400KV ESKOM TRANSMISSION POWER LINE BETWEEN MOSSEL BAY & BEAUFORT WEST
TRANSPORT STUDY

Reference: 113003/MBBW
Prepared for: Envirolution Consulting (Pty) Ltd
Revision: 3
2 September 2016

Document control record

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Report title		TRANSPORT STUDY				
Document ID		113003/KMBBW/TS/01	**Project number**		113003/MBBW	
File path		P:\Projects\113003 Mosselbay Traffic Study\5 DEL DES\501 Engineering\Reports\400KV ESKOM TRANSMISSION LINE_MOSSELBAY-BEAUFORTWEST-TS_Rev3.docx				
Client		Envirolution Consulting (Pty) Ltd	**Client contact**		Marinda Le Roux	
Rev	**Date**	**Revision details/status**	**Prepared by**	**Author**	**Verifier**	**Approver**
1	**11 August 2016**	First Issue	SHL	SHL	HS	JHBC
2	**15 August 2016**	Revised with Client Comments	SHL	SHL	HS	JHBC
3	**02 September 2016**	Revised with Client Comments	SHL	SHL	HS	JHBC
Current Revision		**3**				

Approval			
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Contents

Figures

Tables

EXECUTIVE SUMMARY

This report details the investigation of the transport needs for the proposed 400KV Eskom Transmission Power Line between Mossel Bay & Beaufort West (Gourikwa to Blanco Ref 14/12/16/3/3/2/921 and Blanco to Droërivier Ref 14/12/16/3/3/2/922) to identify potential access routes, including site access and to assess traffic impacts during the construction of the power line. The general freight will comprise building materials such as concrete and reinforcement, structural steel, and cables for the stringing of the conductor.

The imported freight will preferably be transported from Port of Port Elizabeth to the site. The preferred freight route from Port Elizabeth comprises surfaced roads for the majority of the way where site entrances might consist of gravel roads in some cases. This route is predominantly on National or Provincial Roads, with suitable conditions for the transport of normal freight, or abnormal loads with permits. Toll fees are required on this route at Tsitsikamma and abnormal permits might be required for certain elements but have to be confirmed once the construction process commences.

Building materials will most likely be transported from Oudtshoorn or Beaufort West, while certain elements will be transported from manufacturing centres in South Africa - most likely Johannesburg or Port Elizabeth. The transport of elements from these manufacturing centres will be predominantly on National and Provincial roads, which presents no limitations for normal freight.

There is a limited risk of delays to the various deliveries required for the construction of the power line, due to potential routine road maintenance works (such as repairs and reseals). The impact of such activities is dependent on the scheduling of deliveries and of roads contracts, and may be mitigated by the use of the alternative routes proposed in this report.

In general, no obvious problems were identified associated with the transport of freight along the proposed routes to the site, nor for the accesses required for the construction and maintenance of the facility. It will, however, be necessary to confirm certain aspects such as clearances, bridge capacities, etc., by the logistics contractor as part of their preparation as this will be dependent on the actual vehicles configuration used. From an accessibility and traffic perspective it became clear that for the section from Gourikwa to Blanco (Ref 14/12/16/3/3/2/921), all alternatives are viable. The section from Blanco to Droërivier (Ref 14/12/16/3/3/2/922) alternative 1 is preferable from an access perspective and both alternatives are viable from a traffic point of view.

Finally the use of aircraft for transporting any freight to remote sites will have to comply with the South African Civil Aviation Authority's Regulations (South African Civil Aviation Authority, 2016) but is not expected to have any impacts.

1 INTRODUCTION

Envirolution (Pty) Ltd., has engaged Aurecon to prepare a Transport Study, with particular focus on the access to the site, for the proposed 400KV Eskom Transmission Power Line between Mossel Bay & Beaufort West (Gourikwa to Blanco Ref 14/12/16/3/3/2/921 and Blanco to Droërivier Ref 14/12/16/3/3/2/922), in support of the environmental approval application. The extent of the study area between Gourikwa to Blanco Ref 14/12/16/3/3/2/921 is indicated in Figure 1 and the extent of the study area between Blanco to Droërivier Ref 14/12/16/3/3/2/922 is shown in Figure 2:

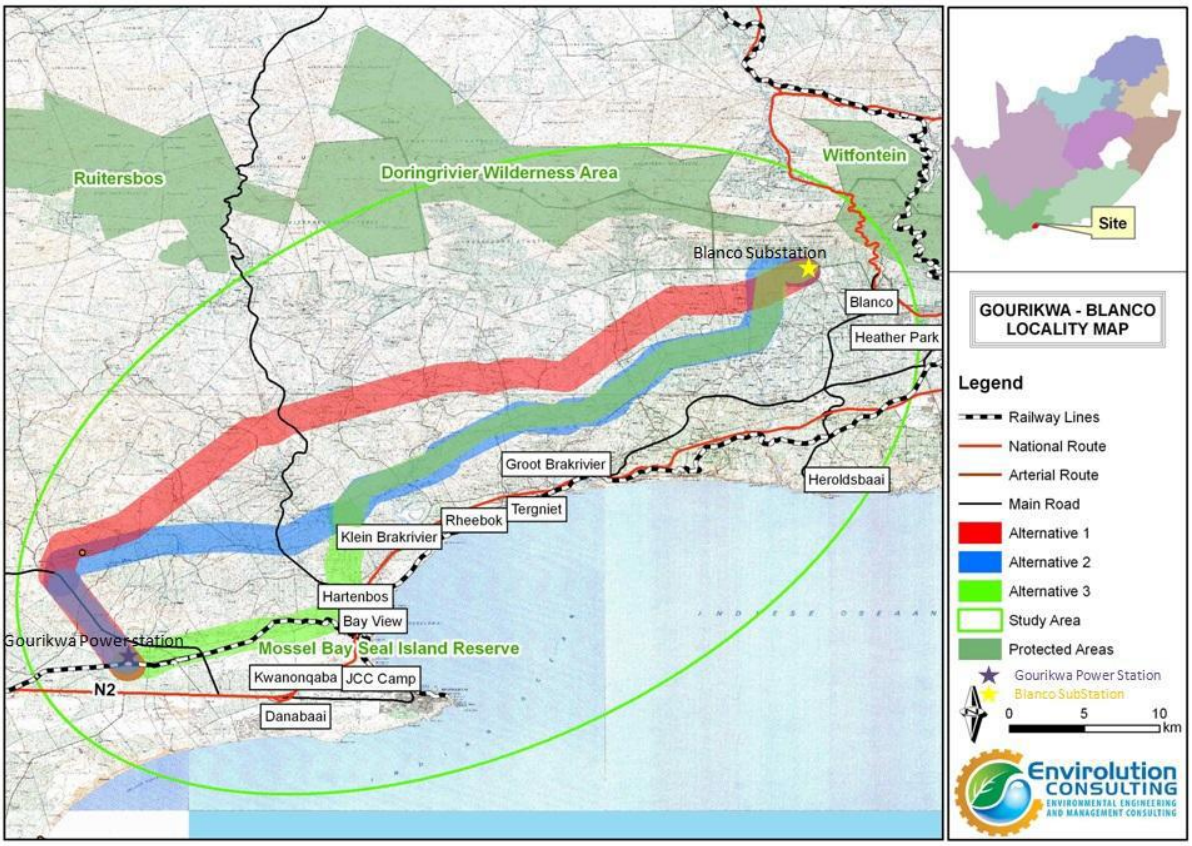


Figure 1: Locality Plan Detail: Gourikwa to Blanco Ref 14/12/16/3/3/2/921 (Envirolution Consulting, 2016)

The section between Gourikwa to Blanco (Ref 14/12/16/3/3/2/921) has four alternatives of more or less the same lengths, with the fourth alternative being a combination of sections of the first three alternatives. The length of the respective alternatives 1 to 4 are approximately 56km, 58km, 52km and 48km respectively.

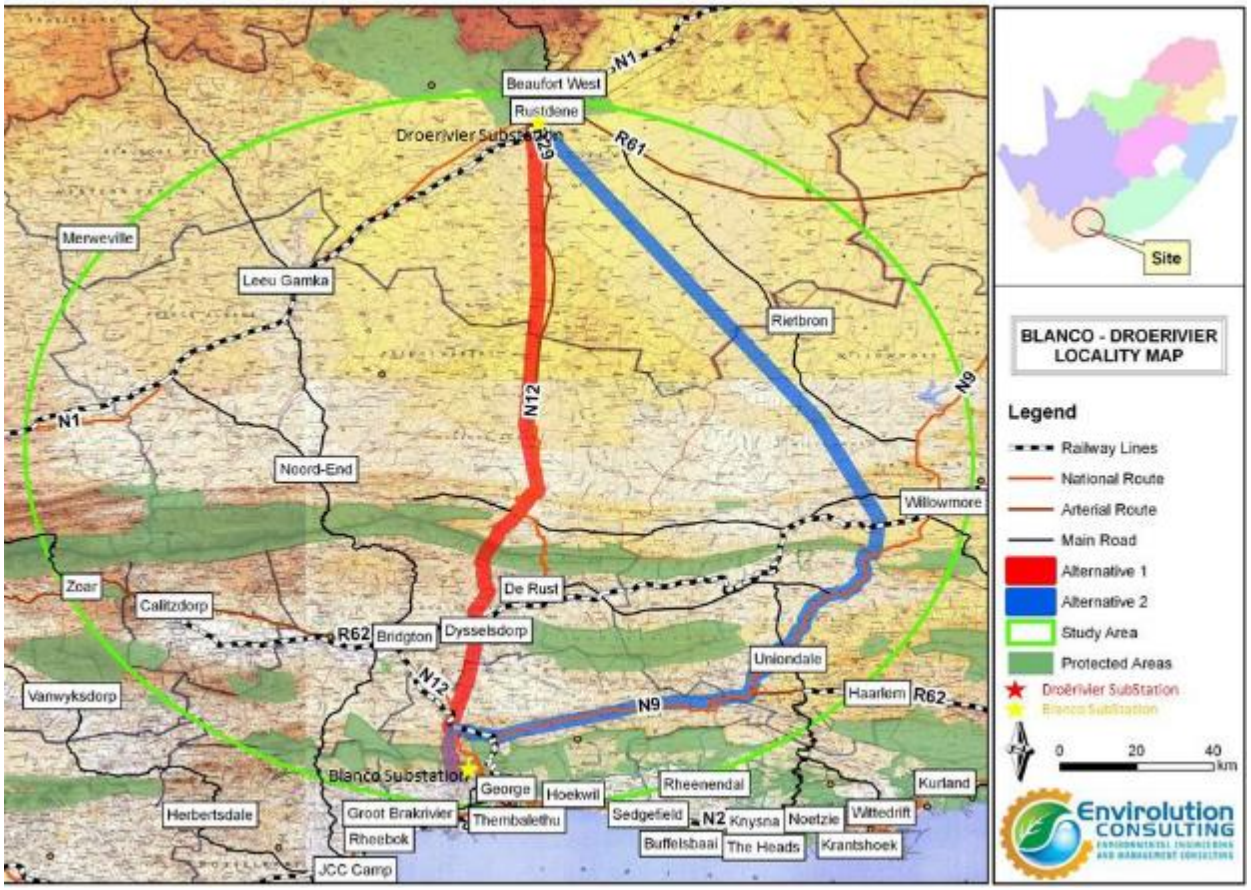


Figure 2: Locality Plan Detail: Blanco to Droërivier Ref 14/12/16/3/3/2/922 (Envirolution Consulting, 2016)

The section between Blanco to Droërivier (Ref 14/12/16/3/3/2/922) has two alternatives that comprise of:

1 A route following the N12 via Dysselsdorp (Indicated in red in Figure 1 - approximately 175km long)

2 A route closer to the N9(R407) and R306 via Uniondale and passing near Willowmore and Rietbron (indicated in blue in Figure 1 – approximately 260km long)

The scope of the study is to evaluate the transport requirements to implement the 400KV Transmission Power Line, with particular focus on the access to site from the N12 and N9 & N2.

The scope of the Transport Assessment Study includes, inter alia:

- Determine the access freight routes between point of delivery (i.e. the preferred port) and the project site for the construction components.
- Determine accessibility for freight along power line routes and probable accesses from the existing road network
- Confirm the associated clearances required for the necessary equipment to be transported from the point of delivery to the project site.
- Confirm freight requirements.
- Determine (abnormal) permit requirements, if any.
- Consider feasibility of alternative accesses to the site from the N2.
- Propose traffic accommodation measures during construction and stringing of powerlines as well as potential upgrading of the access on the Provincial or National Roads.

2 BASIS AND ASSUMPTIONS

The following parameters have been defined / assumed, based on Aurecon's domain knowledge, research and relevant experience:

- Imported elements, are shipped to and transported from the nearest or most practical South African Port to the site which is most likely Port Elizabeth in this instance as Mosselbay harbour is not suitable for imported freight required for this project.
- Certain elements are transported from manufacturing centres within South Africa.
- Materials for concrete foundation structures and road construction are obtained locally from closest available commercial source, but could also be sourced from new borrow pits and quarries on the site, to limit carting of materials over long distances.
- The largest potential loads with respect to weight will be transported as abnormal loads which will be allowed by authorities with conditions which will not exceed the capacity of the structures on the permitted public roads.
- All existing Public roads and structures will be able to accommodate freight with legal loads.
- Long distance freight will be transported predominantly on surfaced roads.
- The geometric standards applied were such that normal freight could be accommodated on the access roads to the proposed development.
- The standard vehicle for the transportation of equipment was assumed to have a wheel base of approximately 18m.

3 ASSESSMENT

3.1 Accessibility

3.1.1 Use of Existing Roads

Maximum use of both the existing servitudes and the existing roads shall be made. In circumstances where private roads will be used, the condition of the said roads must be recorded/photographed prior to use and the condition thereof agreed by the landowner.

All private roads used for access to the servitude shall be maintained by the contractor and upon completion of the works, be left in at least the original condition.

The existing public roads for the Gourikwa – Blanco section are shown in the following figure:

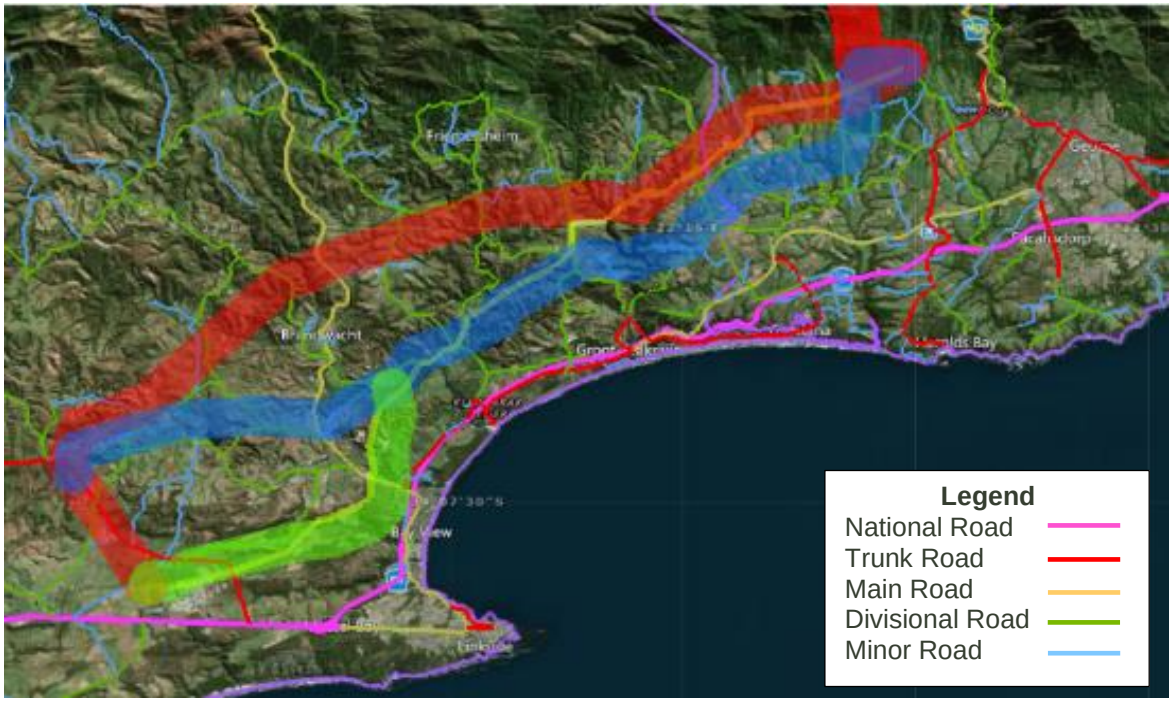


Figure 3: Existing Public Roads: Gourikwa – Blanco Section

Clearly all alternatives for most of the section are accessible from the current network and will require nominal local access roads to be provided

The existing Public Roads for the Blanco – Droërivier section are shown in the following figure:

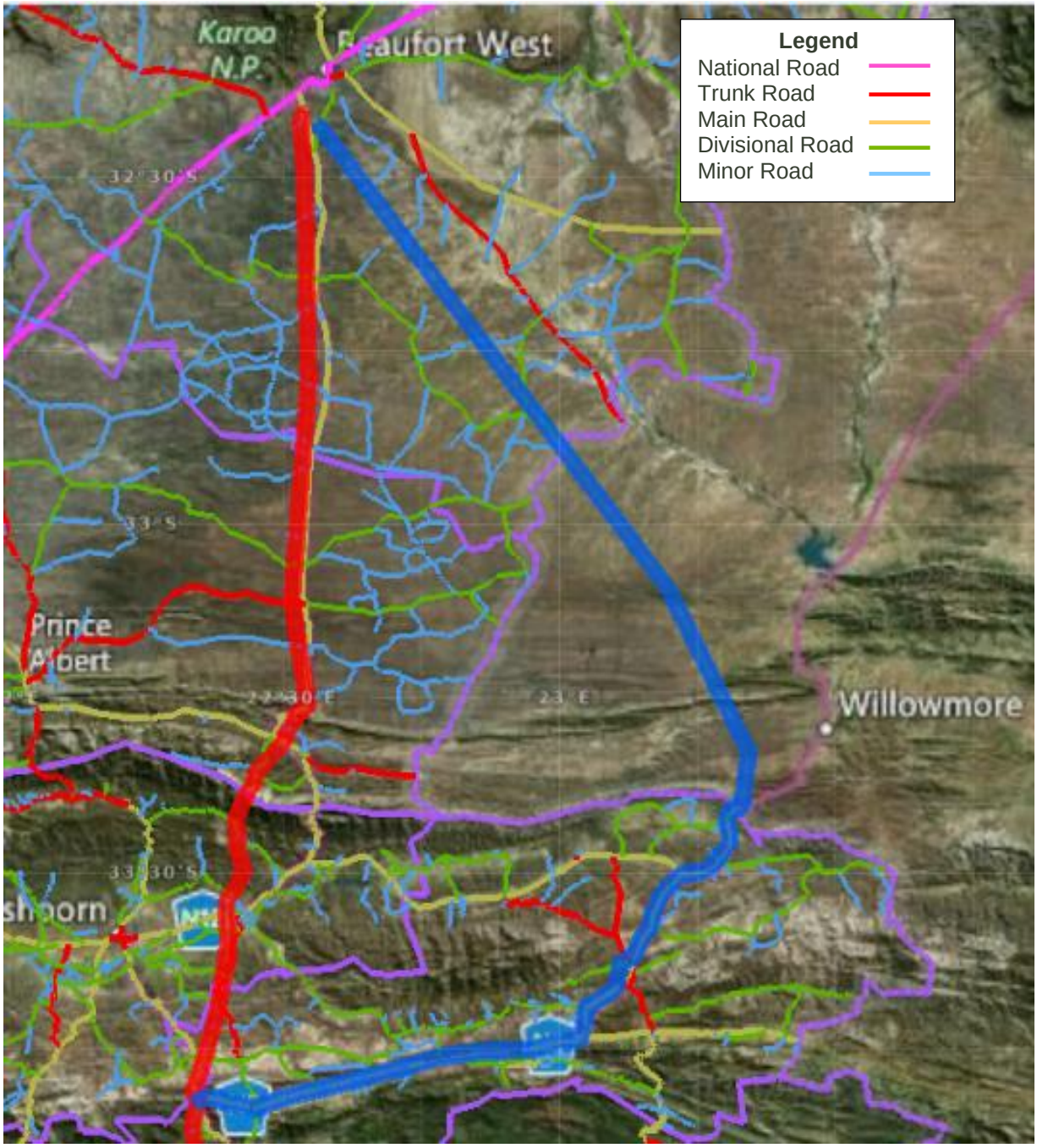


Figure 4: Existing Public Roads: Blanco – Droërivier Section

The Eastern Cape road network information is not available but is similar to the Western Cape network in the area between Uniondale and Rietbron. It could be stated that local access will have to be provided in certain areas where no public access are available. This include sections of up to 10km in mountainous areas and up to 15km in certain remote areas. It should be noted that many private roads are also available although arrangements with owners will have to be made.

3.1.2 Construction of New Roads

Access shall not necessarily be continuous along the line, and the contractor must therefore acquaint himself with the physical access restrictions such as rivers, railways, motorways, mountains, etc. along the line. Access roads shall follow the contours in hilly areas as far as possible, as opposed to winding down steep slopes.

Access is to be established by vehicles passing over the same track on natural ground, multiple tracks are not permitted. Access roads shall only be constructed where necessary at watercourses, on steep slopes or where boulders prohibit vehicular traffic.

Where construction of a new road has been agreed, the road width shall be determined by need, such as equipment size, and shall be no wider than necessary.

Prior to any construction of access roads, details of the access will be submitted in a method statement to the Environmental Officer for approval. Construction may only commence on approval of the details and method statement. All work required for any new access road shall be in accordance with the Environmental Authorization and the approved method statement.

The contractor is to inform the Engineer before entering any of the following areas:

- Naturally wet areas: vlei, swamps, etc.
- Any area after rain.
- Any environmentally sensitive area.

3.1.3 Levelling at Tower Sites

No levelling at tower sites shall be permitted unless approved by the engineer.

The steep slopes formed by the cutbanks and respective fillings when building the tower platforms are to be trimmed back to an angle that ensures stability of the slope. When the ground is loose, berms are to be built on the top of the slope, 2 m long logs spaced evenly must be pegged across the down-slope, re-vegetated with appropriate local grass seeds together with fertiliser.

3.1.4 Gates

- **General**

At points where the line crosses any fence in which there is no suitable gate within the extent of the line servitude the contractor is to, on the engineer's instruction, provide and install a servitude gate. The contractor will mark these crossing points when the tower positions are being pegged.

Where applicable game gates are to be installed in accordance with the relevant drawing.

All vehicles shall pass through gates when crossing fences, and the contractor shall not be allowed to drop fences temporarily for the purpose of driving over them. No construction work shall be allowed to commence on any section of line, unless all gates in that section have been installed. Installation of gates in fences on major road reserves shall comply with the ordinances of the relevant local government. No gates may be installed in national road and railway fences.

- **Installation of Gates**

Care shall be taken that the gates shall be so erected that a gap of no more than 100 mm to the ground is left below the gate.

Where gates are installed in jackal proof fencing, a suitable reinforced concrete sill as shown on the drawing shall be provided beneath the gate.

The original tension is to be maintained in the fence wires.

Where required, the Contractor shall replace rusted or damaged wire strands on either side of the gate with similar new wiring to prevent the movement of animals. The extent of the replacement shall be on the engineer's instruction.

- **Securing of Gates**

The contractor shall ensure that all servitude gates used by him are kept closed and locked at all times.

The contractor shall provide locks for all servitude gates, and when the line is taken over these locks shall be recovered by the contractor and replaced by locks supplied by TCN. The contractor shall also ensure that all existing farm gates used by him are kept closed. The contractor shall provide the engineer with keys for the above locks. No keys shall be provided to landowners to avoid conflict situations between neighbouring landowners.

- **Construction Equipment Required**
    - 4x4 Vehicle
    - Wheeled dumper or track dumper (6 to 8 tons)
    - 360˚ Tracked excavator (13 ton normally, 22 ton for rock breaker)
    - Mobile elevated work platform (MEWP) and lifting equipment
    - Appropriately sized all terrain crane (depending on site)
    - Compressor and drill
    - Transit van
    - Slings and other small tools
    - Road material delivered by supplier to closest convenient point (38 ton gross)
    - Crew size: 4-10 workers including:
        - Supervisor
        - Clerk of works
        - Civil and structural technician
        - Skilled labourers
        - Unskilled labourers
        - Drivers and crane operators

- **Duration of Access Route Works**

The duration of access road construction is typically very short with one day being the norm. For a very long road two working days may be required.

3.1.5 Authority and Permit Requirements

The following is noted:

a) If the N2 via Tsitsikamma is used, toll fees are required (R270.00 and R 381.00 for Class 3 and Class 4 vehicles respectively (2016 tariffs)) on the route from the Port of Port Elizabeth. On the routes from the other manufacturing centres, certain portions of the National Roads are tolled, but the related fees can be avoided by use of alternatives.

b) Abnormal permits will be required for the transport of by the logistics contractor. The estimated permit value will be a function of the actual vehicle configuration, but is estimated at R9000 – R15000 per trip (dependent on the weight of the load and escorting requirements by Provincial Traffic). In extreme cases, permits could cost as much as R50 000 per trip although this is not expected for this project. The abnormal permit application process could take up to one month to complete and should be arranged by the logistics contractor if required.

3.1.6 Route Limitations of the Preferred Route from the Port

The identified route has possible limitations that will necessitate more detailed investigations to identify any limitations once the nature of the actual loads are known (e.g. Clearances). The National Road is an abnormal route and provided the permits are obtained and that loads comply with permitting limits, no problems are expected on the National Routes.

Possible limitations will potentially be encountered on the lower order gravel roads from the National and Provincial roads to the prospective sites. Possible limitations that require investigation may include: motor grid gates with loading constraints, overhead power and telecommunication lines with an insufficient ground clearance, substandard geometry of roads and small drainage structures, and drainage issues.

3.1.7 Capacity of Bridges

The fact that most freight routes are on existing National or Provincial Roads, implies that normal legal loads will not exceed the capacity of Bridge structures on these roads. Abnormal loads will also not exceed the capacity of structures as authorities will only allow permit configurations which will meet the capacity of the structures. However, a detailed investigation should nevertheless be undertaken by the transport contractor, to confirm that the vehicle configuration is suited to the maximum axle loading for the bridges.

The focus should be on the capacity of structures on minor or private roads used. In event of damage, the structures should be strengthened suitably before loads are transported across the structures

3.2 Traffic

3.2.1 Transporting of Equipment

SANRAL and Provincial Authority may require upgrading of the access intersection to the site from National or Provincial Roads. During upgrading of the access, traffic will have to be accommodated, as per SADC Road Traffic Signs Manual requirements. The typical minimum signage requirements, shown in Figure 5, will have to be implemented to ensure safety, should the closure of the road be required during construction.

The accommodation of traffic on the proposed access road, from the gravel road leading to the site, would require consultation with the farm users. As only one-way traffic is likely to be possible on this road, it will likely have to be closed to local traffic at times.

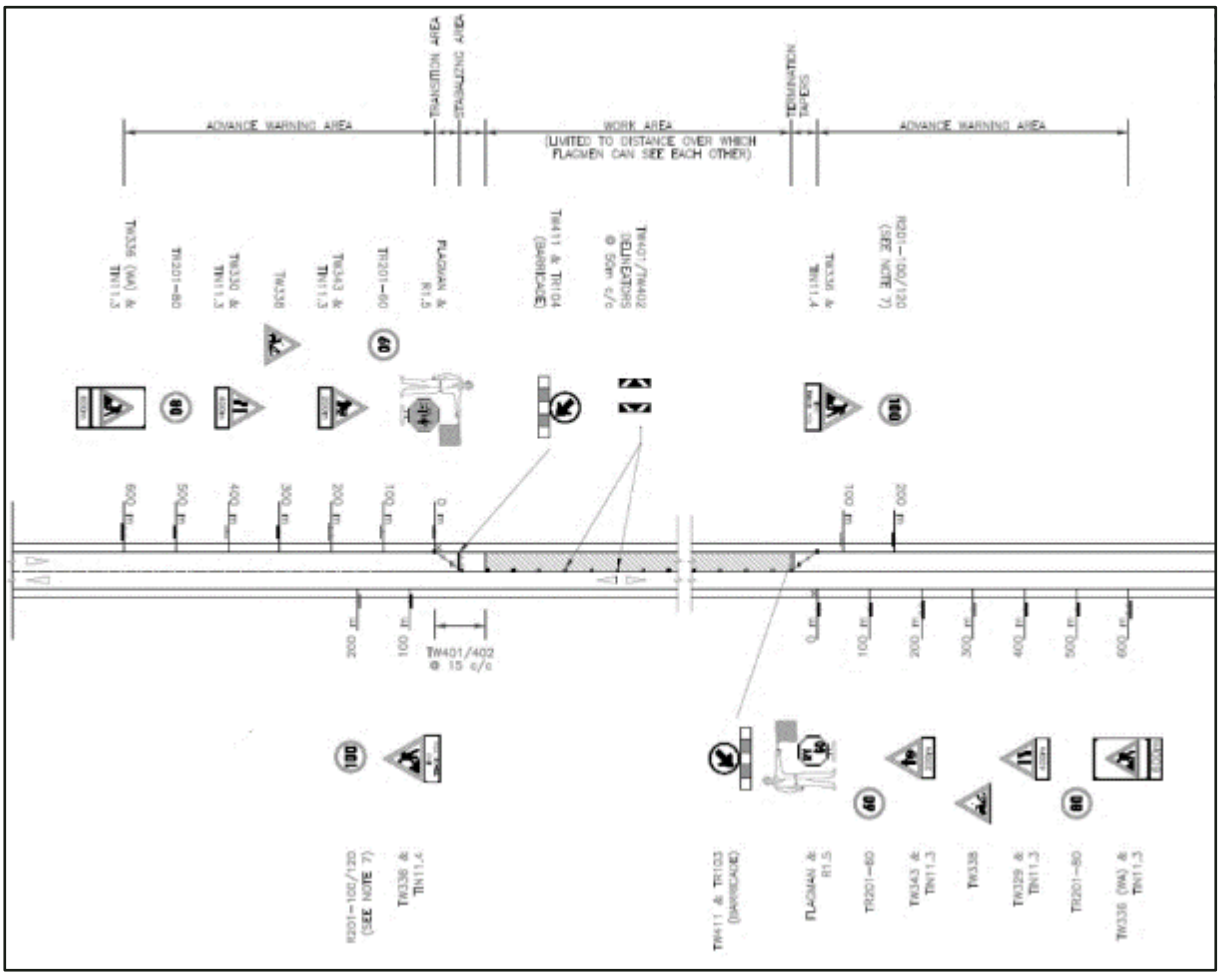


Figure 5: Accommodation of Traffic - Typical Layout as per WCS/15/1/D1

3.2.2 Stringing Across a Road

- **Safety**

The following traffic warning signs are required to be placed 100 m away on both sides of the work area:

- Manned stop / go sign
- Men at work
- Working overhead / working ahead
- Chevron
- Red flags

Additional workers bearing a red flag shall be placed 100m further up the road from both stop / go signs to warn oncoming traffic of possible danger ahead.

All workers must wear high visibility reflective vests at all times.

A worker bearing a red flag must be stationed at the point of operation to warn approaching motorists of the dangers in the immediate area, as well as to warn workers of approaching vehicles.

All workers working at heights must be connected to a fall arrest system.

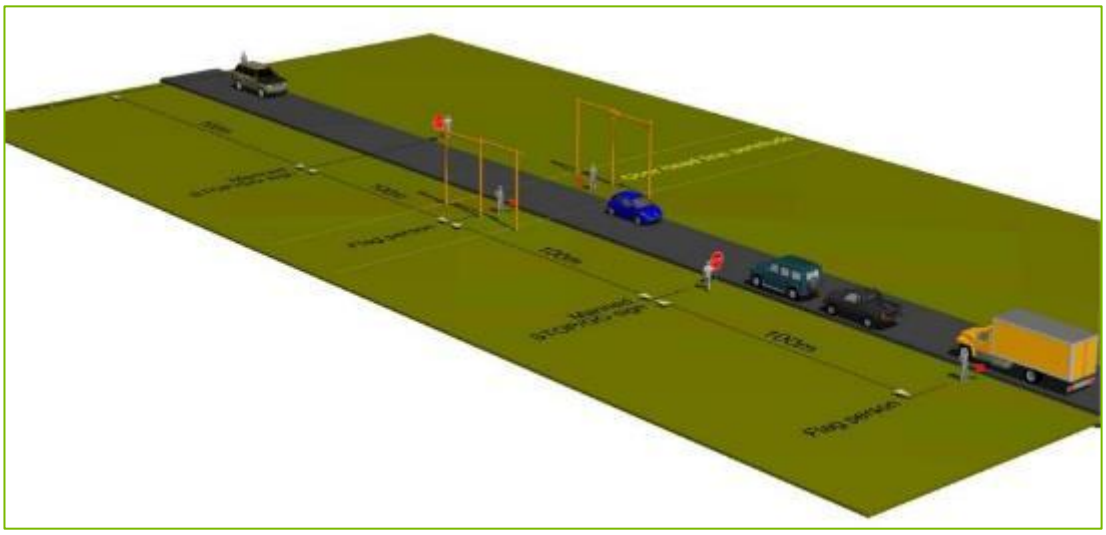


Figure 6: Stringing Across Road Safety Distances

- **Authorisation**

Authorisation must be obtained from the local authority to do a road crossing. The request / notification must state the commencement date as well as the duration of the work to be done.

The authorization letter must be present on site.

All special requirements imposed by the local authority must be adhered to.

Communication between the stop and go signs must be done by means of a 2-way radio system.

- **Road Crossing Structure**

a) Use of Vehicle Mounted Crane

A vehicle mounted crane must be used to lift the wooden poles into position.

Check that the vehicle and crane are in a safe working condition and ensure that the operator has an accredited crane operator's certificate available on site.

Ensure that there are no bystanders within 5m while the crane is on operation.

Ensure that no work is carried out underneath a suspended load.

Ensure that the correct lifting tackle is used and that the load is spread evenly when lifting poles.

b) Construction of Road Crossing Structure

Excavate holes for the poles no less than 1.5m from the road edge without damaging the base layers of the road.

All excavated holes must be a minimum depth of 1.8m or as is applicable for the length of pole used.

A minimum of 3 vertical poles and 2 horizontal cross arms are required on each side of the road.

Attach the sling to the pole as well as the hook of the crane, lift vertically and place it in the excavation.

Backfill the excavation and compact the soil around the poles in layers of 300 mm.

The cross arms are lifted into position as high as possible onto the vertical poles.

The cross arms must be securely attached to the vertical poles using U-bolts.

This procedure must be followed for building the temporary structure on both sides of the road.

Install safety netting

c) Dismantling of the Road Crossing Structure

A sling is attached to the cross arm and hook of the vehicle mounted crane.

Workers working from ladders then loosen the cross arm U-bolts.

The cross arm is then lifted off the vertical poles by crane and lowered to the ground.

While the pole is held secure by the crane, the soil around the vertical poles is then removed and the poles are lifted to the ground with the vehicle mounted crane.

The holes must then be backfilled and compacted in layers of 300 mm to the same consistency as the adjacent virgin soil.

All plant and equipment must then be removed and then all traffic road signs and flags removed.

Ensure that all superfluous equipment is removed from site,

Ensure that the site is returned to its original state to the reasonable acceptance of the local authority and client.

- **Stringing of Conductor Across the Road**

A pilot wire or suitable rope is placed over the temporary wood pole structures.

While the pilot wire / rope rests on the cross arms, the end of the rope is attached to the conductor.

The loose end of the pilot wire / rope is then used to gently pull the conductor across the road crossing structure.

While the conductor is being pulled across the road, traffic must be stopped until the conductor is in position and secured.

Conductor is pulled through to the next permanent structure and as soon as it is secured to the structure and tensioned, the temporary road crossing structure is dismantled.

3.2.3 General Freight Requirements

Currently, the general limitations on road freight transport are:

- Axle load limitation of 7.7t on front axle and 9.0t on single rear axles.
- Axle unit limitations are 18t for dual axle units and 24t for 3 axle units.
- Bridge formula requirements to limit concentration of loads and to regulate load distribution on the vehicle.
- Gross vehicle mass of 56t. This means a typical payload of about 30t.
- Maximum vehicle length of 22m for interlinks, 18.5m for horse and trailers and 13.5m for single units.
- Width limit of 2.6m.
- Height limit 4.3m with a 0.3m tolerance.

Abnormal permits are required for vehicles exceeding these limits, which will most likely not be required for this project.

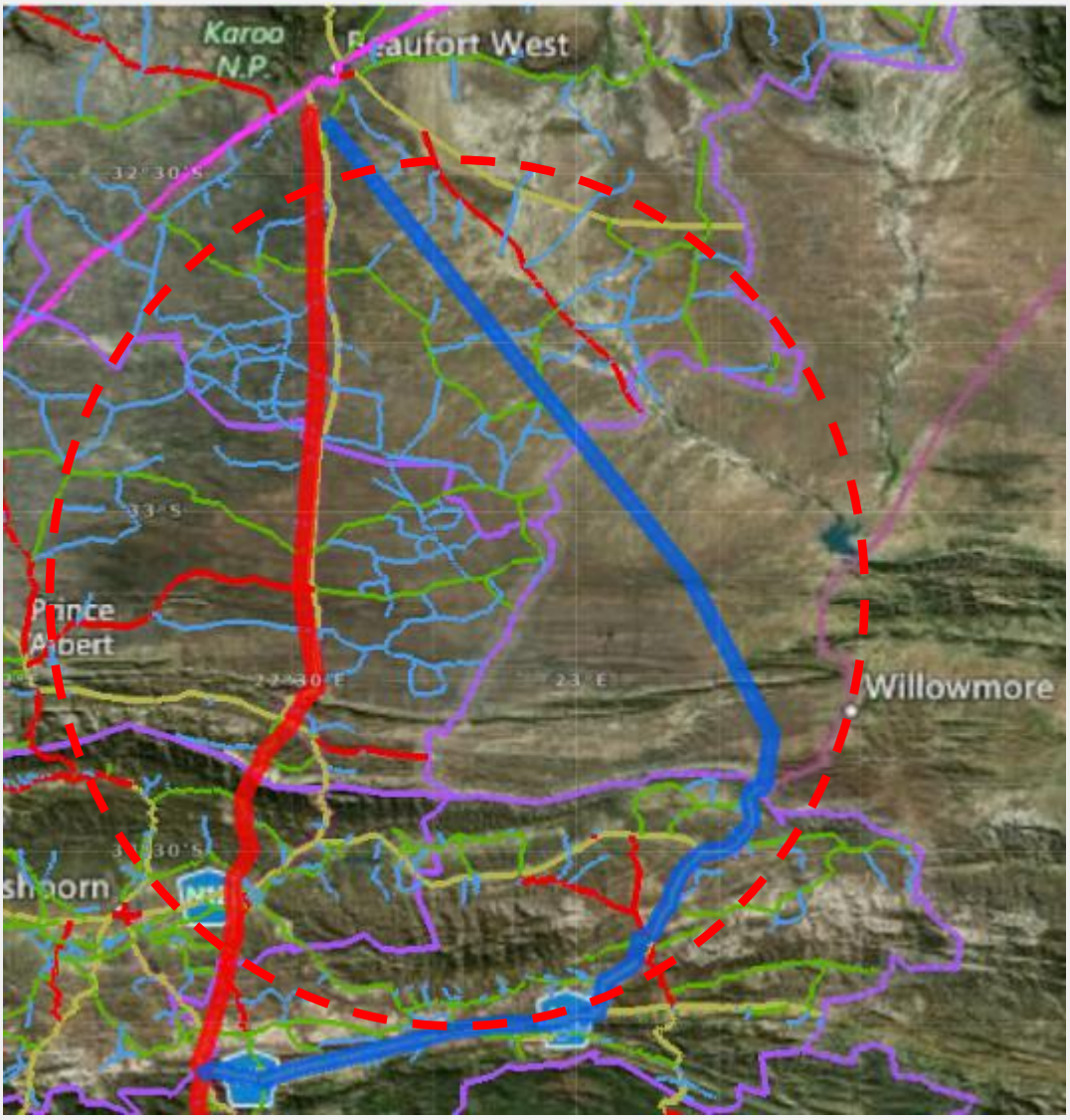
3.3 Impact Assessment

A summary of the study area for Gourikwa to Narina Ref 14/12/16/3/3/2/921 and Narina to Droërivier Ref 14/12/16/3/3/2/922 as provided in Section 1, is given in Table 1:

Table 1: Summary of Gourikwa to Narina Section (Ref 14/12/16/3/3/2/921)Study Area (Envirolution Consulting, 2016)

Location (Centre Point)	34° 2'21.64"S 22° 9'24.49"E
Distance from Johannesburg Manufacturing Centre	1190km
Distance from Port of Port Elizabeth	360km

Table 2: Summary of Narina to Droërivier Section (Ref 14/12/16/3/3/2/922) Study Area (Envirolution Consulting, 2016)



Location (Centre Point)	33°18'35.80"S 22°47'4.94"E
Distance from Johannesburg Manufacturing Centre	1060km
Distance from Port of Port Elizabeth	330km

3.3.1 Access Routes

Considering the size and extent of the study area as well as details of the exact tower positions are still unknown, it is difficult to estimate exactly which roads will be utilised for the transport and consequently deliver equipment to the site from various centres. It was therefore decided to firstly assess the access roads outside the study area for importing components and consequently site access roads within the study area being utilised during construction.

- **Importing Components**

Equipment required for construction of the power line will consist of three main categories, all transported from different locations. The categories are the foundations (concrete and reinforcing), the structure and hardware (steel) as well as cables for the stringing of the conductor. It is accepted that the foundation material will be imported locally, with the steel and strings being transported from Johannesburg or imported from Port Elizabeth. The construction process and associated equipment and material required is shown below:

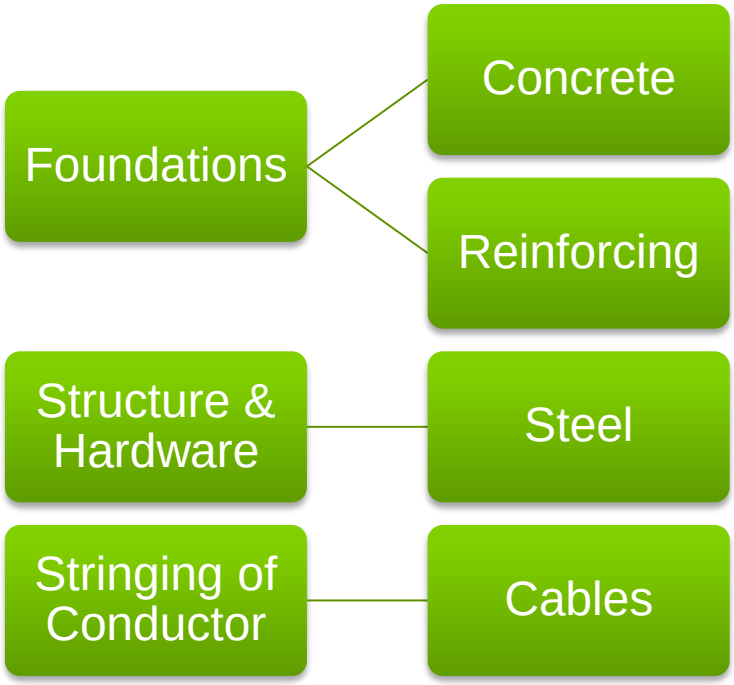


Figure 7: Power Line Construction Process

An example of a normal freight truck, which will most likely transport the building equipment, is illustrated in Figure 8:

Figure 8: Normal Freight Vehicle

The potential ports for landing imported equipment are Port Elizabeth, Saldanha or Cape Town. Port of Mossel Bay is considered not suitable for the handling of imported freight and logistic operations required. Port Elizabeth is the preferred port, with a route length of 330km, as indicated in Figure 9.

It should be noted that the Ports Authority also has preferences on freight imports, which should be respected.

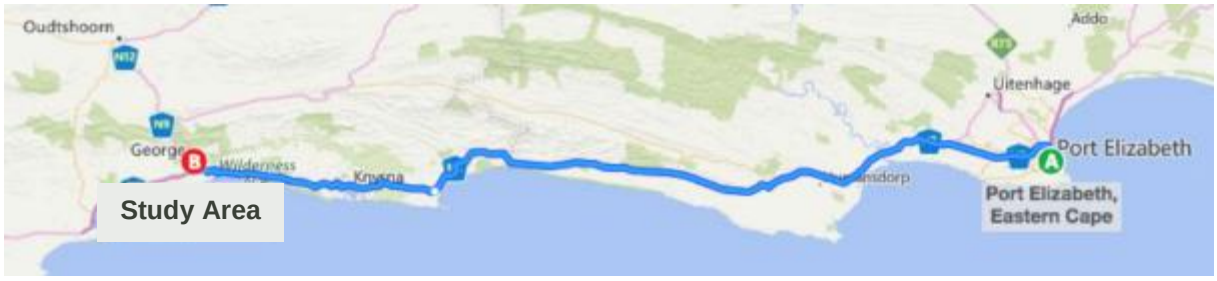


Figure 9: Preferred Freight Route from Port

The route from the alternative Port of Saldanha is about 540km and is the least preferred route. However, it still offers an alternative, should Port of Port Elizabeth not be available for any reason. While Cape Town Port is the second closest port to the site (430km), it would most probably not be able to accommodate the imported elements, due to potential congestion.

It is suggested that the transporting contractor executes a more detailed study before transporting any of the components, to confirm the preferred and alternative routes for each element required for the project. Should any of the preferred sections be unavailable for any reason, a combination of routes should also be considered.

The closest manufacturing centre will most likely be Johannesburg, which is situated 930km from Beaufort West. For the largest part of the route from Johannesburg, the National Route 1 will be used. There are, however, toll fees payable on this specific route, which can be avoided by using alternatives.

The preferred freight route is shown in the figure below.

Figure 10: Preferred Freight Route from Johannesburg Manufacturing Centre

Material sources for road building and concrete works are available in George, Oudtshoorn or Beaufort West and all material will most likely be transported from these towns on the N1 and the N12. To reduce traffic on the access roads, consideration could be given to sourcing material for road building and concrete aggregate from new or existing quarries/sources in the vicinity of the site, provided that approvals will timeously be obtained with respect to the target implementation programme. It is noted that the approval period for such quarries/sources is typically 12 to 18 months. The possible siting of quarries and/or borrow pits should be confirmed prior to construction, after a geotechnical investigation has been conducted.

- **Site Access Roads**

In general are all public roads (National, Provincial and Municipal) considered viable for the use of general freight.

a) Gourikwa (Mossel Bay) to Narina (at Blanco, George) Ref 14/12/16/3/3/2/921

Four equally viable alternatives for the first section of the proposed transmission line are considered. These are shown in Figure 11.

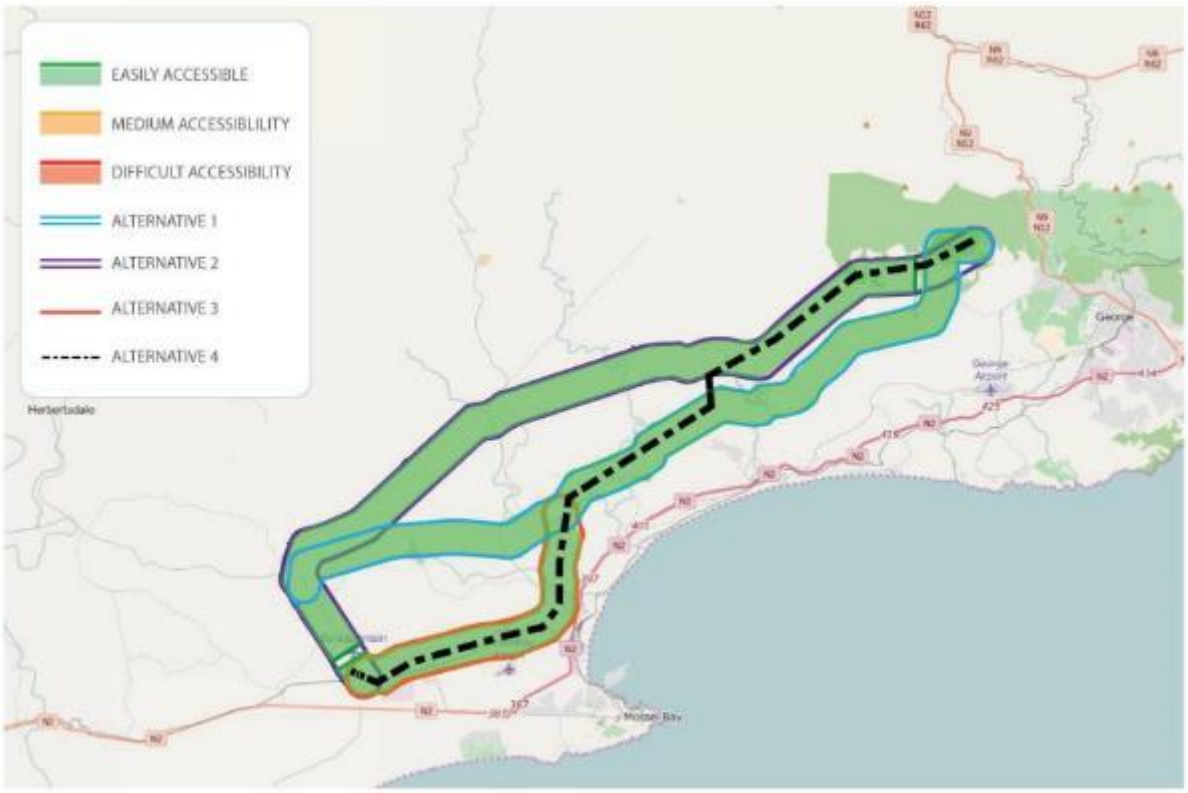


Figure 11: Gourikwa to Narina Access

All routes are easily accessible and therefore all alternatives are deemed to be viable from an access perspective.

The significance of the impact is given in Table 3 below.

Table 3: Impact Significance Table for Gourikwa to Narina - Alternative 1-4

Nature: Impact of Access to site for Gourikwa to Narina (Ref 14/12/16/3/3/2/921) Alternative 1-4		
	Without mitigation	**With mitigation**
CONSTRUCTION PHASE		
Probability	Improbable (2)	Very Improbable (1)
Duration	Short duration (2)	Short duration (2)
Extent	Limited to Region (3)	Limited to Region (3)
Magnitude	Minor (2)	Minor (2)
Significance	**14 (low)**	**7 (low)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
Probability	Very Improbable (1)	Very Improbable (1)
Duration	Medium term (3)	Medium term (3)
Extent	Limited to Region (3)	Limited to Region (3)
Magnitude	Minor (2)	Minor (2)
Significance	**8 (low)**	**8 (low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. The impact can be mitigated to some extent by managing the traffic to and from site. Mitigation measure can include: • Additional traffic control measures at the site access during higher demand periods		
Cumulative impacts: "Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[1]. N/a, negligible, impact only short term.		
Residual Risks: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014). N/a, negligible, impact only short term.		

[1] Unless otherwise stated, all definitions are from the 2014 EIA Regulations, GNR 982

b) Narina (at Blanco, George) to Droërivier (Beaufort West) Ref 14/12/16/3/3/2/922

Two equally viable alternatives for the first section of the proposed transmission line exist. These are indicated in Figure 12 below.

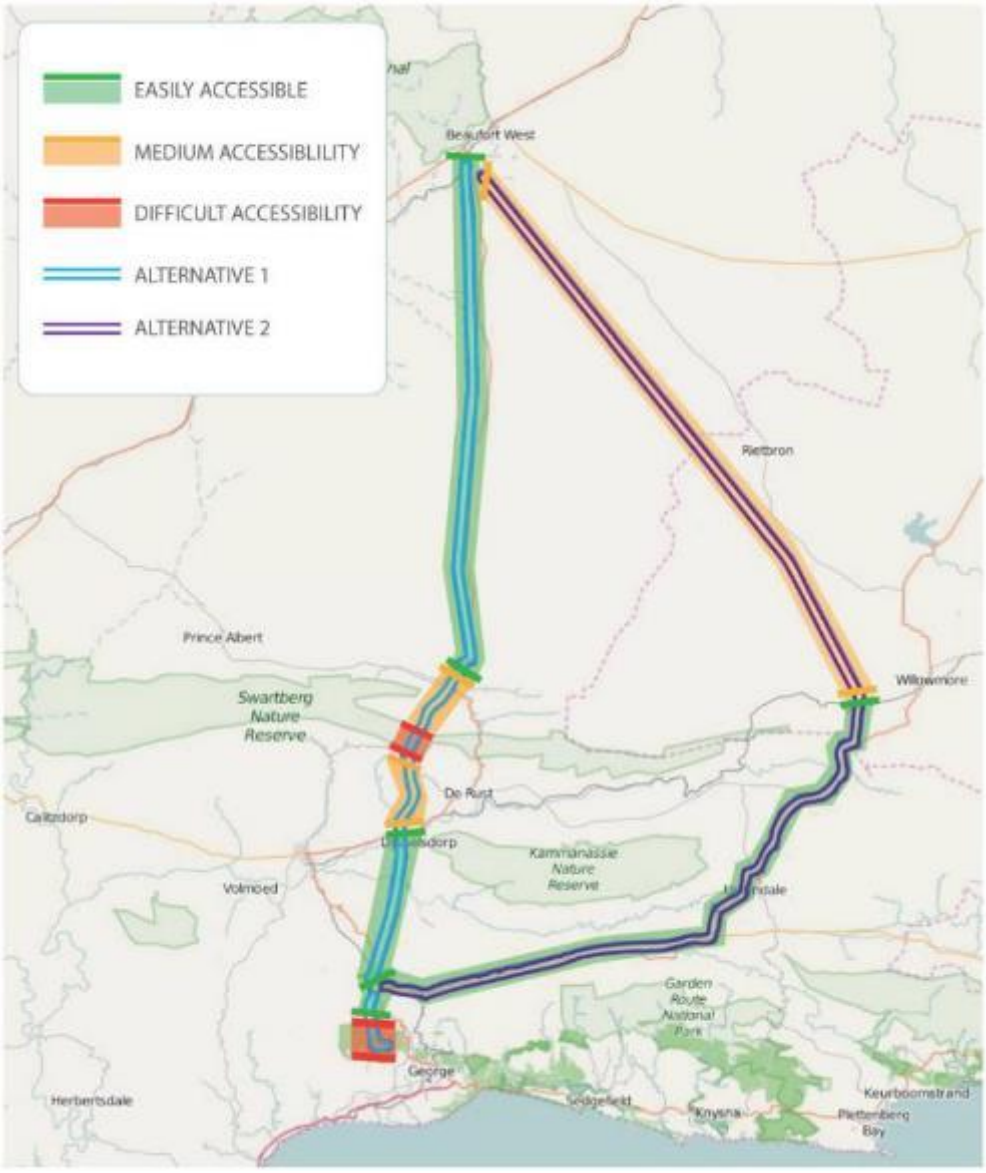


Figure 12: Narina to Droërivier Access

From a desktop study perspective, it seems that there are farm roads present over the section crossing the Swartberg Nature Reserve for Alternative 1. Even though the accessibility might be limited when compared to the preceding sections of the line, it is still very possible to construct the line over the mountain. For inaccessible areas over the mountain areas, which is estimated to be approximately 10 km in length, the towers will have to be constructed in sections where after they will need to be transported by means of a helicopter to the respective sites. Meiringspoort's pass, which is considered difficult for some to navigate, conforms to geometric standards and will not present any problems for the freight being delivered to site seeing that only normal freight is being utilised and not abnormal freight.

Alternative 2 is considered to be less viable than Alternative 1 from a transport perspective, due to the additional length required for construction resulting in additional construction time and material as well as the limited accesses for almost half of the Alternative 2 route (approximately 130 km).

It can therefore be stated that Alternative 1 will be the most viable option for this section from an access perspective. The significance of the impact can be seen in Table 5 below.

Table 4: Impact Significance Table for Narina to Droërivier - Alternative 1

Nature: Impact of Access to site for Narina to Droërivier (Ref 14/12/16/3/3/2/922) Alternative 1		
	Without mitigation	**With mitigation**
CONSTRUCTION PHASE		
Probability	Improbable (2)	Very Improbable (1)
Duration	Short duration (2)	Short duration (2)
Extent	Limited to Region (3)	Limited to Region (3)
Magnitude	Minor (2)	Minor (2)
Significance	**14 (low)**	**7 (low)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
Probability	Very Improbable (1)	Very Improbable (1)
Duration	Medium term (3)	Medium term (3)
Extent	Limited to Region (3)	Limited to Region (3)
Magnitude	Minor (2)	Minor (2)
Significance	**8 (low)**	**8 (low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. The impact can be mitigated to some extent by managing the traffic to and from site. Mitigation measure can include: • Additional traffic control measures at the site access during higher demand periods		
Cumulative impacts: "Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[2]. N/a, negligible impact only short term.		
Residual Risks: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014). N/a, negligible impact only short term.		

[2] Unless otherwise stated, all definitions are from the 2014 EIA Regulations, GNR 982

Table 5: Impact Significance Table for Narina to Droërivier - Alternative 2

Nature: Impact of Access to site for Narina to Droërivier (Ref 14/12/16/3/3/2/922) Alternative 2		
	Without mitigation	**With mitigation**
CONSTRUCTION PHASE		
Probability	Improbable (2)	Improbable (2)
Duration	Short duration (2)	Short duration (2)
Extent	Limited to Region (3)	Limited to Region (3)
Magnitude	Low (4)	Minor (2)
Significance	**18 (moderate)**	**14 (low)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
Probability	Very Improbable (1)	Very Improbable (1)
Duration	Medium term (3)	Medium term (3)
Extent	Limited to Region (3)	Limited to Region (3)
Magnitude	Minor (2)	Minor (2)
Significance	**8 (low)**	**8 (low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. The impact can be mitigated to some extent by managing the traffic to and from site. Mitigation measure can include: • Additional traffic control measures at the site access during higher demand periods		
Cumulative impacts: "Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[3]. N/a, negligible impact only short term.		
Residual Risks: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014). N/a, negligible impact only short term.		

[3] Unless otherwise stated, all definitions are from the 2014 EIA Regulations, GNR 982

3.3.2 Traffic

a) General Remarks

The traffic volumes will have two different patterns for the construction and operational stages of the project with the operational phase having considerably less traffic than the construction (first) phase.

The traffic generation is a function of the length of Section for transport of materials. Therefore the traffic volumes for the Gourikwa – Blanco section (approximately 50km – 55km long) will be substantially less than the Blanco - Droërivier section (varying from 170km to 260km for alternatives 1 and 2 respectively)

The grids/power lines to be constructed during the project will be 400KV power lines. The main components being the support mast, cables, connectors, transformers, etc. All the components will be transported by means of general freight. Based on Aurecon's experience, it is estimated that the number of expected trips per tower would be in the order of 10 heavy vehicles. It is assumed that no abnormal vehicles will be utilised during the construction process, which will limit road closures and geometric upgrades significantly.

It is expected that materials will be transported on existing public or private roads as close as possible to tower sites with construction of only nominal short access roads or tracks. Materials will be airlifted to inaccessible sites where required. Typically tower elements will be transported to an assembly point as close as possible to the tower site on public or private roads, assembled and then lifted by crane or airlifted in position. Concrete bases will be constructed in advance using smaller teams and equipment. Again, at inaccessible sites, the materials, workers and equipment will have to be airlifted.

Air traffic, when required, will have to comply with civil aviation regulations but is not expected to have any significant impacts.

The average construction time per tower (excluding foundations) is estimated to be about a week. The estimated number of heavy vehicle trips per day would be less than 10 round trips. The impact of this on the general traffic would therefore be negligible, as the peak time traffic would be increased by 2 trips at most.

The personnel during construction is estimated to total 100 - 200 persons depending on the contractor's programme and needs. The personnel will most likely reside in George, Beaufort West or Oudtshoorn as the closest towns. It is expected that the majority of construction personnel be transported to and from site by means of busses or mini-busses.

This personnel transport will total approximately 10 to 15 daily trips. The impact of this on the general traffic would therefore also be considered negligible, as the peak hour traffic would be increased by 10 trips at most.

Aurecon is of opinion that the traffic impact for this construction activity will be minimal and that the additional generated traffic is negligible.

This study of transport requirements during the phases of the proposed power lines also has to inform the EIA phase, where an environmental significance scale is used to evaluate the importance of traffic. Table 6 below indicates the identified impacts associated with the construction and operational phase how the significance ratings have been affected by the traffic.

b) Gourikwa (Mossel Bay) to Narina (at Blanco, George) Ref 14/12/16/3/3/2/921

Table 6: Impact Significance Table for Gourikwa to Narina Alternative 1-4 (Ref 14/12/16/3/3/2/921)

Nature: Traffic Impact on existing routes during construction and operation Gourikwa to Narina (Ref 14/12/16/3/3/2/921) Alternative 1-4		
	Without mitigation	**With mitigation**
CONSTRUCTION PHASE		
Probability	Very Improbable (1)	Very Improbable (1)
Duration	Short duration (2)	Short duration (2)
Extent	Limited to Region (3)	Limited to Region (3)
Magnitude	Minor (2)	Minor (2)
Significance	**7 (low)**	**7 (low)**
Status (positive or negative)	Negative	Negative
OPERATIONAL PHASE		
Probability	Very Improbable (1)	Very Improbable (1)
Duration	Medium term (3)	Medium term (3)
Extent	Limited to Region (3)	Limited to Region (3)
Magnitude	Minor (2)	Minor (2)
Significance	**8 (low)**	**8 (low)**
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Low	Low
Can impacts be mitigated?	Yes	
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. The impact can be mitigated to some extent by managing the traffic to and from site. Mitigation measure can include: • Additional traffic control measures at the site access during higher demand periods. • Distributing traffic volume as much as possible. • Dust control for identified sections.		
Cumulative impacts: "Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities[4]. N/a, negligible impact only short term.		
Residual Risks: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014). N/a, negligible impact only short term.		

After construction, the generated site traffic would be limited to maintenance support, with only a few light vehicles accessing the site at regular inspection intervals.

Current traffic volumes on N2 near Grootbrak (Between Mossel Bay and George) are estimated from the most recent SANRAL yearbook at about 10512 ADT (Average Daily Traffic) (SANRAL, 2013), (both directions with a 50/50 split) and a maximum hourly flow of about 2000 veh/h for this section of road.

c) Narina (at Blanco, George) to Droërivier (Beaufort West) Ref 14/12/16/3/3/2/922

For the N12 and N9, traffic counts were considerably less than on the N2 (2792 ADT and 817 ADT respectively) (SANRAL, 2013) and were therefore not deemed relevant. Additional traffic will not have any effect on the current Level of Service (LOS) of these road sections. The impact significance of the additional traffic generated by the construction of the power line for this section is therefore considered negligible.

d) Concluding Remarks

It can therefore be stated that the construction traffic and the post construction traffic would be low without any significant impact on the existing traffic flows on the N2 or provincial roads. It will also have a negligible impact on the pavement structures. Furthermore, the impact of the traffic on the provincial gravel access roads will also be negligible with respect to service levels.

When looking at the impact significance of the various phases, it can be concluded that all impacts will have a “Low” significance. According to the significance rating scale, a low significance can be defined as: “where this (low) impact would not have a direct influence on the decision to develop in the area”

3.3.3 Other Impacts

Other impacts having an effect on the possibility of the proposed development were identified and as:

- Road damage
- Social implications
- Energy consumption
- Vehicle Pollution and noise

These were considered to have little to no impact associated with them and were therefore not evaluated by means of an impact table.

4 CONCLUSION

The transport needs for the proposed 400KV Eskom Transmission Power Line between Mossel Bay & Beaufort West (Gourikwa to Blanco Ref 14/12/16/3/3/2/921 and Blanco to Droërivier Ref 14/12/16/3/3/2/922) was investigated to identify potential access routes, including site access and to assess traffic impacts during the construction of the power line. The general freight will comprise building materials such as concrete and reinforcement, structural steel, and cables for the stringing of the conductor.

FREIGHT ACCESS

The imported freight will preferably be transported from Port of Port Elizabeth to the site. The preferred freight route from Port Elizabeth comprises surfaced roads for the majority of the way where site entrances might consist of gravel roads in some cases. This route is predominantly on National or Provincial Roads, with suitable conditions for the transport of normal freight, or abnormal loads with permits. Toll fees are required on this route at Tsitsikamma and abnormal permits might be required for certain elements but have to be confirmed once the construction process commences.

CONSTRUCTION MATERIALS

Construction materials will most likely be transported from Oudtshoorn or Beaufort West, while certain elements will be transported from manufacturing centres in South Africa - most likely Johannesburg or Port Elizabeth. The transport of elements from these manufacturing centres will be predominantly on National and Provincial roads, which presents no limitations for normal freight.

SITE ACCESS - GENERAL

In general, no obvious problems were identified associated with the transport of freight along the proposed routes to the site, nor for the accesses required for the construction and maintenance of the facility. It will, however, be necessary to confirm certain aspects such as clearances, bridge capacities, etc., by the logistics contractor as part of their preparation as this will be dependent on the actual vehicles configuration used.

There is a limited risk of delays to the various deliveries required for the construction of the power line, due to potential routine road maintenance works (such as repairs and reseals). The impact of such activities is dependent on the scheduling of deliveries and of roads contracts, and may be mitigated by the use of the alternative routes proposed in this report.

The use of aircraft for transporting any freight to remote sites will have to comply with the South African Civil Aviation Authority's Regulations (South African Civil Aviation Authority, 2016) but is not expected to have any impacts.

ACCESS ROUTE – GOURIKWA TO BLANCO

From an accessibility and traffic perspective it is clear that for the section from Gourikwa to Blanco (Ref 14/12/16/3/3/2/921), all alternatives are viable although Alternative 4 is preferred due to the shorter length and therefore least freight and also closer proximity to the National and larger Provincial roads.

ACCESS ROUTE – BLANCO TO DROËRIVIER

Alternative 1 is preferred for the section from Blanco to Droërivier (Ref 14/12/16/3/3/2/922) from an access perspective due to the closer proximity of National and larger Provincial roads and also from a traffic perspective due to the shorter length and therefore least freight.

5 REFERENCES

Envirolution Consulting. (2016). *Environmental Impact Assessment For The Blanco To Droerivier 400kv Transmission Line, And Substation Upgrade.* Johannesburg: Envirolution Consulting.

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SANRAL. (2013). *SANRAL Yearbook.* Pretoria: SANRAL.

South African Civil Aviation Authority. (2016). *South African Civil Aviation Authority*. Retrieved August 11, 2016, from South African Civil Aviation Authority: http://www.caa.co.za/Pages/default.aspx

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Appendix A: EIA Regulations

Table 7: EIA Regulations

EIA REGULATIONS 2014 GNR 982 Appendix 6 CONTENT OF THE SPECIALIST REPORTS	Required at EIA Phase	Cross-reference in your specialist report
(a) details of— the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a curriculum vitae;	**YES**	Document control record
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	**YES**	Document control record
(c) an indication of the scope of, and the purpose for which, the report was prepared	**YES**	Section 2
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	**YES**	Document control record
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	**YES**	Section 2
(f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	**YES**	Section 1
(g) an identification of any areas to be avoided, including buffers;	**YES**	Section 1
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	**YES**	Section 1
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	**YES**	Section 2
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	**YES**	Section 3
(k) any mitigation measures for inclusion in the EMPr	**YES**	Section 3
(l) any conditions for inclusion in the environmental authorisation;	**YES**	Section 3
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	**YES**	Section 3
(n) a reasoned opinion— i. as to whether the proposed activity or portions thereof should be authorised; and ii. if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and	**YES**	Section 4

EIA REGULATIONS 2014 GNR 982 Appendix 6 CONTENT OF THE SPECIALIST REPORTS	Required at EIA Phase	Cross-reference in your specialist report
mitigation measures that should be included in the EMPr, and where applicable, the closure plan;		
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	**YES**	Section 4
(p) any other information requested by the competent authority	**YES**	N/A