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ASLA DEVCO

CIVIL ENGINEERING SERVICES FOR ERF 360 MCGREGOR: STORMWATER MANAGEMENT REPORT

26444CKS0

AUGUST 2013

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SYNOPSIS

Disclaimer

PROJECT 26444CKS0 - CIVIL ENGINEERING SERVICES FOR ERF 360 MCGREGOR: STORMWATER MANAGEMENT REPORT

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Issued for internal review	D Rossouw	A Reviewer	N/A	2013-08-15	N/A	

CONTENTS

ANNEXURE A : LOCALITY PLANS FOR ERF 360: MCGREGOR

ANNEXURE B : GEOTECHNICAL REPORT FOR ERF 360: MCGREGOR

ANNEXURE C : DRAWINGS

1. INTRODUCTION

WorleyParsons RSA was appointed by Asla Devco, to provide designs for civil engineering services for Erf 360 in McGregor, Langeberg Municipality. Erf 360 is earmarked for a housing development and it is foreseen that 466 housing opportunities will be created on Erf 360, Robertson.

Detail of the coverage on the erven will be provided further in the report, but it is envisaged, that approximately 44 % of the areas of Erven 360 will be hardened, which will contribute to the stormwater and treatment thereof.

It is the Municipality's intention to develop Erf 360 and provide housing, as well as business opportunities and open spaces for the development. Civil engineering services will be provided with electrical engineering services and the construction of approximately 466 housing units. Part of the civil engineering services to be provided is a stormwater network for the development to manage the stormwater run-off. This report will address only the proposals for management of the stormwater run-off which will include the treatment of the stormwater to acceptable levels. There is a need to reduce the impact of flooding on community livelihoods, to safeguard human health and protect the natural aquatic environment. Additionally it will be a goal to maintain and improve the quality of the natural water sources with the development of the mentioned erven.

This report will provide measures to treat and manage stormwater in order to comply with criteria as have been established in the National Environmental Management Act.

A system will be provided which is effective and sustainable which will result in the run-off of good quality water.

2. AVAILABLE INFORMATION

The following information was made available to WorleyParsons RSA:

- Detail of the proposed conceptual erf layout for erven on Erf 360, Robertson.
- 1:50 000 topographical Maps of the study area.
- Topographical information for Erf 360, Robertson.
- GIS information with regards to the existing water, stormwater and sewer services.
- As-built information for existing services.

- Geotechnical investigation according to NHBRC and GFSH-2 Specifications for Erf 360, Robertson.

3. LOCATION, SITE TOPOGRAPHY AND SOIL CONDITIONS

A locality plan for Erf 360, Robertson has been attached for reference purposes. The site is situated east of Buitenkant Street, McGregor, between the existing town and the Hoeks River. The northern boundary of the site is adjacent a high density residential area, with high agricultural land to the south of the proposed development.

The nature of the existing topography of Erf 360 can be summarised as follows:

The topography of the site is relatively flat with a slight slope to the east where it borders the flood plane of the Hoeks River. The natural drainage of the site would be from the existing edge of town to the river. The terrain for the development is irregular shaped with an area of 19,2ha. A small earth dam is located on the eastern part of the terrain, which is being used as an irrigation water storage facility.

The terrain earmarked for development is currently being used to grow vineyards with colluvial soils near the surface, underlain by residual shale soils comprising of gravelly silty clays. Below a depth of 1,4 m, rock can be found. During investigations, no water table was encountered, however a perched shallow water table, above the rock, can form in winter months.

4. EXECUTION OF THE APPOINTMENT

Run-off from Erf 360 has been analysed in its entirety with regards to future development. Standards of services, with regards to road surfacing and cross sections, have been used to determine run-off from development areas on the erf under discussion. Provision has been made for rainwater from roofing, with possible future extensions to housing and hardened surfaces on each property. The design of a sustainable urban drainage system, was based on the minimum disruption of the natural water cycle.

The management of stormwater is based on allowing stormwater to infiltrate the natural groundwater body as far as possible with the remainder, to be placed in a stormwater system. It is envisaged that part of the stormwater will be allowed to be absorbed by the colluvial soils. The remainder of the stormwater is taken to a treatment facility where the quality of the stormwater is improved according to the Best Management Practices. Structural controls proposed for the development includes natural infiltration, filtration and treatment.

Stormwater attenuation ponds will not be provided, due to the close proximity of the Hoeks River to the proposed development.

5. HYDROLOGY

5.1 CLIMATE

The study area is situated in the Western Cape winter rainfall region. According to the WB40, Climate of South Africa, climate statistics, the mean annual precipitation (MAP) for McGregor is 215 mm.

Abovementioned precipitation was used for hydrology calculations.

5.2 RUN-OFF CALCULATIONS

Hydrological calculations can be done using various methods which includes:

- Rational Method
- Empirical Method
- Time Area Method

Above-mentioned use a specific set of data. These methods make use of assumptions of approximation of actual events. In using the different methods, large variation could occur between these methods. Computer models applying some of these methods to model hydrological processes were used. The result in the form of peak flows obtained from the programmes were verified against the rational method for reliability and calibrated to produce useful information.

The "Civil Designer" computer program from "Knowledge Base", which is based on the Illudas Model was utilised in modelling run-offs from the study area. The Chicago type storms were used in the analysis.

5.3 RISKS - COST CONSIDERATIONS AND DESIGN FLOOD FREQUENCIES

Although run-off calculations are performed as best possible, non-hydrological reasons can cause the capacity of a stormwater system being exceeded. Limits have been set to probabilities in order to prevent costs from being unrealistically high, in comparison with the benefit of the lower costs.

Although the relationship between function, risk, original cost and maintenance cost plays a major role in determining the design flood frequency, it is assumed in general that the following flood frequencies should be provided for under normal circumstances:

a) Minor system which is the system of pipes, culverts and channels which provides capacity for more regular storms of a smaller nature:

i)	Residential	1:2 years
ii)	Institutional	1:5 years
iii)	Central Business Area	1:5 years

b) Major Storm

A major system usually consists of streets, pipe and box culverts, open channels which are placed to manage stormwater during a severe storm. The capacity of these facilities would be theoretically tested to determine the influence of a major storm in the area in order to eliminate possible shortcomings.

Initial indications are that sufficient capacities exist within road prisms to accommodate major storms without the risk of flooding properties.

6. STORMWATER DRAINAGE AND CONTROL SYSTEMS

6.1 GENERAL

6.1.1 Purpose and principles

Stormwater systems can be categorised into two systems, namely major and minor systems. The purpose and principles of stormwater control does not always necessitate minor and major floods being accommodated in a single system. In relatively small catchments the peak run-off and run-off

volume of both the minor and major floods are usually of such low magnitude that they can be accommodated in a single system.

As catchment areas increase in size, so it becomes less practical and more expensive to retain a single system. In such cases separate minor and major systems should be provided, which will also be applicable to this development.

6.1.2 Minor system

The primary goal of minor systems is to ensure convenience of nearby residents and the safety of traffic during normal rain showers.

The minor system usually consists of road drainage channels and kerbs, kerb inlets, grid inlets, manholes, pipes, box culverts and small open channels for the rapid discharge of run-offs to the major drainage system.

The preliminary sizing of the elements are determined on the basis of short duration, high intensity storms taking into account concentrated flow entering the minor system.

6.1.3 Major system

The major system will seldom be utilised to its full capacity as its purpose is to convey and control large floods.

If justified by costs or natural conditions, the major and minor flows could be accommodated in the same facility. Natural or manmade channels and large diameter culverts are examples. For this development the roads will convey flood water to a treatment facility whilst the channel network will theoretically operate at full capacity.

6.1.4 Recommendations regarding design principles and considerations

It is imperative to emphasize a few aspects viewed as policy standpoints with regards to higher lying developments:

- New developments shall not adversely affect the safety risk within existing developments.
- Pollution of the major discharge system as a result of sedimentation, refuse, effluent and other chemical waste shall be actively controlled.

- In order to exercise a degree of control over new developments, the following requirements should be met:

  - Submission of design assumptions, calculations and results to the Local Authority.

7. ANALYSIS OF THE PROPOSED STORMWATER DRAINAGE SYSTEM

7.1 GENERAL

Erf 360 has a natural fall in an easterly direction. Minimal earthworks will be required to drain stormwater from erven and prevent ponding. The fall is adeqaute to convey stormwater run-off towards the proposed areas for stormwater treatment, from where it will be taken to the Hoeks River. The proposed stormwater routes at the proposed erven for development were analysed for the 1:2 year, 1:10 year, 1:20 year and 1:50 year run-offs, assuming that the area is fully developed, according to the latest available information.

The following was accepted for the purpose of this report:

- The proposed systems provide for drainage from all areas towards the streets. Where practically feasible, the vertical alignment of the streets will allow the adjacent areas to drain towards the streets.

- All streets will be provided with gravelled or concrete channels adjacent.

- For the major system (in access of 1:2 year run-offs), the vertical alignment of the proposed streets will be designed to ensure that the run-offs can drain towards the treatment facility. Adequate inlet / outlet facilities will be provided to ensure that the run-offs reach the treatment facility.

- Maximum flow velocities of 3,5 m/s and minimum flow velocities of 1.0 m/s for the 1:20 year peak run-offs to be used as a guideline.

- All existing and proposed stormwater systems will be maintained and regularly cleaned.

- Permeability of materials based on winter conditions.

7.2 PEAK DISCHARGE FLOWS

The expected peak discharges were calculated for Erf 360. Storm durations of 30 minutes were assumed for the calculation of peak discharges. The 30 minute storm duration is in line with the expected time of concentration for the Erven for development. The expected peak discharges across a range of recurrence intervals were also determined by means of the Rational Method.

The catchment characteristics, as originally defined in the Civil Designer computer programme, were modified / calibrated to yield results that are comparable to those obtained by the rational method.

The final layout of the site will make provision for stormwater drainage and no trapped low points are foreseen. No additional stormwater servitudes are required, but will be finalised, if required at final design stage.

7.3 WATER QUANTITY: RUNOFF VOLUMES

Run-of -volumes from the different erven were determined for recurrence intervals ranging from 0,5 to 1:100 years. For the determination of run-off volumes for the sizing of the stormwater treatment facility, the storm duration was increased to six hours to ensure that the stormwater treatment facility will have adequate capacity for the volume of run-off generated by a storm.

The position of the proposed treatment facility is shown on the drawing in the Annexures. The infiltration/treatment area as shown is for illustrative purposes only.

The outlets of the infiltration area will be a combination of an open trench towards the river as well as an overflow of the area to the river. Provision will be made for adequate erosion protection measures at the outlets of the pond. It is envisaged that the infiltration area will contribute to the retention of pollutants thereby polishing the stormwater effluent before it is discharged into the Hoeks River.

7.4 STORMWATER SYSTEM

An overland channel network adjacent all roads for stormwater will be sized to accommodate 1:2 year storms for the residential and business erven. The sizing of the stormwater channels in the residential area would therefore theoretically accommodate the difference in flow between the 1:2 year storm and the infiltration on erven. Calculations further on in the report indicate the allowance for soak-aways that has been achieved in the infiltration/treatment area as well.

The minor stormwater system will be connected to the infiltration/treatment area. The road network system will act as the major storm system and will take stormwater to the treatment facility as well. Road networks will be designed to accommodate the difference in flow of stormwater between the 1:2 year and 1:20 year flood.

7.4.1 Soakaway Systems

Geotechnical investigations performed by Core Geotechnical Engineers and site investigations indicated a dense gravely silt material of colluvial origin. No watertable was found, but a perched water table could be experienced in winter months. Stormwater will therefore infiltrate and an infiltration rate of 0,03 mm/s will be used for infiltration calculations.

Soakaway will occur in the treatment facility as well. Water from roofs on erven and roads will be taken to the treatment facility which will infiltrate the silty material, boosting the groundwater. The remainder of the stormwater will be taken to the flood plane of the Hoeks River, after being treated.

Water Quality Volume

The following land use figures, as well as runoff coefficients can be provided for Erf 360. These figures are based on proposed land uses.

Land use	Erven	Area (ha)	Coverage (%)	Runoff Coefficient
Residential erven	466	5,85	75	75 %
Public open space	3	6,99	0	10 %
Public road		4,00	56	56 %
TOTAL	**469**	**19,22**		**$\sum$ = 44 %**

From the above information, the volume of stormwater to be treated can be calculated as follows. The rainfall intensity for a design storm of 17 mm total depth is used.

The following volumes for treatment of stormwater is required, using the areas for the different land uses, runoff coefficient and intensity.

	Recurrence Period (years)				
	2 year	10 year	20 year	50 year	100 year
Intensity	17,4	28,2	34,7	45,7	56,3
Post development flow ((ℓ/s)	796	1548	1 907	2 650	3 262

7.5 WATER QUALITY MANAGEMENT

7.5.1 General

SUDS water quality design is based on the implementation of various control measures which forms a treatment train. The water will be taken through more than one treatment process and a greater chance exists that pollution will be restricted at a particular site.

Utilising the concept of a treatment train, the water quality will first be addressed by infiltration through a rock bed layer as well as a reed bed in the treatment facility. Stormwater will infiltrate the soil in the treatment facility where substrate soil will act as an additional effective filter.

A treatment/infiltration area with a length of 200 m will be provided. The position thereof to be in the 30 m buffer zone, between the development and the 1:100 Hoeks River flood plane. A facility with a width of 20 m and a depth of 0,5 m is proposed. This facility will be adequate to treat stormwater up to a flood return period of 1:20 years. An overflow will be provided for stormwater in access of the 1:20 year flood return period. This stormwater will pass straight on to the river in order to prevent flooding of properties.

8. MANAGEMENT REQUIREMENTS

8.1 STORMWATER SYSTEM

Inlet structures and channels to be cleaned to remove silt and debris on a regular basis. A maintenance plan is proposed for removal of debris in the stormwater system. Refuge collection to be performed on a regular basis to prevent foreign matter from entering the stormwater system. Greywater from housing not to be allowed in the stormwater system.

8.2 LITTER TRAPS

Litter traps should be cleaned on a regular basis. Litter to be removed and disposed of in rubbish bins.

8.3 TREATMENT FACILITY

The treatment facility should have monthly maintenance of the area, which should include moving of grass in the facility, removal of alien vegetation and revegetated, if necessary. Reeds to be maintained and controlled for effective functioning.

9. CONCLUSION

The subdivision plan for Erf 360, Roberston will make provision for the measures proposed in this report. Earthworks will be performed which will ensure proper drainage patterns to feed the treatment facility and prevent undesirable matter entering the Hoeks River.

In conclusion, we trust the report and recommendations contained in this report will be to your satisfaction. We would like to thank you for the opportunity to do the investigation and look forward to implementing the proposed measures.

FJ Rossouw Pr Tech Eng
TECHNICAL DIRECTOR
WorleyParsons RSA

August 2013

Annexure A : Locality Plans for Erf 360: McGregor

McGREGOR
ERF 360

AERIAL CONTEXT

- Subject Properties
- Cadastral Boundaries
- Area to be surveyed = ±19.22ha
- Area to be surveyed for floodline determination purposes (ASLA to confirm)

PLEASE NOTE:
All boundary line positions, distances and property sizes need to be verified by a Professional Land Surveyor.

REF:

COMPILED BY: F. Britz

INDEMNITY

DATE: January 2013

CLIENT

SCALE: See Linescale

DRAWING NO: 3

URBAN DYNAMICS WESTERN CAPE
TOWN & REGIONAL PLANNERS
3RD A MOW BUILDING
NO. 3 ELWOOD WAY
DELLVILLE - 7530
PO BOX 2645
DELLVILLE
7532

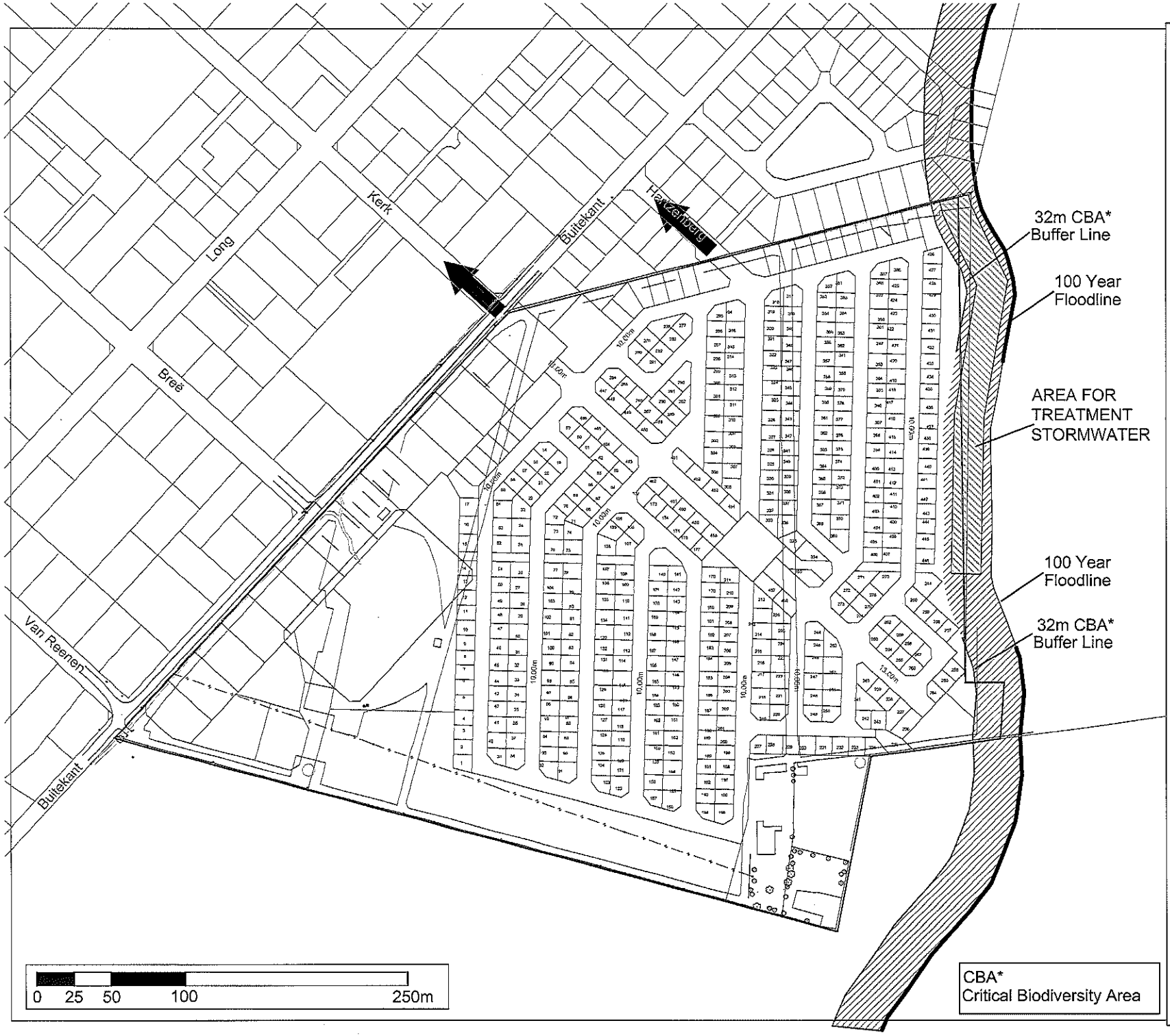
TEL: (021) 913 1744
FAX: (021) 913 1748

Website: www.udwc.co.za
URBAN DYNAMICS WESTERN CAPE INC REG. No. 2006/032121

Annexure B : Geotechnical Report for Erf 360: McGregor

Annexure C : Drawings

- Location plan for stormwater treatment facility
- Section of Stormwater treatment facility



McGREGOR
ERF 360

CONCEPTUAL LAYOUT
OPTION 3

Application Area

100 Year floodline
Contour Line (1m interval)

CBA*
Critical Biodiversity Area

PLEASE NOTE:
All boundary line positions, distances and property sizes need to be verified by a Professional Land Surveyor.

DATE July 2013
SCALE See linescale
PLAN NO. 1
FILE NAME:
CLIENT

URBAN DYNAMICS WESTERN CAPE
TOWN & REGIONAL PLANNERS
SEA VIEW BUILDING
NO. 3 BJ WOOD WAY
BELLVILLE • 7530
PO BOX 2445
BELLVILLE
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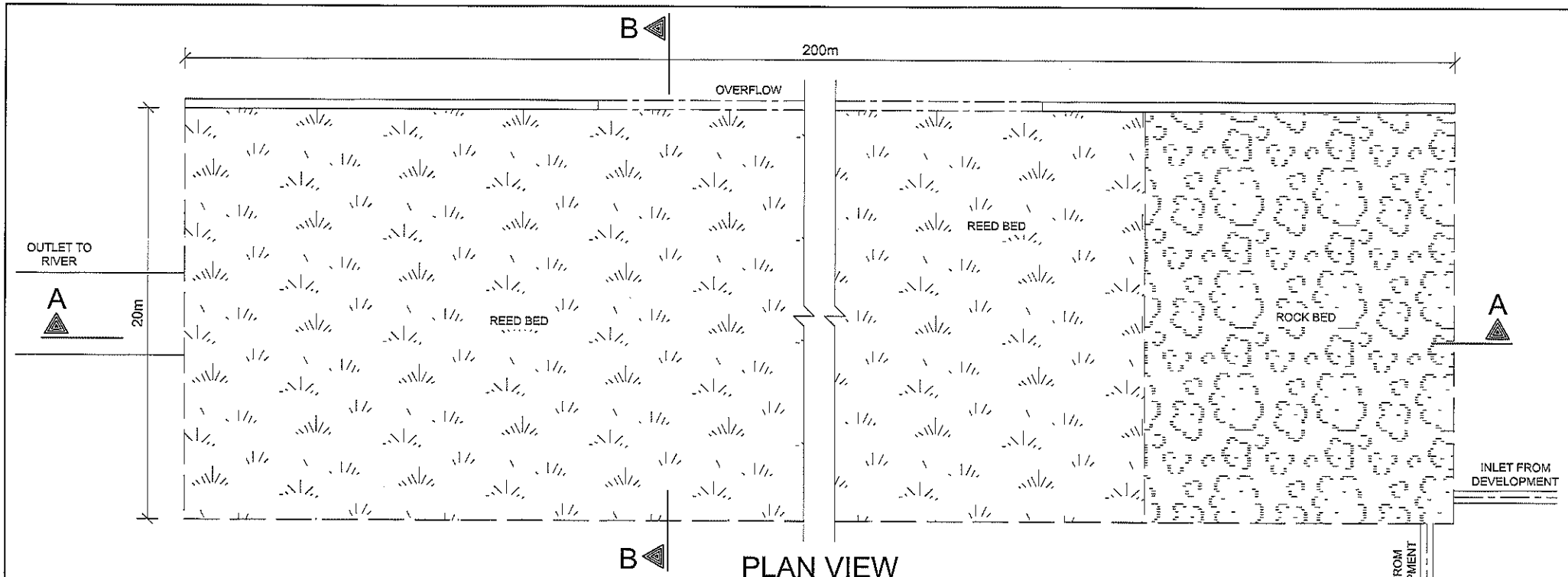
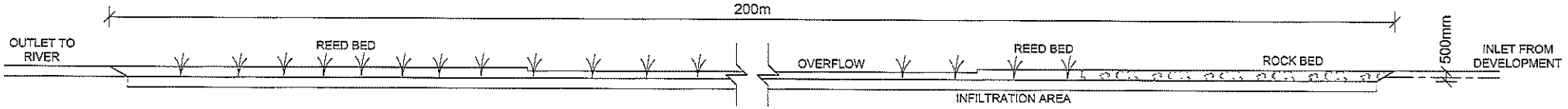
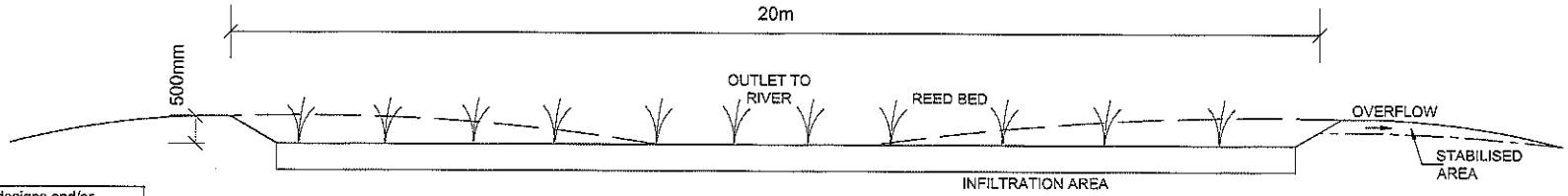
TEL: (021) 948 1045
FAX: (021) 948 1088
Website: www.udwc.co.za
URBAN DYNAMICS WESTERN CAPE INC REG. No : 05/09002/21





SECTION A-A



SECTION B-B

AMENDMENT				
NO.	DATE	CHECKED	DONE BY	DESCRIPTION

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PROJECT
McGREGOR HOUSING

DRAWING DESCRIPTION
DETAIL OF TREATMENT/INFILTRATION AREA FOR TREATMENT STORMWATER

SCALE 1 : 200
DATE AUGUST 2013
DRAWING NUMBER 26444CKS0/SW/T

WorleyParsons

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ASLA DEVCO

ERF 360, MCGREGOR HOUSING PROJECT

SERVICES REPORT

26444B – 26444BV01

AUGUST 2013

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ASLA DEVCO

SYNOPSIS

The purpose of this report is to provide detail of the proposed civil engineering services for the development on Erf 360, Robertson.

PROJECT 26444B - ERF 360, MCGREGOR HOUSING PROJECT

REV	DESCRIPTION	ORIG	REVIEW	WORLEY-PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
A	Issued for internal review	Author	A Reviewer	N/A	2013-08-14	N/A	

CONTENTS

ASLA DEVCO
ERF 360, MCGREGOR HOUSING PROJECT
SERVICES REPORT

1. PURPOSE OF REPORT

The purpose of this report is to summarise the status of all existing services, as well as to provide standards of the services proposed for the housing project in McGregor, Erf 360.

2. LOCATION, TOPOGRAPHY AND LAYOUT

The site is located in McGregor, adjacent to Buitekant Avenue and opposite Van Reenen and Kerk Avenues, on the eastern boundary between the existing town and the Hoeks River.

There are existing residential developments adjacent to the terrain with the proposed terrain for the development being vacant. It is foreseen that the development of Erf 360 will be a greenfields project. Proposed layout plans takes into account the existing irrigation dam, as well as the existing buildings in the south eastern corner of the terrain. The proposed layout plan takes into account as well, the moderate slope with measures for management of stormwater.

The site drains naturally towards the floodplane of the Hoeks river. The terrain has an average slope of 1:20 with no localised low points where ponding of stormwater will occurs. The watertable is deeper than 1 m and no subsurface drainage is foreseen. If necessary subsurface drainage will be provided to minimise that effect of the water table in winter months. Soil tests and profiling of the terrain have been performed to establish the exact condition of the in-situ material. The design of pavement structures and foundations for housing will take cognizance of the geotechnical conditions of the in-situ material. The design of the streets will take low points on the site into consideration, in order to drain stormwater away from the houses.

Urban Dynamics have produced erf layout plans for the development which consist of single residential erven of approximately 150 m^2.

3. STREET LAYOUT

The natural slope of the terrain for the proposed development is towards the Hoeks River and moderate slopes are experienced. Minor low points exist on erven which will have to be filled in order to provide drainage from the erven, to the proposed road system.

Preliminary designs indicate that stormwater can be accommodated in an overland stormwater system and discharged into the Hoeks River. A treatment facility will be introduced in the stormwater system, before stormwater is taken to the Hoeks River.

Preliminary investigations indicate that the material on site is mainly dense gravelly silts and gravelly clays. Over the majority of the sites this soil overlay moderate shales of rock. Imported material will be required to provide proper pavement structures. A subsurface drainage system could probably be required to minimise the effect of the high water table in winter. Further testing and investigation during construction will be done to determine the necessity of subsurface drainage.

A Traffic Impact Assessment report will have to be completed. The street layout plan, with intersections onto existing routes, will be based on abovementioned report. Adequate capacity exists within the existing road network.

4. SEWER RETICULATION

It is envisaged that the new proposed water bourne sewer system connects to the existing sewer treatment network. Upgrading of the existing sewer network will be required, as well as a length of new gravity sewer line. A total of 550 m sewer pipe will be provided ranging from 160 mm to 250 mm. During the detail stage, capacities within the existing treatment plant, will be verified, however initial calculations indicate that enough capacity exists in the existing treatment plant. In the case of a sewer pump station be required, it will be included in the planning stages. A survey of the existing sewer network and development will confirm the necessity of a pump station for sewer drainage purposes.

5. WATER RETICULATION

There are existing waterlines adjacent the area for the proposed development. It is however proposed that a dedicated water feed be provided between the reservoir and this development. A 160 mm feed line will form part of the connecting bulk water to the development.

It is foreseen that a network of ∅ 110 / ∅ 160 mm water lines be provided for the internal water reticulation system and to the bulk water line for the development. Tests during the design stage, will however verify the required sizes of the water lines.

6. TELKOM SERVICES

Telkom will be approached with a layout of the development and will have the opportunity to provide a Telkom distribution system within the development. The necessary sleeves will be provided at street crossings.

7. ELECTRICITY

The electricity supply to this development will be upgraded by Escom. The cost thereof will form part of this project. The provision of an 11kV electrical feed from Die Kop to Buitekant street will be required, in order to provide electricity to the development. In the case of a sewer pump station being required, electrical provision will be made in the substation to be provided.

8. PROPOSED SERVICES

8.1 STREETS

8.1.1 Minimum Standards (see attached table)

- Minimum longitudinal gradient: 0,5%.
- Crossfall on streets must be 2,5%.

8.1.2 Road And Street Name Signage

- All signs must only include the street name and not the extension .e.g. (Road/Street).
- Embossed street name kerbs with black lettering on white background shall be used on a concrete footing.

8.1.3 Pavement Layers

- Pavement layers shall be as per the attached table.
- G5 wearing course to be provided.

- G5 material to have a minimum PI of 11 for wearing purposes.
- G7 selected material to be provided as a sub base layer.
- Insitu material to be properly compacted.

8.1.4 Verges

The remainder of the reserve shall be trimmed to the edge of the road reserve to provide easy access to erven (both sides of the road).

8.1.5 Street Layout

The street layout will consist of local streets and collector roads within various reserve widths. A main access route in the development has been provided which will provide access via lower order collector roads, access ways and cul de sacs. The remainder of the collector routes follows a grid pattern, connecting to Buitekant street.

No street kerbs will be provided. The main access route will be provided with raised speed humps for calming purposes. These humps will be placed within road reserves and will serve to reduce speed on the access route.

Open areas are created for provision of a crèche, church as well as additional open spaces which can be used for recreation.

8.2 STORMWATER AND SUBSURFACE DRAINAGE

8.2.1 Channels

- Stormwater drainage will be provided through a series of open overland channels.
- In areas where gradients are steep, concrete channels will be provided.
- Channels across streets will be concrete as well.
- Perforated or slotted uPVC pipes (normal duty) complying with the requirements of SABS 791 shall be used in subsurface drains.

8.2.2 Manholes

- Manholes to be standard brick manholes with precast top slabs with calcamite step irons placed at 300 mm c/c below manhole opening.
- Catchpits to be inline type to accommodate stormwater from channels adjacent roads.
- No junction boxes will be allowed in stormwater lines.
- Inlets may not be positioned on bellmouth radii.
- Manhole cover and frames to be lockable type 2A SABS 558 CI frame and cover.

8.2.3 Detention Facilities

No on-site detention facilities are proposed. The proposed development will be above the 1:100 floodline and only treatment of stormwater will be done in a swale, before the stormwater is taken to the Hoeks River adjacent. Stormwater from existing developments upstream, is being taken to the river in a separate stormwater system.

8.3 FOUL SEWER

8.3.1 Minimum Design Criteria

- Minimum gradient for pipelines must ensure a minimum velocity of 0,7 m/s.
- Minimum acceptable starting gradient for 100/110 mm ∅ = 1:100 with a limiting gradient of 1:200 for 150/160 mm ∅ pipes. Where possible, 1:80 gradients will be used at the start of all sewer lines.
- Minimum cover to pipes to be 750 mm.
- Minimum house connection depth to be generally 1,0 m (invert level to lowest ground level on erf) and where topography requires, the lowest part on the erf must be able to drain towards the connection.

8.3.2 Pipes

- Pipes to be positioned one meter from the erf boundaries in the road reserve.
- Pipes to be positioned on the topographical lower side of the road reserve.
- Minimum pipe size for collecting sewers to be 150/160 mm.
- Minimum pipe size for house connection to be 100/110 mm.
- The following pipes may be used:
  - Bitumen dipped Fibre Cement – series 4 pipes and fittings
  - Class 34 heavy duty uPVC

8.3.3 Manholes

- Manholes to be
  - Dolomitic precast concrete rings
  - Fibre Cement manholes (full resistance to flotation provided)
  - Brick manholes (wall must be plastered internally)
- Manhole cover and frames to be SG Iron (duct tile iron), type 2A, GJ rotating wedge lock system.
- Manholes to be constructed as per Langeberg Municipality Standards.
- All manholes to be provided with calcamite (or similar approved) step irons.
- Maximum spacing between manholes to be 90 m. (according to CCT specifications).
- Maximum chimney height may not exceed 400 mm.

8.3.4 General

- All erven to be provided (including POS) with water and sewer connections.
- All manholes to be water tight.
- Double house connections will be allowed terminating 1,0 m inside the erf with an endcap, according to municipal details. Connections to be visible and clearly marked.
- Rodding eyes to be provided with split sewer connections.

8.4 WATER

8.4.1 Minimum Design Criteria

- Minimum cover to pipes shall be 900 mm, with maximum 1000 mm.
- House connection to be laid to cross roadways with a minimum cover of 800 mm terminating 1,0 m inside the erf boundary at a depth of 400 mm.

8.4.2 Pipes **(Standard specifications for uPVC pipes and pressure bends and cast iron fittings and specials shall apply)**

- Minimum pipe size to be 110 mm ∅.
- uPVC Class 12 pipes to be used. If under roads; uPVC, class 16 to be used.
- Pipes generally to be positioned 1,0 m off the road reserve boundary (higher topographical side of road reserve).

8.4.3 **Valves** (Standard specification for gate valves shall apply)

- Isolating valves should be provided to ensure that not more than 4 valves must be closed to isolate any section.
- Valves to be positioned opposite splays and where possible outside paved areas.

- Spindle top to be maximum 450 mm below beltoby cover.
- Valves to be clearly marked and visible.

8.4.4 **Fire Hydrants** (Standard specification for fire hydrants shall apply)

- Fire hydrants to be pillar type, fitted with tamper proof quick coupling type hydrant outlets, painted yellow.
- Fire hydrants shall be positioned such that the spacing does not exceed 180 m, and where possible care must be taken not to place them in front of driveways.
- Fire hydrants are to be anti clockwise closing – Ainsworth RSV type with "63 mm London round thread" and type 5 CI cover and frame.
- Fire hydrants to be placed on high/low points and at pipe ends in cul-de-sac roads.
- Hydrant outlet to be between 400 and 600 mm below hydrant cover.

8.4.5 **Erf Connections**

- All water connection pipes to be HDPE pipes connected with "Talbot brass" ferrules and saddle to main pipe and endcap at terminating end.
- Single connection to be minimum 20 mm nominal .
- Double connections to be minimum 25 mm nominal ∅ splitting to 2x 20 mm nominal diameter connection.
- House connection to be placed 1,0 m inside the erf boundary, clearly marked and visible.
- Standard specification for ductile iron saddles shall apply.

8.4.6 General

- Valve cover and frame to be painted King blue with a 200 mm wide blue strip painted on the kerb face.
- Hydrant cover and frame to be painted yellow with a 200 mm wide yellow strip painted on the kerb face.
- Valve and hydrant chambers to be constructed as per Langeberg Standard Specifications.

8.5 CABLE DUCTING

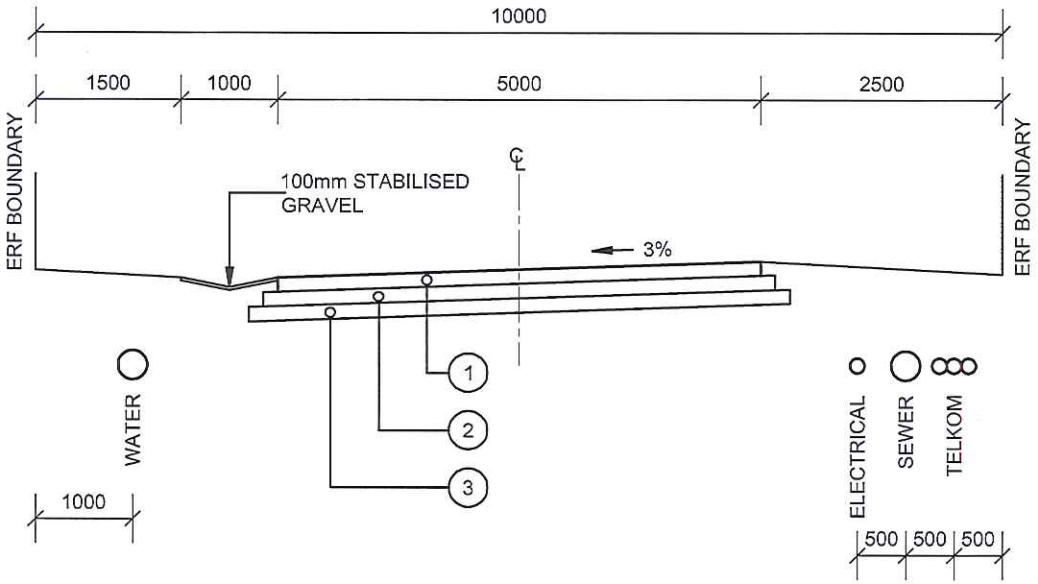
Marking of cable ducting will be as follows:

- Telkom
  - 5mm thick T, cut out on kerb and painted green. Draw wire attached to a wooden marker with a 200 mm green painted top.
- Electric ducts
  - 5mm thick V, cut out on kerb and painted red. Draw wire attached to a wooden marker with a 200 mm red painted top.
- Valve
  - Beltoby to be painted blue with 5 mm wide V cut on kerb and 250 mm wide blue strip painted on kerb directly opposite valve.
- Hydrant
  - Cover to be painted yellow with standard FH marking as per SARTSM marked on road surface directly opposite hydrant.

Appendix A – Cross Sections and Table of Minimum Requirements

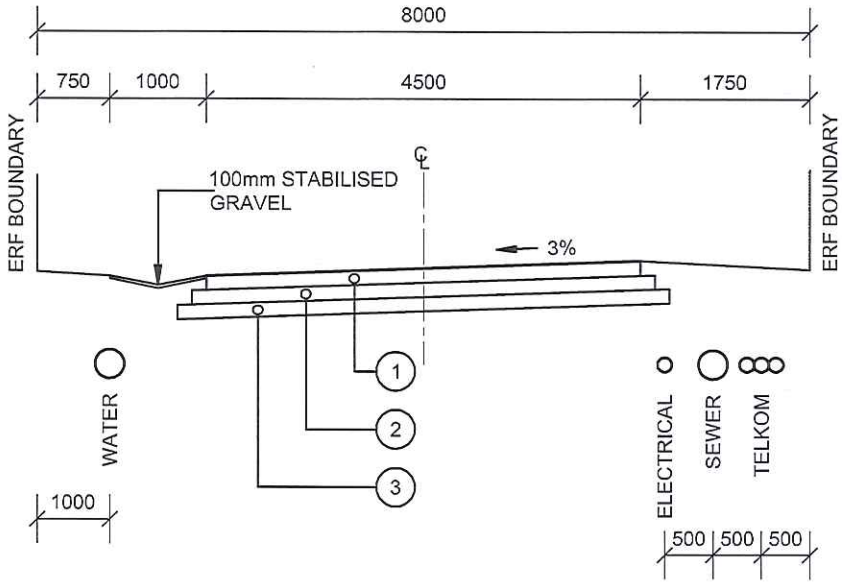
TABLE 1: MINIMUM REQUIREMENTS FOR ROAD CROSS SECTIONS

Road class	Function	Road reserve width	Blacktop width	Camber/ crossfall	Kerb type	Pavement layers	Surfacing	Minimum bellmouth radius
5a	Local distributor	13 m	5,5 m	Crossfall 15 cm	None	150 mm G7 selected 150 mm Insitu compacted	150 mm wearing course	8 m
5b	Access collector	10 m	5,0 m	Crossfall 15 cm	None	150 mm G7 selected 150 mm Insitu compacted	150 mm wearing course	8 m
5c	Residential access loop	8 m	4,5 m	Crossfall 12,5 cm	None	150 mm G7 selected 150 mm Insitu compacted	150 mm wearing course	6 m
5d	Access way	6 m	4,0 m	Crossfall 12,5 cm	None	150 mm G7 selected 150 mm Insitu compacted	150 mm G5 wearing course	3 m
5e	Access court	4 m	3,0 m	Crossfall 9,0 cm	None	150 mm G7 selected 150 mm Insitu compacted	150 mm G5 wearing course	1 m



NOTES:

1. 150mm G5 WEARING COURSE
2. 150mm G7 SELECTED LAYER
3. 150mm INSITU COMPACTED



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Project
McGREGOR HOUSING

Drawing description
TYPICAL STREET CROSS SECTION

SCALE
1 : 200

DATE
AUG 2013

DRAWING NUMBER
26444CKS0/housing