Aquatic ecosystem assessment for the proposed increase in fuel storage capacity on Erf 21594, Kraaifontein Industrial area

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Executive summary

Moov Energy (Pty) Ltd currently store 46m³ of diesel on its property, Erf 21594, located within the Kraaifontein Industrial area. They propose to reconfigure the layout of their site to accommodate three new bunded above ground storage tanks, and bunding for a fourth one if required in the future. The study area is situated in the Mosselbank Catchment (quaternary catchment G21E).

The erf is completely developed with no aquatic habitats or features occurring on it. However, the southern boundary of the site lies adjacent to a wetland on Erf 21593. This wetland is an artificial feature that has formed as a result of stormwater inputs from upslope development and impeded drainage due to the railway line immediately downslope. The wetland does not support any important or endangered habitats from an ecological perspective. Nevertheless, the wetland does function as a stormwater attenuation pond and therefore provides some level of ecosystem services within the catchment. Given its location adjacent to an industrial area, the most important of these services is the amelioration of water quality. The wetland discharges directly into the stormwater infrastructure of the City of Cape Town which conveys it to the Mosselbank River. The wetland also overlies an aquifer that is of high susceptibility to contamination from anthropogenic activities.

The risk that polluted run-off from the site flows into the artificial wetland would be of a high significance. However this impact is addressed by the designs of the bund area and the stormwater management plan. These will include the following measures to prevent the risk of potentially contaminated runoff discharging into the artificial wetland:

1) *The current stormwater plan makes provision for how contaminated run-off from the site will be kept separate from general 'clean' stormwater from the site. Contaminated run-off and wash water generated on the site will be disposed of into the sewer. Run-off flow intensity and volume are shown to not increase as a result of the development, nor should water quality of the run-off deteriorate. No run-off should flow directly into the wetland adjacent to the site.;*
2) *the outlets of the bunded subdivisions will be designed so that contaminated water containing hydrocarbons can be flushed into the sewer system, whilst clean stormwater in the bund areas can be discharged into the stormwater system; and*
3) *Bund storage capacity exceeds the tank volume to ensure that in a worst-case leak scenario – the entire tank can be contained.*

During construction there is a risk that the waste material from decommissioned infrastructure will be dumped into aquatic features resulting in their disturbance. All waste must be disposed of at an approved waste disposal facility that can accommodate the type of waste being disposed of. While the construction is undertaken on the site there is a risk that run-off from the construction site will flow into the wetland. This impairment of water quality should be avoided by installing stormwater management on the site before construction of the rest of the infrastructure. Furthermore:

-Construction should take place in summer;

- Adequate ablutions are provided for contractors;

- Machinery needs to be serviced to ensure there are no oil or fuel leaks, and provided with drip trays when parked; and

- No stock-piling of material or dumping of waste outside of the site footprint.

When the site is operational there will be trucks passing through the site each day. This means that during rainfall events, run-off from the site could impact upon the wetland adjacent to the site. This can be addressed by designing for onsite stormwater management, as previously described. It can also be managed by ensuring machinery and trucks on site are serviced and provided with drip trays when parked.

Considering that the wetland may contribute to the recharge of an aquifer that is highly susceptible to contamination, it is recommended that the potential impacts to groundwater associated with the proposed development be assessed by a geohydrologist.

The storage of LPG gas is not considered to have any additional impact from an aquatic ecosystem perspective. Furthermore, the storage of oils and other products are not considered to have an additional impact from an aquatic ecosystem perspective. This is because these are already being stored on site and the oils and other products are stored indoors. The stormwater management plan for the site is an improvement from the current scenario

If the recommendations of this report are implemented then the proposed increase in fuel storage capacity on Erf 21594 will most likely have a low to very low impact from a freshwater ecological perspective.

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1 Introduction

1.1 Project background

Moov Energy (Pty) Ltd is situated on Erf 21594 (hereafter referred to as the site) within Kraaifontein Industria, on the outskirts of Kraaifontein, a suburb of Cape Town, in the Western Cape, South Africa. The site currently has two existing Above-ground fuel Storage Tanks (AST) with a combined capacity of 46m^3. Moov Energy (Pty) Ltd proposes to increase the storage capacity by installing two 1000m^3 ASTs for storing 50 parts per million (ppm) diesel and a single 500m^3 AST for storing Unleaded Petrol (ULP).

Moov Energy (Pty) Ltd appointed Kantey and Templer Consulting Engineers to conduct an environmental authorisation application for the proposed works. Kantey and Templer Consulting Engineers subsequently appointed Freshwater Consulting to assess the potential impacts which the proposed activities will have upon aquatic ecosystems and resources.

1.2 Objective statement

The objective of this study is to provide the required freshwater ecological input into the environmental authorisation- and water use authorisation processes. To provide this input, the report aims to:

1) Identify, map the extent of, and assess the ecological functionality, sensitivity and importance of all freshwater features on the site, or potentially impacted by development on the site.
2) Assess the proposed development and its potential impacts to freshwater ecosystems;
3) Provide recommendations regarding the proposed development and mitigation measures to reduce impacts to freshwater ecosystems associated with the development; and
4) Identify potential water uses that will be triggered in terms of the National Water Act (Act. No 36 of 1998) and assess the risk associated with development activities to water resources through application of the Risk Assessment Matrix (RAM), in terms of Government Notice GN 4167 of 2023 as a basis to guide the appropriate Water Use Authorisation process.

1.3 Definitions

Freshwater ecosystems include both water courses and wetlands. Of relevance to this is assessment is the definition of both water courses and wetlands as stipulated in the National Water Act (NWA) (Act 36 of 1998):

"water course" means –

(a) a river or spring;

(b) a natural channel in which water flows regularly or intermittently;

(c) a wetland, lake or dam into which, or from which, water flows; and

(d) any collection of water which the Minster may, by notice in the Gazette, declare to be a water course, and a reference to a water course includes , where relevant, its bed and banks;

"wetland" means –

land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

For a wetland to be classified as such, it must have one or more of the following features (after DWAF 2005):

- Hydromorphic soils that display characteristics resulting from prolonged saturation such as mottles, organic streaking or gleying.
- The presence, at least occasionally of vegetation indicators i.e. the presence of obligate or facultative wetland plants (Corry 2012) which means they are found most often in wetlands.
- A high water table that results in saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil.

1.4 Site location

Erf 21594 is located within Kraaifontein Industria, at number 13 Kiaat Street. Kraaifontein Industrial complex is located on the outskirts of the suburb of Kraaifontein (Figure 1). The site is within the catchment of the Mosselbank River, quaternary catchment G21E. The N1 highway lies along the industrial area's northern boundary, separating it from the smallholdings of Joostenberg Vlakte. Railway lines run along the industrial area's southern and western boundaries. The railways separate the industrial area from residential areas of Kraaifontein. The Kraaifontein refuse transfer station, Kraaifontein integrated waste recycling plant and the informal settlement of Bloekombos are located east of the site.

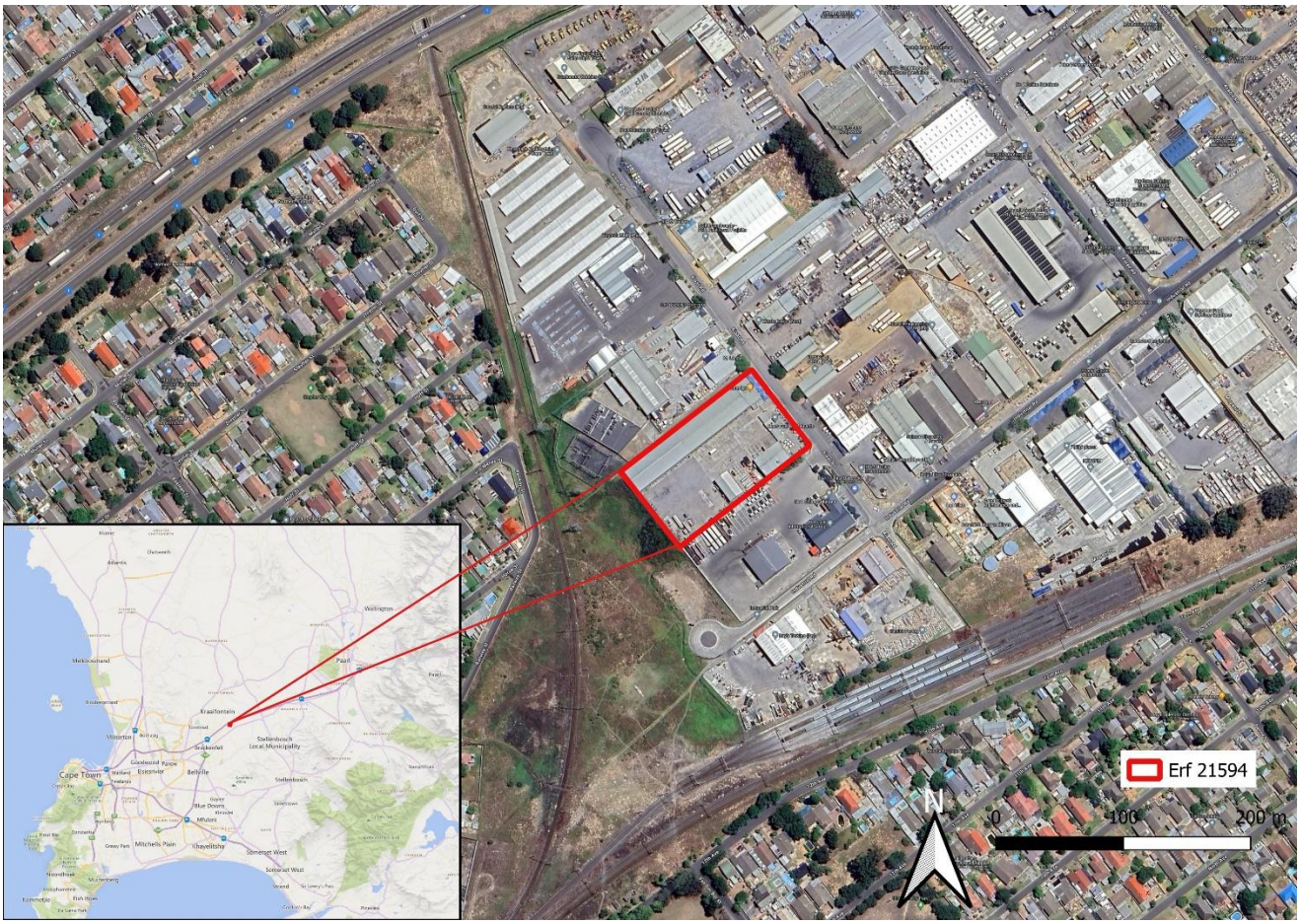

Figure 1. A map of the study area showing its location within Kraaifontein Industria, on the outskirts of the City of Cape Town.

1.5 Legislation considerations

1.5.1 For freshwater resources in South Africa

The National Environmental Management Act (No. 107 of 1998) (NEMA), and the National Water Act (No. 36 of 1998) (NWA) regulate activities potentially impacting upon freshwater resources in South Africa.

a) NEMA

Of particular relevance are Activities 12, 19 and 48 of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended). These listed activities refer to specific works or development within a watercourse, within a mapped setback area from a watercourse or, if no setback is mapped, within 32m of a watercourse. Activities 10, 14, 18 and 23 of Listing Notice 3 (GN 324) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations, 2014 (as amended), may also have relevance. The National Environmental Management Act is enforced by the provincial Department of Environmental Affairs and Development Planning (DEAD-P).

b) NWA

The National Water Act is the legislature responsible for the management and protection of South Africa's water resources. Sections 21 of the NWA lists eleven water uses. These are:

21(a) taking water from a water resource;

21(b) storing water;

21(c) impeding or diverting the flow of water in a watercourse;

21(d) engaging in a stream flow reduction activity contemplated in section 36;

21(e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);

21(f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;

21(g) disposing of waste in a manner which may detrimentally impact on a water resource;

21(h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

21(i) altering the bed, banks, course or characteristics of a watercourse;

21(j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

21(k) using water for recreational purposes.

Section 21 (c) and (i) water uses are typically relevant to developments where freshwater features occur. There are two possible ways of authorising a new Section 21 (c) and (i) water use – a Water Use License (WUL) or a General Authorisation (GA). The application for a WUL (known as a Water Use License Application or WULA) is typically longer than that of a GA, and requires more information in order to be processed. A WUL is a customised authorisation with conditions specific to the proposed water uses. The GA is a legislated document (Government Notice GN 4167 of 2023) with set conditions. Government Notice GN 4167 of 2023 also specifies how to determine the risk which the water use poses to a water resource. The risk assessment matrix is the tool used to determine whether an activity requires a WUL or can be authorised as a GA. A low-risk activity can be a GA whilst a moderate or high risk requires a license.

The proposed activity is located on a site which borders directly on a wetland. There is therefore a risk of the activity impacting aquatic habitats and a Section 21 (c) and (i) water use is likely to be triggered. A risk assessment has been carried out in this report to guide the water use authorisation process.

1.5.2 For Freshwater assessment reports

For environmental impact assessments, NEMA, through Government Notice 320 in Government Gazette 43110 of 20 March 2020, requires certain criteria to be met by specialist reports These requirements and where they are addressed in this report, is given in Table 1.

Table 1. Table of requirements for specialist report, from Government Notice 320 in Government Gazette 43110 of 20 March 2020, and where they can be found in this report.

No.	*Requirements*	*Location in this report*
2.1	Assessment must be undertaken by a suitably qualified SACNASP registered specialist	Appendix I
2.2	Description of the preferred development site, including the following aspects-	Section 2
2.2.1	a. Aquatic ecosystem type	Section 3.1
2.2.1	b. Presence of aquatic species and composition of aquatic species communities, their habitat, distribution, and movement patterns	Section 3.1

2.2.2	Threat status, according to the national web based environmental screening tool of the species and ecosystems, including listed ecosystems as well as locally important habitat types identified	Section 2 and 3
2.2.3	National and Provincial priority status of the aquatic ecosystem (i.e., is this a wetland or river Freshwater Ecosystem Priority Area (FEPA), a FEPA sub- catchment, a Strategic Water Source Area (SWSA), a priority estuary, whether they are free-flowing rivers, wetland clusters, etc., a CBA or an ESA; including for all a description of the criteria for their given status	Section 2.5
2.2.4	A description of the Ecological Importance and Sensitivity of the aquatic ecosystem including:	Section 3
	a. The description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g., movement of surface and subsurface water, recharge, discharge, sediment transport, etc.);	Section 3
	b. The historic ecological condition (reference) as well as Present Ecological State (PES) of rivers (in-stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel, flow regime (surface and groundwater)	Section 3
2.3	Identify any alternative development footprints within the preferred development site which would be of a "low" sensitivity as identified by the national web based environmental screening tool and verified through the Initial Site Sensitivity Verification	N/A
2.4	Assessment of impacts – a detailed assessment of the potential impact(s) of the proposed development on the following very high sensitivity areas/ features:	Section 5
2.4.1	Is the development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	Section 5
2.4.2	Is the development consistent with maintaining the Resource Quality Objectives for the aquatic ecosystems present?	Section 5
2.4.3	How will the development impact on fixed and dynamic ecological processes that operate within or across the site, including:	Section 5
	a. Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g., suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes);	Section 5
	b. Change in the sediment regime (e.g., sand movement, meandering river mouth/estuary, changing flooding or sedimentation patterns) of the aquatic ecosystem and its sub-catchment;	Section 5

	c. The extent of the modification in relation to the overall aquatic ecosystem (i.e., at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.) and	Section 5
	d. Assessment of the risks associated with water use/s and related activities.	Section 10
2.4.4	How will the development impact on the functionality of the aquatic feature including:	Section 5
	a. Base flows (e.g., too little/too much water in terms of characteristics and requirements of system);	Section 5
	b. Quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g., seasonal to temporary or permanent; impact of over abstraction or instream or off-stream impoundment of a wetland or river);	Section 5
	c. Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g., change from an unchanneled valley-bottom wetland to a channelled valley-bottom wetland);	Section 5
	d. Quality of water (e.g., due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication);	Section 5
	e. Fragmentation (e.g., road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and	Section 5
	f. Loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g., waterfalls, springs, oxbow lakes, meandering or braided channels, peat soil, etc).	Section 5
2.4.5	How will the development impact on key ecosystem regulating and supporting services especially Flood attenuation; Streamflow regulation; Sediment trapping; Phosphate assimilation; Nitrate assimilation; Toxicant assimilation; Erosion control; and Carbon storage.	Section 5
2.4.6	How will the development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	Section 5
2.4.7	In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered, in relation to size of the estuary; availability of sediment; wave action in the mouth; protection of the mouth; beach slope; volume of mean annual runoff; and extent of saline intrusion (especially relevant to permanently open systems).	Section 5
	3. The report must contain as a minimum the following information:	
3.1	Contact detail of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	Appendix I
3.2	A signed statement of independence by the specialist.	Appendix II

3.3	A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment.	Section 1.6
3.4	The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant.	Section 1.6
3.5	A description of the assumptions made, any uncertainties or gaps in knowledge or data.	Section 1.7
3.6	The location of areas not suitable for development, which are to be avoided during construction and operation, where relevant.	N/A
3.7	Additional environmental impacts expected from the proposed development.	Section 5
3.8	Any direct, indirect and cumulative impacts of the proposed development on site.	Section 5
3.9	The degree to which impacts, and risks can be mitigated.	Section 5
3.10	The degree to which impacts, and risks can be reversed.	Section 5
3.11	The degree to which the impacts and risks can cause loss of irreplaceable resources.	Section 5
3.12	A suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies.	N/A
3.13	Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr).	Section 5
3.14	A motivation must be provided if there were development footprints identified as per paragraph 2.3 for reporting in terms of Section 24(5)(a) and (h) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) that were identified as having a "low" aquatic biodiversity and sensitivity and that were not considered appropriate.	N/A
3.15	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not.	Section 11
3.16	Any conditions to which this statement is subjected.	Section 11

1.6 Methods

The findings of this report were informed by a desktop review of available information as well as a site visit conducted on the 23rd of May 2024. The following methods were used to assess the freshwater ecosystems on the site:

- The ecological importance and sensitivity of the wetland habitats was assessed according DWAF, 1999;
- The ecosystem services supplied by the wetland areas was assessed using Wet-EcoServices as described by Kotze *et al* (2020); and
- The risk posed to water resources by the activity was assessed using the Risk Assessment Matrix developed by the DWS and legislated in GN 4167 of 2023.

1.7 Limitations

Whilst each of the above-mentioned tools have certain limitations that are discussed by their authors, the additional limitations to this specific assessment include the following:

- The detection and assessment of wetland habitats processes is complicated by the highly modified environment within which the study site is located.
- The site visit was conducted late in May 2024, despite high rainfall in mid-autumn, late May represents the end of the area's dry season and therefore habitat indicators (such as vegetation) were more difficult to detect;
- A lack of long term or seasonal data to describe variability in freshwater characteristics of the area; and
- The rapid level at which the assessments were undertaken.

2 Study area context

2.1 Catchment characteristics

The study site lies within the G21E quaternary catchment, drained by the Mosselbank River (Figure 2). The Mosselbank is a tributary of the Diep River which drains into the sea in Table Bay. The lower Diep River system is subject to extensive impacts as a result of urban residential, informal and industrial development associated with the northern suburbs of the City of Cape Town. Of particular concern to the Diep River and its estuary are the significant water quality impacts from run-off and discharges into the system.

The G21E catchment has an area of 53287.2 hectares and occurs on low, gently sloping hills and plains. The aspect is south-westerly. Agricultural land use, predominantly for dryland, winter crops and pastures, dominate the northern portions of the catchment. The southern portions, including areas around the study site, are dominated by residential, industrial and informal developments.

The Mean Annual Run-off (MAR) for the catchment is 60.04 mm/annum (Middleton & Bailey, 2008) and the Mean Annual Precipitation (MAP) is approximately 541mm (Schulze, 2009). It receives most of its annual precipitation during the winter months of June – August (Figure 2A). Summers are from December – February are typically hotter and drier than winters (Figure 2B).

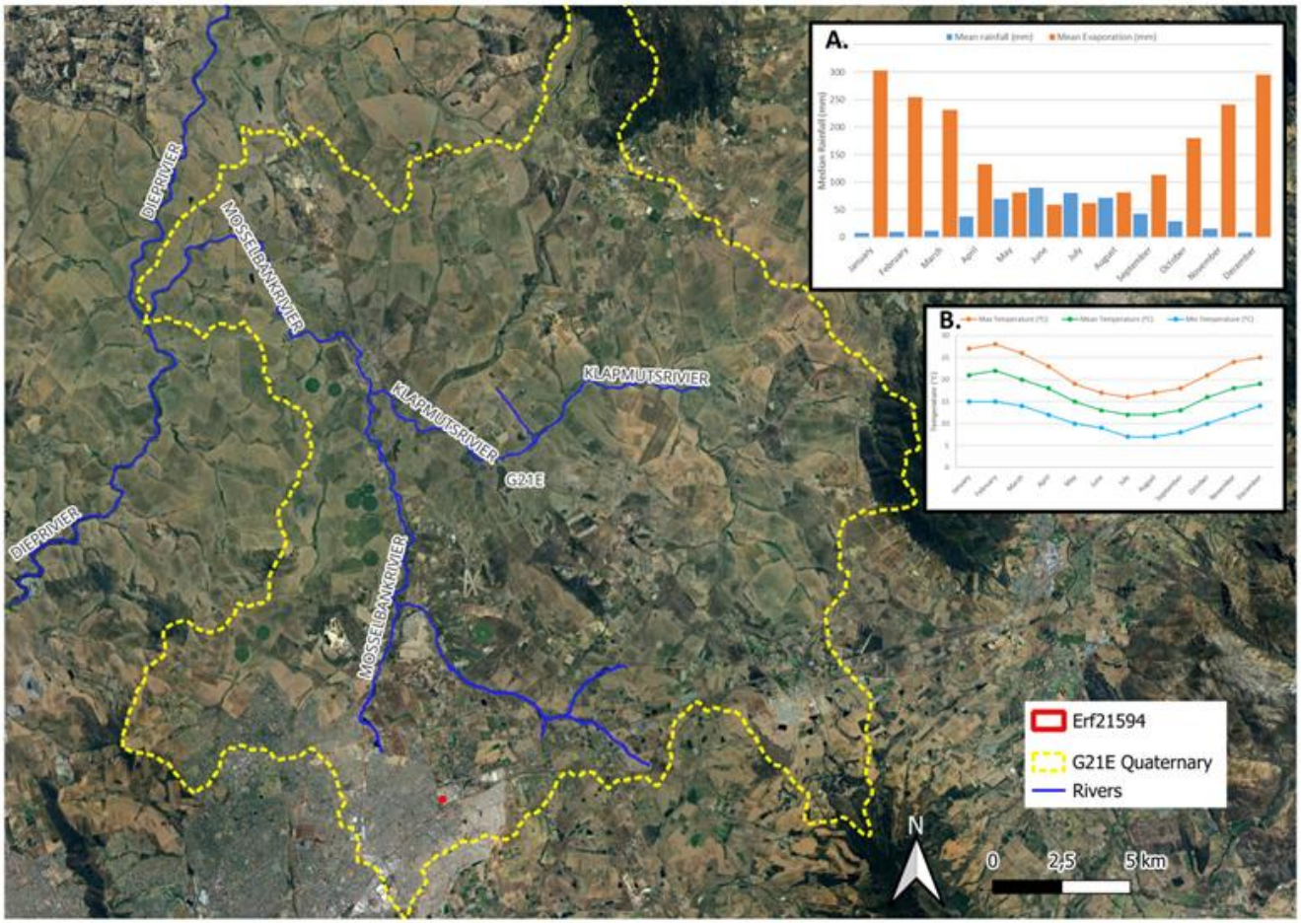

Figure 2. A map of the G21E catchment showing the location of the site relative to the Mosselbank and Klapmuts Rivers draining towards the Diep River. Insets show: (A) the mean annual rainfall (blue) and mean evaporation (orange) for the area and (B) shows the mean monthly maximum (orange), mean (green) and minimum (blue) temperatures (Schulze, 2009)

2.2 Land use and an historical review of the site

A review of historical aerial photographs and satellite imagery of the site was conducted to understand the nature of the site and adjacent wetlands prior to the anthropogenic impacts that are currently evident within the study area.

Aerial imagery of the site captured in 1938 (Figure 3A), shows that prior to the industrial development of the area, the land use was predominantly smallholdings, similar to what is observed in Joostenberg Vlakte today. There is no clear evidence that natural wetland habitat occurred within, or adjacent to the study site. A watercourse is evident in the 1938 photograph, north of the site. It flows west, towards the Mosselbank River. Construction of a railway line to the south and west of the site, perpendicular to the topographic gradient and thus to overland flow direction, had been completed more than 80 years ago. The railway line would have created a berming effect, thus impeding surface runoff.

By 1996 (Figure 3B) there had been substantial residential development to the west of the site. The industrial area was under development, with many erven, including the study site, still vacant. The watercourse, mentioned above, was separated from the site by the N1 highway by 1996 and captured in a stormwater channel and pond north of the highway.

Over the subsequent 12 years (1996 -2008), there is evidence of wet areas establishing on the south-western boundary of the site (Figure 3B-D), on Erf 21593, most likely in response to increased catchment hardening and the location of the railway that impedes runoff. In 1996 the artificial wetland habitat appears as dark green vegetation and by 2005 there is a brown core to this area which is most likely *Typha capensis* bulrushes. By 2008 there is more evidence of bulrushes with dark patches that appear to be open water. In 2008, a stormwater channel has been excavated across Erf 21593, conveying flow north west. Essentially, the formation of artificial wetland habitat adjacent to the site is most likely a consequence of increasing catchment hardening, together with the location of the railway that acts as a berm within the landscape, impeding flow and driving the formation of seasonal and temporary wetlands on the upslope side of the railway.

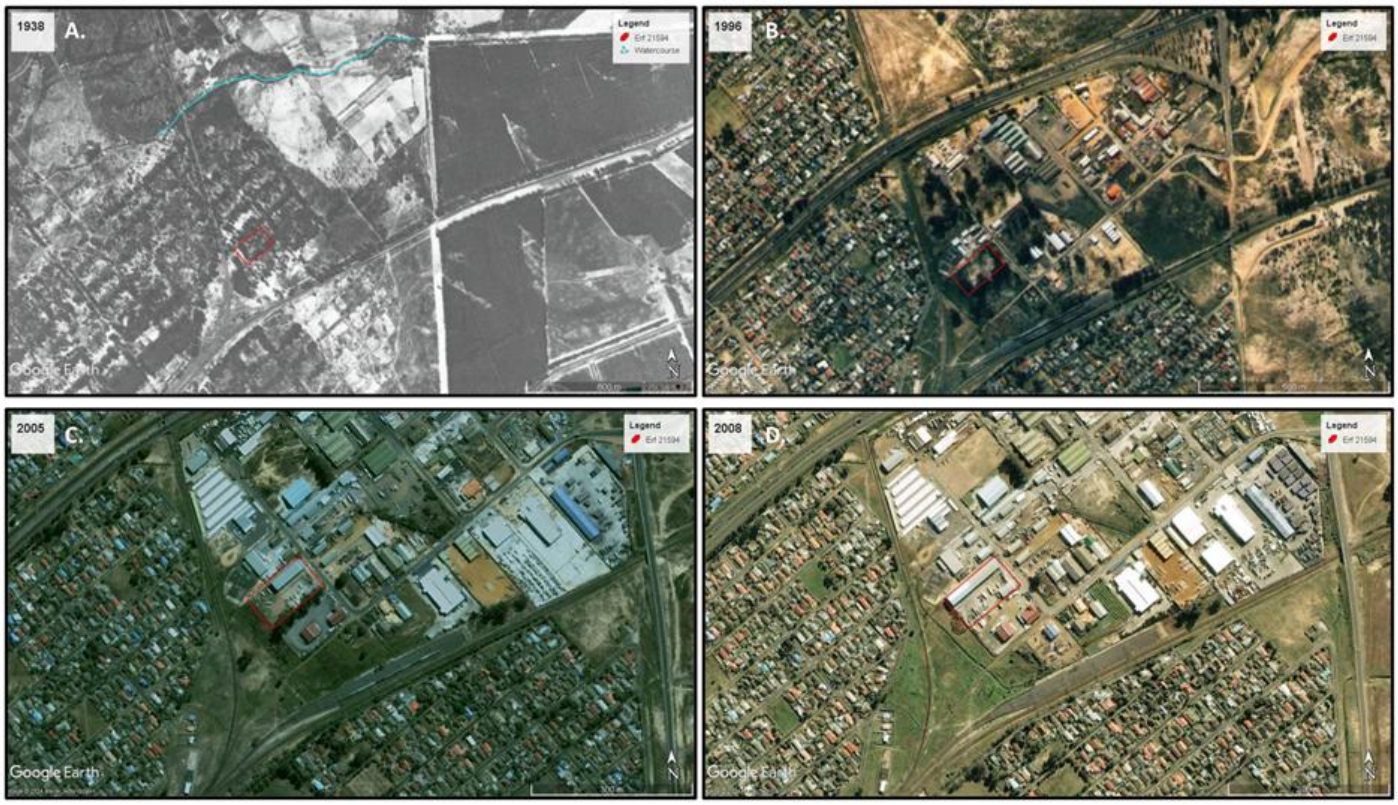

Figure 3. Aerial photographs and Google Earth satellite imagery of the site from 1938 to 2008, showing the development of the industrial area

2.3 Abiotic factors (Geology, topography, soil)

The study site lies on very gently sloping plains on the interface between industrial and residential areas of Kraaifontein. The soils of the area are grey aeolian sands, relatively deep and well drained. The area overlies a major aquifer with an average depth to groundwater of 9.13 meters below ground level (DWAF, 2005). It is a vulnerable aquifer with a high susceptibility for contamination by anthropogenic activities (Figure 4).

The natural drainage across the area, has been modified by development of infrastructure such as railway lines, roads and hardened surfaces. Where infilling has taken place around railway lines or other infrastructure, drainage may be slowed by the fill material. Due to the very low gradients across the site, this will cause some perching of water and can drive the formation of temporary wetlands. Drainage and flow through the area is primarily determined by the stormwater infrastructure that has been installed. The flow from Kraaifontein industria gravitates to its south-western boundary where it daylights into the wetland described in Section 2.2. It is then conveyed in an open channel to the north and west, via the City of Cape Town's stormwater infrastructure until it discharges into the Mosselbank River just upstream of the Kraaifontein Waste Water Treatment Works (refer to Figure 5).

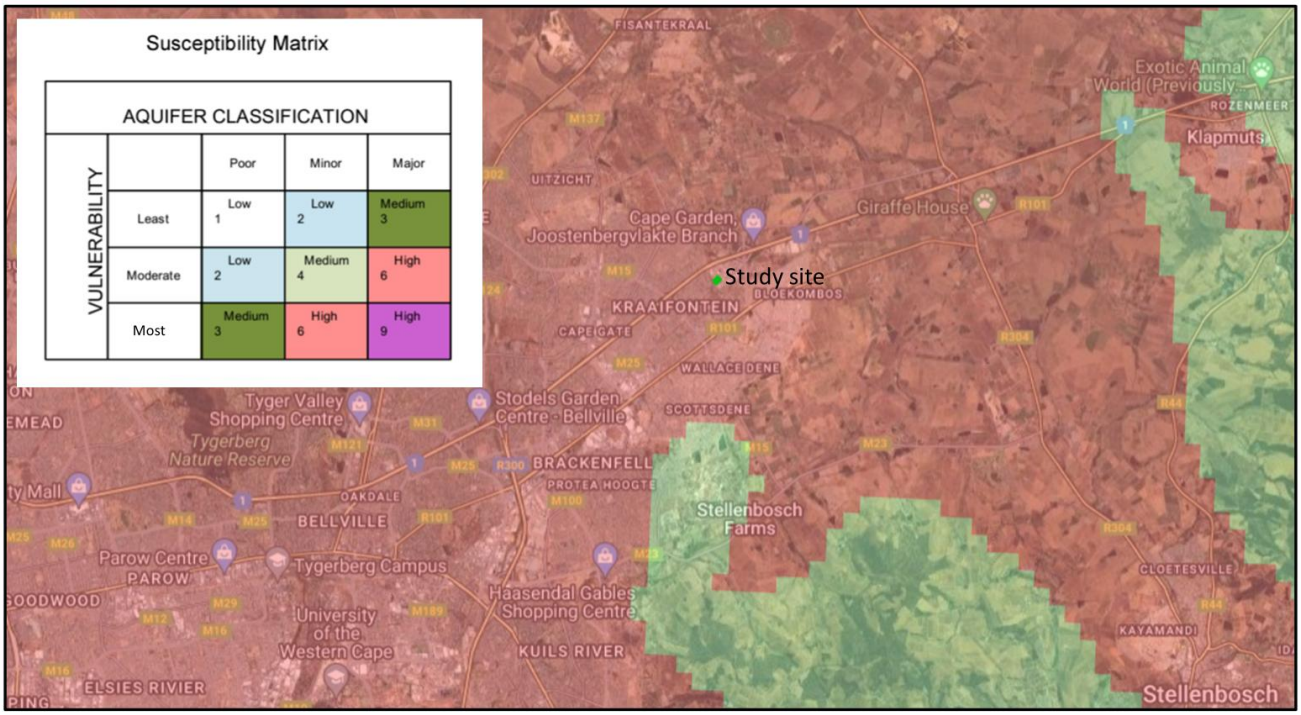

Figure 4. A map of aquifer susceptibility (DWS, 2013) for the study area

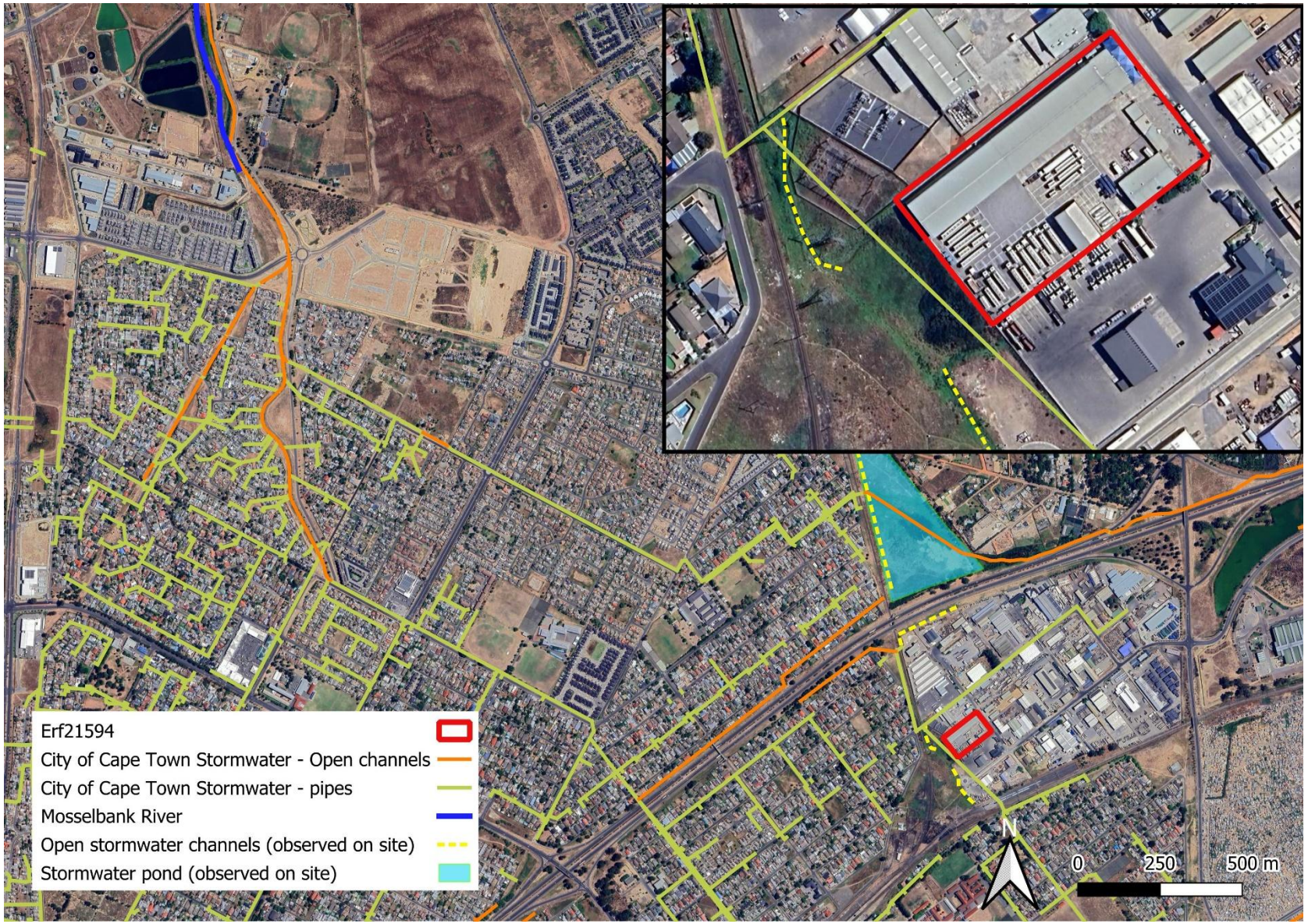

Figure 5. A map of the Moov Energy site showing how run-off from the site (and the rest of the Kraaifontein Industria) is conveyed through the City of Cape Town's stormwater infrastructure to the Mosselbank River

2.4 Biotic factors (Fauna and Flora)

The area was historically vegetated with Cape Flats Sand Fynbos. This is a moderately tall shrubland with some scattered emergent taller shrubs. It occurred naturally across the sandy soils of the Cape Flats. Due to the transformation of this area as a result of the sprawl of the City of Cape Town, this vegetation type is considered critically endangered. The site, erf 21594, is itself completely developed and contains no remnants of natural vegetation. Erf 21593, to the south of the site, contains some highly modified remnants of natural vegetation. This area is however significantly modified by the railway and the excavation of stormwater ponds and channels. There is also evidence that the site is disturbed by regular burning. No sensitive or rare, plant or animal species were observed on the site and due to its highly modified state it is unlikely to contain them.

2.5 Conservation planning

The City of Cape Town's Biodiversity Network mapping (City of Cape Town, 2018), the City of Cape Town's wetland mapping (City of Cape Town, 2017), the National Freshwater Ecosystem Priority Areas (NFEPA) (Nel *et al*., 2011) and the National Wetland Mapping Version 5 (Van Deventer *et al*., 2018) mapping initiatives were consulted to determine if there are any areas identified as priorities for conservation, on or near to the study site. There are no critical biodiversity areas or ecological support areas mapped on or adjacent to the site. The National Freshwater Ecosystem Priority Areas (NFEPA) (Nel *et al*., 2011) and the National Wetland Mapping Version 5 (Van Deventer *et al*., 2018) mapping initiatives have not mapped any wetlands on or near the site. The City of Cape Town wetland mapping has mapped the wetland which occurs on Erf 21593, south of the site, as a natural or semi-natural wetland. This is connected to another wetland, mapped as transformed, which occurs on Erf 2295 (Figure 6).

These areas were visited on the 23rd of May 2024. The transformed wetland mapped by the City of Cape Town on Erf 2295 has been developed. The remaining extent of the wetland on Erf 21593, mapped as natural or semi-natural by the City of Cape Town, was observed on site. This wetland is further described and discussed in the following section of this report.

Figure 6. A map of the study site, showing the areas of conservation concern in the City of Cape Town's biodiversity network and wetlands mapping

3 Freshwater Assessment

3.1 Current extent of aquatic habitats on site

The only wetland that occurs in close proximity to the site is the artificial wetland on Erf 21593, against the southern boundary of the site (Figure 7). This wetland is mapped as natural or semi-natural by the City of Cape Town's wetland mapping conducted in 2017. However, through an assessment of historical imagery and site evaluation, it is probable that this wetland has established as an artificial system due to increased catchment hardening and associated stormwater runoff from Kraaifontein Industria, and impedance against the railway line.

The wetland is fed by a stormwater channel that conveys flow from the south-east, as well as directly from flows off the roads of the industrial area and from the developed erven 21596, 21594 (study site), 11477, 10268 and 5266 (Figure 8A & B). The area that lies against Erf 21594 and 11477 is permanently inundated, with a seasonal fringe (Figure 8C). The wetland extends around Erf 11477 in an excavated channel (Figure 8D). Water within the wetland then enters the stormwater system of the City of Cape Town, and discharges into the Mosselbank River immediately upstream of the Kraaifontein waste water treatment works.

The permanently saturated areas of the wetlands are dominated by dense growth of *Typha capensis* bulrushes. The seasonal edges are overgrown with kikuyu grass (*Cenchrus clandestinus*), *Pycreus polystachyos* var. *polystachyos*, Spanish reed (*Arundo donax*) Castor oil (*Ricinus communis*) and dock weed (*Rumex crispus*). At the time of the site visit, the wetland had recently been disturbed by the removal of vegetation and sediment by machinery.

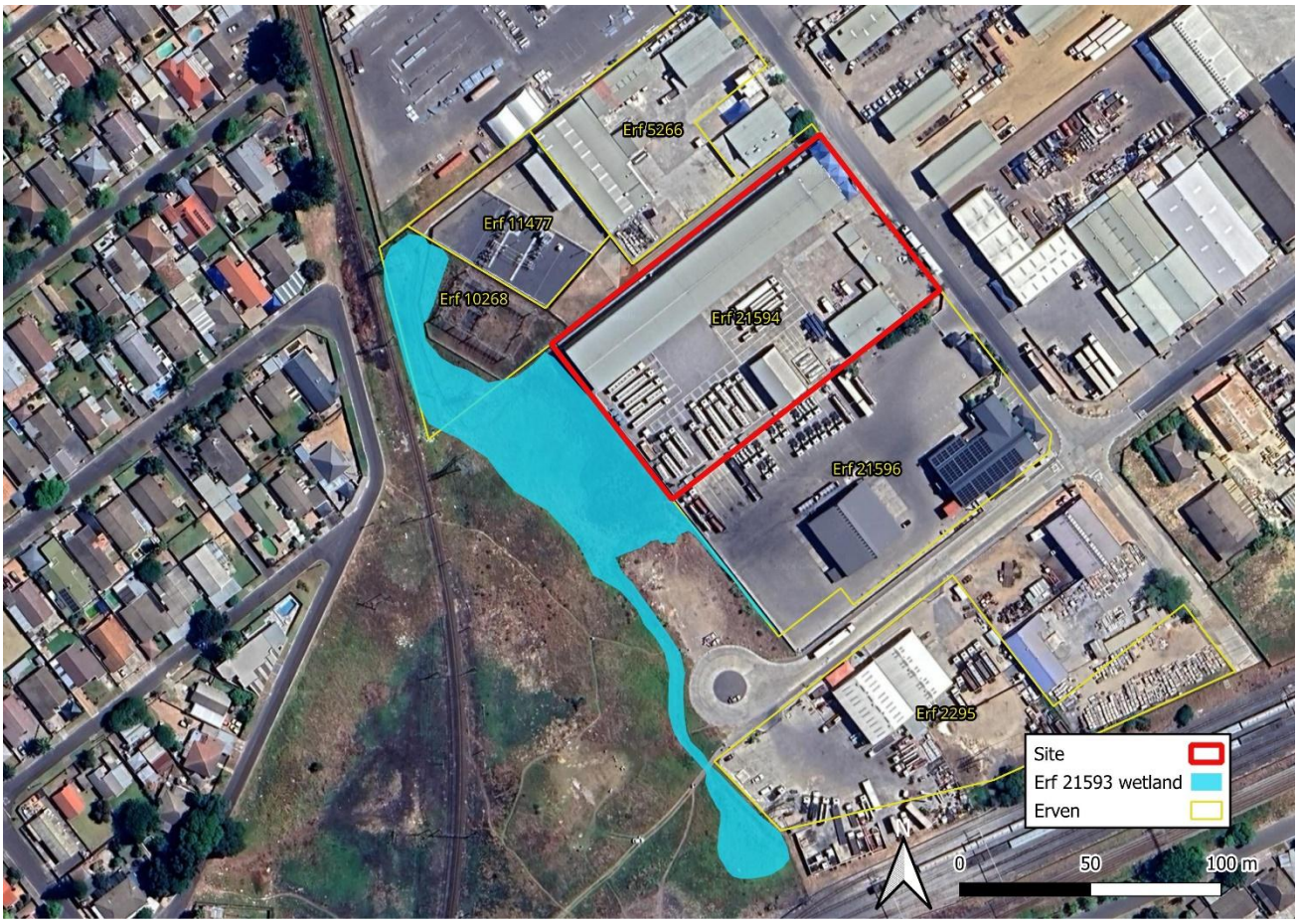

Figure 7. A map of the study site, showing the extent of the wetland on the adjacent Erf 21593, mapped as part of this study.

Figure 8. Photographs of the wetland on Erf 21593, showing, (A) the locations where run-off from Erf 21596 enters the wetland; (B) the location where run-off from the roads of the Kraaifontein industrial area flows into the wetland; (C) the permanently inundated wetland area against the boundary wall of the site ;(D) the channel of the wetland flowing from the east; and (E) the channel flowing to the west around erf 10268.

3.2 Habitat Assessment

The determination of a wetland's Present Ecological State (PES), using methodology such as the *WET*-Health tool (Macfarlane *et al.*, 2020), is an assessment of the wetland's deviation from its natural reference state. As the wetland on erf 25193 is artificial and has no natural state against which to assess it, an assessment of PES is not appropriate.

Nevertheless, all wetlands, whether natural or artificial, that support aquatic habitat may be considered ecologically important and are therefore subject to the assessment of its Ecological Importance and Sensitivity and the ecosystem services which may be provided.

3.3 Ecological importance and sensitivity

The ecological importance and sensitivity of the wetland on Erf 21593 was assessed according to DWAF (1999). This assessment ranks functional importance as well as the sensitivity of habitats and species of the aquatic features using a four-point scale. The four-point assessment scale is shown in Table 2.

Table 2. The categories of the four-point scale used to assess an aquatic feature's importance and sensitivity (DWAF, 1999)

	General description	Range of median
Very high	Quaternaries/delineations that are considered to be unique on a national and international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually very sensitive to flow modifications and have no or only a small capacity for use.	>3-4
High	Quaternaries/delineations that are considered to be unique on a national scale based on their biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases may have substantial capacity for use.	>2-≤3
Moderate	Quaternaries/delineations that are considered to be unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are not usually very sensitive to flow modifications and often have substantial capacity for use.	>1-≤2
Low/ marginal	Quaternaries/delineations that are not unique on any scale. These rivers (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have substantial capacity for use.	≤1

The findings of the EIS assessment are shown in Table 3. Despite the presence of aquatic habitat, the wetland does not support any sensitive species or habitats. It has low diversity and is dominated by alien plant species. Due to the poor water quality of the run-off which flows into the wetland, it is unlikely to support a diverse aquatic faunal community. It is therefore deemed to be of low ecological importance and sensitivity.

Table 3. The ecological importance and sensitivity of the wetland which occurs on Erf 21593

	Erf 21593 Wetland
Rare and endangered biota	1
Unique biota	1
Intolerant biota	1
Species/taxon richness	1
Diversity of aquatic habitat types or features	2
Refuge value of habitat type	2
Sensitivity of habitat to flow changes	1
Sensitivity of flow related water quality changes	1
Migration route/corridor for instream and riparian biota	1
National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, PNEs	1
RATINGS	1
EIS CATEGORY	**Low**

3.4 Ecosystem services

The assessment of the ecosystem services provided by the wetland on Erf 21593 was conducted according to the guidelines as described by Kotze *et al* (2020) for *WET*-Ecoservices assessment. The assessment examines and rates the services shown in Figure 9. The assessment evaluates a wide range of relevant characteristics of the wetland and its catchment to determine 1) the extent to which the wetland can supply a specific service and 2) the extent to which this service could be considered valuable in the context of the wetland's location (demand for the service).

Ecosystem services where both, the demand for the service within a catchment context, and the ability of the wetland to provide such services, are considered significant. A service that is demanded of the wetland, given its context within an industrial area, is the amelioration of water quality through assimilation of phosphates, nitrates and toxicants. Despite the impacts to the wetland, it is able to provide this service to a limited degree.

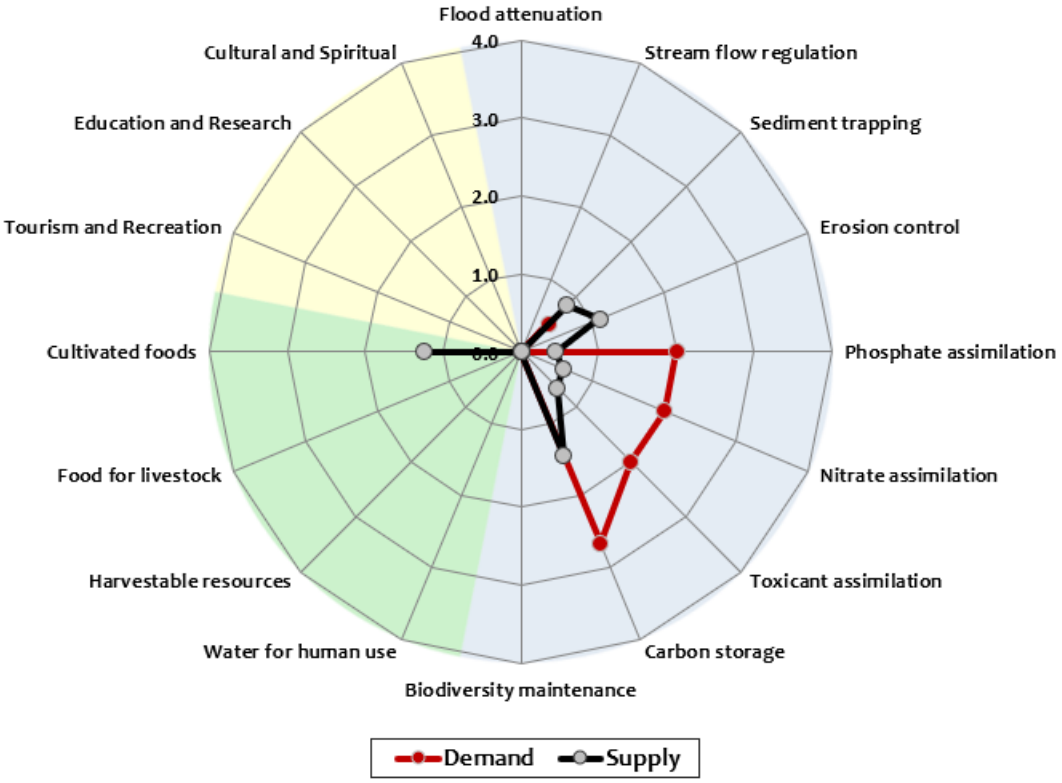

Figure 9. A radar diagram, showing the extent to which various ecosystem services are supplied by- and demanded of the wetland on Erf 21593

4 Activity description

The proposed activity entails the removal of the two existing diesel ASTs with a combined capacity of 46 m^3 and the installation of three new ASTs with a combined capacity of 2 500 m^3, with the configuration as follows:

- 2 x 1 000 m^3 aboveground tanks for the storage of 50 ppm diesel; and

- 1 x 500 m^3 aboveground tank for the storage of ULP 95.

The existing diesel tanks will become obsolete. The project will therefore involve the construction of one main reinforced concrete bund with intermediate walls, thus allowing all tanks to be located within their own subdivision. A total number of four aboveground tanks can be accommodated within the available space. Under the current project, only three tanks will be constructed with space allowance for a future tank. Each intermediate bund will comprise a drain pit (sump).

In addition to the storage of diesel in the aboveground tanks, there may be as many as four pre-loaded diesel tankers (trucks) parked overnight on the facility. The tankers have a capacity of 40 000l each. There will be no petrol tankers standing full overnight on the site. Full tankers will be parked under a canopy. The parking area for overnight full tankers will have an oil water drainage channel to the oil separator. A new washbay is also proposed on the site.

The project will also involve the demolition of two warehouses (one of which contains a wash bay and the other contains oil drums), an out building at the sites entrance, the toilets and office space within the main warehouse and two small storerooms (with firefighting equipment mounted on them) to make way for the proposed project. A new access entrance gate will be created. The existing entrance and exit will be used exclusively as an exit with the project.

In addition to the fuel storage tanks – the site will contain storage of LPG gas (1.5 tonnes) on the site. It is also proposed to store 500 000l of other products within the existing main warehouse on the site. This 500 000l of product comprises of the following:

- 99% of the product will be lubricants and oils,
- 0.5% will be degrasol engine cleaner, and
- The remaining 0.5% will be ethanol solution.

It is important to note that the gas and other products mentioned are already stored on the site.

As part of the new development, a stormwater management plan has been compiled (Kantey & Templer, 2025) (Figure 11). This plan indicates all water running off the site will be separated into three categories, namely: Clean Storm Water (CSW), Accidentally Oil Contaminated (AOC) and Continuously Oil Contaminated (COC). Any contaminated water from the site or the bund areas will be drained to the sewer. Clean water will be allowed to flow into the stormwater pond, off site, via a underflow / overflow discharge manhole. Any flow from the new wash bay, areas where loaded trucks will be staged overnight on the site and the truck loading point are considered COC. The bund areas around the new above ground storage tanks will be considered AOC. The water from the bunds will drain to a central switching valve, which will remain closed. After an inspection of the bund contents, the valve will be used to drain the water to the CSW system if uncontaminated or to the COC system, if contaminated.

The proposed development will not result in any increase in peak flow run-off volumes from the site. This is because the site is already completely covered by hardened surfaces.

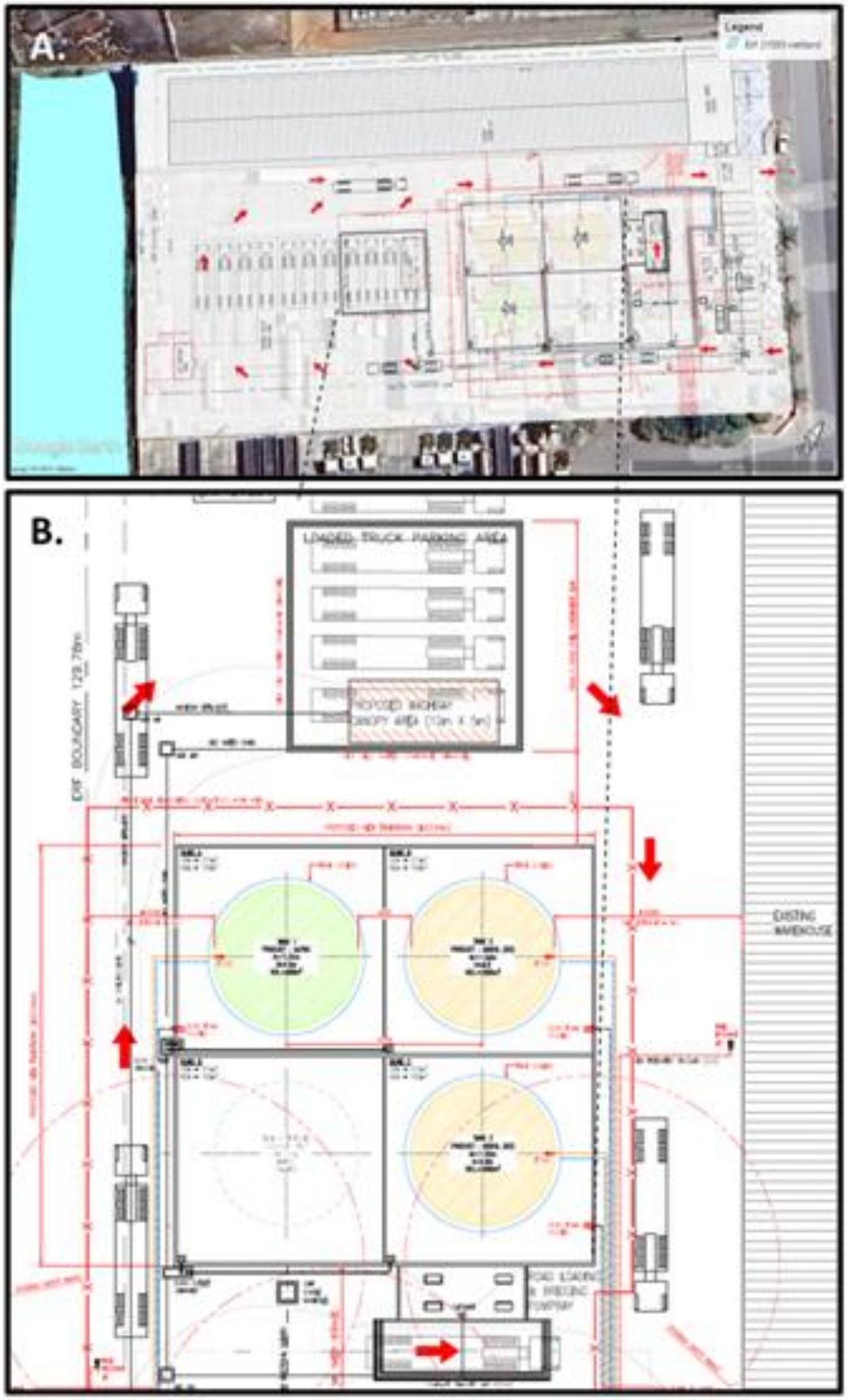

Figure 10. The new proposed layout of the site(Revision E), (A) overlain over a Google Earth satellite image showing the proximity of the ASTs and wash bay to the wetland area on Erf 21593.

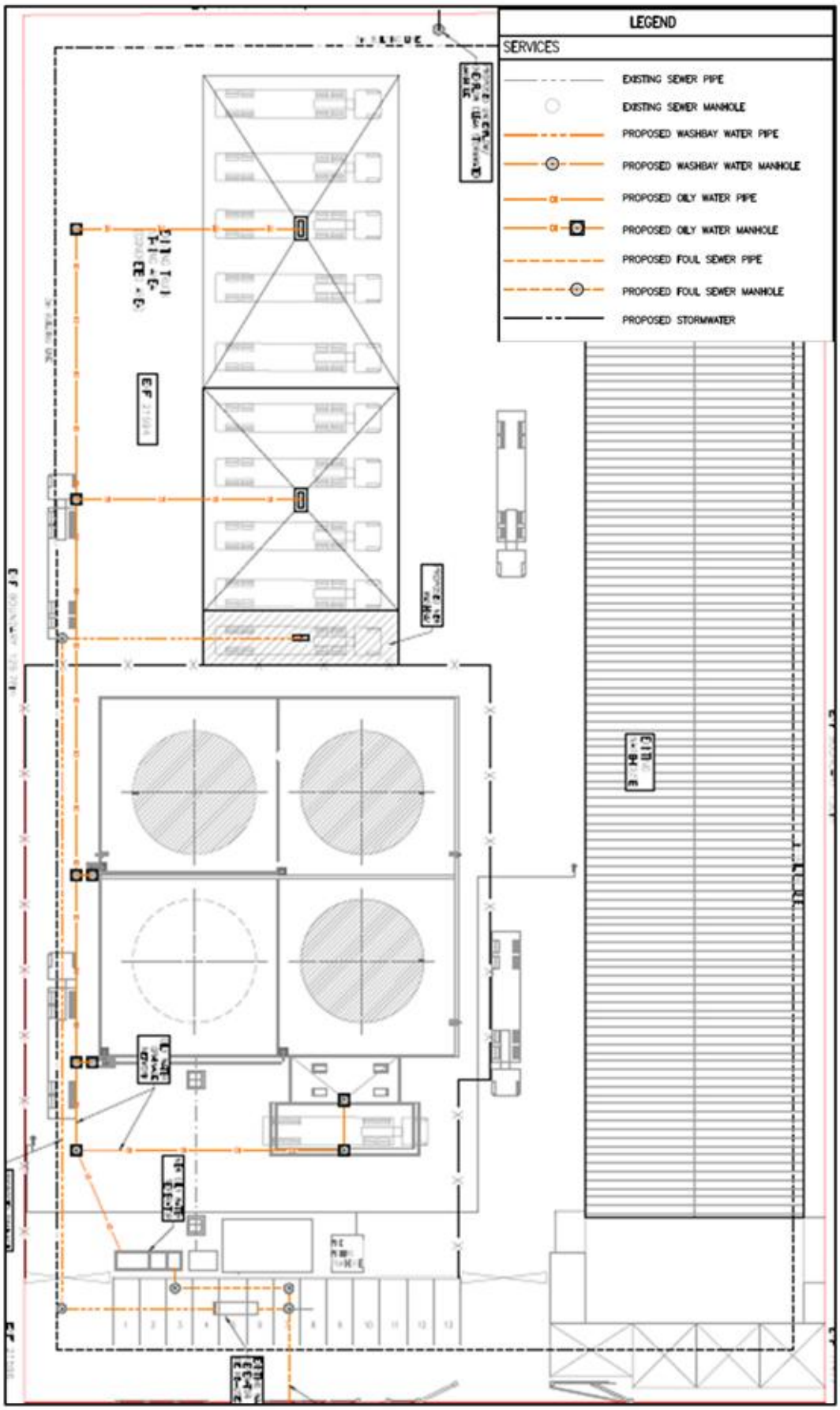

Figure 11. The proposed stormwater drainage layout (from Kantey & Templer, 2025)

5 Impact Assessment

The impact assessment methodology (Appendix III) is applied to the current proposed activity as well as to a 'with mitigation' scenario. All impacts listed are negative unless stated otherwise.

5.1 Planning Phase

During rainfall events potential runoff of contaminated stormwater arising from the site. Although the tanks themselves will be bunded, they have outflow valves that can potentially discharge into the stormwater system. In the event of flow of polluted runoff from the bunded area, contaminated stormwater would enter the wetland and thus compromise its ability to fulfil its currently functionality of stormwater attenuation and water quality amelioration. Furthermore, the potential discharge of contaminated stormwater into a wetland that ultimately discharges into a natural watercourse, is considered an impact at a **regional** scale, prior to consideration of mitigation. The duration of the impacts to water quality will be difficult to reverse and will persist in the **long-term** term. Due to the highly modified ecosystem which the wetland represents, and small relative scale of the site and subsequent low contribution to run-off from the industrial area as a whole, the intensity is deemed to be **medium**. It is **highly probable** that these impacts will occur if not mitigated. As a result, the impact will be of **high** significance (Table 4).

The designs of the bund area and the stormwater management plan for the site was compiled to address the potential impacts mentioned above:

1) The current stormwater plan makes provision for how contaminated run-off from the site will be kept separate from general 'clean' stormwater from the site. Contaminated run-off and wash water generated on the site should be contained on site, removed and disposed of into the sewer. Run-off flow intensity and volume are shown to not increase as a result of the development, nor should water quality of the run-off deteriorate. No run-off should flow directly into the wetlands adjacent to the site.;
2) the outlets of the bunded subdivisions will be designed so that contaminated water containing hydrocarbons can be flushed into the sewer system, whilst clean stormwater in the bund areas can be discharged into the stormwater system.;
3) The wash bay water drains to the oil separator and then into the sewer system; and
4) Bund storage capacity exceeds the tank volume to ensure that in a worst-case leak scenario – the entire tank can be contained.

With these mitigation measures incorporated into the designs of the proposed layout, the impact is likely to have a **site-specific** extent, be of **short-term** duration, have a **low to negligible** intensity and be an **improbable** occurrence. The significance of the impact will be **very low** (Table 4). Given that the status quo for the area is that run-off flows directly into the wetland, the implementation of onsite stormwater management will be a positive impact of the development.

5.2 Construction Phase

5.2.1 Decommissioning of infrastructure

The proposed increase in storage capacity of fuel on Erf 21594 requires that some existing buildings, fuel tanks and other infrastructure be demolished and removed from the site. During this activity there is a risk that the waste generated by the activity will be disposed of in a location that caused disturbance to aquatic habitat. The likelihood of this impact is **improbable**, but should it take place it will have a **high** intensity as a result of direct disturbance. The duration will be **long** term and the extent will be **site specific** (to the site where the disturbance takes place). The significance it therefore deemed to be **medium** (Table 5).

It must be ensured that the waste material is either reused or disposed of. Old fuel storage tanks or any other waste that could contain pollutants must be disposed of in the correct manner at a site approved for the disposal of waste of that nature. This includes any waste water that might be pooled in the smaller bund areas of the existing tanks and within the wash-bay.

With the proper disposal of the waste material or reuse thereof, there will be **very low** to negligible impact upon aquatic features.

5.2.2 Construction of new infrastructure

The construction activities on site will entail the operation of machinery and use of potential pollutants. During construction there is a risk that run-off, either as a result of rainfall or from washing of surfaces (for example: spraying down an area where cement was mixed), will flow off the site and into the adjacent wetland. This could result in further water quality impairment of the wetland. It is expected to be **local** and of **medium** intensity given the size of the site and condition of the wetland. The impacts of this will most likely only persist for the **short term**, but without mitigation this impact is **probable**. As a result, the impact has a **low** significance (Table 6).

The impact can be mitigated by implementing and developing stormwater management infrastructure as described in Section 5.1 before the rest of the activities are undertaken. Furthermore, if activities are undertaken in the summer months there is a lower likelihood of run-off from the site. During construction, good site management and environmental practices must be ensured by an approved Environmental Control Officer (ECO). These include:

- Adequate ablutions provided for contractors;
- Machinery needs to be serviced to ensure there are no oil or fuel leaks, and provided with drip trays when parked; and
- No stock-piling of material or dumping of waste outside of the site footprint.

If these mitigation measures are implemented the impact of the activity is likely to be a **very low** significance (Table 6).

5.3 Operation Phase

Trucks are expected to pass through the site daily. Some will also be parked there. Other machinery will also be operated on the site. Trucks and machinery can be a source of pollutants, such as hydrocarbons. This risk is **probable**, if proper maintenance of machinery on site is not undertaken. As an operational impact it is likely have a **long-term** duration. The intensity will be **medium** with a **local** extent. The significance of the impact is therefore **high**.

All trucks and other machinery need to be regularly inspected and serviced to ensure that oil and fuel leaks are not excessive on the site. Machinery needs to be provided with drip trains if they are to be parked on the site. If these mitigations are in place – the impact will have a **very low** significance.

5.4 Summary of avoidance, management and mitigation recommendations

Design phase:

1) It is recommended that the stormwater plan shows how contaminated run-off from the site will be kept separate from general 'clean' stormwater from the site. Contaminated run-off and wash water generated on the site should be contained on site, removed and disposed of at an appropriate disposal facility. Run-off flow intensity and volume should not increase as a result of the development, nor should water quality of the run-off deteriorate. No run-off should flow directly into the wetlands adjacent to the site.;
2) The outlets of the bunded subdivisions need to be designed so that they can never be opened and allowed to flow into the wetlands adjacent to the site. The washing / flushing or draining of the bunded areas must be designed to be passively contained at all time (for example: the outlets could be permanently connected to pipes which convey flow to a tank which can be transported to an approved disposal site for the waste water); and
3) Bund storage capacity should match or exceed the tank volume to ensure that in a worst-case leak scenario – the entire tank can be contained.

Construction Phase:

1) Ensure waste material from the decommissioning of infrastructure on site is disposed of at an approved disposal site.;
2) Construction of stormwater management infrastructure (as described under Section 5.4) should be undertaken before the construction of other infrastructure on site.;
3) Construction should take place in summer;
4) Adequate ablutions are provided for contractors;
5) Machinery needs to be serviced to ensure there are no oil or fuel leaks, and provided with drip trays when parked; and
6) No stock-piling of material of dumping of waste outside of the site footprint.

Operational Phase:

1) Machinery on the site needs to be regularly serviced and provided with drip trays.

Table 4. A summary of the impacts of the design of the increased fuel storage facility

Description of impact		Extent	Duration	Intensity	Probability	Significance	Confidence
Design of proposed fuel storage enlargement without accommodating run-off or flow from bund outlets							
Impairment of surface water quality	Without mitigation	Regional	Long Term	Medium	Highly probable	High	Medium
	With mitigation	Site specific	Short Term	Negligible	Improbable	Very Low	Medium

Table 5. A summary of the impacts arising from the construction of the increased fuel storage facility.

Description of impact		Extent	Duration	Intensity	Probability	Significance	Confidence
Activity: Decommissioning of infrastructure							
Disturbance of aquatic habitat	Without mitigation	Site specific	Long Term	High	Improbable	Medium	Medium
	With mitigation	Site specific	Short Term	Negligible	Improbable	Very Low	Medium
Activity: Construction of bunded areas, new tanks and other infrastructure on site							
Water quality impairment	Without mitigation	Local	Short Term	Medium	Probable	Low	Medium
	With mitigation	Local	Short Term	Low	Probable	Very Low	Medium

Table 6. A summary of the impacts arising from the operation of the increased fuel storage facility

Description of impact		Extent	Duration	Intensity	Probability	Significance	Confidence
Operation of the site as a fuel storage facility							
Water quality impairment	Without mitigation	Local	Long Term	Medium	Highly probable	High	Medium
	With mitigation	Site specific	Short Term	Negligible	Improbable	Very Low	Medium

10 Risk assessment

The proposed development will trigger a Section 21 (c) and (i) water use in terms of the NWA. A Risk Assessment Matrix (RAM) is carried out according to Government Notice GN 4167 of 2023, to determine if the water uses require a license or a GA. The findings of the risk assessment will need to be communicated to the Department of Water Sanitation (DWS). The RAM has been carried out for the proposed development and is shown in Table 7.

Table 7. A summary of the Risk Assessment Matrix findings the proposed layout of the site before stormwater mitigation measures were tabled

Phase	Activity	Impact	Potentially affected watercourses		Significance (max = 100)	Risk Rating	Confidence level
			Name/s				
Design	Design of stormwater management on site and bund outflow controls	Impairment of water quality of freshwater and groundwater resources	Erf 21593 Wetland		51.2	M	Medium
Construction	Decomissioning of existing infrastructure on site	Disturbance of aquatic habitat	Erf 21593 Wetland		9.6	L	Medium
	Construction of new infrastructure	Water quality impairment	Erf 21593 Wetland		24	L	Medium
Operation	Operation of fuel storage depo on the site (moving and storing greater volumes than the current status quo)	Water quality impairment	Erf 21593 Wetland		38.4	M	Medium

Table 8. A summary of the Risk Assessment Matrix findings the proposed layout of the site after stormwater mitigation measures were tabled

Phase	Activity	Impact	Potentially affected watercourses		Significance (max = 100)	Risk Rating	Confidence level
			Name/s				
DESIGN	Design of stormwater management on site and bund outflow controls	Impairment of water quality of freshwater and groundwater resources	Erf 21593 Wetland		22.4	L	Medium
CONSTRUCTION	Decomissioning of existing infrastructure on site	Disturbance of aquatic habitat	Erf 21593 Wetland		2.4	L	Medium
	Construction of infrastructure	Water quality impairment	Erf 21593 Wetland		9.6	L	Medium
OPERATION	Operation of fuel storage depo on the site (moving and storing greater volumes than the status quo)	Water quality impairment	Erf 21593 Wetland		19.2	L	Medium

The risk of the proposed increase in fuel storage capacity impacting upon freshwater resources, without any stormwater mitigation in place, is **moderate**. This means that the activity would require a water use license for Section 21 (c) and (i) water uses in terms of the National Water Act. The primary risk is that run-off from the site or water from the bund areas will enter the wetland located on Erf 21593. This wetland is itself of low importance, however, its degradation poses a risk to downstream ecosystems. This concern can be addressed by implementing the mitigation measures recommended in Section 5.4 of this report. Primarily, the proposed layout should show how stormwater will be accommodated on site rather than being directly discharged into the wetland, and how the bund outlets will be managed on site to prevent contaminated water being discharged to the stormwater system.

A stormwater management plan was prepared for the site. The plan addresses the above concerns. With the implementation of these design measures incorporated into the proposed layout, the risk of the proposed activity will be **low** (Table 8). This means that the activity could be authorised under the GA in terms of Government Notice GN 4167 of 2023 for Section 21 (c) and (i) water uses.

11 Conclusion

The proposed activity is located on Erf 21594, within the Kraaifontein Industrial area. The entire erf is developed and there are no aquatic features on the site. The adjacent erf, Erf 21593, does contain a wetland area. This wetland extends to the edge of the boundary between erven 21594 and 21593. The feature is deemed to be an artificial wetland that has formed as a result of two driving factors 1) the development that has taken place upgradient of the site and subsequent increase of run-off from the area and 2) the impedance of this run-off as a result of the railway line that runs along the industrial area's western and southern boundaries. The wetland therefore functions as a stormwater pond, attenuating run-off from industrial areas. It overtops directly into the City of Cape Town's stormwater infrastructure, before it ultimately daylights into the Mosselbank River, a tributary of the Diep River.

The risk that polluted run-off from the site flows into the artificial wetland would be of a high significance. However this impact is addressed by the designs of the bund area and the stormwater management plan. These will include the following measures to prevent the risk of potentially contaminated runoff discharging into the artificial wetland:

1) The current stormwater plan makes provision for how contaminated run-off from the site will be kept separate from general 'clean' stormwater from the site. Contaminated run-off and wash water generated on the site should be contained on site, removed and disposed of into the sewer. Run-off flow intensity and volume are shown to not increase as a result of the development, nor should water quality of the run-off deteriorate. No run-off should flow directly into the wetland adjacent to the site.;
2) the outlets of the bunded subdivisions will be designed so that contaminated water containing hydrocarbons can be flushed into the sewer system, whilst clean stormwater in the bund areas can be discharged into the stormwater system;
3) The wash bay water drains to the oil separator and then into the sewer system; and
4) Bund storage capacity exceeds the tank volume to ensure that in a worst-case leak scenario – the entire tank can be contained.

During construction there is a risk that the waste material from decommissioned infrastructure will be dumped into aquatic features resulting in their disturbance. All waste must be disposed of at an approved waste disposal facility that can accommodate the type of waste being disposed of. While the construction is undertaken on the site there is a risk that run-off from the construction site will flow into the wetland. This impairment of water quality should be avoided by installing stormwater management on the site before construction of the rest of the infrastructure. Furthermore:

-Construction should take place in summer;

- Adequate ablutions are provided for contractors;

- Machinery needs to be serviced to ensure there are no oil or fuel leaks, and provided with drip trays when parked; and

- No stock-piling of material or dumping of waste outside of the site footprint.

When the site is operational there will be trucks passing through the site each day. This means that run-off from the site could impact upon the wetland adjacent to the site. This can be addressed by designing for onsite stormwater management, as previously described. It can also be managed by ensuring machinery and trucks on site are serviced and provided with drip trays when parked.

Considering that the wetland may contribute to the recharge of an aquifer that is highly susceptible to contamination, it is recommended that the potential impacts to groundwater associated with the proposed development be assessed by a geohydrologist.

The storage of LPG gas is not considered to have any additional impact from an aquatic ecosystem perspective. Furthermore, the storage of oils and other products are not considered to have an additional impact from an aquatic ecosystem perspective. This is because these are already being stored on site and

the oils and other products are stored indoors. The stormwater management plan for the site is an improvement from the current scenario.

If the recommendations of this report are implemented then the proposed increase in of fuel storage capacity on Erf 21594 will most likely have a low to very low impact from a freshwater ecological perspective.

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Appendix i: Details of specialist

STUART BARROW

NAME:	Stuart Barrow
NATIONALITY:	South African
PROFESSION:	Freshwater Ecology
SPECIALISATION:	Conservation Ecology
YEARS EXPERIENCE:	10 years post BSc
PROFESSIONAL REGISTRATION:	Registered Environmental Scientist and Aquatic Scientist (SACNSP Number: 400128/17)

CONTACT DETAILS:

TELEPHONE:	0812707337
EMAIL:	stuart@streamlineconsult.co.za
LANGUAGES:	English and Afrikaans
COUNTRIES OF WORK:	South Africa

EDUCATION:

MSc (2014)	Stellenbosch University, South Africa. Conservation ecology.
BSc (2012)	Stellenbosch University, South Africa. Conservation ecology.

SUMMARISED EMPLOYMENT RECORD

2021 – present	Founder and Chairman of Lighthouse Academy (www.lighthouseacademy.org.za)
Jan 2015 – 2023	BlueScience (Pty) Ltd
2014 – 2015	Part-time employment at Geohydrological and Spatial Solutions (GEOSS) (Pty) Ltd.

KEY EXPERIENCE RECORD AND PROJECT INVOLVEMENT

2020-2023

- River maintenance and management plans
- Management of alien tree clearing and riparian and wetland revegetation teams
- Water quality monitoring for water use licence compliance and auditing
- Water use license applications

Experience unrelated to freshwater ecology:

- Establishing Lighthouse Academy NPO and PBO
- Fund raising, financial and administrative management of Lighthouse Academy

2016-2020

- River Maintenance and Management Plans
- Freshwater and wetland assessment projects

- Water Use License applications
- Water Quality monitoring for water use licence compliance and auditing
- Wetland and riparian vegetation rehabilitation

2015

- Freshwater and wetland assessment projects
- Wetland and riparian vegetation rehabilitation
- Water Use License applications
- River Maintenance and Management Plans

2013 -2014

- Compiling monthly reports on the geohydrology monitoring of boreholes for agricultural use.
- Master's Thesis: Contrasting impacts of alien sport fish, *Micropterus dolomieu*, in the Cape Floristic Region.

2012

- Fourth year mini-thesis: An assessment of the ichthyofauna of the Tradouw river catchment: Implications for the conservation of the Barrydale Redfin. (*Pseudobarbus burchelli*)

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Stuart Bruce Barrow

Registration Number: 400128/17

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice (Schedule 1 of the Act)

Aquatic Science (Professional Natural Scientist)
Environmental Science (Professional Natural Scientist)

Effective **15 November 2017** Expires **31 March 2026**

Chairperson

Chief Executive Officer

To verify this certificate scan this code

Appendix II: Declaration

DECLARATION OF THE SPECIALIST

Note: Duplicate this section where there is more than one specialist.

I Stuart Barrow, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that:

- In terms of the general requirement to be independent:
  - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or

  - am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 of the NEMA EIA Regulations has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- In terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;

- I have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any Report, plan or document prepared or to be prepared as part of the application; and

- I am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations.

8 August 2025

Signature of the [redacted]Freshwater ecologist: Date:

Freshwater Consulitng CC

Name of company (if applicable):

Appendix III: Impact Assessment ratings

The evaluation of impacts is based on an evaluation of the nature of each impact and the significance assigned to each impact is based on an assessment of the extent, intensity, duration and probability of occurrence as described below:

The evaluation of impacts in this report is based on an evaluation of the nature of each impact and the significance assigned to each impact is based on an assessment of the extent, intensity, duration and probability of occurrence as described below:

Nature of the impact:

- Description of the **type of effect** the activity would have on the affected environment.

Extent:
Reflects the importance of the environment on:

- **Site specific** scale: impact (and implications) limited to the project site.
- **Local** scale: Impact extends only as far as the activity, limited to the site and its immediate surroundings, and local assets/ resources.
- **Regional** scale: Impact extends to a regional scale, and affects provincial resources, e.g. District or Province; Western Cape.
- **National** scale: Impact extends to a national scale, and affects national resources; South Africa.
- **International scale:** Impact extends across national borders, and affects global resources

Duration:

- **Short term** (0-5 years);
- **Medium term** (6-15 years);
- **Long term** (>15 years with the impact ceasing after full implementation of all development components with mitigations);
- **Permanent** (mitigation, either human or natural, will not occur in such a way or in such a time span that the impact can be considered transient).

Intensity:

- **Negligible** (the impact is so small that effects on the natural functioning of the environment are not detectable at all);
- **Low** (affects the environment such that natural functions or processes are not affected – or not degraded significantly more than their present state);
- **Medium** (affected environment is altered but natural functions or processes continue, albeit in a modified/ increasingly modified way);
- **High** (natural functions or processes are altered to the extent that they will temporarily or permanently cease).

Probability of occurrence:

- **Improbable** (low likelihood of the impact occurring);
- **Probable** (distinct possibility of the impact occurring);
- **Highly probable** (the impact will most likely occur);
- **Definite** (the impact will occur regardless of any preventative measures).

Significance of impact:
The significance of each impact identified was guided by the protocols outlined in PHS Consulting (2018) as follows:

Significance is the product of **probability** and **severity**.

Probability describes the likelihood of the impact occurring, and is rated as follows:

Probability	
Improbable	Rating 1
Probable	Rating 2
Highly Probable	Rating 3
Definite	Rating 4

The **severity factor** is calculated from the factors given to "**intensity**" and "**duration**".
Intensity and duration factors are awarded to each impact, as described below.

The **intensity factor** is awarded to each impact according to the following method:

Intensity Factor	
Negligible	Factor 0
Low	Factor 1
Medium	Factor 2
High	Factor 3

Duration describes the length of time for which the impact will endure and is rated as follows

Duration Factor	
Short term	Factor 1
Medium term	Factor 2
Long term	Factor 3
Permanent	Factor 4

The **severity factor** is therefore calculated as follows:

THE SEVERITY FACTOR = INTENSITY FACTOR X DURATION FACTOR

The product of severity and probability therefore provides the **significance rating** as follows:

Significance	
Negligible	Significance rating = <4
Low	Significance rating = 4-6
Medium	Significance rating = 7-15
High	Significance rating: = 16-29
Very high	Significance ration >30

Appendix IV: Full Risk Assessment Matrix

PROJECT: Moov Fuel, Erf 21594, Kraaifontein Industria

RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.1

Name of Assessor: Stuart Barrow

Signature: 

SACNASP Registration Number: 400128/17

Date of assessment: 12-Jun-24

Risk to be scored for all relevant phases of the project (**factoring in specified control measures**). MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
						Abiotic Habitat (Drivers)			Biota (Responses)											
			Name/s	PES	Overall Watercourse Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
DESIGN	Design of stormwater management on site and bund outflow controls	Impairment of water quality of freshwater and groundwater resources	Erf 21593 Wetland	n/a (artificial)	Low / Very low	1	3	0	1	1	6	4	4	14	2	28	80%	22.4	L	Medium
CONSTRUCTION	Decomissioning of existing infrastructure on site	Disturbance of aquatic habitat	Erf 21593 Wetland	n/a (artificial)	Low / Very low	0	1	0	1	0	2	2	2	6	2	12	20%	2.4	L	Medium
CONSTRUCTION	Construction of infrastructure	Water quality impairment	Erf 21593 Wetland	n/a (artificial)	Low / Very low	1	2	1	1	1	4	2	2	8	2	16	60%	9.6	L	Medium
OPERATION	Operation of fuel storage depo on the site (moving and storing greater volumes than the status quo)	Water quality impairment	Erf 21593 Wetland	n/a (artificial)	Low / Very low	2	3	1	1	1	6	2	4	12	2	24	80%	19.2	L	Medium