Wetland Baseline & Risk Assessment for the proposed Mulilo Struisbult PV2 Area and Gridline Project

Copperton, Pixley ka Seme District Municipality, Northern Cape, South Africa

February 2023

CLIENT

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com

Table of Contents

List of Tables

List of Figures

1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a wetland baseline and risk assessment for the proposed Mulilo Struisbult PV2 and gridline. The proposed project involves the development of a solar facility, located in Copperton in the Northern Cape of South Africa (Figure 1-1**Error! Reference source not found.**). The Project Area of Influence (PAOI) is the assessment area applicable to the project and is given by the proposed area together with the regulated 500 m area around the proposed development boundaries (Figure 1-2).

The approach was informed by the Environmental Impact Assessment Regulations. 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices 320 (20 March 2020) in terms of NEMA, dated 20 March: "*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation*" (Reporting Criteria).

This assessment has been completed in accordance with the requirements of the published General Notice (GN) 509 by the Department of Water and Sanitation (DWS). This notice was published in the Government Gazette (no. 40229) under Section 39 of the National Water Act (Act no. 36 of 1998) in August 2016, for a Water Use Licence (WUL) in terms of Section 21(c) & (i) water uses. The GN 509 process provides an allowance to apply for a WUL for Section 21(c) & (i) under a General Authorisation (GA), as opposed to a full Water Use Licence Application (WULA). A water use (or potential) qualifies for a GA under GN 509 when the proposed water use/activity is subjected to analysis using the DWS Risk Assessment Matrix (RAM). This assessment will implement the RAM and provide a specialist opinion on the appropriate water use authorisation.

This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

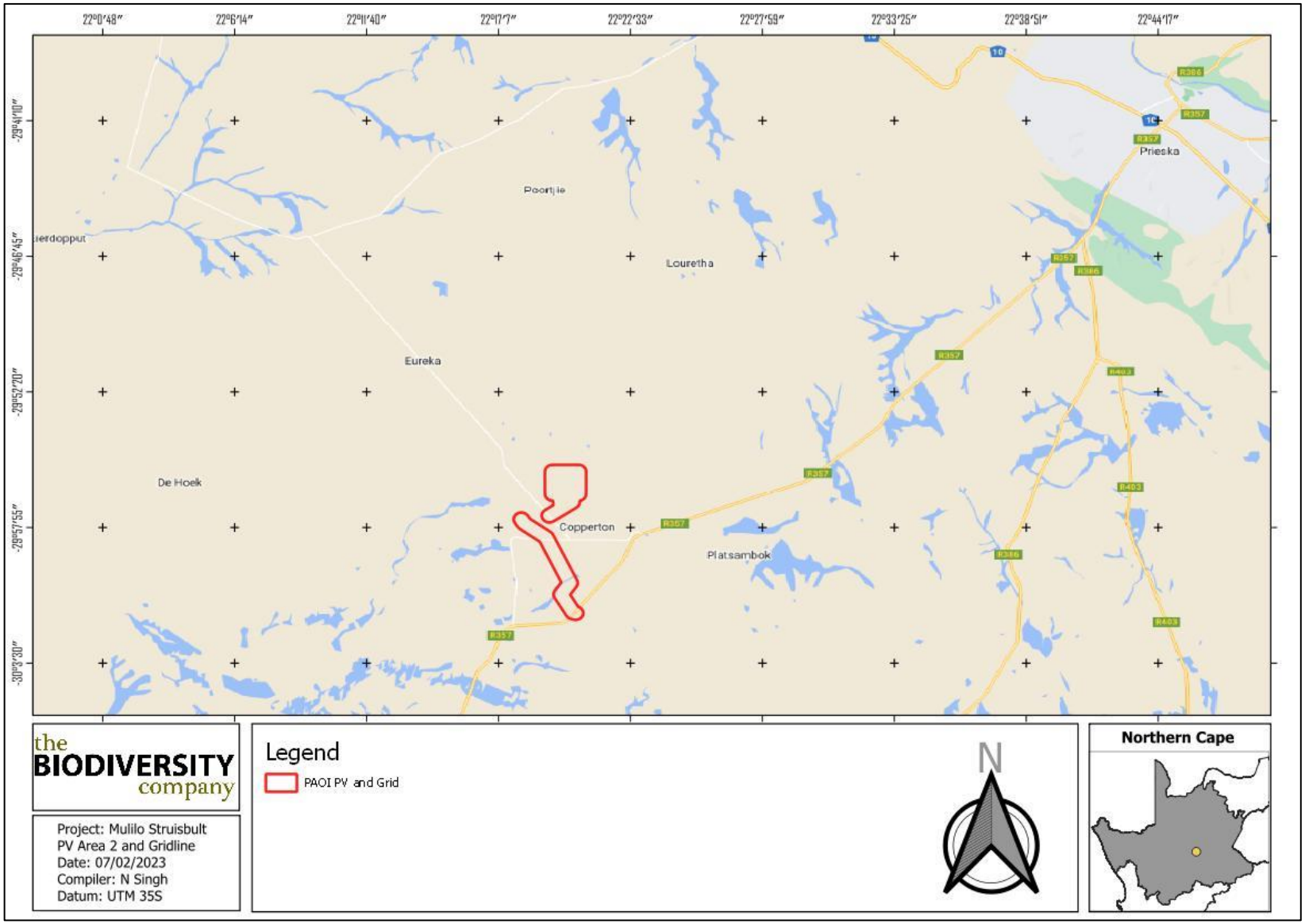

Figure 1-1 Map illustrating the location of the project

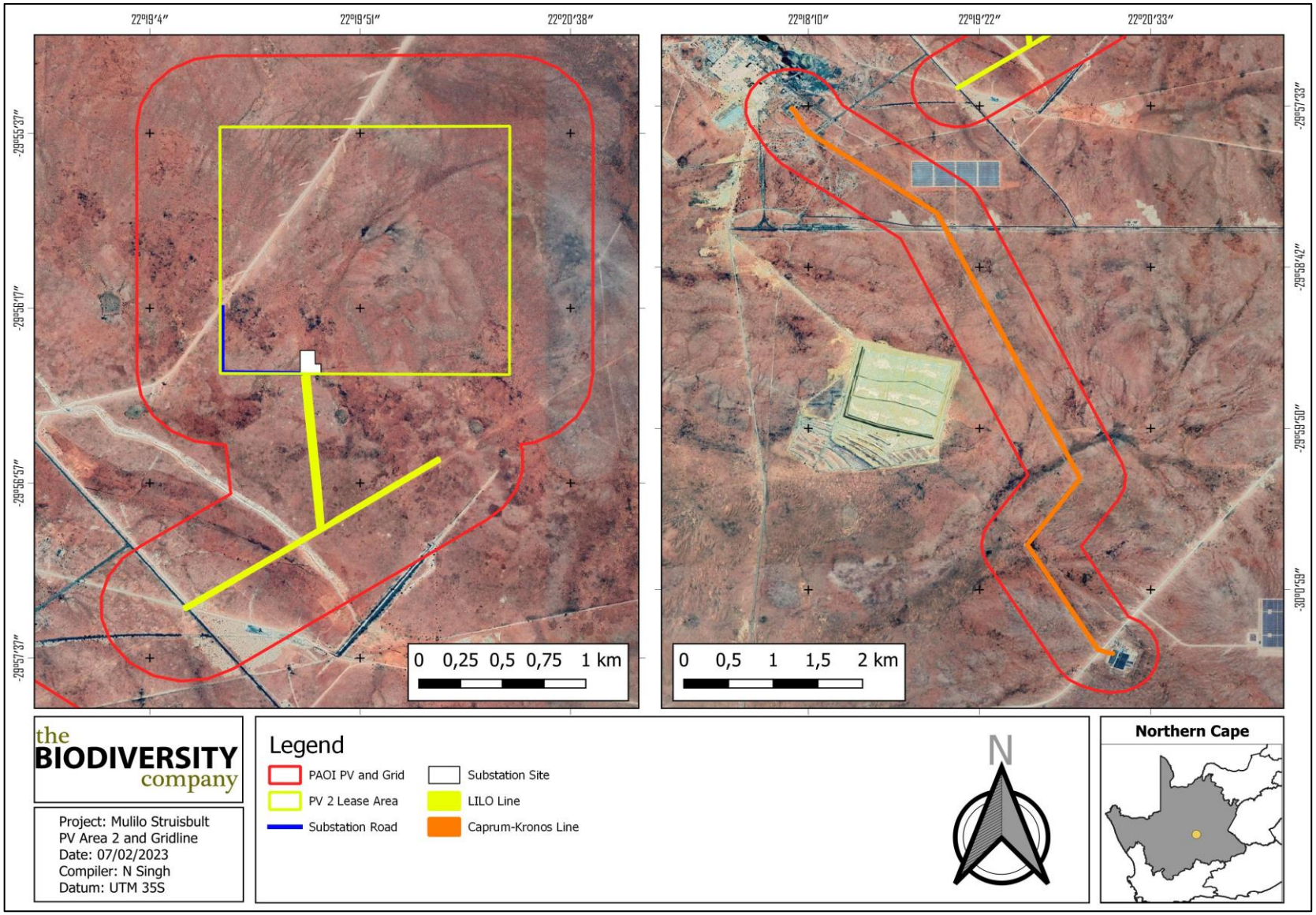

Figure 1-2 Map illustrating the Project Area of Influence

1.2 Specialist Details

Report Name	**Wetland Baseline & Risk Assessment for the Proposed Mulilo Struisbult PV2 and Gridline Project**
Reference	**Mulilo Struisbult PV2 and Gridline**
Submitted to	EIMS Environmental Impact Management Services
Report Writer & Fieldwork	**Namitha Singh**  Namitha Singh is a wetland consultant with experience in wetland assessments, coastal geomorphology and estuary management. She possesses a BSc. Honours in Environmental Science and has worked on projects related to residential developments, infrastructural developments, sand mining and general natural resource management.
Reviewer	**Andrew Husted**  Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 13 years' experience in the environmental consulting field.
Declaration	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

1.3 Terms of Reference

The following tasks were completed in fulfilment of the terms of reference for this assessment:

- The delineation, classification and assessment of wetlands within 500 m of the project area;
- Conduct risk assessments relevant to the proposed activity;
- Recommendations relevant to associated impacts; and
- Report compilation detailing the baseline findings.

1.4 Key Legislative Requirements

1.4.1 National Water Act (NWA, 1998)

The DWS is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, estuaries, or aquifers. The National Water Act (Act No. 36 of 1998) (NWA) allows for the protection of water resources, which includes:

- The maintenance of the quality of the water resource to the extent that the water resources may be used in an ecologically sustainable way;
- The prevention of the degradation of the water resource; and
- The rehabilitation of the water resource.

A watercourse means;

- A river or spring;
- A natural channel in which water flows regularly or intermittently;

- A wetland, lake or dam into which, or from which, water flows; and
- Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

The NWA recognises that the entire ecosystem and not just the water itself, and any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the DWS. Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) and (i).

1.4.2 National Environmental Management Act (NEMA, 1998)

The National Environmental Management Act (NEMA) (Act 107 of 1998) and the associated Regulations as amended in April 2017, states that prior to any development taking place within a wetland or riparian area, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment Report (BAR) process or the Environmental Impact Assessment (EIA) process depending on the scale of the impact.

2 Methods

A single wetland site visit was conducted from the 31st of January to the 2nd of February 2023, constituting a wet season survey.

2.1 Identification and Mapping

The wetland areas were delineated in accordance with the DWAF (2005) guidelines, a cross section is presented in Figure 2-1. The outer edges of the wetland areas were identified by considering the following four specific indicators:

- The Terrain Unit Indicator helps to identify those parts of the landscape where wetlands are more likely to occur;
- The Soil Form Indicator identifies the soil forms, as defined by the Soil Classification Working Group (1991), which are associated with prolonged and frequent saturation.
    - The soil forms (types of soil) found in the landscape were identified using the South African soil classification system namely; Soil Classification: A Taxonomic System for South Africa (Soil Classification Working Group, 1991);
- The Soil Wetness Indicator identifies the morphological "signatures" developed in the soil profile as a result of prolonged and frequent saturation; and
- The Vegetation Indicator identifies hydrophilic vegetation associated with frequently saturated soils.

Vegetation is used as the primary wetland indicator. However, in practise the soil wetness indicator tends to be the most important, and the other three indicators are used in a confirmatory role.

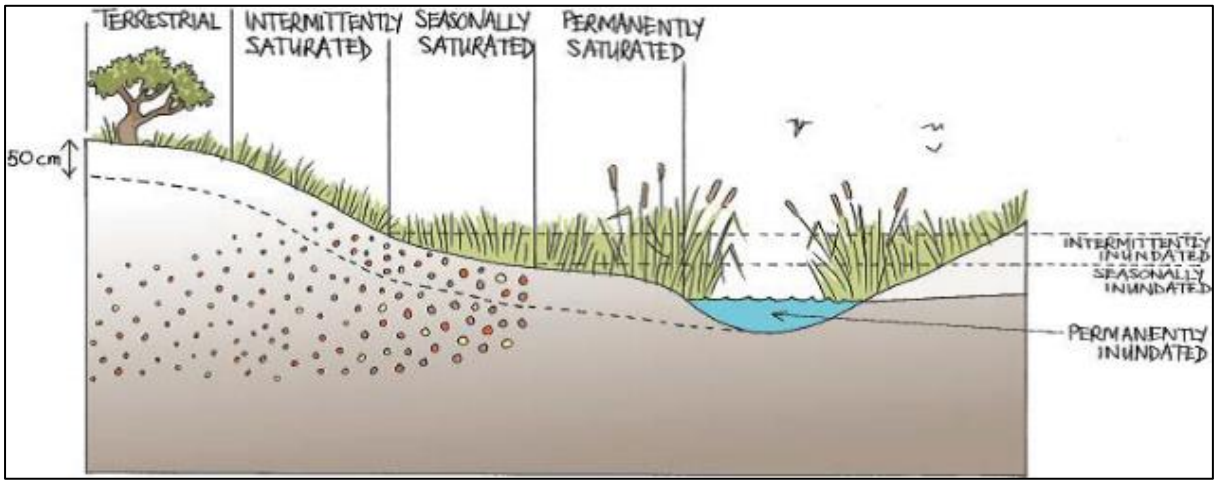

Figure 2-1 Cross section through a wetland, indicating how the soil wetness and vegetation indicators change (Ollis et al. 2013)

2.2 Delineation

The wetland indicators described above are used to determine the boundaries of the wetlands within the project area. These delineations are then illustrated by means of maps accompanied by descriptions.

2.3 Functional Assessment

Wetland Functionality refers to the ability of wetlands to provide healthy conditions for the wide variety of organisms found in wetlands as well as humans. Eco Services serves as the main factor contributing to wetland functionality.

The assessment of the ecosystem services supplied by the identified wetlands was conducted per the guidelines as described in WET-EcoServices (Kotze *et al*. 2008). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the services are provided (Table 2-1).

Table 2-1 Classes for determining the likely extent to which a benefit is being supplied

Score	Rating of likely extent to which a benefit is being supplied
< 0.5	Low
0.6 - 1.2	Moderately Low
1.3 - 2.0	Intermediate
2.1 - 3.0	Moderately High
> 3.0	High

2.4 Present Ecological Status

The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact. The Present State categories are provided in Table 2-2.

Table 2-2 The Present Ecological Status categories (Macfarlane, et al., 2008)

Impact Category	Description	Impact Score Range	PES
None	Unmodified, natural	0 to 0.9	A
Small	Largely Natural with few modifications. A slight change in ecosystem processes is discernible and a small loss of natural habitats and biota may have taken place.	1.0 to 1.9	B
Moderate	Moderately Modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.	2.0 to 3.9	C
Large	Largely Modified. A large change in ecosystem processes and loss of natural habitat and biota has occurred.	4.0 to 5.9	D
Serious	Seriously Modified. The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.	6.0 to 7.9	E
Critical	Critical Modification. The modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	8.0 to 10	F

2.5 Importance and Sensitivity

The importance and sensitivity of water resources are determined to establish resources that provide higher than average ecosystem services, biodiversity support functions or are particularly sensitive to impacts. The mean of the determinants is used to assign the Importance and Sensitivity (IS) category as listed in Table 2-3.

Table 2-3 Description of Importance and Sensitivity categories

IS Category	Range of Mean	Recommended Ecological Management Class
Very High	3.1 to 4.0	**A**
High	2.1 to 3.0	**B**
Moderate	1.1 to 2.0	**C**
Low Marginal	< 1.0	**D**

2.6 Ecological Classification and Description

The National Wetland Classification Systems (NWCS) developed by the South African National Biodiversity Institute (SANBI) will be considered for this study. This system comprises a hierarchical classification process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels, and then also includes structural features at the lower levels of classification (Ollis *et al.,* 2013).

2.7 Buffer Requirements

The "Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries" (Macfarlane *et al.,* 2014) was used to determine the appropriate buffer zone for the proposed activity.

2.8 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The focus area was based on the spatial files provided by the client and any alterations to the area and/or missing GIS information would have affected the area surveyed;
- Only the layout of the proposed development was provided to the specialist; and
- No natural wet areas / wetlands have been found within the project area of influence, consequently no functional or risk assessment has been conducted for the project.

3 Results and Discussion

3.1 Desktop Baseline

3.1.1 Project Area

The proposed project is located west of the R357 in the Copperton area of the Northern Cape. The site is approximately 60 km southwest of the town Prieska and approximately 70 km northeast of Vanwyksvlei. Presently, the proposed area is surrounded by wind, solar and mining developments, with large spans of undeveloped land. Furthermore, the project area is located in the D54D quaternary catchment falling within the Orange River water management area.

3.1.2 Vegetation Type

The PAOI is characterised by two vegetation regions in the Northern Cape namely, the Bushmanland Arid Grassland (NKb3) and the Bushmanland Basin Shrubland (Nkb6) (Mucina, and Rutherford, 2010). The latter is the dominant type within the PAOI, with the Arid Grassland occurring only in the northern sections of the PV area and its respective regulated area.

The Bushmanland Basin Shrubland is centred on the Brandvlei and Van Wyksvlei areas, spanning to Granaatsboskolk in the west and Copperton in the east. The northern and southern boundaries are given by Kenhardt and Williston respectively. The common vegetation features consist of dwarf shrubland dominated by low, sturdy, spiny and sometimes succulent shrubs from the *Rhigozum*, *Salsola*, *Pentzia* and *Eriocephalus* genus's and, grasses from the *Stipagrostis genus* (Mucina, and Rutherford, 2010).

The Bushmanland Basin Shrubland is least threatened with a conservation target of 21%. None of the unit is conserved formally and there no signs of serious transformations. However, there is moderate erosion and scattered individuals of the alien species from the *Prospis* genus which can cause dense infestations (Mucina, and Rutherford, 2010).

The Bushmanland Arid Grassland vegetation type spans from Aggeneys in the west to Prieska in the east. The southern edges are formed by Bushmanland Basin vegetation whilst the north-western edges border dessert vegetation. Near Upington and between Upington and Prieska, there is intermingling units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland and Gordonia Duneveld. Overall, the

area consists of sparsely vegetated grassland dominated by white grasses (*Stipagrostis* species) and low shrubs (*Salsola* species). Annual herbs are common in years of abundant precipitation (Mucina, and Rutherford, 2010).

This vegetation type is least threatened with a 21% target. Small patches are conserved in the Augrabies Falls National Park and Goegab Nature Reserve. Little transformation has occurred within the broader vegetation region which is also considered to have significantly low erosion (Mucina, and Rutherford, 2010).

3.1.3 Soils and Geology

According to the land type database (Land Type Survey Staff, 1972 - 2006), the project area is characterised by the Ah93 Ag154 and land types, with the Ah93 being the dominant type. The Ah93 land type is characterised by Glenrosa and/or Mispah soil forms comprising of shallow soils with an expected presence of lime, red-yellow apedal soils to a lesser extent, and a high salt content. Majority of the soils within the Ag154 land type are shallow red-yellow freely drained apedals with a high base status.

The geology of the area consists of mudstones and shales of the Ecca Group (Prince Albert and Volksrust Formations) and, Dwyka tillites of the early Karoo age. Furthermore, recent quaternary alluvium and calcrete are expected with superficial deposits of the Kalahari Group in the east. Additionally, palaeozoic diamictites of the Dwyka Group and, gneisses and metasediments of Mokolian Age are also present (Mucina, and Rutherford, 2010)

3.1.4 Climate

The project area is characterised by two climatic regions described below however, the general and overall climatic conditions experienced throughout the PAOI will be similar as described below.

The Bushmanland Arid Grassland is characterised by summer rainfall with an overall mean annual precipitation ranging between 70mm in the west to 200mm in the east (Mucina & Rutherford, 2006). Whereas the Bushmanland Basin Shrubland has an overall mean annual precipitation ranging between 100mm to 200mm. Temperature extremes are common with temperatures ranging between the 35 and 40 degrees centigrade during summer and, temperatures expected to dip below 0 degrees centigrade during winter.

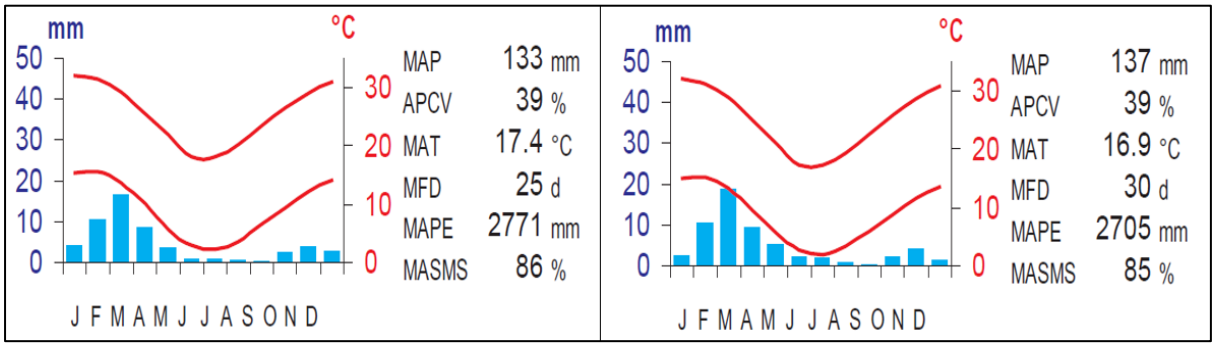

Figure 3-1 Climate for the Bushmanland Arid Grassland (left) and Bushmanland Basin Shrubland (right) vegetation types

3.1.5 South African Inventory of Inland Aquatic Ecosystems

This spatial dataset is part of the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) which was released as part of the National Biodiversity Assessment (NBA 2018). National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE, 2018).

As illustrated in Figure 3-2, three SAIIAE wetlands were identified within the PAOI. Two of these were classified as depression wetlands and one was classified as a river system. The first depression is located in the POAI, south-east of the proposed PV2 Area, whilst the second one is located in the eastern POAI of the Caprum-Kronos Line and, the river system is intersected by the Caprum-Kronos Line.

3.1.6 NFEPA Wetlands

The National Freshwater Ecosystem Priority Areas (NFEPA) dataset is a collaborative project of the South African National Biodiversity Institute (SANBI) and the Council for Scientific Industrial Research (CSIR). The NFEPA dataset encompasses wetland areas on a national scale, derived from remotely sensed imagery and various other datasets like; national land cover and SANBI's Wetland Map 1. The purpose of the dataset was to map the locality of wetland areas enabling the identification of wetlands with a conservation significance.

Two NFEPA wetlands were identified by means of this dataset (Figure 3-2). The wetlands were classified as depressions and wetland flats. The depression wetland occupies the same spatial location as the SAIIAE wetland located south-east of the proposed PV2 area, whilst the wetland flat is located at the southern end of the Caprum-Kronos Line.

3.1.7 Topographical Inland Water and River Lines

The topographical inland and river line data for "2922" and "3022" quarter degree squares was used to identify potential wetland areas within the PAOI. This dataset indicates that there are two topographical river lines and two inland water areas located within the PAOI (Figure 3-3). Both topographical river lines are classified as non-perennial center lines, the first located within the proposed PV2 area orientated in a north-east south-west direction and, the second having a corresponding location as the SAIIAE river. The inland water areas were classified as one dry pan and one non-perennial pan, both occupying the same spatial location as the SAIIAE depression wetlands listed above.

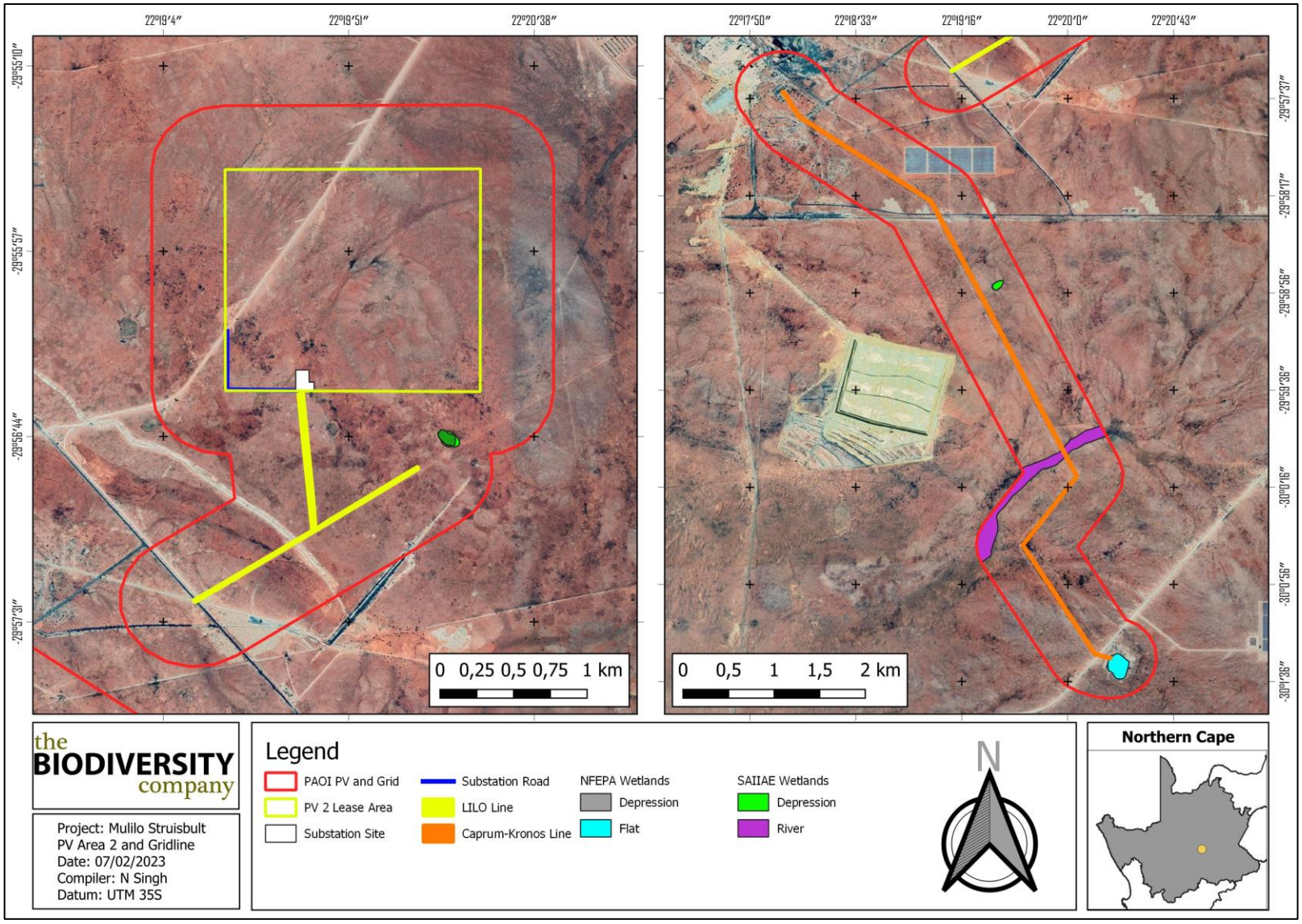

Figure 3-2 NFEPA and SAIIAE Wetlands located within the PAOI

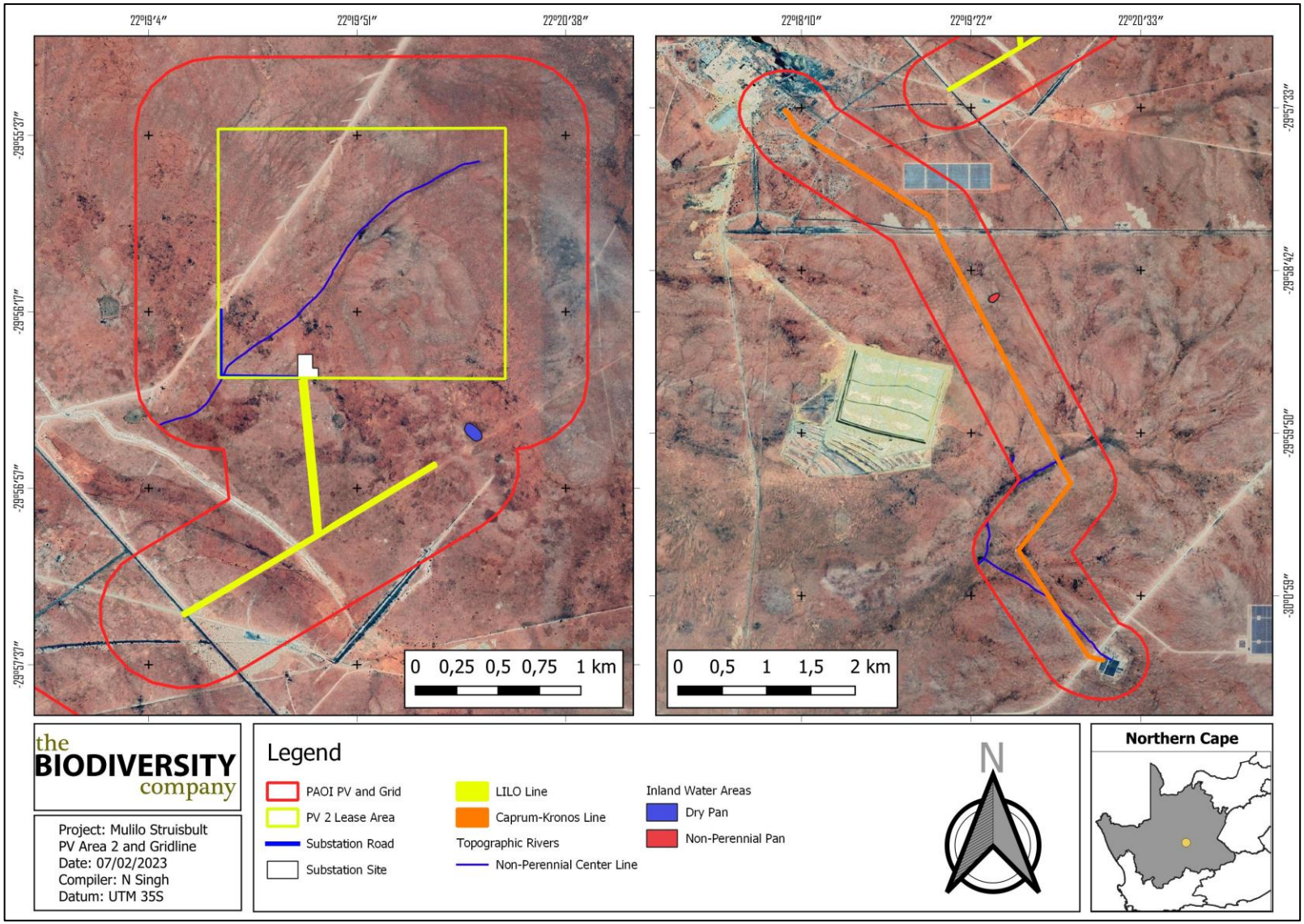

Figure 3-3 Topographical River Lines and Inland Water Areas for the PAOI

3.1.8 Terrain

The terrain of the 500 m regulated area has been analysed to determine potential areas where wetlands are more likely to accumulate (due to convex topographical features, preferential pathways, or more gentle slopes).

3.1.9 Digital Elevation Model (DEM)

A Digital Elevation Model (DEM) has been created to identify lower laying regions as well as potential convex topographical features which could point towards preferential flow paths. The 500 m regulated area ranges from 1 063 to 1 112 metres above sea level (MASL). The lower laying areas (generally represented in dark blue) represent the area that will have the highest potential to be characterised as wetlands (Figure 3-4).

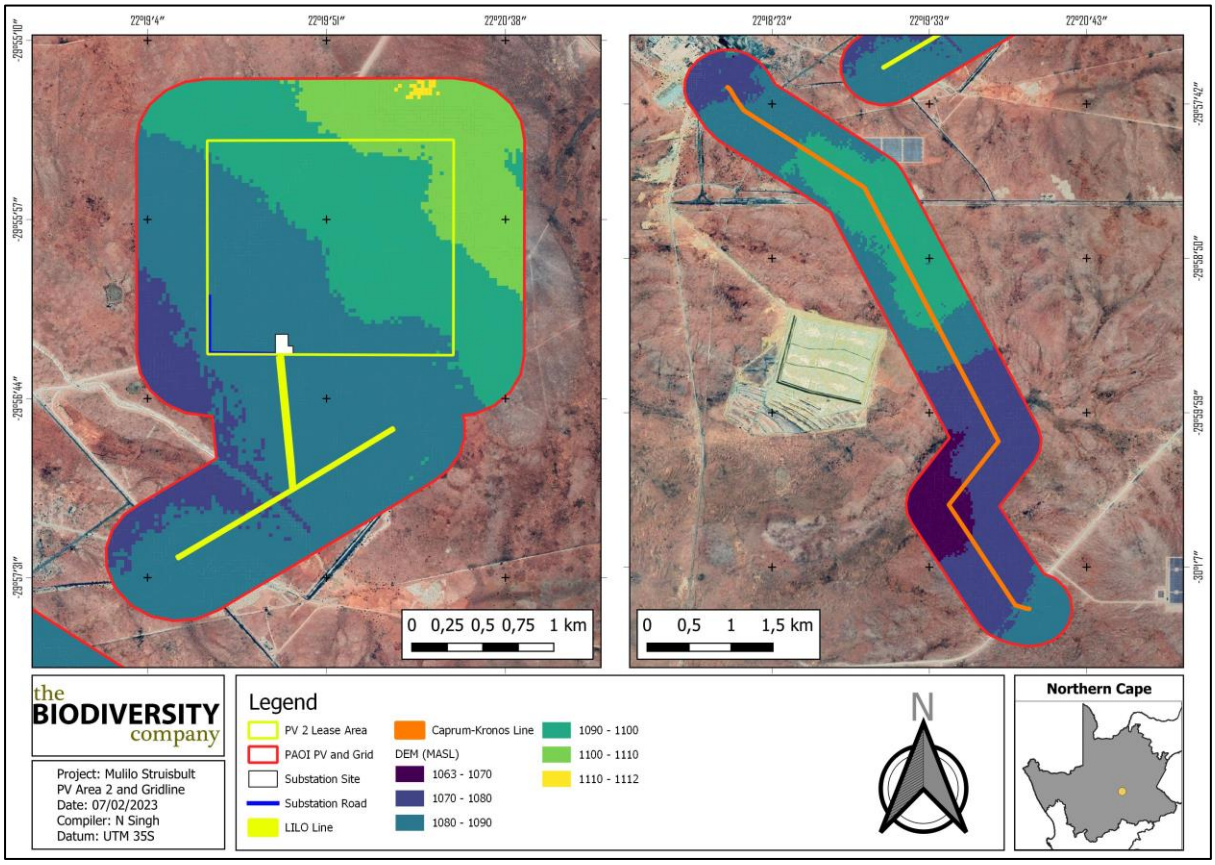

Figure 3-4 DEM for the Project Area

4 Field Assessment

4.1 Delineation and Description

Three shallow depression features were identified within the PAOI (Figure 4-1). Although, no evidence of hydrophytic vegetation and hydromorphic soils were found within these features (Figure 4-2). Furthermore, the drainage features identified in the desktop assessment (Figure 3-3) are likely to be of a historical nature and do not presently display any distinct flow paths, riparian, or wetland characteristics (Figure 4-2).

Whilst these three depression features do not qualify as wetlands, they are still considered an important aspect of the broader ecosystem attributed to temporarily providing a water source for animals in a water scarce biome. These features are not intersected by the proposed development and are located a sufficient distance away from the proposed layout however, it is still necessary for the development to take cognisance of their location as a precautionary measure to prevent adverse impacts (eg., infilling, dumping and, littering) to them. Additionally, the development should take cognisance of the location of non-perennial drainage features as a precaution to prevent damage to the development infrastructure in the low likelihood event that these systems do flow in periods of exceptionally high precipitation.

The project area was characterised by Mispah and Glenrosa soil forms, with other associated soils also occurring in the assessment footprint area. The Mispah soil form typically consists of an orthic A horizon overlaying hard rock substratum. Whilst the Glenrosa soil form consists of an orthic A horizon overlaying a lithic B horizon. Both of these forms have shallow free-draining soils that are not typically found in wetlands as they do not have a high water retention capacity attributed to their low clay and fine sand textural properties.

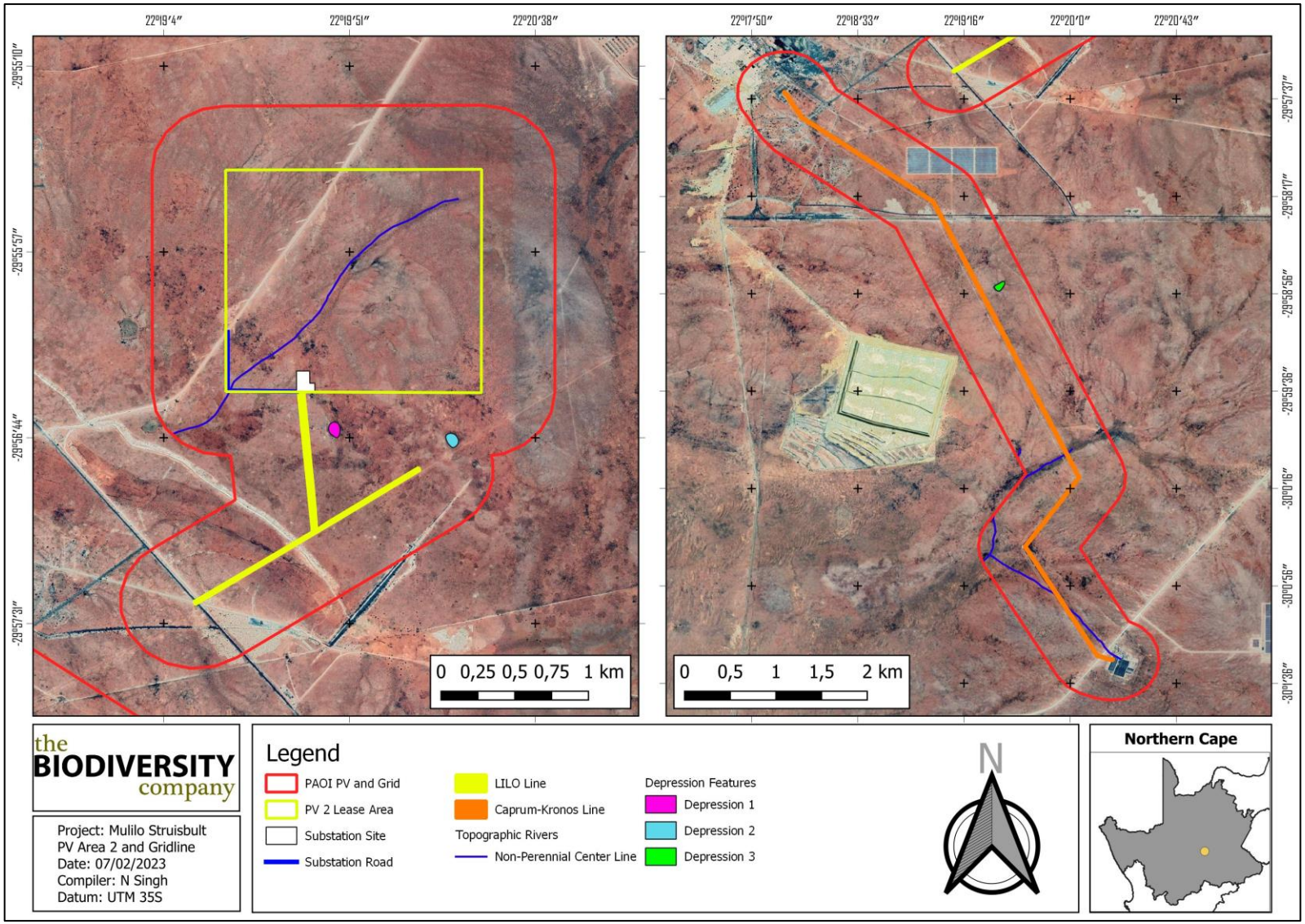

Figure 4-1 Depression features identified within the POAI

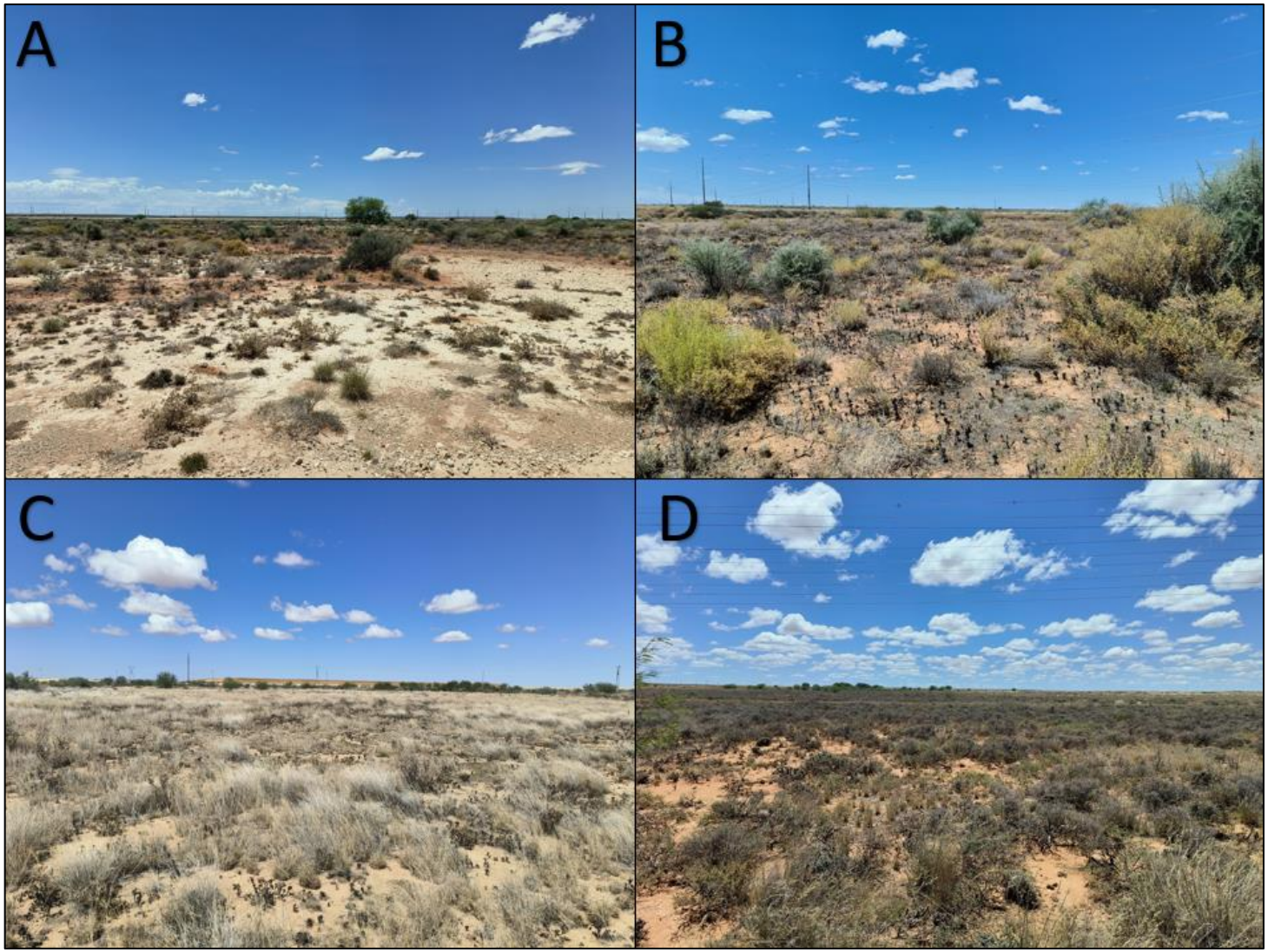

Figure 4-2 Photographs of the Depression features (A, B & C) and Non-perennial drainage area (D)

5 Conclusion and Recommendation

5.1 Baseline Ecology

During the site assessment, no wetlands were found within the project area of influence. The project area was characterised by Mispah and Glenrosa soil forms which are not typically found within wetland areas.

It is suggested that the three depression features identified should be demarcated and avoided for their functional capability of providing wildlife with water following high rainfall events.

5.2 Specialist Recommendation

During the assessment no wetlands were found within the project area of influence. Based on this, no Section 21 (c) and (i) water uses are required to be authorised for this project.

6 References

Department of Water Affairs and Forestry (DWAF). 2005a. A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas.

Department of Water and Sanitation (DWS). 2005b. River Ecoclassification: Manual for Ecostatus Determination. First Draft for Training Purposes. Department of Water Affairs and Forestry.

Department of Water and Sanitation (DWS). 2020. A Desktop Assessment of the Present Ecological State, Ecological Importance and Ecological Sensitivity per Sub Quaternary Reaches for Secondary Catchments in South Africa. Draft. Compiled by RQS-RDM.

Kotze, D.C., Marneweck, G.C., Batchelor, A.L., Lindley, D.C., and Collins, N.B. 2009. A Technique for rapidly assessing ecosystem services supplied by wetlands, Mondi Wetland Project.

Macfarlane, D.M., Bredin, I.P., Adams, J.B., Zungu, M.M., Bate, G.C. and Dickens, C.W.S. 2014. Preliminary guideline for the determination of buffer zones for rivers, wetlands and estuaries. Final Consolidated Report. WRC Report No TT 610/14, Water Research Commission, Pretoria.

Macfarlane, D.M., Kotze, D.C., Ellery, W.N., Walters, D., Koopman, V., Goodman, P. and Goge, C. 2007. A technique for rapidly assessing wetland health: WET-Health. WRC Report TT 340/08.

Mucina, L. and Rutherford, M.C., 2010. The vegetation of South Africa, Lesotho and Swaziland.

Nel J.L. and Driver A. 2012. South African National Biodiversity Assessment 2011: Technical Report. Volume 2: Freshwater Component. CSIR Report Number CSIR/NRE/ECO/IR/2012/0022/A, Council for Scientific and Industrial Research, Stellenbosch.

Nel JL, Murray KM, Maherry AM, Petersen CP, Roux DJ, Driver A, Hill L, Van Deventer H, Funke N, Swartz ER, Smith-Adao LB, Mbona N, Downsborough L and Nienaber S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

Ollis DJ, Snaddon CD, Job NM, and Mbona N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African Biodiversity Institute, Pretoria.

SANBI. 2009. Further Development of a Proposed National Wetland Classification System for South Africa. Primary Project Report. Prepared by the Freshwater Consulting Group (FCG) for the South African National Biodiversity Institute (SANBI).