s

THE DEVELOPMENT OF A VANADIUM ELECTROLYTE PRODUCTION FACILITY IN THE EAST LONDON INDUSTRIAL DEVELOPMENT ZONE.

ENVIRONMENTAL SCOPING REPORT

DEDEAT Reference:

DRAFT

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THE PROJECT TEAM

The following table provides the names and responsibilities of the project team.

EOH Coastal & Environmental Services team and responsibilities	
Name	**Role/Responsibility**
Dr Alan Carter	Environmental Assessment Practitioner (EAP)
	Project Leader
	Report Review
Mrs Amy Lindsay	Project Manager
	Client Liaison
	Report Writing

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LIST OF ACRONYMS

The following acronyms have been used in this report:

AEL	Air Emissions License
BCMM	Buffalo City Metropolitan Municipality
BEC	Bushveld Energy Company
BID	Background Information Document
CA	Competent Authority
CBA	Critical Biodiversity Area
DAFF	Department of Agriculture, Forestry and Fisheries
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioners of South Africa
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECO	Environmental Control Officer
ECPTA	Eastern Cape Parts and Tourism Agency
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
ELIDZ	East London Industrial development Zone
EMPr	Environmental Management Programme
GN	Government Notice
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
IDC	Industrial Development Corporation
IDP	Integrated Development Plan
IEMP	Integrated Environmental Management Plan
MEC	Member of the Executive Council
MHI	Major Hazard Installation
NDP	National Development Plan
NEM:AQA	National Environmental Management Air Quality Act
NEM:WA	National Environmental Management Waste Act
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Area
PoS	Plan of Study
PPP	Public Participation Process
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SDF	Spatial Development Framework
SG	Surveyor General
VRFB	Vanadium Redox Flow Battery
WULA	Water Use License Application

1. INTRODUCTION

1.1. Background to the Study

The Industrial Development Corporation (IDC) together with the Bushveld Energy Company (Pty) Ltd (BEC) is proposing to develop a facility within the East London Industrial Development Zone (ELIDZ) that will manufacture Vanadium Electrolyte for the production of vanadium redox flow batteries (VRFB).

The VRFB is a technically and commercially advanced RFB available on the market as it is highly reliable as an energy storage unit. Many RFBs are affected by ion contamination due to the different material species applied in each of the positive and negative halfcells and the diffusion of ions from the positive to the negative electrolyte. The identical active species in the VRFB catholyte and anolyte i.e. positive and negative electrolyte, respectively, eliminates this concern. The application of the VRFB as a viable solution in the renewable energy storage market is of interest to both mineral and renewable energy stakeholders.

For this particular development, raw vanadium will be sourced from a vanadium mine located in Britz, North West Province, where it will be purified to produce high purity vanadium pentoxide using sulphuric acid. The prepurification and purification processes will occur onsite at the vanadium mine.

The purified vanadium pentoxide will then be transported from the mine to the ELIDZ by road or rail freight. The vanadium pentoxide will be further processed through an electrochemical process under acidic conditions at the ELIDZ facility to produce the vanadium electrolyte. The vanadium electolyte will be used in the production of VRFB. It is anticipated that the Vanadium Electrolyte produced at the ELIDZ facility will supply a large portion of the local market as well as the export market.

EOH Coastal and Environmental Services (EOH CES) will facilitate the Environmental Impact Assessment process to secure the required Environmental Authorisation (EA) and Air Emissions License (AEL) for the proposed development in the ELIDZ.

1.2. Environmental Authorisation in South Africa

The regulation and protection of the environment within South Africa occurs mainly through the application of various items of legislation within the regulatory framework of the Constitution (Act 108 of 1996).

The primary legislation regulation for Environmental Impact Assessments (EIA) within South Africa is the National Environmental Management Act (NEMA, Act 107 of 1998). NEMA makes provision for the Minister of Environmental Affairs to identify activities which may not commence prior to authorisation from either the Minister or the provincial Member of the Executive Council (MEC). In addition, NEMA provides for the formulation of regulations in respect of such authorisations.

The EIA 2014 Regulations (as amended) allow for a Basic Assessment process for activities with limited environmental impact (listed in Listing Notice 1 and Listing Notice 3) and a more rigorous two-tiered approach to activities with potentially greater environmental impact (listed in Listing Notice 2). This two-tiered approach includes both a Full Scoping and EIA Process (Figure 1.1).

ELIDZ has an existing Environmental Authorization for light industry issued in 2001, which allows for the development of a light industrial zone. Additional activities specific to a particular facility must still obtain Environmental Authorisation. The proposed development of a VRFB production facility in the ELIDZ triggers a Full Scoping and EIA Process due to listed activities triggered from **Listing Notice 2.** A list of activities triggered is shown in Table 3.1 below.

Air emission licence

Based on the scope and scale of the vanadium processing facilities, an AEL application and accompanying Atmospheric Impact Report is required for the proposed activities that will take place at the facility in the ELIDZ. The possible listed activities that may be triggered in terms of the Listed Activities Requiring an AEL under the Environmental Management Air Quality Act (NEMAQA) Act no. 39 of 2004, include:

- 7.2 production or use of acids.

Major Hazardous installation

The MHI assessment will be carried out to comply with the requirements of the revised Major Hazard Installation Regulations of July 2001, under the South African Occupational Health and Safety Act. The assessment will also comply with any known MHI requirements of the Buffalo City Metropolitan Municipality (BCMM) as of January 2018.

Figure 1.1: The Full Scoping and EIA Process flow chart

1.3. Scoping Phase

The Scoping Phase is designed to determine the "scope" of the subsequent Environmental Impact Assessment (EIA), conducted in fulfilment of the application for authorisation. The overall aim of the Scoping Phase is to determine the environmental issues and impacts associated with the proposed VRFB production facility that require further investigation in an EIA. The purpose of scoping is therefore to identify:

- Issues;
- Impacts; and
- Alternatives.

An integral part of the Scoping Phase is the initial public participation process (PPP). This process ensures that all possible interested and affected parties (I&APs) are informed of the proposed activity and are provided with an opportunity to comment and identify issues.

1.4. Nature and Structure of this Report

This report fulfils the requirement of the EIA Regulations (2014 as amended) for the documentation of the Scoping Phase. The structure of this report is based on APPENDIX 2 of the Environmental Impact Assessment Regulations (2014 as amended), which clearly specifies the required content of a Scoping Report.

1.5. Assumptions and Limitations

This report is based on information that is currently available and, as a result, the following limitations and assumptions are implicit–

- The report is based on a project description taken from design specifications for the proposed VRFB production facility that have not yet been finalised, and which are likely to undergo a number of iterations and refinements before they can be regarded as final. A project description based on the final design will be provided in the EIA Phase.
- Descriptions of the natural and social environments are based on limited fieldwork and available literature. More detailed information will be provided in the EIA phase based on the outcomes of the specialist studies.

1.6. Details and Expertise of the Environmental Assessment Practitioner

In terms of Section APPENDIX 2; Content of a Scoping Report (1) of the EIA Regulations (2014 as amended), a Scoping Report must contain all the information necessary for a proper understanding of the process, information on all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include–

(a) Details of–
(i) The EAP who prepared the report; and
(ii) The expertise of the EAP to carry out scoping procedures

In fulfilment of the above-mentioned legislative requirements, the details of the Environmental Assessment Practitioner (EAP) that prepared this Final Scoping Report as well as the expertise of the individual members of the study team are provided below.

1.6.1. Details of the EAP

Dr Alan Carter

Alan is an Executive at EOH CES and has extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. Alan is a member of the American Institute of Certified Public Accountants and holds BCom and BCompt Honours degrees in accounting from Rhodes University and the University of South Africa, respectively. He also has a PhD degree in Marine Botany from Rhodes University and is a professional member of the South African Institute of Ecologists and Environmental Scientists. Alan is also a registered Professional Scientist with the South African Council of Natural Scientific Professions (SACNSP) as well as a registered Environmental Assessment Practitioner with Environmental Assessment Practitioners of South Africa (EAPSA).

Please find the proof of SACNASP and EAPSA registration in Appendix A

1.6.2. Expertise of the study team

EOH CES has been involved in numerous large and complex Environmental Impact Assessment (EIA) projects in South Africa over the past 25 years. This experience was initially gained during the undertaking of integrated environmental management studies, as well as the management of large and complex Environmental & Social Impact Assessments. EOH CES has managed numerous large EIAs from pre-feasibility through to operation for international clients in 18 African countries. These have been rigorously reviewed by parties such as the World Bank, MIGA, European Investment Bank, IFC, German Investment

Bank (KFW), African Development Bank, BHP Billiton international peer review team, FMO and we have yet to have any major corrections or addendums made to any EAIA undertaken, and have a reputation of producing quality products within tight deadlines and within budget.

Ms Amy Lindsay

Ms Amy Lindsay is a Senior Environmental Consultant at EOH-CES. Amy holds a B.Sc. in Biochemistry and Zoology as well as a B.Sc. Honours in Zoology, both from the University of Johannesburg. Her honours project investigated the role of a tenebrionid beetle in the ecology of Bakwena Cave, Pretoria. Her M.Sc project, through Stellenbosch University, was a study on the effects of probiotics on the physiological and biochemical development of hatchery raised dusky kob (*Argyrosomus japonicus*) larvae. Her professional interests and passion lies within coastal and marine ecology as well as the development of sustainable aquaculture in South Africa. Amy has experience in a wide variety of areas with particular focus on aquaculture EIAs, coastal development EIAs and EMPs as well as coastal and estuarine management programmes. Amy is a registered Candidate Scientist with the South African Council of Natural Scientific Professions (SACNSP)

Amy will assume the role of project manager.

Please find the proof of SACNASP registration in Appendix A

Other team members include:

EOH CES Team	
Nande Suka	Environmental Impact Assessment
Thina Mgweba	Socio-economic Impact Assessment
Roy de Kock	Ecological Impact Assessment
External Specialists	
Airshed	Air Quality Impact Assessment
Design Point	Stormwater Management Plan
Ishecon	Major Hazards Installation Assessment

Please find Specialist Terms of Reference in the Plan of Study for the EIA, Section 10

2. PROPERTY DESCRIPTION AND ACTIVITY LOCATION

In terms of Section APPENDIX 2; Content of a Scoping Report (1) of the EIA Regulations (2014 as amended), a Scoping Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include

b) The location of the activity, including –
- *(i) The 21 digit Surveyor General code of each cadastral land parcel;*
- *(ii) Where available, the physical address and farm name;*
- *(iii) Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary or properties;*

c) A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is –
- *(ii) On land where the property had not been defined, the coordinates within which the activity is to be undertaken;*

2.1. Property Description

The proposed Vanadium Electrolyteproduction facility is located within the ELIDZ, in the Buffalo City Metropolitan Municipality (BCMM). The BCMM falls within the Eastern Cape Province (Figure 2.1). Figure 2.2 indicates the ELIDZ in relation to landmarks in the general vicinity of East London.

Figure 2.1: The location of the East London Industrail Develoment Zone within the Eastern Cape Province

Figure 2.2: The East London Industrial Development Zone in relation to the airport and the port

Four proposed sites within the ELIDZ will be assessed. The location of the proposed sites within the ELIDZ are indicated in Figure 2.3 below.

Figure 2.3: The location of the four site alternatives that were assessed within the East London Industrial Development Zone complex

Table 2.1 lists property attributes for each of the site alternatives such as the 21 digit Surveyor General code, the size of the property and the GPS co-ordinates or the four corners of the site.

Table 2.1: Site localities and associated properties

Site	Attribute	Details
Site A	Erf number:	Erf 60936
	21 digit SG Code:	C02300040006093600000
	Size:	10 451m2
	North corner:	33° 3'26.63"S; 27°51'19.23"E
	East corner:	33° 3'29.19"S; 27°51'20.81"E
	South corner:	33° 3'30.14"S; 27°51'18.50"E
	West corner:	33° 3'27.96"S; 27°51'16.88"E
	Property owner:	East London IDZ (transfer in progress)
Site B	Erf number:	Erf 60843
	21 digit SG Code:	C02300040006084300000
	Size:	7 477m2
	North corner:	33° 3'21.73"S; 27°50'9.43"E
	East corner:	33° 3'23.07"S; 27°50'10.32"E
	South corner:	33° 3'25.56"S; 27°50'4.59"E
	West corner:	33° 3'24.35"S; 27°50'3.65"E
	Property owner:	East London Industrial Development Zone
Site C	Erf number:	Erf 76336
	21 digit SG Code:	SG Code: C02300040007633600000
	Size:	31 391m2
	North corner:	33° 3'13.14"S; 27°50'10.30"E
	East corner:	33° 3'15.85"S; 27°50'11.74"E
	South corner:	33° 3'18.09"S; 27°50'6.86"E
	West corner:	33° 3'15.38"S; 27°50'5.14"E
	Property owner:	East London Industrial Development Zone
Site D	Erf number:	Erf 56354
	21 digit SG Code:	SG Code: C02300040005635400000
	Size:	24 1339m2
	North corner:	33° 2'13.93"S; 27°50'29.47"E
	East corner:	33° 2'17.31"S; 27°50'31.44"E
	South corner:	33° 2'20.39"S; 27°50'25.85"E
	West corner:	33° 2'16.35"S; 27°50'23.42"E
	Property owner:	East London Industrial Development Zone

BEC are in the process of formally acquiring site A as their preferred site within the ELIDZ and once this process has been completed, BEC will become the owner of the site. Therefore, the property ownership details will change at a later stage in the project.

2.2. Site Photographs

Figure 2.4 below consists of photographs showing the general area of each of the proposed sites. Descriptions of each photograph follows in Table 2.2 below.

SITE PHOTOGRAPHS

Figure 2.4: Site photographs

Table 2.4: Location and description of photos above.

Site photograph in Figure 2.4	Coordinates at which the photograph was taken	General description of the site
A	33° 3'28.74"S; 27°51'17.77"E	The site has not been cleared. The aquaculture development zone is located approximately 100 meters away from the site. The site is fully serviced with water, sewage and electrical supply. The topography is relatively flat, therefore major earthworks will not be required.
B	33° 3'22.07"S; 27°50'9.37"E	The site has previously been cleared. A drainage line is

Site photograph in Figure 2.4	Coordinates at which the photograph was taken	General description of the site
		located along the southern boundary of the site. Tenants located adjacent to the site already have their own air emissions license. Services will need to be provided to the site. The topography is relatively flat, therefore major earthworks will not be required
C	33° 3'13.99"S; 27°50'10.89"E	The site has not been cleared. Tenants of a similar industry are located nearby to the site that already has their own air emissions license. The site is fully serviced with water, sewage and electrical supply. The topography is relatively flat, therefore major earthworks will not be required
D	33° 2'16.67"S; 27°50'31.35"E	The site has not been cleared. The topography will require that major earthworks be under taken. Surrounding tenants include logistics tenants. The site is fully serviced with water, sewage and electrical supply.

3. PROJECT DESCRIPTION

In terms of Section APPENDIX 2; Content of a Scoping Report (1) of the EIA Regulations (2014), a Scoping Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include

d) A description of the scope of the proposed activity, including –

(i) All listed and specified activities triggered;

(ii) A description of the activities to be undertaken, including associated structures and infrastructure;

3.1. The process of producing VRFBs

The development of the Vanadium Electrolyteproduction facility in the ELIDZ triggers the need for a **Full Scoping and EIA** process under the NEMA EIA Regulations of 2014 as amended in Listing Notice 2. The listed activities that have been applied for are provided in Table 3.1 below.

Table 3.1: The listed activities that are triggered by the proposed development

LISTED ACTIVITIES WHICH TRIGGER A FULL SCOPING AND EIA PROCESS		
Listed Activity Number	**Description**	**Description of project activity that triggers listed activity**
Listing Notice 2 Activity No. 4	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic meters.	*The proposed development will require onsite storage of more than 500 cubic meters of dangerous goods during the production and storage of final product stages. These dangerous goods will include sulphuric acid, hydrochloric acid and anhydrous ammonia.*

The facility proponent is initially required to submit a report detailing the scoping phase (Scoping Report), and set out the terms of reference for the EIA process (Plan of Study for EIA). This is then followed by a report detailing the EIA phase (EIR). The competent authority will issue a final decision subsequent to their review of the final EIR.

The competent authority, that must consider and decide on the application for authorisation in respect of the activities listed in Table 3.1, is the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT).

It is important to note that in addition to the requirements for an authorisation in terms of the NEMA, there may be additional legislative requirements which need to be considered prior to commencing with the activity, these include but are not limited to:

- National Environmental Management: Air Quality Act (Act No. 39 of 2004);
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004);
- National Forestry Act (Act No. 84 of 1998); and
- The National Heritage Resources Act (Act No. 25 of 1999).

3.2. Description of the proposed development

3.2.1. Process and materials

Vanadium electrolyte will be manufactured at the proposed facility in the ELIDZ . There are two processes required to produce vanadium electrolyte:

1. Pre-purification of vanadium ore feedstock to produce vanadium compounds ammonium polyvanadate (APV) and ammonium metavanadate (AMV), and further purification of AMV to produce high purity vanadium pentoxide (V_2O_5); and
2. Production of the vanadium electrolyte by dissolution of vanadium pentoxide in acid.

For the purposes of this study, the detailed methodology for the purification of vanadium ore to produce high purity vanadium pentoxide will not be discussed in detail as this process will not occur at the ELIDZ. This process will occur onsite at the vanadium mine in Brits and the high purity vanadium pentoxide will be transported to the ELIDZ facility.

Production of the vanadium electrolyte by dissolution of vanadium pentoxide in acid:

The high purity vanadium pentoxide will arrive at the ELIDZ facility via road or rail freight. In order to produce the electrolyte to be utilised in the manufacture of the VRFB, the high purity vanadium pentoxide will be solubilised in acid. This process can be undertaken by following one of three methods:

1. Electrochemical dissolution;
2. Chemical reduction; and
3. Thermochemical reduction.

1. Electochemical dissolution

Electrochemical dissolution of solid V_2O_5 is achieved by pumping a slurry of V_2O_5 in aqueous Sulphuric Acid through a cathodic (positive) half-cell under controlled conditions to electrochemically reduce the compound and produce a $V^{3.5+}$ solution. This acidic $V^{3.5+}$ solution is pre-charged to provide a 100% state of charge VRFB electrolyte. In the anodic (negative) half-cell, the same concentration of sulphuric acid is used as the electrolyte to accommodate any mixing of the electrolytes. Oxygen evolution occurs at the electrode. This method can additionally be used to recycle V^{3+} to generate a V_2O_5 slurry.

Electrochemical dissolution is the **preferred technology alternative** for the generation of the vanadium electrolyte. Table 3.2 provides details regarding the chemical requirements of the electrolyte production process. These requirements include the volumes to be used as well as the characteristic of the chemicals to be used.

2. Chemical reduction

A slurry of V_2O_5 (V^{5+}) in aqueous sulphuric acid is chemically reduced to V_2O_5 (V^{4+}), where V^{4+} is in the form of dissolved vanadyl sulphate ($VOSO_4$), by adding a suitable chemical reductants to the slurry. The process is known as the wet route. Reducing agents include oxalic acid, concentrated Sulphuric Acid, sulphur dioxide (SO_2) or carbon monoxide (CO). Such reducing agents pose handling challenges due to their hazardous nature. The vanadyl sulphate must be reduced in a second electrochemical step to achieve the desired oxidation state.

Within this context, a concern is that the application of chemical reductants could be governed by registered patents. It is advised that the validity of any patents be investigated as part of any further assessment.

3. Thermochemical reduction

The thermochemical reduction of solid V_2O_5 to provide a suitable combination of vanadium oxidation states is a well-established process. The reductant can be a gas or solid, and the process is known as the dry route. V_2O_5 (V^{5+}) is reduced to $V^{3.5}$+ either in a hydrogen-rich atmosphere at elevated temperatures, or mixed in a stoichiometric ratio with a solid reductant (V_2O_3) and sulphuric acid to form a paste which is then heated.

As with the chemical reduction process, the thermochemical production of electrolyte is governed by registered patents.

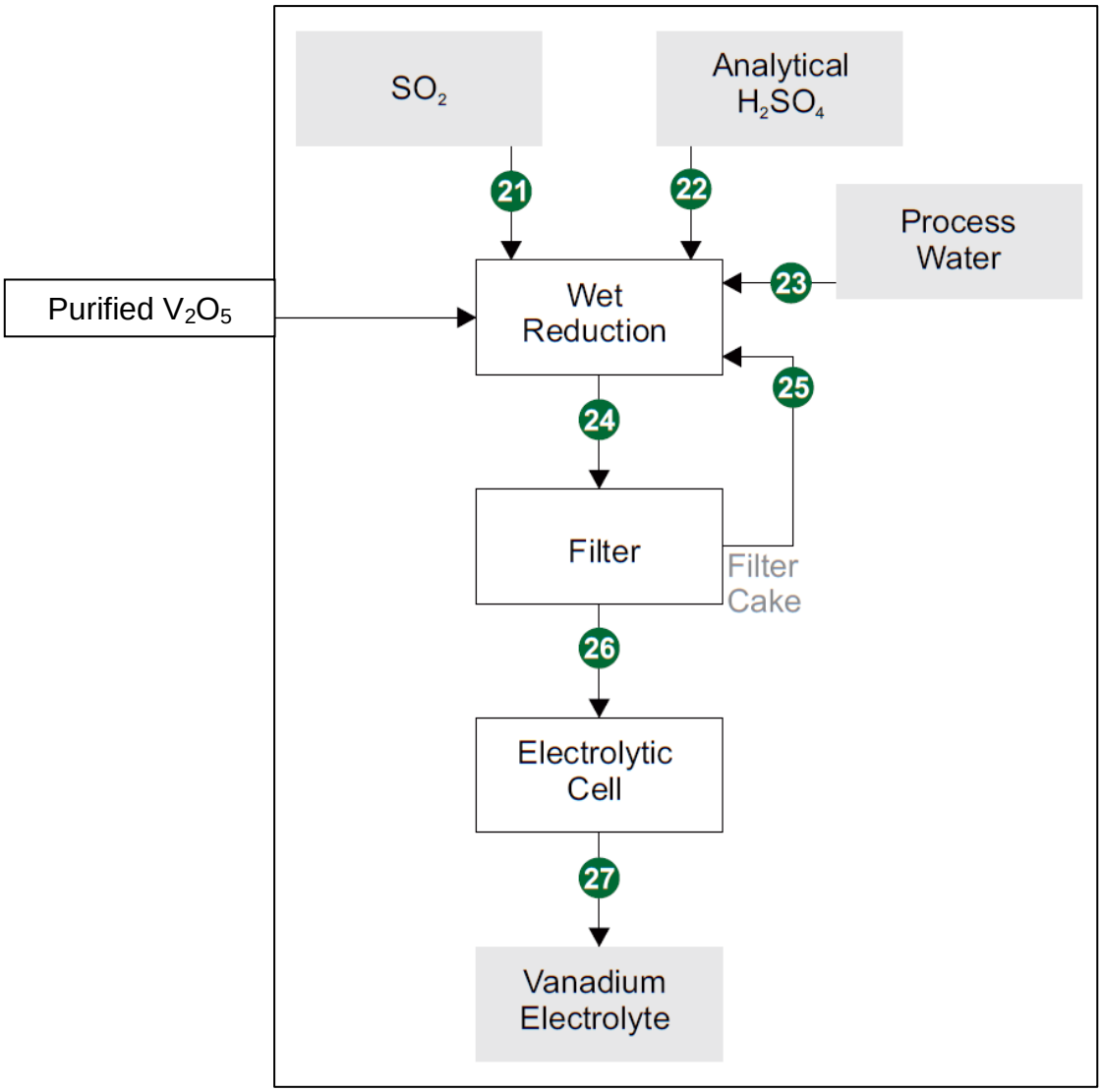


Figure 3.1: The process flow for the production of the vanadium electrolyte

Table 3.2: The mass balance sheet associated with the process flow illustrated in Figure 3.1 that indicate the reagents and volumes and characterises of the reagents to be used

Stream number		**21**	**22**	**23**	**24**	**25**	**26**	**27**
Stream description		**SO_2 Addition**	**Sulphuric Acid Added**	**Water**	**Filter Feed**	**Filter Cake**	**Filtrate**	**$V^{3.5+}$ Poly-electrolyte**
Quantity	**Units**	**Electrolyte Production**						
Total mass	Kg/h or kg	40.1	480	712	1458	12.6	1446	1446
Total volume	M^3/h or m^3	15.2	0.26	0.71	1.10	0.01	1.09	1.09
Total density	Kg/m^3	2.63	1840	1000	1331	2022	1327	1329
Solids mass	Kg/h or kg (dry)	-	-	-	10.05	10.05	-	-

Stream number		21	22	23	24	25	26	27
Stream description		SO_2 Addition	Sulphuric Acid Added	Water	Filter Feed	Filter Cake	Filtrate	$V^{3.5+}$ Poly-electrolyte
Quantity	Units	Electrolyte Production						
Solids volume	M^3/h or m^3	-	-	-	0.0004	0.00	-	-
Solids density	Kg/m^3	-	-	-	2326	2326	-	-
Solids percentage	% (solids w/w)	-	-	-	0.69	80.00	-	-
TDS mass	Kg/h or kg	-	470	-	724	1.25	722	722
TDS Volume	M^3/h or m^3	-	0.25	-	0.37	0.00	0.37	0.37
TDS density	Kg/m^3	-	1872	-	1974	1974	1974	1974
Water mass	Kg/h or kg	-	9.60	712	725	1.26	723	723
Water volume	M^3/h or m^3	-	0.01	0.71	0.72	0.00	0.72	0.72
Water density	Kg/m^3	-	1000	1000	1000	1000	1000	1000
AMV	Kg/h or kg	-	-	-	190.89	0.33	190.55	190.89
APV	Kg/h or kg	-	-	-	1.63	-	-	-
Sulphuric acid	Kg/h or kg	-	470.2	-	532.47	0.92	531.55	531.55
Ammonia (NH_3)	Kg/h or kg	-	-	-	-	-	-	-
Vanadium (V^{3+})	Kg/h or kg	-	-	-	83.01	-	-	83.01
Vanadium pentoxide (V_2O_5) equivalent	Kg/h or kg	-	-	-	148.45	0.26	148.19	148.45
Sulphur dioxide (SO_2)	Kg/h or kg	40.09	-	-	-	-	-	-

It is anticipated that approximately 500m^3 of electrolyte, 30 tonnes of Sulphur, and 350m^3 Sulphuric acid will be stored on site at any one time.

Waste streams

It is anticipated that approximately 12.6 kg/hour of acidic waste will be produced with a 10% Sulphuric Acid content as a result of the production process. This waste will be stored separately in bunded containers and disposed of at the nearest registered hazardous waste treatment facility.

3.2.2. Proposed layout of facility

The proposed production area for the ELIDZ facility is approximately 10 000m^2 with a yard and storage area of approximately 5000m^2. The following equipment will be placed in the production area::

- Deionised (DI)/Reverse osmosis (RO) water plant;
- Sulphuric acid let down tanks and storage tank (20m^3);
- A laboratory;
- Work shop/storage facility;
- Steam boiler; and
- Four pre-production modules.

Each pre-production module will include the following equipment:

- Power supply;
- Three glass lined reacting tanks (20 000L each);
- Two catholyte tanks (30 000L each);
- Two electrolyte cell stacks (14 Cells each) ;
- One anolyte tank (10 000L);
- One intermediate storage tank (40 000L);
- Two heat exchanges;
- Four rectifiers; and

- Electric heaters for catholyte/anolyte tanks.

Figure 3.3 below provides a schematic layout of a single pre-production module while Figure 3.4 provides a schematic layout of the entire facility incorporating the three proposed pre-production modules

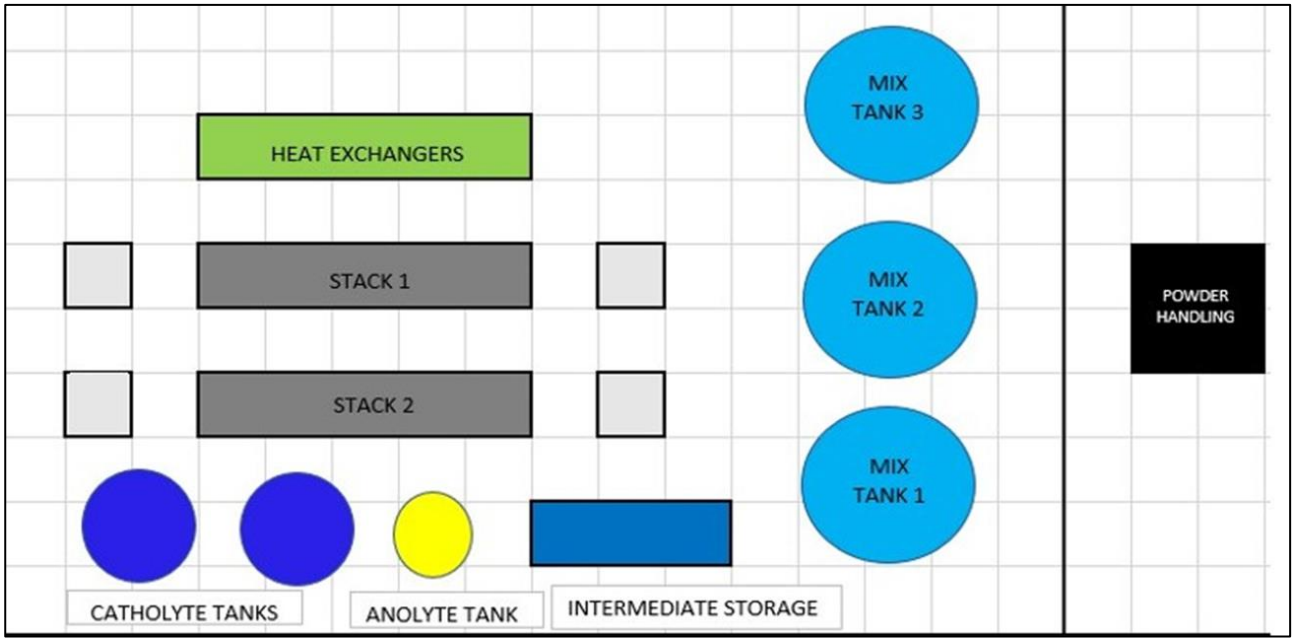


Figure 3.3: A schematic layout of a single pre-production module

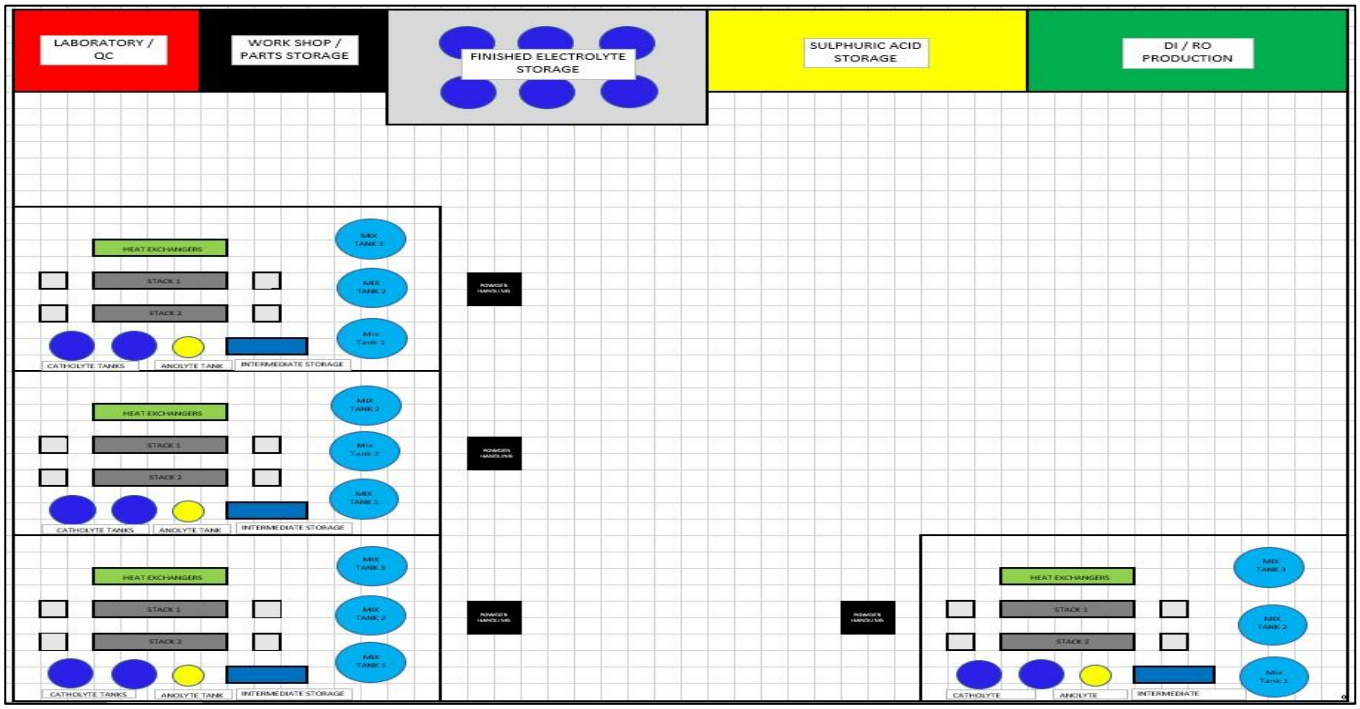


Figure 3.4: a schematic layout of the proposed VRFB production facility

Various sensors and controls will be installed throughout the production facility to ensure quality control, to prevent spillages and contamination as well as to monitor emissions. The sensors and controls to be installed include the following:

- Catholyte hydrogen sensors
- Anolyte oxygen sensors
- Catholyte pump controls
- Anolyte pump controls

- Catholyte pressure sensors
- Anolyte pressure sensors
- Catholyte temperature sensors
- Anolyte temperature sensors
- Condenser temperature sensor
- Catholyte liquid level sensor
- Anolyte liquid level sensor
- Catholyte tank weight sensor
- Anolyte tank weight sensor
- Heat exchanger cooling water sensors
- Catholyte extractor fan controls
- Anolyte extractor fan controls
- Condenser water flow rate control
- Ampere control
- Amp/hour control
- Voltage controls
- Catholyte flow controls
- Anolyte flow controls
- Catholyte tank valves
- Anolyte tank valves
- In-line UV analyser

The electrolyte that will be produced will the stored in $1m^3$ plastic containers. It is anticipated that approximately $500m^3$ of product will be stored onsite at any one time and then moved to the Port of East London to await export. No more than $250m^3$ of product will be stored at the Port of East London at any one time. The Port of East London has the necessary approvals in place.

4. RELEVANT LEGISLATION AND POLICY

In terms of Section APPENDIX 2; Content of a Scoping Report (1) of the EIA Regulations (2014 as amended), a Scoping Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include

e) A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;

4.1. Relevant Environmental Legislation used in the Compilation of this Scoping Report

Table 4.1 summarises the legislation that is relevant to the proposed Vanadium Electrolyte production facility in the ELIDZ.

Table 4.1: Environmental legislation considered in the preparation of the Vanadium Electrolyte production Scoping Report

Title of Environmental Legislation	Implications for the Proposed VRFB production facility
Constitution Act (Act No. 108 of 1996)	This is the supreme law of the land. As a result, all laws, including those pertaining to the proposed development, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone has the right: a) To an environment that is not harmful to their health or well-being. b) To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that: (i) Prevent pollution and ecological degradation. (ii) Promote conservation. (iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.
National Environmental Management Act (NEMA) (Act No. 107 of 1998)	• The developer must be mindful of the principles, broad liability and implications associated with NEMA and must eliminate or mitigate any potential impacts. • The developer must also comply with the 2014 EIA Regulations as amended in the terms of the Act which specifies when an environmental authorisation is required and the nature of the EIA process.
National Environmental Management: Waste Act (NEMWA) (59 of 2008)	The purpose of this Act relates to the proper management of waste. The Act also provides for the waste related activities where a Waste Licence is required. This includes the processing, recycling and refining of waste.
National Environmental Management: Air Quality Act (NEMAQA) (39 of 2004)	This Act requires that listed activities be operated within the conditions of an AEL, which has implications related to emissions monitoring and minimisation. Listed activity 7.2 – production and or use in manufacturing of Sulphuric Acid (all installations using more than 100 tons per annum) of the NEMAQA will be triggered by the proposed Vanadium Electrolyte production facility. As a result, an AEL will be required.

Also:

- The EIA Regulations;
- The Air Quality Act Regulations (GNR 893, 2013);
- The Buffalo City Municipality Trade Effluent By-law;
- The BCMM Spatial Development Framework;
- BCMM Air Quality Management Plan;
- The ELIDZ Environmental Authorisation (2001); and
- The ELIDZ Environmental Management Framework.

5. PROJECT NEED & DESIRABILITY

In terms of Section APPENDIX 2; Content of a Scoping Report (1) of the EIA Regulations (2014), a Scoping Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include

f) A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;

5.1. Improved storage of energy generated from sustainable sources

There is an increasing need to develop energy alternatives that are more sustainable. However, one of the main challenges of energy alternatives is ensuring the regular and reliable generation of energy from renewable sources and generation of energy outside of peak demand times. An effective energy system must be environmentally friendly and be able to safely, reliably and cost-effectively store the excess energy generated during times of peak generation, and to subsequently deliver the energy with demand.

Redox flow batteries (RFBs) are a feasible solution for large-scale storage of excess energy due to them having a relatively high efficiency and long cycling life compared with conventional batteries. RFBs are also able to be installed at a relatively low cost. The long cycling life of RFBs is due to the rechargeable characteristic of the batteries where the battery is able to efficiently maintain energy capacity through a high number of charge/discharge cycles. With these capabilities, the RFB is a practical solution for large-scale energy storage for renewable energy power plants. While the RFB is efficient in terms of energy storage and power production, improvements in energy density are important to consider enabling more mobile applications.

The VRFB is a technically and commercially advanced RFB available on the market as it is highly reliable as an energy storage unit. Many RFBs are affected by ion contamination due to the different material species applied in each of the positive and negative half-cells and the diffusion of ions from the positive to the negative electrolyte. The identical active species in the VRFB catholyte and anolyte i.e. positive and negative electrolyte, respectively, eliminates this concern. The application of the VRFB as a viable solution in the renewable energy storage market is of interest to both mineral and renewable energy stakeholders.

5.2. Economic development

5.2.1. ELIDZ

The ELIDZ's vision and mission clearly outlines the primary reason for existence of the Zone, that of developing, managing and maintaining an industrial complex together with the associated utilities and services that will firstly attract investors and secondly service those investors as customers of the ELIDZ.

The main function of the renewable energy sector is to identify possible investors interested in locating in the zone, secure these investors, settle them in the zone and provide the necessary infrastructure, utilities and services to allow them to manufacture or produce in accordance with their business model.

The proposed Vanadium Electrolyte production facility falls within the mandate of the ELIDZ and therefore, forms a key development that will aid the ELIDZ in achieving its goals for the Zone.

5.2.2. Eastern Cape Provincial Industrial Development Strategy

Three main strategic Goals are identified from the situational analysis contained in the Eastern Cape Provincial Industrial Development Stratedy (PIDS):

1. Economic Growth: Increasing economic growth through strengthening of existing sectors and diversification into new high potential industrial sectors, coupled with state investment in infrastructure;
2. Labour Absorption: Improved labour absorption through skills development, especially for the youth, and through spatial deconcentration of sectors, especially manufacturing industry; and
3. Job Retention: The net retention of existing jobs through the development of sectoral industrial policies and strategies and through the utilization of bridging and retraining strategies in declining industries;

The proposed development of the Vanadium Electrolyte production facility in the ELIDZ directly satisfies Goal 1 and 2 of the PIDS.

3.1. Skills transfer

The development of a specialised production facility creates the opportunity to train local (South African) engineers, etc. in how to operate and manage the process. This will result in job creation for newly graduated professionals and for semi-skilled and un-skilled workers in various aspects of the facility operation.

4. PROJECT ALTERNATIVES

In terms of Section APPENDIX 2; Content of a Scoping Report (1) of the EIA Regulations (2014), a Scoping Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include

g) A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including –

(i) Details of the alternatives considered;

One of the objectives of an EIA is to investigate alternatives to the proposed project. There are two types of alternatives: Fundamental Alternatives and Incremental Alternatives.

4.1. Reasonable and Feasible Alternatives

Alternatives should include consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The no-go alternative must also in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment.

"*Alternatives*", in relation to a proposed activity, is defined as different means of meeting the general purpose and requirements of the activity, which may include alternatives to; -

a) the property on which or location where it is proposed to undertake the activity;
b) the type of activity to be undertaken;
c) the design or layout of the activity; or
d) the option of not implementing the activity.

4.2. Fundamental Alternatives

Fundamental alternatives are developments that are totally different from the proposed project description and usually include the following:

- Alternative property or location where it is proposed to undertake the activity.
- Alternative type of activity to be undertaken.
- Alternative technology to be used in the activity.

4.3. Incremental Alternatives

Incremental alternatives are modifications or variations to the design of a project that provide different options to reduce or minimise environmental impacts. There are several incremental alternatives that will be considered during the EIA Phase of the project, including:

- The design or layout of the activity; and
- The operational aspects of the activity.

4.4. No-Go development

The EIA process is obligated to assess the status quo (i.e. the "No-Go" option). The No-Go alternative provides the assessment with a baseline against which predicted impacts resulting from the proposed development may be compared. A "No-Go" alternative has been assessed for the proposed development.

A summary of the different alternative options are provided in Table 6.1 below:

Table 6.1: Proposed alternatives for the Vanadium Electrolyte production facility in the ELIDZ

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
Property or location This refers to the **fundamental location options**, and the environmental risks and impacts associated with such options.	**Site alternative A** (Preferred alternative)	– Required service infrastructure such as water services, electricity supply, sanitation, etc. has been installed. – Located in an area zoned for light industry. – Located within the ELIDZ, so access to additional support provided by the ELIDZ to its tenants. – BEC is currently in the process of obtaining this plot from the ELIDZ.	– Land is currently undeveloped and consists mostly of natural veld. – Site is in close proximity to the ELIDZ's Aquaculture Development Zone.	YES	YES	– Although the Aquaculture Development Zone is located close by, mitigation measure can be put in place to ensure that there is minimal impact from the proposed Vanadium Electrolyte production facility. (currently infrastructure not operational and in process of being demolished)
	Site Alternative B	– Required service infrastructure such as water services, electricity supply, sanitation, etc. has been installed. – Located in an area zoned for light industry. – Located within the ELIDZ, so access to additional support provided by the ELIDZ to its tenants. – Site is already partially cleared. – An AEL has been granted	– The site size is only just adequate enough for the proposed activities. – The site still needs to undergo a sub-division process where the land will be available for sale. – BEC have identified this site as their second choice should they not successfully acquire Site A from the ELIDZ.	YES	YES	– None

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
		to the adjacent tenant.				
	Site Alternative C	– Required service infrastructure such as water services, electricity supply, sanitation, etc. has been installed. – Located in an area zoned for light industry. – Located within the ELIDZ, so access to additional support provided by the ELIDZ to its tenants. – Site is already partially cleared. – An AEL has been granted to the adjacent tenant.	– Land is currently undeveloped and consists mostly of natural veld. – BEC have not put in an application to acquire this plot from the ELIDZ as this site is not a preferred or second option.	YES	NO	– Since the BEC are not going to try and acquire this plot from the ELIDZ, this site will not be further assessed.
	Site Alternative D	– Required service infrastructure such as water services, electricity supply, sanitation, etc. has been installed. – Located in an area zoned for light industry. – Located within the ELIDZ, so access to additional support provided by the ELIDZ to its tenants.	– Land is currently undeveloped and consists mostly of natural veld – The topography is steeper than the other alternatives. Therefore major earthworks may be required to level the site. – BEC have not put in an application to acquire this plot from the ELIDZ as this site is not a preferred or second option.	YES	NO	– Since the BEC are not going to try and acquire this plot from the ELIDZ, this site will not be further assessed.
Type of activity This refers to the **fundamental land use options**,	**Production of electrolyte for Vanadium Redox Flow Batteries**	– VRFBs are modular and scalable from kilowatt to megawatt applications; – Long life cycle of up to 20	– Low volumetric energy storage capacity. – The system requires the using of expensive ion-	YES	YES	– None

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
such as industrial, residential, infrastructure, farming, conservation, etc. and the environmental risks and impacts associated with such options	(Preferred alternative)	years (up to 10 000 charge/discharge cycles); – The electrolyte is stored in separate tanks and does not form part of the power cell. This ensures an extended battery life and minimal performance degradation as the energy is stored in tanks and not the cell. – Inherently safe and no thermal runaway is not possible, improving VRFB safety characteristics. – Reduced contamination of electrolytes; – Rapid deployment (can be containerized); and – Re-usability and recyclability of the vanadium in the electrolyte at VRFB end of life.	exchange membrane, which can contribute more than 40% of the overall battery cost.			
	None	– The land is located within an IDZ, so alternative land uses such as residential or agricultural use will not occur on site.	– N/A	N/A	N/A	– None
Type of technology This refers to the **fundamental**	**Alternative 1 – Production of vanadium electrolyte using**	– Fewer environmental impacts where the only consideration is gas generation at the anode.	– Difficult in controlling colloidal solids. – Requires continuous maintenance of a reliable	YES	YES	– None

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
technology options, such as energy generation from wind vs. coal fired power plant, etc. and the environmental risks and impacts associated	**electrochemical dissolution** (Preferred alternative)	– Requires reduced capital and operational costs. – Easy preparation and operation of process. – Electricity and vanadium pentoxide are the only inputs.	electricity supply.			
	Alternative 2 – Production of vanadium electrolyte using chemical reduction	– There is a moderate temperature requirement. – Process is relatively quick. – Production is able to be increased with low capital investment. – Electricity consumption relatively low.	– Application of chemical reductants is governed by registered patents.	YES	NO	– Due to the legality of the patents required for the production process, this alternative will not be further assessed.
	Alternative 2 – Production of vanadium electrolyte using thermochemical reduction	– Process is relatively quick.	– Capital intensive for the use of alloy materials employed in the high temperature reactor (800°C - 900°C). – The reactor needs to be properly seal to vent the expulsion of hazardous gasses. – High maintenance requirements for the reactor. – High operational costs. – Application of thermochemical reductants is governed by	YES	NO	– Due to the legality of the patents required for the production process, this alternative will not be further assessed.

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
			registered patents			
Design or layout This relates mostly to alternative ways in which the proposed development or activity can be physically laid out on the ground to minimise or reduce environmental risks or impacts.	**Alternative layout 1** (Preferred alternative)	– The layout proposed will be designed to ensure maximum manufacturing efficiency with minimal unnecessary impact on the environment.	–	YES	YES	– None
Operational aspects This relates mostly to alternative ways in which the development or activity is constructed and operated in order to reduce environmental risks or impacts.	**Alternative operational activity 1** (Preferred alternative)	The facility is designed to operate 24 hours per day, 7 days per week.		YES	YES	– None
No-go option This refers to the	Existing activities on site includes	– Will remain relatively undisturbed until	– No contribution towards an industrial development	YES	YES	– None

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
current status quo and the risks and impacts associated to it.	untransformed land within an existing industrial development zone	another tenant is found to develop the site.	zone in East London. – No job opportunities. – No development opportunities			

5. PUBLIC PARTICIPATION

In terms of Section APPENDIX 2; Content of a Scoping Report (1) of the EIA Regulations (2014), a Scoping Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include

g) A full description of the process followed to reach the proposed preferred activity, site and location within the site, including –

(ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents.

(iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;

5.1. Notification of Interested and Affected Parties

5.1.1. Public Participation

Public consultation is a legal requirement throughout the EIA process. Developers are required to conduct public consultation throughout the Scoping and EIR phase. Formal EIA documents are required to be made available for public review and comment by the proponent, these include the Project Brief, Scoping Report and Terms of Reference for the EIA, the draft and final EIA reports and the decision of the Environmental Authority. The method of public consultation to be used depends largely on the location of the development and the level of education of those being impacted on by the project. Required means of public consultation include:

- Site notice(s);
- Newspaper advertisement(s);
- Letter of Notification and information to affected landowner(s), stakeholders and registered I&APs (Proof: e-mail, fax, registered letters to DEDEAT);
- Background Information Document (BID) distribution;
- Public meeting (Attendance register and meeting minutes); and
- Authority and Stakeholder engagement (DEA, DAFF, ECDC, ADM, BCMM, TNPA, BKCB, Ward Councillor, ELIDZ tenants, etc.).

5.2. Stakeholder and I&AP database

Below is a list of all stakeholders identified during the EIA process as well as registered I&APs:

Table 7.1: Compilation of organs of state, key stakeholders and registered I&APs

Organisation	Name	E-mail
Organs of State		
BCMM Air Quality Officer	Alan MacIntyre	AlanM@buffalocity.gov.za
BCMM Environmental Manager	Jane Katushabe	JaneG@buffalocity.gov.za
BCMM Municipal Manager	Andile Sihlahla	citymanager@buffalocity.gov.za
BCMM Planning	Hans Shluter	hanss@buffalocity.gov.za
BCMM Sanitation	Mark Westerberg	MarkW@buffalocity.gov.za
ELIDZ	Johan Burger	johan@elidz.co.za
ELIDZ	Vernon Mooneiya	vernon@elidz.co.za
ELIDZ	Chris Ettmayr	chris@elidz.co.za
DEDEAT	Briant Noncembu	briant.noncembu@deaet.ecape.gov.za
DEDEAT	Nozuko Mabongo	nozuko.mabongo@dedea.gov.za

Organisation	Name	E-mail
DEDEAT	Allister Mc-Master	Alistair.McMaster@dedea.gov.za
Ward Councillor (Ward 46)	Nceba W. Kilimani	NcebaK@buffalocity.gov.za
Border-Kei Chamber of Business	Les Holbrook	les@bkcob.co.za
DAFF	Keagan Halley	KeagonH@daff.gov.za
DAFF	Michelle Pretorius	MichellePR@daff.gov.za
ADM	Luyanda Mafumbu	mafumbul@amathole.gov.za
TNPA ELS	Nozuko Litile	Nozuko.Litile@transnet.net
ECDC	Rory Haschick	rory@ecdc.co.za
ECDC	Pierre Le Pan	pleppan@ecdc.co.za
ECDC	Willie van Heerden	wheerden@ecdc.co.za
ELIDZ Tenants		
Voestalpine Stamptec South Africa	Michael Blechinger	Michael.Blechinger@voestalpine.com
MC Synchro	Keith Thompson	keitht@mcsyncrosa.co.za
Feltex Caravelle	Darryl Meyer	darrylm@feltex.co.za
IAC Feltex	Dieter Kriegisch	dkriegisch@iacfeltex.co.za
Feltex Fehrer	Alistair Murray	AlistairM@feltex.co.za
Feltex Trim	Tony Hiscock	Tonyh@feltex.co.za
Molan Pino	John Flanegan	j.flanegan@molan-pino-sa.com
ASP Clinic	Dr. Trollop	Torrchristopher261@gmail.com
Johnsons Control	Gregory Kriedemann	greg.kriedemann@jci.com
	Marius Coetzee	marius.coetzee@jci.com
	Tracy Van Helsdingen	Tracy.Van.Helsdingen@jci.com
TI Automotives Fuel Systems	Bruce West	bwest@za.tiauto.com
TI Automotive Systems SA (PTY) Ltd	Carlos Da Fonseca	cdafonseca@za.tiauto.com
Linde & Viemann	Gehard Gericke	g.gericke@linde-wieman.com
Seda	Terrance Mtola	tmtola@seci.org.za
	Joe Ntsomi	jntsomi@tiautosa.co.za
UTI	Jimmy Lee	JLey@go2uti.com
UTI – Sun Couriers	Charles Johnson	chjohnson@za.go2uti.com
UTI – Material Handling	Geoff Sampson	gsansom@za.go2uti.com
VDS	Ronnie Gerber	ronnieg@vdsgroup.co.za
TAC	Neville Thungavel	Neville@toanywhere.co.za
Auto Carrier	Paulus de Wilzen	paulusdw@grindrod.co.za
Matla Diamond	Chia-Chao Wu	cwu@matla-innovation.com
Sunningdale	Neil Van Rensburg	neil@sunningdaledairy.co.za
	Karen Boy	karen@sunningdaledairy.co.za
Kromberg & Schubert	Cobus Kotze	cokot@ksse.kroschu.com
Froetek SA	Werner Bendisch	werner.bendisch@froetek.com
MSC	Barbara Taylor	btaylor@msc.co.za
EC NGO Coalition NGO	Rooks Moodley	rooksmoodley@ecngoc.co.za
ECITI	Mncedi Mgwigwi	mncedi@eciti.co.za
Collectall	Jonathan Earl	jon@collectall.com
Chemin	Matthew Speelman	matthew@chemin.co.za
Avumile Business Investments	Vumile Mtyobele	admin@avumile.co.za
Langa Energy	Patrick M. Nawa	patrick@langaenergy.co.za
Kubela Meladi	Abraham	abram@kubela.co.za
ABET	Dumisani Rheme	dumisanir@yahoo.com
		dumisanirheme@gmail.com
RG Brose Automotive Components	Piet Strydom	piet.strydom@rgbrose.co.za
CSIR	Mandla Sodladla	mandla@elidz.co.za
Boysens	James Tarr	james.tarr@bsa.boysen-online.de
Master Artisan	Willie Gresse	willie@maasa.com

Organisation	Name	E-mail
New Shelf /Dimension Data	Mr Mangaliso Radebe	mangaliso.radebe@dimensiondata.com
BCM	Mr X Wonono	wononox@buffallocity.co.za
Zizi Consulting/ Pokopela	No-Olie Olivia Sigidi	olivia.sigidi@ziziconsulting.co.za
Milltrans	Johan Stapelberg	Johan.millel@mweb.co.za
Murray & Roberts	Nick Lotter	Nick.Lotter@murrob.com
Big foot	Dion Naidoo	dion@bigfootexpress.co.za
Fox tech Ikhwezi	Leigh Briggs	leigh@foxtechikhwezi.co.za
Yanfeng Automotive Interiors	Riaan Goosen	riaan.goosen@yfai.com
	Greg Kriedemann	gregory.kriedemann@yfai.com
ILB Helios	David Nunez	dnunez@ilbhelios.co.za
DSV	Denzil Mauer	denzil.mauer@za.dsv.com
Clariter	Bart Samardakiewicz	'bartek@clariter.com'
Registered I&APs		
None so far		

5.3. Issues & Comments

No issues have been submitted yet. This section will be updates as issues and comments are submitted and responses are provided.

6. DESCRIPTION OF THE ENVIRONMENT

In terms of Section APPENDIX 2; Content of a Scoping Report (1) of the EIA Regulations (2014) as amended, a Scoping Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include

g) A full description of the process followed to reach the proposed preferred activity, site and location within the site, including –

(iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

The following section describes the current land use, climate, topography, geology and hydrology within the ELIDZ study area.

6.1. Current land use

The proposed sites (Site A and Site B) within the ELIDZ are currently unused. Site A (the preferred site option), is currently untransformed. Site B is located directly adjacent to an existing plastics recycling facility and the site shows some degree of clearing. The ELIDZ received an Environmental Authorisation in 2001 for light industry. Therefore, the sites within the ELIDZ are earmarked for light industrial developments such as the proposed Vanadium Electrolyte production facility.

6.2. Climate

East London receives an average of 593mm of rain per year, with most occurring in the summer months (Figure 8.1). The monthly distribution of average daily maximum temperatures (Figure 8.1) shows that the average midday temperatures for East London range from 23°C in July to 28°C in February. The region is the coldest during July when the mercury drops to 9.3°C on average during the night (Metroblue, 2018). Figure 8.2 indicates average wind data based on observations taken over the past 15 years at the East London Airport.

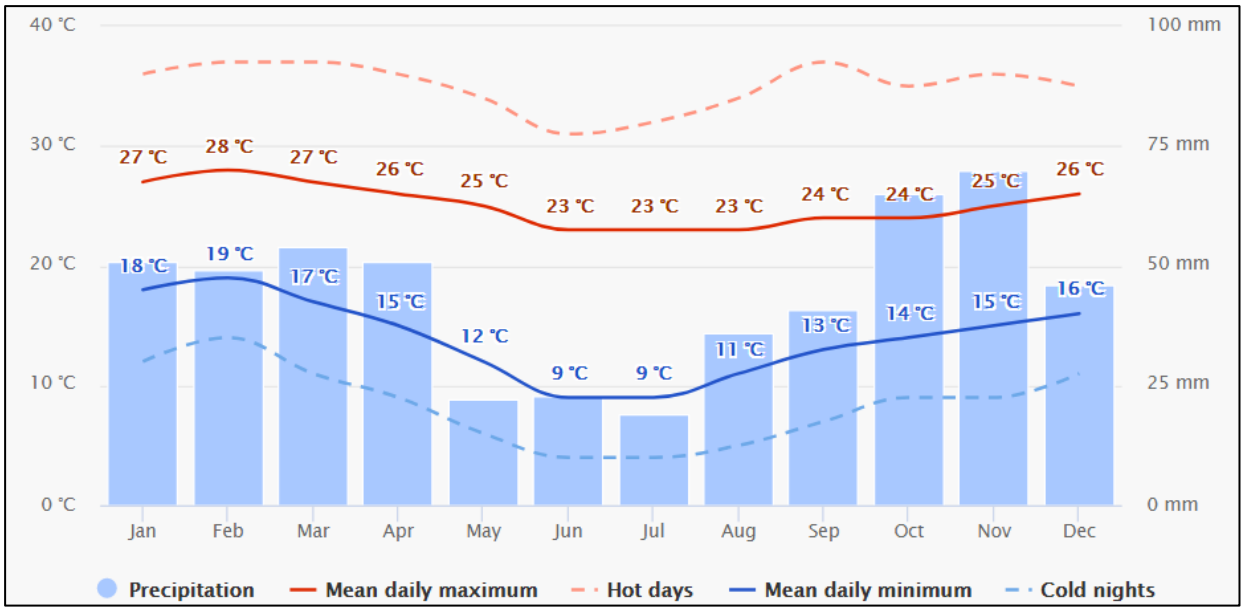
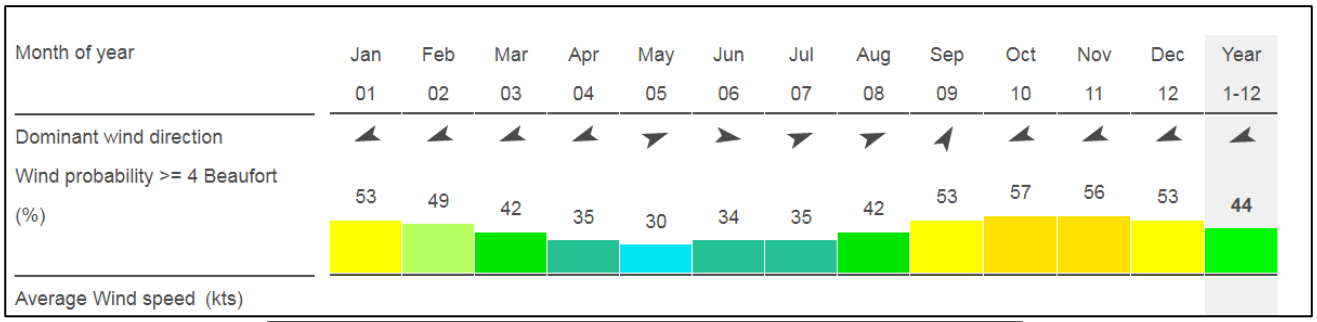


Figure 8.1: Average rainfall and temperature patterns in East London (www.meteroblue.com)



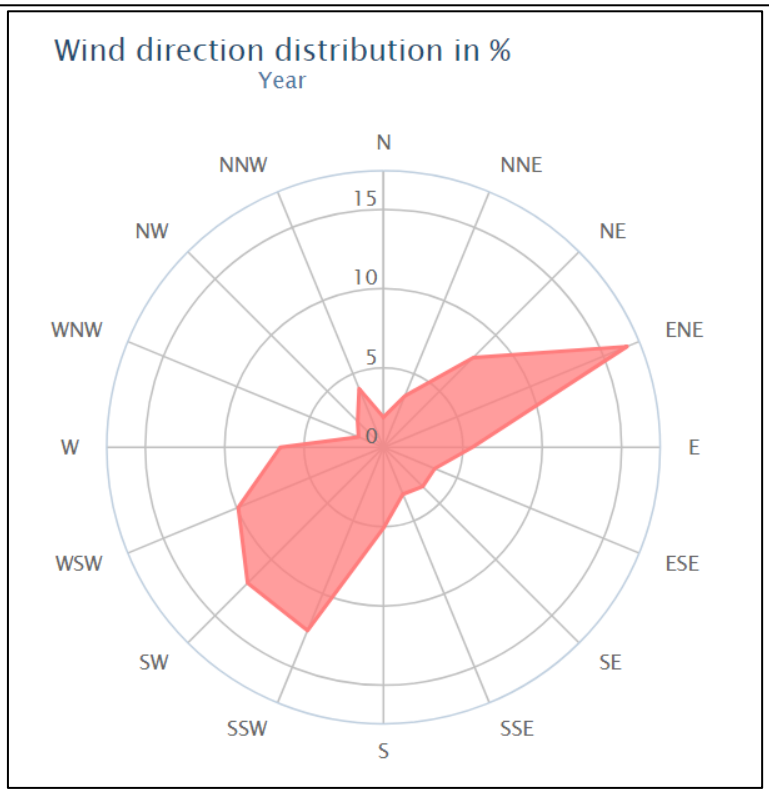


Figure 8.2: Wind data for East London (www.windfinder.com)

6.3. Topography

The topography of Sites A and B is generally flat, with a mild slope from south to north (Figure 8.3).

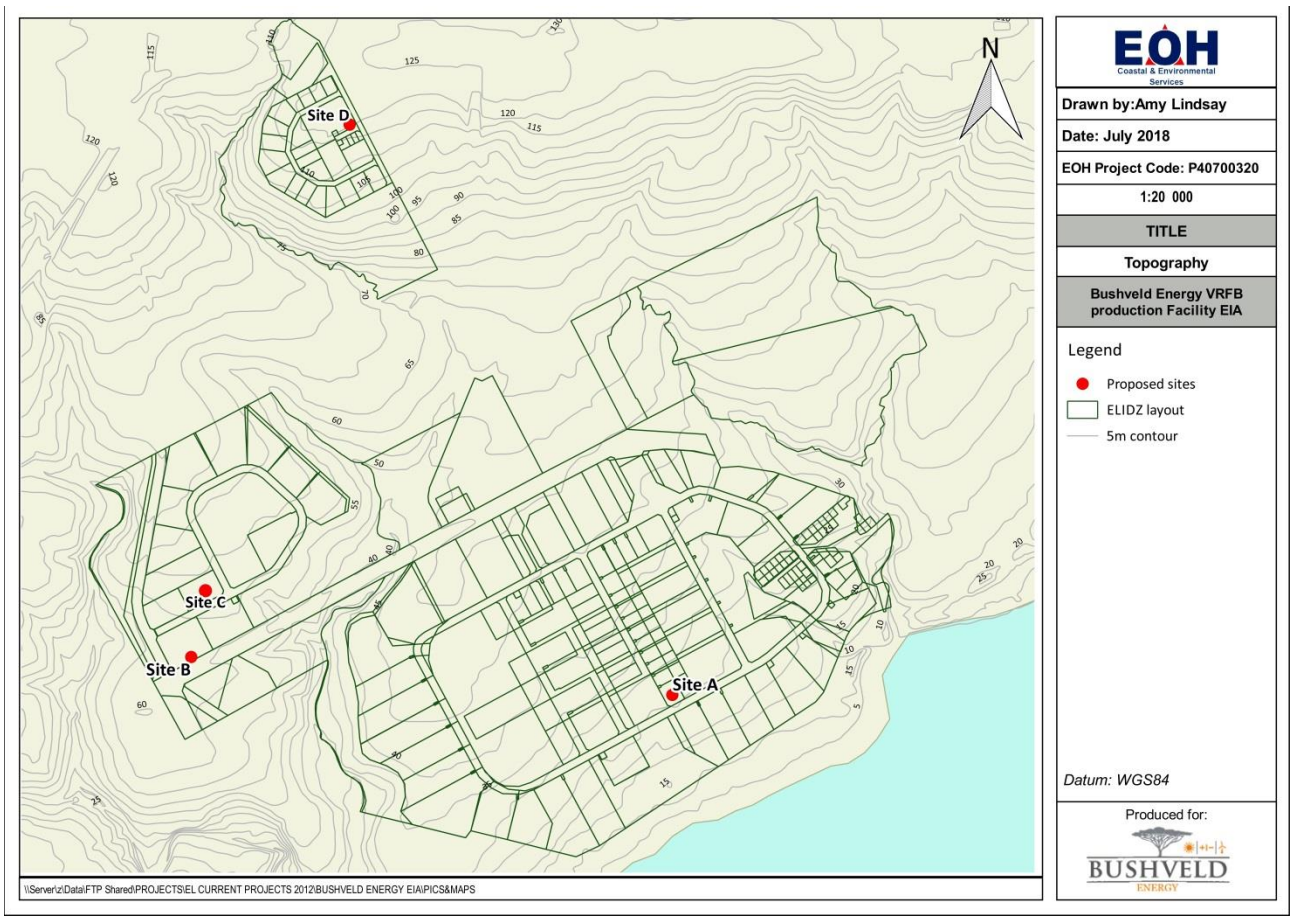


Figure 8.3: Topography of the ELIDZ

6.4. Geology

The physical features of the site is typical of the BCM coastline where dolerite outcrops occur (e.g. Kwelera, Gonubie, West Bank, Igoda, Christmas Rock) with the majority and remainder of the geological formations being primarily calcareous sandstones of the Algoa Group. A few deposits of grey and grey/red mudstone of the Beaufort Group also occur but are limited in their extent (e.g. Keiskamma, Gulu, Winterstrand, Gonubie). The marine origin of these formations results in the high salinity of groundwater found in the Amatole catchments and Fish River basin.

6.5. Hydrology

Site B lies between the Hickmans and Mvubukazi Rivers, both small, temporary open/closed systems of less than 8 km in length. The boundary of the Site B is approximately 400 m from the Hickmans River, and is separated from it by a number of vacant sites, and an arterial road. Site A is not in close proximity to any rivers or drainage lines.

No wetlands occur within or surrounding Sites A and B.

6.6. Vegetation and Floristics

This section focuses on desktop information of the vegetation and floristics of the ELIDZ as a whole, although the ecological impact specialist will undertake a thorough assessment of the vegetation and floristics.

6.6.1. South African National Biodiversity Institute (SANBI)

Mucina and Rutherford (2006) have classified the vegetation type on site as Albany Coastal Belt. This vegetation type is distributed within 15 km of the coastline, from Kei Mouth to the Sunday's River. Typically the land is dominated by short grasslands punctuated by scattered bush clumps or solitary *Acacia natalitia* trees. It is categorised as **LEAST THREATENED**.

6.6.2. Eastern Cape Biodiversity Conservation Plan

The ELIDZ as a whole is classified by the ECBCP as a Critical Biodiversity Area (CBA 2). However, the land has been rezoned and authorisation given for the construction and operation of suitable light industry within the ELIDZ. In fact, a significant number of facilities have already been constructed and are currently operating within the ELIDZ.

6.7. Socio-Economic Profile

6.7.1. Population

Based on the Integrated Development Plan (IDP), the BCMM population has shown a steady growth over the years. It has grown from 704,855 in 2001 to 755,200 in 2011 (0.7% growth rate).

The population demographic based on the 2011 census was 85% black, 7.71% white, 6.02% coloured, 0.83% Indian/Asian and 0.33% other. The gender distribution is 47.5% male and 52.5% female. Age distribution revealed that there is a relatively high youth component of the population, with 37.3% between the ages of 15 and 35.

6.7.2. Economy

BCMM has the 2nd largest economy in the Eastern Cape after the Nelson Mandela Metro. The finance sector is the largest sector in BCMM, representing 29% of the total economy. This is followed closely by Community Services which accounts for 2%, manufacturing (17percent), trade (13%) and transport 8%. The contribution of agriculture (1%) and mining (0.4%) remains minimal.

The size of the financial sector at BCMM can be attributed to the regional head offices of the finance institutions which are domiciled in East London. The strength of the community services sector can be attributed to the Provincial Government Head Offices in Bhisho as well as the regional offices of the government departments that are in East London.

The manufacturing sector (which is based on automotive manufacturing) has been affected by the global recession as illustrated by the shrinking in size (8%) between 2008 and 2009. It should be remembered that this industry is based primarily on exports to global markets which were severely affected by the recession. Trade was also affected by the recession as illustrated by the shrink (2%) between 2008 and 2009. This is because with loss of income through the job losses that come with a recession, there is less money for people to spend.

The community services sector employed about 30% of the employed in BCMM. This is followed by trade (23%) and manufacturing 18%. The finance sector, the largest sector by size, employs only 8% of those employed in BCMM. The households sector refers to employment around households and currently accounts for 8% of all jobs in BCMM. Construction accounts for about 6% of the total jobs, agriculture employs 2% of the employed.

6.7.3. Employment

BCMM has high levels of unemployment, at around 30% or 75,000 people, associated with much reliance on survival in the second informal economy. This is related to high levels of poverty (60% of all households earned less than R1600/ month in 2001) which in turn constraints BCMM's ability to deliver basic services in a sustainable manner. Significant service delivery backlogs exist, including an estimated 130,000 housing units being required in the period of 2007 – 2027.

The main perceived weakness of the business environment are distance from markets/ customers, transport costs and congestion, and lack of government services. While the two main perceived strengths of the business environment are location being accessible to clients, customers and markets, and the accessibility to logistics infrastructure such as the port, airport, and highways. The constraints on business growth include the lack of available labour force skills and availability of finances.

In addition to low levels of economic growth, unemployment is also linked to skills levels of the labour force. Literacy levels stayed stagnant between 1996- 2001 at 77% and 9.5% of the population having no education.

This challenge is seen by BCMM as one of the major contributors to systemic poverty and unemployment that the municipality experiences. With less than 10% of the population with no matric or post matric qualification and 37% with no schooling at all there is a need to energise efforts to improve education and skills development.

7. MANNER IN WHICH THE ENVIRONMENT MAY BE AFFECTED

In terms of Section APPENDIX 2; Content of a Scoping Report (1) of the EIA Regulations (2014), a Scoping Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include:

g) A full description of the process followed to reach the proposed preferred activity, site and location within the site, including –

(v) The impacts and risks which have informed the identification of each alternative, including the nature, significance, consequences, extent, duration and probability of such identified impacts, including the degree to which these impacts –

- *Can be revised*
- *May cause irreplaceable loss of resources; and*
- *Can be avoided. Managed or mitigated*

(vi) The methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;

(vii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

(viii) The possible mitigation measures that could be applied and level of residual risk;

(ix) The outcome of the site selection matrix

(x) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and

(xi) A concluding statement indicating the preferred alternatives, including preferred location of the activity.

7.1. Assessment of impacts

EOH CES has developed a rating scale for the Scoping Phase in accordance with the requirement outlined in Appendix 2 of the 2014 EIA Regulations (as amended). This scale takes into consideration the following variables:

- Significance
- Consequence
- Extent
- Duration
- Probability
- Reversibility and Mitigation

It is, however, important to note that impacts are assessed and rated on a broader issues level, and are regarded as preliminary. This is because, at the Scoping Phase, a limited amount of information on project related detail is available, and baseline data on the project affected environment and social systems has not been gathered yet. This information requires input from a number of specialist assessments, which are only completed after the Scoping phase thus, a definitive assessment of project specific impacts cannot be completed at the Scoping phase, and our interpretation of the new requirements is that the environmental and social consequences of the project and alternatives needs to be discussed more broadly than what is required in the EIR. This we refer to as an issues level assessment.

7.1.1. Issues Identification matrix

Six factors are considered when assessing the significance of the identified issues, namely:

1. ***Significance*** - Each of the below criterion (points 2-6 below) are ranked with scores assigned, as presented in Table 1 to determine the overall significance of an activity. The total scores recorded for the effect (which includes scores for duration; extent; consequence and probability) and reversibility / mitigation are then read off the matrix presented in Table 2, to determine the overall significance of the issue. The overall significance is either negative or positive.
2. ***Consequence*** - the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
3. ***Extent*** - the spatial scale defines the physical extent of the impact.
4. ***Duration*** - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
5. The ***probability*** of the impact occurring - the likelihood of impacts taking place as a result of project actions arising from the various alternatives. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
6. ***Reversibility / Mitigation*** – The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in Table 6.1 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 9.1: Ranking of Evaluation Criteria

Effect	**Duration**	
	Short term	Less than 5 years
	Medium term	Between 5-20 years
	Long term	More than 20 years
	Extent	
	Localized	The proposed site and its immediate environs
	Moderate	District / Municipal and Provincial level
	Extensive	National and International level
	Consequence	
	Slight	Slight impacts or benefits on the affected system(s) or party(ies)
	Moderate	Moderate impacts or benefits on the affected system(s) or party(ies)
	Severe/ Beneficial	Severe impacts or benefits on the affected system(s) or party(ies)
	Probability	
	Unlikely	The likelihood of these impacts occurring is slight (low probability)
	May Occur	The likelihood of these impacts occurring is possible (high probability)
	Definite	The likelihood is that this impact will definitely occur
Reversibility/ Mitigation	**Reversibility / Mitigation**	
	Easily achievable	The impact can be easily, effectively and cost effectively mitigated/reversed
	Achievable	The impact can be effectively mitigated/reversed without much difficulty or cost

	Difficult	The impact could be mitigated/reversed but there will be some difficultly in ensuring effectiveness and/or implementation, and significant costs
	Very Difficult	The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly

7.2. Impacts mind map

The mind map (Table 9.2) maps out at a high level the categories or types of impacts that are expected for the proposed development of the Vanadium Electrolyte facility in the ELIDZ under various themes.

7.3. Possible Environmental Issues and Impacts

Table 9.3 to 9.5 provides more detailed environmental issues and resulting impacts that have been identified for the following phases of the project development:

- Planning and design;
- Construction; and
- Operation.

The identification of these impacts has resulted in the recommendation of the following specialist assessments:

- Ecological;
- Socio-economic;
- Air Quality; and
- Stormwater management.

The impacts have been identified for all the various options proposed and as clarification of these options is gained, some of these impacts may become redundant.

Table 9.2: Mind map of the impacts identified within the Scoping phase of the proposed Vanadium Electrolyte production facility in the ELIDZ.

MIND MAP: IMPACTS: PROPOSED VANADIUM ELECTROLYTE PRODUCTION FACILITY				
THEMES	**CATEGORIES**	**PLANNING & DESIGN PHASE**	**CONSTRUCTION PHASE**	**OPERATIONAL PHASE**
Legislative Environment	Environmental, legal and policy compliance	**X**	**X**	**X**
Socio-economic Environment	Health & safety		**X**	**X**
	Social benefits from the project		**X**	**X**
	Benefit to renewable energy sector			**X**
Cross Cutting Impacts	Hazardous substances	**X**	**X**	**X**
	Waste	**X**	**X**	**X**
	Air quality	**X**		**X**
Cumulative Impacts	Waste	**X**		**X**
	Air quality	**X**		**X**

Please note that CONSTRUCTION PHASE IMPACTS WILL BE SUFFICIENTLY MITIGATED BY COMPLIANCE WITH THE EXISTING ELIDZ CONSTRUCTION EMPR (APPENDIX G)

Table 9.3: Issues and impacts identified in the planning and design phase of the proposed development

PLANNING AND DESIGN PHASE			
Issue	**Impact**	**Significance**	**Further Assessment**
Environmental, legal and policy compliance	Failure to comply with existing policies and legal obligations in the planning and design phase could lead to the project conflicting with local, provincial and national policies, legislation etc. This could result in legal non-compliance, fines, overall project failure or delays in construction activity and undue disturbance to the natural environment.	HIGH NEGATIVE	General EIA All specialists
Hazardous substances	The inappropriate planning for the transport, storage and handling of hazardous substances (i.e. sulphuric acid) will result in the contamination of surrounding terrestrial and aquatic environments.	HIGH NEGATIVE	General EIA Major Hazards Installation
Waste	It is anticipated that 12.6 kg/hr of acidic waste will be produced with a 10% sulphuric acid content. Inadequate planning for the appropriate storage and treatment of this waste could result in negative impacts on the ELIDZ sewerage infrastructure, and further, on the BCMM sewerage infrastructure, and at worst, on the marine environment to which the Hood Point Sea outfall discharges.	HIGH NEGATIVE	General EIA Major Hazards Installation Stormwater Management Plan
Air quality	Priority pollutants including SO_2 will be released as a result of the chemical reactions that take place at the anode when producing the VRFB. These pollutants have the potential to significantly decrease the quality of the air in the general area. The minimisation of these pollutions muct be accounted for in the planning and design phase of the project	MODERATE NEGATIVE	General EIA Air Quality Specialist
	It is possible that the facility may release malodorous emissions that could negatively impact on the surrounding land users in not taken into consideration during the planning and design phase.	MODERATE NEGATIVE	General EIA Air Quality Specialist

Table 9.4: Issues and impacts identified in the construction phase of the proposed development

CONSTRUCTION PHASE			
Issue	**Impact**	**Significance**	**Further Assessment**
CONSTRUCTION IMPACTS WILL BE SUFFICIENTLY MITIGATED BY COMPLIANCE WITH THE EXISTING ELIDZ CONSTRUCTION EMPR (APPENDIX G)			

Table 9.5: Issues and impacts identified in the operational phase of the proposed development

OPERATIONAL PHASE			
Issue	**Impact**	**Significance**	**Further Assessment**
Environmental, legal and policy compliance	Failure to comply with existing policies and legal obligations during the operational phase could lead to the project conflicting with local, provincial and national policies, legislation etc. This could result in legal non-compliance, fines, overall project failure or delays in construction activity and undue	MODERATE NEGATIVE	General EIA All specialists

OPERATIONAL PHASE			
Issue	**Impact**	**Significance**	**Further Assessment**
	disturbance to the natural environment.		
Health and safety	The inappropriate storage and handling of hazardous substances (i.e. sulphuric acid), and the uncontrolled emissions of SO_2 during the operational phase will pose a significant threat to the health and safety of the employees of the proposed facility as well as surrounding tenants.	MODERATE NEGATIVE	General EIA All specialists
Social benefits from the project	Social benefits, including the potential for the provision of both skilled and unskilled employment in the long term, must be promoted during the operational phase of the project.	BENEFICIAL	General EIA Social specialist
Benefit to renewable energy sector	During the operational phase, the VRFBs will provide a reliable and efficient energy storage solution for the growing renewable energy sector in South Africa and abroad.	BENEFICIAL	General EIA Social specialist
Hazardous substances	During the operational phase, the inappropriate transport, storage and handling of hazardous substances (i.e. sulphuric acid) will result in the contamination of surrounding terrestrial and aquatic environments.	HIGH NEGATIVE	General EIA Major Hazards Installation
Waste	During the operational phase, it is anticipated that 12.6 kg/hr of acidic waste will be produced with a 10% sulphuric acid content. This could result in negative impacts on the ELIDZ sewerage infrastructure, and further, on the BCMM sewerage infrastructure, and at worst, on the marine environment to which the Hood Point Sea outfall discharges.	HIGH NEGATIVE	General EIA Major Hazards Installation Stormwater Management Plan
Air quality	During the operational phase, Priority pollutants including SO_2 will be released as a result of the chemical reactions that take place at the anode when producing the VRFB. These pollutants have the potential to significantly decrease the quality of the air in the general area.	MODERATE NEGATIVE	General EIA Air Quality Specialist
	It is possible that the facility may release malodorous emissions during the operational phase that could negatively impact on the surrounding land users.	MODERATE NEGATIVE	General EIA Air Quality Specialist

7.4. Assessment of issues and impacts

All issues and impacts identified in Section 9.2 are assessed according to the assessment matrix as described in Section 9.1 and summarised in Table 9.6 to 9.8 below.

Table 9.6: Assessment of impacts during the Planning & Design phase of the proposed Vanadium Electrolyte production facility development

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY & MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Environmental, legal and policy compliance	Site A *(Preferred alternative)*	Failure to comply with existing policies and legal obligations in the planning and design phase could lead to the project conflicting with local, provincial and national policies, legislation etc. This could result in legal non-compliance, fines, overall project failure or delays in construction activity and undue disturbance to the natural environment.	**HIGH**	Severe	Localized	Long Term	Definite	Easily Achievable	All relevant legislation must be adhered to Input from specialists must be included into the EIR.	**LOW**
	Site B	Failure to comply with existing policies and legal obligations in the planning and design phase could lead to the project conflicting with local, provincial and national policies, legislation etc. This could result in legal non-compliance, fines, overall project failure or delays in construction activity and undue disturbance to the natural environment.	**HIGH**	Severe	Localized	Long Term	Definite	Easily Achievable	All relevant legislation must be adhered to Input from specialists must be included into the EIR.	**LOW**
Hazardous substances	Site A *(Preferred alternative)*	The inappropriate planning for the transport, storage and handling of hazardous substances (i.e. sulphuric acid) will result in the contamination of surrounding terrestrial and aquatic environments.	**HIGH**	Severe	Moderate	Short Term	Possible	Easily Achievable	Hazardous waste must be correctly transported, stored and handled as per legislative requirements. Input from specialists must be included into the EIR.	**LOW**
	Site B	The inappropriate planning for the transport, storage and handling of hazardous substances (i.e. sulphuric acid) will result in the contamination of surrounding terrestrial and aquatic environments.	**HIGH**	Severe	Moderate		Possible		Hazardous waste must be correctly transported, stored and handled as per legislative requirements. Input from specialists must be included into the EIR.	**LOW**
	No-Go Option	There will be no impact as a result of hazardous substances.	**LOW**	Slight	Localized		Definite		None required	**LOW**
Waste	Site A *(Preferred alternative)*	It is anticipated that 12.6 kg/hr of acidic waste will be produced with a 10% sulphuric acid content. Inadequate planning for the appropriate storage and treatment of this waste could result in negative impacts on the ELIDZ sewerage infrastructure, and further, on the BCMM sewerage infrastructure, and at worst, on the marine environment to which the Hood Point Sea outfall discharges.	**HIGH**	Severe	Moderate	Short term	Probable	Easily Achievable	Process waste must be appropriately stored on site and disposed of at a registered hazardous waste disposal facility. Input from specialists must be included into the EIR.	**LOW**
	Site B	It is anticipated that 12.6 kg/hr of acidic waste will be produced with a 10% sulphuric acid content. Inadequate planning for the appropriate storage and treatment of this waste could result in negative impacts on the ELIDZ sewerage infrastructure, and further, on the BCMM sewerage infrastructure, and at worst, on the marine environment to which the Hood Point Sea outfall discharges.	**HIGH**	Severe	Moderate		Probable		Process waste must be appropriately stored on site and disposed of at a registered hazardous waste disposal facility. Input from specialists must be included into the EIR.	**LOW**
	No-Go Option	There will be no impact as a result of process waste	**LOW**	Slight	Localised		Definite		None required	**LOW**
Air quality	Site A *(Preferred alternative)*	Priority pollutants including SO2 will be released as a result of the chemical reactions that take place at the anode when producing the VRFB. These pollutants have the potential to significantly decrease the quality of the air in the general area. The minimisation of these pollutions muct be accounted for in the planning and design phase of the project	**MODERATE**	Moderate	Moderate	Medium term	Definite	Moderately Achievable	An Air Emissions License is required that states specifc conditions that the BEC will need to adhere to. Input from specialists must be included into the EIR.	**MODERATE**
		It is possible that the facility may release malodorous emissions that could negatively impact on the surrounding land users in not taken into consideration during the planning and design phase.	**MODERATE**	Moderate	Moderate		Possible		An Air Emissions License is required that states specifc conditions that the BEC will need to adhere to. Input from specialists must be included into the EIR.	**MODERATE**
	Site B	Priority pollutants including SO2 will be released as a result of the chemical reactions that take place at the anode when producing the VRFB. These pollutants have the potential to significantly decrease the quality of the air in the general area. The minimisation of these pollutions muct be accounted for in the planning and design phase of the project	**MODERATE**	Moderate	Moderate		Definite		An Air Emissions License is required that states specifc conditions that the BEC will need to adhere to. Input from specialists must be included into the EIR.	**MODERATE**
		It is possible that the facility may release malodorous emissions that could negatively impact on the surrounding land users in not taken into consideration during the planning and design phase.	**MODERATE**	Moderate	Moderate		Possible		An Air Emissions License is required that states specifc conditions that the BEC will need to adhere to. Input from specialists must be included into the EIR.	**MODERATE**
	No-Go Option	No pollutants will be emitted into the atmosphere. Therefore, no	**LOW**	Slight	Localised	Short term	Definite	Easily Achievable	None required.	**LOW**

		further decrease in the quality of the air will occur.								
		No malodourous emissions will negatively impact on surrounding land users	**LOW**	Slight	Localised		Definite		None required.	**LOW**

Table 9.7: Assessment of impacts during the Construction phase of the proposed Vanadium Electrolyte production facility development

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY & MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
CONSTRUCTION IMPACTS WILL BE SUFFICIENTLY MITIGATED BY COMPLIANCE WITH THE EXISTING ELIDZ CONSTRUCTION EMPR (APPENDIX G)										

Table 9.8: Assessment of impacts during the Operational phase of the proposed Vanadium Electrolyte production facility development

IMPACT	ALTERNATIVE	CAUSE AND COMMENT	SIGNIFICANCE OF IMPACT	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	DEGREE OF REVERSIBILITY & MITIGATION	MITIGATION MEASURES	RESIDUAL RISK
	(SIGNIFICANCE WITHOUT MITIGATION)								(SIGNIFICANCE WITH MITIGATION)	
Environmental, legal and policy compliance	Site A *(Preferred alternative)*	Failure to comply with existing policies and legal obligations during the operational phase could lead to the project conflicting with local, provincial and national policies, legislation etc. This could result in legal non-compliance, fines, overall project failure or delays in construction activity and undue disturbance to the natural environment.	**MODERATE**	Moderately severe	Localised	Long Term	Possible	Easily Achievable	All relevant legislation must be adhered to Input from specialists must be included into the EIR.	**LOW**
	Site B	Failure to comply with existing policies and legal obligations during the operational phase could lead to the project conflicting with local, provincial and national policies, legislation etc. This could result in legal non-compliance, fines, overall project failure or delays in construction activity and undue disturbance to the natural environment.	**MODERATE**	Moderately severe	Localised	Long Term	Possible	Easily Achievable	All relevant legislation must be adhered to Input from specialists must be included into the EIR.	**LOW**
Health and safety	Site A *(Preferred alternative)*	The inappropriate storage and handling of hazardous substances (i.e. sulphuric acid), and the uncontrolled emissions of SO2 during the operational phase will pose a significant threat to the health and safety of the employees of the proposed facility as well as surrounding tenants.	**MODERATE**	Moderately severe	Localised	Short Term	Possible	Easily Achievable	All health and safety measures must be implemented as per legislative requirements. Input from specialists must be included into the EIR.	**LOW**
	Site B	The inappropriate storage and handling of hazardous substances (i.e. sulphuric acid), and the uncontrolled emissions of SO2 during the operational phase will pose a significant threat to the health and safety of the employees of the proposed facility as well as surrounding tenants.	**MODERATE**	Moderately severe	Localised		Possible		All health and safety measures must be implemented as per legislative requirements. Input from specialists must be included into the EIR.	**LOW**
	No-go alternative	No risks to the health and safety of any employees in the ELIDZ.	**LOW**	Slight	Localised		Definite		None required.	**LOW**
Social benefits from the project	Site A	Social benefits, including the potential for the provision of both skilled and unskilled employment in the long term, must be promoted during the operational phase of the project.	**BENEFICIAL**	Slight	Localised	Long Term	Probable	Easily Achievable	Input from specialists must be included into the EIR.	**BENEFICIAL**
	(Preferred alternative)	Social benefits, including the potential for the provision of both skilled and unskilled employment in the long term, must be promoted during the operational phase of the project.	**BENEFICIAL**	Slight			Probable		Input from specialists must be included into the EIR.	**BENEFICIAL**
	Site B	N employment opportunities will be created for skilled and unskilled staff.	**MODERATE**	Moderately severe	Localised		Definite	Moderately difficult to achieve	None required	**MODERATE**
Benefit to renewable energy sector	Site A	During the operational phase, the VRFBs will provide a reliable and efficient energy storage solution for the growing renewable energy sector in South Africa and abroad.	**BENEFICIAL**	Slight	Extensive	Medium Term	Probable	Easily Achievable	Input from specialists must be included into the EIR.	**BENEFICIAL**
	(Preferred alternative)	During the operational phase, the VRFBs will provide a reliable and efficient energy storage solution for the growing renewable energy sector in South Africa and abroad.	**BENEFICIAL**	Slight	Extensive		Probable		Input from specialists must be included into the EIR.	**BENEFICIAL**
	Site B	No reliable and efficient energy storage solution for the growing renewable energy sector in South Africa and abroad available from the ELIDZ.	**MODERATE**	Moderately severe	Extensive		Definite	Moderately difficult to achieve	None required	**MODERATE**
Hazardous substances	Site A *(Preferred alternative)*	During the operational phase, the inappropriate transport, storage and handling of hazardous substances (i.e. sulphuric acid) will result in the contamination of surrounding terrestrial and aquatic environments.	**HIGH**	Severe	Moderate	Short Term	Possible	Easily Achievable	Hazardous waste must be correctly transported, stored and handled as per legislative requirements. Input from specialists must be included into the EIR.	**LOW**
	Site B	During the operational phase, the inappropriate transport, storage and handling of hazardous substances (i.e. sulphuric acid) will result in the contamination of surrounding terrestrial and aquatic environments.	**HIGH**	Severe	Moderate		Possible		Hazardous waste must be correctly transported, stored and handled as per legislative requirements. Input from specialists must be included into the EIR.	**LOW**
	No-Go Option	There will be no impact as a result of hazardous substances.	**LOW**	Slight	Localized		Definite		None required	**LOW**
Waste	Site A *(Preferred*	During the operational phase, it is anticipated that 12.6 kg/hr of acidic waste will be produced with a 10% sulphuric acid content. This could result in negative impacts on the ELIDZ sewerage infrastructure, and	**HIGH**	Severe	Moderate	Short term	Probable	Easily Achievable	Process waste must be appropriately stored on site and disposed of at a registered hazardous waste disposal	**LOW**

	alternative)	further, on the BCMM sewerage infrastructure, and at worst, on the marine environment to which the Hood Point Sea outfall discharges.							facility. Input from specialists must be included into the EIR.	
	Site B	During the operational phase, it is anticipated that 12.6 kg/hr of acidic waste will be produced with a 10% sulphuric acid content. This could result in negative impacts on the ELIDZ sewerage infrastructure, and further, on the BCMM sewerage infrastructure, and at worst, on the marine environment to which the Hood Point Sea outfall discharges.	**HIGH**	Severe	Moderate		Probable		Process waste must be appropriately stored on site and disposed of at a registered hazardous waste disposal facility. Input from specialists must be included into the EIR.	**LOW**
	No-Go Option	There will be no impact as a result of process waste	**LOW**	Slight	Localised		Definite		None required	**LOW**
Air quality	Site A *(Preferred alternative)*	During the operational phase, Priority pollutants including SO_2 will be released as a result of the chemical reactions that take place at the anode when producing the VRFB. These pollutants have the potential to significantly decrease the quality of the air in the general area.	**MODERATE**	Moderate	Moderate	Medium term	Definite	Moderately Achievable	An Air Emissions License is required that states specifc conditions that the BEC will need to adhere to. Input from specialists must be included into the EIR.	**MODERATE**
		It is possible that the facility may release malodorous emissions during the operational phase that could negatively impact on the surrounding land users.	**MODERATE**	Moderate	Moderate		Possible		An Air Emissions License is required that states specifc conditions that the BEC will need to adhere to. Input from specialists must be included into the EIR.	**MODERATE**
	Site B	During the operational phase, Priority pollutants including SO_2 will be released as a result of the chemical reactions that take place at the anode when producing the VRFB. These pollutants have the potential to significantly decrease the quality of the air in the general area.	**MODERATE**	Moderate	Moderate		Definite		An Air Emissions License is required that states specifc conditions that the BEC will need to adhere to. Input from specialists must be included into the EIR.	**MODERATE**
		It is possible that the facility may release malodorous emissions during the operational phase that could negatively impact on the surrounding land users.	**MODERATE**	Moderate	Moderate		Possible		An Air Emissions License is required that states specifc conditions that the BEC will need to adhere to. Input from specialists must be included into the EIR.	**MODERATE**
	No-Go Option	No pollutants will be emitted into the atmosphere. Therefore, no further decrease in the quality of the air will occur.	**LOW**	Slight	Localised	Short term	Definite	Easily Achievable	None required.	**LOW**
		No malodourous emissions will negatively impact on surrounding land users	**LOW**	Slight	Localised		Definite		None required.	**LOW**

8. PLAN OF STUDY FOR EIA PHASE

In terms of Section APPENDIX 2(2) of the EIA Regulations (2014), a Scoping Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include:

h) a plan of study for undertaking the environmental impact assessment process to be undertaken, including–

(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity.;

(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;

(iii) aspects to be assessed by specialists;

(iv) a description of the proposed method of assessing the environmental impacts, including aspects to be assessed by specialists;

(v) a description of the proposed method of assessing duration and significance;

(vi) an indication of the stages at which the competent authority will be consulted;

(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and

(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;

(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be manages and monitored.

In line with the above-mentioned legislative requirement, this Chapter sets out the Plan of Study (PoS) for the EIA phase of the assessment. Consultation with DEDEAT will be on going throughout this EIA. However, it is anticipated that DEDEAT will provide relevant comment with respect to the adequacy of this PoS for the EIA, as it informs the content of the EIR and sufficiency thereof.

8.1. Specific challenges to the EIA Phase

The specific challenges to the proposed Vanadium Electrolyte production facility, as a development within the ELIDZ, are the following possible impacts:

- Impacts relating to legislative requirements;
- Impacts on health and safety;
- Impacts on job creation (positive);
- Impacts on the renewable energy sector in South Africa and abroad (positive);
- Impacts relating to hazardous substances;
- Impacts relating to process waste; and
- Air quality emissions.

8.2. Scope and Intent of the EIA Phase

The following aspects in Section 10.1 above will be assessed as part of the EIA process, although it is assumed that additional impacts will be raised by I&APs, the EAP and/or the specialist consultants, and these will also be assessed.

8.2.1. Specialist Studies

The specialist studies include the specialist assessments identified in the Scoping Report and any additional studies required by the authorities. This requires the appointment of specialists to gather baseline

information in their fields of expertise, and to assess the possible impacts and make recommendations to mitigate negative impacts and optimise benefits. The resulting information is synthesised into the Environmental Impact Report (EIR).

The following specialist studies will be conducted:

- Ecological Impact Assessment;
- Air Quality Impact Assessment;
- Socio-economic Impact Assessment; and
- Major Hazards Installation Assessment.

8.2.2. Ecological Impact Assessment (EOH: Mr Roy de Kock)

An Ecological Impact Assessment will be required to assess the sensitivity of the fauna and flora within the boundaries of the ELIDZ as well as the specific sites.

The Ecological Impact Assessment will include the following main tasks:

- Assess the conservation value of the various ecological habitats in the area, in order to assess the significance of habitat loss on faunal groups as a result of the development.
- Define and map faunal habitats that are sensitive and require conservation. These may need to be defined as No-Go or Restricted Development areas.
- Carry out two rapid surveys to assess the diversity of amphibian, reptile, bird and mammal species in the area, in summer and winter meet Provincial Authority expectations.
- Identify the main animal communities associated with the plant communities (amphibian, mammals, birds, and reptiles).
- Identify any rare or endangered faunal species that require consideration in the conservation programme.
- Assess the extent of alien faunal species over the site, and associated risks of alien invasion as a result of the proposed development.
- Describe the impacts of current land use, so that the potential impacts from the development on the natural environment can be understood in this context.
- Place the project area within the biodiversity context of the region.
- Provide a sensitivity map of the concession area in order for the proponent to better place the layout of the project's infrastructure.
- To address all issues and concerns raised by IAPs during the scoping phase.
- Determine the impacts of the construction and operation of the proposed development on the faunal biodiversity in the area.
- The significance of the potential impacts and benefits will be assessed using the EOH-CES methodology. Any predictions will need to include the confidence in the impacts occurring, and the significance of these impacts occurring on the local fauna.
- Provide recommendations and mitigation measures that will reduce negative impacts on the local ecology and optimize conservation benefits.

8.2.3. Air Quality Impact Assessment (Airshed)

An Air Quality Impact Assessment will be required. The Air Quality Impact Assessment will comprise the following:

Legislative and Assessment Criteria Review

- A review of all air quality related legislation with specific reference to:
- The South African National Environmental Management Air Quality Act (NEMAQA) (Act no. 39 of 2004) National Ambient Air Quality Standards (NAAQS) and Minimum Emission Standards.
- Air Quality Guidelines (AQGs) for criteria and non-criteria pollutants as published by the World Health Organisation (WHO).

- Inhalation reference concentrations (RfCs) for non-criteria pollutants as published by the United Stated Environmental Protection Agency (US EPA).

Baseline Air Quality Characterisation

- Procuring on-site or modelled MM5 meteorological data for a 3 year period i.e. 2013, 2014 and
- Analysis of meteorological, topographical and land-use data to determine atmospheric dispersion potential and preparation of data for dispersion model input.
- Analysis of readily available ambient air quality and project data including design, monitoring and modelled data.

Air Quality Impact Assessment

- Identification and quantification of all sources of emission associated with the Project by referring to Project design parameters and emission factors published by the US EPA and Australian National Pollutant Inventory (NPI).
- Emissions inventory will include particulate and gaseous pollutants.
- Atmospheric dispersion modelling though the application of the US EPA AERMOD model to determine ground level particulate and gaseous concentrations; and dustfall rates.
- Compliance and impact assessment by comparing predicted ground level concentrations and dustfall rates to the relevant air quality criteria.
- The development of an air quality management and mitigation plan based on the findings of compliance and impact assessment.

Deliverables

- A specialist Air Quality Impact Assessment report will be prepared.

8.2.4. Socio-economic Impact Assessment (EOH: Ms Thina Tandani)

The nature of the proposed project deems it necessary to conduct a Socio-economic Impact Assessment. This process will include:

- The provision of a detailed description of the socio-economic environment in and around the project area.
- Analysis the potential impacts of the proposed project.
- Provision of guidelines for limiting or mitigating negative impacts and optimising benefits.

The specific terms of reference are as follows:

- Describe the local social environment, with particular reference to the possible labour-sending communities.
- Determine the current land-use patterns of the development area and the areas outside of the development boundary that are likely to be affected.
- Assess the significance of potential environmental and social impacts on the local populace and the district.
- Evaluate how the project could contribute to Local Economic Development (LED) in line with the Integrated Development Plans (IDP) of the BCMM.
- Establish a baseline understanding of current state of livelihoods, income sources, education levels and food security.
- Investigate possible effects on livelihoods, income levels, education levels, food security and other factors relevant to the affected communities.
- Consultation with stakeholders should be done in such a way as to contribute to the formulation of the mine's Social and Labour Plan (SLP).

- Develop a monitoring programme to ensure effective implementation of the recommended mitigation measures.

8.2.5. Major Hazards Installation Assessment (Ishecon)

PHASE A – Initial Risk Assessment to Determine Suitability of Proposed Design and Location in Terms of MHI Risks

STEP 1 - Information gathering and incident identification:

- A visit to the proposed site in East London, and to the designer offices in Johannesburg, to gather all relevant information available at this stage of the project e.g. material listings, inventories, turnovers, design drawings, P&ID's and PFD's, process conditions and flow rates, maps, weather data, key operating instructions, emergency procedures, details of process safety management systems in place, failure modes e.g. rupture, leaks, venting etc.
- A brief evaluation of the types of activities surrounding the proposed site will be undertaken.
- Conduct discussions with operations and design staff or contractors and / or members of the Client's H&S Committee (if available) to identify hazards and agree risk assessment terms of reference. (Note that co-ordination of discussions with staff and the H&S committee will be the responsibility of the client).
- Identify potential major hazardous incidents associated with the installation. Potential knock-on effects to neighbouring facilities will also be included.
- Produce a preliminary list of identified incidents to the client for review (and for consultation with their H&S committee if available). The list will include the process design/operation parameters that will be used in the assessment and the client will be required to verify the parameters are suitable. Agree a final list of potential MHI incidents to be quantified.

STEP 2 – Consequence Quantification

- Determine the magnitude of the agreed hazardous incidents in terms of:
- Size of the loss of containment, or internal explosion;
- Duration of the incident.
- Perform a consequence analysis to identify the effects of applicable hazards e.g.:
- Pool formation, spread and evaporation to obtain the emissions;
- Dispersion to obtain aerial exposure concentrations;
- Explosion and radiation circles;
- Consequences of key events such as radiation zones and overpressure radii will be plotted suitable land use maps.
- For each incident determine the consequences and estimate the severity in terms of fatalities.

STEP 3 – Likelihood and Risk Quantification

- Quantify the likelihood of the MHI events based on generic data derived from databases, or estimations from the experience of the operating personnel, or in the case of critical events by the compilation of fault trees. The failure data will be adjusted based on a brief evaluation of the Process Safety Management system likely to be in place at the facility.
- Based on the population activities around the site estimate the population risk weighting factors to be used.
- Combine the likelihood and severity of the major hazards to produce individual risk estimates i.e. quantitative representations of the risks.
- Compile weighted individual risk profiles for the installation, and weighted individual risk contours (isopleths 10 -5 and 10 -6 or less) indicating the possible impact of weather conditions and wind directions. Public and employee MHI type risks will be addressed.

- A societal risk estimation will be presented in the form of an F-N curve.

STEP 4 – Risk Assessment

- Assess these risks by making value judgments in terms of internationally recognized quantitative acceptability criteria (use UK HSE R2P2 and PADHI as a basis) as well as any criteria available from the national, provincial and local authorities.
- Compile a brief letter indicating the consequences, the risks and the acceptability of these as per the proposed design. If the risks are tolerably low proceed to PHASE C, if not then PHASE B will be required.

PHASE B – Risk Reduction to Achieve a Suitable MHI Risk Profile (if not necessary this phase can be omitted)

STEP 5 – Risk Reduction Options

- Establish possible risk reduction measures.
- Repeat the risk modelling incorporating as many agreed risk reduction options as necessary to achieve tolerably low risks.
- If necessary, confirm the expenditure that would be justified to further reduce risks in order to prove ALARP.
- Agree a final design for the MHI RA to use as a basis and prepare final models.

PHASE C – Compile MHI Report for Notifications

STEP 6 – Technical Report

- For the final proposed installation compile all the information, analysis, assessments and conclusions as detailed above into a typed DRAFT technical risk assessment report.
- Review the on-site emergency plans and where necessary provide ideas on any possible improvements in the light of the risk assessment results.

8.3. Environmental Impact Report (EIR)

The main purpose of the EIR is to gather and evaluate environmental information, so as to provide sufficient supporting arguments to evaluate overall impacts, consider mitigation measures and alternative options, and make a valued judgement in choosing the best development alternative. The EIR is made available for public and authority review. The availability of the report is advertised in the local newspaper and is situated at an easily accessible location.

8.4. Issues and Response Trail

The issues and response trial consists of the compilation of comments, issues and concerns raised by I&APs and the authorities as well as the relevant responses to these comments.

8.5. Environmental Management Programme (EMPr)

The EMPr informs the client and the technical team of the guidelines which will need to be followed during construction to ensure that there are no lasting or cumulative negative impacts of the construction process on the environment.

- The standards and guidelines that must be achieved in terms of environmental legislation.
- Mitigation measures and environmental specifications which must be implemented for all phases of the project in order to minimise the extent of environmental impacts, to manage environmental

impacts and where possible to improve the condition of the environment.
- Provide guidance through method statements that are required to be implemented to achieve the environmental specifications.
- Define corrective action that must be taken in the event of non-compliance with the specifications of the EMPr.
- Prevent long-term or permanent environmental degradation.

In addition to this, the Public Participation Process (PPP) is continued. As for the Scoping Phase, opportunity is provided for I&APs to voice concerns and issues regarding the project. At this stage the project details may have changed in response to the preliminary findings of the Draft Scoping Report. I&APs and key stakeholders are also given the opportunity to review the Environmental Impact Report (EIR) before it is submitted to the authorities.

8.6. Environmental Authorisation and Appeals Process

Upon thorough examination of the EIR, the authority will either issue an Environmental Authorisation (EA), which either authorises the project or refuses it. Should authorisation be granted, it usually carries Conditions of Approval. The proponent is obliged to adhere to these conditions. Once the authorisation has been issued, it is publicised and the public are given 20 calendar days from the issuing of the authorisation to lodge an appeal with the authorities.

8.7. The Public Participation Process

8.7.1. Public Review Of The Draft Scoping Report (DSR)

All I&APs on the I&AP database will be notified in writing of the availability of the DSR for public review. The notification letter will provide details of the 30-day public comment period, the venues and websites where the report could be viewed, the contact details of the PPP consultant and how written comments on the DSR should be submitted, and details of the public meeting to present the DSR.

8.7.2. Public Review of the Draft Environmental Impact Report (DEIR)

All I&APs on the Register of I&APs will be notified in writing of the availability of the DEIR for public review. The notification letter will provide details of the 30-day public comment period, the venues and websites where the report can be viewed, the contact details of the PPP consultant and how written comments on the DEIR should be submitted, and details of the public meeting to present the DEIR.

8.7.3. Notification of Environmental Authorisation (EA)

Advertisements announcing the EA will be placed in the same regional and local newspapers used to announce the project and the EIA. The adverts will be placed in the Daily Dispatch. The adverts will inform I&APs of the decision and where the decision can be accessed and will draw their attention to their right to appeal the decision and set out the appeal procedures.

8.8. Environmental Impact Report (EIR)

The Specialist Studies described in Section 10.2 will inform the EIR. In addition, the EIR will gather any comments received from I&APs and determine whether it is necessary to increase the scope of work or amend the Terms of Reference for the specialists. The EIR will examine the 'No-Go' alternative along with the proposed development, as required in the EIA regulations.

8.8.1. Structure of the EIA Report

In broad terms, the Environmental Impact Report (EIR) will have the following structure:

EXECUTIVE SUMMARY AND ENVIRONMENTAL IMPACT STATEMENT

PART ONE: INTRODUCTION AND DESCRIPTION OF ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

1. Introduction
2. Brief Description of The Proposed Project
3. Environmental Impact Assessment process
4. Activities triggering the EIA process
5. The environmental study team
6. The environmental assessment process followed
7. Structure of the Report

PART TWO: THE PROPOSED VANADIUM ELECTROLYTE PRODUCTION FACILITY

1 Project Overview
2 Alternatives
3 Technical Description of Preferred Options

PART THREE: DESCRIPTION OF THE AFFECTED ENVIRONMENT

1. The Natural Environment
2. Socio-Economic Environment
3. The Policy, Legal And Administrative Environment

PART FOUR: ASSESSMENT OF THE ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE VANADIUM ELECTROLYTE PRODUCTION FACILITY

1. Impacts Associated with the Vanadium Electrolyte production facility
2. Conclusion

PART FIVE: ENVIRONMENTAL MANAGEMENT PLAN AND OVERALL RECOMMENDATIONS AND CONCLUSIONS

8.9. Methodology for assessing the significance of impacts (Including Specialist Studies)

The methodology will be similar as described in Section 9.1.1 of this report.

9. RECOMMENDATIONS AND CONCLUSIONS

9.1. Summary of the project description

The Industrial Development Corporation (IDC) together with the Bushveld Energy Company (Pty) Ltd (BEC) is proposing to develop a facility within the East London Industrial Development Zone (IDZ) that will manufacture vanadium redox flow batteries (VRFB).

The VRFB is a technically and commercially advanced RFB available on the market as it is highly reliable as an energy storage unit. Many RFBs are affected by ion contamination due to the different material species applied in each of the positive and negative half-cells and the diffusion of ions from the positive to the negative electrolyte. The identical active species in the VRFB catholyte and anolyte i.e. positive and negative electrolyte, respectively, eliminates this concern. The application of the VRFB as a viable solution in the renewable energy storage market is of interest to both mineral and renewable energy stakeholders.

For this particular development, raw vanadium will be sourced from a vanadium mine located in Britz, North West Province, where it will be purified to produce high purity vanadium pentoxide using sulphuric acid. The prepurification and purification processes will occur onsite at the vanadium mine.

The purified vanadium pentoxide will then be transported from the mine to the ELIDZ by road or rail freight. The vanadium pentoxide will be further processed through an electrochemical process under acidic conditions at the EILIDZ to produce the vanadium electrolyte. The vanadium electolyte will be used in the production of VRFB. It is anticipated that the Vanadium Electrolyte produced at the ELIDZ facility will supply a large portion of the local market as well as the export market.

9.2. Preliminary environmental description and assessment

The proposed development will occur within the established ELIDZ, which received an Environmental Authorization for light industry in 2001 that allows for the development of a light industrial zone. An initial assessment of the proposed site within the ELIDZ suggests that there are no sensitive environments that will be impacted on by the proposed development. However, based on the technical description of the project, the emission of SO_2 poses a threat to the air quality.

The two possible alternative sites within the ELIDZ will be assessed in full detail during the EIA report phase as well as any sensitive areas and features that are identified by any of the other specialists during their assessments of the area.

9.3. Fatal flaws

No fatal flows have been identified during the Scoping Phase of this assessment.

9.4. Recommendations

It is recommended that the following form part of the EIR phase:

- Public Participation;
- Specialist studies;
- Consultation with I&APs regarding possible significance of impacts and suitable mitigation measures;
- Evaluation of impacts prior to mitigation;
- Compilation of mitigation measures;
- Evaluation of impacts after mitigation;
- Provision of an opinion as to whether or not the activity should be authorised;
- Compilation of an environmental impact statement;
- Compilation of a draft Environmental Management Programme (EMPr); and

- Application for an Air Emissions License.

APPENDIX A - SACNASP & EAPSA REGISTRATION

SACNASP
South African Council for Natural Scientific Professions

herewith certifies that

Alan Robert Carter

Registration number: 400332/04

is registered as a

Professional Natural Scientist

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

Environmental Science

Effective **31 August 2004** Expires **31 March 2019**

President

Executive Director

The Interim Certification Board

for

Environmental Assessment Practitioners
of
South Africa

Alan Robert Carter

was certified as an

ENVIRONMENTAL ASSESSMENT PRACTITIONER

on this 1st day of March 2012

Chairperson

Secretary

APPENDIX B: PUBLIC PARTICIPATION

SITE NOTICES

Copy of site notice placed onsite:

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT

EOH Coastal & Environmental Services

Proposed Vanadium Redox Flow Battery Production Facility, East London Industrial Development Zone, Buffalo City Metropolitan Municipality, Eastern Cape

Notice is hereby given in terms of Regulation 41(2a) published in Government Notice No. R982 of the National Environmental Management Act (Act 107 of 1998) (NEMA), of the application for an environmental authorisation for EIA activities to the Department of Economic Development, Environmental Affairs and Tourism. An additional application has been made to the Air Quality Officer at the Buffalo City Metropolitan Municipality for authorisation of activities listed under the NEM: Air Quality Act regulations (GNR 893).

Proponent and Location:
Bushveld Energy (Pty) Ltd is proposing to establish a Vanadium Redox Flow Battery production facility in the East London Development Zone (ELIDZ). The site proposed for the facility falls within Zone 1A of the ELIDZ on Erf number 60936 and 60938 within the BCMM.

Listed Activities:
Listed Activities: A FULL SCOPING & EIR is triggered by the following listed activities:

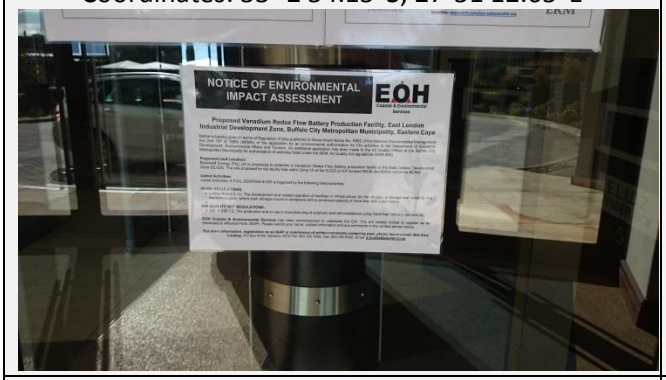
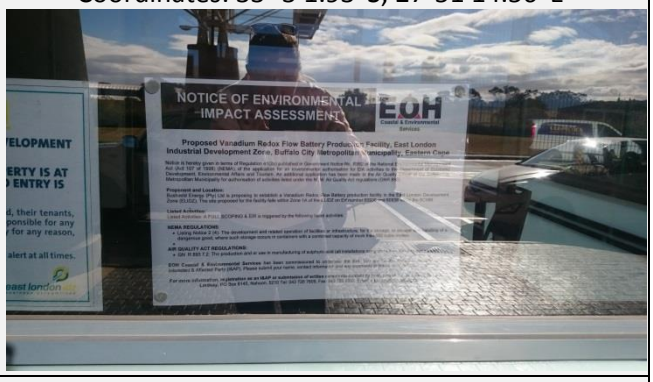
NEMA REGULATIONS:
- Listing Notice 2 (4): The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic meters.
-

AIR QUALITY ACT REGULATIONS:
- GN R 893 7.2: The production and or use in manufacturing of sulphuric acid (all installations using more than 100 tons per annum).

EOH Coastal & Environmental Services has been commissioned to undertake the EIA. You are hereby invited to register as an Interested & Affected Party (I&AP). Please submit your name, contact information and any comments to the contact person below.

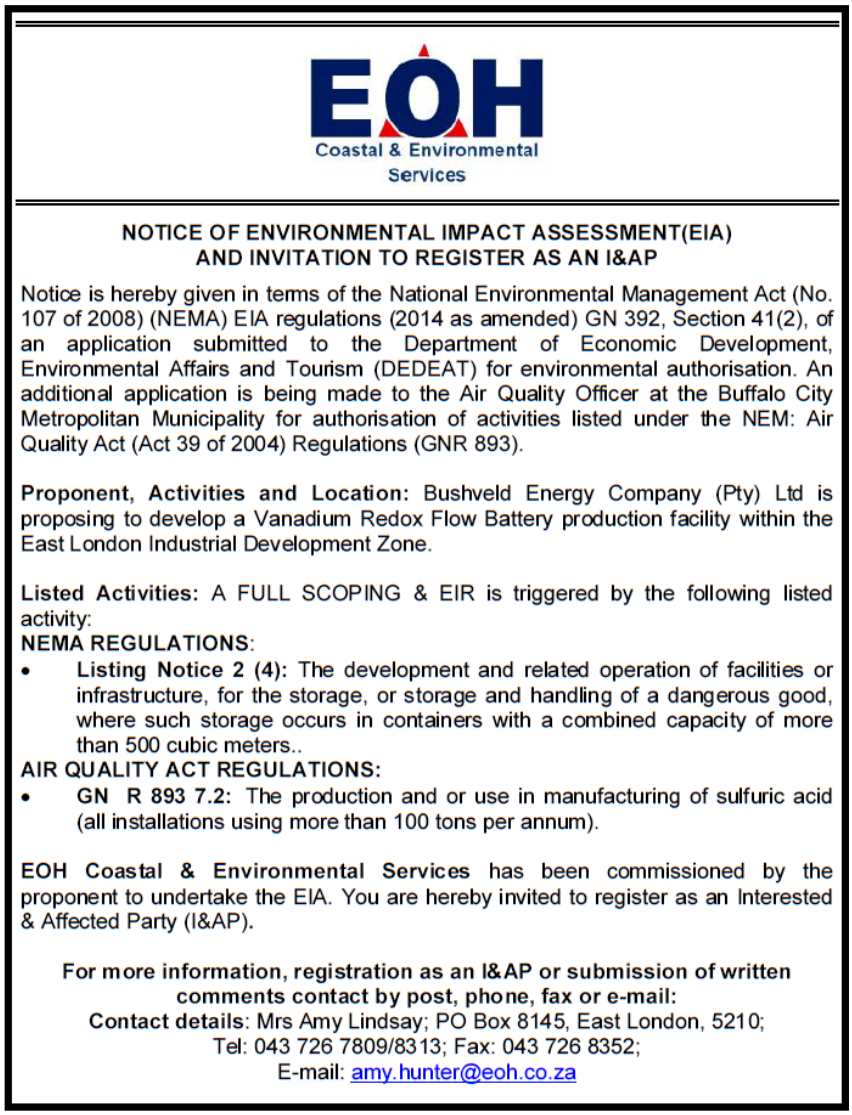
For more information, registration as an I&AP or submission of written comments contact by post, phone, fax or e-mail: Mrs Amy Lindsay, PO Box 8145, Nahoon, 5210 Tel: 043 726 7809, Fax: 043 726 8352, Email: **a.hunter@cesnet.co.za**

Proof of site notices placed onsite:

<table>
<tr><th colspan="2">VISIBLE SIGNAGE AT THE ELIDZ</th></tr>
<tr><td>At the ELIDZ main office
Coordinates: 33° 2'54.15"S; 27°51'12.65"E
  </td><td>At the ELIDZ Zone 1A reception building
Coordinates: 33° 3'1.93"S; 27°51'14.56"E
  </td></tr>
<tr><td>At the ELIDZ Zone 1A entrance
Coordinates: 33° 3'3.10"S; 27°51'15.61"E
  </td><td>At the ELIDZ Zone 1B entrance
Coordinates: 33° 3'20.52"S; 27°50'3.47"E
  </td></tr>
</table>

NEWSPAPER ADVERTISEMENT

Copy of newspaper advert placed in the Daily Dispatch on the 6th of August 2018:



EOH
Coastal & Environmental Services

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT(EIA) AND INVITATION TO REGISTER AS AN I&AP

Notice is hereby given in terms of the National Environmental Management Act (No. 107 of 2008) (NEMA) EIA regulations (2014 as amended) GN 392, Section 41(2), of an application submitted to the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) for environmental authorisation. An additional application is being made to the Air Quality Officer at the Buffalo City Metropolitan Municipality for authorisation of activities listed under the NEM: Air Quality Act (Act 39 of 2004) Regulations (GNR 893).

Proponent, Activities and Location: Bushveld Energy Company (Pty) Ltd is proposing to develop a Vanadium Redox Flow Battery production facility within the East London Industrial Development Zone.

Listed Activities: A FULL SCOPING & EIR is triggered by the following listed activity:

NEMA REGULATIONS:

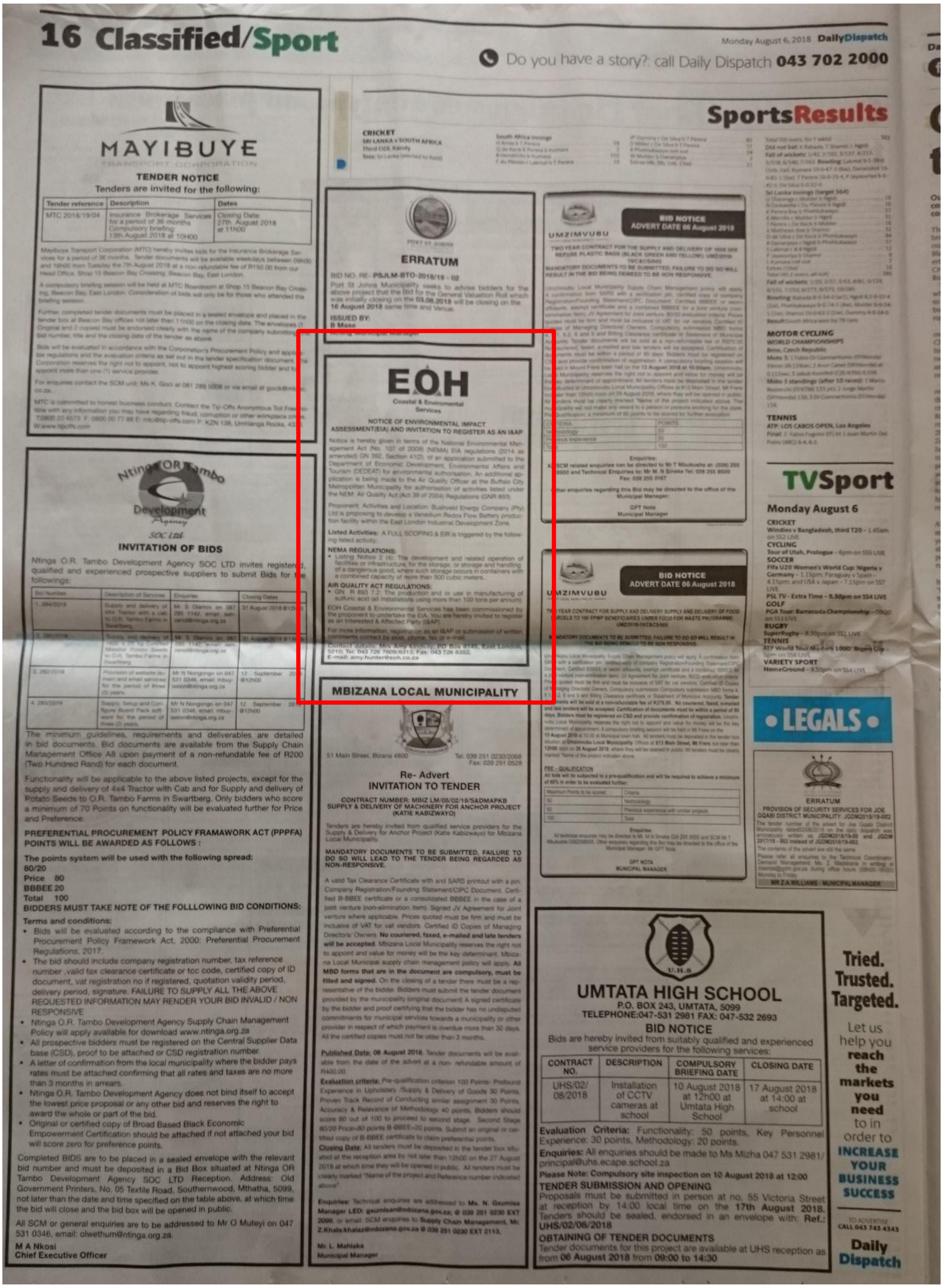
- **Listing Notice 2 (4):** The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic meters..

AIR QUALITY ACT REGULATIONS:

- **GN R 893 7.2:** The production and or use in manufacturing of sulfuric acid (all installations using more than 100 tons per annum).

EOH Coastal & Environmental Services has been commissioned by the proponent to undertake the EIA. You are hereby invited to register as an Interested & Affected Party (I&AP).

For more information, registration as an I&AP or submission of written comments contact by post, phone, fax or e-mail:
Contact details: Mrs Amy Lindsay; PO Box 8145, East London, 5210;
Tel: 043 726 7809/8313; Fax: 043 726 8352;
E-mail: amy.hunter@eoh.co.za



16 Classified/Sport

Monday August 6, 2018 DailyDispatch

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EOH Coastal & Environmental Services

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT(EIA) AND INVITATION TO REGISTER AS AN I&AP

Notice is hereby given in terms of the National Environmental Management Act (No. 107 of 2008) (NEMA) EIA regulations (2014 as amended) GN 392, Section 41(2), of an application submitted to the Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) for environmental authorisation. An additional application is being made to the Air Quality Officer at the Buffalo City Metropolitan Municipality for authorisation of activities listed under the NEM: Air Quality Act (Act 39 of 2004) Regulations (GNR 893).

Proponent, Activities and Location: Bushveld Energy Company (Pty) Ltd is proposing to develop a Vanadium Redox Flow Battery production facility within the East London Industrial Development Zone.

Listed Activities: A FULL SCOPING & EIR is triggered by the following listed activity:

NEMA REGULATIONS:
- Listing Notice 2 (4): The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic meters.

AIR QUALITY ACT REGULATIONS:
- GN R 893 7.2: The production and or use in manufacturing of sulfuric acid (all installations using more than 100 tons per annum).

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For more information, registration as an I&AP or submission of written comments contact by post, phone, fax or e-mail:

Contact details: Mrs Amy Lindsay, PO Box 8145, East London, 5210; Tel: 043 726 7809/6313; Fax: 043 726 8352; E-mail: amy.hunter@eoh.co.za

BACKGROUND INFORMATION DOCUMENT (BID) THAT WAS CIRCULATED TO INTEREST AND AFFECTED PARTIES/STAKEHOLDERS

BACKGROUND INFORMATION DOCUMENT AND INVITATION TO COMMENT

Proposed Vanadium Electrolyte Production Facility in the East London Industrial Development Zone

AIM OF THIS DOCUMENT

The aim of this Background Information Document is to provide people affected by and interested in the proposed project with information about this project, the process being followed and to provide them with an opportunity to be involved in the Environmental Impact Assessment (EIA) process.

Interested and Affected Parties (I&APs) may raise issues of concern. These will be examined and included in the Reports.

The findings of the EIA will be provided to the DEDEAT (Provincial, Amathole Region) for final decision making, as to whether or not the project should go ahead and if so under what conditions

Return address for comments:
EOH Coastal & Environmental Services
Mrs Amy Lindsay
25 Tecoma Street
Berea
P.O Box 8145
Nahoon, 5210
Tel: (043) 726 7809
Fax: (043) 726 8352
Email: a.hunter@cesnet.co.za

EOH Coastal & Environmental Services

BACKGROUND

Bushveld Energy (Pty) Ltd has appointed EOH Coastal & Environmental Services (EOH-CES) to undertake the necessary environmental investigations for the construction of a Vanadium Electrolyte production facility and to apply for environmental authorisation from the provincial Department of Economic Development and Environmental Affairs & Tourism (DEDEAT), as required by South Africa's environmental legislation. Details of the relevant laws and an overview of the environmental impact assessment process are provided on the next page.

PROJECT DESCRIPTION

The proposed project will entail the construction of a facility that will produce Vanadium Electrolyte with the East London Industrial Development Zone (ELIDZ). Purified vanadium will be transported from a facility in Brits, North-West Province, to the ELIDZ. At the ELIDZ facility, the purified vanadium will be processed to produce the electrolyte required for the VRFBs. VRFBs are deep cycle batteries that have applications in energy storage for the renewable energy sectors.

ENVIRONMENTAL IMPACT ASSESSMENT PRACTITIONER

EOH Coastal and Environmental Services (EOH CES) was established in 1990 as a specialist environmental consulting company and has considerable experience in terrestrial, marine and freshwater ecology, the Social Impact Assessment (SIA) process, State of Environment Reporting (SOER), Integrated Waste Management Plans (IWMP), Environmental Management Programme (EMPr), Spatial Development Frameworks (SDF), public participation, as well as the management and co-ordination of all aspects of the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) processes. EOH CES has been active in all of the above fields, and in so doing have made a positive contribution towards environmental management and sustainable development in South Africa and many other African countries. We believe that a balance between development and environmental protection can be achieved by skilful, considerate and careful planning.

Figure 1: Locality of the proposed sites within the ELIDZ for the Vanadium Electrolyte production facility

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

According to the EIA regulations (2014 as amended) promulgated under the National Environmental Management Act (No.107 of 1998, NEMA) the potential impacts on the environment will have to be assessed in terms of the listed activities. The proposed development activities trigger the need for a Full Scoping and EIA process under the Regulations of 2014 (Listing Notice 2).. The table below lists the activities requiring authorisation in terms of the Air Quality Act. The Air Quality Act uses the EIA process as described in GN R982 as the main tool for assessment of the potential impact of the triggered activities. As such, this Scoping Report is compiled to fulfil the requirements of both licensing authorities.

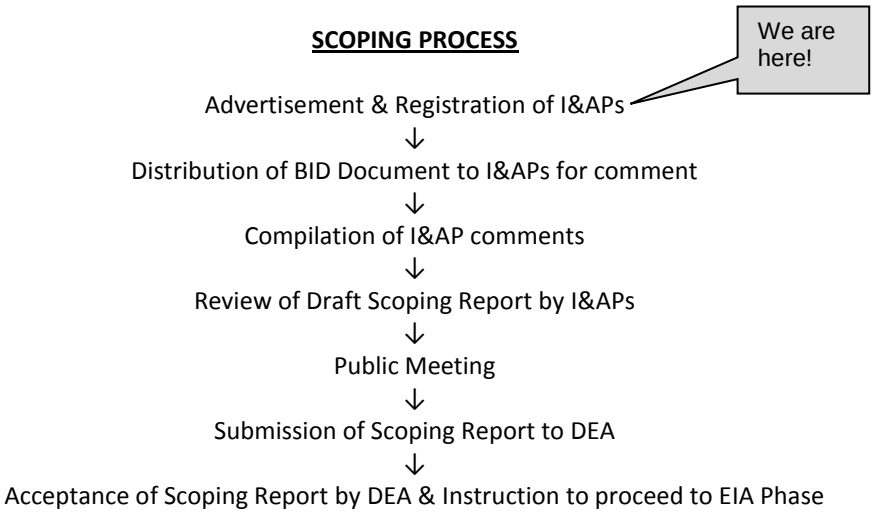
Activity number	Activity Description
NEMA Regulations 2014 as amended Listing Notice 2 Activity No. 4	The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic meters.
Air Quality Act Regulations (GNR 893) Category 7 – 7.2	The production and or use in manufacturing of sulfuric acid (all installations using more than 100 tons per annum).

Please note, these activities will be authorised by the provincial authority Department of Economic Development and Environmental Affairs & Tourism (DEDEAT: Amathole Region). An additional application has been made to the Air Quality Officer at the Buffalo City Metropolitan Municipality (BCMM) for authorisation of the activities listed under the AQA regulations.

APPROACH TO THE FULL SCOPING AND EIA

APPROACH TO THIS SCOPING AND EIA REPORT

The EIA for the proposed project is presently in the SCOPING phase. This phase serves primarily to inform the public and relevant authorities about the proposed project and to determine any impacts. These impacts will then be extensively addressed by specialists in the field during the EIA phase. Only after the full EIA report has been submitted will a decision be made by DEDEAT and BCMM.



THE ENVIRONMENTAL IMPACT ASSESSMENT PHASE

This phase is more complex and more detailed than the Scoping phase, since it focuses on undertaking specialist studies that may be identified during the Scoping phase. Specialist studies provide expert input into the EIA process based on scientific information. I&APs will be consulted again during this phase, and will be given an opportunity to comment on the Draft Environmental Impact Report (EIR) that will contain the specialist reports. During this phase an Environmental Management Programme (EMPr) must also be prepared for the project.

The final EIR is submitted to the DEDEAT who, after considering the report, will make a decision on whether or not to authorise the activities. The authorisation of activities carries a number of legally binding conditions, which will be contained in the Environmental Authorisation document. This document will be circulated to all registered I&APs within two weeks of receipt from the DEDEAT.

HOW CAN YOU BE INVOLVED

A Public Participation Process (PPP) is being conducted as part of the EIA. The aim of the PPP is to allow everyone who is interested in, or likely to be affected by, the proposed development to provide input into the process.
The Public Participation Process will include:

- Advertisements in the Daily Dispatch;
- Notice Boards on site;
- Circulation of the BID (this document) to all I&APs and other key stakeholders
- Review of all reports by registered I&APs and stakeholders.

If you consider yourself an I&AP, it is important that you become and remain involved in the PPP. In order to do so please follow the steps below in order to ensure that you are continually informed of the project developments and will ensure your opportunity to raise issues and concerns pertaining to the project.

STEP 1: Please register by responding to our notification and invitation, with your name and contact details (details provided on cover page and below). As a registered I&AP you will be informed of all meetings, report reviews and project developments throughout the EIA process.
STEP 2: Register by returning the slip at the back of this document to EOH CES.
STEP 3: Attend meetings that will be held throughout the EIA process. As a registered I&AP, you will be invited to these meetings.
EOH-CES is required to engage with all private and public parties that may be interested and/or affected by the proposed Vanadium Electrolyte production facility in the ELIDZ, in order to distribute information for review and comment in a transparent manner.

It is important for I&APs to note the following:

1. In order for EOHCES to continue engaging with you, please ENSURE that you register on our database by contacting the person below; and
2. As the EIA process is regulated by specific review and comment timeframes, it is your responsibility to submit your comments within these timeframes.

I hereby wish to register as an Interested and Affected Party (I&AP) for the Vanadium Electrolyte production facility in the ELIDZ EIA

Name: _____

Organization:

_____

Postal address:

_____

Email: _____

Phone #: _____ Fax #:_____

My initial comments, issues or concerns are:

_____

_____

_____

_____

_____

_____

Other individuals, stakeholders, organisations or entities that should be registered are:

Name: _____

Organization:

_____

Postal address:

_____

Email: _____

Phone #: _____ Fax #: _____

Please return details to: **Mr Amy Lindsay**: P.O. Box 8145, Nahoon, 5210
Telephone: (043) 726 7809
Fax: (043) 726 8352
Email: a.hunter@cesnet.co.za

LETTER OF NOTIFICATION

To be inserted when notification is circulated

PROOF OF INITIAL I&AP AND STAKEHOLDER NOTIFICATION, August 2018

To be inserted when notification is circulated

APPENDIX C: APPROVED EAST LONDON INDUSTRIAL DEVELOPMENT ZONE EMPR