SINGI PROPERTIES (PTY) LTD

# ROADS AND WET SERVICES REPORT:

# PROPOSED RESIDENTIAL DEVELOPMENT ON ERF 2006, PARSONS VLEI, PORT ELIZABETH.



## SYNOPSIS

This report deals with a preliminary engineering investigation regarding the bulk services and the preliminary investigation and design of the main internal roads, storm water, sewer and water reticulation systems that will serve the mentioned residential development.

## PREPARED BY:

**Civil Consulting Solutions**
29 Michael Heights
Montmedy Road
Lorraine
6070

CCS
CIVIL CONSULTING SOLUTIONS
EMAIL:RUAAN@CIVILCS.CO.ZA
CELL:076 891 9118

DATE: 19 March 2024

| Report Compiled by: | Reviewed by: |
|---|---|
| Ruaan Van Schalkwyk | Lawrence Greene |
| Candidate Eng Tech. 2021403155 | Pr Eng Tech. 2020300841 |

# CONTENTS



## TABLE OF APPENDICES

# 1. TERMS OF REFERENCE

In terms of our appointment by Dr. C. Maringa on behalf of SINGI PROPERTIES (Pty) Ltd, we have prepared an engineering report regarding the preliminary investigation of the bulk services and preliminary investigation and design of the main internal roads, storm water, sewer and water reticulation systems that will serve the mentioned residential development.

# 2. SCOPE

The scope of this report deals with the collection of data on and adjacent to Erf 2006, Parsons Vlei and analysis of this data concerning an engineering opinion regarding the availability of bulk services, identification of restraints, further approvals and studies as well as the preliminary investigation and design of main internal roads, storm water, sewer and water reticulation systems to serve the above-mentioned residential development.

The above information is required for the rezoning and sub-division application as well as the foul sewer drainage and storm water management plan that must form part of the environmental reports.

# 3. LEVEL OF SERVICES

The level of services will be in accordance with the Guidelines for Human Settlement Planning and Design compiled under the patronage of the Department of Housing by CSIR Building and Construction Technology: (2000: Revision August 2003) and other acceptable design specifications.

# 4. DATA COLLECTION

## 4.1 DRAWINGS

Aerial photos, information and details on the existing Burchell Drive, existing municipal sewer, storm water and water reticulation systems in the vicinity of the site, have been obtained from the Nelson Mandela Bay Municipality (NMBM).

## 4.2 SITE DEVELOPMENT PLAN

The proposed Site Development Plan indicating the main internal layout, access road and boundaries of the development on Erf 2006, Parsons Vlei were obtained from the Architect, Reynier Koen of RK Architects.

## 4.3 LAND SURVEYOR

A coordinated contour survey of the site including cadastral boundaries, adjacent roads and existing services has been obtained from the client, which was done by the professional land surveyor, John Kotze.

## 4.4 FIELD RECORDS AND OBSERVATIONS

Erf 2005, Parsons Vlei is abutting the site on the northern boundary, Erf 15, Parsons Vlei to the western boundary, Erf 17, 18, 20, 1746 and Erf 1745 Parsons Vlei to the southern boundary and Erf 1744, Parsons Vlei and Burchell Drive to the eastern boundary. An existing open stormwater channel is observed along the northern boundary of the site.

The levels on the site vary approximately between 178m above Mean SeaLevel (MSL) near the south-western corner of the site and 173.5m MSL near the north-eastern corner of the site.

The site slopes in general with a very flat to mild gradient from south-west to north-east.

A detailed geo-technical investigation of the area is not available at present and will have to be done prior to the detailed design stage.

However, based on discussions with the appointed Geotechnical expert, Professional Engineering Technologist, Mr. L. Greene and based on his knowledge of the area due to the proximity of some of his former geotechnical investigations, the soil profile can in general be described as follows:

The topsoil mainly consists of silty sand or sandy silt with vegetation and roots. The site is underlain by residual soil, Quartzitic sandstone, alluvial based gravel of mudstone and shale, with a possibility of clay inclusions.

Based on the current information at our disposal, the probability that a high groundwater table could be present in the area of the development is considered to be high, especially near the lower-lying areas of the site.

# 5. EXTENT OF THE DEVELOPMENT

In accordance with the Architectural Layout Plan, the proposed residential development can in general be described as follows:

The area of the site is approximately 3,107ha.

The residential development consists of the following:

| | | |
|---|---|---|
| 22 x 3 Bedroom Townhouse: | 142m2: | Double storey |
| 22 x 3 Bedroom Townhouse: | 114m2: | Single storey |
| 32 x 2 Bedroom Townhouse: | 103m2: | Single storey |
| 24 x 2 Bedroom Townhouse: | 54m2: | 2-Storey blocks |
| 47 x 2 Bedroom Apartments: | 50m2: | 2-Storey blocks |
| 8 x 1 Bedroom Apartments: | 35m2: | 2-Storey blocks |

In total, the development will consist of 155 units. Private Open Space areas of 0.32ha have been provided

# 6. ANALYSIS

## 6.1 METHODOLOGY

The methodology adopted in analyzing an effective design for the wet services system and main internal roads for the residential development under discussion, consists of the following:

- Establishing acceptable objectives for the proposed road and wet services systems.
- Determine appropriate design standards for the purpose of analysis and report.
- Applying these criteria to the expected post-development conditions to confirm findings and details regarding the proposed design and constructed works.

## 6.2 ACCEPTABLE OBJECTIVES

- To provide flood control measures that prevent loss of life and significant damage to property from the run-off from major storms and keep excess run-off away from buildings and/or habitable units as far as practically possible.
- To provide reasonable access to buildings and/or habitable units, effective water supply, effective foul sewer and storm water drainage systems for the health, safety and convenience of the community and to protect property from damage by frequent storms.
- To provide economical facilities and find solutions to accommodate water demand, foul sewer effluent and storm water run-off problems compatible with the physical and ecological environment and protect the natural environment against pollution.
- To implement procedures and practices which are consistent with the operating and maintenance standards of the accountable governing body corporate and local authority.

## 6.3 APPROPRIATE DESIGN STANDARDS

A balance must be achieved between the objectives, optimal land use and economic viability of the development.

A compromise between the Guidelines for the provision of Engineering Services as published by the Department of Community Development 1983 (Blue Book), Guidelines for the Provision of Engineering Services and Amenities In Residential Townships Development issued by The South African Housing Advisory Council 1994 ("old" Red Book) and Guidelines for Human Settlement Planning and Design compiled underthe patronage of the Department of Housing by CSIR Building and Construction Technology: (2000: Revision August 2003) ("new" Red Book).

The Guidelines for the Geometric design of Urban arterial roads (UTG1, 1986), TRH4 Specifications: Structural Design of Inter-urban and Rural road pavements and other accepted specifications as indicated, have generally been adopted as a basis for the design of the roads, water supply, sewer and storm water control systems.

In accordance with the recommendations from the Hydrological Research Unit (HRU) of the University of the Witwatersrand: HRU report No. 1/72 - Design Flood Determination in S.A. and HRU report No. 2/78 – Additional information and improvements to Depth - Duration - Frequency diagram the so-called Rational Method has been used to determine the run-off for the relative small catchment areas on and adjacent to Erf 2006, Parsons Vlei.

Intensity/Duration/Frequency Curves for 100; 50 down to the 5 and 2-year recurrence intervals for the Port Elizabeth area have been used in calculations.

# 7. INVESTIGATION AND PRELIMINARY DESIGN

## 7.1 ROADS – ACCESS

Access to the proposed residential development on Erf 2006 Parsons Vlei will be off the existing public road Burchell Road near the north-eastern boundary of the site subject to the approved Traffic Impact Assessment (TIA).

All intersection upgrades and recommendations must be implemented in accordance with the said TIA.

(Refer to Drawing No. TK/2024-05/RS/01)

The applicable Transportation Development Levy payable to the NMBM will be based on the trip generation calculations of the proposed development.

## 7.2 ROADS - STRUCTURAL

The structural design of the main internal roads will have to be done in accordance with the TRH4 Specifications: Structural design of inter-urban and rural road pavements subject to the conditions as indicated in the geotechnical report.

The structural layer works of the main internal roads have been preliminary designed to accommodate the repetitive axle loads associated with post-development light vehicles and occasional heavier commercial vehicles.

- 150mm in-situ silty sandy material compacted to 90% to 98% Modified American Association of State Highway Traffic Officials (MOD AASHTO) density.
- Depending on the insitu Californian Bearing Ratio (CBR) of the insitu layer, a 200mm to 300mm crushed overburden material compacted to 92% MOD AASHTO density can be instructed by the Engineer.
- 150mm G5 material compacted to 95% MOD AASHTO density.
- 100mm G2 (Classification in accordance with TRH 14: Guidelines for Road Construction Materials) crushed stone material compacted to minimum 100% MOD AASHTO density.
- 25mm Continuously Graded Medium Mix Asphalt layer compacted to 95% Marshall Density on top of the G2 basecourse layer with an 80mm high precast mountable kerb on each side of the road.
- 100mm high precast Barrier kerbs at bellmouths on the minimum 6.4m wide access road and/or parking areas as dictated by applicable safety and mobility guidelines.

Alternatively, the private roads of Erf 2006, Parsons Vlei could also be designed as follows.

- 150mm in-situ silty sandy material compacted to 90% to 98% Modified American Association of State Highway Traffic Officials (MOD AASHTO) density.
- Depending on the insitu Californian Bearing Ratio (CBR) of the insitu layer, a 200mm to 300mm crushed overburden material compacted to 92% MOD AASHTO density can be instructed by the Engineer.
- 150mm G5 material compacted to 95% MOD AASHTO density.
- 80mm deep Class 40/2.6 and/or 60mm deep concrete Class 30/2.0with an 80mm high mountable kerb on each side of the road.
- 100mm high precast Barrier kerbs at bellmouths on the minimum 6.4m wide entrance road and/or parking areas as dictated by applicable safety and mobility guidelines.

In certain instances, speed humps can also be designed to act as traffic calming measures as well as the mechanisms to retard and/or divert stormwater overland flow.

## 7.3 ROADS – GEOMETRIC DESIGN

If required, the coordinated horizontal alignment of the access road and Burchell Road layout will have to be amended and designed in accordance with the guidelines as indicated in the approved TIA report.

Based on our experience there should be at least two lanes in and two lanes out for a development of this magnitude to effectively regulate access/ exit of visitors as well as residents conveniently subject to security requirements.

The main internal entrance road should have a minimum width of 6.0m wide. The internal ring road will vary between 6.0m and 4.5m wide.

As far as practically possible, the vertical alignment of the roads will have to be done in accordance with the mentioned Guidelines as mentioned earlier in this report.

The roads will also act as shallow overland storm water channels.

Considering the flat to mild topography of the site from south-west to north-east, the roads will have to be designed to fall within the allowed minimum and maximum gradients (self-cleansing flow and maximum storm water flow velocities) to the catchpit inlets, but also with an overall fall towards the proposed storm water ponds on and/or near the Private Open Spaces at the north-eastern part of the site.

Based on our experience and in accordance with the available topographical data for the site, maximum and minimum longitudinal vertical gradients on the roads should vary in general between 1,5% and 0,5% (absolute minimum 0,4%) respectively with a cross fall gradient of 2,0% to 2,5%.

## 7.4 STORM WATER SYSTEM

Based on previous discussions with Mr Shaun Abrahams of the NMBM, Roads and Storm Water Division, it was agreed that where practical possible, the controlled storm water outflow from Erf 2006,Parsons Vlei had to be limited to a maximum of the discharge resulting from a 1 in 5-year recurrence interval pre-development rainstorm.

To accomplish the storm water management objectives as indicated earlier in this report, the following major and minor storm water control mechanisms will have to be introduced:

(Refer to Drawing No. TK/2024-05/RS/01)

- Design and construct the piped storm water system including the roads and parking on Erf 2006, Parsons Vlei to intercept and also act as storm water channels and overland flow routes, sloping north and north-east to the storm water attenuation ponds. The outflow from the respective ponds will be directed north-east towards the existing stormwater channel.

- The attenuation storm water ponds A and B on Erf 2006, Parsons Vlei have been preliminary designed to retain post-development major design storm inflows up to 1 in 100-year recurrence interval with a 1 in 5-year pre-development discharge. In accordance with our calculations, the effective storage capacity of the proposed ponding system should be 0.342Ml and 0.664Ml respectively.

- The embankments to the ponding facilities should preferably be constructed at a gradient of 1 vertical to 3 horizontal (maximum 1 vertical to 2 horizontal).
- The surface areas of the ponds must be effectively grassed and maintained.

- Erosion protection measures must be implemented at inlet-, outlet- and overflow structures including overland flow routes. This can be done by the effective design and construction of semi-rigid Gabion/Reno mattress/geo-textile structures and establishment of effective ground cover.

- In order to limit the possibility of mosquito problems in the major pond areas, construct 600mm wide concrete “V” channels combined with grassing to act as low flow channels from each inlet- to the outlet structure of the ponds.

- The surface run-off from minor post-development rainstorms (up to maximum 1 in 5-year recurrence interval) has been preliminary designed to be conveyed and intercepted by the piped storm water system.

- The storm water pipes should mainly consist of Class 50D concrete pipes SABS 677 (Class 100D under roads) with respective diameters from 300mm up to 450mm depending on the available gradients of the road reserves as calculated during the

detailed design stage, hard rock conditions and general topography of the storm water routes. All pipes to be laid to SANS 1200 LE standards.

- All final formation levels of the proposed development shall be shaped to fall towards the roads and storm water system. The floor level of all buildings shall be a minimum of 255mm above the adjacent final formation level.

## 7.5 WATER SUPPLY SYSTEM

The supply reservoir for the proposed development will be the Chelsea Reservoir with a top water level (TWL) of 234m above mean sea level (MSL).

There is an existing NMBM 400mm diameter uPVC water main in Burchell Road near the north-eastern corner of Erf 2006 Parsons Vlei.

(Refer to Drawing No. TK/2024-05/W/01)

Under normal circumstances, the provision of water to the proposed development on Erf 2006, Parsons Vlei will be off the mentioned 400mm diameter NMBM reticulation main in Burchell Road as confirmed with Mr. N. Barnard of NMBM in June 2024 for a high-density residential project subject to the conditions as dictated by NMBM.

According to the Municipal By Law Clause 30, General Conditions of Supply: "The granting of a supply of water by the Municipality will not constitute an undertaking by it to maintain at any time or at any point in its water supply system: -

a) An uninterrupted supply
b) A specific pressure or rate of flow in such supply; or
c) A specific standard or quality of water."

SANS 10252-1:2012, Water Supply and Drainage for Buildings, clearly states that the above must be considered where the local authority's water supply is not capable of providing sufficient pressure and rate of flow for fire installations, storage tanks are required.

Based on our design calculations, the Annual Average Daily Demand (AADD) for the 155 sectional title apartments and townhouses will be 86.52 kilolitres per day under post-development conditions. That should be well within the supply capacity of the existing Chelsea reservoir.

In order to accommodate the required minimum residual head pressure of 150kPa under total instantaneous peak demand of 10,01 l/s design flow and a maximum fire flow of 25 litres per second (moderate fire risk regarding denser housing developments) the main internal reticulation should consist of a main feeder pipe of 160mm diameter and a main 110mm diameter looped reticulation system for the sectional title development.

Unless otherwise dictated by NMBM, the fire hydrants will be the pillar type and the

maximum spacing of the fire hydrants will be 180m in accordance with SANS 0900 – 1972.

Under normal conditions the proposed 160mm diameter connection off the existing 400mm diameter NMBM water pipeline near the north-eastern corner of Erf 2006 Parsons Vlei and 110mm diameter ring mains shall be adequate to supply the total instantaneous flow (including fire flow) of 35.01litres per second for the said residential development at the required minimum residual pressure of 150kPa.

Considering maximum residual pressures and residual head pressures under no-flow conditions, the proposed water reticulation on Erf 2006 Parsons Vlei shall consist of uPVC pipes Class 12 in accordance with SANS 966: 1998 Part 1 specifications and laid in accordance with SANS 1200 LB. The completed water reticulation will be tested under a minimum pressure of 1800 kPa in accordance with SANS 1200 L.

To limit the risk of the current low-flow and/or no-flow water supply conditions of the NMBM infrastructure due to the drought inter alia, the following precautionary measures must be implemented.

- As discussed with the NMBM Head of Fire Safety Division, Mr. B. Comely, on 4 May 2024, a fire hydrant, non-return valve, and booster connection shall be installed directly after the consumer valve on the 110mm diameter connection to Erf 2006 Parsons Vlei near the entrance. This safety measure can assist the NMBM Fire Department to boost the water flow with the NMBM fire brigade in the proposed looped reticulation and fire hydrants on Erf 2006 Parsons Vlei in case of sub-standard municipal water supply under fire conditions.

- Subject to the approval of all the relevant authorities, it is also recommended that the Developer should make provision for rainwater harvesting on Erf 2006 Parsons Vlei. The said water shall be treated as advised by a specialist for drinking purposes. The Homeowner/Tennant shall take full accountability for the effective design, implementation and maintenance of the individual rainwater harvesting systems on Erf 2006 Parsons Vlei. That will inter alia include the effective and safe storage, treatment, distribution, booster pump system and use concerning the mentioned rainwater.

## 7.6 FOUL SEWER SYSTEM

The effluent of the proposed residential development consisting of 155 units on Erf 2006 Parsons Vlei, will be treated at the Fishwater Flats Treatment Works (FWFTW).

The preliminary total design Average Dry Weather Flow (ADWF) of the proposed Residential development under discussion has been calculated to be 68.60kl per day.

The capacity of the existing Fishwater Flats Treatment Works is 132Ml per day. The FWFTW is currently treating less than 109Ml per day.

Under the current conditions it should be possible for the existing Fishwater Flats Treatment Works to handle the additional post- development effluent of **0.070ML per day (68.60kl/day)** generated by the proposed residential development as confirmed in principle on 5 June 2024 and subject to final approval by **Mr Cebo Tetyane of NMBM.**

The existing NMBM 225mm diameter sewer line is running near the northern boundary of Erf 2006, Parsons Vlei.

(Refer to Drawing No. TK/2024-05/FS/01)

The Average Dry Weather Flow (**ADWF**) is equal to 0.79 l/s. Based on the experience of the NMBM Sewerage Division, we prefer to use the more conservative Harmon's Formula to determine the Peak Dry Weather Flow (**PDWF**) and to rather use an infiltration factor of 100% of the PDWF to calculate the Peak Wet Weather Flow (**PWWF**). In accordance with our calculations, the preliminary design **PDWF is equal to 3.02 l/s** and the **PWWF** of the proposed development on Erf 2006, Parsons Vlei will be **equal to 6.04 l/s.**

The foul sewer reticulation mains from the proposed development will drain to the existing NMBM sewer network via a manhole connection on the afore mentioned 225mm diameter NMBM sewer main **subject to the approval of Mr Conrad Bruintjies of NMBM.**

Considering the topography of Erf 2006, Parsons Vlei, the main internal waterborne gravity sewers have been preliminary designed to accommodate the peak weather design flows and will mainly consist of 110mm diameter Class 51 (Class 34 under roads) PVC Sewer pipes: SANS 791: 2002 up to a maximum of 160mm diameter Class 400kPa PVC-U pipes: SANS 1601 Type 1 specification.

# 8. CONCLUSION

We believe that if the proposed works would be designed and executed in accordance with the recommendations as indicated in this report, the proposed residential development on Erf 2006, Parsons Vlei could be serviced effectively from a civil engineering perspective.

# APPENDIX A

# PRELIMINARY ROADS & STORMWATER LAYOUT PLAN


## LEGEND

| | |
|---|---|
| | PROPOSED STORMWATER |
| | EXISTING STORMWATER |
| | "V" CHANNEL |
| | 160mm SUBSOIL |
| 1:40 | CROSS-FALL |
| | 250x300 OPENING |
| | OVERLAND FLOW |
| R 7.50 | 7,5m RADIUS |
| 202.32 | FINAL FORMATION LEVEL |
| | BARRIER KERB |
| | ROLL OVER KERB |
| | 160mm SLEEVE uPVC class6 |

ISSUED FOR:
FOR INFORMATION ONLY

| R | DATE | REVISION |
|---|---|---|
| | | |

CCS
CIVIL CONSULTING SOLUTIONS
EMAIL: ruaan@civilcs.co.za CELL: +27(0)76 891 9118

PROJECT:
PROPOSED NEW RESIDENTIAL DEVELOPMENT ON ERF 2006 PARSONS VLEI, PORT ELIZABETH

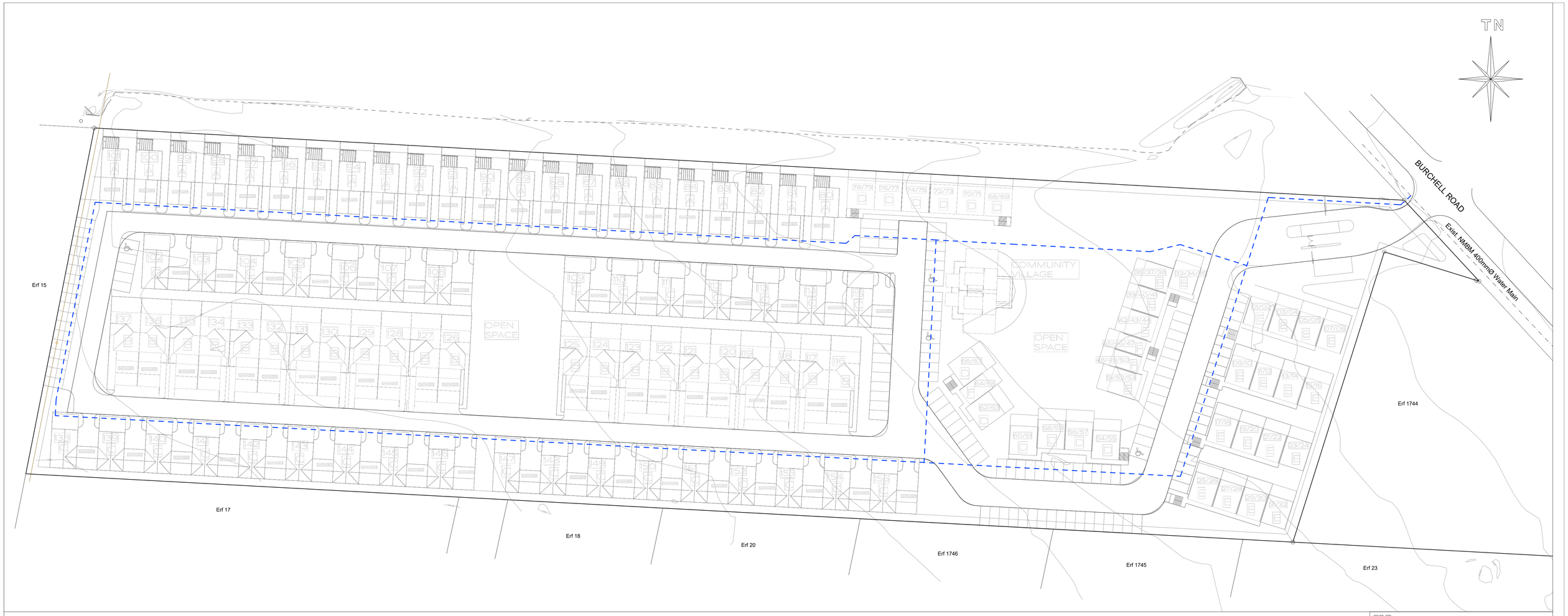
DRAWING:
PRELIMINARY INTERNAL ROADS AND STORMWATER LAYOUT

| DESIGNED: | DRAWN: | CHECKED: |
|---|---|---|
| RvS | RvS | |
| SCALE: | DATE: | SIGNED: |
| 1:500 on A1 | MAY 2024 | |

| DRAWING No.: | REVISION: |
|---|---|
| TK/2024-05/RS/01 | . |

# APPENDIX B

# PRELIMINARY WATER RETICULATION LAYOUT PLAN




## LEGEND

- EXISTING WATER MAIN
- PROPOSED WATER
- DOUBLE CONNECTION 34Ø HDPE
- SINGLE CONNECTION 25Ø HDPE
- FH — FIRE HYDRANT: PILLAR TYPE

CHELSEA RESERVOIR
CAPACITY = 90.8Ml
TWL = 234mMSL

ISSUED FOR:
FOR INFORMATION ONLY

| R | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

CCS
CIVIL CONSULTING SOLUTIONS
EMAIL: ruaan@civilcs.co.za CELL: +27(0)76 891 9118

PROJECT:
PROPOSED NEW RESIDENTIAL DEVELOPMENT ON ERF 2006 PARSONS VLEI, PORT ELIZABETH

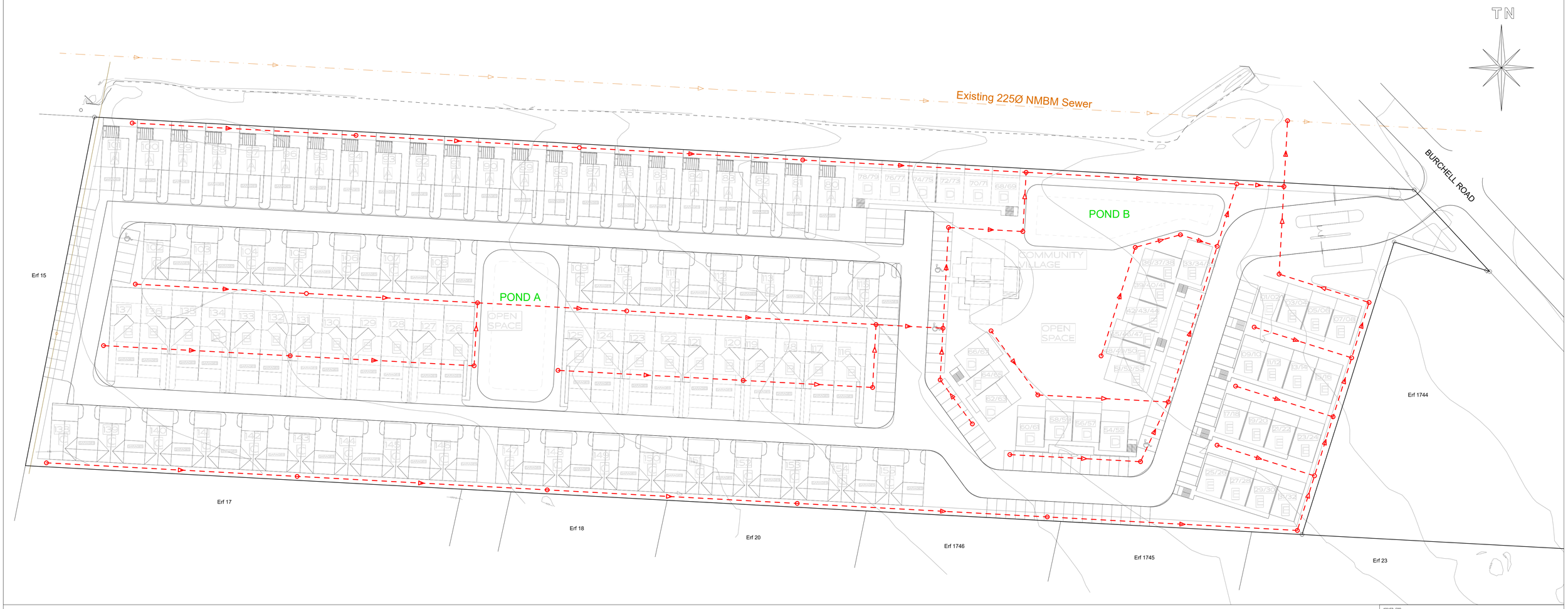
DRAWING:
PRELIMINARY WATER RETICULATION LAYOUT

| DESIGNED: | DRAWN: | CHECKED: |
|---|---|---|
| RvS | RvS | |
| SCALE: | DATE: | SIGNED: |
| 1:500 on A1 | MAY 2024 | |

| DRAWING No.: | REVISION: |
|---|---|
| TK/2024-05/W/01 | . |

# APPENDIX C

# PRELIMINARY FOULSEWER LAYOUT PLAN




| LEGEND | |
|---|---|
| | EXISTING SEWER |
| | PROPOSED SEWER |
| | SEWER MANHOLE |

ISSUED FOR:
FOR INFORMATION ONLY

| R | DATE | REVISION |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

CCS
CIVIL CONSULTING SOLUTIONS
EMAIL: ruaan@civilcs.co.za CELL: +27(0)76 891 9118

PROJECT:
PROPOSED NEW RESIDENTIAL DEVELOPMENT ON ERF 2006 PARSONS VLEI, PORT ELIZABETH

DRAWING:
PRELIMINARY FOULSEWER RETICULATION LAYOUT

| DESIGNED: | DRAWN: | CHECKED: |
|---|---|---|
| RvS | RvS | |
| SCALE: | DATE: | SIGNED: |
| 1:500 on A1 | MAY 2024 | |

| DRAWING No.: | REVISION: |
|---|---|
| TK/2024-05/FS/01 | . |

# APPENDIX D

# ARCHITECTURAL SITE DEVELOPMENT PLAN


| UNIT TYPE | FLOORS | BEDRMS | BATH | GARAGES | AREA | TOTAL AREA | COV | TOTAL COV | NUMBER UNITS | PARKING BAYS | TOTAL BAYS | OPEN SPACE | TOTAL SPACE | TOTAL AREA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **A** | DOUBLE | 3 | 2 | 2 | 142 m2 | 3124 | 89 | 1958 | 22 | 1,5 | 33 | 24 | 528 | 3408 m2 |
| **B** | SINGLE | 3 | 2 | 2 | 114 m2 | 2508 | 114 | 2508 | 22 | 1,5 | 33 | 24 | 528 | 2508 m2 |
| **C** | SINGLE | 2 | 2 | 2 | 103 m2 | 3296 | 103 | 3296 | 32 | 1,5 | 48 | 24 | 768 | 3296 m2 |
| **D** | WALKUPS | 2 | 2 | 0 | 54 m2 | 1296 | 27 | 648 | 24 | 1,5 | 36 | 18 | 432 | 1296 m2 |
| **E** | WALKUPS | 2 | 1 | 0 | 50 m2 | 2350 | 25 | 1175 | 47 | 1,5 | 70,5 | 18 | 846 | 2350 m2 |
| **F** | WALKUPS | 1 | 1 | 0 | 35 m2 | 280 | 18 | 140 | 8 | 1,25 | 10 | 12 | 96 | 280 m2 |
| **TOTAL** | | | | | **498** | **12854** | **376** | **9725** | **155** | **8,75** | **230,5** | **120** | **3198** | **13138 m2** |

| | |
|---|---|
| SITE AREA | 31076 m2 |
| NUMBER OF UNITS | 155 |
| UNIT AREA | 12854 m2 |
| GATEHOUSE | 72 m2 |
| COMMUNITY CENTRE | 142 m2 |
| TOTAL | 13068 m2 |
| COVERAGE AREA | 9939 m2 |
| COVERAGE | 32% m2 |
| PARKING NEEDED | 230,5 bays |
| PARKING UNITS | 233 bays |
| PARKING VISITORS | 49 bays |
| PARKING PARAPLEGIC | 5 bays |
| TOTLA PROVIDED | 282 bays |
| OPEN SPACE REQUIRED | 3198 m2 |
| OPEN SPACE PROVIDED | 3265 m2 |

BURCHELL Estate

RK architects international

reynier 0828225422