Agricultural Compliance and Environmental Risk Assessment Report

Project: National Road R30, Section 8 Upgrade (Road and Burrow Pits) Klerksdorp to Buffelsvallei, Northwest Province

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1. Introduction

This report complies with the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources. It provides a comprehensive assessment of the agricultural compliance and environmental risks associated with the National Road R30, Section 8 Upgrade, including both the road construction and the burrow pits required for material extraction.

The report includes:

- A detailed description of the project and its context.
- An assessment of the agricultural sensitivity of the site, including soil, vegetation, and climate.
- An evaluation of potential impacts on agricultural resources, supported by scientific data.
- Proposed mitigation measures to minimize adverse effects, backed by evidence-based practices.
- A conclusion on the acceptability of the project from an agricultural perspective

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2. Project Description

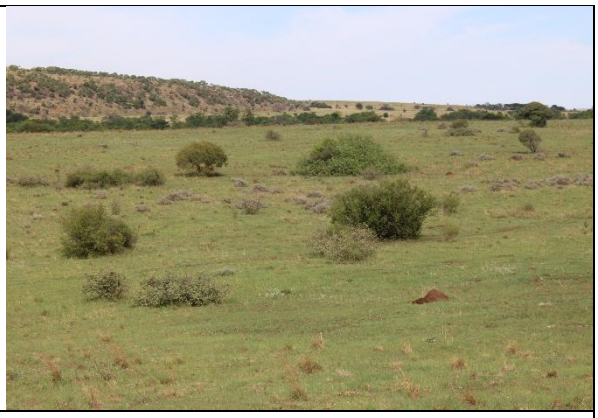
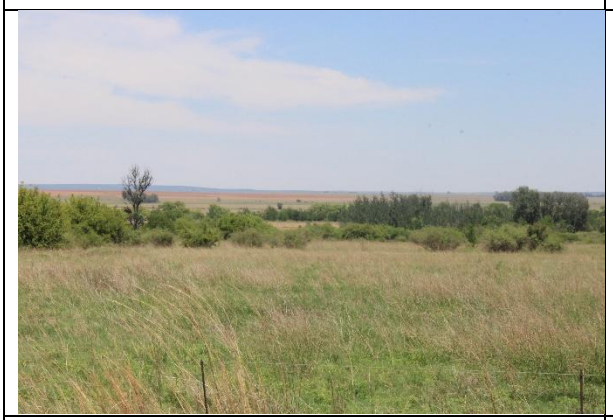
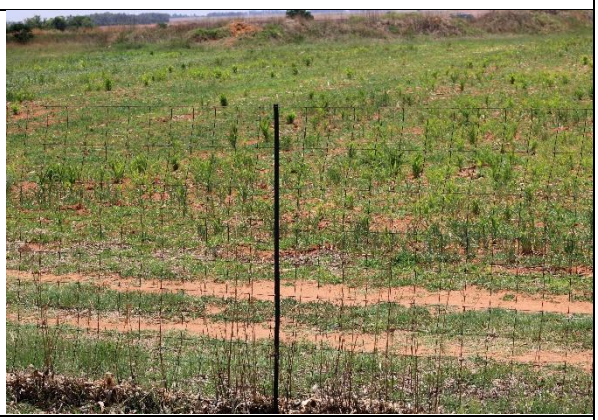
2.1 Location and Context

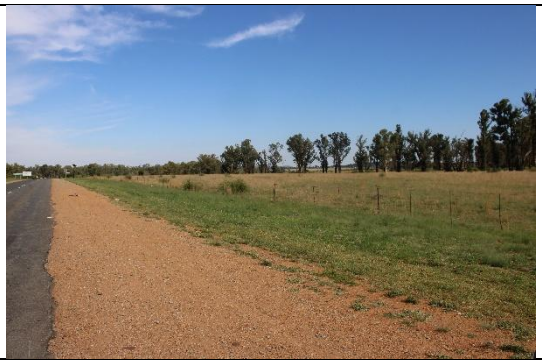
- **Location:** Dr. Kenneth Kaunda District Municipality, Northwest Province, South Africa.
- **Surrounding Land Uses:** The area is predominantly agricultural, with extensive livestock grazing and limited crop production. The region is characterized by semi-arid conditions, making it more suitable for grazing than intensive farming.
- **Project Purpose:** The burrow pits are required for material extraction to support the construction of the National Road R30, Section 8 Upgrade.

2.2 Development Footprint

- **Total Area:** 29.89 hectares (less than 2% of surrounding agricultural land).

Parcel Breakdown:

	
Parcel 1 (R30 S8-1): 4.99 ha	Parcel 2 (R30 S8-2): 4.98 ha
	
Parcel 3 (R30 S8-3): 4.99 ha	Parcel 5 (R30 S8-5): 4.99 ha
	
Parcel 10 (R30 S8-10): 4.98 ha	Parcel 11 (R30 S8-11): 4.96 ha




Section 8 Road Perspective

2.3 Project Activities

- **Excavation and Material Extraction:**
  - Removal of soil and gravel for road construction.
  - Temporary storage of extracted materials on-site.
- **Rehabilitation:**
  - Post-extraction restoration of the site to its original or improved condition.
  - Implementation of erosion control and revegetation measures.

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3. Agricultural Sensitivity Assessment

3.1 Land Use and Agricultural Activities

- **Dominant Activity:** livestock grazing (cattle/horses and small stock).
- **Secondary Activities:** Seasonal subsistence farming and marginal crop production.
- **Land Capability:** Limited by shallow soils, low fertility, and semi-arid climate. According to the **South African Land Capability Classification System**, the area is classified as **Class IV** (suitable for grazing with moderate limitations) and **Class V** (suitable for grazing with severe limitations).

3.2 Vegetation Composition

- **Vaal-Vet Sandy Grassland (Gh10):**
  - Dominated by sparse grasses such as *Eragrostis lehmanniana* and *Aristida congesta*.
  - Low moisture retention capacity due to sandy soils (Mucina & Rutherford, 2006).

    - Prone to overgrazing, leading to soil degradation and increased erosion risk.

- **Klerksdorp Thornveld (Gh13):**
    - Characterized by a mix of woody shrubs (e.g., *Acacia karroo*) and grasses (e.g., *Themeda triandra*).
    - Supports grazing but is sensitive to climate variability and requires rotational grazing to prevent degradation (Mucina & Rutherford, 2006).

3.3 Soil Characteristics

- **Shallow Sandy Loams (Land Type Dc):**
    - Soil depth: <0.5m.
    - Low water retention and high susceptibility to wind erosion.
    - Organic carbon content: <1%, indicating low fertility (Soil Classification Working Group, 2018).
- **Moderately Deep Clay Loams (Land Type Bb):**
    - Soil depth: 0.6m–1.2m.
    - Moderate water retention but prone to compaction and seasonal waterlogging.
    - Clay content: 20–35%, providing better nutrient retention than sandy soils.
- **Deep Well-Drained Soils (Land Type Ea):**
    - Soil depth: >1.2m.
    - High water infiltration rates and moderate fertility.
    - Suitable for dryland cropping and improved pasture management.

3.4 Climate and Water Availability

- **Rainfall:** 400–600mm annually, with high inter-annual variability (South African Weather Service, 2023).
- **Temperature:** Average summer temperatures range from 25°C to 35°C, while winter temperatures range from 5°C to 20°C.
- **Drought Risk:** High, with frequent droughts exacerbated by climate change (DEA, 2013).
- **Water Retention:** Poor due to sandy soils, increasing reliance on rain-fed farming.

3.5 Agricultural Sensitivity Zoning

Zone Classification	Agricultural Use	Sensitivity Level	Management Considerations
High Sensitivity	Marginal grazing land	High	Erosion control, rotational grazing
Moderate Sensitivity	Extensive grazing	Moderate	Sustainable pasture management
Low Sensitivity	Limited cropping	Low	Soil conservation techniques

4. Impact Assessment

4.1 Loss of Agricultural Land

- **Extent of Impact:**
  - Temporary disruption of 29.89 hectares (<2% of total farmland).
  - Primarily affects grazing lands, with minimal impact on cultivated areas.
- **Potential Consequences:**
  - Reduced grazing capacity for livestock farmers.
  - Fragmentation of agricultural land, limiting movement between grazing areas.
  - Displacement of farming activities during construction.
- **Mitigation Measures:**
  - Reintroduce native grass species post-construction.
  - Provide alternative grazing solutions during construction.
  - Design livestock crossings to minimize fragmentation.

4.2 Soil Degradation and Erosion Risk

- **Key Risks:**
  - Soil compaction and topsoil depletion due to heavy machinery.
  - Increased vulnerability to wind and water erosion.
- **Mitigation Measures:**
  - Stockpile and reuse topsoil for rehabilitation.

- Install silt traps, grassed swales, and erosion blankets.
- Apply organic amendments to restore soil fertility.

4.3 Hydrological and Water Availability Changes

- **Key Risks:**
  - Altered surface water drainage patterns, leading to localized flooding or water scarcity.
  - Reduced groundwater recharge due to soil compaction.
- **Mitigation Measures:**
  - Install drainage channels and retention basins.
  - Preserve natural wetland areas to enhance groundwater sustainability.

4.4 Impacts on Agricultural Biodiversity

- **Key Risks:**
  - Loss of native vegetation and pollinators.
  - Reduced grazing quality and soil stability.
- **Mitigation Measures:**
  - Replant native forage species post-construction.
  - Establish buffer zones with indigenous plants to support biodiversity.

5. Environmental Risk Assessment

Impact	Severity (Pre-Mitigation)	Likelihood	Mitigation Measures	Severity (post-mitigation)
Soil erosion	High	Moderate	Erosion control measures, rehabilitation	Low
Loss of agricultural land	Moderate	Low	Grazing restoration, compensation strategies	Low
Surface water contamination	Moderate	Low	Water quality monitoring, stormwater management	Low

Impact	Severity (Pre-Mitigation)	Likelihood	Mitigation Measures	Severity (post-mitigation)
Loss of soil fertility	High	Moderate	Topsoil conservation, fertilization	Low
Disruption to grazing	Low	High	Phased construction, continued grazing access	Very Low

6. Mitigation and Management Measures

1. **Soil Conservation:**
    - Implement erosion control measures such as contour plowing and mulching.
    - Rehabilitate disturbed areas using native grass species.
2. **Water Management:**
    - Design stormwater management systems to prevent waterlogging and runoff.
    - Preserve natural wetlands to maintain groundwater recharge.
3. **Biodiversity Restoration:**
    - Replant indigenous vegetation to restore habitat for pollinators and beneficial insects.
    - Establish buffer zones to protect sensitive ecosystems.
4. **Monitoring and Evaluation:**
    - Conduct regular soil and water quality assessments.
    - Monitor the success of rehabilitation efforts and adjust strategies as needed.

7. Conclusion

The Road Upgrade and Burrow Pits development is compliant with the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources.

It was found that the road reserve for most of the route is very wide and will allow for construction vehicle access without impacting on production. Grazing lands are fairly close to the road reserve. Dust may be problematic during the construction period and should be controlled however they won't be any direct impact on farming operations.

With the effective implementation of proposed mitigation measures, the project will have minimal impact on agricultural productivity and sustainability. The project is acceptable from an agricultural perspective, provided that all mitigation and management measures are strictly adhered to.

References

1. Mucina, L., & Rutherford, M. C. (2006). *The Vegetation of South Africa, Lesotho and Swaziland*. South African National Biodiversity Institute.
2. Soil Classification Working Group. (2018). *Soil Classification: A Natural and Anthropogenic System for South Africa*. Agricultural Research Council.
3. South African Weather Service. (2023). *Climate Data for Northwest Province*.
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