Appendix G.2

TERRESTRIAL AND AQUATIC ASSESSMENT

R Bay Properties (Pty) Ltd

TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT

Including Plant and Animal Species

DC22/0002/2023: KZN/EIA/0001867/2023
JUNE 2023

PUBLIC

R Bay Properties (Pty) Ltd

TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT

Including Plant and Animal Species

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 41103633

OUR REF. NO. DC22/0002/2023: KZN/EIA/0001867/2023

DATE: JUNE 2023

R Bay Properties (Pty) Ltd

TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT

Including Plant and Animal Species

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft Terrestrial Assessment			
Date	06 June 2023			
Prepared by	Aisling Dower			
Signature				
Checked by	Anri Scheepers			
Signature	 Scheepers, Anri (ZAAS02690) 2023.06.12 08:22:02 +02'00'			
Authorised by	Anri Scheepers			
Signature	 Scheepers, Anri (ZAAS02690) 2023.06.12 08:22:44 +02'00'			
Project number	41103633			
Report number	1			
File reference	\\corp.pbwan.net\za\Central_Data\Projects\41100xxx\41103633 - Richbay Warehouse PMB\41 Biodiversity\01-Reports\01-Draft\Terrestrial			

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1 INTRODUCTION

R-Bay Properties (Pty) Ltd (R-Bay), a subsidiary of the Richbay Group of Companies (Richbay) proposes to construct a chemical warehouse for the storage of dangerous goods with a capacity of approximately 2 000 m^3. The warehouse will be designed as a purpose-built chemical warehousing structure, situated in Pietermaritzburg, KwaZulu Natal .

WSP Group Africa (Pty) Ltd (WSP) was appointed in the role of Independent Environmental Assessment Practitioner (EAP) to undertake the S&EIR processes for the development of the Project, including the necessary terrestrial ecology surveys and impact assessment reports, in support of the environmental regulatory process.

1.1 PURPOSE OF THE REPORT

This report summarises the baseline terrestrial biodiversity and ecosystems of the area that could be impacted by the proposed chemical warehousing infrastructure, and documents the assessment of the potential impacts of the proposed Project on terrestrial ecosystems and biodiversity, i.e. terrestrial vegetation communities, flora and fauna species.

The report also summarises the recommended measures for the mitigation of any negative impacts for inclusion in the updated EMPr for the Project, to ensure that the relevant South African biodiversity legislative and policy requirements are satisfactorily met; and proposes additional measures as required.

1.2 PROJECT LOCATION AND EXTENT

The Project will entail the clearance of vegetation for the development of warehousing on a site of 9955 m^2, in Shortts Retreat (Mkondeni), Pietermaritzburg (Appendix B, Figure B-1). The warehousing will be used as an importation hub where chemicals (already packed and palletized) will be offload from shipping containers, and stored, prior to dispatch to Richbay facilities throughout Southern Africa. The proposed site is adjacent to one of the existing Richbay production facilities, and is required in the immediate vicinity to alleviate space constraints at the existing Richbay Pietermaritzburg site. The space constraints have been negatively affected by the increase in shipping challenges through the Durban Port. In addition, processed chemicals (already packed and palletized) will be stored prior to dispatch for international distribution. No processing or decanting will take place in the warehouse/s.

The chemicals that will be stored at the warehouse/s will include:

- Hydrochloric Acid.
- Acetic Acid.
- Sodium Hypochlorite.
- Sulphuric Acid.
- Caustic Soda (Solid).
- Caustic Soda Liquid.
- Phosphoric Acid.
- Nitric Acid.
- Sodium Metabisulphite (Solid).
- Formaldehyde.

- Ammonium 25%.
- Sodium Chlorite 25-31%.

1.3 STUDY AREA

The study area for the Project was defined as the proposed development footprint plus all areas encompassed by the project site boundary, within which direct and indirect impacts on terrestrial and biodiversity receptors (i.e. direct habitat loss, fauna disturbance/mortality) could occur (Figure B-1).

1.4 TERMS OF REFERENCE

The terms of reference for the terrestrial ecology assessment set out in the scoping report include the following: A detailed terrestrial ecology assessment will be carried out in the EIA phase and will include the following:

- Confirmation of sensitivities and buffers.
- A comprehensive site visit and field assessment in order to characterise the vegetation and plant communities present at the site in greater detail. This includes habitat mapping, developing species lists and descriptions of the typical and dominant species within the site and the potential impact of the development on these habitats and plant communities.
- Identification and quantification of the abundance and distribution of species of conservation concern within the site and especially within the development footprint.
- Evaluate the possible impact of the development on landscape connectivity in the field based on the likely use of the area as a corridor for movement by fauna as well as any local impacts on faunal communities. This should include the identification of any corridors that should be kept clear of development at the site and any buffers required around such features.
- Identify sensitive faunal habitats that should be avoided and measures that should be implemented to reduce impacts on fauna in general.
- Consider the potential impact of the development on CBAs and broad-scale ecological processes at the site. This should consider the habitats affected by the current development as well as the overall impact of development in the area at a broader scale.
- Evaluate, based on the site attributes, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.
- Assess the impacts identified above in light of the site-specific findings and the layout to be provided by the developer.

2 APPLICABLE LEGISLATION, POLICY AND STANDARDS

Applicable national and provincial legislation, associated regulations and policies that are pertinent to biodiversity, which were used to guide the EIA, include:

- National Environmental Management Act (NEMA) (Act No. 107 of 1998) including Section 24, concerning Procedures for the assessment and minimum criteria for reporting on identified themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, when applying for environmental authorisation;
- Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity;
- Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity;
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), specifically:
- ToPS – National lists of critically endangered, endangered, vulnerable and protected species (2007);
- National list of threatened terrestrial ecosystems for South Africa (2011) (NEMBA Threatened Ecosystems, 2011);
- National list of alien and invasive species (2016);
- Environment Conservation Act (Act No. 73 of 1989), specifically the Lists of declared weeds and invader plants (CARA, 1983);
- National Water Act (Act No. 36 of 1998);
- KwaZulu Natal Nature Conservation Management Act (Act No. 9 of 1997);
- Natal Nature Conservation Ordinance (Act No. 15 of 1974);
- KwaZulu Natal Biodiversity Sector Plan (2016); and
- National Protected Area Expansion Strategy (2016).

Recent, relevant South African national policies and guidance were also taken into consideration, in the development of the baseline description and impact assessment process, including:

- Draft National Biodiversity Offset Policy (2017);
- Draft National Biodiversity Offset Guideline (2022); and
- Species Environmental Assessment Guideline (SANBI, 2020).

3 METHODOLOGY

The terrestrial biodiversity baseline description and impact assessment took cognisance of Government Notice No. 320, published in 2020 under the National Environmental Management Act (1998) concerning 'Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Theme in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (1998), when applying for Environmental Authorisation'.

In line with the assessment and reporting requirements set out in the protocol, this assessment included two main study components; a desktop literature review, supplemented by information gathered during a terrestrial ecology field inspection conducted in December 2021.

3.1 LITERATURE REVIEW

The aim of the desktop literature review component was to collate and review available ecological information related important biodiversity and ecosystem features in Project region, including presence of protected areas or important conservation areas, key ecological processes and functions, and the likely composition and structure of local flora and fauna communities.

Other existing available datasets that were reviewed and consolidated to assess terrestrial ecosystems and associated fauna, flora and vegetation include:

- A general vegetation type description relevant to the broader study area was obtained from Mucina and Rutherford (2011);
- The formal conservation context of the region at a provincial and national level was established based on the KwaZulu Natal Biodiversity Sector Plan (2016), the National List of Threatened Ecosystems (NEMBA Threatened Ecosystems, 2011), the South African Protected Areas Database (SAPAD), the South African Conservation Areas Database (SACAD) and the national protected area expansion strategy; and
- A preliminary review of land cover and habitat types was undertaken at a desktop level using available satellite imagery and GeoTerraImage national land cover classifications (2020).

3.2 SITE SENSITIVITY VERIFICATION

A desktop analysis of available satellite imagery, biodiversity datasets and published literature was conducted to confirm the indicated sensitivity of the site under consideration (i.e. the proposed development footprint), to determine the need for full Terrestrial and/or Aquatic Biodiversity Specialist Assessments. The desktop assessment of site sensitivity was supplemented by data gathered during initial site visits. The objectives of the site sensitivity verification phase was to:

- Assess the suitability of the study area for the support of flora, invertebrate and other fauna species of conservation concern with potential to occur within the proposed infrastructure footprint and surrounds, to scope the appropriate level of effort for the baseline assessments;
- Identify priority areas for botanical survey during flowering season;
- Confirm the various levels of sensitivity ascribed for the LSA by the DFFE National Screening Tool report.

3.3 SITE VISIT

A single-day site visit was conducted in December 2021. The field visit focused on remaining semi-natural habitat patches within the proposed development footprints. The following aspects were considered:

- General characteristics of development footprint and immediately adjacent areas with regard to land cover and vegetation communities;
- General habitat characteristics and condition of natural/semi-natural land within the development footprint, including floral composition, presence of disturbances (incl. alien invasive species establishment) and presence of potential important/sensitive species and sites; and
- Assessment of the suitability of habitats in the LSA to support flora/fauna species of concern with potential to occur in the area.

3.4 ASSESSMENT OF SITE ECOLOGICAL IMPORTANCE

The ecological importance (sensitivity) of vegetation communities and habitats was determined using the protocol for evaluating site ecological importance (SEI) as published in SANBI's Species Assessment Guideline (SANBI, 2020). SEI is considered to be a function of the biodiversity importance (BI) of a receptor and its resilience to impacts (receptor resilience, RR):

$$SEI = BI + RR.$$

Biodiversity importance is a function of conservation importance (CI) and the functional integrity (FI) of the receptor:

$$BI = CI + FI$$

- Conservation Importance is defined as "the importance of a site for supporting biodiversity features of conservation concern, e.g., populations of IUCN threatened and Near-Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystem types, through predominantly natural processes" (SANBI, 2020).
- Functional Integrity is defined as "A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts" (SANBI, 2020).
- Receptor Resilience is defined as "the intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention" (SANBI, 2020).

Further details of the sensitivity tables and ratings are provided in Appendix A.

The various categories of SEI and linked mitigation requirements are described in Table 3-1 overleaf.

Table 3-1 – SEI and required mitigation

Site Ecological Importance	Required mitigation
Very high	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable, followed by appropriate restoration activities.
Very low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

3.5 IMPACT ASSESSMENT

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

[1] Impacts that arise directly from activities that form an integral part of the Project.
[2] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[3] Secondary or induced impacts caused by a change in the Project environment.
[4] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] presented in Table 3-2.

Table 3-2 - Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

[5] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

Environmental Significance Rating (Positive (+))	Very low	Low	Moderate	High	Very High

IMPACT MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan. The mitigation sequence/hierarchy is shown in **Figure 1** below.

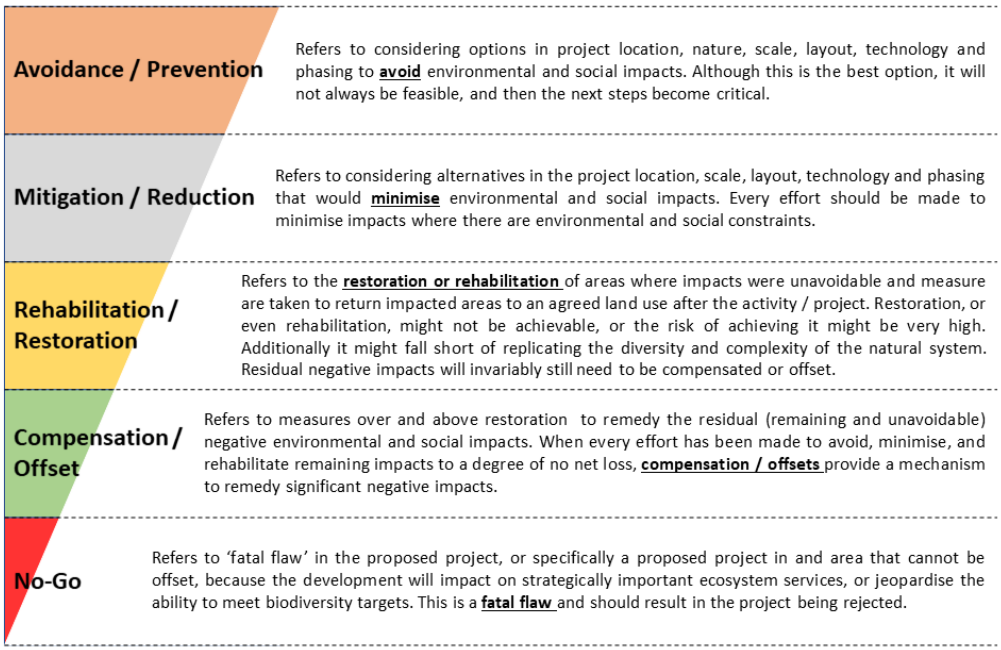

Figure 1: Mitigation Sequence/Hierarchy

3.6 STUDY ASSUMPTIONS AND LIMITATIONS

DATA USED FOR SPECIALIST ASSESSMENT

The baseline description was based on available national datasets and literature for the region, supplemented by a single site visit conducted during December 2021, which is the optimum timing for the identification of flowering grass and plant species.

It is acknowledged that since the time of survey, much of the LSA has been transformed through dumping of spoil heaps by adjacent development activities/developers.

ASSUMPTIONS, UNCERTAINTIES OR GAPS IN KNOWLEDGE

Dedicated fauna surveys were not conducted, since these were not considered warranted due to the degraded nature of habitats within and surrounding the LSA, which was considered to be of limited importance in terms of support of fauna species. An assessment of the suitability of habitats in the LSA to support faunal species of concern with potential to occur was conducted.

It is possible that certain flora taxa such as short-lived annuals, geophytes, cryptic species or dormant deciduous species, that are most readily visible or distinguishable when in leaf or flower, may have been apparent at different times in the wet/growing season and as such may have been overlooked during field visit.

4 TERRESTRIAL BIODIVERSITY BASELINE

The LSA is situated in an industrial park, characterised by degraded grassland (Figure 4-1) and bounded by industrial development to the north and east, and a tarred road to the west and south. A degraded wetland system occurs further to the west of the tarred road. The LSA has become degraded as a result of overgrazing by cattle, dumping and burning, leaving a remnant patchy cover of disturbed grassland, interspersed by occasional *Acacia* sp. trees and stands of invasive species.

Figure 4-1: Landscape of the proposed development area (March 2022)

4.1 SITE SENSITIVITY VERIFICATION

The proposed infrastructure footprint was assessed using the National Web-based Environmental Screening Tool. The information was verified via literature review, aerial imagery review and the findings of the initial site visits (Table 4-1).

According to the Tool, the Terrestrial Biodiversity Theme for the LSA is rated as 'Very High Sensitivity', due to its overlap with land mapped as Critical Biodiversity Area (CBA) 1, and a Priority Focus Area of the national Protected Areas Expansion Strategy. This was verified via the mapping exercise described in Section 4.2.2 and as such the Very high sensitivity is supported, and this report therefore follows the gazetted protocol for a Terrestrial Biodiversity Specialist Assessment.

The National Web Based Screening Tool indicated that the LSA is considered to be of 'Medium sensitivity' in terms of the Plant Species Theme on account of the potential presence of at least 15 flora species of conservation concern, including *Hermannia sandersonii, Hydrostachys polymorhpa, Asclepias bicuspis, Woodia verruculosa, Cineraria atriplicifolia, Helichrysum pannosum, Disperis woodii* and *Thunbergia venosa*, as well as seven other sensitive species that cannot be named in this report. However, in the context of the degraded nature of the LSA, it was considered that the site is of Low sensitivity in terms of plant SCC support; the information contained in this report is therefore aligned with the requirements for a Plant Species Compliance statement as described in the protocols.

The screening report indicated that the Animal Species Theme for the LSA was rated as 'medium' sensitivity, due to its potential support of animal species including rough-haired golden mole (*Chrysospalax villosus*), tree hyrax (*Dendrohyrax arboreus*), orebi (*Ourebia ourebi ourebi*), an unnamed sensitive species, and Natal hinge-backed tortoise (*Kinxys natalensis*); however, due to the

absence of suitable habitat for these species, it is motivated that the site sensitivity for animal species is Low; and the information on fauna contained in this report is therefore aligned with the requirements for a Animal Species Compliance statement as described in the protocols.

Table 4-1: Verification of biodiversity Sensitivities identified in the screening report

THEME	ASCRIBED SENSITIVITY	SENSITIVE FEATURE / SPECIES	VERIFICATION OUTCOME
Animal Species Theme	Medium	*Chrysospalax villosus*	This species occurs in undisturbed sandy soils in grasslands, meadows and along edges of marshes and as such is unlikely to occur on site
	Medium	*Dendrohyrax arboreus*	Low – this species occurs in forest and thus is unlikely to occur in LSA due to absence of suitable habitat.
	Medium	*Ourebia ourebi ourebi*	Low – this species occurs in savannah woodlands, floodplains and other open grasslands - unlikely to occur in LSA due to absence of suitable habitat.
	Medium	Sensitive species 8	Low – this species occurs mainly within scarp and coastal forests, thickets or dense coastal bush - unlikely to occur in LSA due to absence of suitable habitat.
	Medium	*Kinxys natalensis*	Low – this species cccurs in dry rocky habitat in thornveld, valley bushveld, dry thicket or bushveld savanna - unlikely to occur in LSA due to absence of suitable habitat.
Aquatic Biodiversity Theme	Low	n/a	Low
Plant Species Theme	Medium	15 medium sensitivity plant species	Low – none of the potential species are considered likely to occur in significant numbers due to the degraded nature of the LSA
Terrestrial Biodiversity Theme	Very high	CBA1 Protected area expansion strategy	Very high

Following scoping, Ezemvelo KZN Wildlife requested that the terrestrial biodiversity impact assessment should include input from a millipede and mollusc specialist. No potentially sensitive species of either of these groups was identified in the National Web-based Environmental Screening Tool report as potentially occurring in the area. As is the case for other fauna species of concern potentially occurring that were highlighted by the screening tool, the likelihood of invertebrate species of concern occurring in the LSA was considered very low given the highly degraded nature of the LSA, therefore no dedicated surveys for these taxa were done to inform the impact assessment.

4.2 REGIONAL BIODIVERSITY CONTEXT

VEGETATION TYPES AND THREATENED ECOSYSTEMS

The LSA is located within the KwaZulu-Natal Hinterland Thornveld vegetation type (SVs 3) (Drawing B-2), which is scattered at altitudes of 450-900 m in the valleys of the Mpisi, Mvoti, Umgeni, Mlazi, Lufafa and Mtungwane rivers (Mucina and Rutherford, 2011). The vegetation is characterised by open thornveld dominated by Acacia species including *A. robusta, A. natalita, A. nilotica*, with other trees including *Combretum mole, Ziziphus mucronata, Brachylena elliptica, Cussonia spicata, Erythrina latissima, Aloe marlothi* subsp. *marlothii* and *Euphorbia ingens* also potentially occurring. The endemic succulent Aloe pruinosa occurs in this vegetation type. Although considered Vulnerable by Mucina and Rutherford, this vegetation type doesn't feature on the National List of Ecosystems that are Threatened (DFFE, 2022) and the LSA is situated outside the mapped extent of remaining areas (SANBI, 2021) – which are considered Least Concern (Drawing B-3).

TERRESTRIAL CRITICAL BIODIVERSITY AREAS

Based on the Ezemvelo KZN Wildlife 2014, uMgungundlovu District Municipality Biodiversity Sector Plan, the proposed development falls within an area mapped as CBA irreplaceable on the KZN Biodiversity Sector Plan (2016) (Drawing B-4). CBA 'irreplaceable' areas that are considered critical for meeting biodiversity targets and thresholds, and which requires to ensue persistence of viable populations of species and functional ecosystems. The Ecological Support Area (ESA) 'Mkhondeni Local Corridor' occurs to the south of the site, which is known to include habitat for millipedes and molluscs (EKZN Wildlife, 2023[6]).

PROTECTED AREAS, AND PRIORITY AREAS FOR PROTECTED AREA EXPANSION

The nearest protected area to the LSA is the Mpushini Protected Environment, which occurs in scattered patches > 5 km to the east of the LSA (Drawing B-5).

The LSA falls within an area mapped as a 'Priority Focus Area' of the NPAES (Drawing B-6), which aligns with the CBA Irreplaceable area mapped as part of the KZN Biodiversity Sector Plan (Drawing B-4).

STRATEGIC WATER SOURCE AREAS

The nearest Strategic Water Source Area (SWSA) is the Southern Drakensburg SWSA, which is situated approximately 5 km to the northwest of the LSA (Drawing B-7).

FRESHWATER ECOSYSTEM PRIORITY AREAS (FEPA)

No FEPA quinary catchments or wetlands have been identified in the vicinity of the LSA (Drawing B-8).

[6] Comments on Final Scoping Report received from EKZN Wildlife Planning Division: IEM Section, 24 March 2023

INDIGENOUS FORESTS

No forest habitat occurs in the LSA. Some scattered mature indigenous tree species including paperback thorn (*Vachellia sieberiana var woodii*), broadpod robust thorn (*Vachellia robusta*) and scented-pod acacia (*Vachellia nilotica*) occur in the LSA.

4.3 LOCAL STUDY AREA BASELINE

The LSA is situated in the suburbs of Pietermaritzberg, in an industrial zone characterised by warehouses and hardstanding. The terrestrial ecology baseline situation encountered during the site visit conducted in December 2021 is described in the sections that follow.

VEGETATION AND FLORA

A single vegetation community was identified in the LSA during the field survey – disturbed grassland (Drawing B-9). Although degraded, this grassland continues to perform ecological functions including support of indigenous trees and flora species.

The vegetation structure of this community is low open grassland, featuring grass species including *Tristachya leucothrix, Themeda triandra, Sporobolus pyramidalis, Brachiaria deflexa, Alloteropsis semialata, Melinis repens*, and *Eragrostis curvula* occurring, which are indicative of relatively natural, although over-grazed conditions. Occasional indigenous trees are scattered through the LSA, including paperback thorn (*Vachellia sieberiana var woodii*), broadpod robust thorn (*Vachellia robusta*) and scented-pod acacia (*Vachellia nilotica*), the shrub blunt-leaved currant (*Searsia cf. rehmanniana*) and sickle bush (*Dichrostachys cinerea*).

Forbs recorded in this vegetation community consist largely of exotic species including *Verbena rigida, Verbena aristigera, Argemone ochroleuca, Datura strumarium* and *Tagetes minuta*, with indigenous Asteraceae and *Gomphocarpus* sp. also evident.

Other observed indigenous species include *Ledebouria ovatifolia*, and a maculate aloe (Aloe sp.) (Figure 4-2).

Figure 4-2 - *Ledebouria ovatifolia* and Aloe sp.

It is noted that in the intervening time since conducting the site visit in 2021, and finalisation of this report in 2023, the LSA has been severely impacted through the dumping of spoil heaps generated through earthworks on the adjacent development site to the east.

DECLARED ALIEN INVASIVE SPECIES

Six NEMBA declared Alien and Invasive Species (AIS) were recorded in the LSA during the field survey (Table 4-2). Most AIS occur in heavily disturbed areas such as roadsides and dumping grounds. Without management, these species are expected to colonise adjacent habitats, competing with, and ultimately replacing, indigenous vegetation and flora.

Table 4-2 – Declared AIS recorded in LSA

Scientific name	Common name	Growth form	NEMBA Category
Lantana camara	West Indian lantana	Shrub	1b
Leucaena leucocephala	River tamarind	Tree	2
Melia azedarach	Seringa	Tree	1b/3
Senna didymobotrya	Peanut butter cassia	Tree/shrub	1b
Solanum mauritianum	Bugweed	Tree/shrub	1b
Tipuana tipu	Tipu tree	Tree	3

FAUNA

No evidence of important foraging or breeding habitat for fauna was detected on site during the survey, although it is likely that the scattered trees on site provide nesting habitat for local bird populations. Since the potential presence of three mammal and one reptile species of concern was highlighted in the National Web-based Environmental Screening Tool, and the potential presence of invertebrate species of concern (molluscs, millipedes) highlighted by Ezemvelo KZN Wildlife at scoping, these are discussed in the sections that follow.

Mammals

The potential presence of rough-haired golden mole (*C. villosus*), tree hyrax (*D. arboreus*), orebi (*O. ourebi ourebi*), and an unnamed sensitive deer species in the LSA was highlighted by the screening tool. No evidence of the presence of these species was observed during the site visit, and the habitat on site was considered unsuitable for their support (see Table 4-1).

Herpetofauna

The potential presence of Natal hinge-backed tortoise (*K. natalensis*) was highlighted by the screening tool, due to the LSA's overlap with the known distribution of this species. It prefers dry rocky habitat in thornveld, valley bushveld, dry thicket or bushveld savanna at elevations between 50 and 1,200 m (Hofmeyr and Boycott, 2017) and as such could potentially occur in the LSA which supported degraded grassland at baseline. In ideal habitat conditions, it has an estimated density of one individual per two hectares (R.C. Boycott pers. obs, in Hofmeyr and Boycott, 2017), however, it is

considered is doubtful if viable populations exist outside reserves due to habitat degradation (Hofmeyr and Boycott, 2017). The likelihood of the presence of this species in the LSA is therefore considered low, and no evidence of its presence were detected during the survey.

Invertebrates

Following completion of the baseline studies, Ezemvelo KZN Wildlife requested that the terrestrial biodiversity impact assessment should include input from a millipede and mollusc specialist, although no potentially sensitive species of either of these groups was identified in the National Web-based Environmental Screening Tool report as potentially occurring in the area.

Approximately 234 species and subspecies of millipede are known from KwaZulu-Natal, many of which are considered endemic (Armstrong and Hamer, 2015). The heavily over-grazed and trampled condition of the LSA does not lend itself to the support of millipede species which typically rely on the presence of relatively undisturbed soil conditions, uncompacted soil and leaf litter as suitable habitat.

The terrestrial site conditions are unsuitable for the support of mollusc species of concern, since these typically rely on undisturbed natural habitats for their survival, and as is the case for millipedes, the heavily over-grazed and trampled condition of the LSA renders the on-site habitat unsuitable for the support of significant or diverse mollusc populations.

EKZN Wildlife Biodiversity Research & Assessment division was consulted regarding potential presence of invertebrate SCC in the LSA on 06 June 2023. At the time of writing, no information on millipede/mollusc presence in the LSA had been received – should invertebrate species of concern be indicated to be present, specific surveys for these will be carried out prior to construction, to inform the need for any additional mitigation measures..

EXISTING IMPACTS ON BIODIVERSITY AND DRIVERS OF CHANGE

The LSA is characterised by disturbed grassland. Existing drivers of change in the proposed development site include grazing by cattle, dumping of litter/rubble (Figure 4-3) and presence of alien and invasive species, which have resulted in disturbance of the natural vegetation community and habitat loss. Nevertheless, at baseline (2021) the LSA supported indigenous tree and succulent species, and as such was considered natural habitat, although heavily degraded.

Figure 4-3 – Cattle grazing, dumping

It is noted that in the intervening time since conducting the site visit in 2021, and finalisation of this report in 2023, the LSA has been severely impacted through the dumping of spoil heaps generated through earthworks on the adjacent development site to the east.

SITE ECOLOGICAL IMPORTANCE

The results of the SEI assessment are summarised as follows:

- Conservation Importance (CI) = Low, since SCC and range-restricted species have not been confirmed on site, nor are they expected to occur, and less than 50% of the LSA contains natural habitat to support SCC.
- Functional Integrity (FI) = Low, since the LSA is > 1 ha, with almost no habitat connectivity, low rehabilitation potential and several significant current negative ecological impacts (e.g. heavy overgrazing, dumping, burning, AIS proliferation (at baseline)).
    - The Biodiversity Importance (BI = FI + CI) is therefore considered Low.
- Receptor Resilience (RR) = High, since it is considered that the degraded grassland of the LSA could recover relatively quickly (5-10 years) to restore >75% of the original species composition and functionality of the receptor functionality, since many of the indigenous species observed at baseline persisted in the LSA despite the presence of ongoing disturbance or impacts (e.g. overgrazing, fire, dumping), and have a high likelihood of returning once disturbance has been removed.
    - The baseline Site Ecological Importance (BI +RR) is therefore considered Medium – development activities of medium impact are considered acceptable, provided that impacts are minimised, and there are appropriate restoration activities.

5 IMPACT ASSESSMENT

Potential impacts of the project on terrestrial biodiversity features (species and ecosystems) were evaluated using the semi-quantitative methodology set out in Section 3.5. Further detail on the magnitude definition for impacts on terrestrial biodiversity is provided in Table 5-1.

Table 5-1 – Magnitude definition for terrestrial biodiversity IA

Magnitude	Definition
Very low	Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the 'no change' situation.
Low	Minor shift away from existing baseline conditions. Change arising from the loss/disturbance will be discernible, but underlying character, composition and/or attributes of the baseline condition will be similar to pre-development circumstances or patterns. Having a minor effect on the known extent or condition of an ecosystem or faunal habitat. Species of concern are minimally affected
Medium	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed. Loss of a moderate proportion of the known extent or condition of an ecosystem or habitat. The impact is near the limits of the ability of a species of concern to adapt
High	Major alteration to key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed. Loss of a high proportion of the known extent or condition of an ecosystem or habitat. Species of concern are substantially affected
Very high/unknown	Total loss of key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed. Total loss of the known known extent or condition of an ecosystem or habitat. Species of concern are beyond the limits of adaptation, and changes to natural processes and functions are commonly irreversible.

The construction and operation of the proposed warehouse is anticipated to result in the following key impacts on terrestrial biodiversity receptors:

- Direct impacts through clearing of land and resultant loss of biodiversity (flora and fauna, ecosystems)
- Establishment and spread of alien and invasive species.
- Loss and fragmentation of faunal habitats.

The outcomes of the impact assessment are summarised in Table 5-2 and described in detail in the following sections.

5.1 CONSTRUCTION PHASE

5.1.1. Direct loss and disturbance of degraded grassland habitat

The development of the warehouse facility will result in the direct loss of degraded grassland habitat due to clearance of vegetation, soil removal, and replacement with buildings and concrete hardstanding. The impact prior to mitigation is considered to be of low magnitude, given the degraded nature, moderate SEI and small extent (approx. 0.5 ha) of the affected area, and the fact the loss will be irreversible and permanent, resulting in an overall impact of Moderate significance.

The application of the recommended mitigation measures (Section 5.3) around minimisation of the warehouse footprint and restoration of adjoining vegetation communities (currently affected by spoil heaps from the adjacent facility) is predicted to result in a residual impact of Low significance.

5.1.2. Establishment and spread of alien and invasive plant species

Disturbances caused by earth works during construction will facilitate the spread of alien invasive species that are already established in the LSA. Alien plant infestations can spread exponentially, suppressing or replacing indigenous vegetation, which could result in the impairment of ecosystem functioning and loss of biodiversity, and could also compromise vegetation restoration efforts subsequent to completion of construction.

Development of a site AIS management plan to mitigate and prevent AIS spread during construction and operation is expected to reduce the probability of the impact occurring, resulting in a residual impact of Low significance.

5.1.3. Injury and mortality of faunal species

The bulk earthworks involved in site development have the potential to injure/kill individual faunal species of concern that may be present in the study area. In particular, this impact could affect small mammals and reptile species that are ground-dwelling and relatively slow moving, and as such are vulnerable to heavy machinery movements and site clearance activities. The bulk earthworks and associated heavy machinery activity could also affect breeding fauna (e.g. nesting birds) through sensory disturbances which may reduce the quality/desirability of the currently established breeding sites/dens in nearby areas.

Without mitigation, the magnitude of the potential impact on fauna and the probability of occurrence of impacts on fauna are both expected to be Low due to the low suitability of the on-site habitats for fauna support, amounting to an impact of Low significance. Once mitigation measures are implemented, the magnitude and probability of the potential impact occurring can be further reduced, resulting in a residual impact of Very Low significance.

5.2 OPERATION PHASE

5.2.1. Spread of alien and invasive plant species

The spread of alien invasive species in, and immediately adjacent to the Project site will continue to be an impact of concern during the operational phase. Areas of disturbance such as access roads are susceptible to the establishment of alien invasive species. Considering that at baseline, alien invasive species were already present, this impact could be of high magnitude, and extend to the local geographic scale. This impact is potentially of long term duration, ceasing with the decommissioning and rehabilitation of the Project site. Prior to the implementation of recommended measures, this impact will be of moderate impact significance; but can be reduced to a low impact significance following the implementation of the required mitigation measures.

5.2.2. Loss and fragmentation of fauna habitat

Some fauna habitat will be permanently lost within the LSA due to the presence of the warehouse and associated hardstanding, which will interrupt habitat continuity particularly for smaller, less mobile fauna species, such as invertebrates and ground-dwelling mammals, if present. In addition, the presence of people and vehicles, site lighting at night, in the warehouse area are likely to further reduce the available area for fauna support due to anthropogenic disturbance. The magnitude of the potential impact is considered low, and the likelihood of the impact occurring is also considered low, since the LSA is already surrounded by industrial developments or roads, and as such is already isolated from nearby areas of natural habitat – resulting in an impact of low significance prior to mitigation. With the successful implementation of the recommended mitigation measures, it is anticipated that the potential magnitude and probability of the impact occurring can be further reduced.

5.3 DECOMMISSIONING PHASE

5.3.1. Spread of alien and invasive plant species

Site closure/rehabilitation activities as part of the decommissioning phase of the Project are likely to facilitate spread of invasive plant species, through frequent vehicular movements, earth moving works, and the creation of bare ground conditions ideal for the establishment of self-seeding, highly invasive plants.

The magnitude of the potential impacts is considered moderate, and the extent of impacts could be local as site closure/rehabilitation works could facilitate the spread of these species along the road network within the locality; spread of these species could also occur via wind and bird dispersal. The duration of the impact is considered permanent, resulting in an impact of Moderate significance prior to mitigation; however, the impact can be reduced to one of Low significance with the implementation of the specified mitigation measures (Section 5.4).

5.4 MITIGATION MEASURES

Mitigation measures that are designed to avoid and minimise loss and degradation to the ecological resources on the site, are summarised in the sections that follow.

5.5 AREAS TO BE AVOIDED

- Vegetation clearing should be restricted to the proposed Project infrastructure footprints only (i.e. warehouse, carparks, access roads only), with no clearing permitted outside of these areas; and
- The footprints to be cleared should be clearly demarcated prior to construction to prevent unnecessary clearing outside of this area.

5.6 MINIMISATION

- Should invertebrate species of concern be indicated to be potentially present in the LSA once feedback from consultation with mollusc and millipede experts is received, specific surveys for these will be carried out prior to construction, to inform the need for the development of any additional mitigation measures for these species.
- Prior to the commencement of construction works, a dedicated vegetation and flora survey will be carried out to identify any indigenous plant or tree species that can be preserved for use in rehabilitation activities, and map the locations of AIS so that these can be managed before they are inadvertently spread via earthworks during construction.
- No heavy vehicles should travel beyond the marked works zone.

- As appropriate, barrier/fences should be erected to prevent fauna gaining access to construction and operational areas where they have a high probability of being killed or injured.
- A low-speed limit (recommended 20 km/h in areas of highest risk e.g. where roads are located near riparian/wetland habitat) should be enforced within the LSA to reduce the risk of potential wildlife collisions.
- The handling, poisoning or killing of fauna by construction workers, warehouse staff and contractors must be strictly prohibited; and
- Employees and contractors should be made aware of the presence of, and rules regarding fauna through suitable induction training and on-site signage.
- Movement across the Project area should be facilitated by providing suitably sized gaps in fencing and/or culverts/passageways under roads for fauna.

5.7 REHABILITATION

- Following completion of construction, all litter, building rubble, etc. must be removed and disposed of at an appropriate site.
- Any areas that were cleared of topsoil must be revegetated and the site left in a safe, stable and environmentally friendly condition.
- Soils should be replaced around excavated/disturbed areas in the correct order, i.e. subsoils at the bottom, top soils on the top
- If any indigenous plant species were removed from the site prior to construction, these should be replanted, with locations for planting to be specified, and planting overseen by a ecologist or botanist
- Any remaining areas of bare soils must be overseeded with an appropriate grass seed mix including a binding creeping grass and a nurse species selected for its rapid growth properties to provide stability to the disturbed soils. If necessary, seeded areas should be further stabilised with a biodegradable (jute) mesh that is pegged in place. The seed mixture should be manually sown over the prepared soils.
- Any imported plants used for revegetation purposes should consist of native grassland/thornveld species.
- Deep watering immediately after installation of the sods/sowing seeds on bare soil areas will be required to promote the rooting of the sods back into the soils below, and/or the germination of the sown seeds. Manual watering should be done twice-weekly for at least four weeks, and every week thereafter for the duration of the dry season.

5.8 AIS CONTROL AND MANAGEMENT

An alien invasive species control programme must be developed, or any existing AIS management programmes expanded, to include the active control of alien invasive species that may establish/spread as a result of proposed Project activities.

Alien and invasive species management to be prioritised for the following alien and invasive species control areas:

- Areas where vegetation cover is disturbed.
- Areas where soils imported from external sources are applied.
- All rehabilitated areas.
- Areas within the development area that are already invaded by alien species.
- Road fringes.

5.9 MONITORING REQUIREMENTS

The following monitoring requirements are proposed:

- The presence of alien and invasive flora species should be documented prior to the commencement of the development of the infrastructure and rehabilitation activities, and the baseline case used as a benchmark against which the spread of these species can be monitored. Annual monitoring inspections should identify target areas for clearing and additional rehabilitation.
- The soils and vegetation at rehabilitated/revegetated areas should be inspected weekly for the first 2 months to ensure that germination and establishment are progressing as expected and that watering frequency is adequate. After that, inspections can be done monthly for the remainder of the year and then quarterly for a further 2 years.
- Invertebrate monitoring of restored vegetation following construction should be done to determine whether the restored habitats support milliped or mollusc species understood to be present in the nearby Mkhondeni Local Corridor' ESA.
- The Proponent's progress with the implementation of the required mitigation measures should be audited annually, to confirm that the mitigation measures have been effectively implemented on site, and to ensure that the measures are effective. In the case that the mitigation measure audits find that additional measures are necessary to manage risks to terrestrial habitats and species, these will be included in the site-wide environmental monitoring programme.

5.10 CUMULATIVE IMPACTS

Permanent loss of degraded grassland habitat as a result of the proposed development will contribute to cumulative impacts of loss in this locality, given the widespread transformation of the area to industrial use.

The application of the mitigation measures will reduce the Project's contribution to the regional-scale losses of this habitat, yet some residual impacts of low significance will remain. However, in the context of the recent transformation of the LSA through dumping of spoil by adjacent land users, revegetation of disturbed habitat within the LSA adjacent to the proposed infrastructure footprint presents an opportunity to restore some level of habitat connectivity and function at the site level, reducing the Project's contribution to cumulative impacts in the locality. These positive effects can be balanced against the residual impacts on grasslands in the regional context.

Table 5-2 – Terrestrial biodiversity impact summary

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation						
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating
CONSTRUCTION																			
Impact 1:	Clearance of vegetation, earthworks	Loss and disturbance of degraded grassland	Construction	Negative	Difficult	3	1	5	5	3	**42**	**N3**	2	1	3	5	2	**22**	**N2**
					Significance	**N3 - Moderate**							**N2 - Low**						
Impact 2:	Clearance of vegetation, earthworks	Establishment and spread of AIS	Construction	Negative	Moderate	2	1	3	4	4	**40**	**N3**	2	1	3	4	2	**20**	**N2**
					Significance	**N3 - Moderate**							**N2 - Low**						
Impact 3:	Clearance of vegetation, earthworks	Injury and mortality of fauna species	Construction	Negative	Moderate	3	1	5	5	2	**28**	**N2**	2	1	5	5	1	**13**	**N1**
					Significance	**N2 - Low**							**N1 – Very low**						
Operation																			
Impact 1:	Operational activities	Spread of AIS established during construction	Operational	Negative	High	3	2	3	4	3	**36**	**N3**	2	1	3	4	3	**30**	**N2**
					Significance	**N3 - Moderate**							**N2 - Low**						
Impact 2:	Presence of warehouse, fencing, lighting and hardstanding	Loss and fragmentation of fauna habitat	Construction	Negative	Moderate	2	1	5	5	2	**26**	**N2**	1	1	5	5	2	**24**	**N2**
					Significance	**N2 - Low**							**N2 - Low**						
Decommissioning																			
Impact 1:	Closure / rehab	Spread of AIS during earthworks, soil import for rehabilitation etc.	Decommissioning	Negative	High	3	2	3	4	3	**36**	**N3**	2	1	3	4	3	**30**	**N2**

6 CONCLUSION

The study area is located in the KwaZulu-Natal Hinterland Thornveld vegetation type, which is not listed as threatened on the NEMBA Threatened Ecosystems (DFFE, 2022). According to the spatial delineations of the Kwazulu Natal Biodiversity Sector Plan, the study area is mapped as a CBA1.

Most of the study area consists of degraded grassland, and the site ecological importance of this habitat unit is rated low. Nevertheless, the National Web-based Environmental Screening Tool categorises the Terrestrial Biodiversity Theme for the study area as Very High Sensitivity. This is based on the stated presence of land designated as CBA1 and the presence of proposed priority areas for protected area expansion. It is noted however, that the study area itself was characterised as degraded grassland when baseline surveys took place in December 2021, and has since been completely transformed through dumping of spoil by developers involved in earthworks on a site adjacent to the LSA.

The proposed Project will have negative impacts on terrestrial habitats and species, primarily during the construction phase as a result of site clearance, topsoil removal and earthworks activities. These activities will have impacts such as permanenty loss of approx. 0.5 ha of degraded grassland habitat, possible injury and mortality of SoC, as well as the spread of alien invasive species. These impacts are generally rated as having a moderate impact significance on the environment prior to mitigation measures, decreasing to a low impact significance following the successful implementation of the recommended mitigation measures. The revegetation/restoration of disturbed areas currently transformed by spoil heaps presents an opportunity to enhance the biodiversity value of the site (and the area mapped as a CBA1), compared to its current (2023) condition. The monitoring of the spread and establishment of alien invasive species through the development and implementation of an AIS management plan is recommended and should be incorporated into the Project's authorised Environmental Management Programme (EMPr).

Provided that the mitigation measures and monitoring requirements set out in Section 5.6, 5.7 and 5.8 are adhered to, the Project may be authorised from a terrestrial ecosystems and biodiversity perspective.

7 REFERENCES

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Appendix A

SITE ECOLOGICAL IMPORTANCE DETERMINATION CRITERIA

The ecological sensitivity of habitats in the study area was determined using the protocol for evaluating site ecological importance (SEI) as published in SANBI's Species Assessment Guideline (SANBI, 2020). SEI is considered to be a function of the biodiversity importance (BI) of a receptor and its resilience to impacts (receptor resilience, RR), as per:

SEI = BI + RR.

Biodiversity importance is a function of conservation importance (CI) and the functional integrity (FI) of the receptor, as per:

BI = CI + FI

- **Conservation Importance** is defined as "the importance of a site for supporting biodiversity features of conservation concern present, e.g., populations of IUCN threatened and Near Threatened species (CR, EN, VU and NT), Rare species, range-restricted species, globally significant populations of congregatory species, and areas of threatened ecosystems types, through predominantly natural processes" (SANBI, 2020).
- **Functional Integrity** is defined as "A measure of the ecological condition of the impact receptor as determined by its remaining intact and functional area, its connectivity to other natural areas and the degree of current persistent ecological impacts" (SANBI, 2020).
- **Receptor Resilience** is defined as "the intrinsic capacity of the receptor to resist major damage from disturbance and/or to recover to its original state with limited or no human intervention" (SANBI, 2020).

Table 1: Conservation Importance (CI) criteria.

Conservation Importance (CI)	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10km2; Any area of natural habitat of a CR ecosystem type or large area (>0.1 % of the total ecosystem type extent) of natural habitat of an EN ecosystem type; and Globally significant populations of congregatory species (>10% of global population).
High	Confirmed of highly likely occurrence of CR, EN, VU species that have a global EOO of > 10km2, IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining; Small area (>0.01% but <0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (>0.1%) of natural habitat of VU ecosystem type; Presence of Rare species; Globally significant populations of congregatory species (>1% but < 10% of global population).

Medium	Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals; Any area of natural habitat of threatened ecosystem type with status of VU; Presence of range-restricted species; and >50% of receptor contains natural habitat to support SCC.
Low	No confirmed or highly likely populations of SCC; No confirmed or highly likely populations of range-restricted species; and <50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC; No confirmed and highly unlikely populations of range-restricted species; and No natural habitat remaining.

Table 2: Functional Integrity (FI) criteria.

Functional Integrity (FI)	Fulfilling Criteria
Very High	Very large (>100 ha) intact area for any conservation status of ecosystem type or >5a ha for CR ecosystem type; High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches; No or minimal current negative ecological impacts with no signs of major disturbance (e.g., ploughing)
High	Large (>5 ha but < 100 ha) intact area for any conservation status ecosystem types; Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches; and Only minor current negative ecological impacts (e.g., few livestock utilising area) with no signs of major past disturbance (e.g., ploughing) and good rehabilitation potential.
Medium	Medium (>5ha but< 20 ha) semi-intact area for any conservation status ecosystem type or >20 ha for VU ecosystem type; Only narrow corridors of good connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches; Mostly minor current negative ecological impacts with some major impacts (e.g., established population of alien invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but <5ha) area;

	Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential; and Several minor and major current negative ecological impacts.
Very Low	Very small (<1 ha) area; No habitat connectivity except for flying species or flora with wind-dispersed seeds; Several major current negative ecological impacts.

BI = CI + FI

Biodiversity Importance (BI) Rating Matrix

Biodiversity Importance (BI)		Conservation Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Functional Integrity	**Very High**	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Table 3: Receptor Resilience criteria (RR)

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (˜less than 5 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (˜ 5-10 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Habitat that can recover slowly (˜ more than 10 years) to restore >75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ˜less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impacts occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

SEI = BI + RR

Site Ecological Importance (SEI) Rating Matrix

Site Ecological Importance		Biodiversity Importance				
		Very High	**High**	**Medium**	**Low**	**Very Low**
Receptor Resilience	**Very Low**	Very High	Very High	High	Medium	Low
	Low	Very High	Very High	High	Medium	Very Low
	Medium	Very High	High	Medium	Low	Very Low

	High	High	Medium	Low	Very Low	Very Low
	Very High	Medium	Low	Very Low	Very Low	Very Low

Table 4: Guidelines for interpreting SEI in the context of the proposed development activities.

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

Appendix B

MAPS

PATH: S:\GIS\SWSP\Projects\41103633 - Richbay Warehouse PMB\13-GIS\MXD\41103633_Locality_A3P.mxd PRINTED ON: 2023-05-30 AT: 2:50:41 pm

LEGEND
- Richbay Bay Warehouse
- Main road
- Access road
- Rivers - Perennial
- Rivers - Non perennial

0 150 300
1:8 000 METRES

NOTE(S)
1. LINE NOTES
2. LINE NOTES
3. LINE NOTES

REFERENCE(S)
1. COORDINATE SYSTEM: GCS WGS 1984
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
RICHBAY PROPERTIES

PROJECT
RICHBAY BAY WAREHOUSE PMB DRAFT EIA

TITLE
LOCALITY MAP

CONSULTANT
wsp

YYYY-MM-DD	2023/05/30
DESIGNED	KM
PREPARED	KM
REVIEWED	PN
APPROVED	PN

PROJECT NO. 41103633 CONTROL REV.

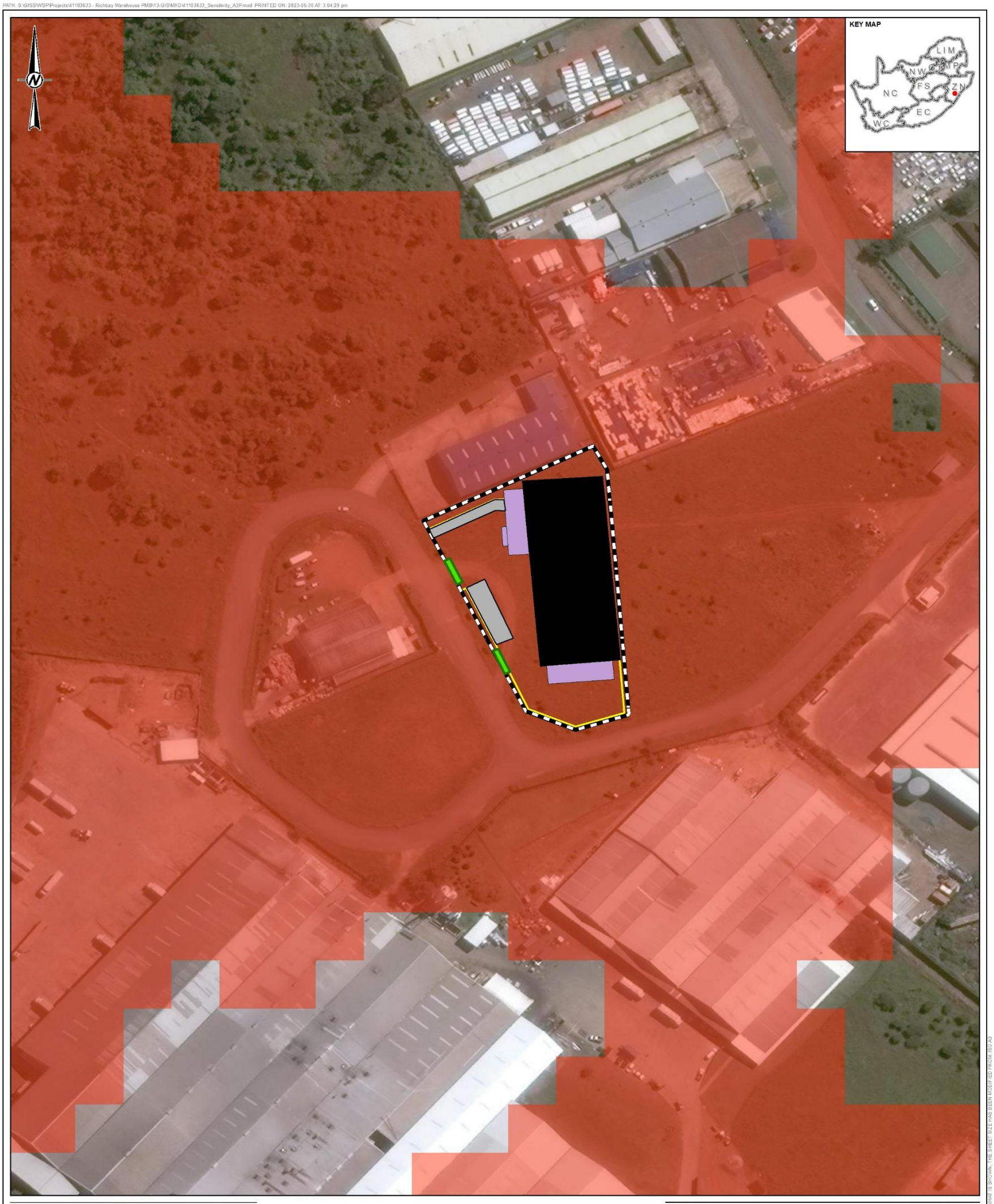
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3 25mm 0

Drawing B-1: Site location

Drawing B-2: Vegetation types

Drawing B-3: Threatened ecosystems (NEMBA)

PATH: S:\GIS\WSP\Projects\41103633 - Richbay Warehouse PMB\13-GIS\MXD\41103633_Sensitivity_A3P.mxd PRINTED ON: 2023-05-30 AT: 3:04:29 pm



LEGEND

- Path
- Fence
- Warehouse
- Buildings
- Entry Points
- Parking

KZN Biodiversity Sector Plan (2016)

- CBA: Irreplaceable

0 25 50
1:1 500 METRES

NOTE(S)
1. LINE NOTES
2. LINE NOTES
3. LINE NOTES

REFERENCE(S)
1. COORDINATE SYSTEM: GCS WGS 1984
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
RICHBAY PROPERTIES

PROJECT
RICHBAY BAY WAREHOUSE PMB DRAFT EIA

TITLE
SENSITIVITY MAP

CONSULTANT

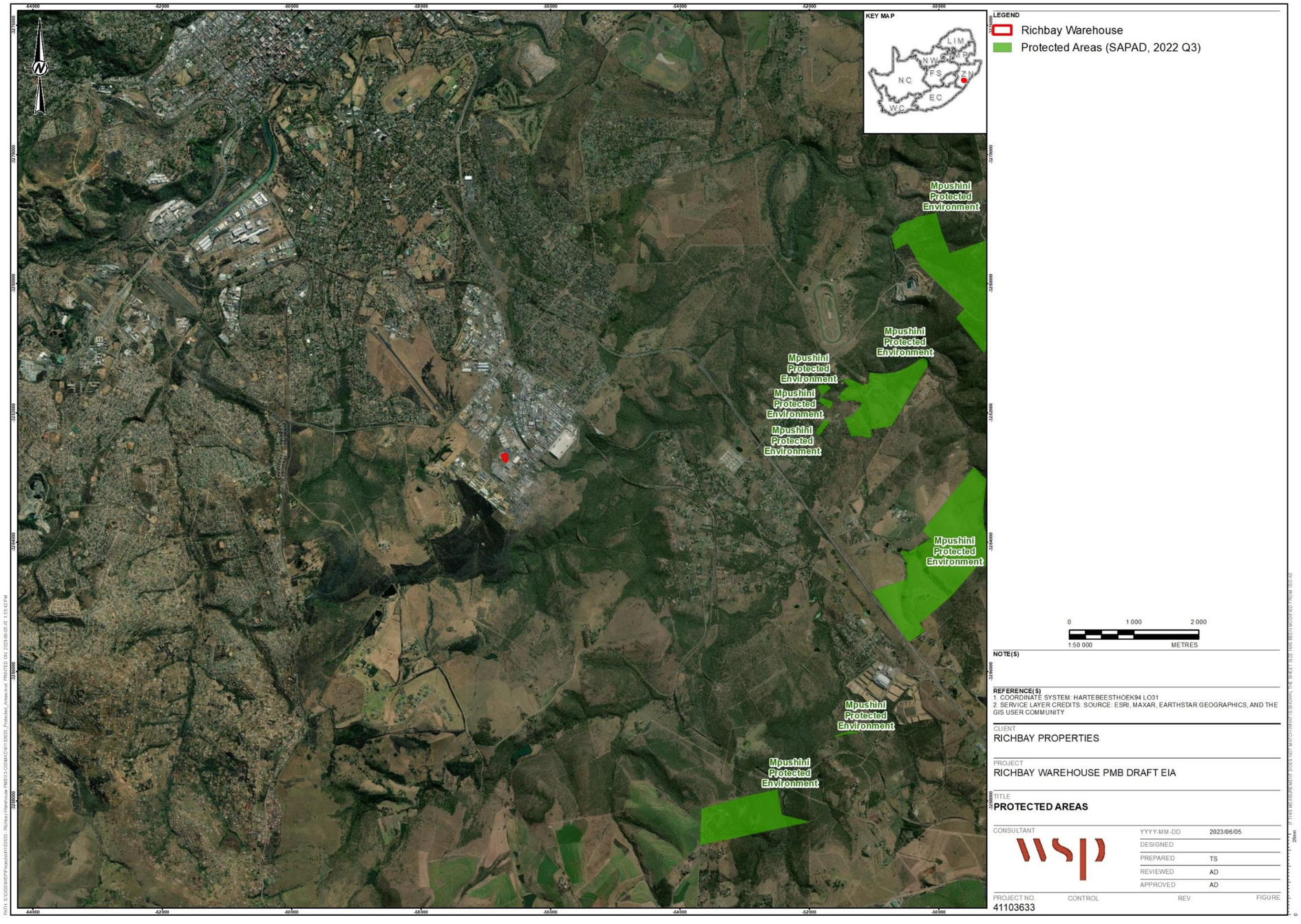
YYYY-MM-DD	2023/05/30
DESIGNED	KM
PREPARED	KM
REVIEWED	PN
APPROVED	PN

PROJECT NO. 41103633 CONTROL REV.

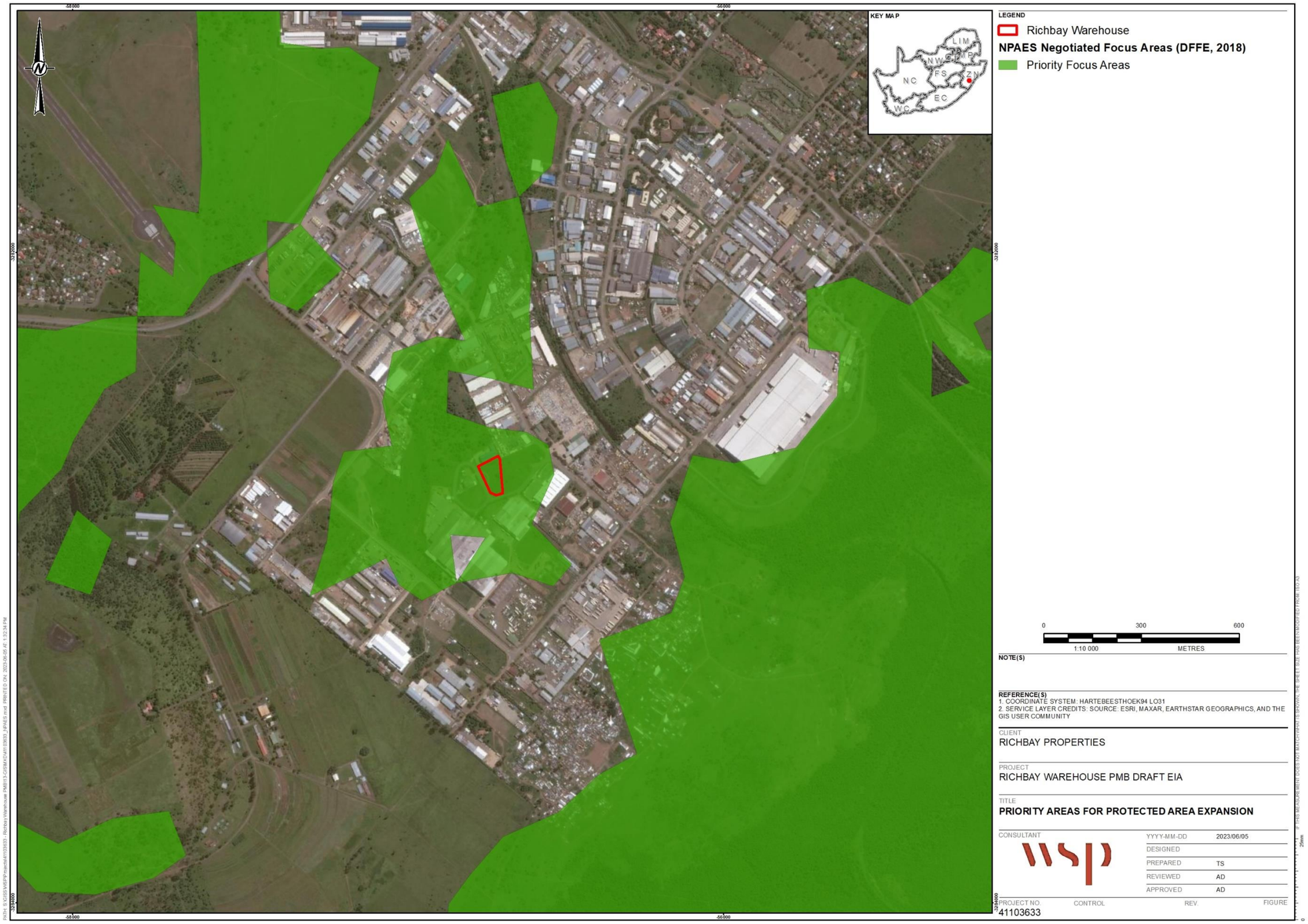
IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3

0 25mm

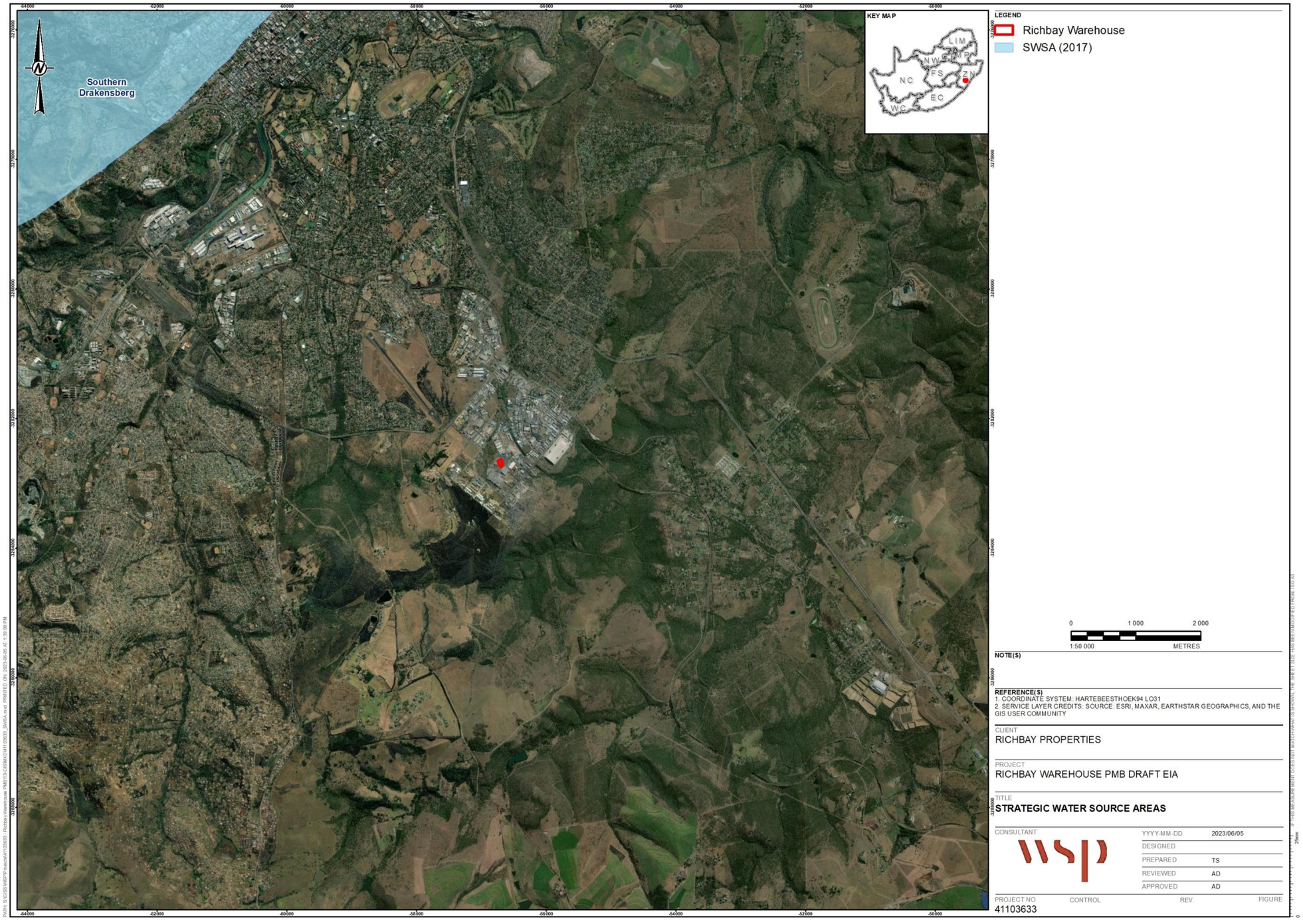
Drawing B-4: KZN Biodiversity Sector Plan (2016)



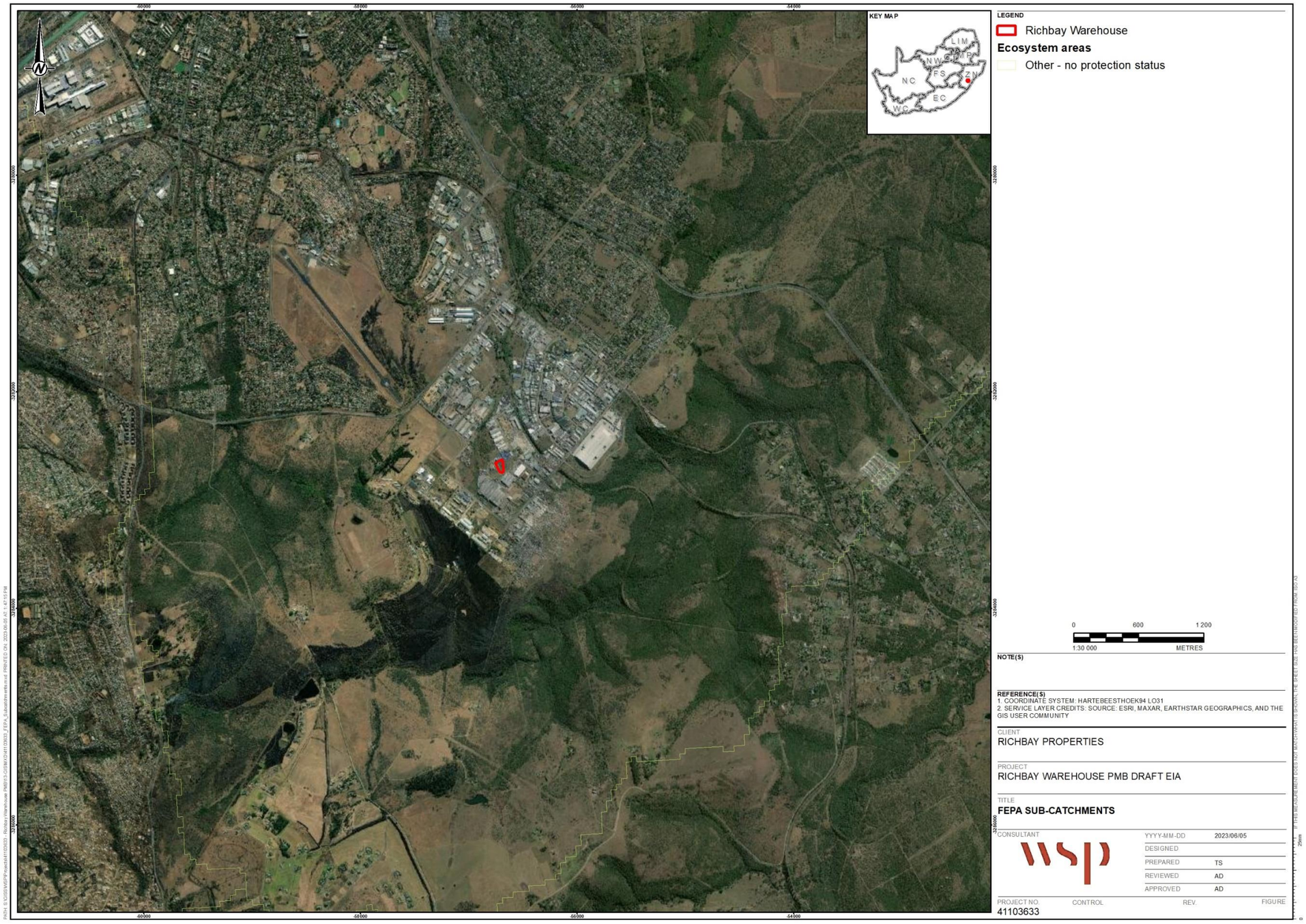
Drawing B-5: Protected areas



Drawing B-6: Priority areas for protected area expansion



Drawing B-7: Strategic water resource areas



Drawing B-8: FEPAs

Drawing B-9: Mapped vegetation communities

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South Africa

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R Bay Properties (Pty) Ltd.

AQUATIC BIODIVERSITY COMPLIANCE STATEMENT

DC22/0002/2023: KZN/EIA/0001867/2023
JUNE 2023

PUBLIC

R Bay Properties (Pty) Ltd.

AQUATIC BIODIVERSITY COMPLIANCE STATEMENT

TYPE OF DOCUMENT (VERSION) PUBLIC

PROJECT NO. 41103633

OUR REF. NO. DC22/0002/2023: KZN/EIA/0001867/2023

DATE: JUNE 2023

R Bay Properties (Pty) Ltd.

AQUATIC BIODIVERSITY COMPLIANCE STATEMENT

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QUALITY CONTROL

Issue/revision	First issue	Revision 1	Revision 2	Revision 3
Remarks	Draft Aquatic Assessment			
Date	06 June 2023			
Prepared by	Aisling Dower			
Signature				
Checked by	Anri Scheepers			
Signature	Scheepers, Anri (ZAAS02690) 2023.06.12 08:29:43 +02'00'			
Authorised by	Anri Scheepers			
Signature	Scheepers, Anri (ZAAS02690) 2023.06.12 08:30:14 +02'00'			
Project number	41103633			
Report number	1			
File reference	\\corp.pbwan.net\za\Central_Data\Projects\41100xxx\41103633 - Richbay Warehouse PMB\41 Biodiversity\01-Reports\01-Draft\Aquatic			

CONTENTS

TABLES

FIGURES

No table of figures entries found.

APPENDICES

1 INTRODUCTION

R-Bay Properties (Pty) Ltd (R-Bay), a subsidiary of the Richbay Group of Companies (Richbay) proposes to construct a chemical warehouse for the storage of dangerous goods with a capacity of approximately 2 000 m^3. The warehouse will be designed as a purpose-built chemical warehousing structure, situated in Pietermaritzburg, KwaZulu Natal (Appendix A, Drawing A-1).

WSP Group Africa (Pty) Ltd (WSP) was appointed in the role of Independent Environmental Assessment Practitioner (EAP) to undertake the S&EIR processes for the development of the Project, including the necessary ecology/biodiversity surveys and impact assessment reports, in support of the environmental regulatory process.

1.1 PURPOSE OF THE REPORT

This report summarises the baseline status of wetland ecosystems within 500 m of proposed chemical warehousing infrastructure, and documents the assessment of the potential impacts of the proposed Project on wetland ecosystems and ecosystem services.

The report also summarises the recommended measures for the mitigation of any negative impacts for inclusion in the updated EMPr for the Project, to ensure that the relevant South African biodiversity legislative and policy requirements are satisfactorily met; and proposes additional measures as required.

1.2 PROJECT LOCATION AND EXTENT

The Project will entail the clearance of vegetation for the development of warehousing on a site of 9955 m^2, in Shortts Retreat (Mkondeni), Pietermaritzburg (Appendix B, Figure B-1). The warehousing will be used as an importation hub where chemicals (already packed and palletized) will be offload from shipping containers, and stored, prior to dispatch to Richbay facilities throughout Southern Africa. The proposed site is adjacent to one of the existing Richbay production facilities, and is required in the immediate vicinity to alleviate space constraints at the existing Richbay Pietermaritzburg site. The space constraints have been negatively affected by the increase in shipping challenges through the Durban Port. In addition, processed chemicals (already packed and palletized) will be stored prior to dispatch for international distribution. No processing or decanting will take place in the warehouse/s.

The chemicals that will be stored at the warehouse/s will include:

- Hydrochloric Acid.
- Acetic Acid.
- Sodium Hypochlorite.
- Sulphuric Acid.
- Caustic Soda (Solid).
- Caustic Soda Liquid.
- Phosphoric Acid.
- Nitric Acid.
- Sodium Metabisulphite (Solid).
- Formaldehyde.
- Ammonium 25%.

- Sodium Chlorite 25-31%.

1.3 STUDY AREA

The study area for the Project was defined as the proposed development footprint plus a 500 m buffer, within which direct and indirect impacts on wetlands/watercourses could potentially occur as a result of the proposed development (Appendix A, Drawing A-2).

2 APPLICABLE LEGISLATION, POLICY AND STANDARDS

Applicable national and provincial legislation, associated regulations and policies that are pertinent to biodiversity, which were used to guide the assessment of impacts on aquatic/wetland ecosystems, include:

- National Environmental Management Act (NEMA) (Act No. 107 of 1998) including Section 24, concerning Procedures for the assessment and minimum criteria for reporting on identified themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, when applying for environmental authorisation;
  - Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity;
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), specifically:
- ToPS – National lists of critically endangered, endangered, vulnerable and protected species (2007);
- National list of threatened terrestrial ecosystems for South Africa (2011) (NEMBA Threatened Ecosystems, 2011);
- National list of alien and invasive species (2016);
- Environment Conservation Act (Act No. 73 of 1989), specifically the Lists of declared weeds and invader plants (CARA, 1983);
- National Water Act (Act No. 36 of 1998);
- KwaZulu Natal Nature Conservation Management Act (Act No. 9 of 1997);
- Natal Nature Conservation Ordinance (Act No. 15 of 1974);
- KwaZulu Natal Biodiversity Sector Plan (2016); and
- National Protected Area Expansion Strategy (2016).

Recent, relevant South African national policies and guidance were also taken into consideration, in the development of the baseline description and impact assessment process, including:

- Draft National Biodiversity Offset Policy (2017);
- Draft National Biodiversity Offset Guideline (2022); and
- Species Environmental Assessment Guideline (SANBI, 2020).

3 METHODOLOGY

The aquatic biodiversity assessment took cognisance of Government Notice No. 320, published in 2020 under the National Environmental Management Act (1998) concerning 'Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Theme in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (1998), when applying for Environmental Authorisation'.

In line with the assessment and reporting requirements set out in the protocol, this assessment included two main study components; a desktop literature review, supplemented by information gathered during a wetland ecology survey conducted in December 2021.

3.1 SITE SENSITIVITY VERIFICATION

The proposed infrastructure footprint was assessed using the National Web-based Environmental Screening Tool, which indicated Low sensitivity for the LSA under the relative Aquatic Biodiversity Theme.

A desktop assessment was then conducted to confirm the indicated sensitivity of the site under consideration (i.e. the proposed development footprint), to determine the need for a full Aquatic Biodiversity Specialist Assessment, or Aquatic Biodiversity Compliance Statement. Aerial imagery for the LSA, and nationally-available datasets were consulted to inform the site sensitivity verification, including the South African National Wetland Map version 5 (NWM5) (Van Deventer et al., 2019), and the National Freshwater Ecosystem Priority Area database.

3.2 WETLAND ASSESSMENT

A field survey of wetlands within the study area was conducted during December 2021. The methods used in the identification, delineation, classification and assessment of wetlands in the study area are described in the sections below.

WETLAND DELINEATION

The delineation procedure originally set out in "A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas", DWAF (2005) and updated by DWAF (2008), describes the following four indicators of wetland presence that can be used to define the boundary of a wetland:

1) The position in the landscape, which helps identify those parts of the landscape where wetlands are more likely to occur;
2) The type of soil form (i.e., the type of soil according to a standard soil classification system), since wetlands are associated with certain soil types;
3) The presence of wetland vegetation species, and
4) The presence of redoxymorphic soil features, which are morphological signatures that appear in soils with prolonged periods of saturation (due to the anaerobic conditions which result).

These indicators were used in the field to delineate the boundary of the temporary zone (outer boundary) as well as the seasonal and permanent zonal characteristics of the wetland systems encountered within the study area

WETLAND CLASSIFICATION

To allow for the differentiation between wetland systems and the prioritisation of systems either for conservation or management purposes, the wetlands were classified in accordance with each hydrogeomorphic (HGM) unit for assessment purposes according to (Kotze *et al*., 2008). Six major inland HGM types are recognised for the purposes of wetland classification (Table 3-1), and these criteria were applied to the current assessment.

Table 3-1 - Wetland Hydrogeomorphic Units (after Kotze *et al*., 2008)

Wetland Hydro-geomorphic type	Description	Source of water maintaining the wetland[1]	
		Surface	Sub-surface
Floodplain	Valley bottom areas with a well-defined stream channel, gently sloped and characterised by floodplain features such as oxbow depressions and natural levees and the alluvial (by water) transport and deposition of sediment, usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*
Channelled valley bottom	Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterised by the net accumulation of alluvial deposits or may have steeper slopes and be characterized by the net loss of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*/***
Unchannelled valley bottom	Valley bottom areas with no clearly defined stream channel, usually gently sloped and characterised by alluvial sediment deposition, generally leading to a net accumulation of sediment. Water inputs mainly from channel entering the wetland and from adjacent slopes.	***	*/***
Hillslope seepage with channelled outflow	Slopes on hillsides, which are characterized by the colluvial (transported by gravity) movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well-	*	***

Wetland Hydro-geomorphic type	Description	Source of water maintaining the wetland[1]	
		Surface	Sub-surface
	defined stream channel connecting the area directly to a stream channel.		
Hillslope seepage without channelled outflow	Slopes on hillsides, which are characterized by the colluvial movement of materials. Water inputs mainly from sub-surface flow and outflow either very limited or through diffuse sub-surface and/or surface flow but with no direct surface water connection to a stream channel.	*	***
Depression (includes pans)	A basin shaped area with a closed elevation contour that allows for the accumulation of surface water (i.e., it is inward draining). It may also receive sub-surface water. An outlet is usually absent, and therefore this type is usually isolated from the stream channel network.	*/***	*/***

[1] Precipitation is an important water source and evapotranspiration an important output in all the above settings.

*Water source: * Contribution usually small; *** Contribution usually large; **** Contribution may be small or important depending on the local circumstances.*

PRESENT ECOLOGICAL STATUS (PES)

A PES assessment was conducted for all hydro-geomorphic wetland units in the Study Area in order to establish a baseline of the current state of the wetlands, and to provide an indication of the conservation value and sensitivity of the wetlands.

The Level 2 WET-Health assessment as described in Macfarlane *et al.* (2008) was applied for the determination of the PES score for each wetland unit. The PES score is reflected in the placement of each wetland unit into a PES category. A description of the PES scores and linked impact categories is provided in **Table 3-2**.

Table 3-2 - Impact scores and categories of Present Ecological State used by WET-Health for describing the integrity of wetlands (Macfarlane *et al*., 2008)

Impact Category	Description	Impact Score Range	Present Ecological State Category
None	Unmodified, or approximates natural condition	0 – 0.9	A

Impact Category	Description	Impact Score Range	Present Ecological State Category
Small	Largely natural with few modifications, but with some loss of natural habitats	1 – 1.9	B
Moderate	Moderately modified, but with some loss of natural habitats	2 – 3.9	C
Large	Largely modified. A large loss of natural habitat and basic ecosystem function has occurred	4 – 5.9	D
Serious	Seriously modified. The losses of natural habitat and ecosystem functions are extensive	6 – 7.9	E
Critical	Critically modified. Modification has reached a critical level and the system has been modified completely with almost complete loss of natural habitat	8 – 10.0	F

ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

The EIS was determined using the methodology developed by Rountree *et al.* (2013). It is a rapid scoring system to evaluate:

- Ecological Importance and Sensitivity;
- Hydrological Functions; and
- Direct Human Benefits.

The scoring assessment incorporates:

- EIS score derived using aspects of the original Ecological Importance and Sensitivity assessments developed for riverine assessments (DWAF, 1999);
- Hydro-function importance score derived from the WET-EcoServices tool for the assessment of wetland ecosystem services Kotze et al. (2009); and
- Direct human benefits score derived from the WET-EcoServices tool for the assessment of wetland ecosystem services Kotze et al. (2009).

The highest score of the three derived scores (each with range 0 – 4) was then used to indicate the overall importance category of the wetland (Table 3-3).

Table 3-3 - Ecological importance and sensitivity categories

Ecological Importance and Sensitivity Category Description	Range of EIS score
Very high: Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers	> 3 and ≤ 4
High: Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	> 2 and ≤ 3
Moderate: Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers	> 1 and ≤ 2
Low/marginal: Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	> 0 and ≤ 1

3.3 STUDY ASSUMPTIONS AND LIMITATIONS

DATA USED FOR SPECIALIST ASSESSMENT

The Aquatic Biodiversity Species Compliance statement was prepared on the basis of the site sensitivity verification process undertaken in response to the national web-based screening report. The site sensitivity verification was completed via desktop analysis of available datasets, aerial imagery and the site visit conducted in December 2021.

The wetland survey was done in December 2021, which coincides with the wet season and as such maximised the opportunity for the detection and identification of flowering wetland plants, delineation using vegetation indicators, and assessment of ecological importance and sensitivity (EIS).

It is therefore considered that there are no sampling or information limitations pertaining to this Aquatic Biodiversity Species Compliance Statement and the recommendations contained in this report.

ASSUMPTIONS, UNCERTAINTIES, OR GAPS IN KNOWLEDGE

The aquatic biodiversity baseline description is qualitative and based on the available desktop information and findings of the December 2021 site visit. The recommended mitigation/management measures focus on the mitigation of potential impacts on aquatic ecosystem/species receptors that occur within 500 m of the proposed project infrastructure within the within the study area.

4 AQUATIC/WETLAND BIODIVERSITY BASELINE

4.1 SITE SENSITVITY VERIFICATION AND MOTIVATION FOR COMPLIANCE STATEMENT

No wetlands or watercourses occur within the LSA, and the Low sensitivity indicated by the National Environmental Screening tool was confirmed. The reporting protocols for an aquatic biodiversity compliance were therefore applied to the aquatic biodiversity assessment. Since a wetland is located within 500 m of the proposed development, this was assessed in the field to inform the baseline description and identification of potential Project impacts on the system. In line with the gazetted requirements for compliance statements, a detailed impact assessment was not required; instead, management actions for potential impacts are proposed in Section 5.0 to ensure that any potential project impact is satisfactorily mitigated.

4.2 REGIONAL CONTEXT

The site falls within U20J quaternary catchment in the Mvoti - Umzimkulu Water Management Area (WMA) 11, and, with a catchment area of 687 km^2. Mean annual precipitation is approximately 840 mm, whilst mean annual evaporation is approximately 1200 mm. The uMnsunduze River lies approximately 5 km to the northeast and Mpushini River 4.2 km to the south of the proposed site.

AQUATIC CRITICAL BIODIVERSITY AREAS (CBAS) AND ECOLOGICAL SUPPORT AREAS

The Study Area was compared to relevant available spatial biodiversity planning datasets, i.e. the KwaZulu Natal Biodiversity Sector Plan (2016) in order to assess the local and regional biodiversity context of the site. No specific aquatic CBAs occur in the LSA, although the LSA is mapped as a CBA1 due to the potential presence of millipede/mollusc SCC.

STRATEGIC WATER SOURCE AREAS (SWSAS)

No strategic water source areas (SWSAs) occur in the LSA – the nearest being the southern Drakensberg SWSA which is situated approx. 5 km northwest of the LSA (Drawing A-3).

FRESHWATER ECOSYSTEM PRIORITY AREAS (FEPA) SUB-CATCHMENTS

The LSA does not coincide with any FEPA sub-catchments or features (Drawing A-4).

NATIONAL WETLAND MAP VERSION 5

The South African National Wetland Map version 5 (NWM5) portrays the most up-to-date spatial data for the extent and types of estuarine and inland aquatic (freshwater) ecosystems of South Africa (Van Deventer *et al.*, 2019). The proposed development footprint in relation to wetlands mapped as part of the National Wetland Map 5 project is illustrated on Drawing A-5. Since a seep wetland is indicated within 500 m of the proposed development, the key objective of the wetland baseline data gathering studies was to define the extent and condition of this (and other) wetland habitat in the study area.

4.3 WETLAND DELINEATION AND CLASSIFICATION

No wetlands occur within the site, however, a single hillslope seep wetland of 3.89 ha situated approximately 150 m to the west of the proposed development (Drawing A-6) was delineated. The

wetland is separated from the proposed development via the existing tarred access road, and wasteland that is currently heavily overgrazed by cattle, and used for dumping of building rubble etc.

4.4 PRESENT ECOLOGICAL STATUS (PES)

The hillslope seep to the west of the site exists in a landscape that is characterised by industrial activities and livestock grazing, which have resulted in degradation of the wetland habitat. Building rubble was observed in the wetland, as well as areas of excavation, possible abstraction boreholes, and exotic weed species. The PES of the wetland was assessed as being Seriously Modified (PES E) (Table 4-1).

Table 4-1 – Wetland PES

Final (adjusted) Scores				
PES Assessment	Hydrology	Geomorphology	Water Quality	Vegetation
Impact Score	7.1	6.3	6.5	7.0
PES Score (%)	29%	37%	35%	30%
Ecological Category	**E**	**E**	**E**	**E**
Trajectory of change	↓	↓	→	↓
Confidence (revised results)	High	High	High	High
Combined Impact Score	6.9			
Combined PES Score (%)	31%			
Combined Ecological Category	**E**			
Hectare Equivalents	1.2 Ha			

4.5 ECOLOGICAL IMPORTANCE AND SENSITIVITY

The EIS of the wetland was considered to be Low/marginal, that is, not being ecologically important or sensitive at an scale, largely as a result of its seriously modified condition, and reduced role in biodiversity support and ecosystem service supply.

Table 4-2 – Wetland ecological importance and sensitivity

Hillslope seep	Importance
Ecological importance & sensitivity	1.7
Hydro-functional importance	1.1
Direct human benefits	0.1
Overall Importance and Sensitivity Score	**1.7**
Overall Importance and Sensitivity Category	**D**

4.6 BUFFER ZONES

Buffer zones for the wetland were calculated using the DWS buffer zone tool for the determination of aquatic impact buffers and setback requirements for wetland ecosystems. The calculated buffers for the hillslope seep wetland are set out in Table 4-3.

Table 4-3 – Buffer zone determination

Phase	Required buffer (m from wetland edge)
Construction phase	15
Operation phase	24
Final aquatic impact buffer requirement	24

5 PROPOSED IMPACT MANAGEMENT MEASURES

Notwithstanding the fact that the study area is considered to be of low sensitivity for aquatic biodiversity, and the proposed development is cut off from downslope wetlands via the existing tarred road, and no significant impacts on aquatic biodiversity as a result of the proposed development are therefore anticipated, the following impact mitigation and management measures are recommended to avoid/minimise potential impacts on the nearby wetland arising from the proposed warehouse development.

- Construction should be done in the dry season and completed by the wet season, so that appropriate water management systems are in place for stormwater management.
- A buffer of at least 24 m from the wetland edge must be retained for development (based on the Buffer Zone tool) – since the development boundary is approximately 150 m from the wetland edge, this will be easily achievable.
- A stormwater management plan should be implemented for the warehouse area, separating clean and dirty water and ensuring that only clean water reports to the receiving environment.
- Pollution prevention measures for the protection of wetlands, rivers and streams from contamination with hydrocarbons, sediments and other chemicals to be implemented.
- Erosion control and protection measures installed as part of the construction of the project will be adapted for the specific area and situation where signs of erosion appear.
- Soil compacted in non-operational areas during construction activities should be ripped to break up the compacted soil surface and re-vegetated to aid infiltration and decrease run-off.
- Topsoil stockpiles to be re-vegetated with non-invasive vegetation, in order to stabilise the soil, aid infiltration and decrease run-off.
- The re-vegetation programme shall take cognisance of the climatic and seasonal conditions but should generally be undertaken annually starting in spring and early summer.
- Develop an alien and invasive plant management program to pro-actively strive towards the eradication and control of alien invasive species within the warehouse site, so that any project-induced spread to nearby areas is limited.

5.1 MONITORING REQUIREMENTS

The following monitoring requirements are proposed:

- The implementation of the recommended mitigation measures via the site-wide EMPr should be monitored on a regular basis, to audit their efficacy in addressing potential impacts, so that adaptive management actions can be timeously undertaken as necessary, to ensure that potential impacts on the receiving environment are avoided/minimised.

6 REFERENCES

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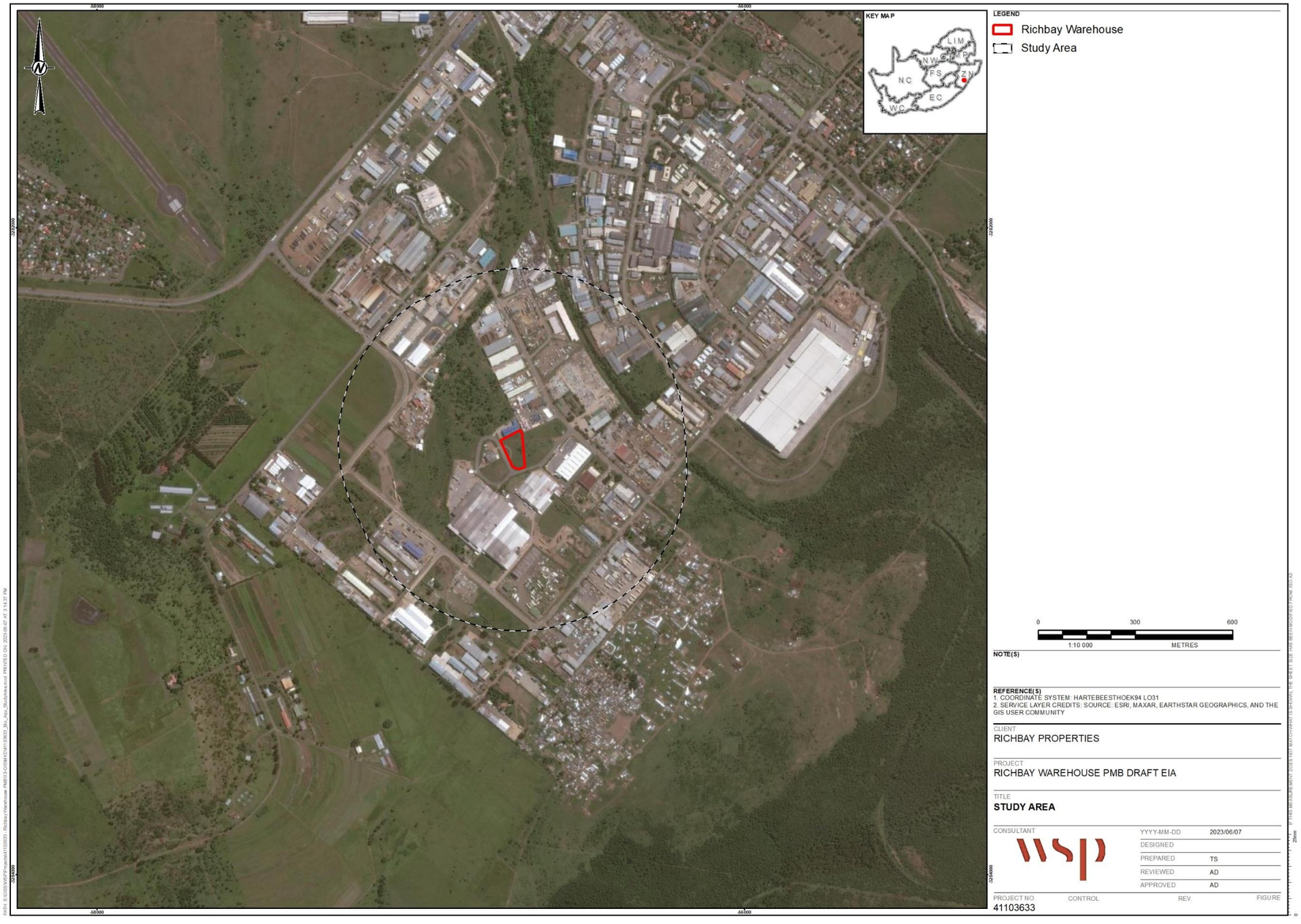
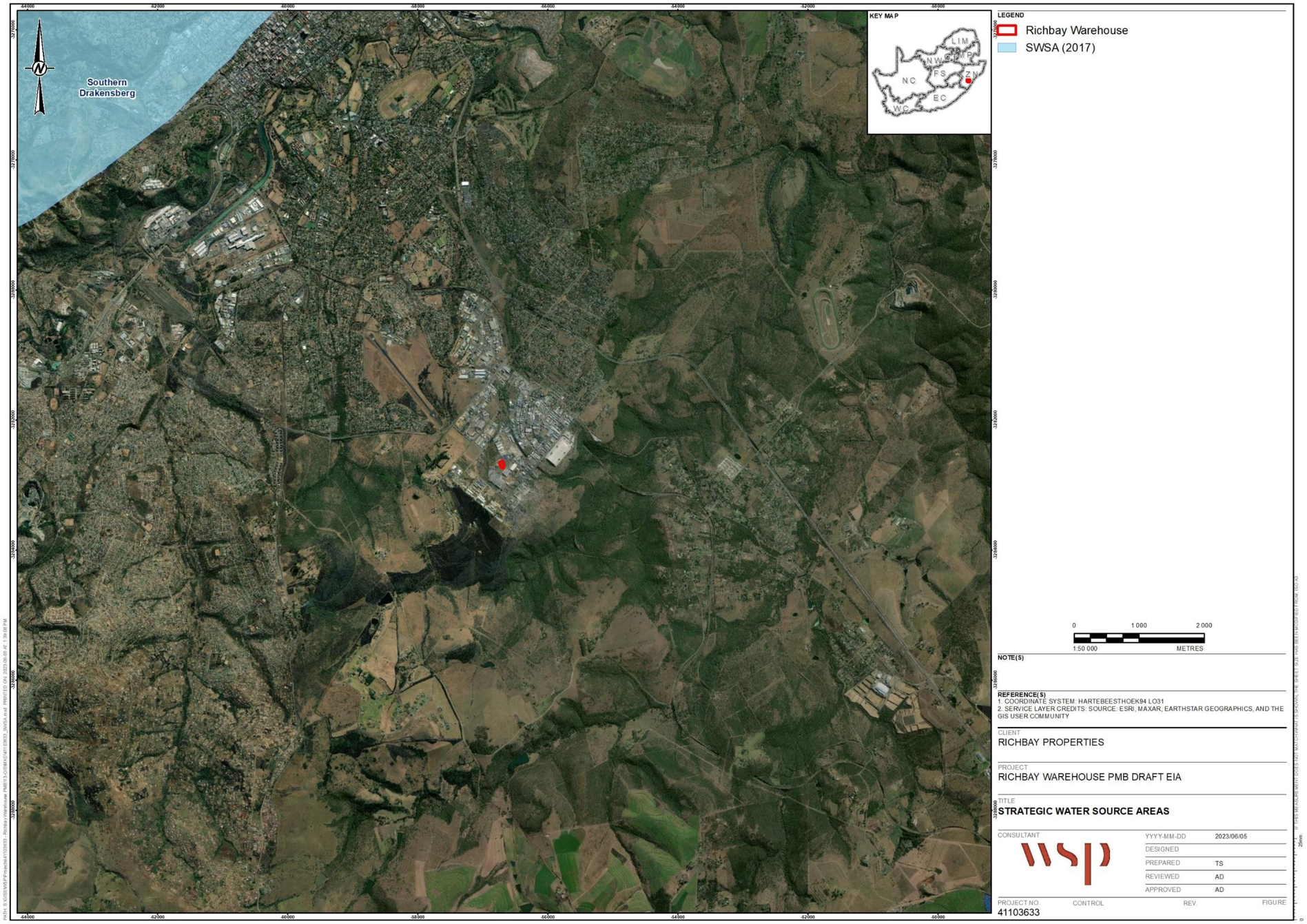
Appendix A

DRAWINGS

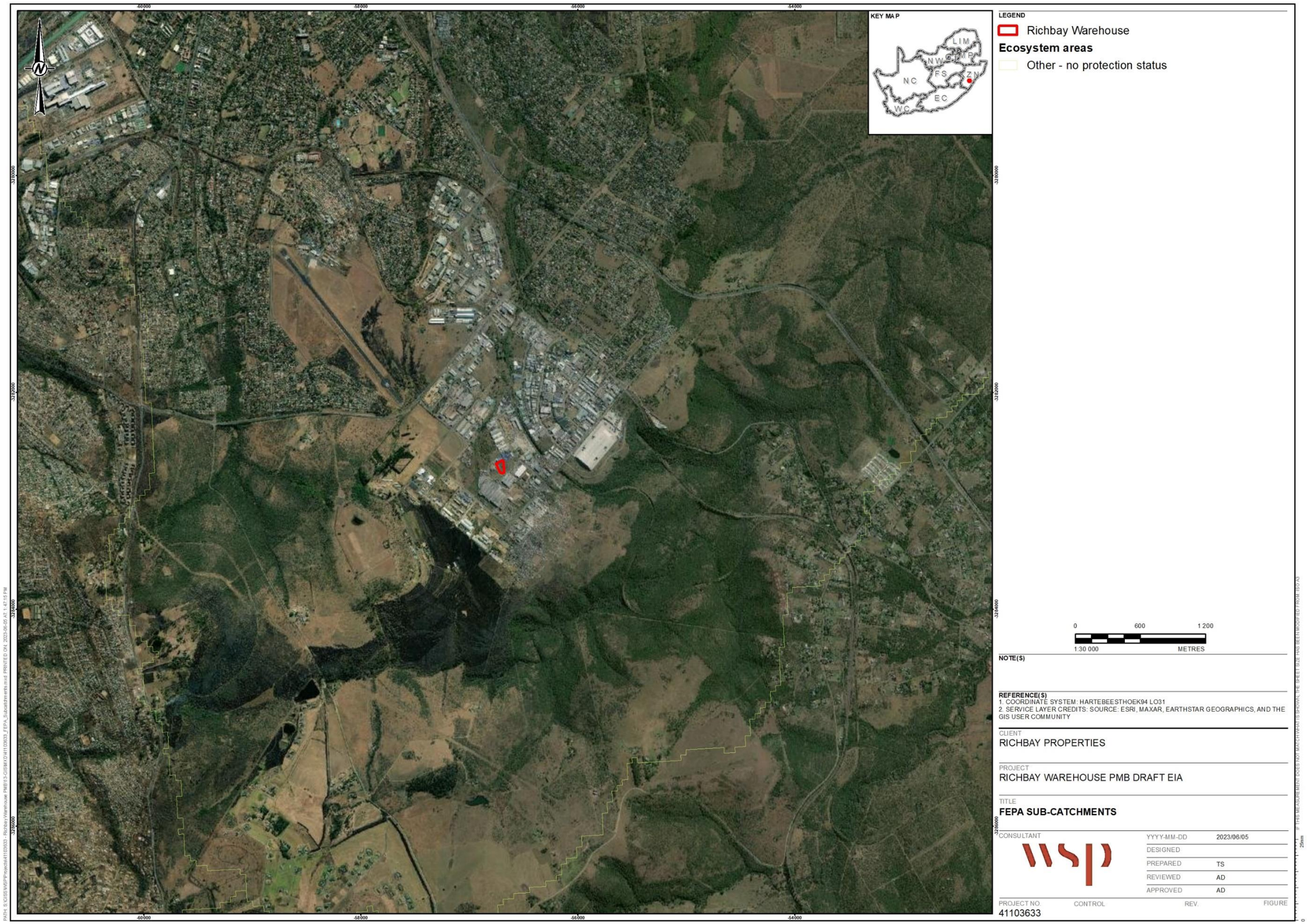
Drawing A-1: Site location



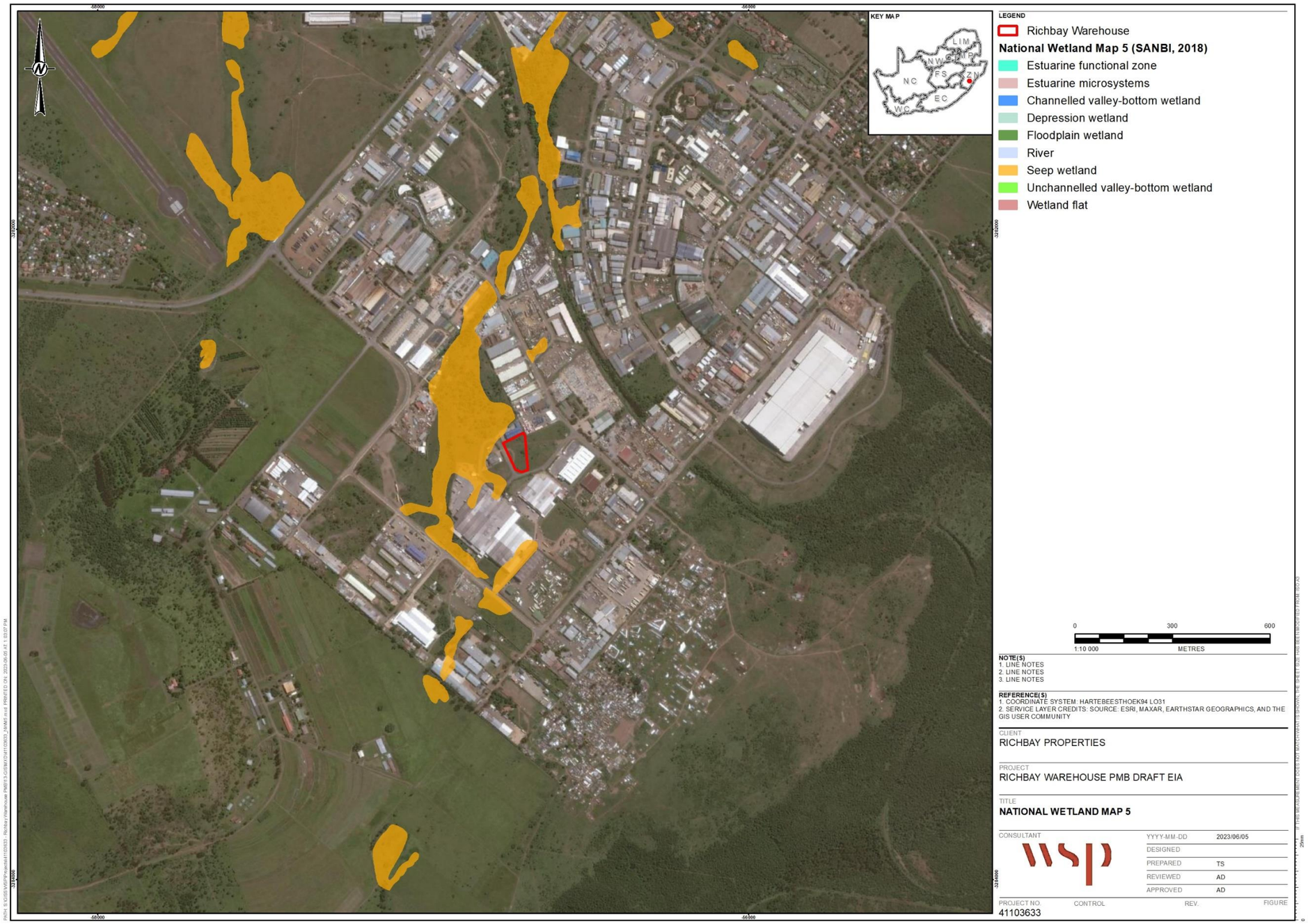
Drawing A-2: Study area



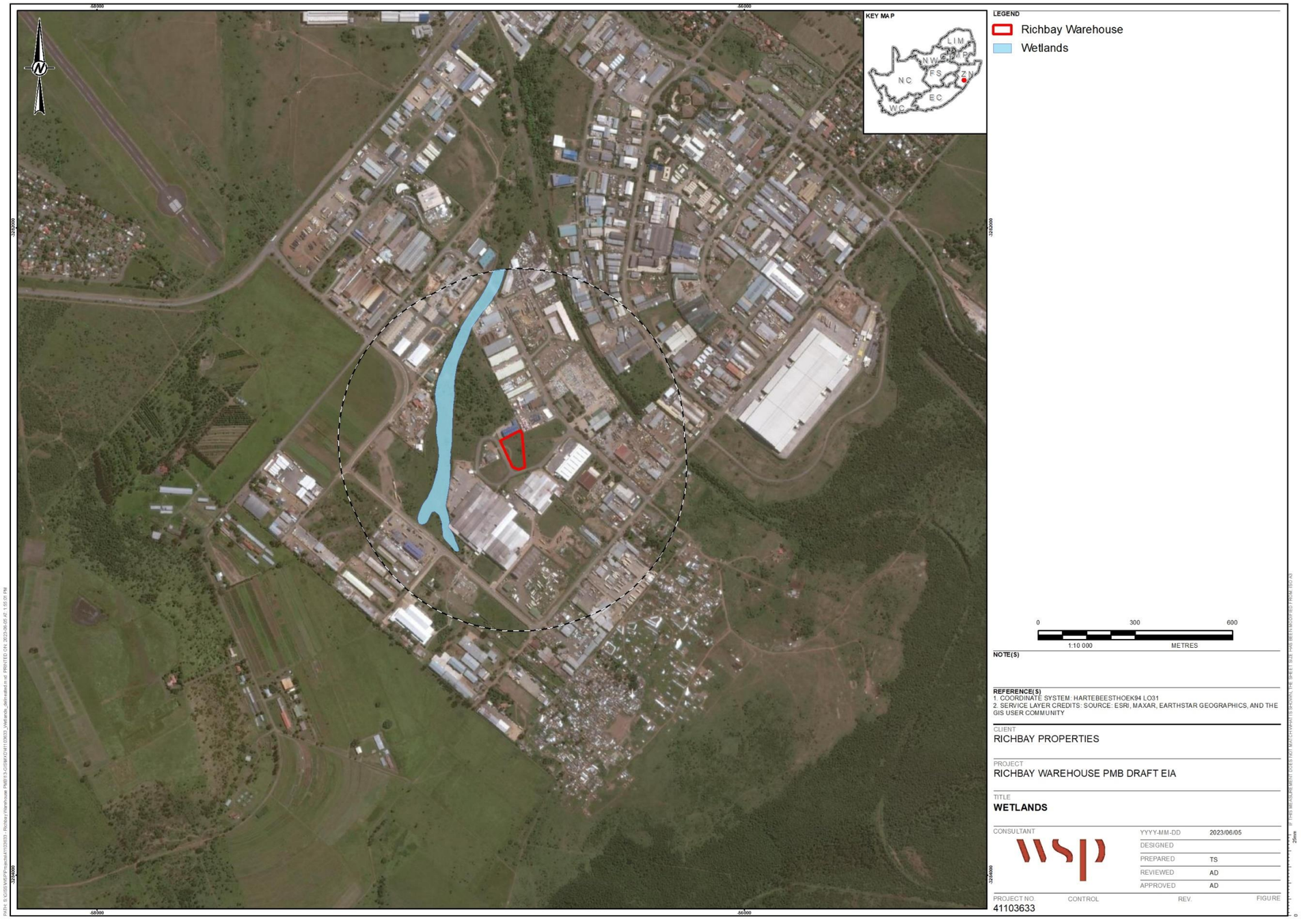
Drawing A-3: Strategic water resource areas



Drawing A-4: FEPA subcatchments/features



Drawing A-5: National Wetland map 5



Drawing A-6: Wetland delineation

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