1. **INTRODUCTION**

CDC Development Consulting Engineers has been appointed by *Parker & Sayed Property Ventures CC* for the planning and design of the civil engineering services for the Eclipse Lifestyle Estate Residential Development. This report indicates, discusses and elaborates on the design criteria and specifications that will be applied in the detail design of the internal roads, stormwater, water and sewer reticulation infrastructure of the proposed development.

2. **LOCATION AND ACCESS**

The proposed development is located on Erf 233 in Touws River on the northern side of National Road N1.

3. **DEVELOPER AND SERVICE PROVIDER DETAIL**

3.1 **Details of Developer**

Company: Parker & Sayed Property Ventures CC

Postal Address: P.O. Box 1753
BELLVILLE
7535

Telephone Number: 021 – 683 2050
Cellphone: 083 407 3943

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P O Box 686, Ceres, 6835  E-mail: jlouwcdc@lando.co.za  Tel/Fax: 023-316 1429  Cell: 083 627 2298
Mazoe, CERES, 6835  *  21 Alexander Street, PAARL, 7646
CIYAYA DEVELOPMENT CONSULTANTS CC  *  CC No.: 96/52580/23
Members / Lede: M J Louw Pr. Eng. 820418 & J D Louw
3.2 **Details of Engineering Consultant**

Company: CDC Development Consultants
Postal Address: P.O. Box 686
CERES 6835
Physical Address: c/o Skurweberg- and Fourth Avenue
CERES 6835
Telephone Number: 023 – 31 61429
Fax Number: 023 – 31 61429
E-mail: jlouwcdc@lando.co.za
Cellphone Number: 083 627 2298

3.3 **Details of Town Planner**

Company: BolandPlan
Postal Address: P.O. Box 963
WORCESTER 6850
Physical Address: 68 High Street
WORCESTER 6850
Telephone Number: 023 – 342 1347
Fax Number: 023 – 342 1347

4. **ENGINEERING SERVICES**

The proposed development will include:

- 129 Single Residential Units ± 450 – 600 m²
- 122 Town Houses (Single title) ± 300 m²
- 81 Town Houses ± 275 m²
- 63 Duplex Units
- Commercial/Retail Centre
- Resort Zone: Conference Centre
  Train Lodge Accommodation
The services will be designed to connect to the exiting municipal services infrastructure and will therefore be designed to accommodate all requirements for developments of this nature. The internal services will be according to accepted engineering specifications and principles as well as acceptable environmental requirements and specifications, as provided in the approved environmental scoping and impact assessment reports.

No drawings accompany this report. The layout of the water, sewer, roads and stormwater infrastructure will be finalised during the preliminary engineering and detail design phases of the project.

SITE DEVELOPMENT PLAN

The design criteria and specifications as contained in this report is based on the Guidelines for the provision of engineering services and amenities in residential township development, 1994 as amended.
4.1 Roads

Macro Road Network

The proposed development will be accessible via District Road OP 6117 – a turnoff from the N1 opposite Touws River. Access from this road into the development will be by means of a Class 4 local distributor access road.

Internal Roads

The design criteria will generally be based on the design standards of the Guidelines for the Provision of Engineering Services and Amenities in Residential Township Development as shown in Table 4.1. The criteria are given for the various road classes and road reserve widths. All roads within the proposed development will be either Class 5a, 5b or 5c roads.

TABLE 4.1: Road Design Criteria

<table>
<thead>
<tr>
<th>Parameter</th>
<th>ROAD CATEGORY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Local Distributor (Class 4)</td>
</tr>
<tr>
<td>Road Reserve Width</td>
<td>15 m</td>
</tr>
<tr>
<td>Carriageway Width</td>
<td>6 m</td>
</tr>
<tr>
<td>Minimum Centre Line Radii for Angles of Deflection 60° and More</td>
<td>50 m</td>
</tr>
<tr>
<td>Desired Maximum Speed</td>
<td>50 km/h</td>
</tr>
<tr>
<td>Minimum Stopping Distances</td>
<td>60 m</td>
</tr>
<tr>
<td>Minimum Gradient</td>
<td>0.5 %</td>
</tr>
<tr>
<td>Maximum Gradient</td>
<td>10%</td>
</tr>
<tr>
<td>Minimum K-value</td>
<td>6</td>
</tr>
</tbody>
</table>
Geological investigations on the in-situ material along the centre line of the roads have not yet been carried out. The pavement design will be determined once these results are available and suitable quarries or commercial sources for the construction materials have been identified.

The effect of expensive soils and collapsible materials will also be taken into account with the detail design. The adopted pavement design is given in Tables 4.2.

### TABLE 4.2:  Estimated Pavement Design - Surfacing, Base and Sub-Base

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Local Distributor (Class 4)</th>
<th>Residential Access Collector (Class 5a)</th>
<th>Residential Access Loop (Class 5b)</th>
<th>Residential Access Cul-de-sac (Class 5c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic Class</td>
<td>E2</td>
<td>E0</td>
<td>E0</td>
<td>E0</td>
</tr>
<tr>
<td>Category</td>
<td>UB</td>
<td>UC</td>
<td>UC</td>
<td>UC</td>
</tr>
<tr>
<td>Structural Design Traffic</td>
<td>0.8 – 3 ( \times 10^6 )</td>
<td>&lt; 0.2 ( \times 10^6 )</td>
<td>&lt; 0.2 ( \times 10^6 )</td>
<td>&lt; 0.2 ( \times 10^6 )</td>
</tr>
<tr>
<td>Wearing course</td>
<td>20mm Asphalt / Cape Seal</td>
<td>20mm Asphalt / Cape Seal</td>
<td>20mm Asphalt / Cape Seal</td>
<td>20mm Asphalt / Cape Seal / Block paving</td>
</tr>
<tr>
<td>Base</td>
<td>125 G2</td>
<td>125 G2</td>
<td>125 G2</td>
<td>125 G2</td>
</tr>
<tr>
<td>Sub-base</td>
<td>150 C4</td>
<td>125 C4</td>
<td>125 C4</td>
<td>125 C4</td>
</tr>
<tr>
<td>Upper-selected</td>
<td>150 G7</td>
<td>150 G7</td>
<td>150 G7</td>
<td>150 G7</td>
</tr>
</tbody>
</table>
4.2 Water

*Bulk Supply*

The bulk water reticulation system will be connected to the existing municipal water supply as approved by the municipality.

Refer report by CES Consulting Engineers “Development of Erf 233, Touws River: Bulk Water and Sewer Services.”

The design criteria will be based on the “Guidelines for Human Settlement Planning and Designs: as published by the CSIR and will also refer to the local municipality’s guidelines and standards for the design standards for a development of this nature is summarised in Table 4.3 below.

**TABLE 4.3: Water Supply Design Criteria**
Water Demand

The estimated water demand based on the above are converted into peak flows according to the chosen design criteria. The estimated water demand for the proposed layout and zoning is calculated at 355,4 kℓ/day (AADD) with a resultant peak flow of 15 t/s.

4.3 Sewerage

Bulk Sewer Service

Waterborne sewerage will be provided in this development and will connect into exiting bulk municipal sewerage system. The development will require a new pump station and rising main that will pump the sewage collected to the sewage treatment plant.

Refer report by CES Consulting Engineers “Development of Erf 233, Touws River: Bulk Water and Sewer Services”.
Sewer Network Design

The sewer network will be designed to provide a connection point to each stand, either adjacent to the sewer pipeline or across the street from the sewer pipeline. The design guidelines to be used will be the “Guidelines for Human Settlement Planning and Designs” as published by the CSIR with reference to the municipality guidelines and standards for the design and maintenance of water and sanitation services. Typical design standards for a development of this nature is summarised in Table 4.4 below.

**TABLE 4.4: Sewerage Design Guidelines**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>ELEMENT</th>
<th>GUIDELINES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Design Flow</td>
<td>Residential</td>
<td>1,0 kl/stand/day</td>
</tr>
<tr>
<td></td>
<td>Schools</td>
<td>15 l/pupil/day</td>
</tr>
<tr>
<td></td>
<td>Commercial &amp; Business</td>
<td>1200l/d/500m²</td>
</tr>
<tr>
<td></td>
<td>Community Halls</td>
<td>50l/person/day</td>
</tr>
<tr>
<td></td>
<td>Industrial</td>
<td>80% of 13,6 l/d/ha</td>
</tr>
<tr>
<td>2. Minimum Pipe diameter</td>
<td>Gravity sewers</td>
<td>150 mm</td>
</tr>
<tr>
<td></td>
<td>Connections</td>
<td>100 mm</td>
</tr>
<tr>
<td>3. Minimum Velocity at full flow</td>
<td>Gravity sewers</td>
<td>0,7 m/s</td>
</tr>
<tr>
<td></td>
<td>Rising mains</td>
<td>0,7 m/s</td>
</tr>
<tr>
<td>4. Peak Factor</td>
<td>Residential</td>
<td>2.5</td>
</tr>
<tr>
<td>5. Stormwater Infiltration</td>
<td></td>
<td>15% of design flow</td>
</tr>
<tr>
<td>6. Pipe capacity</td>
<td>Flow level in pipe as percentage of diameter</td>
<td>67% at design flow</td>
</tr>
<tr>
<td>7. Minimum Gradients for Pipes</td>
<td>100 mm dia</td>
<td>1 : 120</td>
</tr>
<tr>
<td></td>
<td>150 mm dia</td>
<td>1 : 260</td>
</tr>
<tr>
<td></td>
<td>200 mm dia</td>
<td>1 : 300</td>
</tr>
<tr>
<td></td>
<td>225 mm dia and bigger</td>
<td>1 : 350</td>
</tr>
</tbody>
</table>
The estimated sewerage flows for the proposed development (PDDWF) is based on 1 000 ℓ/unit/day with a resultant peak design flow of 237.6 k ℓ/day.

4.4 Stormwater

Internal Stormwater System

The site drains to the existing river flowing on the eastern boundary of the proposed development. The stormwater management strategy will be to manage and collect all surface runoff in a properly designed stormwater system that will discharge into the natural drainage systems on the site.

Stormwater from the residential developed areas will be collected in the internal road system and surface channels that will be designed accordingly. The water will then be collected through grid covered drop inlets and piped under the roads to points where the water will be discharged, in an efficient, safe and environmentally acceptable manner as discussed below in the Stormwater Management section.
The standards for the stormwater infrastructure to be installed with the proposed development can be summarized as follows:

- **Flood recurrence interval:** 5 years
- **Pipe material:** Concrete
- **Pipe class:** 100D
- **Pipe diameters:** min. 450 mm dia. Up to 750 mm dia. as required
- **Bedding:** Class C
- **Inlets:** Grid covered drop inlets as required
- **Junctions:** Points of deflections on pipelines

As stormwater infrastructures will be constructed in accordance with the standard requirements and specifications as agreed with the municipality.

**Stormwater Management**

The traditional design of stormwater drainage systems have been to collect and convey stormwater runoff as rapidly as possible to a suitable location where it can be discharged. We have experienced that as areas urbanize this type of design results in major drainage and flooding problems downstream. We are also more conscious of the quality of the environment and the impact that uncontrolled increases in runoff can have on land owners.
Many municipalities have adopted stormwater management regulations after flood problems have already developed as a result of earlier development. Regulating future development generally does not relieve existing problems, but can reduce and manage these problems and prevent the creation of new problems.

The objective of a stormwater management plan should be to manage the stormwater resources of the collective watersheds to:

- Prevent flood damage
- Preserve the natural and beneficial functions of the natural drainage system
- Preserve and enhance stormwater quality

Local on-site detention, grass-lined swales, stormwater infiltration systems, undulations, landscaping, etc. can all be utilized, individually or in combination to attenuate peak flood discharges to the required peak discharge rate and to improve stormwater quality.

For the proposed development 100% of the site is expected to drain towards the river during flood situations. It is proposed that the stormwater from residential properties be managed and attenuated accordingly before released into the natural drainage system and that the existing river be managed to avoid flooding of existing and future developments downstream.
5. **FLOODLINE**

The 1:50 year flood line has been determined.

6. **DRAWINGS AND CONTOUR SURVEY**

A contour survey for the development site (1.0 meter intervals) has been completed.

No drawings accompany this report. The layout of the internal sewer, water, roads and stormwater infrastructure will be finalized during the preliminary engineering phase of the project.

Detail design will commence on local authority approval of the application.

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M.J. LOUW PR. ENG. 820418