



**Project no: 402828**  
**Roads Materials Supply Strategy**

**Botanical Sensitivity Analyses for Proposed Borrow Pit**

DR2310/28.9/0.02L Beaufort West

[FINAL](#)

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prepared for

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## DR2310/28.9/0.02L Beaufort West

### ***Executive summary***

The proposed borrow pit application area will affect a maximum area of 4.2 ha of Gamka Karoo (NKI1). The existing borrow pit is 1.0 ha in area and receives water diverted from the adjacent hillside. The extension will remove an additional 1.9 ha of natural vegetation within this application area. Gamka Karoo has Least Threatened status because it is extensive and largely untransformed. The proposed site is not in an Ecological Support Area, and not in a Freshwater Ecosystem Priority Areas (FEPA). For these reasons gravel mining on the site is acceptable, provided that mitigation and restoration is carried out as specified. With mitigation, the gravel mining on the proposed site would not cause a significant loss in sensitive plant species or permanently alter ecosystem processes. Mitigation involves saving topsoil before gravel mining, and post mining reshaping, topsoil spreading, and ensuring that drainage from the surrounding area is not captured by the borrow pit (BP). In addition, invasive alien *Prosopis* (mesquite/meskiet) trees to the north and along the man-made channel to the west of the existing BP must be removed to reduce the risk of colonization of the disturbed area by this declared invader.

### ***Methods***

Following a desktop study to identify Critical Biodiversity Areas and Freshwater Ecosystem Priority Areas, the site was explored on foot on 2 March 2015. Photos were taken and a list of indigenous plant species and invasive alien plant species compiled. The vegetation was described in terms of type, height, structure, cover and extent. The geographical co-ordinates of any threatened and specially-protected plant species in the South African Red Data List were recorded. More detailed methods, including methods for scoring the significance of impacts, are given, together with references in the document entitled Botanical Sensitivity Analyses for Proposed Borrow Pits – Part 1 – Methods 2013.

### ***Botanical description***

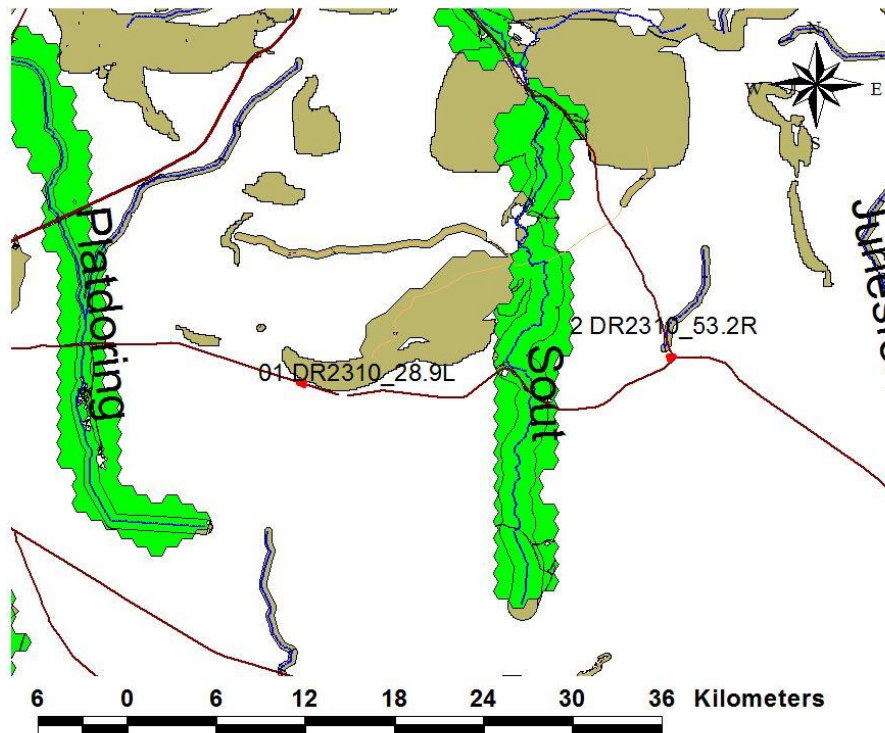
#### Regional conservation status and vegetation type

The vegetation of the application area is Gamka Karoo (NKI1), a largely untransformed vegetation type that has Least Threatened status (Rouget et al. 2004). The proposed borrow pit is NOT in a Critical Biodiversity Area, Ecological Support Area (Skowno 2009, **Figure 1**), nor in a Freshwater Ecosystem Priority Area (WRC 2011, **Figure 2**). Mean annual rainfall is between 200 and 400 mm/year.

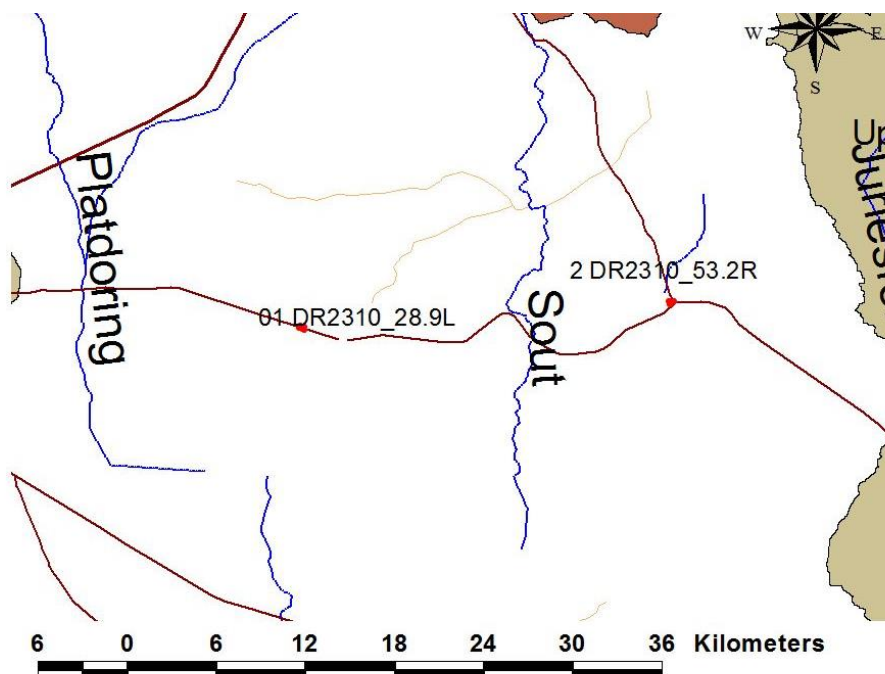
#### Landcover in borrow pit application area

The application area (4.2 ha) includes an existing 1.0 ha borrow pit adjacent to the DR2310 on private land presently used for small stock farming (**Figure 3 & 4**). About 25 % of the vegetation within the application area has been disturbed by previous gravel mining. The BP extension will remove an additional 1.9 ha (50%) of indigenous vegetation. Soils are shallow and silty, and overlie Beaufort series mudstone. Runoff from the dolerite-capped ridge to the north drains southwards

towards the road (**Figure 4**). A small drainage line crosses the eastern part of the application area.



**Figure 1. Proposed borrow pits (red dots) in relation to Critical Biodiversity Areas (CBA light green), and ecological support areas (brown) mapped for the Central Karoo District Municipality (Skowno 2009)**



**Figure 2. Proposed borrow pit (red dots) in relation to Freshwater Ecosystem Priority Areas (dark brown) and upstream areas (light brown) as defined by WRC (2011)**

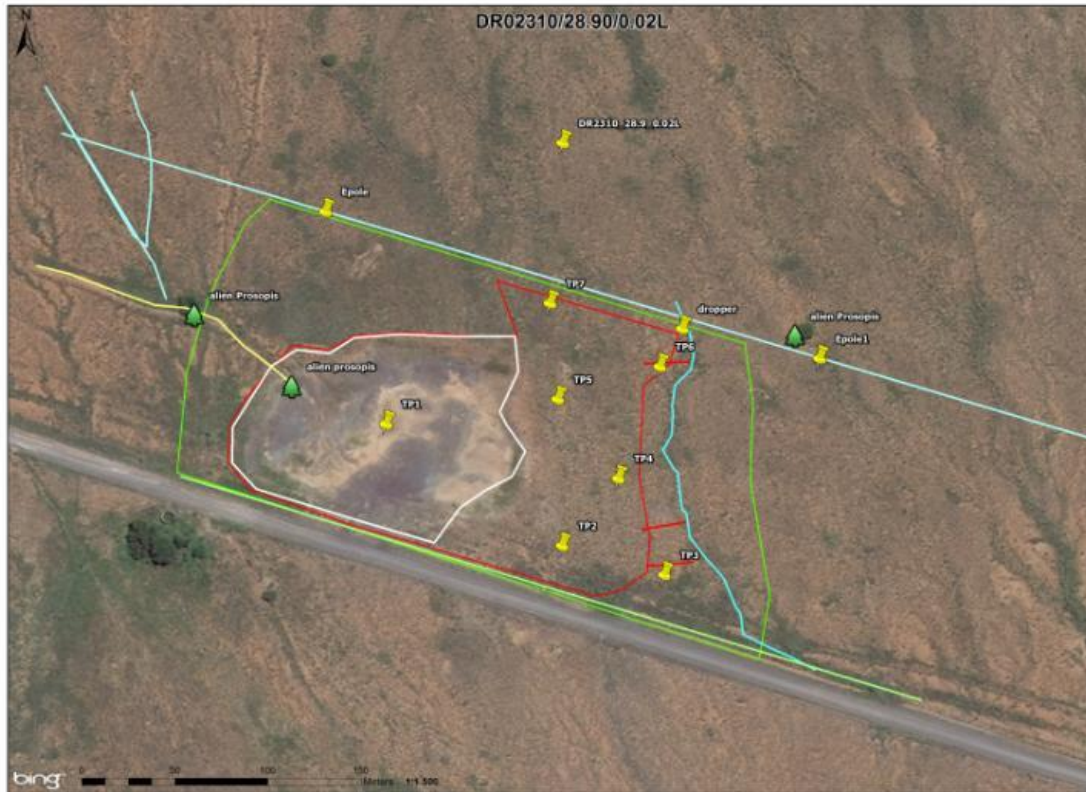
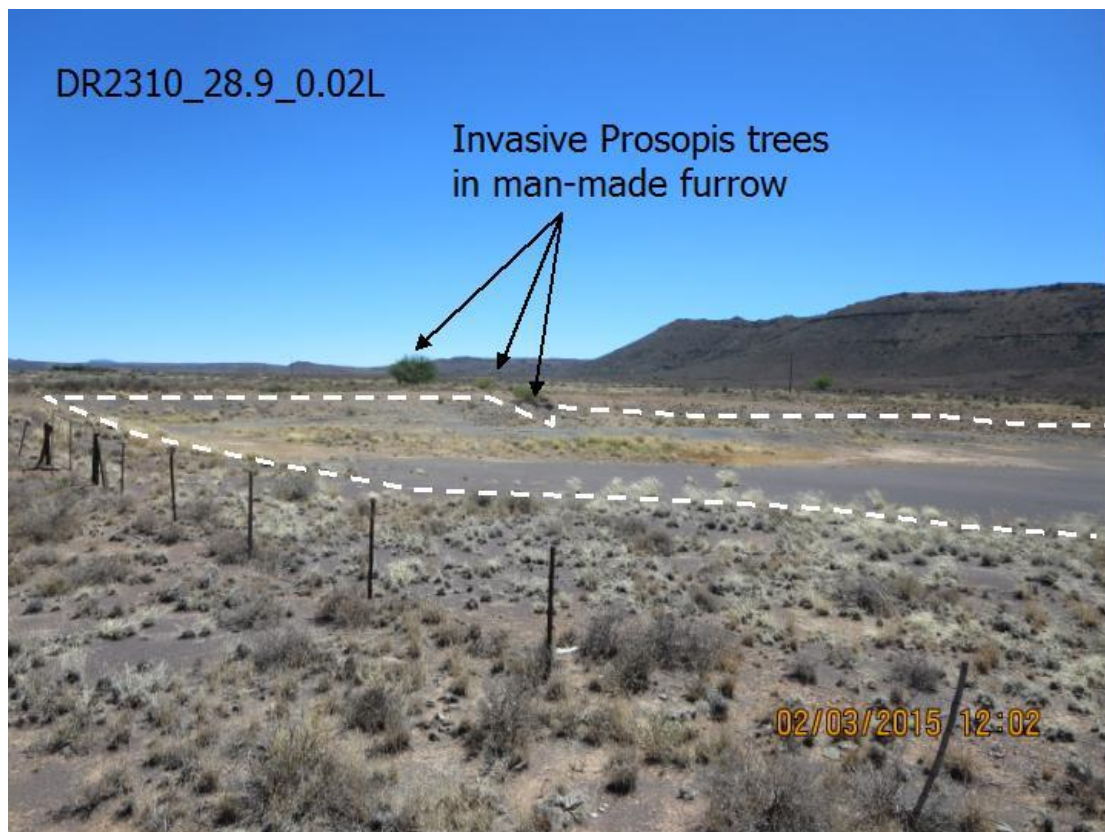


Figure 3. Application area (green polygon) in relation to the divisional road, drainage lines (blue), existing borrow pit (white outlined), proposed preferred resource (red outline) and man-made canal (yellow line to west) invaded by *Prosopis* trees



**Figure 4. Existing borrow pit (dashed white line), invasive *Prosopis* trees, and dolerite ridge to north of the site**

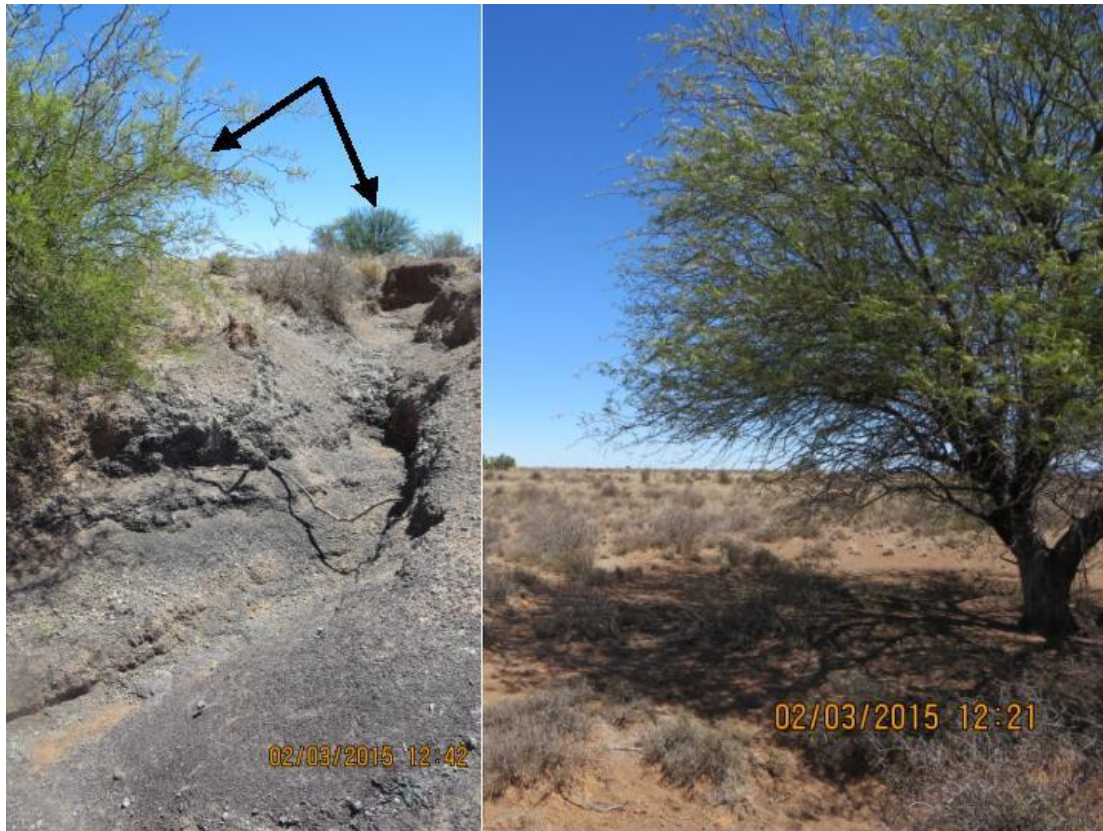
Vegetation and plant species of borrow pit application area

The vegetation on the proposed borrow pit application area comprises a mixture of grasses and succulent and non-succulent shrubs. The dominant species is *Pentzia incana* (ankerkaroo). The vegetation is denser in the south-eastern corner of the application area that benefits from runoff from the ridge to the north (**Figure 5**).

Of the 29 indigenous plant species recorded from the site, four are protected in the Western Cape but none of these is a threatened Red Listed species (**Appendix 1**). Invasive alien plants recorded on the site were *Prosopis* sp (mesquite) and *Salsola kali* (rolbos). Most of the *Prosopis* trees and saplings recorded were associated with a man-made furrow in the western region of the investigated area which leads water from the hillside into the existing BP (**Figure 6**).



**Figure 5. The densely-vegetated south-eastern corner of the application area showing the mix of grasses and Karoo shrubs**



**Figure 6. Invasive alien *Prosopis* sp (Mesquite) trees to the north of the proposed borrow pit extension area and along a man-made canal leading water from the hillside into the west side of the existing BP**

### ***Impact Assessment***

The application area is not in an Ecological Support Area, but not in a FEPA. No plant species of special conservation concern were found during the site survey. Gravel mining is acceptable provided that surface hydrology is not permanently affected by the mining (i.e. that runoff to rivers is not captured by the borrow pit). Without mitigation the negative impacts are of medium intensity, long duration and of medium significance because they have potential to divert and capture runoff water, to remove natural vegetation and to promote establishment of invasive alien plants – particularly *Prosopis* (mesquite). Mitigation will reduce the impact to low to very low significance.

### ***Mitigation***

Environmental management recommended for this borrow pit is as follows:

1. Fence out borrow pit to contain movement of people and vehicles;
2. Fell all *Prosopis* (mesquite/meskiet) trees along the inlet furrow to the west of the existing BP, and fell the large tree to the north east of the BP. Remove all branches and seed pods and dispose of at an official/ licensed waste disposal site;
3. Set back the proposed BP 20 m from the dry drainage line that runs southwards through the eastern third of the investigated area;

4. Using a scraper blade, remove the top 200-300 mm (20-30 cm) of the soil surface "top soil" (even if the surface is rocky) from areas to be mined. This surface material contains seeds and bulbs needed for re-vegetation of the site;
5. Store topsoil in berms <2 m high that will not be driven on during the mining operation nor washed away by rain;
6. Machinery moved from sites contaminated with seeds of economically and environmentally significant weeds should be cleaned before entering this site;
7. Supply a field toilet and waste drum;
8. Do not permit collection of firewood from undamaged vegetation;
9. Remove any soil contaminated by fuel or oil spills and dispose of this at a licensed waste disposal facility;
10. Remove all plastic bottles and other litter and dispose of this at a licensed waste disposal facility;
11. Upon completion of gravel mining, contour the site to prevent rapid runoff of water that will cause soil erosion;
12. Shape the walls of the BP at a shallow enough angle (not steeper than 1:3) to hold soil and plants;
13. Prevent inundation of the borrow pit depressions as this prevents establishment of Karoo vegetation and affects runoff to rivers. The pit must be free draining. Divert water into established vegetation or into the drainage line in the eastern section of the investigated site area. Close the furrow leading water into the BP from the west;
14. Rip any remaining hardened or scalped surfaces to facilitate water infiltration and seedling establishment
15. Spread the topsoil stockpile throughout the reshaped borrow pit so that all subsoil is covered by topsoil throughout the borrow pit to facilitate colonization by plant species with soil-stored seeds;
16. Spread any unused stockpile or hard-rock debris over the floor of the closed BP to provide shelter to plants;
17. Reseed the borrow pit area with *Fingerhuthia africana* and *Cenchrus ciliaris*

**Appendix 1. Plant species recorded in proposed borrow pit development area. Protected WC = protected in Western Cape; Threat Status: LC = Least Concern, NE = Not Evaluated. Dominant species are in BOLD type.**

WC means protected in terms of the Western Cape Nature Conservation Laws Amendment Act (3 of 2000). Schedule 3 Endangered Plants, Schedule 4 Protected plants. Under this legislation no person shall do the following:

(a) uproot the plant in the process of picking the flower of any flora; (b) without a permit; (i) pick any endangered or protected flora, or (ii) pick any flora on a public road or on the land on either side of such road within a distance of ninety metres from the centre of such road, or (c) pick any protected or indigenous unprotected flora on land of which he or she is not the owner, without the permission of the owner of such land or of any person authorised by such owner to grant such permission.

**Note: For Least Threatened species with Western Cape Protected Status, no blanket mitigation measure is prescribed for these species by CapeNature. Translocation will be recommended by the consultant where deemed feasible and desirable.**

Family	Alien	Species	Threat status	SA Endemic	Protection status WC
ACANTHACEAE		Blepharis capensis (L.f.) Pers.	LC	Yes	
ACANTHACEAE		Monechma incanum (Nees) C.B. Clarke	LC	No	
APOCYNACEAE		Gomphocarpus filiformis (E.Mey.) D.Dietr.	LC	No	
ASPARAGACEAE		Asparagus capensis L. var. capensis	LC	No	
ASPARAGACEAE		Asparagus striatus (L.f.) Thunb.	LC	Yes	
ASPHODELACEAE		Aloe variegata L.	LC	No	WCp
ASTERACEAE		Dicoma capensis Less.	LC	No	
ASTERACEAE		Osteospermum leptolobum (Harv.) Norl.	LC	Yes	
ASTERACEAE		Othonna sedifolia DC.	LC	No	
<b>ASTERACEAE</b>		<b>Pentzia incana (Thunb.) Kuntze</b>	<b>LC</b>	<b>No</b>	
ASTERACEAE		Rosenia oppositifolia (DC.) K.Bremer	LC	Yes	
ASTERACEAE		Senecio radicans (L.f.) Sch.Bip.	LC	Yes	
ASTERACEAE		Tripteris sinuata DC. var. sinuata	LC	No	
BIGNONIACEAE		Rhigozum obovatum Burch.	LC	No	
CHENOPODIACEAE	X	Salsola kali L.	NE	No	
CRASSULACEAE		Crassula capitella Thunb.	LC	No	
EUPHORBIACEAE		Euphorbia braunsii N.E.Br.	LC	No	
FABACEAE	X	Prosopis glandulosa Torr. var. glandulosa	NE	No	
GERANIACEAE		Sarcocaulon camdeboense Moffett	LC	Yes	
MESEMBRYANTHEMACEAE		Aridaria noctiflora (L.) Schwantes	LC	No	WCp
MESEMBRYANTHEMACEAE		Delosperma species			WCp
MESEMBRYANTHEMACEAE		Drosanthemum lique (N.E.Br.) Schwantes	LC	Yes	WCp
POACEAE		Cenchrus ciliaris L.	LC	No	
POACEAE		Eragrostis lehmanniana Nees var. lehmanniana	LC	No	
POACEAE		Eragrostis obtusa Munro ex Ficalho & Hiern	LC	No	
POACEAE		Fingerhuthia africana Lehm.	LC	No	
POACEAE		Stipagrostis ciliata (Desf.) De Winter	LC	No	
POACEAE		Stipagrostis obtusa (Delile) Nees	LC	No	
SCROPHULARIACEAE		Aptosimum indivisum Burch. ex Benth.	LC	Yes	
SOLANACEAE		Lycium cinereum Thunb.	LC	No	
ZYGOPHYLLACEAE		Zygophyllum microcarpum Licht. ex Cham. & Schltdl.	LC	No	
TOTAL = 31 species					

