

TILENGA ESIA - APPENDIX D: A3 Copy of Key Figures

May 2018



FIGURE 1.1 - GEOGRAPHIC CONTEXT OF PROJECT LOCATION

 Project Area

Project:
Tilenga Project ESIA

Client:
Total E&P Uganda B.V.
and Tullow Uganda
Operations Pty Ltd

Designed: LC
Checked: GM
Approved: MW

Date: 01/06/2018
Scale @ A3: 1:3,000,000

Coordinate Reference System:
WGS 1984 UTM Zone 36N



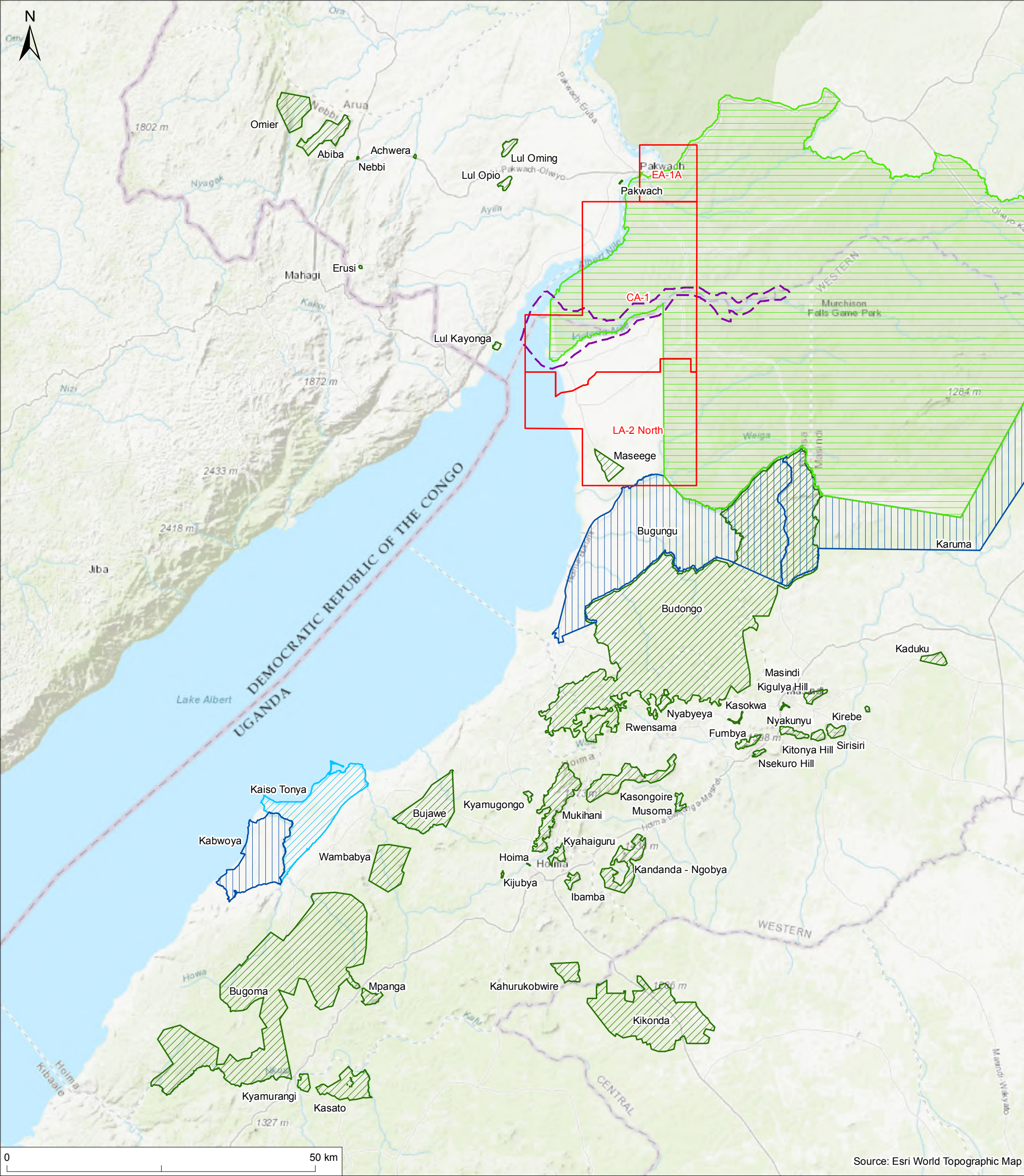


FIGURE 1.2 - PROTECTED AREAS WITHIN WESTERN UGANDA

- Project Area
- Protected Area:
 - Murchison Falls National Park
 - Ramsar
 - Community Wildlife Management Area
 - Forest Reserve
 - Wildlife Reserve

Project:
Tilenga Project ESIA

Client:
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and Tullow Uganda
Operations Pty Ltd

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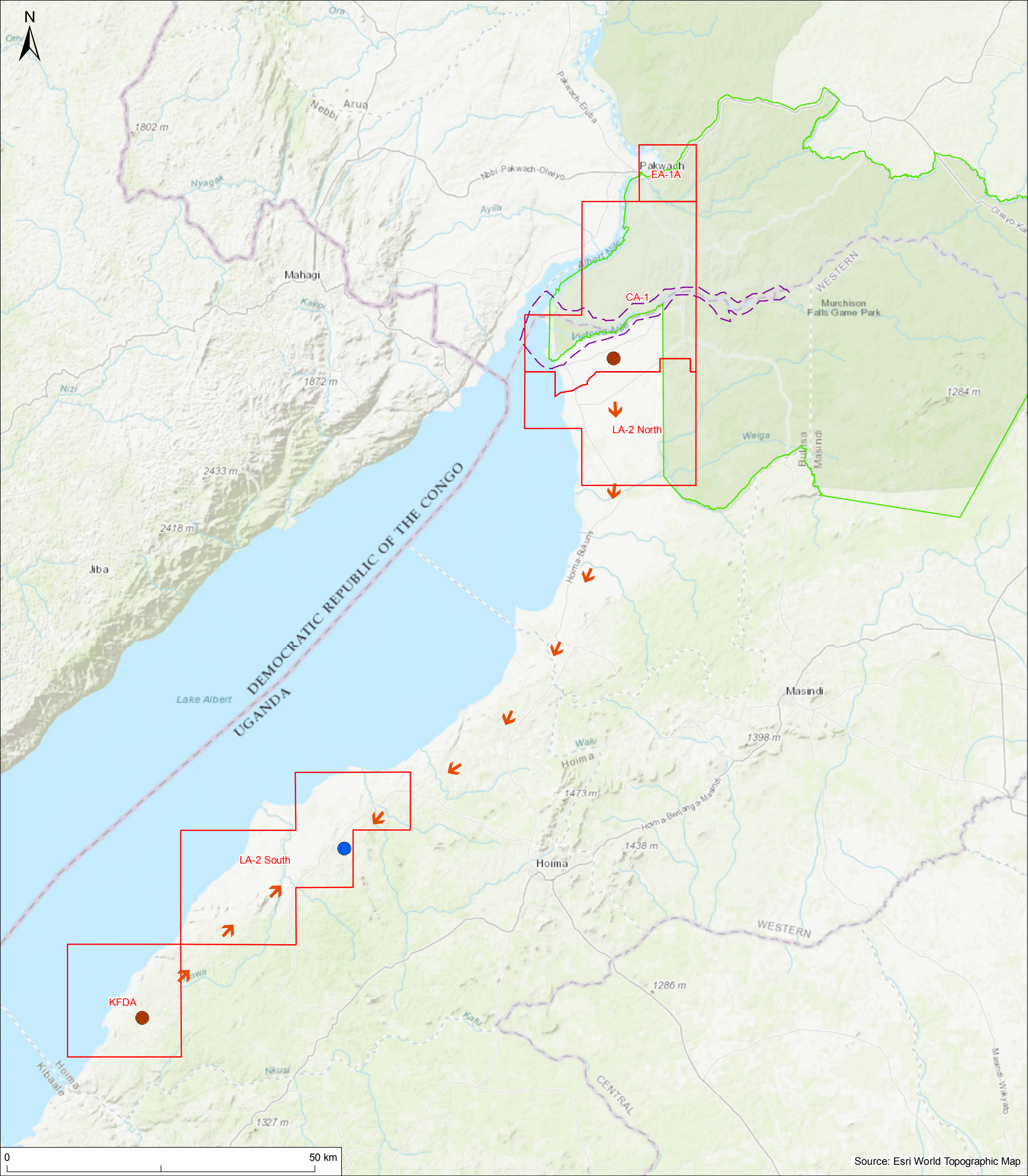


FIGURE 1.3 - LAKE ALBERT DEVELOPMENT MAP

- Production Licence Blocks and Exploration Areas
- Protected Area:
 - Murchison Falls National Park
 - Ramsar
- Kabaale Hub
- CPF Location
- Indicative Feeder Pipeline Route

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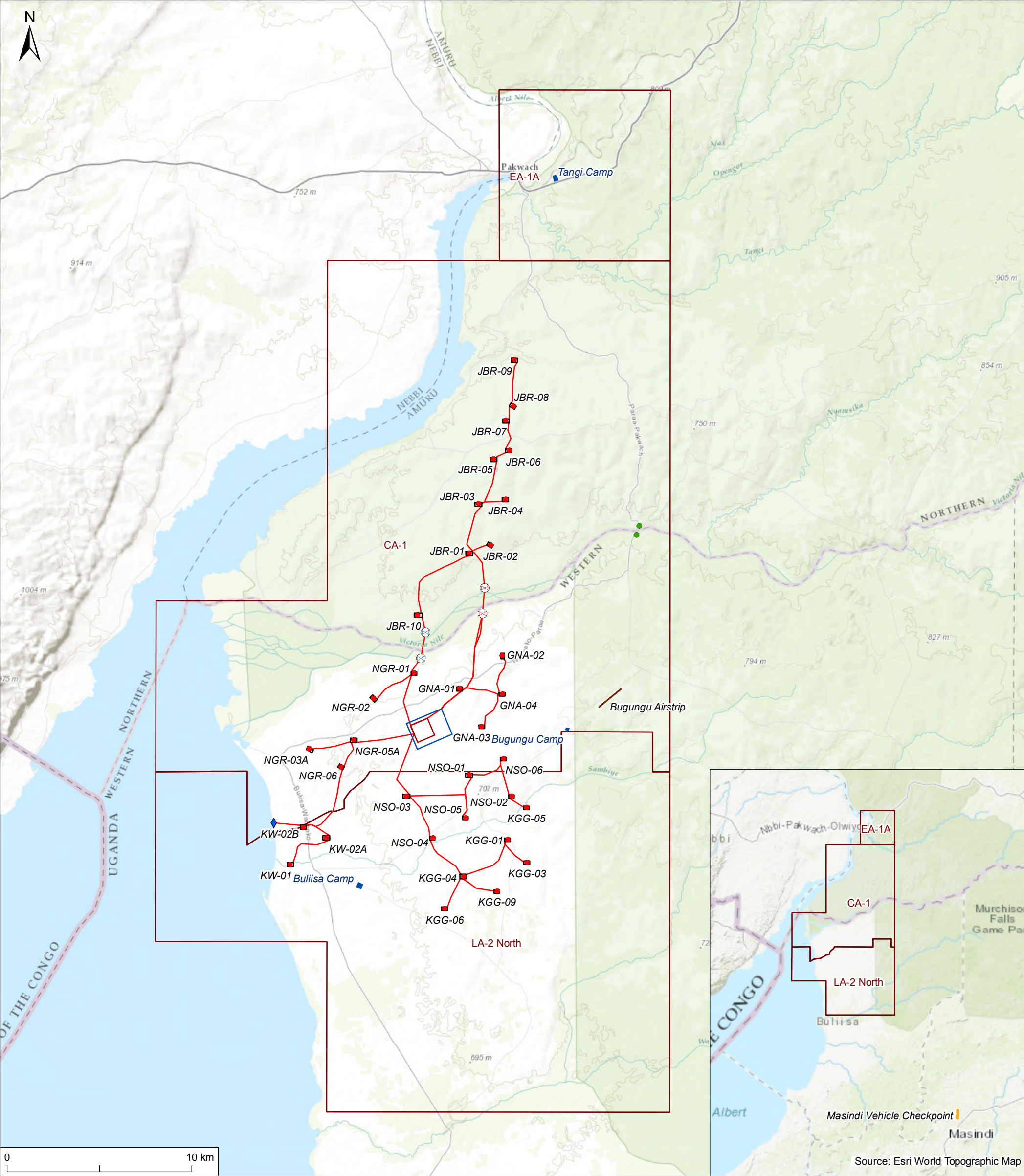


FIGURE 1.4 - PROPOSED TILENGA PROJECT DEVELOPMENT INFRASTRUCTURE

- | | |
|--|----------------------------------|
| Project Area | Production and Injection Network |
| Wellpad location | Industrial Area |
| Wellpad Extent - Maximum | CPF |
| Water Abstraction System | Bugungu Airstrip |
| Victoria Nile Pipeline HDD Crossing - Option 1 | Camp |
| Victoria Nile Pipeline HDD Crossing - Option 2 | Masindi Vehicle Check Point |
| Victoria Nile Ferry Crossing | |

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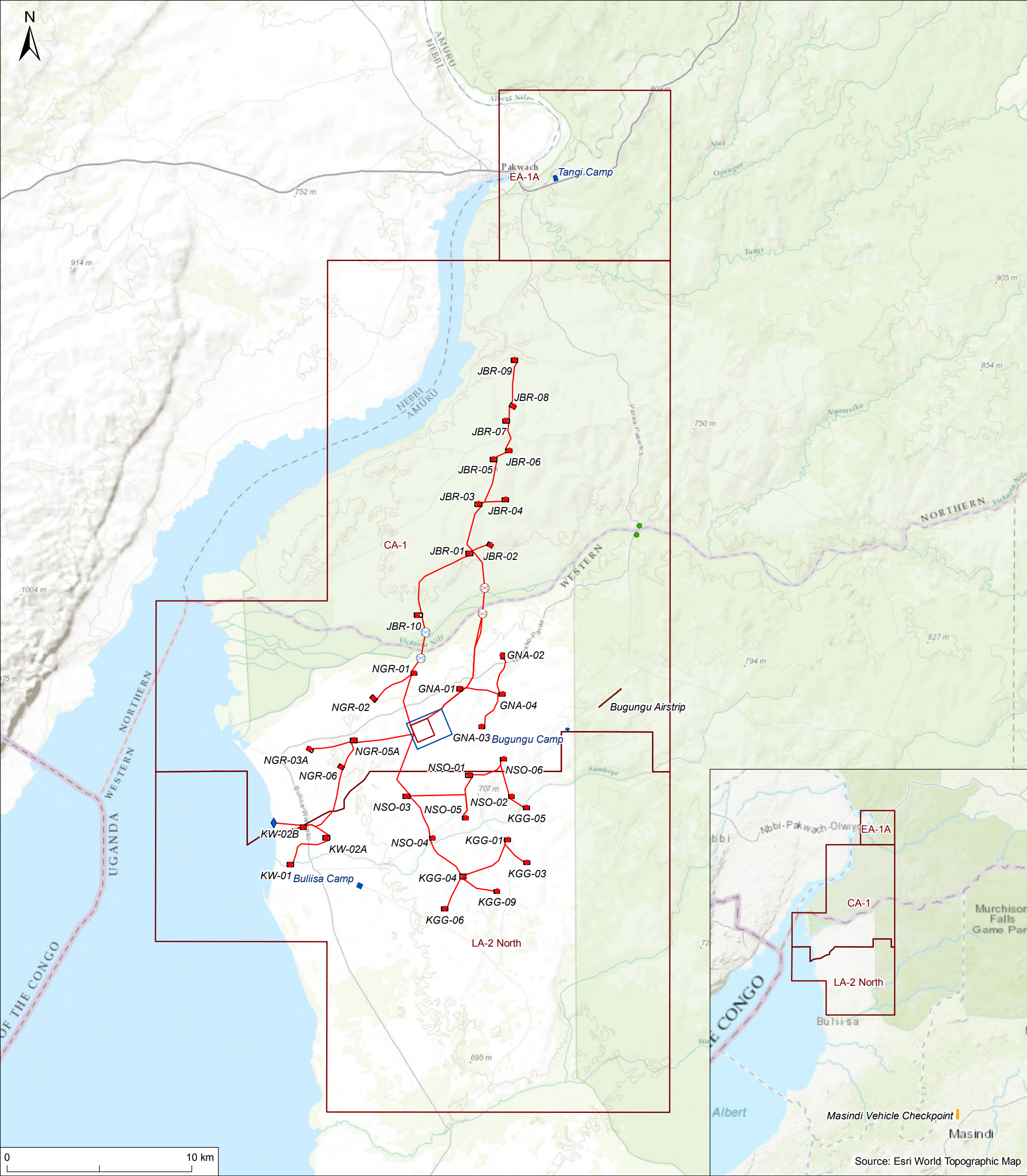


FIGURE 4.1 - INDICATIVE LAYOUT OF PROJECT

- | | |
|--|----------------------------------|
| Project Area | Production and Injection Network |
| Wellpad location | Industrial Area |
| Wellpad Extent - Maximum | CPF |
| Water Abstraction System | Bugungu Airstrip |
| Victoria Nile Pipeline HDD Crossing - Option 1 | Camp |
| Victoria Nile Pipeline HDD Crossing - Option 2 | Masindi Vehicle Check Point |
| Victoria Nile Ferry Crossing | |

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FIGURE 4.4 - LOCATION OF EXISTING AND PROPOSED BOREHOLES AT THE BULIISA, BUGUNGU AND TANGI CAMPS

- Existing Camp Area
- Proposed Extension Area
- Existing Borehole
- New Borehole
- New Test Pumping Borehole

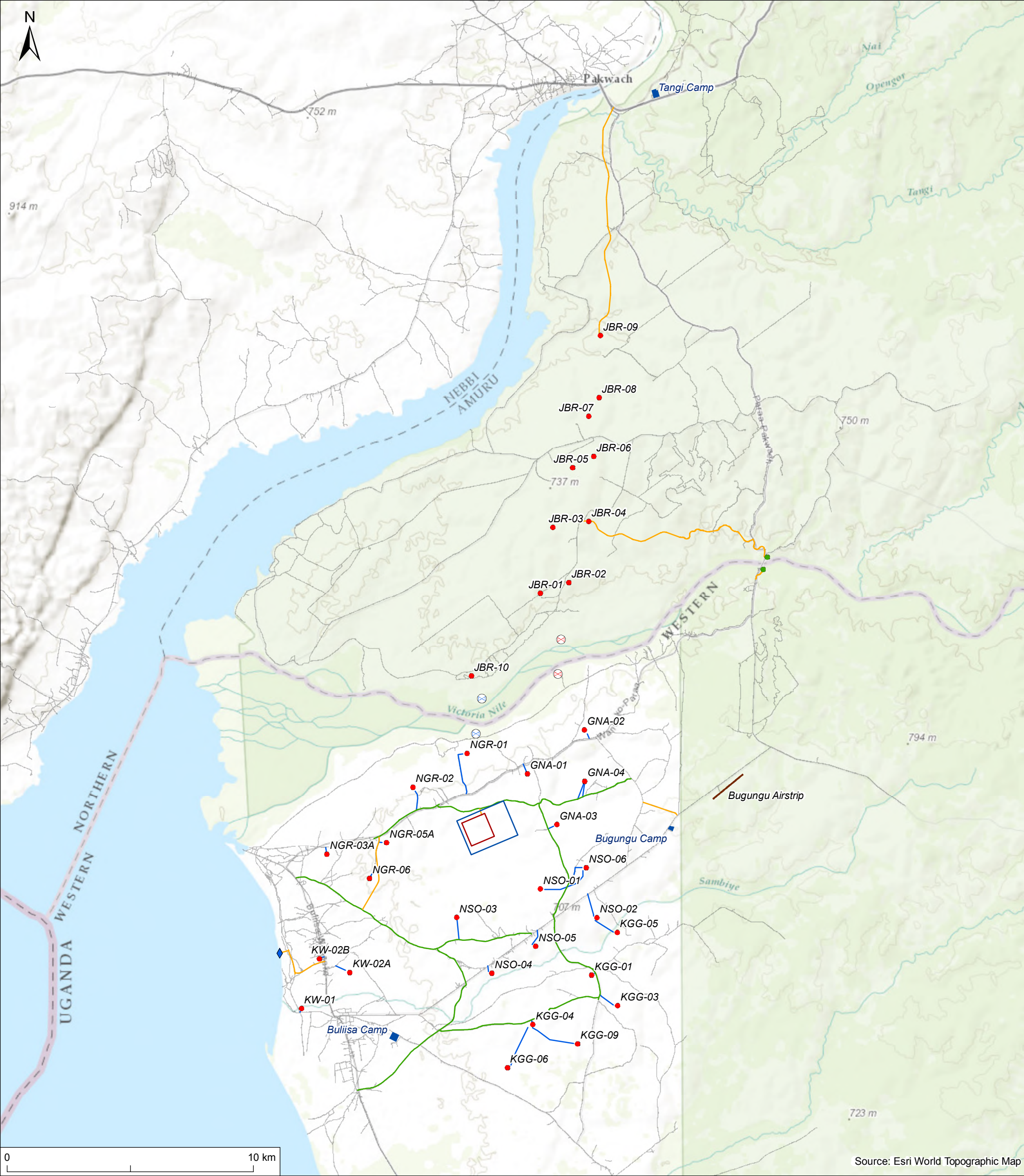


FIGURE 4.12 - UPGRADED AND NEW ROADS

- Wellpad location
- Water Abstraction System
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp
- New roads
- Upgraded roads
- Inter field access roads

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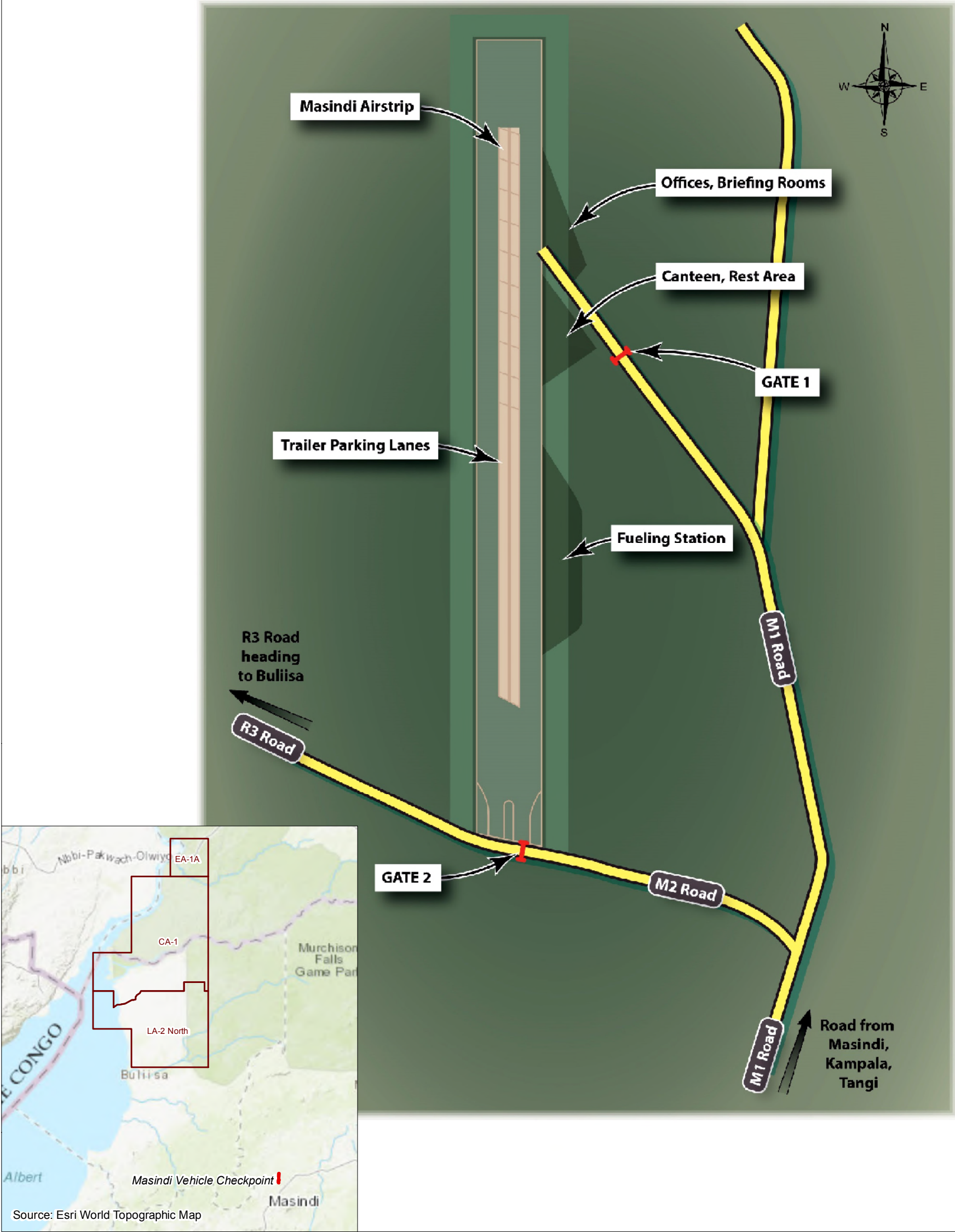


FIGURE 4.15 - INDICATIVE LAYOUT AT MASINDI VEHICLE CHECK POINT

- Project Area
- Masindi Vehicle Check Point

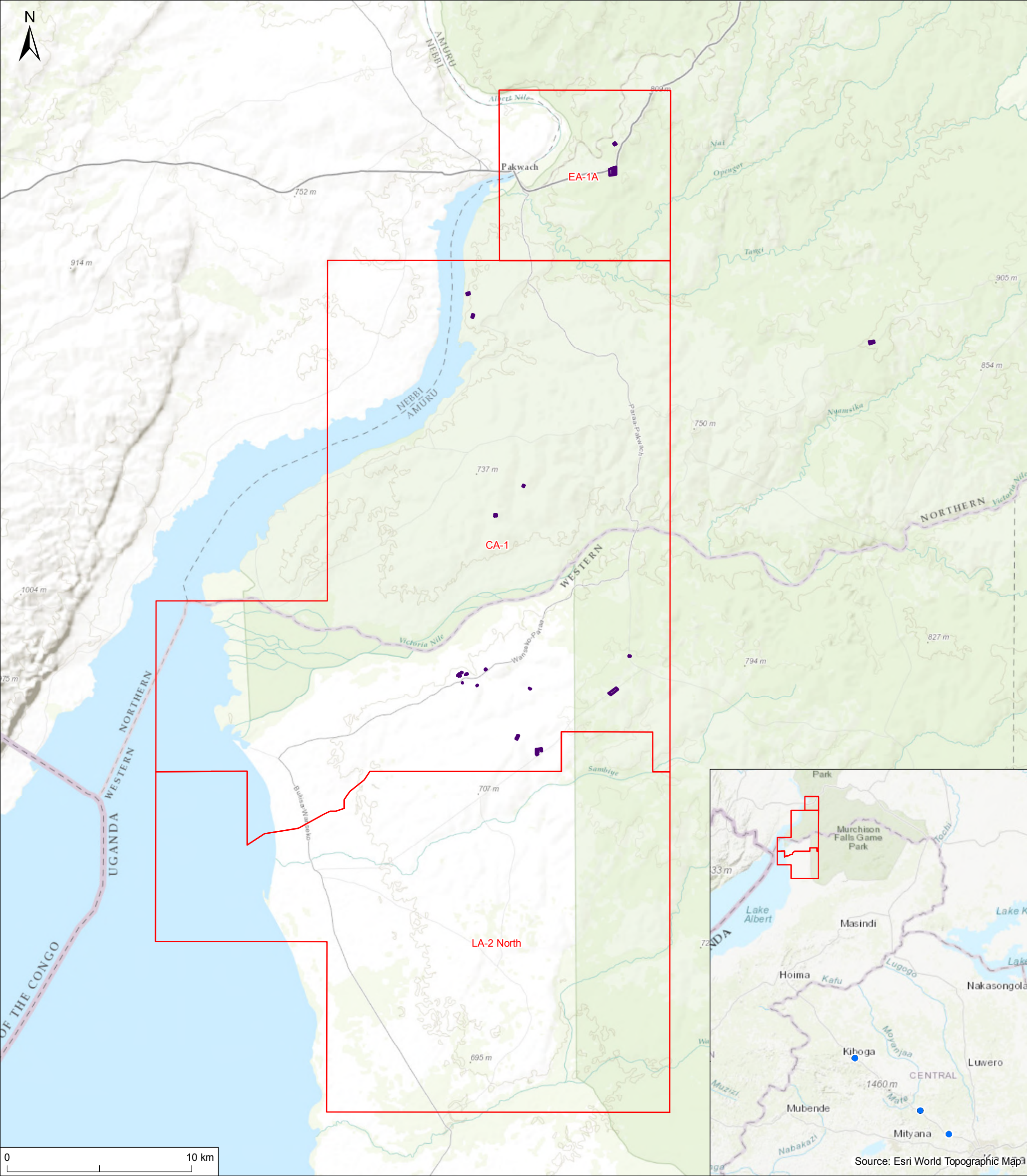


FIGURE 4.19 - LOCATION OF BORROW PITS AND QUARRY SITES

- Project Area
- Murram Borrow Pit Location
- Stone Quarry

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Tilenga Project ESIA

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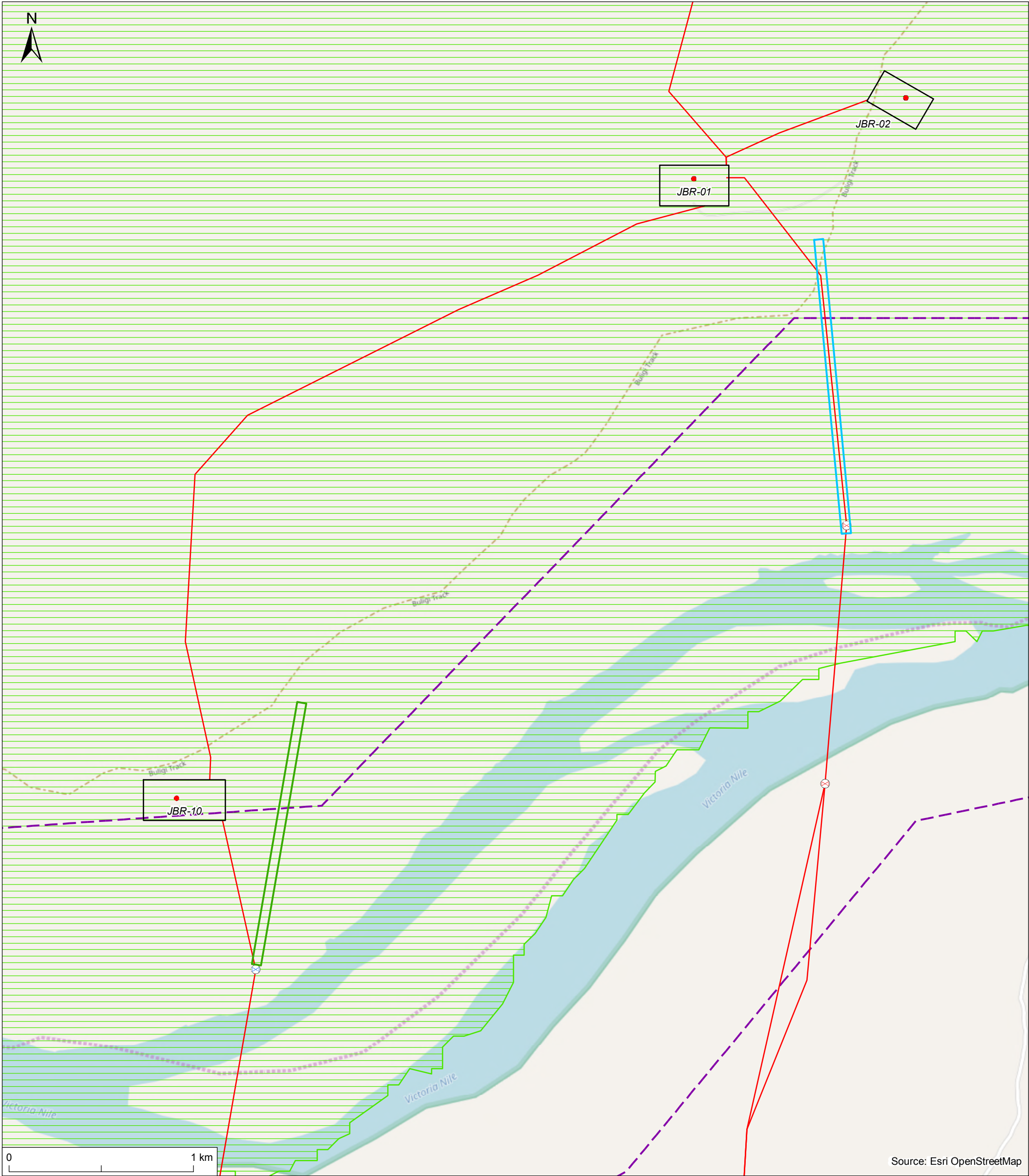


FIGURE 4.34 - PROPOSED HDD STRINGING AREAS

- Wellpad location
- Wellpad Extent - Maximum
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Pipeline HDD Crossing - Option 2
- Production and Injection Network
- Murchison Falls National Park
- Murchison Falls - Albert Delta Wetland System Ramsar Site
- Victoria Nile HDD Crossing Option 1 Stringing Area
- Victoria Nile HDD Crossing Option 2 Stringing Area

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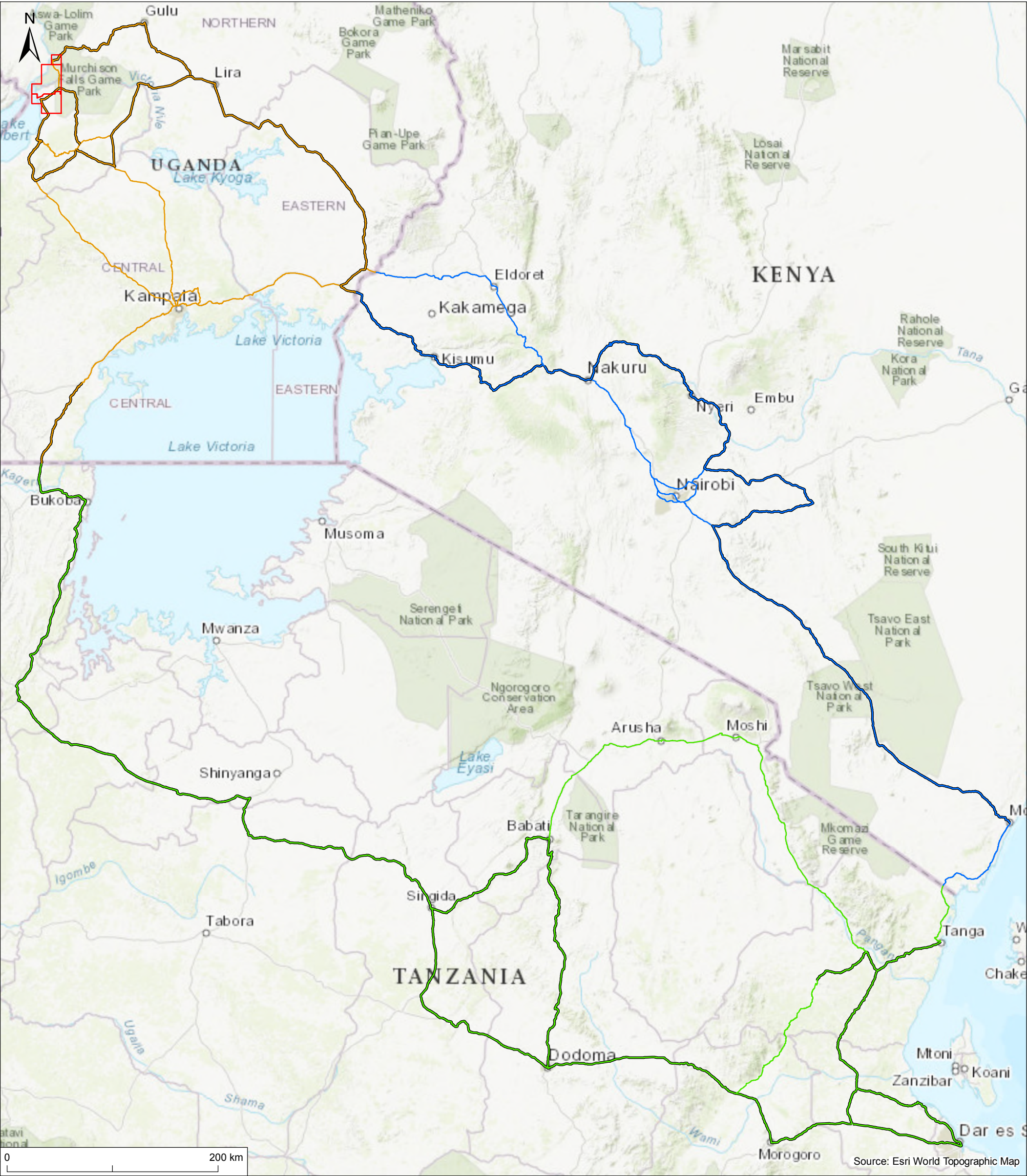


FIGURE 4.35 - ROAD TRANSPORTATION ROUTES FROM MOMBASA PORT AND DAR ES SALAAM PORT

- Project Area
- Primary Road - Uganda
- Alternative Road - Uganda
- Primary Road - Kenya
- Alternative Road - Kenya
- Primary Road - Tanzania
- Alternative Road - Tanzania

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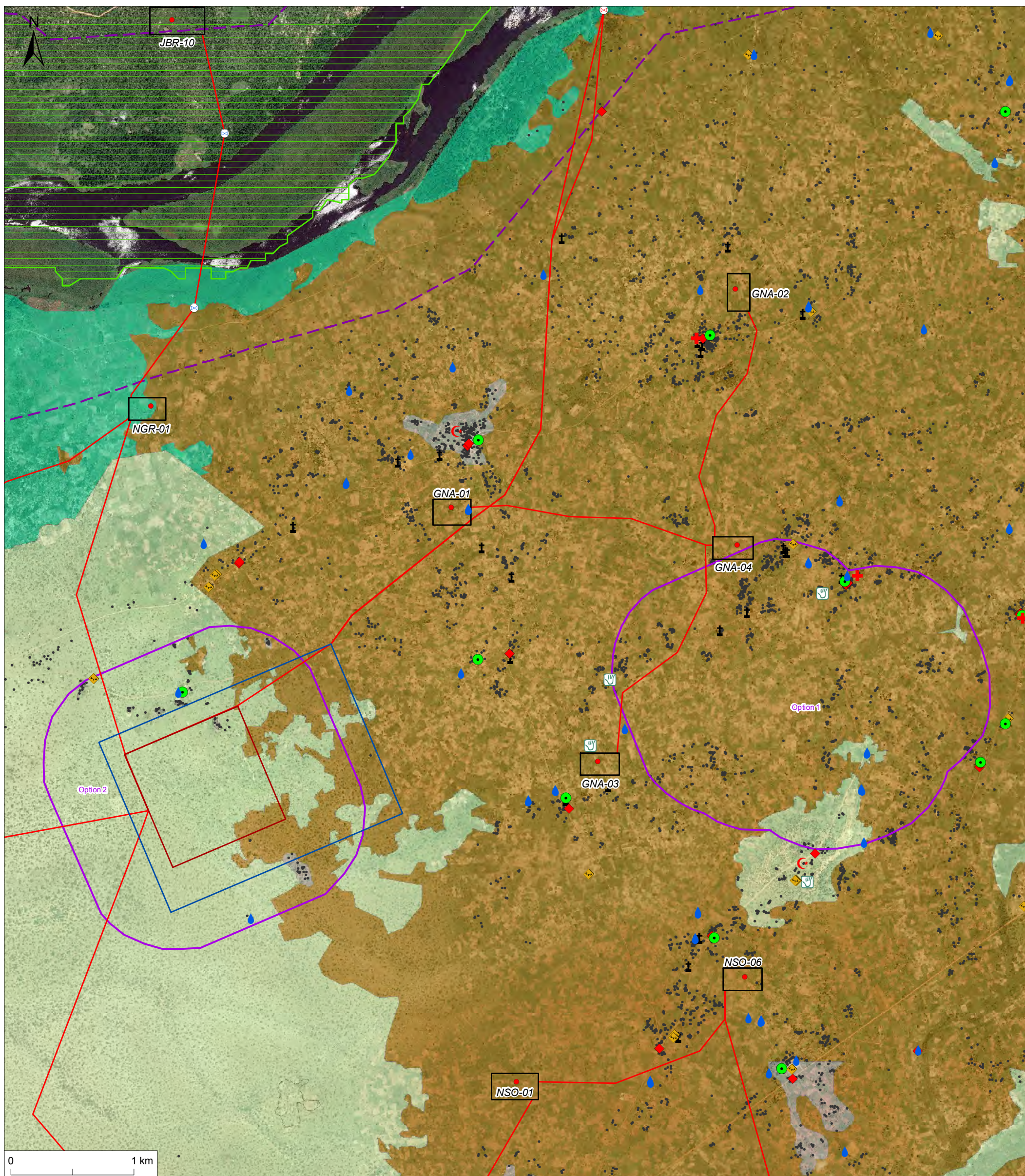


FIGURE 4.43 - ALTERNATIVE LOCATIONS FOR THE INDUSTRIAL AREA

- | | | |
|--|-------------------------------------|------------------------------------|
| • Wellpad location | Murchison Falls National Park | Place of Worship - Church |
| Wellpad Extent - Maximum | Ramsar | Place of Worship - Mosque |
| Victoria Nile Pipeline HDD Crossing - Option 1 | Land cover type | Traditional Healer |
| Victoria Nile Pipeline HDD Crossing - Option 2 | Crop farming area, tethering system | Trading Center |
| Production and Injection Network | Grazing area, agro-pastoral system | Clinic / Drug Shop / Health Center |
| Industrial Area | Peri-urban area | Borehole |
| CPF | Urban center | Play Ground |
| Industrial Area Alternatives | Wetland area | Meeting Point |
| | Inhabited Area | |

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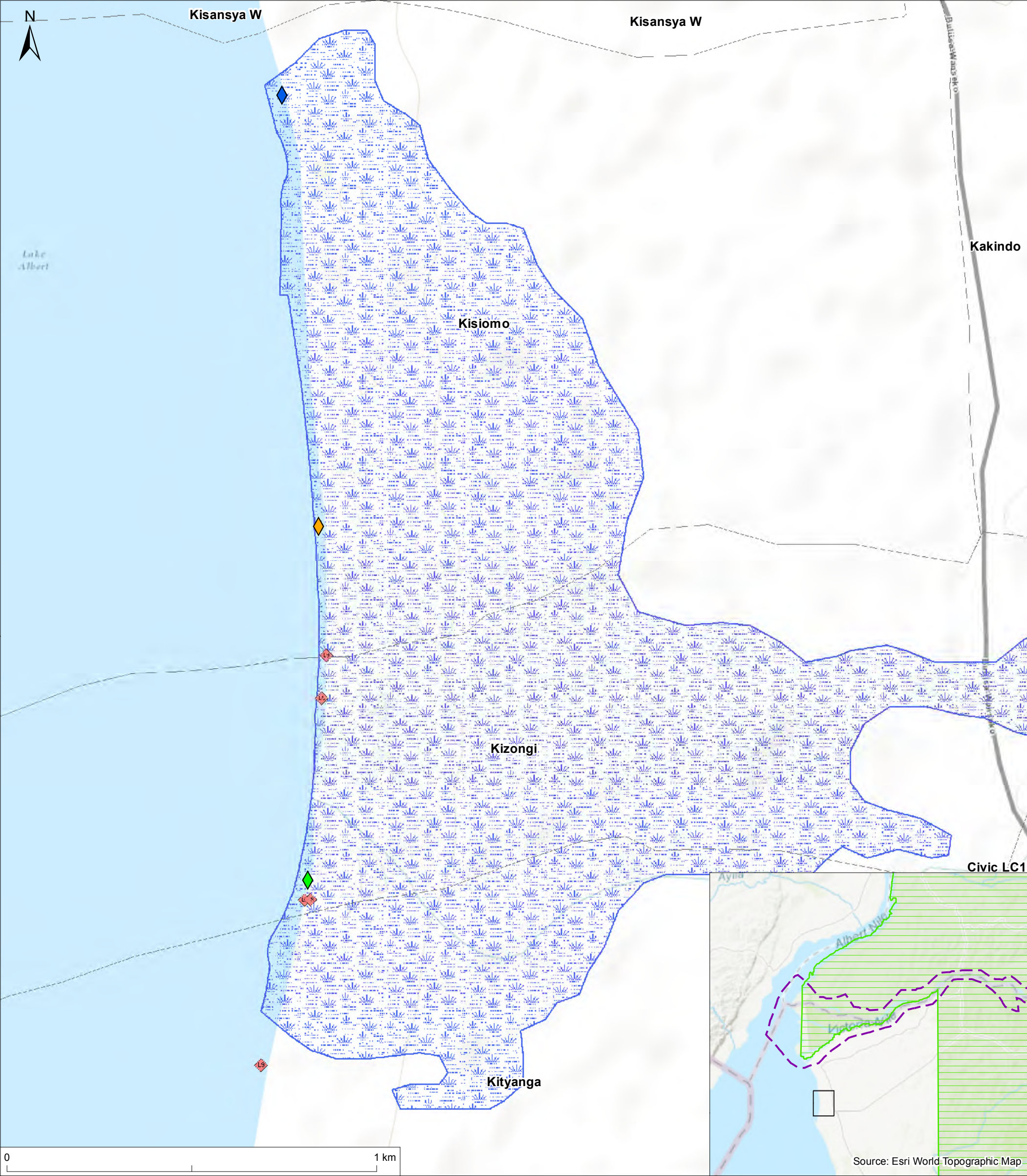


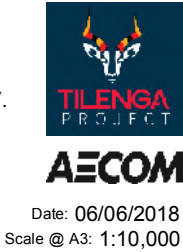
FIGURE 4.44 - LOCATION OF THREE WATER ABSTRACTION SYSTEM OPTIONS

- | | | | |
|--|-------------------------------|---|--------------------------|
|  | Murchison Falls National Park |  | Water Abstraction Site 1 |
|  | Ramsar |  | Water Abstraction Site 2 |
|  | Wetlands |  | Water Abstraction Site 3 |
|  | Landing site | | |

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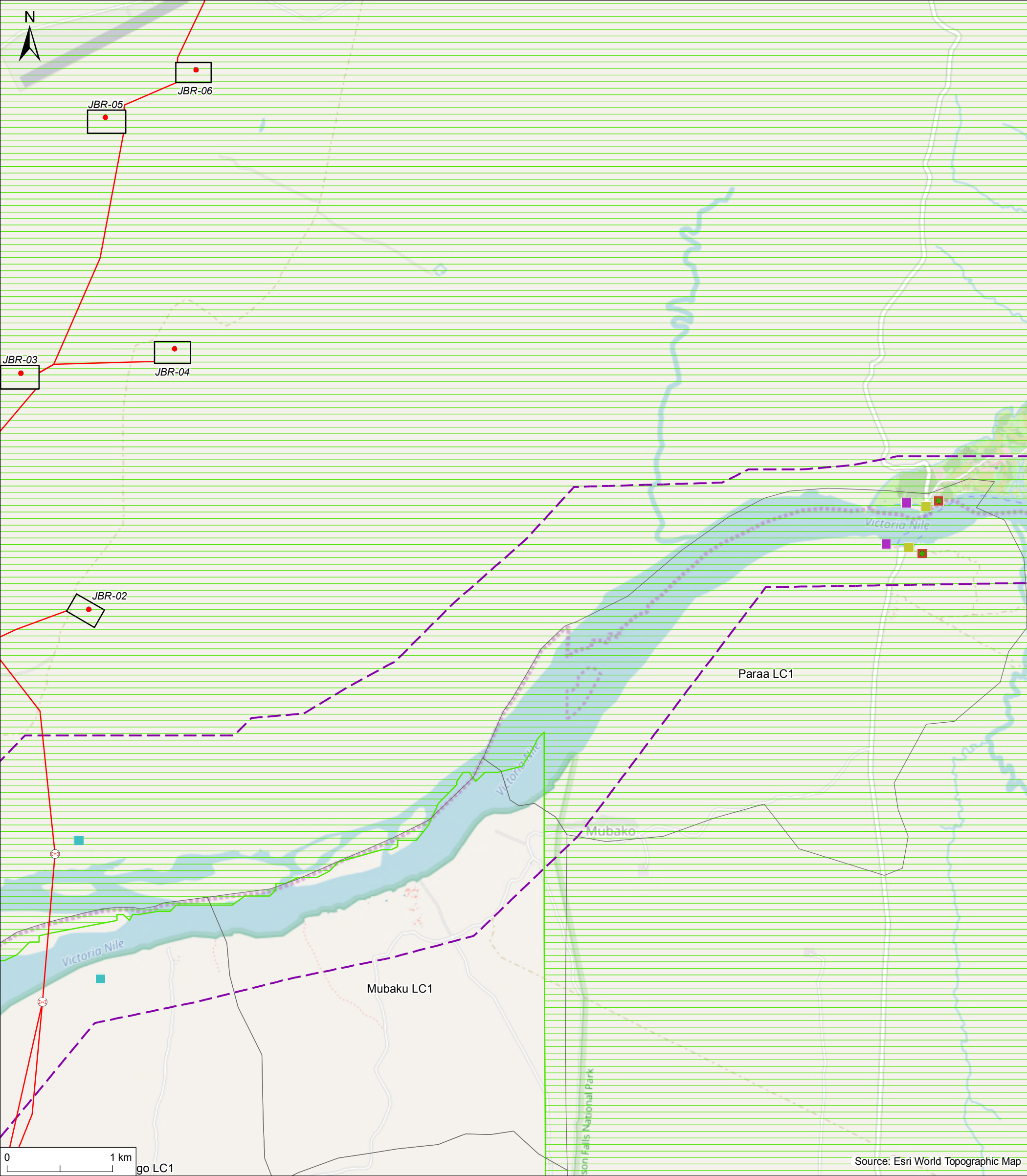


FIGURE 4.45 - LOCATION OF VICTORIA NILE FERRY CROSSING OPTIONS

- Wellpad location
- Wellpad Extent - Maximum
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Murchison Falls National Park
- Ramsar
- Village Boundary (UBOS 2012)
- Victoria Nile Ferry Crossing - Location A
- Victoria Nile Ferry Crossing - Location B
- Victoria Nile Ferry Crossing - Location C
- Existing Paraa Ferry Crossing - Location D

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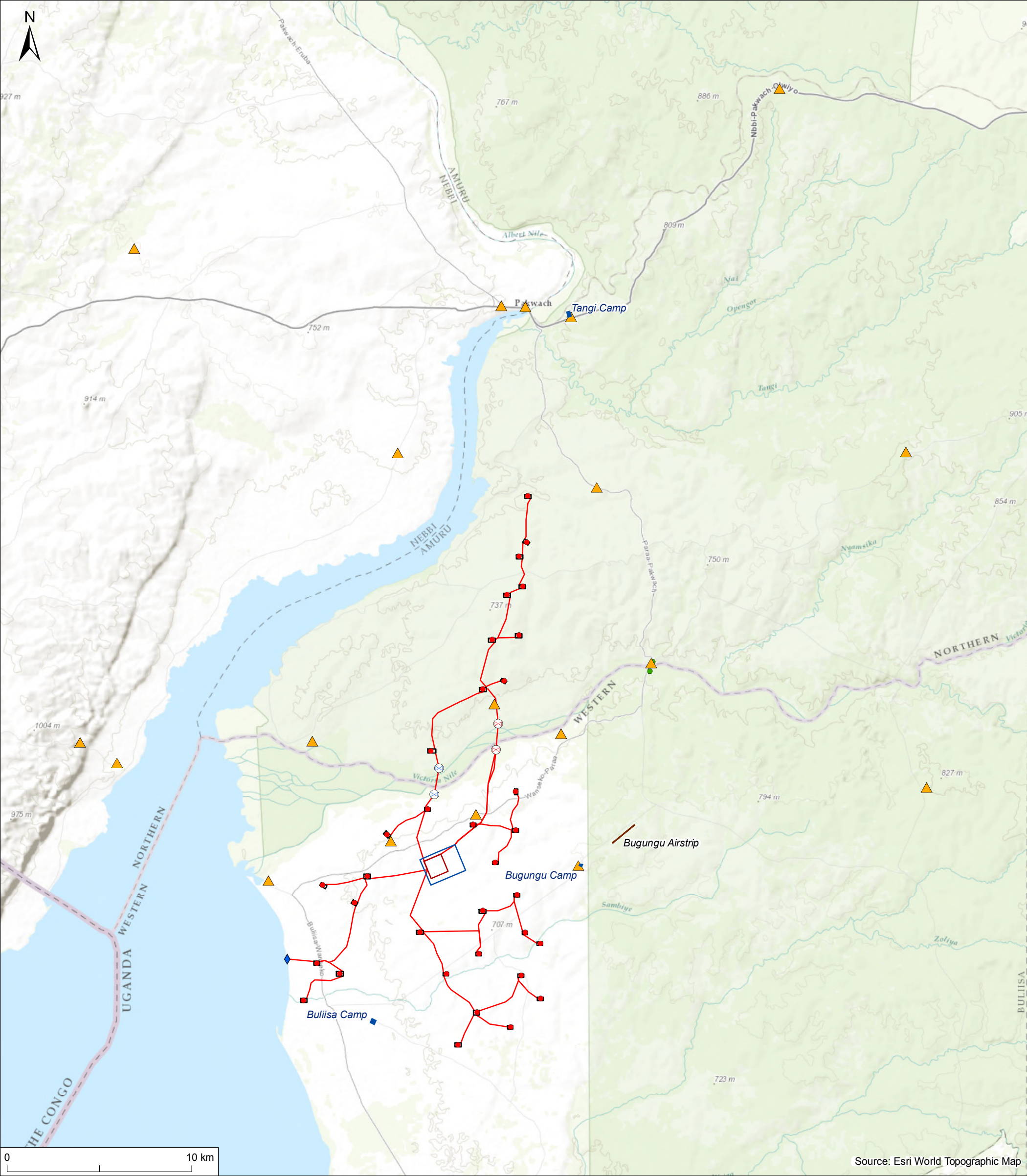


FIGURE 6.1 - AIR QUALITY SURVEYS - MONITORING LOCATIONS

- Wellpad location
- Wellpad Extent - Maximum
- Water Abstraction System
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp
- Previous Air Quality Survey Location

Project:
Tilenga Project ESIA

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Operations Pty Ltd

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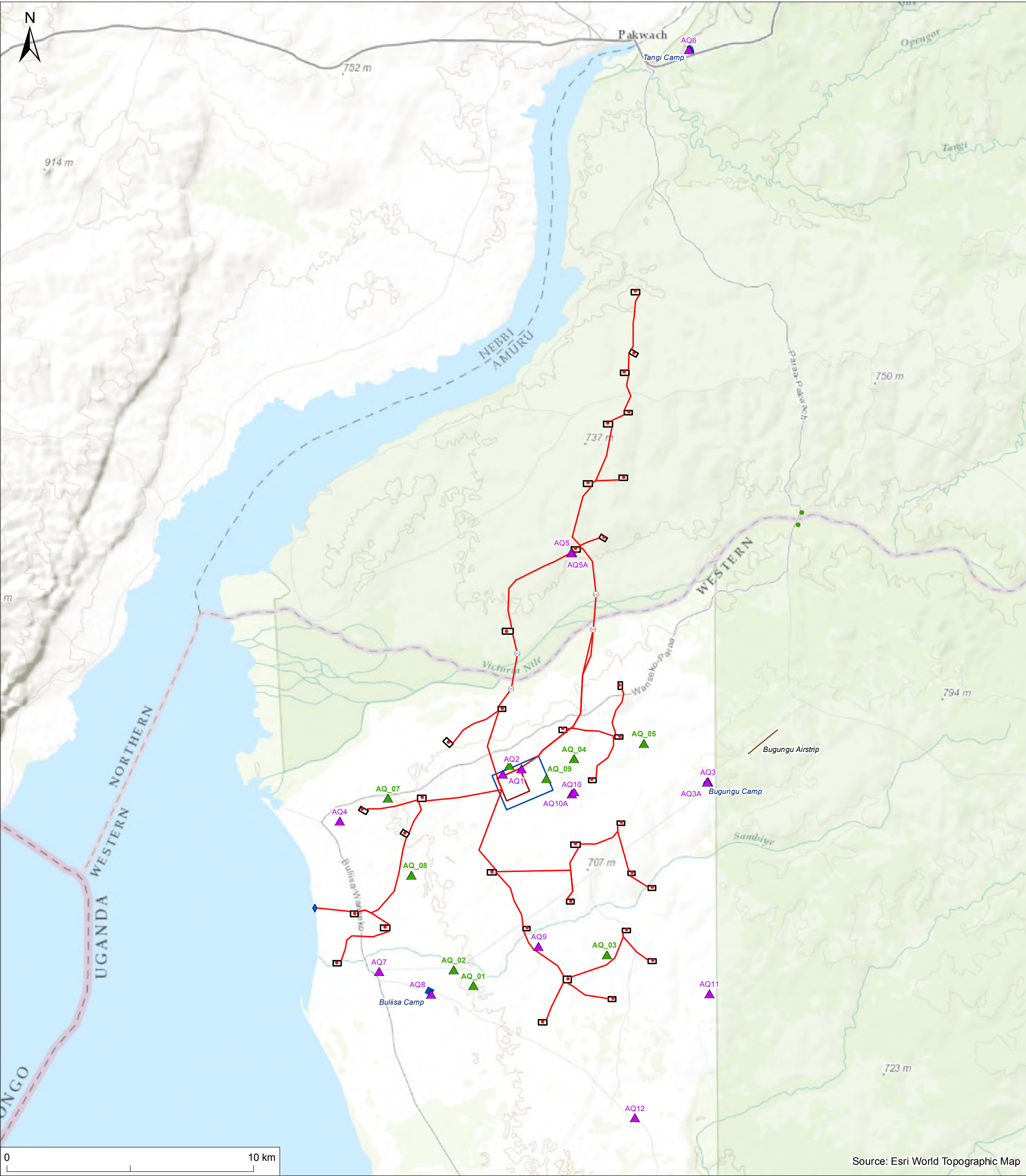


FIGURE 6.2 - 2016/2017 AIR QUALITY BASELINE SURVEY - MONITORING LOCATIONS

- Wellpad location
- Wellpad Extent - Maximum
- Water Abstraction System
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp
- ESIA Baseline Air Quality Survey Location
- Air Quality Survey Location (AWE 2017)

Project:
Tilenga Project ESIA

Client:
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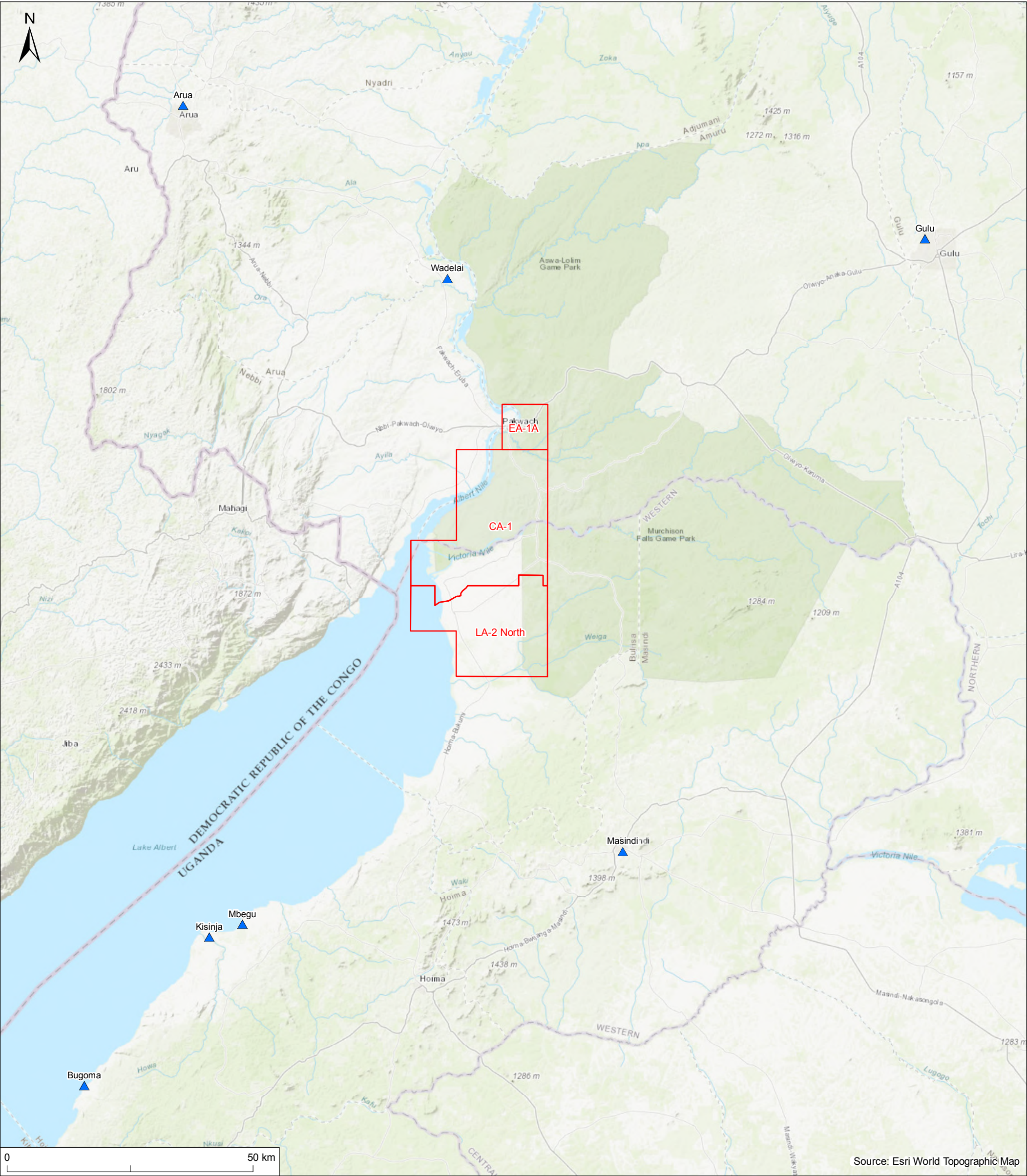


FIGURE 6.3 - WEATHER STATION DATA SOURCES

- Project Area
- Meteorological Station Location

Project:
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Client:
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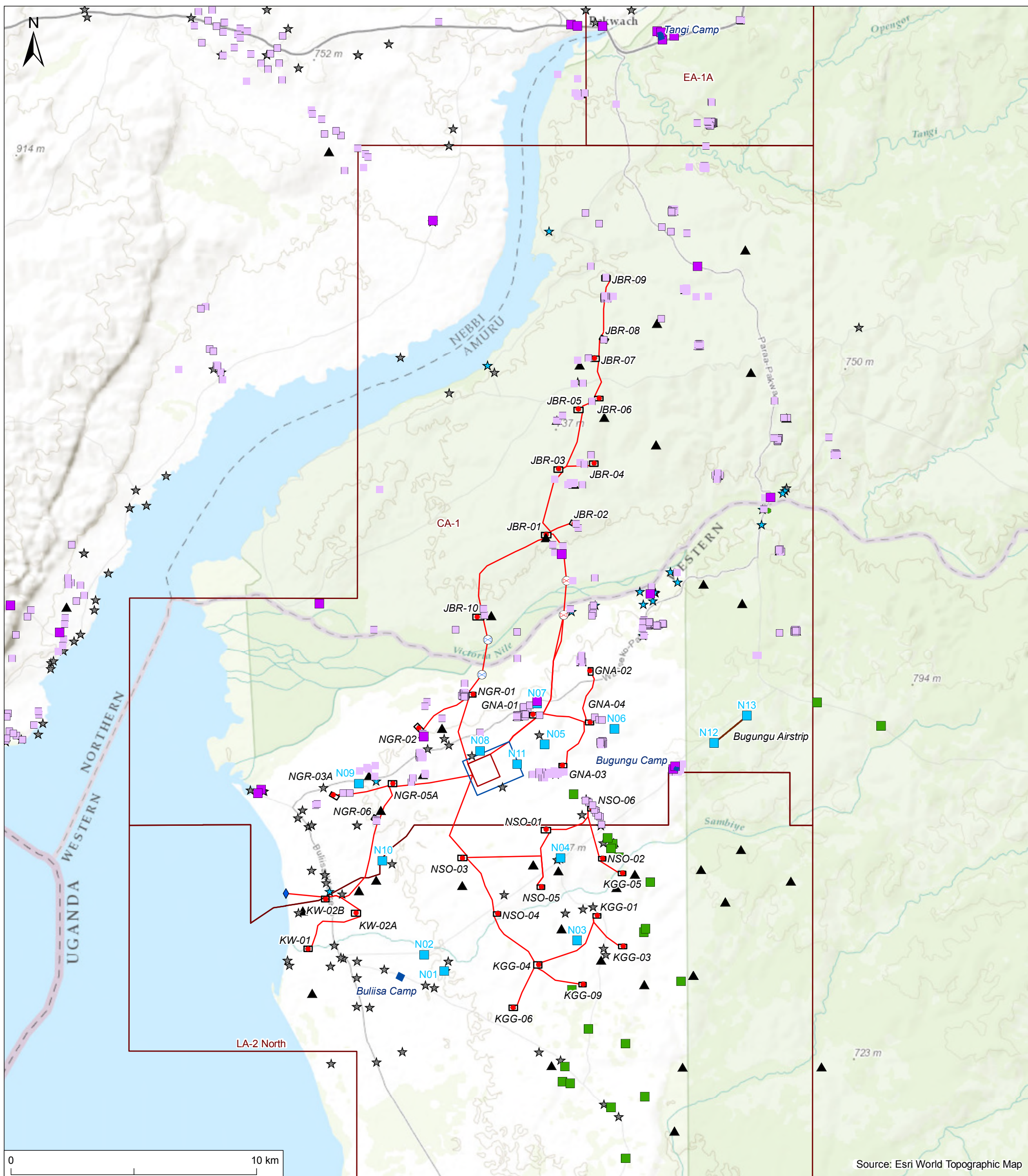
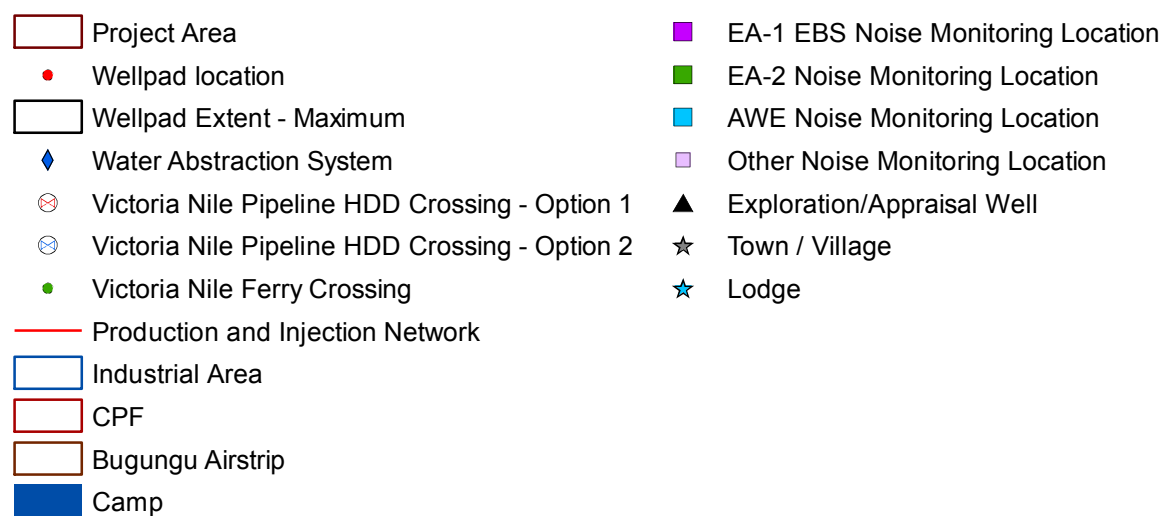


FIGURE 7.1 - KNOWN NOISE MONITORING LOCATIONS



Project:
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Client:
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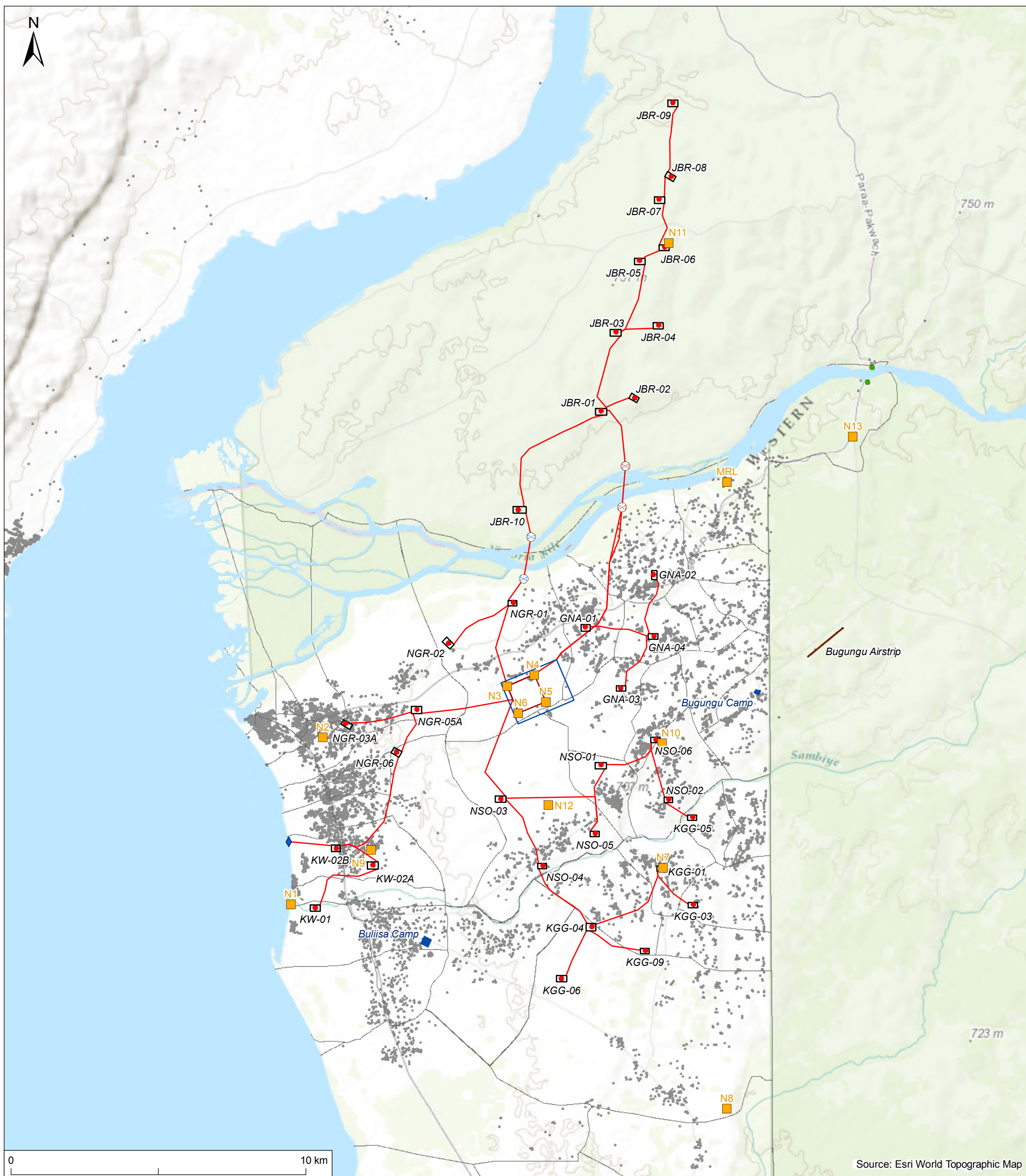


FIGURE 7.2 - NOISE ESIA BASELINE SURVEY - MONITORING AND RECEPTOR LOCATIONS

- Wellpad location
- Wellpad Extent - Maximum
- ◆ Water Abstraction System
- ⊗ Victoria Nile Pipeline HDD Crossing - Option 1
- ⊗ Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp
- Noise Monitoring Survey Location
- Inhabited Area
- Village Boundary (UBOS 2012)

Project:
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Client:
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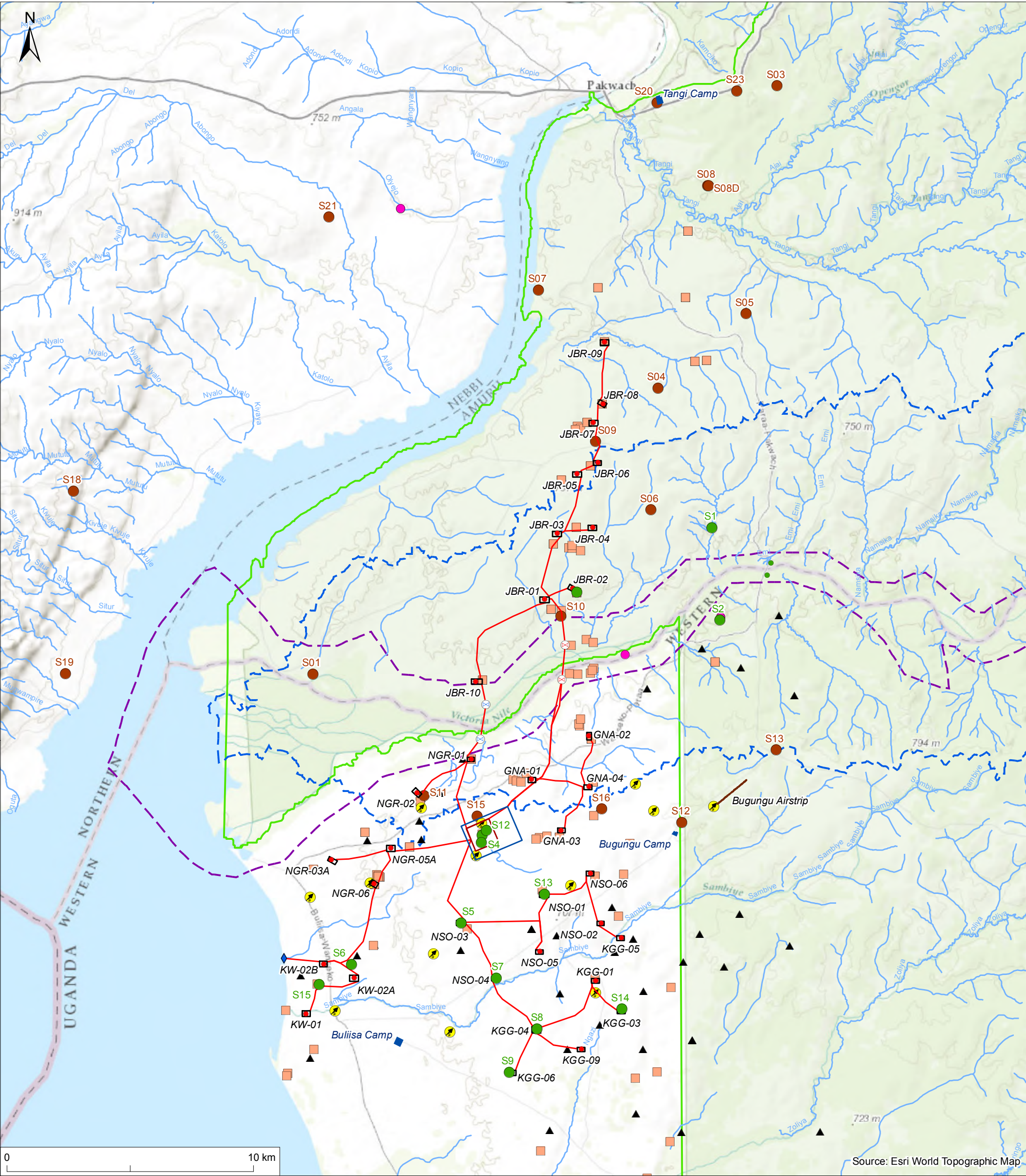
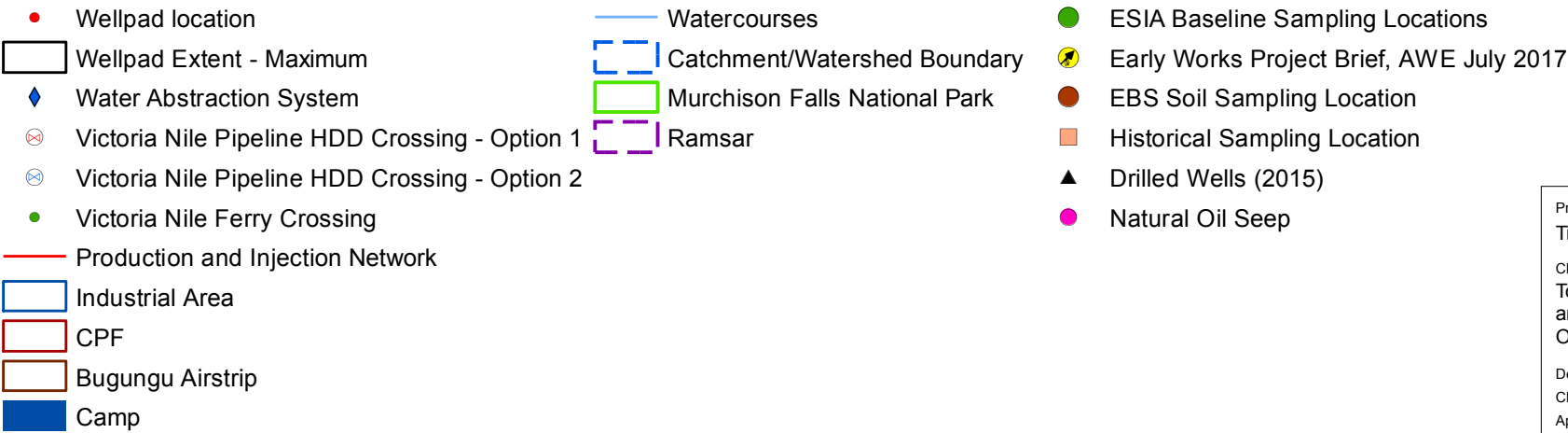


FIGURE 8.1 - SOIL SURVEY LOCATIONS



Project:
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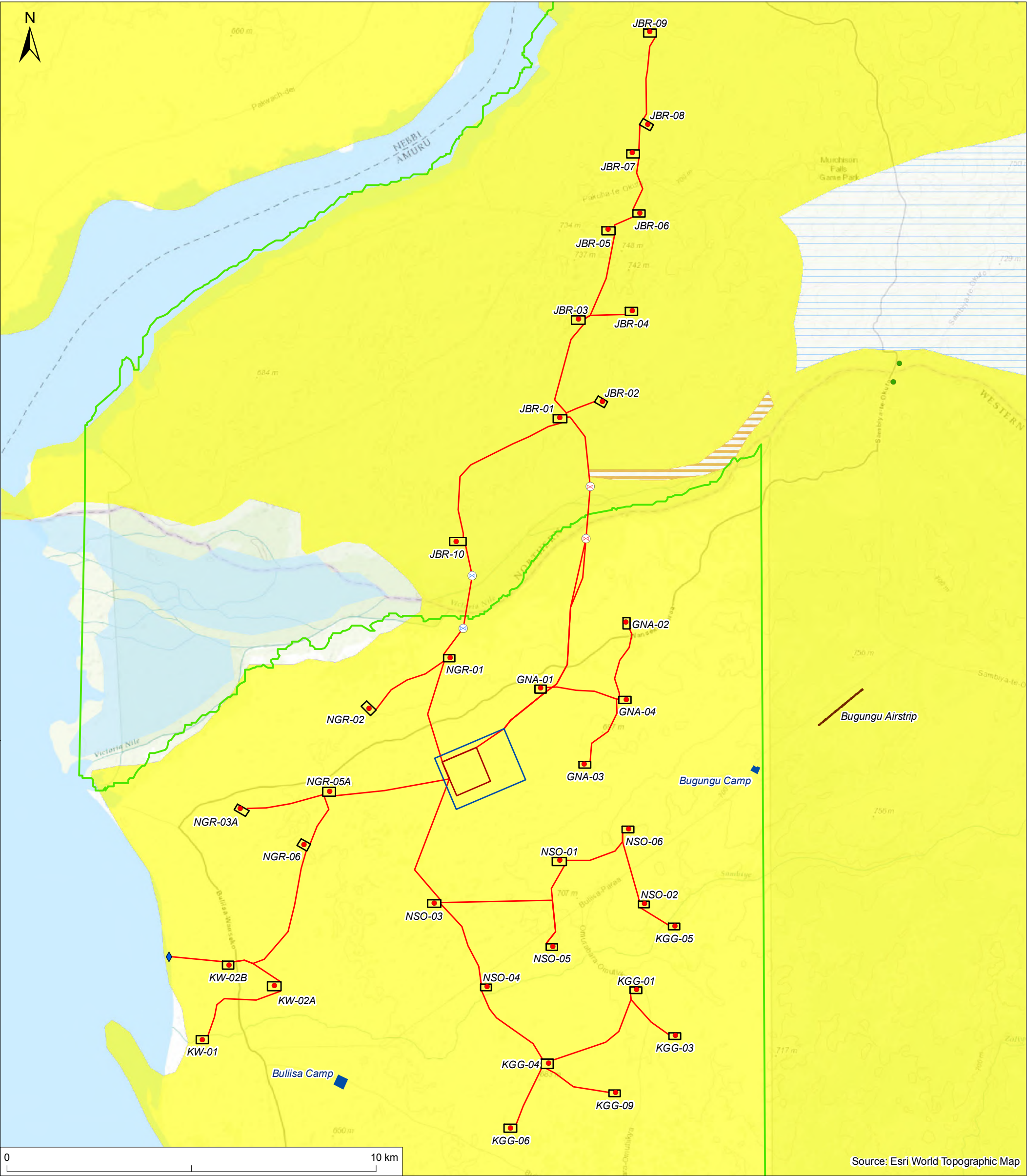
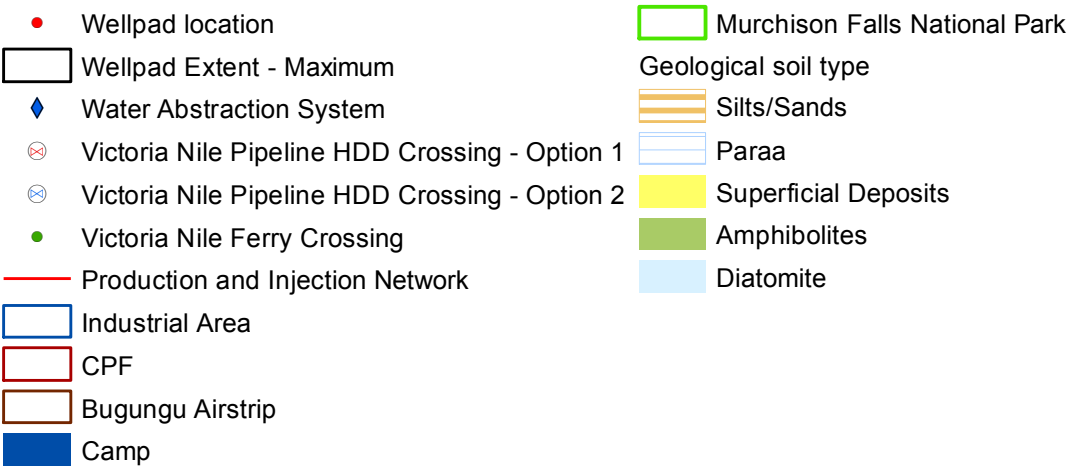


FIGURE 8.4 - SURFACE GEOLOGY



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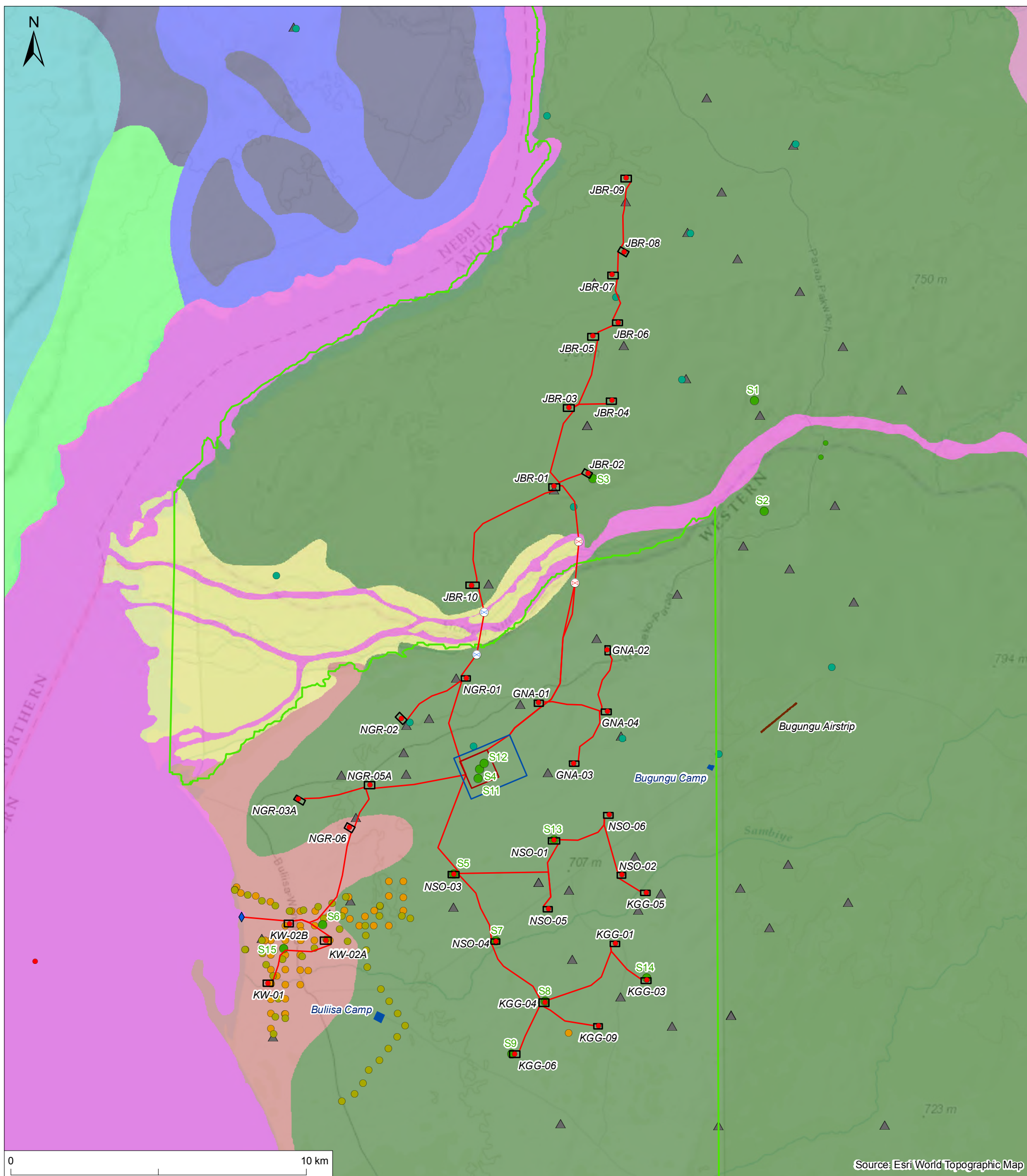
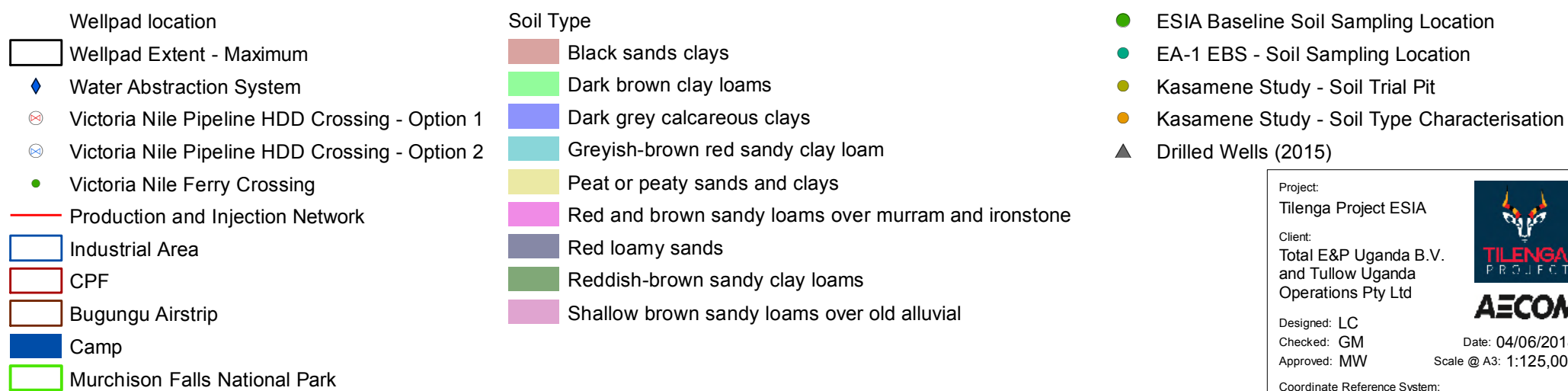


FIGURE 8.5 - MAPPED SOIL TYPE



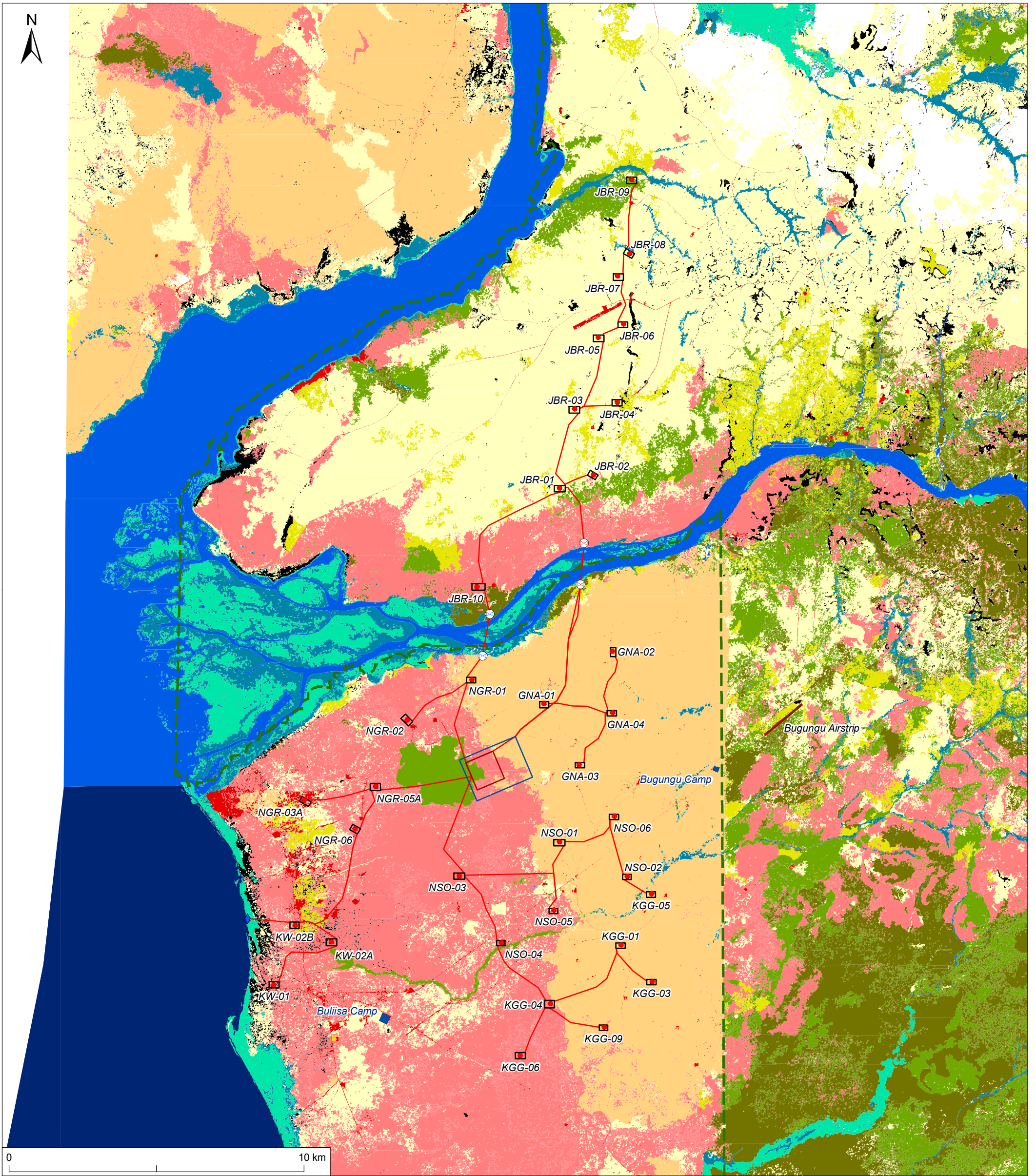


FIGURE 8.6 - LAND COVER CLASSIFICATION

- Wellpad location
- Wellpad Extent - Maximum
- ◆ Water Abstraction System
- ⊗ Victoria Nile Pipeline HDD Crossing - Option 1
- ⊗ Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp
- Murchison Falls National Park

- Land Cover Class (WCS 2017)**
- Bare Soil (rural) IR3
 - Built-up Areas BU
 - Burnt Area
 - Bushlands SH2 (L-B T)
 - Closed Moist Woodlands WO1
 - Cyperus Papyrus Swamp WE11 (L-BX1)
 - Dry Grassland GR2

- Dry Wooded Grassland WG2
- Moist Grassland GR1 (L-B Q)
- Open Moist Woodlands WO1
- Permanent Rivers PR
- Small-scale Farming AG2
- Standing Waters SW (L-B WW)
- Swamps WE1 (L-B X)

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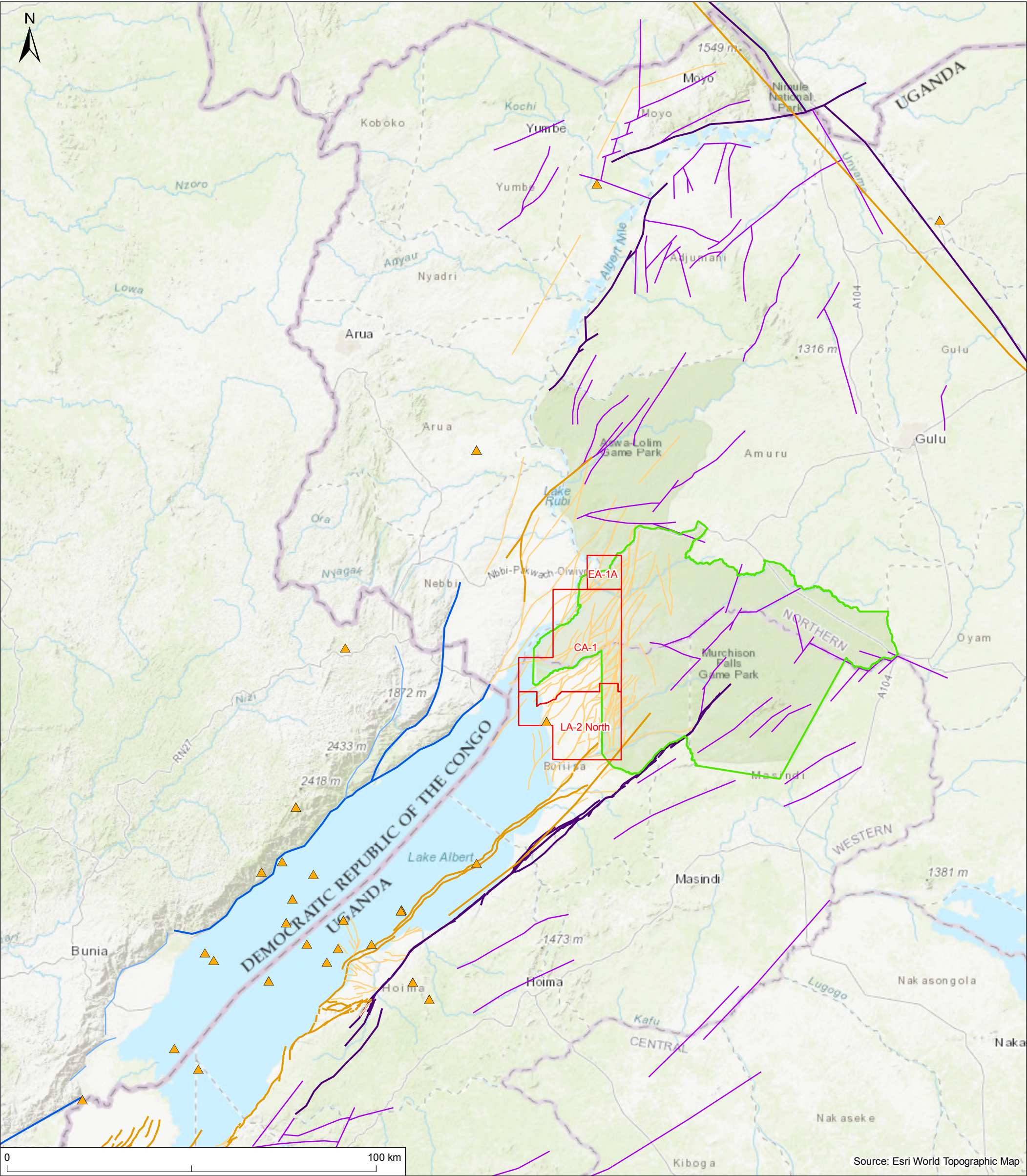


FIGURE 8.7 - SEISMIC EVENTS 2000 - 2017 AND FAULTS

- Project Area

Murchison Falls National Park
- Earthquakes 2000-2017 (USGS)

Faults

Major fault (Geoter)

Minor fault (Geoter)

Main boundary, major fault (Fugro 2012)

Main boundary, minor fault (Fugro 2012)

Interpreted, major fault (Fugro 2012)

Interpreted, minor fault (Fugro 2012)
- Project:
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Client:
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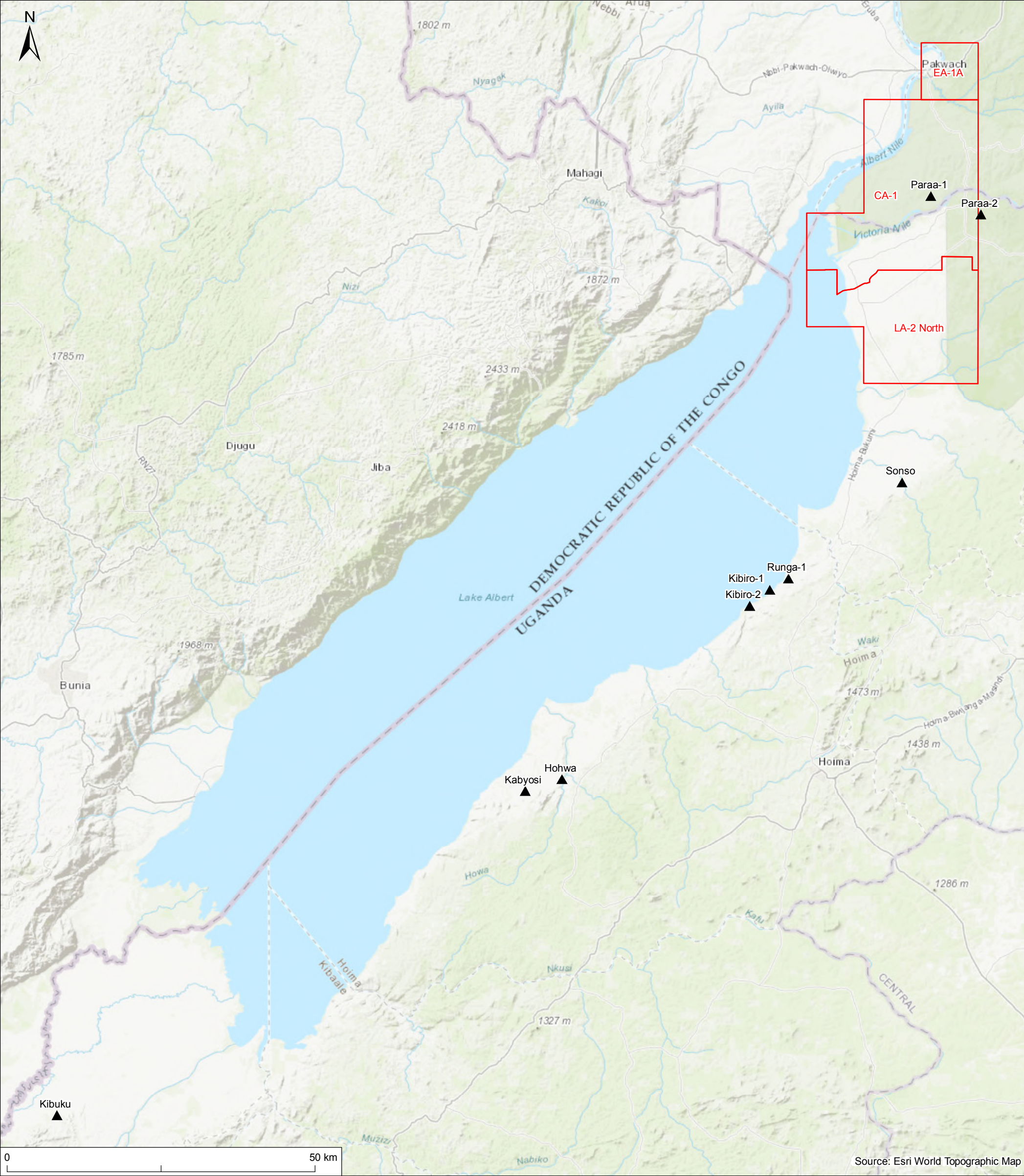


FIGURE 8.8 - LAKE ALBERT RIFT BASIN NATURAL OIL SEEPS

- Project Area
- Oil Seepage

Project:
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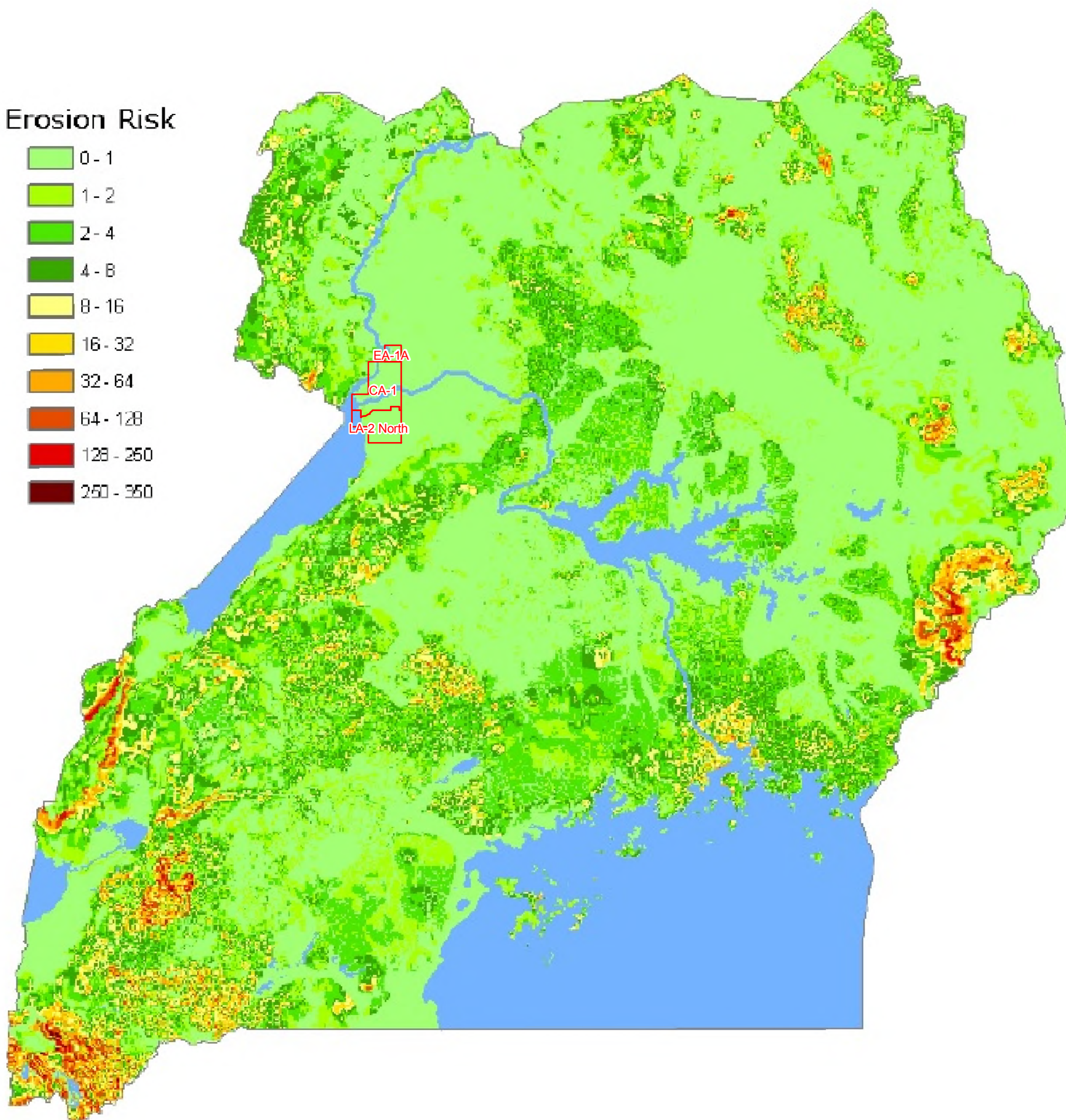
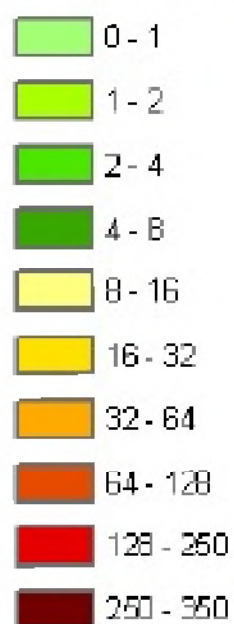
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Erosion Risk



0 200 km

FIGURE 8.9 - ESTIMATED SOIL EROSION RISK

 Project Area

Project:
Tilenga Project ESIA
Client:
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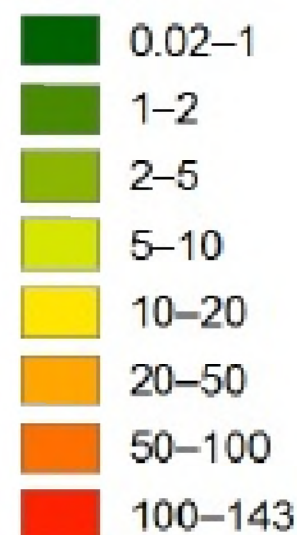
Coordinate Reference System:
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Rates of estimated soil erosion risk for the 50 largest protected areas in Uganda

$t\ ha^{-1}\ y^{-1}$



□ National boundaries

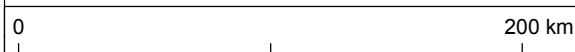
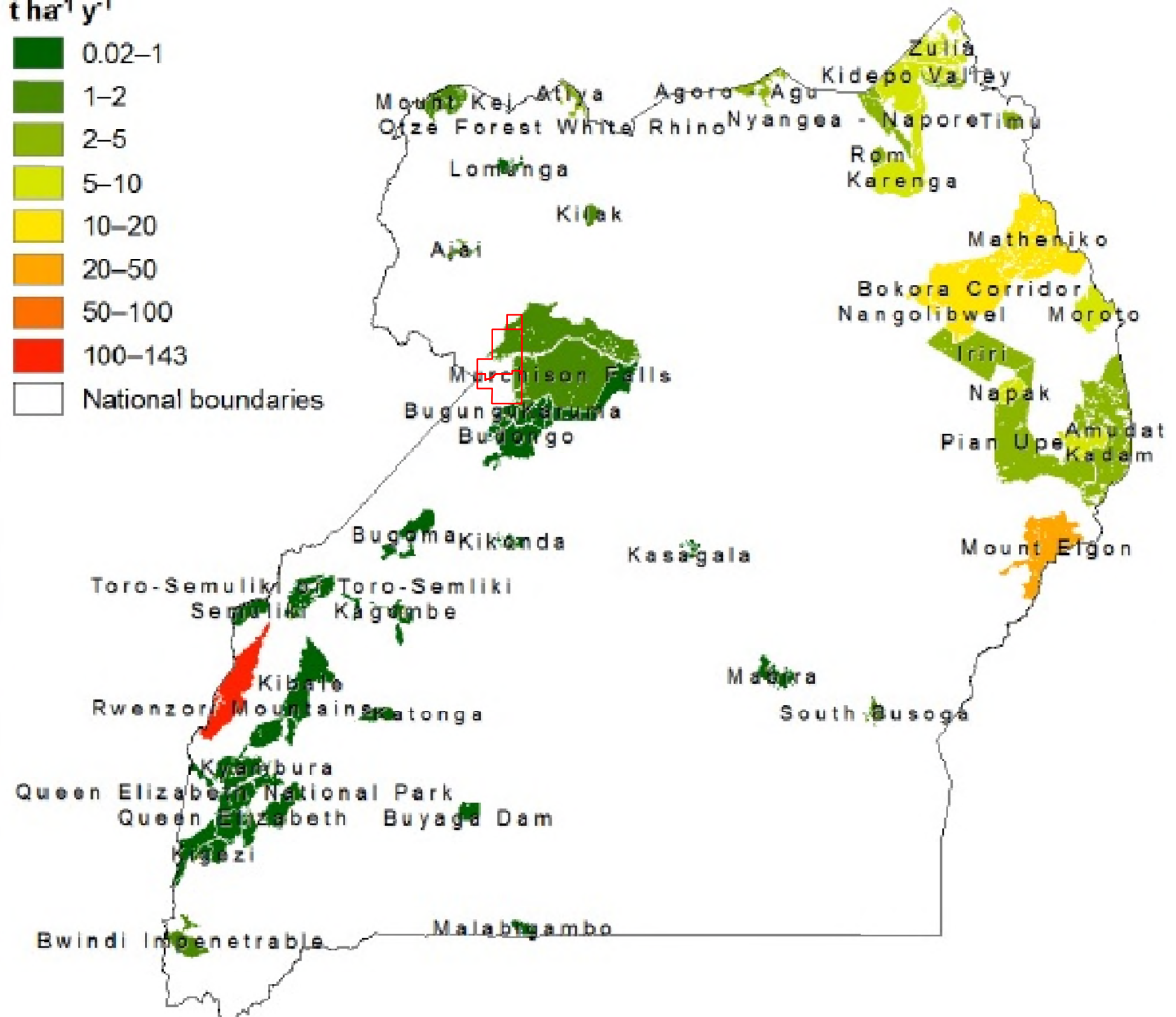
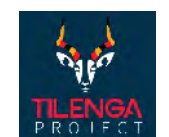


FIGURE 8.10 - ESTIMATED SOIL EROSION RISK FOR PROTECTED AREAS

□ Project Area

Project:
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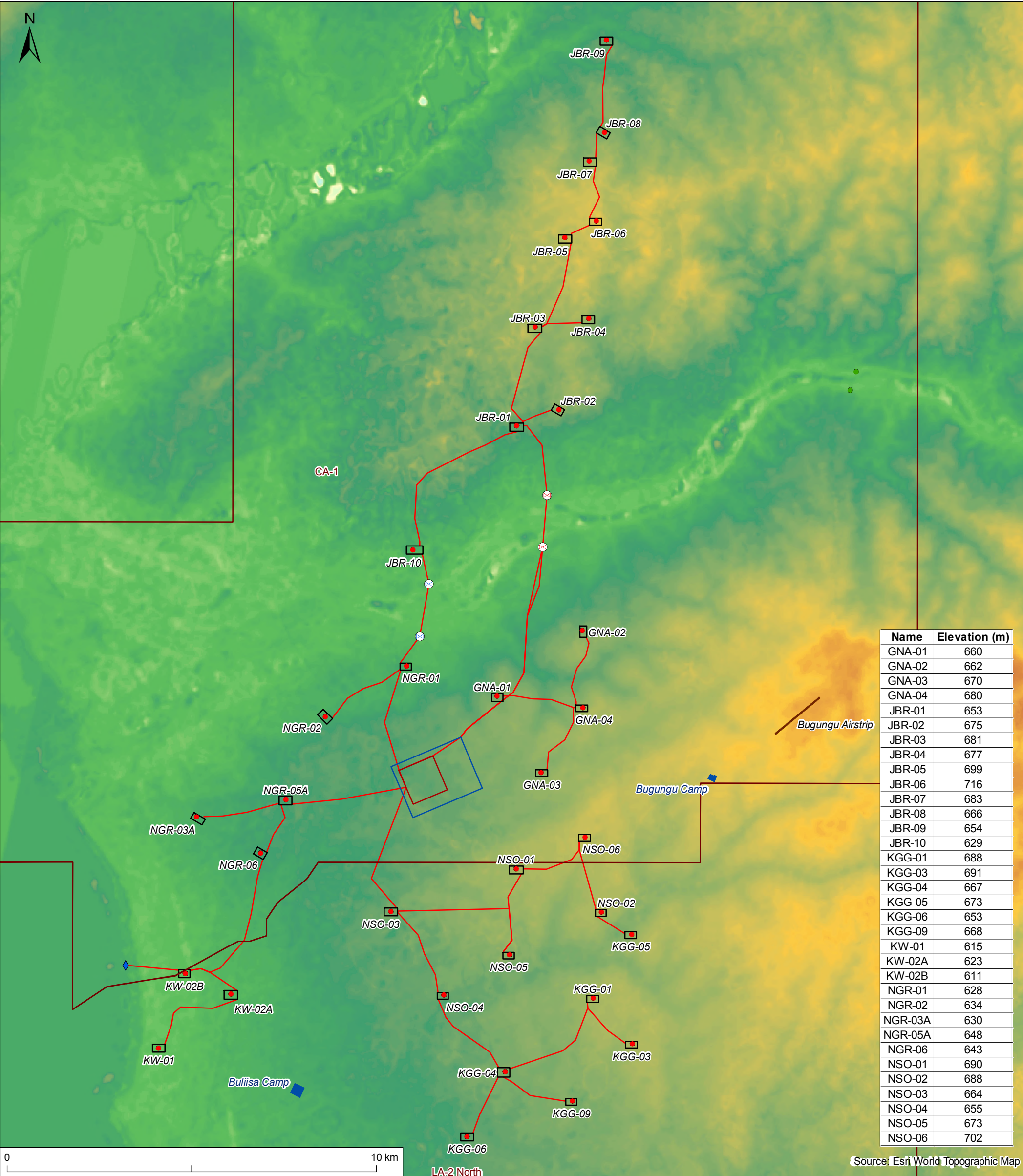
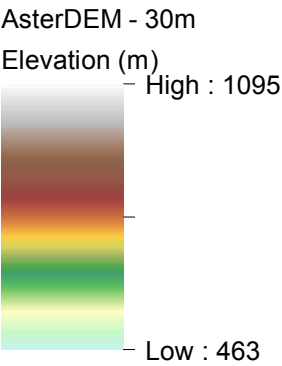


FIGURE 8.11 - TOPOGRAPHY OF PROJECT AREA

- Project Area
- Wellpad location
- Wellpad Extent - Maximum
- Water Abstraction System
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp



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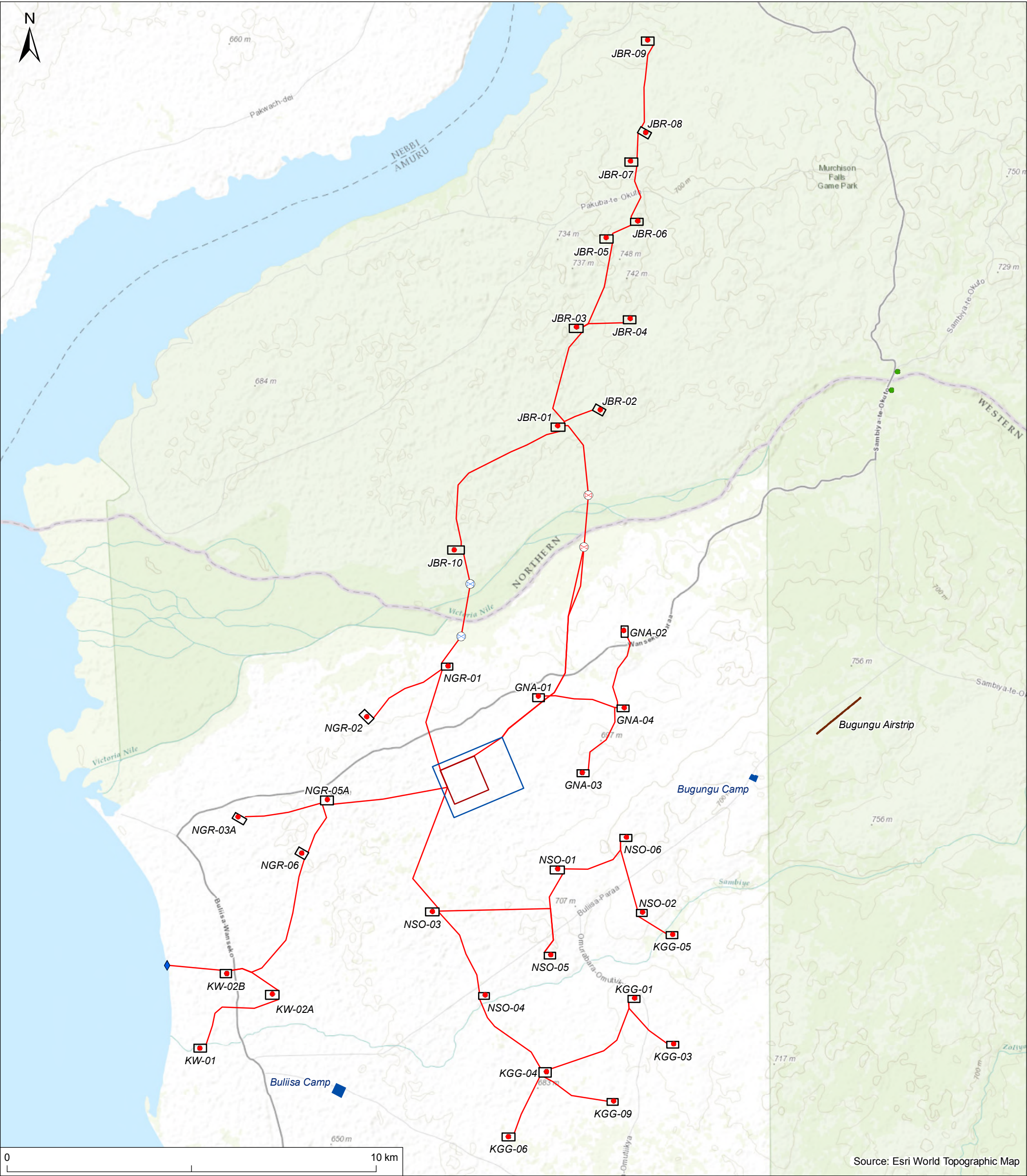


FIGURE 9.1 - PROJECT OVERVIEW

- Wellpad location
- Wellpad Extent - Maximum
- Water Abstraction System
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp

Project:
Tilenga Project ESIA

Client:
Total E&P Uganda B.V.
and Tullow Uganda
Operations Pty Ltd

Designed: LC
Checked: GM
Approved: MW

Coordinate Reference System:
WGS 1984 UTM Zone 36N

Date: 01/06/2018
Scale @ A3: 1:100,000

TILENGA PROJECT

AECOM

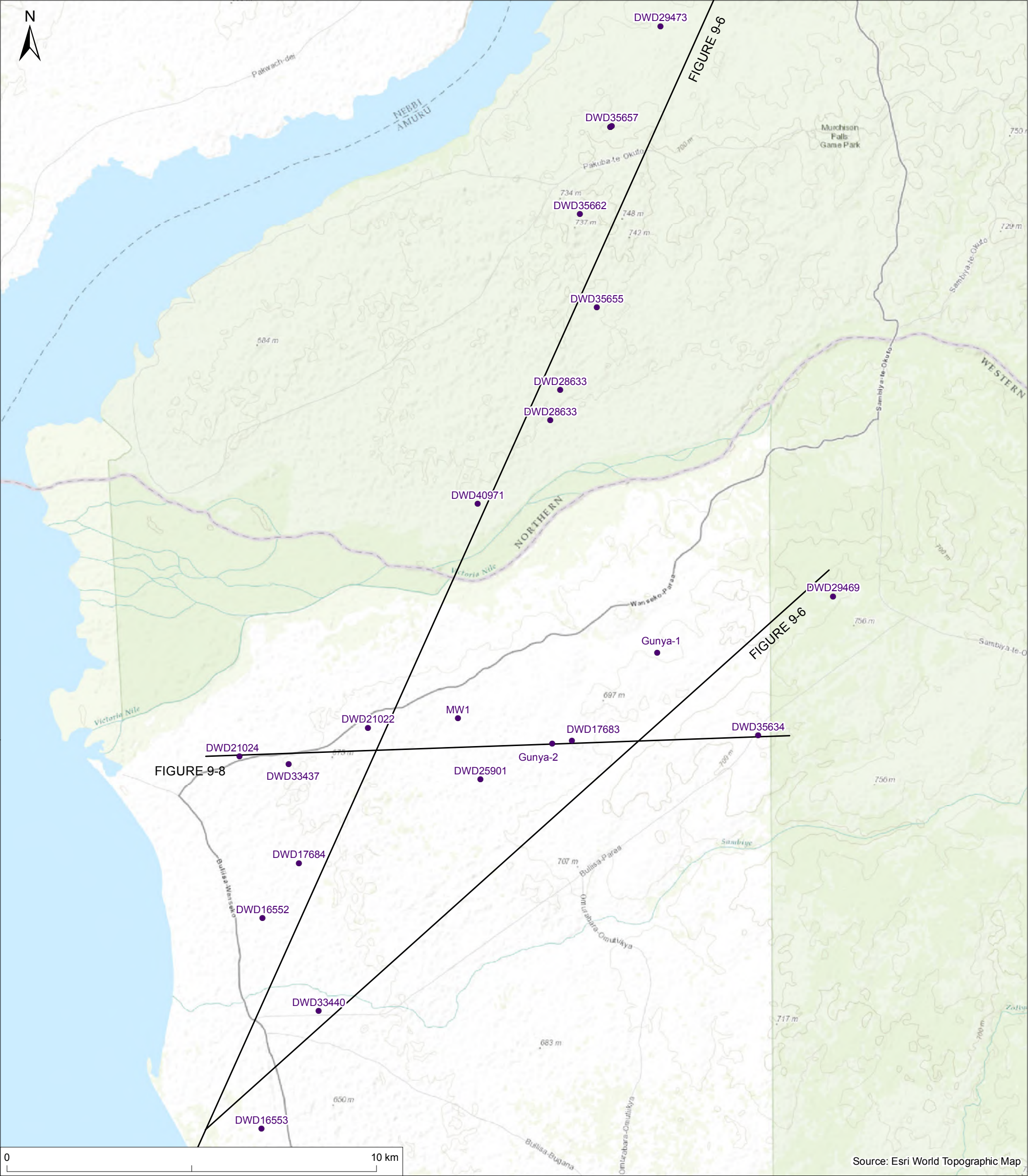


FIGURE 9.5 - LITHOLOGICAL CROSS SECTION LINES ACROSS THE STUDY AREA

- DWRM / MW Well
- Lithological Cross Section

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Client:
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Operations Pty Ltd

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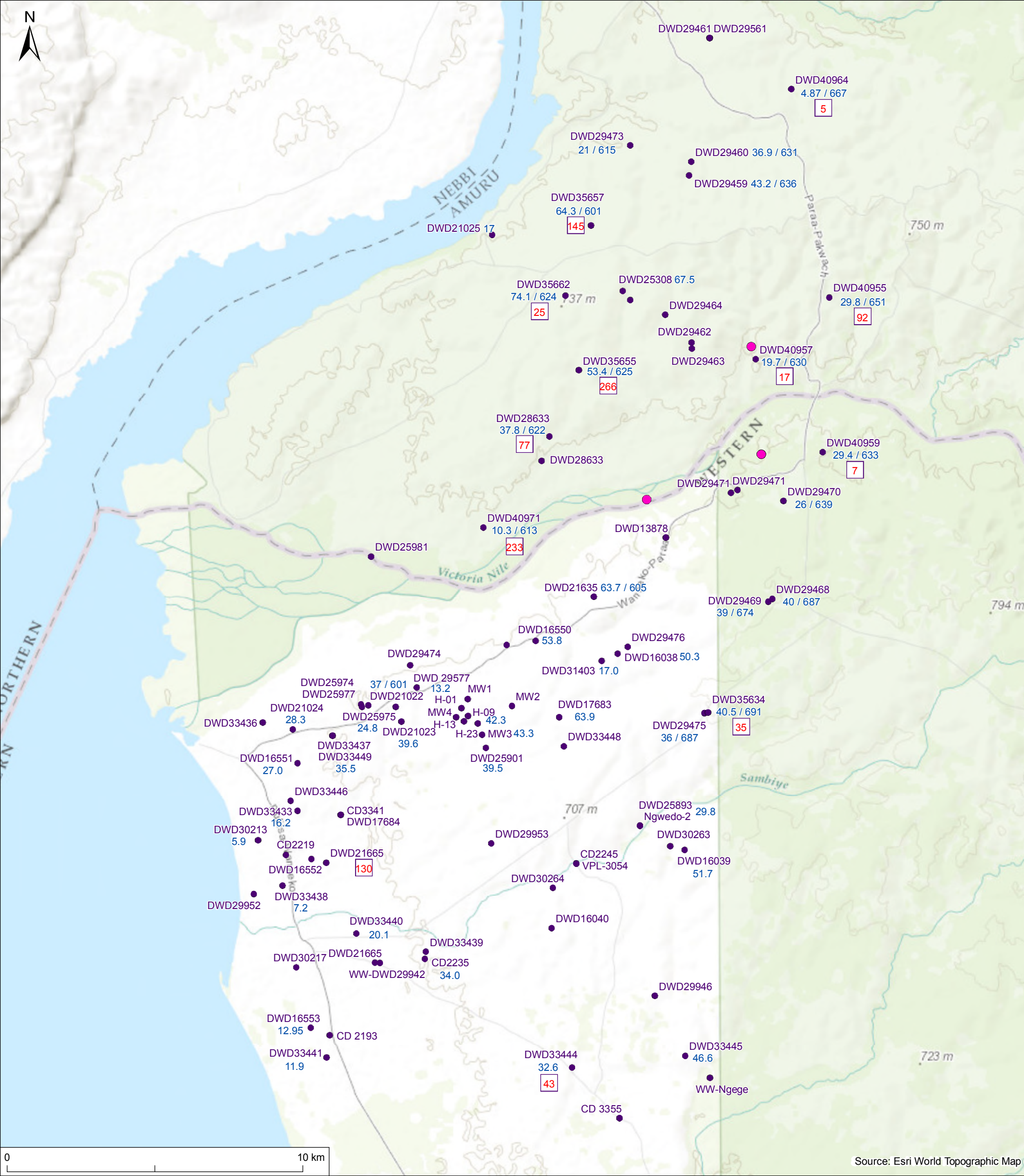


FIGURE 9.9 - LOCATION OF PUMPING TEST INFORMATION AND GROUNDWATER LEVELS

- Natural Oil Seep
- DWRM / MW Well
- 26 / 639 Groundwater level (m below ground/mad)
- 10 Borehole with pumping test information (T in m2/day)

Project:
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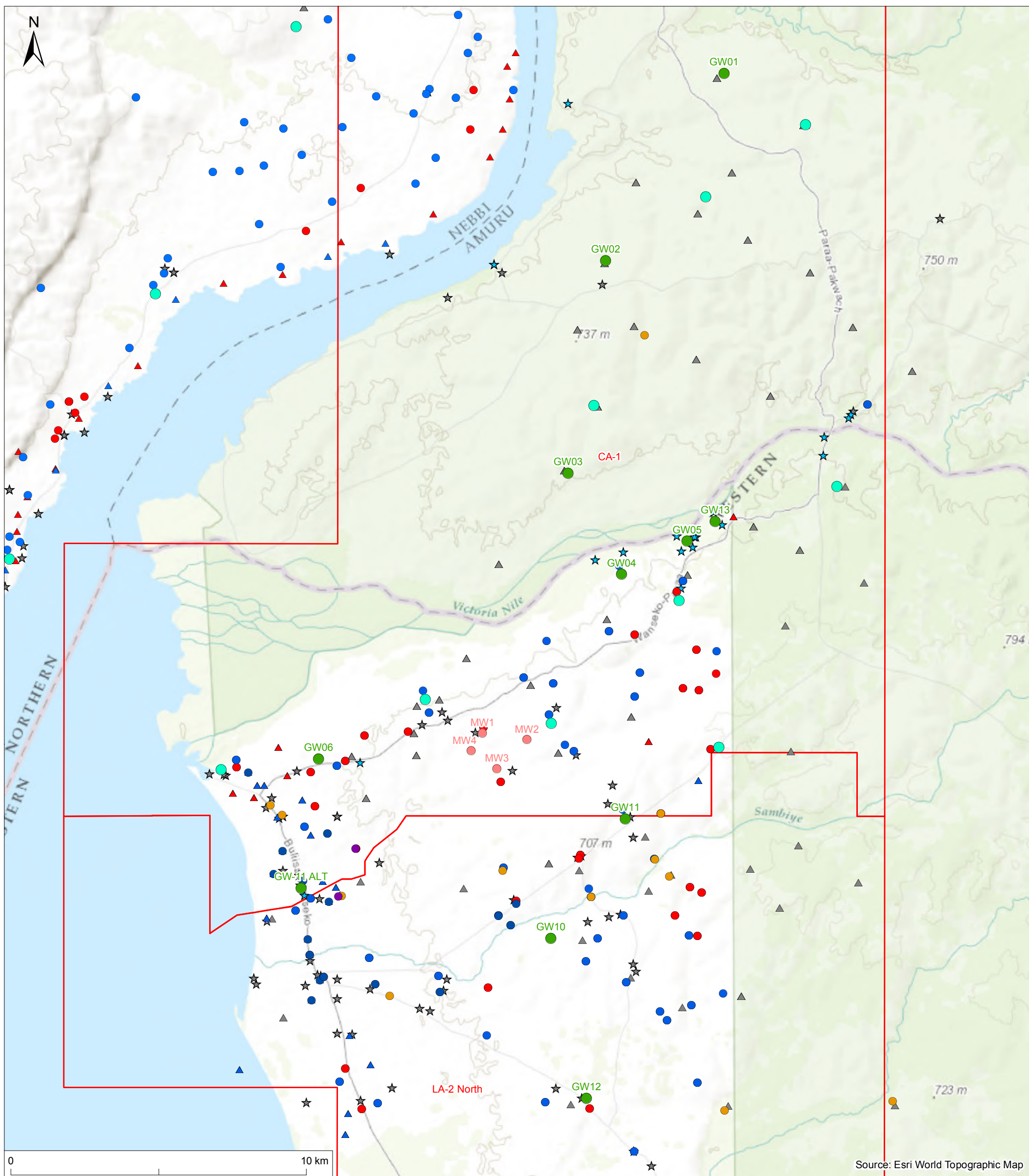


FIGURE 9.10 - PUBLIC GROUNDWATER SUPPLY SOURCES AND KNOWN GROUNDWATER SAMPLING LOCATIONS

- | | | |
|---|--|---|
| <ul style="list-style-type: none"> Project Area ★ Lodges ★ Towns and Village | <ul style="list-style-type: none"> ● Groundwater Survey Location (2016/2017) ● Groundwater Survey Location (2014) ● Groundwater Monitoring Well (TOTAL 2018) ● Kasamene Study - Freshwater DC Borehole Location ● Albertine Graben - Freshwater Monitoring Borehole ● Albertine Graben - Watertech Freshwater Monitoring Borehole ▲ Exploration/Appraisal Wells (and associated groundwater boreholes used for operational needs) | <p>Ministry of Water and Environment Database (accessed July 2015)</p> <ul style="list-style-type: none"> ● Deep borehole, Functional (in use) ● Deep borehole, Decommissioned, Functional (not in use)/Non-functional ▲ Shallow well, Functional (in use) ▲ Shallow well, Decommissioned, Functional (not in use)/Non-functional |
|---|--|---|

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Date: 04/06/2018
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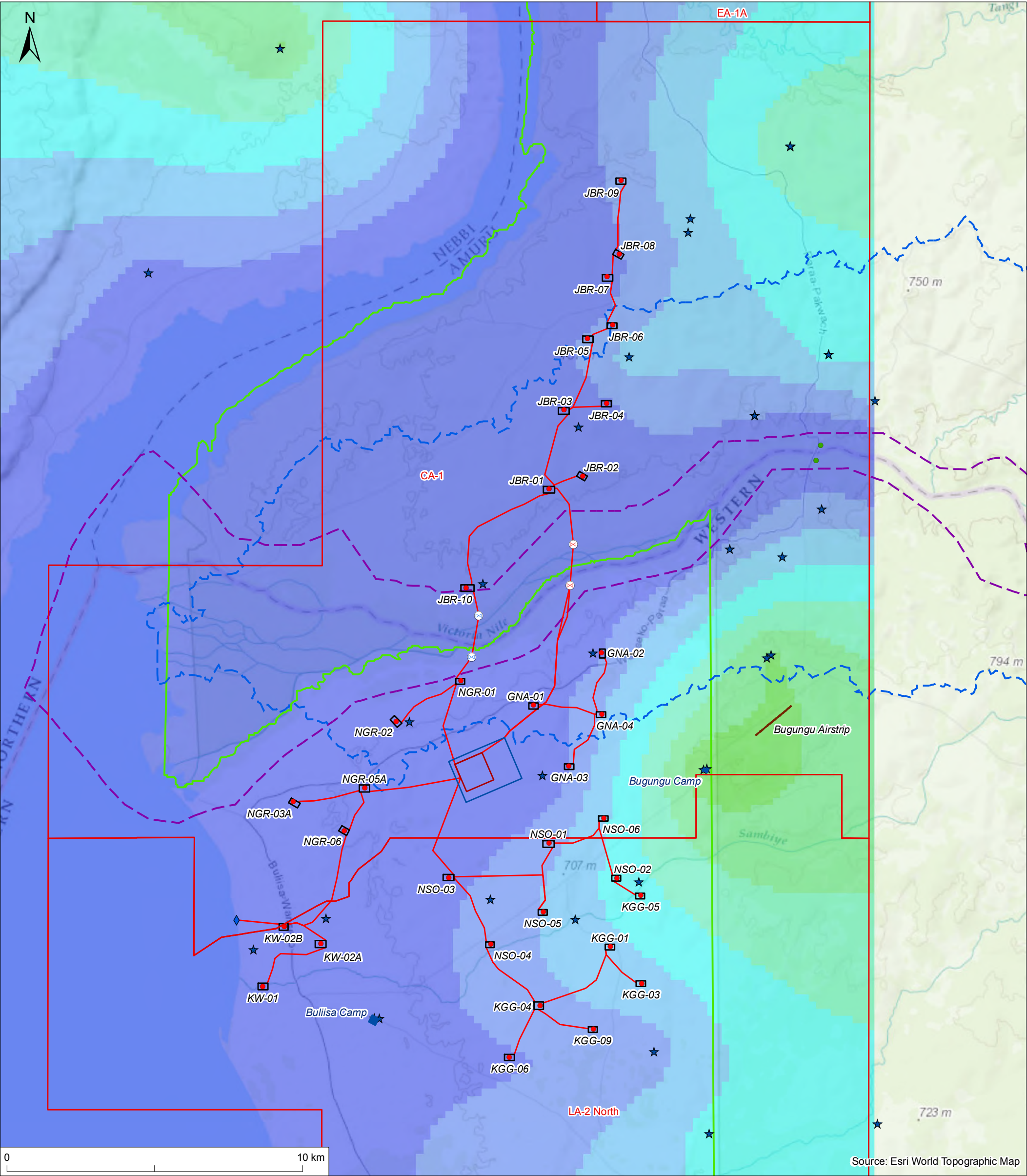
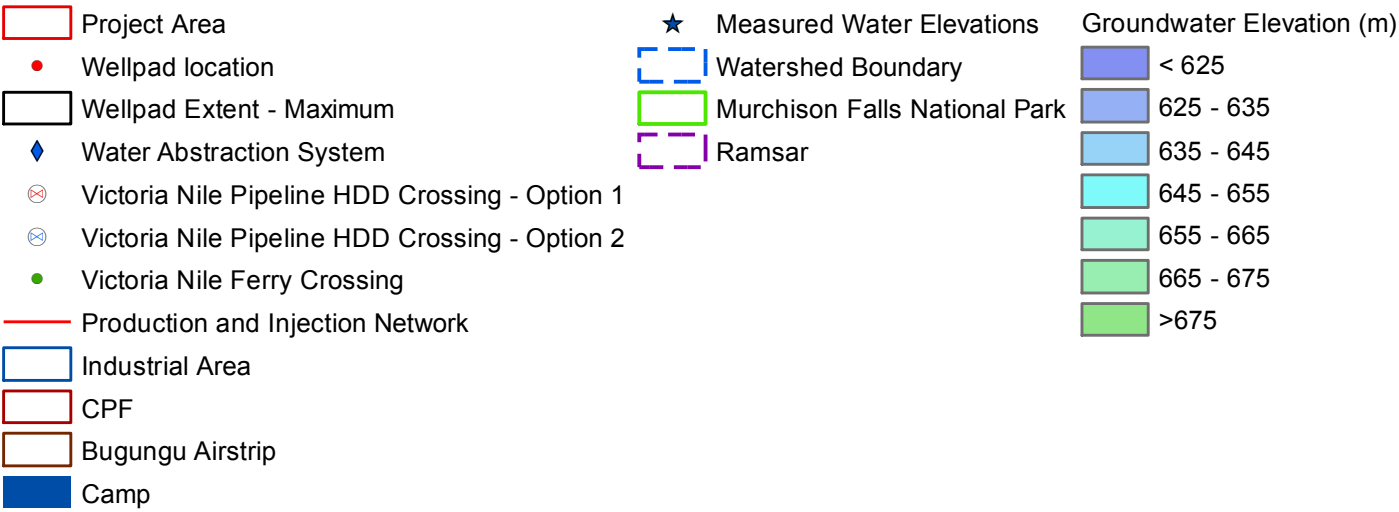


FIGURE 9.11 - GROUNDWATER ELEVATIONS



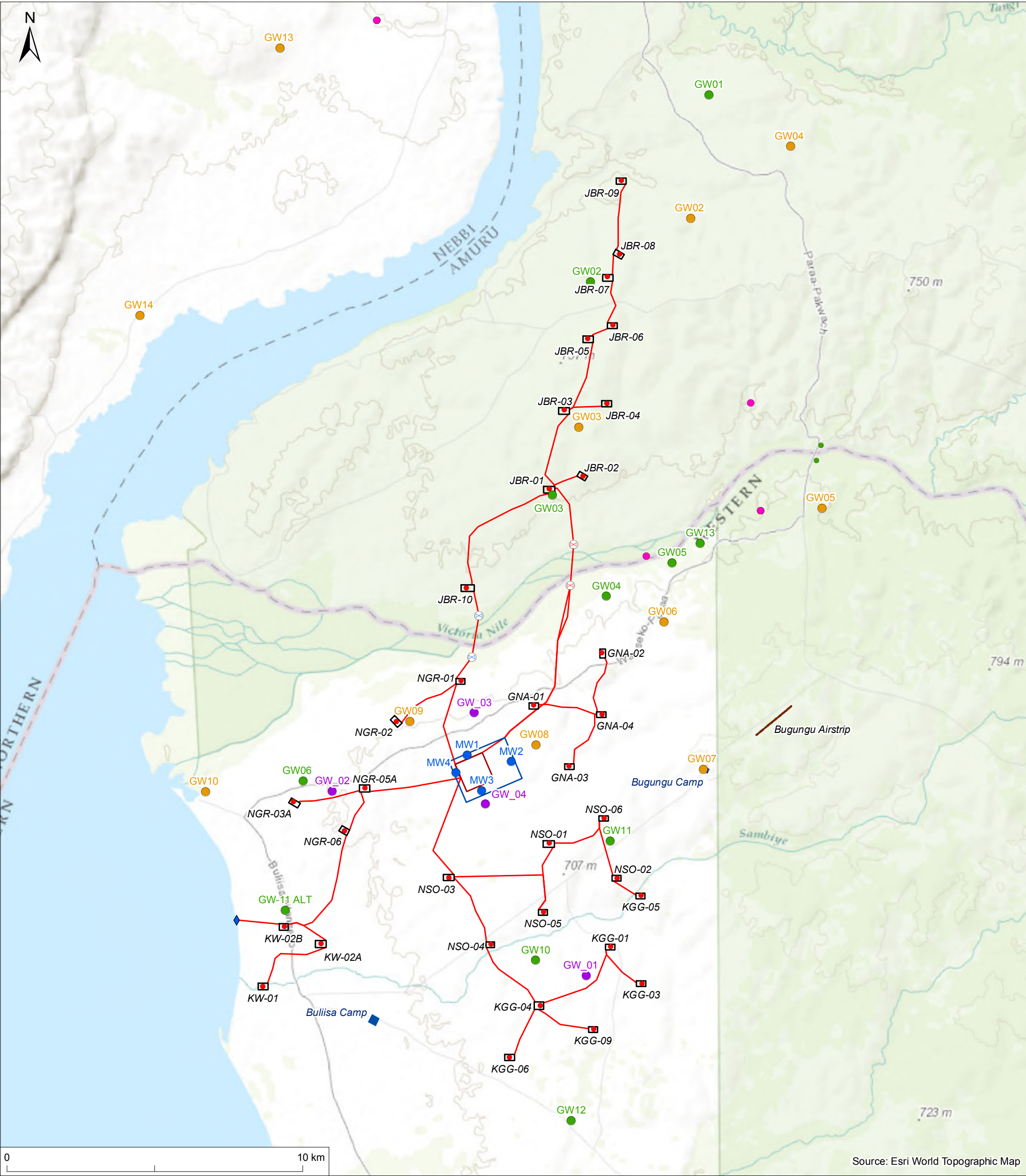


FIGURE 9.12 - GROUNDWATER SAMPLE LOCATIONS 2014 - 2018

- Wellpad location

Wellpad Extent - Maximum

Water Abstraction System

Victoria Nile Pipeline HDD Crossing - Option 1

Victoria Nile Pipeline HDD Crossing - Option 2

Victoria Nile Ferry Crossing

Production and Injection Network

Industrial Area

CPF

Bugungu Airstrip

Camp
- Groundwater Survey Location (2014)

Groundwater Survey Location (2016/2017)

Groundwater Monitoring Well (TOTAL 2018)

Groundwater Survey Location (AWE 2017)

Natural Oil Seep

Project:
Tilenga Project ESIA

Client:
Total E&P Uganda B.V.
and Tullow Uganda
Operations Pty Ltd

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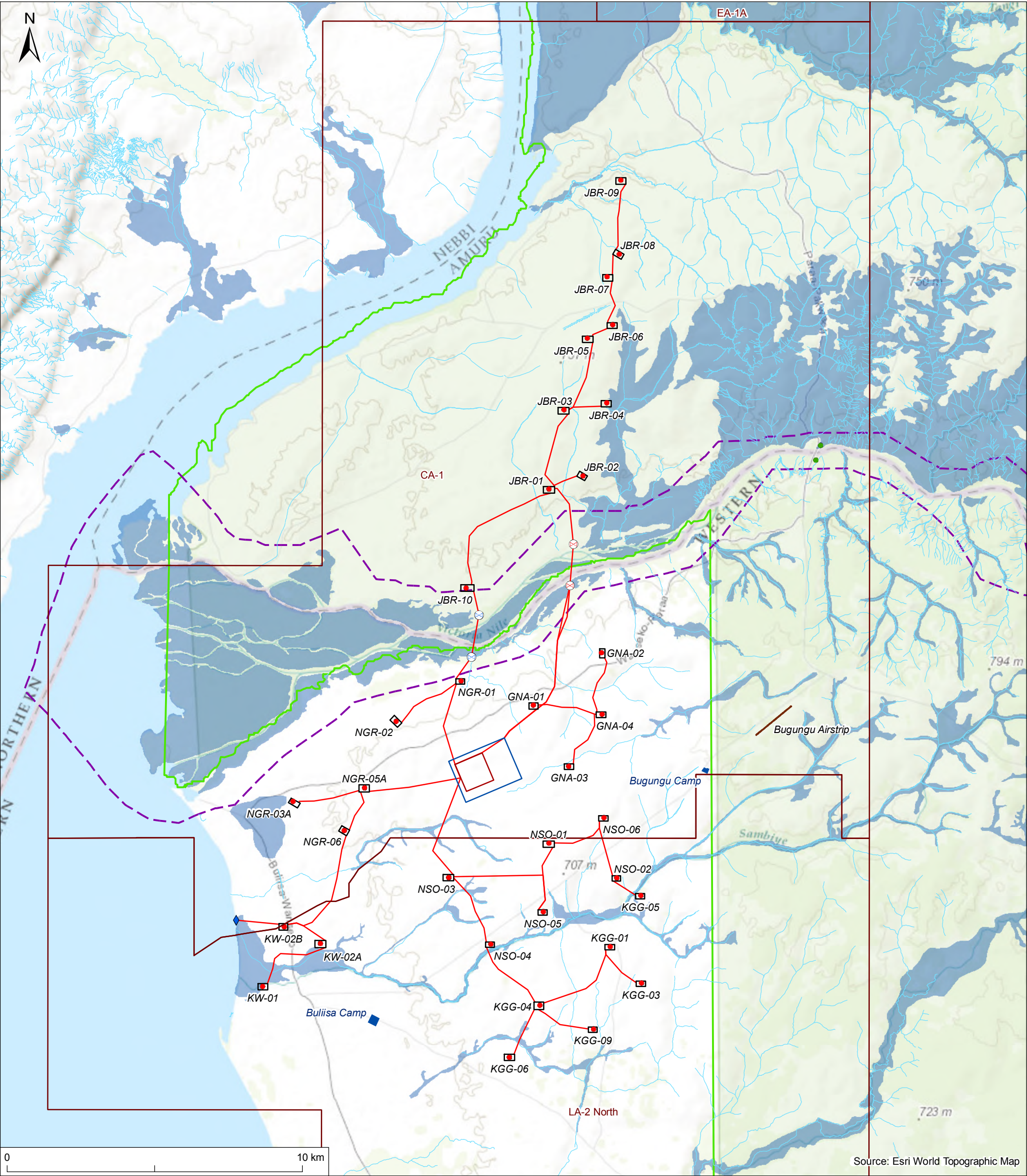
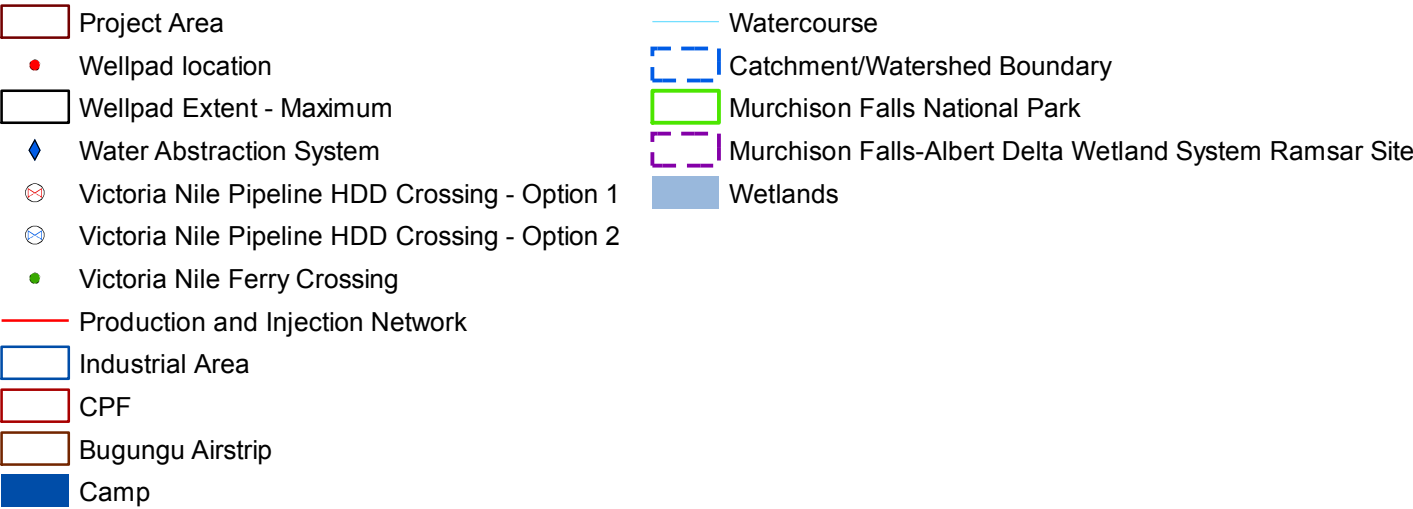


FIGURE 10.1 - ESIA PROJECT AREA AND ENVIRONS



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Client:
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Operations Pty Ltd

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Date: 01/06/2018
Scale @ A3: 1:125,000

Coordinate Reference System:
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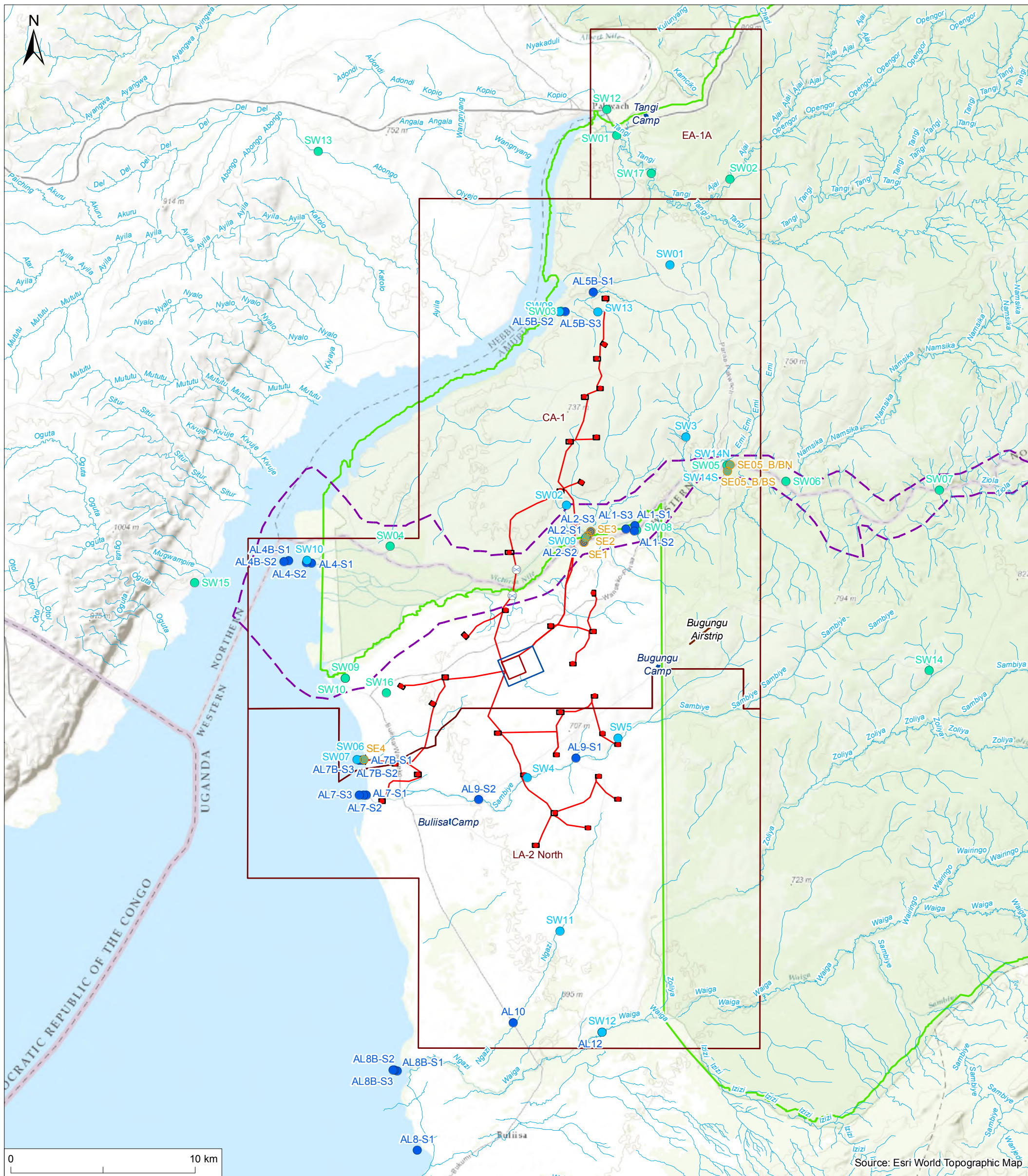
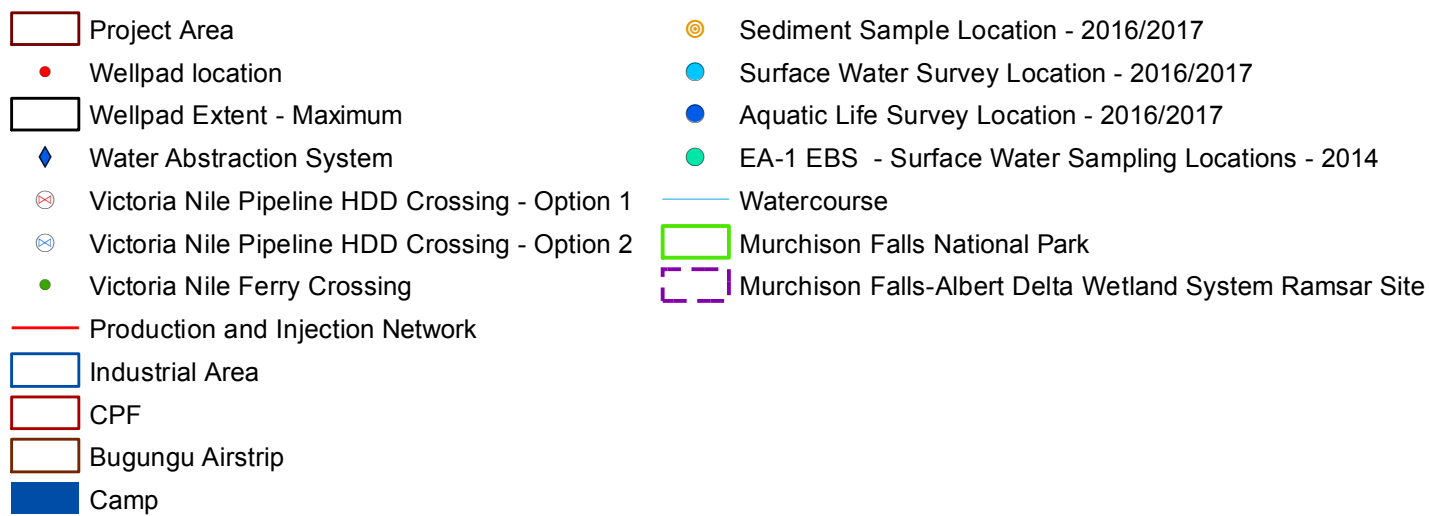


FIGURE 10.3 - ESIA BASELINE SURVEY - SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS 2014 - 2017



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Client:
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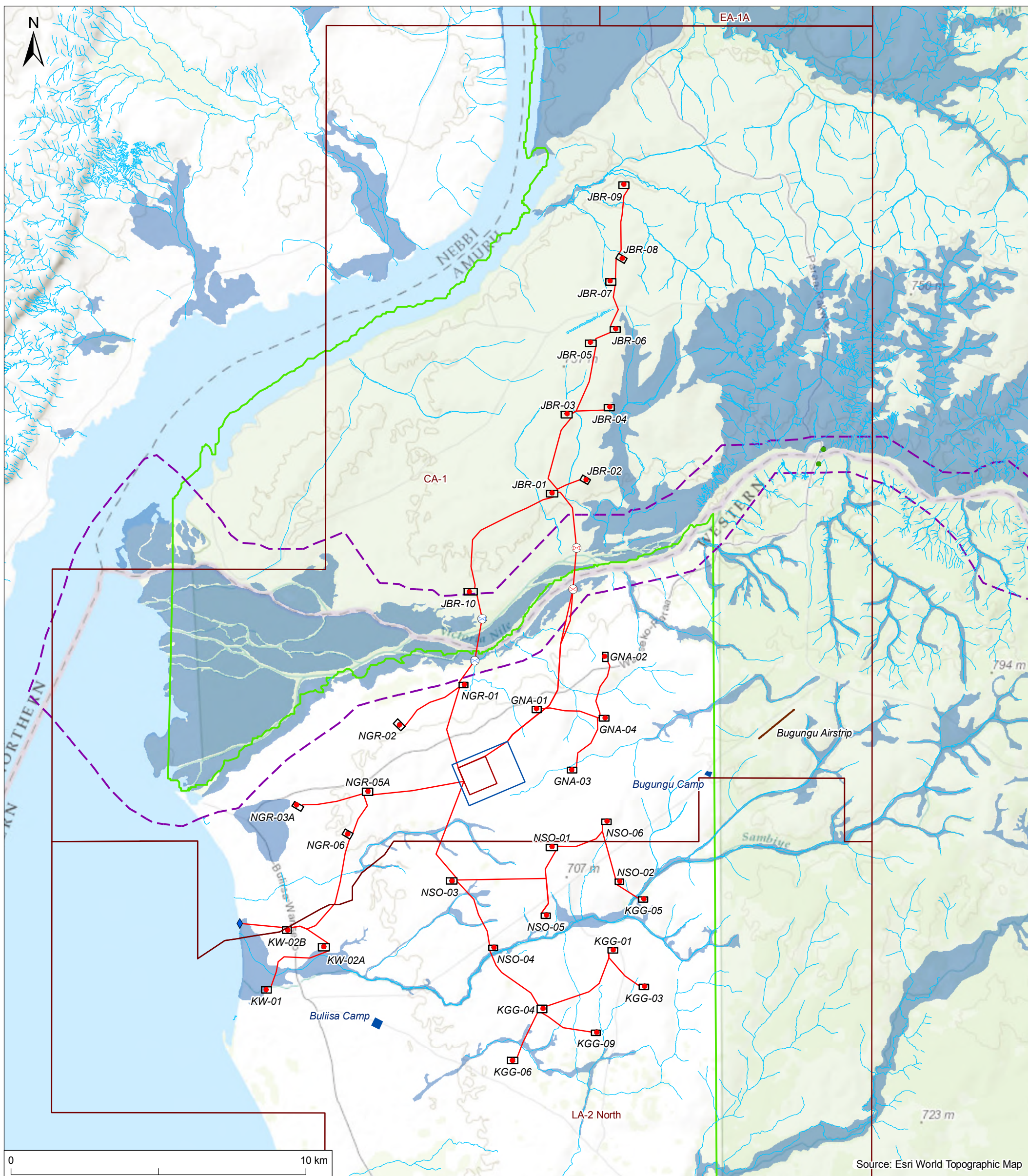
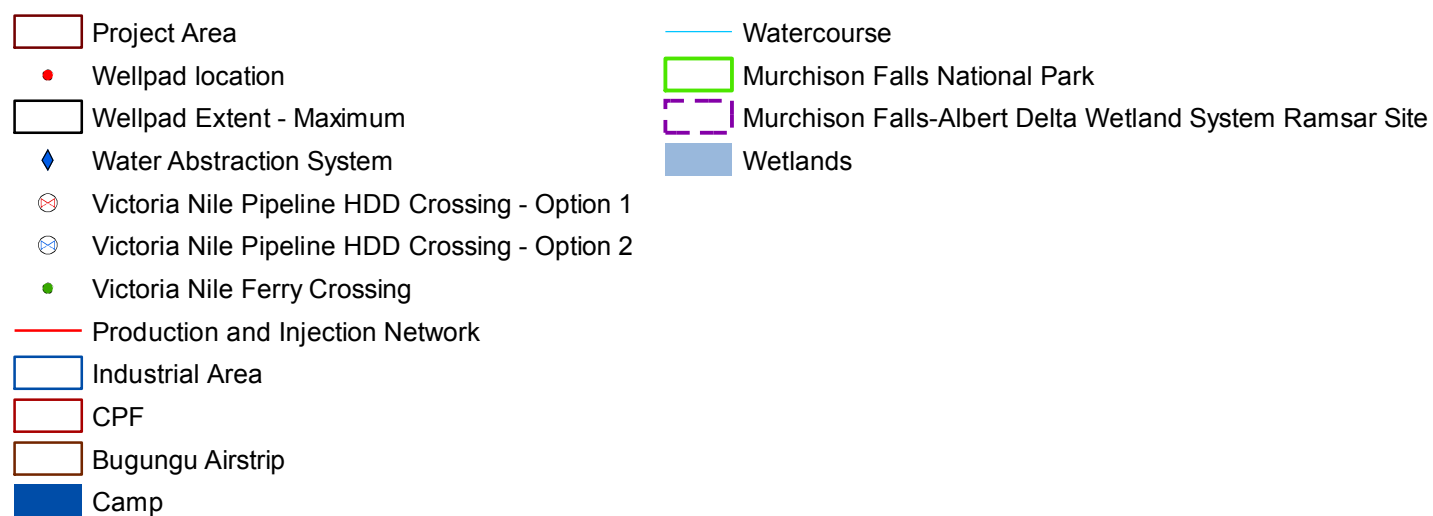


FIGURE 10.8 - ORDINARY STREAMS AND WETLANDS IN THE STUDY AREA



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Tilenga Project ESIA

Client:
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and Tullow Uganda
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Approved: MW

Date: 01/06/2018
Scale @ A3: 1:125,000

Coordinate Reference System:
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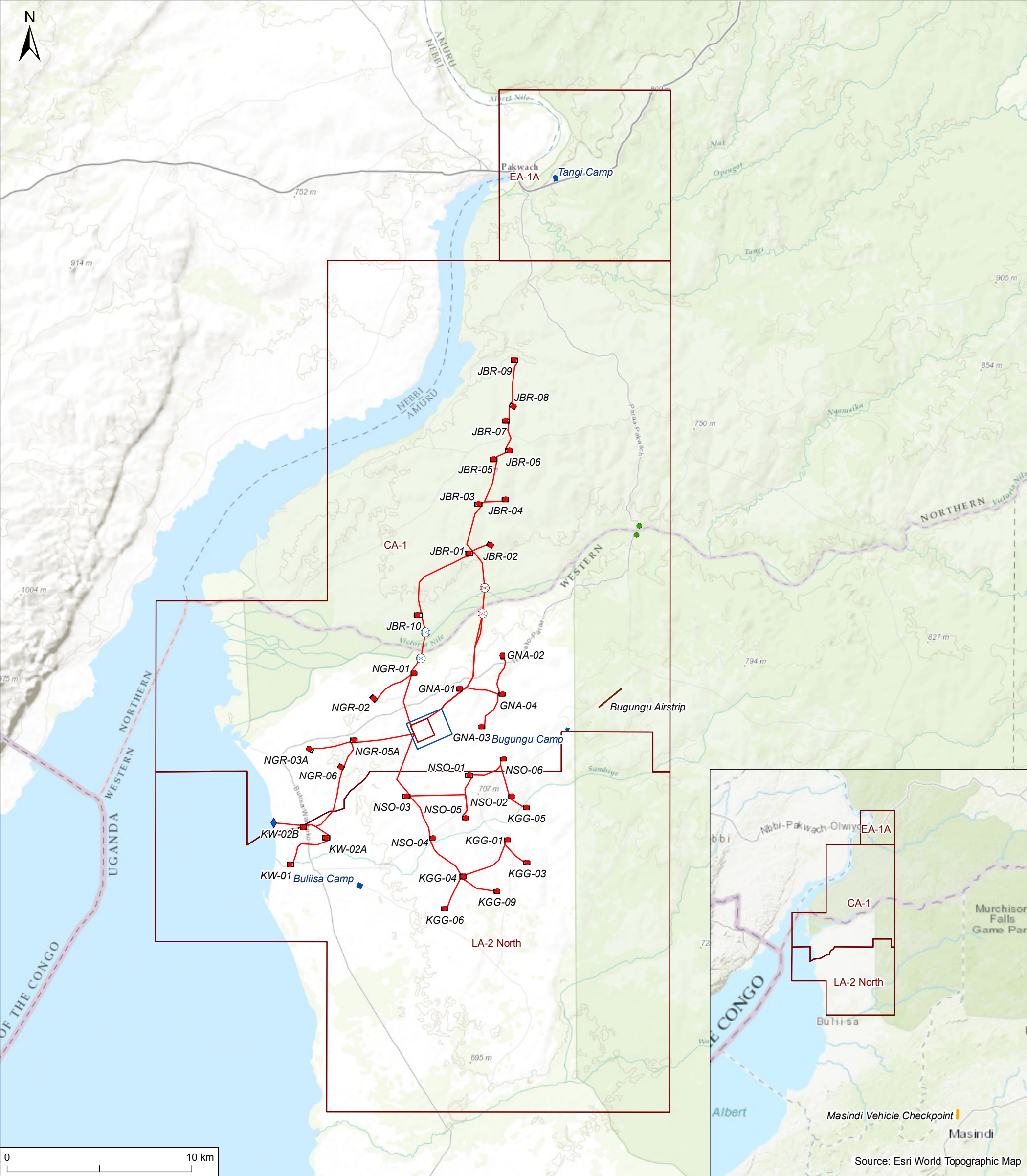


FIGURE 11.1 - INDICATIVE LAYOUT OF PROJECT

- Project Area

Wellpad location

Wellpad Extent - Maximum

Water Abstraction System

Victoria Nile Pipeline HDD Crossing - Option 1

Victoria Nile Pipeline HDD Crossing - Option 2

Victoria Nile Ferry Crossing
- Production and Injection Network

Industrial Area

CPF

Bugungu Airstrip

Camp

Masindi Vehicle Check Point

Project:
Tilenga Project ESIA

Client:
Total E&P Uganda B.V.
and Tullow Uganda
Operations Pty Ltd

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Approved: MW

Coordinate Reference System:
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Date: 01/06/2018
Scale @ A3: 1:200,000

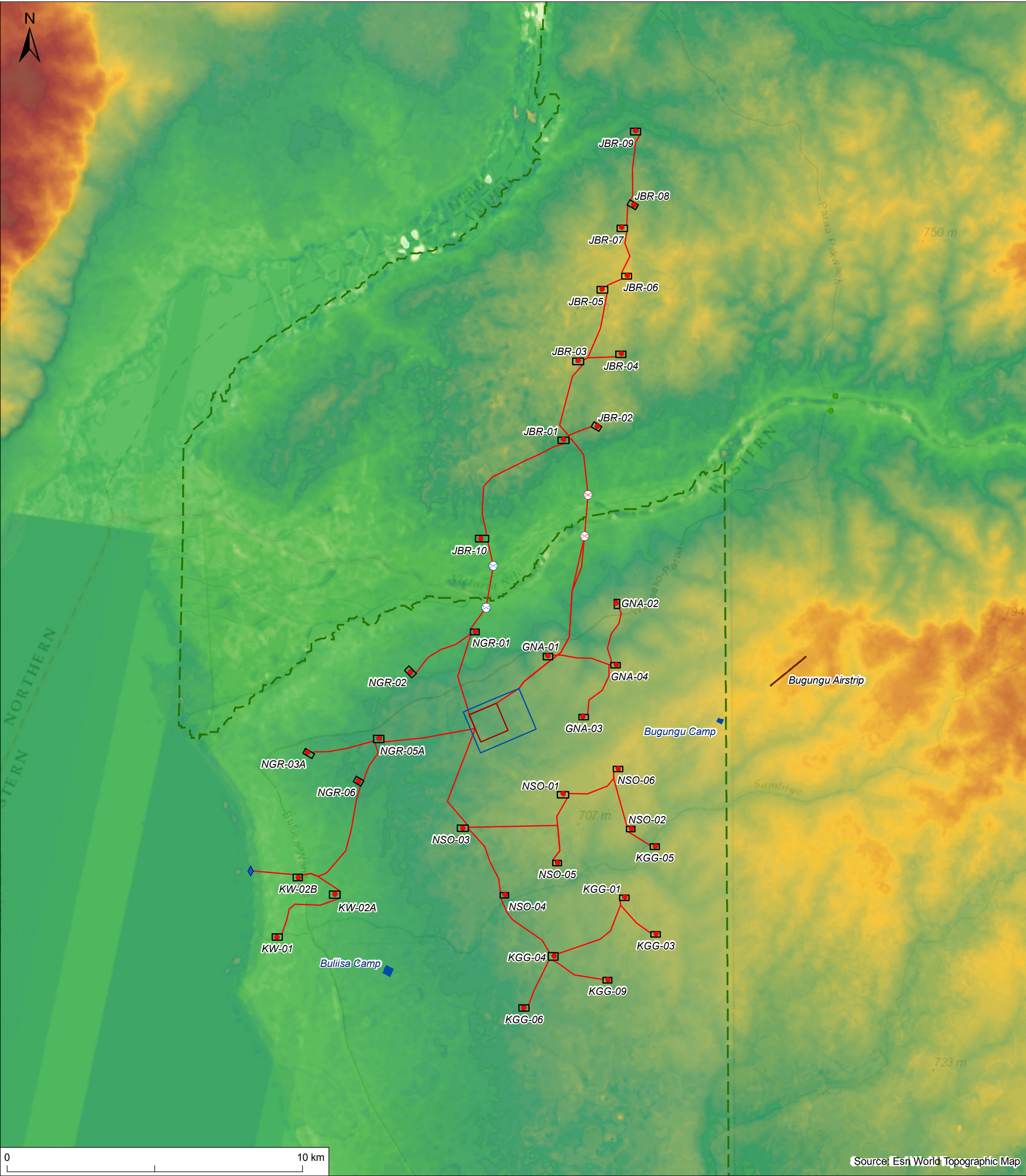
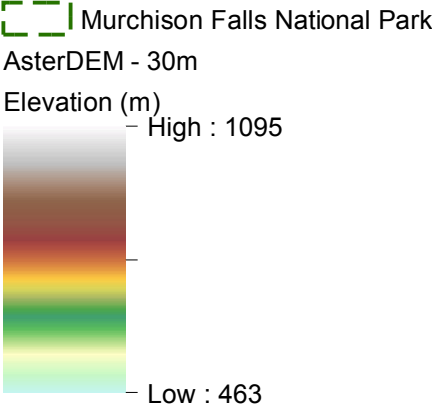


FIGURE 11.2 - TOPOGRAPHY

- Wellpad location
- Wellpad Extent - Maximum
- Water Abstraction System
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp



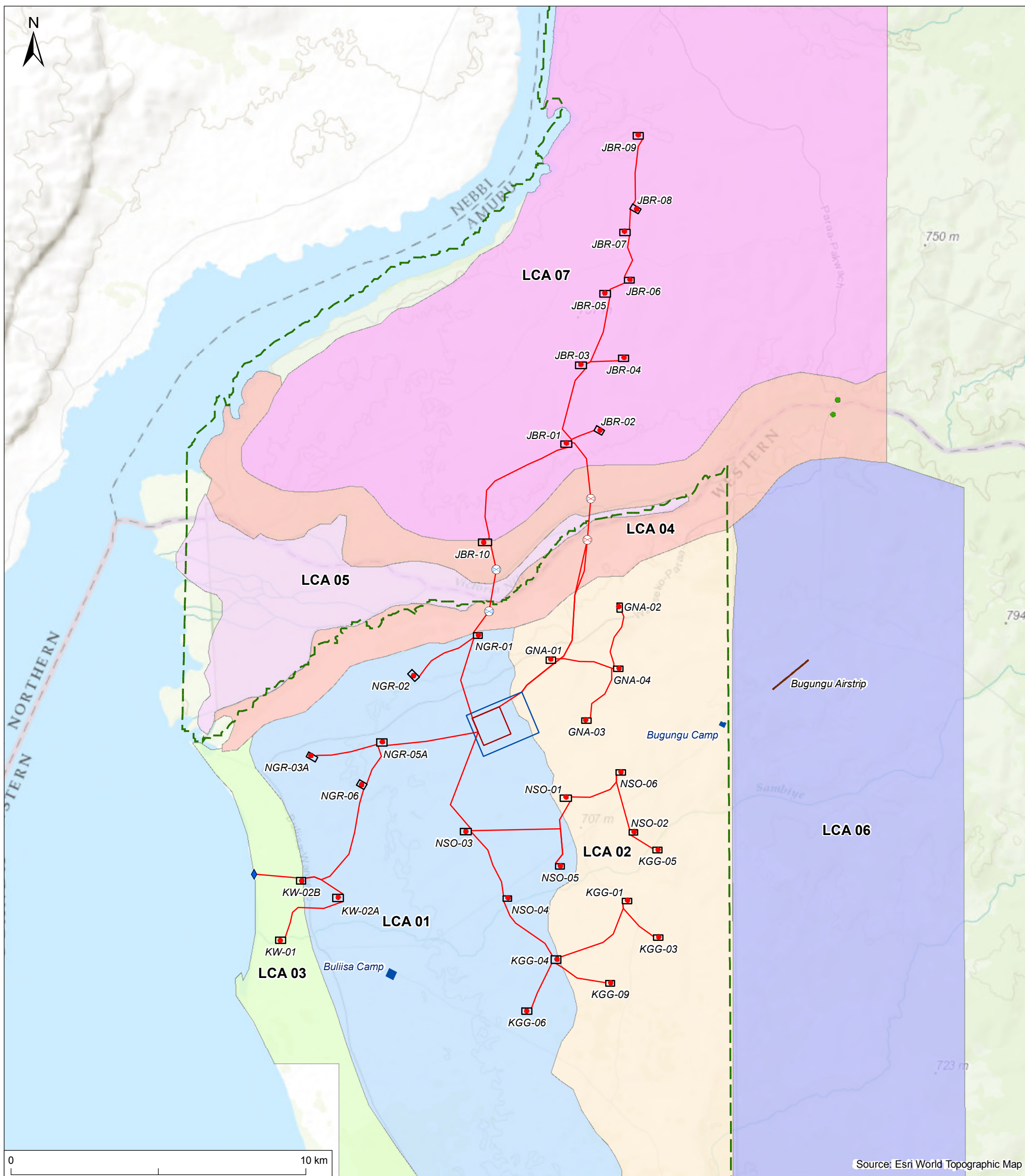


FIGURE 11.3 - LANDSCAPE CHARACTER AREAS

- Wellpad location
- Wellpad Extent - Maximum
- ◆ Water Abstraction System
- ⊗ Victoria Nile Pipeline HDD Crossing - Option 1
- ⊗ Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp
- Murchison Falls National Park
- Landscape Character Area
- LCA 01 - Buliisa Lowland Pastoral Farmland
- LCA 02 - Buliisa Lowland Rolling Farmland
- LCA 03 - Lake Albert Coastal Fringe
- LCA 04 - Victoria Nile Corridor
- LCA 05 - Lake Albert-Victoria Nile Delta
- LCA 06 - MFNP South, Rolling Woodland
- LCA 07 - MFNP North, Savanna Plateau

Project:
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Client:
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Coordinate Reference System:
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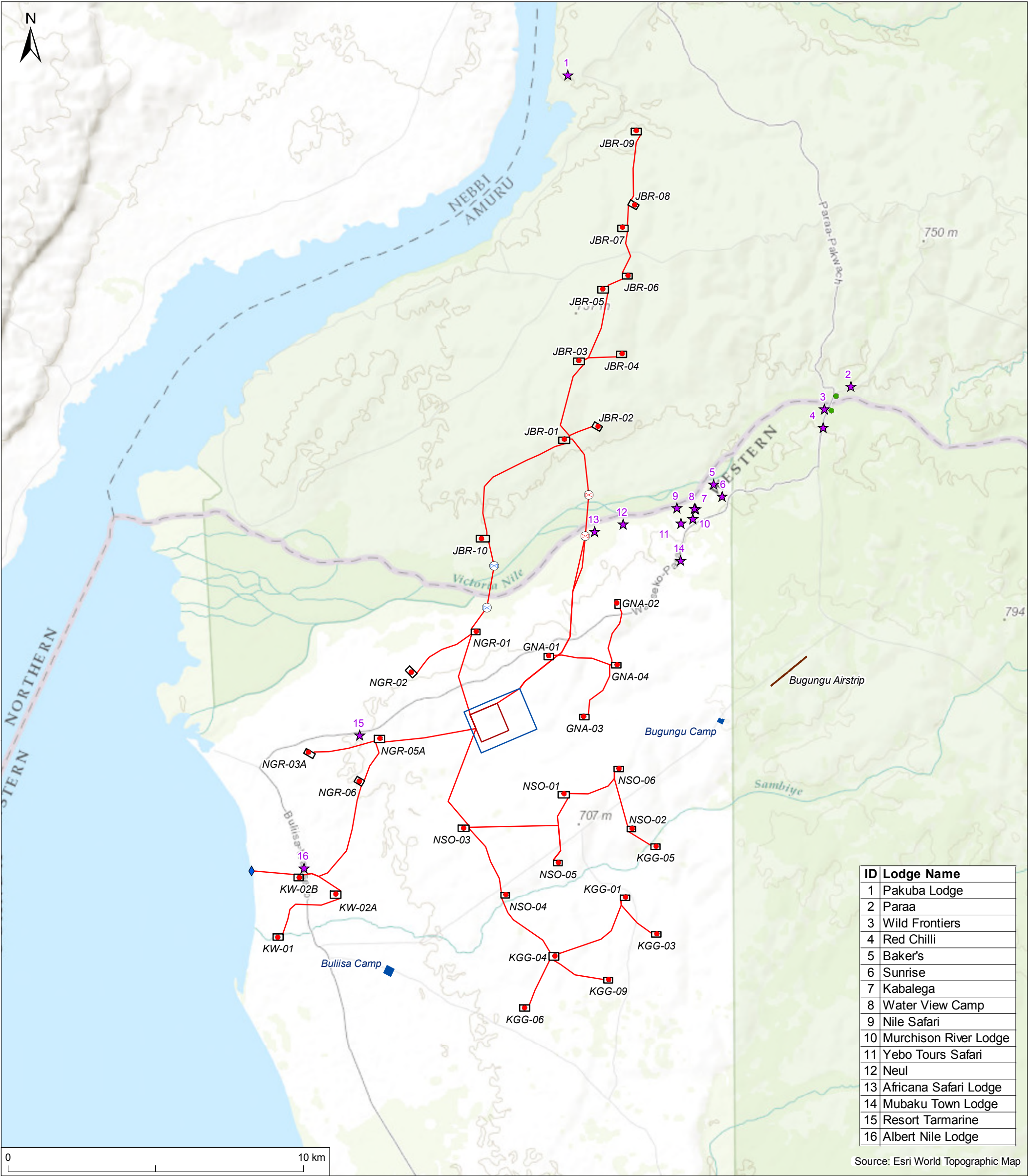


FIGURE 11.11 - TOURIST LODGES

- Wellpad location
- ★

 Lodge
- Wellpad Extent - Maximum
- ◆

 Water Abstraction System
- ⊗

 Victoria Nile Pipeline HDD Crossing - Option 1
- ⊗

 Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp

Project:
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Client:
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Designed: LC
Checked: GM
Approved: MW

Coordinate Reference System:
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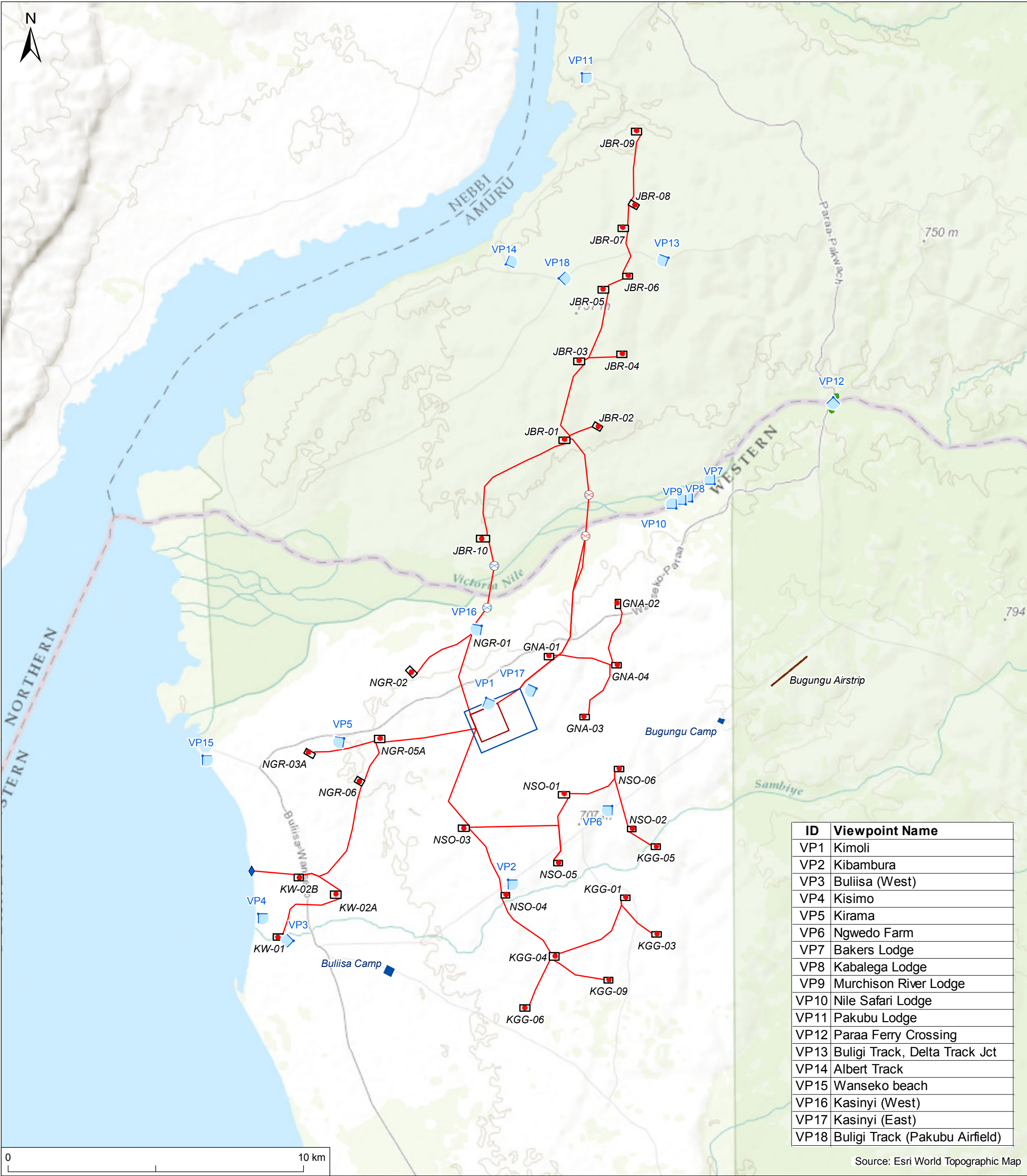


FIGURE 11.12 - LANDSCAPE AND VISUAL VIEWPOINT LOCATION PLAN

- Wellpad location
- Wellpad Extent - Maximum
- Water Abstraction System
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp
- Proposed Viewpoint Location

Project:
Tilenga Project ESIA

Client:
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Approved: MW

Coordinate Reference System:
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Date: 01/06/2018
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FIGURE 12.1 - LOCATION OF WASTE MANAGEMENT FACILITIES

- Project Area
- Waste Management Facility
 - Hazardous
 - Non-hazardous

Project:
Tilenga Project ESIA

Client:
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Operations Pty Ltd

Designed: LC
Checked: GM
Approved: MW

Coordinate Reference System:
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Scale @ A3: 1:1,000,000

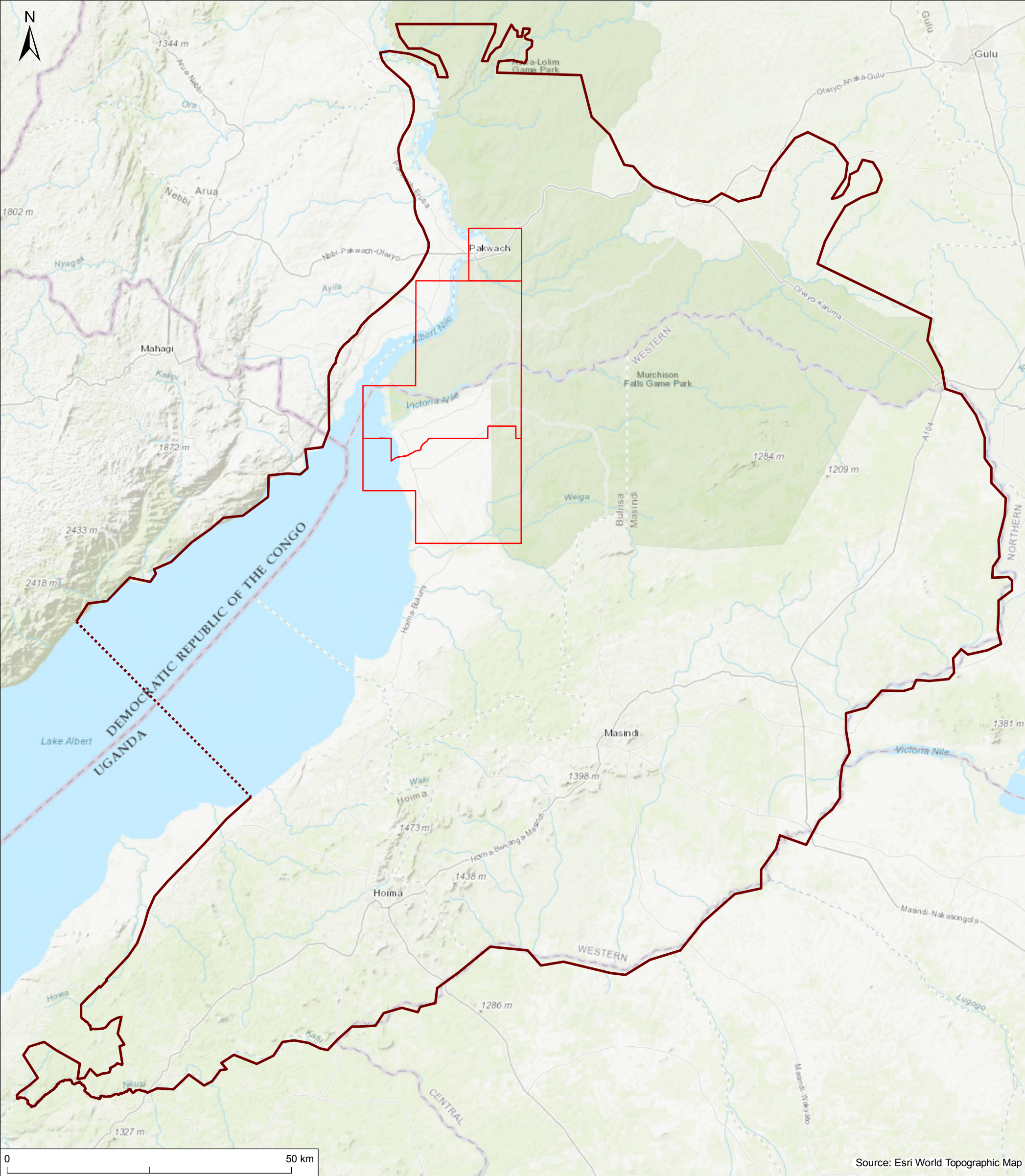


FIGURE 13.1 - BIODIVERSITY AREA OF INFLUENCE

- Project Area
- Project Area of Influence
- Indicative Project Area of Influence*

* Indicative as impacts on Lake Albert may extend beyond this boundary

Project:
Tilenga Project ESIA

Client:
Total E&P Uganda B.V.
and Tullow Uganda
Operations Pty Ltd

Designed: LC
Checked: GM
Approved: MW

Coordinate Reference System:
WGS 1984 UTM Zone 36N

Date: 01/06/2018
Scale @ A3: 1:650,000

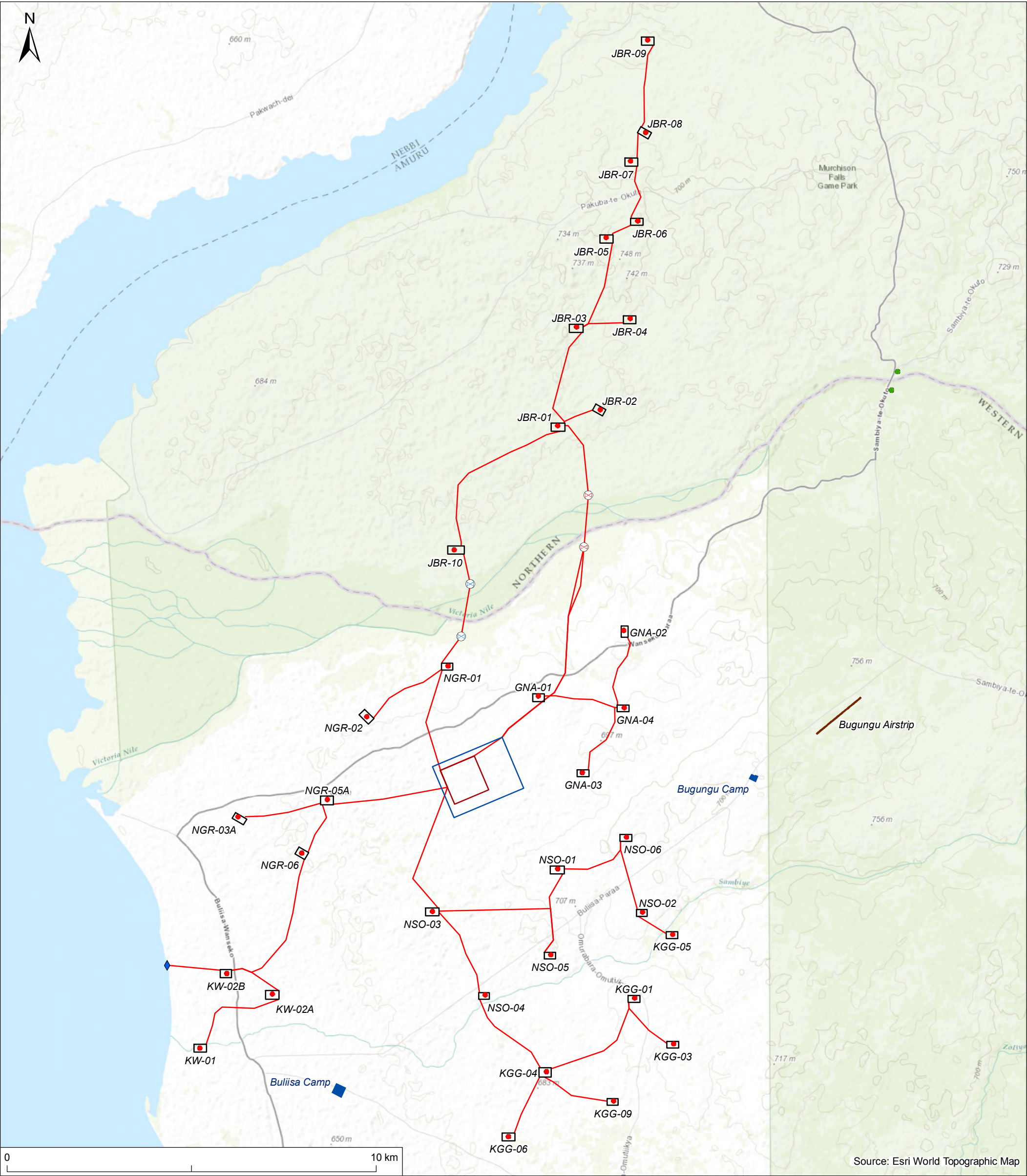


FIGURE 13.2 - INDICATIVE LAYOUT OF PROJECT

- Wellpad location
- Wellpad Extent - Maximum
- Water Abstraction System
- Victoria Nile Pipeline HDD Crossing - Option 1
- Victoria Nile Pipeline HDD Crossing - Option 2
- Victoria Nile Ferry Crossing
- Production and Injection Network
- Industrial Area
- CPF
- Bugungu Airstrip
- Camp

Project:
Tilenga Project ESIA

Client:
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Approved: MW

Coordinate Reference System:
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Date: 01/06/2018
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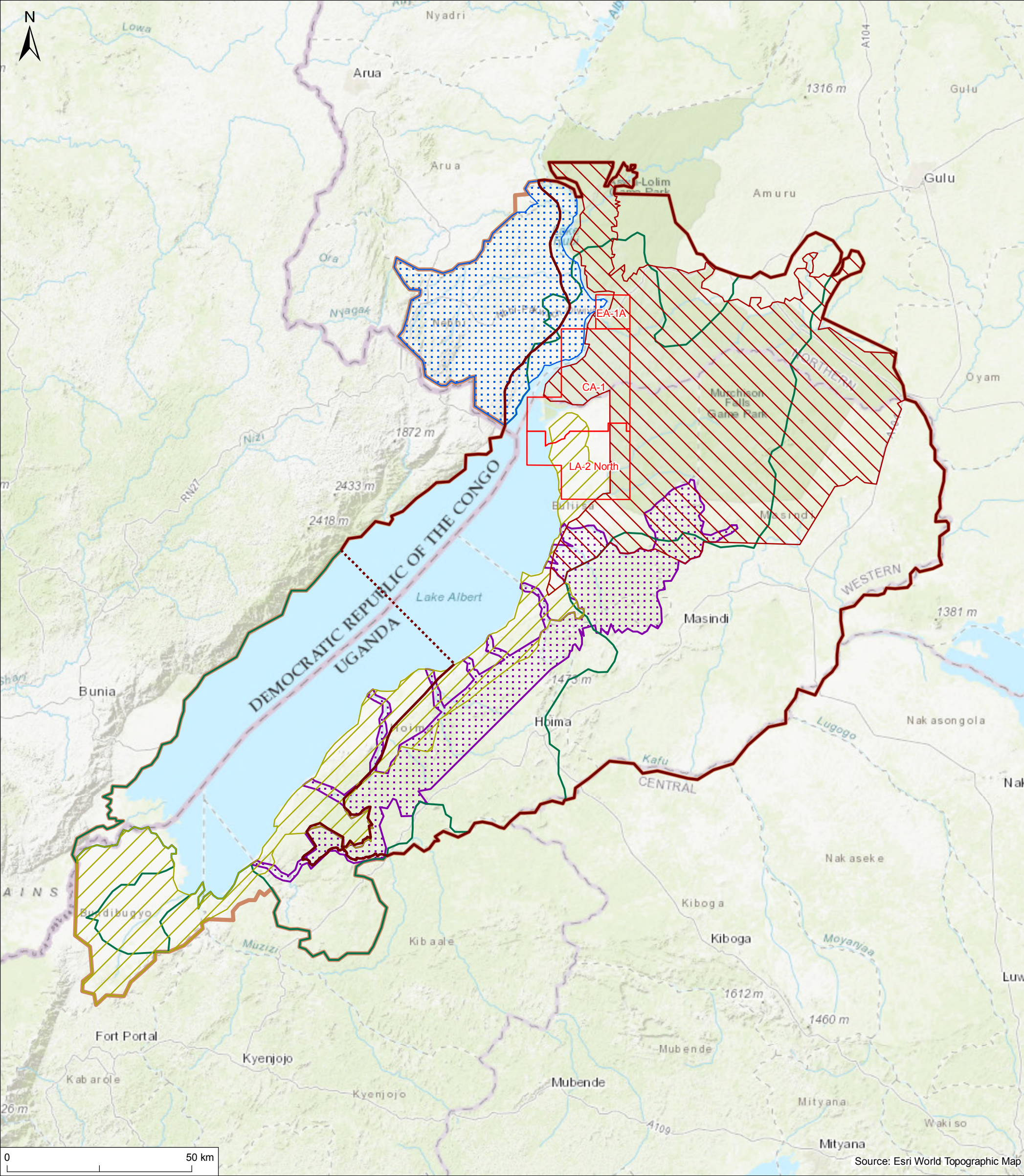


FIGURE 13.3 - CHA LANDSCAPE CONTEXTS

- Project Area
- Project Area of Influence
- Indicative Project Area of Influence*
- Landscape Context A
- Landscape Context B
- Landscape Context C
- Landscape Context D
- Landscape Context E
- Landscape Context F

* Indicative as impacts on Lake Albert may extend beyond this boundary

Project:
Tilenga Project ESIA

Client:
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and Tullow Uganda
Operations Pty Ltd

Designed: LC
Checked: GM
Approved: MW

Date: 01/06/2018
Scale @ A3: 1:1,000,000
Coordinate Reference System:
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