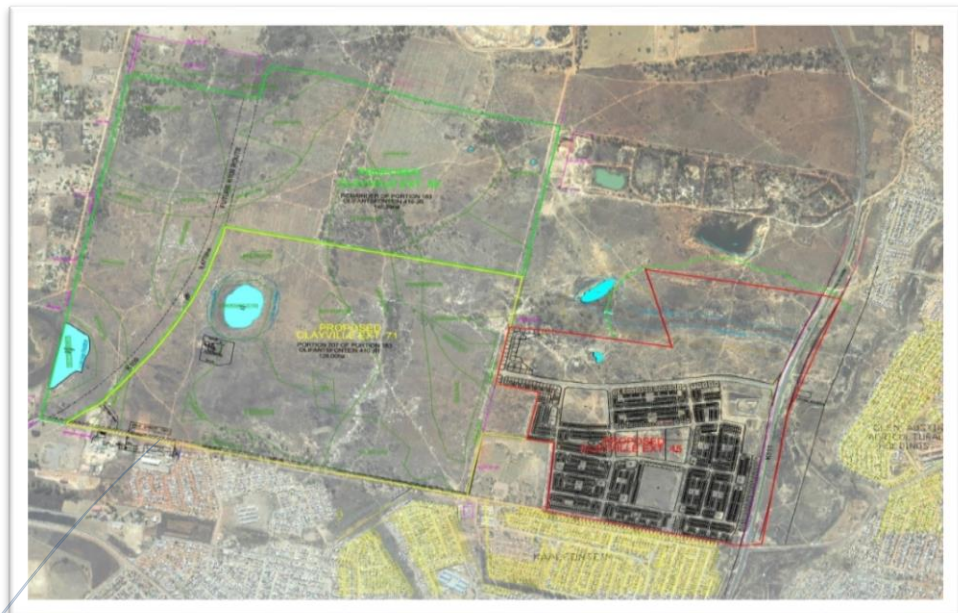


CLAYVILLE/TEMBISA MEGA PROJECT BUSINESS PLAN: ELECTRICAL SERVICES REPORT

Project: 14040 & 14050 Date: 03 Nov 2015 – Rev 04



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Abbreviation

ADMD	– After Diversity Maximum Demand
Al	– Aluminium
BNG	– Breaking New Ground
Cu	– Copper
DoE	– Department of Energy
EMM	– Ekurhuleni Metropolitan Municipality
FLISP	– Finance Linked Individual Subsidy Programme
GDoH	– Gauteng Department of Housing
HPS	– High Pressure Sodium
HV	– High Voltage (88kV or higher)
LCE	– Lebohang Consulting Engineers
LV	– Low Voltage
MV	– Medium Voltage (11kV)
PILC	– Paper Insulated Lead Covered
RDP	– Reconstruction and Development Programme

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1. Project Description

The Clayville/Tembisa Mega Project is a large scale mixed land use housing development situated within the Ekurhuleni Metro Municipality (EMM) boundary area of jurisdiction. This mixed income and topology development strives to create a sustainable and secure environment for the community, and caters for a wide range of beneficiaries from the poorest of the poor to the middle class. The mixed tenure housing development is planned in accordance with the Breaking New Ground (BNG) Policy of national government.

The Clayville/Tembisa Mega Project comprises of approximately 14 320 BNG housing units and through innovative urban design, this development blends the surrounding communities, access routes, social and commercial facilities (School, Businesses, Crèches, Parks, etc.) with the various housing typologies and public open spaces situated on Portion 207 (A Portion of Portion 183), Portion 188 and the Remainder of Portion 183 of the Farm Olifantsfontein 410-JR. See **Annexure A** for a locality plan of the area.

The development yields a total area of approximately 364ha.

This Mega Project also offers the opportunity for integration of this development site with the existing townships in and around the immediate area. Special care will be taken to create social contours throughout the development and beyond to promote seamless integration of communities. The Clayville/Tembisa Mega Project will form a benchmark in integrated housing development market in this country by transforming the existing fragmented and racially-based framework inherited from the previous government into a safe, spirited, pulsating community that is socially, economically and fiscally affordable and sustainable.

Valumax Midrand (Pty) Ltd was appointed by Gauteng Department of Human Settlements (GDHS) to commence with the immediate construction of 200 RDP units in Clayville Extension 45 and to make the township operational. The remaining units in Clayville Ext 45, 71 and 50 will be constructed over a rolling 4 year period.

Refer to the tables below for the Urban Amenities breakdown.

<u>Urban Amenities Clayville Ext 45</u>		
	Number of Facilities (erven) Note: Floor area calculated after FAR and Coverage has been applied.	Estimated kVA per Facility
Business	1 large business node	75 VA/m ²
Industrial	0	100 VA/m ²
Cultural Village	2	50 VA/m ²
Community Facility	2	75 VA/m ²
Religious	2	25 kVA
Schools	2	50 kVA
Crèche	3	50 kVA
Parks	5 formal parks with approximately 30 courtyards as internal play area or combi courts.	n/a

Urban Amenities Clayville Ext 50		
	Number of Facilities (erven) Note: Floor area calculated after FAR and Coverage has been applied.	Estimated kVA per Facility
Business	4	75 VA/m ²
Clinic/Library	3	50 VA/m ²
Community Facility	3	75 VA/m ²
Religious	2	25 kVA
Schools	1	50 kVA
Parks	4	n/a

Urban Amenities Clayville Ext 71		
	Number of Facilities (erven) Note: Floor area calculated after FAR and Coverage has been applied.	Estimated kVA per Facility
Business	2	75 VA/m ²
Clinic	2	50 VA/m ²
Community Facility	7	75 VA/m ²
Religious	2	25 kVA
Schools	1	50 kVA
Filling Station	1	75 VA/m ²
Parks	47	n/a

Table 1 - 3 – Urban Amenities

Note: The urban amenities can only be confirmed upon approval of the development plan.

Estimated total load for the urban amenities is 5MVA. Please note that this is estimated on the current number and size of urban amenities as per drawings "Clayv50Lay"-21/10/2015, "Clayv71Lay" – 26/10/2015 & "Clayville Subdivisions, Consolidation, Master Plan 2014 06 20" which were received from Valumax Midrand.

2. Situational Analysis

2.1. Spatial Investigation

2.1.1. Spatial Location – Regional Analysis

The Clayville/Tembisa Mega Project is situated in the Ekurhuleni Metro Municipality (EMM) area of jurisdiction.

The portion of Olifantsfontein Farm 410-JR where Clayville located is at co-ordinates: **25°58'12.60"S, 28°11'8.00"E**

The proposed development is located east of the future K109, north of Kaalfontein Ext 22, south of the R562 (Olifantsfontein Road) and west of the K111.

The spatial context of the development in relation to surrounding urban areas is illustrated in Figure 1.

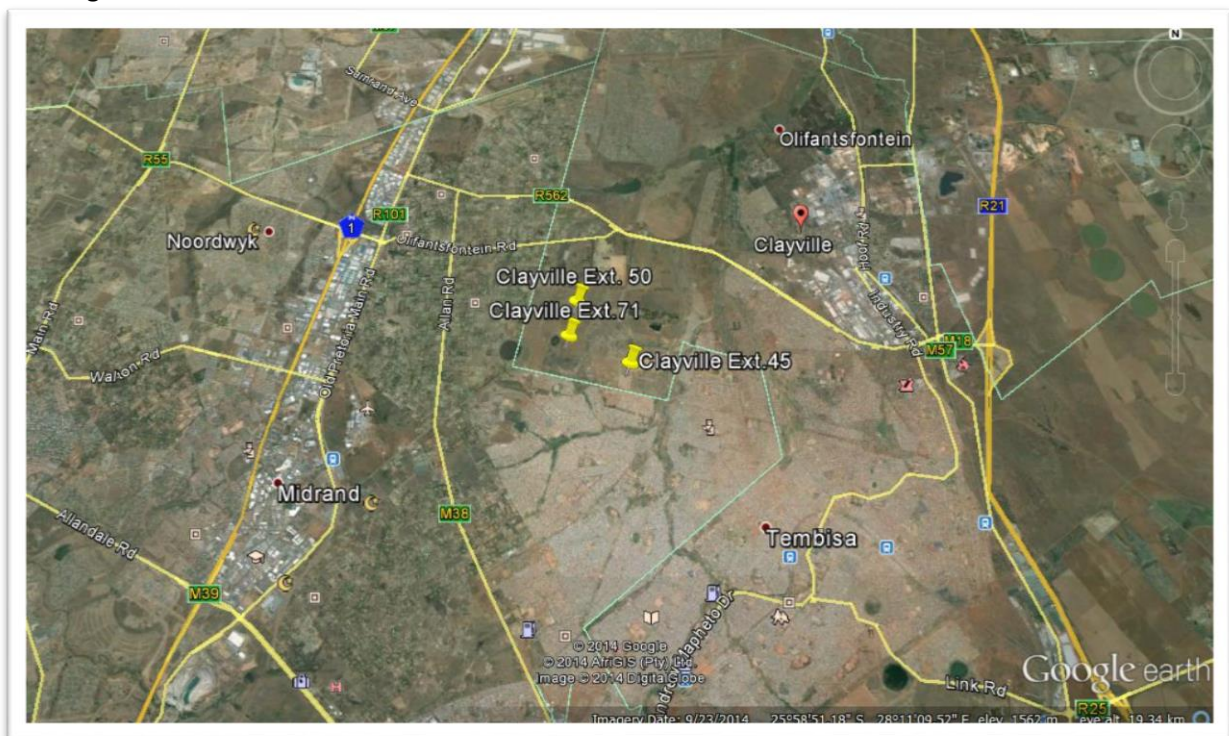


Figure 1 - The spatial context of the development in relation to surrounding urban areas

Clayville is located approximately 37 km North East of Johannesburg CBD.

2.1.2. Positive and Negative Impacts of the Spatial Development

The areas around the Clayville/Tembisa Mega Project such as Tembisa, Clayville and Kaalfontein are predominantly previously disadvantaged settlements with limited access to basic services, public amenities and social facilities. This development will stimulate economic growth, stimulate service delivery, increases revenue inflows for the city, provide decent housing alternatives to eradicate the critical housing shortage in Tembisa and help to minimize illegal land invasion.

2.2. Project Context

2.2.1. Location

The development will take place on Portion 207 (A Portion of Portion 183), Portion 188 and the Remainder of Portion of the Farm Olifantsfontein 410-JR as illustrated in Figure 1.

2.2.2. Historical Data

The Ekurhuleni Metropolitan Municipality (EMM) in conjunction with the Gauteng Department of Human Settlements (GDHS) expropriated a portion of land from the Strydom Land Portfolio in 2007 for the development of RDP housing in the Tembisa area. Following the expropriation process, EMM appointed a PRT to submit an application for township establishment to establish a township on Portion 188 of the farm Olifantsfontein 410-JR, which was called Clayville Extension 45.

Clayville Extension 45 was initially designed as a fully subsidized township which provided for a total of 1 419 RDP (Fully subsidized) units, 820 Rental units and 152 FLISP units-therefore a total of 2 384 residential units to eradicate the housing backlog in Madelakufa 1, 2 and Freedom Square informal settlements.

Valumax Midrand/Tamworth Investments JV (Valumax/Tamworth JV) submitted a development proposal to the Department of Human Settlements and EMM wherein it was proposed that the entire development model be amended from a subsidized township to a fully integrated housing model that provides RDP, GAP/FLISP and SHRA rental units.

The development proposal motivated that an increase in residential yield could be achieved in Clayville Extension 45 through the densification of the township by utilizing the existing township layout with the existing services that are already installed. The integrated development model will densify the township through a range of strategic rezoning, consolidation and subdivision applications. These applications will not change the street layout or the internal services. It will also not cause any delays in the implementation strategy/plan as a substantial part of the existing layout is kept unchanged.

The new development model for **Clayville Ext 45** provides the following number of different housing typologies (RDP, GAP/FLISP and Rental):

- 200 : Single Residential RDP units
- 1 421 : High Density Walk-up RDP units
- 1 134 : Single Residential GAP/FLISP units
- 420 : High Density Rental units
- **3 175 : Total Residential Units**

The proposed Valumax/Tamworth JV development model increase the residential yield from 2384 units to 3175 residential units which is an increase of 791 residential units. That is an increase of 38% which makes a considerable difference in eradicating the critical housing backlog in the Tembisa area.

Valumax/Tamworth JV was subsequently appointed by the GDHS as Turnkey Developer for Clayville Extension 45, Clayville Extension 71 and 50.

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Clayville Ext 71 will provide the following number of different housing typologies (RDP, GAP/FLISP and Rental):

- 2 412 : High Density Walk-up RDP units
- 2 220 : Single Residential GAP/FLISP units
- 1 402 : High Density Rental units
- **6 034 : Total Residential Units**

Clayville Ext 50 will provide the following number of different housing typologies (RDP, GAP/FLISP and Rental):

- 2 045 : High Density Walk-up RDP units
- 2 278 : Single Residential GAP/FLISP units
- 788 : High Density Rental units
- **5 111 : Total Residential Units**

2.2.3. Environmental

Clayville Ext 45 has a positive record of decision which was issued in August 2006.

The EIA applications for Clayville Ext 71 and 50 are in process and approval is anticipated to be in place by March 2016.

2.2.4. Economic Situation/Activity

Historically the Tembisa/Clayville areas have been neglected in terms of service delivery and Changes in the growth of the employment population provide an indication of underlying changes in economic activity. Employment is essentially demand driven; therefore an increase in employment is an indication of an increase in economic activity caused by an increase demand for commodities.

2.2.5. SWOT Analysis

Strengths <ul style="list-style-type: none">• Vacant Land in strategic areas.• Close to existing developments.• Close to major access routes.	Weaknesses <ul style="list-style-type: none">• New Infrastructure to be installed.• Cost of new infrastructure
Opportunities <ul style="list-style-type: none">• Opportunity to integrate spatially segregated areas.• Create economic opportunity.• Employment Creation.• Access to services and public amenities (Schools, Crèches, Churches, Parks, etc)• Provide a wide range of housing options.• Increase revenue streams for local authority.• Upliftment of local community through local community participation.	Threats <ul style="list-style-type: none">• Nearby informal settlements.• Land invasion.• Bulk Supply from Eskom is urgently required to supply the development.• Bulk Electricity Capacity in the area needs to be created/upgraded by Eskom.

3. Project Rationale (Objectives)

3.1. Project Alignment

3.1.1. Spatial Development Framework

In terms of Chapter 5 of the Municipal Systems Act, 2000 (Act 32 of 2000), the municipality's Integrated Development Plan must reflect a spatial development framework which must include the provision of basic guidelines for a land use management system for the municipality.

The fundamental role that the Municipal Spatial Development Framework must play in municipal area is to ensure the development of a sustainable urban and rural environment while at the same time creating an enabling environment for the implementation of the developmental agenda of national government.

The Clayville/Tembisa Mega Project aligns itself to this role and it complies with development guidelines and principles as contained in the Municipal Spatial Development Framework as listed below:

- Sustainability
- Efficiency
- Integration
- Economic development

3.1.2. Municipal IDP

The Municipal Systems Act, 2000 requires municipalities to draw up an Integrated Development Plan as a singular, inclusive and strategic development plan that is aligned with the deliberate efforts of the surrounding municipalities and other spheres of government. In terms of the Municipal Systems Act, municipalities are required to produce a five year IDP which is reviewed annually and consists of the following components:

- A vision of the long-term development of the city;
- An assessment of the existing level of development in the city which must include an identification of the need for basic municipal services;
- The city's development priorities and objectives for its elected term;
- The city's strategies which must be aligned with any rational or provincial sectoral plans and planning requirements;
- A spatial development framework which must include the provision of basic guidelines for a land use management system;
- The city's operational strategies;
- A disaster management plan;

Any development undertaken in the municipal area must be assessed according to the IDP to ensure that it is aligned with the development vision of the city, that it adheres to the spatial development framework guidelines, and that it is obtained within the city's budget. The Clayville/Tembisa Mega Project is in accordance with Municipal planning initiatives as contained in the IDP.

3.1.3. Housing Growth and Development Strategy

The Growth and Development Strategy aims to promote integrated, holistic, sustainable and participatory growth and development. It acknowledges and identifies the role of other sectors of society in ensuring socio-economic transformation. The Growth and Development Strategy seek to achieve a shared vision, amongst all sectors of our society, for the achievement of our goal of

improving the quality of life for all our citizens. It reinforces the principle of integrated, holistic, sustainable and participatory development as a critical pillar in addressing poverty and unemployment – and as a principle that encompasses meeting all the needs of our people, ensuring community or beneficiary involvement and ownership, long-term sustainability on all levels, and equitable socio-economic development with equitable benefits for all. It is believed that the Clayville/Tembisa Mega Project will be developed in accordance with the vision and principles as contained in the Growth and Development Strategy.

3.1.4. Urban Edge

The Urban Edge has been drawn by the Provincial Government to ensure that urban sprawl is contained in order to protect valuable agricultural land and natural areas and to ensure a more sustainable urban structure. The Clayville/Tembisa Mega Project is ideally located within the urban edge in between already built-up developments where industrial and business will further enhance the spatial integration of the wider region.

3.2. Desired Outcomes of the Development

The desired outcome of the development is to create a vibrant human settlement that conforms to the Subsidised Housing principles as contained in the National Department of Corporate Governance, Traditional Affairs and Human Settlements' Comprehensive Plan for Sustainable Development, 2004 (Breaking New Ground). In addition to this, the aim of the development is to:

- Have access to reliable and affordable basic services
- Have a variety of housing typologies and tenure types
- Enable socio-economic integration
- Provide access to economic opportunities and sustainable transport
- Provide access to social services
- Be in balance with the natural open systems
- Have access to green open spaces
- Create a safe, secure environment
- Use local labour and resources
- Ensure community participation and empowerment
- Create a development which is financially viable.
- Essentially the development strives to be a place to live, work and play in a safe, secure environmentally conducive neighbourhood.

The development strives to meet and adhere to all the above-mentioned principles in the layout planning and urban design of the development. The true success of the development can only be measured once the development is completed and community feedback is received from the residents living in the development to assess if the above mentioned principles were met.

3.3. Project Benefit Analysis

The Clayville/Tembisa Mega Project will assist in eradicating the backlog which currently exists for housing in the region. The variety of housing typologies and tenure types provided within the development will also ensure that a wide range of the market is catered for by the development. The development also ensures that community facilities are provided for within the development. A large number of temporary and permanent employment opportunities will be created by the development through construction activities during the implementation of the development as well as the business and commercial developments that will create job opportunities in the long run.

3.4. Project Spin-Offs

The spin-offs of the project will be fully understood during the construction of the development. The development will provide work opportunities for a number of contract workers during the construction of the electrical networks, and as the development is established and the commercial sites are developed, more work opportunities will be created to the secondary labour market.

Furthermore, the development will house commuters who previously had to travel a much farther distance to their places of employment. In addition to the electrical internal network which will be supplied, street lighting will also be installed.

The street lighting will provide for safer neighbourhoods, encouraging late travel, increased hours of operation for businesses, secure places for children to play and social networking. The street lighting will assist in the viability of the project and facilitate the take up of the bonded houses and commercial stands.

3.5. Public Participation Process

A thorough public participation process was followed in the Clayville/Tembisa Mega Project. Firstly, a public participation process was followed during the environmental investigations as well as the town planning process. During these processes the community commented on all aspects of this project.

A political steering committee has been established for this project, whereby a platform has been created for the community to air their views. COJ officials, the MMC, ward councillors, community representatives as well as the GDoH are represented at this meeting.

4. Project Specification – Bulk and Internal Electrical Network

4.1. Introduction

The aim was to create a development which will have a reliable electrical network as well as a network which will be visually appealing. To fall in-line with EMM specifications, an underground network was designed for where the MV infrastructure is underground, the LV infrastructure is underground, and the service connections are underground.

MV Power failures are less since the MV networks are not exposed to adverse weather conditions. The quality of supply and quality of service of the MV networks are much higher than overhead networks. The above systems are reticulation systems which are accepted by EMM and the networks must be handed over to EMM on completion.

The developer is also in agreement with this since it increases the aesthetics of the area. The same reticulation approach will be maintained throughout the development.

4.2. Background

This report deals with the Bulk, Bulk Link and Internal Infrastructure requirements for the development which consists of approximately 14 320 BNG units. The Clayville/Tembisa Mega Project is situated within the Ekurhuleni Metro Municipality Boundary and on the border of the EMM and Eskom supply areas which makes the provision of supply more challenging than under normal circumstances.

After basic planning was completed to establish the extent of the development, negotiations were entered into with EMM Electricity and Energy for the provision of bulk electrical services for the development.

The scope of the project will entail the bulk electricity supply via Eskom backbone overhead network by EMM through the self-build/turn-key construction of a new EMM substation, the bulk link from the newly constructed sub to the development distribution points and the internal electrical reticulation inclusive of service connections and the street lighting networks. The entirety of the electrical infrastructure will be taken over by the EMM for maintenance and billing purposes upon completion.

4.3. Scope of the Project

The Scope of Works for the Electrical Consultant Engineer has been defined as:

- Bulk, Link & Internal Electrical Engineering Services for the entirety of the development.

Note: 492 units have already been serviced in the first phase of the Clayville Ext 45 development.

4.4. Design Criteria

4.4.1. Bulk Supply

Temporary bulk supply

Currently a Budget Quote has been received from Eskom for a temporary 7MVA supply to service a portion of the first phase of Clayville Ext 45 from their College Substation. According to Eskom there is minimal additional 11kV capacity at the substation however the HV capacity is limited and as a result no additional load can be added to the substation. There are currently no other feasible temporary alternatives.

This supply will expire after 5 years and as a result a permanent bulk supply solution must be found for the entire development.

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Permanent Bulk supply

Bulk supply in the area is constrained, however after holding meetings with Eskom they have indicated that a solution could be available as early as the end of 2016 when they envisage their HV network to be repaired, however planning meetings are continually being postponed and as yet there are no set dates which are being worked towards. If their current network is repaired, an upgrade will be required to create sufficient additional capacity on the repaired network. A new substation is required in the area not only to supply the Clayville/Tembisa Mega Project but also the surrounding areas. The developer has received confirmation from the relevant supply authorities that they will be allowed to construct the substation and associated works as a "Self-Build" Project due to Eskom/EMM's capital constraints. The envisaged end state of the new Ekurhuleni Metropolitan Municipality Clayville substation is 3x30MVA 88/11kV. An approximate total capacity of 55 MVA is required for the entire Clayville/Tembisa Mega Project. This includes approximately 3 MVA excess per extension in order to cater for the unknown number and scale of the urban amenities.

After holding discussions with Eskom there appear to be 2 possible options for bringing sufficient capacity into the area, with each posing a different set of challenges.

Option 1 – Linking into existing Claystep/Clayglass 88kV ring:

Positives:

- Currently forms part of the most stable Eskom network in the area.
- Possibly the quickest solution.

Negatives:

- No confirmation has yet been received from Eskom on whether or not sufficient capacity is available on this network.
- A double circuit will most likely need to be constructed to prevent the EMM Clayville substation from being positioned on a radial feed.
- Approximately 8km of 88kV double circuit line will need to be constructed.
- Crossing existing Eskom 275kV and 88kV lines could be problematic.
- A larger servitude will be required to cater for the double circuit overhead lines.

Option 2 – Upgrading and repair of existing Lulamisa/Crowthorne 88kV infrastructure:

Positives:

- Once completed sufficient capacity will be available.
- A shorter link line will be required to merge into this network.

Negatives:

- EMM Clayville Substation would need to loop-in off the existing Midrand Estates-Noordwyk line.
- The Midrand Estates-Noordwyk line is in serious need of refurbishment. Ideally, Eskom would like to rebuild the line.
- The Lulamisa-Crowthorne line had to be dismantled (Legal matter) which is one of the ring's ends, the other end being the Lepini-Ivory Park line. Lepini-Ivory Park was already running at 101% under normal conditions before winter.
- The entire associated network is operating under an abnormal situation and operational contingency plans are being used to prevent blackouts.

- As a result, no immediate work can be done on any part of that network and no additional load can be added.
- A larger servitude will likely, still be required.

In order for the construction of the substation to proceed, Eskom's network strengthening needs to be completed. No timelines are currently available for either option.

4.1.2 Internal Infrastructure

The proposed infrastructure will follow Ekurhuleni's underground specifications as they will ultimately take over the infrastructure. The Medium Voltage (MV) infrastructure is underground; Low Voltage (L.V) infrastructure is underground and the service connections underground. It is anticipated that electrical reticulation cost per BNG unit in the first year of construction, will be approximately R (excl. VAT). This cost per unit will be escalated per annum. The technical specifications discussed in this report may change after final discussions with Ekurhuleni.

MV Infrastructure

The development will be subdivided into zones and miniature substations placed per zone, rendering 3kVA per subsidised household ADMD and 3.5kVA per FLISP household ADMD according to EMM Electricity and Energy specification. Essentially 500 kVA mini- substations may be used.

Mini-substation Information:

- Type: Type 'B' Mini-sub with SF6 RMU,
- Colour: Beige,
- LV Spurs: MCCB (Fixed size, CBI or similar) Contractor to size accordingly (depending on feeder size) and install.
- Including: Streetlight Control Panel
- The mini-subs must be installed complete with concrete plinths.
- All mini-substations must be fitted with protective structures.

All MV Cables will be to Ekurhuleni Standard: 6.35/11kV, 300mm² Al x 3 core PILC, screened cable.

All MV cables are to be buried at a depth of 0.9m (on a 0.1m bed) total trench depth 1m, trench width 0.45m.

The mini-substations will be connected on ring/ 3 leg-ring design networks directly from the substation or switching station.

LV Infrastructure

The low voltage network will be fed from appropriately rated feeder circuit breakers in the miniature-substations via underground cables to Metering Kiosks (equal or similar to 12, 16 or 20 way Power Process Systems 3CR12). Earth conductors (120mm², 70mm² and 35mm²) must be run in parallel with the LV supply cables.

All meter kiosks must be protective structures able to house standard British footprint meters.

LV cables will be 95mm² Cu PVC/PVC/SWA/PVC 600/1000V.

All LV cables are to be buried at a depth of 0.5m (on a 0.1m bed) total trench depth 0.6m, trench width 0.3m.

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Service Connections

Parameters:

- ADMD (Subsidised Unit): 3kVA/erf
- ADMD (FLISP Unit): 3.5kVA/erf
- Supply voltage: 420/242 Volt
- Regulation: +- 8%
- Service connection (max.): 40 Amp, Curve 1, 10kA (In Kiosk)

All service connections will be done with 16mm² 2-core Cu PVC/SWA cable and shall be installed from the Kiosk to the DB in the residential unit to avoid joining of cables.

The service connection must be able to interface with an Ekurhuleni specified pre-payment meter. Currently the preferred meter will be a standard footprint PLC meter.

Metering and Vending

The house owner is responsible for applying for a pre-paid meter directly at Ekurhuleni Metro Municipality. The contractor will terminate and install a CB in the Meter Kiosk and must clearly mark the Unit/House numbers in the Kiosk. Discussions are still being held between the developer and EMM as to the most cost effective solution for the installation of the meters.

The metering of RDP units will differ and this process still needs to be confirmed.

Sleeves

Cable sleeves shall be installed for road crossings and any other required position where the sleeves would be considered appropriate. 160mm inside diameter PVC or NEX tube sleeves shall be used, buried at a depth of 1.5m where roads are to be constructed at a later stage.

Earthing

Earthing requirements shall be carried out in accordance with EMM specification and shall adhere to the latest revision of the SANS 10292 (SABS 0292) *Earthing of low-voltage (LV) distribution systems*.

The TN-C-S earthing system shall be employed.

Multiple earthing at less than 5Ω shall apply to all mini-substations.

Street Lighting

The public lighting shall be in accordance with EMM specification and SANS 10098-1:2007, Table 2: *Recommended lighting values for group B and group C streets and footways*.

Streetlight Poles

New 8.7m galvanised steel poles shall be installed. The poles must be earthed using 6mm² BCEW

Streetlight Fittings

70W HPS Luminaire, side entry, no overhang with a boom angle of 15° must be installed. Luminaire mounting height: 7.5m. One fitting per pole.

4.5. Engineering Comments

This project will provide the electrical infrastructure for the proposed development. After construction the infrastructure will be handed over to EMM. The budget put forth in this proposal has overall escalations taken into account at a rate of 6% per annum. Acknowledgement needs to be made of the current low price of base metals, should the price of the base metals increase through SEIFSA beyond

the escalations provided for, the Contractor reserves the right to apply for additional funding in relation thereto.

4.6. Professional Team

The developer Valumax Midrand (Pty) Ltd has appointed Lebohang Consulting Engineers (Pty) Ltd to act on their behalf for the negotiations with the supply authority, design approval and project management of the construction of the proposed infrastructure.

5. Strategy and Implementation

An internal electricity infrastructure network will be provided to ensure that all stands in the development can be supplied with electricity. This proposed network will receive bulk electricity supplies from the relevant network.

The following preconditions and key success factors are required for the provision of an electricity supply connection to each erf:

- That the proposed EMM Clayville Substation needed to supply this development be constructed as a “Self-Built” project to be built by the developer and handed over to EMM.
- That bulk electricity supplies can be made available by Eskom or EMM in the interim.
- That adequate funding is provided by the developer, the Department of Energy and EMM for the FLISP units.
- Those negotiations are successfully concluded between the relevant parties.
- That agreements can be put in place where required: i.e. Valumax, EMM, Eskom and GDHS.
- That design approvals be given timeously.
- That construction of the facilities is executed in terms of contracts.

5.1. **Procedural Plan**

The design will be done using the layout plan of the proposed development to be received from the Developer. Specialised computer programs will be utilised to do the drafting and calculate the volt drops and currents in the conductors of the networks before installation.

5.2. **Action Plan**

The following actions are required:

5.2.1. **Design stage**

- Determine ADMD for housing and expected loads for other stands.
- Determine position of network in street reserve.
- Determine the technology to be used i.e. overhead, underground or other.
- Determine material to be used.
- Determine metering methods, i.e. prepaid meters, split or meter in house.
- Finalise design and obtain approvals – drawings and design reports.

5.2.2. **Documentation and Procurement stage**

- Finalising project and particular specifications for equipment required for the planned infrastructure.

5.2.3. **Construction Stage**

- Install components of the reticulation system as per EMM specifications.
- Before installation all items must be inspected and approved to ensure that quality standards are maintained. Also obtain appropriate certificates and paperwork and forward to EMM.
- After construction is complete the scheme shall be finally inspected.
- Inspection sheets shall be completed for record purposes.

5.2.4. Commissioning and handing over

- After final inspection of the installation arrangements must be made with the appropriate departments in EMM for the power to be switched on and the installation to be handed over.
- The inspection sheets together with as-built drawings, any manuals and a materials list must be issued to EMM for their records and the updating of their asset register.

5.3. Stakeholder Engagement

- The Electrical engineers will engage with EMM during the following aspects:
- Approval and designs
- Attending site meetings during construction
- Taking over of the installation on completion
- EMM will thereafter take over the operation and maintenance of the system after commissioning.

6. Operation and Maintenance

The operation and maintenance of the electrical networks will be executed through the existing organisational structures of EMM.

All enquiries and complaints will have to be routed through the normal customer service channels of EMM for the network supplying the development.

Clayville/Tembisa Mega Project

Overall Funding Report

Electrical Infrastructure

7. Financial Arrangements

The assumptions in terms of the financial arrangements are as follows:

The availability of funds from different funding sources will be investigated i.e. Valumax Midrand (Pty) Ltd, D.O.E and EMM etc.

It must be noted that the Department of Energy does not provide any funds for street lights.

The costs detailed below are proposed based on the information available at the time of submission of this report and are subject to either increases or decreases as and when more detail becomes available.

7.1. Costing of the Project

Please see annexure A for the detailed scope of work.

Cost Summary for the Clayville/Tembisa Mega Project:

Summary	Total Project Cost	Date: 02/11/2015 Rev 5
Ext 45		Total Cost
Bulk & Link		
Bulk & Link Eskom Fees		
Bulk Professional Fees		
Internal Electrification		
Internal Professional Fees		
Ext 50		Total Cost
Bulk & Link		
Bulk & Link Eskom Fees		
Bulk Professional Fees		
Internal Electrification		
Internal Professional Fees		
Ext 71		Total Cost
Bulk & Link		
Bulk & Link Eskom Fees		
Bulk Professional Fees		
Internal Electrification		
Internal Professional Fees		
Total: Excl VAT		Excluding VAT

Please note that this is a **Subsidised Housing Project** where all the houses will receive a higher level of service in the form of an underground electrical network.

7.2. Funding

The Department of Energy will be approached to determine to what extent subsidies and other funds can be provided for funding the electrical portion of the project.

7.3. Bulk and Link Services

As the project consists of more than 43% fully subsidised, 18% Social Rental and 39% FLISP units, application will be made to DoE for subsidising the required bulk and link infrastructure to the development. This development will take up a substantial portion of the substation capacity (approximately 60%) whilst the remainder will be used for future residential developments, businesses, business parks and EMM requirements.

8. Risk Analysis

Clayville/Tembisa Mega Project is a provincial mega-project which will provide urgently needed housing in the Clayville/Tembisa area (approximately 14 320 units under this project). This area has been identified as a service delivery hot spot and an expedited delivery programme is proposed. Additional houses are planned in future developments in the area, and bulk infrastructure is the biggest constraint to delivery of the houses. The construction of housing for this project has already commenced and the plan will be to deliver these 14 320 units within 4 years, meaning that the bulk infrastructure construction must commence urgently.

A major external risk is that these houses will not receive an electrical supply once constructed if the bulk infrastructure is not completed in time. This will have political implications as provincial government will be seen as unable to deliver on their promises and have a negative impact on their public image.

Technically there are also risks to the project if the construction and commissioning of the proposed EMM Clayville substation is delayed.

There is currently 7.0 MVA of temporary supply capacity available which will be sufficient to supply approximately 1 year (October 2016) worth of housing construction. If the substation has not been energised within the allocated time-frame a full electrical network will have been installed and numerous houses constructed which cannot be occupied. This will again have a negative impact on both the provincial government and project's integrity.

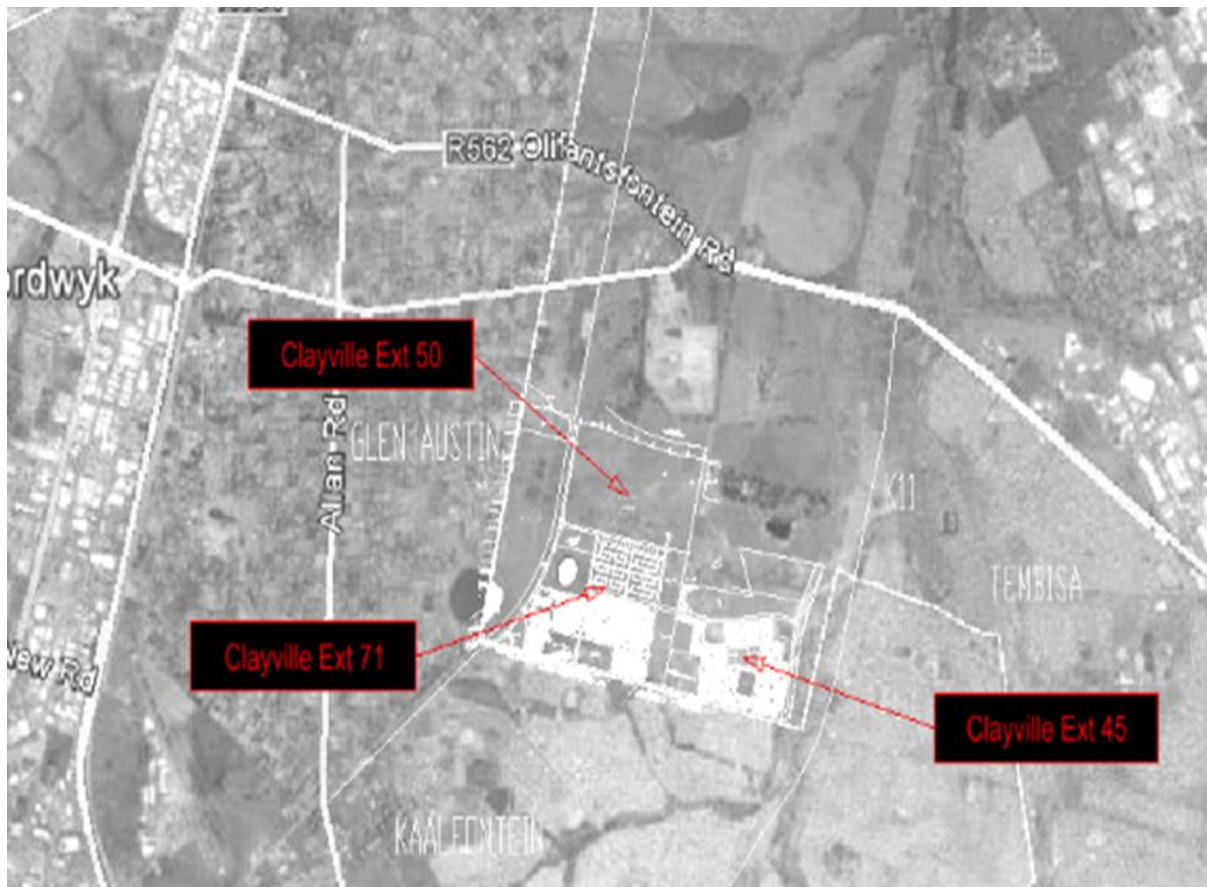
9. Procurement

The aim is to implement a solution which offers the maximum benefit for the eventual home purchaser.

Where possible, preference will be given to local contractors, sub-contractors and suppliers without compromising the project's viability and quality. Contractors shall make use of local labour in such a manner as to give expression to maximum benefits being derived by the previously disadvantaged local communities, specifically in relation to empowerment and job creation through the employment and training labourers, contractors, sub-contractors and suppliers rendering services. The professional service providers involved in the preparation of this Business Plan is Lebohang Consulting Engineers (Pty) Ltd. In order to optimise the utilisation of the information gathered and investigations conducted during the Business Plan Phase, the cost effective approach would be to retain Lebohang Consulting Engineers for the design and construction stages following Business Plan approval.

ANNEXURE A

CLAYVILLE/TEMBISA MEGA PROJECT LOCALITY PLAN



ANNEXURE B

Scope of Works

All the below prices include professional fees, were applicable but excludes VAT and any Eskom Connection Fees.

Bulk – Substation & Bulk Link

EMM/Eskom Bulk - Substation:

Design & construct a new 3x30 MVA EMM substation with an Eskom Switching Station to supply the development through the “Self-Build Process”.

Detailed scope will be finalised after receipt of a feasibility quotation from EMM/Eskom.

Eskom Bulk Link:

Design and construct new HV OHL lines to bring capacity into the development and supply capacity to the new EMM Clayville Substation.

Scope will only be finalised after a decision has been made on which approach will be taken.

EMM/Eskom Bulk Link:

7.0 MVA (Budget Quote Ref: 10945435)

Eskom to do the following under direct customer process:

- At Eskom College Substation prepare Spare R5 & R7 11kV Feeder Breakers.
- Terminate the 11kV 3c 185mm² XLPE Cu cable from RMU (1) that is laid by the developer onto Clayville 1 11kV breaker at Eskom College Substation.
- Terminate the 11kV 3c 185mm² XLPE Cu cable from RMU (2) that is laid by the developer onto Clayville 2 11kV breaker at Eskom College Substation.

Customer to do the following under direct customer process:

- Lay 362m of 11kV 3c 185mm² XLPE Cu cable from the feeder breaker (1) at Eskom College Substation to RMU (1)
- Lay 359m of 11kV 3c 185mm² XLPE Cu cable from the feeder breaker (2) at Eskom College Substation to RMU (2)
- To provide cable with enough slack to terminate them onto the switchgear.
- Secure the servitudes for the cables until they are out of Eskom supply area.
- To design and construct internal reticulation network for Clayville Ext 45.

Total Substation & Bulk Link Cost: R

Internal Electrification

EMM Internal Electrification:

EMM Internal Scope:

- Approve/Support appropriate internal electrification designs.
- Construction – Quality management and appoint COW.
- Network Services – Outage arrangement.

Customer Internal Electrification:

Customer Internal Scope:

- The internal network to be designed to the latest EMM standards and specifications as the internal network will be handed over in phases to EMM upon completion.
- The LV reticulation will be 95mm² 4 core PVC Cu underground cables connected to 12-way, 16-way and 20-way high risk metering kiosks.
- LV feeders will be protected using MCCB's.
- Service cables will be underground 16mm² 2C Cu SWA to SANS 1507.
- Supply and install PLC2 meters for certain portions of the development.
- The service cables to go directly into the units via a 40mm HDPE pipe/duct onto the distribution board of the units.
- Developer will ensure that a WUL is acquired where the cable route is within 500m of a wetland. The conditions of the WUL must be met during construction.
- Supply and install street lights in accordance with EMM Specifications.
- Provide security to ensure assets are not stolen or vandalised.

Total Internal Electrification Cost: R

Total Project Cost: R