8.1.1.2 CPP

PM_{10} Predicted Impacts

The plot showing the predicted 99th percentile 24-hour concentration of PM_{10} (cumulative) from all the point sources at the proposed CPP is presented in Figure 8-12. The predicted maximum ground level concentration of 15 µg/m³ at any point outside the CPP boundary is within 75 µg/m³ (current limit value).

The ground level concentration predicted is the potential contribution the operation of the CPP will add to the ambient atmosphere and not cumulative impact from all the existing sources in the area.

The predicted annual concentration of PM_{10} is presented in Figure 8-13. The maximum ground level concentration of 1.4 µg/m³ at any point outside the CPP boundary is below the current standard of 40 µg/m³.

Sulfur Dioxide (SO_2)

The plot of SO_2 1-hour, 24-hour and annual concentrations predicted from the proposed CPP are presented (Figure 8-14, Figure 8-15, Figure 8-16). The predicted 1-hour average simulation returned maximum ground level SO_2 concentrations of 575 µg/m³. This maximum is higher than SA standard of 350 µg/m³. The 24-hour ground level concentration is exactly at the current limit (125 µg/m³). The predicted annual SO_2 concentration of 16.4 µg/m³ is below the annual standard of 50 µg/m³. It is worth mentioning that the highest contributor of SO_2 was the boiler which will be fired by coal for 2/3 weeks of the year.

Nitrogen Dioxide (NO_2)

The plots showing model predictions 1-hourly and annual NO_2 concentrations (all NO_x assumed to be NO_2) are presented (Figure 8-17 and Figure 8-18). The 1-hour average simulation predicted a ground level NO_2 concentration of 323 µg/m³ is higher than the SA standard (200 µg/m³). The predicted annual level is within the current standard (40 µg/m³). NO_2 emission from the boiler contributed the most to the total NO_2 concentrations from the CPP.

Carbon Monoxide (CO)

Model simulations of 1-hour and annual 8-hour CO concentrations are presented (Figure 8-19 and Figure 8-20). The predicted 1-hour average CO maximum ground level concentration of 0.003 mg/m³ is lower than the standard (30 mg/m³). The predicted 8-hour average concentration of 0.001 mg/m³ is within the current standard of 10 mg/m³. CO emission was simulated from the boiler only.

A summary of the model prediction for the proposed CPP is presented in Table 8-3 below. The predicted concentrations for the different averaging periods were compared to the current standards to assess compliance.

Table 8-3: Summary of Dispersion Modelling Results (CPP) Without Mitigation

Air Contaminant	Averaging Period	Ambient Air Quality Standard ($\mu g/m^3$)	Maximum GLC ($\mu g/m^3$
Inhalable Particulates (PM_{10})	24 hour	75	15.5
	Annual	40	1.4
Sulfur Dioxide (SO2)	1 hour	350	575
	24 hour	125	125
	Annual	50	16.4
Nitrogen Dioxide (all NO_x assumed to be NO_2)	1 hour	200	323
	Annual	40	9.4
CO (mg/m^3)			
Carbon Monoxide	1 hour	30	0.003
	8 hour	10	0.001

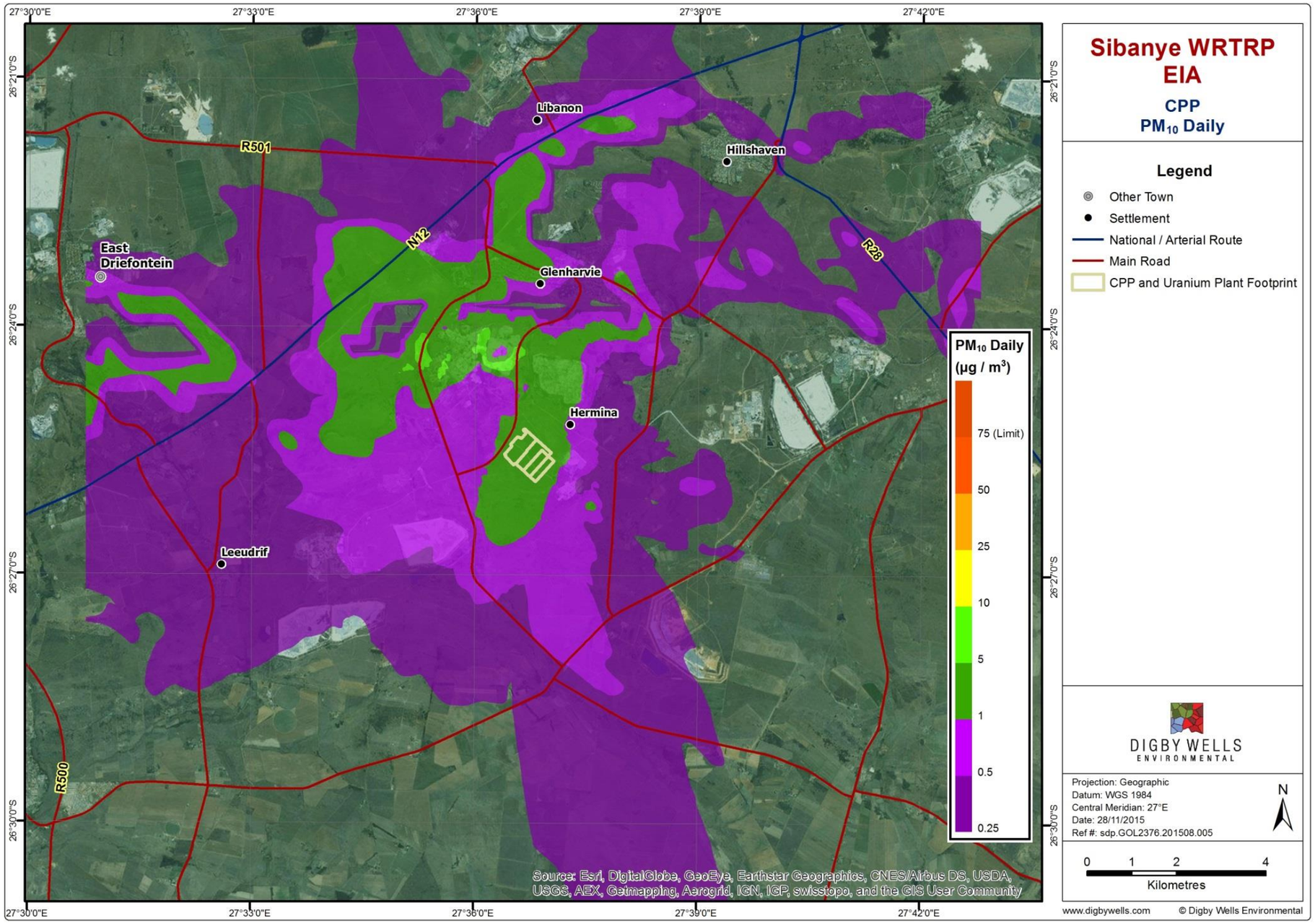

Figure 8-12: Predicted 24-Hour Average PM_{10} Concentrations, 99th Percentile (µg/m^3)

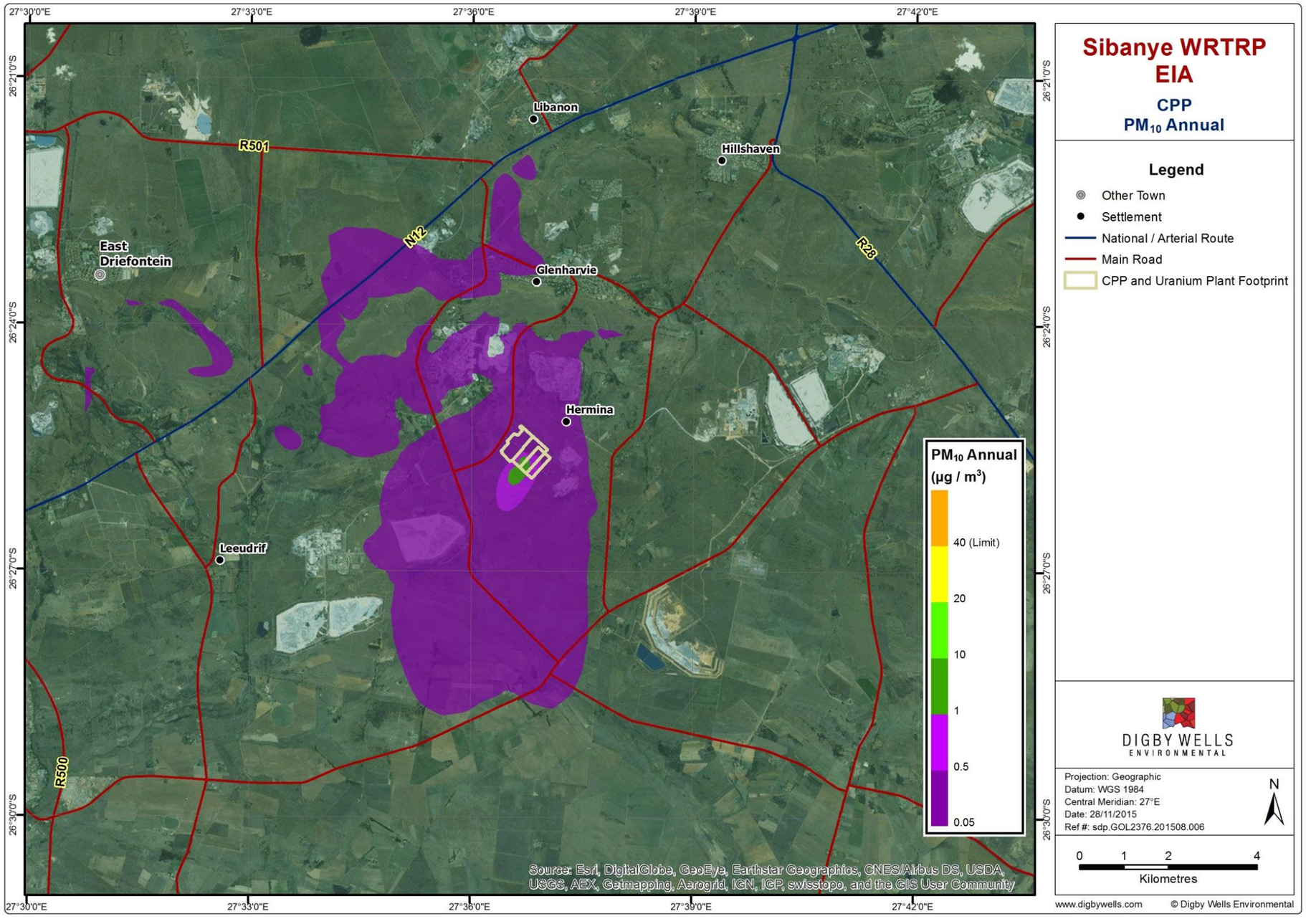

Figure 8-13: Predicted Annual Average PM_{10} Concentrations, 100th Percentile (µg/m^3)

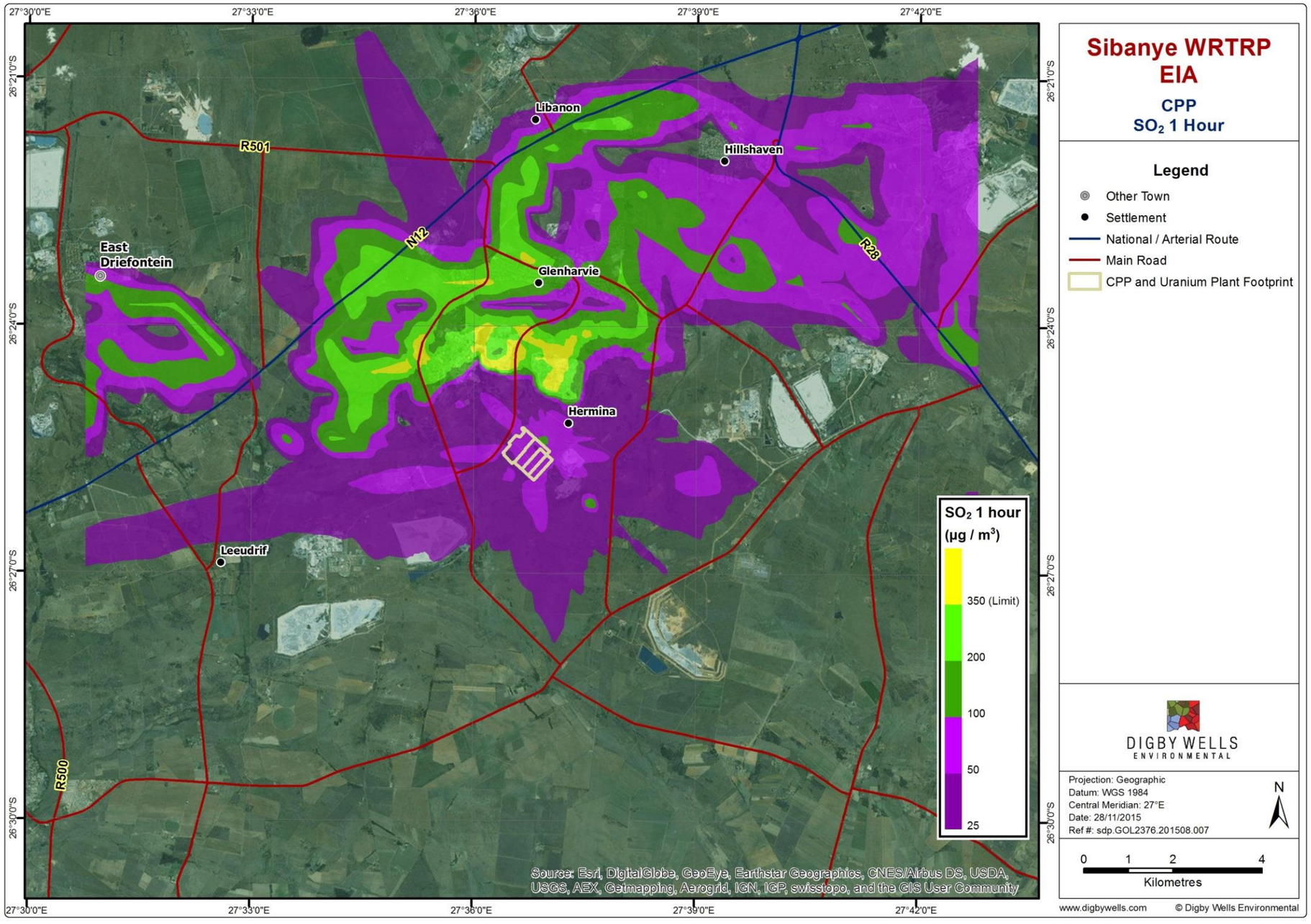

Figure 8-14: Predicted SO_2 Maximum 1-Hour Average Concentrations (µg/m^3)

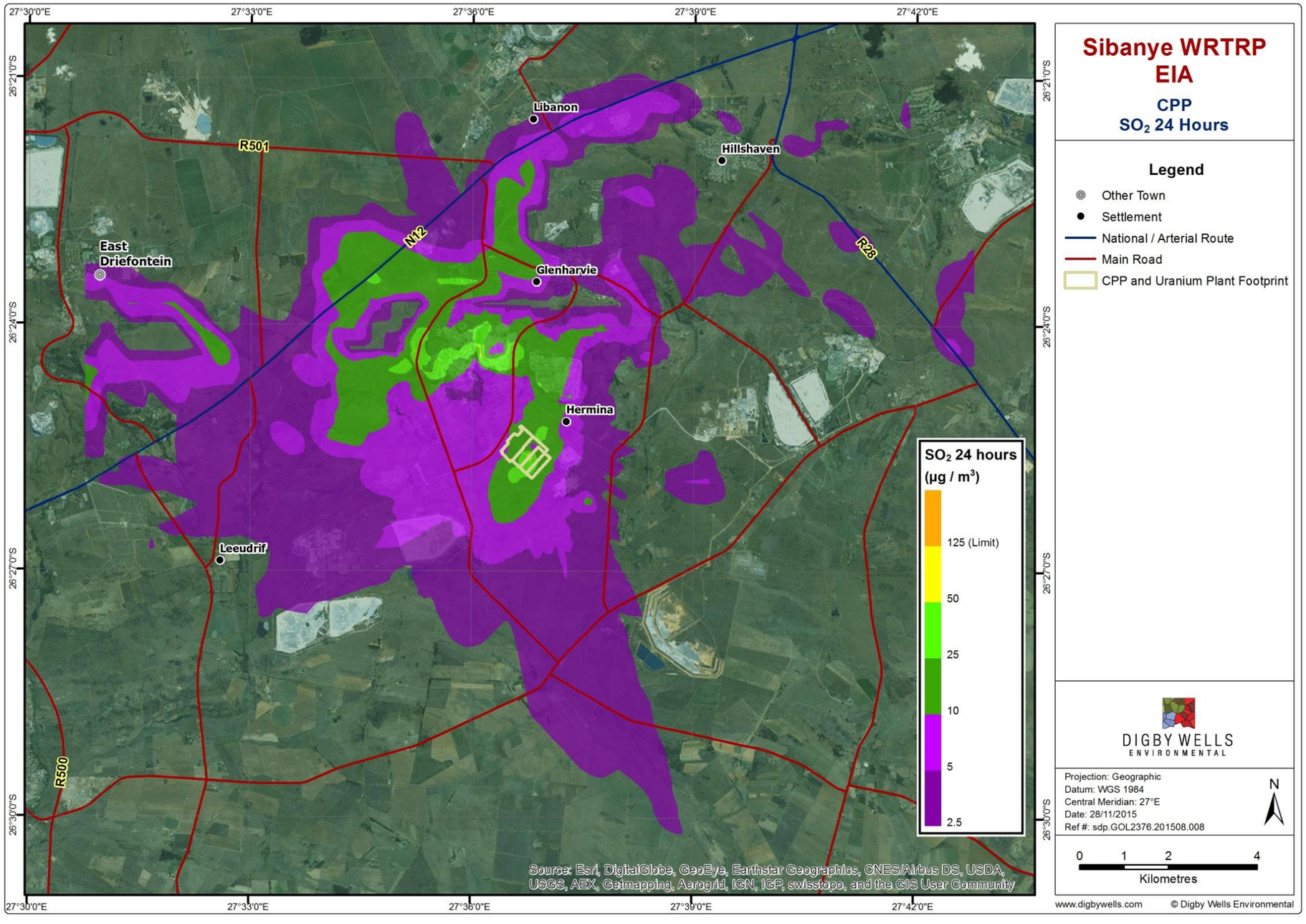

Figure 8-15: Predicted SO_2 Maximum 24-Hour Average Concentration (µg/m^3)

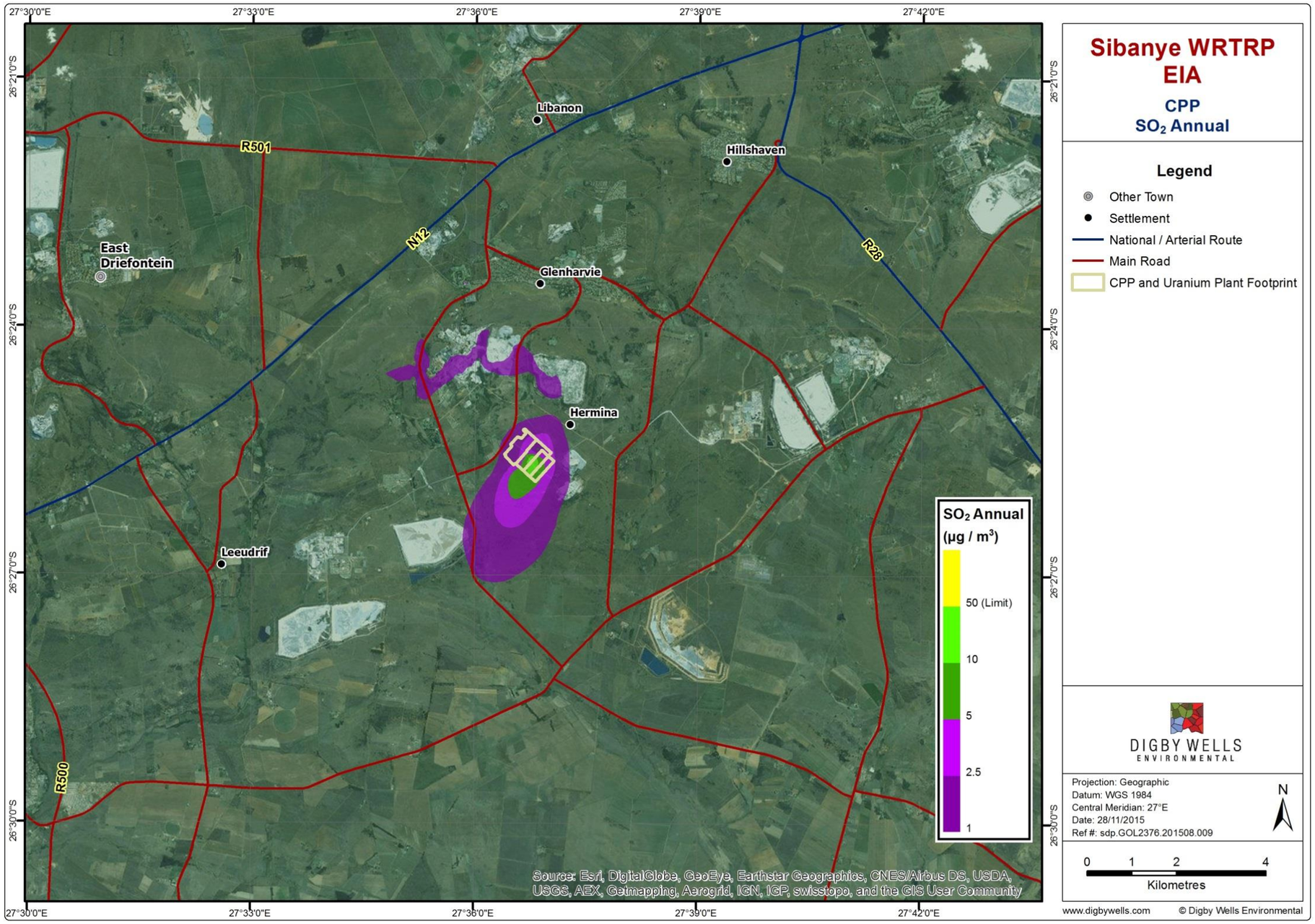

Figure 8-16: Predicted SO_2 Annual Concentration (µg/m^3)

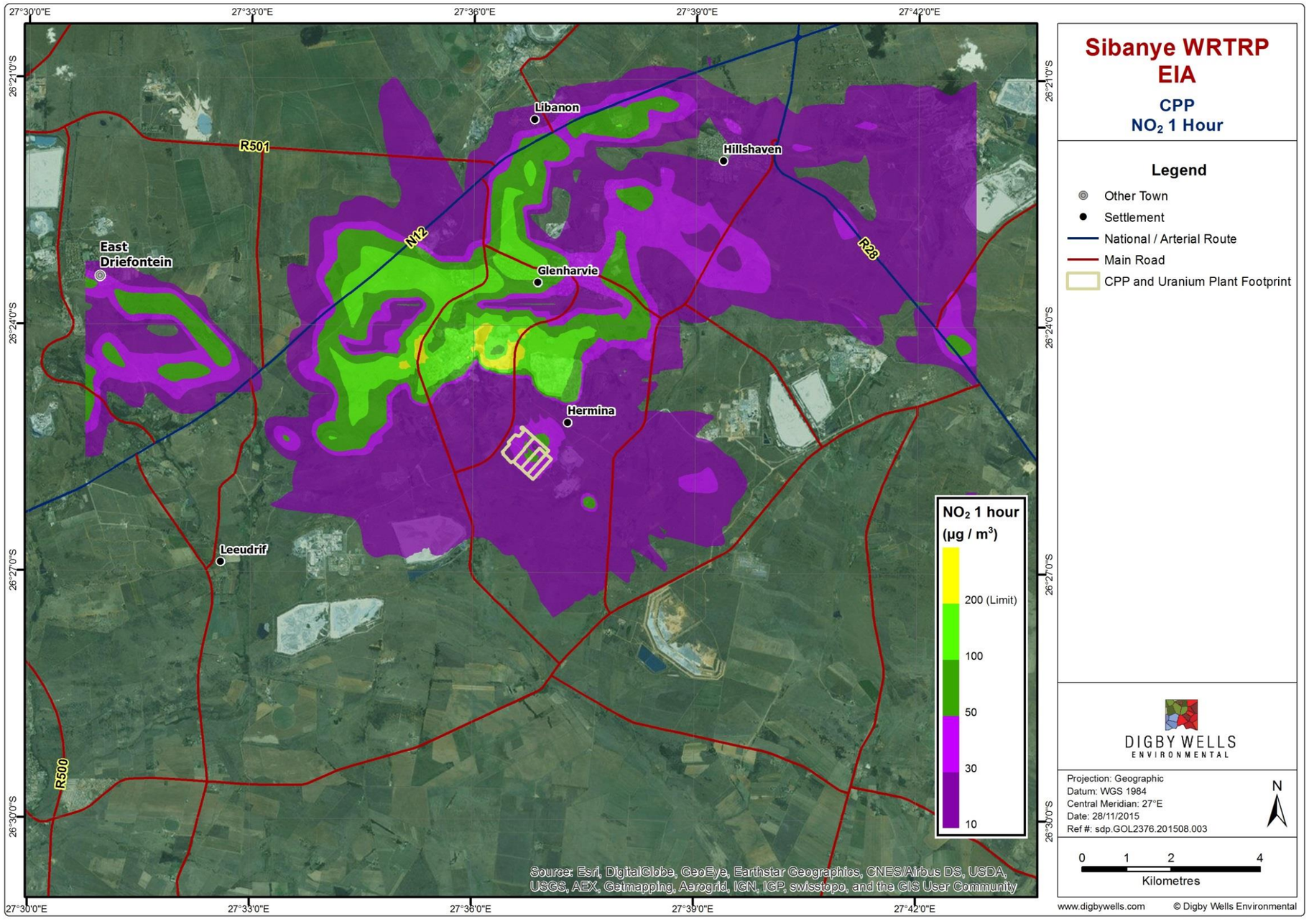

Figure 8-17: Predicted NO_2 Maximum 1-Hour Average Concentrations (µg/m^3)

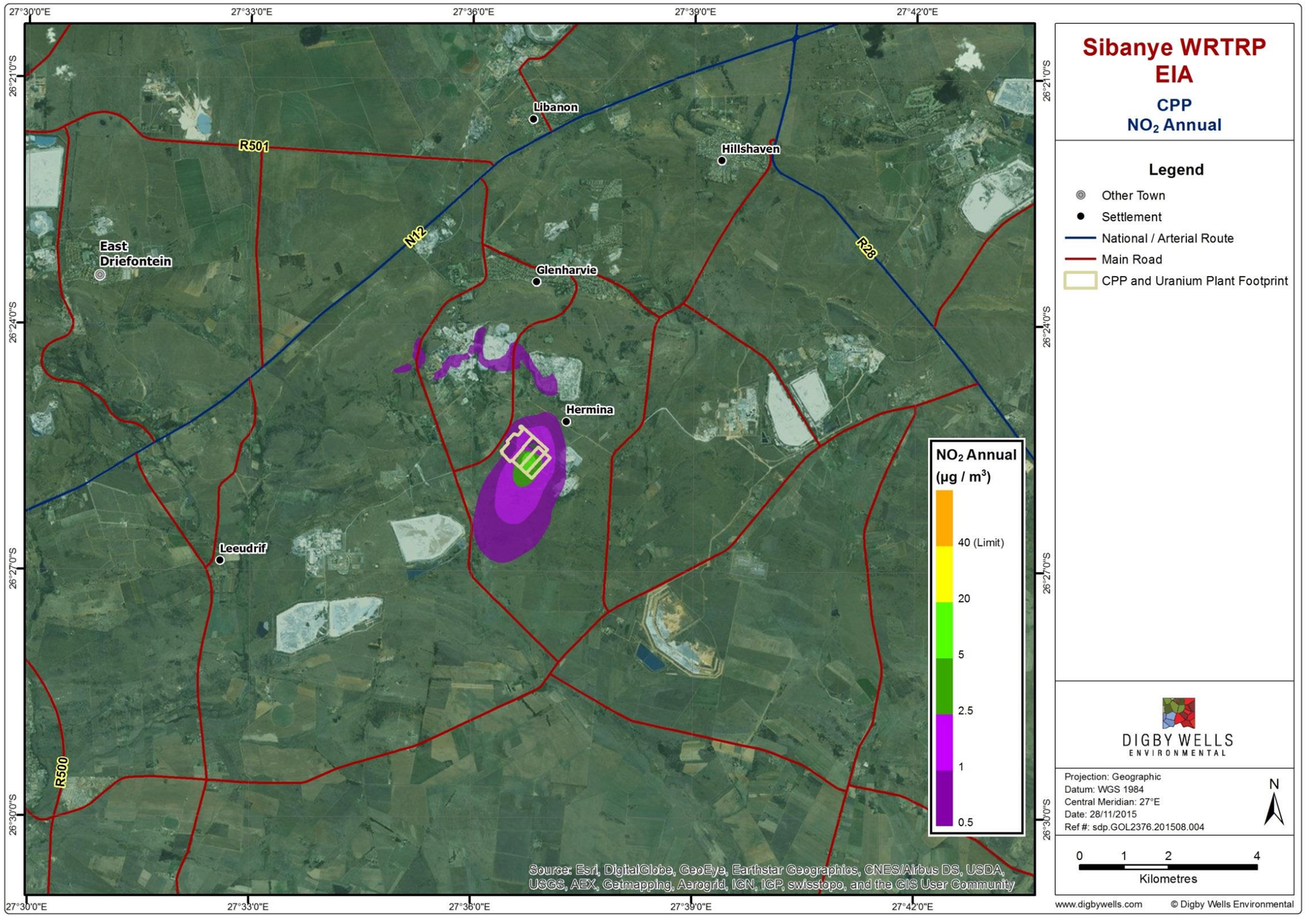

Figure 8-18: Predicted NO_2 Annual Concentration (µg/m^3)

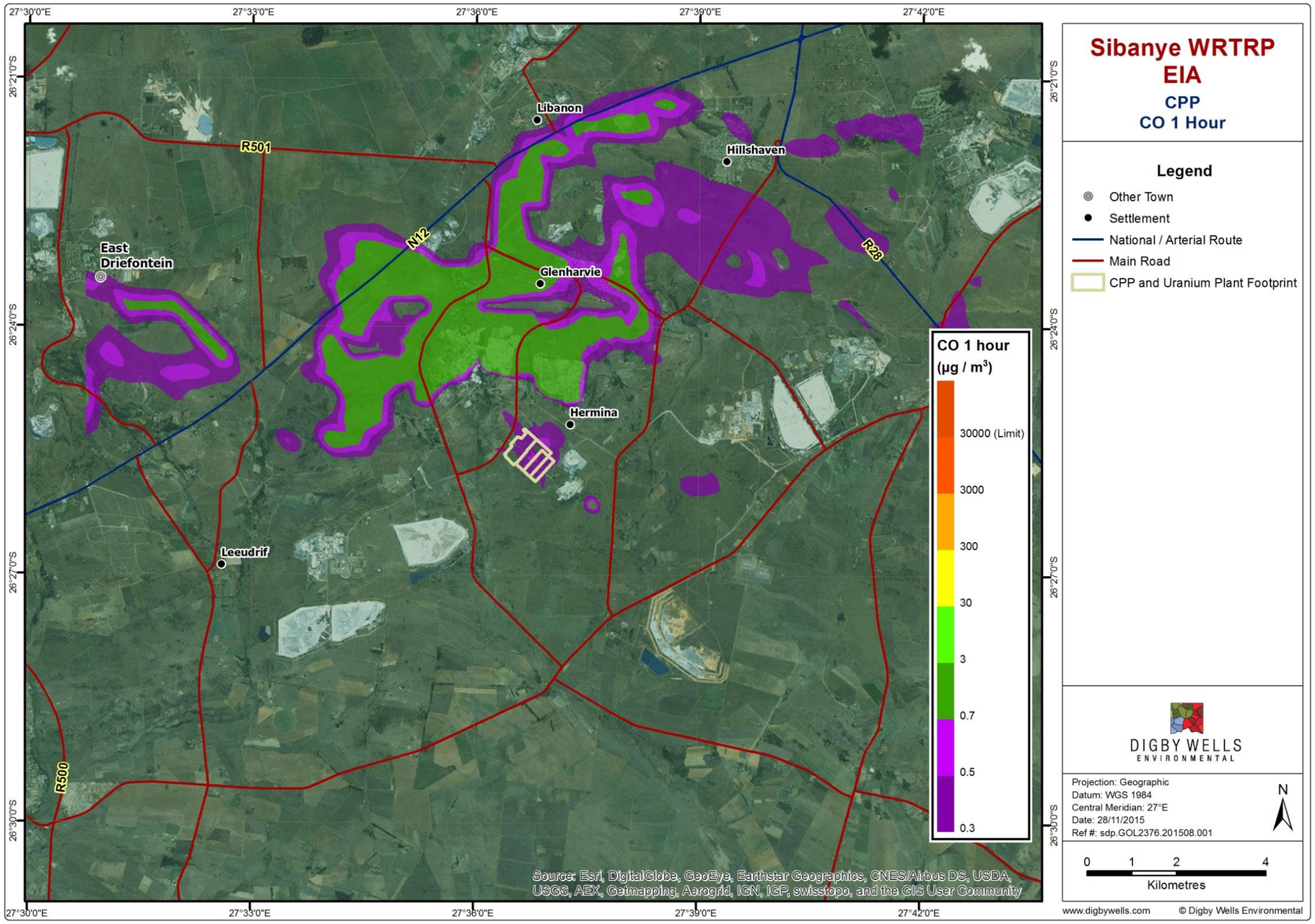

Figure 8-19: Predicted CO 1-Hour Concentration (µg/m^3)

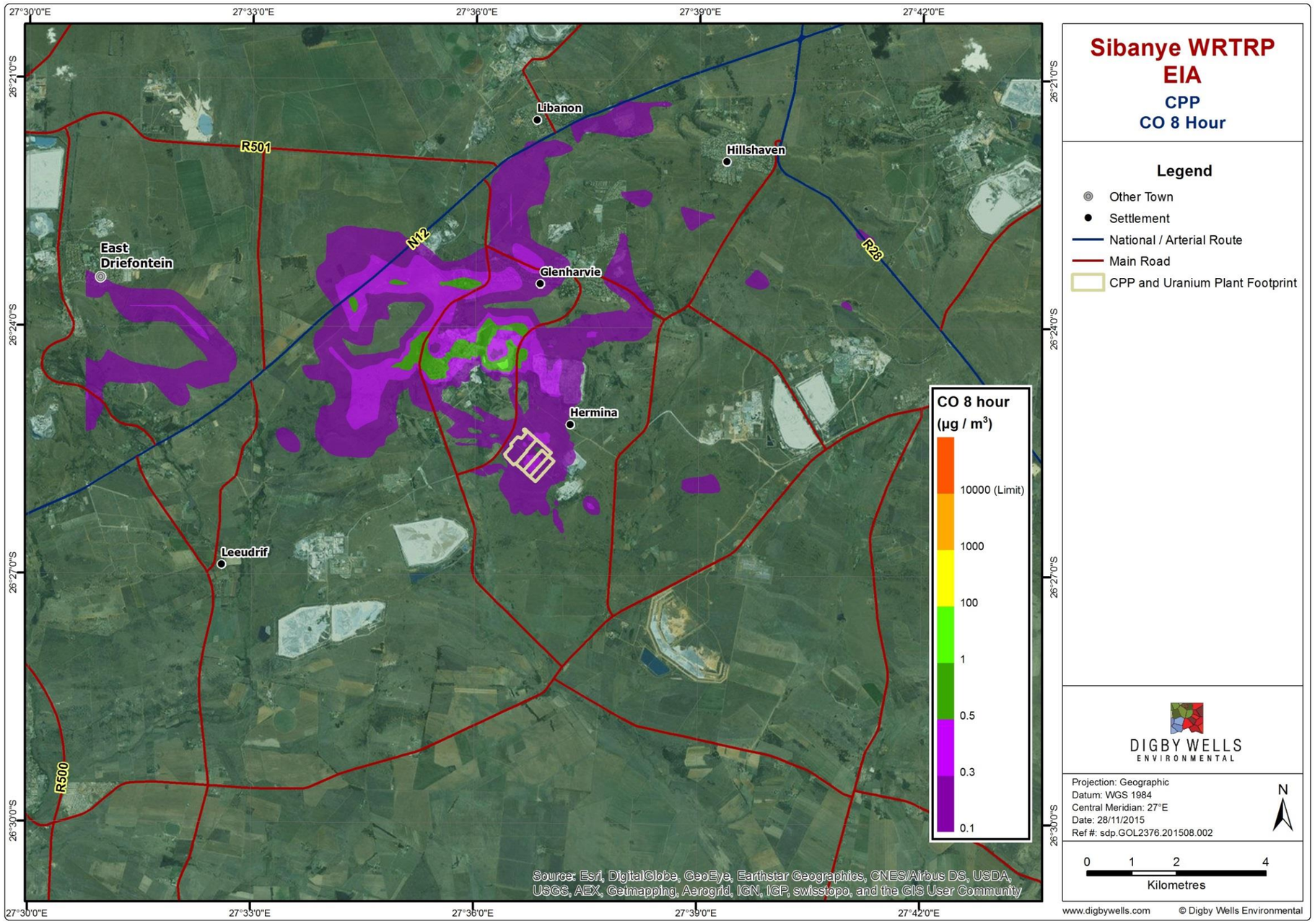

Figure 8-20: Predicted CO 8-Hour Concentration (µg/m^3)

8.2 Driefontein Mining Right Area

8.2.1 Driefontein 3 TSF

PM_{10} Predicted Impacts

The predicted 99th percentile 24-hour (daily) concentration of PM_{10} attributed to wind erosion from the existing Driefontein 3 TSF is presented in Figure 8-21. The maximum predicted ground level concentration of 621 µg/m³ occurred at the middle of the TSF, and is in exceedance of the limit of 75 µg/m³. This is the current and worst case scenario. The remaining (predicted impacts), will continue to decrease as the wet reclamation process continues until source is removed.

In terms of spatial impact, much of the area around the TSF was within the recommended limit. Ambient PM_{10} levels predicted for nearby receptors – Carletonville and Letsatsing were 2.8 µg/m³ and 7.4 µg/m³ respectively.

The predicted PM_{10} level is the potential contribution from the existing Driefontein 3 TSF to ambient atmosphere due to wind erosion. Although construction of pipeline will occur in the Driefontein MRA, this will have minimal impact on air quality of the area.

The predicted highest annual concentration of PM_{10} anticipated from Driefontein 3 TSF is presented in Figure 8-22. The highest annual ground level concentration of 69 µg/m³ is in exceedance of the current standard of 40 µg/m³. The predicted concentrations at the nearby residential area of Carletonville and Letsatsing were 0.21 µg/m³ and 1.2 µg/m³ respectively.

$PM_{2.5}$ Predicted Impacts

The 24-hour (daily) concentration for $PM_{2.5}$ at the proposed Project area is presented in Figure 8-23. The maximum predicted ground level concentration of 52 µg/m³ is within the standard of 40 µg/m³. The ground level concentration predicted for the nearby residential area of Carletonville and Letsatsing were 0.01 µg/m³ and 0.29 µg/m³ and were within limit.

The isopleth plot for the predicted $PM_{2.5}$ concentration is presented (Figure 8-24). The maximum predicted ground level concentration of 5.7 µg/m³ is within the standard of 20 µg/m³. Ground level concentrations at the nearby receptors were 0.02 µg/m³ and 0.12 µg/m³ respectively

Dust fall Impacts

The predicted dust deposition rates attributed to Driefontein 3 TSF from wind erosion are presented in Figure 8-25. The maximum predicted deposition rates of 92 mg/m^2/day is within the non-residential limit of 1 200 mg/m^2/day (NDCR 2013) around the TSF. However, the deposition rates predicted for the nearby receptors i.e. Carletonville and Letsatsing of 0.18 mg/m2/day and 31 mg/m2/day were within the residential limit of 600 mg/m2/day.

It should be noted that isopleth plots reflecting monthly averaging periods contain only the highest predicted ground level concentrations for that averaging period, over the entire

period for which simulations were undertaken. Results of dispersion model simulations for the Driefontein 3 TSF are presented below (Table 8-4).

Table 8-4: Summary of Dispersion Modelling Results (Driefontein 3 TSF)

Air Contaminant	Averaging Period	Ambient Air Quality Standard (µg/m^3)	Maximum GLC (µg/m^3	Levels at receptors (µg/m^3)	
				Carletonville	Letsatsing
Inhalable Particulates (PM_{10})	24 hour	75	621	2.8	7.4
	Annual	40	69	0.21	1.2
Fine Particulate ($PM_{2.5}$)	24 hour	40	52	0.01	0.29
	Annual	20	5.7	0.02	0.12
Dust fall (mg/m^2/day)					
Dust Deposition	monthly	600	92	0.18	31