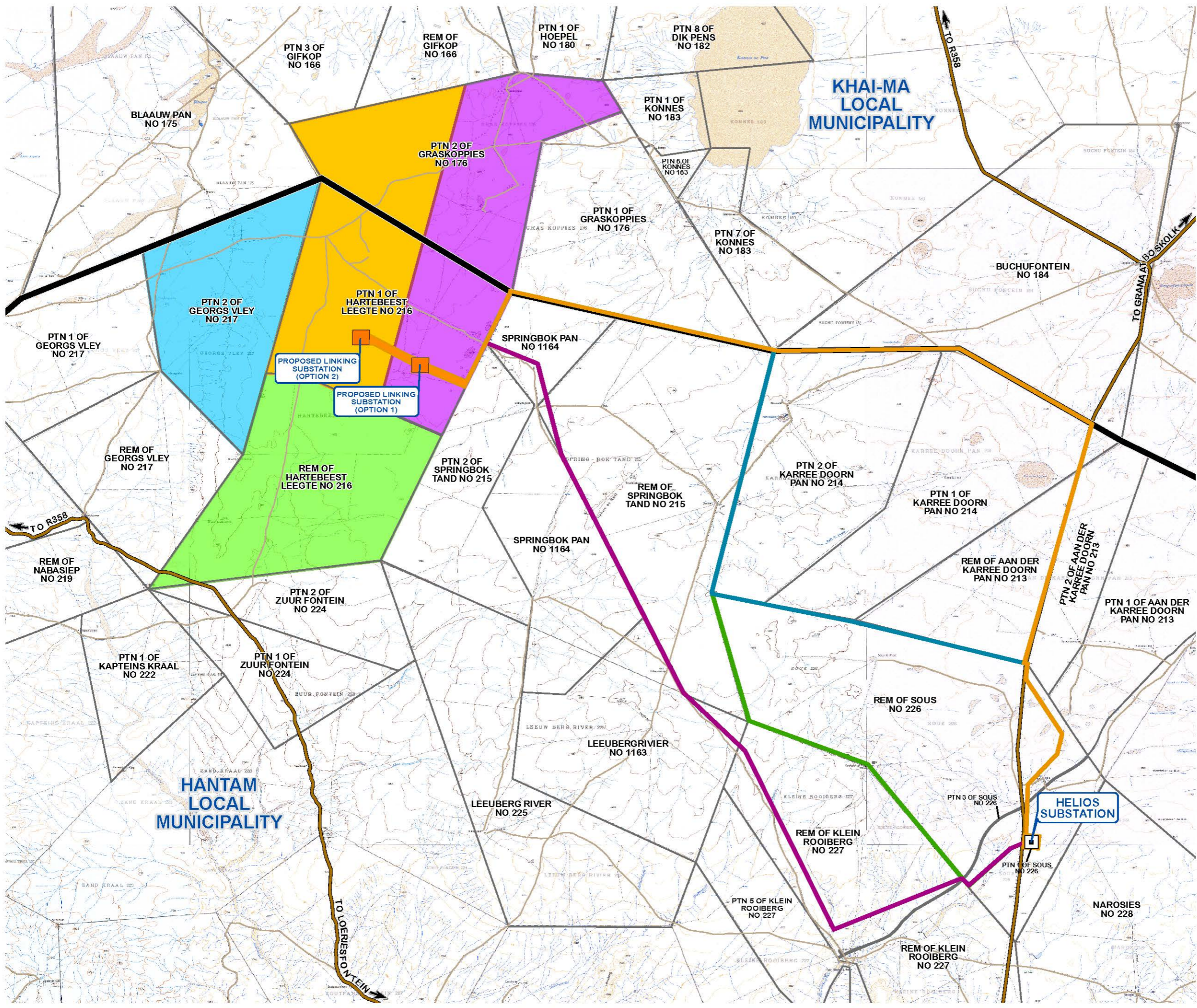


PROPOSED CONSTRUCTION OF FOUR WIND FARMS AND ASSOCIATED GRID CONNECTION
NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE
PROJECT OVERVIEW



- Legend**
- Local Municipal Boundaries
 - Secondary Roads
 - Local Access Roads
 - Adjoining Farm Boundaries
 - Helios Substation
 - Proposed Linking Substation Site Alternatives

- Proposed Wind Farm Projects**
- Graskoppies Wind Farm
 - Hartebeestleegte Wind Farm
 - Ithemba Wind Farm
 - Xhal Boom Wind Farm

- Proposed Corridor Alternatives**
- Option 1
 - Option 2
 - Option 3
 - Option 4

SOURCE: MUNICIPAL DEMARCATION BOARD, 2011
 NGI, 2014

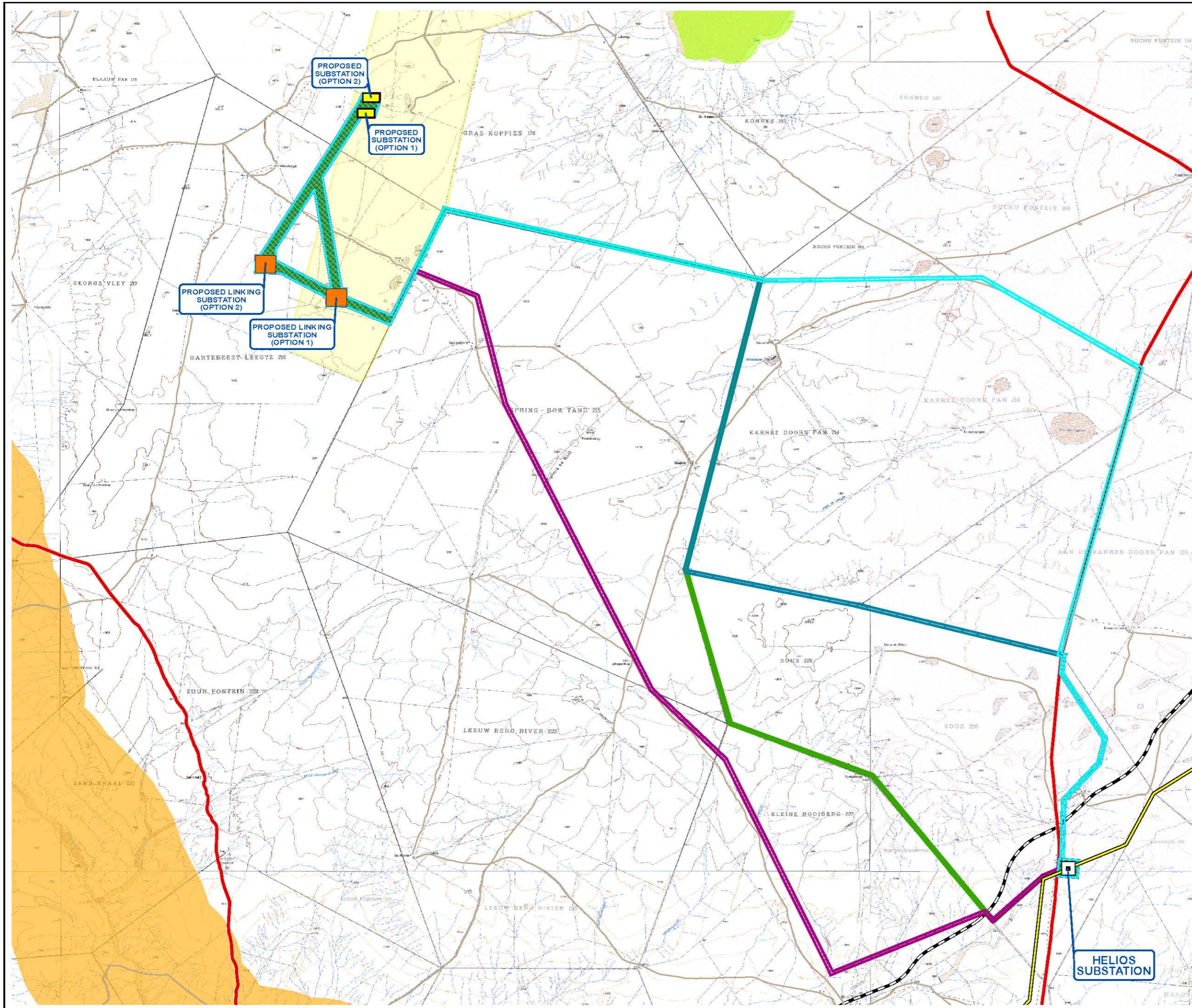
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PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE
CRITICAL BIODIVERSITY AREAS (TERRESTRIAL)



Legend

- Secondary Roads
- Local Access Roads
- Railways
- Existing High Voltage Power Lines (>=132kV)
- Graskoppies Wind Farm Application Site
- Helios Substation
- Proposed Linking Substation Site Alternatives
- Proposed Graskoppies Substation Site Alternatives

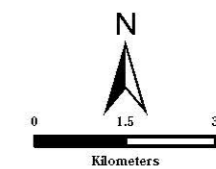
Proposed Corridor Alternatives

- Option 1
- Option 2
- Option 3
- Option 4

Critical Biodiversity Areas

- CBA2
- ESA

SOURCE:
 NGI, 2014
 SANBI, 2012
 NAMAKWA DISTRICT BIODIVERSITY SECTOR PLAN, 2008



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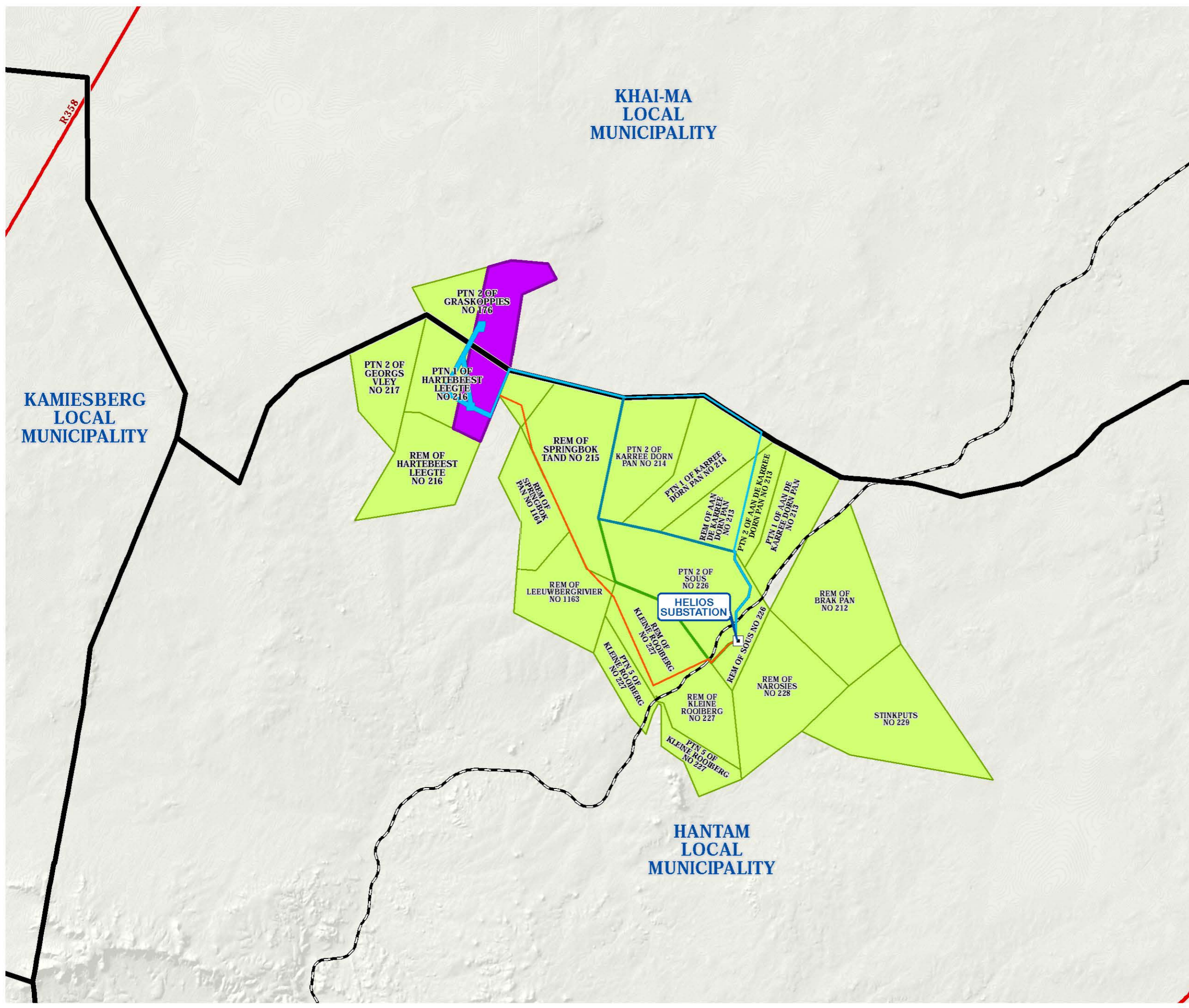
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PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE
OTHER PROPOSED RENEWABLE ENERGY DEVELOPMENTS



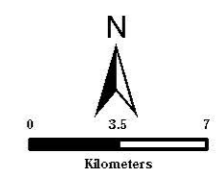
- Legend**
- Local Municipal Boundaries
 - Main Arterial Routes
 - Railways
 - Helios Substation
 - Graskoppies Wind Farm Application Site
 - Other Renewable Energy Application Sites
- Proposed Corridor Alternatives**
- Option 1
 - Option 2
 - Option 3
 - Option 4

KAMIESBERG LOCAL MUNICIPALITY

KHAI-MA LOCAL MUNICIPALITY

HANTAM LOCAL MUNICIPALITY

SOURCE: MUNICIPAL DEMARCATION BOARD, 2011
 NGI, 2014



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PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

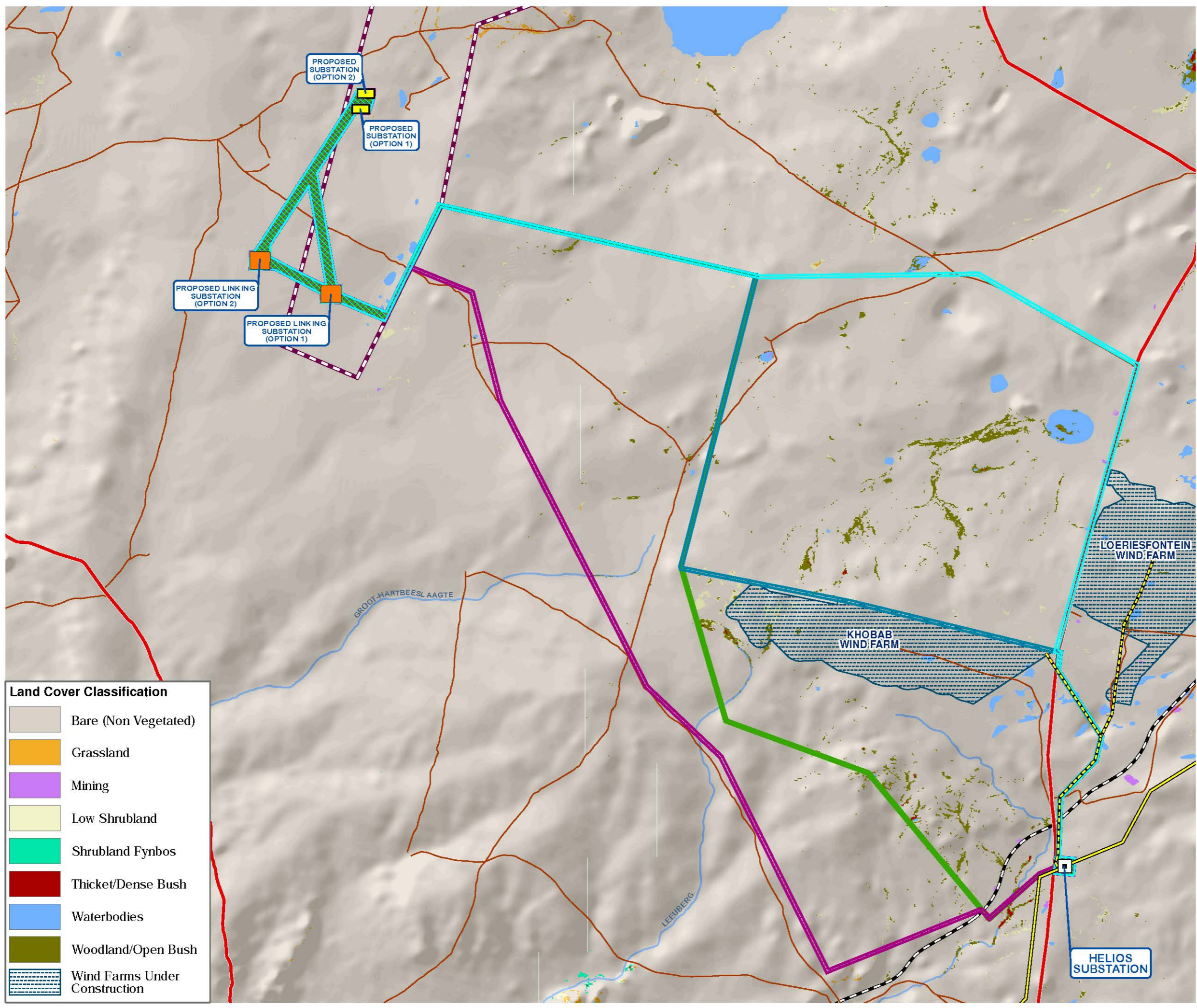
BROAD LAND COVER CLASSIFICATION

Legend

-  Secondary Roads
-  Local Access Roads
-  Railways
-  Existing High Voltage Power Lines (>=132kV)
-  Main Watercourses
-  Graskoppies Wind Farm Application Site
-  Helios Substation
-  Proposed Linking Substation Site Alternatives
-  Proposed Graskoppies Substation Site Alternatives

Proposed Corridor Alternatives

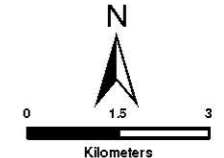
-  Option 1
-  Option 2
-  Option 3
-  Option 4




Land Cover Classification

| | |
|--|-------------------------------|
|  | Bare (Non Vegetated) |
|  | Grassland |
|  | Mining |
|  | Low Shrubland |
|  | Shrubland Fynbos |
|  | Thicket/Dense Bush |
|  | Waterbodies |
|  | Woodland/Open Bush |
|  | Wind Farms Under Construction |

SOURCE: 2013-2014 SA NATIONAL LAND COVER (© GEOTERRAIMAGE - 2014)





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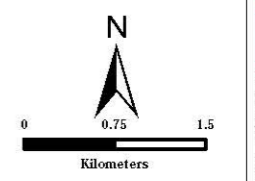
**PROPOSED CONSTRUCTION
OF A 132kV POWER LINE
TO SERVE PROPOSED
WIND ENERGY FACILITIES
GRASKOPPIES WIND FARM
NEAR LOERIESFONTEIN,
NORTHERN CAPE PROVINCE**

**SENSITIVITY OVERLAY:
PREFERRED ALTERNATIVE
(NORTH-EASTERN SECTION)**

- Legend**
-  Secondary Roads
 -  Local Access Roads
 - Preferred Corridor Alternative**
 -  Option 4
 - Environmental Sensitivity**
 -  Avifaunal Sensitivity
 -  Palaeontology Sensitivity: High*
 -  Wetlands/Major Drainage Lines
 -  Drainage Lines
 -  Surface Water Buffers

* Prince Albert Formation

SOURCE:
GOOGLE EARTH, 2016



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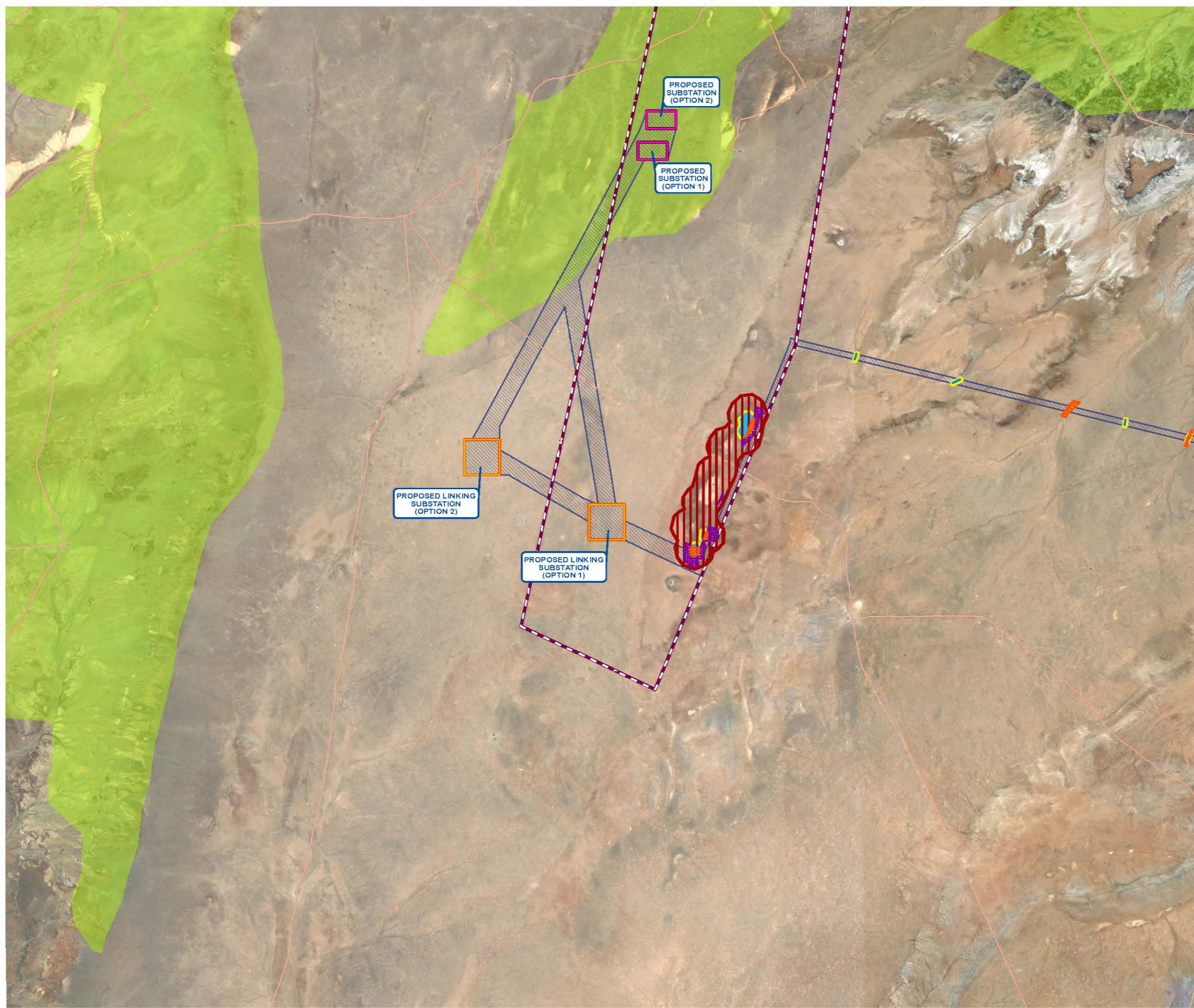
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**PROPOSED CONSTRUCTION
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TO SERVE PROPOSED
WIND ENERGY FACILITIES
GRASKOPPIES WIND FARM
NEAR LOERIESFONTEIN,
NORTHERN CAPE PROVINCE**

**SENSITIVITY OVERLAY:
PREFERRED ALTERNATIVE
(NORTH-WESTERN SECTION)**



Legend

- Local Access Roads
- Graskoppies Wind Farm Application Site
- Proposed Linking Substation Site Alternatives
- Proposed Graskoppies Substation Site Alternatives

Preferred Corridor Alternative

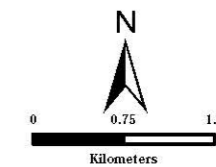
- Option 4

Environmental Sensitivity

- Avifaunal Sensitivity
- Ecological Sensitivity: High
- Ecological Sensitivity: Medium-High
- Palaeontology Sensitivity: High*
- Wetlands/Major Drainage Lines
- Drainage Lines
- Surface Water Buffers

* PRINCE ALBERT FORMATION

SOURCE:
GOOGLE EARTH, 2016



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**PROPOSED CONSTRUCTION
OF A 132kV POWER LINE
TO SERVE PROPOSED
WIND ENERGY FACILITIES
GRASKOPPIES WIND FARM
NEAR LOERIESFONTEIN,
NORTHERN CAPE PROVINCE**

**SENSITIVITY OVERLAY:
PREFERRED ALTERNATIVE
(SOUTHERN SECTION)**




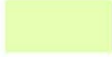



Legend

-  Secondary Roads
-  Local Access Roads
-  Railways
-  Existing High Voltage Power Lines (>=132kV)
-  Helios Substation

Preferred Corridor Alternative


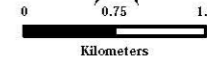

-  Option 4

Environmental Sensitivity

-  Avifaunal Sensitivity
-  Ecological Sensitivity: High
-  Ecological Sensitivity: Medium-High
-  Palaeontology Sensitivity: High*
-  Wetlands/Major Drainage Lines
-  Drainage Lines
-  Surface Water Buffers

* PRINCE ALBERT FORMATION

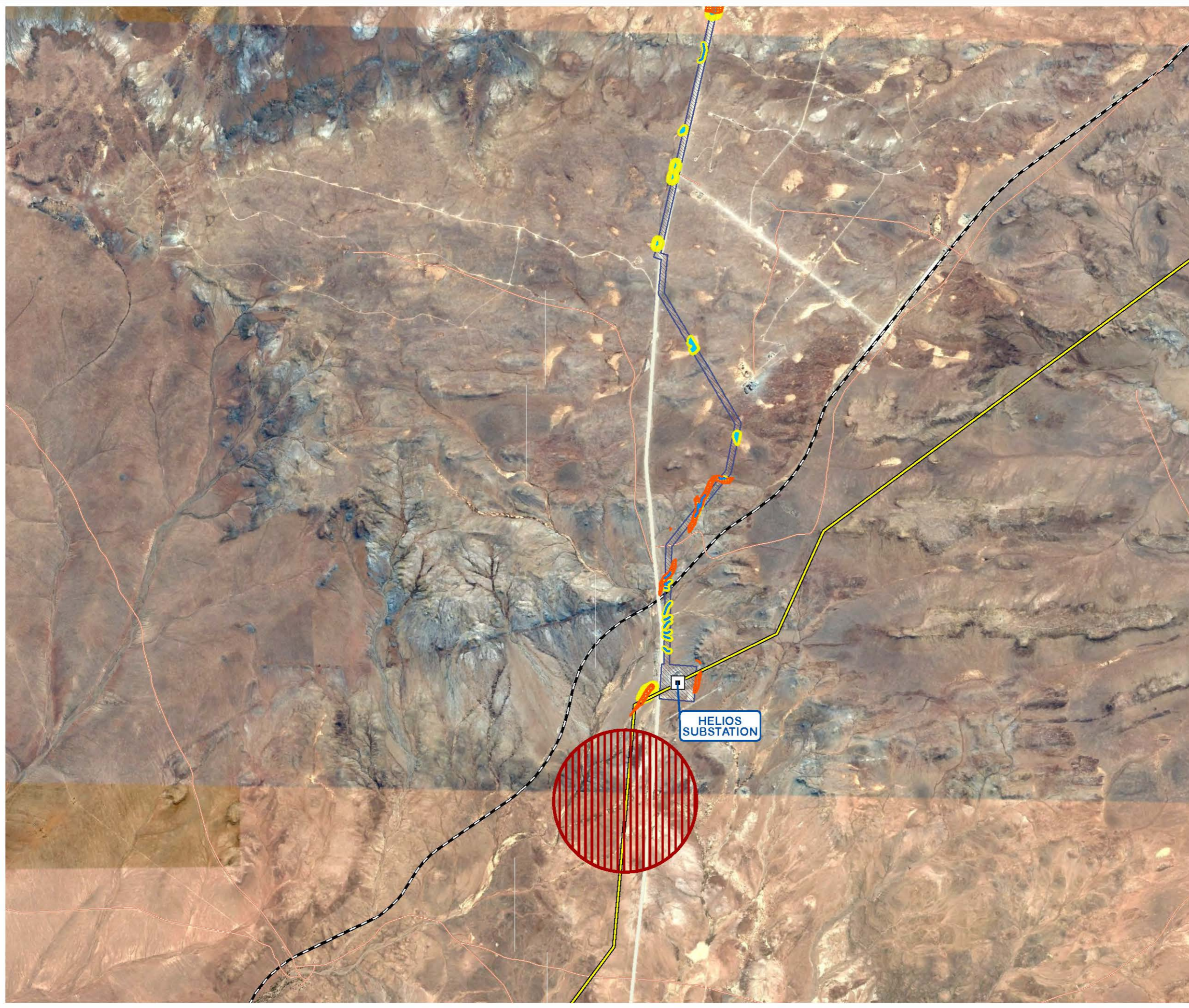
SOURCE:
GOOGLE EARTH, 2016

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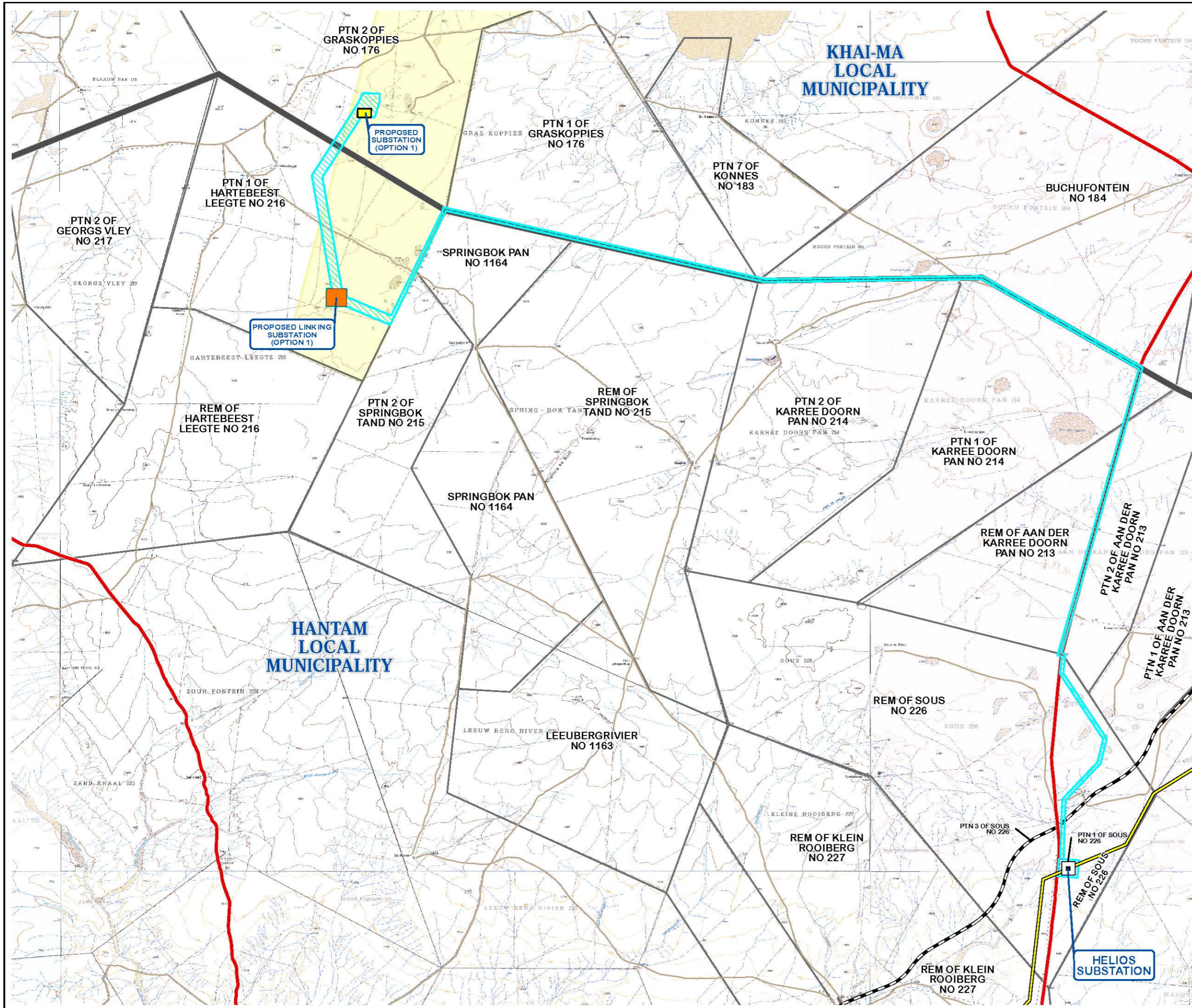
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PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE
PREFERRED ALTERNATIVE



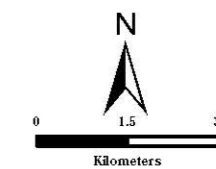
Legend

- Local Municipal Boundaries
- Secondary Roads
- Local Access Roads
- Railways
- Existing High Voltage Power Lines (>=132kV)
- Adjoining Farm Boundaries
- Graskoppies Wind Farm Application Site
- Helios Substation
- Preferred Linking Substation Site Alternative
- Preferred Graskoppies Substation Site Alternative

Preferred Corridor Alternative

- Option 4

SOURCE: MUNICIPAL DEMARCATION BOARD, 2011
 NGI, 2014

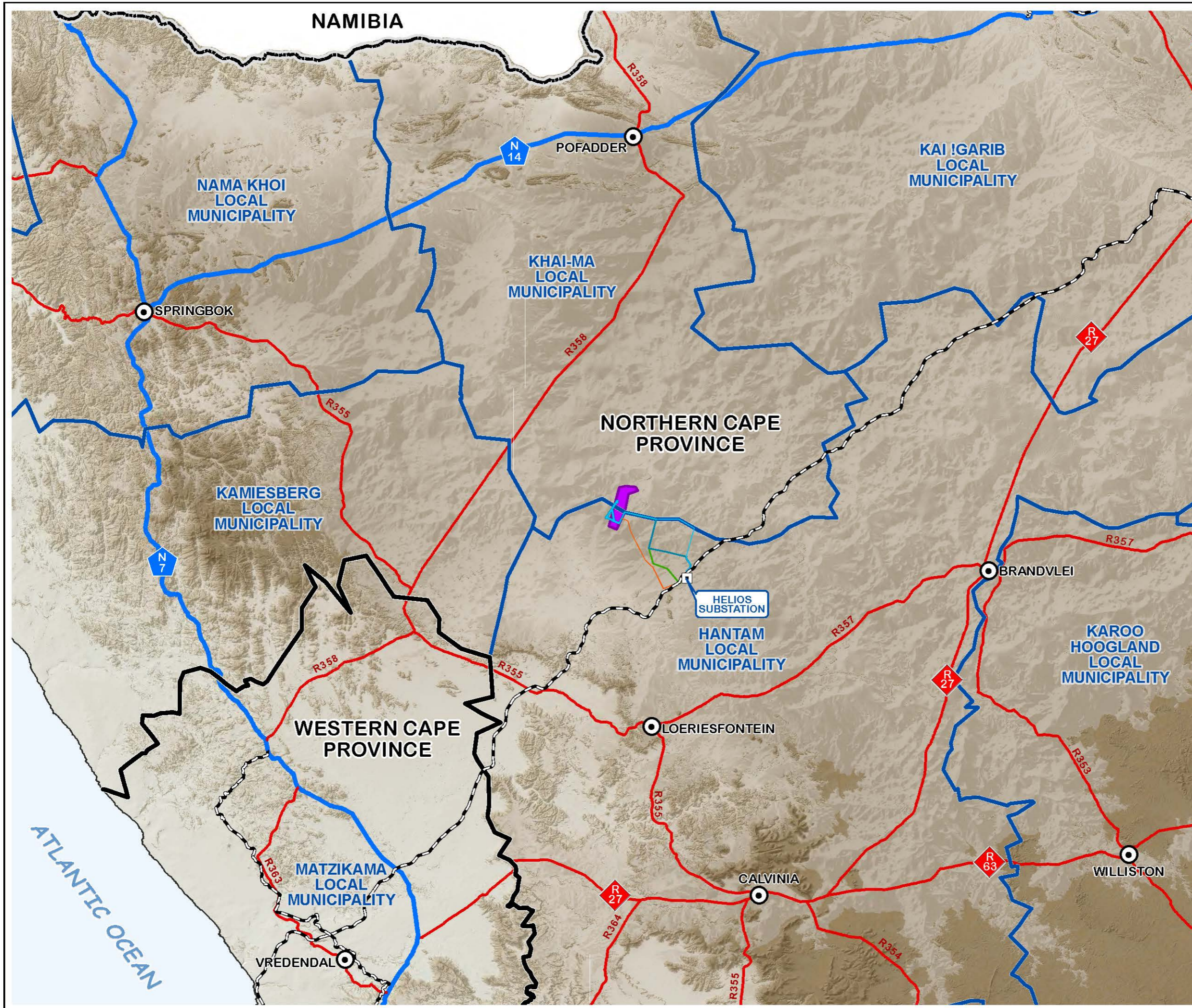


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PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE
REGIONAL CONTEXT

- Legend**
- National Boundary
 - Provincial Boundaries
 - Local Municipal Boundaries
 - National Routes
 - Main Arterial Routes
 - Railways
 - ⊙ Main Towns
 - Graskoppies Wind Farm Application Site
- Proposed Corridor Alternatives**
- Option 1
 - Option 2
 - Option 3
 - Option 4

SOURCE: MUNICIPAL DEMARCATION BOARD, 2011
 NGI, 2014

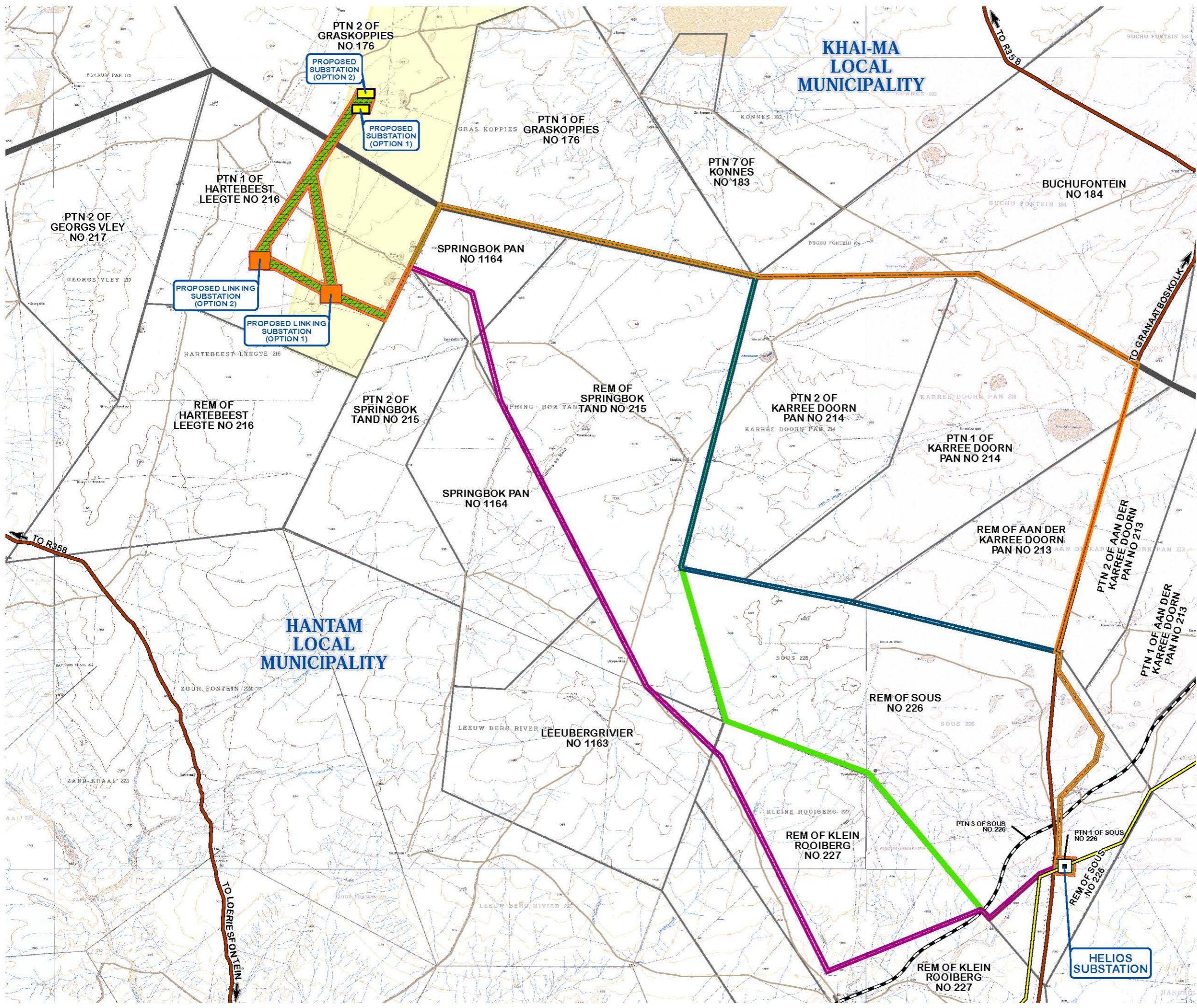
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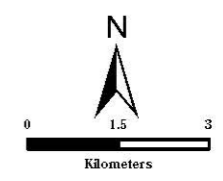
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PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE
ROUTE OVERVIEW



- Legend**
- Local Municipal Boundaries
 - Secondary Roads
 - Local Access Roads
 - Railways
 - Existing High Voltage Power Lines (>=132kV)
 - Adjoining Farm Boundaries
 - Graskoppies Wind Farm Application Site
 - Helios Substation
 - Proposed Linking Substation Site Alternatives
 - Proposed Graskoppies Substation Site Alternatives
- Proposed Corridor Alternatives**
- Option 1
 - Option 2
 - Option 3
 - Option 4

SOURCE: MUNICIPAL DEMARCATION BOARD, 2011
 NGI, 2014

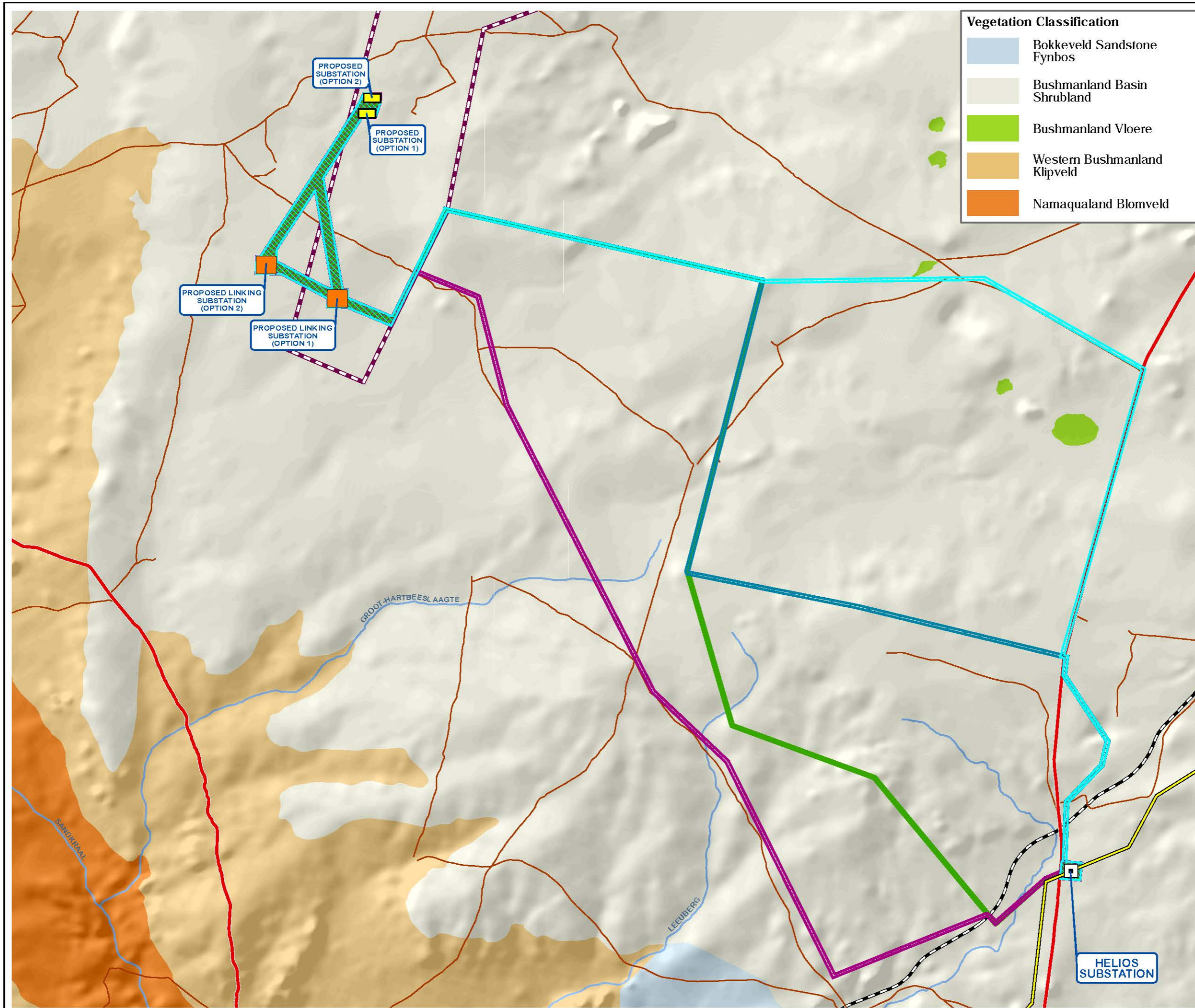


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Vegetation Classification

- Bokkeveld Sandstone Fynbos
- Bushmanland Basin Shrubland
- Bushmanland Vloere
- Western Bushmanland Klipveld
- Namaqualand Blomveld

PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

VEGETATION CLASSIFICATION

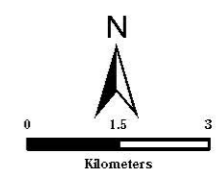
Legend

- Secondary Roads
- Local Access Roads
- Railways
- Existing High Voltage Power Lines (>=132kV)
- Main Watercourses
- Graskoppies Wind Farm Application Site
- Helios Substation
- Proposed Linking Substation Site Alternatives
- Proposed Graskoppies Substation Site Alternatives

Proposed Corridor Alternatives

- Option 1
- Option 2
- Option 3
- Option 4

SOURCE:
NGI, 2014
SANBI, 2012



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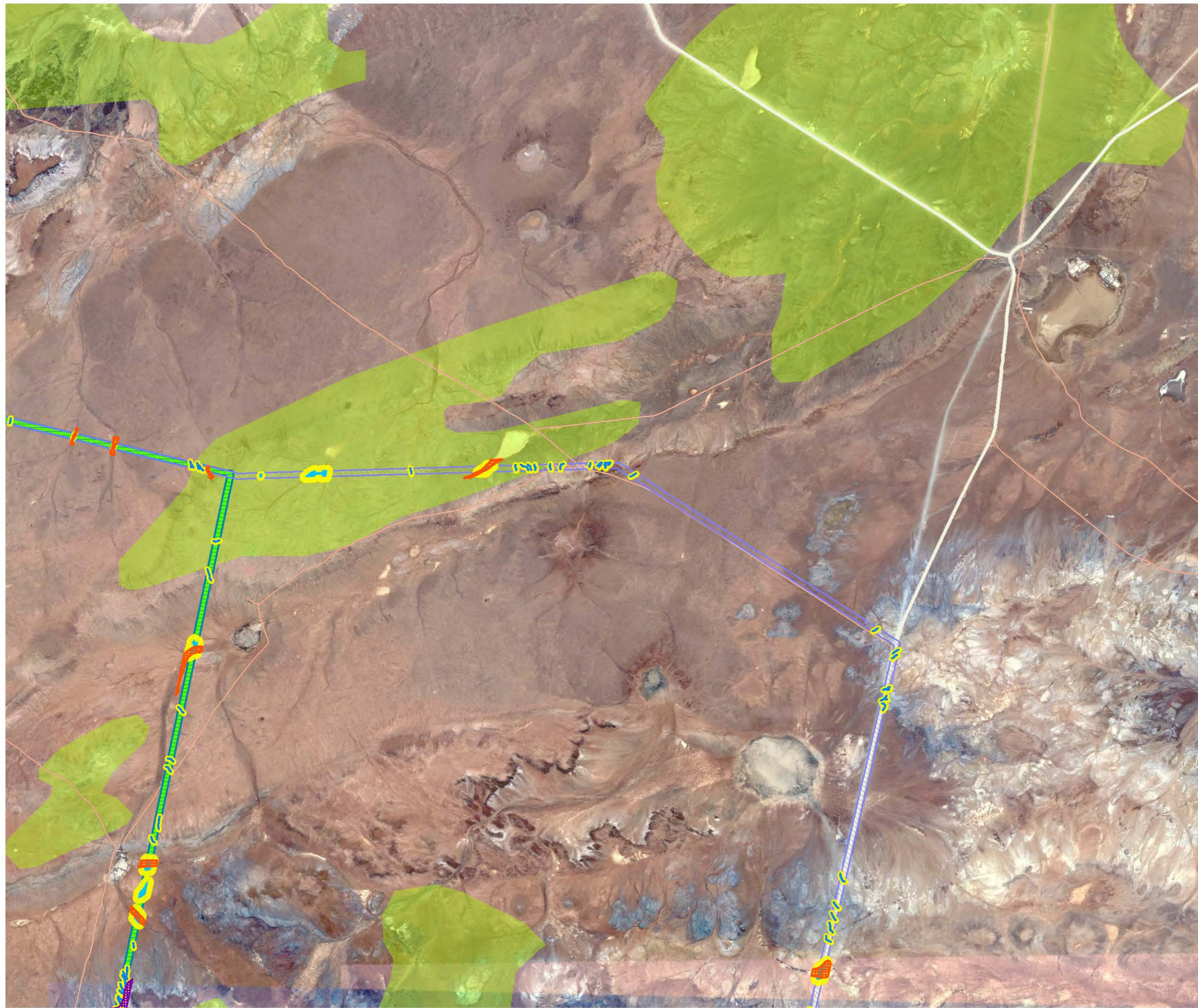
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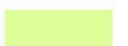



HELIOS SUBSTATION

**PROPOSED CONSTRUCTION
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GRASKOPPIES WIND FARM
NEAR LOERIESFONTEIN,
NORTHERN CAPE PROVINCE**

**ENVIRONMENTAL SENSITIVITY
(NORTH-EASTERN SECTION)**

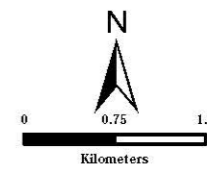


Legend

-  Secondary Roads
-  Local Access Roads
- Proposed Corridor Alternatives**
-  Option 1
-  Option 2
-  Option 3
-  Option 4
- Environmental Sensitivity**
-  Avifaunal Sensitivity
-  Ecological Sensitivity: High
-  Ecological Sensitivity: Medium-High
-  Palaeontology Sensitivity: High*
-  Wetlands/Major Drainage Lines
-  Drainage Lines
-  Surface Water Buffers

* PRINCE ALBERT FORMATION

SOURCE:
GOOGLE EARTH, 2016



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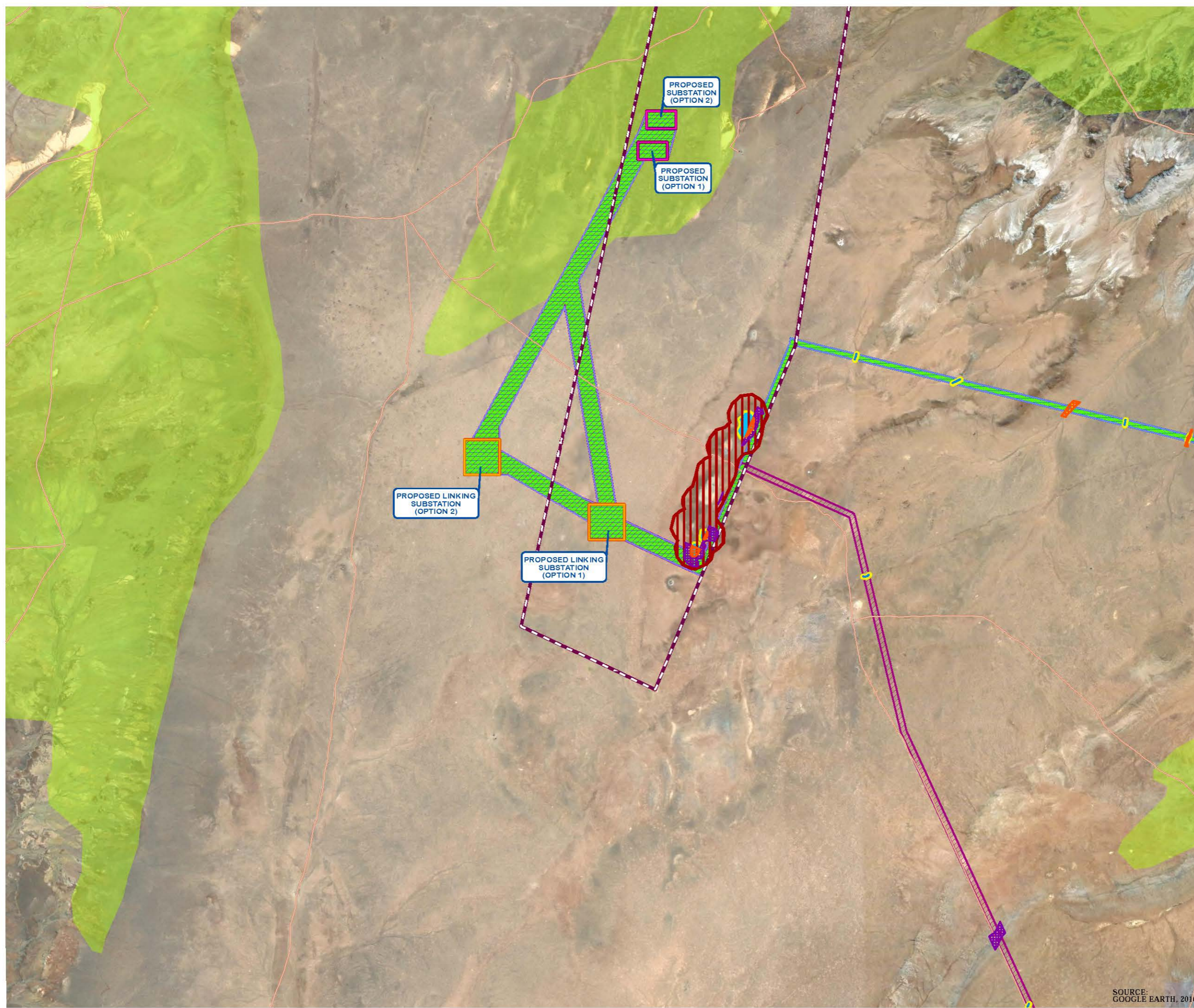
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TO SERVE PROPOSED
WIND ENERGY FACILITIES
GRASKOPPIES WIND FARM
NEAR LOERIESFONTEIN,
NORTHERN CAPE PROVINCE**

**ENVIRONMENTAL SENSITIVITY
(NORTH-WESTERN SECTION)**



Legend

- Local Access Roads
- Graskoppies Wind Farm Application Site
- Proposed Linking Substation Site Alternatives
- Proposed Graskoppies Substation Site Alternatives

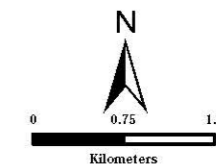
Proposed Corridor Alternatives

- Option 1
- Option 2
- Option 3
- Option 4

Environmental Sensitivity

- Avifaunal Sensitivity
- Ecological Sensitivity: High
- Ecological Sensitivity: Medium-High
- Palaeontology Sensitivity: High*
- Wetlands/Major Drainage Lines
- Drainage Lines
- Surface Water Buffers

* PRINCE ALBERT FORMATION



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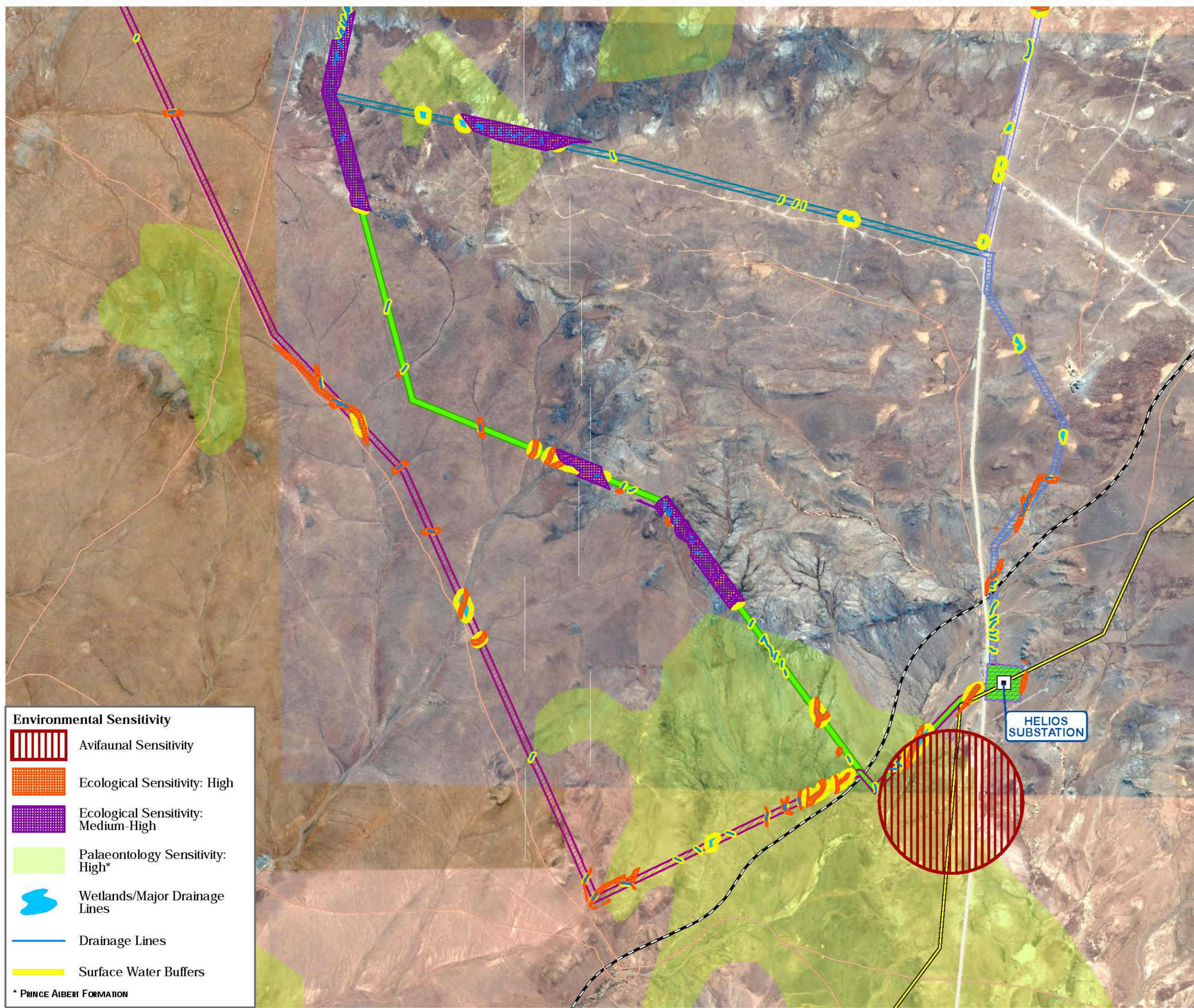
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SOURCE:
GOOGLE EARTH, 2016

PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE ENVIRONMENTAL SENSITIVITY (SOUTHERN SECTION)



Legend

- Secondary Roads
- Local Access Roads
- Railways
- Existing High Voltage Power Lines (>=132kV)
- Helios Substation
- Proposed Corridor Alternatives**
- Option 1
- Option 2
- Option 3
- Option 4

Environmental Sensitivity

- Avifaunal Sensitivity
- Ecological Sensitivity: High
- Ecological Sensitivity: Medium-High
- Palaeontology Sensitivity: High*
- Wetlands/Major Drainage Lines
- Drainage Lines
- Surface Water Buffers

* PRINCE ALBERT FORMATION

SOURCE: GOOGLE EARTH, 2016

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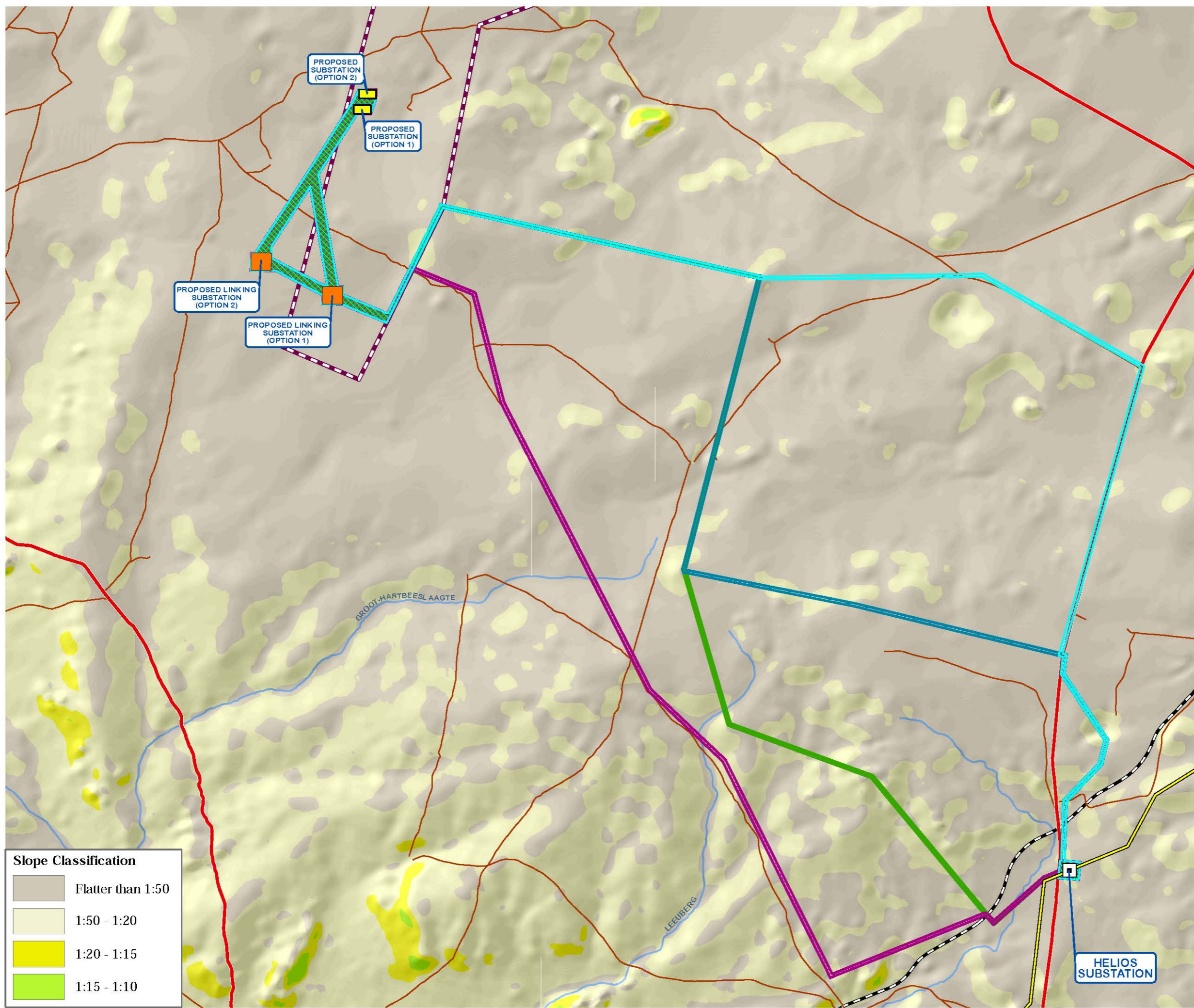
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PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

SLOPE CLASSIFICATION



Legend

- Secondary Roads
- Local Access Roads
- Railways
- Existing High Voltage Power Lines (>=132kV)
- Main Watercourses
- Graskoppies Wind Farm Application Site
- Helios Substation
- Proposed Linking Substation Site Alternatives
- Proposed Graskoppies Substation Site Alternatives

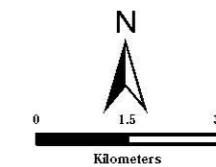
Proposed Corridor Alternatives

- Option 1
- Option 2
- Option 3
- Option 4

Slope Classification

| | |
|--|-------------------|
| | Flatter than 1:50 |
| | 1:50 - 1:20 |
| | 1:20 - 1:15 |
| | 1:15 - 1:10 |

SOURCE: NGI, 2014



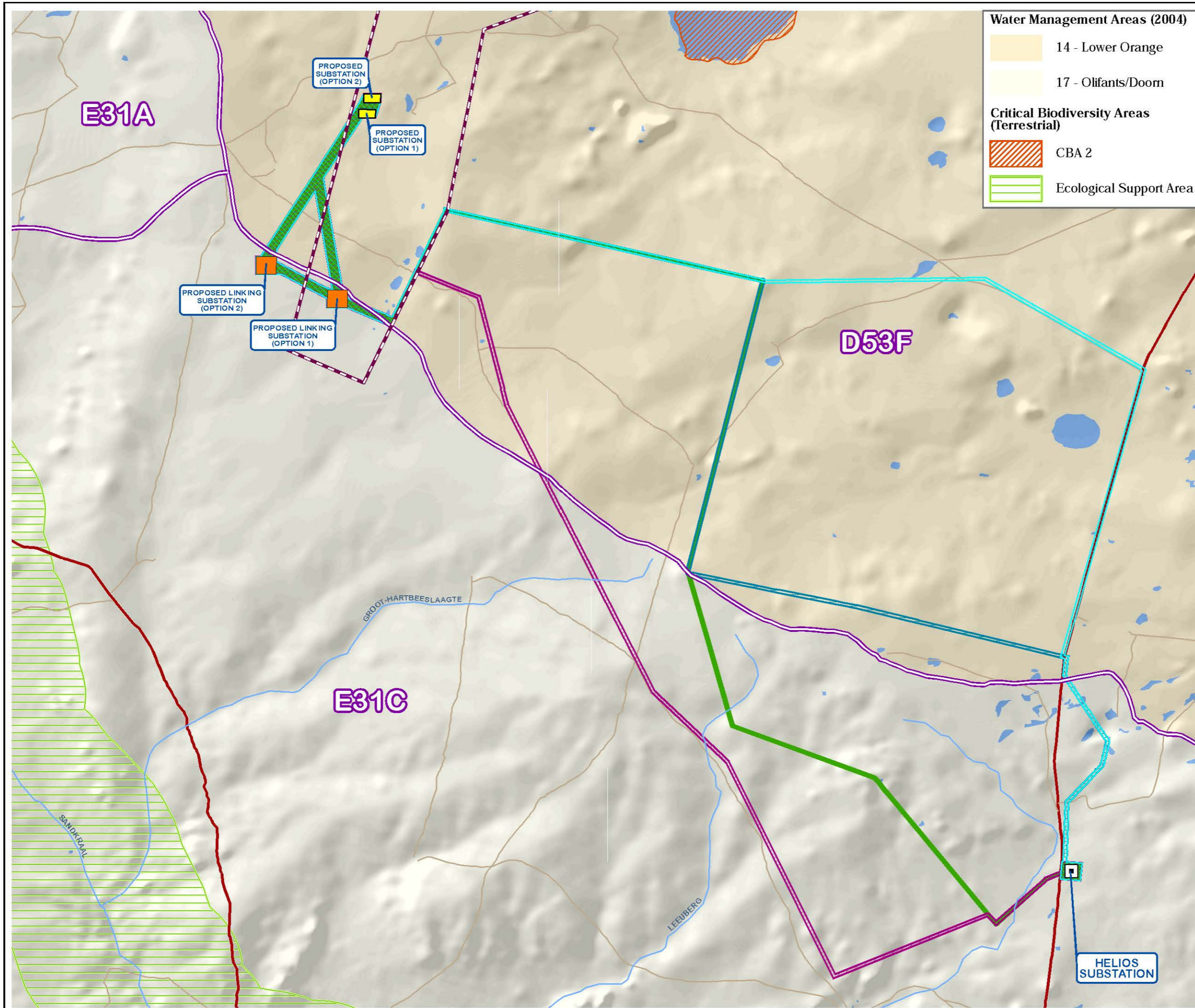
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HELIOS SUBSTATION



Water Management Areas (2004)

- 14 - Lower Orange
- 17 - Olifants/Doom

Critical Biodiversity Areas (Terrestrial)

- CBA 2
- Ecological Support Area

PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

SURFACE WATER ASSESSMENT: DATABASE SURFACE WATER OCCURRENCE

Legend

- Secondary Roads
- Local Access Roads
- Graskoppies Wind Farm Application Site
- Helios Substation
- Proposed Linking Substation Site Alternatives
- Proposed Graskoppies Substation Site Alternatives

Proposed Corridor Alternatives

- Option 1
- Option 2
- Option 3
- Option 4

Surface Water Features

- Quaternary Catchment Boundaries
- Rivers
- Wetlands

SOURCE: DWS, 2004
NFEPA, 2011
NAMAKWA DISTRICT BIODIVERSITY SECTOR PLAN, 2008

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**PROPOSED CONSTRUCTION
OF A 132kV POWER LINE
TO SERVE PROPOSED
WIND ENERGY FACILITIES
GRASKOPPIES WIND FARM
NEAR LOERIESFONTEIN,
NORTHERN CAPE PROVINCE**

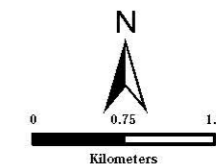
**SURFACE WATER ASSESSMENT:
DELINEATED SURFACE WATER
FEATURES
(NORTH-EASTERN SECTION)**

Legend

-  Secondary Roads
-  Local Access
- Proposed Corridor Alternatives**
-  Option 1
-  Option 2
-  Option 3
-  Option 4
- Surface Water Features**
-  Major Drainage Line
-  Wetland
-  Major Drainage Line/Wetland Buffers*
-  Drainage Lines
-  Drainage Line Buffers (50m)

*Major Drainage Line Buffer: 100m
Wetland Buffer: 50m

SOURCE:
GOOGLE EARTH, 2016

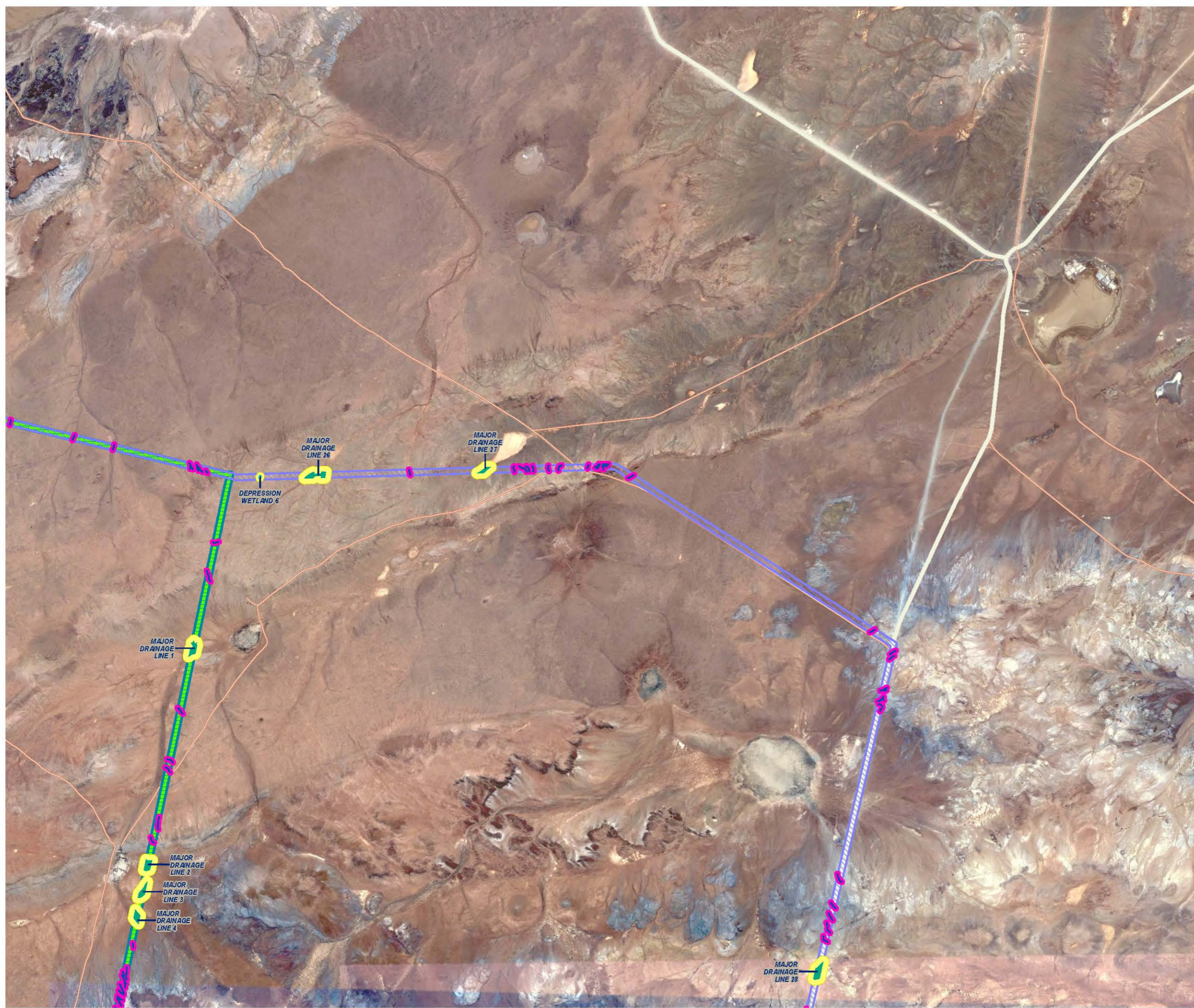


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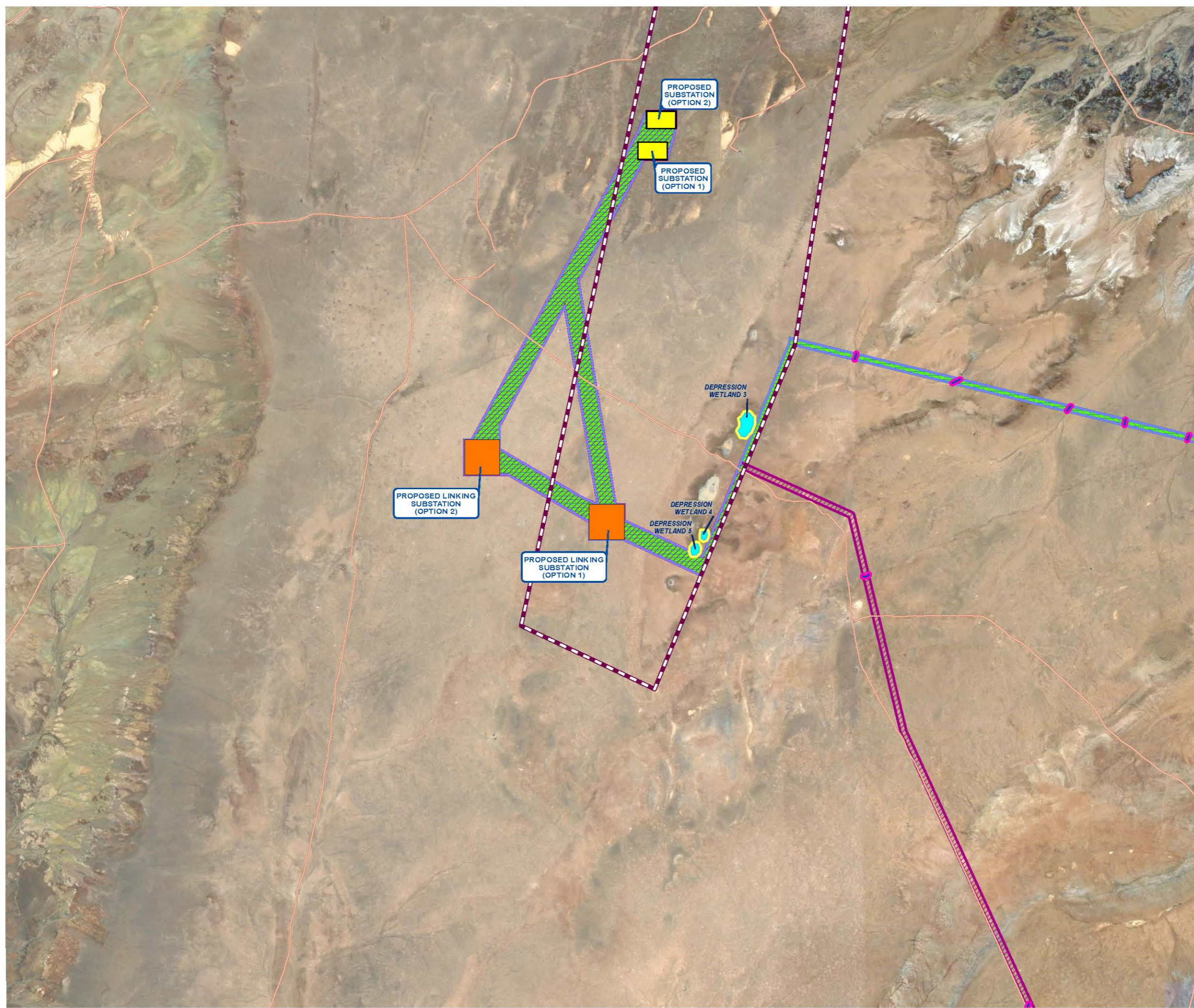
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SURFACE WATER ASSESSMENT: DELINEATED SURFACE WATER FEATURES (NORTH-WESTERN SECTION)

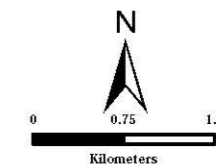


Legend

- Local Access Roads
- Graskoppies Wind Farm Application Site
- Proposed Linking Substation Site Alternatives
- Proposed Graskoppies Substation Site Alternatives
- Proposed Corridor Alternatives**
- Option 1
- Option 2
- Option 3
- Option 4
- Surface Water Features**
- Major Drainage Line
- Wetland
- Major Drainage Line/Wetland Buffers*
- Drainage Lines
- Drainage Line Buffers (50m)

*Major Drainage Line Buffer: 100m
Wetland Buffer: 50m

SOURCE: GOOGLE EARTH, 2016



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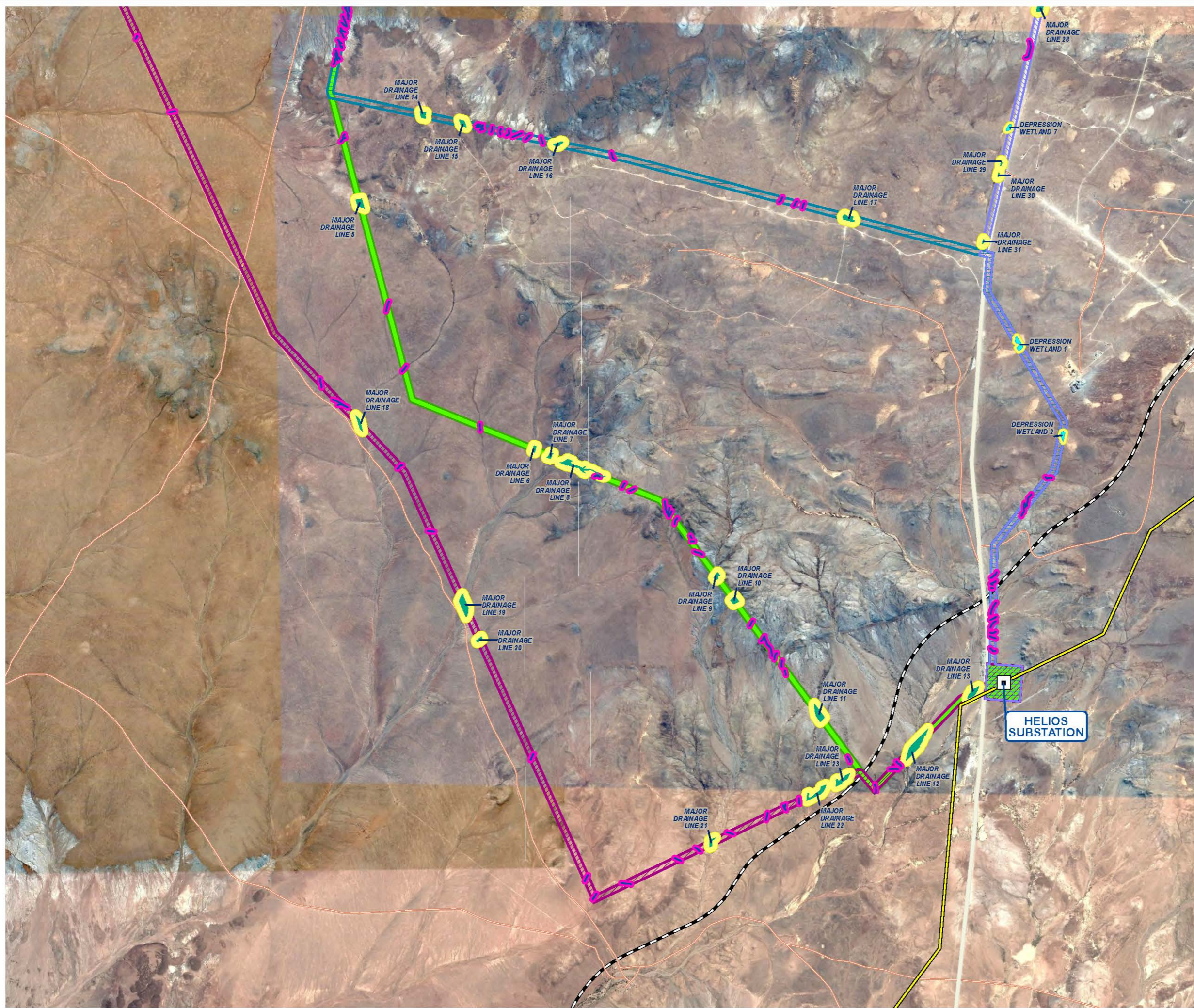
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SURFACE WATER ASSESSMENT: DELINEATED SURFACE WATER FEATURES (SOUTHERN SECTION)

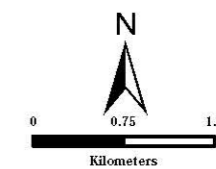


Legend

- Secondary Roads
- Local Access
- Railways
- Existing High Voltage Power Lines (>=132kV)
- Helios Substation
- Proposed Corridor Alternatives**
- Option 1
- Option 2
- Option 3
- Option 4
- Surface Water Features**
- Major Drainage Line
- Wetland
- Major Drainage Line/Wetland Buffers*
- Drainage Lines
- Drainage Line Buffers (50m)

*Major Drainage Line Buffer: 100m
Wetland Buffer: 50m

SOURCE: GOOGLE EARTH, 2016



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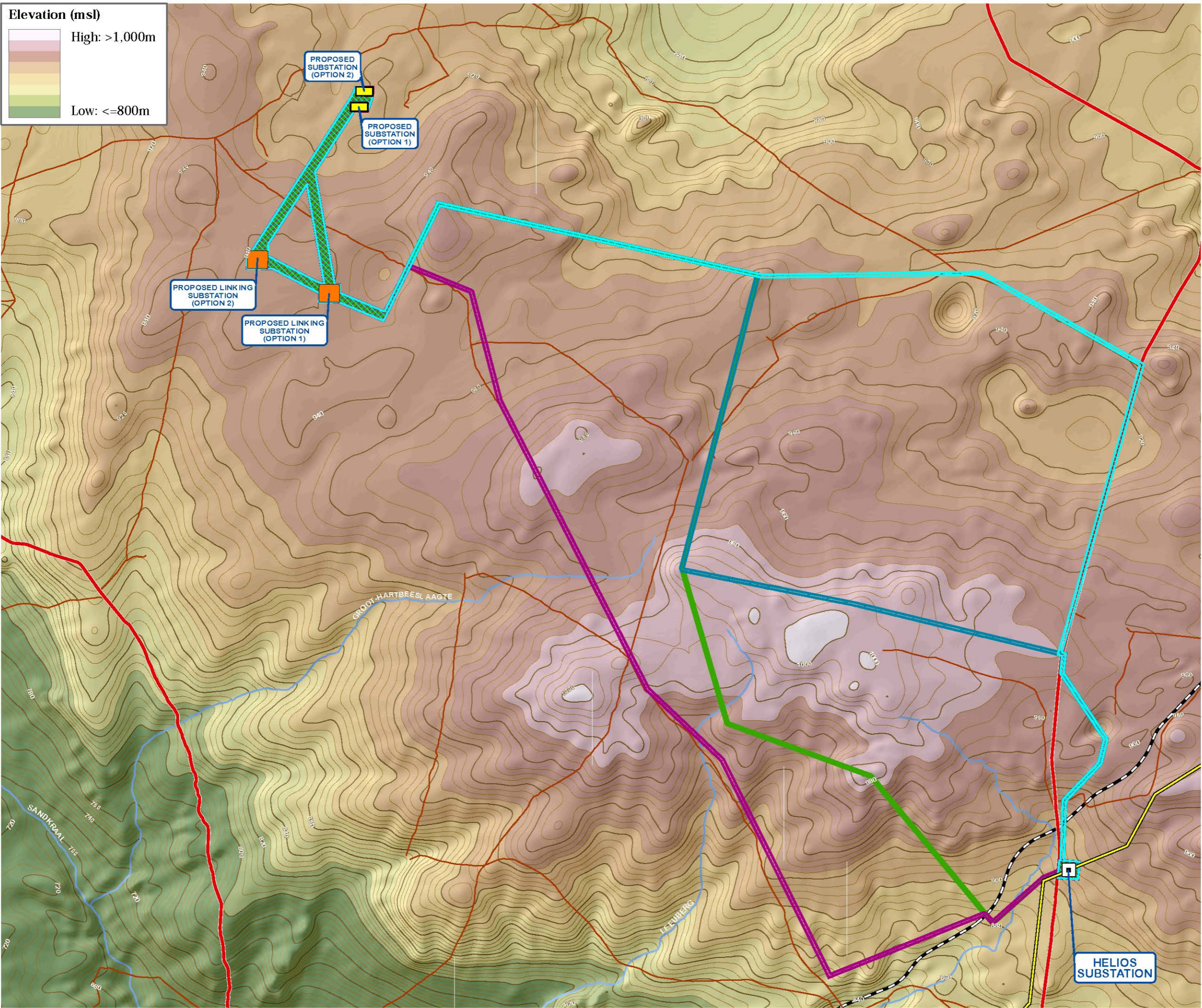
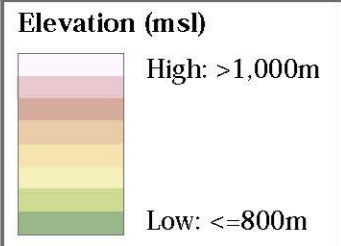
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TOPOGRAPHY

- Legend**
- Secondary Roads
 - Local Access Roads
 - Railways
 - Existing High Voltage Power Lines (>=132kV)
 - Main Watercourses
 - Contours (20m Interval)
 - Contours (5m Interval)
 - Helios Substation
 - Proposed Linking Substation Site Alternatives
 - Proposed Graskoppies Substation Site Alternatives
- Proposed Corridor Alternatives**
- Option 1
 - Option 2
 - Option 3
 - Option 4

SOURCE: MUNICIPAL DEMARCATION BOARD, 2011
NGI, 2014

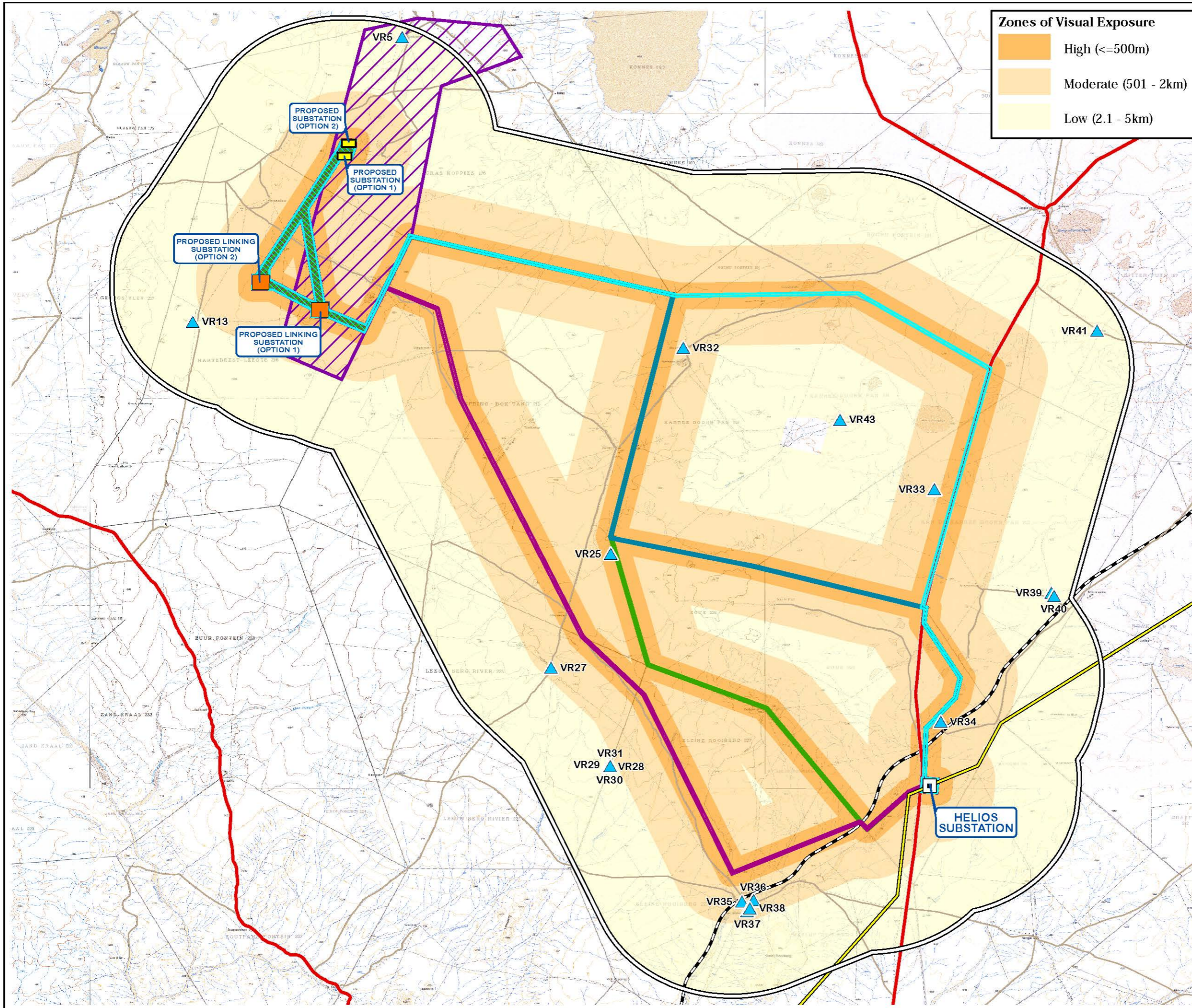
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Zones of Visual Exposure

- High (<=500m)
- Moderate (501 - 2km)
- Low (2.1 - 5km)

PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES GRASKOPPIES WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE

VISUAL ASSESSMENT: POTENTIALLY SENSITIVE VISUAL RECEPTOR LOCATIONS

Legend

- Secondary Roads
- Local Access
- Railways
- Existing High Voltage Power Lines (>=132kV)
- Graskoppies Wind Farm Application Site
- Helios Substation
- Proposed Linking Substation Site Alternatives
- Proposed Graskoppies Substation Site Alternatives
- 5km Visual Assessment Zone
- Potentially Sensitive Receptor Locations

Proposed Corridor Alternatives

- Option 1
- Option 2
- Option 3
- Option 4

SOURCE: NGI, 2014

N

0 1.5 3

Kilometers

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