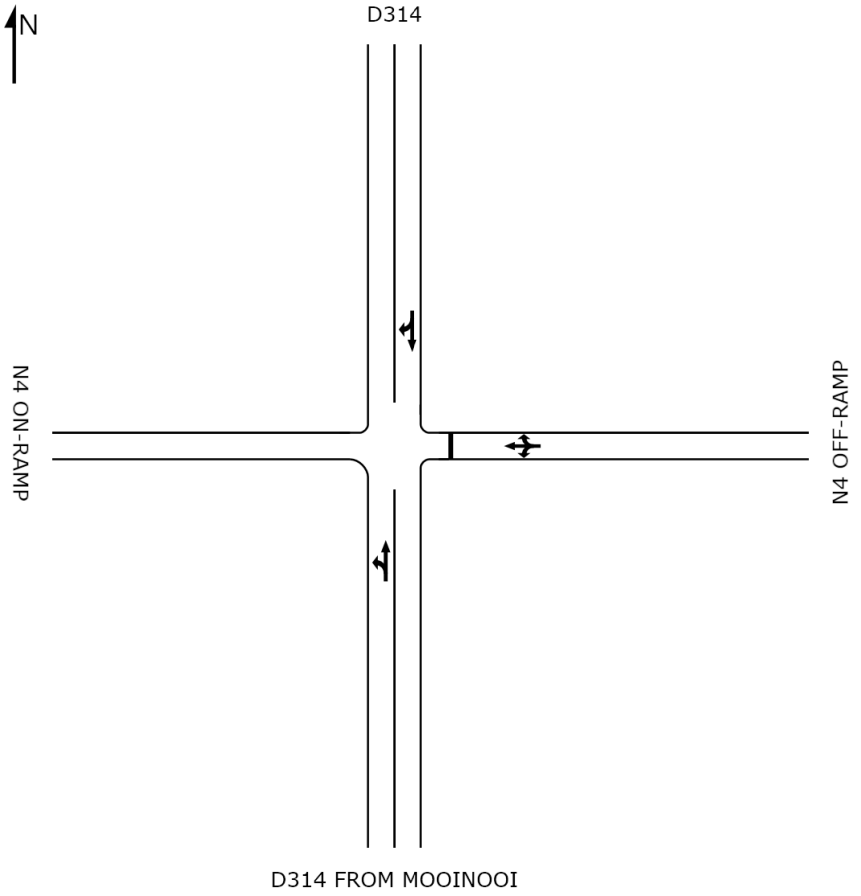
Scenario	Intersection Control	AM Peak LOS	PM Peak LOS
Existing 2012	Existing Layout & Side Road Stopped	LOS **A** & **C**	LOS **A** & **C**
Base 2013	Existing Layout & Side Road Stopped	LOS **A** & **C**	LOS **A** & **C**
Future 2017	Existing Layout & Side Road Stopped	LOS **A** & **D**	LOS **A** & **C**
Future 2017	Proposed Layout & Signalised	Overall LOS **A**	Overall LOS **A**

For the **Existing 2012** scenario the analysis indicates that the intersection operates within acceptable LOS ranges during the peak hours.
With including the development traffic by **2013** and **2017** the intersection operation will deteriorate. To mitigate this it is proposed to signalise and upgrade the intersection by **2017**.
The proposed layout is illustrated below:



D314 and N4 Southern Ramp Terminal

The intersection is priority controlled. The layout is illustrated below:



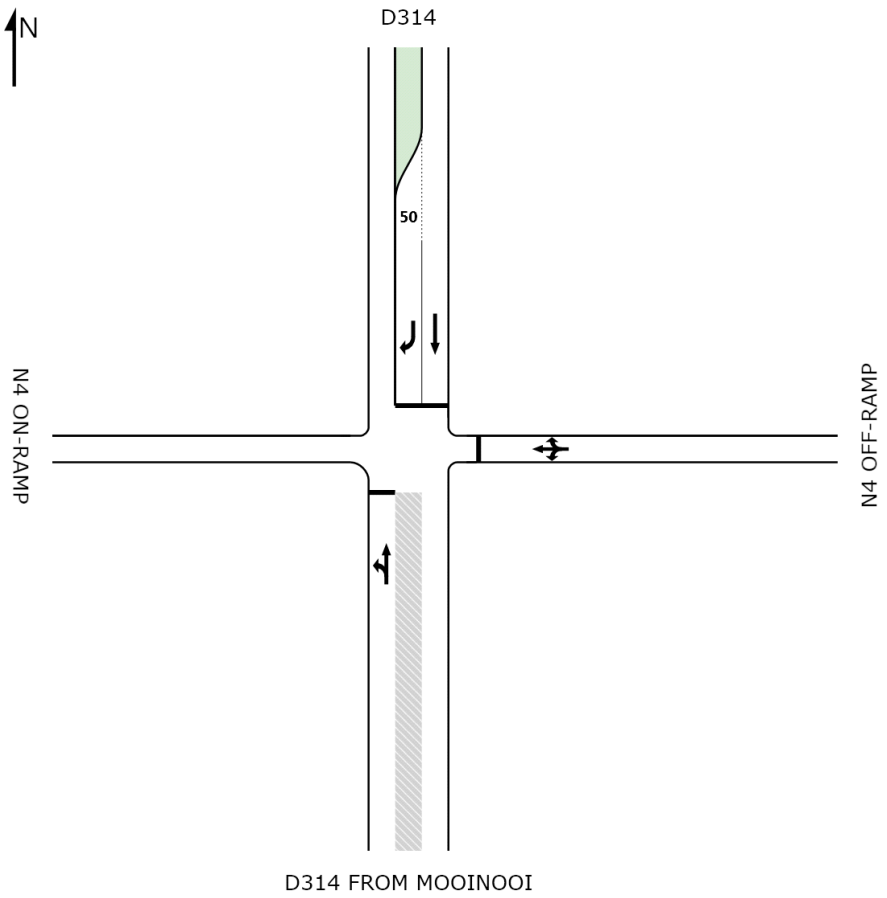
Results of Analysis:

Scenario	Intersection Control	AM Peak LOS	PM Peak LOS
Existing 2012	Existing Layout & Side Road Stopped	LOS **A** & **E**	LOS **A** & **C**
Base 2013	Existing Layout & Side Road Stopped	LOS **A** & **F**	LOS **A** & **C**
Base 2013	Proposed Layout & Signalised	Overall LOS **B**	Overall LOS **B**
Future 2017	Proposed Layout & Signalised	Overall LOS **B**	Overall LOS **B**

For the **Existing 2012** scenario the analysis indicates that the intersection operates within acceptable LOS ranges during the afternoon PM peak hour.

With including the development traffic by **2013** and **2017** the intersection operation will deteriorate. To mitigate this it is proposed to signalise and upgrade the intersection by **2013**.

The proposed layout is illustrated below:



Concluding Remarks

Based on site observations, the existing and base traffic volumes shown in the figures, as well as the above capacity analyses, it was concluded that the proposed development traffic can be accommodated with the proposed upgrades and intersection controls.

4.1.6 PUBLIC TRANSPORT AND PEDESTRIANS

In terms of the National Land Transport Transition Act (NLTTA) 22 of 2000, section 29, it is a requirement that an assessment of the public transport be included in a traffic impact study. The predicted public transport volumes that are additional to the site are set out in the Traffic Impact Assessment attached to the application for township establishment.

The following public transport facilities are recommended:

- ***The implementation of bus and minibus-taxi lay-bys along the main Access Roads.***
- ***Provision of a mini-bus taxi rank near one of the commercial sites.***

The following is proposed for pedestrians:

- ***Construction of 1,5m wide internal sidewalks along the Class 3 and 4 roads within the development.***

4.1.7 CONCLUSION & RECOMMENDATIONS

The proposed Township will comprise of mainly Residential with supporting land uses. The analysis for the **Base 2013** and **Future 2017** including the development traffic indicated that the additional development traffic can be accommodated with the proposed intersection upgrades as proposed in this report.

The following is proposed:

- ***Signalising the intersection of D314 and D108 by 2017.***
- ***Signalising and Upgrading of the N4 and D314 Southern Ramp terminal by 2013 and Northern Ramp terminal by 2017.***
- ***That the refuse removal facilities, servicing and deliveries are catered for within the area.***
- ***That parking should be provided in accordance with the Town Planning Scheme.***
- ***The implementation of bus and minibus-taxi lay-bys along the main Access Roads.***
- ***Provision of a mini-bus taxi rank near one of the commercial sites.***

4.2 GEOTECHNICAL REPORT

The Geological Report was compiled by Geoset CC during April 2012 and entails the following aspects:

4.2.1 PURPOSE

An engineering geological investigation was conducted on the proposed development site on portions of the farm ELANDSDRIFT No. 467-JQ, Mooinooi, Northwest Province, with the aim to assess aspects such as geology, relief and subsoil conditions which may influence the proposed planned urban development in the area. The site is underlain by norite, leuconorite and anorthosite of the Merensky Reef, and anorthosite and leuconorite of the upper chromitite seam, of the Rustenburg Layered Suite, Bushveld Complex. Deposits of quaternary age consist of colluvium and alluvium covering the lithology. The obtained site information is evaluated with regard to the development of masonry structures by the application of standard evaluation techniques. Provisional development zonation for township development according to the NHBRC and SAIEG were done, indicating the expected geotechnical conditions of the site.

Limited excavatability will increase development cost in some areas, and development should be restricted to outside the floodlines.

The loose or soft consistency expected on portions of the site indicated moderate problems regarding the collapsible properties, consolidation and areas also with medium to high expansiveness of the soil in some places, special construction includes the use of compaction techniques or reinforced steel strip foundations, and even stiffened, cellular or soil rafts, split construction or piles, as described for the expected different geotechnical zones. The **special construction** techniques as described will as such mitigate the encountered problems successfully to enable proper development.

4.2.2 SITE DESCRIPTION

4.2.2.1 TOPOGRAPHY

The site is located on a shallow slope generated from the Magalies Mountain and the Mamba Hills towards the Elandsdrift River, with 1160 to 1180MASL.

4.2.2.2 DRAINAGE

Plate flow is the dominant drainage pattern on site, and the Elandsdrift Spruit divides the two portions under investigation. Drainage occurs in an eastern and then northern direction towards the Elandskraal Spruit, and further northwards into the Middelkraal Dam and the Crocodile River.

4.2.2.3 CLIMATE

The Mooinooi region is characterized by summer rainfall with thunderstorms, with annual rainfall figures of 685 mm (Agriculture) and 703 mm (Buffelspoort) recorded at the closest weather stations to the site. Winters are dry with frost common. The warmest months are normally December and January and the coldest months are June and July.

An analysis of the data confirms a Weinert's N-Value in the order of 2.4 for Mooinooi. The chemical decomposition of rocks will therefore be dominant over mechanical disintegration, and deep soil horizons will be expected in areas of poor drainage, underlain by igneous rocks.

Storm water drainage and road pavement design must incorporate the climatic extremes above.

4.2.2.4 VEGETATION

The area is typically characterized by sourish mixed bushveld *veld type* (Acocks, 1988). The site is covered by sparse grasslands of which some was used as agriculture land, and few indigenous trees are present on site.

4.2.2.5 GEOLOGY

The site is underlain by norite, leuconorite and anorthosite of the Merensky Reef, and anorthosite and leuconorite of the upper chromitite seam, of the Rustenburg Layered Suite, Bushveld complex. Expansive clay or turf is a typical weathering product of norite, and loose sandy material with a collapsible fabric usually forms the colluvium from the weathering of the quartzite further to the south of the site.

Deposits of quaternary age consist of colluvium and alluvium covering the lithology. Economic mining surrounds the area and future mining must not be sterilized by this development. No dolomite occurs near the area and no dolomite stability investigation is required.

4.2.3 INVESTIGATION METHODS AND TECHNIQUES

4.2.3.1 SITE INVESTIGATION

The investigation commenced with a desk study, where all relevant information is collected and compiled on a base map. The site was divided into land forms, after which the accuracy of the information was verified by means of a field visit.

Test pits were dug and representative disturbed samples collected and tested. The position of the test pits are represented in Figure 3 (Appendix A). The soil profiles were described according to the methods described by Jennings *et al* (Jennings 1973). This method describes each horizon in terms of moisture content, colour, consistency, structure, type of soil and origin of the soil.

Disturbed samples of the soil materials were taken for laboratory analysis. The grading of the soils was determined by sieve and hydrometer analysis, resulting in cumulative grading curves.

The mechanical properties of the soil material are described in terms of the liquid limit and plasticity index (determined by means of the Atterberg Limit tests) and the linear shrinkage. These values can be used to calculate the potential expansiveness of the soils, and to evaluate the materials for use as construction material. The consistency of a soil is described by means of its Atterberg limits, where the effect of a change in the moisture content on the consistency of a cohesive soil is measured. According to Cernica (1982) these tests are useful "mostly for soil identification and classification". It can also be used to determine the mechanical properties of cohesive soil material[1].

The linear shrinkage test to determine the percentage shrinkage that can be expected, is performed by wetting a soil to approximately its liquid limit and drying the resultant paste in a linear shrinkage mould.

The potential expansiveness of a soil depends upon its clay content, the type of clay mineral, its chemical composition and mechanical character. A material is potentially expansive if it exhibits the following properties (Kantey and Brink, 1952):

- a clay content greater than 12 percent,
- a plasticity index of more than 12,
- a liquid limit of more than 30 percent, and
- a linear shrinkage of more than 8 percent.

The potential expansiveness (low, medium, high, very high) will be calculated by means of Van der Merwe's method (Van der Merwe, 1964), where the equivalent plasticity index versus the clay content of the material is plotted on a graph divided into heave categories. If any sample in the study area classifies as potentially expansive, the amount of heave or mobilization in mm measured on the surface will be calculated.

4.2.3.2 DYNAMIC CONE PENETROMETER (DCP) TEST

DCP-tests were executed in the vicinity of the trial pits to compare and calibrate the consistency as described in the profiles. The delineation of zones, in particular those affected by shallow rock or collapsible or compressible material, can be simplified by this method.

4.2.3.3 LABORATORY TEST

The disturbed samples taken during the investigation were tested by the laboratory of SOILLAB to determine their physical properties. Foundation indicator tests include a grading analyses, the determination of Atterberg limits and linear shrinkages. The compaction character of the weathered norite was determined by a CBR analysis of one sample

4.2.4 RESULTS

4.2.4.1 SOIL PROFILES

Typical profile on colluvium with collapse and expansive properties covering norite

Moist to slightly moist, dark reddish brown, soft or loose to dense, intact, sometimes open textured clayey sand. Colluvium.

Slightly moist, whitish khaki speckled black, dense, clayey Sand. Ferruginised moderately to highly weathered residual norite.

Typical profile on colluvium with expansive properties covering norite
Moist, black mottled grey, stiff, slicken slided or micro shattered sandy clay. Colluvium, sometimes with large core stones.

Slightly moist, orange speckled black, sandy clay. Residual highly weathered norite.

Severe problems regarding excavatability can be expected on the site. To ensure the stability of excavations, it will need standard sidewall protection in excavations exceeding 1,5m.

An expected high free swell percentage will indicate a problematic expansive potential of the turf, and the collapse potential of the red sandy clay also requires special attention and is classified as problematic.

4.2.4.2 DYNAMIC CONE PENETROMETER TESTS

The use of *in situ* dynamic cone penetrometer tests (DCP) concludes the expected inadequate bearing capacity of the colluvium. A slightly moist profile as described during a dry season can change dramatically according to the rising moisture variations, and even lower values are expected during the wet summer months.

A derived CBR (Californian Bearing Capacity Ratio) of less than 10 indicates that the bearing capacities of the soil are not sufficient and to ensure adequate foundation support needed for even single storey residential development, at least compaction techniques will be necessary for safe building construction.

4.2.4.3 GROUNDWATER CONDITIONS

Drainage takes place through sheet wash and the Elandsdrift Spruit, a prominent drainage channel divides the two portions under investigation. Drainage occurs in a northern direction towards the Elandskraal Spruit, and further northwards into the Middelkraal Dam and then into the Crocodile River.

The permanent water table on site is deeper than 1,5m below natural ground surface. A perched water table may exist on the shallow rock during long periods of consistent rain.

A ferruginised profile indicates that some perennial water level fluctuations occur.

Normal water tightening techniques such as damp course on foundation levels are required due to the presence of the slightly ferruginised or moist profile.

4.2.4.4 SLOPE STABILITY AND EROSION

The potential for lateral soil movement or erosion is medium, and the colluvium can be washed away during thunderstorms.

No unstable pit sidewalls were encountered during the investigation and no pit wall caved in. Except for local slope instability within opened trenches and the possible collapse of open pit side walls, no other slope instability is expected within the relative flat areas.

All open excavations exceeding 1,5m in depth must be supported.

4.2.4.5 SANITATION

A closed water borne sewage disposal system will be required due to the high clay percentage of the soil and the relative shallow rock, but excavatibility problems including core stones and rock outcrop will increase this development cost for the installation of services.

4.2.4.6 IMPACT OF MINING ACTIVITIES

Extensive mining activities near the site and a history of mining or contaminated land in the area were found. The site is located near mining activities and possibly in an active area regarding seismic activity, and blasting during mining operations can cause stability problems for structures.

Economic mining surrounds the area and future mining must not be sterilized by this development.

4.2.4.7 EXCAVATION CLASSIFICATION WITH RESPECT TO SERVICES

The excavation characteristics of the different soil horizons encountered have been evaluated according to the South African Bureau of Standards standardised excavation classification for earthworks (SABS – 1200D) and earthworks (small works – SABS 1200DA). In terms of this classification and the in-situ soil/rock consistencies as profiled, the relationships given below are generally applicable.

1. “soft excavation” - very loose/very soft through to dense or stiff.
2. “intermediate excavation” - very dense/very stiff through to very soft rock.
3. “hard excavation” - soft rock or better

Problems regarding excavatability can be expected on the site, with some outcrop and sub outcrop areas classified as hard rock excavation.

The site was classified regarding excavation properties and it ranges from easily excavated by hand in Geotechnical Zone C2H (in portion 34) to more difficult in Zone H3 when dry (portion 1), and it was classified as soft to intermediate in restricted and non-restricted excavation (SANS 1200 D).

Areas within Zone PRC1H1 (in Portion 1) comprising shallow rock, core stones and scattered norite rock outcrop classified as intermediate to hard rock excavation where the necessity of a competent TLB, pneumatic tools or even blasting is required, with Zone PR where solid norite rock outcrop was encountered where blasting will be required.

To ensure the stability of excavations, it will need standard sidewall protection in excavations exceeding 1,5m.

4.2.4.8 IMPACT OF THE GEOTECHNICAL CHARACTER OF THE SITE ON SUBSIDY HOUSING DEVELOPMENTS

During the engineering geological investigation it is essential to determine and quantify the extent of potential problems associated with the area (addressed in **bold** below), before proper township proclamation. The ideal conditions for urban development may be listed as follows:

- A smooth surface gradient with slopes less than 12□. Accessibility should not be restricted by topography (plateau areas).
- No potential for slope instability features - landslides, mud flows.
- Easy **excavation for foundations** and installation of services (normal depth of 1,5m required).
- Foundations above the ground water level or perched water table, with not too low permeability.
- Development above the **1:100 year flood** line.
- Adequate surface and subsurface drainage conditions, with minimal erosion potential.
- No presence of problematic soils, for example **heaving clays, compressible clays, sand with some collapse potential,** or dispersive soils, that will require expensive remedial measures.
- No potential for surface subsidence due to the presence of dolomite (sinkholes) or **undermining**.
- No damaging differential subsidence or movement (less than 5mm total movement at the surface allowed).
- No **backfilled areas** with unconsolidated material or areas with reservoirs or dams.

4.2.5 SITE EVALUATION FOR URBAN DEVELOPMENT

Some severe problems regarding excavatability can be expected on portions of the site, and norite rock outcrop, shallow rock and core stones were typically found on site.

Seepage or the presence of perennial fluctuations of ground water is expected on site, and the presence of a moist profile and ferruginization indicates that a seasonal perched water table may exist. Special care must be taken to ensure adequate surface drainage to prevent the accumulation of water next to structures.

Retaining walls as well as slope stabilization measures are recommended on all constructed embankments exceeding 1,5m. Storm water diversion measures such as ponding pools are recommended to control peak flows during thunderstorms. All embankments must be adequately compacted and planted with grass to stop any excessive erosion and scouring of the landscape.

Development should be planned outside the 1:100 year flood line.

The site contains moderate compressible or collapsible soils, with low to moderately and even highly to very highly expansive soils with variable moisture content and foundations will need specialized treatment.

Economic mining surrounds the area and future mining must not be sterilized by this development.

Rehabilitation of the areas covered by mixed spoil or the use of stiffened or cellular rafts is required on these areas.

4.2.6 SITE SPECIFIC CLASSIFICATION AND ZONATION

Modified Normal Development:
Site Class PRC1H1:
Slightly collapsible clayey sandy soil or clayey turf underlain at shallow depth by residual norite or norite core stones or boulders with differential movement of the soil and rock combination and it will require modified normal foundation with normal drainage provision. The restricted excavation (PR) of service trenches will require a competent TLB, special pneumatic tools and even blasting to reach the required depth for the installation of services, resulting in an increase in development cost.

Special Development:
Site Class C2H:
Moderately to highly collapsible and compressible soil with some expansive properties, with a thickness of more than 750mm, and an expected range of more than 10 and up to 30mm of total soil movement measured at surface, form this zone. Foundations will therefore require modified normal or special foundation techniques such as lightly reinforced strip footings with articulation joints at all internal and external doors and openings with light reinforcement (brickforce) in masonry or even soil replacement by an engineered fill soil raft. Site drainage and plumbing and service precautions must be used. It is classified as C2H in terms of the NHBRC guidelines (1995) or the SAICE Code of practice (1995).

Site Class PC2H:
This zone represents the same zone as above, but spoil with a mixed content and origin that needs to be removed covers the area, underlain by the same moderately to highly collapsible and compressible soil with some expansive properties, with a thickness of more than 750mm, and an expected range of more than 10 and up to 30mm of total soil movement measured at surface, form this zone. Foundations will therefore require modified normal or special foundation techniques such as lightly reinforced strip footings with articulation joints at all internal and external doors and openings with light reinforcement (brickforce) in masonry or even soil replacement by an engineered fill soil raft. Site drainage and plumbing and service precautions must be used. It is classified as PC2H in terms of the NHBRC guidelines (1995) or the SAICE Code of practice (1995).

Site Class H3:
Highly expansive soil consisting of black clay or turf with a thickness in excess of 750mm, in some places underlain by shallow rock with some core stones of norite, and an expected range of more than 30mm of total soil movement measured at surface, form this zone. Foundations will therefore require special designed foundation techniques such as soil, stiffened or cellular rafts to enable proper development.

Site Class PR:
This zone represents areas with norite rock outcrop. This will restrict development and the placement of services.

Site Class PQ:
A quarry or borrow pit near the drainage feature must be backfilled with a controlled fill to engineers specifications before any development can take place.

Undevelopable:
Site Class PD:

The Elandsdrift Spruit divides the two portions under investigation and the 1:100 year flood line must be determined to specify the allowable distance of development from this river. Two smaller drainage features were also identified and must be incorporated in the layout of the town.

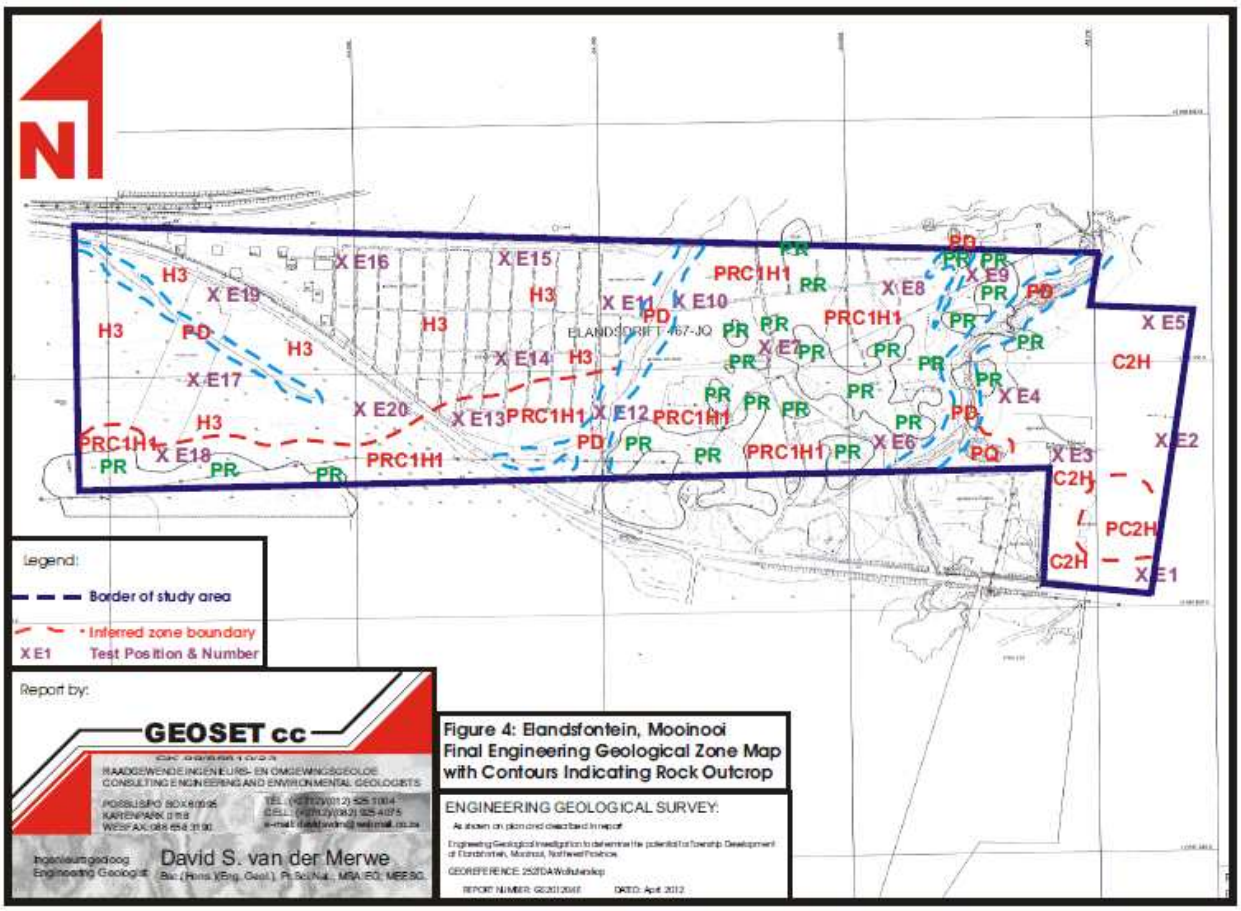


Plate 12: Geotechnical soil zonation

4.2.7 GENERAL FOUNDATION DESIGN AND BUILDING PROCEDURES

4.2.7.1 CONSOLIDATION OR COLLAPSE SETTLEMENT

Site Class C (Estimated total Settlement of less than 5mm):
Normal Construction:
Minor collapse settlement requires normal construction (strip footing and slab on the ground) with compaction in foundation trenches and good site drainage.

Site Class C1 (Estimated total Settlement of between 5 and 10mm):
Modified normal construction:
Reinforced strip footing and slab on the ground.
Articulation joints at some internal and all external doors and openings.
Light reinforcement in masonry.
Site drainage and service/plumbing precautions recommended.
Foundation pressure not to exceed 50 kPa (single storey buildings).

Compaction of in situ soils below individual footings:
Remove in situ material below foundations to a depth and width of 1,5 times the foundation width or to a competent horizon and replace with material compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content.
Normal construction with light reinforcement in strip foundation and masonry.

Deep strip foundations
Normal construction with drainage precaution.
Founding on a competent horizon below problem horizon.

Soil Raft
Remove in situ material to 1,0m beyond perimeter of building to a depth and width of 1,5 times the widest foundation or to a competent horizon and replace with material compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content.
Normal construction with lightly reinforced strip footings and masonry.

Site Class C2 (Estimated total Settlement of more than 10mm):
Stiffened strip footings, stiffened or cellular raft
Stiffened strip footings or stiffened or cellular raft with articulation joints or solid lightly reinforced masonry.
Bearing pressure not to exceed 50 kPa.
Fabric pressure not to exceed 50 kPa.
Site drainage and service/plumbing precautions.

Deep strip foundations
See C1

Compaction of in situ soils below individual footings
See C1

Piled or pier foundations
Reinforced concrete ground beams or solid slabs on piled or pier foundations.
Ground slabs with fabric reinforcement.
Good site drainage.

Soil Raft
See C1

4.2.7.2 EXPANSIVE SOIL

Site Class H (Estimated total heave of less than 7.5mm):
Soil tested as medium expansive with a clay layer thickness of up to 0,3m from surface

Normal construction:
Minor heave requires normal construction (strip footing and slab on the ground) with site drainage and service/plumbing precautions recommended.

Site Class H1 (Estimated total heave of between 7.5 and 15mm):

Tested as medium expansive with a clay layer thickness of between 0,3 to 0,85m from surface,
or a highly expansive clay layer of between 0,3 and 0,4m in thickness from surface
or a clay layer with a very high expansive potential of up to 0.3m.

Modified normal:
Lightly reinforced strip footings.
Articulation joints at all internal/external doors and openings
Light reinforcement in masonry.
Site drainage and plumbing/service precautions.

Or soil raft:
Remove all or part of expansive horizon to 1,0m beyond the perimeter of the construction and replace with inert backfill compacted to 93% MOD AASHTO density at -1% to 2% of optimum moisture content.
Normal construction with lightly reinforced strip footings and masonry.
Site drainage and plumbing/service precautions.

Site Class H2 (Estimated total heave of between 15 and 30mm):
Tested as medium expansive with a clay layer thickness of between 0,85 to 2,0m,
or highly expansive of between 0,4 and 0,85m in thickness measured from surface,
or a clay layer with a very high expansive potential of between 0.3 and 0.4m.

Soil raft:
See H1.

Stiffened or cellular raft:
Articulation joints or solid lightly reinforced masonry.
Site drainage and plumbing/service precautions.

Piled construction:
Piled foundation with suspended floor slabs with or without ground beams.
Site drainage and plumbing/service precautions.

Split construction:
Combination of reinforced brickwork/blockwork and full movement joints.
Suspended floors or fabric reinforced ground slabs.
Site drainage and plumbing/service precautions.

Site Class H3 (Estimated total heave of more than 30mm):
Soil tested as medium expansive with a clay layer thickness of more than 2,0m (>2,0m thick),
or highly expansive of more than 0,85m (0,85m or more in thickness),
or a clay layer with a very high expansive potential of more than 0.4m in thickness.

Foundations require special design by structural engineer of the following:
Soil raft:
As for H1.

Stiffened or cellular raft:
As for H2.

Piled construction:
As for H2.

4.2.8 SITE SPECIFIC FOUNDATION DESIGN AND BUILDING PROCEDURES

The following foundation solutions will possibly be advised:

Site Class H3: Stiffened or cellular raft**,** with articulation joints or lightly reinforced masonry, OR piled construction, i.e. piled foundations with suspended floor slabs with or without ground beams OR a soil raft, i.e. the removal of all or part of the expansive horizon to 1,0m beyond the perimeter of the structure and replacement with inert backfill, compacted to 93% of maximum Mod AASHTO dry density at -1% to +2% of optimum moisture content. Normal construction with lightly reinforced strip foundations and light reinforcement in masonry can then be performed if residual movement is less than 7,5mm. Good site drainage and appropriate service precautions are necessary in conjunction with all of the above.

Site Class C2H: In addition to the above: split construction, comprising a combination of reinforced brickwork/blockwork and full movement joints, suspended floors or fabric reinforced ground slabs and site drainage and plumbing/service precautions, can also be considered.

4.2.9 CONSTRUCTION MATERIALS

Due to the level of development surrounding the area, the likelihood for the development of borrow pits are low. All road building and construction materials will be sourced from established commercial or mining activities in and around Mooinooi.

4.2.10 CONCLUSION

A site of approximately 70 hectares, on portions of the farm Elandsdrift 467JQ, was investigated to determine the engineering geological properties that will influence township proclamation.

- The site is underlain by norite and anorthosite of the Rustenburg Layered Suite, Bushveld Complex. Deposits of quaternary age consist of colluvium and alluvium covering the lithology.
- Some severe problems are foreseen regarding the **excavatability to 1,5m** depth.
- Zoning of the site revealed zones with minor & major constraints regarding the **collapsible properties, consolidation and expansive potential** of the soil.
- **Modified normal & special construction** techniques as described will as such mitigate the encountered problems successfully to enable proper development.
- The following special foundation solutions are advised:
  - **Site Class H3:** Stiffened or cellular raft**,** with articulation joints or lightly reinforced masonry, OR piled construction, i.e. piled foundations with suspended floor slabs with or without ground beams OR a soil raft, i.e. the removal of all or part of the expansive horizon to 1,0m beyond the perimeter of the structure and replacement with inert backfill, compacted to 93% of maximum Mod AASHTO dry density at -1% to +2% of optimum moisture content. Normal construction with lightly reinforced strip foundations and light reinforcement in masonry can then be performed if residual movement is less than 7,5mm. Good site drainage and appropriate service precautions are necessary in conjunction with all of the above.
  - **Site Class C2H:** In addition to the above: split construction, comprising a combination of reinforced brickwork/blockwork and full movement joints, suspended floors or fabric reinforced ground slabs and site drainage and plumbing/service precautions, can also be considered.
- Economic mining surrounds the area and future mining must not be sterilized by this development.

- This investigation was done to reveal the geotechnical properties on site with the techniques as described. Although every possible factor during the investigation was dealt with, it is possible to encounter variable local conditions. This will require the inspection of foundations by a competent person to verify expected problems.

4.3 DETERMINATION OF FLOODLINE

Elandsdrift Spruit divides the two portions under investigation and is located in the far eastern section. A 1:100 year floodline will therefore be required to be calculated to determine the area that will be excluded from the area proposed for residential development and this area will from an integral part of the open space system of the proposed township area.

An independent service provider i.e CWT Water Technology was appointed to determine the 1:100 year floodline applicable along the Elandsdrift Spruit.

Plate 13: View of Elandsdrift Spruit

The floodline determination conducted by CWT Water Technology was completed on 17 April 2012 and the 1:100 year floodline is indicated on the following map (refer dark blue lines representing the 1:100 year floodlines).

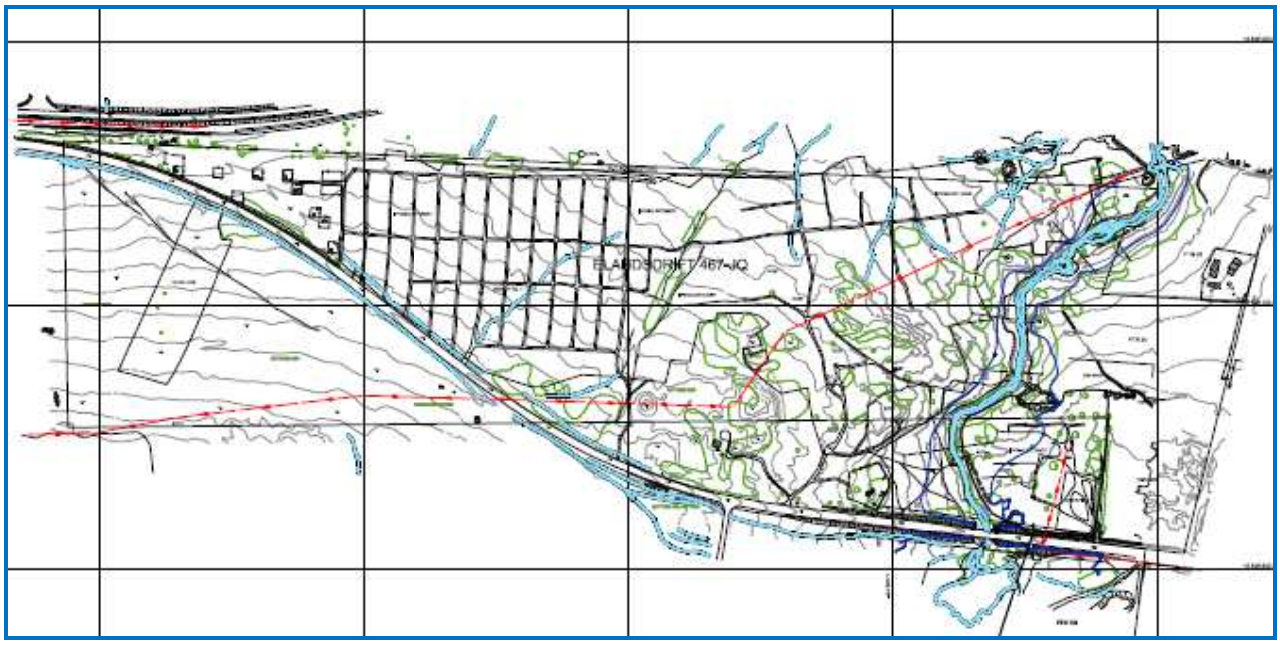


Plate 14: 1:100 year floodline determination results

4.4 PROVISION OF CIVIL AND ELECTRICAL ENGINEERING SERVICES

The status quo of existing civil services networks as well as the provision of civil engineering services to the proposed township area was investigated by EPS Consulting Engineers whereas the existing status quo in respect of electricity networks was investigated by AMPCON Consulting Electrical Engineers. The results of the fore-mentioned investigations are attached as **Annexures R** and **S** to the application for township establishment an can be summarised as follows:

4.4.1 EXISTING SERVICES

- **WATER SOURCE**

There is no sustainable, potable water source is available in the immediate vicinity of the existing informal settlement. The community currently relies on untreated water.

- **SUPPLY PIPELINES AND PUMP SYSTEMS**

No pipelines or pump systems currently exist near the existing informal settlement.

- **SERVICE RESERVOIRS**

No reservoirs have been constructed for the communities to date.

- **DISTRIBUTION NETWORK**

No distribution network is available in the area.

- **SANITATION**

Self-constructed pit toilets, not complying with any regulation, service most of the erven with a number of erven not having any sanitation at all.

4.4.2 WATER

4.4.2.1 WATER DEMAND

- **HISTORICAL WATER CONSUMPTION**

No historical water usage data is available.

- **WATER CONSUMPTION.**

As previously stated, there is no potable water statistics available to establish a benchmark to do future usage calculations. The water demand for the new development is based on Table 9.11 of the "Guidelines for Human Settlement Planning and Design" – Red Book. Provision is made for full-flush sanitation.

The table below reflects the estimated water consumption at 2.5 % growth with an estimated 10 % water loss over the next 25 years in stages of five years.

Year	Household			Municipal and losses	Total Consumption		Growth Rate
	Number Capita	Average Daily Consumption			Day	Year	
		l/c	m^3/d	m^3/d	m^3/d	m^3/a	%/a
2012	5 826	100	582.6	58.26	640.86	233 914	-
2017	6 592	100	659	66	725	264 669	2,5
2022	7 458	100	746	75	820	299 439	2,5
2027	8 438	100	844	84	928	338 786	2,5
2032	9 547	100	955	95	1050	383 312	2,5
2037	10 801	100	1080	108	1188	433 660	2,5

- **WATER CONSUMPTION OF OTHER USERS**

The water consumption of other users are listed below:

DESCRIPTION	NUMBER	AADD DEMAND (l/d)		TOTAL AADD		MUNICIPAL LOSSES	TOTAL CONSUMPTION	
				l/d	m^3/d	m^3/d	m^3/d	m^3/a
Instititional (erven)	5	@	2 000	10 000	10.0	1	11	4015
Business (m^2)	1 773	@	0.4	709	0.7	0	1	285
School & Creche (erven)	2	@	15 000	30 000	30.0	3	33	12045
			TOTALS =	40 709	41	4	45	16345

- **TOTAL WATER DEMAND**

The total water demand for 2012 is:

DESCRIPTION	NUMBER	AADD DEMAND (l/d)		TOTAL AADD		MUNICIPAL LOSSES	TOTAL CONSUMPTION	
				l/d	m^3/d	m^3/d	m^3/d	m^3/a
Residential (capita)	5826	@	100	582 600	582.6	58	641	233914
Instititional (erven)	5	@	2 000	10 000	10.0	1	11	4015
Business (m2)	1 773	@	0.4	709	0.7	0	1	285
School & Creche (erven)	2	@	15 000	30 000	30.0	3	33	12045
			TOTALS =	623309	623	62	686	250259

- **LOSSES**

A 10 % water loss is assumed due to the fact that the bulk and internal network will be completely new and that municipal consumption and irrigation of sports grounds and parks will be strictly controlled.

4.4.2.2 BULK WATER SUPPLY

No bulk water supply system is currently available for the area.

- **Alternative Water Sources**

There are two alternative options (or a combination) that need further investigation to ensure that potable water is available to supply the township with water.

Alternative 1: Connect to Existing Water Distribution Network in Mooinooi

An extensive water reticulation system had been provided for the town of Mooinooi. Mooinooi was initially developed by the mines in the area and the infrastructure was mainly installed by the mines at the time. The main source of water is a bulk connection to the Rand Water Board mainline. Storage capacity (elevated reservoirs) had been provided for Mooinooi from where a bulk supply water pipeline provides water to the town.

The Moonooi water reticulation network currently terminates approximately 2,5km from the proposed new township. The minimum requirement would be the installation of a dedicated bulk line to supply the township with water.

A detailed investigation and analyses of the existing water reticulation network and reservoirs will be required to establish the required upgrades to the existing water supply network to supply the proposed township with water. This would apply especially to the bulk lines and reservoirs to ensure that the proposed new township can be incorporated into the existing Mooinooi water distribution and reticulation network.

This would be the preferred alternative.

Alternative 2: Connect to the Rand Water System

The Rand Water Board mainline along the Provincial Road P2/4 could be utilised as an alternative water source. A dedicated water supply pipeline from the Rand Water Board main could be constructed as an exclusive bulk supply pipeline with sufficient capacity to service the proposed development. An application for the connection point and water supply would have to be lodged with Rand Water by The Local Municipality of Madibeng.

Storage capacity and sufficient water pressure would have to be provided for by means of elevated storage reservoirs and/or pressure pumps.

We recommend that Alternative 1 should be regarded as the preferred alternative and that further investigation be done to incorporate the water reticulation network of the new township with the existing water network of Mooinooi.

A combination of the two alternatives could also be investigated.

- **INFRASTRUCTURAL REQUIREMENTS**

A new reservoir will be constructed to ensure that sufficient capacity is available for the 1 500 households in Elandsdrift. The required capacity for the reservoir is approximately 3 Ml.

Bulk water lines will be installed from the existing reticulation system or new reservoirs up to the proposed new development.

- **INTERNAL WATER LAYOUT**

The internal layout of the water reticulation system will be designed to accommodate peak demand in terms of the "Guidelines for Human Settlement Planning and Design".

- **DESIGN CRITERIA AND MATERIALS**

Annual average daily demand l/day (AADD):

Per Capita	-	100 l/day
Instantaneous Peak	-	4 (AADD)

Fire protection:

Fire Hydrants	-	Quick Coupler fittings or as requested by the fire department, maximum distance180m apart (depending on land uses applied)
Residential	-	1 500 l/min @ 15m residual head, at any one hydrant as per the Redbook.

Water network:

uPVC pipes Class 9 (SABS approved) minimum pipe diameter of 75mm

Maximum pressure	-	90 meter
Minimum pressure	-	24 meter

House connections:

Class 10 HDPE, Type IV pipe		(Table 9.8 and 9.9 of the "Guidelines for Human Settlement Planning and Design")
Serving one erf	-	25mm diameter reducing to 20mm at erf
Serving two erven	-	40mm diameter branching to two 20mm connections at erf.
Valves and cast-iron fittings	-	class 16 (waterworks);

4.4.3 SEWER RETICULATION

4.4.3.1 INTERNAL LAYOUT

The internal sewerage system will be designed to accommodate the average dry weather flow (ADWF) and to service every stand in the development. The design criteria accepted by the Local Municipality Madibeng will be implemented as discussed further in this report.

4.4.3.2 ESTIMATED SEWERAGE RUN-OFF

The sewerage run-off is estimated at 80% of the average daily water demand. Thus, the average dry weather flow (ADWF) is 499 kl/day based on the water calculations above.

4.4.3.3 BULK SEWER

There are two alternative options that would need further investigation as options to accommodate the sewer outflow from the proposed new township.

Alternative 1: Connect to the Existing Sewer Treatment Plant

All internal sewers will gravitate via a conventional sewer system to a pump station situated at the lowest of the proposed development. The pump station, at full development, will be equipped with two electric pumps. Pump control will be by means of pressure switches and flow meters. The sump volume will be determined to minimize motor starts to 10-15 starts per hour. Screens and a grid chamber will be used on the pump station to limit blockages in the pumps.

The sewer will be pumped to the existing sewer treatment plant in Mooinooi.

The existing sewer treatment plant in Mooinooi will have to be upgraded and expanded to accommodate the additional sewerage effluent generated by the proposed new township.

This would be the preferred alternative.

Alternative 2: Install sewer treatment plant

All internal sewers will gravitate via a conventional sewer system to a pump station situated at the lowest of the proposed development. From the pump station, sewer will be pumped to a sewerage treatment plant. The position of the plant will be finalised once information on the geology and flood line becomes available.

The sewerage treatment plant will be provided exclusively for the development. The plant will be designed in accordance with current legislation and requirements of local and regional authorities including DWAF. The mechanical equipment will be designed in order to function unattended for long periods of time. All work will be executed in accordance with the relevant SABS codes. Effluent quality will comply with the SA General Authorization Standard (Environmental Conservation Act, 1989), the SA General Authorization Standard. (GENERAL AUTHORISATIONS IN TERMS OF SECTION 39 OF THE NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998) and will be utilised for irrigation purposes.

If required, an application will be made for a Water Use Licence in terms of the National Water Act, 1998.

Maintenance and operation monitoring will be the responsibility of the Local Municipality Madibeng and will have to comply with prescribed standards.

4.4.3.4 DESIGN CRITERIA AND MATERIALS

Class-34 Heavy Duty Free-flow pipe material or equivalent as well as pre-cast concrete manholes to SABS standards will be used in the construction of the sewer network with the following minimum requirements:

Minimum diameter pipe 160mm;
Pre-cast concrete manholes from 1000mm diameter;
Manhole frames and covers – Polymer Concrete
Maximum spacing of manholes - 75 meters;
House connection (110mm) will be supplied 1 meter from erf boundary.
Bedding and Backfill – SANS 1200

The following design criteria will apply:
Average dry weather flow (ADWF) - 80% of AADD (Water)
Average wet weather flow (AWWF) - ADWF + 15% of ADWF

Allowance for Domestic Sewerage Gradients on Erven:
Optimal gradient - 1:40
Maximum gradient - 1:15
Minimum gradient - 1:100

Network and Main Sewer:

DIAMETER	MINIMUM GRADIENT	MINIMUM FLOW	MAXIMUM VELOCITY
160mm	1/250	3,3 l/s	0,6 m/s
200mm	1/350	5,7 l/s	0,6 m/s
225mm	1/400	7,2 l/s	0,6 m/s
250mm	1/475	9,7 l/s	0,6 m/s
300mm	1/600	24,3 l/s	0,6 m/s

4.4.4 ROADS

4.4.4.1 LAYOUT AND ACCESS

Access to the development will be from the existing provincial road. The provincial road is a gravel road and negotiations with the Provincial Government should be embarked upon for upgrading of the road to a full surfaced standard. Access configuration, final layout and detail of the intersections will comply with the proposals contained in the Traffic Impact Study submitted for the establishment of the township.

4.4.4.2 INTERNAL ROADS

The internal road layout will be submitted to the Local Municipality of Madibeng for approval. The roads will be constructed in widths varying from 5m to 7m. Mountable kerbing will be provided along all the roads. At road intersections, semi mountable kerbs will be provided.

4.4.4.3 DESIGN CRITERIA

The geometric and structural design of the access road will be done in accordance with the "Guidelines for Human Settlement Planning and Design" compiled under the patronage of the Department of Housing by the CSIR.

4.4.4.4 ROAD CONSTRUCTION STANDARDS

Roads are to be constructed to standards specified in SANS 1200. Road materials conforming to the requirements of TRH 14 will be specified.

4.4.5 STORM WATER

4.4.5.1 INTERNAL LAYOUT

The natural drainage pattern of the terrain is towards the natural water course passing through the property from south to north.

4.4.5.2 DESIGN CRITERIA

The storm water design will be done in accordance with the "Guidelines for Human Settlement Planning and Design" compiled under the patronage of the Department of Housing by the CSIR, DWAF and design specifications of the Local Authority. Run-off and peak flow rates will be calculated according to selected return periods and outflow points. The 1:100 recurrence intervals will be used for the major system design and the 1:5 year recurrence will be used for storm water design in the residential areas. A formal drainage system of pipes and/or canals will be provided to convey storm water away from erven and streets and to discharge this water into natural water courses. The drainage system will be designed to minimize the impact of the development on the storm water characteristics of the property:

- Surface drainage where possible.
- Sub-surface (underground) pipe systems might be required to convey storm water from higher laying areas.
- Erosion protection, stabilization of erodible materials, and sediment control.

4.4.6 ELECTRICITY

The area earmarked for the development falls within the Madibeng Local Municipality electrical license distribution area. The networks surrounding the property are however being operated and maintained by Eskom.

4.4.6.1 AFTER DIVERSITY MAXIMUM DEMAND

The estimated after diversity maximum demand for the development as a whole is based on the following: The development includes the following land uses:

- Residential 1 - 837 stands
- Residential 2 - 1,4971 ha
- Business - 0,351 ha
- Educational and institutional - 2,9181 ha

From the briefing, it was indicated that the type of houses to be constructed will be mixed from RDP to Social / Affordable housing. From the prescriptions of the NRS 034, the type of housing can be categorized under the living standards measure (LSM) of 3&4 and 7 respectively.

The after diversity maximum demands will (based on the guidelines of the NRS 034) vary from 1.3 to 3.6kVA per stand.

In order to quantify the total increase in demand as a result of the development, the average after diversity maximum demand was taken as 2kVA per stand. The estimated increase in demand with the other land uses taken into account is estimated at 2.65MVA.

4.4.6.2 BULK ELECTRICITY SUPPLY

An inquiry was made with the Eskom Network Services Department Menlyn to determine the status quo of the existing medium voltage infrastructure in the area. The Elandsdrift 88/11kV substation equipped with 2 x 10MVA transformers is located approximately 2.4kms south-east of the area earmarked for the development. From the information obtained from Eskom, it appears as if the Elandsdrift substation is currently being operated at a demand beyond its safe capacity of 10MVA. The township can in all probability be supplied from the substation. The upgrading of the substation transformers have to be carried out irrespective of whether the proposed development continues or not.

The Mooinooi 88/11kV substation is located 1.8km north-east of the proposed development. The substation has according to Eskom Network Planning been upgraded recently and adequate spare capacity exists to accommodate the proposed development.

A feasibility quote application will have to be submitted to Eskom.

4.4.6.3 LINK SERVICES

Link services to the proposed site will be in the form of an overhead medium voltage line constructed from the Mooinooi substation to the development. The line will be constructed to be in accordance with the latest Eskom specifications and will be handed over to Eskom for operation and maintenance.

4.4.6.4 INTERNAL ELECTRICAL INFRASTRUCTURE

Medium voltage reticulation will be by means of overhead 11kV lines. The lines will be constructed in the street reserves. Poles will be 11 and 13m Eucalyptus with a staggered vertical construction and ACSR code name Mink conductor. Transformers will be installed at selected positions. The transformers will conform to SABS780 and will be mounted on 13m wooden poles. Each transformer will be provided with drop out fuse protection on the medium voltage side. Adequately sized Mosdorph fuses will provide overload protection to the transformers. Low voltage infrastructure will be overhead aerial bundle conductors on 9m and 7m wooden poles. The system will be mainly the mid-block type from where houses will be connected by means of 4mm and 10mm airdac. Pre-payment meters will be installed in all houses. It should be noted that the complete electrical infrastructure system will comply with the requirements of Eskom and will be handed over for operation and maintenance after the completion of construction. The infrastructure can be designed to accommodate a street lighting system. These systems are normally a street front low voltage system. It is recommended that underground house connections be provided if streetlights are to be provided.

4.5 ARCHAEOLOGICAL IMPACT ASSESSMENT

4.5.1 INTRODUCTION

Archaetnos cc was commissioned by Maxim Planning Solutions (Pty) Ltd to conduct an Archaeological Impact Assessment for the proposed development of a township on Portions 34 and the Remaining Extent of Portion 1 of the farm Elandsdrift 467 JQ, near Mooinooi in the North West Province. The results of the archaeological impact assessment are attached as **Annexure O** to the application for township establishment and are summarised in the following sections.

The area has been fairly extensively disturbed in the recent past by various activities including mining, rural/urban developments (large scale squatter camp included), as well as agriculture and other developments (roads, powerlines). One site (a portion of a stone walled Late Iron Age settlement) was identified during the assessment on the boundary of the development area. During previous work on other portions of the same farm by Archaetnos cc a number of archaeological and historical sites were identified in close proximity, and these sites will also be discussed in the report as part of the background to the archaeology of the area.

4.5.2 TERMS OF REFERENCE

The Terms of Reference for the survey were to:

- Identify all objects, sites, occurrences and structures of an archaeological or historical nature (cultural heritage sites) located in the area of the proposed development.
- Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value.
- Describe the possible impact of the proposed development on these cultural remains, according to a standard set of conventions.
- Propose suitable mitigation measures to minimize possible negative impacts on the cultural resources, should this be applicable.
- Review applicable legislative requirements.

4.5.3 LEGISLATIVE REQUIREMENTS

Aspects concerning the conservation of cultural resources are dealt with mainly in two acts. These are the National Heritage Resources Act (Act 25 of 1999) and the National Environmental Management Act (Act 107 of 1998).

4.5.4 NATIONAL HERITAGE RESOURCE ACT

According to the above-mentioned act the following is protected as cultural heritage resources:

a. Archaeological artifacts, structures and sites older than 100 years
b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
c. Objects of decorative and visual arts
d. Military objects, structures and sites older than 75 years
e. Historical objects, structures and sites older than 60 years
f. Proclaimed heritage sites
g. Grave yards and graves older than 60 years
h. Meteorites and fossils
i. Objects, structures and sites or scientific or technological value.

The national estate includes the following:

a. Places, buildings, structures and equipment of cultural significance
b. Places to which oral traditions are attached or which are associated with living heritage
c. Historical settlements and townscapes
d. Landscapes and features of cultural significance
e. Geological sites of scientific or cultural importance
f. Sites of Archaeological and palaeontological importance
g. Graves and burial grounds
h. Sites of significance relating to the history of slavery
i. Movable objects (e.g. archaeological, palaeontological, meteorites, geological specimens, military, ethnographic, books etc.)

A Heritage Impact Assessment (HIA) is the process to be followed in order to determine whether any heritage resources are located within the area to be developed as well as the possible impact of the proposed development thereon. An Archaeological Impact Assessment (AIA) only looks at archaeological resources. An HIA must be done under the following circumstances:

a. The construction of a linear development (road, wall, power line, canal etc.) exceeding 300m in length
b. The construction of a bridge or similar structure exceeding 50m in length
c. Any development or other activity that will change the character of a site and exceed 5 000m^2 or involve three or more existing erven or subdivisions thereof
d. Rezoning of a site exceeding 10 000 m^2
e. Any other category provided for in the regulations of SAHRA or a provincial heritage authority

Structures

Section 34 (1) of the mentioned act states that no person may demolish any structure or part thereof which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.

A structure means any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.

Alter means any action affecting the structure, appearance or physical properties of a place or object, whether by way of structural or other works, by painting, plastering or the decoration or any other means.

Archaeology, palaeontology and meteorites
Section 35(4) of this act deals with archaeology, palaeontology and meteorites. The act states that no person may, without a permit issued by the responsible heritage resources authority (national or provincial):

a. destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
b. destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
c. trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
d. bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment that assists in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.
e. alter or demolish any structure or part of a structure which is older than 60 years as protected.

The above mentioned may only be disturbed or moved by an archaeologist, after receiving a permit from the South African Heritage Resources Agency (SAHRA). In order to demolish such a site or structure, a destruction permit from SAHRA will also be needed.

Human remains
Graves and burial grounds are divided into the following:

a. ancestral graves
b. royal graves and graves of traditional leaders
c. graves of victims of conflict
d. graves designated by the Minister
e. historical graves and cemeteries
f. human remains

In terms of Section 36(3) of the National Heritage Resources Act, no person may, without a permit issued by the relevant heritage resources authority:

a. destroy, damage, alter, exhume or remove from its original position of otherwise disturb the
b. grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
c. destroy, damage, alter, exhume or remove from its original position or otherwise disturb any
d. grave or burial ground older than 60 years which is situated outside a formal cemetery
e. administered by a local authority; or
f. bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation,
g. or any equipment which assists in the detection or recovery of metals.

Human remains that are less than 60 years old are subject to provisions of the Human Tissue Act (Act 65 of 1983) and to local regulations. Exhumation of graves must conform to the standards set out in the **Ordinance on Excavations** (**Ordinance no. 12 of 1980**) (replacing the old Transvaal Ordinance no. 7 of 1925).

Permission must also be gained from the descendants (where known), the National Department of Health, Provincial Department of Health, Premier of the Province and local police. Furthermore, permission must also be gained from the various landowners (i.e. where the graves are located and where they are to be relocated to) before exhumation can take place.

Human remains can only be handled by a registered undertaker or an institution declared under the **Human Tissues Act** (**Act 65 of 1983 as amended**).

Unidentified/unknown graves are also handled as older than 60 until proven otherwise.

4.5.5 NATIONAL ENVIRONMENTAL MANAGEMENT ACT

This act states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made.

Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation's cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

4.5.6 METHODOLOGY

Survey of literature
A survey of literature was undertaken in order to place the development area in an archaeological and historical context. The sources consulted in this regard are indicated in the bibliography.

Field survey
The assessment was conducted according to generally accepted HIA/AIA practices and was aimed at locating all possible objects, sites and features of cultural (archaeological and historical) significance in the area of proposed development. If required, the location/position of any site is determined by means of a Global Positioning System (GPS), while photographs are also taken where needed.
The assessment was undertaken partially on foot, although certain portions were traversed by vehicle.

Oral histories
People from local communities are sometimes interviewed in order to obtain information relating to the surveyed area. It needs to be stated that this is not applicable under all circumstances. When applicable, the information is included in the text and referred to in the bibliography.

Documentation
All sites, objects, features and structures identified are documented according to the general minimum standards accepted by the archaeological profession. Co-ordinates of individual localities are determined by means of the Global Positioning System (GPS). The information is added to the description in order to facilitate the identification of each locality.

4.5.7 DESCRIPTION OF AREA

The proposed development area is located on The Remaining Extent of Portion 1 and Portion 34 (a portion of Portion 7) of the farm Elandsdrift No. 467-JQ, north of the town of Mooinooi in the North West Province. The topography of the area is relatively flat, with only one or two small outcrops and hills. The Elandsdrift Spruit crosses through the area on its eastern most section.

The area has been extensively disturbed in the past through agricultural activities, rural and residential and other developments. This includes the development of a large squatter settlement, while some mining activities are also found in the larger geographical area. If any sites of any real cultural heritage (archaeological & historical) significance did exist here in the past these would have been disturbed or destroyed to a large degree. The 1:50 000 topographic map of the area (2527DA Bapong), dating to 1996, indicates mainly agricultural fields, as well as ruins and other structures/homesteads in the area. No grave sites or other historical features are shown.

4.5.8 DISCUSSION

A short, general, background to the archaeology and history of the area is given in the following section.

Stone Age
The Stone Age is the period in human history when lithic (stone) material was mainly used to produce tools (Coertze & Coertze 1996: 293). In South Africa the Stone Age can be divided in basically into three periods. It is however important to note that dates are relative and only provide a broad framework for interpretation. The division for the Stone Age according to Korsman & Meyer (1999: 93-94) is as follows:

- Early Stone Age (ESA) 2 million – 150 000 years ago
- Middle Stone Age (MSA) 150 000 – 30 000 years ago
- Late Stone Age (LSA) 40 000 years ago – 1850 - A.D.

The closest known Stone Age in the vicinity of Mooinooi is known as the Magaliesberg Research Area. It consists of nine sites including rock shelters in the Magaliesberg Mountain. These date back to the Middle and Late Stone Age (Bergh 1999: 4; Korsman & Meyer 1999: 94-95).

The area does not contain shelters or any other indication of living areas. One can therefore assume that Stone Age people would have stayed somewhere in the hills and would have passed this area during their hunting and gathering activities.

Stone Age material is frequently found close to rivers, but none was found during this survey.

Iron Age
The Iron Age is the name given to the period of human history when metal was mainly used to produce artifacts (Coertze & Coertze 1996: 346). In South Africa it can be divided in two separate phases according to Van der Ryst & Meyer (1999: 96-98), namely:

- Early Iron Age (EIA) 200 – 1000 A.D.
- Late Iron Age (LIA) 1000 – 1850 A.D.

Huffman (2007: xiii) however indicates that a Middle Iron Age should be included. His dates, which now seem to be widely accepted in archaeological circles, are:

- Early Iron Age (EIA) 250 – 900 A.D.
- Middle Iron Age (MIA) 900 – 1300 A.D.
- Late Iron Age (LIA) 1300 – 1840 A.D.

Late Iron Age sites have been identified in the area around the town of Mooinooi. In a band stretching roughly from Brits in the east to Zeerust in the west many Iron Age sites have been discovered previously (Bergh 1999: 7-8). These all belong to the Later Iron Age (Bergh 1999: 8-9). A copper smelting site was identified along the Hex River to the northwest of the surveyed area (Bergh 1999: 8).

During earlier times the area was inhabited by a Tswana group, the Fokeng. In the 19th century and even today, this group still inhabits this area with other Tswana groups, the Kwena and the Po (Bergh 1999: 9-10). During the difaqane these people moved further to the west, but they returned later on (Bergh 1999: 11).

A large Iron Age complex was found during earlier surveys for mining development on other portions of Elandsdrift (van Vollenhoven & Pelser 2008: 12-15), and it is possible that remnants of this could have been located on this section of the farm as well. However, recent developments (such as the squatter settlement) could have obscured all evidence of this.

A section of possible LIA stone walling was identified in the area, although it is located on the outer boundary of the area. This site could be related to the one recorded during 2008. It is not significant.

GPS Location of site: S25.72653 E27.54231.

Historical Age
The historical age started with the first recorded oral histories in the area. It includes the moving into the area of people that were able to read and write.

Early travelers have moved through this part of the Northwest Province. This included David Hume in 1825, Robert Scoon and William McLuckie in 1829 and Dr Robert Moffat and Reverend James Archbell in 1829 (Bergh 1999: 12, 117-119).

Hume again moved through this area in 1830 followed by the expedition of Dr Andrew Smith in 1835 (Bergh 1999: 13, 120-121). In 1836 William Cornwallis Harris visited the area. The well known explorer Dr David Livingston passed through this area between 1841 and 1847 (Bergh 1999: 13, 119-122).

The area around Mooinooi, including the surveyed area was inhabited by white pioneers as early as 1839 (Bergh 1999: 15).

No historical sites or features were identified during the assessment. However, a number were recorded during the 2008 assessment on other portions of the farm. These included farm and farm worker related structures and homesteads, as well as graves. Although none were identified during 2012 it should be noted that sites could be identified during the development process. This would include low stone packed or unmarked graves.

4.5.9 CONCLUSION AND RECOMMENDATIONS

In conclusion it is possible to say that the assessment of Portion 34 and the Remaining Extent of Portion 1 of the farm Elandsdrift 467 JQ, for a proposed township development near the town of Mooinooi in North West was conducted relatively successfully. Besides a small section of possible Late Iron Age stone walling on the outer boundary of the area, no other sites, features or objects of archaeological or historical origin or significance were identified. It is known that other sites, including stone walling from the LIA, recent historical (farm related) structures and graves are located on other portions of the farm, in fairly close proximity to the development area. It is therefore possible that similar sites could still be found in the area, although past and fairly recent developments (such as the squatter settlement) and agricultural activities (ploughing and crop growing) would have extensively disturbed or destroyed any evidence of these if it did exist here in the past. The very dense vegetation in the area also made assessing the area difficult.

Finally, it should be noted that the subterranean presence of archaeological and/or historical sites, features or artifacts are always a distinct possibility. Care should therefore be taken during any development activities that if any of these are accidentally discovered, a qualified archaeologist be called in to investigate. This would include the discovery of previously unknown graves. With farming related activities in the area, including the settlement of farm labourers here, last mentioned is a distinct possibility. Graves related to the squatter residents would also have to be taken into consideration.

4.6 ENVIRONMENTAL IMPACT ASSESSMENT

In assessing the requirements in respect of the conducting of an environmental impact assessment in terms of the National Environmental Management Act, 1998 (Act 107 of 1998), it is prudent to note that informal occupation of the proposed development site already took place. Based on experience gained during projects of similar nature, it is not necessary to conduct a full Environmental Impact Assessment.

In order to verify the unlisted status of this project, an application was submitted to the Department of Economic Development, Environment, Conservation and Tourism. The fore-mentioned application was followed by a site inspection conducted by two (2) officials from the Department of Economic Development, Environment, Conservation and Tourism. In response to the site inspection, the Department of Economic Development, Environment, Conservation and Tourism issued a letter on 03 October 2012 confirming that the project was regarded as not falling within the prescribed Basic Assessment / EIA Scoping procedures (refer exemption letter attached to the application for township establishment as **Annexure T**).

5. PROPOSED TOWNSHIP

5.1 LAND USES

The intention of the applicant i.e the Madibeng Local Municipality is to utilize the concerned properties for the establishment of the proposed township area of Mooinooi Extension 2. As mentioned in Section 1, the Department of Human Settlements, Public Safety and Liaison has embarked on a programme to eradicate informal settlements and to replace same with integrated human settlements. This is also the case in respect of the Mamba Informal Settlement where informal occupation of the land has taken place. The project set out from the onset to endeavour to accommodate the existing informal housing structures on properly planned and surveyed erven. For this purpose, we commissioned an aerial

survey of the proposed development area to determine the exact location of the existing informal housing structures.

Plate 15: View of aerial survey indicating existing informal structures

Even though the Department of Human Settlement, Public Safety and Liaison initially set out to erect 1500 sustainable integrated human settlement units, the size of the subject property as well as the physical restrictions, as will be discussed in detail in section 5.2, limited the number of erven that could be provided on the subject properties to approximately 900.

As mentioned previously the layout planning process initially set out to accommodate as many existing informal dwelling structures on erven as possible. During the layout planning process it however became apparent that this endeavour would prove futile due to the following factors:

- The existing settlement pattern in the central part of the development area allowed for the creation of roads with a road reserve 8 metres or less. This road reserve width would have proven inadequate to accommodate a proper road surface as well as the necessary services networks;
- The settlement pattern also gave rise to an excessive number of four way intersections along collector roads;
- Based on the existing site demarcations and the need to provide road reserves to supply access to the individual erven, erf sizes ranged between 125m² and 450m². This large variance in the erf sizes was not regarded as acceptable.

The initial layout plan compiled in respect of the township area and setting out to accommodate the existing informal housing structures is indicated in the following layout plan:

Plate 16: Initial layout plan compiled in respect of the township area to accommodate existing informal structures

During presentation of the layout plan to the Project Steering Committee on 14 September 2012, it was resolved to compile a conventional layout plan in respect of the proposed township area and to disregard the location of existing informal housing structures due to the factors mentioned above. Where possible we endeavoured to accommodate existing informal structures on erven but the amended layout plan was compiled based on sound planning principles. The layout plan of the township area makes provision for the following land uses:

Use Zone	Proposed Land Use	Number of erven	Area in hectares	% of area
Residential No. 1	Dwelling houses	837	31,6461	46,05%
Residential No. 2	Flats (Social housing / flats)	1	1,4971	2,18%
Business No. 1	Shops	1	0,3511	0,51%
Institutional	Community Facility	1	02814	0,41%
Institutional	Church	4	0,5049	0,73%
Educational	Primary School	1	1,9512	2,84%
Educational	Crèche	3	0,2406	0.35%
Municipal	Park	17	19,7692	28,77%
Streets	Streets		12,4848	18,16%
Total		**865**	**68,7264**	**100%**

Following receipt of instructions to compile a conventional layout plan in respect of the proposed township area, Maxim Planning Solutions (Pty) conducted a site survey to identify all existing formal housing structures already erected on the development area. During the compilation of the layout pan of the proposed township area, we endeavoured to provided as many as possible formal structures on planned erven. In some instances it was however impossible to attain this due to the location of the structures in relation to one another. The layout plan indicating the location of existing formal housing structures are reflected on the following layout plan (note formal structures in red and formal structures under construction are indicated in blue)

Plate 17: Amended layout plan also indicating existing formal housing structures

The amended layout plan was presented tot he Project Steering Committee on 01 November 2012. An opportunity was given to the members of the Project Steering Committee to scrutinize the layout plan and to propose such amendments as may be deemed necessary. The layout plan was subsequently approved on 07 November 2012. This approved layout plan is reflected above.

During the meeting of the Project Steering Committee on 01 November 2012, a representative of Lonmin Mining Group commented on a proposed Eskom powerline that is to be constructed and which may prove to impact on the proposed development area. In response to the fore-mentioned information, Maxim Planning Solutions (Pty) Ltd approached Eskom for information in respect of the proposed powerline. Eskom subsequently provided the co-ordinates of the proposed 88kV overhead powerline servitude area and it was confirmed that the proposed powerline servitude will impact on the western portion of the proposed township area. In order to accommodate the route of the proposed Eskom servitude, amendments were effected tot he western portion of the township area to accommodate the 31m Eskom servitude area. The final layout plan compiled in respect of the proposed township area of Mooinooi Extension 13 is reflected on the following layout plan:

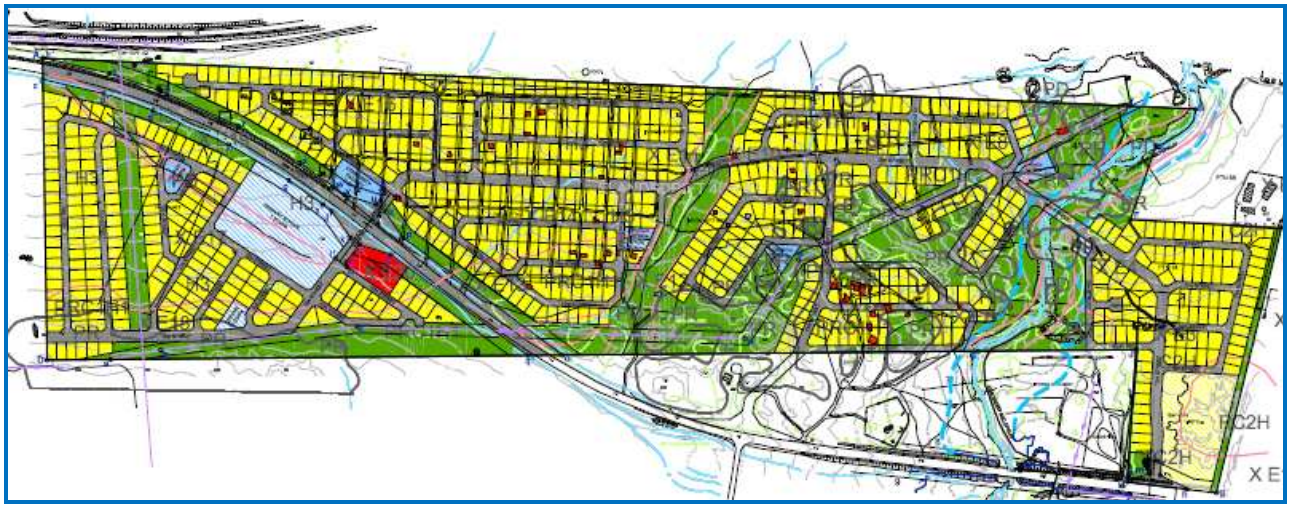


Plate 18: Final layout plan

5.2 FACTORS INFLUENCING THE LAYOUT PLAN

The layout plan of the proposed township area of Mooinooi Extension 13 was influenced by the following factors:

- An existing powerline located along the eastern boundary of the proposed township area (refer area in purple along the eastern boundary of the township area on **Plate 20** below). The layout plan accommodates this powerline in a Municipal erf accommodating a building restriction area of 9m from the centre of the powerline.
- An existing overhead powerline traversing the central portion of the development area. Provision was made for a 18m building restriction area along the route of this powerline (refer area in purple traversing the development area from east to west on **Plate 20** below).

Plate 19: View of existing powerline traversing central portion of development area

- The proposed Eskom powerline servitude, traversing the western portion of the development area, was similarly incorporated in the layout plan within open space erven (refer area in purple traversing the western portion of the development area from north to south on **Plate 20** below).
- The development area is traversed by Road 108 and provision was made for a road reserve with of 30 metres in accordance with the relevant proclamation notice published in the Official Gazette No. 3777 on 17 September 1975 and as amended by Administrator's Notice 1078 published in the Provincial Gazette No. 2202 on 26 July 1978 (refer area in grey on **Plate 20**)

Plate 20: Powerlines and Road 108

- The proposed township area is traversed by the Elandsdrift Spruit and the 1:100 year floodline applicable to the fore-mentioned Spruit was calculated by CWT Water Technology, as reflected in blue on **Plate 21**.

Plate 21: Powerlines, Road 108 and 1:100 year floodline

Plate 22: View of Elandsdrift Spruit

- The geotechnical investigation conducted in respect of the development area identified an old borrow pit (refer area in purple on **Plate 23**) in the eastern sector of the development area as well as an area characterised by mixed spoil (refer area in brown on the following Plate). In addition to the fore-mentioned, the geotechnical investigation also identified a drainage feature located within the central portion of the development area (refer area in yellow on **Plate 23**). Based on the location of the borrow pit in relation to the rock outcrop area, this borrow pit was accommodated in the open space system of the proposed township area. The area characterised by mixed spoil was reserved for future social housing purposes. The central drainage feature was accommodated into the open space system of the proposed township area.

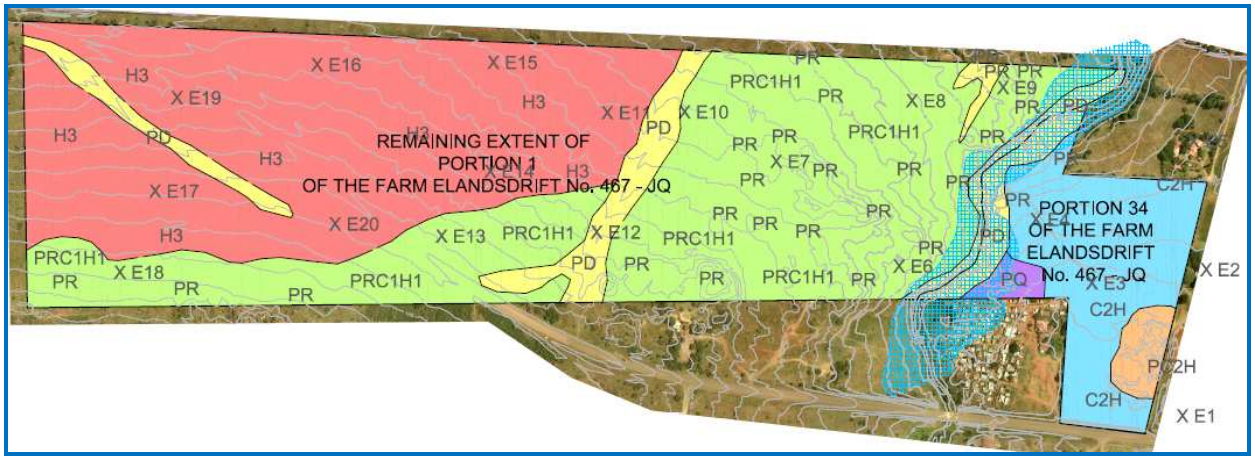


Plate 23: Geotechnical soil zonation

- The aerial survey of the development area also identified areas characterised by extensive rock outcrop (as indicated in red dashed lines on **Plate 24**). From the current settlement pattern it was also evident that these areas are not suitable for residential development purposes and these areas were incorporated into the open space system of the proposed township area.

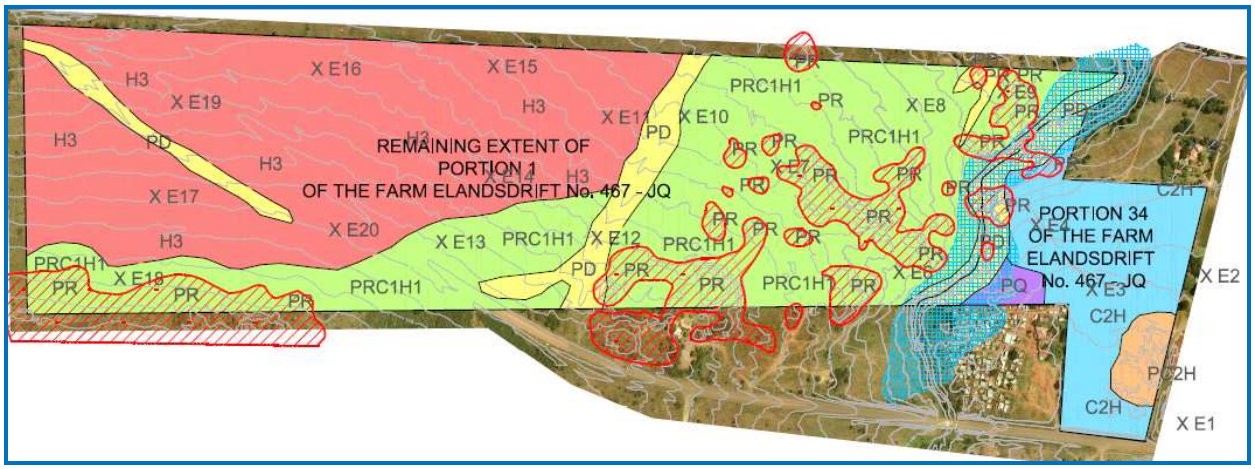


Plate 24: Geotechnical soil zonation and rock outcrop areas

Plate 25: View of rock outcrop area

- All the physical restrictions that had to be taken into consideration during the layout planning process are reflected on **Plate 26**.

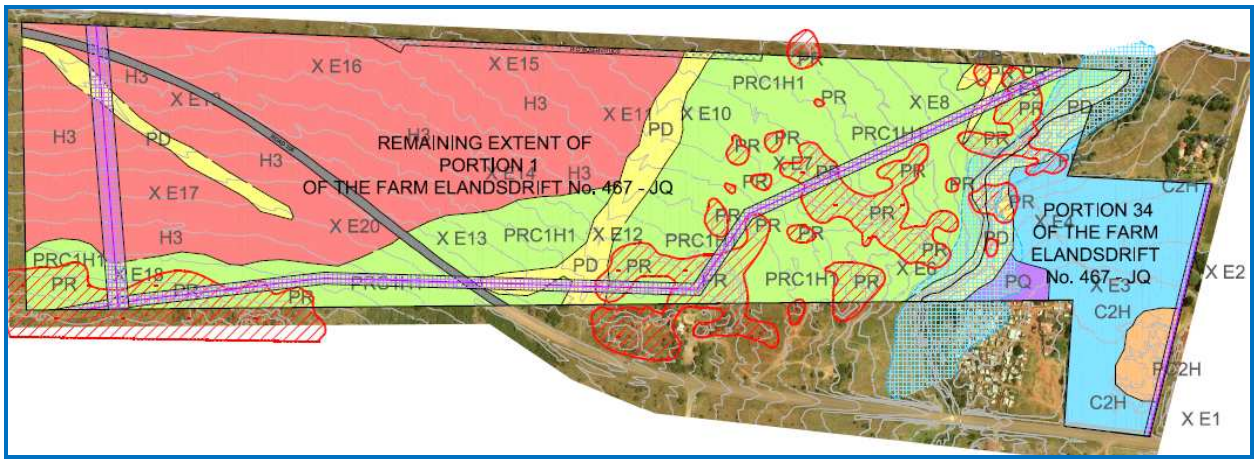


Plate 26: View of all physical restrictions affecting the development area

- The road network of the proposed township area makes provision for a system of 16m, 13m and 10m streets and was designed to ensure proper surface drainage.

Plate 27: View of street network and accesses adopted for the proposed township area

- Access to the proposed township area will be obtained from Road 108 from an access point located in the eastern sector of the township area as well as a proposed entrance point along Road 108 within the central part of the development area. The latter access point will similarly function as a service node in the township area providing for community facilities, commercial- and educational facilities.

Plate 28: View of Road 108 (direction west)

Plate 29: View of Road 108 (direction east)

- A 16m building restriction area was imposed along Road 108 and said building restriction area was accommodated into the open space system of the proposed township area where it applies to residential erven.
- A line of no access was also imposed along the boundary of the township area bordering onto Road 108.
- As mentioned previously, the township layout plan makes provision for 837 residential erven with an average stand size of 378m² . The residential erven were positioned in areas deemed suitable for development (i.e areas not influenced by rocky outcrop, floodline or powerline building restriction areas or servitudes).

Plate 30: Layout plan indicating road network and residential erven

- The layout plan of the proposed township area is also based on the intention to provide a central service node. This service node, located at the entrance to the township area from Road 108 makes provision for a site that can function as a community facility (community hall, clinic, municipal pay point), a business site (shop), as well as a site demarcated for a primary school. In addition to the fore-mentioned facilities, the layout plan also accommodates a number of erven provided for the purposes of churches as well as for the establishment of crèche facilities. These erven were provided at strategic locations within the township area.

Plate 31: View of layout plan indicating non-residential erven

- During preparation of the layout plan and site visits conducted, two (2) existing cemetery site were also identified. The one site is located along the southern boundary of Portion 34 of the farm Elandsdrift No. 467-JQ and the other within the central portion of the development area. These cemetery sites were accommodated in the open space system of the proposed township area and no provision has been made for the extension of these facilities due to the unfavourable soil conditions that are not suitable for the development of a cemetery. Based on field observations the graves are all of recent origin and comprise burials that have taken place recently.

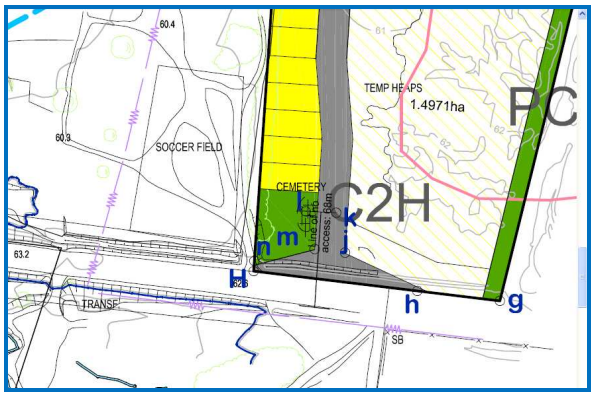


Plate 32: Location of cemetery in eastern sector

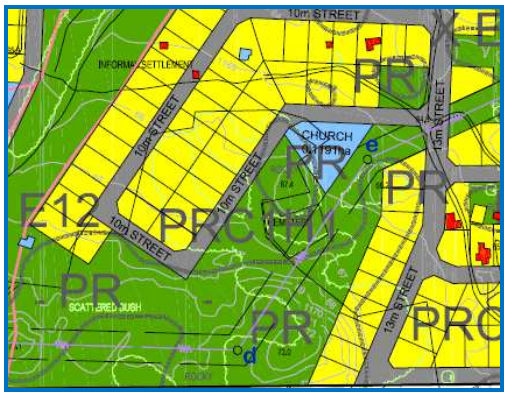


Plate 33: Location of cemetery in central sector

- The layout plan also makes provision for stormwater outlets at strategic locations throughout the proposed township area to allow for the surface drainage of the township area.

6. CONCLUSION

The following strategic guidelines exist that serve to motivate and guide development on the Remaining Extent of Portion 1 and Portion 34 (a portion of Portion 7) of the farm Elandsdrift No. 467-JQ:

CONSTITUTION

According to Chapter 2: Bill of Rights of the Constitution of the Republic of South Africa (Act 108 of 1996), Section 26 stipulates that, with regard to housing, everyone has the right to have access to adequate housing.

DEVELOPMENT FACILITATION ACT (ACT 65 OF 1995)

The establishment of a township on the farm Elandsdrift No. 467-JQ will adhered to the applicable development directives as stipulated in the Development Facilitation Act, 1995 (Act 65 of 1995) namely the:

- Promoting of integration in respect of social, economic institutional and physical aspects of development;
- Promoting integrated development in rural and urban areas
- Promoting development of localities that are nearer to residential and employment opportunities; and
- Optimizing the use of existing resources.

NORTH WEST SPATIAL DEVELOPMENT FRAMEWORK: 2011

In terms of the North West Spatial Development Framework: 2011, the residential development of the farm Elandsdrift No. 467-JQ could be classified under two types of intervention zones:

Intervention Zone Two: Social Inclusion Areas representing areas for investment in people rather than in places: The purpose of Intervention Zone Two is to focus on rural development by promoting the

concept of social inclusion and the strengthening in economic activity and poverty to address high levels of spatial fragmentation and exclusion.

Intervention Zone Three: Stimulating and kick starting New Potential Growth Nodes as indicated in the North West Spatial. The purpose of the Intervention Zone Three is to focus on the emergence of potential new nodes where spatial overlaps between areas of economic activity and areas of poverty occur. This implies focused investment in poverty concentrations that show potential for economic development in their spatial and socio-economic context.

The Bojanala Platinum District SDF indicate the study area as part of the mining belt (Mining GVA above 2500) and the area is earmarked for the concentration of especially poor income communities.

MADIBENG SPATIAL DEVELOPMENT FRAMEWORK

The Mooinooi/Bapong complex in the south-western part of the region is indicated as an important future development area. Not only is this an area that is characterized by a number of settlements that are poorly services and poorly connected, but it is also of strategic importance in the sense that it lies on the Bakwena Platinum Corridor and the mining focus area. The Bapong complex is an ever growing settlement cluster that should be the focus area for the introduction of infrastructure and services. If it is expected that the mining activities in this area will further expand in future, then it can be expected that these settlements will also further grow. The location of these settlements on the Platinum Corridor will enable them to benefit from economic development along the corridor once that begins to materialise in Madibeng.

Although Elandsdrift No.467 JQ is located in the Mining Corridor, it can be seen as part of the Bapong Settlement Development area as it is located between Mooinooi, mining activities and Bapong.

The linkage between the Bapong/Mooinooi Settlement Development Area and Brits is indicated as a Strategic linkage.

HOUSING SECTOR PLAN

Bapong is indicated as a Current Housing Project Rural (PHP) which comprises of 50 Subsidy housing units.

With regard to Potential New Housing Projects, Mooinooi area informal settlement upgrade is indicated as a project within the Multi Year Implementation programme for the Year 2012/2013 – 2016/17 whereby a minimum of 1000 units will be created.

Portion 34 of the farm Elandsdrift No 467-JQ and the Remaining Extent of Portion 1 of the farm Elandsdrift No. 467-JQ are also subject to Notarial Deed of Agreement No. 4374/2009 dated 11 September 209 whereby the National Department of Land Affairs of the Republic of South Africa imposed certain conditions pursuant to the acquisition of the property on behalf of the Madibeng Local Municipality for human settlement purposes. This notarial deed of agreement sets out the responsibilities of the various parties in respect of the development of the subject property in order to allow for the transfer of erven to the respective beneficiaries. The process of township establishment embarked on by the Madibeng Local Municipality aims at ensuring compliance with the conditions contained in the fore-mentioned Notarial Deed of Agreement.

Conclusions drawn from the various specialist reports regarding the development potential of the land are as follows:

HOUSING BACKLOG (HSP)

- Elandsdrift, Western Platinum Mines , Wonderkop, Mooinooi, Maroelakop, Segwaelane are indicated as part of Cluster 1 and Bapong is indicated as Cluster 2.
- The average annual growth rate that were utilized for Cluster 1 and 2 is 5,3% per annum which indicates a total backlog estimated in 2007 as 5407.
- With regard to the Identification of Potential Housing Projects for inclusion in Multi - Year implementation programme Mooinooi area informal settlement upgrade (Elandsdrift) is indicated as a project within the Multi Year Implementation programme for the Year 2012/2013 – 2016/17 whereby a minimum of 1000 units will be created.
- Portion 34 of the farm Elandsdrift No 467-JQ and the Remaining Extent of Portion 1 of the farm Elandsdrift No. 467-JQ are subject to Notarial Deed of Agreement No. 4374/2009 dated 11 September 2009 whereby the National Department of Land Affairs of the Republic of South Africa imposed certain conditions pursuant to the acquisition of the property on behalf of the Madibeng Local Municipality for human settlement purposes. This notarial deed of agreement sets out the responsibilities of the various parties in respect of the development of the subject property in order to allow for the transfer of erven to the respective beneficiaries. Therefore the process of township establishment embarked on by the Madibeng Local Municipality can be seen as a process that aims at ensuring compliance with the conditions contained in the fore-mentioned Notarial Deed of Agreement.

TRANSPORT STUDY

- The farm Elandsdrift is located along Road 108 to the north of the N4 and west of D314 (a road under the jurisdiction of North West Province). **Access into the site will be off Road 108.**
- With regard to the trip distribution, mostly all the traffic will come from the south via the N4 or Mooinooi.
- The intersection between the D314 and Road 108 is currently stop controlled.
- The following scenarios with regard to future development on this specific intersection is indicated as follows:
  - For the **Existing 2012** scenario the analysis indicates that the intersection operates with acceptable LOS during both peak hours analyzed.
  - With including the additional traffic by **2013** the intersection operation will deteriorate slightly although no upgrades will be necessary.
  - For the **Future 2016** scenario the intersection operation will near capacity during the AM peak hour, therefore at that stage traffic signals are proposed if it is warranted.

- **The Traffic Impact Study made the following recommendation:**
  - That Road 108 is tarred
  - Provision of traffic signals at the intersection of D314 and Road 108 by 2016.
  - Provision of a 1,5m wide sidewalk from D314 to the site.

GEOTECHNICAL REPORT

- A site of approximately 70 hectares, on portions of the farm Elandsdrift No.467-JQ, was investigated to determine the engineering geological properties that will influence township proclamation.
- After Site inspection the following was indicated:

- The site is underlain by norite, leuconorite and anorthosite of the Merensky Reef, and anorthosite and leuconorite of the upper chromitite seam, of the Rustenburg Layered Suite, Bushveld complex. Expansive clay or turf is a typical weathering product of norite, and loose sandy material with a collapsible fabric usually forms the colluvium from the weathering of the quartzite further to the south of the site.
- Deposits of quaternary age consist of colluvium and alluvium covering the lithology.
- Economic mining surrounds the area and future mining must not be sterilized by this development.
- No dolomite occurs near the area.
- Limited excavatability will increase development cost in some areas, and development should be restricted to outside the floodlines.

- Certain aspects needs to be considered with regard to the proposed township:
  - Some severe problems are foreseen regarding the **excavatability to 1,5m** depth.
  - Zoning of the site revealed zones with minor & major constraints regarding the **collapsible properties, consolidation and expansive potential** of the soil.
  - **Modified normal & special construction** techniques as described will as such mitigate the encountered problems successfully to enable proper development.
  - **The following special foundation solutions are advised:**
    Site Class H3: Stiffened or cellular raft**,** with articulation joints or lightly reinforced masonry, OR piled construction, i.e. piled foundations with suspended floor slabs with or without ground beams OR a soil raft, i.e. the removal of all or part of the expansive horizon to 1,0m beyond the perimeter of the structure and replacement with inert backfill, compacted to 93% of maximum Mod AASHTO dry density at -1% to +2% of optimum moisture content. Normal construction with lightly reinforced strip foundations and light reinforcement in masonry can then be performed if residual movement is less than 7,5mm. Good site drainage and appropriate service precautions are necessary in conjunction with all of the above.
    Site Class C2H: In addition to the above: split construction, comprising a combination of reinforced brickwork/blockwork and full movement joints, suspended floors or fabric reinforced ground slabs and site drainage and plumbing/service precautions, can also be considered.
- To conclude the township establishment process can continue but will have to take into account the special foundation solutions as mentioned above.

CIVIL ENGINEERING REPORT

A study was conducted by EPS Consulting Engineers and the following indicated:

The current situation with regard to services was indicated as follows:

Water Source
There is no sustainable water available in the existing township. The community relies on untreated water.

Supply Pipelines and Pump Systems
No pipelines currently exist in the townships.

Service Reservoirs
No reservoirs had been constructed for the communities to date.

Distribution Network
No distribution network is available in the area.

Sanitation
Self-constructed pit toilets, not complying with any regulation, service most of the erven with a number of erven not having any sanitation at all.

After a detail investigation was conducted the following are proposed with regard to the provision of services with regard to the proposed township:

Water:

Bulk water Supply

It is recommend that Alternative 1 should be regarded as the preferred alternative and that further investigation be done to incorporate the water reticulation network of the new township with the existing water network of Mooinooi. Alternative 1 is discussed as follows:

Alternative 1: Connect to Existing Water Distribution Network in Mooinooi

An extensive water reticulation system had been provided for the town of Mooinooi. Mooinooi was initially developed by the mines in the area and the infrastructure was mainly installed by the mines at the time. The main source of water is a bulk connection to the Rand Water Board mainline. Storage capacity (elevated reservoirs) had been provided for Mooinooi from where a bulk supply water pipeline provides water to the town. The Moonooi water reticulation network currently terminates approximately 2,5km from the proposed new township. The minimum requirement would be the installation of a dedicated bulk line to supply the township with water.

A detailed investigation and analyses of the existing water reticulation network and reservoirs will be required to establish the required upgrades to the existing water supply network to supply the proposed township with water. This would apply especially to the bulk lines and reservoirs to ensure that the proposed new township can be incorporated into the existing Mooinooi water distribution and reticulation network.

- **Infrastructural Requirements**
  A new reservoir will have to be constructed to ensure that sufficient capacity is available for the ±900 households in Elandsdrift. The required capacity for the reservoir is approximately 3 Ml. Bulk water lines will be installed from the existing reticulation system or new reservoirs up to the proposed new development.
- **Internal Water Layout**
  The internal layout of the water reticulation system will be designed to accommodate peak demand in terms of the “Guidelines for Human Settlement Planning and Design”.

Sanitation:

Internal Layout
The internal sewerage system will be designed to accommodate the average dry weather flow (ADWF) and to service every stand in the development. The design criteria accepted by the Local Municipality Madibeng will be implemented as discussed further in this report.

Estimated Sewerage Run-Off

The sewerage run-off is estimated at 80% of the average daily water demand. Thus, the average dry weather flow (ADWF) is 792 kl/day based on the water calculations above.

- **Bulk Sewer**
  Alternative 1: Connect to the Existing Sewer Treatment Plant
  All internal sewers will gravitate via a conventional sewer system to a pump station situated at the lowest of the proposed development. The pump station, at full development, will be equipped with two electric pumps. Pump control will be by means of pressure switches and flow meters. The sump volume will be determined to minimize motor starts to 10-15 starts per hour. Screens and a grid chamber will be used on the pump station to limit blockages in the pumps. The sewer will be pumped to the existing sewer treatment plant in Mooinooi. The existing sewer treatment plant in Mooinooi will have to be upgraded and expanded to accommodate the additional sewerage effluent generated by the proposed new township.

Roads:

- **Layout and Access**
  Access to the development will be from the existing provincial road. The provincial road is a gravel road and negotiations with the Provincial Government should be embarked upon for upgrading of the road to a full surfaced standard. Access configuration, final layout and detail of the intersections will comply with the proposals contained in the Traffic Impact Study submitted for the re-establishment of the township.

- **Internal Roads**
  The internal road layout will be submitted to the Local Municipality Madibeng for approval. The roads will be constructed in widths varying from 5m to 7m. Mountable kerbing will be provided along all the roads. At road intersections, semi mountable kerbs will be provided.

- **Design Criteria**
  The geometric and structural design of the access road will be done in accordance with the "Guidelines for Human Settlement Planning and Design" compiled under the patronage of the Department of Housing by the CSIR.

- **Road Construction Standards**
  Roads are to be constructed to standards specified in SANS 1200. Road materials conforming to the requirements of TRH 14 will be specified.

Storm Water:

- **Internal Layout**
  The natural drainage pattern of the terrain is towards the natural water course passing through the property from South to North.

- **Design Criteria**
  The storm water design will be done in accordance with the "Guidelines for Human Settlement Planning and Design" compiled under the patronage of the Department of Housing by the CSIR, DWAF and design specifications of the Local Authority. Run-off and peak flow rates will be calculated according to selected return periods and outflow points. The 1:100 recurrence intervals will be used for the major system design and the 1:5 year recurrence will be used for storm water design in the residential areas. A formal drainage system of pipes and/or canals will be provided to convey storm water away from erven and streets and to discharge this

water into natural water courses. The drainage system will be designed to minimize the impact of the development on the storm water characteristics of the property:

- Surface drainage where possible.
- Sub-surface (underground) pipe systems might be required to convey storm water from higher laying areas.
- Erosion protection, stabilization of erodible materials, and sediment control.

ELECTRICAL ENGINEERING REPORT

A study was conducted by Ampcon Consulting Electrical Engineers and the following are indicated with regard to the provision of Electrical Services to the proposed township:

- The area earmarked for the development falls within the Madibeng Local Municipality electrical license distribution area. The networks surrounding the property are however being operated and maintained by Eskom.

- After a detail investigation was conducted the following are proposed with regard to the provision of electrical services with regard to the proposed township:

  - After diversity maximum demand
    The after diversity maximum demands will (based on the guidelines of the NRS 034) vary from 1.3 to 3.6kVA per stand.

In order to quantify the total increase in demand as a result of the development, the average after diversity maximum demand was taken as 2kVA per stand. **The increase in demand will, based on the above, be in the order of 2,65MVA.**

- **Bulk Electricity supply**

The Elandsdrift 88/11kV substation equipped with 2 x 10MVA transformers is located approximately 2.4kms South East of the area earmarked for the development.

From the information obtained from Eskom, it appears as if the Elandsdrift substation is currently being operated at a demand beyond its safe capacity of 10MVA. The township can in all probability be supplied from the substation. The upgrading of the substation transformers have to be carried out irrespective of whether the proposed development continues or not.

The Mooinooi 88/11kV substations is located 1.8km North-East of the proposed development. The substation has according to Eskom Network planning been upgraded recently and adequate spare capacity exists to accommodate the proposed development.

A feasibility quote application will have to be submitted to Eskom.

- **Link services**

Link services to the proposed site will be in the form of an overhead medium voltage line constructed from the Mooinooi substation to the Development. The line will be constructed to be in accordance with the latest Eskom specifications and will be handed over to Eskom for operation and maintenance.

- **Internal electrical infrastructure**

Medium voltage reticulation will be by means of overhead 11kV lines. The lines will be constructed in the street reserves. Poles will be 11m and 13m Eucalyptus with a staggered vertical construction and ACSR code name Mink conductor.

Transformers will be installed at selected positions. The transformers will conform to SABS780 and will be mounted on 13m wooden poles. Each transformer will be provided with drop out fuse protection on the medium voltage side. Adequately sized Mosdorph fuses will provide overload protection to the transformers.

Low voltage infrastructure will be overhead aerial bundle conductor on 9 and 7m wooden poles. The system will be mainly the mid-block type from where houses will be connected by means of 4mm and 10mm airdac.

Pre-payment meters will be installed in all houses. It should be noted that the complete electrical infrastructure system will comply with the requirements of Eskom and will be handed over for operation and maintenance after the completion of construction.

The infrastructure can be designed to accommodate a street lighting system. These systems are normally a street front low voltage system. It is recommended that underground house connections be provided if streetlights are to be provided.

ARCHAEOLOGICAL REPORT

The area has been fairly extensively disturbed in the recent past by various activities including mining, rural/urban development's (large scale squatter camp included), as well as agriculture and other developments (roads, powerlines). One site (a portion of a stone walled Late Iron Age settlement) was identified during the assessment on the boundary of the development area. **Besides this small section of possible Late Iron Age stone walling on the outer boundary of the area, no other sites, features or objects of archaeological or historical origin or significance were identified**.

Finally, it should be noted that the subterranean presence of archaeological and/or historical sites, features or artefacts are always a distinct possibility. Care should therefore be taken during any development activities that if any of these are accidentally discovered, a qualified archaeologist be called in to investigate. This would include the discovery of previously unknown graves. With farming related activities in the area, including the settlement of farm labourers here, last mentioned is a distinct possibility. Graves related to the squatter residents would also have to be taken into consideration.

TOPOGRAPHICAL FEATURES AND FLOODLINE

The site is located on a shallow slope generated from the Magalies Mountain and the Mamba Hills towards the Elandsdrift River, with 1160 to 1180MASL. Plate flow is the dominant drainage pattern on site, and the Elandsdrift Spruit divides the two portions under investigation. Drainage occurs in a eastern and then northern direction towards the Elandskraal Spruit, and further northwards into the Middelkraal Dam and the Crocodile River. To conclude the topographical features will not have a detrimental impact on the proposed township.

The topographical features of the proposed development area were determined by means of an aerial survey that was conducted by Azur Aerial Works.

A detail floodline study was commissioned to determine the exact area affected by the 1:100 year floodline. This area was, in terms of current legislation, excluded for residential development and was

incorporated within the proposed township as "Public Open Space" areas and for the purposes of recreational activities.

MINING IMPACT

The rights to minerals and rights to chrome in respect of the Remaining Extent of Portion 1 and Portion 34 respectively were ceded in favour of Samancor Limited (01/008883/06) by virtue of Notarial Cession of Mineral Rights K1072/1992RM and Notarial Cession of Chrome Rights K979/1993RM registered on 25 February 1993 and 22 February 1993 respectively. The consent of the mineral rights and chrome rights holder will be obtained as part of the township establishment process.

The geotechnical investigation conducted in respect of the proposed development area also indicated extensive mining activities near the site and a history of mining or contaminated land in the area were found. The site is located in close proximity to mining activities and mining operations can cause stability problems for structures. In terms of standard township establishment procedures relating to land that is undermined and subject to settlement, shock or cracking, the "shock warning clause" will be made applicable to all erven in the proposed township area.

ENVIRONMENTAL IMPACT ASSESSMENT

Based on experience obtained during previous projects of similar nature and based on directives issued by the Department of Economic Development, Environment, Conservation and Tourism, the fore-mentioned Department confirmed that the project does not require any Basic Assessment or Environmental Impact Assessment as informal settlement has already taken place on the development area.

K. RAUBENHEIMER
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