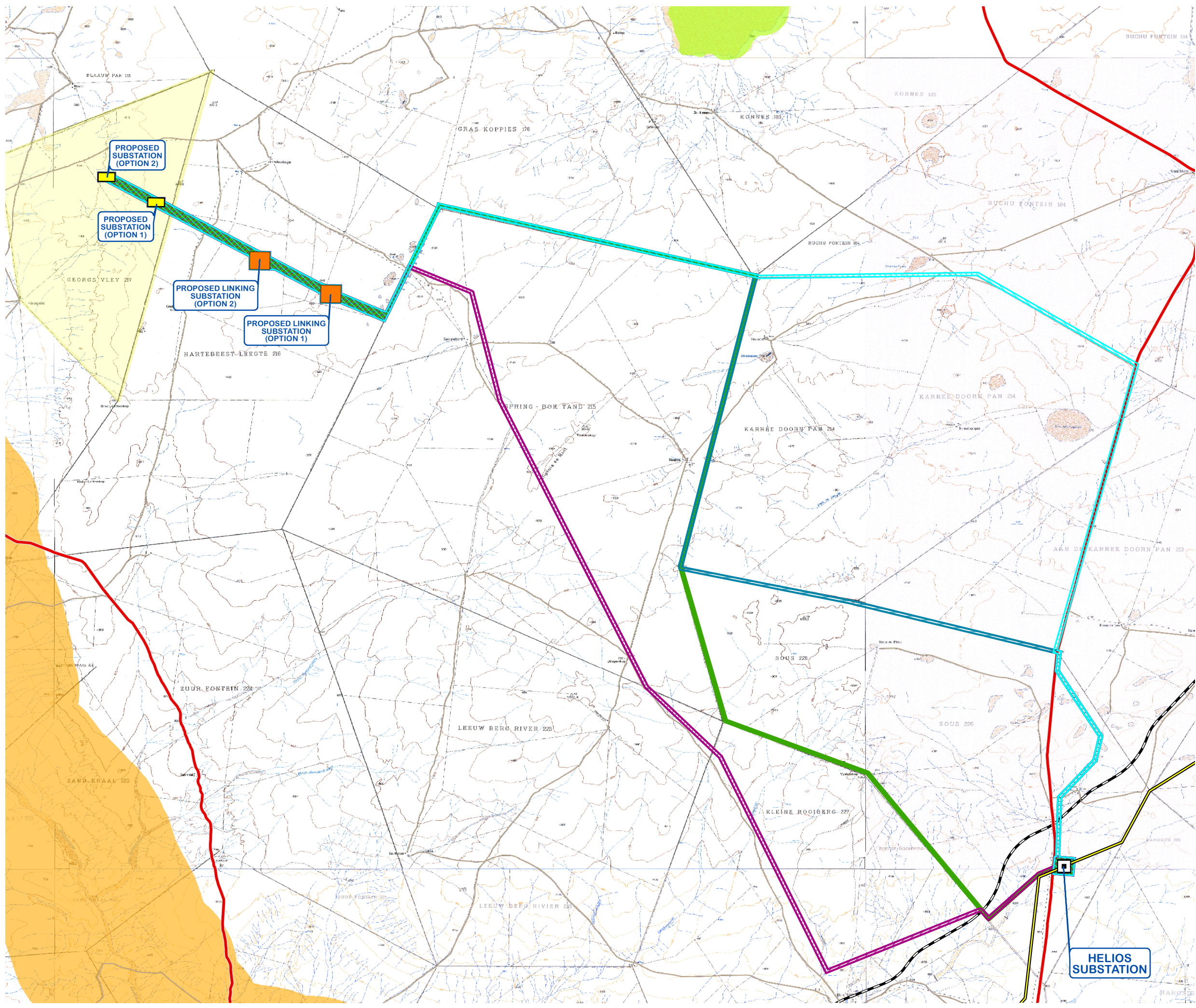
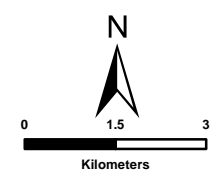


**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES**  
**XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**  
**CRITICAL BIODIVERSITY AREAS (TERRESTRIAL)**



- Legend**
- Secondary Roads
  - Local Access Roads
  - Railways
  - Existing High Voltage Power Lines ( $\geq 132kV$ )
  - Xha! Boom Wind Farm Application Site
  - Helios Substation
  - Proposed Linking Substation Site Alternatives
  - Proposed Xha! Boom 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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**HELIOS SUBSTATION**





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

**BROAD LAND COVER  
CLASSIFICATION**

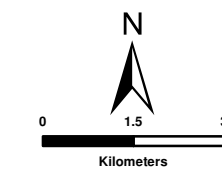
**Legend**

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

**Proposed Corridor Alternatives**

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

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

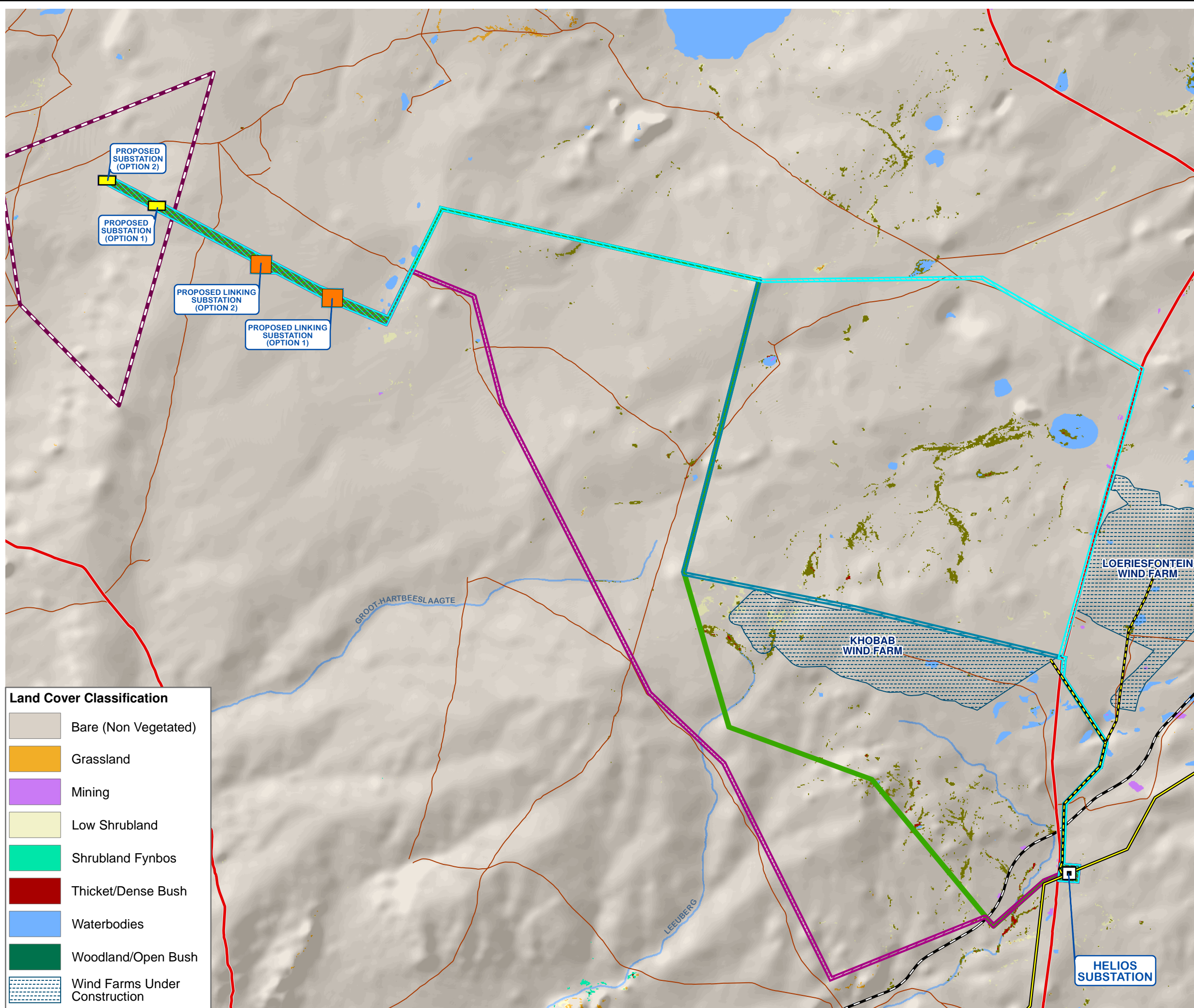


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**Land Cover Classification**

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

**HELIOS  
SUBSTATION**

GROOT-HARTBEESLAAGTE

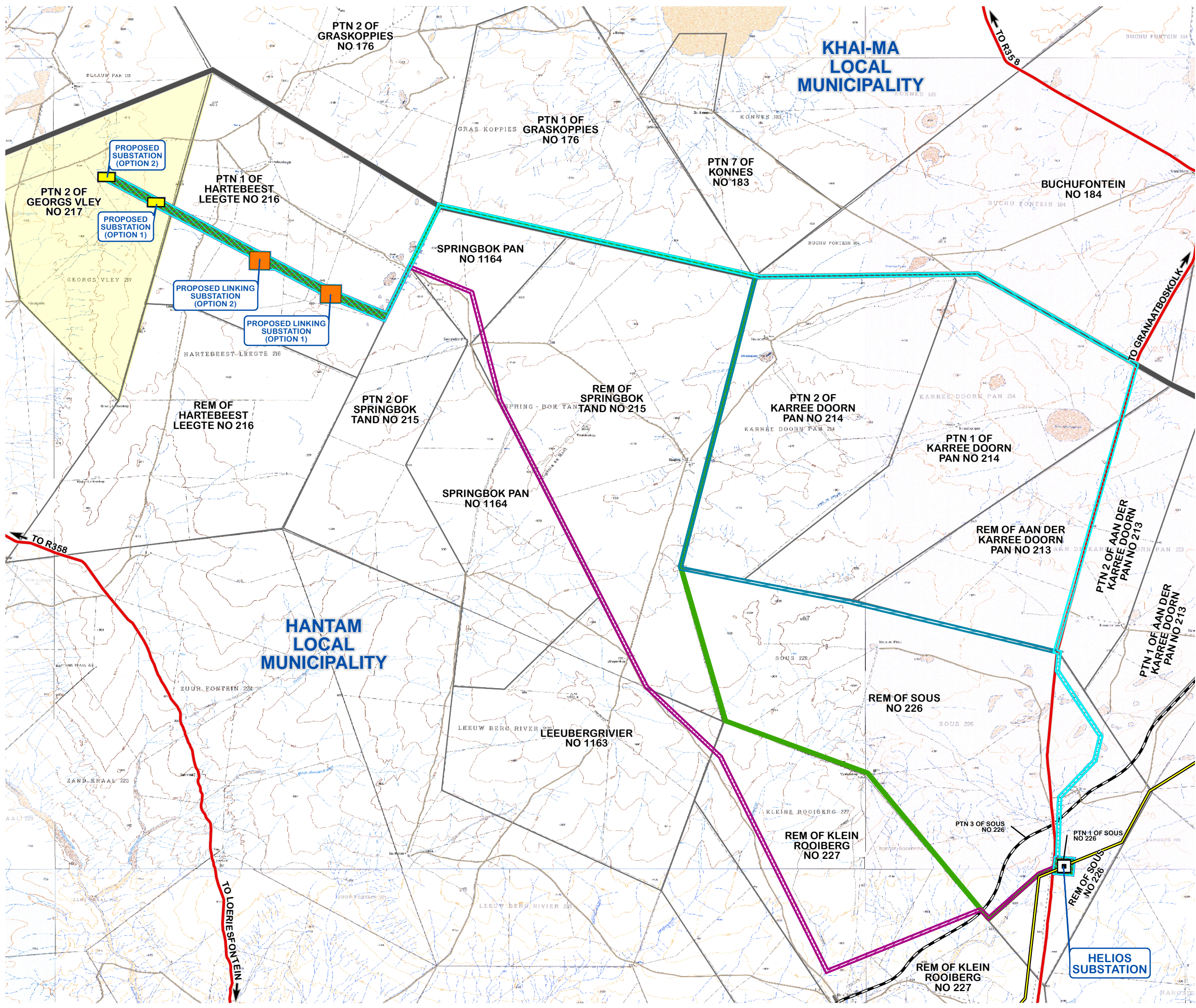
LEEUBERG

**KHOBAB  
WIND FARM**

**LOERIESFONTEIN  
WIND FARM**

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

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



SOURCE: MUNICIPAL DEMARCATION BOARD, 2011  
 NGI, 2014

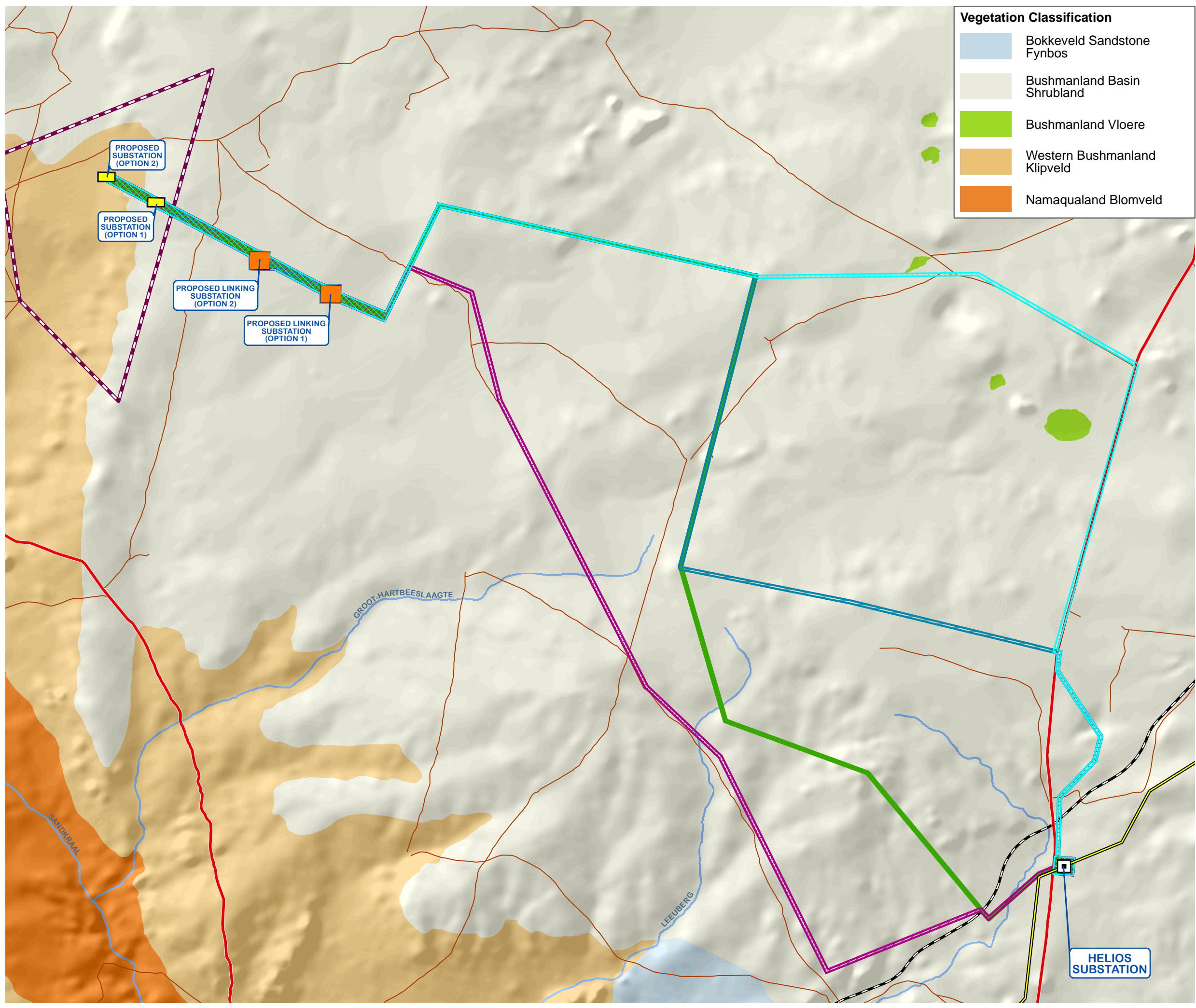
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**Vegetation Classification**

- 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 XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**

**VEGETATION CLASSIFICATION**

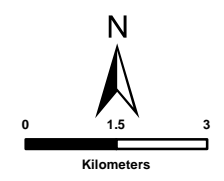
**Legend**

- Secondary Roads
- Local Access Roads
- Railways
- Existing High Voltage Power Lines ( $\geq 132kV$ )
- Main Watercourses
- Xha! Boom Wind Farm Application Site
- Helios Substation
- Proposed Linking Substation Site Alternatives
- Proposed Xha! Boom Substation Site Alternatives

**Proposed Corridor Alternatives**

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

SOURCE:  
NGI, 2014  
SANBI, 2012



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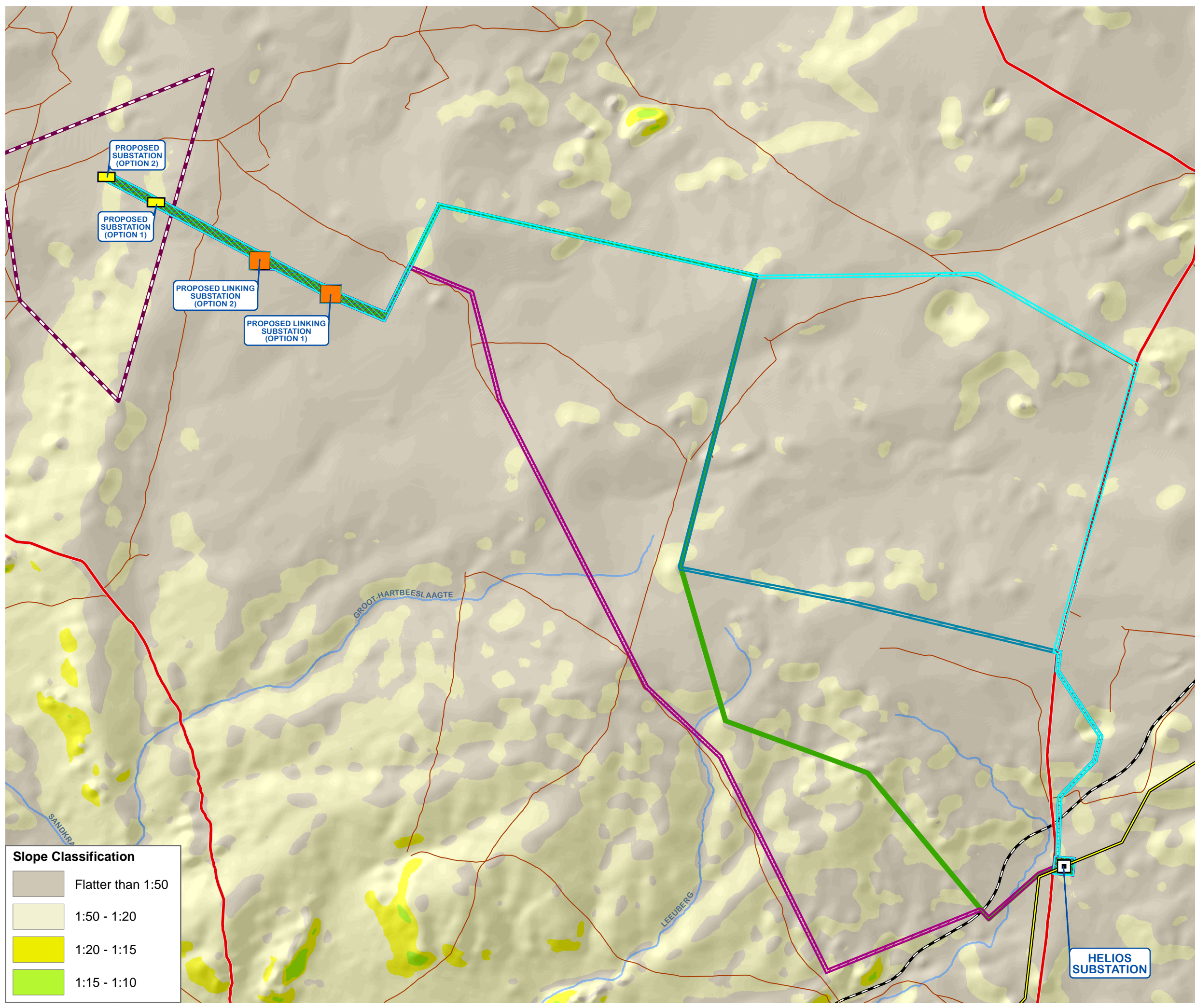
Project No 13622	Prepared By KLS	Date 09/12/2016
Map Ref No 13622/BA_X05	Revision 1	Date 23/05/2017

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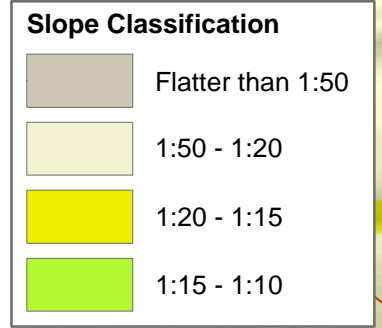
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**HELIOS SUBSTATION**

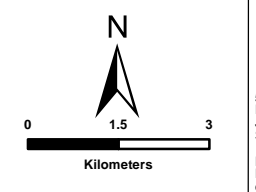
**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES**  
**XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**  
**SLOPE CLASSIFICATION**



- Legend**
- Secondary Roads
  - Local Access Roads
  - - - Railways
  - Existing High Voltage Power Lines (>=132kV)
  - Main Watercourses
  - Xha! Boom Wind Farm Application Site
  - Helios Substation
  - Proposed Linking Substation Site Alternatives
  - Proposed Xha! Boom Substation Site Alternatives
- Proposed Corridor Alternatives**
- Option 1
  - Option 2
  - Option 3
  - Option 4



SOURCE: NGI, 2014



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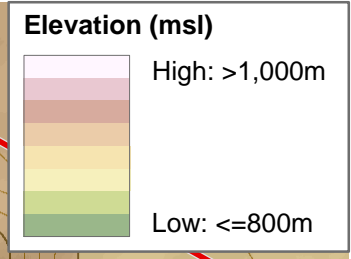
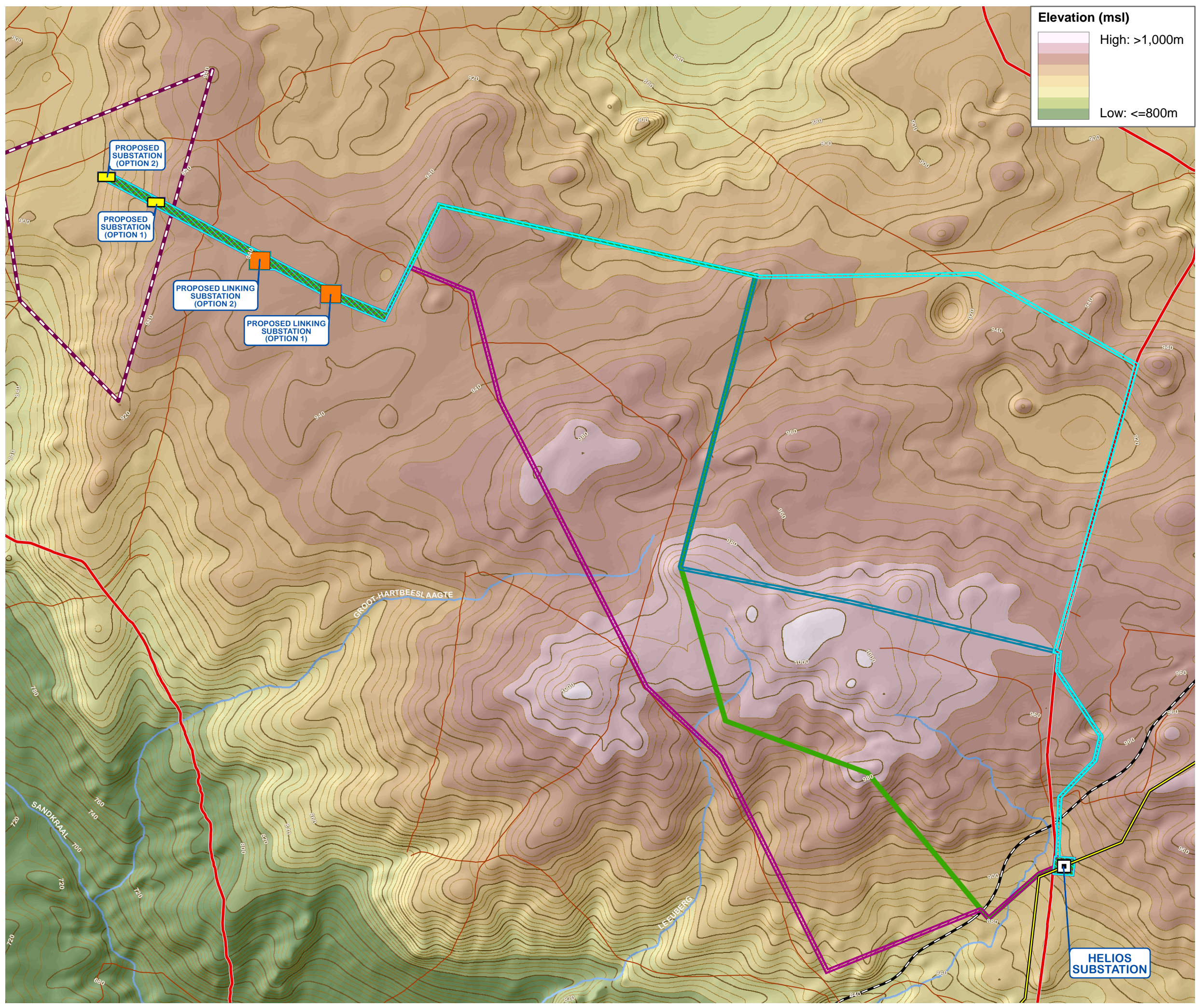
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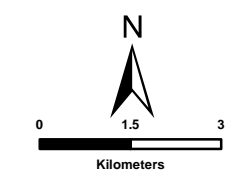
**HELIOS SUBSTATION**



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

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

SOURCE: NGI, 2014



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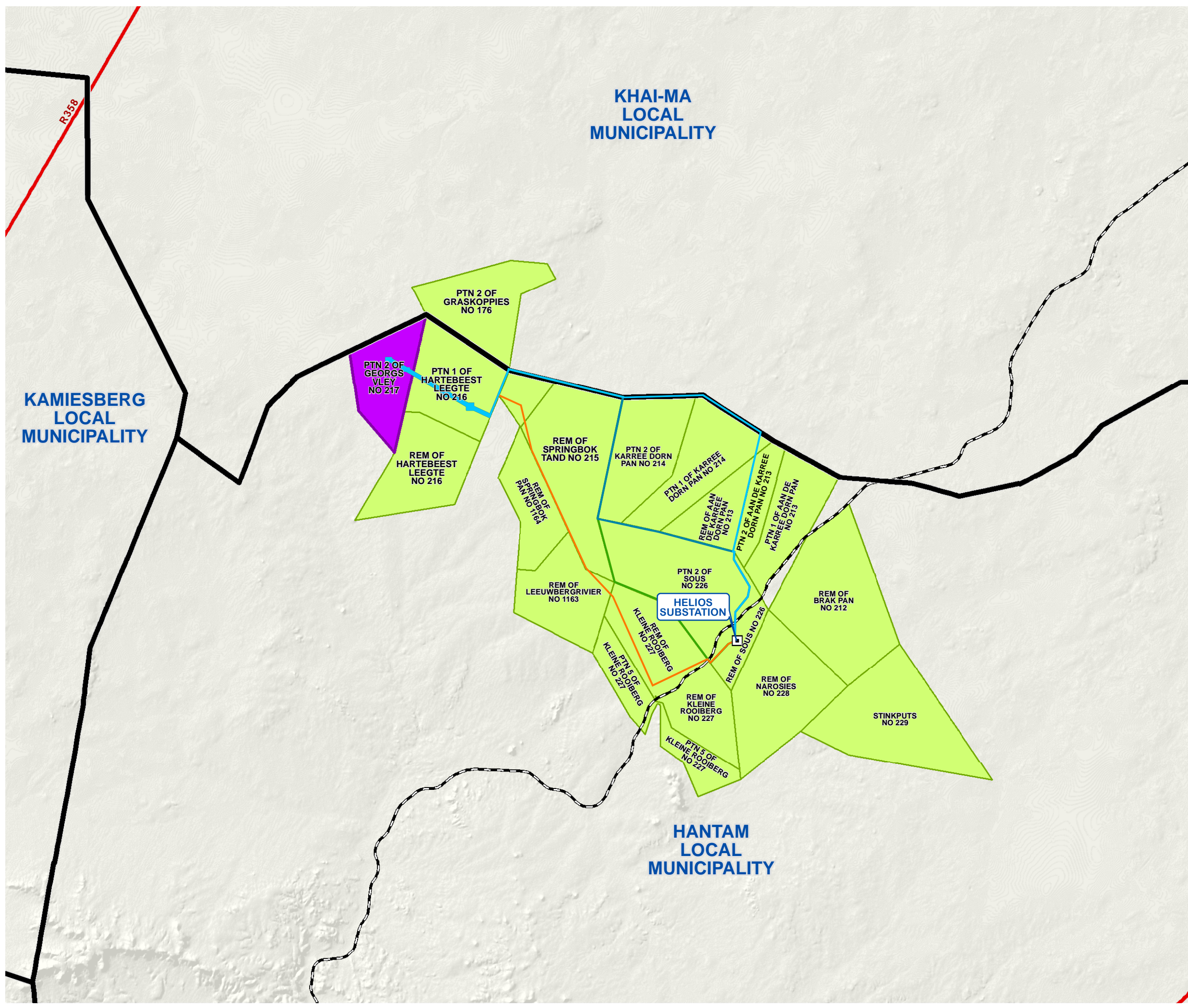
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**HELIOS SUBSTATION**

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



**Legend**

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

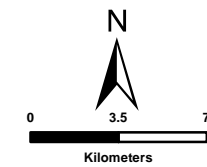
**KAMIESBERG LOCAL MUNICIPALITY**

**KHAI-MA LOCAL MUNICIPALITY**

**HANTAM LOCAL MUNICIPALITY**

**HELIOS SUBSTATION**

SOURCE: MUNICIPAL DEMARCATION BOARD, 2011  
 NGI, 2014

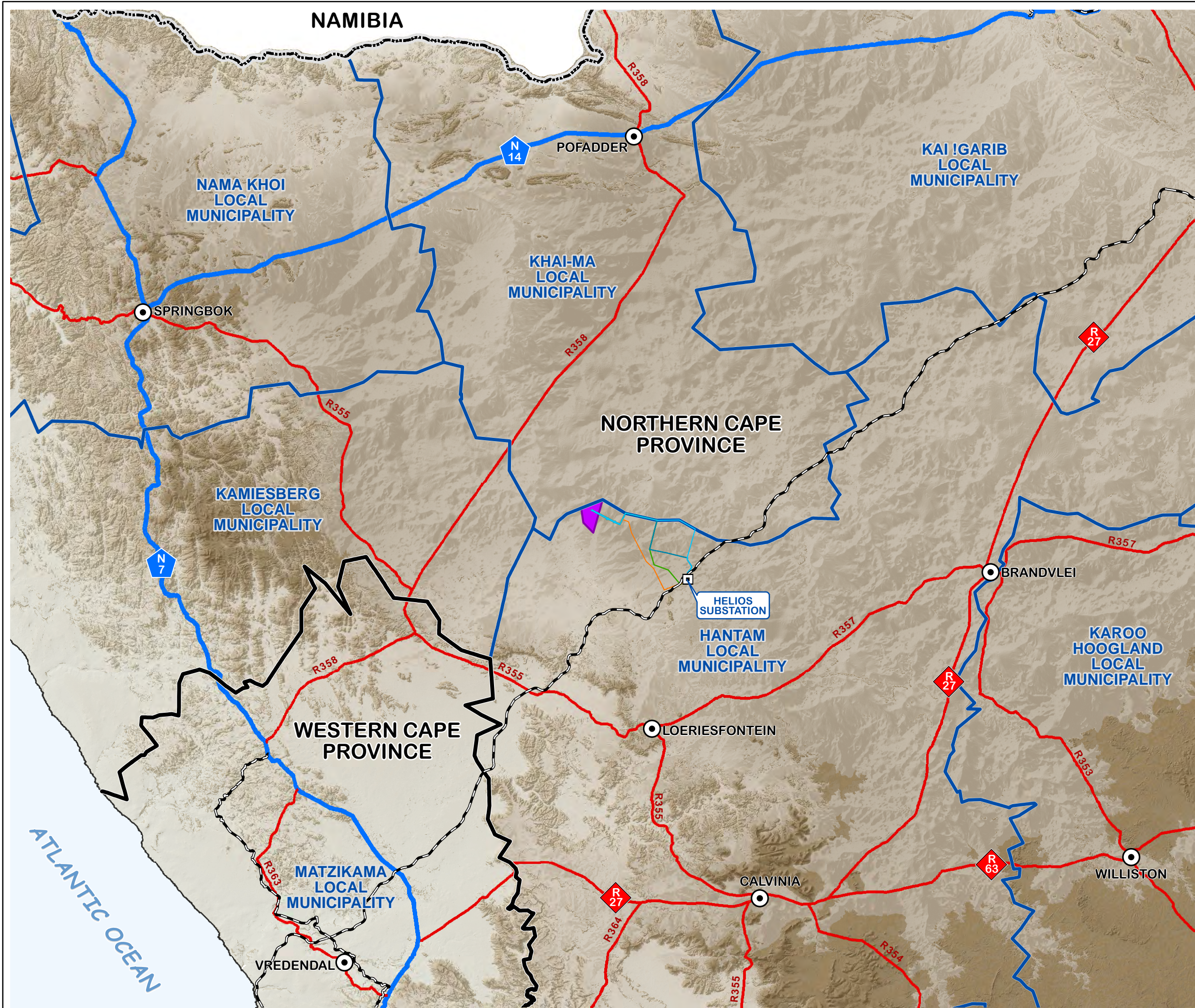


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<b>Project No</b> 13622	<b>Prepared By</b> KLS	<b>Date</b> 12/07/2017
<b>Map Ref No</b> 13622/BA_X08	<b>Revision</b> 0	<b>Date</b> _____

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**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES**  
**XHA! BOOM 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
- Xha! Boom 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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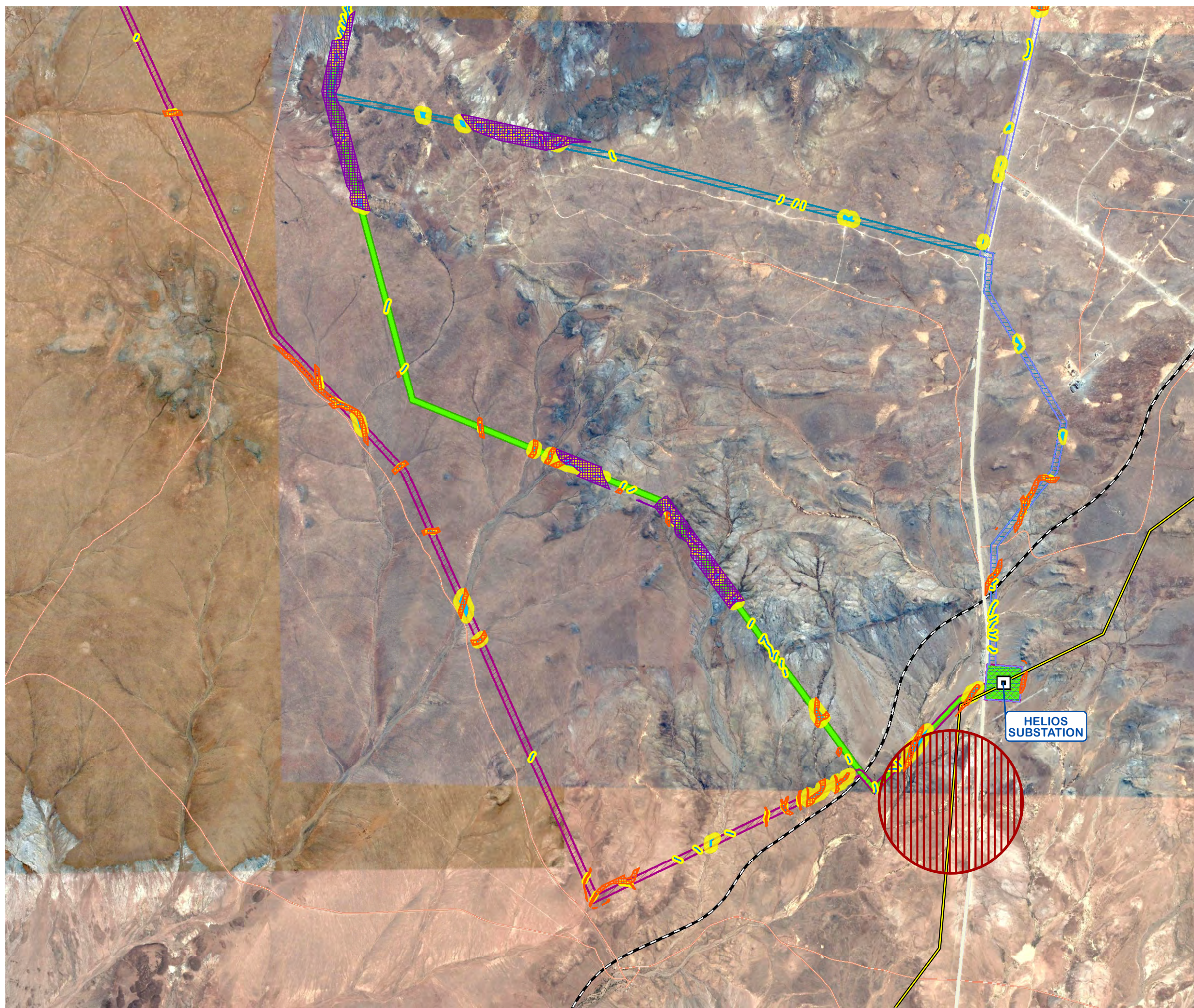
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**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES**  
**XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**  
**ENVIRONMENTAL SENSITIVITY (SOUTHERN SECTION)**



**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
-  Wetlands/Major Drainage Lines
-  Drainage Lines
-  Surface Water Buffers

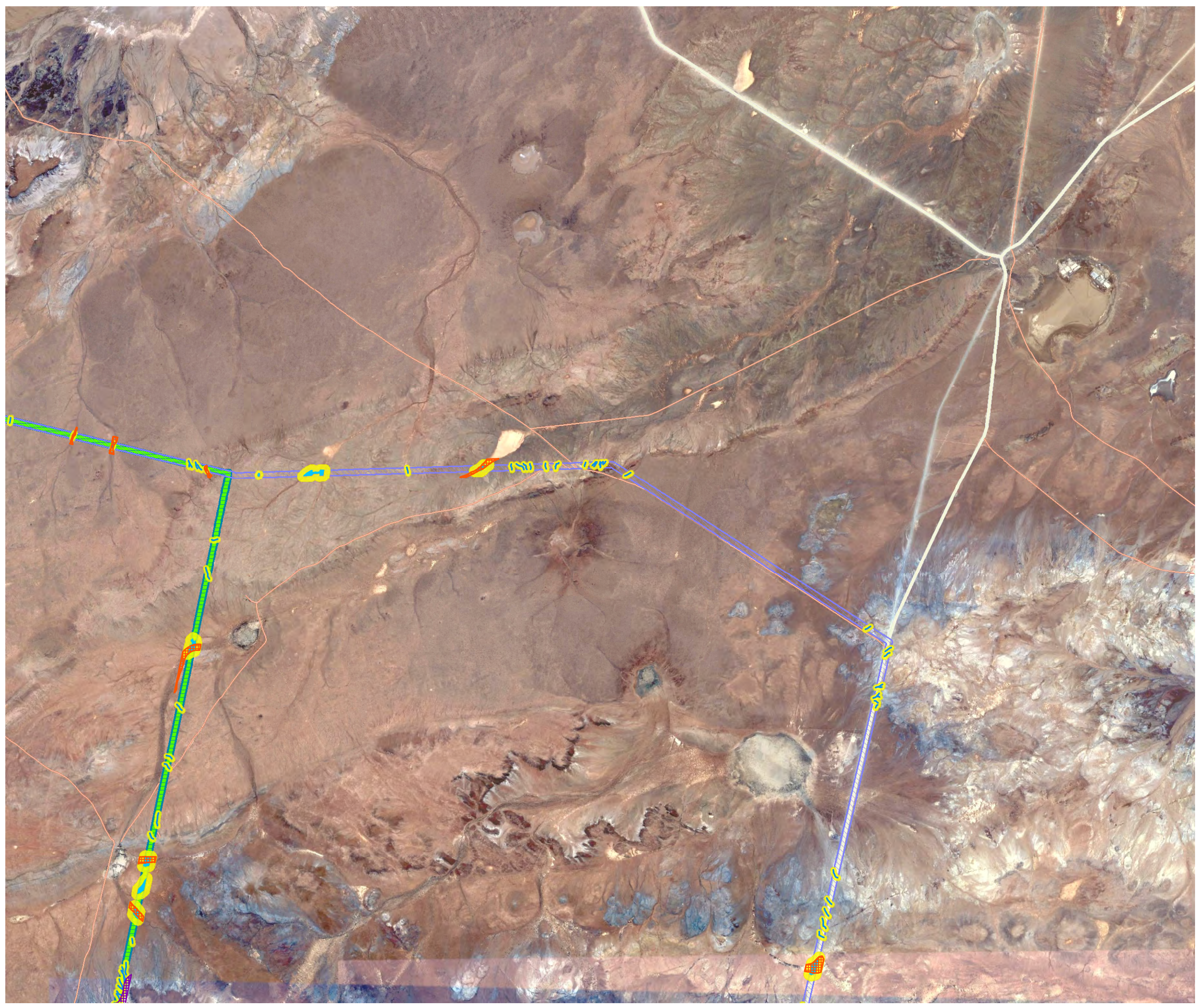
SOURCE: GOOGLE EARTH, 2016

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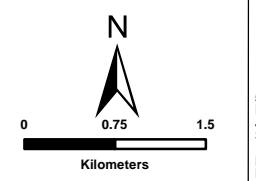


**PROPOSED CONSTRUCTION  
OF A 132kV POWER LINE  
TO SERVE PROPOSED  
WIND ENERGY FACILITIES  
XHA! BOOM WIND FARM  
NEAR LOERIESFONTEIN,  
NORTHERN CAPE PROVINCE**

**SURFACE WATER ASSESSMENT:  
DELINEATED SURFACE WATER  
FEATURES  
(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
  - Wetlands/Major Drainage Lines
  - Drainage Lines
  - Surface Water Buffers

SOURCE:  
GOOGLE EARTH, 2016



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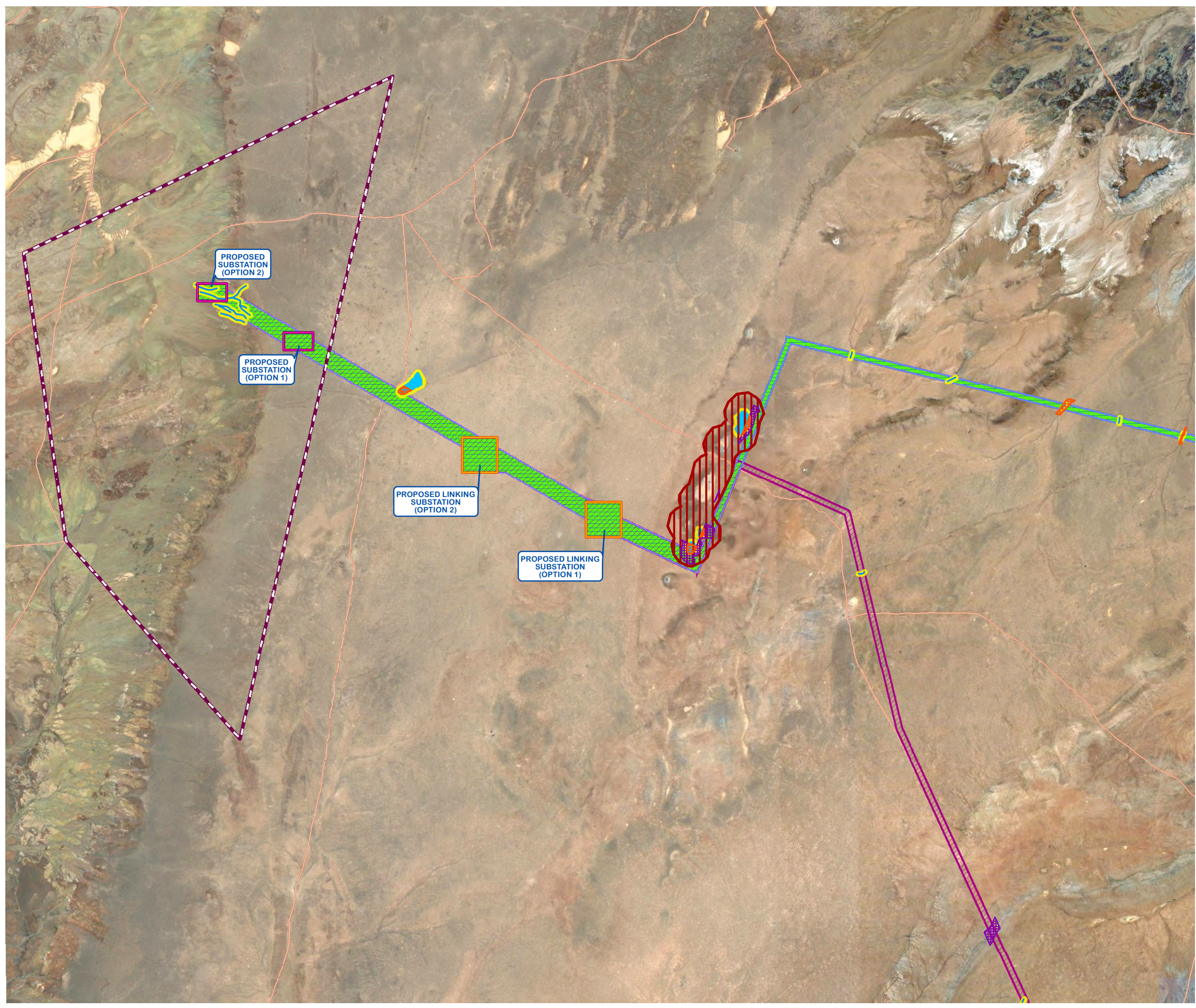
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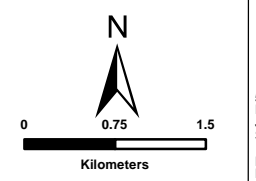
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**XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**  
**ENVIRONMENTAL SENSITIVITY (NORTH-WESTERN SECTION)**



- Legend**
- Local Access Roads
  - Xha! Boom Wind Farm Application Site
  - Proposed Linking Substation Site Alternatives
  - Proposed Xha! Boom 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
  - Wetlands/Major Drainage Lines
  - Drainage Lines
  - Surface Water Buffers

SOURCE: GOOGLE EARTH, 2016



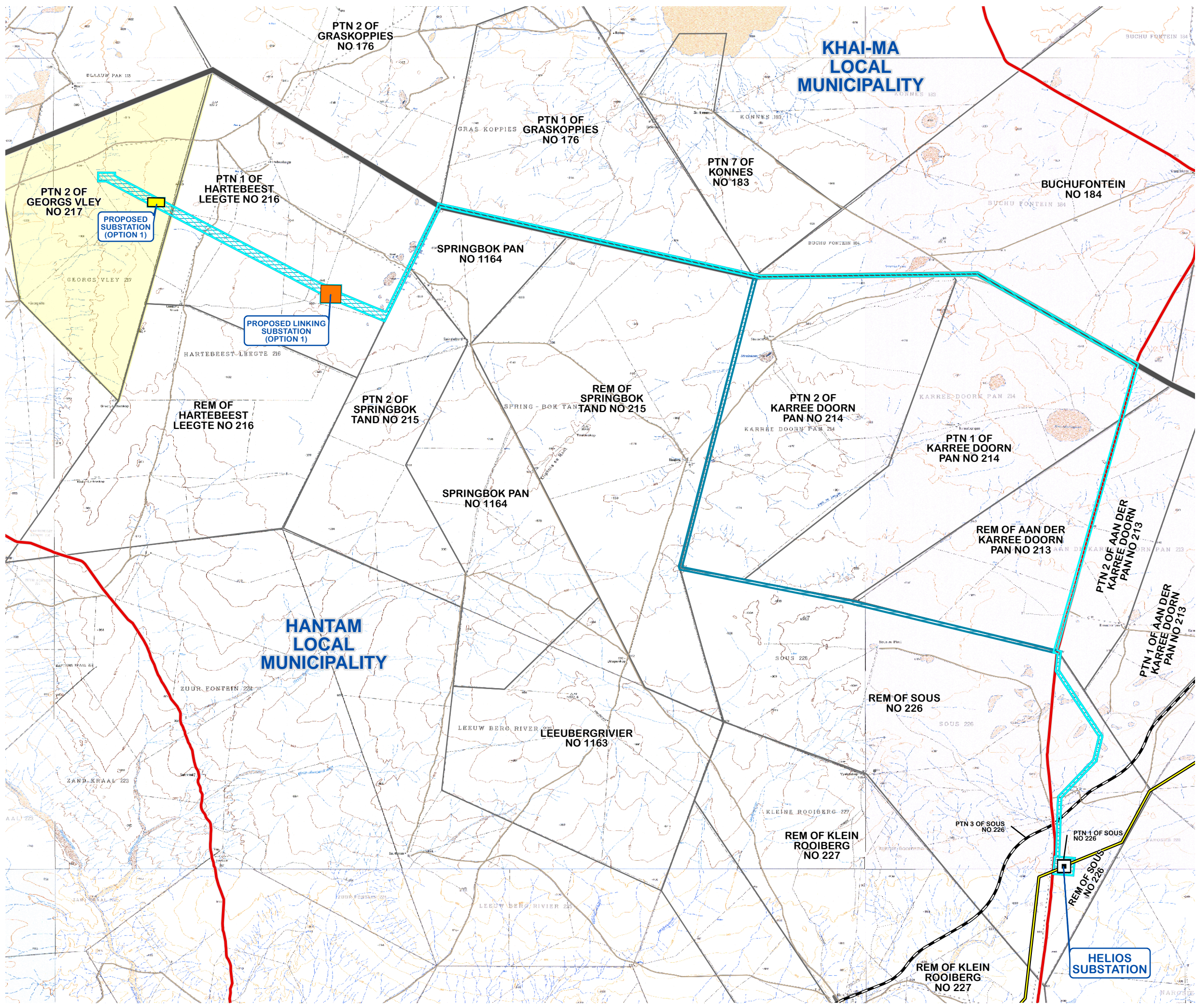
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<b>Map Ref No</b> 13622/BA_X09a	<b>Revision</b> 0	<b>Date</b> _____

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**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE FAVOURABLE ALTERNATIVES**



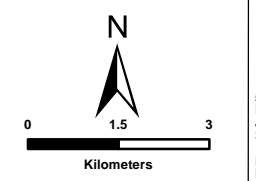
**Legend**

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

**Favourable Corridor Alternatives**

- Option 2
- Option 4

SOURCE: MUNICIPAL DEMARCATION BOARD, 2011  
NGI, 2014



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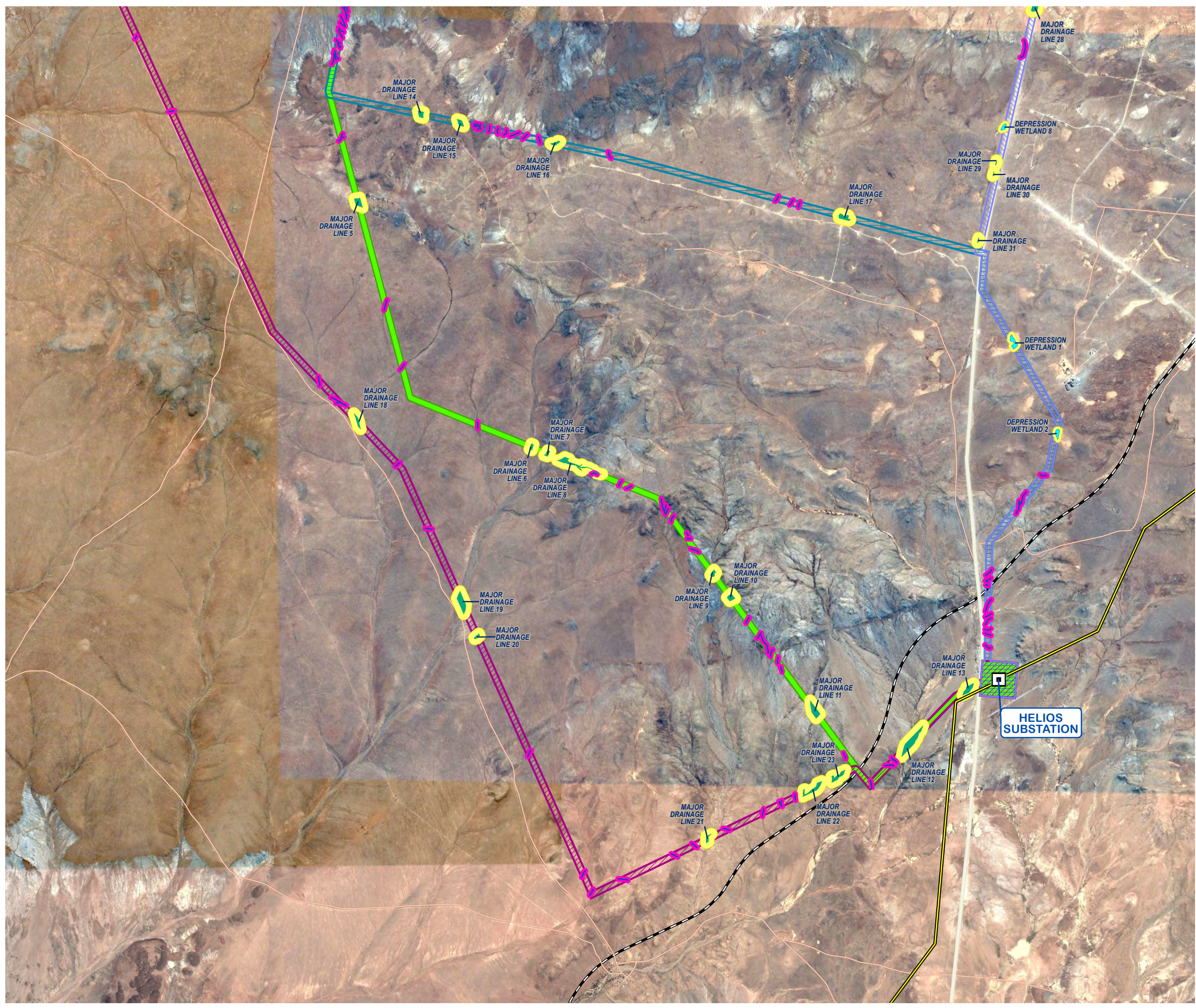
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**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**

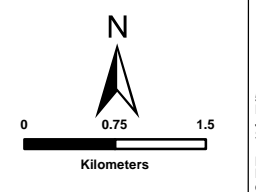
**SURFACE WATER ASSESSMENT: DELINEATED SURFACE WATER FEATURES (SOUTHERN SECTION)**



- 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
- 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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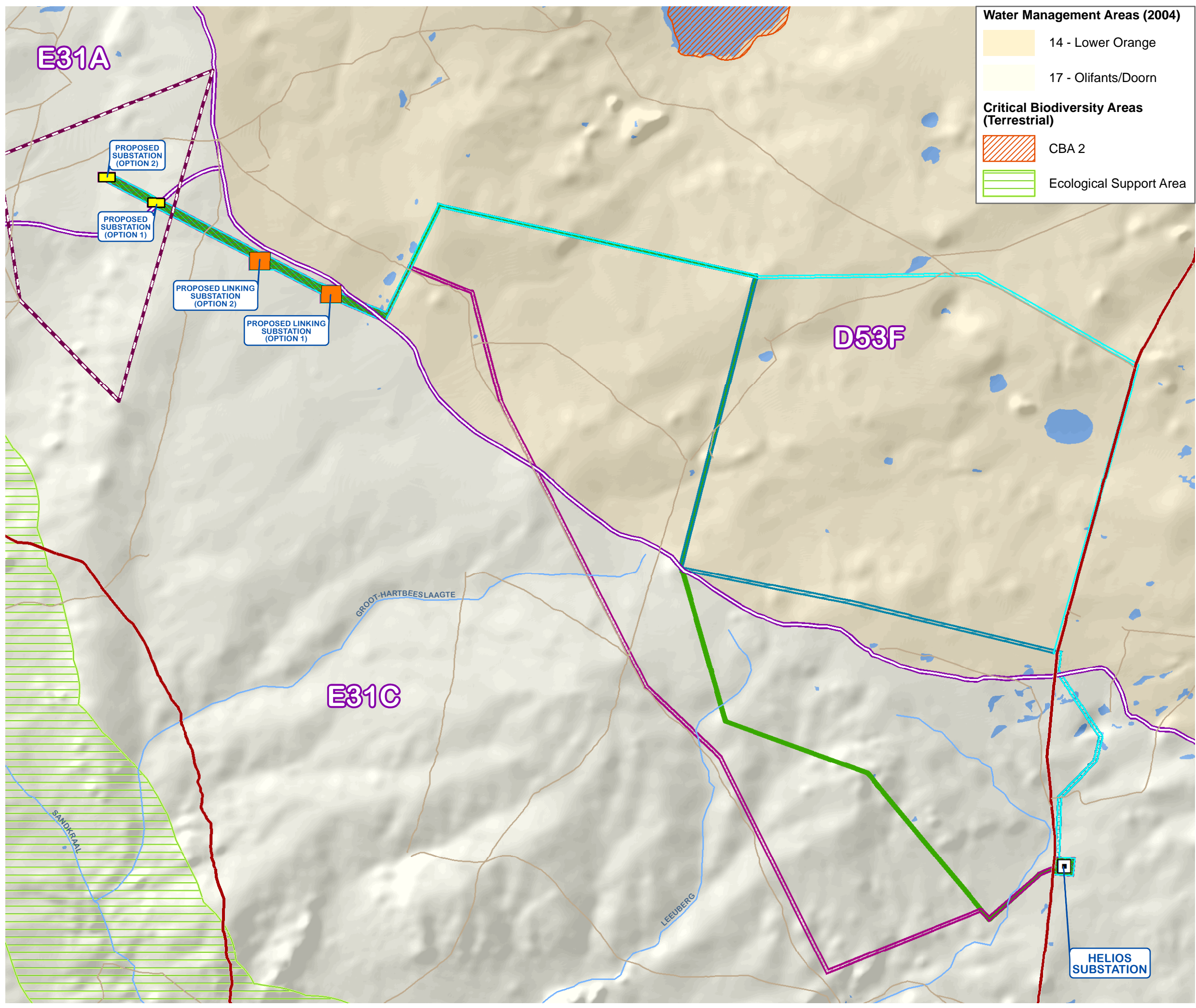
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Map Ref No 13622/BAS_X04	Revision 1	Date 24/07/2017

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**Water Management Areas (2004)**

- 14 - Lower Orange
- 17 - Olifants/Doorn

**Critical Biodiversity Areas (Terrestrial)**

- CBA 2
- Ecological Support Area

**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES**  
**XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**  
**SURFACE WATER ASSESSMENT: DATABASE SURFACE WATER OCCURRENCE**

**Legend**

- Secondary Roads
- Local Access Roads
- Xha! Boom Wind Farm Application Site
- Helios Substation
- Proposed Linking Substation Site Alternatives
- Proposed Xha! Boom 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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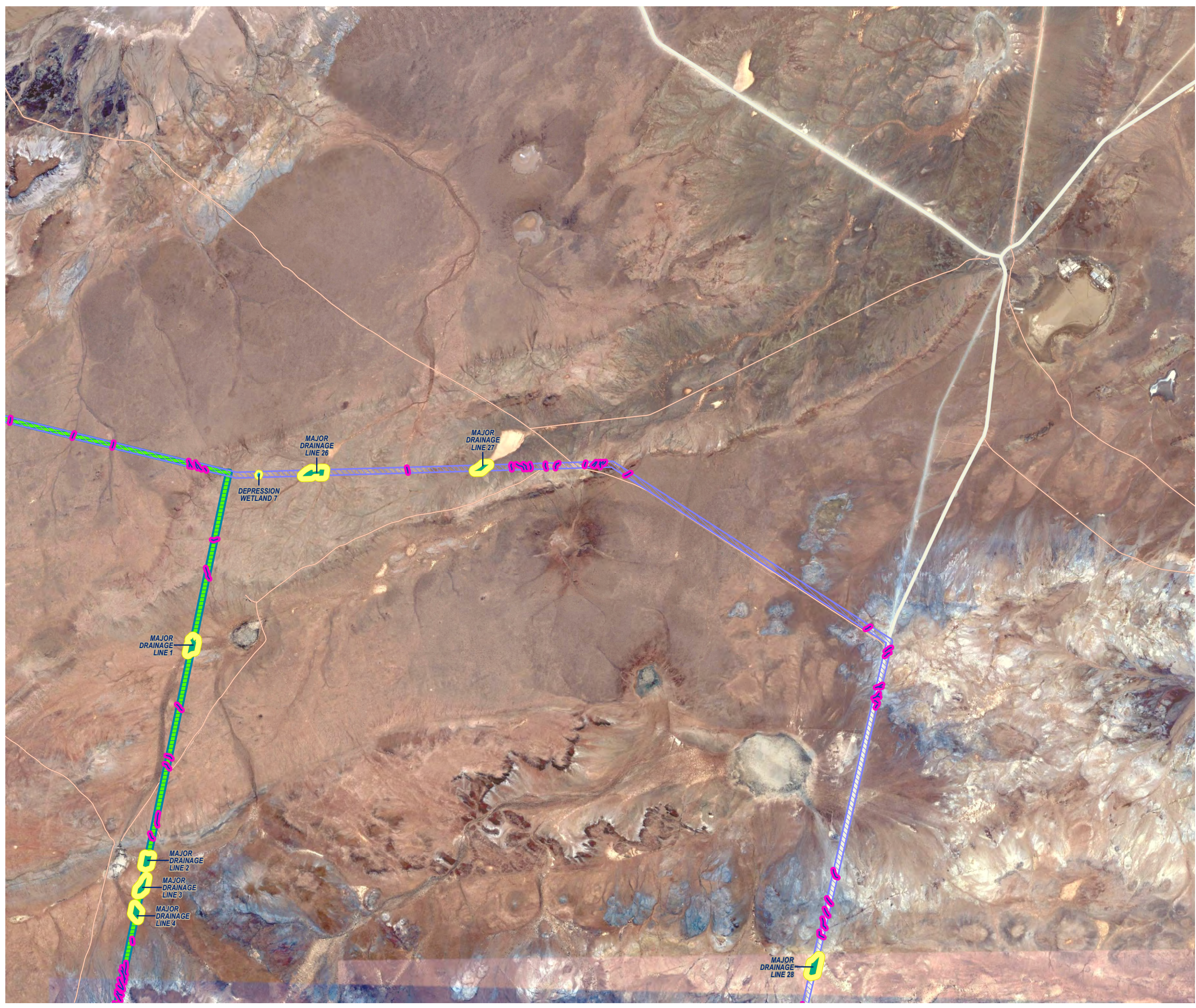
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**HELIOS SUBSTATION**

**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES**  
**XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**  
**SURFACE WATER ASSESSMENT: DELINEATED SURFACE WATER FEATURES (NORTH-EASTERN SECTION)**



**Legend**

- Secondary Roads
- Local Access Roads

**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

0 0.75 1.5  
Kilometers

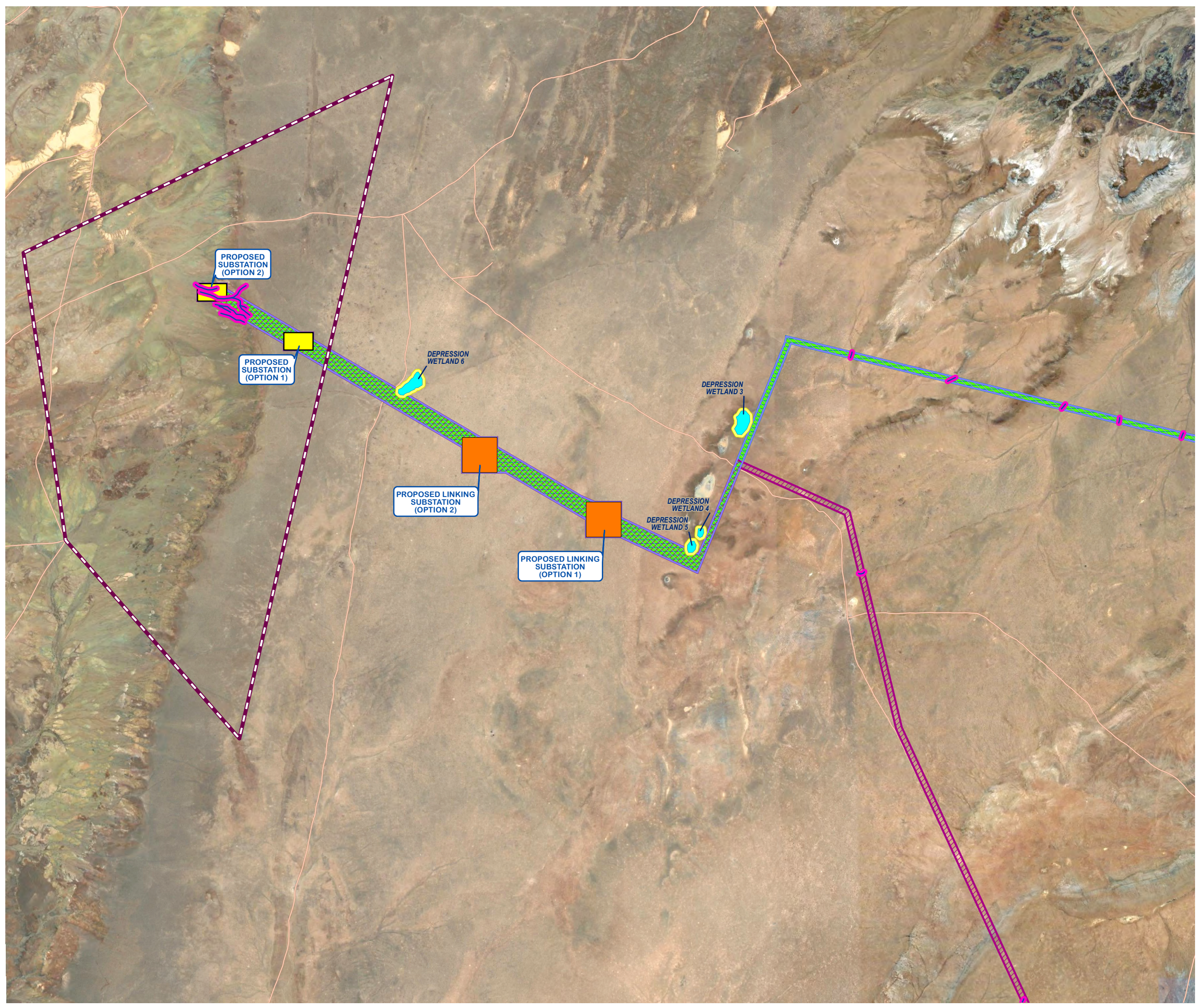
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<b>Project No</b> 13622	<b>Prepared By</b> KLS	<b>Date</b> 08/02/2017
<b>Map Ref No</b> 13622/BAS_X03	<b>Revision</b> 1	<b>Date</b> 24/07/2017

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**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES**  
**XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**  
**SURFACE WATER ASSESSMENT: DELINEATED SURFACE WATER FEATURES (NORTH-WESTERN SECTION)**



**Legend**

- Local Access
- Xha! Boom Wind Farm Application Site
- Proposed Linking Substation Site Alternatives
- Proposed Xha! Boom 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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<b>Project No</b> 13622	<b>Prepared By</b> KLS	<b>Date</b> 08/02/2017
<b>Map Ref No</b> 13622/BAS_X02	<b>Revision</b> 1	<b>Date</b> 24/07/2017

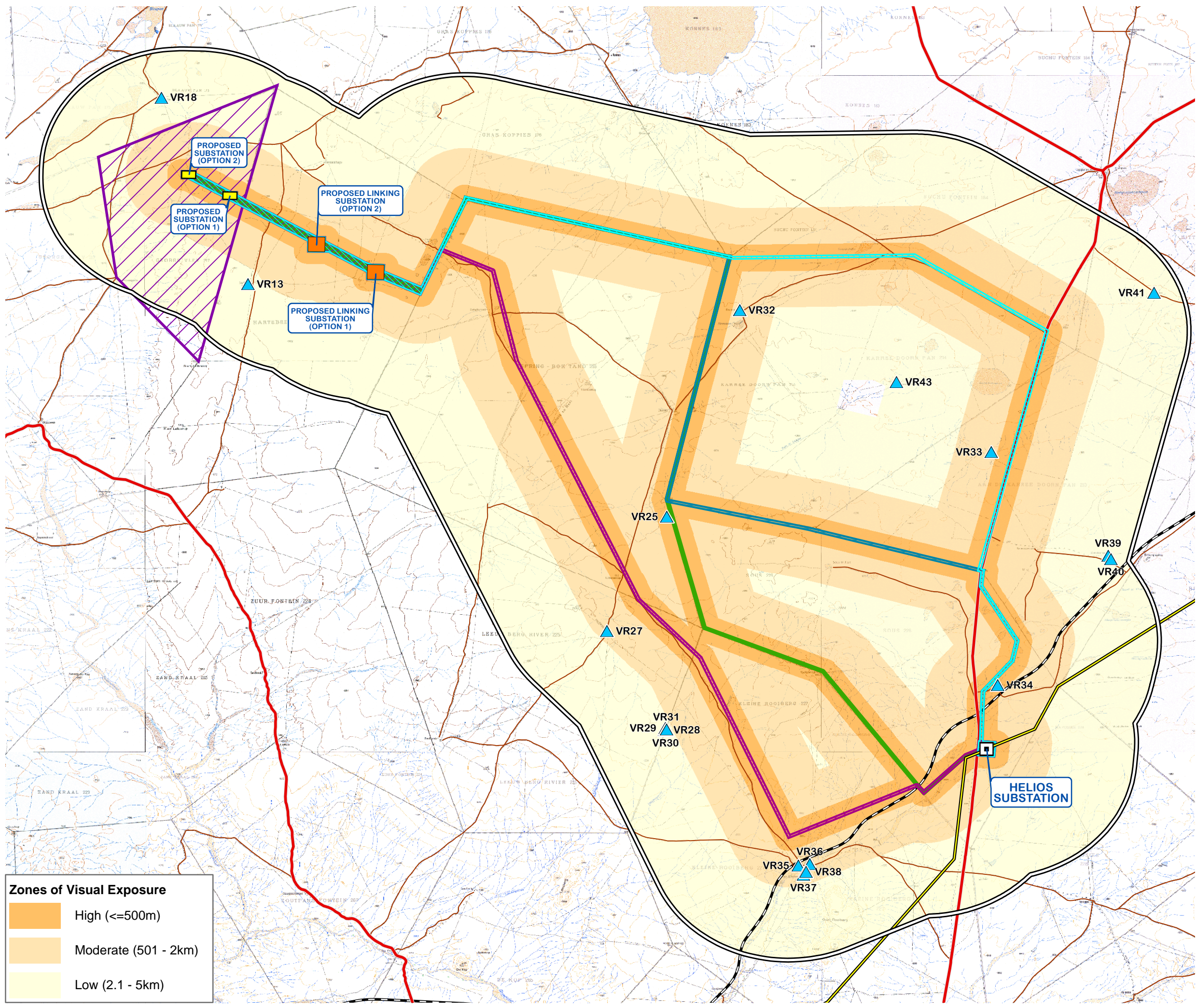
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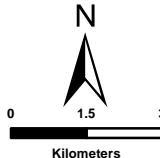
**PROPOSED CONSTRUCTION OF A 132kV POWER LINE TO SERVE PROPOSED WIND ENERGY FACILITIES XHA! BOOM WIND FARM NEAR LOERIESFONTEIN, NORTHERN CAPE PROVINCE**

**VISUAL ASSESSMENT: POTENTIALLY SENSITIVE VISUAL RECEPTOR LOCATIONS**



- Legend**
- Secondary Roads
  - Local Access Roads
  - Railways
  - Existing High Voltage Power Lines ( $\geq 132kV$ )
  - Xha! Boom Wind Farm Application Site
  - Helios Substation
  - Proposed Linking Substation Site Alternatives
  - Proposed Xha! Boom 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  
SANBI, 2012



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**Zones of Visual Exposure**

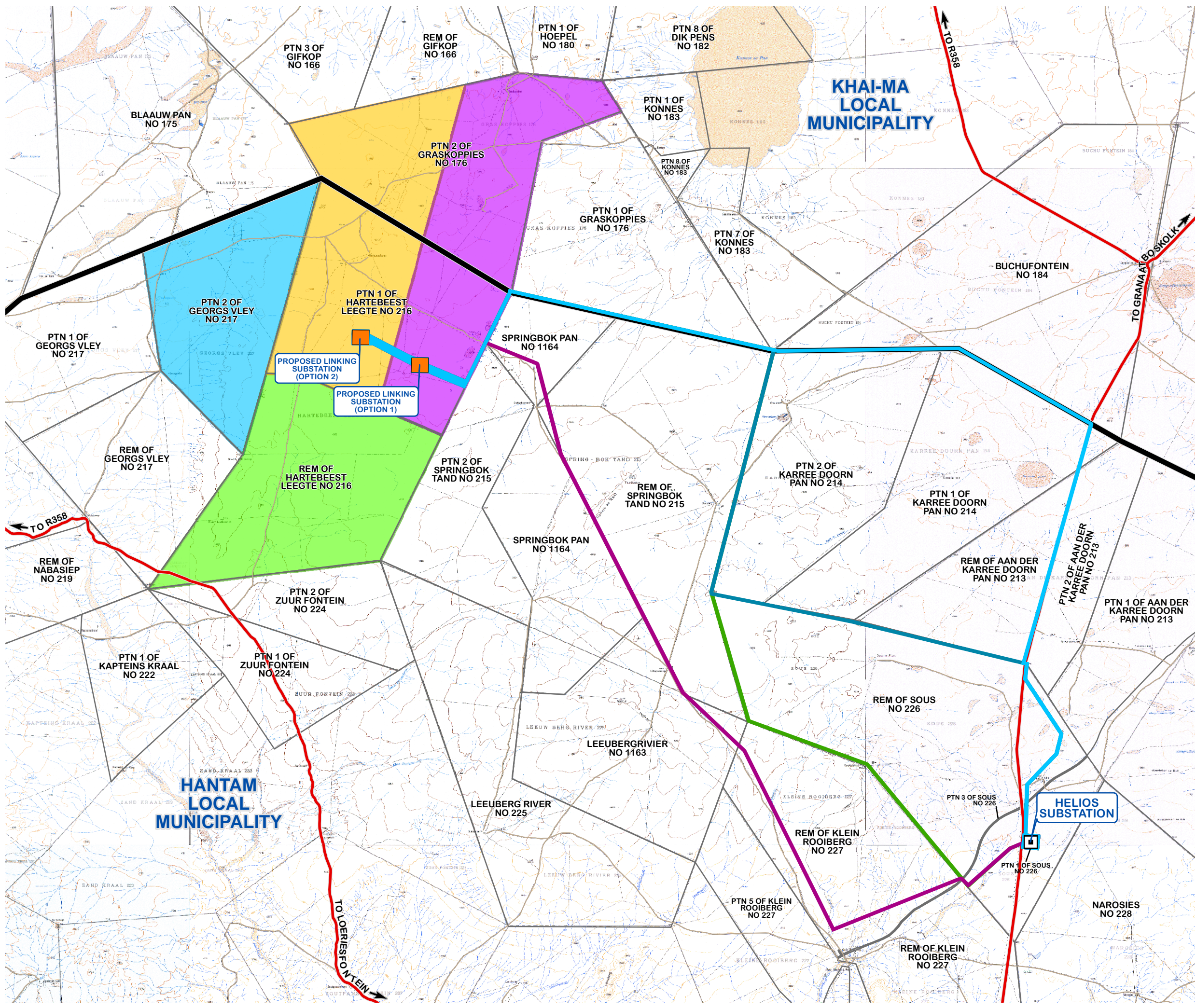
	High ( $\leq 500m$ )
	Moderate (501 - 2km)
	Low (2.1 - 5km)

Project No 13622	Prepared By KLS	Date 19/12/2016
Map Ref No 13622/BAV_X05	Revision 2	Date 21/08/2017

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**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
  - Xha! 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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Project No 13622	Prepared By KLS	Date 18/10/2016
Map Ref No 13622/BID_01	Revision 2	Date 23/05/2017

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