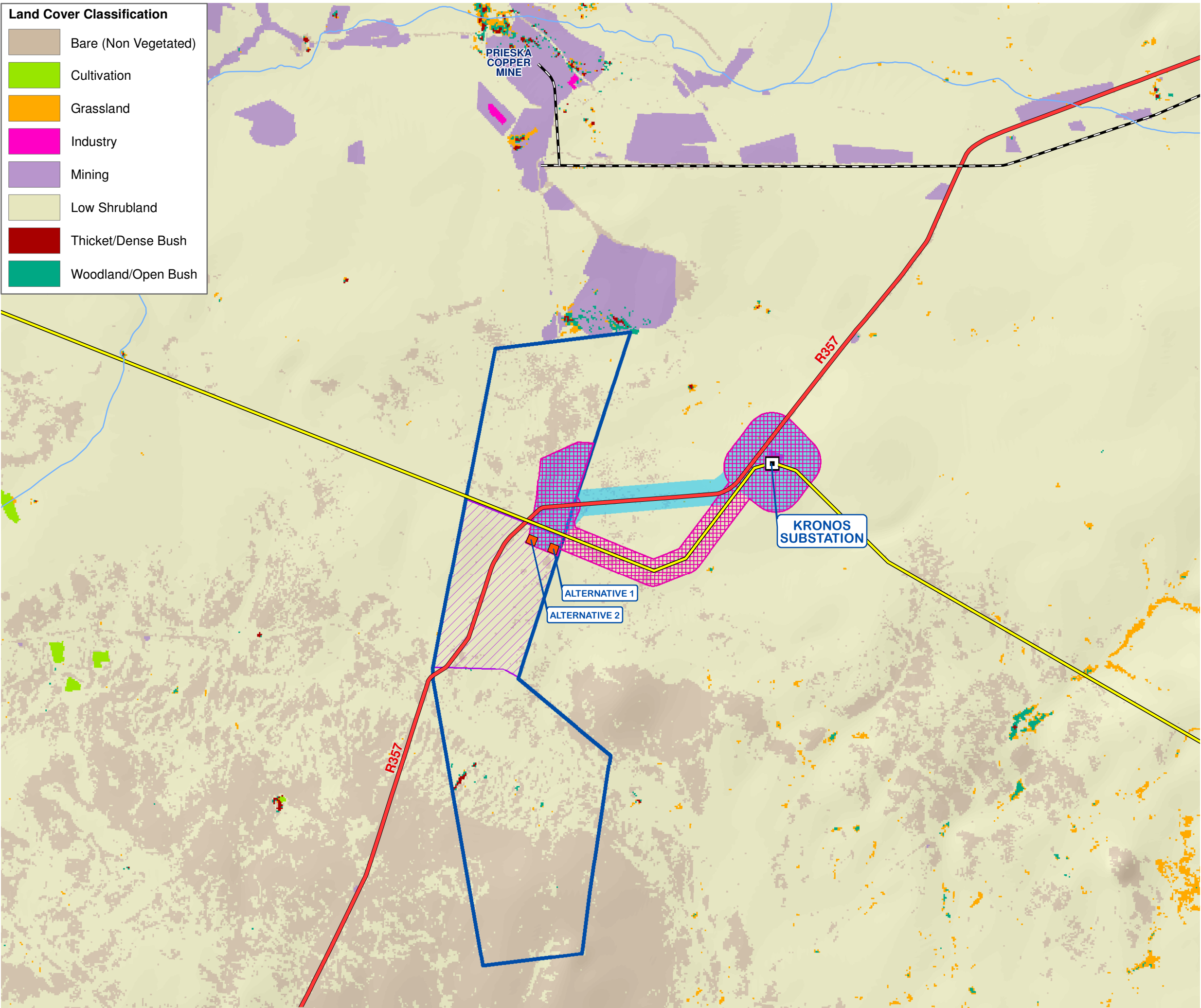


Land Cover Classification

- Bare (Non Vegetated)
- Cultivation
- Grassland
- Industry
- Mining
- Low Shrubland
- Thicket/Dense Bush
- Woodland/Open Bush



**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

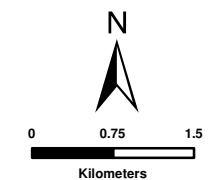
**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**BROAD LAND COVER
CLASSIFICATION**

Legend

- Main Roads
- Railway Line
- Existing High Voltage Power Lines (400kV)
- Main Rivers/Water Courses
- Existing Substation
- Application Site
- Proposed Helena Solar 3 Development Area
- Proposed Power Line Corridor: Option 1
- Proposed Power Line Corridor: Option 2
- Proposed Substation Site Alternatives

SOURCE:
ESKOM, 2012
BIOTHERM ENERGY 2015
2013-2014 SA NATIONAL LAND COVER
(© GEOTERRAIMAGE - 2014)



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Project No	Map Ref No	Prepared By	Date
13031	13031/EA3_06	KLS	20/08/2015

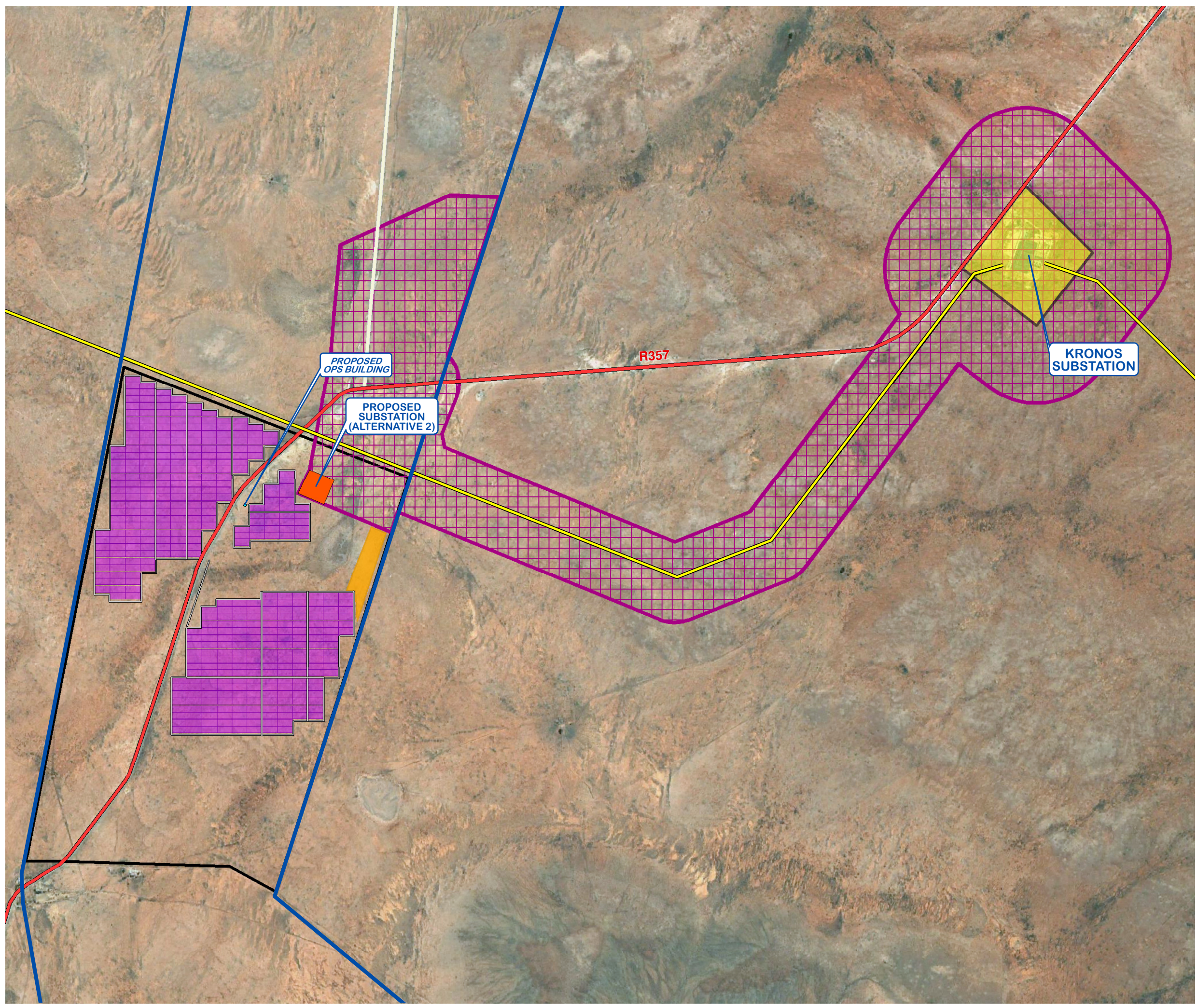
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**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

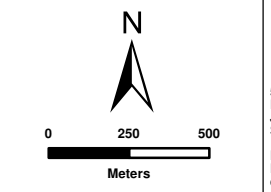
PREFERRED SITE LAYOUT



Legend

-  Main Road
 -  Secondary Road
 -  Existing High Voltage Power Lines (400kV)
 -  Kronos Substation Site
 -  Application Site
 -  Proposed Helena Solar 3 Development Area
 -  Preferred Power Line Corridor: Option 2
- Proposed Layout Components**
-  PV Panel Area
 -  Laydown Areas
 -  Preferred Substation Site
 -  Ops Building
 -  Internal Roads

SOURCE:
ESKOM, 2012
GOOGLE EARTH, 2012
BIOTHERM ENERGY, 2015



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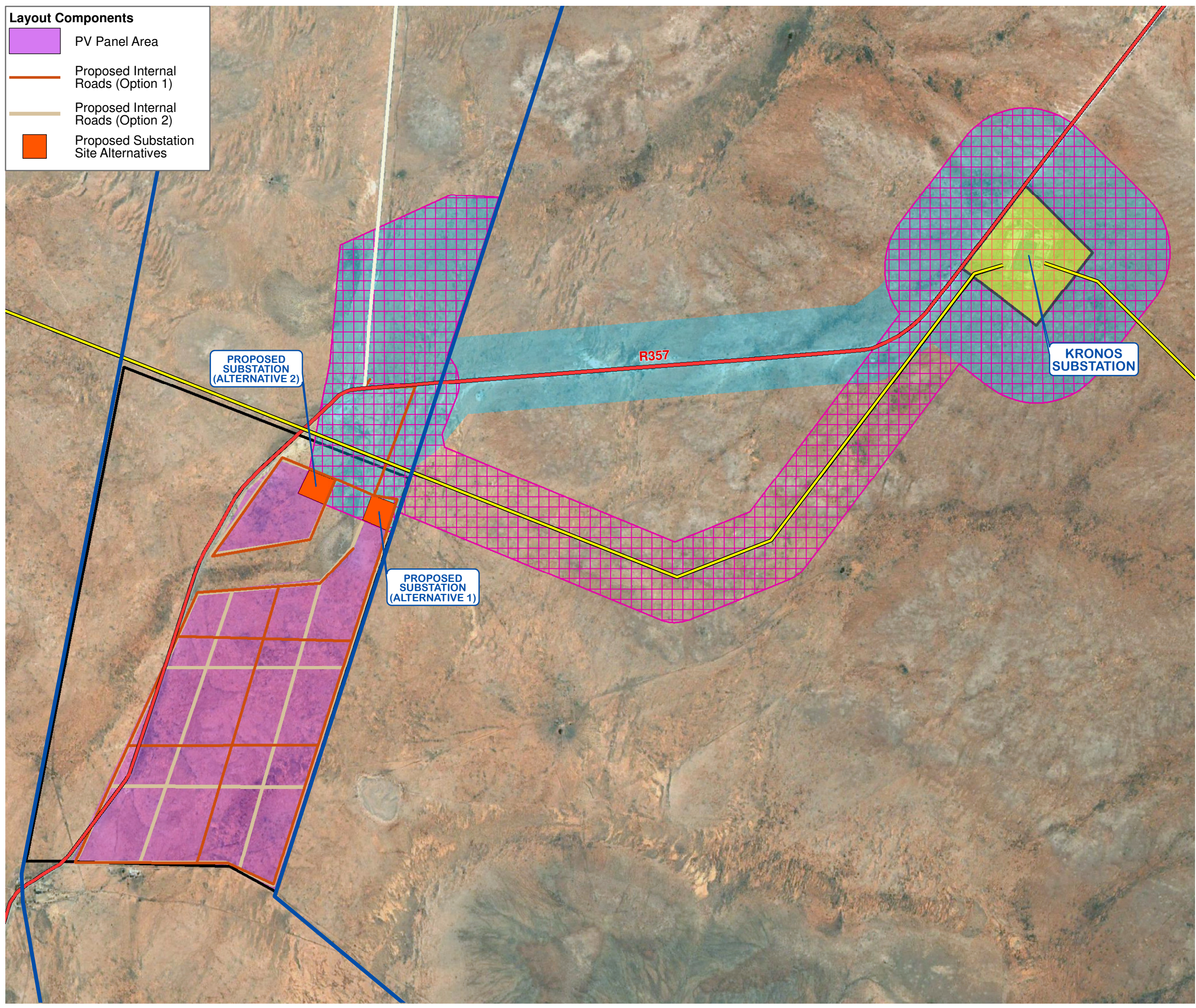
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Layout Components









-  PV Panel Area
-  Proposed Internal Roads (Option 1)
-  Proposed Internal Roads (Option 2)
-  Proposed Substation Site Alternatives

**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

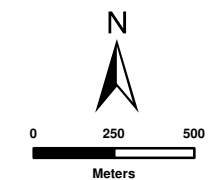
**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**VISUAL ASSESSMENT:
PROPOSED SITE LAYOUT**

Legend

-  Main Road
-  Secondary Road
-  Existing High Voltage Power Lines (400kV)
-  Kronos Substation Site
-  Application Site
-  Proposed Helena Solar 3 Development Area
-  Proposed Power Line Corridor: Option 1
-  Proposed Power Line Corridor: Option 2

SOURCE:
ESKOM, 2012
GOOGLE EARTH, 2012
BIOTHERM ENERGY, 2015



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**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**
**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**
REGIONAL CONTEXT

Legend

-  Local Municipal Boundaries
-  National Route (N10)
-  Main Roads
-  Railway Line
-  Existing High Voltage Power Lines (400kV)
-  Main Rivers
-  Main Towns
-  Kronos MTS Substation
-  Application Site
-  Proposed Power Line Corridor: Option 1
-  Proposed Power Line Corridor: Option 2

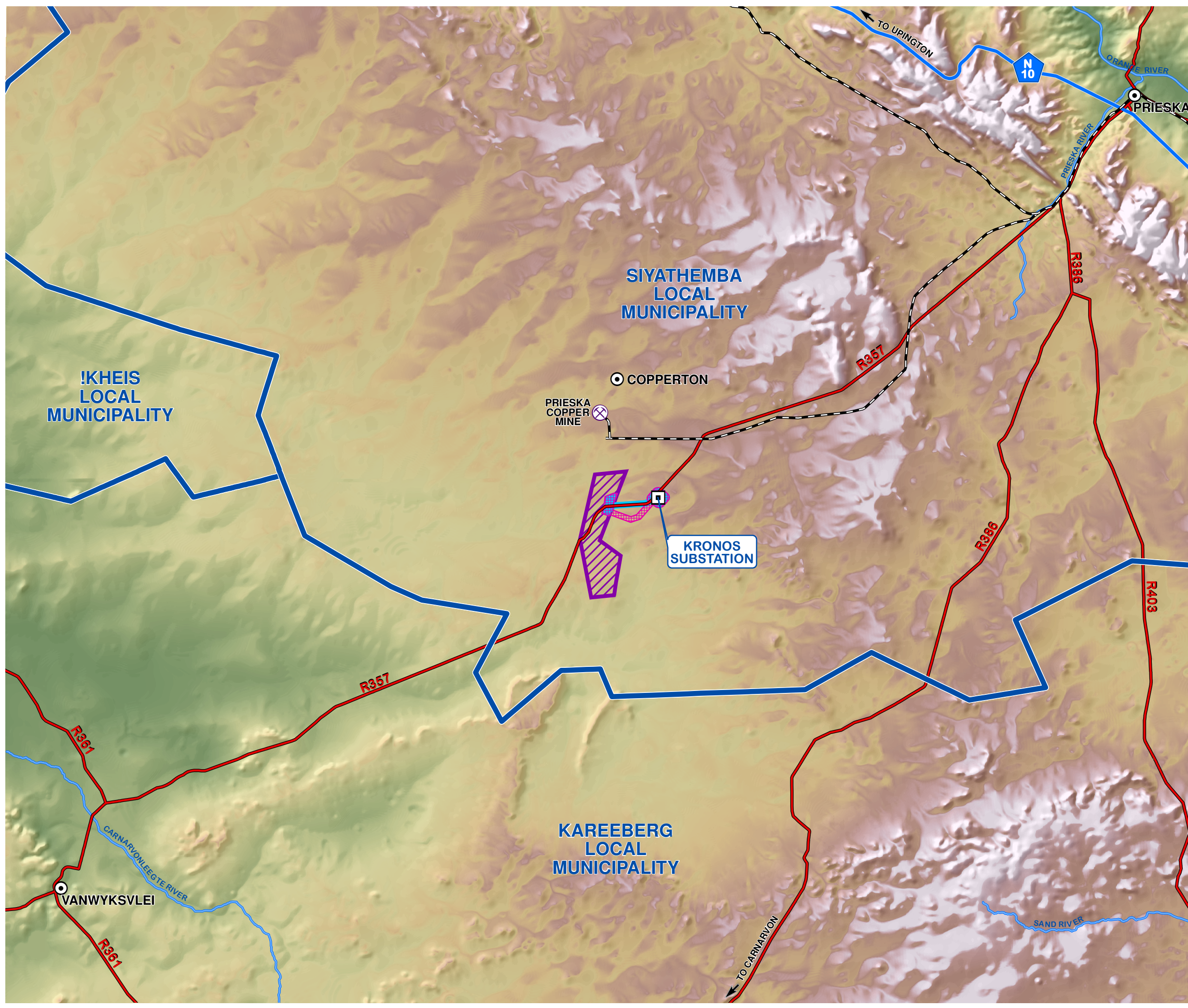
SOURCE:
ESKOM, 2012
MUNICIPAL DEMARCATION BOARD, 2011
NFEP, 2011
NGI, 2014

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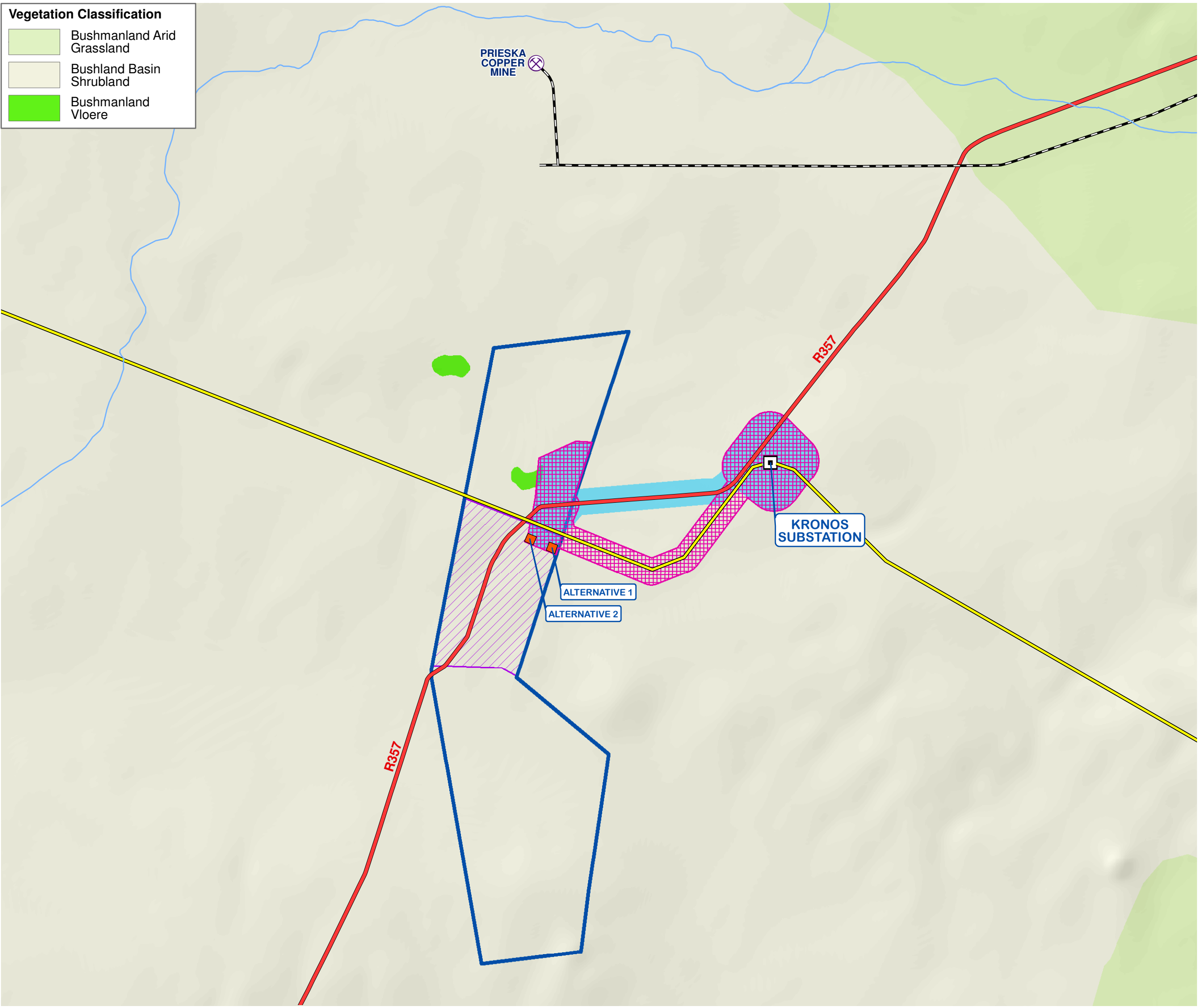
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Vegetation Classification

- Bushmanland Arid Grassland
- Bushland Basin Shrubland
- Bushmanland Vloere



**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**VEGETATION CLASSIFICATION
(SANBI 2006)**

Legend

- Main Roads
- Railway Line
- Existing High Voltage Power Lines (400kV)
- Main Rivers/Water Courses
- Existing Substation
- Application Site
- Proposed Helena Solar 3 Development Area
- Proposed Substation Site Alternatives
- Proposed Power Line Corridor: Option 1
- Proposed Power Line Corridor: Option 2

SOURCE:
ESKOM, 2012
MAINSTREAM, 2015
SANBI, 2006

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13031	13031/EA3_05	KLS	18/08/2015

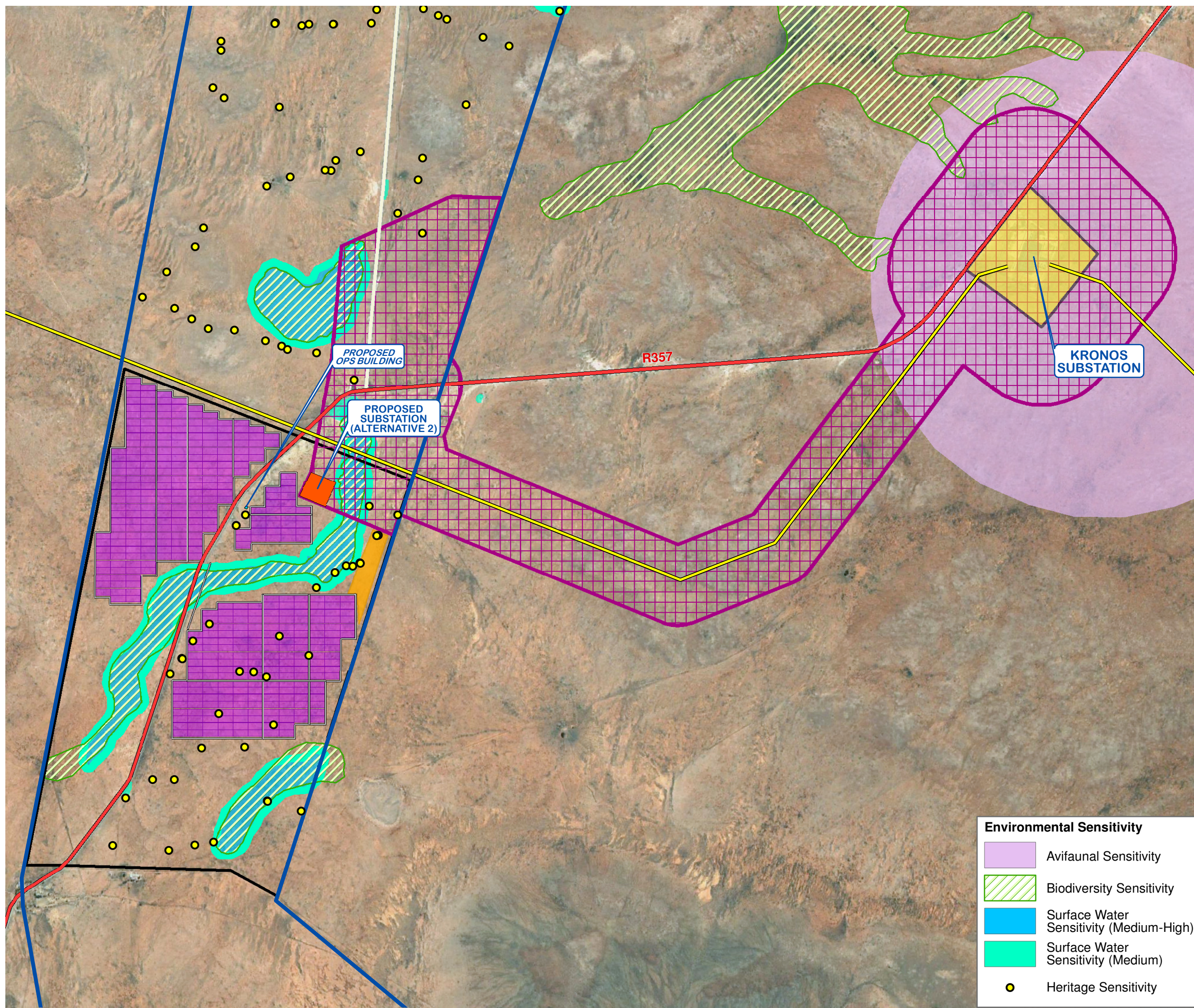
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**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

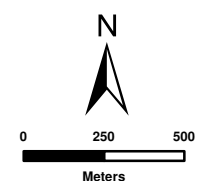
**PREFERRED SITE LAYOUT
WITH SENSITIVITY OVERLAY**



Legend

- Main Road
 - Secondary Road
 - Existing High Voltage Power Lines (400kV)
 - Kronos Substation Site
 - Application Site
 - Proposed Helena Solar 3 Development Area
 - Preferred Power Line Corridor: Option 2
- Proposed Layout Components**
- PV Panel Area
 - Laydown Areas
 - Preferred Substation Site
 - Ops Building
 - Internal Roads

SOURCE:
ESKOM, 2012
GOOGLE EARTH, 2012
BIOTHERM ENERGY, 2015



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Environmental Sensitivity












- Avifaunal Sensitivity
- Biodiversity Sensitivity
- Surface Water Sensitivity (Medium-High)
- Surface Water Sensitivity (Medium)
- Heritage Sensitivity

**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

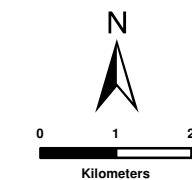
**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

SITE LOCALITY

Legend

-  Main Roads
-  Railway Line
-  Existing High Voltage Power Lines (400kV)
-  Existing Substations
-  Adjoining Farm Boundaries
-  Application Site
-  Proposed Helena Solar 3 Development Area
-  Other Proposed Solar PV Energy Facilities
-  Proposed Substation Site Alternatives
-  Proposed Power Line Corridor: Option 1
-  Proposed Power Line Corridor: Option 2

SOURCE:
ESKOM, 2012
BIOTHERM ENERGY, 2015



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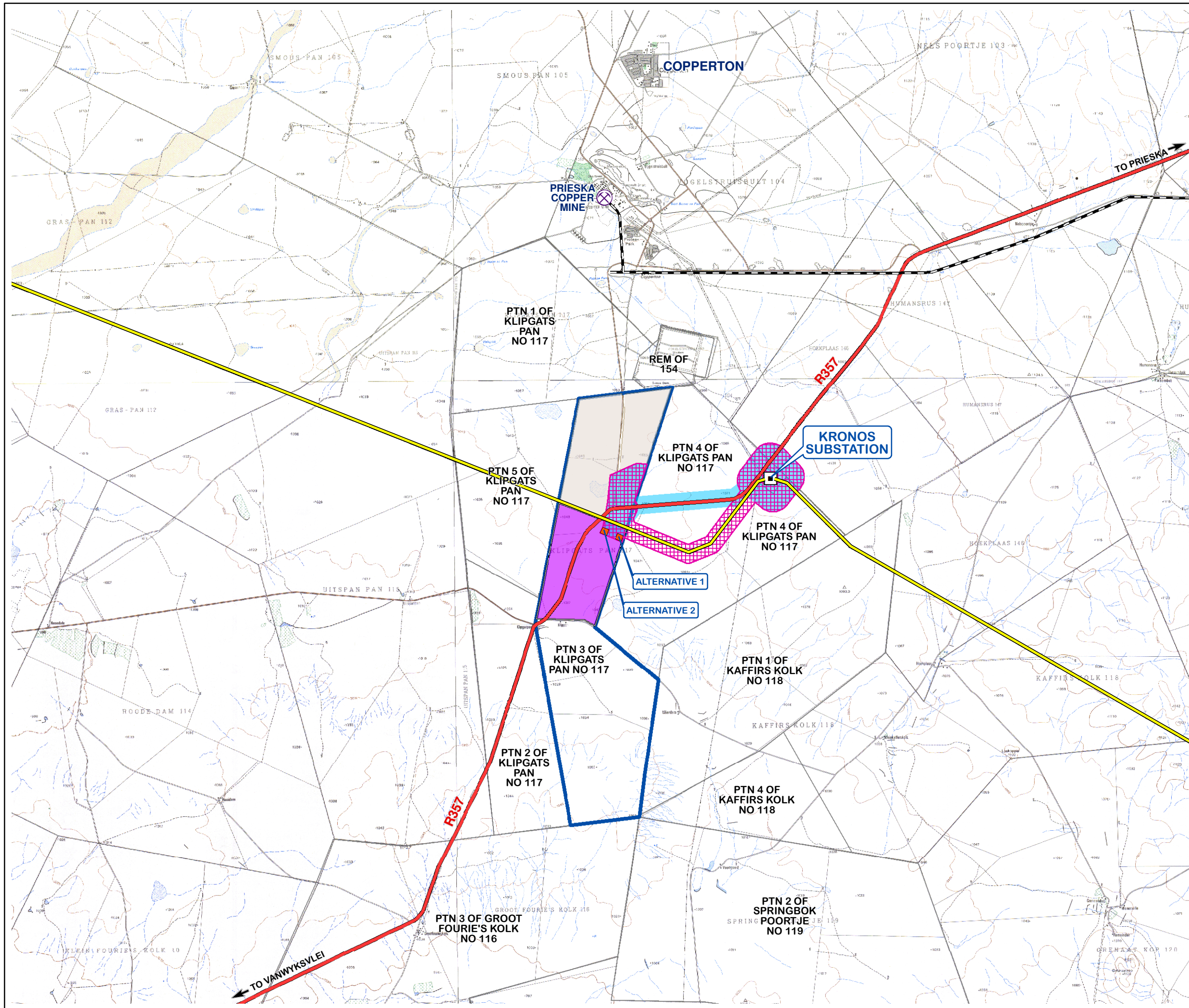
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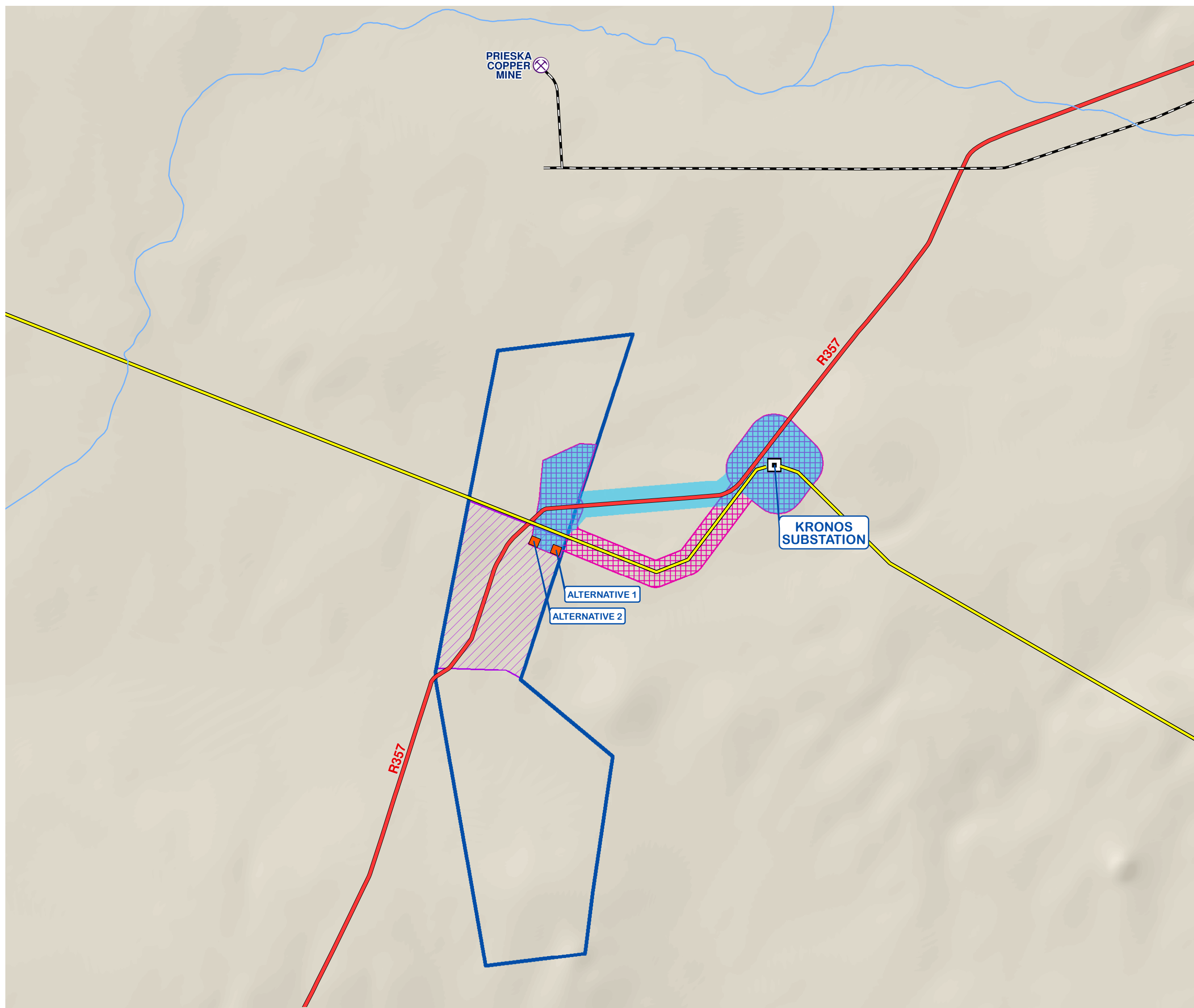
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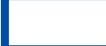




**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

SLOPE CLASSIFICATION



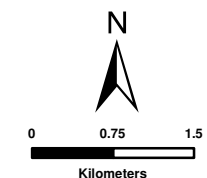
Legend

-  Main Roads
-  Railway Line
-  Existing High Voltage Power Lines (400kV)
-  Main Rivers/Water Courses
-  Existing Substation
-  Application Site
-  Proposed Helena Solar 3 Development Area
-  Proposed Substation Site Alternatives
-  Proposed Power Line Corridor: Option 1
-  Proposed Power Line Corridor: Option 2

Slope Classification

-  <=8%

SOURCE:
ESKOM, 2012
BIOTHERM ENERGY, 2015
NGI, 2014



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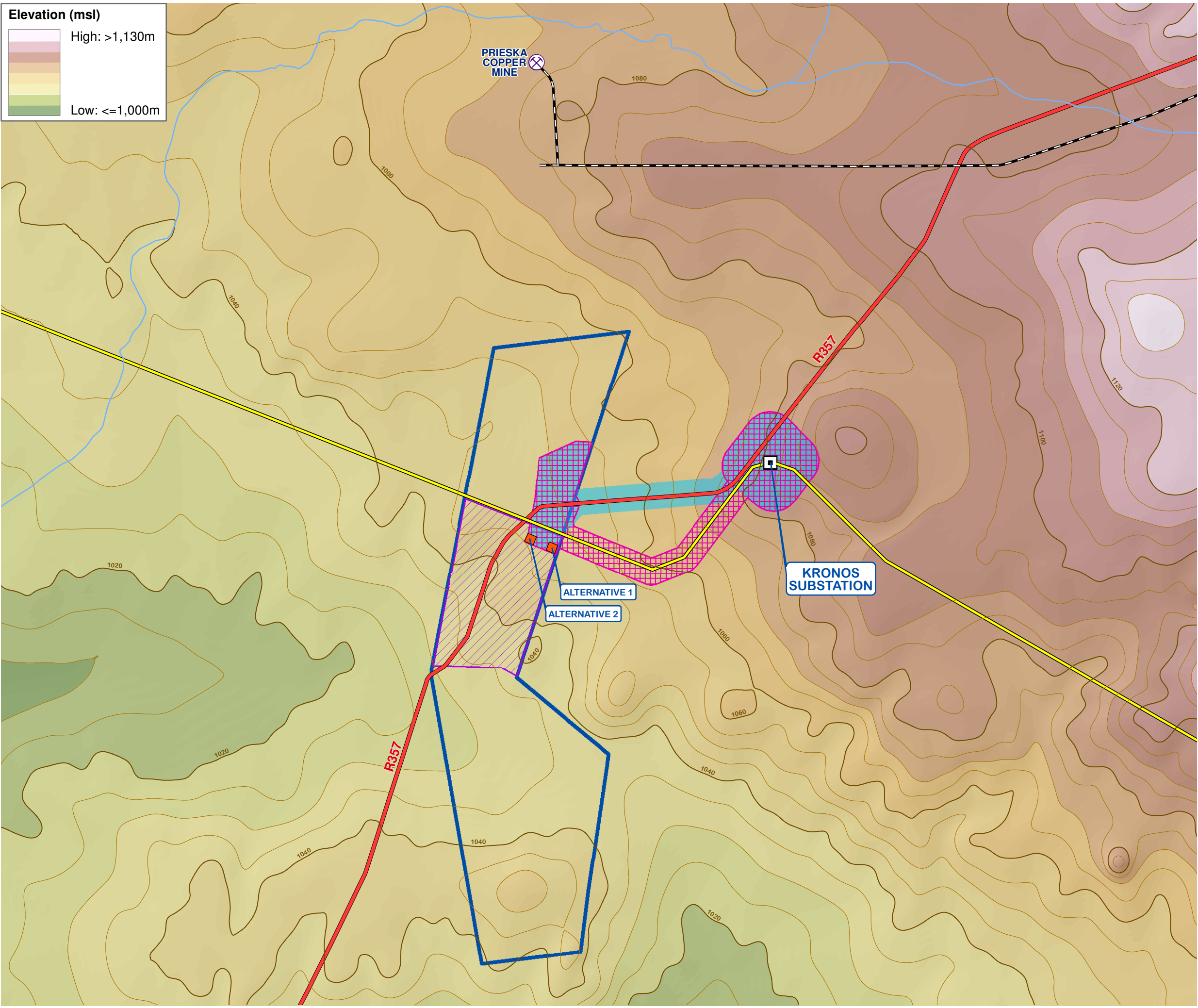
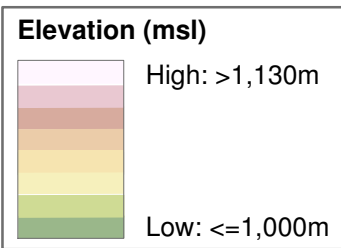
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**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

TOPOGRAPHY

- Legend**
- Main Roads
 - Railway Line
 - Existing High Voltage Power Lines (400kV)
 - Main Rivers/Water Courses
 - Contours (20m Interval)
 - Contours (5m Interval)
 - Existing Substation
 - Application Site
 - Proposed Helena Solar 3 Development Area
 - Proposed Substation Site Alternatives
 - Proposed Power Line Corridor: Option 1
 - Proposed Power Line Corridor: Option 2

SOURCE:
ESKOM, 2012
BIOTHERM ENERGY, 2015
NGI, 2014

0 0.75 1.5
Kilometers

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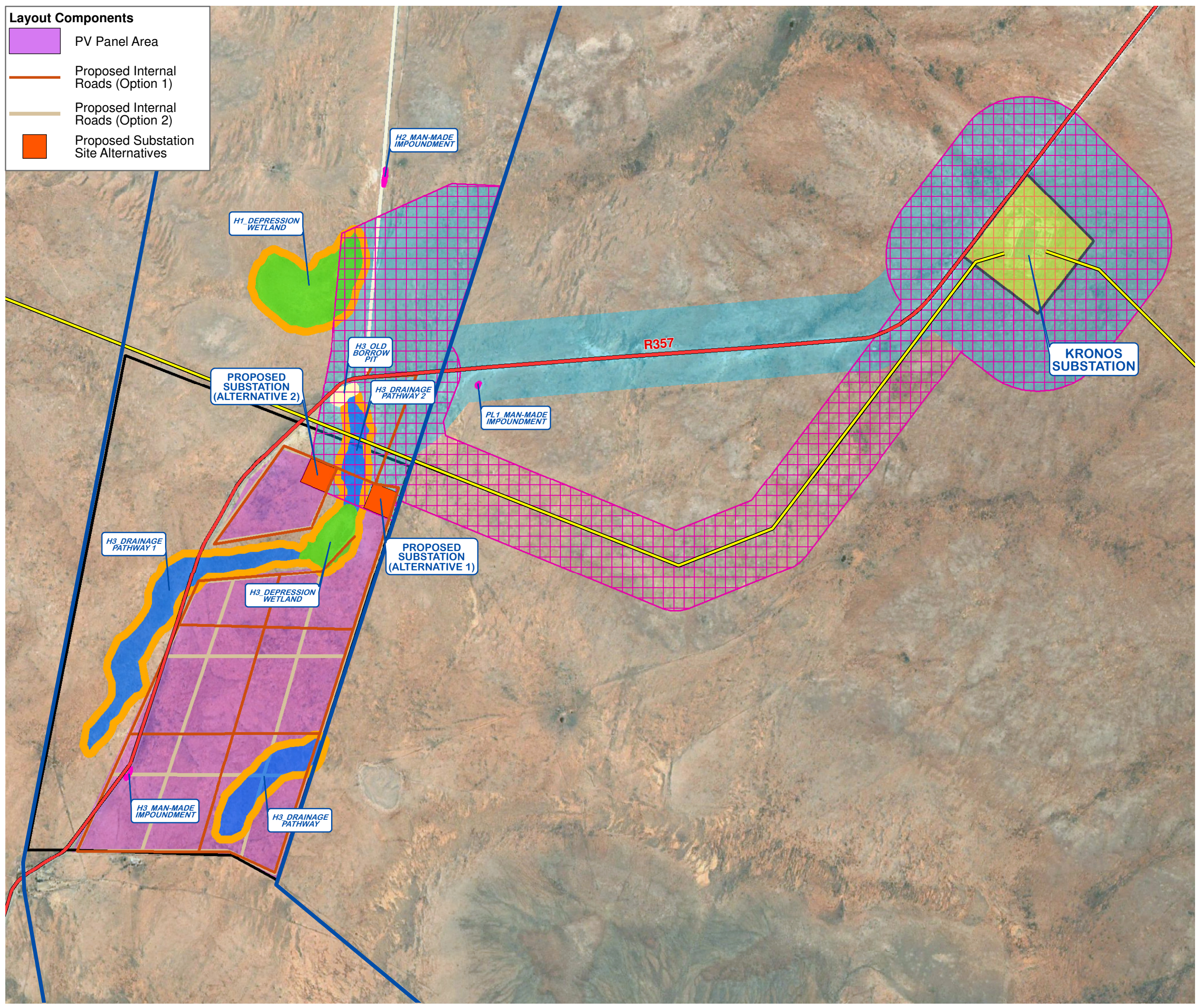
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Layout Components

- PV Panel Area
- Proposed Internal Roads (Option 1)
- Proposed Internal Roads (Option 2)
- Proposed Substation Site Alternatives

**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

SURFACE WATER DELINEATION

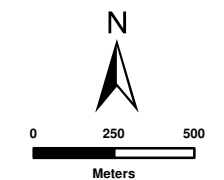
Legend

- Main Road
- Secondary Road
- Existing High Voltage Power Lines (400kV)
- Kronos Substation Site
- Application Site
- Proposed Helena Solar 3 Development Area
- Proposed Power Line Corridor: Option 1
- Proposed Power Line Corridor: Option 2

Surface Water Features

- Drainage Paths
- Wetlands
- Man-Made Impoundments
- Old Borrow Pit
- Surface Water Buffers (50m)

SOURCE:
ESKOM, 2012
GOOGLE EARTH, 2012
BIOTHERM ENERGY, 2015



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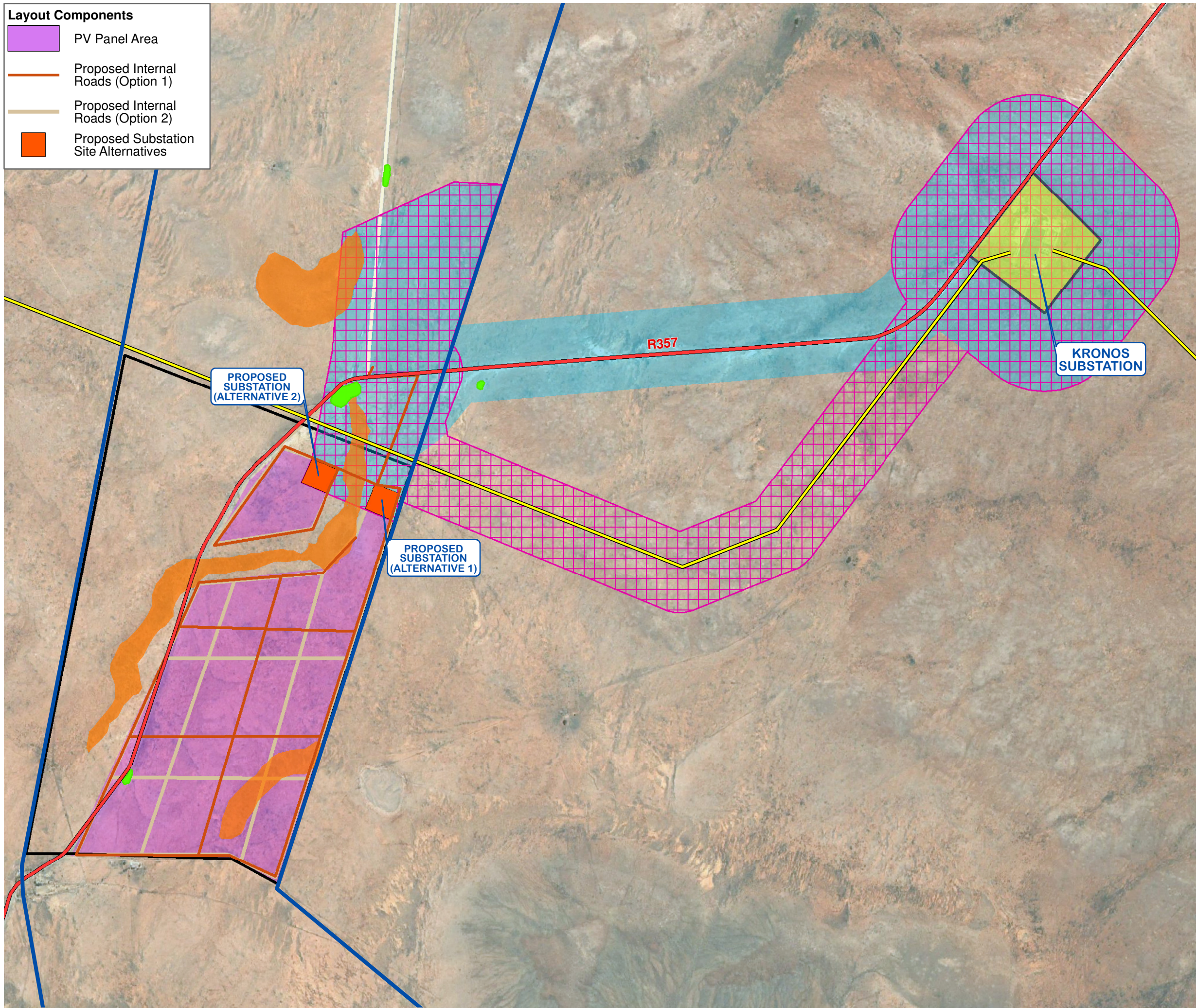
Layout Components

-  PV Panel Area
-  Proposed Internal Roads (Option 1)
-  Proposed Internal Roads (Option 2)
-  Proposed Substation Site Alternatives









**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**SENSITIVITY OVERLAY:
SURFACE WATER**



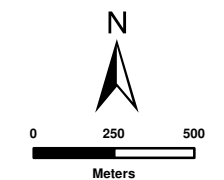
Legend

-  Main Road
-  Secondary Road
-  Existing High Voltage Power Lines (400kV)
-  Kronos Substation Site
-  Application Site
-  Proposed Helena Solar 3 Development Area
-  Proposed Power Line Corridor: Option 1
-  Proposed Power Line Corridor: Option 2

Sensitivity Rating

-  Medium
-  Medium-High

SOURCE:
ESKOM, 2012
GOOGLE EARTH, 2012
BIOTHERM ENERGY, 2015



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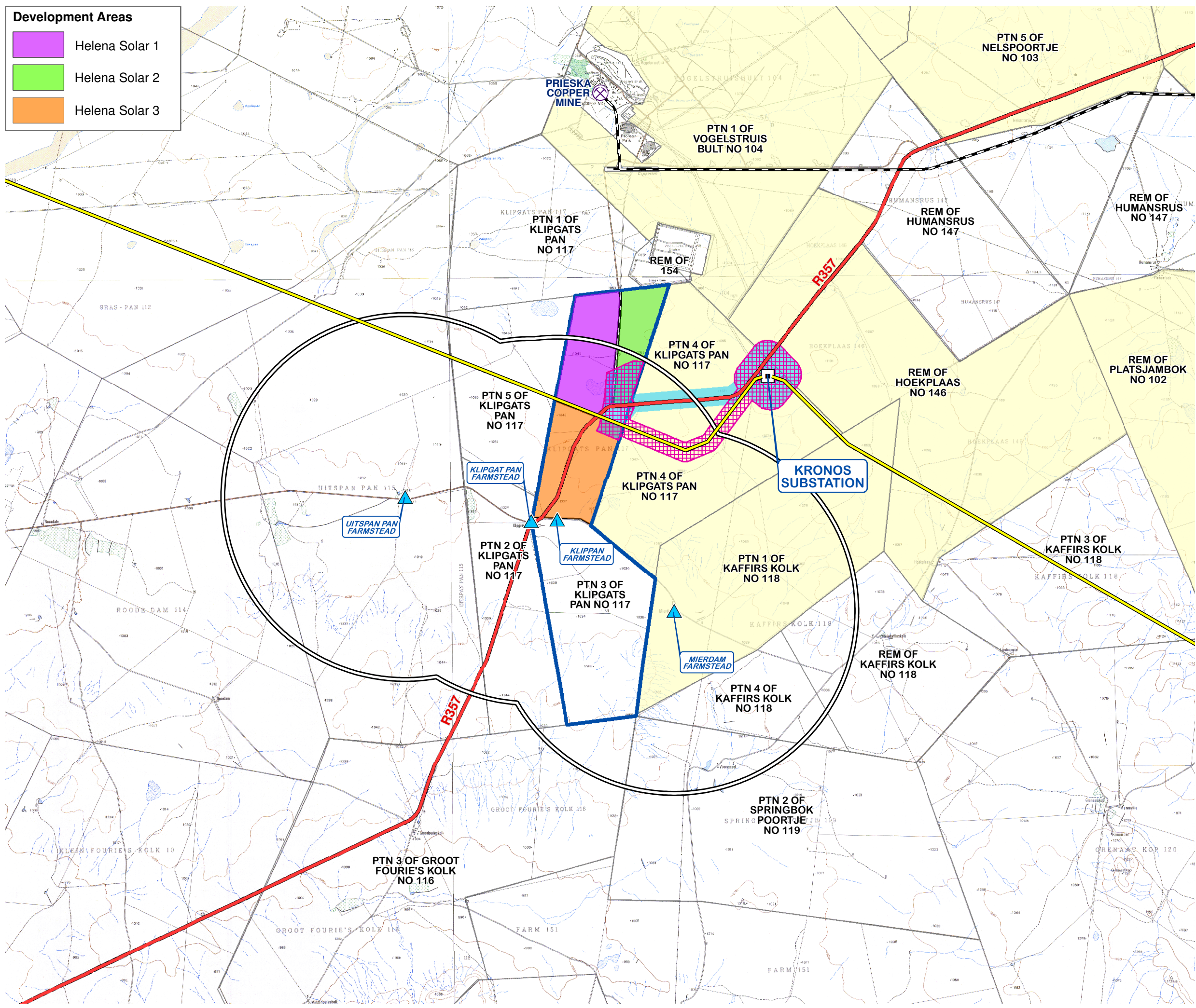
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Development Areas

- Helena Solar 1
- Helena Solar 2
- Helena Solar 3



**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

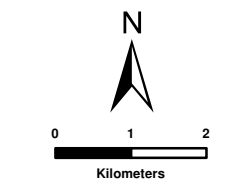
**HELENA SOLAR 1,
HELENA SOLAR 2 AND
HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**VISUAL ASSESSMENT:
OTHER PROPOSED RENEWABLE
ENERGY DEVELOPMENTS**

Legend

- Main Roads
- Railway Line
- Existing High Voltage Power Lines (400kV)
- Existing Substations
- Adjoining Farm Boundaries
- Application Site
- Other Renewable Energy Application Sites
- Proposed Power Line Corridor: Option 1
- Proposed Power Line Corridor: Option 2
- Proposed Substation Site Alternatives
- Potentially Sensitive Receptor Locations
- 5km Buffer

SOURCE:
ESKOM, 2012
BIOTHERM ENERGY, 2015



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Land Cover Classification

- Bare (Non Vegetated)
- Cultivation
- Grassland
- Industry
- Mining
- Low Shrubland
- Thicket/Dense Bush
- Woodland/Open Bush

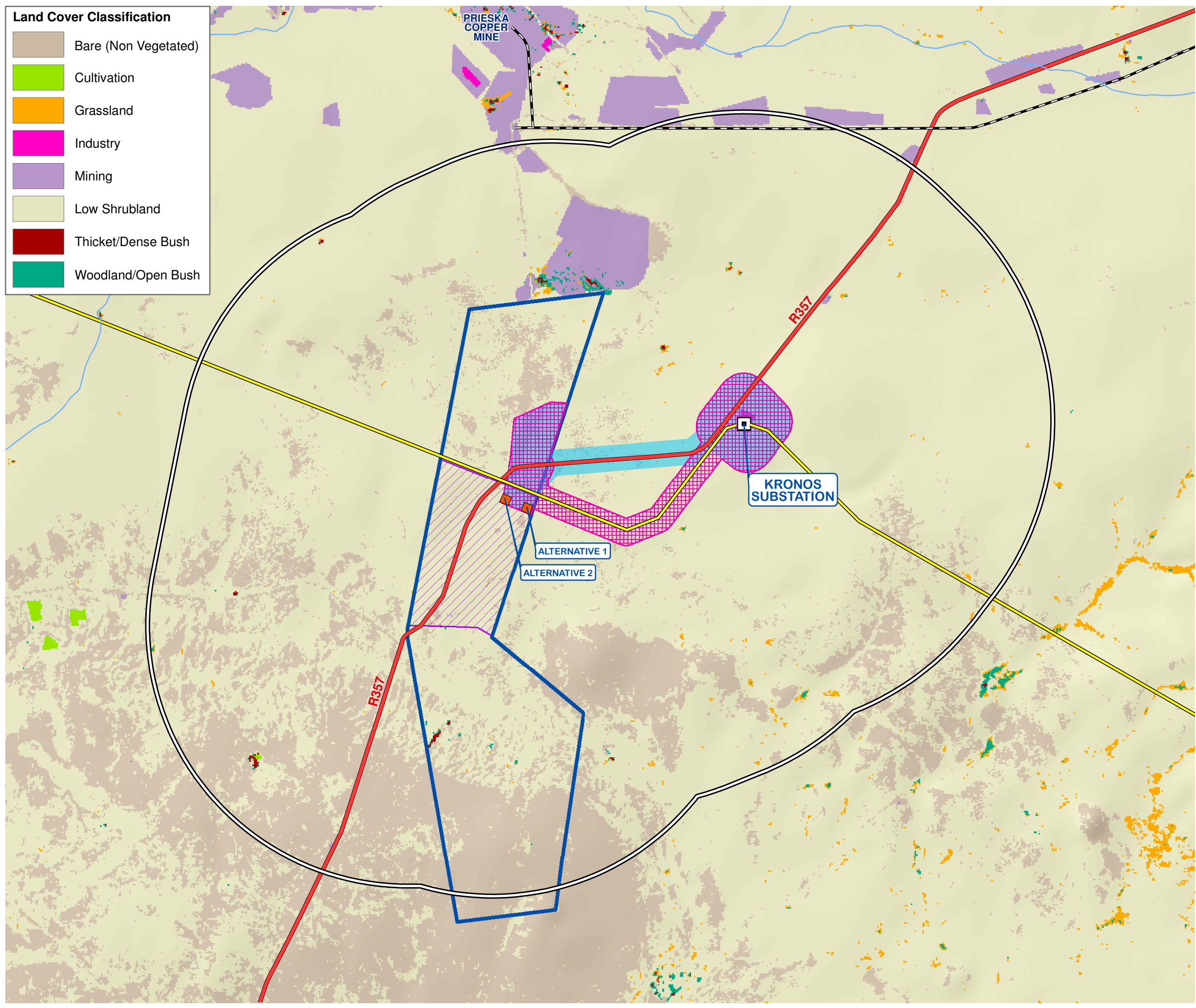
**PROPOSED
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ENERGY FACILITY**

**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

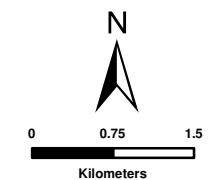
**VISUAL ASSESSMENT:
BROAD LAND COVER
CLASSIFICATION**

Legend

- Main Roads
- Railway Line
- Existing High Voltage Power Lines (400kV)
- Main Rivers/Water Courses
- Existing Substation
- Application Site
- Proposed Helena Solar 3 Development Area
- 5km Visual Assessment Zone
- Proposed Power Line Corridor: Option 1
- Proposed Power Line Corridor: Option 2
- Proposed Substation Site Alternatives



SOURCE:
ESKOM, 2012
BIOTHERM ENERGY 2015
2013-2014 SA NATIONAL LAND COVER
(© GEOTERRAIMAGE - 2014)



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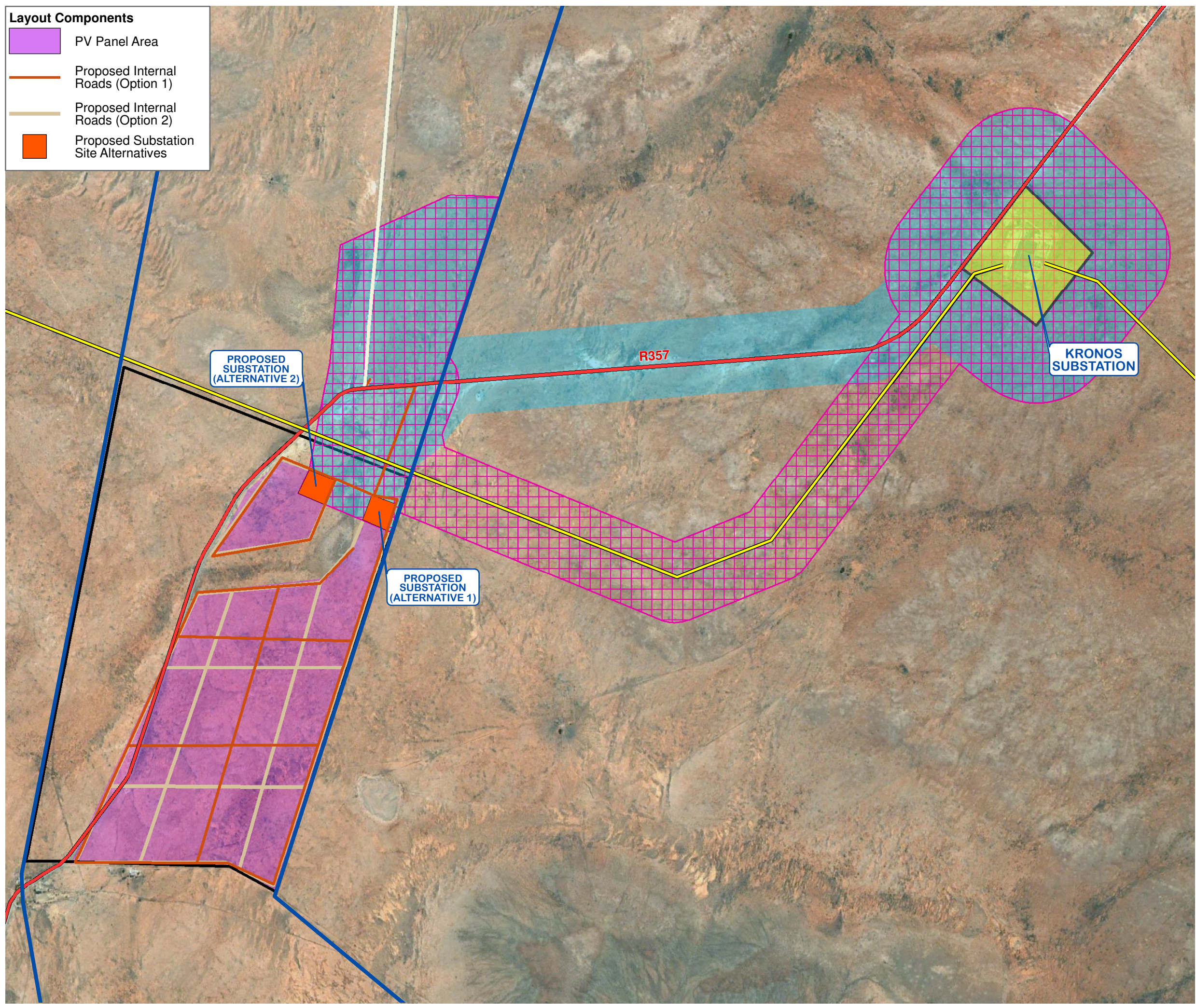
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Layout Components

- PV Panel Area
- Proposed Internal Roads (Option 1)
- Proposed Internal Roads (Option 2)
- Proposed Substation Site Alternatives

**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

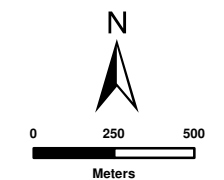
**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**VISUAL ASSESSMENT:
PROPOSED SITE LAYOUT**

Legend

- Main Road
- Secondary Road
- Existing High Voltage Power Lines (400kV)
- Kronos Substation Site
- Application Site
- Proposed Helena Solar 3 Development Area
- Proposed Power Line Corridor: Option 1
- Proposed Power Line Corridor: Option 2

SOURCE:
ESKOM, 2012
GOOGLE EARTH, 2012
BIOTHERM ENERGY, 2015



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Visual Receptors
 Potentially Sensitive Receptor Locations

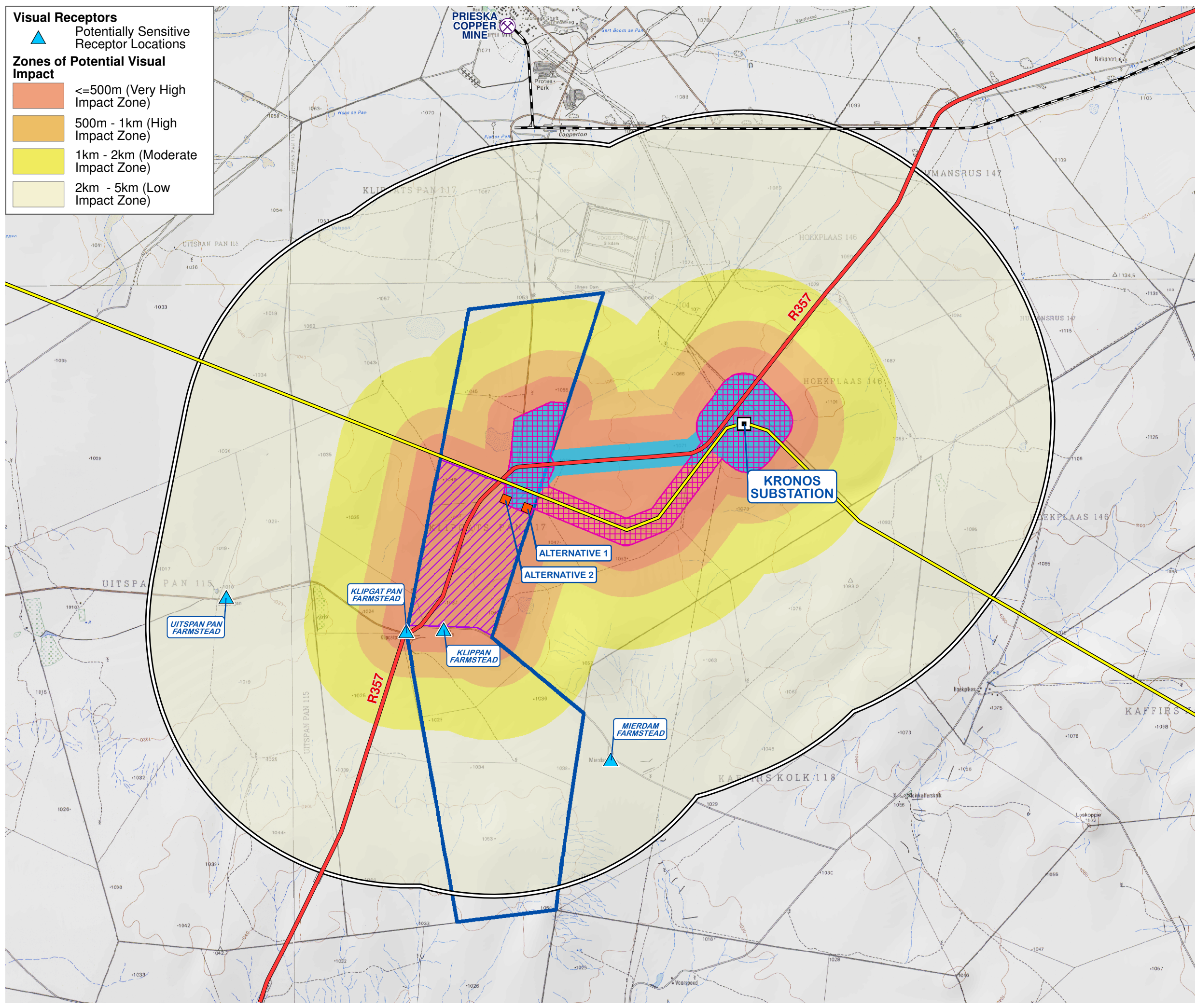
Zones of Potential Visual Impact

- <=500m (Very High Impact Zone)
- 500m - 1km (High Impact Zone)
- 1km - 2km (Moderate Impact Zone)
- 2km - 5km (Low Impact Zone)

PROPOSED CONSTRUCTION OF A 75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY

HELENA SOLAR 3 NEAR COPPERTON NORTHERN CAPE PROVINCE

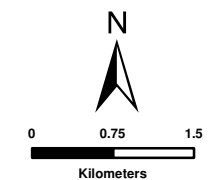
VISUAL ASSESSMENT: POTENTIALLY SENSITIVE VISUAL RECEPTOR LOCATIONS



Legend

- Main Roads
- Railway Line
- Existing High Voltage Power Lines (400kV)
- Main Rivers/Water Courses
- Existing Substation
- Application Site
- Proposed Helena Solar 3 Development Area
- 5km Visual Assessment Zone
- Proposed Power Line Corridor: Option 1
- Proposed Power Line Corridor: Option 2
- Proposed Substation Site Alternatives

SOURCE:
 ESKOM, 2012
 BIOTHERM ENERGY, 2015



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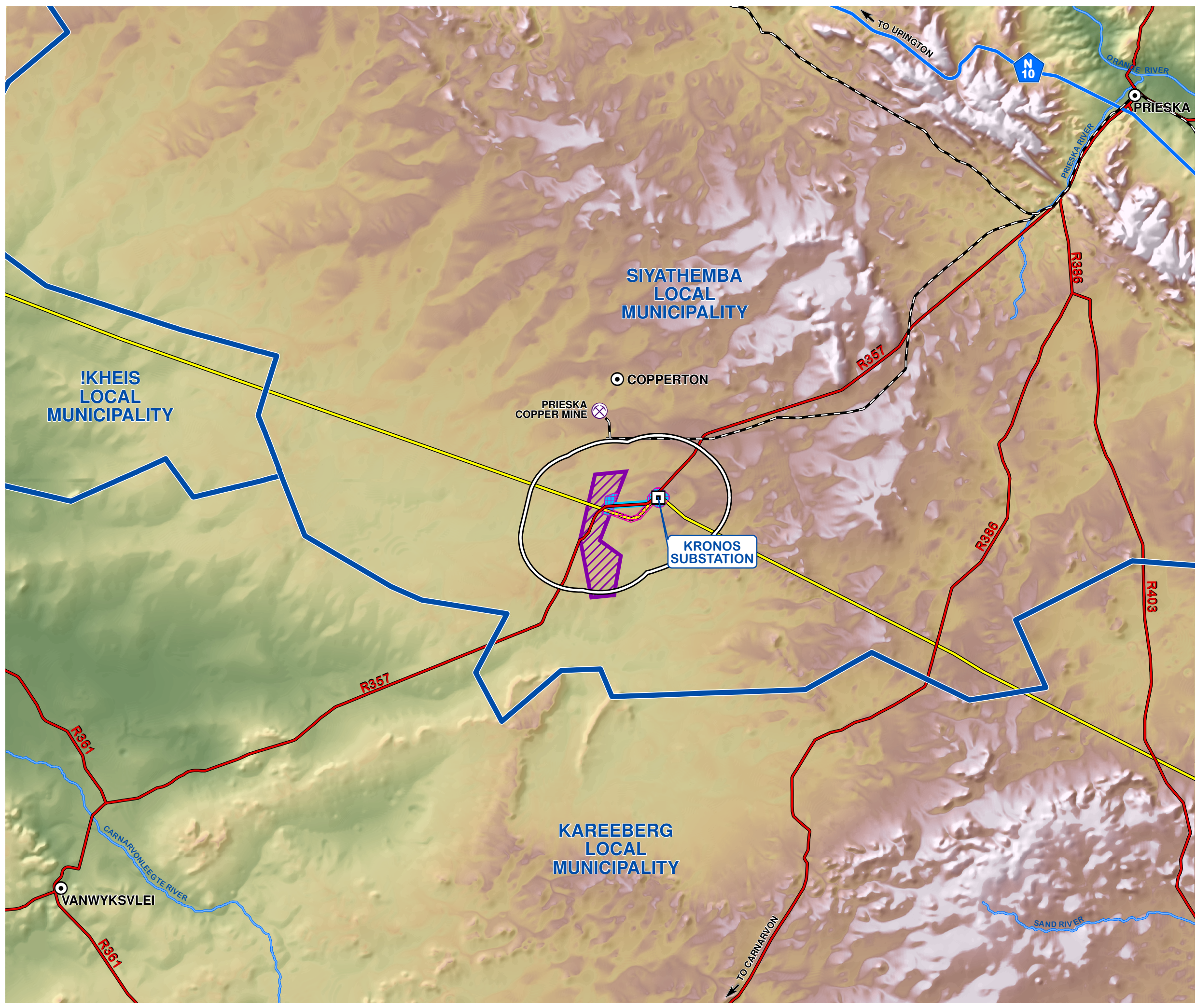
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PROPOSED CONSTRUCTION OF A 75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY

HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE

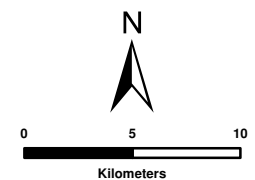
VISUAL ASSESSMENT:
REGIONAL CONTEXT



Legend

- Local Municipal Boundaries
- National Route (N10)
- Main Roads
- Railway Line
- Existing High Voltage Power Lines (400kV)
- Main Rivers
- Main Towns
- Kronos MTS Substation
- Application Site
- 5km Visual Assessment Zone
- Proposed Power Line Corridor: Option 1
- Proposed Power Line Corridor: Option 2

SOURCE:
ESKOM, 2012
MUNICIPAL DEMARCATION BOARD, 2011
NFEPA, 2011
NGI, 2014



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Vegetation Classification

-  Bushmanland Arid Grassland
-  Bushland Basin Shrubland
-  Bushmanland Vloere







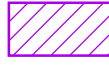




PRIESKA COPPER MINE

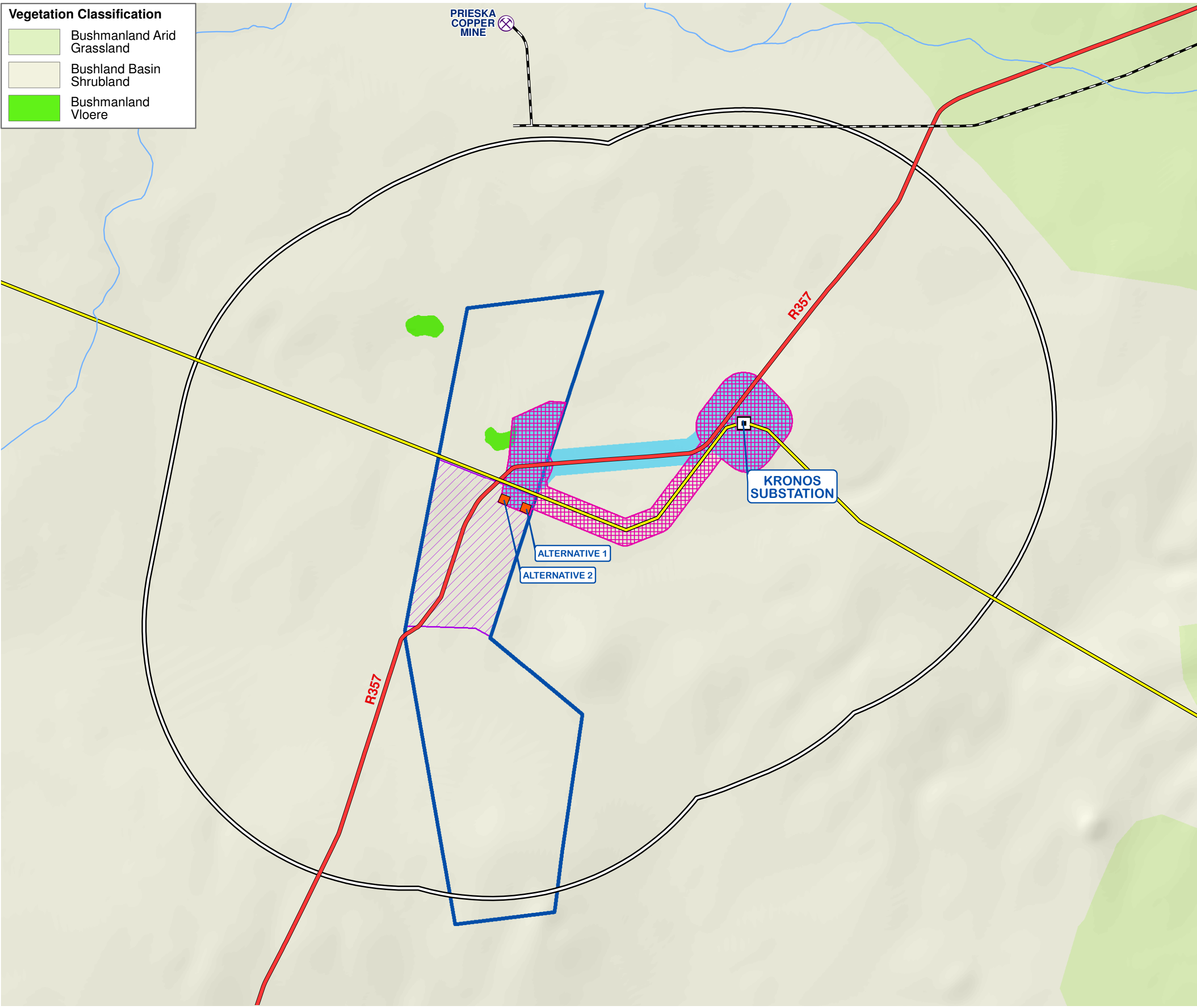
PROPOSED CONSTRUCTION OF A 75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY

HELENA SOLAR 3 NEAR COPPERTON NORTHERN CAPE PROVINCE

VISUAL ASSESSMENT: VEGETATION CLASSIFICATION (SANBI 2006)


Legend

-  Main Roads
-  Railway Line
-  Existing High Voltage Power Lines (400kV)
-  Main Rivers/Water Courses
-  Existing Substation
-  Application Site
-  Proposed Helena Solar 3 Development Area
-  5km Visual Assessment Zone
-  Proposed Power Line Corridor: Option 1
-  Proposed Power Line Corridor: Option 2
-  Proposed Substation Site Alternatives



SOURCE:
ESKOM, 2012
BIOTHERM ENERGY, 2015
SANBI, 2006

N



0 0.75 1.5
Kilometers

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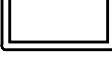







PROPOSED CONSTRUCTION OF A 75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY

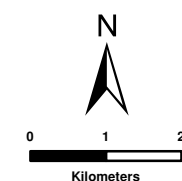
HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE

VISUAL ASSESSMENT:
SITE LOCALITY

Legend

-  Main Roads
-  Railway Line
-  Existing High Voltage Power Lines (400kV)
-  Existing Substations
-  Adjoining Farm Boundaries
-  Application Site
-  5km Visual Assessment Zone
-  Proposed Helena Solar 3 Development Area
-  Other Proposed Solar PV Energy Facilities
-  Proposed Power Line Corridor: Option 1
-  Proposed Power Line Corridor: Option 2
-  Proposed Substation Site Alternatives

SOURCE:
ESKOM, 2012
BIOTHERM ENERGY, 2015
MUNICIPAL DEMARCATION BOARD, 2011

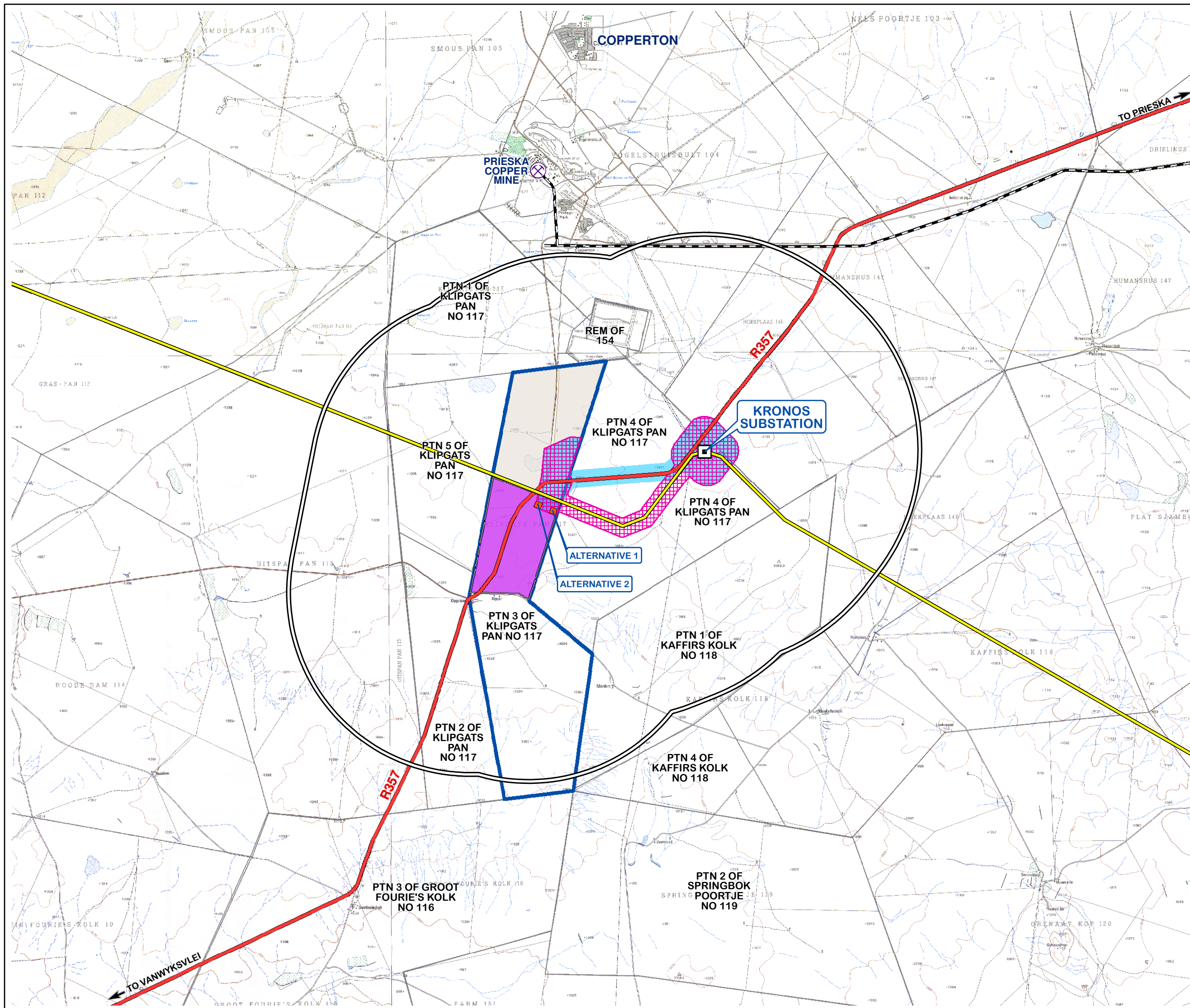


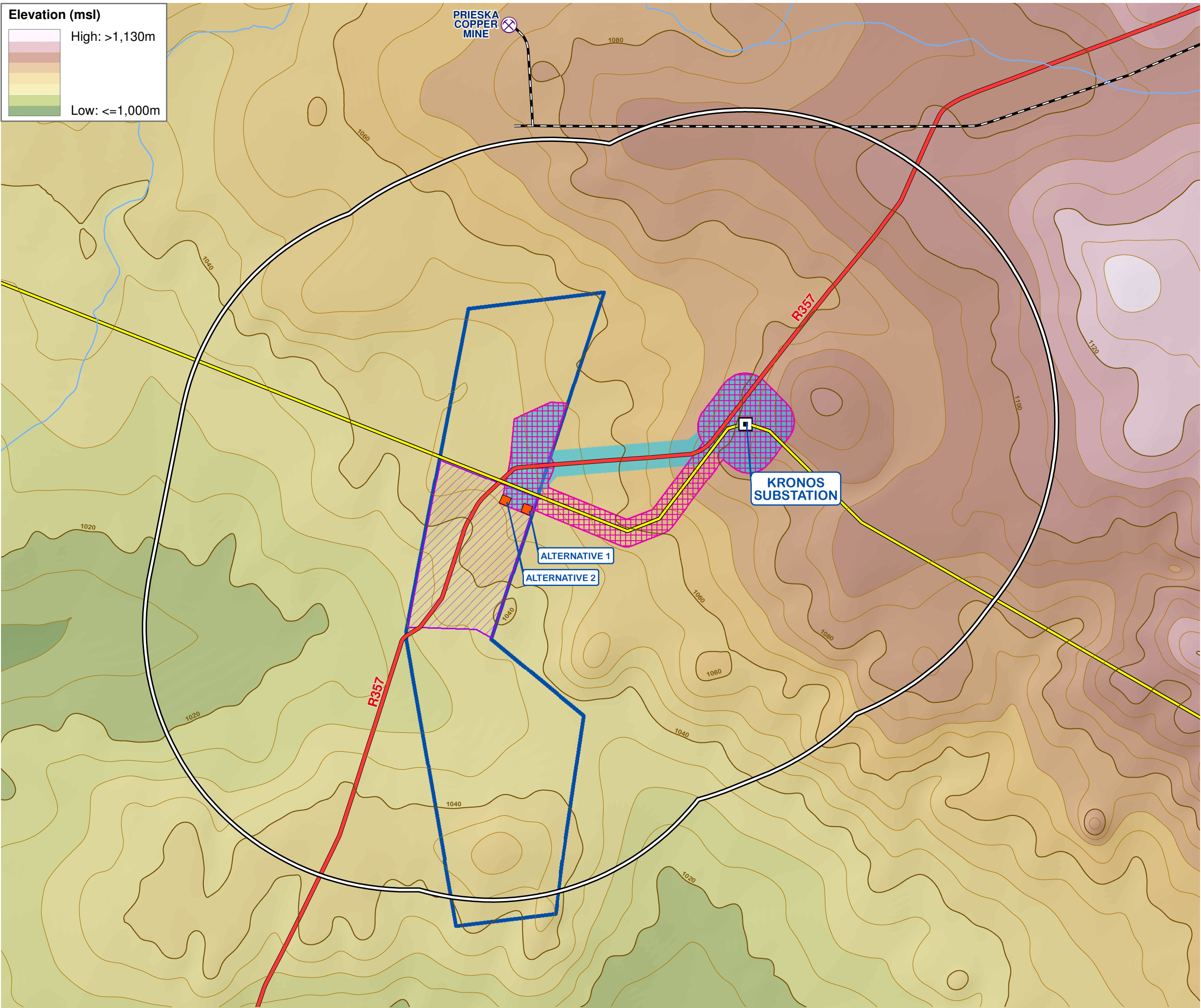
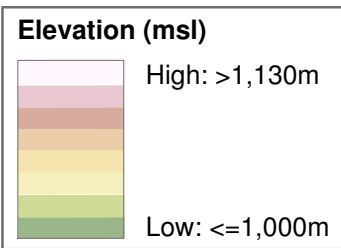
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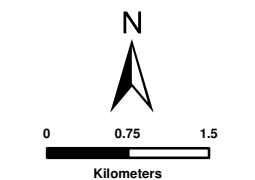
**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 3
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**VISUAL ASSESSMENT:
TOPOGRAPHY**

- Legend**
- Main Roads
 - Railway Line
 - Existing High Voltage Power Lines (400kV)
 - Main Rivers/Water Courses
 - Contours (20m Interval)
 - Contours (5m Interval)
 - Existing Substation
 - Application Site
 - Proposed Helena Solar 3 Development Area
 - 5km Visual Assessment Zone
 - Proposed Power Line Corridor: Option 1
 - Proposed Power Line Corridor: Option 2
 - Proposed Substation Site Alternatives

SOURCE:
ESKOM, 2012
MAINSTREAM, 2015
NGI, 2014



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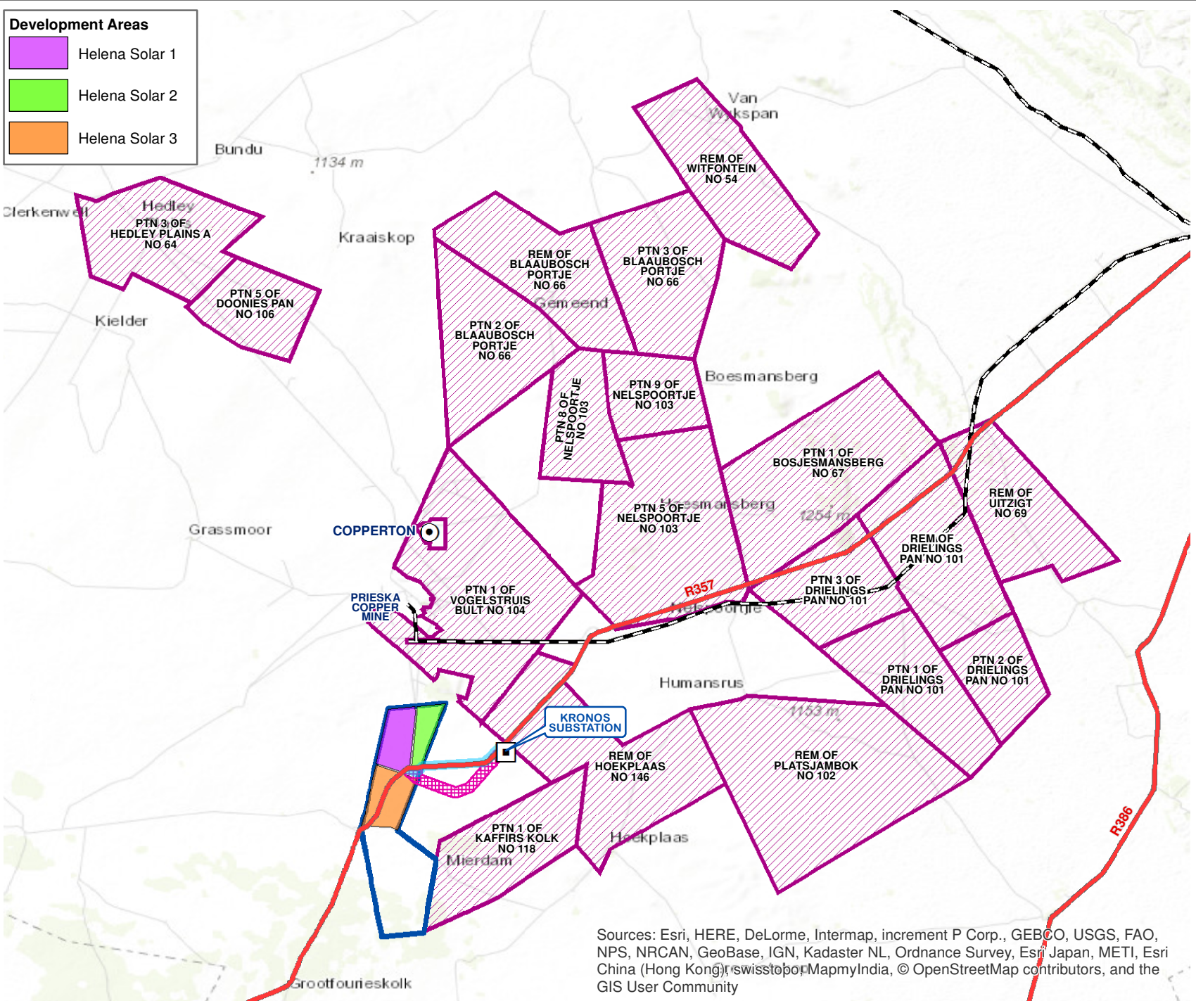
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Development Areas

- Helena Solar 1
- Helena Solar 2
- Helena Solar 3



PROPOSED CONSTRUCTION OF A THREE PHASED 75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY (END CAPACITY 225MW)

HELENA SOLAR 1 ; HELENA SOLAR 2 AND HELENA SOLAR 3 NEAR COPPERTON NORTHERN CAPE PROVINCE

OTHER PROPOSED RENEWABLE ENERGY DEVELOPMENTS

Legend

- Main Roads
- Other Roads
- Railway Line
- Existing Substation
- Application Site
- Proposed Power Line Corridor: Option 1 (500m)
- Proposed Power Line Corridor: Option 2 (500m)
- Other Renewable Energy Application Sites

SOURCE: ESKOM, 2011

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Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community