ENVIRONMENTAL IMPACT ASSESSMENT:

TRAFFIC/TRANSPORTATION STUDY

FOR

PROJECT LIMA

for

BOHLWEKI ENVIRONMENTAL

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ANNEXURES

1 INTRODUCTION

Goba Pty Ltd was appointed by Bohlweki Environmental to undertake a traffic/transportation impact study as part of the Environmental Impact Assessment for the proposed Project LIMA(Steelpoort Pump Storage scheme) to be located near Roossenekal in the Mpumalanga Province. A study area locality plan is shown in Annexure A, Figure 1. Site A has been established as the preferred site for the construction of the Steelpoort Pumped Storage scheme.

This report contains a description of the Status Quo transport infrastructure and the transport/traffic impact for the construction period and operational period of the proposed Steelpoort Pumped storage scheme.

The De Hoop Dam will be completed in 2010 and construction on the Pumped storage scheme will commence in mid 2009 and be completed within 5 years by 2014.

2 STATUS QUO CONDITIONS

The following section summarises the present conditions related to transportation for the proposed development of the Steelpoort Pumped Storage Scheme.

2.1 Description of Road Infrastructure

The Steelpoort River Valley under consideration is located between the Stoffberg to Phokwane provincial road (R579) and the Roossenekal to Steelpoort provincial road (R555). A map highlighting these roads is shown in Figure 2, Annexure A.

The proposed De Hoop Dam is located some 20km further north along the Roossenekal to Steelpoort Road (R555) near the Limpopo Province border at the tributary of the Steelpoort and Klip rivers.

The proposed pumped storage scheme site A is shown in Figure 2 together with the proposed access roads from the main provincial roads to the sites.

2.2 Description of Present Travel Patterns

The R579 (Road P62-2), R555 (Road 169-1) and R577 provincial routes are not highly trafficked with daily volumes ranging between 600 and 2000 vehicles per day.

Detailed 12 hour classified traffic counts were undertaken in January 2007 at the following locations:

i) R579 (Road P62-2) in Sehlakwane at the junction to the Upper Reservoir site
ii) R579 (Road P62-2)at the junction with the local access road across to R555
iii) R555 (P169-1) at the junction with the access road from R579
iv) R555 (P169-1) and R577 junction outside Roossenekal

A summary of the counts is shown in Figure B1, B2 and B3, Annexure B for the morning peak , afternoon peak and 12 hour time periods respectively. A Provincial traffic count was also obtained for the section of the R555 (P169-1)north of Kennedy's Vale. The count was 1500 vehicles per day with 30% heavies. Using the 12 hour to daily factors of this provincial count the Average daily traffic for the four counting stations was estimated and is contained in Figure B4, Annexure B.

2.3 Location of Employee Residences

The most likely dwelling location of employees to the pumped storage scheme is the Nebo Plateau (near sehlakwane) and Roossenekal , however the number of permanent staff to operate the scheme once online is minimal (only 40 staff). The location of the construction camp for both the De Hoop Dam and the Pumped Storage scheme will also be near Roossenekal.

2.4 Other Transport Infrastructure

There is a railway line from Middelburg to Roossenekal, but this is the nearest rail terminal to the site.

3 TRAFFIC/TRANSPORT IMPACTS

3.1 Transport of Components during Construction

Several very large 250ton component parts would need to be transported to the Site from either Durban harbour or Richards Bay. The frequency of delivery would be no more than 1 every six months. This would require abnormal load transport and the application for the permit to do so is a lengthy and costly process which is outlined below.

The most likely route from Durban harbour or Richards Bay follows National Route N2 along the Kwazulu-Natal coast via Pongola and Piet Retief. From there the R33 via Amsterdam, Warburton, Carolina, Belfast and on to Stoffberg. The route then deviates to via the R555 towards Roossenekal and via the access road to the Valley site.

The critical part of the Abnormal Load Route Permit application is the survey of the prospective route by a qualified structural Engineer who needs to examine all the bridges/overpasses/underpasses and issue a certificate of compliance for the particular vehicle type/width/length and height.

It is estimated that the whole survey and Application procedure may take three to four months to complete, and this would have to be scheduled in the construction programme of the Steelpoort Pumped storage scheme. Although the tonnage is significant the low frequency of the trips means that the traffic loading impact is negligible. Close to the Construction site turning radii of 50m are required for the large superlink loads.

The transport of components impact extent is regional, the duration is very short-term, its intensity is low, and the degree of certainty is highly probable.

3.2 Construction Traffic

This traffic relates directly to the traffic expected during the construction of the Steelpoort Pumped storage scheme itself, which is expected to take place over a period of 5 years. It is anticipated and estimated that the number of construction employees to/from the construction site will peak at 1500 per day. 67% of these workers would be unskilled and semi-skilled living in the Nebo Plateau (surrounding Sehlakwane). The balance is assumed to live near Roossenekal. The split of workers between the two construction sites is expected to be 80% : 20% to the Valley site and Upper Reservoir site respectively. In vehicular terms, assuming 50 workers per bus, 30 buses are required to transport workers daily from there dwellings to the two sites. Of this daily construction employee traffic 100% is conservatively assumed to arrive in the a.m. peak hour and depart in the p.m. peak hour. This traffic is over and above the envisaged construction camp workers which may amount to 70 near the Upper Reservoir site and 2500 near the Valley site.

The revised number of construction workers housed at both the upper and lower reservoir sites would result in an increase in the number of buses transporting workers to the upper reservoir by 3 buses per direction during peak hour. The effect of locating the 2500 workers on site at the lower reservoir will reduce the number of buses to/from the site to zero. This change in accomodation, therefore, has a beneficial effect by reducing the traffic impact of transporting workers to a very small amount during peak hours and the day. The transporatation for food and supplies for the workforce although higher is considered to be low in magnitude and infrequent.

The magnitude and exact nature of heavy vehicle construction traffic is very difficult to determine. The sources of construction materials, supply of material components and the construction programme all influence the nature and frequency of road-based vehicle transport to/from the site. The source of construction material would mainly be Gauteng.

The raw materials for the on-site Cement plant can arrive by rail. Obviously the cement would have to be transported from Roossenekal station to the Valley site.

The heavy vehicle construction traffic is assumed to amount to 20 trucks per day to the Valley site and 5 trucks per day to the Upper Reservoir site. 50% of the trucks are expected to arrive during the A.M peak hour and depart in the P.M. peak. The cumulative vehicular traffic impact of construction employees and heavy construction vehicles is shown in Figures C1 to C4, Annexure C, for the a.m. peak, p.m. peak, 12 hour and daily periods respectively.

A traffic evaluation was performed at the key intersections under consideration. A mid-time period of 2012 was chosen to represent the construction traffic scenario. The results show that the 2012 construction traffic impact on peak hour traffic operations at the key intersections surrounding the Steelpoort Pumped storage scheme is not significant.

The impact on pavement loading to the surrounding roads may, however, be more significant. Assuming the 20 truckloads per day which are fully loaded inbound (3.5 E80s per truck) and empty outbound (2.0 E80s per truck) as well as 24 buses (2.5 E80s fully loaded and 1.8 E80s empty) translates to 213 E80s per day along Route R555 which presently carries an estimated 1647 E80s per day. This represents a proportion of 13%. The accumulative additional axle loading over a sustained 60 month period is 268 380 E80s which is only a contibution of an additional 8% over the five year period. The overall impact of the construction traffic during the construction period translates to advancing the need for pavement rehabilitation by 8%. This situation is the worst-case for the Provincial road R555 (P169-1). As the traffic dissipates along the R555 (Road P69-1) and R577 the proportional impact becomes reduced. The additional daily E80 axle load for each section of the study area is shown in Figure C5, Annexure C.

The additional impact on the pavement of the section of road R579 (P62-2) is 105 E80s per day. This represents a proportion of 42% of the present daily E80 axle loading of 249 E80s. If this is accumulated over the 60 month construction period the impact will be 132 174 E80s compared to the present cumulative 499 868 E80s (a proportion of 26%). If the roads were planned to be rehabilitated in 7 years time then the impact of the bus and construction traffic would mean that rehabilitation would have to be undertaken in 5 years and 10 months time, an advance of 1.85 years.

The effect on pavement loading and subsequent advance of any rehabilitation programme should be mitigated after completion of construction by the possible contribution to the roads rehabilitation programme by Eskom. It should however be acknowledged that the Pumped Storage scheme has so many other economic benefits

such as employment creation, electricity provision and irrigation benefits of incalculable magnitude that this suggestion of contribution could easily be waived.

The construction traffic impact extent is regional, the duration is short-term, it's intensity is low and it will definitely occur.

3.3 Transport of Employees (Operational Traffic)

The additional traffic generated in transporting employees from their residences to work at the new Steelpoort Pumped storage scheme is small. There is only envisaged to be a staff complement of 40 for the Control Centre of the Valley site who would most likely stay in Roossenekal.

This assumed passsenger car traffic was evaluated at the key intersections along the present Roosenekal to Valley site road. The results of the traffic evaluation indicate that the impact of the 2014 operational traffic is small as there is presently sufficient spare capacity at all key junctions to accommodate this peak period traffic increase.(an increase of approxamitely 15%)

The operational traffic impact extent is localised, the duration is long-term, it's intensity is low and it will definitely occur.

4 SUMMARY OF TRAFFIC IMPACTS

4.1 Rating Matrix for Transport of Components	
Criteria	**Rating**
Extent	3
Duration	1
Intensity	1
Probability of occurrence	3
Total	**8**
This is rated as a **Medium** Negative Impact before the implementation of mitigation and management measures	
Mitigation and Management measures - No of trips kept to a minimum - Use approved route	

- Transport ouside peak hours on busy sections	
Criteria	**Rating**
Extent	3
Duration	1
Intensity	1
Probability of occurrence	3
Total	**8**
This is rated as a **Medium** Negative Impact after the implementation of mitigation and management measures	
4.2 Rating Matrix for Construction Traffic	
Criteria	**Rating**
Extent	3
Duration	1
Intensity	1
Probability of occurrence	4
Total	**9**
This is rated as a **Medium** Negative Impact before the implementation of mitigation and management measures	
Mitigation and Management measures - Road rehabilitation after construction -	
Criteria	**Rating**
Extent	3
Duration	1
Intensity	1
Probability of occurrence	4
Total	**9**
This is rated as a **Medium** Negative Impact after the implementation of mitigation and management measures	

4.3 Rating Matrix for Operational Traffic	
Criteria	**Rating**
Extent	2
Duration	3
Intensity	1
Probability of occurrence	2
Total	**8**
This is rated as a **Medium** Negative Impact before the implementation of mitigation and management measures	
Mitigation and Management measures	

- Travel between sites is minimised(electronic control) - Only 40 staff at Valley control centre	
Criteria	**Rating**
Extent	2
Duration	3
Intensity	1
Probability of occurrence	2
Total	**8**
This is rated as a **Medium** Negative Impact after the implementation of mitigation and management measures	

5 CONCLUSIONS

1. The transport of components has a Medium Negative impact as the extent is regional, the duration is very short-term and it is highly probable to occur.
2. The construction traffic has a Medium Negative impact as the extent is regional, the duration is short-term and it will definitely occur.
3. The operational traffic has a Medium Negative impact as the extent is localised, the duration is long-term and it will definitely occur.

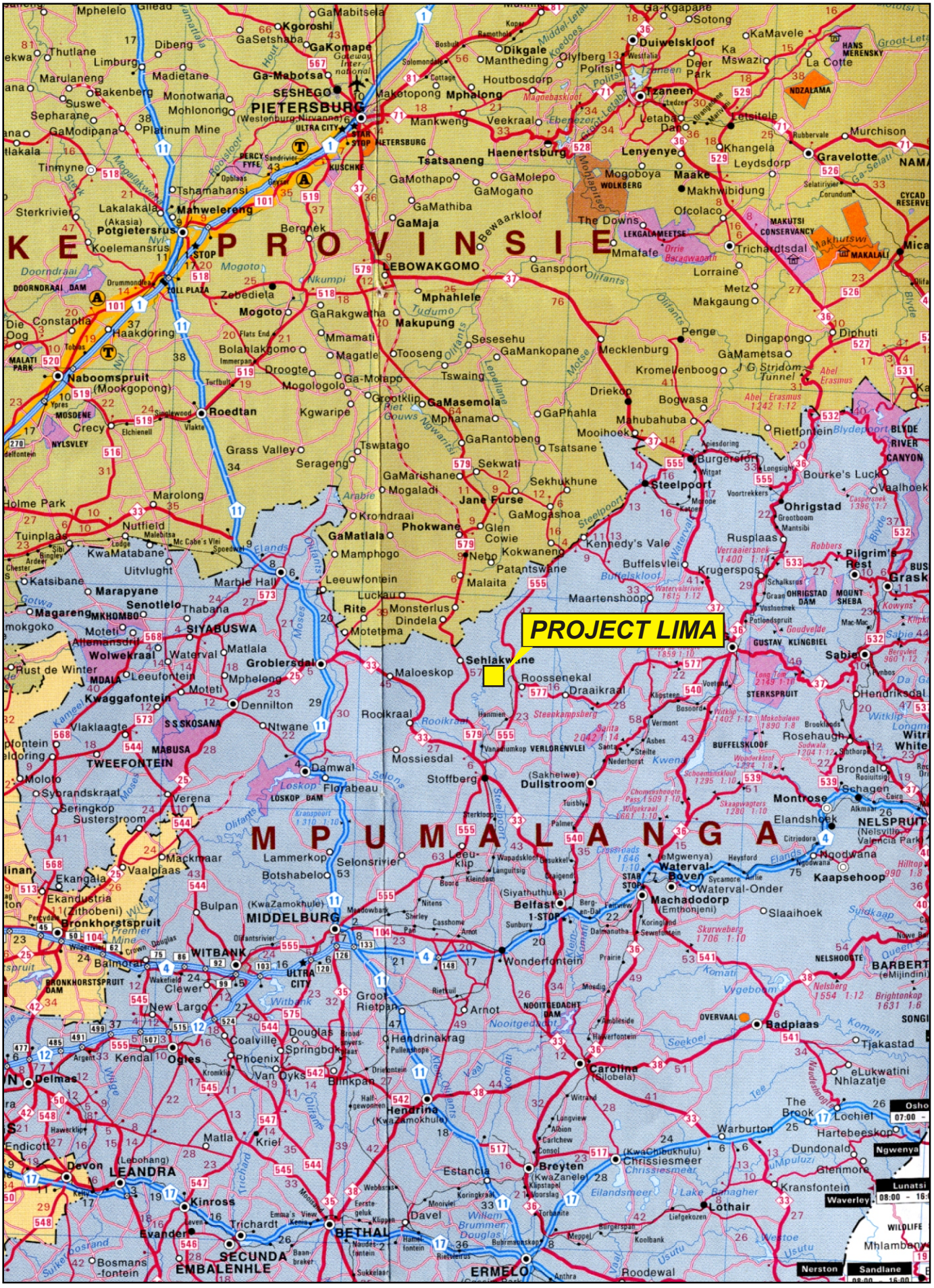
6 RECOMMENDATIONS

It is recommended that the medium negative impact determined using the matrix rating system be given a low weighting when compared to other environmental factors as the Steelpoort Pumped storage scheme benefits far outweigh the considered LOW impact of the transport/traffic.

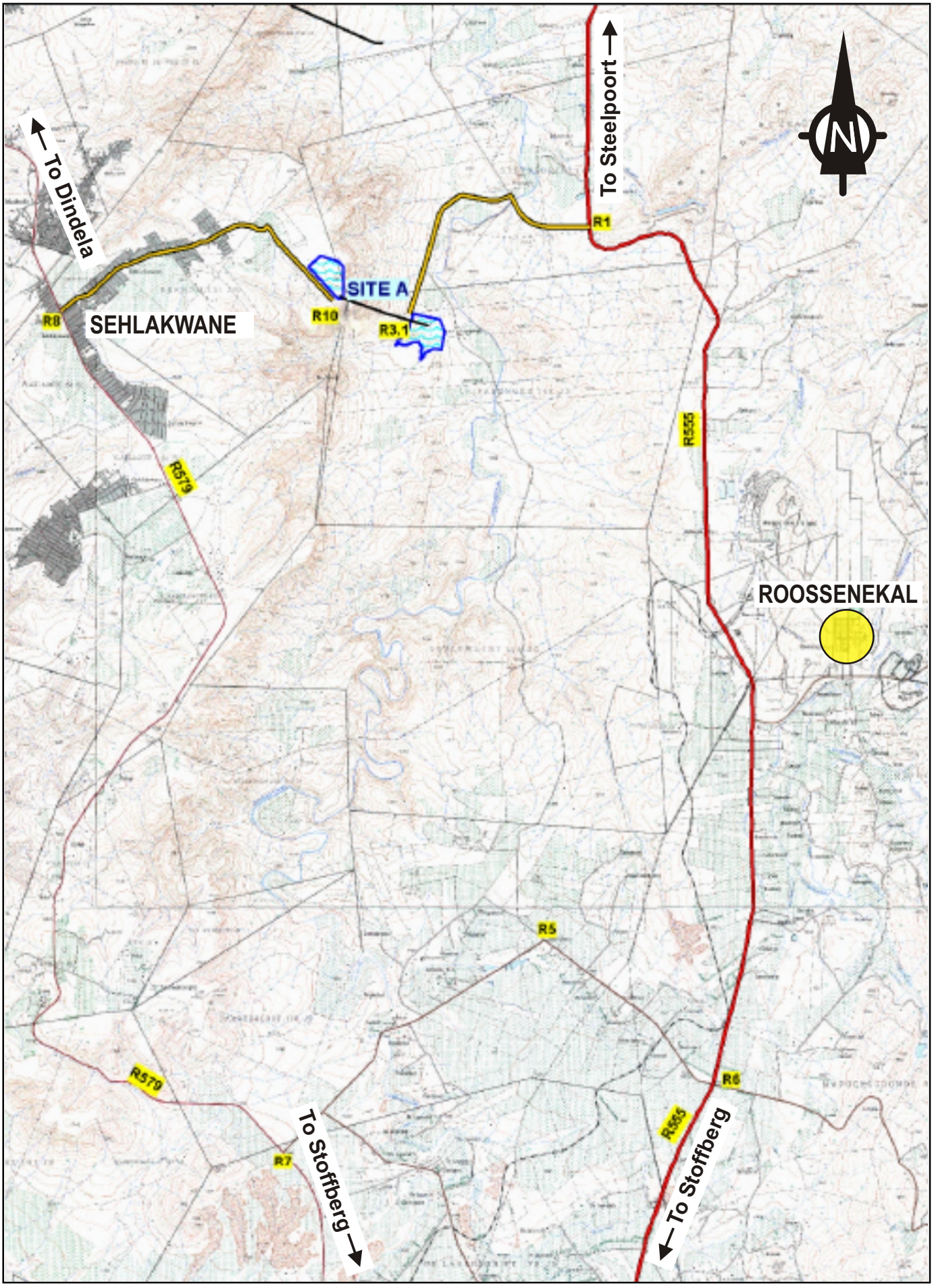
ANNEXURE A

Figure 1 Study Area Locality Map

Figure 2 Road Infrastructure

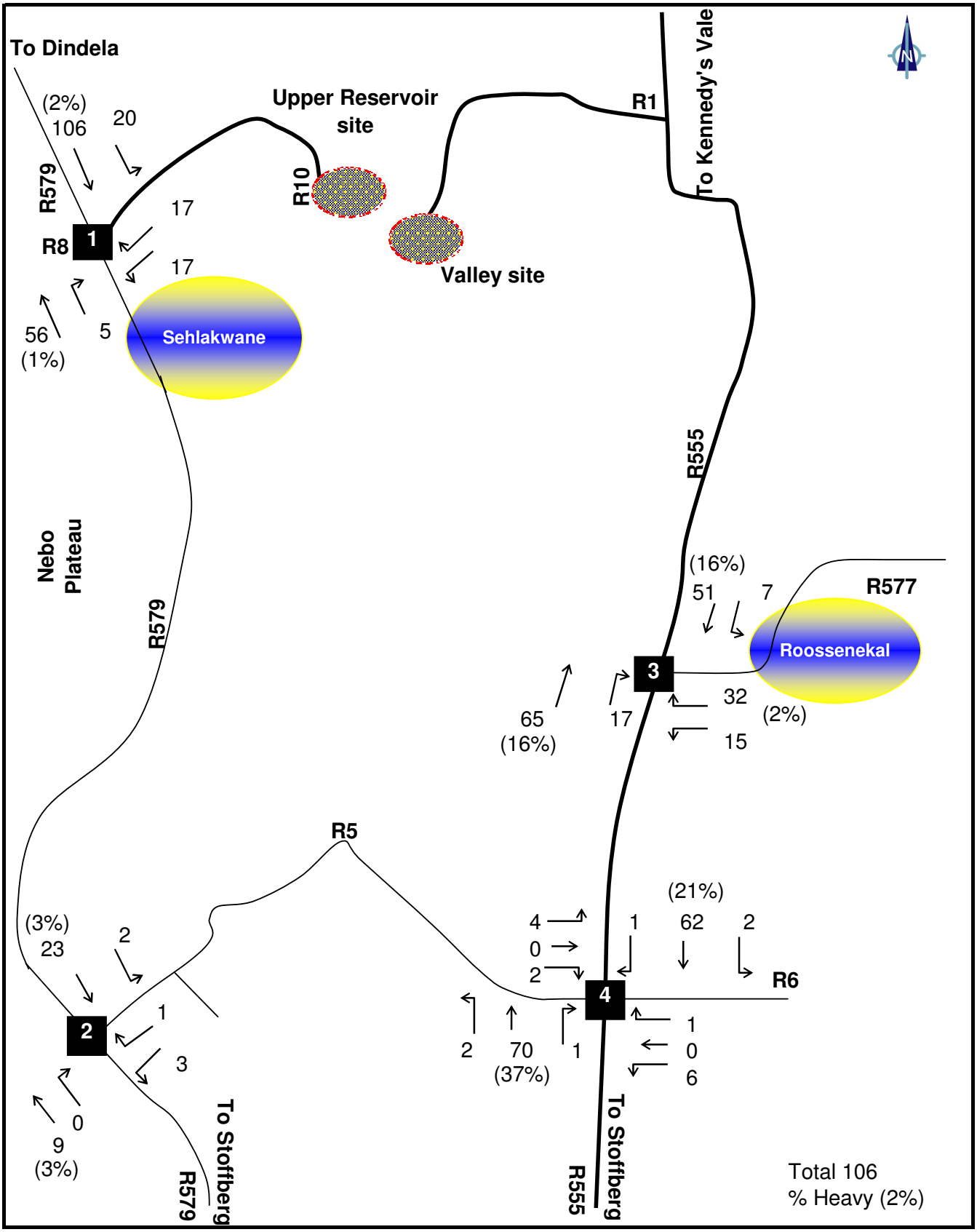


GOBA Consulting Engineers & Project Managers	**PROJECT LIMA PUMPED STORAGE SCHEME** **LOCALITY PLAN**	**Proj. No. 16103GTA** **Fig. 1**



GOBA Consulting Engineers & Project Managers	ROAD INFRASTRUCTURE	Proj. No. 16103GTA
		Fig. 2

ANNEXURE B



GOBA Consulting Engineers & Project Managers	2007 EXISTING AM PEAK VOLUMES (06:30 - 07:30)	Project: 16103GTA
	STEELPOORT PUMPED STORAGE SCHEME	Figure B1

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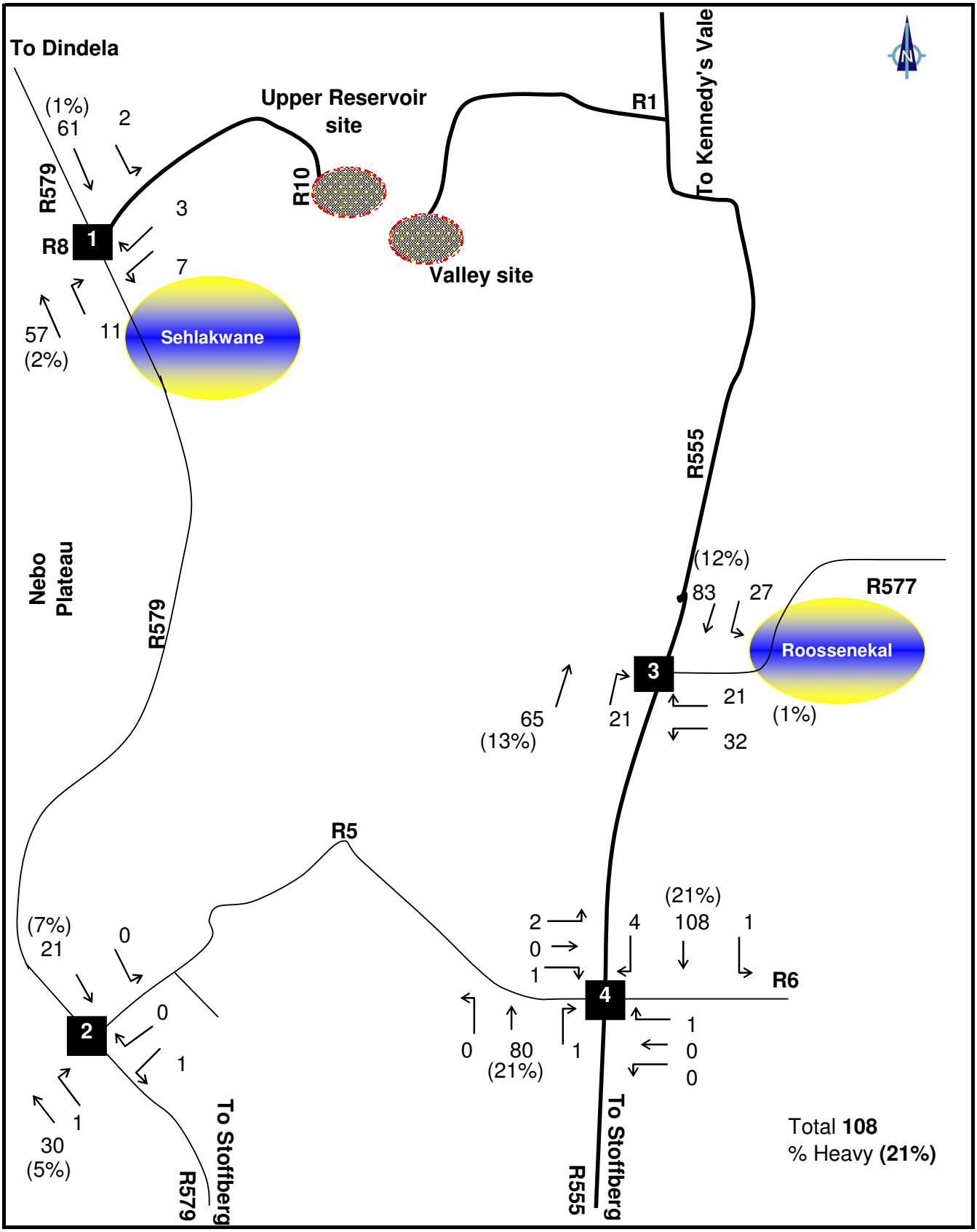

GOBA Consulting Engineers & Project Managers	2007 EXISTING PM PEAK VOLUMES (16:00 - 17:00)	Project: 16103GTA
	STEELPOORT PUMPED STORAGE SCHEME	Figure B2

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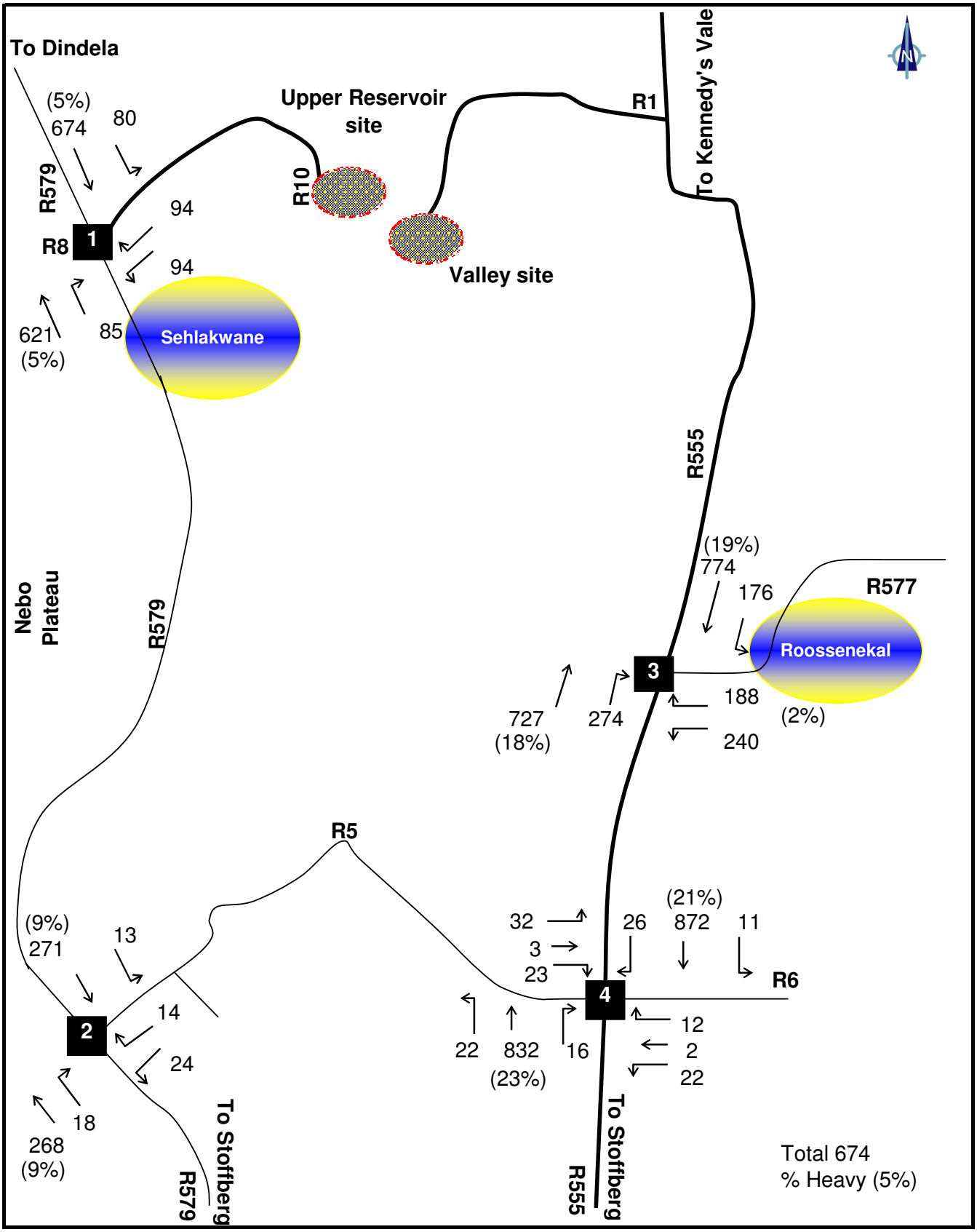

GOBA Consulting Engineers & Project Managers	**2007 EXISTING 12 HOUR VOLUMES**	**Project: 16103GTA**
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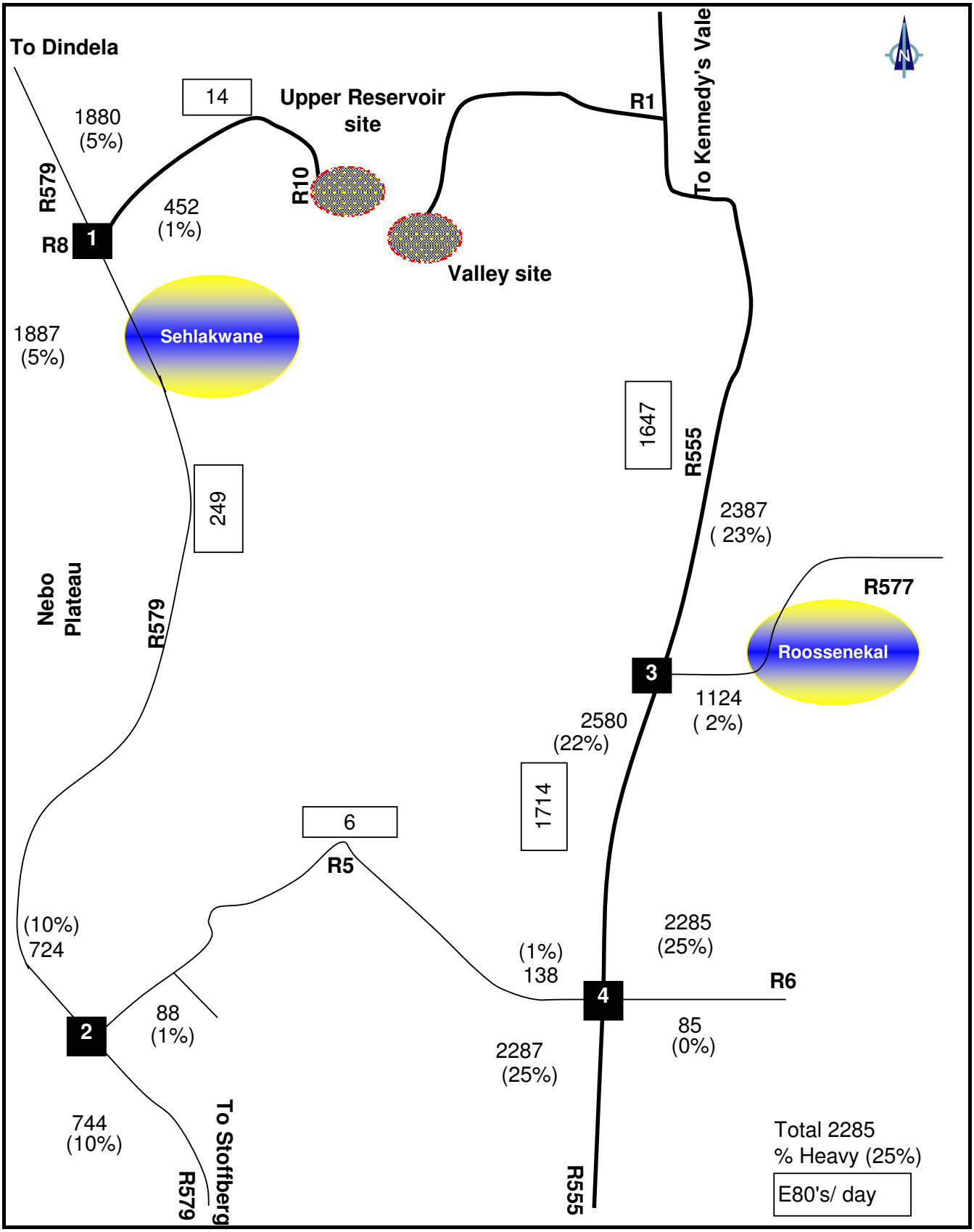

GOBA Consulting Engineers & Project Managers	**2007 EXISTING DAILY TRAFFIC**	**Project: 16103GTA**
	STEELPOORT PUMPED STORAGE SCHEME	**Figure B4**

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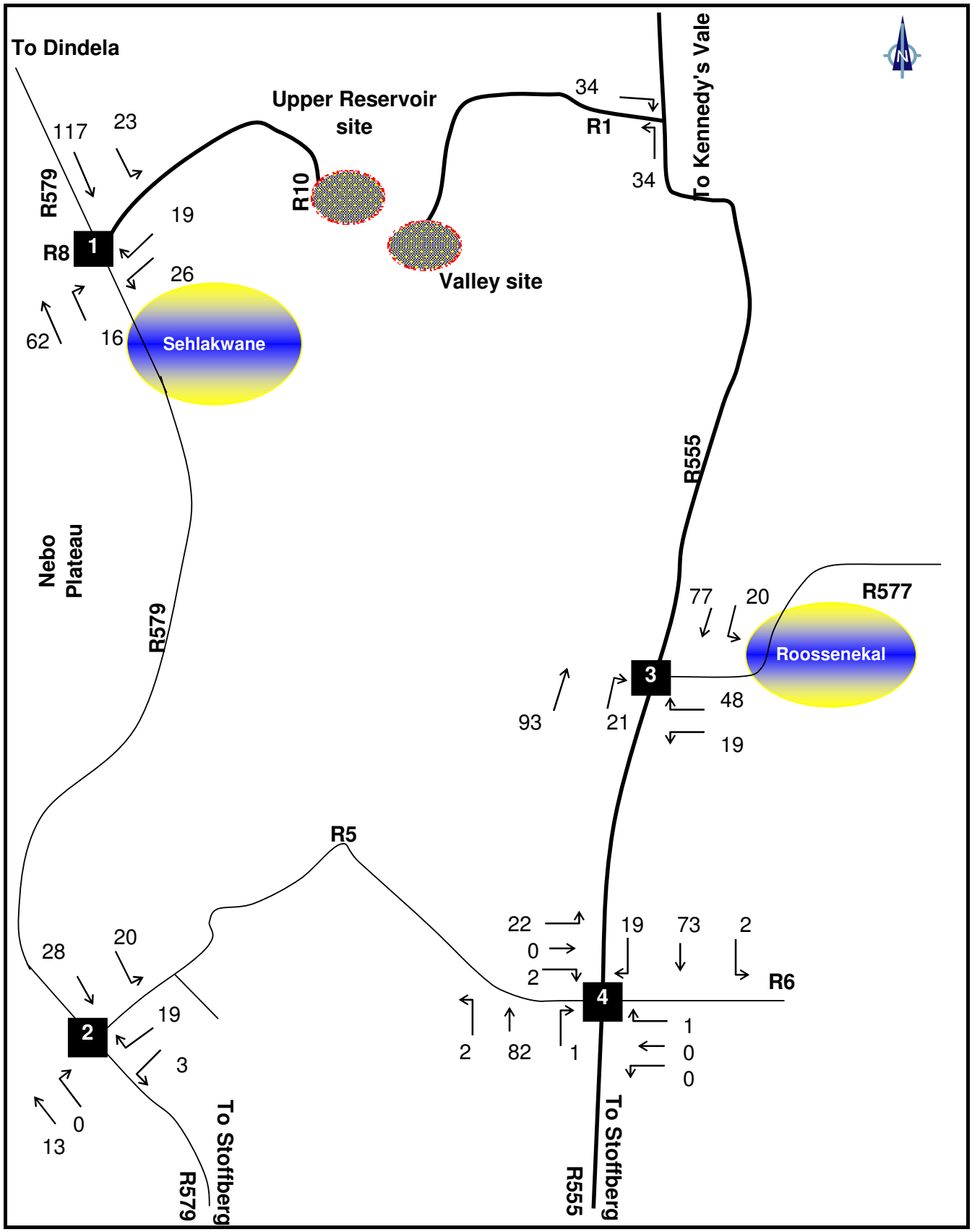
ANNEXURE C

Figure C1 2012 a.m. peak volumes
Figure C2 2012 p.m. peak volumes
Figure C3 2012 12 hour traffic
Figure C4 2012 Daily traffic
Figure C5 E80 Daily Axle volumes plus Construction traffic



GOBA Consulting Engineers & Project Managers	2012 AM PEAK VOLUMES (06:30 - 07:30)	Project: 16103GTA
	STEELPOORT PUMPED STORAGE SCHEME	Figure C1

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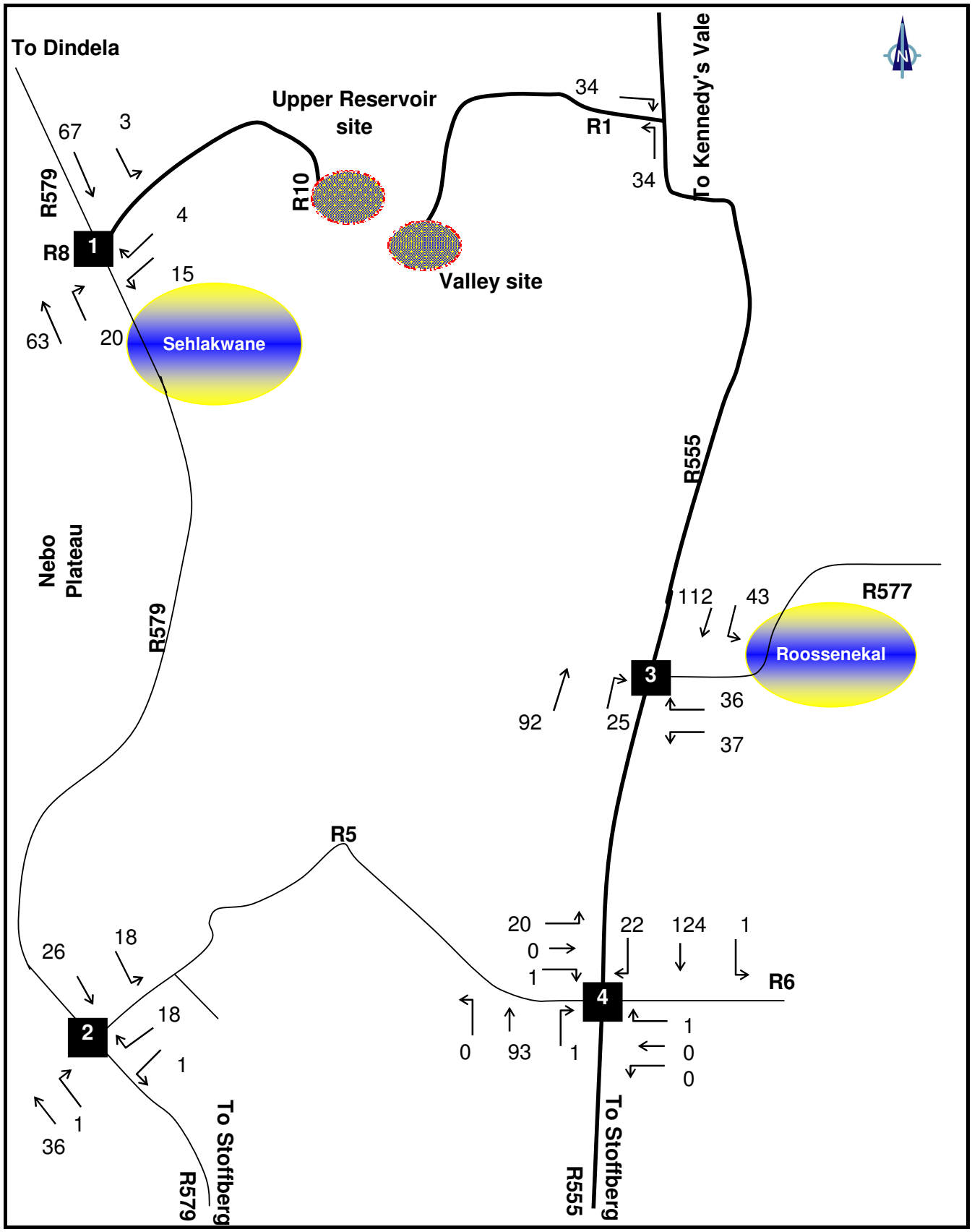

GOBA Consulting Engineers & Project Managers	**2012 PM PEAK VOLUMES (16:00 - 17:00)**	**Project: 16103GTA**
	STEELPOORT PUMPED STORAGE SCHEME	**Figure C2**

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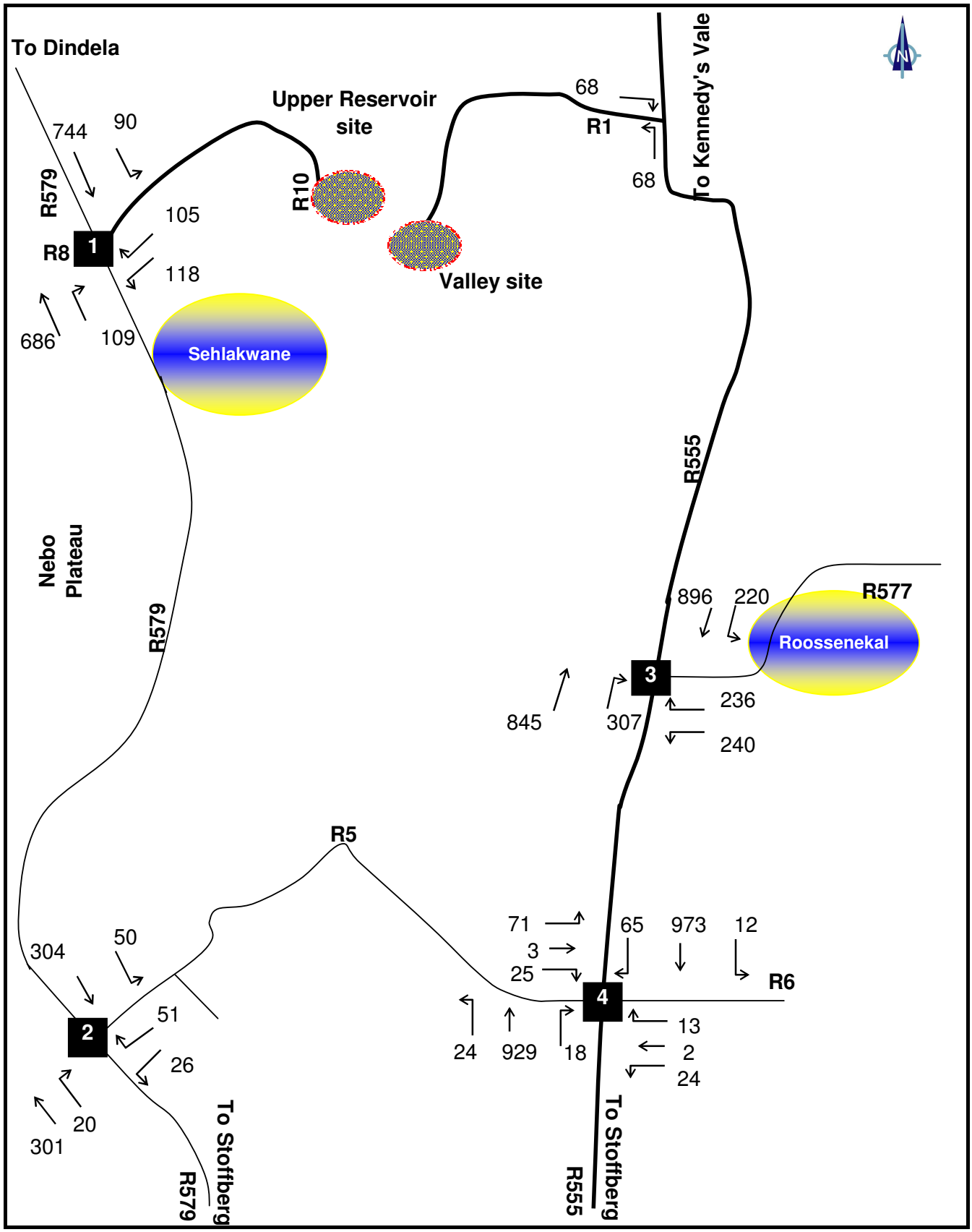

GOBA Consulting Engineers & Project Managers	2012 12 HOUR VOLUMES	Project: 16103GTA
	STEELPOORT PUMPED STORAGE SCHEME	Figure C3

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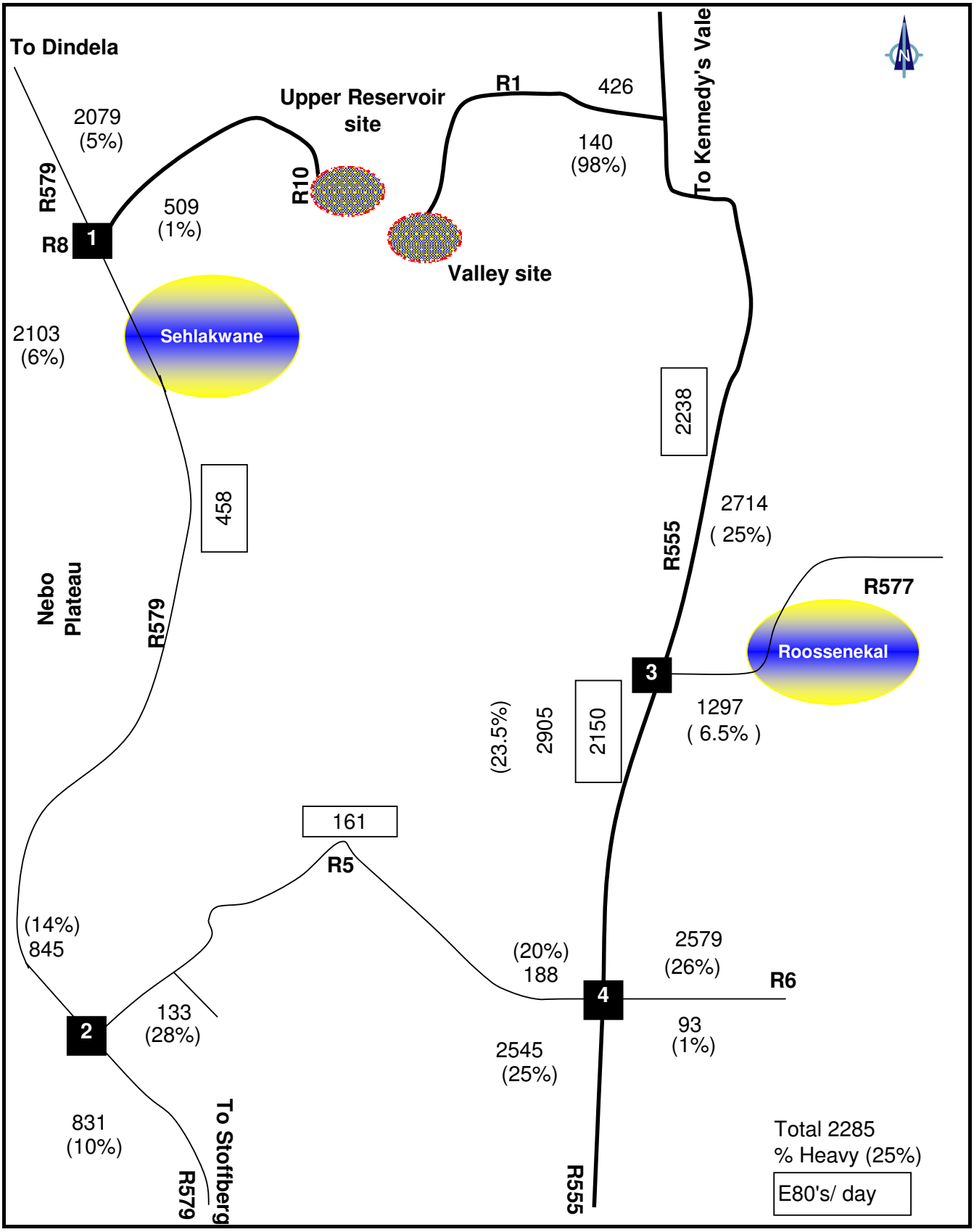

GOBA Consulting Engineers & Project Managers	**2012 DAILY TRAFFIC**	**Project: 16103GTA**
	STEELPOORT PUMPED STORAGE SCHEME	**Figure C4**

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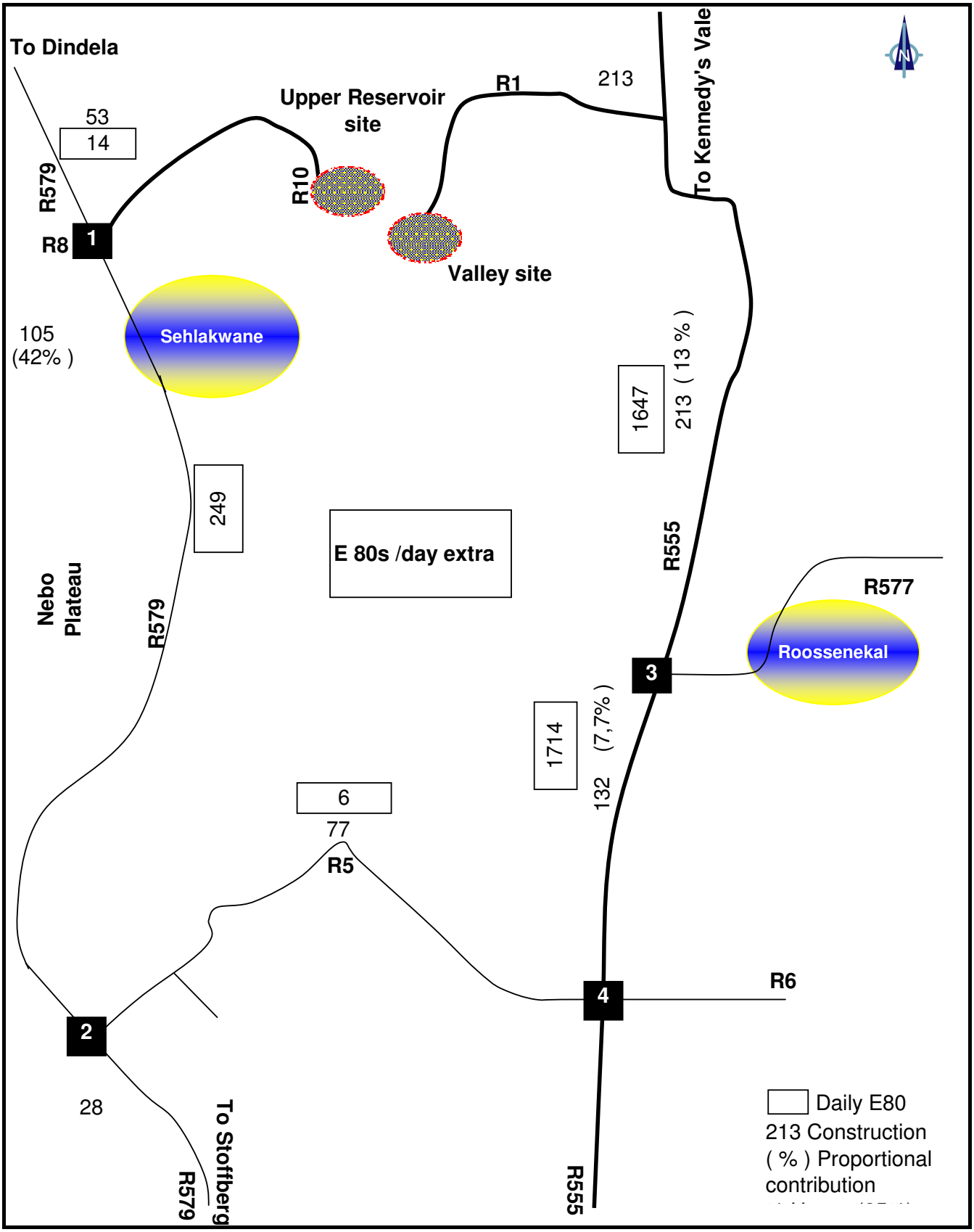

GOBA Consulting Engineers & Project Managers	**E 80 DAILY AXLE VOLUMES PLUS CONSTRUCTION TRAFFIC IMPACT**	**Project: 16103GTA**
	STEELPOORT PUMPED STORAGE SCHEME	**Figure C5**

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