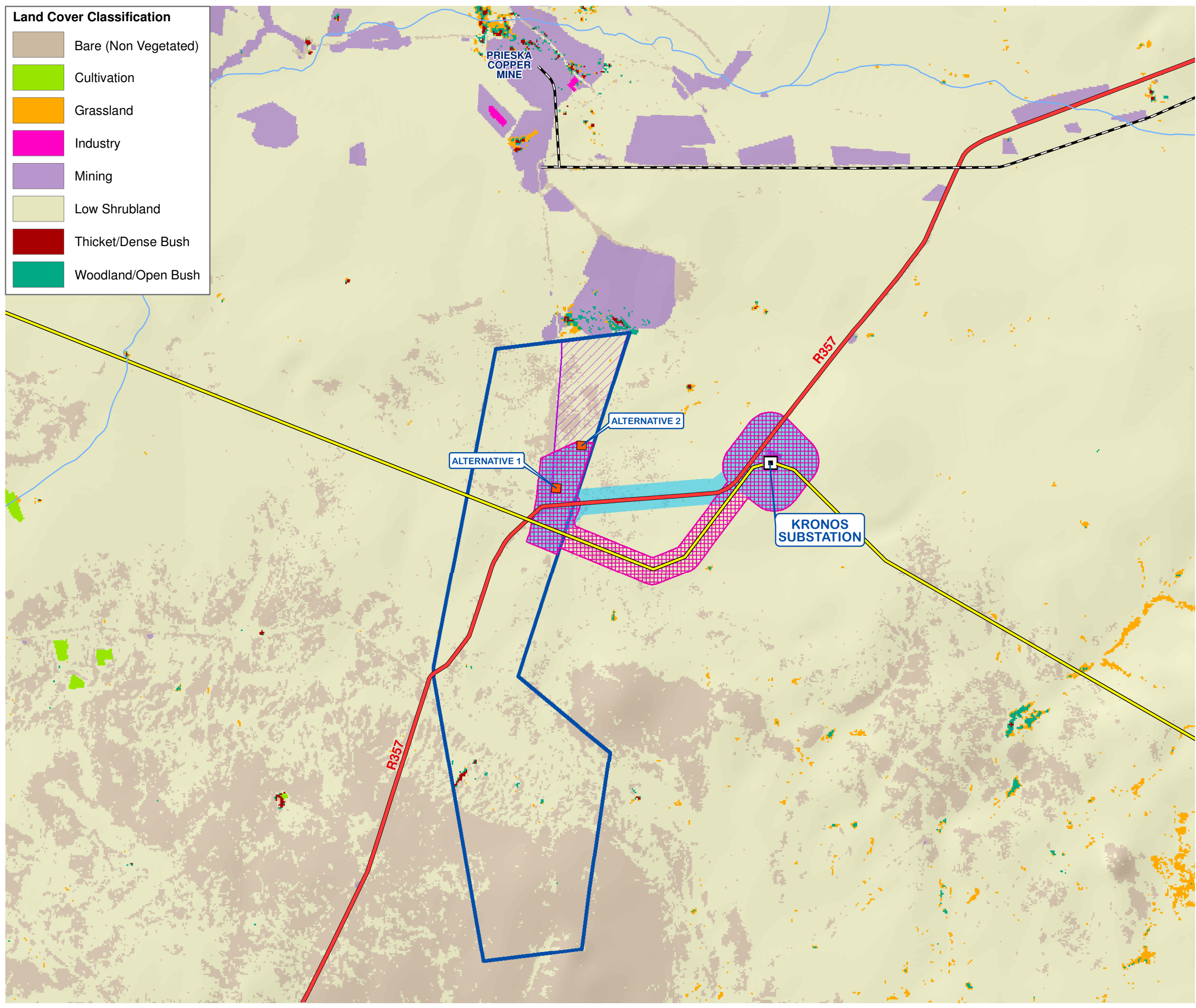


Land Cover Classification

- 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**

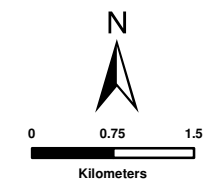
**HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**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 2 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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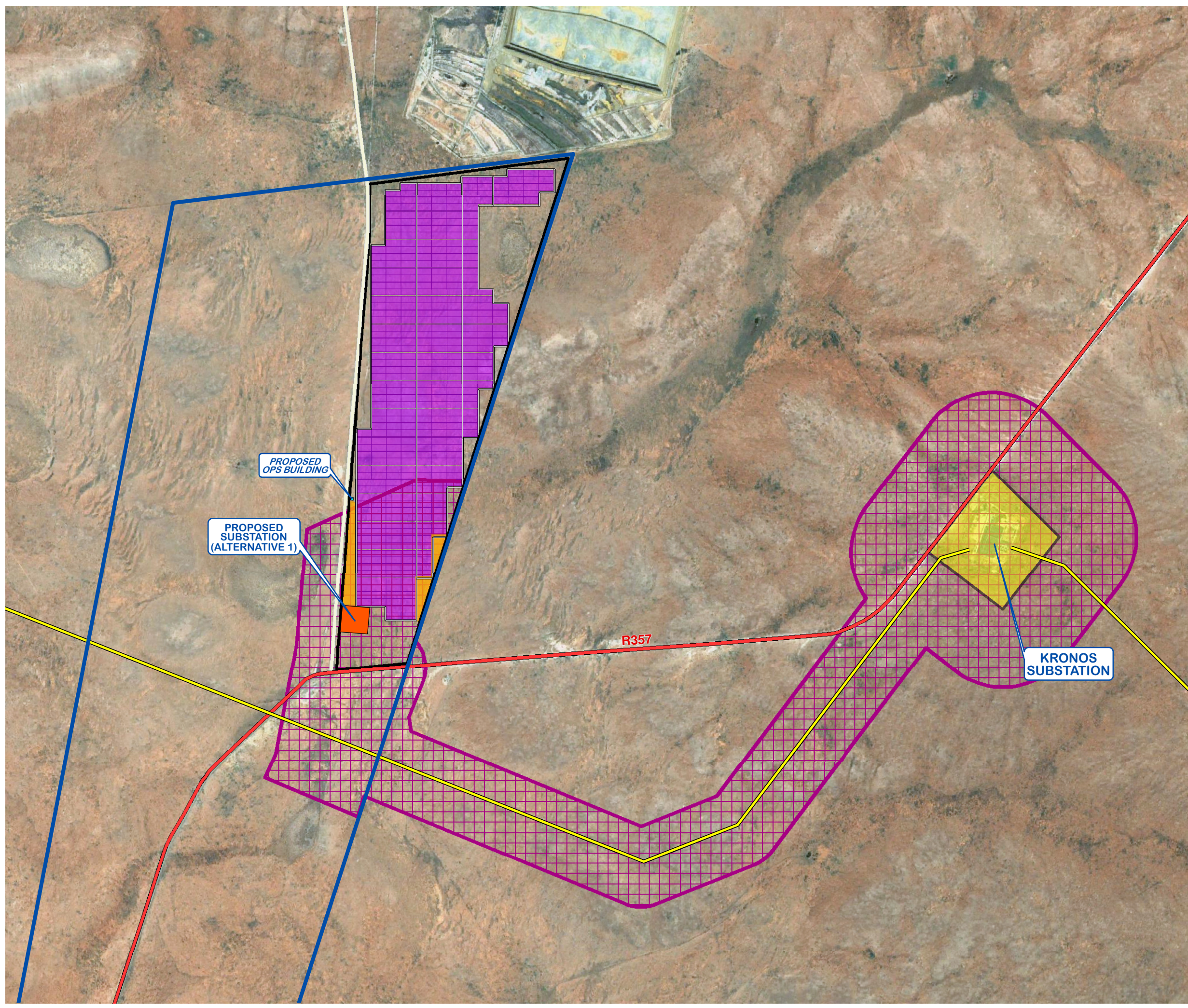
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**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

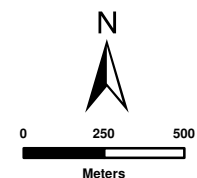
PREFERRED SITE LAYOUT



Legend

- Main Road
 - Secondary Road
 - Existing High Voltage Power Lines (400kV)
 - Kronos Substation Site
 - Application Site
 - Proposed Helena Solar 2 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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Layout Components

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

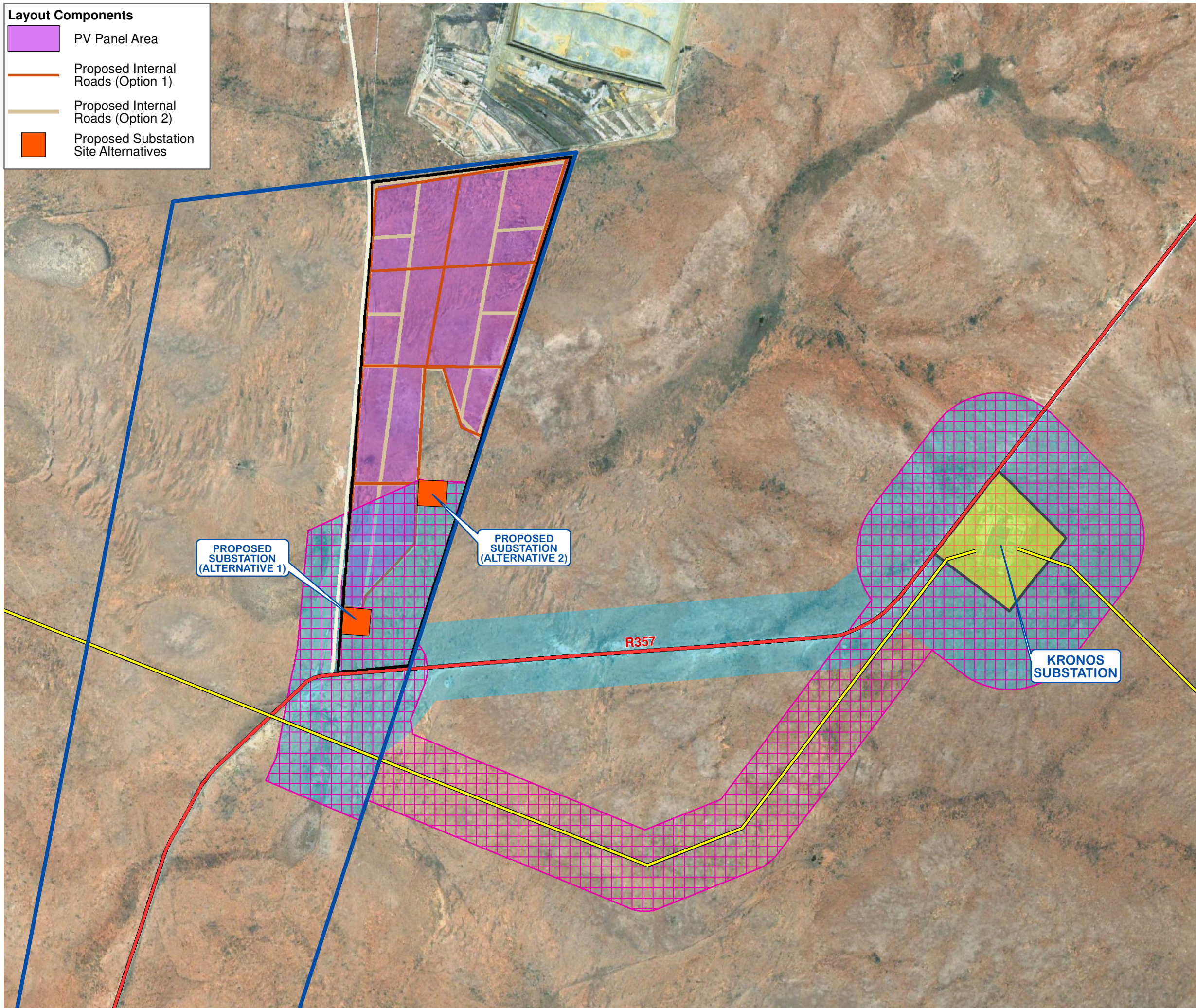
**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
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ENERGY FACILITY**

**HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

PROPOSED SITE LAYOUT

Legend

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



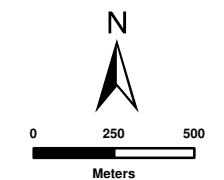
PROPOSED SUBSTATION (ALTERNATIVE 1)

PROPOSED SUBSTATION (ALTERNATIVE 2)

KRONOS SUBSTATION

R357

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



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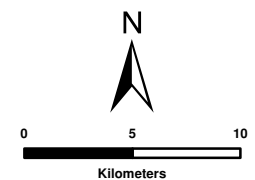
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**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**
**HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**
REGIONAL CONTEXT

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

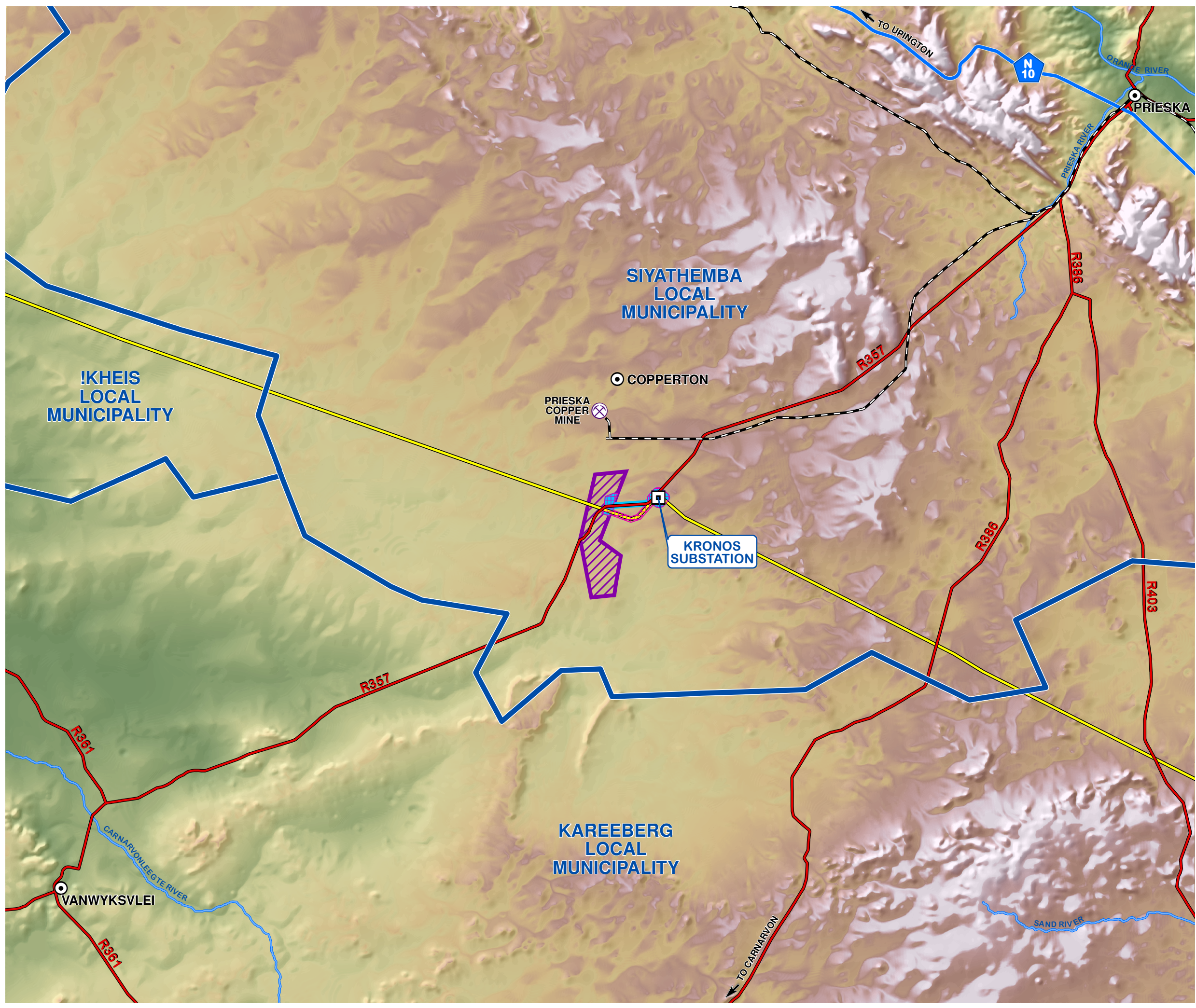


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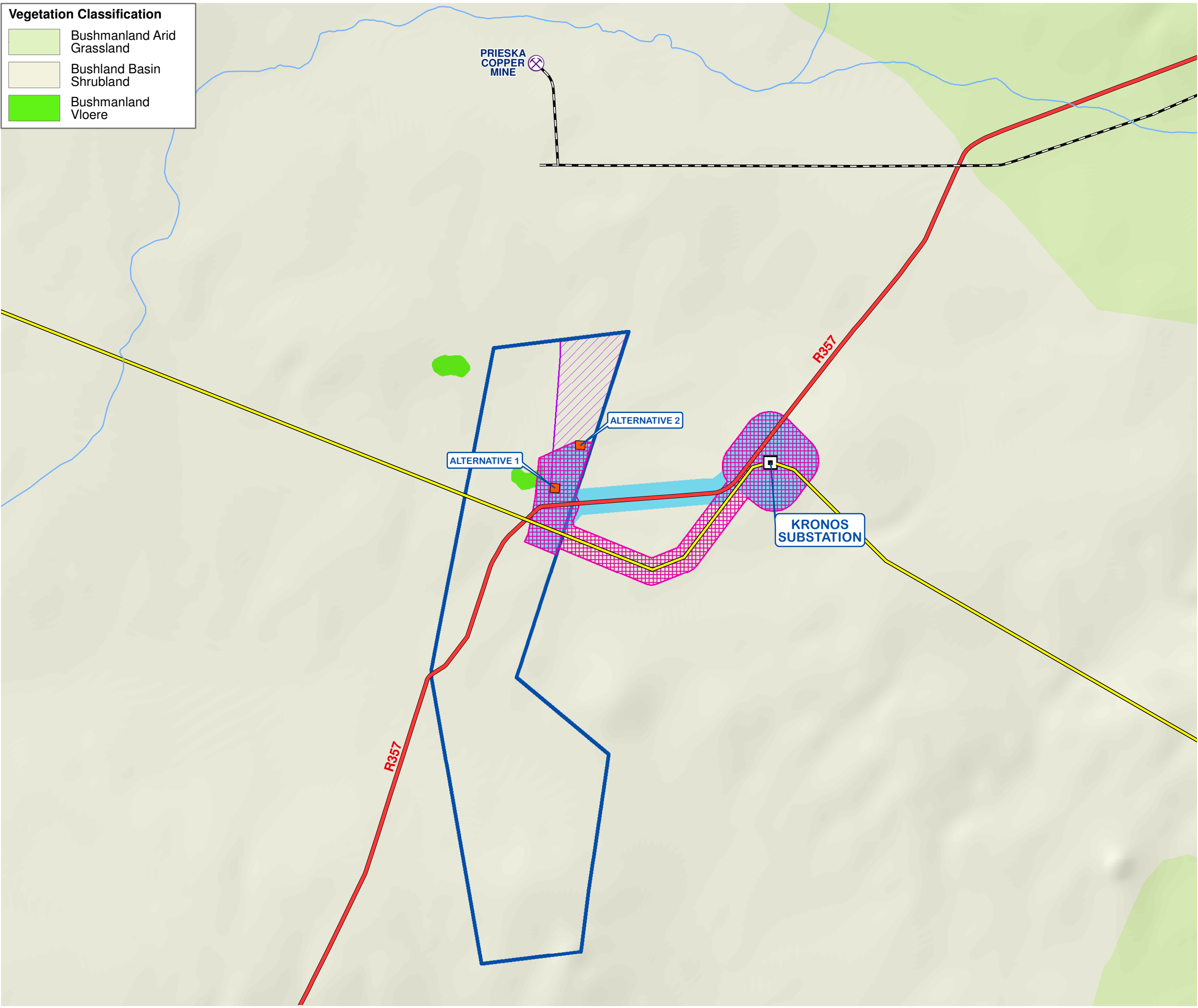
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Vegetation Classification

- Bushmanland Arid Grassland
- Bushland Basin Shrubland
- Bushmanland Vloere



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

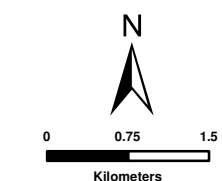
**HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**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 2 Development Area
- Proposed Power Line Corridor: Option 1
- Proposed Power Line Corridor: Option 2
- Proposed Substation Site Alternatives

SOURCE:
ESKOM, 2012
BIOTERM, 2015
SANBI, 2006



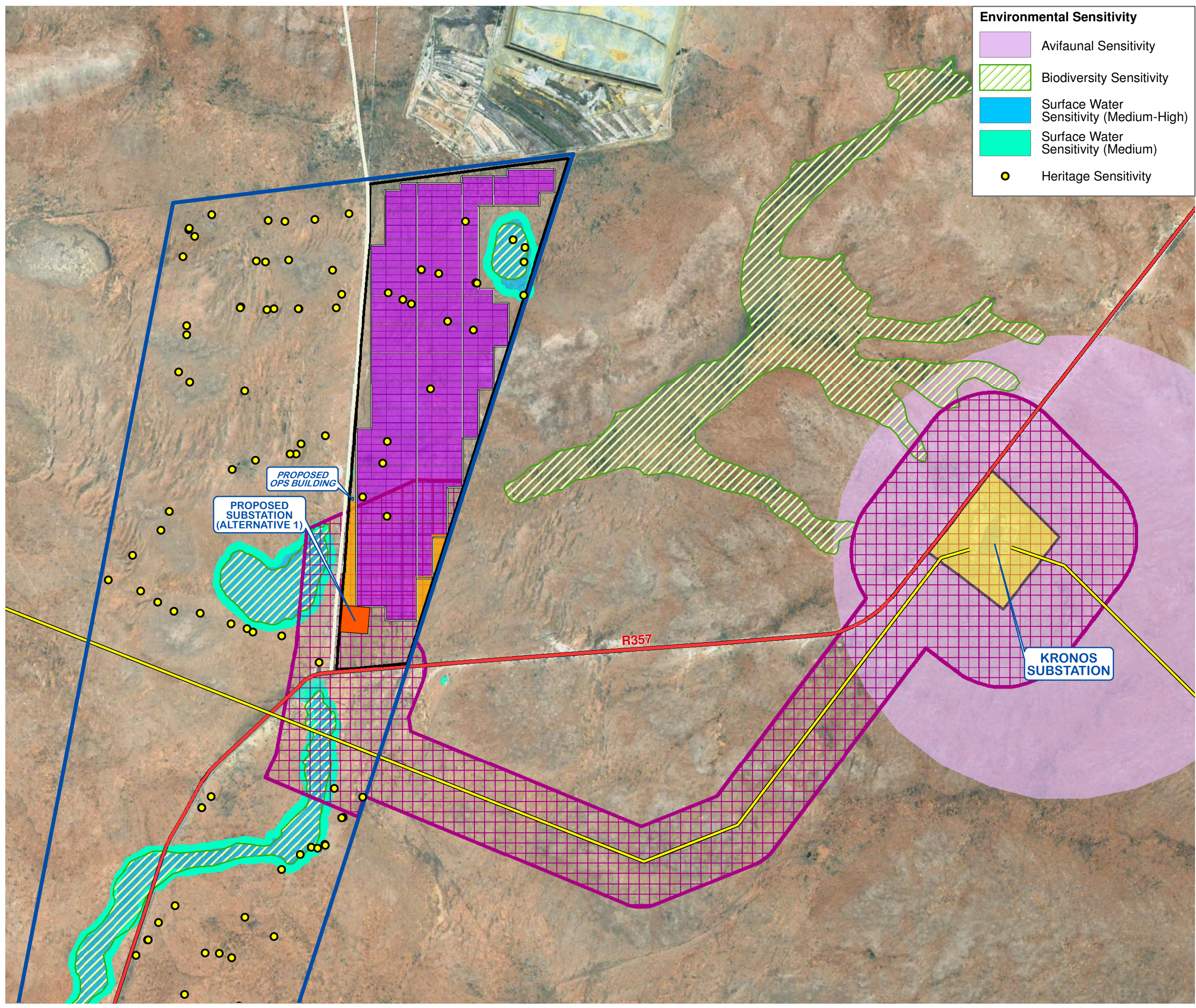
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Environmental Sensitivity

- 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 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

**PREFERRED SITE LAYOUT
WITH SENSITIVITY OVERLAY**

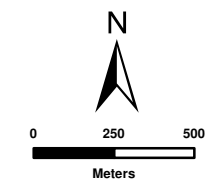
Legend

- Main Road
- Secondary Road
- Existing High Voltage Power Lines (400kV)
- Kronos Substation Site
- Application Site
- Proposed Helena Solar 2 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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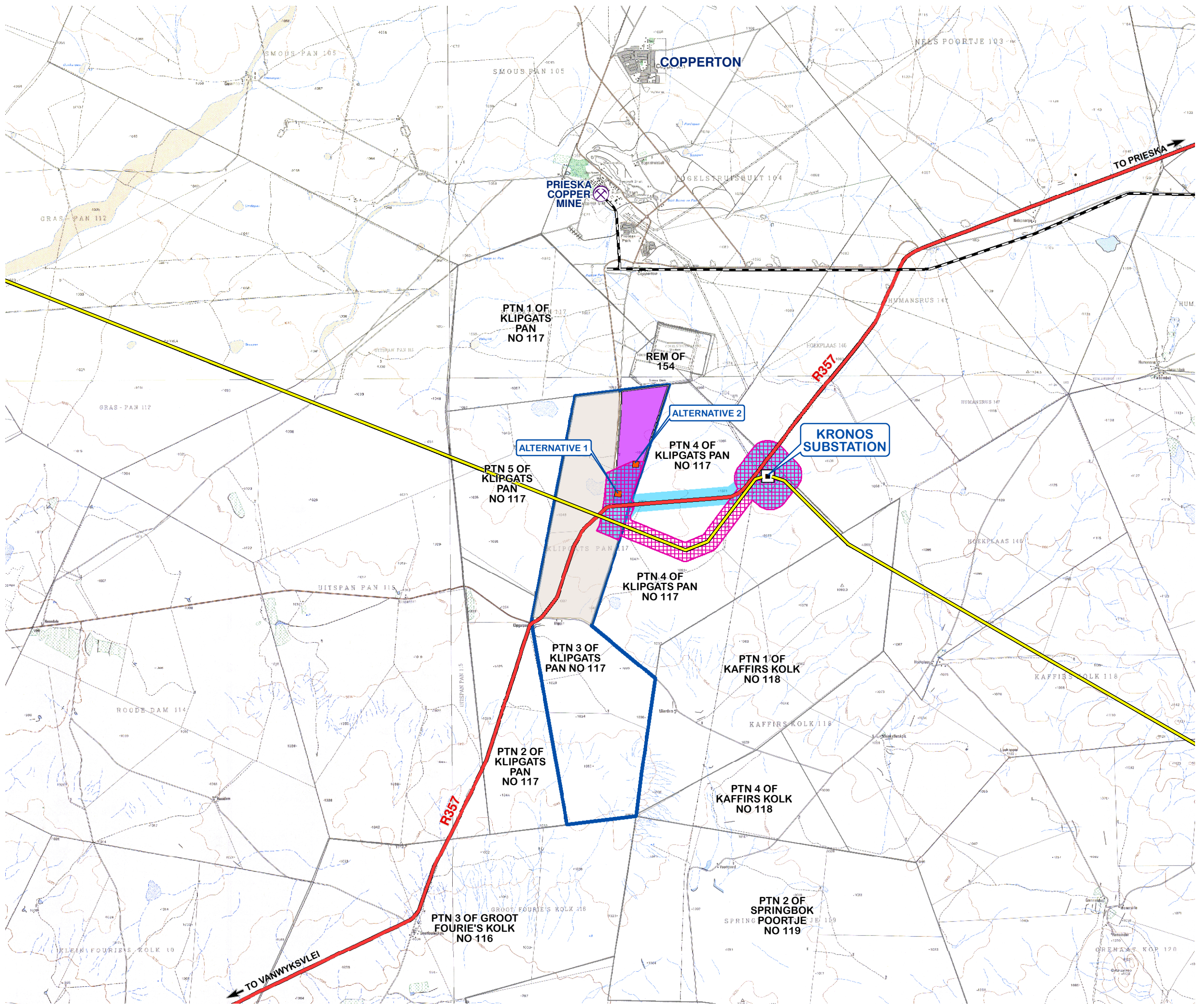
**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

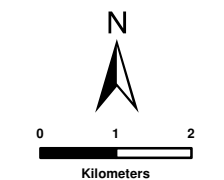
SITE LOCALITY

Legend

-  Main Roads
-  Railway Line
-  Existing High Voltage Power Lines (400kV)
-  Existing Substations
-  Adjoining Farm Boundaries
-  Application Site
-  Proposed Helena Solar 2 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



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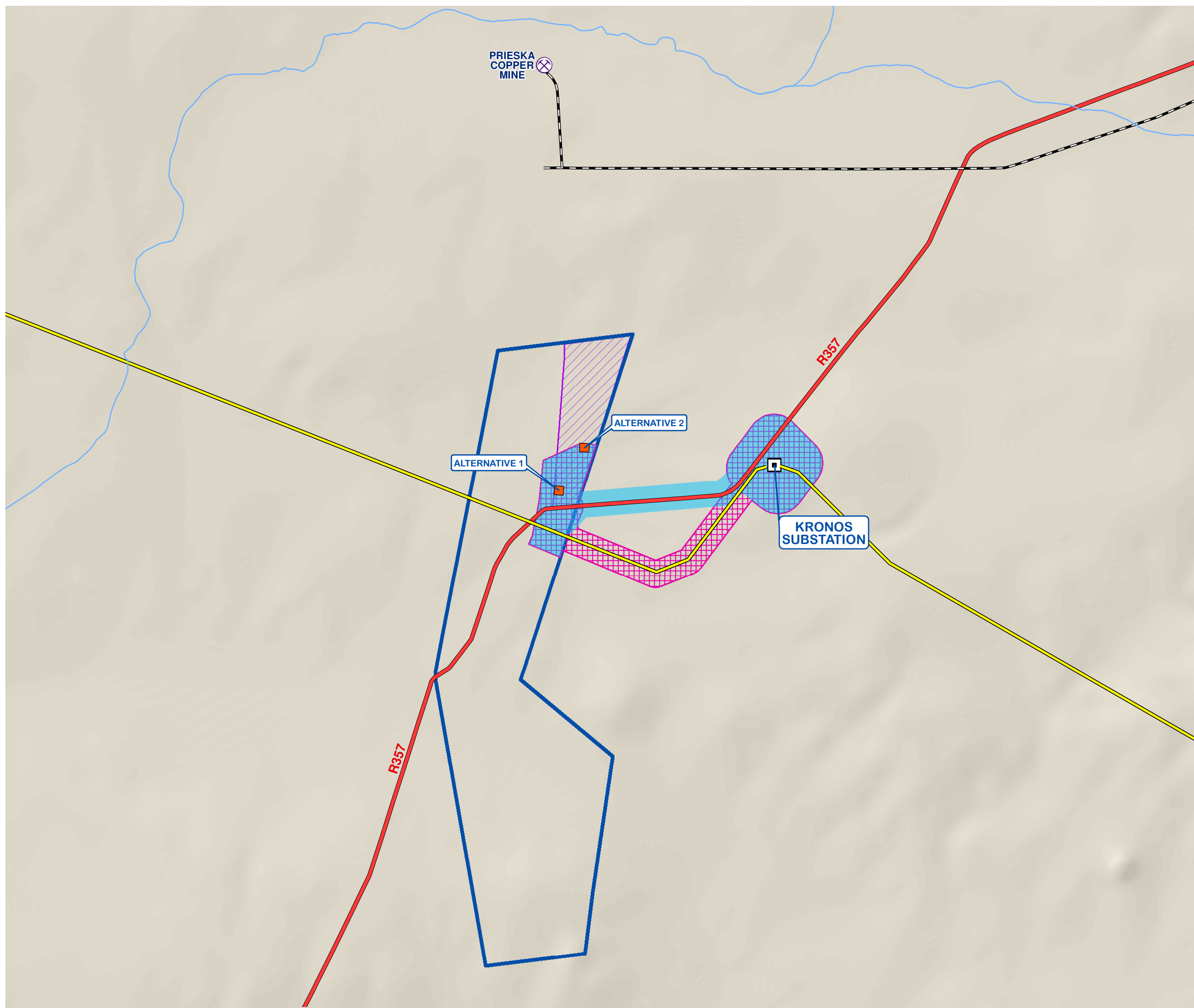
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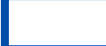




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**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**
**HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**
SLOPE CLASSIFICATION



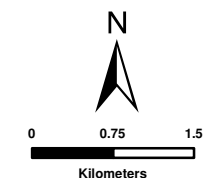
Legend

-  Main Roads
-  Railway Line
-  Existing High Voltage Power Lines (400kV)
-  Main Rivers/Water Courses
-  Existing Substation
-  Application Site
-  Proposed Helena Solar 2 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

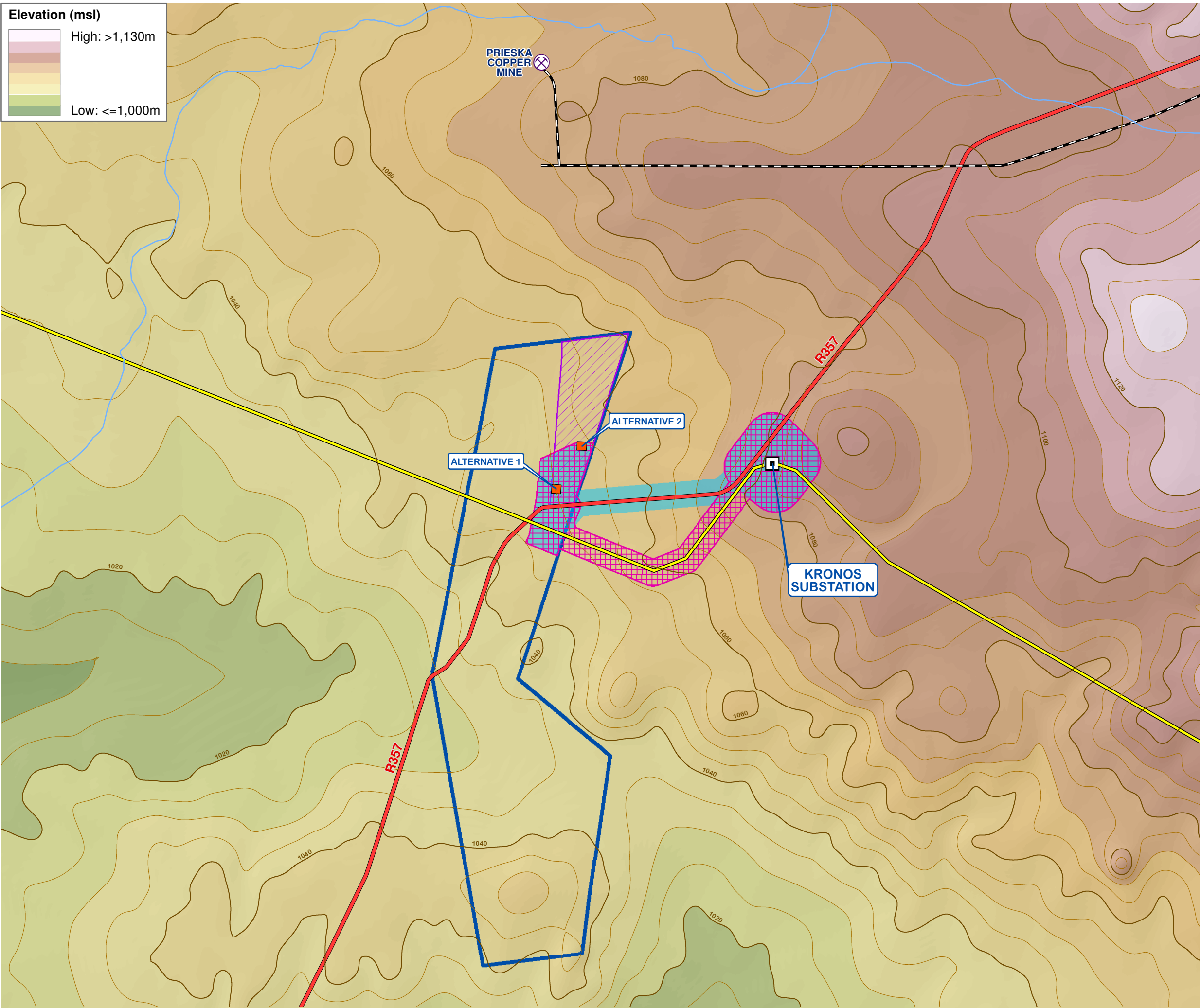
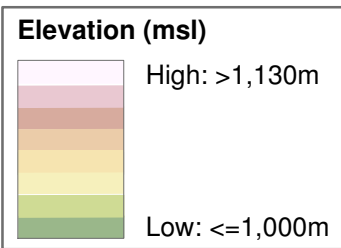


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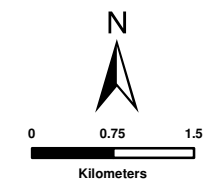
**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 2
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 2 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



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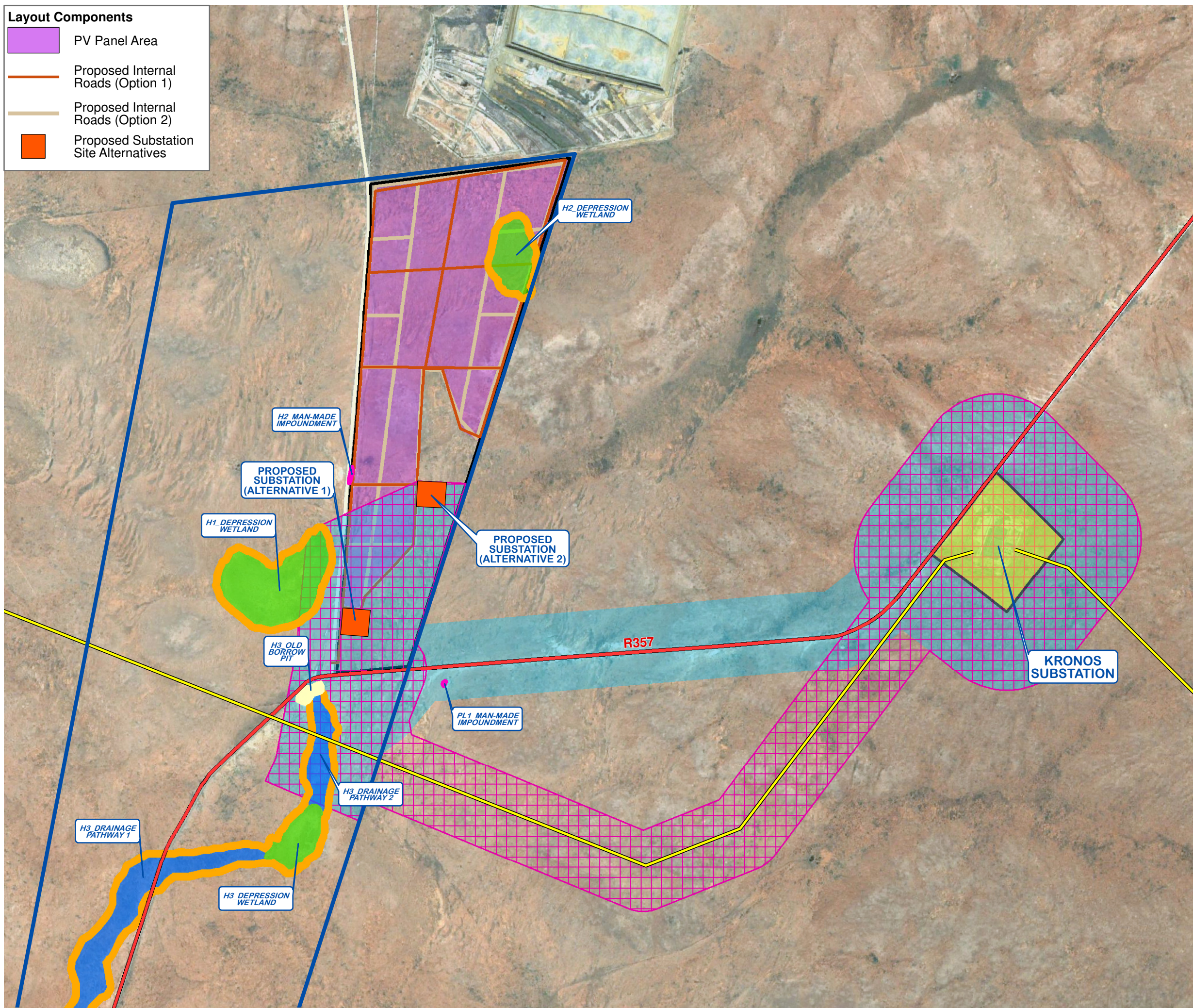
Layout Components

- 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 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

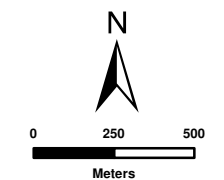
SURFACE WATER DELINEATION



Legend

- Main Road
 - Secondary Road
 - Existing High Voltage Power Lines (400kV)
 - Kronos Substation Site
 - Application Site
 - Proposed Helena Solar 2 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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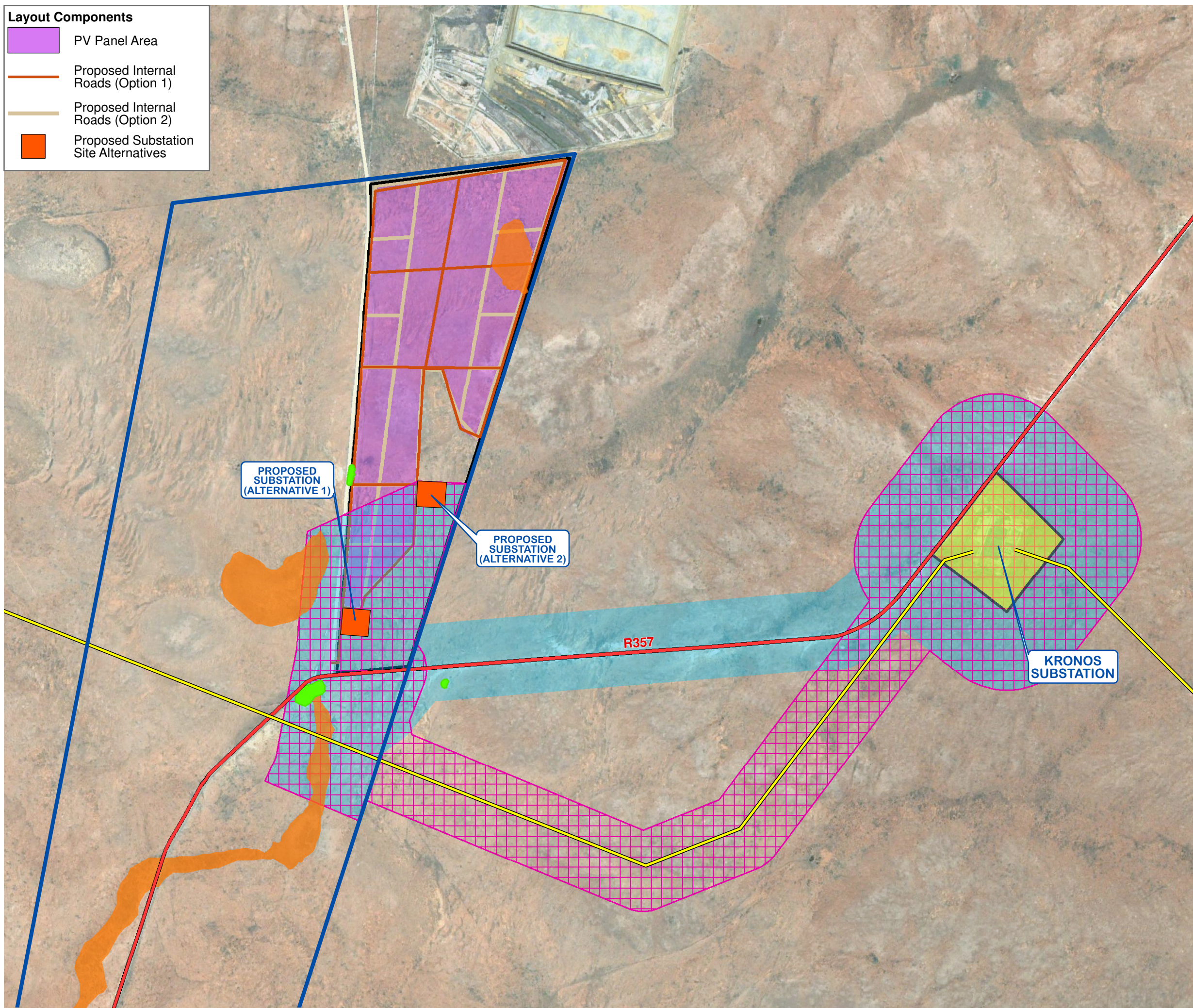
Layout Components

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


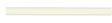






**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 2
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 2 Development Area
-  Proposed Power Line Corridor: Option 1
-  Proposed Power Line Corridor: Option 2

Sensitivity Rating

-  Medium
-  Medium-High

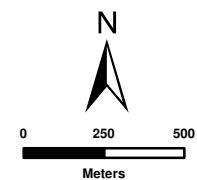
PROPOSED
SUBSTATION
(ALTERNATIVE 1)

PROPOSED
SUBSTATION
(ALTERNATIVE 2)

KRONOS
SUBSTATION

R357

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



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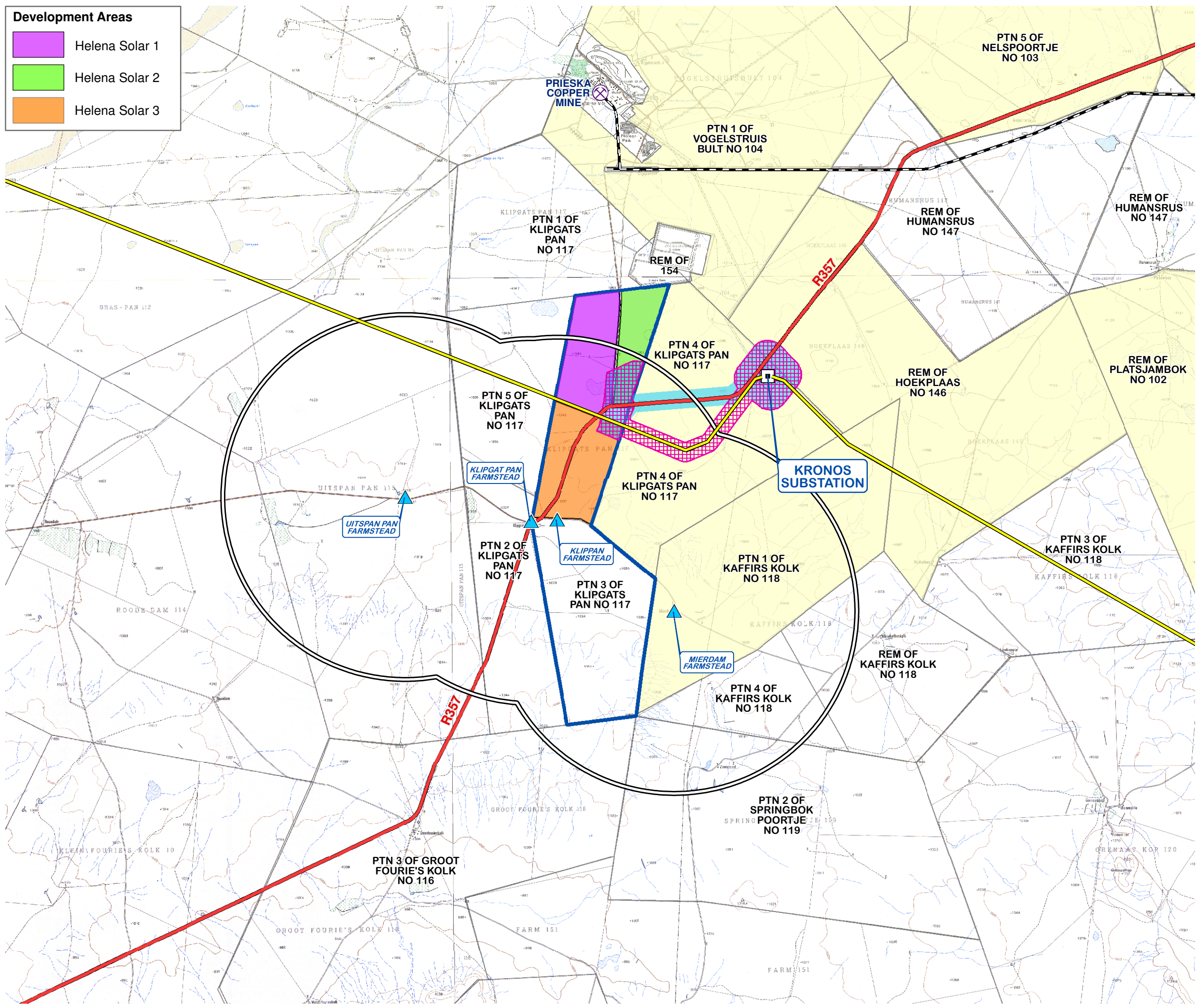
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Development Areas

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



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

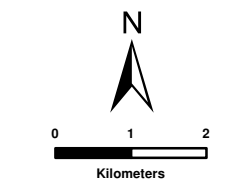
HELENA SOLAR 1, HELENA SOLAR 2 AND HELENA SOLAR 3 NEAR COPPERTON NORTHERN CAPE PROVINCE

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

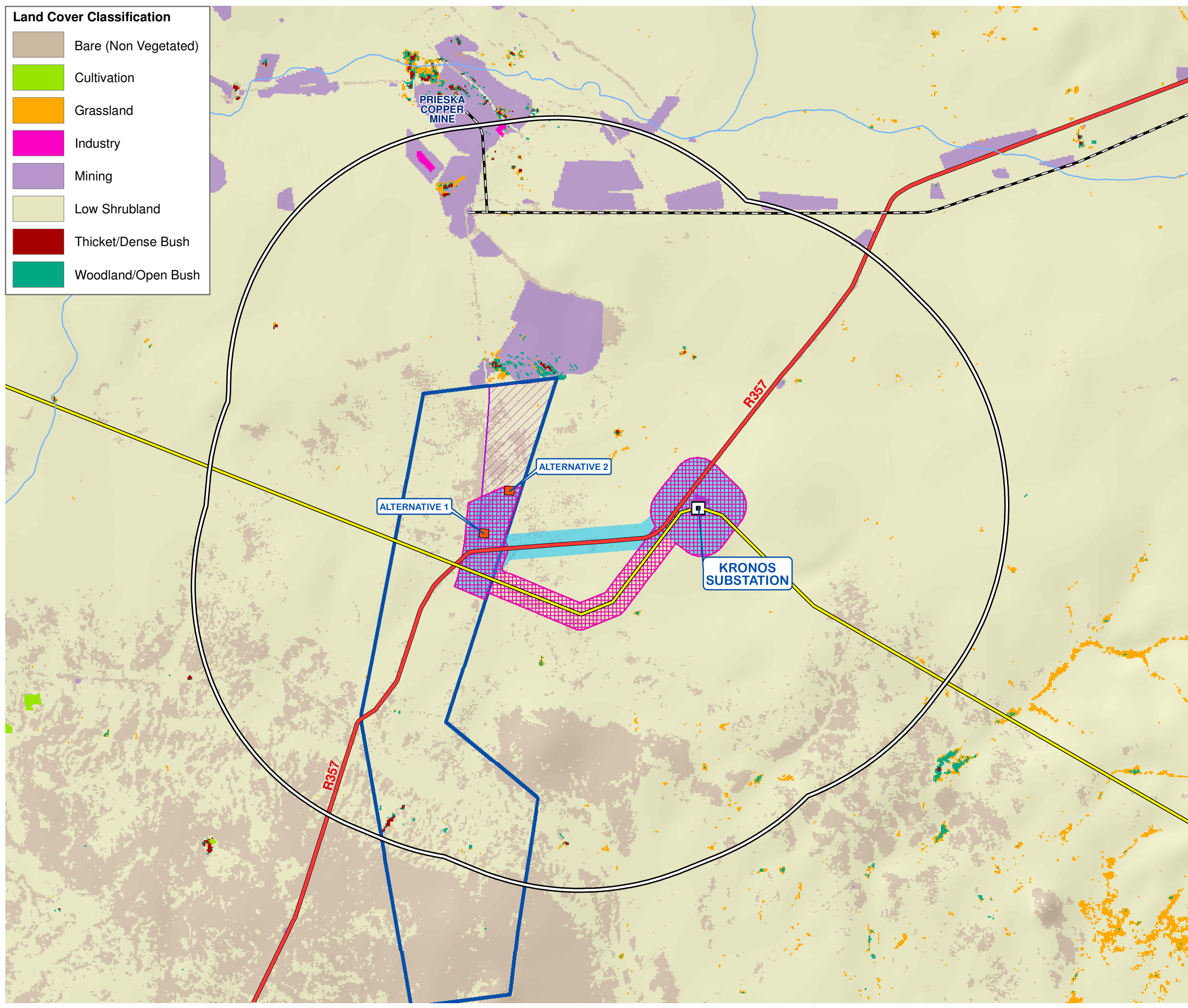
**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

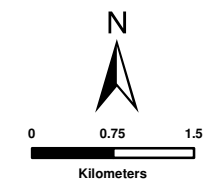
**VISUAL ASSESSMENT:
BROAD LAND COVER
CLASSIFICATION**

Legend

- Main Roads
- Railway Line
- Existing High Voltage Power Lines (400kV)
- Main Rivers/Water Courses
- Existing Substation
- Application Site
- Proposed Helena Solar 2 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
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Layout Components

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

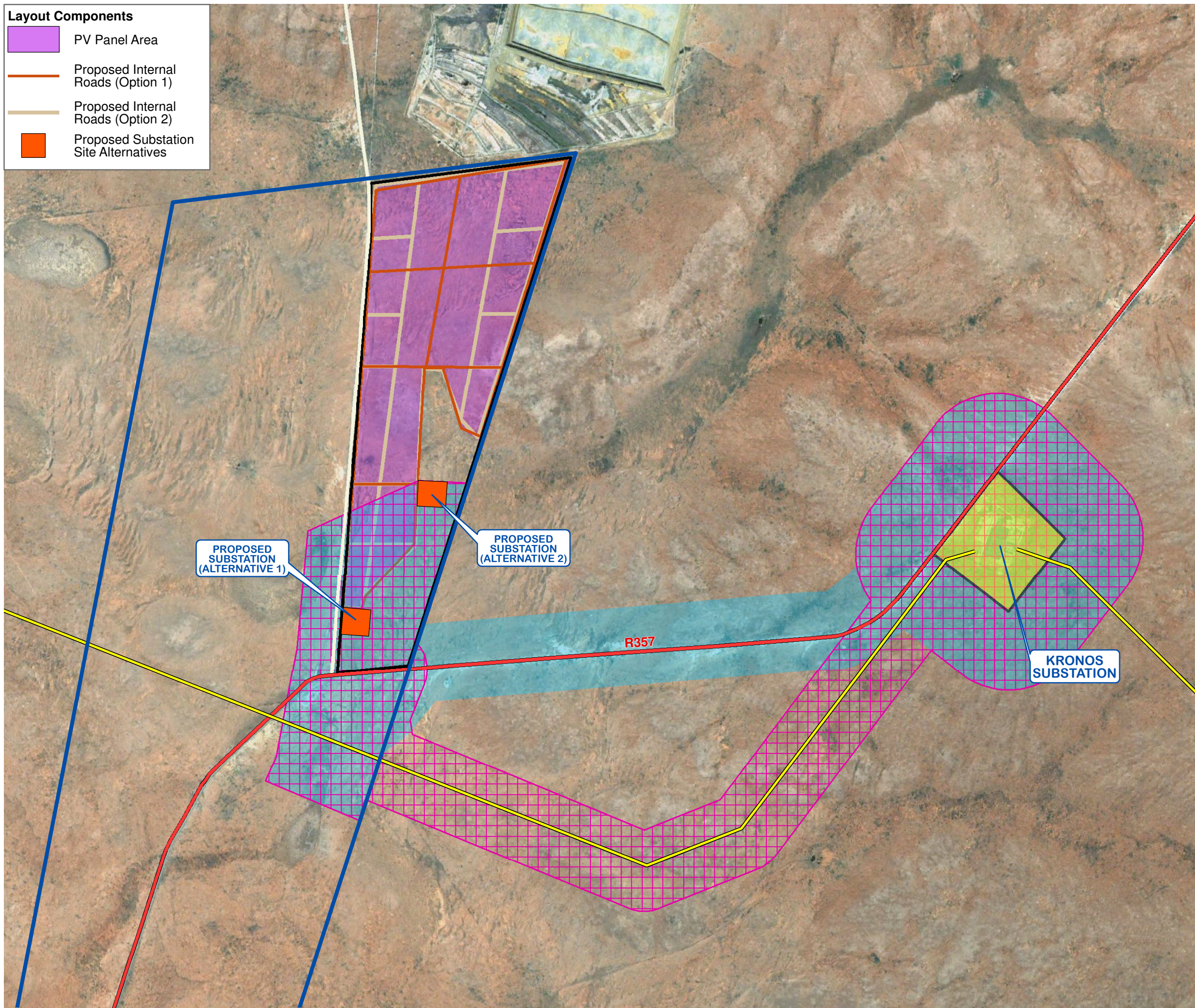
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**HELENA SOLAR 2
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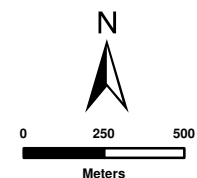
**VISUAL ASSESSMENT:
PROPOSED SITE LAYOUT**

Legend

- Main Road
- Secondary Road
- Existing High Voltage Power Lines (400kV)
- Kronos Substation Site
- Application Site
- Proposed Helena Solar 2 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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
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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)

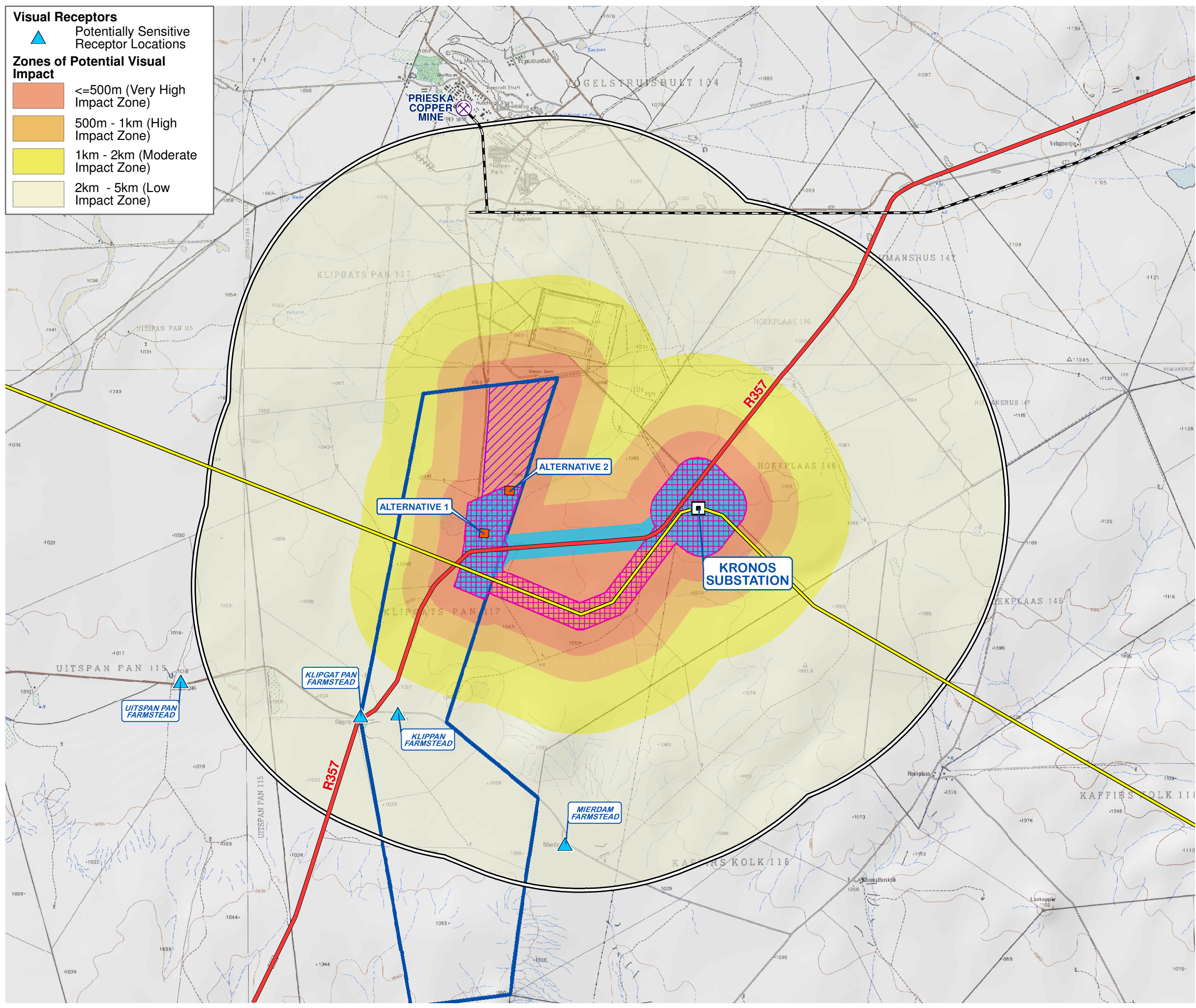
**PROPOSED
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**HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE**

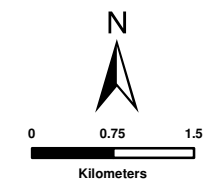
**VISUAL ASSESSMENT:
POTENTIALLY SENSITIVE
VISUAL RECEPTOR LOCATIONS**

Legend

-  Main Roads
-  Railway Line
-  Existing High Voltage Power Lines (400kV)
-  Main Rivers/Water Courses
-  Existing Substation
-  Application Site
-  Proposed Helena Solar 2 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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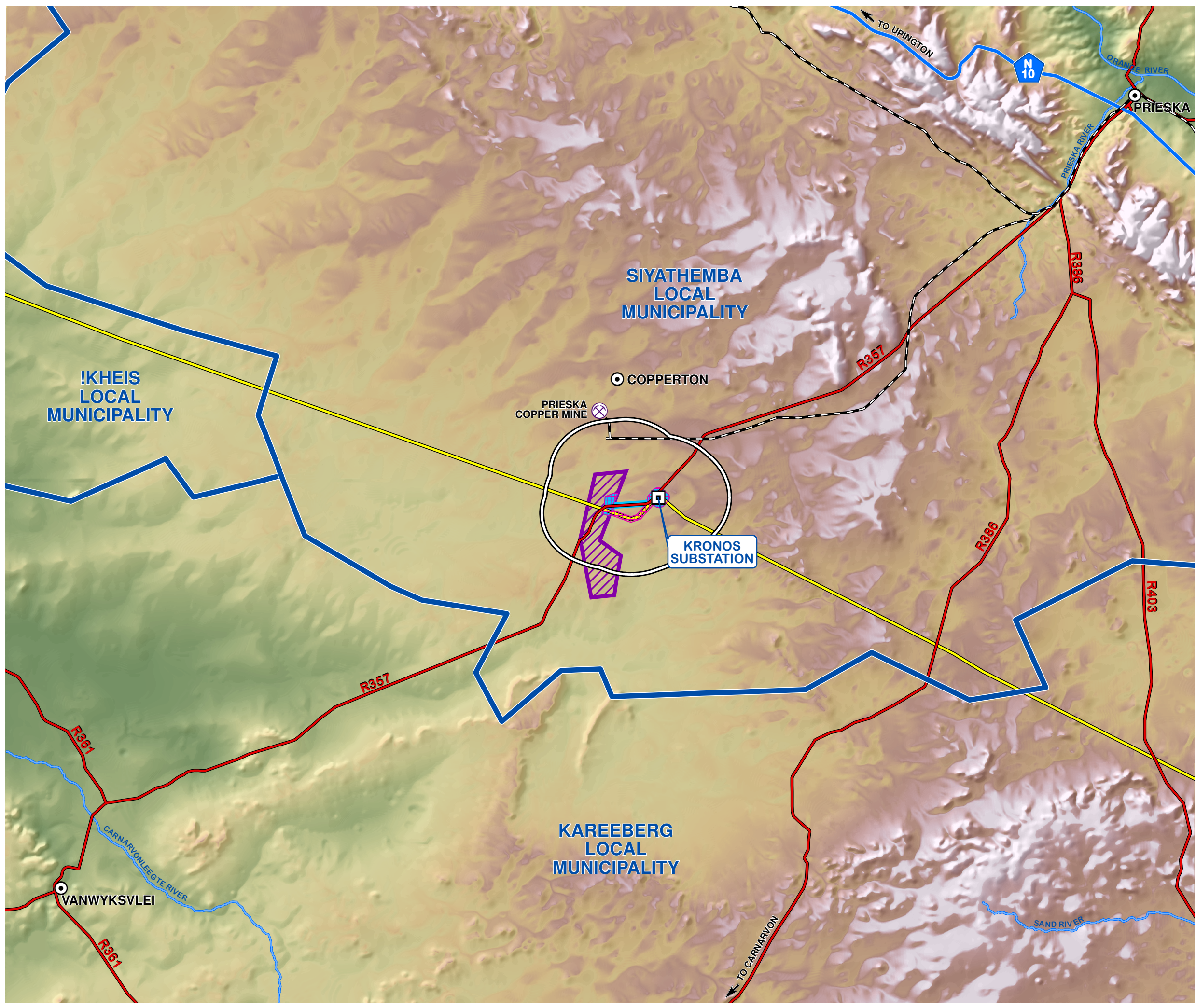
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**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 2
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

 N 0 5 10 Kilometers			
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Vegetation Classification







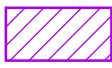




-  Bushmanland Arid Grassland
-  Bushland Basin Shrubland
-  Bushmanland Vloere

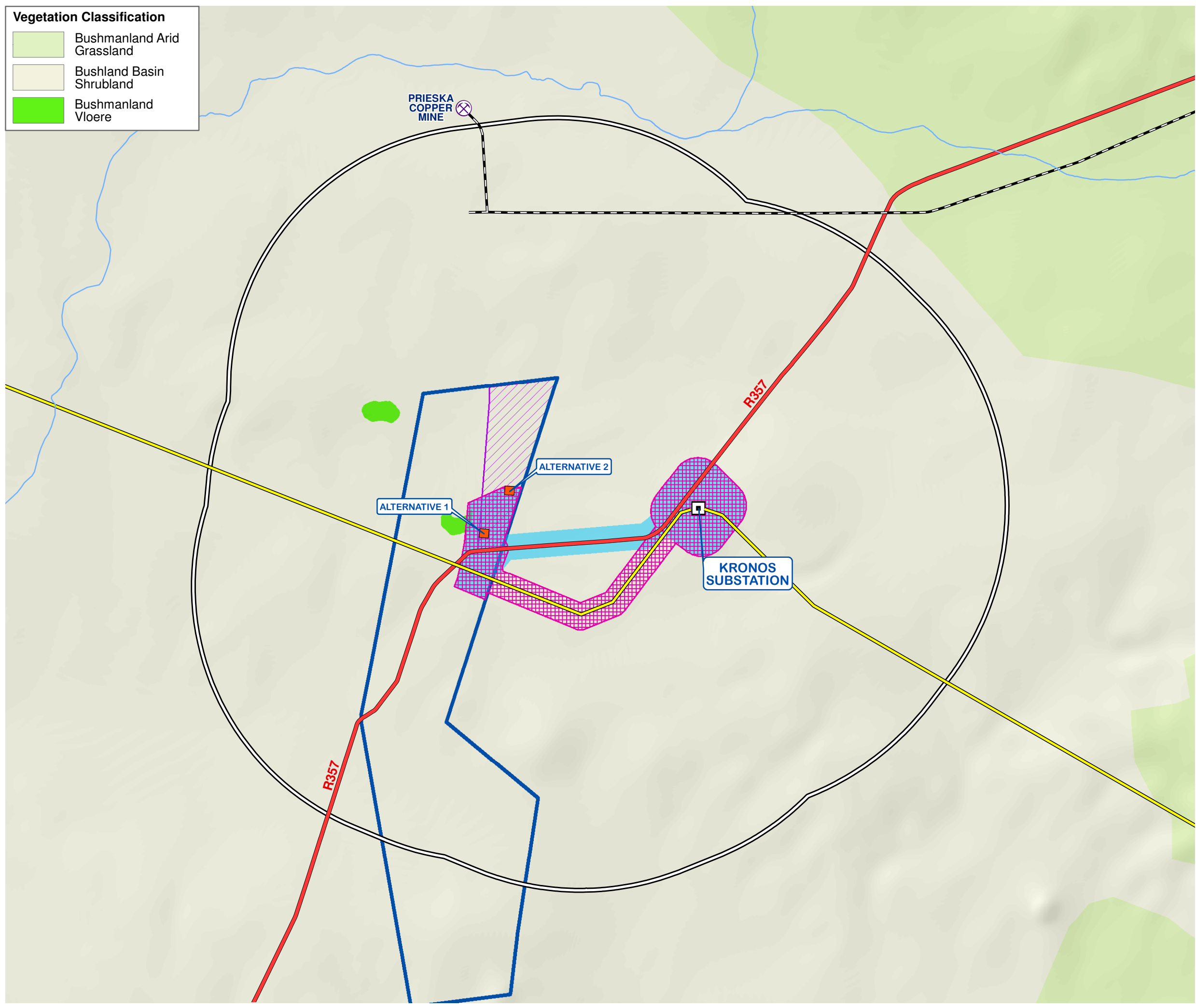
**PROPOSED
CONSTRUCTION OF A
75MW SOLAR
PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 2
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 2 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
BIOTERM ENERGY, 2015
SANBI, 2006

N
0 0.75 1.5
Kilometers

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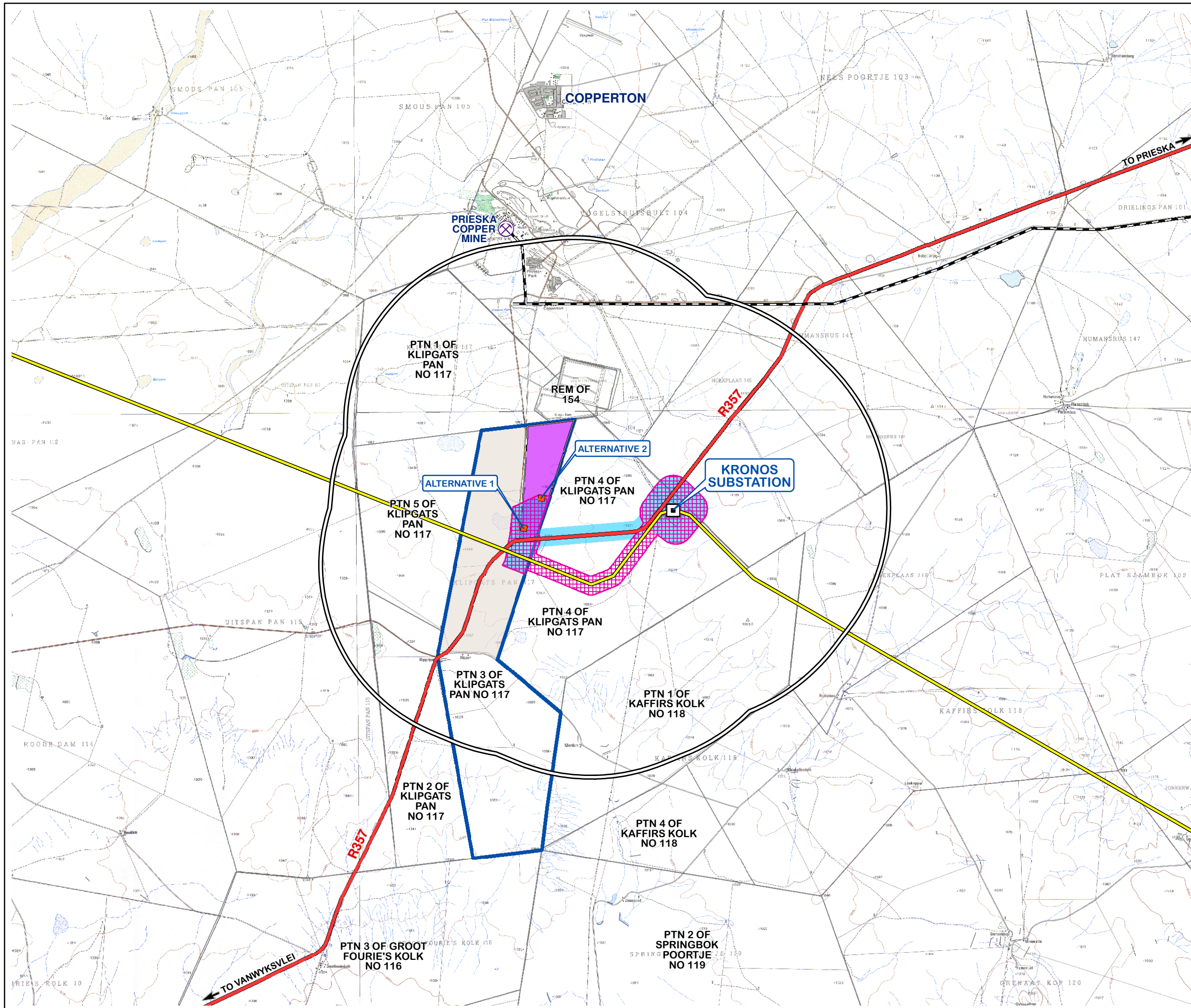
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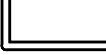

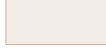



PROPOSED CONSTRUCTION OF A 75MW SOLAR PHOTOVOLTAIC (PV) ENERGY FACILITY

HELENA SOLAR 2
NEAR COPPERTON
NORTHERN CAPE PROVINCE

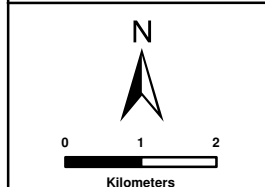
VISUAL ASSESSMENT:
SITE LOCALITY



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 2 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



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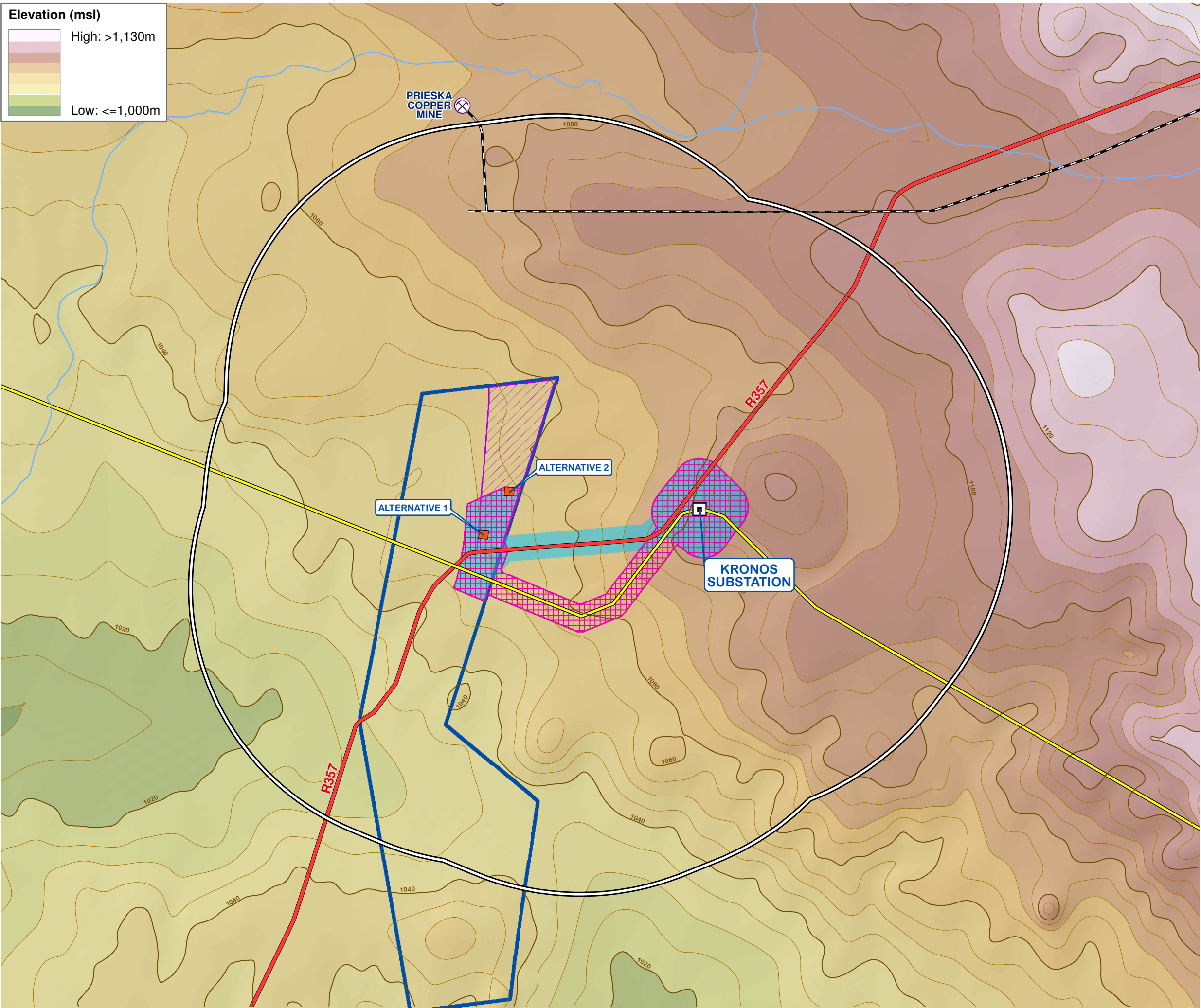
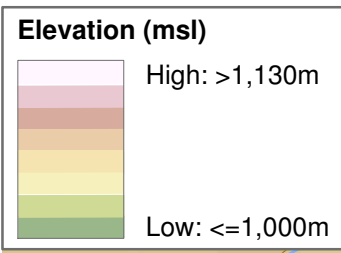
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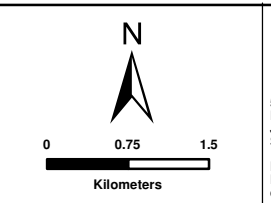
**PROPOSED
CONSTRUCTION OF A
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PHOTOVOLTAIC (PV)
ENERGY FACILITY**

**HELENA SOLAR 2
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 2 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
NGI, 2014



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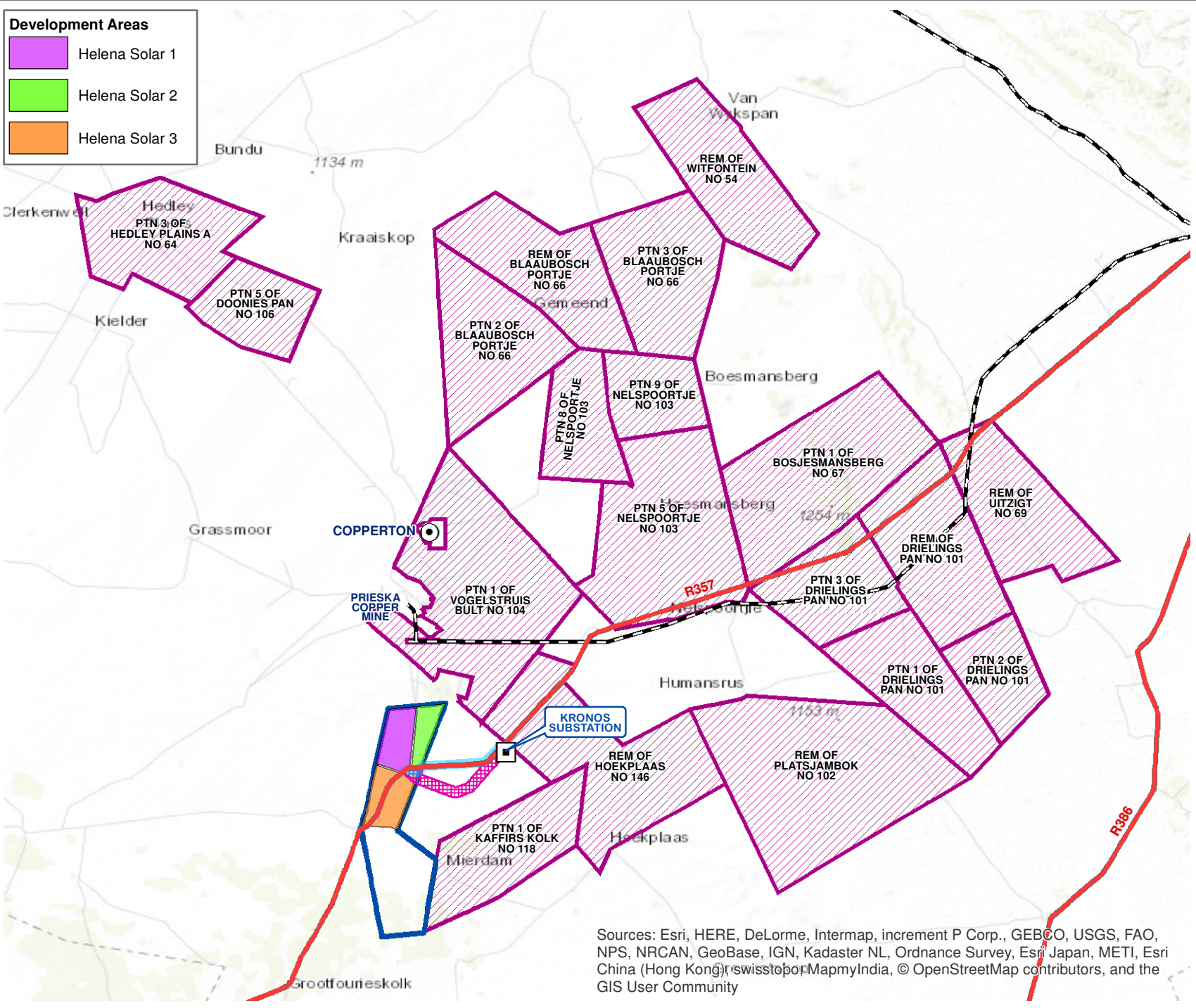
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Development Areas

- 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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