ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

T 011 789 7170 E info@eims.co.za W www.eims.co.za

ENVIRONMENTAL MANAGEMENT PROGRAMME

TETRA4 VIRGINIA PRODUCTION RIGHT

PASA REFERENCE: 12/4/007

PRODUCTION RIGHT REFERENCE: 12/4/1/07/2/2

NOVEMBER 2022

DOCUMENT DETAILS

EIMS REFERENCE:	1473
DOCUMENT TITLE:	Environmental Management Programme (EMPr)

DOCUMENT CONTROL

	NAME	SIGNATURE	DATE
COMPILED:	Brian Whitfield		2022/11/30
CHECKED:	Liam Whitlow		2022/11/30
AUTHORIZED:	Liam Whitlow		2022/11/30

REVISION AND AMENDMENTS

REVISION DATE:	REV #	DESCRIPTION
2022/11/30	ORIGINAL DOCUMENT	2022 Amended EMPr

Table of Contents

List of Figures

List of Tables

Appendices

1 EMPR OVERVIEW

On 21 April 2021, the Minister of Forestry, Fisheries and Environment published the Generic Environmental Management Programme (EMPr) for Gas Pipeline Infrastructure (refer to GN373 of 23 April 2021). Whilst Tetra4 has an approved EMPr for the Production Right (including Cluster 1 development) which was last amended in 2019, the addition of Cluster 2 gas production activities to the approved EMPr following promulgation of GN373 will necessitate the inclusion of the generic EMPr for gas pipeline infrastructure. This EMPr therefore constitutes the amended EMPr based on the 2022 Cluster 2 studies and certain amendments have been made to the previously approved EMPr management measures as indicated in the change register (Appendix 5).

As specified in GN373, the pre-approved generic EMPr fulfils the requirement of section 24N(1A) of the National Environmental Management Act, 1998 (Act 107 of 1998), and is a generic environmental management programme as contemplated in regulations 19(4) and 23(4) of the Environmental Impact Assessment Regulations, 2014, as amended.

As per the above, it is compulsory to utilise this generic EMPr for the Tetra4 gas pipeline infrastructure however this generic EMPr does not specifically cover the Compressor Stations, exploration and production wells or the LNG/LHe Plant infrastructure. The generic EMPr does however make provision for including additional site-specific sensitivities and attributes in Part D thereof.

This revised Tetra4 EMPr therefore contains the following sections:

1. Pre-approved Generic EMPr for the Gas Pipeline Infrastructure which includes **Part A** (Background and Context) and **Part B** (Environmental Controls – Pre-approved Generic Template) – refer to Appendix 1.
2. **Part C**: Detailed property information as well as sensitivity mapping and landowner details (refer to Section 4 of this report).
3. **Part D**: Documentation of site-specific sensitivities and attributes (refer to Section 5 of this report).

Confirmation was obtained from the Department of Forestry, Fisheries and Environment (DFFE) that the pre-approved generic EMPr may not be altered in any way bar for the inclusion of Parts C and D information. While the Part B Environmental Controls contain certain mitigation measures which are not applicable to the Tetra4 Virginia Gas Production Right activities, these mitigation measures are indicated as “not applicable (N/A)” where relevant (e.g. activities in estuaries). Please note that the contractor/s are required to fill in the relevant fields in the tables contained in Part B as per instruction in the Generic EMPr and therefore these tables will only be completed prior to construction and once contractors are appointed.

2 PART A: BACKGROUND AND CONTEXT

Refer to Part A of the Generic EMPr included in Appendix 1.

3 PART B: ENVIRONMENTAL CONTROLS – PRE-APPROVED GENERIC EMPR TEMPLATE

Refer to Part B of the Generic EMPr included in Appendix 1.

4 PART C: SITE-SPECIFIC, PROJECT, APPLICANT AND EAP INFORMATION

4.1 GENERAL EMPR AND PROJECT OVERVIEW

Tetra4 (the Applicant) appointed Environmental Impact Management Services (Pty) Ltd (EIMS) to undertake the necessary steps to prepare and submit an application for Environmental Authorisation (EA) to the Petroleum Agency of South Africa (PASA – the competent authority), in support of plans to extend natural gas production operations within an existing Production Right (PASA Reference: 12/4/1/07/2/2), in the Matjhabeng and Masilonyana Local Municipalities, near the town of Virginia in the Free State Province. A detailed description of the Virginia Gas Project is provided below.

In accordance with Chapter 4 of the EIA Regulations (2014) promulgated under the National Environmental Management Act (Act 107 of 1998 – NEMA, as amended) and Section 86 of the MPRDA Regulations for petroleum exploration and production (2015), an application for EA must be submitted to the PASA to amend the approved Environmental Management Programme (EMPr) as well as to include the combined helium and Liquified Natural Gas (LNG) plant and any activities not currently authorised, to the gas production development. The amendment to the EMPr also requires a Section 102 application under the Mineral and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA). In this regard, several listed activities under various environmental legislation will be affected and as such a number of permits and/ or licenses, in addition to the EA, may be required. Furthermore, the issued Production Right makes provision to undertake site-specific EMPr's within the Production Right area where the area is delineated as of medium to high environmental sensitivity, and Cluster 2 is, in effect, the second of these site-specific EMPr's (Cluster 1 was the first amendment). Within each Cluster (such as Cluster 1 and Cluster 2) whereby an EA is obtained for activities and affected properties not included in previous authorisations resulting in site-specific EMPr's indicating medium, high to very high environmental sensitivities, pre-commencement assessments should be undertaken by a suitably qualified Environmental Officer (EO). The findings of the pre-commencement assessments as well as the responses thereto should be kept on record and must be included in the monthly ECO audits and annual independent auditing.

4.2 DESCRIPTION OF THE PRODUCTION ACTIVITIES

4.2.1 LOCATION

The Cluster 1 and Cluster 2 gas production operations are located approximately 20 km south west of the town of Virginia, within the Matjhabeng and Masilonyana Local Municipalities, in the Free State Province. Table 1 below provides the extent of the production right with the Cluster 1 and Cluster 2 gas production areas, as well as a summary of the properties which make up the Cluster 1 and Cluster 2 areas. The locality and extent of the Cluster 1 and Cluster 2 study areas within the production right area are presented in Figure 1.

Table 1: Property Description

Approved Production Right Area	Approximately 187 000 Hectares
Cluster 1 Study Area	Approximately 14 316 Hectares
Cluster 2 Study Area	Approximately 27 500 Hectares

District Municipality	Lejweleputswa
Local Municipality	Matjhabeng and Masilonyana
Distance and direction from nearest town	**Cluster 1:** Located is approximately 20 km southwest of the town of Virginia, in the Free State Province. **Cluster 2:** The site boundary is ~5km southwest of the town of Virginia, ~9km south the town of Welkom and ~16km north of the town of Theunissen.

CLUSTER 1 21-digit Surveyor General Code for each Portion	**Farm Name, Number and Portion**	**21 Digit Surveyor General Code**
	Brakspruit 121 (Portion RE 0)	F03300000000012100000
	Enkeldoorn 360 (Portion 0)	F03300000000036000000
	Boschluis Spruit 278 (Portion RE 0)	F03300000000027800000
	Boschluis Spruit 278 (Portion 1)	F03300000000027800001
	Boschluis Spruit 278 (Portion 2)	F03300000000027800002
	Retreat 118 (Portion RE 0)	F03300000000011800000
	Nortier 361 (Portion 1)	F03300000000036100001
	Jordaan 1 (Portion 1)	F03300000000000100001
	Driekoppies 322 (Portion 0)	F03300000000042200000
	Frisgewaag 550 (Portion Re 0)	F03300000000055000000
	Frisgewaag 550 (Portion 1)	F03300000000055000001
	Frisgewaag 550 (Portion 2)	F03300000000055000002
	Kleinpan 320 (Portion 0)	F03300000000032000000
	Hendriena 563 (Portion 0)	F03300000000056300000
	Glen Ross 562 (Portion Re 0)	F03300000000056200000
	Glen Ross 562 (Portion 1)	F03300000000056200001
	Glen Ross 562 (Portion 2)	F03300000000056200002
	Glen Ross 562 (Portion 3)	F03300000000056200003
	Glen Ross 562 (Portion 4)	F03300000000056200004
	Glen Ross 562 (Portion 5)	F03300000000056200005
	Glen Ross 562 (Portion 6)	F03300000000056200006
	Glen Ross 562 (Portion 7)	F03300000000056200007
	Glen Ross 562 (Portion 8)	F03300000000056200008
	Glen Ross 562 (Portion 9)	F03300000000056200009
	Glen Ross 562 (Portion 10)	F03300000000056200010
	Palmietkuil 328 (Portion RE 0)	F03300000000032800000
	Palmietkuil 328 (Portion RE 1)	F03300000000032800001
	Palmietkuil 328 (Portion 4)	F03300000000032800004
	Palmietkuil 328 (Portion 5)	F03300000000032800005
	Palmietkuil 328 (Portion 6)	F03300000000032800006
	Kalkoenkrans 225 (Portion RE 1)	F03300000000022500001
	Kalkoenkrans 225 (Portion 2)	F03300000000022500002
	Kalkoenkrans 225 (Portion 4)	F03300000000022500004
	Damplaats 341 (Portion RE 0)	F03300000000034100000
	Zonderzorg 342 (Portion RE 0)	F03300000000034200000

	Zonderzorg 342 (Portion 1)	F03300000000034200001
	Zoetendal 243 (Portion 1)	F03300000000024300001
	Doornrivier 330 (Portion RE 1)	F03300000000033000001
	Doornrivier 330 (Portion 2)	F03300000000033000002
	Excelsior 147 (Portion RE 0)	F03300000000014700000
	Excelsior 147 (Portion 1)	F03300000000014700001
	Terra Blanda 155 (Portion 0)	F03300000000015500000
	Blaauwdrift 188 (Portion 3)	F03300000000018800003
	De Wilger 544 (Portion RE 0)	F03300000000054400000
	Helpmekaar 47 (Portion RE 0)	F03300000000004700000
	Helpmekaar 47 (Portion RE 1)	F03300000000004700001
	Helpmekaar 47 (Portion 3)	F03300000000004700003
	Mond van Doornrivier 38 (Portion RE 0)	F03300000000003800000
	Mond van Doornrivier 38 (Portion 2)	F03300000000003800002
	Middelplaas 583 (Portion 0)	F03300000000058300000
	Grottkau 410 (Portion RE 0)	F03300000000041000000
	Goedemoed 143 (Portion RE 0)	F03300000000014300000
	Goedemoed 143 (Portion 2)	F03300000000014300002
	Deeldam 106 (Portion RE 0)	F03300000000010600000
	Deeldam 106 (Portion 4)	F03300000000010600004
	Leeuwbult 52 (Portion 0)	F03300000000005200000
	Harmonie 579 (Portion 0)	F03300000000057900000
	Erfdeel 188 (Portion 2)	F03500000000018800002
	Tarka 656 (Portion RE 0)	F03500000000065600000
CLUSTER 2 21-digit Surveyor General Code for each Portion	**Farm Name, Number and Portion**	**21 Digit Surveyor General Code**
	Adamsons Vley 655 (Portion 0)	F03500000000065500000
	Adamsons Vley 655 (Portion 1)	F03500000000065500001
	Adamsons Vley 655 (Portion 2)	F03500000000065500002
	Annex 3 No 478 (Portion 0)	F03300000000047800000
	Annex Glen Ross 562 (Portion 0)	F03300000000056200000
	Annex Glen Ross 562 (Portion 1)	F03300000000056200001
	Annex Glen Ross 562 (Portion 10)	F03300000000056200010
	Annex Glen Ross 562 (Portion 2)	F03300000000056200002
	Annex Glen Ross 562 (Portion 3)	F03300000000056200003
	Annex Glen Ross 562 (Portion 4)	F03300000000056200004
	Annex Glen Ross 562 (Portion 5)	F03300000000056200005
	Annex Glen Ross 562 (Portion 6)	F03300000000056200006
	Annex Glen Ross 562 (Portion 7)	F03300000000056200007
	Annex Glen Ross 562 (Portion 8)	F03300000000056200008
	Annex Glen Ross 562 (Portion 9)	F03300000000056200009
	Annex Grusde 474 (Portion 0)	F03300000000047400000
	Annex Mooivlakte 208 (Portion 0)	F03300000000020800000
	Annex Welgelegen No 76 (Portion 0)	F03300000000007600000
	Bethel No 96 (Portion 0)	F03300000000009600000
	Blaauwdrift 188 (Portion 2)	F03300000000018800002
	Blaauwdrift 188 (Portion 3)	F03300000000018800003
	Bloemhoek 509 (Portion 0)	F03300000000050900000

	Bloemhoek 509 (Portion 1)	F03300000000050900001	
	Bloemhoek 509 (Portion 2)	F03300000000050900002	
	Bloemhoek 509 (Portion 5)	F03300000000050900005	
	Bloemhoek 509 (Portion 7)	F03300000000050900007	
	Bloemhoek 509 (Portion 8)	F03300000000050900008	
	Boschkop No 227 (Portion 4)	F03300000000022700004	
	Boschkop No 227 (Portion 5)	F03300000000022700005	
	Boschluis Spruit 278 (Portion 0)	F03300000000027800000	
	Boschluis Spruit 278 (Portion 1)	F03300000000027800001	
	Boschluis Spruit 278 (Portion 2)	F03300000000027800002	
	Braklaagte 41 (Portion 0)	F03300000000004100000	
	Braklaagte 41 (Portion 1)	F03300000000004100001	
	Brakspruit 121 (Portion 0)	F03300000000012100000	
	Bruintjes Hoogte 367 (Portion 0)	F03300000000036700000	
	Bruintjes Hoogte 367 (Portion 2)	F03300000000036700002	
	Bruintjes Hoogte 367 (Portion 3)	F03300000000036700003	
	Bruintjes Hoogte 367 (Portion 4)	F03300000000036700004	
	Bryan 561 (Portion 0)	F03300000000056100000	
	Bryan 561 (Portion 1)	F03300000000056100001	
	Bryan 561 (Portion 10)	F03300000000056100010	
	Bryan 561 (Portion 11)	F03300000000056100011	
	Bryan 561 (Portion 18)	F03300000000056100018	
	Bryan 561 (Portion 19)	F03300000000056100019	
	Bryan 561 (Portion 21)	F03300000000056100021	
	Bryan 561 (Portion 22)	F03300000000056100022	
	Bryan 561 (Portion 23)	F03300000000056100023	
	Bryan 561 (Portion 26)	F03300000000056100026	
	Bryan 561 (Portion 27)	F03300000000056100027	
	Bryan 561 (Portion 28)	F03300000000056100028	
	Bryan 561 (Portion 29)	F03300000000056100029	
	Bryan 561 (Portion 32)	F03300000000056100032	
	Bryan 561 (Portion 33)	F03300000000056100033	
	Bryan 561 (Portion 34)	F03300000000056100034	
	Bryan 561 (Portion 35)	F03300000000056100035	
	Bryan 561 (Portion 36)	F03300000000056100036	
	Bryan 561 (Portion 37)	F03300000000056100037	
	Bryan 561 (Portion 38)	F03300000000056100038	
	Bryan 561 (Portion 39)	F03300000000056100039	
	Bryan 561 (Portion 40)	F03300000000056100040	
	Bryan 561 (Portion 41)	F03300000000056100041	
	Bryan 561 (Portion 46)	F03300000000056100046	
	Bryan 561 (Portion 6)	F03300000000056100006	
	Cabriere 215 (Portion 0)	F03300000000021500000	
	Carlo 596 (Portion 0)	F03300000000059600000	
	Clewer No 104 (Portion 1)	F03300000000010400001	
	Commericia No 430 (Portion 0)	F03300000000043000000	

Damplaats 341 (Portion 0)	F03300000000034100000
Dankbaarheid 16 (Portion 0)	F03300000000001600000
Dayton No 560 (Portion 0)	F03300000000056000000
De Klerks Kraal 231 (Portion 0)	F03300000000023100000
De Klerks Kraal 231 (Portion 1)	F03300000000023100001
De Klerks Kraal 231 (Portion 4)	F03300000000023100004
De Klerks Kraal 231 (Portion 5)	F03300000000023100005
De Klerks Kraal 231 (Portion 6)	F03300000000023100006
De Klerks Kraal 231 (Portion 7)	F03300000000023100007
De Klerks Kraal 231 (Portion 8)	F03300000000023100008
Die Mond 479 (Portion 0)	F03300000000047900000
Die Mond 479 (Portion 1)	F03300000000047900001
Digito 642 (Portion 0)	F03300000000064200000
Doorn River 330 (Portion 0)	F03300000000033000000
Doorn River 330 (Portion 1)	F03300000000033000001
Doorn River 330 (Portion 10)	F03300000000033000010
Doorn River 330 (Portion 11)	F03300000000033000011
Doorn River 330 (Portion 12)	F03300000000033000012
Doorn River 330 (Portion 13)	F03300000000033000013
Doorn River 330 (Portion 14)	F03300000000033000014
Doorn River 330 (Portion 15)	F03300000000033000015
Doorn River 330 (Portion 16)	F03300000000033000016
Doorn River 330 (Portion 17)	F03300000000033000017
Doorn River 330 (Portion 18)	F03300000000033000018
Doorn River 330 (Portion 19)	F03300000000033000019
Doorn River 330 (Portion 2)	F03300000000033000002
Doorn River 330 (Portion 20)	F03300000000033000020
Doorn River 330 (Portion 21)	F03300000000033000021
Doorn River 330 (Portion 3)	F03300000000033000003
Doorn River 330 (Portion 5)	F03300000000033000005
Doorn River 330 (Portion 6)	F03300000000033000006
Doorn River 330 (Portion 8)	F03300000000033000008
Doorndeel 236 (Portion 0)	F03300000000023600000
Doorndeel 236 (Portion 1)	F03300000000023600001
Driekoppies No 422 (Portion 0)	F03300000000042200000
Du Preez Leger No324 (Portion 0)	F03500000000032400000
Enkeldoorn 360 (Portion 0)	F03300000000036000000
Excelsior No 147 (Portion 0)	F03300000000014700000
Excelsior No 147 (Portion 1)	F03300000000014700001
Fairview No 532 (Portion 0)	F03300000000053200000
Farm Annex 2 30 (Portion 0)	F03300000000003000000
Farm Blijdschap 17 (Portion 0)	F03300000000001700000
Farm Byran No 49 (Portion 1)	F03300000000004900001
Farm Byran No 49 (Portion 4)	F03300000000004900004
Farm Lekkerlewe 13 (Portion 0)	F03500000000001300000
Farm Lekkerlewe 14 (Portion 1)	F03900000000001300001

	Farm Shalom 24 (Portion 0)	F0330000000002400000
	Farm Welgelegen Station No 64 (Portion 0)	F0330000000006400000
	Frisgewaag 550 (Portion 0)	F0330000000055000000
	Frisgewaag 550 (Portion 1)	F0330000000055000001
	Frisgewaag 550 (Portion 2)	F0330000000055000002
	Glen Ross 734 (Portion 0)	F0350000000073400000
	Glen Ross 734 (Portion 1)	F0350000000073400001
	Glen Ross 734 (Portion 10)	F0350000000073400010
	Glen Ross 734 (Portion 11)	F0350000000073400011
	Glen Ross 734 (Portion 12)	F0350000000073400012
	Glen Ross 734 (Portion 13)	F0350000000073400013
	Glen Ross 734 (Portion 14)	F0350000000073400014
	Glen Ross 734 (Portion 15)	F0350000000073400015
	Glen Ross 734 (Portion 16)	F0350000000073400016
	Glen Ross 734 (Portion 17)	F0350000000073400017
	Glen Ross 734 (Portion 18)	F0350000000073400018
	Glen Ross 734 (Portion 19)	F0350000000073400019
	Glen Ross 734 (Portion 2)	F0350000000073400002
	Glen Ross 734 (Portion 20)	F0330000000073400020
	Glen Ross 734 (Portion 21)	F0350000000073400021
	Glen Ross 734 (Portion 22)	F0350000000073400022
	Glen Ross 734 (Portion 23)	F0350000000073400023
	Glen Ross 734 (Portion 24)	F0350000000073400024
	Glen Ross 734 (Portion 25)	F0350000000073400025
	Glen Ross 734 (Portion 3)	F0350000000073400003
	Glen Ross 734 (Portion 4)	F0350000000073400004
	Glen Ross 734 (Portion 5)	F0350000000073400005
	Glen Ross 734 (Portion 6)	F0350000000073400006
	Glen Ross 734 (Portion 7)	F0350000000073400007
	Glen Ross 734 (Portion 8)	F0350000000073400008
	Glen Ross 734 (Portion 9)	F0350000000073400009
	Goedemoed No 143 (Portion 0)	F0330000000014300000
	Grasdeel No 586 (Portion 0)	F0330000000058600000
	Grusde 229 (Portion 0)	F0330000000022900000
	Hakkies 695 (Portion 1)	F0350000000069500001
	Hakkies 695 (Portion 14)	F0350000000069500014
	Hakkies 695 (Portion 17)	F0350000000069500017
	Hakkies 695 (Portion 18)	F0350000000069500018
	Hakkies 695 (Portion 2)	F0350000000069500002
	Hakkies 695 (Portion 3)	F0330000000069500003
	Hakkies 695 (Portion 4)	F0350000000069500004
	Hakkies 695 (Portion 5)	F0330000000069500005
	Hakkies 695 (Portion 6)	F0330000000069500006
	Hakkies 742 (Portion 0)	F0330000000074200000
	Hakkies 742 (Portion 1)	F0350000000074200001
	Harmonie 579 (Portion 0)	F0330000000057900000

Harmonie 579 (Portion 1)	F03300000000057900001
Helpmekaar 47 (Portion 0)	F03300000000004700000
Helpmekaar 47 (Portion 1)	F03300000000004700001
Helpmekaar 47 (Portion 3)	F03300000000004700003
Helpmekaar 47 (Portion 4)	F03300000000004700004
Helpmijvoort No 472 (Portion 0)	F03300000000047200000
Houmoed No 326 (Portion 0)	F03300000000032600000
Jonkers Rust 72 (Portion 0)	F03500000000007200000
Jonkers Rust 72 (Portion 1)	F03500000000007200001
Jordaan 1 (Portion 0)	F03300000000000100000
Jordaan 1 (Portion 1)	F03300000000000100001
Jordaans Rust 59 (Portion 0)	F03300000000005900000
Kaalpan 65 (Portion 0)	F03900000000006500000
Kaalpan 65 (Portion 1)	F03900000000006500001
Kaalpan 65 (Portion 2)	F03900000000006500002
Kaalpan 65 (Portion 3)	F03900000000006500003
Kalkoenkrans 225 (Portion 0)	F03300000000022500000
Kalkoenkrans 225 (Portion 1)	F03300000000022500001
Kalkoenkrans 225 (Portion 10)	F03300000000022500010
Kalkoenkrans 225 (Portion 11)	F03300000000022500011
Kalkoenkrans 225 (Portion 12)	F03300000000022500012
Kalkoenkrans 225 (Portion 14)	F03300000000022500014
Kalkoenkrans 225 (Portion 15)	F03300000000022500015
Kalkoenkrans 225 (Portion 2)	F03300000000022500002
Kalkoenkrans 225 (Portion 3)	F03300000000022500003
Kalkoenkrans 225 (Portion 4)	F03300000000022500004
Kalkoenkrans 225 (Portion 6)	F03300000000022500006
Kalkoenkrans 225 (Portion 8)	F03300000000022500008
Kalkoenkrans 225 (Portion 9)	F03300000000022500009
Keimoes No 170 (Portion 0)	F03300000000017000000
Klein Palmiet Kuil 407 (Portion 0)	F03300000000040700000
Klein Palmiet Kuil 407 (Portion 1)	F03300000000040700001
Klein Palmiet Kuil 407 (Portion 2)	F03300000000040700002
Klein Pan 320 (Portion 0)	F03300000000032000000
Kleinbegin 134 (Portion 0)	F03300000000013400000
Kovno 235 (Portion 0)	F03300000000023500000
Langlaagte 110 (Portion 1)	F03300000000011000001
Langlaagte 110 (Portion 2)	F03300000000011000002
Leeuwaarden 171 (Portion 0)	F03300000000017100000
Leeuwaarden 171 (Portion 1)	F03300000000017100001
Leeuwbult 52 (Portion 0)	F03300000000005200000
Leeuwbult 52 (Portion 3)	F03300000000005200003
Leeuwbult 580 (Portion 0)	F03300000000058000000
Leeuwfontein No 256 (Portion 0)	F03300000000025600000
Leeuwvlei No 115 (Portion 0)	F03300000000011500000
Leeuwvlei No 115 (Portion 1)	F03300000000011500001

Lekkerlewe 643 (Portion 0)	F03300000000064300000
Leliesdal No 242 (Portion 0)	F03300000000024200000
Metz No 295 (Portion 4)	F03300000000029500004
Middelplaas 583 (Portion 0)	F03300000000058300000
Middenin No 126 (Portion 0)	F03900000000012600000
Mond Van Doornrivier 38 (Portion 0)	F03300000000003800000
Mond Van Doornrivier 38 (Portion 2)	F03300000000003800002
Mooifontein 639 (Portion 0)	F03300000000063900000
Mooifontein No 158 (Portion 0)	F03300000000015800000
Mooifontein No 158 (Portion 1)	F03300000000015800001
Mooifontein No 158 (Portion 2)	F03300000000015800002
Mooifontein No 158 (Portion 3)	F03300000000015800003
Mooifontein No 158 (Portion 5)	F03300000000015800005
Mooivlakte 199 (Portion 0)	F03300000000019900000
Mooivlakte 199 (Portion 1)	F03300000000019900001
Mooivlakte 199 (Portion 3)	F03300000000019900003
Mooivlei 357 (Portion 0)	F03300000000035700000
Nortier 361 (Portion 0)	F03300000000036100000
Nortier 361 (Portion 1)	F03300000000036100001
Palmietkuil 328 (Portion 0)	F03300000000032800000
Palmietkuil 328 (Portion 1)	F03300000000032800001
Palmietkuil 328 (Portion 4)	F03300000000032800004
Palmietkuil 328 (Portion 5)	F03300000000032800005
Palmietkuil 328 (Portion 6)	F03300000000032800006
Palmietkuil 548 (Portion 0)	F03300000000054800000
Palmietkuil 548 (Portion 1)	F03300000000054800001
Palmietkuil 548 (Portion 2)	F03300000000054800002
Paulina 470 (Portion 0)	F03300000000047000000
Pleasant View No 169 (Portion 0)	F03300000000016900000
Plecy No 82 (Portion 0)	F03300000000008200000
Richelieu 135 (Portion 0)	F03300000000013500000
Rondehoek 200 (Portion 0)	F03300000000020000000
Rondehoek 200 (Portion 1)	F03300000000020000001
Rondehoek 200 (Portion 3)	F03300000000020000003
School Site No 178 (Portion 0)	F03300000000017800000
Semper Idem No 588 (Portion 0)	F03300000000058800000
Spoorleggerswoning 167 (Portion 0)	F03300000000016700000
Stille Woning 703 (Portion 0)	F03500000000070300000
Teacher's Residence No 286 (Portion 0)	F03300000000028600000
Terra Blanda 155 (Portion 0)	F03300000000015500000
The Prairie No 93 (Portion 1)	F03900000000009300001
The Prairie No 93 (Portion 2)	F03900000000009300002
Toulon 368 (Portion 0)	F03300000000036800000
Vaalbank 190 (Portion 1)	F03300000000019000001
Vermeulenskraal No 223 (Portion 2)	F03500000000022300002
Vermeulenskraal No 223 (Portion 6)	F03500000000022300006

	Vermeulenskraal No 223 (Portion 9)	F03500000000022300009
	Vierhoek No 630 (Portion 0)	F03300000000063000000
	Vlakpan 358 (Portion 0)	F03300000000035800000
	Vlakpan 358 (Portion 1)	F03300000000035800001
	Vlakpan 358 (Portion 2)	F03300000000035800002
	Vlakpan 358 (Portion 3)	F03300000000035800003
	Walkersvlei No 133 (Portion 0)	F03900000000013300000
	Welgelegen 382 (Portion 0)	F03300000000038200000
	Welgelegen 382 (Portion 10)	F03300000000038200010
	Welgelegen 382 (Portion 11)	F03300000000038200011
	Welgelegen 382 (Portion 20)	F03300000000038200020
	Welgelegen 382 (Portion 21)	F03300000000038200021
	Welgelegen 382 (Portion 26)	F03300000000038200026
	Welgelegen 382 (Portion 28)	F03300000000038200028
	Welgelegen 382 (Portion 5)	F03300000000038200005
	Welgelegen 534 (Portion 2)	F03300000000053400002
	Weltevrede 638 (Portion 0)	F03300000000063800000
	Weltevreden 443 (Portion 14)	F03300000000044300014
	Weltevreden 443 (Portion 2)	F03300000000044300002
	Weltevreden 443 (Portion 3)	F03300000000044300003
	Weltevreden 443 (Portion 4)	F03300000000044300004
	Weltevreden 443 (Portion 5)	F03300000000044300005
	Weltevreden 443 (Portion 6)	F03300000000044300006
	Weltevreden 443 (Portion 9)	F03300000000044300009
	Werda No 587 (Portion 0)	F03300000000058700000
	Wolvepan No 85 (Portion 7)	F03900000000008500007
	Wolvepan No 85 (Portion 9)	F03900000000008500009
	Yatala No 73 (Portion 0)	F03500000000007300000
	Zoetendal 243 (Portion 0)	F03300000000024300000
	Zoetendal 243 (Portion 1)	F03300000000024300001
	Zonderzorg 342 (Portion 0)	F03300000000034200000
	Zonderzorg 640 (Portion 0)	F03300000000064000000

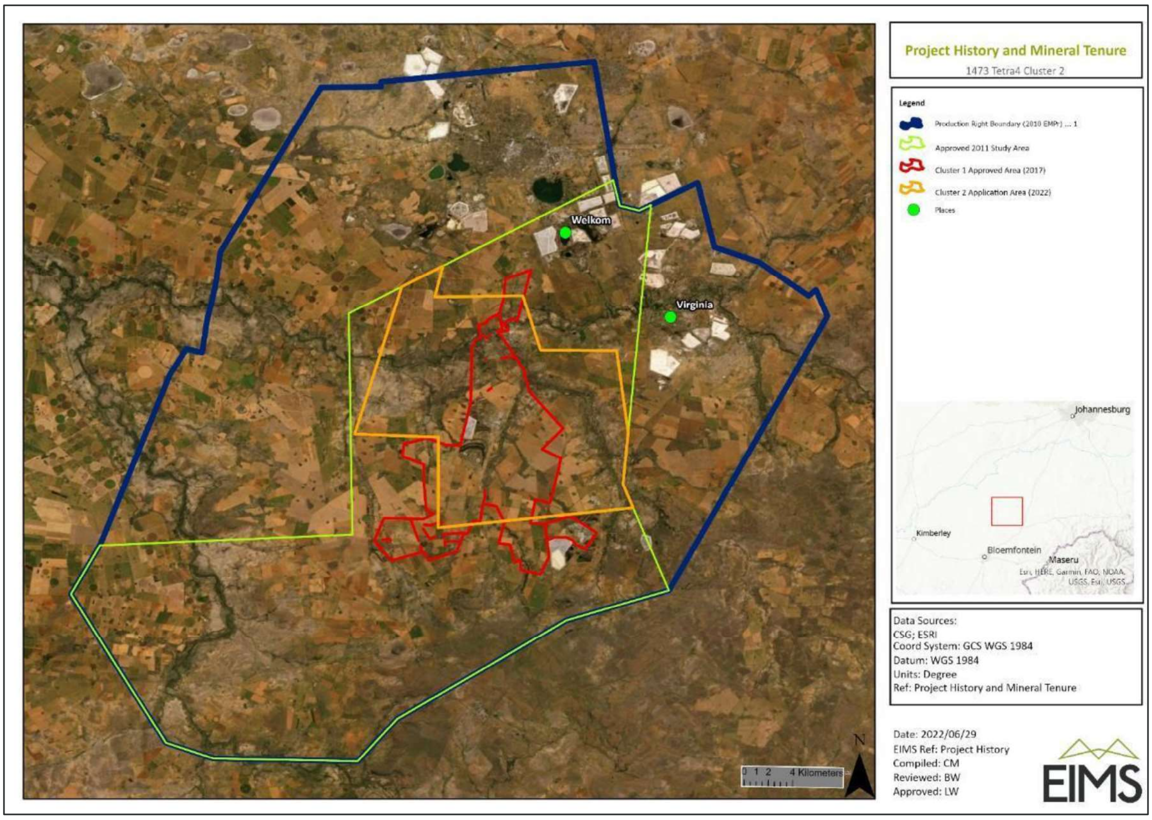


Figure 1: Cluster 1 and Cluster 2 locality in relation to the Production Right area.

4.3 DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

The granted Production Right spans approximately 187 000 hectares and was awarded to Tetra4 (then Molopo South Africa) in 2012 to develop gas fields around the town of Virginia in the Free State Province. Whilst the application for Production Right has been issued for the entire conceptual full field development area, the original Environmental Authorisation and associated EMPr, only applied to the areas with certified reserves only (refer to the green area). In the event that Tetra4 wishes to extend the production operations into the entire application area then a further detailed EIA will be required to amend the EMPr to incorporate these extended areas or clusters. The area approved in the Record of Decision (RoD) issued together with the Production Right spans a total area of approximately 104 659 ha (Certified Reserves), as presented in Figure 1 and depicted by the green outlined area.

Due to the nature of the gas resource and the vast extent of the area, the issued Production Right included a license condition which requires that the license holder undertake pre-commencement assessments for drilling activities planned within the Production Right area where the environmental sensitivity is indicated to be medium, high or very high. This pertains to production activities not already authorised and where the activities are to take place on properties not included in existing authorisations. These site-specific assessments must be approved by the PASA prior to commencement.

The Production Right was issued by the PASA in 2012. As a result of the fact that the exact physical extent of the proposed production activities was unknown at the time of issuance of the Production Right, the following specific conditions were included in the Environmental RoD:

- Condition 3.1.2: The applicant must ensure that the proposed project is carried out and managed in accordance with the approved EMPr and RoD conditions.
- Condition 3.1.11: Areas identified as sensitive sites must be treated as no go areas during the positioning of production infrastructure and where these areas are unavoidable, site-specific environmental assessment must be undertaken and the addendum to the approved EMPr submitted for our consideration and approval.
- EMPr Section 7.1: Areas that are not sensitive will be covered through the general EMPr[1], while areas that would fall into the medium, high and very high sensitivity would require site-specific EMPr's and mitigation measures.

The implication of these conditions was that should any production activities be proposed within any designated medium, high or very highly sensitive areas and these activities and affected properties are not currently authorised, then the holder is required to undertake a site-specific assessment and prepare a site-specific EMPr. In order to limit the number of individual site-specific assessments required for exploration drilling activities within the approved Production Right area and avoid a "piece meal" approach to environmental assessment and management, Tetra4 intend to continue developing the Production operations through a process of Clusters and/or stand-alone assessments, where required. Any areas of medium, high or very high sensitivity within an authorised cluster, require pre-commencement assessments by a suitably qualified and experienced EO[2].Should the pre-commencement assessment identify sensitivities of a specialist nature that the EO is not qualified in identifying, a specialist in the relevant field of practice shall be consulted and where necessary, a site assessment by the specialist undertaken to confirm the way forward. The findings of the assessment and responses thereof must be kept on record and made available to the ECO and external independent auditor.

4.3.1 CLUSTER 1 PROJECT ACTIVITIES

Tetra4 identified 13 existing wells that will be utilised for initial production activities. These 13 wells and the supporting infrastructure required for production related activities is referred to as Cluster 1 and comprises the

[1] The "general EMPr" refers to the latest approved EMPr under the Production Right (including all Cluster amendments and ad hoc amendments approved by the competent authority.

[2] The qualifications and experience of the EO of the shall include at a minimum a tertiary qualification in environmental management with at least 5 years of experience in construction implementation of environmental management measures.

first gas field for development within the approved Production Right area. In addition to the pre-identified 13 wells, the drilling of new wells within the boundary of Cluster 1 was included in the 2017 EIA assessment. Construction of the Cluster 1 gas production project was completed in ~July 2022 with commissioning and full operation commencing ~September 2022.

4.3.1.1 GAS PRODUCTION METHOD

The Cluster 1 gas field production method entails the extraction of gas at individual well sites within the Production Right area. Gas extracted from the wells is compressed and sent via pipeline to further infield compressors and then piped through to the combined helium and LNG plant for processing. The final product includes helium and LNG, both of which are temporarily stored in tankers and trucked away via trailer to be sold to end users. Each component, namely well sites, pipelines, infield centralised compressors and the combined helium and LNG plant is described below in more detail (refer to Figure 2 below for the simplified production method representation).

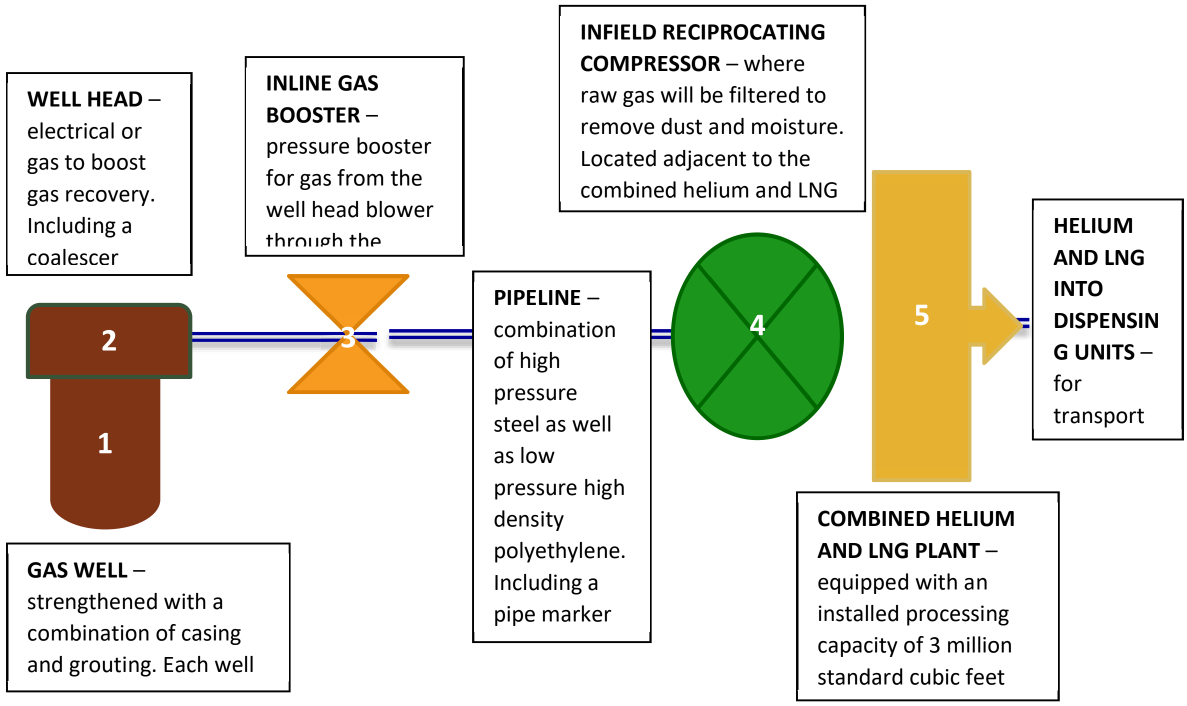


Figure 2: Flow Diagram of Simplified Production Method

4.3.1.1.1 EXPLORATION DRILLING

In addition to the 13 existing wells and the new wells, further exploration wells will be drilled and, if successful, converted into production wells and added to the Cluster 1 network (where the environmental assessment indicated low sensitivity). The EIA sensitivity mapping is utilised to identify areas suitable for exploration drilling. Exploration drilling entails the use of a truck, trailer or skid mounted diamond drill rig to drill to varying depths in order to strike the gas reserve.

Exploration drilling typically requires clearance of an area of 50 m x 50 m in order to set up the rig with associated laydown areas and begin drilling activities. All exploration boreholes to be drilled in accordance with the requirements of the MPRDA Regulations, and will be sealed with a combination of casing and grouting to ensure vertical isolation of the gas from both the surrounding geology and hydrological regime. In addition to the drill rig, lined sumps will be required to store and recirculate water for the drilling process. A maximum of 6000 litres per day is required for drilling purposes and will be sourced from the Municipal water services.

In the event that an exploration borehole proves unsuccessful it will be sealed and cased (in accordance with the MPRDA Regulations) and the area rehabilitated. In the event that the exploration borehole proves successful it will be converted into a production well (as described below) and added to the network of gas producing wells for Cluster 1. The drilling of exploration boreholes is a temporary and short-lived activity and the equipment to be used during drilling activities includes a truck/trailer or skid mounted diamond drill rig, excavator, dozer, grader water cart, light motor vehicle for transport of personnel and chemical toilets.

4.3.1.1.2 WELL SITE CONNECTION

Cluster 1 entails the extraction of gas from 13 existing wells or blowers that have been previously drilled. These wells include (refer to Figure 3 for the location of these wells):

- 2057
- 1629
- 1307;
- DBE01;
- ST23;
- HDR1;
- BEI02;
- HZON1;
- 1400
- EX01;
- 2033;
- RETREAT; and
- SPG03.

In addition to the 13 wells already identified, further wells will be drilled as a result of ongoing exploration activities and, if successful will be added to the well network of the Cluster 1 study area. All future wells to be drilled will be within the boundary of the issued Production Right area and as such will be considered in the environmental site-specific assessment to be undertaken for Cluster 1. Ongoing exploration activities and the identification and drilling of new wells are essential activities and required in order to ensure that the Cluster produces volumes of gas required to ensure economic viability.

All wells that are drilled and used for production purposes are strengthened with a combination of casing and grouting to average depths of 300 m. The casing and grouting ensures that the gas is isolated from surrounding geology and promotes the preferential flow of gas from the geological formation through the well and up to the surface. As the gas is naturally lighter than air, it rises naturally to the surface and no well stimulation is required (aka no fracking, etc). The combination of casing and grouting also serves to ensure that gas is isolated and prevented from interacting with the geohydrological regime.

Due to low gas pressures, each well will be equipped with an electrical or gas driven wellhead which boosts gas recovery by creating pressure differentials of up to 25 psi through vacuum suction. From the wellhead, the blower will be connected via pipeline to an inline gas booster or a centralised infield reciprocating gas compressor. Pipelines are a combination of high pressure steel as well as low pressure high density polyethylene (HDPE) and is installed at a minimum depth of 1.5m or below the plough line. The pipeline is installed through the use of a back-actor and TLB. Where piping (e.g. for the compressors and driers) will be brought to surface, a 110 mm steel piping of approximately 10 m – 30 m is utilised instead to ensure pipe strength and long-term integrity. In Cluster 1, each production well site surface infrastructure is approximately 10 m x 10 m and includes the installed wellhead. The well site infrastructure includes fencing, an alarm system, and short length of piping from the wellhead with monitoring and emergency features (e.g. pressure relief and check valves, etc.) prior to going underground.

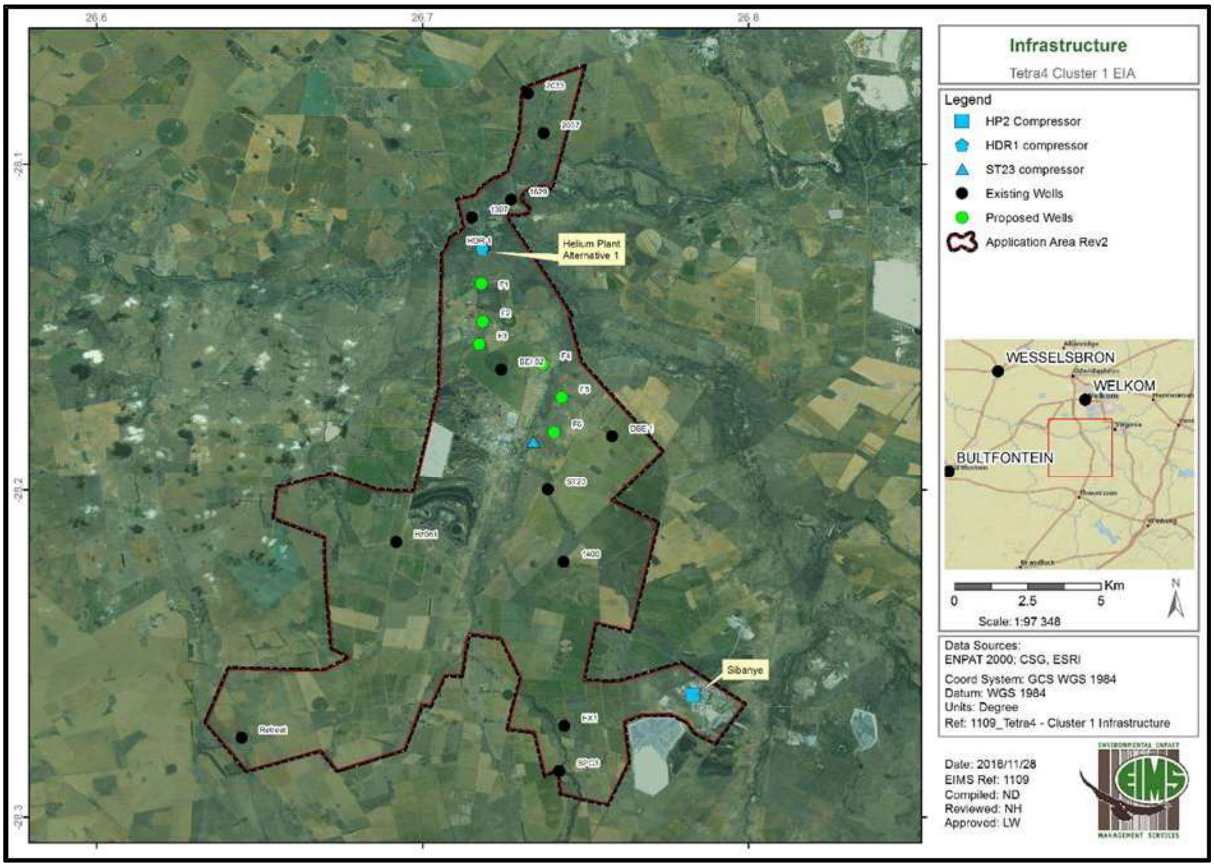


Figure 3: Location of Existing Wells (Black), New Wells (Green) and Other Cluster 1 Surface Infrastructure

4.3.1.1.3 BOOSTER AND INFIELD COMPRESSOR STATIONS

The pressurised gas will enter the pipelines from the production wells towards 2 centralised infield reciprocating compressors, to be pumped via trunkline to the combined helium and LNG plant. The footprint of the wellhead is 10 m x 10 m, however, should a localised booster compressor be required at any future well with very low pressure, then the combined footprint will be approximately 30 m x 20 m per well with booster. The footprint for a centralised reciprocating infield compressors including the gas drier station is approximately 60 m x 60 m.

Raw gas received at the reciprocating compressors will be filtered to remove dust and moisture through the use of a combination water filter and an activated carbon filter that absorbs dust and unwanted organic compounds. Once filtered, the gas from the compressors will be dried to 7 pounds per MMSCF adjacent to the compressor stations, and then piped for final processing to the adjacent combined helium and LNG plant.

4.3.1.1.4 LNG/HELIUM PLANT

Feed gas from compressors is discharged into the combined helium and LNG plant. The plant is equipped with an installed processing capacity of 3 million standard cubic feet per day (MMSCFD) of natural gas with a helium content of approximately 2.36 Vol %. In order to achieve the required volumes of purified helium, the compressed feed gas is fed into a further installed gas pre-treatment unit which removes any additional condensate, traces of sulphur, mercury and hydrocarbons before entering the helium separating membranes and pressure swing adsorption (PSA) unit. Once separated by the combination of membranes and the PSA unit, the plant separates feed gas to a minimum of 99.999 Vol% helium. Purified helium is then liquefied and placed into dispensing units for transport off-site via trailer.

The Helium Recovery Plant consists of the following (refer to Figure 4 below):

- Feed Gas Compressor;
- Mercury / Sulphur Guard Bed;

- TSA Unit (Temperature Swing Adsorption);
- Membrane System;
- PSA Unit (Pressure Swing Adsorption);
- Helium Liquefaction Plant and Filling Station;
- Closed Loop Cooling Water System;
- Instrument Air Station;
- Interconnecting Piping & Peripheral Instrumentation;
- Process Control System / Electrical Switch Gears; and
- Commissioning Spare Parts

Natural gas removed of helium content is then re-circulated back into the plant where it is compressed into LNG. The LNG is then also placed into dispensing units for transport off-site also via trailer. The footprint of the combined helium and LNG plant (approximately 100 m x 100 m), as well as infield reciprocating compressors, temporary storage facilities and transport loading modules and mobile offices is approximately 6 hectares in extent. Refer to Figure 5 for a schematic representation and layout of the helium recovery unit.

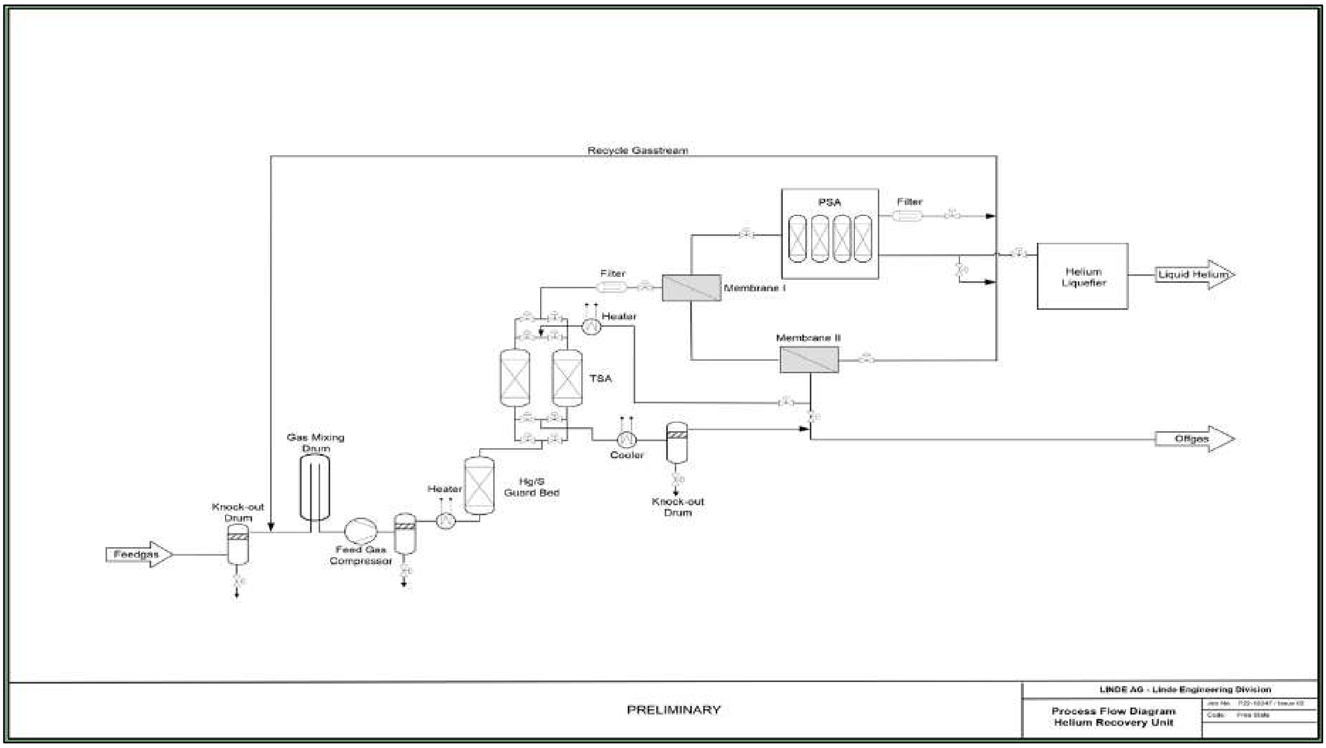


Figure 4: Cluster 1 Helium Recovery Unit Process Flow Diagram

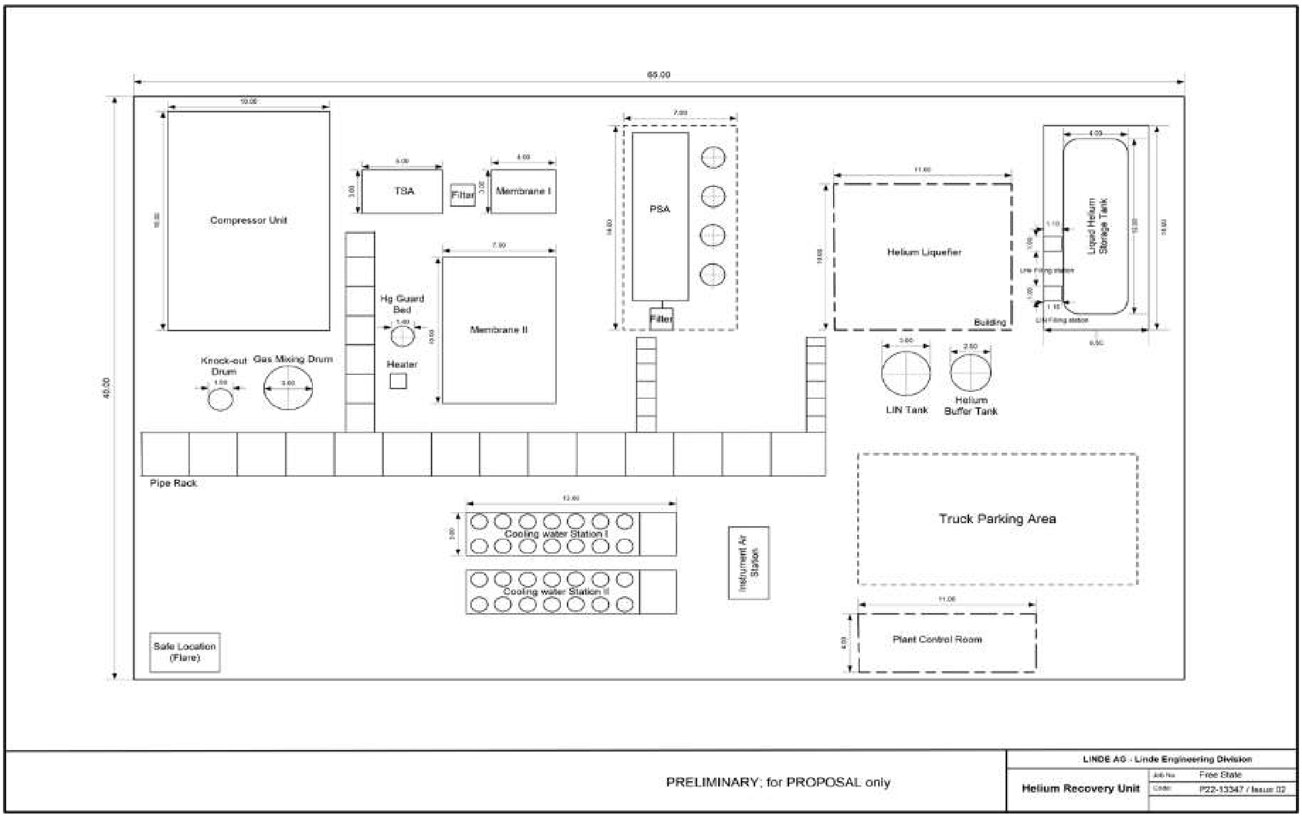


Figure 5: Schematic Representation of Helium Recovery Unit

4.3.1.2 GAS PROCESSING

The Cluster 1 will process raw gas at three primary stages during the production process. The first stage of gas processing occurs at the gas well or blower equipped with a wellhead. Raw gas from the wellhead equipped blower is fed through to a coalescer filter installed at the wellhead. The coalescer filter removes water vapour in the form of condensate from gas and then pipes the gas through to the second stage of gas processing at the inline booster compressors or the infield reciprocating gas compressors.

The second stage of processing at the inline booster compressors or at the infield reciprocating gas compressors which entails the removal of further condensate, dust and organic compounds through the use of an installed drier station and activated carbon filter. The third and final stage of gas processing occurs at the pre-treatment module of the combined helium and LNG plant. Through a combination of membranes, PSA unit and mercury guard bed any additional condensate, sulphur traces, mercury and hydrocarbons are separated out before the gas enters the helium purification and liquefaction process. Removed of impurities, the remaining helium free off-gas is then re-circulated into the plant and processed into high quality LNG. All gas processing is undertaken to ensure that feed gas to the combined helium and LNG plant does not damage the various membranes and PSA unit.

4.3.1.3 SURFACE INFRASTRUCTURE

Cluster 1 comprises of limited subsurface and surface infrastructure as listed below:

- Access roads;
- Pipelines;
- Coalescer filter or knockout drum at each well;
- Pipe markers (approximately every 100 m of the pipeline, where feasible);
- Wellheads;
- Booster pumps (where required);
- Inline booster compressors or infield reciprocating compressors;
- Gas driers;
- Fencing;
- Combined helium and LNG plant;
- Helium storage and dispensing units;
- LNG storage and dispensing units;
- Chemical storage;
- Temporary hazardous waste storage (including but not limited to waste water and waste containing hydrocarbons such as used oil and filters, diesel, lubricants, grease, etc.);
- Temporary general waste storage; and
- Mobile offices and ablutions facilities

Infrastructure required for the Cluster 1 gas field development is broadly split between:

1. Infrastructure required for gas extraction and transport at well sites; and
2. Infrastructure required for gas processing and transport of final product.

Infrastructure required for gas extraction includes wellheads, pipelines, inline boosters and fencing. Infrastructure for gas processing includes infield compressors, the combined helium and LNG plant, product storage and dispensing units and offices.

4.3.1.4 ROADS AND SITE ACCESS CONTROL

Access to the individual well sites, compressor stations, and combined helium and LNG plant is controlled through a single entrance and exit point. Well sites are accessed via existing pre-approved access roads and the plant via a formal access road leading on to the R30. All production well sites, compressor stations, and the combined helium and LNG plant are fenced off with 1.8 m high razor diamond mesh fencing or an equivalent product. Site access and traffic flow is designed to optimise control over the flow of public, contractors and operational vehicles as well as pedestrians. All visitors to the site are required to sign in at the security check point located at the entrance gate of the plant. Employees and visitors are required to retain proof of identification whilst on site.

4.3.1.5 POWER SUPPLY

Electricity to power the combined helium and LNG plant and compressor stations for operation is sourced from Eskom substations.

4.3.1.6 WATER MANAGEMENT

Water management for the Cluster 1 gas production project refers to the water requirements for exploration and limited amounts for production activities, as well as the management of waste water such as condensate and formation water.

4.3.1.6.1 BULK WATER REQUIREMENTS

Cluster 1 does not require bulk water for its operations. Water for drinking, domestic purposes and exploration is sourced from existing municipal supply.

4.3.1.6.2 WASTE WATER

Waste water from the Cluster 1 gas production components consists of either condensate (waste water from condensation out of the gas) or very rarely, formation water (a natural layer of water inside oil and gas reservoirs). The amount of condensate likely to be produced during the Cluster 1 gas production and processing activity is as per the schematic diagram in Figure 6 below. The condensate and any formation water encountered will be disposed of as per the legislative requirements which includes disposal by a licensed contractor at a suitably registered waste disposal facility.

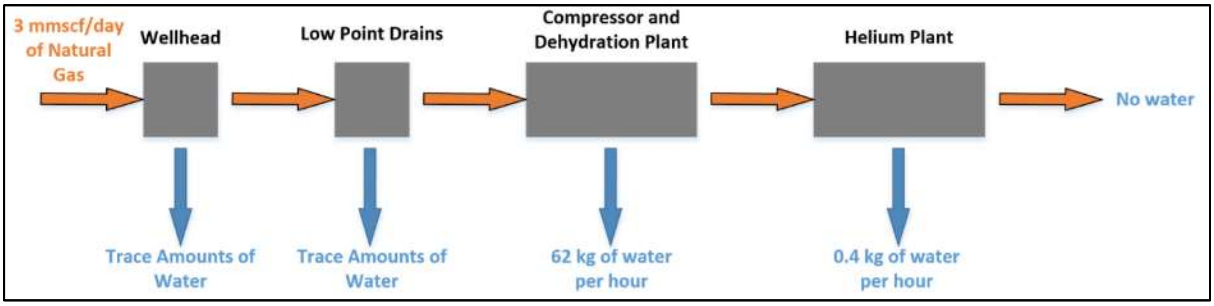


Figure 6: Schematic Diagram Representing the Potential Amount of Waste Water Produced During Gas Production and Processing

4.3.1.7 WASTE MANAGEMENT

The design philosophies for waste management are based on applicable legislation, in particular NEMWA, DWAF (DWS) best practice guidelines, and currently accepted good industry practice for waste management. Principles of waste minimisation at source, segregation for reuse, recycling and treatment or disposal will be applied to the handling of waste, wherever possible.

The waste (general and hazardous) generated during construction (which is largely completed now) and operations will be addressed as per the details below.

4.3.1.7.1 GENERAL WASTE

The following types of general waste (produced mainly during construction, with minimal amounts post-construction) is generated through the Cluster 1 activities:

- Domestic solid waste;
- Scrap metal; and
- Building rubble.

Cluster 1 uses a general waste storage facility and all waste is collected by an approved, licenced waste contractor for removal and final disposal at a registered general waste disposal facility.

4.3.1.7.2 HAZARDOUS WASTE

Hazardous waste, including but not limited to hydrocarbon containing waste (used oil and filters, diesel, lubricants, and grease) is stored in clearly marked skip bins (solids) and containers (liquids). These skip bins/ containers are placed in an isolated area on a hard, impervious surface. When full, the bins/ containers are collected by a contractor for safe disposal or recycling companies. A waste disposal certificate are required from the contractor to track safe disposal.

Condensate (including effluent from the filters and drop out water) removed from gas processing at the various stages described previously is stored in clearly marked containers (should it not be within DWS livestock watering and irrigation standards) for final disposal offsite at a registered hazardous waste disposal facility by a licensed contractor.

Mercury and other trace metals absorbed by the membranes and guard beds equipped at the combined helium and LNG plant are designed to last for approximately 10 years before requiring replacement and will be collected by a licenced contractor for safe disposal also at a registered hazardous waste disposal site. Records of all final waste disposal certificates will be kept.

Other liquid waste such as sewage and domestic waste water is collected and disposed offsite appropriately by licenced contractors to registered disposal facilities.

4.3.2 CLUSTER 2 PROJECT ACTIVITIES

Tetra4 wish to expand the natural gas (LNG/LHe) production operations, to be located within the approved production right area and around the Cluster 1 project (Figure 1). It is important to note that Figure 1 shows the full extent of the 2010 Production Right area (blue outline) while the 2011 accompanying EMPr to the Production Right was prepared based on a detailed assessment of the reduced area (green outline in Figure 1). The 2011 approved EMPr allows for exploration activities within the area of assessment (green outline). Cluster 1 and Cluster 2 both fall within the Production Right boundary as well as the area assessed in preparation of the Production Right EMPr.

The Cluster 2 application area covers a total of ~27 500 hectares. This planned expansion to the existing approved production activities will involve:

- Up to 300 new production wells;
- Gas transmission pipelines and associated infrastructure (such as booster stations, low point drains, pigging stations, etc.);
- 3 compressor stations; and
- An additional new combined Liquid Natural Gas (LNG) and Liquid Helium (LHe) plant (“LNG/LHe Plant”) and associated infrastructure.

It is not possible at this time to identify specific locations of the production wells due to the nature of the exploration phase. During the exploration drilling campaign, gas composition, geology etc is assessed at each exploration well and this data is continually reassessed (modelled) to guide the future exploration campaign (i.e. location of future exploration wells). Only when viable gas reserves are found at a particular exploration well, can the exploration wells be converted into production wells and thereafter, the exact placement of pipelines and associated infrastructure can be determined. It is for this reason that 600m wide well transects have been identified along the targeted geological fractures, fissures and/or faults where gas is more likely to be encountered. Similarly, 300m wide pipeline transects have also been identified to connect the various well transects to the LNG/LHe plant area. These 600m and 300m wide transects will allow for detailed assessments of any sensitivities therein so that deviations to the wells and pipelines can be made. The Cluster 2 study area and associated transects within which infrastructure will be positioned are presented in Figure 7.

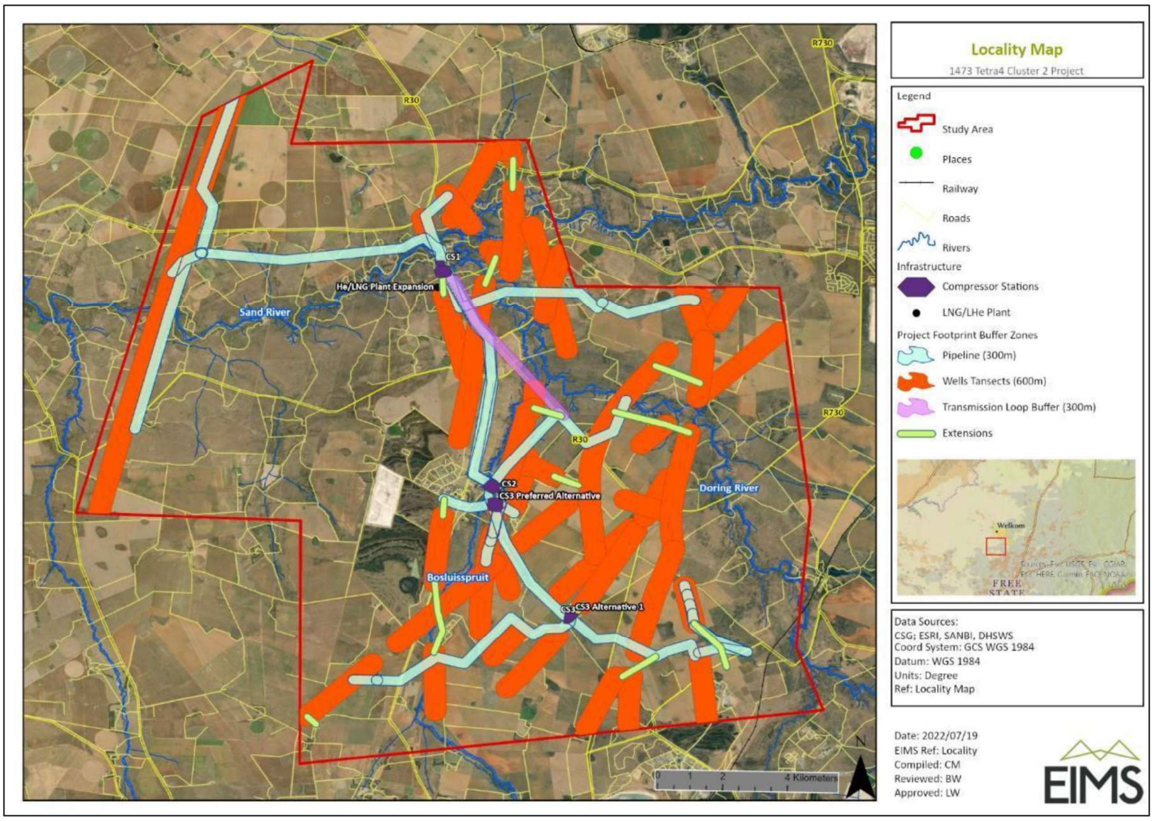


Figure 7: Cluster 2 study area and infrastructure footprint transects.

4.3.2.1 THE GAS RESOURCE

The Tetra4 Production Right is located within the Sand River Play or Virginia Gas Field. Despite not being clearly defined, the field is composed predominantly of Karoo, Ventersdorp and Witwatersrand Supergroup lithologies complete with younger dolerite intrusions. Major fault systems associated with closely spaced zones of fractures and joints provide for preferential pathways for a combination of abiogenic and biogenic gas to reach the surface.

As such, the resulting gas at the surface is a direct emission from the major fault or from minor secondary faults linked to a major fault. In this regard, it is thought that the primary source of gas originates from the Witwatersrand Supergroup or shallower Karoo. The gas is presumed to be a mix of both abiogenic gas from the mantle, and biogenic gas originating from ancient fissure waters, coal beds of the Ecca Group of the Karoo Supergroup as well as ancient algal mats within the shallow marine/lacustrine Witwatersrand Supergroup deposits.

Once the gas target areas are intersected, the feed gas will flow passively out of the wells at a low pressure of ~0.4 barg[3] (gauge pressure) and with a temperature in the range between 10 º and 30 ºC. The feed gas will be compressed upstream of the helium process units by 3 inline compressor stations (designated as 'CS' in the maps in this report) which will be located at strategic points along the gas pipeline routes as shown in Figure 7. A gas pre-treatment will remove condensate (water) as well as traces of sulfur, mercury and C3+ gas components (e.g. propanes, butanes, pentanes) which could cause possible damage to the downstream process equipment. The hydrogen sulphide and CO_2 are washed out in the amine process. The process causes these acid gases to be absorbed in the amine solution. The amine solution then goes through a regenerator to produce a lean amine mixture and an associated waste stream which is flared and is of a minimal volume owing to the fact that the gas is very sweet in general and not sour. Mercury removal is also a precaution and happens in the process to protect downstream equipment. The mercury removal is a regenerative adsorption process which will require specialist waste removal offsite once the beds become saturated and the waste will be disposed of at a suitably registered waste disposal facility. The gas extraction and processing are discussed further in Section 4.3.2.2 below.

4.3.2.2 GAS PRODUCTION METHOD

Gas production encompasses the exploration drilling for viable gas resources with specific focus on existing geological fractures followed by the extraction of gas through production wells. From the production wells, a gas gathering network of pipes, booster stations, metering stations, pigging stations and compressor stations transports the gas to the LNG/LHe Plant where gas processing, storage and distribution is undertaken.

Gas production is accomplished by extracting gas occurring in fractures, fissures and/or faults within the Ventersdorp and Witwatersrand supergroups located at depths of between approximately 380 to 880 meters (m). Construction of the gas gathering pipelines for Cluster 1 is completed and the LNG/LHe processing facility was recently commissioned and going operational now. Cluster 1 is therefore well on the way to producing up to 50 tons of LNG and 375 kg of LHe per day. Cluster 2 of the project aims to expand upon Cluster 1 production by increasing natural gas production. This is achieved through the expansion of the gas gathering infrastructure and the production capacities. The project consists of two components namely, (1) gas gathering and (2) the LNG/LHe processing plant. The targeted total feed gas flow from Cluster 2 production wells is estimated at ~45 million-standard cubic feet per day (MMSCFD) by 2026 and the aim is to produce gas at this volume for up to 20 years.

The gas is to be collected from a group of wells located in the well transects shown in Figure 7 and transported to a single feed point whereafter it is piped to the processing plant (LNG/LHe plant). Each group of ~10-12 gas production wells will feed into a common booster station. From the ~28 booster stations the gas will be fed into a gas transmission pipeline (trunkline) towards a compressor station. The compressor stations' outlets will then be combined through a trunkline into the single tie-in feed point within the proximity of the Plant.

[3] Barg: a unit of gauge pressure, i.e. pressure in bars above ambient or atmospheric pressure.

The Cluster 2 project entails a total of ~ 300 production wells which, when combined, will produce a total of ~45 MMSCFD[4]. The wells will be located within the identified zones with the number of wells informed by the total gas requirements and expected well gas capacity. The current plan is to drill vertical or incline wells ~300m apart along the fault lines and within the identified and assessed well transect areas.

The Cluster 2 gas field will have 3 x ~15MMSCFD zones each with one compressor station. Approximately 10-12 production wells will be grouped and will be routed to a common booster station and thereafter feed to a compressor station. Power to the booster stations will be provided from nearby existing Eskom power sources or alternatively a gas engine.

The gas gathering network will comprise primarily of High-Density Polyethylene (HDPE) pipelines buried at least 1.5 m below plough level (or adjusted in consultation with landowners) in order to ensure minimal disruption to existing agricultural activities. Sensitive environmental features, land-uses and infrastructure will be avoided as far as practically possible. However, it is practically impossible to avoid all sensitive features (including tar road crossings and river crossings). In the case where the pipeline will cross dirt roads an open cut trench technique will be used with suitable reinstatement of the road thereafter. To ensure that the integrity of tar roads is not compromised, horizontal directional drilling (HDD) will be used to lay the pipe underneath the road. Similarly, HDD will be used for perennial river crossings to lay the pipeline approximately 6m underneath the riverbeds. Non-perennial stream crossings will utilise opencut methodology during the dry season with suitable reinstatement and rehabilitation of the river bed.

4.3.2.2.1 EXPLORATION DRILLING

Exploration wells will be drilled and, if successful, converted into production wells. As the exact location of exploration well drilling cannot be identified at this stage, this study has followed the approach of assessing well corridors (600 m wide or 300 m on either side of known target fractures, fissures and/or faults). Exploration drilling entails the use of a truck, trailer or skid mounted drill rig to drill to varying depths (~380 m to ~880 m) along known fault lines to strike the gas reserve. Although uncommon, blowout or blowback of water and/or gas is prevented using a blowout diverter which is installed in the drill line (on surface) and the blowout diverter valves safely redirect any water and/or gas to a discharge line for safe disposal. In addition, firefighting equipment and personnel are present during the drilling operation.

Exploration drilling typically requires temporary clearance of an area of 50 m x 50 m in order to set up the rig and begin drilling activities. All exploration boreholes must be drilled and cased in accordance with applicable international standards and best practice guidelines[5], and will be sealed with a combination of casing and grouting to ensure vertical isolation of the gas and/or any deep saline water from both the surrounding geology and freshwater hydrological regime. In addition to the drill rig, lined sumps will be required to store and recirculate water for the drilling process. A maximum of 6000 litres of water per day per well is required for drilling purposes and will be sourced from the municipality and not from the surrounding environment.

In the event that an exploration borehole proves unsuccessful (i.e. no viable gas) it will be concrete sealed and cased when the depth of the boreholes intersected deeper saline aquifers and/or gas as specified in the well closure and rehabilitation guideline (refer to Appendix 4) and the area rehabilitated to pre-drilling conditions. In the event that an exploration borehole proves successful (i.e. sufficient gas flow) it will be converted into a production well (as described below) and added to the network of gas producing wells for Cluster 2. The drilling of exploration boreholes is a temporary and short-lived activity and the equipment to be used during drilling activities includes a truck/trailer or skid mounted drill rig, excavator, dozer, grader water cart, light motor vehicle for transport of personnel and chemical toilets.

4.3.2.2.2 WELL SITE CONNECTION

All wells that are drilled and used for production purposes are strengthened with a combination of casing and grouting to average depths of 300 m, depending on the different flow zones intersected, to prevent any interplay

[4] To contextualize this volume of gas, if all of the ~45 MMSCFD gas was converted to electricity in the highest efficiency generator station, it would produce about 270 MW.

[5] Internationally accepted best practice should be applied and reference should be made to the relevant British Oil and Gas and/or the API guidelines and standards.

between deep and shallow aquifers. The casing and grouting ensure that the gas is isolated from surrounding geology and promotes the preferential flow of gas from the formation through the well and up to the surface. As the gas is naturally lighter than air, it rises naturally to the surface and no well stimulation is required. The combination of casing and grouting also serves to ensure that gas is isolated and prevented from interacting with the geohydrological regime. This means that water from the deeper saline aquifer cannot migrate into the shallower freshwater aquifer and similarly gas cannot contaminate the shallow groundwater. The production well flange and well head will be located within the concrete well chamber which will be below ground.

Due to low gas pressures in the wells, groups of ~10-12 wells will be included as an inlet to a booster station to provide vacuum suction. The booster stations will be connected via ~480 km of pipelines to centralised infield reciprocating gas compressor stations. Pipelines will consist of high-pressure steel or low-pressure high-density polyethylene (HDPE) depending on site conditions and installed at a minimum depth of 1.5 m below surface level (1.5m to top of pipe). The pipeline will be installed using a back-actor and TLB in most areas with horizontal directional drilling in areas where roads, flowing rivers or other constraints require this method. Servitude corridors (10 m wide) will be maintained free of woody plants to prevent disturbance of the pipeline by root growth and ensure access by Tetra4 personnel for regular inspection and infrequent maintenance. Pipelines will be marked with concrete markers (Figure 8) and adhere to ASME B31.8 (Section 851.7) and will have low point drains at strategic locations for testing and pipeline maintenance.

Figure 8: Typical pipeline servitude and pipe marker.

Production wells will be placed within a secured precast well chamber with manhole for access. Minimal mechanical infrastructure will be placed within the precast well chamber other than the wellhead, connecting pipeline, an isolation valve and sample point. The surface infrastructure for the manhole would be 1,4 m x 1,1 m and the manhole surface height will be 0,25 m. Where production wells are located within agricultural crop areas, the surface manholes will be moved outside of the crop areas to reduce impacts on farming in the long term the surface manholes will be located on the boundaries of the crop areas in consultation with the respective landowners. This will be accomplished by connecting a horizontal subterranean pipeline to the production well. Figure 14 shows the typical designs of a precast well chamber.

4.3.2.2.3 GAS INLINE STATIONS

In order to transport gas via pipelines from the wellheads to the Plant, various inline infrastructure is required to monitor, measure and control gas flow through the pipelines and this includes booster stations, pigging stations and compressor stations. Localised inline gas booster stations will be installed for each cluster of 7-10 wells which will feed pressurised gas via pipelines from the production wells to the compressor stations. The booster stations will occupy an area of 10 m x 14 m (Figure 15) and a total of 28 booster stations are expected to be constructed.

Inline pigging stations (Figure 9) are installed near river crossings to allow for regular cleaning and inspection of the pipelines. The pigging stations allow for insertion of probes or cleaning pigs (plugs) in order to perform regular maintenance. There are approximately 4 major river crossings but with multiple pipe branches. In total there should be approximately 14 pig launcher/receiver pairs. Pigging stations occupy an area of approximately 5 m x 5 m (~25 m^2) each.

Low Point Drains (Figure 10) are installed along the pipeline to allow periodic maintenance of the pipeline whereby any condensate is able to be removed from the pipeline where the pipeline has a low point (gravity collection of condensates). Approximately 240 low point drains may be installed, and each occupies an area of ~1.5 m^2.

Figure 9: View of an existing pigging station constructed as part of Cluster 1.

Figure 10: View of an existing low point drain constructed as part of Cluster 1.

Raw gas received at the compressor stations will be filtered to remove dust and moisture using a combination of a water filter and an activated carbon filter that absorbs dust and unwanted organic compounds. Once filtered, the gas from the compressors will be dried to 7 pounds per MMSCF adjacent to the compressor stations, and then piped for final processing to the LNG/LHe Plant. The footprint for a compressor station including the gas drier station will be approximately 60 m x 60 m (Figure 11 and Figure 16).

Figure 11: Example of Compressor Station just recently constructed as part of Cluster 1.

4.3.2.2.4 COMBINED HELIUM AND LIQUID NATURAL GAS PLANT

Feed gas from the centralised reciprocating infield compressor stations will be discharged into the combined LNG/LHe Plant. The LNG/LHe facility is a modularized facility to convert the Feed Gas into LNG and LHe which will be stored onsite before being transported by road tankers to offtake suppliers.

The Cluster 2 LNG/LHe Plant will be constructed directly adjacent to the Cluster 1 plant which is currently under construction on the remaining extent of the farm Mond Van Doornrivier 38. A Major Hazardous Installation (MHI) study shall inform the relevant safety measures to be implemented at the facility.

The LNG/LHe plant comprises of the following process units:

- Gas Treatment and Boosting System;
- Helium Separation Unit;
- Gas Liquefaction System;
- LHe Storage (~2x100 m^3);
- LNG Storage (~11x300 m^3); and
- LHe and LNG road tanker loading bays.

The area occupied by the Cluster 2 LNG/LHe plant in the operational phase is ~9 hectares while additional areas would be cleared during the construction phase for various contractor laydown areas, offices, parking, waste storage, etc. Rehabilitation of the temporary construction camp and laydown areas (~15.8 hectares) must commence within 1 month after site de-establishment and adequate rehabilitation be achieved within 1 year thereafter to prevent dust and erosion. A breakdown of the approximate area to be occupied by the LNG/LHe Plant and temporary laydown areas is shown in Table 2 below and an overview provided in Figure 12.

Table 2: Approximate LNG/LHe Plant and laydown area.

Aspect	Total Ha	Total Ha
LNG/LHe Plant Cluster 2 (Permanent)	~9.6	~25.4
Laydown areas for drilling contractors, gas gathering contractors, plant contractors, parking, offices, etc. (Temporary)	~15.8	

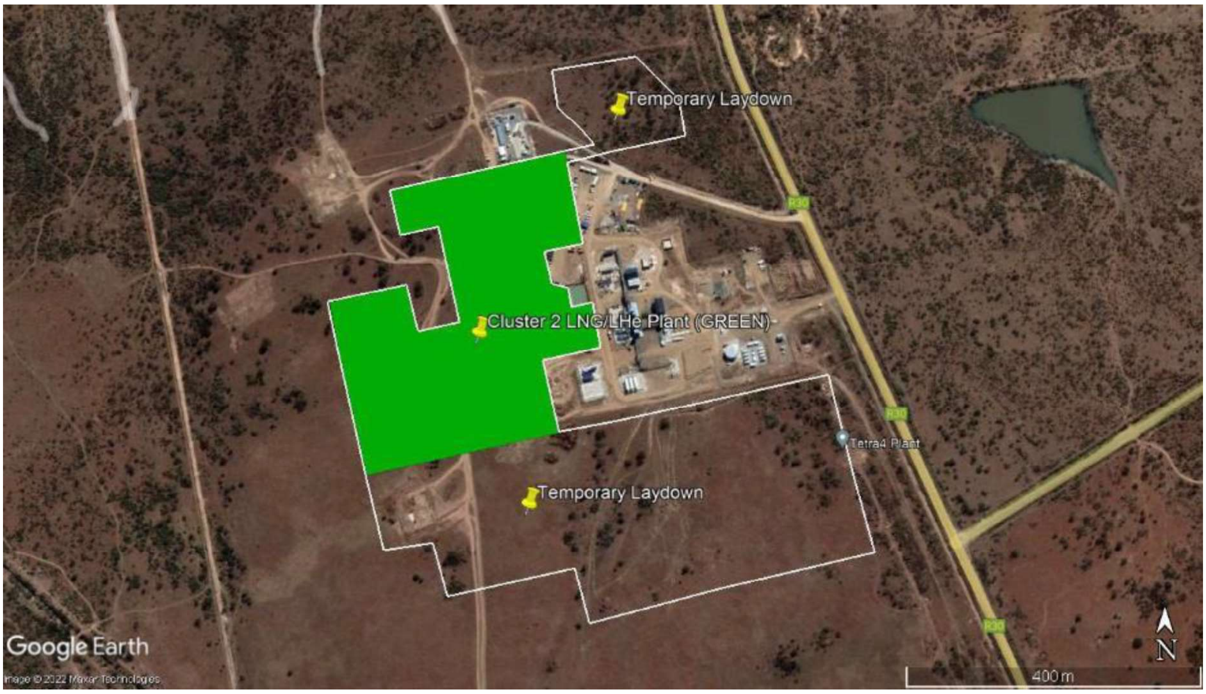


Figure 12: Area to be impacted by the LNG/LHe Plant (green filled area) and laydown areas (clear white outline).

The plant will include a small sewage treatment works as well as stormwater infrastructure to separate clean and dirty water. Clean water will be diverted into the environment while dirty water will be diverted into an evaporation pond of approximately 1005 m^3. Treated effluent from the sewage treatment plant will also be directed to the evaporation pond from where water will be pumped into a reverse osmosis plant and then stored in the fire water and service water tanks for reuse. The fire water and service water tanks are linked and therefore, recirculating to service water tank is taken off for use in the system. The fire water tank is maintained at a minimum level to ensure fire water availability. No discharge of polluted water will take place and all waste products from the sewage treatment works (sludge) and the reverse osmosis plant will be collected by a registered waste contractor for offsite disposal at a suitably licenced facility.

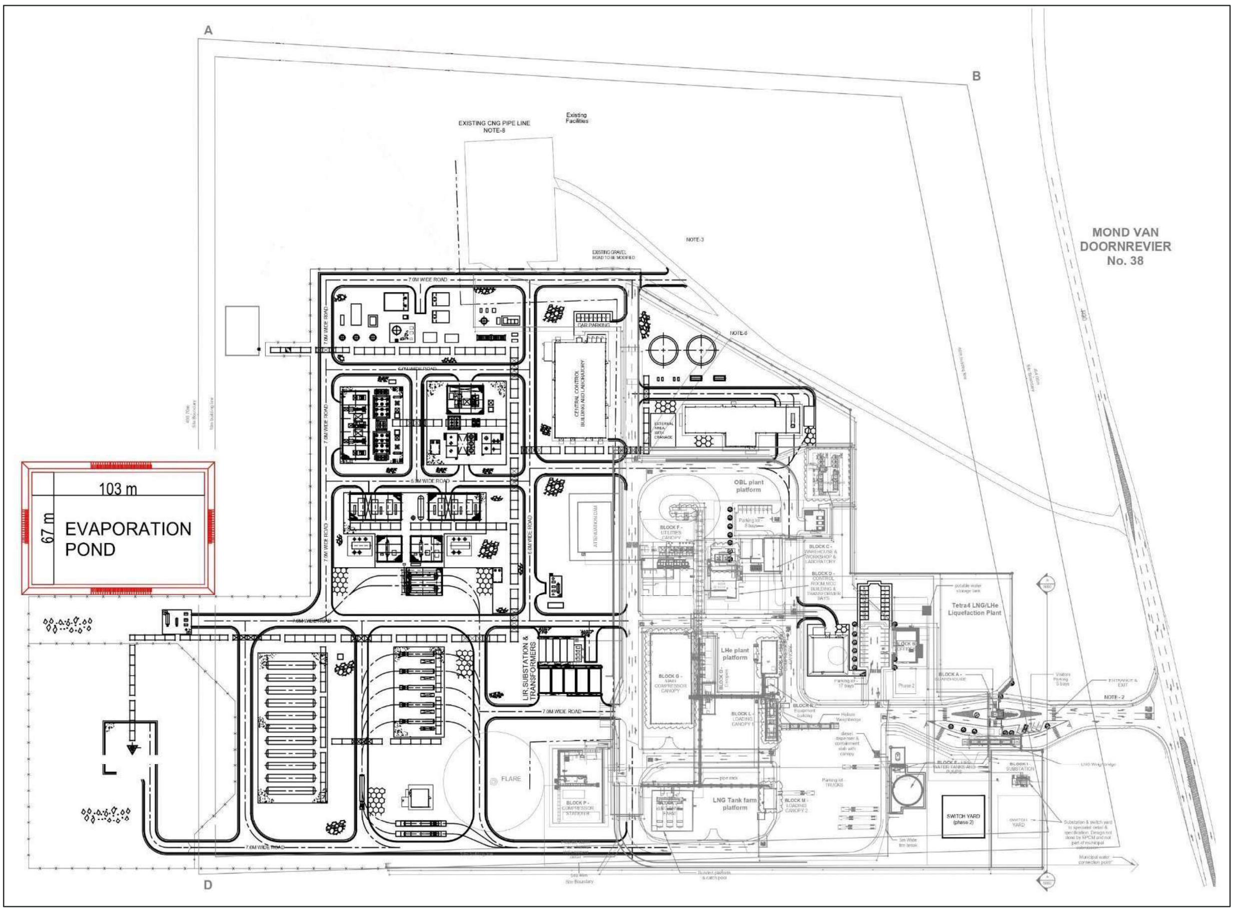


Figure 13: Preliminary layout of the Cluster 2 Plant extension to Cluster 1 Plant

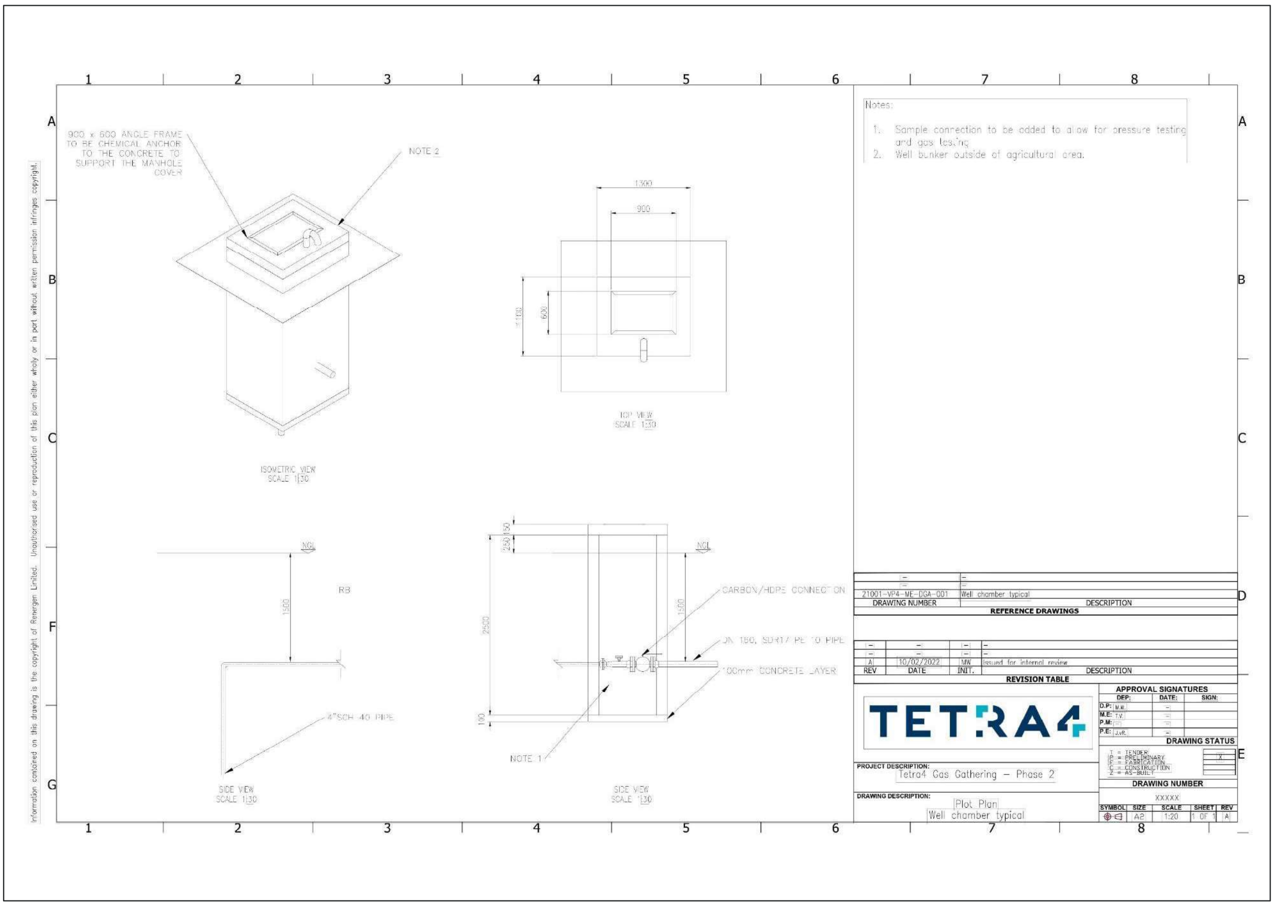


Figure 14: Typical subterranean precast well chamber layout

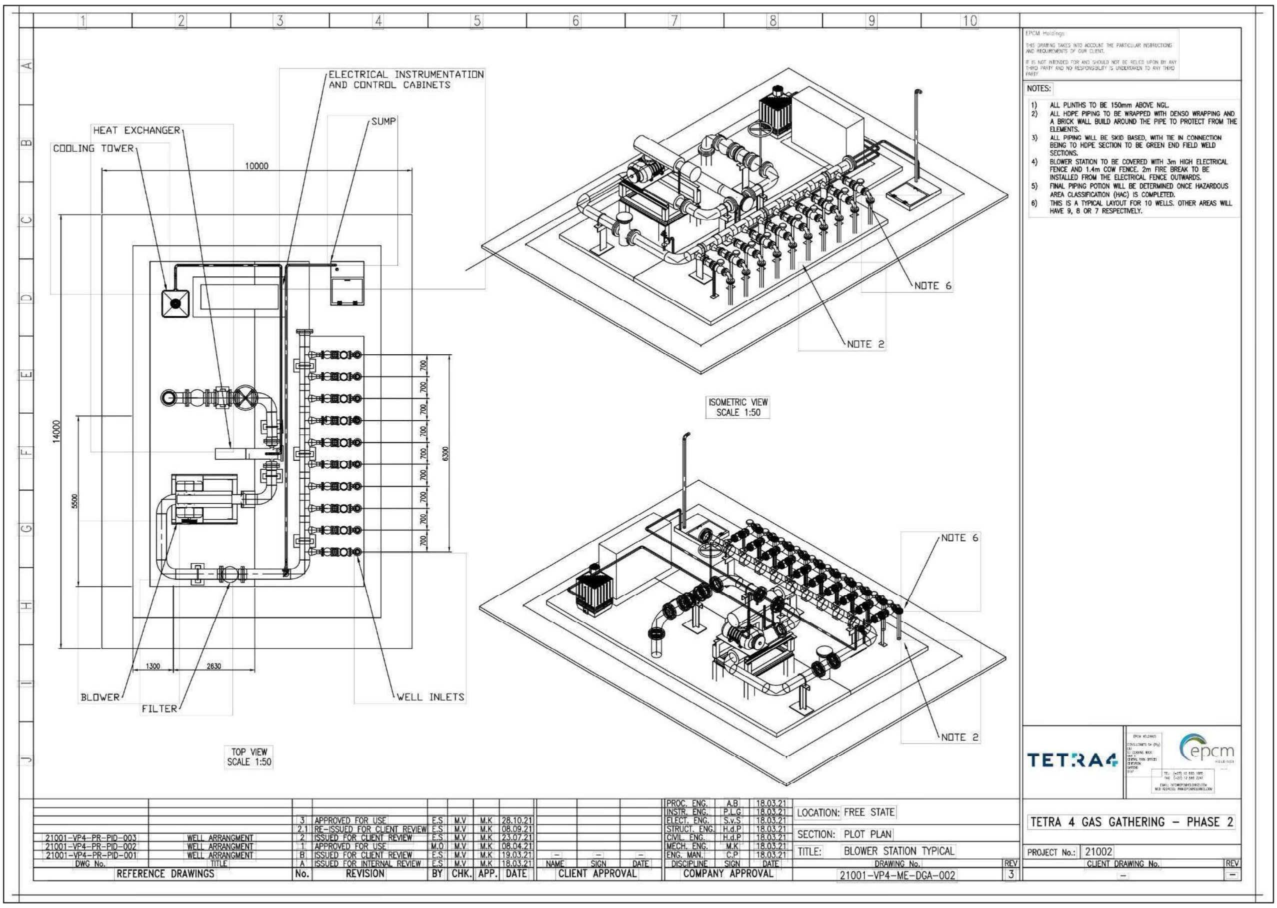


Figure 15: Typical booster station layout

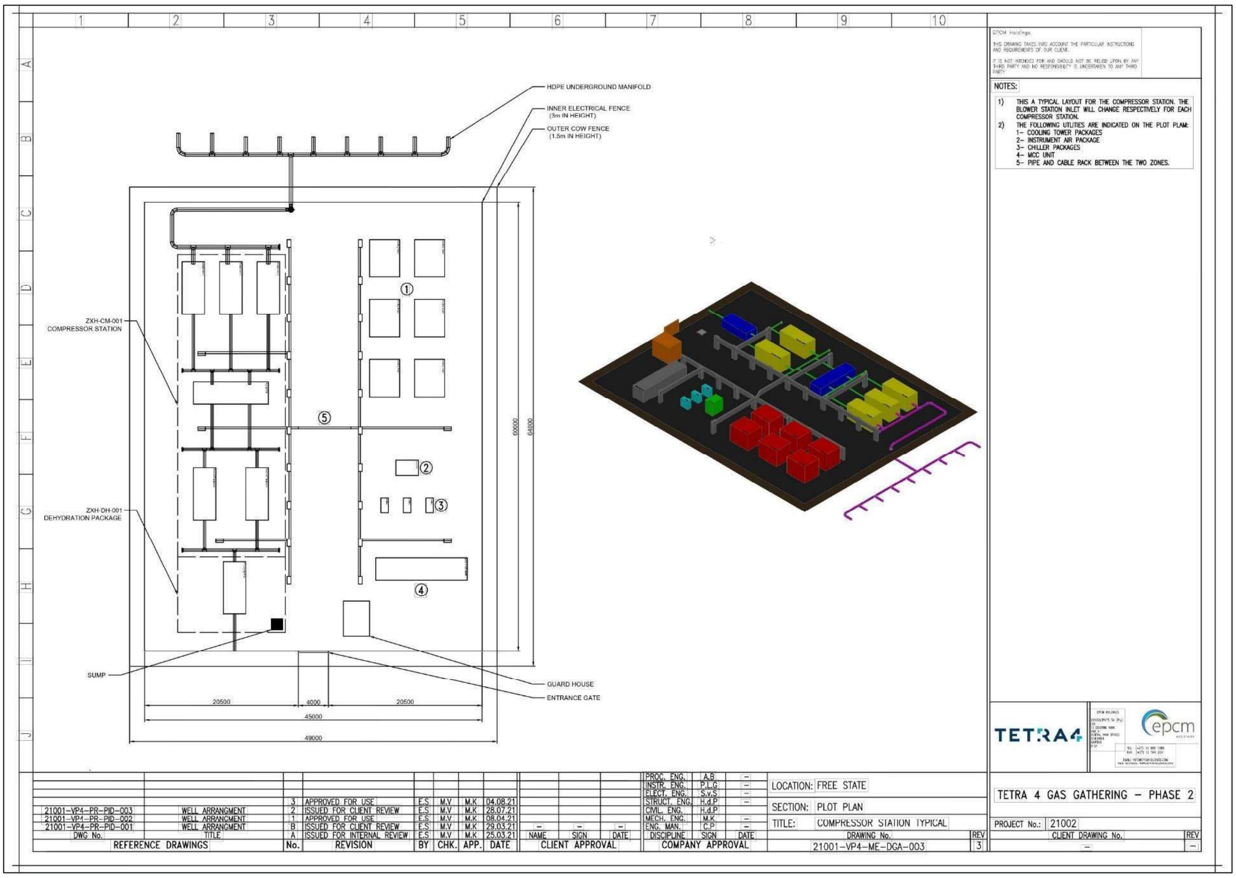


Figure 16: Typical compressor station layout

4.3.2.3 SURFACE INFRASTRUCTURE

The Cluster 2 project expansion requires various surface infrastructure as listed below:

- Access roads (temporary / permanent);
- Pipelines and powerlines;
- Coalescer filter or knockout drum at each booster station;
- Pipe markers (approximately every 100 m of the pipeline, where feasible);
- Wellheads;
- Booster pumps (where required);
- Inline booster compressors or infield reciprocating compressors;
- Gas driers;
- Security Fencing (booster stations, compressor stations and LNG/LHe Plant infrastructure);
- Combined helium and LNG plant;
- LNG/LHe storage and dispensing units;
- Chemical storage;
- Temporary hazardous waste storage (including but not limited to waste water recirculation at drill sites and waste containing hydrocarbons such as used oil and filters, diesel, lubricants, grease, etc.);
- Temporary general waste storage;
- Contractors' laydown areas around the LNG/LHe Plant area; and
- Permanent offices, storage areas and workshops.

In broad summary, infrastructure required for the Cluster 2 gas field development is split between:

- Gas Gathering Network: infrastructure required for gas extraction and transport at well sites (including compressor stations); and
- Gas Processing: infrastructure required for gas processing and transport of final product.

4.3.2.4 CONTRACTORS' LAYDOWN AREAS, OFFICES AND ABLUTION FACILITY

As the gas gathering network is spread over an extensive area, the contractor's laydown areas and offices will be centrally located adjacent to the LNG/LHe Plant. During peak construction, there will be approximately 1000 temporary workers and temporary ablution facilities will be provided. Thereafter approximately 55 operational employees will be catered for at the LNG/LHe plant area and ablution facilities connected to a sewage treatment works will be provided. The laydown areas, offices and ablutions facility will be temporary whereby the offices will serve as the base of operations for coordinating the operation and the ablution facilities will serve as a change room and ablution facility for employees while on site. Construction materials such as aggregate and concrete will be sourced from licenced suppliers and delivered to site as and when required.

No overnight accommodation of employees (except for security personnel) will be permitted at the Plant and other site areas during the construction phase. Normal construction working hours will be limited between ~6 am and ~6 pm (sunrise to sunset) from Monday to Saturday while the working hours for the commissioning phase of the LNG/LHe Plant and compressor stations may extend into the evening periods and on Sundays but will be of short duration. The operational phase will be a 24 hour operation, 7 days a week.

4.3.2.5 SITE ACCESS CONTROL

Access to the individual well sites, compressor stations, and combined helium and LNG plant will be controlled through a single entrance and exit point at each site. Well sites will be accessed via existing access roads (as far as possible) and the plant via the existing security-controlled access road leading off the R30. All booster stations, compressor stations, and the combined LNG/LHe plant will be fenced off with 1.8 m high razor diamond mesh fencing or an equivalent product. All visitors to the sites will be required to sign in at the security check point located at the entrance gates. All employees will be required to retain proof of identification whilst on site.

4.3.2.6 ROADS

Access to the LNG/LHe Plant will be via the R30, a surfaced two-lane provincial road which links to the R73 and the town of Virginia. The access off the R30 is currently being upgraded to ensure safe entry with the installation of slip lanes.

Exploration and production wells will be accessed via existing access roads where possible. Some existing gravel roads may require temporary widening or reinforcement for larger construction vehicles such as drill rigs. Where there is no existing access to exploration wells, temporary gravel access will be constructed and if required, a suitable surface reinforcing will be temporarily installed to prevent damage to the environment (e.g. stone compacted layer). Any temporary access roads will be rehabilitated following completion of the construction activities requiring those temporary roads.

Production well sites will require permanent light delivery vehicle (LDV) access for security and maintenance purposes and where no existing roads occur, permanent single lane access will be constructed. Where existing or new access roads traverse drainage lines or streams, culverts will be installed and any necessary authorisations for such road crossings will be obtained prior to commencement.

4.3.2.7 POWER SUPPLY

The compressor stations will require a medium voltage substation connection from existing Municipal/Eskom lines (11 kV / 33 kV switchboard to a 400 V switchboard). The booster stations will require 220 V (low voltage) and will be powered by either solar PV, LNG generator or municipal pole mounted transformers.

4.3.2.8 WATER MANAGEMENT

Water management for the Cluster 2 Project refers to the water requirements for exploration and limited amounts for production activities, as well as the management of waste water such as condensate and formation water.

4.3.2.8.1 WATER REQUIREMENTS

Water for construction, drilling, Plant operation, drinking and domestic purposes will be sourced from existing municipal supply which is piped into the Cluster 1 plant service water tank.

4.3.2.8.2 WASTE WATER

Waste water from the Cluster 2 Project will consist of either condensate (waste water from condensation out of the gas) or very rarely, formation water (a natural layer of water inside gas reservoirs). The amount of waste water to be produced during the Cluster 2 gas drilling, production and processing activity is as per the schematic diagram in Figure 19 below. The condensate and any formation water encountered will be disposed of as per the legislative requirements which includes disposal by a licensed contractor at a suitably registered waste disposal facility.

A Storm Water Management Plan (SWMP) for the plant area will be developed which will ensure separation of clean and dirty water. Clean water will be diverted back into the environment in a controlled manner, while dirty water will be collected and stored within an evaporation pond for treatment and reuse. Waste water management within the LNG/LHe Plant will include:

- A small sewage water treatment works (SWTW) to pre-treat the site domestic wastewater before it enters the main Reverse Osmosis Water Treatment Works (RO-WTW).
- A RO-WTW to treat all wastewater at the LNG/Helium Plant site with reuse of treated water (no discharge to environment).

The wastewater from the Plant (rainfall, process water, condensate, formation water, etc) will be stored in an evaporation pond (Figure 13) before being treated. Treated water will be stored in the Service/Firewater Tank for recirculation in the plant operations. Small volumes of brine from the 2 X WTW's will be collected by a service provider for offsite disposal.

The SWTW can store a maximum of 45 m^3 of wastewater (i.e. pre-treated) and a maximum of 36 m^3 of treated water at any one time. The SWTW can treat a maximum of 30 m^3 on any given day as per design flow with normal operation only 20 m^3 per day. A schematic representation of the SWTW is shown in Figure 17.

The main RO-WTW will have a 5 m^3 feed tank which will be supplied with effluent from the evaporation pond (1005 m^3). The brine/concentrate tank will be 100 litres while the product tank will be 5m^3. Recovered effluent/service water will be pumped from the product tank to the Service/Fire water storage tank (clean water capacity 1407 m^3). The feed tank, product tank and concentrate tank will be JoJo (Roto) tanks. The service/fire water tank will be a steel reservoir. A schematic representation of the RO-WTW is shown in Figure 18.

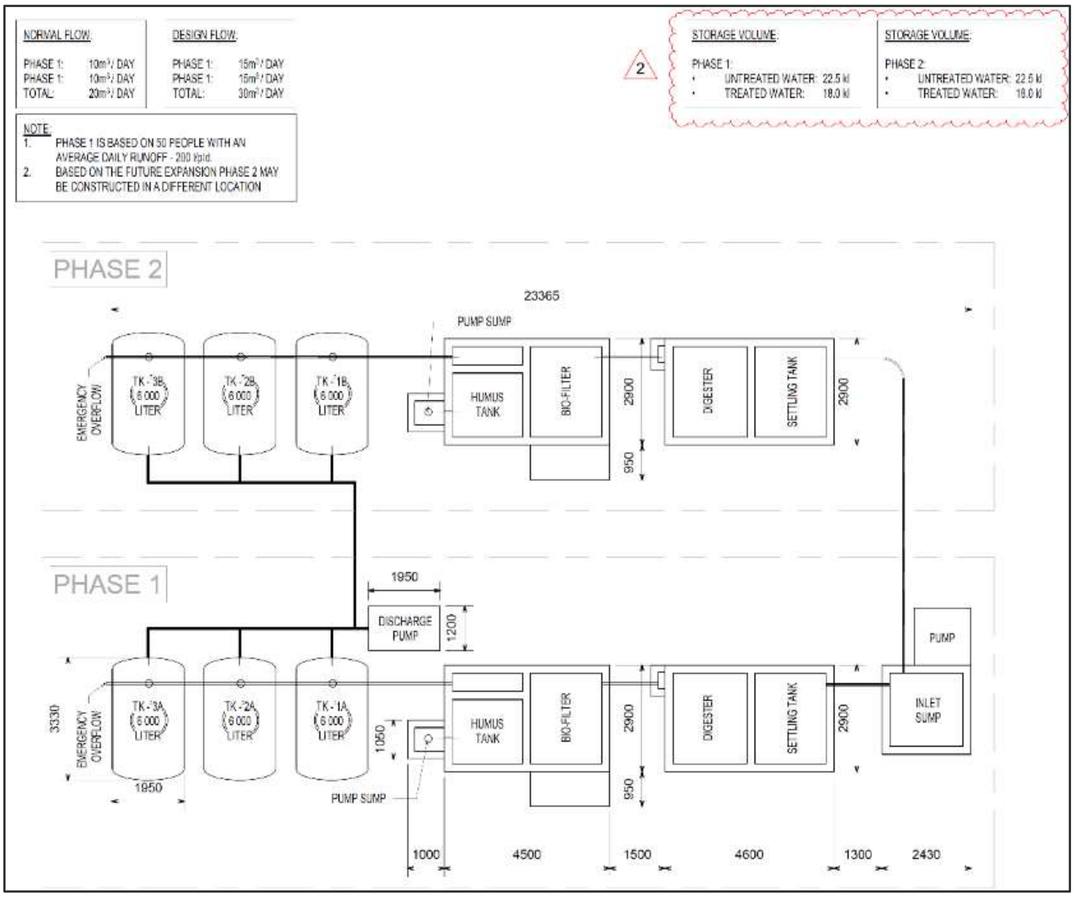
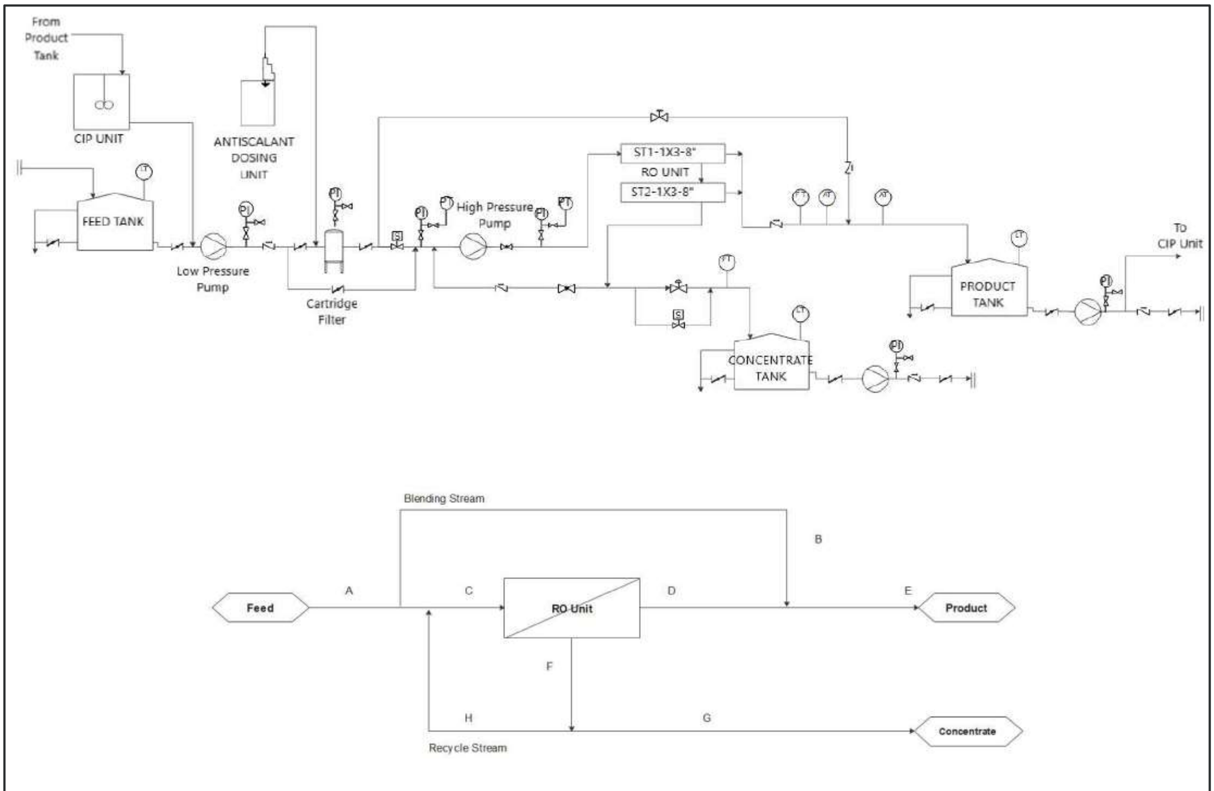
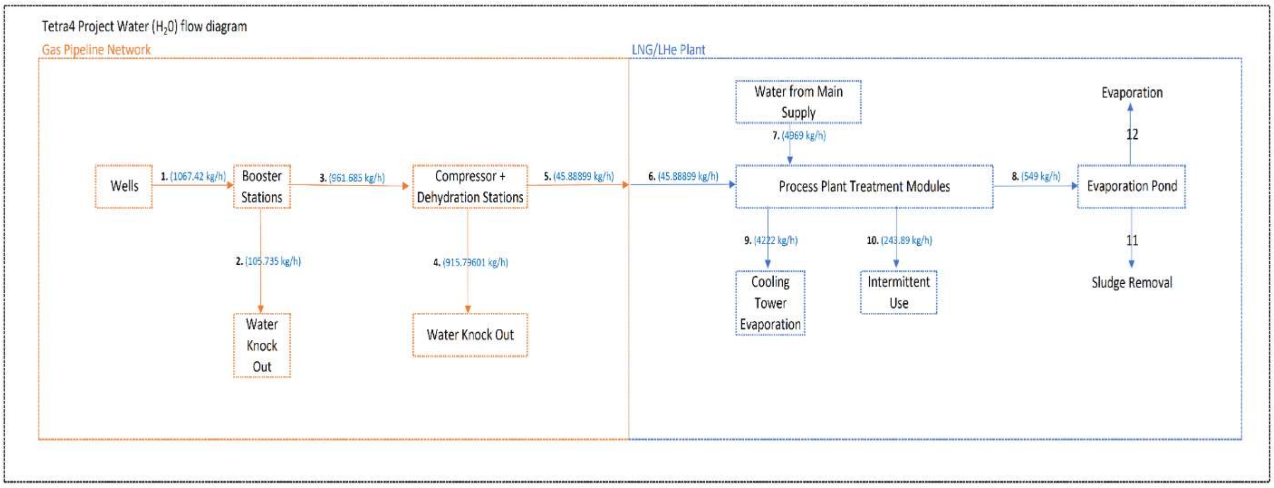


Figure 17: Typical schematic of the Cluster 2 sewage water treatment works.



Parameter	UOM	A	B	C	D	E	F	G	H
Flow	m3/h	5,7	0,5	7,1	3,5	4	3,6	1,7	1,9

Figure 18: Typical schematic of the Cluster 2 reverse osmosis treatment works.



Process Stream	Flow (H2O)	Description
1	1 067 kg/h	Natural flow from the wellhead. This is an estimation based on historic information and fluctuates per well. However, for the purposes of the water balance an average is used.
2	106 kg/h	Booster station features two potential knock-out points: 1) inlet filter and 2) blower unit and associated heat exchanger. The expected knock-out comes primarily from the blower unit.
3	962 kg/h	Combined flow from the 10 blower stations per compressor station.
4	916 kg/h	Compressor station features dehydration package designed to remove majority of water content in the stream.
5	46 kg/h	Feed gas to process plant.
6	46 kg/h	Feed gas to process plant.
7	4 969 kg/h	Service water and potable water are self-produced inside the Plant from water imported. Continuous Service Water consumption is for cooling water system make-up.
8	549 kg/h	Flowrate to be defined based on final plot plan during detailed design. Oily Water flowrate estimated assuming 25,4 mm as first flush. Water sent to evaporation pond in 24 h.
9	4 222 kg/h	Evaporated Cooling Water from Cooling Towers
10	244 kg/h	Potable water discontinuous consumption is 292 l/h to buildings and 13600 l/h to eye washes and safety showers. Assume average consumption with balance of water.

Figure 19: Water balance showing the potential amount of waste water produced during gas production and processing.

4.3.2.9 WASTE MANAGEMENT

The design philosophies for waste management are based on applicable legislation, in particular NEMWA, DWAF (DWS) best practice guidelines, and currently accepted good industry practice for waste management. Principles of waste minimisation at source, segregation for reuse, recycling and treatment or disposal will be applied to the handling of waste, wherever possible. The waste (general and hazardous) generated during construction and operations will be addressed as detailed below.

4.3.2.9.1 GENERAL WASTE

The following types of general waste (produced mainly during construction, with minimal amounts post construction/ operation) will be generated by the Cluster 2 Project:

- Domestic solid waste;
- Scrap metal; and
- Construction waste.

The Cluster 2 Project will utilise a temporary general waste storage facility and all waste will be collected by an approved, licenced waste contractor for removal and final disposal at a registered general waste disposal facility. No new landfills will be directly established by the project within the project boundaries.

4.3.2.9.2 HAZARDOUS WASTE

Hazardous waste, including but not limited to hydrocarbon containing waste (used oil and filters, diesel, lubricants, and grease) will be stored in clearly marked skip bins (solids) and containers (liquids). These skip bins/ containers will be placed in an isolated area on a hard, impervious surface. When full, the bins/ containers will be collected by a contractor for safe disposal or recycling companies which will be appointed to collect waste. A waste disposal certificate will be required from the contractor to ensure safe disposal.

Drilling waste will consist of wastewater and drilling mud which will not be stored more than 90 days on site. This waste will be stored in lined sumps adjacent to the drill rig and once drilling is completed, the waste will be removed from site and adequately disposed of at an appropriately licenced waste disposal facility.

Condensate (including effluent from the filters and drop out water) removed from gas processing at the various stations described previously will also be stored in clearly marked containers (should it not be within DWS livestock watering and irrigation standards) for final disposal offsite at a registered hazardous waste disposal facility by a licensed contractor.

Mercury and other trace metals are absorbed by the membranes and guard beds equipped at the plant which are designed to last for approximately 10 years before requiring replacement. These membranes and waste guard beds will be collected by a licenced contractor for safe disposal at a registered hazardous waste disposal site. Records of all final waste disposal certificates will be kept.

Other liquid waste such as sewage and domestic waste water will be generated and will be treated onsite at the plant area in the sewage treatment plant. The effluent from the sewage treatment plant will be directed to the evaporation pond from where waste water will be treated in a reverse osmosis treatment system for reuse within the plan operations.

4.3.2.10 CLUSTER 2 PROJECT SCHEDULING

The Cluster 2 project will comprise of two components namely the gas gathering network and the LNG/LHe Plant. The full field well development will comprise 3 phases/groups of wells during which exploration and drilling will be undertaken. The first phase will target ~15 MMSCFD of gas followed by the second phase of ~30 MMSCFD and finally the third phase of ~45 MMSCFD. The construction of the gas gathering network (including pipelines, booster and compressor stations, etc) will commence in ~May 2023 and be completed by ~October 2025 or as the production well development progresses. Construction of the LNG/LHe plant and associated infrastructure will commence in ~March 2023 and be completed by ~February 2026. The operational (gas production) timeframe for the project is approximately 20 years (~2026 to ~ 2046).

4.4 DETAILS OF THE EAP

In terms of Regulation 13 of the EIA Regulations (GNR 982) as amended, an independent EAP, must be appointed by the applicant to manage an EIA application and prepare the associated EMPr. EIMS and the compiler of this report are compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Considers all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

The details of the EIMS consultant (EAP) who compiled this Report are as follows:

Table 3: EAP Details.

Name	**Brian Whitfield**
Tel No:	+27 11 789 7170
Fax No:	+27 86 571 9047
Professional Registrations:	• Professional Natural Scientist with the South African Council for Natural Scientific Professions - SACNASP (400447/13). • Registered EAP with the Environmental Assessment Practitioners Association of South Africa - EAPASA (2022/4496).

Brian is a senior project manager at EIMS and has 18 years of experience in environmental consulting. He holds a BSc (Botany and Zoology) and a BSc Honours degree in Botany from the University of the Witwatersrand. Brian's broad range of experience includes managing and/or undertaking projects in various sectors, including Energy, Mining, Oil and Gas, Water and Infrastructure. He is conversant with the South African environmental legislation as well as sustainability auditing, including Equator Principles, IFC Performance Standards and World Bank EHS guidelines. Brian's other experience includes Site Assessments, Water-use licensing, Environmental Monitoring and Auditing, Due Diligence Assessments, Competent Persons Reporting, Environmental Management Plans and Strategic Environmental Assessments. The Curriculum Vitae of the EAP included in Appendix 2.

4.5 ENVIRONMENTAL SENSITIVITY MAPS

The sensitivity/constraint map will form an integral part of proactive mitigation of impacts during the planning and design phase of the ongoing Production Operations extending across the entire Production Right area. The sensitivity maps will guide development by the applicant for the total full field development over the Life of Production, by restricting the impact footprint in certain areas deemed as sensitive. Areas that are not sensitive will be covered through this general EMPr, while areas that would fall into the medium, high and very high sensitivity would require site-specific EMPr's and mitigation measures, of which Cluster 1 and Cluster 2 study areas represent the site-specific/cluster specific EMPr. This would allow for a strategic approach to be adopted where additional mitigation measure are introduced to mitigate impacts in sensitive areas, while also providing the applicant with an indication of potential environmental issues to be expected in the sensitive geographical locations. Please refer to Appendix 3 for the Sensitivity Map/s.

As the production phase continues to expand the number of wells, the sensitivity approach would continually guide development and mitigation through identifying areas that require a site-specific EMPr (i.e. areas that are not sensitive and/or areas that fall within any of the existing site-specific EMPr's). Exploration and Production activities within sensitive areas which have already been included in a site-specific EMPr, but were not specifically identified (e.g. new boreholes, pipelines, etc) will require a site-specific pre-commencement assessment before a new activity commences. Before a new activity is constructed its location will be identified on the sensitivity map and this will inform Tetra4 on whether a site-specific EMPr or pre-commencement assessment will be required. Should a pre-commencement assessment by the EO identify any potential sensitivities that the EO is not suitably qualified or experienced in, specialist input must be obtained to mitigate potential impacts for that specific site. Any new project activities which fall within an area designated as medium or high sensitivity will be subject to the requirements of:

1. A site-specific EMPr and authorisation application (refer to Figure 20) where no EA exists, or
2. A pre-commencement assessment if the cluster already conducted the site-specific EMPr and was issued an EA.

The intention will be that as the Production Activities expand on a spatial and temporal scale that this EMPr will be supplemented as is required with separate site-specific EMPr's (similarly to what has been done for Cluster 1) and pre-commencement assessments to guide EMPr implementation on site.

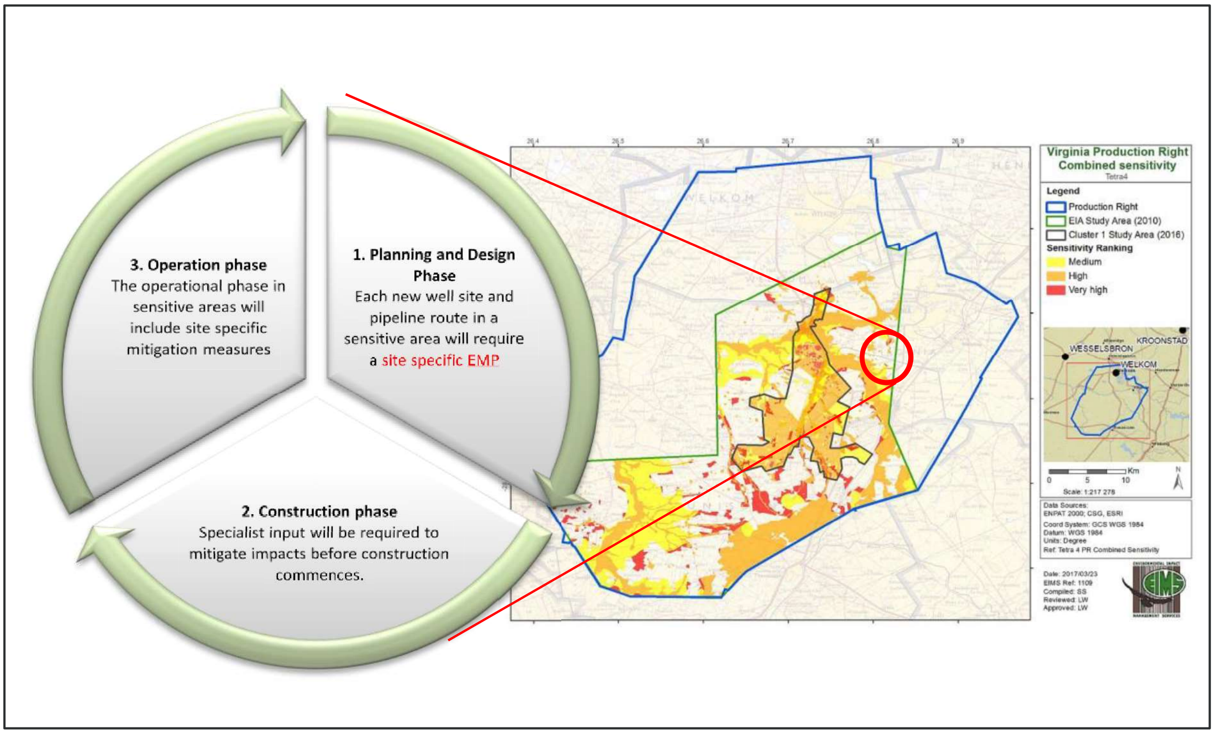


Figure 20: Sensitivity Implementation Cycle for the Production Application

A composite environmental sensitivity map for a large portion of the Production Right area was prepared in support of the application for Production Right in 2010. This PR sensitivity map originated as a result of the original EIA process and specialist studies (primarily desktop). Subsequent to the issuance of the Production Right, and as a consequence of the requirements of the original PR EMPr, the environmental sensitivity maps have, where relevant, been refined to account for the site-specific production activities for both Cluster 1 and Cluster 2. As noted in Section 4.1, the intention of the EMPr is to account for the lack of detail regarding the extent and nature of the proposed full field Production Activities, through a process of supplementing the EMPr as applicable, with individual site-specific assessments for new clusters where production activities and affected properties were not yet authorised and their associated environmental sensitivity.

Refer to Appendix 3 for the Cluster 2 composite sensitivity map (Figure 44) as well as the stand-alone site-specific sensitivities maps. The Production Right, Cluster 1 and Cluster 2 combined sensitivity ranking map is included in Figure 45 of Appendix 3.

4.6 ENVIRONMENTAL MONITORING AND ACTION PLANS

This section provides a more detailed description of the intent, objectives and actions applicable to key environmental aspects associated with the Production.

4.6.1 GROUNDWATER MONITORING

Groundwater monitoring for the project should be undertaken to meet the following objectives:

- To measure the impacts of gas production on groundwater levels and quality;
- To detect short- and long-term water level and quality trends;
- To calculate aquifer parameters, like the rate of recharge and storage coefficients;
- To recognise changes in groundwater characteristics, to enable analysis of their causes and to trigger the appropriate groundwater management response;
- To check the accuracy of predicted impacts;

- To use the information gathered for model calibration and/or verification; and
- To develop adequate practices and procedures for groundwater protection.

The groundwater monitoring programme should include the following activities to ensure consistent results. It should be noted that Tetra4 is already implementing a groundwater monitoring programme for the Cluster 1 area. The procedures implemented as part of the existing monitoring programme must be integrated into groundwater monitoring programme described below:

- Purging is an important aspect of groundwater sampling, which aims to remove stagnant water adjacent to the well screen immediately before sampling. Purging allows for the inflow of water from the adjacent formation that is representative of the aquifer conditions for sampling. Micro-purging is the most practical (less time consuming than normal purging and preventative of collapses in old borehole casings) due to a large amount of water removal). Micro-purging (SANS 5667-11:2015) involves the removal of small volumes of water directly adjacent to the well screen to be sampled using a sampling device which causes minimum disturbance to water in the borehole column, in this case a bladder pump. Micro-purging is carried out until the variation in parameters acquired by the hand-held probe, in a closed system, is stable. Low-flow sampling in a closed system is considered an adequate technique when sampling for dissolved gasses;
- Sampling bottles must be rinsed with the water removed from the borehole to reduce the risk of incidental contamination; and
- Samples should be kept cool after sampling and transported to a laboratory in cooler boxes.

Tetra4 does have an existing monitoring protocol and network in place which was implemented as part of the Cluster 1 operations. It is recommended that additional monitoring boreholes be established down-gradient of the plant expansion footprint to evaluate the expected mass load contribution to environmental and groundwater receptors. Drilling localities for dedicated monitoring boreholes, where required, should be determined by means of a geophysical survey to target lineaments and weathered zones acting as preferred groundwater flow pathways and contaminant transport mechanisms. Table 6 details the updated and revised monitoring network and program, with the updated integrated groundwater monitoring network depicted Figure 21. Privately owned, neighbouring boreholes situated within high impact risk areas have been included into the existing monitoring network whereas all other borehole identified as part of the hydrocensus user survey should be visited and analysed on an annual basis. In the event that monitoring of any gas production well/s indicates gas leaks, casing or cementation failure, the frequency of of monitoring the boreholes within the zone of influence (pollution plume modelling) must be increased to monthly until monitoring results indicate any pollution of groundwater has been adequately restored to baseline levels over a period of at least 6 months.

Baseline and background water quality results should be evaluated to set a site-specific limit per parameter and applied as benchmark for monitoring purposes. Supplementary guidelines i.e., Water Use Licence (WUL) conditions should also be considered as part of the monitoring protocol (if any groundwater monitoring conditions are included in the amended Cluster 2 WUL). All monitoring localities should be subjected to an initial comprehensive water quality analysis to evaluate hydrochemical composition and identify potentially elevated parameters going forward. Chemical variables to form part of the baseline sampling run are listed below:

Based on the boreholes identified during the 2016 and 2022 hydrocensus, the existing monitoring database, the results of the hydrogeology (groundwater) impact assessment and the monitoring requirements discussed above, the following response triggers are recommended.

- The following monitoring response triggers are proposed for the project:
    - The primary proof of connectivity between the deep-seated production zone and the shallow potable Karoo aquifer is water level drawdown and groundwater quality changes;
    - A lowering in groundwater level by more than 10m will trigger a response from Tetra4;
    - An increase in any of the indicator elements by more than 25% from baseline conditions will trigger a response from Tetra4;

- Once a response has been triggered, Tetra4 will launch an investigation and the management response will involve:
  - A check of nearby borehole use;
  - A check of nearby and recent water borehole and gas well drilling activities;
  - A check of climatic conditions and expected trends; and
  - If the outcome of these actions and the Tetra4 monitoring results indicate that the decline in groundwater level and/or in groundwater quality in a private borehole may be as a result of the impacts of Tetra4's activities, Tetra4 will enter into discussions with the affected borehole user to develop the correct course of action.

The routine surface and groundwater monitoring parameters are presented in Table 4 and in addition to these parameters, a handheld Aquaread will be used to analyse for Temperature, Turbidity, ORP, Dissolved Oxygen, pH, EC and Salinity. The routine ground- and surface water sampling must be undertaken on a quarterly basis.

Table 4: Baseline and routine surface and groundwater monitoring parameters.

Metals			
Calcium	Iron	Magnesium	Potassium
Silicon	Sodium	Vanadium	Zinc
Aluminium	Arsenic	Barium	Beryllium
Boron	Cadmium	Chromium	Cobalt
Copper	Lead	Lithium	Manganese
Molybdenum	Nickel	Rubidium	Selenium
Silver	Thallium	Titanium	Uranium
Antimony	Strontium	Mercury	
Anions			
Bromide	Chloride	Fluoride	Nitrate as N and NO_3
Nitrite as N and NO_2		Sulphate	
BTEXMN/ Gasoline Range Organics and Total Petroleum Hydrocarbons			
MTBE	TAME	Benzene	Toluene
Ethylbenzene	m+p-Xylene	o-Xylene	1,3,5-Trimethylbenzene
1,2,4-Trimethylbenzene	Naphthalene	TPH GRO C6-C10	TPH C10-C28
TPH C28-C40		TPH C10-C40 Total	
Dissolved Gasses			
Dissolved Methane		Dissolved Ethane	
Polycyclic Aromatic Hydrocarbons			
Acenaphthene	Acenaphthylene	Fluorene	Phenanthrene
Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene
Chrysene	Benzo(b+k)fluoranthene	Benzo(a)pyrene	Benzo(g,h,i)perylene
Dibenz(a,h)anthracene		Indeno(123-cd)pyrene	
Other			
Total Oil and Grease	Total Hardness as $CaCO_3$	pH	Electric Conductivity
Total Dissolved Solids	Dissolved Organic Carbon	Dissolved Inorganic Carbon	P-Alkalinity as $CaCO_3$
M-Alkalinity as $CaCO_3$	Dissolved Oxygen	Carbonate (CO_3)	Bicarbonate (HCO_3)
Ammonia and Ammonia a as N			

Table 5 provides the detail for the Groundwater Monitoring Programme. The groundwater monitoring programme must be reviewed on an annual basis. The monitoring positions, frequency and elements for analysis must be re-assessed based on the monitoring results as well as against any incidents or exceedances that have occurred during the year.

Table 5: Groundwater Monitoring Programme

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
Planning	Drilling of exploration/ production boreholes	• Hydrocensus/ baseline sampling to be conducted. • Standards: Guidance on Sampling Techniques (SABS ISO 5667:2:1991), Guidance on Sampling of Groundwater (SABS ISO 5667:11:2009) and Guidance on the Preservation and Handling of Samples (SABS ISO 5667:3:1994). Laboratory analysis undertaken at a SANAS Accredited Laboratory. • Monitoring parameters: Full monitoring set included in Table 4 and in all hydrocensus boreholes listed in Table 6. Physical parameters: Groundwater level.	• Records of baseline water quality results	Tetra4	Once-off prior to construction	Hydrocensus/ baseline water quality report
Construction	Post-construction of production wells and	• Pressure testing on surface for well casing/cementation or integrity failure post drilling and prior to connection into	• Sustained well integrity.	Tetra4.	As per well design report	Pressure test logs

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
	prior to production	production well - according to Tetra4 Internal Procedures.				
Production	Production Boreholes (Routine)	• Standards: Guidance on Sampling Techniques (SABS ISO 5667:2:1991), Guidance on Sampling of Groundwater (SABS ISO 5667:11:2009) and Guidance on the Preservation and Handling of Samples (SABS ISO 5667:3:1994). Laboratory analysis undertaken at a SANAS Accredited Laboratory. • Locations: New dedicated monitoring boreholes (if required) and boreholes as listed in Table 7 (hydrocensus borehole information) which are within the zone of influence of each production well. • Monitoring parameters: Parameters included in Table 4. Physical parameters: Groundwater level. • Internal Tetra4 Procedures	• Alignment with background and baseline values. An increase in any of the indicator elements by more than 25% from baseline conditions will trigger a response from Tetra4. The lowering in groundwater level by more than 10m will trigger a response from Tetra4. • No water supply (quality and quantity) complaints.	Tetra4.	Quarterly	Quarterly Water Quality Report

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
Production	Leaks identified at production boreholes	• Standards: Guidance on Sampling Techniques (SABS ISO 5667:2:1991), Guidance on Sampling of Groundwater (SABS ISO 5667:11:2009) and Guidance on the Preservation and Handling of Samples (SABS ISO 5667:3:1994). Laboratory analysis undertaken at a SANAS Accredited Laboratory. • Locations: All hydrocensus boreholes (equipped and unequipped) within the zone of influence of the affected production well. • Monitoring parameters: Parameters included in Table 4. Physical parameters: Groundwater level.	• Alignment with background and baseline values. An increase in any of the indicator elements by more than 25% from baseline conditions will trigger a response from Tetra4. The lowering in groundwater level by more than 10m will trigger a response from Tetra4. • No water supply (quality and quantity) complaints.	Tetra4.	Monthly until leaks are repaired	Results included in quarterly water quality report. Leak repair register

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
Closure, post-closure and rehabilitation	Production/ exploration boreholes post-closure	• <u>Standards</u>: Guidance on Sampling Techniques (SABS ISO 5667:2:1991), Guidance on Sampling of Groundwater (SABS ISO 5667:11:2009) and Guidance on the Preservation and Handling of Samples (SABS ISO 5667:3:1994). Laboratory analysis undertaken at a SANAS Accredited Laboratory. • <u>Locations</u>: New dedicated monitoring boreholes (if required) and boreholes as listed in Table 6 which are within the zone of influence of each production well after that well's closure. • <u>Monitoring parameters</u>: Parameters included in Table 5 (routine surface and groundwater monitoring parameters). <u>Physical parameters</u>: Groundwater level. • Internal Tetra4 Procedures.	Alignment with background and baseline values. An increase in any of the indicator elements by more than 25% from baseline conditions will trigger a response from Tetra4. The lowering in groundwater level by more than 10m will trigger a response from Tetra4.	Tetra4.	Annually.	Annual water quality report

Table 6: Hydrocensus Borehole Information

Monitoring locality	Latitude	Longitude	Locality description	Monitoring frequency		Parameters
				Water quality	Water level	
Existing monitoring boreholes						
11A	-28.193137	26.739703	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	Refer to Table 4
11C	-28.194320	26.739080	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
15E	-28.277361	26.641556	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
21A (BH05)	-28.119556	26.722806	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
21B	-28.119389	26.722333	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
21D	-28.120278	26.723028	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
22A	-28.119194	26.720306	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
22D (BH09)	-28.117306	26.721722	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
23C	-28.251048	26.743863	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
23D	-28.254167	26.742944	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
24D	-28.144972	26.741444	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
25A	-28.287028	26.742056	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
25B	-28.302167	26.743083	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
8B	-28.177728	26.747135	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
BD52	-28.259487	26.777427	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
BH01	-28.127231	26.719194	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
BH02	-28.144047	26.718938	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
BH07	-28.129905	26.733792	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
Mon-2057	-28.090217	26.736790	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
Mon-F1	-28.134285	26.719059	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
Mon-F3	-28.160855	26.739085	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
Mon-F4	-28.155733	26.715230	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
Mon-HDR1	-28.126232	26.720356	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
MV01	-28.241273	26.770132	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
OB	-28.229342	26.757408	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
OC	-28.218611	26.754778	Existing Tetra4 Monitoring borehole	Quarterly	Quarterly	
Newly identified hydrocensus boreholes (2022)						
HBH01	-28.156508	26.794027	Borehole in private use for livestock purposes.	Bi-annually	Bi-annually	Refer to Table 4
HBH08	-28.156508	26.794027	Borehole in private use for livestock purposes.	Bi-annually	Bi-annually	
HBH27	-28.128449	26.654374	Borehole in private use for domestic and livestock purposes.	Bi-annually	Bi-annually	
HBH39	-28.169627	26.635037	Borehole in private use for domestic and livestock purposes	Bi-annually	Bi-annually	

Monitoring locality	Latitude	Longitude	Locality description	Monitoring frequency		Parameters
				Water quality	Water level	
HBH41	-28.147466	26.724128	Borehole in private use for domestic and irrigation purposes.	Bi-annually	Bi-annually	
HBH42	-28.147499	26.724159	Borehole in private use for domestic and irrigation purposes.	Bi-annually	Bi-annually	
HBH43	-28.151021	26.725400	Borehole not in use.	Bi-annually	Bi-annually	
HBH48	-28.178267	26.745580	Borehole in private use for domestic and livestock purposes.	Bi-annually	Bi-annually	
HBH49	-28.178856	26.746212	Borehole in private use for domestic and livestock purposes.	Bi-annually	Bi-annually	
HBH50	-28.183719	26.746794	Borehole in private use for domestic and livestock purposes.	Bi-annually	Bi-annually	
HBH63	-28.201657	26.783977	Borehole in private use for livestock purposes.	Bi-annually	Bi-annually	
HBH66	-28.212197	26.789505	Borehole in private use for livestock purposes.	Bi-annually	Bi-annually	
HBH72	-28.193122	26.739700	Borehole not in use.	Bi-annually	Bi-annually	
HBH73	-28.193009	26.739636	Borehole in private use for domestic and livestock purposes.	Bi-annually	Bi-annually	
HBH74	-28.229587	26.800249	Borehole in private use for domestic and livestock purposes.	Bi-annually	Bi-annually	
New monitoring boreholes						
Mon BH01	-28.123973	26.721958	New monitoring borehole down-gradient of the production plant serving as Doringrivier receptor	Quarterly	Quarterly	Refer to Table 4
Mon BH02	-28.124473	26.717889	New monitoring borehole down-gradient of the production plant serving as Sandrivier receptor	Quarterly	Quarterly	

Notes: All remaining boreholes as identified during the hydrocensus user survey conducted, should be included into the monitoring network on an annual basis.

Figure 21: Updated integrated groundwater monitoring network.

Figure 22: TDS pollution plume migration of contaminants originating from the deeper, fractured aquifer migrating through the intergranular aquifer (Operational phase).

Figure 23: CH_4 pollution plume migration of contaminants originating from the deeper, fractured aquifer migrating through the intergranular aquifer (Operational phase).

4.6.2 SURFACE WATER MONITORING

A surface water management plan was developed for the mitigation measures suggested for the surface water risks identified.

- This surface water quality monitoring plan must be implemented to determine any changes in the water quality (i.e. organics and inorganics); and
- Any water (this makes it relevant to condensate) generated at the well heads need to be captured in some form of dirty water storage facility and disposed of as hazardous waste at a suitably licenced waste disposal facility. This water may however be disposed of in the natural environment, if it complies with the relevant waste water limits as set out in GN665 – Revision of General Authorisations in terms of section 39 of the National Water Act, 1998 (Act No. 36 of 1998).

Table 7 provides the detail for the Surface Monitoring Programme.

Table 7: Surface Water Resources Monitoring Programme

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
Planning	Baseline	• Standards: Aquatic Water Quality Standards as published in the Department of Environmental Affairs (DEA) (2014): Framework for the Management of Contaminated Land. • Locations: Within the zone of influence of compressors, plant and production wells for the Doring River, Sand River, Bosluisspruit. • Parameters: Full monitoring set in Table 4.	• Target: None-establish baseline.	Tetra4.	Prior to construction- preferably dry and wet season samples.	Baseline Water Quality Report.
Construction	Pipelines	• Standards: Aquatic Water Quality Standards as published in the Department of Environmental Affairs (DEA) (2014): Framework for the Management of Contaminated Land. • Locations: Upstream and downstream of active construction areas in pipeline crossings. • Parameters: Temp (C), Baro (mb), pH pHmV, ORP (REDOX), DO (% Sat), EC (uS/cm @25C), RES	• Target: <10% variation in upstream and downstream – if exceeded then review and institute appropriate actions.	Tetra4.	Monthly during active construction in watercourses.	Monthly Water Quality Report.

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
		(Ohms.cm), TDS (mg/L), SAL (ppt), SSG (st), Turbidity.				
Construction	Plant, stations, drill sites	• Standards: DWS Discharge Limits • Locations: Dirty water containment features; localised dirty water collections and temporary storage (as applicable). • Parameters: DWS Discharge parameters.	• Compliance with DWS Discharge Limits.	Tetra4.	Ad hoc- prior to planned discharge.	Monthly ECO Report.
Production	Plant, stations and production wells	• Standards: Aquatic Water Quality Standards as published in the Department of Environmental Affairs (DEA) (2014): Framework for the Management of Contaminated Land. • Locations: Within the zone of influence of compressors, plant and production wells for the Doring River, Sand River, Bosluisspruit. • Parameters: Full monitoring set in Table 4.	• Target: Alignment with background and baseline values. An increase in any of the indicator elements by more than 25% from baseline	Tetra4.	Quarterly	Quarterly Water Quality Report.

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
			conditions will trigger a response from Tetra4.			
Production	Plant and stations	• Standards: DWS Discharge Limits • Locations: Dirty water containment features; localised dirty water collections and temporary storage (as applicable). • Parameters: DWS Discharge parameters.	• Compliance with DWS Discharge Limits.	Tetra4.	Ad hoc- prior to planned discharge.	Monthly ECO Report.
Closure, post-closure and rehabilitation	Plant, stations, production wells	• Standards: Aquatic Water Quality Standards as published in the Department of Environmental Affairs (DEA) (2014): Framework for the Management of Contaminated Land. • Locations: Within the zone of influence of compressors, plant and production wells for the Doring River, Sand River, Bosluisspruit. • Parameters: Full monitoring set in Table 4.	• Target: Alignment with background and baseline values. An increase in any of the indicator elements by	Tetra4.	Annually.	Annual water quality report

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
			more than 25% from baseline conditions will trigger a response from Tetra4.			

4.6.3 AIR QUALITY MONITORING

Air quality monitoring can be split into two main types namely, emissions monitoring at source, and ambient monitoring. The functional requirements for these are discussed in this section and detailed in Table 8.

4.6.3.1 **EMISSION MONITORING**

Regular monitoring of air emissions from the Helium and LNG plant is recommended. Particular attention to start-up and upset conditions should be included for monitoring purposes in order to adequately delineate emission and process metrics during these conditions, as well as routine conditions. Furthermore, the following are recommended for adequate emissions monitoring and air quality management at the Helium and LNG plant:

- Monitoring data collected during each emission monitoring event should undergo trend analysis and reviewed at regular intervals (quarterly or annually), and compared with the operating standards so that any necessary corrective actions can be taken;
- Records of monitoring results should be kept in an acceptable format and reported to the responsible authorities and relevant parties, if required; and
- A record of accidental releases of pollutants to the environment should be maintained and appropriate corrective measures should be implemented to be better prepared for future occurrences.

4.6.3.2 **AMBIENT AIR QUALITY MONITORING**

Ambient air quality monitoring can serve to meet various objectives, such as:

- Compliance monitoring;
- Validate dispersion model results;
- Use as input for health risk assessment;
- Assist in source apportionment and source quantification;
- Temporal and spatial trend analysis; and
- Tracking progress made by control measures.

To determine and assess cumulative impacts of pollutants at Air Quality Sensitive Receptors (AQSRs) and define air quality trends in the Project region, it is recommended that ambient air quality measurement be included as part of the Project's air quality management plan. Pollutants such as CH_4, SO_2, NO_2, PM2.5 and PM10 may be included in the monitoring campaign to be conducted at regular intervals over the life of the project. Due to the extent of the project site, monitoring locations may be varied over time within the project boundary and at various project sections, considering the locations of unpaved roads, exploration and production wells, booster stations, compressor stations, Helium and LNG plant and the probability of a particular pollutant being released by the activity. Where construction and operational activities are to take place within zones of influence of an AQSR as determined by the modelling results of the air quality impact assessment (2022), the landowners or occupiers of these AQSRs must be notified of such activities and monitoring protocols adjusted in consultation and agreement with the affected party/ies.

Table 8: Air Quality Monitoring Programme

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
Construction	Plant and compressor stations (Dust).	• Standards: ASTM D1739:1998; SANS 1929; National Dust Control Regulations (GN827/2013), National Ambient Air Quality Standards (GN1210/2009). • Locations: All dust sensitive receptors within the designated impact zones (200m) of the Processing Plants and Regional Compressor sites. • Parameters: Dust fallout.	• Alignment with baseline dust fallout. • Dust Fallout: ○ <600mg/m²/day. ○ <400 mg/m²/day (where agricultural activities take place). ○ National Dust Control Regulations. • No dust complaints from landowners.	Tetra4.	Monthly total dust fallout sampling to be conducted at the four main wind directions (north; east; south and west) during the construction of the plant and compressor stations to assess cumulative deposition rates	Monthly Monitoring Report.

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism

Production	Booster and compressor stations
	
	Combined helium and LNG plant
		• Standards: Passive diffusive sampling, National Ambient Air Quality Standards (GN1210/2009).
		• Locations:
		  ○ Booster and compressor stations and Combined Helium and LNG Plant.
		• Parameters:
		  ○ Combined Helium and LNG Plant: PM10, PM2.5, SO_2 and NO_2.
		  ○ GHG: Booster and compressor stations and plant.
			• Comply with emissions limits or industry guidelines.
			• Limit fugitive/ unintended GHG emissions (incl. Methane).
			• PM10, PM2.5, SO_2, and NO_2 GLCs should comply with their various NAAQS.
			• VOCs GLCs should comply with the TCEQ guideline.
				Tetra4.	• PM10, PM2.5, SO_2, VOCs, and NO_2 GLCs: Annually.
					• GHG: Monthly inspections of booster and compressor stations and plant.
						Annual / Monthly monitoring report.

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
Production	Production wells	• Standards: Passive diffusive sampling, National Ambient Air Quality Standards (GN1210/2009). • Locations: Production well heads. • Parameters: GHG and odour emissions (leakages).	• Comply with emissions limits or industry guidelines. • Limit fugitive/ unintended GHG emissions (incl. Methane).	Tetra4.	• GHG: Annually.	Annual monitoring report.
Closure, post-closure and rehabilitation	Post Closure Phase	• Standards: Passive diffusive sampling, National Ambient Air Quality Standards (GN1210/2009). • Locations: At all closed production wells. • Parameters: Methane	• VOCs GLCs should comply with the TCEQ guideline. • No localised increases in Methane emissions-indicating leaks from plugging.	Tetra4.	Every 5 years.	Monitoring Report (5 yearly basis).

4.6.4 BIODIVERSITY MONITORING

Table 9 provides details of the monitoring activities that are required to ensure that the biodiversity and specifically the invasive species are properly managed, and that rehabilitation is successful post-closure.

Table 9: Biodiversity Monitoring Plan

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
Construction	All Surface Activities.	• Standards: Conservation of Agricultural Resources Act, Act No. 43 of 1983; National Environmental Management: Biodiversity Act, Act No. 10 of 2004-alien and invasive species list (2014). • Locations: All production areas and adjacent area (~5m). • Parameters: Plant community composition. Alien and invasive plant abundance (numbers, density, cover, frequency); Condition (measures of vigour, performance,	• Target: All alien invasive plant species effectively controlled. • Indicators: New floral species appearing on site, alien species list (including density information), change in composition/structure of native plant communities, extent of invasive species populations, record of clearing activities, decline in abundance of alien plant species over time.	Tetra4.	Quarterly Survey.	Quarterly in EO Reports. Annual monitoring report (summary of quarterly surveys). Vegetation clearing records.

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
		fecundity); Structure (size or age class information).				
Construction	All Surface Activities within watercourses or 100m from watercourses.	• Standards: None • Locations: All impacted watercourses. • Parameters: Watercourse monitoring datasheet (refer to wetland and aquatic specialist study).	• Target: no construction related erosion and /or watercourse degradation.	Tetra4.	Bi-monthly in vicinity to watercourses.	Annual monitoring report.
Production	Production Surface Activities.	• Standards: Conservation of Agricultural Resources Act, Act No. 43 of 1983; National Environmental Management: Biodiversity Act, Act No. 10 of 2004-alien and invasive species list (2014).	• Target: All alien invasive plant species effectively controlled. • Indicators: New floral species appearing on site, alien species list (including density information), change in composition/structure of native plant communities, extent of invasive species populations, record of clearing activities, decline in abundance of alien plant species over time.	Tetra4.	Annual Survey.	Annual survey report. Clearing records.

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
		• Locations: All production areas and adjacent area (~5m). • Parameters: Plant community composition. Alien and invasive plant abundance (numbers, density, cover, frequency); Condition (measures of vigour, performance, fecundity); Structure (size or age class information).				
Production	Exploration and Production Surface Activities (Construction).	• Standards: None • Locations: All impacted watercourses. • Parameters: Watercourse monitoring datasheet (refer to wetland and aquatic specialist study).	• Target: no construction related erosion and /or watercourse degradation.	Tetra4.	Bi-monthly during construction in vicinity to watercourses and 1 year thereafter.	Annual monitoring report.

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
Closure, post-closure and rehabilitation	Exploration and Production Surface Activities (Post closure).	• Standards: Conservation of Agricultural Resources Act, Act No. 43 of 1983; National Environmental Management: Biodiversity Act, Act No. 10 of 2004-alien and invasive species list (2014). • Locations: All production areas and adjacent area (~5m). • Parameters: Plant community composition. Alien and invasive plant abundance (numbers, density, cover, frequency); Condition (measures of vigour, performance, fecundity); Structure (size or	• Target: Confirmation that acceptable cover has been achieved in areas where natural vegetation is being re-established. 'Acceptable cover' means re-establishment of pioneer grass communities over the disturbed areas at a density similar to surrounding undisturbed areas, non-eroding and free of invasive alien plants. • Indicators: New species appearing on site, alien species list (including density information), change in composition/structure of native plant communities, extent of invasive species populations, record of clearing activities, decline in abundance of alien plant species over time.	Tetra4.	Bi-annual Survey (3 years post closure).	Annual survey report. Photographic record.

Phase	Activity	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
		age class information); erosion;				

4.6.5 HERITAGE MONITORING

The action plan to mitigate identified impacts is based on the overriding principle of minimisation of the disturbance of the development activities on the identified heritage constraints and sensitivities. The individual monitoring actions required towards managing the impact on identified heritage sensitivities and constraints, are detailed in Table 10.

Table 10: Heritage Management Plan

Phase	Area and site no.	Mitigation measures	Timeframe	The responsible party for implementation	Monitoring	Legislative compliance	Reporting Mechanism
Planning	General project impact area	Develop a chance find procedures in case where possible heritage finds (incl. unmarked graves) are uncovered.	Prior to construction.	Tetra4 EO	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	Chance find procedure
Construction	General project impact area	Implement a chance find procedures in case where possible heritage finds (incl. unmarked graves) are uncovered.	Ongoing throughout construction.	Tetra4 EO Heritage Specialist (when required)	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Construction	Grave and burial ground sites (TET 1, TET 7-8, TET 11, TET 15, TET 19, TET 22, SSL/BET/72, SITE 2, SITE 19 and T0003, T0009, T0024, T0029) that were located within the proposed development	▪ The graves should be demarcated with a 50-meter buffer and should be avoided and left *in situ*. ▪ A Grave Management Plan should be developed for any graves where construction activities closer 50m from graves which also	Ongoing throughout construction.	Tetra4 EO Heritage Specialist (when required)	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report

Phase	Area and site no.	Mitigation measures	Timeframe	The responsible party for implementation	Monitoring	Legislative compliance	Reporting Mechanism
	area and were rated as high local heritage significance and had a heritage grading of IIIA.	need to be approved by SAHRA BGG. ▪ If the site is going to be impacted and the graves need to be removed a grave relocation process as per the Heritage Management Plan for the site is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA BGG under the NHRA and National Health Act regulations.					
Construction	Burial Grounds and Graves (T0010, T0013) that were located outside of the proposed development area.	No mitigation required as no development is planned near these sites.	N/A	Tetra4 EO	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-	ECO Monthly Checklist/Report

Phase	Area and site no.	Mitigation measures	Timeframe	The responsible party for implementation	Monitoring	Legislative compliance	Reporting Mechanism
						36 and 38 of NHRA	
Construction	Historic to recent sites with possible grave sites (TET 4-6, TET 13, TET 14, TET 25a, TET 25b, TET 26, SSL/BET/37-39, SSL/BET/53, SSL/BET/60, SSL/BET/66) that were located within the proposed development area and were rated as high local heritage significance and had a heritage grading of IIIA.	▪ Mitigation measures would include applying for the test excavation and/or GPR permit to determine if the site contains graves (if construction activities are to occur on or within close proximity to these sites). ▪ If human remains are discovered a grave relocation process is recommended as a mitigation and management measure. This will involve the necessary social consultation and public participation process before grave relocation permits can be applied for with the SAHRA BGG under the NHRA and National Health Act regulations. ▪ When graves are discovered/uncovered	Ongoing throughout construction.	Tetra4 EO Heritage Specialist (when required)	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report

Phase	Area and site no.	Mitigation measures	Timeframe	The responsible party for implementation	Monitoring	Legislative compliance	Reporting Mechanism
		the site should be demarcated with a 50-meterno-go-buffer-zone and the grave should be avoided. ▪ If, during test excavations, it is determined that the site does not contain graves, no further mitigation will be required.					
Construction	Historic to recent sites with possible grave sites (T0015, T0023, T0026, T0027, T0028) that were located outside of the proposed development area and were rated as high local heritage significance and had a heritage grading of IIIA.	No mitigation required.	Ongoing throughout construction.	Tetra4 EO	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Construction	Structures (TET2, TET3, TET9, SITE 1A, SITE 1B, SITE 20, SITE 21, T0021, T0040,	▪ It is recommended that a no-go-buffer-zone of at least 30m is kept to the closest infrastructure.	Ongoing throughout construction.	Tetra4 EO Heritage Specialist (when required)	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations	ECO Monthly Checklist/Report

Phase	Area and site no.	Mitigation measures	Timeframe	The responsible party for implementation	Monitoring	Legislative compliance	Reporting Mechanism
	T0041) that were located within the proposed development area and were rated as medium local heritage significance and had a heritage grading of IIIB.	▪ If development occurs within 30m of the site, the structure will need to be satisfactorily studied and recorded before impact occurs. ▪ Recording of the site i.e. (a) map indicating the position and footprint of the structure (b) photographic recording of the structure (c) measured drawings of the floor plans of the structure. ▪ Submission of permit application to SAHRA to allow for the disturbance to the site. A Phase 2 Heritage Report must accompany the permit.				from SAHRA under Section 34-36 and 38 of NHRA	
Construction	Structures (T0014) that were located outside of the proposed development area and were rated as medium	No mitigation is required as no development is planned within close proximity to these sites.	N/A	Tetra4 EO	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-	N/A

Phase	Area and site no.	Mitigation measures	Timeframe	The responsible party for implementation	Monitoring	Legislative compliance	Reporting Mechanism
	local heritage significance and had a heritage grading of IIIB.					36 and 38 of NHRA	
Construction	Structures (TET27, SSL/BET/25, SSL/BET/26, SSL/BET/36, T0017, T0018, T0019, T0020, T0025, T0037, T0038) that were located within the proposed development area and were rated as low local heritage significance and had a heritage grading of IIIC.	No mitigation is required. The documentation of the site in the HIA report is sufficient and the site can be destroyed without a permit but with the approval of this report.	N/A	Tetra4 EO	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Construction	Structures (T0016, T0022) that were located outside of the proposed development area and were rated as low local heritage significance and	No mitigation required as no development is planned within close proximity to these sites.	N/A	Tetra4 EO	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	N/A

Phase	Area and site no.	Mitigation measures	Timeframe	The responsible party for implementation	Monitoring	Legislative compliance	Reporting Mechanism
	had a heritage grading of IIIC.						
Construction	Structures (T0001, T0002, T0004, T0005, T0030, T0031, T0033, T0034, T0036, T0039) that were located within the proposed development area and were rated to have no research potential or other cultural significance and had a heritage grading of not conservation worthy (NCW).	No mitigation required.	N/A	Tetra4 EO	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report
Construction	Palaeontological finds	▪ The EO must be informed that the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) has a Very High Palaeontological Sensitivity. ▪ If fossil remains are discovered during any phase of construction,	Ongoing throughout construction.	Tetra4 EO Palaeontologist (when required)	Monthly	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 35 of NHRA	Final report to be used by the develop to apply for a destruction permit under s35 of the NHRA.

Phase	Area and site no.	Mitigation measures	Timeframe	The responsible party for implementation	Monitoring	Legislative compliance	Reporting Mechanism
		either on the surface or exposed by fresh excavations the Chance Find Protocol must be implemented by the ECO in charge of these developments.					

4.6.6 NOISE MONITORING

Environmental Noise Monitoring can be divided into two distinct categories, namely:

- Passive monitoring – the registering of any complaints (reasonable and valid) regarding noise; and
- Active monitoring – the measurement of noise levels at identified locations; generally, after a noise complaint was received.

No active environmental noise monitoring is recommended due to the low significance for a noise impact to develop. However, should a reasonable and valid complaint about noise be registered, it is the responsibility of Tetra4 to investigate this complaint as per the specifications in Table 11.

While this section recommends a noise monitoring programme, it should be used as a guideline as site-specific conditions may require that the monitoring locations, frequency or procedure be adapted. In the event of noise complaints being lodged, the following procedure should be followed:

- Any surveys should be designed and conducted by a trained specialist.
- Sampling should be carried out using a Type 1 SLM that meets all appropriate IEC standards and is subject to annual calibration by an accredited laboratory.
- The acoustic sensitivity of the SLM should be tested with a portable acoustic calibrator before and after each sampling session.
- Samples sufficient for statistical analysis should be taken with the use of portable SLM's capable of logging data continuously over the time period. Samples, representative of the day- and night-time acoustic environment should be taken.
- The SLM should be located approximately 1.5 m above the ground and no closer than 3 m to any reflecting surface.
- Efforts should be made to ensure that measurements are not affected by the residual noise and extraneous influences, e.g. wind, electrical interference and any other non-acoustic interference, and that the instrument is operated under the conditions specified by the manufacturer. It is good practice to avoid conducting measurements when the wind speed is more than 5 m/s, while it is raining or when the ground is wet.
- A detailed log and record should be kept. Records should include site details, weather conditions during sampling and observations made regarding the acoustic environment of each site.

Table 11: Noise Monitoring Programme

Phase	Functional Requirements	Performance Indicator/ Target	Roles and Responsibilities	Frequency	Reporting Mechanism
Construction	• Standards: National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008. • Locations: No pre-identified and/or routine site identified during EIA. Site locations to be identified in response to valid noise complaints. • Parameters: 10-minute bins defining the 10-minute descriptors such as LAeq,I (National Noise Control Regulation requirement), LA90,f (background noise level as used internationally), and LAeq,f (Noise level used to compare with IFC noise limit). Noise levels should be co-ordinated with the 5-m/s wind speed. Spectral frequencies should also be measured to define the potential origin of noise.	• Target: Compliance with National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008.	Tetra4.	Ad-hoc.	Annual Monitoring report.
Production	• Standards: National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008. • Locations: No pre-identified and/or routine site identified during EIA. Site locations to be identified in response to valid noise complaints.	• Target: Compliance with National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008.	Tetra4.	Ad-hoc.	Annual Monitoring report.

	• Parameters: 10-minute bins defining the 10-minute descriptors such as LAeq,I (National Noise Control Regulation requirement), LA90,f (background noise level as used internationally), and LAeq,f (Noise level used to compare with IFC noise limit). Noise levels should be co-ordinated with the 5-m/s wind speed. Spectral frequencies should also be measured to define the potential origin of noise.				
Closure, post-closure and rehabilitation	• Standards: National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008. • Locations: No pre-identified and/or routine site identified during EIA. Site locations to be identified in response to valid noise complaints. • Parameters: 10-minute bins defining the 10-minute descriptors such as LAeq,I (National Noise Control Regulation requirement), LA90,f (background noise level as used internationally), and LAeq,f (Noise level used to compare with IFC noise limit). Noise levels should be co-ordinated with the 5-m/s wind speed. Spectral frequencies should also be measured to define the potential origin of noise.	• Target: Compliance with National Noise Control Regulations (GNR 154 of 1992) and SANS 10103:2008.	Tetra4.	Ad-hoc.	Annual Monitoring report.

4.7 STAKEHOLDER ENGAGEMENT

Social impacts occur immediately in the planning phase of a project and as such it is imperative to start with stakeholder engagement as early in the process as possible. Stakeholder Engagement commenced during the EIA Phase of the project (both for the overall Cluster 1 and Cluster2 Production areas and the site-specific infrastructure areas), in accordance with the relevant legislation. Stakeholder Engagement is however required on an ongoing basis throughout the execution of the Production. As such, it is recommended that the Holder develop and implement a detailed Stakeholder Engagement Plan (SEP), designed to work as a living document for implementation over the entire production period.

4.7.1 STAKEHOLDER ENGAGEMENT PLAN

The following stakeholder engagement framework outlines the principles and objectives for stakeholder engagement during all phases of the mining operation:

- To identify and assess the processes and/or mechanisms that will improve the communication between local communities, the wider community and the Holder;
- To improve relations between the Holder’s staff and the people living in the local communities;
- To provide a guideline for the dissemination of information crucial to the local communities in a timely, respectful and efficient manner; and
- To provide a format for the timely recollection of information from the local communities in such a way that the communities are included in the decision-making process.

This SEP plan will assist the Holder to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the production. Such a plan cannot be considered a once off activity and should be regularly updated to ensure that it stays relevant and to capture new information. The SEP should be compiled in line with the relevant IFC Guidelines (IFC) and should consist of the following components:

- Stakeholder Identification and Analysis – time should be invested in identifying and prioritising stakeholders and assessing their interests and concerns;
- Information Disclosure – information must be communicated to stakeholders early in the decision-making process in ways that are meaningful and accessible, and this communication should be continued throughout the life of the project;
- Stakeholder Consultation – each consultation process should be planned out, consultation should be inclusive, the process should be documented, and follow-up should be communicated;
- Negotiation and Partnerships – add value to mitigation or project benefits by forming strategic partnerships and for controversial and complex issues, enter into good faith negotiations that satisfy the interest of all parties;
- Grievance Management – accessible and responsive means for stakeholders to raise concerns and grievances about the project must be established throughout the life of the project;
- Stakeholder Involvement in Project Monitoring – directly affected stakeholders may be involved in monitoring project impacts, mitigation and benefits. External monitors can be involved where they would enhance transparency and credibility;
- Reporting to Stakeholders – report back to stakeholders on environmental, social and economic performance, both those consulted and those with more general interests in the project and parent company; and
- Management Functions – sufficient capacity within the company must be built and maintained to manage processes of stakeholder engagement, track commitments and report on progress.

It is of critical importance that stakeholder engagement takes place in each phase of the project cycle and it must be noted that the approach will differ according to each phase.

4.7.2 GRIEVANCE MECHANISM

In accordance with international good practice the Holder shall establish a specific mechanism for dealing with grievances. A grievance is a complaint or concern raised by an individual or organisation that judges that they have been adversely affected by the project during any stage of its development. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts, or perceived impacts. The IFC standards require Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

The grievance mechanism shall be based on the following principles:

- Transparency and fairness;
- Accessibility and cultural appropriateness;
- Openness and communication regularity;
- Written records;
- Dialogue and site visits; and
- Timely resolution.

Based on the principles described above, the grievance mechanism process involves four stages:

- Receiving and recording the grievance;
- Acknowledgement and registration;
- Site inspection and investigation; and
- Response.

5 PART D: DOCUMENTATION OF SITE-SPECIFIC SENSITIVITIES AND ATTRIBUTES

This EMPr sets out the methods by which proper environmental controls are to be implemented by Tetra4 and the appointed contractors. It has been compiled on the basis that the pre-approved generic EMPr template (Part B) covers most of the required impact management outcomes and actions however certain project infrastructure such as the LNG/LHe Plant, Compressor Stations and exploration and production wells pose additional site-specific sensitivities or attributes which require more specific impact management outcomes and actions that are not included in the pre-approved generic EMPr template.

The broad objective for the management of environmental impacts is to reduce the significance of each negative impact and enhance positive impacts which have been identified during the EIA through a combination of the following:

1. Minimize disturbance to the physical and biological environment;
2. Minimize or prevent disturbance to any sites of cultural or heritage values; and to
3. Minimize or enhance any socio-economic impacts that might result from the activity.

As further areas and site-specific management and mitigations measures are identified throughout the future phases of Production, this EMPr will be supplemented. Unless otherwise specified, all conditions contained in the pre-approved generic EMPr (Part B) will apply to all relevant aspects of the current and future production activities.

This section has been compiled by the EAP (Brian Whitfield) who's details are provided in Part C of the pre-approved generic EMPr. Whilst the requirements in Part B of the pre-approved generic EMPr specify that the "Implementation" and "Monitoring" columns in the tables must be completed by the contractor prior to mobilization, the tables included in this part (Part D) have been completed by the EAP as no such specific instruction is included in the Generic EMPr for this section.

5.1 PIPELINE, BOOSTER STATIONS AND SERVITUDES

Impact management outcome: Minimisation of impacts on land-use. Ensure safety of open trenches to prevent negative impacts on people and animals. Ensure safety and minimisation of nuisance impacts where trench has to be opened to repair faults.

5.1.1 DESIGN / PLANNING PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Comply with Generic Pipeline EMPr conditions for design and planning phase (Part B).	*(Variable responsibilities)*	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	Ad hoc but prior to construction	EO Reports
2. Infrastructure routes should follow existing servitudes and farm boundaries wherever possible. Pipelines must be buried at a minimum of 1.5m below surface which is deeper than the rip-depth to ensure that the farmer has full utilization of their land.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
3. The location of any servitudes or third-party infrastructure must be identified prior to commencement at a specific site and the necessary approvals obtained. This specifically includes the necessary consents for the location of pipes and compression stations when located in proximity to local, provincial and national roads.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
4. SANRAL will only allow pipelines to be laid outside the road reserve and boundary and should preferably not be located within 10 metres of such boundaries. All pipes within a distance of 60 metres from the National Road reserve will	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
require SANRAL approval as this falls within the building restriction area of the National Road.						
5. Once final development footprints (both drilling and development footprints) are determined and confirmed for implementation in specific areas, a public consultation process must be undertaken during which the relevant Interested & Affected Parties (I&APs) are invited to come forward and state whether they are aware of any sacred water sites (secret or not) located within the buffer areas recommended in the hydrology and geohydrology specialist reports. It is important to note that at this stage the I&Ps will not be requested to provide information on the exact location of such sacred sites, only whether such sites are located within these buffer areas. Care must be taken during the public participation to ensure that the cartographic and location information presented to the I&APs contains clear enough information for them to confidently recognise the positions of such proposed drilling site(s) should these be located anywhere in proximity to the properties and landscapes they have knowledge of. The presentation of such cartographic information in English, Afrikaans and Sesotho would be paramount. Should an I&AP state that such a sacred site is indeed located within the recommended buffer area of a proposed development footprint, an experienced team comprising a heritage specialist and geohydrologist must accompany the I&AP to the sacred site for confirmation purposes. The heritage specialist and geohydrologist must compile a letter to indicate the findings of their fieldwork	Tetra4 CLO	Public consultation	During planning and design phase. Prior to construction.	Tetra4 EO	Ad hoc	Minutes of meetings Attendance registers EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
i.e. whether such a sacred site was indeed identified within the recommended buffer area from the proposed development. All aspects relating to the location of the sacred site must be kept strictly confidential. At no stage will any information regarding the position of the sacred site (GPS coordinates, property description etc.) be contained in the letter, or in any other report, document or verbal communication. The confidential manner in which this mitigation will be approached and undertaken with regards to the locations of Sacred Natural Sites, must be clearly communicated to the I&AP from the outset. Once the above-mentioned mitigation work has confirmed the presence of a Sacred Natural Site, the appropriate recommendations must be made by the appointed heritage specialist and geohydrologist.						
6. The relevant heritage screening in accordance with Section 38 of the NHRA, must be completed by a suitably trained EO for all new drill sites and pipeline routes if heritage features are observed or suspected to be on site as part of a site-specific pre- commencement assessment.	Tetra4 EO	Heritage screening	During planning and design phase	Tetra4 EO	Ad hoc	EO Reports
7. Locate pipelines and trunkline alignments outside of buffered watercourses (sensitive watercourse habitat) as far as possible.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Tetra4 EO	Once off	EO Reports
8. Watercourse buffers within 10m from construction footprints should be demarcated on site for the entire	Contractor EO and/or	Suitable demarcation	Prior to construction	Contractor EO and/or	Once off	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
construction process to help indicate sensitive areas and prevent unauthorised access.	Tetra4 EO			Tetra4 EO		
9. Unavoidable crossings should ideally be located perpendicular to the direction of flow at the shortest possible crossing distances.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Tetra4 EO	As and when required	EO Reports
10. Long crossings along the length of wetlands, rivers and drainage lines should be avoided as far as practically possible.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Tetra4 EO	Ad hoc	EO Reports
11. Where construction activities occur within watercourses, a construction method statement should be prepared by the contractor with input from a watercourse specialist prior to the start of construction (unless a generic method statement is development and agreed to by all relevant parties).	Contractor / watercourse specialist	Design and planning specific compliance	Prior to construction	Contractor EO and Tetra4 EO	As and when required	Watercourse construction method statement
12. Search and rescue of species of concern.	Contractor EO and/or Tetra4 EO	Search and rescue	Prior to construction	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
13. Obtain permits for disturbance/destruction of any listed/protected species found on site.	Tetra4 EO	Permit application and approval	During planning and design phase	Contractor EO and/or Tetra4 EO	Once off prior to construction	Permit received EO Reports

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
14. Adhere to the biodiversity no-go area on the farm Adamson Vley 655 Portion 0 (no development or impacts should occur on surface in this no-go area). Consultation and communication with the lead or implementing agent for the sensitive species, Endangered Wildlife Trust (EWT), must be implemented before any construction proximal to the specific area. Monitoring and Management of the species will be crucial throughout the lifetime of the project and must be discussed and implemented in conjunction with the EWT.	Design / Planning Manager Contractor EO and/or Tetra4 EO	Delineation of no-go areas.	Prior to construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
15. Landowners must be consulted, and all reasonable requests complied with. A written landowner agreement should be negotiated and concluded prior to commencement. Should this not be possible, a record should be kept of reasonable negotiations with the land owners.	Tetra4 CLO	Landowner negotiations	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Written landowner agreements
16. If sensitive species occur within the preferred footprint, the first option should be to relocate the proposed footprint followed by the alternative of preparing a relocation plan (prepared by a suitably qualified specialist).	Design / Planning Manager and/or Contractor EO and/or Tetra4 EO	Identify and manage sensitive species	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Route deviation revisions or relocation plan and records of relocation EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
17. Any operational activities that will take place within the below specified distances from noise sensitive receptors must first be discussed and agreed with the affected party (prior to construction): a. Operation (daytime): i. Booster station: 50 m ii. Plant: 170 m iii. Compressors: 80 m b. Operation (night-time): i. Booster station: 150 m ii. Plant: 580 m iii. Compressors: 150 m	Tetra4 CLO	Landowner negotiations	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Written landowner agreements
18. Although field workers conducting initial geological surveys will be allowed to cover large and unpredictable tracts of land, workers should be restricted to access roads/tracks and project infrastructure sites and will not be allowed to wander off into the rest of the property or surrounding land.	Survey teams	Compliance with pre-approved landowner agreements.	During planning and design phase	Contractor EO and/or Tetra4 EO	Ad hoc	Complaints register EO Reports
19. Tetra4 must provide all the affected landowners with a construction schedule to ensure that they know when construction will take place on their properties. Any changes to the construction schedule must be communicated to the farmers at least a week in advance.	Tetra4 Project Manager	Distribution of construction schedule to landowners	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Evidence of distribution of construction

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
						schedule to landowners EO Reports
20. Before activities commence on privately owned land, Tetra 4 must discuss with the landowner and if agreed to, compile an asset and infrastructure baseline of any landowner infrastructure that may be affected by the project. Any infrastructure or landowner property damaged by Tera4 must be suitably compensated. Photographs and GPS co-ordinates of the infrastructure must be included in the baseline (under strict agreement by the landowner). A copy of the baseline affecting their property should be given to each landowner, who should sign off the document to ensure that it is accurate. Tetra 4 should keep the master document. If any damage occurs, it should be reinstated to its pre-project status. If the infrastructure must move, it must be done at Tetra 4's cost. Tetra 4 must ensure that the construction team has a copy of the asset and infrastructure baseline to guarantee that no infrastructure will be damaged due to ignorance during the construction phase of the project.	Tetra4 Project Manager	Landowner consultations Compilation of asset register	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	EO Reports
21. All contractors should sign a code of conduct as part of their induction process. Induction must explicitly include aspects such as closing gates and littering. A disciplinary action system must be put in place for any transgressions affecting the landowners.	Tetra4 Health and Safety Manager	Induction training	Prior to construction	Tetra4 EO	Once off prior to construction	Induction records including signed code of conduct

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
22. Contractors should be required to make use of a certain proportion of local labour - it is acknowledged that not all skills will be available locally. Jobs should be advertised in a way that is accessible to all members of society and labour desks (labour registration stations) should be in accessible areas. No unrealistic expectations should be created and the recruitment policy giving preference to local labour should be communicated from the beginning of the project. The local area of influence should be agreed with the stakeholders early in the process.	Contractor	Identification and appointment of local labour	Prior to construction	Contractor EO and/or Tetra4 EO	Once off prior to construction	Recruitment records
23. Horizontal directional drilling is recommended for the Sand River and Bosluisspruit crossings, as opposed to the clearing, temporary damming, excavation, lowering and infilling of pipelines in these river watercourses. Vegetation clearing, topsoil stripping, trenching and infilling to bury the pipeline, are an acceptable approach in other types of watercourse crossings.	Design / Planning Manager	River crossing design methodology	Prior to construction	Tetra4 EO	As and when required	River crossing design methodology
24. A community health and safety plan inclusive of a Traffic Management Plan will be developed based on risks identified in consideration of community health and safety.	Contractor HSSE Manager / Tetra4 HSSE Manager	Develop Community Health and Safety Plan and Traffic Management Plan	Prior to construction	Tetra4 Health and Safety Manager	Once off	Approved Community Health and Safety Plan and Traffic Management Plan
25. A construction method statement should be prepared by the contractor prior to the start of construction.	Contractor		Prior to construction	Contractor EO and/or	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
				Tetra4 EO		
26. Provision should be made in the design phase for permanent access tracks/roads that will be required for the maintenance of the pipeline.	Contractor		Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

5.1.2 CONSTRUCTION PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Comply with Generic Pipeline EMPr conditions for construction phase (Part B).	*(Variable responsibilities)*	Construction specific compliance	Construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
2. Trench breakers with a low hydrological conductivity should be used to reduce water movement in bedding and padding material along the buried pipeline in wetlands and other watercourses. Long and/or steep approaches that border watercourses (specifically wetlands) should receive trench breakers that will help to restrict the desiccation impact on wetlands due to preferential drainage. It is recommended that input be obtained from a geotechnical specialist or geohydrologist regarding the use and positioning of trench breakers along buried sections of the pipeline. Other crossings through depression (pan) and flat wetland require trench-breakers or other forms of underground	Design / Planning Manager Pipeline contractor	River crossing design methodology	Ad hoc	Contractor EO and/or Tetra4 EO	Ad hoc	River crossing design methodology EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
barriers/plugs to prevent preferential drainage along the pipeline/trunkline alignment.						
3. The pipelines will be buried in accordance with the schedule as agreed upon with landowners to minimise disturbance to farming operations.	Pipeline contractor	Comply with construction schedule	According to schedule and agreed with landowners	Contractor EO and/or Tetra4 EO	Monthly	Construction schedule EO Reports
4. Open trenches to be fenced or barricaded where necessary and should be clearly demarcated.	Pipeline contractor	Trench barriers	Whenever open trenches occur	Contractor EO and/or Tetra4 EO	Weekly	EO Reports
5. No trenches may remain open overnight except for the short lead area of the trench (<1 m in length which must be barricaded).	Pipeline contractor	Trench barriers	Whenever open trenches occur	Contractor EO and/or Tetra4 EO	Weekly	EO Reports
6. Access to areas with open fences should be controlled.	Pipeline contractor	Access control	Ad hoc	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
7. Develop and implement a protocol on how to rescue a stranded animal from a trench.	Pipeline contractor	Follow protocol	Ad hoc	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
8. Should any additional development footprints within 1 000 m of the Sand River be proposed, archaeological field surveys of the proposed development footprint areas should be undertaken to identify any tangible remains of the battle of Zand River and the Old Diamond Mine at Welgegun. This must include the associated heritage impact assessment to address any perceived significant impacts on this battle and old diamond mine and its associated tangible remains. A	Heritage specialist	Field survey	Ad hoc	Tetra4 EO	Ad hoc	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
heritage specialist must be appointed to undertake the archaeological field surveys as well as the compilation of a heritage impact assessment report, which must be implemented.						
9. Ensure that as much of the infrastructure as possible is sited away from agricultural lands.	Tetra4 Project Manager / Contractor	Landowner negotiation and agreements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
10. Utilize servitudes, farm roads and any other routes to avoid sensitive areas.	Tetra4 Project Manager / Contractor	Landowner negotiation and agreements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
11. Ensure that pipelines are buried at sufficient depth (1.5 m minimum) to avoid interference with arable agriculture activities.	Tetra4 Project Manager / Contractor	Landowner negotiation and agreements	Ongoing during construction	Contractor EO and/or	Monthly	EO Reports
12. Ensure that new access features along roads are acceptable to SANRAL and allow for safety to motorists and the general public.	Tetra4 Project Manager / Contractor	Safety assessments	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
13. Topsoil should be removed from areas that are to be cleared and stockpiled separately for later use during rehabilitation (and may only be used for rehabilitation purposes).	Contractor	Topsoil stockpiles	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
14. Topsoil stockpiles should not exceed 1.5m in height or have a slope steeper than 1:2.	Contractor	Topsoil stockpiles	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
15. Topsoil stockpiles should ideally not stand for longer than a period of 12 months where possible. Should it be required to	Contractor	Topsoil stockpiles	Ongoing during construction	Contractor EO and/or	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
store topsoil for longer than 12 months, suitable storage methods must be investigated to ensure viability of topsoil is maintained.				Tetra4 EO		
16. All exposed areas should remain moist through water spraying during dry periods where dusty conditions are noted or as directed by the EO.	Contractor	Dust suppression	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
17. All clean water should be diverted away from the site.	Contractor	Clean water diversion berms etc.	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
18. Minimize the area that is disturbed during construction activities in order to minimize the potential stormwater disturbance and to reduce the sediment loads to receiving water courses.	Contractor	Minimized disturbance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
19. Adequate drainage and erosion protection in the form of cut-off berms or trenches should be provided where necessary.	Contractor	Cut-off berms or trenches	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
20. The contractor must prevent labourers form loitering in the area and causing noise disturbance.	Contractor	Effective labour supervision	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
21. Ensure that all equipment is in a good working condition to ensure that no additional noise is admitted from them.	Contractor	Equipment maintenance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
22. Light (visual) impact should be kept to a minimum (e.g. use of full cut-off lighting fixtures if necessary).	Contractor	Lighting considerations	Ongoing during construction	Contractor EO and/or	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
				Tetra4 EO		
23. Retain vegetation were possible to maintain its natural noise and visual screening function.	Contractor	Minimized disturbance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
24. In controlling vehicle entrained particulate matter, it is recommended that water be applied on all unpaved road sections to ensure a minimum of 50% control efficiency (CE). In addition, binding agents or chemical suppressants should be considered for application on all unpaved road sections. The need for dust control to be informed by the ECO.	Contractor	Dust suppression	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
25. Where possible, locate infrastructure in previously disturbed places and/or habitats with a lower sensitivity score.	Contractor	Selection of disturbed areas over natural areas where possible	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
26. Rehabilitate disturbed areas as soon as possible.	Contractor	Rehabilitation immediately following construction	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
27. Control alien and invasive species.	Contractor	Timely control of alien and invasive species	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
28. Where construction activities are closer than 50 m from a demarcated grave site adequate warning signage or barricading must be installed to prevent inadvertent	Contractor	Barricading / warning signs	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
disturbance of the site and where applicable within the buffer.						
29. Where it is suspected that the destruction of possible stillborn and unmarked graves may occur near historic buildings etc, the following mitigations apply: a. written notification to SAHRA that reconnaissance excavation will be undertaken; b. reconnaissance excavation (archaeological test excavation by hand) of the structure(s) to assess whether any graves are indeed located here; and c. should evidence for graves be found, a comprehensive grave relocation procedure must be implemented.	Heritage Specialist	Identify risks of stillborn or unmarked graves and appoint heritage specialist when necessary	Ad hoc	Contractor EO and/or Tetra4 EO	Ad hoc	EO Reports
30. Where construction activities are closer than 50 m from a demarcated historic site, adequate warning signage or barricading must be installed to prevent inadvertent disturbance of the site and where applicable within the buffer. For destruction/disturbance of archaeological sites the relevant permissions and permits must be obtained from SAHRA prior to commencement of destruction activities.	Contractor	Barricading / warning signage	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
31. For destruction/disturbance of historic sites the relevant permissions and permits must be obtained from SAHRA prior to commencement of destruction activities. This may include recording of site by way of measured drawings, photographs and qualitative descriptions. Compilation of Phase 2 Heritage	Heritage Specialist	Obtain permissions from SAHRA	Ad hoc	Contractor EO and/or Tetra4 EO	Ad hoc	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Report containing the recorded data. Submission of permit application to SAHRA/Free State Heritage to allow for the disturbance to the site. A Phase 2 Heritage Report must accompany the permit. Ensure that necessary monitoring is undertaken well in advance of the actual construction, where applicable.						
32. Construction and unavoidable access tracks/roads through wetlands, rivers and other watercourses must provide habitat connectivity between upstream and downstream reaches (e.g. flume pipes and/or culverts) and to reduce the risk of scour erosion and channel incision within the watercourse, if the relevant authorisations (where required) are in place.	Contractor	Comply with wetland crossing method statements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
33. No perched flumes should be present in temporary construction running tracks and/or permanent access tracks.	Contractor	Comply with wetland crossing method statements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
34. Prevent the use of only one or two flume pipes in access/running tracks located in watercourses, specifically unchanneled valley bottom wetland and seep wetlands where concentrated flows can result in head cut development and the formation of a channel.	Contractor	Comply with wetland crossing method statements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
35. Surface flows should also be spread out in channelled watercourse crossings though the use of several flume pipes to prevent channel incision and scour erosion.	Contractor	Comply with wetland crossing	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		method statements				
36. Construction in non-perennial watercourses should ideally occur during the dry season.	Contractor	Comply with wetland crossing method statements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
37. Any new erosion features identified should be stabilised during the construction process (soft interventions such as hay bales, rock packs, runoff control berms and 'bio-socks' are recommended).	Contractor	Identify erosion and timely interventions	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
38. Erosion control features should be maintained.	Contractor	Ongoing maintenance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
39. Keep vegetation clearing to a minimum on the adjacent slopes to prevent erosion on approaches bordering watercourses.	Contractor	Minimize disturbance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
40. Small temporary contour berms may be used to help control runoff on approaches should it be required.	Contractor	Water runoff planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
41. Drainage furrows that may be required to create dry working conditions should ideally be avoided as they can easily erode during high flow events.	Contractor	No drainage furrows in watercourses	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
42. Dewatering discharges at construction sites should be done in a silt trap to prevent erosion and sedimentation in adjacent watercourses.	Contractor	Utilise silt traps	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
43. Runoff from the construction footprint should be controlled on site to prevent concentrated point releases of water into downslope watercourses. Care needs to be taken not to initiate or aggravate erosion in watercourses.	Contractor	Plan water runoff strategically to avoid concentrated release points	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
44. Use smaller/quieter equipment as far as possible when operating near noise sensitive receptors.	Contractor	Use smaller/quieter equipment use near noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
45. Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. When working near noise sensitive receptors, engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised.	Contractor	Regular vehicle and equipment maintenance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
46. Where possible only undertake construction activities during the day. If night-time activities are required, do not operate closer than 500 m from any sensitive receptors. Ensure a good working relationship between the developer and all potentially noise-sensitive receptors.	Contractor	Construction planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
47. Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them (especially if work is to take place within 500 m from them at night).	Contractor	Construction planning and communicating with noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
48. Unless it is an emergency situation, non-routine noisy activities such as construction, decommissioning, start-up and maintenance, should be limited to day-time hours.	Contractor	Construction planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
49. Information that should be provided to potentially sensitive receptor(s) includes: Proposed working dates, the duration that work will take place in an area, and working times; The reason why the activity is taking place; The construction methods that will be used; and Contact details of a responsible person where any complaints can be lodged should there be an issue of concern.	Contractor	Adequate communication with noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
50. When simultaneous noise emitting activities are to take place close to potential noise-sensitive receptors, co-ordinate the working time with periods when the receptors are not at home.	Contractor	Adequate communication with noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
51. Construction activities that are to take place within the below specified distances from noise sensitive receptors must first be discussed and agreed with the affected party: a. Wells: 400 m b. Pipeline: 90 m	Contractor	Adequate communication with noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
c. Blower station: 600 m d. Plant: 430 m e. Compressors: 420 m						
52. Ensure that pipeline route is re-vegetated as soon as possible after construction and that soil surface is in good condition.	Contractor	Ongoing rehabilitation as construction progresses	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
53. Progressive rehabilitation of disturbed land should be carried out to minimize the amount of time that bare soils are exposed to the erosive effects of rain and subsequent runoff.	Contractor	Ongoing rehabilitation as construction progresses	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
54. Traffic and movement over stabilised areas should be controlled (minimised and kept to certain paths), and damage to stabilised areas should be repaired timeously and maintained.	Contractor	Construction planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
55. Ensure that topsoil (0-30 cm approx.) and subsoil (~30 cm and deeper) are stored separately during excavation, so they can be replaced in the correct order.	Contractor	Topsoil management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
56. Should any artefacts, fossils or graves be uncovered during the construction activity, the Applicant, the relevant SAHRA authority and SAPS (in the case of a grave) should be notified immediately, and necessary permitting procedures followed. All activities within this area should be stopped immediately until permitted to proceed by the project environmental manager.	Contractor	Follow chance finds procedure	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
57. The contractor must take all reasonable measures to ensure that fires are not started as a result of operational activities on site and shall also ensure that their operations comply with the Occupational Health and Safety Act (Act No. 85 of 1993).	Contractor	Undertake fire risk assessments	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
58. The following measures will be taken to reduce the risk of fires: No open fires are permitted on site; Every possible precaution shall therefore be taken when working with potential flammable equipment or liquids near potential sources of combustion. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities; The contractor shall ensure that there is always basic firefighting equipment available on site.	Contractor	Undertake fire risk assessments	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
59. The contractor shall appoint a member of his staff to be responsible for the installation and inspection of firefighting equipment; and the contractor is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. A fire and safety officer must be appointed as legally required and should be a member of the local firefighting association to ensure rapid response to all neighbouring farms in case of a fire.	Contractor	Fire emergency planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
60. As construction will only take place during day-time hours and will be of limited duration, Air Quality Sensitive Receptors (AQSRs) within 150 m of a road/pipeline construction site should be notified of the activities and	Contractor	Adequate communication with sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
potential disturbance durations prior to construction taking place.						
61. As construction will only take place during day-time hours and will be of limited duration, AQSRs within 400 m radius of all well construction sites, 600 m from booster station construction sites and 420m from compressor construction sites should be notified of the activities and potential disturbance durations prior to construction taking place.	Contractor	Adequate communication with sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
62. The construction site should be surrounded with suitable safety signage to alert pedestrians and vehicles about the construction activity.	Contractor	Erect safety signage	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
63. Landowners should be notified prior to accessing their land. The number and identity of workers, the purpose of the visit and specific areas to be visited, should be provided in the notification.	Contractor	Adequate communication with landowners	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
64. No worker will be allowed to sleep or overnight within the active construction area, except for minimal security personnel and only if communicated to the applicable landowner.	Contractor	Adequate communication with landowners	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
65. If construction areas are fenced, the fences must be checked for snares on a regular basis for the duration of the construction period and any snares encountered must be reported to the EO for immediate removal and the landowner must be informed.	Contractor	Report snares	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
66. Any contractor or employee caught poaching should be removed from site.	Contractor	Disciplinary action, etc.	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
67. Any potential protected or sensitive areas should be clearly demarcated as no-go areas.	Contractor	Demarcation, barricading and/or signage	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
68. No littering is to take place on the site or surrounding areas.	Contractor	Adequate waste management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
69. Waste disposal drums should be emptied on regular bases. The drums should be water and scavenger proof. Precautions shall be taken to prevent any refuse from spreading on and from the site.	Contractor	Adequate waste management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
70. No waste is allowed to be burned on site.	Contractor	Adequate waste management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
71. The construction servitude should not remain bare (stripped for longer than a month at a time). It is therefore recommended that the pipeline be completely constructed in sections, rather than removing all of the topsoil and creating open trenches across the entire study area for prolonged periods of time.	Contractor	Project schedule	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
72. The servitude width should be restricted in watercourse crossings to reduce the footprint of the impact.	Contractor	Minimize disturbance to watercourses	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
73. Limited topsoil stripping is conditional on the prevention of soil compaction by heavy motorised vehicles (HMVs) through the use and maintenance of running tracks. Examples of running tracks include bogmats or rock aggregate combined with geotextile fabric and flume pipes. Alternatively topsoil across the entire width of the construction servitude (often referred to as the right of way) can be stripped and stored separately outside of buffered watercourses.	Contractor	Minimize disturbance to watercourses	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
74. After completion of the construction phase, the reinstatement of the original topography of the watercourse (its geomorphological template) should be undertaken followed by re-vegetation activities. The following mitigation measures are recommended: Limit the construction activities to the smallest area possible; Reinstate the geomorphological template of the watercourse crossing using subsoil material, followed by topsoil material on top. This should be done as soon as possible after completion of construction activities; During the reinstatement of watercourse profiles to the pre-construction profile, entrenched gullies and channels may have to be cut back to create a lower gradient that will not be susceptible to erosion; Once the crossing has been shaped and topsoil reintroduced to stripped areas, Biojute can be applied according to specification to avoid rill formation and undercutting below Biojute material.	Contractor	Watercourse rehabilitation plan	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
75. All on-site vehicle and equipment maintenance must be undertaken within an area of secondary containment, such	Contractor	Pre-emptive spill or leak management	Ongoing during construction	Contractor EO and/or	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
as a bund or over a drip tray, to prevent accidental soil contamination.				Tetra4 EO		
76. Oil and diesel stored on site must be placed within a suitably sized bund. The dispensing of hydrocarbons must be undertaken with due care to prevent or contain spills.	Contractor	Pre-emptive spill or leak management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
77. Areas that have been cleared should be re-vegetated with indigenous species as agreed to by the landowner, such as *Eragrostis tef*, after construction and initial rehabilitation work (reinstatement of the geomorphological and topographical template) is completed.	Contractor	Comply with revegetation and rehabilitation plan	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
78. All workers must be educated on the need to ensure safety of surrounding communities and the public in general.	Contractor	General awareness of public and their safety at all times	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
79. Road safety legislation must be complied with at all times with additional consideration of the World Bank Group Environmental Health and Safety Guidelines.	Contractor	Comply with the rules of the road	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

5.1.3 OPERATIONAL PHASE (PRODUCTION PHASE)

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Comply with Generic Pipeline EMPr conditions for post construction phase (Part B).	Tetra4	Operational specific compliance	Operational phase	Tetra4 EO	Monthly	EO Reports
2. Affected landowners should be informed if it is necessary to open the trench for repair work. They must be given at least 24 hours' notice unless it is an emergency. They must be notified on what date and time the trenches will be re-opened, how big a team will be on their property and what kind of equipment will be used.	Tetra4 Project Manager	Timely notification and discussions with landowners	Ad hoc	Tetra4 EO	Monthly	EO Reports
3. Open trenches to be fenced or barricaded where necessary and should be clearly demarcated.	Tetra4 EO	Barricading, etc.	While trenches are open	Tetra4 EO	Monthly	EO Reports
4. Access to areas with open fences should be controlled.	Tetra4 EO	Access control	Ad hoc	Tetra4 EO	Monthly	EO Reports
5. If any damage is done to the property or harvest of the landowner, they must be compensated for their losses.	Tetra4 CLO and EO	Compensation for losses	Ad hoc	Tetra4 EO	Ad hoc	EO Reports
6. The impacts of servitudes on the land value of the affected properties must be considered and mitigated by means of negotiation. If the negotiation process is unsuccessful, it must be arbitrated by a suitably qualified third party. Once the preferred routing has been identified, Tetra4 must engage with the affected landowners for consensus of the preferred final pipeline routing. The preferred or final routing will be developed (where possible) in conjunction with landowners for their respective property. The agreed upon routing must be	Tetra4 Project Manager	Land valuation and servitude compensation	Ongoing	Tetra4 EO	Annually	Compensation proof

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
attached to Landowner agreements as a sketch plan and indicate the provisional servitude area.						
7. All gates on the landowners' property (and where relevant adjacent properties traversed) are to be closed if found closed and left open if found open. Contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be represented at all times. Any impact such as noise, dust, bright lights etc. that may cause disturbance to landowners or tenants, will be kept to a minimum.	Tetra4 EO	Access control	Ad hoc	Tetra4 EO	Weekly	EO Reports
8. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the responsible party.	Tetra4 Project Manager	Compensation for losses	Ad hoc	Tetra4 EO	Ad hoc	EO Reports
9. Labour should be transported to and from site to discourage loitering in adjacent areas.	Tetra4 Project Manager	Labour transport arrangements	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
10. Workers should be easily identifiable by clothing and ID badges (with clear ID photographs).	Tetra4 Health and Safety officers	Worker identification	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
11. Fires will only be allowed in facilities or equipment specially constructed for this purpose.	Tetra4 EO	Fire risk assessment	Ad hoc	Tetra4 EO	Monthly	EO Reports
12. A firebreak shall be maintained around the perimeter of the LNG Plant complex	Tetra4 EO	Maintain firebreak	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
13. Sufficient ablution facilities should be made available where relevant.	Tetra4 EO	Provision of ablution facilities	Throughout operational phase	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
14. Ensure that any possible source of leakage/spillage is contained and that bulk storage facilities are isolated from surrounding soils, especially wetlands.	Tetra4 EO	Infrastructure maintenance	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
15. Control all waste sources emanating from operations activities.	Tetra4 EO	Waste management	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
16. An emergency response protocol must be implemented at the operations that are aimed at early detection and swift reaction. Where possible and reasonable daily inspections (focused on detecting leaks and spills) of pipelines and booster stations must be implemented.	Tetra4 EO	Emergency response protocol and emergency drills	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
17. All workers must be educated on the need to ensure safety of surrounding communities and the public in general.	Tetra4 EO	Ensure safety of surrounding communities and public	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
18. Road safety legislation must be complied with at all times with additional consideration of the World Bank Group Environmental Health and Safety Guidelines.	Tetra4 EO	Always comply with rules of the road	Throughout operational phase	Tetra4 EO	Monthly	EO Reports

5.1.4 DECOMISSIONING AND CLOSURE PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Comply with Generic Pipeline EMPr conditions for post construction phase (Part B).	Tetra4 EO	Decommissioning and Closure specific compliance	Decommissioning and Closure phase	Tetra4 EO	Monthly	EO Reports
2. Rehabilitate area to its original landform or as agreed to by the landowner, tenants and/or authorities.	Tetra4 EO	Reinstatement and revegetation	Within 6 months from commencement of decommissioning	Tetra4 EO	Monthly	EO Reports
3. Rip compacted surfaces where necessary as part of the rehabilitation.	Tetra4	Rip compacted areas	Once off	Tetra4 EO	Monthly	EO Reports
4. Re-vegetation should be done where required. The use of indigenous species to the specific area should be promoted.	Tetra4 EO	Indigenous seeding where necessary using the correct seed mix as agreed to with landowner	Following reinstatement and during appropriate season	Tetra4 EO	Monthly	EO Reports
5. Weed species should be eradicated at all disturbed areas. This must be monitored for a period following rehabilitation to ensure that alien invasive plants do not establish themselves.	Tetra4 EO	Identify and eradicate weed species using appropriate methods in consultation with landowners	Ad hoc	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
6. Re-vegetation of cleared areas should occur directly after decommissioning of production infrastructure has been completed.	Tetra4 EO	Reinstatement and revegetation	Within 6 months from commencement of decommissioning	Tetra4 EO	Monthly	EO Reports
7. Regular inspections should be carried out during the entire rehabilitation process and ongoing maintenance must be implemented until the area is fully rehabilitated.	Tetra4 EO	Visual inspections	Monthly until rehabilitation is successful	Tetra4 EO	Monthly	EO Reports
8. The production footprint area and all other areas impacted on by production and other activities, should be suitably rehabilitated (where necessary) to re-attract faunal species to the area, to provide suitable habitat for their re-establishment, and to prevent the loss of land use capacity.	Tetra4 EO	Reinstatement and revegetation	Within 6 months from commencement of decommissioning	Tetra4 EO	Monthly	EO Reports
9. If the landowner wishes to utilise the infrastructure this must be agreed to and handed over in writing. Provision should be made in instances where a farmer wants to retain a borehole or section of pipeline for water supply. Written agreement must be obtained in such cases.	Tetra4 Land Liaison Officer	Landowner agreement	Ad hoc	Tetra4 EO	Ad hoc	EO Reports
10. Remnant erosion features that remain after the rehabilitation phase should be addressed until full rehabilitation and closure is achieved. Rehabilitation interventions should be considered with care and not worsen erosion once implemented.	Tetra4 EO	Visual inspections	Monthly until rehabilitation is successful	Tetra4 EO	Monthly	EO Reports
11. During the start of the growing season the annual grass *Eragrostis tef* can be introduced through manual broadcasting	Tetra4 EO	Indigenous seeding where necessary using	Following reinstatement and during	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
on reinstated watercourse surfaces. The use of this species must however be discussed and agreed with the affected landowner prior to use.		the correct seed mix as agreed to with landowner	appropriate season			
12. Rehabilitated areas within watercourse boundaries must be protected from overgrazing. Protection methods must be identified in consultation with the respective landowners.	Tetra4 EO	Landowner agreement	Ad hoc	Tetra4 EO	Monthly	EO Reports

5.2 PLANT, COMPRESSION STATIONS AND ASSOCIATED INFRASTRUCTURE

Impact management outcome: Ensure public safety and prevent pollution of the surrounding environment.

5.2.1 DESIGN / PLANNING PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. A hazardous installation risk assessment must be conducted prior to construction and any recommendations of such assessments complied with.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
2. The location of any servitudes or third-party infrastructure must be identified prior to commencement at a specific site and the necessary approvals obtained. This specifically includes the	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
necessary consents for the location of compression stations when located in proximity to local, provincial and national roads.						
3. Once final development footprints (both drilling and development footprints) are determined and confirmed for implementation in specific areas, a public consultation process must be undertaken during which the relevant Interested & Affected Parties (I&APs) are invited to come forward and state whether they are aware of any sacred water sites (secret or not) located within the buffer areas recommended in the hydrology and geohydrology specialist reports. It is important to note that at this stage the I&Ps will not be requested to provide information on the exact location of such sacred sites, only whether such sites are located within these buffer areas. Care must be taken during the public participation to ensure that the cartographic and location information presented to the I&APs contains clear enough information for them to confidently recognise the positions of such proposed drilling site(s) should these be located anywhere in proximity to the properties and landscapes they have knowledge of. The presentation of such cartographic information in English, Afrikaans and Sesotho would be paramount. Should an I&AP state that such a sacred site is indeed located within the recommended buffer area of a proposed development footprint, an experienced team comprising a heritage specialist and geohydrologist must accompany the I&AP to the sacred site for confirmation purposes. The heritage specialist and geohydrologist must compile a letter to indicate the findings of their fieldwork i.e. whether such a sacred site was indeed identified within the recommended buffer area from the proposed development. All aspects relating to the location of the	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
sacred site must be kept strictly confidential. At no stage will any information regarding the position of the sacred site (GPS coordinates, property description etc.) be contained in the letter, or in any other report, document or verbal communication. The confidential manner in which this mitigation will be approached and undertaken with regards to the locations of Sacred Natural Sites, must be clearly communicated to the I&AP from the outset. Once the above-mentioned mitigation work has confirmed the presence of a Sacred Natural Site, the appropriate recommendations must be made by the appointed heritage specialist and geohydrologist.						
4. The relevant heritage screening in accordance with Section 38 of the NHRA, must be completed by a suitably trained EO for all new drill sites and pipeline routes if heritage features are observed or suspected to be on site as part of a site-specific pre-commencement assessment.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
5. Locate pipeline compressors outside of buffered watercourses (sensitive watercourse habitat) as far as possible.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
6. Search and rescue of species of concern.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
7. Obtain permits for disturbance/destruction of any listed/protected species found on site.	Design / Planning Manager	Design and planning	During planning and design phase	Contractor EO and/or	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		specific compliance		Tetra4 EO		
8. Landowners must be consulted, and all reasonable requests complied with. A written landowner agreement should be negotiated and concluded prior to commencement. Should this not be possible, a record should be kept of reasonable negotiations with the land owners.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
9. If sensitive species occur within the preferred footprint, the first option should be to relocate the proposed footprint followed by the alternative of preparing a relocation plan (prepared by a suitably qualified specialist).	Design / Planning Manager and/or Contractor EO and/or Tetra4 EO	Identify and manage sensitive species	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Route deviation revisions or relocation plan and records of relocation EO Reports
10. International Best Practice Standards in design of LNG facilities must be implemented.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
11. Any operational activities that will take place within the below specified distances from noise sensitive receptors must first be discussed and agreed with the affected party (prior to construction): c. Operation (daytime):	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
i. Booster station: 50 m ii. Plant: 170 m iii. Compressors: 80 m d. Operation (night-time): i. Booster station: 150 m ii. Plant: 580 m iii. Compressors: 150 m						
12. Tetra4 must provide all the affected landowners with a construction schedule to ensure that they know when construction will take place on their properties. Any changes to the construction schedule must be communicated to the farmers at least a week in advance.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
13. Before activities commence on privately owned land, Tetra 4 must discuss with the landowner and if agreed to, compile an asset and infrastructure baseline of any landowner infrastructure that may be affected by the project. Any infrastructure or landowner property damaged by Tera4 must be suitably compensated. Photographs and GPS co-ordinates of the infrastructure must be included in the baseline (under strict agreement by the landowner). A copy of the baseline affecting their property should be given to each landowner, who should sign off the document to ensure that it is accurate. Tetra 4 should keep the master document. If any damage occurs, it should be reinstated to its pre-project status. If the infrastructure must move, it must be done at	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Tetra 4's cost. Tetra 4 must ensure that the construction team has a copy of the asset and infrastructure baseline to guarantee that no infrastructure will be damaged due to ignorance during the construction phase of the project.						
14. All contractors should sign a code of conduct as part of their induction process. Induction must explicitly include aspects such as closing gates and littering. A disciplinary action system must be put in place for any transgressions affecting the landowners.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
15. Contractors should be required to make use of a certain proportion of local labour - it is acknowledged that not all skills will be available locally. Jobs should be advertised in a way that is accessible to all members of society and labour desks (labour registration stations) should be in accessible areas. No unrealistic expectations should be created and the recruitment policy giving preference to local labour should be communicated from the beginning of the project. The local area of influence should be agreed with the stakeholders early on in the process.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
16. A community health and safety plan inclusive of a Traffic Management Plan will be developed based on risks identified in consideration of community health and safety.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

5.2.2 CONSTRUCTION PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Ensure that as much of the infrastructure as possible is sited away from agricultural lands.	Tetra4 Project Manager / Contractor	Landowner negotiation and agreements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
2. Utilize servitudes, farm roads and any other routes to avoid sensitive areas.	Tetra4 Project Manager / Contractor	Landowner negotiation and agreements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
3. Ensure that and new access features along roads are acceptable to SANRAL and allow for safety to motorists and the general public.	Tetra4 Project Manager / Contractor	Access features to comply with SANRAL requirements	Once off	Tetra4 EO	Monthly	EO Reports
4. Topsoil should be removed from areas that are to be cleared and stockpiled separately for later use during rehabilitation (and may only be used for rehabilitation purposes).	Contractor	Topsoil stockpiles	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
5. Topsoil stockpiles should not exceed 1.5m in height or have a slope steeper than 1:2.	Contractor	Topsoil stockpiles	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
6. Topsoil stockpiles should ideally not stand for longer than a period of 12 months where possible. Should it be required to store topsoil for longer than 12 months, suitable storage methods must be investigated to ensure viability of topsoil is maintained.	Contractor	Topsoil stockpiles	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
7. All exposed areas should remain moist through water spraying during dry periods where dusty conditions are noted or as directed by the EO.	Contractor	Dust suppression	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
8. All clean water should be diverted away from the site.	Contractor	Clean water diversion berms etc.	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
9. Minimize the area that is disturbed during construction activities in order to minimize the potential stormwater disturbance and to reduce the sediment loads to receiving water courses.	Contractor	Minimized disturbance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
10. Adequate drainage and erosion protection in the form of cut-off berms or trenches should be provided where necessary.	Contractor	Cut-off berms or trenches	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
11. The contractor must prevent labourers form loitering in the area and causing noise disturbance.	Contractor	Effective labour supervision	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
12. Ensure that all equipment is in a good working condition to ensure that no additional noise is admitted from them.	Contractor	Equipment maintenance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
13. Light (visual) impact should be kept to a minimum (e.g. use of full cut-off lighting fixtures if necessary).	Contractor	Lighting considerations	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
14. Retain vegetation were possible to maintain its natural noise and visual screening function.	Contractor	Minimized disturbance	Ongoing during construction	Contractor EO and/or	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
				Tetra4 EO		
15. In controlling vehicle entrained particulate matter, it is recommended that water be applied on all unpaved road sections to ensure a minimum of 50% control efficiency (CE). In addition, binding agents or chemical suppressants should be considered for application on all unpaved road sections. The need for dust control to be informed by the ECO.	Contractor	Dust suppression	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
16. Where possible, locate infrastructure in previously disturbed places and/or habitats with a lower sensitivity score.	Contractor	Rehabilitation immediately following construction	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
17. Rehabilitate disturbed areas as soon as possible.	Contractor	Timely control of alien and invasive species	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
18. Control alien and invasive species.	Contractor	Barricading / warning signs	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
19. Where construction activities are closer than 50 m from a demarcated grave site adequate warning signage or barricading must be installed to prevent inadvertent disturbance of the site and where applicable within the buffer.	Contractor	Barricading / warning signs	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
20. Where it is suspected that the destruction of possible stillborn and unmarked graves may occur near historic buildings etc, the following mitigations apply:	Heritage Specialist	Identify risks of stillborn or unmarked graves and	Ad hoc	Contractor EO and/or Tetra4 EO	Ad hoc	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
a. written notification to SAHRA that reconnaissance excavation will be undertaken; b. reconnaissance excavation (archaeological test excavation by hand) of the structure(s) to assess whether any graves are indeed located here; and c. should evidence for graves be found, a comprehensive grave relocation procedure must be implemented.		appoint heritage specialist when necessary				
21. Where construction activities are closer than 50 m from a demarcated historic site, adequate warning signage or barricading must be installed to prevent inadvertent disturbance of the site and where applicable within the buffer. For destruction/disturbance of archaeological sites the relevant permissions and permits must be obtained from SAHRA prior to commencement of destruction activities.	Contractor	Barricading / warning signage	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
22. For destruction/disturbance of historic sites the relevant permissions and permits must be obtained from SAHRA prior to commencement of destruction activities. This may include recording of site by way of measured drawings, photographs and qualitative descriptions. Compilation of Phase 2 Heritage Report containing the recorded data. Submission of permit application to SAHRA/Free State Heritage to allow for the disturbance to the site. A Phase 2 Heritage Report must accompany the permit. Ensure that necessary monitoring is undertaken well in advance of the actual construction, where applicable.	Heritage Specialist	Obtain permissions from SAHRA	Ad hoc	Contractor EO and/or Tetra4 EO	Ad hoc	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
23. Construction and unavoidable access tracks/roads through wetlands, rivers and other watercourses must provide habitat connectivity between upstream and downstream reaches (e.g. flume pipes and/or culverts) and to reduce the risk of scour erosion and channel incision within the watercourse, if the relevant authorisations (where required) are in place.	Contractor	Comply with wetland crossing method statements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
24. Construction in non-perennial watercourses should ideally occur during the dry season.	Contractor	Comply with wetland crossing method statements	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
25. Any new erosion features identified should be stabilised during the construction process (soft interventions such as hay bales, rock packs, runoff control berms and 'bio-socks' are recommended).	Contractor	Identify erosion and timely interventions	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
26. Erosion control features should be maintained.	Contractor	Ongoing maintenance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
27. Keep vegetation clearing to a minimum on the adjacent slopes to prevent erosion on approaches bordering watercourses.	Contractor	Minimize disturbance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
28. Small temporary contour berms may be used to help control runoff on approaches should it be required.	Contractor	Water runoff planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
29. Drainage furrows that may be required to create dry working conditions should ideally be avoided as they can easily erode during high flow events.	Contractor	No drainage furrows in watercourses	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
30. Dewatering discharges at construction sites should be done in a silt trap to prevent erosion and sedimentation in adjacent watercourses.	Contractor	Utilise silt traps	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
31. Runoff from the construction footprint should be controlled on site to prevent concentrated point releases of water into downslope watercourses. Care needs to be taken not to initiate or aggravate erosion in watercourses.	Contractor	Plan water runoff strategically to avoid concentrated release points	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
32. Use smaller/quieter equipment as far as possible when operating near noise sensitive receptors.	Contractor	Use smaller/quieter equipment use near noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
33. Ensuring that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. When working in close proximity to noise sensitive receptors, engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised.	Contractor	Regular vehicle and equipment maintenance	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
34. Where possible only undertake construction activities during the day. If night-time activities are required, do not operate closer than 500 m from any sensitive receptors. Ensure a good working relationship between the developer and all potentially noise-sensitive receptors.	Contractor	Construction planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
35. Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them (especially if work is to take place within 500 m from them at night).	Contractor	Construction planning and communicating with noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
36. Unless it is an emergency situation, non-routine noisy activities such as construction, decommissioning, start-up and maintenance, should be limited to day-time hours.	Contractor	Construction planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
37. Information that should be provided to potentially sensitive receptor(s) includes: Proposed working dates, the duration that work will take place in an area, and working times; The reason why the activity is taking place; The construction methods that will be used; and Contact details of a responsible person where any complaints can be lodged should there be an issue of concern.	Contractor	Adequate communication with noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
38. When simultaneous noise emitting activities are to take place close to potential noise-sensitive receptors, co-ordinate the working time with periods when the receptors are not at home.	Contractor	Adequate communication with noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
39. Construction activities that are to take place within the below specified distances from noise sensitive receptors must first be discussed and agreed with the affected party: a. Wells: 400 m b. Pipeline: 90 m c. Blower station: 600 m d. Plant: 430 m e. Compressors: 420 m	Contractor	Adequate communication with noise sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
40. Progressive rehabilitation of disturbed land should be carried out to minimize the amount of time that bare soils are exposed to the erosive effects of rain and subsequent runoff.	Contractor	Ongoing rehabilitation as construction progresses	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
41. Traffic and movement over stabilised areas should be controlled (minimised and kept to certain paths), and damage to stabilised areas should be repaired timeously and maintained.	Contractor	Construction planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
42. Ensure that topsoil (0-30 cm approx.) and subsoil (30 cm +) are stored separately during excavation, so they can be replaced in the correct order.	Contractor	Topsoil management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
43. Should any artefacts, fossils or graves be uncovered during the construction activity, the Applicant, the relevant SAHRA authority and SAPS (in the case of a grave) should be notified immediately, and necessary permitting procedures followed. All activities within	Contractor	Follow chance finds procedure	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
this area should be stopped immediately until permitted to proceed by the project environmental manager.						
44. The contractor must take all reasonable measures to ensure that fires are not started because of operational activities on site and shall also ensure that their operations comply with the Occupational Health and Safety Act (Act No. 85 of 1993).	Contractor	Undertake fire risk assessments	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
45. The following measures will be taken to reduce the risk of fires: No open fires are permitted on site; Every possible precaution shall therefore be taken when working with potential flammable equipment or liquids near potential sources of combustion. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities; The contractor shall ensure that there is always basic firefighting equipment available on site.	Contractor	Undertake fire risk assessments	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
46. The contractor shall appoint a member of his staff to be responsible for the installation and inspection of firefighting equipment; and the contractor is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. A fire and safety officer must be appointed as legally required and should be a member of the local firefighting association to ensure rapid response to all neighbouring farms in case of a fire.	Contractor	Fire emergency planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
47. As construction will only take place during day-time hours and will be of limited duration, AQSRs within 150 m of a road/pipeline	Contractor	Adequate communication with sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
construction site should be notified of the activities and potential disturbance durations prior to construction taking place.						
48. As construction will only take place during day-time hours and will be of limited duration, AQSRs within 400 m radius of all well construction sites, 600 m from booster station construction sites and 420m from compressor construction sites should be notified of the activities and potential disturbance durations prior to construction taking place.	Contractor	Adequate communication with sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
49. On-site rainfall must be measured at the Helium Plant on a regular basis.	Tetra4 EO	Rainfall data capturing	Year round	Tetra4 EO	Monthly	Monitoring Reports and/or EO Reports
50. The construction site should be surrounded with suitable safety signage to alert pedestrians and vehicles about the construction activity.	Contractor	Erect safety signage	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
51. Landowners should be notified prior to accessing their land. The number and identity of workers, the purpose of the visit and specific areas to be visited, should be provided in the notification.	Contractor	Adequate communication with landowners	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
52. No worker will be allowed to sleep or overnight within the active construction area, except for minimal security personnel and only if communicated to the applicable landowner.	Contractor	Adequate communication with landowners	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
53. If construction areas are fenced, the fences must be checked for snares on a regular basis for the duration of the construction	Contractor	Report snares	Ongoing during construction	Contractor EO and/or	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
period and any snares encountered must be reported to the EO for immediate removal and the landowner must be informed.				Tetra4 EO		
54. Any contractor or employee caught poaching should be removed from site.	Contractor	Disciplinary action, etc.	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
55. Any potential protected or sensitive areas should be clearly demarcated as no-go areas.	Contractor	Demarcation, barricading and/or signage	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
56. No littering is to take place on the site or surrounding areas.	Contractor	Adequate waste management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
57. Waste disposal drums should be emptied on regular bases. The drums should be water and scavenger proof. Precautions shall be taken to prevent any refuse from spreading on and from the site.	Contractor	Adequate waste management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
58. No waste is allowed to be burned on site.	Contractor	Adequate waste management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
59. All on-site vehicle and equipment maintenance must be undertaken within an area of secondary containment, such as a bund or over a drip tray, to prevent accidental soil contamination.	Contractor	Pre-emptive spill or leak management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
60. Oil and diesel stored on site must be placed within a suitably sized bund. The dispensing of hydrocarbons must be undertaken with due care to prevent or contain spills.	Contractor	Pre-emptive spill or leak management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
61. Areas that have been cleared should be re-vegetated with indigenous species as agreed to by the landowner, such as *Eragrostis tef*, after construction and initial rehabilitation work (reinstatement of the geomorphological and topographical template) is completed.	Contractor	Comply with revegetation and rehabilitation plan	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
62. All workers must be educated on the need to ensure safety of surrounding communities and the public in general.	Contractor	General awareness of public and their safety at all times	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
63. Road safety legislation must be complied with at all times with additional consideration of the World Bank Group Environmental Health and Safety Guidelines.	Contractor	Comply with the rules of the road	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
64. The construction camp and office site shall be located adjacent to the plant as indicated in the EIAr and no other temporary camps may be constructed outside of the assessed area unless approved by the landowner and with due consideration of the enviro-legal requirements. The area required for the camp and site office shall be kept to a minimum, as to reduce the impact on surrounding ecology. Activities should be restricted to the agreed or fenced area.	Contractor	Construction camp locations	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
65. An approved chemical toilet service supplier should be used to supply and maintain chemical toilets for the duration of the proposed activity on the site. Portable toilets should be sited on	Tetra4	Provide sufficient ablution facilities and	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
the campsite in such a way that they do not cause water pollution, odour or other forms of pollution.		maintain adequately				

5.2.3 OPERATIONAL PHASE (PRODUCTION PHASE)

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Implement a site-specific stormwater management plan for the compressor and helium/LNG plant that will enable dispersed release of runoff at outlets, with outlets located outside (upslope) of buffered watercourses (where possible).	Tetra4 Plant Manager	Maintain SWMP	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
2. Ensure separation of clean and dirty water and provide for adequate dirty water containment.	Tetra4 Plant Manager	Maintain SWMP	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
3. Ensure that sufficient ablution facilities are available on site and that septic tanks are located outside of buffered watercourses.	Tetra4 Plant Manager	Maintain ablution facilities	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
4. Stabilise new channels that form as a result of head cut erosion or other forms of erosion once they are recorded.	Tetra4 EO	Identify and contain erosion	Ad hoc	Tetra4 EO	Monthly	EO Reports
5. International Best Practice Standards in operation of LNG facilities must be implemented.	Tetra4 Plant Manager	Operate plant according to International	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		Best Practice Standards				
6. All gates on the landowners' property (and where relevant adjacent properties traversed) are to be closed if found closed and left open if found open. Contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be represented at all times. Any impact such as noise, dust, bright lights etc. that may cause disturbance to landowners or tenants, will be kept to a minimum.	Tetra4 Maintenance Crews	Ensure landowner access protocols are followed	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
7. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the responsible party.	Tetra4 Project Manager	Compensation for losses	Ad hoc	Tetra4 EO	Ad hoc	EO Reports
8. Access to the production area should be strictly controlled.	Tetra4 Project Manager	Security access control	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
9. Labour should be transported to and from site to discourage loitering in adjacent areas.	Tetra4 Project Manager	Labour transport arrangements	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
10. Workers should be easily identifiable by clothing and ID badges (with clear ID photographs).	Tetra4 Health and Safety officers	Worker identification	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
11. Fires will only be allowed in facilities or equipment specially constructed for this purpose.	Tetra4 EO	Fire risk assessment	Ad hoc	Tetra4 EO	Monthly	EO Reports
12. A firebreak shall be maintained around the perimeter of the LNG Plant complex	Tetra4 EO	Maintain firebreak	Throughout operational phase	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
13. Sufficient ablution facilities should be made available.	Tetra4 EO	Provision of ablution facilities	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
14. Ensure that any possible source of leakage/spillage is contained and that bulk storage facilities are isolated from surrounding soils, especially wetlands.	Tetra4 EO	Infrastructure maintenance	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
15. Control all waste sources emanating from operations activities.	Tetra4 EO	Waste management	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
16. All wastes generated must be stored and disposed of according to relevant legal requirements.	Tetra4 EO	Waste management	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
17. The use of low–NOx burners should be considered for operation of the Helium and LNG plant.	Tetra4 Project Manager	Utilise low-NOx burners	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
18. Products, liquid fuels and chemicals should be stored in areas where there are provisions for containment of spills.	Tetra4 EO	Hazardous chemical management	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
19. Implementing vapour recovery systems to control losses of VOCs for storage tanks and other applicable units should be considered.	Tetra4 Project Manager	Utilise vapor recovery systems	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
20. A suitable and effective gas leak detection system must be designed and implemented to monitor gas leaks from the pipelines and other production infrastructure.	Tetra4 Project Manager	Ensure leak detection system is working at all times	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
21. A suitable boil off gas recovery system must be installed.	Tetra4 Project Manager	Utilise boil off gas recovery system	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
22. Automatic shutdown systems and pressure release valves must be implemented where appropriate.	Tetra4 Project Manager	Ensure automatic shut down systems and pressure release valves are functional	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
23. On-site rainfall must be measured at the Helium Plant on a regular basis.	Tetra4 EO	Rainfall data capturing	Year round	Tetra4 EO	Monthly	Monitoring Reports and/or EO Reports
24. No littering is to take place on the site or surrounding areas.	Tetra4 EO	Maintain adequate waste management practices	Ongoing during operational phase	Tetra4 EO	Monthly	Monitoring Reports and/or EO Reports
25. Waste disposal drums should be emptied on regular bases. The drums should be water and scavenger proof. Precautions shall be taken to prevent any refuse from spreading on and from the site.	Tetra4 EO	Adequate waste management	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
26. No waste is allowed to be burned on site.	Tetra4 EO	Adequate waste management	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
27. An emergency response protocol must be implemented at the operations that are aimed at early detection and swift reaction. Where possible and reasonable daily inspections (focused on	Tetra4 EO	Emergency response protocol and	Throughout operational phase	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
detecting leaks and spills) of compressor stations and LNG/LHe Plant must be implemented.		emergency drills				
28. All on-site vehicle and equipment maintenance must be undertaken within an area of secondary containment, such as a bund or over a drip tray, to prevent accidental soil contamination.	Tetra4 maintenance crews	Pre-emptive spill or leak management	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
29. Oil and diesel stored on site must be placed within a suitably sized bund. The dispensing of hydrocarbons must be undertaken with due care to prevent or contain spills.	Tetra4 HSE Manager	Pre-emptive spill or leak management	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports

5.2.4 DECOMISSIONING AND CLOSURE PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Rehabilitate area to its original landform or as agreed to by the landowner, tenants and/or authorities.	Tetra4 EO	Reinstatement and revegetation	Within 6 months from commencement of decommissioning	Tetra4 EO	Monthly	EO Reports
2. Rip compacted surfaces where necessary as part of the rehabilitation.	Tetra4	Rip compacted areas	Once off	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
3. Re-vegetation should be done where required. The use of indigenous species to the specific area should be promoted.	Tetra4 EO	Indigenous seeding where necessary using the correct seed mix as agreed to with landowner	Following reinstatement and during appropriate season	Tetra4 EO	Monthly	EO Reports
4. Weed species should be eradicated at all disturbed areas. This must be monitored for a period following rehabilitation to ensure that alien invasive plants do not establish themselves.	Tetra4 EO	Identify and eradicate weed species using appropriate methods in consultation with landowners	Ad hoc	Tetra4 EO	Monthly	EO Reports
5. Re-vegetation of cleared areas should occur directly after decommissioning of production infrastructure has been completed.	Tetra4 EO	Reinstatement and revegetation	Within 6 months from commencement of decommissioning	Tetra4 EO	Monthly	EO Reports
6. Regular inspections should be carried out during the entire rehabilitation process and ongoing maintenance must be implemented until the area is fully rehabilitated.	Tetra4 EO	Visual inspections	Monthly until rehabilitation is successful	Tetra4 EO	Monthly	EO Reports
7. The production footprint area and all other areas impacted on by production and other activities, should be suitably rehabilitated (where necessary) to re-attract faunal species to the area, to provide suitable habitat for their re-establishment, and to prevent the loss of land use capacity.	Tetra4 EO	Reinstatement and revegetation	Within 6 months from commencement of decommissioning	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
8. If the landowner wishes to utilise the infrastructure this must be agreed to and handed over in writing. Provision should be made in instances where a farmer wants to retain a borehole or section of pipeline for water supply. Written agreement must be obtained in such cases.	Tetra4 Land Liaison Officer	Landowner agreement	Ad hoc	Tetra4 EO	Ad hoc	EO Reports
9. Remnant erosion features that remain after the rehabilitation phase should be addressed until full rehabilitation and closure is achieved. Rehabilitation interventions should be considered with care and not worsen erosion once implemented.	Tetra4 EO	Visual inspections	Monthly until rehabilitation is successful	Tetra4 EO	Monthly	EO Reports

5.3 EXPLORATION DRILLING

Impact management outcome: Minimization of impacts on existing land-use, sensitive areas and surface and ground water. Improvement of numerical modelling results.

5.3.1 DESIGN / PLANNING PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Any drill sites or infrastructure routes located inside medium, high or very highly sensitive sites on the sensitivity /constraint map require a site-specific pre-commencement assessment. The pre-commencement assessment must address the sensitive aspects on	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
site, as identified in the overall sensitivity / constraint map. The pre-commencement assessment must be compiled by the site Environmental Officer (EO) with a suitable environmental qualification and experience. All recommendations of the pre-commencement assessment must be implemented on site. The completeness and adequacy of the pre-commencement assessment in respect of identifying and managing on site sensitivities must be included in the monthly ECO reports and annual independent audit.						
2. The identified drill site should, where possible, not infringe on the landowners' surface activities.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
3. Unless agreed to by the relevant landowner, irrigation Pivot points should remain unaffected by infrastructure, and must be deviated around or buried to allow for continued pivot irrigation operation.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
4. Once prospective drilling sites are identified, a suitably trained EO must undertake a site-specific pre-commencement assessment to assess the site for any potential environmental sensitivities prior to commencement. Should environmental sensitivities be identified, the relevant Tetra4 Response or Action Plan Procedures must be adhered to.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
5. The location of the drilling site should be done so as to impact minimally on the daily activities of the landowner. The location of the site should be consulted with the landowner.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
6. Drilling site should not be situated near visually sensitive areas or residential areas unless agreed to by the relevant landowner. Steep areas should be avoided.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
7. A hydrocensus must be undertaken within a 500 m radius around each future gas production target to confirm the presence of private boreholes that have not already been identified as part of the 2016 and 2022 hydrocensus. All private boreholes inside this zone must be visited and inspected. The information gathered must be used to plan for, and implement, groundwater management measures. A photo must be taken of each private borehole within the 500 m radius for future record. The testing requirements for each borehole should be evaluated based on field conditions. A sound groundwater monitoring programme must be implemented in the hydrocensus boreholes that will be affected as well as in the newly drilled monitoring boreholes. Should the results of the monitoring programme indicate a negative impact on private groundwater users as a result of Tetra4's activities, alternative arrangements must be negotiated with the affected parties.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
8. Once final development footprints (both drilling and development footprints) are determined and confirmed for implementation in specific areas, a public consultation process must be undertaken during which the relevant Interested & Affected Parties (I&APs) are invited to come forward and state whether they are aware of any sacred water sites (secret or not) located within the buffer areas recommended in the hydrology and geohydrology specialist reports. It is important to note that at this stage the I&Ps will not be requested to provide information on the exact location of such sacred sites, only whether such sites are located within these buffer areas. Care must be taken during the public participation to ensure that the cartographic and location information presented to the I&APs contains clear enough information for them to confidently recognise the positions of such proposed drilling site(s) should these be located anywhere in proximity to the properties and landscapes they have knowledge of. The presentation of such cartographic information in English, Afrikaans and Sesotho would be paramount. Should an I&AP state that such a sacred site is indeed located within the recommended buffer area of a proposed development footprint, an experienced team comprising a heritage specialist and geohydrologist must accompany the I&AP to the sacred site for confirmation purposes. The heritage specialist and geohydrologist must compile a letter to indicate the findings of their fieldwork i.e. whether such a sacred site was indeed identified within the recommended buffer area from the proposed development. All aspects relating to the location of the sacred site must be kept strictly confidential. At no stage will any information regarding the position of the sacred site (GPS	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
coordinates, property description etc.) be contained in the letter, or in any other report, document or verbal communication. The confidential way this mitigation will be approached and undertaken with regards to the locations of Sacred Natural Sites, must be clearly communicated to the I&AP from the outset. Once the above-mentioned mitigation work has confirmed the presence of a Sacred Natural Site, the appropriate recommendations must be made by the appointed heritage specialist and geohydrologist.						
9. The relevant heritage screening in accordance with Section 38 of the NHRA, must be completed by a suitably trained EO for all new drill sites and pipeline routes if heritage features are observed or suspected to be on site as part of a site-specific pre-commencement assessment.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
10. Search and rescue of species of concern.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
11. Obtain permits for disturbance/destruction of any listed/protected species found on site.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
12. Adhere to the biodiversity no-go area on the farm Adamson Vley 655 Portion 0 (no development or impacts should occur on surface in this no-go area). Consultation and communication with the lead or implementing agent for the sensitive species, Endangered	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Wildlife Trust (EWT), must be implemented before any construction proximal to the specific area. Monitoring and Management of the species will be crucial throughout the lifetime of the project and must be discussed and implemented in conjunction with the EWT.	for drilling operation					
13. Landowners must be consulted, and all reasonable requests complied with. A written landowner agreement should be negotiated and concluded prior to commencement. Should this not be possible, a record should be kept of reasonable negotiations with the land owners.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
14. If sensitive species occur within the preferred footprint, the first option should be to relocate the proposed footprint followed by the alternative of preparing a relocation plan (prepared by a suitably qualified specialist).	Design / Planning Manager and/or Contractor EO and/or Tetra4 EO	Identify and manage sensitive species	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Route deviation revisions or relocation plan and records of relocation EO Reports
15. Although field workers conducting initial geological surveys will be allowed to cover large and unpredictable tracts of land, workers should be restricted to access roads/tracks and drilling sites and will not be allowed to wander off into the rest of the property or surrounding land.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
16. Tetra4 must provide all the affected landowners with a construction schedule to ensure that they know when construction will take place on their properties. Any changes to the construction schedule must be communicated to the farmers at least a week in advance.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
17. Before activities commence on privately owned land, Tetra 4 must discuss with the landowner and if agreed to, compile an asset and infrastructure baseline of any landowner infrastructure that may be affected by the project. Any infrastructure or landowner property damaged by Tera4 must be suitably compensated. Photographs and GPS co-ordinates of the infrastructure must be included in the baseline (under strict agreement by the landowner). A copy of the baseline affecting their property should be given to each landowner, who should sign off the document to ensure that it is accurate. Tetra 4 should keep the master document. If any damage occurs, it should be reinstated to its pre-project status. If the infrastructure must move, it must be done at Tetra 4's cost. Tetra 4 must ensure that the construction team has a copy of the asset and infrastructure baseline to guarantee that no infrastructure will be damaged due to ignorance during the construction phase of the project.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
18. All contractors should sign a code of conduct as part of their induction process. Induction must explicitly include aspects such as closing gates and littering. A disciplinary action system must be put in place for any transgressions affecting the landowners.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
19. Contractors should be required to make use of a certain proportion of local labour - it is acknowledged that not all skills will be available locally. Jobs should be advertised in a way that is accessible to all members of society and labour desks (labour registration stations) should be in accessible areas. No unrealistic expectations should be created and the recruitment policy giving preference to local labour should be communicated from the beginning of the project. The local area of influence should be agreed with the stakeholders early on in the process.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
20. A community health and safety plan inclusive of a Traffic Management Plan will be developed based on risks identified in consideration of community health and safety.	Design / Planning Manager for drilling operation	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

5.3.2 CONSTRUCTION PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Separation pits (sumps) for wastewater and grease and oil polluted fluids should be excavated and constructed to adequately store wastewater.	Contractor	Sump construction to prevent pollution	Prior to drilling	Contractor EO / Tetra4 EO	Monthly	Sumps at drill sites EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
2. Where excavating sumps, topsoil and subsoil should be stored separately and only used for rehabilitation.	Contractor	Topsoil and subsoil management	Prior to drilling	Contractor EO / Tetra4 EO	Monthly	EO Reports
3. Sump areas must be lined with PVC to prevent seepage.	Contractor	Sump construction with liner	Prior to drilling	Contractor EO / Tetra4 EO	Monthly	EO Reports
4. In order to contain non-biodegradable oil and fuel spills, drip pans or PVC lining should be provided for drill rigs and other equipment with a risk potential.	Contractor	Spill / pollution prevention measures	During drilling	Contractor EO / Tetra4 EO	Monthly	EO Reports
5. For stationary drill rigs, thin concrete slabs and/or with contiguous impervious PVC lining should be installed before the stationary drill rigs are erected.	Contractor	Spill / pollution prevention measures	Prior to drilling	Contractor EO / Tetra4 EO	Monthly	EO Reports
6. Sump areas must be designed to accommodate the 1:50 year flood event.	Contractor	Sump design to accommodate 1:50 year rainfall	Once off at each drill site	Contractor EO / Tetra4 EO	Monthly	EO Reports
7. Clean and dirty water streams must be separated.	Contractor	Clean and dirty water management	During drilling	Contractor EO / Tetra4 EO	Monthly	EO Reports
8. The location and design of the sumps must be in accordance with the applicable GN 704 conditions.	Contractor	Sump design consider GN704	Once off at each drill site	Contractor EO / Tetra4 EO	Monthly	EO Reports
9. Sump areas should be constructed in such a way that clean water (stormwater) is diverted away from these areas.	Contractor	Clean and dirty water management	Once off at each drill site	Contractor EO / Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
10. The topsoil layer of the surface area required for the drill and sumps should be excavated and stored according to accepted topsoil management practices while topsoil on the remaining 50mx50m drill site may remain *in situ* as long as there is no potential for contamination of topsoil in those areas.	Contractor	Topsoil management	Once off at each drill site	Contractor EO / Tetra4 EO	Monthly	EO Reports
11. Spills of hazardous substances should be collected and disposed of at a suitably licensed facility.	Contractor	Spill and waste management	Ad hoc	Contractor EO / Tetra4 EO	Monthly	EO Reports
12. Collected spills from the drill must not be allowed to contaminate the soils and/or the closed water system utilised for the drilling fluids.	Contractor	Spill and waste management	Ad hoc	Contractor EO / Tetra4 EO	Monthly	EO Reports
13. It is recommended that where possible, closed, above ground tanks are utilised for future drilling as opposed to sumps/pits.	Contractor	Sump tank considerations	Ad hoc	Contractor EO / Tetra4 EO	Monthly	EO Reports
14. Drilling fluids should be environmentally friendly to prevent any harm to the environment or groundwater regime and should be kept in a lined mud pit or surface container.	Contractor	MSDS of drilling fluids must indicate non-toxic to environment etc.	Throughout drilling operations	Contractor EO / Tetra4 EO	Monthly	EO Reports
15. Offsite disposal of excess drill fluids should take place.	Contractor	Adequate disposal of excess drill fluids	Ad hoc	Contractor EO / Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
16. Oil recovered from the drilling rigs and any vehicle on site should be collected, stored and disposed of at licenced facilities or provided to accredited vendors for recycling.	Contractor	Waste management and disposal to be undertaken according to legislation	Ad hoc	Contractor EO / Tetra4 EO	Monthly	EO Reports
17. The drill rig should be provided with necessary hazard protection systems (e.g. a gas blowout prevention system; or Washington well head).	Contractor	Installation of blowout protection system	Ongoing during drilling operations	Contractor EO / Tetra4 EO	Monthly	EO Reports
18. The drilling activities must comply with the IFC Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development (where practical and specifically considering the short-term drilling periods for this project) with specific attention to the following aspects: GHG emissions, gas flaring, wastewater pit design, solid removal systems for drill cuttings and fluids, alternative disposal methods for disposal of drill cuttings and fluids. These guidelines should be implemented as and where feasible as certain aspects of the guidelines relate to long-term drilling activities while Tetra4 drilling is short term (~3 months per well).	Contractor	Drilling operations to ensure minimal GHG emissions, gas flaring, wastewater pit design, etc.	Ongoing during drilling operations	Contractor EO / Tetra4 EO	Monthly	EO Reports
19. The total footprint area to be cleared for drilling should be kept to a minimum by demarcating the drilling areas and restricting removal of vegetation to these areas only.	Contractor	Minimise vegetation clearing	Ongoing during drilling operations	Contractor EO / Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
20. Progressive rehabilitation of disturbed land should be carried out to minimize the amount of time that bare soils are exposed to the erosive effects of rain and subsequent runoff.	Contractor	Ongoing rehabilitation as construction progresses	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
21. Traffic and movement over stabilised areas should be controlled (minimised and kept to certain paths), and damage to stabilised areas should be repaired timeously and maintained.	Contractor	Construction planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
22. Ensure that topsoil (0-30 cm approx.) and subsoil (30 cm +) are stored separately during excavation, so they can be replaced in the correct order.	Contractor	Topsoil management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
23. Should any artefacts, fossils or graves be uncovered during the construction activity, the Applicant, the relevant SAHRA authority and SAPS (in the case of a grave) should be notified immediately, and necessary permitting procedures followed. All activities within this area should be stopped immediately until permitted to proceed by the project environmental manager.	Contractor	Follow chance finds procedure	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
24. The contractor must take all reasonable measures to ensure that fires are not started as a result of operational activities on site and shall also ensure that their operations comply with the Occupational Health and Safety Act (Act No. 85 of 1993).	Contractor	Undertake fire risk assessments	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
25. The following measures will be taken to reduce the risk of fires: No open fires are permitted on site; Every possible precaution shall therefore be taken when working with potential flammable equipment or liquids near potential sources of combustion. Such	Contractor	Undertake fire risk assessments	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
precautions include having an approved fire extinguisher immediately available at the site of any such activities; The contractor shall ensure that there is always basic firefighting equipment available on site.						
26. The contractor shall appoint a member of his staff to be responsible for the installation and inspection of firefighting equipment; and the contractor is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. A fire and safety officer must be appointed as legally required and should be a member of the local firefighting association to ensure rapid response to all neighbouring farms in case of a fire.	Contractor	Fire emergency planning	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
27. As construction will only take place during day-time hours and will be of limited duration, AQSRs within 150 m of a road/pipeline construction site should be notified of the activities and potential disturbance durations prior to construction taking place.	Contractor	Adequate communication with sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
28. As construction will only take place during day-time hours and will be of limited duration, AQSRs within 400 m radius of all well construction sites, 600 m from booster station construction sites and 420m from compressor construction sites should be notified of the activities and potential disturbance durations prior to construction taking place.	Contractor	Adequate communication with sensitive receptors	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
29. The construction site should be surrounded with suitable safety signage in order to alert pedestrians and vehicles about the construction activity.	Contractor	Undertake safety risk assessment and erect signage	Ongoing during drilling operations	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		where necessary				
30. Landowners should be notified prior to accessing their land. The number and identity of workers, the purpose of the visit and specific areas to be visited, should be provided in the notification.	Contractor	Adequate communication with landowners	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
31. No worker will be allowed to sleep or overnight within the active construction area, except for minimal security personnel and only if communicated to the applicable landowner.	Contractor	Adequate communication with landowners	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
32. If construction areas are fenced, the fences must be checked for snares on a regular basis for the duration of the construction period and any snares encountered must be reported to the EO for immediate removal and the landowner must be informed.	Contractor	Report snares	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
33. Any contractor or employee caught poaching should be removed from site.	Contractor	Disciplinary action, etc.	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
34. Any potential protected or sensitive areas should be clearly demarcated as no-go areas.	Contractor	Demarcation, barricading and/or signage	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
35. No littering is to take place on the site or surrounding areas.	Contractor	Adequate waste management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
36. Waste disposal drums should be emptied on regular bases. The drums should be water and scavenger proof. Precautions shall be taken to prevent any refuse from spreading on and from the site.	Contractor	Adequate waste management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
37. No waste is allowed to be burned on site.	Contractor	Adequate waste management	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
38. Areas that have been cleared should be re-vegetated with indigenous species as agreed to by the landowner, such as *Eragrostis tef*, after construction and initial rehabilitation work (reinstatement of the geomorphological and topographical template) is completed.	Contractor	Comply with revegetation and rehabilitation plan	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
39. All workers must be educated on the need to ensure safety of surrounding communities and the public in general.	Contractor	General awareness of public and their safety at all times	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
40. Road safety legislation must be complied with at all times with additional consideration of the World Bank Group Environmental Health and Safety Guidelines.	Contractor	Comply with the rules of the road	Ongoing during construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

5.3.3 OPERATIONAL PHASE (PRODUCTION PHASE)

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
N/A – the exploration drilling process does not require any "operational" phase mitigation measures.						

5.3.4 DECOMISSIONING AND CLOSURE PHASE

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Well abandonment and plugging to comply with the requirements of the approved rehabilitation plan and accepted best practice.	Contractor	Ensure plugging is effective	Post drilling	Contractor EO and/or Tetra4 EO	Once off	EO Reports
2. The well casing must be cut at least 1.5m below surface prior to backfill to prevent obstruction to ongoing land use into the future.	Contractor	Ensure well casing is cut at least 1.5m below surface	Post drilling	Contractor EO and/or Tetra4 EO	Once off	EO Reports
3. Remnant erosion features that remain after the rehabilitation phase should be addressed until full rehabilitation and closure is achieved. Rehabilitation interventions should be considered with care and not worsen erosion once implemented.	Contractor	Monitor for erosion until adequate revegetation is noted	Post drilling	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

5.4 PRODUCTION WELLS

Impact management outcome: Minimization of impacts on existing land-use, sensitive areas and surface and ground water. Improvement of numerical modelling results.

5.4.1 DESIGN / PLANNING PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Well design to be undertaken according to designs developed by a qualified well engineer.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	Prior equipping production well	Well designs EO Reports

5.4.2 CONSTRUCTION PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. The existing production boreholes should be assessed and where relevant retrospectively amended to ensure suitable integrity to align with the design objectives of the MPRDA Regulations.	Tetra4 Production Manager	Consider well designs to confirm compliance with Regulations	Case by case basis for each well	Tetra4 EO	Prior equipping production well	Well designs EO Reports
2. The recommended gas well construction configuration is such that the upper 300 – 450 m of the geological succession is cased off using a combination of telescopic drilling, steel casing and cementation between the well annulus and the casing towards	Contractor / Tetra4 Production Manager	Ensure casing is installed correctly and to the correct depth	Case by case basis for each well	Tetra4 EO	Prior equipping production well	Well designs EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
isolating the shallow Karoo potable aquifer from the deep-seated gas production zone and the saline formation water associated with the production zone.						
3. In the unlikely event that produced water has to be extracted from gas production wells, this water should be stored in sealed containers, removed from site and disposed of to a suitable environment/waste management facility.	Tetra4 Production Manager / Tetra4 EO	Adequate control of water produced	Case by case basis for each well	Tetra4 EO	Ad hoc	EO Reports
4. A groundwater monitoring programme (to monitor gas pressure and potential leaks) must be implemented in the monitoring and hydrocensus boreholes to detect dissolved methane and ethane gas.	Tetra4 EO	Include methane analysis in hydrocensus boreholes	During monitoring programme	Tetra4 EO	Annually	Water Quality Monitoring Reports
5. Well construction according to the relevant standards and regulations.	Contractor / Tetra4 Production Manager	Well design / construction records	Case by case basis for each well	Tetra4 EO	Ad hoc	Well construction register

5.4.3 OPERATIONAL PHASE (PRODUCTION PHASE)

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. A water quality monitoring plan needs to be produced and implemented to determine any changes in the water quality.	Tetra4 EO	Undertake water quality monitoring	During operational phase	Tetra4 EO	Quarterly	Water Quality

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
						Monitoring Reports
2. Any water (Incl. condensate) generated from production wells need to be captured in some form of dirty water storage facility. This water must be collected and suitably disposed of as hazardous waste.	Tetra4 EO	Management of dirty water	During operational phase – Ad hoc	Tetra4 EO	Ad hoc	EO Reports
3. All gates on the landowners' property (and where relevant adjacent properties traversed) are to be closed if found closed and left open if found open. Contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be represented at all times. Any impact such as noise, dust, bright lights etc. that may cause disturbance to landowners or tenants, will be kept to a minimum.	Tetra4 Maintenance Crews	Ensure landowner access protocols are followed	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
4. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the responsible party.	Tetra4 Project Manager	Compensation for losses	Ad hoc	Tetra4 EO	Ad hoc	EO Reports
5. Labour should be transported to and from site to discourage loitering in adjacent areas.	Tetra4 Project Manager	Labour transport arrangements	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
6. Workers should be easily identifiable by clothing and ID badges (with clear ID photographs).	Tetra4 Health and Safety officers	Worker identification	Throughout operational phase	Tetra4 EO	Monthly	EO Reports
7. An emergency response protocol must be implemented at the operations that are aimed at early detection and swift reaction. Where possible and reasonable daily inspections (focused on	Tetra4 EO	Emergency response protocol and	Throughout operational phase	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
detecting leaks and spills) of production wells must be implemented.		emergency drills				

5.4.4 DECOMISSIONING AND CLOSURE PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Well abandonment and plugging to comply with the requirements of the approved rehabilitation plan and accepted best practice.	Project Manager / Contractor	Ensure plugging is effective	Post operational phase	Contractor EO and/or Tetra4 EO	Once off	EO Reports
2. Tetra4 to implement well-specific plugging requirements protect the shallow potable Karoo aquifers at closure.	Project Manager / Contractor	Ensure plugging is effective	Post operational phase	Contractor EO and/or Tetra4 EO	Once off	EO Reports
3. Well design to be done by a qualified engineer who will consider unique subsurface conditions of each well and plan around them to mitigate the following risks: stray gas migration, saline intrusion and fugitive emissions.	Project Manager / Contractor	Ensure plugging is effective	Post operational phase	Contractor EO and/or Tetra4 EO	Once off	EO Reports
4. The cement seals to be pumped as a water-cement slurry down the casing to the bottom of the well, leaving a sheath of cement to set and harden.	Project Manager / Contractor	Ensure plugging is effective	Post operational phase	Contractor EO and/or Tetra4 EO	Once off	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
5. Testing to be implemented to ensure that the plug is placed at the proper level and provides adequate protection of permeable zones, for example the fracture zones from which gas was produced and the overlying Karoo aquifers. These tests should include tagging the top of the plug.	Project Manager / Contractor	Ensure plugging is effective	Post operational phase	Contractor EO and/or Tetra4 EO	Once off	EO Reports
6. Well casing must be cut off at least 1.5m below surface however prior to that and before final rehabilitation, a casing test should be considered to determine whether gas or liquid or a combination thereof is escaping from the casing. If gas is detected during this test, additional seals should be designed and implemented.	Project Manager / Contractor	Ensure well casing does not cause interference with land use	Post operational phase	Contractor EO and/or Tetra4 EO	Once off	EO Reports
7. Rehabilitate area to its original landform or as agreed to by the landowner, tenants and/or authorities.	Tetra4 EO	Reinstatement and revegetation	Within 6 months from commencement of decommissioning	Tetra4 EO	Monthly	EO Reports
8. Rip compacted surfaces where necessary as part of the rehabilitation.	Tetra4	Rip compacted areas	Once off	Tetra4 EO	Monthly	EO Reports
9. Re-vegetation should be done where required. The use of indigenous species to the specific area should be promoted.	Tetra4 EO	Indigenous seeding where necessary using the correct seed mix as agreed to with landowner	Following reinstatement and during appropriate season	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
10. Weed species should be eradicated at all disturbed areas. This must be monitored for a period following rehabilitation to ensure that alien invasive plants do not establish themselves.	Tetra4 EO	Identify and eradicate weed species using appropriate methods in consultation with landowners	Ad hoc	Tetra4 EO	Monthly	EO Reports
11. Re-vegetation of cleared areas should occur directly after decommissioning of production infrastructure has been completed.	Tetra4 EO	Reinstatement and revegetation	Within 6 months from commencement of decommissioning	Tetra4 EO	Monthly	EO Reports
12. Regular inspections should be carried out during the entire rehabilitation process and ongoing maintenance must be implemented until the area is fully rehabilitated.	Tetra4 EO	Visual inspections	Monthly until rehabilitation is successful	Tetra4 EO	Monthly	EO Reports
13. Remnant erosion features that remain after the rehabilitation phase should be addressed until full rehabilitation and closure is achieved. Rehabilitation interventions should be considered with care and not worsen erosion once implemented.	Tetra4 EO	Visual inspections	Monthly until rehabilitation is successful	Tetra4 EO	Monthly	EO Reports

5.5 ACCESS ROADS

Impact management outcome: Ensure access roads are agreed to with affected landowners and any degradation to access roads is adequately repaired.

5.5.1 DESIGN / PLANNING PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Decisions regarding the siting/location of new roads should be done with agreement of the landowner. Fence lines should be followed as far as practical.	Project Manager / Tetra4 EO	Landowner negotiations	Prior to construction	Tetra4 EO	Ad hoc	Landowner agreements EO Reports
2. The relevant heritage screening in accordance with Section 38 of the NHRA, must be completed by a suitably trained EO for all new drill sites and pipeline routes if heritage features are observed or suspected to be on site as part of a site-specific pre- commencement assessment.	Tetra4 EO	Heritage screening	During planning and design phase	Tetra4 EO	Ad hoc	EO Reports
3. Search and rescue of species of concern.	Contractor EO and/or Tetra4 EO	Search and rescue	Prior to construction	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
4. Obtain permits for disturbance/destruction of any listed/protected species found on site.	Tetra4 EO	Permit application and approval	During planning and design phase	Contractor EO and/or Tetra4 EO	Once off prior to construction	Permit received EO Reports
5. Use existing access roads as much as possible and any new access roads must be agreed to with the landowner and EO and no deviations from access roads allowed.	Project Manager / Tetra4 EO	Landowner negotiations	Prior to construction	Tetra4 EO	Ad hoc	Landowner agreements EO Reports
6. Adhere to the biodiversity no-go area on the farm Adamson Vley 655 Portion 0 (no development or impacts should occur on surface in this no-go area). Consultation and communication with the lead or implementing agent for the sensitive species, Endangered Wildlife Trust (EWT), must be implemented before any construction proximal to the specific area. Monitoring and	Design / Planning Manager Contractor EO and/or	Delineation of no-go areas.	Prior to construction	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
Management of the species will be crucial throughout the lifetime of the project and must be discussed and implemented in conjunction with the EWT.	Tetra4 EO					
7. If sensitive species occur within the preferred footprint, the first option should be to relocate the proposed footprint followed by the alternative of preparing a relocation plan (prepared by a suitably qualified specialist).	Design / Planning Manager and/or Contractor EO and/or Tetra4 EO	Identify and manage sensitive species	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Route deviation revisions or relocation plan and records of relocation EO Reports
8. Ideally, no vehicle access tracks/roads should transect through watercourses. Access tracks/roads should be designed in such a way to minimise overlap with watercourses.	Design / Planning Manager and/or Contractor EO and/or Tetra4 EO	Manage access tracks through watercourses	Planning and design phase	Contractor EO and/or Tetra4 EO	Ad hoc	Access road route designs EO Reports
9. Tetra4 must provide all the affected landowners with a construction schedule to ensure that they know when construction will take place on their properties. Any changes to the construction schedule must be communicated to the farmers at least a week in advance.	Tetra4 Project Manager	Distribution of construction schedule to landowners	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	Evidence of distribution of construction schedule to landowners EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
10. Before activities commence on privately owned land, Tetra 4 must discuss with the landowner and if agreed to, compile an asset and infrastructure baseline of any landowner infrastructure that may be affected by the project. Any infrastructure or landowner property damaged by Tera4 must be suitably compensated. Photographs and GPS co-ordinates of the infrastructure must be included in the baseline (under strict agreement by the landowner). A copy of the baseline affecting their property should be given to each landowner, who should sign off the document to ensure that it is accurate. Tetra 4 should keep the master document. If any damage occurs, it should be reinstated to its pre-project status. If the infrastructure must move, it must be done at Tetra 4's cost. Tetra 4 must ensure that the construction team has a copy of the asset and infrastructure baseline to guarantee that no infrastructure will be damaged due to ignorance during the construction phase of the project.	Tetra4 Project Manager	Landowner consultations Compilation of asset register	Prior to construction	Contractor EO and/or Tetra4 EO	Ad hoc	EO Reports
11. All contractors should sign a code of conduct as part of their induction process. Induction must explicitly include aspects such as closing gates and littering. A disciplinary action system must be put in place for any transgressions affecting the landowners.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports
12. A community health and safety plan inclusive of a Traffic Management Plan will be developed based on risks identified in consideration of community health and safety.	Design / Planning Manager	Design and planning specific compliance	During planning and design phase	Contractor EO and/or Tetra4 EO	As and when required	EO Reports

5.5.2 CONSTRUCTION PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Existing roads should be used where possible.	Design / Planning Manager	Landowner negotiations and agreements	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	Landowner agreements EO Reports
2. No trees shall be removed unless authorised by a suitably qualified environmental professional.	Contractor EO / Tetra4 EO	Identify trees and avoid damage or destruction where possible	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
3. Protected tree species may not be removed, unless relocation is deemed viable by the specialist ecologist and relevant permits are obtained.	Contractor EO / Tetra4 EO	Identify protected trees and avoid damage or destruction where possible. Obtain permit where relevant	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	Permit (where relevant) EO Reports
4. Access roads on steep gradients shall be avoided as far as possible.	Contractor EO / Tetra4 EO	Avoid access roads on steep gradients to prevent erosion	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
5. In case of new access roads, adequate drainage and erosion protection in the form of off-cut berms or trenches should be provided where necessary.	Contractor EO / Tetra4 EO	Ensure adequate drainage on access roads to prevent erosion	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
6. Access routes across rivers, streams and wetland areas should be avoided as far as possible. Where such crossings are unavoidable, the relevant authorisations must be obtained, if applicable.	Contractor EO / Tetra4 EO	Avoid wetlands or obtain relevant approvals	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	WUL (where relevant) EO Reports
7. Minimise the frequency of vehicle travel on unsurfaced roads where possible.	Contractor EO / Tetra4 EO	Minimise unnecessary use of unsurfaced roads	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
8. Rehabilitation of access roads must be undertaken immediately once use of the roads are not required and must be to the satisfaction of the landowner as required by the landowner signed access agreements.	Contractor EO / Tetra4 EO	Rehabilitation of temporary access roads	Ad hoc during construction phase	Contractor EO and/or Tetra4 EO	Ad hoc	EO Reports
9. Reduce speed limit on gravel roads to reduce noise and dust generation.	Contractor EO / Tetra4 EO	Reduce speed limits on gravel roads	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
10. No unauthorised driving should be allowed through watercourses. Driving can only occur on specially designed tracks/roads that minimised the risk of erosion and surface flow concentration.	Contractor EO / Tetra4 EO	Prevent unauthorised driving through wetlands	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
11. Access tracks should be maintained during the entire construction process and removed once construction is completed.	Contractor EO / Tetra4 EO	Maintain access roads	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
12. Flume pipes should be monitored and kept free of blockages.	Contractor EO / Tetra4 EO	Monitor flume pipes where installed	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
13. If private roads are affected by project activities, it is the responsibility of Tetra4 to maintain these roads as long as the roads are used by the project.	Contractor EO / Tetra4 EO	Maintain landowners access roads if used	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
14. Tetra4 should engage with the relevant farmers about road maintenance, as some of landowners have preferential ways in which the roads must be maintained. The road maintenance agreements must be formalised before construction commences.	Contractor EO / Tetra4 EO	Landowner negotiations and agreements	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	Landowner agreements EO Reports
15. Any potential protected or sensitive areas should be clearly demarcated as no-go areas.	Contractor EO / Tetra4 EO	Demarcate sensitive areas	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
16. In controlling vehicle entrained particulate matter, it is recommended that water, be applied on all unpaved road sections to ensure a minimum of 50% control efficiency (CE). In addition, binding agents or chemical suppressants should be considered for application on all unpaved road sections and this should only be undertaken if the landowner agrees.	Contractor EO	Apply dust suppression measures on access roads	During construction phase	Contractor EO and/or Tetra4 EO	Monthly	MSDS where relevant EO Reports

5.5.3 OPERATIONAL PHASE (PRODUCTION PHASE)

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Maintain access roads that are frequently used to prevent overgrowth of natural vegetation and alien invasive species.	Tetra4 EO	Maintain access roads	During operational phase	Tetra4 EO	Monthly	EO Reports
2. No unauthorised driving should be allowed through watercourses. Driving can only occur on specially designed tracks/roads that minimised the risk of erosion and surface flow concentration.	Tetra4 EO	Prevent unauthorised driving through wetlands	During operational phase	Tetra4 EO	Monthly	EO Reports
3. All gates on the landowners' property (and where relevant adjacent properties traversed) are to be closed if found closed and left open if found open. Contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be represented at all times. Any impact such as noise, dust, bright lights etc. that may cause disturbance to landowners or tenants, will be kept to a minimum.	Tetra4 EO	Ensure landowner access protocols are followed	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
4. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the responsible party.	Tetra4 EO	Compensation for losses	Ad hoc	Tetra4 EO	Ad hoc	EO Reports
5. If private roads are affected by project activities, it is the responsibility of Tetra4 to maintain these roads as long as the roads are used by the project.	Tetra4 EO	Maintain landowners access roads if used	Ongoing during operational phase	Tetra4 EO	Monthly	EO Reports
6. Tetra4 should engage with the relevant farmers about road maintenance, as some of landowners have preferential ways in which the roads must be maintained. The road maintenance	Tetra4 EO	Landowner negotiations and agreements	Ongoing during operational phase	Tetra4 EO	Monthly	Landowner agreements EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
agreements must be formalised before construction commences.						
7. In controlling vehicle entrained particulate matter, it is recommended that water, be applied on all unpaved road sections to ensure a minimum of 50% control efficiency (CE). In addition, binding agents or chemical suppressants should be considered for application on all unpaved road sections and this should only be undertaken if the landowner agrees.	Tetra4 EO	Apply dust suppression measures on access roads	During operational phase	Tetra4 EO	Monthly	MSDS where relevant EO Reports

5.5.4 DECOMISSIONING AND CLOSURE PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. In consultation and agreement with the relevant landowner, the access roads should be rehabilitated to pre-construction conditions.	Contractor EO / Tetra4 EO	Apply dust suppression measures on access roads	During decommissioning and closure phase	Contractor EO and/or Tetra4 EO	Monthly	EO Reports
2. Should landowners choose to retain access roads, written agreements to reflect this must be in place.	Tetra4 Project Manager / Tetra4 EO	Landowner negotiations and agreements	During decommissioning and closure phase	Contractor EO and/or Tetra4 EO	Monthly	Landowner agreements EO Reports
3. Rip compacted surfaces where necessary as part of the rehabilitation.	Contractor EO / Tetra4 EO	Rip compacted areas	During decommissioning and closure phase	Contractor EO and/or Tetra4 EO	Ad hoc	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
4. Re-vegetation should be done where required. The use of indigenous species to the specific area should be promoted.	Contractor EO / Tetra4 EO	Indigenous seeding where necessary using the correct seed mix as agreed to with landowner	Following reinstatement and during appropriate season	Contractor EO / Tetra4 EO	Monthly	EO Reports
5. Weed species should be eradicated at all disturbed areas. This must be monitored for a period following rehabilitation to ensure that alien invasive plants do not establish themselves.	Contractor EO / Tetra4 EO	Identify and eradicate weed species using appropriate methods in consultation with landowners	Ad hoc	Contractor EO / Tetra4 EO	Monthly	EO Reports
6. Regular inspections should be carried out during the entire rehabilitation process and ongoing maintenance must be implemented until the area is fully rehabilitated.	Contractor EO / Tetra4 EO	Visual inspections	Monthly until rehabilitation is successful	Contractor EO / Tetra4 EO	Monthly	EO Reports
7. In controlling vehicle entrained particulate matter, it is recommended that water, be applied on all unpaved road sections to ensure a minimum of 50% control efficiency (CE). In addition, binding agents or chemical suppressants should be considered for application on all unpaved road sections and this should only be undertaken if the landowner agrees.	Contractor EO / Tetra4 EO	Apply dust suppression measures on access roads	During decommissioning and closure phase	Contractor EO / Tetra4 EO	Monthly	MSDS where relevant EO Reports

5.6 GENERAL

Impact management outcome: Where relevant, minimise negative impacts and enhance positive impacts on the biophysical and socio-economic environment.

5.6.1 DESIGN / PLANNING PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. The pre-production condition of the water resources must be utilised as the target for post-production closure objectives. To achieve this relevant water pre-construction water sampling must be undertaken to determine the baseline.	Tetra4 EO	Baseline water quality sampling and results	Prior to construction	Tetra4 EO	Once off prior to construction	Baseline water quality report
2. After any site-specific assessment conducted for an activity inside of the Cluster 2 boundary and outside of the authorised development zones/areas, within medium, high and very high sensitivities, a site-specific Environmental Management plan must be compiled to include the site-specific requirements. The site assessment must include a survey of the preferred footprint area (including access routes) to identify any potential sensitive/ red data species (flora and fauna).	Tetra4 EO	Site specific sensitivity assessment	Prior to construction	Tetra4 EO	Ad hoc as and when required	Site specific EMP / mitigation measures
3. The EO must undergo training by a suitably qualified heritage specialist / archaeologist in the identification of potential heritage sensitivities occurring within this study area.	Tetra4 EO	Heritage training for EO by suitably qualified specialist	Prior to construction	Tetra4 EO	Once off	Training records
4. Pre-commencement assessment records must be kept as well as the resulting action plans.	Tetra4 EO	Undertake pre-commencement assessments for sensitivities, etc.	Prior to construction	Tetra4 EO	Ad hoc	Pre-commencement assessments / EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
5. All underground pipelines and other utility infrastructure and servitudes should be identified prior to construction. Any damage to public or private property, including roads, stormwater systems, fences, gates, buildings and other structures, pipelines, powerlines and other utilities or infrastructure and movable properties, should be repaired, replaced or otherwise compensated for as agreed with the affected person.	Contractor	Identify existing utilities to prevent damage	Prior to construction	Tetra4 EO	Ad hoc	Pre-commencement assessments / EO Reports
6. If third party activities will be negatively affected, Tetra4 must enter into negotiations with the affected parties as soon as reasonably achievable to ensure the affected parties are compensated fairly or can make additional arrangements. Interference with existing livelihoods should be avoided if possible.	Tetra4 Project Manager	Negotiations with affected parties	Prior to construction	Tetra4 EO	Ad hoc	Landowner agreements / third party agreements / EO Reports
7. If any new activities are planned for a property, Tetra4 must consult with the landowner and take reasonable steps to obtain his consent to execute the activity on his/her land. A procedure to arrange access to properties must be devised and formalised. All reasonable efforts must be taken to obtain agreement on the procedure with the landowners and it must be formalised. Access must be arranged at least 24 hours prior, except in emergencies, when the landowners should also be informed immediately. If routine access is required, the landowners must be provided with a roster indicating dates and approximate times that access will be required.	Tetra4 Project Manager / Land Liaison Offer	Landowner negotiations and agreements	Prior to construction	Tetra4 EO	Ad hoc	Landowner agreements

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
8. A hydrocensus should be conducted before the project commences and each affected party should be given the records affecting their property. Tetra4 should keep records of all the properties. If any decline in the volume or quality of water occurs that can be linked to Tetra4 activities, Tetra4 should provide the affected parties with water of equivalent or better quality (depending on use) until such a time that the quality and availability is restored to pre-project levels.	Tetra4 EO	Hydrocensus	Prior to construction	Tetra4 EO	Ad hoc	Water monitoring report (baseline)
9. Before construction commences Tetra4 must meet individually with each applicable landowner to discuss their movement patterns and needs. It is important to inform the affected stakeholders about the possibility of changed travel patterns (as previously agreed) as soon as possible.	Tetra4 Project Manager / Land Liaison Offer	Landowner negotiations and agreements	Prior to construction	Tetra4 EO	Ad hoc	Landowner agreements
10. Adverse impacts on farming activities during the planting or harvesting season must be minimised as far as possible however should tangible impacts occur during these times, adequate compensation must be provided to the affected party.	Tetra4 Project Manager / Land Liaison Offer	Landowner negotiations and agreements	Prior to construction	Tetra4 EO	Ad hoc	Landowner agreements and compensation (where necessary)
11. Tetra4 must meet with the landowners before the construction phase commences and formalise security arrangements in writing and where appropriate include the existing forums.	Tetra4 Project Manager / Land Liaison Offer	Landowner negotiations and agreements	Prior to construction	Tetra4 EO	Ad hoc	Landowner agreements

5.6.2 CONSTRUCTION PHASE

Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Tetra4 should liaise with local training institutions or service providers to determine whether there are any opportunities to offer internships and practical experience for their students as part of the SLP.	Tetra4 Project Manager	Negotiations with training institutions in line with SLP commitments	During construction phase	Tetra4 EO	Ad hoc	SLP commitments
2. Tetra4 must ensure that skills development requirements form part of their contracts with sub-consultants as prescribed in the SLP. The skills development requirements and bursaries for local learners as discussed in their SLP must be implemented.	Tetra4 Project Manager	Skills development for contractors	During construction phase	Tetra4 EO	Ad hoc	Skills development programme
3. Toolbox talks should at a minimum include: a. Waste management practices; b. Alien and invasive species identification and reporting; c. General behaviour whilst on private land; d. Environmental sensitivities identified in the EIA; e. Anti-poaching and theft; f. Risks posed by the project to the public and measures to prevent such risks from materialising; and g. Talks about the impact of promiscuous behaviour as well as HIV/AIDS and Tuberculosis (TB), in accordance with existing Tetra4 Human Resources (HR) Policy.	Contractor EO / Tetra4 EO	Tool box talks	During construction phase	Contractor EO / Tetra4 EO	Ad hoc	Tool box talks records
4. A workforce code of conduct should be developed to maximise positive employee behaviour in the local community.	Tetra4 Project Manager	Develop and implement	During construction phase	Tetra4 EO	Ad hoc	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
		workforce code of conduct				
5. No informal settlers should be allowed on private property within the development area. If any contractor or employee erects an illegal structure the landowner and police should be informed immediately and asked to remove the structure.	Contractor EO / Tetra4 EO	Prevent informal settlers on private property in working areas	During construction phase	Contractor EO / Tetra4 EO	Ad hoc	EO Reports
6. The potential for farm labourers to seek employment on the project must be discussed with farmers in the relevant forums and in toolbox talks with project personnel to ensure that no unrealistic expectations of permanent employment are conveyed to farm labourers.	Contractor / Tera4	Landowner negotiations	During construction phase	Contractor EO / Tetra4 EO	Ad hoc	EO Reports

5.6.3 OPERATIONAL PHASE (PRODUCTION PHASE)

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. The applicant must take reasonable measures to prevent any disruption to the landowners' use of the properties (e.g. farming). Landowners/tenants should be compensated for loss of arable land in accordance with the landowner access agreements (contracts).	Tetra4 Project Manager / Land Liaison Offer	Landowner negotiations and agreements	During operational phase	Tetra4 EO	Ad hoc	Landowner agreements

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
2. Awareness must be undertaken with the stakeholders (including local community members and workers) explaining the process and potential risks of gas production in laymen terms.	Community Liaison Officer	Safety awareness to stakeholders	During operational phase	Tetra4 EO	Ad hoc	Stakeholder engagement records
3. A defined waste management system must be implemented according to the hierarchy of waste management (avoid, reduce, reuse, recycle, dispose).	Tetra4 EO	Develop and implement waste management plan	During operational phase	Tetra4 EO	Ad hoc	EO Reports
4. Toolbox talks should at a minimum include: a. Waste management practices; b. Alien and invasive species identification and reporting; c. General behaviour whilst on private land; d. Environmental sensitivities identified in the EIA; e. Anti-poaching and theft; f. Risks posed by the project to the public and measures to prevent such risks from materialising; and g. Talks about the impact of promiscuous behaviour as well as HIV/AIDS and Tuberculosis (TB), in accordance with existing Tetra4 Human Resources (HR) Policy.	Tetra4 EO	Tool box talks	During operational phase	Tetra4 EO	Ad hoc	Tool box talks records

5.6.4 DECOMISSIONING AND CLOSURE PHASE

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. Tetra4 to apply for the relevant closure licence from the relevant authority at the appropriate time for decommissioning and closure.	Tetra4	Application/s for relevant closure licences	Prior to formal closure	Tetra4	Once off	Closure Environmental Authorisation / Closure Certificate
2. Toolbox talks should at a minimum include: h. Waste management practices; i. Alien and invasive species identification and reporting; j. General behaviour whilst on private land; k. Environmental sensitivities identified in the EIA; l. Anti-poaching and theft; m. Risks posed by the project to the public and measures to prevent such risks from materialising; and n. Talks about the impact of promiscuous behaviour as well as HIV/AIDS and Tuberculosis (TB), in accordance with existing Tetra4 Human Resources (HR) Policy.	Tetra4 EO	Tool box talks	During decommissioning phase	Tetra4 EO	Ad hoc	Tool box talks records

5.6.5 ALL PHASES

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
1. The hydrocensus boreholes can only be tested after permission is obtained from the respective landowners.	Tetra4 EO	Landowner negotiations and agreements and notifications of each monitoring event	Ad hoc	Tetra4 EO	Ad hoc	Landowner agreements
2. Communication to stakeholders about the nature and extent of economic opportunities should be undertaken. No unrealistic expectations should be created and the recruitment policy giving preference to local labour should be communicated from the beginning of the project.	Tetra4 CLO	Stakeholder consultation	Ad hoc	Tetra4 EO	Ad hoc	EO Reports
3. All necessary measures should be taken to prevent spills from occurring on site. However, should a spill occur, the following procedure must be followed: A spill response kit should be always available on site. Where potential contaminants are transported along access roads, emergency containment and mitigation measures must be developed to minimize impacts should accidental spills occur. Any spillage will be investigated, and immediate action must be taken. In the event of a significant spill (>35 litres) of any hazardous substance, these must also be recorded and reported to the PASA, DWA (DWS) and the local/provincial authority where necessary. Depending on the nature and the extent of the spill, contaminated soil must be either excavated or treated on-site. The EO should	Contractor EO / Tetra4 EO	Spill prevention measures implemented	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
determine the exact method of treatment. Clean up should be immediate and to the satisfaction of the EO. A register of the treatment method and clean up close out report must be kept and be made available reviewed by the ECO during independent audits. Treatment could include the use of absorbent material or hydrocarbon-digesting substances. It is therefore, recommended that a spill kit and hydrocarbon digesting substance should always be kept on site. Clean up should be immediate and to the satisfaction of the EO and verified as adequate by the ECO during the subsequent audit. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. Materials used for the remediation of spills must be used according to product specification and guidance for use. A record of all spills and actions taken to remediate the spills should be maintained. Proper and frequent maintenance should be done to minimise spillage risk.						
4. Inspect vehicles for leaks and repair all leaks immediately.	Contractor EO / Tetra4 EO	Visual inspections of vehicles	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports
5. Any generators used in watercourses should be used with a functional drip tray and inspected regularly for leaks.	Contractor EO / Tetra4 EO	Spill prevention measures implemented	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports
6. Sediment deposition should be prevented in watercourses and especially watercourse channels through the following measures: Implementing stormwater control measures around construction areas; and dewatering during excavation activities in watercourses should be released in a silt bay with	Contractor EO / Tetra4 EO	Silt traps installed and prevention of erosion to prevent	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
sufficient capacity that filters and retains sediment before the water is released into the watercourses.		sedimentation of watercourses				
7. Sediment deposition events into watercourses should be evaluated by an experienced aquatic or wetland specialist and based on the magnitude of the impact recommendations can be made regarding the removal of deposited material and need for notifications to the authorities.	Aquatic or wetland specialist	Sediment deposition assessment and remediation measures implemented	Ad hoc	Contractor EO / Tetra4 EO	Ad hoc	EO Reports
8. Tetra4 must employ an EO/ECO that oversees all the environmental aspects of the project.	Tetra4	Appoint full time Tetra4 EO	Once off	Independent ECO / Independent auditor	Monthly / Annually	ECO and Audit Reports
9. There must be a formal procedure in place on how to record and/or report incidents and grievances.	Tetra4 EO	Develop incident and grievance management plans	Once off	Tetra4 EO	Once off	Incident and grievance management plans
10. All personnel should be aware of the procedures to follow in the case of a health or environmental emergency such as in the case of an accidental injuries or spills.	Contractor EO / Tetra4 EO	Tool box talks to include emergency procedures	Ad hoc	Contractor EO / Tetra4 EO	Ad hoc	EO Reports
11. Workers should be advised on sexual transmitted diseases and preventative measures against sexual transmitted diseases should be put in place-for example provision of condoms in camp site.	Contractor EO / Tetra4 EO	Tool box talks to include STD awareness	Ad hoc	Contractor EO / Tetra4 EO	Ad hoc	EO Reports
12. All personnel should be provided with relevant safety clothing (PPE).	Contractor / Tetra4 Health and	All personnel issued correct PPE	As and when required	Contractor EO / Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
	Safety Managers					
13. No person should be allowed to enter construction site without prior authorization.	Contractor / Tetra4 Health and Safety Managers	Site security control	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports
14. Workers will not be allowed to keep or use alcohol, recreational drugs, traditional or modern weapons, snares or otherwise dangerous objects onsite, or to enter the sites while under the influence of alcohol or drugs.	Contractor / Tetra4 Health and Safety Managers	Site screening / security protocol prior to entry	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports
15. Workers will not be allowed to keep (or have in their possession at any point in time) any animals, including livestock, poultry, wildlife or pets.	Contractor EO / Tetra4 EO	Tool box talks to include restrictions on keeping animals	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports
16. A complaints register should be maintained to log complaints by landowners, occupants and other Interested and Affected Parties, and response to such complaints. The complaints register should be provided to PASA on an annual basis, and at any point in time if requested by the PASA.	Tetra4 CLO	Maintain complaints register	Ongoing	Contractor EO / Tetra4 EO	Monthly	Complaints register
17. Relevant farm access protocols must be complied with.	Tetra4 Project Manager	Compliance with landowner agreements	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports
18. Notice of any service interruptions must be given at least 24 hours before the interruption takes place – a SMS or e-mail system can be used for this purpose.	Tetra4 Project Manager	Notify relevant parties of service interruptions	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
19. Tetra4 should compile and implement a traffic safety plan specifically for the turn-offs from the R30. This plan should form part of the Health and Safety requirements for all contractors. Appropriate road signage must be used at the entry and exit points to the site. Although Tetra4 cannot take responsibility for all road users, they should include road safety toolbox talks. Tetra4 should liaise with the responsible roads authority to ensure road signs are updated and maintained.	Contractor / Tetra4 Health and Safety Managers	Compile and implement traffic safety plan	Ongoing	Contractor EO / Tetra4 EO	Monthly	Safety incident register / EO Reports
20. Create a community liaison forum (CLF) that communicates the mitigation and monitoring measures to the affected parties. This forum can also act as a platform to discuss environmental issues. The CLF can meet twice a year to discuss all the concerns about the project and to share new project information. It can be an important aspect assisting Tetra 4 with obtaining a social license to operate.	Tetra4 CLO	Create CLF and provide clear communication to affected parties	Ongoing	Contractor EO / Tetra4 EO	Monthly	CLF notifications / EO Reports
21. A copy of the EMPr should be available on the work site at all times. Appointed sub-contractors must be made aware of their obligations under this EMPr.	Contractor EO / Tetra4 EO	EMPr to be available at all work sites	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports
22. Emergency procedures should be displayed prominently on site. Ensure that all emergency response protocols are in place and that all workers are aware of the procedures.	Contractor / Tetra4 Health and Safety Officers	Display emergency procedures prominently at work sites	Ongoing	Contractor EO / Tetra4 EO	Monthly	EO Reports
23. Tetra4 must compensate the landowners for any damage to property or goods if it was due to behaviour of their contractors. Sub-contractors must be made aware of this and	Tetra4 Project Manager	Compensation to landowners for any damage	Ad hoc	Tetra4 EO	Ad hoc	Proof of compensation where

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
a clause spelling out their liability should be included in their contracts.		caused by the project				relevant / EO Reports
24. If any damage to landowners' property occurs as a result of project activities, Tetra4 must carry the cost of rehabilitation /repair /replacement and compensate the farmer for his losses. If needed an external mediation process should be followed.	Tetra4 Project Manager	External mediation in the case of compensation disputes	Ad hoc	Tetra4 EO	Ad hoc	Proof of mediation and final outcome where relevant / EO Reports
25. There must be a formal procedure in place on how to report incidents and/or damage to landowner property and a claims procedure to ensure records of all grievances are kept. To receive compensation, the claim forms must be submitted to the Tetra4 CLO or suitable representative. Compensation should follow the IFC principles, which states that market related prices should be paid, and if anything is restored, it must be to the same or better standards than before.	Tetra4 Project Manager	Develop and implement incident procedure and grievance procedure	Ad hoc	Tetra4 EO	Ad hoc	Incident register / grievance register / EO Reports
26. As far as possible obstruction of access routes and sensitive areas must be avoided. If it cannot be avoided both parties must agree on alternative routes, and Tetra4 should carry the cost of implementing the alternatives. If practical and required by the landowner, access routes to land/infrastructure should be reinstated in the decommissioning phase. This must be done in conjunction and only under agreement with the landowner.	Tetra4 Project Manager	Comply with landowner agreements	Ad hoc	Contractor EO / Tetra4 EO	Ad hoc	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
27. The necessary equipment and personal protection equipment (PPE) must be kept on site to clean spills up and leaks. Tetra4 personnel must receive adequate training on the use of the equipment and the disposal of waste material generated during a spill. All such wastes must be treated as hazardous. The waste must be placed in a dedicated sealed container on site, which must be disposed of to a licensed facility.	Contractor / Tetra4 HSE Managers	Ensure sufficient spill kits and PPE provided on site and provide regular training on spill handling.	Ongoing	Contractor EO / Tetra4 EO	Ad hoc	EO Reports
28. Procurement targets to be in line with the existing Social Labour Plan (SLP).	Tetra4 Project Manager	Ensure procurement targets are in line with SLP commitments	Ongoing	Tetra4 EO	Ad hoc	EO Reports
29. Tetra4 should work with the existing farmers' security groups (where possible and permissible) and farmers' associations (Virginia and Theunissen) to create a farm access protocol for everybody that need to access the properties, and a safety plan. Tetra4 should also become a member of these forums, and an existing WhatsApp group if permissible.	Tetra4 Safety / Security Manager	Ensure safety and security of affected parties is not negatively affected by project activities	Ongoing	Tetra4 EO	Monthly	EO Reports
30. Farms that are equipped with alarms are all connected to a central point at AgriSec, and this is a good point of departure for Tetra4 to consider security arrangements for their own assets and to link in and work with existing systems.	Tetra4 Safety / Security Manager	Investigate most suitable safety arrangements	Ongoing	Tetra4 EO	Monthly	EO Reports
31. If a security company is used, their schedules should be communicated to the farmers, especially to those farmers that have Tetra4 infrastructure. It must be considered that guards changing shifts contribute to the impact of strangers accessing	Tetra4 Safety / Security Manager	Provide landowners with security company schedules, etc.	Ongoing	Tetra4 EO	Monthly	EO Reports

Impact Management Actions	Implementation			Monitoring		
	Responsible person	Method of implementation	Timeframe for implementation	Responsible person	Frequency	Evidence of compliance
properties, and therefore a system that considers the safety of both the Tetra4 infrastructure and the safety of the landowners must be implemented.						
32. The necessary sanitation facilities for security personnel must be made available, and some form of shelter from the elements.	Tetra4 Safety / Security Manager	Provide adequate sanitation facilities for security personnel	Ongoing	Tetra4 EO	Monthly	EO Reports
33. For Cluster 2 activities, no abstraction of water from the surrounding environment will take place. Cluster 2 shall utilise existing municipal water sources for all activities and reuse of water must take place where reasonable.	Tetra4 EO	Prevent abstraction of water from the environment	Ongoing	Tetra4 EO	Monthly	EO Reports

Generic Environmental Management Programme (EMPr) for Gas Pipeline Infrastructure

2020

Prepared for: Department of Environment, Forestry and Fisheries, Department of Energy, Department of Public Enterprises, iGas, Eskom and Transnet

Prepared by: Council for Scientific and Industrial Research (CSIR) and South African National Biodiversity Institute (SANBI)

energy
Department:
Energy
REPUBLIC OF SOUTH AFRICA

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

public enterprises
Department:
Public Enterprises
REPUBLIC OF SOUTH AFRICA

OPERATION PHAKISA
planning | implementation | growth

CSIR
our future through science

SANBI
Biodiversity for Life
South African National Biodiversity Institute

Eskom

TRANSNET

iGas

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR) FOR GAS TRANSMISSION PIPELINE INFRASTRUCTURE

Prepared for:
Department of Environment, Forestry and Fisheries
Department of Mineral Resources and Energy
Department of Public Enterprises
iGas
Eskom
Transnet

Published by:
CSIR
PO Box 320
Stellenbosch
South Africa
7599

Authors:

Paul Lochner	Council for Scientific and Industrial Research
Rohaida Abed	Council for Scientific and Industrial Research
Luanita Snyman-van der Walt	Council for Scientific and Industrial Research
Annick Walsdorff[1]	Council for Scientific and Industrial Research
Fahiema Daniels	South African National Biodiversity Institute
Tsamaelo Malebu	South African National Biodiversity Institute

With Contributions From:

Professor Raymond Durrheim	University of the Witwatersrand
Surina Laurie[1]	Council for Scientific and Industrial Research
Dr. David Le Maitre	Council for Scientific and Industrial Research
Dr. Graham von Maltitz	Council for Scientific and Industrial Research
Simon Bundy	SDP Ecological and Environmental Services
Alex Whitehead	SDP Ecological and Environmental Services
Lizande Kellerman	Council for Scientific and Industrial Research
Simon Todd	3 Foxes Biodiversity Solutions
Dr. Derek Berliner	Eco-Logic Consulting
Dr. Lara Van Niekerk	Council for Scientific and Industrial Research
Steven Weerts	Council for Scientific and Industrial Research
Gary de Winnaar	GroundTruth

[1] Note that these Authors were under the employ of the Council for Scientific and Industrial Research (CSIR) during the completion of the relevant SEA Report Chapters; however, has subsequently resigned.

Dr. Vere Ross-Gillespie	GroundTruth
Chris van Rooyen	Chris Van Rooyen Consulting
Albert Froneman	Chris Van Rooyen Consulting
Kate MacEwan	Inkululeko Wildlife Services
Brassnavy Manzunzu	Council for Geoscience
Elsona van Huyssteen	Council for Scientific and Industrial Research
Cheri Green	Council for Scientific and Industrial Research
Dave McKelly	Council for Scientific and Industrial Research
Zukisa Sogoni	Council for Scientific and Industrial Research
Professor Doreen Atkinson	Nelson Mandela University
Johann Lanz	Private, Independent Consultant

EMPr to be cited as:

Department of Environment, Forestry and Fisheries, 2020. Generic Environmental Management Programme for Gas Transmission Pipeline Infrastructure. CSIR Report Number: CSIR/SPLA/EMS/IR/2019/0073/B. Stellenbosch and Durban.

CONTENTS

TABLES

FIGURES

GENERIC ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR) FOR GAS PIPELINE INFRASTRUCTURE

PART A: BACKGROUND AND CONTEXT

1 INTRODUCTION

1.1 Background and Need

Section 24N of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended (NEMA) requires that an environmental management programme (EMPr) be submitted where an environmental impact assessment (EIA) has been identified as the environmental instrument to be utilised as the basis for a decision on an application for environmental authorisation (EA). There is a reliance on the EMPr to ensure that the actual environmental impacts of a project are consistent with those evaluated in the EIA process. The EMPr is therefore fundamental to the EIA process and should ensure that commitments given at the planning and assessment stage of a project are carried through to the development and operational stages. The EMPr plays a vital role in the implementation of consistent and continued environmental management for the duration of a project life cycle.

The content of an EMPr must either contain the information set out in Appendix 4 of the NEMA EIA Regulations, 2014, as amended (hereinafter referred to as the EIA Regulations) or must be a generic EMPr relevant to an application as identified and gazetted by the Minister in a Government Notice. Once the Minister has identified, through a Government Notice, that a generic EMPr is relevant to an application for EA, that generic EMPr must be applied by all parties involved in the EA process, including, but not limited to, the applicant and the competent authority (CA).

By way of an example, the final Strategic Transmission Corridors that were assessed as part of the 2016 Strategic Environmental Assessment (SEA) for Electricity Grid Infrastructure in South Africa were gazetted for implementation on 16 February 2018 under Government Notice No. 113 in Government *Gazette* No. 41445. Other than identifying the Strategic Transmission Corridors, the *Gazette* documented alternative procedures to be followed when applying for EA for large scale electricity transmission and distribution development or expansion activities when developed in the Strategic Transmission Corridors (i.e. a basic assessment (BA) process instead of the previously required S&EIR process). This streamlined environmental assessment process also includes a reduced decision-making timeframe for the CA (i.e. 57 days).

As part of the 2016 SEA for Electricity Grid Infrastructure, a Generic EMPr was compiled for the development and expansion of (a) overhead electricity transmission and distribution infrastructure; and (b) substation infrastructure for the transmission and distribution of electricity. On 22 March 2019, these two Generic EMPrs were gazetted for implementation under Government Notice No. 435 in Government *Gazette* No. 42323.

In December 2019 a SEA for the Development of a Phased Gas Pipeline Network in South Africa was finalised. This SEA similarly developed a Generic EMPr for gas transmission pipeline infrastructure.

1.2 Purpose

This document constitutes a Generic EMPr relevant to EA applications for proposed gas transmission pipelines and associated infrastructure, and all activities identified in terms of section 24(2)(a) and (b) of

NEMA necessary for the realisation of such infrastructure. This Generic EMPr covers the expansion of all such activities. This Generic EMPr provides a pre-approved template that is to be used by an applicant when preparing an EMPr for gas transmission pipeline infrastructure. It also aims to capture learning and best practice in managing the planning, development and operation of gas transmission pipelines in sufficient detail. The scope of this Generic EMPr is outlined in paragraph 1.4 below.

1.3 Objective

The objective of this generic EMPr is to prescribe and pre-approve generally accepted impact management outcomes and impact management actions, which can commonly and repeatedly be used for the avoidance, management and mitigation of impacts and risks associated with the development and operation of gas transmission pipeline infrastructure. The use of a generic EMPr is intended to reduce the need for the environmental assessment practitioner (EAP) to prepare, and for the CA to review, individual EMPrs for applications of a similar nature.

This document forms part of the information requirements to enable CAs to make an informed and defensible decision on an application for EA.

1.4 Scope

The scope of this Generic EMPr applies to gas transmission pipeline infrastructure which is located below-ground or above-ground for the purposes of connecting to above-ground infrastructure such as pigging stations or compressor stations and associated listed or specified activities identified in terms of section 24(2)(a) and (b) of NEMA necessary for the realisation of such infrastructure which requires EA in terms of the NEMA, and is further described below:

- <u>Gas Pipeline Scale</u> – This Generic EMPr applies to the development and related operation of gas transmission pipeline infrastructure outside an industrial complex, using pipelines, exceeding 1 000 m in length, with a throughput capacity of more than 700 tons per day. This generic EMPr also applies to applications for EA for activity 7 (i) and (ii) of Environmental Impact Assessment Regulations Listing Notice 2 of 2014, as amended and activity 60 (i) and (ii) of Environmental Impact Assessment Regulations Listing Notice 1 of 2014 as amended, and all associated listed or specified activities necessary for the realisation of such infrastructure.
- <u>Applicants</u> – This Generic EMPr applies to iGas, Transnet and Eskom as well as any other potential gas transmission pipeline applicant.
- <u>Project Lifecycle</u> – This Generic EMPr applies to the design, development and operational related activities only.

1.5 Exclusions

This Generic EMPr does <u>not</u> apply to:

- Gas pipelines proposed within Zones 1 and 5 of the Gauteng Provincial Environmental Management Framework Standard as published under Government Notice No. 164 in Government *Gazette* No. 41473 of 2 May 2018;
- Gas pipelines that fall below the thresholds of the EIA Regulations;
- Development of compressor stations; and
- Above ground gas pipelines unless where a gas pipeline is needed to be routed above ground in order to connect to infrastructure such as pigging stations or compressor stations.

1.6 Structure and Framework of this Generic EMPr

The Generic EMPr is structured in five parts as indicated below and illustrated in Figure 1:

- **PART A: BACKGROUND AND CONTEXT:**
  - This section provides background and context of the Generic EMPr. It includes the purpose and scope of the EMPr, technical terms and definitions, roles and responsibilities of key persons involved in the development and operational stages, and reporting and documentation requirements, and is legally binding on the parties involved.

- **PART B: PRE-APPROVED GENERIC EMPR TEMPLATE:**
  - This section provides the generic environmental controls and requirements relevant to all gas transmission pipeline projects falling within the scope of this document. Controls in this section reflect minimum and general requirements for managing and mitigating impacts for specific gas transmission pipeline activities during the design, development and operational phases. This section also includes specific environmental controls applicable to the biomes and ecosystems assessed in the SEA, where applicable.

    This template must be completed by the contractor. The contractor is required to complete all columns within the template and each completed page must be signed and dated by the contractor and holder of an EA prior to commencement of the activity.

    Where an impact management outcome is not relevant, the words “not applicable” can be inserted in the template under the “responsible persons” column.

    The template is not required to be submitted to the CA.

    This template, once signed and dated, is legally binding. The holder of an EA will remain responsible for its implementation.

- **PART C: SITE SPECIFIC, PROJECT, APPLICANT AND EAP INFORMATION:**
  - This section needs to be completed by the EAP and the applicant. It requires the provision of details relating to the preliminary infrastructure layout and a declaration that the applicant will comply with the pre-approved generic EMPr template contained in Part B, and understands that the impact management outcomes and impact management actions are legally binding. The preliminary infrastructure layout must be finalized and submitted with the relevant basic assessment report or an environmental impact assessment report, ensuring that all impact management outcomes and actions have been either pre-approved in Part B or approved in terms of Part D. The basic assessment report or an environmental impact assessment report will be regarded as being incomplete if the final infrastructure layout and the signed declaration are not included.

    Once completed and signed, to allow the public access to the generic EMPr, the applicant must make the EMPr available to the public in accordance with the requirements of Regulation 26(h) of the EIA Regulations.

    It must be noted that, if the EA is to be transferred, Part C must be completed by the new holder and submitted with an application for an amendment of the EA in terms of Part 1 of Chapter 5 of the EIA Regulations 2014, as amended.

    The basic assessment report, or amendment basic assessment report, will be considered to be incomplete should a signed copy of Part C not be submitted to the CA. Once approved, Part C forms part of the EMPr for the development and the EMPr is legally binding to a holder of an EA.

- **PART D: DOCUMENTATION OF SITE-SPECIFIC SENSITIVITIES AND ATTRIBUTES:**

  This section describes project specific environmental control requirements that are not covered in Part B of the Generic EMPr, and is only to be completed if there are environmental management measures applicable to the site which have not been included in the generic impact management outcomes or actions.

  - These specific management controls must be referenced spatially, and must include impact management outcomes and impact management actions. Part D needs to be completed by an EAP, following the same format of the pre-approved template in Part B, and submitted to the CA together with the relevant basic assessment report or an environmental impact assessment report depending on the location of the pipeline in relation to the strategic pipeline corridors, for consideration and approval. This section needs to include mitigation measures and environmental control requirements specific to a particular project. These controls are in addition to the general controls described in Part B and must form part of the EMPr and will be legally binding. These requirements will be based on the findings of the basic assessment report or an environmental impact assessment report depending on the location of the pipeline.

  - Once the activity has commenced, a holder of an EA may make amendments to the impact management outcomes and impact management actions in the following manner:

    - Amendments to the impact management outcomes must be made in line with the process as contemplated in Regulation 37 of the EIA Regulations; and
    - Amendments to impact management actions must be made in line with the process contemplated in Regulation 36 of the EIA Regulations.

- **Part E: Method Statements:**
  - Once the contractor has been appointed, the method statements required in Part E of the Generic EMPr must be prepared and appended to the pre-approved template. Each method statement must also be duly signed and dated on each page by the contactor and the EA holder. Once signed, these method statements are legally binding and the holder of the EA remains responsible for its implementation. The method statements do not need to be submitted to the CA for consideration or approval. Any amendments to the method statements must be signed by both the EA holder and the contractor and the changed method statements must be dated.

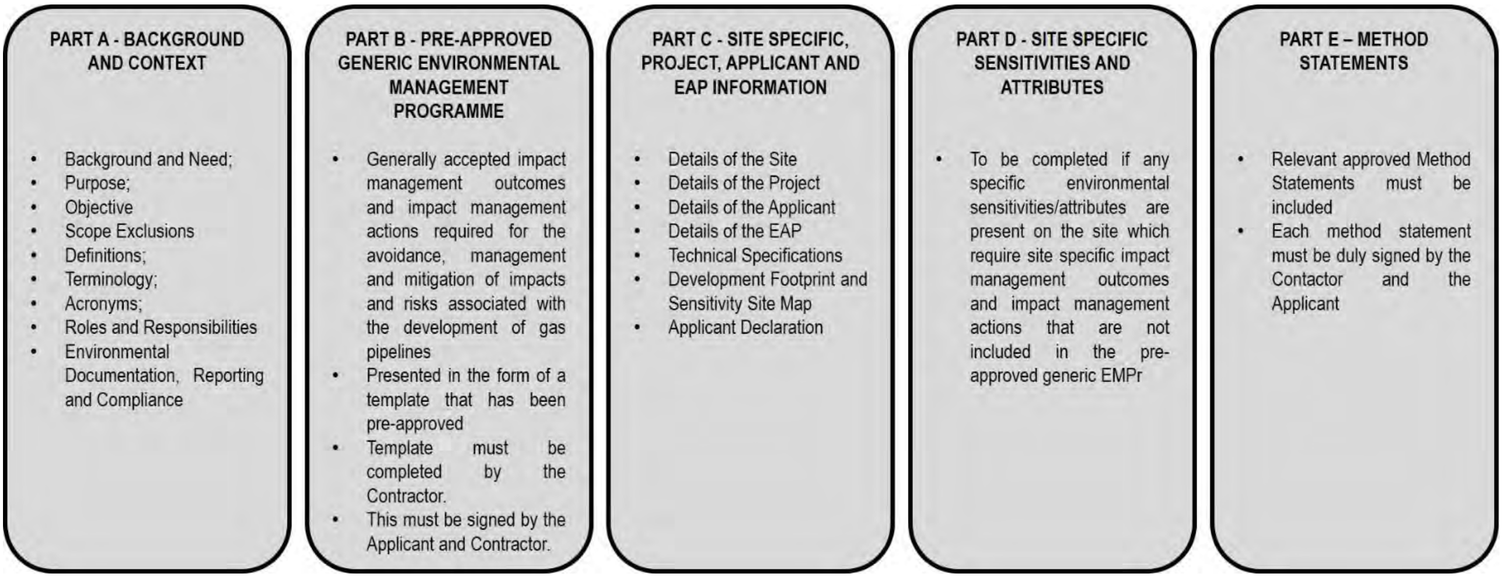


Figure 1: Framework for the Generic EMPr

1.7 Definitions and Terminology

Any word or expression used in this EMPr has the meaning that is assigned in the NEMA or EIA Regulations, unless the context requires otherwise, which is described in Table 1.

Table 1: Definitions and Terminology

Term	Definition
Applicant	The applicant in this Generic EMPr is defined as the person that applies for the EA and if successful in obtaining an EA, is thereafter the holder of the EA. The roles and responsibilities of the various members of the applicant's team are specified in Table 3, which shows that the applicant's project manager is the individual that is overall responsible for implementing the Generic EMPr on behalf of the applicant.
Clearing	Clearing and removal of vegetation, whether partially or in whole, including trees and shrubs, as specified.
Construction camp	Area designated for key construction infrastructure and services, including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management.
Contractor	The contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract, are in line with the environmental management programme and that method statements are implemented as described.
Hazardous Substance	A substance governed by the Hazardous Substances Act, 1973 (Act 15 of 1973) as well as the Hazardous Chemical and Substances Regulations, 1995.
Method Statement	Written submission by the contractor to the applicant's project manager in response to this EMPr or a request by the applicant's project manager and ECO. The method statement must set out the equipment, materials, labour and method(s) the contractor proposes using to carry out an activity identified by the applicant's Project Manager when requesting the method statement. This must be done in such detail that the applicant's Project Manager and ECO is able to assess whether the contractor's proposal is in accordance with this EMPr and/or will comply with the requirements of this generic EMPr.
Slope	The inclination of a surface expressed as one unit of rise or fall for so many horizontal units.
Solid Waste	Solid waste, including construction debris, hazardous waste, excess cement/ concrete, wrapping materials, timber, cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
Spoil	Excavated material, which is unsuitable for use as material in the construction works or is material, which is surplus to the requirements of the construction works.
Topsoil	A varying depth (up to 300 mm) of the soil profile, including existing vegetation cover and soil seed bank, irrespective of the fertility, appearance, structure, agricultural potential, fertility and composition of the soil.
Works	Works to be executed in terms of the contract.

1.8 Acronyms and abbreviations

The acronyms and abbreviations used in this Generic EMPr are described in Table 2.

Table 2: Acronyms and Abbreviations

Abbreviations	
ALARP	As Low as Reasonably Practicable, the acronym for the risk management approach ensures all threats are eliminated or at least minimised to ALARP level
BA	Basic Assessment
BLSA	BirdLife South Africa
CA	Competent Authority
CBA	Critical Biodiversity Area
CR	Critically Endangered
CEO	Contractor's Environmental Officer
COGTA	Department of Co-operative Governance and Traditional Affairs
DEFF	Department of Environment, Forestry and Fisheries
DisM	Disaster Management
DHSWS	Department of Human Settlements, Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAR	Environmental Audit Report
ECA	Environmental Conservation Act No. 73 of 1989
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EO	Environmental Officer
EMPr	Environmental Management Programme Report
EMS	Environmental Management System
EN	Endangered
EFZ	Estuarine Functional Zone
ERAP	Emergency Response Action Plan
ESA	Ecological Support Area
EWT	Endangered Wildlife Trust
FPA	Fire Protection Agency
FPO	Fire Protection Officer
GA	General Authorisation
HCS	Hazardous chemical Substance
HNC	Heritage Northern Cape
HDD	Horizontal Directional Drilling
I&APS	Interested and Affected Parties
IFC	International Finance Corporation
IDP	Integrated Development Plan
MHI	Major Hazard Installation
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
ONA	Other Natural Area
PM	Project Manager
PAMP	Protected Area Management Plan
PPE	Personal Protective Equipment
PIGS	Pipeline Intelligence Gauge Stations
RI&APs	Registered interested and affected parties
ROW	Right of Way. This is an area of about 30 – 50 m wide, and it is needed for trenching and construction activities, as well as for the storage and stockpiling of soil, pipes and equipment.
RSDF	Regional Spatial Development Framework
SS	Site Supervisor
SDF	Spatial Development Framework

Abbreviations	
SPLUMA	Spatial Planning and Land Use Management Act
SSC	Species of Conservation Concern
VU	Vulnerable
WULA	Water Use License Application

1.9 Roles and Responsibilities for the Implementation of the Generic EMPr

The effective implementation of this Generic EMPr is dependent on established and clear roles, responsibilities and reporting lines within an institutional framework. This section of the Generic EMPr gives guidance to the various environmental roles and reporting lines and defines responsibilities for each role within the institutional framework. However, project specific requirements will ultimately determine the need for the appointment of specific person(s) to undertake specific roles and or responsibilities. As such, it must be noted that in the event that no specific person, for example, an environmental control officer (ECO) is appointed, the holder of the EA remains responsible for ensuring that the duties indicated in this document for action by the ECO are undertaken. The environmental responsibilities and reporting structure are represented in Figure 2 and Table 3.

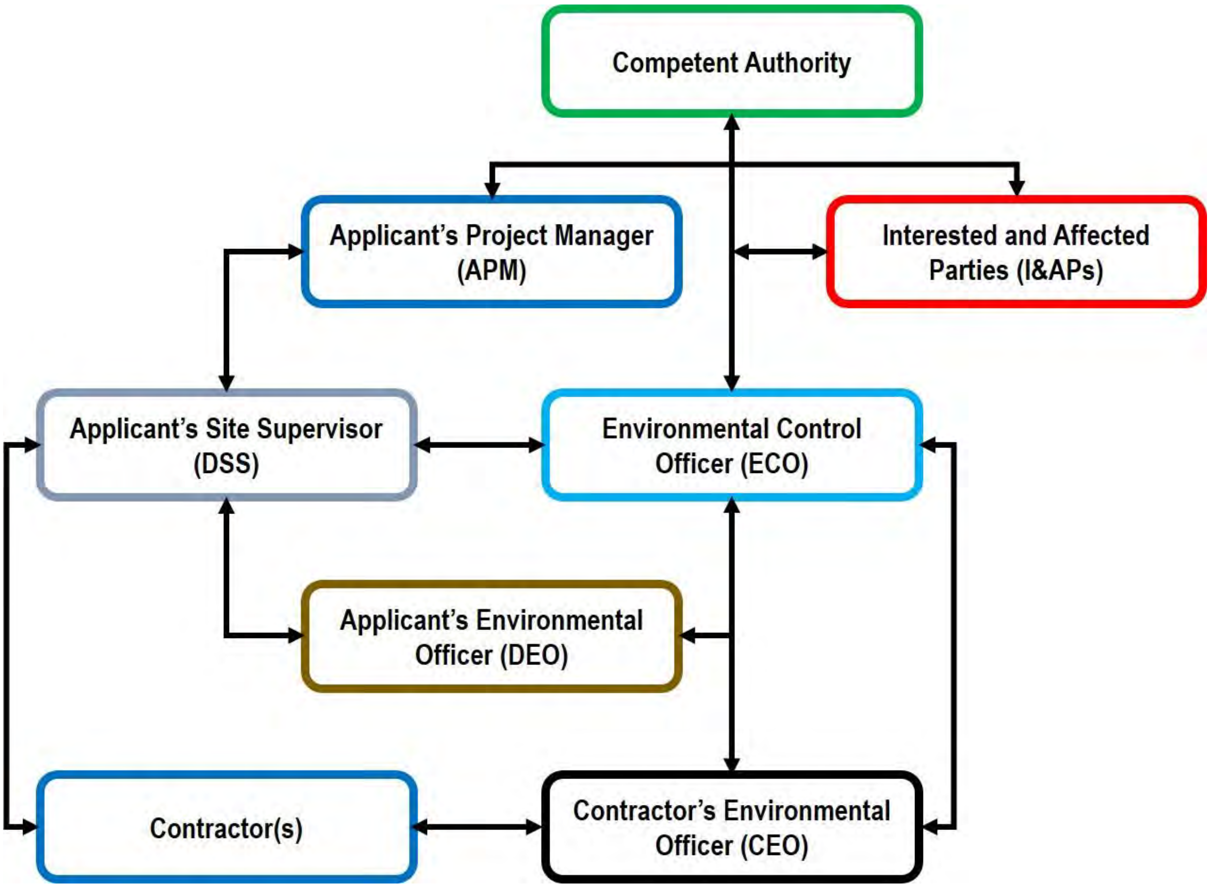


Figure 2: EMPr Roles and Responsibilities

Table 3: Roles and Responsibilities for the Implementation of the Generic EMPr

Function	Role and Responsibilities
Project Manager (PM) Wherever reference is made in the EMPr to the "EA holder it is understood that the "project manager" is the duly appointed representative of the EA holder.	**Role:** ▪ The project manager appointed by the EA holder will have overall responsibility for the management of the project and the implementation of the EMPr on behalf of the EA holder. ▪ The project manager is accountable for ensuring compliance with the EMPr and any conditions of approval from the CA on behalf of the EA holder. ▪ Where required, an environmental control officer (ECO) must be contracted by the project manager to objectively monitor the implementation of the EMPr according to relevant environmental legislation, and the conditions of the EA. ▪ The project manager is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and must ensure that the ECO is integrated as part of the project team while remaining independent. **Responsibilities:** ▪ Be fully conversant with the conditions of the EA; ▪ Ensure that all stipulations within the EMPr are communicated and adhered to by the EA holder and its Contractor(s); ▪ Issuing of site instructions to the Contractor for corrective actions required; ▪ Monitor the implementation of the EMPr throughout the project by means of site inspections and meetings. Overall management of the project and EMPr implementation; ▪ Ensure that periodic environmental performance audits are undertaken on the project implementation; and ▪ Ensure all permits, authorisations and licenses are obtained, monitored and adhered to.
Site Supervisor (SS)	**Role:** ▪ The site supervisor reports directly to the project manager, oversees site works, and liaises with the contractor and the ECO. ▪ The site supervisor is responsible for the day to day implementation of the EMPr and for ensuring the compliance of all contractors with the conditions and requirements stipulated in the EMPr. **Responsibilities:** ▪ Ensure that all contractors identify an environmental officer. ▪ Must be fully conversant with the conditions of the EA. Oversees site works, liaison with contractor, PM and ECO. ▪ Must ensure that all landowners have the relevant contact details of the site staff, ECO and contractor's environmental officer. ▪ Issuing of site instructions to the contractor for corrective actions required. ▪ Issuing all non-compliance notices to contractors. ▪ Ratify the monthly environmental audit report that is compiled by the ECO. However, feedback from the SS is not mandatory.
Environmental Control Officer (ECO) Note: The ECO is an independent quality controller and undertakes environmental inspections and compliance audits, and compiles monthly audit reports. The Contractor, Contractor's Environmental Officer and Environmental Officer must report non-compliance to the ECO. The ECO relies, *inter alia*, on input from the AEO.	**Role:** ▪ The ECO should be employed by the EA holder for the duration of the project. The ECO should have appropriate training and experience in the implementation of environmental management specifications. ▪ The primary role of the ECO is to act as an independent quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts. ▪ In this respect, the ECO is to conduct periodic site inspections, attend regular site meetings, pre-empt problems and suggest mitigation and be available to advise on incidental issues that arise. ▪ The ECO is also required to conduct compliance audits, verify the monitoring reports submitted by the Contractor's Environmental Officer. ▪ The ECO is to provide feedback to the SS and PM regarding all environmental matters. The SS and PM in turn reports back to the Contractor and Registered Interested and Affected Parties (RI&APs), as required. ▪ The Contractor, Contractor's Environmental Officer and the Environmental Officer are answerable to the ECO for non-compliance with the Performance Specifications as set out in the EA and EMPr. ▪ Issues of non-compliance raised by the ECO must be taken up by the PM, and resolved with the Contractor as per the conditions of contract. ▪ Decisions regarding environmental procedures, specifications and requirements which have a cost implication (i.e. those that are deemed to be a variation, not allowed for in the Performance Specification) must be endorsed by the PM.

Function	Role and Responsibilities
	▪ The ECO must also, as specified by the EA, report to the CA as and when required. **Responsibilities:** ▪ Be aware of the findings and conclusions of all BA documentation, and EA and licenses related to the development; ▪ Be familiar with the recommendations and mitigation measures of this EMPr; ▪ Be conversant with relevant environmental legislation, policies and procedures, and ensure compliance with them; ▪ Undertake regular and comprehensive site inspections/compliance audits of the construction site according to the generic EMPr and applicable licenses in order to monitor compliance as required; ▪ Educate the construction team about the management measures contained in the EMPr and environmental licenses; ▪ Compilation and administration of an environmental monitoring plan to ensure that the environmental management measures are implemented and are effective; ▪ Monitoring the performance of the contractors using a weekly environmental checklist and ensuring compliance with the EMPr and associated method statements; ▪ In consultation with the SS order the removal of person(s) and/or equipment which are in contravention of the specifications of the EMPr and/or environmental licenses; ▪ Liaison between the PM, Contractors, authorities and other lead stakeholders on all environmental concerns; ▪ Issuing of site instructions to the contractor for corrective actions required; ▪ Compile a regular (monthly) environmental audit report highlighting any non-compliance issues as well as satisfactory or exceptional compliance with the EMPr; ▪ Validating the regular site inspection reports, which are to be prepared by the CEO; ▪ Validating the findings of the regular environmental internal audits on the CEO which are to be prepared by the EO; ▪ To record all environmental incidents (spills, impacts, legal transgressions etc.) and corrective and preventive actions taken in the environmental incident log, with inputs provided by the CEO. ▪ Checking the CEO's public complaints register in which all complaints are recorded, as well as action taken; ▪ Assisting in the resolution of conflicts; ▪ Facilitate training for all personnel on the site – this may range from carrying out the training, to reviewing the training programmes of the contractor and/or sub-contractors; ▪ In case of non-compliances, the ECO must first communicate this to the site supervisor, who has the power to ensure this matter is addressed in accordance with the relevant legislative requirements. Should no action or insufficient action be taken, the ECO may report this matter directly to the authorities as non-compliance; ▪ Maintenance, update and review of the EMPr; ▪ Communication of all modifications to the EMPr to the relevant stakeholders. ▪ Further note, the ECOs function is not limited to the construction phase alone, but is also an active role during the operational and later phases of the project. ▪ Arrange that the final environmental audit for construction is conducted by an independent auditor/consultant in accordance with the conditions of EA.

Environmental Officer (EO)
 	
The EO provides input to the ECO.
	Role:
	▪ The EO will report to the project manager.
	▪ The EO is responsible for implementation of the EMPr, environmental monitoring and reporting, providing environmental input to the project manager, ECO and Contractor, liaising with contractors and the landowners as well as a range of environmental coordination responsibilities.
	▪ The EO is the EA holder's environmental representative on site and works together with the ECO and Contractor;
	
	Responsibilities:
	▪ Be fully conversant with:
	    ○ the EMPr;
	    ○ the conditions of the EA and any licenses; and
	    ○ all relevant environmental legislation.
	▪ Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;

Function	Role and Responsibilities
	▪ Ensure that all stipulations within the EMPr are communicated and adhered to by the Employees, Contractor(s) and its sub-contractor(s); ▪ Confine the construction site to the demarcated area; ▪ Conduct environmental internal environmental audits as agreed between the EA holder and the contractor with regards to EMPr and authorisation compliance; ▪ Assist the contractors in addressing environmental challenges on site; ▪ Assist in incident management: ▪ Report environmental incidents to the EA holder and ECO, and ensure that corrective action is taken, and lessons learnt shared; ▪ Assist the contractor in investigating environmental incidents and compile investigation reports; ▪ Follow-up on pre-warnings, defects, non-conformance reports; ▪ Measure and communicate environmental performance to the Contractor; ▪ Conduct environmental awareness training on site together with the ECO and CEO; ▪ Ensure that the necessary legal permits and / or licenses are in place and up to date.
Contractor	**Role:** ▪ The contractor has overall responsibility for ensuring that all work, activities, and actions linked to the delivery of the contract are in line with the EMPr and that method statements are implemented as described. ▪ External contractors must ensure compliance with this EMPr while performing the onsite activities as per their contract with the EA holder. ▪ The contractors are required, where specified, to provide method statements setting out in detail how the impact management actions contained in the EMPr will be implemented during the development or expansion gas pipeline infrastructure activities. ▪ The main contractor that is appointed by the EA holder and has a signed contract with the EA holder must appoint a contractor's environmental officer (CEO). The CEO of the main contractor will then be responsible for all sub-contractors working under the main contractor in terms of verifying that they abide by the requirements of the EMPr. **Responsibilities:** ▪ Implementation and compliance with recommendations and conditions of the EA and EMPr, including providing the contractor's environmental protection policy and the specific method statements for the project; ▪ Ensure all site staff are trained and kept updated in terms of the EA, EMPr and other legal requirements; ▪ Project delivery and quality control for the development services as per appointment; ▪ Employ a contractor's environmental officer to monitor and report to the AEO and ECO on the daily activities on-site during the construction period; ▪ Ensure that safe, environmentally acceptable working methods and practices are implemented and that equipment is properly operated and maintained, to facilitate proper access and enable any operation to be carried out safely; ▪ Attend on site meeting(s) prior to the commencement of activities to confirm the procedure and designated activity zones; ▪ Ensure that contractors' staff repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in this EMPr, to the satisfaction of the ECO.
Contractor's Environmental Officer (CEO)	**Role:** ▪ The CEO's primary role is to coordinate the environmental management activities of the contractor on site and to be responsible for on-site implementation of the EMPr (or relevant sections of the EMPr) applicable to the contractor. ▪ The CEO can be a dedicated environmental officer; or an independent consultant. ▪ The contractor must ensure that the CEO is suitably qualified to perform the necessary tasks and is appointed at a level such that she/he can interact effectively with other site contractors, labourers, the ECO and the public. ▪ The CEO ensures that all sub-contractors working under the contractor abide by the requirements of the EMPr. ▪ The contractor is answerable to the site supervisor for all environmental issues associated with the project. ▪ Contractor performance will, amongst others, be assessed on health, safety and environmental management criteria.

Function	Role and Responsibilities
	<u>Responsibilities</u> ▪ Be on site throughout the duration of the project; ▪ Ensure all their staff are aware of the environmental requirements, conditions and constraints with respect to all of their activities on site; ▪ Implementing the environmental conditions, guidelines and requirements as stipulated within the EA, EMPr and method statements; ▪ Attend the environmental site meeting; ▪ Undertaking corrective actions where non-compliances are registered within the stipulated timeframes; ▪ Report back formally on the completion of corrective actions; ▪ Environmental monitoring as required by applicable legislation; ▪ Assist the ECO and EO in maintaining all the site documentation; ▪ Prepare the site inspection reports and corrective action reports for submission to the ECO and EO; ▪ Assist the ECO and EO with preparing regular reports (e.g., monthly); and ▪ Where more than one Contractor is undertaking work on site, each company appointed as a contractor will appoint a CEO representing that company.

1.10 Environmental Documentation, Reporting and Compliance

To ensure accountable and demonstrated implementation of the EMPr, a number of reporting systems, documentation controls and compliance mechanisms shall be in place for all gas pipeline projects as a minimum requirement.

1.10.1 Document Control/Filing system

An approved filing system (that meets the requirements of ISO 9000) shall be established at the outset of the construction phase and shall be maintained throughout the lifespan of the project, and an EMPr file must be kept. The EA holder is solely responsible for the upkeep and management of the EMPr file. As a minimum, all documentation detailed below will be stored in the EMPr file. A hard copy of all documentation shall be filed, while an electronic copy may be kept where relevant. A duplicate hard copy file will be maintained in the office of the site supervisor (where applicable). This duplicate file must remain current and up-to-date. The filing system must be updated and relevant documents added as required. Note that if a credible electronic filing system is being operated that is up-to-date and accessible at all times, then this can replace the hard copies.

The EMPr file must be made available at all times on request by the CA or other relevant authorities. The EMPr file will form part of any environmental audits undertaken as prescribed in the EIA Regulations and where relevant the EA.

1.10.2 Documentation to be available

At the outset of the project, the following documents shall be placed in the filing system and be accessible at all times:

- Copy of the EA;
- Copy of the generic and site specific EMPr as well as any amendments thereof;
- Copy of declaration of implementing the Generic EMPr and subsequent approval of site specific EMPr and amendments thereof;
- All the contractor’s method statements;
- Completed environmental checklists;
- Copies of the accepted monthly environmental audit reports;
- Minutes and attendance register of environmental site meetings;
- An up-to-date environmental incident log;

- A copy of all non-compliances notices issued;
- A copy of all instructions or directives issued;
- Complaints register; and
- A copy of all corrective actions signed off. The corrective actions must be filed in such a way that a clear reference is made to the non-compliance record.

1.10.3 Weekly Environmental Checklists

The ECO is required to complete a weekly environmental checklist, the format of which is to be agreed prior to commencement of the activity. The ECO is required to sign and date the checklist, retain a copy in the EMPr file and submit a copy of the completed checklist to the site supervisor on a weekly basis.

The checklists will form the basis for the monthly environmental audit reports complied by the ECO. Copies of all competed checklists will be attached as Annexures to the environmental audit report, as required in terms of the EIA Regulations.

1.10.4 Environmental Site Meetings

An environmental site meeting will take place at least bi-monthly (i.e. every two weeks). The meeting will be chaired by the EA holder's project manager or the EA holder's site supervisor and CEOs will be required to attend. All environmental issues shall be tabled at the meeting for discussion and resolution.

Minutes of the environmental site meetings shall be kept. The minutes must include an attendance register and will be attached to the monthly report that is distributed to attendees. Each set of minutes must clearly record **matters for attention** that will be reviewed at the next meeting.

1.10.5 Required Method Statements

A Method Statement is a written submission by the contractor to the project manager, site supervisor or ECO in response to the EMPr, setting out the plant, materials, labour and method the contractor proposes using to carry out an activity. The method statement will be done in such detail that the ECO is enabled to assess whether the contractor's proposal is in accordance with the EMPr.

The Method Statement must cover applicable detail with regards to:

- construction procedures;
- materials and equipment to be used;
- getting the equipment to and from site;
- how the equipment and material will be moved while on site;
- how and where material will be stored;
- the containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur;
- timing and location of activities;
- compliance/ non-compliance with the EMPr; and
- any other information deemed necessary by the ECOs.

Unless indicated otherwise by the project manager, the contractor shall provide the following method statements to the project manager a minimum of 14 days prior to the commencement date of the activity:

- Site establishment – Camps, Lay-down or storage areas, satellite camps, infrastructure;
- Batch plants;
- Workshop or plant servicing;

- Handling, transport and storage of Hazardous Chemical Substances;
- Vegetation management – Protected, clearing, aliens, felling;
- Access management – Roads, gates, crossings etc.;
- Fire plan – to minimise the risk of fire on site;
- Waste management – transport, storage, segregation, classification, disposal (all waste streams);
- Social interaction – complaints management, compensation claims, access to properties etc.;
- Water – use (source, abstraction and disposal), access and all related information, crossings and mitigation;
- Emergency preparedness – Spills, training, other environmental emergencies;
- Dust and noise management methodologies;
- Blasting required for construction;
- Faunal interaction and risk management – only if the risk was identified – wildlife interaction especially on game farms; and
- Heritage and palaeontology management.

The ECO shall ensure that the contractors perform in accordance with these method statements.

1.10.6 Environmental Incident Log (Diary)

The ECO is required to maintain an up-to-date and current environmental incident log (environmental diary). The Environmental Incident Log is a means to record all environmental incidents. An environmental incident in the context of this document is defined as:

- Any deviation from the listed environmental mitigation measures (listed in this EMPr) that may be addressed immediately by the ECOs. (for example a contractor's staff member littering or a drip tray that has not been emptied);
- Any environmental impact resulting from an action or activity by a contractor in contravention of the EMPr which as a single event would have a minor impact but which if cumulative and continuous would have a significant effect; and
- General environmental information such as road kills or injured wildlife.

The ECO is to record all environmental incidents in the environmental incident log. All incidents regardless of severity must be reported to the EA holder. The Log is to be kept in the EMPr file and at a minimum the following will be recorded for each environmental incident:

- The date and time of the incident;
- Description of the incident;
- The name of the responsible party and supervisor;
- The incident must be listed as significant or minor;
- If the incident is listed as significant, a non-compliance notice must be issued, and recorded in the log;
- Remedial or corrective action taken to mitigate the incident; and
- Record of repeat minor offences by the same person/s.

The Environmental Incident Log will be captured in the Environmental Audit Report.

1.10.7 Non-compliance

A non-compliance notice will be issued to the responsible contractor by the ECO via the SS or PM. The non-compliance notice must be issued in writing and a copy filed in the EMPr file. The notice must as a minimum include the following:

- Time and date of the non-compliance;
- Name of the responsible party and supervisor;
- Nature and description of the non-compliance;
- Recommended/required corrective action; and
- Date by which the corrective action needs to be completed.

The contractors shall act immediately when a notice of non-compliance is received, correct whatever is the cause for the issuing of the notice ensuring that this is in compliance with the conditions of the EA and the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended. Complaints received regarding activities on the construction site pertaining to the environment shall be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Non-compliances must be reported to the relevant CA for them to deal with the transgression, as it deems fit. The contractor is deemed not to have complied with the EMPr if, inter alia:

- There is a deviation from the environmental conditions, impact management outcomes and impact management actions, as approved in the generic and site specific EMPr as relevant, which deviation has, or may cause, an environmental impact; or
- There is contravention of environmental legislation.

1.10.8 Corrective Action Records

For each non-compliance notice issued, a documented corrective action must be recorded. On receiving a non-compliance notice from the SS, the CEO will ensure that the corrective actions required take place within the stipulated timeframe and in accordance with the legislative requirements. On completion of the corrective action the CEO is to issue a Corrective Action Report in writing to the ECOs. If satisfied that the corrective action has been completed, the ECO is to sign-off on the corrective action report, and attach the report to the non-compliance notice in the EMPr file. A corrective action is considered complete once the report is signed off by the ECO.

1.10.9 Contractor Environmental Agreements

Each contractor working on site is required to sign a contractor environmental agreement. This agreement provides for signed acknowledgement by the contractor of the EMPr and the environmental controls and stipulations therein. The signed copies of the contractor environmental agreements are to be filed in the EMPr file. No contractor will be allowed to start work without having signed the contractor environmental agreement.

1.10.10 Photographic Record

A digital photographic record must be kept. The photographic record will be used to show before, during and post rehabilitation evidence of the project and this evidence can also be used in cases of damages claims if they arise. Each image must be dated and a brief description note attached.

The Contractor shall:

- Allow the ECO access to take photographs of all areas, activities and actions.

The ECO shall keep an electronic database of photographic records, which will include:

- Pictures of all areas designated as work areas, camp areas, construction sites and storage areas taken before these areas are set up;
- All bunding and fencing;
- Road conditions and road verges;
- Condition of all farm fences;
- Topsoil storage areas;
- All areas to be cordoned off during construction;
- Waste management sites;
- Ablution facilities (inside and out);
- Any non-conformances deemed to be "significant";
- All completed corrective actions for non-compliances;
- All required signage;
- Photographic recordings of incidents;
- All areas before, during and post rehabilitation; and
- Relevant photographs in the environmental audit report.

1.10.11 Complaints Register

The ECO shall keep a current and up-to-date complaints register. The complaints register is to be a record of **all** complaints received. The complaints register shall:

- Record the name and contact details of the complainant;
- Record the time and date of the complaint;
- Contain a detailed description of the complaint;
- Where relevant and appropriate, contain photographic evidence of the complaint or damage (ECO to take relevant photographs); and
- Contain a copy of the ECO written response to each complaint received and keep a record of any further correspondence with the complainant. The ECO's written response will include a description of any corrective action to be taken and must be signed by the Contractor, ECO and affected party. Where a damage claim is issued by the complainant, the ECO shall respond as described in Section 1.10.13 below.

1.10.12 Claims for Damages

In the event that a Claim for Damages is received, the ECO shall:

- Record the full detail of the complaint as described in Section 1.10.11 above;
- The PM will evaluate the claim and associated damage and submit the evaluation to the site supervisor for approval;
- Following consideration by the project manager, the claim is to be resolved and settled immediately, or the reason for not accepting the claim communicated in writing to the claimant. Should the claimant not accept this, the ECO shall, in writing report the incident to the negotiator and legal department; and
- A formal record of the response by the ECO to the claimant as well as the rectification and the method of any making payments will be recorded in the EMPr file.

1.10.13 Interaction with Affected Parties

Open, transparent and good relations with affected landowners, communities and regional staff are an essential aspect to the successful management and mitigation of environmental impacts.

The Contractor shall ensure that:

- All negotiations with affected parties are done with the affected parties, SS and ECO present;
- No oral agreements between the above parties shall be entered into. All agreements will be recorded in writing, signed by all parties and filed in the EMPr file;
- Affected parties will be informed by the CEO of any changes to the construction programme;
- The Contractor's contact telephone numbers are made available to all I&APs; and
- Contact with all affected parties will be courteous at all times.

The ECO shall ensure that:

- All queries, complaints and claims are dealt with within an agreed timeframe;
- Any or all negotiations take place with the affected parties, SS and Contractor present;
- Any or all agreements are documented, signed by all parties and a record of the agreement kept in the EMPr file;
- His/her contact telephone numbers are made available to all landowners and affected parties;
- A current and up-to-date list of affected parties and their contact details are available at all times in the EMPr file;
- Contact with affected parties is courteous at all times; and
- All documented agreements, settlements and claims are attached to the environmental audit report.

1.10.14 Environmental Audits

Internal environmental audits of the activity and implementation of the EMPr are undertaken as required. The findings and outcomes must be included in the EMPr file and in any external audit to be submitted to the CA at intervals as indicated in the EA.

An Environmental Audit Report must be prepared monthly. The report will be tabled as the key point on the agenda of the environmental site meeting. The report is submitted for acceptance at the meeting and the final report will be circulated to the project manager and, filed in the EMPr file. At a frequency determined by the EA with respect to external audits, the ECO shall submit the monthly reports to the CA, as part of any external audits conducted in terms of NEMA. At a minimum, the monthly environmental audit report is to cover the following:

- Weekly environmental checklists;
- Deviations and non-compliances with the checklists;
- Non-compliance notices issued;
- Completed and reported corrective actions;
- Environmental monitoring;
- General environmental findings and actions; and
- Minutes of the bi-monthly environmental site meetings.

1.10.15 Final Environmental Audit Report for Development and Rehabilitation

On final completion of the construction phase and rehabilitation, and in accordance with any audit requirements of the EA with respect to development and rehabilitation, a final environmental audit report is to be prepared by an independent consultant and submitted to the CA. The Developer's Project Manager must commission and appoint the independent consultant. The Environmental Audit Report must comply with Appendix 7 of the EIA Regulations, and shall contain the following:

- Details of the independent person who prepared the report;

- Details of the expertise of independent person that compiled the report;
- A declaration that the independent auditor is independent in a form as may be specified by the competent authority;
- An indication of the scope of, and the purpose for which, the Environmental Audit Report was prepared;
- A description of the methodology adopted in preparing the environmental audit report;
- An indication of the ability of the EMPr, and where applicable, the closure plan to-
  - Sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an on-going basis;
  - Sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the closure of the facility; and
  - Ensure compliance with the provisions of environmental authorisation, EMPr, and where applicable, the closure plan;
- A description of any assumptions made, and any uncertainties or gaps in knowledge;
- A description of any consultation process that was undertaken during the course of carrying out the environmental audit report;
- A summary and copies of any comments that were received during any consultation process; and
- Any other information requested by the competent authority.
- Acceptance and approval of the Final Environmental Audit Report by the Competent Authority with respect to development and rehabilitation will end the construction phase EMPr as successful and completed.
- Where an operational component is relevant, the audit requirements relating to operation, as contained in the EA, must be complied with.

PART B: ENVIRONMENTAL CONTROLS – PRE-APPROVED GENERIC EMPR TEMPLATE

2 INTRODUCTION

This section captures impact management outcomes and actions that are applicable to specific biomes and ecosystems assessed in the SEA, as well as those that are generic to proposed gas transmission pipelines. Overall, it provides a pre-approved Generic EMPr template with aspects and activities that are common to proposed gas transmission pipeline infrastructure. For each identified aspect or activity, a set of prescribed impact management outcomes and associated actions have been identified. The format of this is indicated in Table 4 below. Table 4 also shows those aspects that are pre-defined and those that still need to be completed by the Contractor prior to commencement of construction (i.e. Implementation and Monitoring). The sections highlighted in red need to be completed by the Contractor by providing the information under each heading for each environmental impact management action.

Table 4: Format of the Specific Environmental Controls per Biome and Ecosystem, and Generic Environmental Controls

Impact Management Outcome: PREDEFINED AS PART OF GENERIC EMPr						
Impact Management Actions	Implementation			Monitoring		
	Responsible Person	Method of Implementation	Timeframe for Implementation	Responsible Person	Frequency	Evidence of Compliance
PREDEFINED AS PART OF GENERIC EMPr	TO BE COMPLETED BY CONTRACTOR	TO BE COMPLETED BY CONTRACTOR	TO BE COMPLETED BY CONTRACTOR	TO BE COMPLETED BY CONTRACTOR	TO BE COMPLETED BY CONTRACTOR	TO BE COMPLETED BY CONTRACTOR

A holder of an EA is responsible to ensure the implementation of these impact management outcomes and actions for all projects as a minimum requirement, in order to mitigate the impact of such aspects identified for the development or gas transmission pipeline infrastructure. It is important to re-iterate that the mitigation hierarchy must be implemented during all phases of the development. It is a key principle upon which this EMPr is based. Impacts must be:

- Avoided:
  - This includes the consideration of alternatives in the project location, siting, scale, layout, technology and phasing, to avoid impacts on biodiversity, ecosystems and people. This is the best option; however, it is not always possible.
- Minimised, mitigated or managed:
  - This includes considering alternatives in the project location, siting, scale, layout, technology and phasing, which would minimise impacts on the environment.
- Rehabilitated:
  - This includes rehabilitating areas where impacts are unavoidable and measures are provided to return impacted areas to near natural state or agreed land use after closure.
- Offset:
  - This includes measures over and above rehabilitation to compensate for the residual negative impacts on the environment after every effort has been made to minimise and then rehabilitate the impacts.

3 DESIGN / PLANNING PHASE

3.1 Terrestrial Ecology – Flora and Fauna

Impact Management Outcomes: To achieve planning of pipeline routes and infrastructure in a manner that results in minimal loss and/or disturbance of terrestrial ecosystems and sensitive species.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Use the environmental sensitivity maps generated in the SEA Report, the National Web-based Environmental Screening Tool, and any other relevant and recently available spatial information to inform initial desktop-level planning and routing design. 2. Conduct ground assessments and pre-construction field-work by a suitably qualified specialist in order to verify the sensitivity and micro-site the development footprint. 3. Identify and map the following features that fall within the pipeline route, right-of-way, and areas for all other associated infrastructure. This must be undertaken in consultation with local fauna and flora experts: a. threatened (Critically Endangered (CR), Endangered (EN), and Vulnerable (VU)), rare and range restricted species; b. location, extent and ecological condition of natural vegetation; c. natural forest areas; d. protected trees; and e. protected plant species. 4. As far as possible, ensure that the routing of the proposed infrastructure is based on the following: a. Avoidance of Protected Areas as far as possible. If avoidance of protected areas cannot, under any circumstances, be achieved ensure that any infrastructure is reflected in the Protected Area Management Plan (PAMP) and that there is approval from the management authority. b. Avoid Critical Biodiversity Area (CBA) 1 and CBA 2 as far as possible; and c. Minimise the impact in Ecological Support Areas (ESAs) and remnants of natural vegetation of least concern and areas identified as Other Natural Areas (ONA) in a systematic conservation or biodiversity plan. 5. Where areas have been identified and confirmed as natural, semi natural or degraded areas of CR and EN ecosystem types, they should be avoided completely and not be directly impacted by the project footprint.						

Impact Management Outcomes: To achieve planning of pipeline routes and infrastructure in a manner that results in minimal loss and/or disturbance of terrestrial ecosystems and sensitive species.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
6. Plan the placement of infrastructure in such a way that areas identified as Very High sensitivity (confirmed habitat of species of Species of Conservation Concern (SCCs)) or High sensitivity (confirmed locality of threatened species) are avoided. If avoidance is not possible, suitable engineering solutions must be used to traverse these areas. 7. Use existing roads as far as possible for access to the pipeline route. 8. Wherever possible, align the pipeline and associated infrastructure along existing servitudes and linear disturbance such as a road and through degraded or transformed (e.g. cultivated) areas. 9. Design the infrastructure to use as much common/shared infrastructure as possible with development in nodes, rather than spreading out. 10. Avoid burrows of porcupines, aardvarks and carnivores. 11. Minimise the development footprint as much as possible by undertaking comprehensive planning, and ensure that the planning makes provision for rehabilitation of cleared areas after construction is completed. 12. A rehabilitation plan must be developed based on site-specific issues and requirements including soft and hard engineering interventions and revegetation. 13. An ECO must be appointed to oversee the rehabilitation phase, and ensure least possible harm to biodiversity and ensure compliance to the rehabilitation plan. 14. Locate temporary-use areas such as construction camps and lay-down areas in previously disturbed areas as far as possible. 15. The seasonal timing of the construction phase should be taken into consideration and planned in order to avoid impact, such as to minimise impacts from any known animal migrations across the proposed construction area. 16. The schedule and progression of the construction work must be planned and designed in a manner in which any area is only disrupted for a short period. 17. Align and design the pipeline route such that hillslope hydrology and soil erosion impacts are minimised. 18. Avoid any construction on steep slopes (>25 degrees). 19. Avoid areas of high erosion vulnerability as much as possible. 20. Ensure proper design and planning for demolition activities, with an emphasis on using delayed explosion methods, if blasting is required. 21. Incorporate, and budget for, control of invasive species for all phases of the gas pipeline development and operation.						

Impact Management Outcomes: To achieve planning of pipeline routes and infrastructure in a manner that results in minimal loss and/or disturbance of terrestrial ecosystems and sensitive species.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
22. An Alien Invasive Species (AIS) Management Plan must be developed for implementation throughout the project phases. 23. Permits for removal of any protected and SCC plant species must be obtained from the relevant authority prior to the cutting or clearing of the affected species. Such permits must be maintained on file. 24. Design and compile a monitoring plan that collects data, which can detect, for example, trends and undesirable outcomes in time for remedial action to be taken. The following should be considered: a. The establishment of a baseline prior to construction to ensure that changes are documented and compared to areas not affected by the construction; b. For Fynbos, Renosterveld and Grassland, the most basic monitoring would be to track fire incidence, i.e. how frequently a given area burns in a fire. Fire occurrence data are available from 2000 onwards and can be used to determine the historical fire frequency (and season). This information can be used to determine whether fire occurrences are changing as a result of the pipeline development. c. Individual threatened terrestrial species-level monitoring (flora and fauna).						

3.2 Freshwater Ecosystems (Watercourses, Rivers and Wetlands)

Impact Management Outcomes: To achieve planning of pipeline routes and infrastructure that results in minimal loss and/or disturbance of freshwater ecosystems and sensitive species.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. The planning of the gas pipeline routing and associated infrastructure placement must align with catchments of low to medium sensitivity, as best as possible. 2. Use the environmental sensitivity maps generated in the SEA Report, the National Web-based Environmental Screening Tool, and any other relevant and recently available spatial information to inform initial desktop-level planning and routing design. Avoid the placement of the following infrastructure within or close to wetlands or rivers (including the associated buffer habitat), and if avoidance is not possible the footprint must be minimised: a. Gas pipeline, pigging stations (within right of ways (ROWs)) and b. Construction camps, pipeline stockpiles, and access roads.						

Impact Management Outcomes: To achieve planning of pipeline routes and infrastructure that results in minimal loss and/or disturbance of freshwater ecosystems and sensitive species.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
3. Desktop validation of selected pipeline routes must be undertaken by a suitably qualified freshwater specialist using aerial/satellite imagery and available data layers. Validation checks must be undertaken to determine whether the gas pipeline and infrastructure pass through freshwater ecosystems and minimum required buffer areas. 4. All areas must be ground-truthed in conjunction with field-work by a suitably qualified freshwater specialist where gas pipeline and associated infrastructure are placed within freshwater ecosystems and/or specified buffers. The freshwater specialist must: a. Confirm the presence of freshwater and inland aquatic sensitivities (i.e. ecosystem types, habitats and species) with recommendations (including specified buffers) to avoid sensitive areas. b. Include rehabilitation plans (including erosion control measures) developed for watercourse crossings. c. Include stormwater management plans (including engineering layout and designs) produced for planned watercourse crossings.						

3.3 Estuaries

<table>
<tr><td colspan="7">Impact Management Outcomes: To achieve planning of pipeline routes and infrastructure so that it avoids the Estuarine Functional Zone (EFZ) and surrounding areas in order to avoid habitat destruction, loss of estuarine and riparian habitat (e.g. mangroves, saltmarshes, reeds, swamp forest), and degradation and reduction in ecological function and productivity of affected estuaries. To ensure optimum planning to such a level that estuarine physical and sediment dynamics are unaltered, water quality does not deteriorate, and loss of connectivity and habitat fragmentation between upper catchment and/or marine environment does not materialise.</td></tr>
<tr><th rowspan="2">Impact Management Actions</th><th colspan="3">Implementation</th><th colspan="3">Monitoring</th></tr>
<tr><th>Responsible Person</th><th>Method of Implementation</th><th>Timeframe for Implementation</th><th>Responsible Person</th><th>Frequency</th><th>Evidence of Compliance</th></tr>
<tr><td>1. As far as possible, no pipeline or associated infrastructure and activities (e.g. roads, Pipeline Intelligence Gauge Stations (PIGS), trenching, pipe jacking, or ROW clearance) should be developed within or below the EFZs.
2. If development within the EFZ cannot be avoided, detailed specialist sedimentary studies and assessments must be undertaken to determine the depth to which Horizontal Directional Drilling (HDD) needs to be undertaken in the EFZ (this is typically to bedrock level or levels below potential bed scouring (1:100 year return period) and would involve HDD across the entire length of the EFZ at depth potentially exceeding 20 m).
3. Avoid, as far as possible, coastal freshwater ecosystems potentially linked to estuaries (e.g. inflowing rivers and/or wetlands/seeps within a 10 km radius of the EFZ).
4. Where these coastal freshwater ecosystem types cannot be avoided, the assessment undertaken through the BA must determine whether the fine-scale, micro-sited gas pipeline alignment and development footprint can avoid the actual estuary, EFZ, associated coastal freshwater ecosystems, and associated buffers, as well as to determine appropriate management actions to be implemented as required which must be included as Part D of the EMPr.
5. Preference should be given to the position of gas pipelines within areas that have no natural vegetation remaining.
6. Avoid, as far as possible, natural estuarine indigenous vegetation such as mangroves and saltmarsh when selecting the infrastructure placement and pipeline route.
7. Appropriate rehabilitation procedures/measures should be planned to minimise the risk of increased sediment load in coastal rivers leading to downstream deposition in associated estuaries.</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

3.4 Ground Water Resources

Impact Management Outcomes: To achieve a gas pipeline route that is acceptable from a ground water perspective.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. If groundwater is predicted to occur within the depth of the pipeline excavations, even if seasonally, then the vulnerability of geohydrological features/aquifers must be determined using appropriate and relevant assessment methods, such as the DRASTIC method (a GIS based model used for groundwater vulnerability assessment). 2. If shallow aquifers cannot be avoided and/or dewatering of excavations are required, determine the following: d. dewatering technique to be employed; e. anticipated dewatering flow rate, volume and duration; f. water quality; and g. options for water collection, storage and/or disposal (based on established water quality) to reduce potential impacts to groundwater and the surrounding environment.						

3.5 Avifauna

Impact Management Outcomes: To achieve an acceptable gas pipeline route from an avifaunal perspective.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Ensure that the route and infrastructure placement planning results in the least impact on threatened avifauna species and their nests (especially for ground-dwelling / ground-nesting species). 2. Nest surveys, if needed, should be undertaken by a suitably qualified avifaunal specialist to identify all active nests of threatened avifauna species in the construction right-of-way and immediately adjacent areas prior to the commencement of the servitude clearing. a. On discovery of a nest, the avifaunal specialist must be provided with a work schedule which will enable him/her to ascertain, if, when and where the breeding birds could be impacted by the clearing activities. Appropriate management measures would need to be implemented, the nature of which will depend on the conservation status of the species and the location of the nest.						

Impact Management Outcomes: To achieve an acceptable gas pipeline route from an avifaunal perspective.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
b. In the event that a nest cannot under any circumstances be avoided: Remove eggs and/or chicks to a rehabilitation facility if the nest will be destroyed. c. If the nest falls outside the actual pipeline servitude, the timing of construction activities to avoid the disturbance of the breeding birds must be considered and implemented.						

3.6 Bats

Impact Management Outcomes: To achieve an acceptable gas pipeline route that has the least impact to bats, as best as possible.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Avoid, as best as possible, placing infrastructure in the vicinity of known and potential bat roosts, especially known large maternity roosts and near areas utilized by bats of conservation importance. While species differ in their preferences, the following act as ideal habitats for bats to roost: a. Large trees or bush clumps; b. Caves and sinkholes; c. Rock crevices; d. Disused or old mining adits; e. Tunnels; and f. Dwellings/buildings with sufficient roosting space under roofs. 2. Bats require adequate surface water for feeding and drinking, particularly for insectivorous bats which hunt insects congregating above water bodies or wet soil. Such areas should also be avoided in the planning of infrastructure, wherever possible (Refer to ***Section 3.2: Freshwater Ecosystems***). 3. If the above avoidance cannot be achieved, ensure that the development footprint is minimised in order to reduce disturbance to habitat that could be utilised by bats.						

3.7 Agricultural Resources

Impact Management Outcomes: To achieve a reduced amount of disturbance on productive agricultural land as a result of the implementation of the impact management actions.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Plan the fine-scale positioning of the gas pipeline, block valves, pigging stations, access roads, storage areas and construction camps to have minimal disturbance on agricultural activities and agricultural land. 2. Where possible the gas pipeline infrastructure must be positioned on existing boundaries or edges of agricultural units of land (fields) wherever possible, so as not to interfere with agricultural activities within a unit. 3. Avoid, wherever possible, the pipeline route from running through: a. areas that are utilised for and/or are suitable for deep rooted agricultural and forestry crops; and b. lands that have contour banks. Where the above avoidance is not possible, ensure that the construction is undertaken in the least productive agricultural season or period in order to minimise the impact on agricultural processes. 4. Existing farm based accommodation and settlements must be taken into consideration during the fine-scale positioning of the gas pipeline and associated infrastructure, as best as possible.						

3.8 Seismicity

Impact Management Outcomes: To confirm the susceptibility of the gas pipeline and associated infrastructure to ground movement that could result in damage.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. The following regions within the development footprint, should be mapped and designated as "sensitive", with input from a suitably qualified specialist: a. Steep topography prone to landslides; b. Thick near-surface low-seismic-velocity layers that could cause site amplification; and c. Problem soils and sands that could collapse or liquefy when shaken. 2. Avoid sites that are susceptible to earthquake damage, as best as possible. 3. Ensure that the gas pipeline and associated infrastructure is designed with appropriate mitigation measures; such as but not limited to:						

Impact Management Outcomes: To confirm the susceptibility of the gas pipeline and associated infrastructure to ground movement that could result in damage.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
a. Pipelines must be built to the most recent applicable international standards. b. Pipelines must be equipped with valves that will stop gas flow in a specific section if there is a significant drop in pressure. c. Prior to construction, sites prone to landslides, lateral spreading and liquefaction must be identified. The sites must either be avoided; or the pipeline must be strengthened or made more flexible as deemed appropriate; or the ground conditions must be improved; or some combination of the above measures must be implemented.						

3.9 Settlement Planning, Disaster Management and Social Aspects

Impact Management Outcomes: To build local community capacity and municipal support, avoiding key areas (where possible) and providing decision support.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
<u>Settlement Planning and Social Aspects:</u> 1. The servitude planning and proclamation will need to comply with local land use planning regulation and be included in negotiations as part of Local SDF and Land Use Management Schemes all of which need to comply with the Spatial Planning and Land Use Management Act (SPLUMA) regulations or provincial regulations where provincial planning legislation is in place. 2. The development of a Regional Spatial Development Framework (RSDF) (provision for this framework is included in Section 19-20 of SPLUMA) should be investigated as a suitable spatial planning tool for the gas pipeline. If determined to be the appropriate tool, a RSDF should be developed for the gas pipeline. The development of a RSDF would mean that municipalities do not need to alter their SDFs and IDPs specifically to accommodate the gas pipeline and the outcomes of the SEA will support the content of the RSDF. 3. The cost of improving the state of readiness of all spheres of government, especially municipalities, to deal with the implementation of the gas transmission pipeline servitude planning must be considered when the planning and implementation of the servitude is undertaken.						

Impact Management Outcomes: To build local community capacity and municipal support, avoiding key areas (where possible) and providing decision support.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
4. When referring to regulatory capacity, special mention should be made to the need for compliance monitoring and enforcement for successful implementation of the gas transmission pipeline project. 5. Transmission pipelines should avoid crossing through town areas, service towns, dense rural settlements and high-density population areas. 6. Use existing infrastructure servitudes where viable and agreed to. 7. Ensure that the gas transmission pipeline is sited so as avoid the need for resettlement. Where involuntary resettlement cannot be avoided, the relocation of affected households and/or compensation for economic displacement should be guided by national and/or international best practice (such as a Resettlement Action Plan) to manage the impact of resettlement. 8. Ensure a fair compensation process is implemented by the EA holder, where required, in line with the most recent and relevant Standards (such as the International Finance Corporation (IFC) Performance Standards). 9. All planning must take the current and future growth potential of towns into consideration in selecting the final gas transmission pipeline alignment. The EA holder must check growth direction of nearby settlements as well as existing and approved township development applications and land use rights. New development areas indicated in SDFs and applicable municipal infrastructure masterplans must also be taken into consideration. 10. Location of servitudes should not exclude existing or potential businesses or industries that use or would benefit from access to a high volume, regular source of natural gas. 11. The pipeline design must be carefully considered together with relevant design and building standards should it be constructed in the vicinity of populated areas, including the higher density population areas and economic nodes such as eThekwini, Cape Town, Nelson Mandela Bay and Gauteng. 12. Where avoidance of a populated area is not possible, the following management measures need to be put in place: a. Detailed route design considering existing and planned land use and developments to minimise impact on people and livelihoods as far as possible. b. Consult and inform the stakeholders. c. Ensure agreed time frames are respected. d. Ensure alternative access to properties is identified. 13. Timeous negotiations and detailed studies must be undertaken to minimise negative impact in vulnerable communities especially in traditional authority areas.						

Impact Management Outcomes: To build local community capacity and municipal support, avoiding key areas (where possible) and providing decision support.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
14. Ensure transparency in decision-making to provide clarity and ensure clean processes. 15. All negotiations and planning process should ensure that the phasing is clear, that schedules for the construction is limited and clearly communicated to limit the impacts on the population and their livelihoods. 16. A servitude agreement must be drawn up and signed by the EA holder and land owner(s). The agreement must stipulate the requirements of the agreement, as well as the activities that may and may not be undertaken within the servitude, such as growth of deep rooted plants.						
<u>Disaster Management:</u> 17. Ensure that pipelines located in high population density areas or areas requiring high levels of protection for the public, are designed to leak minimally rather than break (full bore rupture) in the event of an incident, e.g. if impacted, for example, by an excavator, or if some material failure occurs. 18. Ensure that pipelines are designed and built according to international and national standards and in accordance with the surrounding land-use. 19. The pipeline design must take into account the latest technology in order to prevent leaks and to monitor volumes of natural gas transmitted. This must include a suitable system to manage and monitor the transmission of the gas through the pipeline. 20. A Leak Detection Monitoring Plan must be compiled. 21. Pigging stations must be located in areas accessible to 24 hour emergency services. 22. Identify and consult with the municipalities affected by the final routing of the gas transmission pipeline. Determine what support would be required, should a disaster occur. 23. The EA holder must have discussions with the National Department of Co-operative Governance and Traditional Affairs (COGTA), as well as affected provinces, about municipal Disaster Management (DisM) capacity-building measures. 24. Ensure the Department of Mineral Resources and Energy are consulted with to determine the location of mining areas. 25. The DisM capacity of the affected municipalities needs to be investigated in detail, and a comparative matrix established as a baseline status quo situation. 26. Draft a set of interventions to build municipal Disaster Management capacity by working with provincial governments.						

Impact Management Outcomes: To build local community capacity and municipal support, avoiding key areas (where possible) and providing decision support.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
27. Develop an emergency plan for implementation during the construction and operational phases, based on widespread consultation and awareness-raising. 28. Include municipalities and Fire Protection Associations in their disaster management planning procedures. 29. Ensure that a community emergency response plan is devised and coordinated with appropriate community representatives. This should include: a. The warning signs of a possible gas leak, such as: I. Dirt being blown or appearing to be thrown into the air; II. A white vapour stream or mist-like cloud over the pipeline; III. Dead or dying vegetation in an otherwise green area; IV. A dry area in a wet field; V. Flames coming from the ground or appearing to burn above the ground; VI. Continuous bubbling in wet or flooded areas; VII. Unexpected frost or ice on the ground; VIII. A roaring, blowing or hissing sound; IX. An unusual “rotten egg” odour (Natural gas actually has no smell, but gas producers add chemicals to create a smell, and this helps with identification of leaks). b. Important steps emergency responders can take during the initial stages of an incident: I. If it is safe to do so, turn off any mechanized equipment and ignition sources in the vicinity of the suspected leak; II. Secure the site and determine a plan to evacuate or sheltering place; III. Monitor for hazardous atmospheres; IV. Control and redirect traffic; and V. Provide immediate access to representatives from the pipeline company. c. The role of the local responders: I. Handling traffic control and evacuation; II. Securing the site; III. Firefighting; IV. Making appropriate contacts if it appears other agencies, facilities or local authorities are impacted by the pipeline incident; V. Handling search and rescue; and VI. Providing medical assistance.						

Impact Management Outcomes: To build local community capacity and municipal support, avoiding key areas (where possible) and providing decision support.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
d. The emergency response plan should also include a continuing-education program for all first responders and the public residing adjacent to the pipeline.						

3.10 Surveying and Staking for the Final Pipeline Route

Impact Management Outcomes: Impact to the environment is minimised through adherence to EMPr requirements. No environmental degradation occurs as a result of the survey and pegging operations.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. No vegetation clearing must occur during survey and pegging operations. 2. No new access roads must be developed to facilitate access for survey and pegging purposes. 3. The surveyor is to demarcate (peg) access roads/tracks in consultation with the ECO. No deviations will be allowed without the prior written consent from the ECO.						

4 CONSTRUCTION PHASE

4.1 Environmental Awareness Training

Impact Management Actions	Implementation			Monitoring		
Impact Management Outcome: The development and execution of an effective environmental awareness training programme to ensure that all staff are aware of their responsibilities in terms of the Generic EMPr.						
	Responsible Person	Method of Implementation	Timeframe for Implementation	Responsible Person	Frequency	Evidence of Compliance
1. All staff must receive environmental awareness training prior to being involved in the construction activities. This includes newly appointed staff after the commencement phase. 2. The Contractor must allow for sufficient sessions to train all construction personnel with no more than 20 personnel attending each course at a time. 3. Refresher environmental awareness training must be available as and when required. 4. All staff must be aware of the conditions and controls linked to the Environmental Authorisation (EA) and within the EMPr, within their respective work areas, and made aware of their individual roles and responsibilities in achieving compliance with the EA and EMPr. 5. The Contractor must erect and maintain information posters at key locations on site, and the posters must include, as a minimum, information on safety notifications and cautions against littering. 6. Environmental awareness training must include, as a minimum, the following: a. Description of significant environmental impacts, actual or potential, related to their work activities; b. Mitigation measures to be implemented when carrying out specific activities; c. Emergency preparedness and response procedures; d. Procedures to be followed when working near or within sensitive areas; e. Wastewater management procedures; f. Water usage and conservation; g. Solid waste management procedures; h. Sanitation procedures; i. Fire prevention and awareness on the dangers of open and/or unattended fires; j. Disease prevention; and k. Chance find procedure for archaeological/paleontological/historical sites unearthed during construction.						

Impact Management Outcome: The development and execution of an effective environmental awareness training programme to ensure that all staff are aware of their responsibilities in terms of the Generic EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
7. A record of all environmental awareness training courses undertaken as part of the EMPr must be maintained on file and be available. 8. An attendance register of all staff that have received environmental awareness training must be maintained on file and be available. 9. Course material must be available to any personnel that may need to refer to it, and it must be presented in appropriate languages so that all staff are able to understand the information given.						

4.2 Construction Site Establishment

Impact Management Outcome: Impacts to the environment during site establishment are minimised and the development footprint is limited and demarcated.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. A Method Statement must be provided by the Contractor prior to any onsite activity that includes the layout of the construction camp in the form of a plan showing the location of key infrastructure and services (where applicable), including but not limited to offices, overnight vehicle parking areas, stores, the workshop, stockpile and lay down areas, hazardous materials storage areas (including fuels), the batching plant (if one is located at the construction camp), designated access routes, equipment cleaning areas and the placement of staff accommodation, cooking and ablution facilities, waste and wastewater management. 2. Location of construction camps must be carefully considered and within the approved area to ensure that the site does not impact on sensitive areas identified during the Environmental Assessment phase or field work. 3. Sites must be located, where possible, on previously disturbed areas. 4. The construction camp must be fenced in accordance with ***Section 4.12: Fencing and gate installation***. 5. The use of existing accommodation for contractor staff, where possible, is encouraged. 6. Every effort must be made to keep the footprint as small as possible.						

4.3 No-Go and Restricted Areas

Impact Management Outcome: To establish effective demarcation and management of No-Go and restricted areas in order to reduce resultant environmental impacts.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Identification of No-Go and restricted areas is to be informed by the Environmental Assessment, site field-work, the EA and any additional areas identified during construction. 2. Erect, demarcate and maintain a temporary fence or barrier around the perimeter of any No-Go and restricted area. This must have clear signage, and colour coding could be used if appropriate. 3. Fencing of No-Go and restricted areas is to be undertaken in accordance with ***Section 4.12: Fencing and gate installation***. 4. Unauthorised access and construction related activities inside No-Go and restricted areas are prohibited.						

4.4 Freshwater Ecosystems (Watercourses, Wetlands and Water Bodies)

Impact Management Outcome: Construction of pipeline routes and infrastructure that results in minimal to no loss and/or disturbance of freshwater ecosystems and sensitive species, and reduced erosion, pollution and contamination of watercourses.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Identification and demarcation of "no-go" areas must be undertaken as per ***Section 4.3 (No-go and Restricted Areas)***. 2. Control and supervision of heavy machinery and vehicles operating within (and in proximity to) watercourses and wetlands must be undertaken. 3. Supervision of personnel, construction materials, cement batching, and fuel/oil/waste being processed or stored in proximity to watercourses and wetlands must be undertaken. 4. Inspection of trenches (including both excavation and back-filling) and low fences for fauna must be undertaken. 5. Permits for removal of any protected and plant species must be obtained from the relevant authority prior to the removal of the affected species. Such permits must be maintained on file. 6. All construction should take place during the dry season, as far as possible. 7. All watercourses and water bodies must be protected from direct or indirect spills of pollutants such as solid waste, sewage, cement, oils, fuels, chemicals, aggregate tailings, wash and contaminated water or organic material resulting from the Contractor's activities.						

Impact Management Outcome: Construction of pipeline routes and infrastructure that results in minimal to no loss and/or disturbance of freshwater ecosystems and sensitive species, and reduced erosion, pollution and contamination of watercourses.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
8. In the event of a spill, prompt action must be taken to contain and clear the polluted or affected areas. 9. Where possible, construction equipment should not traverse any seasonal or permanent wetland. 10. Excavation or construction in a watercourse and wetland area must be avoided unless exceptional circumstances require that such activities cannot be avoided. The necessary environmental approvals for such activities must be obtained beforehand. 11. Development of permanent watercourse crossings must only be undertaken where no better-fitting alternative access to the construction right of way and pigging station positions is available. 12. Existing crossing points must be favoured over the creation of new crossings (including temporary access). 13. No excavation or construction shall be permitted within the 1:100 year flood line or riparian zone (whichever is the greatest) of a watercourse or within 500 m from the boundary of a wetland area without prior approval from the Competent Authority in the form of a water use authorisation. 14. Rivers and watercourses must be kept clear of felled trees, vegetation cuttings and debris. The integrity of the river banks must be maintained by only trimming parts of trees directly affecting the gas transmission line routing. 15. When working in or near any watercourse and wetland, the following environmental controls and considerations must be taken: a. Water levels during the period of construction; b. The bed, banks, course or characteristics of a watercourse must not be altered, where possible; c. During the execution of the works, appropriate measures to prevent pollution and contamination of the riparian environment must be implemented e.g. including ensuring that construction equipment is well maintained; d. Where earthworks is being undertaken in proximity to any watercourse, slopes must be stabilised using suitable materials, i.e. sandbags or geotextile fabric, to prevent sand and rock from entering the channel; and e. Appropriate rehabilitation and re-vegetation measures for the watercourse banks must be implemented timeously. In this regard, the banks should be appropriately and incrementally stabilised as soon as construction allows.						

4.5 Estuaries

Impact Management Outcome: Construction of pipeline routes and infrastructure that results in minimal to no loss and/or disturbance of estuarine ecosystems and sensitive species.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Construction activities associated with the establishment of access roads through inflowing associated coastal wetlands or rivers (if unavoidable) connected to and within 10 km of an estuary should be restricted to a working area of 10 m in width either side of the road, and these working areas should be clearly demarcated. No vehicles, machinery, personnel, construction material, cement, fuel, oil or waste should be allowed outside of the demarcated working areas. 2. Ensure adequate freshwater watercourse crossings (i.e. culverts of the correct specification) are designed and constructed where roads traverse these areas so that the concentration of flow (particularly during high flow conditions) is minimised as far as possible. In the case of river crossings, bank stabilisation measures (gabions, eco logs, geofabric, sediment fences) are required when wetland or watercourse banks steeper than 1:5 are denuded during construction. 3. Construction camps, toilets, temporary laydown areas and borrow pits should be located outside of the EFZ and any buffer areas (as recommended by a suitably qualified specialist during environmental assessment or planning/design phase) around inflowing coastal wetlands and rivers within 10 km of an estuary and should be rehabilitated following construction. 4. Timing of all construction activities (including establishment of construction camps, temporary lay-down areas, construction of haul roads and operation of heavy machinery) within the proximity of estuaries and/or coastal freshwater ecosystems within 10 km of an estuary should occur in the dry season as far as is practicable. 5. As far as possible, adopt below ground pipe construction methods (such as HDD rather than trenching). 6. Avoid clearing of estuarine vegetation within the EFZ in any manner to prevent estuarine erosion, or if unavoidable, implement rehabilitation of estuarine vegetation as soon as possible to stabilise soil. 7. Avoid clearing of riparian indigenous vegetation upstream of estuaries within 10 km of the EFZ as far as possible, or if unavoidable, implement rehabilitation of riparian vegetation as soon as possible to stabilise soil. 8. Pits and/or excavations should be checked regularly by the on-site ECO and plans put in place for species rescue and relocation. 9. The following is not allowed within 30 m of the edge of any estuary, coastal river or coastal wetlands: a. Fuel storage, refuelling, vehicle maintenance or vehicle depots.						

Impact Management Outcome: Construction of pipeline routes and infrastructure that results in minimal to no loss and/or disturbance of estuarine ecosystems and sensitive species.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
b. Washing of vehicles and machinery. c. Temporary or permanent stockpiling of spoil material, including stripped topsoil. 10. Refuelling and fuel storage areas, and areas used for the servicing or parking of vehicles and machinery, should be located on impervious bases and should have containment around them. The containment should be sufficiently high to ensure that all the fuel kept in the area will be captured in the event of a major spillage. 11. No effluents or polluted water should be discharged directly into any estuary, river or wetland areas. 12. Workers should be made aware of the importance of not destroying or damaging the vegetation along estuaries, coastal rivers and coastal wetland areas, of not undertaking activities that could result in the pollution of drainage lines or wetlands, and of not killing or harming any animals that they encounter. 13. Fixed point photography must be undertaken to record and monitor vegetation changes and potential site impacts occurring during the construction phase. 14. Avoid the use of herbicides in close proximity (close than 50 m) to wetlands or rivers and do not disturb riparian/or wetland buffer areas. 15. Care should be taken at all times not to destabilise riparian areas and increase the sediment load downstream to the estuary.						

4.6 Terrestrial Ecology – Flora

Impact Management Outcomes: Vegetation clearance is minimised via adherence to the EMPr vegetation clearance requirements, which is restricted to the authorised development footprint of the proposed infrastructure; and alien vegetation is effectively controlled.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
<u>**General**</u> 1. Ensure that the development footprint area and physical extent of construction activities are as per the site plan and rehabilitate cleared areas after construction is completed. 2. Avoid any unnecessary vegetation clearance. Vegetation clearing must be limited to the construction right-of-way and access roads only. 3. Minimise the duration of the construction activities on site.						

Impact Management Outcomes: Vegetation clearance is minimised via adherence to the EMPr vegetation clearance requirements, which is restricted to the authorised development footprint of the proposed infrastructure; and alien vegetation is effectively controlled.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
4. Indigenous vegetation that does not interfere with the construction must be left undisturbed. 5. Search, rescue and replanting of all rare, protected and threatened plant species likely to be damaged during the construction phase within the development footprint must be identified and undertaken by a relevant and suitably qualified specialist, prior to any development, breaking of ground or clearing of vegetation. This must be undertaken only where the impact on rare, protected and threatened plant species cannot first be avoided as identified on the site plan. 6. The Environmental Audit Report must confirm that all identified species have been rescued, retained in a nursery and/or replanted and that the location of replanting is compliant with conditions of approvals. 7. Species removed and trees felled due to construction activities must be documented in an inventory. 8. A record must be taken of vegetation clearance where permit conditions apply – e.g. document number of trees removed in comparison to what is approved on the permit. 9. If possible, cut trees in the construction zone in a way that will allow them to re-sprout, provided that they do not impact on the pipeline during the operational phase in relation to deep roots within the pipeline servitude. 10. Debris resulting from vegetation clearing shall not be burned under any circumstances. 11. All threatened species and sensitive vegetation not removed must be clearly marked and such areas fenced off in accordance with ***Section 4.3: No-Go and Restricted Areas***. 12. Vegetation must be trimmed or removed where the root system is likely to intrude on the gas transmission pipeline. 13. Vegetation that does not grow deep enough to cause interference with the construction, must not be cut or trimmed unless it is growing in the road access area, and then only at the discretion of the Project Manager. 14. Where clearing for access purposes is essential, the maximum width to be cleared within the construction right-of-way and servitude must be in accordance to distance as agreed between the landowner and the EA holder. 15. Deep valleys and environmentally sensitive areas that restrict vehicle access, or legally protected areas, must not be cleared of vegetation provided that the vegetation poses no threat to the construction process.						

Impact Management Outcomes: Vegetation clearance is minimised via adherence to the EMPr vegetation clearance requirements, which is restricted to the authorised development footprint of the proposed infrastructure; and alien vegetation is effectively controlled.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
16. Train the construction workers and inspectors with regards to their responsibilities regarding biodiversity and ecological impacts, and monitor their actions (refer to ***Section 4.1: Environmental Awareness Training***). 17. Where fragmentation of key habitats has occurred use landscape design methods to re-establish ecological connectivity such as use of indigenous seeds and plants for landscaping, and creation of riparian strips. 18. No collection of 'fuelwood' should be allowed on site. 19. During construction maintain top soil for later rehabilitation. 20. Ensure that the valuable top layer of the soil containing the seed banks is carefully removed and stored. The top layer of the soil (100 to 150 mm deep) should be stripped and replaced in a way that minimises disturbance (e.g. no tillage). The deeper layers of the soil can then be removed and stockpiled as well. It is best to keep these layers separate and the replace the layers in the same sequence in which they were removed. 21. The time that it is stored for should be kept to the absolute minimum. 22. If more soil needs to be removed for any reason then that soil should be stored separately and replaced first. The initial top layer stripping and replacement is essentially a form of top-dressing which contains most if not all of the seedbank and is critical for successful rehabilitation. **<u>Management of Alien Invasive Plants:</u>** 23. Identify and map invasive species along and within the planned pipeline route and infrastructure placement areas prior to construction. 24. Alien invasive vegetation must be managed and removed in accordance with a costed plan that is in line with relevant municipal, provincial, and national legislation, procedures, guidelines and recommendations. Remove alien invasive plants, preferably before they set seed, and re-vegetate as soon as possible with perennial fast-growing indigenous vegetation. Ensure that re-vegetated areas are not disturbed, all livestock are kept away (as applicable), and no off road driving is undertaken. 25. All cut plant material and removed alien invasive plants must be removed from site and disposed of at a licensed waste disposal facility and based on consultation with suitably qualified specialists. Proof of disposal must be retained and kept on file. 26. The use of herbicides must be in compliance with the relevant legislation enforced at the time.						

Impact Management Outcomes: Vegetation clearance is minimised via adherence to the EMPr vegetation clearance requirements, which is restricted to the authorised development footprint of the proposed infrastructure; and alien vegetation is effectively controlled.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
27. Only a registered pest control operator may apply herbicides on a commercial basis and commercial application must be carried out under the supervision of a registered pest control operator. 28. A daily register must be kept of all relevant details of herbicide usage. 29. Ensure that machinery is properly cleaned before being brought onto site and also before moving it from a section of the route where invading species were controlled to a section that is free of invading species. 30. Minimise import of materials that could contain propagules of invasive species, particularly plants and/or screening such materials to ensure they are propagule free. 31. Do not use sand sources contaminated with invasive alien plant seed for bedding of the pipe or for construction work.						

4.7 Terrestrial Ecology - Fauna

Impact Management Outcomes: Impact to fauna is minimised during construction.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Ensure that the development footprint area and physical extent of construction activities are minimised as much as possible and rehabilitate cleared areas after construction is completed. 2. Minimise the duration of the construction activities on site. 3. No threatened species identified in areas of Very High and High Sensitivity on the National Web-based Environmental Screening Tool and/or threatened species as listed according to the National Environmental Management: Biodiversity Act (Act 10 of 2004) and relevant provincial ordinances, may be removed and/or relocated without appropriate authorisations/permits. 4. Where impact cannot be avoided, search and rescue along the proposed pipeline route and infrastructure placement areas must be completed by a suitably qualified specialist prior to any development, breaking of ground or clearing of vegetation, in order to ensure that no animals (e.g. porcupine, aardvark, carnivores) are harmed. Alternatively, animals can be flushed out of the area of the pipeline footprint to avoid being harmed. 5. If animals are required to be captured and moved, then permits for removal must be obtained from the relevant authorities prior to the removal of the affected species, and they must be kept on file. 6. No deliberate or intentional killing of fauna is allowed. Ensure that all staff understand that no animals may be intentionally harmed or killed for any purpose. 7. Poaching or illegal collection of rare or threatened species must not be tolerated under any circumstances. All instances of illegal collection should be reported to the applicable Provincial Nature Conservation Authorities. 8. Ensure the use of surveillance and monitoring of snares, debarking, hunting etc. in order to minimise poaching. 9. Develop community education programs near vulnerable sites to minimise poaching. 10. All animal dens in proximity to the construction work areas must be marked as ***No-Go and Restricted Areas (Refer to Section 4.3)***. 11. If roads or structures are fenced, use plain strands and not jackal proof fencing to ensure animals can still move through fences in accordance with ***Section 4.12: Fencing and gate installation***.						

Impact Management Outcomes: Impact to fauna is minimised during construction.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
12. Where fragmentation of key habitats has occurred use landscape design methods to re-establish ecological connectivity such as green bridges or wildlife crossings, establishment of conservation corridors, and underpasses for migrating animals. 13. No dogs or other pets should be allowed on site. 14. Night driving should be limited on site. 15. Appropriate lighting should be installed to minimise negative effects on nocturnal animals. 16. Speed limits should be set on all roads on site. Vehicle speeds must kept slow to minimise potential collisions with animals. 17. Electrical fences, if installed, should be erected at least 30 cm from the ground or according to relevant the norms and standards of the Nature Conservation Authorities. 18. Wherever possible, time construction activities to avoid the breeding or migration periods of the threatened or important taxa that may occur along the gas pipeline route. 19. Equip open trenches with suitable ramps or steps every 50 m so that trapped animals can escape. In areas where there is high animal activity, fine-mesh fences should be laid out around the open section of trenches and secured to minimise the likelihood of animals falling in. 20. Conduct daily patrols to rescue any animals trapped in the pipeline trench.						

4.8 Avifauna

Impact Management Outcomes: To avoid avian mortality and displacement due to nest destruction, habitat destruction and sensory disturbance during the construction phase.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Activities must be restricted to the construction right-of-way, development footprint and servitude width as far as is practical possible. 2. No access must be allowed to property and habitats beyond the servitude and development footprint. 3. Maximum use must be made of existing access roads to prevent the unnecessary construction of new roads. 4. Implement noise and dust reduction measures according to industry best practice.						

4.9 Bats

Impact Management Outcomes: To ensure least disturbance and harm to bats during the construction phase.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Keep working areas damp to reduce dust production in order to prevent the reduction of foraging potential of an area. 2. Keep soil workings contained in order to prevent the reduction in fresh water availability and displacement of bats.						

4.10 Heritage Resources

Impact Management Outcomes: Impact to heritage resources is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Identify, demarcate and prevent impact to all known sensitive heritage features on site in accordance with the No-Go procedure in ***Section 4.3: No-go and Restricted Areas***. 2. Carry out general monitoring of excavations for potential fossils, artefacts and material of heritage importance. 3. Any buffer areas identified by the Heritage specialist in the assessment report must be adhered to (e.g. graves, caves, kraals, ruins and palaeontological features). 4. All work must cease immediately, if any human remains and/or other archaeological, palaeontological and historical material are uncovered. Such material, if exposed, must be reported to the nearest museum, archaeologist/palaeontologist, or the South African Heritage Resources Agency (SAHRA) (or the South African Police Services), so that a systematic and professional investigation can be undertaken. Sufficient time must be allowed to remove/collect such material before construction recommences.						

4.11 Access Roads

Impact Management Outcomes: To establish effective access and movement of vehicles within authorised areas on site in order to minimise resultant environmental impacts.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Access to the construction right of way, site camps, storage areas, and pigging station positions must be negotiated with the relevant landowner. Such access roads must fall within the assessed and authorised area. 2. An access agreement must be formalised and signed by the Project Manager (PM), Contractor and landowner before commencing with the construction activities. 3. The access roads to the construction right of way, site camps, storage areas, and pigging station positions must be signposted after access has been negotiated and before the commencement of the construction activities. 4. All contractors must be made aware of all these access routes. 5. Restrict all vehicle traffic within the authorised disturbance area. 6. Any access route deviation from that in the written agreement must be closed and re-vegetated immediately, at the expense of the Contractor. 7. Maximum use of both existing servitudes and existing roads must be made. 8. In circumstances where private roads must be used, the condition of such roads must be recorded in accordance with ***Section 1.10.10: Photographic Record***; prior to use and the condition thereof agreed by the landowner, the PM, and the Contractor. 9. All private roads used for access to the construction right of way and pigging station positions must be maintained and upon completion of the works, be left in at least the original condition. This must be agreed with the asset owner. 10. Access roads and bridges shall only be constructed where necessary at watercourses, on steep slopes or where boulders prohibit vehicular traffic (refer to ***Section 4.4 Freshwater Ecosystems (Watercourses, Wetlands and Water Bodies)*** for controls when seeking access in proximity to a water course or water body). 11. As far as possible, access roads must follow the contours in hilly areas, as opposed to winding down steep slopes. 12. Access roads must be constructed in accordance with relevant design standards.						

4.12 Fencing and Gate Installation

Impact Management Outcomes: The erection of fencing and management of fencing is to be undertaken in accordance with relevant legislation.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Use existing gates available to gain access to all parts of the area authorised for development, where possible. 2. Existing and new gates are to be recorded and documented in accordance with ***Section 1.10.10: Photographic Record***. 3. All gates must be fitted with locks and be kept locked at all times during the construction phase, unless otherwise agreed with the landowner. 4. At points where the pipeline routing crosses a fence in which there is no suitable gate within the extent of the construction right of way, on the instruction of the Project Manager (PM), a gate must be installed at the approval of the landowner. 5. Original tension must be maintained in the fence wires. 6. All gates installed in electrified fencing must be re-electrified. 7. All demarcation fencing and barriers must be maintained in good working order for the duration of the gas transmission pipeline construction activities. 8. Fencing must be erected around the construction site camp, batching plants, hazardous storage areas, and all designated No-Go and restricted areas, where appropriate and would not cause harm to sensitive flora and fauna. 9. Any temporary fencing to restrict the movement of live-stock must only be erected with the permission of the landowner. 10. All fencing must be constructed with high quality, SABS approved, material. 11. The use of razor wire as fencing must be avoided. 12. Fenced areas with gate access must remain locked after hours, during weekends and on holidays if staff are away from site. Site security will be required at all times.						

4.13 Water Supply Management

<table>
<tr><td colspan="7">Impact Management Outcome: To ensure that water use during the construction phase is minimised as best as possible and is compliant with the National Water Act (Act 36 of 1998, as amended).</td></tr>
<tr><th rowspan="2">Impact Management Actions</th><th colspan="3">Implementation</th><th colspan="3">Monitoring</th></tr>
<tr><th>Responsible Person</th><th>Method of Implementation</th><th>Timeframe for Implementation</th><th>Responsible Person</th><th>Frequency</th><th>Evidence of Compliance</th></tr>
<tr><td>1. All abstraction points or boreholes must be registered with the DHSWS and suitable water meters installed to ensure that the abstracted volumes are measured on a daily basis.
2. The Contractor must ensure the following if water abstraction is needed and authorised:
a. The vehicle abstracting water from a river does not enter or cross it and does not operate from within the river;
b. No damage occurs to the river bed or banks and that the abstraction of water does not entail stream diversion activities; and
c. All reasonable measures to limit pollution or sedimentation of the downstream watercourses are implemented.
3. Ensure water conservation is being practiced by:
a. Minimising water use during cleaning of equipment.
b. Undertaking regular audits of water systems.
c. Including a discussion on water usage and conservation during environmental awareness training; and
d. Encouraging the use of grey water.</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

4.14 Storm Water and Waste Water Management

<table>
<tr><td colspan="7">Impact Management Outcomes: To manage construction storm water and waste water discharges in accordance with relevant national and provincial legislation and local by-laws.</td></tr>
<tr><th rowspan="2">Impact Management Actions</th><th colspan="3">Implementation</th><th colspan="3">Monitoring</th></tr>
<tr><th>Responsible Person</th><th>Method of Implementation</th><th>Timeframe for Implementatio n</th><th>Responsible Person</th><th>Frequency</th><th>Evidence of Compliance</th></tr>
<tr><td>1. Appropriate pollution control facilities necessary to prevent discharge of water containing pollutants or visible suspended materials into watercourses or water bodies shall be designed and implemented.
2. Runoff from the cement/concrete batching areas must be strictly controlled, and contaminated water shall be collected, stored and either treated or disposed of off-site, at an <u>authorised</u> facility approved by the Project Manager (PM).
3. All spillage of oil onto concrete surfaces must be controlled by the use of an approved absorbent material. The used absorbent material must be disposed of at an appropriate and authorised waste disposal facility. Proof of disposal must be retained on file.</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Impact Management Outcomes: To manage construction storm water and waste water discharges in accordance with relevant national and provincial legislation and local by-laws.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
4. Natural storm water runoff not contaminated during the construction phase and clean water can be discharged directly to watercourses and water bodies, subject to the approval from the PM and support from the ECO. 5. Water that has been contaminated with natural suspended solids only, such as soils and silt, may be released into watercourses or water bodies only once all suspended solids have been removed from the water by settling out these solids in settlement ponds. The release of settled water back into the environment must be subject to the approval from the PM and support from the ECO.						

4.15 General Solid Waste Management

Impact Management Outcomes: To manage general solid waste in accordance with relevant national and provincial legislation and local by-laws.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. All measures regarding waste management must be undertaken using an integrated waste management approach. 2. Sufficient, covered waste collection bins (scavenger and weatherproof) must be provided. 3. A suitably positioned and clearly demarcated waste collection site must be identified and provided on site. 4. The waste collection site must be maintained in a clean and orderly manner. 5. Waste must be segregated into separate bins and clearly marked for each waste type for recycling and safe disposal. 6. Staff must be trained in waste segregation. 7. Recycling of waste types must be maximised. 8. Bins must be emptied regularly and the resulting waste disposed of correctly. 9. General waste produced on site must be disposed of at a registered waste disposal sites or via a recycling company. 10. Certificates of safe disposal for general and recycled waste must be maintained and retained on file. 11. Under no circumstances shall any waste be disposed of, burned or buried, on site.						

4.16 Hazardous Waste Management

Impact Management Outcomes: To manage hazardous waste in accordance with relevant national and provincial legislation and local by-laws.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. All measures regarding hazardous waste management must be undertaken using an integrated waste management approach. 2. Sufficient, covered waste collection skips (scavenger and weatherproof) must be provided for the collection of hazardous waste. Where required, necessary approvals for such collection must be obtained from the relevant authority in terms of the National Environmental Management: Waste Act (Act 59 of 2008, as amended). 3. A suitably positioned and clearly demarcated hazardous waste collection site must be identified and provided on site. 4. The hazardous waste collection site must be maintained in a clean and orderly manner. 5. Hazardous waste produced on site must be disposed of at a registered hazardous waste disposal site. 6. Certificates of safe disposal for hazardous waste must be maintained and retained on file. 7. Under no circumstances shall any waste be disposed of, burned or buried, on site.						

4.17 Safety of the Public

Impact Management Outcomes: All precautions are taken where possible to minimise the risk of injury, harm or complaints.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Identify fire hazards, demarcate and restrict public access to these areas as well as notify the local authority of any potential threats e.g. large brush stockpiles, fuels etc. 2. All unattended open excavations must be adequately fenced or demarcated. 3. Adequate protective measures must be implemented to prevent unauthorised access to and climbing of protective scaffolding. 4. Ensure structures vulnerable to high winds are secured. 5. Maintain an incidents and complaints register in which all incidents or complaints involving the public are logged. 6. Ensure that an awareness campaign is undertaken prior to the commencement of construction to inform surrounding landowners, land users and occupiers, as well as Interested and Affected Parties of the proposed construction, and inform them of the potential risks associated with prohibited activities within the gas pipeline servitude, such as illegal excavations. 7. Ensure that all surrounding Interested and Affected Parties have access to a contact number for the Contractor and Pipeline Operator for emergency situations.						

4.18 Sanitation

Impact Management Outcomes: No pollution or disease arises on-site as a result of sanitation facilities or lack thereof.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Mobile chemical toilets must be installed on site if no other ablution facilities are available. 2. The use of ablution facilities and or mobile toilets must be used at all times and no indiscriminate use of the environment for the purposes of ablutions must be permitted under any circumstances. 3. Ablution facilities shall be located within 100 m of any work place and must be sufficient enough to accommodate the workforce (minimum requirement of 1:15 workers on site).						

Impact Management Outcomes: No pollution or disease arises on-site as a result of sanitation facilities or lack thereof.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
4. Where mobile chemical toilets are required, the following must be ensured: a. Toilets are located no closer than 100 m to any watercourse or water body; b. Toilets are secured to the ground to prevent them from toppling due to wind or any other cause; c. No spillage occurs when the toilets are cleaned or emptied and the contents are managed in accordance with the EMPr; d. Toilets are emptied before long weekends and workers holidays, and must be locked after working hours; and e. Toilets are serviced regularly and the ECO must inspect toilets to ensure compliance to health standards. 5. A copy of the waste disposal certificates must be maintained.						

4.19 Prevention of Disease

Impact Management Outcomes: The risk of the occurrence and spread of disease is minimised through the effective implementation of EMPr actions.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Undertake environmentally-friendly pest control in the camp area. 2. Ensure that the workforce is sensitised to the effects of sexually transmitted diseases, especially HIV/AIDS, or other highly infectious viruses such as COVID-19. 3. The Contractor must ensure that information posters on HIV/AIDS and COVID-19 are displayed in the Contractor site camp area. 4. Information and education relating to sexually transmitted diseases and COVID-19 are to be made available to both construction workers and the local community, where applicable. 5. Free condoms at central points must be made available to all staff on site. 6. Medical support must be made available. 7. Provide access to Voluntary HIV Testing and Counselling Services.						

4.20 Emergency Procedures

Impact Management Objective: Emergency procedures are in place to enable a rapid and effective response to all types of environmental emergencies.						
Impact Management Outcomes: All emergency situations are managed in accordance with the emergency procedures.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Compile an Emergency Response Action Plan prior to the commencement of the proposed project. 2. The Emergency Response Action Plan must deal with accidents, potential spillages and fires in line with relevant legislation. 3. All staff must be made aware of emergency procedures as part of environmental awareness training. 4. The relevant local authority must be made aware of a fire as soon as it starts. 5. In the event of an emergency, necessary mitigation measures to contain a spill or leak must be implemented (see ***Hazardous Substances, Section 4.21***).						

4.21 Hazardous Substances

Impact Management Outcomes: The management of hazardous substances is undertaken in accordance with relevant legislation.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. The Occupational Health and Safety Act (Act 85 of 1993) and its associated regulations must be complied with at all times. 2. The use and storage of hazardous substances to be minimised and non-hazardous and non-toxic alternatives substituted where possible. 3. All hazardous substances must be stored in suitable containers. 4. Containers must be clearly marked to indicate contents, quantities and safety requirements. 5. An Alphabetical Hazardous Chemical Substance (HCS) control sheet must be drawn up and kept up to date on a continuous basis. 6. All hazardous chemicals that will be used on site must have Material Safety Data Sheets (MSDS). 7. All employees working with HCS must be trained in the safe use of the substance and according to the safety data sheet.						

Impact Management Outcomes: The management of hazardous substances is undertaken in accordance with relevant legislation.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
8. Employees handling hazardous substances/materials must be aware of the potential impacts and follow appropriate safety measures. 9. Appropriate personal protective equipment (PPE) must be made available. 10. The Contractor must ensure that diesel and other liquid fuel, oil and hydraulic fluid is stored in appropriate storage tanks or in bowsers. 11. All storage areas must have sufficient containment in order to contain a spill/leak from the stored containers. Containment areas to be suitably lined with a SABS approved liner. 12. Provision must be made for refuelling at the storage area by protecting the soil with an impermeable groundcover. Where dispensing equipment is used, a drip tray must be used to ensure small spills are contained. 13. No unauthorised access into the hazardous substances storage areas must be permitted. 14. No smoking must be allowed within the vicinity of the hazardous storage areas. 15. Adequate fire-fighting equipment must be made available at all hazardous storage areas. 16. Where refuelling away from the dedicated refuelling station is required, a mobile refuelling unit must be used. Appropriate ground protection such as drip trays must be used. 17. An appropriately sized spill kit must kept onsite and available at all times. The spill kit size must be relevant to the scale of the activities involving the use of hazardous substances. 18. An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken. 19. The responsible operator must have the required training to make use of the spill kit in emergency situations. 20. In the event of a spill, contaminated soil must be collected in containers and stored in a central location and disposed of according to the National Environmental Management: Waste Act 59 of 2008. Refer to ***Section 4.14*** for procedures concerning storm and waste water management, ***Section 4.15*** for general solid waste management, and ***Section 4.16*** for hazardous waste management.						

4.22 Workshop, Equipment Maintenance and Storage

Impact Management Outcomes: Soil, surface water and groundwater contamination is minimised.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Where possible and practical all maintenance of vehicles and equipment must take place in the workshop area. 2. During servicing of vehicles or equipment, especially where emergency repairs are effected outside the workshop area, a suitable drip tray must be used to prevent spills onto the soil. 3. Leaking equipment must be repaired immediately or be removed from site to facilitate repair. 4. Workshop areas must be monitored for oil and fuel spills. 5. An appropriately sized spill kit must kept onsite and available at all times. The spill kit size must be relevant to the scale of the activities involving the use of hazardous substances. 6. An appropriate number of spill kits must be available and must be located in all areas where activities are being undertaken. 7. The responsible operator must have the required training to make use of the spill kit in emergency situations. 8. The workshop area must have a concrete slab that is sloped to facilitate runoff into a collection sump or suitable oil/water separator where maintenance work on vehicles and equipment can be performed. 9. Water drainage from the workshop must be contained and managed in accordance with ***Section 4.14: Storm Water and Waste Water Management***.						

4.23 Batching Plants

Impact Management Outcome: The management, handling and storage of sand, stone and cement is undertaken in accordance with the EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Concrete mixing must be carried out on an impermeable surface (such as on boards or plastic sheeting and/or within a bunded area with an impermeable surface).						

Impact Management Outcome: The management, handling and storage of sand, stone and cement is undertaken in accordance with the EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
2. Batching plant areas must be fitted with a containment facility for the collection of cement laden water. This facility must be impervious to prevent soil and groundwater contamination. 3. Contaminated water from the batching plant must be contained to prevent soil and groundwater contamination. 4. Bagged cement must be stored in an appropriate facility and at least 10 m away from any watercourses, gullies and drains. 5. A washout facility must be provided for washing of concrete associated equipment. Water used for washing must be restricted. 6. Hardened concrete from the washout facility or concrete mixer can either be reused or disposed of at an appropriate licensed disposal facility. 7. Empty cement bags must be secured with adequate binding material if these will be temporarily stored on site. 8. Sand and aggregates containing cement must be kept damp to prevent the generation of dust (Refer to ***Section 4.24: Dust emissions***). 9. Any excess sand, stone and cement must be removed or reused from site on completion of the construction period and disposed at a registered disposal facility. Certificates of safe disposal for general and recycled waste must be maintained and retained on file. 10. Temporary fencing must be erected around batching plants in accordance with ***Section 4.12: Fencing and gate installation***.						

4.24 Dust Emissions

Impact Management Outcome: Dust prevention measures are applied to minimise the generation of dust and deposition on the surrounding land.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Take all reasonable measures to minimise the generation of dust as a result of construction activities to the satisfaction of the ECO. 2. Removal of vegetation must be avoided until such time as soil stripping is required and similarly exposed surfaces must be re-vegetated or stabilised as soon as is practically possible.						

Impact Management Outcome: Dust prevention measures are applied to minimise the generation of dust and deposition on the surrounding land.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
3. Excavation, handling and transport of erodible materials must be avoided under high wind conditions or when a visible dust plume is present. 4. During high wind conditions, the ECO must evaluate the situation and make recommendations as to whether dust-damping measures are adequate, or whether construction work operations must cease altogether until the wind speed drops to an acceptable level. 5. Where possible, soil stockpiles must be located in sheltered areas where they are not exposed to the erosive effects of the wind. 6. Where erosion of stockpiles becomes a problem, erosion control measures must be implemented at the discretion of the ECO. 7. Vehicle speeds must be kept slow and must not exceed 40 km/h along dust roads or 20 km/h when traversing unconsolidated and non-vegetated areas, in order to minimise potential collisions with animals and dust creation. 8. Appropriate dust suppression measures must be used when dust generation is unavoidable, e.g. dampening with water; particularly during prolonged periods of dry weather in summer. Such measures must also include the use of temporary stabilising measures (e.g. chemical soil binders, straw, brush packs, chipping). 9. Straw stabilisation must be applied at a rate of one bale/10 m² and harrowed into the top 100 mm of top material, for all completed earthworks. 10. For significant areas of excavation or exposed ground, dust suppression measures must be used to minimise the spread of dust.						

4.25 Blasting

Impact Management Outcome: Impact to the environment is minimised through a safe blasting practice.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Any blasting activity must be conducted by a suitably licensed blasting contractor. 2. Minimise blasting operations to mid-day, where required. 3. Notification of blasting activities must be provided to surrounding landowners, emergency services, and site personnel 24 hours prior to such activities taking place on site.						

Impact Management Outcome: Impact to the environment is minimised through a safe blasting practice.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
4. Sign-boards of the blasting operation and times must be placed at the boundary of the site camp and on the main access road leading to site.						

4.26 Noise

Impact Management Outcomes: Noise management is undertaken in accordance with SANS 10103 and requirements of the EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. The Contractor must keep noise levels within acceptable limits. 2. Restrict the use of sound amplification equipment for communication and emergency only. 3. All vehicles and machinery must be fitted with appropriate silencing technology and must be properly maintained. 4. Any complaints received by the Contractor regarding noise must be recorded and communicated. Where possible or applicable, provide transport to and from the site on a daily basis for construction staff. 5. Develop a Code of Conduct for the construction phase in terms of behaviour of construction staff. 6. Operating hours during the construction phase as determined by the EA must be adhered to. Where not defined, it must be ensured that construction activities must still meet the impact management outcome related to noise management.						

4.27 Fire Prevention

Impact Management Outcomes: Fire prevention measures are carried out in accordance with relevant legislation and the EMPr, in order to prevent uncontrollable fires.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Designate smoking areas where the fire hazard could be regarded as insignificant. 2. Open and unattended fires must not be allowed on site under any circumstances. 3. Educate workers on the dangers of open and/or unattended fires. 4. Firefighting equipment must be available on all vehicles located on site. 5. The local Fire Protection Agency (FPA) must be informed of construction activities. 6. Contact numbers for the FPA and emergency services must be communicated in the environmental awareness training and displayed at a central location on site. 7. The ECO must send the FPA their contact details, and must also make a note of the FPA's contact details.						

4.28 Stockpiling and Stockpile Areas

Impact Management Outcomes: Stockpiling management is undertaken in accordance with the requirements of the EMPr.						
Impact Management Actions	Implementation			Monitoring		
	Responsible Person	Method of Implementation	Timeframe for Implementation	Responsible Person	Frequency	Evidence of Compliance
1. All material that is excavated during the construction phase (either during piling (if required) or earthworks) must be stored appropriately on site in order to minimise impacts to watercourses, wetlands, estuaries and water bodies. 2. Stockpiles must be located on flat areas where runoff will be minimised, and at least 10 m away from storm water channels and drains, and at least 32 m away from any watercourse, water body, estuary or wetland (refer to ***Sections 4.4 and 4.5***). 3. All stockpiled material must be maintained and kept clear of weeds and alien vegetation growth by undertaking regular weeding and control methods. 4. Topsoil stockpiles must not exceed 2 m in height. 5. During periods of strong winds and heavy rain, the stockpiles must be covered with appropriate material (e.g. cloth, tarpaulin etc.). 6. Where possible, sandbags (or similar) must be placed at the bases of the stockpiled material in order to prevent erosion of the material.						

4.29 Agricultural Resources

Impact Management Outcomes: To maintain soil capability levels and to achieve reduced levels of erosion and disturbance on productive agricultural land as a result of the implementation of the impact management actions.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
<u>Activities that Disturb the Land Surface:</u> 1. Implement an effective system of run-off control, using furrows and banks, wherever it is required, that collects and safely disseminates run-off water from all hardened and disturbed surfaces and prevents potential down slope erosion. Such a system is required wherever run-off water will tend to accumulate and then flow with the potential to cause erosion. 2. Apply soil surface stabilising measures in all areas that are highly susceptible to erosion or on which erosion occurs that cannot be controlled by the run-off control system. 3. If any contour banks are disturbed, fully restore their integrity and that of the run-off system of which they are a part, after disturbance. 4. Inspect the entire site for any evidence of erosion. Keep a record at each inspection of all occurrences of erosion with their GPS positions and photographs. If there are no occurrences of erosion, that must also be recorded. **<u>Excavation and Backfilling of Excavations:</u>** 5. Before excavation, the topsoil with its original vegetation, to a depth of 30 cm, must be stripped from the entire surface of the excavation area and stockpiled for re-spreading after backfilling. Underlying subsoil that is excavated must also be stockpiled, but separately from the topsoil. In addition, significantly different subsoil layers must also be stored in separate stockpiles from one another. 6. Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them. 7. When backfilling, the separate soil layers must be backfilled in their same, original vertical sequence i.e. deepest soil layer at the bottom, and topsoil at the top. 8. Ensure that the trench is backfilled in a manner that allows the surface to be free draining and prevents erosion. Subsidence (and resultant channelling of run-off) can make the backfilled trench susceptible to erosion. 9. Erosion must be controlled if necessary on newly backfilled areas, which are likely to be susceptible to erosion.						

Impact Management Outcomes: To maintain soil capability levels and to achieve reduced levels of erosion and disturbance on productive agricultural land as a result of the implementation of the impact management actions.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
10. The Contractor and ECO must sign off after every backfilling event that soil has been backfilled in the correct order with topsoil at the surface, and that the backfilled area is higher than the surrounding surface. 11. Inspect the entire site for any evidence of erosion. Keep a record at each inspection of all occurrences of erosion with their GPS positions and photographs. If there are no occurrences of erosion, that must also be recorded.						

4.30 Seismicity

Impact Management Outcomes: To confirm the susceptibility of the gas pipeline and associated infrastructure to ground movement that could result in damage.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Undertake ongoing monitoring of seismicity. If necessary, re-evaluate design specifications and implement changes. 2. Install seismic sensors and monitor both weak and strong ground motion in “sensitive” regions to improve hazard assessments.						

4.31 Settlement Planning, Disaster Management and Social Aspects

Impact Management Outcomes: To build local community capacity and municipal support, avoiding key areas and providing decision support.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Ensure effective Disaster Management training capacity-building/awareness are established for municipalities. 2. Where avoidance of a populated area is not possible, the following management measures need to be put in place:						

Impact Management Outcomes: To build local community capacity and municipal support, avoiding key areas and providing decision support.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
a. Consult and inform the stakeholders. b. Ensure agreed time frames are respected. c. Ensure all engagement, management and communication with workers are in line with the requirements stipulated by the Department of Labour. Labour management measures that fall within the ambit of the Department of Labour include employment contracts, working hours, minimum wage, working clothing and compensation for occupational injuries and diseases. 3. Develop and implement communication strategies to facilitate public participation. 4. Develop and implement a collaborative and constructive approach to conflict resolution as part of the external stakeholder engagement process. 5. Sustain continuous communication and liaison with neighbouring owners and residents. 6. Ensure contractors implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories. 7. Develop a recruitment process and/or use a recruitment agency to advertise job and secure positions beforehand, thereby minimising the amount of job opportunities offered on-site during the construction phase. 8. Ensure that the number and availability of jobs is clearly mentioned and discussed during the awareness sessions that would be undertaken when the final alignment of a proposed section of the pipeline has been confirmed. 9. Develop a Code of Conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable, such as trespassing, hunting, stock theft etc. 10. The EA holder and/or the appointed contractor should provide transport to and from the site on a daily basis for construction workers. This will enable the contactor to effectively manage and monitor the movement of construction workers on and off the site. 11. Depending on the duration of the contract, the EA holder and or the contractor(s) should make the necessary arrangements for construction workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks. 12. Where feasible, no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site. This would reduce the risk to local farmers. 13. Accommodation must be found in existing settlement or the construction camp must be located in or adjacent to existing settlements. 14. Ensure that construction camps do not remain permanent and should not be permanently occupied for more than 3 months.						

Impact Management Outcomes: To build local community capacity and municipal support, avoiding key areas and providing decision support.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
15. Ensure that clear access to public facilities and public transport is maintained (e.g. detour less than 500 m (walking distance)), as well as clear 24 hour access to emergency services). 16. Ensure that competent personnel are appointed for welding operations.						

4.32 Excavation and Installation of Foundations

Impact Management Outcome: Impact to the environment is minimised through adherence to EMPr requirements. No environmental degradation occurs as a result of excavation or installation of foundations.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. All excess spoil generated during the excavation for foundations must be disposed of in an appropriate manner and at a recognised disposal site, if not used for backfilling purposes. Certificates of safe disposal for general and recycled waste must be maintained and retained on file. 2. Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes. 3. Management of equipment for excavation purposes must be undertaken in accordance with ***Section 4.22: Workshop, equipment, and maintenance storage***; and 4. Hazardous substances spills from equipment must be managed in accordance with ***Section 4.21: Hazardous substances***. 5. Batching of cement to be undertaken in accordance with ***Section 4.23: Batching plants***; 6. Residual cement must be disposed of in accordance with ***Sections 4.15 and 4.16: General Solid Waste Management; and Hazardous Waste Management***.						

4.33 Pipeline Stringing

Impact Management Outcomes: Impact to the environment is minimised through adherence to EMPr requirements. No environmental degradation occurs as a result of stringing.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. No services (electrical distribution lines, telephone lines, roads, railways lines, pipelines fences etc.) must be damaged because of stringing operations. Where disruption to services is unavoidable, persons affected must be given reasonable notice, in writing. 2. Where stringing operations cross cultivated land, damage to crops is restricted to the minimum required to conduct stringing operations, and reasonable notice, in writing, must be provided to, and agreed by, the landowner. 3. Transport of the pipes from the laydown area to the construction right-of-way to be undertaken in accordance with ***Section 4.24: Dust Emissions.***						

4.34 Civil Works for Pigging Stations

Impact Management Outcomes: Impact to the environment is minimised through adherence to EMPr requirements.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Where terracing is required, topsoil must be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone. 2. Areas to be rehabilitated include terrace embankments and areas outside the pigging station yards. 3. Where required, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled. 4. These areas can be stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly. 5. Rehabilitation of the disturbed areas must be managed in accordance with ***Section 5.1: Landscaping and rehabilitation***. 6. All excess spoil generated during terracing activities must be disposed of in an appropriate manner and at a legally operated landfill site. Certificates of disposal must be retained and maintained on file. 7. Spoil can however be used for landscaping purposes and must be covered with a layer of 150 mm topsoil for rehabilitation purposes.						

5 POST-CONSTRUCTION PHASE: REHABILITATION, OPERATIONS AND MAINTENANCE

5.1 Landscaping and Rehabilitation

Impact Management Actions	Implementation			Monitoring		
Management Outcomes: Landscaping and rehabilitation is in undertaken in accordance with the approved rehabilitation plan/specification						
	Responsible Person	**Method of Implementation**	**Time Period**	**Responsible Person**	**Method of Implementation**	**Mechanism for Monitoring Compliance**
1. Implement rehabilitation measures and interventions according to the site-specific rehabilitation plan. 2. Personnel and equipment must be restricted to a minimum to execute the on-site work. 3. A suitably qualified rehabilitation expert or specialist with expertise in restoration ecology must be appointed to manage the process in order to recreate the natural environment as best as possible and to ensure that ecosystem structure and function recover. 4. Monitor and evaluate rehabilitation procedures implemented, including the use of an unmanned aerial vehicle (UAV) or drone to assess the effectiveness of implementation, if feasible. 5. All areas disturbed by construction activities must be subject to landscaping and rehabilitation. Working footprints must be kept to a minimum. No further destruction and disturbance of surrounding vegetation must take place during the rehabilitation phase. 6. Vehicles to remain on designated tracks and avoid oil, diesel, petrol leaks and spills (Refer to ***Section 4.21: Hazardous Substances*** and ***Section 4.22: Workshop, Equipment Maintenance and Storage***). 7. Keep noise levels to a minimum (Refer to ***Section 4.26***). 8. Rehabilitation efforts to mimic or be more pristine natural habitat than the pre-construction conditions. 9. Establish natural topography. 10. All spoil and waste must be removed and disposed of at a registered waste disposal facility and certificates of disposal must be retained and maintained on file. 11. On completion of the construction phase all temporary fences are to be removed, and where possible re-used by the Contractor on other projects. Alternatively, the temporary fences (if in a useable condition) could be donated to surrounding affected communities based on agreements and discussions with community leaders. 12. The contractor must ensure that all fence uprights are appropriately removed, ensuring that no uprights are cut at ground level but rather removed completely.						

Management Outcomes: Landscaping and rehabilitation is in undertaken in accordance with the approved rehabilitation plan/specification						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Time Period**	**Responsible Person**	**Method of Implementation**	**Mechanism for Monitoring Compliance**
13. Berms that have been created must have a slope of 1:4 and be replanted with indigenous species and grasses that approximates the original condition. 14. Where new access roads have crossed cultivated farmlands, that land must be rehabilitated as agreed to by the EA holder and the landowners. For example, ripping must be undertaken to a depth of 600 mm. 15. Indigenous species of the local area must be used for replanting. The species and grasses selected must compliment or approximate the original condition. 16. During re-vegetation, all-terrain vehicles, agricultural equipment, seed drills etc. must be used for ground applications, and helicopters and/or fixed wing aircrafts must be used for aerial applications. 17. Where required, re-vegetation including hydro-seeding can be enhanced using a vegetation seed mixture as described below. A mixture of seed can be used provided the mixture is carefully selected to ensure the following: a. Annual and perennial plants are chosen; b. Pioneer species are included; and c. Species chosen must be indigenous to the area, and must grow in the area without any problems. 18. Root systems must have a binding effect on the soil; and 19. The final product must not cause an ecological imbalance in the area. 20. Planting of plant stock and reseeding should be timed to maximise the likelihood of successful recruitment. 21. Stockpiled topsoil must be used for rehabilitation (refer to ***Section 4.28: Stockpiling and Stockpiled Areas***). 22. Stockpiled topsoil must be evenly spread so as to facilitate seeding and minimise loss of soil due to erosion. 23. Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed. 24. Subsoil must be ripped before topsoil is placed. 25. Topsoil must be stored adjacent to the cleared area. Topsoil contains viable seeds, rhizomes and root stock. 26. The rehabilitation must be timed so that rehabilitation can take place at the optimal time for vegetation establishment.						

Management Outcomes: Landscaping and rehabilitation is in undertaken in accordance with the approved rehabilitation plan/specification						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Time Period**	**Responsible Person**	**Method of Implementation**	**Mechanism for Monitoring Compliance**
27. Where impacted through construction related activities, all sloped areas must be stabilised to ensure proper rehabilitation is effected and erosion is controlled as per the instruction from the ECO. 28. Sloped areas stabilised using design structures or vegetation as specified in the design to prevent erosion of embankments. The contract design specifications must be adhered to and implemented strictly. 29. Return plants removed during the plant rescue operation (i.e. those that are suitable for placement in a pipeline servitude (excluding deep-rooted trees)). 30. Rescued plants that cannot be returned to the servitude can be placed in suitable areas adjacent to the servitude, close to their removal site. 31. Intense and appropriate alien invasive control must be implemented during the rehabilitation phase. 32. Ensure that appropriate follow-up operations are continued until the invading species are effectively under control. a. In the Fynbos biome, many of the Fynbos invaders are woody plants, which have deep roots and would have to be controlled if they occurred in the pipeline servitude. Alien grasses are particularly aggressive invaders in the Sand Fynbos and Renosterveld communities and possibly also the Strandveld communities. Studies of invasive species control measures have shown that eradication of a species cannot be achieved except in the initial stage of establishment. Therefore, effective control in this context should be that alien plant species cover within the pipeline servitude is reduced to, and maintained at, less than 5% canopy cover. b. In the Albany Thicket biome, the following must be considered with regards to alien invasive plants and restoration plans: i. There is a high vulnerability to overgrazing by livestock, in particular *Portulacaria* dominated vegetation types. This is particularly relevant when rehabilitating sensitive habitat where livestock may be present. ii. There is a high vulnerability of some thicket types to fire damage. iii. Invasive alien vegetation, especially rooikrans (*Acacia cyclops*) poses a real threat to Thicket by increasing the fuel load. This renders it prone to hot fires that will severely damage if not destroy the succulent and tree component. iv. There is a slow re-growth and recovery after vegetation removal. This is particularly true for arid and some mesic thicket vegetation types.						

Management Outcomes: Landscaping and rehabilitation is in undertaken in accordance with the approved rehabilitation plan/specification						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Time Period**	**Responsible Person**	**Method of Implementation**	**Mechanism for Monitoring Compliance**
v. Disturbance in arid areas of succulent thickets are prone to invasion of karroid species and arid adapted alien vegetation.						

5.2 Pipeline Commissioning

Impact Management Outcomes: Impact to the environment is minimised through adherence to EMPr requirements.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. The relevant authorities must be notified in writing prior to any venting being undertaken. 2. As best as possible, ensure that the volume of methane vented is kept as low as possible. 3. It is recommended that venting is undertaken during suitable atmospheric conditions, such as during windy conditions and at an elevated ambient temperature. 4. As best as possible, venting must be avoided at night. 5. Venting must be closely monitored and controlled. Ensure that all possible sources of ignition are eliminated or controlled.						

5.3 Temporary Site Closure

Impact Management Outcomes: Site closure procedures are implemented in accordance with the EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Containment areas must be emptied (where applicable) in accordance with the impact management actions included in ***Sections 4.21: Hazardous Substances*** and ***4.22 Workshop, Equipment Maintenance and Storage.*** 2. Hazardous storage areas must be well ventilated. 3. Fire extinguishers must be serviced and accessible. Service records to be filed and audited at last service.						

Impact Management Outcomes: Site closure procedures are implemented in accordance with the EMPr.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
4. Emergency and contact details must be displayed. 5. Security personnel must be briefed and have the facilities to contact or be contacted by relevant management and emergency personnel. 6. Night hazards such as reflectors, lighting, traffic signage etc. must be checked. 7. Fire hazards identified and the local authority must have been notified of any potential threats e.g. large brush stockpiles, fuels etc.; 8. Stockpiles shall be appropriately secured. 9. Structures vulnerable to high winds must be secured. 10. Wind and dust mitigation must be implemented. 11. Cement and materials stores must have been secured. 12. Toilets must have been emptied and secured. 13. Refuse bins must have been emptied and secured. 14. Drip trays must have been emptied and secured.						

5.4 Terrestrial Ecology – Flora and Fauna

Impact Management Outcomes: Impact to fauna is avoided or mitigated during the operational phase.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. The access routes for maintenance activities must be kept as limited as possible and access should be controlled by gating access routes. 2. Vehicle speeds must be kept slow to minimise potential collisions with animals and dust creation. 3. Time environmental inspections to avoid the breeding season of conservation important taxa. Where avoidance is not possible, ensure that the inspections are carried out as efficiently as possible with least disturbance. 4. Ensure the use of surveillance and monitoring of snares, debarking, hunting etc. in order to minimise poaching. 5. Develop community education programs near vulnerable sites to minimise poaching. 6. Keep all livestock out of rehabilitated natural areas. 7. Off road driving in rehabilitated areas must not take place. 8. Access roads and tracks to pigging stations and any other locations must be regularly maintained, especially their drainage, to ensure that ongoing disturbances of the						

Impact Management Outcomes: Impact to fauna is avoided or mitigated during the operational phase.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
ecosystems are minimised. This is particularly important in areas with deep, sandy soils where there is a natural tendency for them to widen and the tracks to deepen over time. 9. Ensure that re-vegetation is occurring according to the rehabilitation plan. 10. There should be regular inspections by personnel trained to understand the local vegetation and to be able to monitor its recovery using recognised procedures (e.g. permanent survey and photo-plots). These surveys should be done once a year in the early stages (1-3 years) and bi-annually after that. The surveys should be in the same season so that trends can be assessed and any adverse trends in the species diversity, ecosystem structure or ecosystem function identified and addressed. Expert advice should be sought if deemed necessary. 11. An Alien Invasive Species (AIS) Management Plan must be implemented during the operational phase of the development, which makes provision for regular alien clearing and monitoring. Clearing of such exotic species must be undertaken at least annually. 12. Carry out regular surveys to identify invading species and implement the necessary control operations where they are found. 13. When the gas pipeline is closed, ensure that any invasions are controlled as part of the closure processes. As part of the hand-over process, ensure that the landowner's responsibility to maintain the cleared areas is acknowledged in writing. 14. Generic requirements regarding herbicides apply (refer to ***Section 4.6***). 15. Ensure sound soil and water management to prevent erosion and repair it when identified. 16. If unintended subsurface drainage (e.g. desiccation of wetlands or creation of new wetlands), piping or erosion is identified, take remedial action such as excavation drains or putting in plugs. 17. Post-construction rehabilitation monitoring should be conducted twice yearly for the first two years and then annually thereafter. a. In the Fynbos Biome, during the first two years, a third survey should be carried out in the autumn to assess the degree of summer-time mortality in the winter rainfall region. b. Erosion monitoring; and c. Monitoring for alien species invasions. The plan should include types of invasive species, growth forms, densities and levels of infestation, potential dispersal mechanisms, knock-on impacts to terrestrial and freshwater ecosystems caused during implementation, as well as monitoring of the effectiveness of the control treatments (initial control and follow-ups), and the recording of any new invasive						

Impact Management Outcomes: Impact to fauna is avoided or mitigated during the operational phase.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
species. If new species are observed, their control needs to be integrated into the control programme.						

5.5 Freshwater Ecosystems (Watercourses, Rivers and Wetlands)

Impact Management Outcomes: To minimise disturbance of freshwater ecosystems during patrol and maintenance activities.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Development of a plan for attachment to the EMPr template to guide the clearing of natural deep-rooted wetland or riparian vegetation to maintain the pipeline servitude, and annual control of invasive alien plants (including quantifiable targets and objectives). 2. Implement plans for clearing of vegetation and control of invasive alien plants, and application of herbicides (Refer to ***Section 4.6***). 3. Monitor vegetation within pipeline servitudes that are within or proximal to watercourses, using an unmanned aerial vehicle (UAV) or drone to assess the effectiveness of implementation, if feasible.						

5.6 Estuaries

Impact Management Outcomes: To minimise disturbance of estuarine ecosystems during patrol and maintenance activities.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Ensure natural indigenous vegetation such as mangroves and saltmarsh are avoided as best as possible, and that there is regular control of alien invasive plants in line with a control plan. 2. Monitor the condition of the infrastructure to ensure that there is no exposed section, ongoing erosion occurring or leakages. 3. Should the pipe become exposed it would require the suspension of operations and the HDD of the pipe at greater depths below ground within 6 months, once sediment engineering studies have been done to confirm new burial depth. 4. Operational staff should be made aware of the sensitivities of estuarine and freshwater environments. 5. Fixed point photography could be used to monitor long-term vegetation changes and potential site impacts. 6. Where impacts to estuaries (i.e. HDD) and/or coastal freshwater ecosystems within 10 km of estuaries cannot be avoided, monitoring measures should be implemented at a minimum, with additional supporting input from in-depth studies where required. 7. For all construction work within the 10 km above an estuary as delineated by the EFZ, monitoring of potential impacts is recommended at suitable sites to be determined in-field by estuarine and/or freshwater ecosystems specialists as required. Sampling is required prior to construction taking place to allow for the establishment of the systems baseline condition (i.e., its state prior to development activities). Monthly monitoring is recommended for the duration of construction to evaluate trends, with summer and winter monitoring at three year intervals recommended thereafter during the operational phase. 8. Depending on the impact site, monitoring/sampling is to be conducted by estuarine/freshwater specialists with relevant qualifications pertaining to estuarine sediment dynamics, physical processes, water quality and ecology (or freshwater aquatic ecology if in coastal freshwater ecosystem). Resource Quality Objectives as set under the National Water Act (Act 36 of 1998, as amended) provide the benchmark conditions to maintain in estuaries or rivers. These requirements are specifically important in the event of HDD through an estuary and its EFZ is impossible to avoid. Monitoring of other aspects (e.g. water quality, microalgae, invertebrates,						

Impact Management Outcomes: To minimise disturbance of estuarine ecosystems during patrol and maintenance activities.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
fish and birds) are required even if the estuary or EFZ is not directly impacted, but where upstream activities may cause indirect impacts to an estuary. 9. In cases where freshwater ecosystems upstream of estuaries are likely to be affected by gas pipeline development appropriate measures of monitoring should be considered, including: a. Upstream and downstream biomonitoring to include appropriate indicators/measures of assessing rivers (e.g. diatoms, water quality/clarity, macro-invertebrates using the SASS5 method, instream and riparian habitat using the IHI method) and wetland habitats (e.g. WET-Health and WET-EcoServices) of a potential impact is recommended at suitable sites to be determined in-field by a specialist. b. Monitoring/sampling is to be conducted by suitably qualified specialists (e.g. DHSWS accredited SASS 5 practitioners) with sufficient experience in assessing aquatic ecology and water quality; c. A single sampling event is recommended prior to construction taking place to serve as a reference condition; d. Monthly monitoring is recommended for the duration of construction to evaluate trends; and e. Biannual monitoring is recommended thereafter during the operational phase, up to the point in time when the monitoring can establish that the systems are stable.						

5.7 Avifauna

Impact Management Outcomes: To reduce avian mortality and displacement due to nest and habitat destruction, and sensory disturbance during patrol and maintenance activities.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. In the event of aerial monitoring to inspect the pipeline servitude and associated infrastructure, avoid flying below 500 m above ground to limit sensory disturbance to nesting birds. If this is unavoidable, then ground-based monitoring should be undertaken with the least amount of disturbance as possible. 2. Consider the use of drones for aerial inspections to limit the disturbance factor, if feasible.						

Impact Management Outcomes: To reduce avian mortality and displacement due to nest and habitat destruction, and sensory disturbance during patrol and maintenance activities.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
3. Schedule ground-based programs to occur outside of breeding windows. 4. When conducting ground-based programs (walking or driving) stay near the ditch-line to limit disturbance to breeding birds. 5. Plan a once-off pass through as opposed to an “in and out” methodology in order to limit potential disturbance to birds. 6. If feasible, schedule repairs outside of the breeding windows. 7. Activities must be restricted to the servitude width. 8. Ensure that no access is allowed to properties and habitats outside the servitude. 9. Implement noise and dust reduction measures according to best practices. 10. If activity occurs within breeding windows, conduct nesting surveys. 11. Temporary removal of a nestlings and/or eggs by a qualified avifaunal rehabilitation expert for the duration of the repair activities must be considered.						

5.8 Seismicity

Impact Management Outcomes: Reduced susceptibility of the gas pipeline and associated infrastructure to ground movement that could result in damage.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Monitor both weak and strong ground motion in the above-mentioned “sensitive” regions (noted in ***Section 3.8***) to improve hazard assessments. If necessary, increase the sensitivity and/or density of the sensors. Relocate, reinforce or protect the gas pipeline if a significant increase in hazard or risk is indicated. 2. Ensure that ongoing monitoring of seismicity is undertaken. If necessary, re-evaluate design specifications and upgrade structures.						

5.9 Maintenance and Settlement Planning, Disaster Management and Social Aspects

Impact Management Outcomes: To build local community capacity and municipal support.						
Impact Management Actions	**Implementation**			**Monitoring**		
	Responsible Person	**Method of Implementation**	**Timeframe for Implementation**	**Responsible Person**	**Frequency**	**Evidence of Compliance**
1. Ensure maintenance is undertaken as per the required schedule and appropriate corrective actions implemented timeously. Normally, leaks are detected by abnormal pressure drops and a loss of transported volumes. Risk Based Inspection via scheduled intelligent pigging of the pipeline must be undertaken in order to set an initial baseline and thereafter monitor the condition of the pipeline. 2. Ensure that gas pipeline infrastructure is regularly inspected for signs of corrosion or any potential perforation of the pipeline walls that could result in gas leaks and subsequent explosions. 3. Ensure that the latest technology is used during integrity testing (in particular to detect general corrosion, pitting corrosion, stress corrosion cracking, etc.) – for example automated ultrasonics, electromagnetic acoustic transducer (EMAT). 4. Ensure that risks to the pipeline due to any changes in the environmental conditions surrounding the pipeline (e.g. increase in moisture in the drainage line where the pipe is laid down) are considered. 5. Ensure that the location class of a section of existing pipeline is changed in the event of land use change. Where there are changes in land use planning (or existing land use) along the alignment of an existing pipeline, a safety assessment must be carried out and additional control measures determined to ensure that the risk associated with a rupture or leak is ALARP. 6. During a pipeline-related disaster, the key strategies that apply to all natural gas emergencies are to establish a command and safe staging area, secure the scene, evacuate at-risk occupants and bystanders, effect viable rescues, eliminate ignition sources, and co-operate with the local utility company. 7. Implement the community emergency response plan. 8. Plans should be developed for safeguarding critical infrastructure. 9. Training exercises of first responders must take into account critical infrastructure. Preferably, joint exercises with providers of critical infrastructure services should be regularly scheduled.						

PART C: SITE SPECIFIC, PROJECT, APPLICANT AND EAP INFORMATION

This section of the Generic EMPr needs to be completed by the EAP and applicant It requires the provision of details relating to the preliminary infrastructure layout, the EAP, applicant and general project.

Contact Details of the Developer and EAP, and Details of the Project and Specifications

Details of the applicant	
Name of applicant:	Tetra4 (Pty) Ltd
Tel Number:	+27 10 045 6000
Fax Number:	
Postal Address:	1 Bompas Road, Johannesburg, 2196
Physical Address:	1 Bompas Road, Johannesburg, 2196, ZA
Details and Expertise of the EAP	
Name of EAP:	Brian Whitfield
Tel Number:	+27 11 789 7170 / +27 82 688 9850
Fax Number:	+27 86 571 9047
E-mail Address:	brian@eims.co.za
Expertise of the EAP (Curriculum Vitae included):	EAPASA Ref: 2022/4496 (CV Included as attachment)
Details of the Project	
Project name:	Tetra4 Virginia Gas Production Project
Description of the project:	Gas production, transmission and processing
Project location (per project component i.e. pipeline, pigging station, block valve etc.):	Refer to EMPr Document: Section 4.2.1 (Table 1)
Farm name (if applicable)	Section 4.2.1 (Table 1)
Farm number (if applicable)	Section 4.2.1 (Table 1)
Portion name	Section 4.2.1 (Table 1)
Portion number	Section 4.2.1 (Table 1)
Latitude	Section 4.2.1 (Table 1)
Longitude	Section 4.2.1 (Table 1)
Preliminary Technical Specification of the Gas Transmission Pipeline	
Pipeline Depth Below Ground	1.5m to top of pipe
Pipeline Length	~480km
Pipeline Diameter	10 inch
Pipeline Pressure	up to 23bar (design 30bar) between CS and Plant
Pipeline Material Composition	high-pressure steel or low-pressure high-density polyethylene (HDPE)
Pipeline Throughput	~45 MMSCFD
Gas Product Composition or Specification	Methane and Helium
Pipeline Markers	
Number of markers	max 4800 but likely much less
Composition of markers	Concrete
Marker spacing	~100m
Marker height	~1m
Marker colour	White
Block Valves	
Number of block valves	
Composition and visual description of block valves	
Block valve spacing	
Pigging Stations	
Number of Pigging Stations	~14
Composition and visual description of pigging stations	Concrete pad with above ground piping (~5mx5m)
Pigging station spacing	Variable

Footprint of the Pigging Station (m²)	5mX5m = 25m^2 per station
Footprint of construction area and storage areas (m²)	Temporary camp/laydown: ~15.8Ha
Anticipated construction duration	3.5 years
Anticipated number of staff during the construction phase (permanent and temporary)	~4600

Development Footprint and Sensitivity Site Map

A site sensitivity map overlaid with the preliminary infrastructure layout must be created and included in this section. From a sensitivity perspective, the map must be prepared from the National Web-based Environmental Screening Tool (https://screening.environment.gov.za/screeningtool) and must:

- Consider the findings of the screening process;
- Be displayed according to the four sensitivity tiers i.e. Very High, High, Medium or Low or two tier sensitivity where this is relevant;
- Identify the nature of each sensitive feature e.g. raptor nest, threatened plant species, archaeological site, etc.
- Identify features both within the planned working area and any known sensitive features in the surrounding landscape.

From an infrastructure and technical perspective, the map must also include the following:

- The route of the gas transmission pipeline and all associated infrastructure assessed in the basic assessment or S&EIR process illustrated at an appropriate resolution to enable fine scale interrogation. It is recommended that <20 km of gas transmission pipeline length is illustrated per page in A3 landscape format.
- All above ground infrastructure such as, but not limited to, block valves, pipeline markers and pigging stations should be labelled and numbered accordingly on the map.
- Farm portion names and gate access points.
- The location of pipeline within existing infrastructure servitudes, where relevant.

Figure 3 provides an example of a development footprint and sensitivity map.

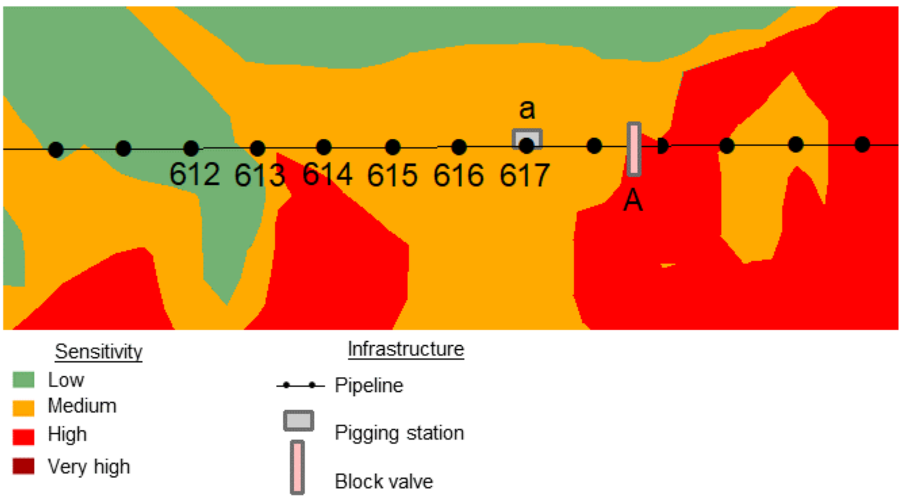


Figure 3: Example of a Development Footprint and Environmental Sensitivity Map in the context of a final gas transmission pipeline profile

Beneath each development footprint and sensitivity map, the landowner contact details and any specific requirements regarding each land parcel as required by the landowner must be included. An example template to provide such information is indicated in Table 5. Furthermore, specific mitigation measures as determined by the findings of the basic assessment or S&EIR process, field-work and screening tool site sensitivity map with reference to specific positions of the infrastructure should be identified. An example of this template is provided in Table 6. Where considered appropriate, photographs of sensitive features in the context of above-ground infrastructure shall be used.

Table 5: Example Template for Landowner Details and Specific Access Requirements

Land Owner and Access Details			
Block Valve, Pipeline Marker, Pigging Station Number	Example: 419-422	Example: 423-429	Example: 430-437
Farm Name	Refer to I&AP Database		
Farm Owner			
Farm Manager (or other managerial or supervisory contact if different from owner or if owner is not permanently on the Farm)			
Contact Name			
Contact Number			
Special request by landowner			
Access requirements			

Table 6: Example Template for Project Specific Environmental Controls

Project Specific Environmental Controls		
Block Valve, Pipeline Marker, Pigging Station Number	Environmental Aspect	Site Specific Mitigation
Example: 419-422		
Example: 423-429		
Example: 430-437		

Declaration

The applicant must sign the following declaration as confirmation of understanding of the legality of the Generic EMPr.

The applicant affirms that he/she:

- will abide by and comply with the prescribed impact management outcomes and actions as stipulated in Part B of the Generic EMPr;
- has the understanding that the impact management , outcomes and actions are legally binding; and
- will provide written notice to the CA approximately 14 days prior to the date of commencement of construction in order to facilitate compliance inspections.

Signature: Applicant   Date:

________________________________   _______________

PART D: DOCUMENTATION OF SITE-SPECIFIC SENSITIVITIES AND ATTRIBUTES

If any specific environmental sensitivities/attributes are present on the site, which require more specific impact management outcomes and actions that are not included in the pre-approved generic EMPr template (Part B), these must be included in this section. This Site Specific EMPr must follow the same template as that of Part B (i.e. pre-approved Generic EMPr template).

The information in this section must be prepared by an EAP. The name and expertise of the EAP, including the curriculum vitae, must be included in this section of the EMPr.

Once approved, Part D will form part of the EMPr for the site and is legally binding.

Part D only applies to additional management outcomes and actions that are necessary. This section will not be required if there are no specific environmental sensitivities or attributes within the affected site that needs to be managed.

PART E: METHOD STATEMENTS

Method Statements must be prepared by the Contractor prior to commencement of the activity on a project specific basis, and to be updated regularly, as required. The method statements are not required to be submitted to the CA.

Appendix 2: EAP CV

EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES

CURRICULUM VITAE

Name:	Brian Peter Whitfield
Nationality:	South African
Date of Birth:	20 October 1977
Profession:	Environmental Scientist
Professional Qualification/ Training:	BSc (Botany and Zoology); University of the Witwatersrand, 1998 BSc Honours (Botany); University of the Witwatersrand, 1999
Professional Membership/ Registrations:	Registered Professional Natural Scientist (SACNASP- #400447/13). Registered Environmental Assessment Practitioner - EAP (2022/4496) with the Environmental Assessment Practitioners Association of South Africa (EAPASA)
Current Employer:	Environmental Impact Management Services (Pty) Ltd.

KEY EXPERIENCE

Brian is a senior project manager at EIMS and has over 18 years of experience as an EAP. He holds a BSc (Botany and Zoology) and a BSc Honours degree in Botany from the University of the Witwatersrand. Brian is a registered Professional Natural Scientist with the South African Council for Natural Scientific Professions (400447/13) and a registered EAP (2022/4496) with the Environmental Assessment Practitioners Association of South Africa (EAPASA). Brian's broad range of experience includes managing and/or undertaking projects in various sectors, including Energy, Mining, Oil and Gas, Water and Infrastructure. He is conversant with the South African environmental legislation as well as sustainability auditing, including Equator Principles, IFC Performance Standards and World Bank EHS guidelines. Brian's other experience includes Site Assessments, Water-use licensing, Environmental Monitoring and Auditing, Due Diligence Assessments, Competent Persons Reporting, Environmental Management Plans and Strategic Environmental Assessments.

CAREER SUMMARY

Period: May 2014 - Current	Organisation: EIMS	Position: Senior Project Manager
Key Projects/Assignments	Project Management including but not limited to the following key projects: • Ilima Colliery EIR/EMPR Amendment Application • Manungu Coal Mine Expansion (EIA, WML, IWUL) • Tetra4 Evander Exploration Right Application • Tetra4 Virginia Regional General Authorisation • Menar Kookfontein Prospecting Right Application • Sungu Sungu Dannhauser Oil and Gas Exploration Application	

	• Sungu Sungu ER313 Oil and Gas Exploration Application • Eskom Real Estate (ERE) Waste Management Plan • Eskom Dolos Giraffe Substation BA • PH Bagale Lichtenburg Hospital BA • Old Mutual Properties Zonkizizwe Mixed Use Development Advisory Services • EMPR Performance Assessment audits on a number of Collieries • Water Use Licence external audits for mines, power stations, etc • Cennergi Tsitsikamma Community Wind Farm Annual External Audit (including IFC/World Bank compliance) • Cennergi Amakala Emoyeni Wind Farm Annual External Audit (including IFC/World Bank compliance) • Thabametsi Power Station Lenders Environmental Technical Advisor • Eskom Wittekleibosch Powerline and Substation Construction Audits • Eskom Dedisa Grassridge Powerline Construction Audits • Various audits for Eskom Power Stations Mentoring and Quality Control • Responsible for mentoring consultants on enviro-legal processes, project management, etc. • Quality review of reports to ensure compliance with legislation, guidelines, etc.

Period: August 2012 – May 2014	**Organisation: EIMS (Full time secondment to Transnet State Owned Company Limited)**	**Position: Transnet Capital Projects Environmental Manager**
Key Projects/Assignments	Transnet Capital Projects (TCP) Environmental Manager on the New Multi-Product Pipeline (NMPP) Project under the umbrella of the Centre of Excellence. The project included the following aspects: • Pipeline 1: 554km of pipeline construction (30m wide servitude) from Durban Harbour (Island View) to Heidelberg (Gauteng) including construction of 2 Terminals, 3 Pump Stations and 2 Metering Stations. • Pipeline 2&3: 72km of Pipeline construction (30m wide servitude) from Jameson Park Terminal (Gauteng) via Alrode Terminal to Langlaagte Depot (Gauteng). • Pipeline 4: 89km of Pipeline construction (30m wide servitude) from Kendal Power Station (Mpumalanga) to Waltloo Terminal (Gauteng). Responsibilities: The following responsibilities applied to this position:	

- Develop and implement a plan and strategy to address the closeout of environmental components of the project.
- Facilitate, co-ordinate and manage the environmental closeout and handover process of the project:
    - Facilitate the environmental execution of the reinstatement and rehabilitation of the Right of Way servitude (Wetland, erosion, grassing, etc);
    - Manage and ensure the landowner signoff of each property that has been obtained;
    - Ensure that all the required documents for handover have been prepared and are ready for handover to Transnet Pipelines (TPL);
    - Ensure all environmental risks are captured on the risk register and that all risks are mitigated and closed out;
    - Ensure that all actions from Community Liaison Forums (CLF's) and any other meetings are closed out.
- Plan, monitor and control the allocated budget.
- Ensure compliance with all conditions of the Environmental Authorisation (EA), permits, licenses, etc.
- Oversee the environmental performance of all contractors:
    - Ensure that all relevant information is shared with the contractor;
    - Ensure quality control of all environmental services.
- Visit and check all sites to ensure that the work is being undertaken as required by the EA and Environmental Management Plan (EMP).
- Facilitate environmental communication and engagement with internal and external stakeholders:
    - Interface with Interested and Affected Parties (I&AP's) where required;
    - Chair and facilitate regular feedback meetings with TPL and the environmental team;
    - Liaise with Government Departments as required;
    - Regularly meet with the Project Directors of the various teams on the project to ensure that environmental management is being adequately addressed.
- Provide the necessary environmental input into designs, plans, etc.
- Prepare environmental opinions and interpretations as and when required.
- Sign off all Independent Environmental Audit reports.

<table>
<tr><td></td><td colspan="2">Prepare and submit monthly progress and cost reports to various Executive Committee Members.
Support and manage the environmental team.</td></tr>
<tr><td>Period: 19 May 2008 to 31 July 2012</td><td>Organisation: EIMS</td><td>Position: ECO Manager and Independent Environmental Auditor to the Transnet NMPP Project</td></tr>
<tr><td>Key Projects/Assignments</td><td colspan="2"><u>Responsibilities</u>:

Manage team of Environmental Control Officers (10 individuals at peak of project construction) as well as acting as Independent Auditor during period of the project.
Assist with all permits and applications where applicable on the project e.g.: borrow pits, water use licenses (WUL), etc. including but not limited to:
The compilation of 40 borrow pit (mining permit) applications with 9 permits issued (others cancelled for various reasons). Closure applications for the 9 permits have additionally been undertaken.
Educate the construction team about the management measures of the EMP’s and ROD’s/EA’s.
Regular liaison with the construction team and the project leader.
Recommend corrective action for any non-compliance incidents on the construction site.
Consult with the I&AP’s and the contractor where required by the EMP.
Comment on damage claims from the public.
Notify affected parties of changes to the construction programme should they be involved.
Ensure open communication channels between the affected parties and the contractor and respond promptly to queries and claims.
Develop a monitoring and auditing programme which is implemented for the duration of the construction phase of the project to monitor compliance with the conditions of the EMP’s and RoD’s/EA’s. The management of this programme includes:

Ensure ECO’s conduct daily audits in identified sensitive areas;
Ensure ECO’s conduct weekly audits in their respective areas;
Compilation of a monthly audit report with a rating of the compliance with the EMP. This report is submitted to the relevant competent authorities including:
Department of Environmental Affairs (DEA);

</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">▪ Gauteng Department of Agriculture and Rural Development (GDARD);
▪ Department of Water Affairs (DWA – National).
o Ensure ECO’s keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage is recorded in full to ensure the responsible party is held liable;
o Provide ad hoc advise and clarification on compliance issues to the responsible contractor;
o Maintain records of compliance / non-compliance with the conditions of the authorizations and make available to competent authorities on request;
o Assist the contractors in the identification of suitable contractors camp sites and delineation of environmental sensitive areas;
o Review and approval of Environmental Awareness Training to be undertaken by the contractors or other suitable service providers.</td></tr>
<tr><td>Period: July 2004 to 19 May 2008</td><td>Organisation: EIMS</td><td>Position: Environmental Consultant</td></tr>
<tr><td>Key Projects/Assignments</td><td colspan="2">Was involved in and managed numerous projects during this time. A detailed list can be provided on request.</td></tr>
</table>

LANGUAGE CAPABILITY

Language	Speak	Read	Write
English	Excellent	Excellent	Excellent
Afrikaans	Fair	Fair	Fair

DECLARATION

I confirm that the above information contained in the CV is an accurate description of my experience and qualifications and that, at the time of signature.

2022-06-06

Signature of Staff Member

Date

Appendix 3: Sensitivity Mapping

SENSITIVITY MAPPING

Environmental sensitivity mapping provides a strategic overview of the environmental, cultural and social assets in a region. The sensitivity mapping technique integrates numerous datasets (base maps and shapefiles) into a single consolidated layer making use of Geographic Information System (GIS) software and analysis tools. Environmental sensitivity mapping is a rapid and objective method applied to identify areas which may be particularly sensitive to development based on environmental, cultural and social sensitivity weightings – which is refined by specialists' input within each respective specialist field based on aerial or ground-surveys. Therefore, the sensitivity mapping exercise assists in the identification of sensitive areas within and surrounding the application area. Table 12 provides an overview of the sensitivity ranking system and Figure 24 provides a visual representation of the combined sensitivity mapping approach.

This sensitivity mapping approach allows for the identification of lower risk areas for positioning the project infrastructure whilst protecting identified sensitive environmental areas/ features though more rigorous mitigation (where possible). Areas identified as no-go would be fully excluded from any project related development regardless of the level of mitigation put forward. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of environmental assessment processes.

The compilation of the combined sensitivity map for Cluster 2 has taken into consideration the individual raking of sensitivity by the following respective specialist disciplines:

- Air quality & Health Risk;
- Geohydrology;
- Heritage (*Note: Heritage sites are not visible on the combined sensitivity map due to the small scale of these sites. Please refer to individual heritage sensitivity maps*);
- Hydrology (1:100-year floodlines);
- Noise;
- Social;
- Soils and Agriculture;
- Terrestrial Biodiversity (including Aquatic and Wetlands); and
- Visual.

The individual sensitivity maps for the above mentioned studies are presented in Figure 25 to Figure 43 and Figure 44 presents the risk based consolidated sensitivity/ composite map which provides an overlay of all sensitivity areas however each specialist discipline sensitivities have various management and mitigation measures. Work within the various sensitivity rankings must be managed according to the EMPr as well as the recommendations in the individual specialist reports included in the EIA Report.

The application area contains a range of low, medium and highly sensitive areas as well as two no-go areas which are as follows:

1. The Beatrix tailings storage facility has been designated as a no-go area due to the limitations of any development on the facility (damage to this facility would be unacceptable).
2. An area assigned a Very High terrestrial theme sensitivity has been delineated on the farm Adamsons Vley 655 (Portion 0) based on the presence of a protected faunal species. Previous attempts to relocate this species have been unsuccessful and *in situ* conservation remains the preferred outcome. This area should exclude any surface development infrastructure. Consultation and communication with the lead or implementing agent for the sensitive species, Endangered Wildlife Trust (EWT), must be implemented before any construction proximal to the specific area. Monitoring and Management of the species will be crucial throughout the lifetime of the project and must be discussed and implemented in conjunction with the EWT.

The detailed specialist assessments of the receiving environment within the well and pipeline transects have allowed specific mitigation measures to be put forward for these areas including the high, medium, low and least concern areas and development within the transects must comply with the EMPr. The areas **outside** of the well and pipeline transects have been assessed and ranked based on previous studies as well as desktop analysis (including lidar imagery where possible) and therefore **any activities outside of the ground-truthed transects must follow a risk-based approach to determine what additional measures, if any, must be implemented**. For any minor[6] infrastructure required outside of the well and pipeline transects, a risk-based approach will be undertaken based on the following methodology:

- Infrastructure required within low sensitive areas can be undertaken and managed in line with identified mitigation measures in the EMPr.
- Infrastructure located inside medium or highly sensitive sites on the sensitivity maps require a site-specific pre-commencement assessment. The pre-commencement assessment must address the sensitive aspects on site, as identified in the relevant specialist reports. The pre-commencement assessment must be compiled by the site Environmental Officer (EO) with a suitable environmental qualification and experience. All recommendations of the pre-commencement assessment must be clearly recorded and thereafter implemented on site. The completeness and adequacy of the pre-commencement assessment in respect of identifying and managing on site sensitivities must be included in the monthly ECO reports and annual independent audit reports.

Table 12: Sensitivity rating system for areas outside of the studied well and pipeline transects.

Sensitivity Rating	Description	Management Method
Least Concern	The inherent feature status and sensitivity is already degraded. The proposed development will not affect the current status and/or may result in a positive impact. These features would be the preferred alternative for infrastructure placement.	Comply with EMPr
Low	The proposed development will not have a significant effect on the inherent features status and sensitivity.	Comply with EMPr
Medium	The proposed development will negatively influence the current status of the feature.	Undertake risk-based assessment prior to final infrastructure placement and then comply with EMPr.
High	The proposed development will negatively significantly influence the current status of the feature.	Undertake risk-based assessment prior to final infrastructure placement and then comply with EMPr.
No-Go	No development permitted under any circumstances.	No development permitted under any circumstances.

[6] By “minor” it is important to note that the intention is not to provide for carte-blanch development of areas outside of the transects.

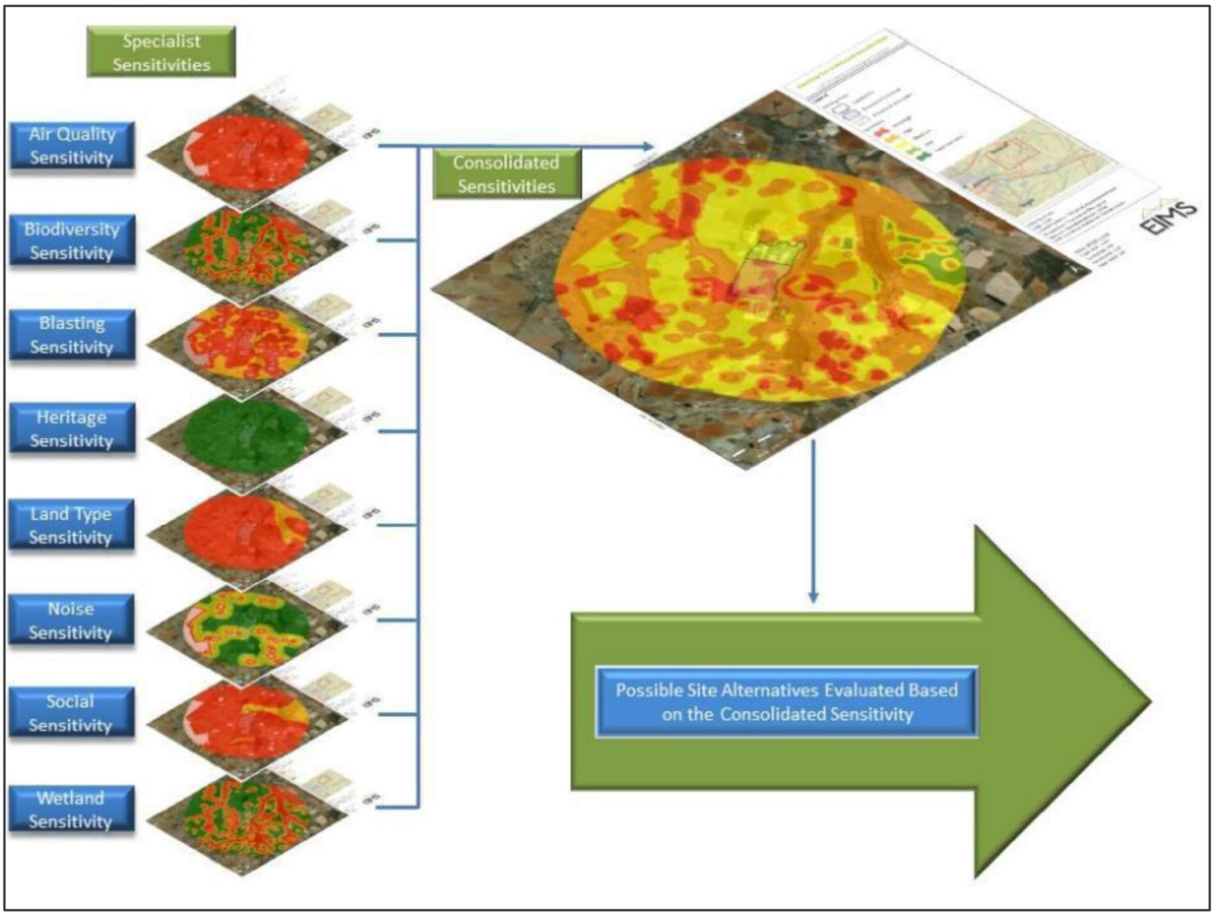


Figure 24: Example of combined sensitivity mapping approach.

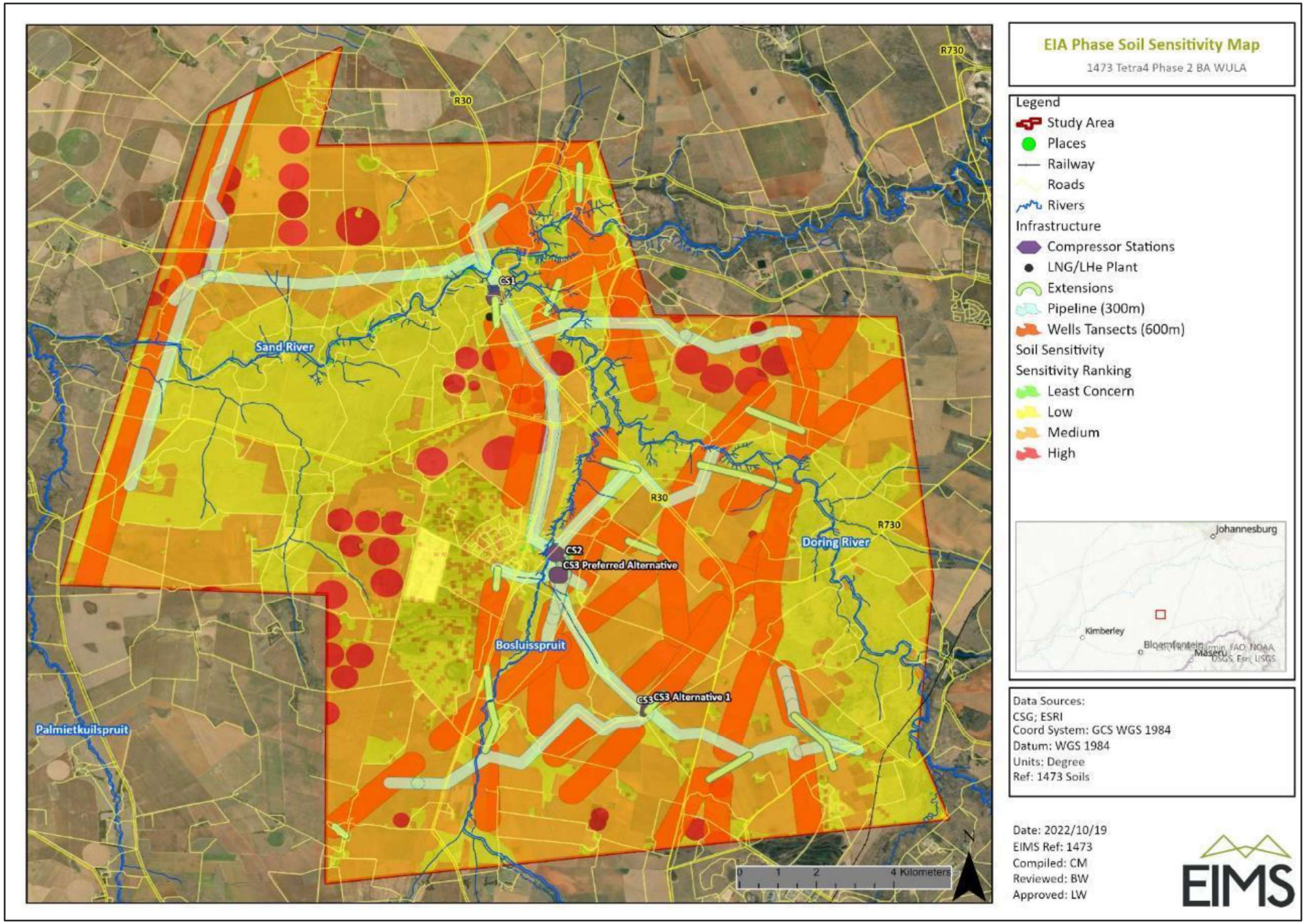


Figure 25: Soils and Agricultural Sensitivity Map.

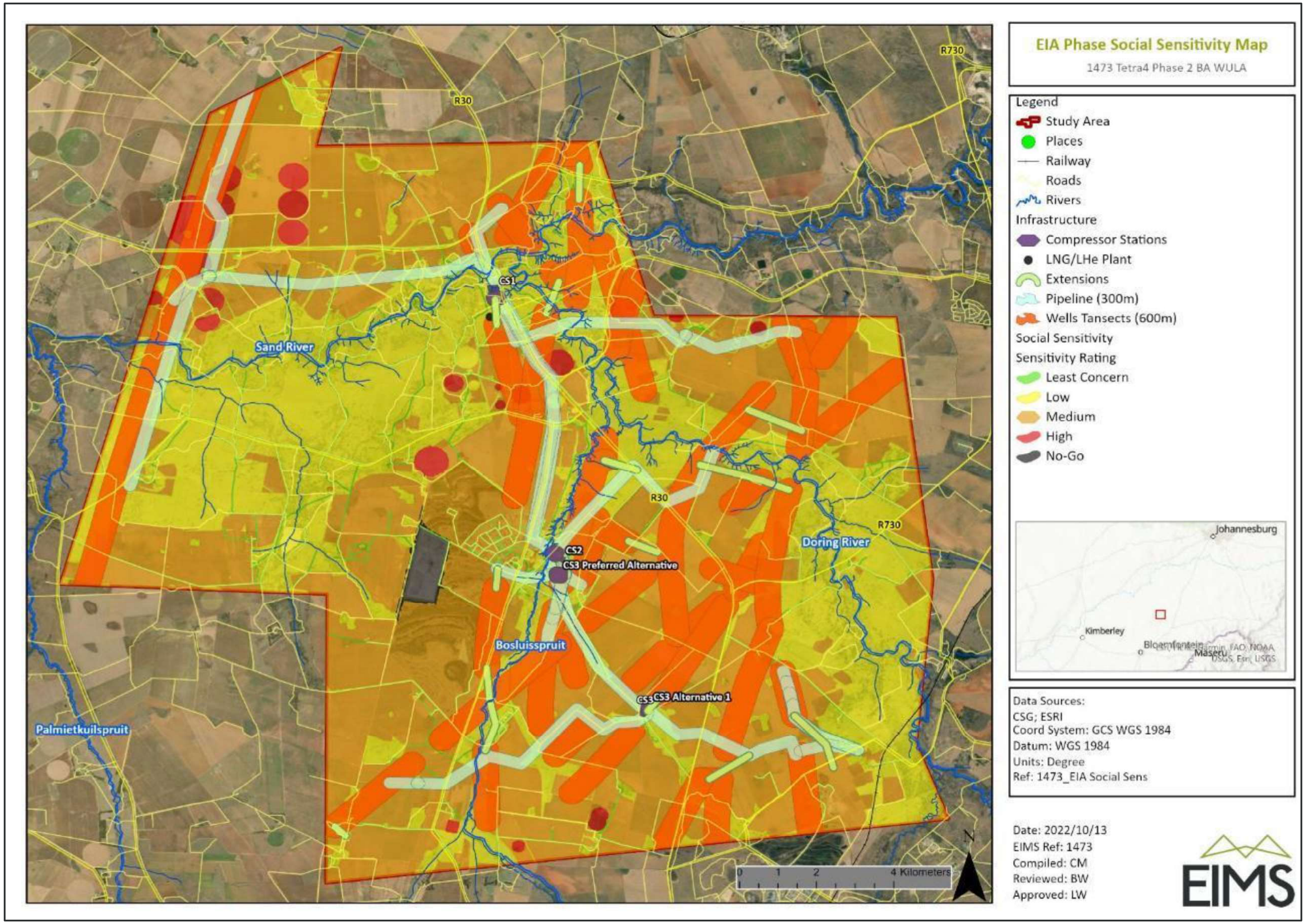


Figure 26: Social Sensitivity Map.

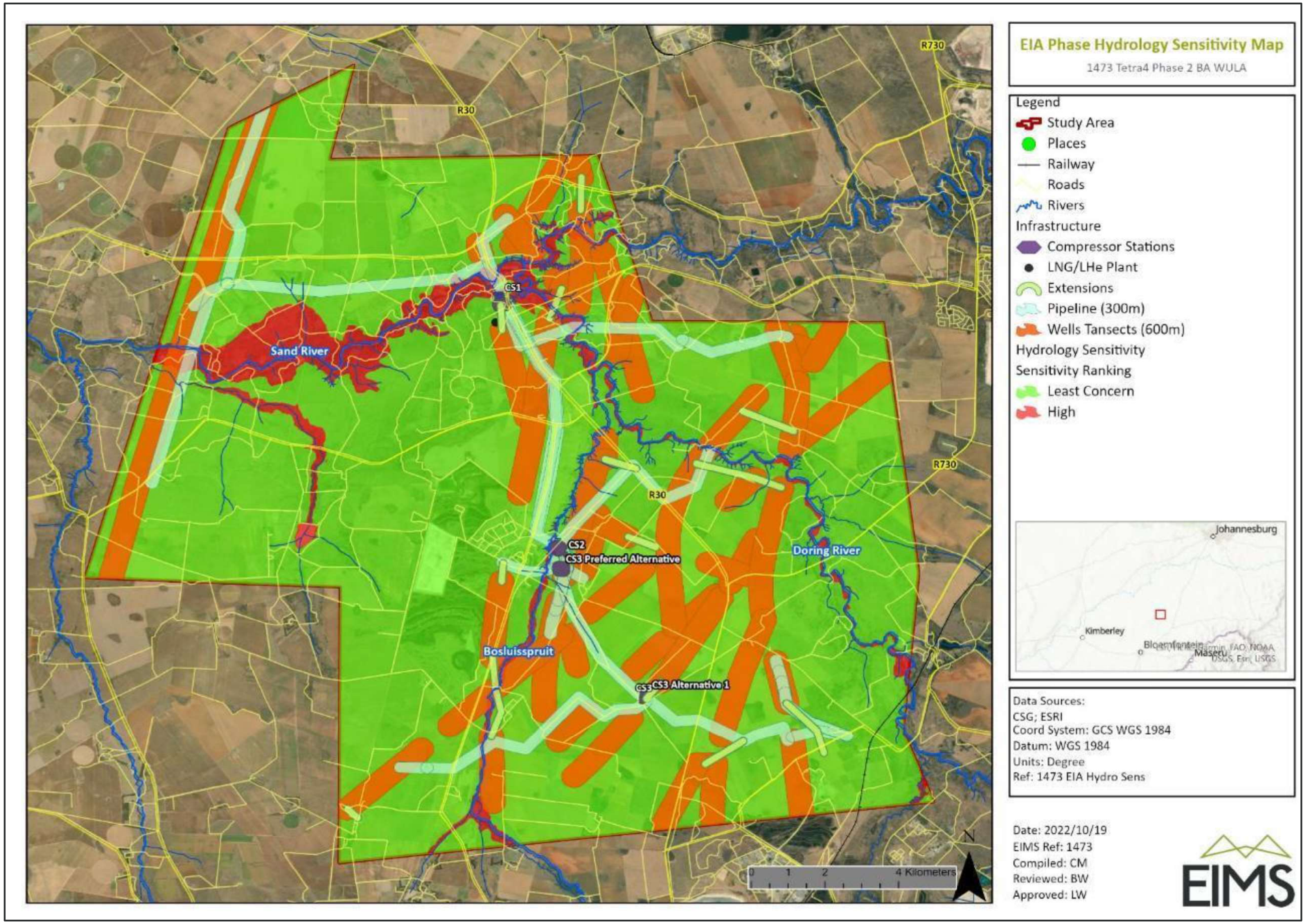


Figure 27: Hydrology sensitivity map (1:100-year floodlines).

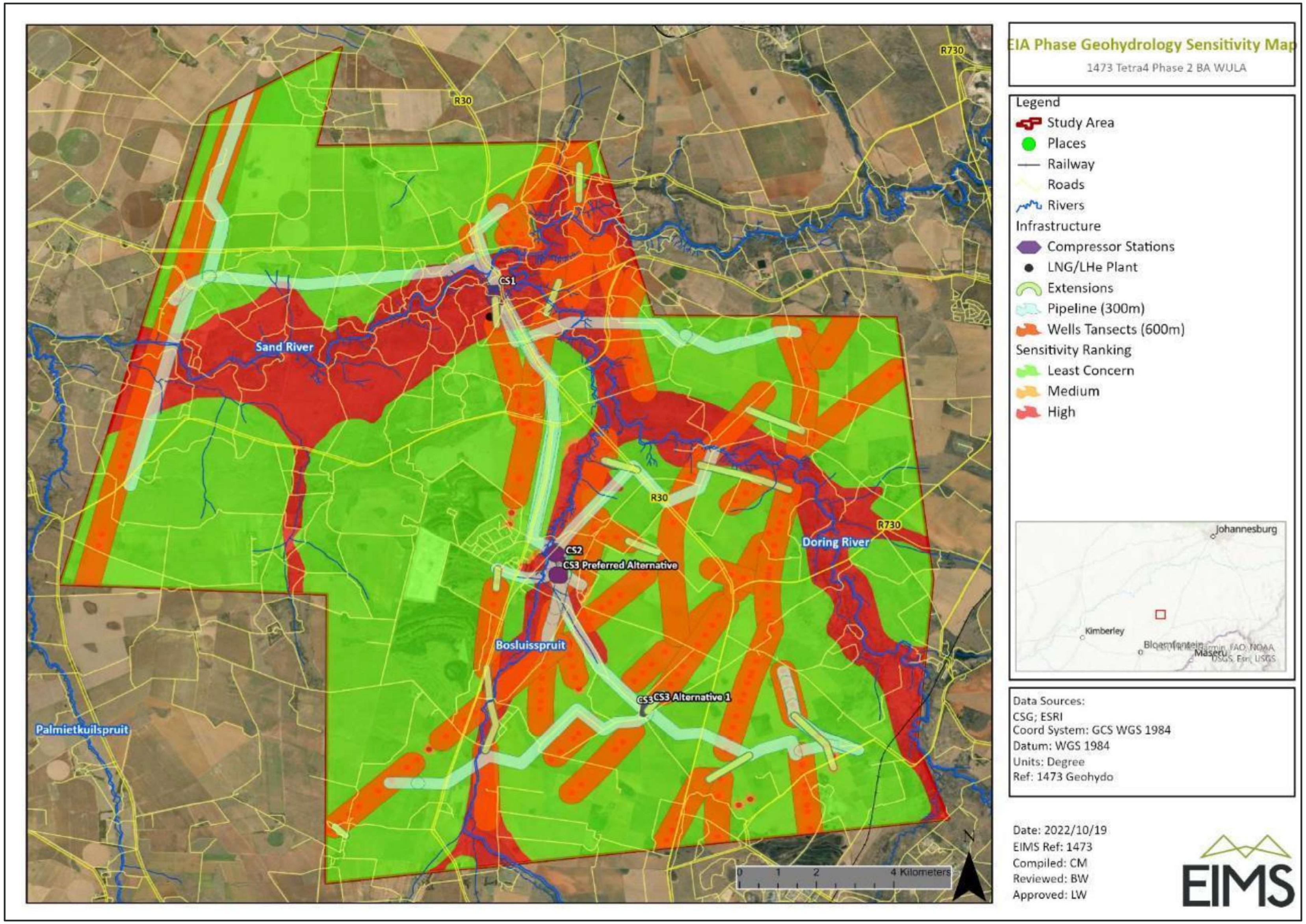


Figure 28: Geohydrology sensitivity map.

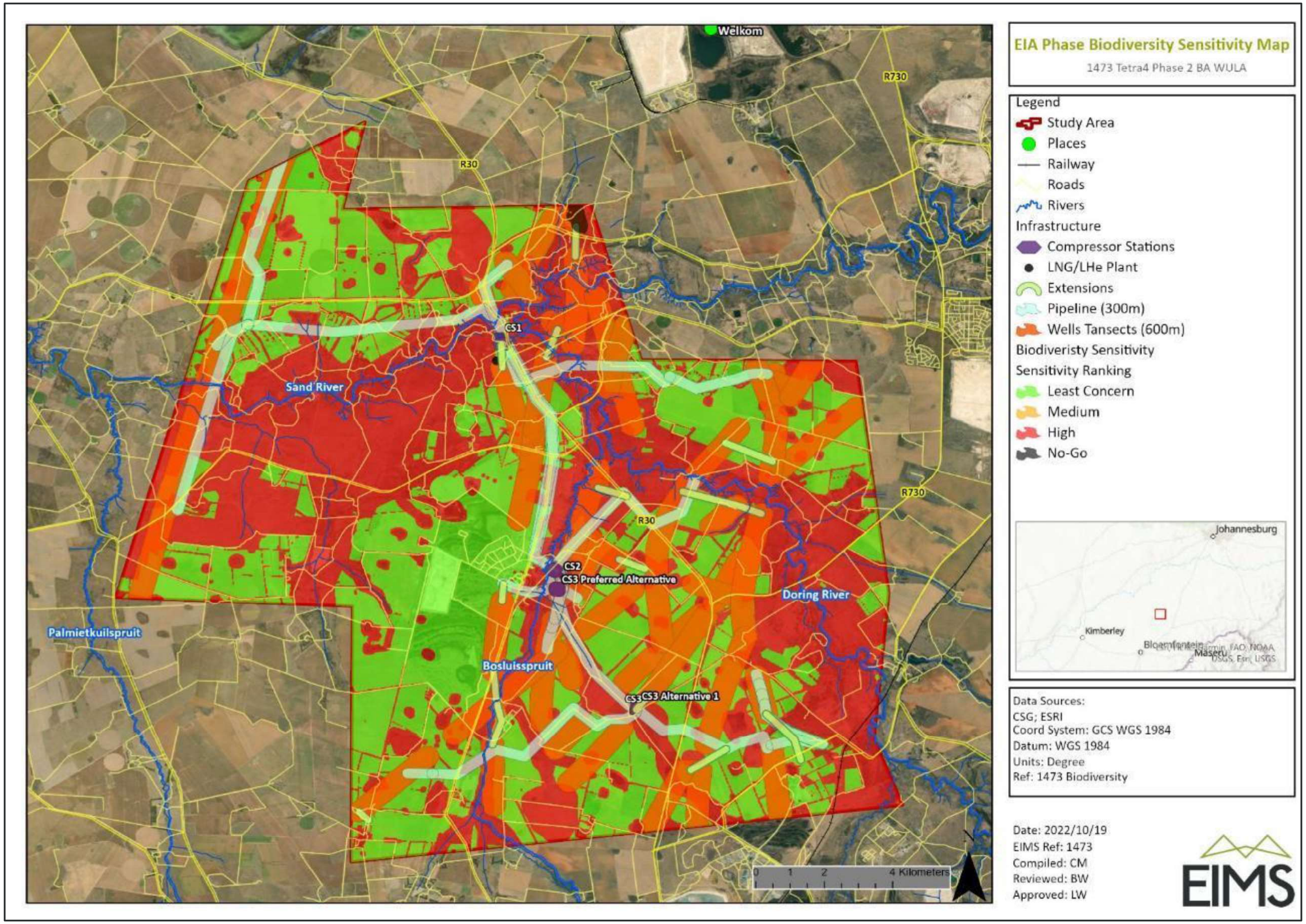


Figure 29: Biodiversity (ecology, aquatic and wetlands) sensitivity map.

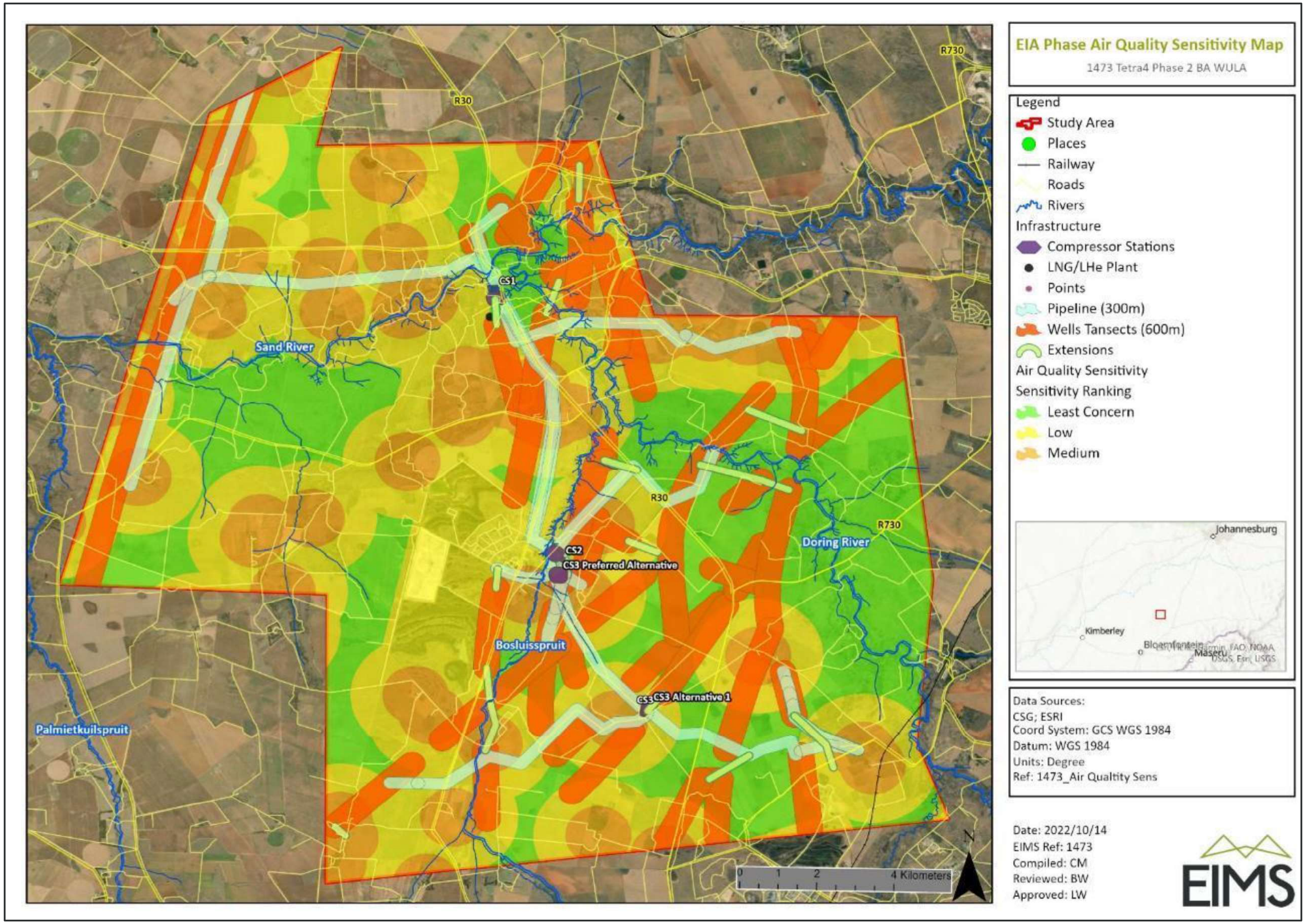


Figure 30: Air quality sensitivity map.

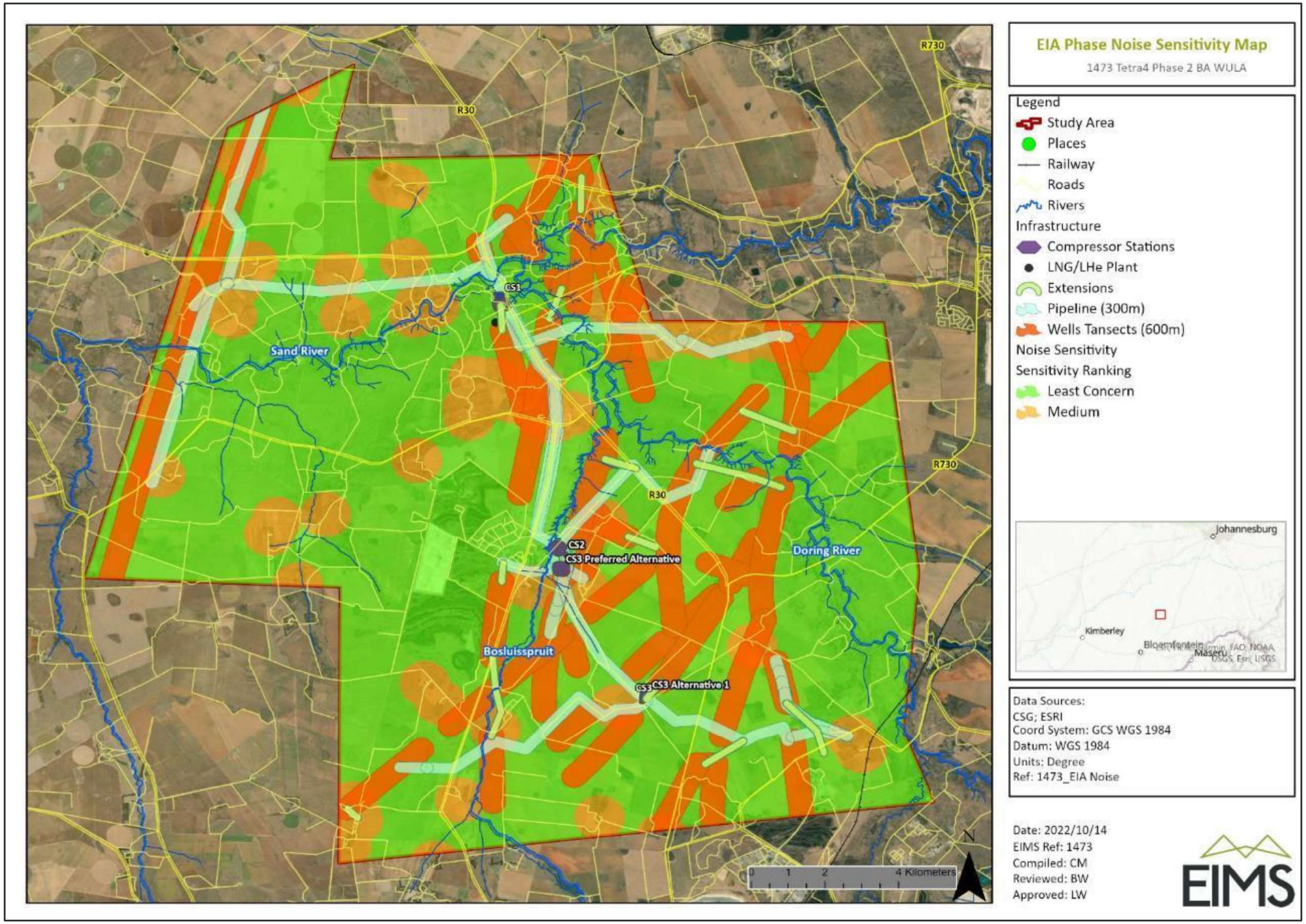


Figure 31: Noise sensitivity map.

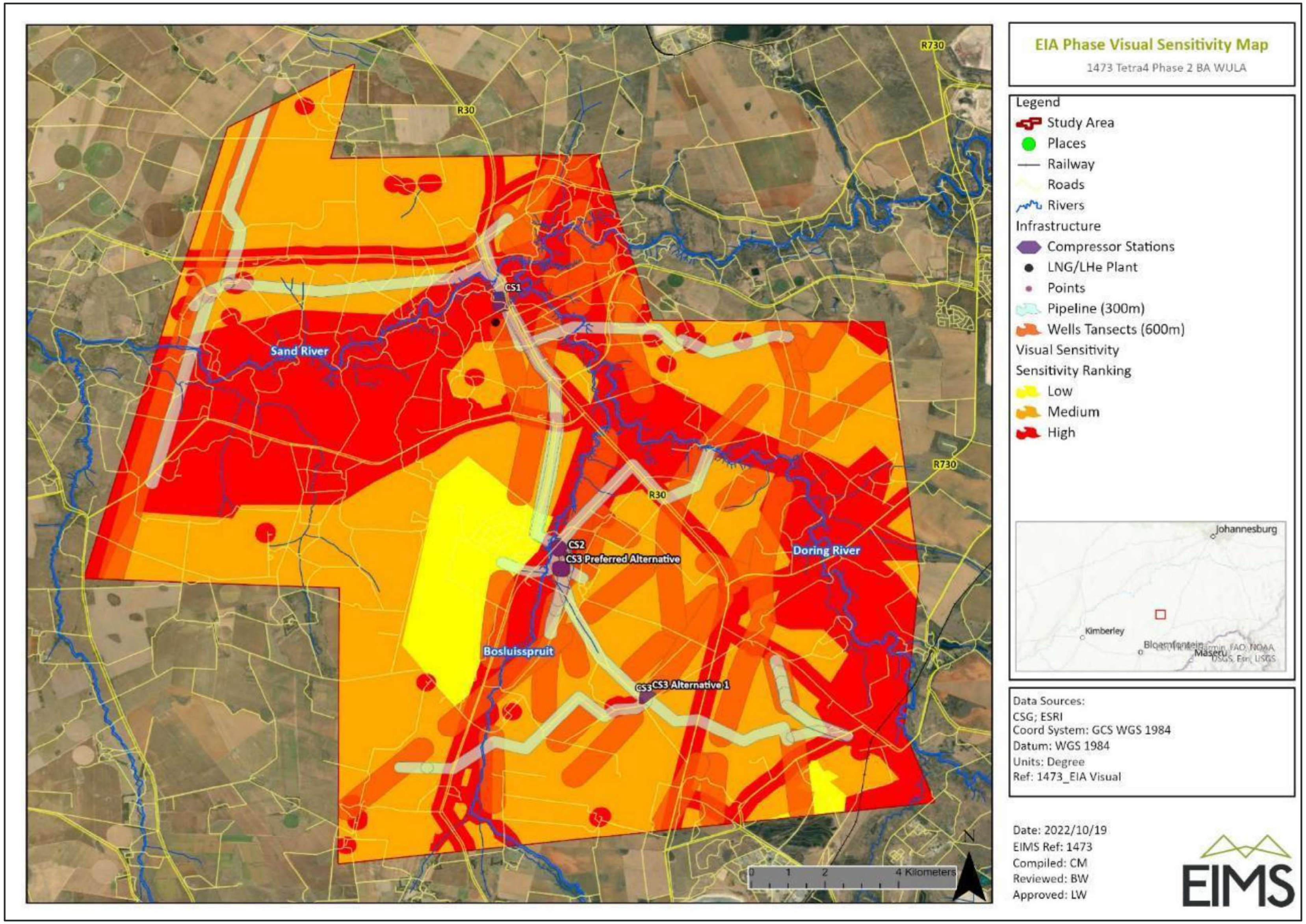


Figure 32: Visual sensitivity map.

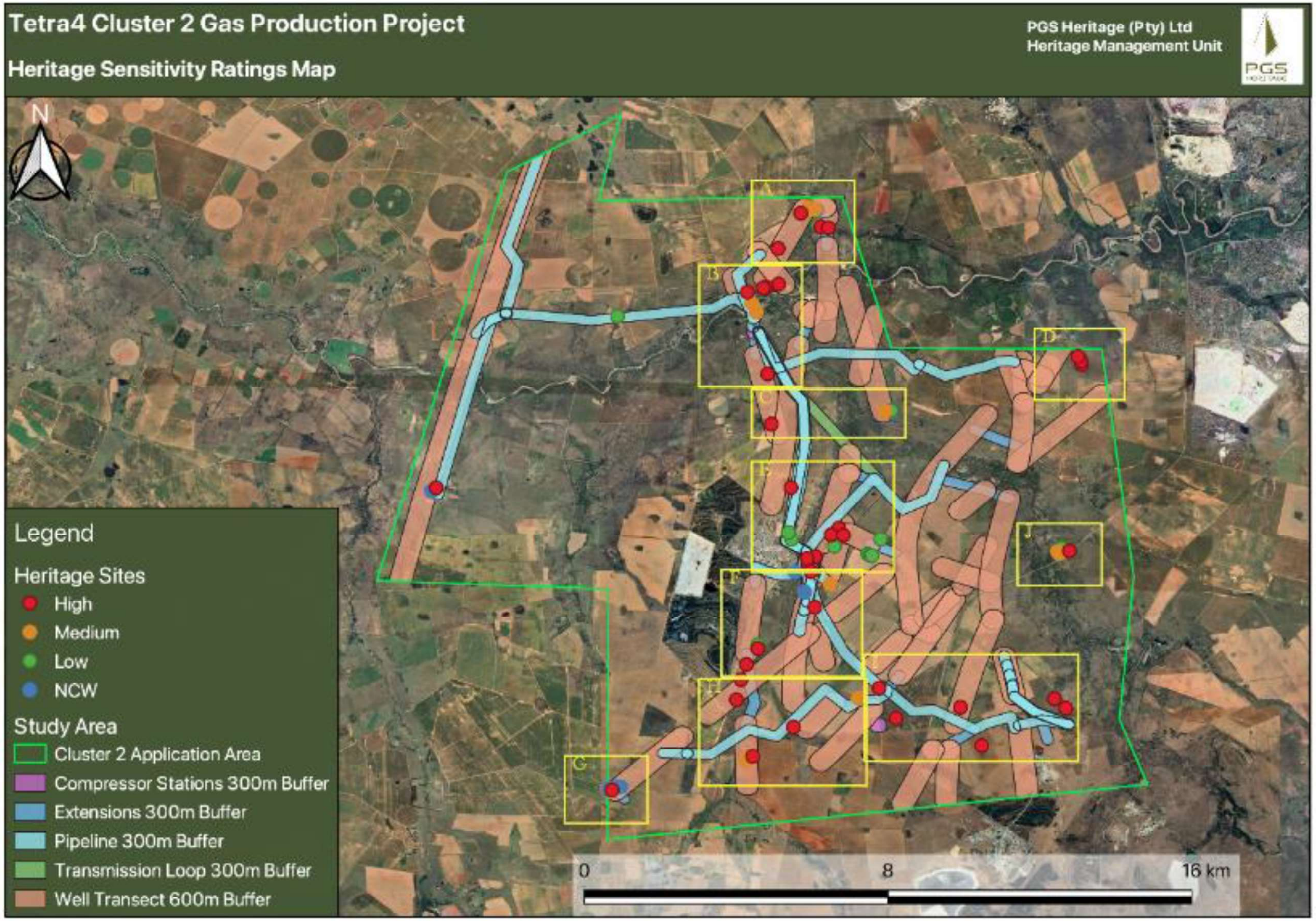


Figure 33: Map showing heritage sensitivity rating of identified heritage resources. See insets below.

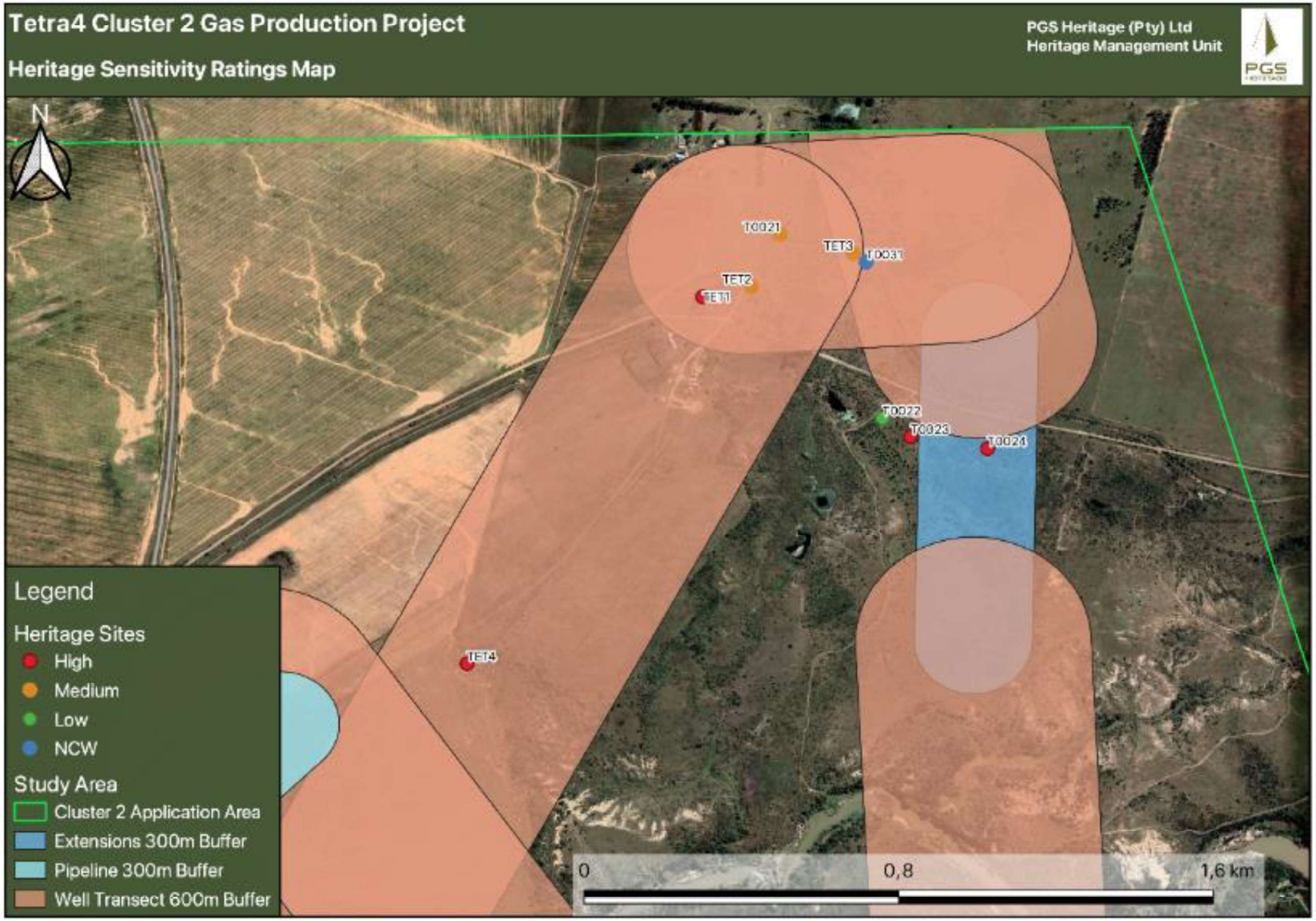


Figure 34: Heritage sensitivity rating of identified heritage resources. Inset A.

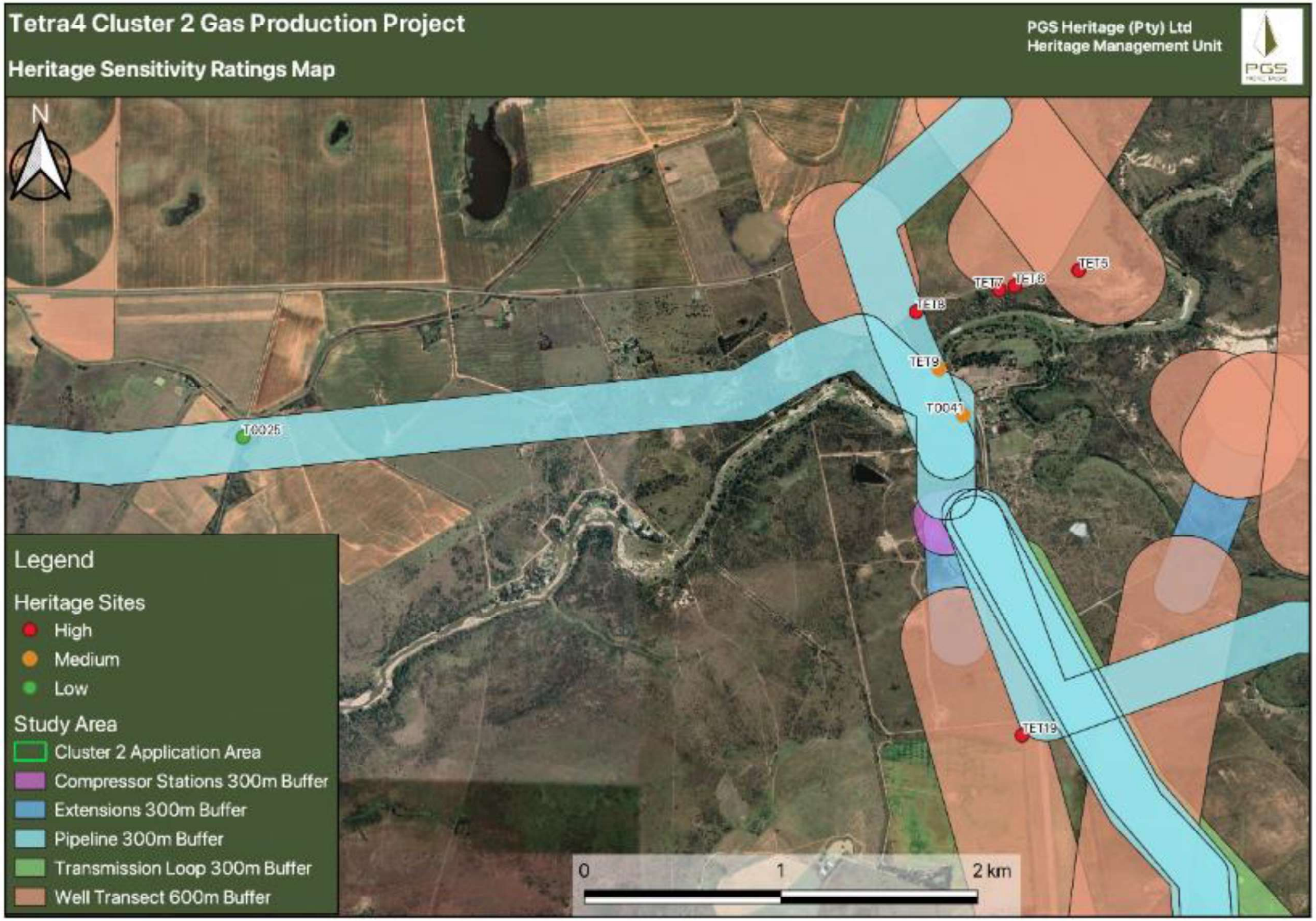


Figure 35: Heritage sensitivity rating of identified heritage resources. Inset B.

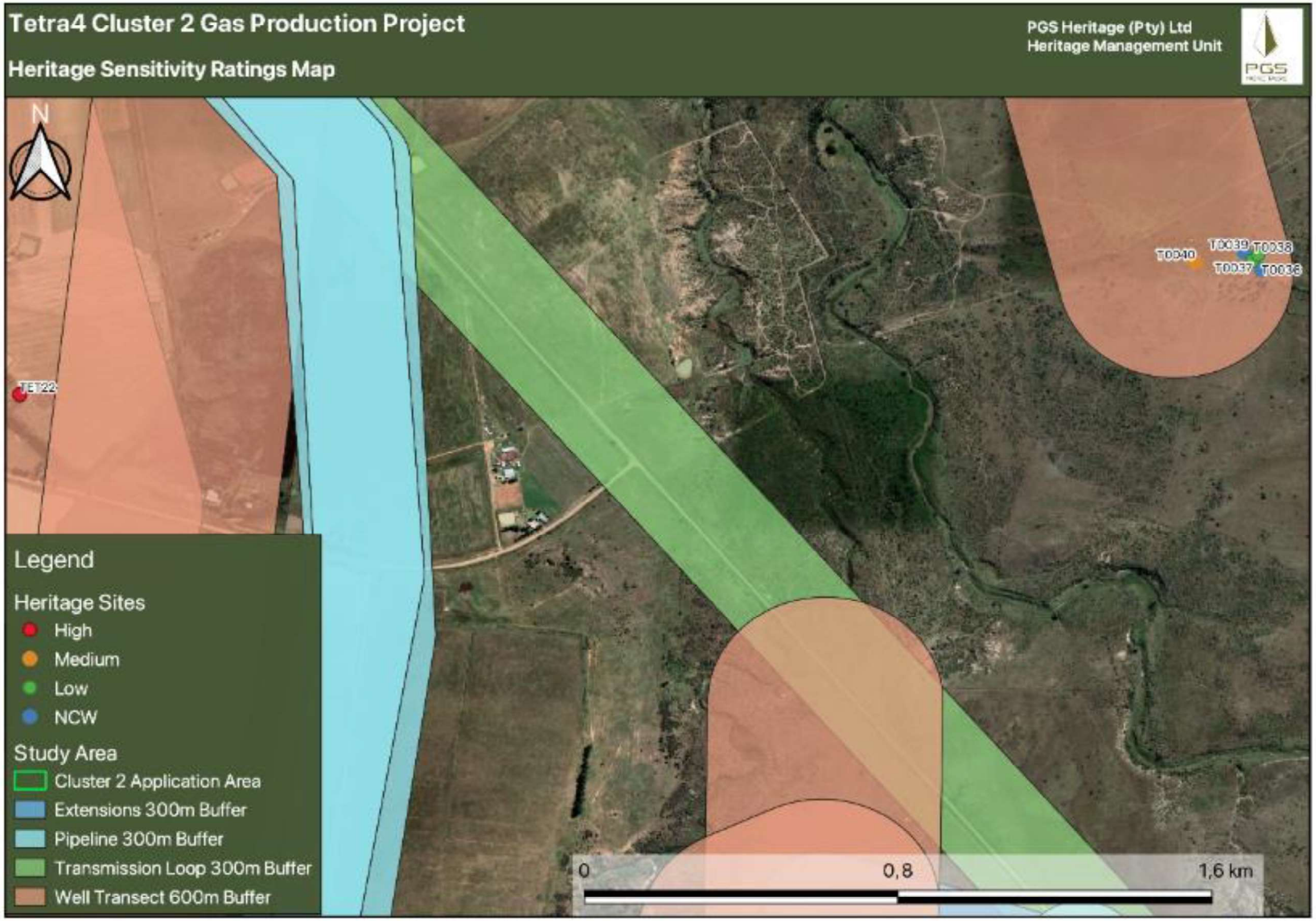


Figure 36: Heritage sensitivity rating of identified heritage resources. Inset C.

Figure 37: Heritage sensitivity rating of identified heritage resources. Inset D.

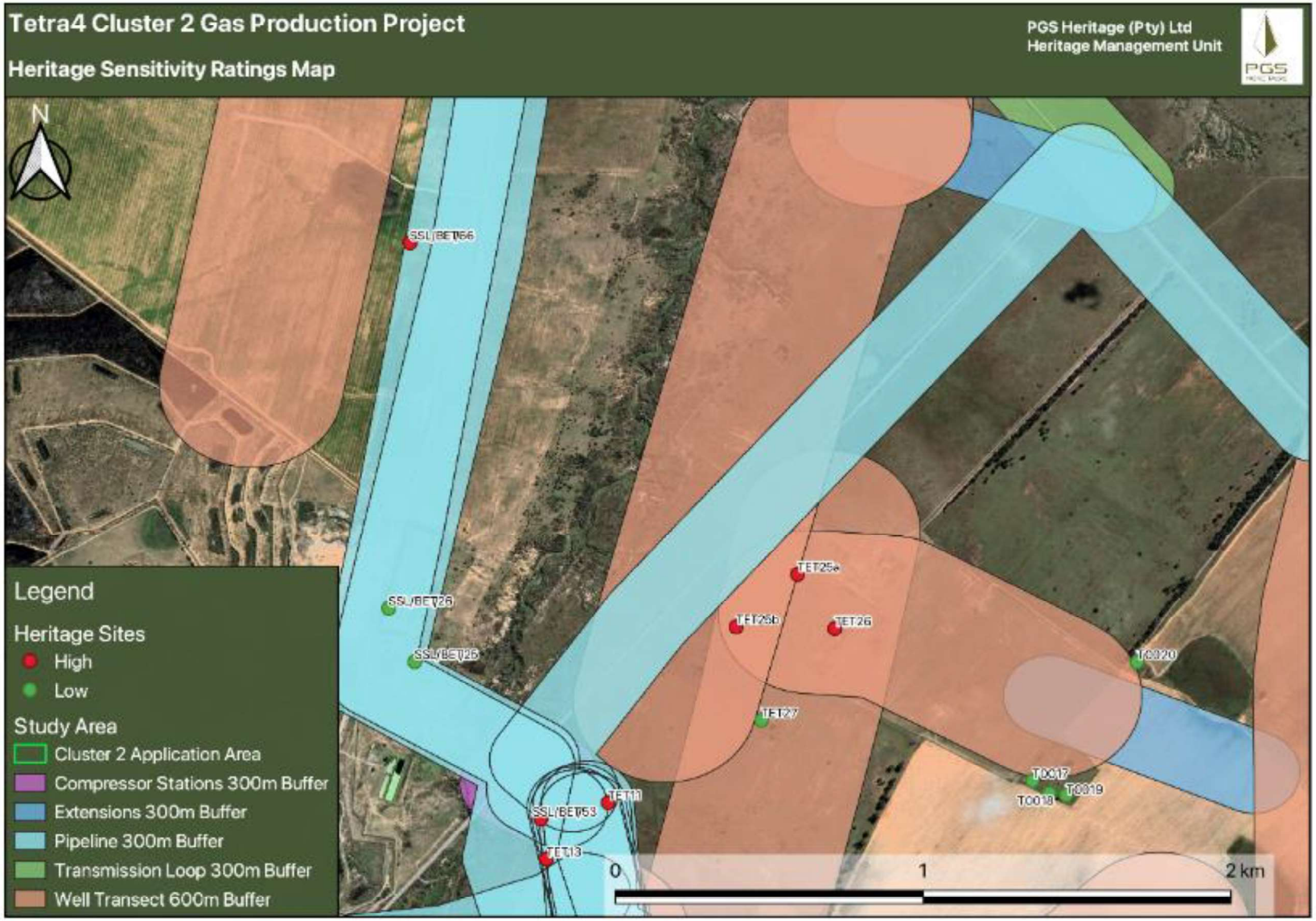


Figure 38: Heritage sensitivity rating of identified heritage resources. Inset E.

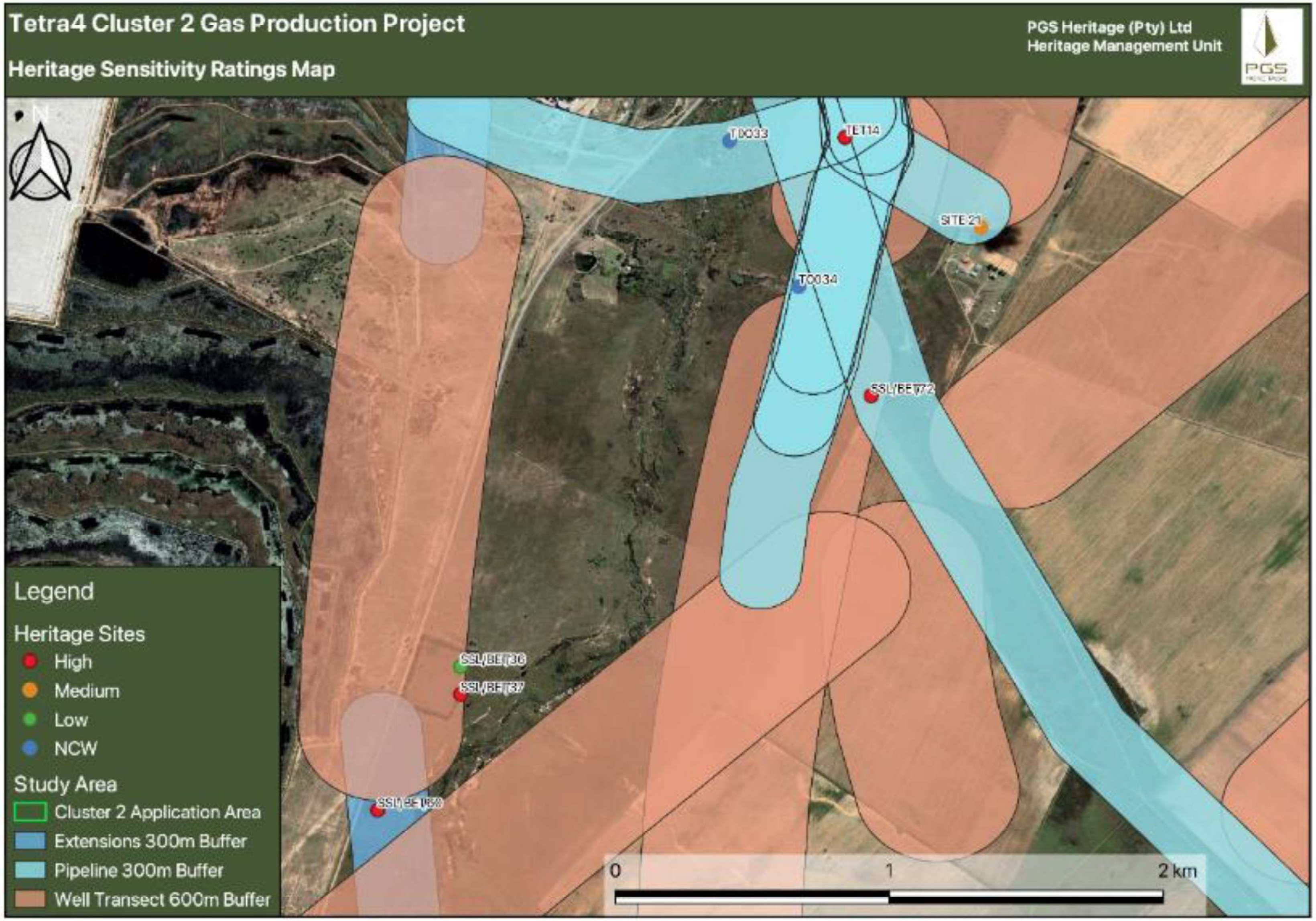


Figure 39: Heritage sensitivity rating of identified heritage resources. Inset F.

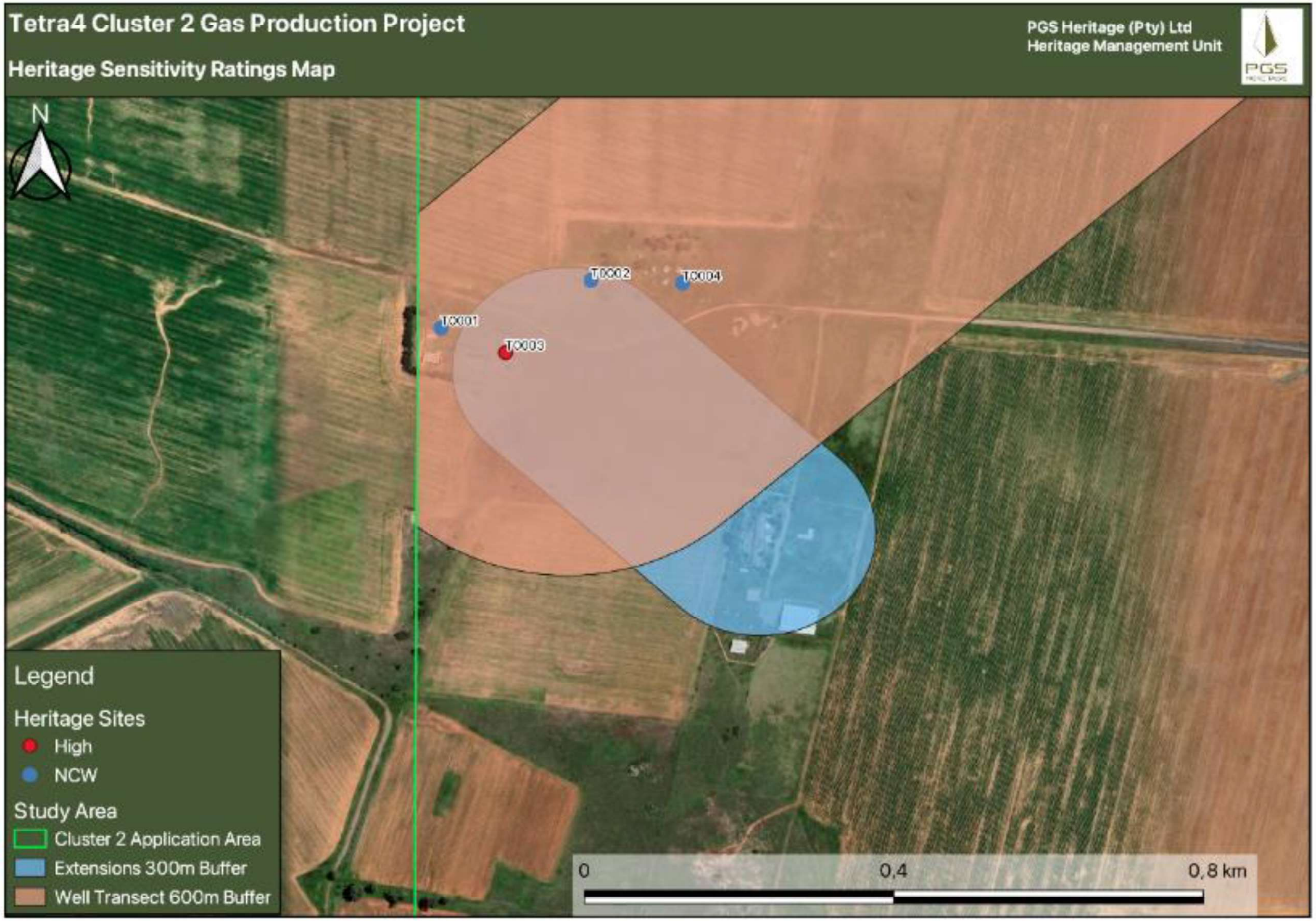


Figure 40: Heritage sensitivity rating of identified heritage resources. Inset G.

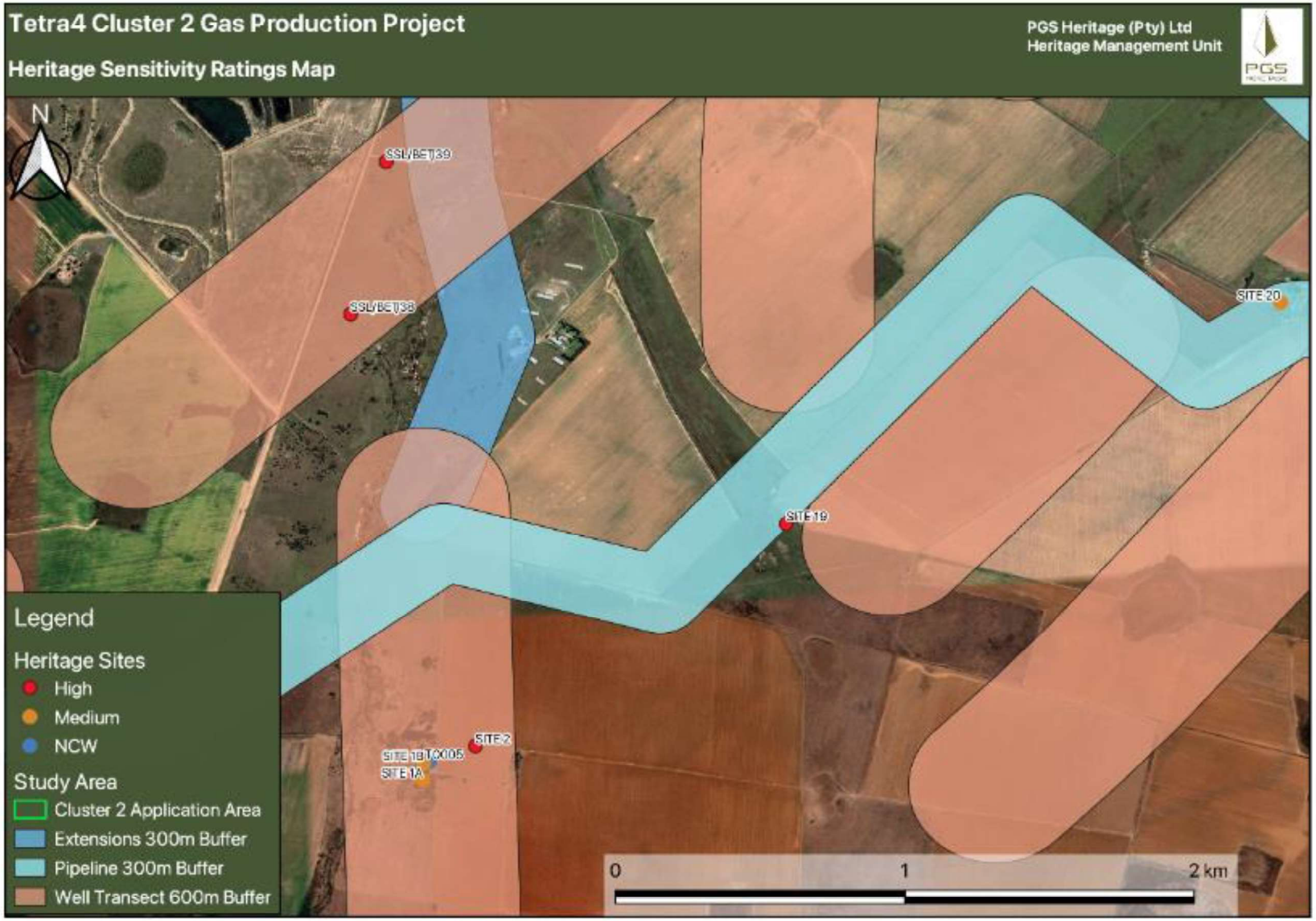


Figure 41: Heritage sensitivity rating of identified heritage resources. Inset H.

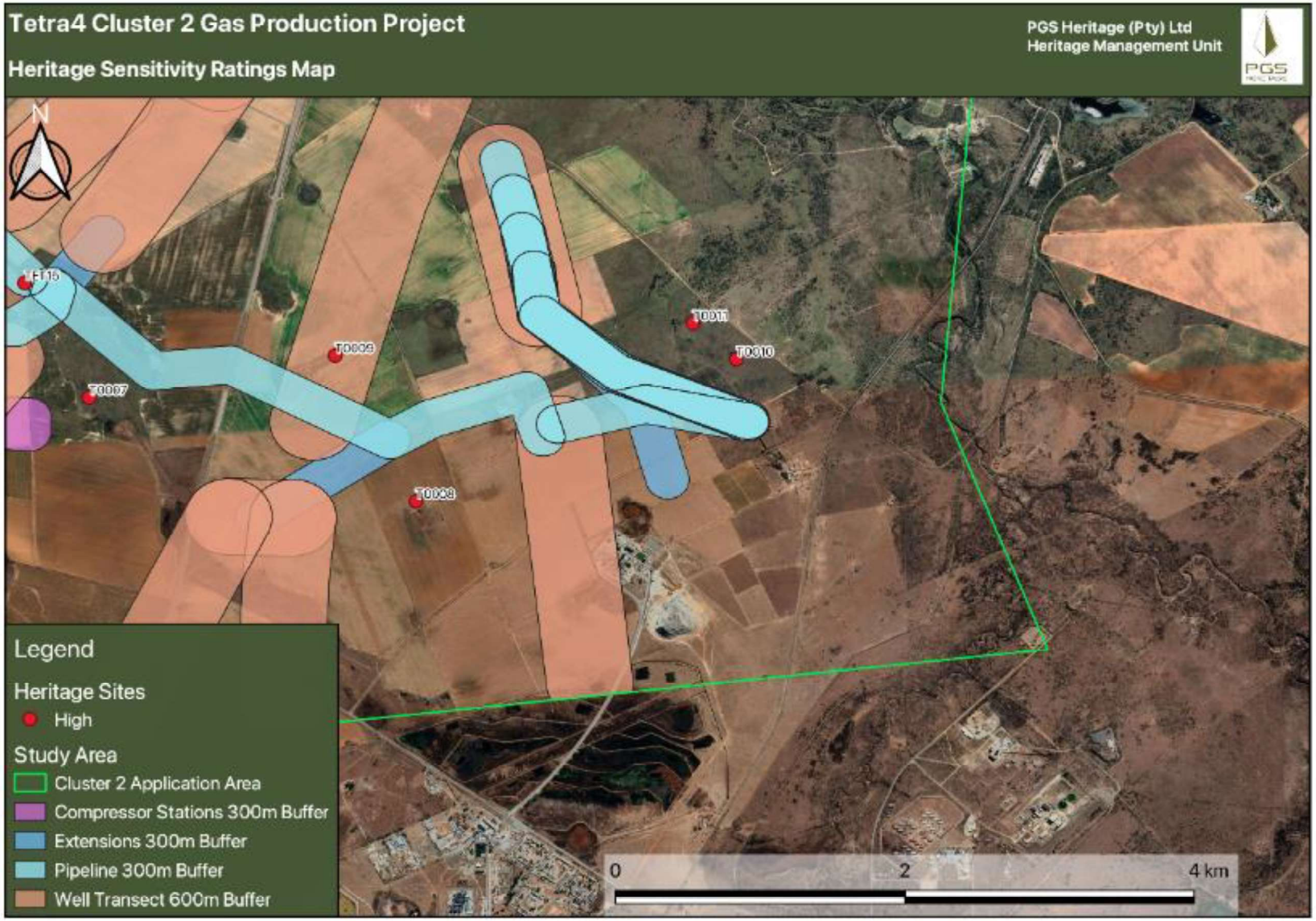


Figure 42: Heritage sensitivity rating of identified heritage resources. Inset I.

Figure 43: Heritage sensitivity rating of identified heritage resources. Inset J.

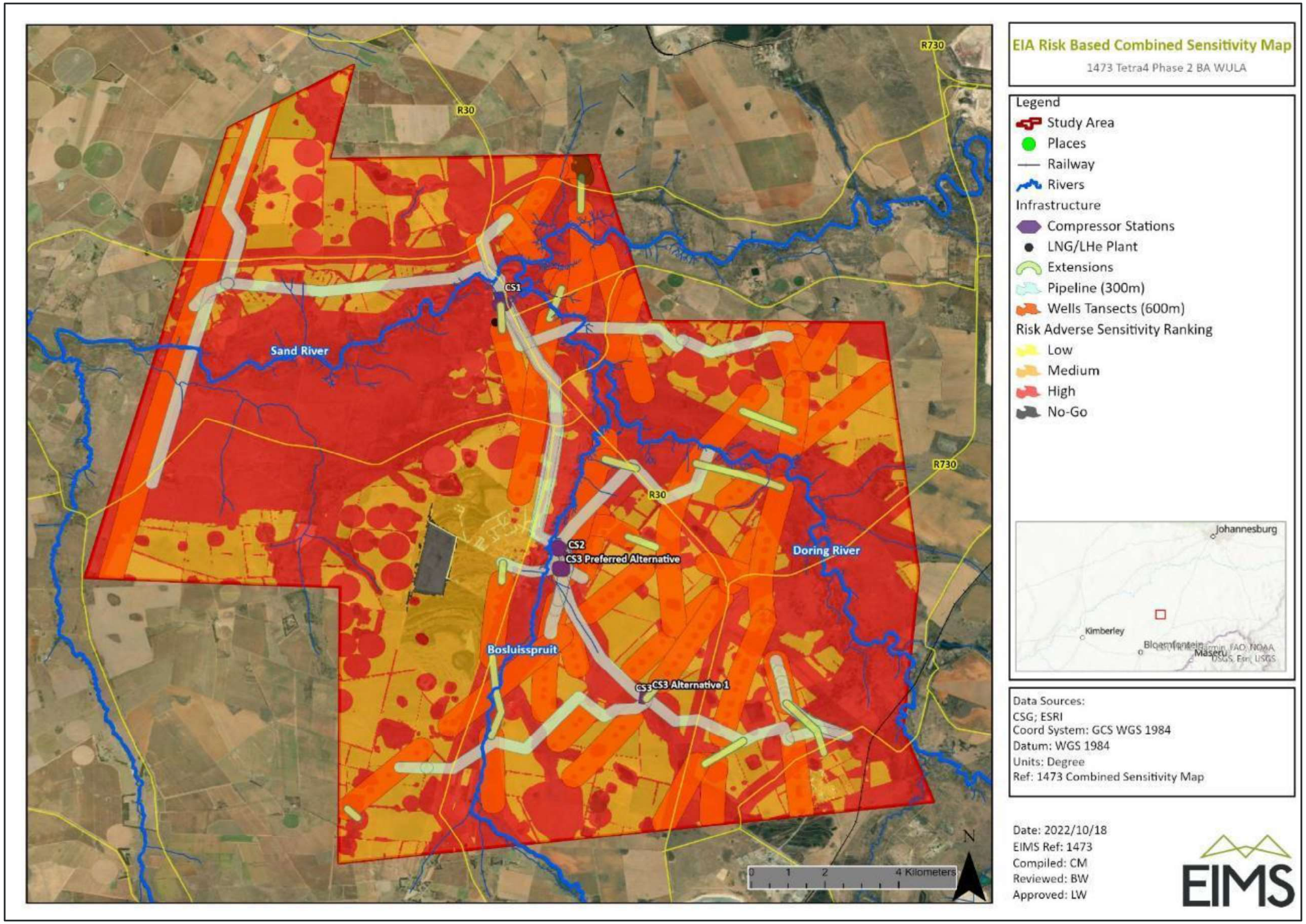


Figure 44: Cluster 2 combined sensitivity map.

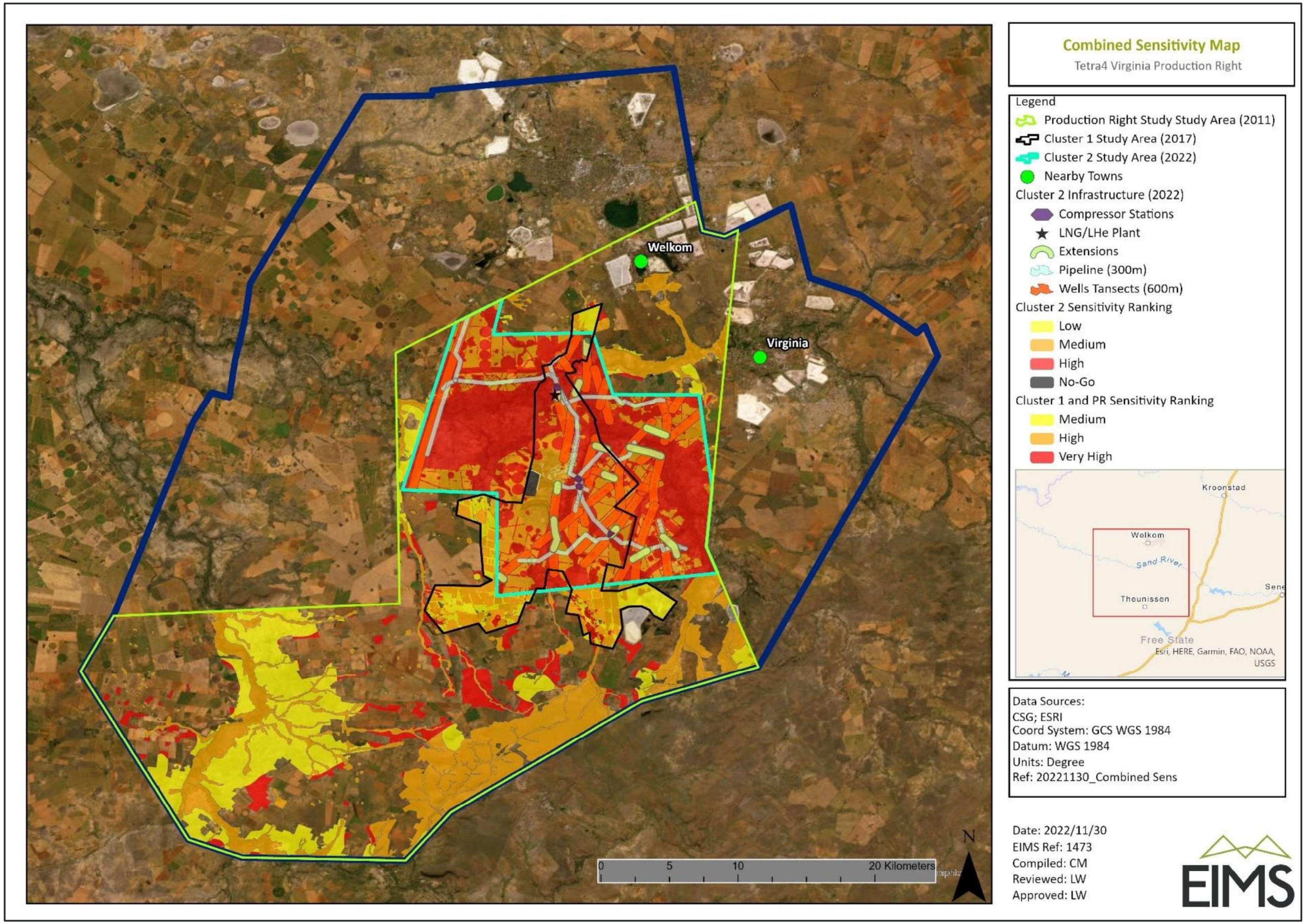
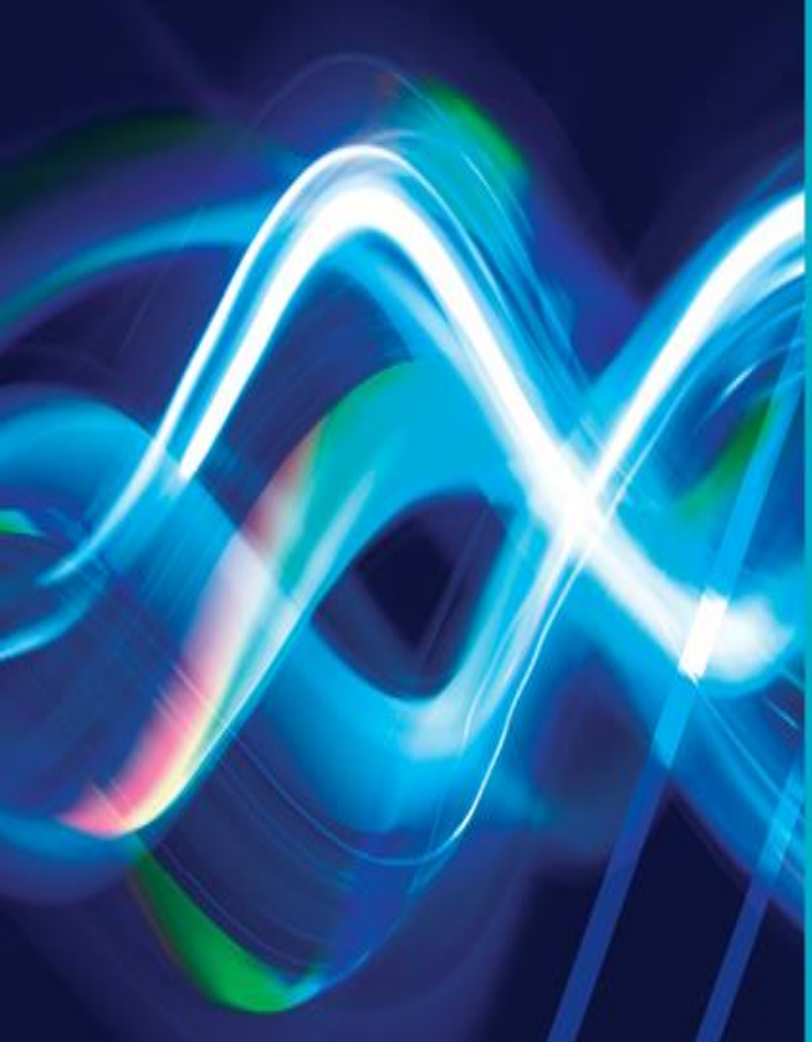


Figure 45: Production Right, Cluster 1 and Cluster 2 sensitivity rankings.

Appendix 4: Well closure, sealing and rehabilitation guideline



VIRGINIA PRODUCTION RIGHT

PASA REF#: 12/4/1/07/2/2 PR

GAS WELL CLOSURE, ABANDONMENT AND REHABILITATION GUIDELINES

2021

Table of Contents

List of Tables

1. PURPOSE OF THIS DOCUMENT

This document aims to provide guidance during the preparation for well closure, sealing and abandonment of a gas production/exploration well, focussing on the following aspects:

1. Determining the most suitable and appropriate closure, sealing and rehabilitation strategy with specific focus on:
    - Technical aspects pertaining to plugging mechanisms/techniques in order to ensure the most suitable and appropriate well specific closure, sealing and rehabilitation strategy is implemented - with specific focus on the plugging methods to ensure no vertical gas and/or fluid movements within the well;
    - Specifications of plugging material and equipment to ensure compliance with well abandonment standards (e.g., Best Practice Standards etc.);
    - Ensuring the landscape is safe, stable and non-polluting over the long-term, and that the post closure land use aligns with the surrounding land use and does not affect the sustained utilization thereof;
    - Mechanisms and tests that would be implemented to ensure cement bonding is structurally sound;
    - Mechanisms and tests that could be implemented for *future long-term monitoring* to ensure well plugging and sealing is structurally sound
2. Preparation of a consolidated site-specific closure, sealing and rehabilitation plan and project cost-breakdown.

2. WELL CLOSURE AND ABANDONMENT REQUIREMENTS AS PER THE EMPR

2.1 Well Objectives

Driven by the closure targets, the following well closure and rehabilitation objectives applies:

1. Well closure must represent legislative frameworks and requirements as stipulated by:
    - Industry Best Practice standards and guidelines; and
2. The gas well sealing, and closure plan must be <u>aimed at preventing groundwater and natural gas reservoir fluids from migrating within or laterally through a well over time, by isolating all porous formations and freshwater aquifers.</u>
3. Reflect the local environment - ecosystem rehabilitation of impacted areas, including natural fauna and flora, hydrology and hydrogeology;
4. Ensure than the final landscape is <u>safe, stable and non-polluting over the long term</u>, and that post closure land-use does not affect the sustained utilization thereof.

2.2 Closure Objectives

The surface area of the well to be abandoned and sealed, must be clear of obstructions and equipment and the well must be cemented for the <u>full length and diameter of the well to surface</u>.

Landform, erosion control and re-vegetation is an important part of the rehabilitation process. Landform and land use are closely interrelated, and the landform should be returned as closely as possible to the original landform. This requires the following:

- Remove any discard or waste materials from the well sites and dispose at a suitably licenced waste disposal facility;
- Shape, level and de-compact the final landscape after removing all of the project infrastructure, where necessary dress with topsoil and, where necessary, vegetate with indigenous species.

As is the nature of natural gas exploration, wells not yielding viable gas will be plugged and rehabilitated. The basic aim is to render wells permanently safe and remove all surface signs of exploration activity. All efforts should be taken to ensure the surface area is returned as close as possible to its pre-exploration condition.

The following factors must be taken into account when designing the well closure strategy:

- Final condition and design of the well;
- Height of the cement in the annulus outside the casing;
- Any permeable formations outside the casing that must be covered in cement;
- Any cemented casing overlaps;
- The need for abandonment plugs to cover the full diameter of the wellbore;
- The type of fluid in the annuli above the cement;
- Consideration of the difficulties of injecting cement into the annulus;
- Future monitoring of the well plug integrity;
- The depth below surface at which casings must be cut; and
- Any related seismic activity risks.

There are various alternative closure and post closure options available. The identification and consideration of the most suitable alternatives are driven by, inter alia the following considerations:

- The ability of the selected alternative to adequately meet the specified closure vision and objectives;
- The efficiency, viability, and practicality of the selected alternative; and
- The alignment with the local environmental and socio-economic context and associated opportunities and constraints.

The table below presents options and alternatives referenced in the EMP related to the process of abandoning and closure of a well site. The preferred options mentioned in the table below, are subject to input from the Contractor and Well Specialist who are required to advise on suitable options related to well-specific conditions.

Table 1: Recommended well closure techniques

Exploration activity	Aspect	Options	Comment
Exploration wells	Casing	Retain	Subject to pre-closure inspection of casing integrity by well engineer. The retention of well casings is strongly dependent on the nature of the geological strata and location of aquifers and other porous/permeable zones. The presence of these zones may also be a hindrance to the removal of a casing string.
	Plugging extent	Entire well length	Best Practice Guidelines requires well to be cemented for the full length and diameter of the wellbore to surface.
	Plugging material	API Standard	The cement to be used must comply with the requirements of the relevant API standards and Best Practice Guidelines, or alternative standards as agreed with the PASA and as approved by a well engineer.
	Plugging technique	Squeeze	The displacement method minimizes the contamination of the cement by being able to displace fluid within the well – thus allowing for a more stable well plug.
	Well surface infrastructure	Complete removal	Best Practice Guidelines requires that the surface areas of a decommissioning well must be clear of obstructions and equipment. In order to allow hindered land use of the well area, it is suggested that all surface infrastructures be removed. In addition, the well be capped at +-1m below the ground level with the requirement for marking its location and representing its position on the Title/SG diagram.

It is anticipated that the closure options listed in the table above is in line with industry Best Practice Guidelines.

3. WELL CLOSURE, SEALING AND REHABILITATION ACTIONS

The anticipated closure actions can be summarised as follows:

1. Phase 1: Preparation for closure
2. Phase 2: Well Closure and Sealing
3. Phase 3: Earth Works and Surface Rehabilitation
4. Phase 4: Reporting

The tables below provide a summary of the closure actions/requirements for each phase.

PHASE 1: PREPARATION FOR CLOSURE

A licence holder may only suspend a production well on obtaining the approval of the designated agency (PASA). In this regard, a well that is no longer active or producing, or for which the approved suspension period has passed, must be plugged/sealed and rehabilitated in accordance with a PASA approved closure, sealing and rehabilitation plan.

The following tasks should be undertaken prior to well closure and rehabilitation:

Table 2: Summary of tasks to be undertaken prior to well closure and rehabilitation

Actions	Requirements
1. The well must be cleared of obstructions prior to abandonment	• Removal of surface infrastructure ○ Tetra4 will advise on storage facilities to store removed infrastructure
2. Assess well condition through downhole logging	• Conduct **Calliper logging** to identify and investigate potential blockages/cavities within well. ○ This information is crucial for the planning of cementation and volumetric requirements • **Cement Bond Logging** to investigate the current integrity of the casing and cementation ○ Determine whether top-up cementation work will be required (specifically across sections with "no cement bond" or "poor cement bond" results are noted).
3. Preparation of a site-specific closure, sealing and rehabilitation plan	• Contractor to determine the most suitable and appropriate closure, sealing and rehabilitation strategy with specific focus on the plugging method to ensure no vertical gas and/or fluid movements within the well. • Contractor to prepare a consolidated site-specifi closre/sealing plan – to be submitted to Tetra4 for approval. • The identification and consideration of the most suitable alternatives must be driven by the following considerations: ○ The ability of the selected alternative to adequately meet the specified closure vision and objectives; ○ The efficiency, viability, and practicality of the selected alternativs; and

	○ The alignment with the local environmental and socio-economic context and associated opportunities and constraints

PHASE 2: WELL CLOSURE AND SEALING

The table below provides a summary of tasks to be undertaken during well closure and sealing.

Table 3: Tasks should be undertaken during well closure and sealing

Actions	Requirements
4. Isolate all potential hydrocarbon/water bearing formations through the placement of cement plugs	• Develop cement formulation for cementing the entire well annulus. • Develop cement formulation to top-up "no bond" or "poor bond" cemented sections between casing and formation walls – ensure cement seals and does not disperse into porous formations. • Cement formulations and volumetric calculations to be approved by well engineer/cement specialist
5. Well Cementation	• Contractor must ensure cement mixture seals the entire well length along the well annulus. Cement plugs must be stacked along the <u>full length and diameter of the well to surface</u> (open hole section above the packer as well as the upper casing) to ensure efficient redundancy. • All plugs must be tagged to ensure successful placement. • <u>Cementation extent:</u> ○ From end of hole (bottom of well) to surface. • <u>Cementation technique</u>: ○ **Squeeze technique** - this displacement method minimizes the contamination of the cement by being able to displace fluid within the well, thus allowing for a more stable well plug. Contractor must also make use of <u>wiper plugs</u> for cement displacement. • Contractor to conduct cement top-ups along the annulus and existing cemented sections showing "no bond" or "poor bond" from logging results. • A surface / shallow cement plug (+/ 50m below ground Level) must be set, and the well casing must be cut and capped 1 m below ground level to remove the wellhead and all casing above this point
6. Cementation integrity testing	• Integrity of the plugs must be confirmed by setting weight down on the upper most plug (using the drill string) as well as a differential pressure test for 4 hours at determined pressure with less than 10% bleed over the period. Pressure test data to be captured in 15-minute intervals for the entire 4-hour testing period.

PHASE 3: EARTH WORKS AND SURFACE REHABILITATION

The table below provides a summary of tasks to be undertaken during earth works and surface rehabilitation

Table 4: Tasks should be undertaken earth works and surface rehabilitation

Actions	Requirements

7. Earth Works and Surface Rehabilitation	• The well casing must be cut and capped 1 m below ground level to remove the wellhead and all casing above this point;
	
	• Placement of a "surface tag" in order to ensure monitoring can continue once the casing is cut and the area revegetated.
	
	• Surface area to be rehabilitated is ±40 m^2 (well dependant – Tetra4 to confirm rehabilitation size)
	
	• Earth works and surface rehabilitation must include:
	    ○ Earthworks to shape and profile the area in order to conform to the surrounding area;
	    ○ Re-instate natural drainage lines;
	    ○ Re-vegetate surface areas with an *Eragrostis teff* or local pioneer specie seed mix
	
	• Rehabilitation must reflect the local environment - ecosystem rehabilitation of impacted areas, including natural fauna and flora, hydrology and hydrogeology
	
	• Contractor must ensure that than the final landscape is safe, stable and non-polluting over the long term, and that post closure land-use does not affect the sustained utilization

PHASE 4: REPORTING

The table below provides a summary of reporting requirements after well closure, sealing and rehabilitation.

Table 5: Summary of reporting requirements

Actions	Requirements

9.	• Contractor to prepare a comprehensive project report containing the following:
	    ○ Calliper and CBL logging results;
	    ○ Cement formulations and Material Safety Datahseets of all additives;
	    ○ Cementation methodology and photographs;
	    ○ Recorded pressure test data;
	    ○ Well tagging photographs and coordinates;
	    ○ Surface rehabilitation photographs.

Appendix 5: EMPr Amendment Change Register (2022)

Cluster 2 – Change Register of EMPR Management Measures (October 2022)

This change register summarises the 2022 proposed management/mitigation measure amendments to the Tetra 4 Virginia Production Right EMPR following the Cluster 2 EIA Application process.

Changes are shown in RED STRIKE THROUGH TEXT (*proposed removals*) and BLUE TEXT (*proposed additions*).

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
1	Pre-construction	All	Water quality baseline	The pre-production condition of the water resources must be utilised as the target for post-production closure objectives. ~~All necessary measures must be taken to ensure that the post-production water quality as the same as pre-production baseline levels.~~ In order to achieve this relevant water pre-construction water sampling must be undertaken to determine the baseline.	Wording is too specific and not fully within Tetra4 control as groundwater quantity and quality is impacted by various external activities such as mining, agriculture, etc. The requirement to monitor water quality against baseline is included in other EMPr conditions and any changes must be investigated to determine the root cause with appropriate corrective actions taken where necessary.
3	Pre-construction	Pipelines	Impacts on land-use	Infrastructure routes should follow existing servitudes and farm boundaries wherever possible. ~~Where necessary pipelines should be laid underground below plough ripping level. In the event that surface pipelines are to be utilised, written approval must first be obtained from the relevant landowner.~~ Pipelines ~~that will~~ must be buried at a minimum of 1.5m below surface which is deeper than the rip-depth to ensure that the farmer has full utilization of their land.	Pipelines will not be laid above ground due to the greater risk to the pipe (vandalism, exposure to elements) and also due to the greater negative impact this would have on existing land use. The requirement to lay pipelines below ground is already included in the remaining conditions.
6	Pre-construction	Processing facilities	Public safety	A hazardous installation risk assessment must be conducted prior to construction and any recommendations of such assessments complied with.	Additional text to tighten up compliance with risk assessment.
10	Construction	Access roads	Access roads	Existing roads should be used where possible. Decisions regarding the siting/location of new roads should be done with agreement of the landowner. Fence lines should be followed as far as practical. No trees shall be removed unless authorised by a suitably qualified environmental professional. Protected tree species may not be removed, unless relocation is deemed viable by the specialist ecologist and relevant permits	Additional text to reinforce timely rehabilitation and in line with landowner agreements.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				are obtained. Construction of drill sites and associated access roads on steep gradients shall be avoided as far as possible. In case of new access roads, adequate drainage and erosion protection in the form of off-cut berms or trenches should be provided where necessary. Access routes across rivers, streams and wetland areas should be avoided as far as possible. Where such crossings are unavoidable, the relevant authorisations must be obtained, if applicable. Minimise the frequency of vehicle travel on unsurfaced roads where possible. Rehabilitation of access roads must be undertaken immediately once use of the roads are not required and must be to the satisfaction of the landowner as required by the landowner signed access agreements.	
17	Pre-construction	All	Flora and fauna direct and indirect mortality	Search and rescue of species of concern. Obtain permits for disturbance/destruction of any listed/protected species found on site. Where possible, undertake activities in previously disturbed areas and/or habitats with lower sensitivity. Where possible, locate activities on the boundaries of existing disturbance. Use existing access roads as much as possible and any new access roads must be agreed to with the landowner and EO and no deviations from access roads allowed. Adhere to the biodiversity no-go area on the farm Adamson Vlei 655 Portion 0 (no development or impacts may occur in this no-go area).	Additional text to include requirement to comply with landowner agreements.
18	Pre-construction	Exploration drilling	Reducing groundwater available to existing users.	A hydrocensus must be undertaken within a 500 m radius around each future gas production target to confirm the presence of private boreholes that have not already been identified as part of the 2016 and 2022 hydrocensus. All private boreholes inside this zone must be visited and inspected. The information gathered must be used to plan for, and implement, groundwater management measures. A photo must be taken of each private borehole within the 500 m radius for future record. Where possible, the sustainable yields of private boreholes that fall within the zones of impact above must be determined prior to Tetra4 commencing with any groundwater abstraction. Complete a pumping test on the boreholes within the zones of impact. The testing requirements for each borehole should be evaluated based on field conditions. A sound groundwater monitoring programme must be implemented in the hydrocensus boreholes that will be affected as well as in the newly drilled monitoring boreholes ~~and in the gas production wells~~. Should the results of the monitoring programme indicate a negative impact on private groundwater users as a result of Tetra4's activities, alternative	Monitoring of water quality cannot be undertaken in an equipped production well. This is impractical and there are already requirements to have monitoring boreholes in proximity to the wells.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				arrangements must be negotiated with the affected parties. Tetra4 must apply for a water use license in the event that groundwater abstraction for the project triggers the requirements of the National Water Act (Act 38 of 1996).	
20	Construction	Pipelines	Disruption of watercourse hydrology	~~Pipeline crossings through wetlands and other watercourses should ideally be raised aboveground on plinths to prevent preferential flow along their length. In areas where this is not possible,~~ Trench breakers with a low hydrological conductivity should be used to reduce water movement in bedding and padding material along the buried pipeline in wetlands and other watercourses. Long and/or steep approaches that border watercourses (specifically wetlands) should receive trench breakers that will help to restrict the desiccation impact on wetlands due to preferential drainage. It is recommended that input be obtained from a geotechnical specialist or geohydrologist regarding the use and positioning of trench breakers along buried sections of the pipeline. Other crossings through depression (pan) and flat wetland require trench-breakers or other forms of underground barriers/plugs to prevent preferential drainage along the pipeline/trunkline alignment.	Pipelines will not be laid above ground due to the greater risk to the pipe (vandalism, exposure to elements) and also due to the greater negative impact this would have on existing land use.
22	All Phases	All	Improvement of numerical modelling results	A groundwater monitoring programme must be implemented. On-site rainfall must be measured at the Helium Plant on a ~~daily~~ regular basis. Tetra4 must undertake geophysical surveys at the remainder of the gas production wells in a similar fashion to what has been completed to date. These surveys must be used to identify additional groundwater monitoring borehole drilling targets as the project progresses. New monitoring boreholes must be drilled only where there are no existing and available boreholes within the zone of influence. Pumping tests and/or slug tests can also be considered on private boreholes within the zones of influence discussed above that are not already equipped, provided that the geological logs are available for the boreholes ~~(21A, 21B, 21D, 22A, 22B, 4A, 11C, 15E, 17E, 22D, 23D, 24D, 25A, 25B, 25D, OB, OC, ZA)~~. The hydrocensus boreholes can only be tested after permission was obtained from landowners. The information obtained form the activities listed above must be interpreted and incorporated into the existing conceptual model for the project. This data as well as the results of the groundwater monitoring programme must be used to update and re-calibrate the numerical groundwater flow and contaminant transport model for the project on an annual basis.	Removal of Cluster 1 specific detail to ensure that the condition is generic and appropriate to ALL Tetra4 operations.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
24	Construction	Production wells	Stray gas migration affecting groundwater quality	Well design to be undertaken according to designs developed by a qualified well engineer. The existing production boreholes should be assessed and where relevant retrospectively amended to ensure suitable integrity to align with the design objectives of the MPRDA Regulations. The recommended gas well construction configuration is such that the upper 300 – 450 m of the geological succession is cased off using a combination of telescopic drilling, steel casing and cementation between the well annulus and the casing towards isolating the shallow Karoo potable aquifer from the deep-seated gas production zone and the saline formation water associated with the production zone. In the unlikely event that produced water has to be extracted from gas production wells, this water should be stored in sealed containers, removed from site and disposed of to a suitable environment/waste management facility. A groundwater monitoring programme (to monitor gas pressure and potential leaks) must be implemented in ~~the gas well, as well as in~~ the monitoring and hydrocensus boreholes to detect dissolved methane and ethane gas. Well construction according to the relevant standards and regulations.	Monitoring of water quality cannot be undertaken in an equipped production well. This is impractical and there are already requirements to have monitoring boreholes in proximity to the wells.
25	Pre-construction	All	Enviro-legal compliance	Holder to obtain all necessary environmental permits to comply with all legislative requirements.	Addition of "environmental" to align with environmental specific permits and licences.
29	Construction	All	Temporary construction camps, laydowns, offices.	The construction camp and office site shall be located adjacent to the plant as indicated in the EIAr and no other temporary camps may be constructed outside of the assessed area~~sited and fenced (where necessary) in consultation with the landowner and tenants~~. ~~No camp and office site shall be situated closer than 100 meters from any stream, spring, dam or pan, and 100 meters from any residential area or farm homestead. In the event that any infrastructure is located closer than 100 m from any residential area or homestead then written consent must be obtained from the relevant landowner/ occupier.~~ The area required for the camp and site office shall be kept to a minimum, as to reduce the impact on surrounding ecology. Activities should be restricted to the agreed or fenced area. ~~In the case where water will be required, the water supply pipelines laid down should be done in accordance to the agreement with the landowner and tenants, in such a manner that the surface and natural vegetation are not unduly disturbed (where necessary)~~. Only legal water supplies may be utilised. An approved chemical toilet service supplier should be used to supply and maintain chemical toilets for the duration of the proposed	Cluster 1 construction is now completed and while Cluster 1 had a broader approach to construction camp locations, this is not the case for Cluster 2. The Cluster 2 camp and laydown area for ALL contractors is located adjacent to the LNG/LHe Plant and on land Tetra4 is in control of. Furthermore water supply moving forward is only Municipal water (no abstraction from the environment) and water will be treated and reused at the plant. This condition has therefore been adjusted to speak to Cluster 2 construction moving forward (since Cluster 1 construction

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				activity on the site. Portable toilets (preferred) should be used and sited on the campsite in such a way that they do not cause water pollution, odour or other forms of pollution. Any impact such as noise, dust, bright lights etc. that may cause disturbance to landowners or tenants, will be kept to a minimum. ~~No structures older than 60 years are to be impacted on without the necessary permits.~~	is now completed). The removal of the heritage sentence in this specific condition is due to the fact that no heritage structures are located in the proposed area of the construction camp at the LNG/LHe plant. Heritage mitigation measures are contained in other conditions for infrastructure in areas nearer to heritage sites and also covered by the requirement for a pre-construction survey and a chance finds procedure requirement.
33	Construction	All	Impacts on Traffic Safety	A consulting engineer with a transportation background should be consulted in order to ensure that and new access features along roads are acceptable to SANRAL, and allow for the consideration and approval of safety to motorists and the general public.	Inclusion of wording to clarify which access features require additional SANRAL approval.
35	Construction	All	Management of topsoils	Topsoil should be removed from areas that are to be cleared and stockpiled separately for later use during rehabilitation (and may only be used for rehabilitation purposes). Topsoil should be stockpiled for the minimal amount of time and should not exceed 1.5m in height, or have a slope steeper than 1:2. Stockpiles should ideally not stand for longer than a period of 12 months where possible. Should it be required to store topsoil for longer than 12 months, suitable storage methods must be investigated to ensure viabilitiy of topsoil is maintained. All exposed areas should remain moist through water spraying during dry periods.	Additional wording to tighten up control measures to ensure that topsoil is conserved and only utilised for rehabilitation purposes.
36	Construction	Exploration drilling	Water pollution and waste management	To mitigate the effluent from ~~long term~~ drilling sites ~~(>3 years)~~: Separation pits (sumps) for wastewater and grease and oil polluted fluids should be excavated and constructed to treat wastewater; Where excavating these pits, topsoil and subsoil should be stored separately; Sump areas should be lined with PVC to prevent seepage; In order to contain non-biodegradable oil and fuel spills, drip pans or PVC lining should be provided for mobile pans and drip pans; For stationary drill rigs, thin concrete slabs and/or with PVC lining should be installed before the stationary drill rigs are erected; Sump areas must be designed to accommodate the 1:100 year flood event. Clean and dirty water streams must be separated. Sump areas must be	It is not anticipated that any drill sites will be operated for more than 3 years however the remaining requirements of this exploration drilling activity are applicable to all drill sites.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				designed to accommodate the 1:100 year flood event. Clean and dirty water streams must be separated. The location and design of the sumps must be in accordance with the applicable GN 704 conditions; and Sump areas should be constructed in such a way that clean water (stormwater) is diverted away from these areas. To mitigate effluent from ~~short term~~ drillings sites ~~(<3 years)~~: The topsoil layer of the surface area required for the drill and sumps should be excavated and stored according to accepted topsoil management practices while topsoil on the remaining 50mx50m drill site may remain insitu as long as there is no potential for contamination of topsoil in those areas; A contiguous impervious PVC layer (e.g. large silage sheets) is placed under the drill (within the excavated area) to collect any spills; Spills of hazardous substances should be collected and disposed of according to the approved EMPR requirements at a suitably licensed facility; Collected spills from the drill must not be allowed to contaminate the soils and/or the closed water system utilised for the drilling fluids; and It is recommended that where possible, closed, above ground tanks are utilised for future drilling as opposed to sumps/pits; areas where potential spills from drilling or other waste could occur must be lined to prevent contamination of the soil.	
39	Construction	All	Fugitive emissions (dust) from exploration/production drilling	In controlling vehicle entrained particulate matter, it is recommended that water ~~(at an application rate of 2 litre/m2-hour),~~ be applied on all unpaved road sections to ensure a minimum of 50% control efficiency (CE). In addition, binding agents or chemical suppressants should be considered for application on all unpaved road sections. The need for dust control to be informed by the ECO.	It is not reasonable to impose a specific water application rate as site specific conditions may require more or less water to ensure adequate dust control to achieve 50% CE.
40	Construction	All	Loss of farm labour to the Cluster 1 project	~~If any farm labourers apply for positions at Tetra4 or one of its contractors, Tetra4 or the contractor must ensure that the labourer is aware that the position may only be temporary and what the long term consequences of taking the position are.~~ The potential for farm labourers to seek employment on the project must be discussed with farmers in the relevant forums and also in toolbox talks with project personnel to ensure that no unrealistic expectations of permanent employment are conveyed to farm labourers.	This condition is not auditable as there is no documented evidence or records kept of verbal discussions with farm labourers as the requests are ad hoc during construction.
44	Construction	All	Disturbance/ destruction of cemeteries	The final development footprint, whether it entails the in-field south (Alternative P4) pipeline, the in-field north (Alternative P2) pipeline or the trunkline (ST23 to Sibanye), must be re-aligned where possible to allow for a buffer area between each cemetery and the development footprint area.	Addition of Cluster 2 specific mention based on most recent study undertaken.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				A buffer area of at least 50 m between each cemetery and the development footprint area is preferred. In cases where such a 50 m buffer area would not be possible, the buffer area can be reduced with due consideration of the heritage specific buffers described in the Cluster 2 Heritage Specialist Report. However, with the exception of the cemetery at TET 16, this reduced buffer area may never be less than 25 m. Furthermore, all construction work undertaken at distances of between less than 50 m and 25 m from such identified cemeteries, must be monitored by a heritage specialist/ archaeologist. Since no development alternatives were possible to the proposed pipeline in proximity to TET 16 other than to place the pipeline footprint on the northern side of the farm road which runs along the fence located north of the cemetery. This means that the pipeline development here will be located roughly 12 m from the nearest grave at TET 16. On the condition that the development activities here remain at least 10 m from the nearest grave at the cemetery, without any machinery or activities undertaken across or south of the farm fence located here, the development of the pipeline here may be allowed. Please note that any construction work undertaken here at distances closer than 50 m from the cemetery, must again be monitored by a heritage specialist/archaeologist. Moreover, the placement of the development footprints for the six proposed well positions at F1, F2, F3, F4, F5 and F6 as well as the proposed compressor site at ST23 must be done in such a way that a buffer area of at least 50 m is allowed between these development footprints and the heritage sites identified, where possible. Should any construction be required closer than 50 m of a cemetery, a heritage specialist should be consulted to monitor the excavation during construction and necessary permission from SAHRA obtained, where applicable.	
49	Construction	All	Watercourse erosion	Prevent the use of only one or two flume pipes in access/running tracks located in watercourses, specifically unchannelled valley bottom wetland and seep wetlands where concentrated flows can result in headcut development and the formation of a channel. Surface flows should also be spread out in channelled watercourse crossings though the use of several flume pipes to prevent channel incision and scour erosion. Access tracks should be maintained during the entire construction process and removed once construction is completed. Flume pipes should be monitored and kept free of blockages. Construction in non-perrenial watercourses should	Addition of wording to provide clarification of type of watercourse when considering dry season as perennial rivers still flow during the dry season.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				ideally occur during the dry season. Any new erosion features identified should be stabilised during the construction process (soft interventions such as hay bales, rock packs, runoff control berms and 'bio-socks' are recommended). Erosion control features should be maintained. Keep vegetation clearing to a minimum on the adjacent slopes to prevent erosion on approaches bordering watercourses. Small temporary contour berms may be used to help control runoff on approaches should it be required. Drainage furrows that may be required to create dry working conditions should ideally be avoided as they can easily erode during high flow events. Development of a watercourse monitoring plan before the onset of the construction phase, and the development and implementation of a watercourse rehabilitation plan during the latter half of the construction phase to ensure the eroded wetlands and other watercourses are stabilised and rehabilitated. Dewatering discharges at construction sites should be done in a silt bay to prevent erosion and sedimentation in adjacent watercourses. Runoff from the construction footprint should be controlled on site to prevent concentrated point releases of water into downslope watercourses. Care needs to be taken not to initiate or aggravate erosion in watercourses.	
50	Construction	All	Noise impacts from construction activities	The use of smaller/quieter equipment when operating near receptors. Ensuring that equipment is well maintained and fitted with the correct and appropriate noise abatement measures. When working in close proximity to noise sensitive receptors, engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised. Where possible only undertake construction activities during the day. If night-time activities are required, do not operate closer than 500 m from any sensitive receptors. Ensure a good working relationship between the developer and all potentially noise-sensitive receptors. Communication channels should be established to ensure prior notice to the sensitive receptor if work is to take place close to them (especially if work is to take place within 500 m from them at night). Unless it is an emergency situation, non-routine noisy activities such as construction, decommissioning, start-up and maintenance, should be limited to day-time hours. Information that should be provided to potentially sensitive receptor(s) includes: Proposed working dates, the duration that work will	Addition of latest noise specialist recommendations.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				take place in an area, and working times; The reason why the activity is taking place; The construction methods that will be used; and Contact details of a responsible person where any complaints can be lodged should there be an issue of concern. When simultaneous noise emitting activities are to take place close to potential noise-sensitive receptors, co-ordinate the working time with periods when the receptors are not at home. Operational equipment to be employed should be reviewed to ensure the quietest available technology is used. Equipment with lower sound power levels must be selected in such instances and vendors/contractors should be required to guarantee optimised equipment design noise levels. Construction activities that is to take place within the below specified distances from noise sensitive receptors must first be discussed and agreed with the affected party: o Wells: 400 m o Pipeline: 90 m o Blower station: 600 m o Plant: 430 m o Compressors: 420 m	
54	Construction	Pipelines	Safety aspects associated with open trenches (people and animals)	Open trenches to be fenced or barricaded where necessary, and should be clearly demarcated. ~~The time that any trench remains open should be limited~~. No trenches may remain open overnight except for the short lead area of the trench (<1m in length which must be barricated). Access to areas with open fences should be controlled. There must be a protocol on how to rescue a stranded animal from a trench.	The removed sentence is too subjective to be auditable. A more appropriate and defined (quantitative) requirement has been added.
56	Construction	Exploration drilling	Spillage of oils, fuel and chemicals	The placement of drip trays under the drilling rigs should be implemented and recorded to minimize the contamination of waste oil from the drilling rig. Drilling fluids should be ~~biodegradable~~ inert or environmentally friendly to prevent any harm to the environment or groundwater regime and should be kept in a lined mud pit or surface container. Proper rehabilitation and off site removal of excess fluids should take place. Oil recovered from the drilling rigs and any vehicle on site should be collected, stored and disposed of at licenced facilities or provided to accredited vendors for recycling.	The removal of the word "biodegradable" stems from the fact that natural biodegradation requires the correct micro-organisms to achieve this process as identified by the Geohydrological Specialist. These micro-organisms do not occur naturally in the geological profile and therefore the requirement for environmentally friendly drilling fluids has been specified to prevent

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
					adverse impacts on the groundwater regime.
58	Construction	All	Loss/ management of heritage features	Should any artefacts, fossils or graves be uncovered during the ~~production~~ construction activity, the Applicant, the relevant SAHRA authority and SAPS (in the case of a grave) should be notified immediately and necessary permitting procedures followed. All activities within this area should be stopped immediately until permitted to proceed by the EAP/ECO.	Heritage or palaeontological finds would only occur during the construction phase and not during the operational ("production" phase.
59	All Phases	All	Spill response and pollution clean-up	All necessary measures should be taken to prevent spills from occurring on site. However, should a spill occur, the following procedure must be followed: A spill response kit should be available on site at all times. Where potential contaminants are transported along access roads, emergency containment and mitigation measures must be developed to minimize impacts should accidental spills occur. Any spillage will be investigated and immediate action must be taken. In the event of a significant spill (>35 litres) of any hazardous substance, these must also be recorded and reported to the PASA, DWA (DWS) and the local/provincial authority where necessary. Depending on the nature and the extent of the spill, contaminated soil must be either excavated or treated on-site. The EO should determine the exact method of treatment. Clean up should be immediate and to the satisfaction of the EO. A register of the treatment method and clean up close out report must be kept and be made available reviewed by the ECO during independent audits. Treatment could include the use of absorbent material or hydrocarbon-digesting substances. It is therefore, recommended that a spill kit and hydrocarbon digesting substance should be kept on site at all times. Clean up should be immediate and to the satisfaction of the E~~C~~O and verified as adequate by the ECO during the subsequent audit. Excavation of contaminated soil must involve careful removal of soil using appropriate tools/machinery to storage containers until treated or disposed of at a licensed hazardous landfill site. Materials used for the remediation of spills must be used according to product specification and guidance for use. A record of all spills and actions taken to remediate the spills should be kept at all times. Proper and frequent maintenance should be done to minimise spillage risk.	The full time Environmental Officer (EO) would be ultimately responsible for adequate spill clean-up.
60	Construction	All	Fire safety	The contractor must take all reasonable measures to ensure that fires are not started as a result of operational activities on site, and shall also ensure that their operations comply with the Occupational Health and Safety Act (Act No. 85 of 1993). The following measures will be taken to reduce the	Inclusion of wording to strive for synergy between project and local firefighting association.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				risk of fires: No open fires are permitted on site; Every possible precaution shall therefore be taken when working with potential flammable equipment or liquids near potential sources of combustion. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities; The contractor shall ensure that there is basic fire fighting equipment available on site at all times. The contractor shall appoint a member of his staff to be responsible for the installation and inspection of this equipment; and the contractor is to ensure that he/she has the contact details of the nearest fire station in case of an emergency. A fire and safety officer must be appointed as legally required and must be a member of the local firefighting association to ensure rapid response to all neighbouring farms in case of a fire. Firebreaks must also be implemented. Ponding water bodies which are may come into contact with spilled LNG must be avoided to prevent Rapid Phase Transition (RPT) events. International Best Practice Standards in Design, construction and operation of LNG facilities must be implemented. The recommendations of the revised MHI study must be implemented.	
61	All Phases	All	Movement on site	Reduce speed limits (especially on gravel roads) to reduce dust emissions and accident risk. ~~Keep the amount of vehicle movement on site as minimal as possible.~~ Gates should be kept closed (unless otherwise agreed to in writing with the relevant landowner). Newly constructed access roads should be well maintained.	This sentence is too subjective to be material to assessing compliance. Evidence of excessive dust, etc which are other mitigation measures are a more quantitative measure of mitigation success.
66	All Phases	All	Health and Safety	All personnel should be aware of the procedures to follow in the case of a health or environmental emergency such as in the case of an accidental injuries or spills. Workers should be advised on sexual transmitted diseases and preventative measures against sexual transmitted diseases should be put in place-for example provision of condoms in camp site. Personnel should be provided with safety clothing and no person should be allowed to enter construction site without prior authorization ~~by site manager~~. The construction site should be surrounded with ~~danger tape and/or other~~ suitable safety signage in order to alert pedestrians and vehicles about the construction activity.	The safety department deals with site access and general safety related aspects and therefore it is too prescriptive to require the site manager to be the sole responsible party in this regard. Based on experience with using danger tape (plastic tape), this tape tends to cause environmental pollution and also poses a hazard to livestock if eaten.
70	All Phases	All	Damage to farm roads and existing infrastructure	If private roads are affected by project activities it is the responsibility of Tetra4 to maintain these roads as long as they use it. Tetra4 should engage with the relevant farmers about road maintenance, as some of landowners	Construction cannot only take place during the dry season as this would result in ~6 months of the year in

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				have preferential ways in which the roads must be maintained. The road maintenance agreements must be formalised before construction commences. ~~It is recommended that construction be planned for the dry season.~~ Tetra4 must provide all the affected landowners with a construction schedule to ensure that they know when construction will take place on their properties. Any changes to the construction schedule must be communicated to the farmers at least a week in advance. Before the project commences Tetra 4 should compile an asset and infrastructure baseline of any landowner infrastructure that may be affected by the project. Any infrastructure or landowner property damaged by Tera4 must be suitably compensated. Photographs and GPS co-ordinates of the infrastructure must be included in the baseline. A copy of the baseline affecting their property should be given to each landowner, who should sign off the document to ensure that it is accurate. Tetra 4 should keep the master document. If any damage occurs it should be reinstated to its pre-project status. If the infrastructure must move, it must be done at Tetra 4's cost. Tetra 4 must ensure that the construction team has a copy of the asset and infrastructure baseline to guarantee that no infrastructure will be damaged due to ignorance during the construction phase of the project. Notice of any service interruptions must be given at least 24 hours before the interruption takes place – a SMS or e-mail system can be used for this purpose.	which contractors would need to demobilise. Mitigation measures for work in wet areas and road maintenance have been covered in the EMPr conditions.
72	All Phases	All	Increase in poaching incidents	If areas are fenced, the fences must be checked for snares on a ~~daily basis~~ regular basis for the duration of the construction period and any snares encountered must be reported to the EO for immediate removal. All incidences must be reported to the closest police station. Anti-poaching toolbox talks should form part of the induction process of all the fencing teams. Any contractor or employee caught poaching should be removed from site.	The requirement to check for snares on a daily basis is impractical as the daily work in all locations does not happen.
74	All Phases	All	Loss/change of sense of place due to visual impacts and project activities	Re-vegetation of exposed areas as soon as possible. Dust suppression methods applied where necessary to reduce visual impact of dust. Lighting on site should be pointed downwards and away from oncoming traffic and nearby residents. Create a community liaison forum (CLF) that communicates the mitigation and monitoring measures to the affected parties. This forum can also act as a platform to discuss environmental issues. The CLF can meet twice a year to discuss all the concerns about the project and to share new project information. It can be an important aspect	Removal on non-auditable or implementable statement.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				assisting Tetra 4 with obtaining a social license to operate. ~~Successful rehabilitation will go a long way in recreating a rural sense of place.~~	
78	Operation	All	Social issues	All areas posing risk to interface communities during the site establishment phase of the proposed development need to be properly marked and visible to reduce accidents. The health and safety of the interface communities and workers should not be compromised in any way. All gates on the landowners' property (and where relevant adjacent properties traversed) are to be closed if found closed and left open if found open. Contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be represented at all times. Any impact such as noise, dust, bright lights etc. that may cause disturbance to landowners or tenants, will be kept to a minimum. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the contractor. A record of all damage and remedial actions shall be kept on site. Access to the production area should be strictly controlled. Labour should be transported to and from site to discourage loitering in adjacent areas and to prevent possible increase in crime or disturbance. Workers should be easily identifiable by clothing and ID badges (with clear ID photographs). ~~Workers should carry with them at all times a letter from the applicant/employer, stating their identity, role/task description, and landline number which the landowner may phone to confirm ID and other information given by the worker.~~ ~~The drill site shall be fenced, where necessary to prevent any loss or injury to persons or livestock during the production phase.~~ Fires will only be allowed in facilities or equipment specially constructed for this purpose. If required by applicable legislation, a firebreak shall be cleared around the perimeter of the camp and office sites. Sufficient ablution facilities should be made available. The applicant must take reasonable measures to prevent any disruption to the landowners use of the properties (e.g. farming). Landowners/tenants should be compensated for loss of arable land in accordance with the landowner access agreements (contracts).	The requirement for workers to carry a letter containing all this information is impractical as work progresses into new areas on a continual basis. Workers are still required to be identifiable (both on-person branding as well as vehicle branding) and Tetra4 is required to notify landowners prior to work in any particular area (with continual updates as work proceeds into new areas).
82	Operation	Production wells	Contamination from leakage and spillage	~~The pipeline needs to be inspected regularly to find and fix any leakages.~~ A water quality monitoring plan needs to be produced and implemented to determine any changes in the water quality. Any water (Incl. condensate) generated the ~~conventional and unconventional well heads~~ from production wells need to be captured in some form of dirty water storage facility. This water must be collected and suitably disposed of as hazardous	An automated leak detection system will be installed which will identify if there are any leaks in pipelines which would then require inspections. Removal of "conventional and unconventional" as this is not

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				waste ~~can be tested and treated (if needed) and used for irrigation or discharge into the environment if found to be suitable~~. ~~Should the water be found to be unsuitable for irrigation or discharge into the environment, the contaminated water will be disposed of at a suitable licenced facility.~~	applicable to the wells and was a remnant of the Cluster 1 conditions. No disposal of waste into the environment will be permitted as it has been confirmed that all condensate, etc is disposed of at a licenced waste disposal site.
85	Decommissioning and Closure	Production wells	Contamination from leakage and spillage	~~All wells should be capped to prevent the spilling of contaminated groundwater. The water quality monitoring plan should be implemented in this phase to monitor any deterioration of the water quality.~~	All wells are connected to the pipeline network and non-gas producing wells are decommissioned through full bore concrete plugging. Furthermore, water will not naturally migrate up a well and groundwater is not contaminated. This condition is therefore not relevant.
88	Decommissioning and Closure	Production wells	Well casing and/or cementation failure affecting groundwater quality	Well abandonment and plugging to comply with the requirements of the approved rehabilitation plan and accepted best practice. Tetra4 to implement well-specific plugging requirements protect the shallow potable Karoo aquifers at closure. Well design to be done by a qualified engineer who will take corrosion, pressures, temperatures, exposure times, production life and well rehabilitation into consideration. The cement seals to be pumped as a water-cement slurry down the casing to the bottom of the well, leaving a sheath of cement to set and harden. The integrity of the seals should, where applicable, be pressure tested before the next phase of drilling commences. If the well fails the pressure test, the casing will be re-cemented before drilling continues. Testing to be implemented to ensure that the plug is placed at the proper level and provides adequate protection of permeable zones, for example the fracture zones from which gas was produced and the overlying Karoo aquifers. These tests should include tagging the top of the plug. ~~Pressure testing should be undertaken on the seal but care should be taken not to damage the seal during pressure testing.~~ Swabbing can be undertaken to remove fluids from the well. Upon completion of the rehabilitation of the well, a surface casing vent flow test should be considered to determine whether gas or liquid or a combination thereof is escaping from the casing. If gas is detected during this test, additional seals should be designed and	The requirement to pressure test the seal is not practical as has been confirmed in Cluster 1 wells. Gas producing wells are connected to the pipeline network and cannot be readily disconnected to undertake groundwater and gas monitoring at each production well. Furthermore, disconnecting a production well will result in liberation of methane to the atmosphere during each monitoring event is environmentally detrimental from a climate change perspective. There will be monitoring boreholes located within the zone of influence of each production well to ensure that any impacts are identified.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				implemented. ~~A groundwater and gas monitoring programme to be implemented at each well to serve as an early detection mechanism~~.	
93	All Phases	All	Water abstraction	~~The necessary DWS permits should be obtained if it is expected that DWS abstraction limits will be triggered before water abstraction is undertaken. Obtain agreement from landowner to abstract water from existing boreholes. If required, abstraction of water should be kept within the permit limits as issued to the landowner by DWA. Water may only be obtained from approved sources. [Amendment 2019/05].~~	Whilst Cluster 1 included the option of abstraction from the surrounding surface and groundwater resources, this is not the case for Cluster 2 where all water requirements will be sourced from Municipal sources. Construction of Cluster 1 is completed and therefore this condition is no longer applicable.
95	All Phases	All	Interference with existing land uses/livelihoods	If a farmer reports any invasion of alien species as a result of Tetra4, immediate action must be taken to ensure the invasion does not spread further. If any damage was done as a result of their activities, Tetra4 should carry the cost of rehabilitation and compensate the farmer for his losses. If needed an external mediation process should be followed. There must be a formal procedure in place on how to report incidents and a claims procedure to ensure records of all grievances are kept. Environmental incidents must be reported to the CLO, who must inform the EO. In order to receive compensation, the claim forms must be submitted to the Tetra4 CLO. Compensation should follow the IFC principles, which states that market related prices should be paid, and if anything is restored, it must be to the same or better standards than before. A water hydrocensus should be conducted before the project commences and each affected party should be given the records affecting their property. Tetra4 should keep records of all the properties. If any decline in the volume or quality of water occurs that can be linked to Tetra4 activities, Tetra4 should provide the affected parties with water of equivalent or better quality (depending on use) until such a time that the quality and availability is restored to pre-project levels. Create a CLF to communicate the mitigation and monitoring measures to affected parties as well as to discuss environmental issues and assist Tetra4 with obtaining a social license to operate.	Correction of technical wording.
96	All Phases	All	Nuisance factor due to increase in ambient dust and noise levels	Waste management measures to be adhered to in order to minimise waste and associated nuisances from affecting neighbouring receptors. Complaints or grievance register kept on site indicating nature of complaint and how complaint was addressed. Create a CLF that communicates the mitigation and monitoring measures to the affected parties. ~~Any alarm~~	No loud alarms are installed on infrastructure. This condition related to Cluster 1 and through experience, this condition is no longer applicable.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				~~systems to be used must be designed to avoid nuisance to surrounding landowners as far as practically and reasonably possible~~.	
97	All Phases	All	Local travel patterns (longer travelling times and need to change routes due to increase in traffic)	Before construction commences Tetra4 must meet individually with each applicable landowner to discuss their movement patterns and needs. Tetra4 must provide all the affected landowners with a construction schedule to ensure that they know when construction will take place on their properties. It is important to inform the affected stakeholders about the possibility of changed travel patterns (as previously agreed) as soon as possible. ~~It is recommended that construction be done outside the peak planting and harvesting seasons~~. Adverse impacts on farming activities during the planting or harvesting season must be minimised as far as possible however should tangeable impacts occur during these times, adequate compensation must be provided to the affected party. Any changes to the construction schedule must be communicated to the farmers at least a week in advance. As far as possible obstruction of access routes and sensitive areas must be avoided. If it cannot be avoided both parties must agree on alternative routes, and Tetra4 should carry the cost of implementing the alternatives. If practical and required by the landowner, access routes to land/infrastructure should be reinstated in the decommissioning phase. This must be done in conjunction with the landowners. ~~Amended by removing a sentence in April 2019.~~	It is impractical to prevent construction activities during the planting and harvesting season as this makes up a significant portion of the year. Any negative impacts on agricultural activities and loss of income must be adequately compensated and therefore no financial loss is foreseen to landowners.
98	Operation	All	Greenhouse gas emissions including odour nuisance and health impacts	The use of low–NOx burners should be considered for operation of the Helium and ~~CNG/~~LNG plant. Products, liquid fuels and chemicals should be stored in areas where there are provisions for containment of spills. Implementing vapour recovery systems to control losses of VOCs for storage tanks and other applicable units should be considered. A suitable and effective gas leak detection system must be designed and implemented to monitor gas leaks from the pipelines and other production infrastructure. A suitable boil off gas recovery system must be installed. Automatic shutdown systems and pressure release valves must be implemented where appropriate.	Removal of CNG as the plant is only LNG.
99	All Phases	All	Fugitive emissions (dust) including health impacts	Vehicle speeds on unpaved roads should be keep as low as reasonably possible. Unnecessary travelling of vehicles on untreated roads should be avoided. In controlling vehicle entrained particulate matter, it is recommended that water ~~(at an application rate of 2 litre/m2 hour)~~, be applied on all unpaved road sections to ensure a minimum of 50% control efficiency (CE). In addition, binding agents or chemical suppressants should	It is not reasonable to impose a specific water application rate as site specific conditions may require more or less water to ensure adequate dust control to achieve 50% CE.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				be considered for application on all unpaved road sections. During construction and rehabilitation phases, stockpiles of fine or erodible material should be treated regularly with water sprayers to reduce their potential for erosion.	
104	All Phases	All	Impacts on local economy	~~Removed as part of the Amendment in April 2019 [Amendment 2019/05].~~	Previously removed condition during 2019 amendment. Therefore moving entirely now.
107	All Phases	All	Impacts on safety and security of local residents due to presence of unfamiliar people in the area	Tetra4 should work with the existing farmers' security groups (where possible and permissible) ~~(Sector 4 Security group/ AgriSec)~~ and farmers' associations (Virginia and Theunissen) to create a farm access protocol for everybody that need to access the properties, and a safety plan. Tetra4 should also become a member of these forums, and an existing WhatsApp group. Farms that are equipped with alarms are all connected to a central point at AgriSec, and this is a good point of departure for Tetra4 to consider security arrangements for their own assets and to link in and work with existing systems. Pictures, make and registration numbers of all vehicles used by Tetra4 on site should be provided to the farmer's security group and distributed to all affected landowners to ensure that they will be able to identify these vehicles if they access their properties. ~~Consider using an electronic vehicle tracking system (e.g.TeleMatrix) that can identify drivers and send electronic alerts (e-mail/SMS) to assist with knowing the whereabouts of drivers and informing affected parties when vehicles enter and exit property (geo-fencing).~~ Tetra4 should give a roster to the farmers stating dates and approximate times that contractors will be on the farms. All access arrangements should as far as possible be made at least 24 hours before access is required. Tetra4 must meet with the landowners before the construction phase commences and formalise security arrangements in writing and where appropriate include the existing forums. All contractors and employees need to wear photo identification cards. Vehicles should be marked as construction vehicles and should have relevant logo's clearly exhibited. Entry and exit points of the site should be controlled. Areas where materials are stockpiled must be fenced, where appropriate. If a security company is used, their schedules should be communicated to the farmers, especially to those farmers that have Tetra4 infrastructure. It must be considered that guards changing shifts contribute to the impact of strangers accessing properties, and therefore a system that considers the safety of both the Tetra4 infrastructure and the safety	Removal of specific security group name as this is too prescriptive. The electronic vehicle tracking system is impractical to manage on a real time basis. The remaining conditions are considered adequate to ensure that landowners are aware of personnel movements and presence in the area.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
				of the landowners must be implemented. Under no circumstances should anyone be allowed to erect a dwelling for security forces on any of the farms. The necessary sanitation facilities must be made available, and some form of shelter from the elements. Health and safety officer to be appointed on site.	
109	Construction	All	Nuisance factor due to increase in ambient noise levels	As construction will only take place during day-time hours and will be of limited duration, AQSRs within 150 m of the road/pipeline construction site should be notified of the activities and potential disturbance durations prior to construction taking place.	Addition of new mitigation measure based on Specialist input and recommendation.
110	Construction	All	Nuisance factor due to increase in ambient noise levels	As construction will only take place during day-time hours and will be of limited duration, AQSRs within 400 m radius of all well construction sites, 600 m from booster station construction sites and 420m from compressor construction sites should be notified of the activities and potential disturbance durations prior to construction taking place.	Addition of new mitigation measure based on Specialist input and recommendation.
111	Operation	All	Nuisance factor due to increase in ambient noise levels	Operational activities that take place within the below specified distances from noise sensitive receptors must first be discussed and agreed with the affected party (prior to construction): o Operation (day-time): - Blower station: 50 m - Plant: 170 m - Compressors: 80 m o Operation (night-time): - Blower station: 150 m - Plant: 580 m - Compressors: 150 m	Addition of new mitigation measure based on Specialist input and recommendation.
112	All Phases	All	Displacement of faunal species	Outside lighting should be designed and limited to minimize impacts on fauna. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible.	Addition of new mitigation measure based on Specialist input and recommendation.
113	All Phases	All	Community Health and Safety	All workers must be educated on the need to ensure safety of surrounding communities and the public in general. Road safety legislation must be complied with at all times with additional consideration of the World Bank Group Environmental Health and Safety Guidelines. A community health and safety plan inclusive of a Traffic Management Plan will be developed based on risks identified in consideration of community health and safety.	Addition of new mitigation measure based on Specialist input and recommendation.
114	Construction	Exploration drilling	IFC Environmental, Health, and Safety Guidelines for Onshore	The drilling activities must comply with the IFC Environmental, Health, and Safety Guidelines for Onshore Oil and Gas Development with specific attention to the following aspects: GHG emissions, gas flaring, wastewater	Addition of new mitigation measure based on Specialist input and recommendation.

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
			Oil and Gas Development	pit design, solid removal systems for drill cuttings and fluids, alternative disposal methods for disposal of drill cuttings and fluids	
115	All Phases	All	Water abstraction	For Cluster 2 activities, no abstraction from the surrounding environment will take place. Cluster 2 shall utilise existing municipal water sources for all activities and reuse of water must take place where reasonable.	Addition of new mitigation measure based on Specialist input and recommendation.
116	Planning/ Construction/ Operation	All	Flora and fauna direct and indirect mortality	Adhere to the biodiversity no-go area on the farm Adamson Vley 655 Portion 0 (no development or impacts should occur on surface in this no-go area). Consultation and communication with the lead or implementing agent for the sensitive species, Endangered Wildlife Trust (EWT), must be implemented before any construction proximal to the specific area. Monitoring and Management of the species will be crucial throughout the lifetime of the project and must be discussed and implemented in conjunction with the EWT.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
117	Planning / Construction	Exploration drilling	Social issues	As far as possible, exploration wells should be constructed (drilled) outside of existing cultivated lands. Where this is not possible, the final production well concrete bunkers must be located outside of cultivated lands and the borehole and connecting pipeline must be at least 1.5 m below surface to prevent interference with crop production activities.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
118	Construction/ Operation/ Decommissioning	All	Social issues	Tetra4's activities will cause a certain level of economic displacement for some of the affected farmers. In the event that the farmer disagrees with the compensation offered, the actual impact on their livelihoods must be assessed by an agricultural economist or suitably experienced third party. Compensation must be done according to international best practice.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
119	Planning / Construction	All	Social issues	Affected landowners must be provided with the construction schedule and when revisions to the schedule are made, these must be communicated to the affected landowners. Furthermore, construction timeframes must be made clear to individual affected landowners prior to construction.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
					mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
120	Planning / Construction	All	Social issues	The impacts of servitudes on the land value of the affected properties must be considered and mitigated by means of negotiation. If the negotiation process is unsuccessful, it must be arbitrated by a suitably qualified third party.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
121	Planning and Design	All	Social issues	Farm safety must be a priority and the landowners and Tetra4 must agree on security measures prior to construction on their farms.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
122	Planning/ Construction/ Operation	All	Social issues	Tetra4 must consult with landowners about any new work or potential changes that may take place on their properties.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
123	Pre-construction	All	Social issues	Protocols on farm access, compensation, communication, and road maintenance must be agreed upon and be in place before construction commences. The affected landowners must have input in the development of these protocols.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
					specialists and landowners. This mitigation measure is therefore included in the EMPr.
124	Construction/ Operation/ Decommissioning	All	Social issues	A grievance mechanism and claims procedure must be in place and shared with all the stakeholders before the construction commences.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
125	Construction/ Operation/ Decommissioning	All	Social issues	A special meeting must be conducted with farm workers and other vulnerable parties, in their mother languages, to ensure that they understand the technical and safety aspects of the project.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
126	Construction	All	Community Health and Safety	Construction activities may only take place during the daytime (sunrise to sunset) and no construction personnel may remain on private land at night (sunset to sunrise).	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
127	Construction/ Operation/ Decommissioning	All	Air Quality	The separation distances as indicated in the air quality specialist study must be complied with for the respective project phases and project components.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
					mitigation measure is therefore included in the EMPr.
128	Construction/ Operation/ Decommissioning	All	Social issues	Tetra4 must develop the following procedures and strict adherence with these procedures must be undertaken at all times by all relevant project personnel: - Pipeline Monitoring Maintenance Procedure - Access Procedure - Access Road Inspection and Maintenance Procedure	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
129	Construction/ Operation/ Decommissioning	All	Social issues	All contractors should sign a code of conduct as part of their induction process. Induction must explicitly include aspects such as closing gates and littering. A disciplinary action system must be put in place for any transgressions affecting the landowners	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
130	Pre-construction	All	Social issues	A revised landowner contract must be finalized prior to commencement of construction and Tetra4 will engage with each individual affected landowner regarding the detailed planned works on their properties.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
131	Construction/ Operation/ Decommissioning	All	Social issues	Tetra4 must share the works schedule per property prior to commencement of any activity onsite. This communication will include details of the respective contractors that are appointed, provide the affected landowners with a project schedule for their respective properties and any changes to the schedule must be formally communicated in writing to the affected landowners prior to implementing such changes.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This

Previous EMPr Ref #	Phase	Activities	Impact/ Aspect	Management/ Mitigation Measures	Reasons for Deletions/Insertions of certain text (October 2022)
					mitigation measure is therefore included in the EMPr.
132	Pre-construction	All	Social issues	Once the preferred routing has been identified, Tetra4 must engage with the affected landowners for consensus of the preferred final pipeline routing. The preferred or final routing will be developed (where possible) in conjunction with landowners for their respective property. The agreed upon routing must be attached to Landowner agreements as a sketch plan and indicate the provisional servitude area.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.
133	Construction/ Operation/ Decommissioning	All	Safety and security of surrounding communities and public	All workers must be educated on the need to ensure safety of surrounding communities and the public in general. Road safety legislation must be complied with at all times with additional consideration of the World Bank Group Environmental Health and Safety Guidelines. A community health and safety plan inclusive of a Traffic Management Plan will be developed based on risks identified in consideration of community health and safety.	This mitigation measure was included in the EIR as a recommended specific condition to be included in the decision to place emphasis on this requirement to mitigate specific concerns raised by specialists and landowners. This mitigation measure is therefore included in the EMPr.