TRAFFIC FEASIBILITY STUDY
FOR PROPOSED DEVELOPMENT
OF

THE ALBANY WIND ENERGY FACILITY
MAKHANDA (ERSTWHILE GRAHAMSTOWN)

WITHIN
MAKANA LOCAL MUNICIPALITY

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(Revision 1)

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LIST OF ABBREVIATIONS

MW	Mega Watts
MLM	Makana Local Municipality
SANRAL	South African National Roads Agency SOC Limited
TIS	Traffic Impact Study
veh/h	vehicles per hour
WEF	Wind Energy Facility

1. INTRODUCTION AND BACKGROUND

Emonti Consulting Engineers CC was approached to prepare a Traffic Feasibility Study for the proposed development of various properties both situated within the Makana Local Municipality (MLM). It should be noted that this is not a Traffic Impact Study (TIS). A TIS is to follow based on the outcome of the overall feasibility of the development and the programming of the development by the Developer.

Following this desktop study, recommendations regarding site access from the public road network, road network improvements, building lines, further traffic related studies, etc., will be made.

The site is located just east of Makhanda, which is situated within the MLM area. A site locality map can be seen in Figure 1.1. The proposed development comprises the implementation of a Wind Energy Facility (WEF).

Albany Wind Power (Pty) Ltd plans to develop, construct and operate a WEF approximately 7km east of Makhanda in the Eastern Cape Province. According to the data recorded by Albany Wind Power in the area, this project site appears to have favourable wind conditions to operate a wind farm.

The proposed Albany WEF will consist of up to 66 turbines each capable of generating approximately 4.5 Mega Watts (MW) of power. The WEF will also include a short power line and switching station in order to connect the WEF to the existing Eskom substation. The current layout allows for a maximum generating output of up to 297 MW, but the final design may be reduced dependant on the outcome of the specialist studies undertaken during the Environmental Impact Assessment Process. The turbine footprints and associated facility infrastructure (internal access roads, substations, construction compound, batching plant and operations building) will cover a maximum area of approximately 46.19 ha (post rehabilitation) depending on the final layout design should the project proceed to the construction phase.

In summary the Albany WEF includes:

i. Up to sixty-six turbines with a generation capacity of up to 4.5 MW each resulting in a nominal power output of up to 297 MW;
ii. The proposed WEF will include turbines with a rotor diameter of up to 170m, a hub height of up to 130m and blade length of up to 85m;
iii. Internal access roads of between 8m (during operation) and 14m (during construction, to be partly rehabilitated) wide to each turbine;
iv. Existing roads will be used as far as possible. However, where required, internal access roads will be constructed between the turbines;
v. Three connecting substations (switching stations);
vi. Switching stations to connect the turbines to the WEF IPP 132/33kV s/s;
vii. WEF IPP 132/33 kV Substation;
viii. Foundations with an area of up to 550m² for each turbine;
ix. A primary laydown area of approximately 3 900m² adjacent to each turbine;
x. Temporary infrastructure including a site camp and a laydown area of approximately 30m² per turbine (all to be rehabilitated post construction);
xi. A 25m² area for switchgear and/or transformer at each turbine;

xii. Medium voltage cabling between turbines and the switching stations, to be laid underground where technically feasible;
xiii. An up to 100 000m² for the substation, battery storage and site office area; and
xiv. Batching plant, temporary laydown area and construction compound area of approximately 90 000m².

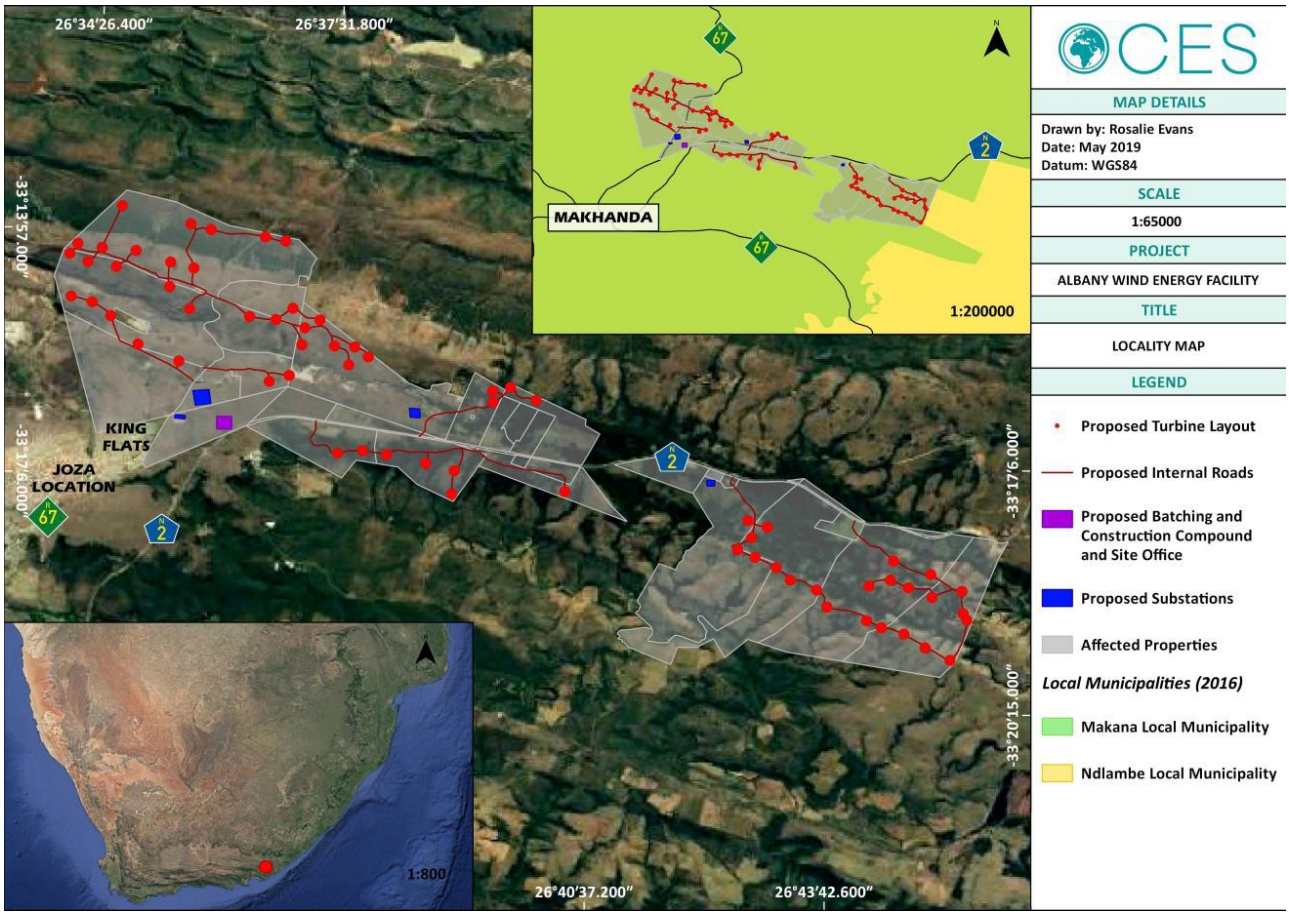


Figure 1.1: Site locality and proposed layout of the wind turbines

2. EXISTING OPERATING CONDITIONS

Capacity

From on-site observations and available traffic counts sufficient spare capacity appears to exist along road network to cater for the medium to long term future regarding anticipated traffic growth, including future trips relating to this development. This will however be commented on later in this report and covered in more detail in the TIS, when undertaken.

Cycle and pedestrian facilities

No formalised cycle facilities are currently available on the surrounding road network. However, a formalised pedestrian facility is available in the form of a concrete walkway along sections of the N2 and R67 boundaries with the site as illustrated overleaf.

Concrete walkway along the N2 and R67 boundaries with the site

Public transport facilities

No formalised public transport facilities are currently available on the surrounding road network.

Road condition

Both the N2 and the R67 are relatively well maintained and should be capable of accommodating the expected traffic generated by the proposed development, both during the construction and operational stages.

3. TRAFFIC VOLUMES

Current traffic volumes

In order to establish the current traffic conditions relevant traffic count information was used. This traffic count information was obtained from existing traffic count data available. No new traffic counts were undertaken. The volume of traffic on the two roads adjacent to the site, i.e. the N2 and the R67, are relatively low. As such spare capacity exists to accommodate the proposed development.

Generated trips

Based on the size of the development, less than 50 veh/h are expected to be generated in any given peak period, both for the construction and operational stages. This again implies that spare capacity will exist in the future to accommodate the volume of additional vehicles.

4. INTERNAL CIRCULATION AND PARKING

Parking and loading

The development will not be a major trip generator. As such the demand for parking and loading will be minimal. The period when parking and loading will be at its highest, will be during the construction stage. It should be noted that all the required loading and parking will need to be provided on the site. This will be at the site office and construction compound shown in Figure 1.1.

Internal roadways

The internal roadways will be gravel and designed to in accordance with the Guidelines for Human Settlement Planning and Design ("The Redbook"), Reference One. Geometric designs of the roads will ensure that the requirements of all types of vehicles expected to visit the site are met, i.e.

minimum turning radii, roadway widths, etc. The pavement design will form part of the detailed design stage.

5. ACCESS PROPOSALS

The proposed accesses to the site are via existing accesses. No new accesses/intersections are proposed. There are three proposed accesses along the R67 and a further four accesses along the N2. The positions of the proposed accesses are shown in Figure 5.1.

The current speed limit along the N2 is 120km/h and 100km/h along the R67. The intersection sight distance appears to be adequate at all the proposed intersections. However, during the entry and exiting of the abnormal loads special measures will need to be implemented in order to facilitate the turning movements which take longer than normal. These measures will be addressed in the detailed traffic management plan to be undertaken at a later stage.

It should be noted that the existing accesses to be used are general “farm” type accesses and will need to be temporary improved in order to facilitate the expected abnormal loads during the construction stage.

6. ROAD IMPROVEMENTS

The anticipated impact of the proposed development varies depending on the road segment under review. From the initial review, the following road improvements are most likely to be required to accommodate the development:

i. Localised access widening.
ii. Cattle grid along the R67 will need to be evaluated to determine whether it can accommodate the expected abnormal loading.

Cattle grid along the R67

If found to be inadequate then either a temporary bypass, removal of the cattle grid or the bridging thereof, will need to be implemented.

7. BUILDING LINES

Generally building lines along the roads under the authority of SANRAL vary, based on:

i. whether they are rural or urban, and
ii. type of development (e.g. residential, commercial, filling station, etc.).

In addition to the above, SANRAL has larger building lines for wind farms. These do change from time to time, but the information currently available indicated the following building lines for wind farms in the Eastern Cape:

i. An absolute minimum offset of tip height plus 10% of the wind turbines might be considered but a desirable offset of tip height plus 50% is favoured to avoid the fall out of parts that might be flung around if a mast falls over. In this regard, the minimum offset of tip height plus 50% of the wind turbines equates to 322.5m.
ii. All other structures shall be erected at least 60m from the national road reserve fence and 500m from an intersection. As there are no future plans for any major development in the area the need for the 500m building restriction for the accommodation of an interchange and the small accesses are not required. A reduction of the 500m to 60m is therefore suggested.

Currently it is proposed that the closest wind turbine be 500m from the National roads which is further than the minimum 322.5m, thus satisfying this minimum requirement. It is however not proposed to reduce this 500m to the 322.5m as this 500m will satisfy any further onerous building lines that SANRAL may want to impose in the future.

8. ABNORMAL LOADS TRANSPORTED ON NATIONAL ROADS

As abnormal loads have to be transported by road to the site, a *permit* will need to be obtained from the Eastern Cape Department of Transport.

In addition, SANRAL require a *route clearance report* to be undertaken. This will be done at a later stage of the planning process. The requirements of the route clearance report are included in Appendix B, which include the following:

i. Delay to Road Users.
ii. Road Closures.
iii. Road Construction works.
iv. Wide Loads.
v. Monitoring and Records.

It should be noted that SANRAL reserves the right to oppose any issued abnormal load permit in the event of any un-envisioned delay or disruption to public road users on National roads, or in the event that the carrier does not consistently meet the requirements as set out in Appendix B.

9. CONCLUSIONS

Following the desktop investigation it is concluded that:

i. The current road network is sufficient to cater for this development, subject to certain improvements/amendments being implemented.

ii. Certain localised road improvements may be required in order to facilitate the temporary accesses to the site to accommodate the expected abnormal loads.

10. RECOMMENDATIONS

Based on the desktop investigation and conclusions it is recommended that:

i. This Traffic Feasibility Study being included as part of the overall Feasibility Report for the development.

ii. The following are the most likely conditions that would be imposed on the development by the relevant road authority/ies. ***(It should however be noted that these improvements may change subject to the findings of the TIS and subsequent consultation with the relevant road authority/ies):***

a. The internal roads will be gravel, the designs of which will be determined at detailed design stage. The roads will be construction in a phased manner according to the phasing of the development.

b. Access to the site will be via three proposed accesses along the R67 and four along the N2, all of which are existing accesses. No new accesses are to be introduced.

c. A minimum building line of 322.5m (i.e. tip height of the wind turbine plus 50%). It is however, proposed that the current 500m (as measured from the proposed positions of the wind turbines in Figure 1.1) being implemented.

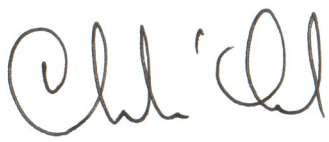
d. All other structures shall be erected at least 60m from the national road reserve fence and 500m from an intersection. As there are no future plans for any major development in the area the need for the 500m building restriction for the accommodation of an interchange and the small accesses are not required. A reduction of the 500m to 60m is therefore suggested.

e. A bypass to the cattle grid will need to be evaluated to determine whether it is of sufficient design to withstand the proposed abnormal loading during the construction stage. If found to be inadequate then either a temporary bypass, removal of the cattle grid or the bridging thereof, will need to be implemented.

f. A traffic management plan being implemented during all the construction stage to assist construction vehicles in entering/exiting the site.

g. A detailed Traffic Impact Study being undertaken as part of the planning stage of the proposed WEF.

h. A detailed route clearance report will need to be undertaken as part of the planning stage of the proposed WEF.



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11. REFERENCES

Reference 1 Guidelines for Human Settlement Planning and Design ("The Redbook")

APPENDIX A

FIGURES

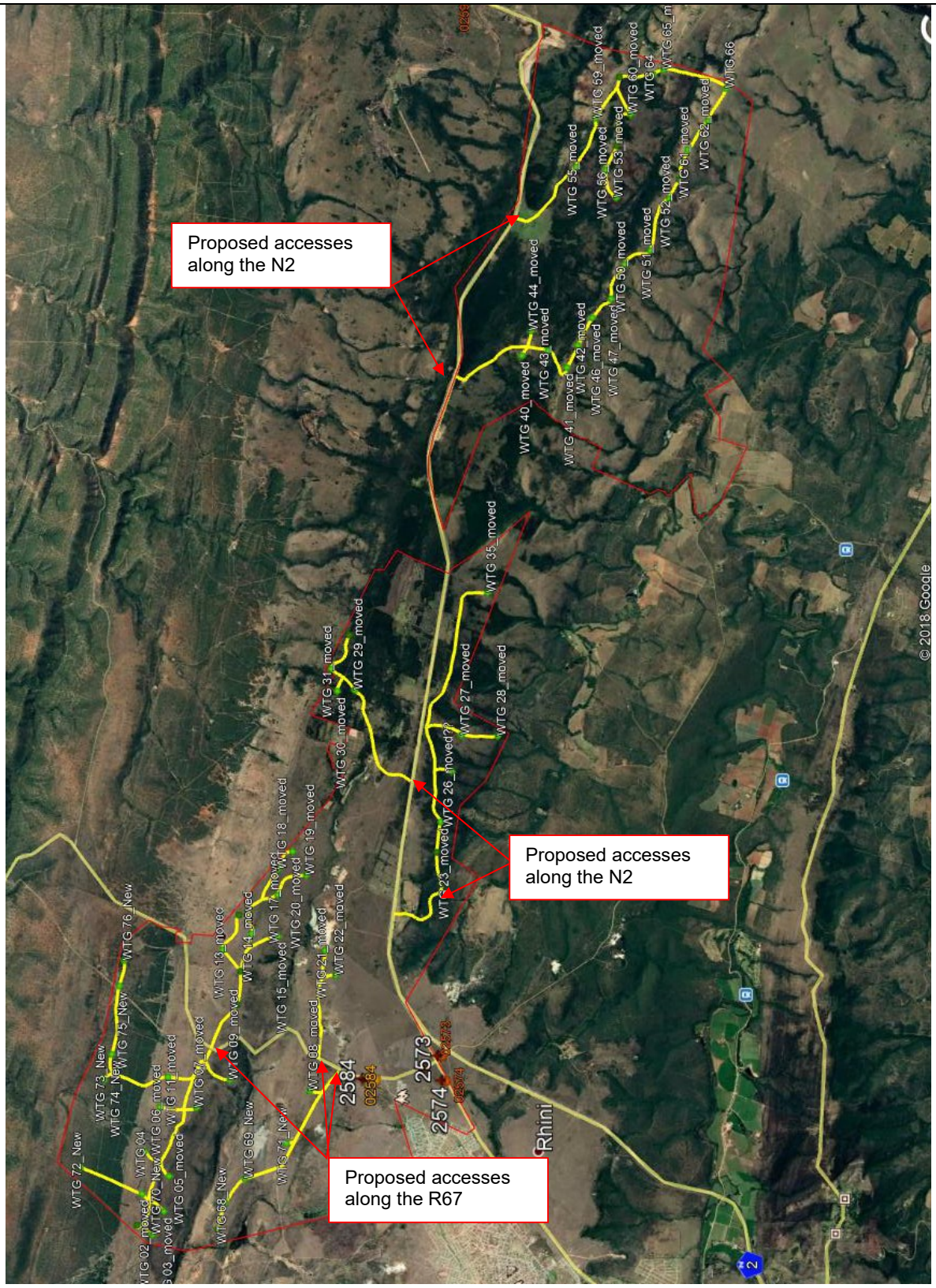

Figure 5.1: Proposed accesses

APPENDIX B

ABNORMAL LOADS TRANSPORTED ON NATIONAL ROADS

Conditions to carriers of frequent abnormal loads for wind turbines to be included into the route clearance report and abnormal load permits

The statement by the Professional Engineer regarding road safety and traffic engineering aspects shall ensure that the transportation of the intended abnormal loads shall conform to the maximum impacts on road users as detailed below. In order to assist the analysis of traffic impacts, SANRAL traffic monitoring information is available for use.

vi. Delay to Road Users:
- Queue lengths: not more than 6 vehicles for longer than 1km should follow behind the abnormal load train without being afforded the opportunity to overtake.
- No single vehicle may follow the abnormal train for more than 5km without being afforded the opportunity to overtake.
- Assessment of the national road constraints and road user trends to be done to plan abnormal passage and to minimise delays to the public road users.
- Utilisation of climbing lanes, rest areas and additional constructed pull-off areas must be actively planned to achieve overtaking of the abnormal train.
- The above requirements must apply in all weather conditions.

vii. Road Closures:
- No longer than 3 hours of accumulated closures per week for all abnormal passage/ all carriers on a road link of 200km shall be permitted. (On mountain pass closures, this closure time could be extended to 6 hours accumulated per week, which closure would be required mainly for the long loads around small radius curves.)
- The carrier must co-ordinate long closures (excess of 1 hour) with other Road Authorities as well as SANRAL construction projects where blasting or other closures could be undertaken. Advance warning of repetitive closures in excess of 15 minutes must be signposted, and signing to be approved by SANRAL. Where abnormal closures and construction closures are located within 50km, they must in all instances be co-ordinated.

viii. Road Construction works:
- The carrier shall liaise continuously at projects of road construction sites to ensure passage of abnormal loads at construction works constraints (which change regularly) and potential damage to temporary bypasses. Should alteration of construction works be required by the carrier, the carrier shall liaise with the Engineer supervising the construction project and be required to pay for any alterations, disruptions or construction delays which may be caused. SANRAL reserves the right to limit passage on construction works to non-abnormal vehicles dimensions and loads, unless suitable arrangements have been made to allow for the passage of abnormal vehicles and loads. Contact details of SANRAL construction projects are available from the relevant SANRAL Regional offices.

ix. Wide Loads:
- Unless other acceptable arrangements are provided to SANRAL, abnormally wide loads along two directional roads, where the abnormal width plus 0.4m is in excess of half the surfaced road width, must be done under stop/go conditions, not longer than 5 km in length. Public vehicles in both directions shall be afforded the opportunity to

overtake the abnormal load at the stop/go point. For lesser trafficked roads, and with SANRAL approval, the delay impact criteria (number of vehicles in queue and length of following) may be used instead of the 5km stop/go length criteria.
- Under conditions of reduced visibility, abnormally wide loads in the above stated vehicle width /road width limit should not be transported.

x. Monitoring and Records:
- The carrier shall ensure that all dangerous/illegal overtaking of the abnormal load and train are recorded, and provided to SANRAL on request.
- The carrier shall ensure that all deviations to these requirements are recorded, and provided to SANRAL on request.
- The carrier shall ensure that all newly identified risks are recorded and conveyed to Provincial Roads Authority and to SANRAL, and negative impacts are mitigated.

xi. General:
- The detailed route description for each type of abnormal load, frequency and general travel times must be submitted to SANRAL for assessment. Periods of high or peak traffic flows must be identified and avoided as much as possible.
- The route clearance statement for each type of abnormal load must be included in the report to be submitted to SANRAL for assessment, which must incorporate the above requirements.
- A statement of passage of dimensional and mass abnormal loads over /under structures and bridges must be submitted to SANRAL for consideration, with protective measures where required.
- The modification of National Road infrastructure for the passage of abnormal loads requires separate consents by SANRAL.
- SANRAL approval shall be required in the event of abnormal loads being planned to overnight on a consistent basis, within National Road reserves.
- The carrier must indicate what advertising will be done to warn to road users, nationally, of the impacts of the abnormal load passage, as well as indicating alternate routes. This must be done on a continuous basis as the transport of abnormal loading unfolds.
- Provision for curtailing of transportation of abnormal loads in adverse weather conditions, and measures to be undertaken in the event of incidents such as crashes and breakdowns must be included in the planning.
- SANRAL reserves the right to oppose any issued abnormal load permit in the event of any un-envisioned delay or disruption to public road users on National roads, or in the event that the carrier consistently not meeting the above requirements.