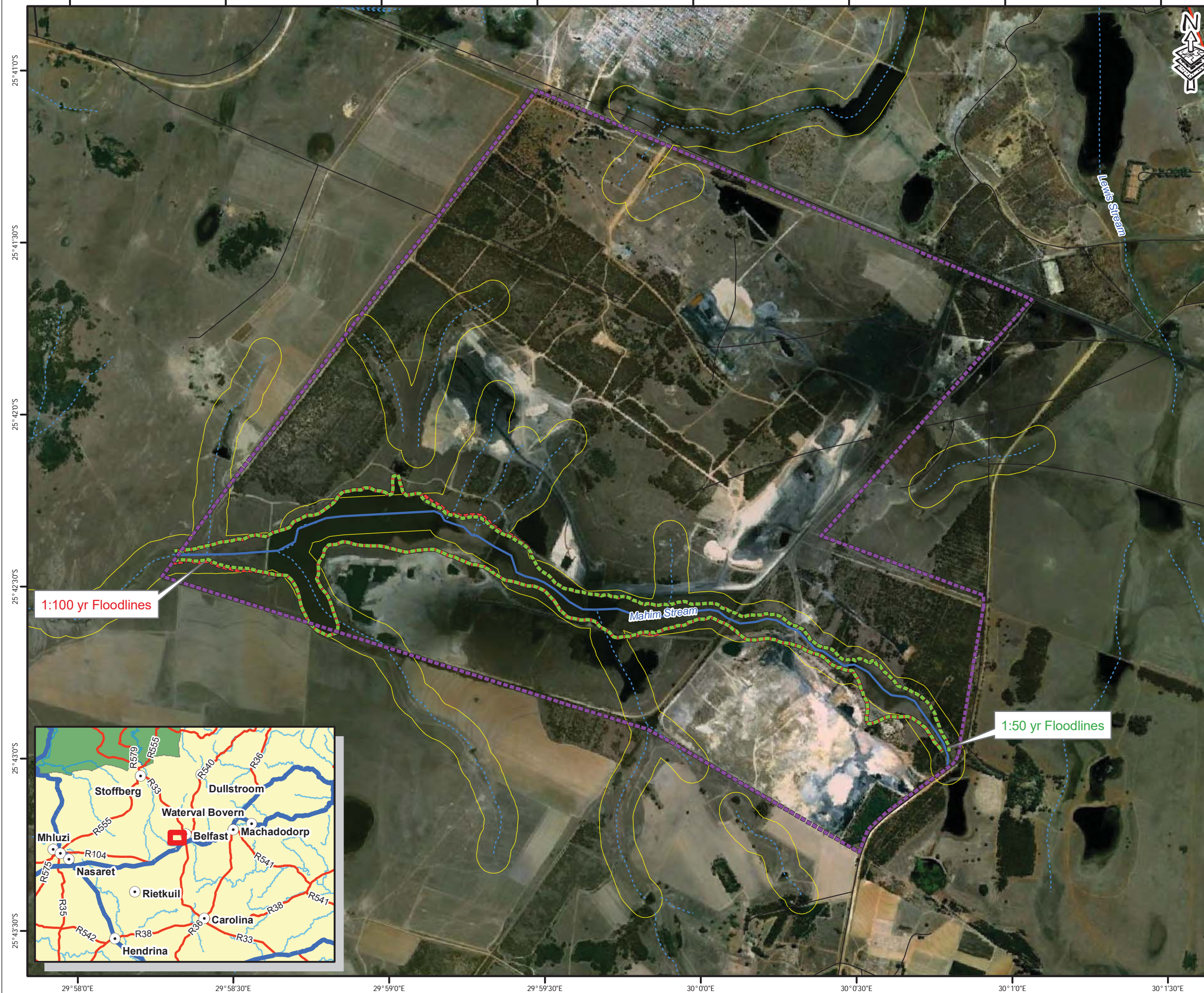


**FIGURE 2-25: FLOOD LINES AND 100M BUFFER ZONES**



**LEGEND**

- Glisa Mine Boundary

**Rivers**

- Non-Perennial
- Perennial

**Road Network**

- National Route
- Main Road
- Secondary
- Other Access

**Floodlines**

- 50yr Floodline
- 100yr Floodline

100m River Buffer

---

Data Sources: Google Earth™ mapping service: 2010

---

FIGURE NO.: 2-25

---

MAP NUMBER: 10-298-2011011-03

---

DRAWN BY: A. J. MAIN  
GIS TECHNOLOGIST

---

REVIEWED BY: P. LOURENS  
HYDROLOGIST

---

DATUM: WGS84  
PROJECTION: GEOGRAPHIC

---

DATE: 11 JANUARY 2011

---

CLIENT: EXXARO

---

PROJECT: GLISA HYDROLOGICAL STUDY

---

SCALE: 1:20,000

---

0 0.15 0.3 0.6 Kilometers

---

**GCS**

63 Wessel Road Woodmead Tel: +27 (0) 11 803 5726  
PO Box 2597 Rivonia 2128 Fax: +27 (0) 11 803 5745  
South Africa E-mail: jhb@gcs-sa.biz

# Glisa EMP & IWUL Consolidation Project

- LEGEND**
- Towns
  - WARMS Data
  - Rivers and Streams**
    - Non-Perennial
    - Perennial
  - Road Network**
    - National Route
    - Main Road
    - Secondary Road
    - Street
    - Railway Line
  - Inland Water**
    - Dams and lakes
    - Dry pans
    - Reservoirs and water tanks
    - Marsh and swamps
    - Non-perennial pans
    - Delineated Wetlands
    - Quaternary Catchments
    - Consolidated Mining Right

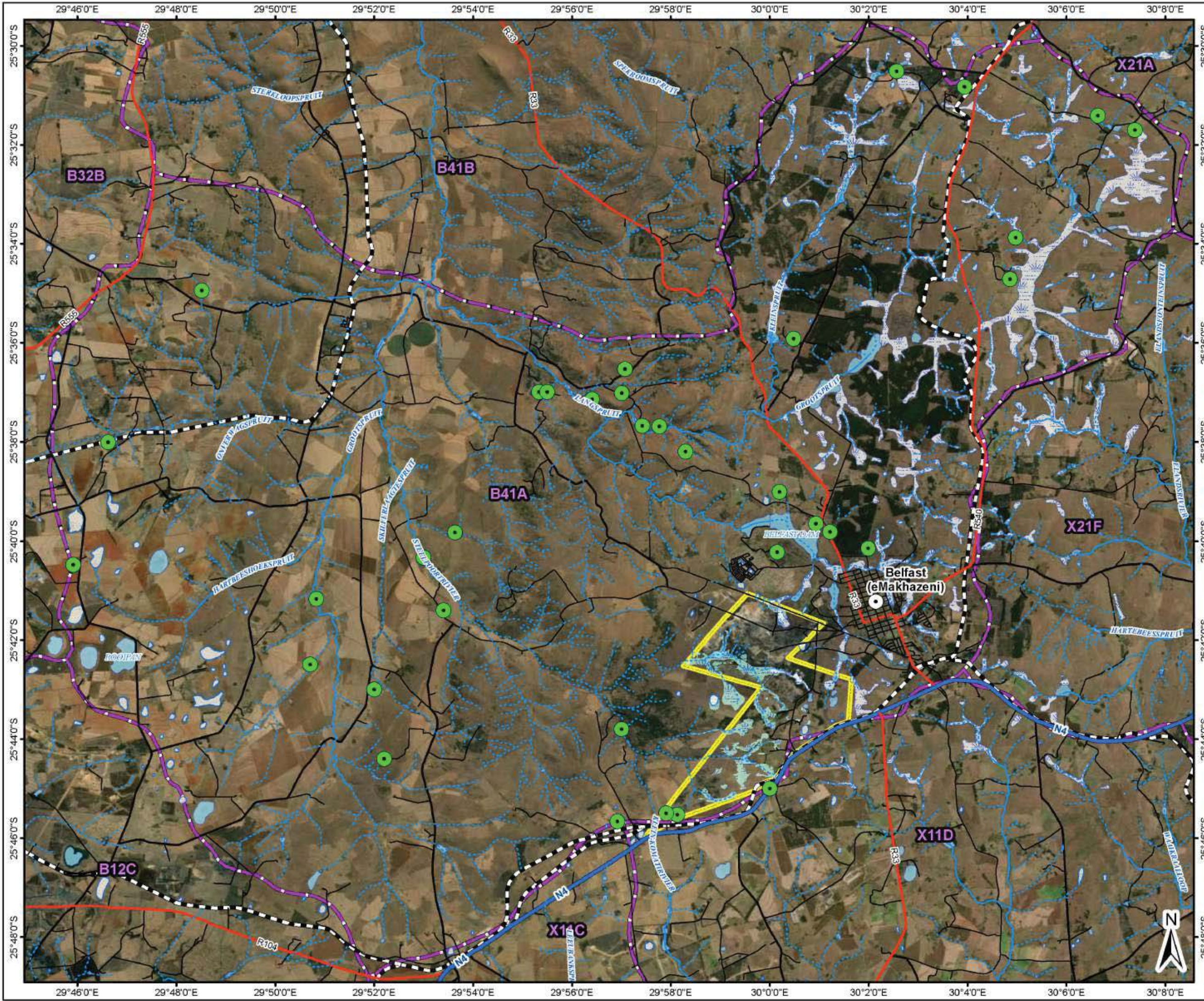
## WARMS DATA (B41A) GLISA & PAARDEPLAATS

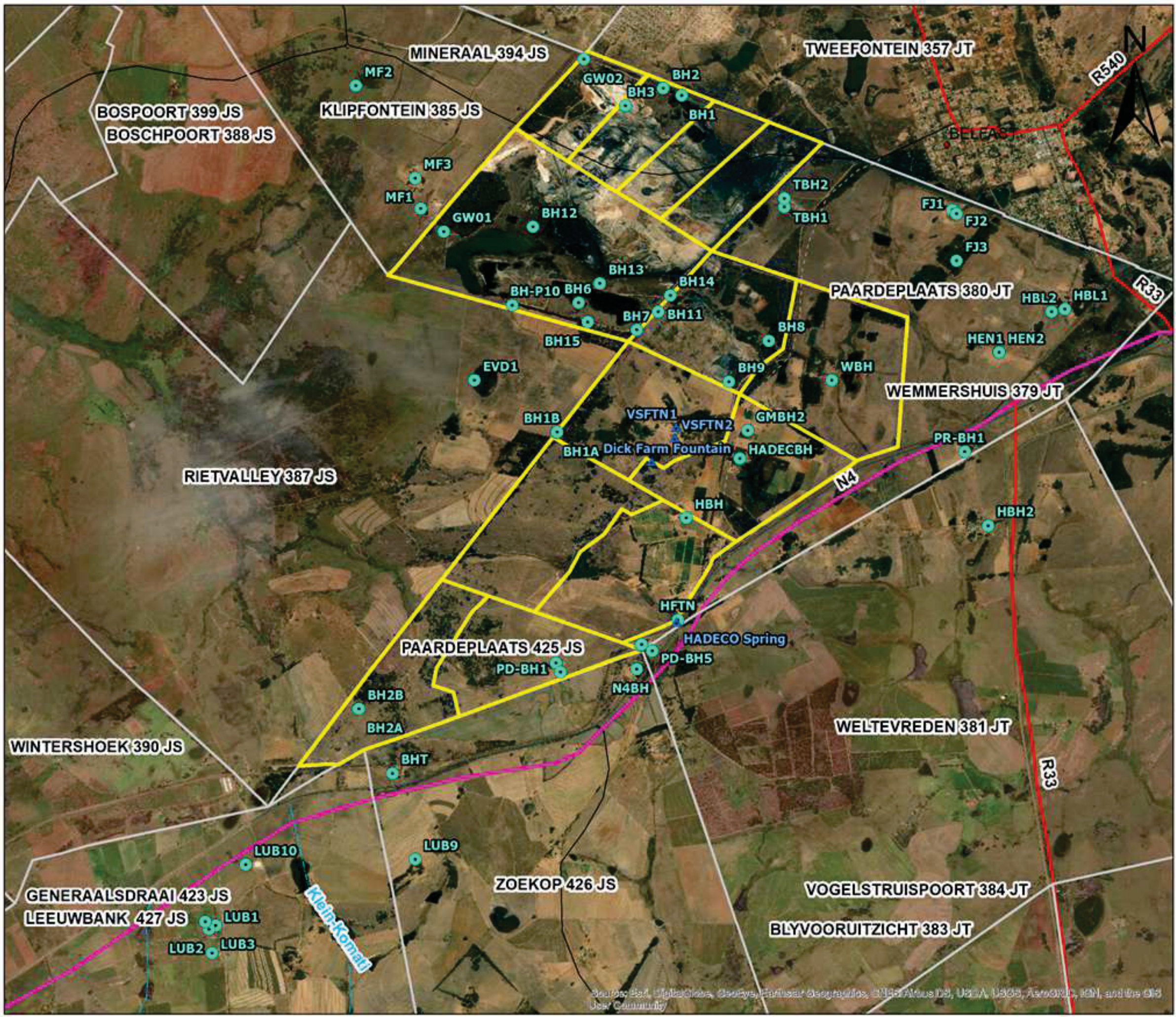


Reviewed: R. Jansse van Rensburg Environmental Compliance and Assessment Manager	Drawn by: A. Brower GIS Consultant
---	--

Coordinate System: GCS WGS 1984  
Datum: WGS 1984  
Units: Degree

	Scale: 1:130 000
	CI Group: 19-0001
	Map ID: 126-001-34 v3
	Date: 18/06/2020





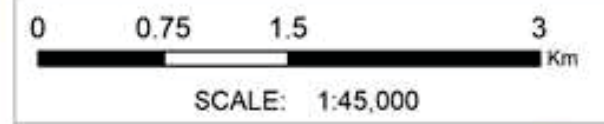
**Legend**

- Springs
- Boreholes Identified
- Parent Farms
- Site Boundary
- Road Network**
- National Route
- Street
- Secondary Road
- Main Road
- River Systems**
- Perennial River
- Non-Perennial River

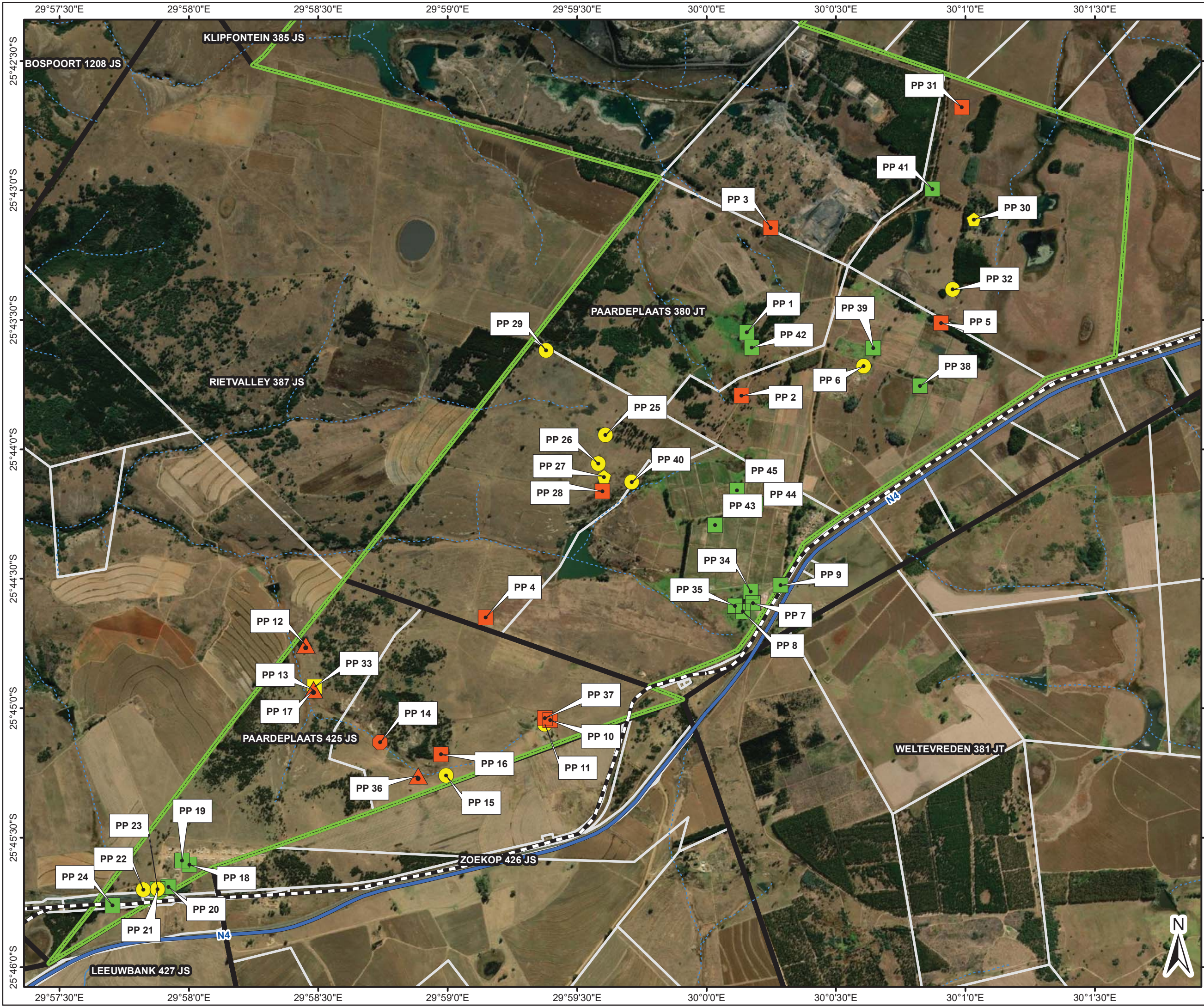


PROPERTY DESCRIPTION:  
 PAARDEPLAATS 380 & PAARDEPLAATS 425  
 NEAR THE TOWN: BELFAST  
 REGISTRATION DIVISION: JT; MPUMALANGA

CLIENT:	CI GROUP (PTY) LTD
DATE: 11 OCTOBER 2019	DATUM PROJECTION: WGS84 GEOGRAPHIC
DRAWN BY: M MORELLI GIS SPECIALIST	REVIEWED BY: M KRUGER HYDROGEOLOGIST



Sources: Esri, DigitalGlobe, GeoEye, Earthstar OpenSource, CNES/Airbus DS, USDA, AeroGRID, IGN, and the GIS User Community



# Glisa EMP & IWUL Consolidation Project

- ### LEGEND
- Towns
  - Rivers and Streams**
    - Non-Perennial
    - Perennial
  - Road Network**
    - National Route
    - Main Road
    - Railway Line
  - Consolidated Mining Right
  - Parent Farms
  - Farm Portions
  - Heritage Sites**
  - Low Significance**
    - Sites with no mitigation measure required
  - Medium Significance**
    - Historic Coal Mine Shafts and Associated Structures
    - Historic Homesteads and Structures with the Possible Risk for Unmarked Graves
    - Historic Farmsteads and Historic Structures
  - Medium to High Significance**
    - Graves and Burial Grounds
    - Possible Rock Art Site & Graves
    - Historic Coal Mine Shafts and Associated Structures

## HERITAGE SITES

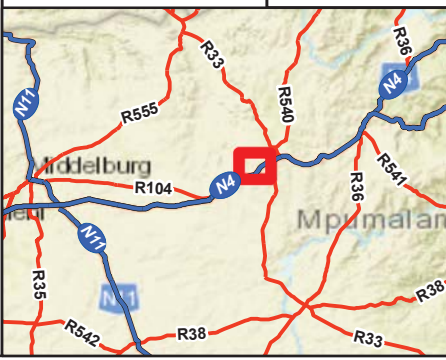


Reviewed: R. Janse Van Rensburg  
Environmental Compliance and Assessment Manager

Drawn by: A Brower  
GIS Consultant










Coordinate System: GCS WGS 1984  
Datum: WGS 1984  
Units: Degree











Scale: 1:25 000  
CIGroup: 19-0001  
Map ID: 126-001-71  
Date: 18/06/2021



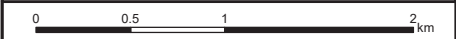
# Glisa EMP & IWUL Consolidation Project

## LEGEND

-  Towns
- Rivers and Streams**
  -  Non-Perennial
  -  Perennial
- Road Network**
  -  National Route
  -  Main Road
  -  Secondary Road
  -  Street
  -  Railway Line
  -  Consolidated Mining Right

- ### Lancover
-  Natural wooded land
  -  Shrubland
  -  Grassland
  -  Waterbodies
  -  Wetlands
  -  Barren land
  -  Cultivated
  -  Build-up
  -  Mines and quarries
  -  Planted Forest

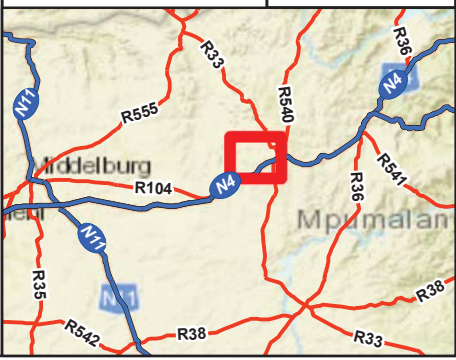
## LANCOVER GLISA & PAARDEPLAATS

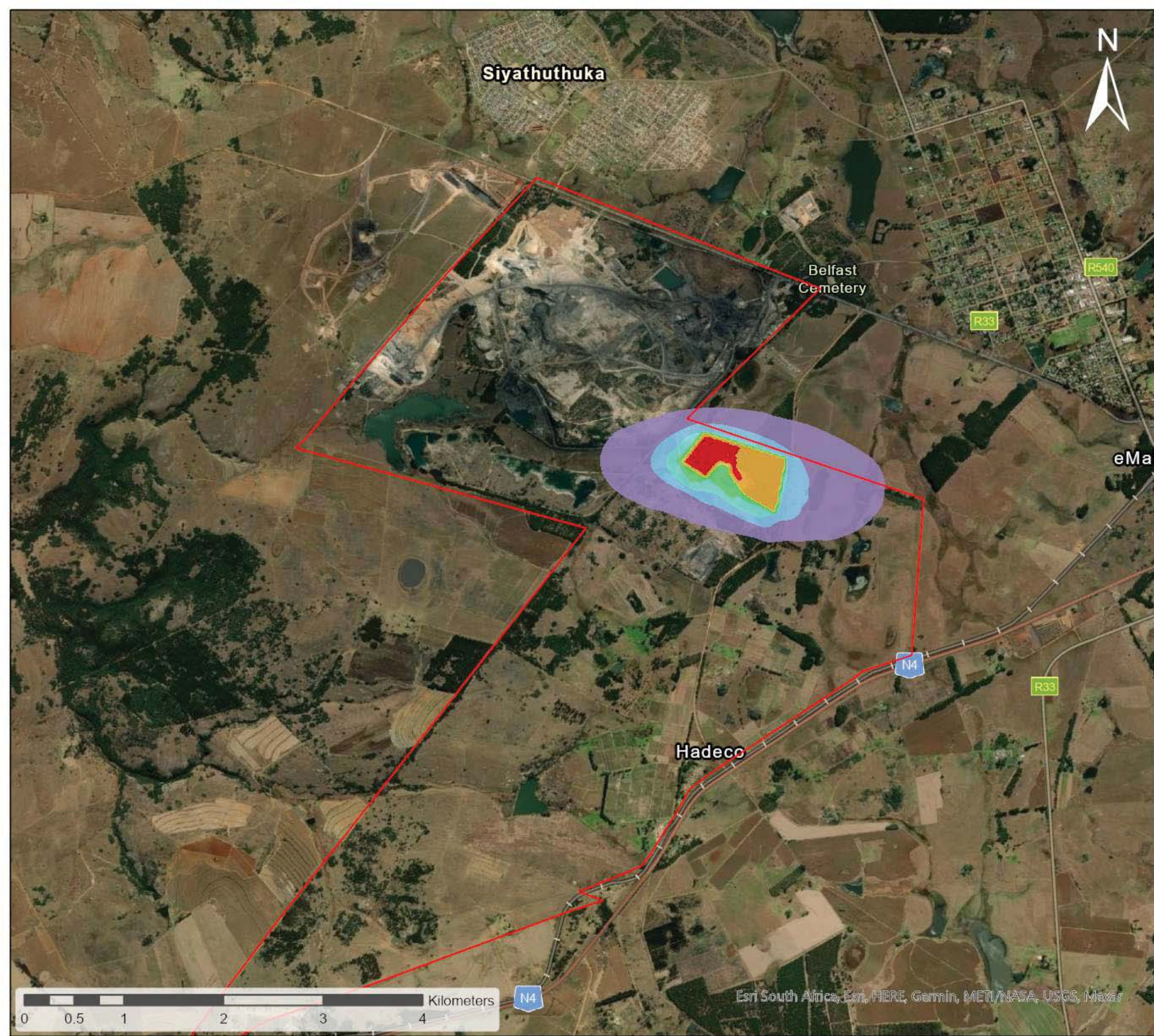


Reviewed: R. Janse Van Rensburg Environmental Compliance and Assessment Manager	Drawn by: A Brower GIS Consultant
--	---

Coordinate System: GCS WGS 1984  
Datum: WGS 1984  
Units: Degree

	Scale: 1:40 000
	CIGroup: 19-0001
	Map ID: 126-001-46
Date: 19/06/2020	





### Legend

Site Boundary

### TSP Annual UnMitigated

mg/m<sup>2</sup>/day

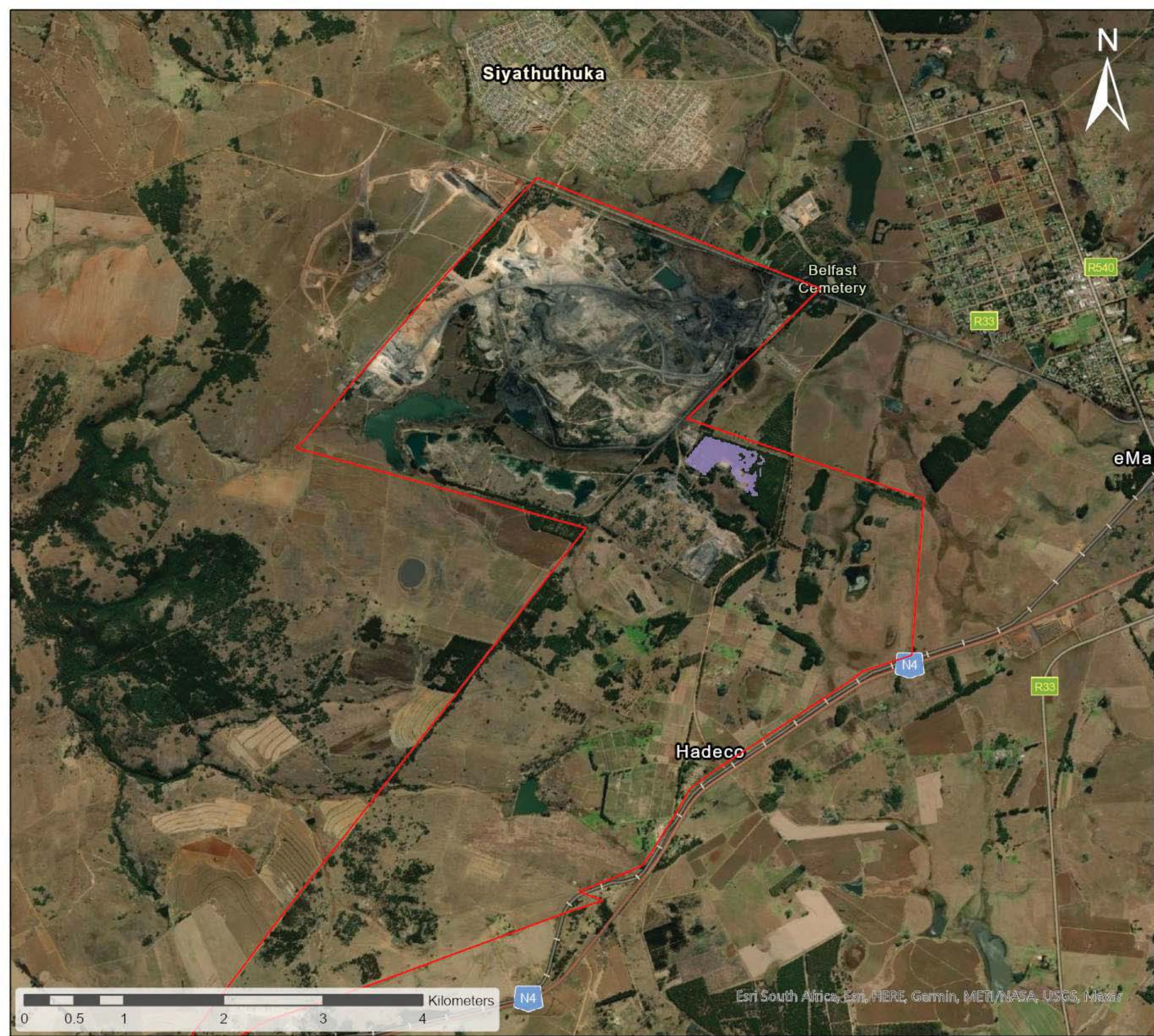
- 0.1 - 1.6
- 1.7 - 5.2
- 5.3 - 13.6
- 13.7 - 32.9
- 33 - 77.3
- 77.4 - 179.1
- 179.2 - 413.2
- 413.3 - 951
- 951.1 - 1 185.1

### Project Details


ProjectNr	ProjectName	ClientName
21-1381	Paardeplaats	NBC Colliery (Pty) Ltd

Map: Air Plots  
Date Exported: 2021/05/11 1:58 PM




ENVIRONMENTAL & ENGINEERING



### Legend

 Site Boundary

### TSP Monthly Mitigated mg/m<sup>2</sup>/day

-  0.1 - 6
-  6.1 - 8.6
-  8.7 - 14.7

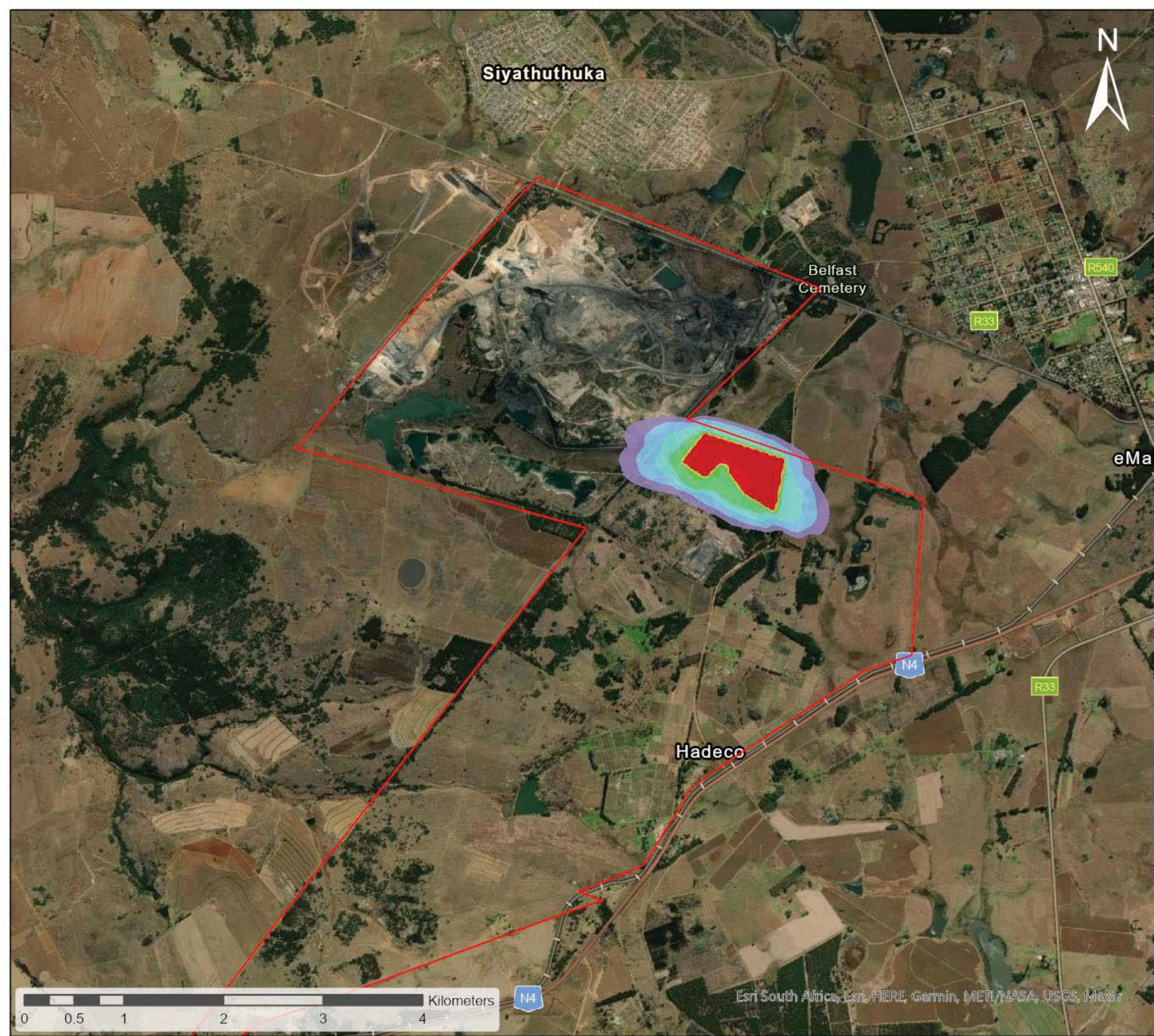
### Project Details

ProjectNr	ProjectName	ClientName
21-1381	Paardeplaats	NBC Colliery (Pty) Ltd










Map: Air Plots  
Date Exported: 2021/05/11 1:57 PM



ENVIRONMENTAL & ENGINEERING



### Legend

-  Site Boundary
- TSP Monthly UnMitigated**  
**mg/m<sup>2</sup>/day**
- 0.1 - 6
-  6.1 - 8.6
-  8.7 - 14.7
-  14.8 - 28.9
-  29 - 62.3
-  62.4 - 140.7
-  140.8 - 325.1
-  325.2 - 758.4
-  758.5 - 1 776.8

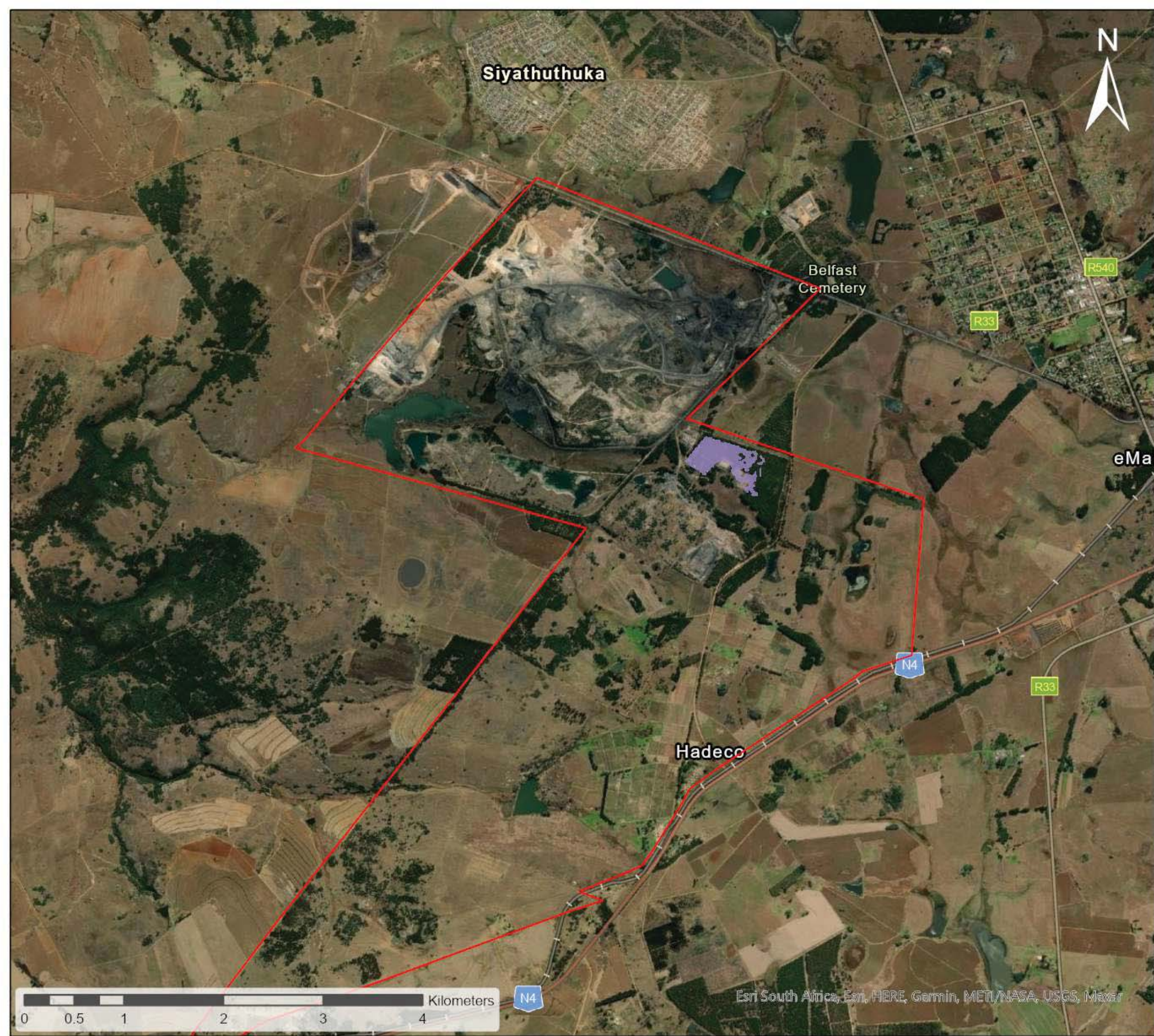
### Project Details

ProjectNr	ProjectName	ClientName
21-1381	Paardeplaats	NBC Colliery (Pty) Ltd


Map: Air Plots  
 Date Exported: 2021/05/11 1:56 PM










### Legend

 Site Boundary

### TSP Monthly Mitigated mg/m<sup>2</sup>/day

-  0.1 - 6
-  6.1 - 8.6
-  8.7 - 14.7

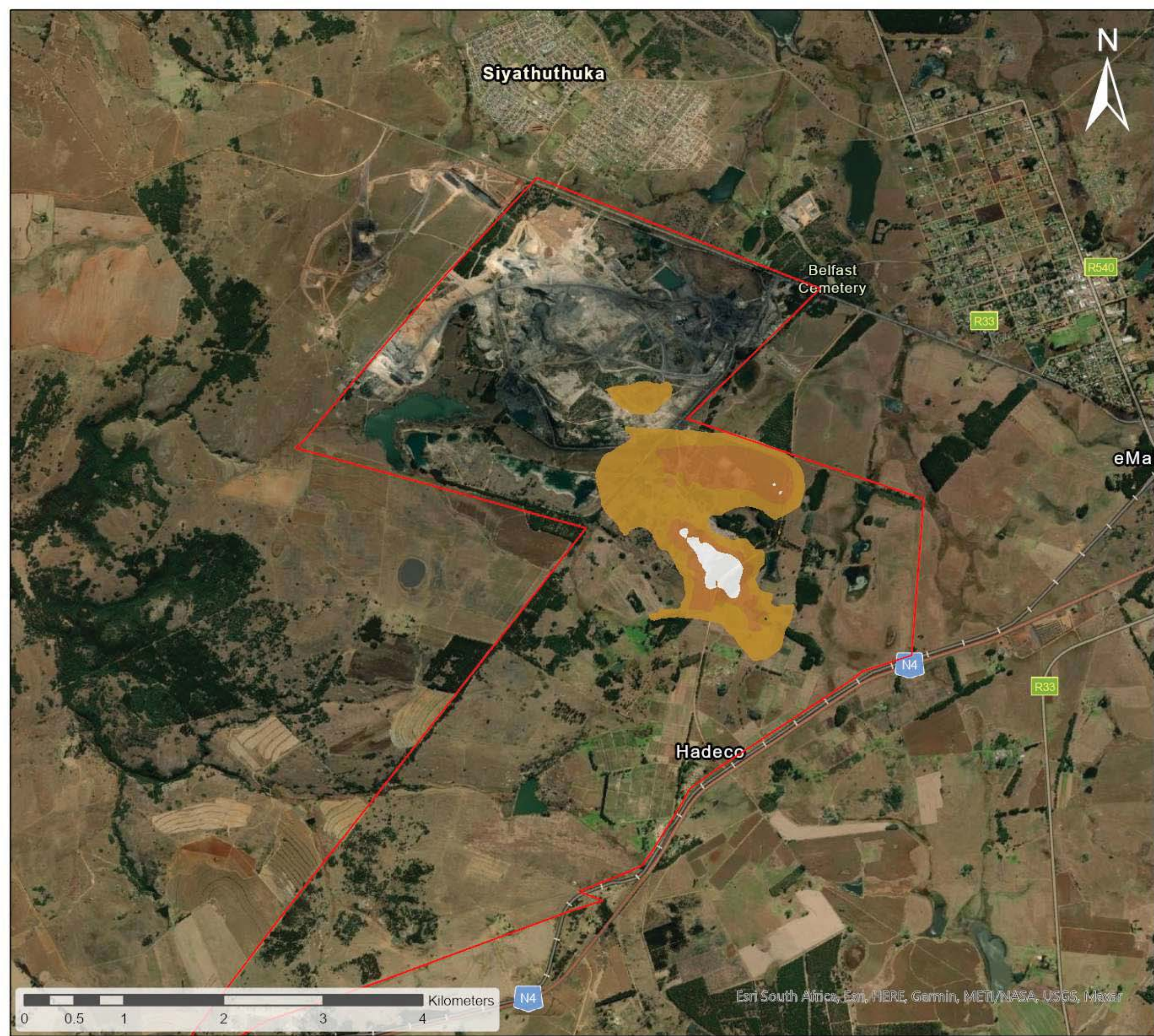
### Project Details

ProjectNr	ProjectName	ClientName
21-1381	Paardeplaats	NBC Colliery (Pty) Ltd

Map: Air Plots  
Date Exported: 2021/05/11 1:57 PM






ENVIRONMENTAL & ENGINEERING



### Legend

 Site Boundary

### PM10 Annual UnMitigated Value

-  0.1 - 1.3
-  1.4 - 1.7
-  1.8 - 2.4
-  2.5 - 3.5

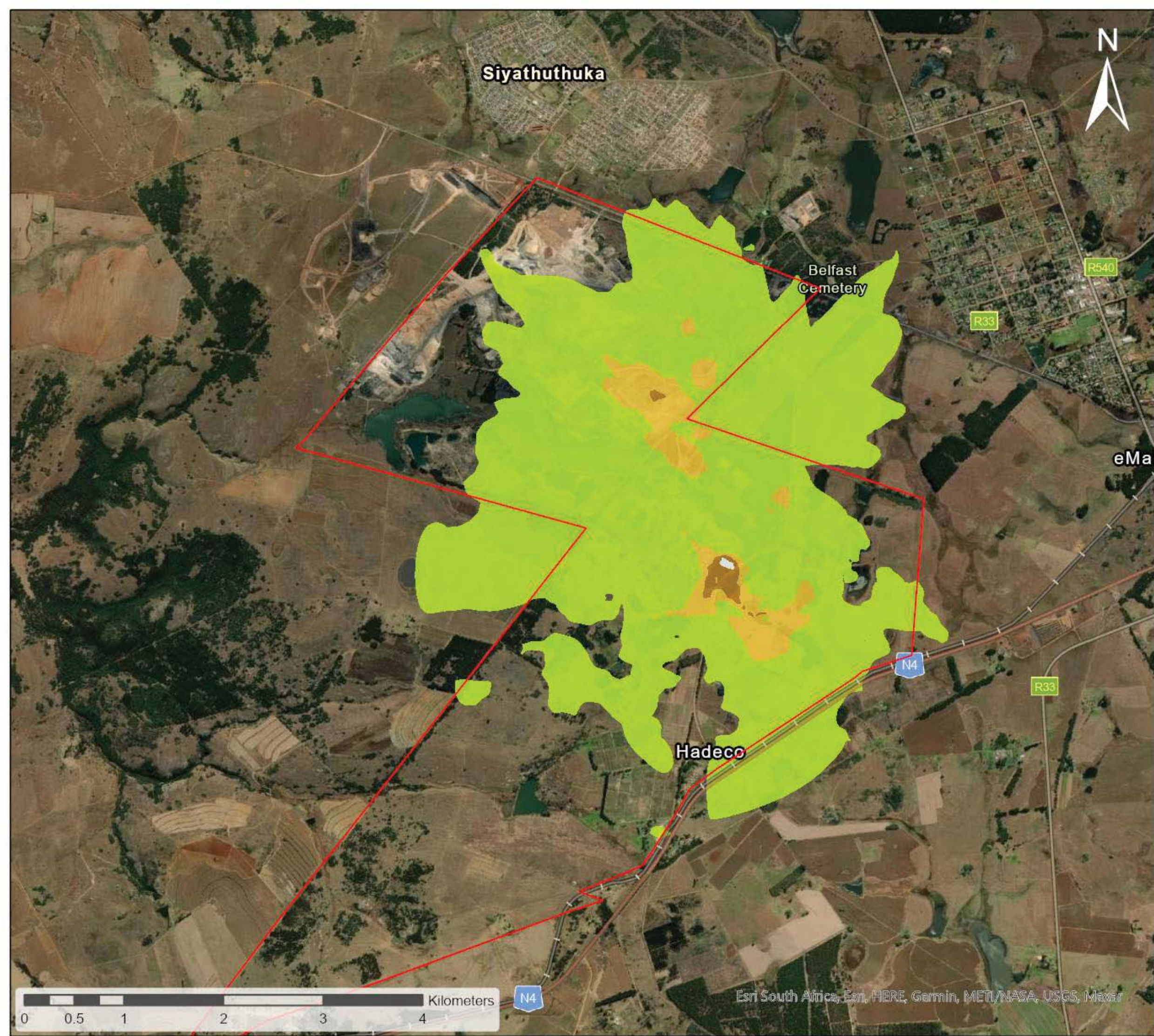
### Project Details

ProjectNr	ProjectName	ClientName
21-1381	Paardeplaats	NBC Colliery (Pty) Ltd


Map: Air Plots






Date Exported: 2021/05/11 1:55 PM





### Legend

 Site Boundary  
**PM10 Daily UnMitigated**  
 $\mu\text{g}/\text{m}^3$

-  0.9 - 5
-  5.1 - 10
-  10.1 - 15
-  15.1 - 20
-  20.1 - 50

### Project Details

ProjectNr	ProjectName	ClientName
21-1381	Paardeplaats	NBC Colliery (Pty) Ltd

Map: Air Plots  
 Date Exported: 2021/05/11 1:54 PM



ENVIRONMENTAL & ENGINEERING



29°56'0"E

29°58'0"E

30°0'0"E

30°2'0"E

Belfast

R33




# NBC Biodiversity Land Management Plan

## Sensitivity

### Legend

-  Project Area
-  Secondary Town
-  Non-Perennial
-  Perennial
-  National Route
-  Main Road
-  Secondary Road
-  Street
-  Railway Line

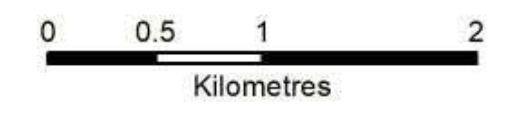
### Sensitivity

-  High
-  Moderate
-  Low



DIGBY WELLS ENVIRONMENTAL

Projection: Transverse Mercator  
 Datum: WGS 1984  
 Central Meridian: 29°E  
 Date: 01/04/2021  
 Ref #: UCD6860\_FF\_14\_KWT



25°42'0"S

25°42'0"S

25°44'0"S

25°44'0"S

25°46'0"S

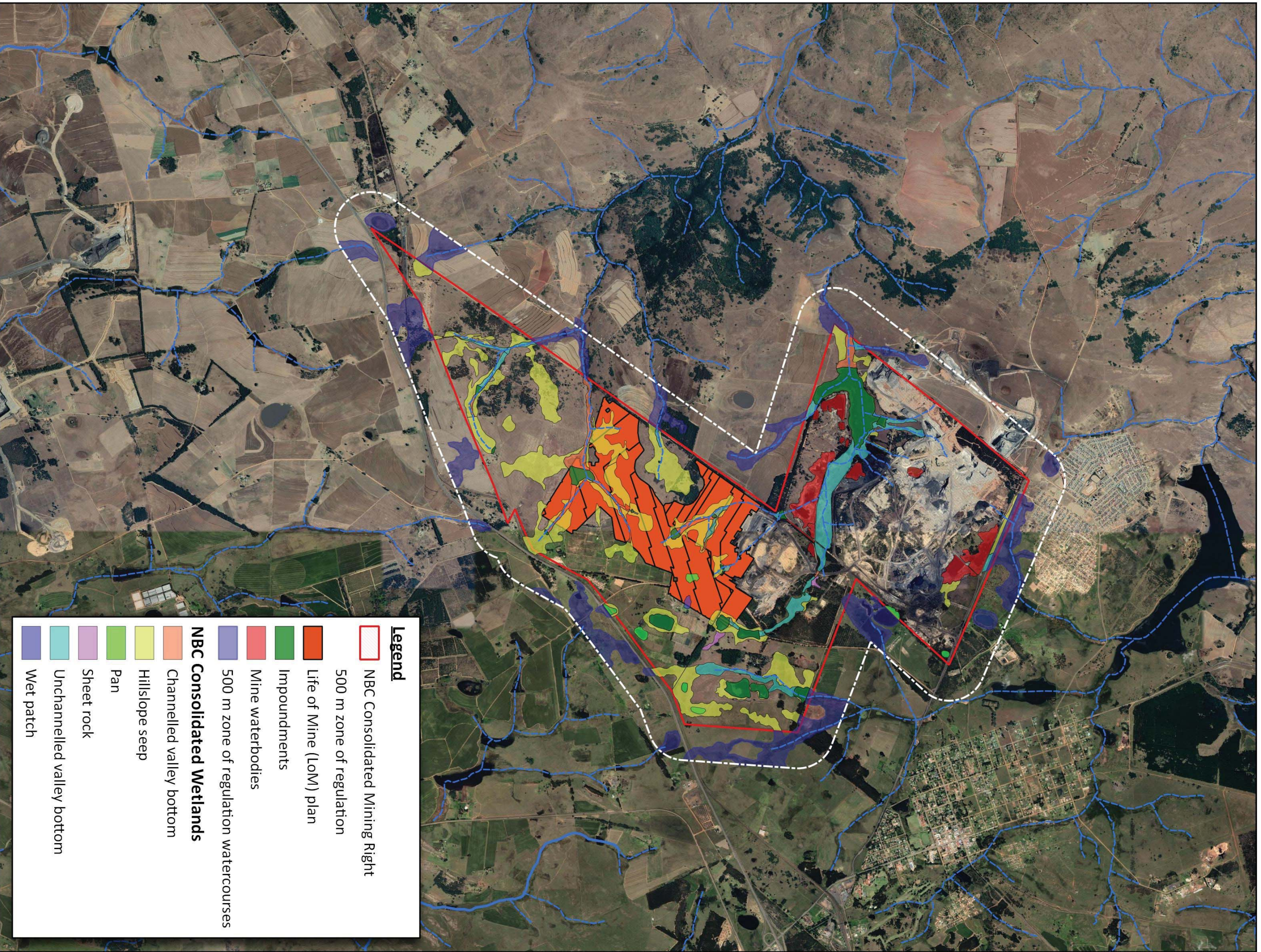
25°46'0"S

29°56'0"E

29°58'0"E

30°0'0"E

30°2'0"E



**Legend**

- NBC Consolidated Mining Right
- 500 m zone of regulation
- Life of Mine (LoM) plan
- Impoundments
- Mine waterbodies
- 500 m zone of regulation watercourses

**NBC Consolidated Wetlands**

- Channelled valley bottom
- Hillslope seep
- Pan
- Sheet rock
- Unchannelled valley bottom
- Wet patch

**NBC Consolidation Project**

Infrastructure - Life of Mine (LoM)



P.O. Box 145202  
Brackengardens  
1452

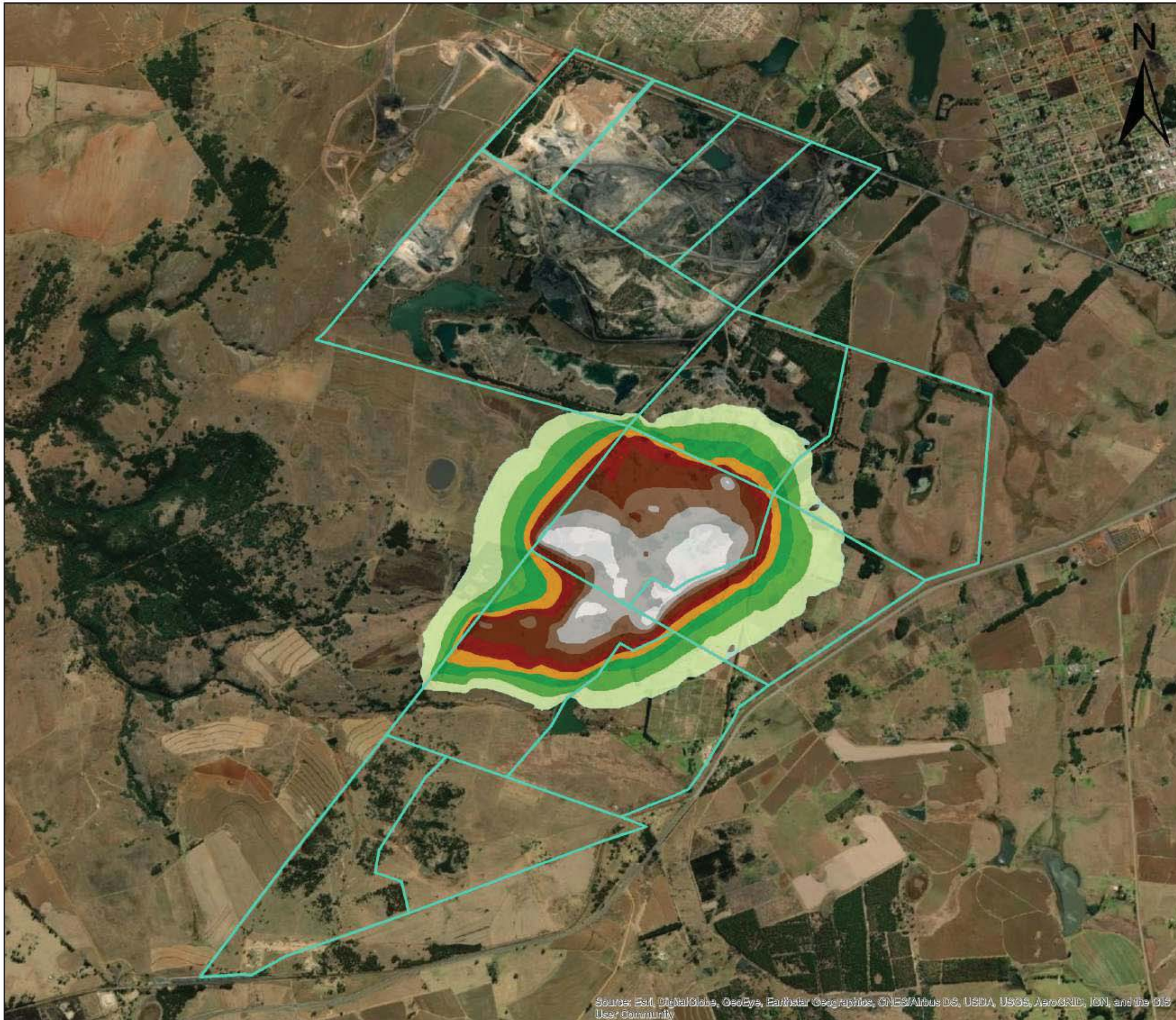
Tel. No.: (+27) 82 863 0769  
Email: [info@ecologyinternational.net](mailto:info@ecologyinternational.net)  
Web: [www.ecologyinternational.net](http://www.ecologyinternational.net)



Date: May 2021

Coordinate System:  
Geographic WGS84

**FIGURE 13-1: SIMULATED GROUNDWATER DRAWDOWN YEAR 15**



**Legend**

Farm Portion

**Groundwater Drawdown (m)**

- 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 25
- 26 - 30
- 31 - 35
- 36 - 40
- 41 - 45
- 46 - 50



PROPERTY DESCRIPTION:  
 PAARDEPLAATS 380 & PAARDEPLAATS 425  
 NEAR THE TOWN: BELFAST  
 REGISTRATION DIVISION: JT; MPUMALANGA

CLIENT:	CI GROUP (PTY) LTD
DATE: 19 May 2021	DATUM PROJECTION: WGS84 GEOGRAPHIC
DRAWN BY: M MORELLI GIS SPECIALIST	REVIEWED BY: M KRUGER HYDROGEOLOGIST

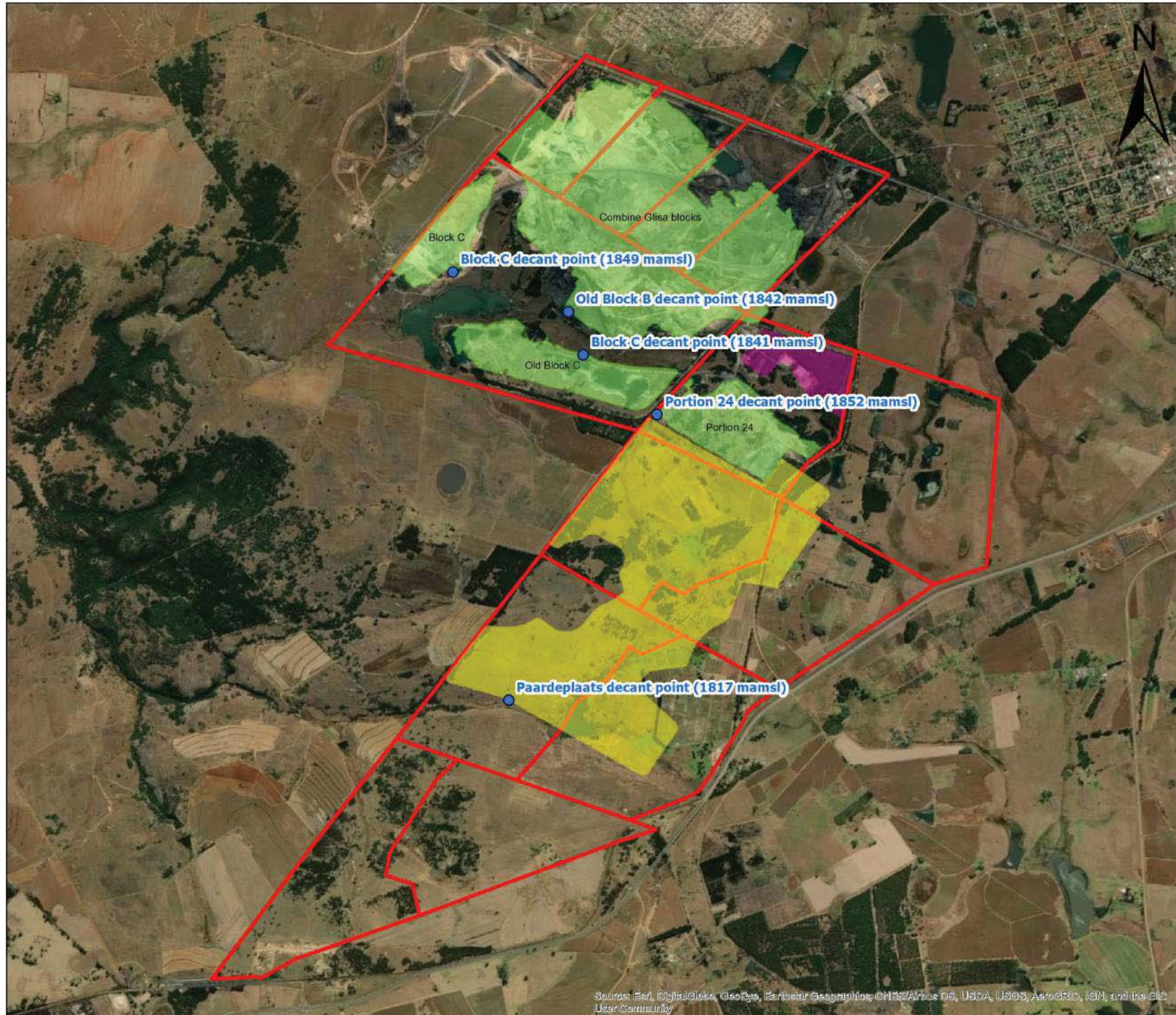


SCALE: 1:35,060



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**FIGURE 13-5: LOCATION OF POTENTIAL DECANT POSITIONS**



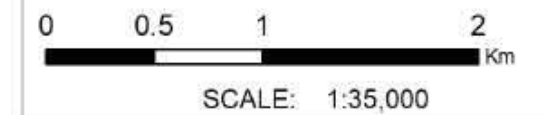
**Legend**

- Farm portions
- Decant points
- Paardeplaats LOM Extent
- Glisa\_outlines
- Discard Dump



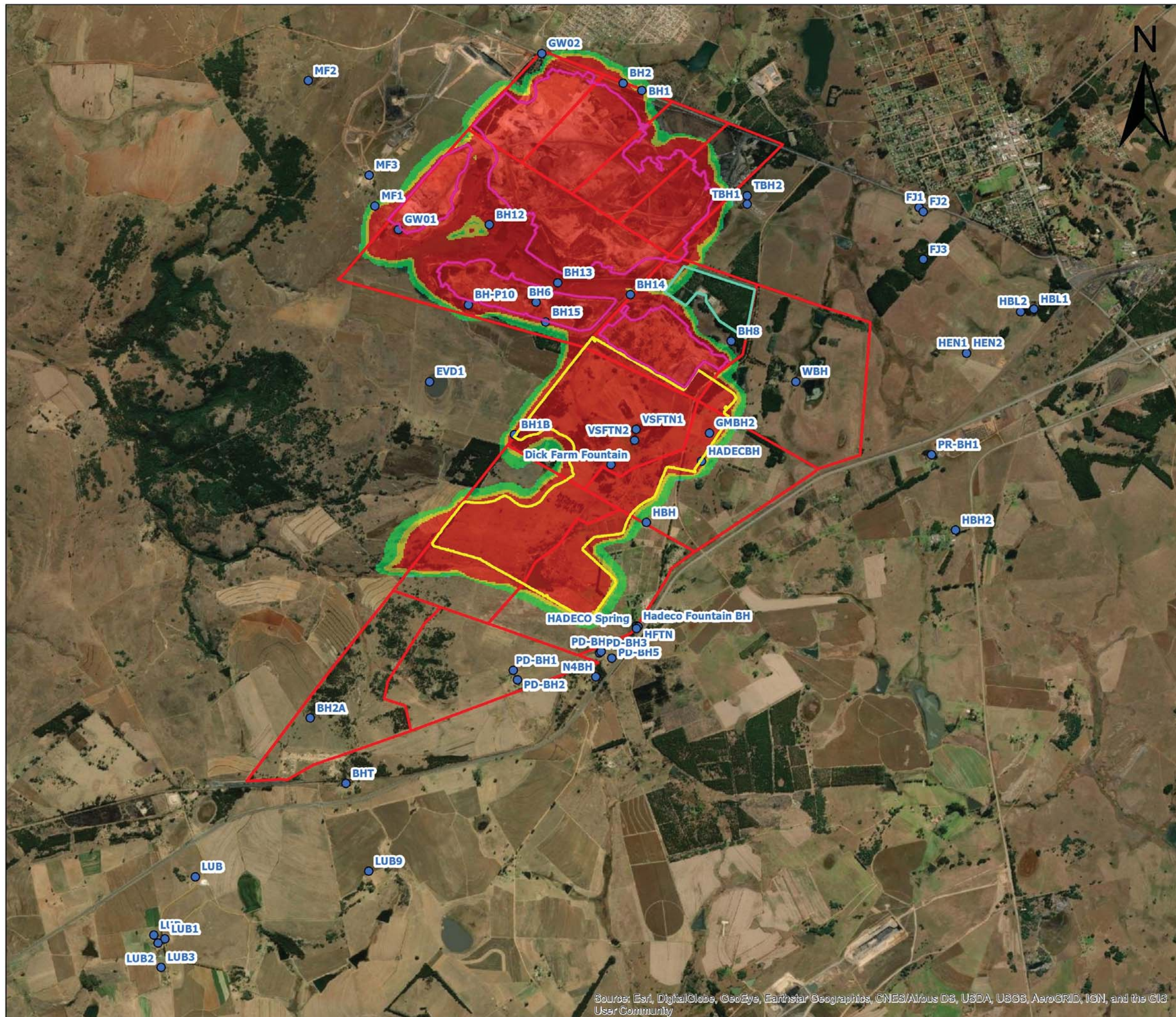
PROPERTY DESCRIPTION:  
 PAARDEPLAATS 380 & PAARDEPLAATS 425  
 NEAR THE TOWN: BELFAST  
 REGISTRATION DIVISION: JT; MPUMALANGA

CLIENT:	CI GROUP (PTY) LTD
DATE: 18 May 2021	DATUM PROJECTION: WGS84 GEOGRAPHIC
DRAWN BY: M MORELLI GIS SPECIALIST	REVIEWED BY: M KRUGER HYDROGEOLOGIST



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**FIGURE 13-6: SIMULATED SO4 CONTAMINANT PLUME – 50 YEARS POST CLOSURE WITH NO DMF LEAKAGE**



**Legend**

- Farm Portions
- Discard Dump
- Glisa\_outlines
- Paardeplaats LOM Extent
- Borehole

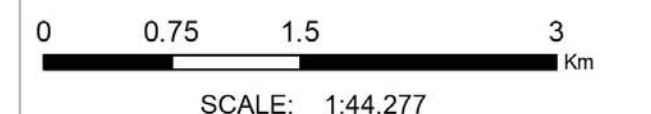
**SO4 Concentration (mg/l)**

- 45
- 46 - 50
- 51 - 250
- 251 - 500
- 501 - 1,000



PROPERTY DESCRIPTION:  
 PAARDEPLAATS 380 & PAARDEPLAATS 425  
 NEAR THE TOWN: BELFAST  
 REGISTRATION DIVISION: JT; MPUMALANGA

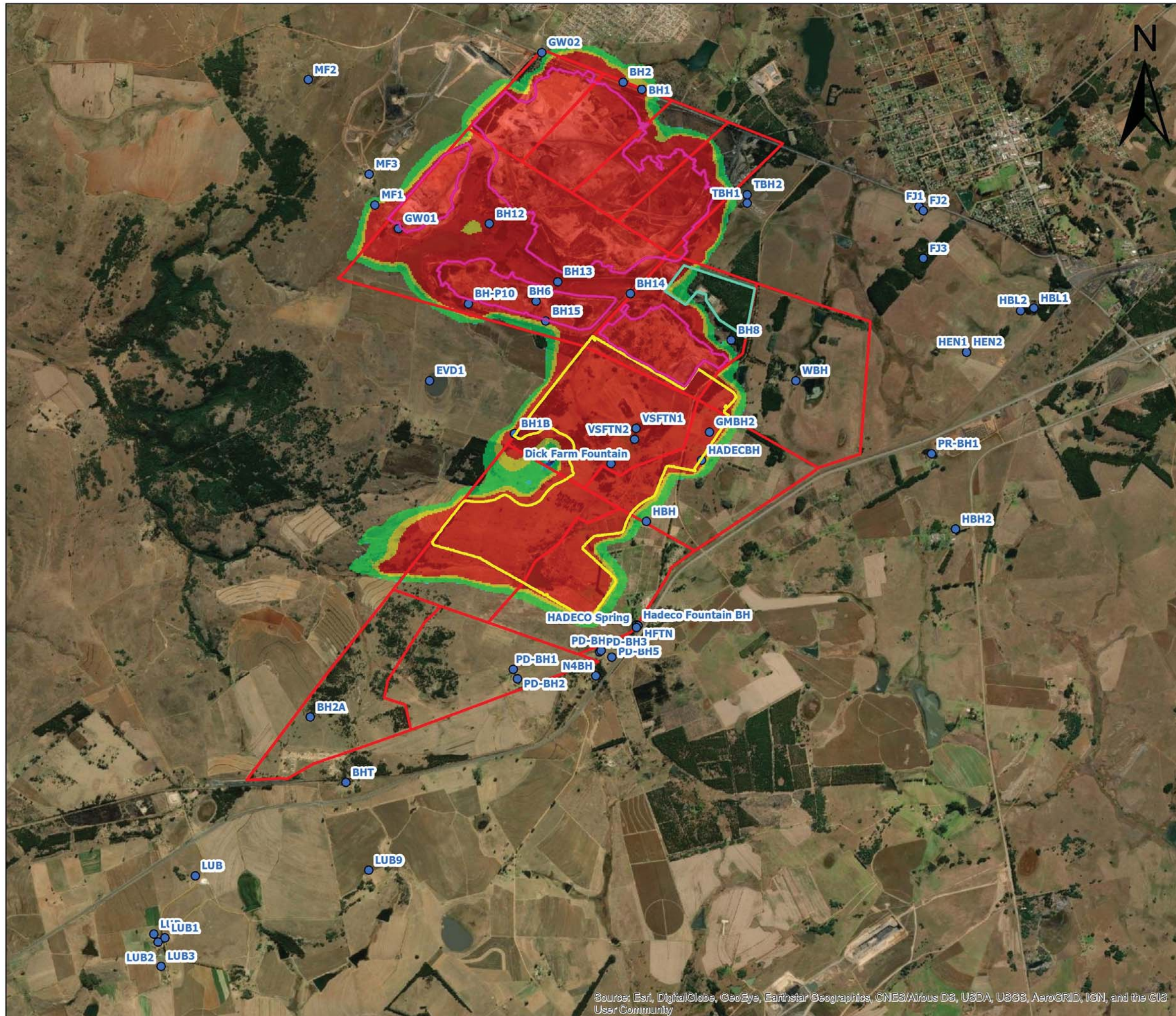
CLIENT:	CI GROUP (PTY) LTD
DATE: 19 May 2021	DATUM PROJECTION: WGS84 GEOGRAPHIC
DRAWN BY: M MORELLI GIS SPECIALIST	REVIEWED BY: M KRUGER HYDROGEOLOGIST



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



**FIGURE 13-8: SIMULATED SO4 CONTAMINANT PLUME – 100 YEARS POST CLOSURE WITH NO DMF LEAKAGE**



**Legend**

- Farm Portions
- Discard Dump
- Glisa\_outlines
- Paardeplaats LOM Extent
- Borehole

**SO4 Concentration (mg/l)**

- 6 - 10
- 11 - 50
- 51 - 250
- 251 - 500
- 501 - 1,000

**MIUNEX<sup>CC</sup>**  
ENVIRONMENTAL CONSULTANTS

PROPERTY DESCRIPTION:  
 PAARDEPLAATS 380 & PAARDEPLAATS 425  
 NEAR THE TOWN: BELFAST  
 REGISTRATION DIVISION: JT; MPUMALANGA

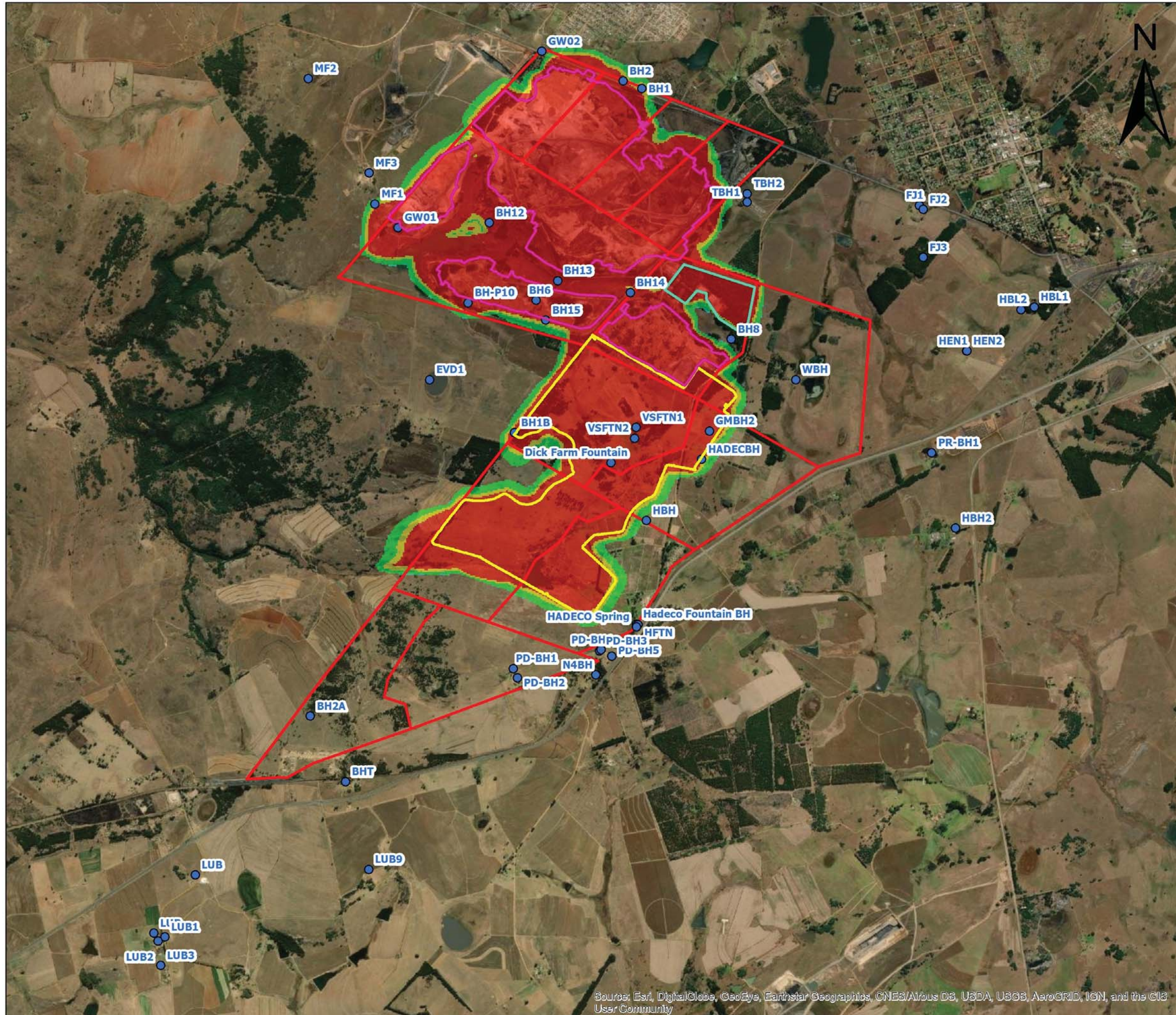
CLIENT:	CI GROUP (PTY) LTD
DATE: 19 May 2021	DATUM PROJECTION: WGS84 GEOGRAPHIC
DRAWN BY: M MORELLI GIS SPECIALIST	REVIEWED BY: M KRUGER HYDROGEOLOGIST

0      0.75      1.5      3  
 Km

SCALE: 1:44,277

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**FIGURE 13-7: SIMULATED SO4 CONTAMINANT PLUME – 50 YEARS POST CLOSURE WITH DMF LEAKAGE**



**Legend**

- Farm Portions
- Discard Dump
- Glisa\_outlines
- Paardeplaats LOM Extent
- Borehole

**SO4 Concentration (mg/l)**

- 40
- 41 - 50
- 51 - 250
- 251 - 500
- 501 - 1,000

**MIUNEX CC**  
ENVIRONMENTAL CONSULTANTS

PROPERTY DESCRIPTION:  
 PAARDEPLAATS 380 & PAARDEPLAATS 425  
 NEAR THE TOWN: BELFAST  
 REGISTRATION DIVISION: JT; MPUMALANGA

CLIENT:	CI GROUP (PTY) LTD
DATE: 19 May 2021	DATUM PROJECTION: WGS84 GEOGRAPHIC
DRAWN BY: M MORELLI GIS SPECIALIST	REVIEWED BY: M KRUGER HYDROGEOLOGIST

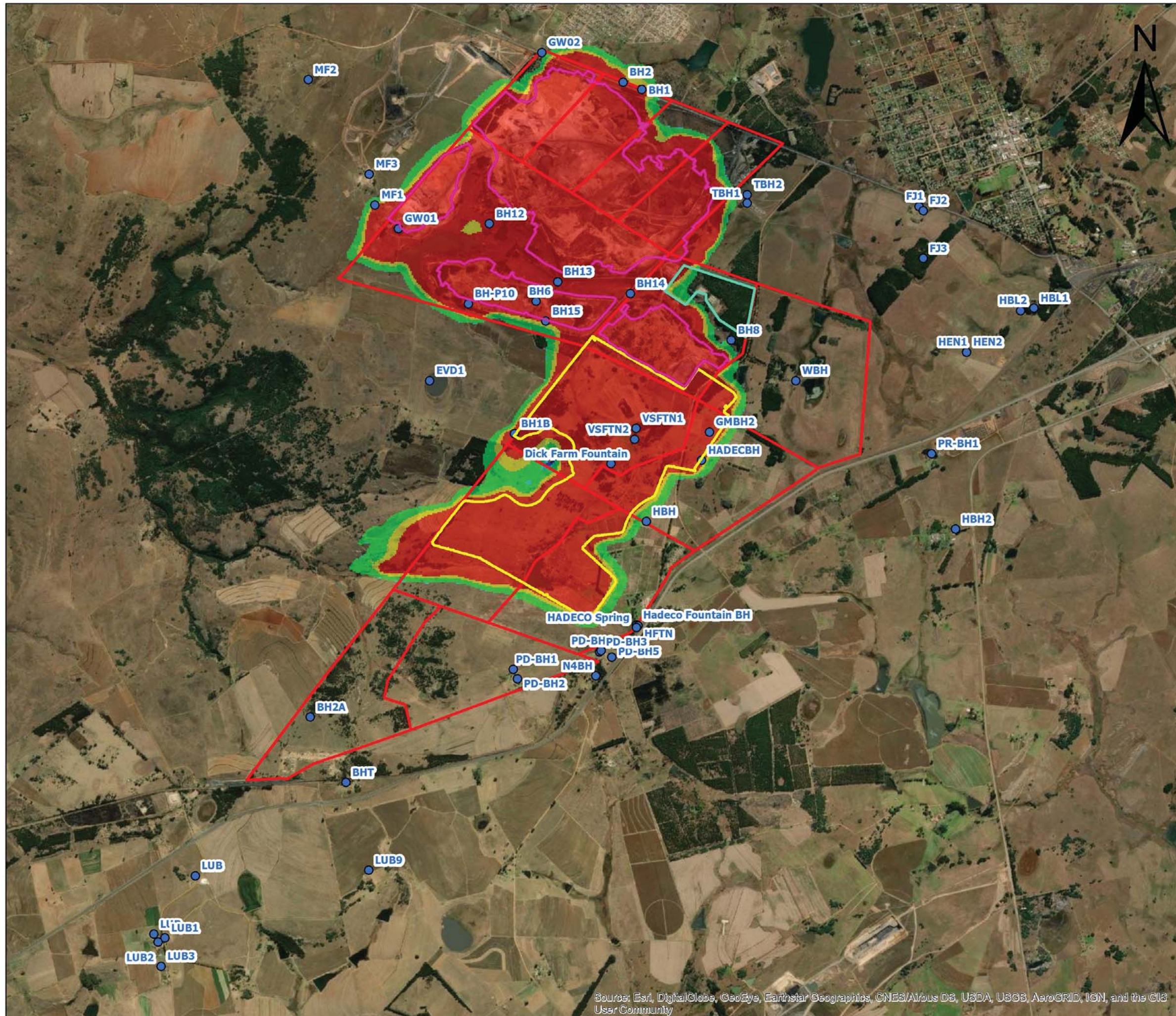
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 Km

SCALE: 1:44,277

Study Area

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**FIGURE 13-8: SIMULATED SO4 CONTAMINANT PLUME – 100 YEARS POST CLOSURE WITH NO DMF LEAKAGE**



**Legend**

- Farm Portions
- Discard Dump
- Glisa\_outlines
- Paardeplaats LOM Extent
- Borehole

**SO4 Concentration (mg/l)**

- 6 - 10
- 11 - 50
- 51 - 250
- 251 - 500
- 501 - 1,000

**MIUNEX<sup>CC</sup>**  
ENVIRONMENTAL CONSULTANTS

PROPERTY DESCRIPTION:  
 PAARDEPLAATS 380 & PAARDEPLAATS 425  
 NEAR THE TOWN: BELFAST  
 REGISTRATION DIVISION: JT; MPUMALANGA

CLIENT:	CI GROUP (PTY) LTD
DATE: 19 May 2021	DATUM PROJECTION: WGS84 GEOGRAPHIC
DRAWN BY: M MORELLI GIS SPECIALIST	REVIEWED BY: M KRUGER HYDROGEOLOGIST

0      0.75      1.5      3  
 Km

SCALE: 1:44,277

Study Area

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community