


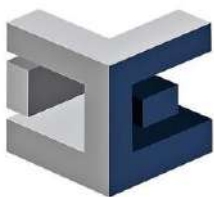
PROPOSED RETAIL DEVELOPMENT ON PRESIDENT PARK X6, EMALAHLENI

STORMWATER MANAGEMENT PLAN

APRIL 2021



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20059/SW/02 (Site Boundaries)

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1 Introduction

EDL Engineers (Pty) Ltd have been appointed by the landowners to compile a Stormwater Management Plan for a proposed Retail development situated on President Park X6, Emalahleni, Mpumalanga.

As part of the development approval process, a Stormwater Management Plan is required in accordance with the Emalahleni Local Municipality: Stormwater Management Requirements.

As per the requirements of the Emalahleni Local Municipality (Roads, Transport and Civil works), effective from February of 2007, the maximum stormwater flow, for a proposed development that is allowed to be discharged directly into the municipal system must be less than or equal to the pre-development 1:5-year storm event.

Furthermore, post-development stormwater run-off from the development may not exceed pre-development runoff up to and including the 1:20-year storm event.

This report determines the parameters of the storm events and recommend methods for effective management of stormwater on site and into the municipal system / adjacent road network. Please refer to **Drawing No. 20059/SW/01**.

2 Site Location

2.1 Site Location

As shown in **Figure 1**, the development is located on the President Park X6, Emalahleni. The proposed development site is located west of the N4 highway and south of Mandela Dr. The site is located between Nita Ave and Tswelopele Junction (Highveld Mall Western Access).

Currently the proposed site is undeveloped with grassland and a few trees.

The approximate coordinates of the development site are:

Latitude: 25°52'58.19"S

Longitude: 29°15'26.12"E

The proposed development site is indicated in red on **Figure 1** below.



Figure 1: Locality Plan

2.2 Rainfall

As per the SANRAL Drainage Manual, as well as Historic Rainfall Data obtained from the South African Weather Service, it can be concluded that Emalahleni falls in a region of 600 to 800mm Mean Annual Precipitation (MAR). An MAR value of 700mm was assumed for the calculations that follows.

3 Proposed Retail Development

3.1 Proposed Retail Development

The proposed site measures approximately 3.0ha in extent and it is the intention of the developer to construct a retail / shopping centre on the erven with a total GLA of 12 000m² and associated parking bays as per the required standard of minimum 6 bays / 100m² of GLA.

The retail development will include shops with sloping roofs, a yard at the back and parking area next to Mandela Drive. Also included are the accesses from Mandela Drive and Nita Avenue and kerbed roadways, with some green areas and islands that will be landscaped and shaped to provide softer surface areas for grass and shrubs as well as plants with groundcover to allow for better aesthetics and greener areas. Please refer to **Drawing No. 20059/SW/02** for a layout of the site without any infrastructure (Pre-Development Scenario).

4 Stormwater methodology & Calculations

4.1 Calculations of Stormwater Run-Off

The maximum stormwater flow, for the proposed development, that is allowed to be discharged directly into the Municipal system / adjacent roads must be less than or equal to the pre-development 1:5-year storm event, as required by the Emalahleni Local Municipality.

Furthermore, post-development stormwater run-off from the development may not exceed pre-development runoff up to and including the 1:20 year storm event.

The stormwater run-off was calculated using the Rational method. The data used in the calculations are summarized in **Table 1** below. Furthermore, the calculations of the pre-development (1:5 year) flow is tabulated in **Table 2** while the post-development run-off is tabulated in Table 3. Please note that the erf (Holding 154) to the south of the study site, forms part of the catchment area under consideration and thus the stormwater from this erf was incorporated in the Pre-and-Post Development calculations.

Table 1: Catchment Parameters

Description	Parameter
Total size of Catchment	0.0304km ²
Longest Watercourse	0.288km
Average Slope	0.02m/m
Mean Annual Rainfall	650mm
Region	Inland

Please refer to **Drawing No. 20059/SW/02** for a layout of the site in the “Pre-Development” state, with characteristics as set out within **Table 2** below.

Table 2: Pre-Development Flow (1:5 Year)

Erf	Area (ha)	Area Distribution Factor	Ave. Slope	T _c (min)	Combined run-off coefficient	Rainfall Intensity (mm/hr)	Peak Flow (m ³ /s)
Combined catchment	3.04	Rural: 100%	0.02m/m	24	0.305	114.8	0.3

For the sake of simplicity, the site has been divided into various segments to calculate the stormwater peak flow that is expected to be generated by the proposed development during the 1:20 Year storm event. As set out in **Table 3**, please find the estimated total Post Development flow. Please refer to **Drawing No. 20059/SW/03**, showing the various catchments, with their respective details (approximate areas) as follows:

Paved Areas:

Paved Area 1 3 207m² Paved Area 2 1 178m² Paved Area 3 2 480m²
 Paved Area 4 2 795m² Paved Area 5 2 978m² Paved Area 6 2 293m²

Roof Areas:

Roof Area 1 3 989m² Roof Area 2 2 722m² Roof Area 3 3 498m²
 Roof Area 4 1 245m²

Service Roads (behind building) 3 079m²

Table 3: Post-Development Flow (1:20 Year)

Erf	Area (ha)	Area Distribution Factor	Ave. Slope	Tc (min)	Combined run-off coefficient	Rainfall Intensity (mm/hr)	Peak Flow (m ³ /s)
Combined catchment	3.04	Urban: 97% Rural: 3%	0.02m/m	8	0.817	197.6	1.365

4.2 Proposed Stormwater Control Measures

The proposed stormwater methodology is to not influence the natural flow of stormwater and to therefore propose that new outlets (discussed later) will release the stormwater run-off to the north of the site's northern boundary past Mandela Dr into the open area therefore allowing the natural flow of stormwater according to the contour levels and the average slope over the site.

As mentioned, the Emalaheni Local Municipality requires that the amount of post-developed runoff, which is discharged into the existing system / surrounding road network, cannot exceed the pre-developed discharge in a major storm event. It is therefore required that excess discharge be either managed on site by temporary storage thereof on site until it can be discharged into the existing system once the peak storm event have passed or allowing a runoff into the surrounding roads of less than or equal to the Pre-Developed 1:5 major storm event volume.

It is calculated at this stage that approximately 1.365m³/s of stormwater runoff water will have to be conveyed from the site. This can be achieved as follows:

- Kerb and Grid inlets are proposed to be placed strategically over the site in such a manner as to capture most of the stormwater running along the paved / surfaced areas of the parking and service road areas towards the northern boundary of the site (natural flow direction). The captured stormwater from the roofs of the buildings will be captured by kerbed inlets to the south of the site and conveyed through pipes to the north. Three (3) attenuation ponds are to be placed as shown on **Drawing No. 20059/SW/01** to allow for the attenuation of storm water on site. Pipe placement of the stormwater structures are set out on **Drawing No. 20059/SW/01**.
- The remaining stormwater is proposed to be discharge by means of the various green areas i.e., gardens etc all over the study site premises, this included a green area in the eastern corner where the buffer of the wetland area is located. Please refer to **Drawing No. 20059/SW/01** for a concept layout of the Stormwater Management System.
- All outlet structures north of Mandela Drive are to be fitted with erosion protection (energy brakers) and gabion mattresses to minimise the effect of erosion at these outlets as a result of scouring and elevated flow velocities.
- The existing culvert below Mandela Drive is proposed to be used (Stormwater pipe is proposed to tie into this culvert) for the drainage of the easternmost stormwater on the site, from the proposed attenuation pond. Please refer to **Drawing No. 20059/SW/0**.

5 Conclusions

The proposed development situated on President Park X6, Emalahleni, Mpumalanga, is subject to the stormwater management requirements of the Emalahleni Local Municipality and Stormwater control measures have been proposed to comply with requirements.

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As mentioned in Chapter 4.2 in this report, these measures include the conveyance of water by kerbs and kerb inlets, with their associated pipe networks, to attenuation ponds and finally, from the site towards the north of Mandela Drive. The pipe locations are shown on **Drawing No. 20059/SW/01**.

All pipes within the mentioned pipe networks are proposed to be laid as far as possible according to the existing average slopes present on the study site to convey stormwater from the site to the opposite side of Nelson Mandela Drive. An open grassed area is proposed where the buffer of the small wetland area is located next to Mandela Drive and in the eastern corner of the site.

Erosion protection measures are proposed for the outlet structures north of Mandela Drive, as set out within Chapter 4 and shown on **Drawing No. 20059/SW/01**.

Figures

Figure 1: Locality



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● SITE LOCATION

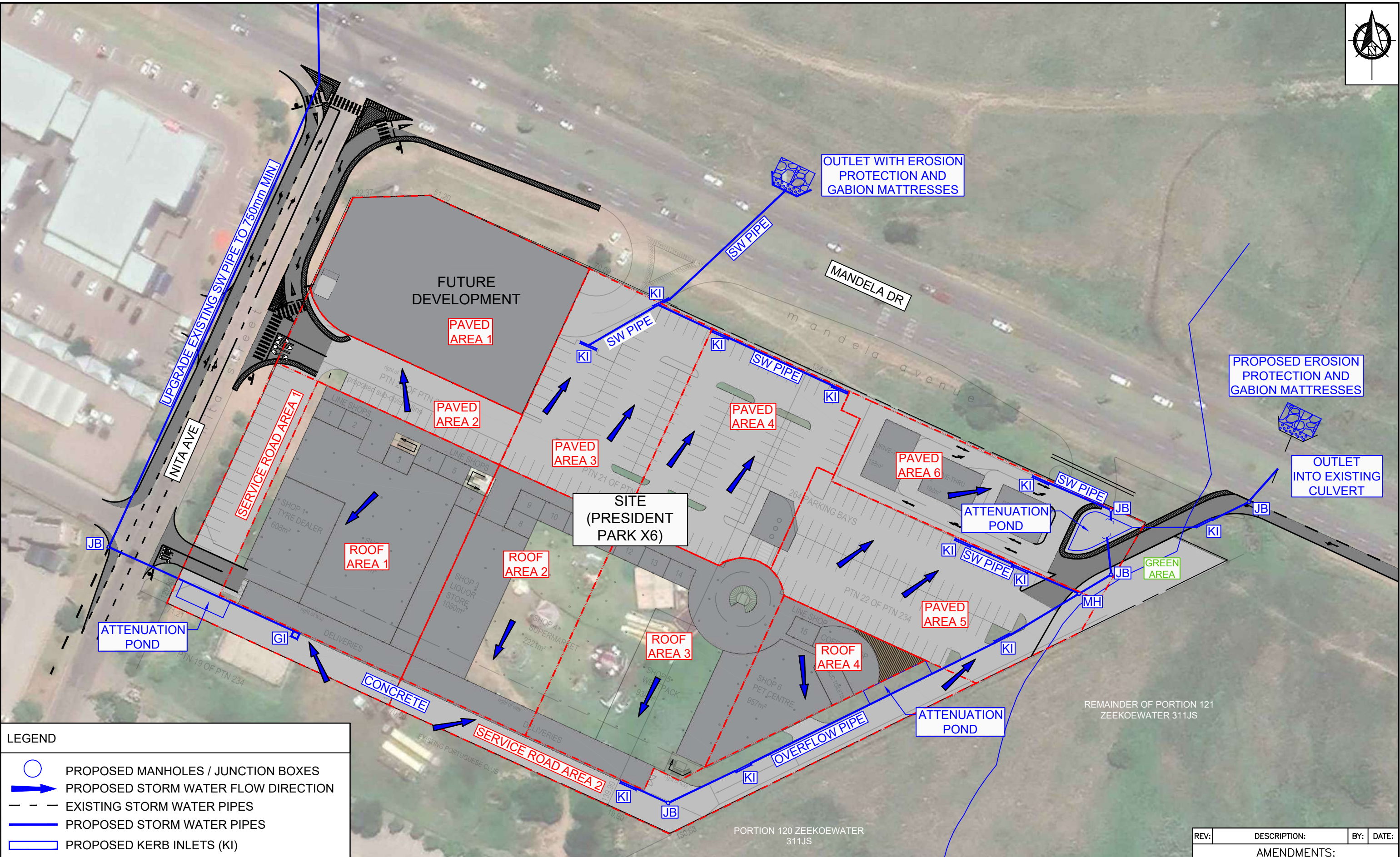
SITE:
PRESIDENT PARK X6

TITLE:
LOCALITY

FIG 1

Drawings

Drawing no: 20059/SW/01 (Proposed Stormwater Layout)
 20059/SW/02 (Site Boundaries)
 20059/SW/03 (Site without any SW control infrastructure)



LEGEND	
	PROPOSED MANHOLES / JUNCTION BOXES
	PROPOSED STORM WATER FLOW DIRECTION
	EXISTING STORM WATER PIPES
	PROPOSED STORM WATER PIPES
	PROPOSED KERB INLETS (KI)

SITE: PRESIDENT PARK X6 (RETAIL DEVELOPMENT)	20059/SW/01 DRAWING NO.		20059 PROJECT NO.		APR .2021 DATE.		 EDL CONSULTING ENGINEERS 1st Floor, Block D The Village Office Park C/O Glenwood Rd & Oberon Ave, Fearie Glen, 0043 Tel: 087 897 5074/5/6 eben@edlengineers.co.za www.edlengineers.co.za
	1:1 000 SCALE AT A3.		HBS DRAWN.		ED KOTZE CHECKED.		
TITLE: STORMWATER MANAGEMENT PLAN							


REV:	DESCRIPTION:	BY:	DATE:
AMENDMENTS:			

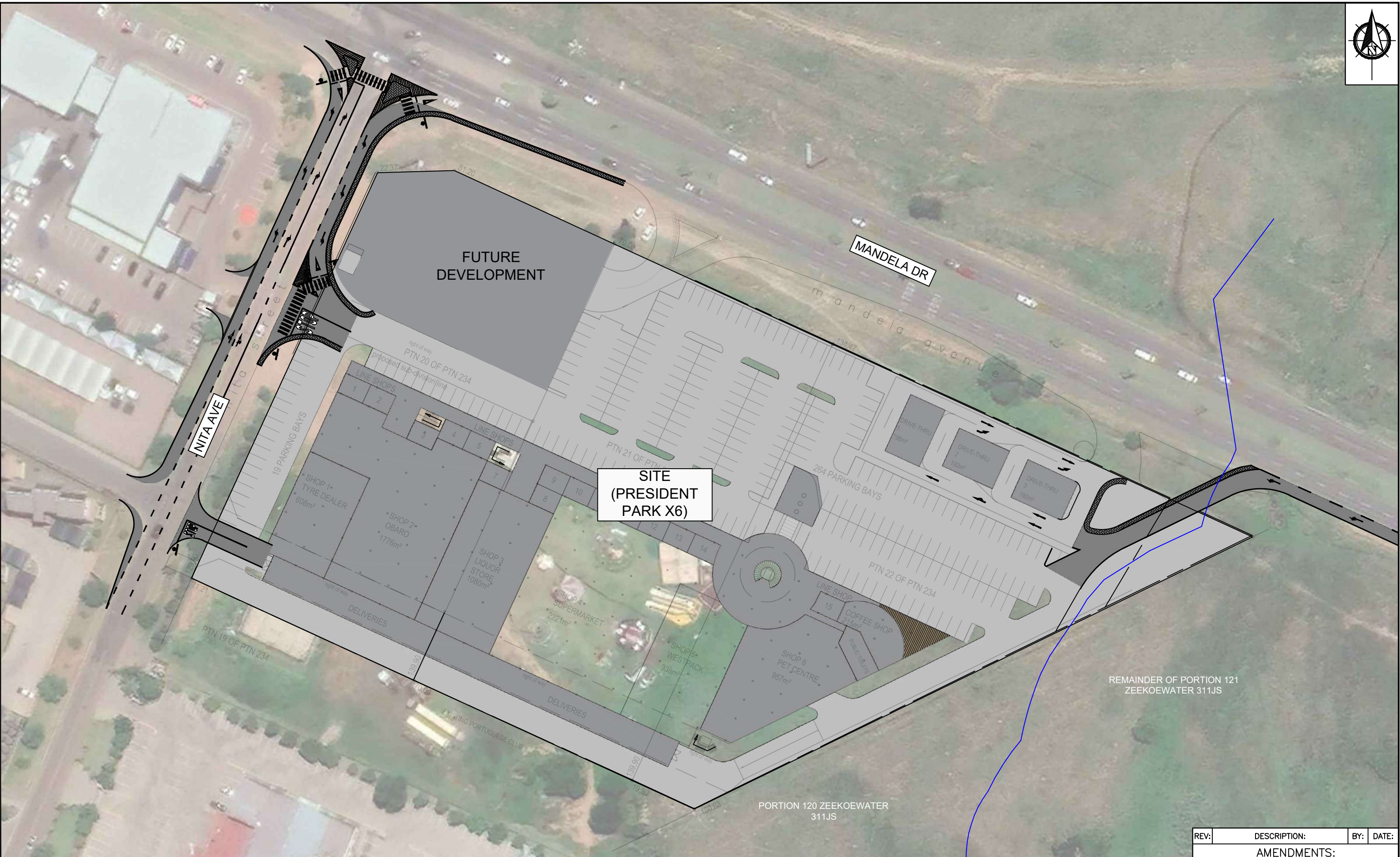


SITE
(PRESIDENT
PARK X6)


LEGEND
←←← PROPOSED SITE BOUNDARIES

REV:	DESCRIPTION:	BY:	DATE:
AMENDMENTS:			

SITE: PRESIDENT PARK X6 (RETAIL DEVELOPMENT)	DRAWING NO. 20059/SW/02		PROJECT NO. 20059	DATE. APR .2021	 EDL CONSULTING ENGINEERS 1st Floor, Block D The Village Office Park C/O Glenwood Rd & Oberon Ave, Fearie Glen, 0043 Tel: 087 897 5074/5/6 eben@edlengineers.co.za www.edlengineers.co.za
	TITLE: SITE BOUNDARIES	SCALE AT A3. 1:1 000	DRAWN. HBS	CHECKED. ED KOTZE	



REV:	DESCRIPTION:	BY:	DATE:
AMENDMENTS:			

SITE: PRESIDENT PARK X6 (RETAIL DEVELOPMENT)	DRAWING NO. 20059/SW/03		PROJECT NO. 20059	DATE. APR .2021	 EDL CONSULTING ENGINEERS 1st Floor, Block D The Village Office Park C/O Glenwood Rd & Oberon Ave, Fearie Glen, 0043 Tel: 087 897 5074/5/6 eben@edlengineers.co.za www.edlengineers.co.za
	TITLE: SITE WITHOUT ANY SW CONTROL INFRASTRUCTURE	SCALE AT A3. 1:1 000	DRAWN. HBS	CHECKED. ED KOTZE	