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UFS-UV  
NATURAL AND  
AGRICULTURAL SCIENCES  
NATUUR- EN  
LANDBOUWETENSKAPPE  
CENTRE FOR ENVIRONMENTAL MANAGEMENT  
SENTRUM VIR OMGEWINGSBESTUUR



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# Taking the sting out of remote sensing: using Google Earth Pro in wetland rehabilitation planning

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DEA: GIS DAY  
29 October 2015



# Layout

- Why are wetlands important?
- Working for Wetlands
- Requirements for wetland rehabilitation
- Google Earth Pro
- Case study

# Wetlands provide various ecosystem services

- water supply
- streamflow regulation
- erosion and flood mitigation
- water quality enhancement
- maintenance of biodiversity

products (fish, grazing, building and crafts material)

- cultural attributes
- recreation and tourism
- maintenance of natural processes

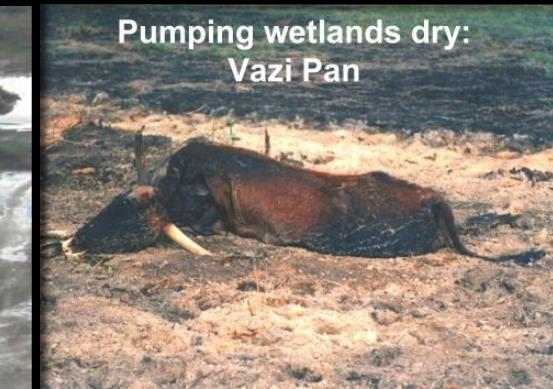


# Wetlands in South Africa

The 2011 National Biodiversity

Assessment reveals that

- 65% of our wetland types are under threat, of which
- 48% critically endangered,
- 12% endangered and
- 5% vulnerable.
- Only 11% of wetland ecosystem types are well protected,
- with 71% not protected at all



# Working for Wetlands

- Working for Wetlands is a joint initiative of the Departments of Environmental Affairs (DEA), Water and Sanitation (DWS) and Agriculture, Forestry and Fisheries (DAFF).
- This illustration of cooperative governance and partnerships comes to life through projects that focus on the
  - rehabilitation,
  - wise use and
  - protection of wetlands in a manner that maximises
  - employment creation,
  - supports small businesses and
  - transfers relevant and marketable skills to beneficiaries.



<https://www.environment.gov.za/projectsprogrammes/workingfowetlands>

## **General principles relating to wetland functioning and management**

**Wetlands result from several driving forces, including geomorphological setting, hydrology, physical processes and biological processes.**

**These forces interact to result in the functions and services to society (e.g. water quality enhancement) associated with wetlands.**

## **Associated principles for implementing wetland rehabilitation**

**Rehabilitation is the reinstatement of these driving forces to a level close to the original system (but seldom fully attaining it) so as to improve the wetland's capacity for providing services to society.**



<b>General principles relating to wetland functioning and management</b>	<b>Associated principles for implementing wetland rehabilitation</b>
<p><b>Wetlands are dynamic, changing on time scales of days, seasons, years, decades, millennia and longer.</b></p> <p><b>Given sufficient time (i.e. geological time spans) all wetlands will ultimately decline as other wetlands develop elsewhere in the landscape.</b></p>	<p><b>The goal of wetland rehabilitation should not be to return and maintain a wetland in a static state but rather to achieve a persistent resilient system that is largely self-maintaining and can respond to change with little human intervention.</b></p>



## **General principles relating to wetland functioning and management**

**Wetlands are an integral part of catchments and broader landscapes.**

**The nature and rates of processes affecting wetlands can be (and often are) influenced by human interventions within catchments and landscapes.**

## **Associated principles for implementing wetland rehabilitation**

**Wetland rehabilitation must be integrated with the surrounding landscape if it is to address the causes of wetland degradation and not just the symptoms.**



## **General principles relating to wetland functioning and management**

**All wetlands occur within some form of socio-economic context that may have a profound effect on management and land-use decisions affecting the functioning of the wetland.**

## **Associated principles for implementing wetland rehabilitation**

**If wetland rehabilitation projects are to be sustainable they must have meaningful ownership by local people.**

**Adequate consideration must be given to socio-economic factors, particularly those relating to the direct users of the wetland.**



<b>General principles relating to wetland functioning and management</b>	<b>Associated principles for implementing wetland rehabilitation</b>
<b>Wetland functioning and management are complex, and without effective planning, the effective management, monitoring and rehabilitation of wetlands are unlikely to be cost-effective</b>	<b>Wetland rehabilitation should take place within a well structure planning, implementation and evaluation programme.</b>



# Working for Wetlands Planning requirements

- Prioritise catchments
- Prioritise wetlands for rehabilitation
- Identify and quantify impacts
- Compile wetland assessment and rehabilitation plan

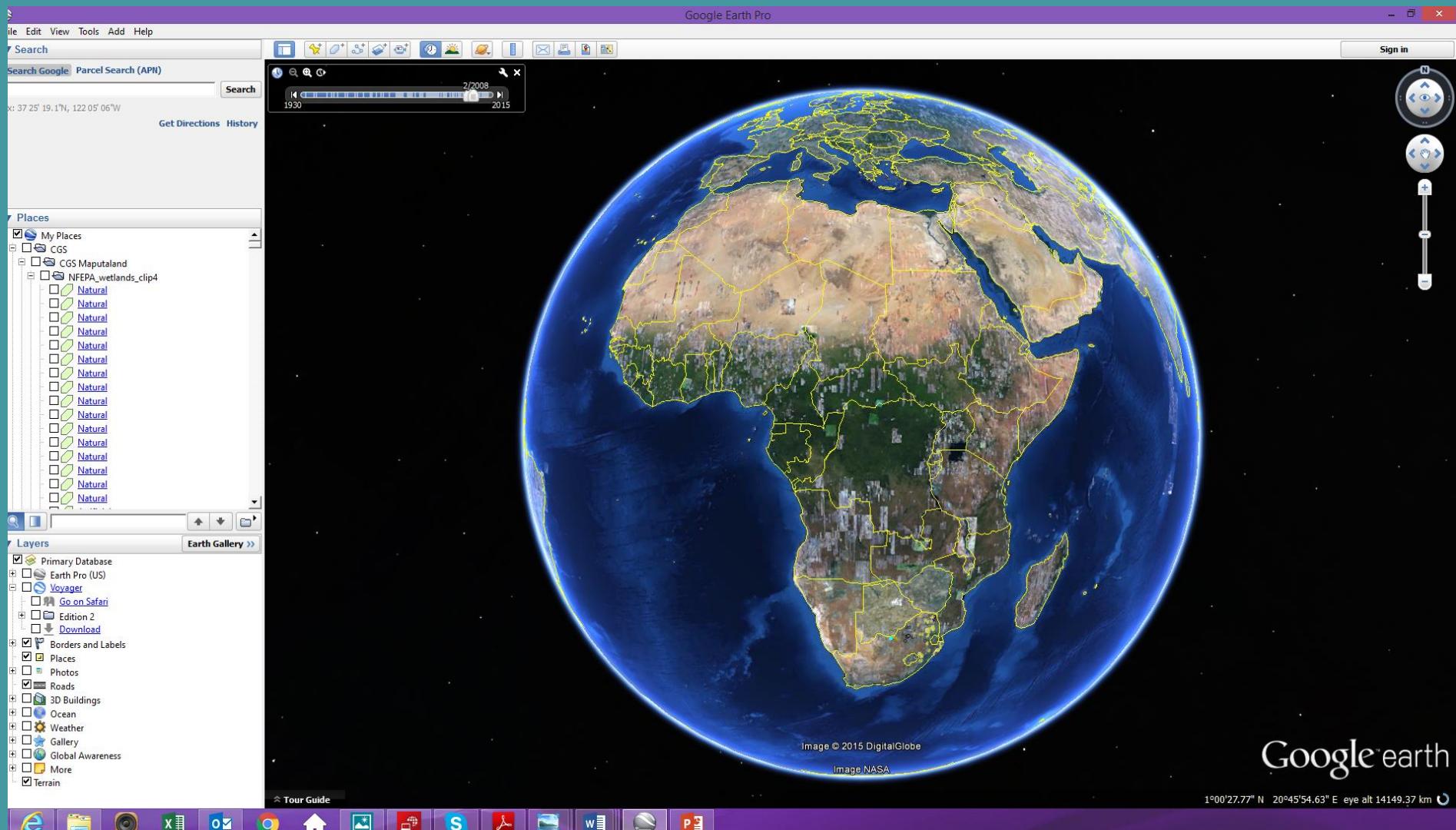
# Rehabilitation Plan requirements

- Wetland Eco-services
- Present Ecological Status
- Importance and sensitivity
- Hectare equivalents

# Basic information requirements

- Wetland and catchment:
- Delineation
- Area
- Slope
- Landuse/landcover

# GOOGLE EARTH PRO



# Features

- Free **licence** key to use
- View an image of objects on Earth. High resolution imagery (greater than 1-meter) for thousands of cities
- Tour the world – using the Sightseeing Tour folder.
- Get directions from one place to another
- View recent historical imagery for your study site.

# Features

- View 3D terrain of a place – e.g. mountainous terrain
- Open and create shape files and \*.kml files and share via email etc

*This is my limited application of a very capable tool*

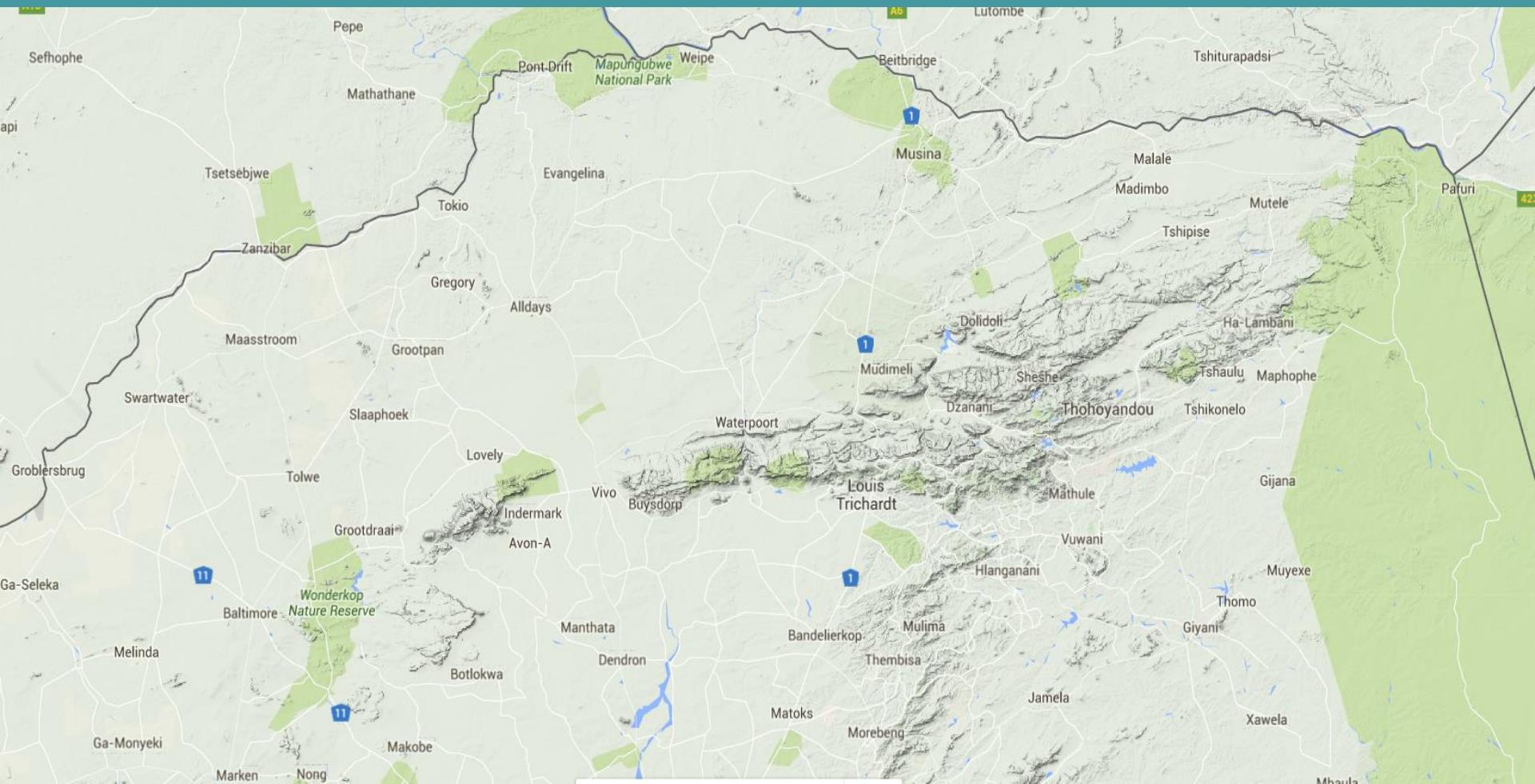
# Draw-backs

- Imagery update (most 1-3 years old) – nor real time
- Some imagery blurry because combines data of different resolution to offer a seamless viewing experience
- Google Earth largely depends on the 3D graphics capabilities of your computer
- Elevation error factor
- Georeferencing

# Draw-backs

- Copy right: Use of the images from Google Earth Pro - the images can be used for personal and (internal) business documents. However, if the images were to be used in a report that is sent to clients as part of a service it is not allowed (Google Earth/Maps Permission Tool)?

# Case study; Leeu Pan, Mapungubwe National Park



2003

437 m

© 2015 Cnes/Spot Image

Google

2003 (Seasonal zone)



Google

2012



437 m

Image © 2015 DigitalGlobe

Google

2003



437 m

© 2015 Cnes/Spot Image

Google

2006

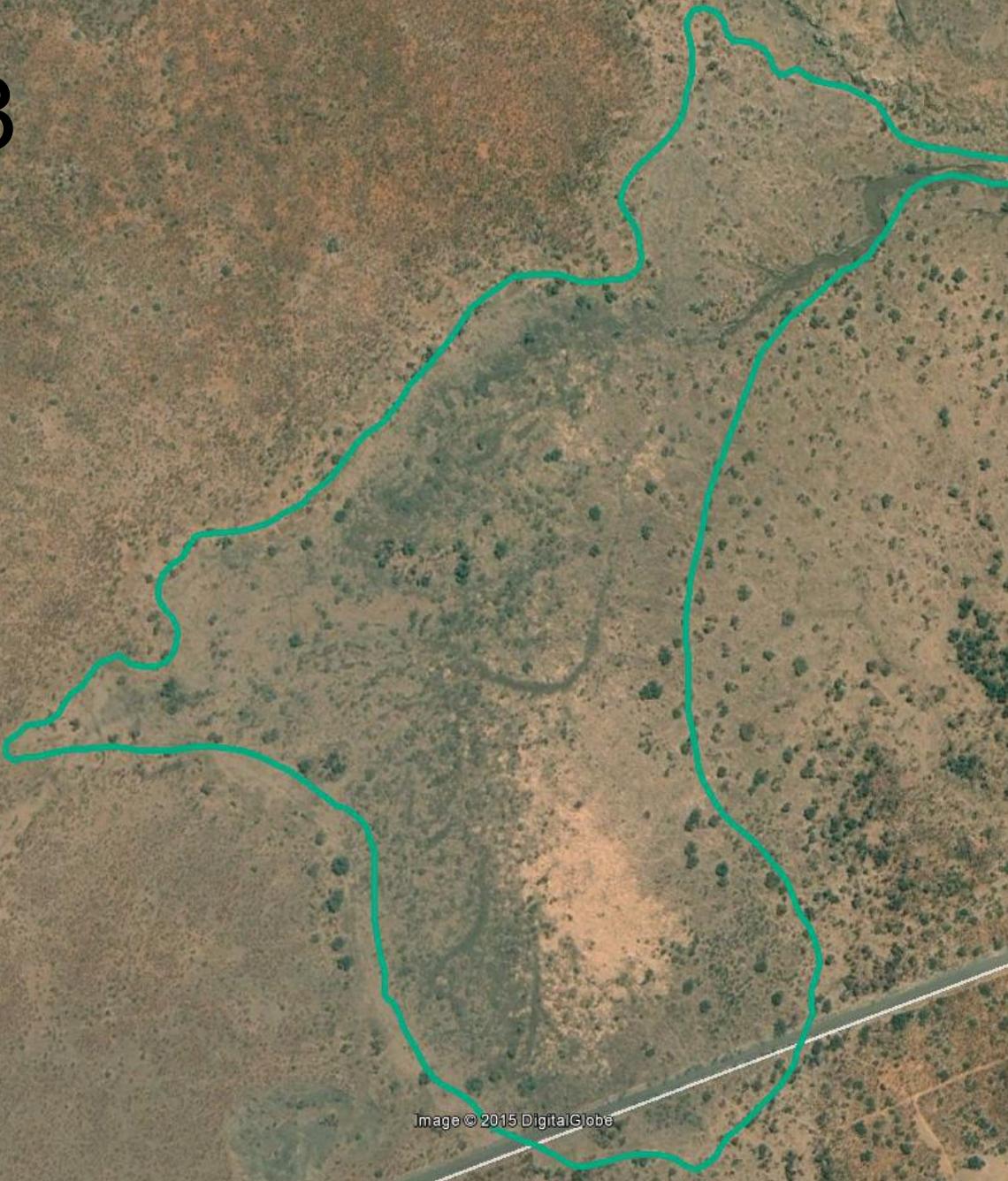


© 2015 Cnes/Spot Image

437 m

Goo

2008



Google

2010



437 m

Image © 2015 DigitalGlobe

Google

2012



437 m

Image © 2015 DigitalGlobe

Google

8/31/2012

### Google Earth - Edit Polygon

Name: Leeu Pan, seasonal

Description | Style, Color | View | Altitude Measurements

Perimeter: 4,114 Meters

Area: 49.2 Hectares

# Area and perimeter

OK

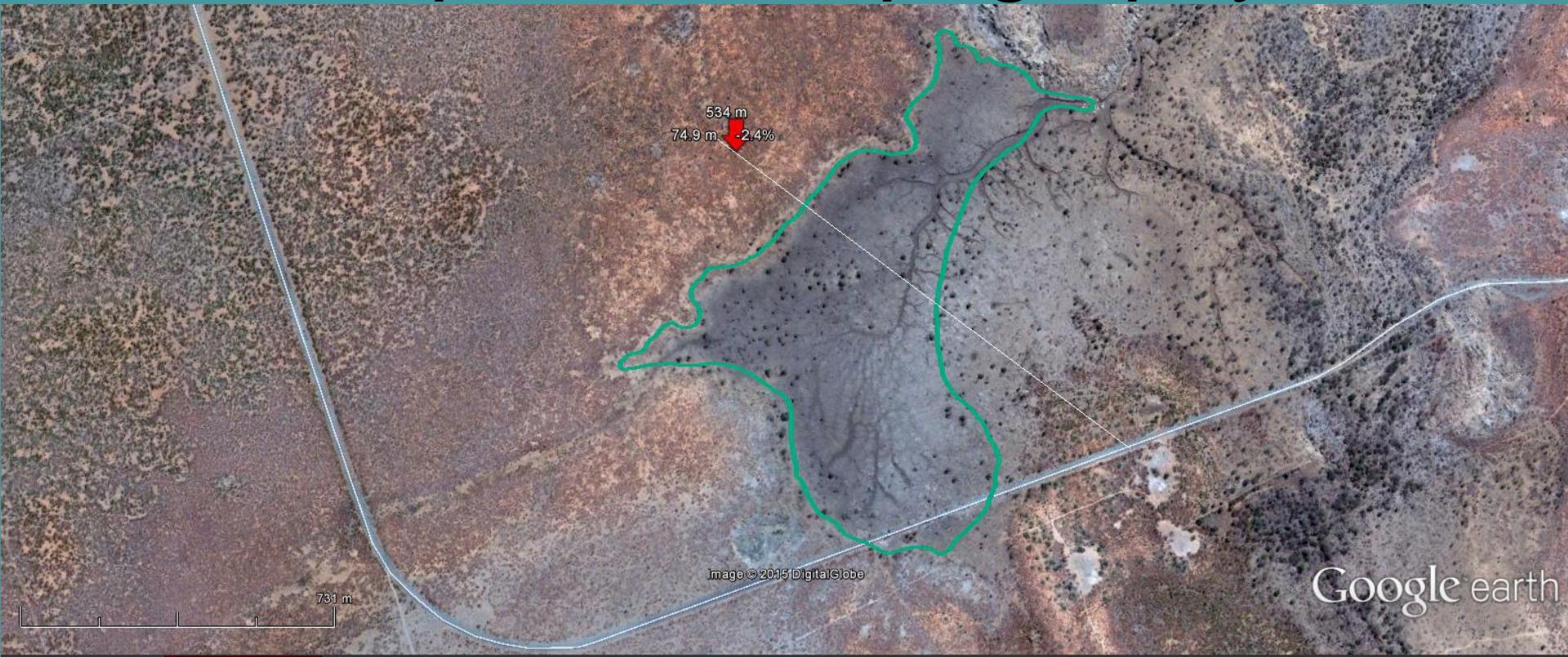
Cancel

429 m



Image © 2015 DigitalGlobe

# Slopes and topography



# 3D advantage



277 m

Image © 2015 DigitalGlobe

Google earth

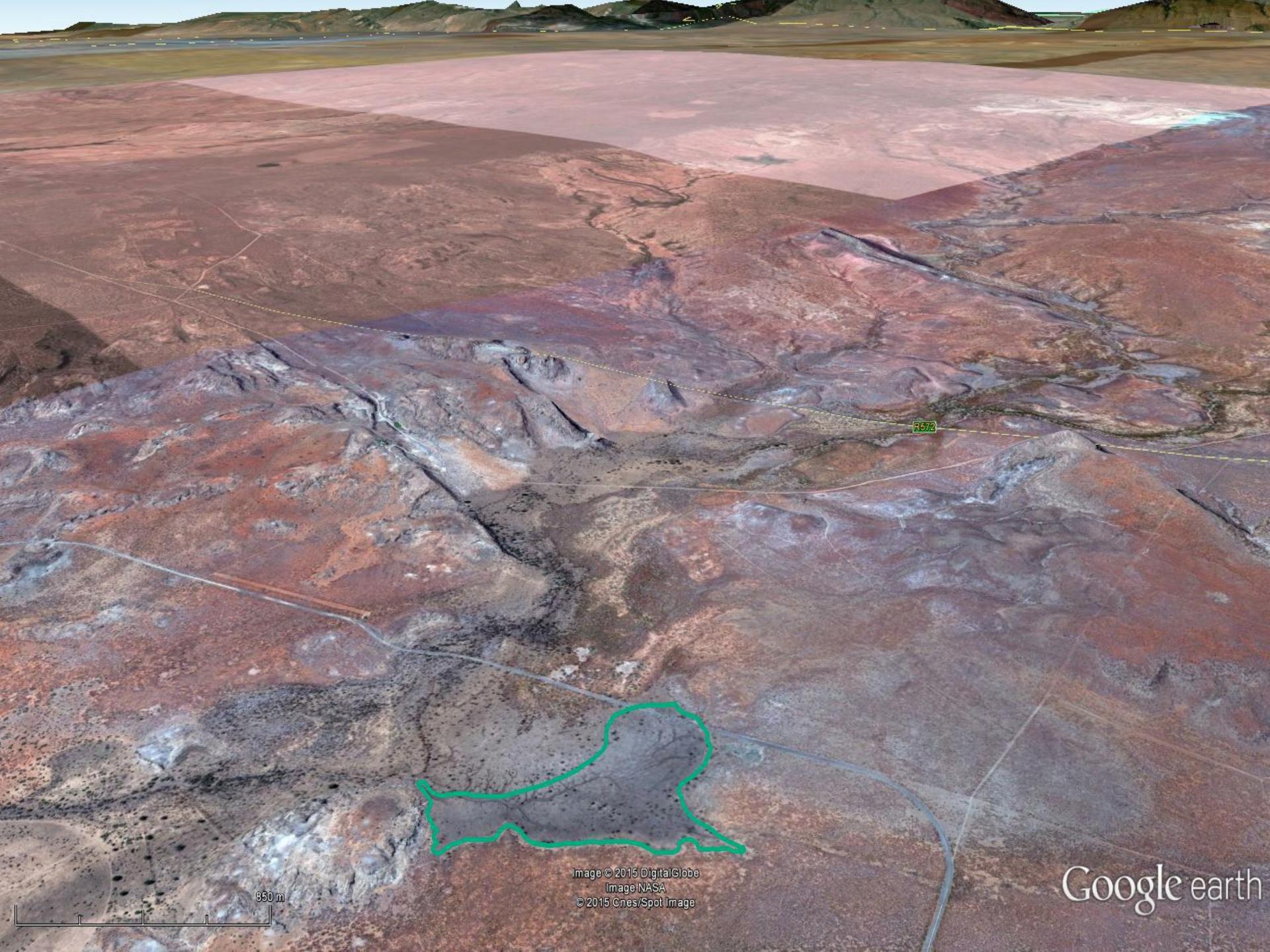


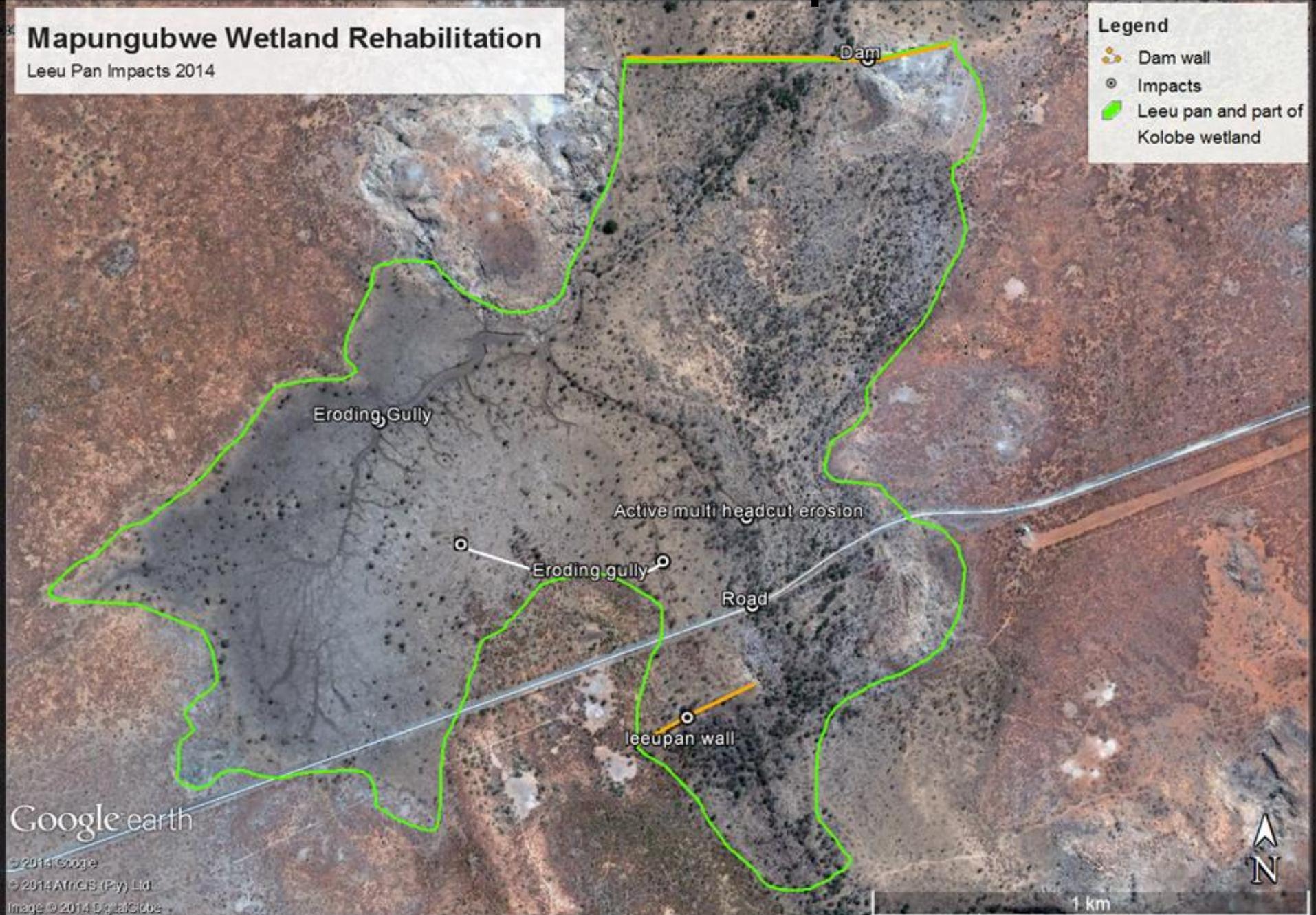
Image © 2015 DigitalGlobe  
Image NASA  
© 2015 Cnes/Spot Image

Google earth

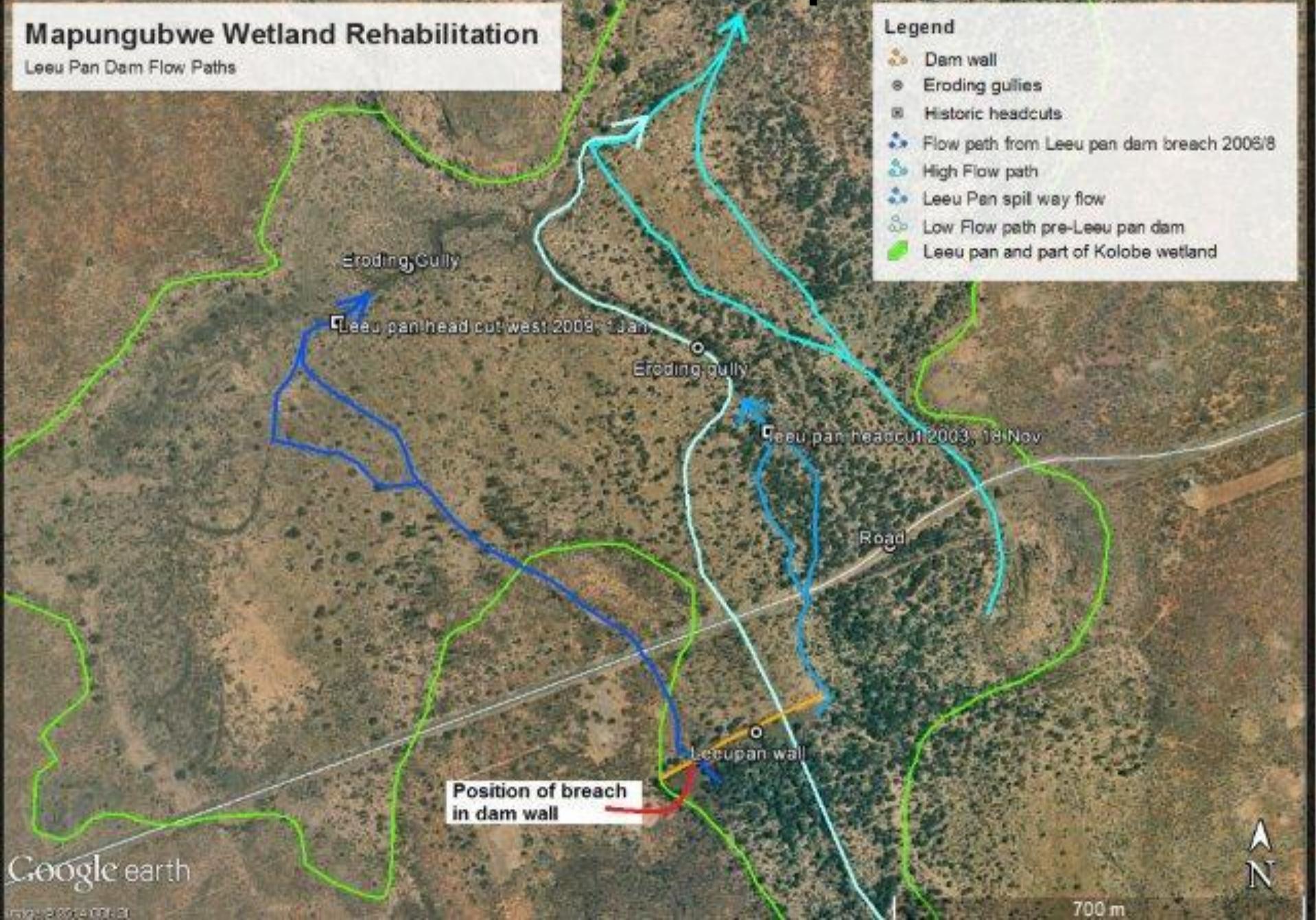
# On the ground



# On the map



# On the map



# Questions/Comments

- 1999

Leeu pan

Original  
channel

Dam